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09/08/99

TIP PROJECT: U–4751

CONTRACT: C203980

R/W PLANS
9/25/2017

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NEW HANOVER COUNTY

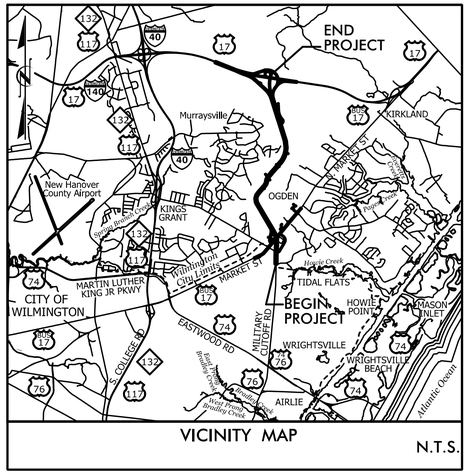
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U–4751	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
40191.1.2		PE
40191.2.1		R/W
40191.3.2		CONSTRUCTION

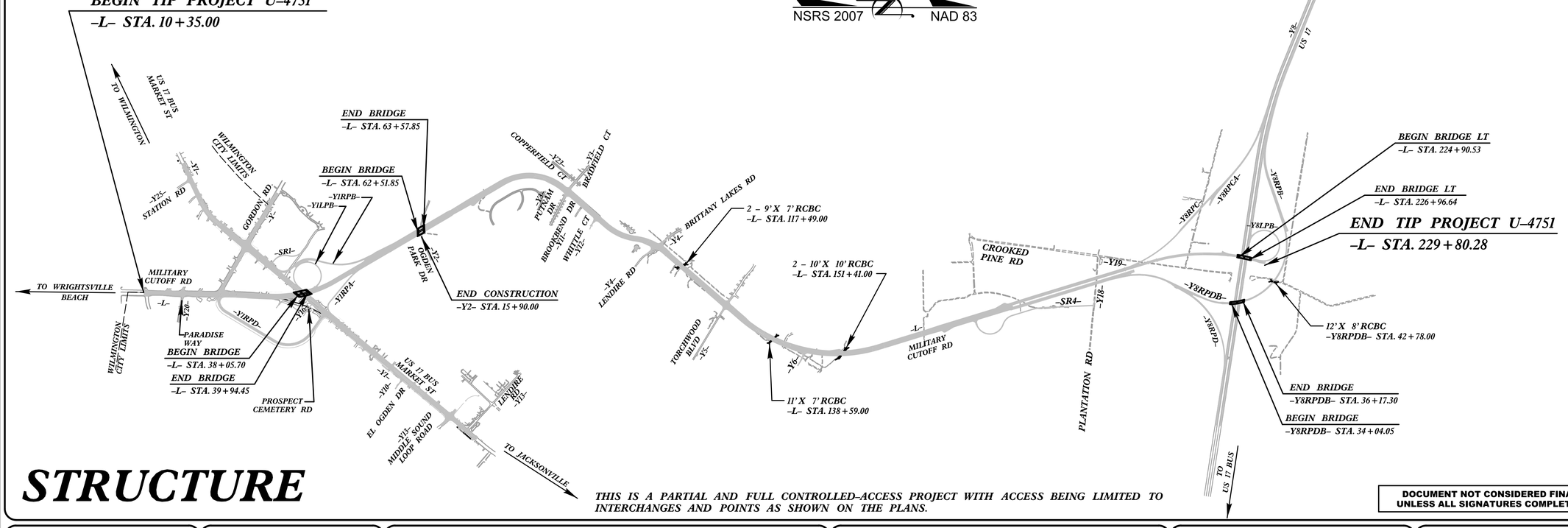
LOCATION: *SR 1409 (MILITARY CUTOFF ROAD EXTENSION) FROM SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, STRUCTURES, CULVERTS, RETAINING WALLS, SIGNALS, NOISE WALLS, AND SIGNING*

FINAL STRUCTURE PLANS



NSRS 2007 NAD 83



STRUCTURE

THIS IS A PARTIAL AND FULL CONTROLLED–ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES AND POINTS AS SHOWN ON THE PLANS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

DESIGN DATA

ADT 2017 = 23,900
ADT 2037 = 49,100
K = 12%
D = 60%
T = 7%*
V = 50 MPH
* (TTST = 3% + DUAL 4%)
FUNC CLASS = ARTERIAL/FREEWAY
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U–4751 = 4.053 MILES

LENGTH STRUCTURE TIP PROJECT U–4751 = 0.103 MILES

TOTAL LENGTH OF TIP PROJECT U–4751 = 4.156 MILES

PLANS PREPARED FOR THE NCDOT BY:

STV 100 Years
STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F–0991

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL 17, 2015

LETTING DATE:
NOVEMBER 21, 2017

KEVIN G. BAILEY, PE
PROJECT ENGINEER

TONY R. LAWS, PE
PROJECT DESIGN ENGINEER

KEVIN FISCHER, PE
PROJECT ENGINEER
NCDOT STRUCTURE DESIGN

STRUCTURAL ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY

9/26/2017

DocuSigned by:
Kevin G. Bailey
452EEC2F784401...

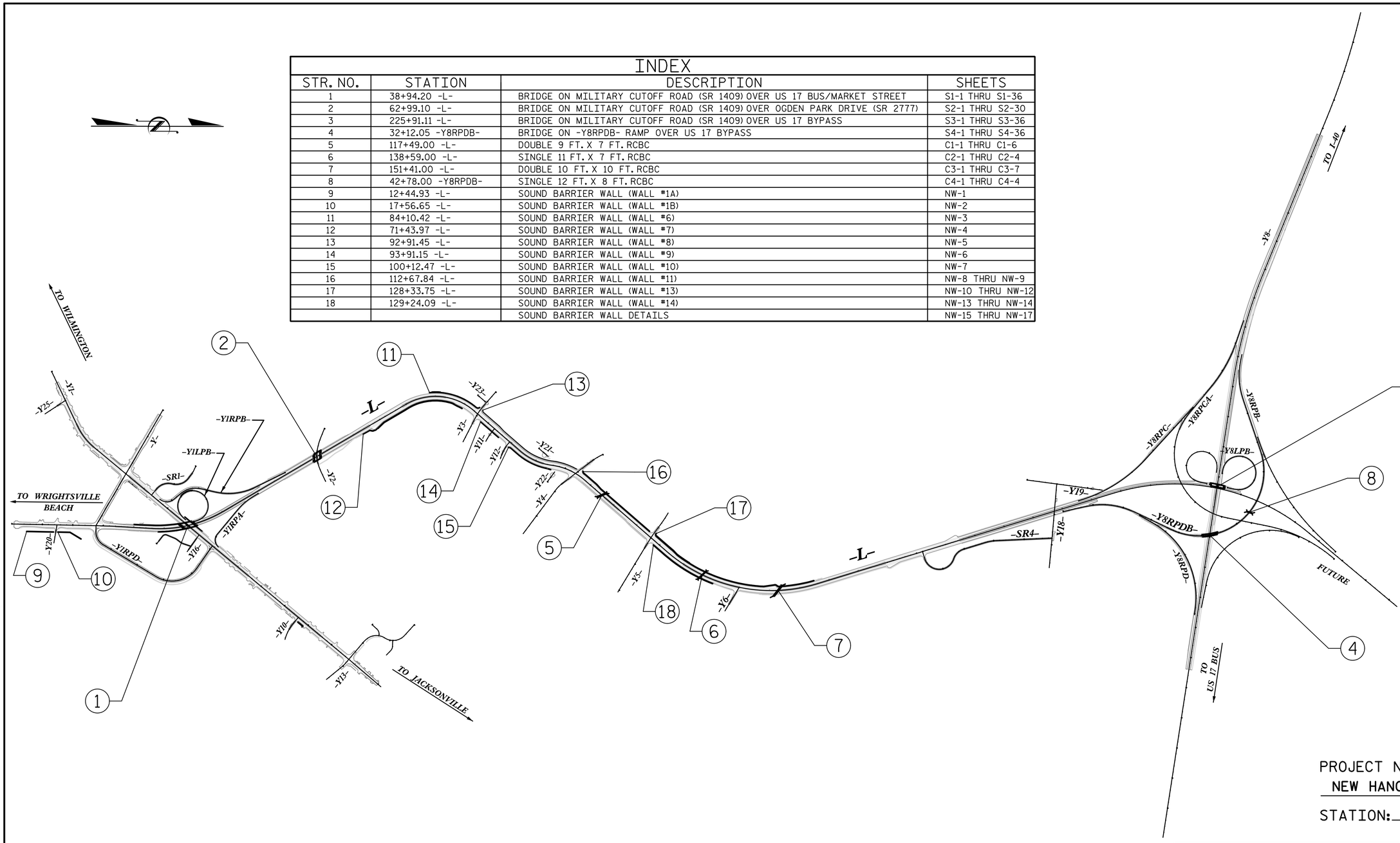
P.E.

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

INDEX

STR. NO.	STATION	DESCRIPTION	SHEETS
1	38+94.20 -L-	BRIDGE ON MILITARY CUTOFF ROAD (SR 1409) OVER US 17 BUS/MARKET STREET	S1-1 THRU S1-36
2	62+99.10 -L-	BRIDGE ON MILITARY CUTOFF ROAD (SR 1409) OVER OGDEN PARK DRIVE (SR 2777)	S2-1 THRU S2-30
3	225+91.11 -L-	BRIDGE ON MILITARY CUTOFF ROAD (SR 1409) OVER US 17 BYPASS	S3-1 THRU S3-36
4	32+12.05 -Y8RPDB-	BRIDGE ON -Y8RPDB- RAMP OVER US 17 BYPASS	S4-1 THRU S4-36
5	117+49.00 -L-	DOUBLE 9 FT. X 7 FT. RCBC	C1-1 THRU C1-6
6	138+59.00 -L-	SINGLE 11 FT. X 7 FT. RCBC	C2-1 THRU C2-4
7	151+41.00 -L-	DOUBLE 10 FT. X 10 FT. RCBC	C3-1 THRU C3-7
8	42+78.00 -Y8RPDB-	SINGLE 12 FT. X 8 FT. RCBC	C4-1 THRU C4-4
9	12+44.93 -L-	SOUND BARRIER WALL (WALL #1A)	NW-1
10	17+56.65 -L-	SOUND BARRIER WALL (WALL #1B)	NW-2
11	84+10.42 -L-	SOUND BARRIER WALL (WALL #6)	NW-3
12	71+43.97 -L-	SOUND BARRIER WALL (WALL #7)	NW-4
13	92+91.45 -L-	SOUND BARRIER WALL (WALL #8)	NW-5
14	93+91.15 -L-	SOUND BARRIER WALL (WALL #9)	NW-6
15	100+12.47 -L-	SOUND BARRIER WALL (WALL #10)	NW-7
16	112+67.84 -L-	SOUND BARRIER WALL (WALL #11)	NW-8 THRU NW-9
17	128+33.75 -L-	SOUND BARRIER WALL (WALL #13)	NW-10 THRU NW-12
18	129+24.09 -L-	SOUND BARRIER WALL (WALL #14)	NW-13 THRU NW-14
		SOUND BARRIER WALL DETAILS	NW-15 THRU NW-17



PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION:

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY

7/26/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX OF SHEETS

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

DRAWN BY : MBC DATE : 5-17
CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

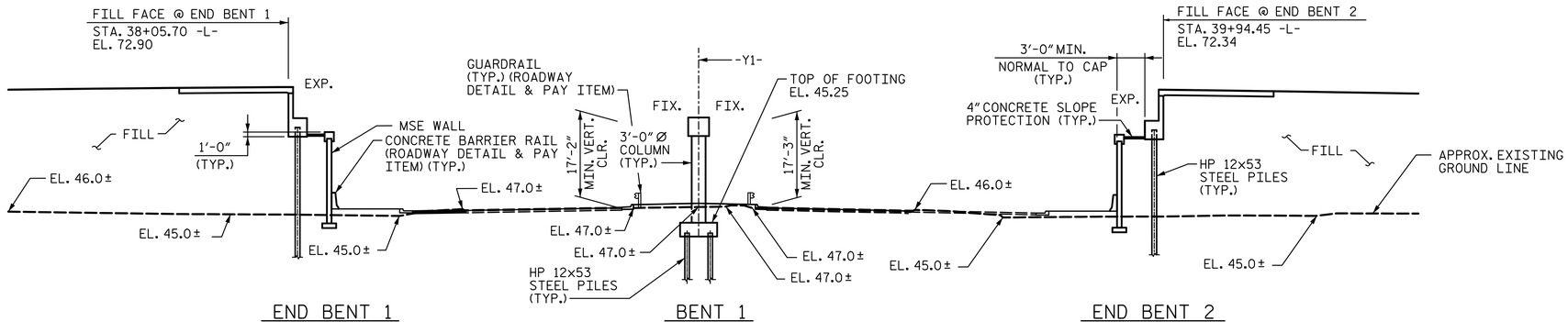
38+00 39+00 40+00

+4.0000%Δ-4.0000%

GRADE DATA

PVI STA. = 38+70.00 -L-
PVI EL. =81.20'
LVC = 810'

SPAN A SPAN B



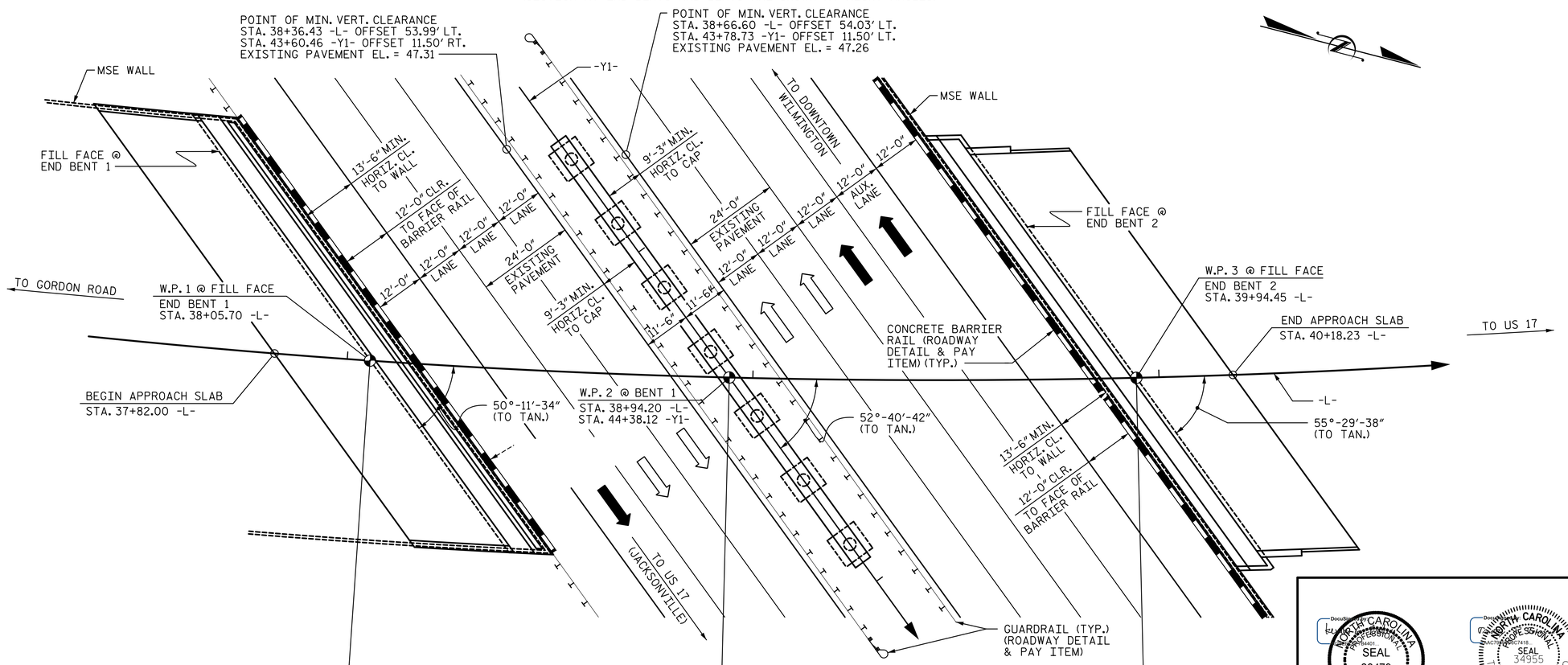
END BENT 1 BENT 1 END BENT 2

SECTION ALONG -L-

(SECTION AT END BENTS AND BENTS ARE SHOWN AT RIGHT ANGLES)

HORIZONTAL CURVE DATA -L-

PI STA. 39+36.24
Δ = 33°-37'-21.7" (LT.)
D = 2°-48'-31"
L = 1197.13'
T = 616.35'
R = 2040.0'



PLAN

(PILES NOT SHOWN FOR CLARITY)

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-
44+38.12 -Y1-
SHEET 1 OF 4 BRIDGE NO. 201

DRAWN BY : VMW DATE : 4-17
CHECKED BY : TJT DATE : 4-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY 11/2/2017

DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND 11/2/2017

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

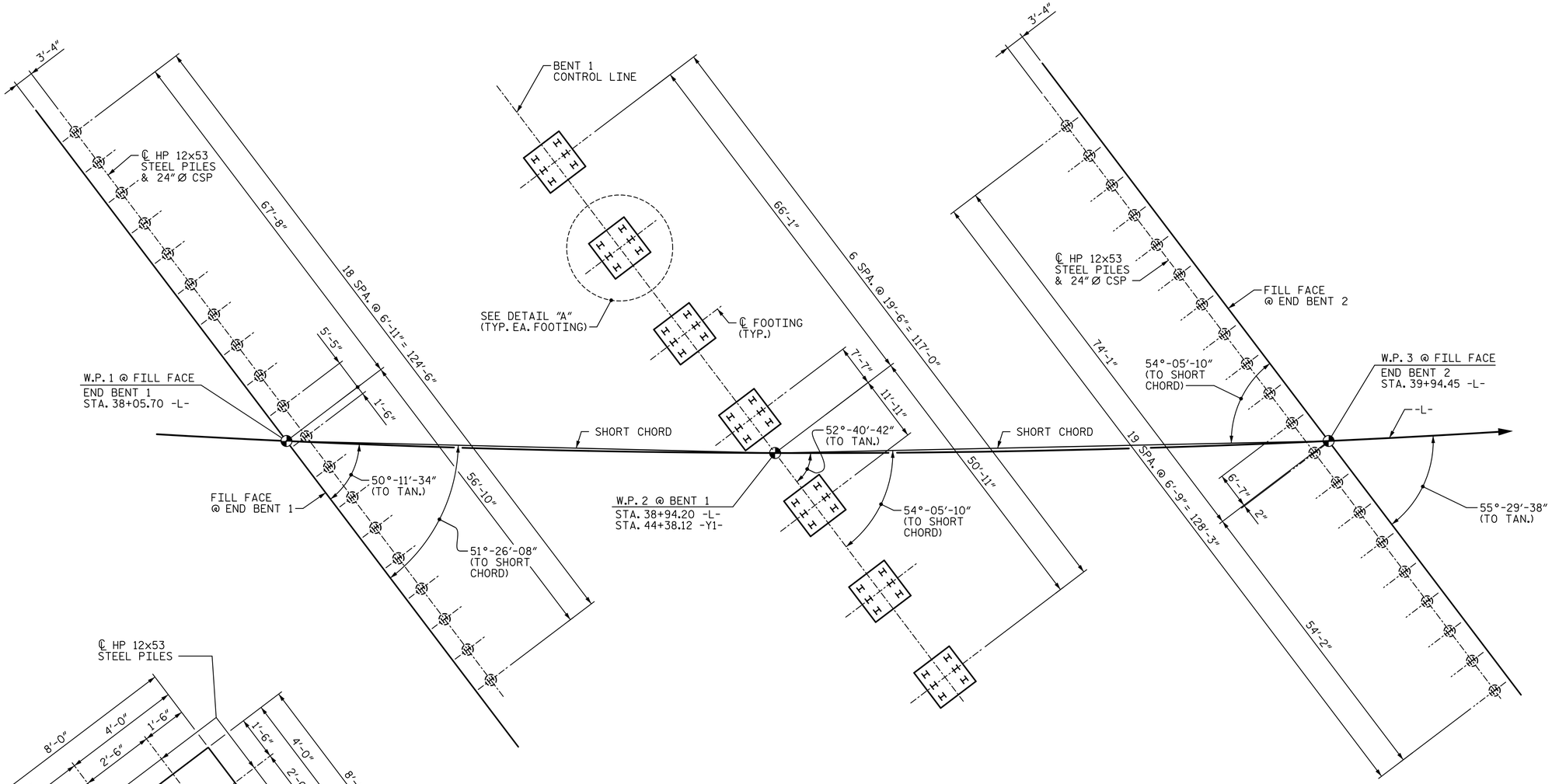
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

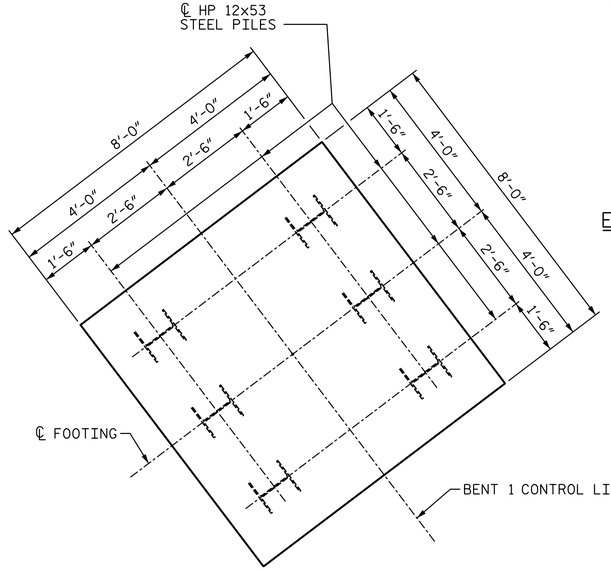
GENERAL DRAWING
FOR BRIDGE ON SR 1409 (MILITARY CUTOFF ROAD EXT.) OVER US 17 BUS/MARKET STREET

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

STR. #1

R:\401_001_U4751_SMU_GD_001_64020i.dgn 11/2/2017 10:52:29 ttownsend





DETAIL "A"

END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE AT THE BOTTOM OF CAP/FOOTING)

FOUNDATION NOTES:

1. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT 1, BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
3. DRIVE PILES AT END BENT 1, BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
4. 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.
5. OBSERVE A SIX MONTH WAITING PERIOD AFTER CONSTRUCTING THE MSE WALLS PRIOR TO INSTALLING PILES AT THE END BENTS. A TWO FOOT DIAMETER CORRUGATED METAL SLEEVE SHOULD BE INSTALLED DURING MSE WALL CONSTRUCTION FOR PILES TO BE INSTALLED INTO AFTER THE WAITING PERIOD ENDS. THE SLEEVE SHOULD BE FILLED WITH SAND AFTER THE PILE IS INSTALLED. SEE MSE WALL PLANS.

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-
SHEET 2 OF 4

DrawnBy : VMW DATE : 4-17
CheckedBy : TJT DATE : 4-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/1/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND
8/1/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

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

STR. #1

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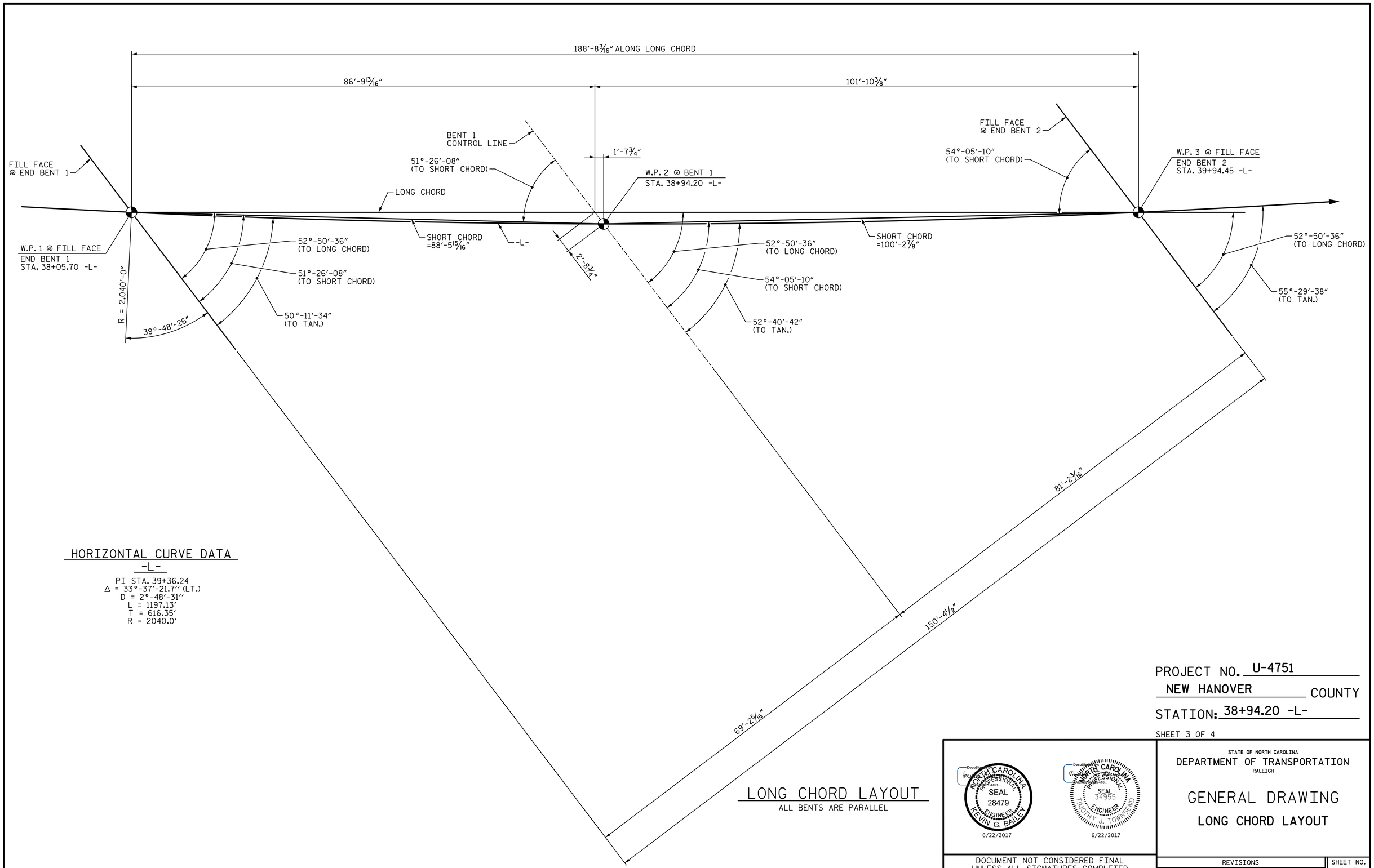

HORIZONTAL CURVE DATA
-L-

PI STA. 39+36.24
Δ = 33°-37′-21.7″ (LT.)
D = 2°-48′-31″
L = 1197.13′
T = 616.35′
R = 2040.0′

LONG CHORD LAYOUT
ALL BENTS ARE PARALLEL

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-
SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
6/22/2017

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/22/2017

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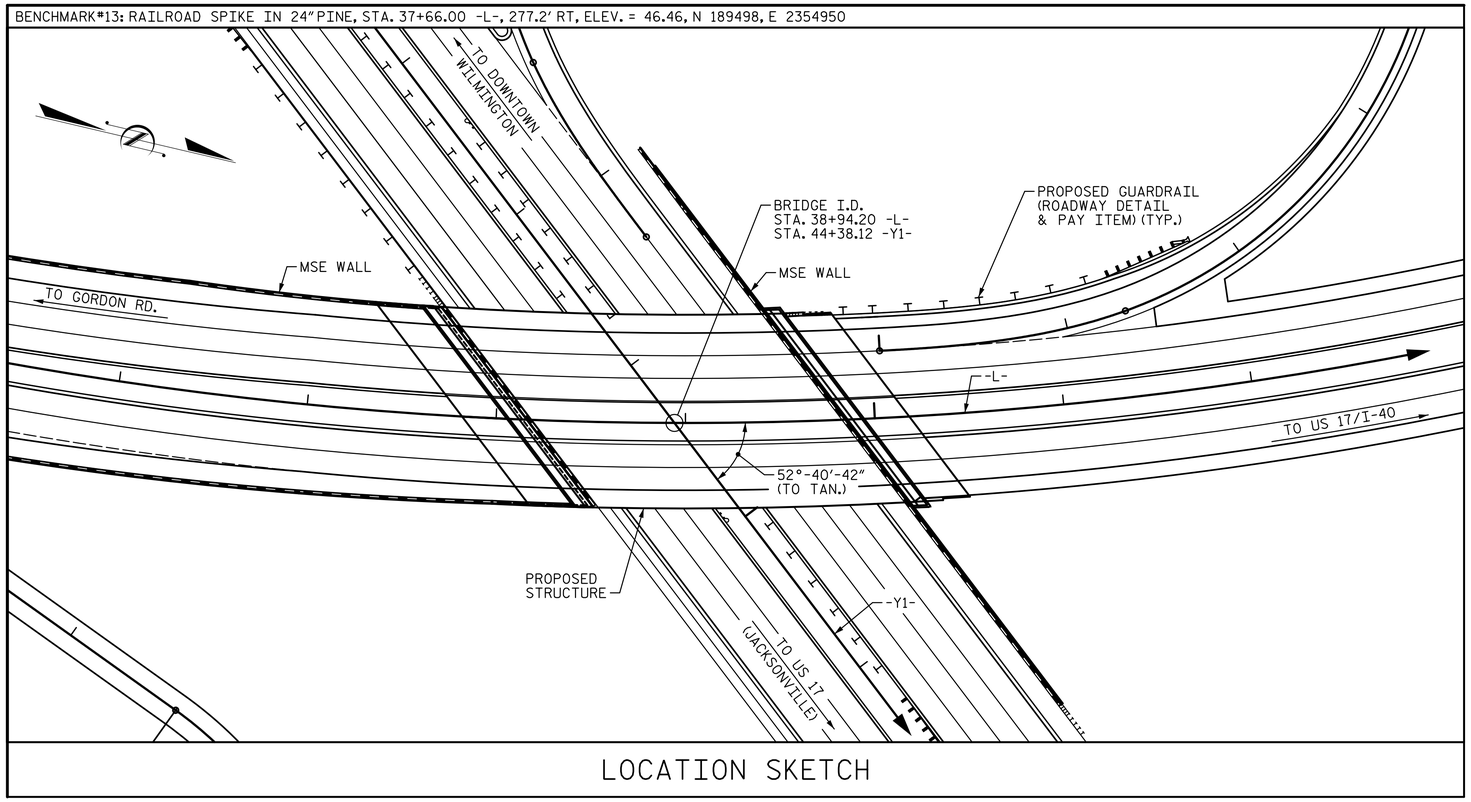
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LONG CHORD LAYOUT

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

STR. #1

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FOUNDATION NOTES, SEE "FOUNDATION LAYOUT" SHEET.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

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

FOR MSE WALLS, SEE GEOTECHNICAL 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 63" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIP. SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			19,078	16,915		LUMP SUM			20	1,817.1					444.5		LUMP SUM	LUMP SUM
END BENT 1					123.9		16,467				19	19	1,140	9		31.6		
BENT 1	LUMP SUM				170.3		31,398	2,743			42	42	2,730	21				
END BENT 2					131.0		17,359				20	20	1,200	10		31.5		
TOTAL	LUMP SUM	1	19,078	16,915	425.2	LUMP SUM	65,224	2,743	20	1,817.1	81	81	5,070	40	444.5	63.1	LUMP SUM	LUMP SUM

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 4 OF 4

DRAWN BY : VMW DATE : 4-17

CHECKED BY : AJP DATE : 5-17

DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
11/2/2017

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J.J. TOWNSEND
11/2/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL

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

STR. #1

R:\401_007_U475l_SMU_GD_004_640201.dgn 11/2/2017 10:52:32 ttownsend

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.03	--	1.75	0.77	1.23	A	I	42.4	1.14	1.03	A	I	25.2	0.80	0.77	1.13	A	I	42.4	
		HL-93 (OPERATING)	N/A		1.60	--	1.35	0.77	1.60	A	I	42.4	1.14	1.79	A	I	25.2	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.53	55.08	1.75	0.77	1.67	A	I	42.4	1.14	1.61	A	I	25.2	0.80	0.77	1.53	A	I	42.4	
		HS-20 (OPERATING)	36.000		2.16	77.76	1.35	0.77	2.16	A	I	42.4	1.14	2.96	A	I	25.2	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.58	48.33	1.40	0.77	4.86	A	I	42.4	1.15	7.71	B	I	67.9	0.80	0.77	3.58	A	I	42.4	
		SNGARBS2	20.000		2.62	52.40	1.40	0.77	3.55	A	I	42.4	1.15	5.40	B	I	67.9	0.80	0.77	2.62	A	I	42.4	
		SNAGRIS2	22.000		2.45	53.90	1.40	0.77	3.33	A	I	42.4	1.15	4.99	B	I	67.9	0.80	0.77	2.45	A	I	42.4	
		SNCOTTS3	27.250		1.78	48.51	1.40	0.77	2.41	A	I	42.4	1.15	3.74	B	I	67.9	0.80	0.77	1.78	A	I	42.4	
		SNAGGRS4	34.925		1.47	51.34	1.40	0.77	1.99	A	I	42.4	1.14	2.59	A	I	25.2	0.80	0.77	1.47	A	I	42.4	
		SNS5A	35.550		1.44	51.19	1.40	0.77	1.95	A	I	42.4	1.14	2.69	A	I	25.2	0.80	0.77	1.44	A	I	42.4	
		SNS6A	39.950		1.31	52.33	1.40	0.77	1.78	A	I	42.4	1.14	2.17	A	I	25.2	0.80	0.77	1.31	A	I	42.4	
		SNS7B	42.000		1.25	52.50	1.40	0.77	1.69	A	I	42.4	1.14	2.10	A	I	25.2	0.80	0.77	1.25	A	I	42.4	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.60	52.80	1.40	0.77	2.17	A	I	42.4	1.14	3.33	A	I	25.2	0.80	0.77	1.60	A	I	42.4	
		TNT4A	33.075		1.60	52.92	1.40	0.77	2.17	A	I	42.4	1.14	3.09	A	I	25.2	0.80	0.77	1.60	A	I	42.4	
		TNT6A	41.600		1.30	54.08	1.40	0.77	1.77	A	I	42.4	1.14	2.46	A	I	25.2	0.80	0.77	1.30	A	I	42.4	
		TNT7A	42.000		1.30	54.60	1.40	0.77	1.77	A	I	42.4	1.14	2.30	A	I	25.2	0.80	0.77	1.30	A	I	42.4	
		TNT7B	42.000		1.34	56.28	1.40	0.77	1.82	A	I	42.4	1.14	1.98	A	I	25.2	0.80	0.77	1.34	A	I	42.4	
		TNAGRIT4	43.000		1.28	55.04	1.40	0.77	1.74	A	I	42.4	1.14	1.84	A	I	25.2	0.80	0.77	1.28	A	I	42.4	
		TNAGT5A	45.000		1.21	54.45	1.40	0.77	1.64	A	I	42.4	1.14	1.83	A	I	25.2	0.80	0.77	1.21	A	I	42.4	
		TNAGT5B	45.000	(3)	1.20	54.00	1.40	0.77	1.63	A	I	42.4	1.14	1.64	A	I	25.2	0.80	0.77	1.20	A	I	42.4	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

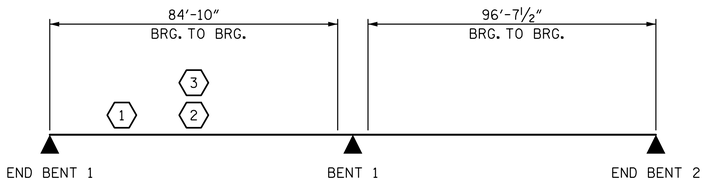
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

DRAWN BY : VMW DATE : 4-17
CHECKED BY : ACA DATE : 5-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

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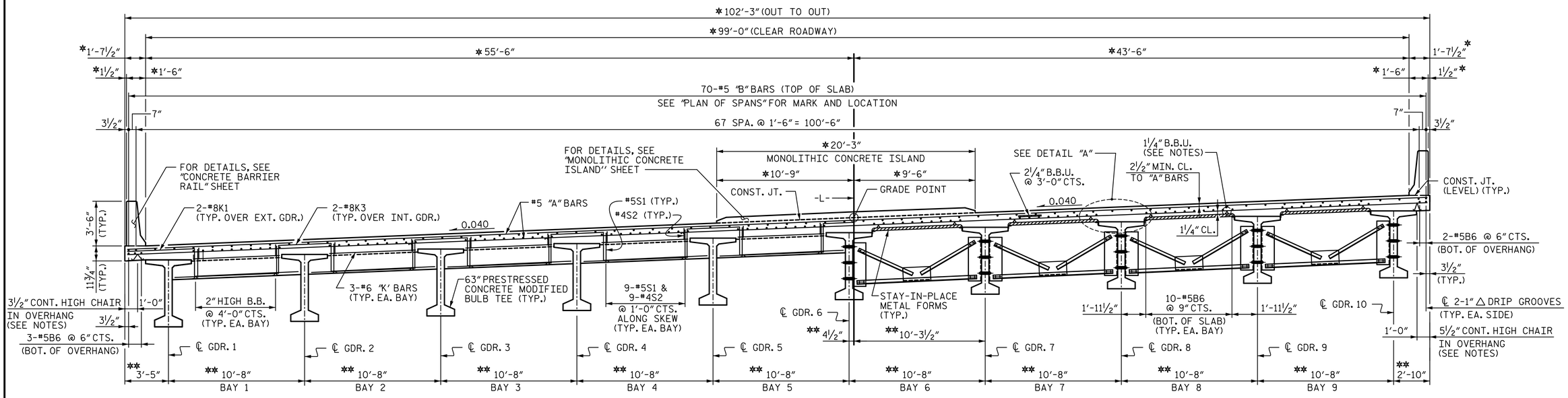
NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/22/2017

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St, Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
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			36

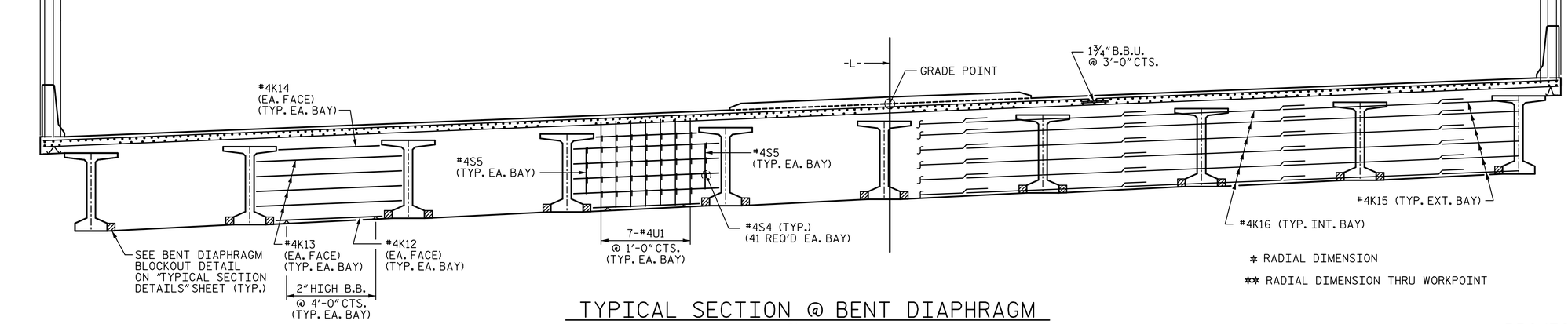


END DIAPHRAGMS

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

INTERMEDIATE DIAPHRAGMS

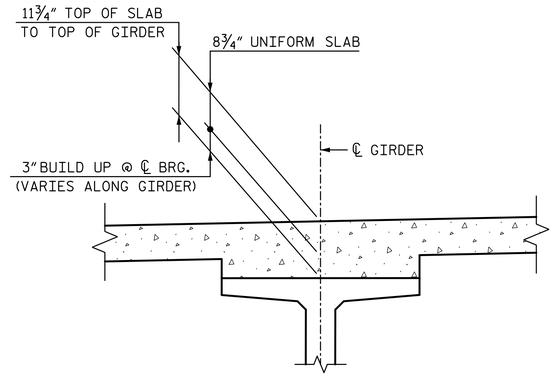
TYPICAL SECTION



* RADIAL DIMENSION

** RADIAL DIMENSION THRU WORKPOINT

TYPICAL SECTION @ BENT DIAPHRAGM



DETAIL "A"

NOTES:

1. 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.
2. LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.
3. 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.
4. FOR INTERMEDIATE DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 63" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.
5. ALL REINFORCING STEEL IN MONOLITHIC CONCRETE ISLAND SHALL BE EPOXY COATED.
6. FOR END DIAPHRAGM AND BENT DIAPHRAGM SECTIONS AND DETAILS, SEE "TYPICAL SECTION DETAILS" SHEET.
7. HEIGHT OF BEAM BOLSTER AND CONTINUOUS HIGH CHAIR IS CALCULATED AT CENTERLINE OF BEARING. CONTRACTOR SHALL ADJUST HEIGHTS, AS NECESSARY TO MAINTAIN PROPER CLEARANCE, DUE TO GIRDER CAMBER AND VARYING WIDTH OVERHANGS.

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PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 2

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DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND ENGINEER

6/22/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-6
1			3			TOTAL SHEETS
2			4			36

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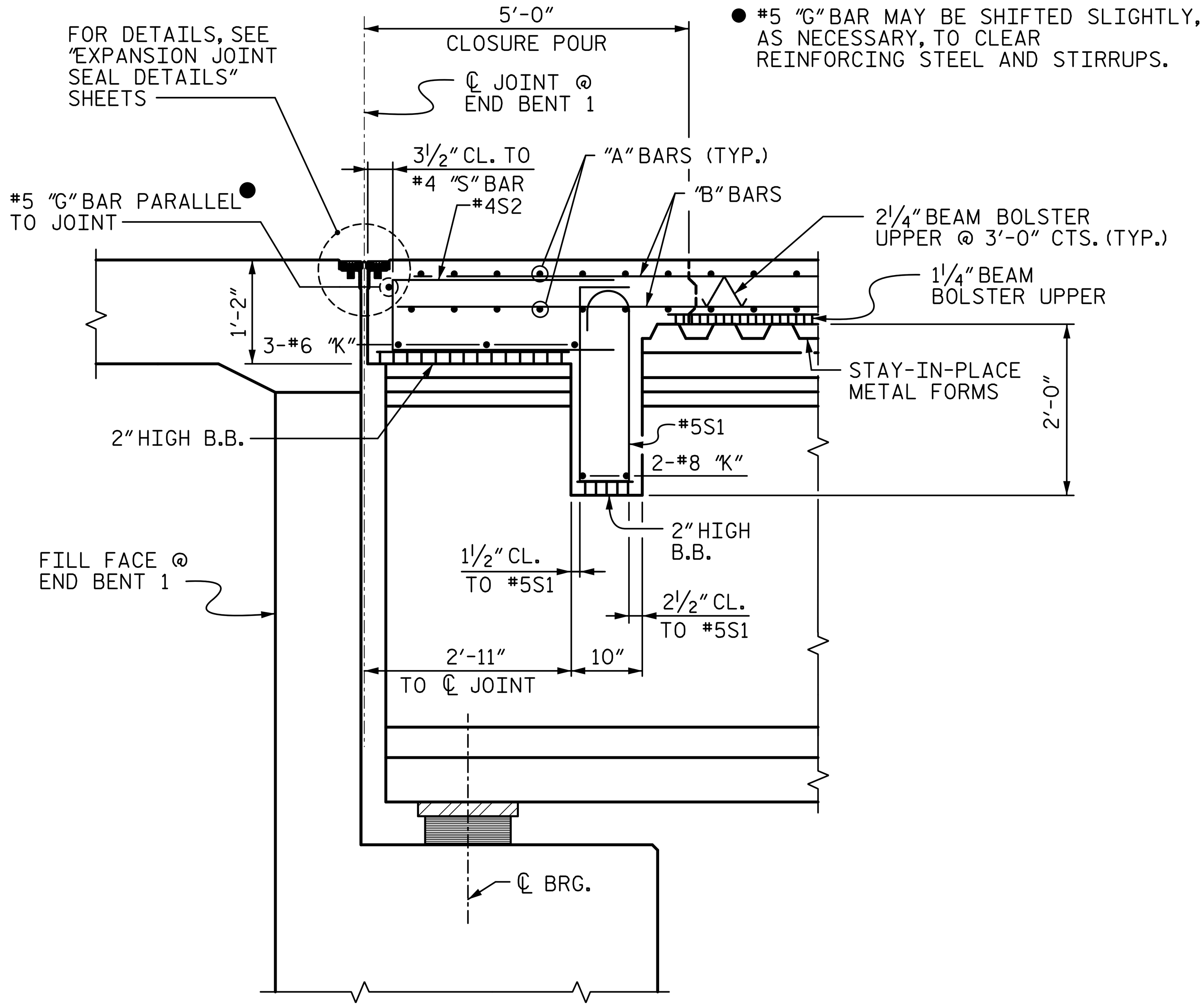
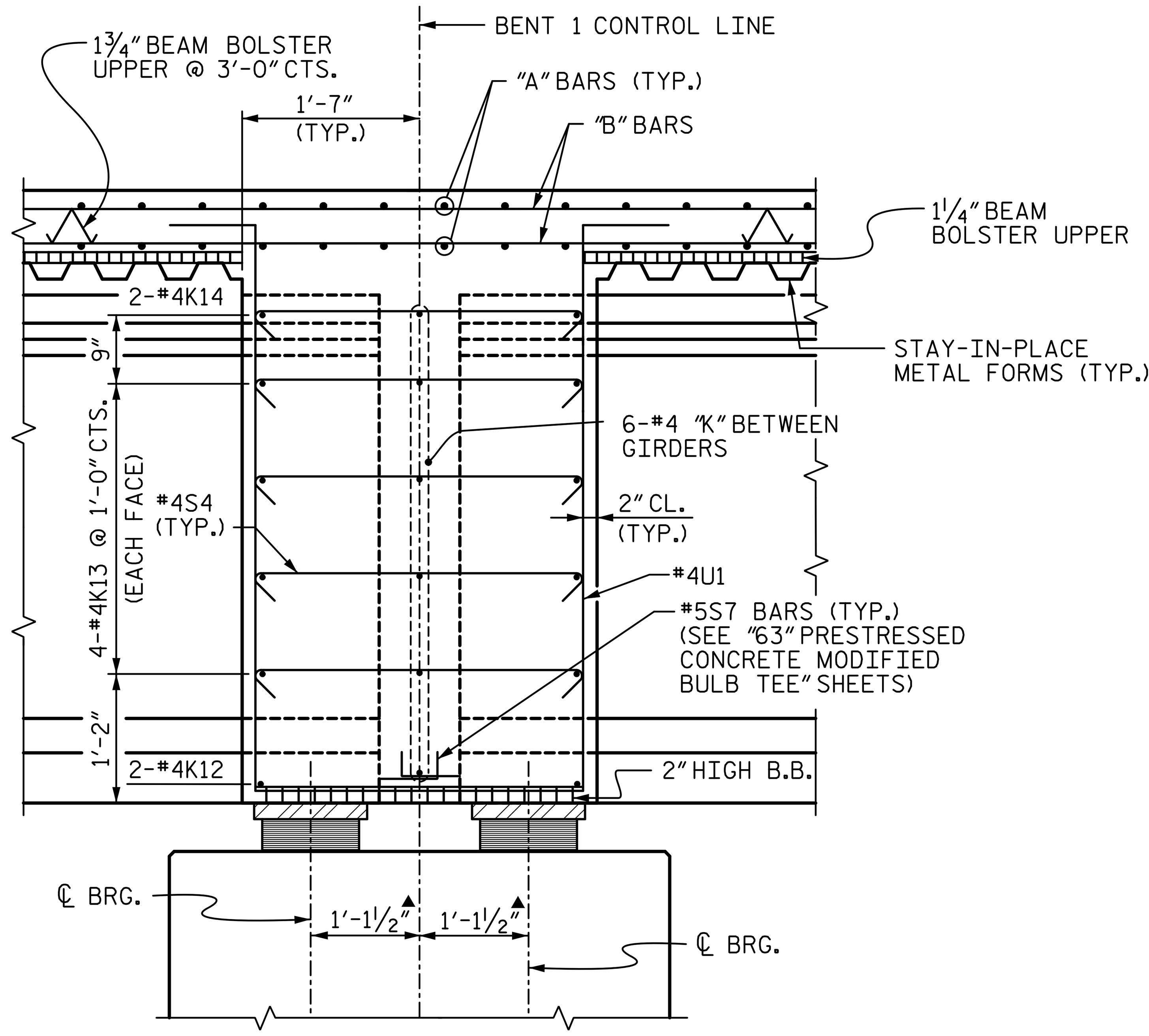
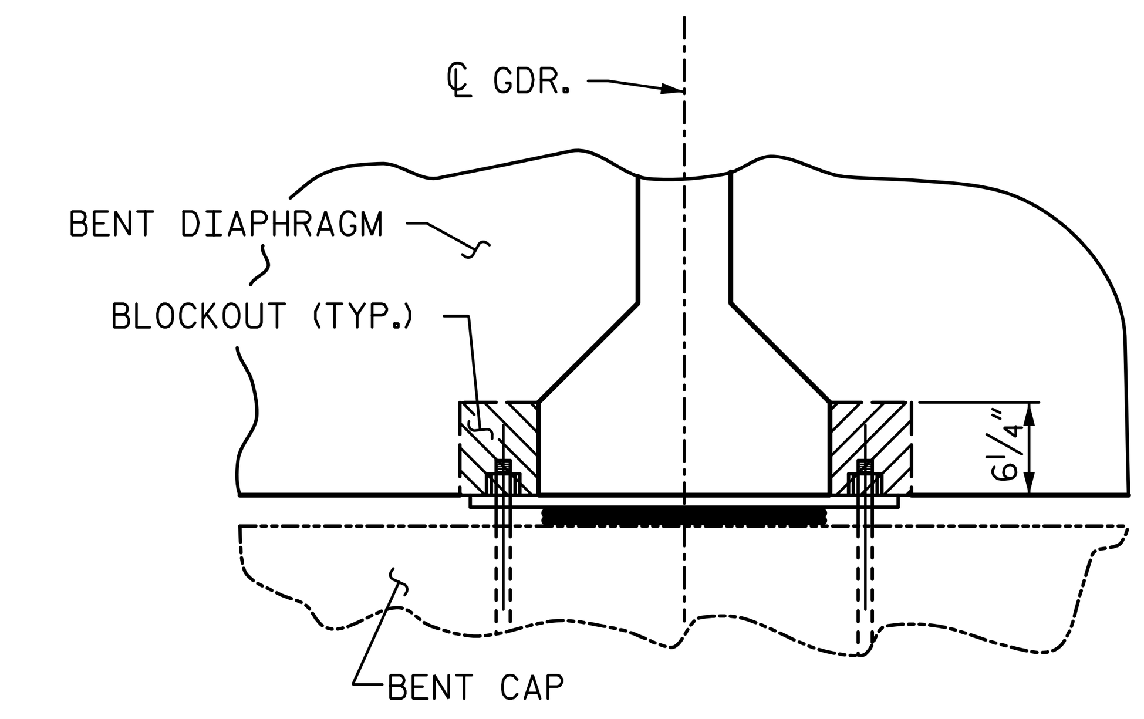


SECTION THRU END DIAPHRAGM

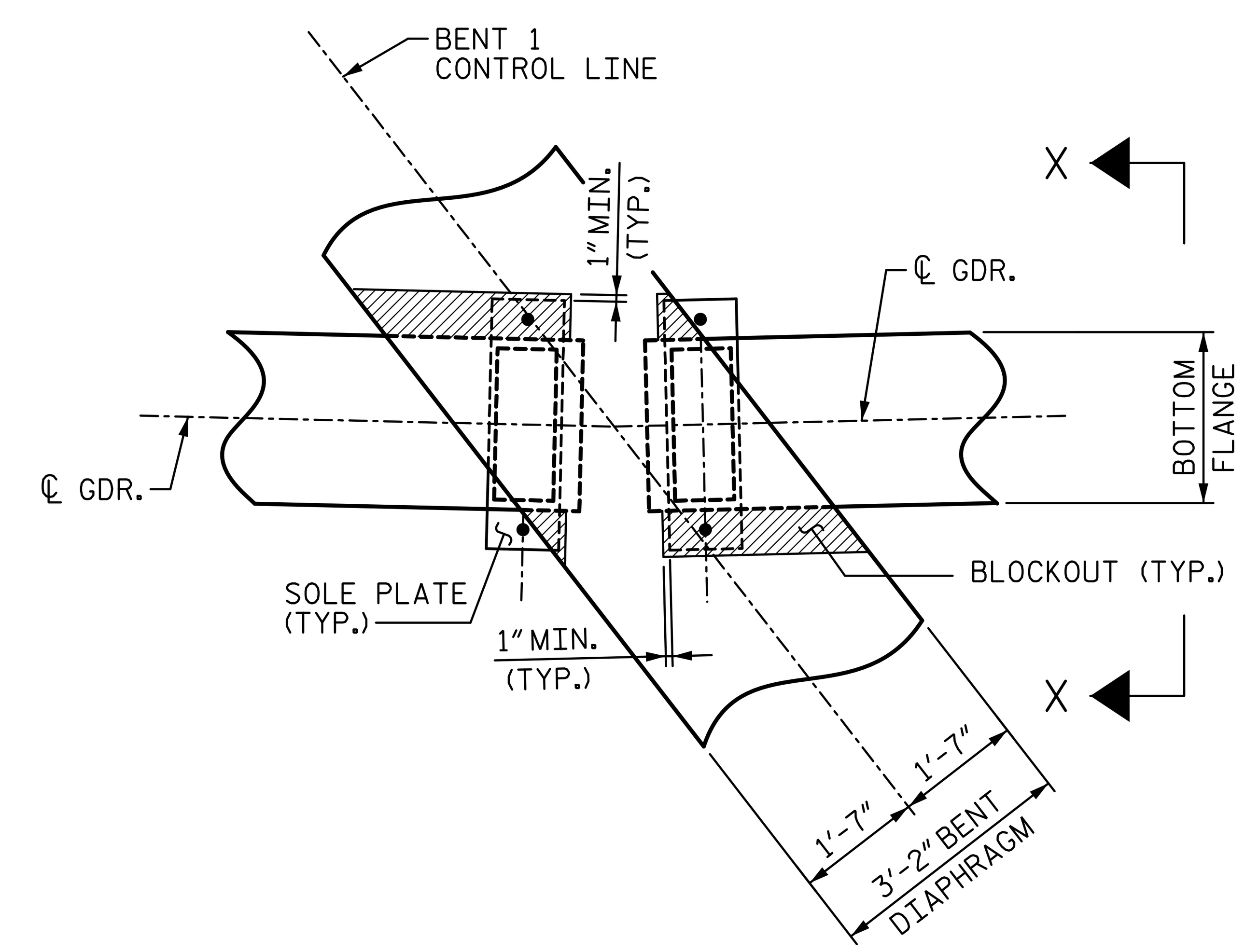
("J" BAR USED WITH STANDARD EXP. JT. NOT SHOWN)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



SECTION THRU BENT DIAPHRAGM



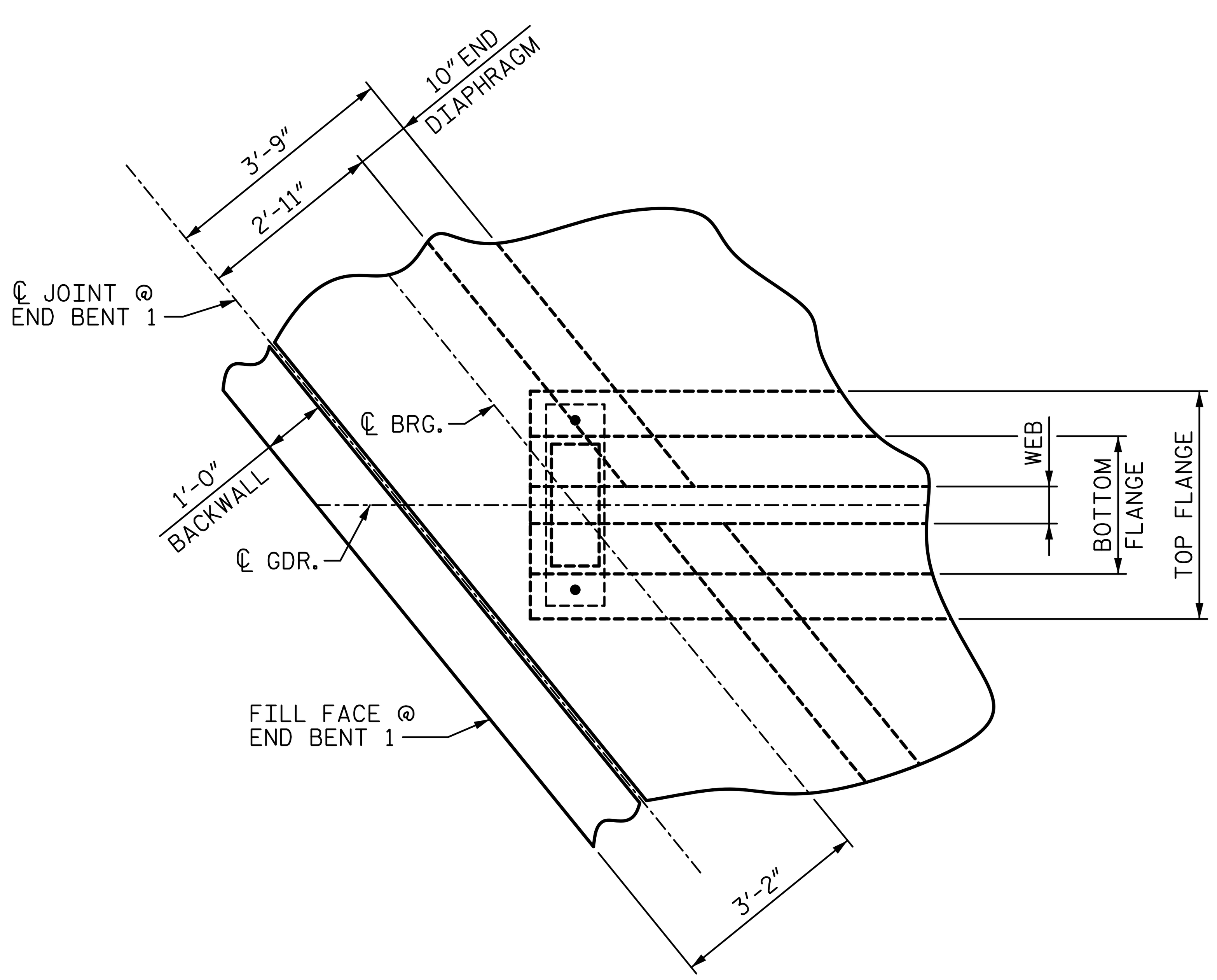
SECTION X-X



PLAN

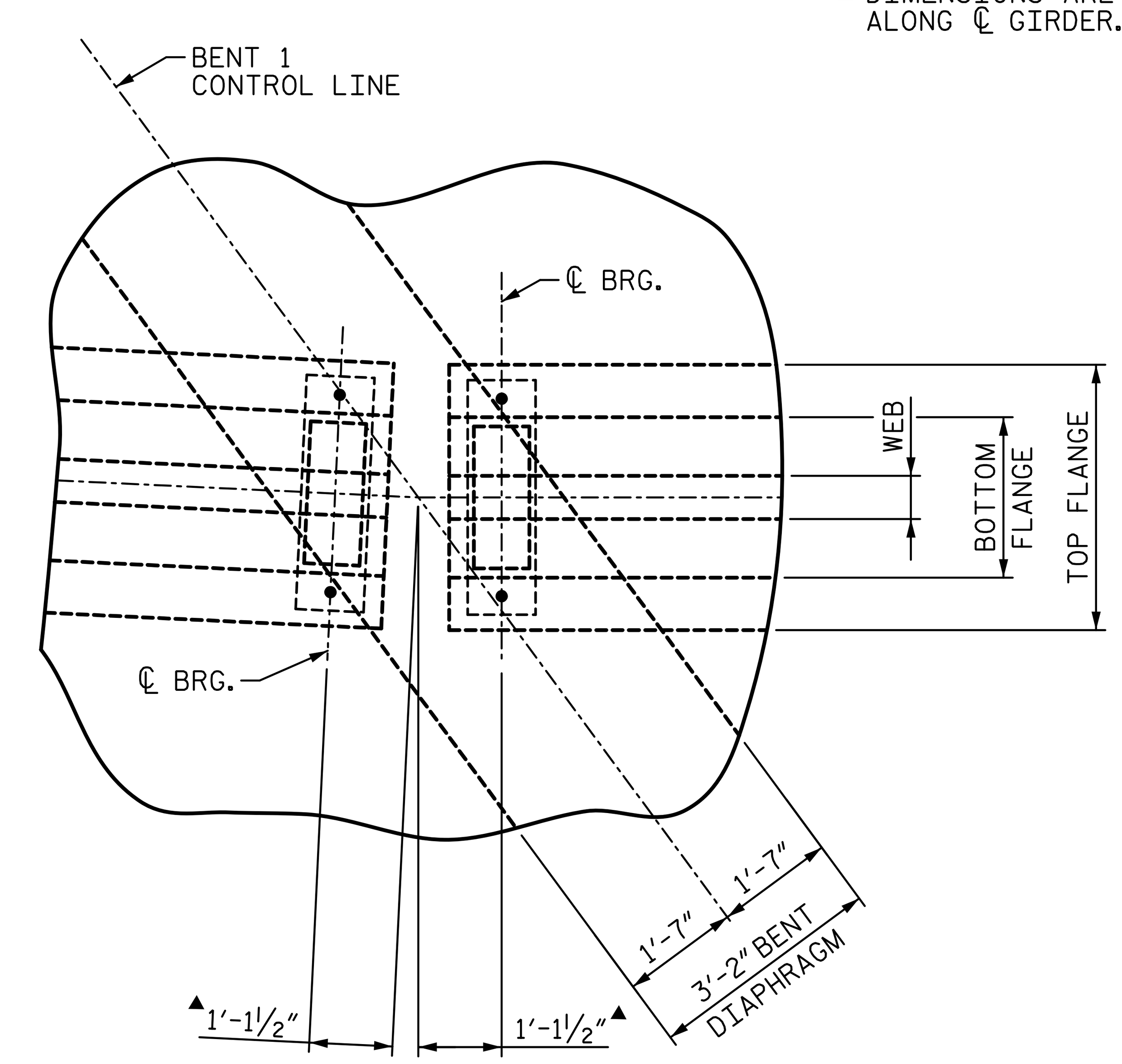
BENT DIAPHRAGM BLOCKOUT DETAIL

▲ DIMENSIONS ARE MEASURED ALONG ℄ GIRDER.



PLAN OF GIRDER AT END BENT

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



PLAN OF GIRDER AT BENT

(BENT CAP NOT SHOWN FOR CLARITY)

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-

SHEET 2 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/22/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

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

SHEET NO. S1-7
TOTAL SHEETS 36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

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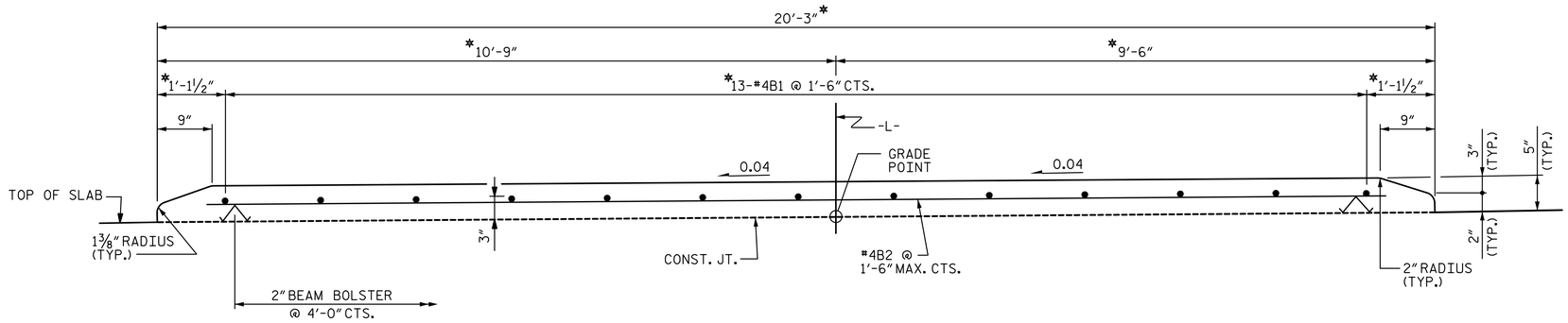
NOTES

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

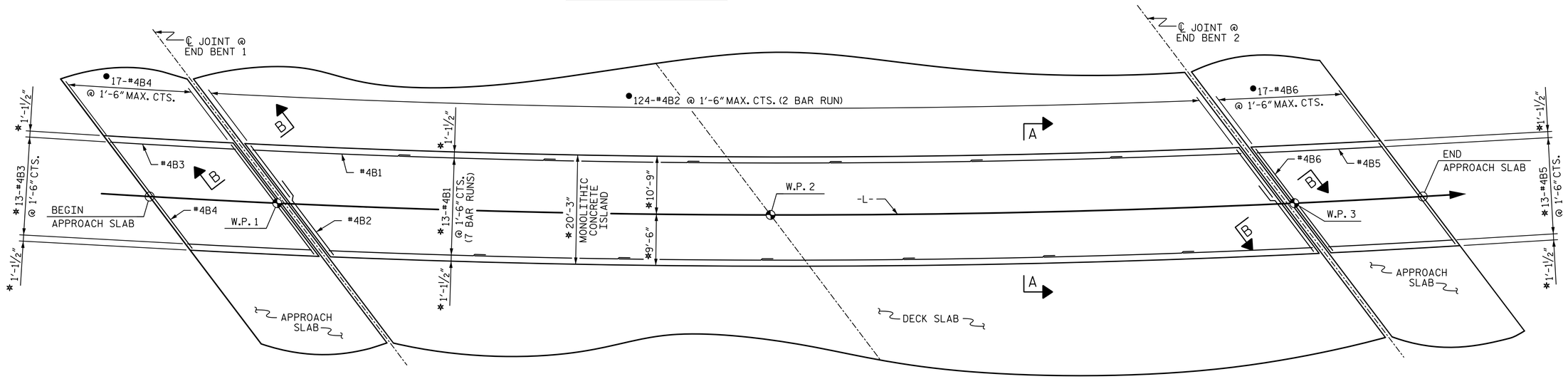
ALL REINFORCING STEEL IN MONOLITHIC CONCRETE ISLAND SHALL BE EPOXY COATED.

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

MONOLITHIC CONCRETE ISLAND SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000psi.



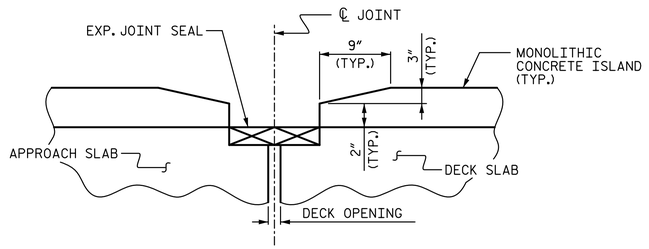
SECTION A-A



PLAN

* RADIAL DIMENSION
● MEASURED ALONG ARC

BILL OF MATERIAL FOR MONOLITHIC CONCRETE ISLAND					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	91	#4	STR	28'-1"	1,707
✳B2	248	#4	STR	13'-4"	2,209
✳B3	13	#4	STR	23'-4"	203
✳B4	17	#4	STR	24'-7"	279
✳B5	13	#4	STR	23'-6"	204
✳B6	17	#4	STR	22'-9"	258
✳EPOXY COATED REINFORCING STEEL					4,860 LBS.
CLASS AA CONCRETE					71.5 CU. YDS.



SECTION B-B

REINFORCING STEEL IN APPROACH SLAB, DECK SLAB AND MONOLITHIC CONCRETE ISLAND NOT SHOWN FOR CLARITY.

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

MONOLITHIC CONCRETE ISLAND

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-8
1			3			TOTAL SHEETS
2			4			36

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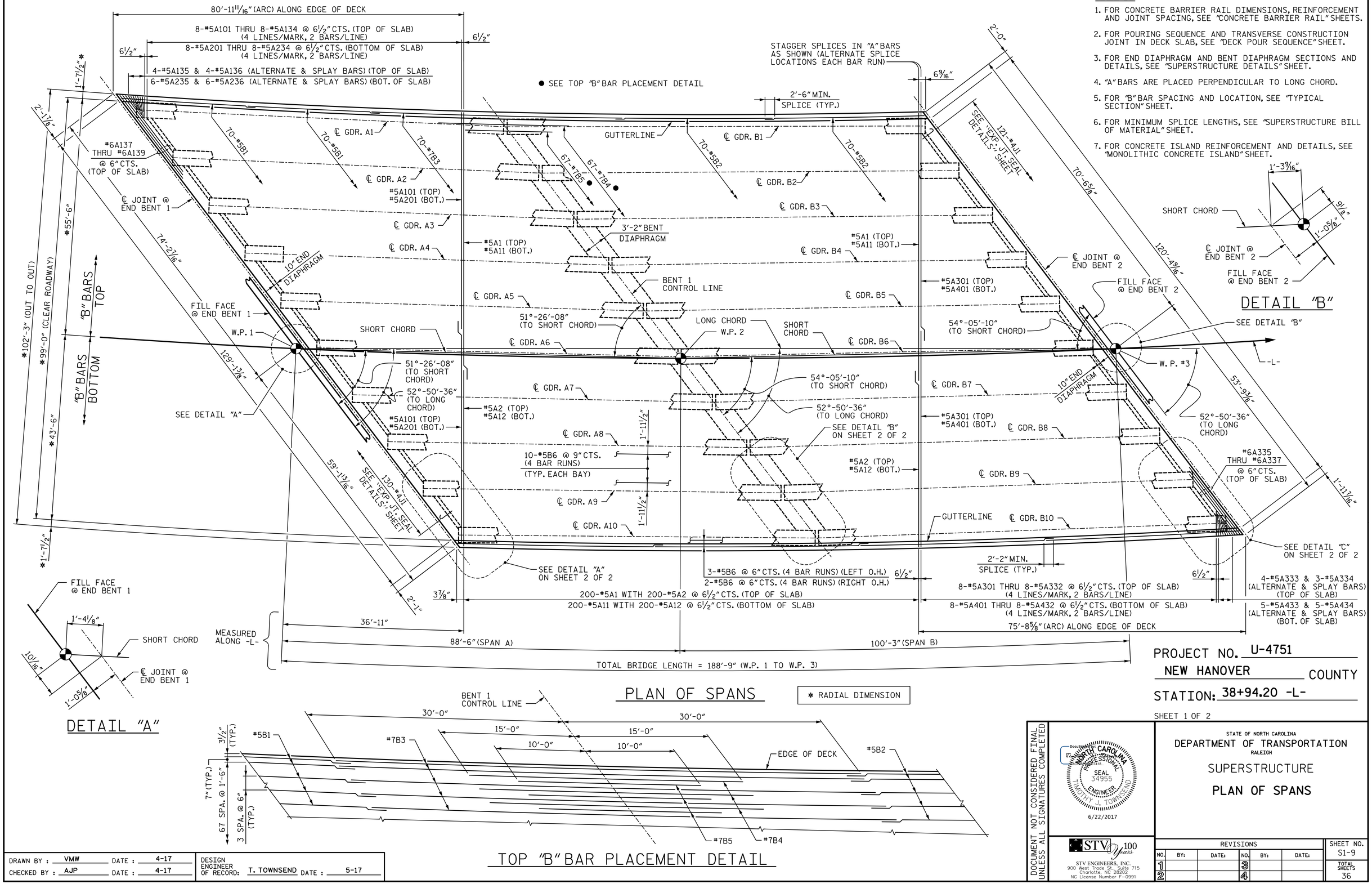
NOTES:

1. FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCEMENT AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.
2. FOR POURING SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR END DIAPHRAGM AND BENT DIAPHRAGM SECTIONS AND DETAILS, SEE "SUPERSTRUCTURE DETAILS" SHEET.
4. "A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD.
5. FOR "B" BAR SPACING AND LOCATION, SEE "TYPICAL SECTION" SHEET.
6. FOR MINIMUM SPLICE LENGTHS, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
7. FOR CONCRETE ISLAND REINFORCEMENT AND DETAILS, SEE "MONOLITHIC CONCRETE ISLAND" SHEET.



DETAIL "B"

PLAN OF SPANS

* RADIAL DIMENSION

DETAIL "A"

TOP "B" BAR PLACEMENT DETAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 2

DRAWN BY : VMW DATE : 4-17

CHECKED BY : AJP DATE : 4-17

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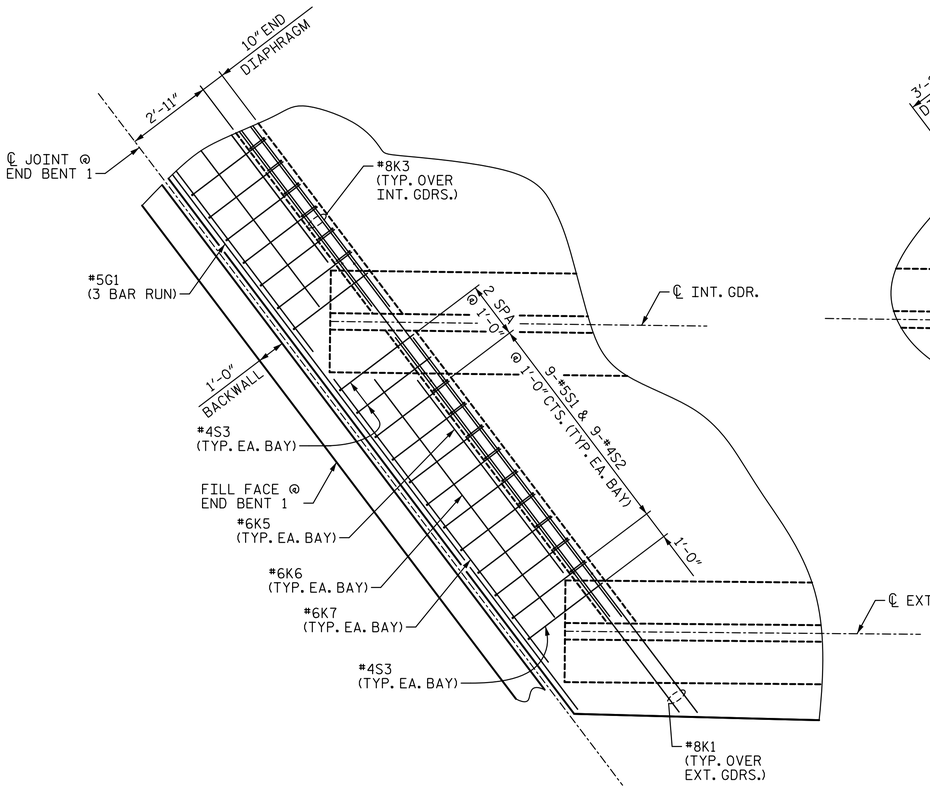
DEPARTMENT OF TRANSPORTATION
RALEIGH

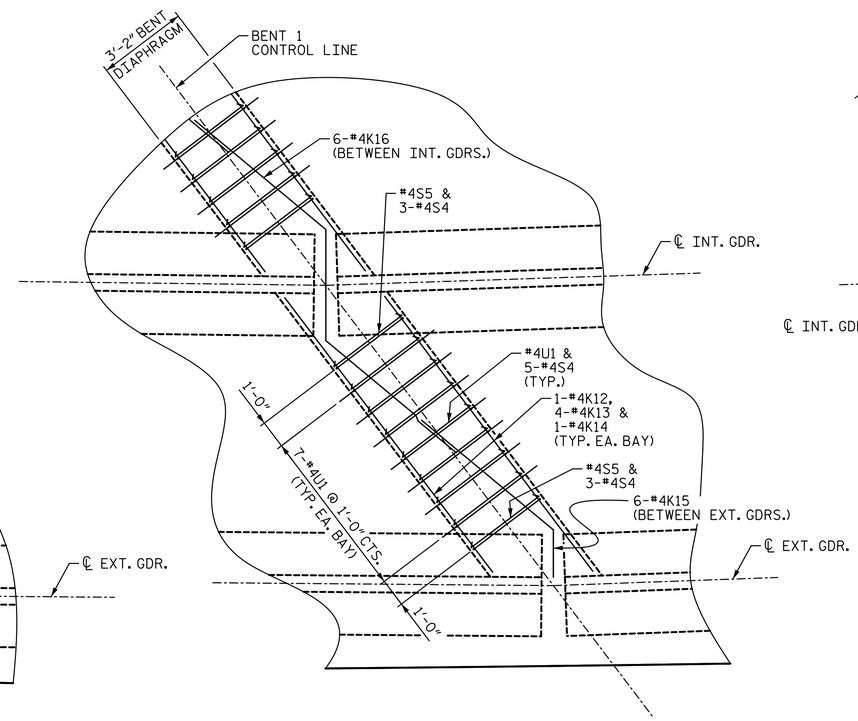
SUPERSTRUCTURE

PLAN OF SPANS

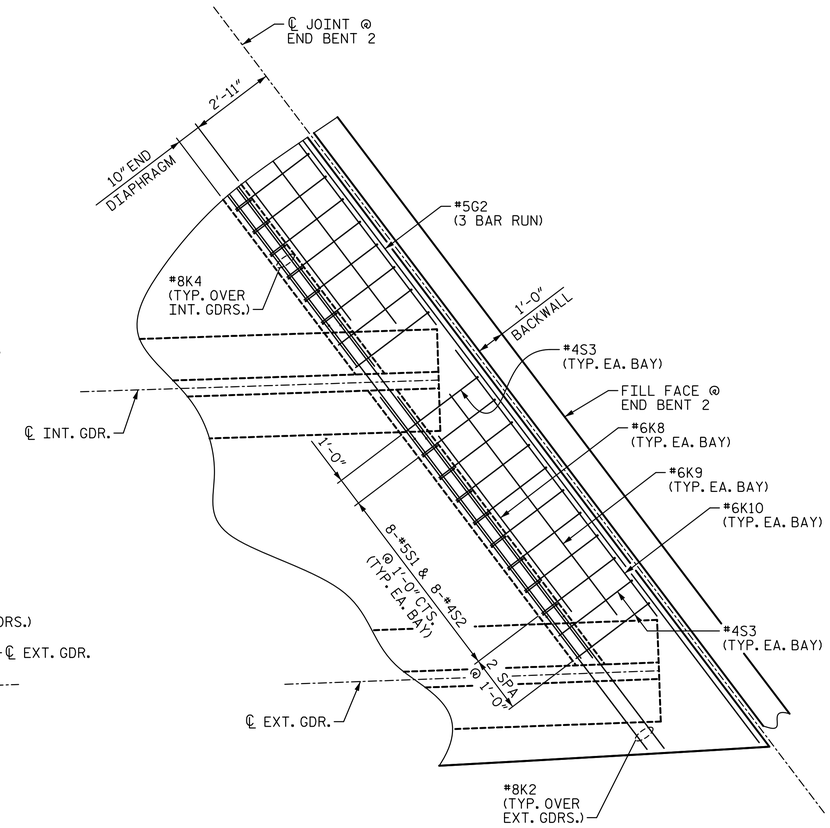
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-9
1			3			TOTAL SHEETS
2			4			36



DETAIL "A"



DETAIL "B"



DETAIL "C"

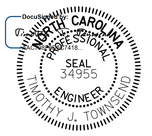
PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



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RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-10
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
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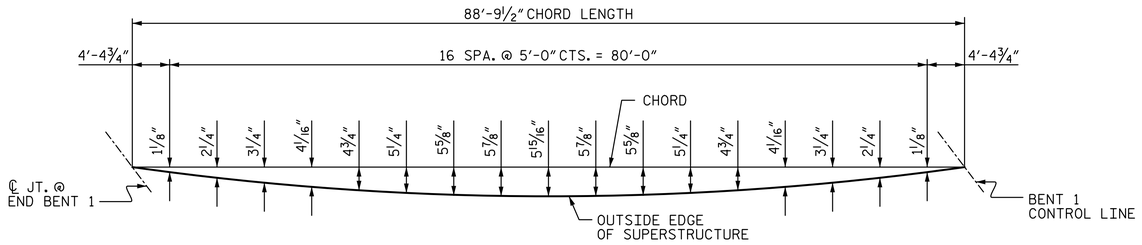
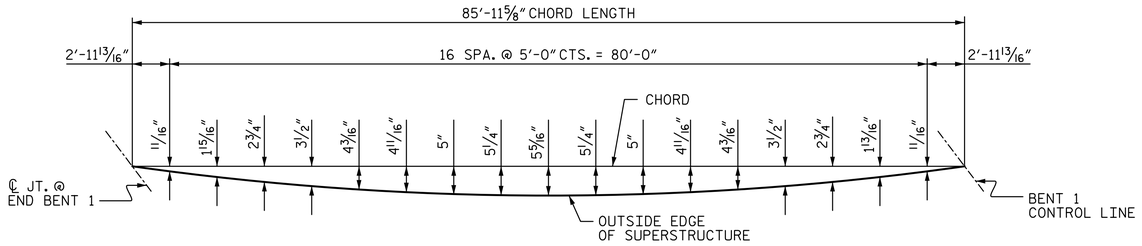
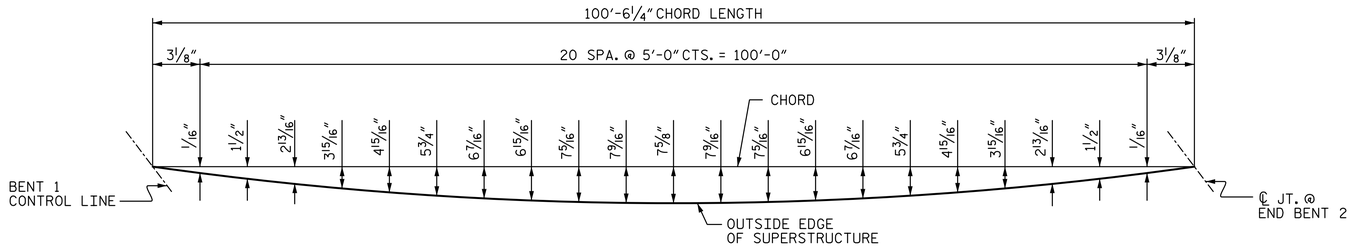


LEFT SIDE

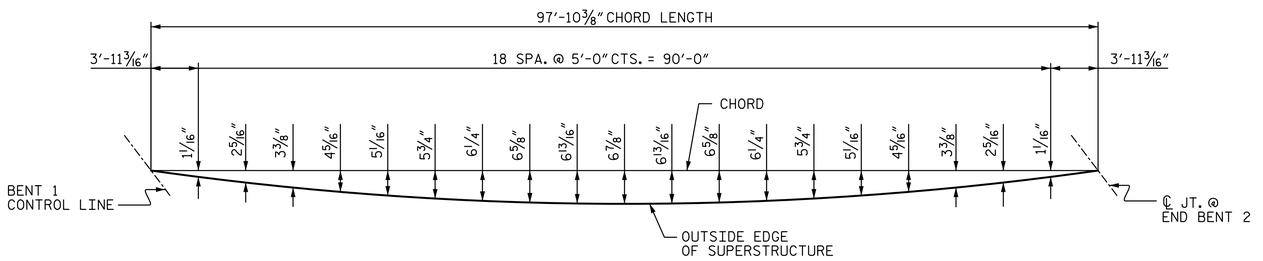


RIGHT SIDE

ARC OFFSETS - SPAN A



LEFT SIDE



RIGHT SIDE

ARC OFFSETS - SPAN B

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND

6/22/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-11
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW DATE : 4-17
CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 5-17

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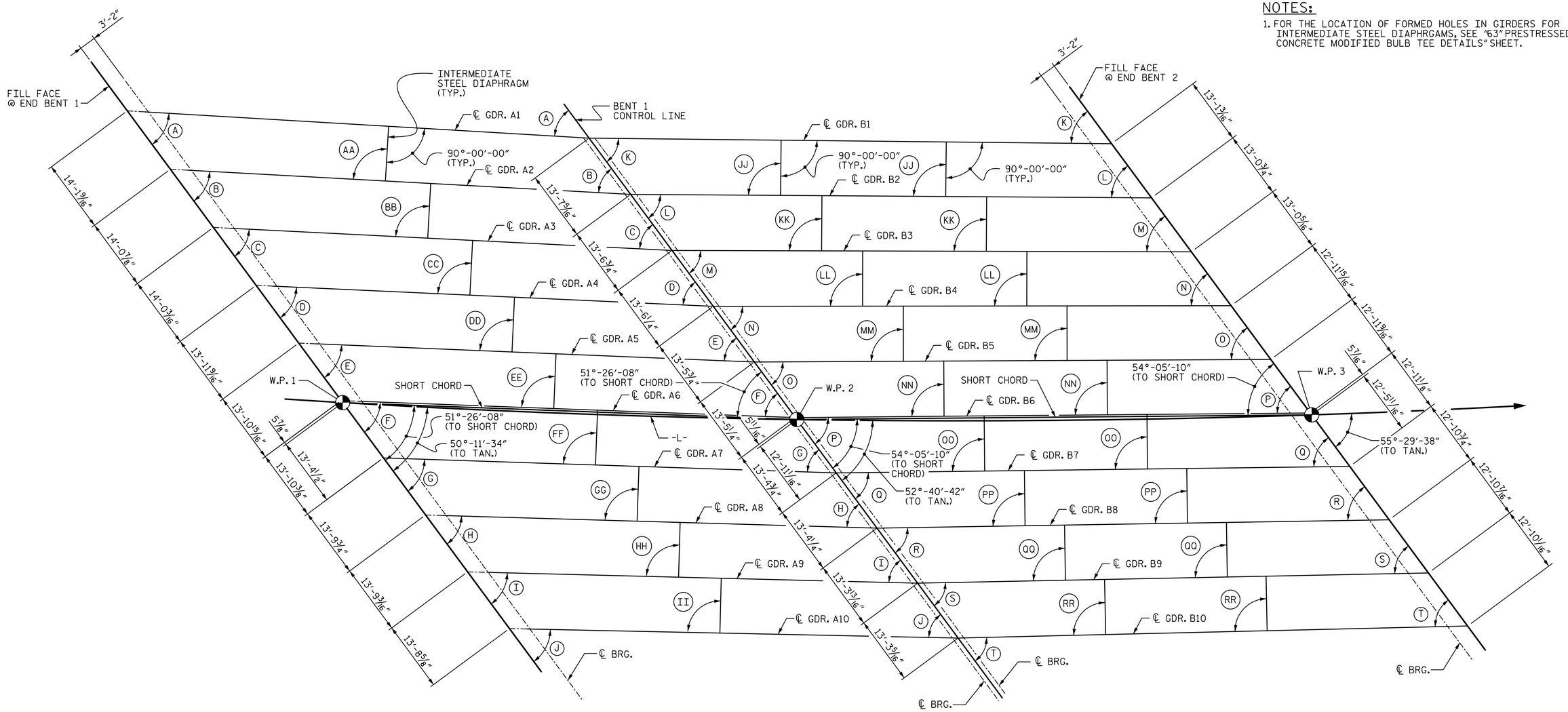
NOTES:

1. FOR THE LOCATION OF FORMED HOLES IN GIRDERS FOR INTERMEDIATE STEEL DIAPHRGAMS, SEE "63" PRESTRESSED CONCRETE MODIFIED BULB TEE DETAILS" SHEET.



FRAMING PLAN

GIRDER ANGLES			
A	50°-11'-18"	K	52°-57'-17"
B	50°-26'-36"	L	53°-11'-09"
C	50°-41'-40"	M	53°-24'-48"
D	50°-56'-32"	N	53°-38'-17"
E	51°-11'-11"	O	53°-51'-35"
F	51°-25'-38"	P	54°-04'-43"
G	51°-39'-53"	Q	54°-17'-40"
H	51°-53'-56"	R	54°-30'-27"
I	52°-07'-48"	S	54°-43'-04"
J	52°-21'-29"	T	54°-55'-31"

DIAPHRAGM ANGLES			
AA	90°-15'-17"	JJ	90°-13'-51"
BB	90°-15'-04"	KK	90°-13'-40"
CC	90°-14'-52"	LL	90°-13'-29"
DD	90°-14'-39"	MM	90°-13'-18"
EE	90°-14'-27"	NN	90°-13'-07"
FF	90°-14'-15"	OO	90°-12'-57"
GG	90°-14'-03"	PP	90°-12'-47"
HH	90°-13'-52"	QQ	90°-12'-37"
II	90°-13'-41"	RR	90°-12'-27"

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-

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6/22/2017

STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

FRAMING PLAN

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-12
1			3			TOTAL SHEETS
2			4			36

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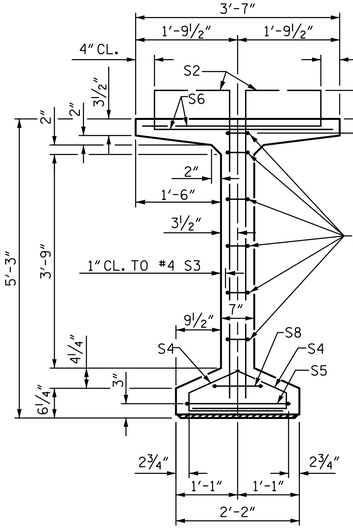
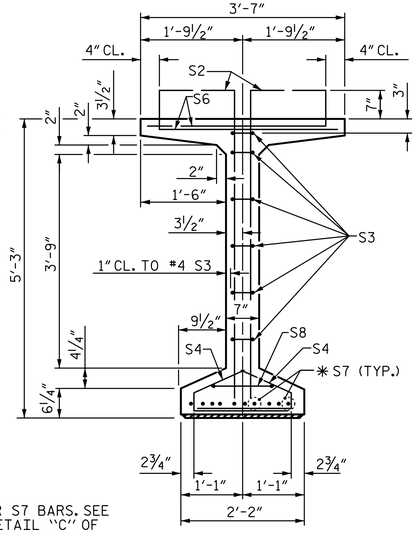
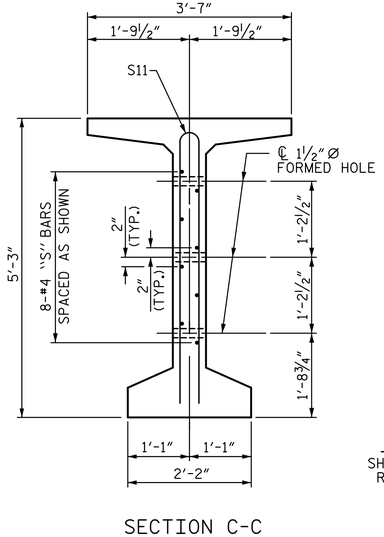


SECTION A-A



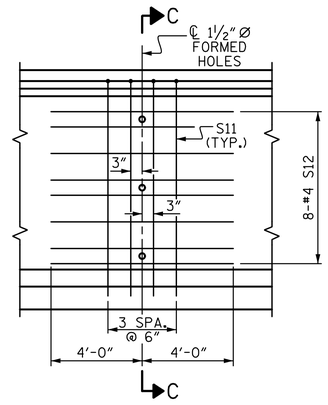
SECTION B-B

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



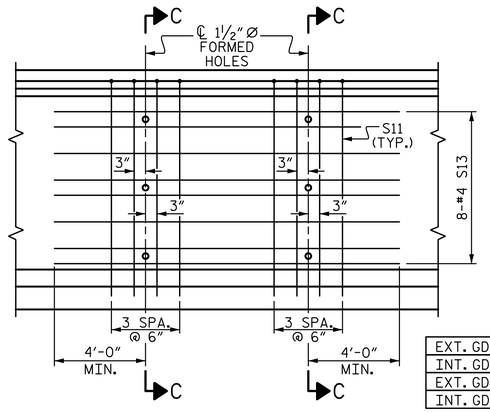
SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)



PARTIAL ELEVATION

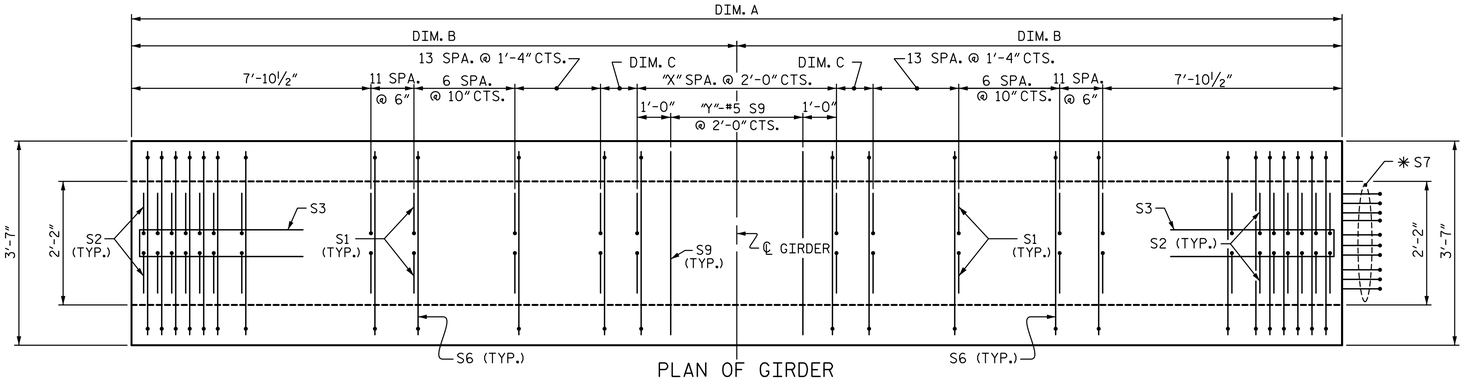
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 1 & 10



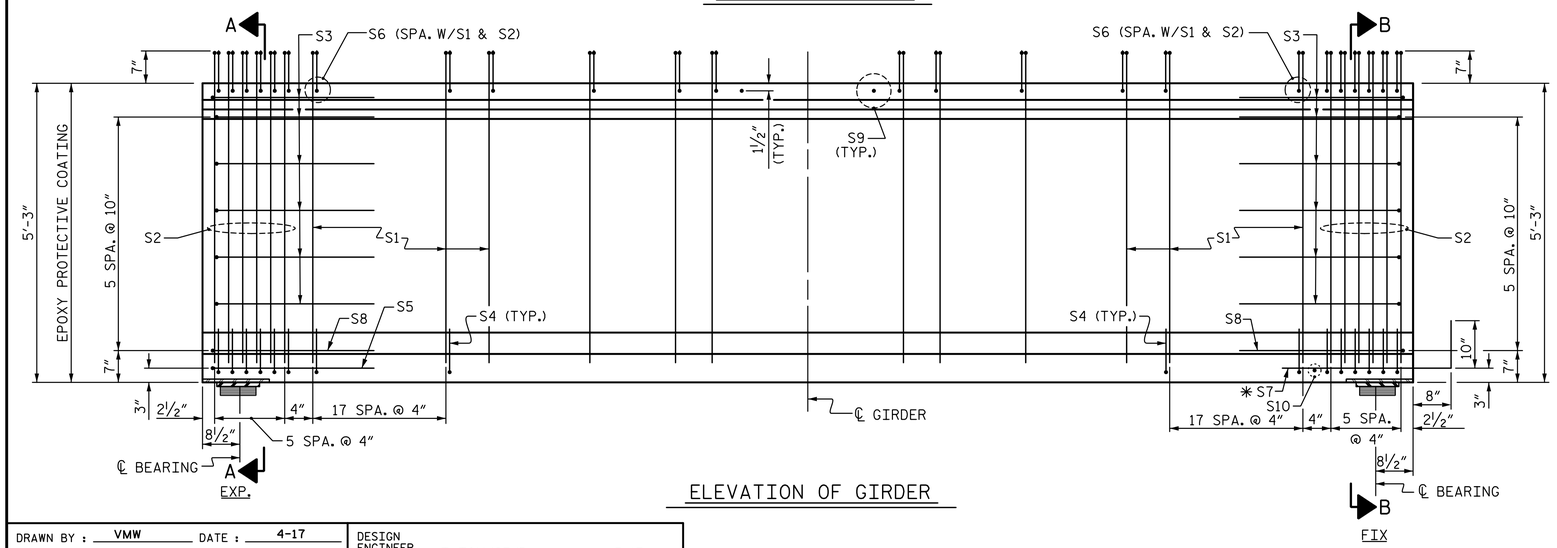
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 2 THRU 9

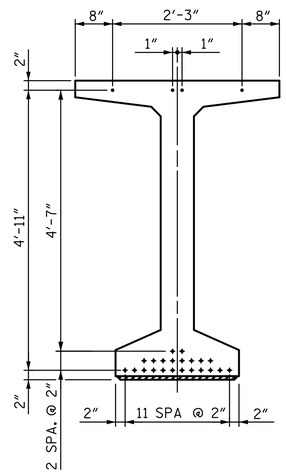
◆ SEE GIRDER TABLES ON SHEET 3 OF 3 FOR VALUES.



PLAN OF GIRDER



ELEVATION OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT

(26 STRANDS REQUIRED)

DEBONDING LEGEND

- FULLY BONDED STRANDS

0.6" Ø L. R. GRADE 270 STRANDS

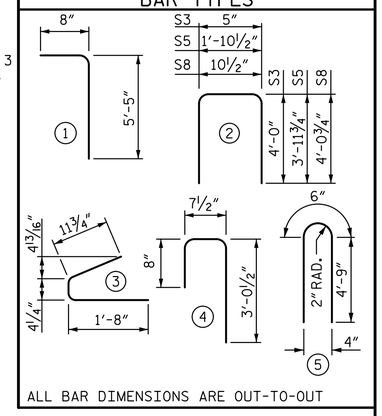
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	◆	#4	1	6'-1"	◆
	S2	24	#5	1	6'-1"	152
	S3	12	#4	2	8'-5"	67
	S4	96	#4	3	3'-0"	192
	S5	1	#5	2	9'-10"	10
	S6	◆	#5	4	4'-4"	◆
	✱S7	10	#5	STR	3'-8"	38
	S8	2	#5	2	9'-0"	19
	S9	◆	#5	STR	3'-3"	◆
	S10	1	#3	STR	1'-10"	1
EXT. GDR.	S11	4	#5	5	10'-0"	42
INT. GDR.	S11	8	#5	5	10'-0"	83
EXT. GDR.	S12	8	#4	STR	8'-0"	43
INT. GDR.	S13	8	#4	STR	17'-0"	91

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

NOTES:

1. FOR GIRDER DETAILS AND DIAPHRAGM HOLE LOCATIONS, SEE SHEET 3 OF 3.
2. FOR VARIABLE DIMENSIONS AND QUANTITIES, SEE SHEET 3 OF 3.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

63" PRESTRESSED CONCRETE MODIFIED BULB TEE

SPAN A

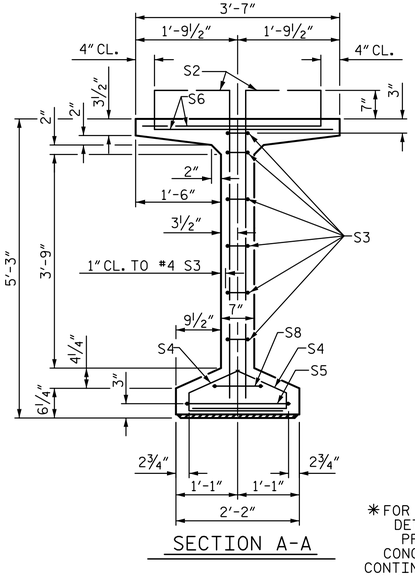
STV 100 Years

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

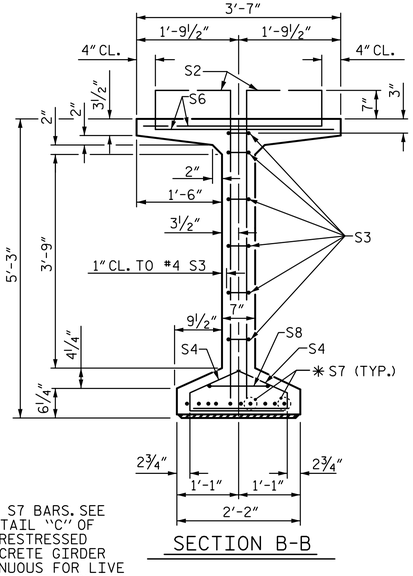
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-13
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

chitkhmb 6/22/2017 3:15:28 PM R:\401_025_U4751_SMU_PCG_013_64020I.dgn

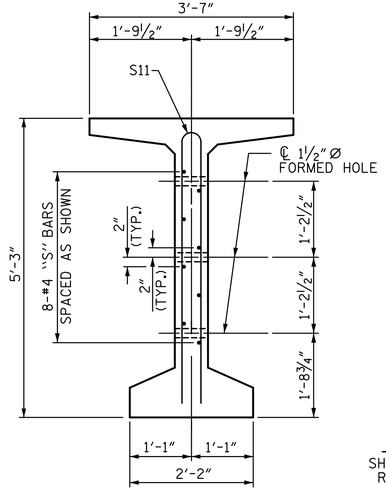


SECTION A-A



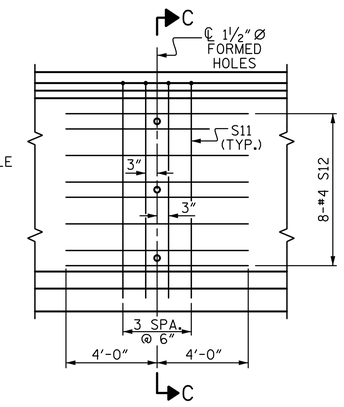
SECTION B-B

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



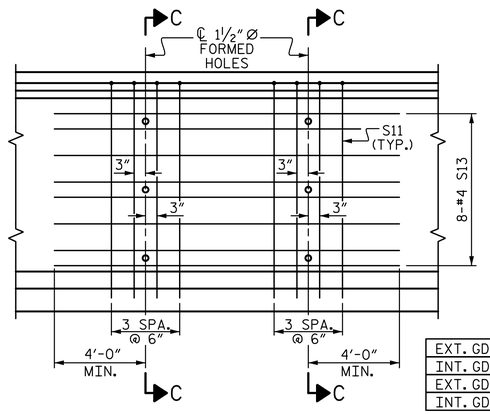
SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)



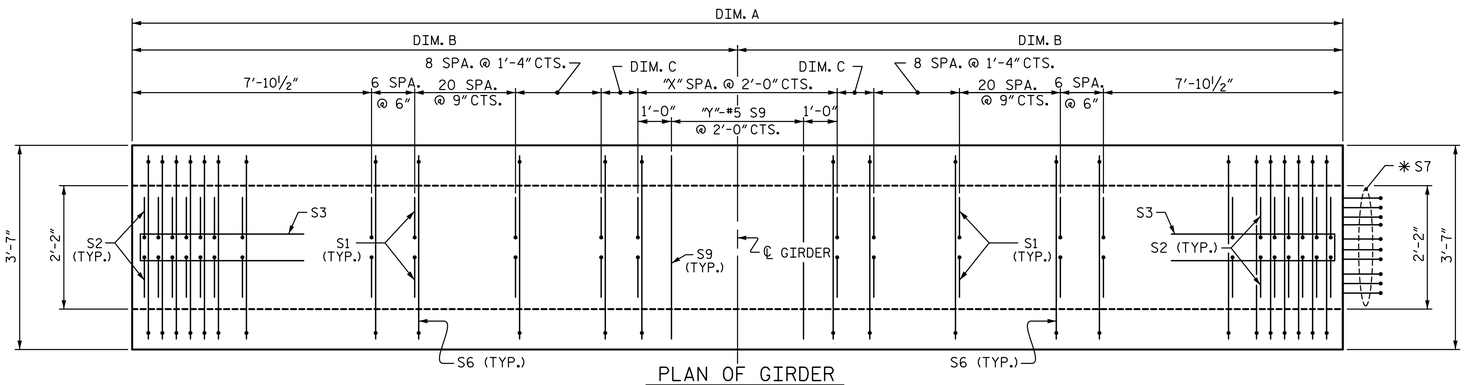
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 1 & 10

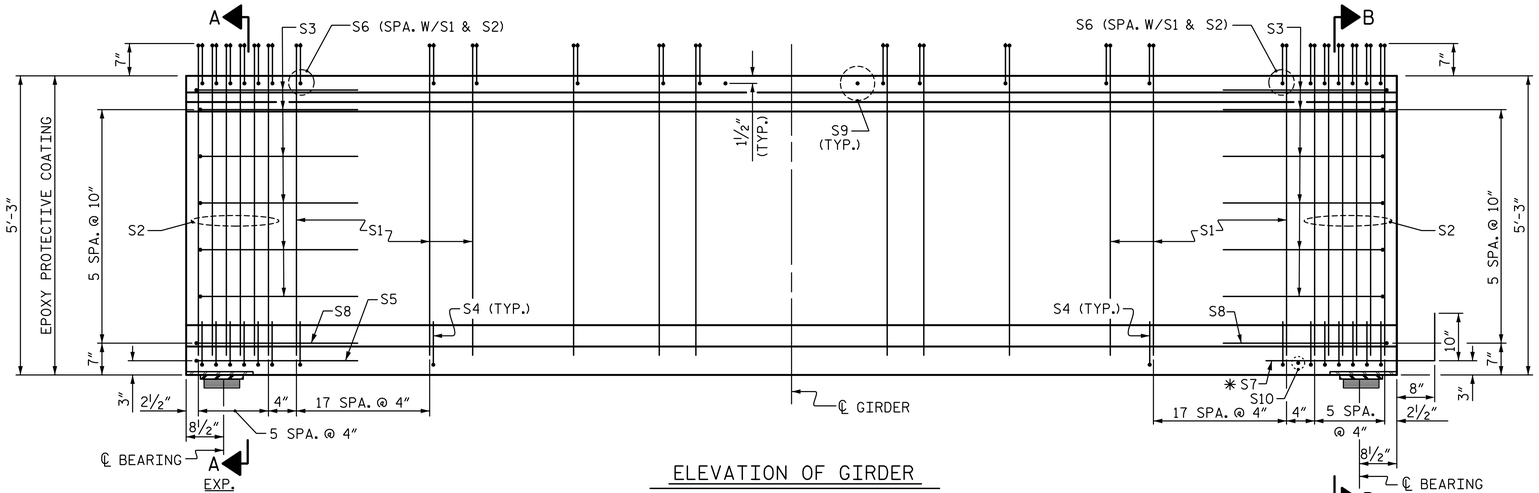


PARTIAL ELEVATION

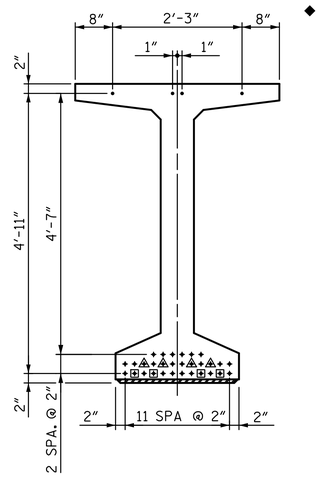
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 2 THRU 9



PLAN OF GIRDER



ELEVATION OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT

(34 STRANDS REQUIRED)

◆ SEE GIRDER TABLES ON SHEET 3 OF 3 FOR VALUES.

DEBONDING LEGEND

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

0.6" Ø 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	◆	#4	1	6'-1"	◆
	S2	24	#5	1	6'-1"	152
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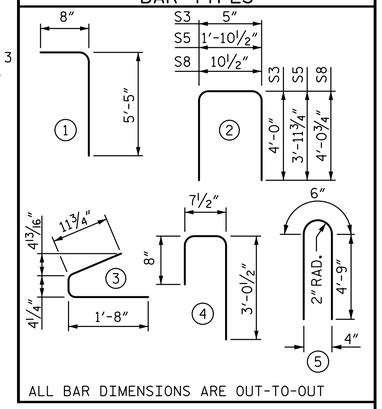
	S4	96	#4	3	3'-0"	192
	S5	1	#5	2	9'-10"	10
	S6	◆	#5	4	4'-4"	◆
	✱S7	10	#5	STR	3'-8"	38
	S8	2	#5	2	9'-0"	19
	S9	◆	#5	STR	3'-3"	◆
	S10	1	#3	STR	1'-10"	1
EXT. GDR.	S11	8	#5	5	10'-0"	83
INT. GDR.	S11	16	#5	5	10'-0"	167
EXT. GDR.	S12	16	#4	STR	8'-0"	86
INT. GDR.	S13	16	#4	STR	16'-1"	172

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

NOTES:

1. FOR GIRDER DETAILS AND DIAPHRAGM HOLE LOCATIONS, SEE SHEET 3 OF 3.
2. FOR VARIABLE DIMENSIONS AND QUANTITIES, SEE SHEET 3 OF 3.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

63" PRESTRESSED CONCRETE MODIFIED BULB TEE

SPAN B

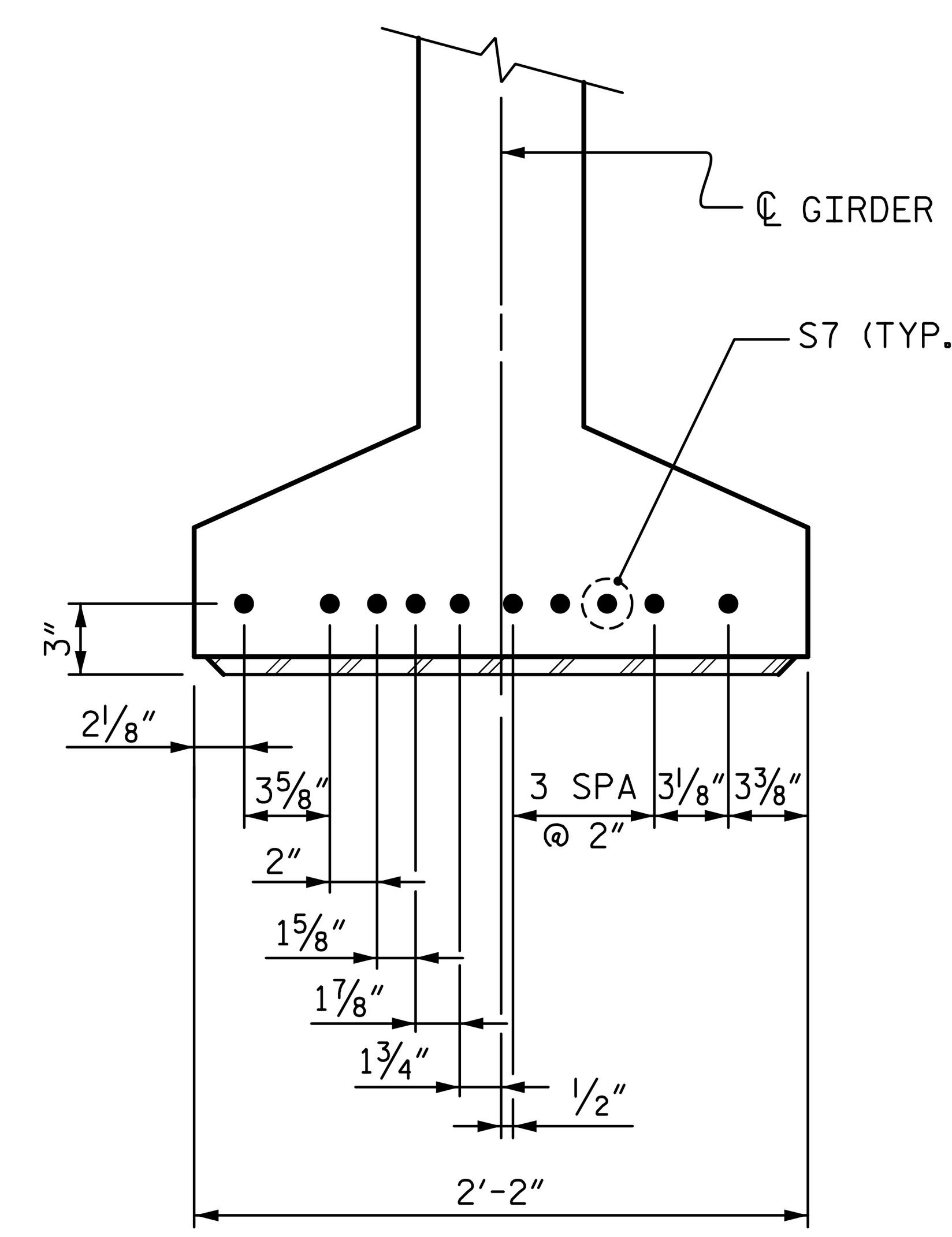
STV 100 Years
STV ENGINEERS, INC
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-14
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

GIRDER TABLE

GDR.	DIM. A	DIM. B	DIM. C	◆ S1 BAR "X" SPA.	S1 BAR NO.	S1 BAR WEIGHT (LBS)	S6 BAR NO.	S6 BAR WEIGHT (LBS)	S9 BAR "Y" NO.	S9 BAR WEIGHT (LBS)	QUANTITIES FOR ONE GIRDER: REINFORCING STEEL (LBS)	7500 PSI CONCRETE (C.Y.)	0.6"Ø L.R. STRANDS	GIRDERS REQ'D: NO. OF GDR.	TOTAL LENGTH
A1	86′-3″	43′-1 1/2″	1′-5″	6	206	837	230	1,040	6	20	2,461	17.1	26	1	86′-3″
A2	85′-11 1/8″	42′-11 9/16″	1′-3 1/16″	6	206	837	230	1,040	6	20	2,550	17.0	26	1	85′-11 1/8″
A3	85′-7 1/2″	42′-9 3/4″	1′-1 1/4″	6	206	837	230	1,040	6	20	2,550	17.0	26	1	85′-7 1/2″
A4	85′-3 7/8″	42′-7 15/16″	1′-11 7/16″	5	204	829	228	1,030	5	17	2,529	16.9	26	1	85′-3 7/8″
A5	85′-0 3/8″	42′-6 3/16″	1′-9 11/16″	5	204	829	228	1,030	5	17	2,529	16.8	26	1	85′-0 3/8″
A6	84′-8 7/8″	42′-4 7/16″	1′-7 15/16″	5	204	829	228	1,030	5	17	2,529	16.8	26	1	84′-8 7/8″
A7	84′-5 5/8″	42′-2 13/16″	1′-6 5/16″	5	204	829	228	1,030	5	17	2,529	16.7	26	1	84′-5 5/8″
A8	84′-2 3/8″	42′-1 3/16″	1′-4 11/16″	5	204	829	228	1,030	5	17	2,529	16.7	26	1	84′-2 3/8″
A9	83′-11 1/4″	41′-11 5/8″	1′-3 1/8″	5	204	829	228	1,030	5	17	2,529	16.6	26	1	83′-11 1/4″
A10	83′-8 1/8″	41′-10 1/16″	1′-1 9/16″	5	204	829	228	1,030	5	17	2,440	16.6	26	1	83′-8 1/8″
B1	98′-0 1/2″	49′-0 1/4″	1′-5 3/4″	11	232	943	256	1,157	11	37	2,785	19.4	34	1	98′-0 1/2″
B2	97′-8 7/8″	48′-10 7/16″	1′-3 15/16″	11	232	943	256	1,157	11	37	2,955	19.4	34	1	97′-8 7/8″
B3	97′-5 1/2″	48′-8 3/4″	1′-2 1/4″	11	232	943	256	1,157	11	37	2,955	19.3	34	1	97′-5 1/2″
B4	97′-2 1/8″	48′-7 1/16″	1′-0 9/16″	11	232	943	256	1,157	11	37	2,955	19.2	34	1	97′-2 1/8″
B5	96′-10 3/4″	48′-5 3/8″	1′-10 7/8″	10	230	935	254	1,148	10	34	2,935	19.2	34	1	96′-10 3/4″
B6	96′-7 5/8″	48′-3 13/16″	1′-9 5/16″	10	230	935	254	1,148	10	34	2,935	19.1	34	1	96′-7 5/8″
B7	96′-4 3/8″	48′-2 3/16″	1′-7 11/16″	10	230	935	254	1,148	10	34	2,935	19.1	34	1	96′-4 3/8″
B8	96′-1 3/8″	48′-0 11/16″	1′-6 3/16″	10	230	935	254	1,148	10	34	2,935	19.0	34	1	96′-1 3/8″
B9	95′-10 3/8″	47′-11 3/16″	1′-4 11/16″	10	230	935	254	1,148	10	34	2,935	19.0	34	1	95′-10 3/8″
B10	95′-7 1/2″	47′-9 3/4″	1′-3 1/4″	10	230	935	254	1,148	10	34	2,765	18.9	34	1	95′-7 1/2″



DETAIL "C"

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

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

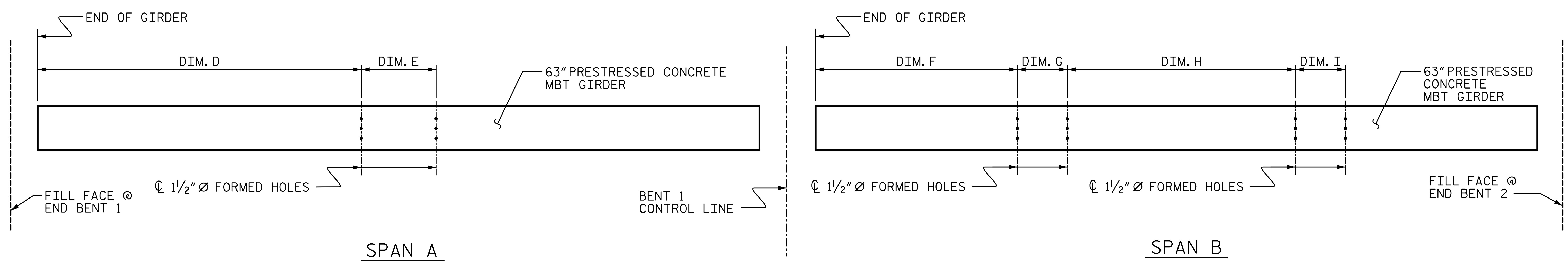
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4″, SHALL BE RAKED TO A DEPTH OF 1/4″.

WHEN DRAPED STRANDS ARE DETAILED, THE LONGITUDINAL LOCATION OF THE HOLD DOWN DEVICES SHALL BE WITHIN 6″ OF THE LOCATION SHOWN AND THE CENTER OF GRAVITY OF THE GROUP OF DRAPED STRANDS SHALL BE LOCATED WITHIN 1/2″ OF THE THEORETICAL LOCATION SHOWN.

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

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

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



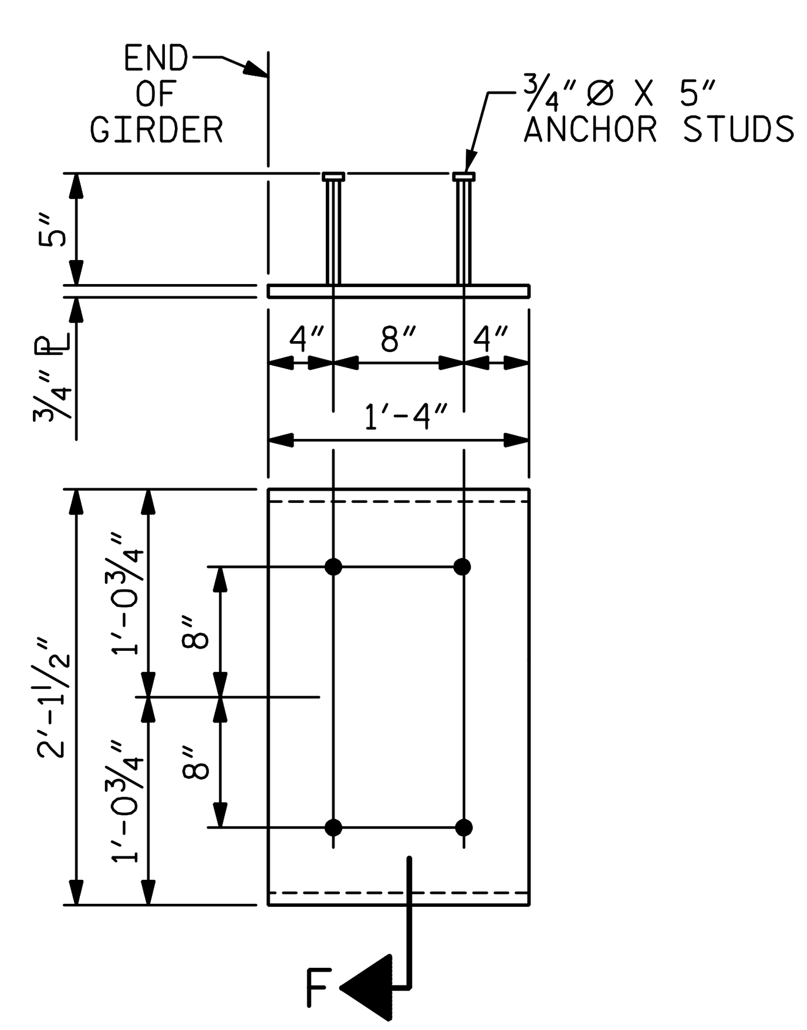
FORMED HOLES LOCATION FOR INTERMEDIATE STEEL DIAPHRAGMS

SPAN A DIMENSIONS TABLE

GDR.	DIM. D	DIM. E
A1	47′-6 11/16″	-
A2	38′-6 3/8″	8′-10″
A3	38′-5″	8′-9 1/16″
A4	38′-3 5/8″	8′-8 1/8″
A5	38′-2 3/8″	8′-7 3/16″
A6	38′-1 1/16″	8′-6 5/16″
A7	37′-11 7/8″	8′-5 7/16″
A8	37′-10 11/16″	8′-4 5/8″
A9	37′-9 1/2″	8′-3 3/4″
A10	37′-8 3/8″	-

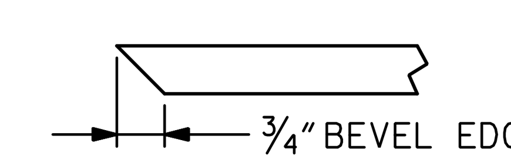
SPAN B DIMENSIONS TABLE

GDR.	DIM. F	DIM. G	DIM. H	DIM. I
B1	36′-11 9/16″	-	32′-1 7/8″	-
B2	28′-9 3/16″	8′-0 13/16″	24′-1 1/8″	7′-11 5/8″
B3	28′-8 7/16″	8′-0″	24′-0 3/4″	7′-10 13/16″
B4	28′-7 3/4″	7′-11 3/16″	24′-0 7/16″	7′-10 1/16″
B5	28′-7 1/16″	7′-10 3/8″	24′-0 1/16″	7′-9 5/16″
B6	28′-6 3/8″	7′-9 5/8″	23′-11 3/4″	7′-8 9/16″
B7	28′-5 11/16″	7′-8 7/8″	23′-11 7/16″	7′-7 13/16″
B8	28′-5 1/16″	7′-8 1/8″	23′-11 3/16″	7′-7 1/8″
B9	28′-4 3/8″	7′-7 7/16″	23′-10 7/8″	7′-6 7/16″
B10	28′-3 13/16″	-	31′-5 5/16″	-



EMBEDDED PLATE "B-1" DETAILS

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 3 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND

6/22/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

63″ PRESTRESSED CONCRETE MODIFIED BULB TEE GIRDER DETAILS

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

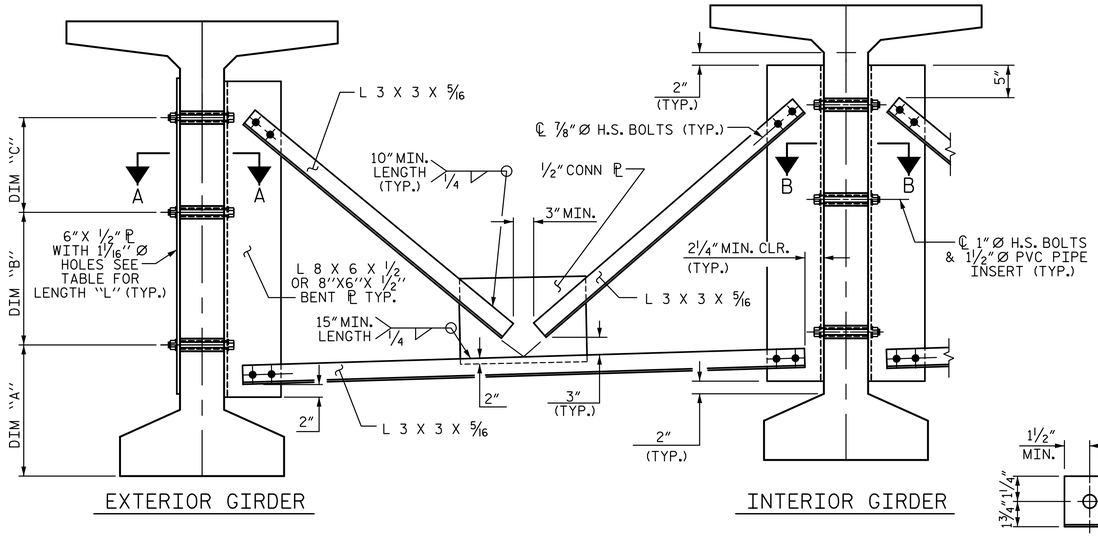
SHEET NO. S1-15

TOTAL SHEETS 36

DRAWN BY : VMW DATE : 4-17

CHECKED BY : AJP DATE : 4-17

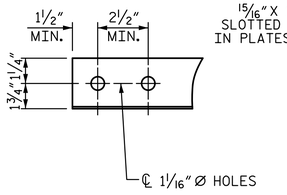
DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 5-17



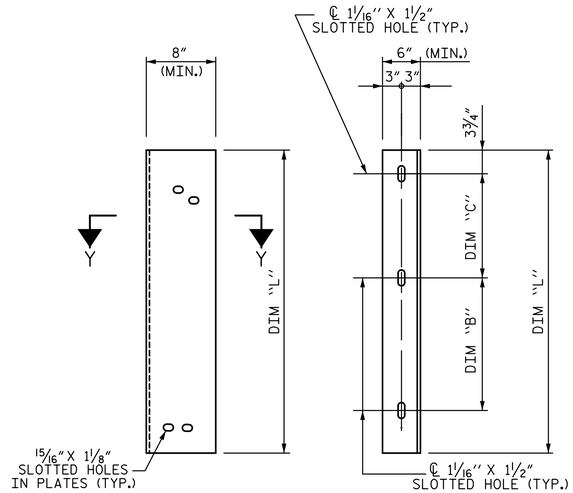
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

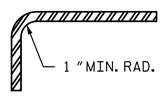


ANGLE END
(L 3 X 3 X 5/16)



DIAPHRAGM FACE

WEB FACE



SECTION Y-Y

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.

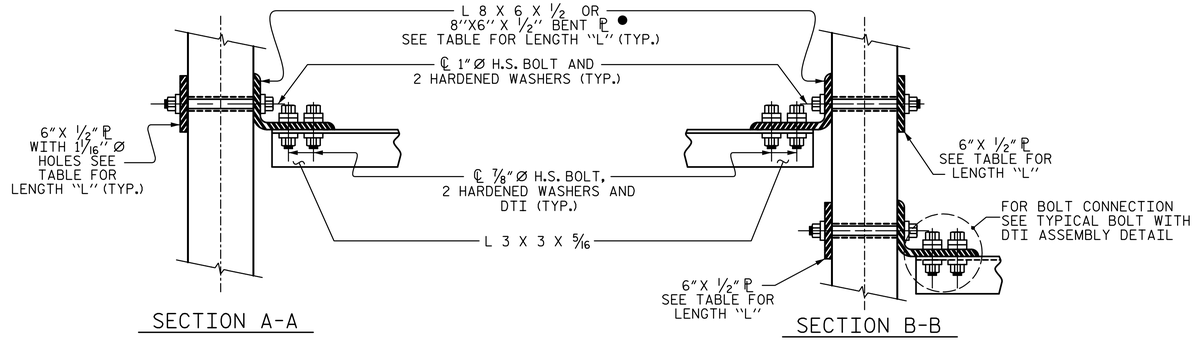
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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 PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
63" BULB TEE	1'-8 3/4"	1'-2 1/2"	1'-2 1/2"	3'-5"

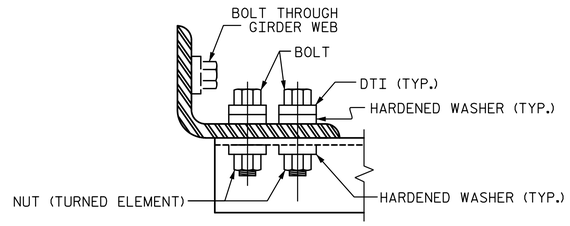


SECTION A-A

SECTION B-B

CONNECTION DETAILS

● SEE "FRAMING PLAN" SHEET FOR 8"X6"X1/2" BENT PL ANGLES



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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Docusigned by: Timothy J. Townsend
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND
6/22/2017

STV 100 Years

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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INTERMEDIATE STEEL DIAPHRAGM DETAILS FOR 63" PRESTRESSED CONCRETE MODIFIED BULB TEE GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-16
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

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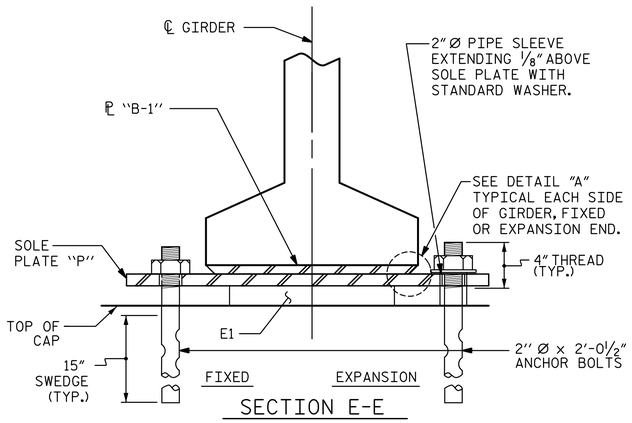
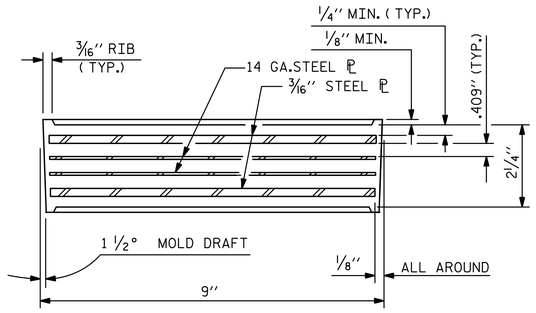
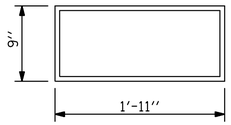


SECTION E-E



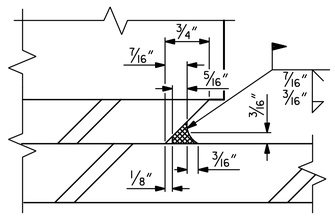
TYPICAL SECTION OF ELASTOMERIC BEARINGS



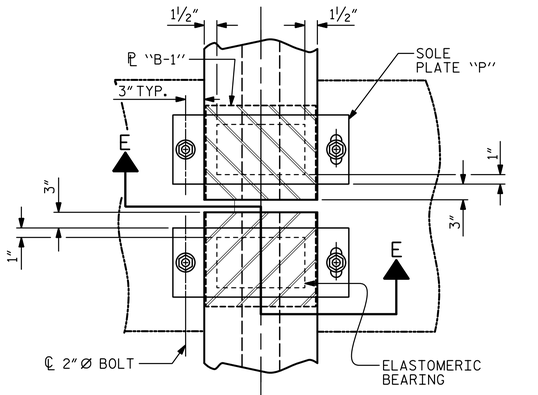
E1 (40 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

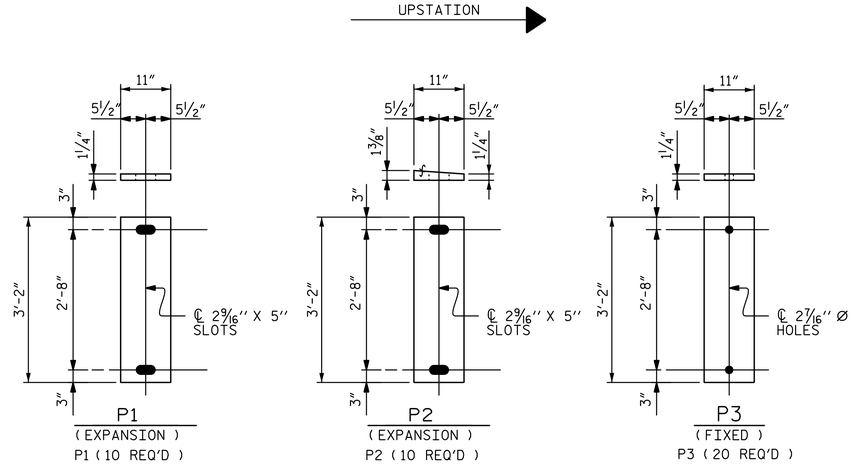


DETAIL "A"



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN END BENT)



SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L.(NO IMPACT)	
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.

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

DRAWN BY : VMW DATE : 4-17

CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 5-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

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ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-17
1			3			TOTAL SHEETS
2			4			36

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DEAD LOAD DEFLECTION TABLE FOR SPAN A											
	GIRDERS 1 & 10										
TENTH POINTS	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.039	0.074	0.101	0.119	0.125	0.119	0.101	0.074	0.039	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.018	0.035	0.048	0.056	0.059	0.056	0.048	0.035	0.018	0.000
FINAL CAMBER ▲	0″	1/4″	1/2″	5/8″	3/4″	13/16″	3/4″	5/8″	1/2″	1/4″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN A											
0.6″ LOW RELAXATION	GIRDERS 2-9										
TENTH POINTS	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.039	0.074	0.101	0.119	0.125	0.119	0.101	0.074	0.039	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.021	0.041	0.056	0.066	0.069	0.066	0.056	0.041	0.021	0.000
FINAL CAMBER ▲	0″	1/4″	3/8″	9/16″	5/8″	11/16″	5/8″	9/16″	3/8″	1/4″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
	GIRDERS 1 & 10										
TENTH POINTS	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.065	0.123	0.169	0.198	0.208	0.198	0.169	0.123	0.065	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.029	0.057	0.080	0.096	0.101	0.096	0.080	0.057	0.029	0.000
FINAL CAMBER ▲	0″	7/16″	13/16″	1 1/16″	1 1/4″	1 1/4″	1 1/4″	1 1/16″	13/16″	7/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN B											
	GIRDERS 2-9										
TENTH POINTS	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
CAMBER (GIRDER ALONE IN PLACE) ▲	0.000	0.065	0.123	0.169	0.198	0.208	0.198	0.169	0.123	0.065	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0.000	0.034	0.068	0.095	0.112	0.119	0.112	0.095	0.068	0.034	0.000
FINAL CAMBER ▲	0″	3/8″	11/16″	7/8″	1″	1 1/16″	1″	7/8″	11/16″	3/8″	0″

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-18
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 5-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : ACA	DATE : 5-17		

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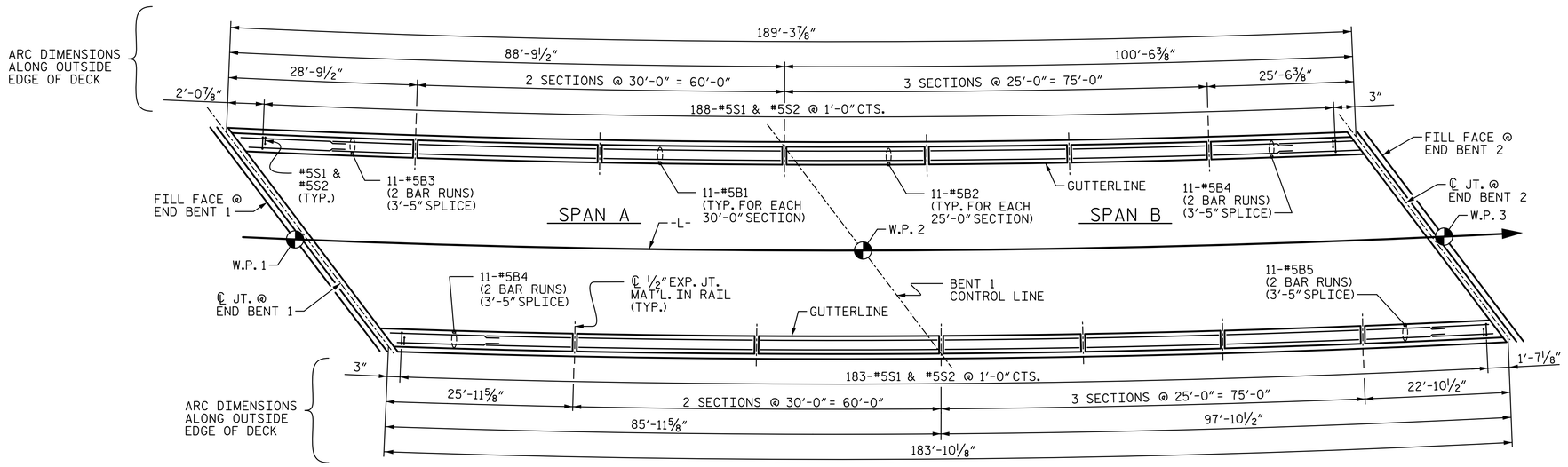
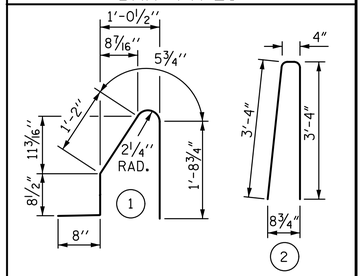


PLAN OF BARRIER RAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

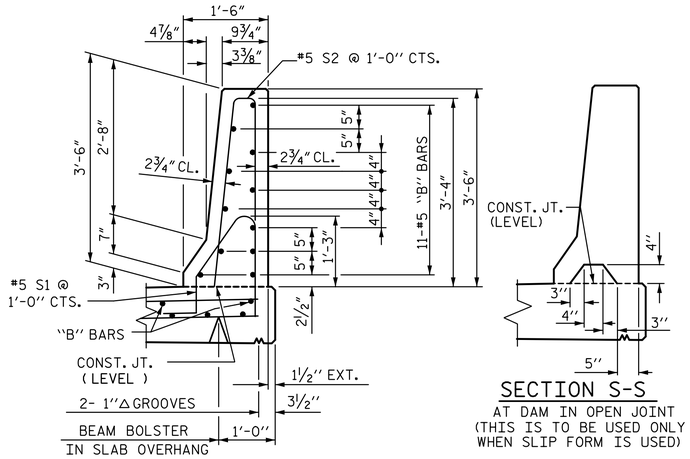
BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B1	44	#5	STR	29'-7"	1,358
✱ B2	66	#5	STR	24'-7"	1,692
✱ B3	22	#5	STR	15'-9"	361
✱ B4	44	#5	STR	15'-0"	688
✱ B5	22	#5	STR	12'-10"	294
✱ S1	371	#5	1	4'-9"	1,838
✱ S2	371	#5	2	7'-0"	2,709

✱ EPOXY COATED REINFORCING STEEL	8940 LBS.
CLASS AA CONCRETE	50.7 CU. YDS.
CONCRETE BARRIER RAIL SUPERSTRUCTURE	373.2 LIN. FT.
● APPROACH SLABS	71.3 LIN. FT.
TOTAL	444.5 LIN. FT.

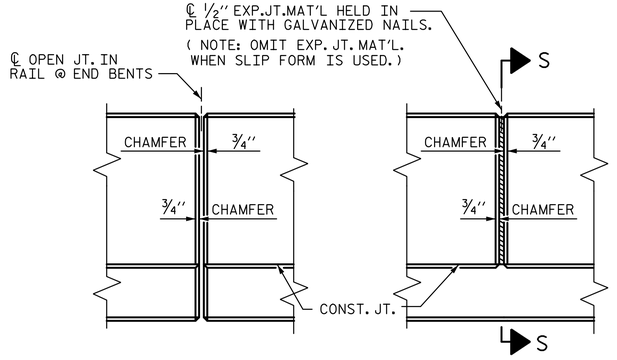
● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE BARRIER RAIL ON THE APPROACH SLABS, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET.



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

NOTES

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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SUPERSTRUCTURE

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-19
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 5-17		

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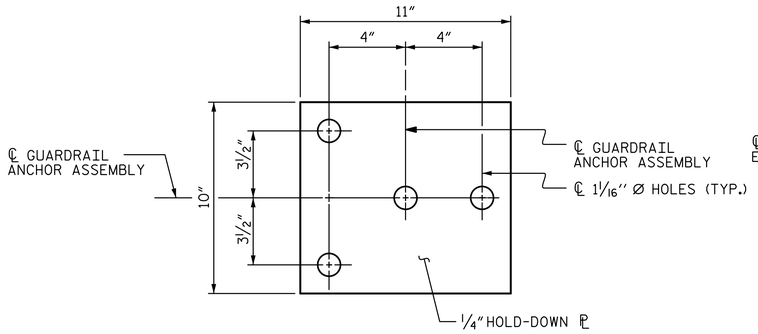
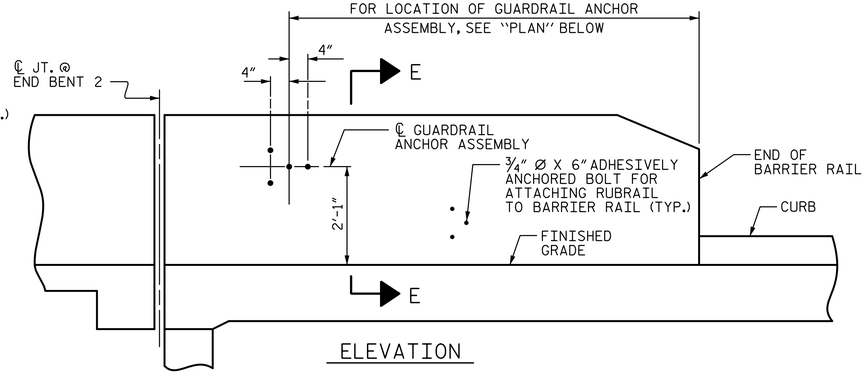


PLAN



ELEVATION

NOTES

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

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

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

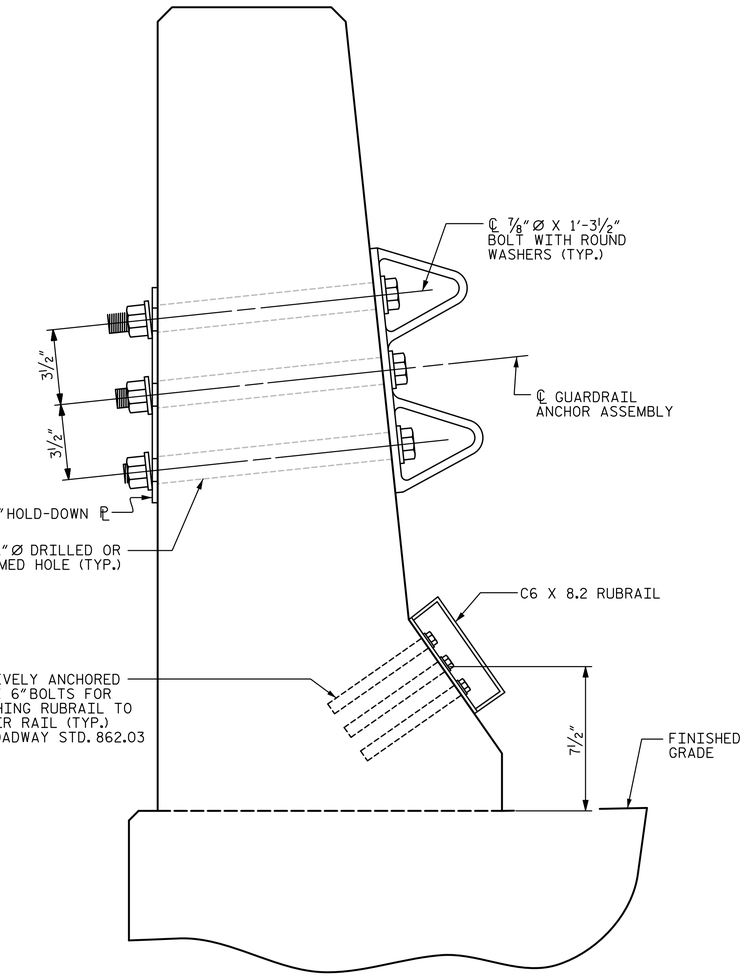
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

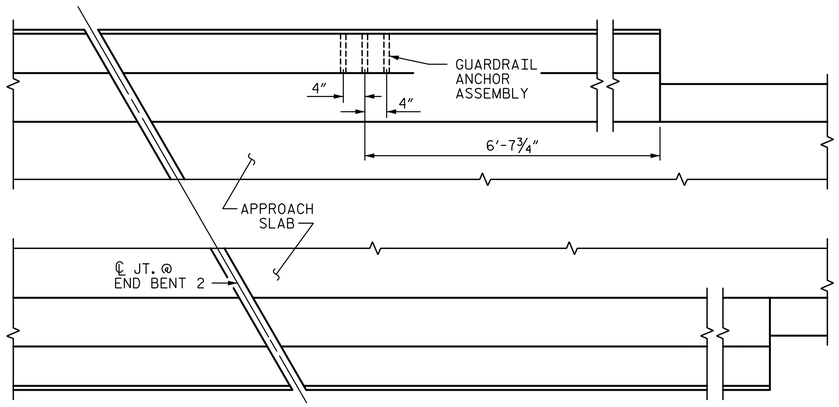
THE 1 ¼″ Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

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



SECTION E-E

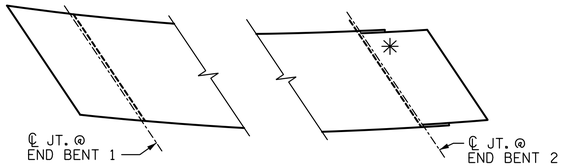
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 2



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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7/24/2017

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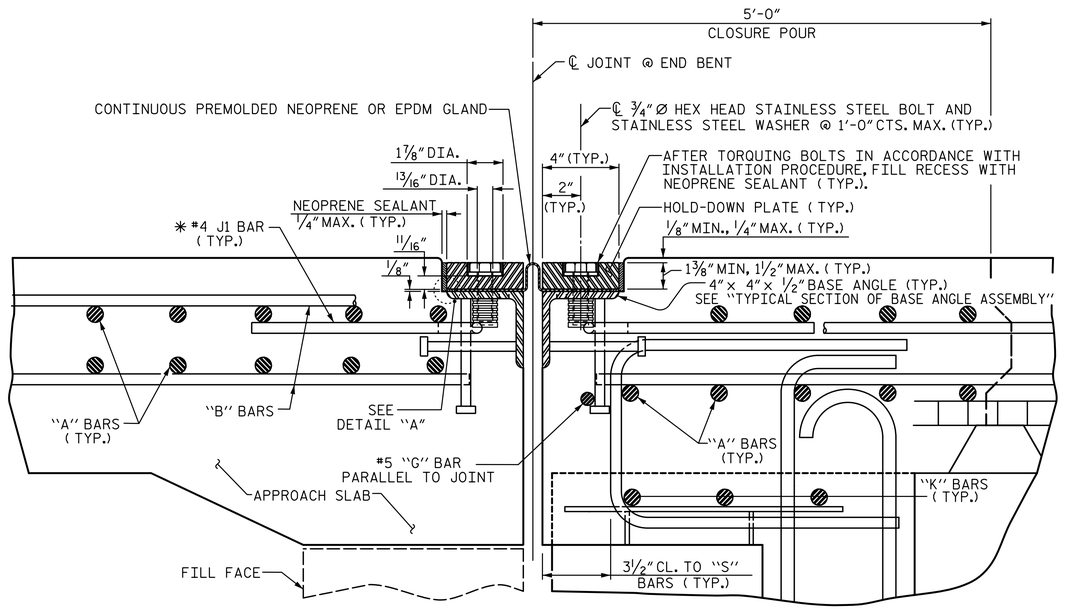
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-20
1			3			TOTAL SHEETS
2			4			36

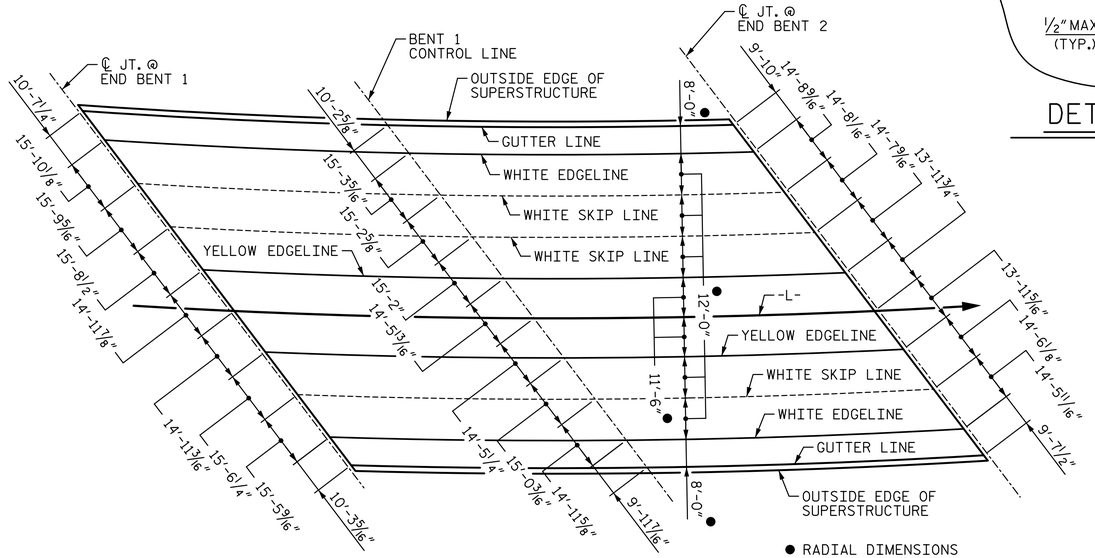
DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : ACA	DATE : 5-17		



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

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



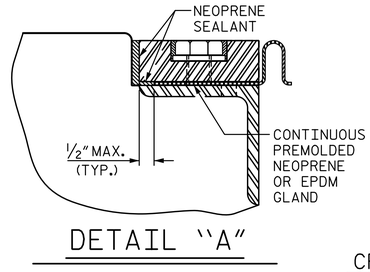
PAVEMENT MARKING ALIGNMENT

INSTALLATION PROCEDURE

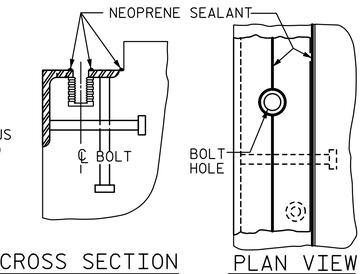
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO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

GENERAL NOTES

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

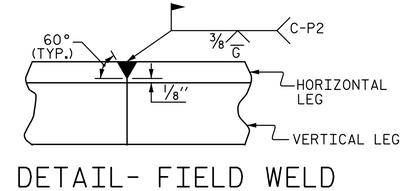


DETAIL "A"



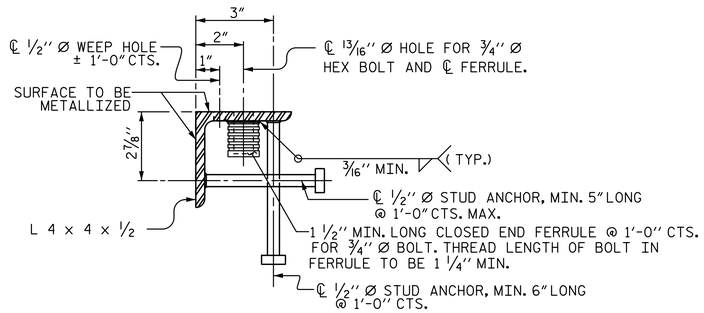
CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	50°-11'-34"	½"	1 5/16"	1¼"	1 1/16"
2	55°-29'-38"	⅝"	1 5/16"	1¼"	1 1/16"



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-21
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

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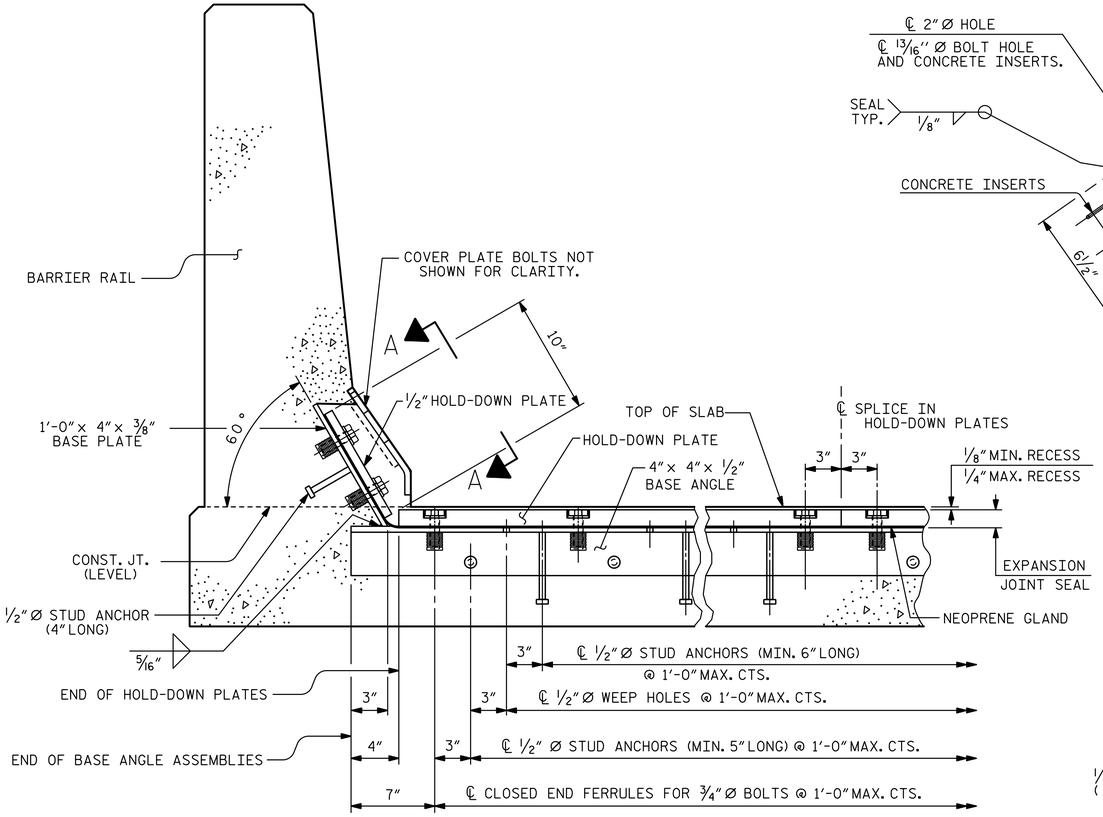
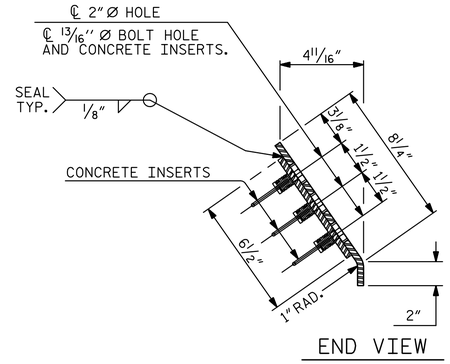
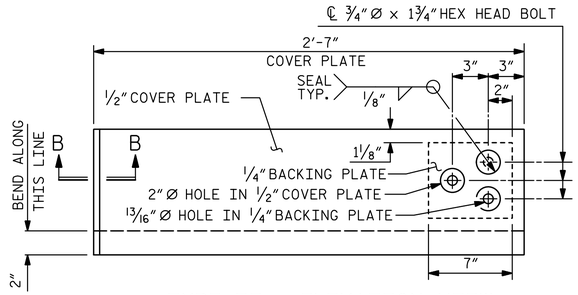


SECTION THRU RAIL NORMAL TO JOINT

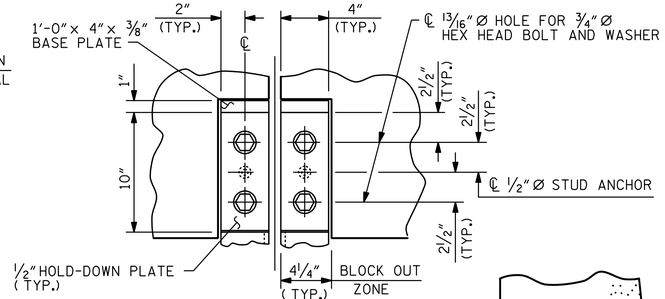


END VIEW

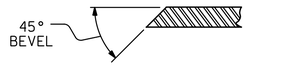


TYPE II - ELEVATION VIEW

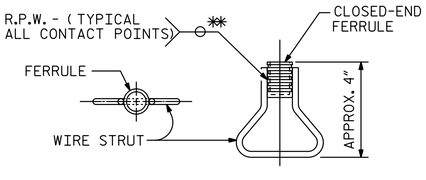
COVER PLATE DETAILS



SECTION A - A



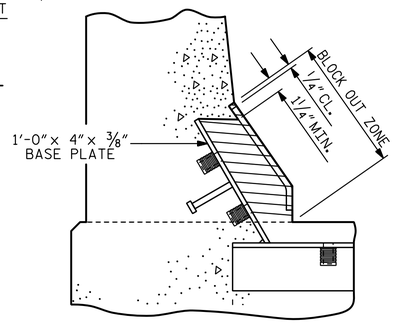
SECTION B - B



PLAN ELEVATION

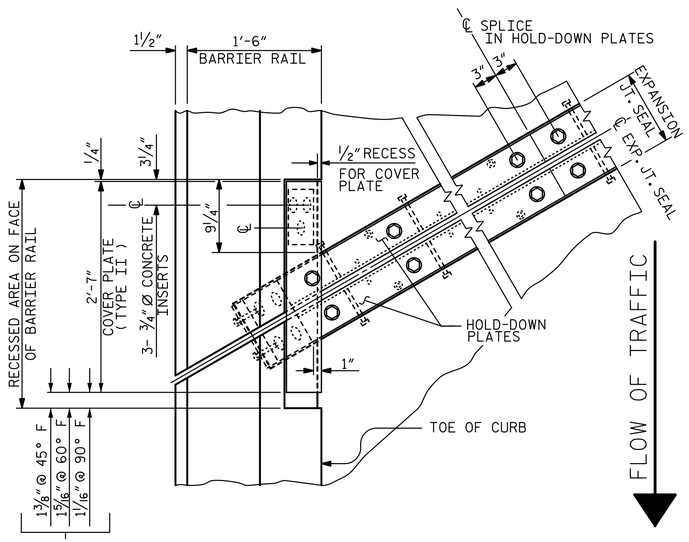
CONCRETE INSERT

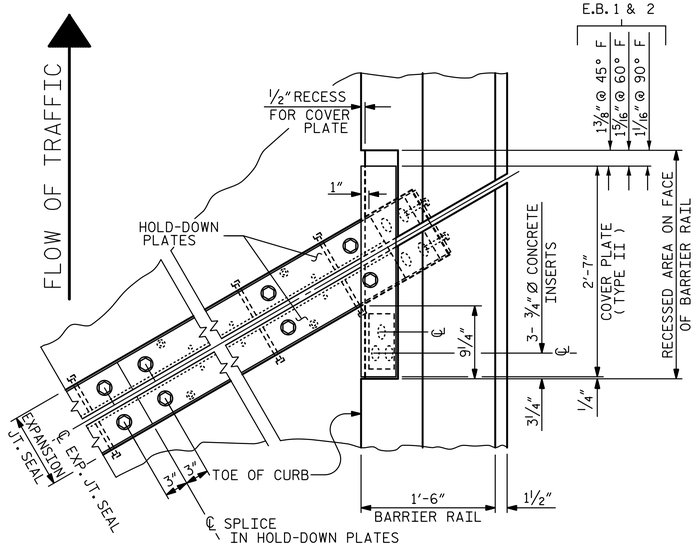
** EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.





PLAN OF EXPANSION JOINT SEAL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY L. TOWNSEND

6/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

STV 100 Years

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

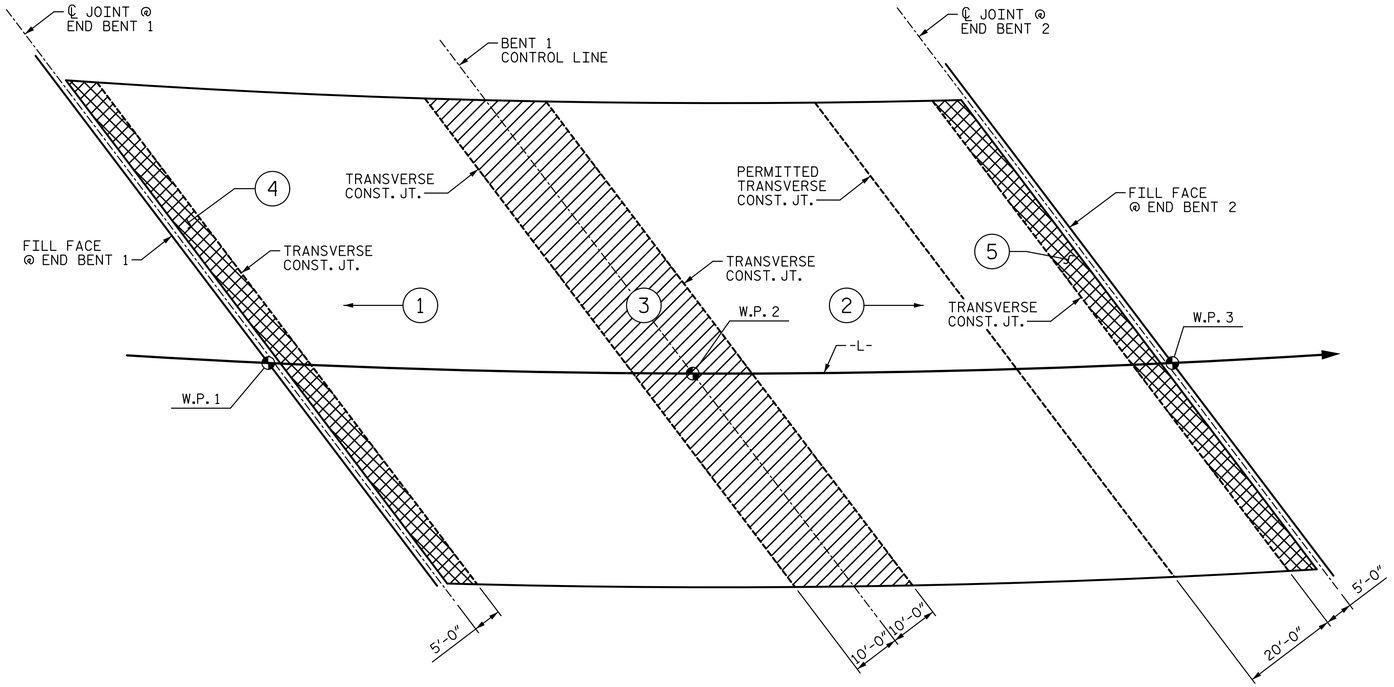
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-22
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

NOTE:
SEE SHEET 1 OF 2 FOR PAVEMENT MARKING ALIGNMENT DETAIL.

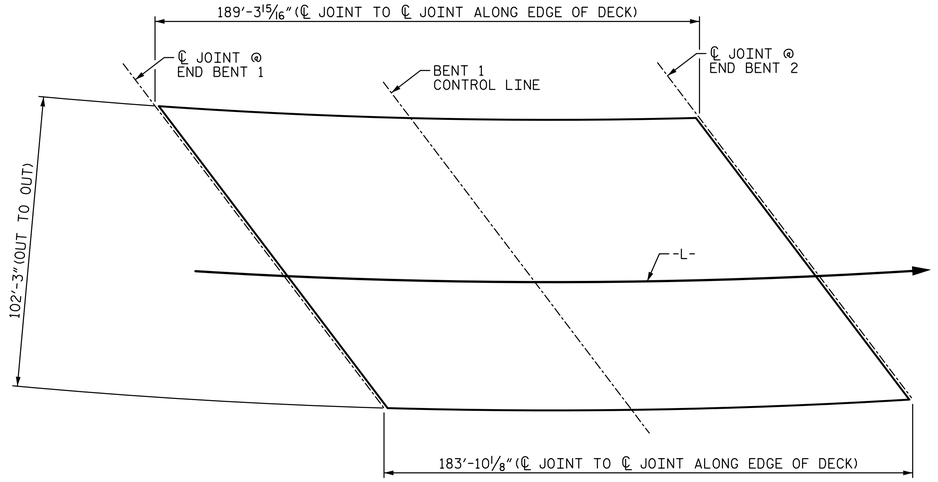
POUR SEQUENCE

TRANSVERSE CONSTRUCTION JOINTS ARE PARALLEL.



LEGEND:

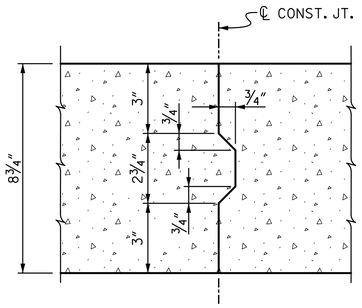
- DECK CLOSURE POUR AT JOINTS
- DECK CLOSURE POUR AT CONTINUOUS BENT
- (#) POUR NUMBER AND DIRECTION OF POUR



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 19,078)

NOTES:

1. CLOSURE POURS SHALL NOT BE CAST UNTIL SLAB CONCRETE IN ADJACENT POURS HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.
2. FOR DECK POUR CONCRETE QUANTITIES, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
3. POURS 3, 4, & 5 MAY BE POURED SIMULTANEOUSLY.



CONSTRUCTION JOINT DETAIL

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DECK POUR SEQUENCE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-23
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 5-17
CHECKED BY : AJP	DATE : 4-17		

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BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	200	#5	STR.	60′-0″	12,516	A233	8	#5	STR.	7′-9″	65	✳ B1	140	#5	STR.	31′-9″	4,636
✳ A2	200	#5	STR.	44′-9″	9,335	A234	8	#5	STR.	6′-5″	54	✳ B2	140	#5	STR.	37′-7″	5,488
A11	200	#5	STR.	60′-0″	12,516	A235	6	#5	STR.	7′-0″	44	✳ B3	70	#7	STR.	60′-0″	8,585
A12	200	#5	STR.	44′-5″	9,265	A236	6	#5	STR.	4′-0″	25	✳ B4	67	#7	STR.	30′-0″	4,108
												✳ B5	67	#7	STR.	20′-0″	2,739
✳ A101	8	#5	STR.	51′-11″	433	✳ A301	8	#5	STR.	52′-1″	435	B6	380	#5	STR.	48′-10″	19,355
✳ A102	8	#5	STR.	50′-6″	421	✳ A302	8	#5	STR.	50′-7″	422						
✳ A103	8	#5	STR.	49′-2″	410	✳ A303	8	#5	STR.	49′-2″	410	✳ G1	3	#5	STR.	46′-0″	144
✳ A104	8	#5	STR.	47′-9″	398	✳ A304	8	#5	STR.	47′-8″	398	✳ G2	3	#5	STR.	43′-0″	135
✳ A105	8	#5	STR.	46′-4″	387	✳ A305	8	#5	STR.	46′-3″	386						
✳ A106	8	#5	STR.	44′-11″	375	✳ A306	8	#5	STR.	44′-9″	373	✳ J1	251	#4	8	1′-5″	238
✳ A107	8	#5	STR.	43′-7″	364	✳ A307	8	#5	STR.	43′-4″	362						
✳ A108	8	#5	STR.	42′-2″	352	✳ A308	8	#5	STR.	41′-10″	349	✳ K1	4	#8	1	18′-8″	199
✳ A109	8	#5	STR.	40′-9″	340	✳ A309	8	#5	STR.	40′-5″	337	✳ K2	4	#8	1	17′-8″	189
✳ A110	8	#5	STR.	39′-5″	329	✳ A310	8	#5	STR.	38′-11″	325	✳ K3	16	#8	2	30′-4″	1,296
✳ A111	8	#5	STR.	38′-0″	317	✳ A311	8	#5	STR.	37′-5″	312	✳ K4	16	#8	2	28′-8″	1,225
✳ A112	8	#5	STR.	36′-7″	305	✳ A312	8	#5	STR.	36′-0″	300	✳ K5	9	#6	STR.	8′-6″	115
✳ A113	8	#5	STR.	35′-3″	294	✳ A313	8	#5	STR.	34′-6″	288	✳ K6	9	#6	STR.	10′-6″	142
✳ A114	8	#5	STR.	33′-10″	282	✳ A314	8	#5	STR.	33′-1″	276	✳ K7	9	#6	STR.	12′-6″	169
✳ A115	8	#5	STR.	32′-6″	271	✳ A315	8	#5	STR.	31′-7″	264	✳ K8	9	#6	STR.	7′-9″	105
✳ A116	8	#5	STR.	31′-1″	259	✳ A316	8	#5	STR.	30′-1″	251	✳ K9	9	#6	STR.	9′-9″	132
✳ A117	8	#5	STR.	29′-9″	248	✳ A317	8	#5	STR.	28′-8″	239	✳ K10	9	#6	STR.	11′-9″	159
✳ A118	8	#5	STR.	28′-4″	236	✳ A318	8	#5	STR.	27′-2″	227	K12	18	#4	STR.	8′-8″	104
✳ A119	8	#5	STR.	26′-11″	225	✳ A319	8	#5	STR.	25′-8″	214	K13	72	#4	STR.	12′-1″	581
✳ A120	8	#5	STR.	25′-7″	213	✳ A320	8	#5	STR.	24′-2″	202	K14	18	#4	STR.	8′-4″	100
✳ A121	8	#5	STR.	24′-2″	202	✳ A321	8	#5	STR.	22′-9″	190	K15	12	#4	9	8′-3″	66
✳ A122	8	#5	STR.	22′-10″	191	✳ A322	8	#5	STR.	21′-3″	177	K16	48	#4	10	16′-7″	532
✳ A123	8	#5	STR.	21′-6″	179	✳ A323	8	#5	STR.	19′-9″	165						
✳ A124	8	#5	STR.	20′-1″	168	✳ A324	8	#5	STR.	18′-3″	152	✳ S1	153	#5	3	6′-0″	957
✳ A125	8	#5	STR.	18′-9″	156	✳ A325	8	#5	STR.	16′-10″	140	✳ S2	153	#4	4	7′-0″	715
✳ A126	8	#5	STR.	17′-4″	145	✳ A326	8	#5	STR.	15′-4″	128	✳ S3	54	#4	6	5′-0″	180
✳ A127	8	#5	STR.	16′-0″	134	✳ A327	8	#5	STR.	13′-10″	115	S4	369	#4	5	3′-7″	883
✳ A128	8	#5	STR.	14′-7″	122	✳ A328	8	#5	STR.	12′-4″	103	S5	18	#4	4	9′-2″	110
✳ A129	8	#5	STR.	13′-3″	111	✳ A329	8	#5	STR.	10′-9″	90						
✳ A130	8	#5	STR.	11′-11″	99	✳ A330	8	#5	STR.	8′-3″	69	U1	63	#4	7	15′-6″	652
✳ A131	8	#5	STR.	9′-5″	79	✳ A331	8	#5	STR.	6′-9″	56						
✳ A132	8	#5	STR.	8′-0″	67	✳ A332	8	#5	STR.	5′-3″	44						
✳ A133	8	#5	STR.	6′-8″	56	✳ A333	4	#5	STR.	5′-0″	21						
✳ A134	8	#5	STR.	5′-4″	45	✳ A334	3	#5	STR.	3′-6″	11						
✳ A135	4	#5	STR.	5′-0″	21	✳ A335	1	#6	STR.	17′-7″	26						
✳ A136	4	#5	STR.	3′-6″	15	✳ A336	1	#6	STR.	18′-7″	28						
✳ A137	1	#6	STR.	22′-4″	34	✳ A337	1	#6	STR.	19′-7″	29						
✳ A138	1	#6	STR.	23′-5″	35												
✳ A139	1	#6	STR.	24′-6″	37	A401	8	#5	STR.	52′-1″	435						
						A402	8	#5	STR.	50′-7″	422						
A201	8	#5	STR.	51′-11″	433	A403	8	#5	STR.	49′-2″	410						
A202	8	#5	STR.	50′-6″	421	A404	8	#5	STR.	47′-8″	398						
A203	8	#5	STR.	49′-2″	410	A405	8	#5	STR.	46′-3″	386						
A204	8	#5	STR.	47′-9″	398	A406	8	#5	STR.	44′-9″	373						
A205	8	#5	STR.	46′-4″	387	A407	8	#5	STR.	43′-4″	362						
A206	8	#5	STR.	44′-11″	375	A408	8	#5	STR.	41′-10″	349						
A207	8	#5	STR.	43′-7″	364	A409	8	#5	STR.	40′-5″	337						
A208	8	#5	STR.	42′-2″	352	A410	8	#5	STR.	38′-11″	325						
A209	8	#5	STR.	40′-9″	340	A411	8	#5	STR.	37′-5″	312						
A210	8	#5	STR.	39′-5″	329	A412	8	#5	STR.	36′-0″	300						
A211	8	#5	STR.	38′-0″	317	A413	8	#5	STR.	34′-6″	288						
A212	8	#5	STR.	36′-7″	305	A414	8	#5	STR.	33′-1″	276						
A213	8	#5	STR.	35′-3″	294	A415	8	#5	STR.	31′-7″	264						
A214	8	#5	STR.	33′-10″	282	A416	8	#5	STR.	30′-1″	251						
A215	8	#5	STR.	32′-6″	271	A417	8	#5	STR.	28′-8″	239						
A216	8	#5	STR.	31′-1″	259	A418	8	#5	STR.	27′-2″	227						
A217	8	#5	STR.	29′-9″	248	A419	8	#5	STR.	25′-8″	214						
A218	8	#5	STR.	28′-4″	236	A420	8	#5	STR.	24′-2″	202						
A219	8	#5	STR.	26′-11″	225	A421	8	#5	STR.	22′-9″	190						
A220	8	#5	STR.	25′-7″	213	A422	8	#5	STR.	21′-3″	177						
A221	8	#5	STR.	24′-2″	202	A423	8	#5	STR.	19′-9″	165						
A222	8	#5	STR.	22′-10″	191	A424	8	#5	STR.	18′-3″	152						
A223	8	#5	STR.	21′-6″	179	A425	8	#5	STR.	16′-10″	140						
A224	8	#5	STR.	20′-1″	168	A426	8	#5	STR.	15′-4″	128						
A225	8	#5	STR.	18′-9″	156	A427	8	#5	STR.	13′-10″	115						
A226	8	#5	STR.	17′-4″	145	A428	8	#5	STR.	12′-4″	103						
A227	8	#5	STR.	16′-0″	134	A429	8	#5	STR.	10′-9″	90						
A228	8	#5	STR.	14′-7″	122	A430	8	#5	STR.	9′-3″	77						
A229	8	#5	STR.	13′-3″	111	A431	8	#5	STR.	7′-9″	65						
A230	8	#5	STR.	11′-11″	99	A432	8	#5	STR.	6′-3″	52						
A231	8	#5	STR.	10′-5″	87	A433	5	#5	STR.	7′-0″	37						
A232	8	#5	STR.	9′-1″	76	A434	5	#5	STR.	4′-6″	23						

✳ EPOXY COATED REINFORCING STEEL	69,776 LBS.
REINFORCING STEEL	60,365 LBS.

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

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, PARAPET, AND BARRIER RAIL		APPROACH SLABS		PARAPET AND BARRIER RAIL
	EPOXY COATED	UNCOATED	EPOXY COATED	UNCOATED	
#4	2′-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″			

SUPERSTRUCTURE BILL OF MATERIAL

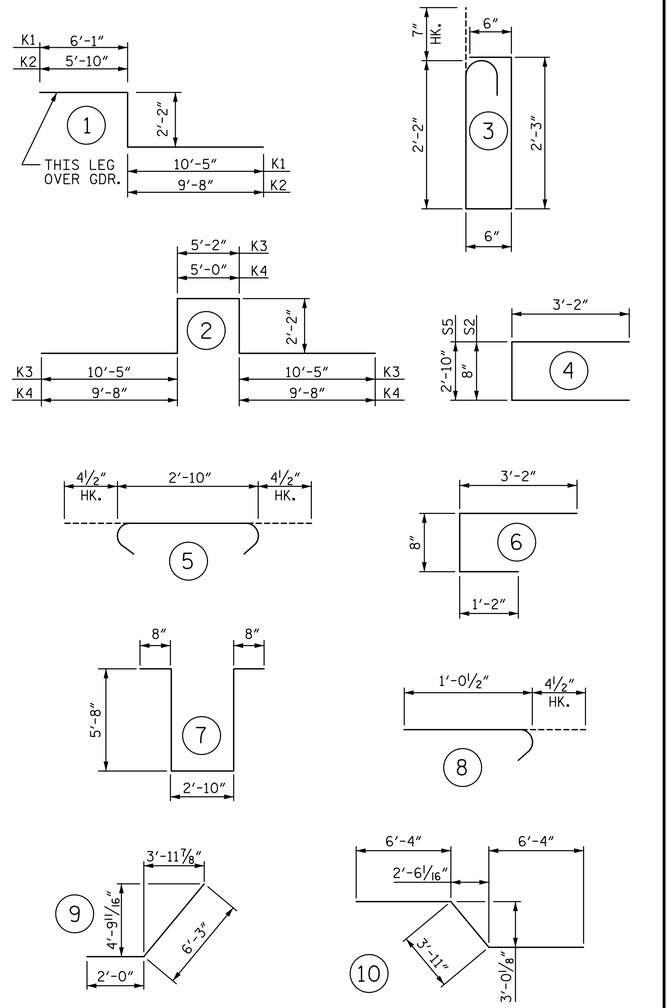
	CLASS AA CONCRETE	EPOXY COATED REINFORCING STEEL	REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	223.4	--	--
POUR 2	263.5	--	--
POUR 3	154.1	--	--
POUR 4	31.0	--	--
POUR 5	28.8	--	--
TOTALS ●	700.8	69,776	60,365

● QUANTITIES FOR BARRIER RAIL AND CONCRETE ISLAND ARE NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	3,443	SQ.FT.
BRIDGE DECK	13,472	SQ.FT.
TOTAL	16,915	SQ.FT.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-24
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW DATE : 4-17

CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 5-17

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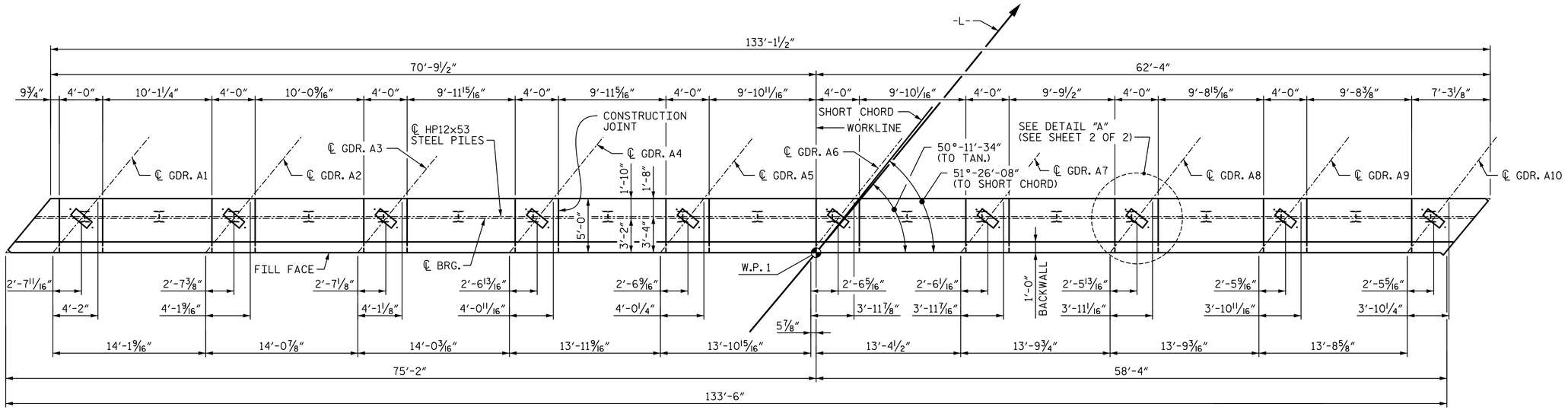
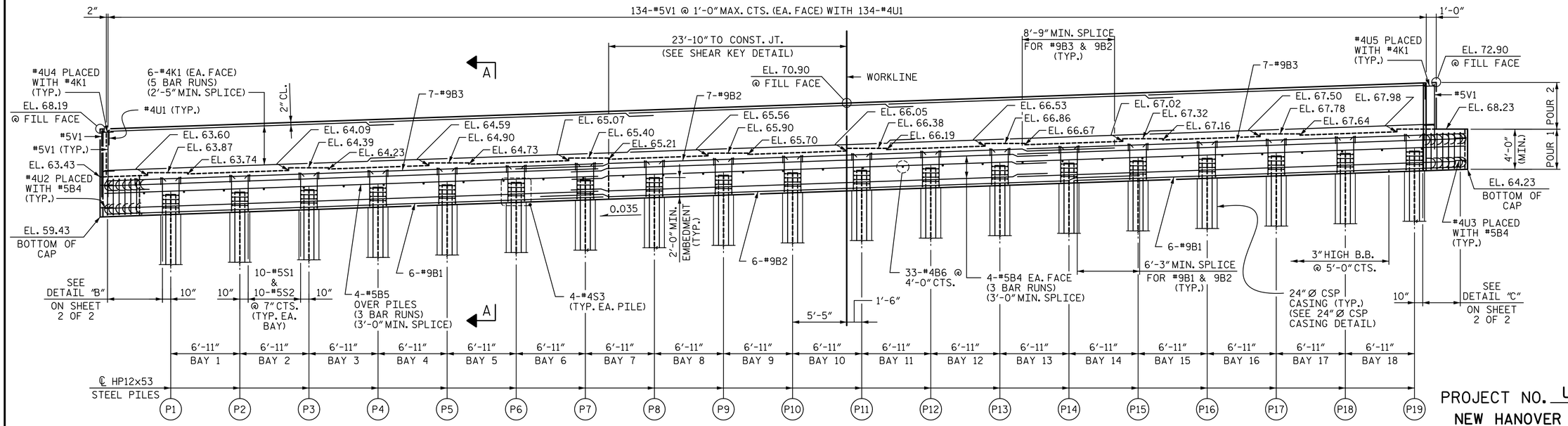


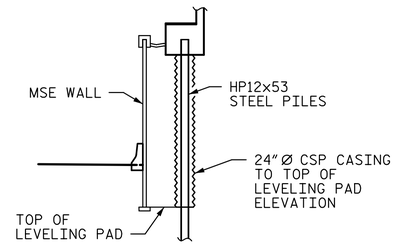
PLAN
(24"Ø CSP CASING NOT SHOWN FOR CLARITY)



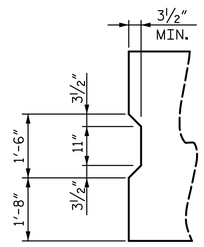
ELEVATION
(LOOKING IN THE DIRECTION OF STATIONING)

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	61.69
P2	61.93
P3	62.17
P4	62.41
P5	62.65
P6	62.90
P7	63.14
P8	63.38
P9	63.62
P10	63.86
P11	64.11
P12	64.35
P13	64.59
P14	64.83
P15	65.08
P16	65.32
P17	65.56
P18	65.80
P19	66.04

NOTES:
1. STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
2. BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
3. THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
4. THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.
5. DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.
6. PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



24"Ø CSP CASING DETAIL



SHEAR KEY DETAIL

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-
SHEET 1 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/22/2017

STV 100 years
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900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-25
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW DATE : 4-17
CHECKED BY : TJT DATE : 4-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

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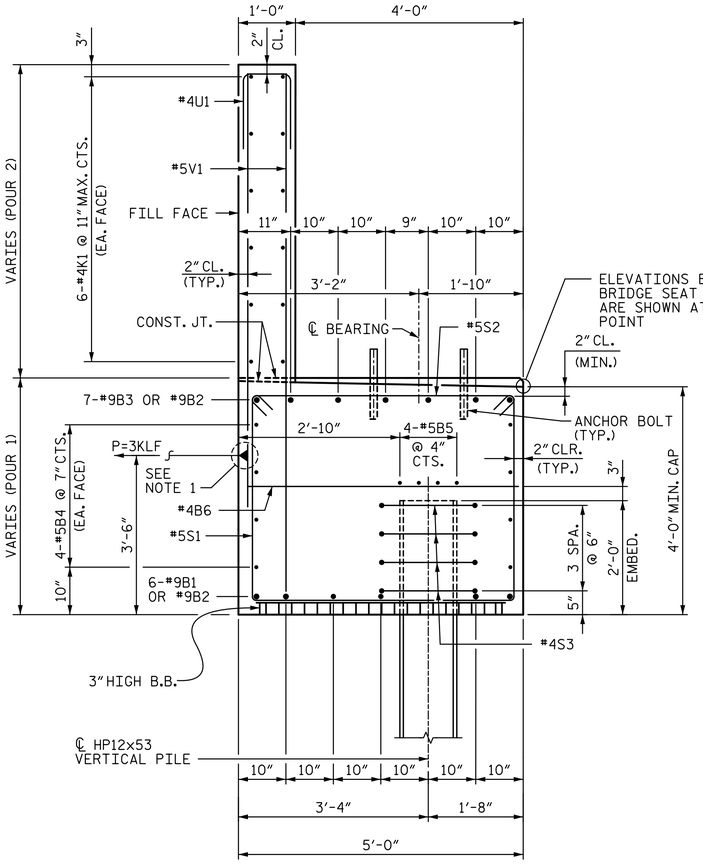
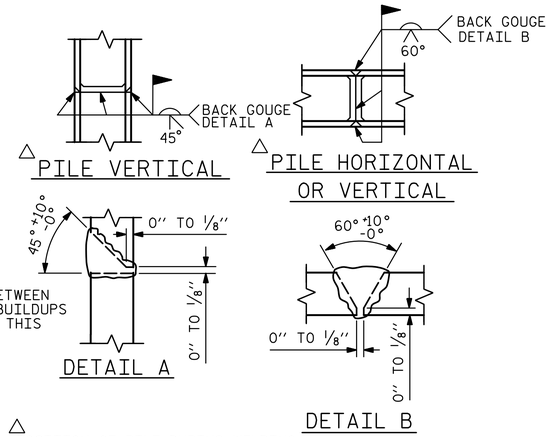
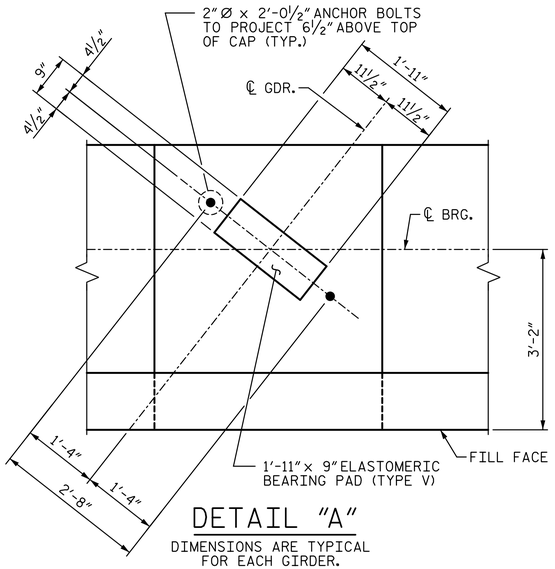


SECTION A-A



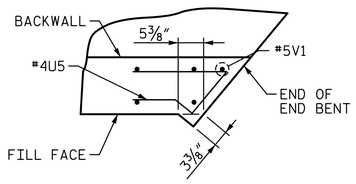
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER.



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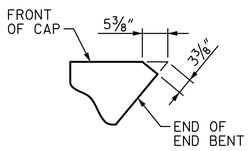

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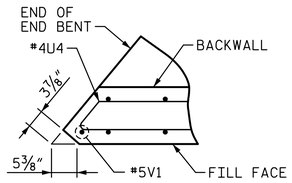

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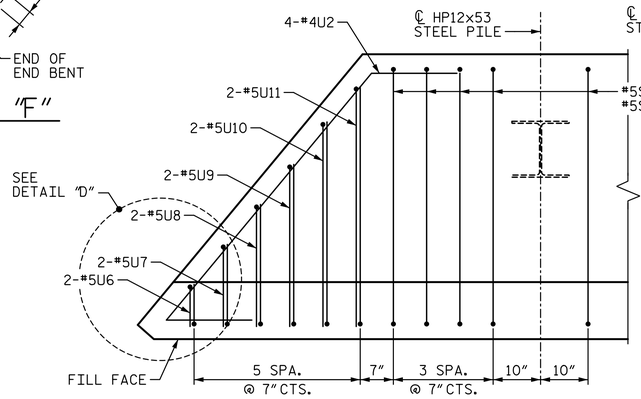
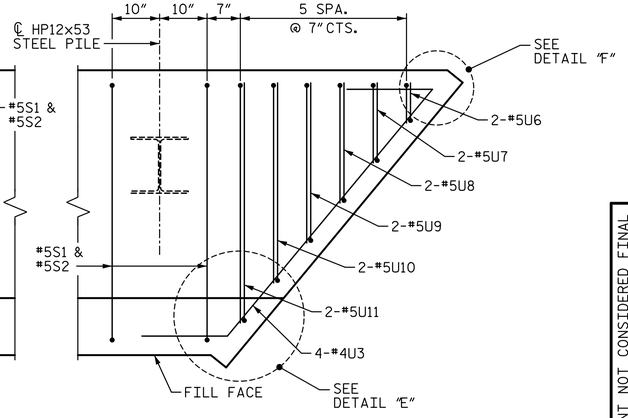


DETAIL "B"

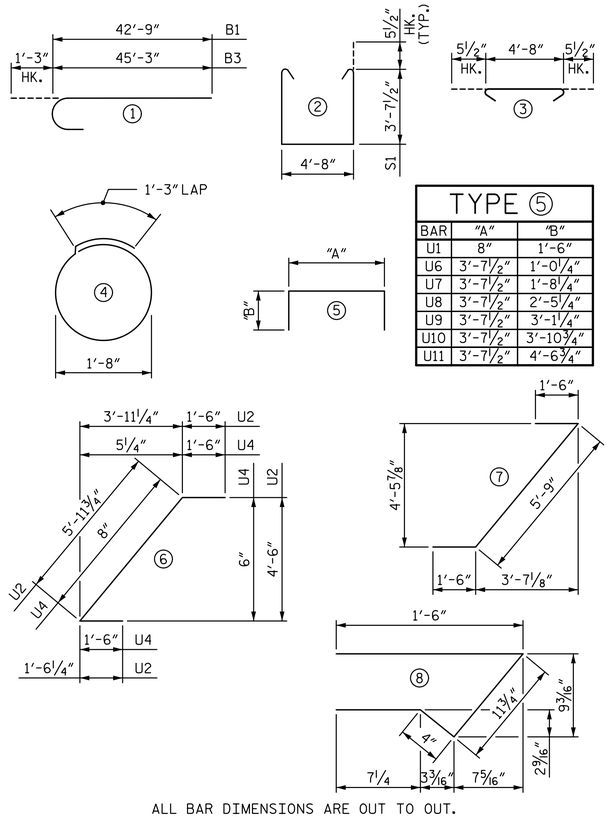
("B" BARS & "V" BARS NOT SHOWN FOR CLARITY)



DETAIL "C"

("B" BARS & "V" BARS NOT SHOWN FOR CLARITY)

BAR TYPES



TYPE ⑤

BAR	"A"	"B"
U1	8"	1'-6"
U6	3'-7 1/2"	1'-0 1/4"
U7	3'-7 1/2"	1'-8 1/4"
U8	3'-7 1/2"	2'-5 1/4"
U9	3'-7 1/2"	3'-1 1/4"
U10	3'-7 1/2"	3'-10 3/4"
U11	3'-7 1/2"	4'-6 3/4"

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF REINFORCING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	1	44'-0"	1,795
B2	13	#9	STR	60'-0"	2,652
B3	14	#9	1	46'-6"	2,213
B4	24	#5	STR	46'-4"	1,160
B5	12	#5	STR	46'-4"	580
B6	33	#4	STR	4'-8"	103
K1	60	#4	STR	28'-7"	1,146
S1	185	#5	2	12'-10"	2,476
S2	185	#5	3	5'-7"	1,077
S3	76	#4	4	6'-6"	330
U1	134	#4	5	3'-8"	328
U2	4	#4	6	9'-0"	24
U3	4	#4	7	8'-9"	23
U4	6	#4	6	3'-8"	15
U5	6	#4	8	3'-5"	14
U6	4	#5	5	5'-8"	24
U7	4	#5	5	7'-0"	29
U8	4	#5	5	8'-6"	35
U9	4	#5	5	9'-10"	41
U10	4	#5	5	11'-5"	48
U11	4	#5	5	12'-9"	53
V1	270	#5	STR	8'-2"	2,300

QUANTITIES

REINFORCING STEEL	LBS.	16,467
CLASS A CONCRETE:		
POUR 1:		
CAP	C.Y.	100.3
POUR 2:		
BACKWALL	C.Y.	23.6
TOTAL	C.Y.	123.9
HP 12x53 STEEL PILES	NO.	19
	LIN. FEET	1,140
PILE SETUP FOR HP 12x53	EA.	19
PILE REDRIVES	EA.	9

NOTES:

1. ABUTMENT RESTRAINTS (STRAPS) ARE REQUIRED ALONG THE CAP AS SHOWN. THE 3kIf LOAD PROVIDED IS A FACTORED LOAD. THE SPACING AND LENGTH OF STRAPS SHALL BE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO INSTALLATION. ANY ADDITIONAL CONSTRUCTION LOADS THAT WILL APPLY LOAD TO THE STRAPS (INCLUDING BUT NOT LIMITED TO CRANE LOADS) SHALL BE INCLUDED IN THE STRAP DESIGN AND SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACING CONSTRUCTION LOADS ON THE APPROACH FILL. ALL COSTS ASSOCIATED WITH THE DESIGN AND INSTALLATION, INCLUDING LABOR AND INCIDENTALS, OF THE STRAPS SHALL BE INCLUDED IN THE VARIOUS CONTRACT BID ITEMS. NO ADDITIONAL PAYMENT WILL BE MADE.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 OF 2 AND "FOUNDATION LAYOUT" SHEET.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 2

DRAWN BY : VMW DATE : 4-17

CHECKED BY : TJT DATE : 4-17

DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

STV 100 Years

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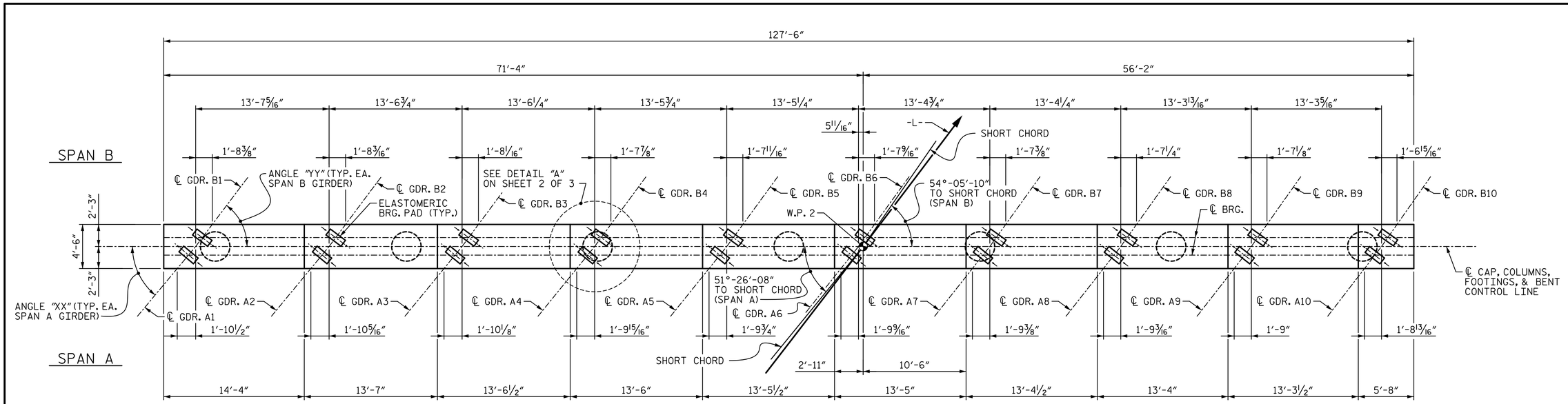
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

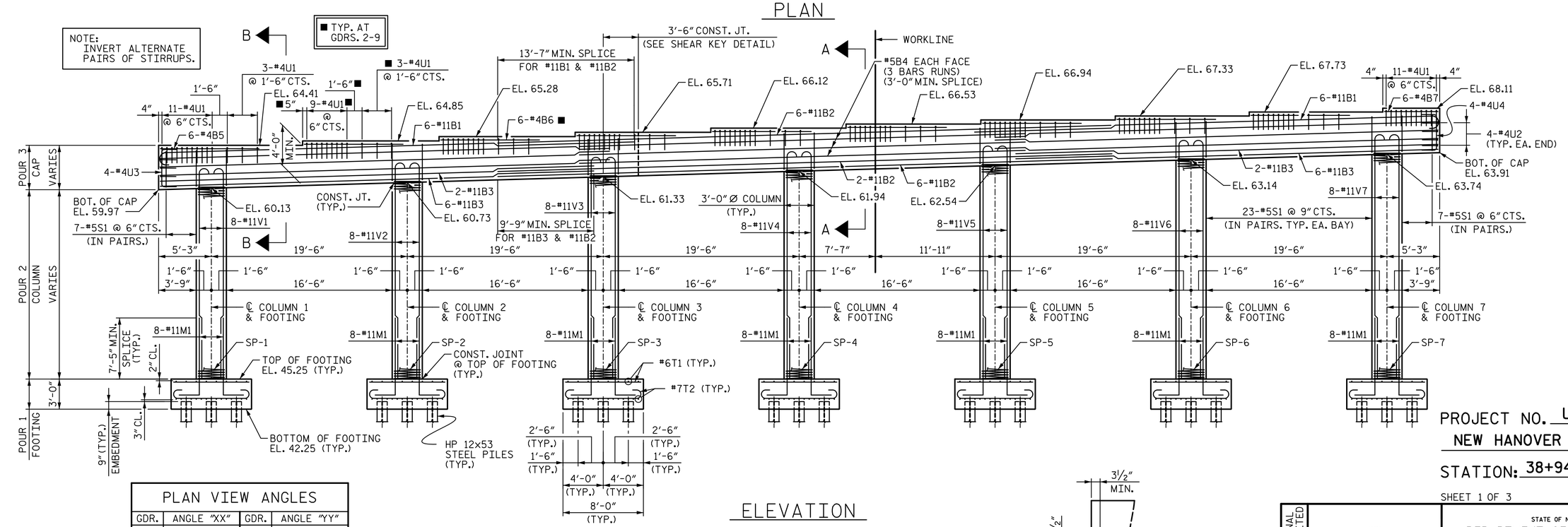
SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-26
1			3			TOTAL SHEETS
2			4			36



PLAN



ELEVATION

PLAN VIEW ANGLES			
GDR.	ANGLE "XX"	GDR.	ANGLE "YY"
A1	50°-11'-18"	B1	52°-57'-17"
A2	50°-26'-36"	B2	53°-11'-09"
A3	50°-41'-40"	B3	53°-24'-48"
A4	50°-56'-32"	B4	53°-38'-17"
A5	51°-11'-11"	B5	53°-51'-35"
A6	51°-25'-38"	B6	54°-04'-43"
A7	51°-39'-53"	B7	54°-17'-40"
A8	51°-53'-56"	B8	54°-30'-27"
A9	52°-07'-48"	B9	54°-43'-04"
A10	52°-21'-29"	B10	54°-55'-31"

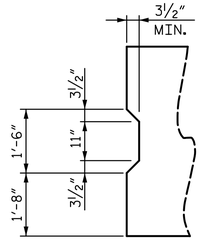
NOTES:

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

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.

SEE SHEET 2 OF 3 FOR SECTIONS CALLED OUT ON ELEVATION VIEW AND DETAIL A.



SHEAR KEY DETAIL

DRAWN BY : VMW DATE : 4-17
CHECKED BY : TJT DATE : 4-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/22/2017

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STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

BENT 1

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 38+94.20 -L-

SHEET 1 OF 3

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-27
1			3			TOTAL SHEETS
2			4			36

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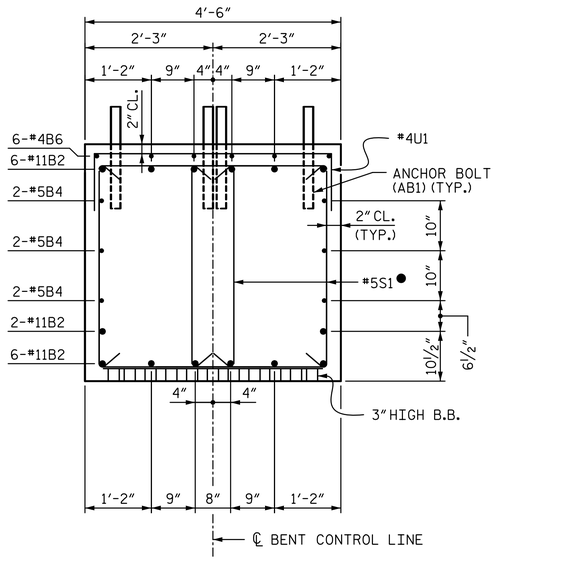
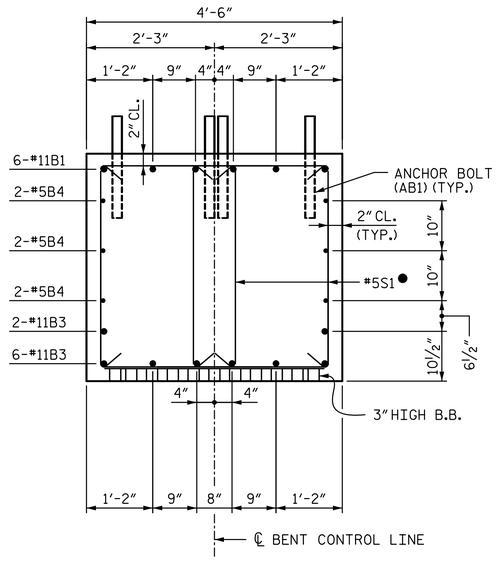
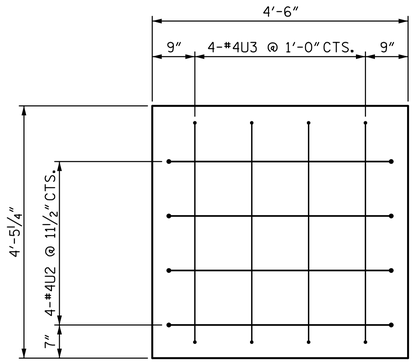


SECTION A-A

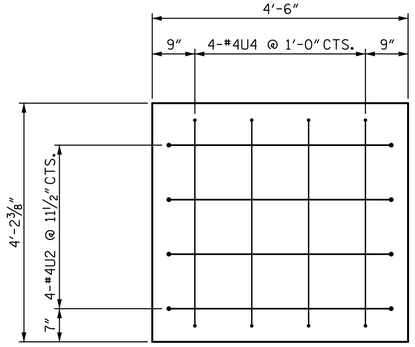
● INVERT ALTERNATE PAIRS OF STIRRUPS



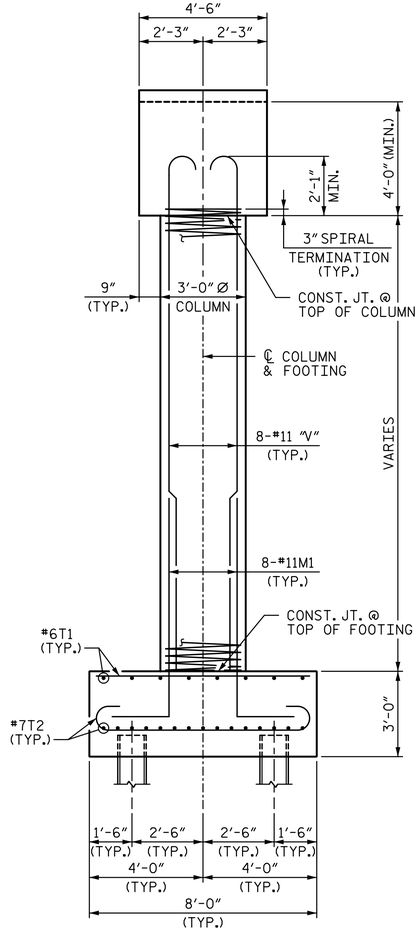
SECTION B-B



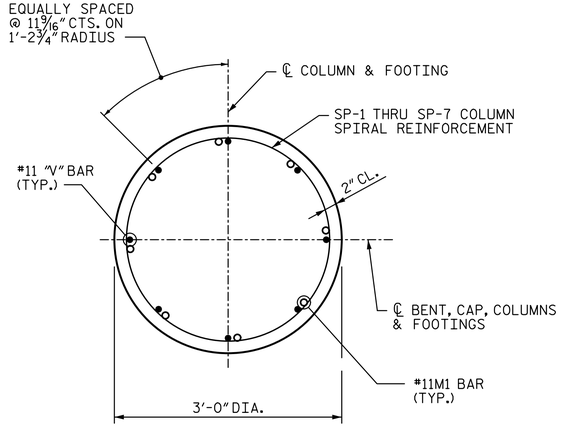
END VIEW
(LEFT SIDE)



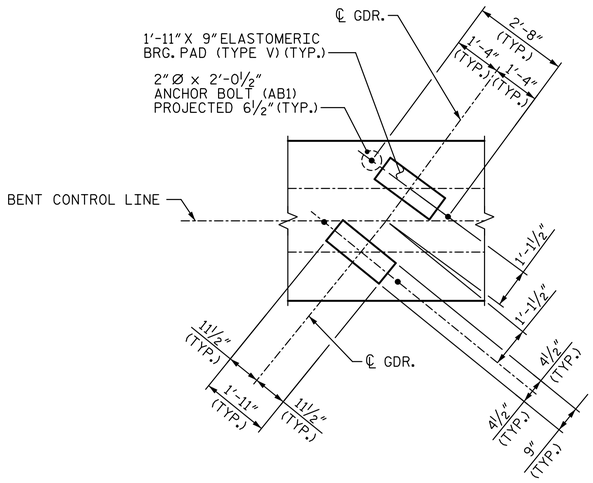
END VIEW
(RIGHT SIDE)



END VIEW



TYPICAL SECTION THROUGH COLUMN



DETAIL "A"
(TYP. EA. GDR.)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 3

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6/22/2017

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RALEIGH

SUBSTRUCTURE

BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-28
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : TJT	DATE : 4-17		

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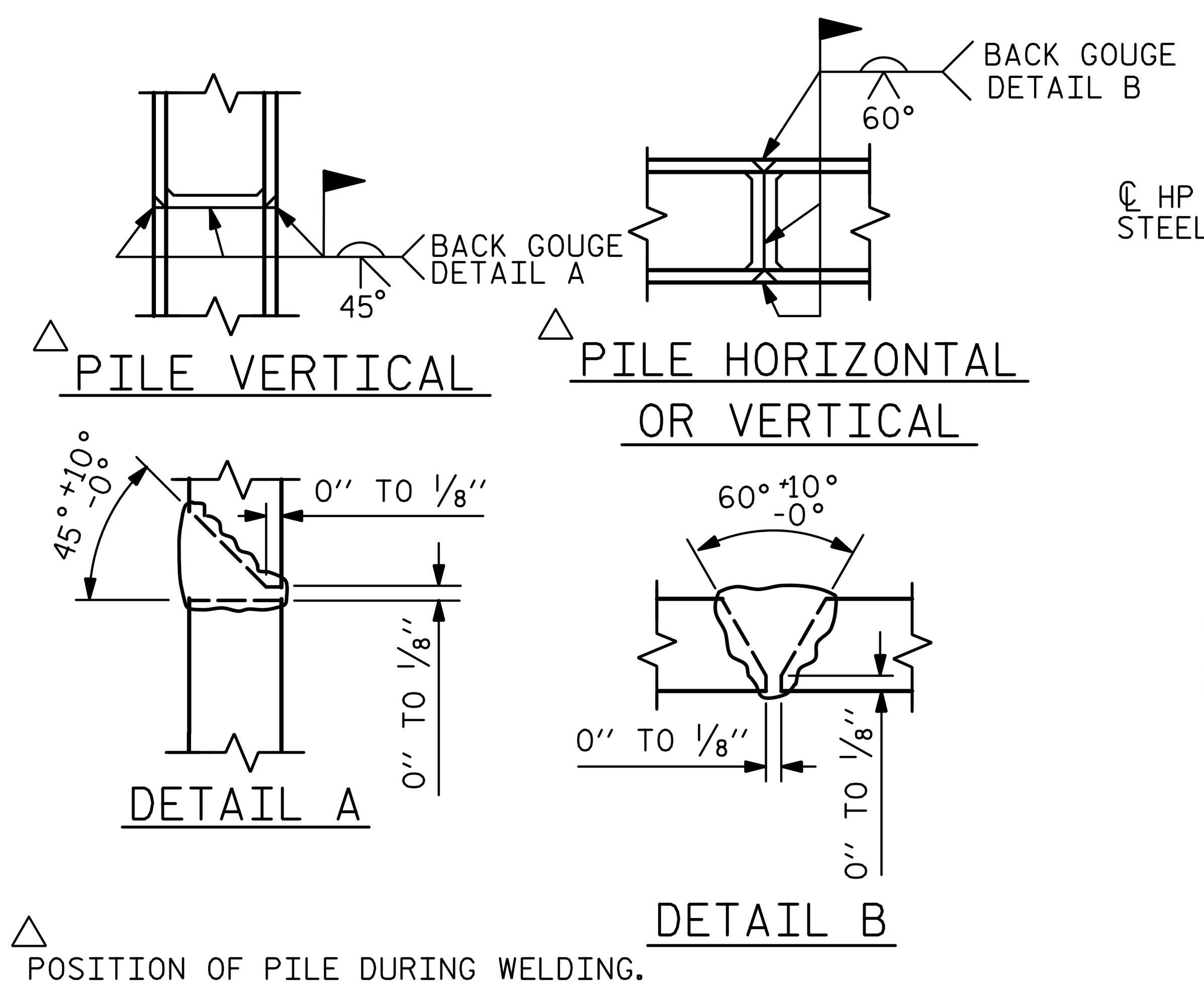
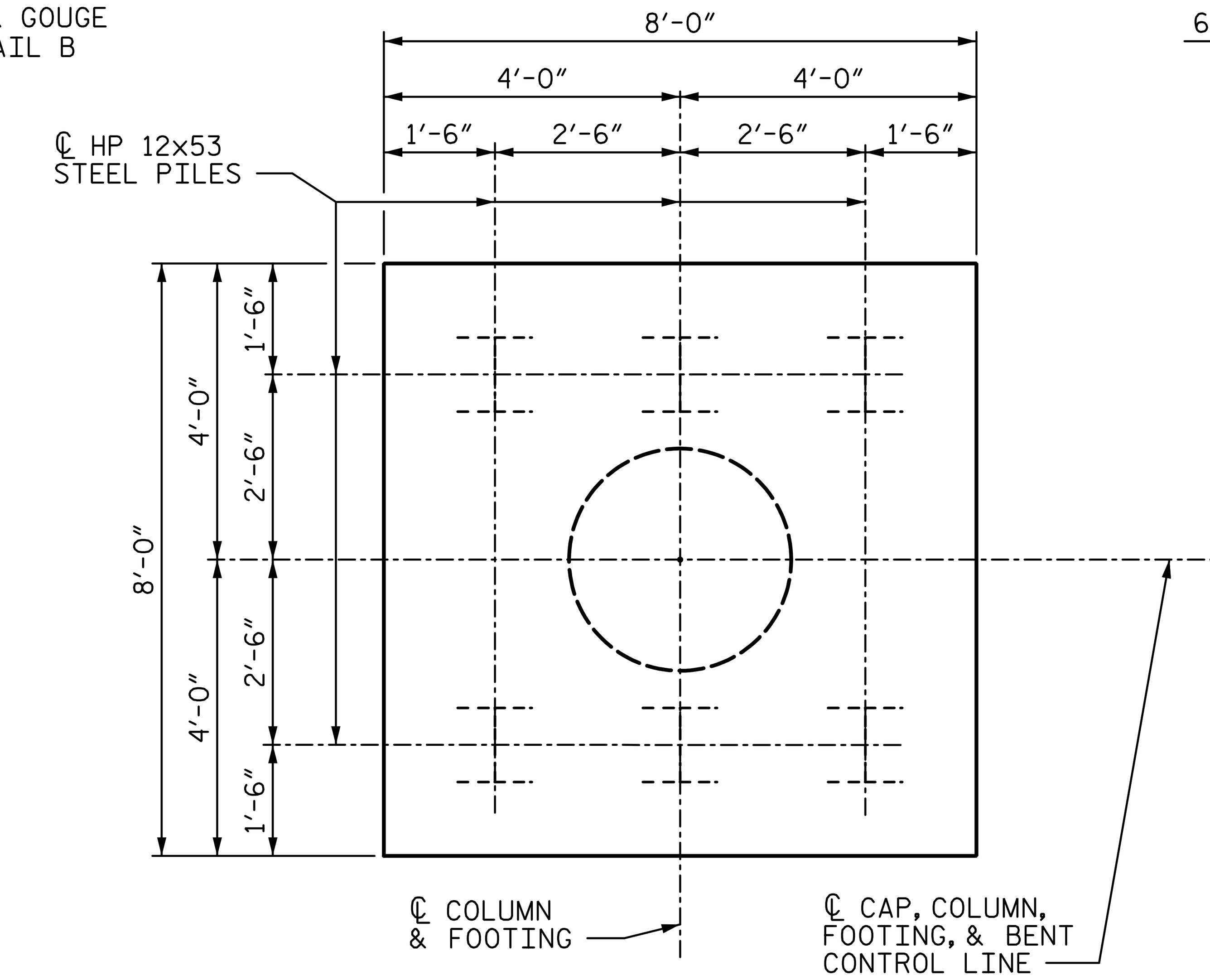
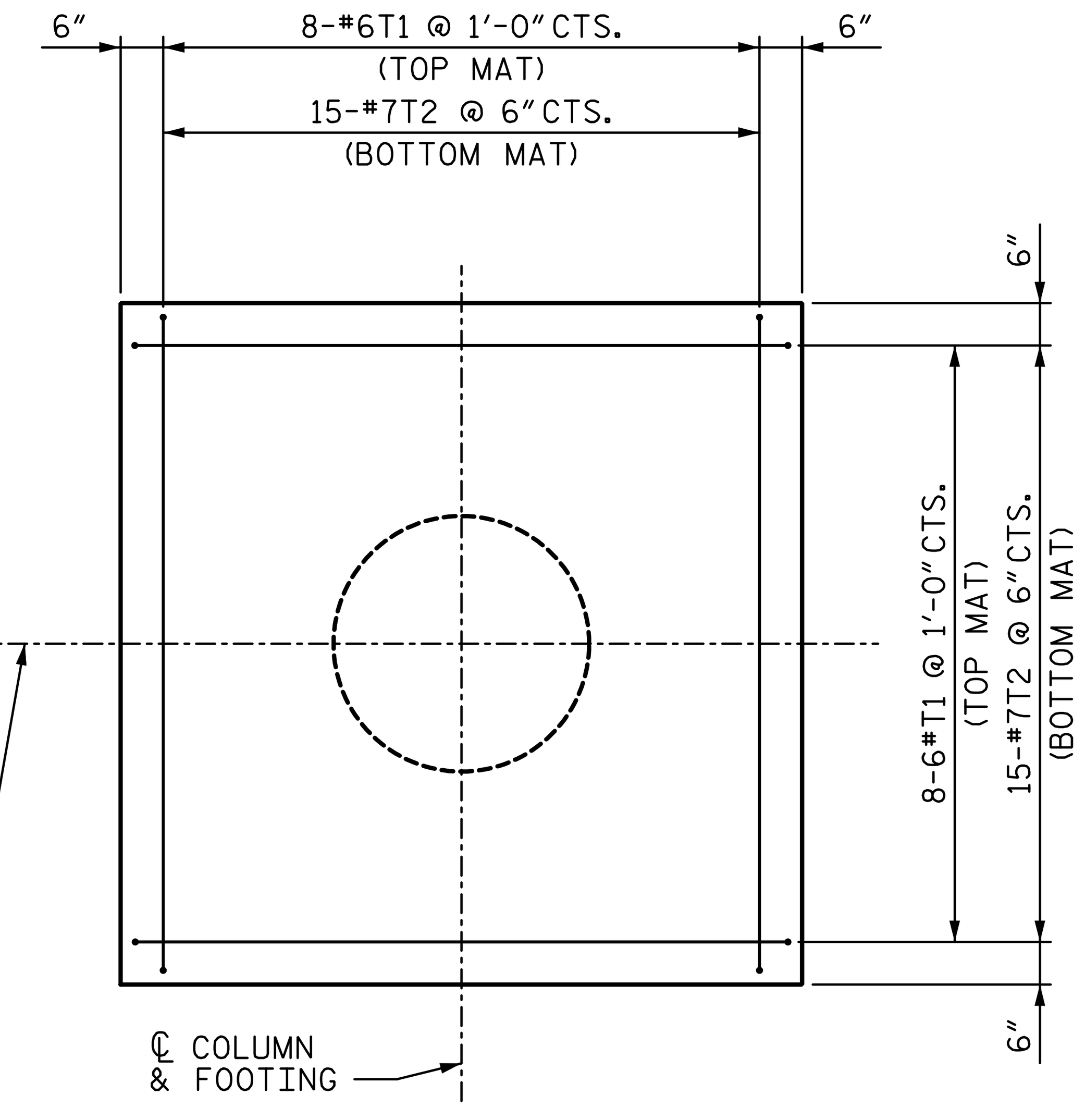


PILE SPLICE DETAILS

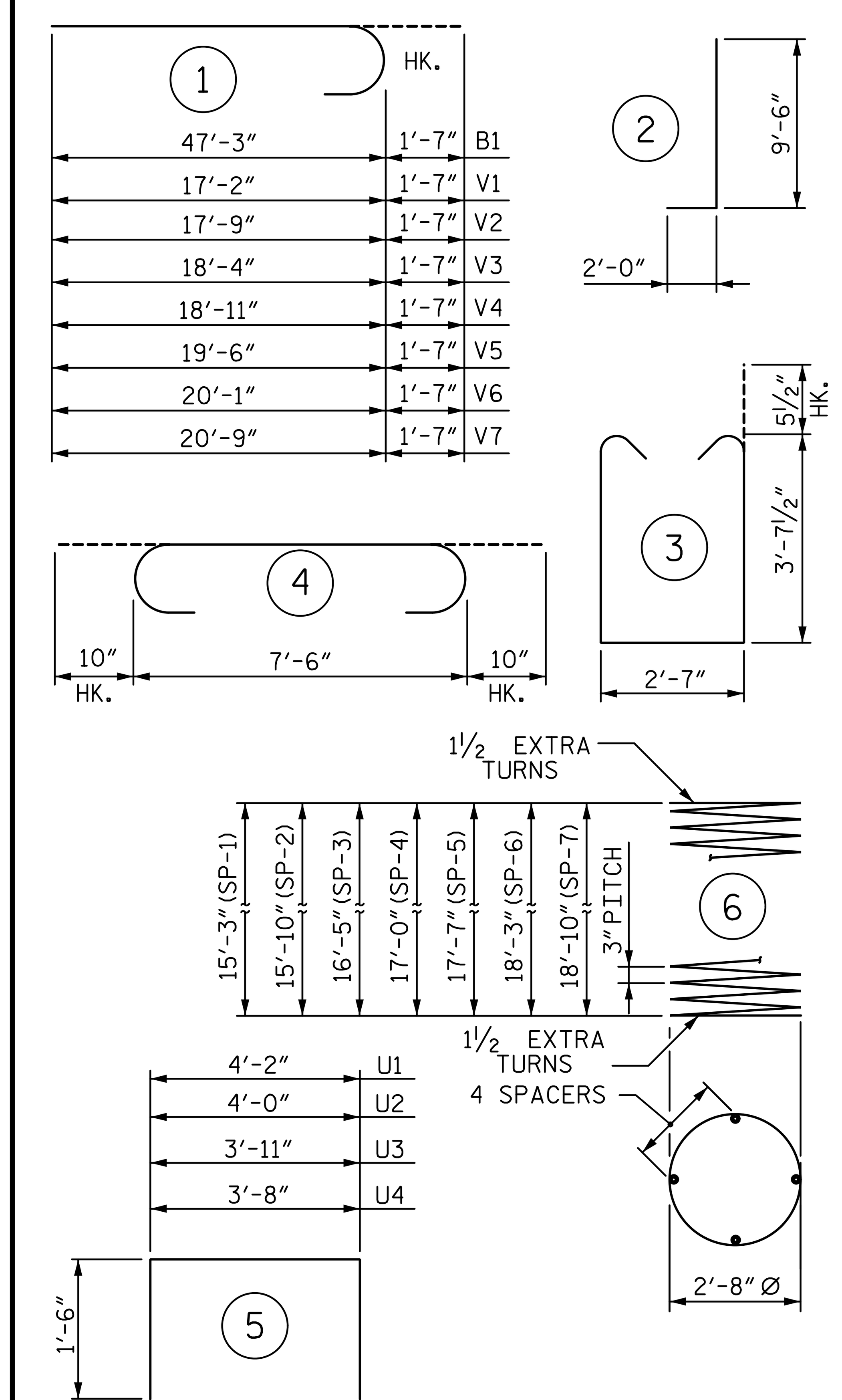


DETAIL "A"



FOOTING REINFORCEMENT DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

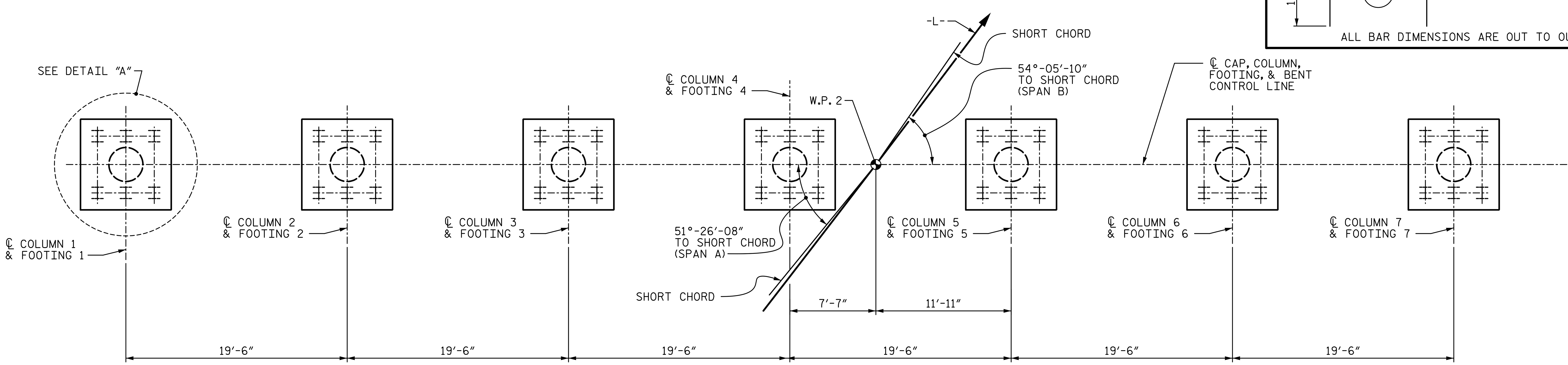
BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	48′-10″	3,113
B2	14	#11	STR	60′-0″	4,463
B3	16	#11	STR	45′-0″	3,825
B4	18	#5	STR	44′-5″	834
B5	6	#4	STR	10′-0″	40
B6	48	#4	STR	9′-1″	291
B7	6	#4	STR	5′-4″	21
M1	56	#11	2	11′-6″	3,422
S1	304	#5	3	10′-9″	3,409
T1	112	#6	STR	7′-8″	1,290
T2	210	#7	4	9′-2″	3,935
U1	121	#4	5	7′-2″	579
U2	8	#4	5	7′-0″	37
U3	4	#4	5	6′-11″	18
U4	4	#4	5	6′-8″	18
V1	8	#11	1	18′-9″	797
V2	8	#11	1	19′-4″	822
V3	8	#11	1	19′-11″	847
V4	8	#11	1	20′-6″	871
V5	8	#11	1	21′-1″	896
V6	8	#11	1	21′-8″	921
V7	8	#11	1	22′-4″	949
SP-1	1	✱✱	6	528′-1″	353
SP-2	1	✱✱	6	547′-4″	366
SP-3	1	✱✱	6	566′-7″	378
SP-4	1	✱✱	6	585′-10″	391
SP-5	1	✱✱	6	605′-1″	404
SP-6	1	✱✱	6	627′-1″	419
SP-7	1	✱✱	6	646′-4″	432

QUANTITIES

REINFORCING STEEL	LBS.	31,398
SPIRAL COLUMN REINFORCING STEEL	LBS.	2,743
CLASS A CONCRETE:		
POUR 1: FOOTINGS	C.Y.	49.8
POUR 2: COLUMNS	C.Y.	30.6
POUR 3: CAP	C.Y.	89.9
TOTAL	C.Y.	170.3
HP 12x53 STEEL PILES	NO.	42
	LIN. FEET	2,730
PILE SETUP FOR HP 12x53	EA.	42
PILE REDRIVES	EA.	21
FOUNDATION EXCAVATION		LUMP SUM

✱✱ THE SP-1 TO SP-7 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



PLAN OF FOOTINGS

(ALL FOOTINGS DIMENSIONS AND REINFORCING STEEL ARE TYPICAL)
(PILE ARRANGMENT FOR FOOTINGS ARE THE SAME)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 3 OF 3

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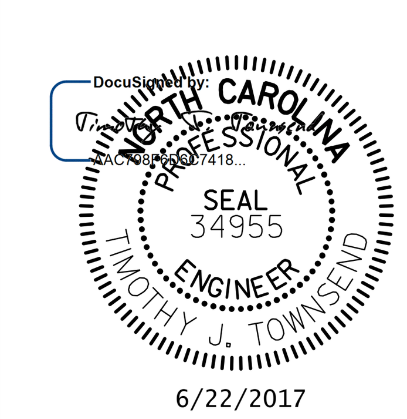

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RALEIGH

SUBSTRUCTURE

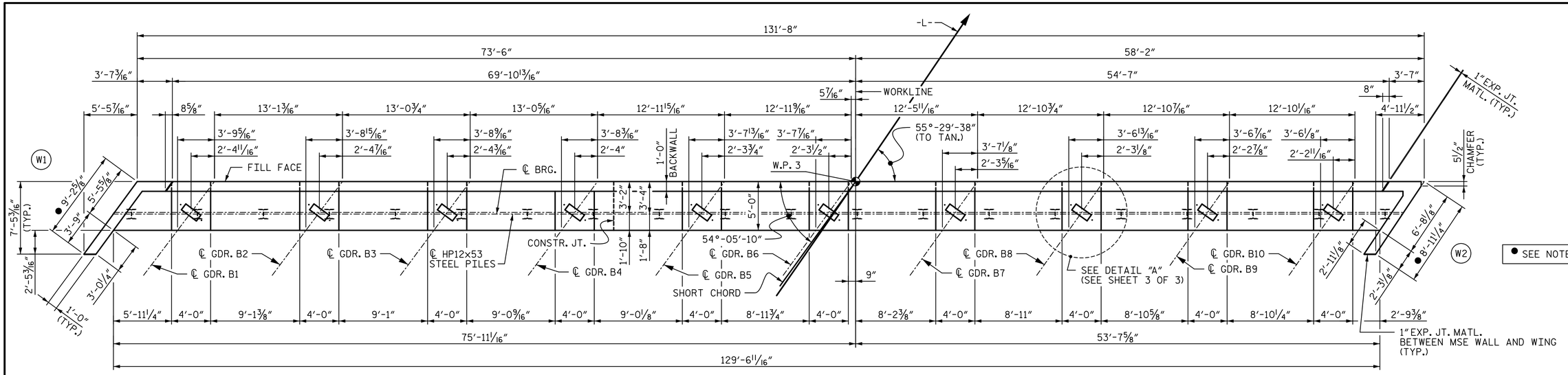
BENT 1

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

SHEET NO. S1-29

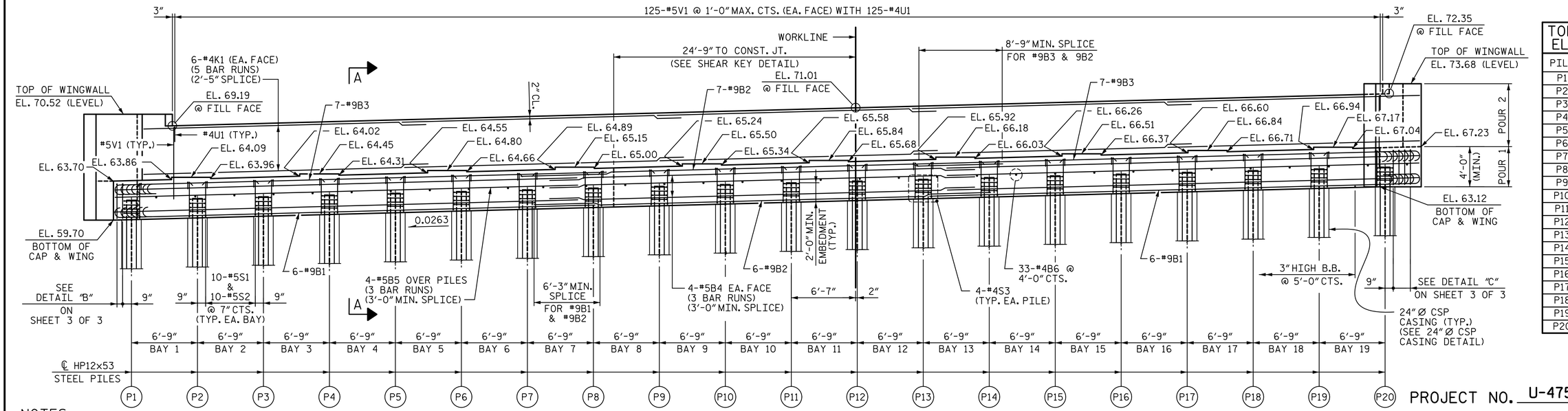
TOTAL SHEETS 36

DRAWN BY : VMW DATE : 4-17
CHECKED BY : TJT DATE : 4-17
DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17



PLAN

(24" Ø CSP CASING NOT SHOWN FOR CLARITY)



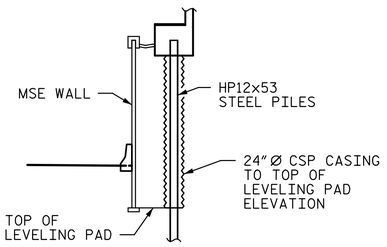
ELEVATION

(LOOKING IN THE DIRECTION OF STATIONING)

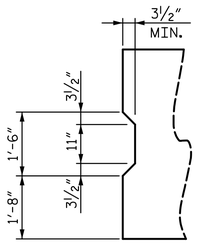
TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	61.76
P2	61.94
P3	62.11
P4	62.29
P5	62.47
P6	62.65
P7	62.82
P8	63.00
P9	63.18
P10	63.36
P11	63.53
P12	63.71
P13	63.89
P14	64.07
P15	64.24
P16	64.42
P17	64.60
P18	64.78
P19	64.95
P20	65.13

NOTES:

1. STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
2. BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
3. THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THAT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
4. THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.
5. DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.
6. PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.
7. CONTRACTOR SHALL VERIFY WING WALL LENGTH BASED ON MSE WALL DESIGN AND MODIFY THE WING WALL LENGTH ACCORDINGLY SUCH THAT THE WING WALL AND 1" EXPANSION JOINT MATERIAL IS FLUSH WITH THE BACK OF THE MSE WALL PANEL.



24" Ø CSP CASING DETAIL



SHEAR KEY DETAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 3

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6/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

STV 100 Years

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-30
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : TJT	DATE : 4-17		

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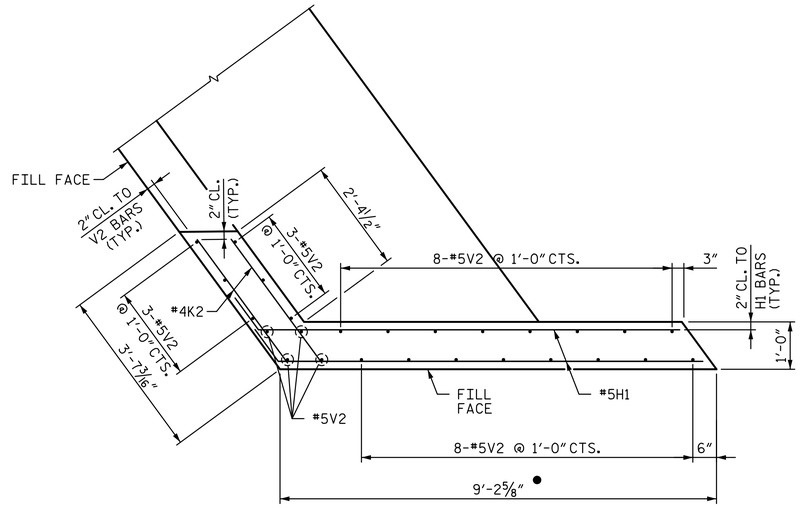
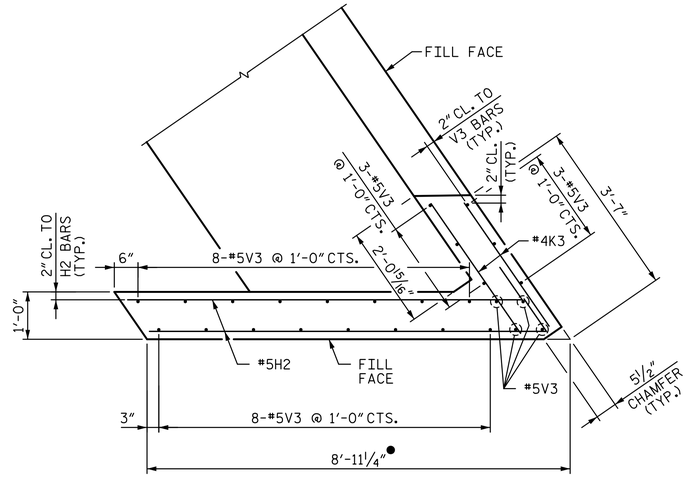
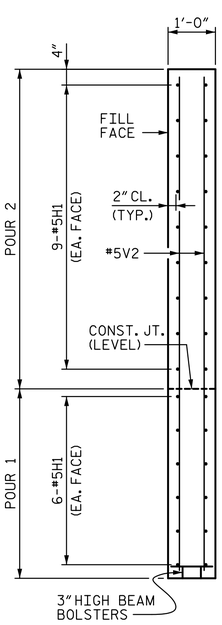


PLAN (W1)

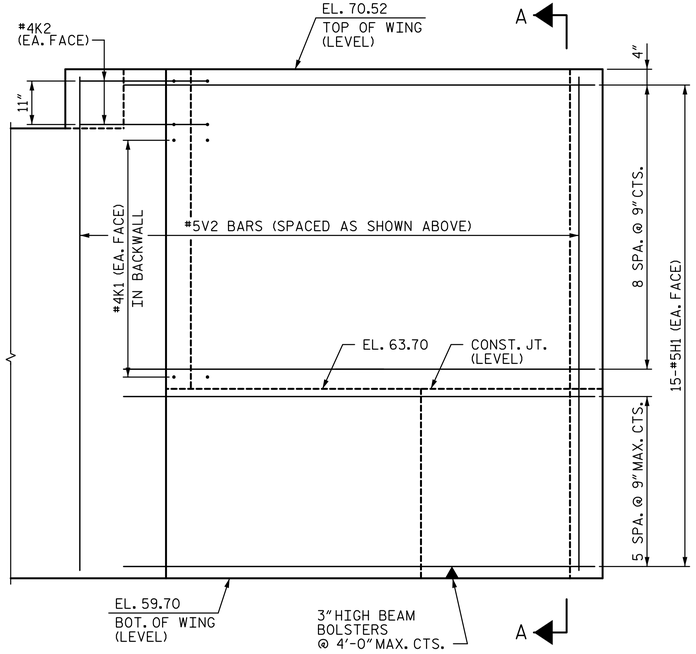


PLAN (W2)

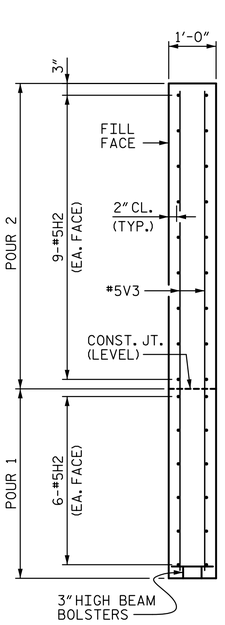
● SEE NOTE 7 ON SHEET 1 OF 3



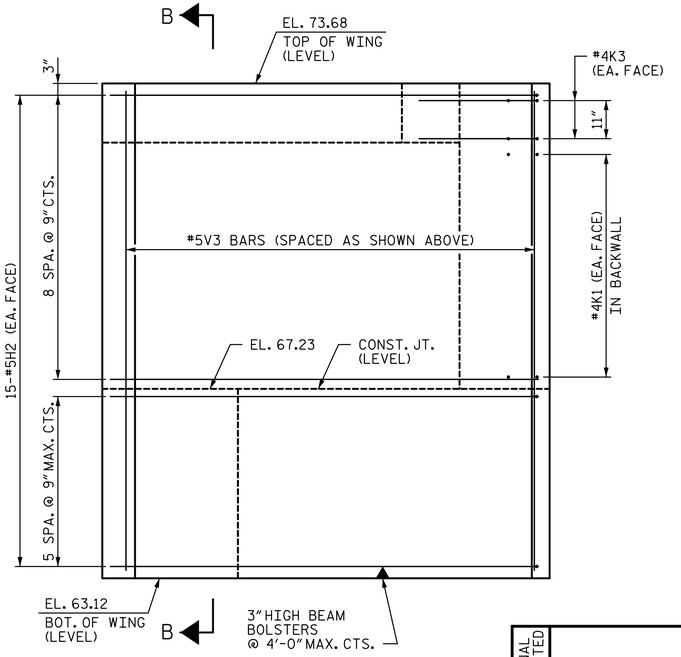
SECTION A-A



ELEVATION (W1)



SECTION B-B



ELEVATION (W2)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 3

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SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-31
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 4-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : TJT	DATE : 4-17		

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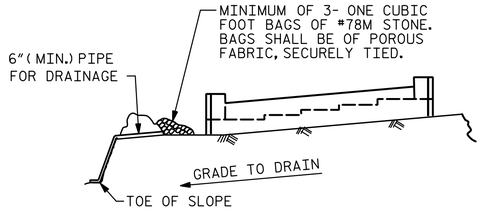
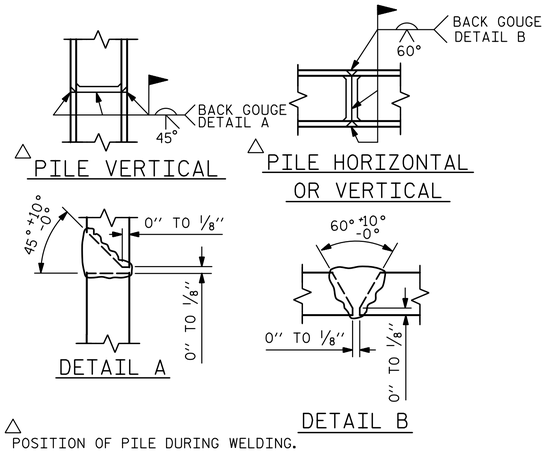


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

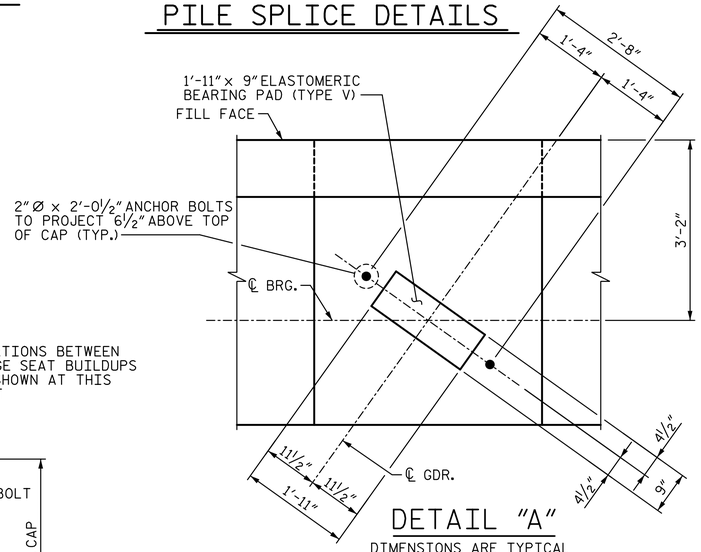
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



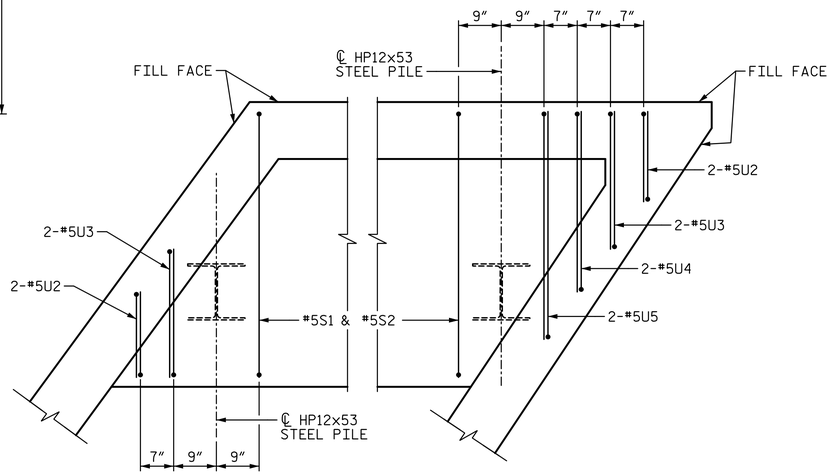
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER.

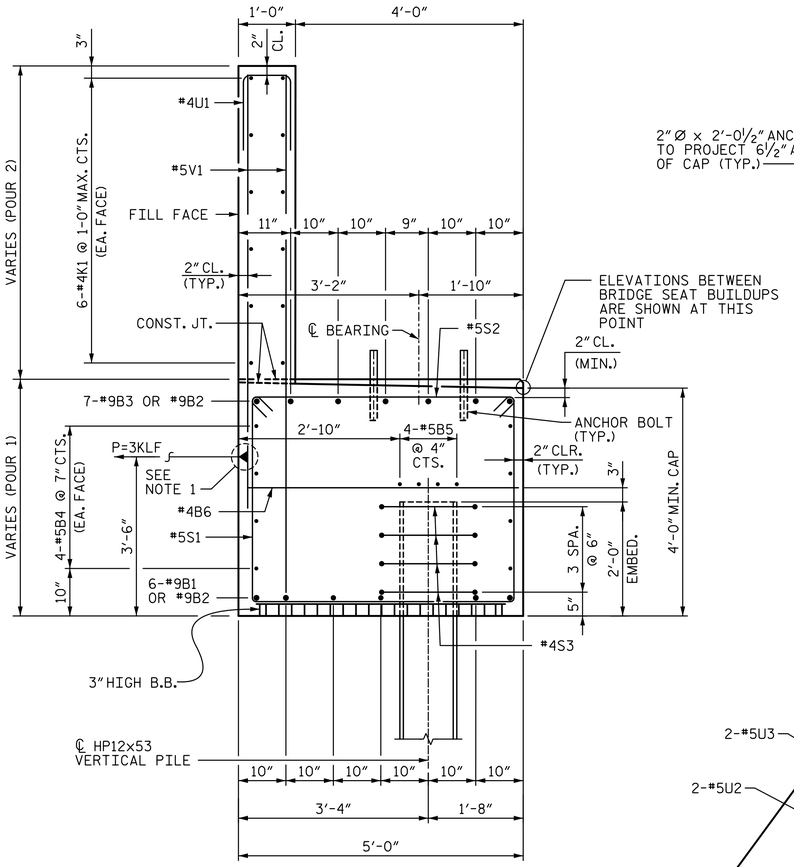


DETAIL "B"

("B" BARS, "V" BARS & END REINFORCEMENT NOT SHOWN FOR CLARITY

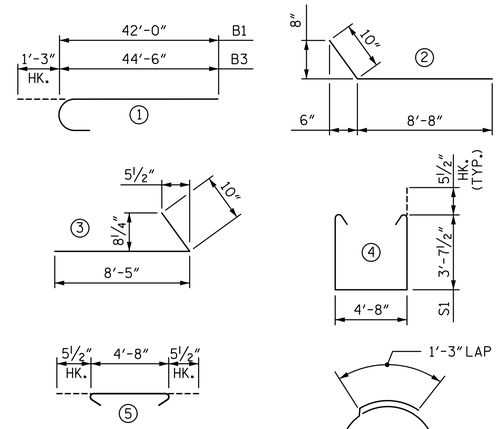
DETAIL "C"

("B" BARS, "V" BARS & END REINFORCEMENT NOT SHOWN FOR CLARITY



SECTION A-A

BAR TYPES



TYPE ⑦		
BAR	"A"	"B"
U1	8"	1'-6"
U2	3'-7 1/2"	1'-7 1/4"
U3	3'-7 1/2"	2'-5 3/4"
U4	3'-7 1/2"	3'-3 3/4"
U5	3'-7 1/2"	4'-2 3/4"

ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF REINFORCING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	①	43'-3"	1,765
B2	13	#9	STR	60'-0"	2,652
B3	14	#9	①	45'-9"	2,178
B4	24	#5	STR	45'-10"	1,147
B5	12	#5	STR	45'-10"	574
B6	33	#4	STR	4'-8"	103
H1	30	#5	②	9'-6"	297
H2	30	#5	③	9'-3"	289
K1	60	#4	STR	28'-3"	1,132
K2	4	#4	STR	3'-1"	8
K3	4	#4	STR	3'-0"	8
S1	190	#5	④	12'-10"	2,543
S2	190	#5	⑤	5'-7"	1,106
S3	80	#4	⑥	6'-6"	347
U1	125	#4	⑦	3'-8"	306
U2	4	#5	⑦	6'-11"	29
U3	4	#5	⑦	8'-7"	36
U4	2	#5	⑦	10'-3"	21
U5	2	#5	⑦	12'-1"	25
V1	250	#5	STR	8'-7"	2,238
V2	26	#5	STR	10'-5"	282
V3	26	#5	STR	10'-1"	273

QUANTITIES

REINFORCING STEEL	LBS.	17,359
CLASS A CONCRETE:		
POUR 1:		
CAP & LOWER WING	C.Y.	100.0
POUR 2:		
BACKWALL & UPPER WING	C.Y.	31.0
TOTAL	C.Y.	131.0
HP 12x53 STEEL PILES	NO.	20
	LIN. FEET	1,200
PILE SETUP FOR HP 12x53	EA.	20
PILE REDRIVES	EA.	10

NOTES:

1. ABUTMENT RESTRAINTS (STRAPS) ARE REQUIRED ALONG THE CAP AS SHOWN. THE 3klf LOAD PROVIDED IS A FACTORED LOAD. THE SPACING AND LENGTH OF STRAPS SHALL BE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER REGISTERED IN NORTH CAROLINA AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO INSTALLATION. ANY ADDITIONAL CONSTRUCTION LOADS THAT WILL APPLY LOAD TO THE STRAPS (INCLUDING BUT NOT LIMITED TO CRANE LOADS) SHALL BE INCLUDED IN THE STRAP DESIGN AND SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PLACING CONSTRUCTION LOADS ON THE APPROACH FILL. ALL COSTS ASSOCIATED WITH THE DESIGN AND INSTALLATION, INCLUDING LABOR AND INCIDENTALS, OF THE STRAPS SHALL BE INCLUDED IN THE VARIOUS CONTRACT BID ITEMS. NO ADDITIONAL PAYMENT WILL BE MADE.
2. FOR ADDITIONAL NOTES, SEE SHEET 1 OF 3 AND "FOUNDATION LAYOUT" SHEET.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 3 OF 3

DRAWN BY : VMW DATE : 4-17
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6/22/2017

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NC License Number F-0991

STATE OF NORTH CAROLINA
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RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-32
1			3			TOTAL SHEETS
2			4			36

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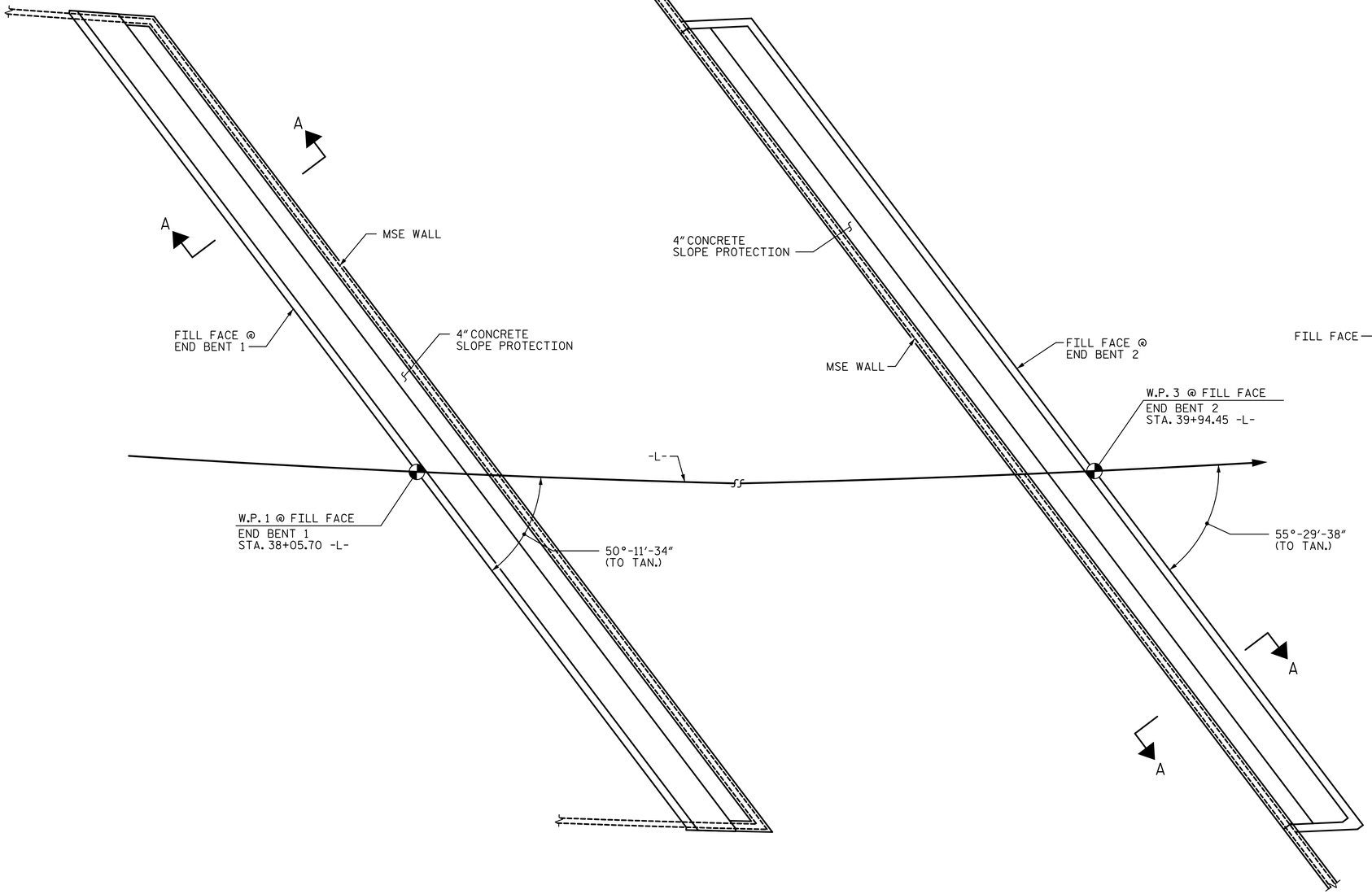
NOTES:

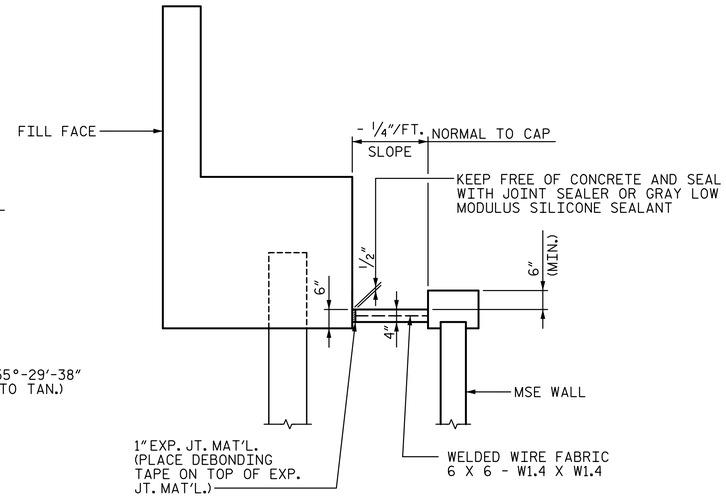
SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

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, 24" WIDE. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 38+94.20 -L-	4 INCH SLOPE PROTECTION	WELDED WIRE FABRIC 24 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	31.6	142
END BENT 2	31.5	142



PLAN



SECTION A-A

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

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SLOPE PROTECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-33
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : VMW	DATE : 5-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : TJT	DATE : 5-17		

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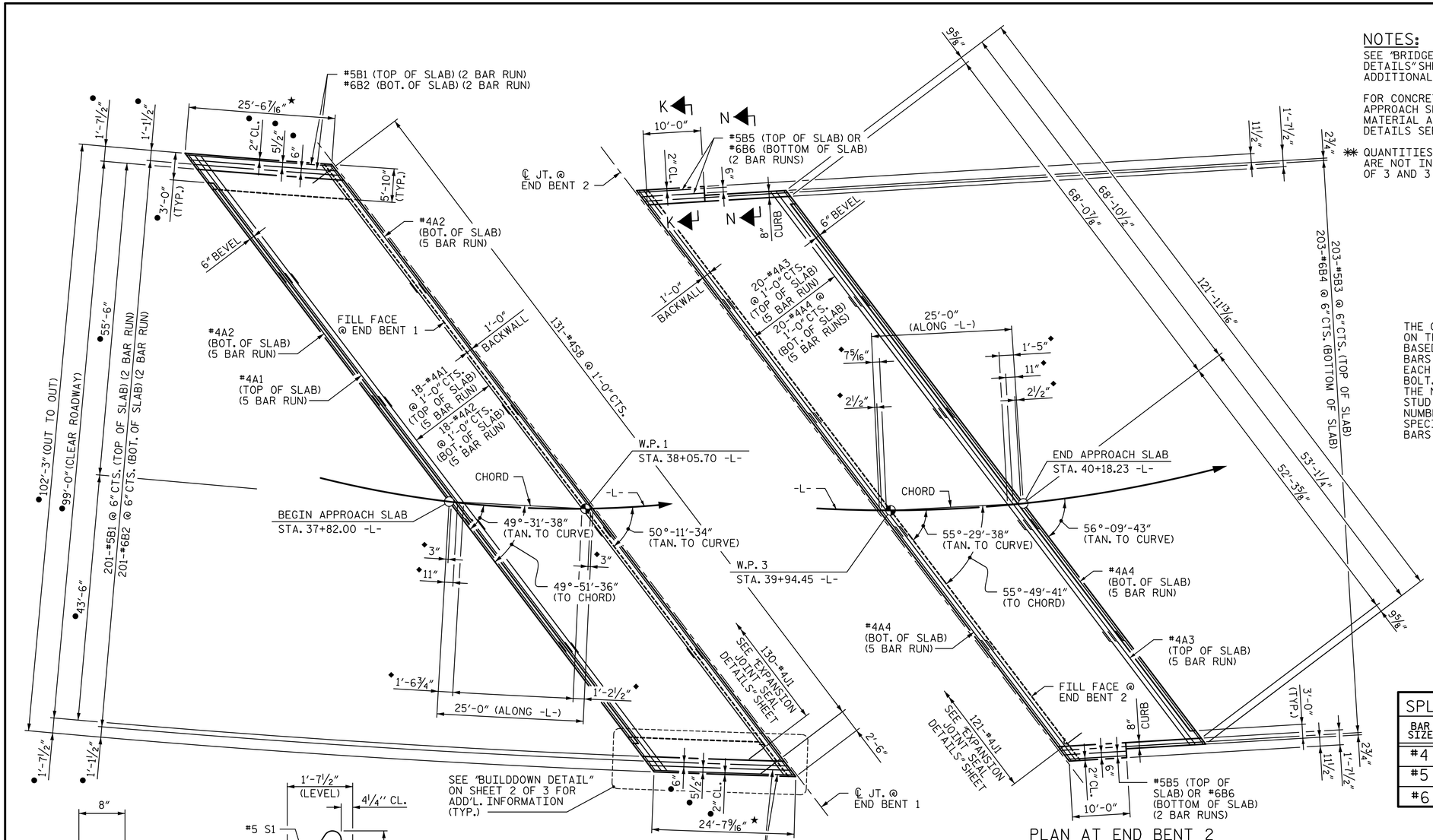


NOTES:

SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 3 FOR ADDITIONAL NOTES.

FOR CONCRETE BARRIER RAIL ON APPROACH SLABS, BILL OF MATERIAL AND ADDITIONAL DETAILS SEE SHEET 2 OF 3.

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 3 AND 3 OF 3.

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

BILL OF MATERIAL

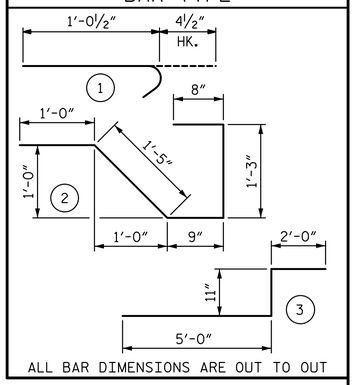
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	95	#4	STR	28'-6"	1,809
A2	110	#4	STR	28'-4"	2,082
✳B1	410	#5	STR	13'-5"	5,737
B2	410	#6	STR	13'-11"	8,570
B9	4	#4	STR	13'-3"	35
✳J1	130	#4	1	1'-5"	123
G1	38	#4	3	7'-11"	201
S8	131	#4	2	5'-1"	445
REINFORCING STEEL ** LBS.					11,333
✳EPOXY COATED REINFORCING STEEL ** LBS.					7,669
CLASS AA CONCRETE ** C.Y.					124.1

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A3	105	#4	STR	26'-5"	1,853
A4	110	#4	STR	26'-3"	1,929
✳B3	203	#5	STR	23'-10"	5,046
B4	203	#6	STR	24'-5"	7,445
✳B5	4	#5	STR	6'-7"	27
B6	4	#6	STR	6'-8"	40
✳J1	121	#4	1	1'-5"	115
REINFORCING STEEL ** LBS.					9,414
✳EPOXY COATED REINFORCING STEEL ** LBS.					7,041
CLASS AA CONCRETE ** C.Y.					110.2

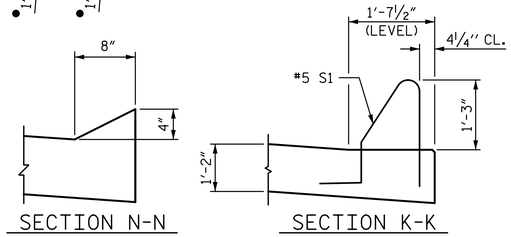
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

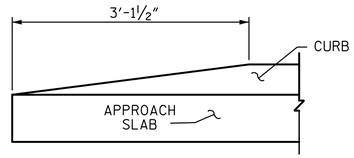
SPLICE LENGTHS

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



SECTION N-N

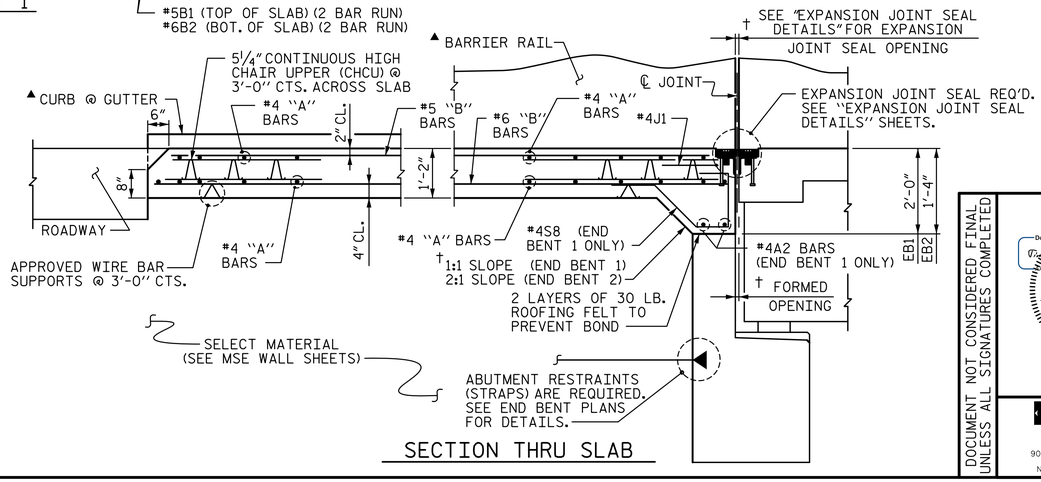
SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

- † NORMAL TO END BENT
- ● RADIAL DIMENSION
- ◆ DIMENSION MEASURED ALONG -L-
- ▲ FOR LOCATIONS OF BARRIER RAILS AND CURB @ GUTTER, SEE PLAN VIEWS AND DETAILS.
- ★ ALONG EDGE OF APPROACH SLABS, ARC OFFSETS ARE NEGLIGIBLE



SECTION THRU SLAB

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 1 OF 3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: V. WU DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: TIMOTHY J. TOWNSEND — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 — 6/22/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-34
1			3			TOTAL SHEETS
2			4			36

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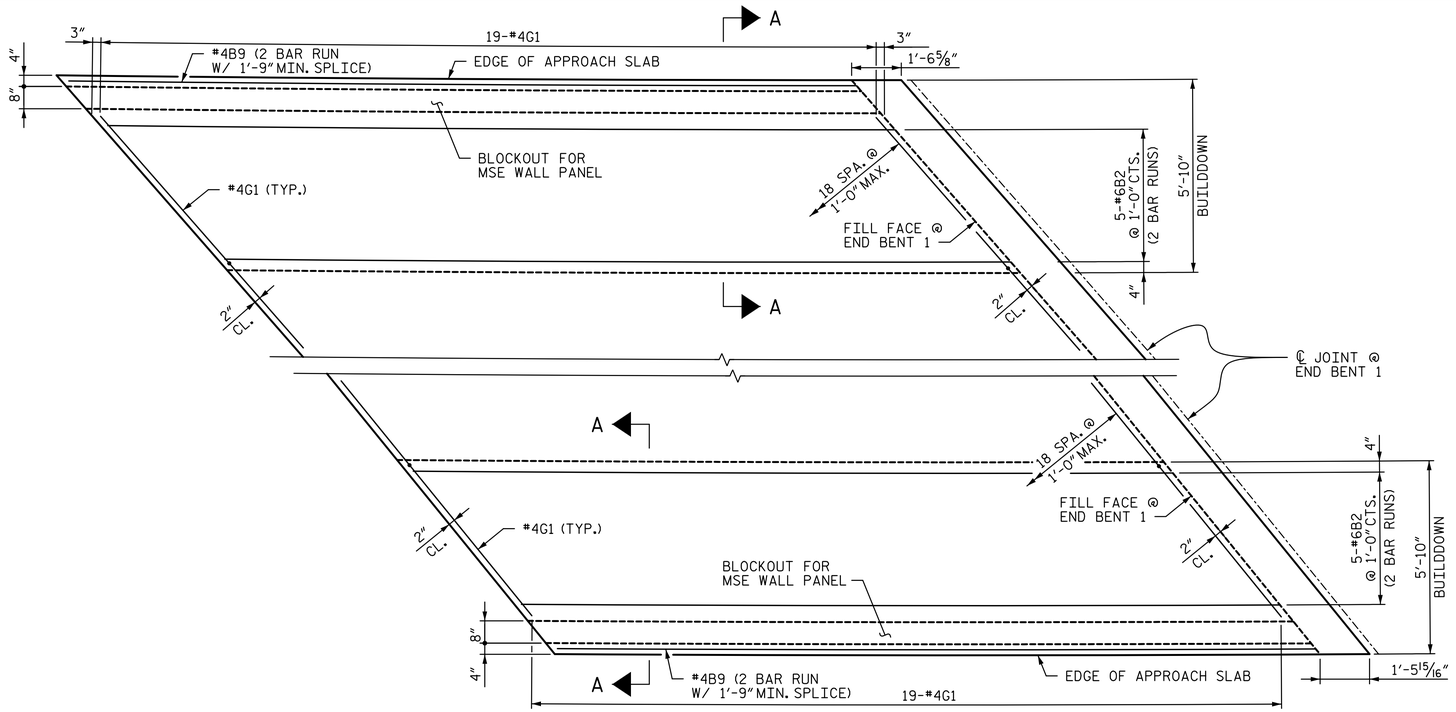


BUILDDOWN DETAIL

NOTES:

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

AREA BETWEEN THE WINGWALL AND APPROACH SLAB AT END BENT 2 SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

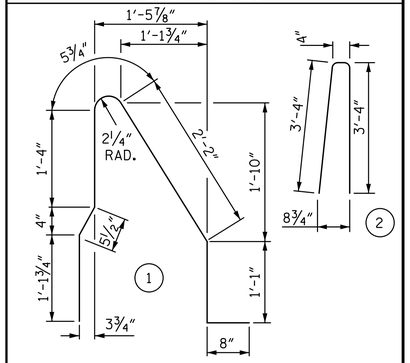
ALL REINFORCING IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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

FOR CONCRETE ISLAND REINFORCEMENT AND DETAILS, SEE "MONOLITHIC CONCRETE ISLAND" SHEET

BAR TYPES

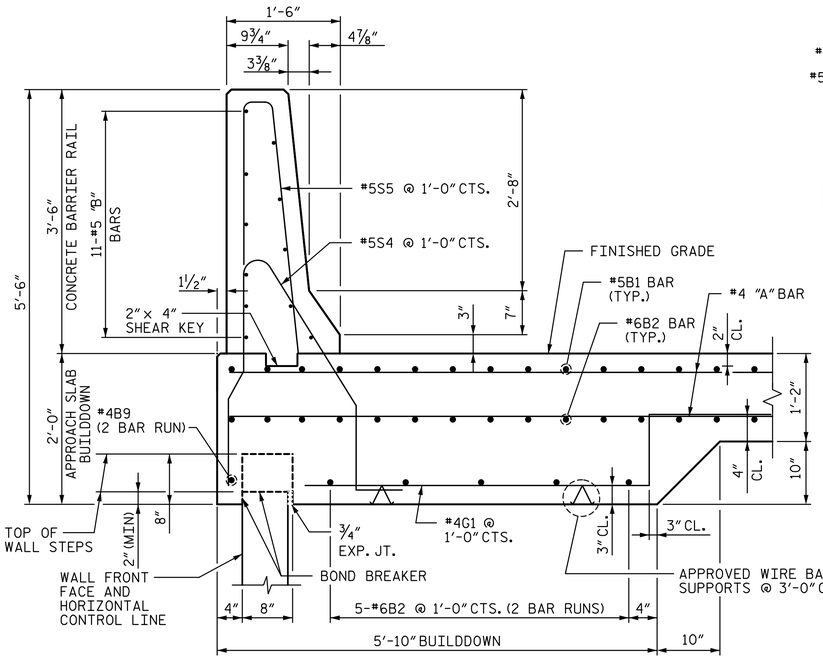


ALL BAR DIMENSIONS ARE OUT TO OUT

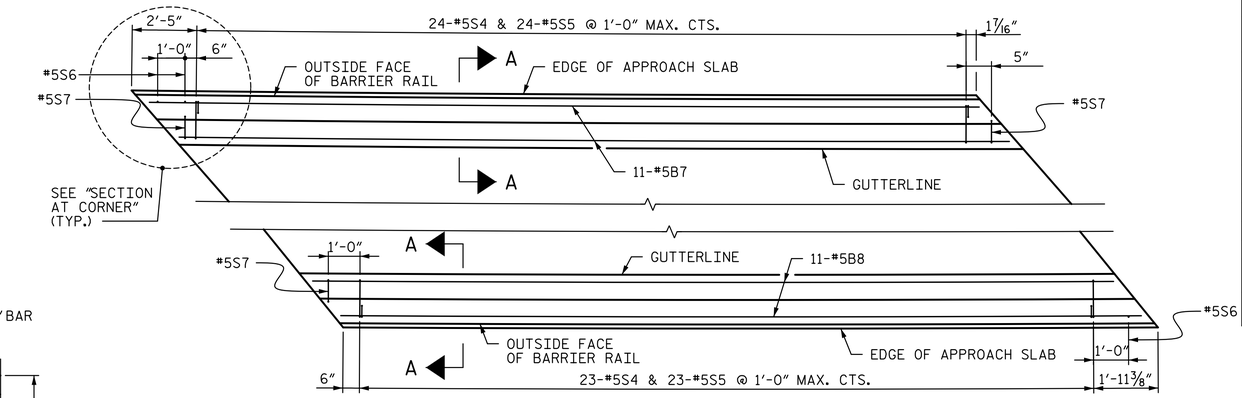
BILL OF MATERIAL

BARRIER RAIL ONLY ON APPROACH SLAB 1

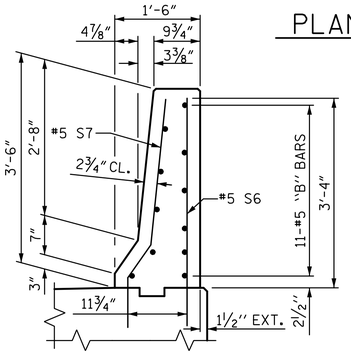
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B7	11	#5	STR	25'-1"	288
✳ B8	11	#5	STR	24'-2"	277
✳ S4	47	#5	1	7'-4"	359
✳ S5	47	#5	2	7'-0"	343
✳ S6	3	#5	STR	4'-0"	13
✳ S7	3	#5	3	4'-2"	13
✳ EPOXY COATED REINFORCING STEEL				LBS	1,293
CLASS AA CONCRETE				C.Y.	6.9



SECTION A-A



PLAN OF BARRIER RAIL @ END BENT 1



SECTION AT CORNER

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 2 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-35
1			3			TOTAL SHEETS
2			4			36

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CHECKED BY : TRL	DATE : 5-17		

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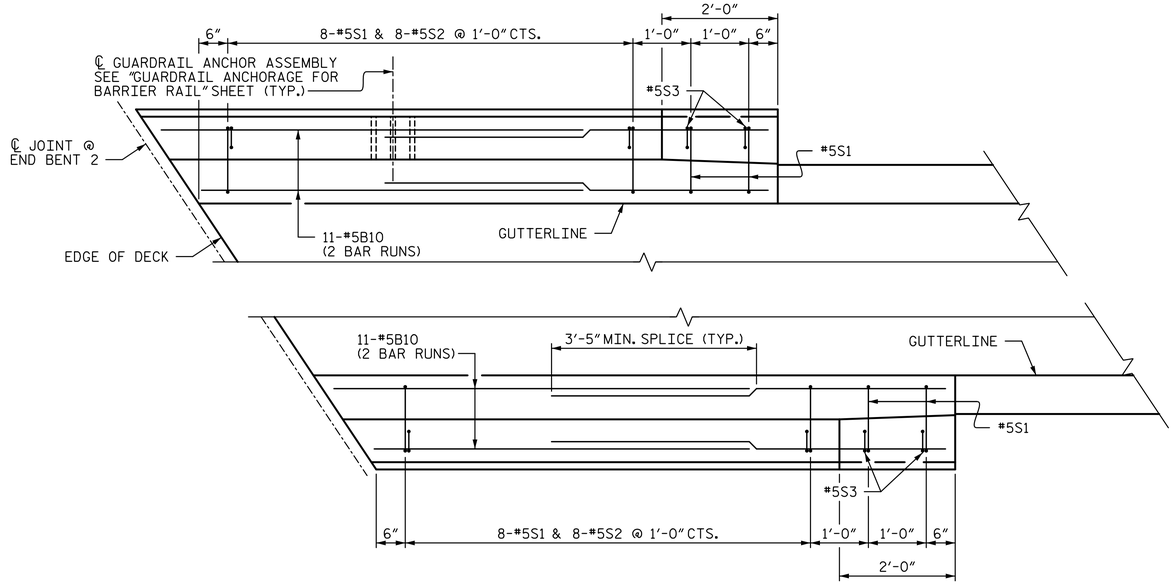


PLAN OF BARRIER RAIL @ END BENT 2

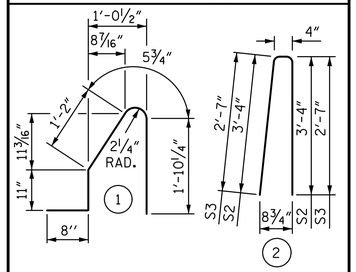
NOTES

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

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES

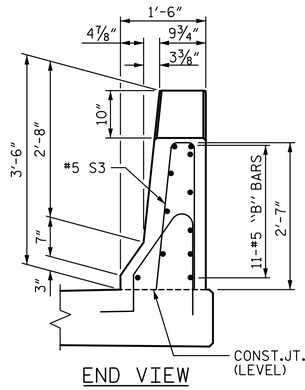


ALL BAR DIMENSIONS ARE OUT TO OUT

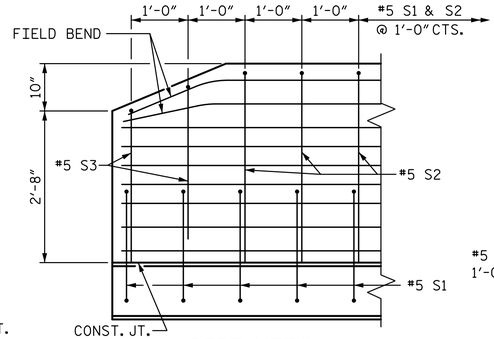
BILL OF MATERIAL

BARRIER RAIL ONLY ON APPROACH SLAB 2

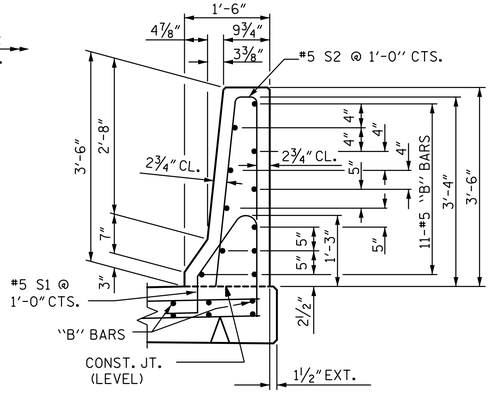
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B10	44	#5	STR	7′-0″	321
✳S1	20	#5	1	5′-1″	106
✳S2	16	#5	2	7′-0″	117
✳S3	4	#5	2	5′-6″	23
✳EPOXY COATED REINFORCING STEEL				LBS.	567
CLASS AA CONCRETE				C. Y.	2.9



END VIEW

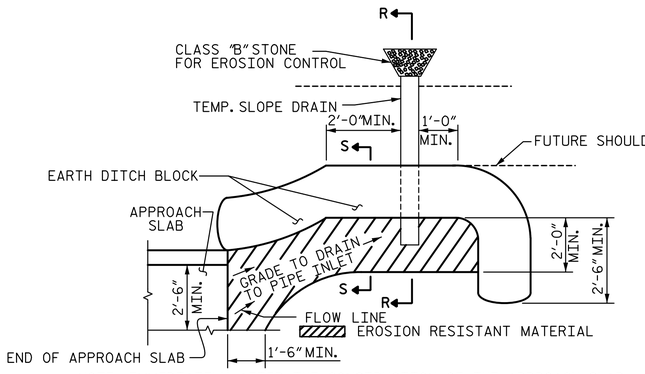


SIDE VIEW



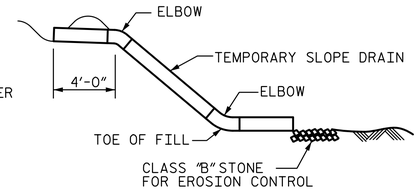
SECTION THRU RAIL

END OF RAIL DETAILS

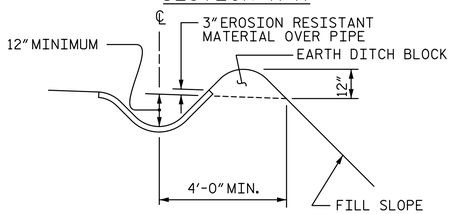


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

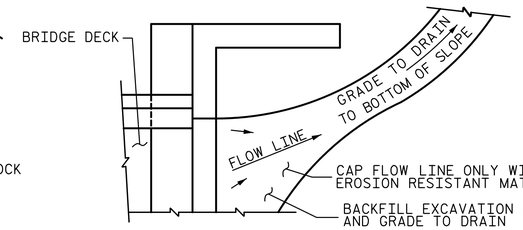
PLAN VIEW



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-4751

NEW HANOVER COUNTY

STATION: 38+94.20 -L-

SHEET 3 OF 3

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Digitally signed by TIMOTHY J. TOWNSEND
NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER
TIMOTHY J. TOWNSEND
7/24/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: V. WU	DATE : 5-17
CHECKED BY : TRL	DATE : 5-17		

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

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

62+00 63+00 64+00

80 70 60 50 40

FILL FACE @ END BENT 1
STA. 62+51.85 -L-
G.P. ELEV. 70.49

FIX.

VARIES
(1'-4" MIN. BERM)

VARIES ■
1.5 MIN.

FILL

1'-0"
(TYP.)

HP 12x53
PILES (TYP.)

EL. 45.0±

EL. 45.0±

EL. 46.0±

(+) 3.7550% (-) 3.7379%

GRADE DATA
PI STA. 63+00.00 -L-
EL. 78.10'
VC = 800'

SPAN A

■ NORMAL TO -Y2-

15'-11" ▲
MIN. VERT. CLR.

EXP.

FILL FACE @ END BENT 2
STA. 63+57.85 -L-
G.P. ELEV. 70.46

4" CONCRETE SLOPE
PROTECTION (TYP.)

VARIES
(1'-3" MIN.
BERM)

VARIES
1.5 MIN. ■

FILL

APPROX. EXISTING
GROUND LINE

EL. 46.0±

EL. 46.0±

EL. 45.0±

EL. 44.0±

END BENT 1

SECTION ALONG -L-

(SECTION @ END BENTS ARE SHOWN AT RIGHT ANGLES)

END BENT 2

1'-4" BERM
EL. 58.67
(LEVEL)

4" CONCRETE
SLOPE PROTECTION

4" CONCRETE
SLOPE PROTECTION

POINT OF MIN.
VERT. CLR.
STA. 63+44.04 -L-
OFFSET 54'-4½" LT.
PAVEMENT ELEV.
(BELOW) = 46.16

1'-3" BERM
EL. 58.61
(LEVEL)

FILL FACE @
END BENT 1

4'-6"

4'-0"

8'-6"

8'-6"

4'-0"

4'-6"

PAVED SHOULDER

OGDEN PARK DR.

TO SR 2048
(GORDON RD.)

PAVED SHOULDER

FILL FACE @
END BENT 2

◆SEE "SLOPE PROTECTION"
SHEET FOR LOCATION OF
BERM TAPER.

TO US 17 BUS.

◆1'-4" BERM
(MIN.)

POT STA. 62+99.10 -L-
POC STA. 14+79.99 -Y2-

W.P. 2
STA. 63+57.85 -L-

-L-

W. P. 1
STA. 62+51.85 -L-

BEGIN APPROACH SLAB
STA. 62+27.99 -L-

118°-18'-59"
(TYP.)

118°-18'-59"
(TAN. TO CURVE)

END APPROACH SLAB
STA. 63+81.71 -L-

TO US 17

℄ OF 6'-0" VERTICAL
CURVE (ROADWAY
DETAIL & PAY ITEM)

-Y2

TO US 17 BUS.

5'-0" BERM

5'-0" BERM

47'-3"

58'-9"

106'-0" (FILL FACE @ END BENT 1 TO FILL FACE @ END BENT 2)

PLAN

(PILES NOT SHOWN FOR CLARITY)
●DENOTES RADIAL DIMENSION

▲VERTICAL CLEARANCE IS CALCULATED BASED ON EXISTING PAVEMENT ELEVATIONS AND 1½" OVERLAY.

NOTE: PAVEMENT ELEV. (BELOW) INCLUDES 1½" OVERLAY.

HORIZ. CURVE DATA -Y2-

PI STA. 15+05.97
△ = 24°-10'-08.7" (LT.)
D = 12°-19'-18.0"
L = 196.15'
T = 99.56'
R = 465.00'

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 62+99.10 -L-
14+79.99 -Y2-
SHEET 1 OF 2 BRIDGE NO. 202

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
7/26/2017

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
7/26/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

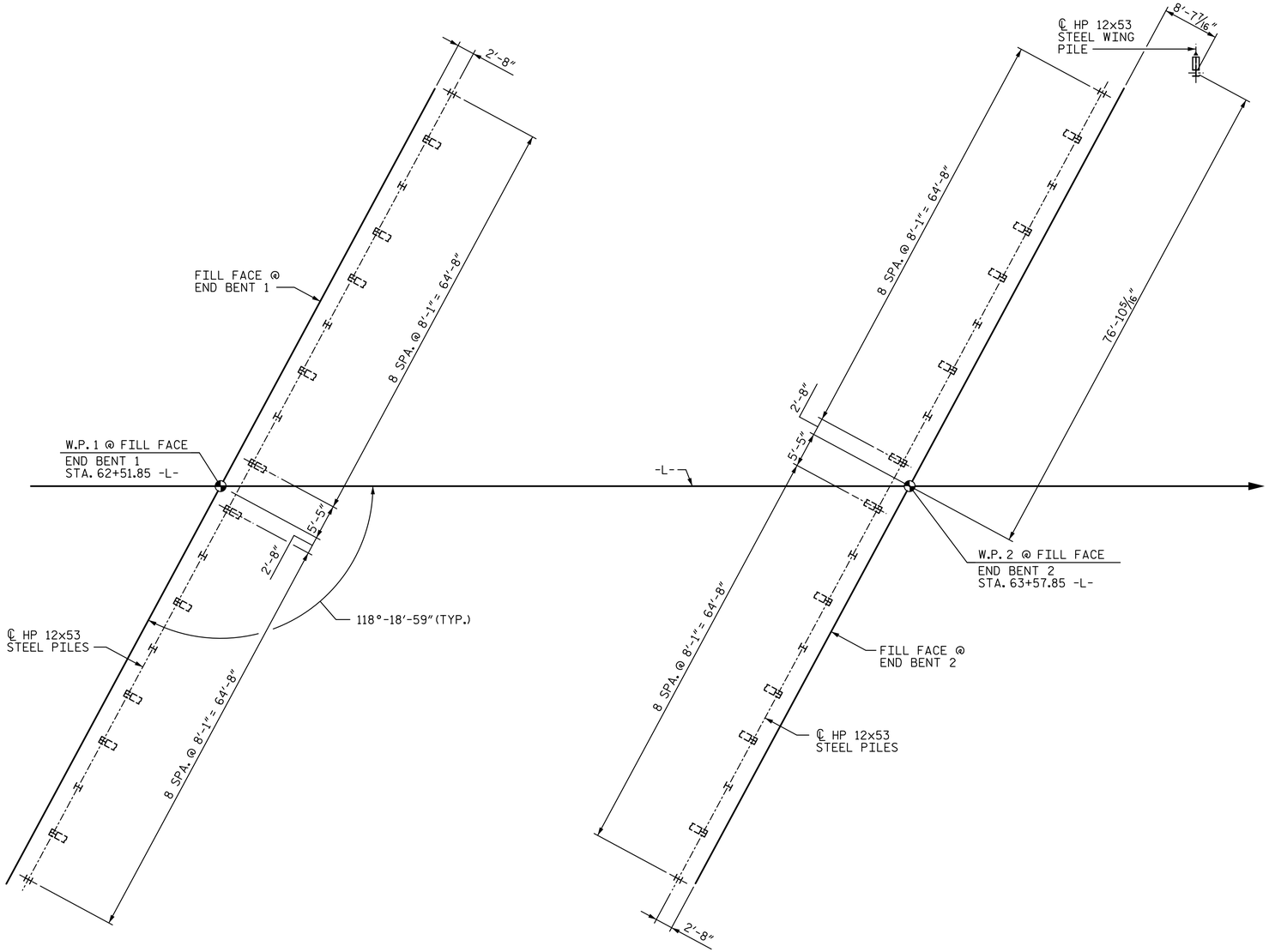
GENERAL DRAWING
FOR BRIDGE ON SR 1409 (MILITARY CUTOFF ROAD EXT.) TO US 17 (OGDEN PARK DRIVE)

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

DRAWN BY : TJT DATE : 3-17
CHECKED BY : AJP DATE : 4-17
DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

STR. #2

R:\402_001_U4751_SMU_GD_001_640202.dgn 7/26/2017 13:23:14 ttownsend



END BENT 1

END BENT 2

FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE TO THE PILE CENTERLINE AT BOTTOM OF THE CAP)

FOUNDATION NOTES:

1. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.
2. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.
3. DRIVE PILES AT END BENT 1 TO A REQUIRED RESISTANCE OF 217 TONS PER PILE.
4. DRIVE PILES AT END BENT 2 TO A REQUIRED RESISTANCE OF 217 TONS PER PILE.
5. IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 51,000 TO 89,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENTS 1 AND 2. THIS DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)-2 OF THE STANDARD SPECIFICATIONS.
6. TESTING THE FIRST PRODUCTION PILE WITH PDA DURING DRIVING, RESTRIKING OR REDRIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
7. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
8. OBSERVE A 2 MONTHS WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT WITHIN 2 FEET OF THE FINISHED GRADE BEFORE END BENT CONSTRUCTION AT END BENT 1 AND 2.

LEGEND

H HP 12x53 VERTICAL PILE @ END BENTS

HP 12x53 BRACE PILE 3H:12V @ END BENTS

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-
14+79.99 -Y2-

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : TRL	DATE : 5-17		

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
8/1/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND
8/1/2017

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STV ENGINEERS, INC.
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NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

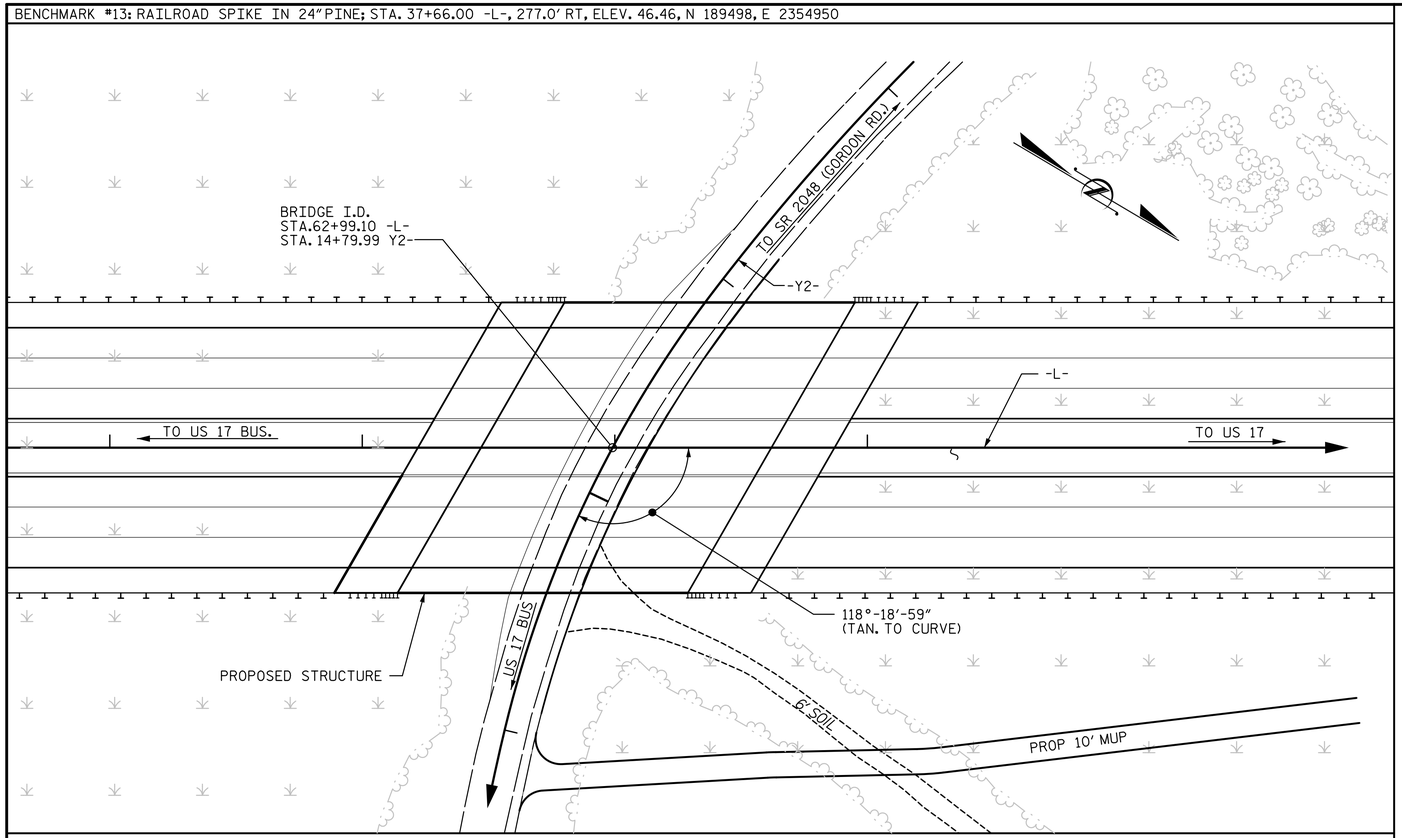
GENERAL DRAWING

FOUNDATION LAYOUT

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

STR. #2

BENCHMARK #13: RAILROAD SPIKE IN 24" PINE; STA. 37+66.00 -L-, 277.0' RT, ELEV. 46.46, N 189498, E 2354950



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FOUNDATION NOTES, SEE "FOUNDATION LAYOUT" SHEET.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, 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.

THE SKEWED END CONDITIONS ARE SUCH THAT THE USE OF 4' WIDE PRESTRESSED CONCRETE DECK PANELS IS NOT POSSIBLE; USE OF 8' WIDE PRESTRESSED CONCRETE DECK PANELS IS NECESSARY.

TOTAL BILL OF MATERIAL

	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIP. SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		12,252	13,100		LUMP SUM		11	1,110.8					248.8		LUMP SUM	LUMP SUM
END BENT 1				103.9		20,130			18	18	1,440	9		598		
END BENT 2				104.2		19,633			19	19	1,615	9		677		
TOTAL	1	12,252	13,100	208.1	LUMP SUM	39,763	11	1,110.8	37	37	3,055	18	248.8	1,275	LUMP SUM	LUMP SUM

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 62+99.10 -L-
14+79.99 -Y2-
SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 ENGINEER KEVIN G. BAILEY
6/29/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/29/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL

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

STR. #2

DRAWN BY : TJT DATE : 3-17
CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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6/27/2017 13:58:15
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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	STRENGTH I MOMENT: DISTRIBUTION FACTORS (DF)	STRENGTH I MOMENT: RATING FACTOR	STRENGTH I MOMENT: SPAN	STRENGTH I MOMENT: GIRDER LOCATION	STRENGTH I MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	STRENGTH I SHEAR: DISTRIBUTION FACTORS (DF)	STRENGTH I SHEAR: RATING FACTOR	STRENGTH I SHEAR: SPAN	STRENGTH I SHEAR: GIRDER LOCATION	STRENGTH I SHEAR: DISTANCE FROM LEFT END OF SPAN (ft)	SERVICE III LIMIT STATE: LIVE-LOAD FACTORS (γ_{LL})	SERVICE III MOMENT: DISTRIBUTION FACTORS (DF)	SERVICE III MOMENT: RATING FACTOR	SERVICE III MOMENT: SPAN	SERVICE III MOMENT: GIRDER LOCATION	SERVICE III MOMENT: DISTANCE FROM LEFT END OF SPAN (ft)	COMMENT NUMBER
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.22	--	1.75	0.99	1.34	A	E	49.8	1.10	1.22	A	I	29.6	0.80	0.99	1.38	A	E	49.8	
DESIGN LOAD RATING		HL-93 (OPERATING)	N/A		1.74	--	1.35	0.99	1.74	A	E	49.8	1.10	2.42	A	I	29.6	N/A	--	--	--	--	--	
DESIGN LOAD RATING		HS-20 (INVENTORY)	36.000	2	1.87	67.32	1.75	0.99	1.87	A	E	49.8	1.10	2.36	A	I	29.6	0.80	0.99	1.93	A	E	49.8	
DESIGN LOAD RATING		HS-20 (OPERATING)	36.000		2.42	87.12	1.35	0.99	2.42	A	E	49.8	1.10	3.12	A	I	29.6	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.58	61.83	1.40	0.99	5.55	A	E	49.8	1.10	7.52	A	I	29.6	0.80	0.99	4.58	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNGARBS2	20.000		3.32	66.40	1.40	0.99	4.01	A	E	49.8	1.10	5.26	A	I	29.6	0.80	0.99	3.32	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNAGRIS2	22.000		3.10	68.20	1.40	0.99	3.75	A	E	49.8	1.10	4.86	A	I	29.6	0.80	0.99	3.10	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNCOTTS3	27.250		2.28	62.13	1.40	0.99	2.76	A	E	49.8	1.10	3.64	A	I	29.6	0.80	0.99	2.28	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNAGGRS4	34.925		1.86	64.96	1.40	0.99	2.26	A	E	49.8	1.10	2.97	A	I	29.6	0.80	0.99	1.86	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNS5A	35.550		1.83	65.06	1.40	0.99	2.21	A	E	49.8	1.10	3.00	A	I	29.6	0.80	0.99	1.83	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNS6A	39.950		1.66	66.32	1.40	0.99	2.01	A	E	49.8	1.10	2.72	A	I	29.6	0.80	0.99	1.66	A	E	49.8	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNS7B	42.000		1.58	66.36	1.40	0.99	1.91	A	E	49.8	1.10	2.65	A	I	29.6	0.80	0.99	1.58	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.02	66.66	1.40	0.99	2.45	A	E	49.8	1.10	3.28	A	I	29.6	0.80	0.99	2.02	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNT4A	33.075		2.02	66.81	1.40	0.99	2.45	A	E	49.8	1.10	3.20	A	I	29.6	0.80	0.99	2.02	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNT6A	41.600		1.64	68.22	1.40	0.99	1.99	A	E	49.8	1.10	2.83	A	I	29.6	0.80	0.99	1.64	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNT7A	42.000		1.64	68.88	1.40	0.99	1.99	A	E	49.8	1.10	2.77	A	I	29.6	0.80	0.99	1.64	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNT7B	42.000		1.68	70.56	1.40	0.99	2.03	A	E	49.8	1.10	2.60	A	I	29.6	0.80	0.99	1.68	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT4	43.000		1.61	69.23	1.40	0.99	1.95	A	E	49.8	1.10	2.51	A	I	29.6	0.80	0.99	1.61	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGT5A	45.000		1.53	68.85	1.40	0.99	1.85	A	E	49.8	1.10	2.48	A	I	29.6	0.80	0.99	1.53	A	E	49.8	
LEGAL LOAD RATING	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGT5B	45.000	3	1.51	67.95	1.40	0.99	1.83	A	E	49.8	1.10	2.37	A	I	29.6	0.80	0.99	1.51	A	E	49.8	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

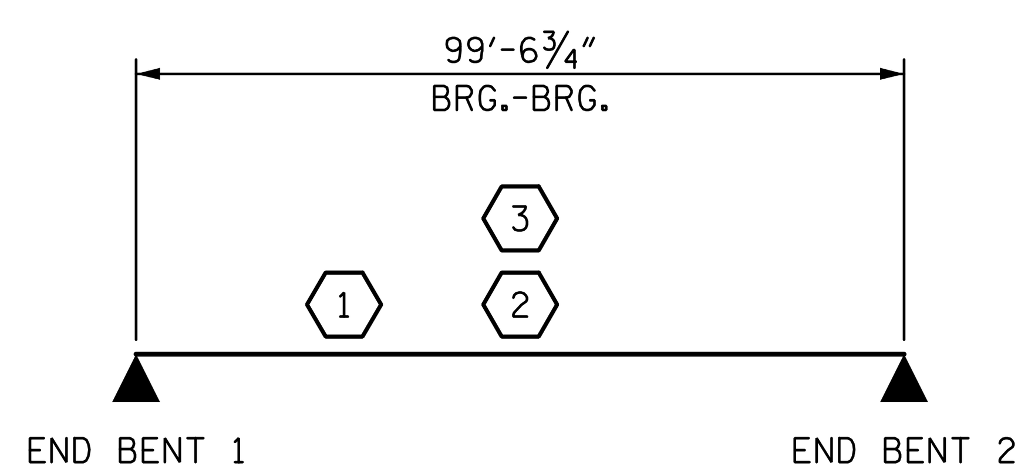
1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)
(2) DESIGN LOAD RATING (HS-20)
(3) LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 62+99.10 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND 6/29/2017

STV 100 Years
STV ENGINEERS, INC.
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NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

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

DRAWN BY : MBC DATE : 4-17
CHECKED BY : AJP DATE : 4-17
DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 5-17

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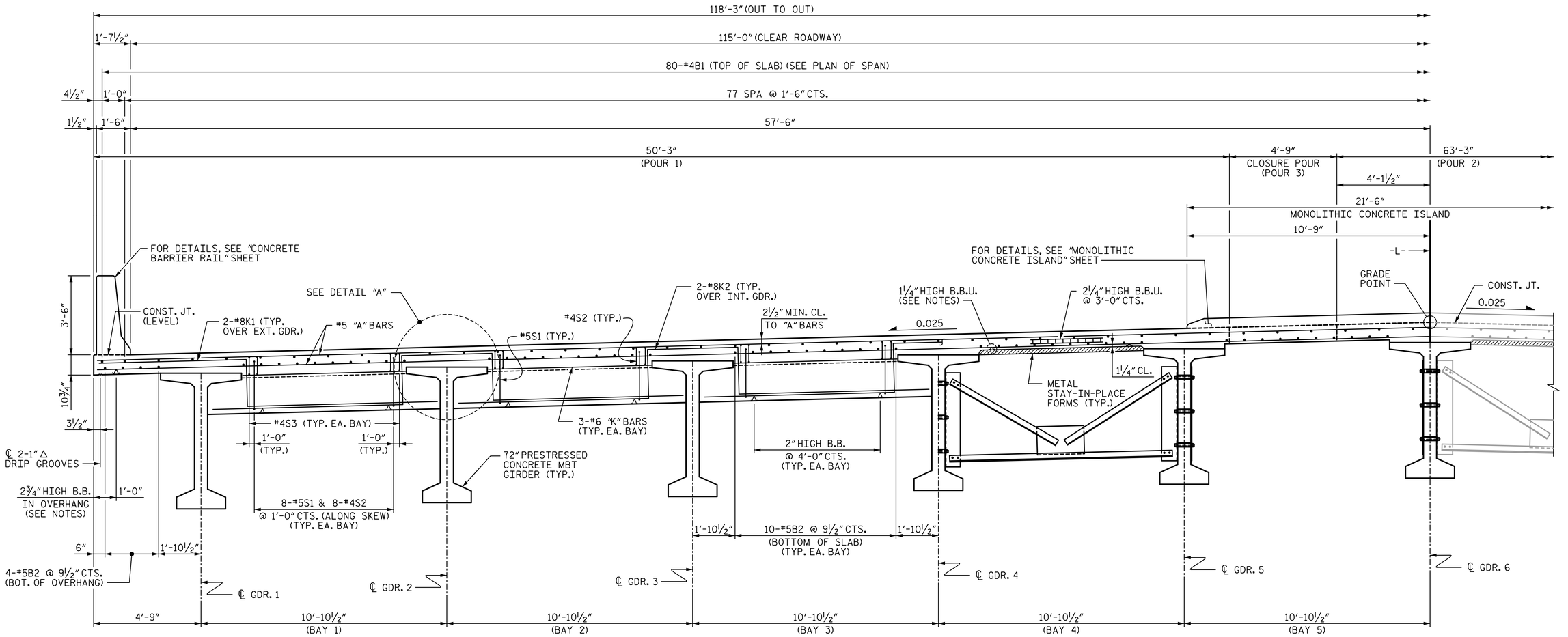


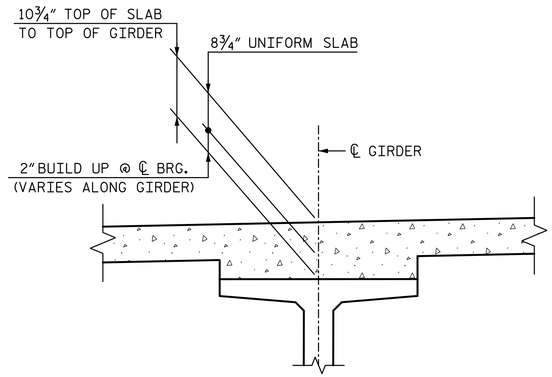
END DIAPHRAGMS

INTERMEDIATE DIAPHRAGMS

NOTES:

1. 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.
2. LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.
3. METAL STAY-IN-PLACE FORMS SHALL NOT BE USED IN BAY 5 DUE TO THE CLOSURE POUR.
4. FOR INTERMEDIATE DIAPHRAGM DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" SHEET.
5. FOR END DIAPHRAGM SECTIONS AND DETAILS, SEE "SUPERSTRUCTURE DETAILS" SHEET.

TYPICAL SECTION



DETAIL "A"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 2

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6/29/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

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

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : AJP	DATE : 4-17		

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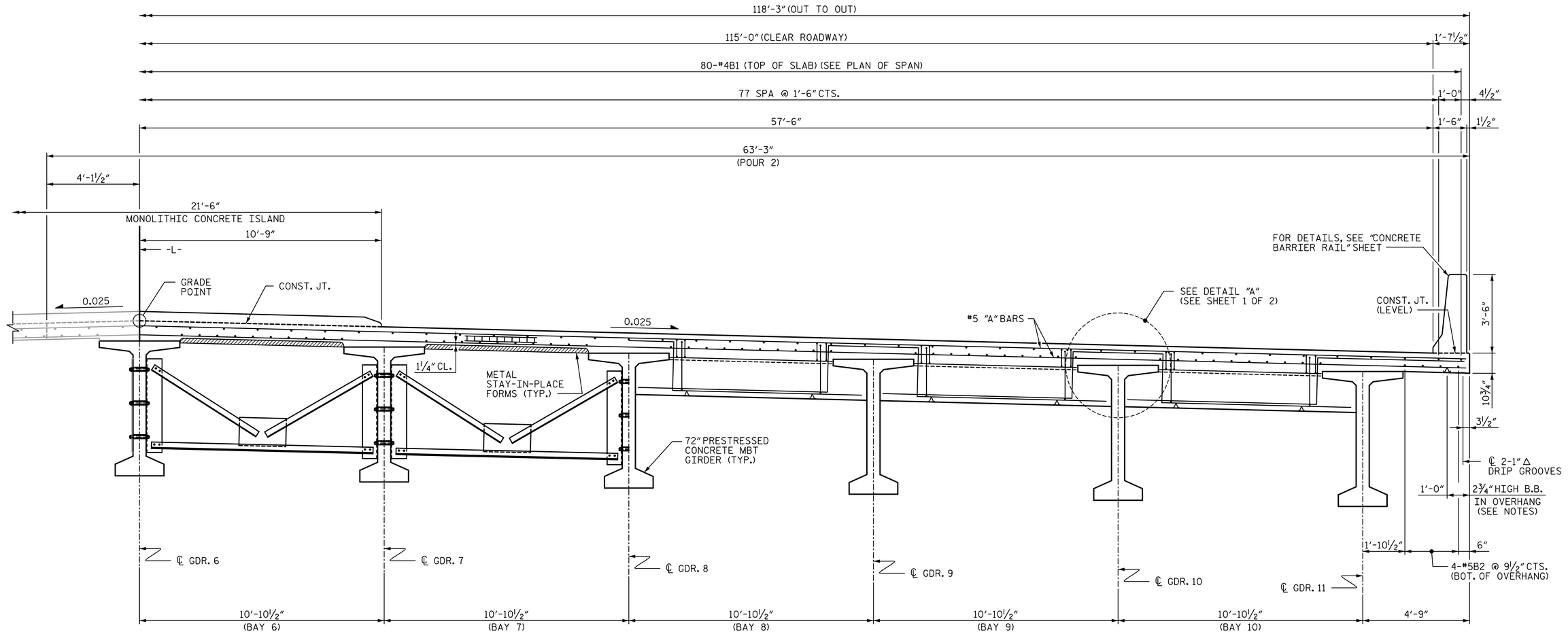
NOTE:

1. FOR NOTES, SEE SHEET 1 OF 2.



INTERMEDIATE DIAPHRAGMS

END DIAPHRAGMS

TYPICAL SECTION

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 2

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6/29/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

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

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : AJP	DATE : 4-17		

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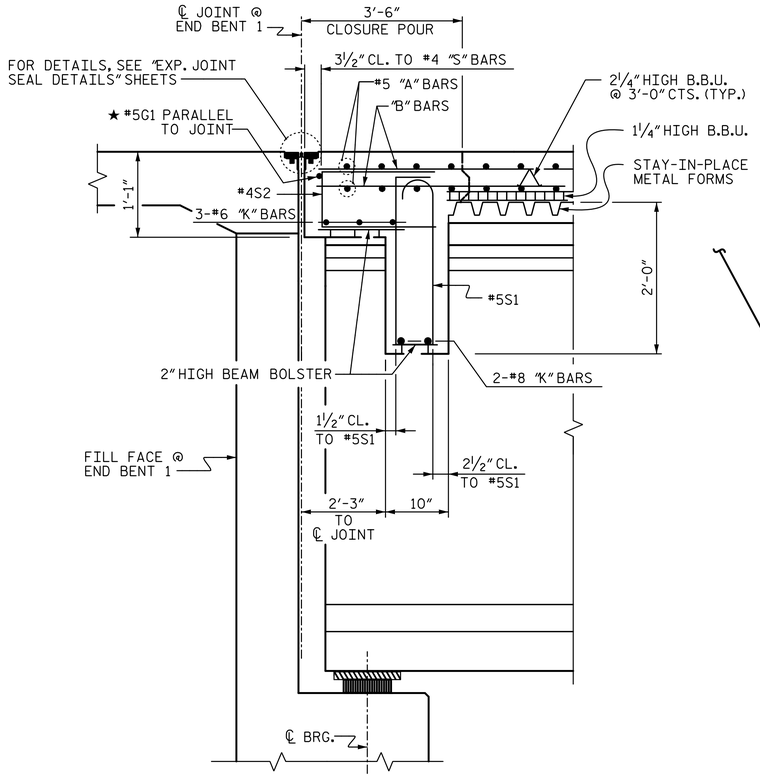
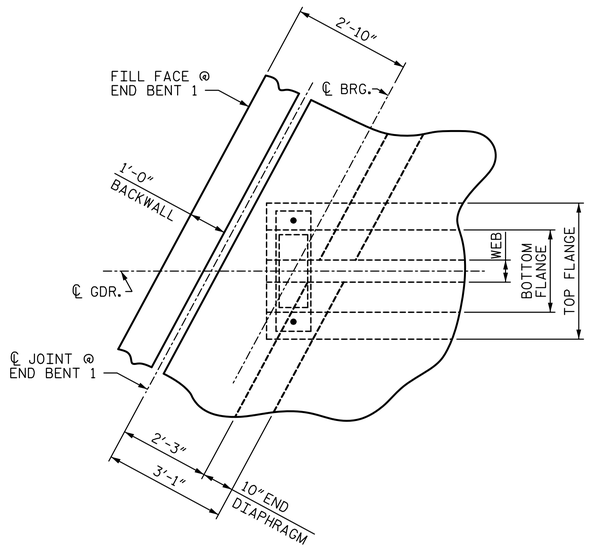


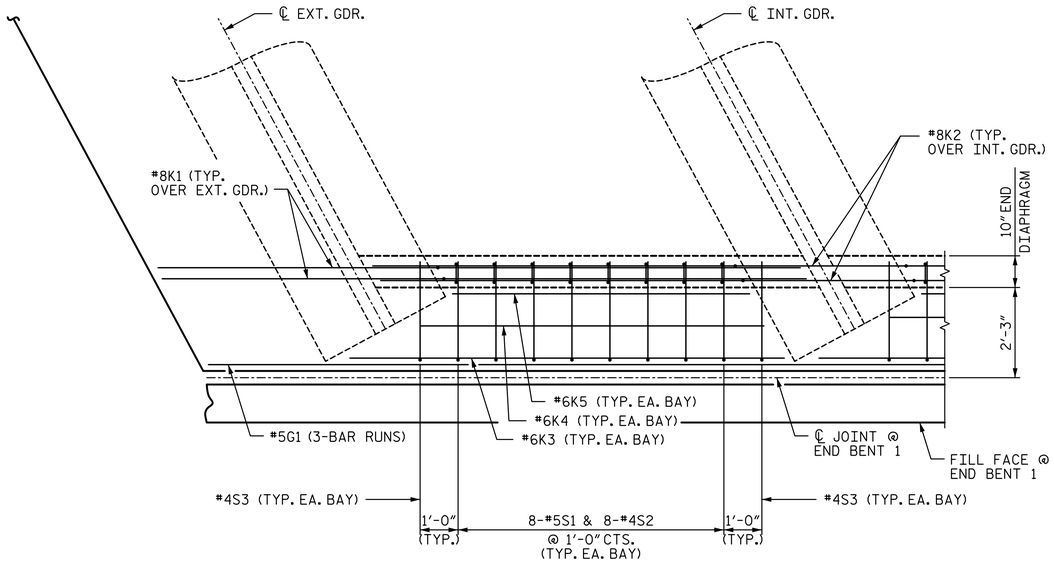
SECTION THRU END DIAPHRAGM

("J" BAR USED WITH STANDARD EXP. JT. NOT SHOWN)



PLAN OF END DIAPHRAGM

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



END DIAPHRAGM DETAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/29/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

SUPERSTRUCTURE DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-7
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : TJT DATE : 3-17
CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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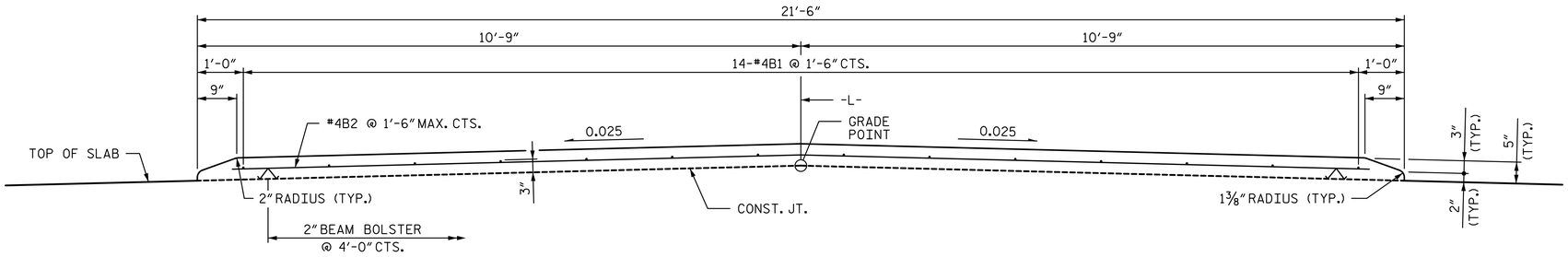
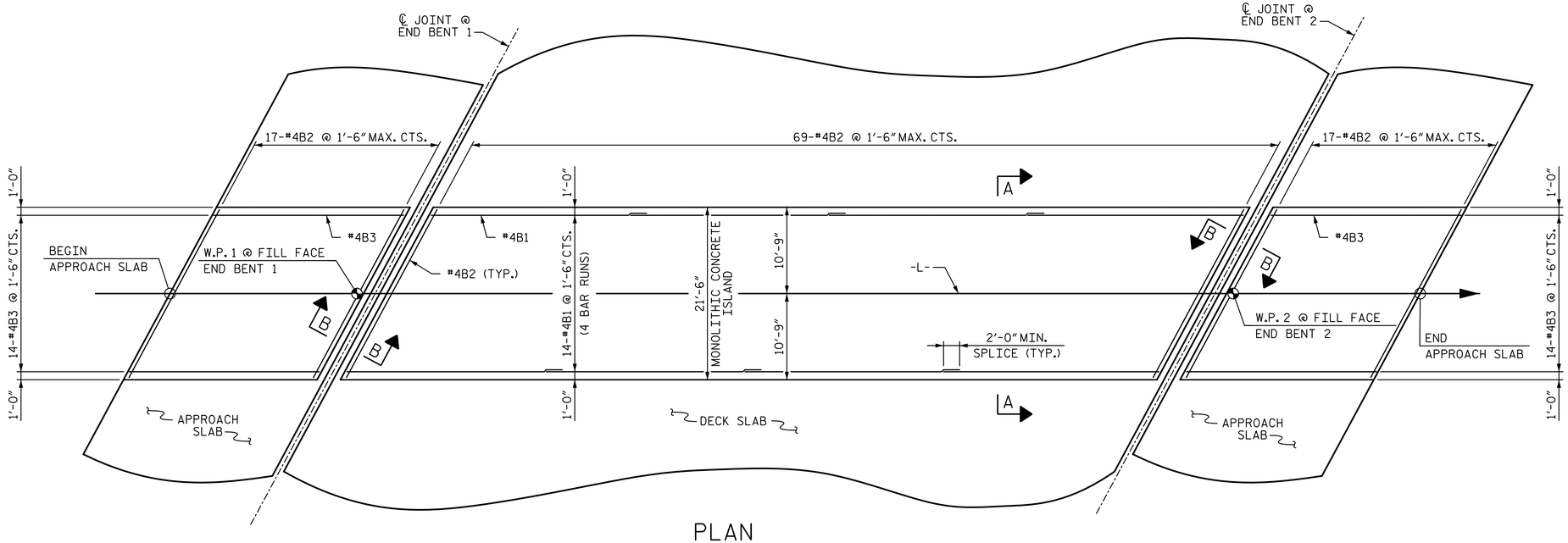
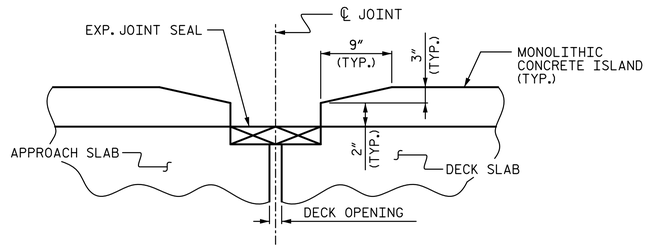


SECTION A-A



PLAN

BILL OF MATERIAL FOR MONOLITHIC CONCRETE ISLAND					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	56	#4	STR	26′-10″	1,004
✳B2	103	#4	STR	22′-10″	1,571
✳B3	28	#4	STR	23′-6″	440
✳ EPOXY COATED REINFORCING STEEL				3,015	LBS.
CLASS AA CONCRETE				49.4	CU. YDS.



SECTION B-B

REINFORCING STEEL IN APPROACH SLAB, DECK SLAB AND MONOLITHIC CONCRETE ISLAND NOT SHOWN FOR CLARITY.

NOTES

NO SEPARATE MEASUREMENT OR PAYMENT WILL BE MADE FOR MATERIALS OR LABOR TO CONSTRUCT THE MONOLITHIC CONCRETE ISLAND. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE SQUARE FOOT PRICE BID FOR "REINFORCED CONCRETE DECK SLAB".

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

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

MONOLITHIC CONCRETE ISLAND SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND

6/29/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

MONOLITHIC CONCRETE ISLAND

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-8
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : TJT DATE : 3-17
CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

TOTAL BRIDGE LENGTH = 106'-0" (W.P. 1 TO W.P. 2)

1'-10 1/8"

33'-9 1/4"

135-#5A100 @ 6 1/2" (TOP OF SLAB)
135-#5A300 @ 6 1/2" (BOTTOM OF SLAB)

#5A104 THRU #5A127 @ 6 1/2" (2 BARS PER MARK) (TOP OF SLAB)

#5A304 THRU #5A327 @ 6 1/2" (2 BARS PER MARK) (BOTTOM OF SLAB)

6 1/2"

℄ JOINT @ END BENT 1

#4B1 (4 BAR RUNS) (TOP OF SLAB) (TYP. EA. OVERHANG)

2'-6" MIN. SPLICE (TYP.)

6 1/2"

#5A127 THRU #5A103 @ 6 1/2" (2 BARS PER MARK) (TOP OF SLAB)

#5A327 THRU #5A303 @ 6 1/2" (2 BARS PER MARK) (BOTTOM OF SLAB)

2-#5A102 & 2-#5A101 (SPLAY BARS) (TOP OF SLAB)

3-#5A302 & 2-#5A301 (SPLAY BARS) (BOTTOM OF SLAB)

SEE "CORNER DETAIL"

1'-7 1/2"

#5G1 (3 BAR RUNS)

GUTTERLINE

80-#4B1 (TOP OF SLAB)

℄ GDR. 1

℄ GDR. 2

SEE END DIAPHRAGM DETAIL ON "SUPERSTRUCTURE DETAILS" SHEET

℄ JOINT @ END BENT 2

℄ GDR. 3

#5G1 (3 BAR RUNS)

67'-8 3/4"

57'-6"

50'-3"

℄ GDR. 4

"B" BARS TOP

4'-9"

℄ GDR. 5

FILL FACE @ END BENT 2

130'-7 5/8"

LONGITUDINAL JOINT

℄ GDR. 6

-L-

118'-3" (OUT TO OUT)

115'-0" (CLEAR ROADWAY)

W.P. 1 @ FILL FACE END BENT 1

W.P. 2 @ FILL FACE END BENT 2

FILL FACE @ END BENT 1

℄ GDR. 7

"B" BARS BOTTOM

66'-7 1/8"

10" END DIAPHRAGM

1'-10 1/2" (TYP.)

℄ GDR. 8

10-#5B2 @ 9 1/2" CTS. (BOTTOM OF SLAB) (2 BAR RUNS) (TYP. EA. BAY)

2'-6" MIN. SPLICE (TYP. TOP OF SLAB)

2'-2" MIN. SPLICE (TYP. BOT. OF SLAB)

10" END DIAPHRAGM

118°-18'-59" (TYP.)

57'-6"

63'-3"

℄ GDR. 9

1'-10 1/2" (TYP.)

132-#4JI @ 1'-0" CTS. SEE "EXP. JT. SEAL DETAILS" SHEET

℄ GDR. 10

1'-10 1/8"

1'-10 1/2"

℄ GDR. 11

GUTTERLINE

132-#4JI @ 1'-0" CTS. SEE "EXP. JT. SEAL DETAILS" SHEET

1'-7 1/2"

2-#5A201 & 3-#5A202 (SPLAY BARS) (TOP OF SLAB)

3-#5A401 & 3-#5A402 (SPLAY BARS) (BOTTOM OF SLAB)

#5A203 THRU #5A229 @ 6 1/2" (2 BARS PER MARK) (TOP OF SLAB)

#5A403 THRU #5A429 @ 6 1/2" (2 BARS PER MARK) (BOTTOM OF SLAB)

6 1/2"

4-#5B2 @ 9 1/2" CTS. (BOTTOM OF SLAB) (2 BAR RUNS) (TYP. EA. OVERHANG) (2'-2" MIN. SPLICE)

6 1/2"

#5A229 THRU #5A203 @ 6 1/2" (2 BARS PER MARK) (TOP OF SLAB)

#5A429 THRU #5A403 @ 6 1/2" (2 BARS PER MARK) (BOTTOM OF SLAB)

138-#5A200 @ 6 1/2" (3 BAR RUNS) (TOP OF SLAB)

138-#5A400 @ 6 1/2" (3 BAR RUNS) (BOTTOM OF SLAB)

29'-5 1/4"

PLAN OF SPAN

6 1/2"

#5A127 THRU #5A103 SPLAY BARS

#5A101

#5A102

#5A103

℄ JOINT @ END BENT 2

CORNER DETAIL

END BENT 2, TOP OF SLAB SHOWN. (BOTTOM OF SLAB AND OPPOSITE CORNER @ END BENT 1 ARE SIMILAR.)

NOTES:

1. FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCEMENT AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.
2. FOR POURING SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR END DIAPHRAGM DETAILS, SEE "SUPERSTRUCTURE DETAILS" SHEET.
4. FOR "B" BAR SPACING & LOCATION, SEE "TYPICAL SECTION" SHEET.
5. FOR MINIMUM SPLICE LENGTHS, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
6. FOR CONCRETE ISLAND REINFORCEMENT AND DETAIL SEE "MONOLITHIC CONCRETE ISLAND" SHEET.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

DRAWN BY : TJT DATE : 3-17

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DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/29/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-9
1			3			TOTAL SHEETS
2			4			30

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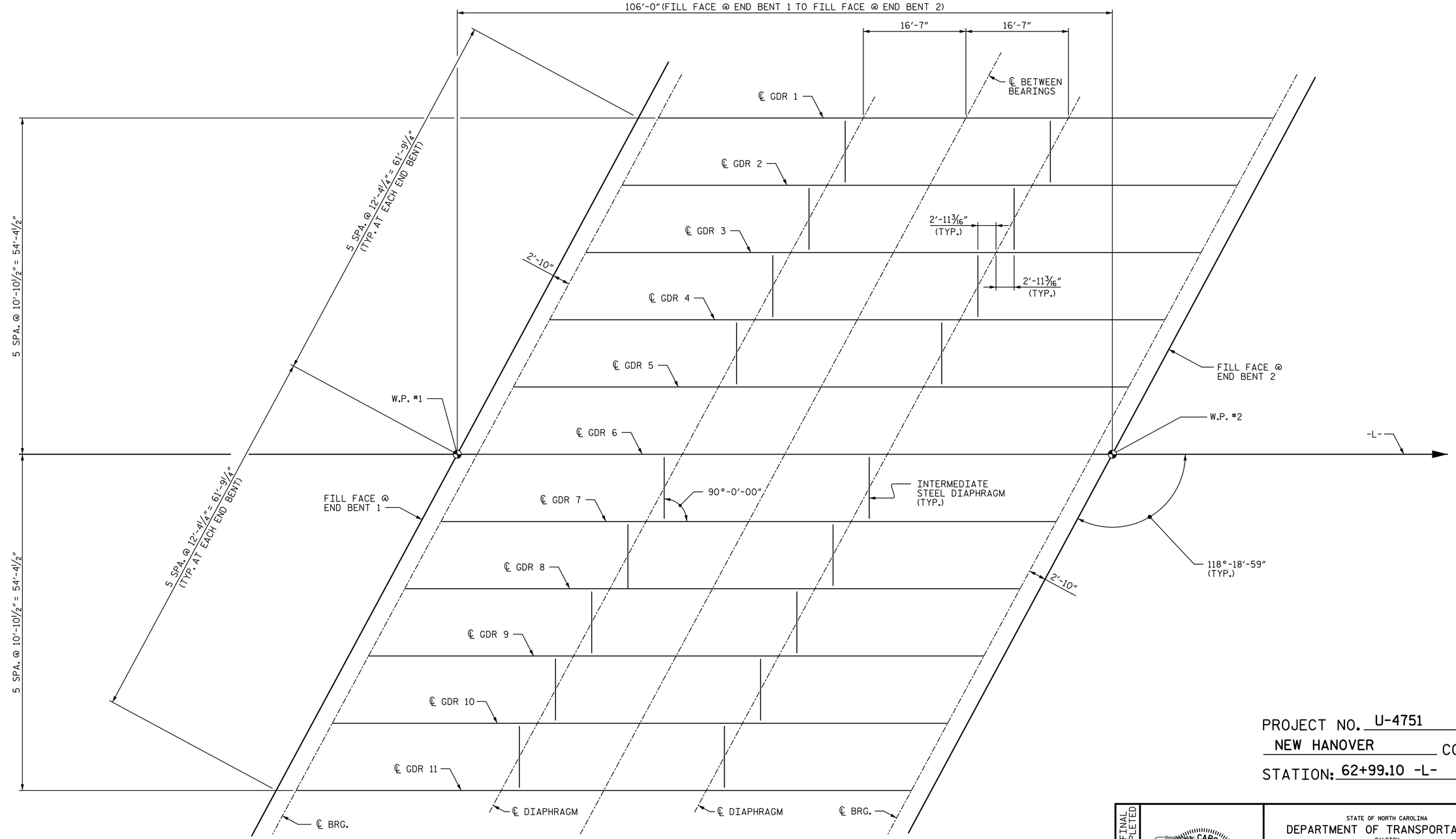

FRAMING PLAN

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

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FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-10
1			3			TOTAL SHEETS
2			4			30

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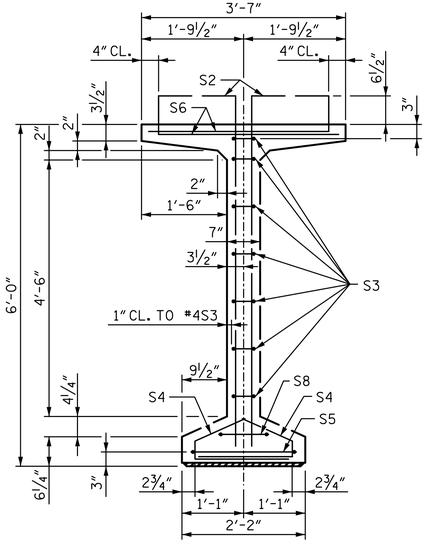
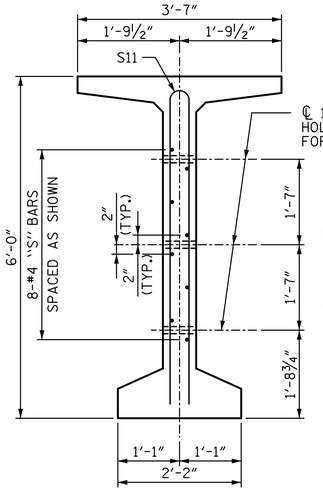


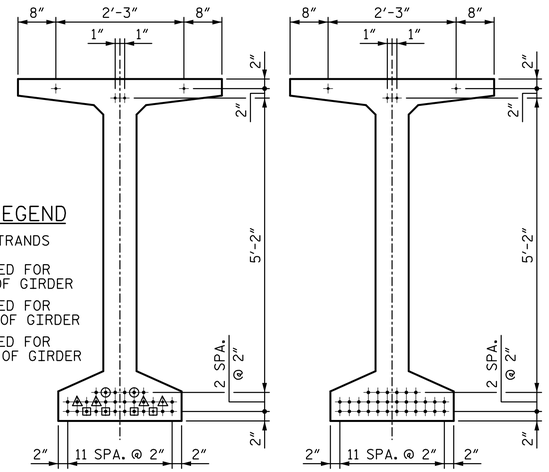
SECTION A-A



SECTION C-C
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

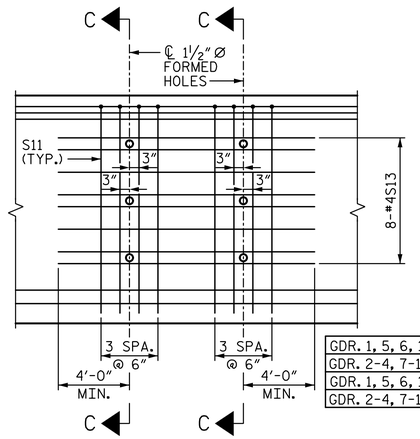
- • FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 24'-0" FROM END OF GIRDER



AT END OF GIRDER AT ℄ OF GIRDER

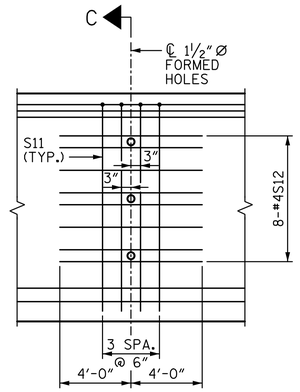
0.6"Ø LOW RELAXATION STRAND LAYOUT

(34 STRANDS REQUIRED)



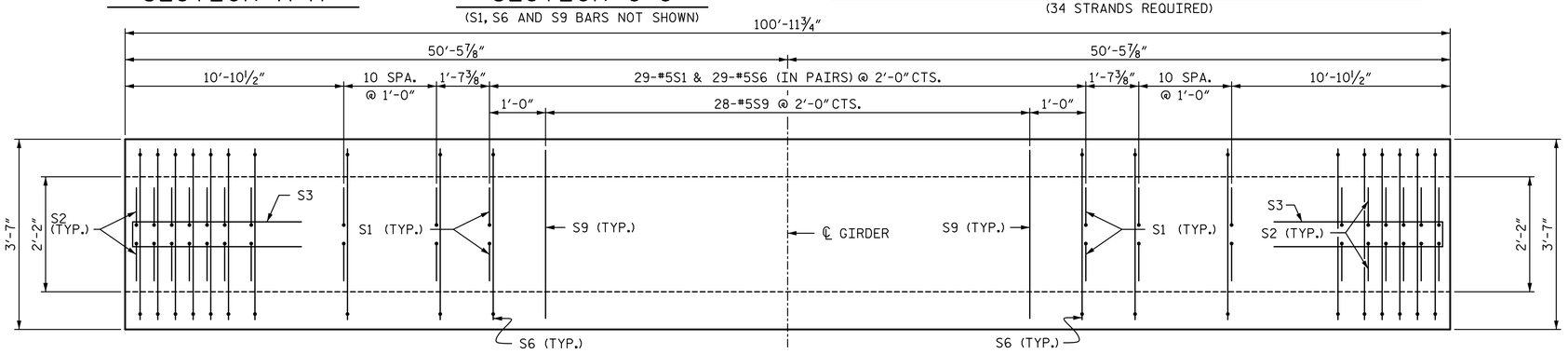
PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 2-4, 7-10

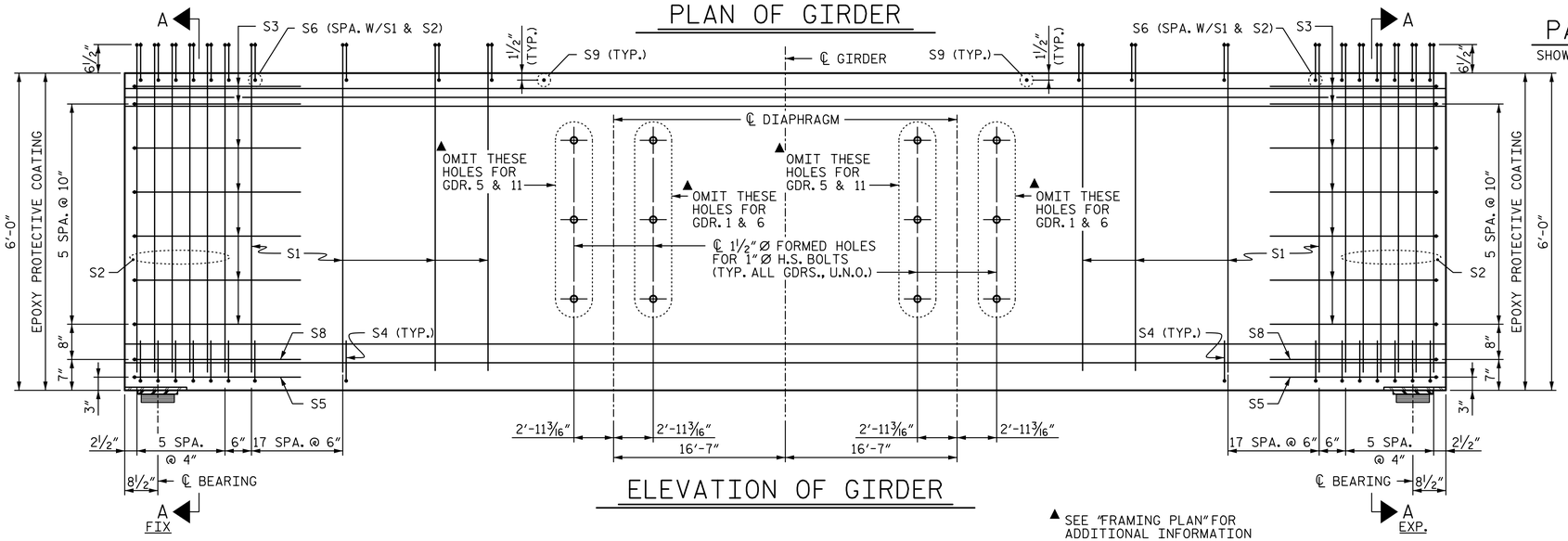


PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER 1, 5, 6, 11



PLAN OF GIRDER



ELEVATION OF GIRDER

▲ SEE "FRAMING PLAN" FOR ADDITIONAL INFORMATION

0.6" Ø L. R. GRADE 270 STRANDS

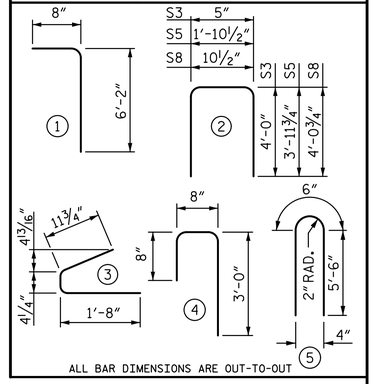
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	170	#4	1	6'-10"	776
S2	24	#5	1	6'-10"	171
S3	14	#4	2	8'-5"	79
S4	96	#4	3	3'-0"	192
S5	2	#5	2	9'-10"	21
S6	388	#5	4	4'-4"	1,754
S8	2	#5	2	9'-0"	19
S9	28	#5	STR	3'-3"	95
S11	8	#5	5	11'-6"	96
S11	16	#5	5	11'-6"	192
S12	16	#4	STR	8'-0"	86
S13	16	#4	STR	14'-0"	150

GDR. 1, 5, 6, 11	
GDR. 2-4, 7-10	
GDR. 1, 5, 6, 11	
GDR. 2-4, 7-10	

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9500 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GDR. 1, 5, 6, 11	3,289	21.6	34
GDR. 2-4, 7-10	3,449	21.6	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
11	100'-11¾"	1,110'-9¼"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 2

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND
6/29/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			30

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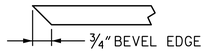
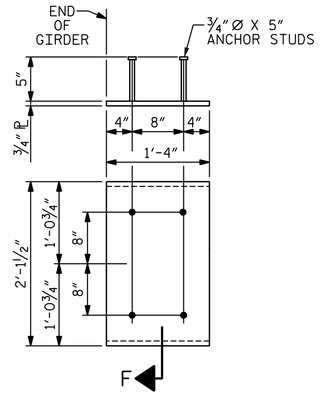


SECTION ''F''

(SEE NOTES)



EMBEDDED PLATE ''B-1'' DETAILS
FOR AASHTO 72″MODIFIED BULB TEES

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5,500 PSI.

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

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

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

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 2

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STV 100 Years

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SUPERSTRUCTURE

72″PRESTRESSED CONCRETE MODIFIED BULB TEE DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-12
1			3			TOTAL SHEETS
2			4			30

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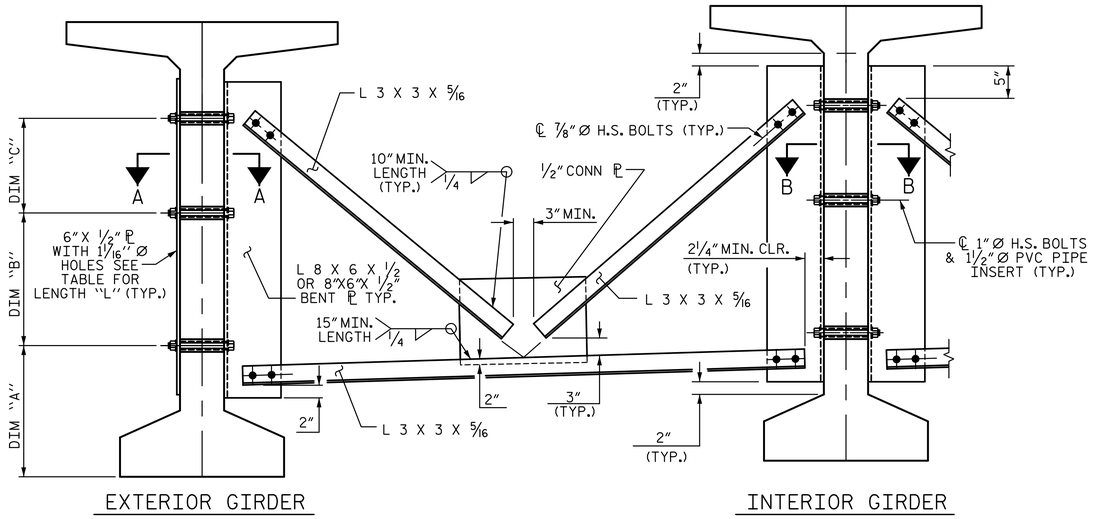
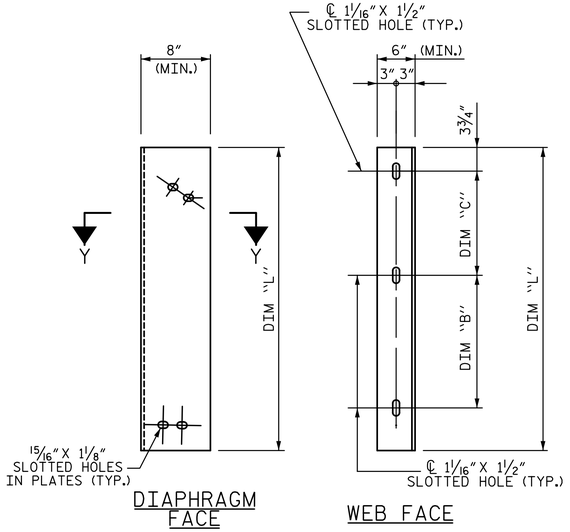


EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE

WEB FACE

STRUCTURAL STEEL NOTES

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

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

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

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

FOR METALLIZATION, APPLY 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.

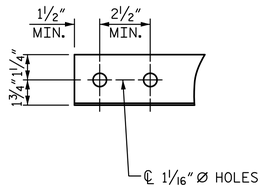
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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 PRESTRESSED CONCRETE GIRDERS.

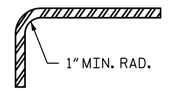
TABLE

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



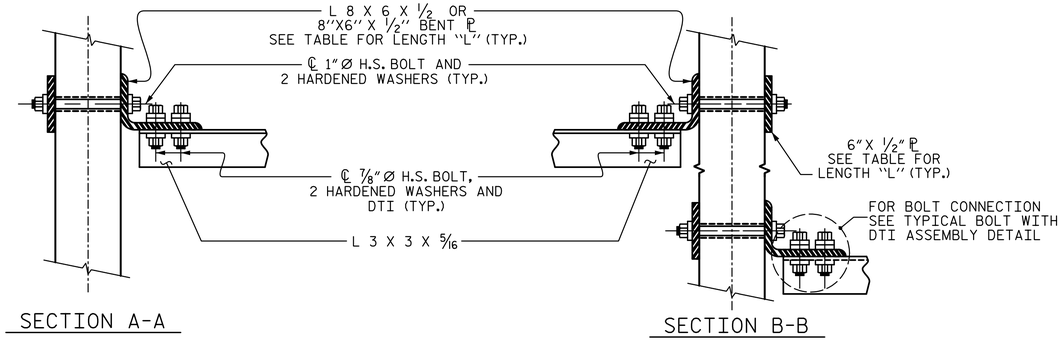
ANGLE END

(L 3 X 3 X 5/16)



SECTION Y-Y

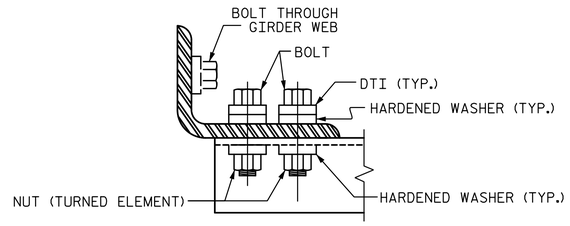
CONNECTOR PLATE DETAIL



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

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SUPERSTRUCTURE

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-13
1			3			TOTAL SHEETS
2			4			30

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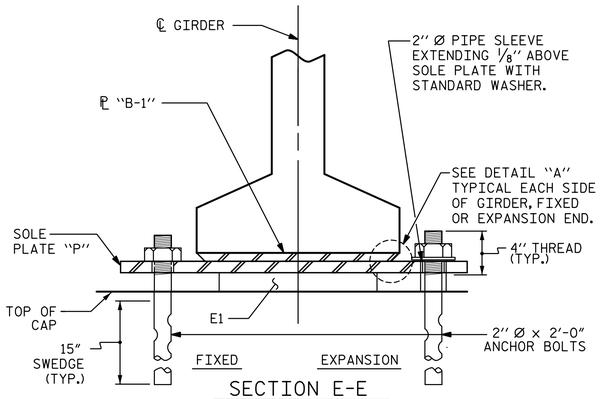

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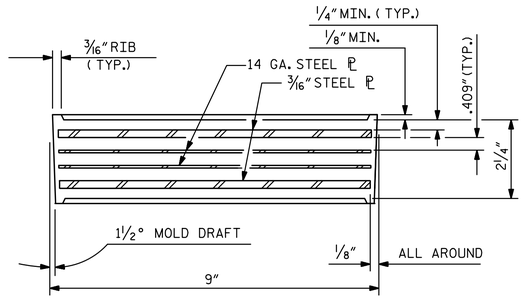
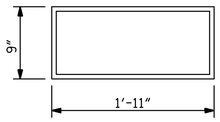


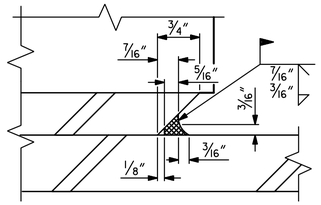
TYPICAL SECTION OF ELASTOMERIC BEARINGS



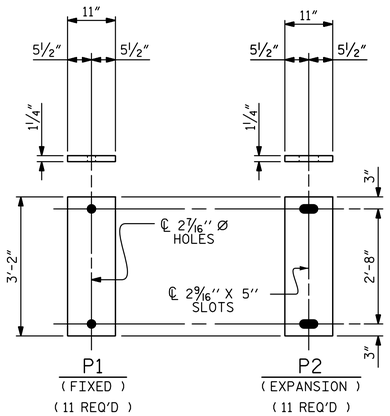
E1 (22 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



DETAIL ''A''



SOLE PLATE DETAILS (''P'')

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
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.

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

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

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

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

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

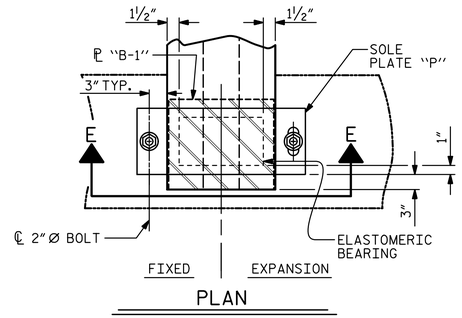
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



PLAN

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Docusigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND

6/29/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-14
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : AJP	DATE : 4-17		

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DEAD LOAD DEFLECTION TABLE

	GIRDERS 1-4, 6, 8-11																				
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.030	0.060	0.088	0.113	0.136	0.155	0.171	0.182	0.189	0.191	0.189	0.182	0.171	0.155	0.136	0.113	0.088	0.060	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.014	0.027	0.041	0.053	0.064	0.073	0.081	0.086	0.090	0.091	0.090	0.086	0.081	0.073	0.064	0.053	0.041	0.027	0.014	0.000
FINAL CAMBER ↑	0″	3/16″	3/8″	9/16″	3/4″	7/8″	1″	1 1/16″	1 1/8″	1 3/16″	1 3/16″	1 3/16″	1 1/8″	1 1/16″	1″	7/8″	3/4″	9/16″	3/8″	3/16″	0″
	GIRDER 5																				
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.030	0.060	0.088	0.113	0.136	0.155	0.171	0.182	0.189	0.191	0.189	0.182	0.171	0.155	0.136	0.113	0.088	0.060	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.011	0.023	0.034	0.045	0.054	0.062	0.068	0.073	0.076	0.077	0.076	0.073	0.068	0.062	0.054	0.045	0.034	0.023	0.011	0.000
FINAL CAMBER ↑	0″	1/4″	7/16″	5/8″	13/16″	1″	1 1/8″	1 1/4″	1 5/16″	1 3/8″	1 3/8″	1 3/8″	1 5/16″	1 1/4″	1 1/8″	1″	13/16″	5/8″	7/16″	1/4″	0″
	GIRDER 7																				
TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.030	0.060	0.088	0.113	0.136	0.155	0.171	0.182	0.189	0.191	0.189	0.182	0.171	0.155	0.136	0.113	0.088	0.060	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.015	0.030	0.045	0.059	0.072	0.082	0.091	0.097	0.100	0.102	0.100	0.097	0.091	0.082	0.072	0.059	0.045	0.030	0.015	0.000
FINAL CAMBER ↑	0″	3/16″	3/8″	1/2″	5/8″	3/4″	7/8″	15/16″	1″	1 1/16″	1 1/16″	1 1/16″	1″	15/16″	7/8″	3/4″	5/8″	1/2″	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).

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 62+99.10 -L-

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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS

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

DRAWN BY : TJT DATE : 3-17
CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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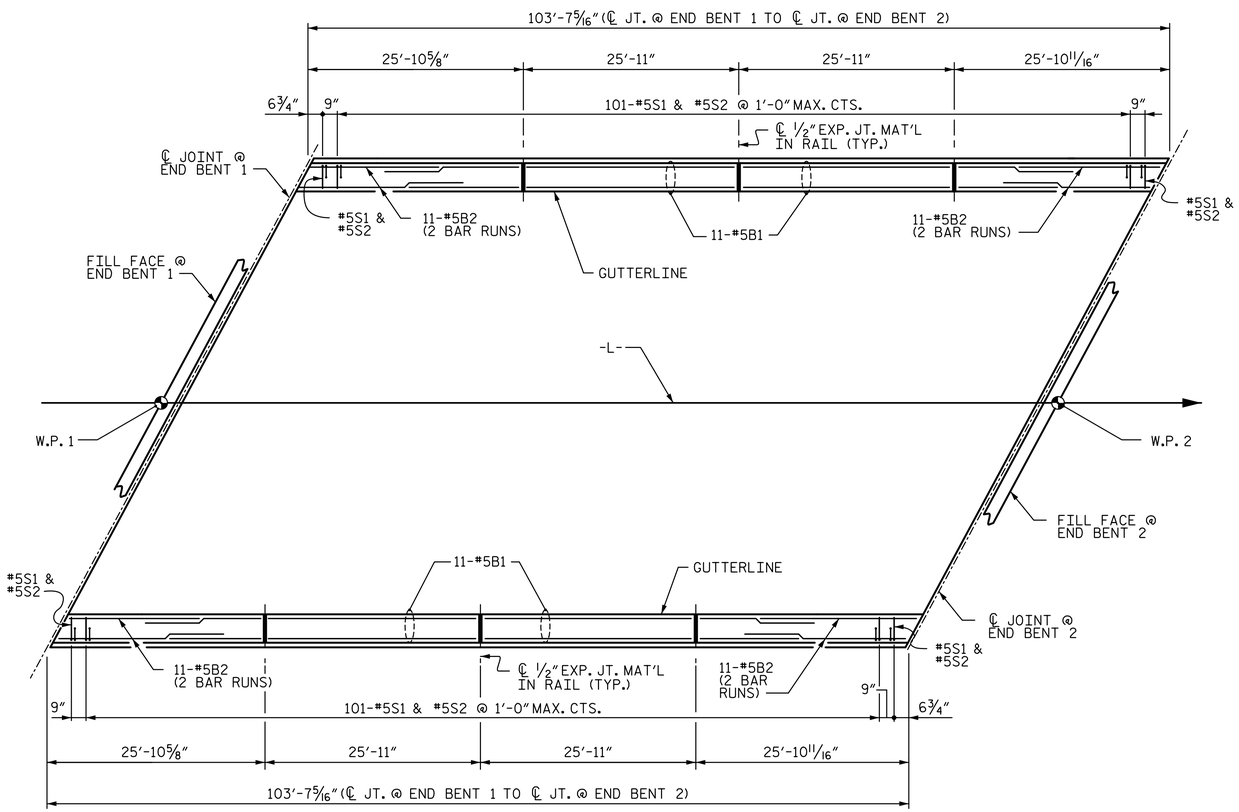
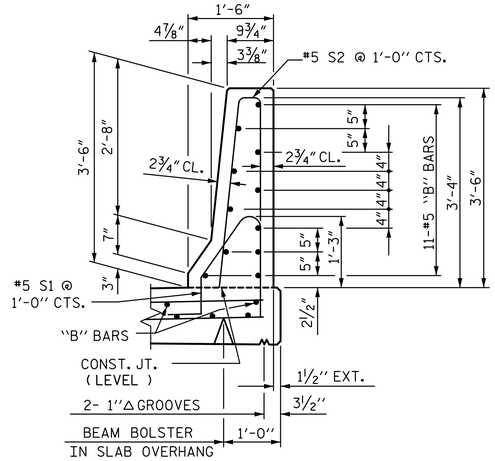
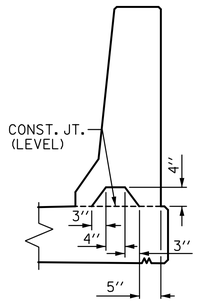


PLAN OF BARRIER RAIL

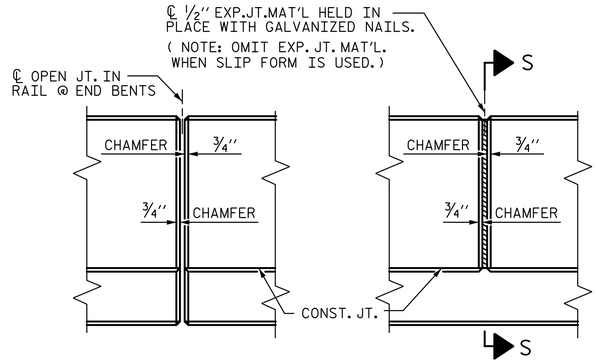


SECTION THRU RAIL



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

NOTES

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

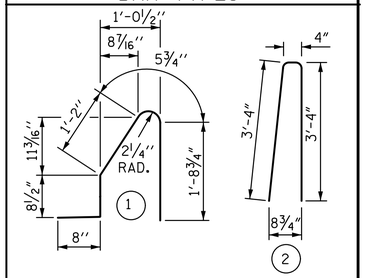
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

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.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	44	#5	STR	25′-6″	1,170
✳ B2	88	#5	STR	14′-0″	1,285
✳ S1	206	#5	1	4′-9″	1,021
✳ S2	206	#5	2	7′-0″	1,504

✳ EPOXY COATED REINFORCING STEEL	4,980	LBS.
CLASS AA CONCRETE	28.2	CU. YDS.
CONCRETE BARRIER RAIL SUPERSTRUCTURE	207.2	LIN. FT.
● APPROACH SLABS	41.6	LIN. FT.
TOTAL	248.8	LIN. FT.

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

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6/29/2017

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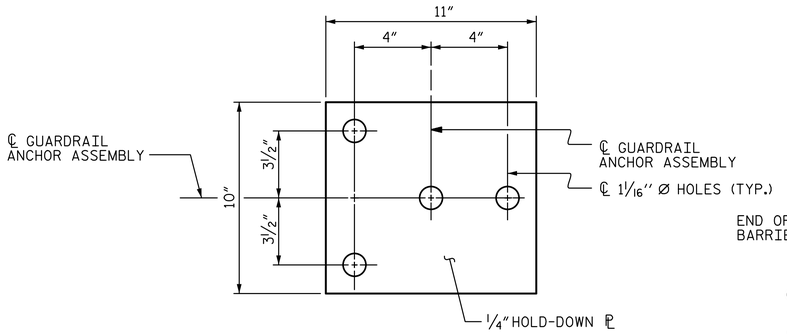
RALEIGH

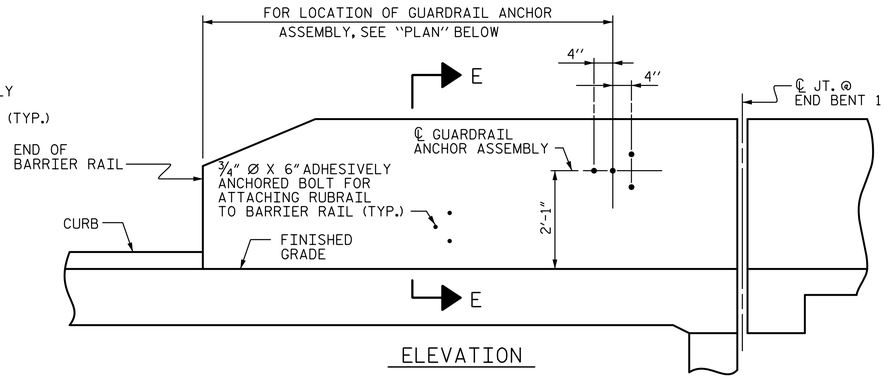
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

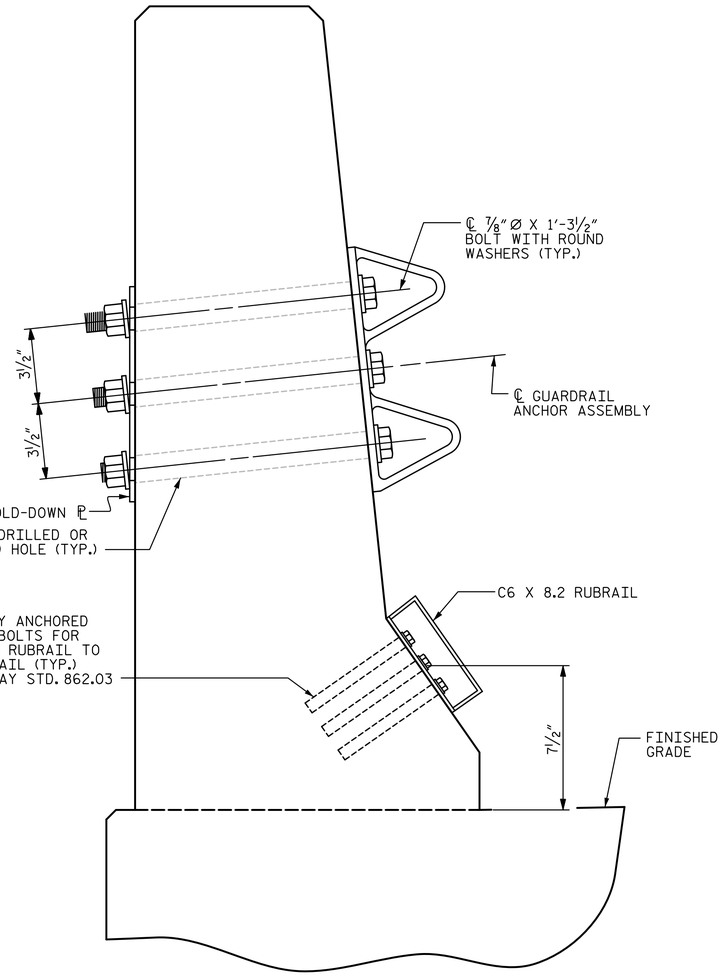
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-16
1			3			TOTAL SHEETS
2			4			30



PLAN

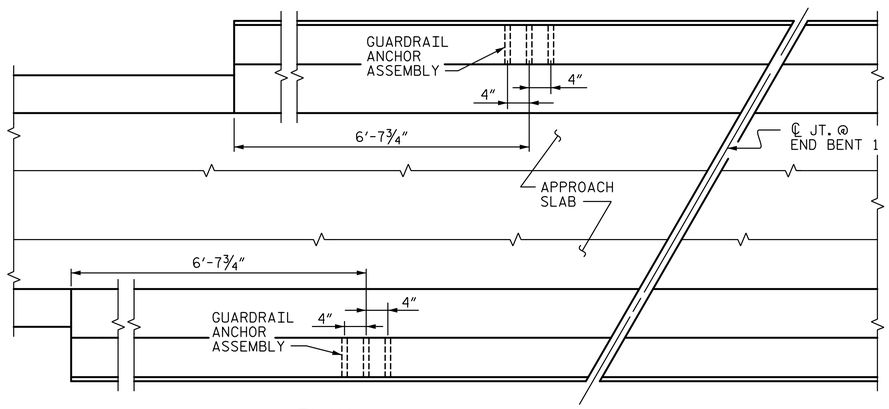


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.

NOTES

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

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

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

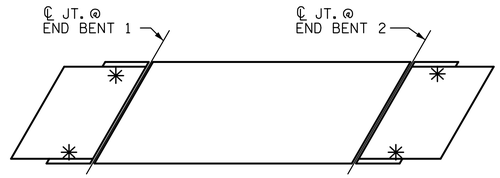
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

DRAWN BY : TJT DATE : 3-17

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DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
7/24/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

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

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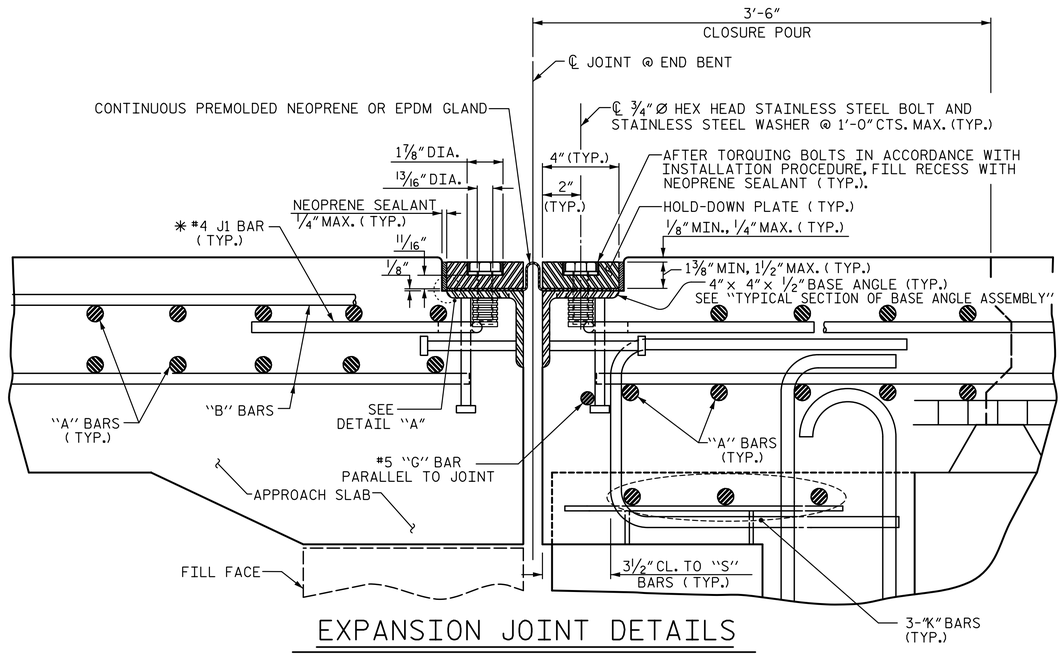


EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

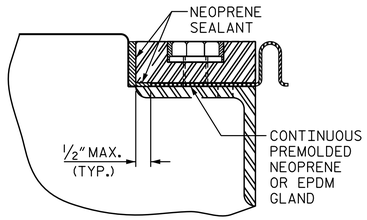
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

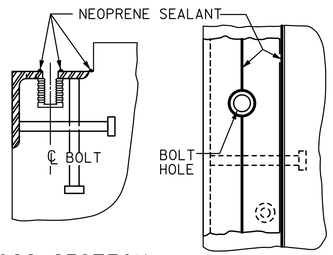
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO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

GENERAL NOTES

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

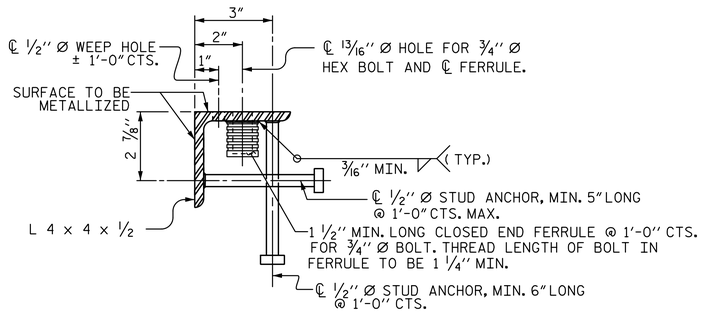


DETAIL "A"

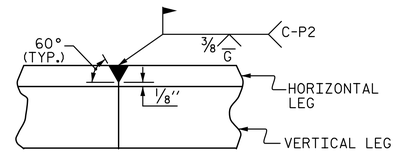


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



TYPICAL SECTION OF BASE ANGLE ASSEMBLY



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	118°-18'-59"	0"	1¼"	1¼"	1¼"
2	118°-18'-59"	⅝"	1⅜"	1¼"	1⅛"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 2

DRAWN BY : TJT DATE : 3-17

CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/29/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-18
1			3			TOTAL SHEETS
2			4			30

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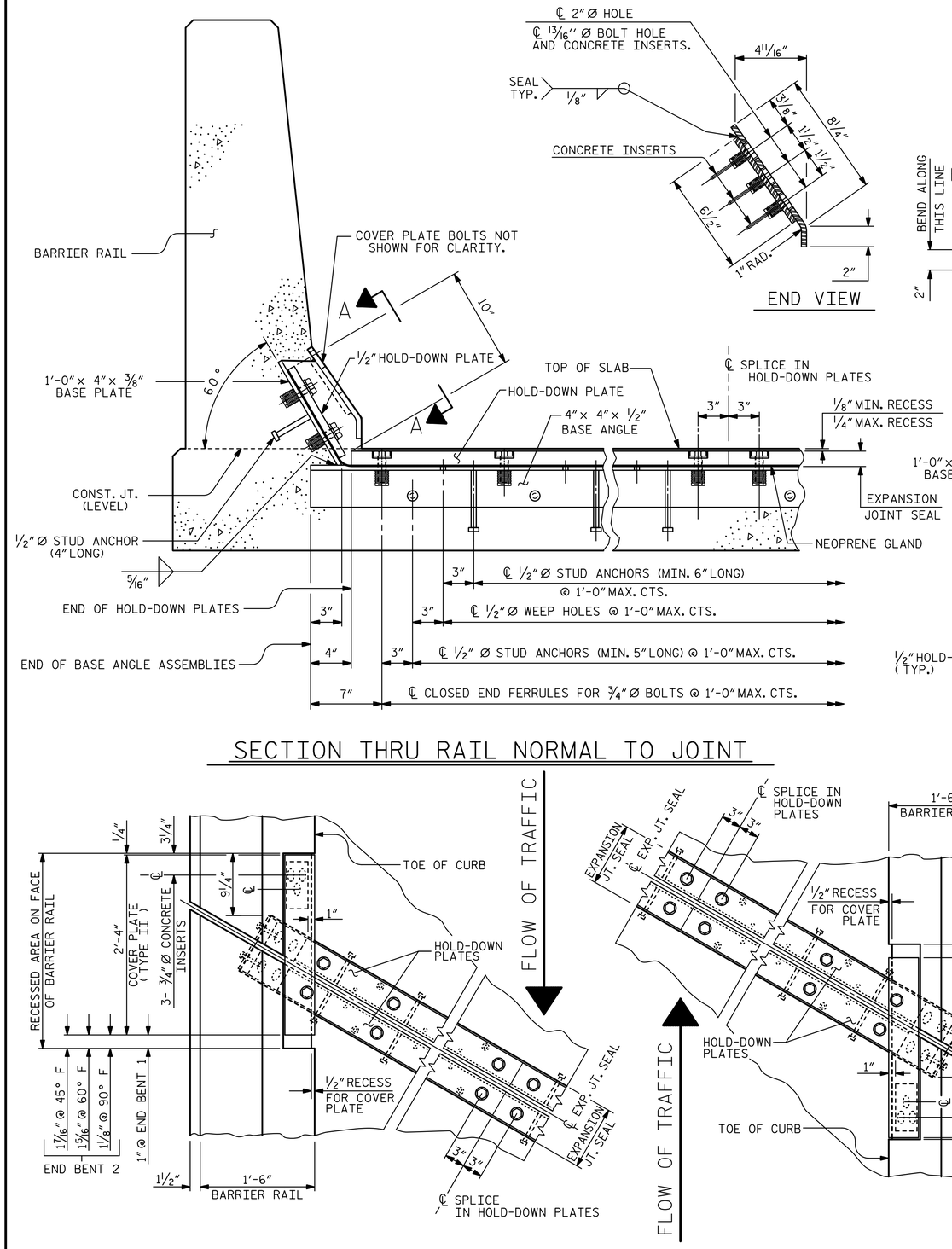
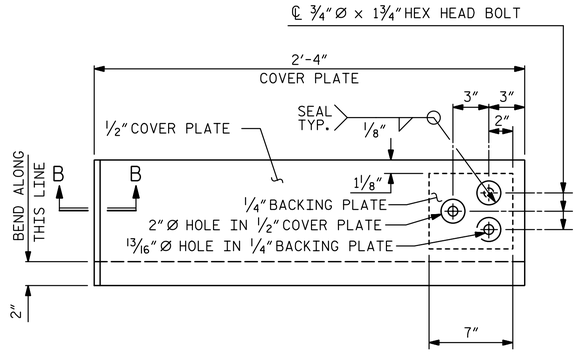
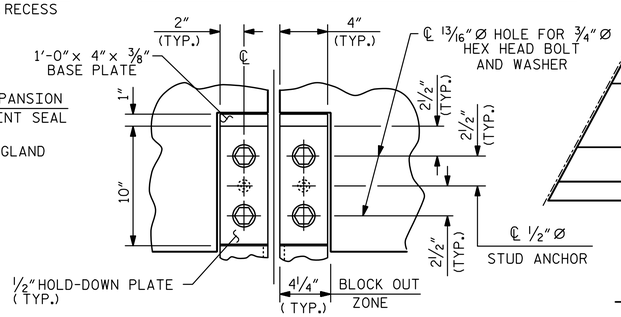


END VIEW

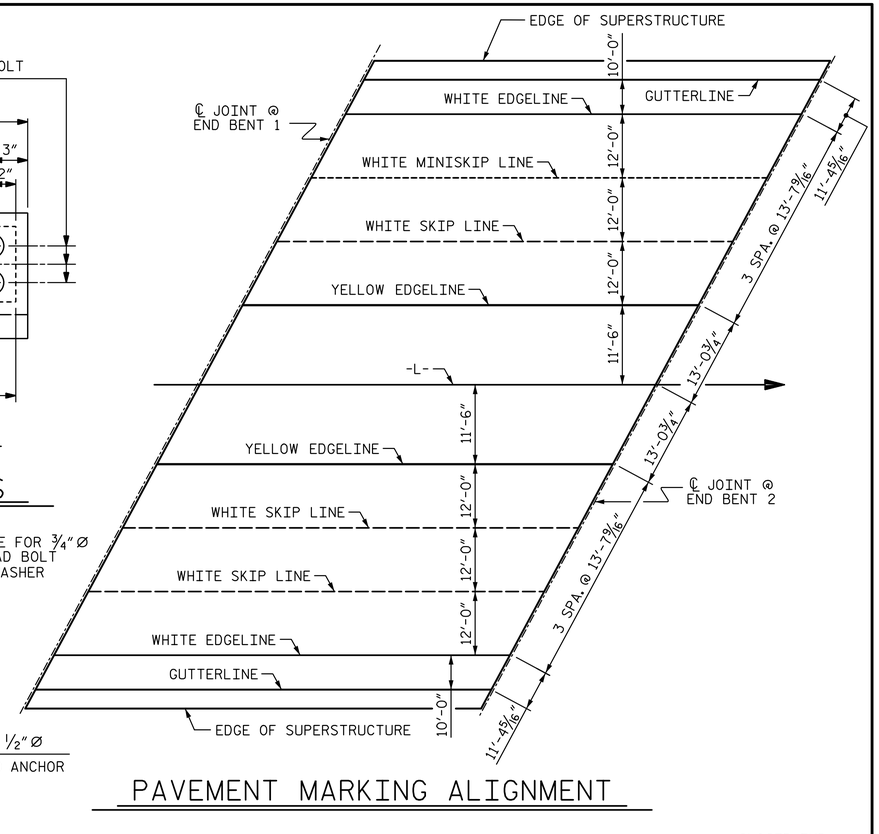


TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

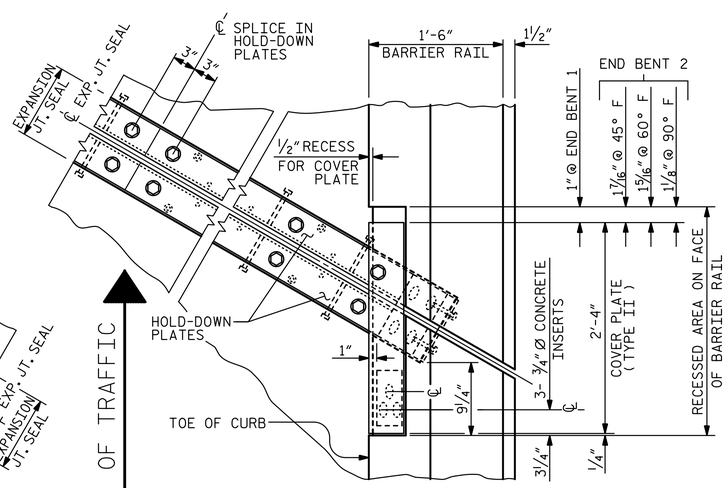


SECTION A - A

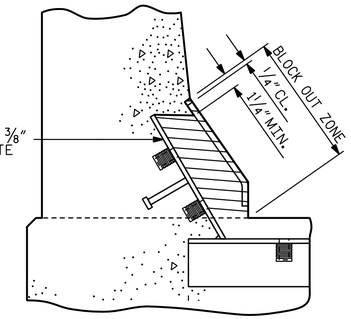


PAVEMENT MARKING ALIGNMENT

SECTION THRU RAIL NORMAL TO JOINT

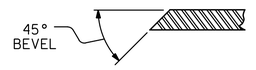


PLAN OF EXPANSION JOINT SEAL

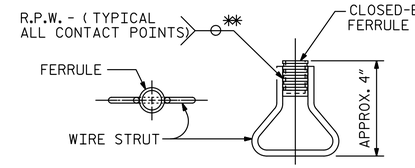


BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.



SECTION B - B



PLAN ELEVATION

CONCRETE INSERT

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 2

DRAWN BY : TJT DATE : 3-17

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DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND

6/29/2017

STV 100 Years

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Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

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

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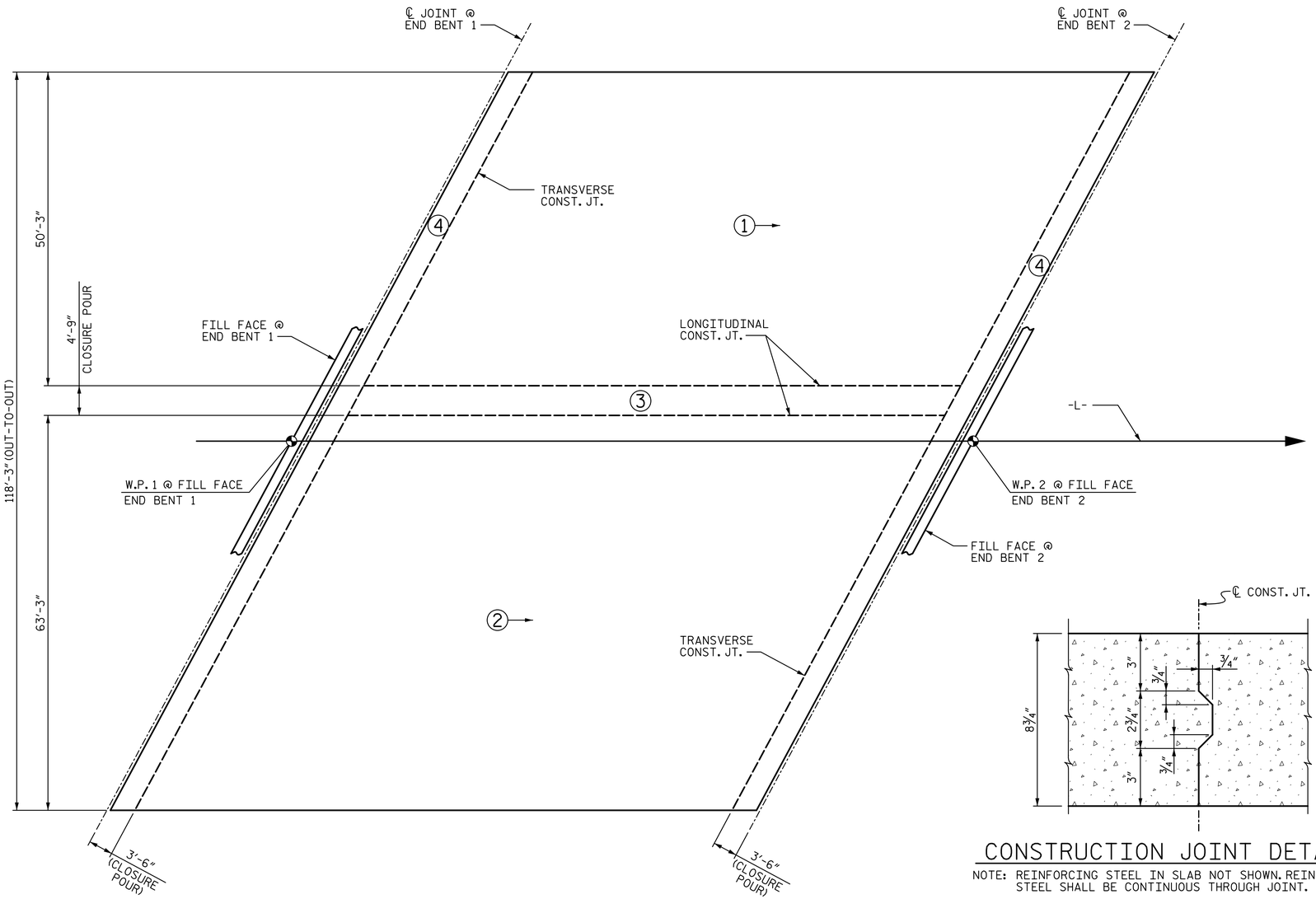
NOTES:

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



POUR SEQUENCE

(#) → INDICATES POUR NUMBER AND DIRECTION OF POUR

CONSTRUCTION JOINT DETAIL

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/29/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DECK POUR SEQUENCE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-20
1			3			TOTAL SHEETS
2			4			30

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : AJP	DATE : 4-17		

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REINFORCING BAR SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A100	135	#5	STR	54′-8″	7,697	A300	135	#5	STR	54′-8″	7,697	✳ B1	320	#4	STR	27′-4″	5,843
✳ A101	2	#5	STR	3′-0″	6	A301	2	#5	STR	3′-0″	6	B2	216	#5	STR	53′-0″	11,940
✳ A102	2	#5	STR	4′-0″	8	A302	3	#5	STR	4′-0″	13						
✳ A103	2	#5	STR	4′-7″	10	A303	2	#5	STR	5′-4″	11	✳ G1	6	#5	STR	46′-6″	291
✳ A104	4	#5	STR	6′-7″	27	A304	4	#5	STR	7′-4″	31						
✳ A105	4	#5	STR	8′-8″	36	A305	4	#5	STR	9′-4″	39	✳ J1	264	#4	6	1′-5″	250
✳ A106	4	#5	STR	10′-8″	45	A306	4	#5	STR	11′-4″	47						
✳ A107	4	#5	STR	12′-8″	53	A307	4	#5	STR	13′-4″	56	✳ K1	8	#8	1	19′-2″	409
✳ A108	4	#5	STR	14′-8″	61	A308	4	#5	STR	15′-4″	64	✳ K2	36	#8	2	28′-0″	2,691
✳ A109	4	#5	STR	16′-8″	70	A309	4	#5	STR	17′-5″	73	✳ K3	20	#6	STR	11′-5″	343
✳ A110	4	#5	STR	18′-8″	78	A310	4	#5	STR	19′-5″	81	✳ K4	20	#6	STR	9′-0″	270
✳ A111	4	#5	STR	20′-8″	86	A311	4	#5	STR	21′-5″	89	✳ K5	20	#6	STR	7′-10″	235
✳ A112	4	#5	STR	22′-8″	95	A312	4	#5	STR	23′-5″	98						
✳ A113	4	#5	STR	24′-9″	103	A313	4	#5	STR	25′-5″	106	✳ S1	160	#5	3	6′-0″	1,001
✳ A114	4	#5	STR	26′-9″	112	A314	4	#5	STR	27′-5″	114	✳ S2	160	#4	4	5′-8″	606
✳ A115	4	#5	STR	28′-9″	120	A315	4	#5	STR	29′-5″	123	✳ S3	40	#4	5	4′-4″	116
✳ A116	4	#5	STR	30′-9″	128	A316	4	#5	STR	31′-5″	131						
✳ A117	4	#5	STR	32′-9″	137	A317	4	#5	STR	33′-6″	140						
✳ A118	4	#5	STR	34′-9″	145	A318	4	#5	STR	35′-6″	148						
✳ A119	4	#5	STR	36′-9″	153	A319	4	#5	STR	37′-6″	156	REINFORCING STEEL					LBS. 36,545
✳ A120	4	#5	STR	38′-9″	162	A320	4	#5	STR	39′-6″	165	✳ EPOXY COATED REINFORCING STEEL					LBS. 36,570
✳ A121	4	#5	STR	40′-10″	170	A321	4	#5	STR	41′-6″	173						
✳ A122	4	#5	STR	42′-10″	179	A322	4	#5	STR	43′-6″	181						
✳ A123	4	#5	STR	44′-10″	187	A323	4	#5	STR	45′-6″	190						
✳ A124	4	#5	STR	46′-10″	195	A324	4	#5	STR	47′-6″	198						
✳ A125	4	#5	STR	48′-10″	204	A325	4	#5	STR	49′-7″	207						
✳ A126	4	#5	STR	50′-10″	212	A326	4	#5	STR	51′-7″	215						
✳ A127	4	#5	STR	52′-10″	220	A327	4	#5	STR	53′-7″	224						
✳ A200	414	#5	STR	23′-8″	10,219	A400	414	#5	STR	23′-6″	10,147						
✳ A201	2	#5	STR	3′-6″	7	A401	3	#5	STR	3′-6″	11						
✳ A202	3	#5	STR	4′-6″	14	A402	3	#5	STR	4′-6″	14						
✳ A203	4	#5	STR	5′-7″	23	A403	4	#5	STR	6′-4″	26						
✳ A204	4	#5	STR	7′-8″	32	A404	4	#5	STR	8′-4″	35						
✳ A205	4	#5	STR	9′-8″	40	A405	4	#5	STR	10′-4″	43						
✳ A206	4	#5	STR	11′-8″	49	A406	4	#5	STR	12′-4″	51						
✳ A207	4	#5	STR	13′-8″	57	A407	4	#5	STR	14′-4″	60						
✳ A208	4	#5	STR	15′-8″	65	A408	4	#5	STR	16′-4″	68						
✳ A209	4	#5	STR	17′-8″	74	A409	4	#5	STR	18′-5″	77						
✳ A210	4	#5	STR	19′-8″	82	A410	4	#5	STR	20′-5″	85						
✳ A211	4	#5	STR	21′-8″	90	A411	4	#5	STR	22′-5″	94						
✳ A212	4	#5	STR	23′-9″	99	A412	4	#5	STR	24′-5″	102						
✳ A213	4	#5	STR	25′-9″	107	A413	4	#5	STR	26′-5″	110						
✳ A214	4	#5	STR	27′-9″	116	A414	4	#5	STR	28′-5″	119						
✳ A215	4	#5	STR	29′-9″	124	A415	4	#5	STR	30′-5″	127						
✳ A216	4	#5	STR	31′-9″	132	A416	4	#5	STR	32′-6″	136						
✳ A217	4	#5	STR	33′-9″	141	A417	4	#5	STR	34′-6″	144						
✳ A218	4	#5	STR	35′-9″	149	A418	4	#5	STR	36′-6″	152						
✳ A219	4	#5	STR	37′-9″	157	A419	4	#5	STR	38′-6″	161						
✳ A220	4	#5	STR	39′-10″	166	A420	4	#5	STR	40′-6″	169						
✳ A221	4	#5	STR	41′-10″	175	A421	4	#5	STR	42′-6″	177						
✳ A222	4	#5	STR	43′-10″	183	A422	4	#5	STR	44′-6″	186						
✳ A223	4	#5	STR	45′-10″	191	A423	4	#5	STR	46′-6″	194						
✳ A224	4	#5	STR	47′-10″	200	A424	4	#5	STR	48′-7″	203						
✳ A225	4	#5	STR	49′-10″	208	A425	4	#5	STR	50′-7″	211						
✳ A226	4	#5	STR	51′-10″	216	A426	4	#5	STR	52′-7″	219						
✳ A227	4	#5	STR	53′-10″	225	A427	4	#5	STR	54′-7″	228						
✳ A228	4	#5	STR	55′-11″	233	A428	4	#5	STR	56′-7″	236						
✳ A229	4	#5	STR	57′-11″	242	A429	4	#5	STR	58′-7″	244						

SUPERSTRUCTURE BILL OF MATERIAL

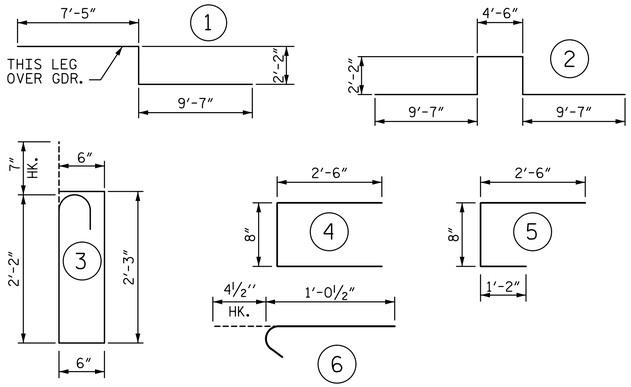
	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	154.7	-	-
POUR 2	193.5	-	-
POUR 3	12.3	-	-
POUR 4	47.8	-	-
TOTAL ●	408.3	36,545	36,570

● QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

GROOVING BRIDGE FLOORS

APPROACH SLABS	4,144	SQ.FT.
BRIDGE DECK	8,956	SQ.FT.
TOTAL	13,100	SQ.FT.

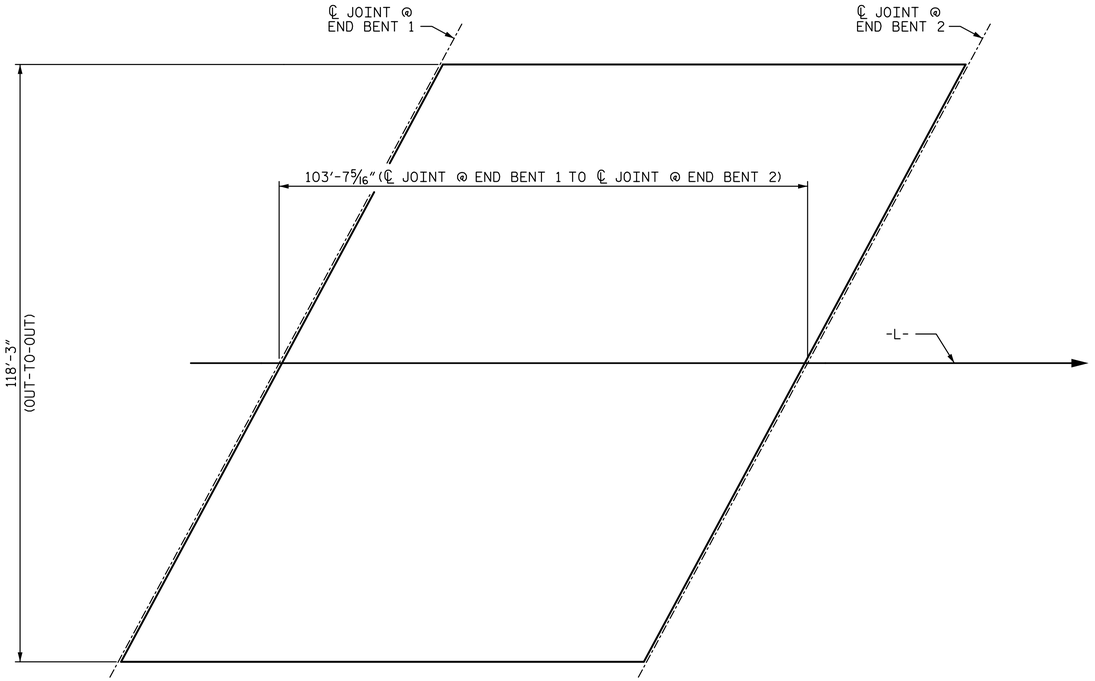
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

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

BAR SIZE	SUPERSTRUCTURE EXCEPT APPROACH SLABS, 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″			



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 12,252)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

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RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-21
1			3			TOTAL SHEETS
2			4			30

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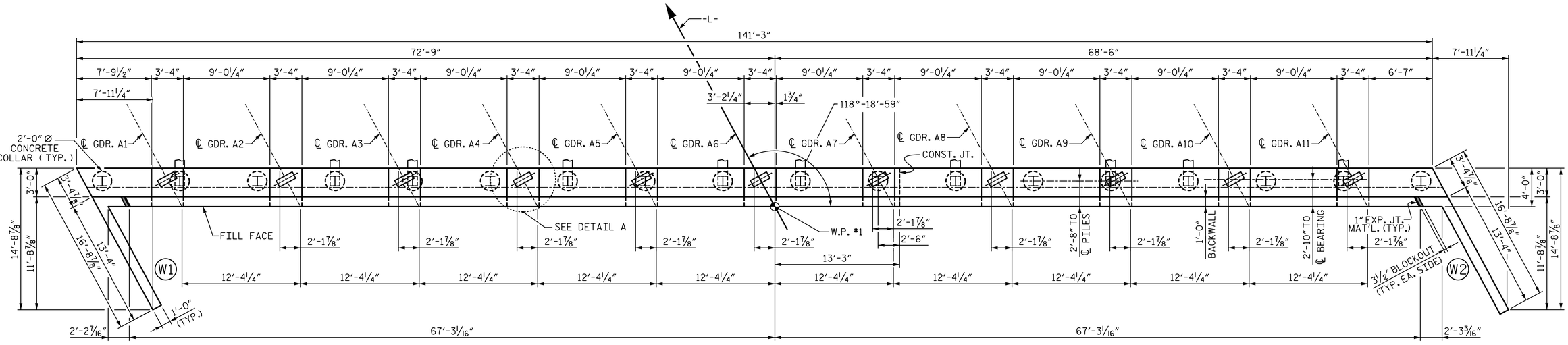
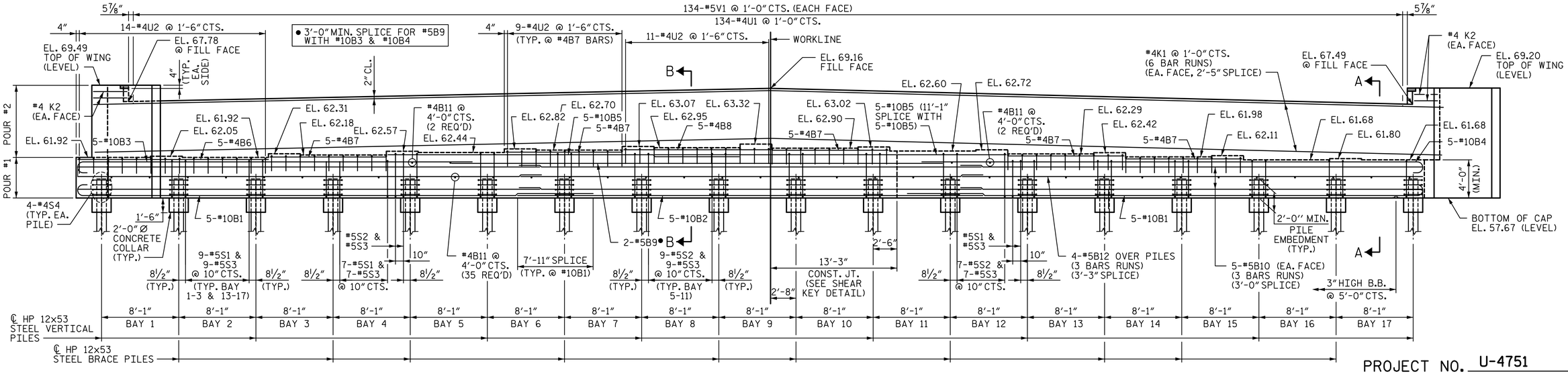


PLAN



ELEVATION

(FOR SECTIONS A-A & B-B, SEE SHEET 3 OF 3)

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

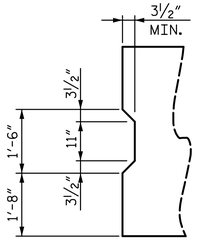
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.

DIMENSIONS LOCATING THE PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

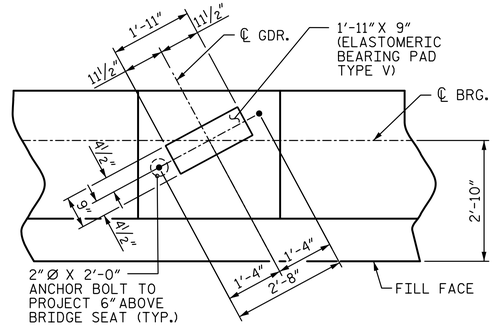
INSTALL THE 4" Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



SHEAR KEY DETAIL



DETAIL A

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/29/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

STV 100 Years

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

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CHECKED BY : TRL DATE : 5-17
DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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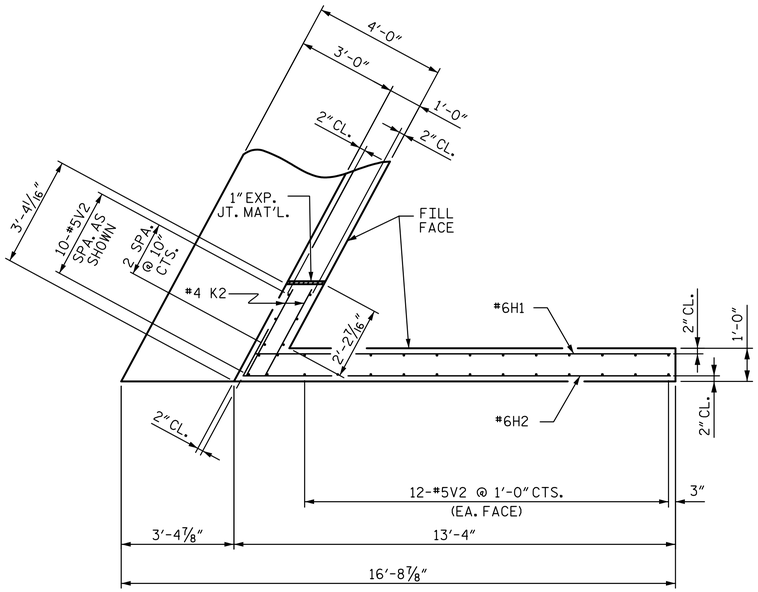
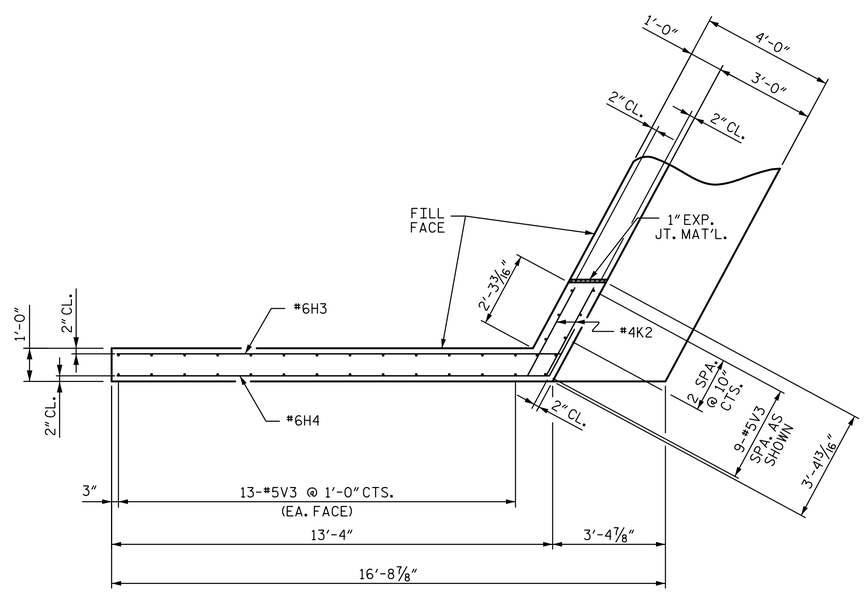
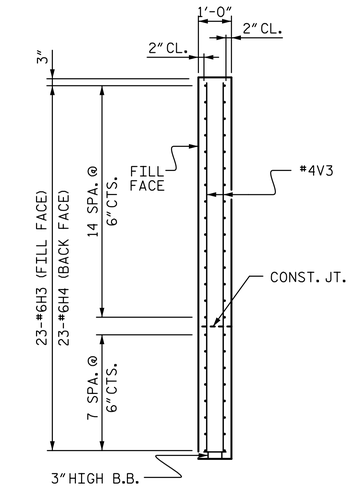


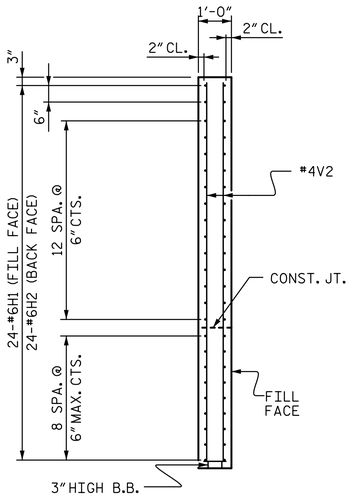
PLAN OF WING (W1)



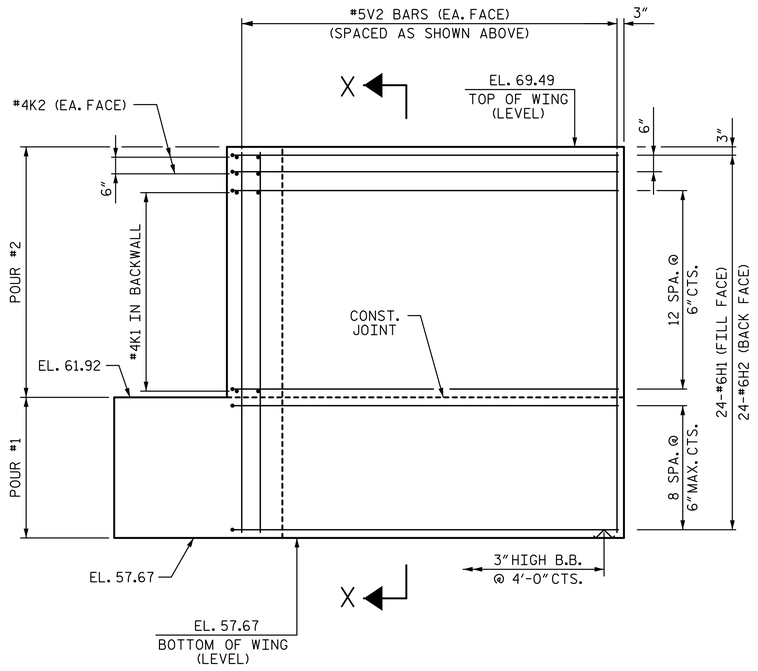
PLAN OF WING (W2)



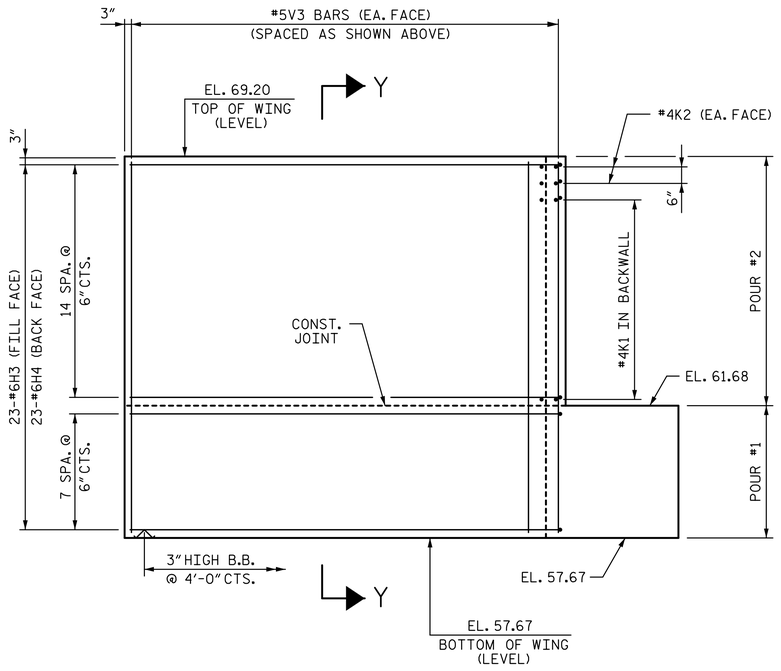
SECTION Y-Y



SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

WING DETAILS

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 3

DRAWN BY : TJT DATE : 3-17

CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/29/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-23
1			3			TOTAL SHEETS
2			4			30

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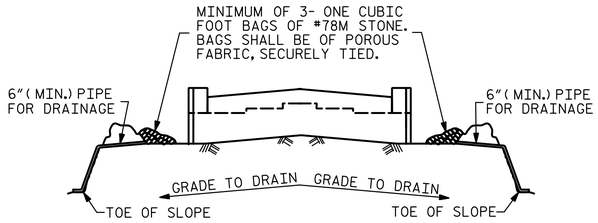
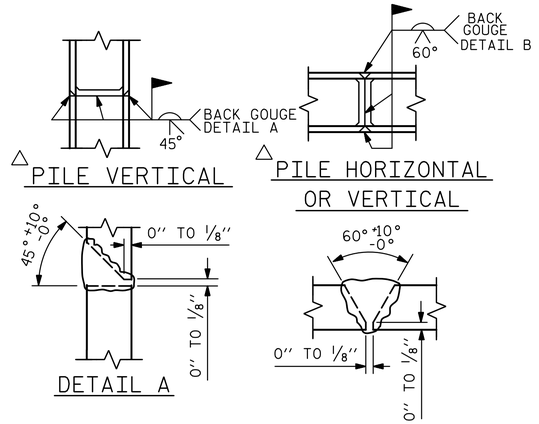


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

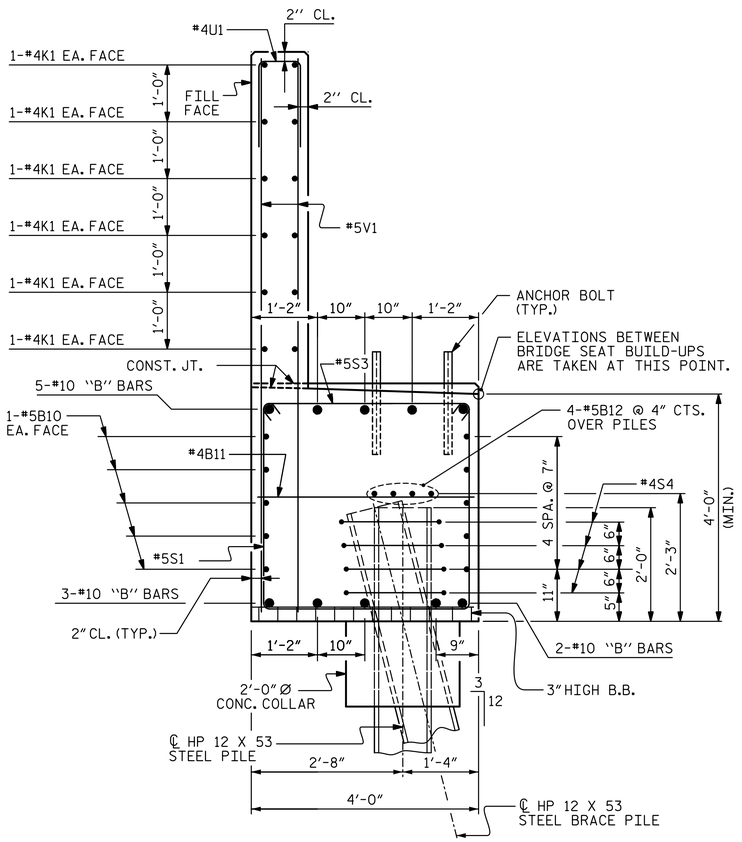
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

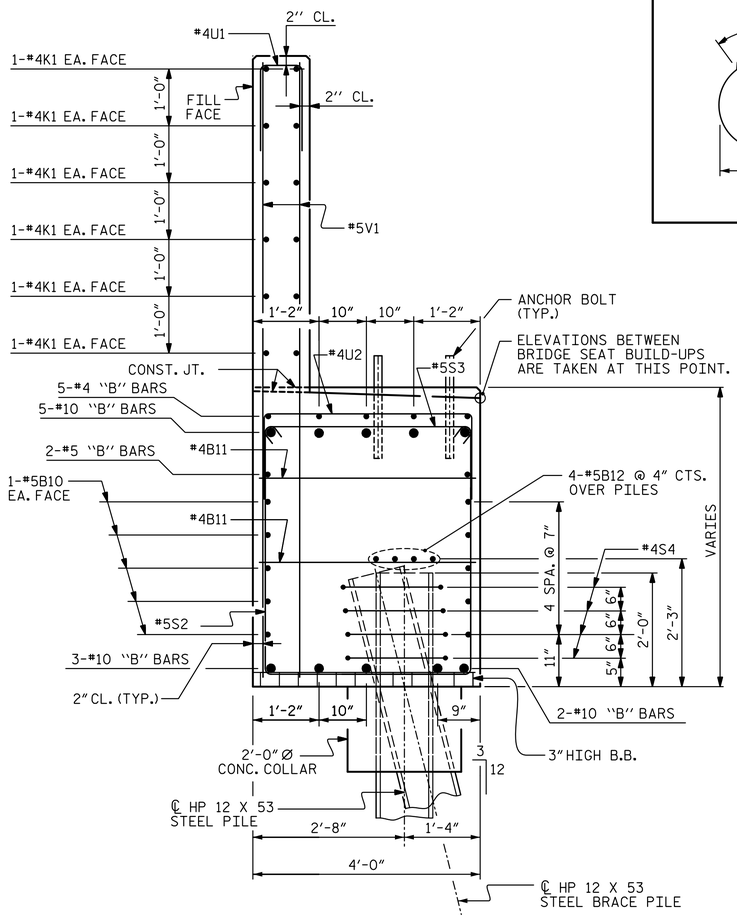


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

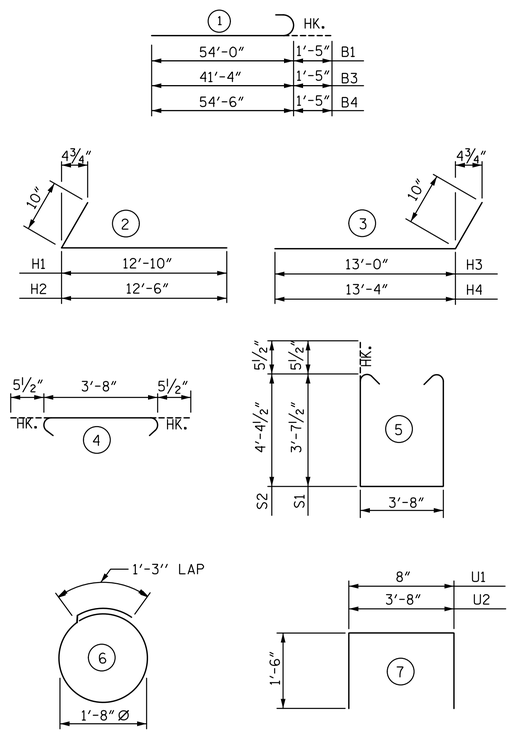


SECTION A-A



SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF REINFORCING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	55'-5"	2,385
B2	5	#10	STR	48'-9"	1,049
B3	5	#10	1	42'-9"	920
B4	5	#10	1	55'-11"	1,203
B5	10	#10	STR	37'-0"	1,592
B6	5	#4	STR	20'-0"	67
B7	25	#4	STR	12'-4"	206
B8	5	#4	STR	15'-4"	51
B9	2	#5	STR	51'-6"	107
B10	30	#5	STR	49'-0"	1,533
B11	39	#4	STR	3'-8"	96
B12	12	#5	STR	49'-0"	613
H1	24	#6	2	13'-8"	493
H2	24	#6	2	13'-4"	481
H3	23	#6	3	13'-10"	478
H4	23	#6	3	14'-2"	489
K1	72	#4	STR	25'-7"	1,230
K2	8	#4	STR	2'-11"	16
S1	81	#5	5	11'-10"	1,000
S2	72	#5	5	13'-4"	1,001
S3	153	#5	4	4'-7"	731
S4	72	#4	6	6'-6"	313
U1	134	#4	7	3'-8"	328
U2	70	#4	7	6'-8"	312
V1	268	#5	STR	9'-5"	2,632
V2	34	#5	STR	11'-4"	402
V3	35	#5	STR	11'-0"	402

QUANTITIES

REINFORCING STEEL	LBS.	20,130
CLASS A CONCRETE:		
POUR 1:		
CAP, COLLAR & LOWER WINGS	C.Y.	103.9
POUR 2:		
BACKWALL & UPPER WINGS	C.Y.	35.3
TOTAL	C.Y.	139.2
HP 12x53 STEEL PILES	NO.	18
	LIN. FEET	1,440
PILE SETUP FOR HP 12x53	EA.	18
PILE REDRIVES	EA.	9

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 3 OF 3

DRAWN BY : TJT DATE : 3-17

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6/29/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

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

SHEET NO. S2-24

TOTAL SHEETS 30

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PLAN

ELEVATION

(FOR SECTIONS A-A & B-B, SEE SHEET 3 OF 3)

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

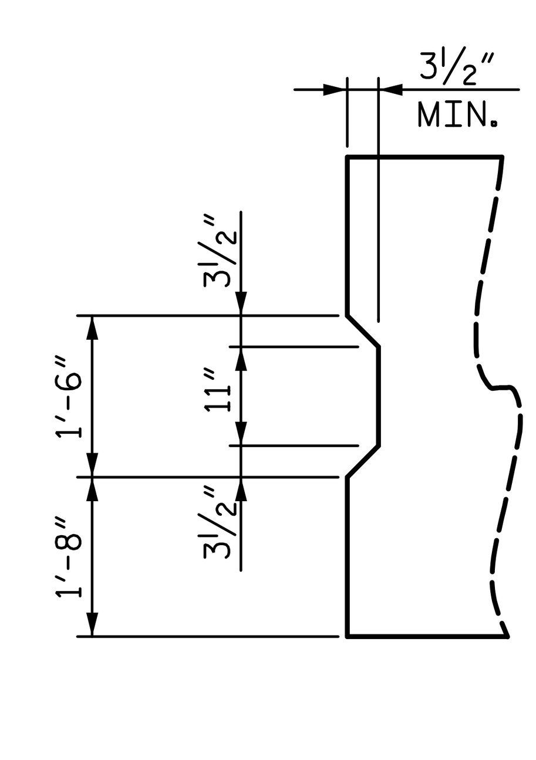
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.

DIMENSIONS LOCATING THE PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

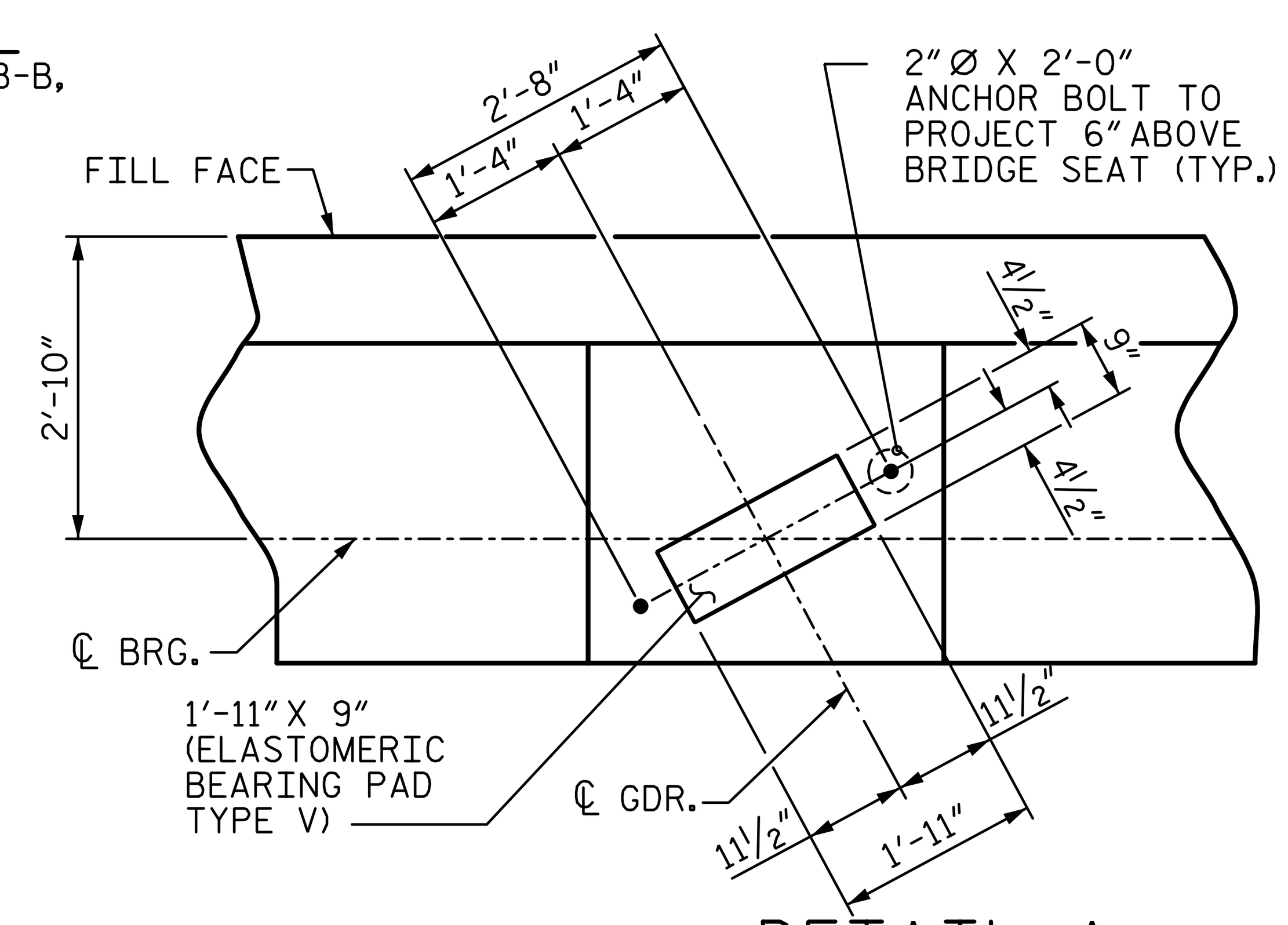
INSTALL THE 4" Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



SHEAR KEY DETAIL



DETAIL A

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17		
CHECKED BY : TRL	DATE : 5-17				

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND
6/29/2017

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
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REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S2-25
1			3			TOTAL SHEETS	30
2			4				

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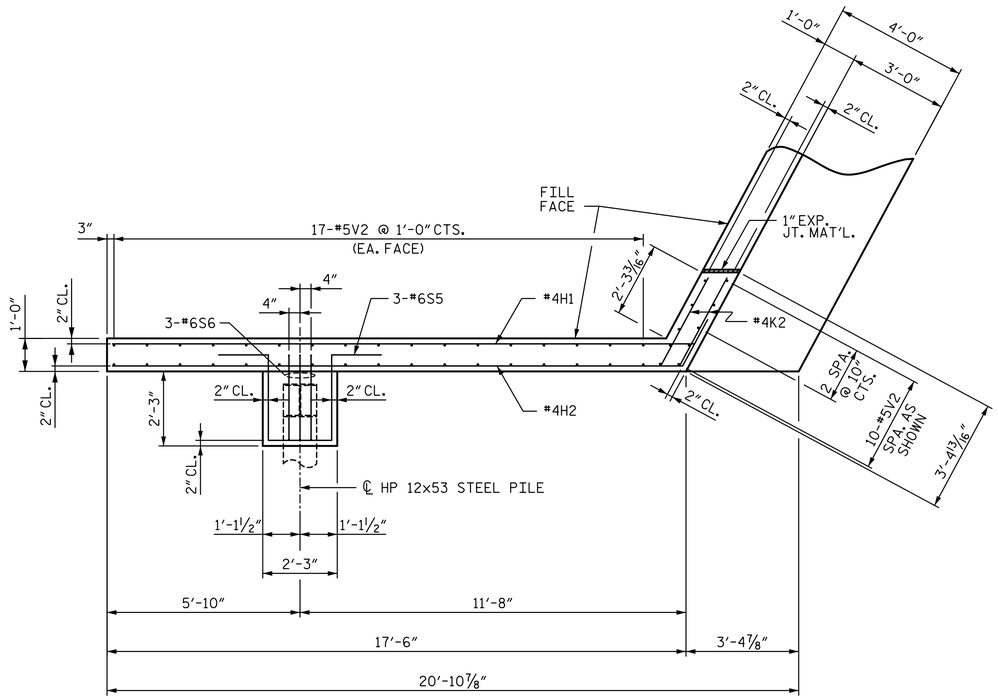
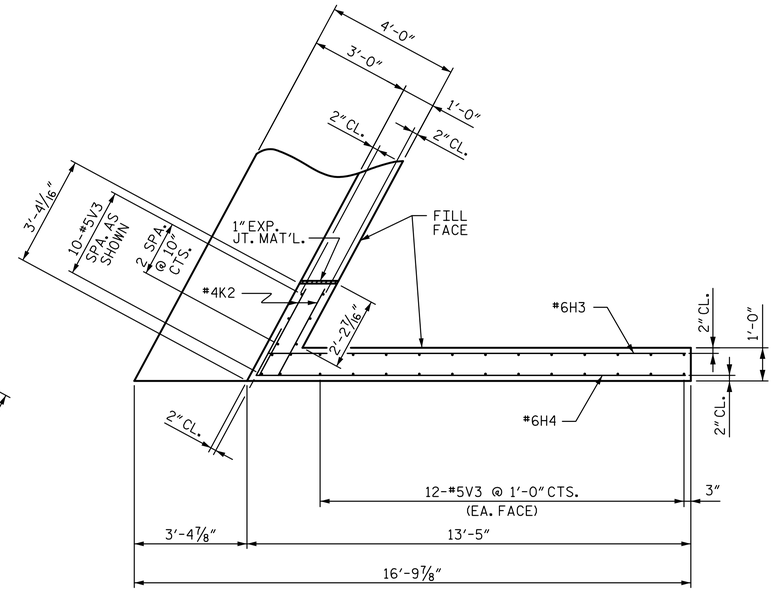
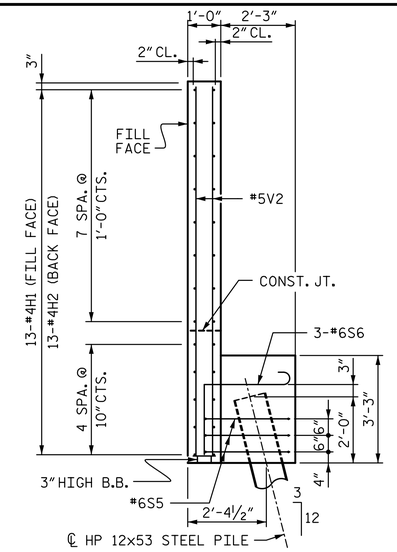


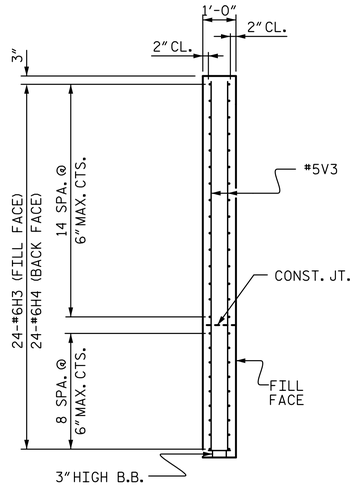
PLAN OF WING (W3)



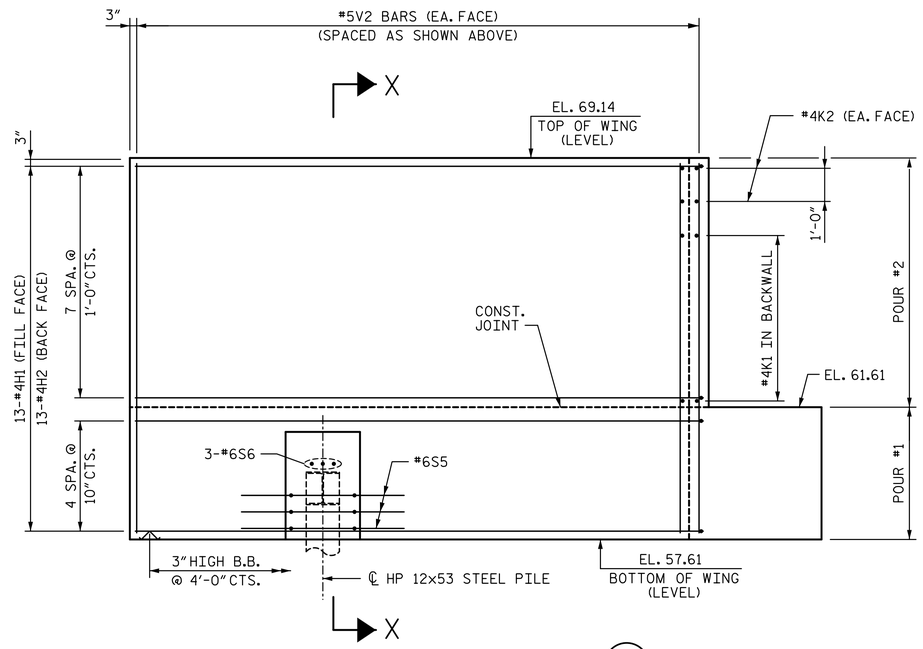
PLAN OF WING (W4)



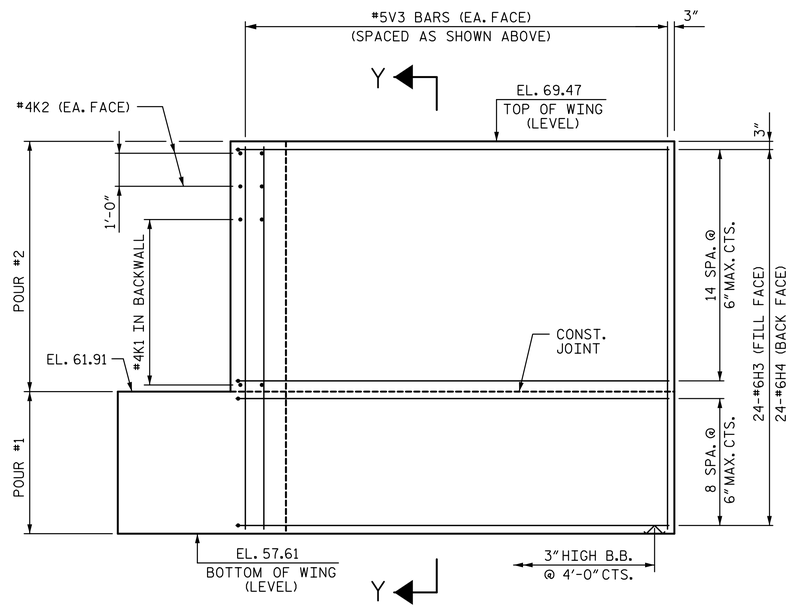
SECTION X-X



SECTION Y-Y



ELEVATION OF WING (W3)



PLAN OF WING (W4)

WING DETAILS

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 3

DRAWN BY : TJT DATE : 3-17

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-26
1			3			TOTAL SHEETS
2			4			30

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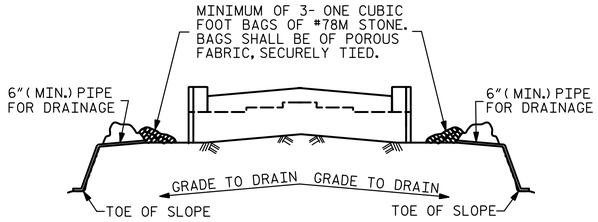

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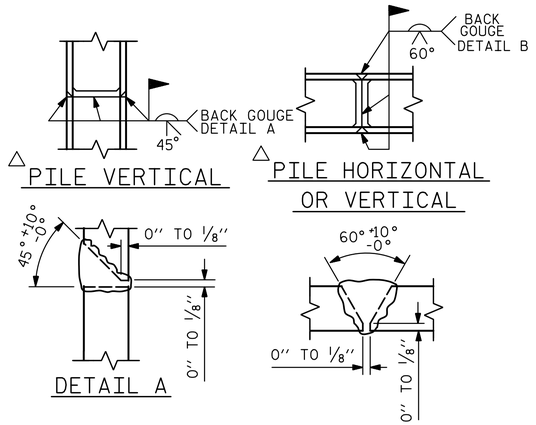
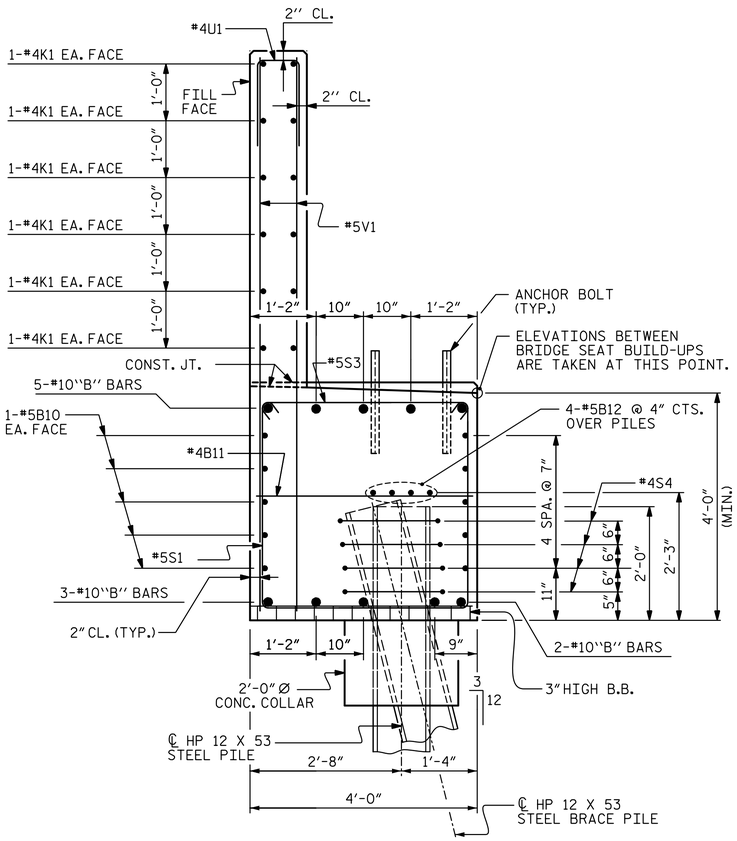
TEMPORARY DRAINAGE AT END BENT

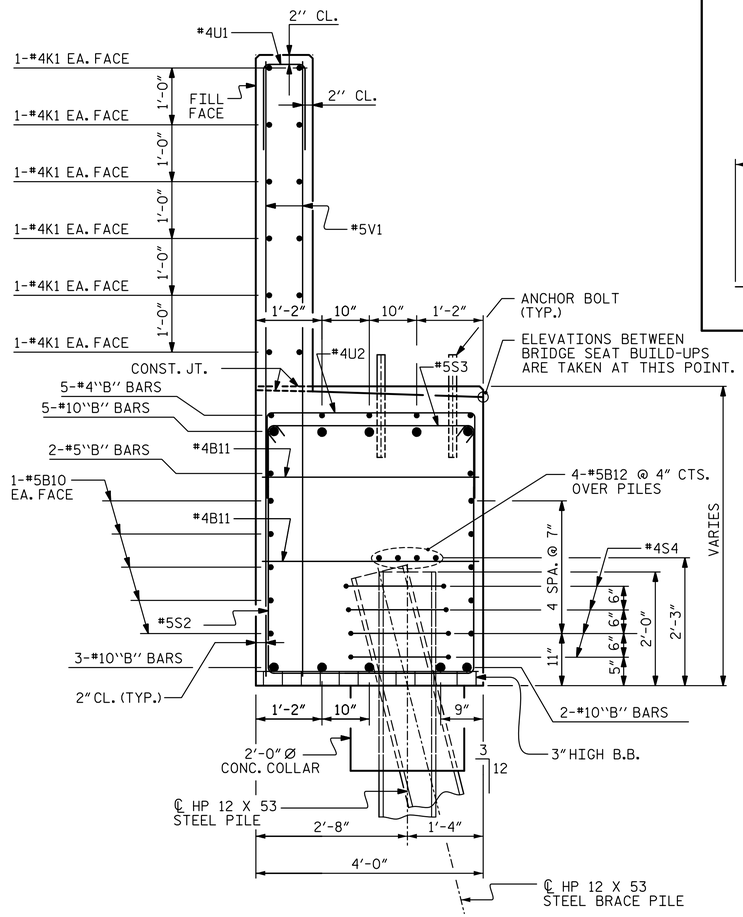


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

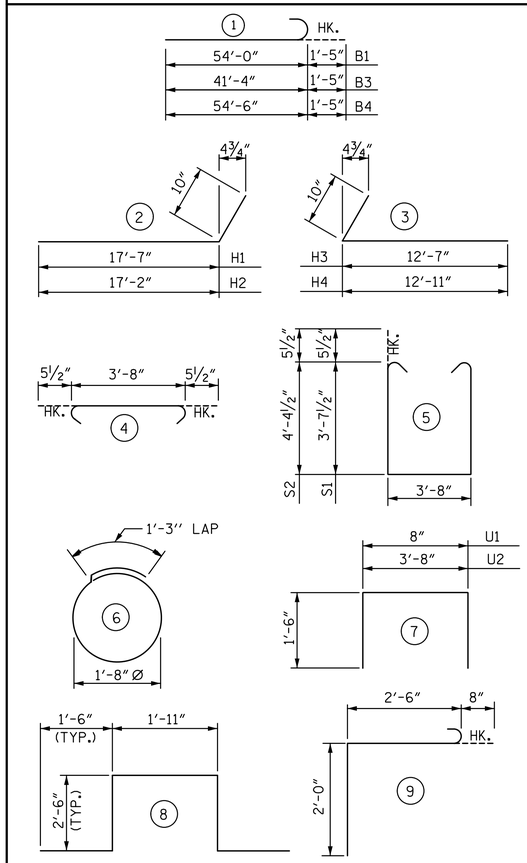


SECTION A-A



SECTION B-B

BAR TYPES



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BILL OF REINFORCING

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	1	55'-5"	2,385
B2	5	#10	STR	48'-9"	1,049
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B4	5	#10	1	55'-11"	1,203
B5	10	#10	STR	37'-0"	1,592
B6	5	#4	STR	20'-0"	67
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B8	5	#4	STR	15'-4"	51
B9	2	#5	STR	51'-6"	107
B10	30	#5	STR	49'-0"	1,533
B11	39	#4	STR	3'-8"	96
B12	12	#5	STR	49'-0"	613
H1	13	#4	2	18'-5"	160
H2	13	#4	2	18'-0"	156
H3	24	#6	3	13'-5"	484
H4	24	#6	3	13'-9"	496
K1	72	#4	STR	25'-7"	1,230
K2	8	#4	STR	2'-11"	16
S1	81	#5	5	11'-10"	1,000
S2	72	#5	5	13'-4"	1,001
S3	153	#5	4	4'-7"	731
S4	72	#4	6	6'-6"	313
S5	3	#6	8	9'-11"	45
S6	3	#6	9	5'-2"	23
U1	134	#4	7	3'-8"	328
U2	70	#4	7	6'-8"	312
V1	268	#5	STR	9'-4"	2,609
V2	44	#5	STR	11'-0"	505
V3	34	#5	STR	11'-4"	402

QUANTITIES

REINFORCING STEEL	LBS.	19,633
CLASS A CONCRETE:		
POUR 1:		
CAP, COLLAR & LOWER WINGS	C.Y.	104.2
POUR 2:		
BACKWALL & UPPER WINGS	C.Y.	39.8
TOTAL	C.Y.	144.0
HP 12x53 STEEL PILES	NO.	19
	LIN. FEET	1,615
PILE SETUP FOR HP 12x53	EA.	19
PILE REDRIVES	EA.	9

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 3 OF 3

DRAWN BY : TJT DATE : 3-17

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6/29/2017

STV 100 Years

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

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

SHEET NO. S2-27

TOTAL SHEETS 30

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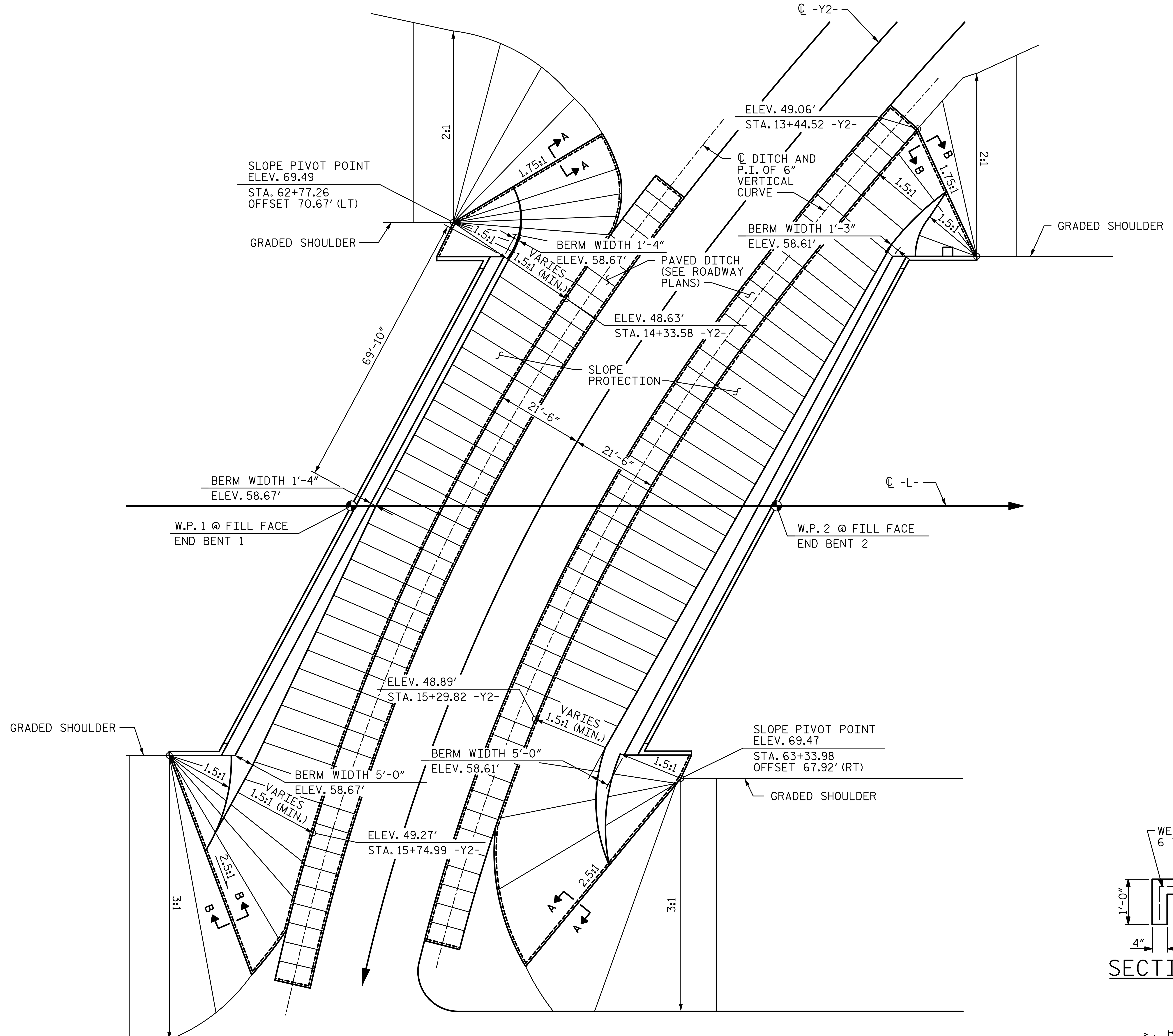


PLAN

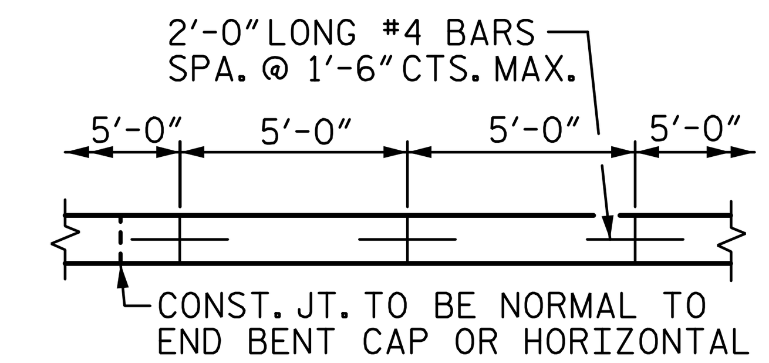
GENERAL NOTES

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

SLOPE PROTECTION SHALL CONSIST OF 4″ POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60″ WIDE. SLOPE PROTECTION SHALL BE POURED IN 5′ STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2′-0″ LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1′-6″ MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4′ AND 5′ STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6″. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

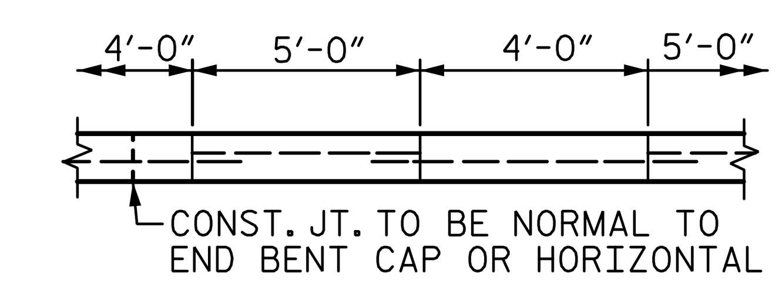
BRIDGE @ STA. 62+99.10 -L-	4″ INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	598	1,190
END BENT 2	677	1,340

✳ QUANTITY SHOWN IS BASED ON 5′ POURS.



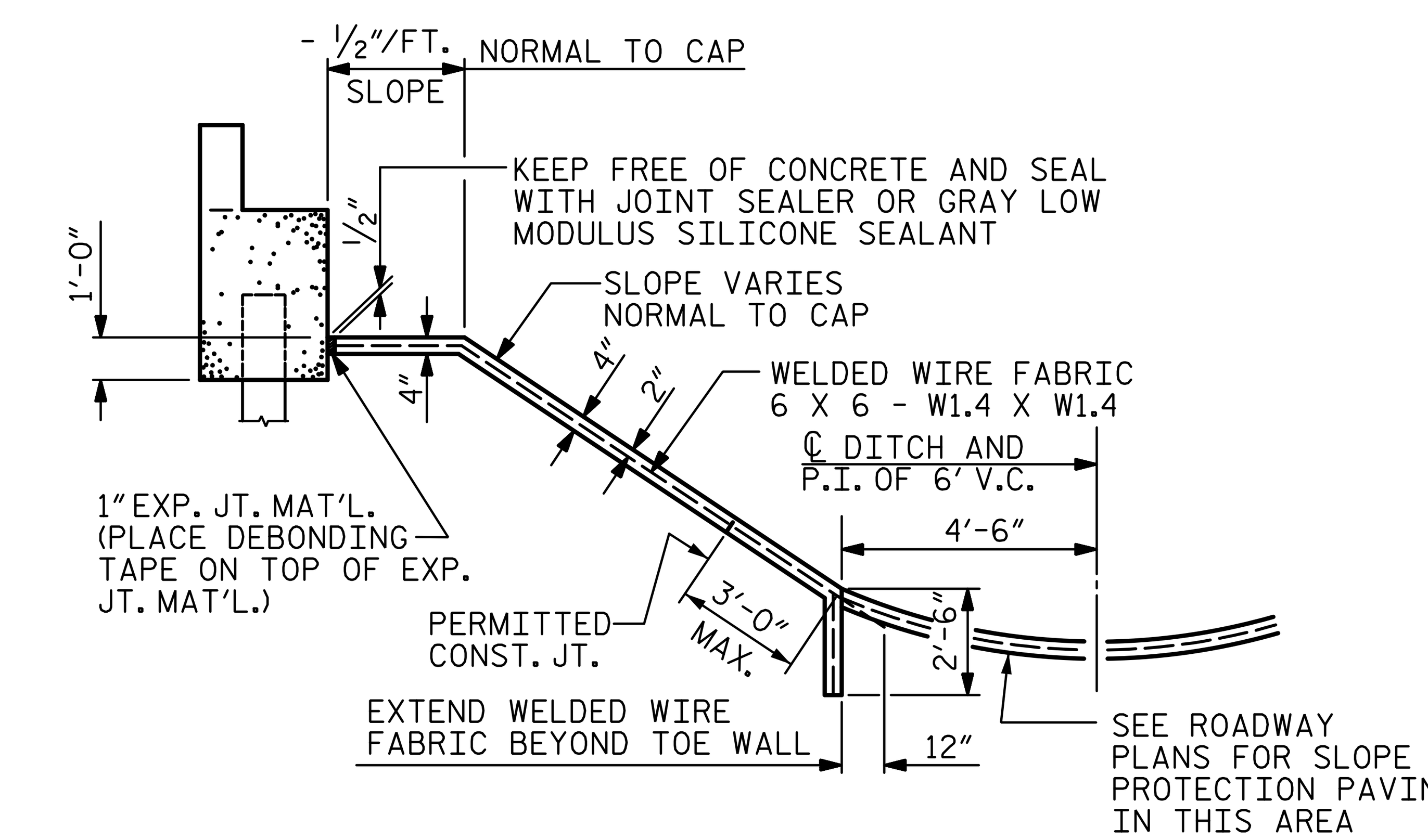
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

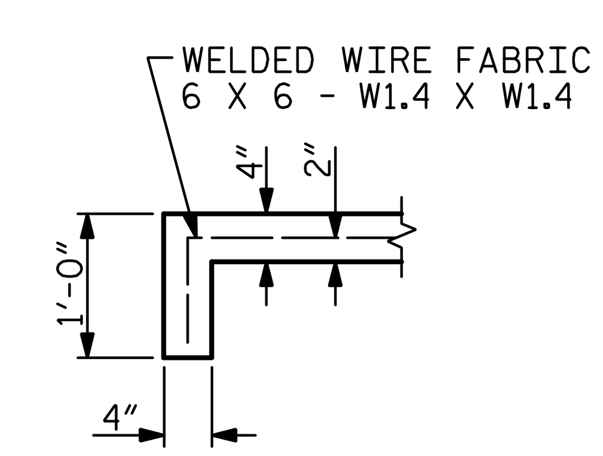


POUR A 4′-0″ STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

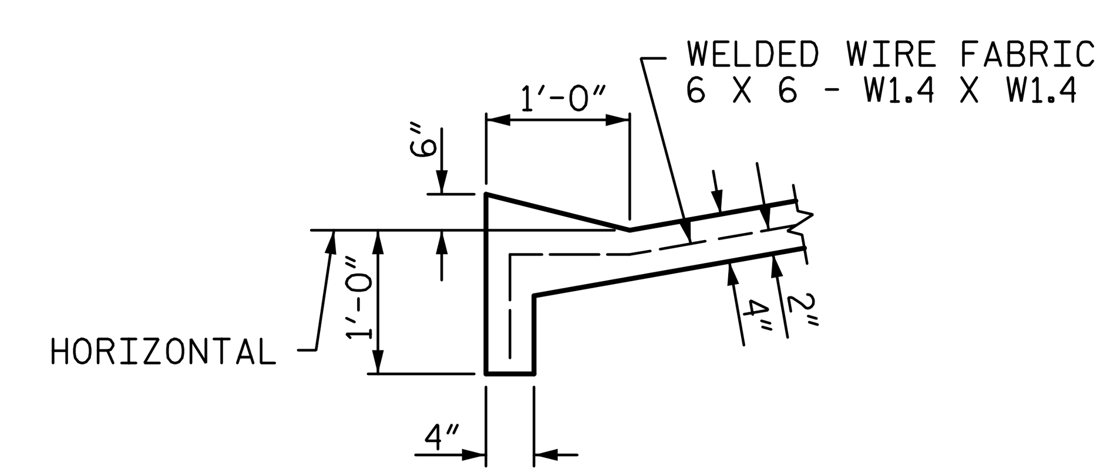
OPTIONAL POURING DETAIL



SECTION ALONG ℄ SURVEY WHEN FILL CATCHES IN DITCH



SECTION A-A



SECTION B-B

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 34955 TIMOTHY J. TOWNSEND 7/26/2017

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

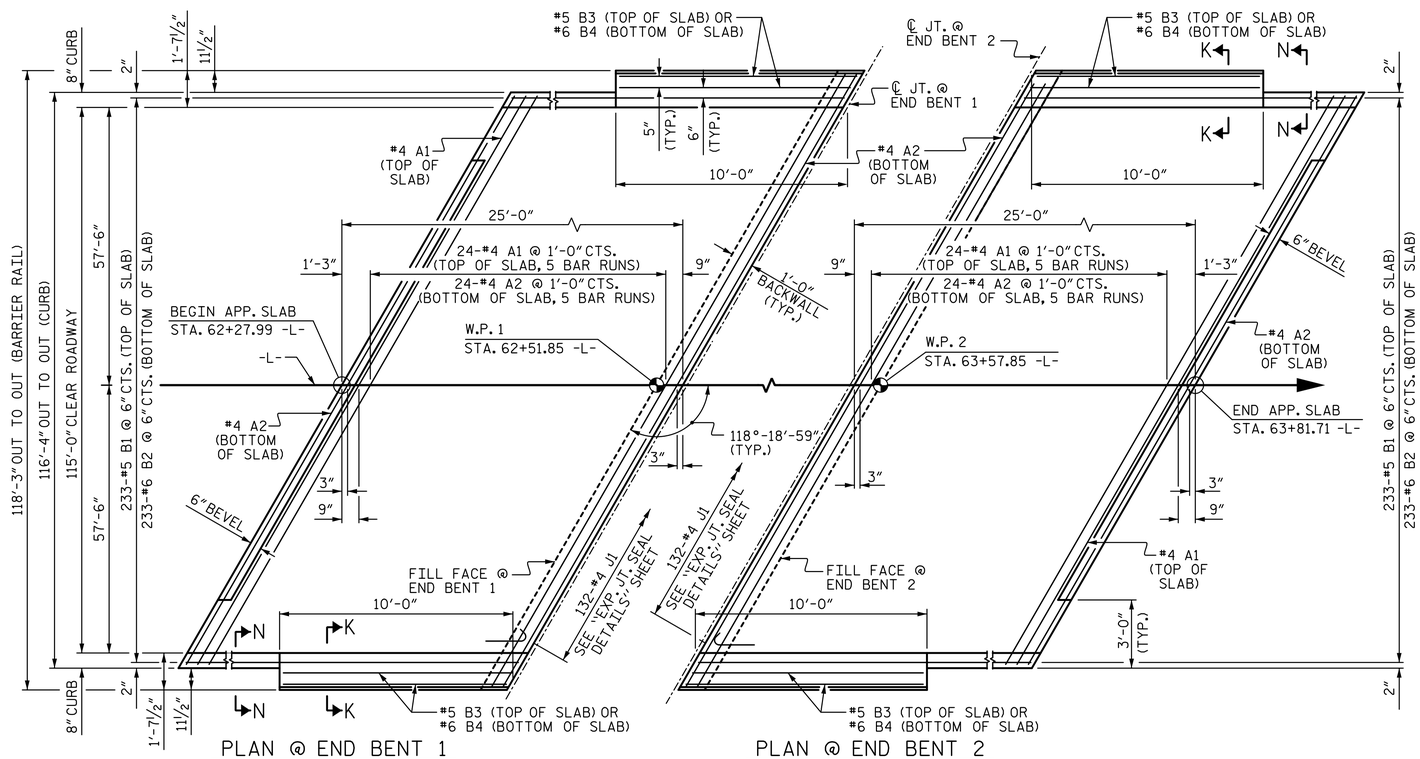
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION

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

SHEET NO. S2-28
TOTAL SHEETS 30

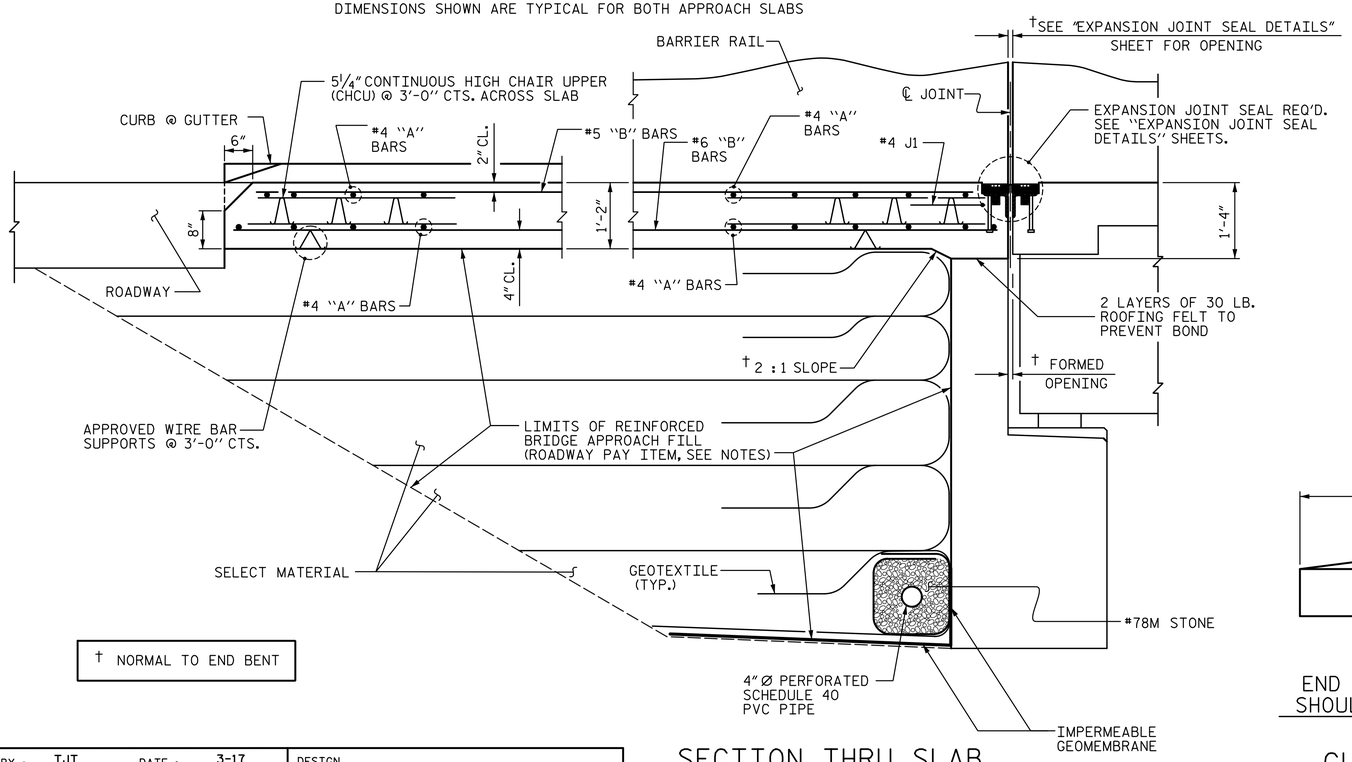
DRAWN BY : TJT DATE : 3-17
CHECKED BY : TRL DATE : 5-17
DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17



PLAN @ END BENT 1

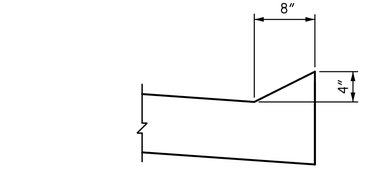
PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

SECTION THRU SLAB



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

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

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

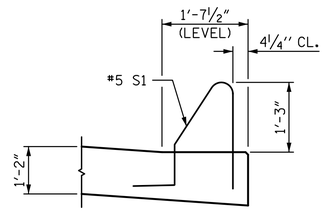
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR CONCRETE ISLAND REINFORCEMENT AND DETAILS, SEE "MONOLITHIC CONCRETE ISLAND" SHEET.

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

SECTION N-N



SECTION K-K

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

BILL OF MATERIAL

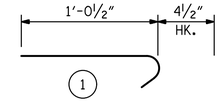
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	125	#4	STR	28'-5"	2,373
A2	130	#4	STR	28'-3"	2,453
✱B1	233	#5	STR	23'-8"	5,751
B2	233	#6	STR	24'-7"	8,603
✱B3	4	#5	STR	10'-0"	42
B4	4	#6	STR	10'-0"	60
✱J1	132	#4	1	1'-5"	125
REINFORCING STEEL ✱✱ LBS.					11,116
✱EPOXY COATED REINFORCING STEEL ✱✱ LBS.					8,291
CLASS AA CONCRETE ✱✱ C.Y.					127.1

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	125	#4	STR	28'-5"	2,373
A2	130	#4	STR	28'-3"	2,453
✱B1	233	#5	STR	23'-8"	5,751
B2	233	#6	STR	24'-7"	8,603
✱B3	4	#5	STR	10'-0"	42
B4	4	#6	STR	10'-0"	60
✱J1	132	#4	1	1'-5"	125
REINFORCING STEEL ✱✱ LBS.					11,116
✱EPOXY COATED REINFORCING STEEL ✱✱ LBS.					8,291
CLASS AA CONCRETE ✱✱ C.Y.					127.1

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 1 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

6/29/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB

STV 100 Years

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

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

SHEET NO. S2-29

TOTAL SHEETS 30

DRAWN BY : TJT DATE : 3-17

CHECKED BY : AJP DATE : 4-17

DESIGN ENGINEER OF RECORD: T. TOWNSEND DATE : 3-17

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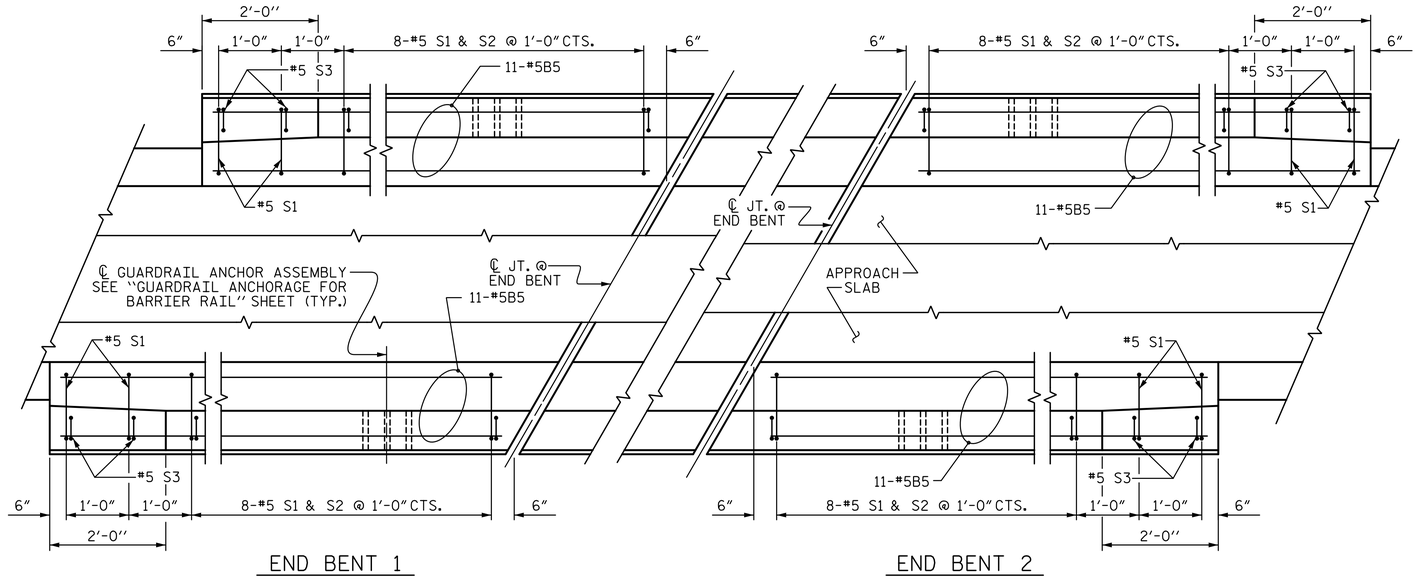


PLAN OF BARRIER RAIL

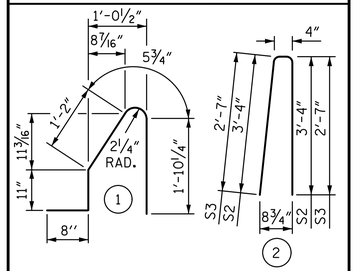
NOTES

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

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

BAR TYPES



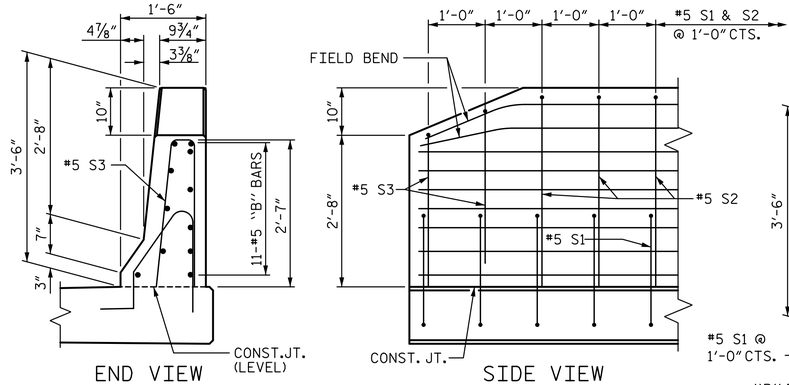
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

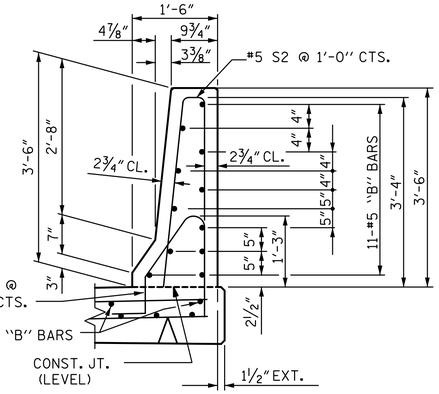
BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B5	44	#5	STR	9'-9"	447
✳S1	40	#5	1	5'-1"	212
✳S2	32	#5	2	7'-0"	234
✳S3	8	#5	2	5'-6"	46

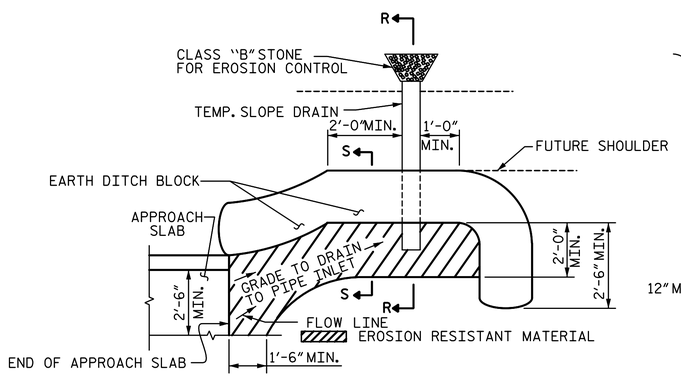
✳EPOXY COATED REINFORCING STEEL	LBS.	939
CLASS AA CONCRETE	C. Y.	5.7
CONCRETE BARRIER RAIL	LIN. FT.	41.6



END OF RAIL DETAILS

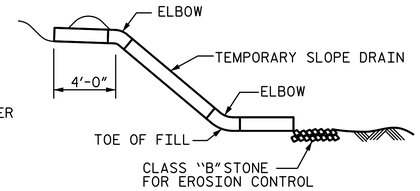


SECTION THRU RAIL

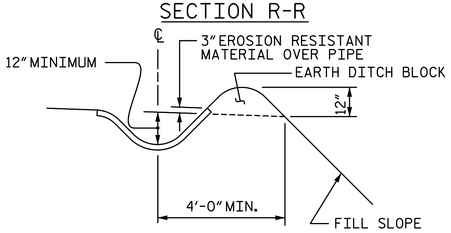


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

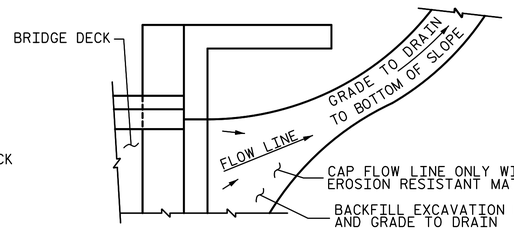
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 62+99.10 -L-

SHEET 2 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 34955 ENGINEER TIMOTHY J. TOWNSEND

7/24/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

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

DRAWN BY : TJT	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. TOWNSEND	DATE : 3-17
CHECKED BY : AJP	DATE : 4-17		

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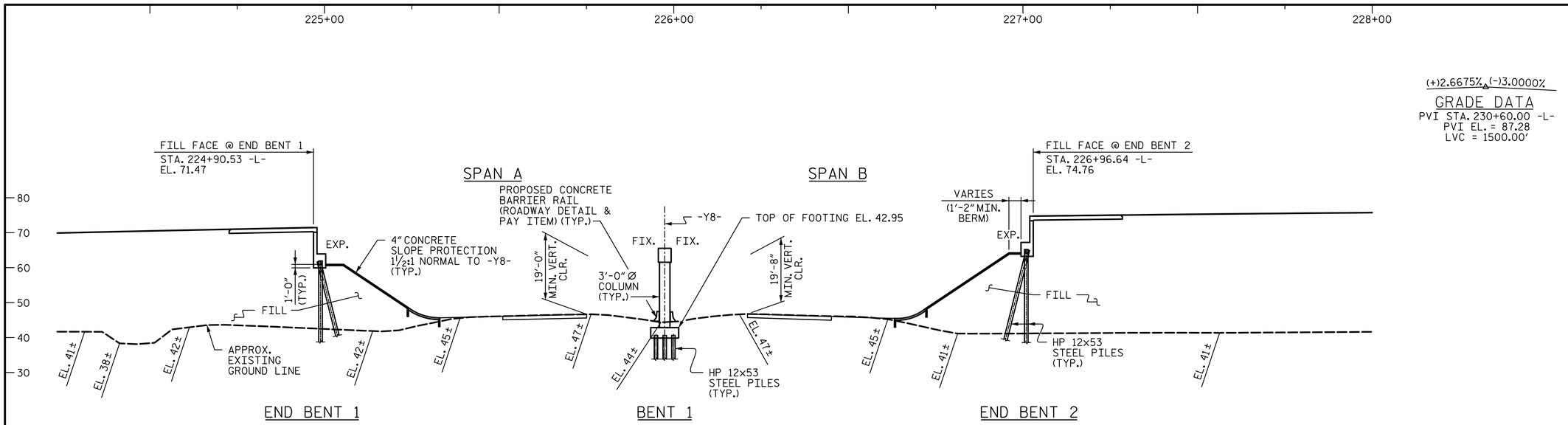


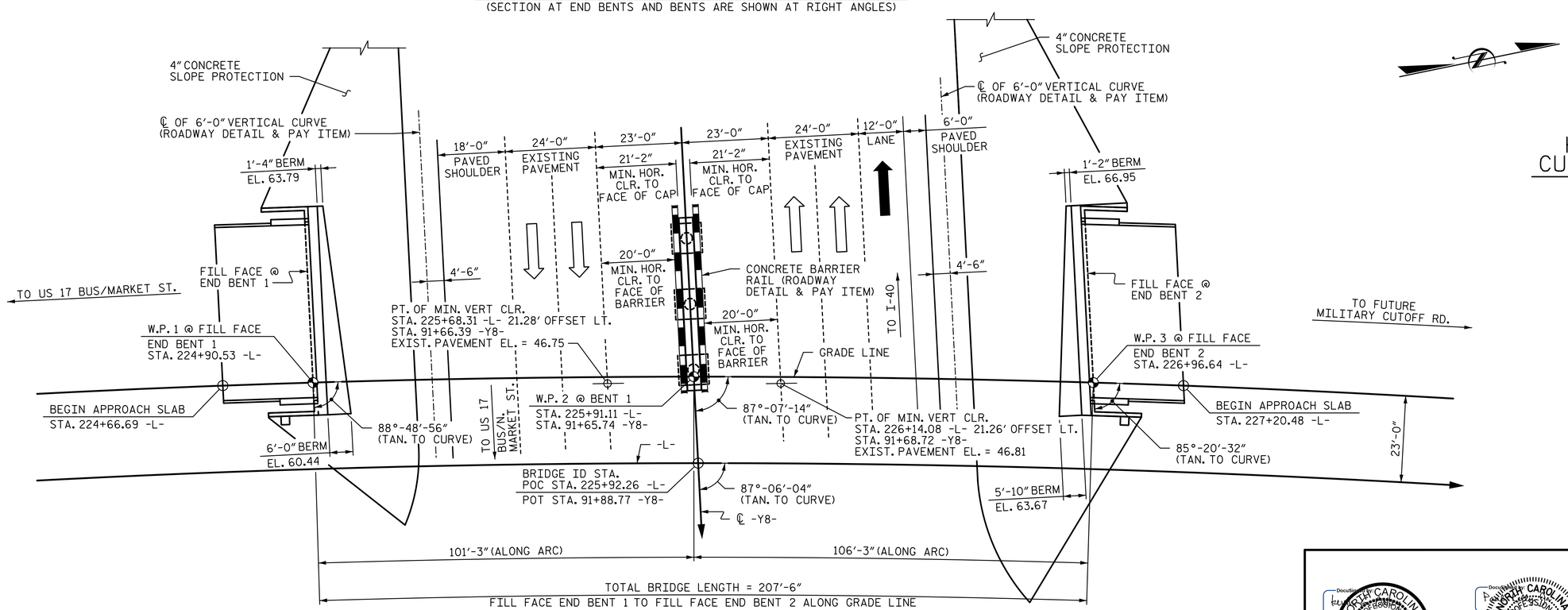
SECTION ALONG -L-

(SECTION AT END BENTS AND BENTS ARE SHOWN AT RIGHT ANGLES)

(+)2.6675% Δ (-)3.0000%

GRADE DATA

PVI STA. 230+60.00 -L-
PVI EL. = 87.28
LVC = 1500.00'



PLAN

(PILES NOT SHOWN FOR CLARITY)

HORIZONTAL CURVE DATA -L-

PI STA. 226+97.66
Δ = 52°-22'-55.53" (RT)
D = 1°-41'-06.6"
L = 3,108.42'
T = 1672.35'
R = 3400.00'

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-
91+88.77 -Y8-
SHEET 1 OF 4 BRIDGE NO. 203

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY
7/24/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR.
7/24/2017

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Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 1409 (MILITARY CUTOFF RD) OVER US 17

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-1
1			3			TOTAL SHEETS
2			4			36

STR. #3

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17
CHECKED BY : TRL	DATE : 5-17	

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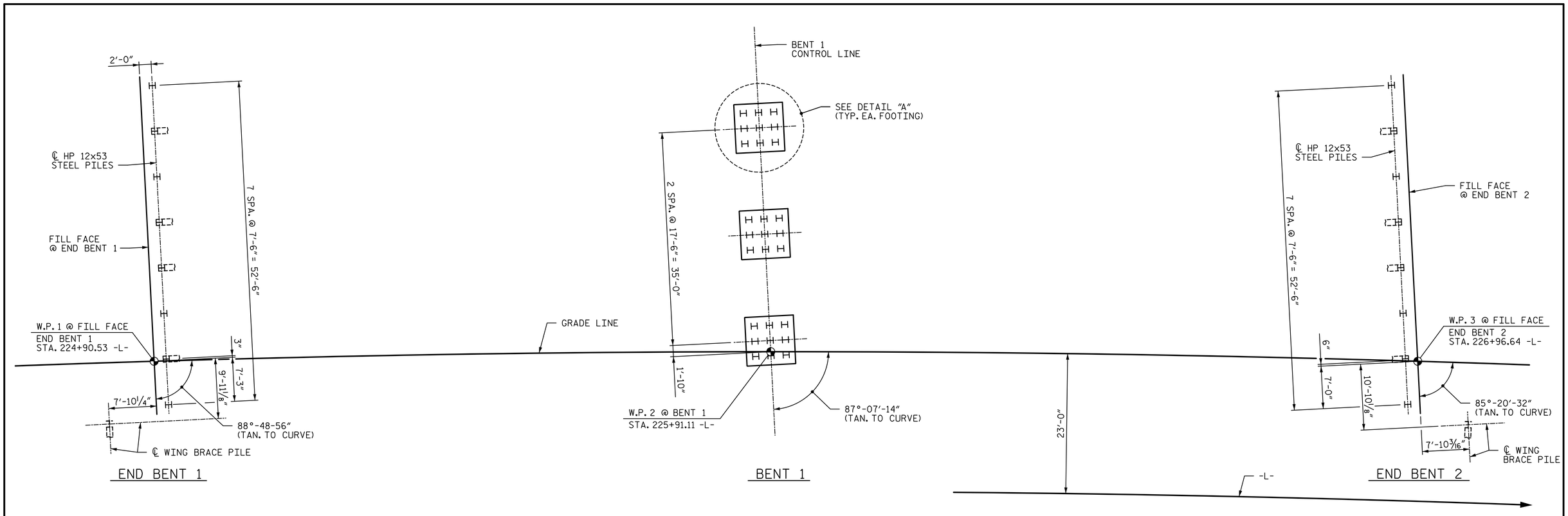
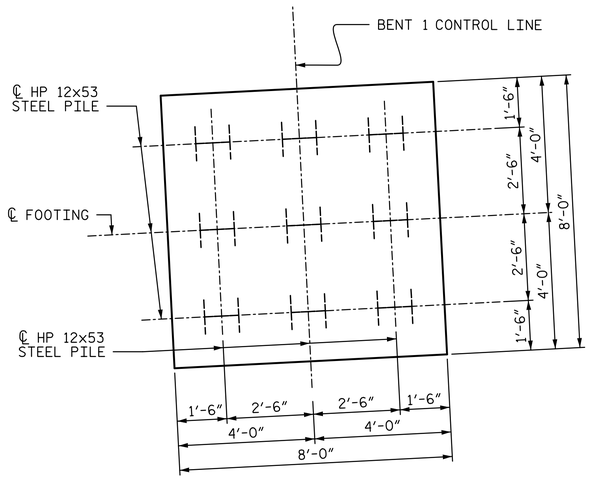


FOUNDATION LAYOUT PLAN

(DIMENSIONS LOCATION PILES ARE SHOWN TO THE PILE CENTERLINE AT THE BOTTOM OF CAP/FOOTING)

FOUNDATION NOTES:

1. OBSERVE A FOUR MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 1.
2. OBSERVE A FOUR MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 2.
3. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
4. PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.
5. DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
6. PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 85 TONS PER PILE.
7. DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 115 TONS PER PILE.
8. PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.
9. DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISNTANCE OF 170 TONS PER PILE.
10. TESTING THE PRODUCTION PILES WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.



DETAIL "A"

LEGEND

H HP 12x53 VERTICAL PILE @ END BENTS

HP 12x53 BRACE PILE 3H:12V @ END BENTS

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-
91+88.77 -Y8-

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
8/1/2017

NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER PAUL E. KELLY, JR.
8/1/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-2
1			3			TOTAL SHEETS
2			4			36

STR. #3

DRAWN BY : MBC DATE : 3-17
CHECKED BY : VMW DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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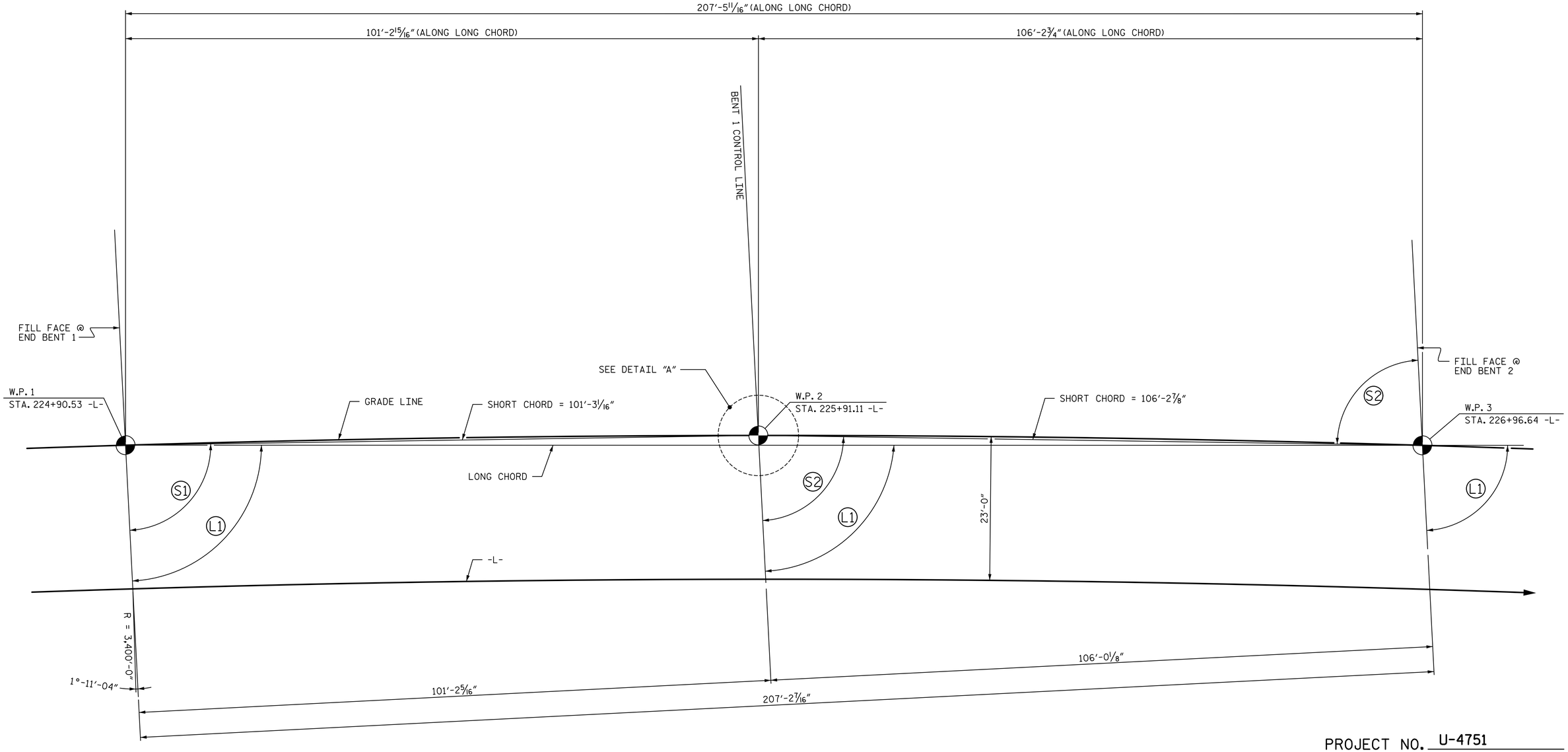
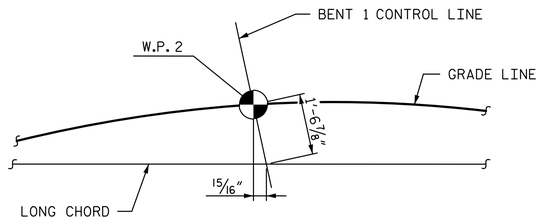


LONG CHORD LAYOUT
(BENTS ARE PARALLEL)

ANGLES			
LONG CHORD		SHORT CHORD	
L1	87°-04′-44″	S1	87°-58′-05″
		S2	86°-13′-53″

HORIZ. CURVE DATA
-L-

PI STA. = 226+97.66 -L-
Δ = 52°22′ 55.5″(RT)
D = 1°41′ 06.6″
L = 3,108.42′
T = 1,672.35′
R = 3,400.00′



DETAIL "A"

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-
91+88.77 -Y8-
SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
7/14/2017

NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER JAMES E. KELLY JR.
7/14/2017

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STATE OF NORTH CAROLINA
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RALEIGH

GENERAL DRAWING
LONG CHORD LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-3
1			3			TOTAL SHEETS
2			4			36

STR. #3

DRAWN BY : MBC DATE : 3-17
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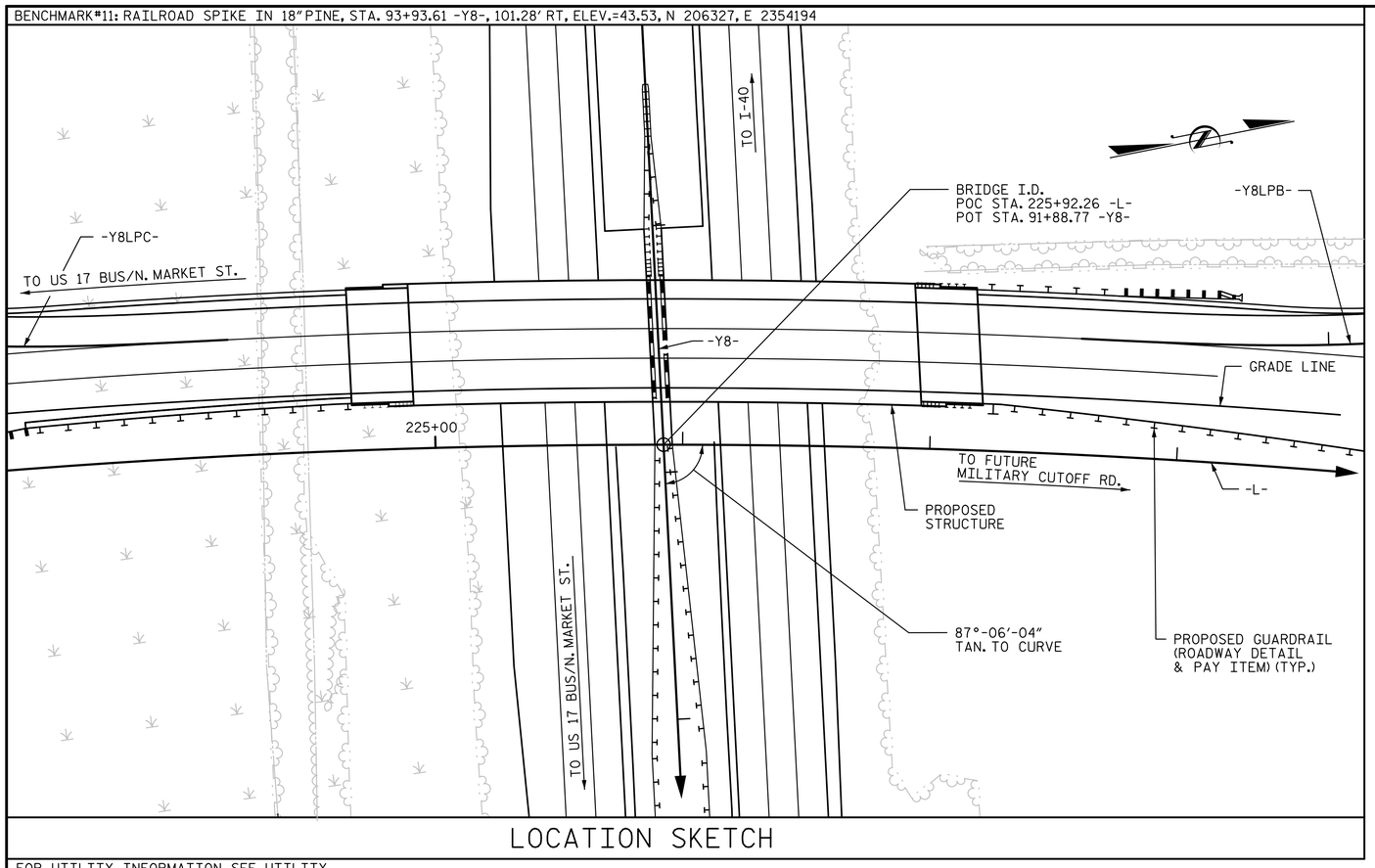
DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FOUNDATION NOTES, SEE "FOUNDATION LAYOUT" SHEET.

FOR PLACING LOAD ON STRUCTURAL MEMBERS, SEE SPECIAL PROVISIONS.

FOR EMBEDDED CLIPS FOR PRESTRESSED GIRDERS, SEE SPECIAL PROVISONS.

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 EQUIP. SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	LIN. FT.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			10,110	10,850		LUMP SUM			10	1,017.8				450.9		LUMP SUM	LUMP SUM
END BENT 1					54.3		7,442				9	9	630		445		
BENT 1	LUMP SUM				66.6		11,240	1,333			27	27	1,350				
END BENT 2					55.0		7,337				9	9	675		1,020		
TOTAL	LUMP SUM	2	10,110	10,850	175.9	LUMP SUM	26,019	1,333	10	1,017.8	45	45	2,665	450.9	1,465	LUMP SUM	LUMP SUM

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY 7/14/2017

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR. 7/14/2017

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STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON SR 1409 (MILITARY CUTOFF RD) OVER US 17

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-4
1			3			TOTAL SHEETS
2			4			36

STR. #3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.47	--	1.75	0.87	1.50	B	EL	51.4	1.00	1.48	A	I	19.2	0.80	0.87	1.47	B	EL	51.4	
		HL-93 (OPERATING)	N/A		1.94	--	1.35	0.87	1.94	B	EL	51.4	1.00	1.97	A	I	19.2	N/A	--	--	--	--	51.4	
		HS-20 (INVENTORY)	36.000	2	1.98	71.28	1.75	0.87	2.12	B	EL	51.4	1.00	1.98	A	I	19.2	0.80	0.87	2.07	B	EL	51.4	
		HS-20 (OPERATING)	36.000		2.62	94.32	1.35	0.87	2.74	B	EL	51.4	1.00	2.62	A	I	19.2	N/A	--	--	--	--	51.4	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.95	66.83	1.40	0.87	6.33	B	EL	51.4	1.00	6.47	A	I	19.2	0.80	0.87	4.95	B	EL	51.4	
		SNGARBS2	20.000		3.56	71.20	1.40	0.87	4.56	B	EL	51.4	1.00	4.48	A	I	19.2	0.80	0.87	3.56	B	EL	51.4	
		SNAGRIS2	22.000		3.32	73.04	1.40	0.87	4.24	B	EL	51.4	1.00	4.12	A	I	19.2	0.80	0.87	3.32	B	EL	51.4	
		SNCOTTS3	27.250		2.45	66.76	1.40	0.87	3.14	B	EL	51.4	1.00	3.10	A	I	19.2	0.80	0.87	2.45	B	EL	51.4	
		SNAGGRS4	34.925		2.00	69.85	1.40	0.87	2.56	B	EL	51.4	1.00	2.51	A	I	19.2	0.80	0.87	2.00	B	EL	51.4	
		SNS5A	35.550		1.96	69.68	1.40	0.87	2.51	B	EL	51.4	1.00	2.52	A	I	19.2	0.80	0.87	1.96	B	EL	51.4	
		SNS6A	39.950		1.78	71.11	1.40	0.87	2.28	B	EL	51.4	1.00	2.27	A	I	19.2	0.80	0.87	1.78	B	EL	51.4	
		SNS7B	42.000		1.70	71.40	1.40	0.87	2.17	B	EL	51.4	1.00	2.21	A	I	19.2	0.80	0.87	1.70	B	EL	51.4	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.17	71.61	1.40	0.87	2.78	B	EL	51.4	1.00	2.75	A	I	19.2	0.80	0.87	2.17	B	EL	51.4	
		TNT4A	33.075		2.17	71.77	1.40	0.87	2.78	B	EL	51.4	1.00	2.69	A	I	19.2	0.80	0.87	2.17	B	EL	51.4	
		TNT6A	41.600		1.76	73.22	1.40	0.87	2.25	B	EL	51.4	1.00	2.34	A	I	19.2	0.80	0.87	1.76	B	EL	51.4	
		TNT7A	42.000		1.76	73.92	1.40	0.87	2.25	B	EL	51.4	1.00	2.30	A	I	19.2	0.80	0.87	1.76	B	EL	51.4	
		TNT7B	42.000		1.79	75.18	1.40	0.87	2.30	B	EL	51.4	1.00	2.17	A	I	19.2	0.80	0.87	1.79	B	EL	51.4	
		TNAGRIT4	43.000		1.72	73.96	1.40	0.87	2.21	B	EL	51.4	1.00	2.10	A	I	19.2	0.80	0.87	1.72	B	EL	51.4	
		TNAGT5A	45.000		1.63	73.35	1.40	0.87	2.09	B	EL	51.4	1.00	2.07	A	I	19.2	0.80	0.87	1.63	B	EL	51.4	
		TNAGT5B	45.000	3	1.62	72.90	1.40	0.87	2.07	B	EL	51.4	1.00	1.99	A	I	19.2	0.80	0.87	1.62	B	EL	51.4	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

1 DESIGN LOAD RATING (HL-93)

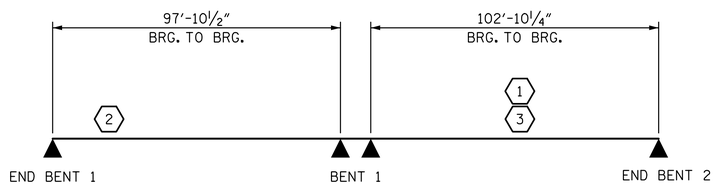
2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

DRAWN BY : MBC DATE : 4-17

CHECKED BY : ACA DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER PAUL E. KELLY JR.

7/14/2017

STV 100 Years

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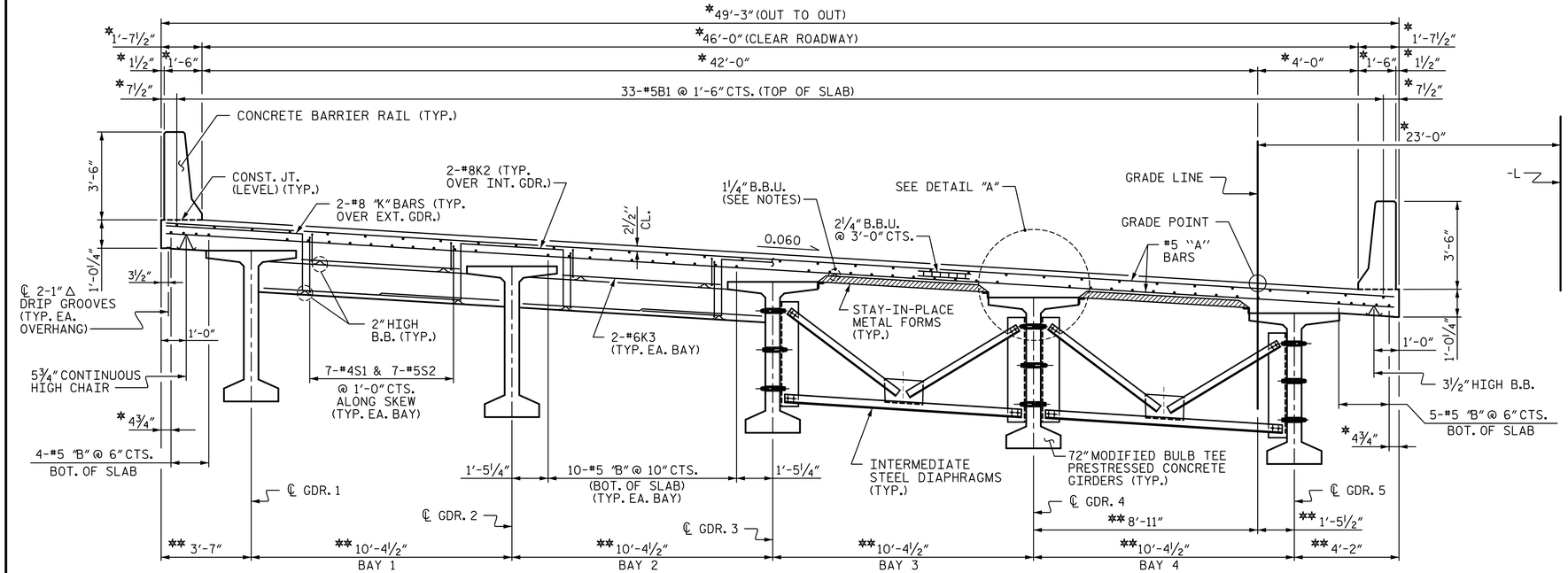
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-5
1			3			TOTAL SHEETS
2			4			36

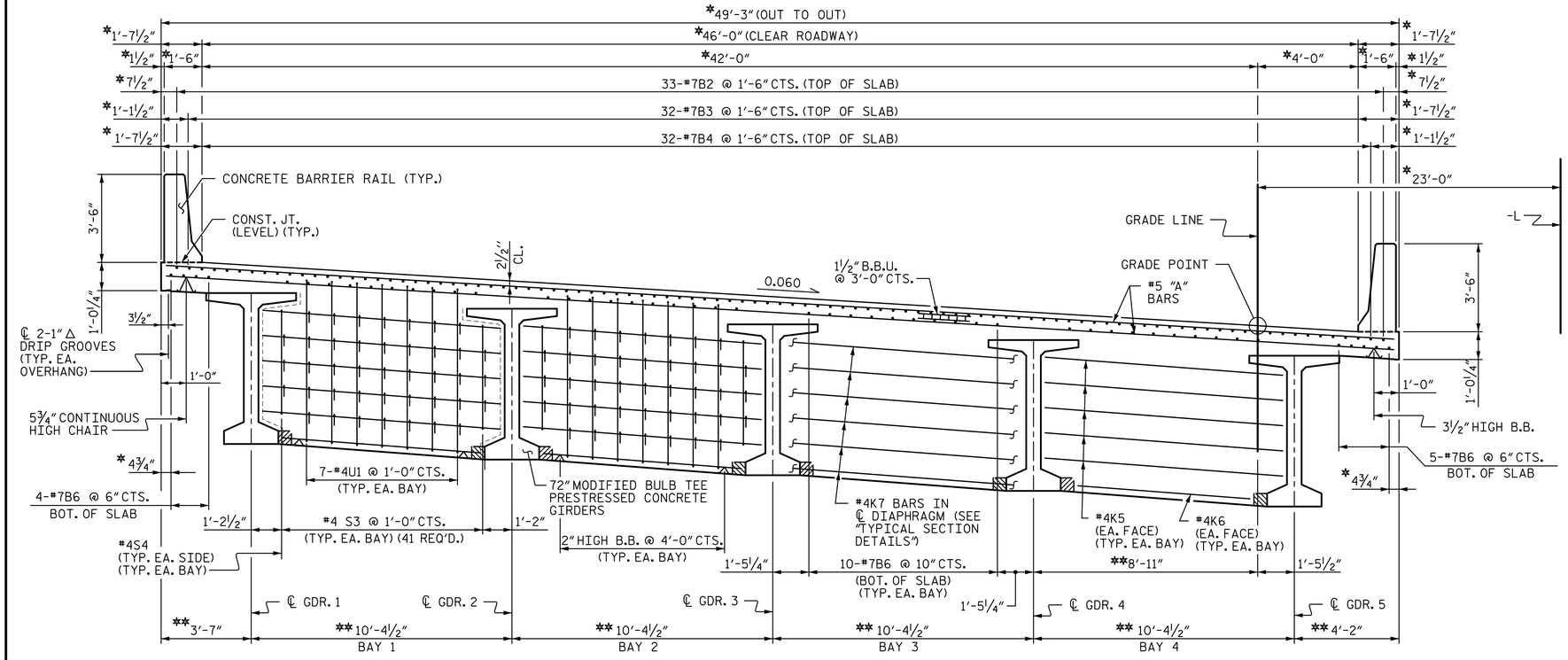
STR. #3



PARTIAL TYPICAL SECTION AT END BENT

PARTIAL TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

* RADIAL DIMENSION
** RADIAL DIMENSION THRU WORKPOINT



TYPICAL SECTION @ BENT DIAPHRAGM

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.

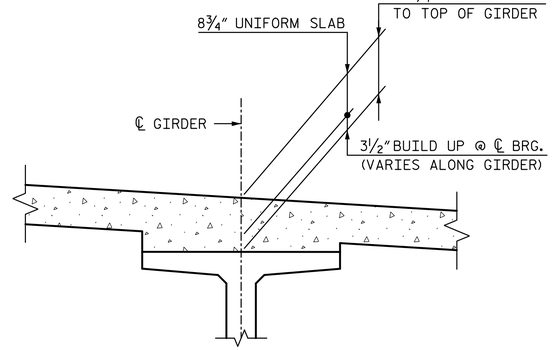
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

FOR BARRIER RAIL DETAILS, SEE "CONCRETE BARRIER RAIL SHEET".

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



DETAIL "A"

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 1 OF 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
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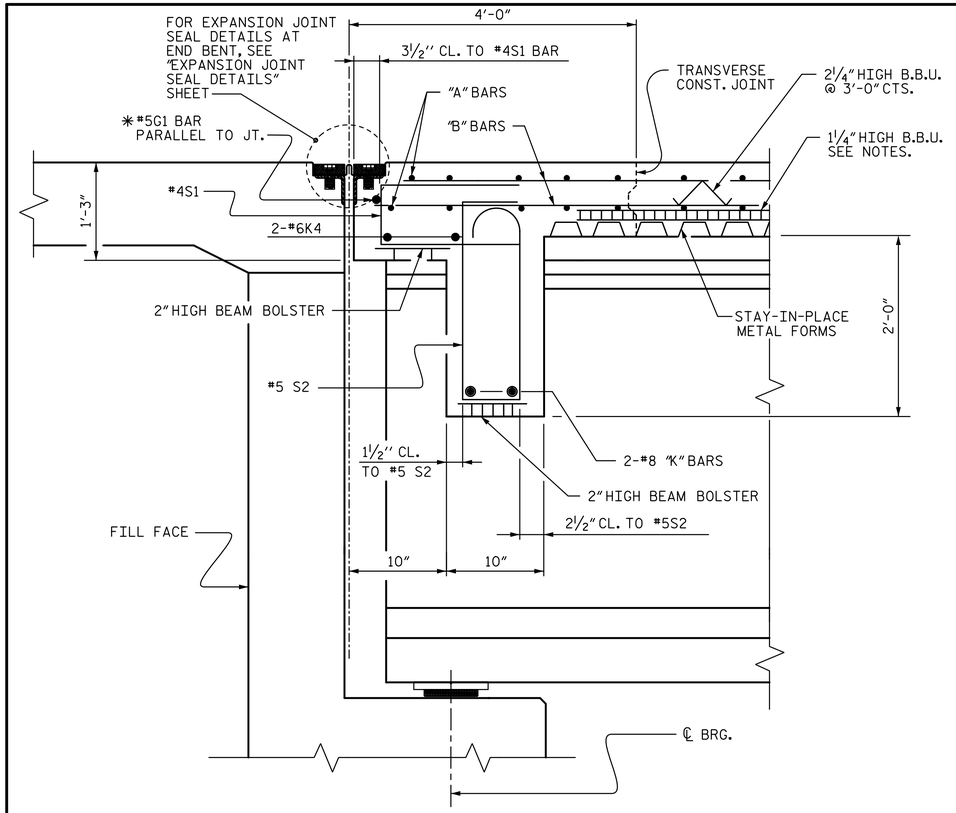
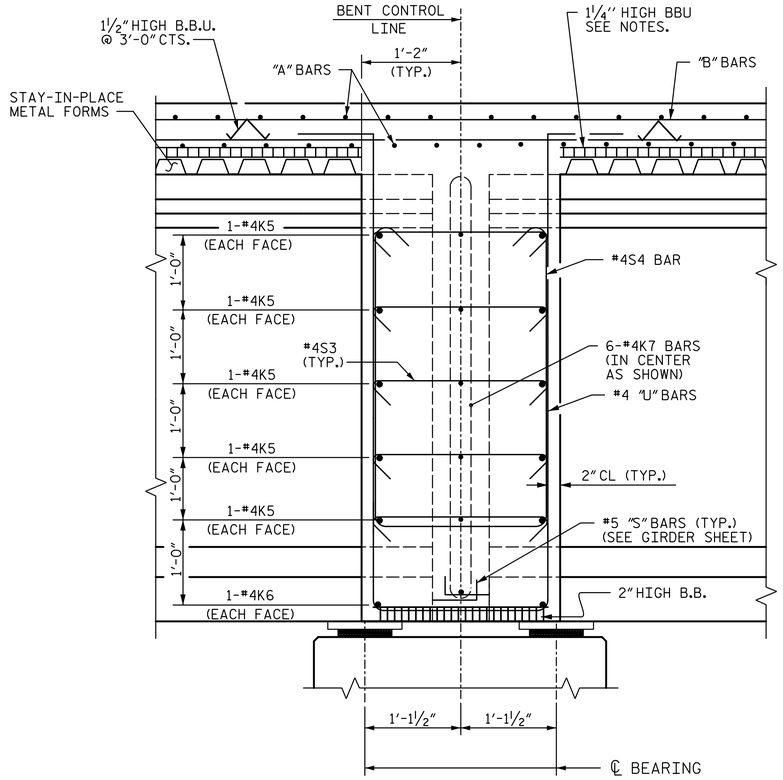
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-6
1			3			TOTAL SHEETS
2			4			36

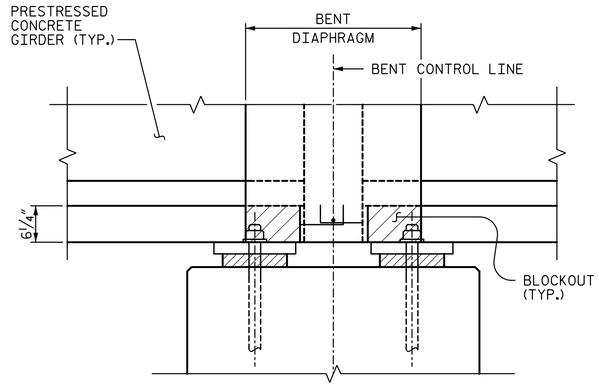


SECTION THRU END DIAPHRAGM

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

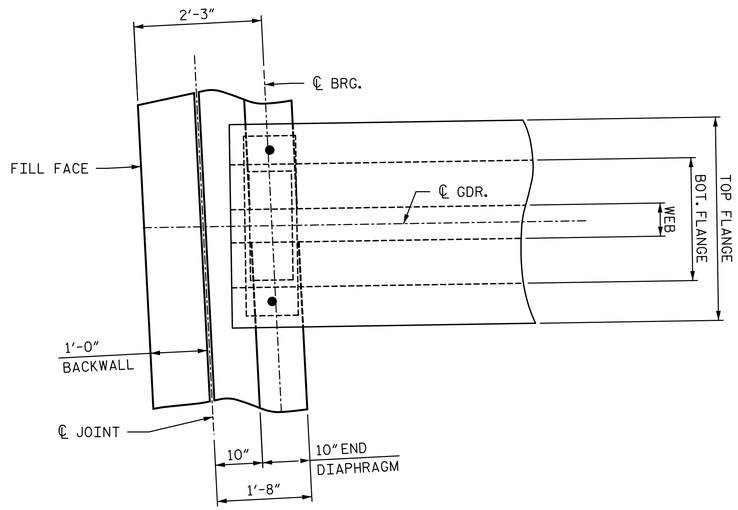


SECTION THRU BENT DIAPHRAGM



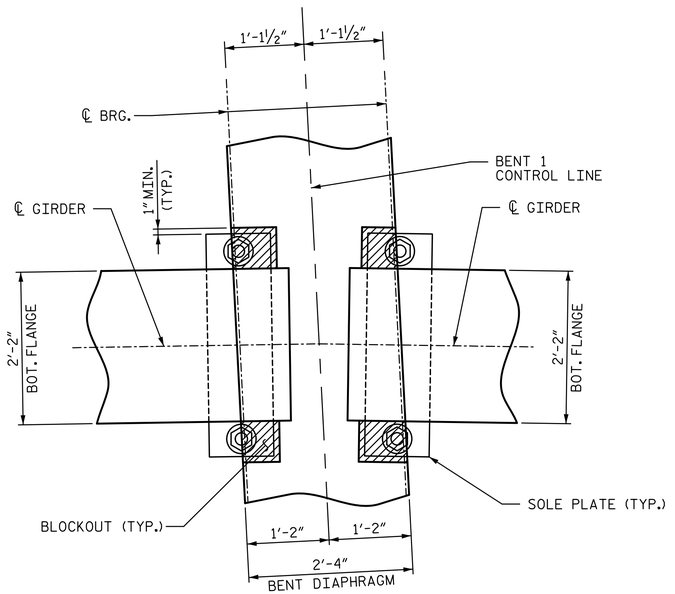
BENT DIAPHRAGM BLOCKOUT DETAILS

(PRESTRESSED GIRDERS WITH CONTINUOUS DECK SLAB)



PLAN OF END DIAPHRAGM

(END BENT 1 SHOWN, END BENT 2 SIMILAR)



PLAN OF BENT DIAPHRAGM

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : PEK	DATE : 5-17		

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 2

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7/14/2017

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RALEIGH

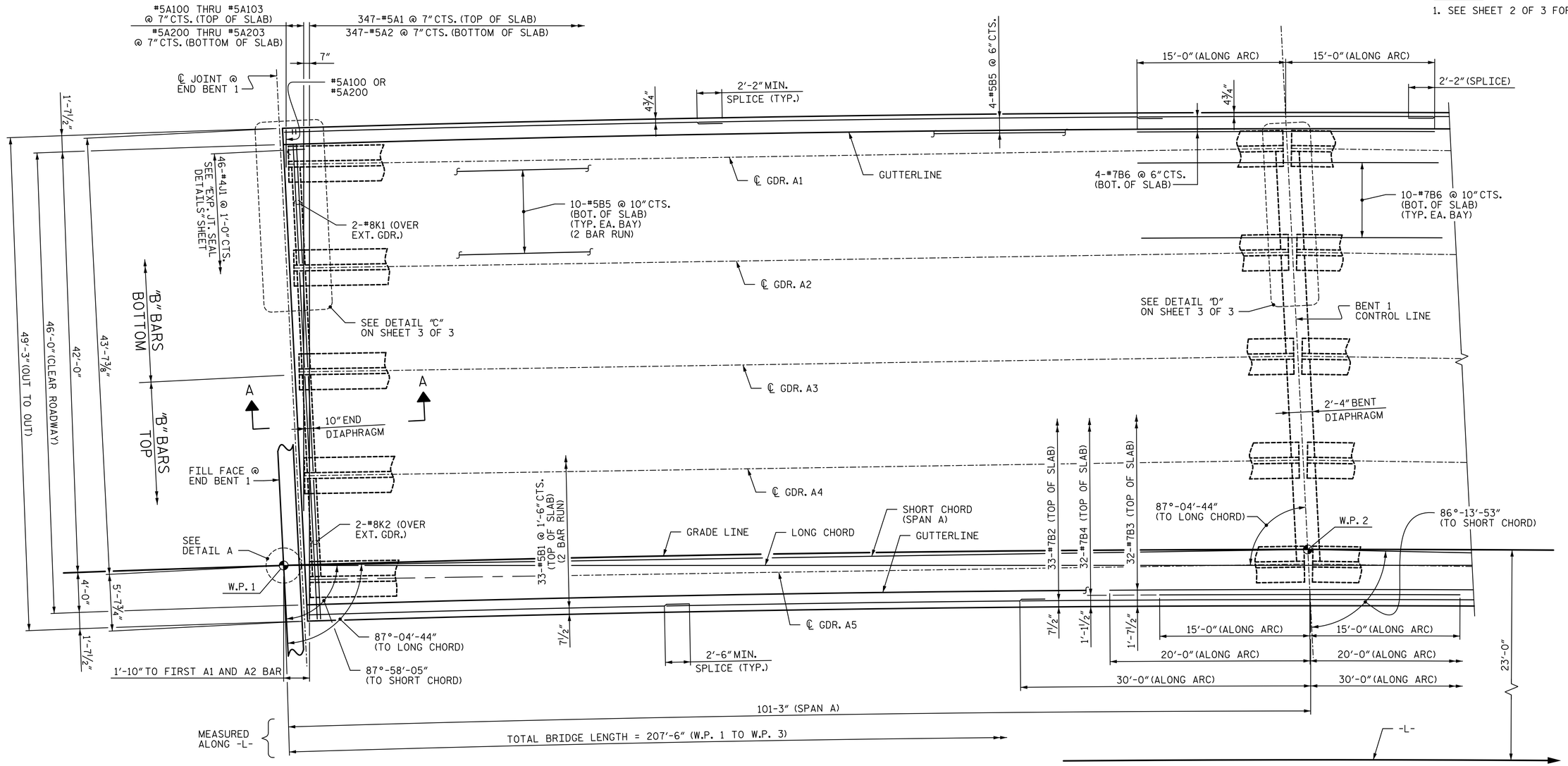
SUPERSTRUCTURE

TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-7
1			3			TOTAL SHEETS
2			4			36

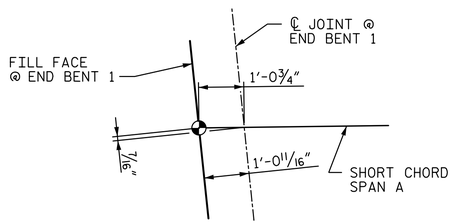
NOTES:

1. SEE SHEET 2 OF 3 FOR NOTES.

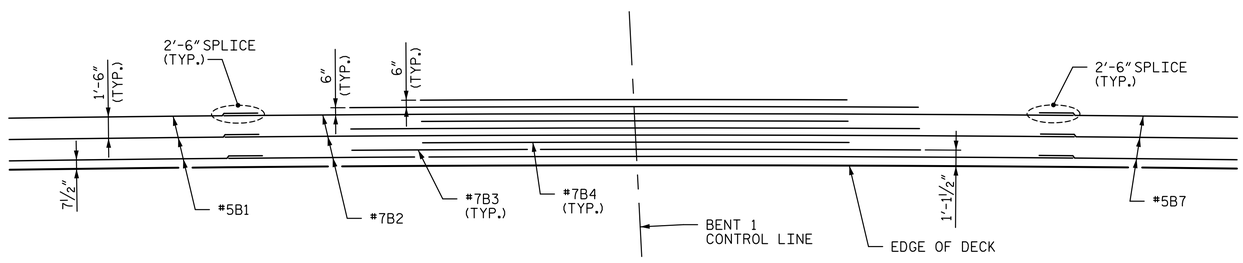


PLAN OF SPAN

("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



DETAIL "A"



REINFORCING STEEL LAYOUT

(TOP OF SLAB)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 1 OF 3

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STATE OF NORTH CAROLINA
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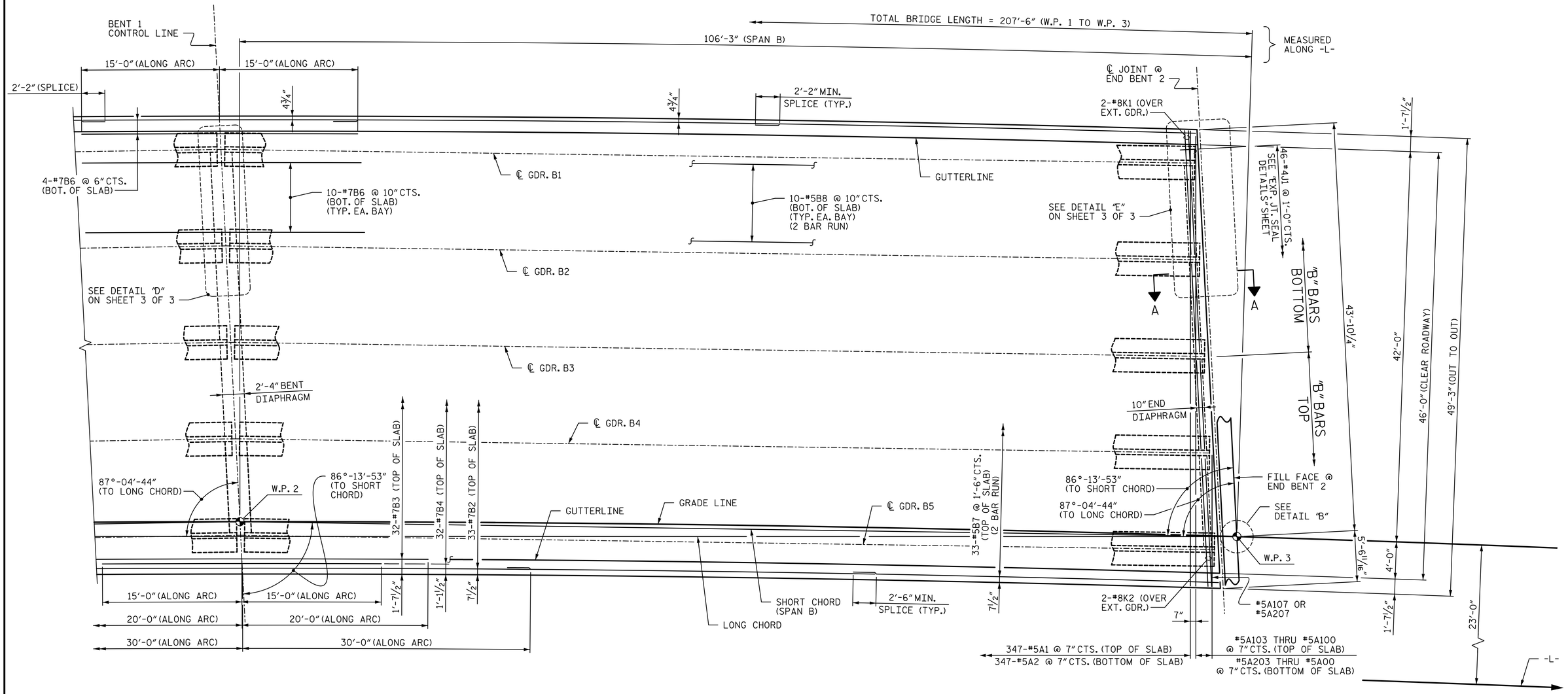
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN
SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-8
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : PEK	DATE : 5-17		

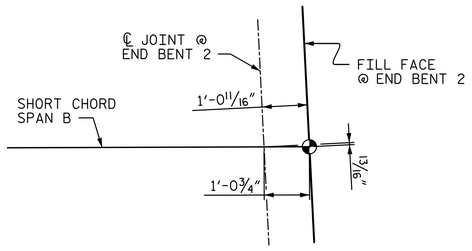


NOTES:

1. FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCEMENT AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.
2. FOR POUR SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR SECTION VIEWS, SEE "SUPERSTRUCTURE DETAILS" SHEET.
4. FOR "B" BAR SPACING AND LOCATION, SEE "TYPICAL SECTION" SHEET.
5. FOR MINIMUM SPLICE LENGTHS, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
6. FOR ADDITIONAL DETAILS, SEE SHEET 3 OF 3.

PLAN OF SPAN

("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



DETIAL "B"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 3

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7/14/2017

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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-9
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
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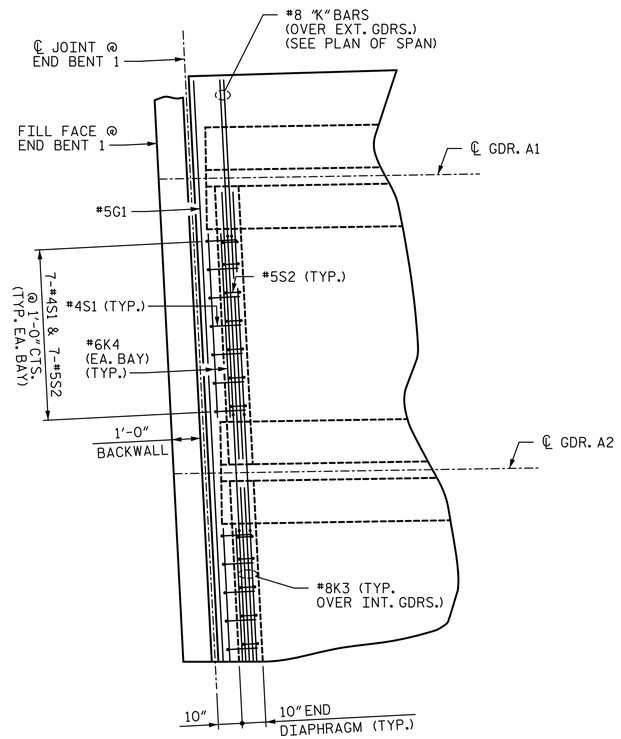

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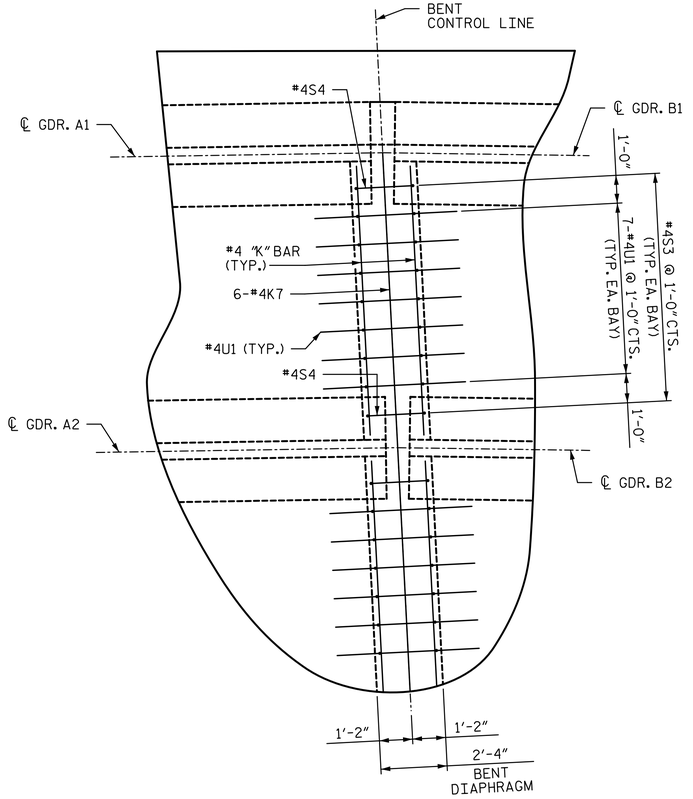

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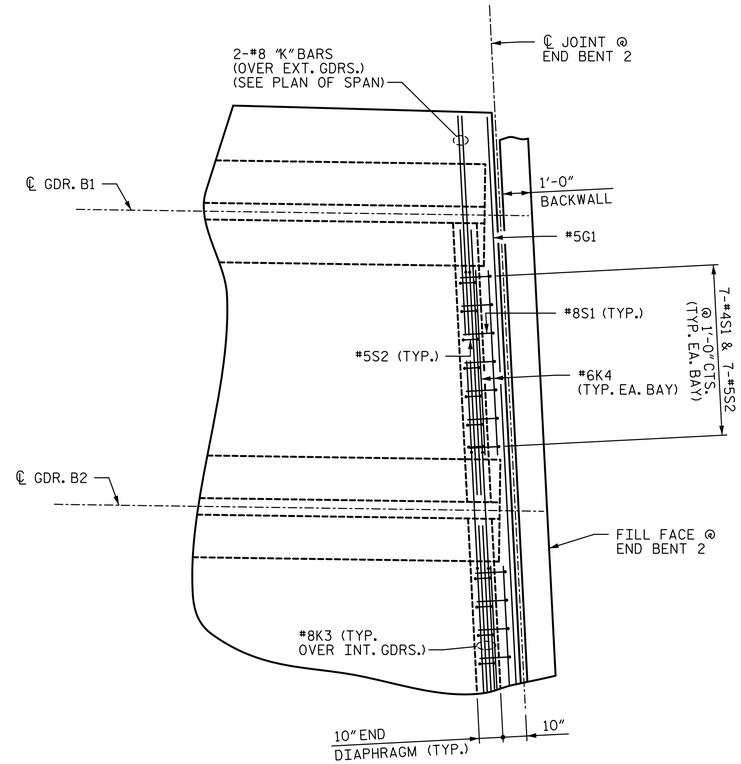

DETAIL "E"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 3 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER PAUL E. KELLY JR.
7/14/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPAN DETAILS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

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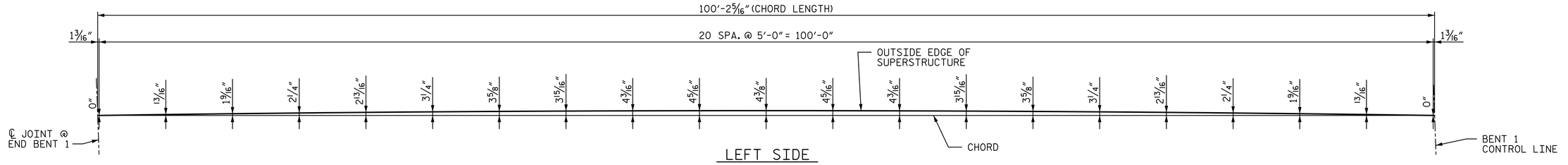
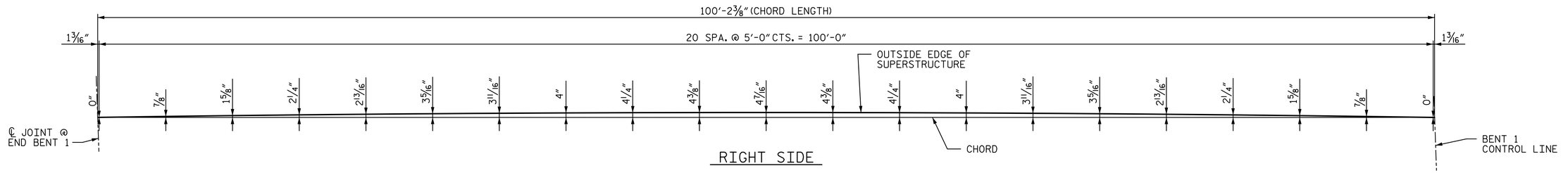
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-10
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 3-17
CHECKED BY : PEK DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

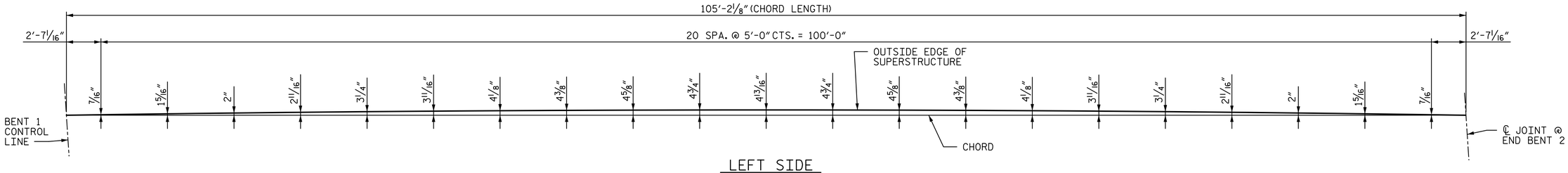


LEFT SIDE

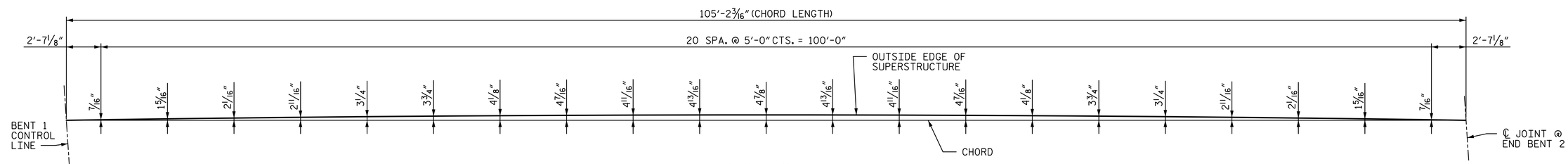


RIGHT SIDE

ARC OFFSETS - SPAN A



LEFT SIDE



RIGHT SIDE

ARC OFFSETS - SPAN B

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: PAUL E. KELLY, JR. NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER
7/14/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-11
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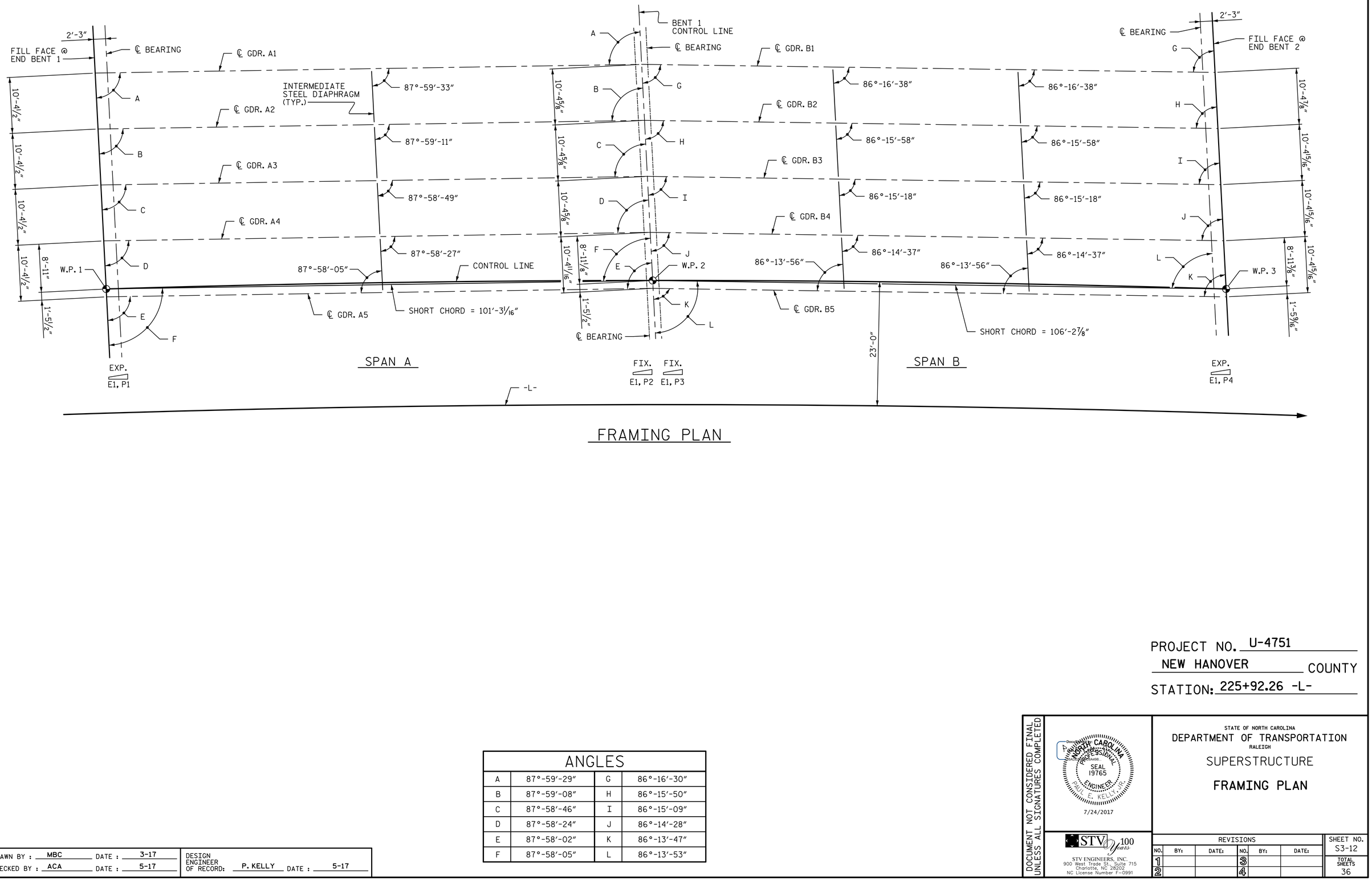
DRAWN BY : MBC	DATE : 2-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : ACA	DATE : 5-17		



FRAMING PLAN

ANGLES			
A	87°-59'-29"	G	86°-16'-30"
B	87°-59'-08"	H	86°-15'-50"
C	87°-58'-46"	I	86°-15'-09"
D	87°-58'-24"	J	86°-14'-28"
E	87°-58'-02"	K	86°-13'-47"
F	87°-58'-05"	L	86°-13'-53"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

DRAWN BY : MBC DATE : 3-17

CHECKED BY : ACA DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR.

7/24/2017

STV 100 Years

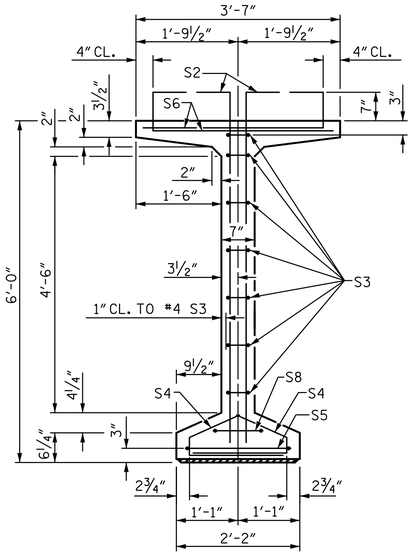
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

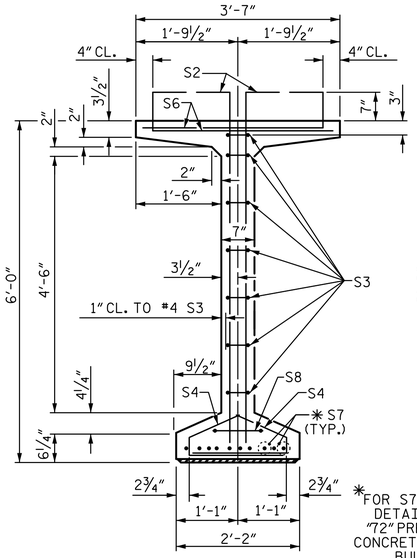
SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-12
1			3			TOTAL SHEETS
2			4			36

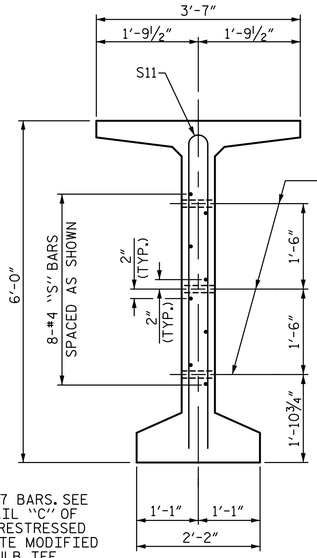


SECTION A-A



SECTION B-B

✱FOR S7 BARS, SEE DETAIL "C" OF "72" PRESTRESSED CONCRETE MODIFIED BULB TEE DETAILS" SHEET

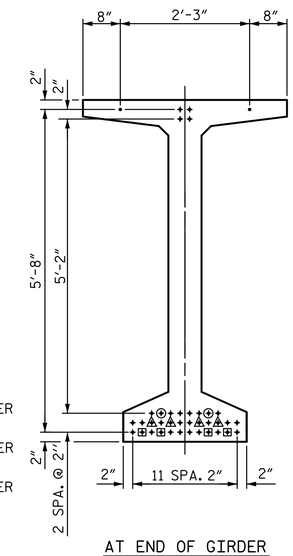


SECTION C-C

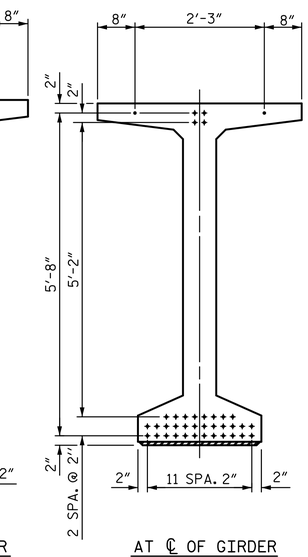
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ⊙ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

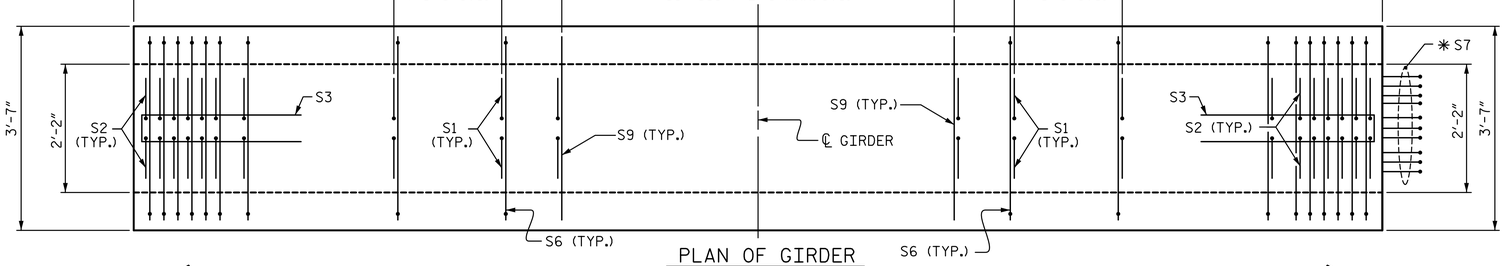


AT END OF GIRDER

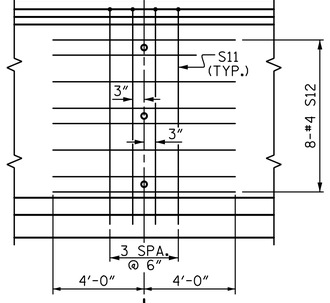


AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

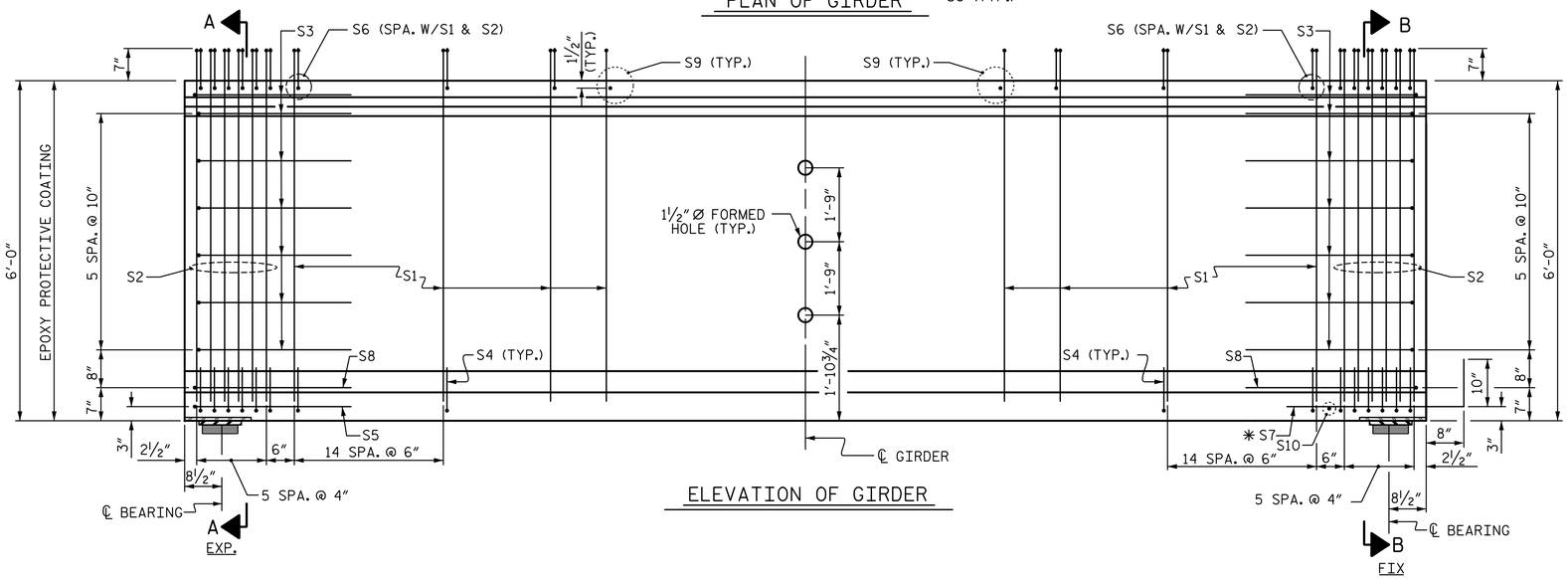


PLAN OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 5



ELEVATION OF GIRDER

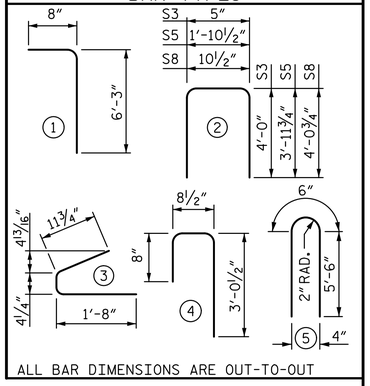
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	160	#4	1	6'-11"	739
S2	24	#5	1	6'-11"	173
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	1	#5	2	9'-10"	10
S6	124	#5	4	4'-5"	571
✱S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	30	#5	STR	3'-3"	102
S10	1	#3	STR	1'-10"	1
S11	4	#5	5	11'-6"	48
S12	8	#4	STR	8'-0"	43

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER	1991	21.3	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	99'-3½"	496'-5½"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 1 OF 3

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

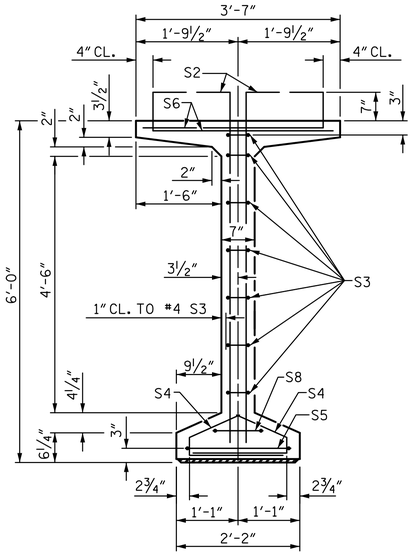
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD "SPAN A"

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

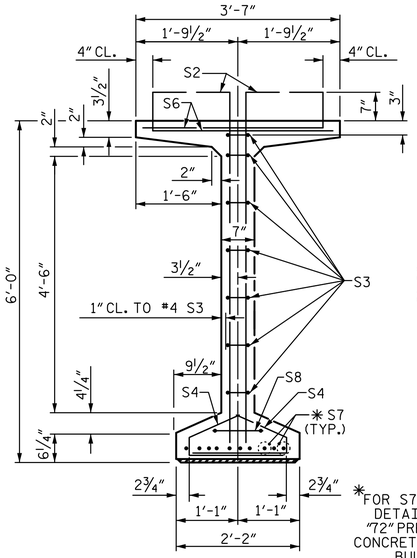
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S3-13

TOTAL SHEETS 36

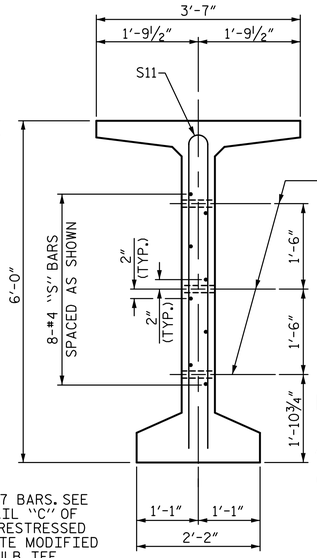


SECTION A-A



SECTION B-B

✳FOR S7 BARS, SEE DETAIL "C" OF "72" PRESTRESSED CONCRETE MODIFIED BULB TEE DETAIL" SHEET

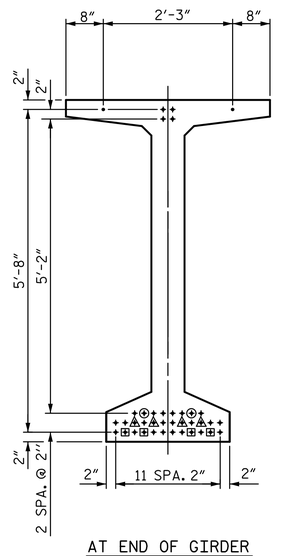


SECTION C-C

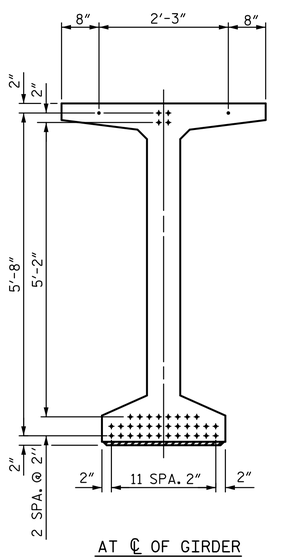
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- △ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

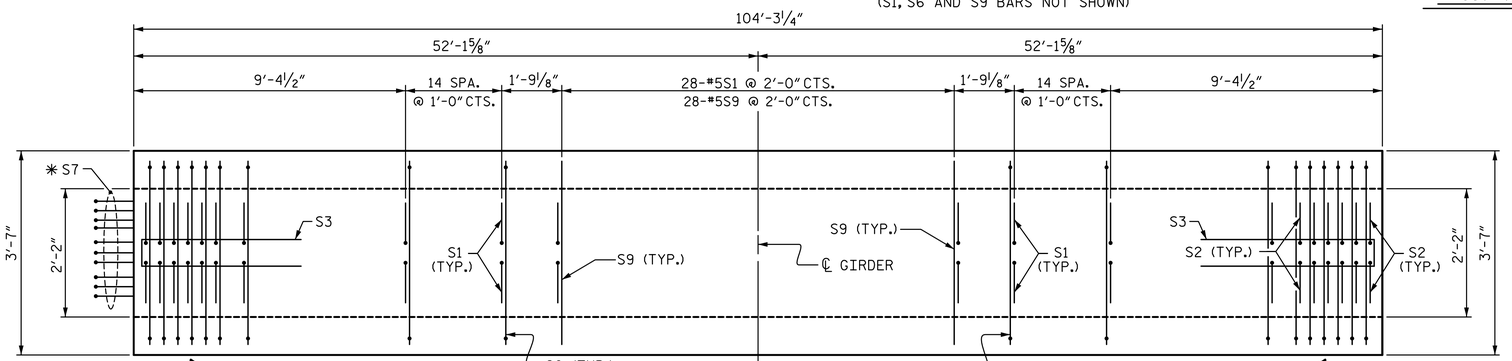


AT END OF GIRDER

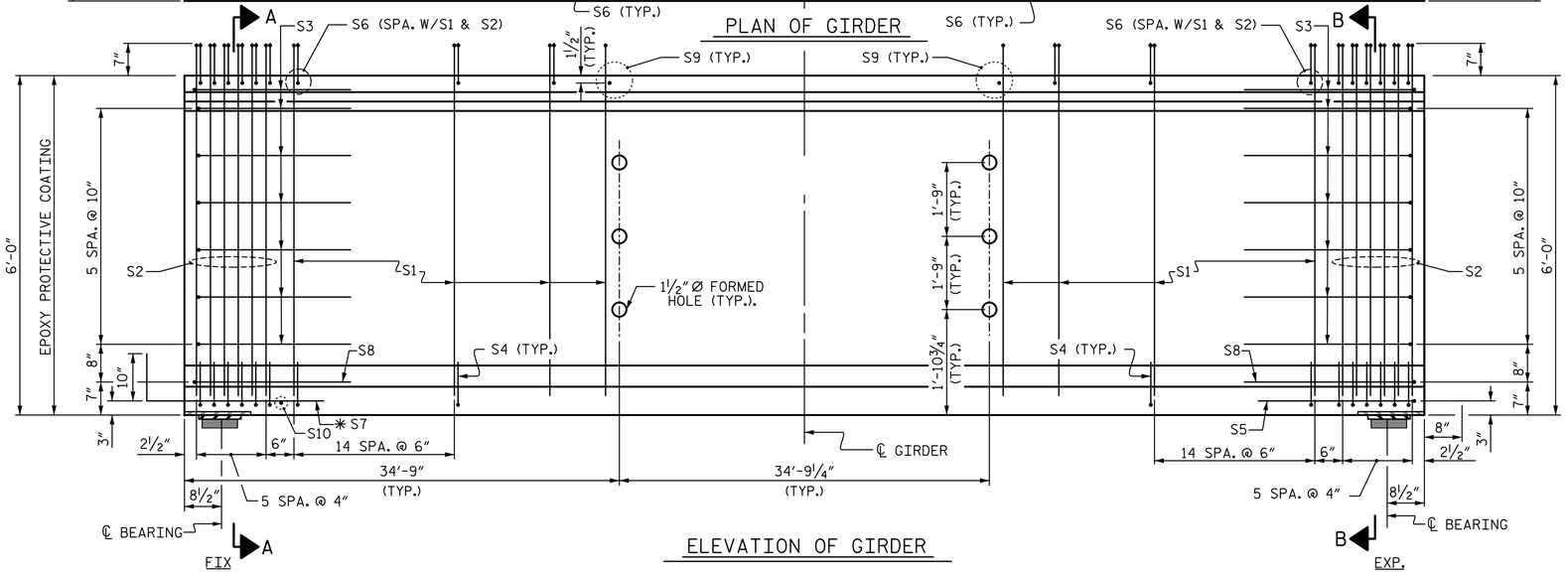


AT ℄ OF GIRDER

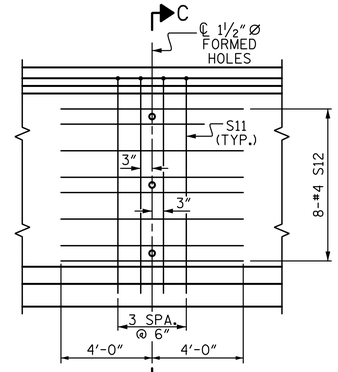
0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 5

0.6" Ø L. R. GRADE 270 STRANDS

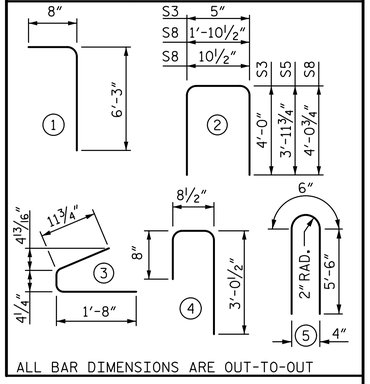
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	172	#4	1	6'-11"	795
S2	24	#5	1	6'-11"	173
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	1	#5	2	9'-10"	10
S6	140	#5	4	4'-5"	645
✳S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	28	#5	STR	3'-3"	95
S10	1	#3	STR	1'-10"	1
S11	4	#5	5	11'-6"	48
S12	8	#4	STR	8'-0"	43

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER	2114	22.3	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	104'-3¼"	521'-4¼"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 3

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY, JR.

7/24/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-14
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 3-17
CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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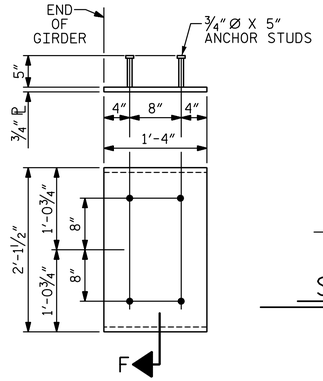
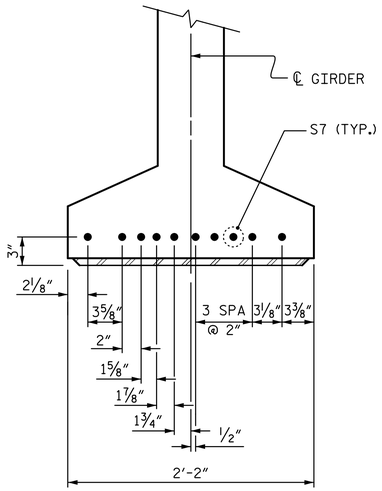


SECTION "F"

(SEE NOTES)

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

(2 REQ'D PER GIRDER)



DETAIL "C"

(FOR 72" MODIFIED BULB TEES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6400 PSI.

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

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

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

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

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 3 OF 3

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Docusigned by: PAUL F. KELLY JR. NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 ENGINEER PAUL F. KELLY JR.

7/14/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-15
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 3-17
CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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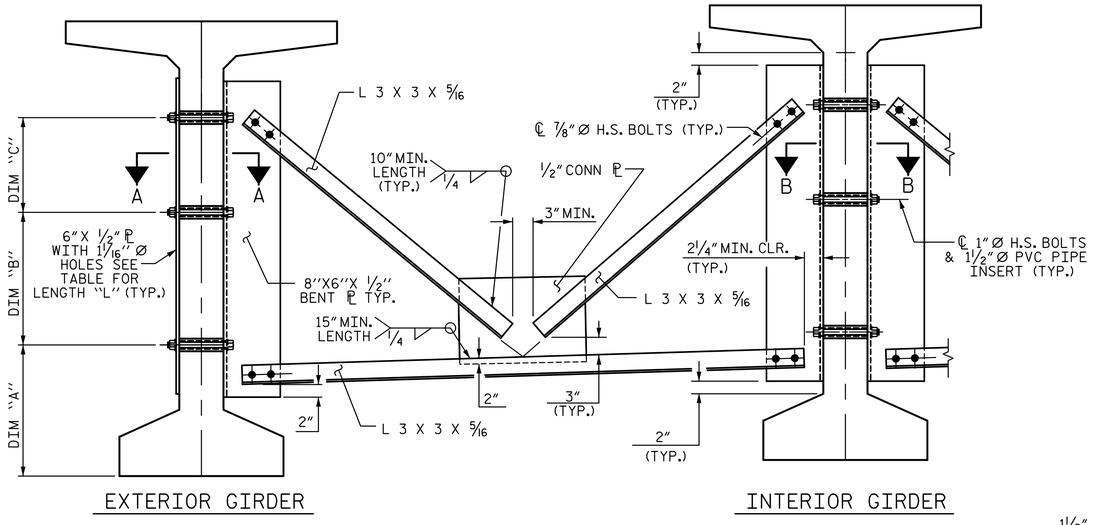
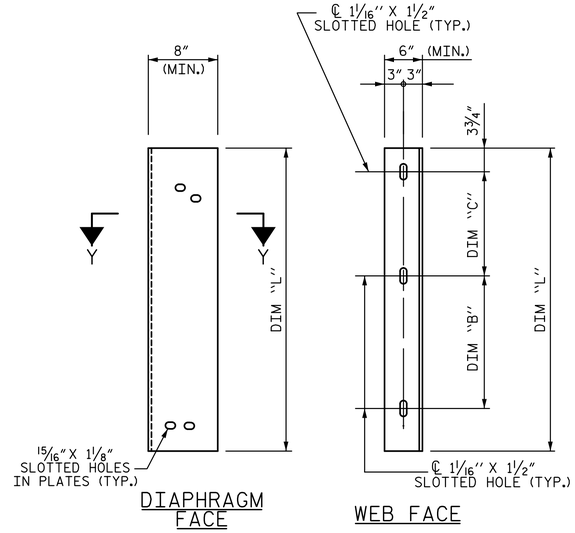
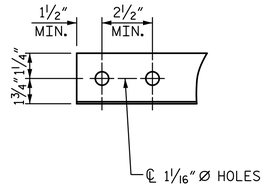
Deliverables & Submittals\U-475I\Structures\Bridge 203\Ustation\Final\40186I7_000I\S0_Deliverables

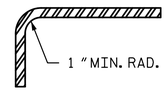


PART SECTION AT INTERMEDIATE DIAPHRAGM





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



SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

FOR METALLIZATION, APPLY 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.

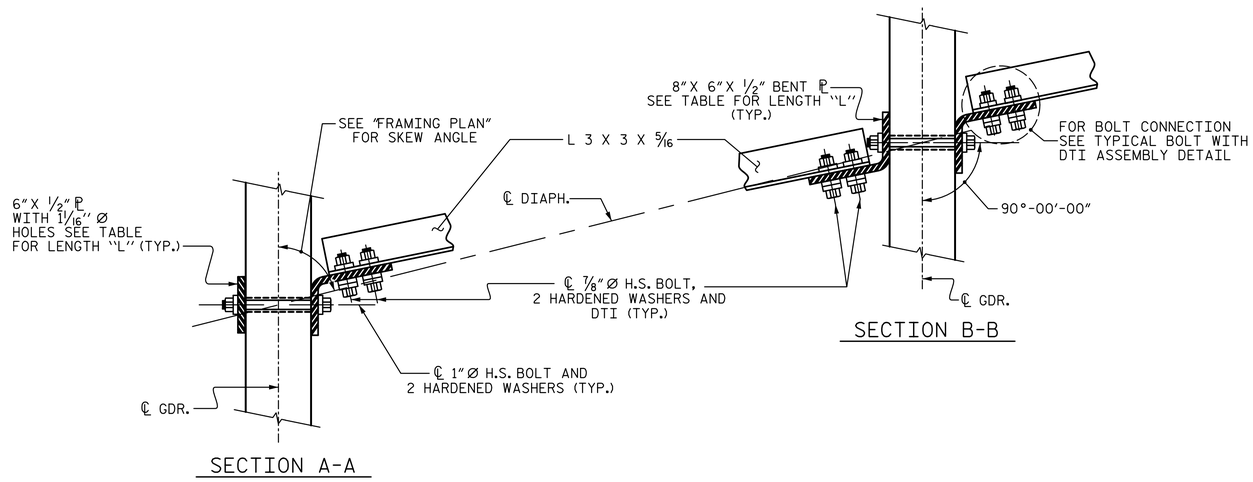
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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 PRESTRESSED CONCRETE GIRDERS.

TABLE

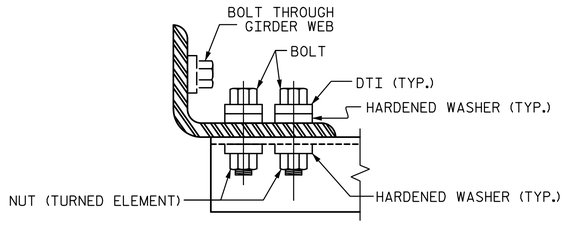
GIRDER TYPE	DIM "A"	DIM "B"	DIM "C"	DIM "L"
72" BULB TEE	1'-10 3/4"	1'-6"	1'-6"	4'-2"



SECTION A-A

SECTION B-B

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR. ENGINEER
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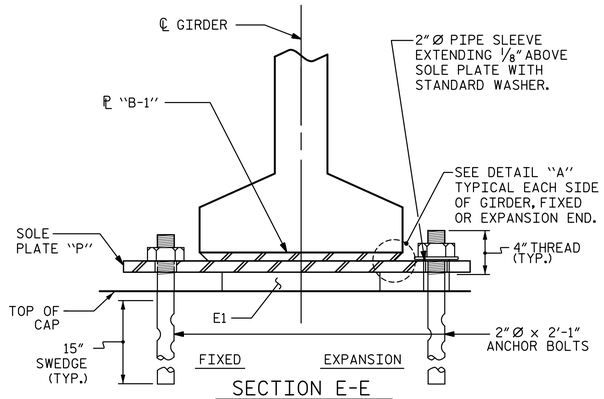
RALEIGH

SUPERSTRUCTURE

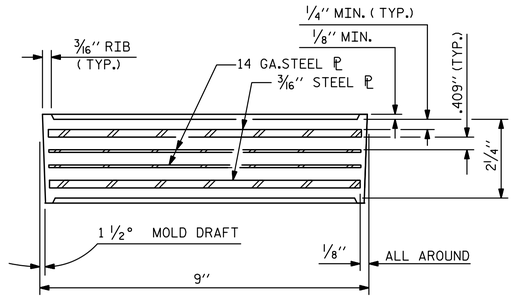
INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-16
1			3			TOTAL SHEETS
2			4			36

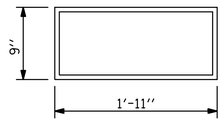
DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : ACA	DATE : 5-17		



SECTION E-E



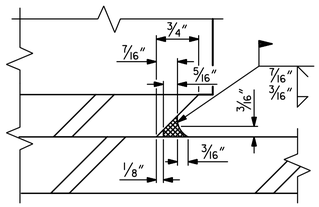
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (20 REQ'D)

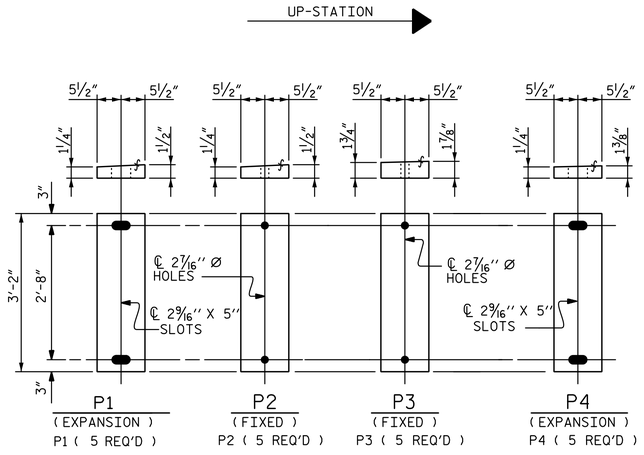
PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



DETAIL "A"

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



SOLE PLATE DETAILS ("P")

NOTES

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

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

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

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

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

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

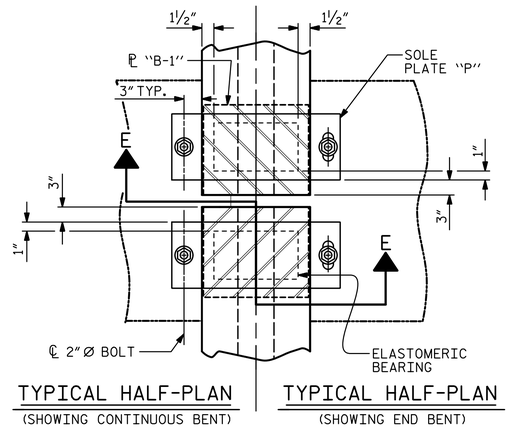
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING END BENT)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : ACA	DATE : 5-17		

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-17
1			3			TOTAL SHEETS
2			4			36

DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 1

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.030	0.058	0.086	0.111	0.133	0.151	0.167	0.177	0.184	0.186	0.184	0.177	0.167	0.151	0.133	0.111	0.086	0.058	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.013	0.027	0.040	0.052	0.063	0.072	0.079	0.085	0.088	0.089	0.088	0.085	0.079	0.072	0.063	0.052	0.040	0.027	0.013	0.000
FINAL CAMBER	0″	3/16″	3/8″	9/16″	11/16″	13/16″	15/16″	1 1/16″	1 1/8″	1 1/8″	1 3/16″	1 1/8″	1 1/8″	1 1/16″	15/16″	13/16″	11/16″	9/16″	3/8″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 2, 3 & 4

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.030	0.058	0.086	0.111	0.133	.151	0.167	0.177	0.184	0.186	0.184	0.177	0.167	.151	0.133	0.111	0.086	0.058	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.014	0.028	0.042	0.055	0.066	0.076	0.083	0.089	0.092	0.093	0.092	0.089	0.083	0.076	0.066	0.055	0.042	0.028	0.014	0.000
FINAL CAMBER	0″	3/16″	3/8″	1/2″	11/16″	13/16″	15/16″	1″	1 1/16″	1 1/8″	1 1/8″	1 1/8″	1 1/16″	1″	15/16″	13/16″	11/16″	1/2″	3/8″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 5

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.030	0.058	0.086	0.111	0.133	.151	0.167	0.177	0.184	0.186	0.184	0.177	0.167	.151	0.133	0.111	0.086	0.058	0.030	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.013	0.026	0.039	0.051	0.061	0.070	0.077	0.083	0.086	0.087	0.086	0.083	0.077	0.070	0.061	0.051	0.039	0.026	0.013	0.000
FINAL CAMBER	0″	3/16″	3/8″	9/16″	3/4″	7/8″	1″	1 1/16″	1 1/8″	1 3/16″	1 3/16″	1 3/16″	1 1/8″	1 1/16″	1″	7/8″	3/4″	9/16″	3/8″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 1

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.062	0.090	0.117	0.140	0.159	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.159	0.140	0.117	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.017	0.033	0.049	0.064	0.077	0.089	0.098	0.104	0.108	0.109	0.108	0.104	0.098	0.089	0.077	0.064	0.049	0.033	0.017	0.000
FINAL CAMBER	0″	3/16″	5/16″	1/2″	5/8″	3/4″	7/8″	15/16″	1″	1″	1 1/16″	1″	1″	15/16″	7/8″	3/4″	5/8″	1/2″	5/16″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 2, 3 & 4

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.062	0.090	0.117	0.140	0.159	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.159	0.140	0.117	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.017	0.035	0.051	0.067	0.081	0.093	0.102	0.109	0.113	0.114	0.113	0.109	0.102	0.093	0.081	0.067	0.051	0.035	0.017	0.000
FINAL CAMBER	0″	3/16″	5/16″	7/16″	5/8″	11/16″	13/16″	7/8″	15/16″	1″	1″	1″	15/16″	7/8″	13/16″	11/16″	5/8″	7/16″	5/16″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 6

TWENTIETH POINTS	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
CAMBER (GIRDER ALONE IN PLACE)	0.000	0.031	0.062	0.090	0.117	0.140	0.159	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.159	0.140	0.117	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L.	0.000	0.016	0.032	0.048	0.062	0.075	0.086	0.094	0.101	0.105	0.106	0.105	0.101	0.094	0.086	0.075	0.062	0.048	0.032	0.016	0.000
FINAL CAMBER	0″	3/16″	3/8″	1/2″	5/8″	3/4″	7/8″	1″	1 1/16″	1 1/16″	1 1/16″	1 1/16″	1 1/16″	1″	7/8″	3/4″	5/8″	1/2″	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).

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Documents not considered final unless all signatures completed
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR.
7/14/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTIONS

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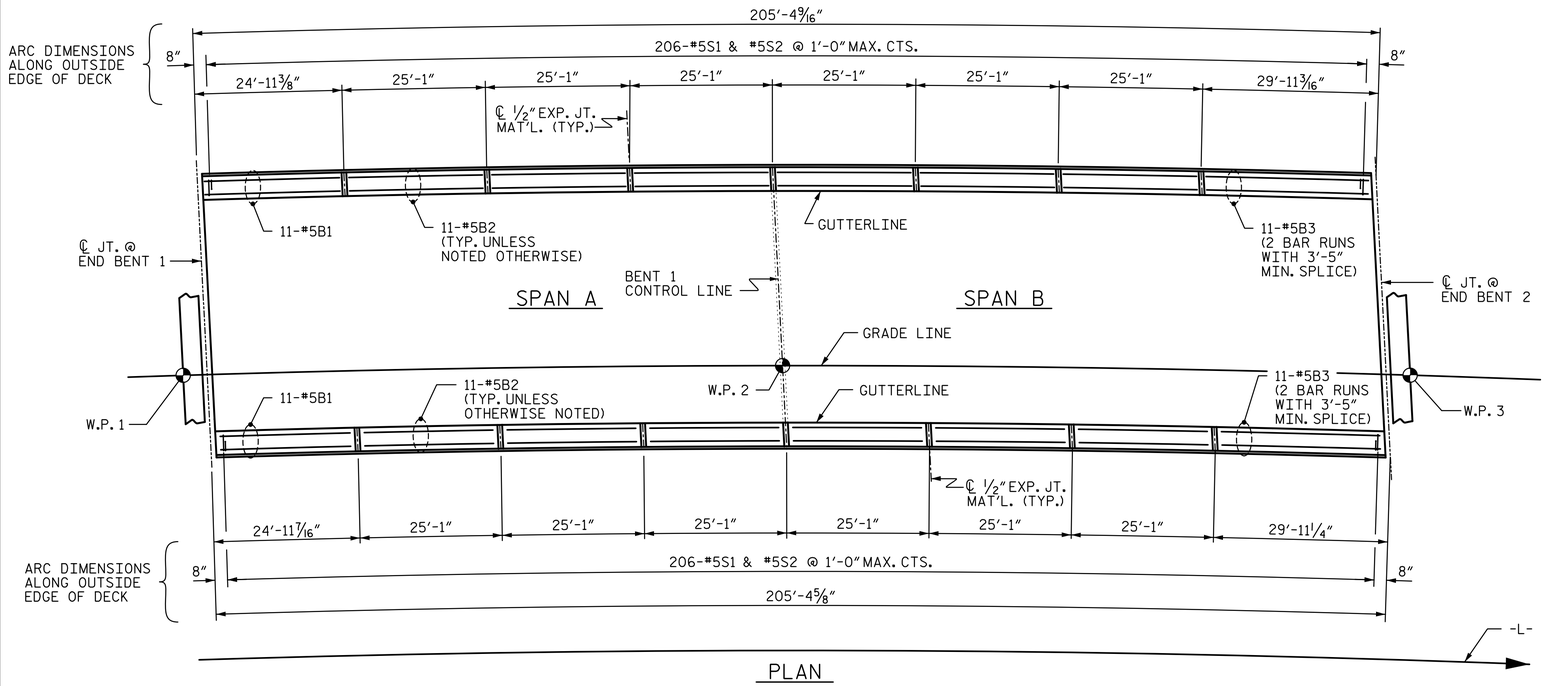
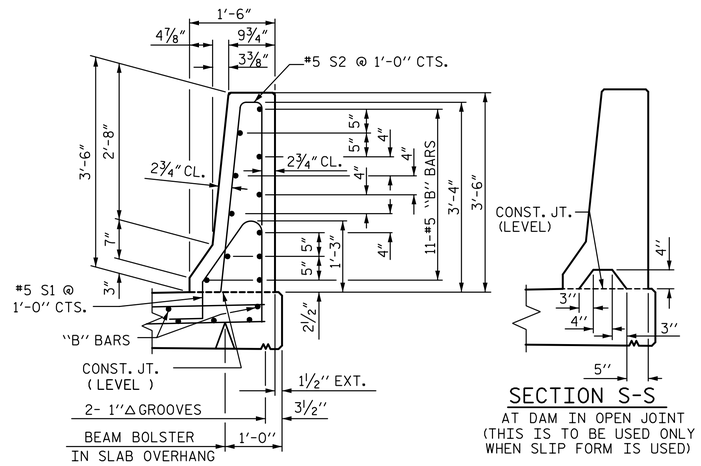
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S3-18
TOTAL SHEETS 36

DRAWN BY : MBC DATE : 5-17
CHECKED BY : ACA DATE : 5-17
DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17



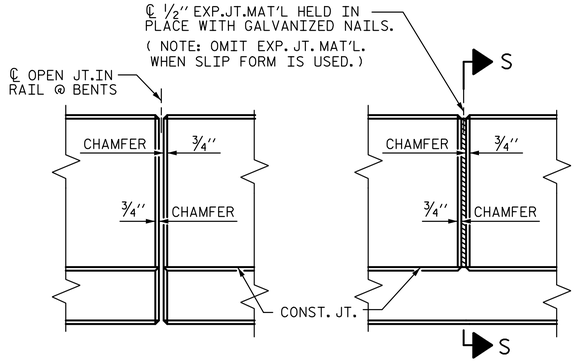
PLAN



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

NOTES

THE BARRIER RAIL IN EACH 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.

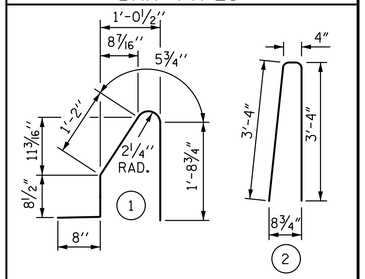
ALL REINFORCING IN BARRIER RAIL SHALL BE EPOXY COATED.

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

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.

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ B1	22	#5	STR	24'-5"	560
✱ B2	132	#5	STR	24'-7"	3385
✱ B3	44	#5	STR	16'-5"	753
✱ S1	412	#5	1	4'-9"	2041
✱ S2	412	#5	2	7'-0"	3008

✱ EPOXY COATED REINFORCING STEEL	9747 LBS.
CLASS AA CONCRETE	58.9 CU. YDS.
CONCRETE BARRIER RAIL SUPERSTRUCTURE	410.76 LIN. FT.
● APPROACH SLABS	40.17 LIN. FT.
TOTAL	450.93 LIN. FT.

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL F. KELLY JR.

7/14/2017

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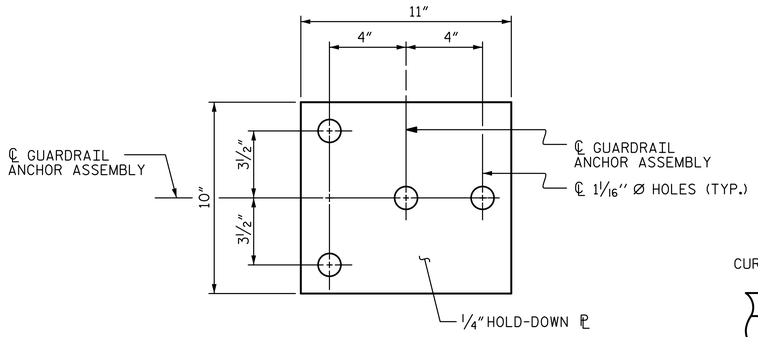
RALEIGH

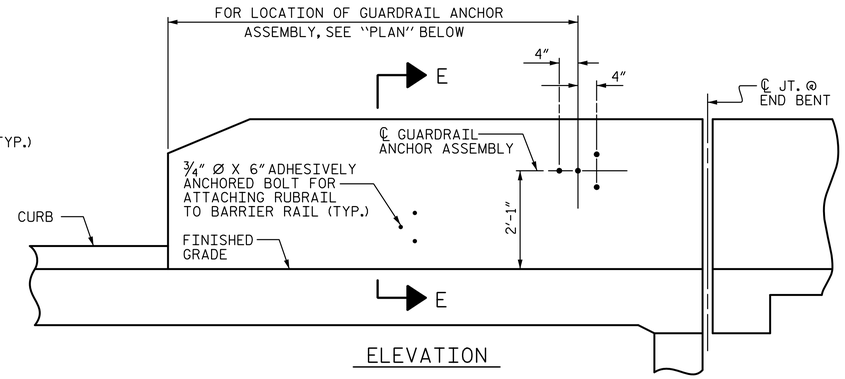
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-19
1			3			TOTAL SHEETS
2			4			36



PLAN



ELEVATION

NOTES

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

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

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

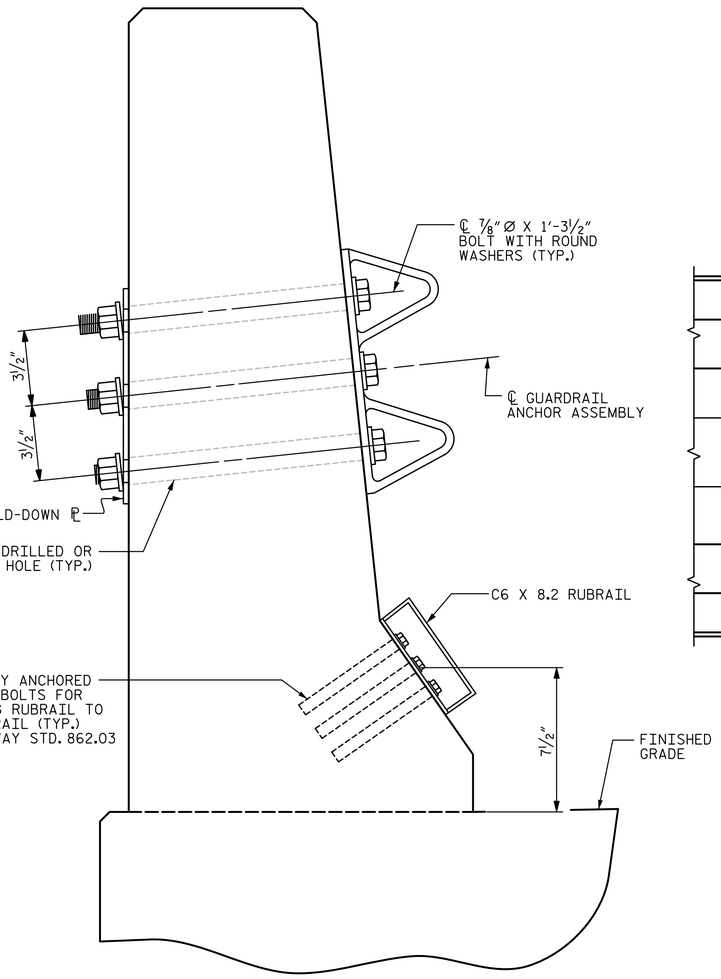
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

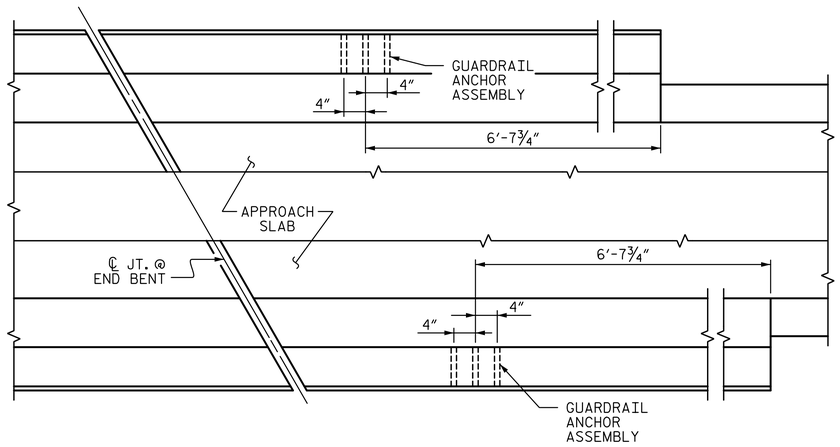
THE 1 ¼″ Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

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



SECTION E-E

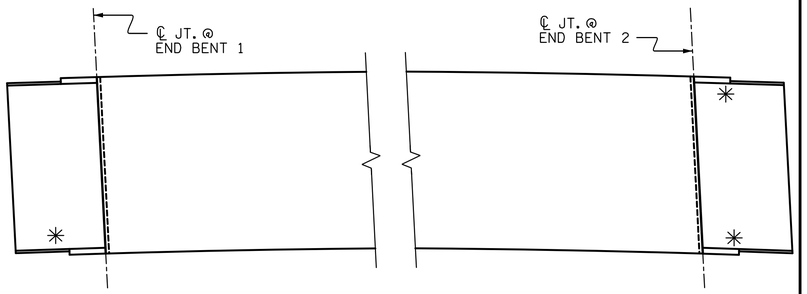
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 2 SHOWN, END BENT 1 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

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7/24/2017

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RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-20
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : TRL	DATE : 5-17		

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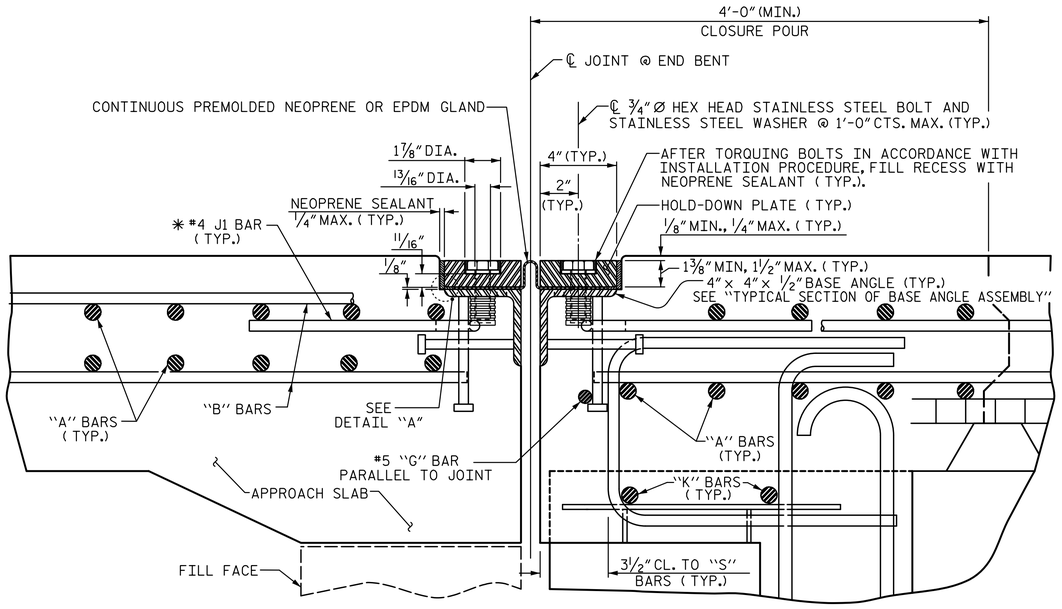
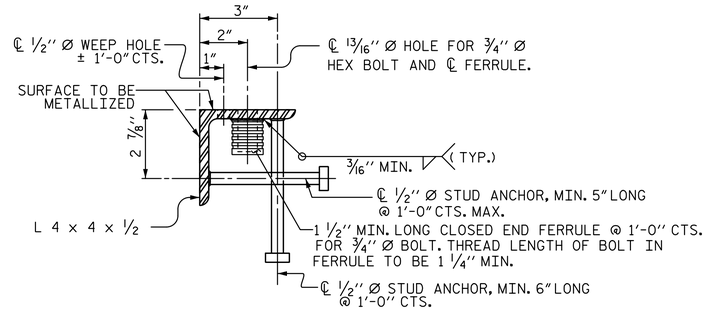


EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

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



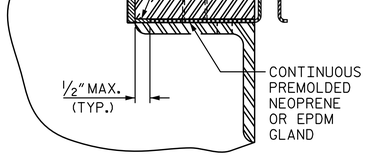
TYPICAL SECTION OF BASE ANGLE ASSEMBLY

INSTALLATION PROCEDURE

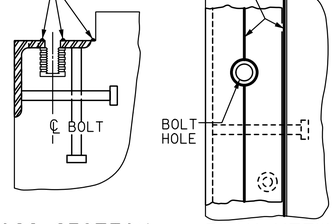
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛″ TO 4¼″ WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO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

GENERAL NOTES

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

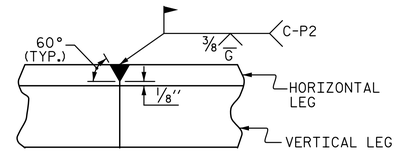


DETAIL "A"



CROSS SECTION PLAN VIEW

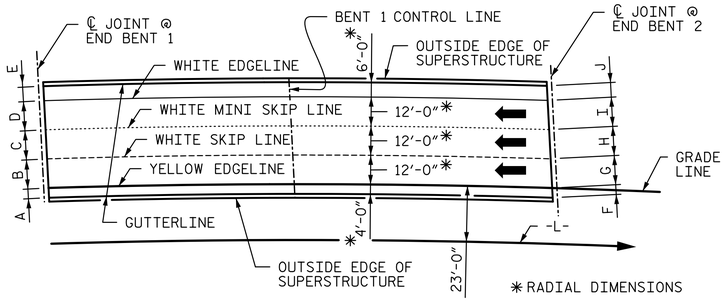
INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	88°-48′-56″	⅝″	1 7⁄16″	1 5⁄16″	1⅛″
2	85°-20′-32″	⅝″	1 7⁄16″	1 5⁄16″	1⅛″

PAVEMENT MARKING DIMENSIONS			
A	4′-0″	F	4′-0 3⁄16″
B	12′-0 1⁄16″	G	12′-0 1⁄2″
C	12′-0 1⁄16″	H	12′-0 7⁄16″
D	12′-0″	I	12′-0 7⁄16″
E	6′-0″	J	6′-0 1⁄4″



✱ RADIAL DIMENSIONS

PAVEMENT MARKING ALIGNMENT

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 1 OF 2

DRAWN BY : MBC DATE : 3-17

CHECKED BY : ACA DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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Digitally signed by PAUL E. KELLY JR.
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 ENGINEER PAUL E. KELLY JR.
7/14/2017

STV 100 Years

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EXPANSION JOINT SEAL DETAILS

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1			3			TOTAL SHEETS
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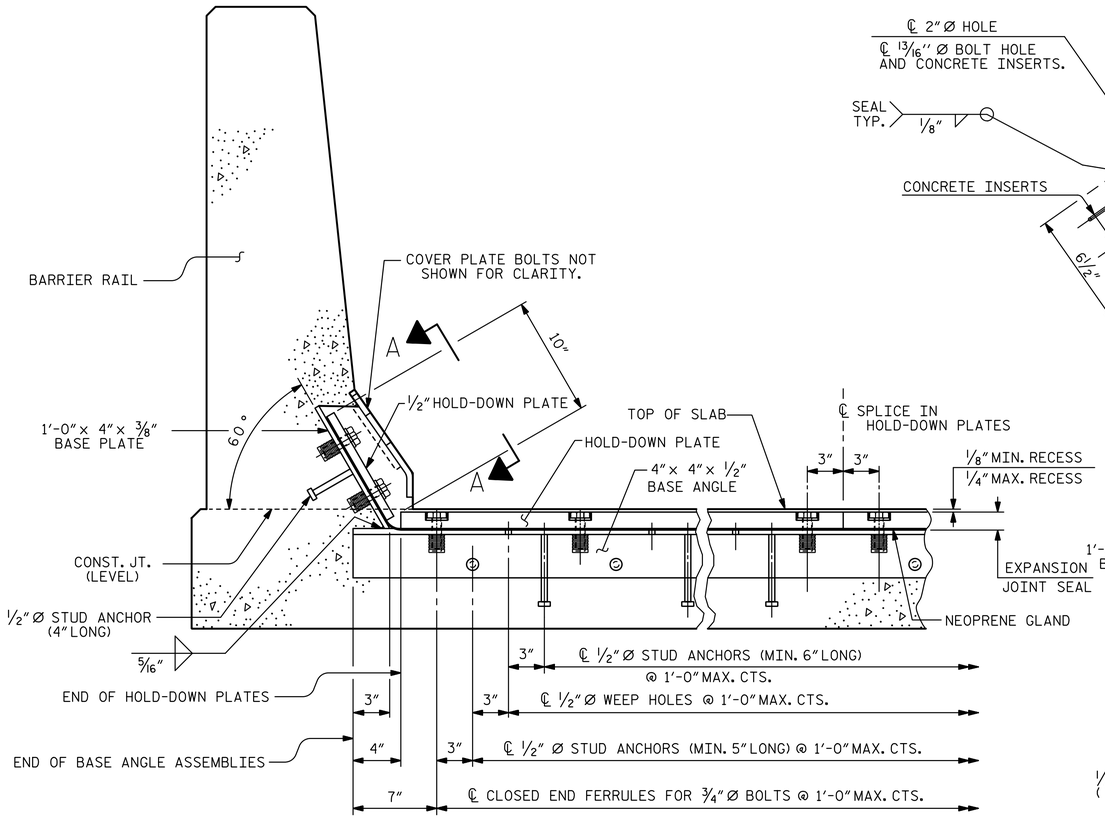
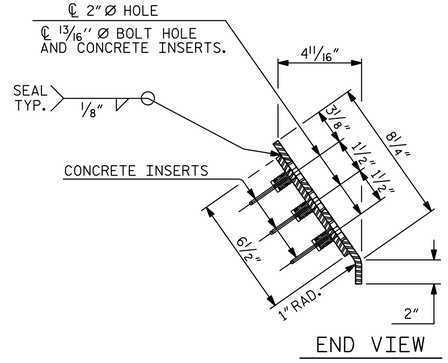
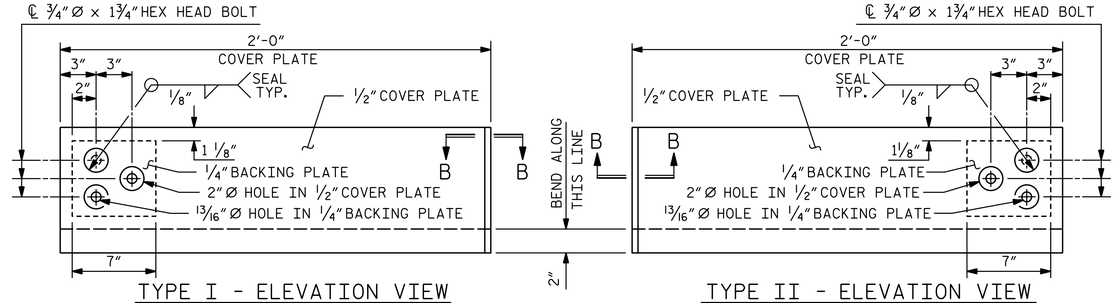


SECTION THRU RAIL NORMAL TO JOINT



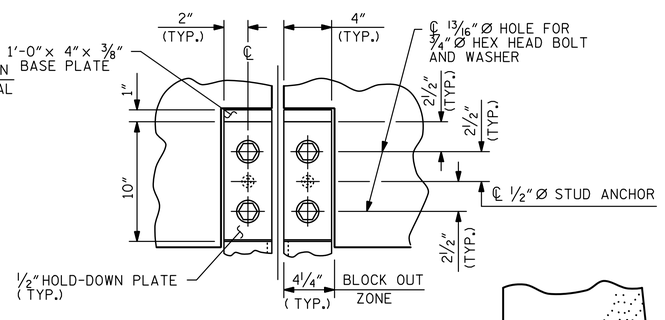
END VIEW



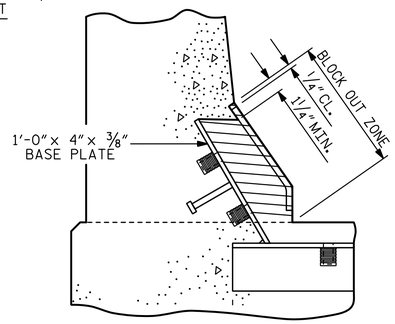
TYPE I - ELEVATION VIEW

TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

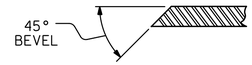


SECTION A - A

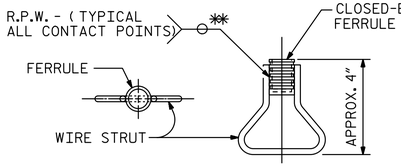


BLOCK OUT DETAIL

SEE " SECTION A - A " FOR OTHER DETAILS.



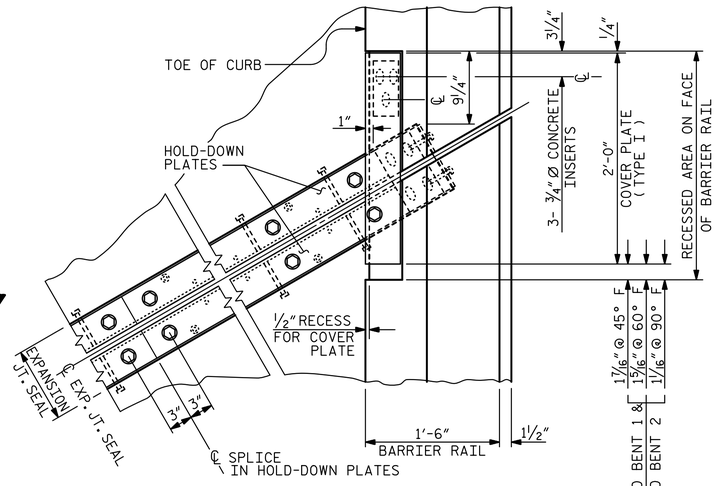
SECTION B - B



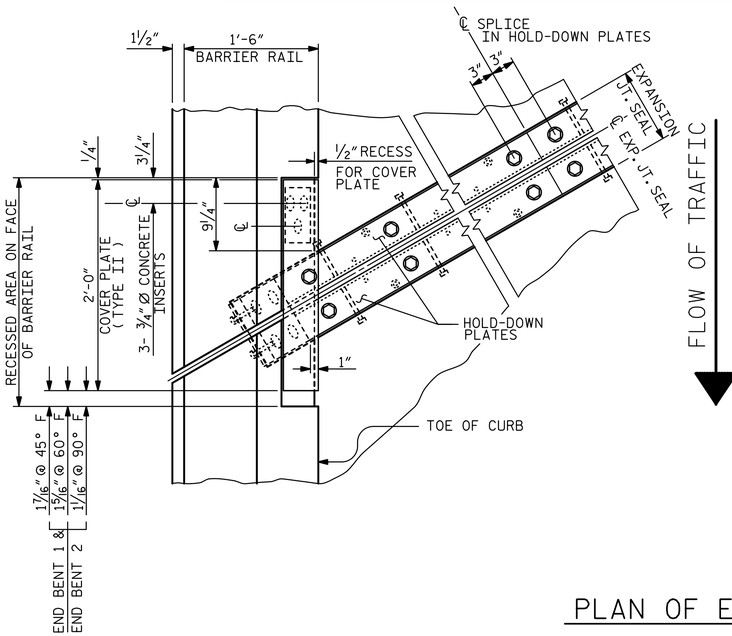
PLAN ELEVATION

CONCRETE INSERT

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



PLAN OF EXPANSION JOINT SEAL



FLOW OF TRAFFIC

NOTE:

SEE SHEET 1 OF 2 FOR PAVEMENT MARKING ALIGNMENT DETAIL.

PROJECT NO. U-4751

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SHEET 2 OF 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

STV 100 Years

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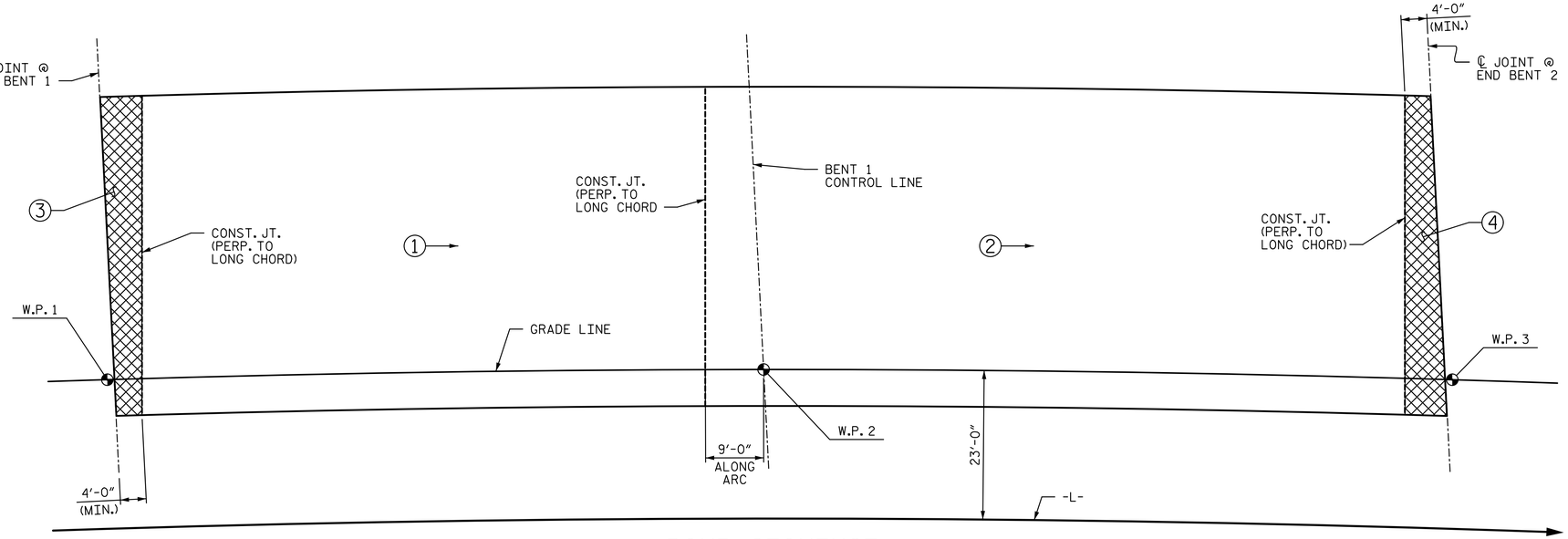


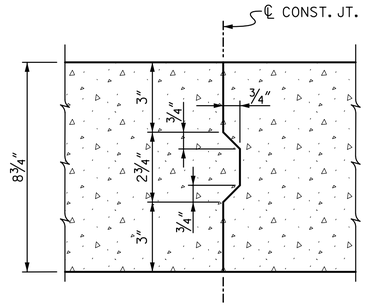
POUR SEQUENCE

DIMENSIONS GIVEN ALONG ARC OF GRADE LINE

→(#) = INDICATES POUR NUMBER AND DIRECTION OF POUR

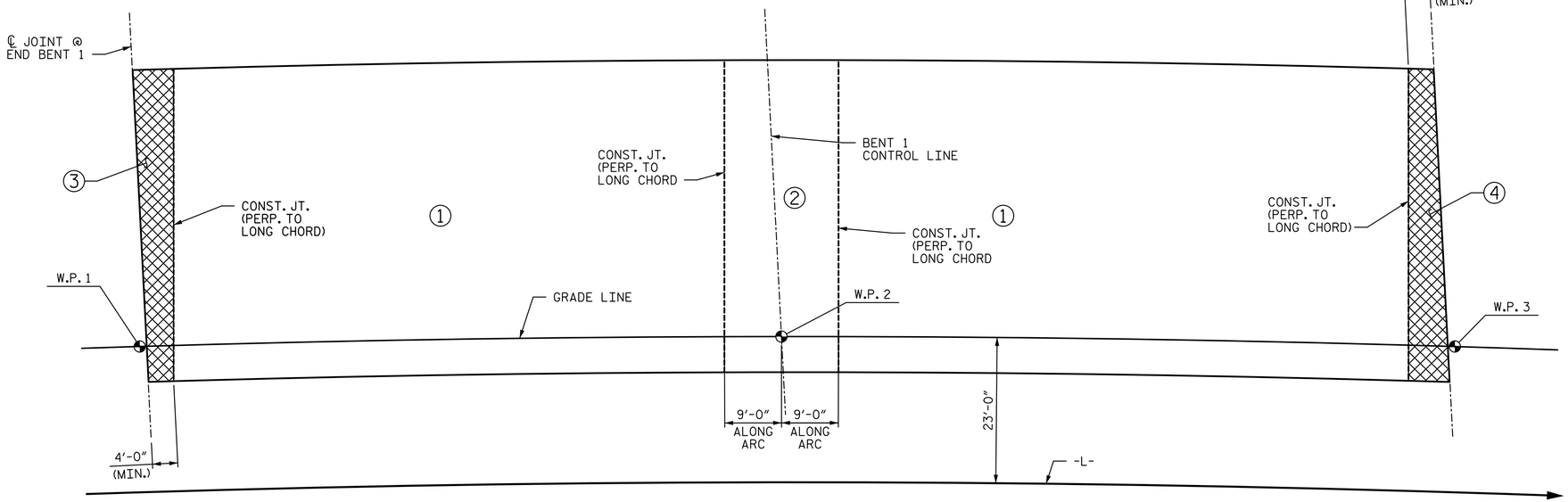
LEGEND:

▨ DECK CLOSURE POUR AT JOINTS.



CONSTRUCTION JOINT DETAIL

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



OPTIONAL POUR SEQUENCE

POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ①POURS REACH A MINIMUM OF 3000 PSI.
DIMENSIONS GIVEN ALONG ARC OF GRADE LINE

LEGEND:

▨ DECK CLOSURE POUR AT JOINTS.

PROJECT NO. U-4751

NEW HANOVER COUNTY

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SUPERSTRUCTURE

DECK POUR SEQUENCE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-23
1			3			TOTAL SHEETS
2			4			36

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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″			

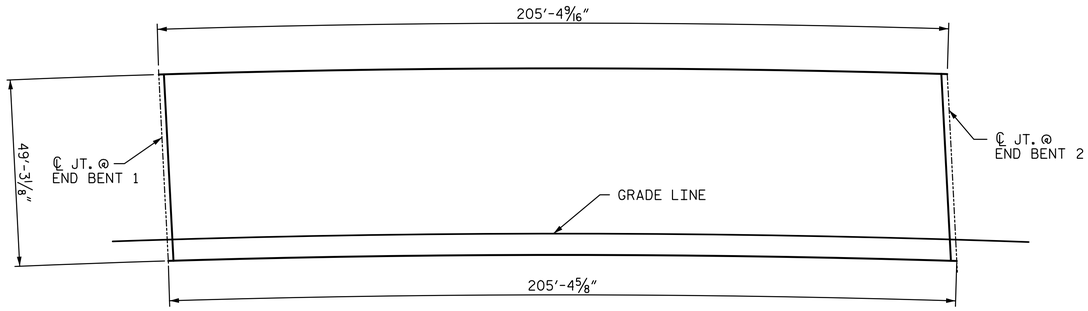
GROOVING BRIDGE FLOORS

APPROACH SLABS	2,066	SQ.FT.
BRIDGE DECK	8,784	SQ.FT.
TOTAL	10,850	SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	143.0	32,749	32,515
POUR 2	202.4		
POUR 3	10.0		
POUR 4	8.9		
TOTALS**	364.3		

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



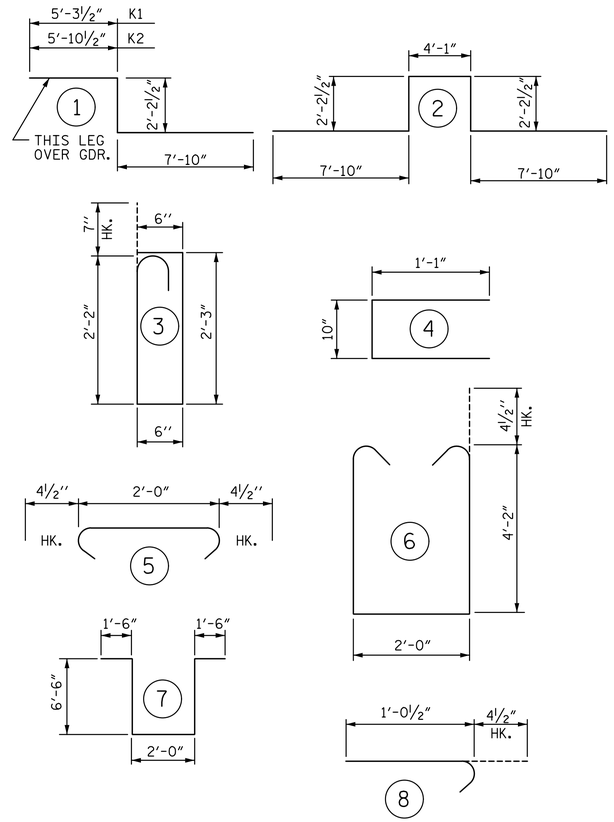
LAYOUT FOR COMPUTING AREA
REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 10,110)

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	347	#5	STR	48′-11″	17,704
A2	347	#5	STR	48′-11″	17,704
✳ A100	2	#5	STR	8′-8″	18
✳ A101	2	#5	STR	20′-2″	42
✳ A102	2	#5	STR	31′-7″	66
✳ A103	2	#5	STR	43′-0″	90
A200	2	#5	STR	8′-8″	18
A201	2	#5	STR	20′-2″	42
A202	2	#5	STR	31′-7″	66
A203	2	#5	STR	43′-0″	90
✳ B1	66	#5	STR	37′-6″	2,581
✳ B2	33	#7	STR	60′-0″	4,047
✳ B3	32	#7	STR	40′-0″	2,616
✳ B4	32	#7	STR	30′-0″	1,962
B5	98	#5	STR	44′-8″	4,566
B6	49	#7	STR	30′-0″	3,005
✳ B7	66	#5	STR	40′-0″	2,754
B8	98	#5	STR	47′-2″	4,821
✳ G1	2	#5	STR	48′-11″	102
✳ J1	92	#4	8	1′-5″	87
✳ K1	4	#8	1	15′-4″	164
✳ K2	4	#8	1	15′-11″	170
K3	12	#8	2	24′-2″	774
K4	16	#6	STR	6′-5″	154
K5	40	#4	STR	9′-5″	252
K6	8	#4	STR	6′-8″	36
K7	12	#4	STR	21′-8″	174
✳ S1	56	#4	4	3′-0″	112
S2	56	#5	3	6′-0″	350
S3	164	#4	5	2′-9″	301
S4	8	#4	6	11′-1″	59
U1	28	#4	7	18′-0″	337

REINFORCING STEEL	32,749 LBS.
✳ EPOXY COATED REINFORCING STEEL	32,515 LBS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

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7/14/2017

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SUPERSTRUCTURE

BILL OF MATERIAL

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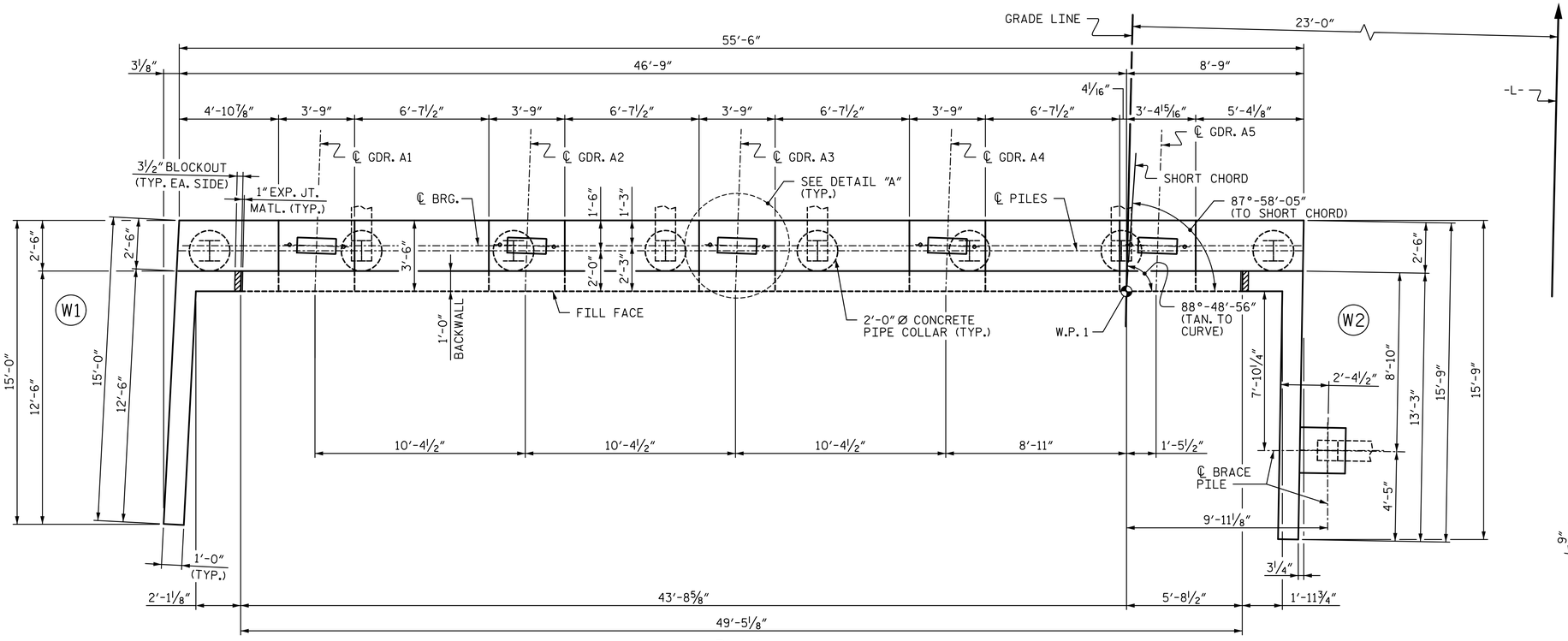
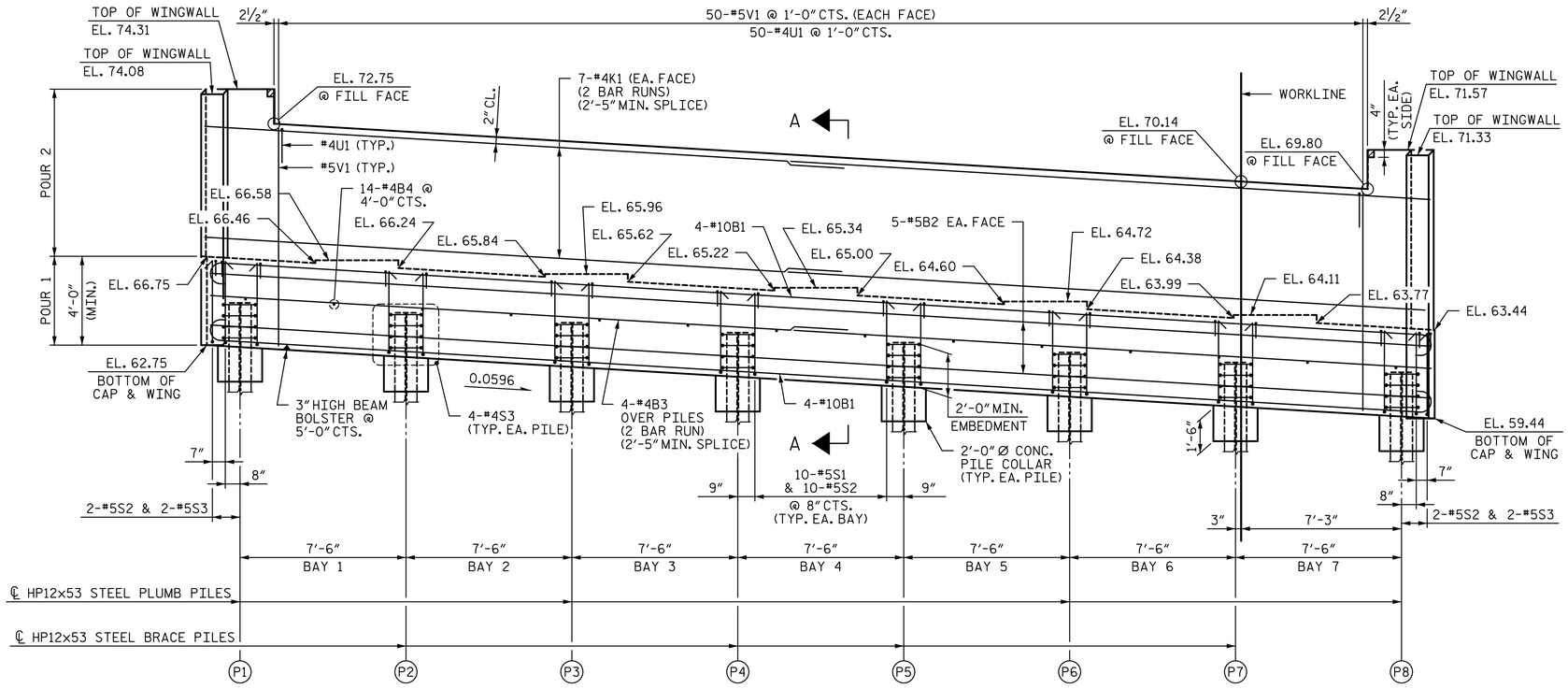


PLAN



ELEVATION

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

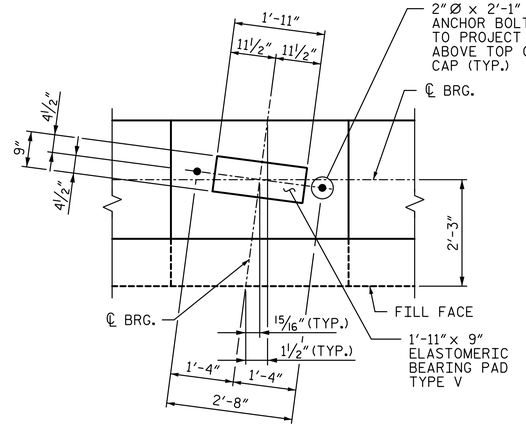
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

INSTALL THE 4"Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORADANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



DETAIL A

(DIMENSIONS ARE TYPICAL FOR EACH GIRDER)

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	64.68
P2	64.23
P3	63.78
P4	63.33
P5	62.88
P6	62.43
P7	61.98
P8	61.53

PROJECT NO. U-4751

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SHEET 1 OF 3

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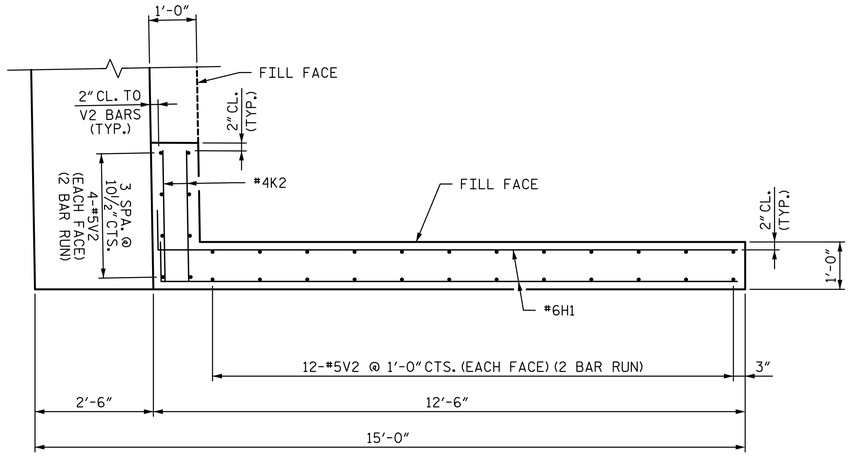
SUBSTRUCTURE

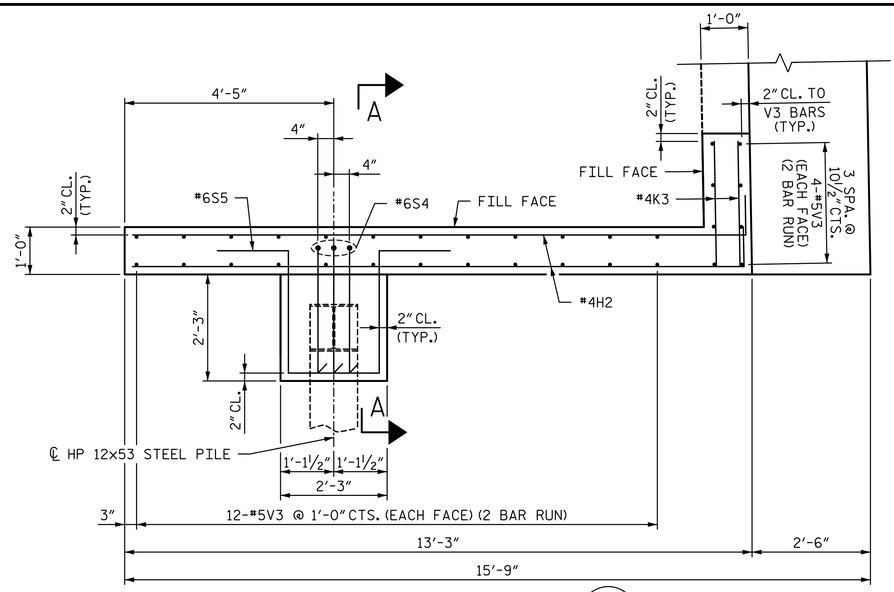
END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-25
1			3			TOTAL SHEETS
2			4			36

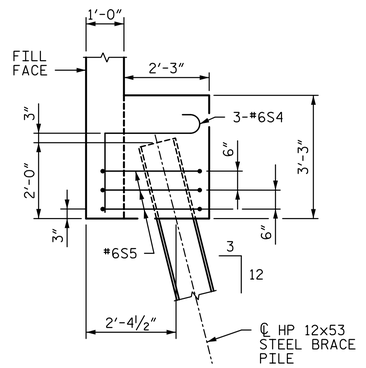
DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : VMW	DATE : 5-17		



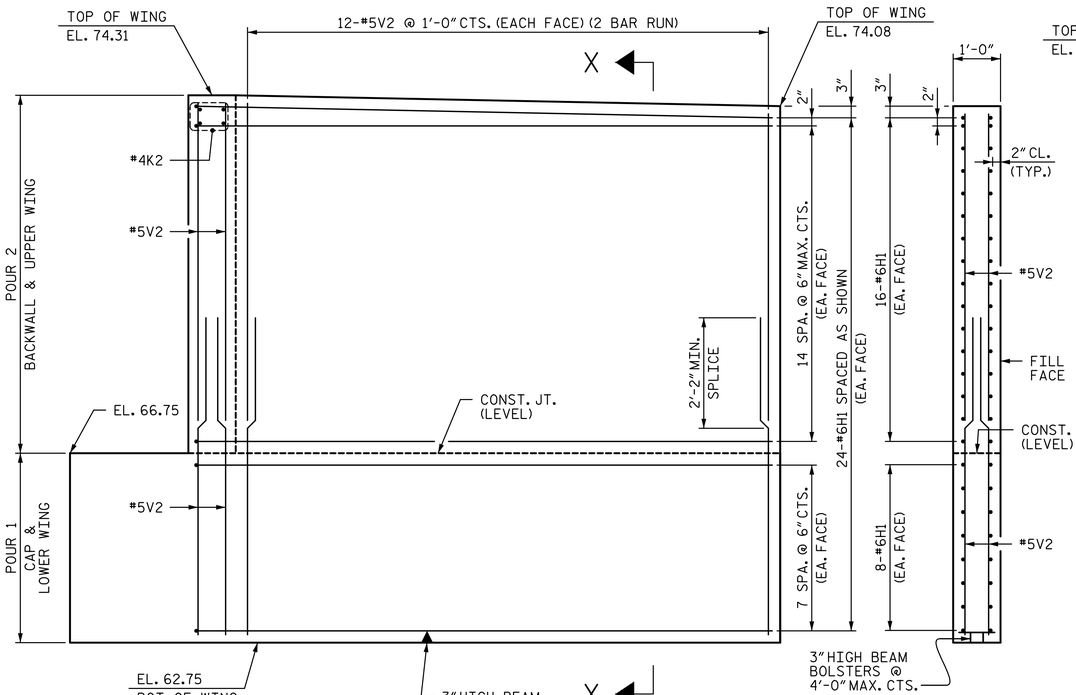
PLAN OF WING W1



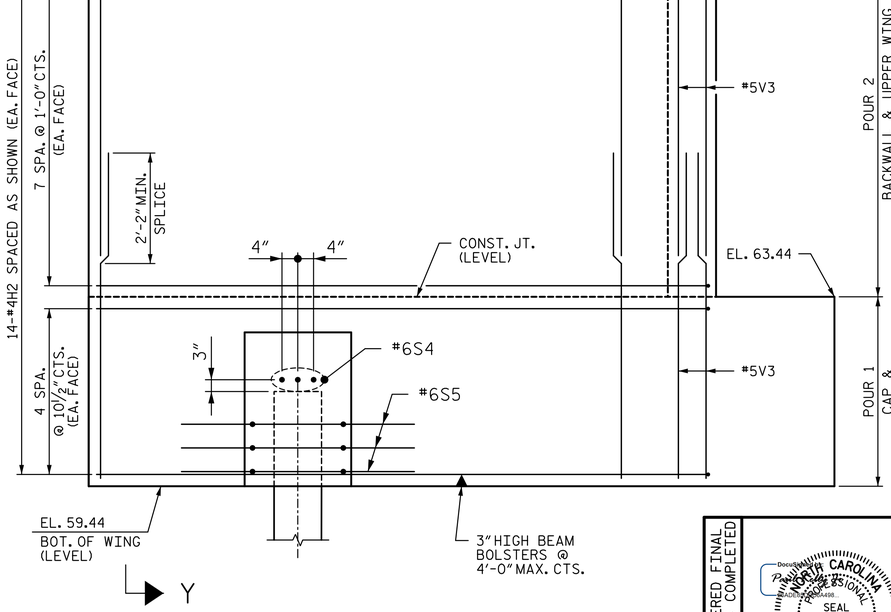
PLAN OF WING W2



SECTION A-A

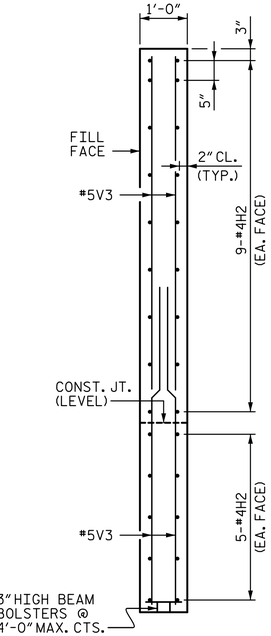


SECTION X-X



ELEVATION OF WING W1

ELEVATION OF WING W2



SECTION Y-Y

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : VMW DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Professional Engineer NORTH CAROLINA SEAL 19765 ENGINEER PAUL E. KELLY JR.

7/14/2017

STV 100 Years

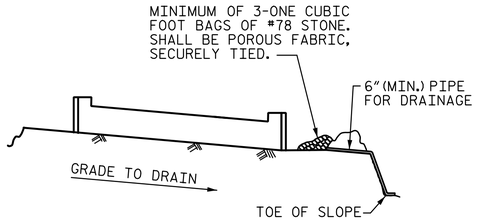
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-26
1			3			TOTAL SHEETS
2			4			36



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

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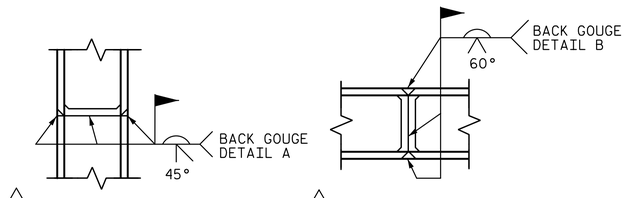
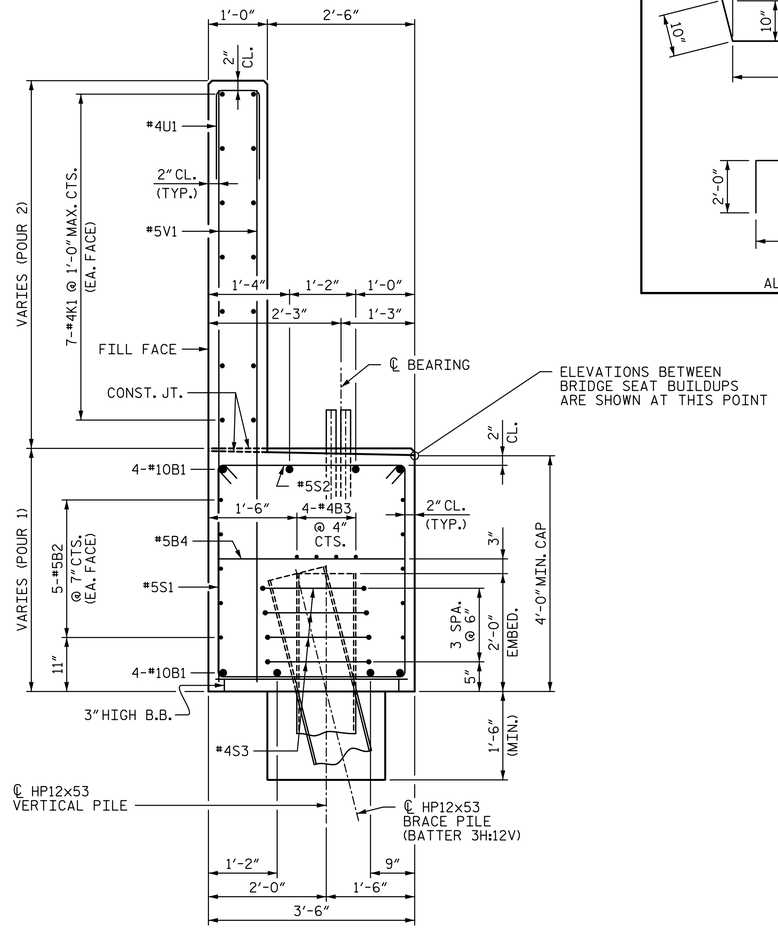
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



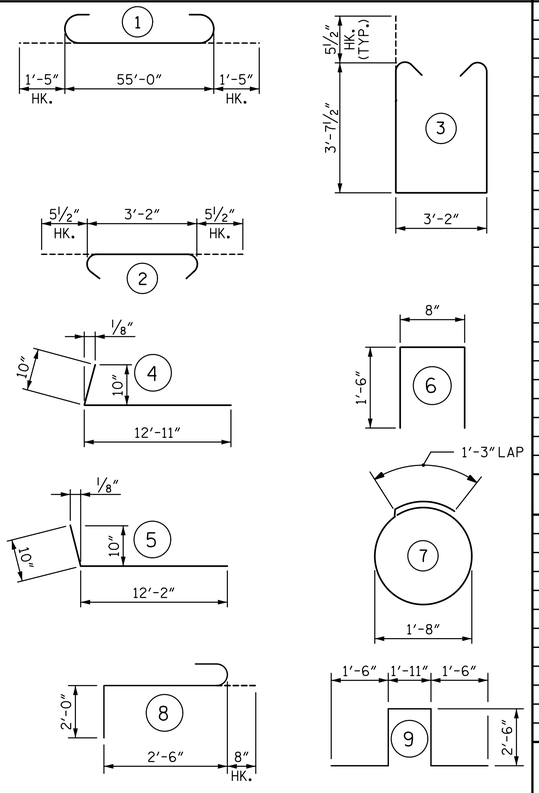
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	1	57'-10"	1,991
B2	10	#5	STR	55'-2"	575
B3	8	#4	STR	28'-10"	154
B4	14	#4	STR	3'-2"	30
H1	48	#6	5	13'-0"	937
H2	28	#4	4	13'-9"	257
K1	28	#4	STR	28'-10"	539
K2	4	#4	STR	2'-9"	7
K3	4	#4	STR	2'-7"	7
S1	74	#5	3	11'-4"	875
S2	74	#5	2	4'-1"	315
S3	32	#4	7	6'-6"	139
S4	3	#6	8	5'-2"	23
S5	3	#6	9	9'-11"	45
U1	50	#4	6	3'-8"	122
V1	50	#5	STR	9'-9"	508
V2	64	#5	STR	6'-9"	451
V3	64	#5	STR	7'-0"	467

QUANTITIES

REINFORCING STEEL	LBS.	7,442
CLASS A CONCRETE:		
POUR 1:		
CAP , COLLARS, & LOWER WING	C.Y.	34.5
POUR 2:		
BACKWALL & UPPER WING	C.Y.	19.8
TOTAL	C.Y.	54.3
HP 12x53 STEEL PILES	NO.	9
	LIN. FEET	630
PILE SETUP FOR HP 12x53 PILES	EA.	9

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 3 OF 3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : VMW DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

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NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER PAUL E. KELLY, JR.

7/14/2017

STV 100 Years

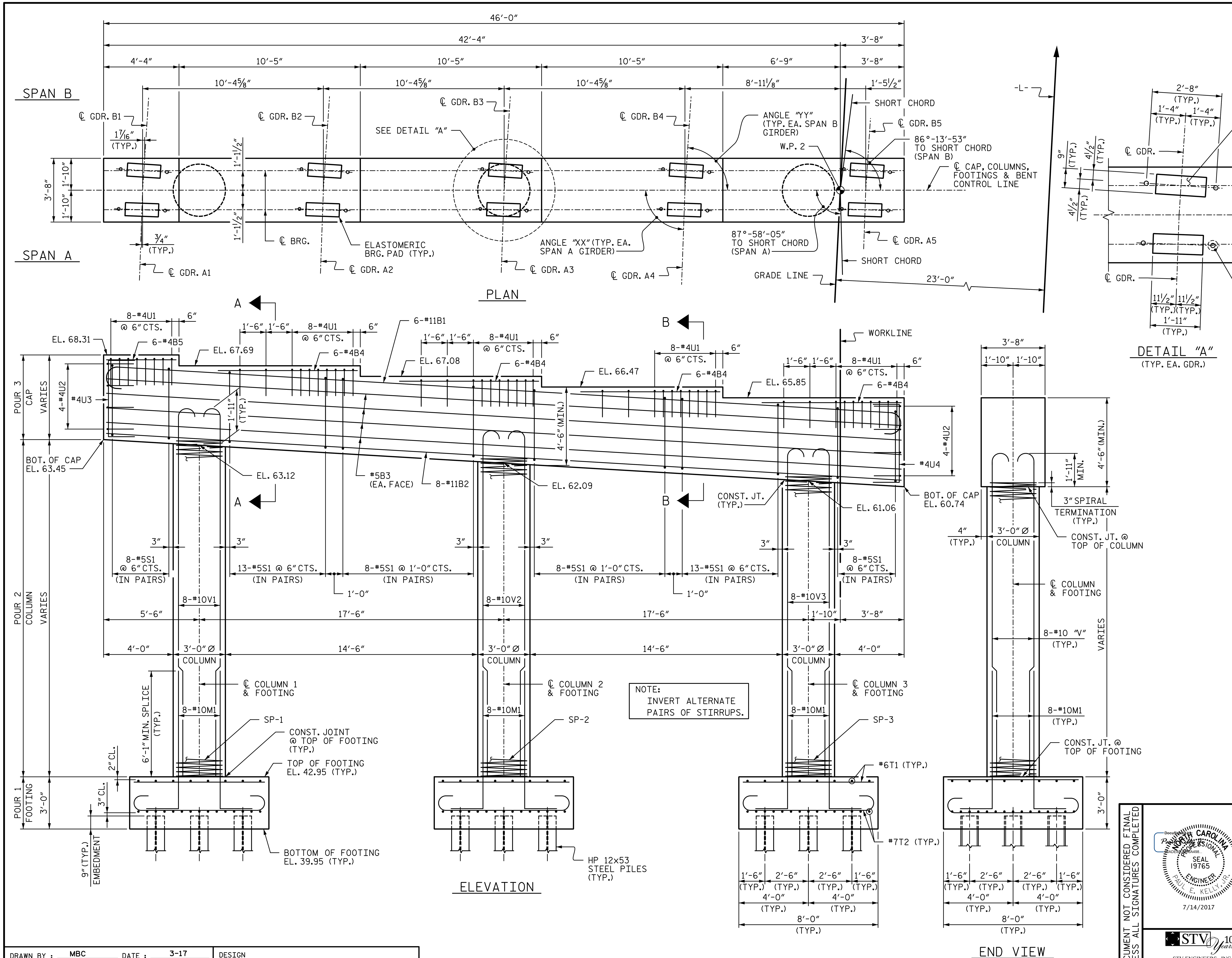
STV ENGINEERS, INC. 900 West Trade St., Suite 715 Charlotte, NC 28202 NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-27
1			3			TOTAL SHEETS
2			4			36



NOTES:

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

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

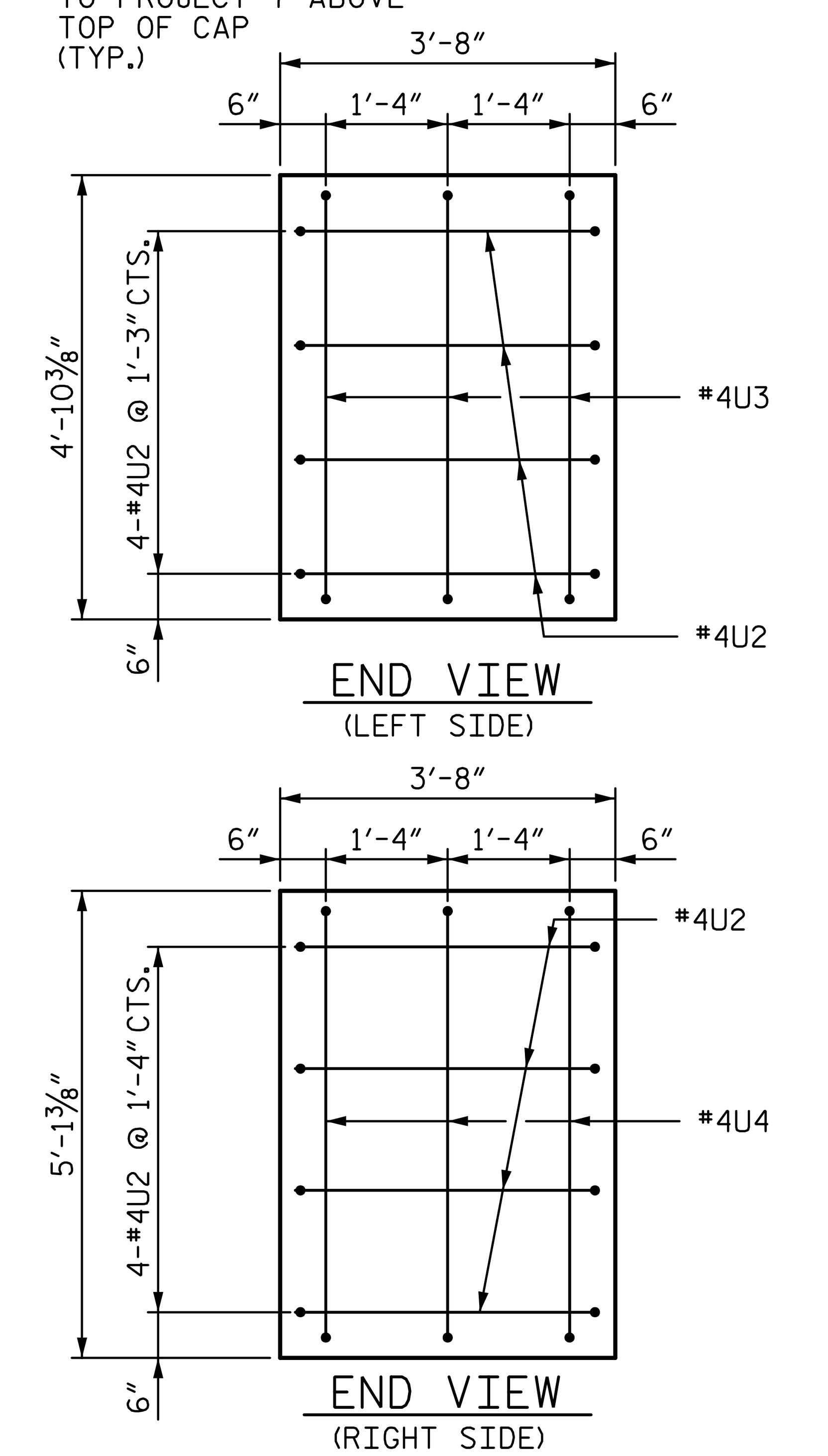
PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.

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

PLAN VIEW ANGLES

GDR.	ANGLE "XX"
A1	87°-59'-29"
A2	87°-59'-08"
A3	87°-58'-46"
A4	87°-58'-24"
A5	87°-58'-02"

GDR.	ANGLE "YY"
B1	86°-16'-30"
B2	86°-15'-50"
B3	86°-15'-09"
B4	86°-14'-28"
B5	86°-13'-47"



PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 1 OF 2

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S3-28
1			3			TOTAL SHEETS	36
2			4				

DRAWN BY: MBC DATE: 3-17
CHECKED BY: VMW DATE: 5-17
DESIGN ENGINEER OF RECORD: P. KELLY DATE: 5-17

\\USPADGVIfs02\vol3\Projects\40186I7\40186I7.000\50_Deliverables & Submittals\U-4751\Structures\Bridge 203\Ustation\Final\403_055_U4751_SMU_BL028_640203.dgn

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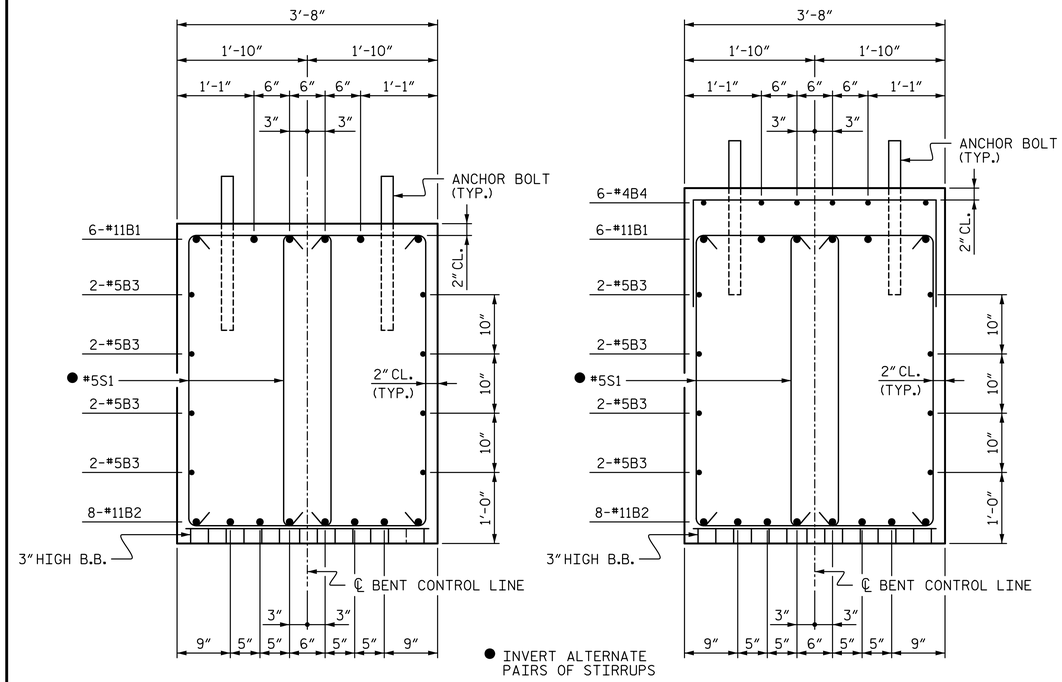
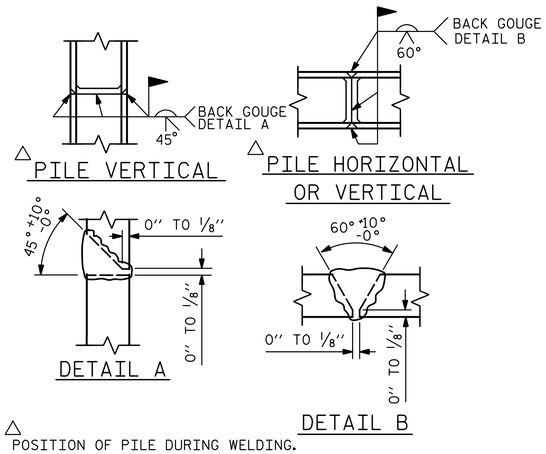


SECTION A-A

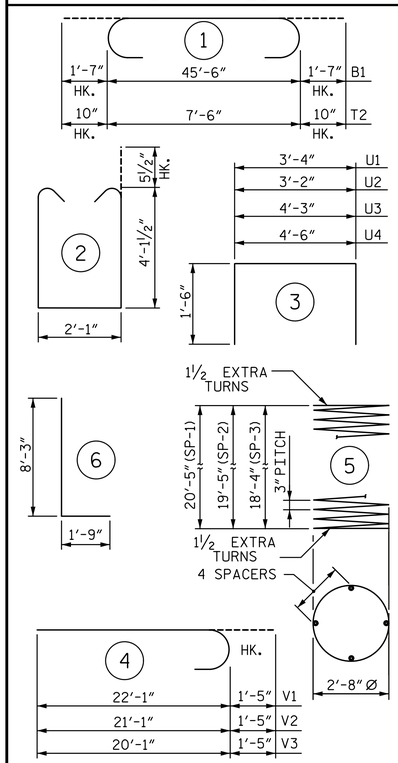
SECTION B-B



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

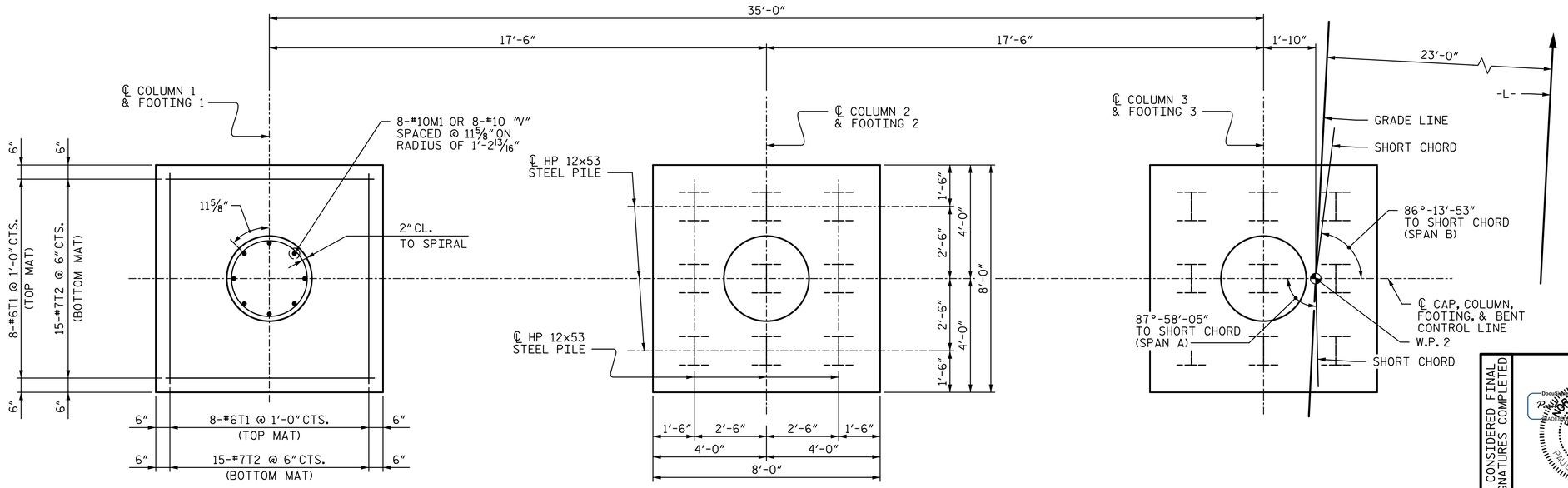
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#11	1	48′-8″	1,551
B2	8	#11	STR	45′-8″	1,941
B3	8	#5	STR	45′-8″	381
B4	24	#4	STR	8′-0″	128
B5	6	#4	STR	4′-0″	16
M1	24	#10	6	10′-0″	1,033
S1	116	#5	2	11′-3″	1,361
T1	48	#6	STR	7′-8″	553
T2	90	#7	1	9′-2″	1,686
U1	48	#4	3	6′-4″	203
U2	8	#4	3	6′-2″	33
U3	3	#4	3	7′-3″	15
U4	3	#4	3	7′-6″	15
V1	8	#10	4	23′-6″	809
V2	8	#10	4	22′-6″	775
V3	8	#10	4	21′-6″	740
SP-1	1	✻✻	5	698′-7″	467
SP-2	1	✻✻	5	665′-7″	445
SP-3	1	✻✻	5	629′-10″	421

QUANTITIES

REINFORCING STEEL	LBS.	11,240
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,333
CLASS A CONCRETE:		
POUR 1 - FOOTINGS	CU. YDS	21.3
POUR 2 - COLUMNS	CU. YDS	15.1
POUR 3 - CAP	CU. YDS	30.2
TOTAL	CU. YDS	66.6
HP 12x53 STEEL PILES	EA.	27
	FT.	1,350
PILE DRIVING EQUIP. SETP FOR HP 12x53 STEEL PILES	EA.	27
FOUNDATION EXCAVATION		LUMP SUM

✻✻ THE SP-1, SP-2, SP-3 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



PLAN OF FOOTINGS

(ALL FOOTINGS, COLUMN DIMENSIONS AND REINFORCING STEEL ARE TYPICAL)
(PILE ARRANGMENT FOR FOOTINGS ARE THE SAME)

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

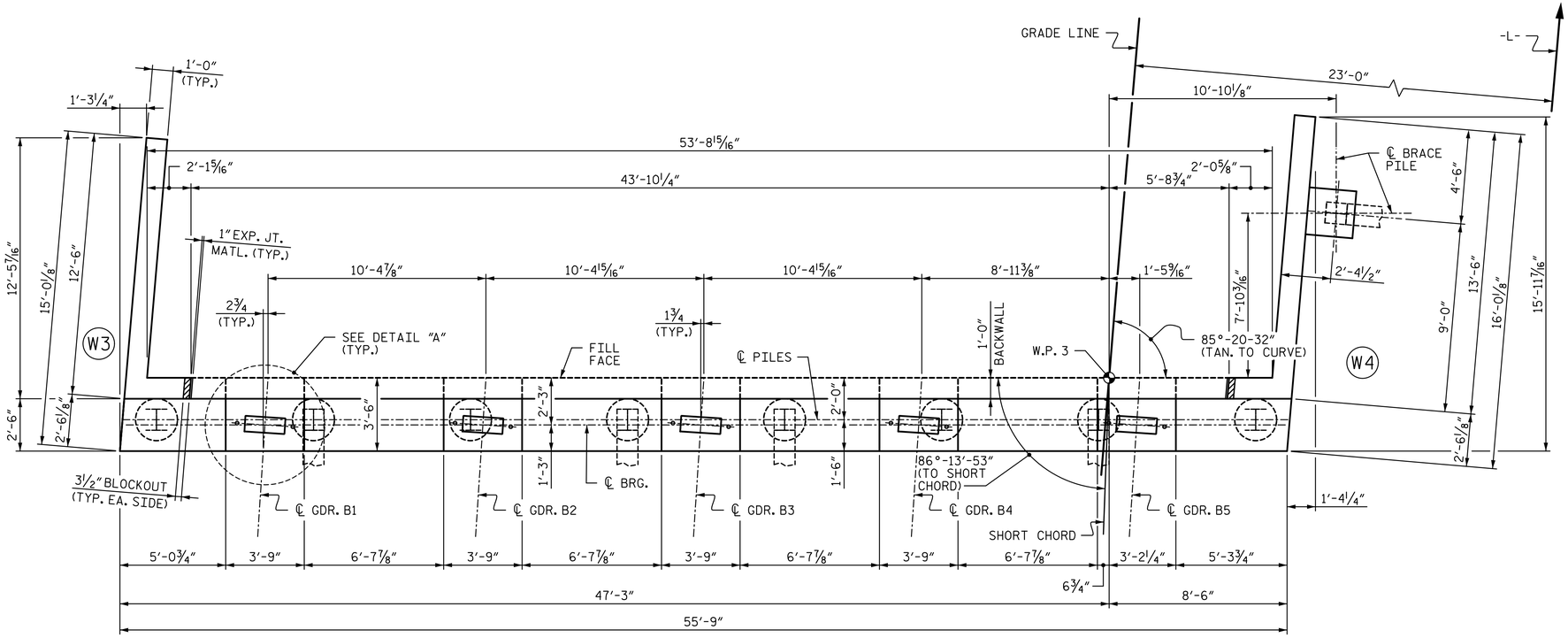
SUBSTRUCTURE

BENT 1

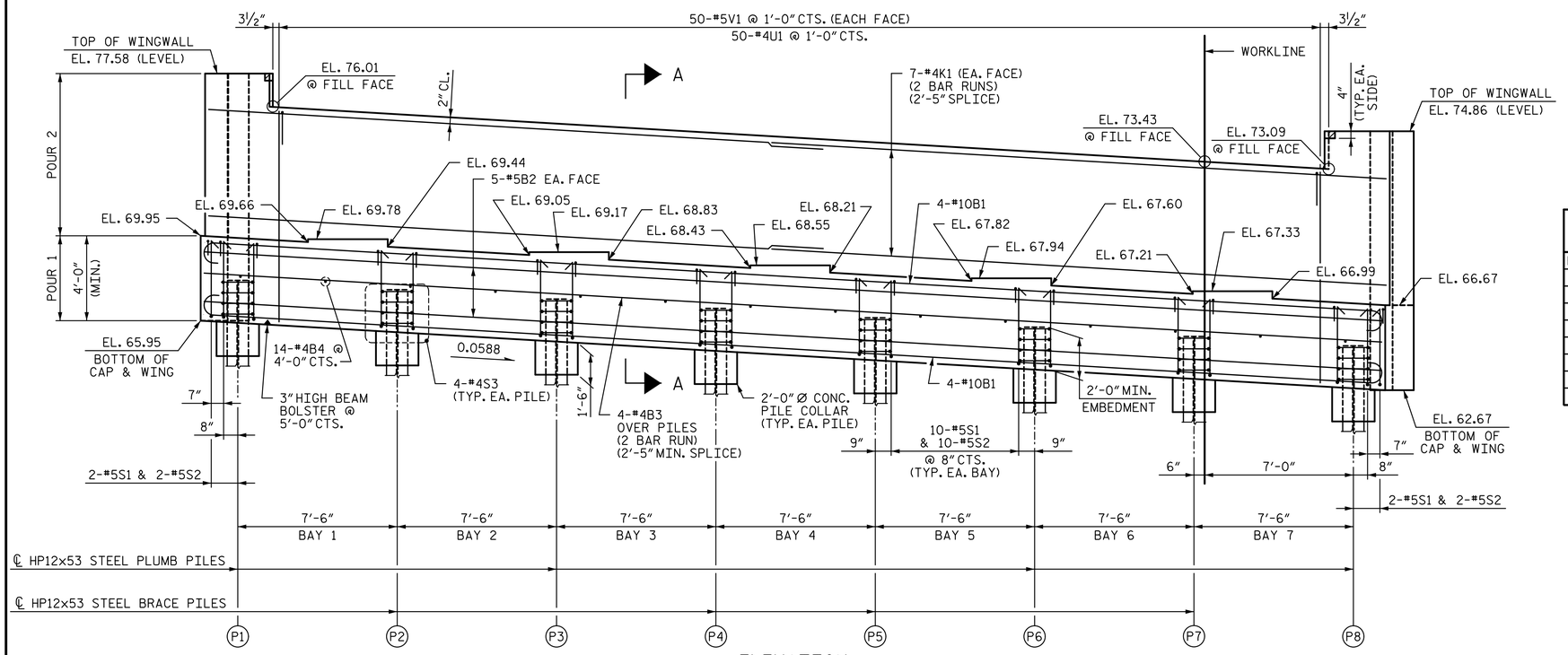
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-29
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 4-17
CHECKED BY : VMW DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17



PLAN



ELEVATION

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

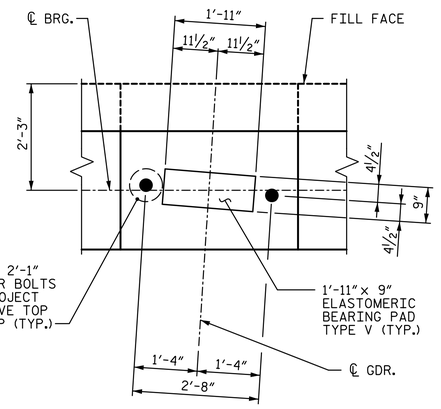
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

INSTALL THE 4" Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



DETAIL A
(DIMENSIONS ARE TYPICAL FOR EACH GIRDER)

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	67.84
P2	67.40
P3	66.96
P4	66.52
P5	66.08
P6	65.64
P7	65.20
P8	64.76

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 1 OF 3

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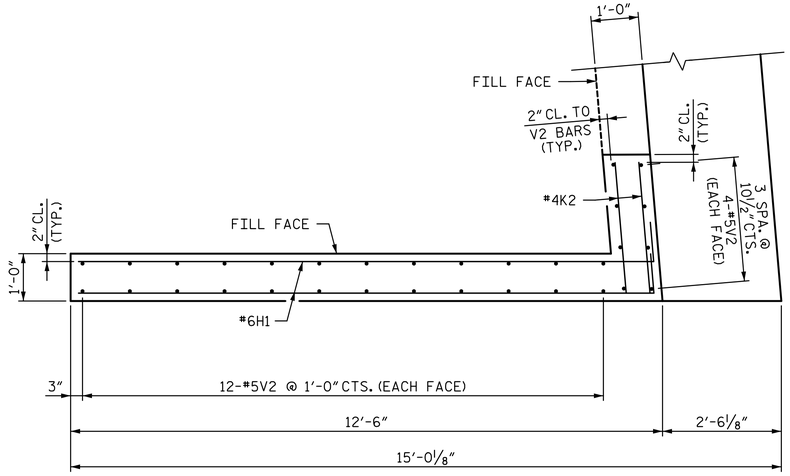
SUBSTRUCTURE

END BENT 2

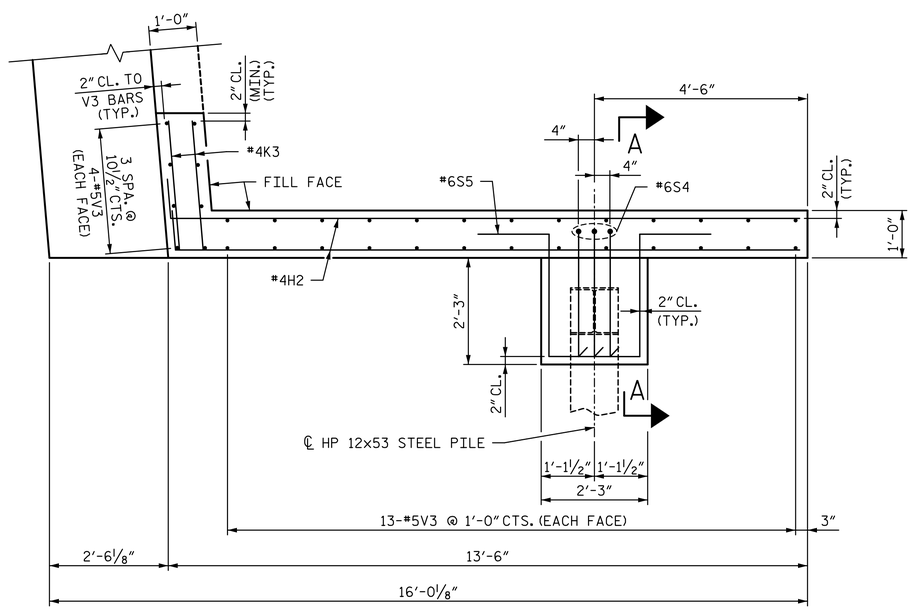
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S3-30
TOTAL SHEETS 36

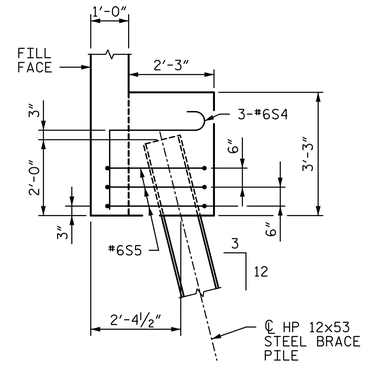
DRAWN BY : MBC DATE : 4-17
CHECKED BY : VMW DATE : 5-17
DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17



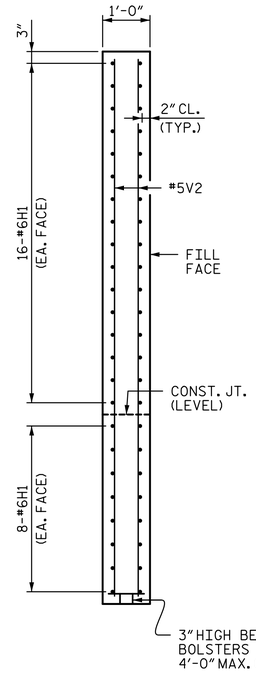
PLAN OF WING W3



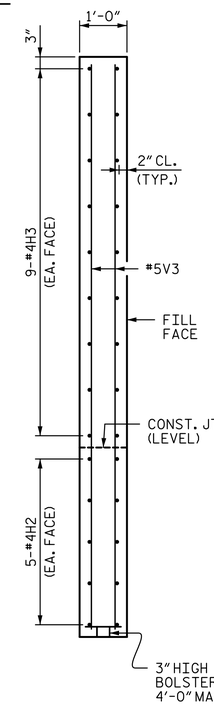
PLAN OF WING W4



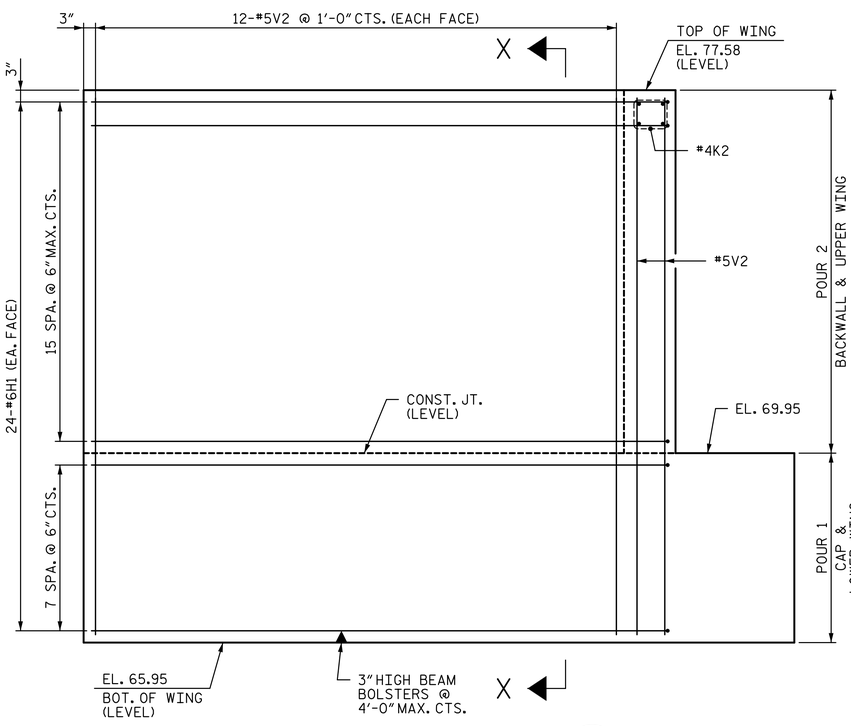
SECTION A-A



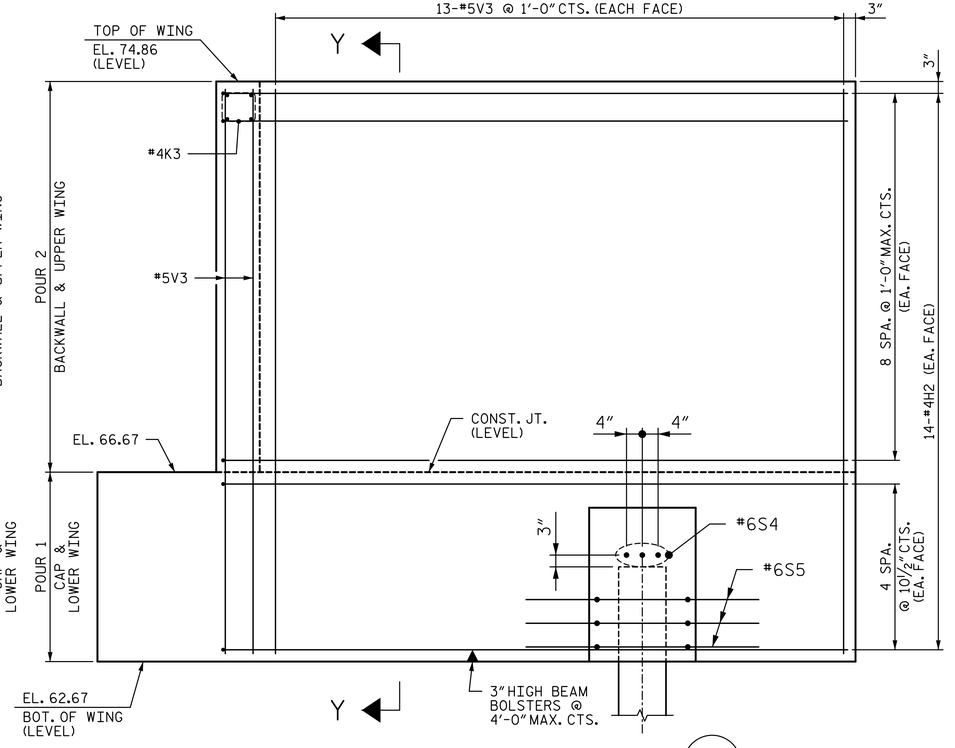
SECTION X-X



SECTION Y-Y



ELEVATION OF WING W3



ELEVATION OF WING W4

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : VMW	DATE : 5-17		

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 2 OF 3

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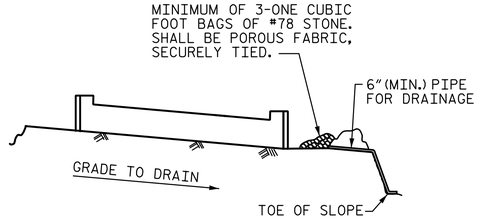
SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-31
1			3			TOTAL SHEETS
2			4			36



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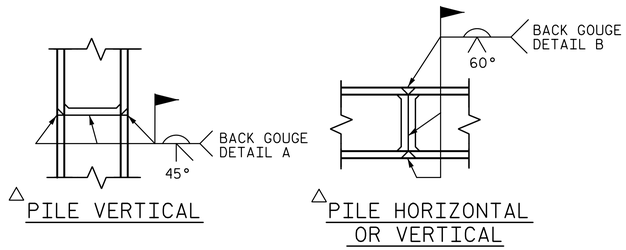
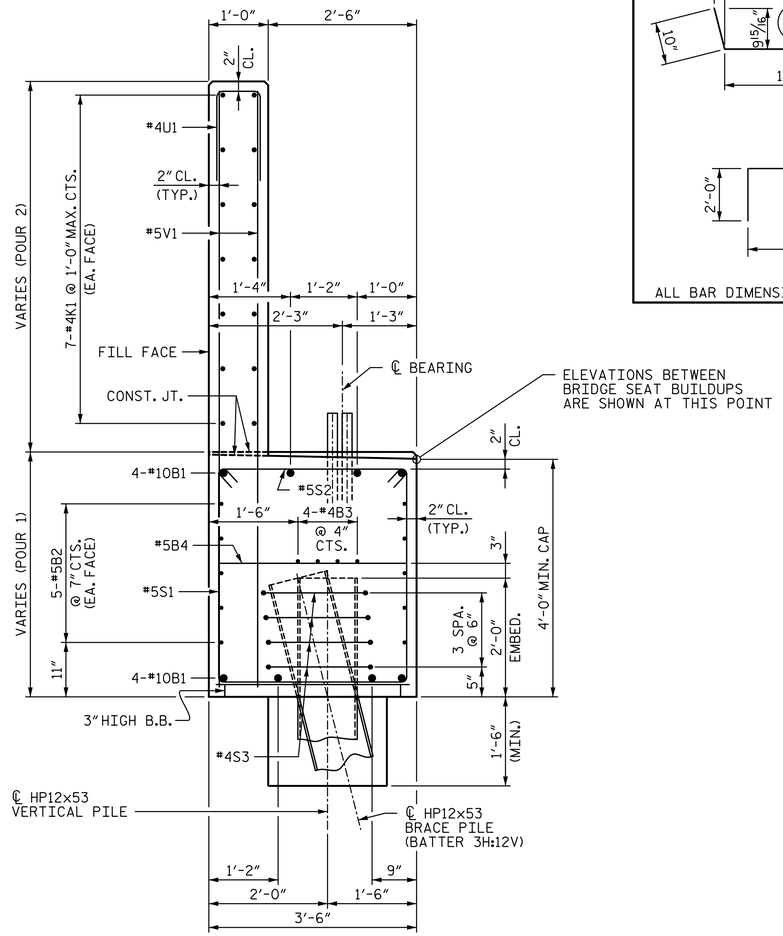


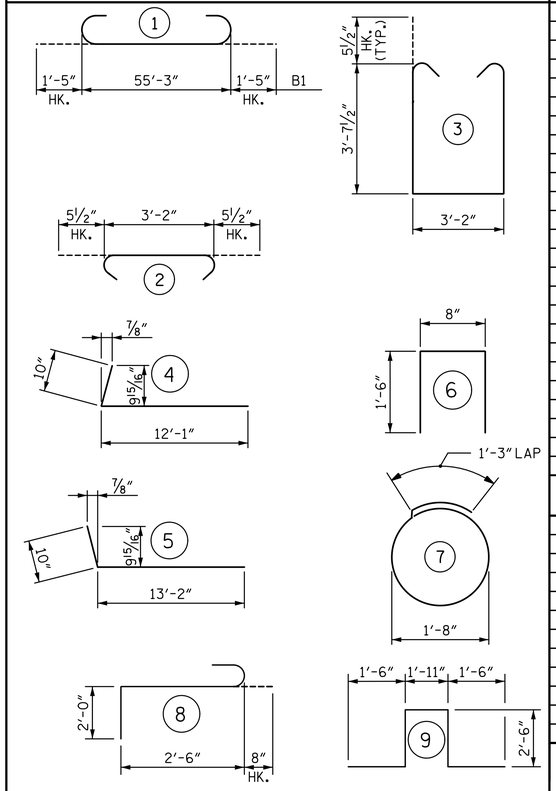
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	1	58'-1"	1,999
B2	10	#5	STR	55'-5"	578
B3	8	#4	STR	28'-11"	155
B4	14	#4	STR	3'-2"	30
H1	48	#6	4	12'-11"	931
H2	28	#4	5	14-0"	262
K1	28	#4	STR	28'-11"	541
K2	4	#4	STR	2'-9"	7
K3	4	#4	STR	2'-8"	7
S1	74	#5	3	11'-4"	875
S2	74	#5	2	4'-1"	315
S3	32	#4	7	6'-6"	139
S4	3	#6	8	5'-2	23
S5	3	#6	9	9'-11"	45
U1	50	#4	6	3'-8"	122
V1	50	#5	STR	9'-10"	513
V2	32	#5	STR	11'-3"	375
V3	34	#5	STR	11'-10"	420

QUANTITIES

REINFORCING STEEL	LBS.	7,337
CLASS A CONCRETE:		
POUR 1:		
CAP, COLLARS, & LOWER WING	C.Y.	34.7
POUR 2:		
BACKWALL & UPPER WING	C.Y.	20.3
TOTAL	C.Y.	55.0
HP 12x53 STEEL PILES	NO.	9
	LIN. FEET	675
PILE SETUP FOR HP 12x53 PILES	EA.	9

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 225+92.26 -L-

SHEET 3 OF 3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : VMW DATE : 5-17

DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 19765 ENGINEER PAUL E. KELLY JR.

7/14/2017

STV 100 Years

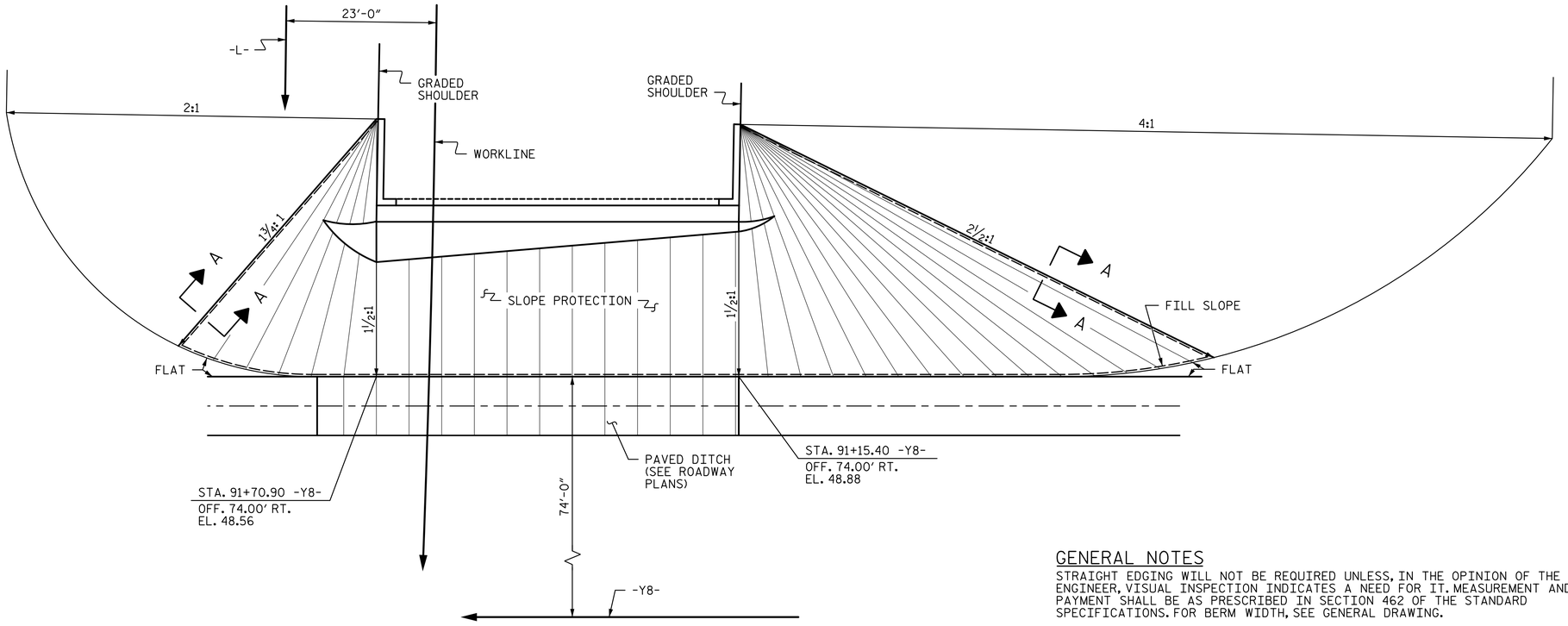
STV ENGINEERS, INC
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-32
1			3			TOTAL SHEETS
2			4			36



PLAN AT END BENT 1

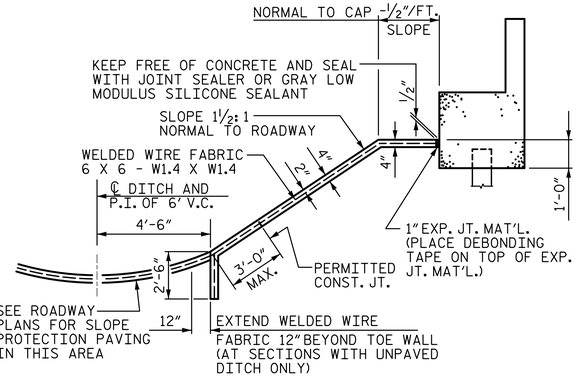
GENERAL NOTES

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

SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE ''POURING DETAIL'' WITH 2'-0''LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6'' MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE ''OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6''. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

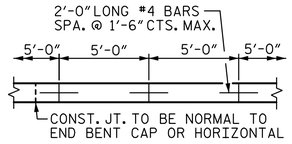
BRIDGE @ STA. 225+92.26 -L-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	445	890

✳ QUANTITY SHOWN IS BASED ON 5' POURS.



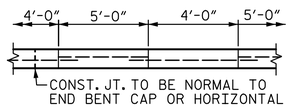
SECTION AT END BENT 1
ALONG ℄ SURVEY -L-

SECTION WITH PAVED DITCH SHOWN,
SECTION WITH UNPAVED DITCH SIMILAR



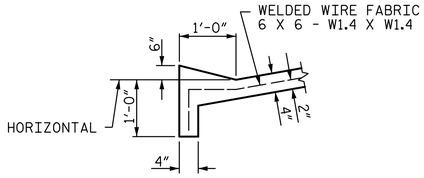
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL



SECTION A-A

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 1 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 ENGINEER PAUL F. KELLY JR.
7/14/2017

STV 100 Years
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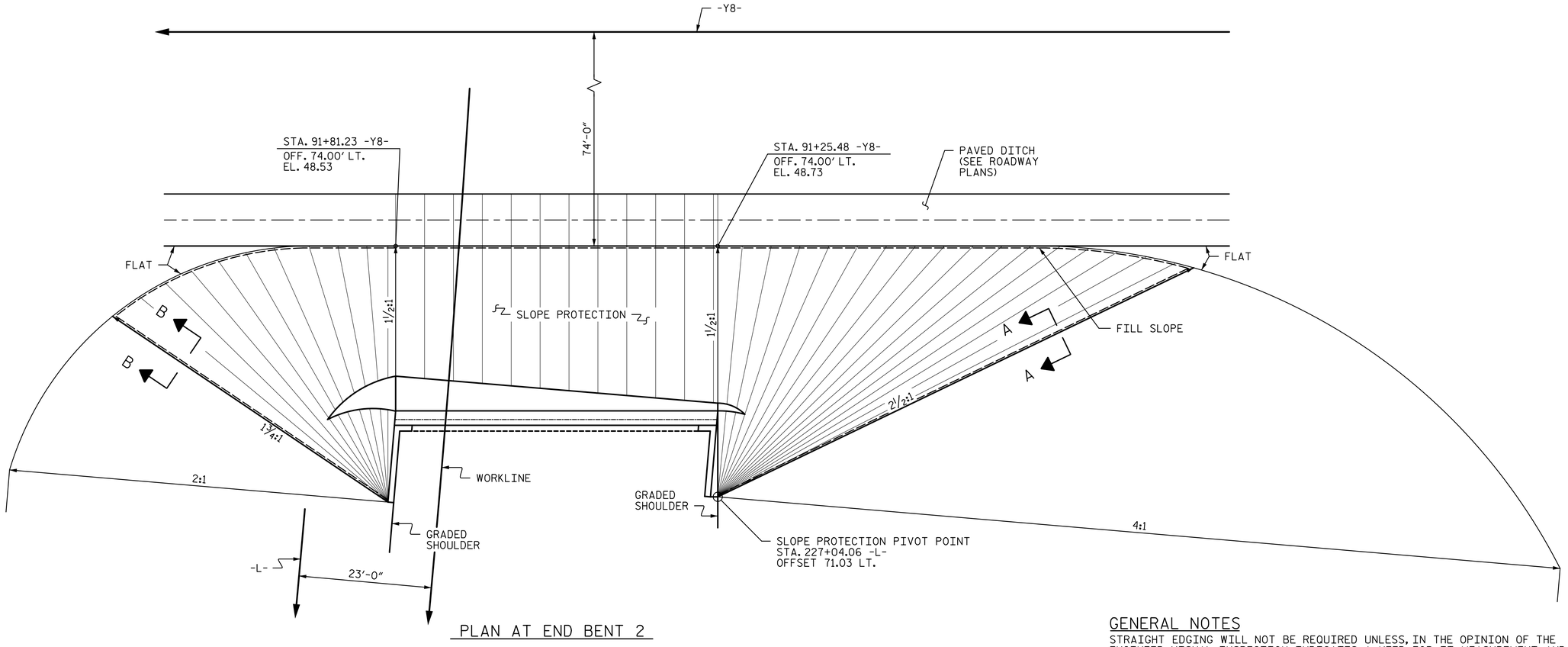
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-33
1			3			TOTAL SHEETS
2			4			36

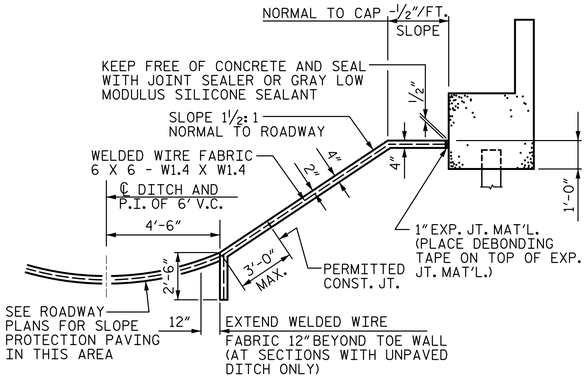
DRAWN BY : MBC DATE : 4-17
CHECKED BY : TRL DATE : 5-17
DESIGN ENGINEER OF RECORD: P. KELLY DATE : 5-17



PLAN AT END BENT 2

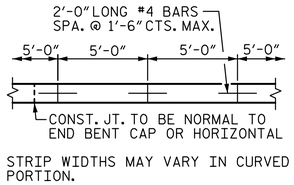
BRIDGE @ STA. 225+92.26 -L-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 2	1,020	2,020

✳ QUANTITY SHOWN IS BASED ON 5' POURS.



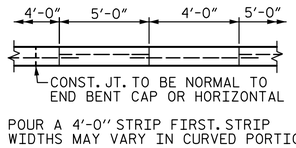
SECTION AT END BENT 2 ALONG ℄ SURVEY -L-

SECTION WITH PAVED DITCH SHOWN,
SECTION WITH UNPAVED DITCH SIMILAR



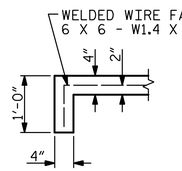
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

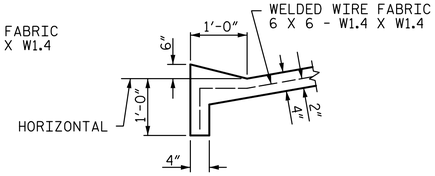


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION A-A



SECTION B-B

GENERAL NOTES

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

SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 2 OF 2

DRAWN BY : MBC DATE : 4-17
CHECKED BY : TRL DATE : 5-17
DESIGN ENGINEER OF RECORD: P. KELLY DATE : 10-16

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY JR.
7/14/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-34
1			3			TOTAL SHEETS
2			4			36

\\USPADGVIFS02\vol3\Projects\40186\17\40186\17_000\50_Deliverables & Submittals\U-4751\Structures\Bridge 203\Ustation\Final\403_069_U4751_SMU_AS_035_640203.dgn
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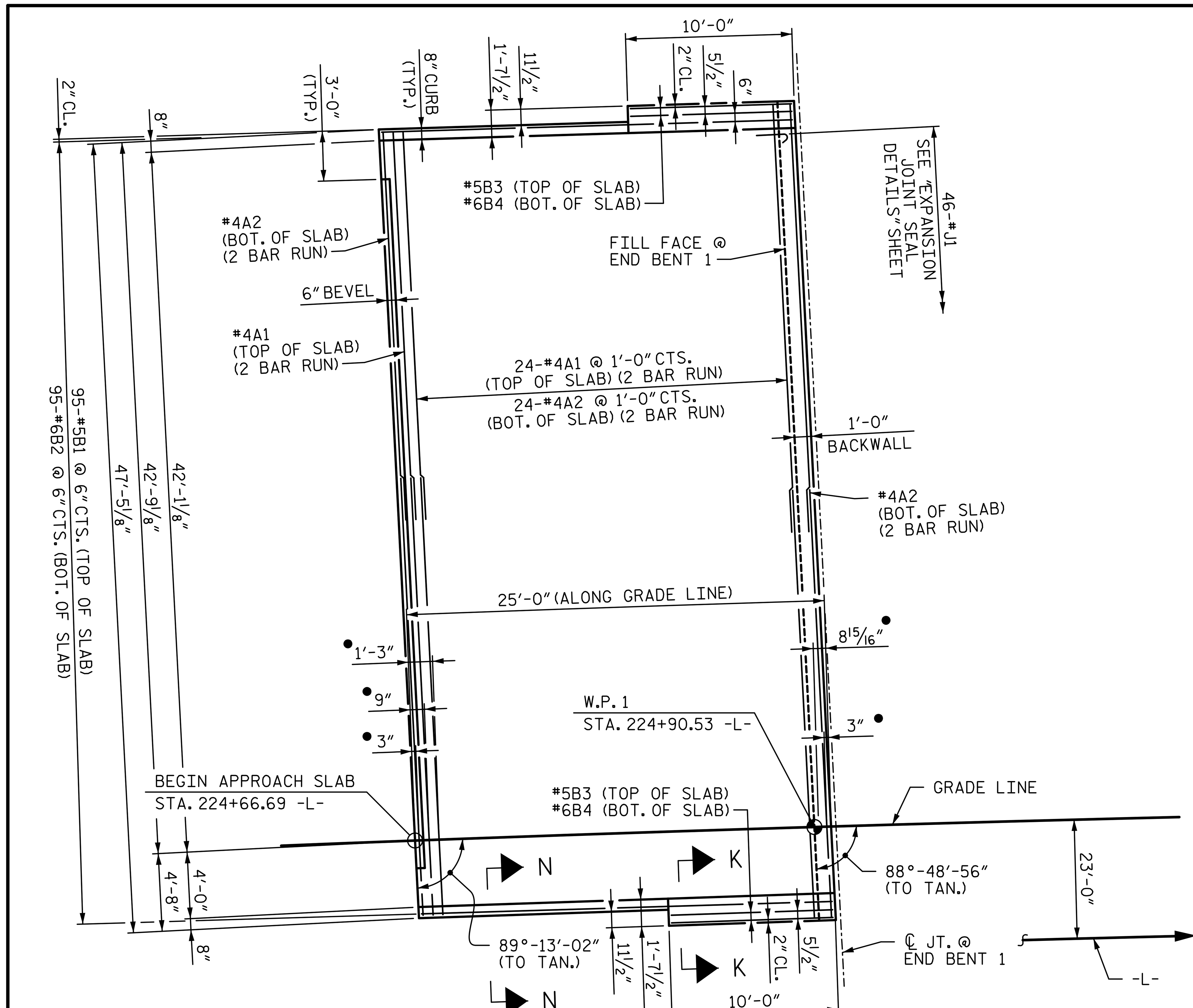
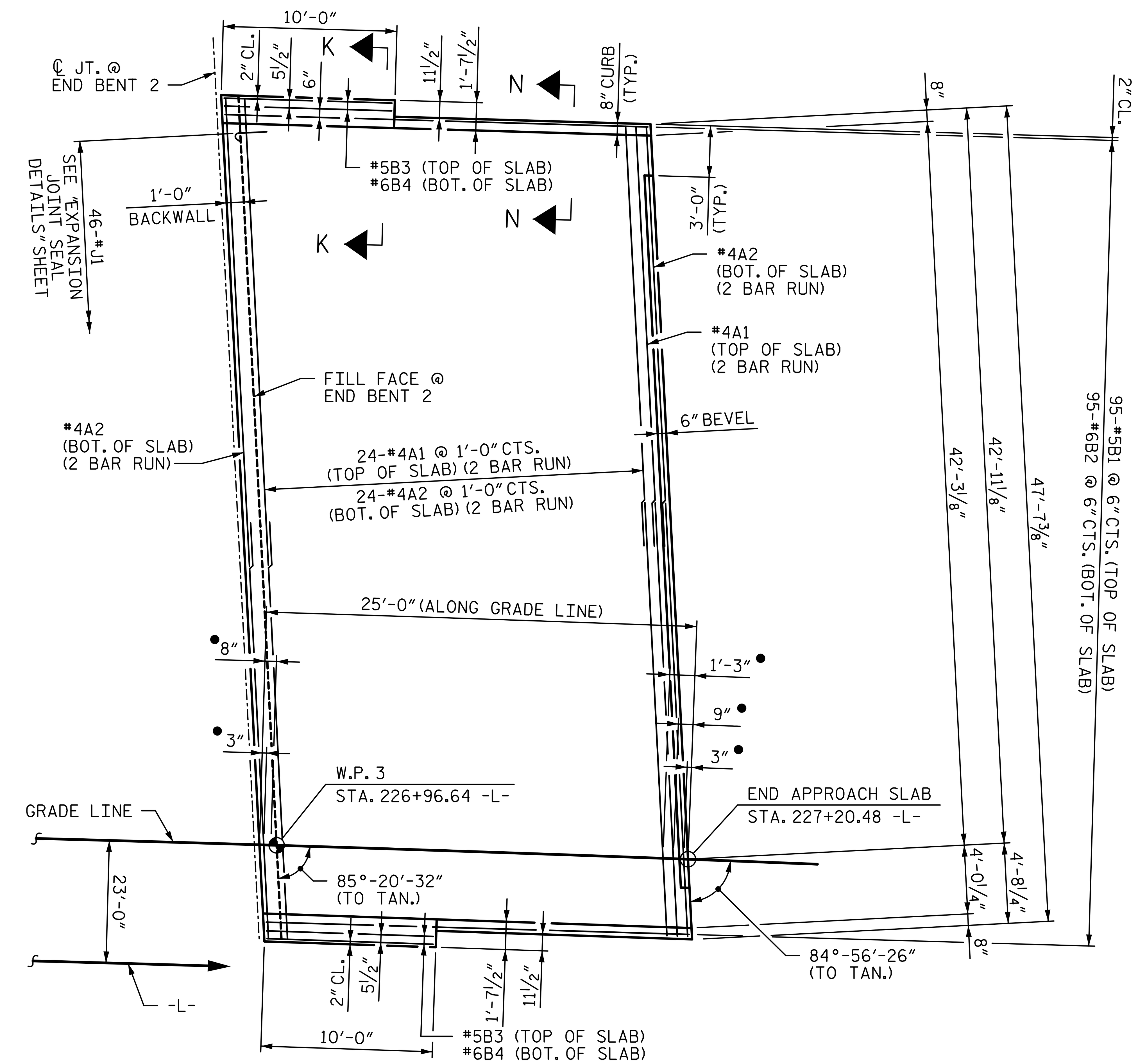


† NORMAL TO END BENT
● DISTANCE MEASURED ALONG GRADE LINE

PLAN AT END BENT 1



PLAN AT END BENT 2

BILL OF MATERIAL

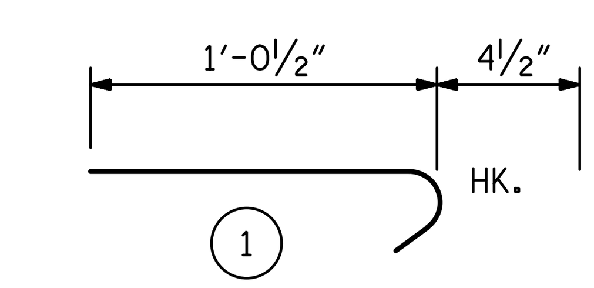
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	50	#4	STR	25'-7"	854
A2	52	#4	STR	25'-5"	883
✱B1	95	#5	STR	23'-9"	2,353
B2	95	#6	STR	24'-7"	3,508
✱B3	4	#5	STR	9'-8"	40
B4	4	#6	STR	9'-8"	58
✱J1	46	#4	1	1'-5"	44
REINFORCING STEEL ✱✱				LBS.	4,449
✱EPOXY COATED REINFORCING STEEL ✱✱				LBS.	3,291
CLASS AA CONCRETE ✱✱				C.Y.	52.4

APPROACH SLAB AT EB 2

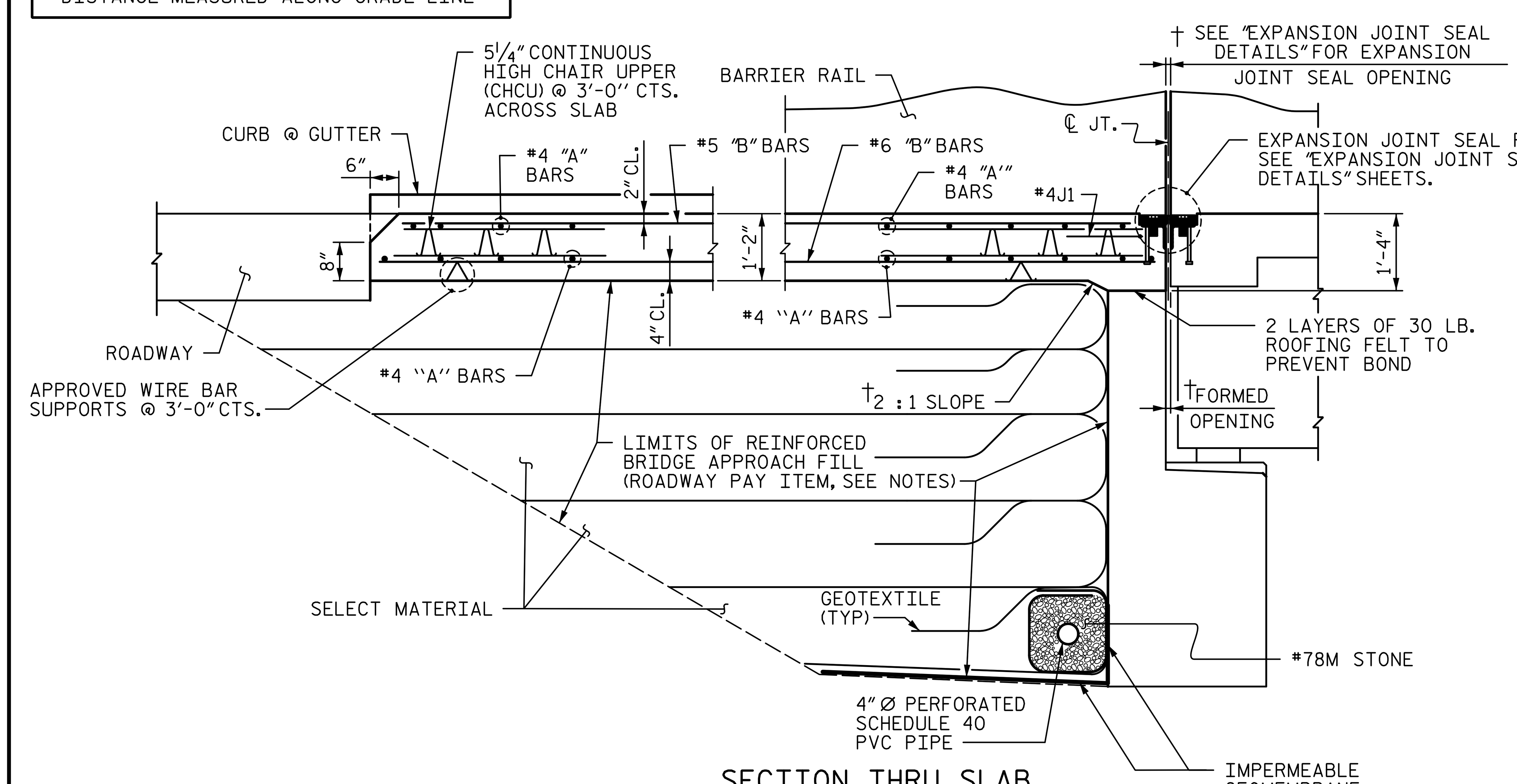
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱A1	50	#4	STR	25'-7"	854
A2	52	#4	STR	25'-5"	883
✱B1	95	#5	STR	23'-9"	2,353
B2	95	#6	STR	24'-7"	3,508
✱B3	4	#5	STR	9'-8"	40
B4	4	#6	STR	9'-8"	58
✱J1	46	#4	1	1'-5"	44
REINFORCING STEEL ✱✱				LBS.	4,449
✱EPOXY COATED REINFORCING STEEL ✱✱				LBS.	3,291
CLASS AA CONCRETE ✱✱				C.Y.	52.4

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

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



SECTION THRU SLAB

NOTES:

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

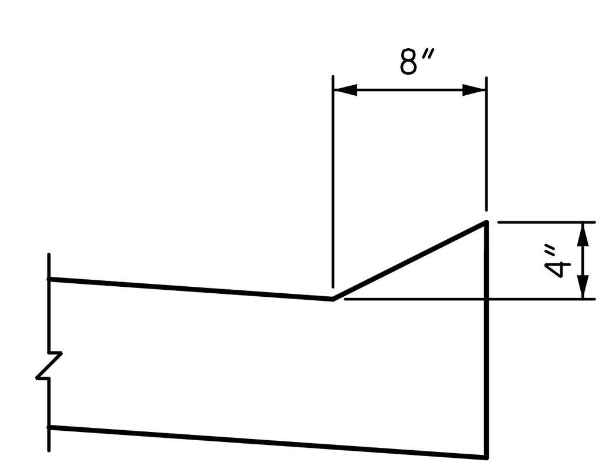
FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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.

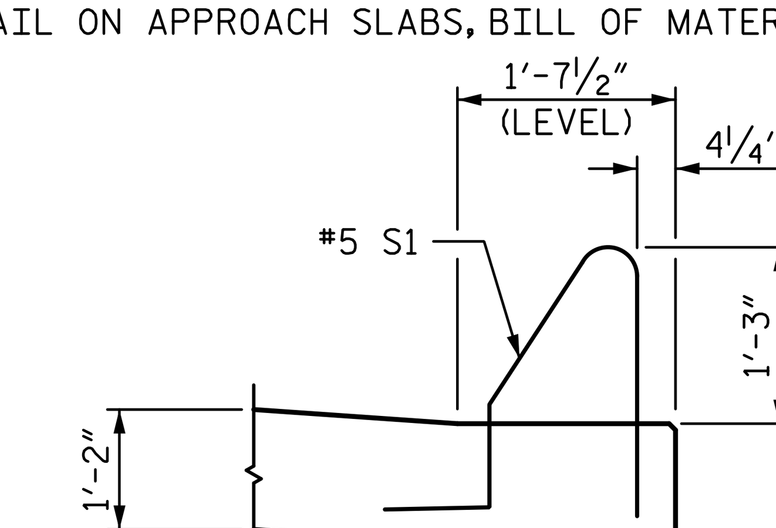
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR CONCRETE BARRIER RAIL ON APPROACH SLABS, BILL OF MATERIAL AND ADDITIONAL DETAILS, SEE SHEET 2 OF 2.

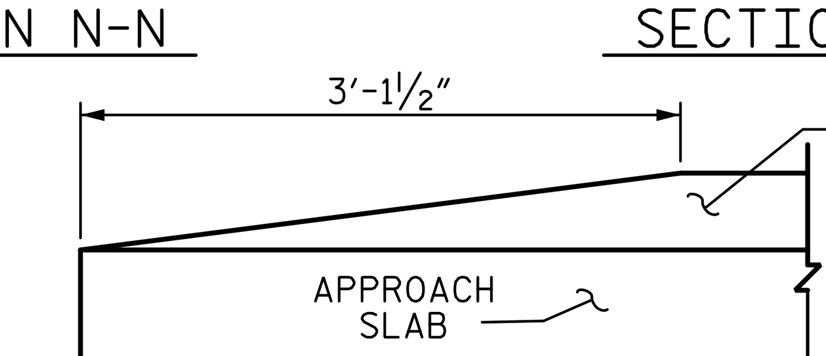
THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.



SECTION N-N



SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

SPLICE LENGTHS

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

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 1 OF 2

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7/14/2017

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NC License Number F-0991

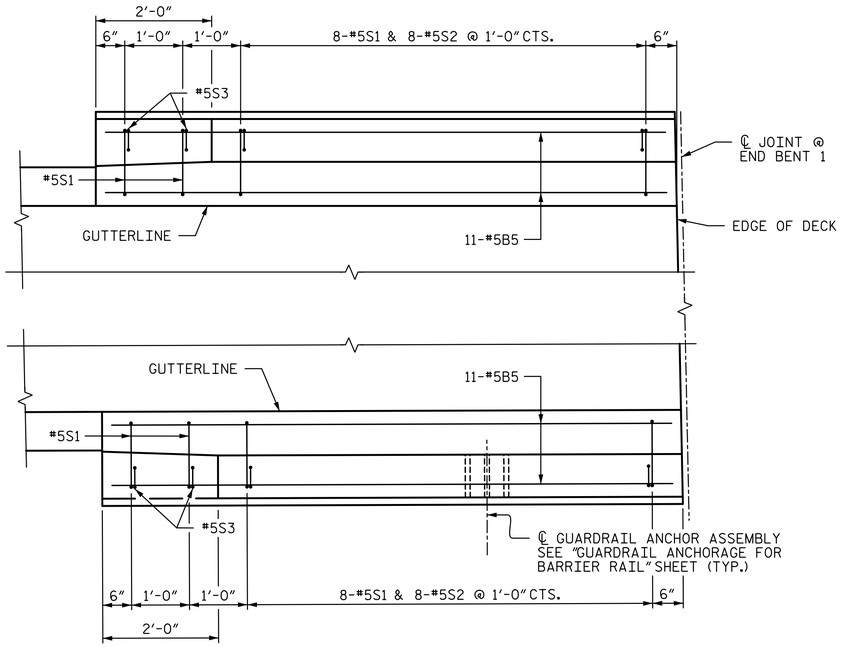
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB

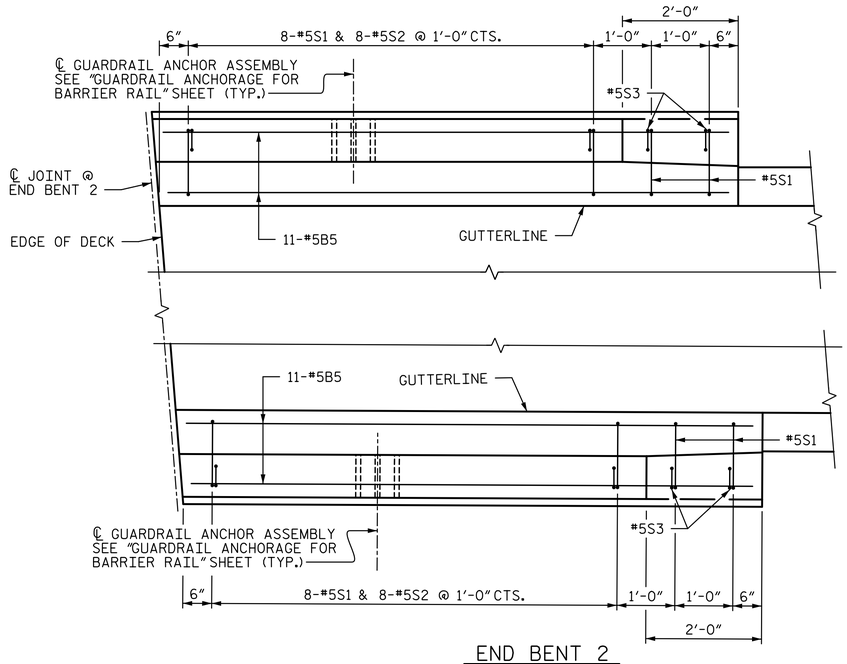
REVISIONS							
NO.	BY:	DATE:		NO.	BY:	DATE:	
1				3			
2				4			

SHEET NO. S3-35
TOTAL SHEETS 36

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : VMW	DATE : 5-17		

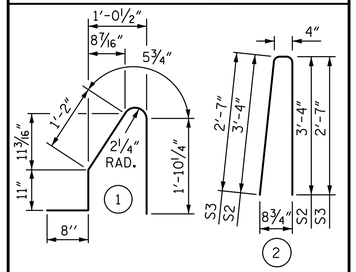


END BENT 1



END BENT 2

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B5	44	#5	STR	9'-8"	444
✳S1	40	#5	1	5'-1"	212
✳S2	32	#5	2	7'-0"	234
✳S3	8	#5	2	5'-6"	46
✳EPOXY COATED REINFORCING STEEL				LBS.	936
CLASS AA CONCRETE				C. Y.	5.6
CONCRETE BARRIER RAIL				LIN. FT.	40.17

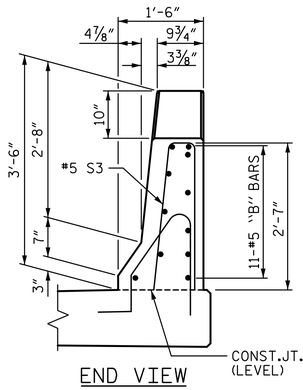
NOTES

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

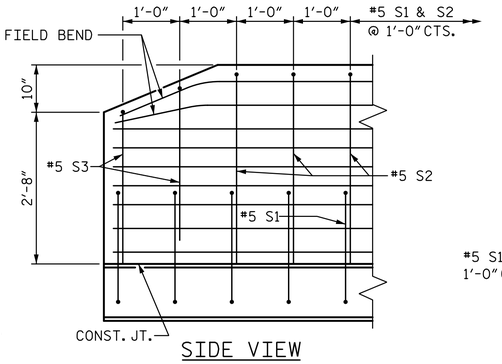
THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

PLAN OF BARRIER RAIL

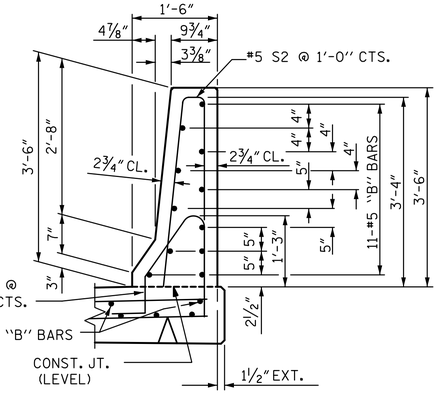


END VIEW

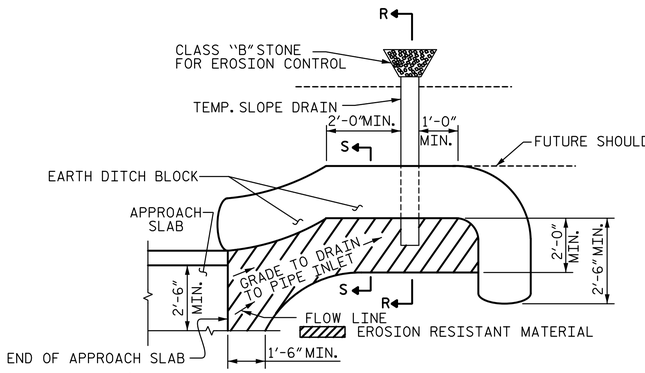


SIDE VIEW

END OF RAIL DETAILS

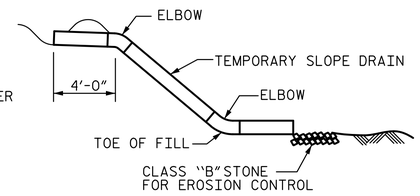


SECTION THRU RAIL

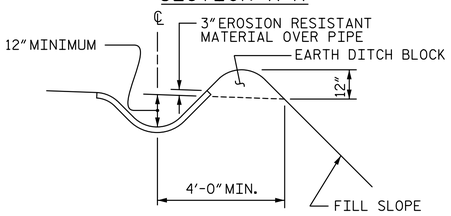


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

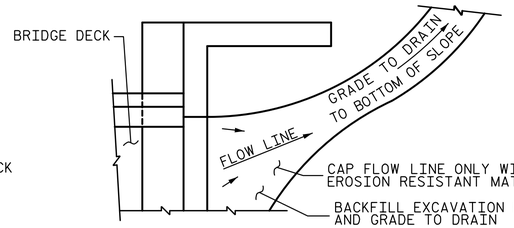
PLAN VIEW



SECTION R-R



SECTION S-S



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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 225+92.26 -L-

SHEET 2 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 19765 PAUL E. KELLY, JR.
7/24/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-36
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: P. KELLY	DATE : 5-17
CHECKED BY : VMW	DATE : 5-17		

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34+00 35+00 36+00 37+00

(+)3.6296%△(-)4.9988%

GRADE DATA

PVI STA. 33+53.00 -Y8RPDB-
PVI EL. = 85.34
LVC = 990.00'

80 70 60 50 40 30

FILL FACE @ END BENT 1
STA. 34+04.05 -Y8RPDB-
EL. 74.20

FILL FACE @ END BENT 2
STA. 36+17.30 -Y8RPDB-
EL. 69.81

SPAN A SPAN B

-Y8-

EXP. 1'-0" (TYP.) 4" CONCRETE SLOPE PROTECTION 1½:1 NORMAL TO CAP (TYP.) FILL APPROX. EXISTING GROUND LINE EL. 41± EL. 41± EL. 45± 18'-3" MIN. VERT. CLR. EL. 46± FIX. FIX. 3'-0" Ø COLUMN (TYP.) PROPOSED CONCRETE BARRIER RAIL (ROADWAY DETAIL & PAY ITEM) (TYP.) TOP OF FOOTING EL. 41.5 EL. 43± HP 12x53 STEEL PILES (TYP.) EL. 44± 17'-3" MIN. VERT. CLR. EL. 45± VARIES (1'-1" MIN. BERM) EXP. FILL EL. 41± HP 12x53 STEEL PILES (TYP.)

END BENT 1 BENT 1 END BENT 2

SECTION ALONG -Y8RPDB-

(SECTION AT END BENTS AND BENTS ARE SHOWN AT RIGHT ANGLES)

℄ OF 6'-0" VERTICAL CURVE (ROADWAY DETAIL & PAY ITEM) -Y8- CONCRETE BARRIER RAIL (ROADWAY DETAIL & PAY ITEM) POINT OF MIN. VERT. CLR. STA. 35+89.31 -Y8RPDB- OFFSET 20.07' LT. STA. 99+22.04 -Y8- EXISTING PAVEMENT EL. = 45.42

5'-7" BERM EL. 61.90 4'-6" 18'-0" PAVED SHOULDER TO US 17 BUS. 20'-0" PAVED SHOULDER 23'-0" 20'-0" PAVED SHOULDER 23'-0" TO I-40 6'-2" BERM EL. 57.38

TO SR 1409 MILITARY CUTOFF RD.

BEGIN APPROACH SLAB
STA. 33+80.07 -Y8RPDB-

POINT OF MIN. VERT. CLR.
STA. 34+94.01 -Y8RPDB- OFFSET -19.84' LT.
STA. 99+53.55 -Y8-
EXISTING PAVEMENT EL. = 46.17

20'-0" MIN. HOR. CLR. TO FACE OF BARRIER RAIL -Y8RPDB- 20'-0" MIN. HOR. CLR. TO FACE OF BARRIER RAIL 24'-0" EXISTING PAVEMENT

W.P. 3 @ FILL FACE
END BENT 2
STA. 36+17.30 -Y8RPDB-

TO US 17

W.P. 1 @ FILL FACE
END BENT 1
STA. 34+04.05 -Y8RPDB-

102°-07'-14" TAN. TO CURVE

W.P. 2 @ BENT 1
CONTROL LINE
STA. 35+12.05 -Y8RPDB-
STA. 99+67.11 -Y8-

107°-57'-30" TAN. TO CURVE

END APPROACH SLAB
STA. 36+41.21 -Y8RPDB-

113°-38'-50" TAN. TO CURVE

4'-6" 18'-0" PAVED SHOULDER 24'-0" EXISTING PAVEMENT 20'-11" MIN. HOR. CL. TO FACE OF CAP 20'-11" MIN. HOR. CL. TO FACE OF CAP 1'-1" BERM EL. 60.86 1'-4" BERM EL. 64.87

108'-0" (ARC LENGTH) SPAN A 105'-3" (ARC LENGTH) SPAN B

℄ OF 6'-0" VERTICAL CURVE (ROADWAY DETAIL & PAY ITEM)

TOTAL BRIDGE LENGTH = 213'-3"
FILL FACE END BENT 1 TO FILL FACE END BENT 2 ALONG GRADE LINE

PLAN

(PILES NOT SHOWN FOR CLARITY)

HORIZ. CURVE DATA -Y8RPDB-

PI STA. = 50+39.08 -Y8RPDB-
△ = 126°18' 36.0" (LT.)
D = 5°24' 18.9"
L = 2,336.80'
T = 2,094.35'
R = 1,060.00'

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-
99+67.11 -Y8-
SHEET 1 OF 4 BRIDGE NO. 204

DRAWN BY : MBC DATE : 3-17
CHECKED BY : TRL DATE : 3-17
DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 28479 KEVIN G. BAILEY 7/24/2017

DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TONY R. LAWS JR. 7/24/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

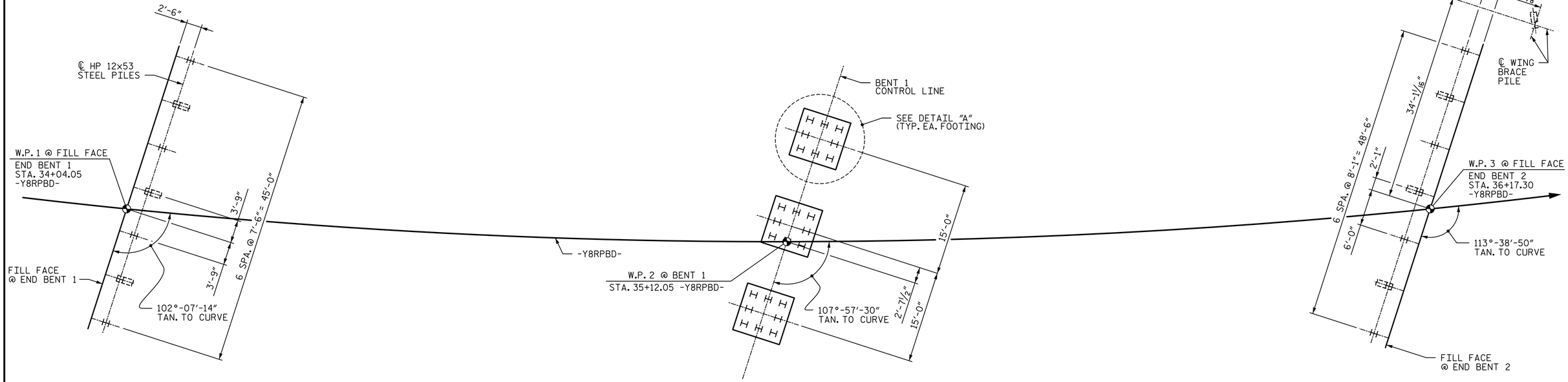
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR BRIDGE ON -Y8RPDB- OVER US 17 BYPASS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-1
1			3			TOTAL SHEETS
2			4			36

STR. #4



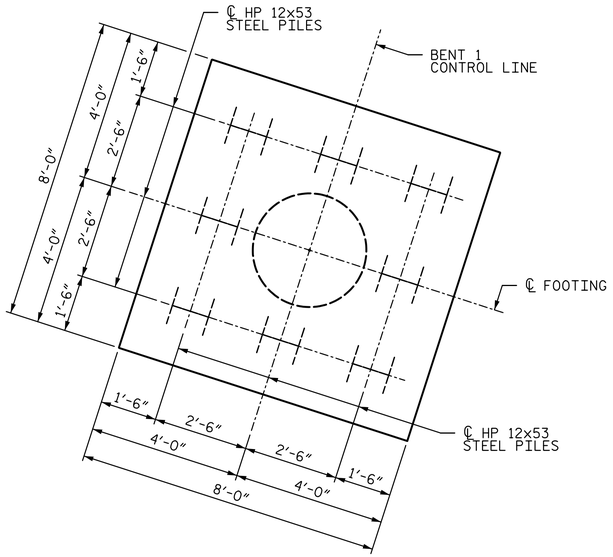
END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE AT THE BOTTOM OF CAP/FOOTING)

FOUNDATION NOTES:

1. OBSERVE A 4 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 1.
2. OBSERVE A 6 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FT OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT 2.
3. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
4. PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 PILES PER PILE.
5. DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 220 TONS PER PILE.
6. PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.
7. DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 185 TONS PER PILE.
8. PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 130 TONS PER PILE.
9. DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 220 TONS PERS PILE.
10. 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.



DETAIL "A"

LEGEND

H HP 12x53 VERTICAL PILE @ END BENTS

HP 12x53 BRACE PILE 3H:12V @ END BENTS

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-
99+67.11 -Y8-

SHEET 2 OF 4

STR. #4

DocuSigned by: NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
8/1/2017

DocuSigned by: NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER JONY R. LAWS, JR.
8/1/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOUNDATION LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-2
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 2-17
CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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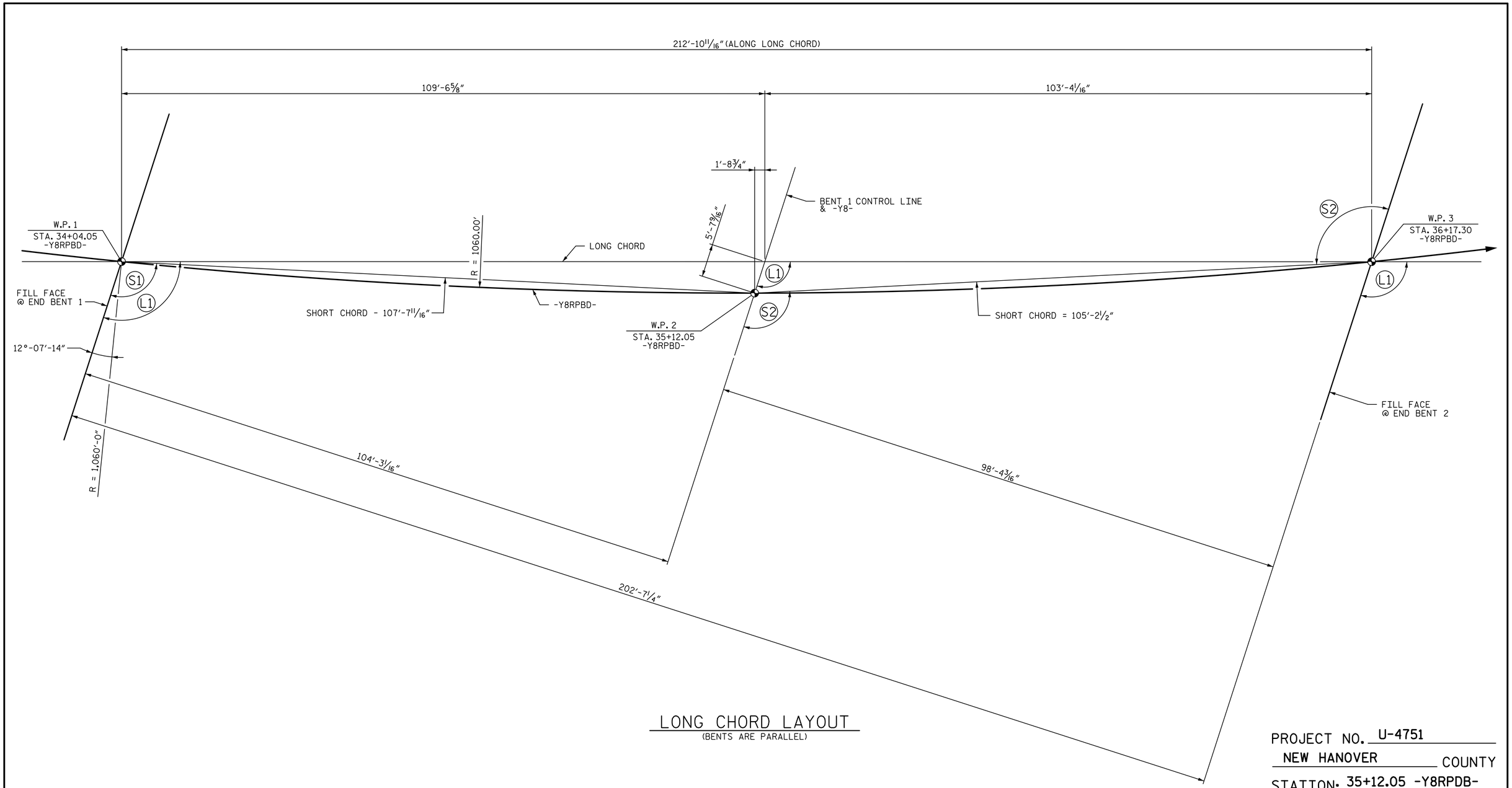

LONG CHORD LAYOUT
(BENTS ARE PARALLEL)

ANGLES			
LONG CHORD		SHORT CHORD	
L1	107°-53′-02″	S1	105°-02′-22″
		S2	110°-48′-10″

HORIZ. CURVE DATA -Y8RPBD-

PI STA. = 50+39.08 -Y8RPBD-
Δ = 126°18′ 36.0″(LT)
D = 5°24′ 18.9″
L = 2,336.80′
T = 2,094.35′
R = 1,060.00′

DRAWN BY : MBC DATE : 2-17
CHECKED BY : TRL DATE : 3-17
DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
6/30/2017

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER JONY R. LAWS JR.
6/30/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LONG CHORD LAYOUT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-3
1			3			TOTAL SHEETS
2			4			36

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-
99+67.11 -Y8
SHEET 3 OF 4

STR. #4

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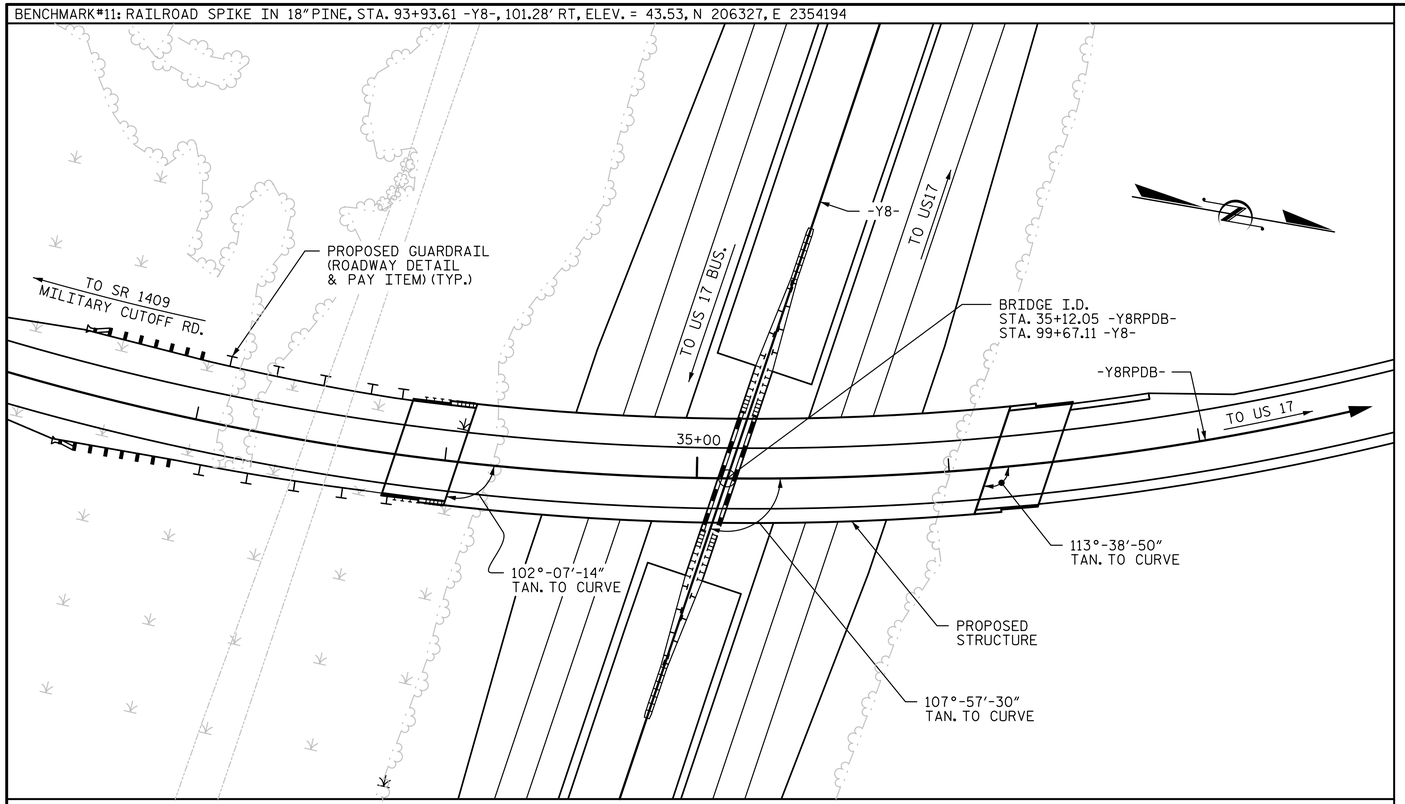
BENCHMARK #11: RAILROAD SPIKE IN 18" PINE, STA. 93+93.61 -Y8-, 101.28' RT, ELEV. = 43.53, N 206327, E 2354194



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

FOR FOUNDATION NOTES, SEE "FOUNDATION LAYOUT" SHEET.

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 EQUIP. SETUP FOR HP 12x53 STEEL PILES	HP 12x53 STEEL PILES		PILE REDRIVES	CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YD.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	EA.	LIN. FT.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			8,708	9,016		LUMP SUM			8	831.6					463.2		LUMP SUM	LUMP SUM
END BENT 1					52.2		7,595				7	7	490	3		452		
BENT 1	LUMP SUM				63.1		11,069	1,563			24	24	1,080	12				
END BENT 2					55.0		7,299				8	8	560	3		355		
TOTAL	LUMP SUM	1	8,708	9,016	170.3	LUMP SUM	25,963	1,563	8	831.6	39	39	2,130	18	463.2	807	LUMP SUM	LUMP SUM

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-
99+67.11 -Y8-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 28479 ENGINEER KEVIN G. BAILEY
6/30/2017

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER JONATHAN R. LAWS JR.
6/30/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LOCATION SKETCH, GENERAL NOTES AND TOTAL BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-4
1			3			TOTAL SHEETS
2			4			36

STR. #4

DRAWN BY : MBC DATE : 4-17
CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.01	--	1.75	1.01	1.28	A	ER	52.5	1.05	1.01	A	ER	31.4	0.80	1.01	1.18	A	ER	52.5	
		HL-93 (OPERATING)	N/A		1.66	--	1.35	1.01	1.66	A	ER	52.5	1.05	2.05	A	ER	31.4	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.68	60.48	1.75	1.01	1.82	A	ER	52.5	1.05	1.98	A	ER	31.4	0.80	1.01	1.68	A	ER	52.5	
		HS-20 (OPERATING)	36.000		2.35	84.60	1.35	1.01	2.35	A	ER	52.5	1.05	2.99	A	I	31.4	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.02	54.27	1.40	1.01	5.44	A	ER	52.5	1.05	7.27	A	I	31.4	0.80	1.01	4.02	A	ER	52.5	
		SNGARBS2	20.000		2.89	57.80	1.40	1.01	3.91	A	ER	52.5	1.05	5.07	A	I	31.4	0.80	1.01	2.89	A	ER	52.5	
		SNAGRIS2	22.000		2.69	59.18	1.40	1.01	3.65	A	ER	52.5	1.05	4.68	A	I	31.4	0.80	1.01	2.69	A	ER	52.5	
		SNCOTTS3	27.250		1.99	54.23	1.40	1.01	2.70	A	ER	52.5	1.05	3.51	A	I	31.4	0.80	1.01	1.99	A	ER	52.5	
		SNAGGRS4	34.925		1.63	56.93	1.40	1.01	2.20	A	ER	52.5	1.05	2.85	A	I	31.4	0.80	1.01	1.63	A	ER	52.5	
		SNS5A	35.550		1.59	56.52	1.40	1.01	2.16	A	ER	52.5	1.05	2.88	A	I	31.4	0.80	1.01	1.59	A	ER	52.5	
		SNS6A	39.950		1.45	57.93	1.40	1.01	1.96	A	ER	52.5	1.05	2.60	A	I	31.4	0.80	1.01	1.45	A	ER	52.5	
		SNS7B	42.000		1.38	57.96	1.40	1.01	1.86	A	ER	52.5	1.05	2.53	A	I	31.4	0.80	1.01	1.38	A	ER	52.5	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.76	58.08	1.40	1.01	2.38	A	ER	52.5	1.05	3.14	A	I	31.4	0.80	1.01	1.76	A	ER	52.5	
		TNT4A	33.075		1.76	58.21	1.40	1.01	2.39	A	ER	52.5	1.05	3.07	A	I	31.4	0.80	1.01	1.76	A	ER	52.5	
		TNT6A	41.600		1.43	59.49	1.40	1.01	1.93	A	ER	52.5	1.05	2.69	A	I	31.4	0.80	1.01	1.43	A	ER	52.5	
		TNT7A	42.000		1.43	60.06	1.40	1.01	1.93	A	ER	52.5	1.05	2.64	A	I	31.4	0.80	1.01	1.43	A	ER	52.5	
		TNT7B	42.000		1.46	61.32	1.40	1.01	1.97	A	ER	52.5	1.05	2.48	A	I	31.4	0.80	1.01	1.46	A	ER	52.5	
		TNAGRIT4	43.000		1.40	60.20	1.40	1.01	1.89	A	ER	52.5	1.05	2.35	A	ER	31.4	0.80	1.01	1.40	A	ER	52.5	
		TNAGT5A	45.000		1.33	59.85	1.40	1.01	1.80	A	ER	52.5	1.05	2.27	A	ER	31.4	0.80	1.01	1.33	A	ER	52.5	
		TNAGT5B	45.000	(3)	1.32	59.40	1.40	1.01	1.78	A	ER	52.5	1.05	2.02	A	ER	31.4	0.80	1.01	1.32	A	ER	52.5	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

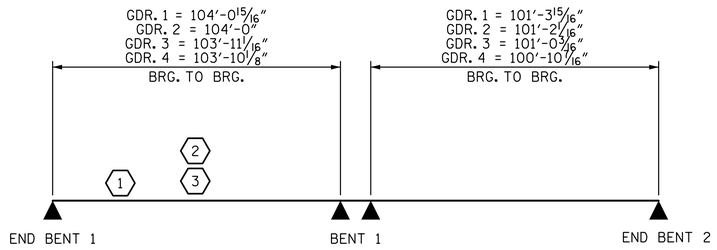
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS

6/30/2017

STV 100 Years

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

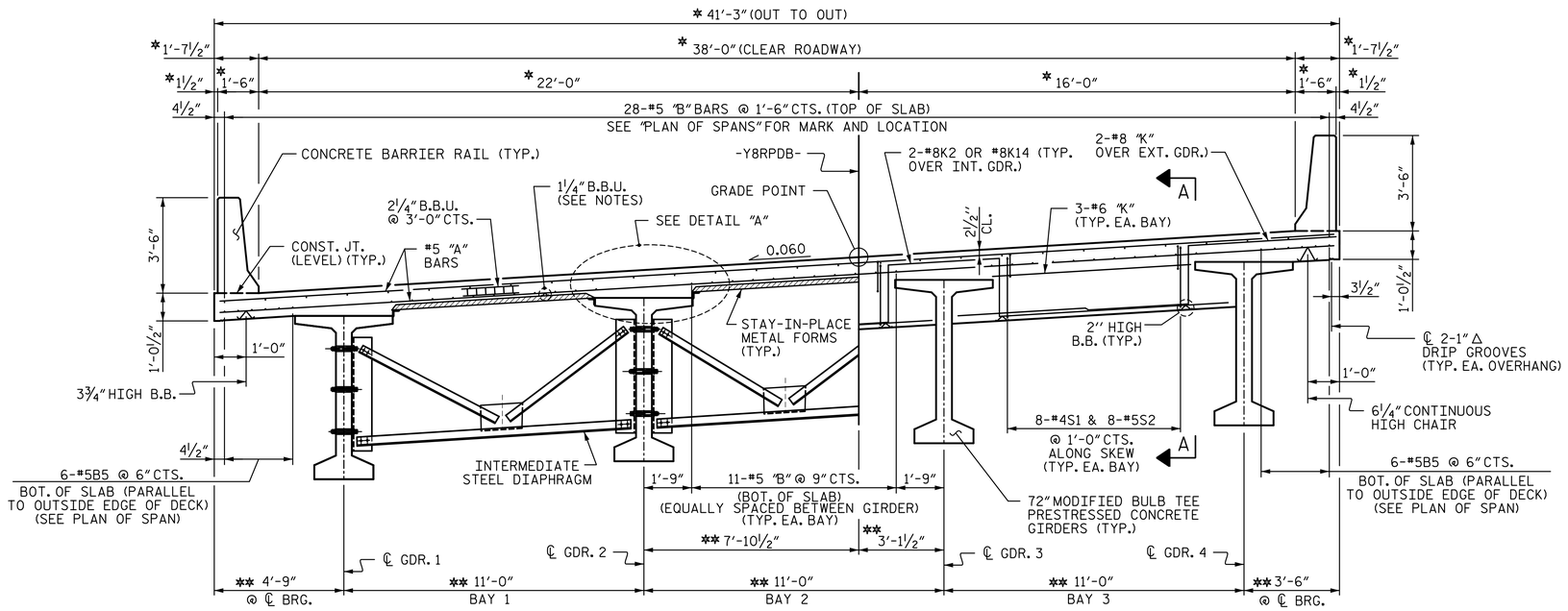
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

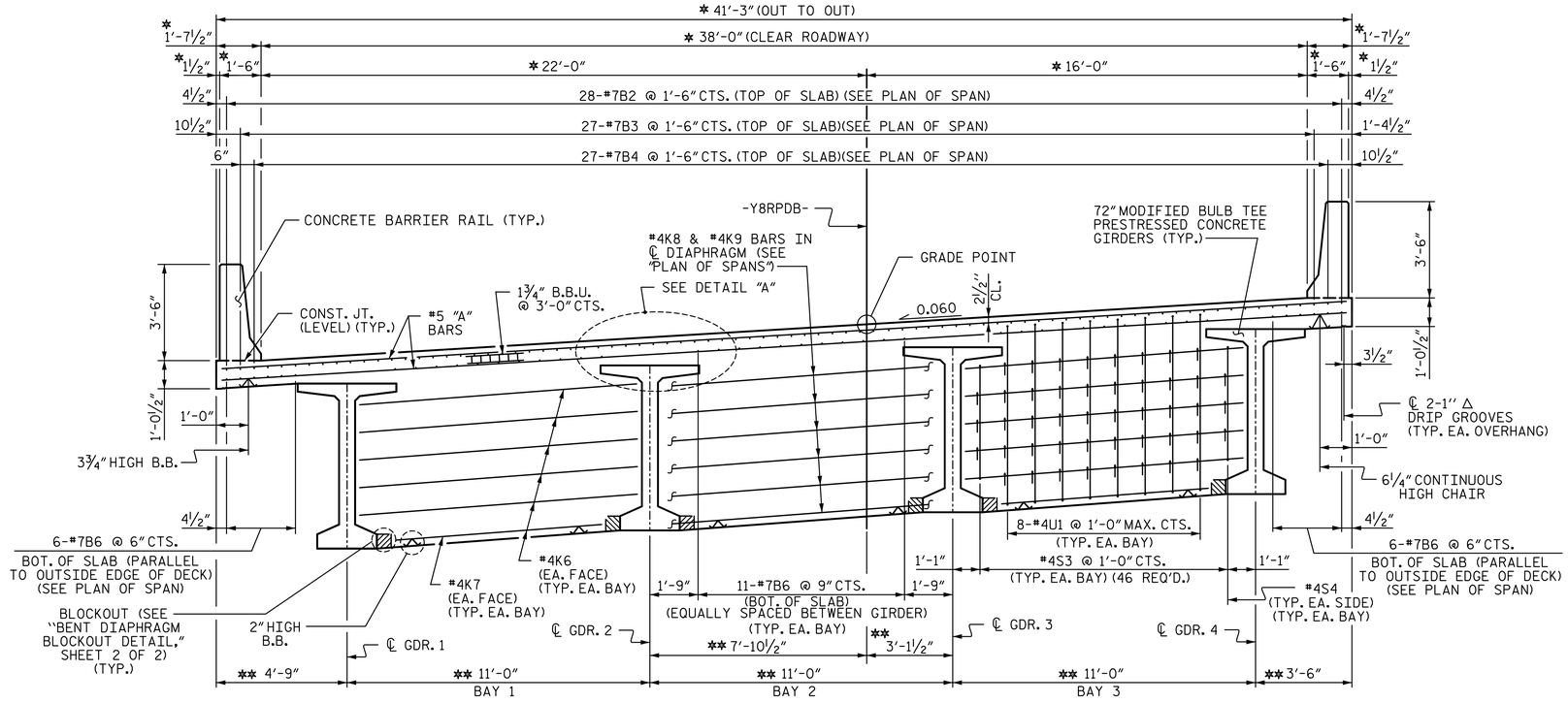
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-5
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
CHECKED BY : TRL	DATE : 3-17		



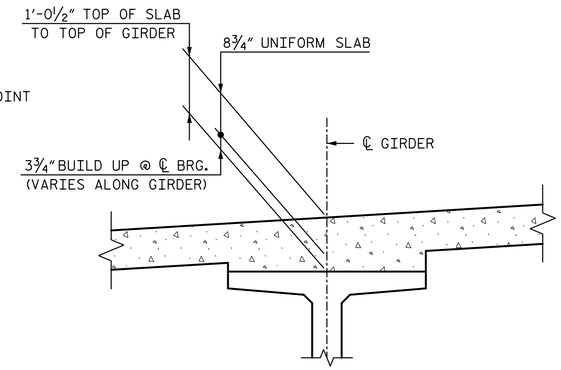
PARTIAL TYPICAL SECTION AT INTERMEDIATE DIAPHRAGM

PARTIAL TYPICAL SECTION AT END DIAPHRAGM



TYPICAL SECTION @ BENT DIAPHRAGM

* RADIAL DIMENSION
** RADIAL DIMENSION THRU WORKPOINT



DETAIL "A"
(TYP. EA. GIRDER)

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

FOR BARRIER RAIL DETAILS, SEE "CONCRETE BARRIER RAIL SHEET".

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

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS
6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

STV 100 years
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Charlotte, NC 28202
NC License Number F-0991

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1			3			TOTAL SHEETS
2			4			36

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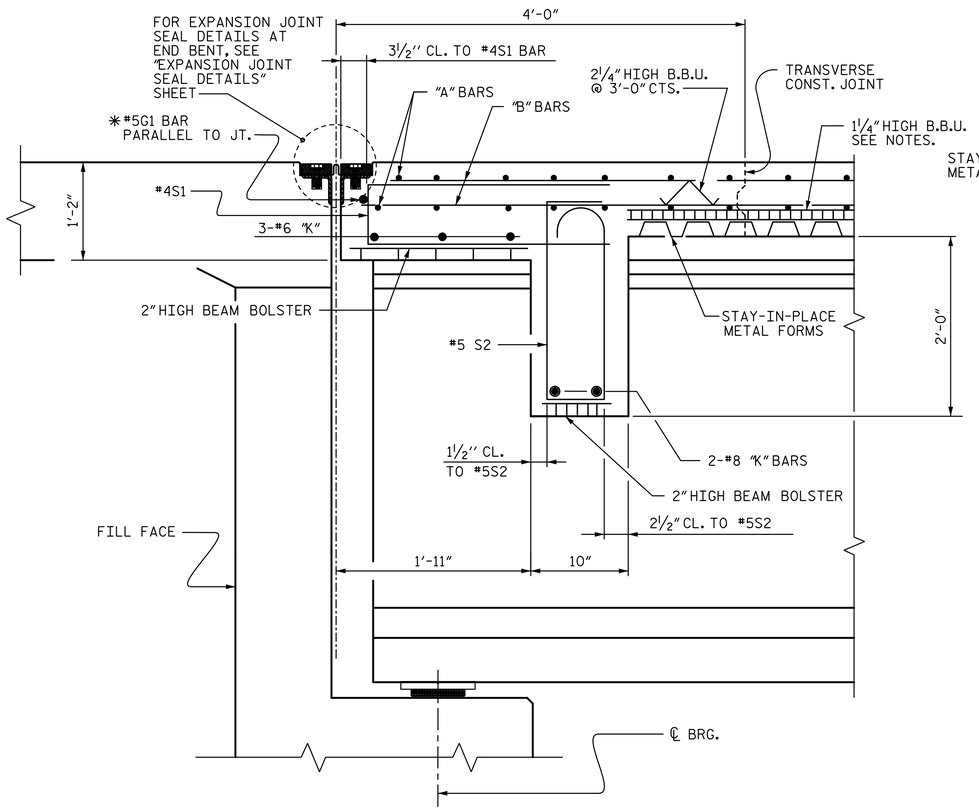
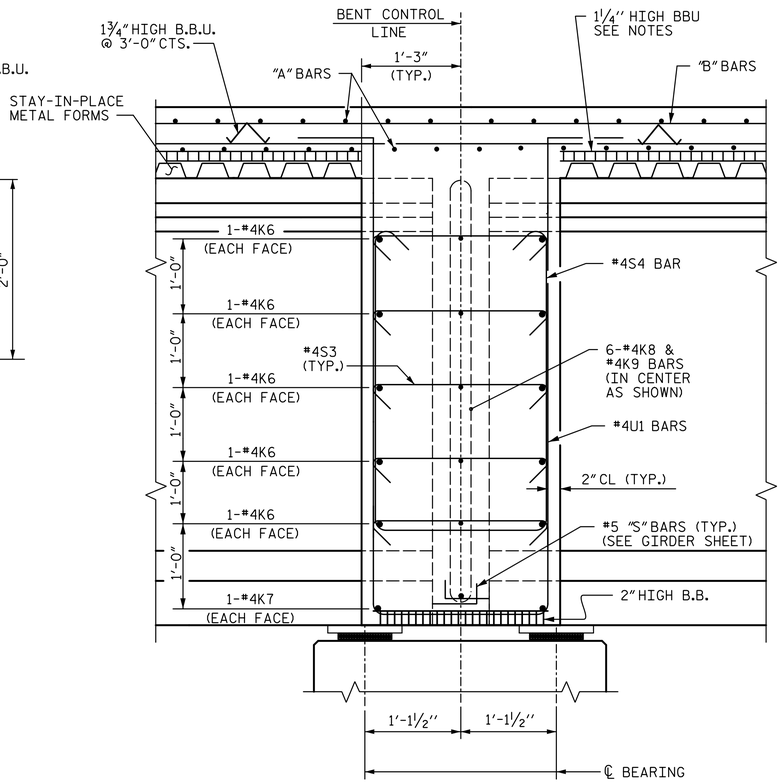
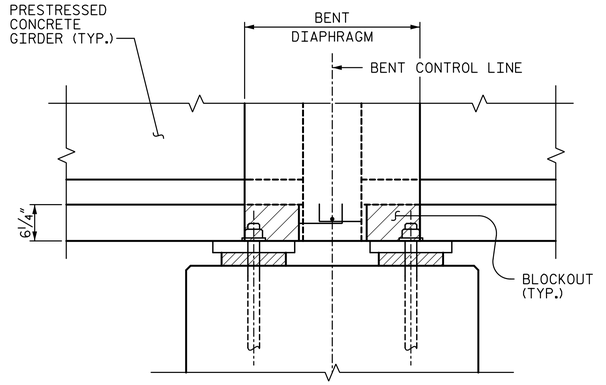


SECTION THRU END DIAPHRAGM

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

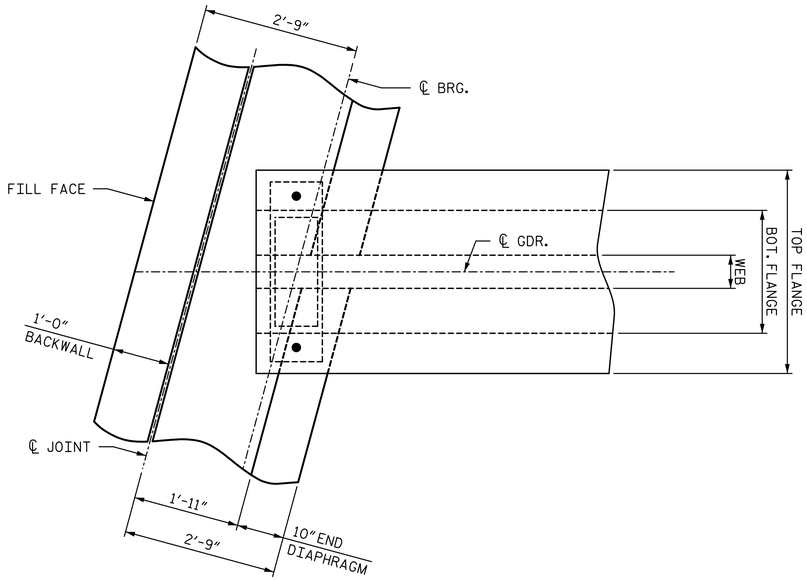


SECTION THRU BENT DIAPHRAGM

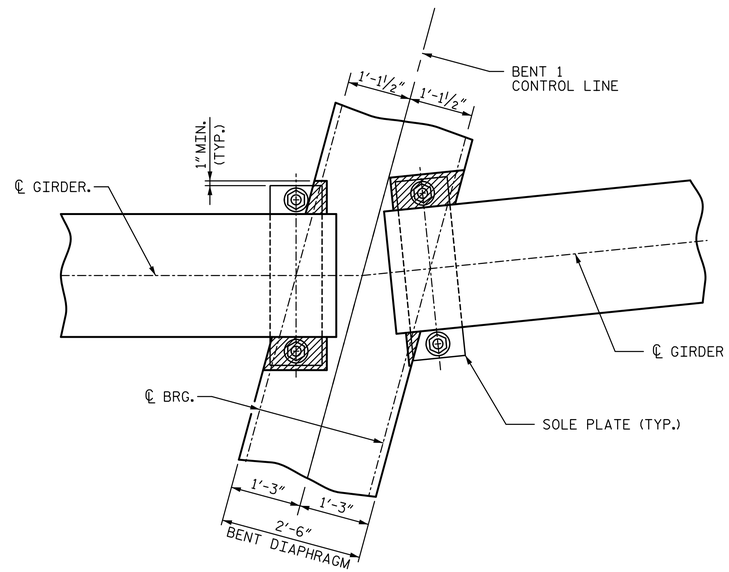


BENT DIAPHRAGM BLOCKOUT DETAILS

(PRESTRESSED GIRDERS WITH CONTINUOUS DECK SLAB)



PLAN AT END DIAPHRAGM



PLAN OF GIRDER AT BENT

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONYR LAWS JR

6/30/2017

STV 100 years

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TYPICAL SECTION DETAILS

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1			3			TOTAL SHEETS
2			4			36

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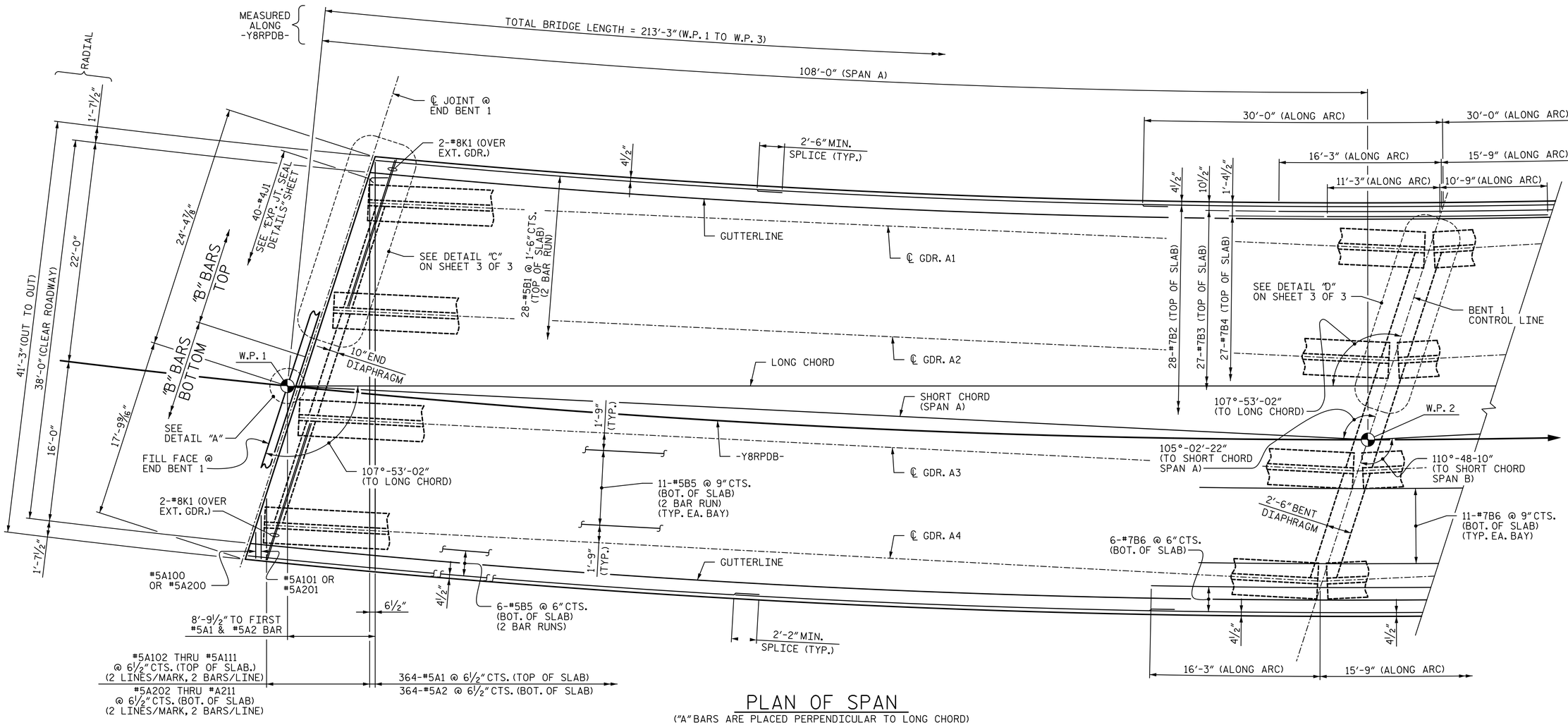
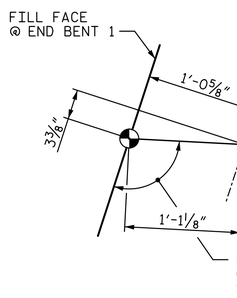
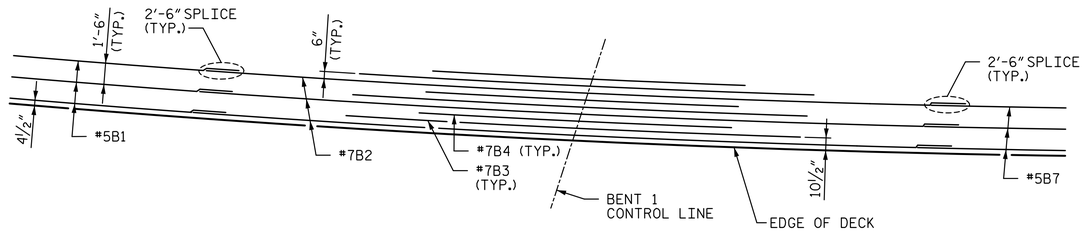


PLAN OF SPAN

("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



DETAIL "A"



REINFORCING STEEL LAYOUT

(TOP OF SLAB)

NOTES:

1. FOR CONCRETE BARRIER RAIL DIMENSIONS, REINFORCEMENT AND JOINT SPACING, SEE "CONCRETE BARRIER RAIL" SHEETS.
2. FOR POUR SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB, SEE "DECK POUR SEQUENCE" SHEET.
3. FOR SECTION VIEWS, SEE "SUPERSTRUCTURE DETAILS" SHEET.
4. FOR "B" BAR SPACING AND LOCATION, SEE "TYPICAL SECTION" SHEET.
5. FOR MINIMUM SPLICE LENGTHS, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.
6. FOR ADDITIONAL DETAILS, SEE SHEET 3 OF 3.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 3

DRAWN BY : MBC DATE : 3-17

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TIMOTHY R. LAWS, JR.

6/30/2017

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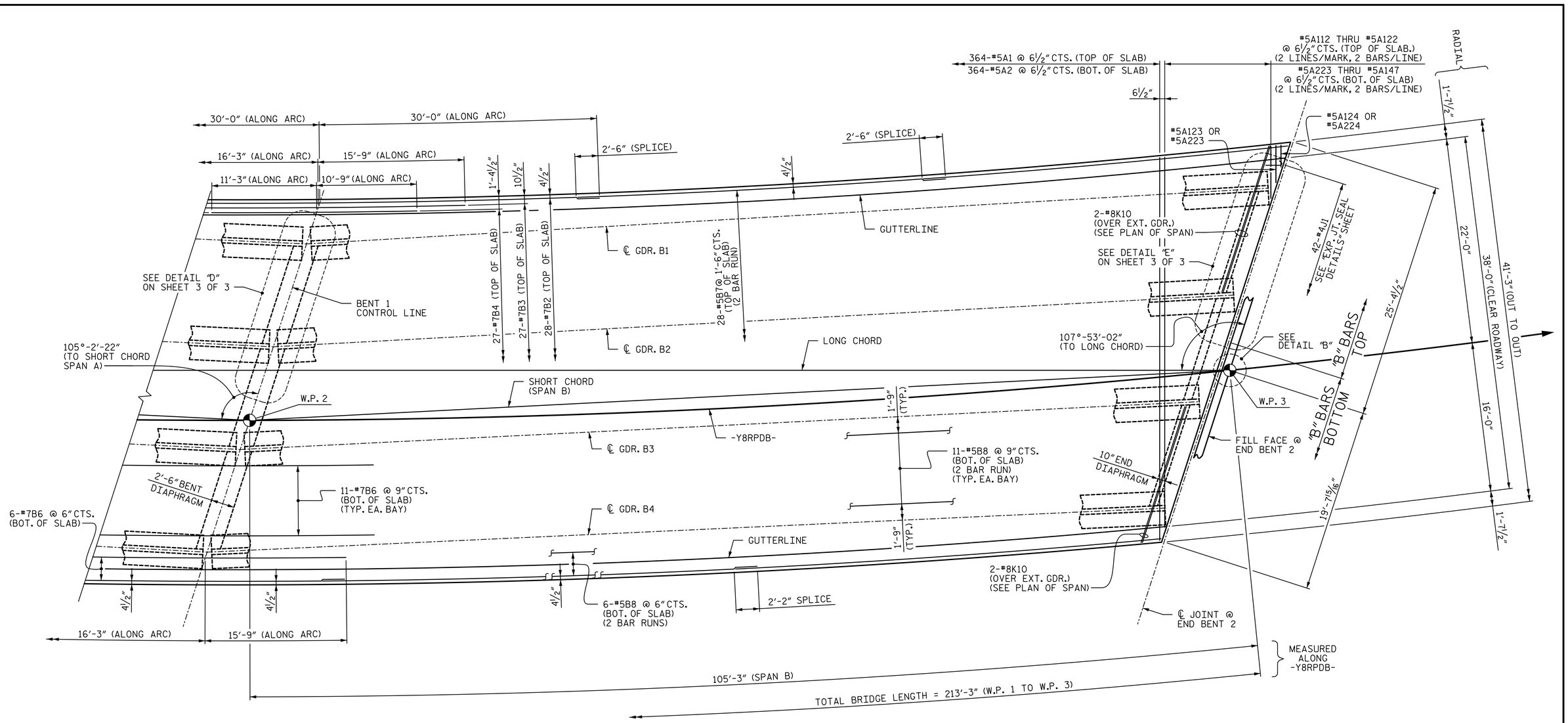
SUPERSTRUCTURE

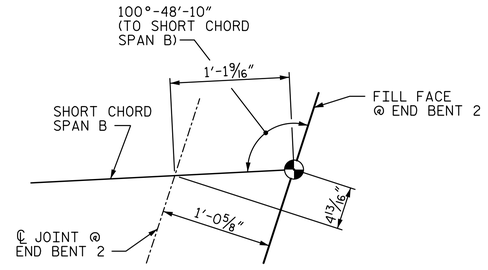
PLAN OF SPAN
SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-8
1			3			TOTAL SHEETS
2			4			36



PLAN OF SPAN

("A" BARS ARE PLACED PERPENDICULAR TO LONG CHORD)



DETAIL "B"

NOTES:

1. FOR NOTES, SEE SHEET 1 OF 3.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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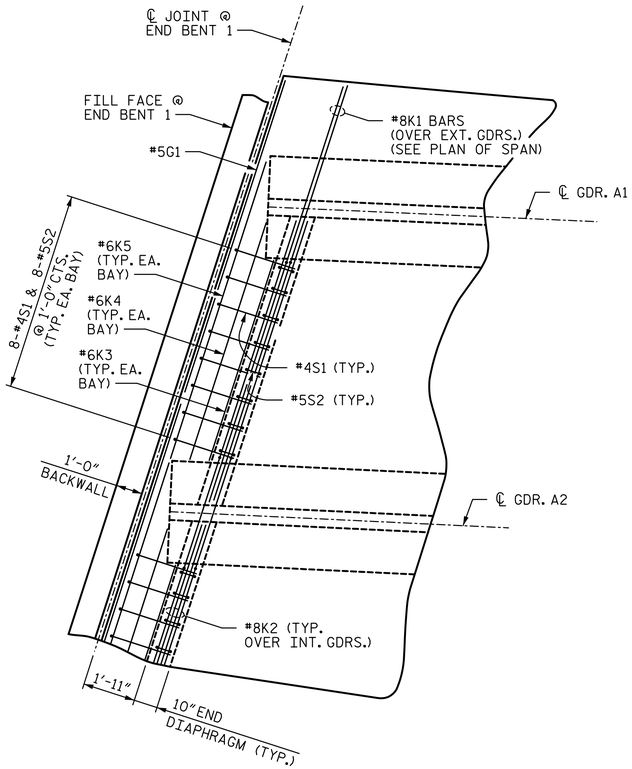
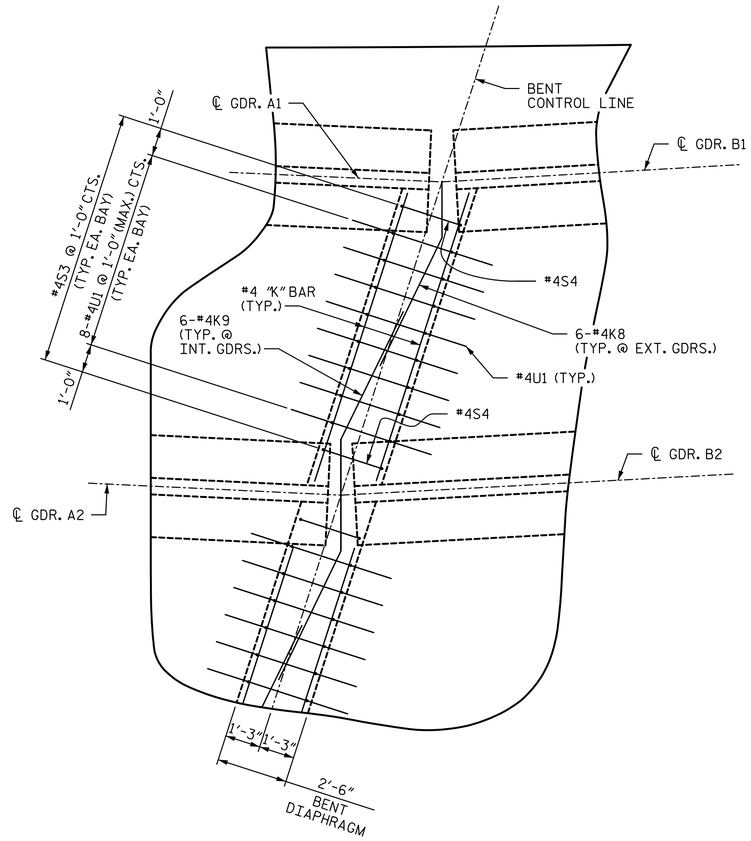
PLAN OF SPAN
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-9
1			3			TOTAL SHEETS
2			4			36



DETAIL "C"



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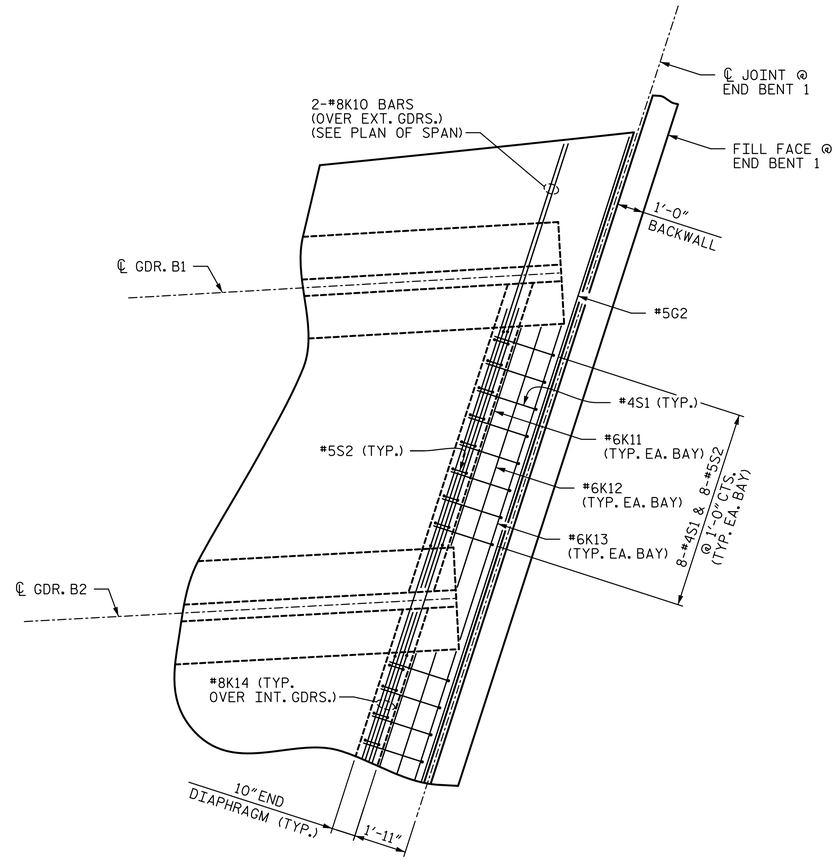

DETAIL "E"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 3 OF 3

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PLAN OF SPAN DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-10
1			3			TOTAL SHEETS
2			4			36

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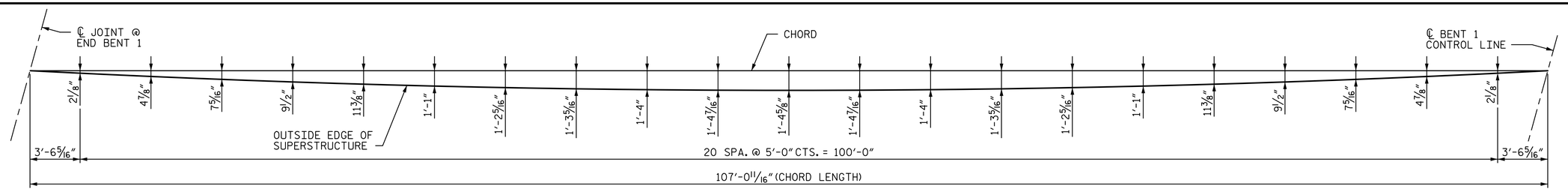

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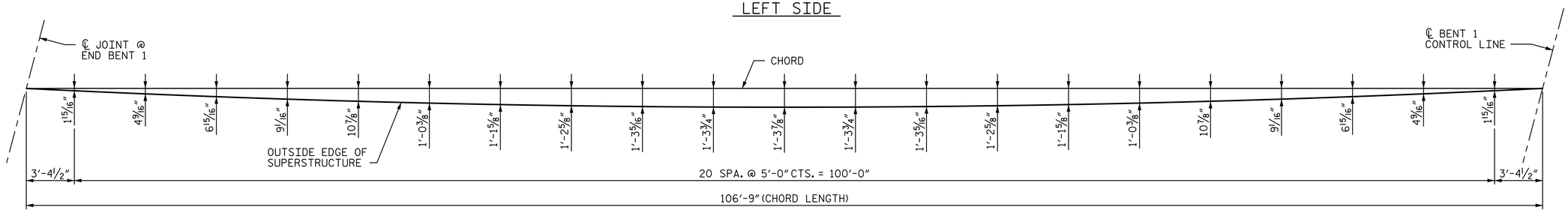
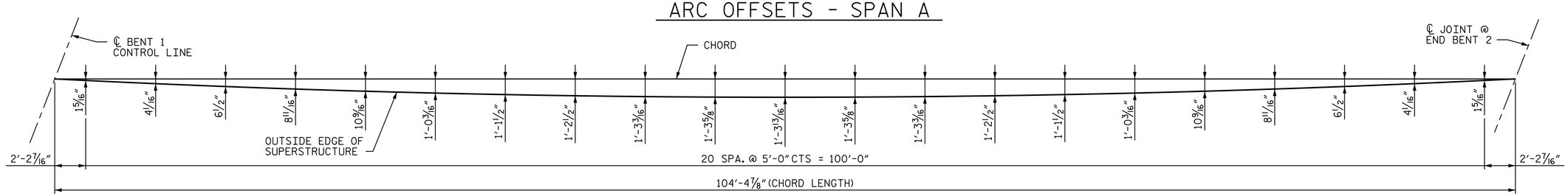


RIGHT SIDE

ARC OFFSETS - SPAN A



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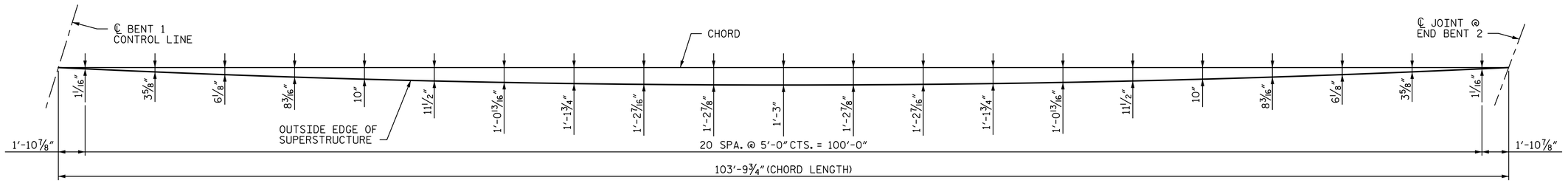

RIGHT SIDE

ARC OFFSETS - SPAN B

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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SUPERSTRUCTURE

ARC OFFSETS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-11
1			3			TOTAL SHEETS
2			4			36

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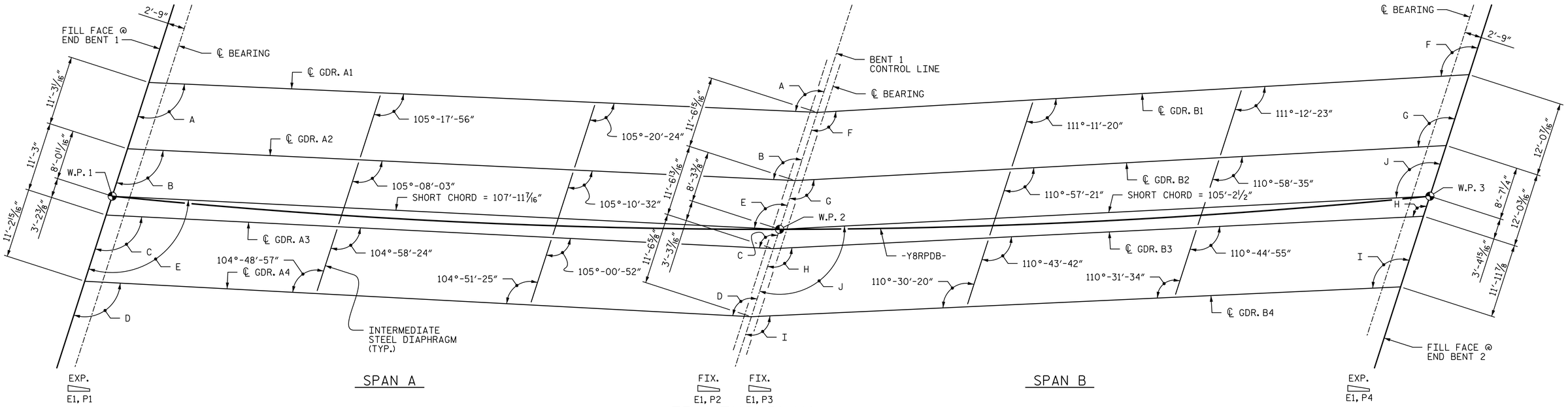
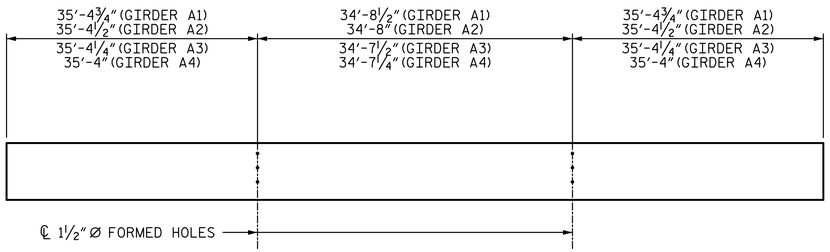


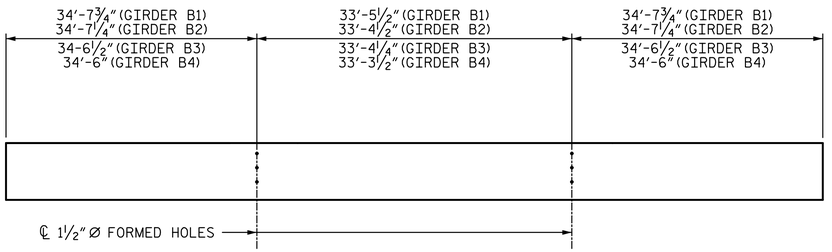
FRAMING PLAN

ANGLES			
A	105°-19'-10"	F	111°-11'-57"
B	105°-09'-18"	G	110°-57'-58"
C	104°-59'-38"	H	110°-44'-19"
D	104°-50'-11"	I	110°-30'-57"
E	105°-02'-22"	J	110°-48'-10"



GIRDERS A1 - A4

SPAN A



GIRDERS B1 - B4

SPAN B

FORMED HOLES LOCATION FOR INTERMEDIATE DIAPHRAGMS

PROJECT NO. U-4751

NEW HANOVER COUNTY

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6/30/2017

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FRAMING PLAN

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1			3		
2			4		

SHEET NO. S4-12

TOTAL SHEETS 36

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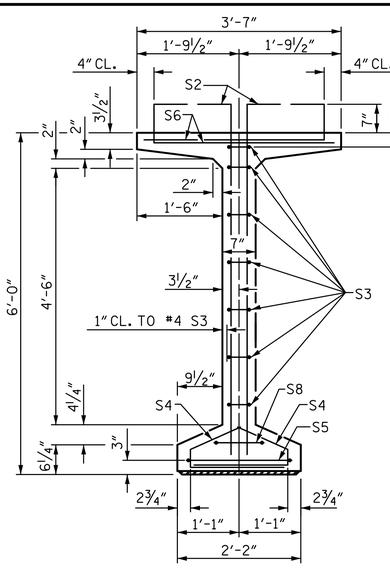
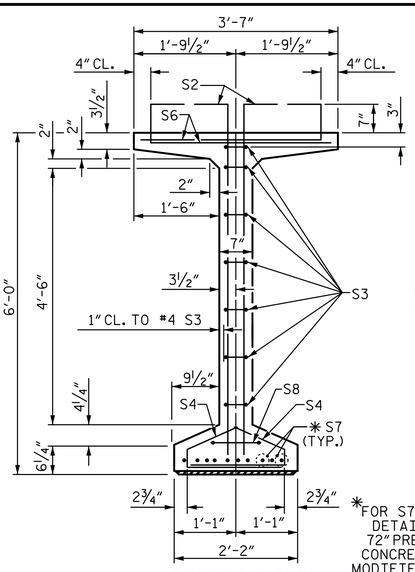
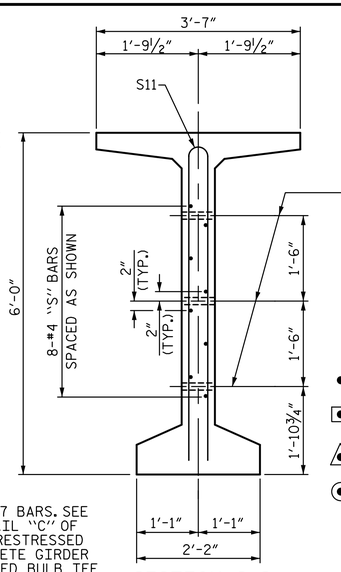


SECTION A-A



SECTION B-B



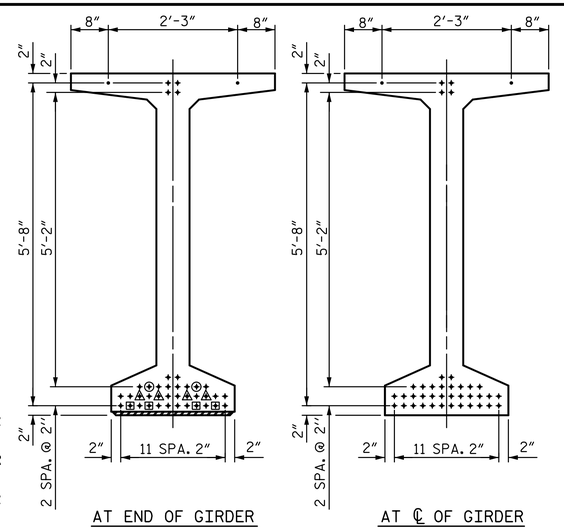
SECTION C-C

✳FOR S7 BARS, SEE DETAIL "C" OF 72" PRESTRESSED CONCRETE GIRDER MODIFIED BULB TEE DETAILS SHEET

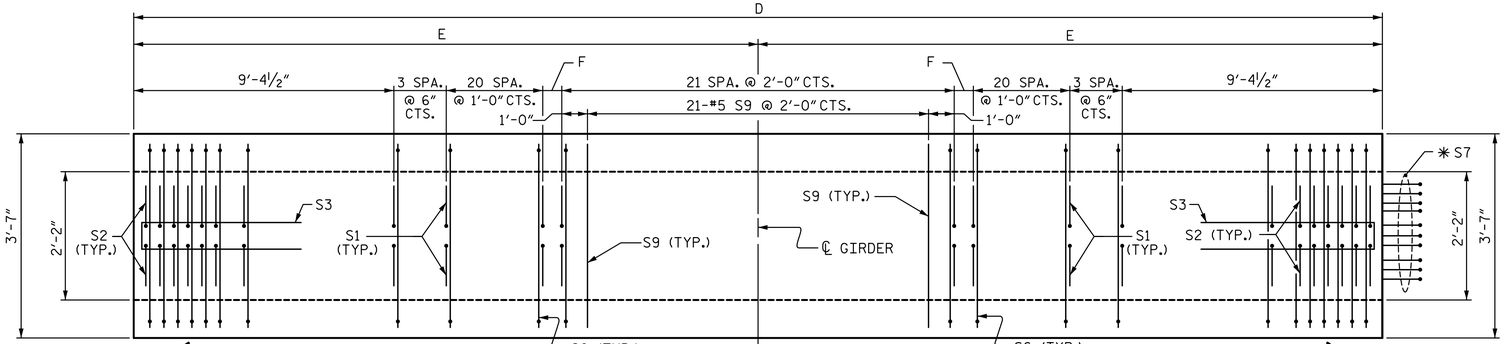
(S1, S6 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ⦿ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

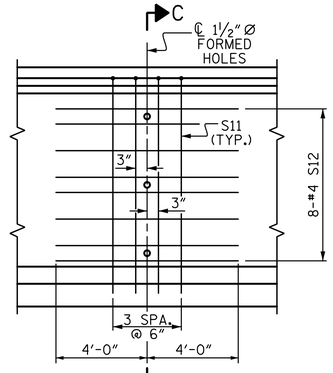


0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER

ELEVATION OF GIRDER



PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 4

GIRDER DIMENSIONS				CONCRETE
GDR.	D	E	F	
A1	105'-6"	52'-9"	10½"	22.6 CY
A2	105'-5"	52'-8½"	10"	22.6 CY
A3	105'-4"	52'-8"	9½"	22.6 CY
A4	105'-3¼"	52'-7⅝"	9¼"	22.6 CY

0.6" Ø L. R. GRADE 270 STRANDS

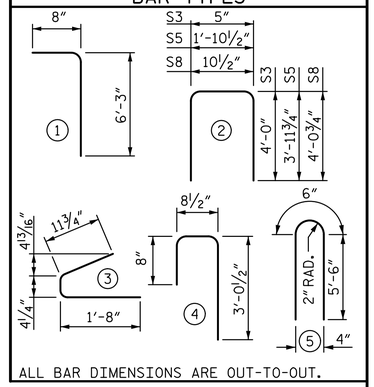
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	196	#4	1	6'-11"	906
S2	24	#6	1	6'-11"	249
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	1	#5	2	9'-10"	10
S6	220	#5	4	4'-5"	1013
✳S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	21	#5	STR	3'-3"	71
S10	1	#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	8500 CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER	2736	SEE TABLE	40

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	SEE TABLE	421'-6¼"

PROJECT NO. U-4751

NEW HANOVER COUNTY

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SHEET 1 OF 3

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DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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DocuSigned by: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TONY R. LAWS, JR.

6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-13
1			3			TOTAL SHEETS
2			4			36

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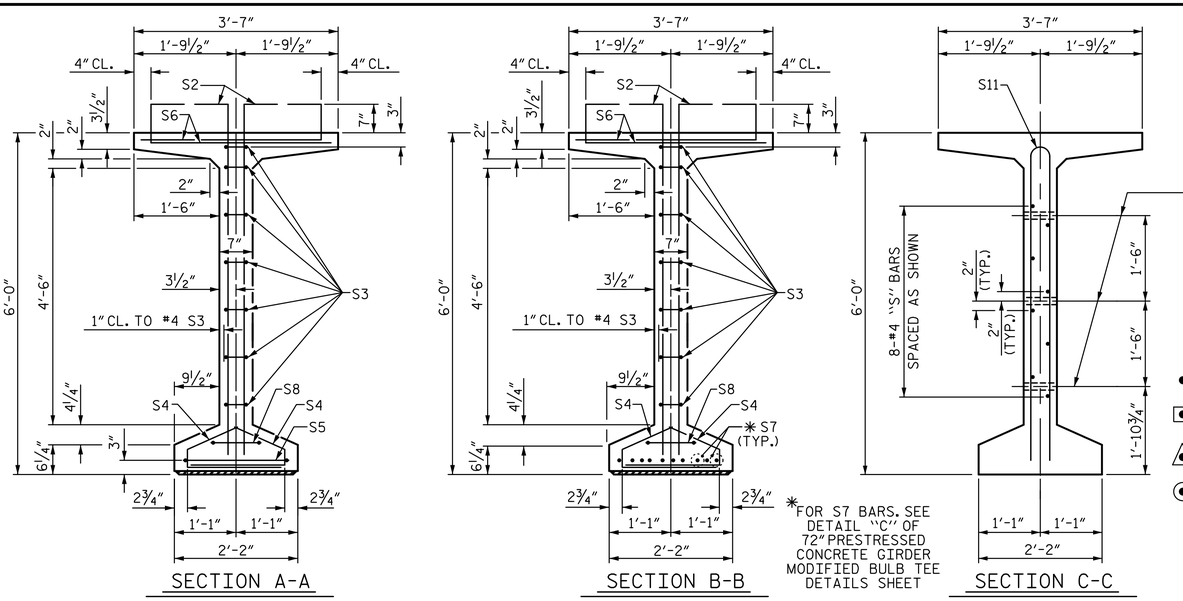
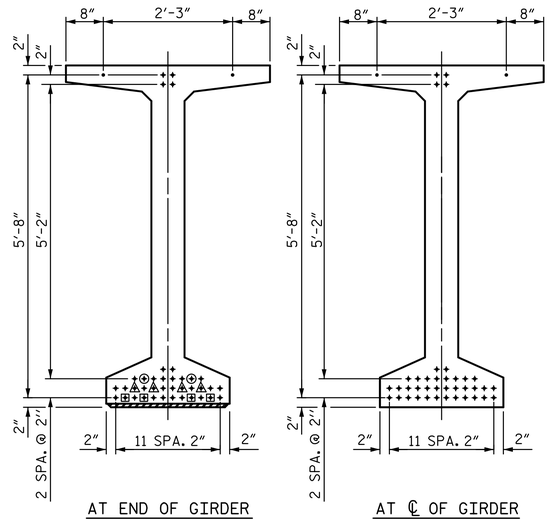
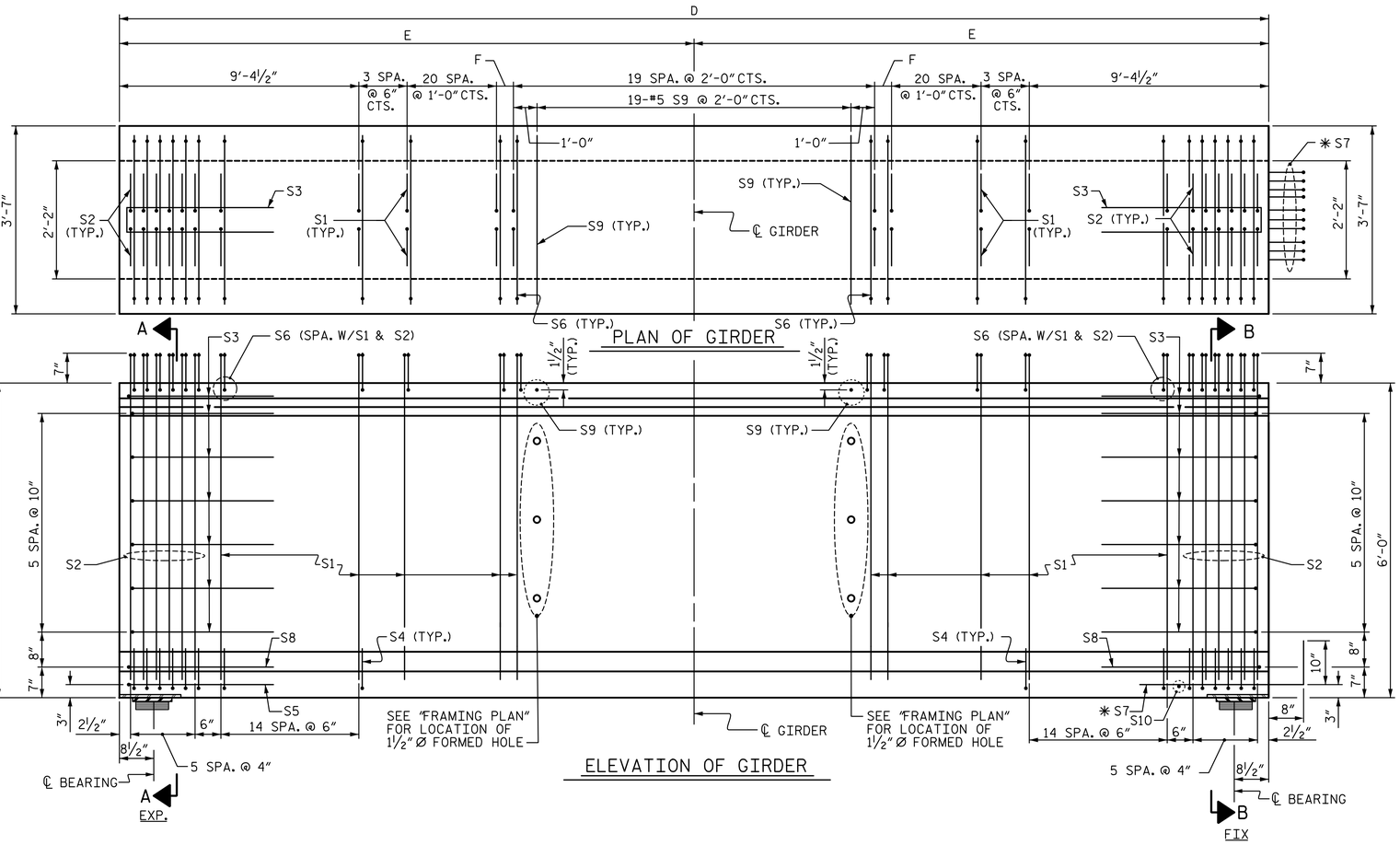


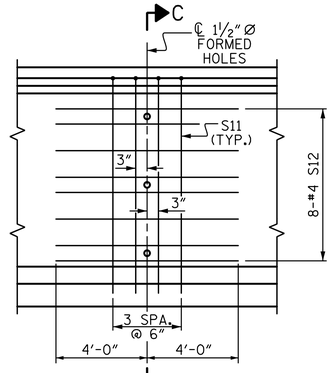
DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT





SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 4

GIRDER DIMENSIONS				CONCRETE
GDR.	D	E	F	
B1	102'-9"	51'-4½"	1'-6"	22.0 CY
B2	102'-7"	51'-3½"	1'-5"	22.0 CY
B3	102'-5¼"	51'-2⅝"	1'-4⅛"	22.0 CY
B4	102'-3½"	51'-1¾"	1'-3¼"	21.9 CY

0.6" Ø L. R. GRADE 270 STRANDS

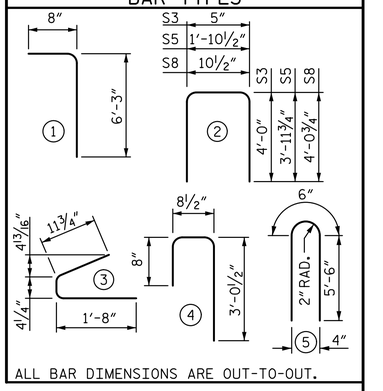
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	192	#4	1	6'-11"	887
S2	24	#6	1	6'-11"	249
S3	14	#4	2	8'-5"	79
S4	84	#4	3	3'-0"	168
S5	1	#5	2	9'-10"	10
S6	216	#5	4	4'-5"	995
* S7	10	#5	STR	3'-8"	38
S8	2	#5	2	9'-0"	19
S9	19	#5	STR	3'-3"	64
S10	1	#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



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8500 CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER	2692	SEE TABLE	40

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	SEE TABLE	410'-0¾"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 3

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 4-17

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.

6/30/2017

STV 100 Years

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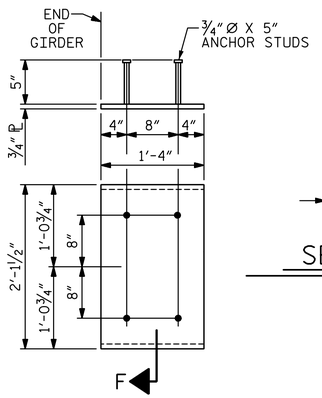
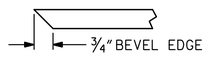
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-14
1			3			TOTAL SHEETS
2			4			36



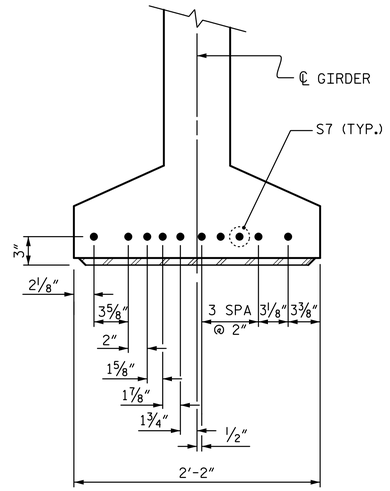


SECTION "F"

(SEE NOTES)

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

(2 REQ'D PER GIRDER)



DETAIL "C"

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6800 PSI.

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

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

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

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

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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6/30/2017

STV 100 years

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RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-15
1			3			TOTAL SHEETS
2			4			36

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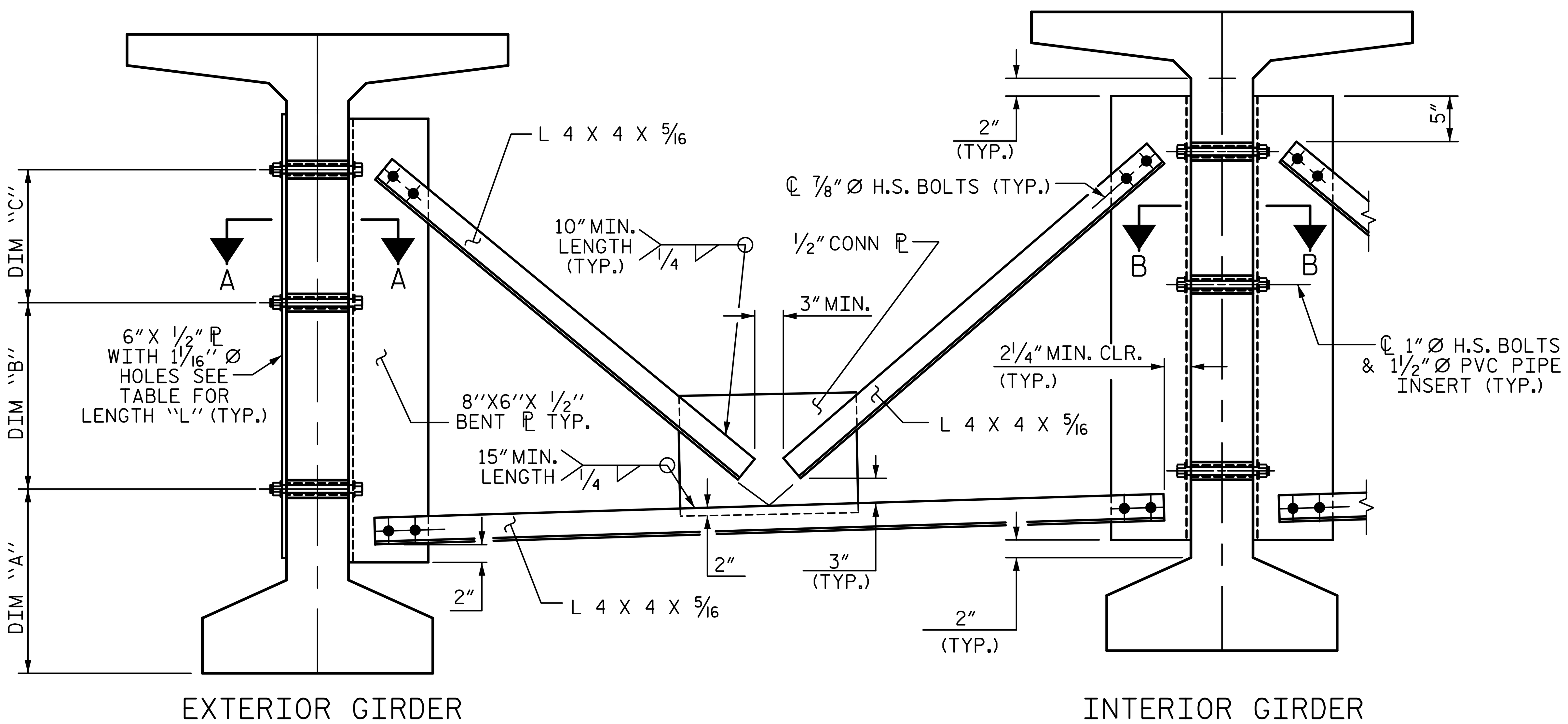
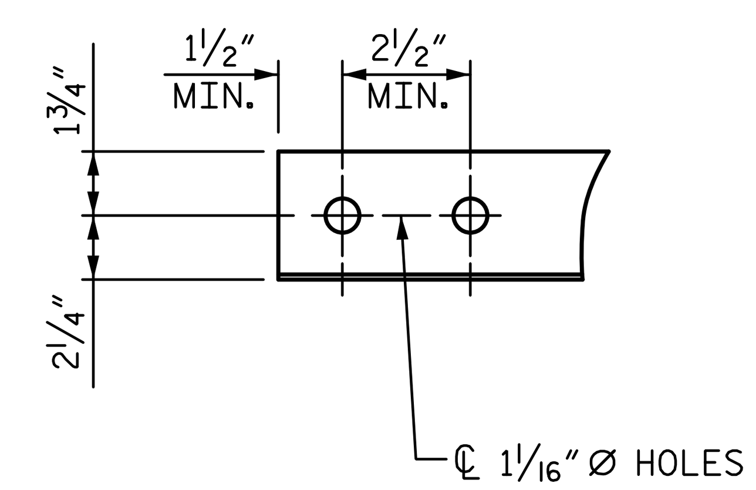
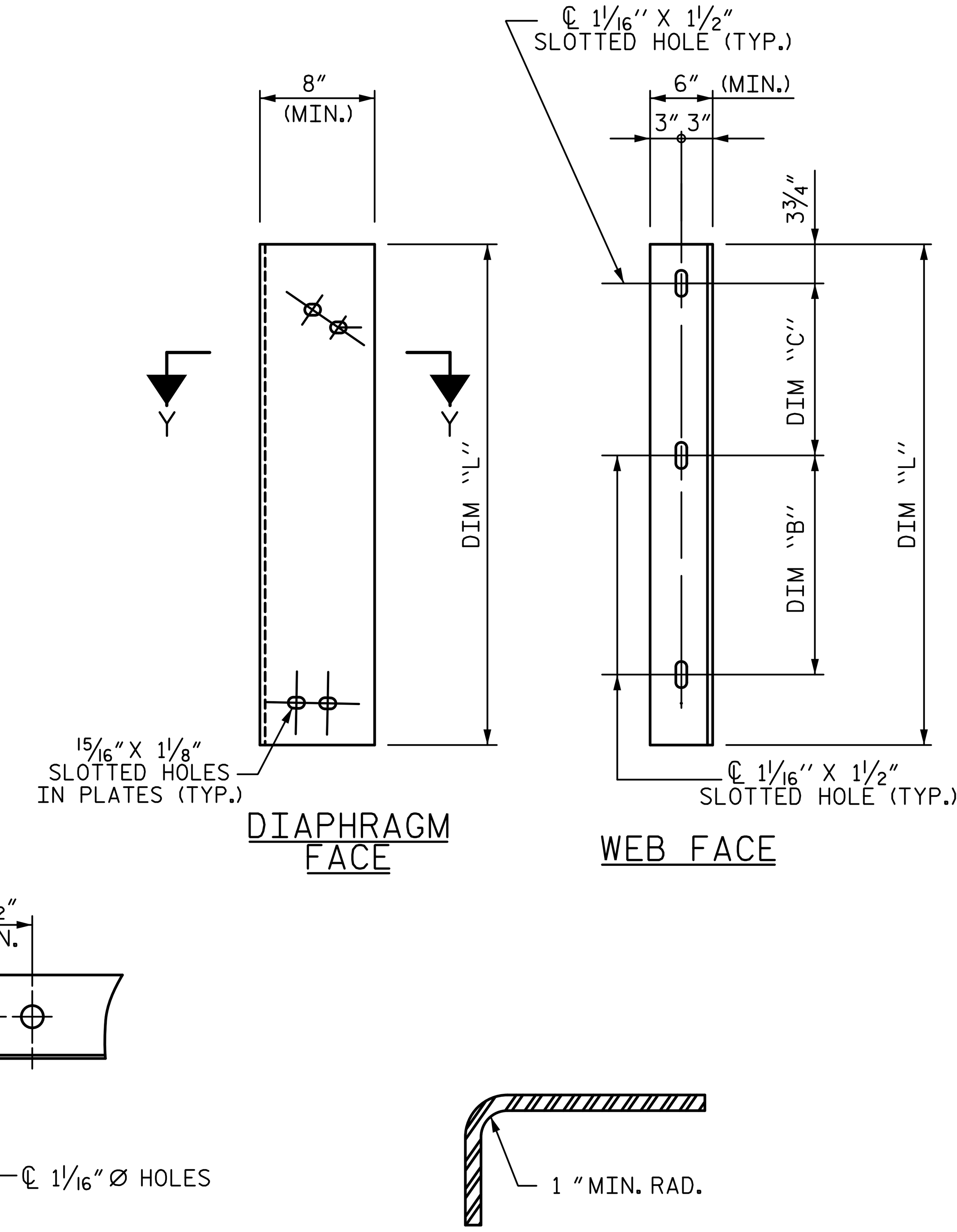


PART SECTION AT INTERMEDIATE DIAPHRAGM



ANGLE END

(L 4 X 4 X 5/16)



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.

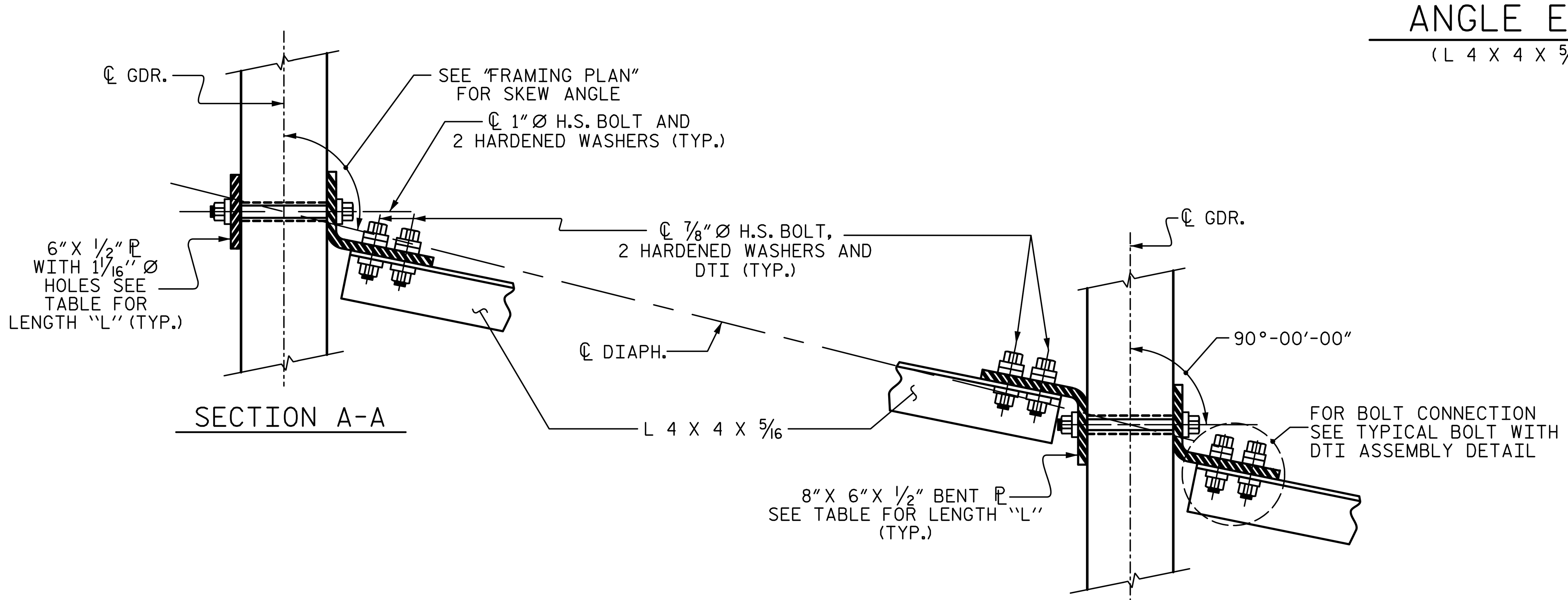
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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.

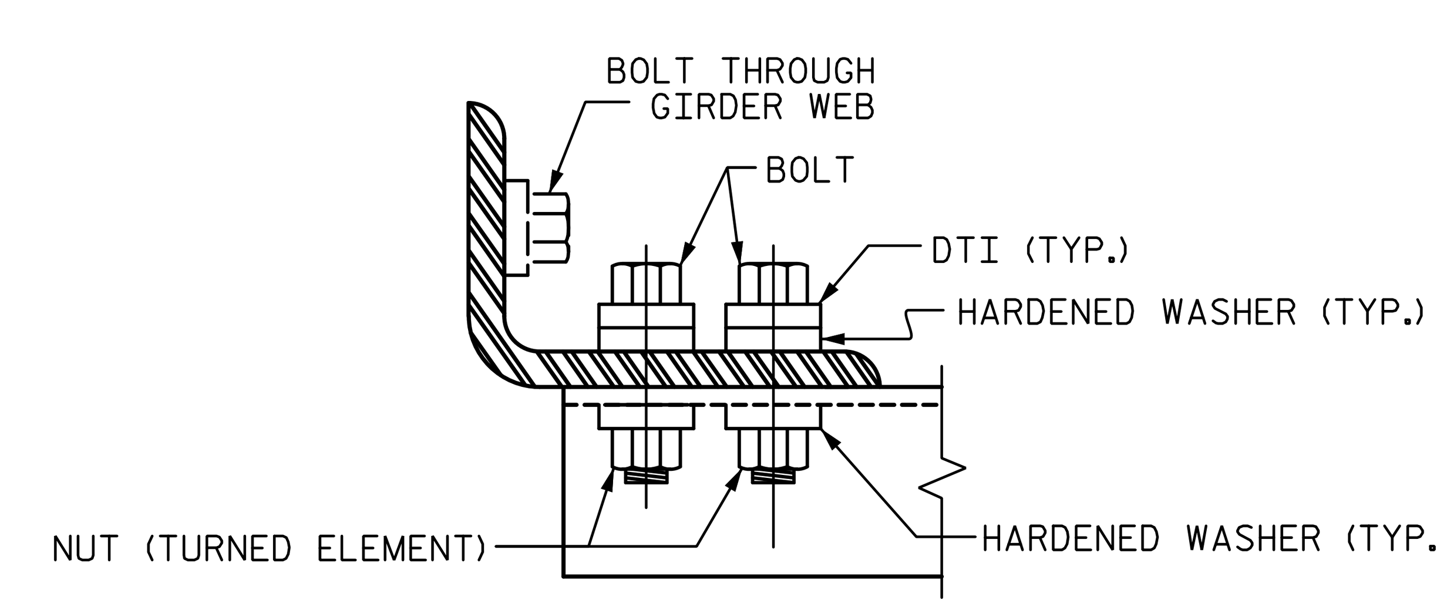
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

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



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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6/30/2017

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RALEIGH

SUPERSTRUCTURE

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

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

SHEET NO. S4-16

TOTAL SHEETS 36

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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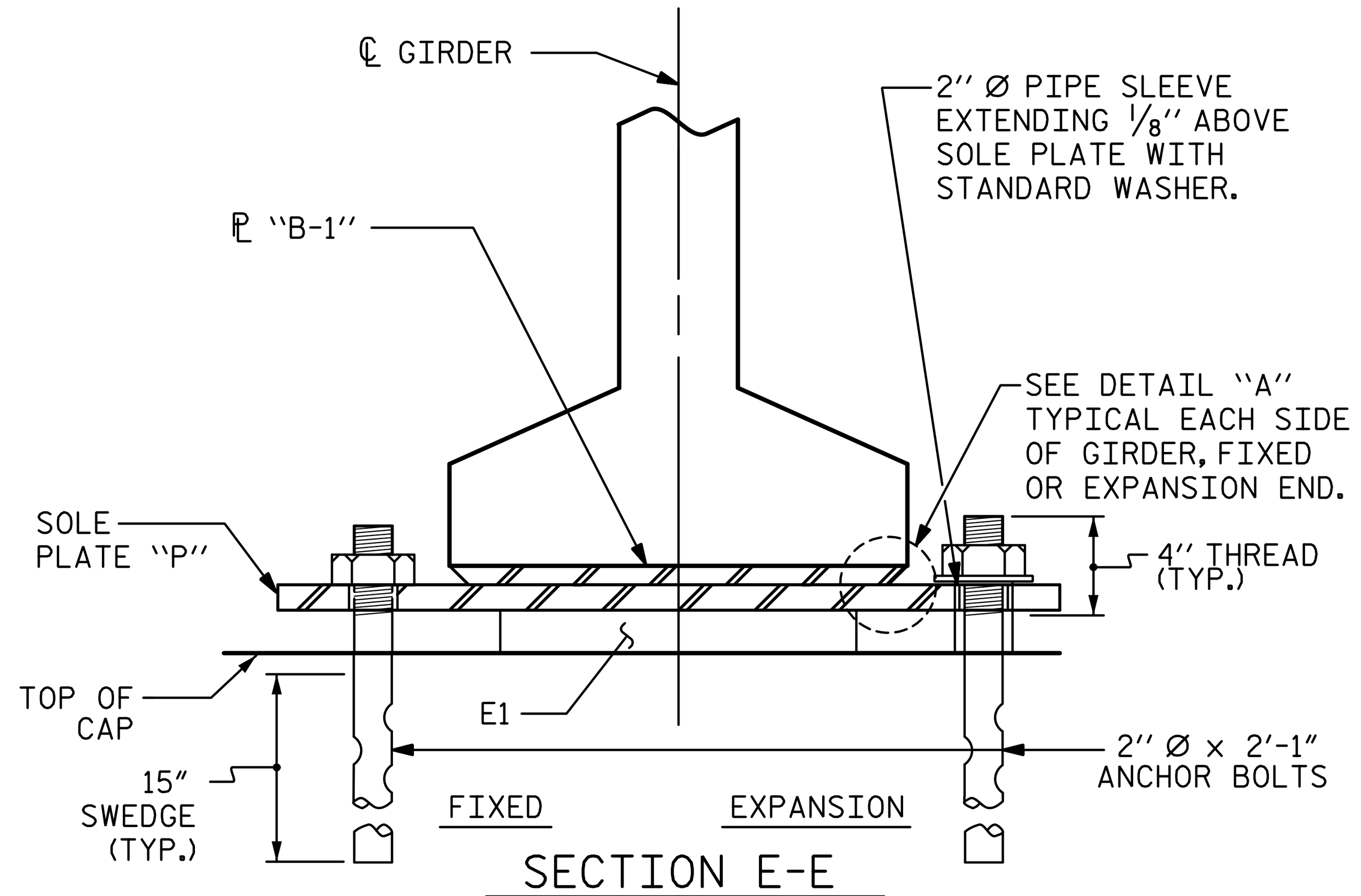
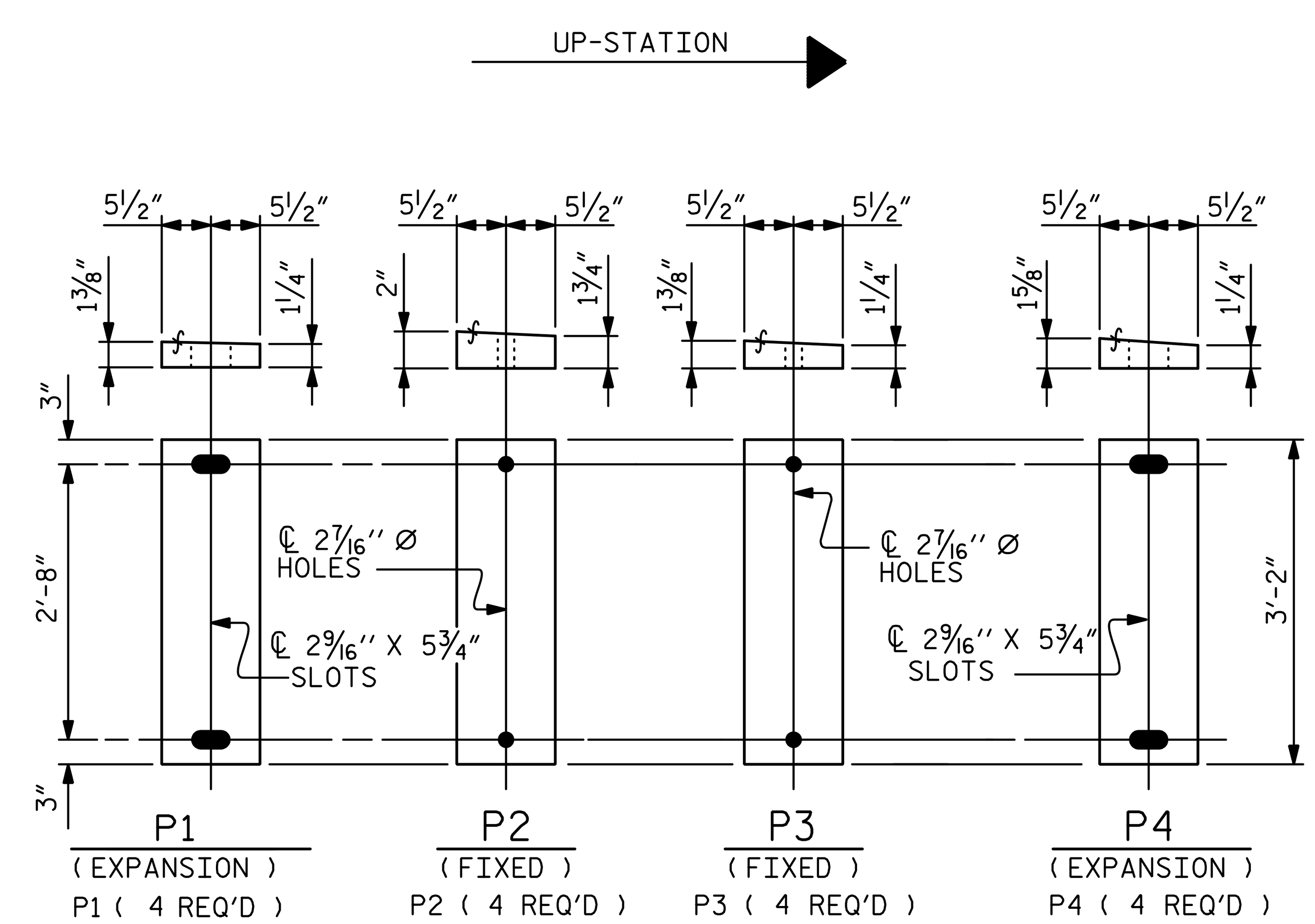


SECTION E-E

MAXIMUM ALLOWABLE SERVICE LOADS

D.L.+L.L. (NO IMPACT)	
TYPE V	365 k



SOLE PLATE DETAILS ("P")

NOTES

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

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

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

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

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

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

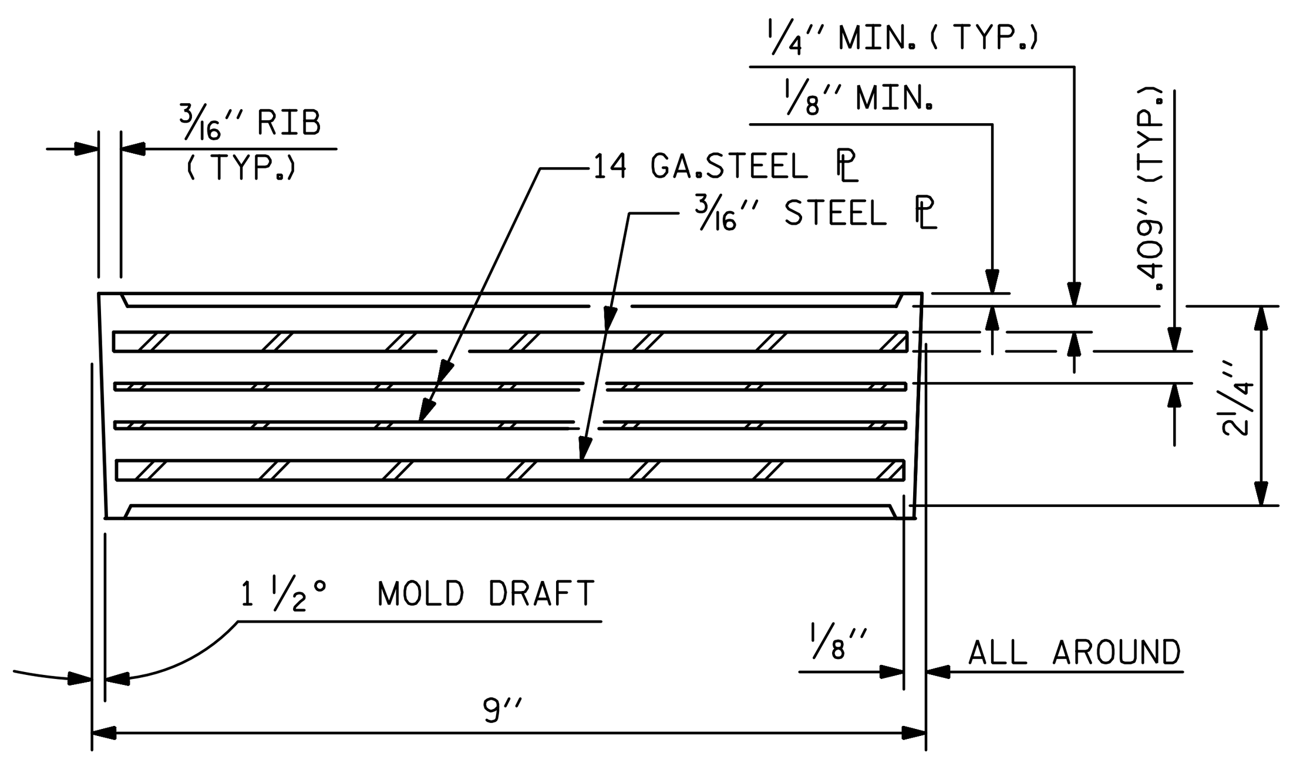
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

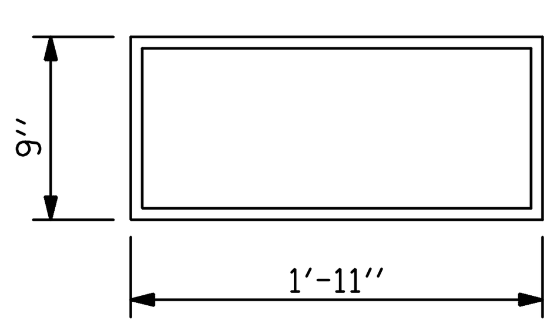
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



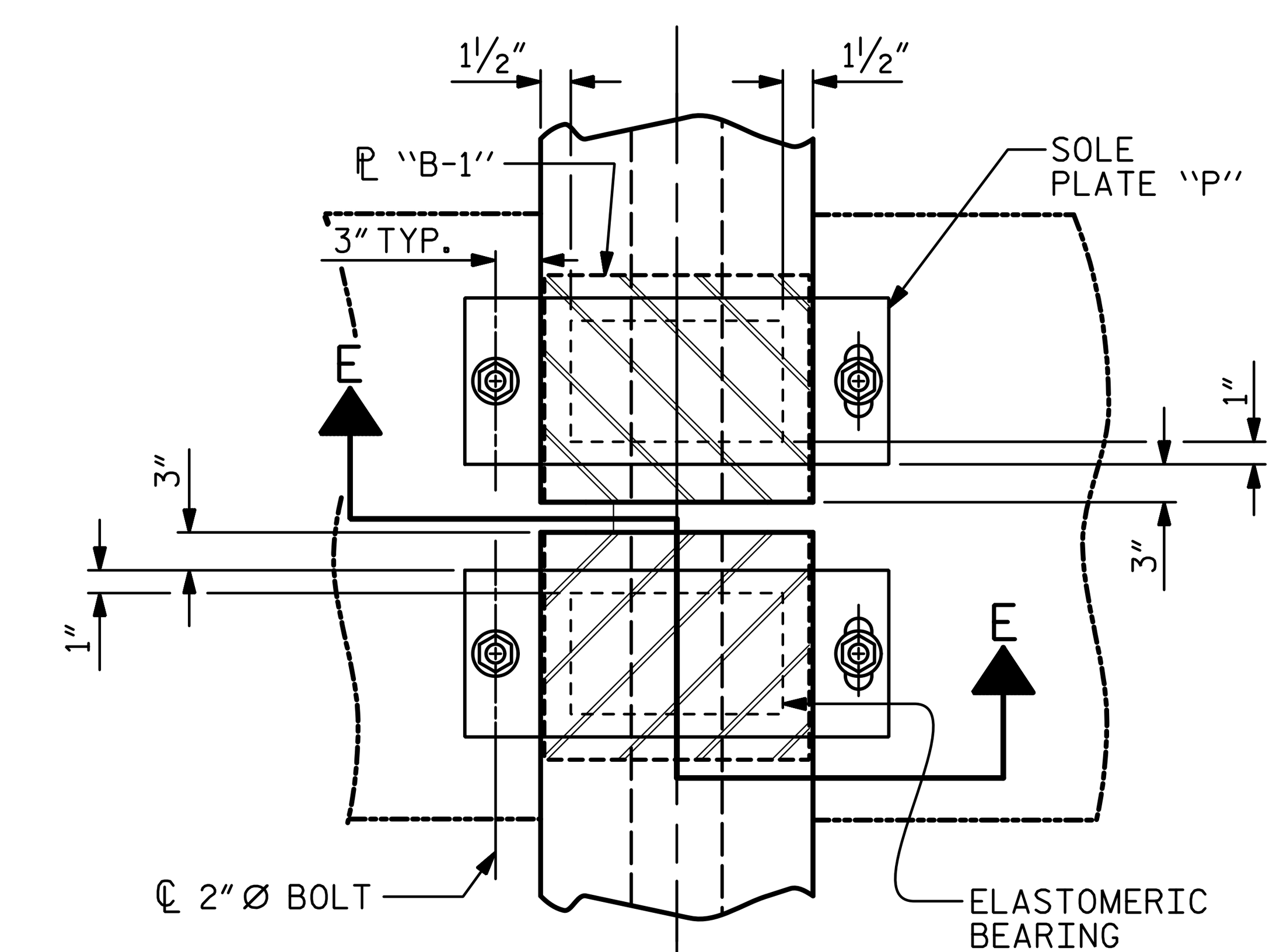
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (16 REQ'D)

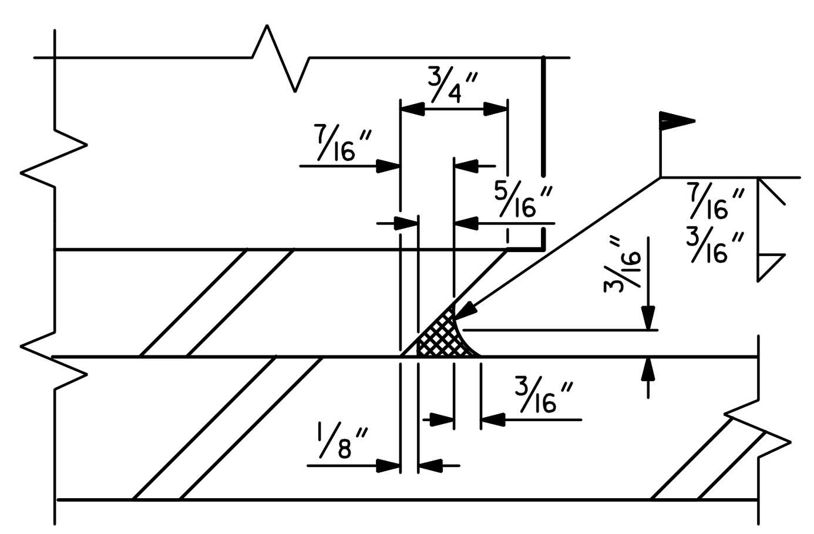
PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING END BENT)



DETAIL "A"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

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

SHEET NO. S4-17
TOTAL SHEETS 36

DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
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DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 1

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.039	0.078	0.114	0.147	0.176	0.201	0.221	0.236	0.244	0.247	0.244	0.236	0.221	0.201	0.176	0.147	0.144	0.078	0.039	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.016	0.032	0.047	0.061	0.073	0.084	0.092	0.098	0.102	0.103	0.102	0.098	0.092	0.201	0.073	0.061	0.047	0.032	0.016	0.000
FINAL CAMBER ↑	0.000	1/4"	9/16"	13/16"	1 1/16"	1 1/4"	1 7/16"	1 9/16"	1 5/8"	1 11/16"	1 3/4"	1 11/16"	1 5/8"	1 9/16"	1 7/16"	1 1/4"	1 1/16"	13/16"	9/16"	1/4"	0.000

DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 2 AND 3

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.039	0.078	0.114	0.147	0.176	0.201	0.221	0.236	0.244	0.247	0.244	0.236	0.221	0.201	0.176	0.147	0.144	0.078	0.039	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.019	0.037	0.055	0.071	0.085	0.097	0.107	0.114	0.119	0.120	0.119	0.114	0.107	0.097	0.085	0.071	0.055	0.037	0.019	0.000
FINAL CAMBER ↑	0.000	1/4"	1/2"	11/16"	15/16"	1 1/8"	1 1/4"	1 3/8"	1 7/16"	1 1/2"	1 1/2"	1 1/2"	1 7/16"	1 3/8"	1 1/4"	1 1/8"	15/16"	11/16"	1/2"	1/4"	0.000

DEAD LOAD DEFLECTION TABLE FOR SPAN A

GIRDER 4

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.039	0.078	0.114	0.147	0.176	0.201	0.221	0.236	0.244	0.247	0.244	0.236	0.221	0.201	0.176	0.147	0.114	0.078	0.039	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.019	0.038	0.056	0.072	0.087	0.100	0.110	0.117	0.121	0.123	0.121	0.117	0.110	0.100	0.087	0.072	0.056	0.038	0.019	0.000
FINAL CAMBER ↑	0.000	1/4"	1/2"	11/16"	7/8"	1 1/16"	1 1/4"	1 5/16"	1 7/16"	1 1/2"	1 1/2"	1 1/2"	1 7/16"	1 5/16"	1 1/4"	1 1/16"	7/8"	11/16"	1/2"	1/4"	0.000

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 1

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.038	0.075	0.110	0.142	0.171	0.195	0.214	0.228	0.237	0.240	0.237	0.228	0.214	0.195	0.171	0.142	0.110	0.075	0.038	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.014	0.027	0.040	0.053	0.064	0.073	0.080	0.086	0.089	0.090	0.089	0.086	0.080	0.073	0.064	0.053	0.040	0.027	0.014	0.000
FINAL CAMBER ↑	0.000	5/16"	9/16"	13/16"	1 1/16"	1 5/16"	1 7/16"	1 5/8"	1 11/16"	1 3/4"	1 13/16"	1 3/4"	1 11/16"	1 5/8"	1 7/16"	1 5/16"	1 1/16"	13/16"	9/16"	5/16"	0.000

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 2 AND 3

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.038	0.075	0.110	0.142	0.171	0.195	0.214	0.228	0.237	0.240	0.237	0.228	0.214	0.195	0.171	0.142	0.110	0.075	0.038	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.016	0.031	0.047	0.061	0.074	0.085	0.093	0.099	0.103	0.105	0.103	0.099	0.093	0.085	0.074	0.061	0.047	0.031	0.016	0.000
FINAL CAMBER ↑	0.000	1/4"	1/2"	3/4"	1"	1 3/16"	1 5/16"	1 7/16"	1 9/16"	1 5/8"	1 5/8"	1 5/8"	1 9/16"	1 7/16"	1 5/16"	1 3/16"	1"	3/4"	1/2"	1/4"	0.000

DEAD LOAD DEFLECTION TABLE FOR SPAN B

GIRDER 4

TWENTIETH POINTS	0.00	.05	0.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.038	0.075	0.110	0.142	0.171	0.195	0.214	0.228	0.237	0.240	0.237	0.228	0.214	0.195	0.171	0.142	0.110	0.075	0.038	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.016	0.032	0.047	0.062	0.075	0.086	0.095	0.101	0.105	0.106	0.105	0.101	0.095	0.086	0.075	0.062	0.047	0.032	0.016	0.000
FINAL CAMBER ↑	0.000	1/4"	1/2"	3/4"	15/16"	1 1/8"	1 5/16"	1 7/16"	1 1/2"	1 9/16"	1 5/8"	1 9/16"	1 1/2"	1 7/16"	1 5/16"	1 1/8"	15/16"	3/4"	1/2"	1/4"	0.000

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

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-

DRAWN BY : MBC DATE : 3-17
CHECKED BY : TRL DATE : 4-17
DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.
6/30/2017

STV 100 Years
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Charlotte, NC 28202
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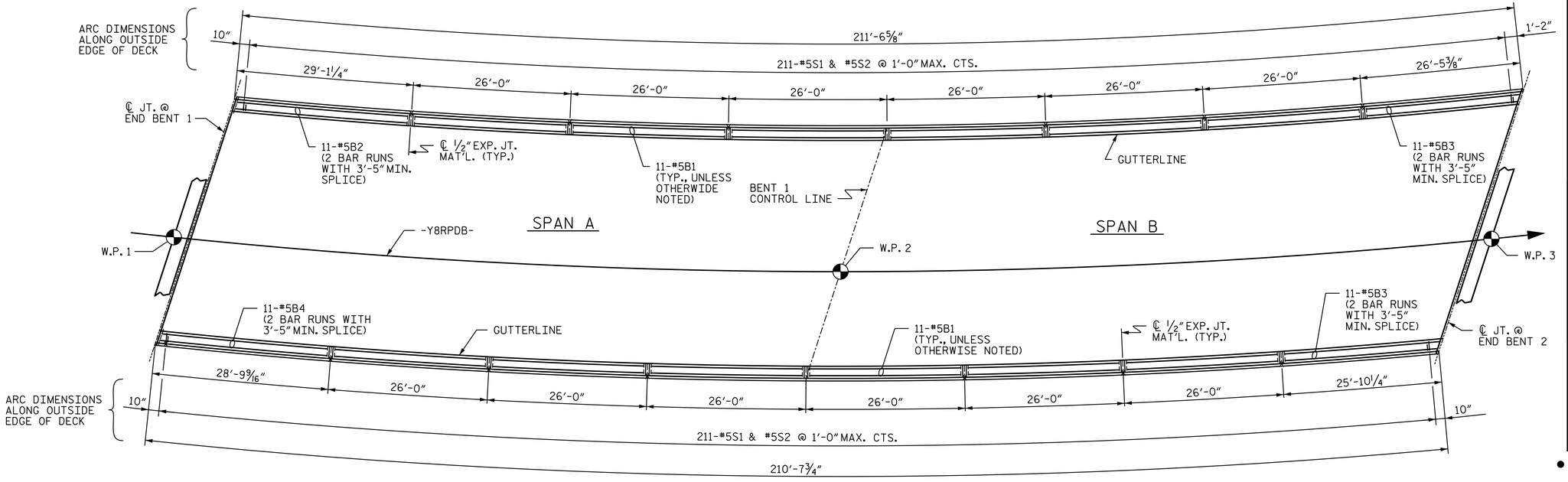
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

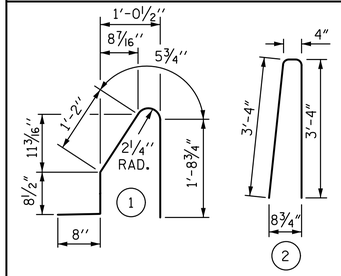
DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-18
1			3			TOTAL SHEETS
2			4			36



PLAN

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

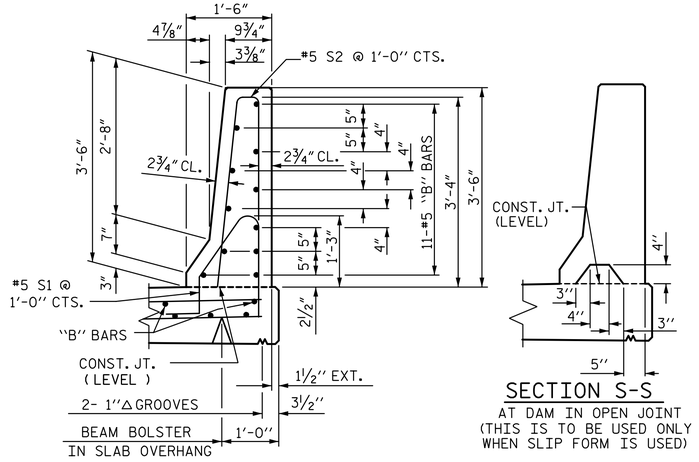
BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	132	#5	STR	25′-6″	3511
✳ B2	22	#5	STR	16′-3″	373
✳ B3	44	#5	STR	14′-9″	677
✳ B4	22	#5	STR	15′-11″	365
✳ S1	422	#5	1	4′-9″	2091
✳ S2	422	#5	2	7′-0″	3081

✳ EPOXY COATED REINFORCING STEEL	10098 LBS.
CLASS AA CONCRETE	57.4 CU. YDS.
CONCRETE BARRIER RAIL SUPERSTRUCTURE	422.20 LIN. FT.
● APPROACH SLABS	41.01 LIN. FT.
TOTAL	463.21 LIN. FT.

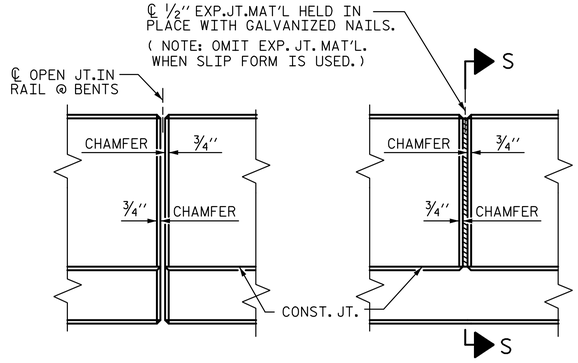
● FOR EPOXY COATED REINFORCING STEEL AND CLASS AA CONCRETE IN THE BARRIER RAIL ON THE APPROACH SLABS, SEE ″BRIDGE APPROACH SLAB DETAILS″ SHEET.



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

NOTES

THE BARRIER RAIL IN EACH 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 IN BARRIER RAIL SHALL BE EPOXY COATED.

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

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

FOR CONCRETE BARRIER RAIL ON APPROACH SLAB, SEE ″BRIDGE APPROACH SLAB DETAILS″ SHEETS.

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS

6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

STV 100 Years

STV ENGINEERS, INC.
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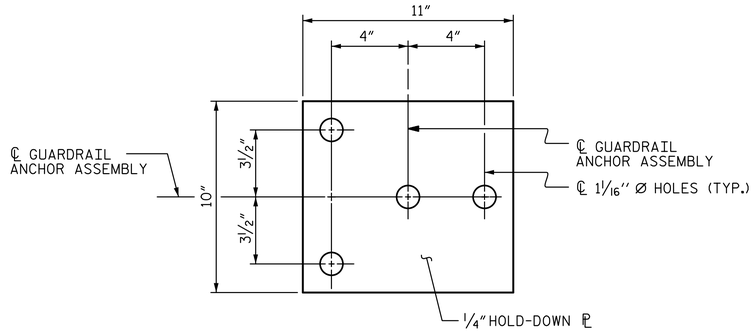
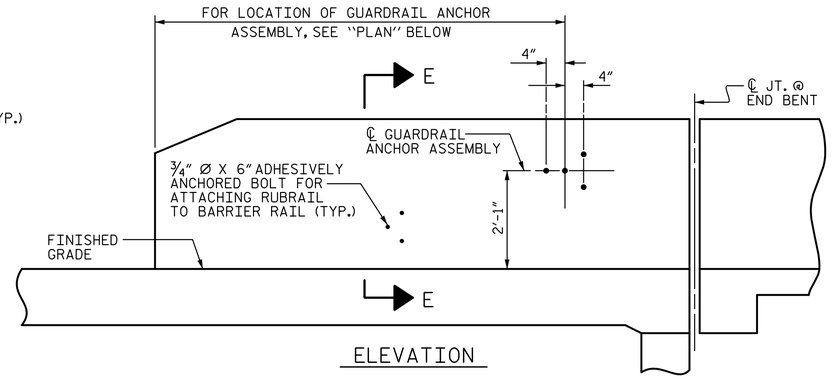
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-19
1			3			TOTAL SHEETS
2			4			36

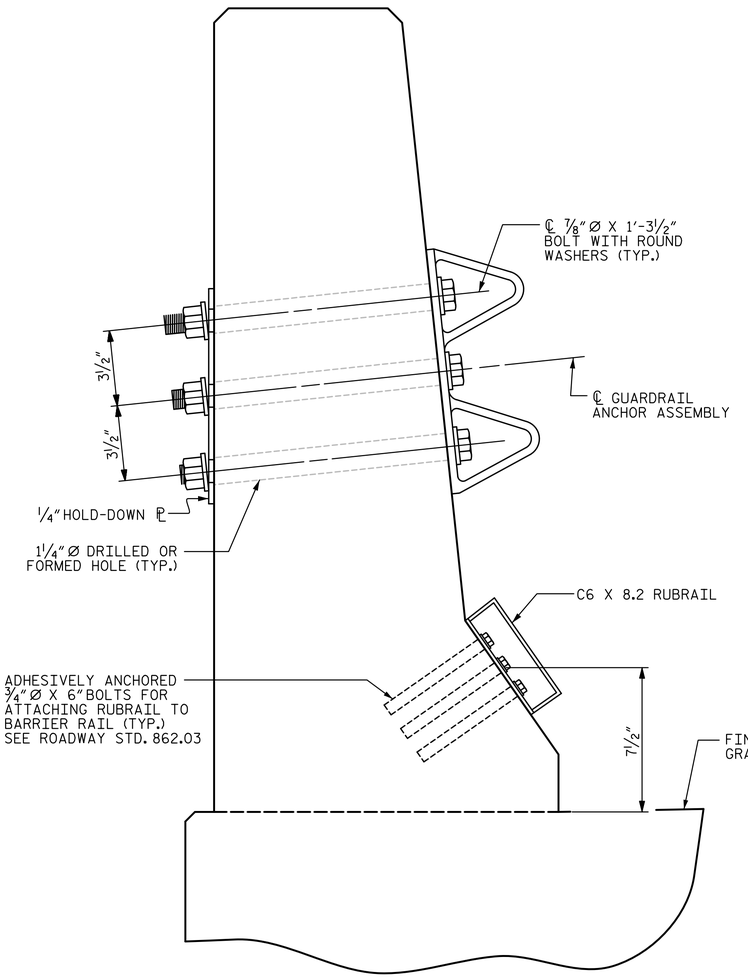
DRAWN BY : MBC	DATE : 3-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
CHECKED BY : TRL	DATE : 4-17		



PLAN



ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS

PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN

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.)

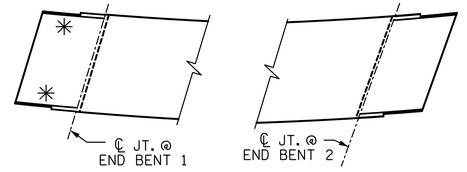
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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DocuSigned by: Tony R. Laws

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.

7/24/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-20
1			3			TOTAL SHEETS
2			4			36

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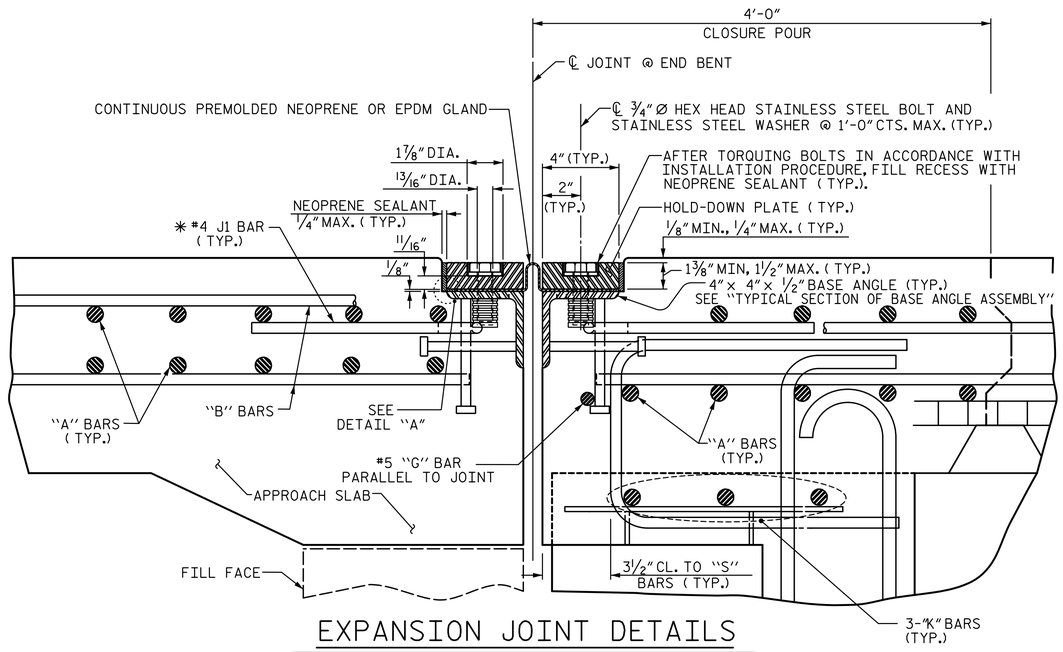


EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

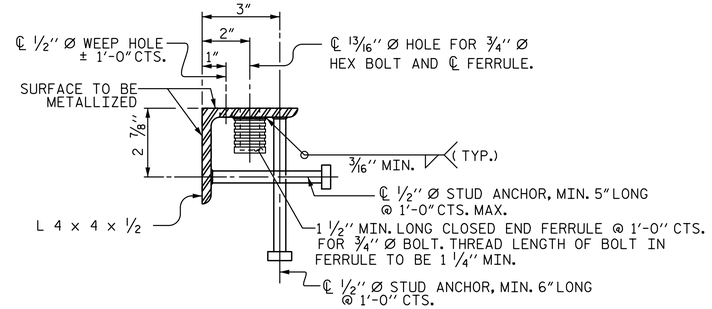
* THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

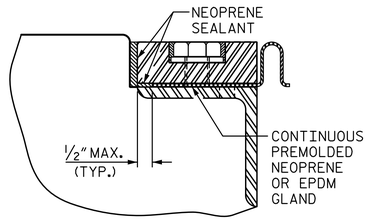
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO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

GENERAL NOTES

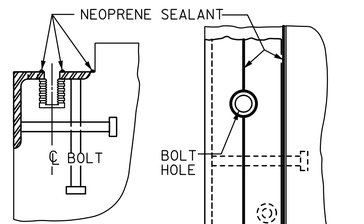
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS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



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

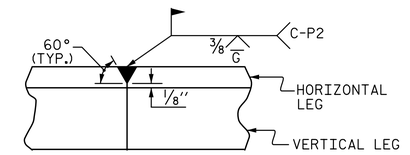


DETAIL "A"



CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL- FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT					
END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	102°-07'-14"	⅝"	1 7/16"	1 5/16"	1⅛"
2	113°-38'-50"	9/16"	1⅜"	1 5/16"	1⅛"

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 2

DRAWN BY : MBC DATE : 3-17
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DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-21
1			3			TOTAL SHEETS
2			4			36

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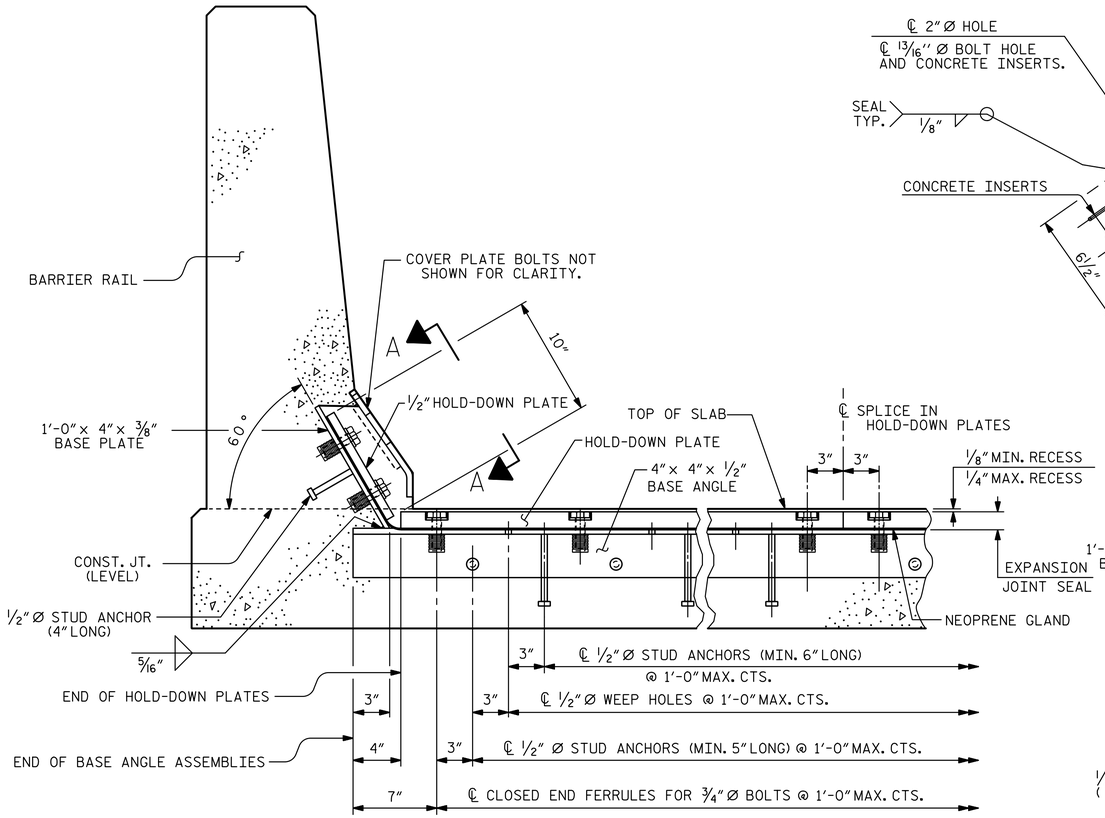
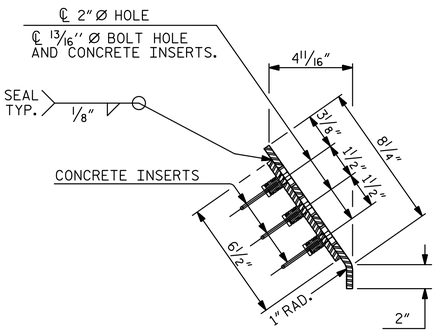
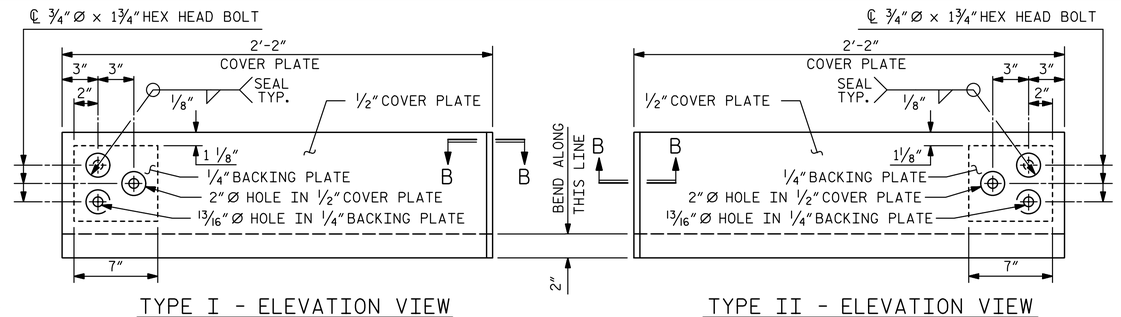


SECTION THRU RAIL NORMAL TO JOINT



END VIEW

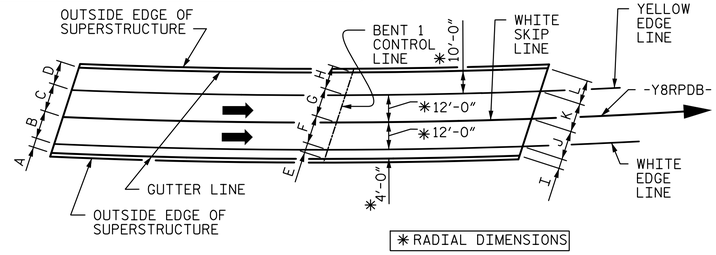


TYPE I - ELEVATION VIEW

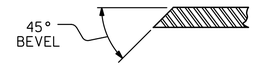
TYPE II - ELEVATION VIEW

COVER PLATE DETAILS

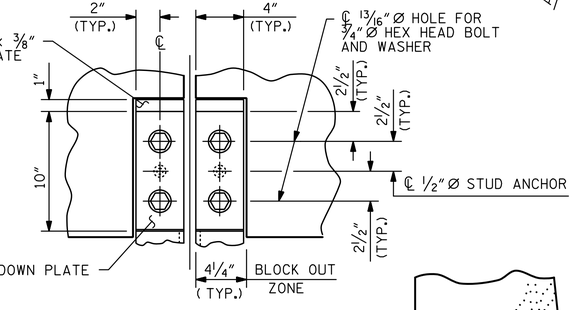
PAVEMENT MARKING DIMENSIONS					
A	4'-4 1/16"	E	4'-2 3/8"	I	4'-4 1/4"
B	12'-3 1/4"	F	12'-7 5/16"	J	13'-1 1/16"
C	12'-3 5/16"	G	12'-7 1/16"	K	13'-1 3/8"
D	10'-2 13/16"	H	10'-6 3/8"	L	10'-11 1/16"



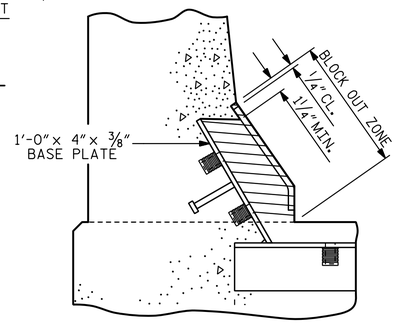
PAVEMENT MARKING ALIGNMENT



SECTION B - B

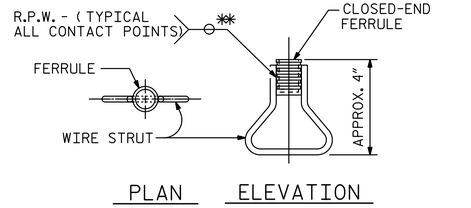


SECTION A - A



BLOCK OUT DETAIL

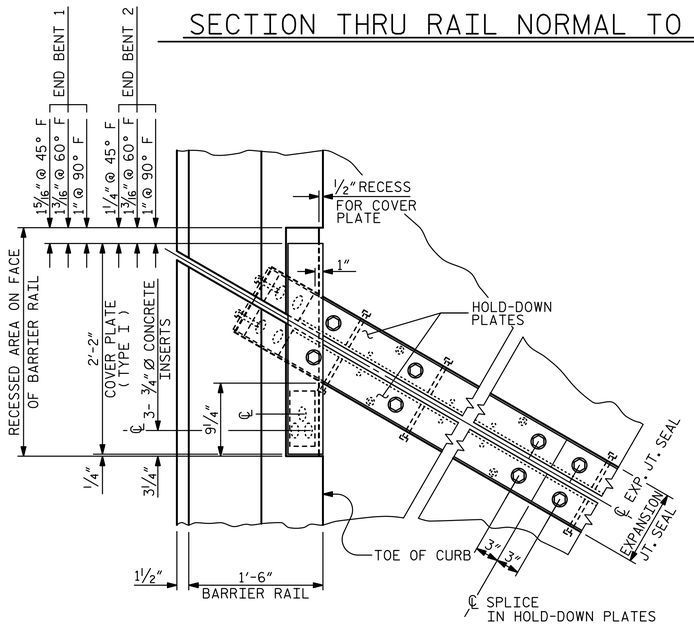
SEE " SECTION A - A " FOR OTHER DETAILS.



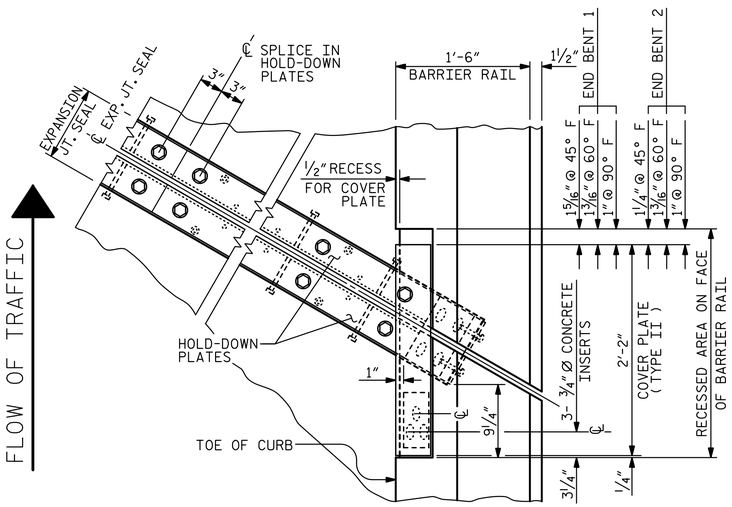
PLAN ELEVATION

CONCRETE INSERT

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



FLOW OF TRAFFIC



PLAN OF EXPANSION JOINT SEAL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 2

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONYR LAWS, JR

6/30/2017

STV 100 Years

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

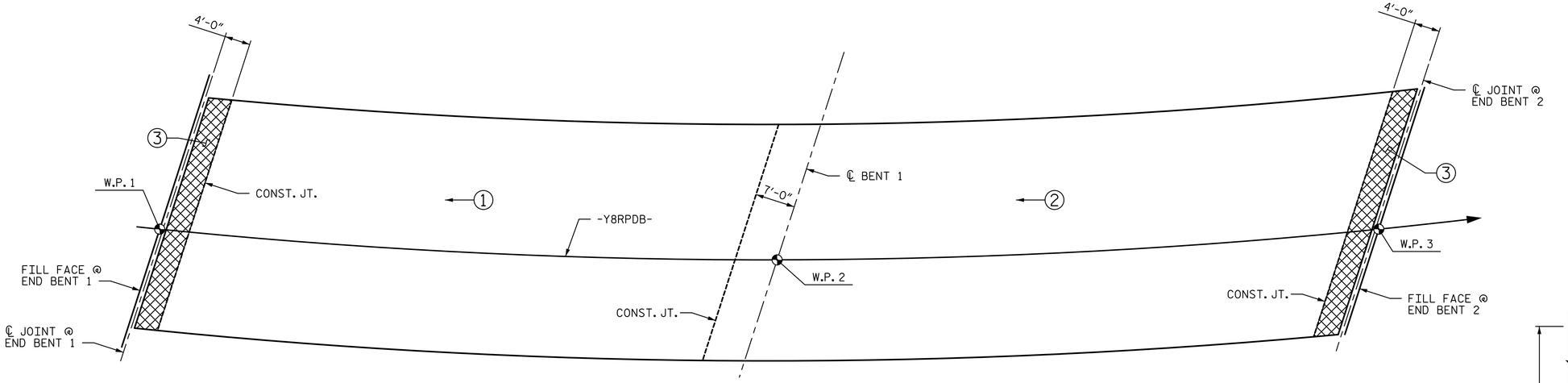
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-22
1			3			TOTAL SHEETS
2			4			36

r:\404_043_U4751_SMU_JT_022_640204.dgn 6/30/2017 13:10:48 ttownsend

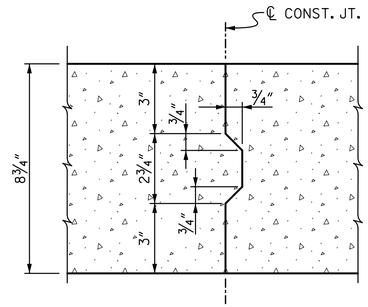


POUR SEQUENCE

←(#) = INDICATES POUR NUMBER AND DIRECTION OF POUR

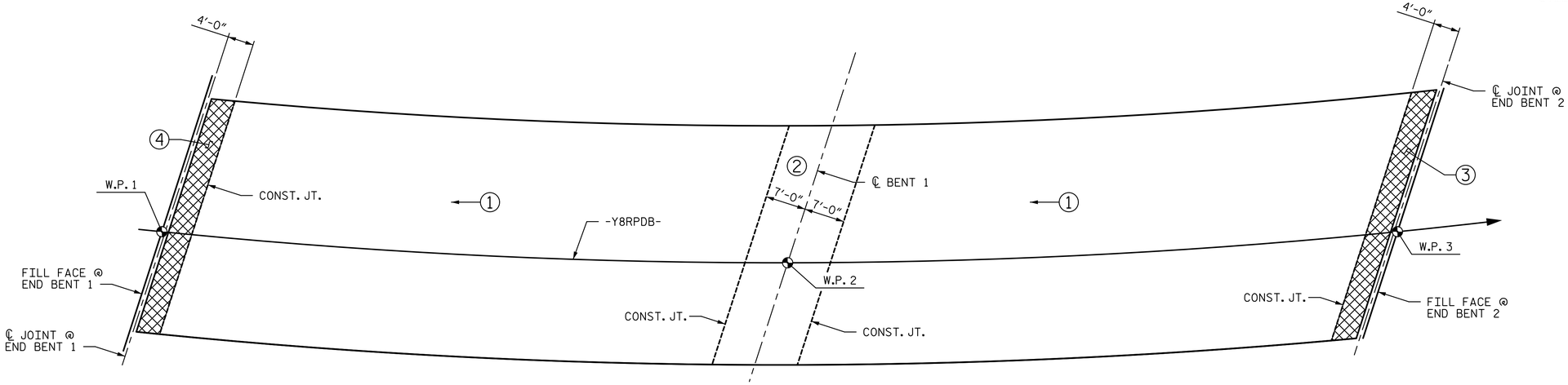
LEGEND:

▨ DECK CLOSURE POUR AT JOINTS.



CONSTRUCTION JOINT DETAIL

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



OPTIONAL POUR SEQUENCE

POUR ② CAN NOT BE STARTED UNTIL THE CONCRETE STRENGTH IN BOTH ADJACENT ①POURS REACH A MINIMUM OF 3000 PSI.

←(#) = INDICATES POUR NUMBER AND DIRECTION OF POUR

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 ENGINEER JOHN R. LAWS, JR.

6/30/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DECK POUR SEQUENCE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-23
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 2-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
CHECKED BY : TRL	DATE : 4-17		

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″			

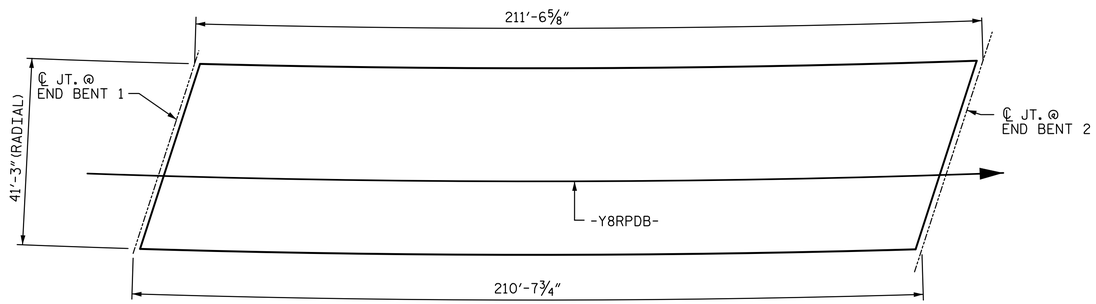
GROOVING BRIDGE FLOORS

APPROACH SLABS	1,670	SQ.FT.
BRIDGE DECK	7,346	SQ.FT.
TOTAL	9,016	SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR #1	131.0	--	--
POUR #2	167.2	--	--
POUR #3	16.2	--	--
TOTALS**	314.4	29,519	28,593

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED



LAYOUT FOR COMPUTING AREA
REINFORCED CONCRETE DECK SLAB
(SQ. FT. = 8,708)

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	364	#5	STR	41′-1″	15,597
A2	364	#5	STR	41′-1″	15,597
✳A100	1	#5	STR	3′-0″	3
✳A101	1	#5	STR	4′-9″	5
✳A102	2	#5	STR	5′-5″	11
✳A103	2	#5	STR	7′-2″	15
✳A104	2	#5	STR	8′-11″	19
✳A105	2	#5	STR	10′-8″	22
✳A106	2	#5	STR	12′-4″	26
✳A107	2	#5	STR	14′-1″	29
✳A108	2	#5	STR	15′-10″	33
✳A109	2	#5	STR	17′-7″	37
✳ A110	2	#5	STR	19′-3″	40
✳ A111	2	#5	STR	21′-0″	44
✳ A112	2	#5	STR	21′-4″	45
✳ A113	2	#5	STR	19′-9″	41
✳ A114	2	#5	STR	18′-1″	38
✳ A115	2	#5	STR	16′-6″	34
✳A116	2	#5	STR	14′-10″	31
✳A117	2	#5	STR	13′-3″	28
✳A118	2	#5	STR	11′-7″	24
✳A119	2	#5	STR	10′-0″	21
✳A120	2	#5	STR	8′-4″	17
✳A121	2	#5	STR	6′-9″	14
✳A122	2	#5	STR	5′-2″	11
✳A123	1	#5	STR	4′-5″	5
✳A124	1	#5	STR	2′-10″	3
A200	1	#5	STR	3′-0″	3
A201	1	#5	STR	4′-9″	5
A202	2	#5	STR	5′-3″	11
A203	2	#5	STR	7′-0″	15
A204	2	#5	STR	8′-9″	18
A205	2	#5	STR	10′-6″	22
A206	2	#5	STR	12′-2″	25
A207	2	#5	STR	13′-11″	29
A208	2	#5	STR	15′-8″	33
A209	2	#5	STR	17′-5″	36
A210	2	#5	STR	19′-1″	40
A211	2	#5	STR	20′-10″	43
A212	2	#5	STR	21′-2″	44
A213	2	#5	STR	19′-7″	41
A214	2	#5	STR	17′-11″	37
A215	2	#5	STR	16′-4″	34
A216	2	#5	STR	14′-8″	31
A217	2	#5	STR	13′-1″	27
A218	2	#5	STR	11′-5″	24
A219	2	#5	STR	9′-10″	21
A220	2	#5	STR	8′-2″	17
A221	2	#5	STR	6′-7″	14
A222	2	#5	STR	5′-0″	10
A223	1	#5	STR	4′-5″	5
A224	1	#5	STR	2′-10″	3

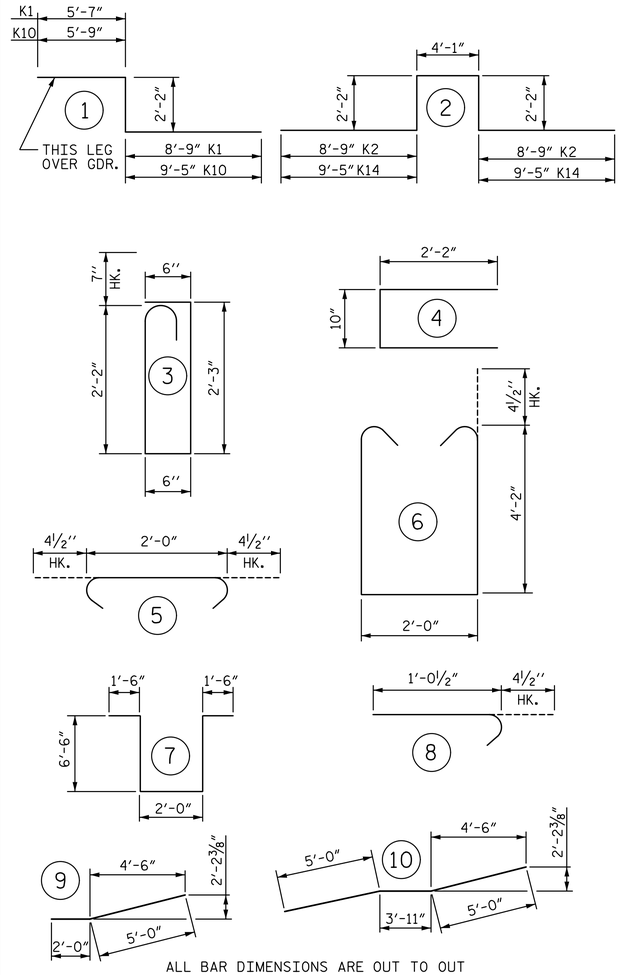
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	56	#5	STR	41′-0″	2,395
✳ B2	28	#7	STR	60′-0″	3,434
✳ B3	27	#7	STR	32′-0″	1,766
✳ B4	27	#7	STR	22′-0″	1,214
B5	90	#5	STR	47′-8″	4,474
B6	45	#7	STR	32′-0″	2,943
✳ B7	56	#5	STR	39′-10″	2,327
B8	90	#5	STR	46′-7″	4,373
✳ G1	1	#5	STR	41′-10″	44
✳ G2	1	#5	STR	44′-8″	47
✳ J1	82	#4	8	1′-5″	78
✳ K1	4	#8	1	16′-6″	176
✳ K2	4	#8	2	25′-11″	277
K3	3	#6	STR	7′-2″	32
K4	3	#6	STR	8′-1″	36
K5	3	#6	STR	10′-9″	48
K6	30	#4	STR	10′-7″	212
K7	6	#4	STR	8′-10″	35
K8	12	#4	9	7′-0″	56
K9	12	#4	10	13′-11″	112
✳ K10	4	#8	1	17′-4″	185
K11	3	#6	STR	7′-10″	35
K12	3	#6	STR	9′-2″	41
K13	3	#6	STR	11′-2″	50
✳ K14	4	#8	2	27′-3″	291
✳ S1	48	#4	4	5′-2″	166
S2	48	#5	3	6′-1″	300
S3	138	#4	5	2′-9″	254
S4	6	#4	6	11′-1″	44
U1	24	#4	7	18′-0″	289

REINFORCING STEEL 29,519 LBS.

✳ EPOXY COATED REINFORCING STEEL 28,593 LBS.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

DRAWN BY : MBC DATE : 3-17
CHECKED BY : TRL DATE : 4-17
DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.
6/30/2017

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St. Suite 715
Charlotte, NC 28202
NC License Number F-0991

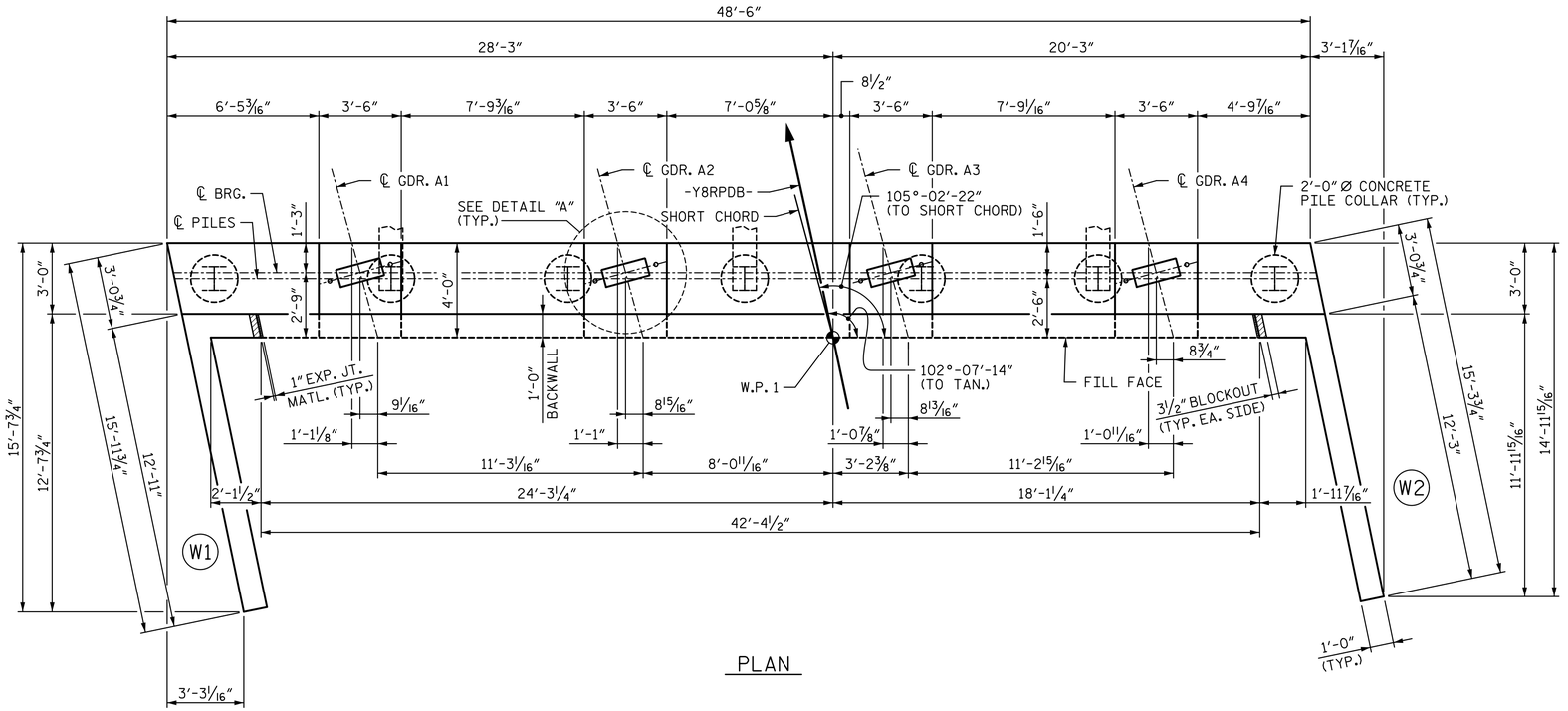
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

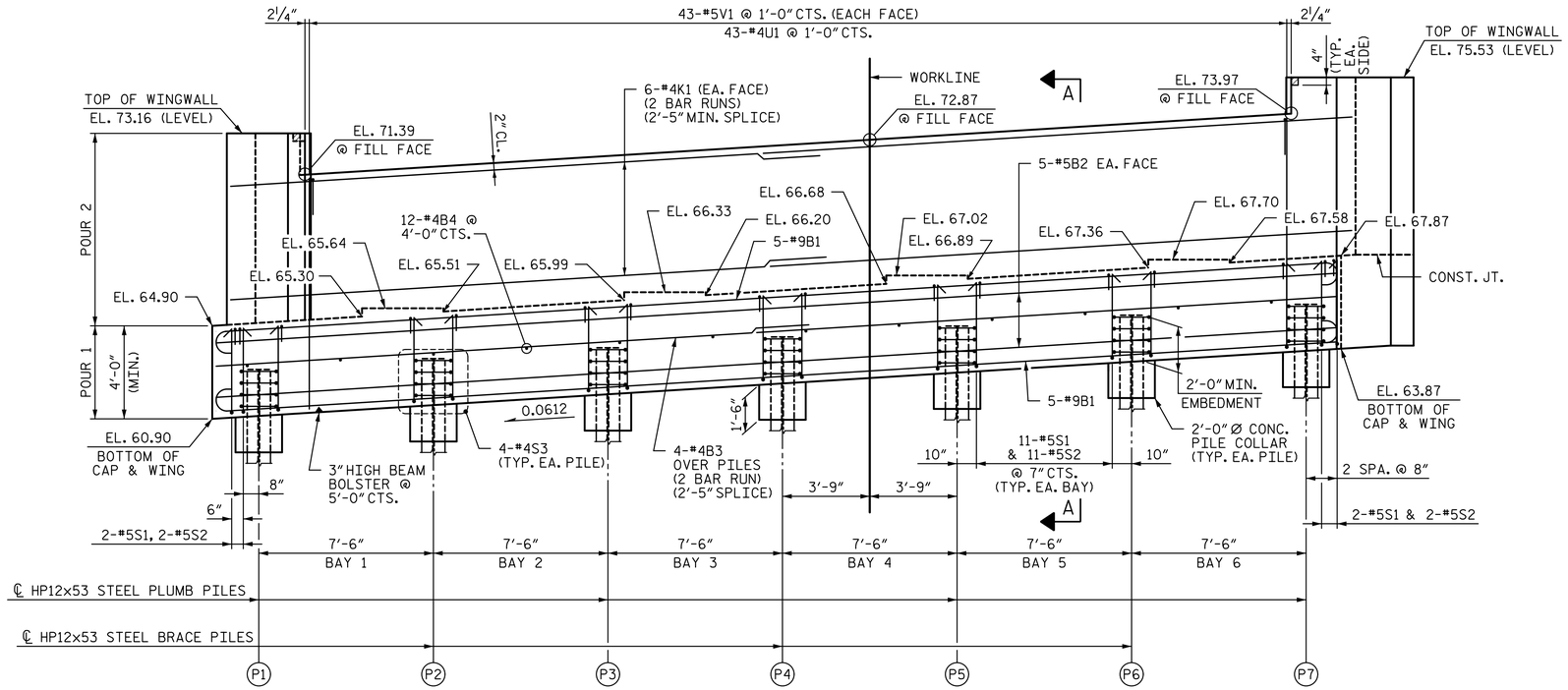
BILL OF MATERIAL

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

SHEET NO. S4-24
TOTAL SHEETS 36



PLAN



ELEVATION

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

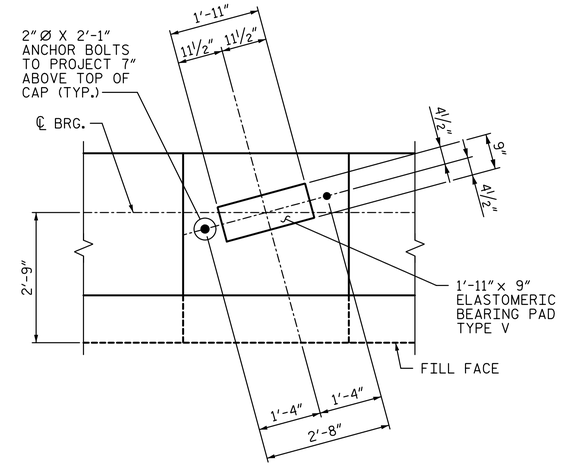
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE OUTSIDE FACE AT THE RATE OF 2%.

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

INSTALL THE 4″ Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL. SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



DETAIL A

(DIMENSIONS ARE TYPICAL FOR EACH GIRDER)

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	63.02
P2	63.48
P3	63.94
P4	64.39
P5	64.86
P6	65.32
P7	65.77

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS

6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-25
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC DATE : 4-17

CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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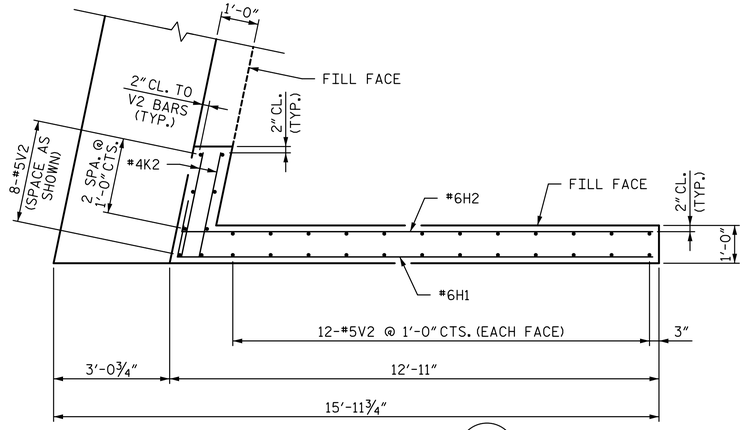
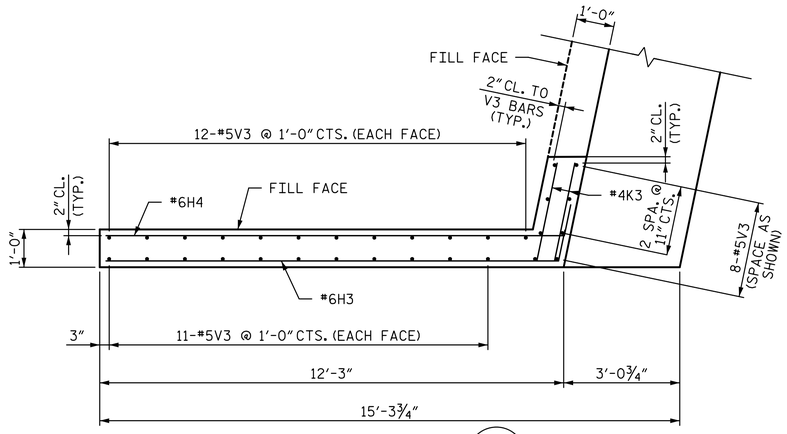


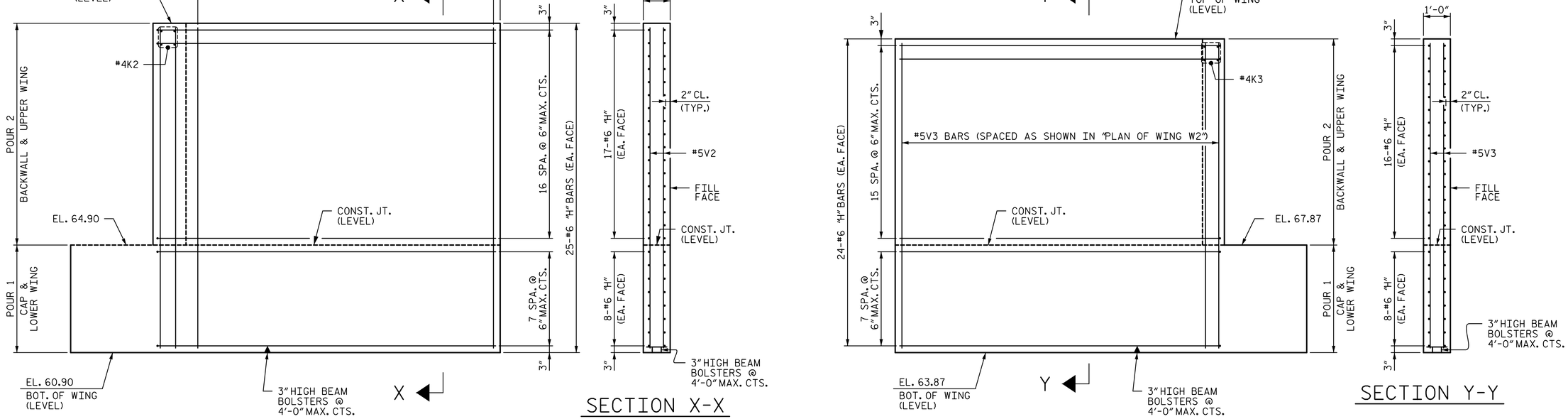
PLAN OF WING W1



PLAN OF WING W2

SECTION X-X

ELEVATION OF WING W1



SECTION Y-Y

ELEVATION OF WING W2

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 3

DRAWN BY : MBC DATE : 4-17

CHECKED BY : TRL DATE : 4-17

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RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-26
1			3			TOTAL SHEETS
2			4			36

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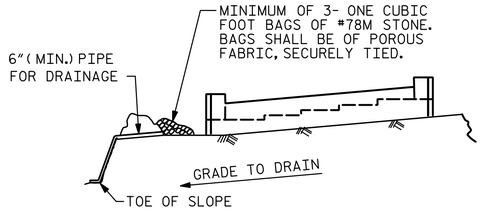
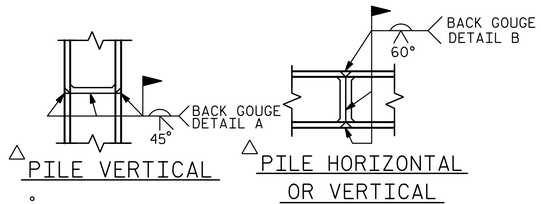


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

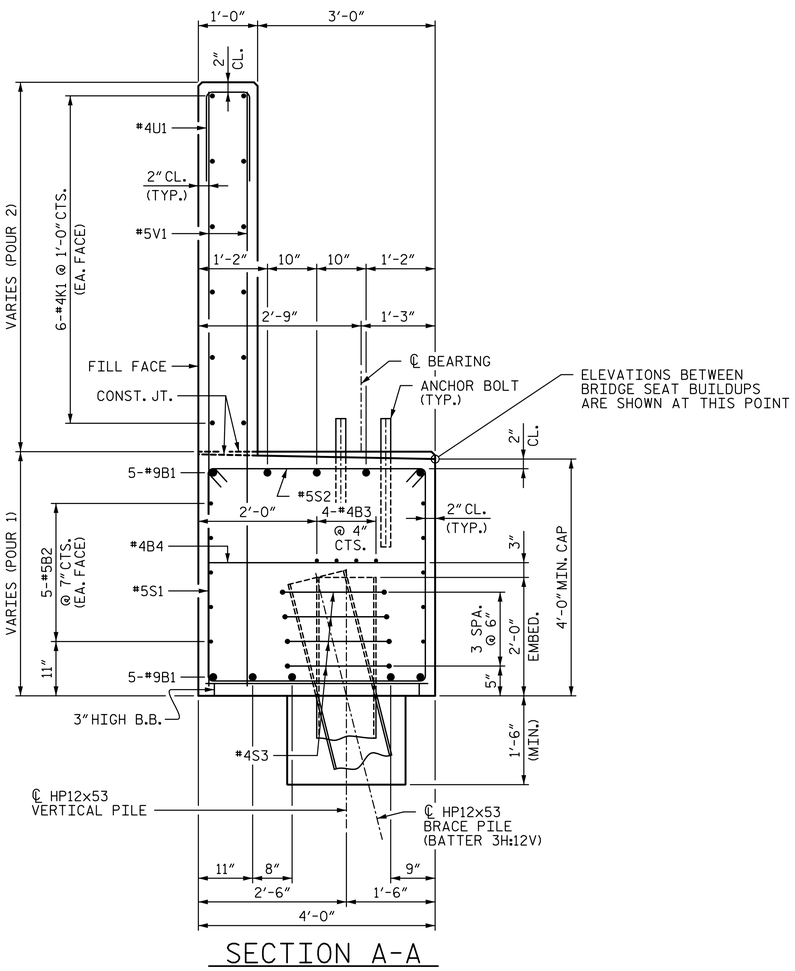
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



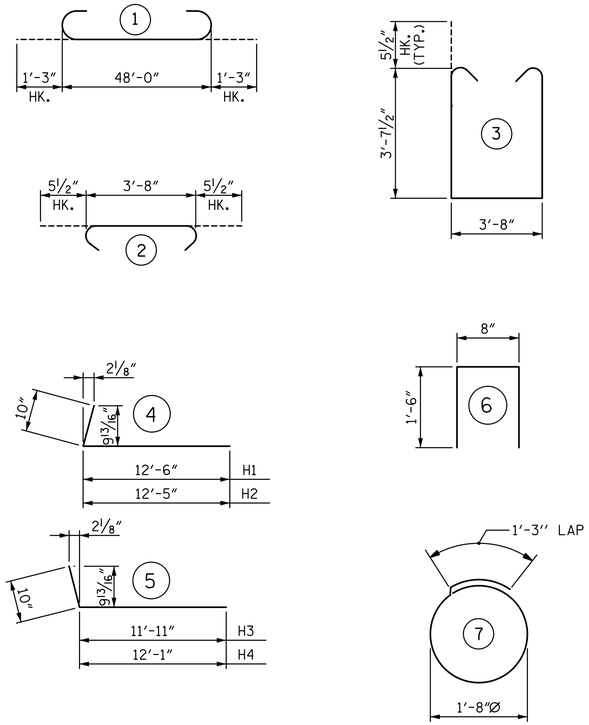
△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	50'-6"	1717
B2	10	#5	STR	48'-2"	502
B3	8	#4	STR	25'-4"	135
B4	12	#4	STR	3'-8"	29
H1	25	#6	4	13'-4"	501
H2	25	#6	4	13'-3"	498
H3	24	#6	5	12'-9"	460
H4	24	#6	5	12'-11"	466
K1	12	#4	STR	25'-4"	203
K2	4	#4	STR	2'-9"	7
K3	4	#4	STR	2'-7"	7
S1	70	#5	3	11'-10"	864
S2	70	#5	2	4'-7"	335
S3	28	#4	7	6'-6"	122
U1	43	#4	6	3'-8"	105
V1	86	#5	STR	9'-10"	882
V2	32	#5	STR	11'-11"	398
V3	31	#5	STR	11'-3"	364

QUANTITIES

REINFORCING STEEL	LBS.	7,595
CLASS A CONCRETE:		
POUR 1:		
CAP , COLLARS, & LOWER WING	C.Y.	33.9
POUR 2:		
BACKWALL & UPPER WING	C.Y.	18.3
TOTAL	C.Y.	52.2
HP 12x53 STEEL PILES	NO.	7
	LIN. FEET	490
PILE REDRIVES	EA.	3
PILE SETUP FOR HP 12x53 PILES	EA.	7

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 3 OF 3

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. LAWS
CHECKED BY : TRL	DATE : 4-17	DATE : 5-17

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TONY R. LAWS, JR.

6/30/2017

STV 100 Years

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

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-27
1			3			TOTAL SHEETS
2			4			36

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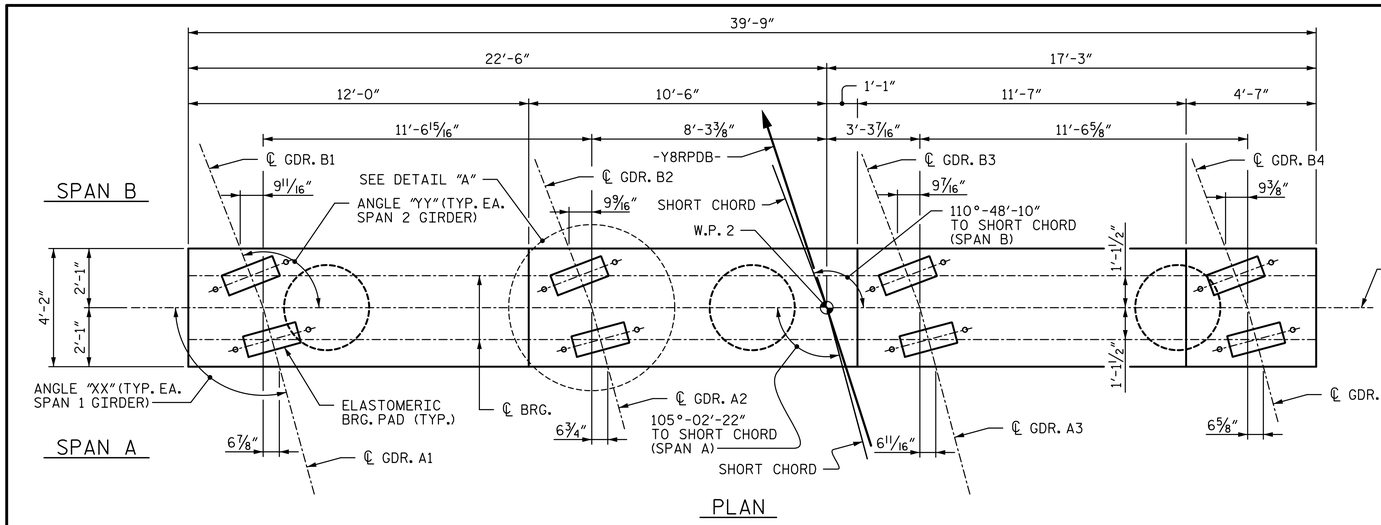
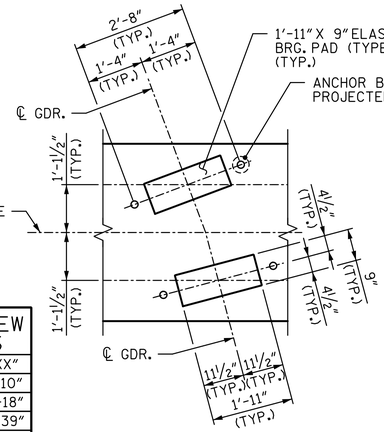


PLAN

PLAN VIEW ANGLES	
GDR.	ANGLE "XX"
A1	105°-19′-10″
A2	105°-09′-18″
A3	104°-59′-39″
A4	104°-50′-11″
GDR.	ANGLE "YY"
B1	111°-11′-57″
B2	110°-57′-58″
B3	110°-44′-19″
B4	110°-30′-57″



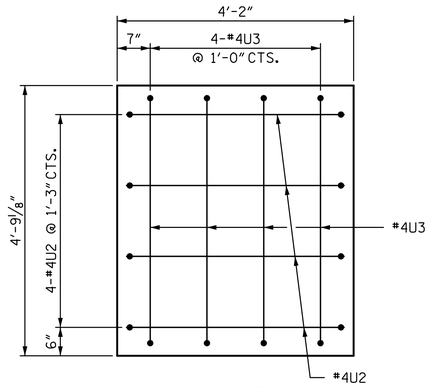
DETAIL "A"
(TYP. EA. GDR.)

NOTES:

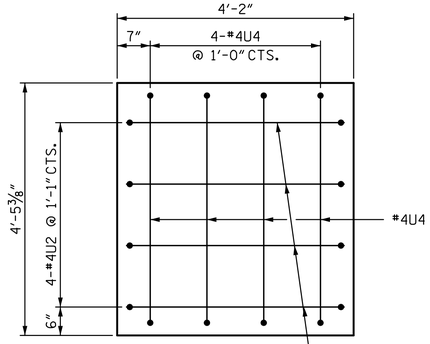
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

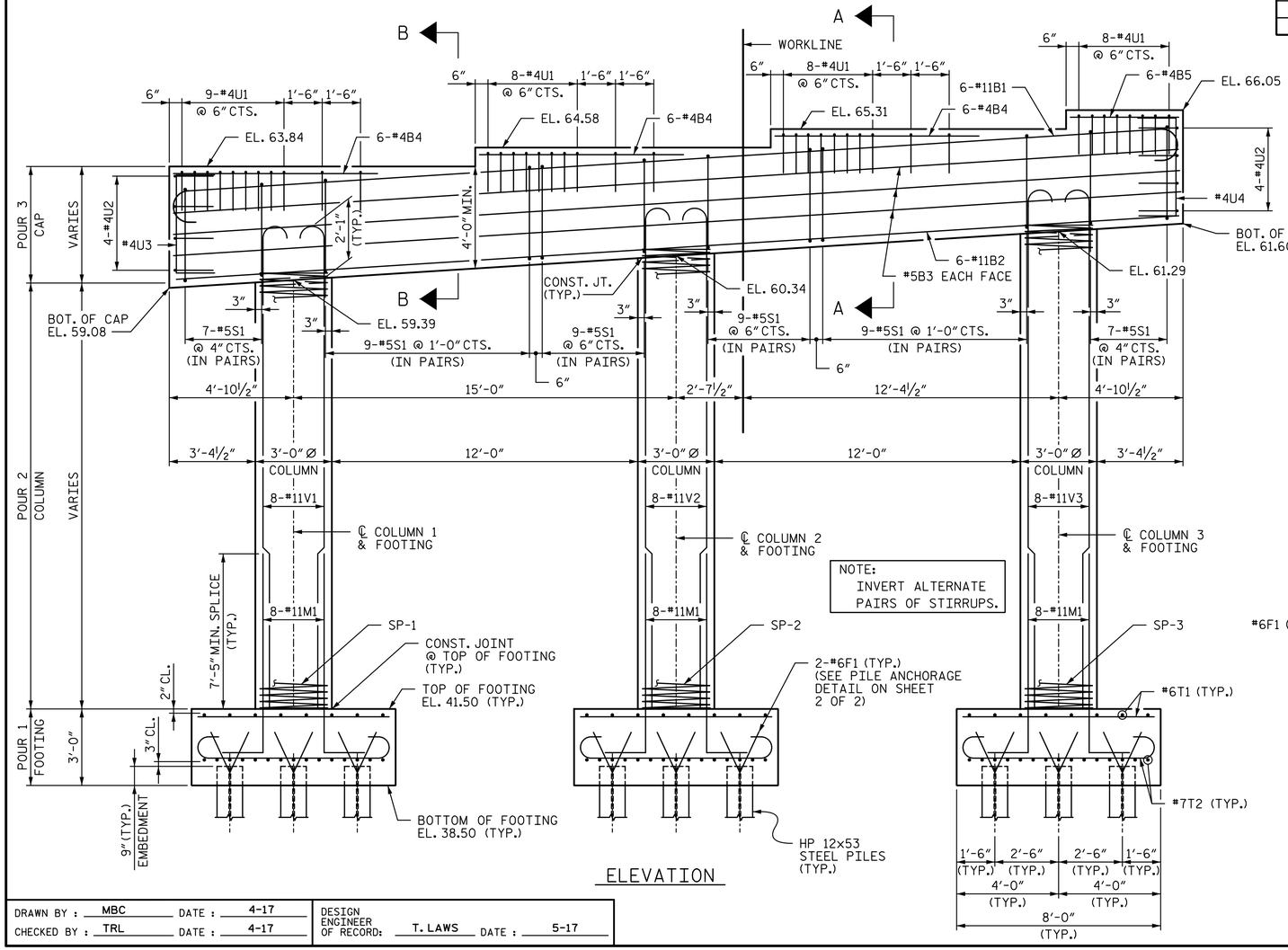
PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.



END VIEW
(LEFT SIDE)

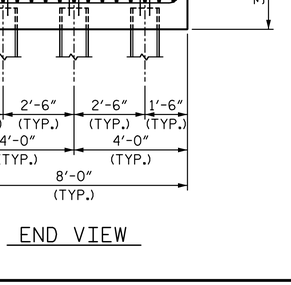


END VIEW
(RIGHT SIDE)



NOTE:
INVERT ALTERNATE PAIRS OF STIRRUPS.

ELEVATION



END VIEW

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-
SHEET 1 OF 2

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DocuSigned by: Timothy Laws
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 ENGINEER TIMOTHY R. LAWS, JR.
6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-28
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
CHECKED BY : TRL	DATE : 4-17		

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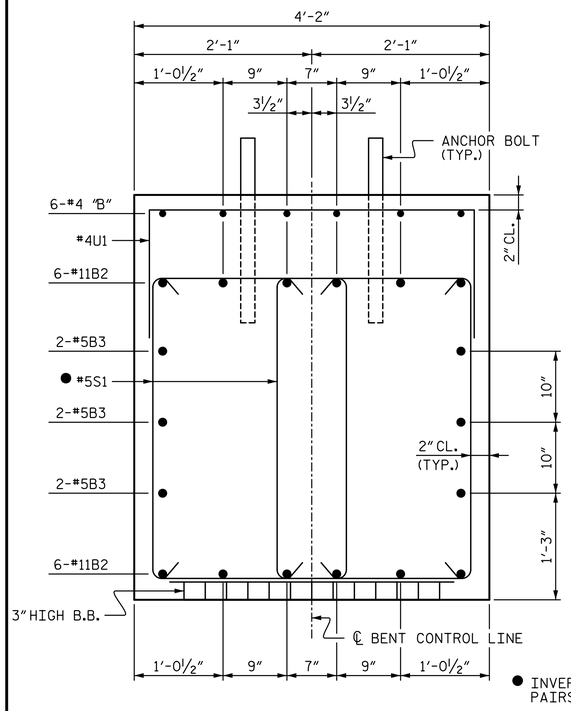
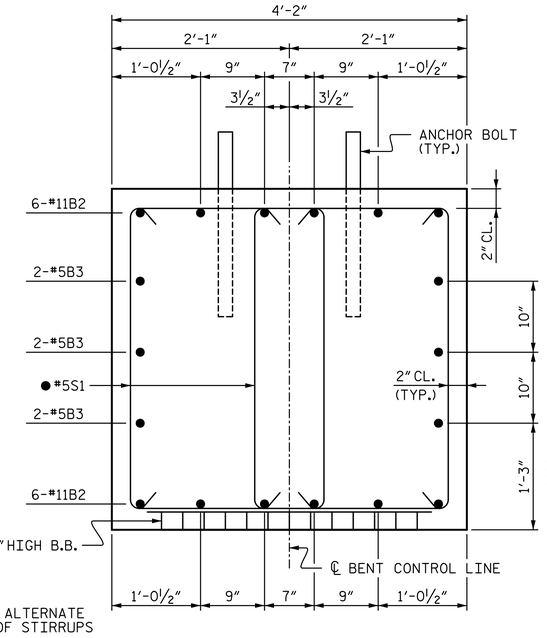
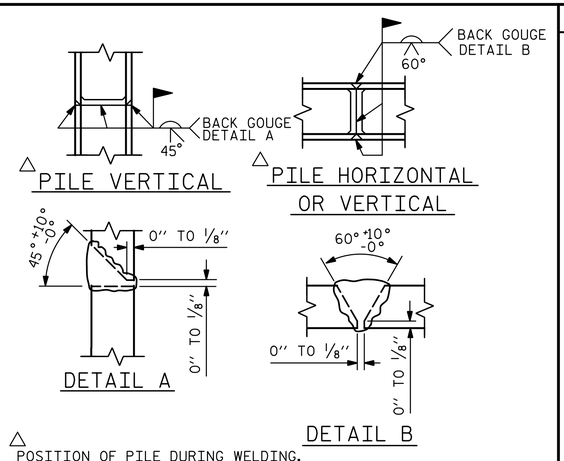


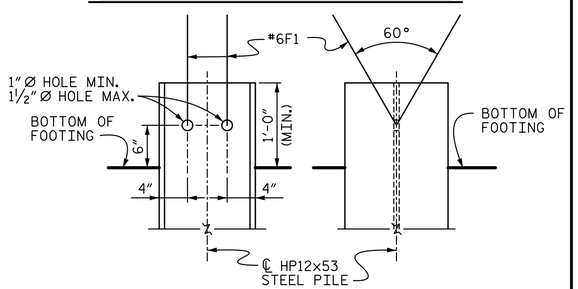
SECTION A-A



SECTION B-B



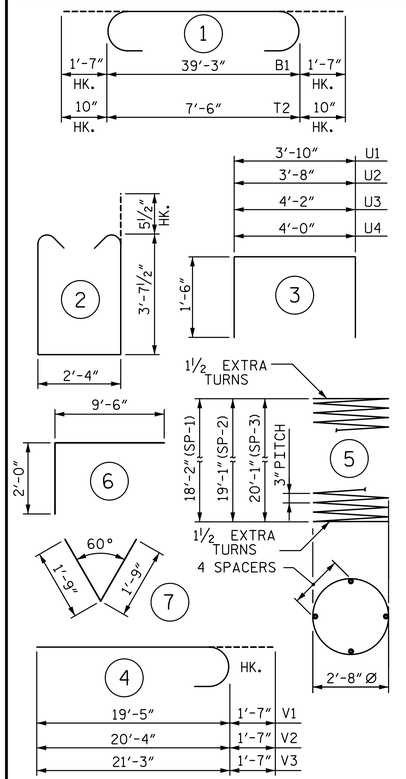
PILE SPLICE DETAILS



PILE ANCHORAGE DETAIL

HOLES SHALL BE DRILLED OR FLAME CUT.
GRIND AREA AROUND FLAME CUT HOLES TO REMOVE BURRS.
REINFORCING BARS SHALL BE TIED OR WEDGED TIGHTLY AGAINST THE TOP OF THE HOLE

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

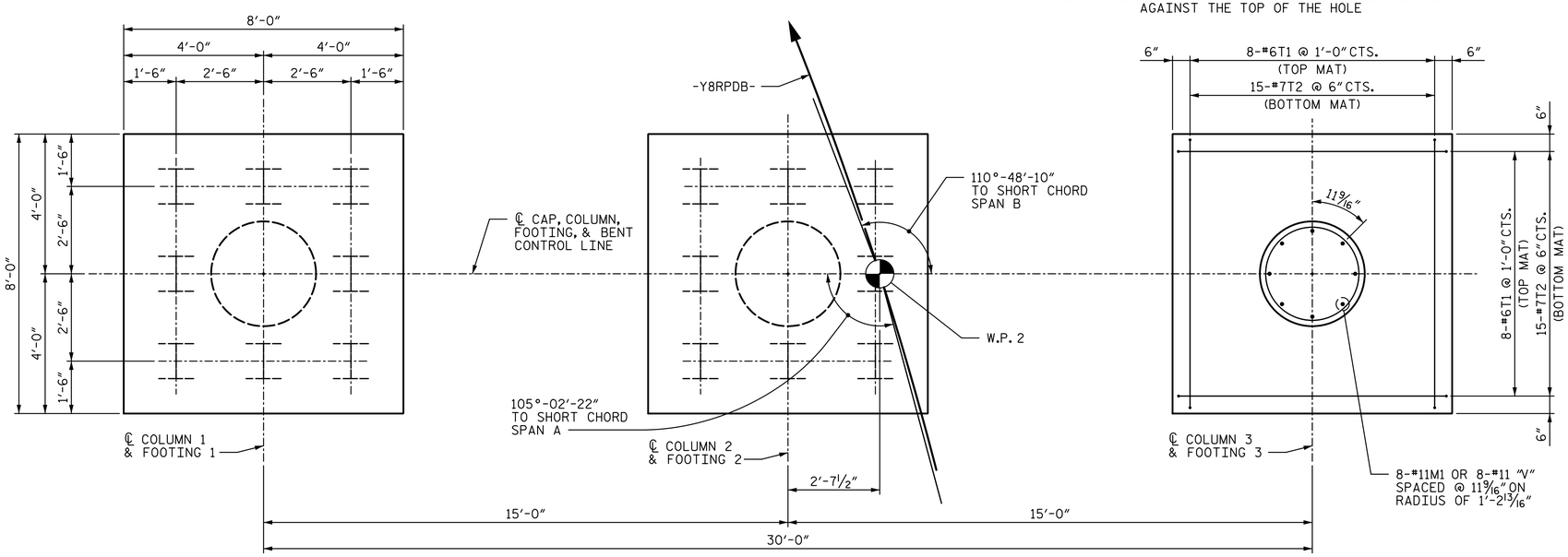
BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#11	1	42′-5″	1,352
B2	6	#11	STR	39′-5″	1,257
B3	6	#5	STR	39′-5″	247
B4	18	#4	STR	8′-0″	96
B5	6	#4	STR	4′-3″	17
F1	48	#6	7	3′-6″	252
M1	24	#11	6	11′-6″	1,466
S1	100	#5	2	10′-6″	1,095
T1	48	#6	STR	7′-8″	553
T2	90	#7	1	9′-2″	1,686
U1	39	#4	3	6′-10″	178
U2	8	#4	3	6′-8″	36
U3	4	#4	3	7′-2″	19
U4	4	#4	3	7′-0″	19
V1	8	#11	4	21′-0″	893
V2	8	#11	4	21′-11″	932
V3	8	#11	4	22′-0″	971
SP-1	1	✻	5	743′-2″	496
SP-2	1	✻	5	779′-2″	520
SP-3	1	✻	5	818′-5″	547

QUANTITIES

REINFORCING STEEL	LBS.	11,069
SPIRAL COLUMN REINFORCING STEEL	LBS.	1,563
CLASS A CONCRETE:		
POUR #1 FOOTINGS	C.Y.	21.3
POUR #2 COLUMNS	C.Y.	14.8
POUR #3 CAP	C.Y.	27.0
TOTAL	C.Y.	63.1
HP 12x53 STEEL PILES	NO.	24
	LIN. FT.	1,080
PILE REDRIVES	EA.	12
PILE DRIVER SETUP FOR HP12x53 PILES	EA.	24
FOUNDATION EXCAVATION		LUMP SUM

✻✻ THE SP-1, SP-2 & SP-3 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



PLAN OF FOOTINGS

(ALL FOOTINGS, COLUMN DIMENSIONS AND REINFORCING STEEL ARE TYPICAL)
(PILE ARRANGMENT FOR FOOTINGS ARE THE SAME)

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 2

DRAWN BY : MBC DATE : 4-17
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DocuSigned by: Tony R. Laws Jr. NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TONY R. LAWS, JR.
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-29
1			3			TOTAL SHEETS
2			4			36

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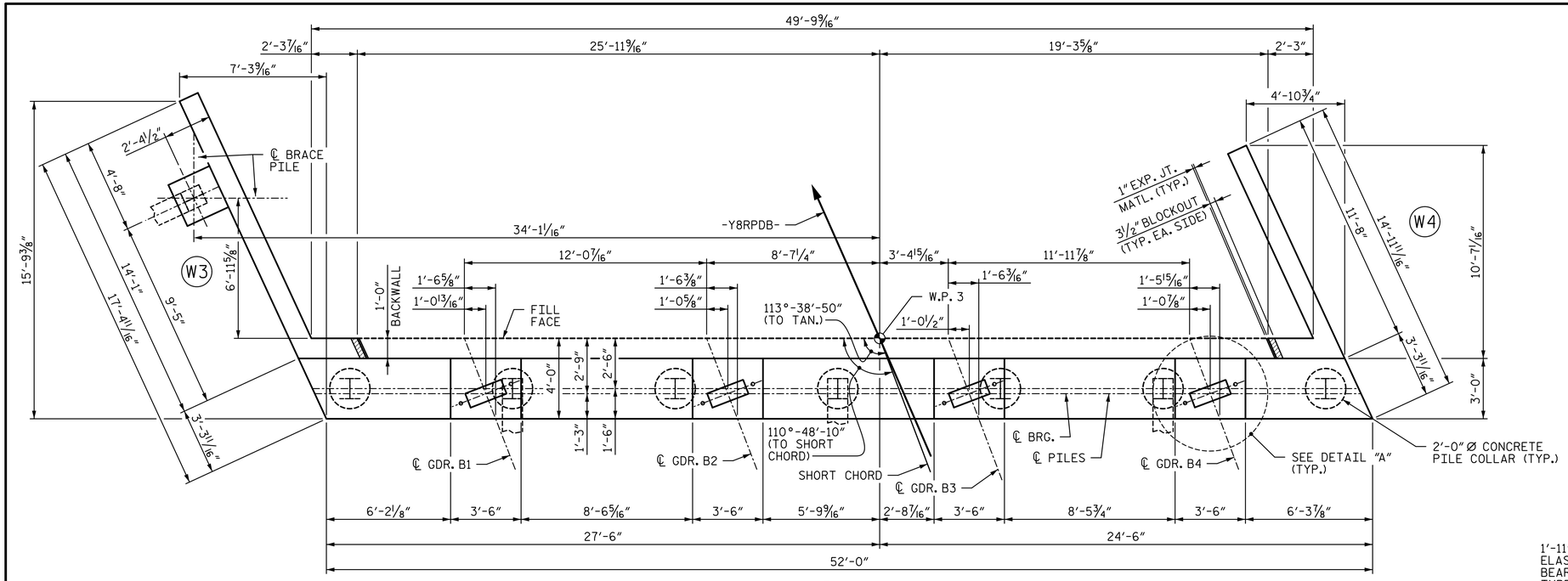
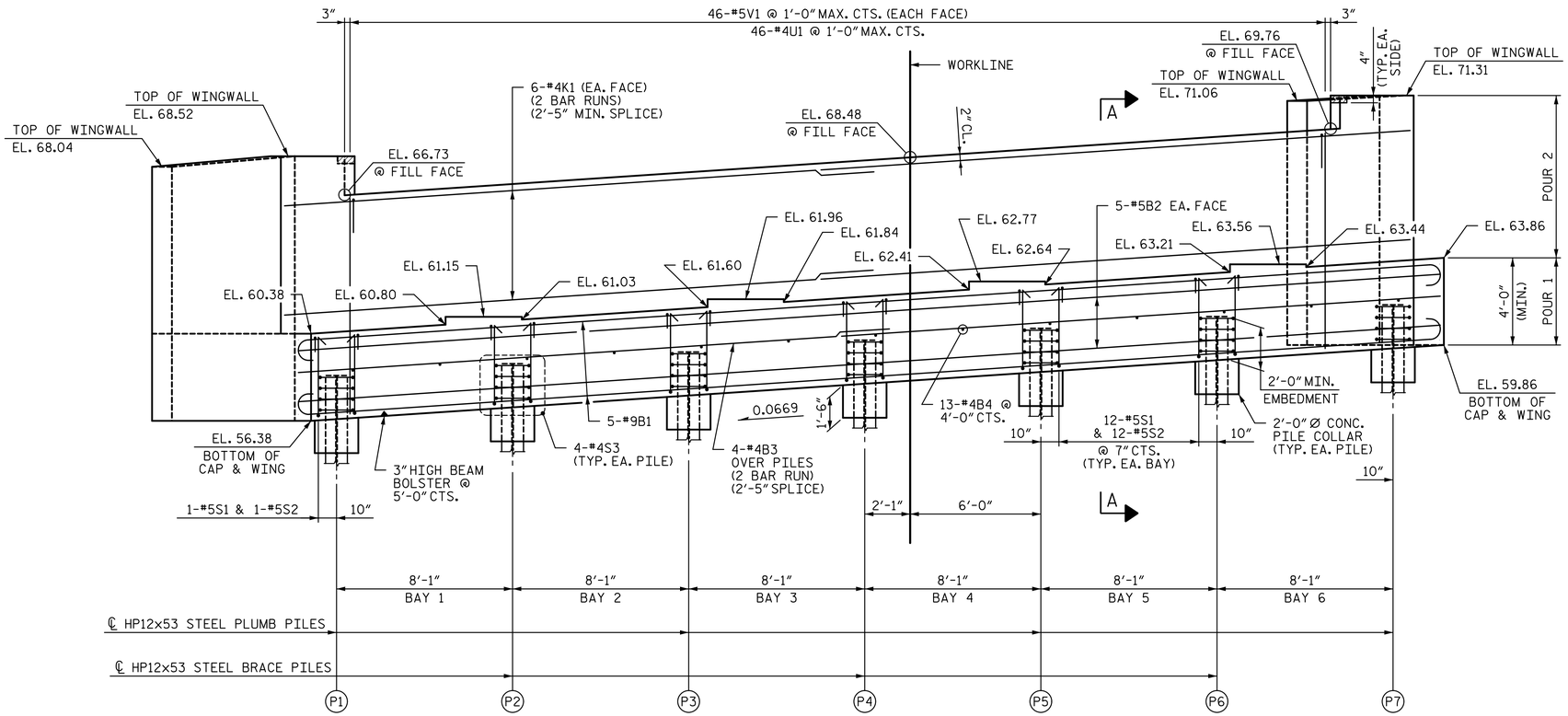
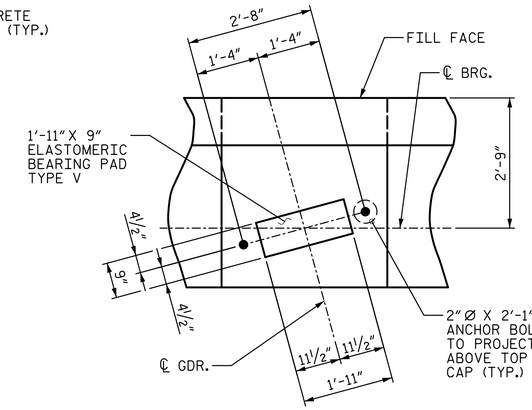


PLAN



ELEVATION



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER.

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

DIMENSIONS LOCATING PILES ARE SHOWN TO THE CENTERLINE OF THE PILE AT THE BOTTOM OF THE END BENT CAP.

INSTALL THE 4" Ø DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR THE REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

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

PILE SPLICE SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND AWS D1.1.

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	58.46
P2	59.00
P3	59.54
P4	60.08
P5	60.62
P6	61.16
P7	61.70

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 3

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6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

STV 100 Years

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-30
1			3			TOTAL SHEETS
2			4			36

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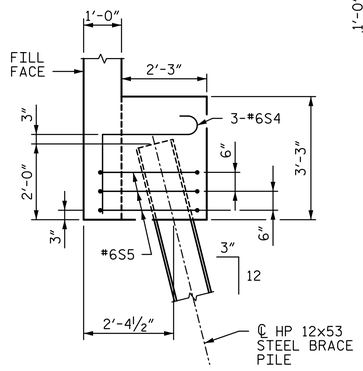
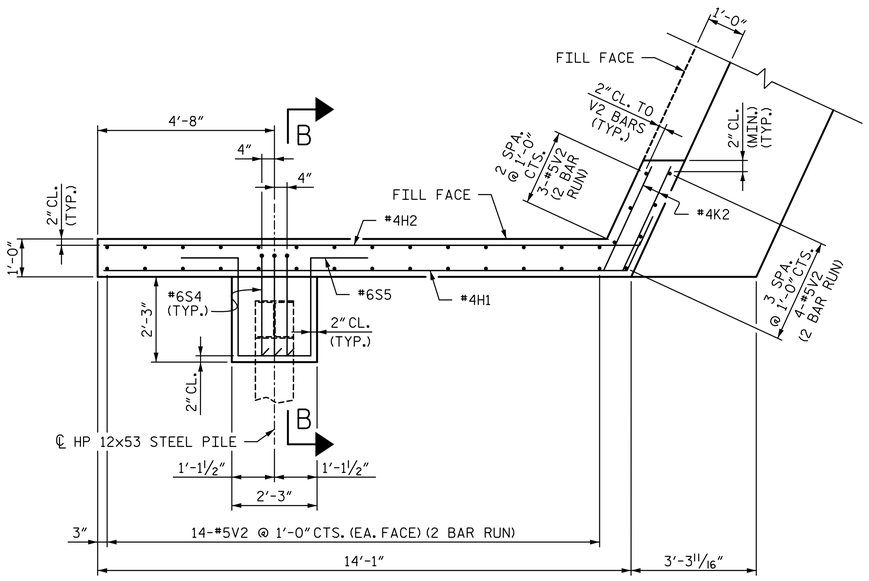
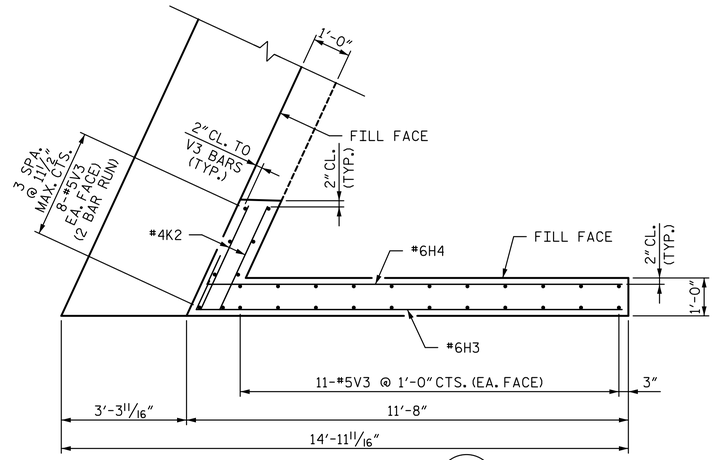


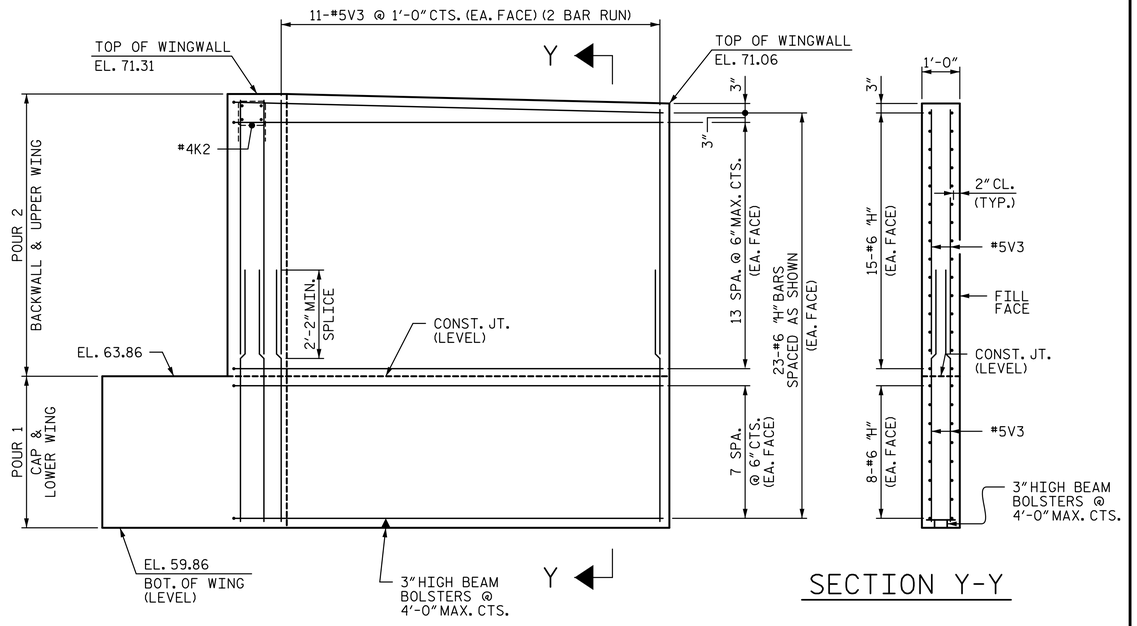
SECTION B-B



PLAN OF WING W3

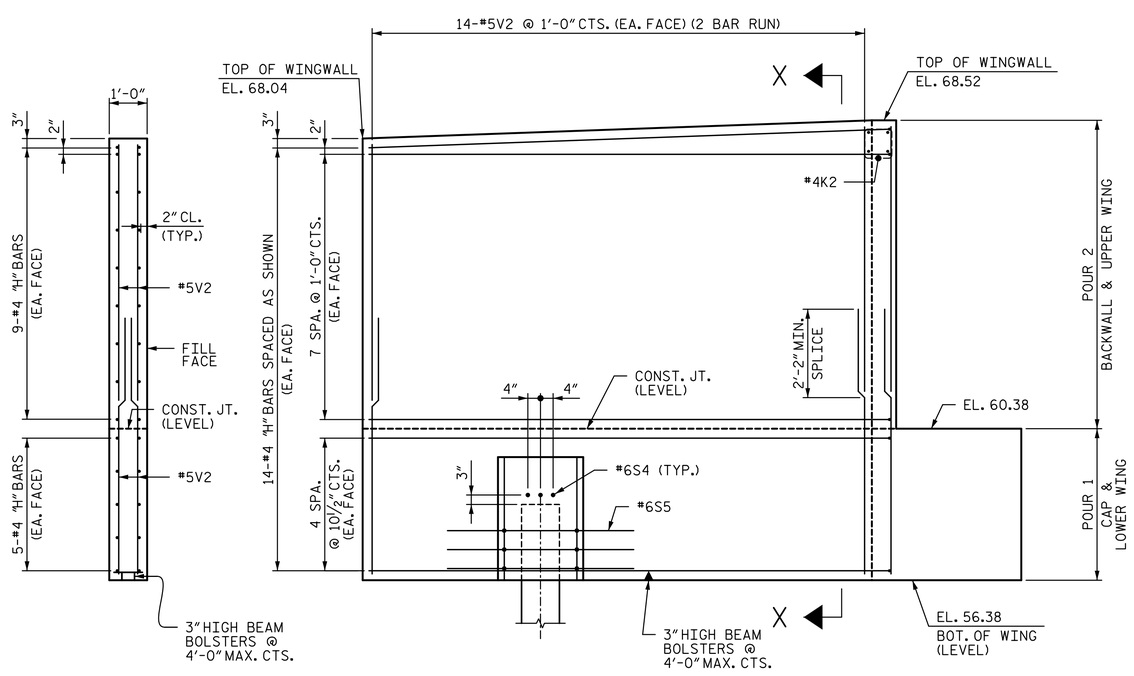


PLAN OF WING W4



SECTION Y-Y

ELEVATION OF WING W4



SECTION X-X

ELEVATION OF WING W3

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS JR.

6/30/2017

STV 100 Years

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NC License Number F-0991

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

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

SHEET NO. S4-31

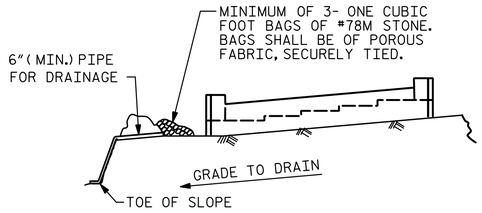
TOTAL SHEETS 36

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 3

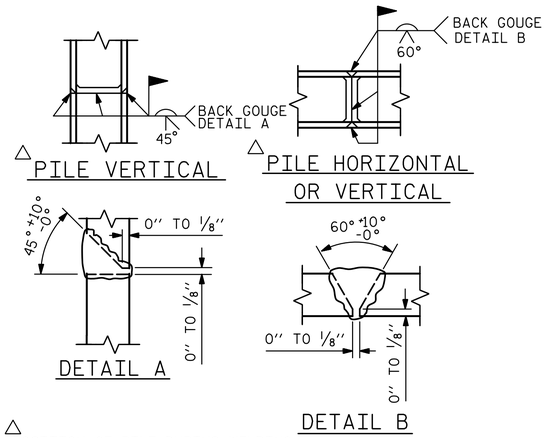


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

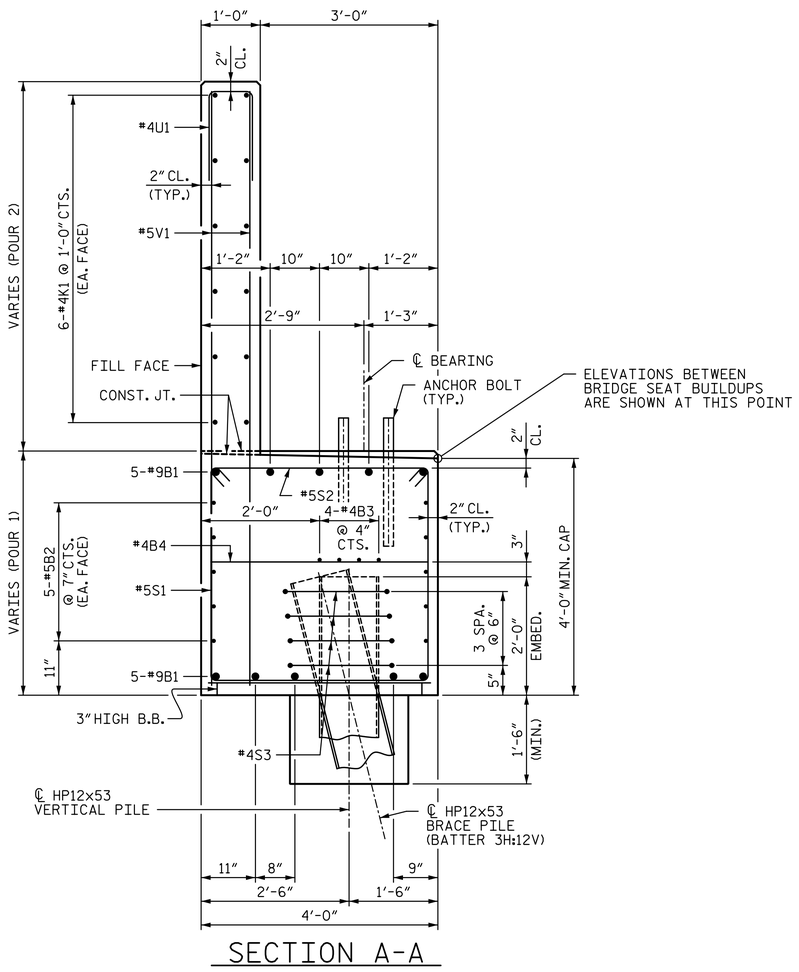
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



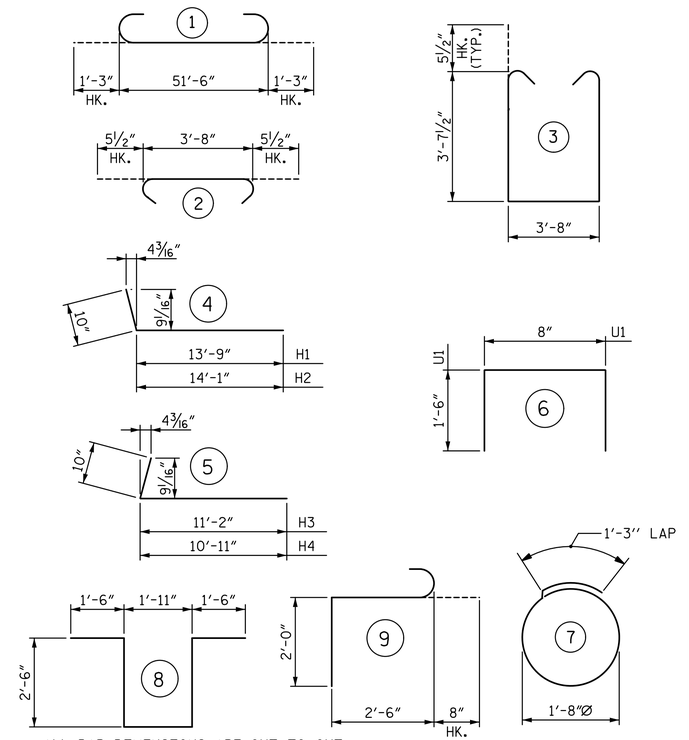
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION A-A

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	51'-0"	1836
B2	10	#5	STR	51'-8"	539
B3	8	#4	STR	27'-1"	145
B4	13	#4	STR	3'-8"	32
H1	13	#4	4	14'-7"	127
H2	13	#4	4	14'-11"	130
H3	23	#6	5	12'-0"	415
H4	23	#6	5	11'-9"	406
K1	12	#4	STR	27'-1"	217
K2	8	#4	STR	3'-0"	16
S1	73	#5	3	11'-10"	901
S2	73	#5	2	4'-7"	349
S3	28	#4	7	6'-6"	122
S4	3	#6	8	9'-11"	45
S5	3	#6	9	5'-2"	23
U1	46	#4	6	3'-8"	113
V1	92	#5	STR	9'-10"	944
V2	70	#5	STR	7'-0"	511
V3	60	#5	STR	6'-10"	428

QUANTITIES

REINFORCING STEEL	LBS.	7,299
CLASS A CONCRETE:		
POUR 1:		
CAP , COLLARS, & LOWER WING	C.Y.	36.0
POUR 2:		
BACKWALL & UPPER WING	C.Y.	19.0
TOTAL	C.Y.	55.0
HP 12x53 STEEL PILES	NO.	7
	LIN. FEET	490
PILE REDRIVES	EA.	3
PILE SETUP FOR HP 12x53 PILES	EA.	8

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 3 OF 3

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RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			36

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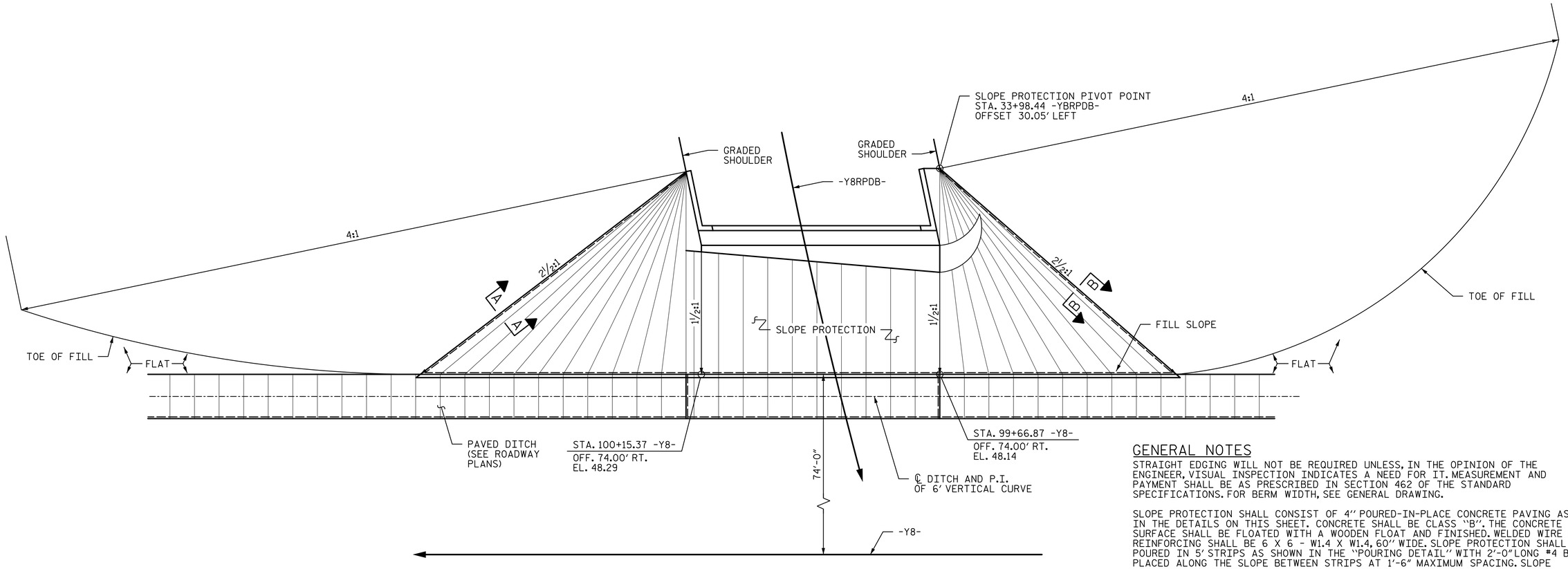
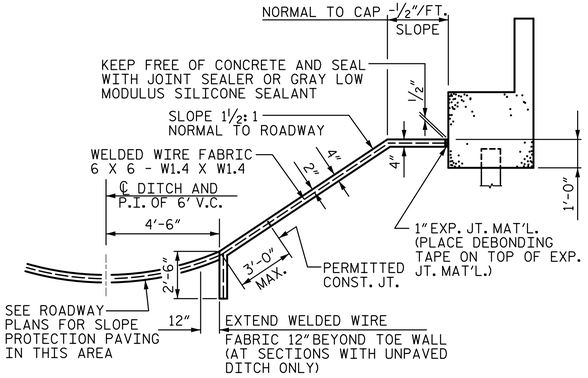


PLAN AT END BENT 1

GENERAL NOTES

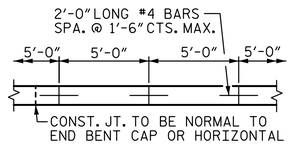
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE ''POURING DETAIL'' WITH 2'-0''LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6'' MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE ''OPTIONAL POURING DETAIL'' WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6''. THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.



SECTION AT END BENT 1 ALONG ℄ SURVEY -Y8RPDB-

SECTION WITH PAVED DITCH SHOWN,
SECTION WITH UNPAVED DITCH SIMILAR

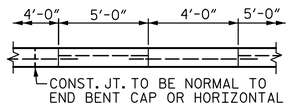


STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

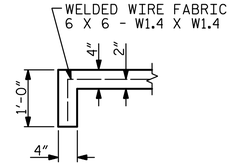
BRIDGE @ STA. 35+12.05 -Y8RPDB-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	452	900

✳ QUANTITY SHOWN IS BASED ON 5' POURS.

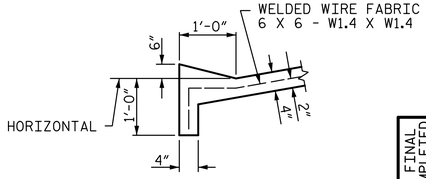


POUR A 4'-0'' STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION A-A



SECTION B-B

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 2

DRAWN BY : MBC DATE : 4-17
CHECKED BY : TRL DATE : 4-17
DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS JR.
6/30/2017

SLOPE PROTECTION DETAILS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-33
1			3			TOTAL SHEETS
2			4			36

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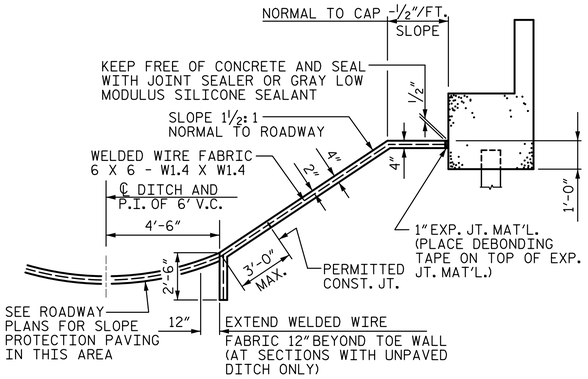
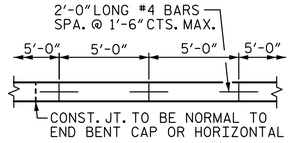


SECTION AT END BENT 2 ALONG ℄ SURVEY -Y8RPDB-

SECTION WITH PAVED DITCH SHOWN,
SECTION WITH UNPAVED DITCH SIMILAR

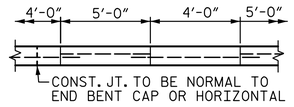
BRIDGE @ STA. 35+12.05 -Y8RPDB-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 2	355	710

✳ QUANTITY SHOWN IS BASED ON 5' POURS.



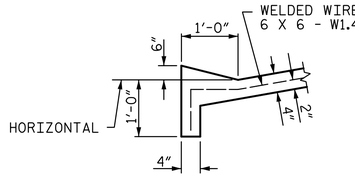
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL

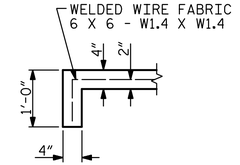


POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



SECTION B-B

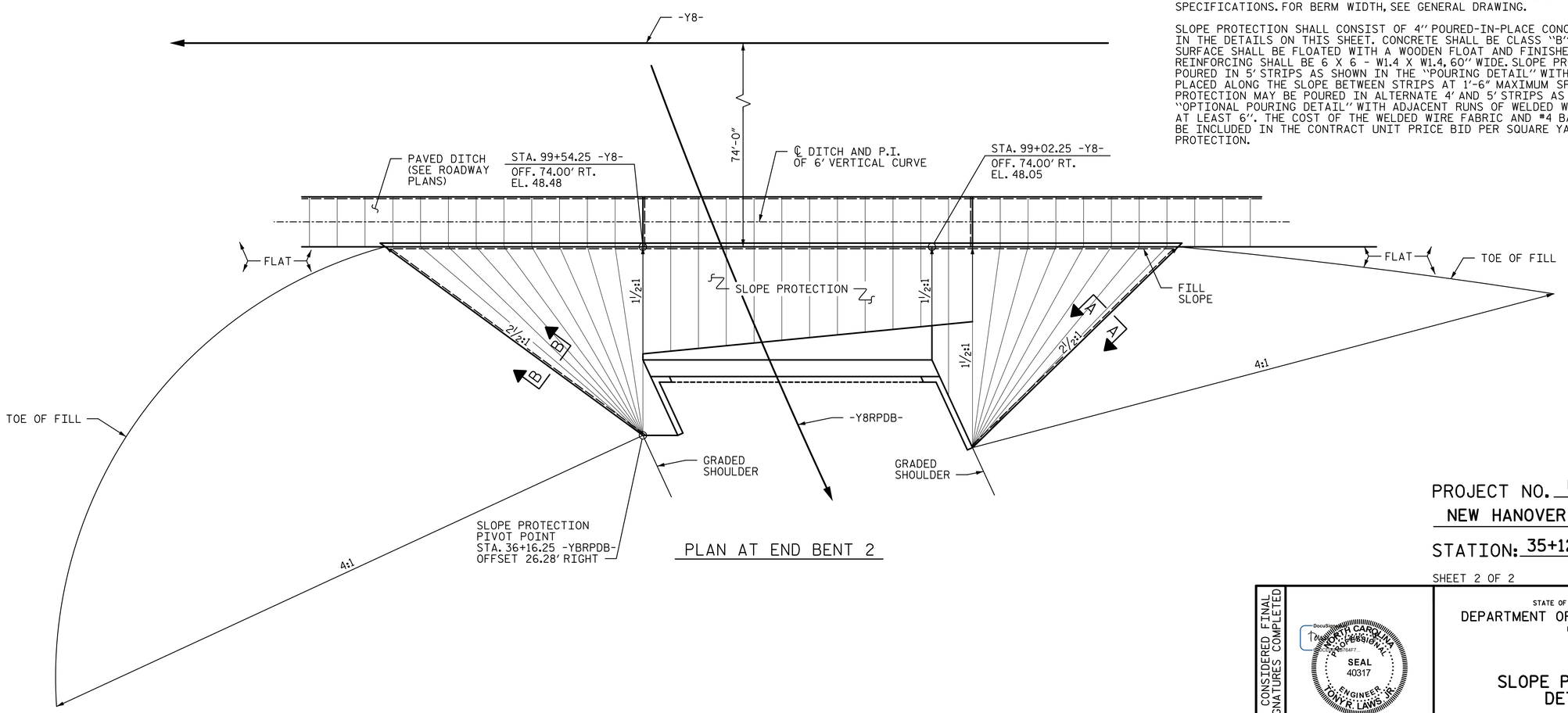


SECTION A-A

GENERAL NOTES

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

SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.



PLAN AT END BENT 2

PROJECT NO. U-4751
NEW HANOVER COUNTY
STATION: 35+12.05 -Y8RPDB-
SHEET 2 OF 2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 40317 TONY R. LAWS
6/30/2017

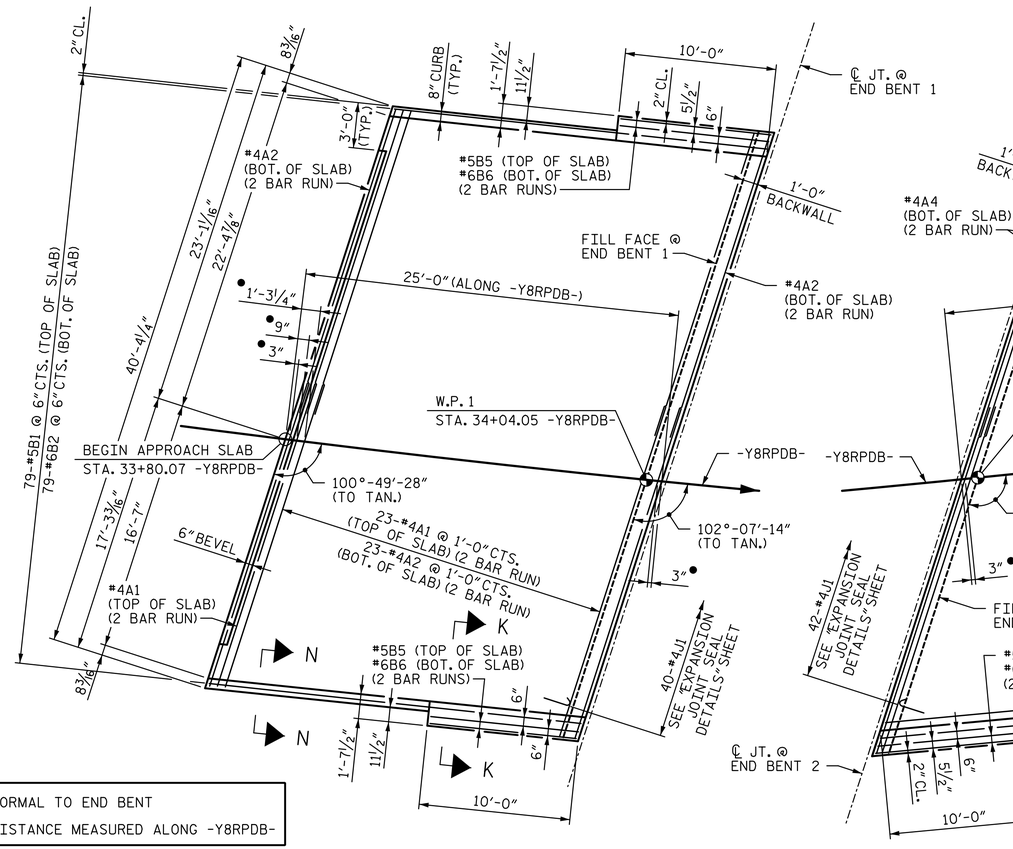
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

STV 100 Years
STV ENGINEERS, INC.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-34
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MBC	DATE : 4-17	DESIGN ENGINEER OF RECORD: T. LAWS	DATE : 5-17
CHECKED BY : TRL	DATE : 4-17		

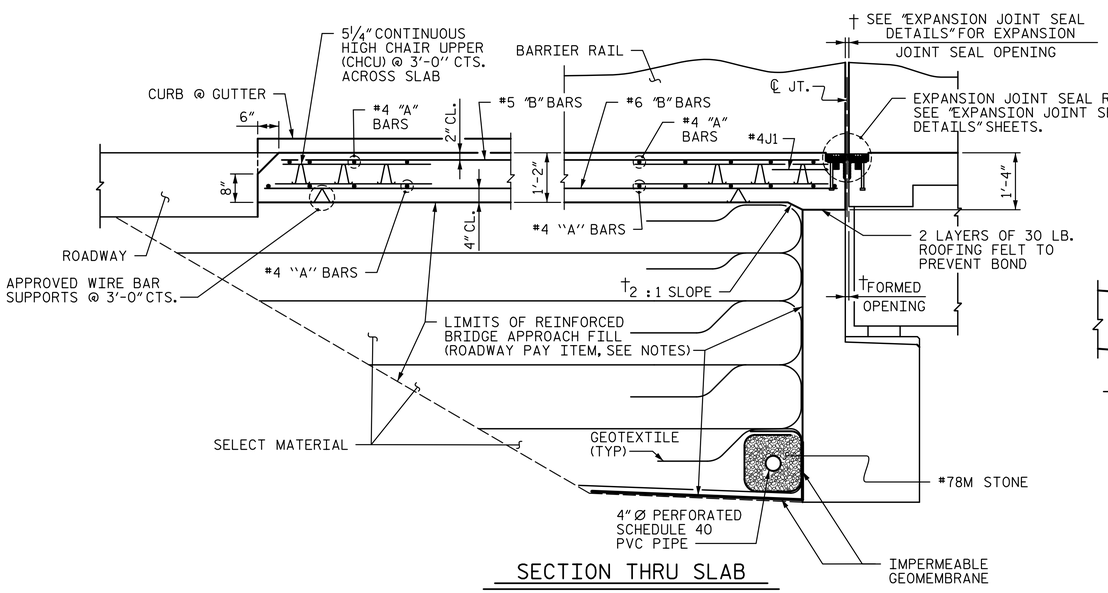


† NORMAL TO END BENT

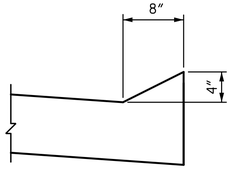
• DISTANCE MEASURED ALONG -Y8RPDB-

PLAN AT END BENT 1

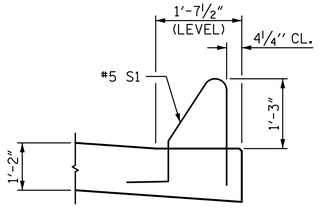
PLAN AT END BENT 2



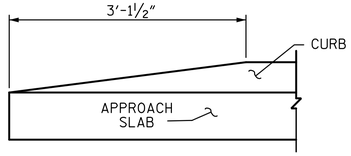
SECTION THRU SLAB



SECTION N-N



SECTION K-K



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES:

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

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4" Ø DRAINAGE PIPE, #78M STONE, 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.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR CONCRETE BARRIER RAIL ON APPROACH SLABS, BILL OF MATERIAL AND ADDITIONAL DETAILS, SEE SHEET 2 OF 2.

BILL OF MATERIAL

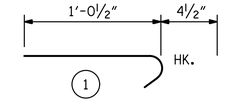
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	48	#4	STR	22'-0"	705
A2	50	#4	STR	21'-10"	729
✳B1	79	#5	STR	24'-2"	1,991
B2	79	#6	STR	24'-8"	2,927
✳B5	8	#5	STR	5'-10"	49
B6	8	#6	STR	5'-11"	71
✳J1	40	#4	1	1'-5"	38
REINFORCING STEEL ✳✳ LBS.					3,727
✳EPOXY COATED REINFORCING STEEL ✳✳ LBS.					2,783
CLASS AA CONCRETE ✳✳ C.Y.					44.0

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A3	46	#4	STR	23'-5"	720
A4	48	#4	STR	23'-3"	745
✳B3	81	#5	STR	23'-10"	2,014
B4	81	#6	STR	24'-5"	2,971
✳B7	8	#5	STR	6'-5"	54
B8	8	#6	STR	6'-6"	78
✳J1	42	#4	1	1'-5"	40
REINFORCING STEEL ✳✳ LBS.					3,794
✳EPOXY COATED REINFORCING STEEL ✳✳ LBS.					2,828
CLASS AA CONCRETE ✳✳ C.Y.					44.1

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED. SEE SHEET 2 OF 2.

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

SPLICE LENGTHS

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

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 1 OF 2

DRAWN BY : MBC DATE : 3-17

CHECKED BY : TRL DATE : 4-17

DESIGN ENGINEER OF RECORD: T. LAWS DATE : 5-17

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DocuSigned by: NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.

6/30/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB

STV 100 Years

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

REVISIONS						SHEET NO.
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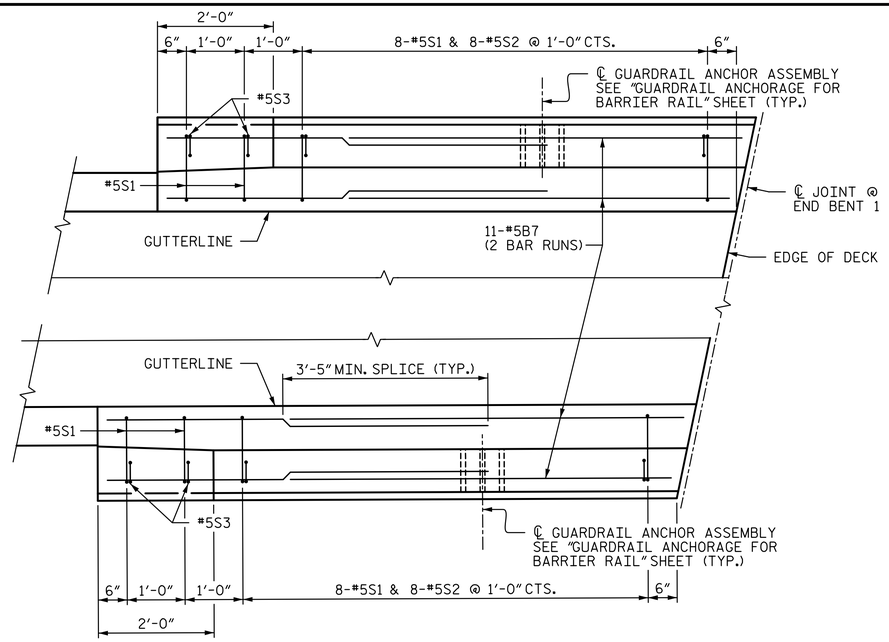
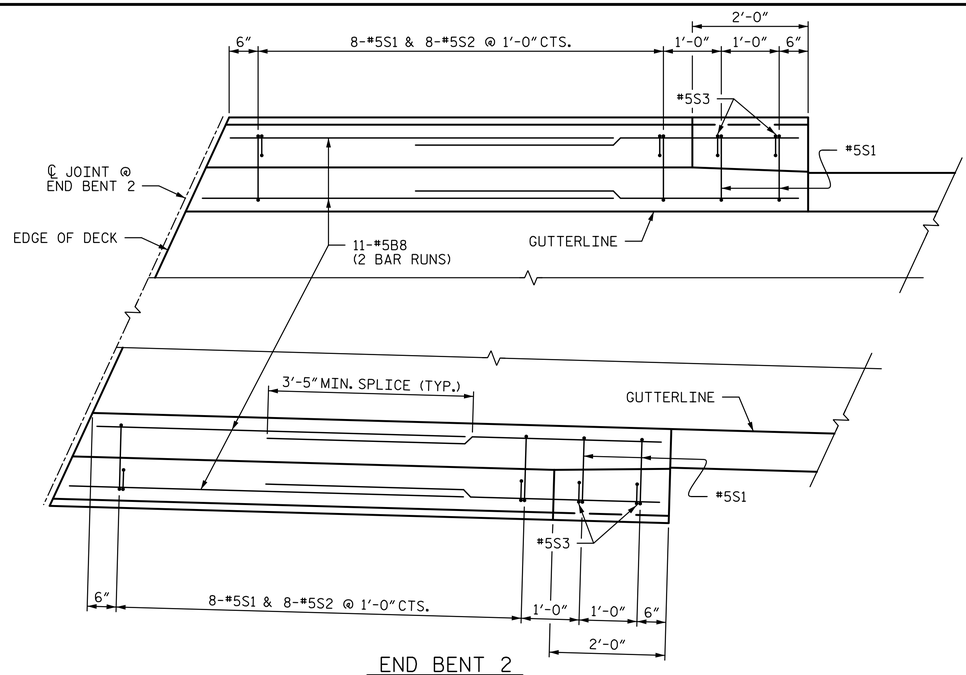
1			3			TOTAL SHEETS
2			4			36

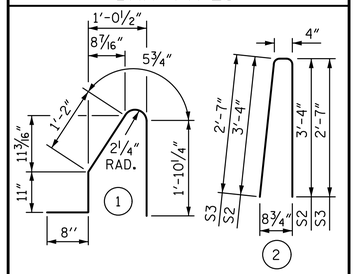


END BENT 1



END BENT 2

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BARRIER RAIL ONLY

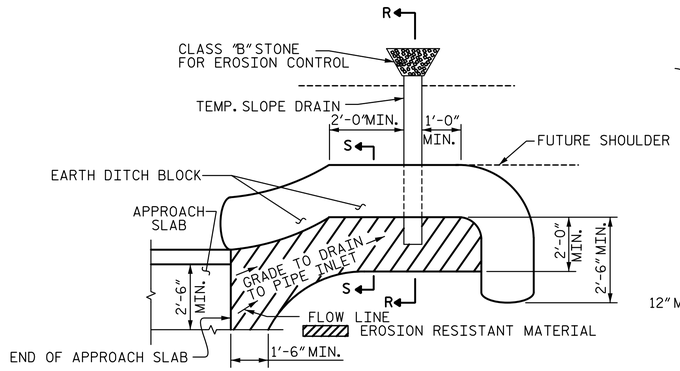
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B7	44	#5	STR	6'-8"	306
✳B8	44	#5	STR	6'-10"	314
✳S1	40	#5	1	5'-1"	212
✳S2	32	#5	2	7'-0"	234
✳S3	8	#5	2	5'-6"	46
✳EPOXY COATED REINFORCING STEEL				LBS.	1,112
CLASS AA CONCRETE				C. Y.	5.7

NOTES

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

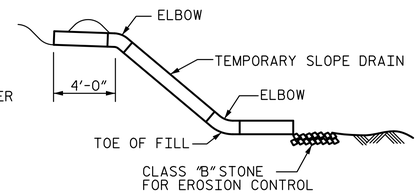
THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

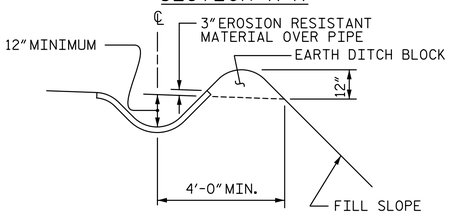


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

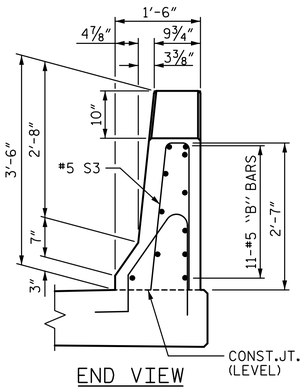
PLAN VIEW



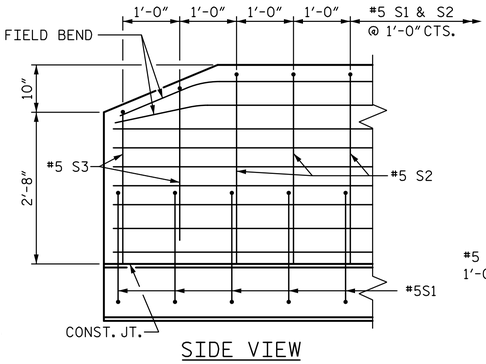
SECTION R-R



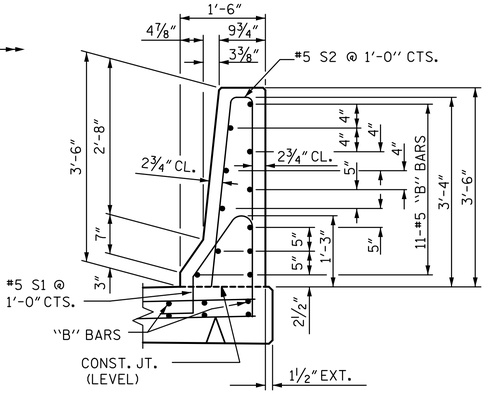
SECTION S-S



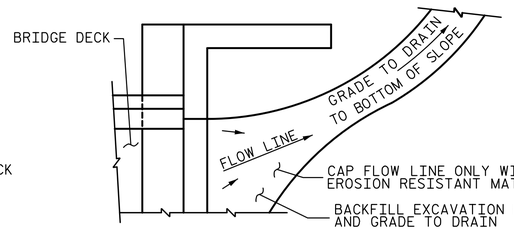
END VIEW



SIDE VIEW



END OF RAIL DETAILS



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)

SECTION THRU RAIL

PROJECT NO. U-4751

NEW HANOVER COUNTY

STATION: 35+12.05 -Y8RPDB-

SHEET 2 OF 2

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NORTH CAROLINA PROFESSIONAL SEAL 40317 ENGINEER TONY R. LAWS, JR.

7/24/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

STV 100 Years

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