TIP PROJECT: U-3109A

CONTRACT: C203844

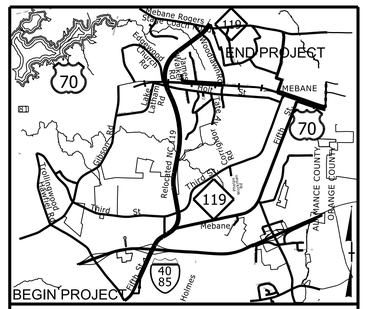
16-MAR-2017 14:06
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
jpadams

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ALAMANCE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3109A		

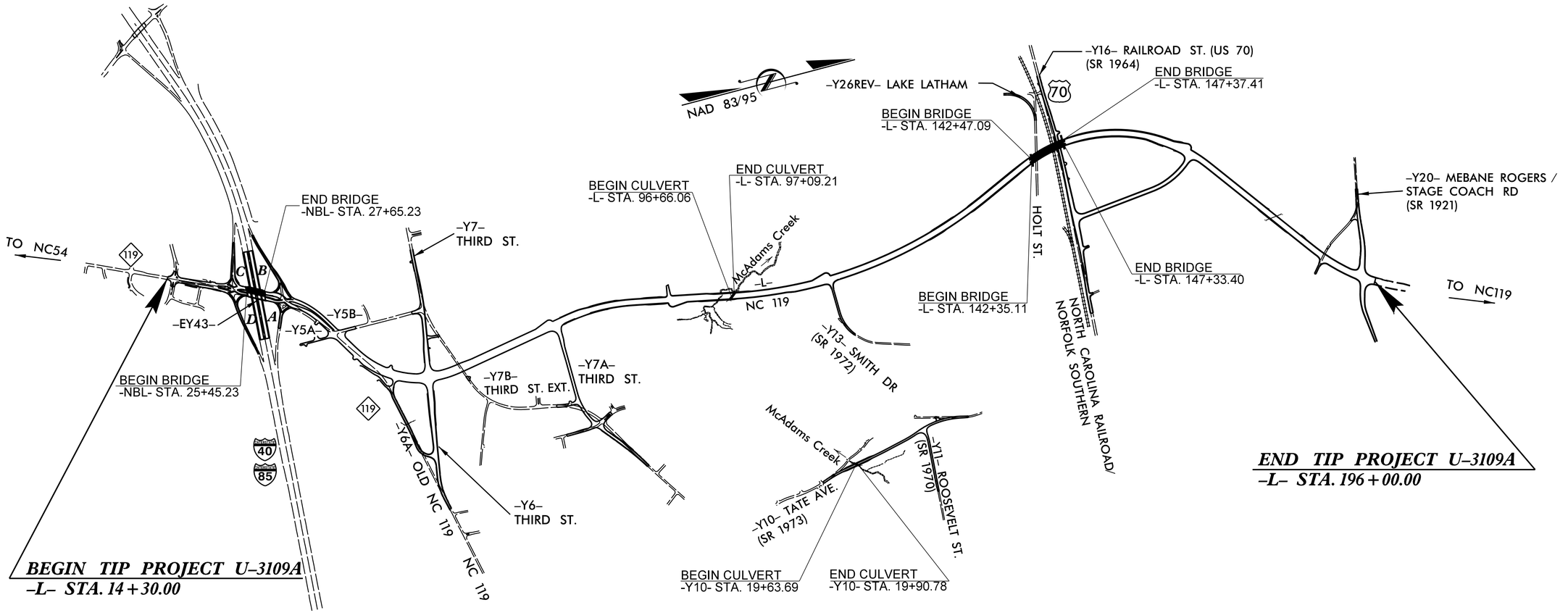
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34900.1.1	STP-0119(10)	PE
34900.2.FRU4	STP-0119(10)	UTILITY
34900.2.FR4	STP-0119(10)	ROW
34900.3.GV2	STP-0119(9)	CONST.



VICINITY MAP

LOCATION: NC 119 RELOCATION FROM I-40 /85 TO NORTH OF SR 1921 (MEBANE ROGERS ROAD /STAGE COACH ROAD)

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



DESIGN DATA

ADT 2016 = 21,100
ADT 2036 = 28,400
K = 9 %
D = 55 %
T = 3 % *
V = 50 MPH
*(TTST 1% + DUALS 2%)
FUNC CLASS =
URBAN COLLECTOR
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-3109A ..... 3.312 mi

LENGTH STRUCTURE TIP PROJECT U-3109A ..... 0.135 mi

TOTAL LENGTH OF TIP PROJECT U-3109A ..... 3.447 mi

PLANS PREPARED BY:

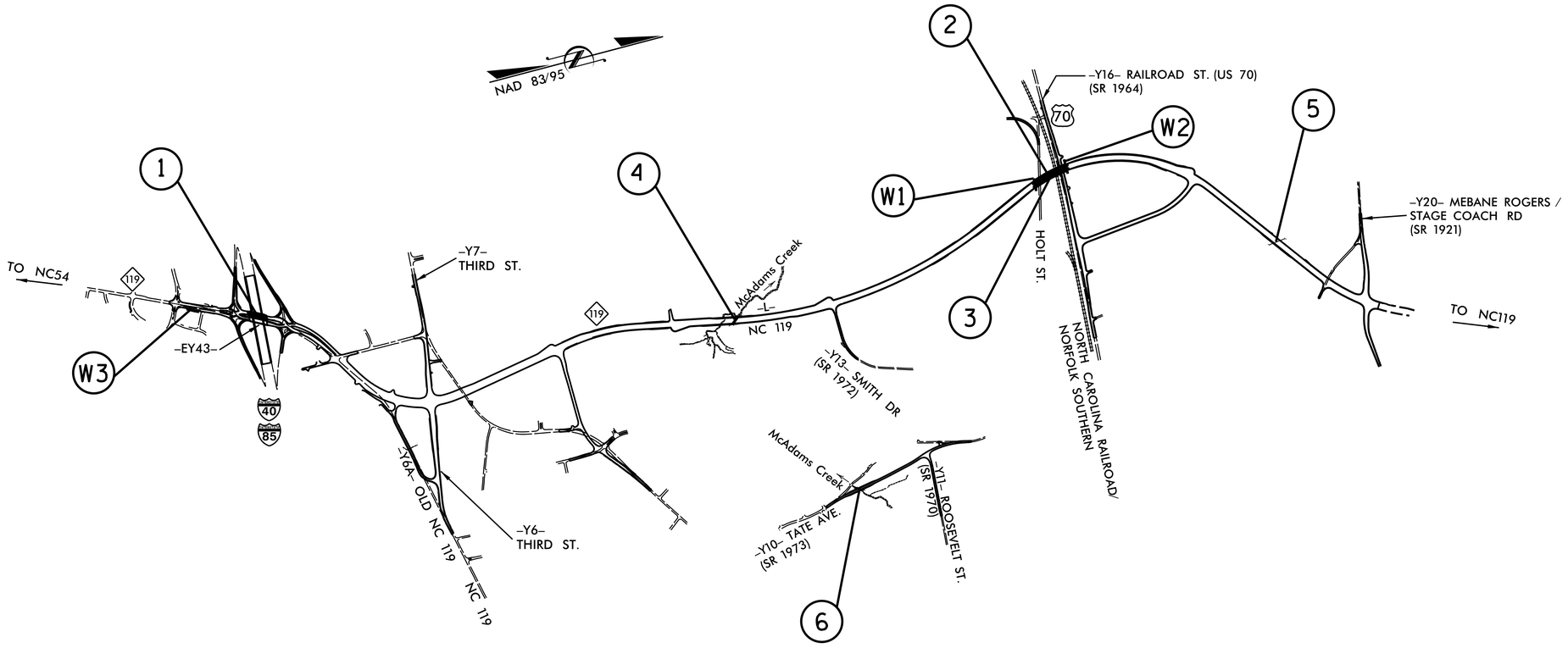
Baker

Michael Baker Engineering, Inc.
8000 Regency Parkway, Suite 600
Cary, NC 27518
Professional Corporation License Number: F-1084

FOR DIVISION OF HIGHWAYS

2012 STANDARD SPECIFICATIONS

LETTING DATE:
MAY 16, 2017



INDEX

STR	STATION	DESCRIPTION	SHEETS
1	26+54.73 -NBL- 26+90.77 -SBL-	NBL BRIDGE ON NC-119 OVER I40-85 BRIDGE #16 GUARDRAIL RETROFIT	S01-1 THRU S01-49
2	146+61.35 -L- (SBL)	SBL BRIDGE ON NC-119 OVER HOLT ST, NORFOLK SOUTHERN RR, AND US-70	S02-1 THRU S02-51
3	146+61.35 -L- (NBL)	NBL BRIDGE ON NC-119 OVER HOLT ST, NORFOLK SOUTHERN RR, AND US-70	S03-1 THRU S03-53
4	96+88.00 -L-	TRIPLE 11 X 9 RCBC	C1-1 THRU C1-6
5	179+55.00 -L-	SINGLE 10 X 7 RCBC	C2-1 THRU C2-5
6	19+77.00 -Y10-	DOUBLE 10 X 10 RCBC	C3-1 THRU C3-5
W1,W2	143+22.52 -L- 146+61.35 -L-	MSE RETAINING WALL	W-1 THRU W-4
W3	16+75.00 -L-	SEGMENTAL GRAVITY RETAINING WALL	W-5 THRU W-6

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

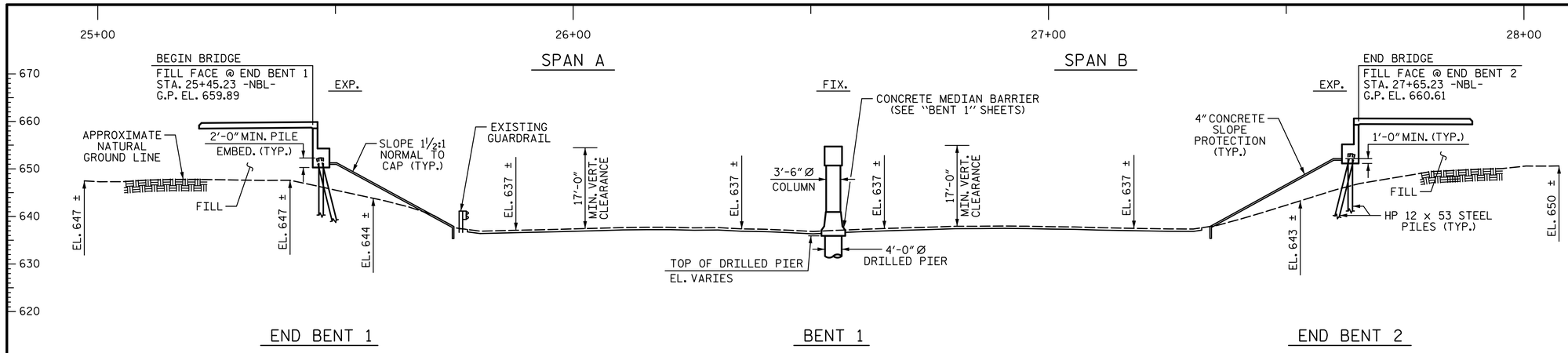
INDEX SHEET

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

DRAWN BY : W.D. CRUTCHER DATE : 02-23-17
CHECKED BY : J.P. ADAMS DATE : 3/2/2017

20-MAR-2017 14:55
T:\Structures\U3109A_TSH.dgn
jpadams

F.A. PROJECT NO. STP-0119(9)



(+)1.9200% △ (-)2.5090%

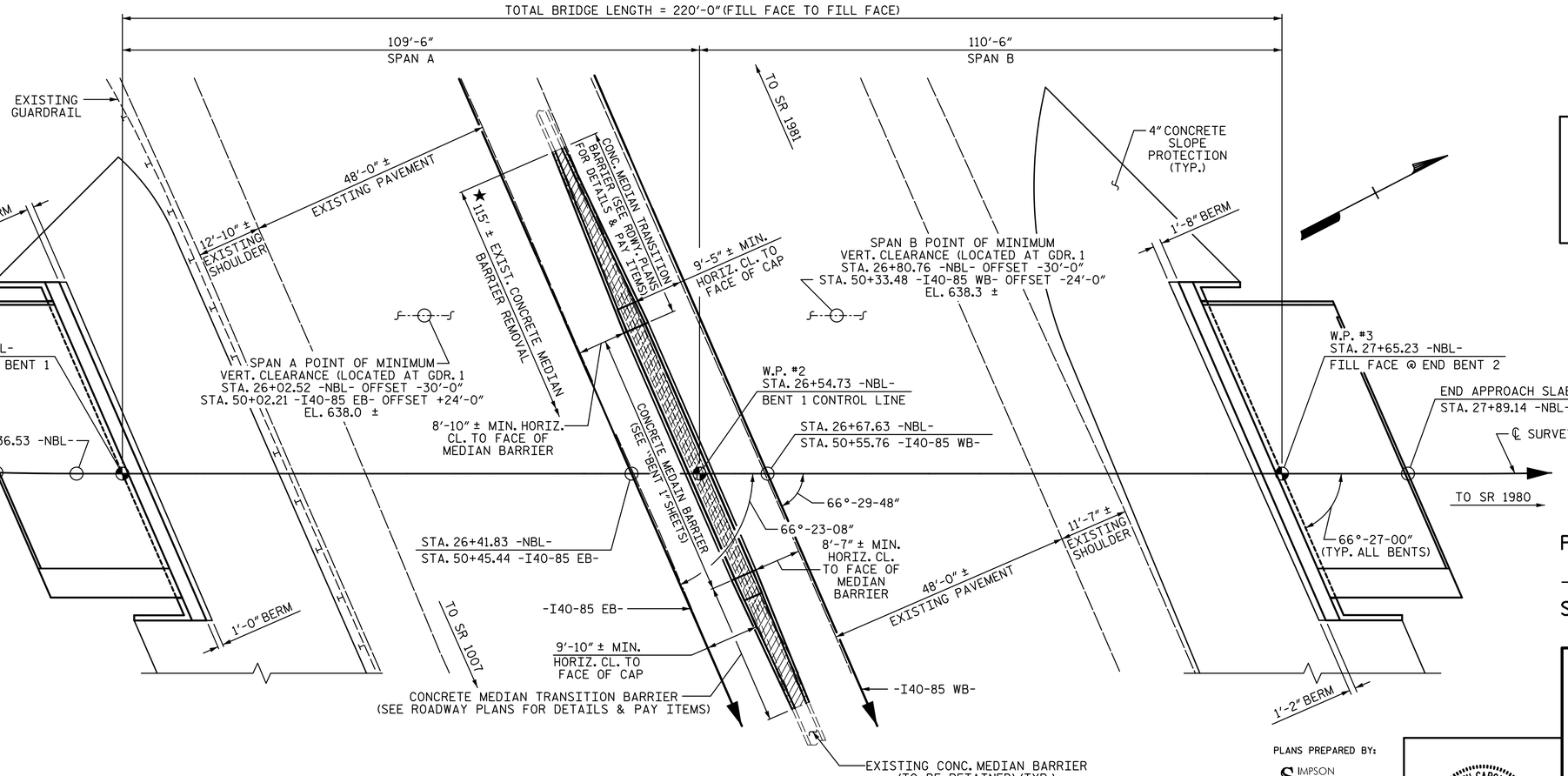
PVI STA. 27+75.00
EL. = 665.29
VC = 850'

GRADE DATA -NBL-

★ EXISTING CONCRETE MEDIAN BARRIER TO BE REMOVED (ROADWAY PAY ITEM)

SECTION ALONG ℄ SURVEY -NBL-

(SECTION @ END BENTS AND BENT ARE @ RIGHT ANGLES)



PLAN

(PILES AND DRILLED PIERS NOT SHOWN IN PLAN VIEW)
(BOTH END BENTS AND BENT ARE PARALLEL)

HORIZONTAL CURVE DATA

PI STA. 25+20.15 -NBL-
△ = 3°-07'-48.6" (LT.)
D = 9°-32'-57.5"
L = 32.78'
T = 16.39'
R = 600.00'

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 1 OF 3 BRIDGE #434

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119
OVER I40-85 WB AND I40-85 EB
BETWEEN SR 1981 AND SR 1980

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-1
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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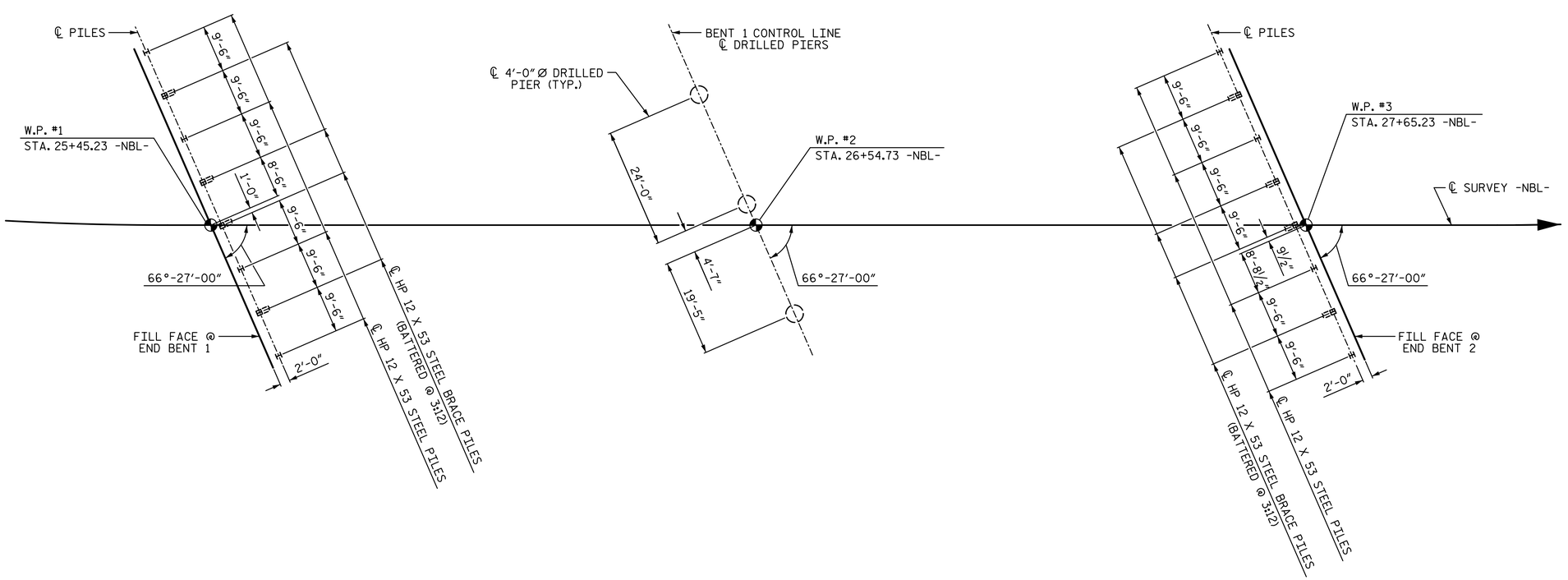
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 024090 ENGINEER THEO J. BEACH
2/13/2017

2/10/2017 9:14:40 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_GD.dgn



END BENT 1 | BENT 1 | END BENT 2

FOUNDATION LAYOUT

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

FOUNDATION NOTES:

FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 470 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 30 TSF.

INSTALL DRILLED PIERS AT BENT 1 TO A TIP ELEVATION NO HIGHER THAN 607.0, 596.0, 604.0 FT (L,C,R) AND WITH THE REQUIRED TIP RESISTANCE.

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

DO NOT USE SLURRY CONSTRUCTION FOR DRILLED PIERS AT BENT 1.

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

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS AT BENT 1. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION NOTES (CONTINUED):

PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.

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

DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 185 TONS PER PILE.

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

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 43,240 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT 1 AND END BENT 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

TESTING THE PRODUCTION PILES WITH THE PDA DURING DRIVING, RESTRIKING OR REDIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS (AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION).

PLANS PREPARED BY:
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Cary, NC 27518
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(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24880 ENGINEER TED J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

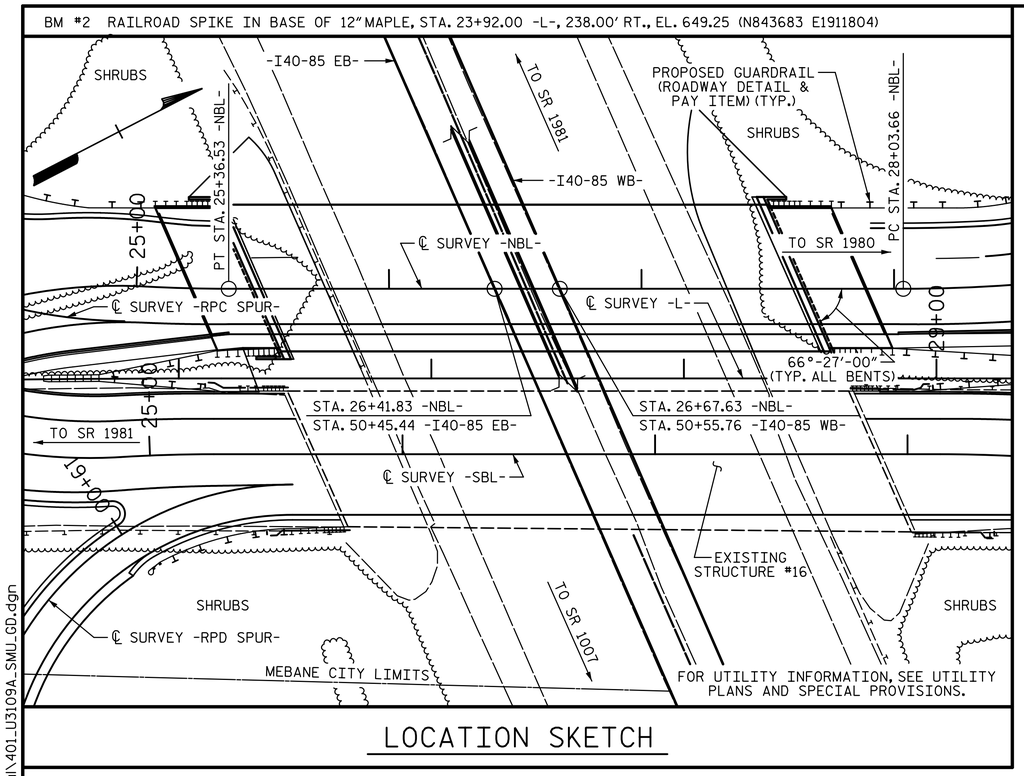
SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119
OVER I40-85 WB AND I40-85 EB
BETWEEN SR 1981 AND SR 1980

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-2
1			3			TOTAL SHEETS
2			4			S01-49



LOCATION SKETCH

TOTAL BILL OF MATERIAL

	4'-0" DIA. DRILLED PIERS IN SOIL	4'-0" DIA. DRILLED PIERS NOT IN SOIL	PDA TESTING	SID INSPECTIONS	SPT TESTING	CSL TESTING	REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONCRETE)	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL
	LF	LF	EA	EA	EA	EA	SF	SF	CY	LS	LB
SUPERSTRUCTURE							12,644	12,400		LS	
END BENT 1									58.6		8220
BENT 1	70.3	31.0							105.8		17,805
END BENT 2									57.5		8097
TOTAL	70.3	31.0	1	3	3	1	12,644	12,400	221.9	LS	34,122

TOTAL BILL OF MATERIAL (CONT'D.)

	SPIRAL COLUMN REINFORCING STEEL	STRUCTURAL STEEL	PILE DRIVING EQUIPMENT SETUP HP 12 X 53 STEEL PILES	HP 12x53 STEEL PILES		TWO BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	1'-2" X 3'-0½" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	2 BAR METAL RAIL RETROFIT
	LB	APPROX. LB	EA	NO.	LF	LF	LF	LF	SY	LS	LS	LF
SUPERSTRUCTURE		446,250				472.38	243.69	243.69		LS	LS	426.69
END BENT 1			8	8	400				305			
BENT 1	3337											
END BENT 2			8	8	480				400			
TOTAL	3337	446,250	16	16	880	472.38	243.69	243.69	705	LS	LS	426.69

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.

CLASS AA CONCRETE IN DECK AND SIDEWALK SHALL BE SAND LIGHTWEIGHT CONCRETE. FOR SAND LIGHTWEIGHT CONCRETE, SEE SPECIAL PROVISIONS.

CLASS AA CONCRETE IN CONCRETE PARAPETS SHALL BE NORMAL WEIGHT CONCRETE.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

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

ALL PAVEMENT MARKING WILL BE IN ACCORDANCE WITH THE PAVEMENT MARKING PLANS AND SHALL PROVIDE FOR BICYCLES.

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.

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

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

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE PAVED SHOULDER ELEVATION. THE TOP OF DRILLED PIER SHALL BE ADJUSTED AS REQUIRED TO MAINTAIN THE TOP OF THE DRILLED PIER 1 FOOT BELOW THE PAVED SHOULDER ELEVATION.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR 2 BAR METAL RAIL RETROFIT, SEE SPECIAL PROVISIONS.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER I40-85 WB AND I40-85 EB BETWEEN SR 1981 AND SR 1980

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-3
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
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www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER TED J. BEACH
5/8/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

5/8/2017 9:55:34 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_GD.dgn

LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR STEEL GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE II 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⟩	1.02	- -	1.75	0.781	**1.02**	A	ER	106.9	0.855	1.57	A	I	90.87	1.30	0.781	1.12	A	ER	106.9	
		HL-93 (OPERATING)	N/A		1.32	- -	1.35	0.781	1.32	A	ER	106.9	0.855	2.03	B	I	16.18	1.00	0.781	1.46	A	ER	106.9	
		HS-20 (INVENTORY)	36.00	⟨2⟩	1.93	69.5	1.75	0.781	**1.93**	B	ER	64.74	0.855	2.15	B	I	107.9	1.30	0.781	2.26	B	ER	64.74	
		HS-20 (OPERATING)	36.00		2.50	90.1	1.35	0.781	2.50	B	ER	64.74	0.855	2.79	B	I	107.9	1.00	0.781	2.93	B	ER	64.74	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.99	53.9	1.40	0.781	3.99	B	ER	64.74	0.855	4.81	B	I	107.9	1.30	0.781	5.32	B	ER	64.74	
		SNGARBS2	20.000		3.06	61.2	1.40	0.781	3.06	B	ER	64.74	0.855	3.53	B	I	107.9	1.30	0.781	3.85	B	ER	64.74	
		SNAGRIS2	22.000		2.90	63.8	1.40	0.781	2.90	B	ER	64.74	0.855	3.28	B	I	107.9	1.30	0.781	3.60	B	ER	64.74	
		SNCOTTS3	27.250		2.22	60.5	1.40	0.781	2.22	B	ER	64.74	0.855	2.58	B	I	107.9	1.30	0.781	2.66	B	ER	64.74	
		SNAGGRS4	34.925		1.86	65.0	1.40	0.781	1.86	B	ER	64.74	0.855	2.14	B	I	107.9	1.30	0.781	2.18	B	ER	64.74	
		SNS5A	35.550		1.84	65.4	1.40	0.781	1.84	B	ER	64.74	0.855	2.15	B	I	107.9	1.30	0.781	2.14	B	ER	64.74	
		SNS6A	39.950		1.68	67.1	1.40	0.781	1.68	B	ER	64.74	0.855	1.96	B	I	107.9	1.30	0.781	1.95	B	ER	64.74	
		SNS7B	42.000		1.62	68.0	1.40	0.781	1.62	B	ER	64.74	0.855	1.91	A	I	90.87	1.30	0.781	1.86	B	ER	64.74	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.02	66.7	1.40	0.781	2.02	B	ER	64.74	0.855	2.32	B	I	107.9	1.30	0.781	2.38	B	ER	64.74	
		TNT4A	33.075		2.01	66.5	1.40	0.781	2.01	B	ER	64.74	0.855	2.28	B	I	107.9	1.30	0.781	2.37	B	ER	64.74	
		TNT6A	41.600		1.67	69.5	1.40	0.781	1.67	B	ER	64.74	0.855	1.97	B	I	16.18	1.30	0.781	1.93	B	ER	64.74	
		TNT7A	42.000		1.67	70.1	1.40	0.781	1.67	B	ER	64.74	0.855	1.95	A	I	90.87	1.30	0.781	1.93	B	ER	64.74	
		TNT7B	42.000		1.69	71.0	1.40	0.781	1.69	B	ER	64.74	0.855	1.88	B	I	107.9	1.30	0.781	1.96	B	ER	64.74	
		TNAGRIT4	43.000		1.64	70.5	1.40	0.781	1.64	B	ER	64.74	0.855	1.83	B	I	107.9	1.30	0.781	1.89	B	ER	64.74	
		TNAGT5A	45.000		1.57	70.7	1.40	0.781	1.57	B	ER	64.74	0.855	1.80	A	I	90.87	1.30	0.781	1.80	B	ER	64.74	
		TNAGT5B	45.000	⟨3⟩	1.55	69.8	1.40	0.781	**1.55**	B	ER	64.74	0.855	1.75	B	I	107.9	1.30	0.781	1.78	B	ER	64.74	
FATIGUE		HL-93 (INVENTORY)	γ_{LL}=0.75		1.94																			

LOAD FACTORS:

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

NOTES:

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

ALLOWABLE STRESS FOR SERVICE II LIMIT STATE ARE AS REQUIRED FOR DESIGN.

DISTANCE FROM LEFT END OF SPAN IS MEASURED FROM ℄ BEARING.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

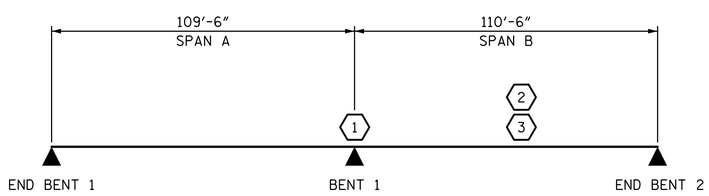
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨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-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR STEEL GIRDERS

(NON-INTERSTATE TRAFFIC)

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

SHEET NO. S01-4
TOTAL SHEETS S01-49

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER TED J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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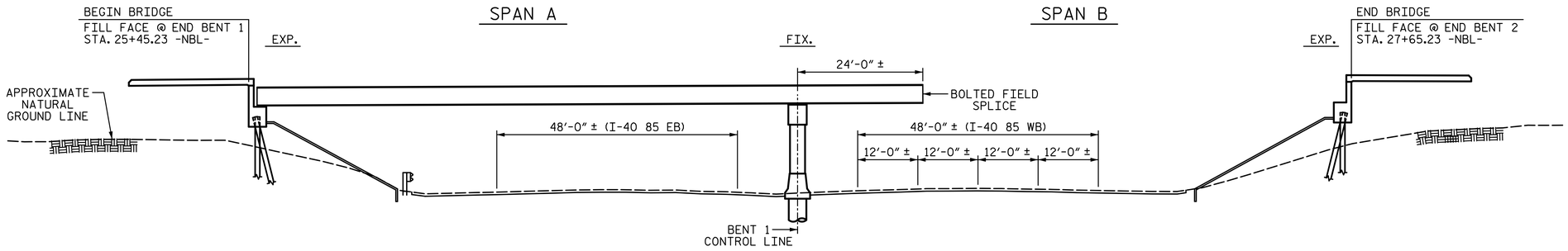

GIRDER ERECTION

(SECTION @ END BENTS AND BENT ARE @ RIGHT ANGLES)

ERECTION NOTES:

ERECT A MINIMUM OF TWO GIRDERS WITH ALL DIAPHRAGMS BETWEEN THE GIRDERS IN PLACE AND THE BOLTS TIGHTENED PRIOR TO RELEASING THE GIRDERS.

ERECT EACH SUBSEQUENT GIRDER WITH DIAPHRAGM CONNECTING TO THE ADJACENT PREVIOUSLY ERECTED GIRDER AND TIGHTEN ALL BOLTS BEFORE RELEASING THE GIRDER.

DURING THE GIRDER ERECTION PROCEDURE, THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING TEMPORARY LATERAL BRACING AND OTHER MEANS OF SUPPORT AS REQUIRED TO ENSURE STABILITY OF THE GIRDERS AND TO ENSURE PLUMBNESS OF THE GIRDERS IN THE FINAL CONDITION.

THE CONTRACTOR MAY SUBMIT AN ALTERNATE ERECTION METHOD TO THE ENGINEER FOR REVIEW AND APPROVAL.

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GIRDER ERECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-5
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER NEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
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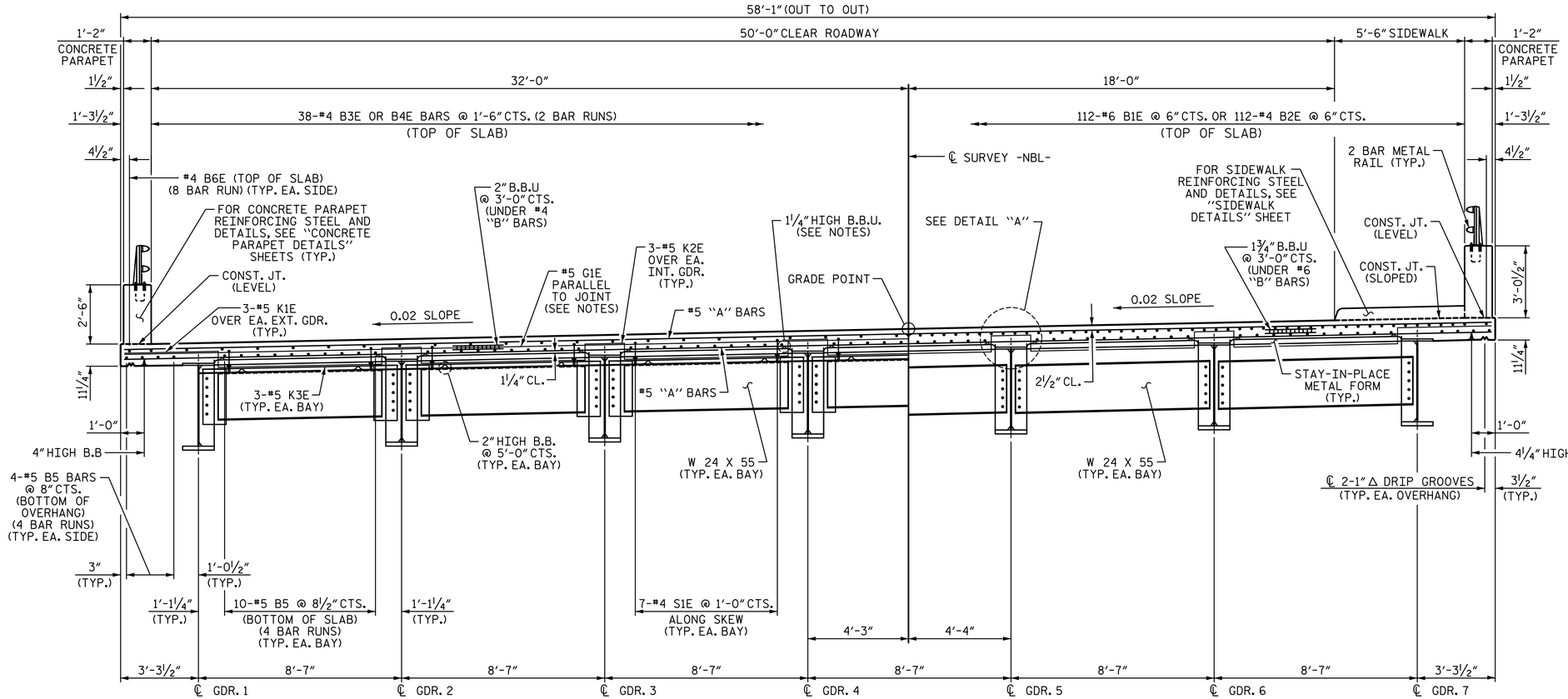
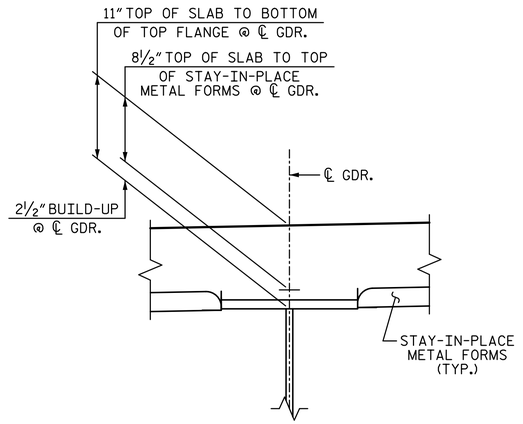


PARTIAL TYPICAL SECTION
(SHOWING END BENT DIAPHRAGMS)

PARTIAL TYPICAL SECTION
(SHOWING BENT DIAPHRAGMS)
(INTERMEDIATE DIAPHRAGMS SIMILAR)

TYPICAL SECTION



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

NOTES:

PROVIDE 1 1/4" 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 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO GIRDER FLANGES IN THE ZONES REQUIRING CHARPY V-NOTCH TEST. SEE STRUCTURAL STEEL DETAIL SHEETS.

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

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

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

THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN METAL STAY-IN-PLACE FORM SUPPORTS OR FORMS AND GIRDER STIFFENERS OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE METAL STAY-IN-PLACE FORM WORKING DRAWINGS.

CLASS AA CONCRETE IN DECK AND SIDEWALK SHALL BE SAND LIGHTWEIGHT CONCRETE. FOR SAND LIGHTWEIGHT CONCRETE, SEE SPECIAL PROVISIONS.

CLASS AA CONCRETE IN CONCRETE PARAPETS SHALL BE NORMAL WEIGHT CONCRETE.

STRUCTURAL STEEL ERECTION IN A CONTINUOUS UNIT SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE UNIT.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-6
1			3			TOTAL SHEETS
2			4			S01-49

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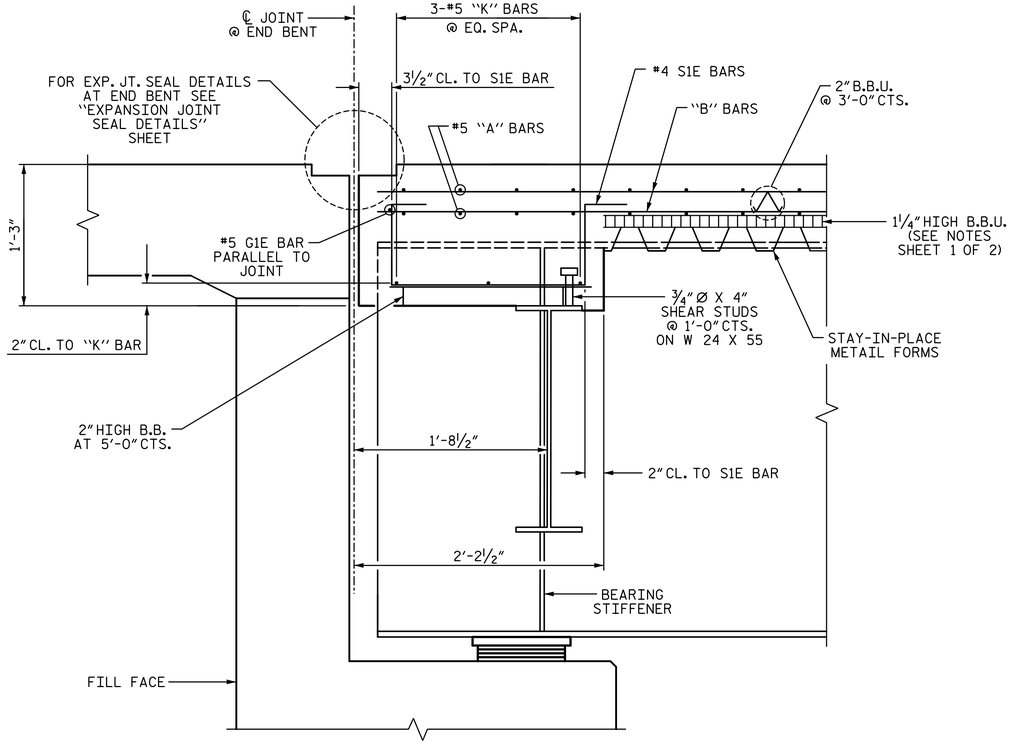
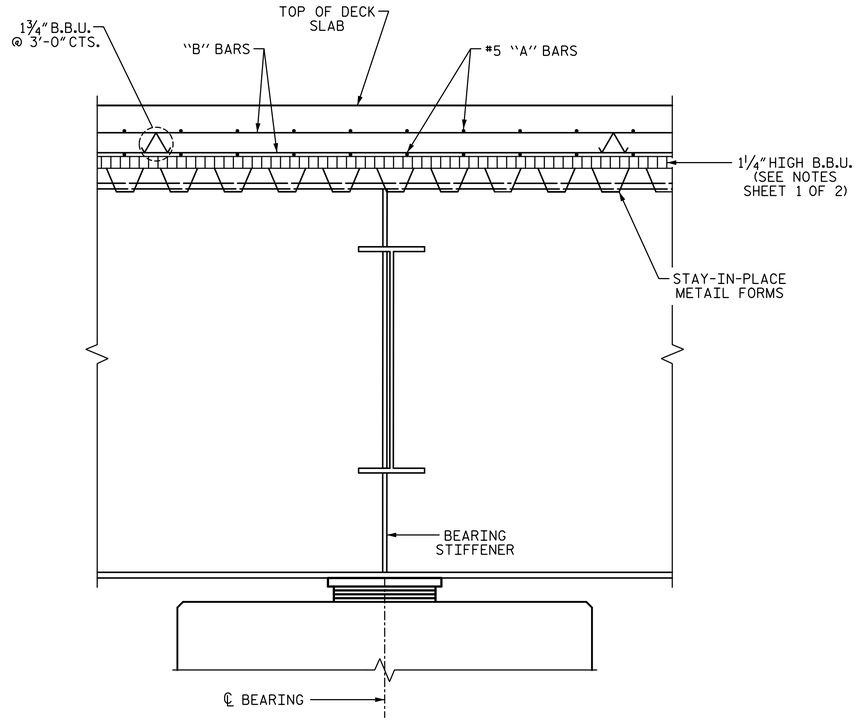


SECTION THRU END BENT

(END BENT 1 SHOWN, END BENT 2 SIMILAR)



SECTION AT BENT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-7
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

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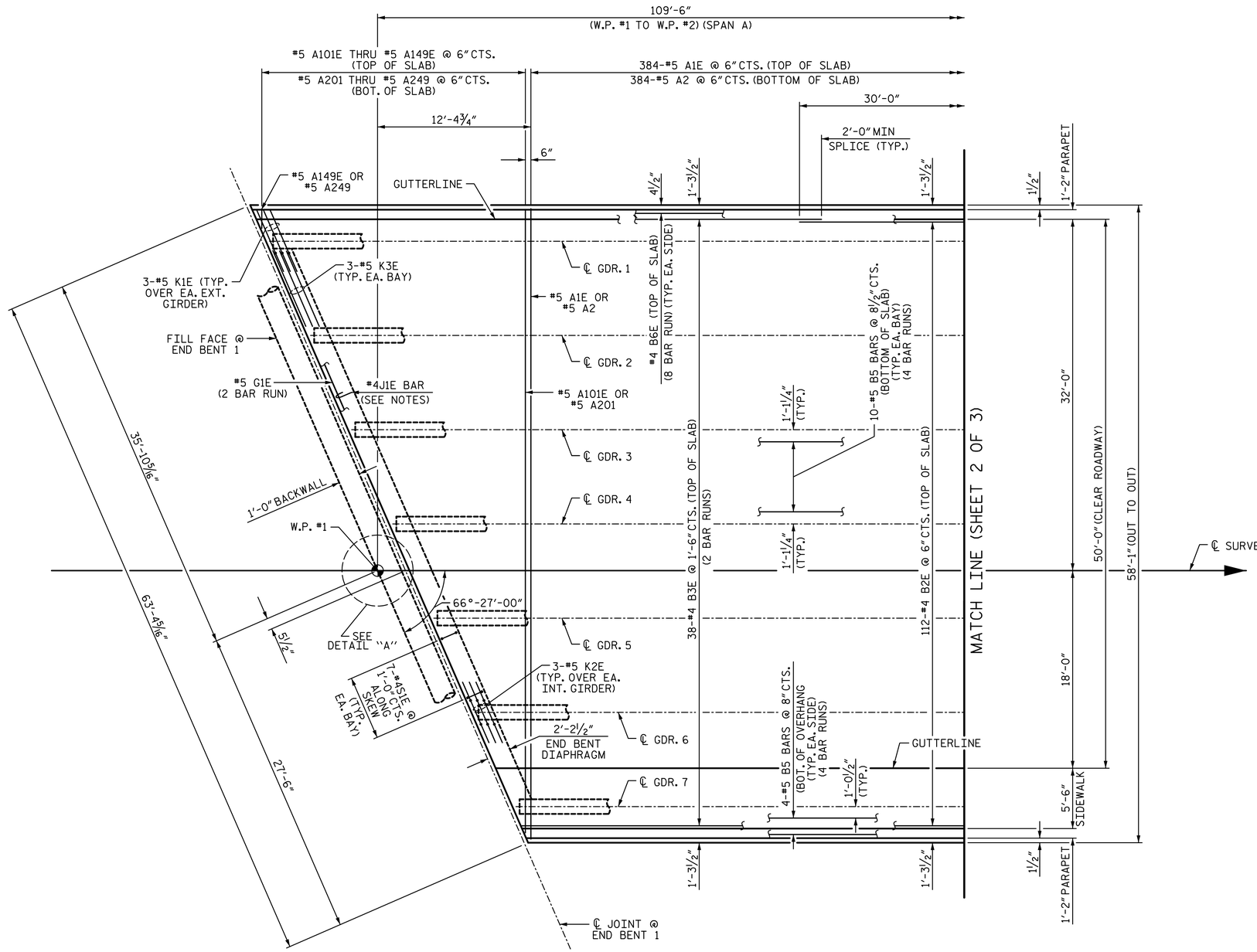
NOTES:

FOR PARAPET REINFORCING STEEL, SEE "CONCRETE PARAPET DETAILS" SHEETS.

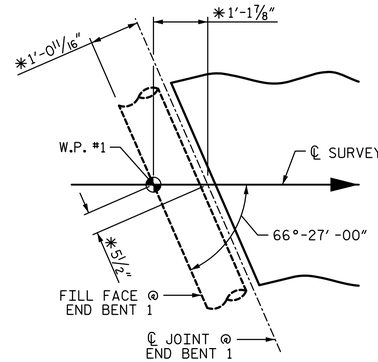
FOR SIDEWALK REINFORCING STEEL, SEE "SIDEWALK DETAILS" SHEET.

FOR PLACEMENT OF #4J1E BARS, SEE "EXPANSION JOINT SEAL DETAILS" SHEET.

* JOINT OPENING AND OFFSETS BASED ON 60° JOINT OPENING.



PARTIAL PLAN - SPAN A



DETAIL "A"

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
(2 SPAN CONTINUOUS UNIT)
(SPAN A)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-8
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24090 ENGINEER THEO J. BEACH
2/13/2017

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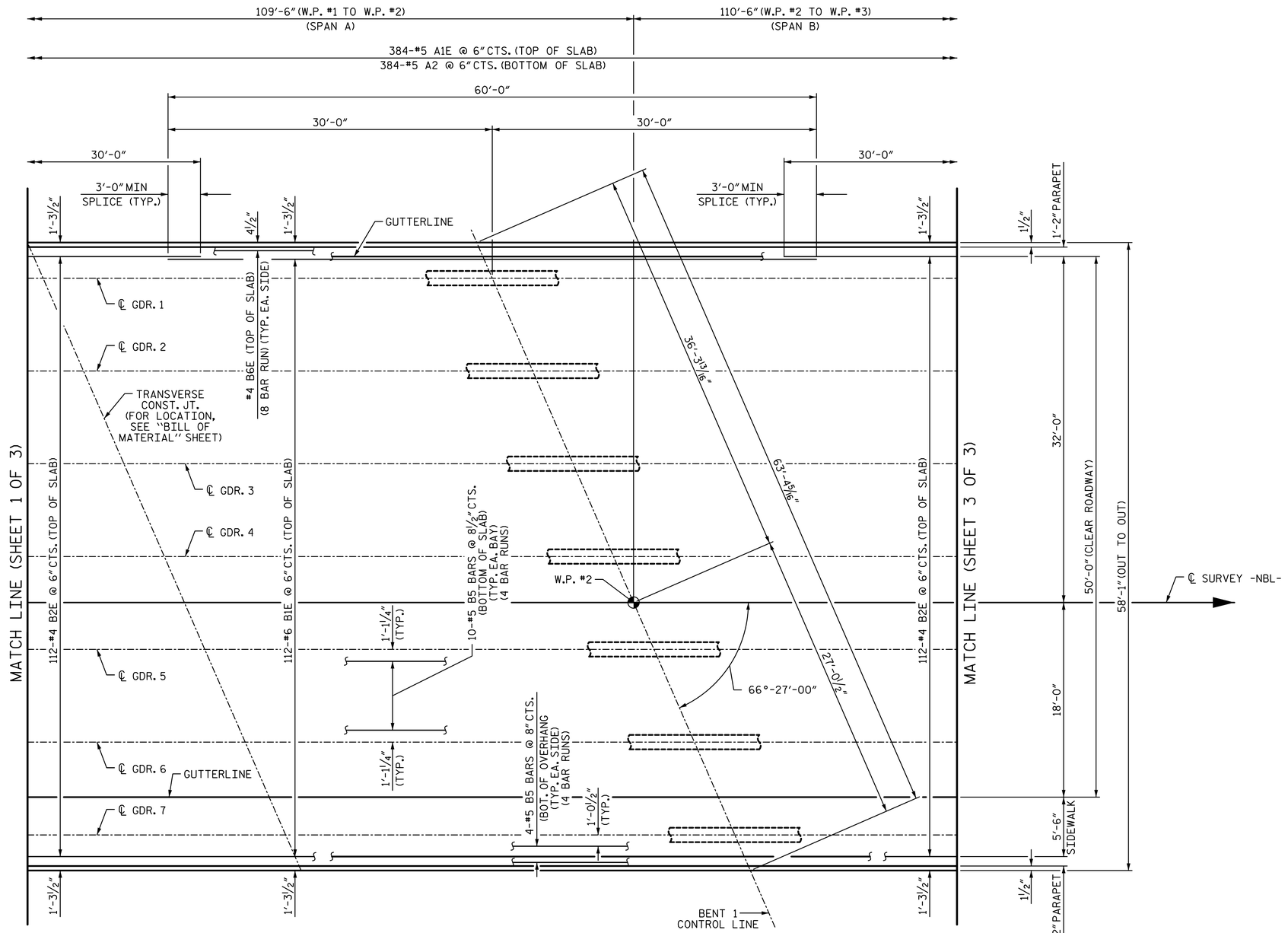

NOTES:

FOR PARAPET REINFORCING STEEL, SEE "CONCRETE PARAPET DETAILS" SHEETS.

FOR SIDEWALK REINFORCING STEEL, SEE "SIDEWALK DETAILS" SHEET.

PARTIAL PLAN - SPANS A AND B

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS
(2 SPAN CONTINUOUS UNIT)
(SPANS A & B)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-9
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER TED J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
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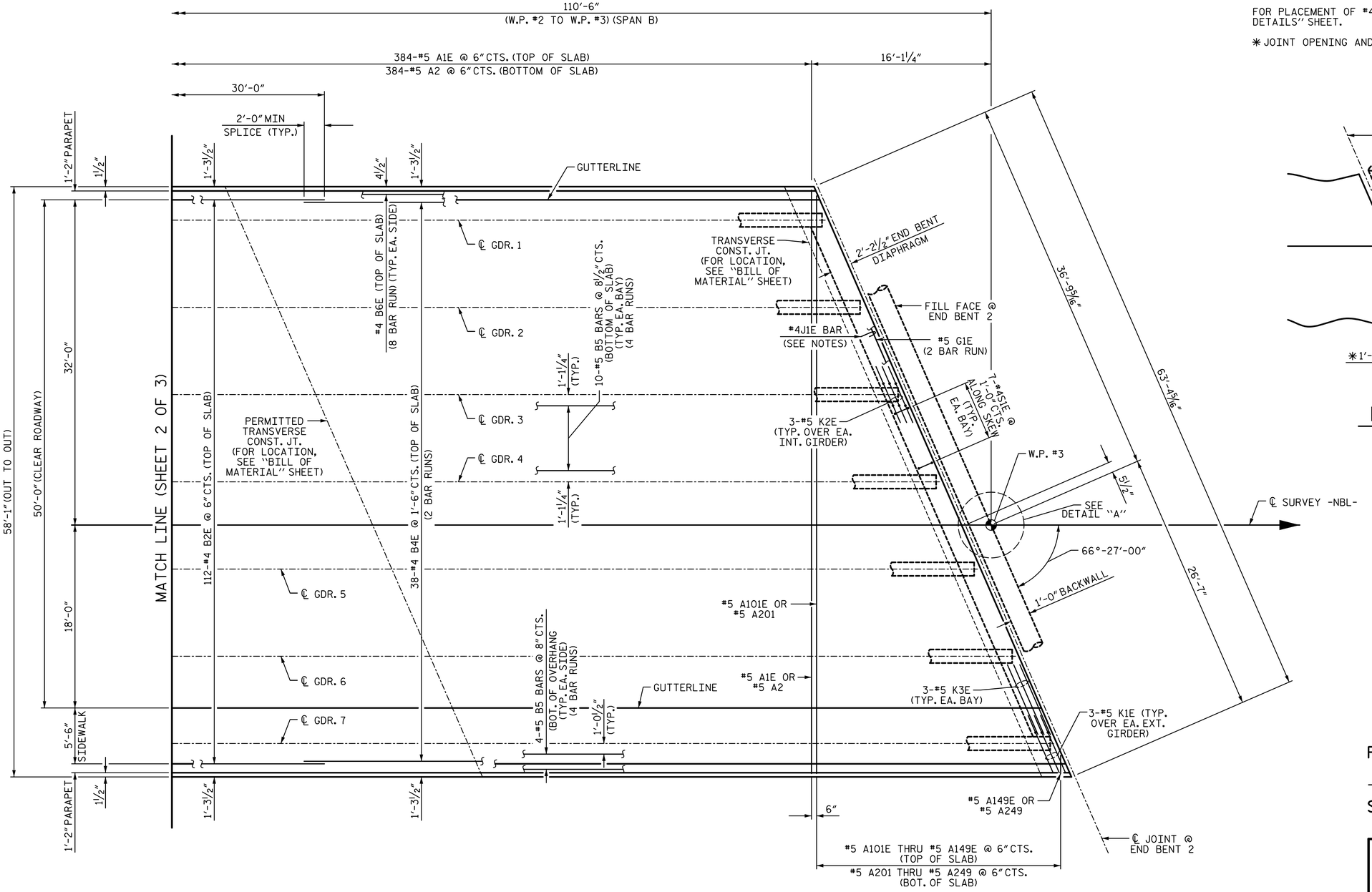


PARTIAL PLAN - SPAN B

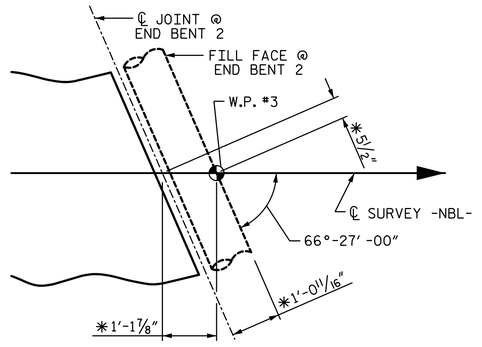
NOTES:

FOR PARAPET REINFORCING STEEL, SEE "CONCRETE PARAPET DETAILS" SHEETS.

FOR SIDEWALK REINFORCING STEEL, SEE "SIDEWALK DETAILS" SHEET.

FOR PLACEMENT OF #4J1E BARS, SEE "EXPANSION JOINT SEAL DETAILS" SHEET.

✱ JOINT OPENING AND OFFSETS BASED ON 60° JOINT OPENING.



DETAIL "A"

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS
(2 SPAN CONTINUOUS UNIT)
(SPAN B)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-10
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24380 ENGINEER TED J. BEACH
2/13/2017

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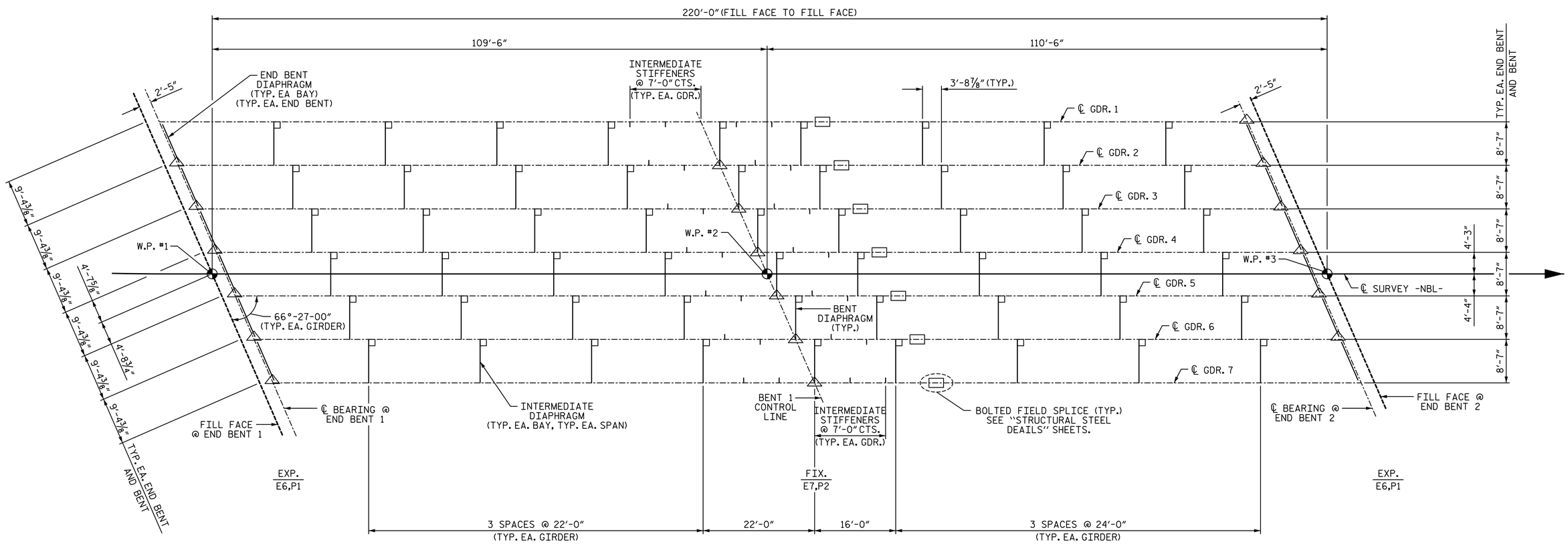
NOTES:

FOR DIAPHRAGM DETAILS, SEE "STRUCTUAL STEEL DETAILS" SHEETS.

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

△ THE BEARING STIFFENERS AT THESE LOCATIONS SHALL BE UTILIZED AS A CONNECTOR PLATE FOR THE DIAPHRAGM.



SPAN A

SPAN B

FRAMING PLAN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-11
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER NEO J. BEACH
2/13/2017

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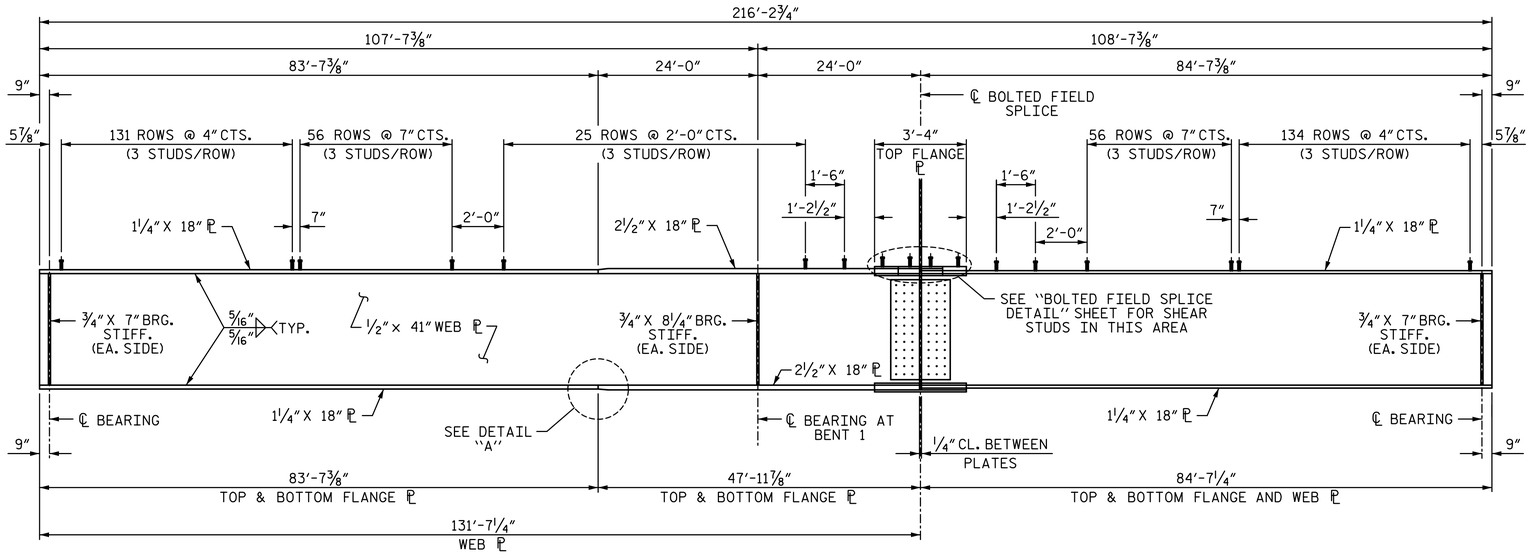
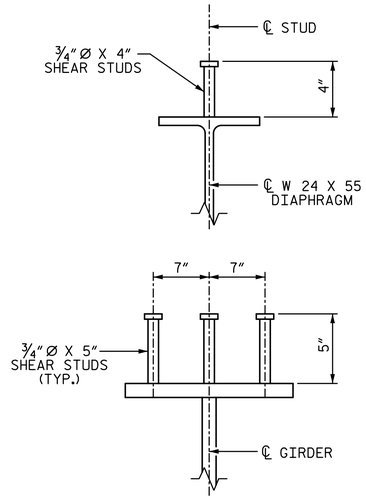


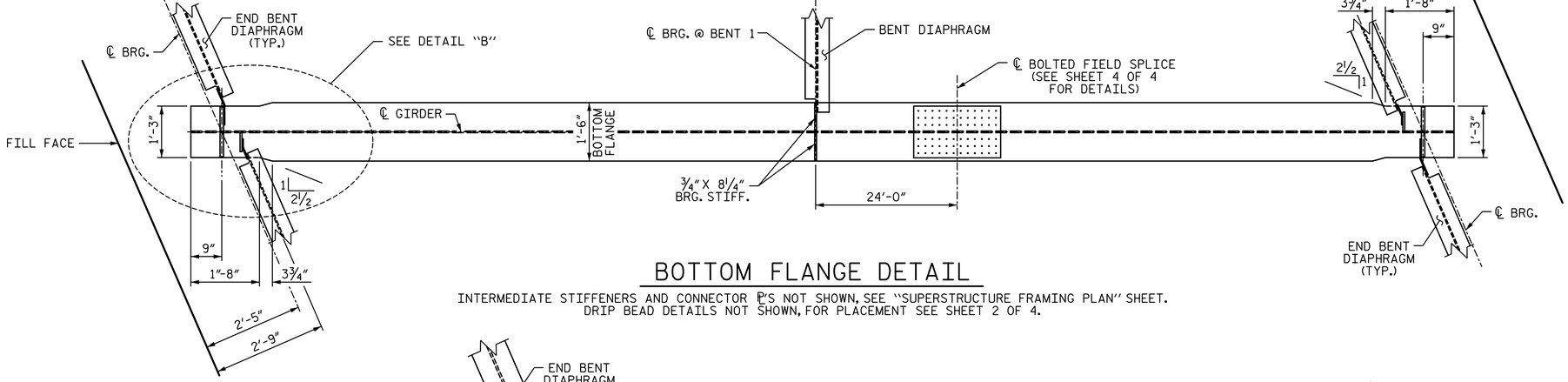
ELEVATION OF GIRDER

INTERMEDIATE STIFFENERS AND CONNECTOR PLATES NOT SHOWN.
SEE ″FRAMING PLAN″ SHEET FOR LOCATIONS.



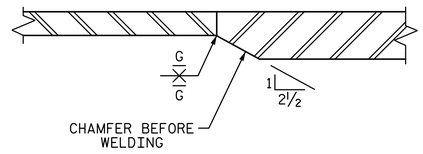
SHEAR STUD DETAILS

(TYPICAL EXCEPT AT TOP FLANGE SPICE ℄.
SEE BOLTED FIELD SPLICE DETAILS FOR SHEAR STUDS IN THIS AREA.)

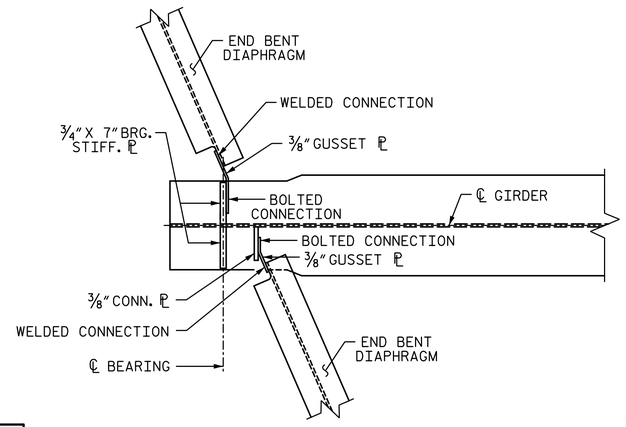


BOTTOM FLANGE DETAIL

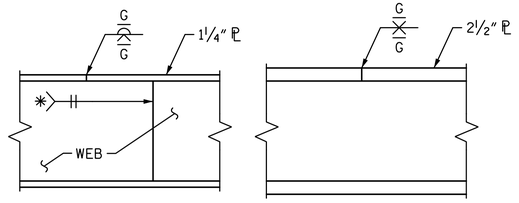
INTERMEDIATE STIFFENERS AND CONNECTOR ℄'S NOT SHOWN, SEE ″SUPERSTRUCTURE FRAMING PLAN″ SHEET.
DRIP BEAD DETAILS NOT SHOWN, FOR PLACEMENT SEE SHEET 2 OF 4.



DETAIL ″A″
(TYP. TOP & BOTTOM FLANGE)



DETAIL ″B″
(SIMILAR EACH END BENT)



ELEVATION

TYPICAL FLANGE AND WEB BUTT JOINT

✱ GRIND SMOOTH AND FLUSH ON OUTER FACE OF EXTERIOR GIRDERS

PROJECT NO. U-3109A
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SHEET 1 OF 4

STATE OF NORTH CAROLINA
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STRUCTURAL STEEL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-12
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER TED J. BEACH
Doc Signer SEAL
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
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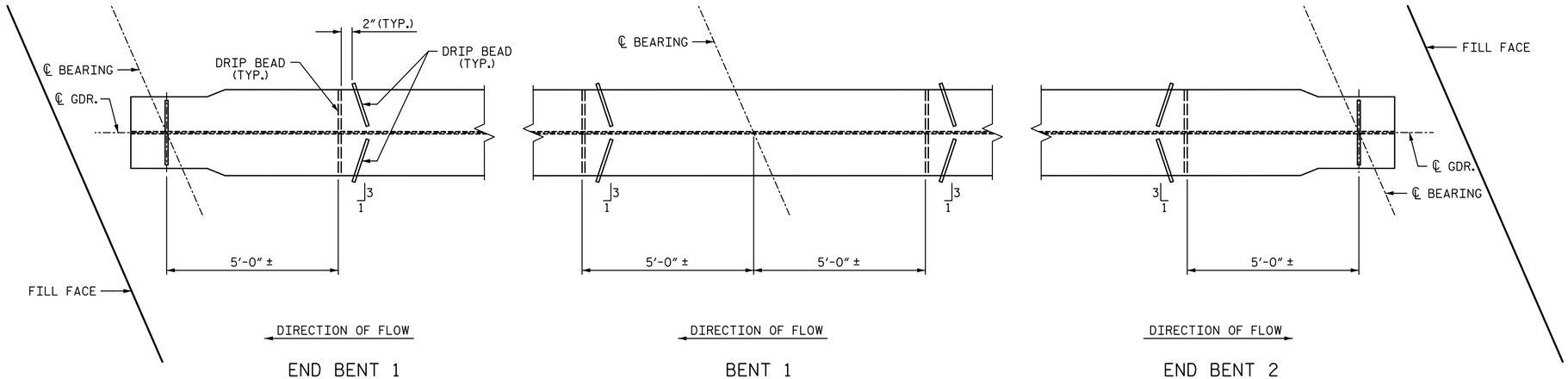


BOTTOM FLANGE - DRIP BEAD DETAILS

NOTES:

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W AND PAINTED IN ACCORDANCE WITH SYSTEM 4 OF ARTICLE 442-8 OF THE STANDARD SPECIFICATIONS UNLESS OTHERWISE NOTED ON THE PLANS.

ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL, UNLESS OTHERWISE NOTED.

ALL FIELD CONNECTIONS TO BE 7/8" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEARING STIFFENERS ARE TO BE PLACED NORMAL TO THE WEB OF THE GIRDER AND SHALL BE PLUMB.

A CHARPY V-NOTCH TEST IS REQUIRED FOR GIRDER MEMBERS AS INDICATED ON THE PLANS.

PERMITTED FLANGE AND WEB SHOP SPLICES SHALL NOT BE LOCATED WITHIN 15 FEET OF MAXIMUM DEAD LOAD DEFLECTION (NOR WITHIN 15 FEET OF INTERMEDIATE BEARINGS OF CONTINUOUS UNITS). KEEP 2 FEET MINIMUM BETWEEN WEB AND FLANGE SHOP SPLICES. KEEP 6" MINIMUM BETWEEN CONNECTOR PLATE OR TRANSVERSE STIFFENER WELDS AND WEB OR FLANGE SHOP SPLICES.

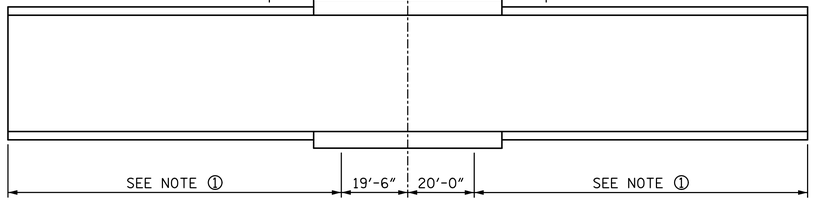
STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELD.

TENSION ON THE AASHTO M164 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-8 OF THE STANDARD SPECIFICATIONS.

END OF GIRDERS SHALL BE PLUMB.

FABRICATORS SHALL DETAIL DIAPHRAGM MEMBERS AND CONNECTIONS FOR FULL DEAD LOAD FIT UP. GIRDERS SHALL BE PLUMB AFTER THE FULL AMOUNT OF DEAD LOAD IS APPLIED.

BEARING STIFFENER MAY REQUIRE COPING IF WIDER THAN BOTTOM FLANGE.

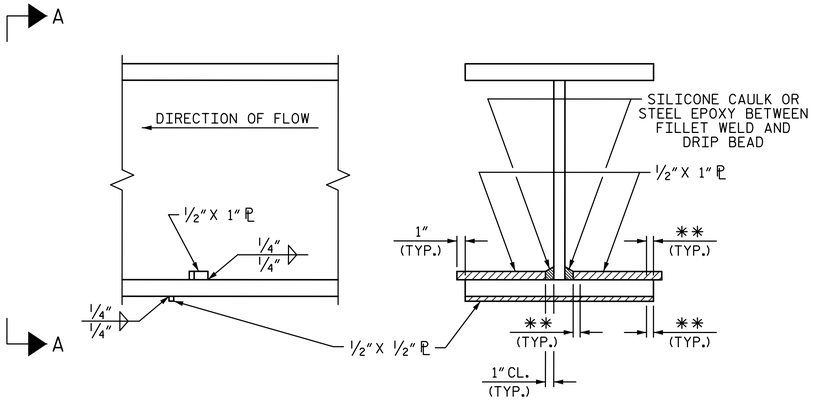


GIRDER MAKE-UP

NOTE ①: CHARPY V-NOTCH TESTS ARE REQUIRED FOR ALL TOP OR BOTTOM FLANGE PLATES WHICH FALL WITHIN THESE LIMITS, ALL WEB PLATES, AND ALL SPLICE PLATES. IF A PERMITTED SHOP FLANGE SPLICE IS NOT USED, CHARPY V-NOTCH TESTS WILL BE REQUIRED FOR THE ENTIRE FLANGE PLATE. FOR CHARPY V-NOTCH TESTS, SEE ARTICLE 1072-7 OF THE STANDARD SPECIFICATIONS.

NOTE ②: NO WELDING OF FORMS OR FALSEWORK TO THE TOP FLANGE WILL BE PERMITTED IN THIS REGION.

CHARPY V-NOTCH TESTS FOR CONTINUOUS PLATE GIRDERS



SECTION

VIEW A-A

** SEE "WELD TERMINATION DETAILS" ON SHEET 3 OF 4

DRIP BEAD DETAILS

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-13
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
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Cary, NC 27518
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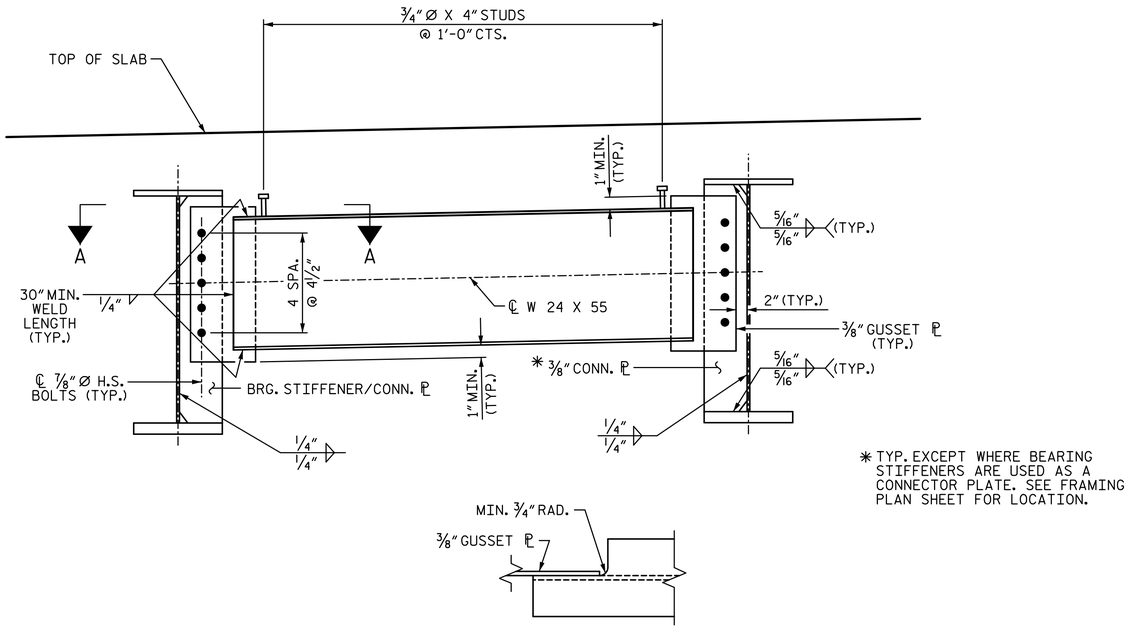
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24330 ENGINEER TED J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

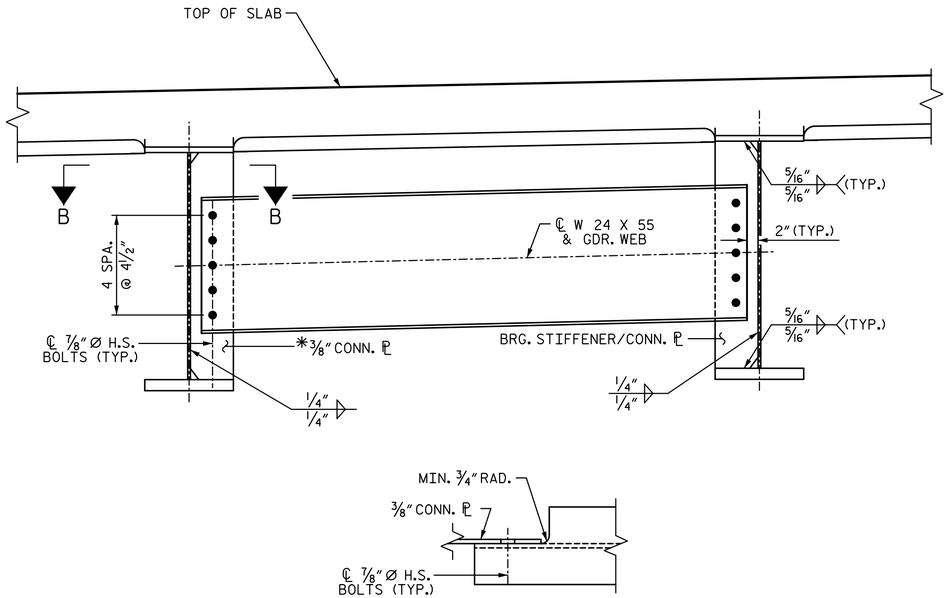


* TYP. EXCEPT WHERE BEARING STIFFENERS ARE USED AS A CONNECTOR PLATE. SEE FRAMING PLAN SHEET FOR LOCATION.

SECTION A-A

END BENT DIAPHRAGM

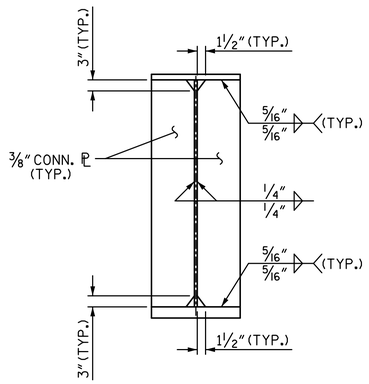
SEE FRAMING PLAN FOR LOCATION OF BRG. STIFFENERS/CONN. ℙ'S



SECTION B-B

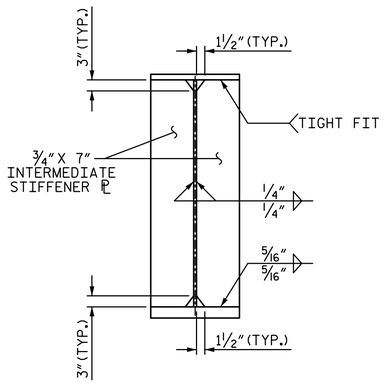
INTERMEDIATE & BENT DIAPHRAGM

SEE FRAMING PLAN FOR LOCATION OF BRG. STIFFENERS/CONN. ℙ'S



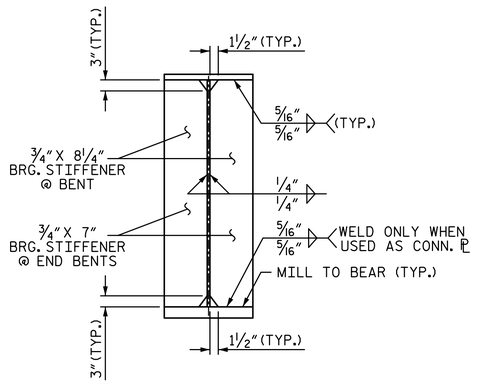
CONNECTOR PLATE

(CONNECTOR PLATES FOR END BENT AND BENT DIAPHRAGMS OR INTERMEDIATE DIAPHRAMS)

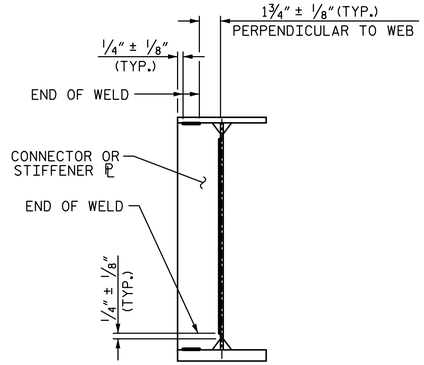


INTERMEDIATE STIFFENER

(SEE FRAMING PLAN FOR LOCATION)



BEARING STIFFENER



WELD TERMINATION DETAIL

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-14
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

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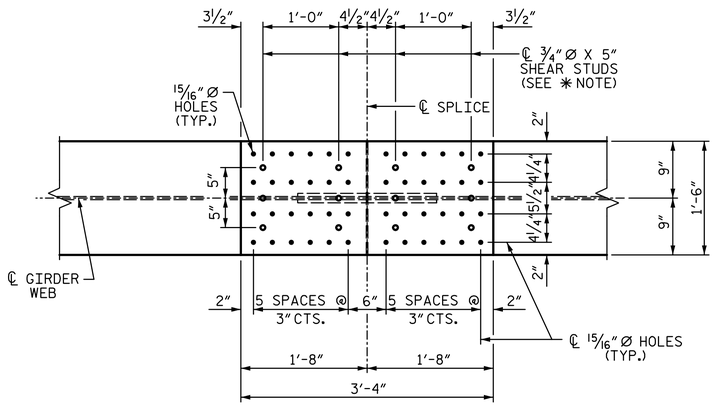
LICENSURE NO. C-2521

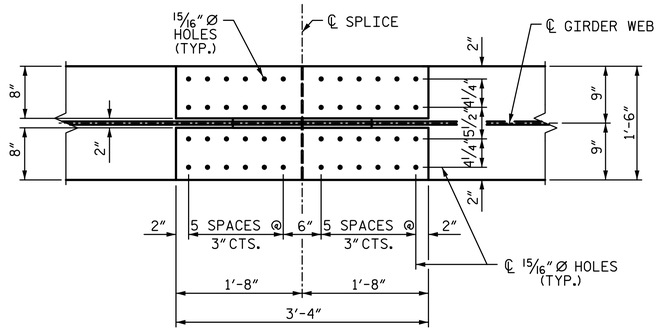
NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
5/8/2017

DRAWN BY:	S. D. COOPER	DATE:	5-15
CHECKED BY:	B.S. COX	DATE:	5-15
DESIGN ENGINEER OF RECORD:	T.J. BEACH	DATE:	5-15

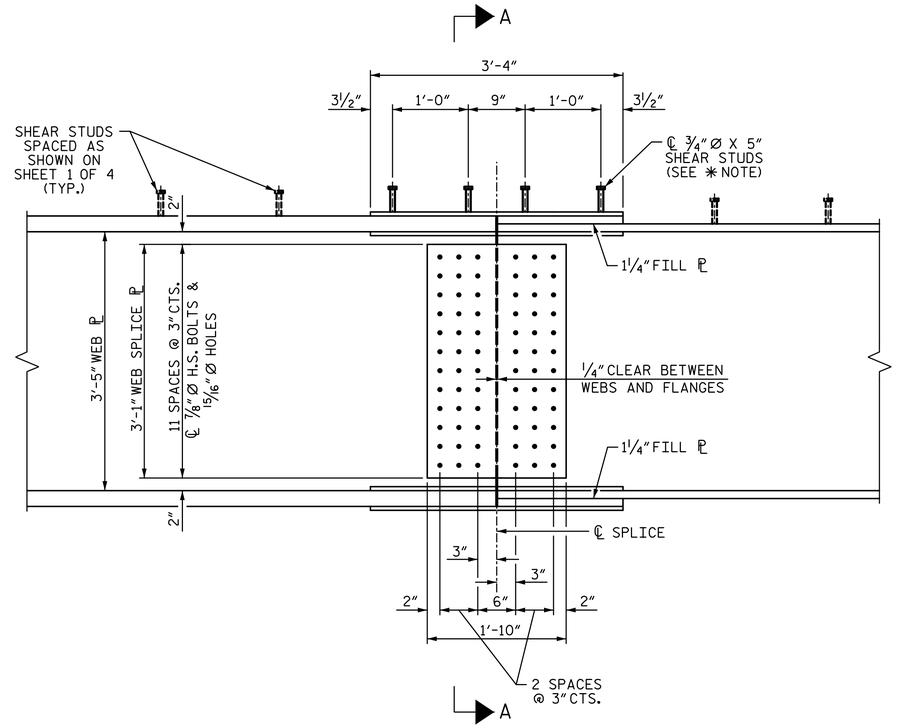
5/8/2017 10:50:15 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_SS.dgn



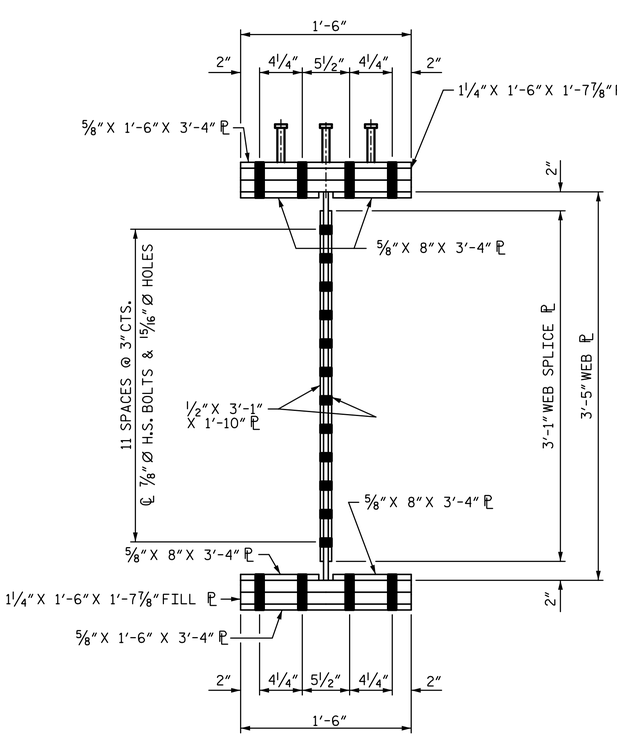
PLAN (TOP OF TOP FLANGE)



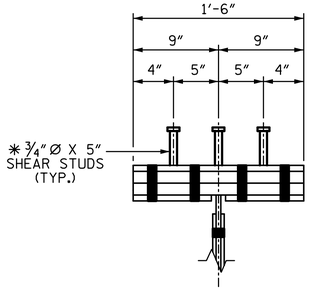
PLAN (TOP OF BOTTOM FLANGE)



ELEVATION



SECTION A-A



SHEAR STUD DETAIL
FOR TOP FLANGE SPLICE PLATE

✳ SHEAR STUDS ARE TO BE SHOP WELDED ON TOP OF PLATE BEFORE FIELD ASSEMBLY.

BOLTED FIELD SPLICE DETAILS

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

STRUCTURAL STEEL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-15
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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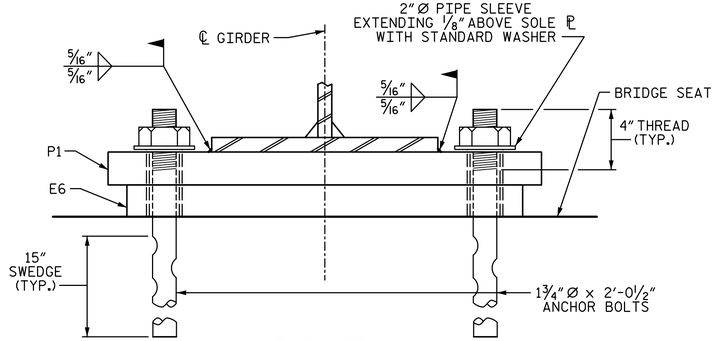
LICENSURE NO. C-2521

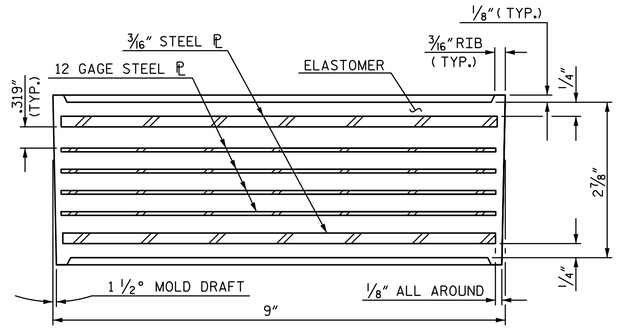
NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER THEO J. BEACH
2/13/2017

2/10/2017 9:09:02 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_SS.dgn

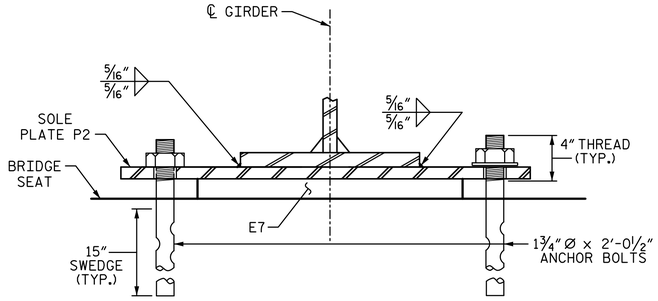


END VIEW

(END BENT 1 & 2)
EXPANSION

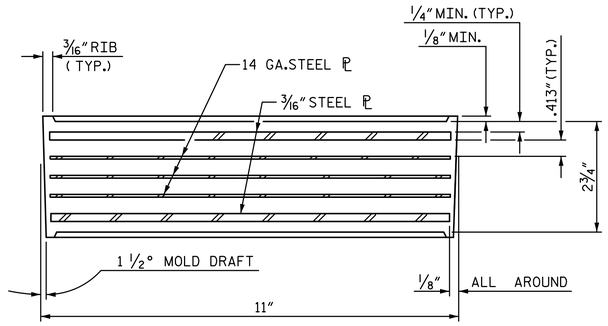


TYPICAL SECTION OF ELASTOMERIC BEARINGS - E6

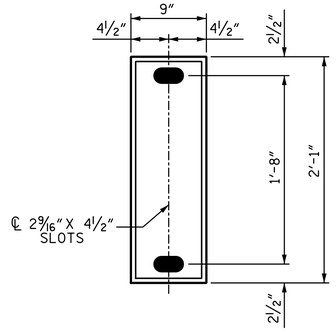


SECTION

(BENT 1)
FIXED



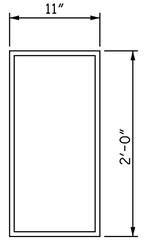
TYPICAL SECTION OF ELASTOMERIC BEARINGS - E7



E6 (14 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

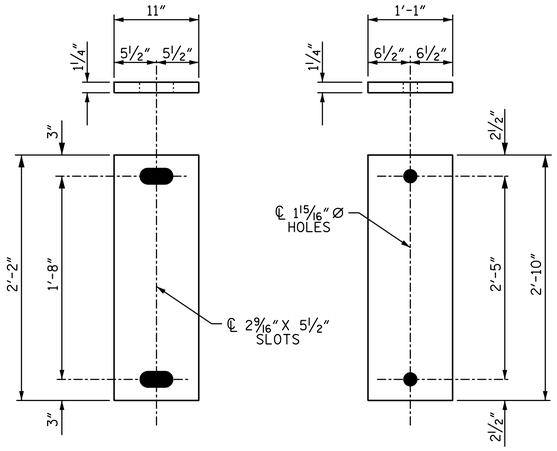
TYPE III



E7 (7 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE VII



P1
(EXPANSION)
P1 (14 REQ'D)

P2
(FIXED)
P2 (7 REQ'D)

SOLE PLATE DETAILS (''P'')

NOTES:

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

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

THE PAYMENT FOR THE PIPE SLEEVES SHALL BE INCLUDED IN THE SEVERAL PAY ITEMS.

FOR AASHTO M270 GRADE 50W STRUCTURAL STEEL, SOLE PLATE SHALL BE AASHTO M270 GRADE 50W AND SHALL NOT BE GALVANIZED. ANCHOR BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

WHEN FIELD WELDING THE SOLE PLATE TO THE GIRDER FLANGE, 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.

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.

THE CONTRACTOR'S ATTENTION IS CALLED TO THE FOLLOWING PROCEDURE, WHICH MAY BE REQUIRED BY THE ENGINEER, TO RESET ELASTOMERIC BEARINGS DUE TO GIRDER TRANSLATION AND END ROTATION:

1. ONCE THE DECK HAS CURED, THE GIRDERS SHALL BE JACKED AND THE ELASTOMERIC BEARING SLOTS CENTERED AS NEARLY AS PRACTICAL ABOUT THE BEARING STIFFENER. THIS OPERATION SHALL BE PERFORMED AT APPROXIMATELY 60° F.

THE CONTRACTOR MAY PROPOSE ALTERNATE METHODS, PROVIDED DETAILS ARE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE III	206 k
TYPE VII	420 k

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-16
1			3			TOTAL SHEETS
2			4			S01-49

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN A

GIRDER 1

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB	0	.019	.037	.053	.067	.079	.087	.092	.094	.092	.087	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK	0	.006	.012	.017	.022	.026	.029	.030	.031	.031	.029	.027	.024	.020	.016	.012	.008	.005	.002	.001	0
TOTAL DEAD LOAD DEFLECTION	0	.032	.063	.090	.114	.134	.149	.156	.160	.157	.149	.137	.120	.101	.081	.060	.041	.024	.012	.004	0
VERTICAL CURVE ORDINATE	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER	0	9/16″	1 1/16″	1 3/16″	1 15/16″	2 1/4″	2 3/16″	2 11/16″	2 3/4″	2 3/4″	2 11/16″	2 3/16″	2 5/16″	2″	1 11/16″	1 3/8″	1 1/16″	3/4″	7/16″	3/16″	0

SPAN A

GIRDER 2

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB	0	.019	.037	.053	.068	.079	.087	.092	.094	.092	.087	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK	0	.005	.010	.015	.019	.022	.024	.026	.026	.026	.025	.023	.020	.017	.014	.010	.007	.004	.002	.001	0
TOTAL DEAD LOAD DEFLECTION	0	.031	.061	.088	.112	.130	.144	.152	.155	.152	.145	.133	.116	.098	.079	.058	.040	.023	.012	.004	0
VERTICAL CURVE ORDINATE	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER	0	9/16″	1 1/16″	1 1/2″	1 15/16″	2 1/4″	2 1/2″	2 5/8″	2 11/16″	2 11/16″	2 5/8″	2 1/2″	2 1/4″	2″	1 11/16″	1 3/8″	1 1/16″	3/4″	7/16″	3/16″	0

SPAN A

GIRDER 3

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB	0	.019	.037	.053	.068	.079	.087	.092	.094	.092	.087	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK	0	.005	.009	.013	.017	.019	.021	.023	.023	.023	.022	.020	.018	.015	.012	.009	.006	.004	.002	.000	0
TOTAL DEAD LOAD DEFLECTION	0	.031	.060	.086	.110	.127	.141	.149	.152	.149	.142	.130	.114	.096	.077	.057	.039	.023	.012	.003	0
VERTICAL CURVE ORDINATE	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER	0	9/16″	1 1/16″	1 1/2″	1 7/8″	2 3/16″	2 7/16″	2 5/8″	2 11/16″	2 11/16″	2 9/16″	2 7/16″	2 1/4″	1 15/16″	1 11/16″	1 3/8″	1 1/16″	3/4″	7/16″	3/16″	0

SPAN A

GIRDER 4

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB	0	.019	.037	.054	.068	.079	.088	.092	.094	.092	.088	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK	0	.003	.006	.009	.011	.013	.014	.015	.016	.015	.015	.013	.012	.010	.008	.006	.004	.003	.001	.000	0
TOTAL DEAD LOAD DEFLECTION	0	.029	.057	.083	.104	.121	.135	.141	.145	.141	.136	.123	.108	.091	.073	.054	.037	.022	.011	.003	0
VERTICAL CURVE ORDINATE	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER	0	1/2″	1″	1 7/16″	1 13/16″	2 1/8″	2 3/8″	2 1/2″	2 9/16″	2 9/16″	2 1/2″	2 3/8″	2 1/8″	1 15/16″	1 5/8″	1 5/16″	1″	3/4″	7/16″	3/16″	0

✳ INCLUDES SLAB, BUILDUPS AND STAY-IN-PLACE FORMS
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-17
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2			4			S01-49

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24180 ENGINEER THEO J. BEACH
DocuSigned by: Theo Beach
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN A — GIRDER 5

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.019	.037	.054	.068	.079	.088	.093	.094	.093	.088	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.006	.012	.017	.022	.025	.028	.030	.030	.030	.029	.026	.023	.020	.016	.012	.008	.005	.002	.001	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.032	.063	.091	.115	.133	.149	.157	.159	.157	.150	.136	.119	.101	.081	.060	.041	.024	.012	.004	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	9/16″	1 1/16″	1 3/16″	1 15/16″	2 1/4″	2 9/16″	2 11/16″	2 3/4″	2 3/4″	2 11/16″	2 1/2″	2 1/4″	2″	1 11/16″	1 3/8″	1 1/16″	3/4″	7/16″	3/16″	0

SPAN A — GIRDER 6

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.019	.037	.054	.068	.080	.088	.093	.094	.093	.088	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.007	.014	.021	.026	.031	.034	.036	.037	.036	.035	.032	.028	.024	.019	.014	.010	.006	.003	.001	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.033	.065	.095	.119	.140	.155	.163	.166	.163	.156	.142	.124	.105	.084	.062	.043	.025	.013	.004	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	9/16″	1 1/8″	1 5/8″	2″	2 3/8″	2 5/8″	2 3/4″	2 7/8″	2 7/8″	2 3/4″	2 9/16″	2 5/16″	2 1/16″	1 3/4″	1 7/16″	1 1/16″	3/4″	1/2″	3/16″	0

SPAN A — GIRDER 7

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.007	.014	.020	.025	.029	.033	.034	.035	.034	.033	.030	.026	.022	.018	.013	.009	.005	.003	.001	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.019	.037	.054	.068	.080	.088	.093	.095	.093	.088	.080	.070	.059	.047	.035	.024	.014	.007	.002	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.009	.018	.025	.032	.038	.042	.044	.045	.045	.043	.039	.035	.029	.024	.018	.012	.007	.004	.001	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.035	.069	.099	.125	.147	.163	.171	.175	.172	.164	.149	.131	.110	.089	.066	.045	.026	.014	.004	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.038	.048	.056	.062	.068	.071	.074	.074	.074	.071	.068	.062	.056	.048	.038	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	9/16″	1 1/8″	1 5/8″	2 1/16″	2 7/16″	2 11/16″	2 7/8″	2 15/16″	2 15/16″	2 7/8″	2 11/16″	2 7/16″	2 1/8″	1 13/16″	1 7/16″	1 1/8″	3/4″	1/2″	3/16″	0

✳ INCLUDES SLAB, BUILDUPS AND STAY-IN-PLACE FORMS
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-18
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:
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(919) 852-0598 (Fax)
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24190 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

2/10/2017 9:09:03 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_DL.dgn

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN B — GIRDER 1

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.027	.039	.052	.065	.076	.086	.094	.099	.100	.099	.093	.084	.072	.057	.039	.020	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.003	.006	.010	.014	.018	.022	.026	.029	.031	.033	.033	.032	.031	.028	.024	.019	.013	.007	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.014	.029	.047	.068	.089	.111	.130	.147	.160	.169	.170	.168	.159	.143	.123	.097	.067	.035	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.049	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.049	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	13/16″	1 1/8″	1 1/2″	1 13/16″	2 3/16″	2 7/16″	2 11/16″	2 13/16″	2 15/16″	2 15/16″	2 7/8″	2 11/16″	2 3/8″	2 1/16″	1 5/8″	1 1/8″	9/16″	0

SPAN B — GIRDER 2

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.027	.039	.052	.065	.076	.087	.094	.099	.101	.099	.093	.084	.072	.057	.039	.020	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.003	.005	.008	.012	.015	.019	.022	.025	.027	.028	.028	.028	.026	.023	.020	.016	.011	.006	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.014	.028	.045	.066	.086	.108	.126	.144	.156	.164	.166	.164	.154	.138	.119	.094	.065	.034	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	13/16″	1 1/8″	1 1/2″	1 13/16″	2 1/8″	2 3/8″	2 5/8″	2 13/16″	2 7/8″	2 7/8″	2 13/16″	2 5/8″	2 5/16″	2″	1 5/8″	1 1/8″	9/16″	0

SPAN B — GIRDER 3

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.028	.039	.052	.065	.076	.087	.094	.099	.101	.099	.093	.084	.072	.057	.040	.020	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.002	.004	.007	.010	.013	.016	.019	.022	.023	.025	.025	.024	.023	.021	.018	.014	.010	.005	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.013	.027	.045	.064	.084	.105	.123	.141	.152	.161	.163	.160	.151	.136	.117	.092	.065	.033	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	13/16″	1 1/8″	1 7/16″	1 3/4″	2 1/16″	2 3/8″	2 9/16″	2 3/4″	2 13/16″	2 13/16″	2 3/4″	2 9/16″	2 5/16″	2″	1 9/16″	1 1/8″	9/16″	0

SPAN B — GIRDER 4

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.028	.039	.052	.065	.077	.087	.095	.099	.101	.099	.094	.085	.072	.057	.040	.020	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.000	.002	.003	.005	.007	.009	.011	.013	.015	.016	.016	.017	.016	.015	.014	.012	.009	.006	.003	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.003	.013	.026	.043	.061	.080	.100	.118	.134	.146	.152	.155	.152	.144	.130	.111	.087	.061	.031	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	3/4″	1 1/16″	1 7/16″	1 3/4″	2″	2 5/16″	2 1/2″	2 11/16″	2 3/4″	2 3/4″	2 5/8″	2 1/2″	2 1/4″	1 15/16″	1 1/2″	1 1/16″	9/16″	0

✳ INCLUDES SLAB, BUILDUPS AND STAY-IN-PLACE FORMS
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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(919) 852-0598 (Fax)
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 040190 ENGINEER THEO J. BEACH
2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-19
1			3			TOTAL SHEETS
2			4			S01-49

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN B — GIRDER 5

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.028	.039	.052	.065	.077	.087	.095	.100	.101	.099	.094	.085	.073	.057	.040	.020	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.003	.006	.009	.013	.017	.022	.025	.028	.031	.032	.032	.032	.030	.027	.023	.018	.013	.006	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.014	.029	.047	.067	.088	.111	.130	.147	.161	.169	.170	.168	.159	.143	.123	.096	.068	.034	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	13/16″	1 1/8″	1 1/2″	1 13/16″	2 3/16″	2 7/16″	2 11/16″	2 7/8″	2 15/16″	2 15/16″	2 7/8″	2 11/16″	2 3/8″	2 1/16″	1 5/8″	1 1/8″	9/16″	0

SPAN B — GIRDER 6

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.028	.039	.052	.065	.077	.087	.095	.100	.101	.099	.094	.085	.073	.057	.040	.021	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.004	.007	.011	.016	.021	.026	.031	.034	.037	.039	.039	.038	.036	.033	.028	.022	.015	.008	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.015	.030	.049	.070	.092	.115	.136	.153	.167	.176	.177	.174	.165	.149	.128	.100	.070	.037	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	13/16″	1 3/16″	1 1/2″	1 7/8″	2 3/16″	2 1/2″	2 3/4″	2 15/16″	3″	3″	2 15/16″	2 3/4″	2 1/2″	2 1/8″	1 11/16″	1 3/16″	5/8″	0

SPAN B — GIRDER 7

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0
DEFLECTION DUE TO WEIGHT OF GIRDER ↓	0	.001	.003	.006	.010	.015	.019	.024	.028	.032	.035	.037	.037	.037	.035	.031	.027	.021	.015	.008	0
✳ DEFLECTION DUE TO WEIGHT OF SLAB ↓	0	.002	.008	.017	.028	.040	.052	.065	.077	.087	.095	.100	.101	.100	.094	.085	.073	.057	.040	.021	0
DEFLECTION DUE TO WEIGHT OF RAIL & SIDEWALK ↓	0	.001	.004	.009	.014	.020	.026	.032	.038	.042	.046	.048	.048	.047	.044	.040	.034	.027	.019	.010	0
TOTAL DEAD LOAD DEFLECTION ↓	0	.004	.015	.032	.052	.075	.097	.121	.143	.161	.176	.185	.186	.184	.173	.156	.134	.105	.074	.039	0
VERTICAL CURVE ORDINATE ↑	0	.014	.027	.039	.048	.057	.064	.069	.073	.075	.076	.075	.073	.069	.064	.057	.048	.039	.027	.014	0
																					0
REQUIRED CAMBER ↑	0	3/16″	1/2″	7/8″	1 3/16″	1 9/16″	1 15/16″	2 1/4″	2 9/16″	2 13/16″	3″	3 1/8″	3 1/8″	3 1/16″	2 7/8″	2 9/16″	2 3/16″	1 3/4″	1 3/16″	5/8″	0

✳ INCLUDES SLAB, BUILDUPS AND STAY-IN-PLACE FORMS
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "REQUIRED CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 040190 ENGINEER TED J. BEACH
2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

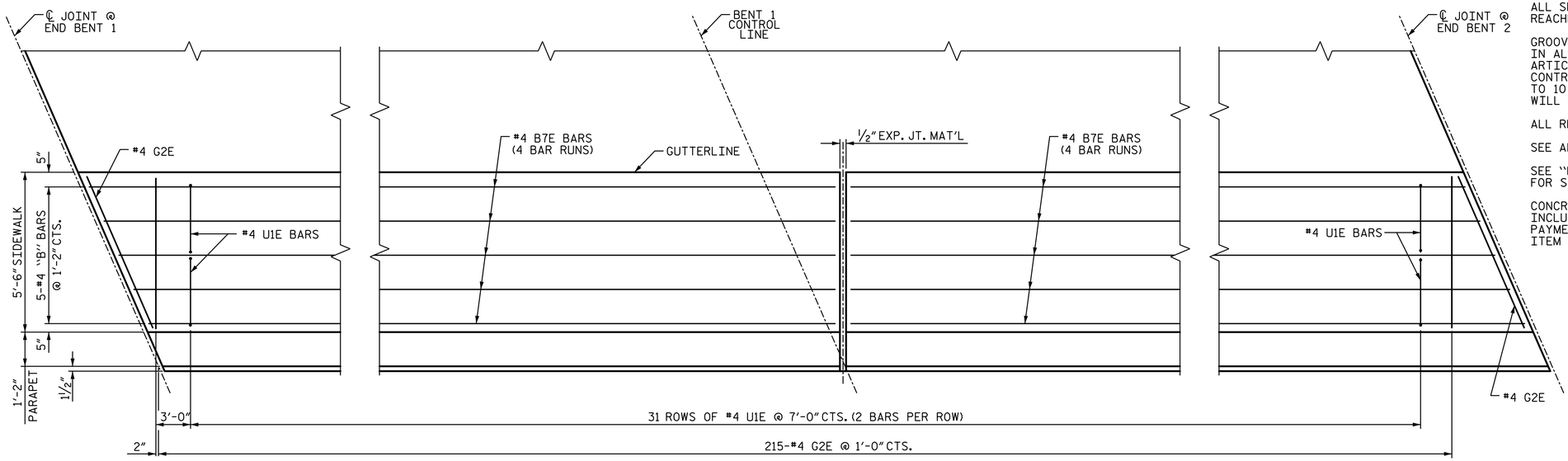
SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

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

SHEET NO. S01-20
TOTAL SHEETS S01-49

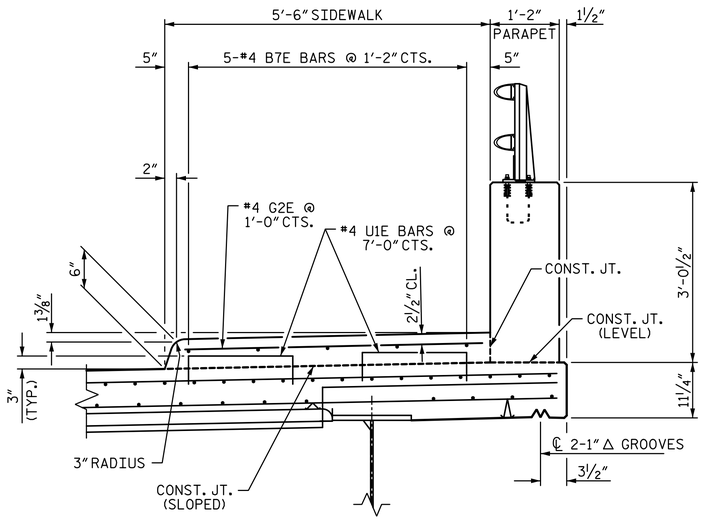


SPAN A

SPAN B

PLAN OF SIDEWALK

DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF CONCRETE PARAPET



SECTION THRU SIDEWALK

NOTES:

THE #4U1E BARS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.

SIDEWALK IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE SIDEWALK IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINTS SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINT WILL BE REQUIRED FOR SEGMENTS LESS THAN 10 FT. IN LENGTH.

ALL REINFORCING STEEL IN SIDEWALK SHALL BE EPOXY COATED.

SEE APPROACH SLAB SHEETS FOR SIDEWALK ON APPROACH SLABS.

SEE "EXPANSION JOINT SEAL DETAILS FOR SIDEWALK" SHEETS FOR SIDEWALK COVER PLATES AT END BENTS.

CONCRETE AND REINFORCING STEEL FOR THE SIDEWALK IS INCLUDED IN THE SUPERSTRUCTURE BILL OF MATERIAL. PAYMENT FOR THE SIDEWALK SHALL BE INCLUDED IN THE PAY ITEM "REINFORCED CONCRETE DECK SLAB".

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

SIDEWALK DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-21
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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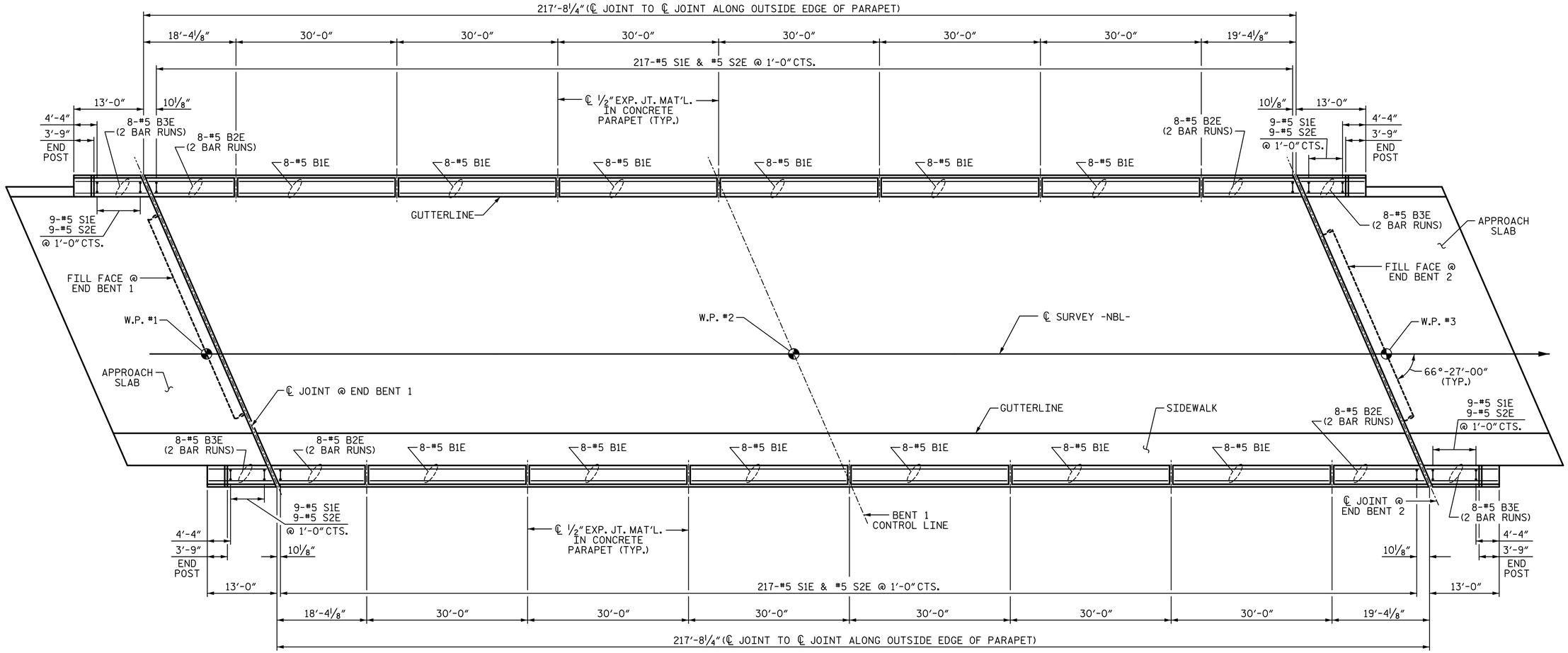

PLAN

NOTE: ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF CONCRETE PARAPET

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE PARAPET DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-22
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER LEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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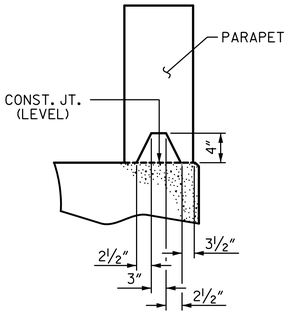
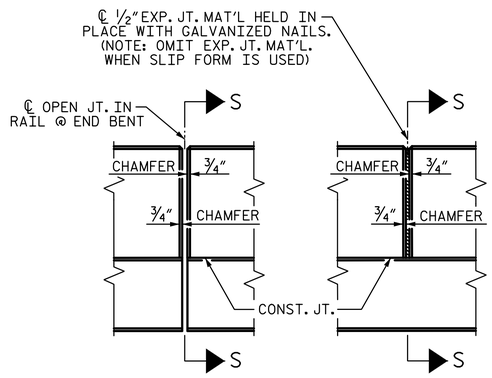


SECTION S-S

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



ELEVATION AT EXPANSION JOINTS

NOTES:

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

ALL REINFORCING STEEL IN PARAPET AND END POSTS SHALL BE EPOXY COATED.

THE #5 S1E AND #5 S2E BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2"MINIMUM CLEARANCE TO THE ½"EXPANSION JT. MATERIAL IN PARAPET.

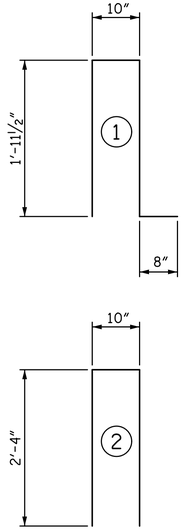
FOR DETAILS OF CONCRETE INSERTS IN END POSTS, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.

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

FOR DETAILS AND LOCATION OF GUARDRAIL ANCHOR ASSEMBLIES, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS" SHEET.

CONCRETE IN PARAPETS SHALL BE CLASS "AA" NORMAL WEIGHT CONCRETE.

BAR TYPES



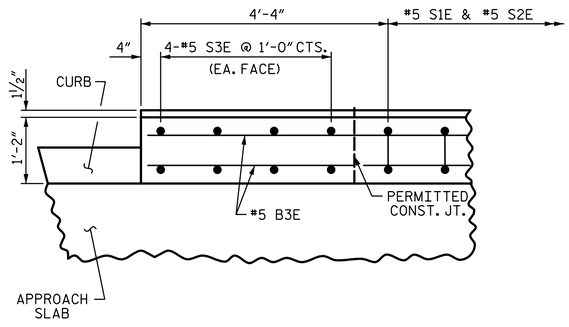
ALL BAR DIMENSIONS ARE OUT TO OUT

"E" INDICATES EPOXY COATED REINFORCING STEEL

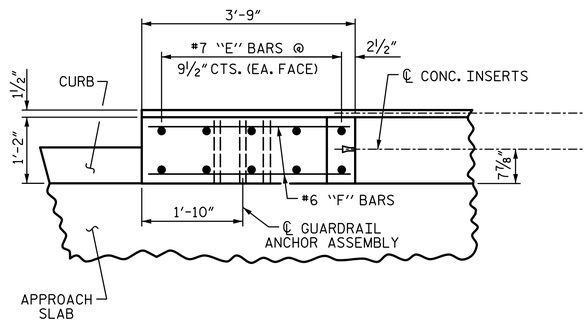
BILL OF MATERIAL
PARAPET AND END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	48	5	STR	29'-7"	1481
B2E	32	5	STR	11'-6"	384
B3E	32	5	STR	8'-0"	267
E1E	4	7	STR	2'-6"	20
E2E	4	7	STR	3'-0"	25
E3E	4	7	STR	3'-6"	29
E4E	4	7	STR	4'-0"	33
E5E	4	7	STR	4'-4"	35
F1E	4	6	STR	2'-0"	12
F2E	4	6	STR	3'-0"	18
F3E	4	6	STR	3'-5"	21
S1E	235	5	1	5'-5"	1328
S2E	235	5	2	5'-6"	1348
S3E	16	5	STR	3'-0"	50

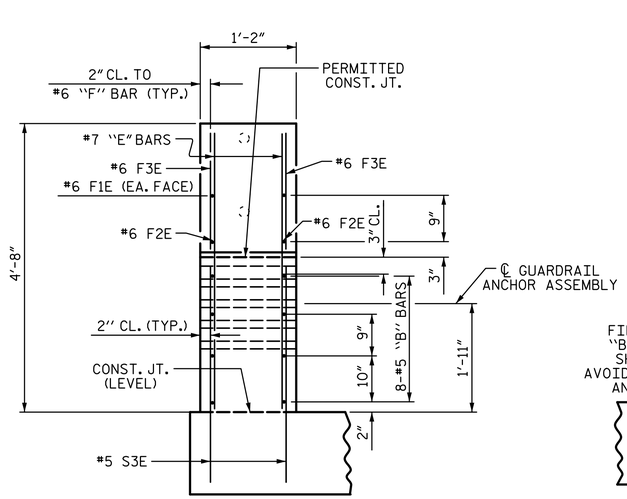
EPOXY COATED REINFORCING STEEL	5051 LB
CLASS "AA" CONCRETE	26.7 CY
1'-2" X 2'-6" CONCRETE PARAPET	243.69 LF



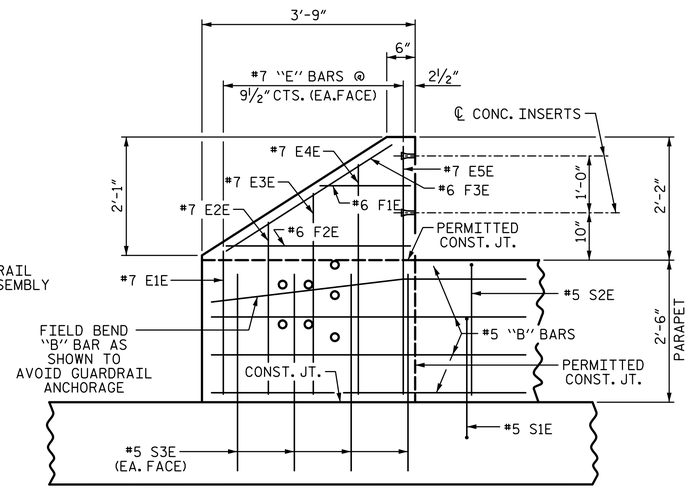
PLAN OF PARAPET



PLAN OF END POST



END VIEW



ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24090 ENGINEER THEO J. BEACH
2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
CONCRETE PARAPET DETAILS (LEFT SIDE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-23
1			3			TOTAL SHEETS
2			4			S01-49

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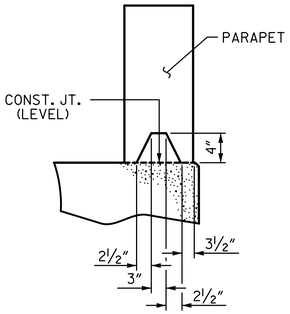
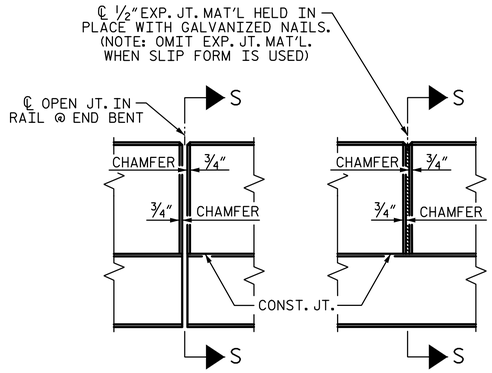


SECTION S-S

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



NOTES:

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

ALL REINFORCING STEEL IN PARAPET AND END POSTS SHALL BE EPOXY COATED.

THE #5 S4E AND #5 S5E BARS MAY BE SHIFTED SLIGHTLY IN ORDER TO MAINTAIN A 2"MINIMUM CLEARANCE TO THE ½"EXPANSION JT. MATERIAL IN PARAPET.

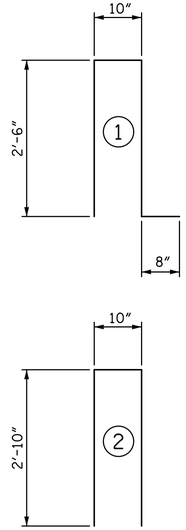
FOR DETAILS OF CONCRETE INSERTS IN END POSTS, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.

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

FOR DETAILS AND LOCATION OF GUARDRAIL ANCHOR ASSEMBLIES, SEE "GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS" SHEET.

CONCRETE IN PARAPETS SHALL BE CLASS "AA" NORMAL WEIGHT CONCRETE.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

"E" INDICATES EPOXY COATED REINFORCING STEEL

BILL OF MATERIAL
PARAPET AND END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	48	5	STR	29'-7"	1481
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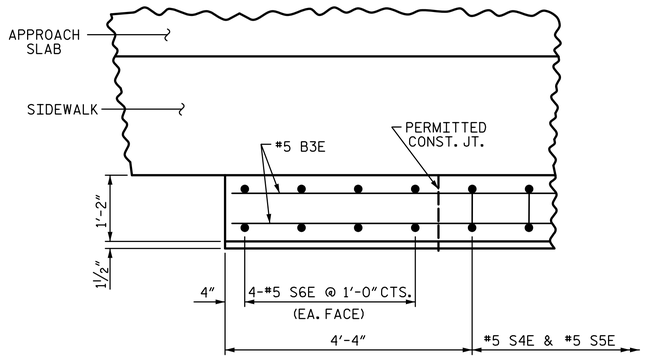
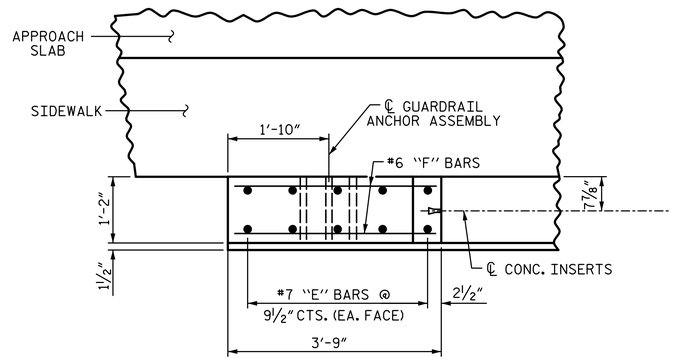
E6E	4	7	STR	3'-0"	25
E7E	4	7	STR	3'-6"	29
E8E	4	7	STR	4'-0"	33
E9E	4	7	STR	4'-6"	37
E10E	4	7	STR	4'-10"	40
F1E	4	6	STR	2'-0"	12
F2E	4	6	STR	3'-0"	18
F3E	4	6	STR	3'-5"	21
S4E	235	5	1	6'-6"	1593
S5E	235	5	2	6'-6"	1593
S6E	16	5	STR	3'-6"	58

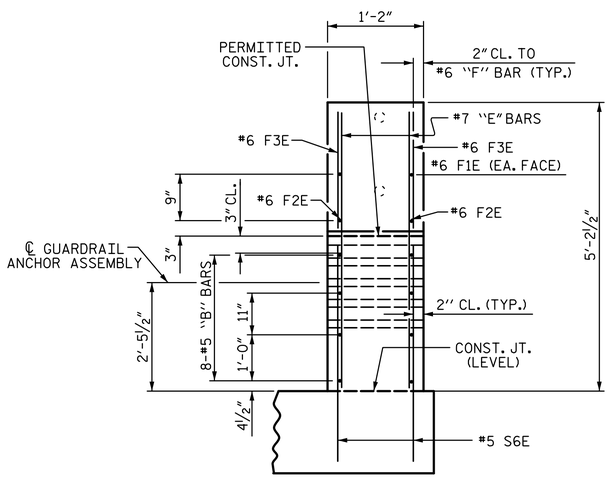
EPOXY COATED REINFORCING STEEL	5591 LB
CLASS "AA" CONCRETE	32.4 CY
1'-2" X 3'-0½" CONCRETE PARAPET	243.69 LF

ELEVATION AT EXPANSION JOINTS



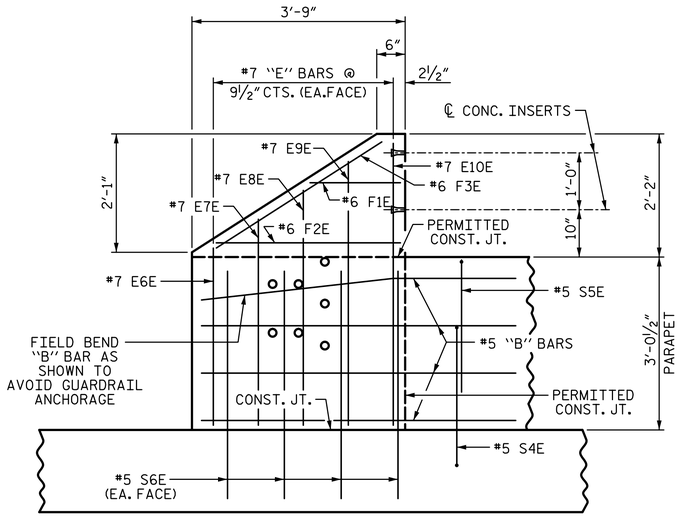


PLAN OF PARAPET



END VIEW

PLAN OF END POST



ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

(SIDEWALK NOT SHOWN FOR CLARITY)

DRAWN BY:	S. D. COOPER	DATE:	5-15
CHECKED BY:	B.S. COX	DATE:	5-15
DESIGN ENGINEER OF RECORD:	T.J. BEACH	DATE:	5-15

PLANS PREPARED BY:

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LICENSURE NO. C-2521

2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
CONCRETE PARAPET DETAILS (RIGHT SIDE)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-24
1			3			TOTAL SHEETS
2			4			S01-49

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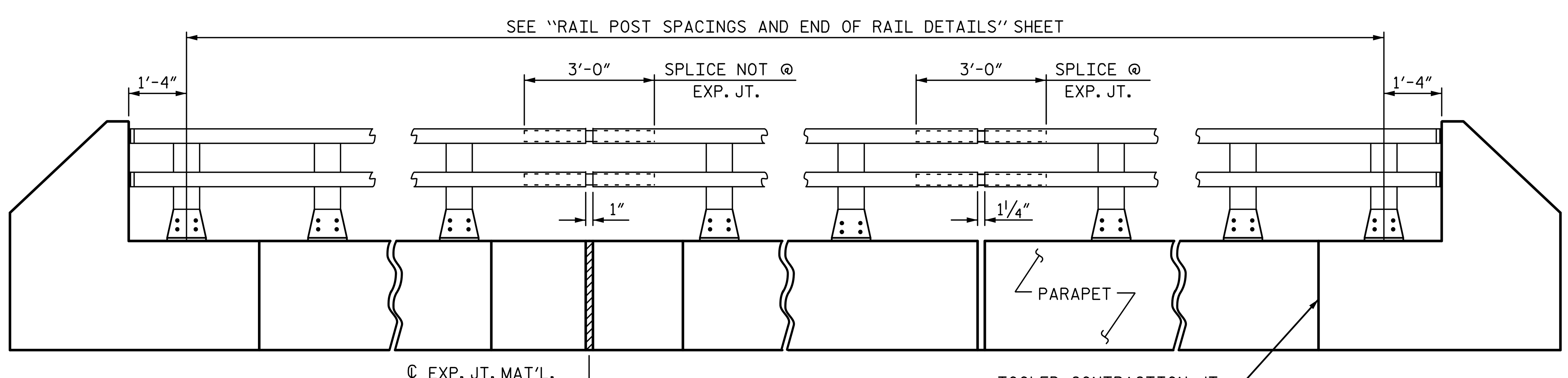
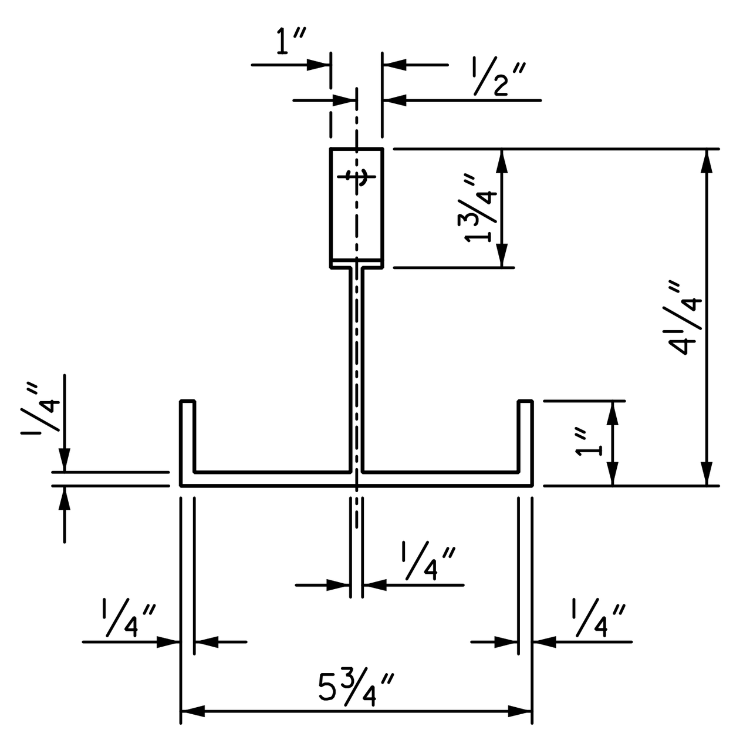
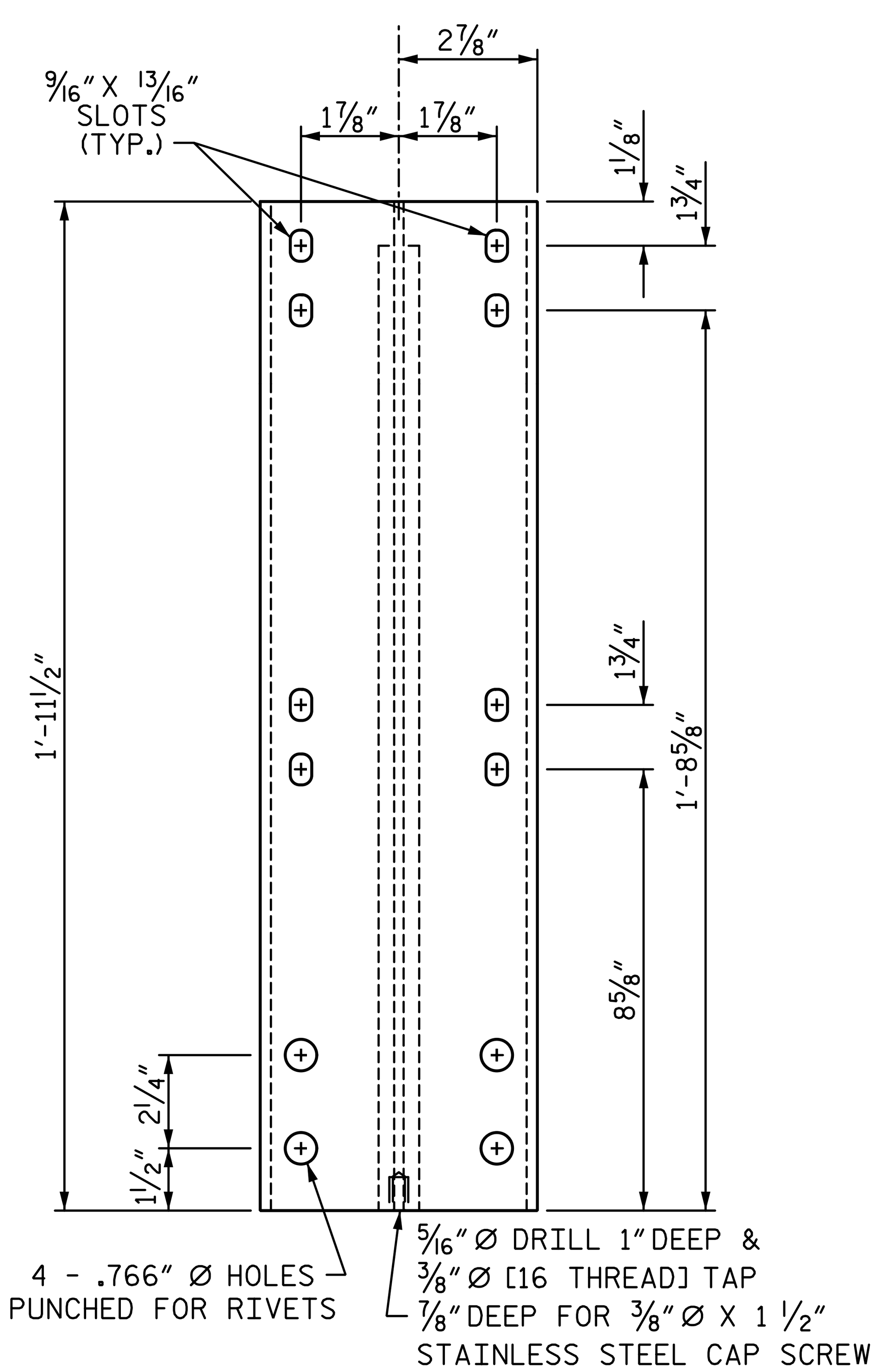


ELEVATION

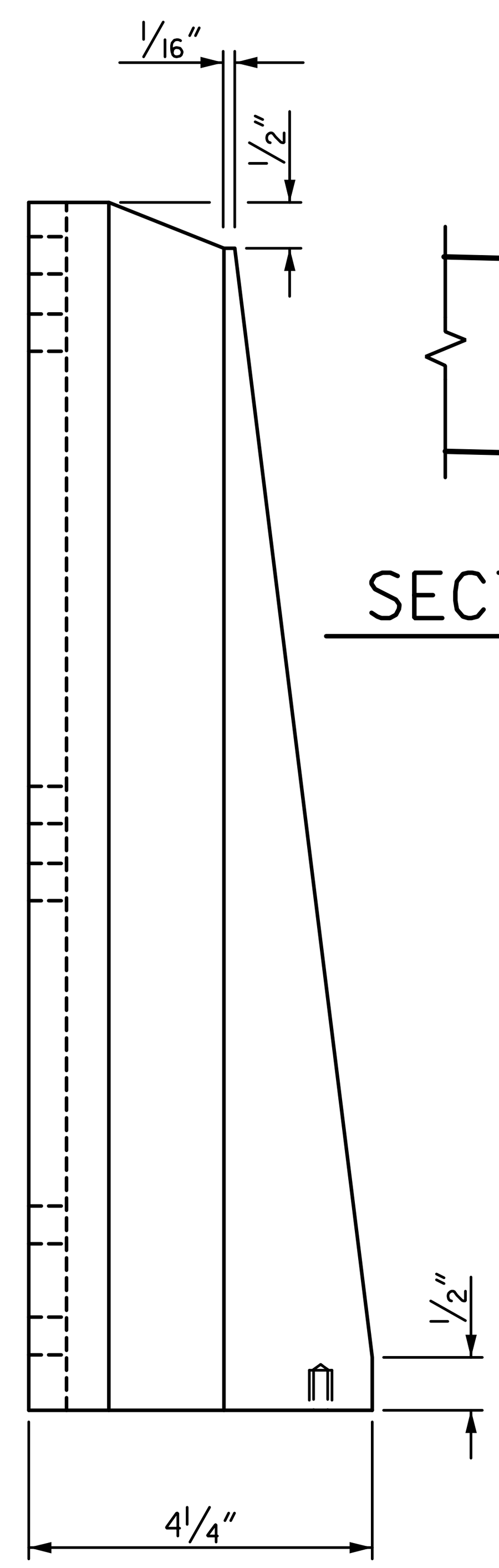
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.



PLAN

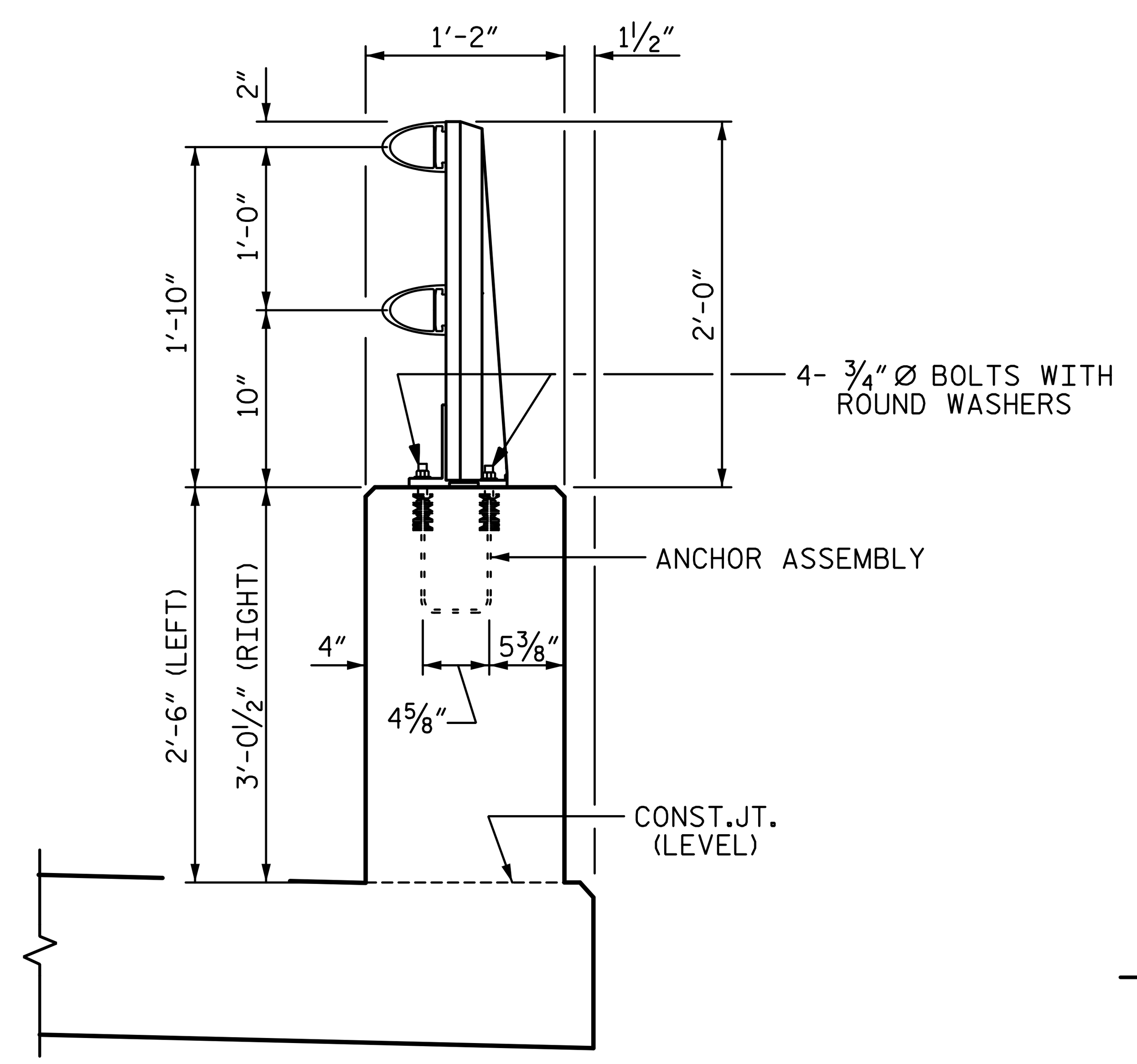


FRONT ELEVATION

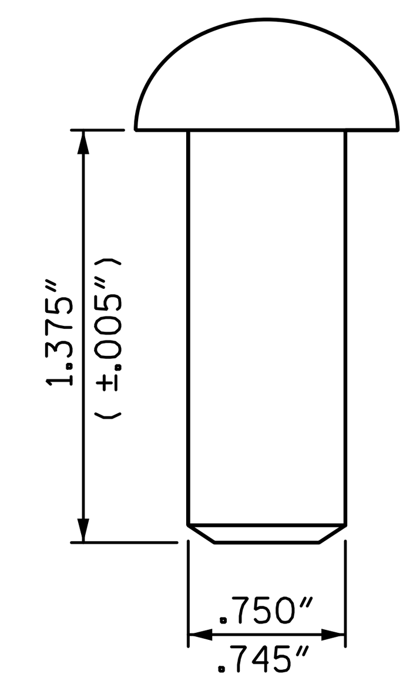


SIDE ELEVATION

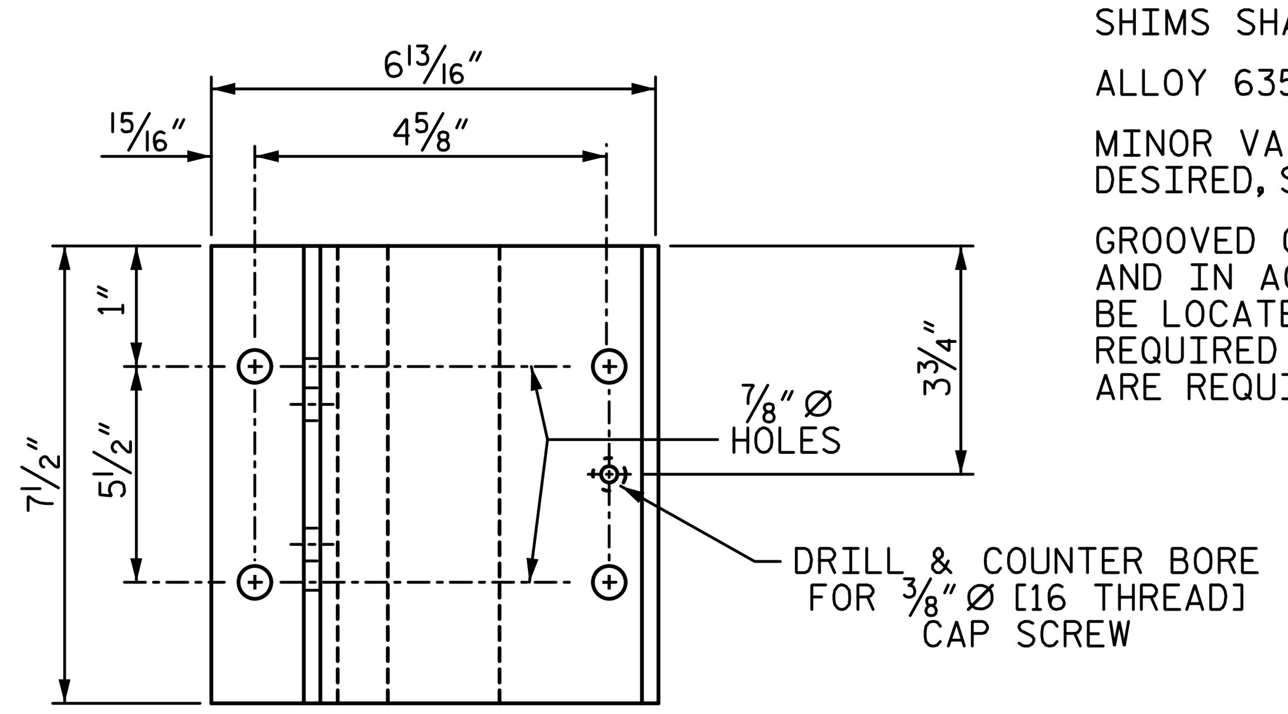
DETAILS OF POST



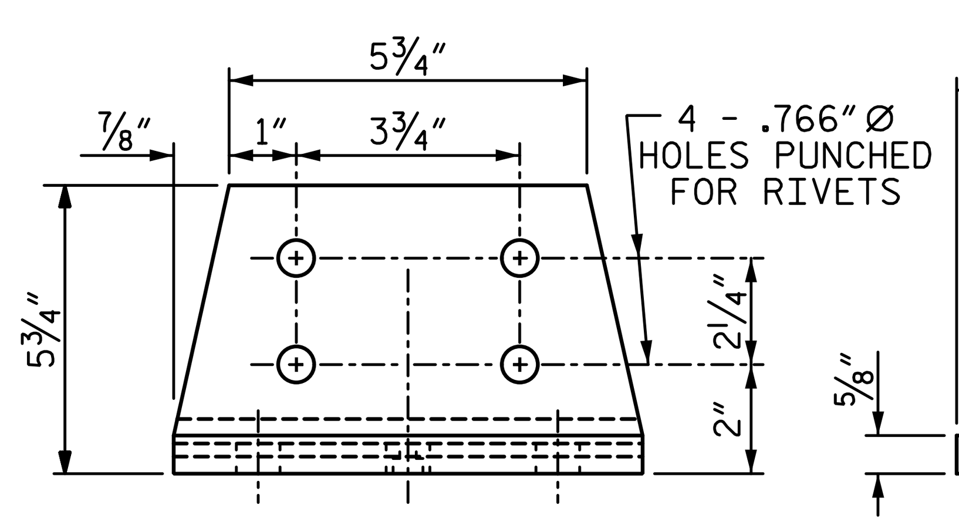
SECTION THRU PARAPET AND RAIL



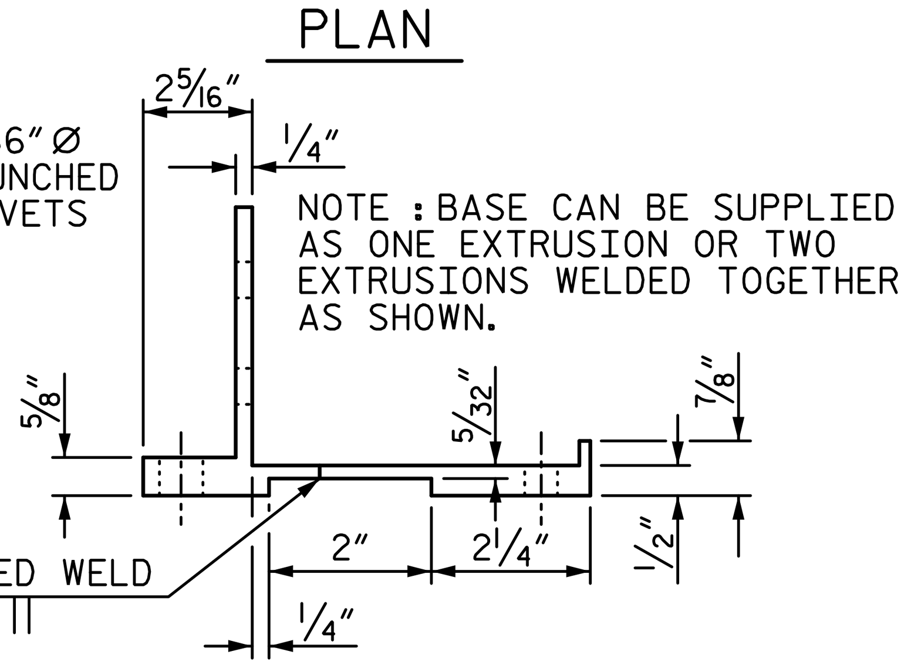
RIVET DETAIL



PLAN



FRONT ELEVATION



SIDE ELEVATION

POST BASE DETAILS

NOTES

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

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

ALUMINUM RAILS

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

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

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

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

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

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

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

GENERAL NOTES

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

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE "RAIL POST SPACINGS AND END OF RAIL DETAILS" SHEET.

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

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

PAY LENGTH = 472.38 LF

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

2 BAR METAL RAIL

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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(919) 852-0598 (Fax)
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 024390 THEO J. BEACH
2/13/2017

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S01-25
1			3					TOTAL SHEETS
2			4					S01-49

DRAWN BY:	S. D. COOPER	DATE:	5-15
CHECKED BY:	B.S. COX	DATE:	5-15
DESIGN ENGINEER OF RECORD:	T.J. BEACH	DATE:	5-15

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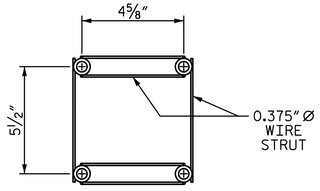
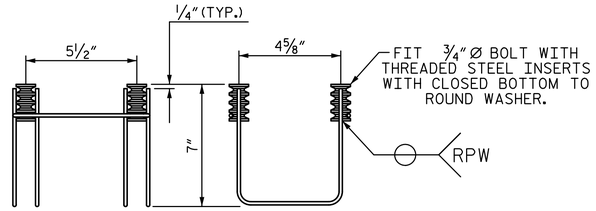


PLAN



SIDE VIEW ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(84 ASSEMBLIES REQUIRED)

NOTES:

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2'' FOR 3/4" FERRULES.

B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

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

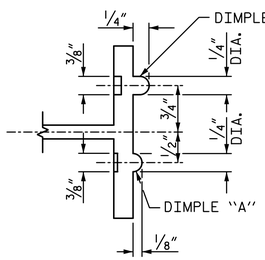
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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

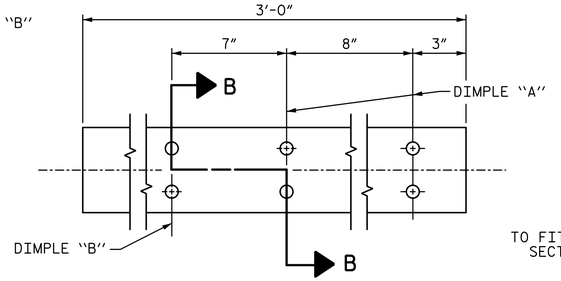
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

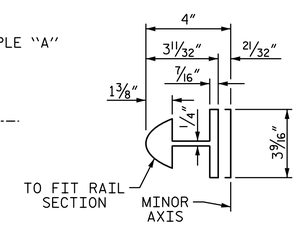
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

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



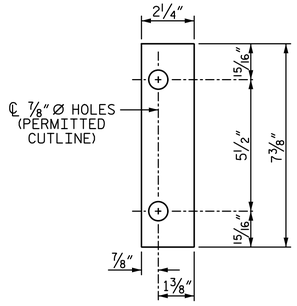
SECTION B-B



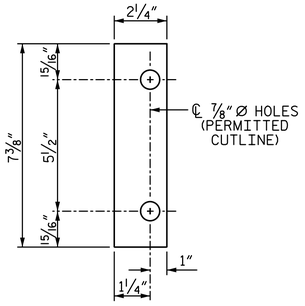


BAR SECTION

EXPANSION BAR DETAILS



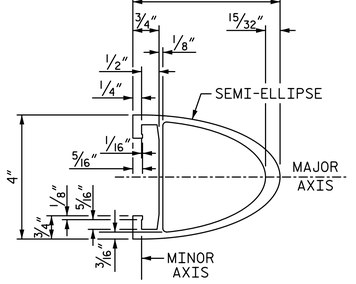
FRONT PLATE



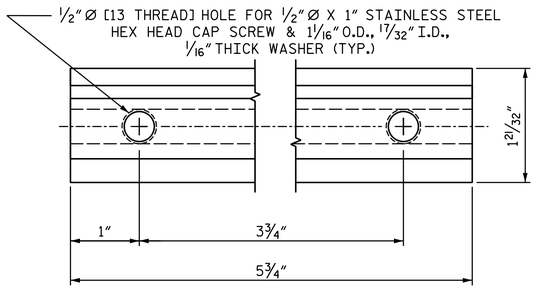
REAR PLATE

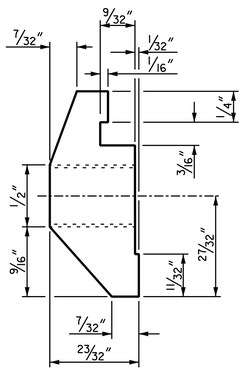
SHIM DETAILS

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



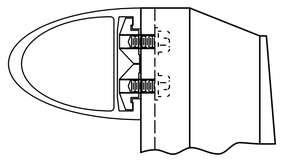
RAIL SECTION



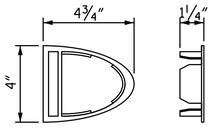


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-26
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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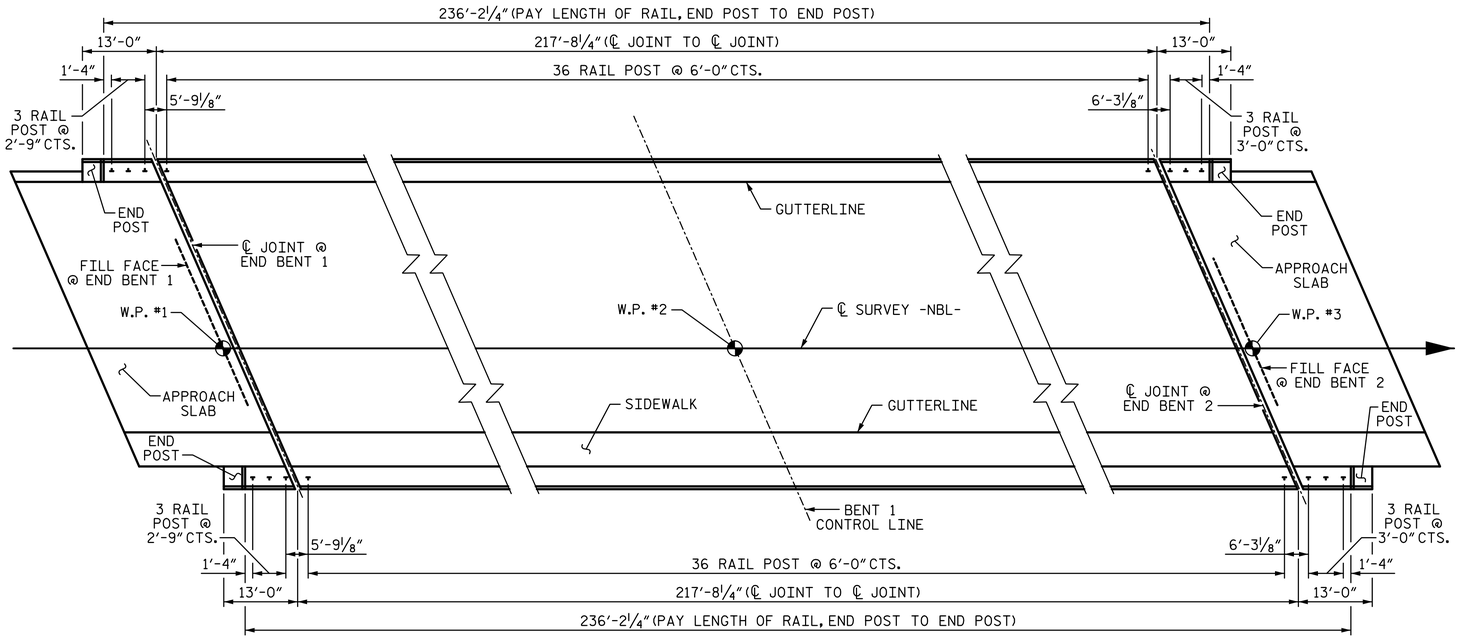
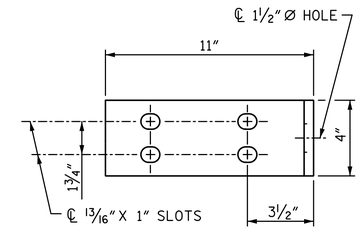
NORTH CAROLINA PROFESSIONAL SEAL 24280 ENGINEER THEO J. BEACH
2/13/2017

2/10/2017 9:09:05 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_BR.dgn

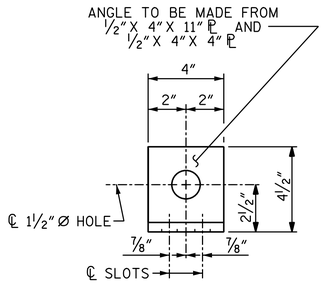


PLAN OF RAIL POST SPACINGS

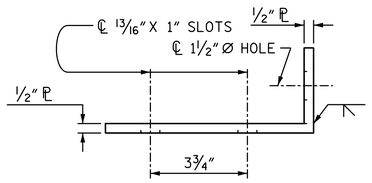
(DIMENSIONS ARE SHOWN ALONG OUTSIDE FACE OF PARAPET)
@ 60° F



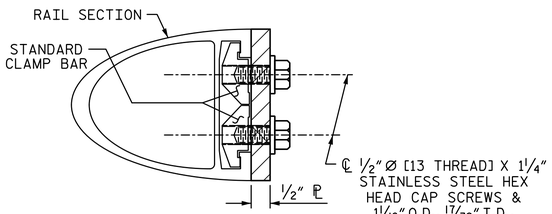
ELEVATION



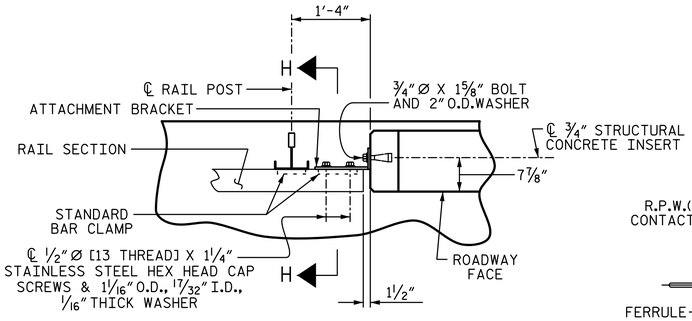
END VIEW



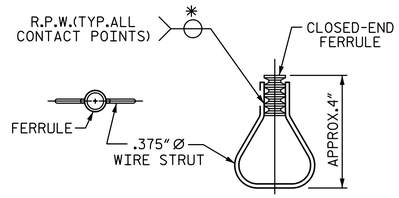
TOP VIEW



SECTION H-H



PLAN - RAIL AND END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

FIXED

DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES:

STRUCTURAL CONCRETE INSERT

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

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

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

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

METAL RAIL TO END POST CONNECTION

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

A. ½"PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

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

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

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

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

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

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

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

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾'' Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾"Ø X 6½"BOLT AND 2"O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾"Ø X 1⅝"BOLT SHALL APPLY TO THE ¾"Ø X 6 ½"BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER THEO J. BEACH
2/13/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

RAIL POST SPACINGS AND END OF RAIL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-27
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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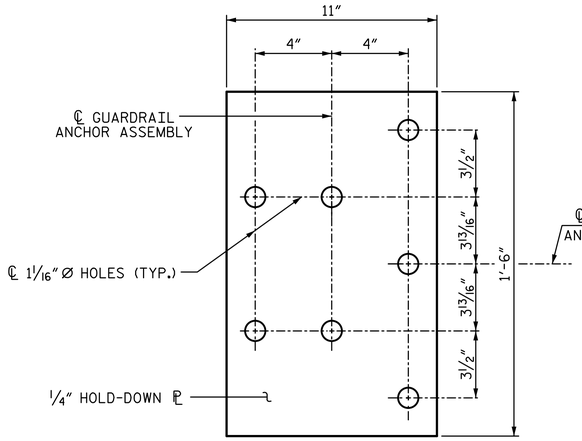
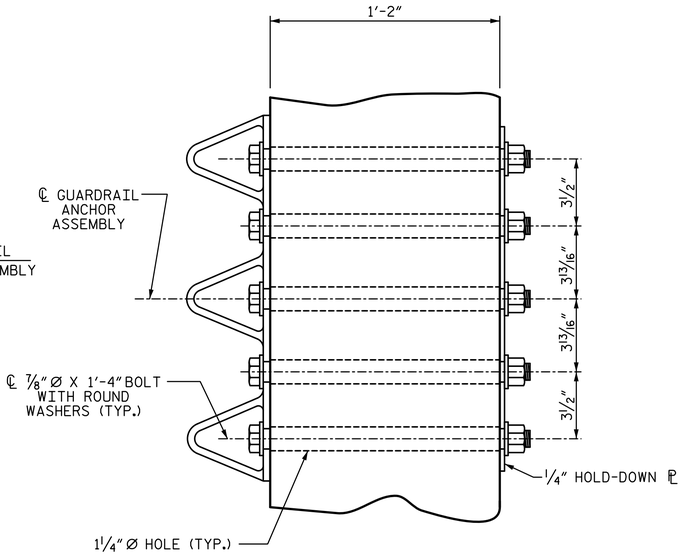


PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES:

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

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

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

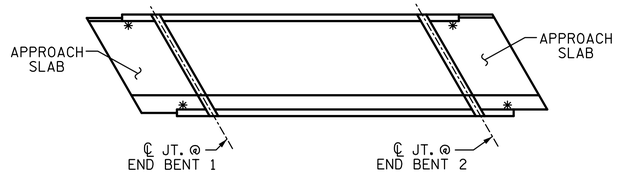
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

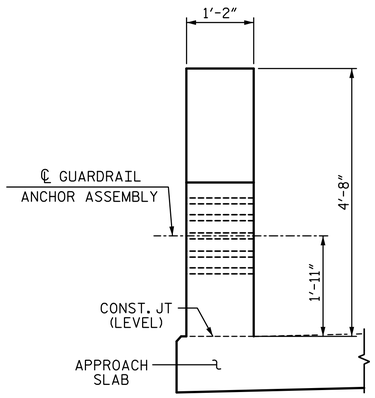
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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

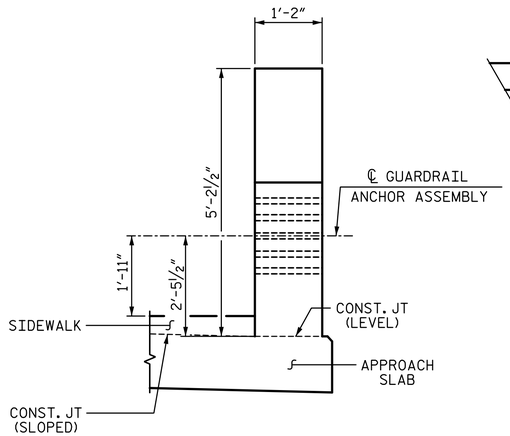


SKETCH SHOWING POINTS OF ATTACHMENT

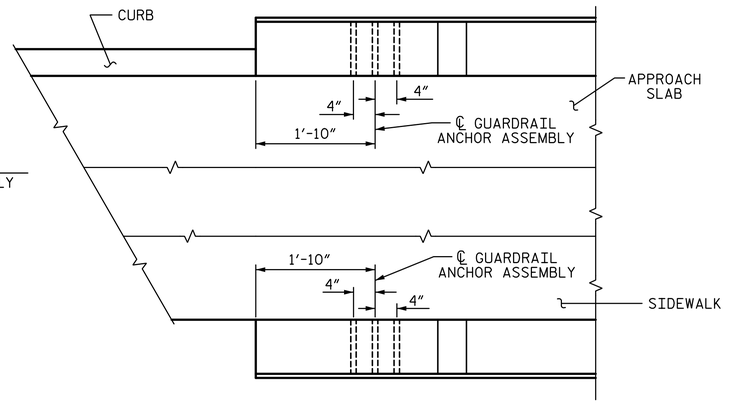
✱LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
LEFT SIDE



END VIEW
RIGHT SIDE



PLAN

LOCATION OF GUARDRAIL ANCHOR @ END POST

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-28
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 024090 ENGINEER TED J. BEACH
2/13/2017

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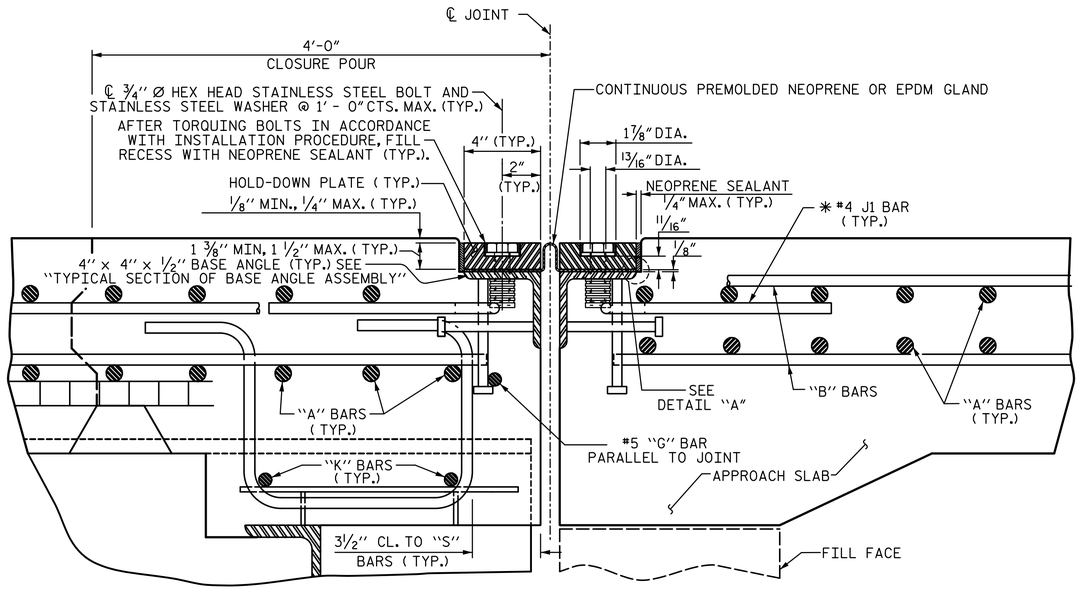


EXPANSION JOINT DETAILS

(SECTION NORMAL TO JOINT)
(END BENT 2 SHOWN, END BENT 1 SIMILAR EXCEPT OMIT CLOSURE POUR)

* 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:

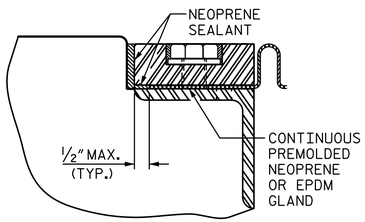
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4⅛" TO 4¼" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED TO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

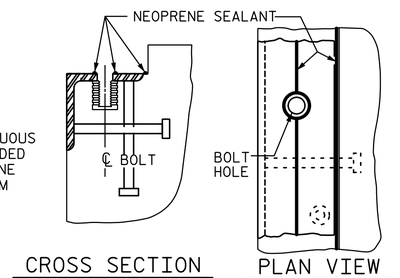
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS 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.

MOVEMENT AND SETTING AT JOINT

END BENT	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	66°-27'-00"	⅞"	1½"	1⅜"	1 3/16"
2	66°-27'-00"	⅞"	1½"	1⅜"	1 3/16"

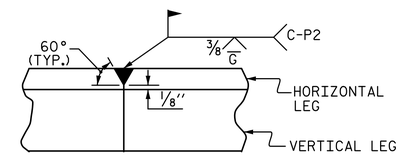


DETAIL "A"

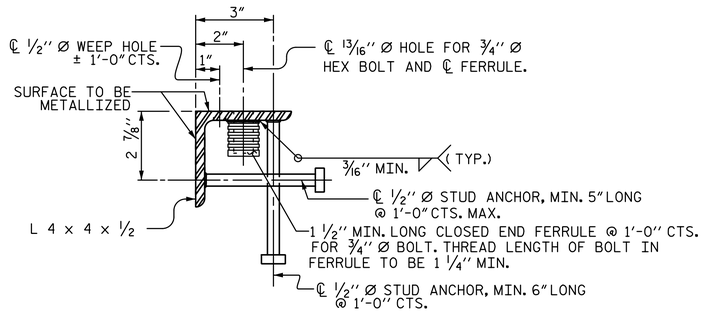


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL - FIELD WELD SPLICE OF BASE ANGLE



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-29
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
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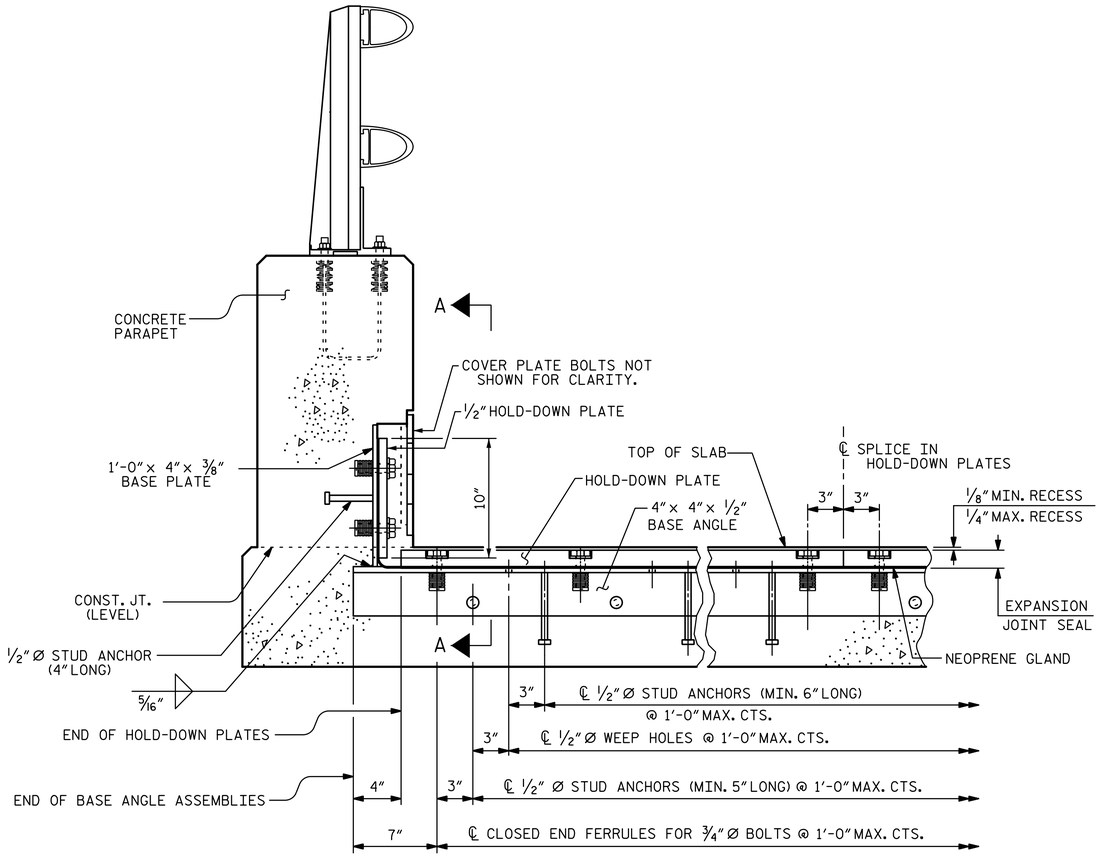
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

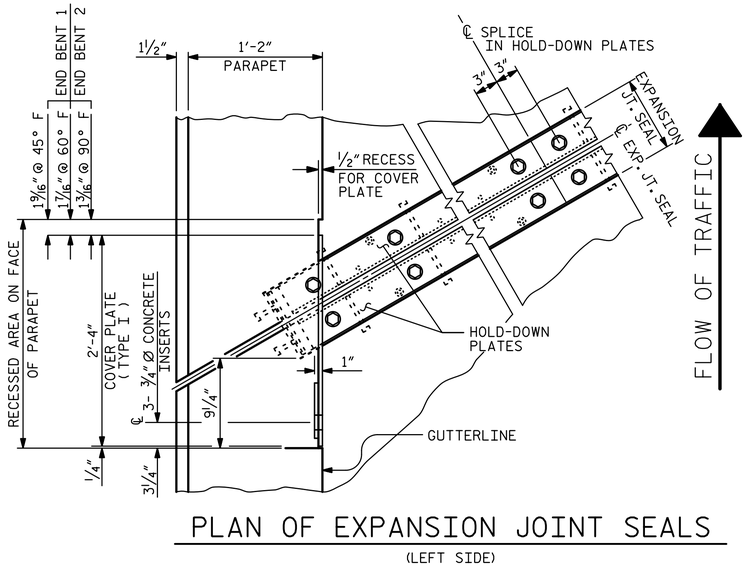
NORTH CAROLINA PROFESSIONAL SEAL 24230 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15



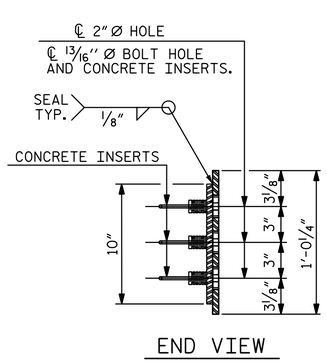
SECTION THRU PARAPET NORMAL TO JOINT

(LEFT SIDE)

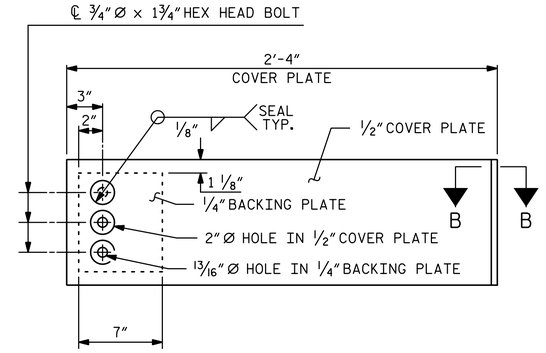


PLAN OF EXPANSION JOINT SEALS

(LEFT SIDE)

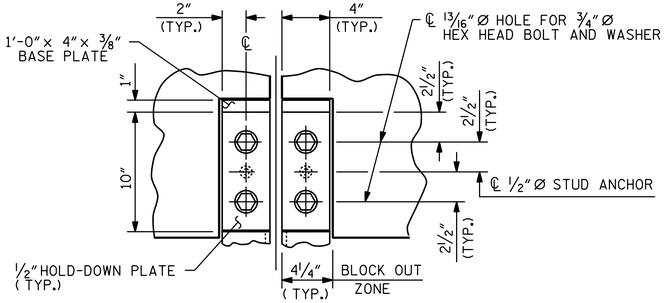


END VIEW

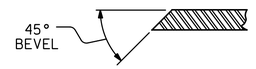


TYPE I - ELEVATION VIEW

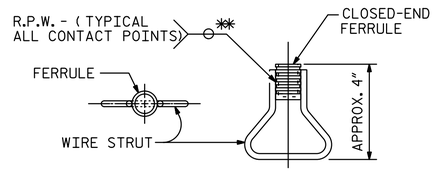
COVER PLATE DETAILS



SECTION A-A



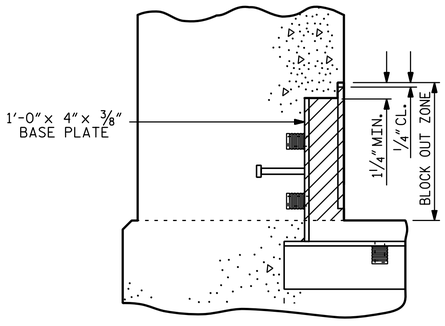
SECTION B-B



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)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR CONCRETE PARAPET LEFT SIDE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-30
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
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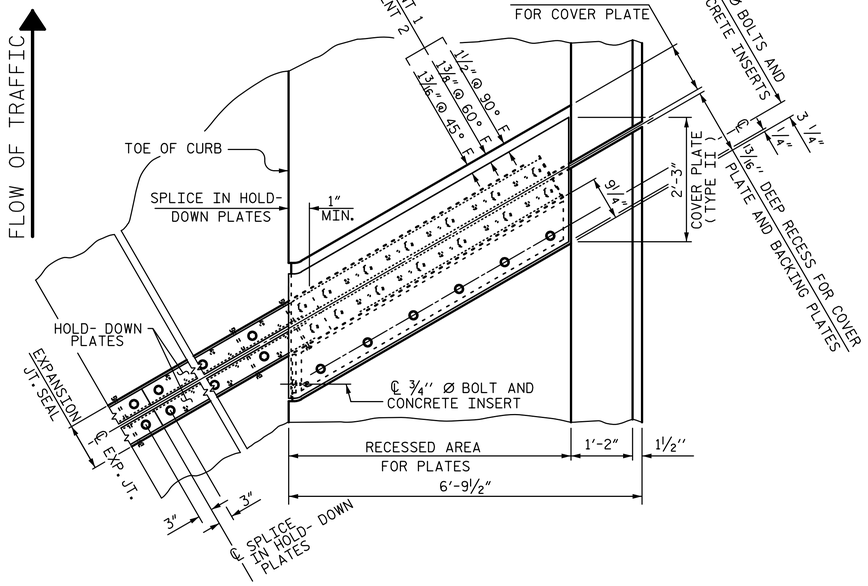
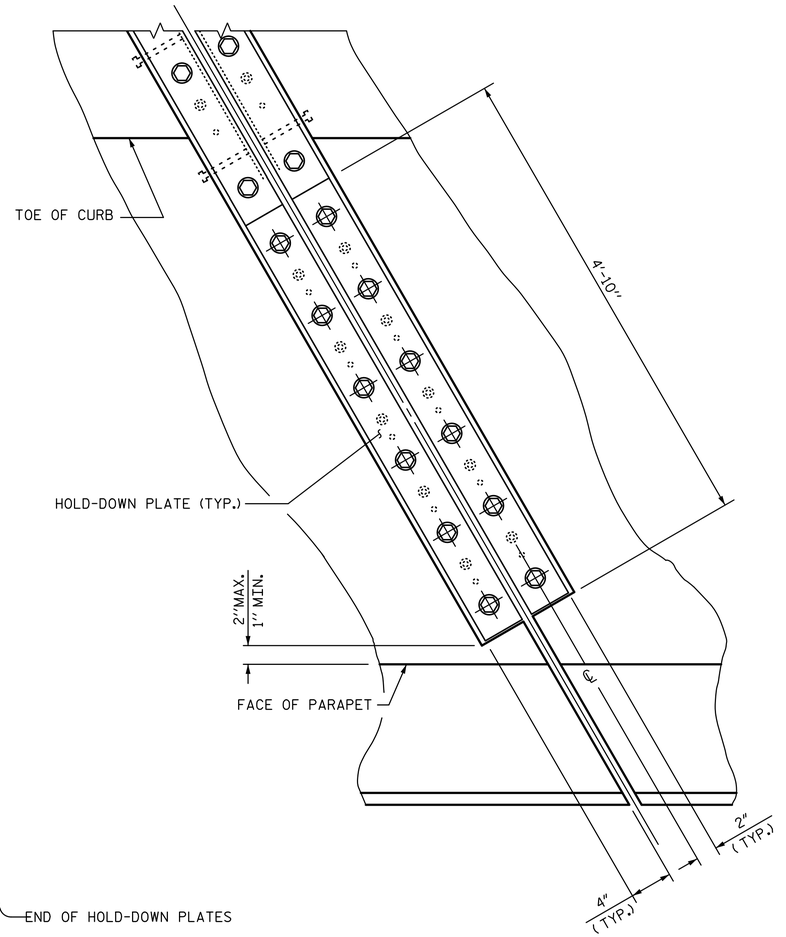
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

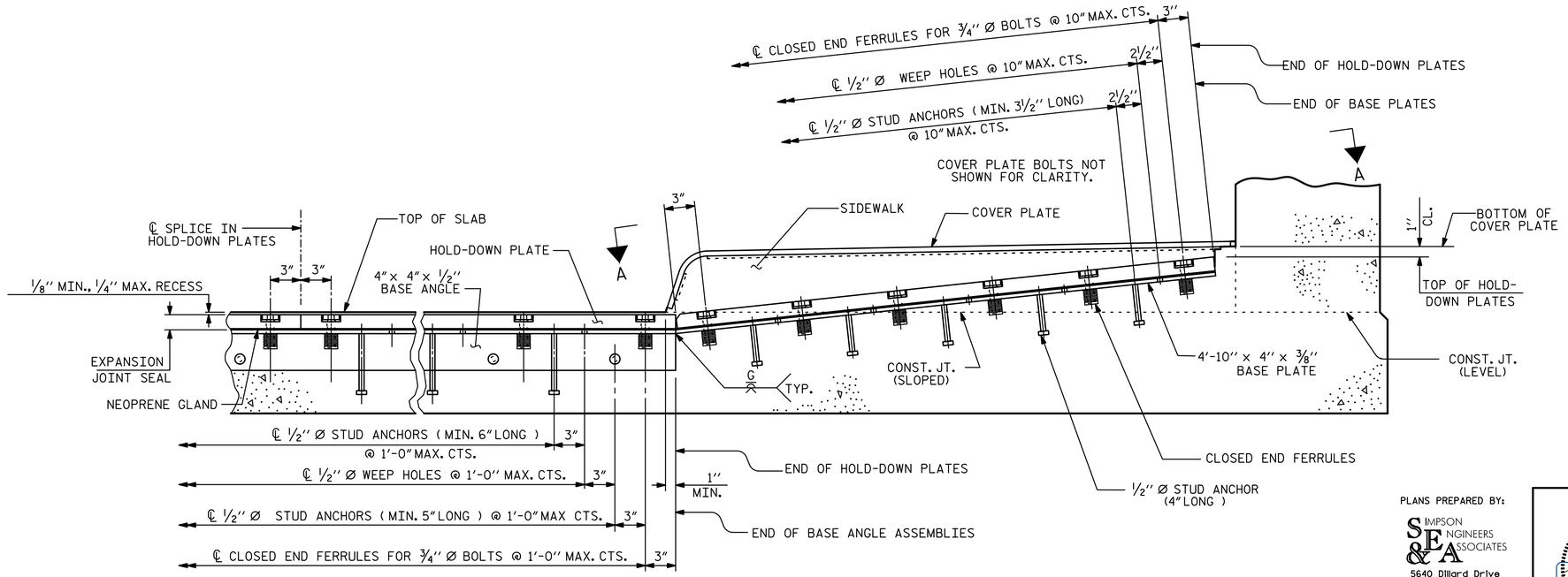
NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER TIMOTHY J. BEACH
2/13/2017



PLAN OF EXPANSION JOINT SEAL - RIGHT SIDE



SECTION A-A



SECTION THRU SIDEWALK NORMAL TO JOINT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR SIDEWALK RIGHT SIDE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-31
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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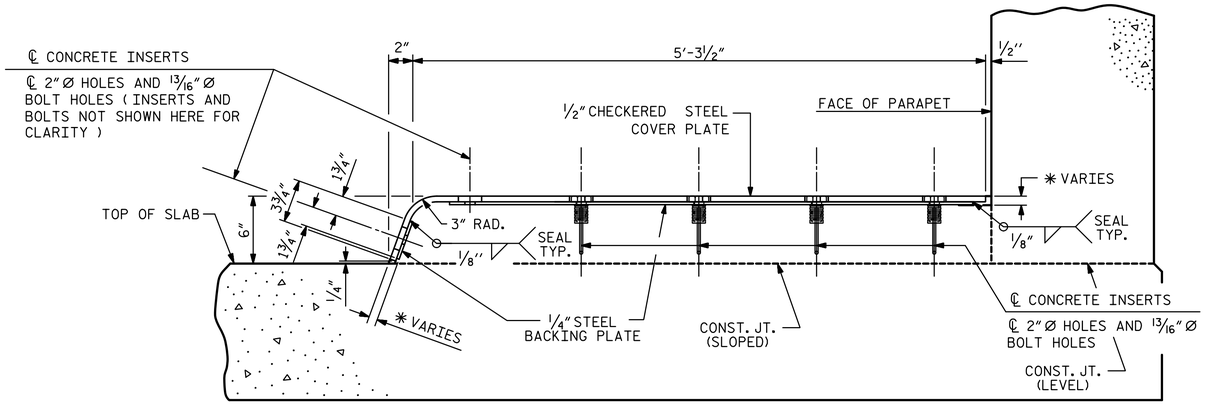
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 024380 ENGINEER TED J. BEACH
2/13/2017

2/10/2017 9:09:06 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_ejs.dgn

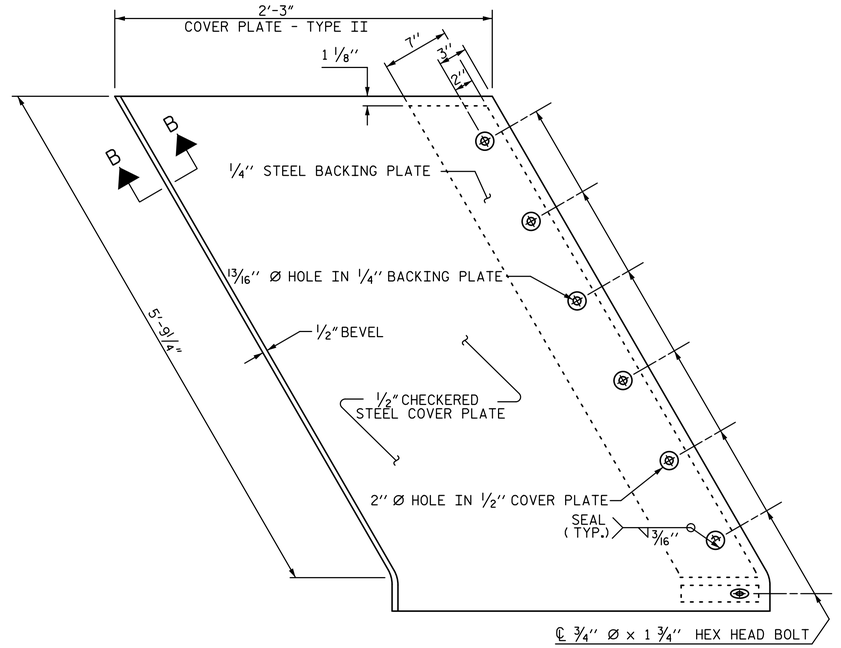


END VIEW
(NORMAL TO SIDEWALK)

✱ CONCRETE RECESS DIMENSIONS:

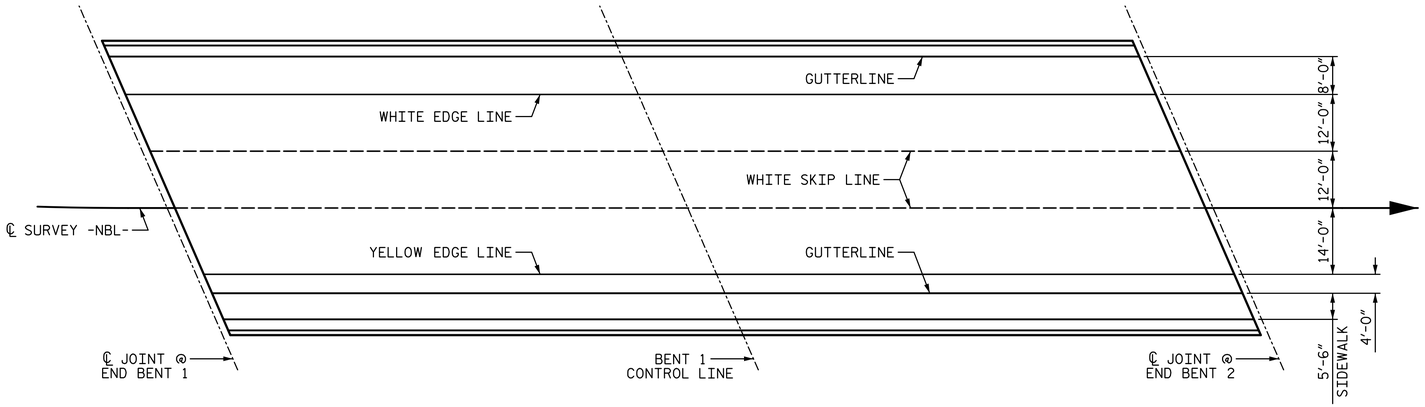
13/16″ FOR THE SIDE OF THE JOINT HAVING THE 1/2″ COVER PLATE WITH A 1/4″ BACKING PLATE.

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

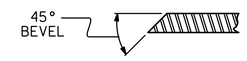


TYPE II - PLAN VIEW

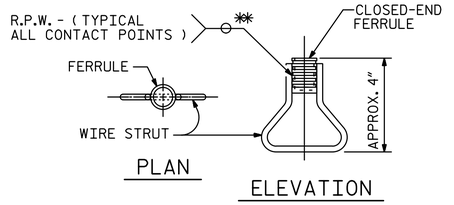
COVER PLATE DETAILS



PAVEMENT MARKING ALIGNMENT



SECTION B-B



PLAN ELEVATION

CONCRETE INSERT

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR SIDEWALK RIGHT SIDE

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

SHEET NO. S01-32

TOTAL SHEETS S01-49

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
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Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24190 ENGINEER TED J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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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

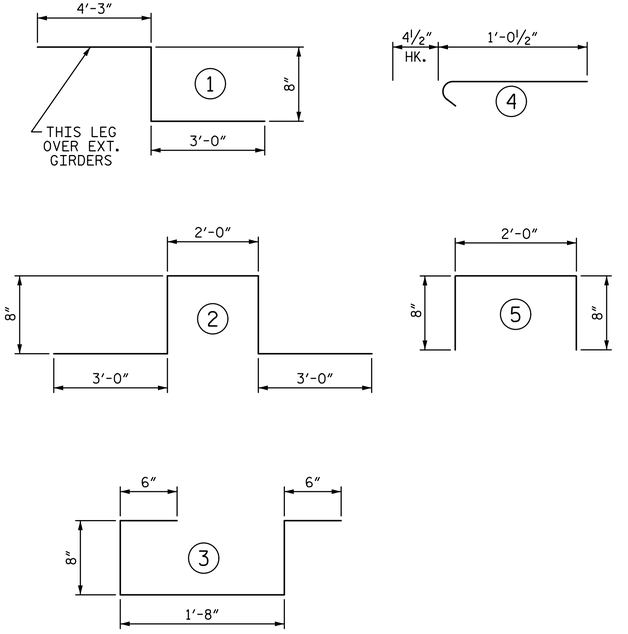
APPROACH SLABS	2219	SQ. FT.
BRIDGE DECK	10181	SQ. FT.
TOTAL	12400	SQ. FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS "AA" SAND LIGHTWEIGHT CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	CY	LB	LB
POUR #1	113.0		
POUR #2	260.1		
POUR #3	9.8		
SIDEWALK	21.8		
TOTAL **	404.7	42049	46666

** QUANTITIES FOR CONCRETE PARAPET ARE NOT INCLUDED.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

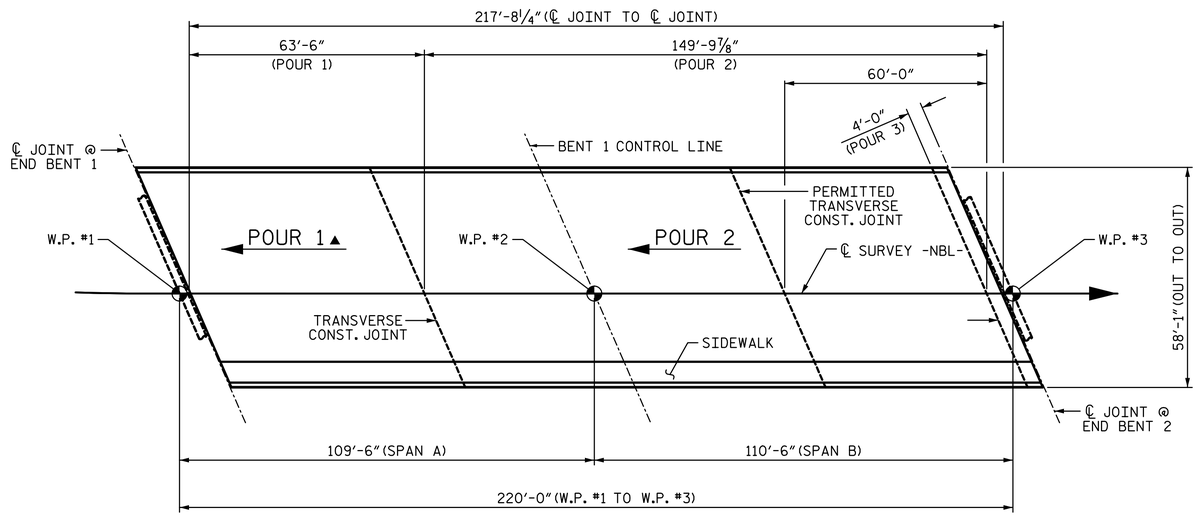
BILL OF MATERIAL

SPANS A & B

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	384	5	STR	57′-9″	23130	A137E	2	5	STR	15′-11″	33	A226	2	5	STR	28′-6″	59
A2	384	5	STR	57′-9″	23130	A138E	2	5	STR	14′-9″	31	A227	2	5	STR	27′-4″	57
						A139E	2	5	STR	13′-7″	28	A228	2	5	STR	26′-3″	55
A101E	2	5	STR	57′-2″	119	A140E	2	5	STR	12′-6″	26	A229	2	5	STR	25′-1″	52
A102E	2	5	STR	56′-1″	117	A141E	2	5	STR	11′-4″	24	A230	2	5	STR	23′-11″	50
A103E	2	5	STR	54′-11″	115	A142E	2	5	STR	10′-2″	21	A231	2	5	STR	22′-9″	47
A104E	2	5	STR	53′-9″	112	A143E	2	5	STR	9′-0″	19	A232	2	5	STR	21′-8″	45
A105E	2	5	STR	52′-7″	110	A144E	2	5	STR	7′-10″	16	A233	2	5	STR	20′-6″	43
A106E	2	5	STR	51′-6″	107	A145E	2	5	STR	6′-9″	14	A234	2	5	STR	19′-4″	40
A107E	2	5	STR	50′-4″	105	A146E	2	5	STR	5′-7″	12	A235	2	5	STR	18′-2″	38
A108E	2	5	STR	49′-2″	103	A147E	2	5	STR	4′-5″	9	A236	2	5	STR	17′-1″	36
A109E	2	5	STR	48′-0″	100	A148E	2	5	STR	3′-3″	7	A237	2	5	STR	15′-11″	33
A110E	2	5	STR	46′-11″	98	A149E	2	5	STR	2′-2″	5	A238	2	5	STR	14′-9″	31
A111E	2	5	STR	45′-9″	95							A239	2	5	STR	13′-7″	28
A112E	2	5	STR	44′-7″	93	A201	2	5	STR	57′-2″	119	A240	2	5	STR	12′-6″	26
A113E	2	5	STR	43′-5″	91	A202	2	5	STR	56′-1″	117	A241	2	5	STR	11′-4″	24
A114E	2	5	STR	42′-3″	88	A203	2	5	STR	54′-11″	115	A242	2	5	STR	10′-2″	21
A115E	2	5	STR	41′-2″	86	A204	2	5	STR	53′-9″	112	A243	2	5	STR	9′-0″	19
A116E	2	5	STR	40′-0″	83	A205	2	5	STR	52′-7″	110	A244	2	5	STR	7′-10″	16
A117E	2	5	STR	38′-10″	81	A206	2	5	STR	51′-6″	107	A245	2	5	STR	6′-9″	14
A118E	2	5	STR	37′-8″	79	A207	2	5	STR	50′-4″	105	A246	2	5	STR	5′-7″	12
A119E	2	5	STR	36′-7″	76	A208	2	5	STR	49′-2″	103	A247	2	5	STR	4′-5″	9
A120E	2	5	STR	35′-5″	74	A209	2	5	STR	48′-0″	100	A248	2	5	STR	3′-3″	7
A121E	2	5	STR	34′-3″	71	A210	2	5	STR	46′-11″	98	A249	2	5	STR	2′-2″	5
A122E	2	5	STR	33′-1″	69	A211	2	5	STR	45′-9″	95						
A123E	2	5	STR	32′-0″	67	A212	2	5	STR	44′-7″	93	B1E	112	6	STR	60′-0″	10093
A124E	2	5	STR	30′-10″	64	A213	2	5	STR	43′-5″	91	B2E	224	4	STR	30′-0″	4489
A125E	2	5	STR	29′-8″	62	A214	2	5	STR	42′-3″	88	B3E	76	4	STR	27′-7″	1400
A126E	2	5	STR	28′-6″	59	A215	2	5	STR	41′-2″	86	B4E	76	4	STR	28′-1″	1426
A127E	2	5	STR	27′-4″	57	A216	2	5	STR	40′-0″	83	B5	272	5	STR	56′-0″	15887
A128E	2	5	STR	26′-3″	55	A217	2	5	STR	38′-10″	81	B6E	16	4	STR	29′-0″	310
A129E	2	5	STR	25′-1″	52	A218	2	5	STR	37′-8″	79	B7E	40	4	STR	28′-9″	768
A130E	2	5	STR	23′-11″	50	A219	2	5	STR	36′-7″	76						
A131E	2	5	STR	22′-9″	47	A220	2	5	STR	35′-5″	74	G1E	4	5	STR	32′-8″	136
A132E	2	5	STR	21′-8″	45	A221	2	5	STR	34′-3″	71	G2E	217	4	STR	5′-0″	725
A133E	2	5	STR	20′-6″	43	A222	2	5	STR	33′-1″	69						
A134E	2	5	STR	19′-4″	40	A223	2	5	STR	32′-0″	67	J1E	110	4	4	1′-5″	104
A135E	2	5	STR	18′-2″	38	A224	2	5	STR	30′-10″	64						
A136E	2	5	STR	17′-1″	36	A225	2	5	STR	29′-8″	62	K1E	12	5	1	7′-11″	99
												K2E	30	5	2	9′-4″	292
												K3E	36	5	STR	8′-0″	300
												S1E	84	4	3	4′-0″	224
												U1E	62	4	5	3′-4″	138

REINFORCING STEEL	42049 LBS.
EPOXY COATED REINFORCING STEEL	46666 LBS.

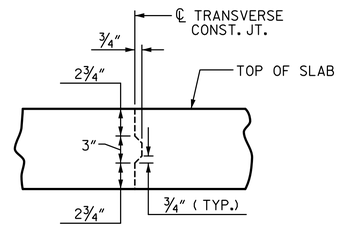
"E" INDICATES EPOXY COATED REINFORCING STEEL



CONCRETE POURING SEQUENCE AND LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SAND LIGHTWEIGHT CONCRETE)

(SQ. FT. = 12644.0)

▲ IF THE CONTRACTOR CHOOSES TO REVERSE THE DIRECTION OF POUR 1, A CONSTRUCTION JOINT WILL BE REQUIRED 4′-0″ FROM THE JOINT SEAL.



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-33
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

2/10/2017 9:09:07 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_BM.dgn

NOTES:

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

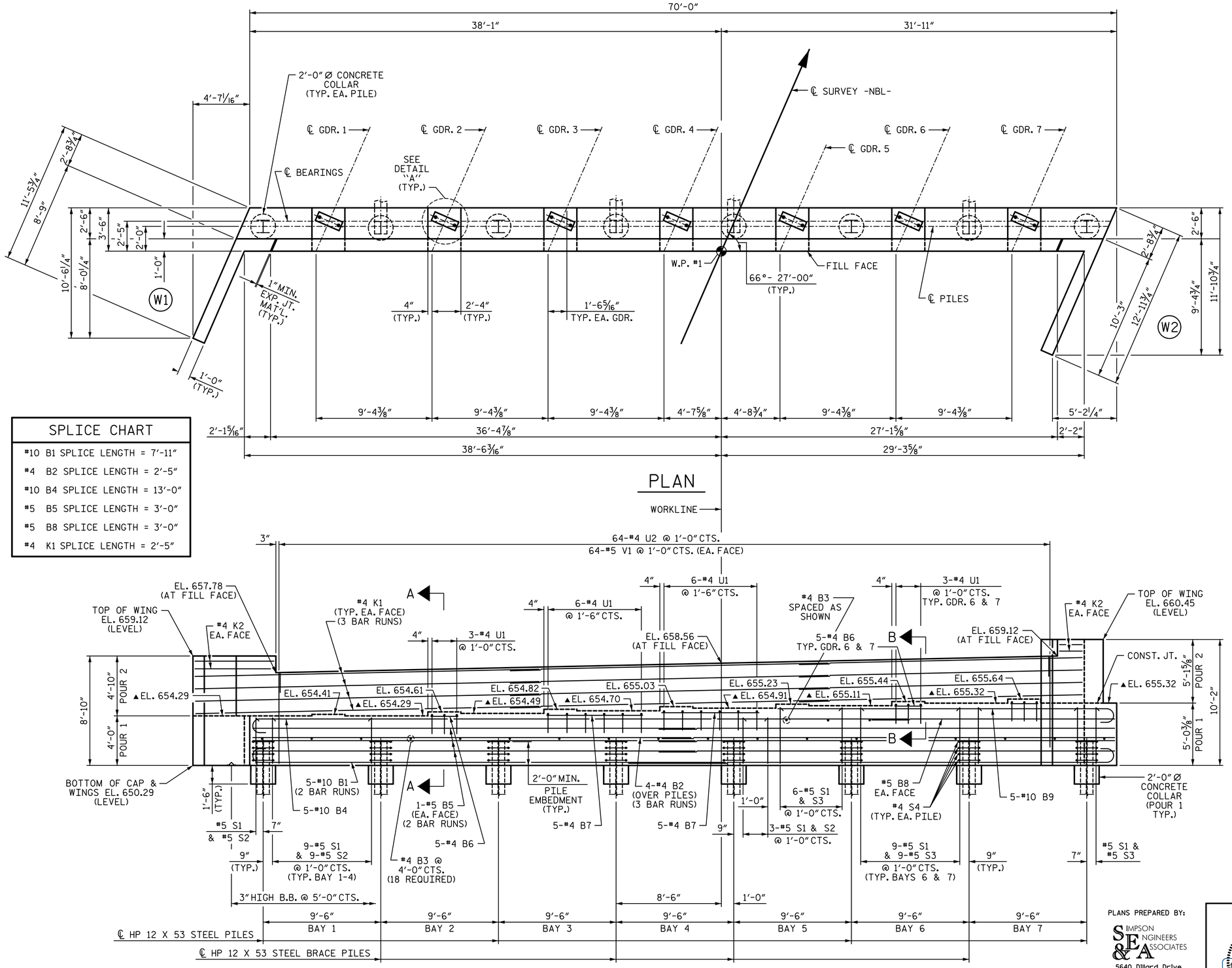
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4"DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.



PLAN

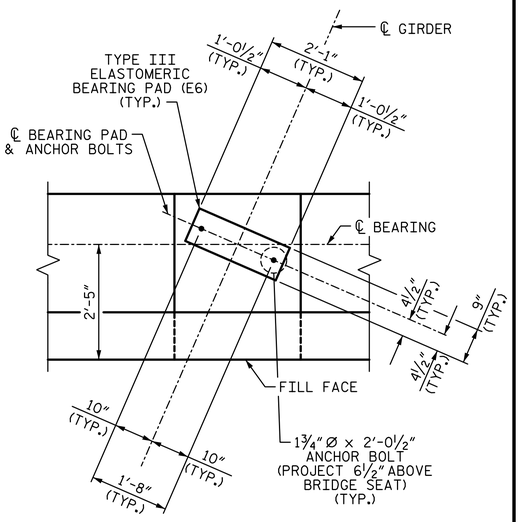
WORKLINE

ELEVATION

▲FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTION A-A ON SHEET 3 OF 3.

SPLICE CHART

#10	B1 SPLICE LENGTH = 7'-11"
#4	B2 SPLICE LENGTH = 2'-5"
#10	B4 SPLICE LENGTH = 13'-0"
#5	B5 SPLICE LENGTH = 3'-0"
#5	B8 SPLICE LENGTH = 3'-0"
#4	K1 SPLICE LENGTH = 2'-5"



DETAIL "A"

TYP. EA. GIRDER

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-34
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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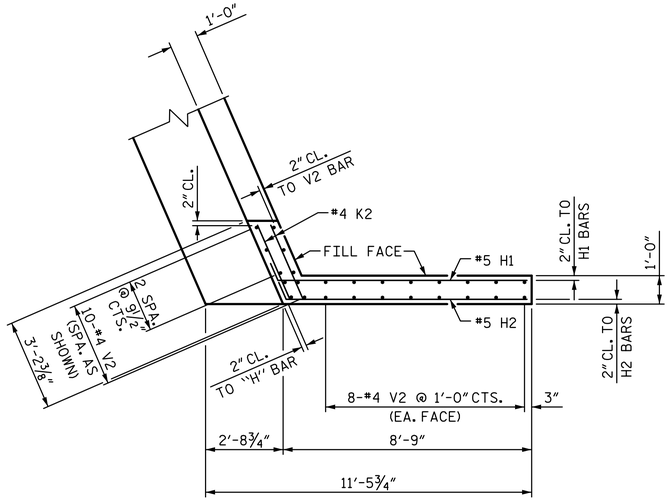
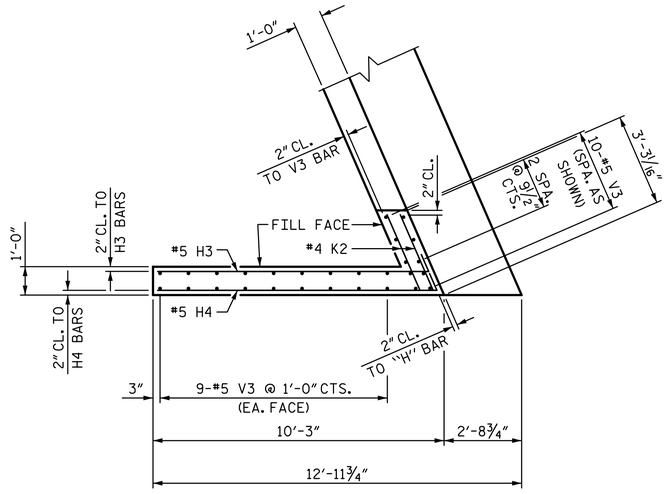
LICENSURE NO. C-2521

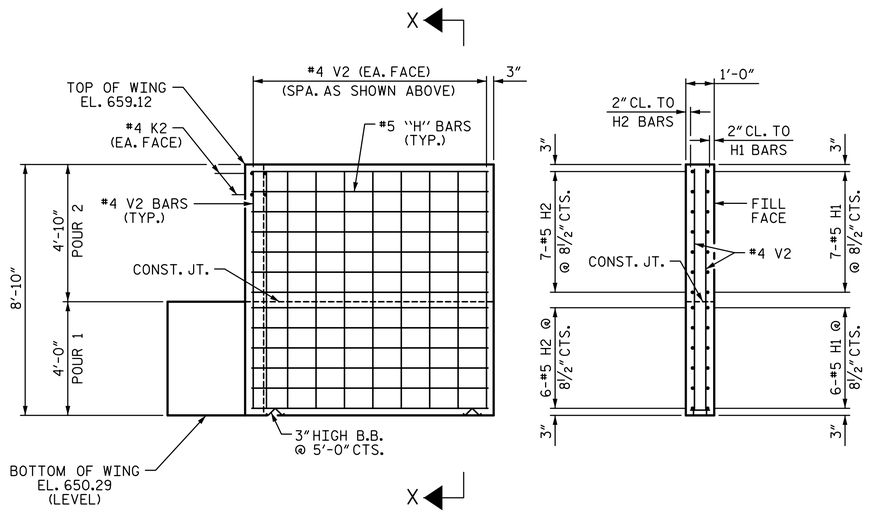
NORTH CAROLINA PROFESSIONAL SEAL 024280 ENGINEER THEO J. BEACH
Digitally Signed
2/13/2017



PLAN OF WING (W1)

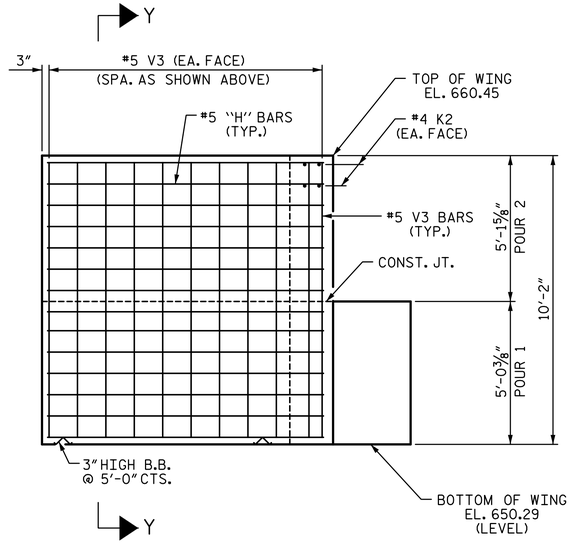


PLAN OF WING (W2)

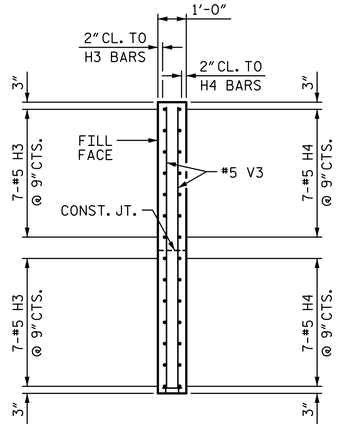


ELEVATION OF WING (W1)

SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-35
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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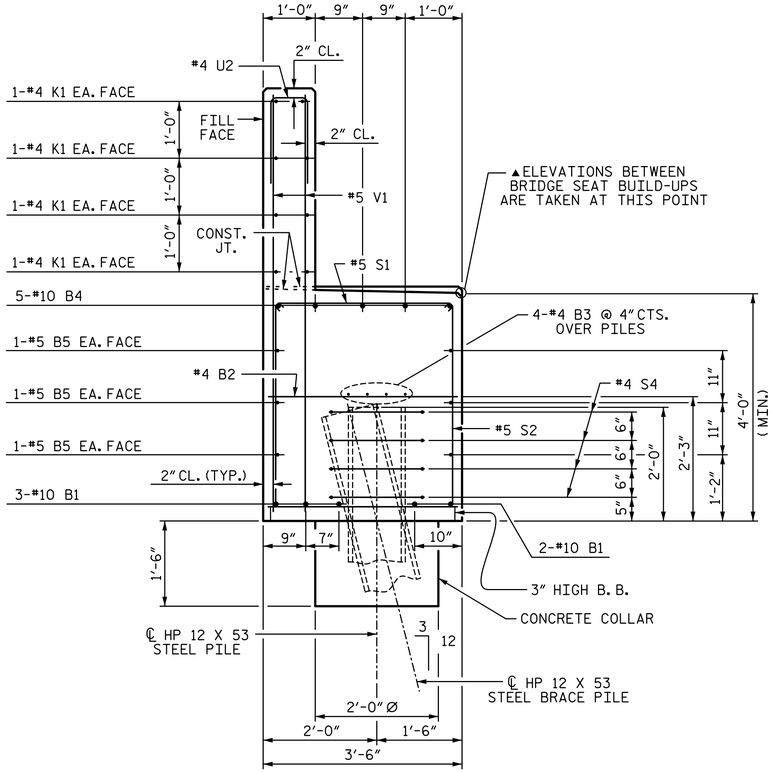
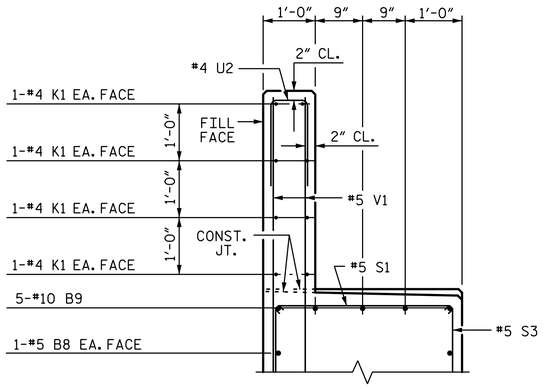
LICENSURE NO. C-2521

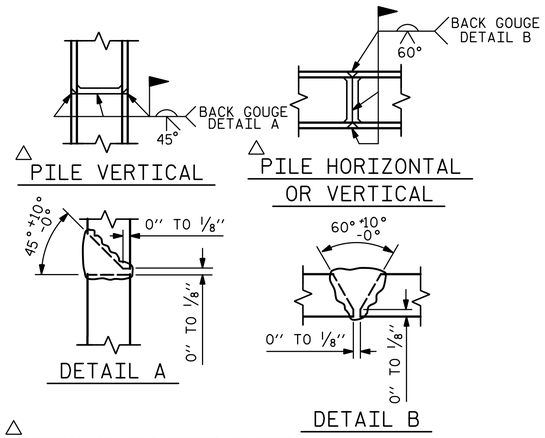
NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER THEO J. BEACH
2/13/2017



SECTION A-A

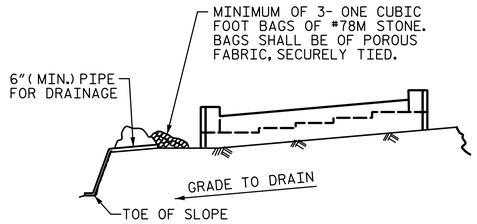


SECTION B-B



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



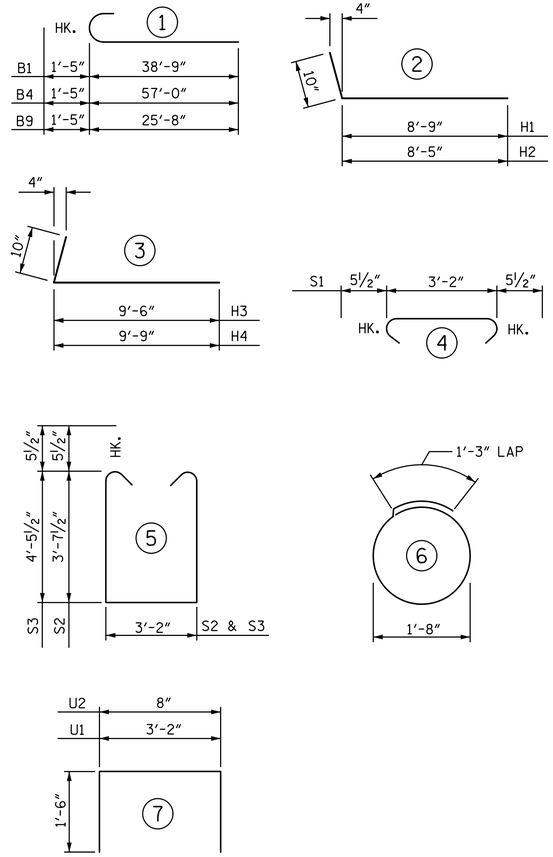
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	10	1	40'-2"	1728
B2	12	4	STR	24'-10"	199
B3	21	4	STR	3'-2"	44
B4	5	10	1	58'-5"	1257
B5	12	5	STR	36'-4"	455
B6	15	4	STR	2'-4"	23
B7	10	4	STR	9'-0"	60
B8	2	5	STR	15'-8"	33
B9	5	10	1	27'-1"	583
H1	13	5	2	9'-7"	130
H2	13	5	2	9'-3"	125
H3	14	5	3	10'-4"	151
H4	14	5	3	10'-7"	155
K1	24	4	STR	24'-10"	398
K2	8	4	STR	2'-10"	15
S1	65	5	4	4'-1"	277
S2	40	5	5	11'-4"	473
S3	25	5	5	13'-0"	339
S4	32	4	6	6'-6"	139
U1	21	4	7	6'-2"	87
U2	64	4	7	3'-8"	157
V1	128	5	STR	7'-2"	957
V2	26	4	STR	8'-6"	148
V3	28	5	STR	9'-10"	287

TOTAL REINFORCING STEEL	8220 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (CAP, COLLARS, & LOWER WINGS)	45.7 CY
POUR 2 (BACKWALL AND UPPER WINGS)	12.9 CY
TOTAL CLASS "A" CONCRETE	58.6 CY
HP 12 X 53 STEEL PILES NO. 8	400 LF

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-36
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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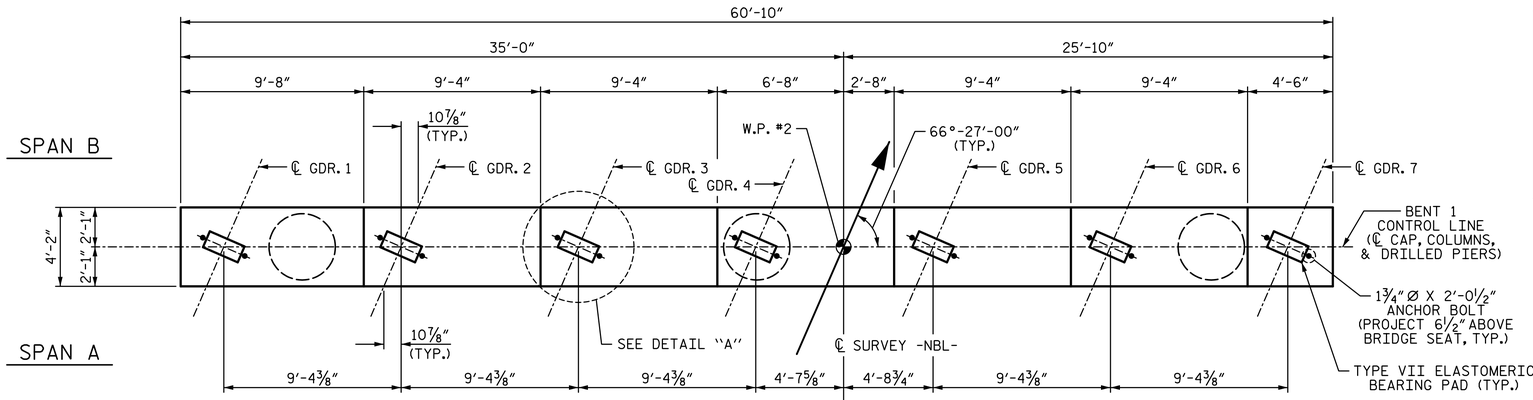
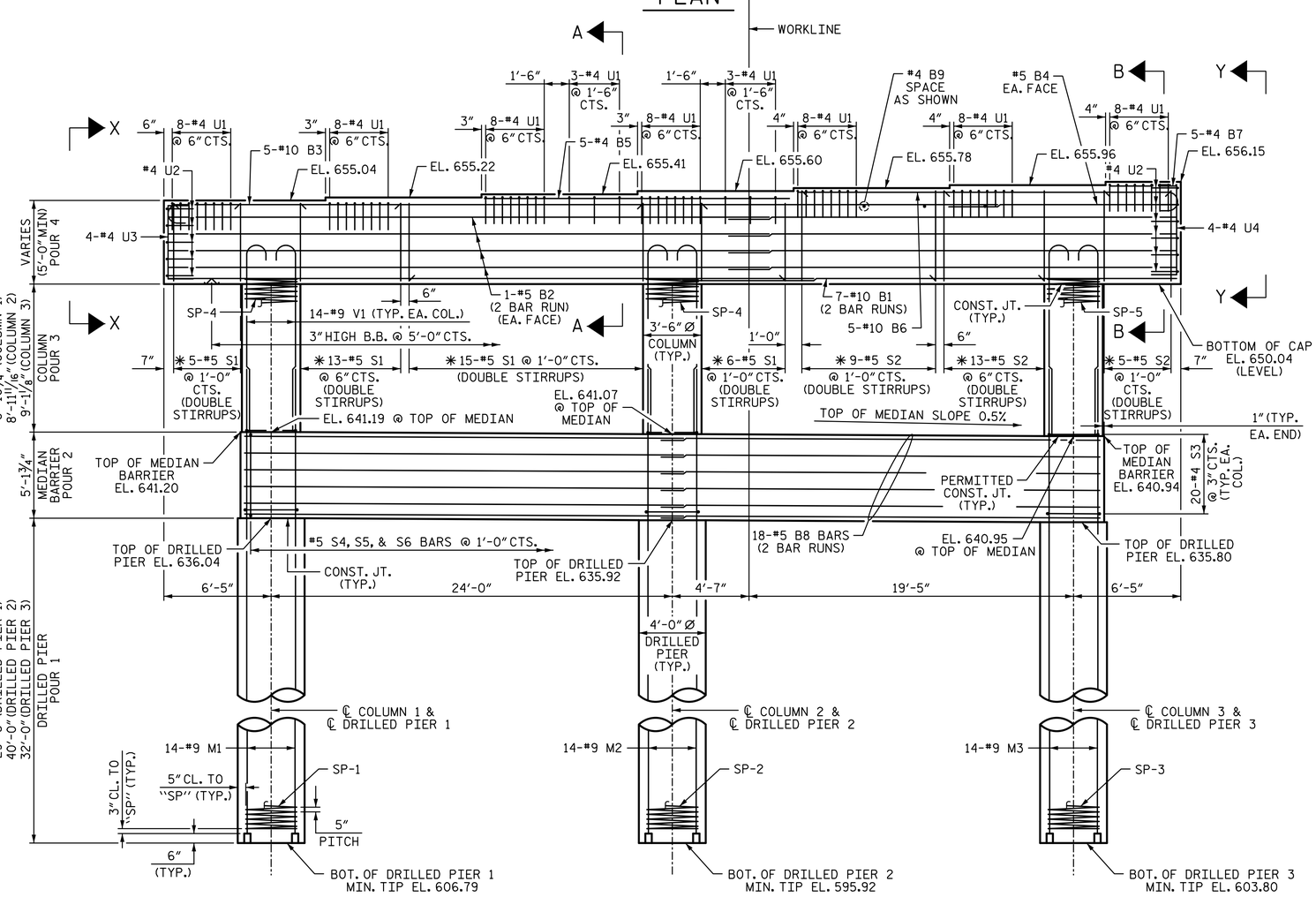
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
Digitally Signed
2/13/2017



PLAN



ELEVATION

SPLICE CHART
#10 B1 SPLICE LENGTH = 7'-11"
#5 B2 SPLICE LENGTH = 3'-0"
#10 B3 SPLICE LENGTH = 13'-0"
#5 B4 SPLICE LENGTH = 3'-0"
#5 B8 SPLICE LENGTH = 3'-0"

NOTES:

✱ INVERT ALTERNATE STIRRUPS.

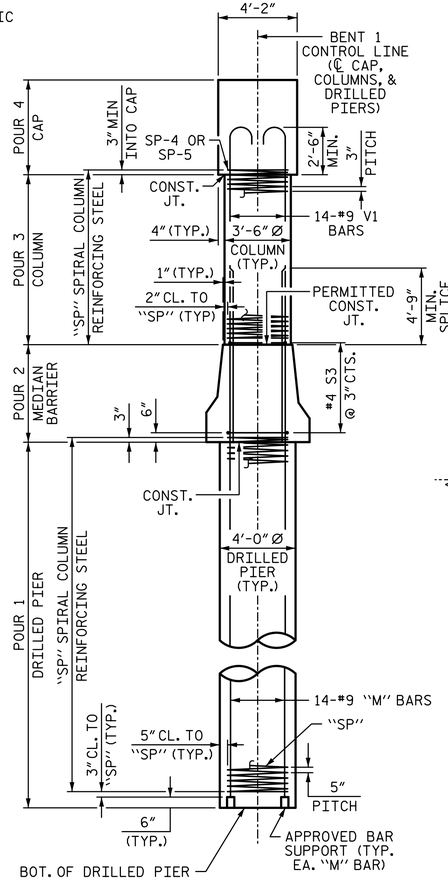
STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

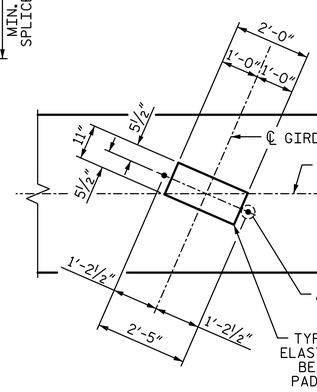
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".

THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON THE APPROXIMATE PAVED SHOULDER ELEVATION. THE TOP OF DRILLED PIER SHALL BE ADJUSTED AS REQUIRED TO MAINTAIN THE TOP OF THE DRILLED PIER 1 FOOT BELOW THE PAVED SHOULDER ELEVATION.

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



END ELEVATION



DETAIL "A"

TYP. EA. GIRDER

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-37
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY:	S. D. COOPER	DATE: 5-15
CHECKED BY:	B.S. COX	DATE: 5-15
DESIGN ENGINEER OF RECORD:	T.J. BEACH	DATE: 5-15

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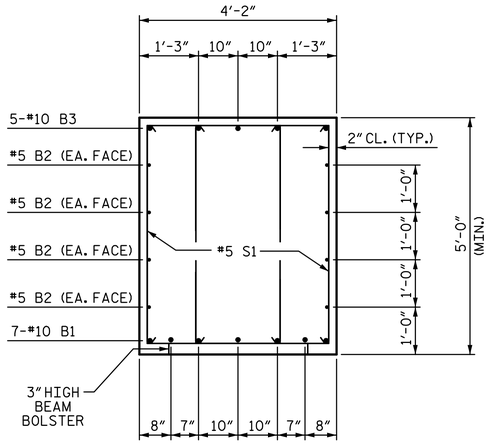
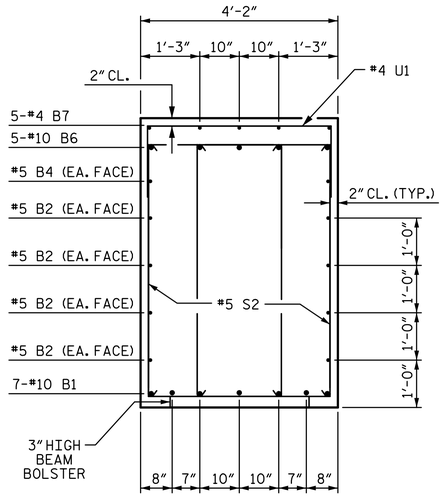
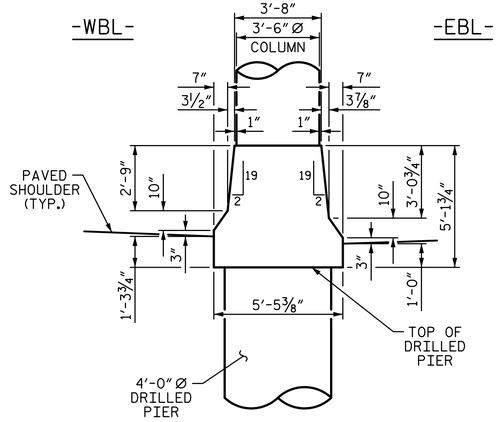


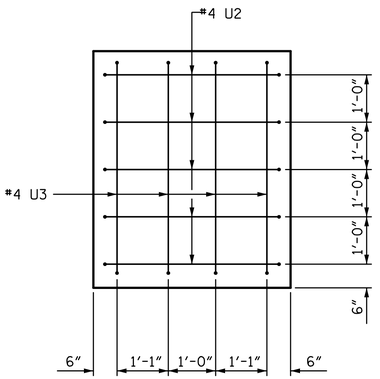
SECTION A-A



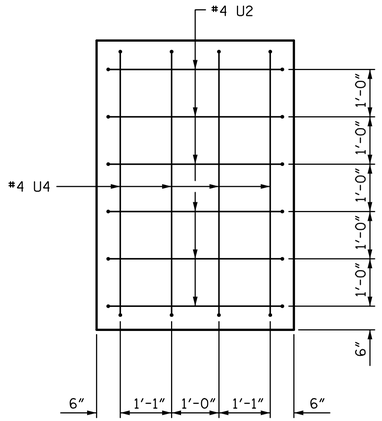
SECTION B-B



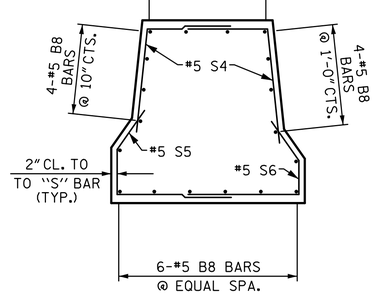
MEDIAN BARRIER LOOKING EASTBOUND



VIEW X-X

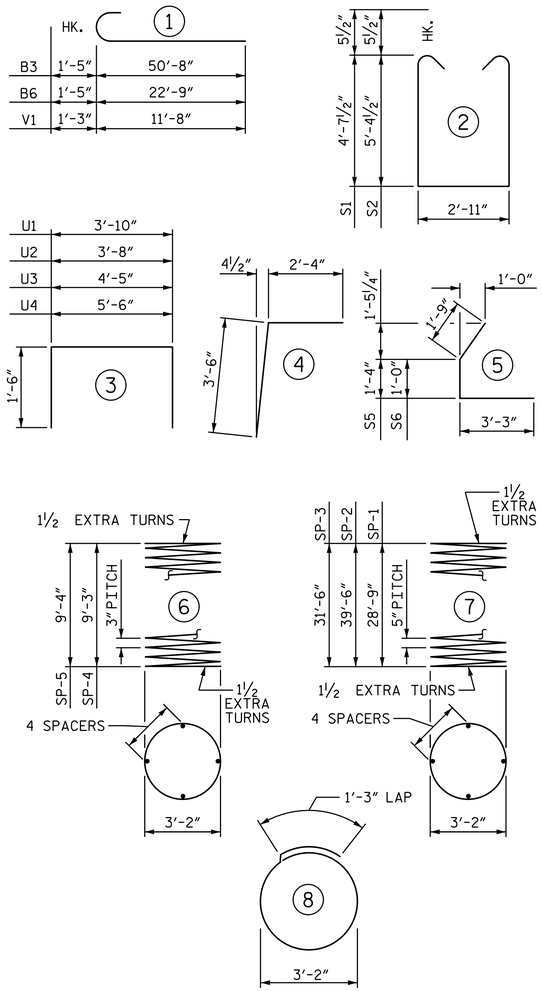


VIEW Y-Y



MEDIAN BARRIER

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

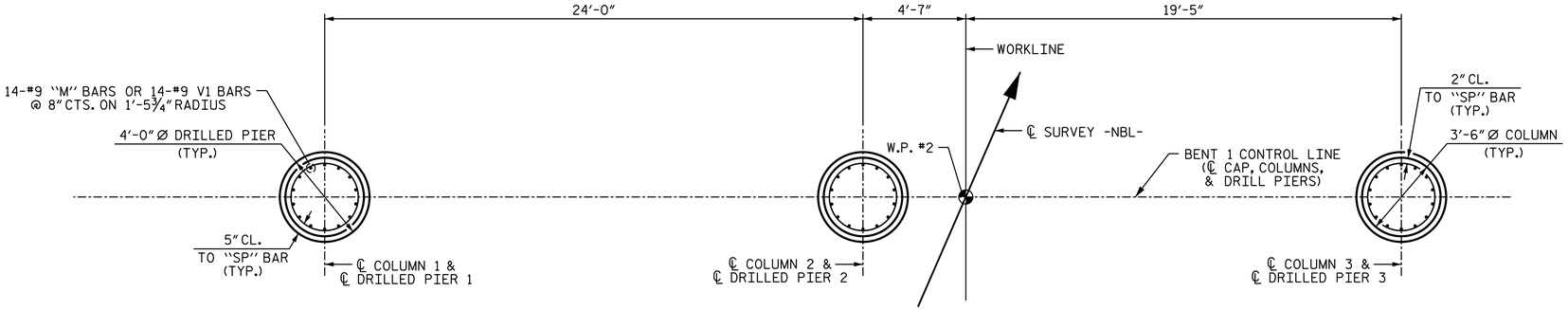
BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	10	STR	34'-2"	2058
B2	16	5	STR	31'-9"	530
B3	5	10	1	52'-1"	1121
B4	2	5	STR	12'-10"	27
B5	5	4	STR	18'-4"	61
B6	5	10	1	24'-2"	520
B7	5	4	STR	4'-2"	14
B8	36	5	STR	27'-2"	1020
B9	3	4	STR	3'-10"	8
M1	14	9	STR	41'-8"	1983
M2	14	9	STR	52'-5"	2495
M3	14	9	STR	44'-5"	2114
S1	78	5	2	13'-1"	1064
S2	54	5	2	14'-7"	821
S3	60	4	8	11'-2"	448
S4	104	5	4	5'-10"	633
S5	52	5	5	6'-4"	343
S6	52	5	5	6'-0"	325
U1	62	4	3	6'-10"	283
U2	11	4	3	6'-8"	49
U3	4	4	3	7'-5"	20
U4	4	4	3	8'-6"	23
V1	42	9	1	12'-11"	1845
SP-1	1	✳	7	705'-2"	735
SP-2	1	✳	7	959'-10"	1001
SP-3	1	✳	7	773'-9"	807
SP-4	2	✳✳	6	392'-10"	525
SP-5	1	✳✳	6	402'-8"	269

REINFORCING STEEL	17805	LB
SPIRAL COL. REINF. STEEL	3337	LB
CLASS "A" CONCRETE BREAKDOWN		
POUR 2 (MEDIAN BARRIER)	44.4	CY
POUR 3 (COLUMNS)	9.6	CY
POUR 4 (CAP)	51.8	CY
TOTAL	105.8	CY
DRILLED PIERS:		
DRILLED PIER CONCRETE POUR 1 (DRILLED PIERS)	47.2	CY
4'-0" Ø DRILLED PIER NOT IN SOIL	31.0	LF
4'-0" Ø DRILLED PIER IN SOIL	70.3	LF
CSL TUBES	423	LF

✳ THE "SP-1", "SP-2" & "SP-3" SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.

✳✳ THE "SP-4" & "SP-5" SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



PLAN OF DRILLED PIERS & COLUMNS

(DIMENSIONS AND REINFORCING STEEL SHOWN ARE TYPICAL FOR EACH COLUMN AND DRILLED PIER)
(MEDIAN BARRIER NOT SHOWN FOR CLARITY)

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-38
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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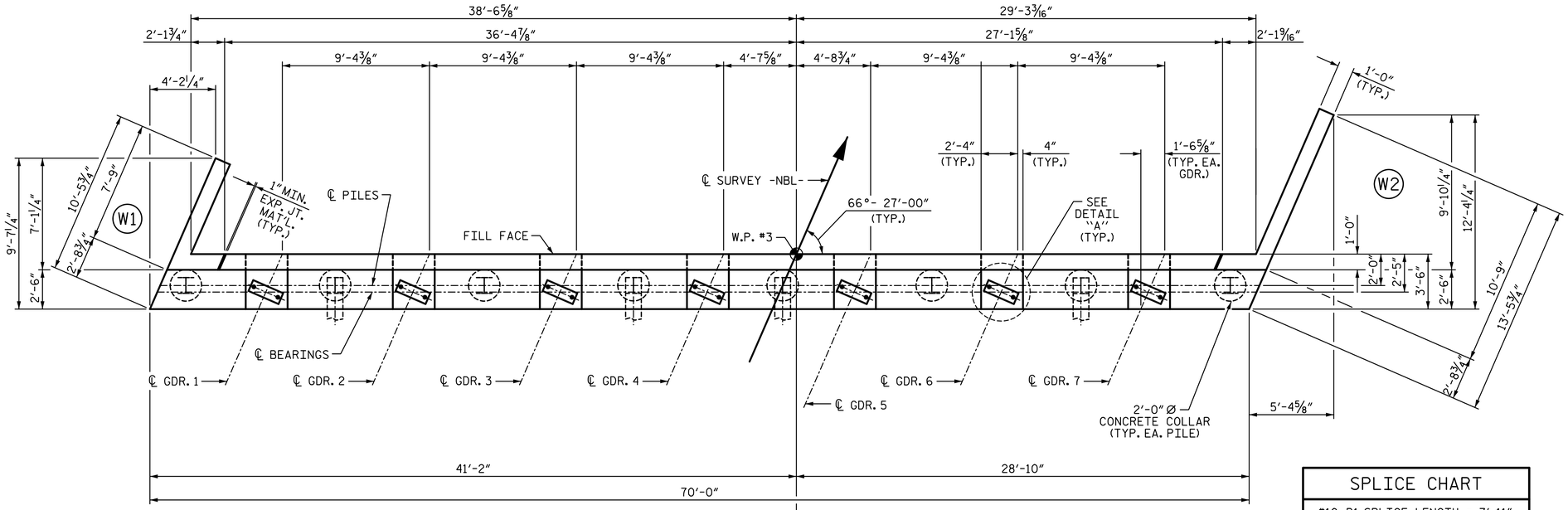
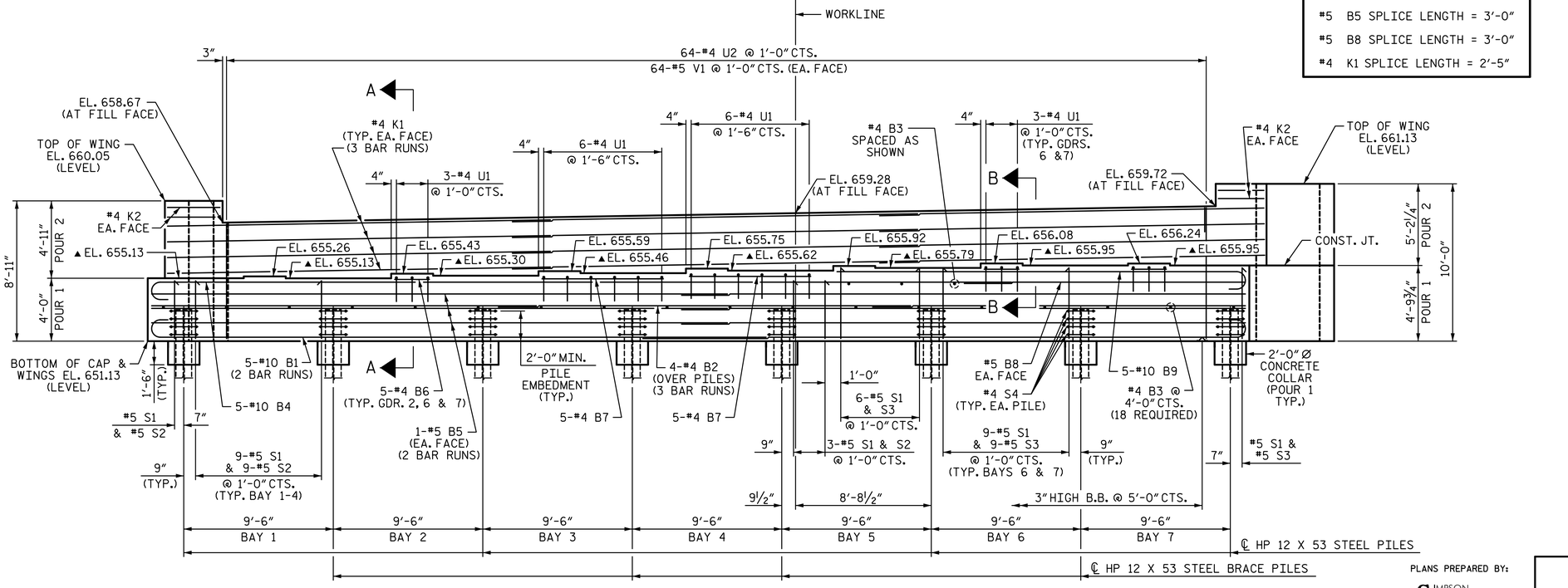
NORTH CAROLINA PROFESSIONAL SEAL 24380 ENGINEER THEO J. BEACH
2/13/2017



PLAN



ELEVATION

▲FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTION A-A ON SHEET 3 OF 3.

NOTES:

STIRRUPS AND "U" BARS 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 CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

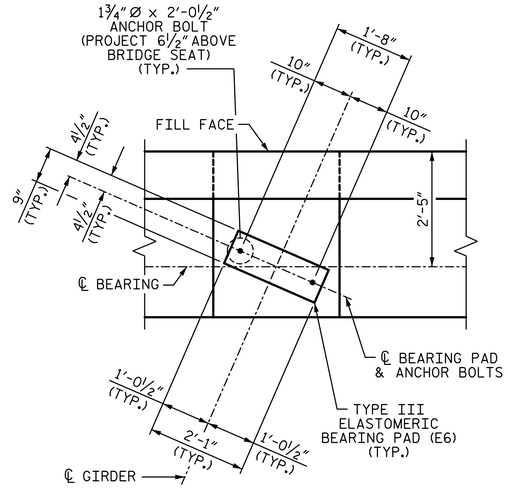
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

SPLICE CHART

#10	B1 SPLICE LENGTH = 7′-11″
#4	B2 SPLICE LENGTH = 2′-5″
#10	B4 SPLICE LENGTH = 13′-0″
#5	B5 SPLICE LENGTH = 3′-0″
#5	B8 SPLICE LENGTH = 3′-0″
#4	K1 SPLICE LENGTH = 2′-5″



DETAIL "A"

TYP. EA. GIRDER

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-39
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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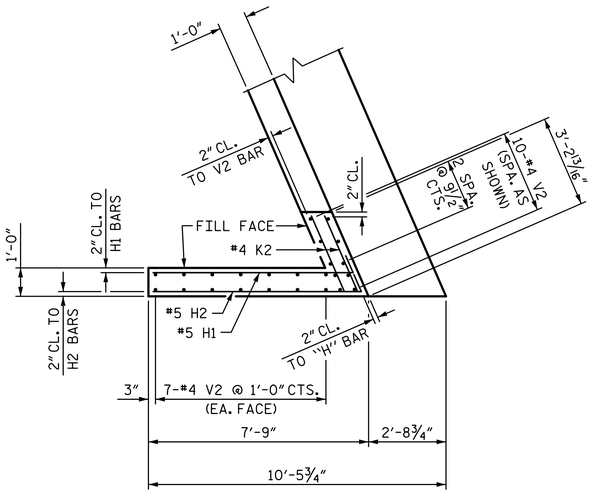
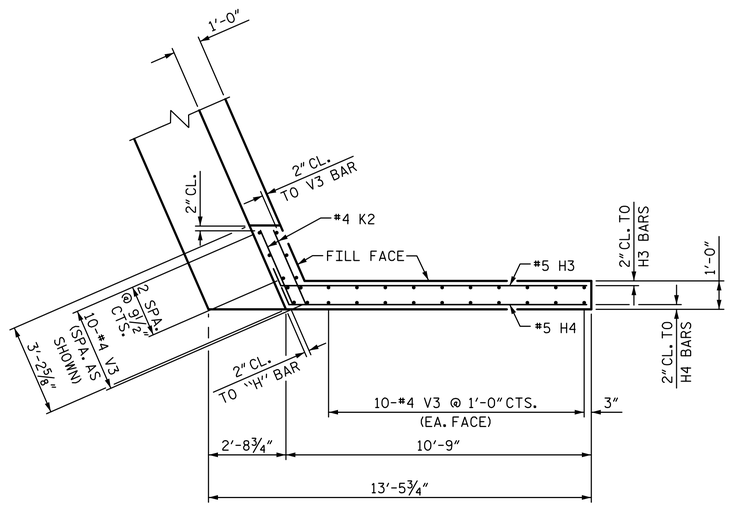
LICENSURE NO. C-2521

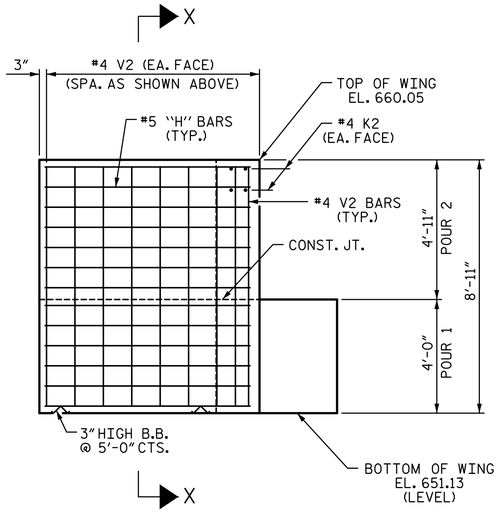
NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
Digitally Signed by Theo J. Beach
2/13/2017



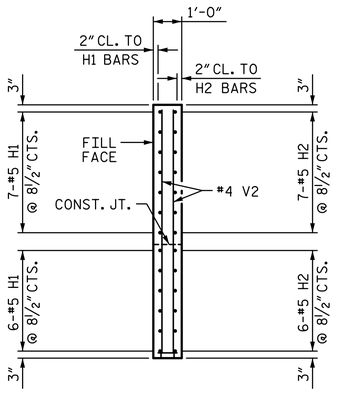
PLAN OF WING (W1)



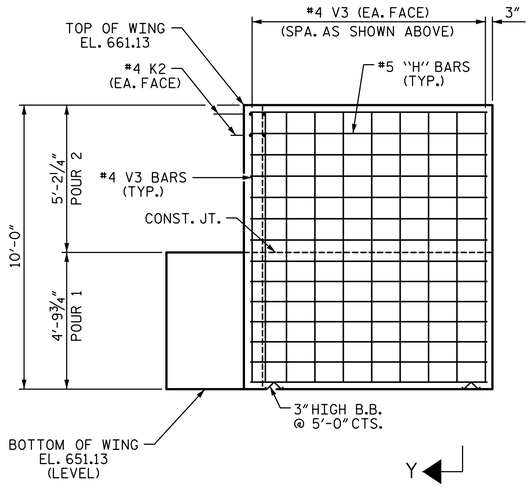
PLAN OF WING (W2)



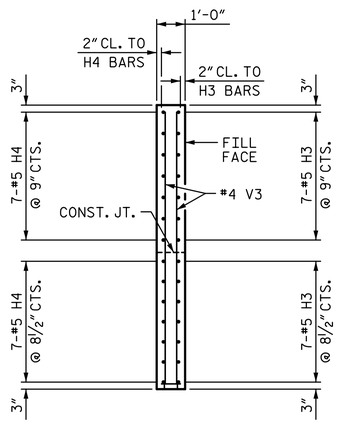
ELEVATION OF WING (W1)



SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 26+54.73 -NBL-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-40
1			3			TOTAL SHEETS
2			4			S01-49

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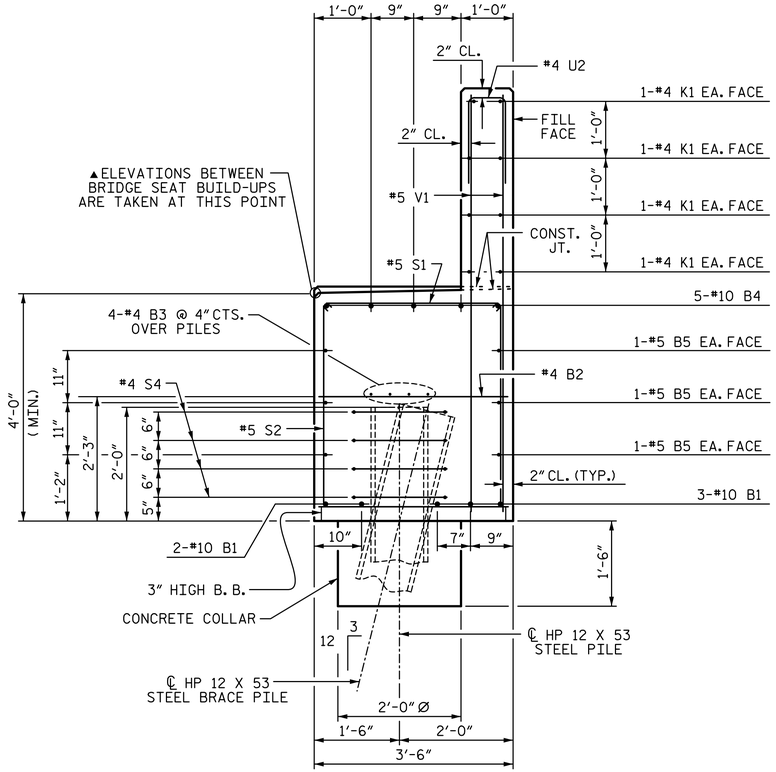
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

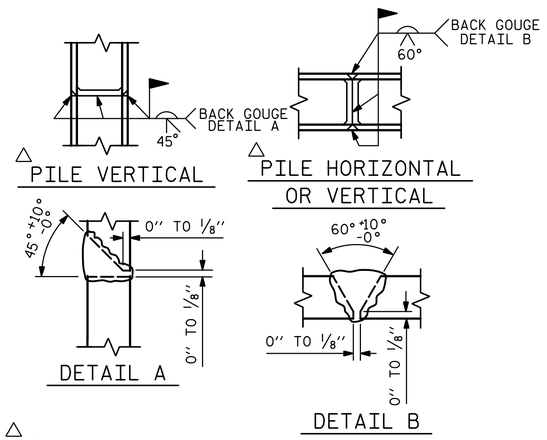
2/10/2017 9:09:09 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_EB2.dgn



▲ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS ARE TAKEN AT THIS POINT

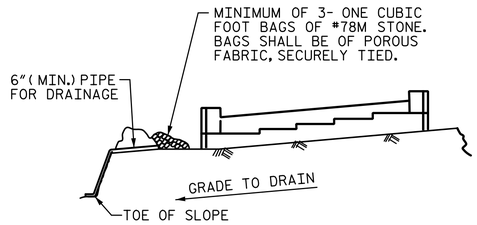
SECTION A-A

SECTION B-B



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



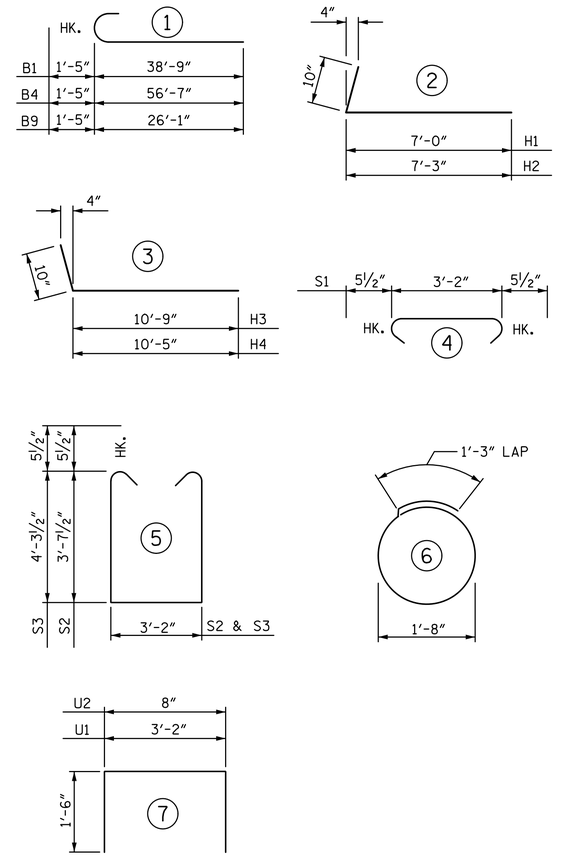
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	10	1	40'-2"	1728
B2	12	4	STR	24'-10"	199
B3	21	4	STR	3'-2"	44
B4	5	10	1	58'-0"	1248
B5	12	5	STR	36'-4"	455
B6	15	4	STR	2'-4"	23
B7	10	4	STR	9'-0"	60
B8	2	5	STR	16'-1"	34
B9	5	10	1	27'-6"	592
H1	13	5	2	7'-10"	106
H2	13	5	2	8'-1"	110
H3	14	5	3	11'-7"	169
H4	14	5	3	11'-3"	164
K1	24	4	STR	24'-10"	398
K2	8	4	STR	2'-10"	15
S1	65	5	4	4'-1"	277
S2	40	5	5	11'-4"	473
S3	25	5	5	12'-8"	330
S4	32	4	6	6'-6"	139
U1	21	4	7	6'-2"	87
U2	64	4	7	3'-8"	157
V1	128	5	STR	7'-2"	957
V2	24	4	STR	8'-7"	138
V3	30	4	STR	9'-8"	194

TOTAL REINFORCING STEEL	8097 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (CAP, COLLARS, & LOWER WINGS)	44.6 CY
POUR 2 (BACKWALL AND UPPER WINGS)	12.9 CY
TOTAL CLASS "A" CONCRETE	57.5 CY
HP 12 X 53 STEEL PILES NO. 8	480 LF

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-41
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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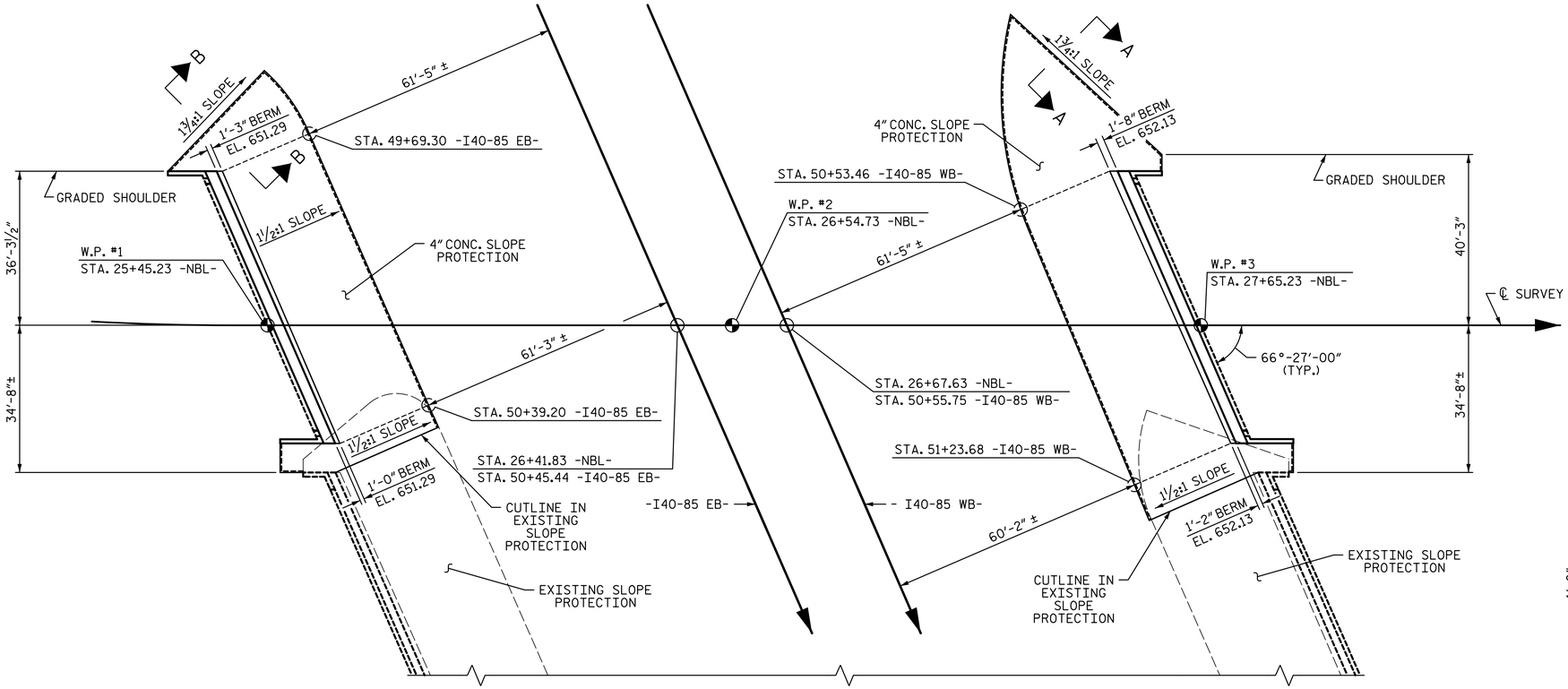
NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
Digitally Signed by Theo Beach
2/13/2017



@ END BENT 1 @ END BENT 2

PLAN OF SLOPE PROTECTION

GENERAL NOTES:

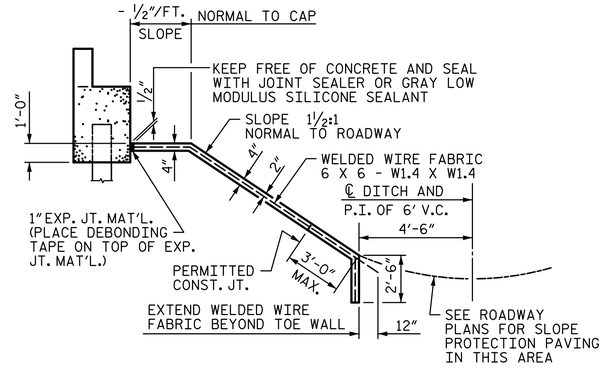
SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS.

ANY COSTS ASSOCIATED WITH REMOVAL OF EXISTING SLOPE PROTECTION TO CUTLINE SHOWN ON PLANS SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

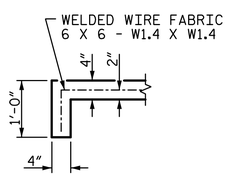
EXISTING SLOPE PROTECTION DAMAGED BY CONSTRUCTION OF NEW END BENTS SHALL BE REPAIRED OR REPLACED AS DIRECTED BY THE ENGINEER. ANY COSTS ASSOCIATED WITH REPAIR OR REPLACEMENT OF EXISTING SLOPE PROTECTION SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

SLOPE PROTECTION NOTES:

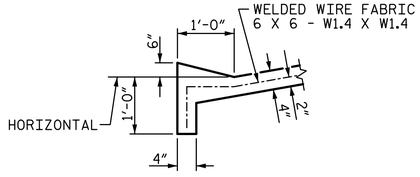
SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL 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.



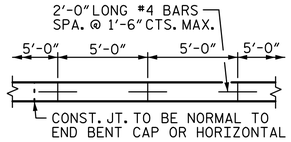
SECTION ALONG ℄ ROADWAY



SECTION A-A

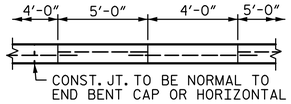


SECTION B-B



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

BRIDGE @ STA. 26+54.73 -NBL-	4" SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SY	APPROX. LF
END BENT 1	305	550
END BENT 2	400	720

* QUANTITY SHOWN IS BASED ON 5'-0" POURS.

PROJECT NO. U-3109A

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STATE OF NORTH CAROLINA
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SLOPE PROTECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-42
1			3			TOTAL SHEETS
2			4			S01-49

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NORTH CAROLINA PROFESSIONAL SEAL 24280 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

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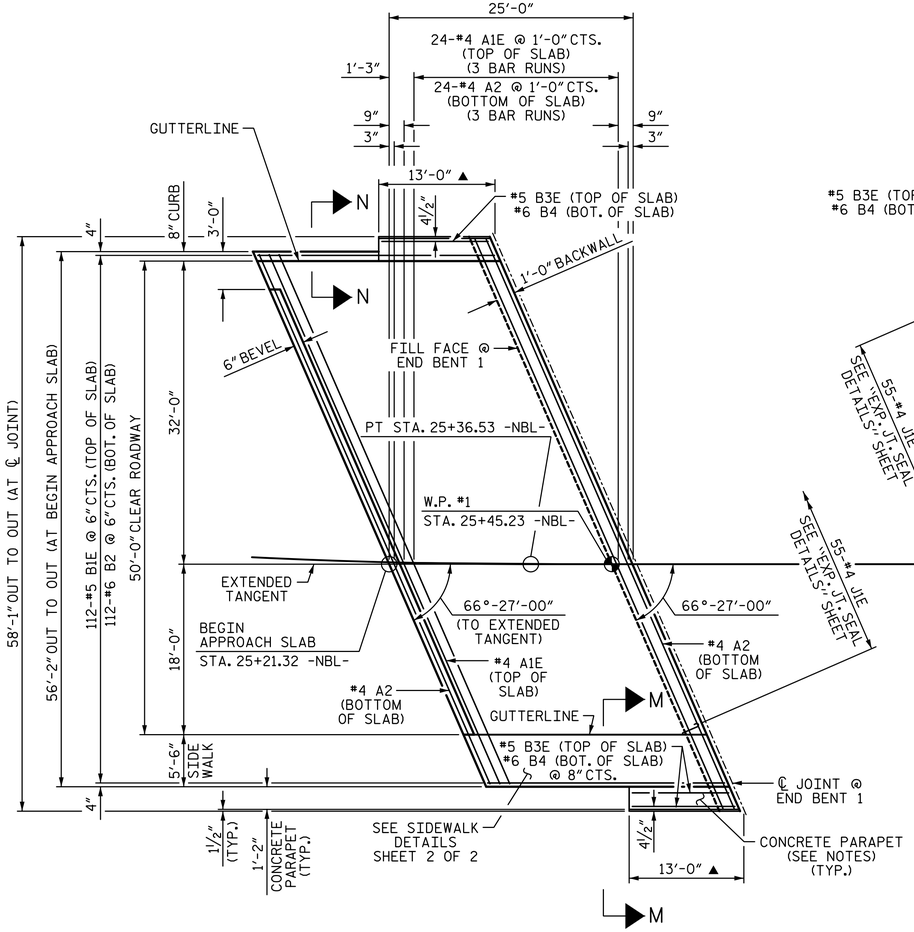
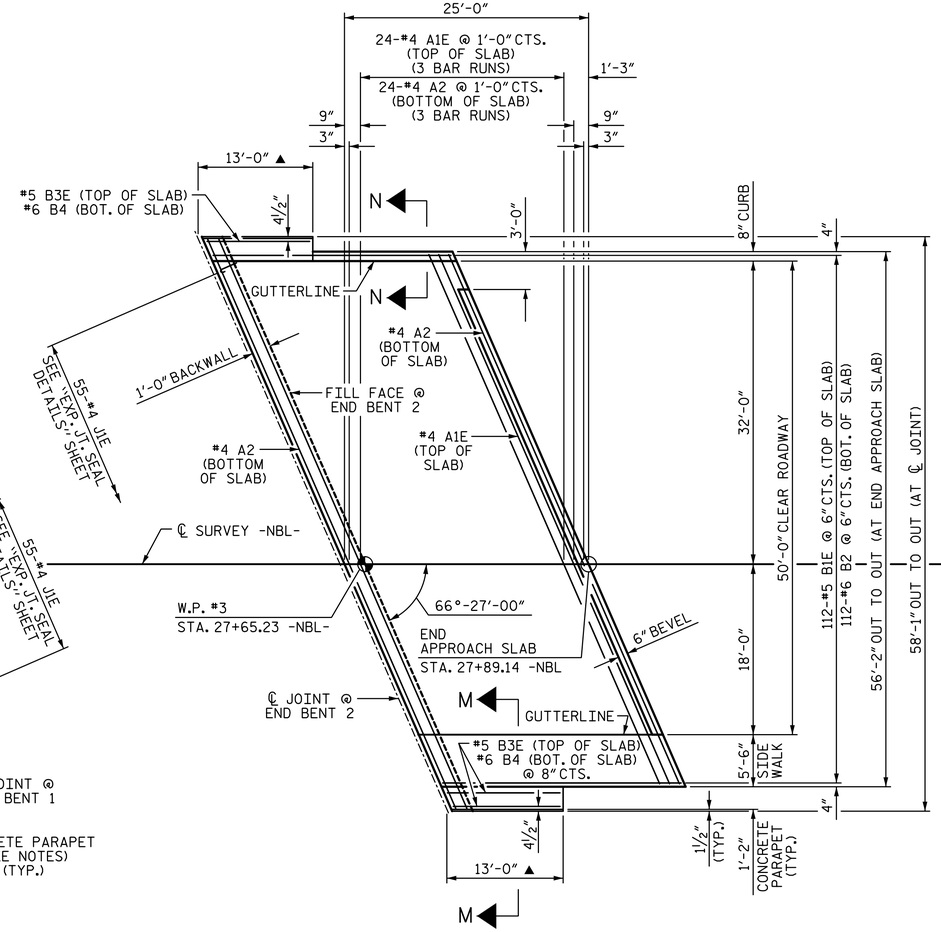
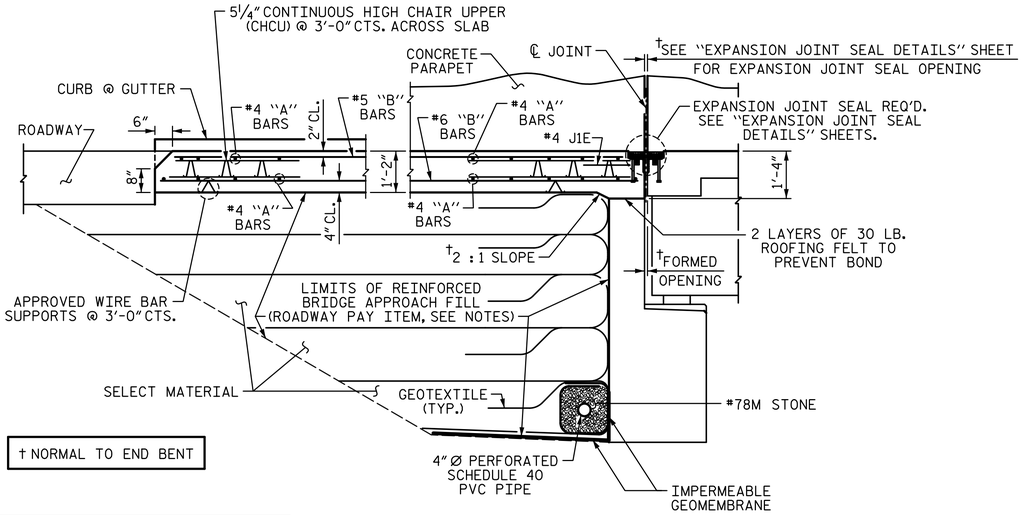


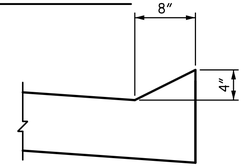
PLAN @ END BENT 1



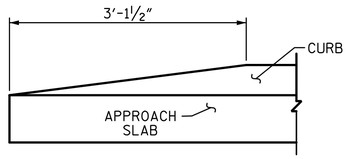
PLAN @ END BENT 2



SECTION THRU SLAB



SECTION N-N



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.

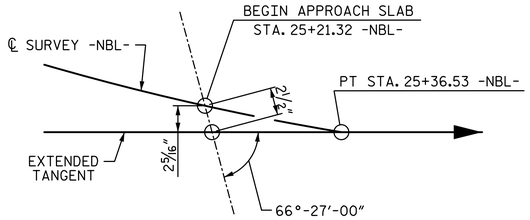
"A" BARS IN APPROACH SLAB @ END BENT 1 SHALL BE SPACED ALONG EXTENDED TANGENT AND PLACED PARALLEL TO FILL FACE.

BOTH OUTSIDE EDGES OF APPROACH SLAB AT END BENT 1 ARE PARALLEL TO EXTENDED TANGENT.

FOR CONCRETE PARAPET DETAILS, DIMENSIONS AND PAY ITEM, SEE "CONCRETE PARAPET DETAILS" SHEETS.

FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

▲ MEASURED FROM ℄ JOINT ALONG OUTSIDE FACE OF CONCRETE PARAPET.



EXTENDED TANGENT LAYOUT

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 1 OF 2

DRAWN BY: S. D. COOPER DATE: 5-15

CHECKED BY: B.S. COX DATE: 5-15

DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:

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2/13/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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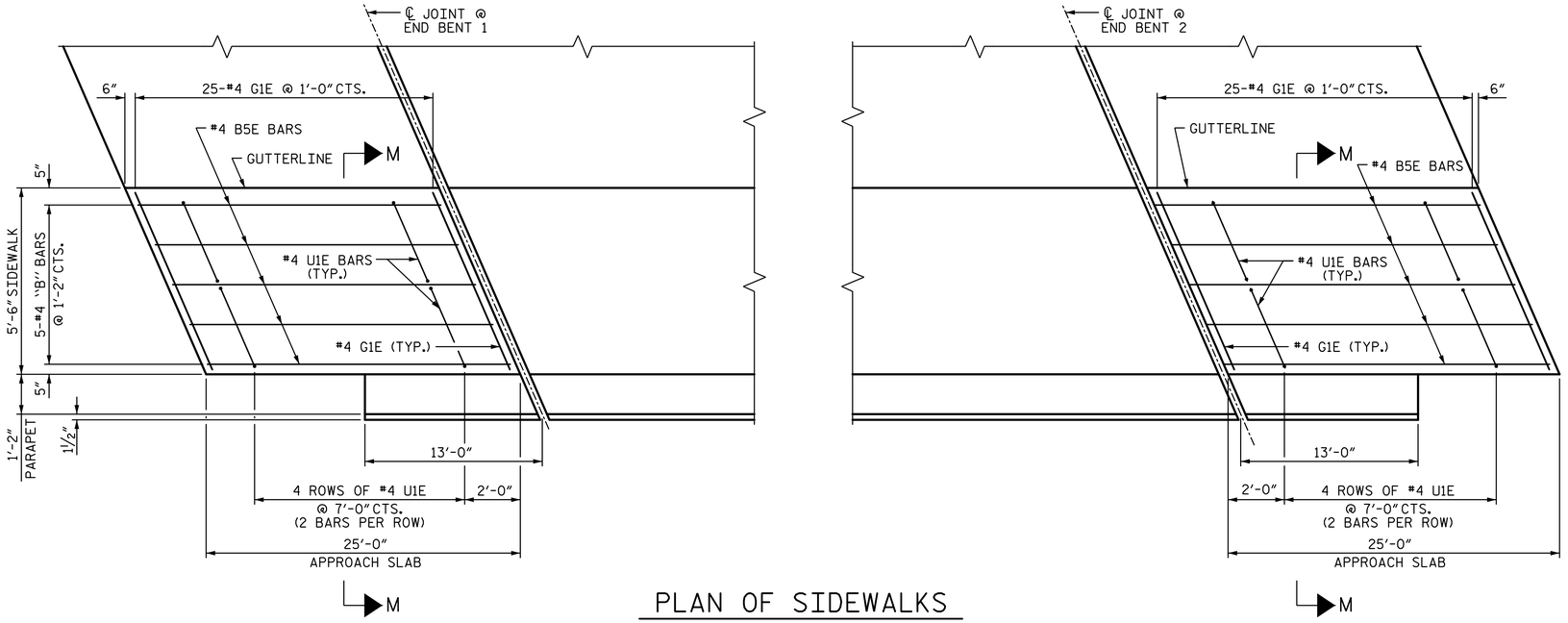
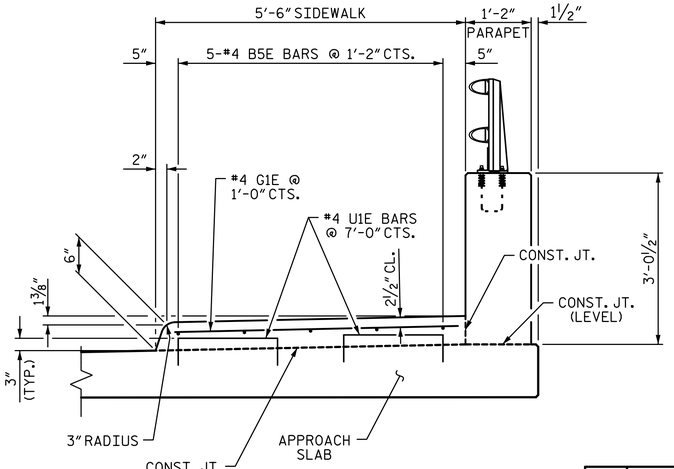
BRIDGE APPROACH SLAB

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-43
1			3			TOTAL SHEETS
2			4			S01-49

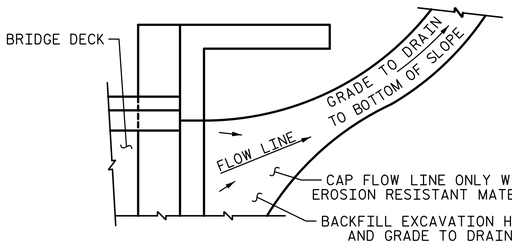


PLAN OF SIDEWALKS



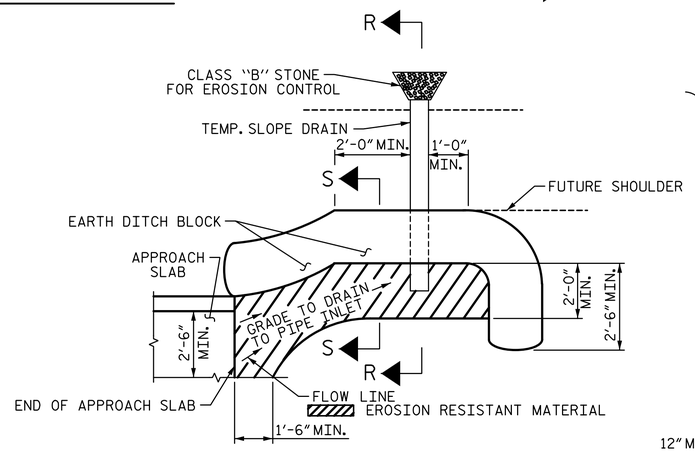
SECTION M-M

SIDEWALK DETAILS



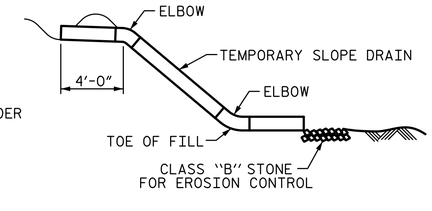
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

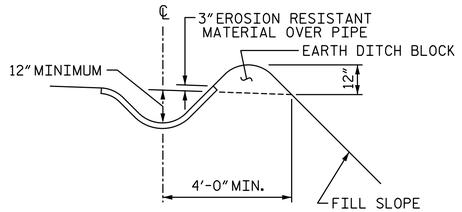


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



SECTION R-R

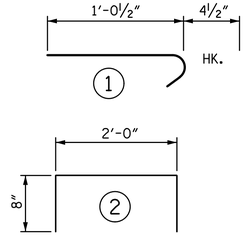


SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED, ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

BILL OF MATERIAL

APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	75	4	STR	22'-4"	1119
A2	78	4	STR	22'-2"	1155
B1E	112	5	STR	23'-11"	2794
B2	112	6	STR	24'-7"	4136
B3E	3	5	STR	12'-0"	38
B4	3	6	STR	12'-0"	54
B5E	5	4	STR	24'-6"	82
G1E	25	4	STR	5'-7"	93
J1E	55	4	1	1'-5"	52
U1E	8	4	2	3'-4"	18
REINFORCING STEEL					5345 LB
EPOXY COATED REINFORCING STEEL					4196 LB
CLASS "AA" CONCRETE BREAKDOWN					
POUR 1 (SLAB & CURB) ✱✱					62.0 CY
POUR 2 (SIDEWALK) ✱✱					2.5 CY
TOTAL					64.5 CY

APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	75	4	STR	22'-4"	1119
A2	78	4	STR	22'-2"	1155
B1E	112	5	STR	23'-11"	2794
B2	112	6	STR	24'-7"	4136
B3E	3	5	STR	12'-0"	38
B4	3	6	STR	12'-0"	54
B5E	5	4	STR	24'-6"	82
G1E	25	4	STR	5'-7"	93
J1E	55	4	1	1'-5"	52
U1E	8	4	2	3'-4"	18
REINFORCING STEEL					5345 LB
EPOXY COATED REINFORCING STEEL					4196 LB
CLASS "AA" CONCRETE BREAKDOWN					
POUR 1 (SLAB & CURB) ✱✱					62.0 CY
POUR 2 (SIDEWALK) ✱✱					2.5 CY
TOTAL					64.5 CY

"E" INDICATES EPOXY COATED REINFORCING STEEL

✱✱ QUANTITIES FOR CONCRETE PARAPET ARE NOT INCLUDED.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+54.73 -NBL-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-44
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: S. D. COOPER DATE: 5-15
CHECKED BY: B.S. COX DATE: 5-15
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 5-15

PLANS PREPARED BY:
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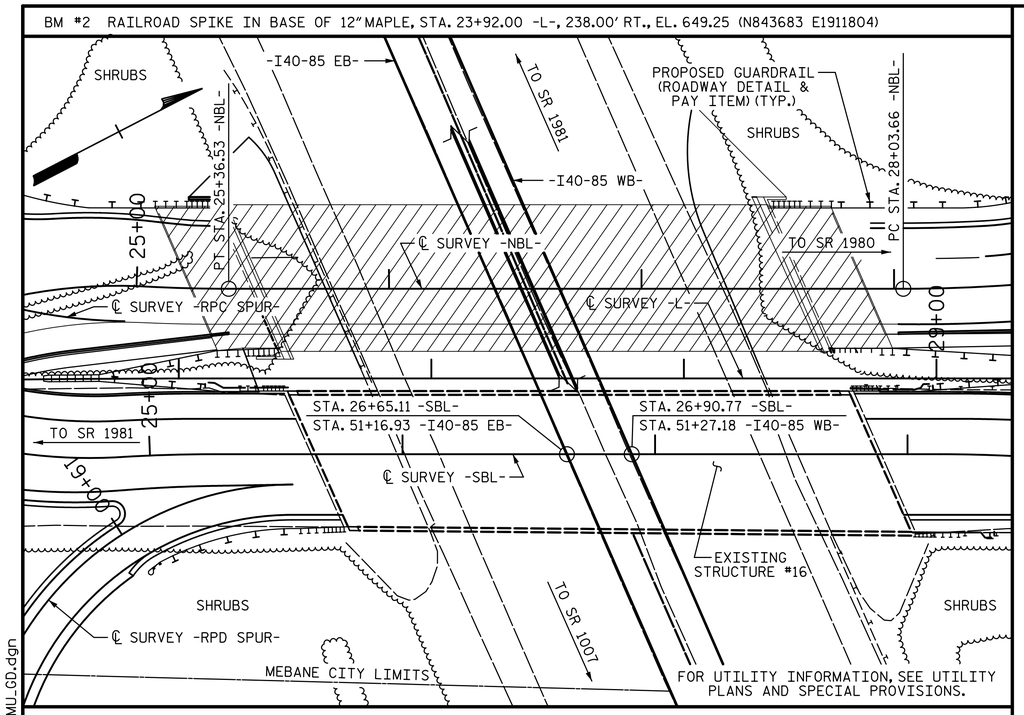
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24330 ENGINEER THEO J. BEACH
2/13/2017

2/10/2017 9:09:10 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 434 (NBL)\Drawings\Final\401_U3109A_SMU_AS.dgn



LOCATION SKETCH

NOTES:

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

THE PROPOSED END POSTS SHALL BE ATTACHED TO BOTH EXISTING BARRIER RAILS USING ADHESIVELY ANCHORED REINFORCING STEEL AS SHOWN, LEVEL ONE FIELD TESTING IS REQUIRED AND THE YIELD LOAD OF THE REINFORCING STEEL IS 3 KIPS. FOR ADHESIVELY ANCHORED REINFORCING, SEE THE STANDARD SPECIFICATIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

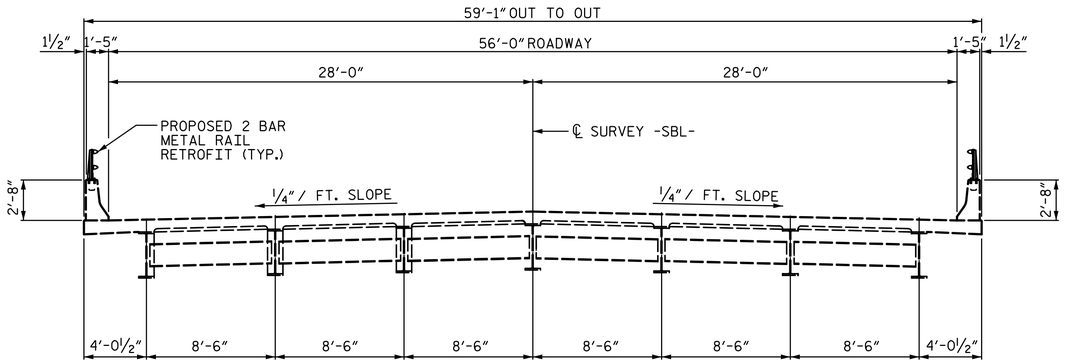
THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

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

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

2 BAR METAL RAIL RETROFIT = 426.69 LF



TYPICAL SECTION

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+90.77 -SBL-

SHEET 1 OF 5 BRIDGE #16

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

EXISTING BRIDGE #16

SBL BRIDGE ON NC 119
OVER I40-85 WB AND I40-85 EB
BETWEEN SR 1981 AND SR 1980

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-45
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

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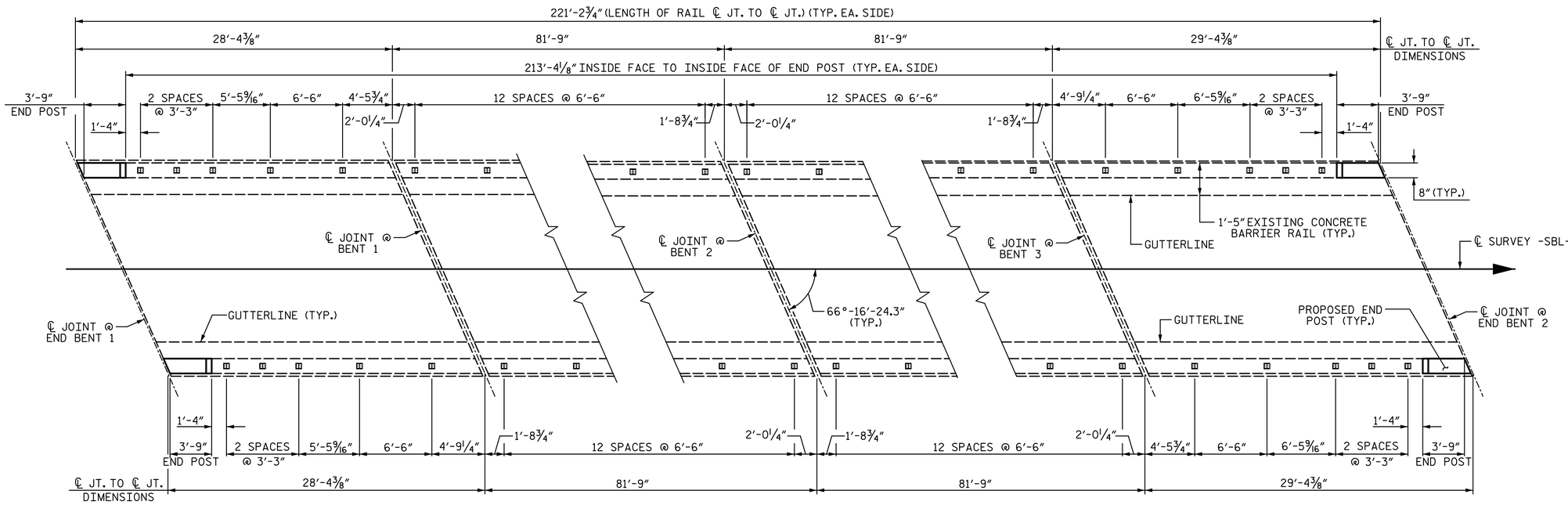
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
3/22/2017

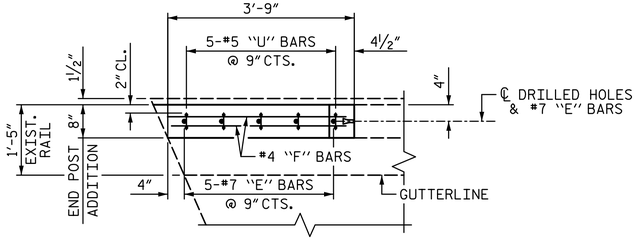
DRAWN BY: T. BANKOVICH DATE: 2-17
CHECKED BY: B.S. COX DATE: 2-17
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 2-17

3/22/2017 11:16:44 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 16 (SBL)\Drawings\401_U3109A_SMU_GD.dgn

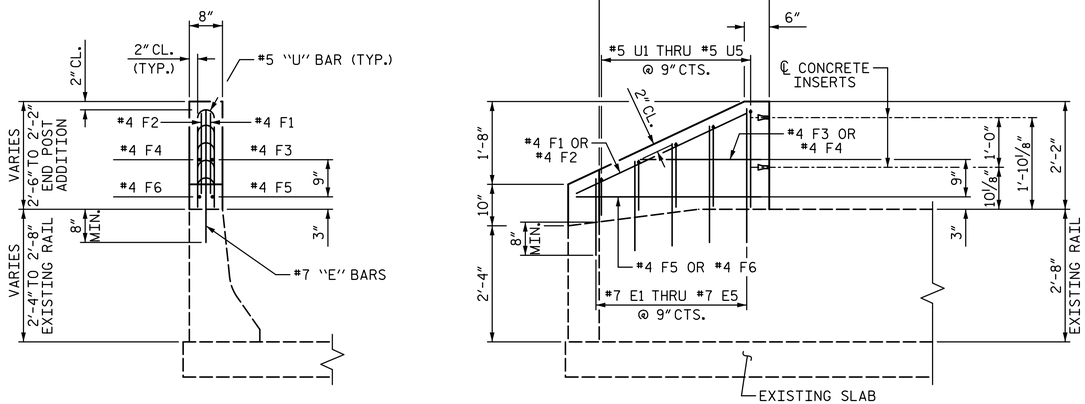


PLAN OF RAIL POST SPACINGS

DIMENSIONS MEASURED ALONG BACK FACE OF BARRIER RAIL



PLAN OF END POST



END VIEW

ELEVATION

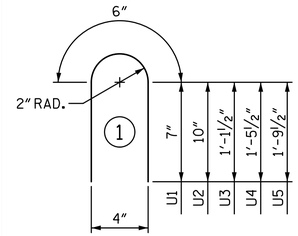
END POST DETAILS

BILL OF MATERIAL FOR 4 END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳E1	4	#7	STR	1′-6″	12
✳E2	4	#7	STR	1′-8″	14
✳E3	4	#7	STR	1′-11″	16
✳E4	4	#7	STR	2′-4″	19
✳E5	4	#7	STR	2′-8″	22
✳F1	4	#4	STR	3′-7″	10
✳F2	4	#4	STR	3′-7″	10
✳F3	4	#4	STR	2′-4″	6
✳F4	4	#4	STR	2′-8″	7
✳F5	4	#4	STR	3′-5″	9
✳F6	4	#4	STR	3′-8″	10
✳U1	4	#5	1	1′-8″	7
✳U2	4	#5	1	2′-2″	9
✳U3	4	#5	1	2′-9″	11
✳U4	4	#5	1	3′-5″	14
✳U5	4	#5	1	4′-1″	17

✳EPOXY COATED REINFORCING STEEL	193 LB
CLASS AA CONCRETE	0.6 CY

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

NOTES:

FOR CONCRETE INSERTS SEE ''END OF RAIL DETAILS'', SHEET 5 OF 5.

THE TOTAL COST FOR THE END POSTS IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF 2 BAR METAL RAIL RETROFIT.

ALL REINFORCING STEEL IN END POST SHALL BE EPOXY COATED.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+90.77 -SBL-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RAIL POST SPACING AND END POST DETAILS FOR 2 BAR METAL RAIL RETROFIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-46
1			3			TOTAL SHEETS
2			4			S01-49

PLANS PREPARED BY:

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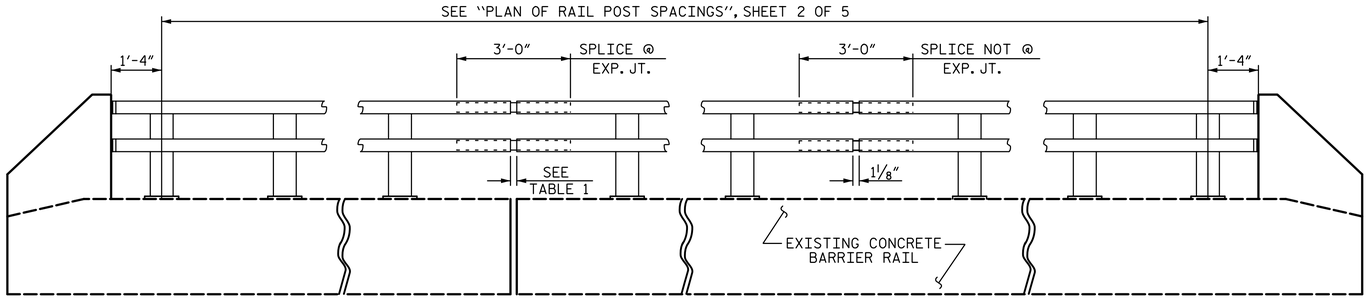
(919) 852-0598 (Fax)
www.slmpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH
2/13/2017

DRAWN BY: T. BANKOVICH DATE: 2-17
CHECKED BY: B.S. COX DATE: 2-17
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 2-17

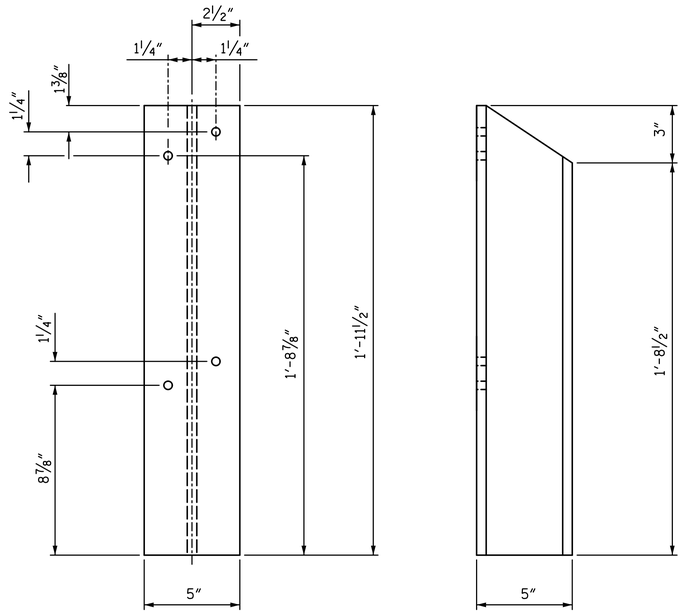
2/10/2017 9:12:15 AM G:\Projects\2014\U-3109A\Structures\Site 1-Bridge 16 (SBL)\Drawings\401_U3109A_SMU_2BMR.dgn



ELEVATION

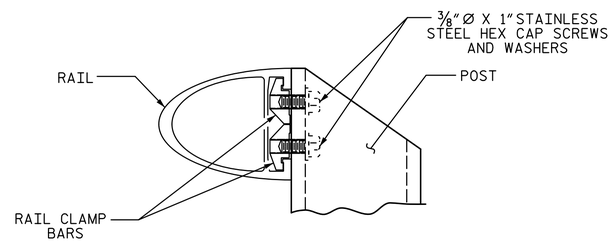
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET 5 OF 5.

TABLE 1	
℄ EXP. JT. @	RAIL OPENING
BENT No. 1	1¾"
BENT No. 2	1⅝"
BENT No. 3	1⅜"

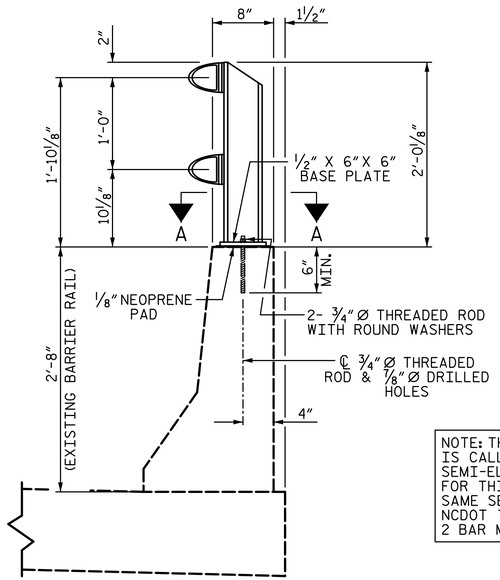


FRONT ELEVATION SIDE ELEVATION

DETAILS OF POST

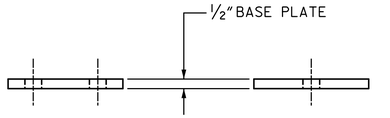


RAIL TO POST CONNECTION DETAIL



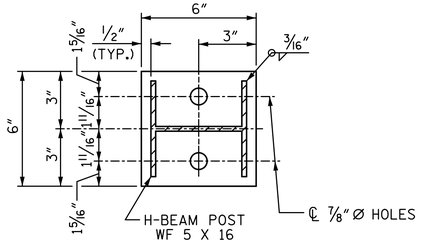
SECTION THRU EXISTING RAIL & 2-BAR METAL RAIL

NOTE: THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE SEMI-ELLIPTICAL RAIL SPECIFIED FOR THIS STRUCTURE IS NOT THE SAME SEMI-ELLIPTICAL RAIL THAT NCDOT TYPICALLY USES IN A 2 BAR METAL RAIL.



FRONT ELEVATION SIDE ELEVATION

POST BASE DETAILS



SECTION A-A

NOTES:

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

ALUMINUM RAILS:

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

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

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

GALVANIZED STEEL RAILS:

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

POST, POST BASES, RAILS, EXPANSION BARS AND CLAMP BARS: AASHTO M270 GRADE 36 STRUCTURAL STEEL - GALVANIZED TO AASHTO M111.

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

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

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

GENERAL NOTES:

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

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE SHEET 5 OF 5.

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

NEOPRENE PADS SHALL BE 60 DUROMETER HARDNESS.

FOR 2 BAR METAL RAIL RETROFIT, SEE SPECIAL PROVISIONS.

PAY LENGTH = 426.69 LIN. FT.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+90.77 -SBL-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

2 BAR METAL RAIL RETROFIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-47
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: T. BANKOVICH DATE: 2-17
CHECKED BY: B.S. COX DATE: 2-17
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 2-17

PLANS PREPARED BY:
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2/13/2017

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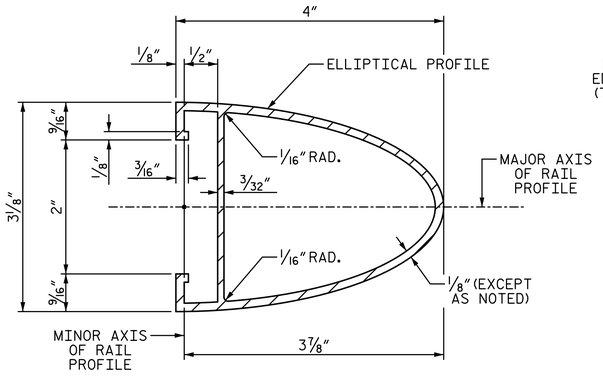
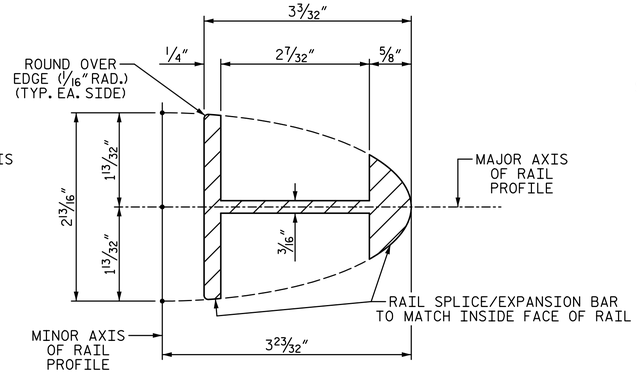


SECTION A-A

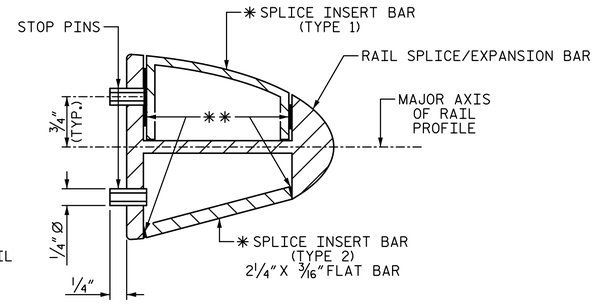
TYPICAL SECTION THRU RAIL



SECTION B-B

RAIL SPLICE/EXPANSION BAR

(RAIL NOT SHOWN FOR CLARITY)



SECTION C-C

✱ USE OF EITHER TYPE 1 OF TYPE 2 SPLICE INSERT BAR IS AT THE OPTION OF THE CONTRACTOR

✱✱ TACK WELD TWO PLACES EACH END (TYP.)

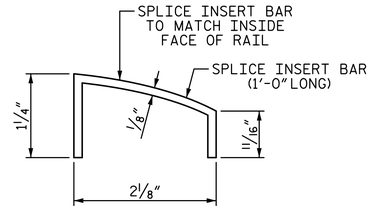
NOTES:

THE CONTRACTOR SHALL USE ADHESIVELY ANCHORED THREADED RODS TO PERMANENTLY ATTACH THE METAL RAIL POSTS TO THE TOP OF THE EXISTING CONCRETE BARRIER RAILS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YEILD LOAD OF THE 3/4″ Ø THREADED ROD IS 3 KIPS. FOR ADHESIVELY ANCHORED THREADED RODS, SEE THE STANDARD SPECIFICATIONS.

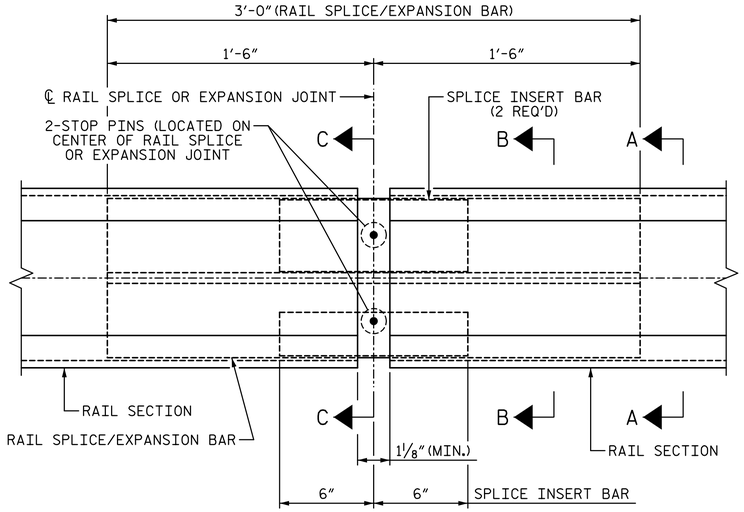
THE COST OF THE THREADED RODS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF 2 BAR METAL RAIL RETROFIT.

AFTER NUTS HAVE BEEN TIGHTEN, THE THREADED ROD THREADS SHALL BE DEFORMED TO PREVENT REMOVAL OF NUTS. TACK WELDING OF NUTS TO THREADED RODS, TO PREVENT THEFT, IS PERMITTED.

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

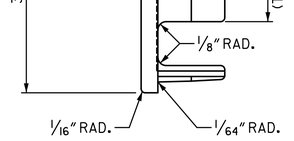


SPLICE INSERT BAR (TYPE 1)



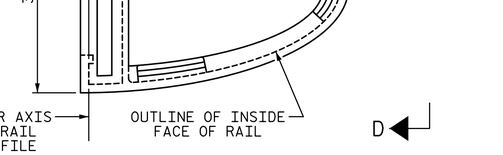
RAIL SPLICE ASSEMBLY

TYPICAL AT EXPANSION JOINTS AND RAIL SPLICE LOCATIONS

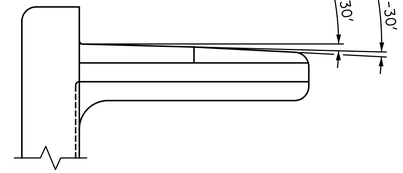


VIEW D-D

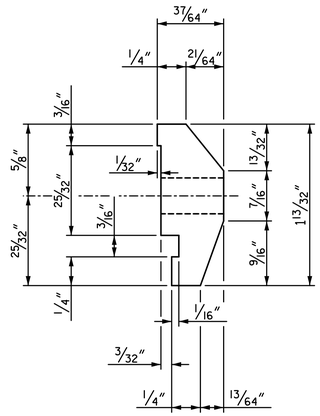
PROVIDE FOR DRIVE FIT



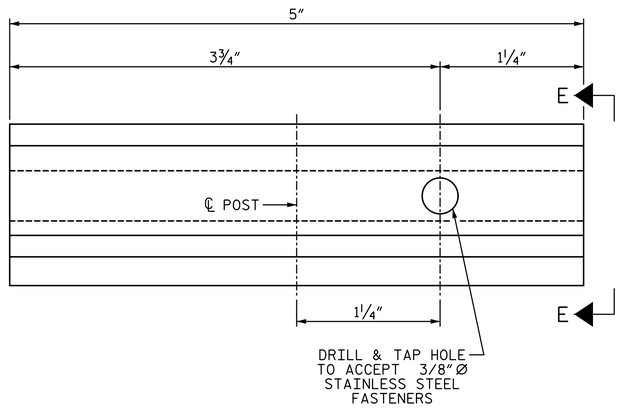
RAIL END CAP DETAIL



DETAIL ″A″



VIEW E-E



RAIL CLAMP BAR

(4 REQUIRED PER POST)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+90.77 -SBL-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

2 BAR METAL RAIL RETROFIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-48
1			3			TOTAL SHEETS
2			4			S01-49

DRAWN BY: T. BANKOVICH DATE: 2-17
CHECKED BY: B.S. COX DATE: 2-17
DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 2-17

PLANS PREPARED BY:
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Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 24290 ENGINEER THEO J. BEACH
3/22/2017

STRUCTURE CONCRETE INSERT:

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

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

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

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

METAL RAIL TO END POST CONNECTION:

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

A. ½" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

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

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

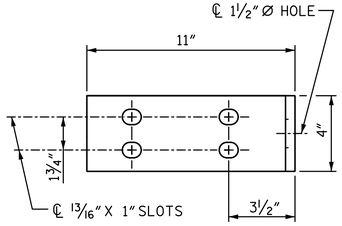
D. STANDARD CLAMP BARS (SEE SHEET 4 OF 5).

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

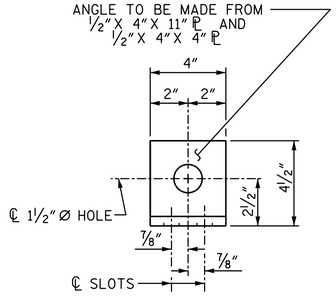
THE ¾" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE ¾" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR 2 BAR METAL RAIL RETROFIT.

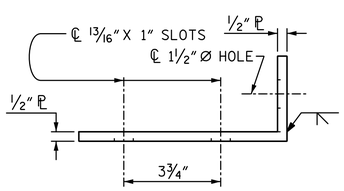
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE ¾"Ø X 1⅝" BOLT WITH WASHER SHALL BE REPLACED WITH A ¾"Ø X 6½" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE ¾"Ø X 1⅝" BOLT SHALL APPLY TO THE ¾"Ø X 6 ½" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



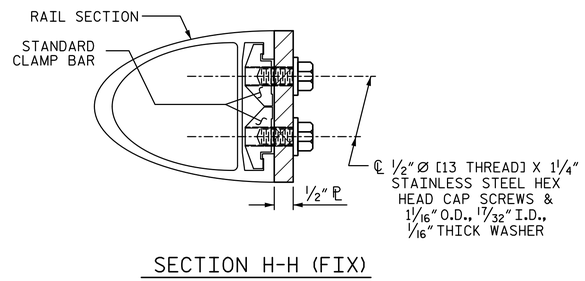
ELEVATION



END VIEW (FIX)

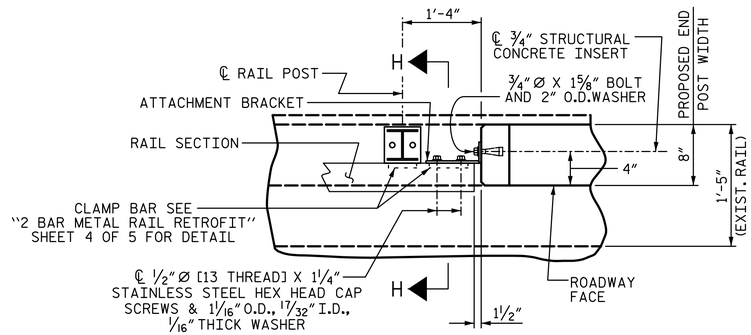


TOP VIEW

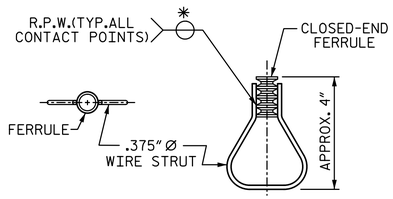


SECTION H-H (FIX)

FIXED



PLAN - RAIL AND END POST



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

DETAILS FOR ATTACHING METAL RAIL TO END POST

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 26+90.77 -SBL-

SHEET 5 OF 5

DRAWN BY: S.D. COOPER DATE: 2-17

CHECKED BY: B.S. COX DATE: 2-17

DESIGN ENGINEER OF RECORD: T.J. BEACH DATE: 2-17

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES

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LICENSURE NO. C-2521

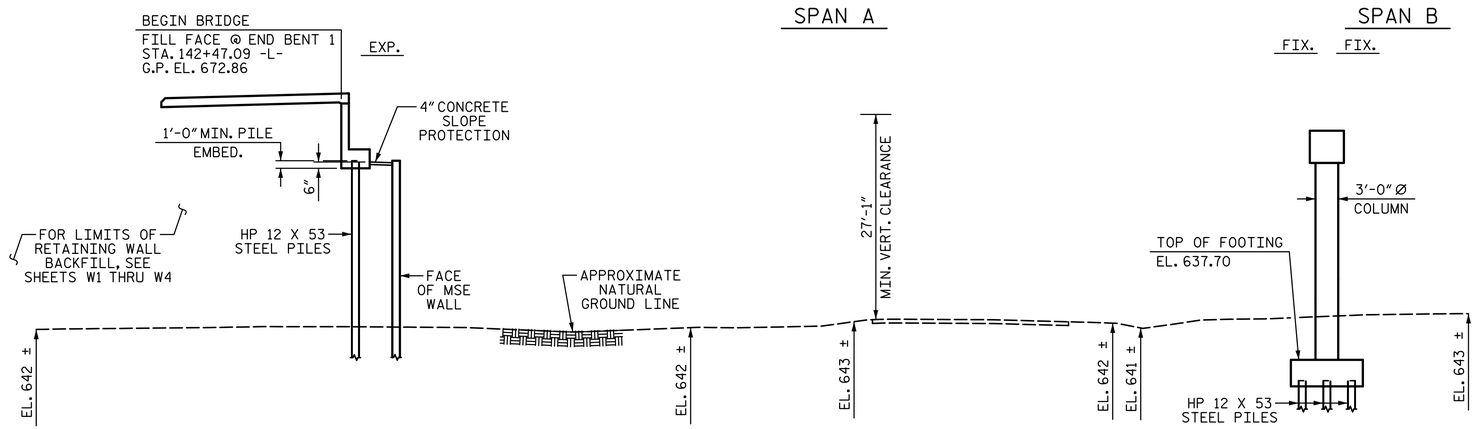
NORTH CAROLINA PROFESSIONAL SEAL 24390 ENGINEER THEO J. BEACH

2/13/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

END OF RAIL DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S01-49
1			3			TOTAL SHEETS
2			4			S01-49



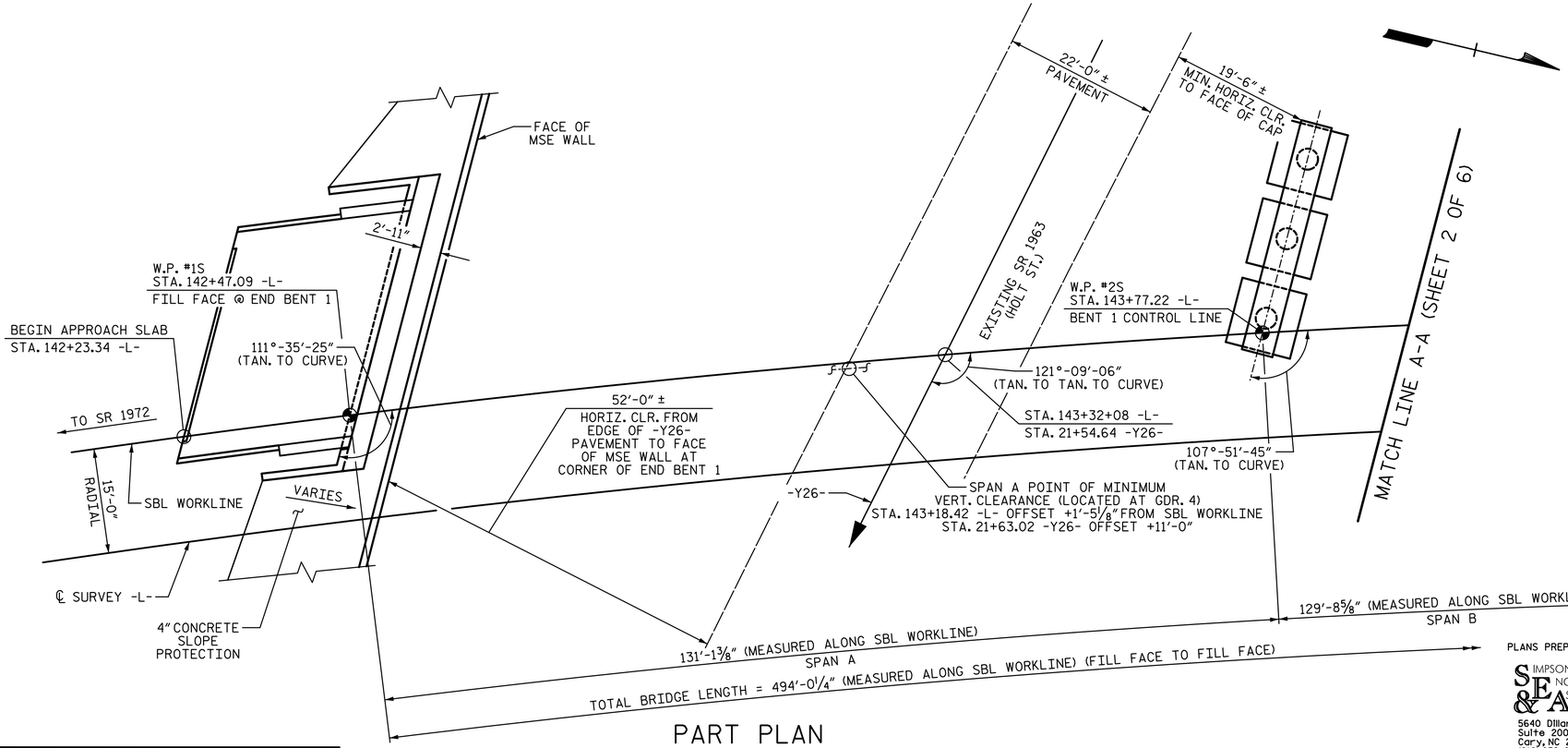
PART SECTION ALONG SBL WORKLINE

(SECTIONS @ END BENT AND BENT @ RIGHT ANGLES)

(+)5.1600% (-)5.2000%

PVI STA. 145+00.00
EL. = 689.41
VC = 1035'

GRADE DATA -L-



PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

HORIZONTAL CURVE DATA -L-

PIs 141+33.32 -L-
θs = 2°-51'-53.2"
Ls = 200.00'
LT = 133.35'
ST = 66.68'

PI STA. 156+58.38 -L-
Δ = 72°-11'-58.8"(RT.)
D = 2°-51'-53.2"
L = 2,520.24'
T = 1,458.42'
R = 2,000.00'

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
Digitally signed by John A. Batts
2/10/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 1 OF 6 BRIDGE #436
MILE POST H-30

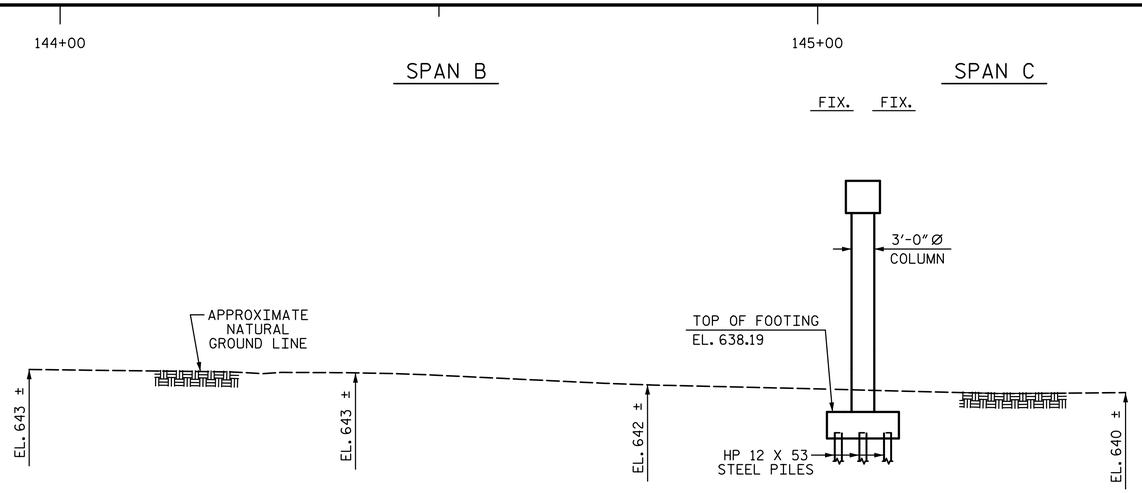
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (SBL)

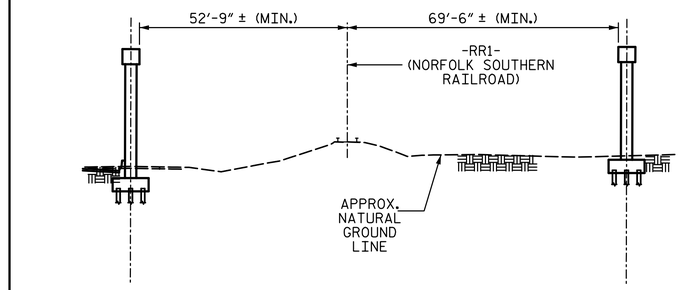
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-1
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2



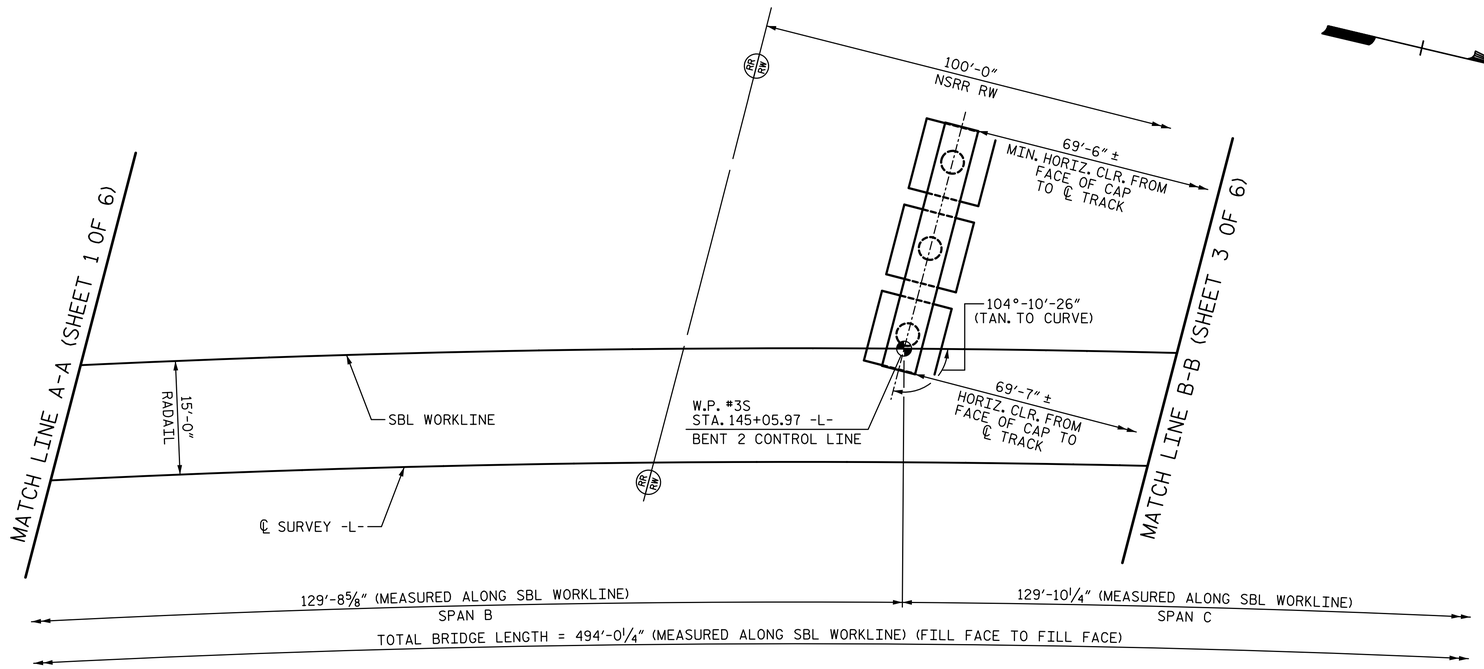
PART SECTION ALONG SBL WORKLINE

(SECTION @ BENT @ RIGHT ANGLE)



SECTION THRU RAILROAD

(SECTION TAKEN AT RIGHT ANGLE TO RAILROAD)
(SPAN C LENGTH BASED ON THIS SECTION)
LOOKING TOWARD MILE POST H-30



PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119
OVER HOLT ST., NORFOLK SOUTHERN
RAILROAD (NSRR) AND US 70
BETWEEN SR 1972 AND SR 1921
(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-2
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 48056 JOHN A. BATTS
9/11/2015

9/11/2015 10:16:39 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_gd.dgn

146+00 147+00

SPAN C SPAN D

FIX. FIX. EXP.

END BRIDGE
FILL FACE @ END BENT 2
STA. 147+37.41 -L-
G.P. EL. 673.14

680 670 660 650 640 630 620

APPROXIMATE NATURAL GROUND LINE

25'-6" (LT. RAIL) MIN. VERT. CLEARANCE

EL. 640 ± EL. 643 ± EL. 641 ±

TOP OF FOOTING EL. 630.99

3'-0" Ø COLUMN

EL. 636 ±

33'-3" MIN. VERT. CLEARANCE

EL. 635 ±

CONCRETE BARRIER (ROADWAY DETAIL & PAY ITEM)

HP 12 X 53 STEEL PILES

BENT 3

EL. 633 ±

4" CONCRETE SLOPE PROTECTION

1'-0" MIN. PILE EMBED.

6"

FACE OF MSE WALL

HP 12 X 53 STEEL PILES

FOR LIMITS OF RETAINING WALL BACKFILL, SEE SHEETS W1 THRU W4

EL. 632 ±

END BENT 2

PART SECTION ALONG SBL WORKLINE

(SECTIONS @ END BENT AND BENT @ RIGHT ANGLES)

HORIZONTAL CURVE DATA -Y16-

PI STA. 20+70.99 -L-
Δ = 6°-03'-45.0" (RT.)
D = 0°-42'-58.3"
L = 846.48'
T = 423.64'
R = 8,000.00'

TOP OF RAIL ELEVATIONS

STA. -RR1-	LT. RAIL	RT. RAIL
11+23.48	640.23	640.03
11+70.95	640.60	640.38
12+17.57	640.99	640.79
12+65.92	641.37	641.16
13+13.78	641.80	641.61
13+58.89	642.22	642.03
14+05.88	642.70	642.51
14+53.39	643.17	642.99
15+02.14	643.67	643.48
15+32.90	643.98	643.80
15+87.93	644.56	644.39
16+33.21	645.01	644.87

100'-0" NSRR RW

30'-0" ± EXISTING PAVEMENT

10'-2" ± MIN. HORIZ. CLR. TO FACE OF BARRIER

10'-11" ± MIN. HORIZ. CLR. TO FACE OF CAP

53'-0" ± HORIZ. CLR. TO FACE OF CAP

TO SR 1949

℄ SURVEY -Y16-

30'-0" PROPOSED PAVEMENT

50'-8" HORIZ. CLR. TO FACE OF MSE WALL

FACE OF MSE WALL

4" CONCRETE SLOPE PROTECTION

3'-3"

W.P. #5S
STA. 147+37.41 -L-
FILL FACE @ END BENT 2

END APPROACH SLAB
STA. 147+61.22 -L-

97°-32'-37" (TAN. TO CURVE)

SBL WORKLINE

VARIES

℄ SURVEY -L-

TO SR 1921

STA. 145+79.17 -L-
STA. 14+39.90 -RR1-

SPAN C POINT OF MINIMUM VERT. CLEARANCE (LOCATED AT GDR. 4)
STA. 145+81.62 -L- OFFSET +1'-5"
FROM SBL WORKLINE
STA. 14+40.75 -RR1- LT. RAIL

W.P. #4S
STA. 146+34.85 -L-

BENT 3 CONTROL LINE

STA. 146+63.68 -L-
STA. 21+87.58 -Y16-

98°-47'-50" (TAN. TO CURVE TO TAN. TO CURVE)

52'-9" ± MIN. HORIZ. CLR. TO FACE OF CAP

TO SR 1982

MATCH LINE B-B (SHEET 2 OF 6)

15'-0" RADIAL

128.027' TO MILE POST H-30

101°-55'-29" TAN. TO CURVE TO TAN. TO CURVE)

CONCRETE BARRIER

100°-28'-55" (TAN. TO CURVE)

SPAN D POINT OF MINIMUM VERT. CLEARANCE (LOCATED AT GDR. 4)
STA. 146+63.54 -L- OFFSET +0'-11"
FROM SBL WORKLINE
STA. 21+88.50 -Y16- OFFSET 0'

RT. RAIL

-RR1-

LT. RAIL

BRIDGE ID
STA. 146+61.35 -L-
STA. 22+02.76 -Y16-

98°-58'-23" (TAN. TO CURVE TO TAN. TO CURVE)

26'-8⅜" (MEASURED ALONG SBL WORKLINE)

129'-10¼" (MEASURED ALONG SBL WORKLINE) SPAN C

103'-4" (MEASURED ALONG SBL WORKLINE) SPAN D

TOTAL BRIDGE LENGTH = 494'-0¼" (MEASURED ALONG SBL WORKLINE) (FILL FACE TO FILL FACE)

PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-3
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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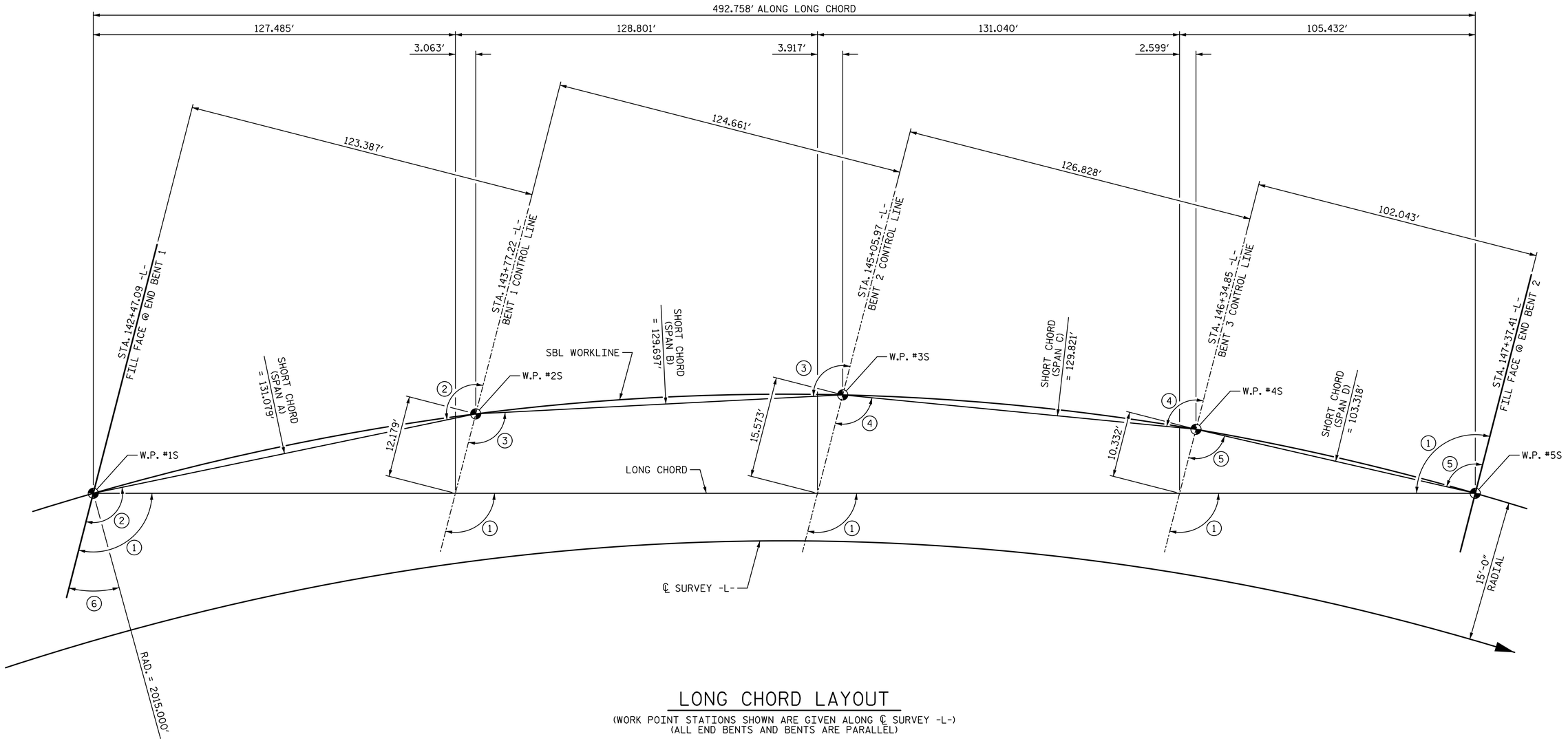
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

9/11/2015 10:16:39 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_gd.dgn



LONG CHORD LAYOUT

(WORK POINT STATIONS SHOWN ARE GIVEN ALONG ℄ SURVEY -L-)
(ALL END BENTS AND BENTS ARE PARALLEL)

ANGLES

1. 104°-34'-01"(TO LONG CHORD)
2. 109°-43'-35"(TO SHORT CHORD - SPAN A)
3. 106°-01'-06"(TO SHORT CHORD - SPAN B)
4. 102°-19'-41"(TO SHORT CHORD - SPAN C)
5. 99°-00'-46"(TO SHORT CHORD - SPAN D)
6. 21°-35'-25"

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 4 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-4
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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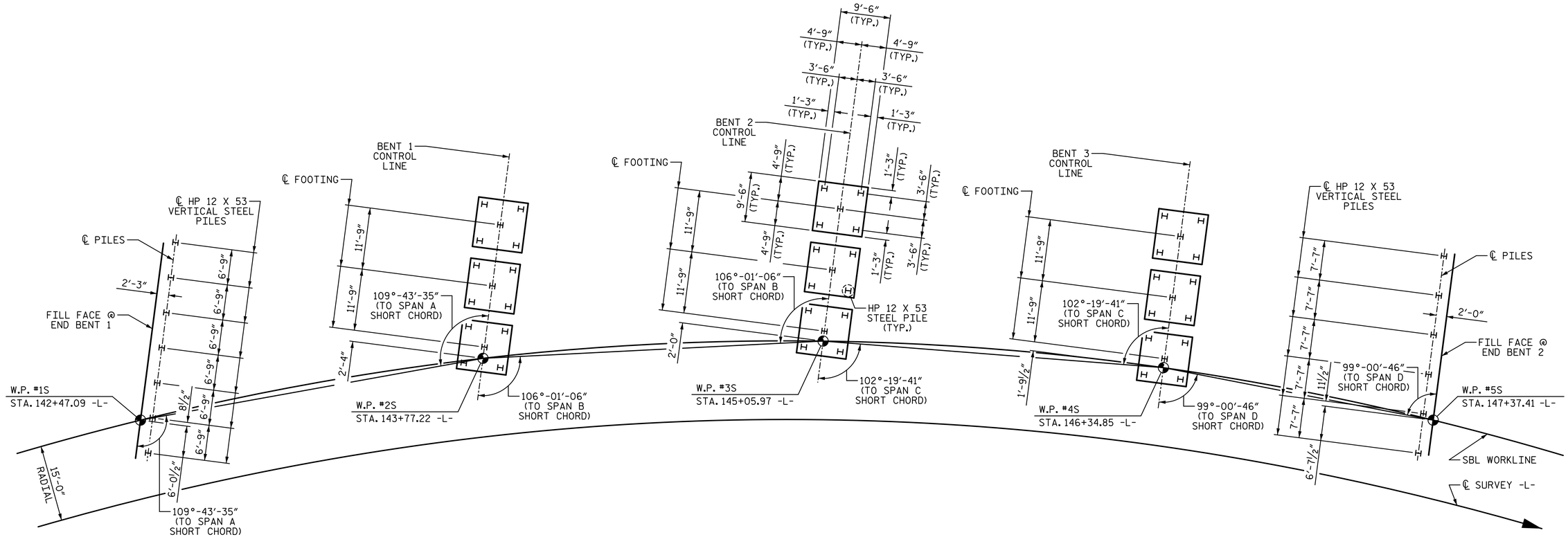
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 18056 JOHN A. BATTS
9/11/2015

9/11/2015 10:16:39 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_gd.dgn



END BENT 1 | BENT 1 | BENT 2 | BENT 3 | END BENT 2

FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE TO THE PILE CENTERLINE AT THE BOTTOM OF THE CAP OR FOOTING)
(DIMENSIONS AND PILE LOCATIONS ARE TYPICAL FOR EACH FOOTING)

FOUNDATION NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

PILES AT BENT 1, BENT 2, AND BENT 3 ARE DESIGNED FOR A FACTORED RESISTANCE OF 140 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

DRIVE PILES AT BENT 1, BENT 2, AND BENT 3 TO A REQUIRED DRIVING RESISTANCE OF 235 TONS PER PILE.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENGERGY IN THE RANGE OF 55,745 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT 1, BENT 1, BENT 2, BENT 3, AND END BENT 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

IF PILES ARE INSTALLED AFTER MSE WALL CONSTRUCTION, USE A FORM TO BLOCK OUT PILE LOCATIONS DURING WALL CONSTRUCTION. DRIVE PILES INSIDE FORM AND FILL FORM WITH NON-EXCAVATABLE FLOWABLE FILL PER ARTICLE 340-2 OF THE STANDARD SPECIFICATIONS.

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 48056 ENGINEER JOHN A. BATTS
9/11/2015

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 5 OF 6

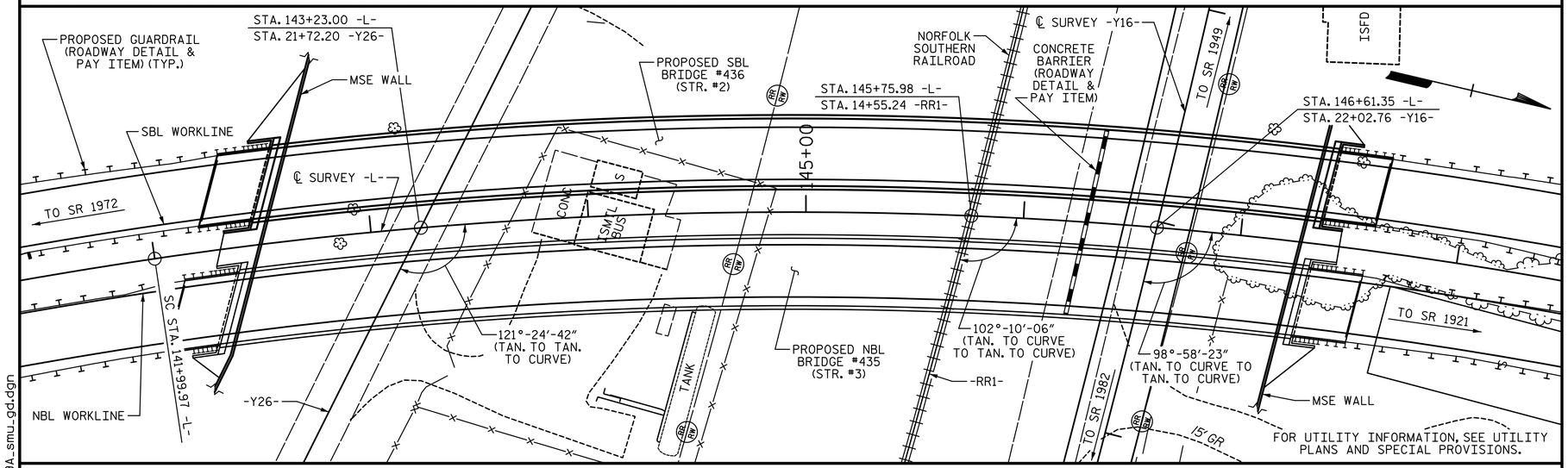
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-5
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

THE ELEVATIONS AND CLEARANCES SHOWN ON THE PLANS AT THE POINTS OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATION(S) 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.

THE RAILROAD TRACK TOP OF RAIL ELEVATIONS ON THE PLANS ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE TOP OF RAIL ELEVATIONS AND REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

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

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

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

WORK SHALL NOT BE STARTED ON BENT 3 UNTIL -Y16- ROADWAY SECTION HAS BEEN EXCAVATED.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	LS	SF	SF	CY	LS	LB	LB	NO	LF	EA	NO	LF	LF	SY	LS	LS
SUPERSTRUCTURE		16834	15050		LS			16	1948.55				1024.2		LS	LS
END BENT 1				43.0		7276				7	7	560		65		
BENT 1	LS			82.5		13198	1786			15	15	865				
BENT 2	LS			81.9		13105	1802			15	15	905				
BENT 3	LS			84.1		15475	2232			15	15	750				
END BENT 2				34.1		5900				6	6	495		45		
TOTAL	LS	16834	15050	325.6	LS	54954	5820	16	1948.55	58	58	3575	1024.2	110	LS	LS

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR SBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-6
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 030561 ENGINEER JOHN A. BATTS
2/13/2017

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT					
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	⟨1⟩	1.13	- -	1.75	0.787	1.34	D	EL	49.8	0.746	1.16	D	I	29.6	0.80	0.787	**1.13**	C	EL	63.8	
		HL-93 (OPERATING)	N/A		1.65	- -	1.35	0.787	1.73	D	EL	49.8	0.747	1.65	C	I	25.1	N/A	- -	- -	- -	- -	- -	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.68	60.5	1.75	0.787	1.86	D	EL	49.8	0.747	1.76	C	I	25.1	0.80	0.787	**1.68**	C	EL	63.8	
		HS-20 (OPERATING)	36.000		2.36	85.0	1.35	0.787	2.42	D	EL	49.8	0.747	2.36	C	I	25.1	N/A	- -	- -	- -	- -	- -	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.27	44.1	1.40	0.787	5.53	D	EL	49.8	0.747	6.13	C	I	25.1	0.80	0.787	3.27	D	EL	49.8	
		SNGARBS2	20.000		2.34	46.8	1.40	0.787	4.00	D	EL	49.8	0.747	4.17	C	I	25.1	0.80	0.787	2.34	C	EL	63.8	
		SNAGRIS2	22.000		2.17	47.7	1.40	0.787	3.74	D	EL	49.8	0.747	3.82	C	I	25.1	0.80	0.787	2.17	C	EL	63.8	
		SNCOTTS3	27.250		1.62	44.1	1.40	0.787	2.75	D	EL	49.8	0.747	2.89	C	I	25.1	0.80	0.525	1.62	D	I	49.8	
		SNAGGRS4	34.925		1.32	46.1	1.40	0.787	2.25	D	EL	49.8	0.747	2.28	C	I	25.1	0.80	0.787	1.32	C	EL	63.8	
		SNS5A	35.550		1.30	46.2	1.40	0.787	2.20	D	EL	49.8	0.747	2.28	C	I	25.1	0.80	0.787	1.30	D	EL	49.8	
		SNS6A	39.950		1.17	46.7	1.40	0.787	2.00	D	EL	49.8	0.747	2.03	C	I	25.1	0.80	0.787	1.17	C	EL	63.8	
		SNS7B	42.000		1.11	46.6	1.40	0.787	1.91	D	EL	49.8	0.747	1.96	C	I	25.1	0.80	0.787	1.11	C	EL	63.8	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.42	46.9	1.40	0.787	2.44	D	EL	49.8	0.747	2.49	C	I	25.1	0.80	0.787	1.42	C	EL	63.8	
		TNT4A	33.075		1.43	47.3	1.40	0.787	2.44	D	EL	49.8	0.747	2.44	C	I	25.1	0.80	0.787	1.43	C	EL	63.8	
		TNT6A	41.600		1.15	47.8	1.40	0.787	1.98	D	EL	49.8	0.747	2.05	C	I	25.1	0.80	0.787	1.15	C	EL	63.8	
		TNT7A	42.000		1.15	48.3	1.40	0.787	1.98	D	EL	49.8	0.747	2.02	C	I	25.1	0.80	0.787	1.15	C	EL	63.8	
		TNT7B	42.000		1.17	49.1	1.40	0.787	2.03	D	EL	49.8	0.747	1.93	C	I	25.1	0.80	0.787	1.17	C	EL	63.8	
		TNAGRIT4	43.000		1.13	48.6	1.40	0.787	1.95	D	EL	49.8	0.747	1.87	C	I	25.1	0.80	0.787	1.13	C	EL	63.8	
		TNAGT5A	45.000		1.07	48.2	1.40	0.787	1.84	D	EL	49.8	0.747	1.82	C	I	25.1	0.80	0.787	1.07	C	EL	63.8	
		TNAGT5B	45.000	⟨3⟩	1.06	47.7	1.40	0.787	1.83	D	EL	49.8	0.747	1.77	C	I	25.1	0.80	0.787	**1.06**	C	EL	63.8	

LOAD FACTORS:

	LIMIT STATE	γ_{DC}	γ_{DW}
DESIGN LOAD RATING FACTORS	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. DISTANCE FROM LEFT END OF SPAN IS MEASURED FROM ℄ BEARING.

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

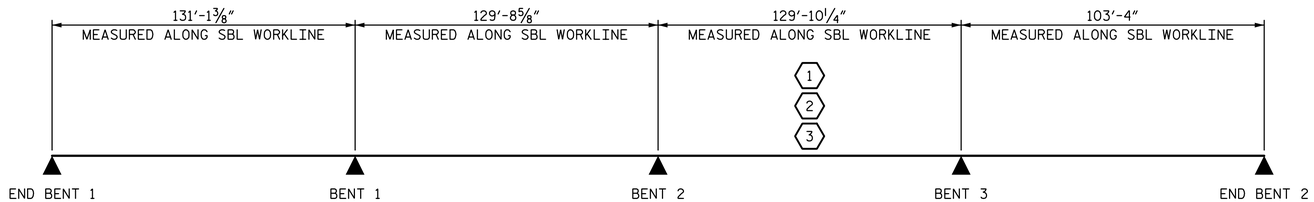
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨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-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-7
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 18096 ENGINEER JOHN A. BATTS
9/11/2015

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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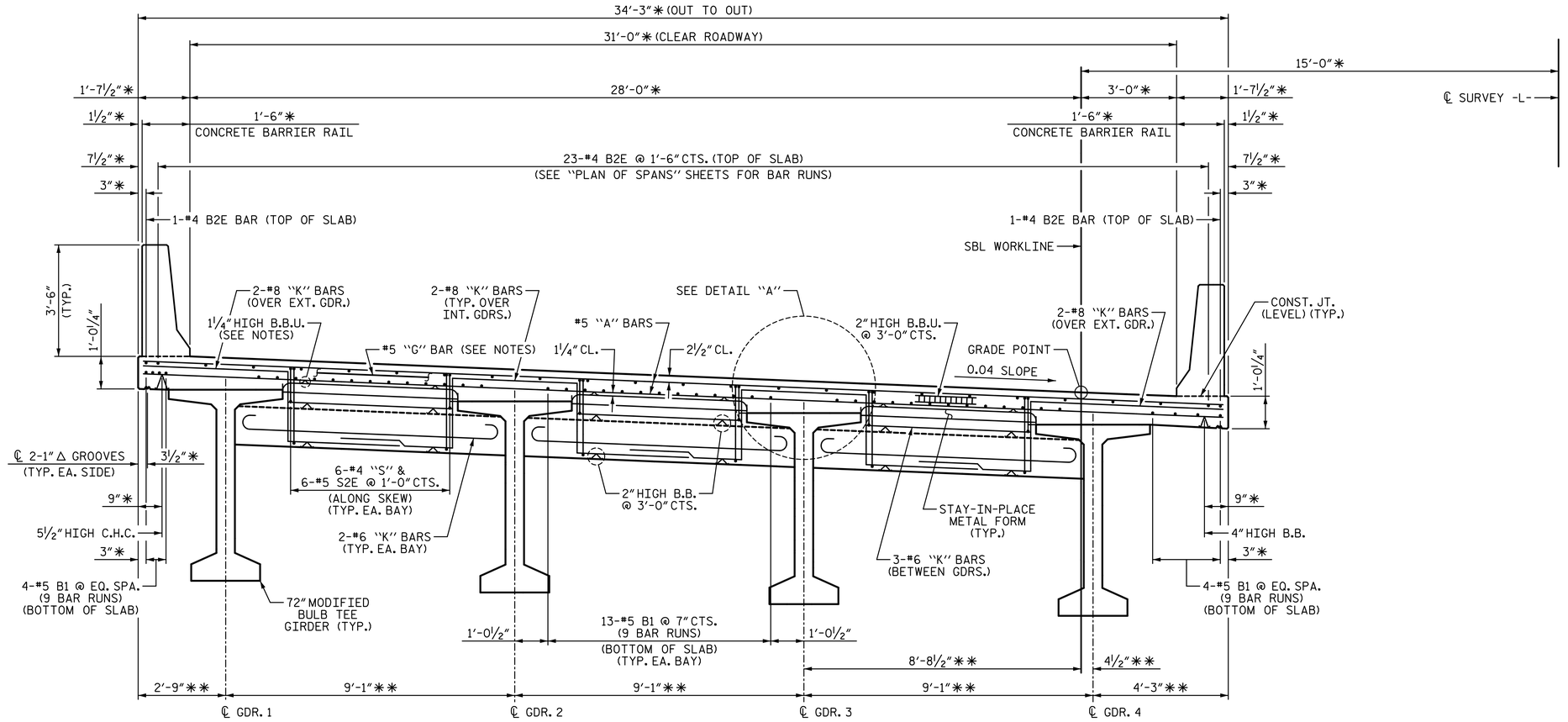


TYPICAL SECTION

(SHOWING END BENT DIAPHRAGMS)

NOTES:

PROVIDE 1¼″HIGH BEAM BOLSTERS UPPER AT 4′-0″CTS. ATOP THE STAY-IN-PLACE METAL 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.

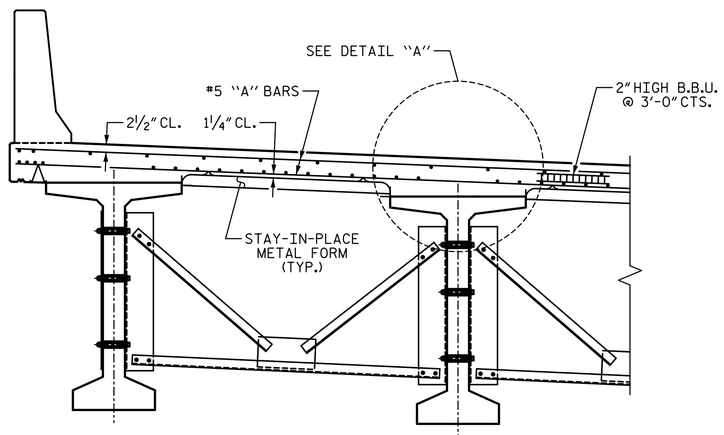
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

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

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

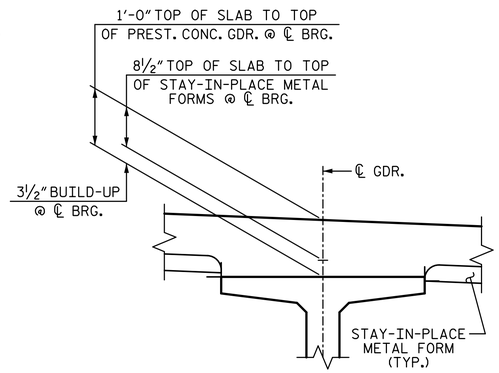
✱ RADIAL DIMENSION

✱✱ RADIAL THRU W.P.



PARTIAL TYPICAL SECTION

(SHOWING INTERMEDIATE DIAPHRAGMS)



DETAIL ''A''

(TYP. EA. GDR.)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-8
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18656 ENGINEER JOHN A. BATTS
9/11/2015

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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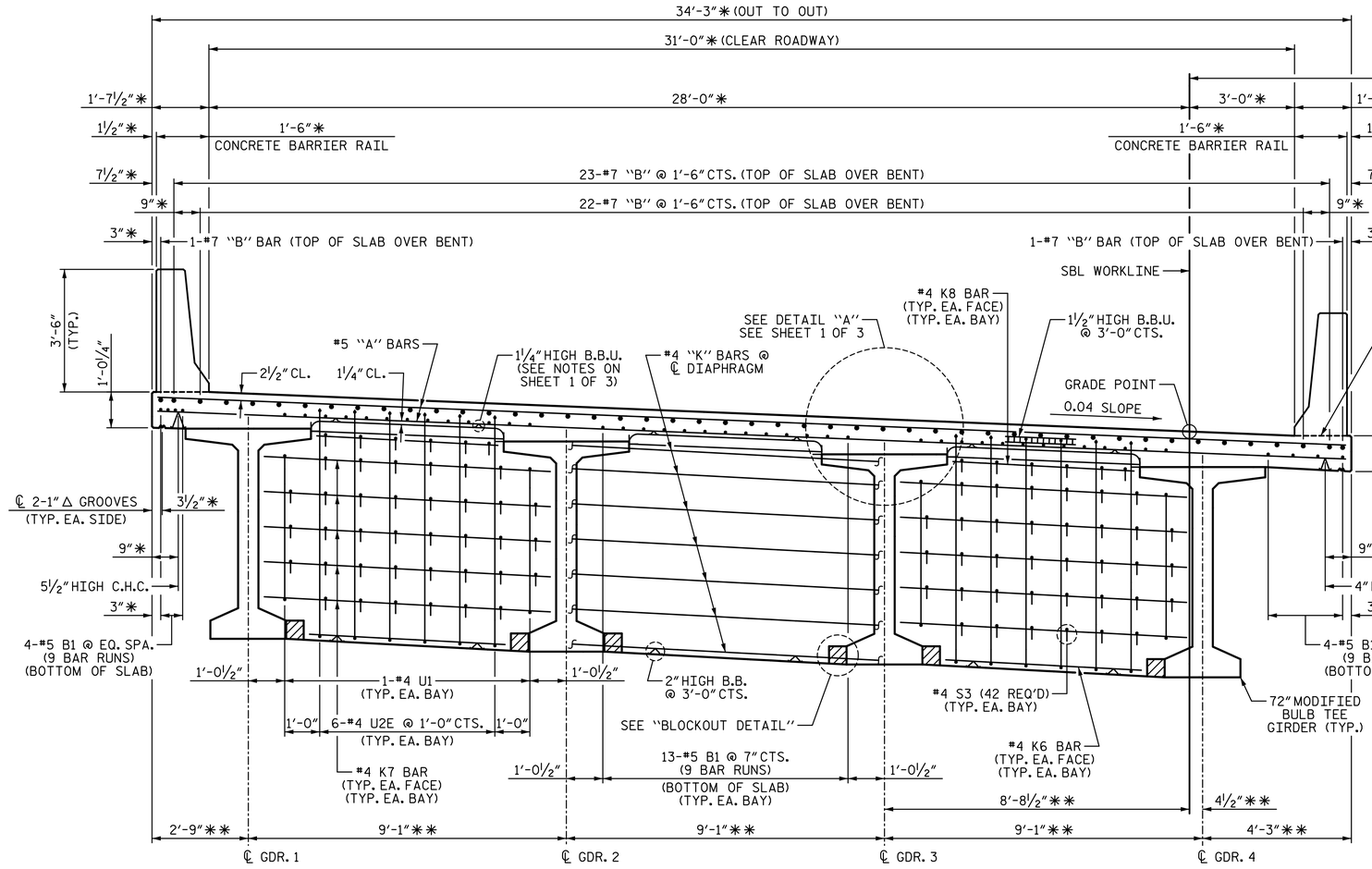


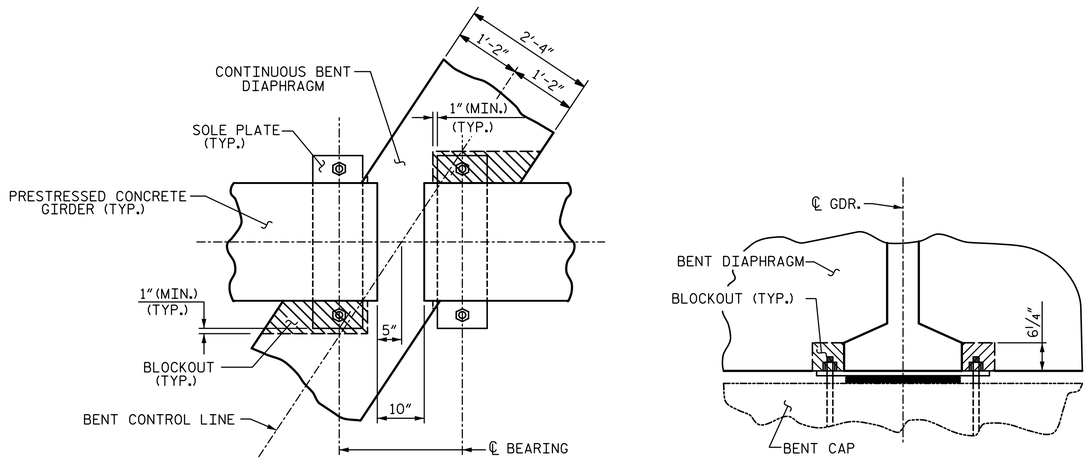
NOTES:

✱ RADIAL DIMENSION

✱✱ RADIAL THRU W.P.

TYPICAL SECTION

(SHOWING CONTINUOUS BENT DIAPHRAGMS)



CONTINUOUS BENT DIAPHRAGM BLOCK-OUT DETAIL

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-9
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

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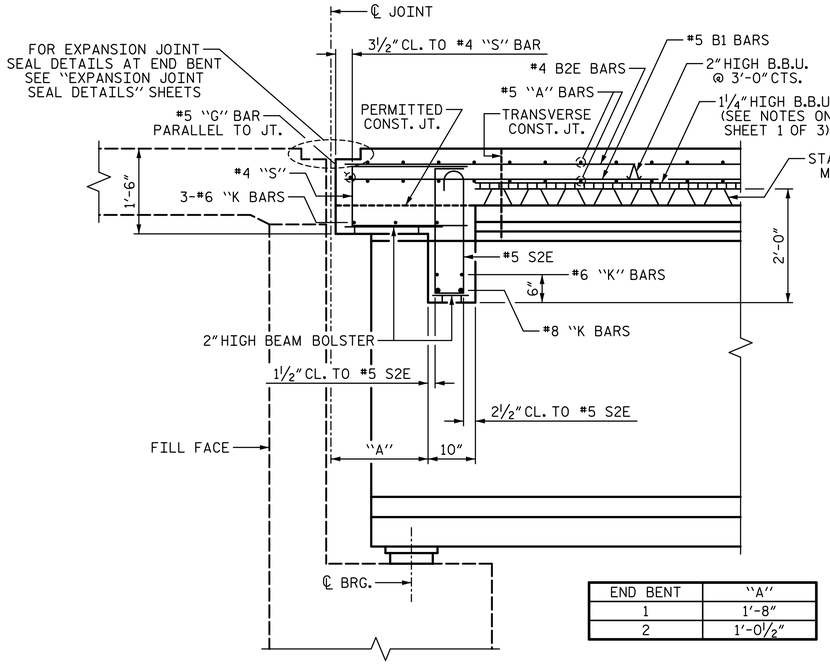
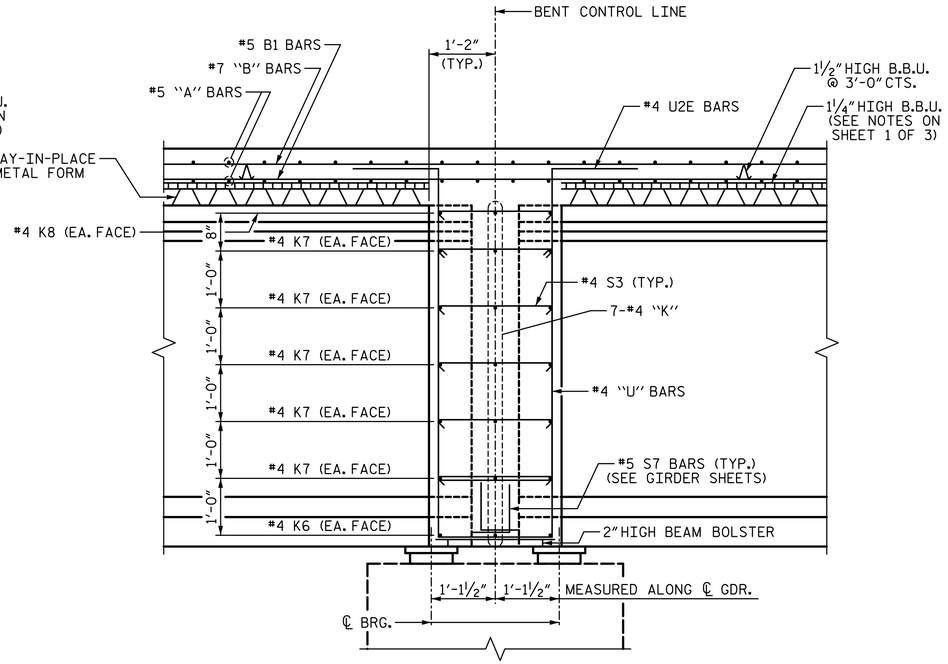


END BENT	"A"
1	1'-8"
2	1'-0½"

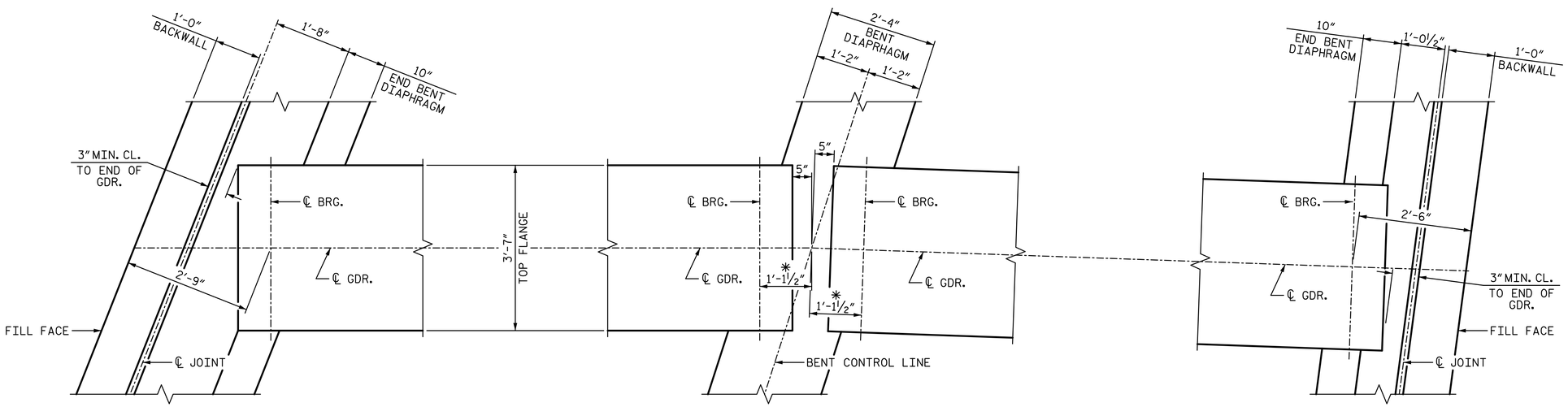
SECTION A-A



SECTION B-B

NOTES:

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



END BENT 1

BENT DIAPHRAGM

(BENT 1 SHOWN, BENTS 2 & 3 SIMILAR)

✳ MEASURED ALONG ℄ GIRDER

END BENT 2

PLAN OF DIAPHRAGMS

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-10
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15

CHECKED BY: J.A. BATTS DATE: 9-15

DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS

9/11/2015

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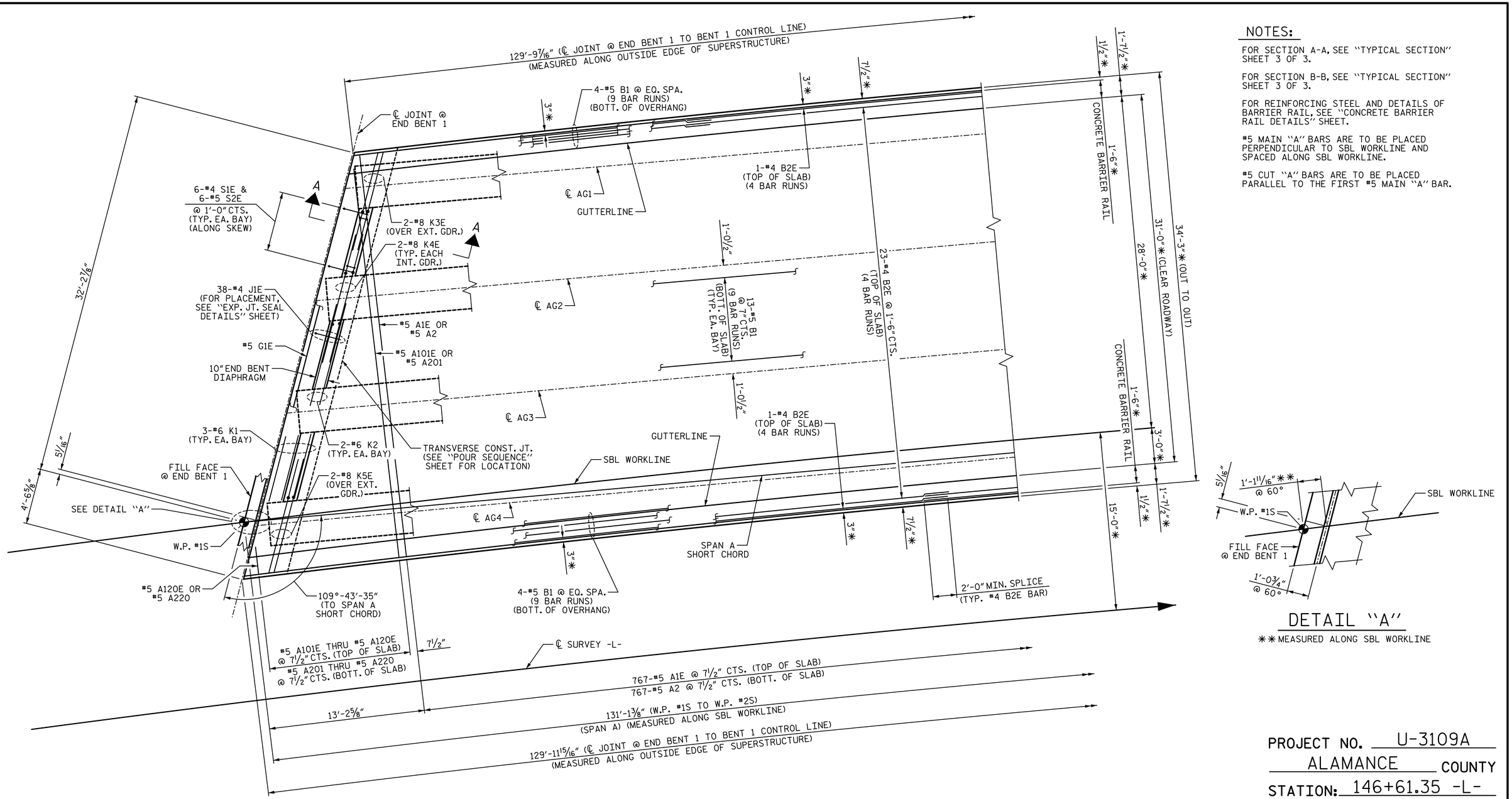

PART PLAN - SPAN A

*RADIAL DIMENSION

DETAIL "A"

**MEASURED ALONG SBL WORKLINE

NOTES:

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

FOR SECTION B-B, SEE "TYPICAL SECTION" SHEET 3 OF 3.

FOR REINFORCING STEEL AND DETAILS OF BARRIER RAIL, SEE "CONCRETE BARRIER RAIL DETAILS" SHEET.

#5 MAIN "A" BARS ARE TO BE PLACED PERPENDICULAR TO SBL WORKLINE AND SPACED ALONG SBL WORKLINE.

#5 CUT "A" BARS ARE TO BE PLACED PARALLEL TO THE FIRST #5 MAIN "A" BAR.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(SBL)

REVISIONS						SHEET NO.
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9/11/2015

DRAWN BY: T. BANKOVICH DATE: 9-15
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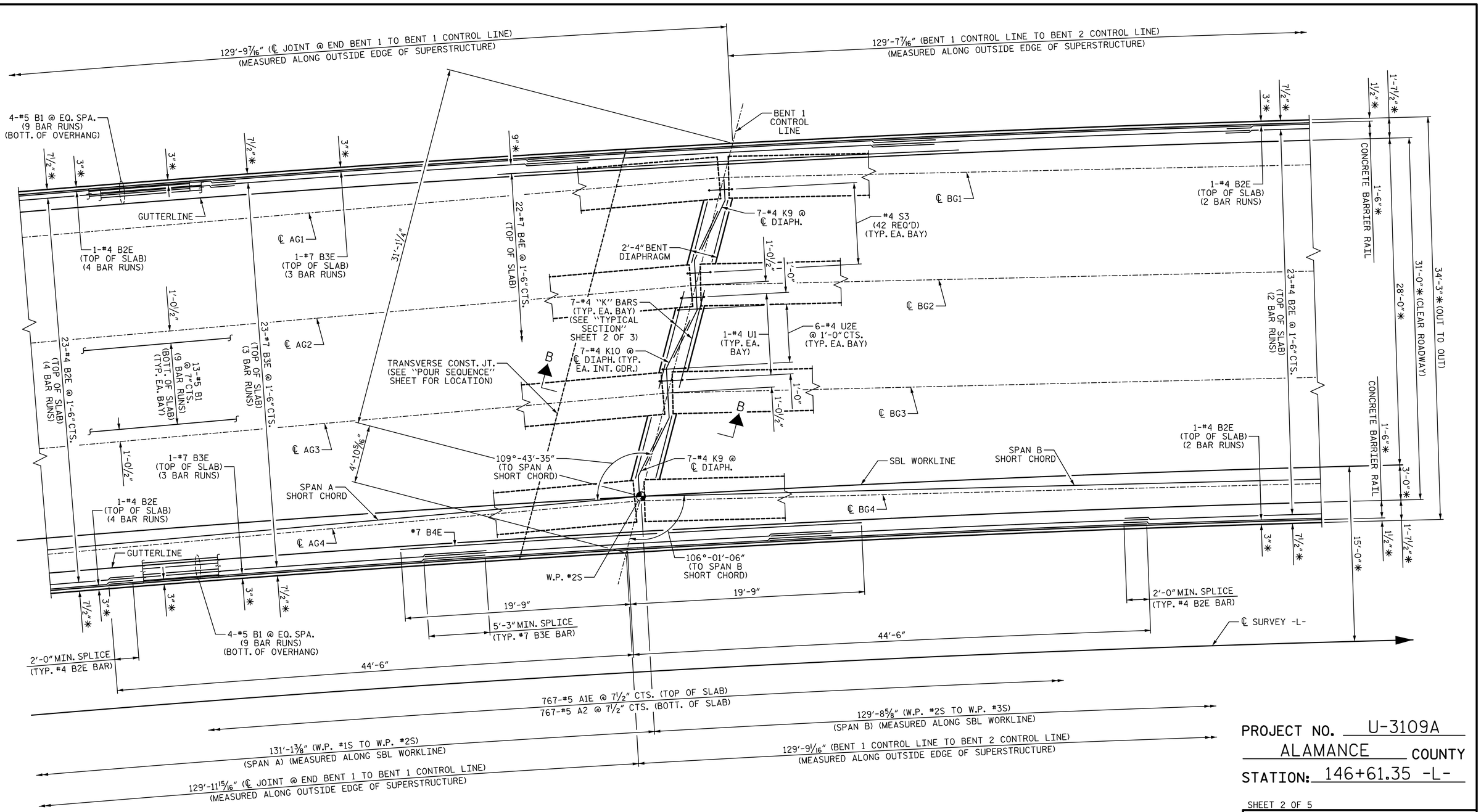

PART PLAN - SPAN A AND SPAN B

*RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(SBL)

REVISIONS						SHEET NO.
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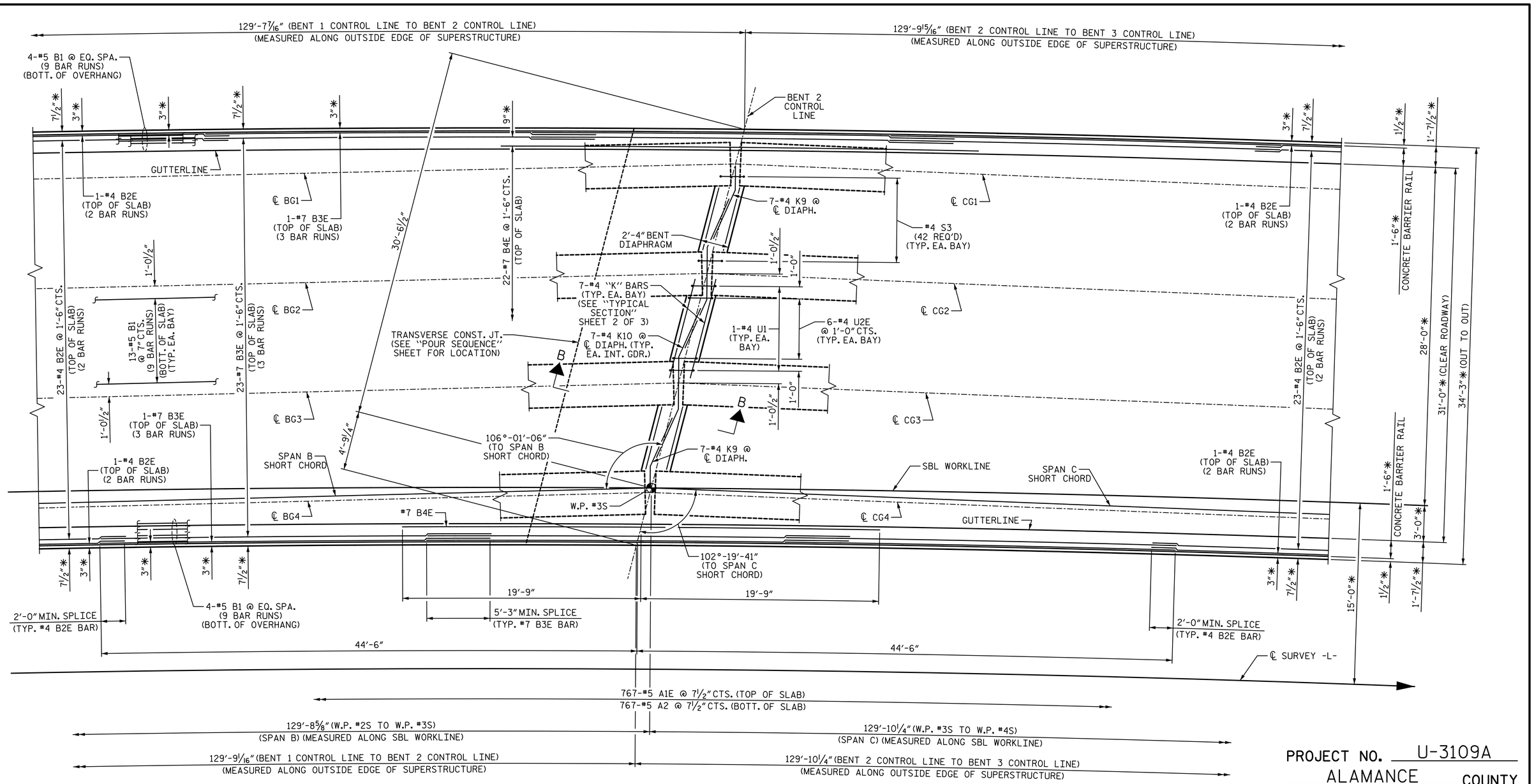
NORTH CAROLINA PROFESSIONAL SEAL 18856 ENGINEER JOHN A. BATTS
9/11/2015



PART PLAN - SPAN B AND SPAN C

* RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(SBL)

REVISIONS						SHEET NO.
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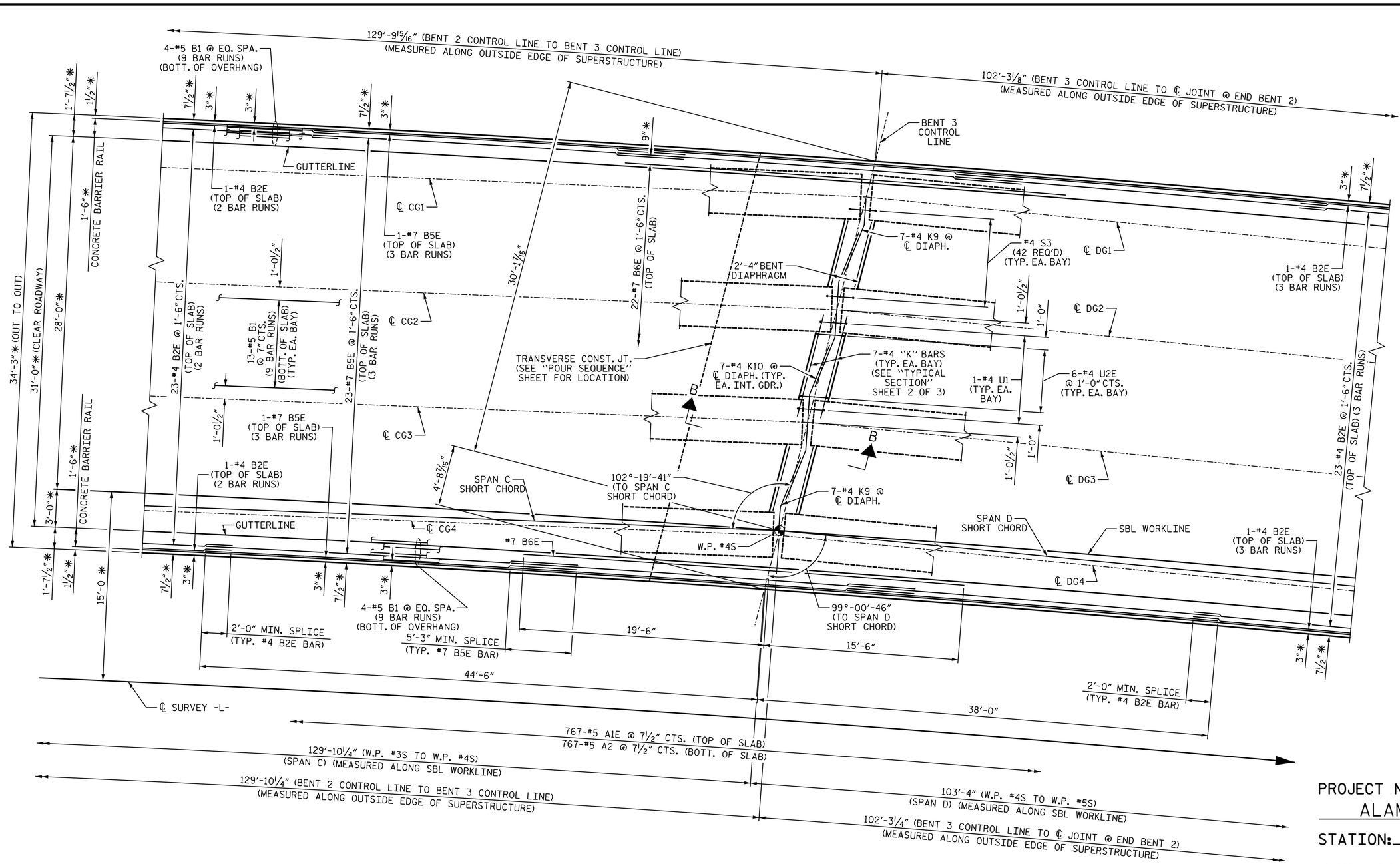

PART PLAN - SPAN C AND SPAN D

℀ RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(SBL)

REVISIONS						SHEET NO.
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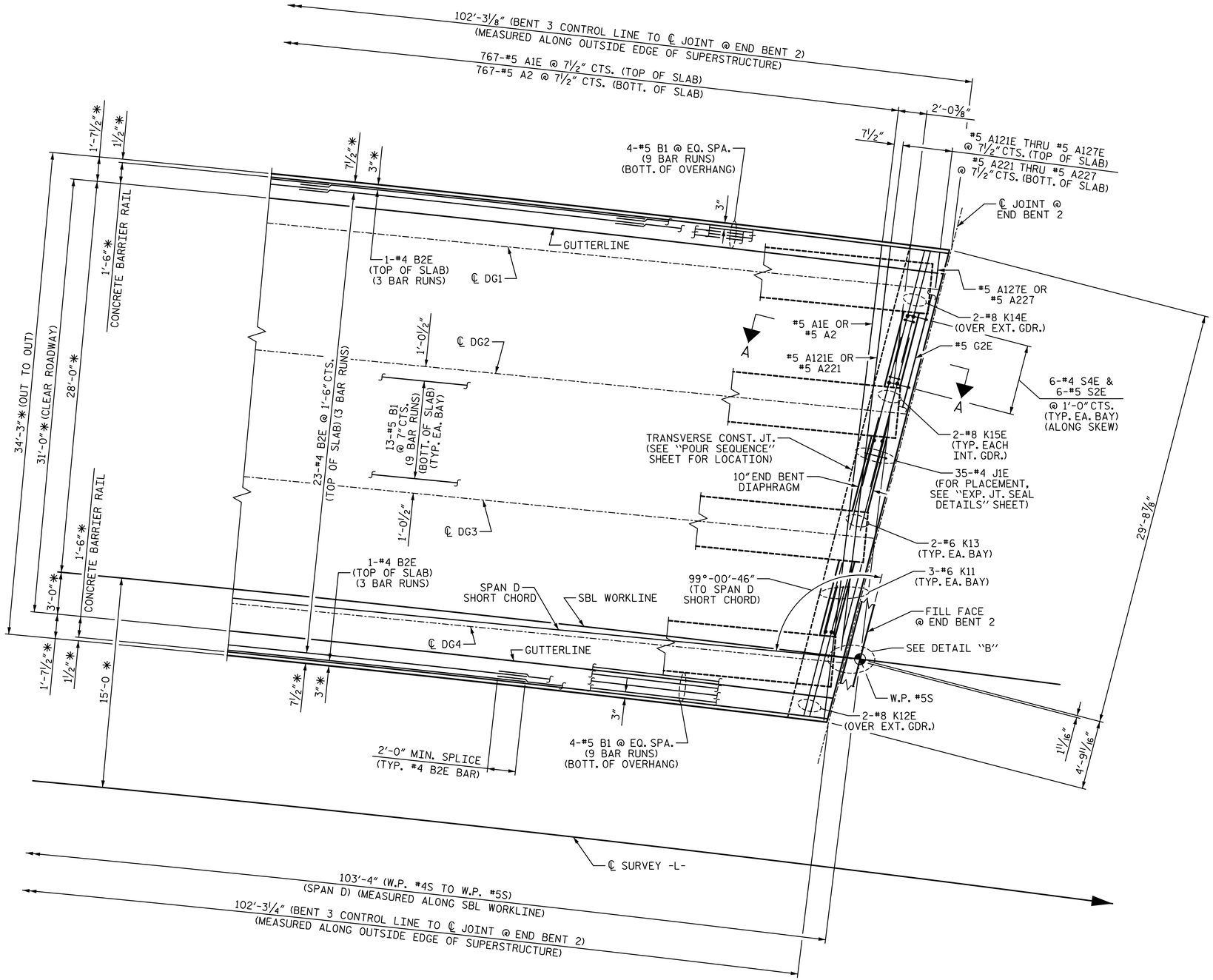
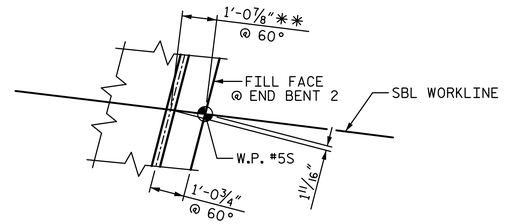


PART PLAN - SPAN D

*RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5



DETAIL "B"

**MEASURED ALONG SBL WORKLINE

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

(SBL)

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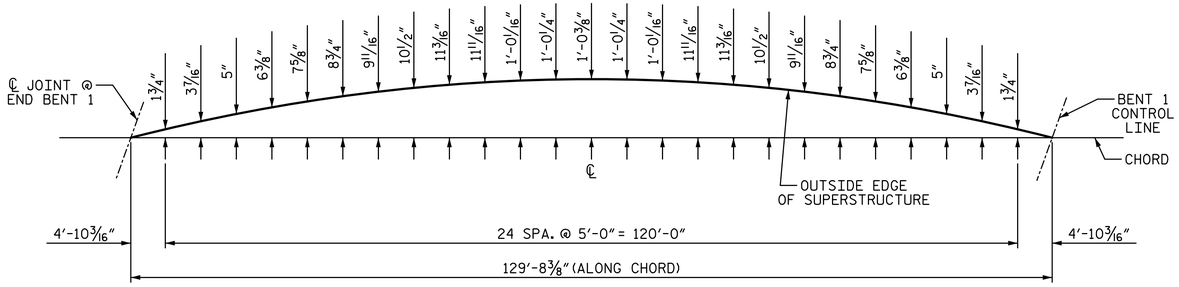
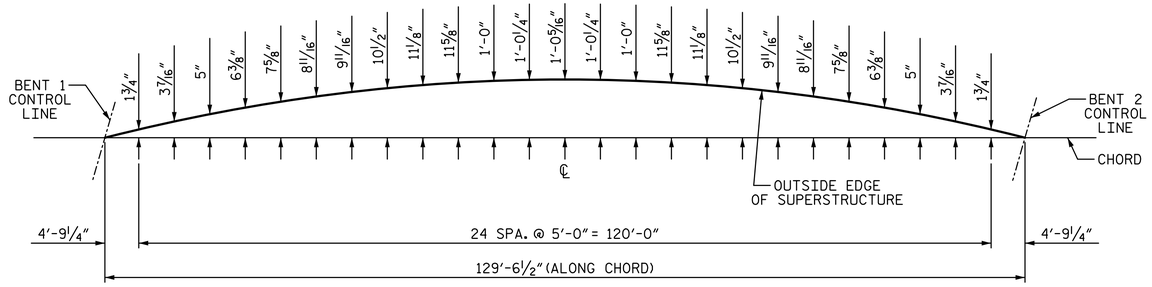


SPAN A ARC OFFSETS (LT SIDE)



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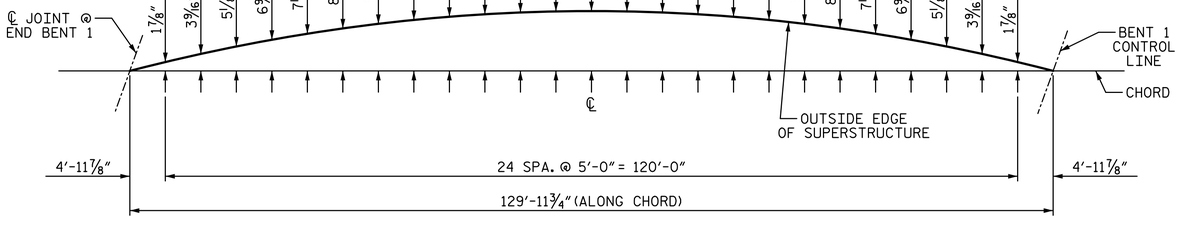

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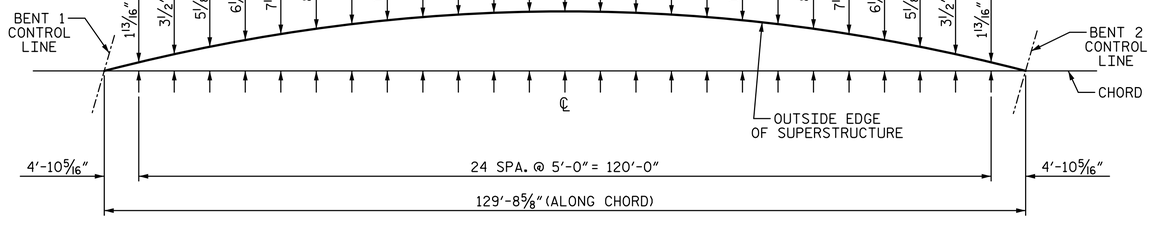

SPAN B ARC OFFSETS (RT SIDE)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

(SBL)

REVISIONS						SHEET NO.
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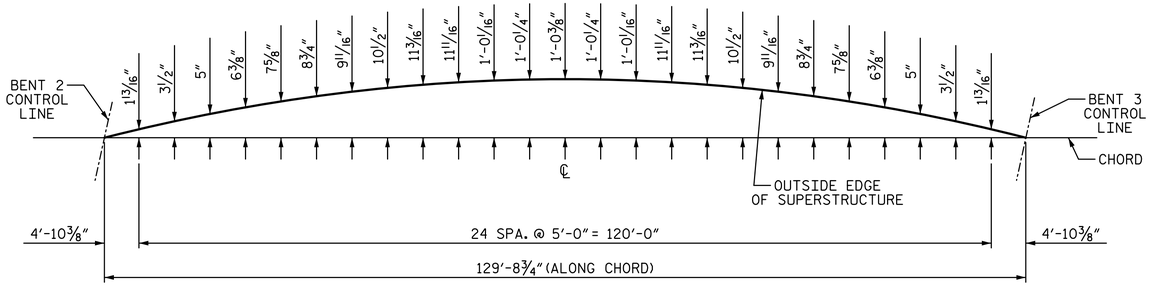

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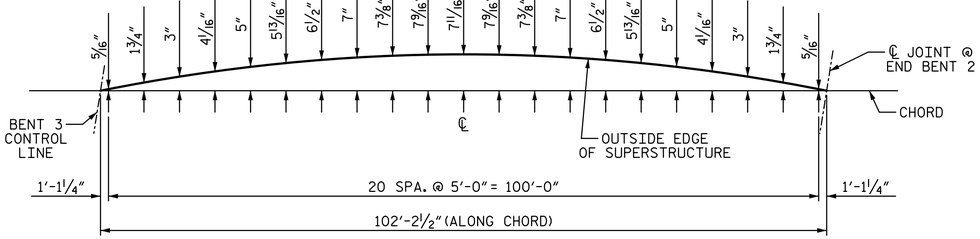

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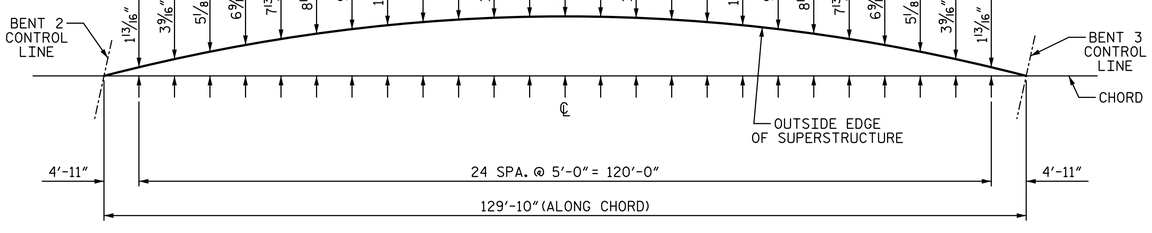
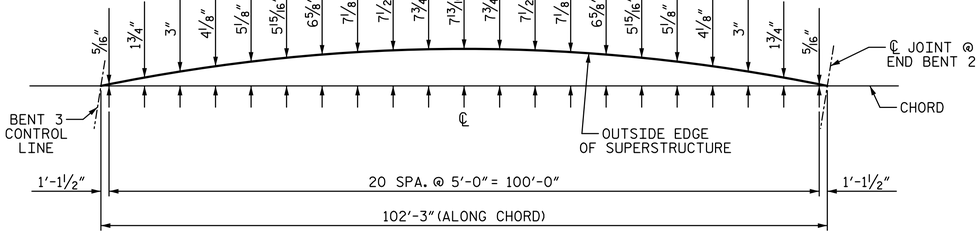


SPAN C ARC OFFSETS (RT SIDE)



SPAN D ARC OFFSETS (LT SIDE)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

ARC OFFSETS

(SBL)

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9/11/2015

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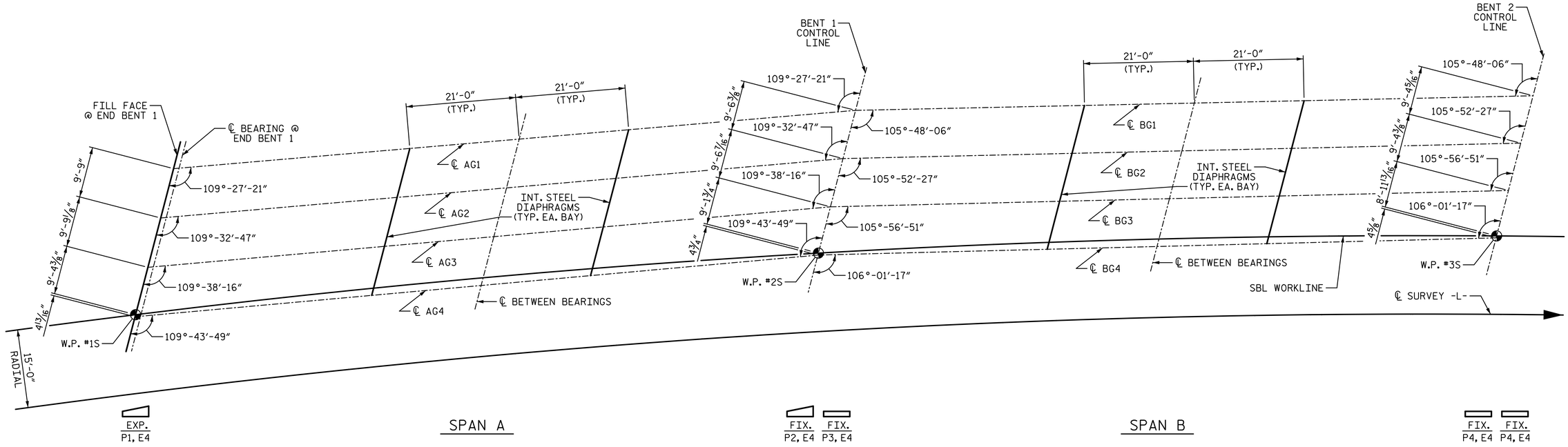

PARTIAL GIRDER LAYOUT

(END BENT 1, BENT 1 AND BENT 2 ARE PARALLEL)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

GIRDER LAYOUT

(SBL)

REVISIONS						SHEET NO.
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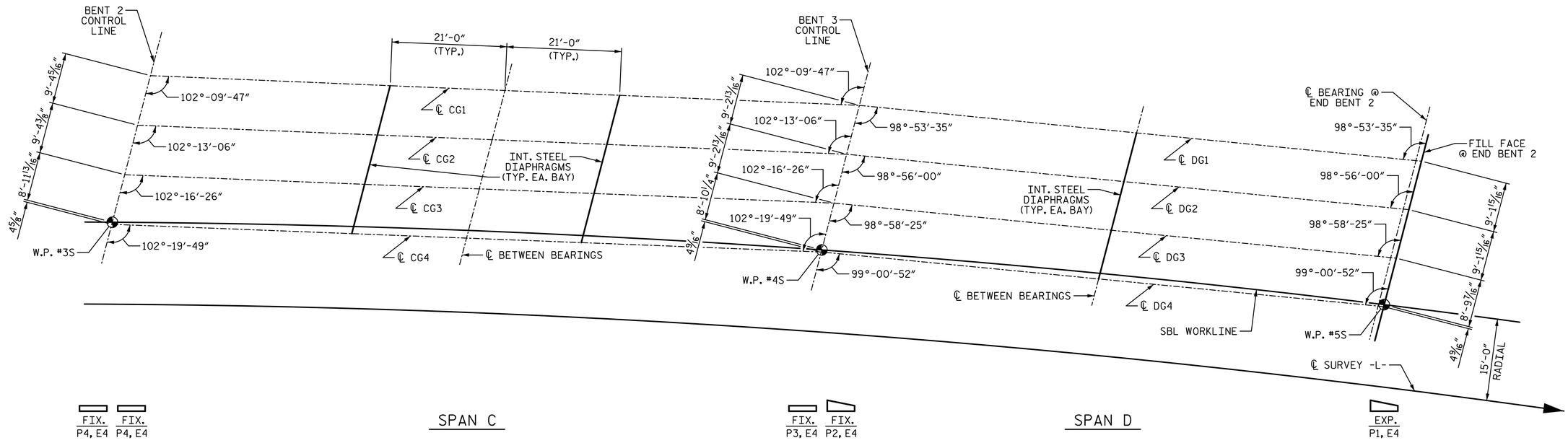

PARTIAL GIRDER LAYOUT

(BENT 2, BENT 3 AND END BENT 2 ARE PARALLEL)

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NORTH CAROLINA PROFESSIONAL SEAL 48056 ENGINEER JOHN A. BATTS
9/11/2015

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ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
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RALEIGH
SUPERSTRUCTURE

GIRDER LAYOUT

(SBL)

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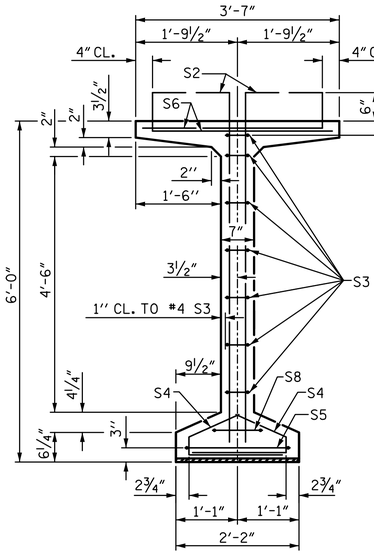
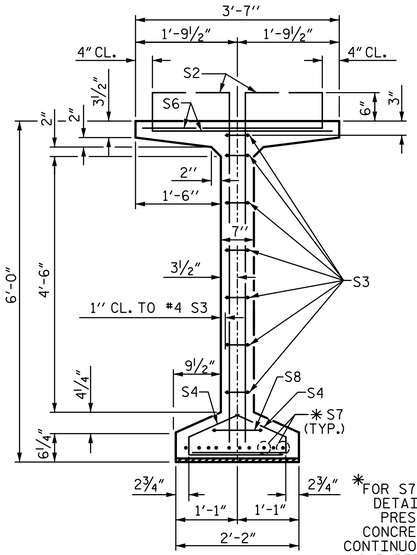
2			4			S02-51

STR. #2

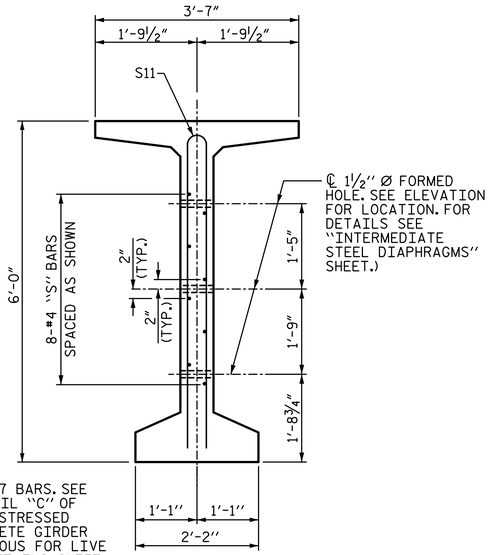


SECTION A-A



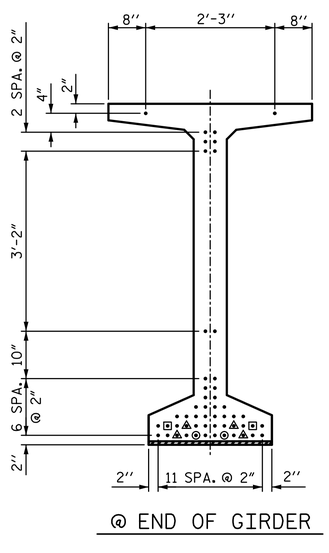
SECTION B-B

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

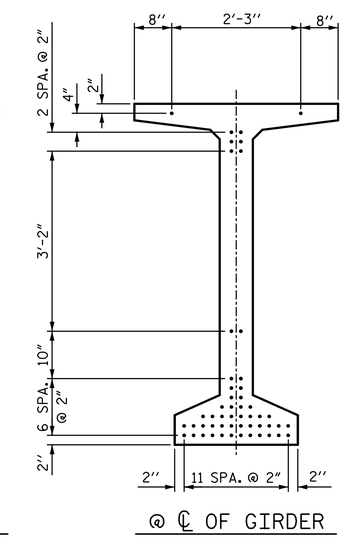


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

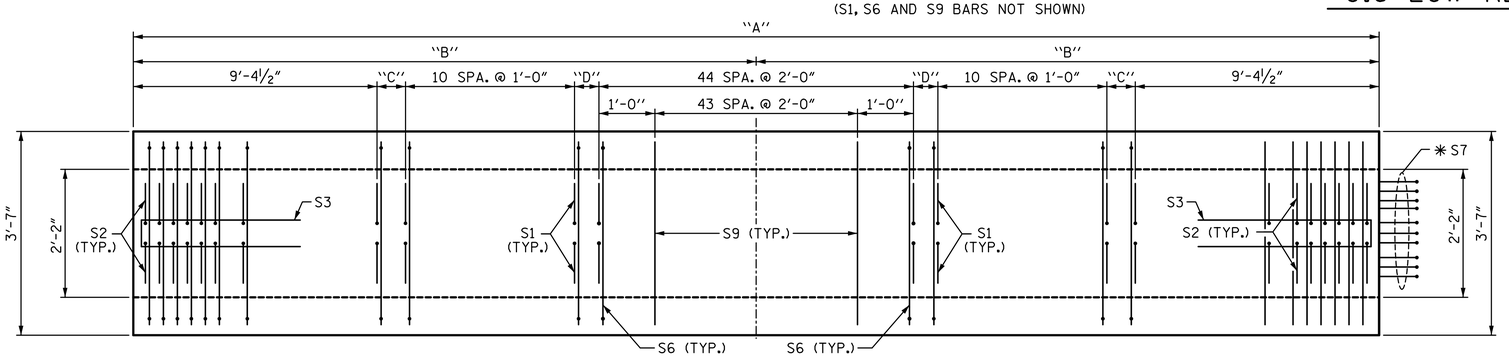


@ END OF GIRDER

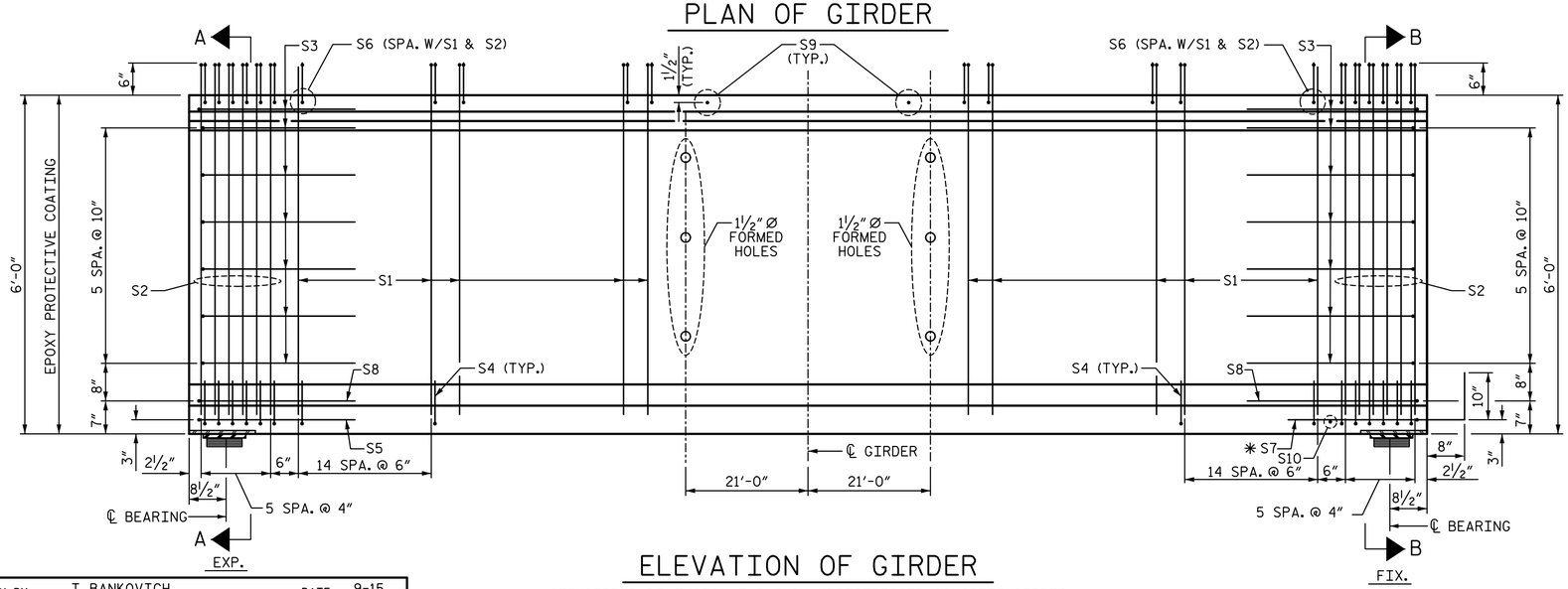


@ ℄ OF GIRDER

0.6" LOW RELAXATION STRAND LAYOUT



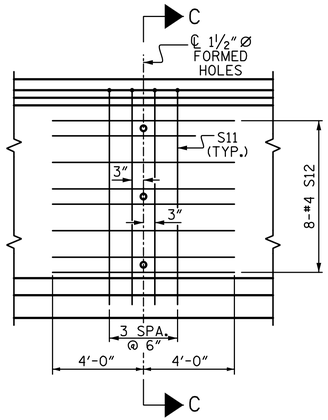
PLAN OF GIRDER



ELEVATION OF GIRDER

SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"

- FULLY DEBONDED STRAND
- ▣ STRAND DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◬ STRAND DEBONDED FOR 20'-0" FROM END OF GIRDER
- ◉ STRAND DEBONDED FOR 28'-0" FROM END OF GIRDER



PARTIAL ELEVATION

(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS)

0.6" Ø L. R. GRADE 270 STRANDS

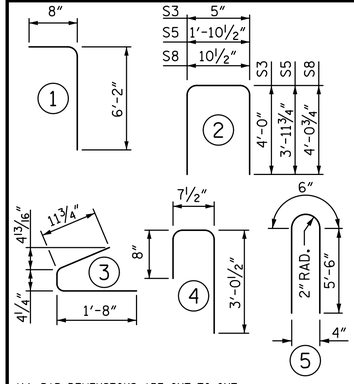
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	194	4	1	6'-10"	886
S2	24	5	1	6'-10"	171
S3	14	4	2	8'-5"	79
S4	84	4	3	3'-0"	168
S5	1	5	2	9'-10"	10
S6	218	5	4	4'-4"	985
✱S7	10	5	STR	3'-8"	38
S8	2	5	2	9'-0"	19
S9	44	5	STR	3'-3"	149
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

SPAN A	REINFORCING STEEL LB.	9,000 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
ALL GIRDERS	2688	27.5	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	"A"	513.35

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A
(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-20
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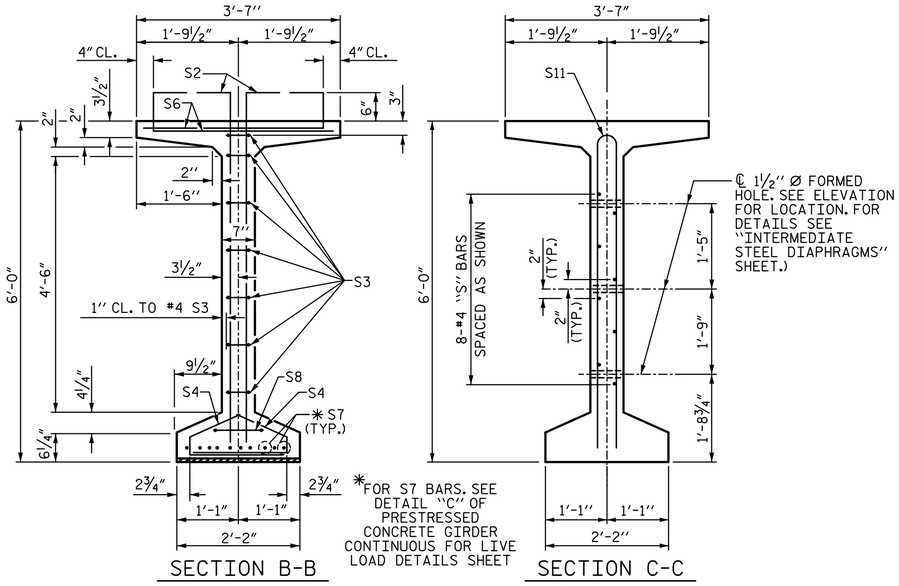
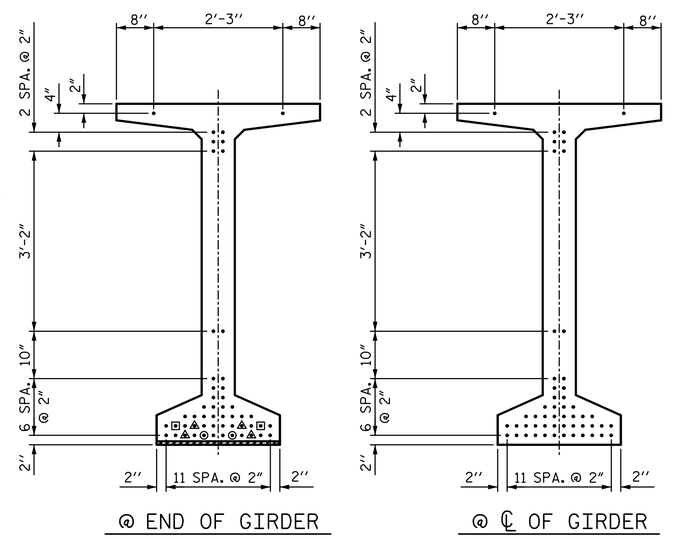
NORTH CAROLINA PROFESSIONAL SEAL 19656 ENGINEER JOHN A. BATTS
9/11/2015





0.6" LOW RELAXATION STRAND LAYOUT

0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
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REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
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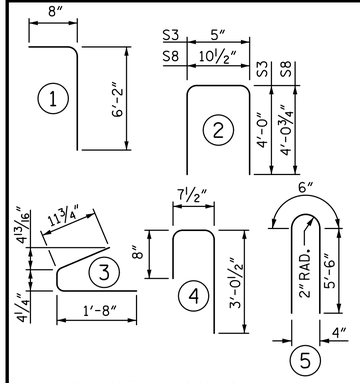
S6	218	5	4	4'-4"	985
✱S7	20	5	STR	3'-8"	76
S8	2	5	2	9'-0"	19
S9	44	5	STR	3'-3"	149
S10	2	3	STR	1'-10"	1
S11	8	5	5	11'-6"	96
S12	16	4	STR	8'-0"	86

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

BAR TYPES



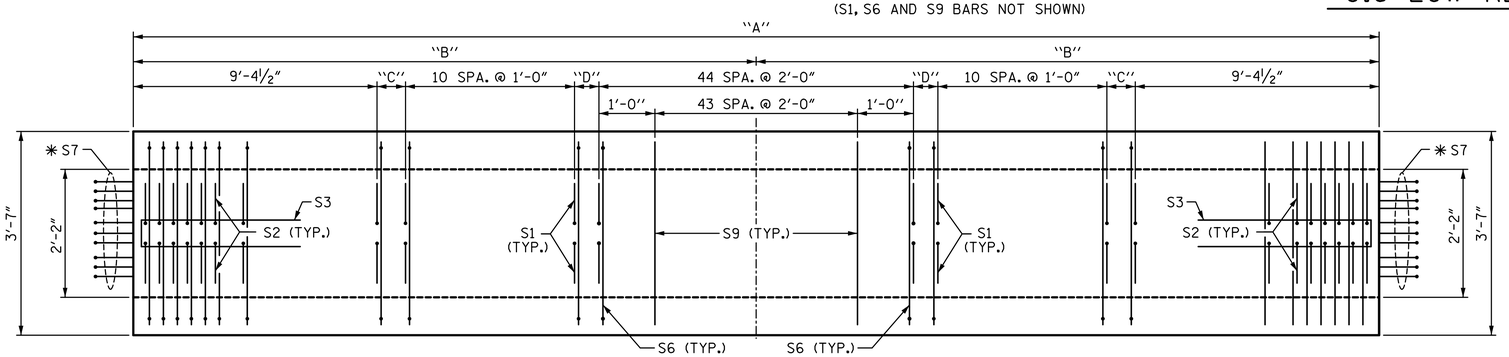
ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

SPAN	REINFORCING STEEL (LB.)	9,000 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
SPAN B	2716	27.6	52
SPAN C	2716	27.6	52

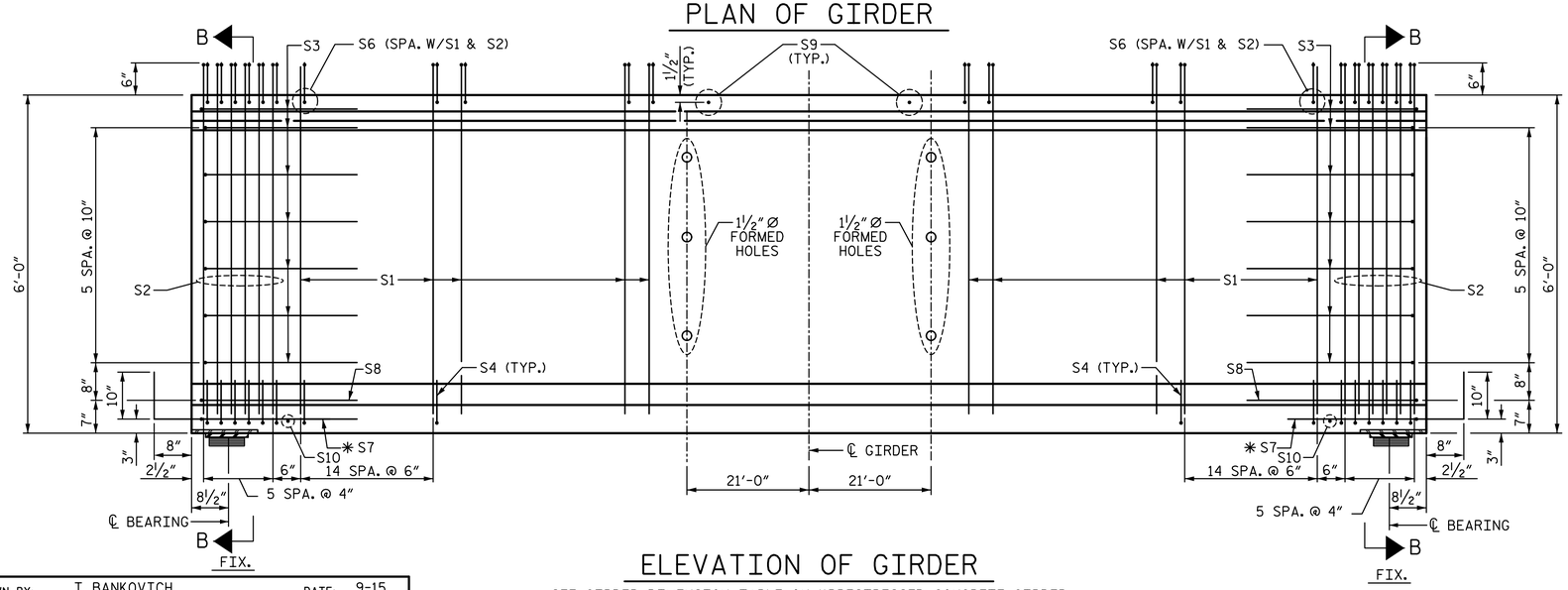
GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4 (SPAN B)	"A"	515.17
4 (SPAN C)	"A"	515.79



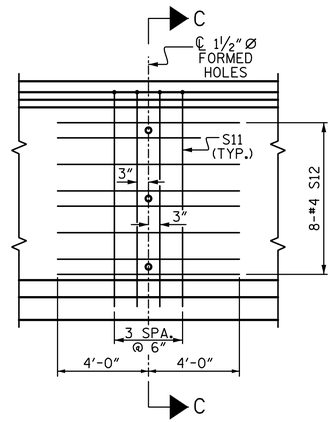
PLAN OF GIRDER

- FULLY DEBONDED STRAND
- ▣ STRAND DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◬ STRAND DEBONDED FOR 20'-0" FROM END OF GIRDER
- ⊙ STRAND DEBONDED FOR 28'-0" FROM END OF GIRDER



ELEVATION OF GIRDER

SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"



PARTIAL ELEVATION

(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-21
1			3			TOTAL SHEETS
2			4			S02-51

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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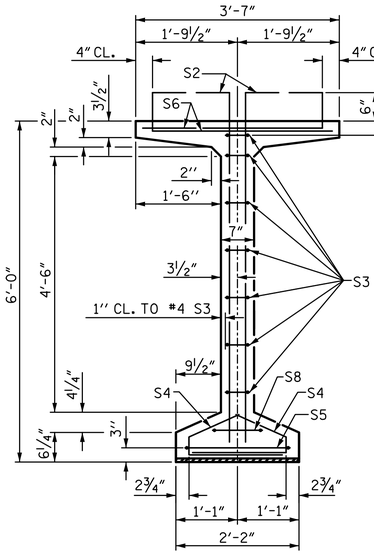
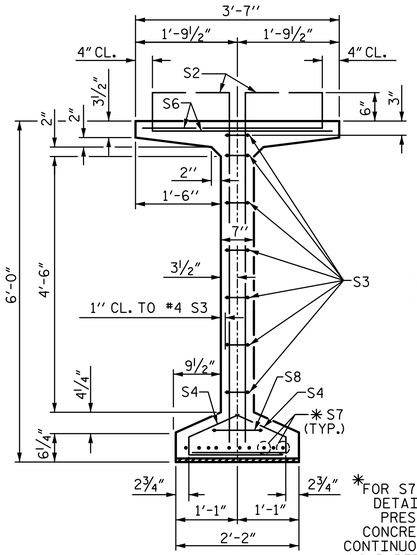
NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

STR. #2

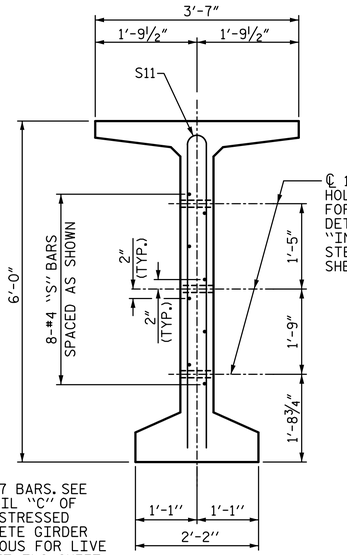


SECTION A-A



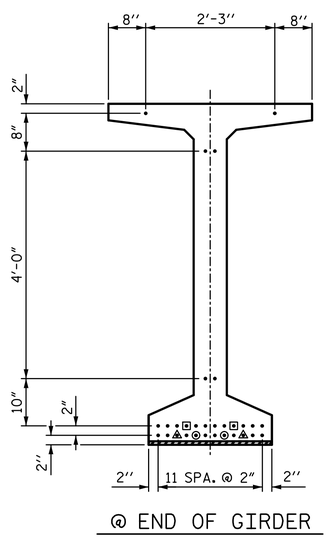
SECTION B-B

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

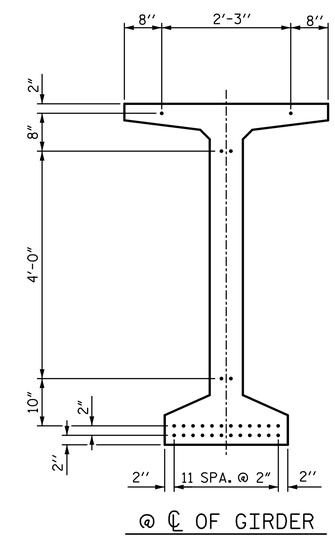


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

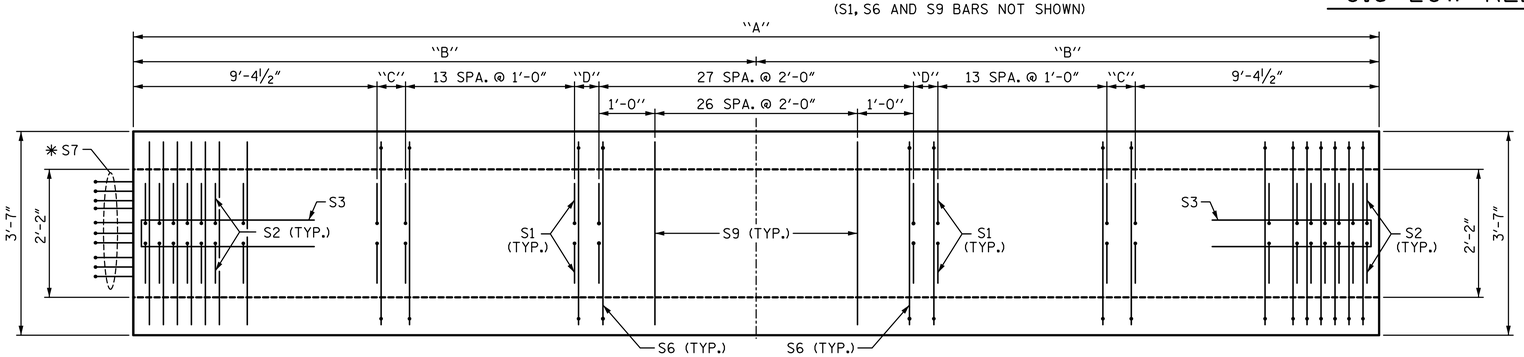


℄ END OF GIRDER

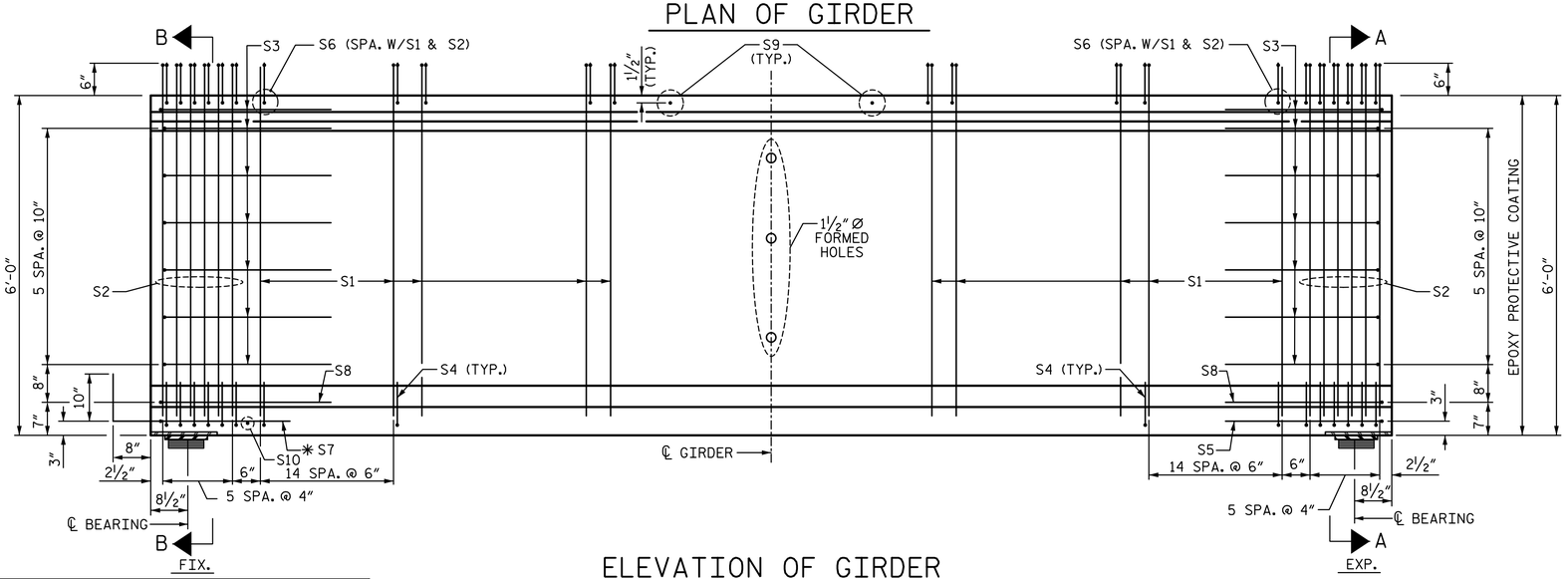


℄ OF GIRDER

0.6" LOW RELAXATION STRAND LAYOUT



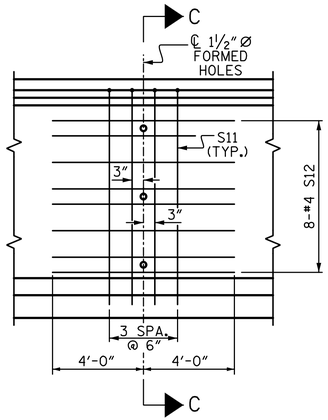
PLAN OF GIRDER



ELEVATION OF GIRDER

SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"

- FULLY DEBONDED STRAND
- ▣ STRAND DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◬ STRAND DEBONDED FOR 8'-0" FROM END OF GIRDER
- ◉ STRAND DEBONDED FOR 24'-0" FROM END OF GIRDER



PARTIAL ELEVATION

(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS)

0.6" Ø L. R. GRADE 270 STRANDS

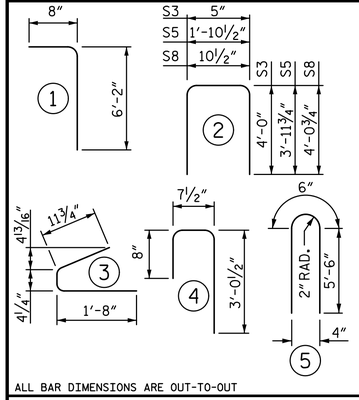
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	172	4	1	6'-10"	785
S2	24	5	1	6'-10"	171
S3	14	4	2	8'-5"	79
S4	84	4	3	3'-0"	168
S5	1	5	2	9'-10"	10
S6	196	5	4	4'-4"	886
✱S7	10	5	STR	3'-8"	38
S8	2	5	2	9'-0"	19
S9	27	5	STR	3'-3"	92
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

SPAN D	REINFORCING STEEL LB.	6,000 PSI CONCRETE C.Y.	0.6" Ø L. R. STRANDS No.
ALL GIRDERS	2340	21.7	30

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	"A"	404.24

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-22
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY:	T. BANKOVICH	DATE: 9-15
CHECKED BY:	J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE: 9-15

PLANS PREPARED BY:
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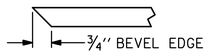
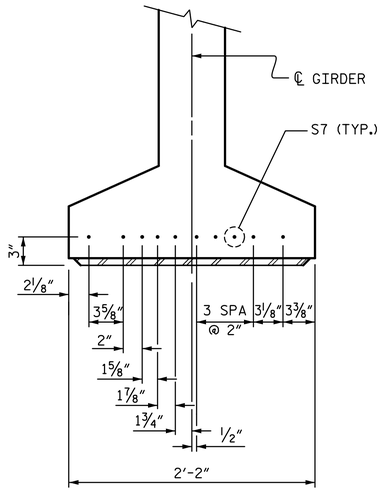
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

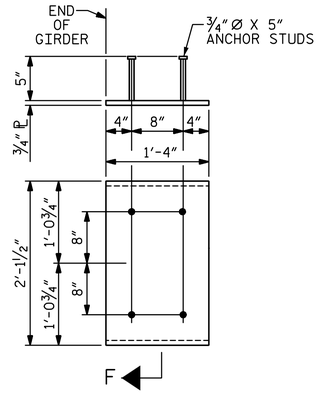


SECTION "F"

(SEE NOTES)



DETAIL "C"



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

(2 REQ'D PER GIRDER)

GIRDER DIMENSION TABLE

GIRDER	"A"	"B"	"C"	"D"
AG1	128'-2¾"	64'-1⅜"	4"	4⅞"
AG2	128'-3⅝"	64'-1 13/16"	4 5/16"	5"
AG3	128'-4½"	64'-2¼"	4¾"	5"
AG4	128'-5⅜"	64'-2 11/16"	5"	5 3/16"
BG1	128'-8⅝"	64'-4 5/16"	6"	5 13/16"
BG2	128'-9¼"	64'-4⅝"	6"	6⅛"
BG3	128'-9¾"	64'-4⅞"	6"	6⅜"
BG4	128'-10⅜"	64'-5 3/16"	6"	6 11/16"
CG1	128'-10⅞"	64'-5 7/16"	6"	6 15/16"
CG2	128'-11 1/4"	64'-5⅝"	6"	7⅛"
CG3	128'-11½"	64'-5¾"	6"	7¼"
CG4	128'-11⅞"	64'-5 15/16"	6"	7 7/16"
DG1	101'-0½"	50'-6¼"	6"	7¾"
DG2	101'-0⅝"	50'-6 5/16"	6"	7 13/16"
DG3	101'-0¾"	50'-6⅜"	6"	7⅞"
DG4	101'-1"	50'-6½"	6"	8"

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 7000 PSI FOR SPAN A, SPAN B AND SPAN C.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4700 PSI FOR SPAN D.

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.

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-23
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:
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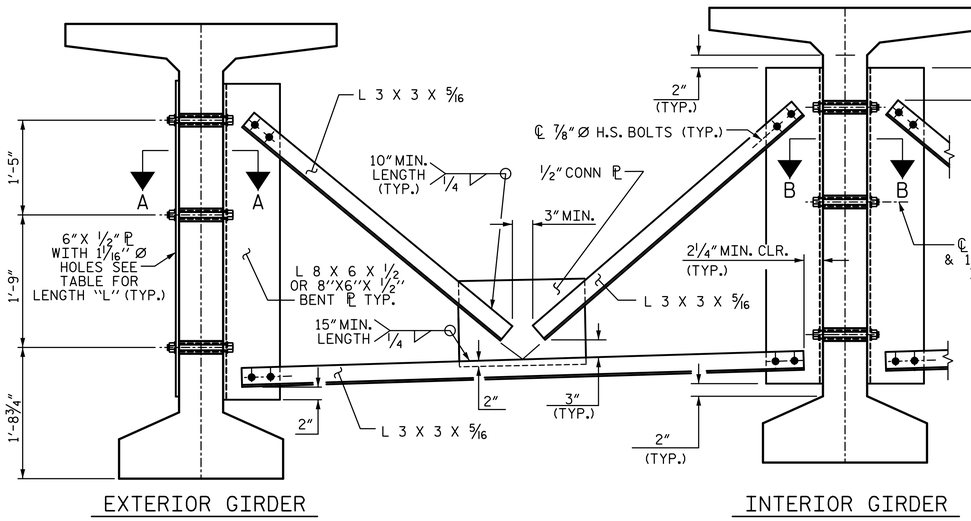
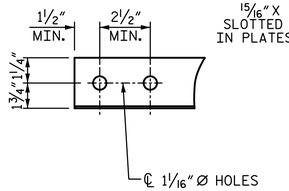
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 15058 ENGINEER JOHN A. BATTS
Documents Signed
3/22/2017

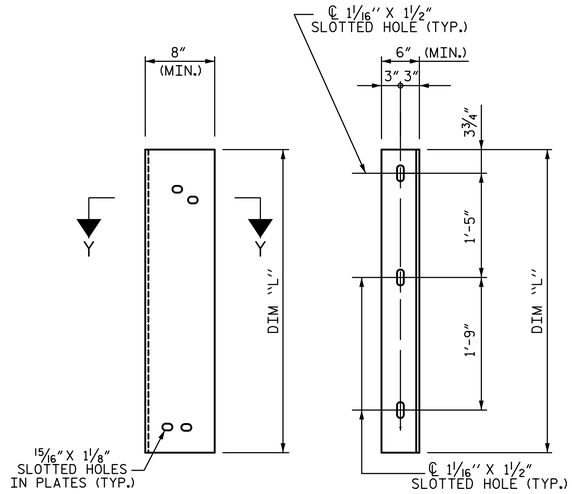
DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

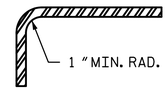


PART SECTION AT INTERMEDIATE DIAPHRAGM



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.

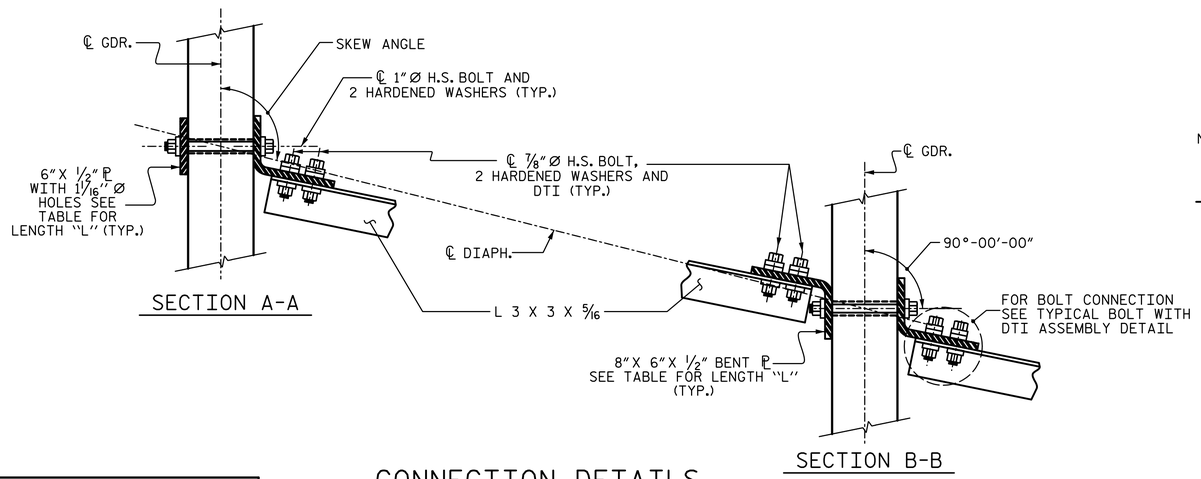
INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

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.

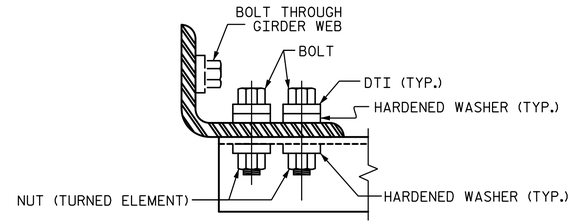
IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

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

TABLE	
GIRDER TYPE	DIM "L"
72"BULB TEE	4'-2"



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 48096 ENGINEER JOHN A. BATTS
9/11/2015

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE
INTERMEDIATE STEEL DIAPRHAGM FOR 72"MODIFIED BULB TEE PREST. CONCRETE GIRDER
(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-24
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

9/11/2015 10:16:44 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_pcg.dgn

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDER 1																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.032	0.066	0.099	0.129	0.155	0.178	0.196	0.209	0.217	0.220	0.217	0.209	0.196	0.178	0.155	0.129	0.099	0.066	0.032	0
FINAL CAMBER ↑	0	3/16″	1/4″	3/8″	7/16″	9/16″	5/8″	11/16″	11/16″	3/4″	3/4″	3/4″	11/16″	11/16″	5/8″	9/16″	7/16″	3/8″	1/4″	3/16″	0
	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDERS 2 & 3																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.033	0.070	0.104	0.135	0.163	0.187	0.206	0.220	0.228	0.231	0.228	0.220	0.206	0.187	0.163	0.135	0.104	0.070	0.033	0
FINAL CAMBER ↑	0	1/8″	1/4″	5/16″	3/8″	7/16″	1/2″	9/16″	9/16″	5/8″	5/8″	5/8″	9/16″	9/16″	1/2″	7/16″	3/8″	5/16″	1/4″	1/8″	0
	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDER 4																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.031	0.065	0.097	0.127	0.153	0.175	0.193	0.206	0.214	0.217	0.214	0.206	0.193	0.175	0.153	0.127	0.097	0.065	0.031	0
FINAL CAMBER ↑	0	3/16″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	3/4″	13/16″	3/4″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	3/16″	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDER 1																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.029	0.044	0.058	0.070	0.080	0.088	0.094	0.098	0.099	0.098	0.094	0.088	0.080	0.070	0.058	0.044	0.029	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	3/4″	13/16″	3/4″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	1/8″	0
	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDERS 2 & 3																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.031	0.046	0.061	0.073	0.084	0.093	0.099	0.103	0.104	0.103	0.099	0.093	0.084	0.073	0.061	0.046	0.031	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	7/16″	1/2″	9/16″	5/8″	11/16″	11/16″	3/4″	11/16″	11/16″	5/8″	9/16″	1/2″	7/16″	3/8″	1/4″	1/8″	0
	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDER 4																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.029	0.043	0.057	0.069	0.079	0.087	0.093	0.096	0.098	0.096	0.093	0.087	0.079	0.069	0.057	0.043	0.029	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	13/16″	13/16″	13/16″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	1/8″	0

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

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-25
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:
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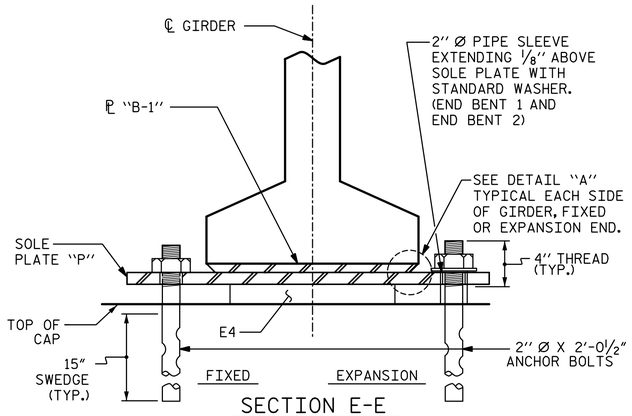
LICENSURE NO. C-2521

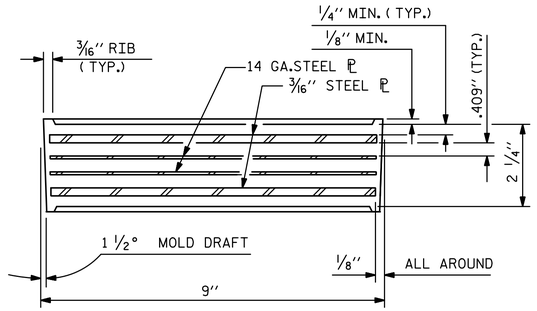
NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

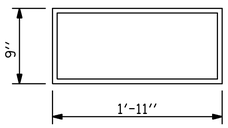
9/11/2015 10:16:44 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_dl.dgn



SECTION E-E



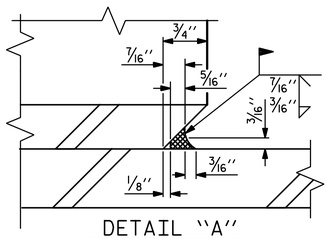
TYPICAL SECTION OF ELASTOMERIC BEARINGS



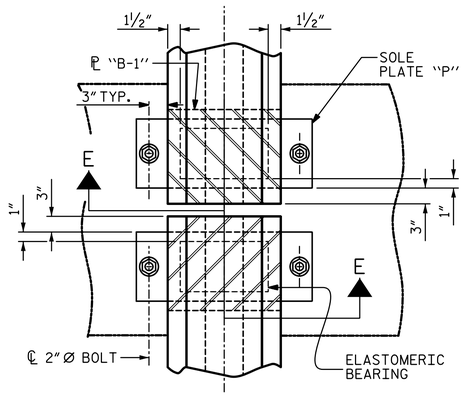
E4 (32 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

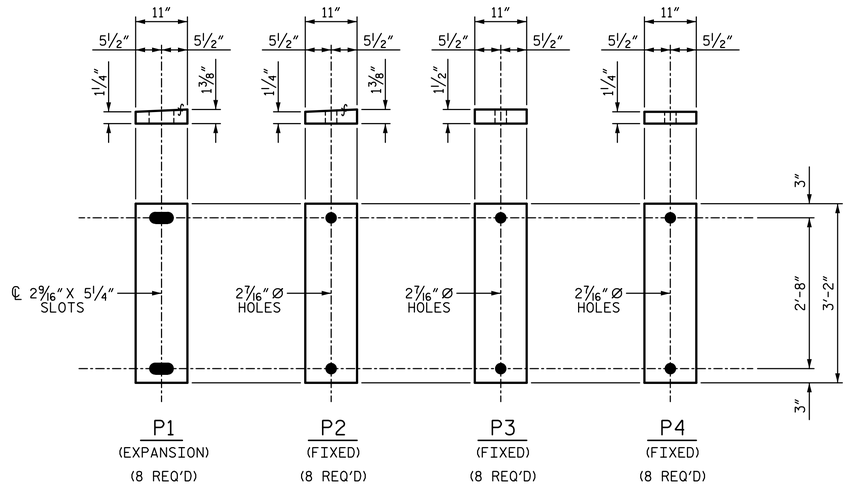


DETAIL "A"



TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



SOLE PLATE DETAILS ("P")

(SEE GIRDER LAYOUT SHEETS FOR ORIENTATION OF BEVELED SOLE PLATES.)

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.

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-26
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:

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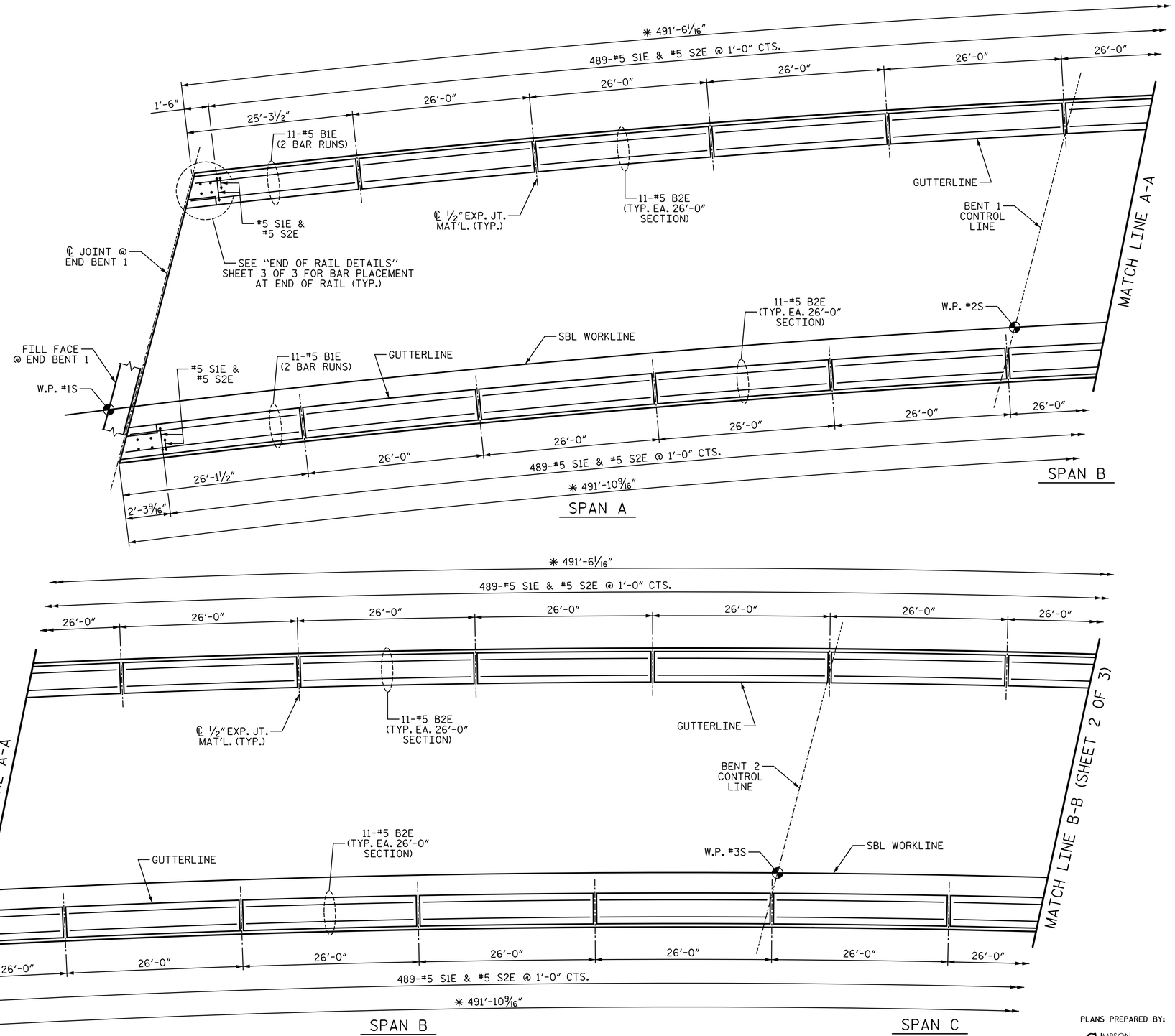
NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

9/11/2015 10:16:45 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_brg.dgn



PART PLAN OF BARRIER RAIL

ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL
✱ @ 60° F

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PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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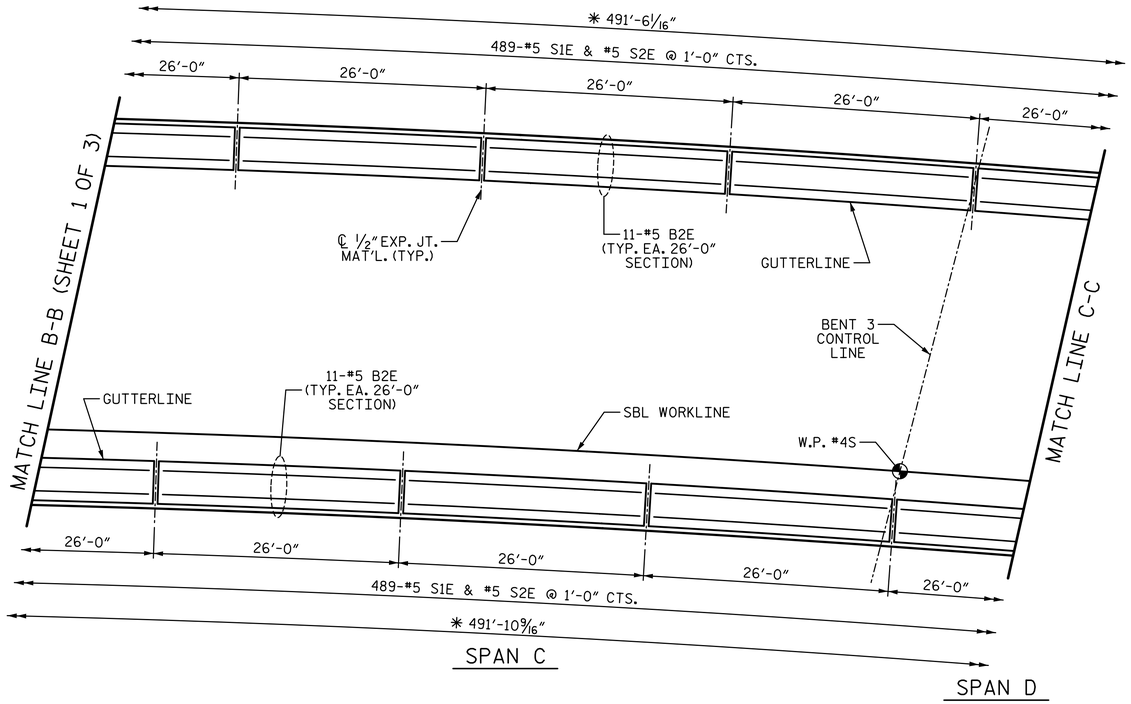
SUPERSTRUCTURE

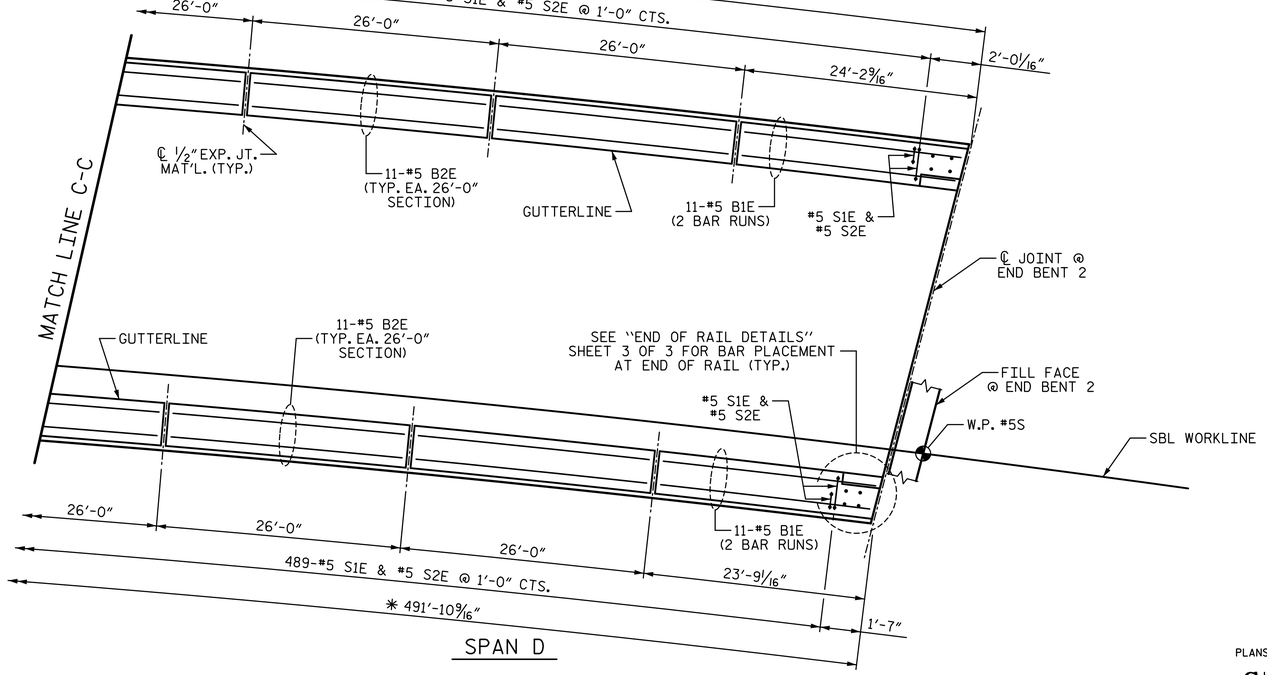
CONCRETE BARRIER RAIL

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-27
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2





PART PLAN OF BARRIER RAIL

ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL
* @ 60° F

DRAWN BY: T. BANKOVICH DATE: 9-15
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DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 2 OF 3

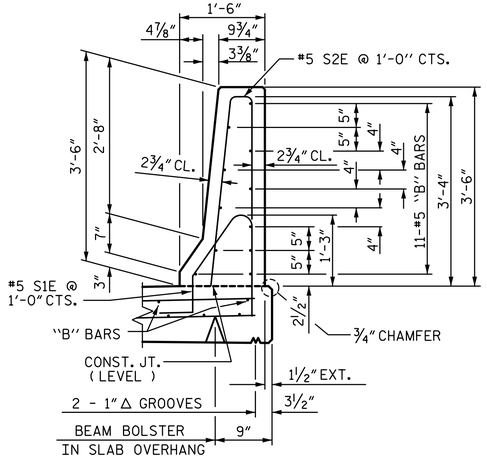
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

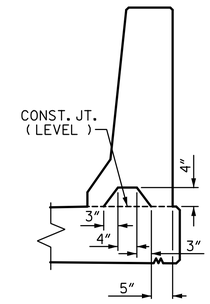
(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-28
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

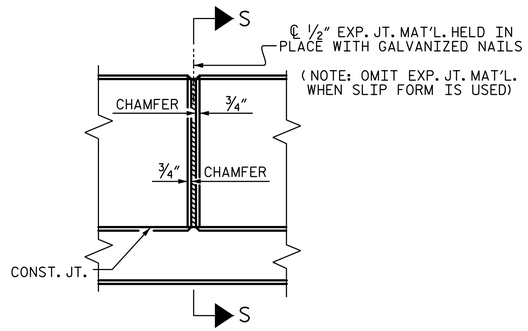


SECTION THRU RAIL



SECTION S-S

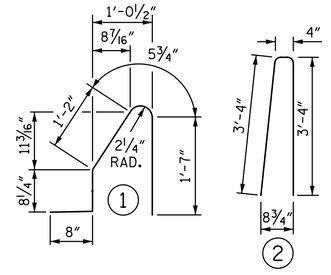
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE BARRIER RAIL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	88	5	STR	14'-7"	1339
B2E	374	5	STR	25'-7"	9980
S1E	978	5	1	4'-7"	4675
S2E	978	5	2	7'-0"	7140
S3E	16	5	STR	4'-0"	67
EPOXY COATED REINFORCING STEEL					23201 LB
CLASS "AA" CONCRETE					133.5 CY
CONCRETE BARRIER RAIL					983.4 LF

"E" INDICATES EPOXY COATED
REINFORCING STEEL

NOTES:

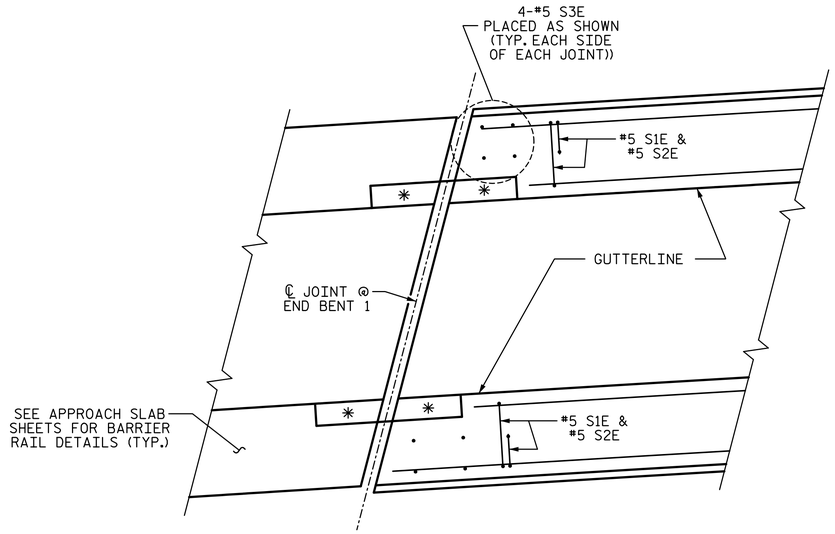
THE BARRIER RAIL IN EACH CONTINUOUS UNIT AND ON APPROACH SLABS SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT CONTINUOUS UNIT AND APPROACH SLAB HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

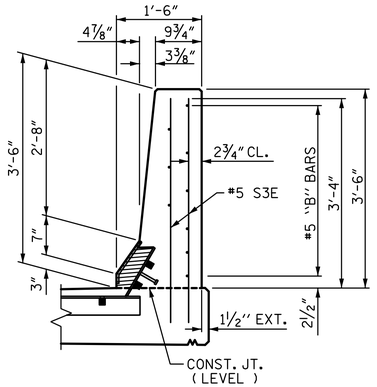
THE #5 S1E AND S2E BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN A 2" MINIMUM CLEARANCE FROM THE CENTERLINE OF THE EXPANSION JOINTS IN BARRIER RAIL SECTIONS.

FOR DETAILS, QUANTITIES AND LIN. FEET FOR CONCRETE BARRIER RAIL ON APPROACH SLAB, SEE "BRIDGE APPROACH SLAB DETAILS" SHEETS.



PLAN

(END BENT 1 SHOWN, END BENT 2 SIMILAR)
* FOR BLOCK OUT DETAILS SEE "EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL" SHEET 2 OF 2



END VIEW @ EXP. JOINTS

END OF RAIL DETAILS @ EXP. JOINTS

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-29
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:
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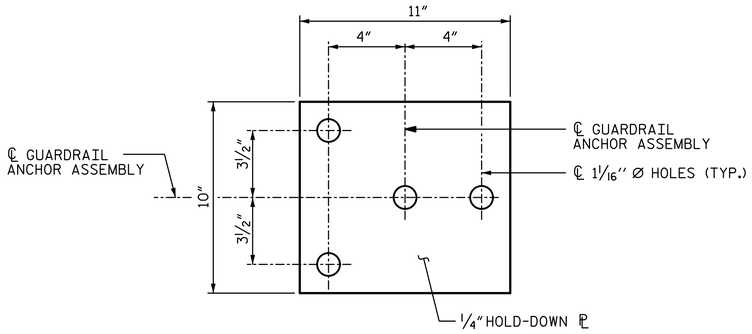
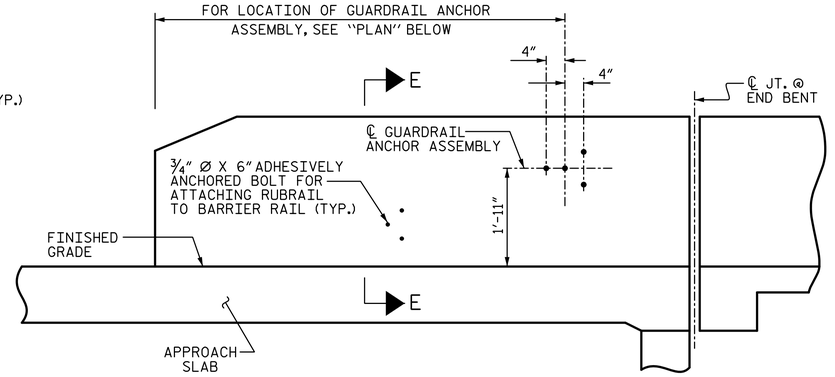
NORTH CAROLINA PROFESSIONAL SEAL 18656 ENGINEER JOHN A. BATTS
9/11/2015

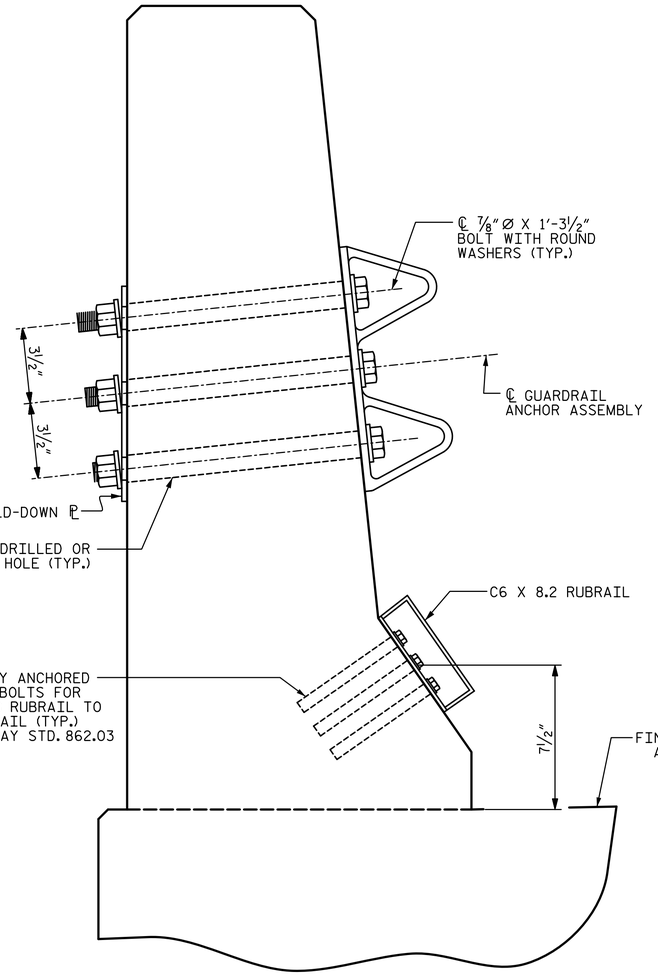
DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15



PLAN



ELEVATION



SECTION E-E

GUARDAIL ANCHOR ASSEMBLY DETAILS

PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

NOTES:

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

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

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

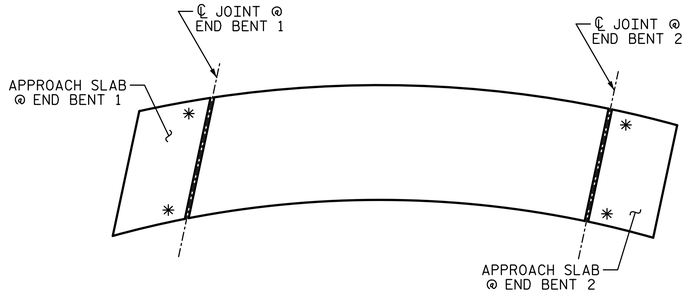
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENT

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

DRAWN BY:	T. BANKOVICH	DATE:	9-15
CHECKED BY:	J.A. BATTS	DATE:	9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE:	9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

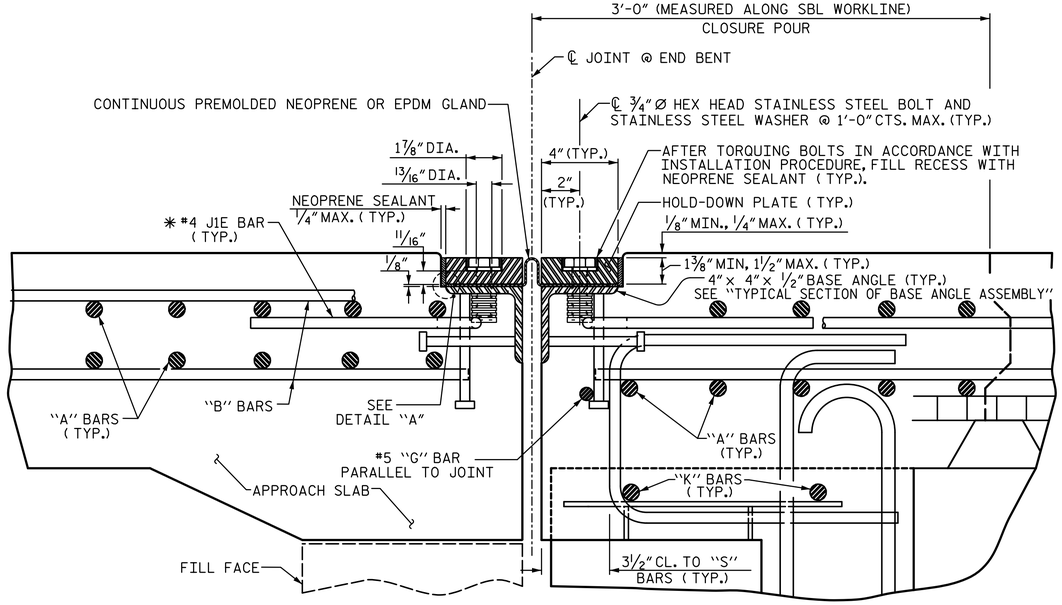
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-30
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2



EXPANSION JOINT DETAILS

(SECTION NORMAL TO JOINT)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)

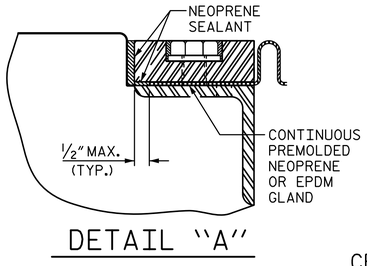
* THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED, ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE:

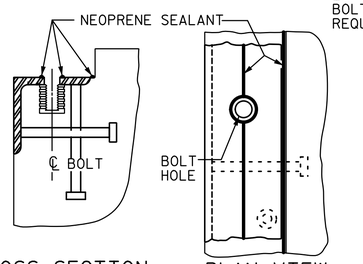
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4 1/8" TO 4 1/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED 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.

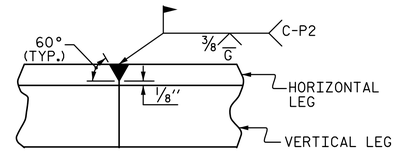


DETAIL "A"

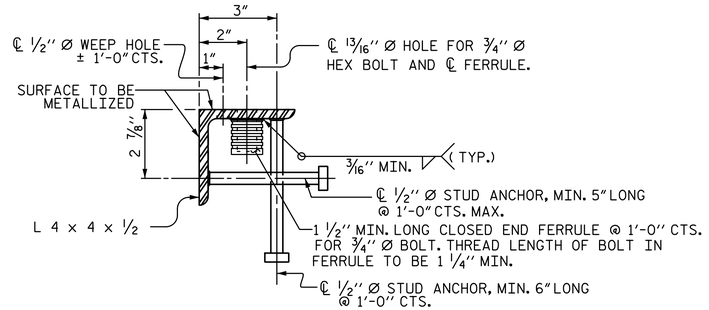


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL - FIELD WELD SPLICE OF BASE ANGLE



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

MOVEMENT AND SETTING AT JOINT

END BENT	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	111°-35'-25"	1"	1 5/8"	1 1/2"	1 3/16"
2	97°-32'-37"	13/16"	1 9/16"	1 1/16"	1 1/8"

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-31
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

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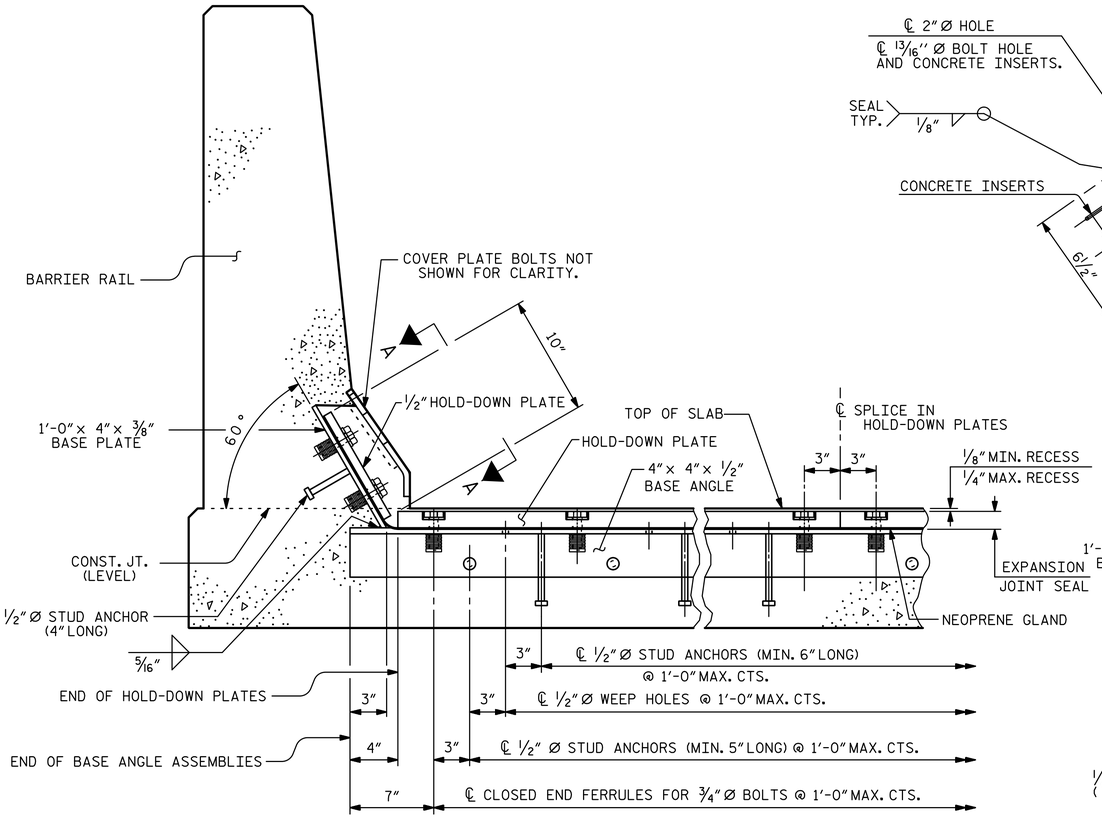
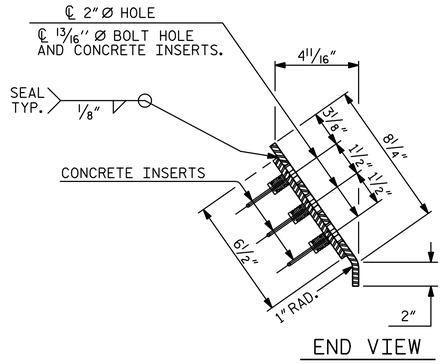
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

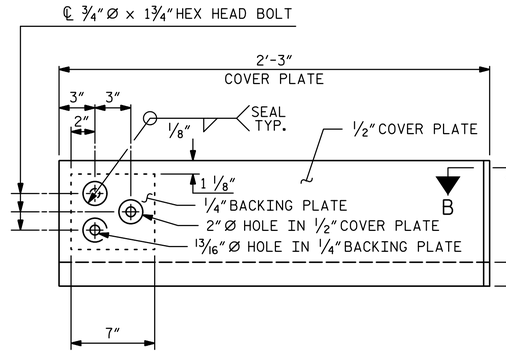
DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15



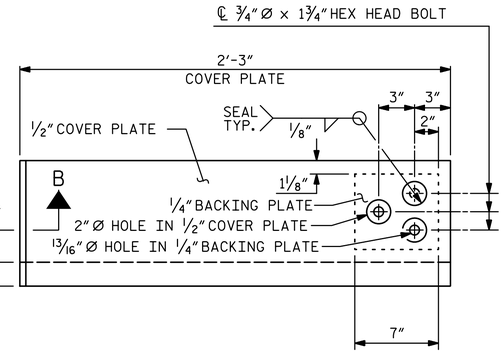
SECTION THRU RAIL NORMAL TO JOINT



END VIEW

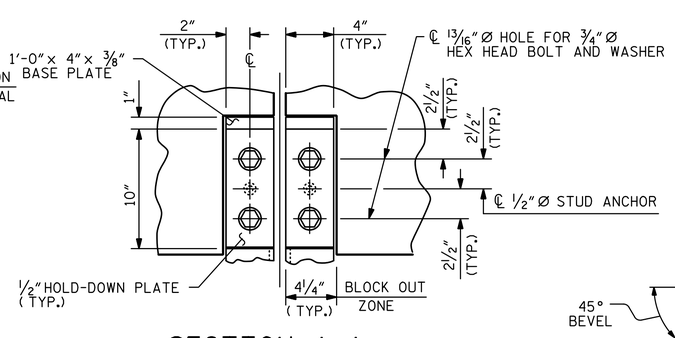


TYPE I - ELEVATION VIEW

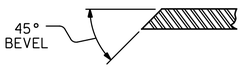


TYPE II - ELEVATION VIEW

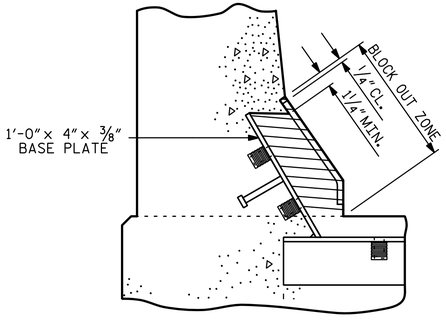
COVER PLATE DETAILS



SECTION A-A

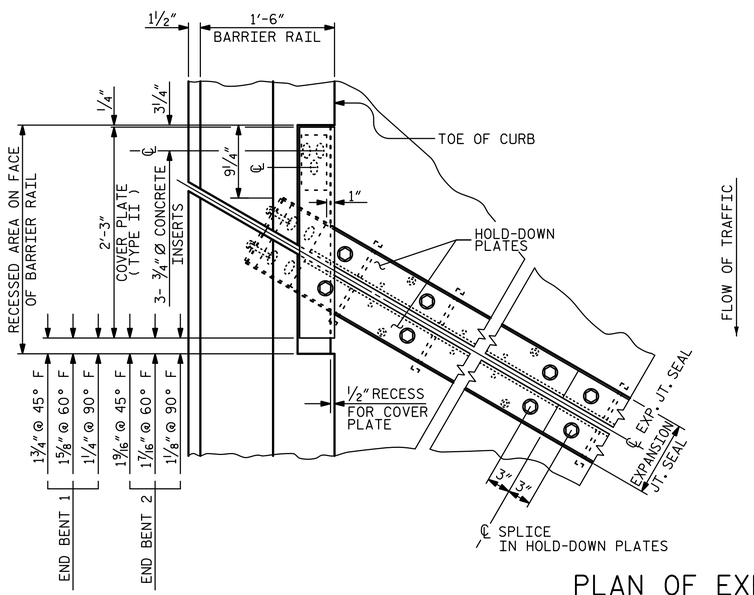


SECTION B-B



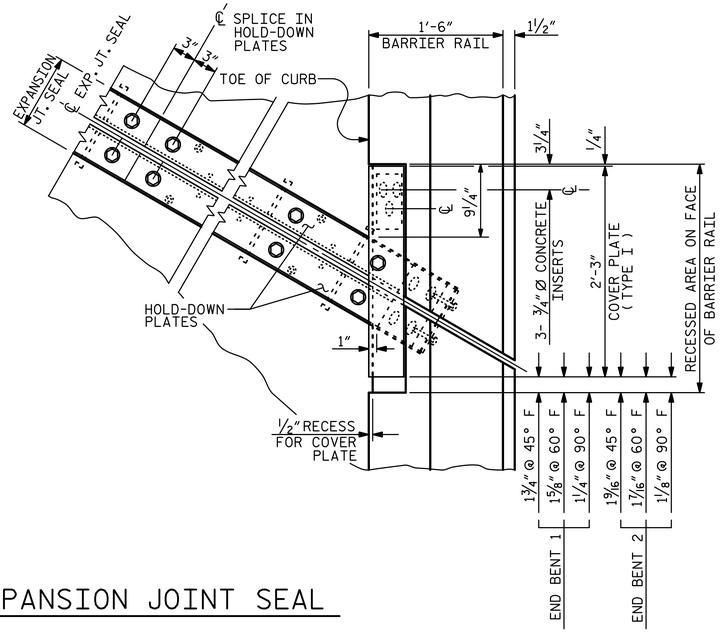
BLOCK OUT DETAIL

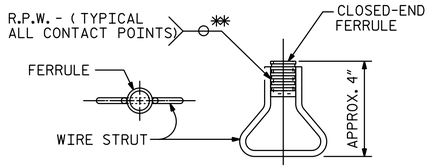
SEE "SECTION A-A" FOR OTHER DETAILS



PLAN OF EXPANSION JOINT SEAL

FLOW OF TRAFFIC





CONCRETE INSERT

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-32
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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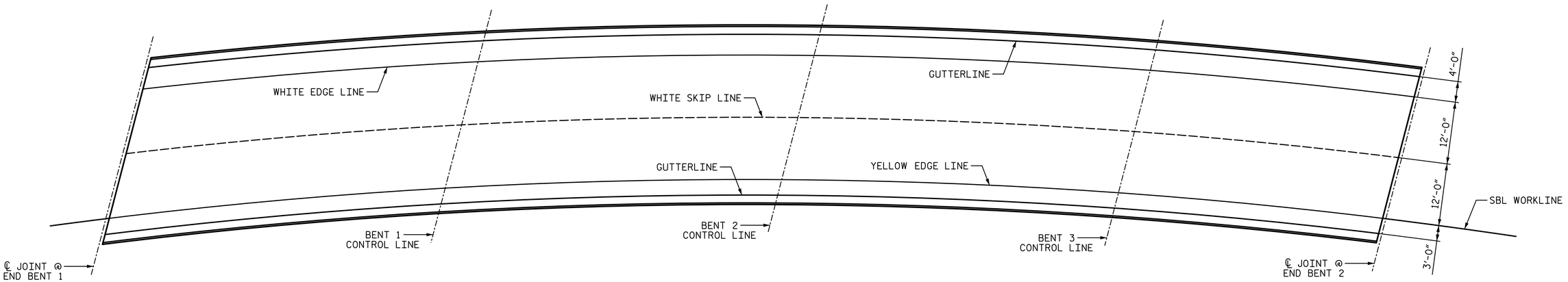

PAVEMENT MARKING ALIGNMENT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PAVEMENT MARKING ALIGNMENT

(SBL)

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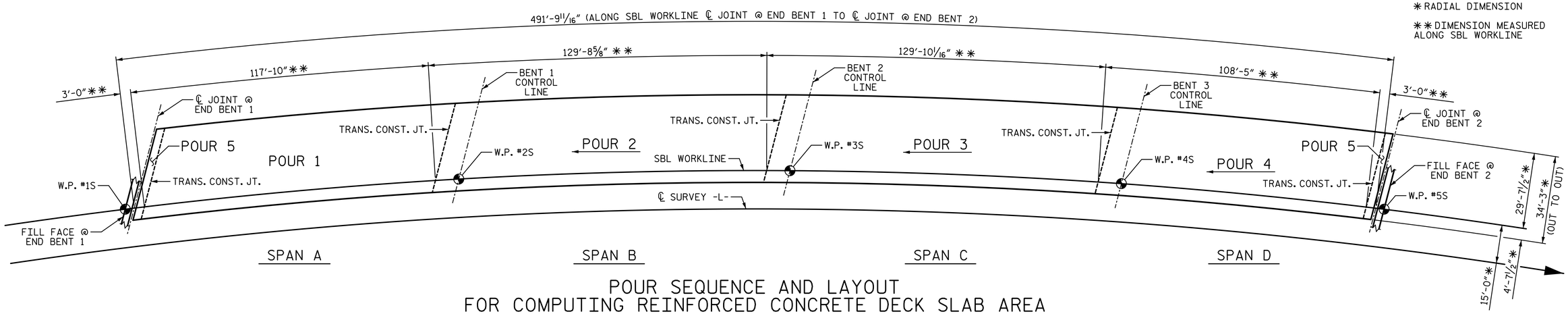
9/11/2015

NOTES:

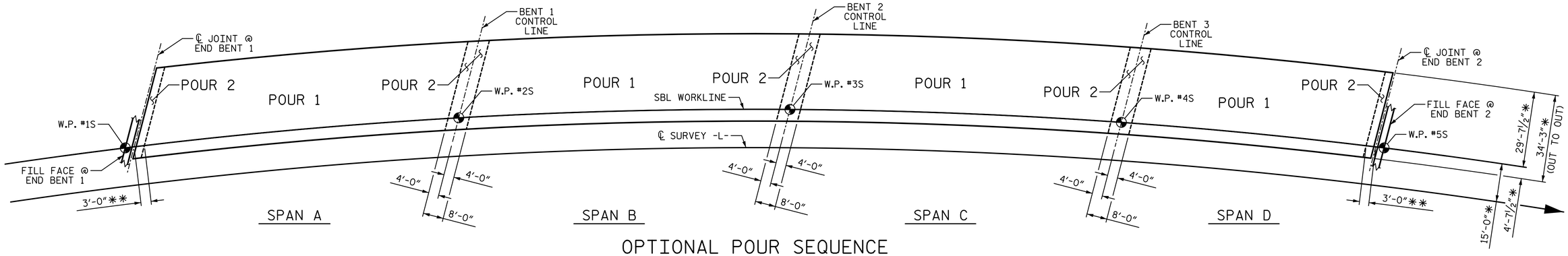
✳ RADIAL DIMENSION

✳✳ DIMENSION MEASURED ALONG SBL WORKLINE



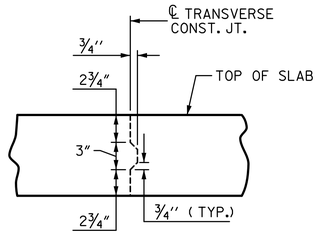
POUR SEQUENCE AND LAYOUT FOR COMPUTING REINFORCED CONCRETE DECK SLAB AREA

(SQ. FT. = 16,834)



OPTIONAL POUR SEQUENCE

POUR 2 CANNOT BE STARTED UNTIL BOTH ADJACENT POUR 1 HAVE REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.



TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN, LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
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RALEIGH
SUPERSTRUCTURE

POUR SEQUENCE

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-34
1			3			TOTAL SHEETS
2			4			S02-51

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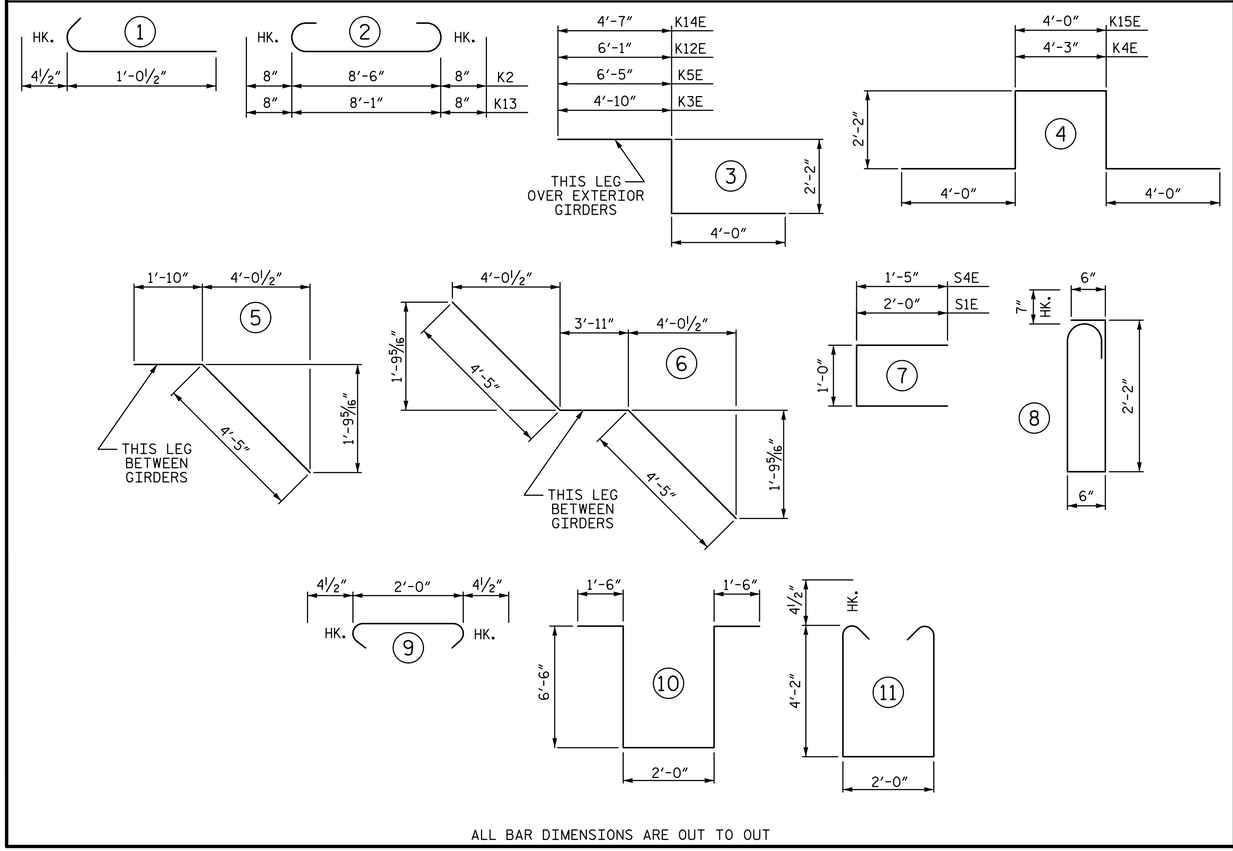
NORTH CAROLINA PROFESSIONAL SEAL 18038 ENGINEER JOHN A. BATTS
9/11/2015

9/11/2015 10:16:47 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_bm.dgn

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

SPANS A, B, C, & D

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	767	5	STR	33′-11″	27133	A219	1	5	STR	4′-6″	5
A2	767	5	STR	33′-11″	27133	A220	1	5	STR	2′-11″	3
						A221	1	5	STR	30′-6″	32
A101E	1	5	STR	33′-4″	35	A222	1	5	STR	25′-9″	27
A102E	1	5	STR	31′-9″	33	A223	1	5	STR	21′-1″	22
A103E	1	5	STR	30′-2″	31	A224	1	5	STR	16′-4″	17
A104E	1	5	STR	28′-7″	30	A225	1	5	STR	11′-8″	12
A105E	1	5	STR	26′-11″	28	A226	1	5	STR	6′-11″	7
A106E	1	5	STR	25′-4″	26	A227	1	5	STR	2′-2″	2
A107E	1	5	STR	23′-9″	25						
A108E	1	5	STR	22′-2″	23	B1	423	5	STR	56′-7″	24964
A109E	1	5	STR	20′-6″	21	B2E	275	4	STR	23′-6″	4317
A110E	1	5	STR	18′-11″	20	B3E	150	7	STR	33′-3″	10194
A111E	1	5	STR	17′-4″	18	B4E	44	7	STR	39′-6″	3552
A112E	1	5	STR	15′-9″	16	B5E	75	7	STR	31′-0″	4752
A113E	1	5	STR	14′-1″	15	B6E	22	7	STR	35′-0″	1574
A114E	1	5	STR	12′-6″	13						
A115E	1	5	STR	10′-11″	11	G1E	1	5	STR	36′-5″	38
A116E	1	5	STR	9′-4″	10	G2E	1	5	STR	34′-2″	36
A117E	1	5	STR	7′-8″	8						
A118E	1	5	STR	6′-1″	6	J1E	73	4	1	1′-5″	69
A119E	1	5	STR	4′-6″	5						
A120E	1	5	STR	2′-11″	3	K1	9	6	STR	5′-6″	74
A121E	1	5	STR	30′-6″	32	K2	6	6	2	9′-10″	89
A122E	1	5	STR	25′-9″	27	K3E	2	8	3	11′-0″	59
A123E	1	5	STR	21′-1″	22	K4E	4	8	4	16′-7″	177
A124E	1	5	STR	16′-4″	17	K5E	2	8	3	12′-7″	67
A125E	1	5	STR	11′-8″	12	K6	18	4	STR	5′-7″	67
A126E	1	5	STR	6′-11″	7	K7	90	4	STR	8′-5″	506
A127E	1	5	STR	2′-2″	2	K8	18	4	STR	5′-5″	65
						K9	42	4	5	6′-3″	175
A201	1	5	STR	33′-4″	35	K10	42	4	6	12′-9″	358
A202	1	5	STR	31′-9″	33	K11	9	6	STR	5′-2″	70
A203	1	5	STR	30′-2″	31	K12E	2	8	3	12′-3″	65
A204	1	5	STR	28′-7″	30	K13	6	6	2	9′-5″	85
A205	1	5	STR	26′-11″	28	K14E	2	8	3	10′-9″	57
A206	1	5	STR	25′-4″	26	K15E	4	8	4	16′-4″	174
A207	1	5	STR	23′-9″	25						
A208	1	5	STR	22′-2″	23	S1E	18	4	7	5′-0″	60
A209	1	5	STR	20′-6″	21	S2E	36	5	8	5′-11″	222
A210	1	5	STR	18′-11″	20	S3	378	4	9	2′-9″	694
A211	1	5	STR	17′-4″	18	S4E	18	4	7	3′-10″	46
A212	1	5	STR	15′-9″	16						
A213	1	5	STR	14′-1″	15	U1	18	4	11	11′-1″	133
A214	1	5	STR	12′-6″	13	U2E	54	4	10	18′-0″	649
A215	1	5	STR	10′-11″	11						
A216	1	5	STR	9′-4″	10						
A217	1	5	STR	7′-8″	8						
A218	1	5	STR	6′-1″	6						

REINFORCING STEEL	54909 LB
EPOXY COATED REINFORCING STEEL	53737 LB

"E" INDICATES EPOXY COATED REINFORCING STEEL

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS "AA" CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	CY	LB	LB
POUR 1	136.0	--	--
POUR 2	162.0	--	--
POUR 3	161.9	--	--
POUR 4	138.4	--	--
POUR 5	9.2	--	--
TOTAL	607.5	54909	53737

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.
SEE "POUR SEQUENCE" SHEET FOR LOCATION OF POURS.

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	1,324	SQ. FT.
BRIDGE DECK	13,726	SQ. FT.
TOTAL	15,050	SQ. FT.

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

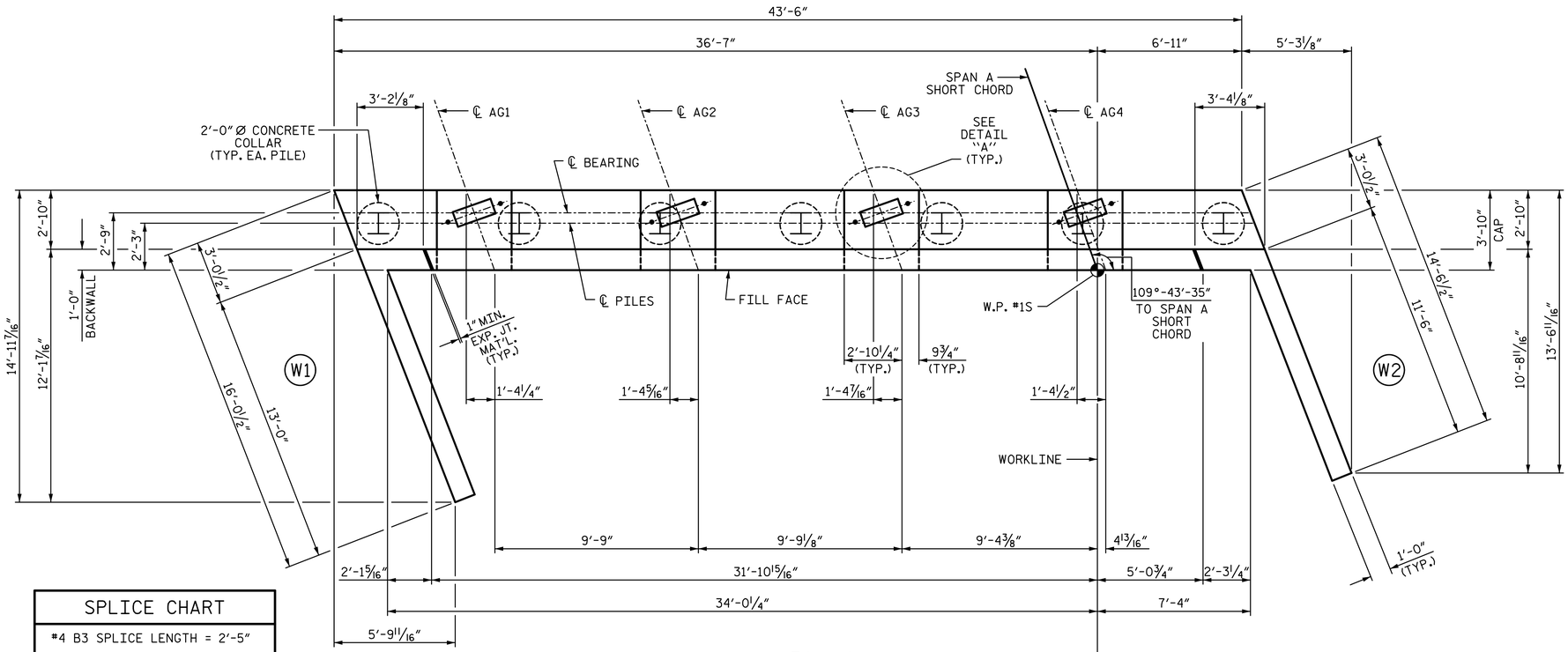
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BILL OF MATERIAL

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-35
1			3			TOTAL SHEETS
2			4			S02-51

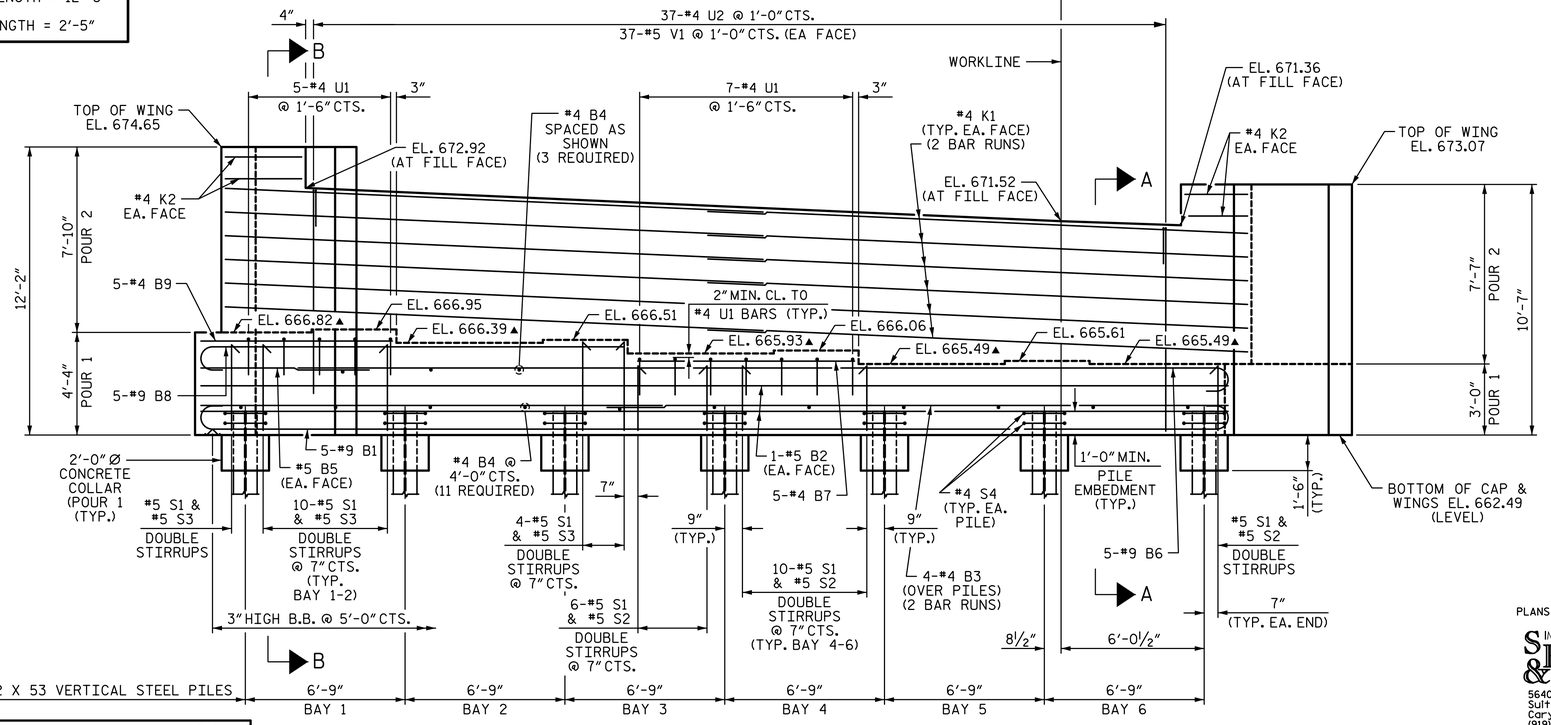
STR. #2



PLAN

SPLICE CHART

#4 B3 SPLICE LENGTH = 2'-5"
#5 B5 SPLICE LENGTH = 3'-0"
#9 B6 SPLICE LENGTH = 12'-6"
#4 K1 SPLICE LENGTH = 2'-5"



ELEVATION

NOTES:

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

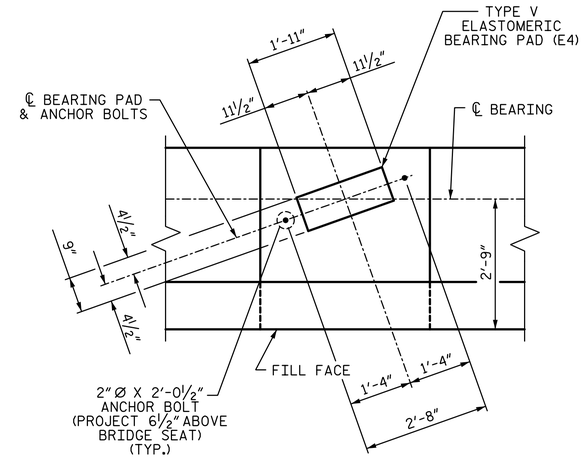
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

▲ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTIONS A-A AND B-B SHEET 3 OF 3.



DETAIL "A"

(TYP. EA. GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-36
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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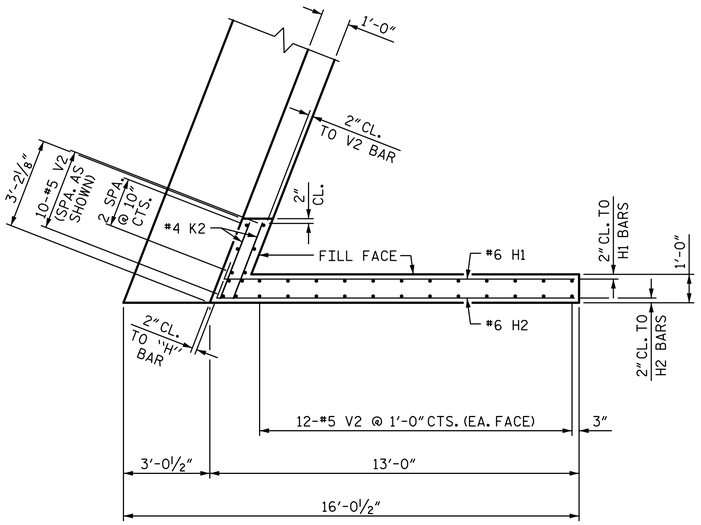
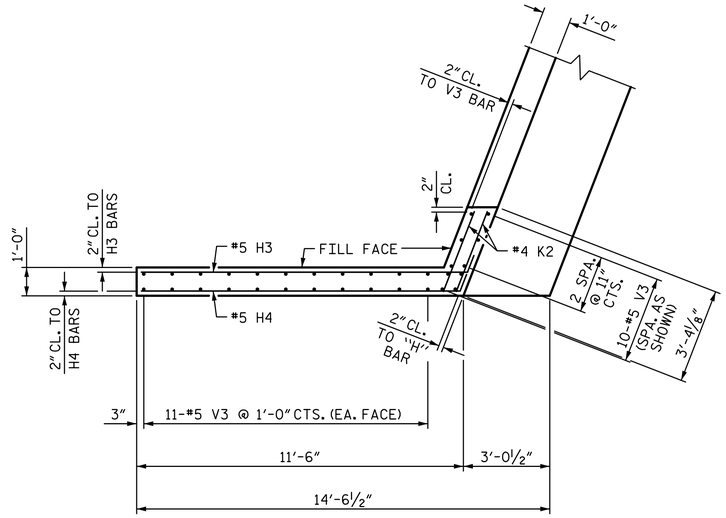
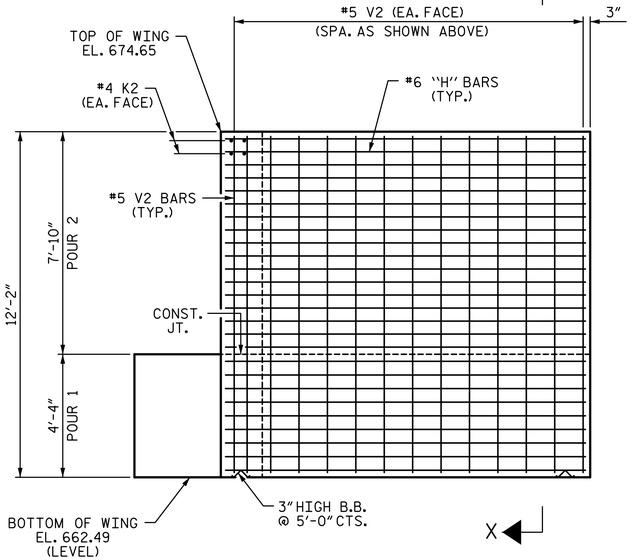
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015



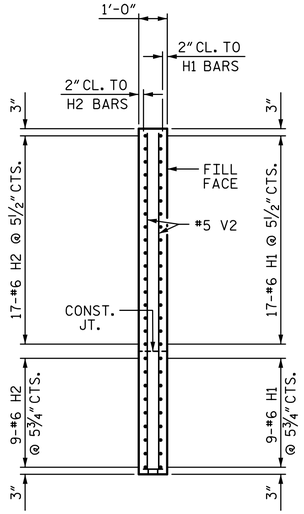
PLAN OF WING (W1)



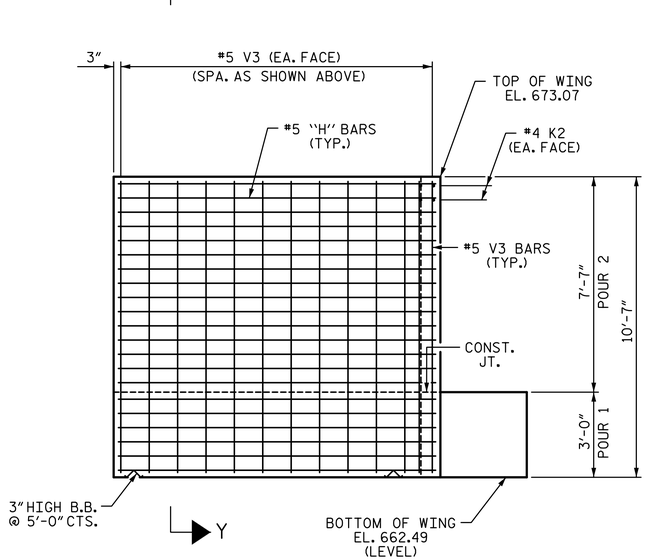
PLAN OF WING (W2)



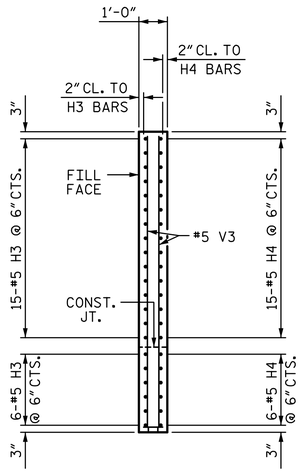
ELEVATION OF WING (W1)



SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-37
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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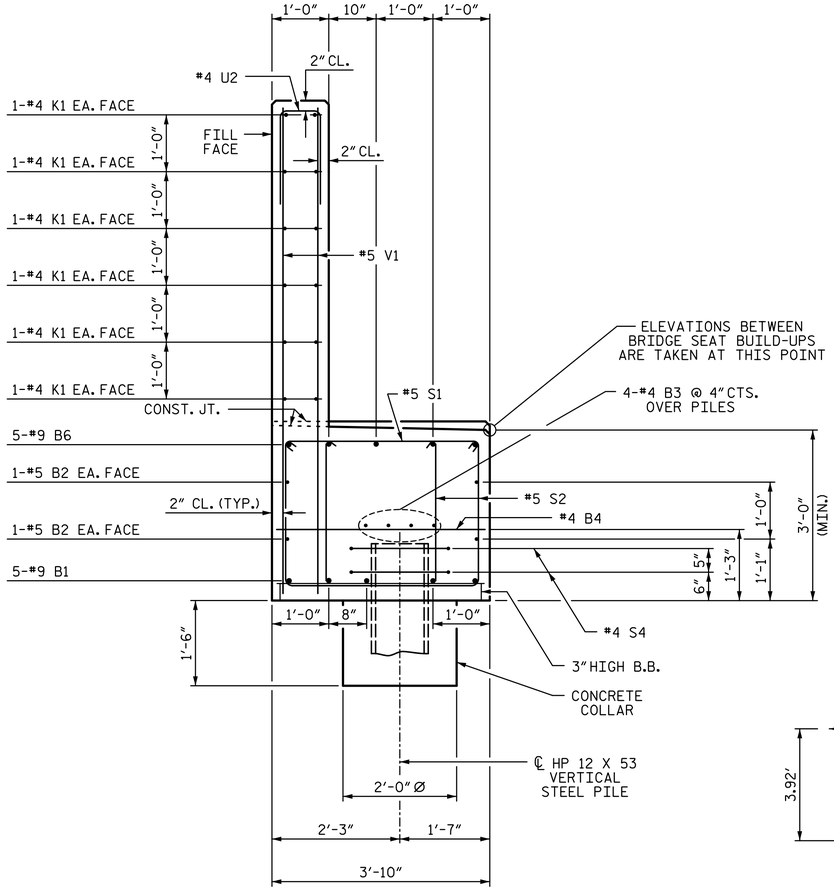
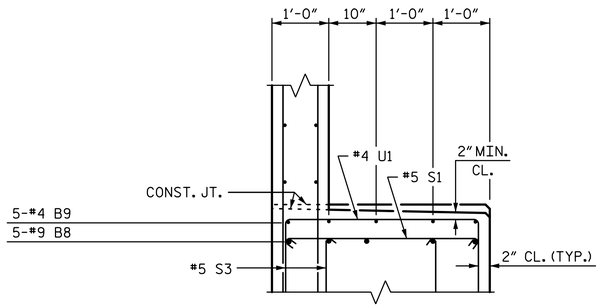
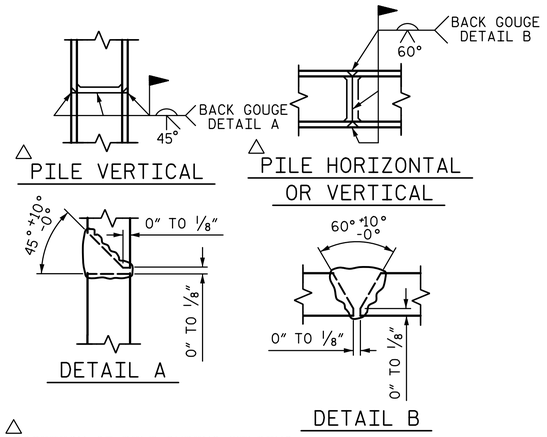


SECTION A-A

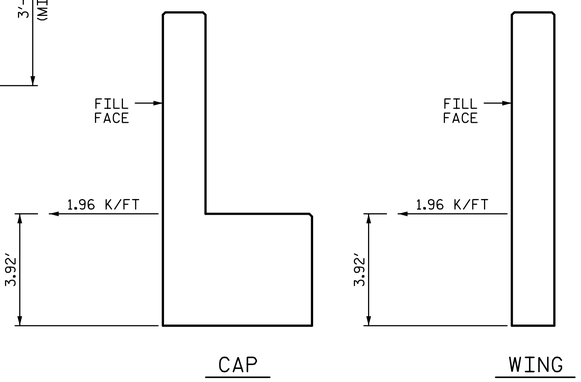
(TIEBACK NOT SHOWN FOR CLARITY)



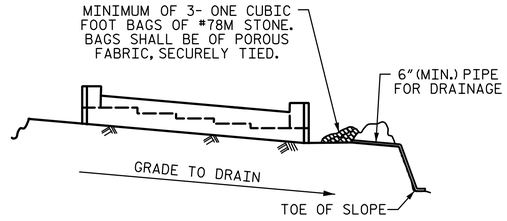
SECTION B-B



PILE SPLICE DETAILS



TIEBACK DETAILS



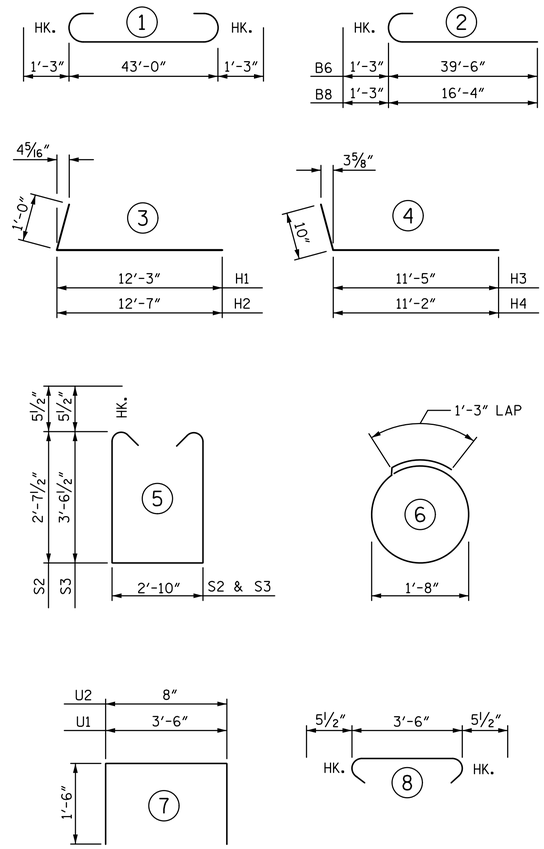
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	9	1	45'-6"	774
B2	4	5	STR	43'-2"	180
B3	8	4	STR	22'-10"	122
B4	14	4	STR	3'-6"	33
B5	2	5	STR	6'-8"	14
B6	5	9	2	40'-9"	693
B7	5	4	STR	9'-3"	31
B8	5	9	2	17'-7"	299
B9	5	4	STR	6'-8"	22
H1	26	6	3	13'-3"	517
H2	26	6	3	13'-7"	530
H3	21	5	4	12'-3"	268
H4	21	5	4	12'-0"	263
K1	24	4	STR	22'-10"	366
K2	8	4	STR	2'-10"	15
S1	62	5	8	4'-5"	286
S2	74	5	5	9'-0"	695
S3	50	5	5	10'-10"	565
S4	14	4	6	6'-6"	61
U1	12	4	7	6'-6"	52
U2	37	4	7	3'-8"	91
V1	74	5	STR	8'-4"	643
V2	34	5	STR	11'-9"	417
V3	32	5	STR	10'-2"	339

TOTAL REINFORCING STEEL	7276 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	26.5 CY
POUR 2	
(BACKWALL AND UPPER WINGS)	16.5 CY
TOTAL CLASS "A" CONCRETE	43.0 CY
HP 12 X 53 STEEL PILES	
NO. 7	560 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	7 EA

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-38
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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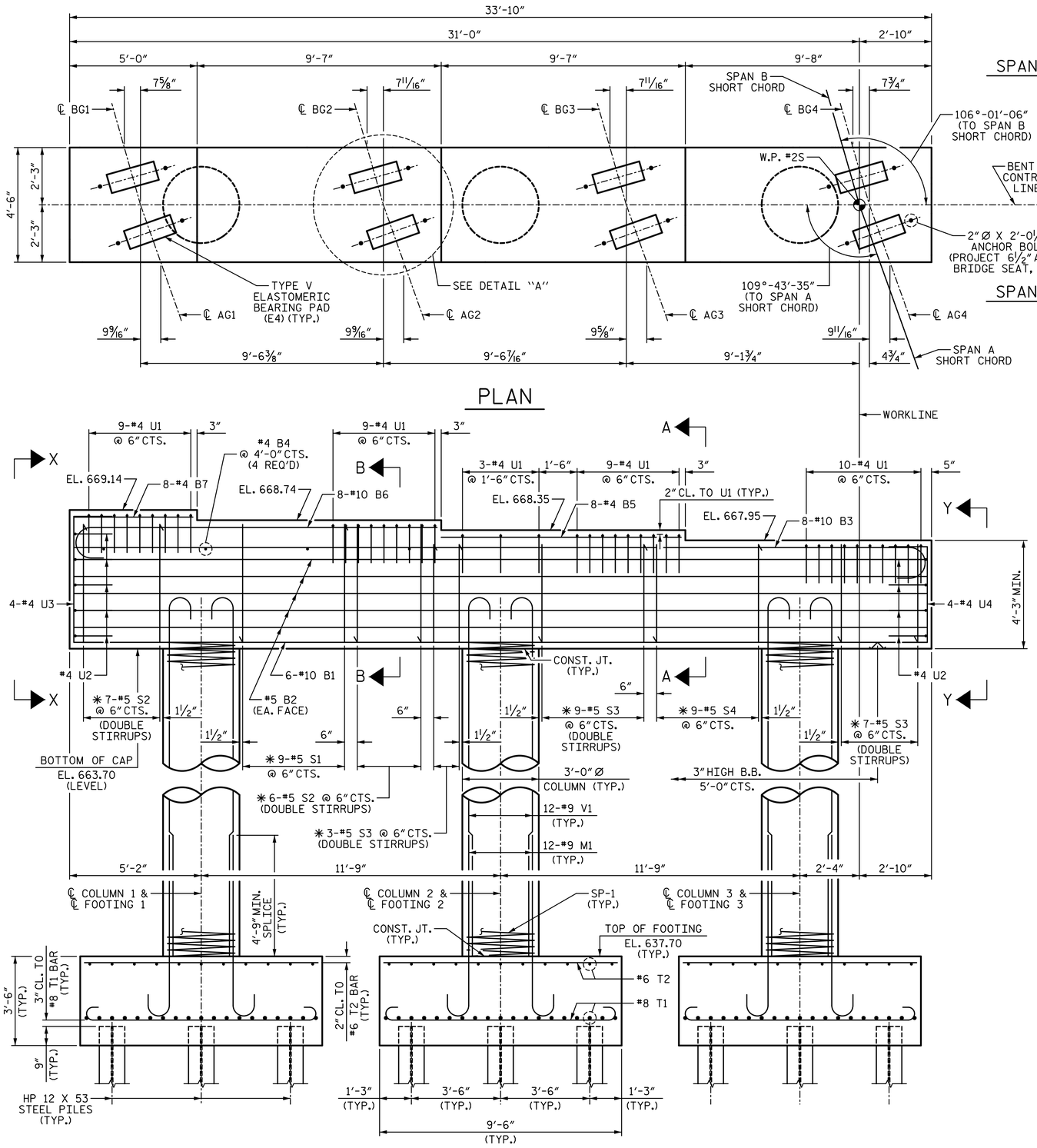
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
3/22/2017

3/22/2017 8:30:08 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_eb1.dgn



NOTES:

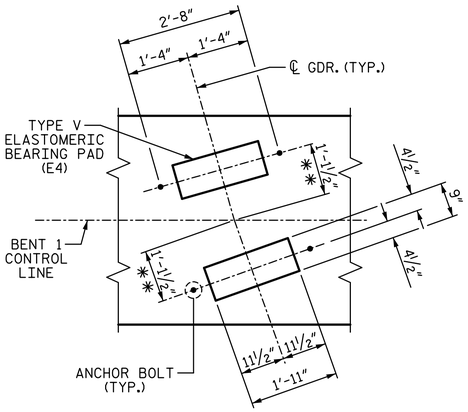
✳ INVERT ALTERNATE STIRRUPS.

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

HOOKS ON ″M″ & ″V″ BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

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

SEE GENERAL DRAWING ″FOUNDATION LAYOUT″ FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL ″A″

(TYP. EA. GIRDER)
(✳✳ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-39
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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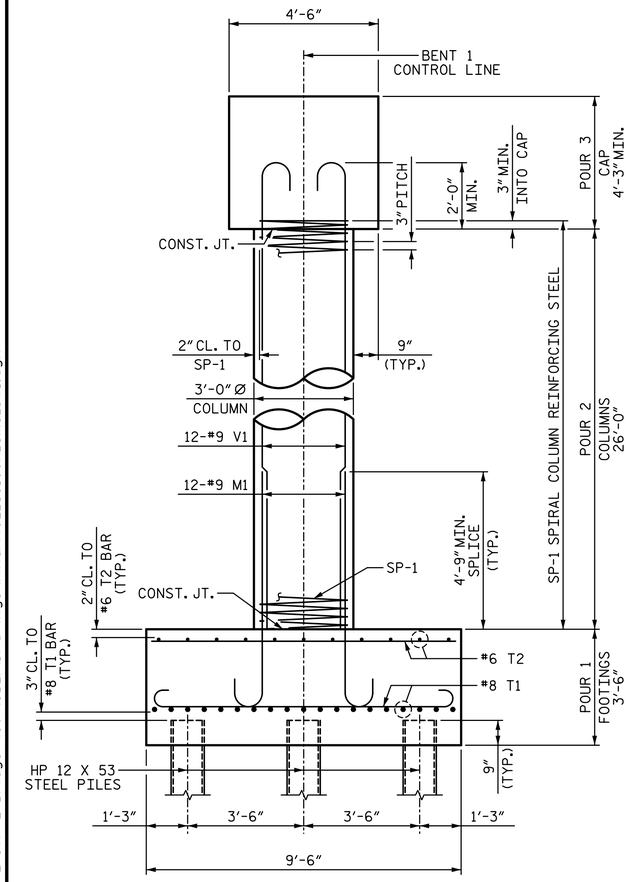
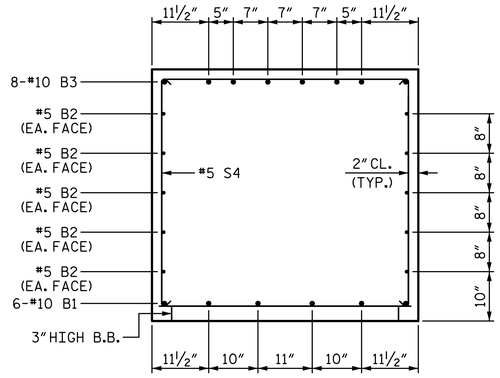
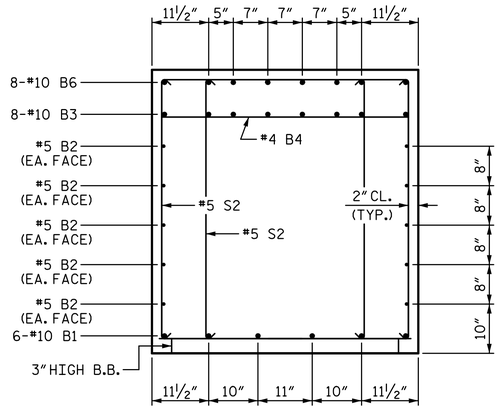


END ELEVATION

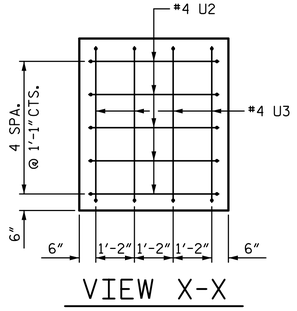
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



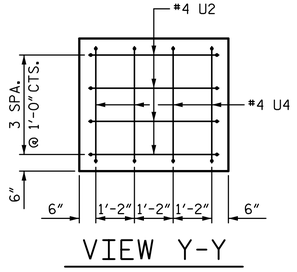
SECTION A-A



SECTION B-B

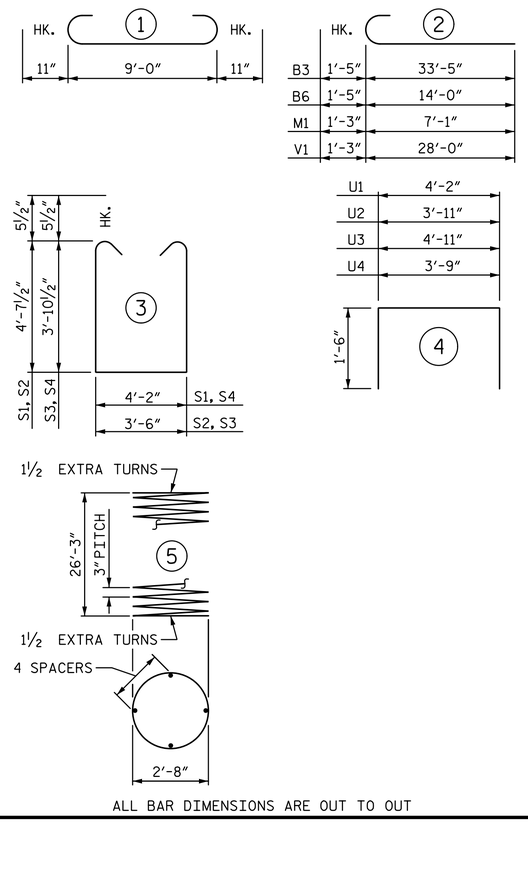


VIEW X-X



VIEW Y-Y

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 1

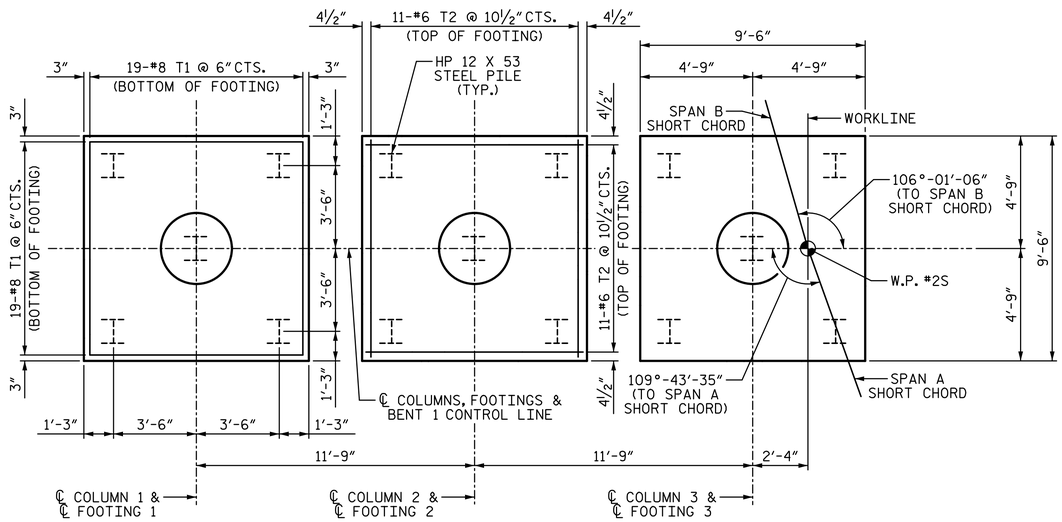
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	33'-6"	865
B2	10	5	STR	33'-6"	349
B3	8	10	2	34'-10"	1199
B4	4	4	STR	4'-2"	11
B5	8	4	STR	9'-5"	50
B6	8	10	2	15'-5"	531
B7	8	4	STR	4'-6"	24
M1	36	9	2	8'-4"	1020
S1	9	5	3	14'-4"	135
S2	26	5	3	13'-8"	371
S3	38	5	3	12'-2"	482
S4	9	5	3	12'-10"	120
T1	114	8	1	10'-10"	3297
T2	66	6	STR	9'-0"	892
U1	40	4	4	7'-2"	191
U2	9	4	4	6'-11"	42
U3	4	4	4	7'-11"	21
U4	4	4	4	6'-9"	18
V1	36	9	2	29'-3"	3580
SP-1	3	*	5	891'-1"	1786

REINFORCING STEEL	13198	LB
SPIRAL COL. REINF. STEEL	1786	LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	20.5 CY
POUR 3 (CAP)	26.9 CY
TOTAL	82.5 CY

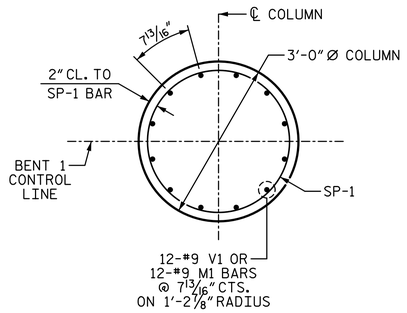
HP 12 X 53 STEEL PILES	
NO. 15	865 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-40
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
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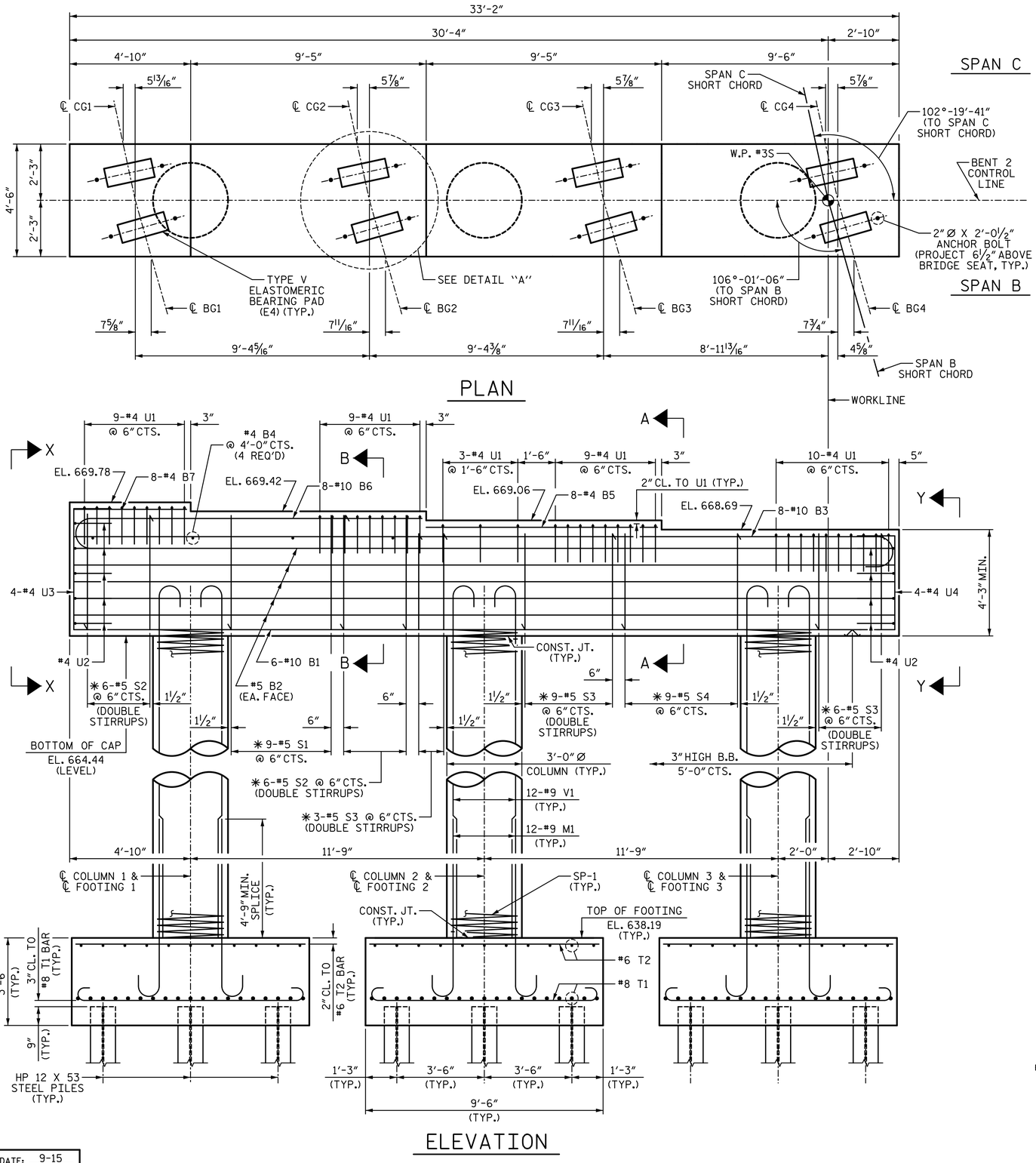
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18068 ENGINEER JOHN A. BATTS
3/22/2017



NOTES:

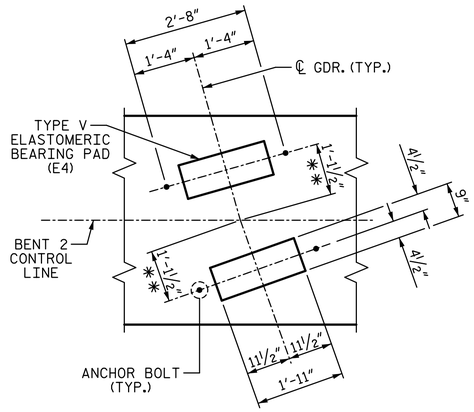
✱ INVERT ALTERNATE STIRRUPS.

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

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL "A"

(TYP. EA. GIRDER)
(✱✱ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-41
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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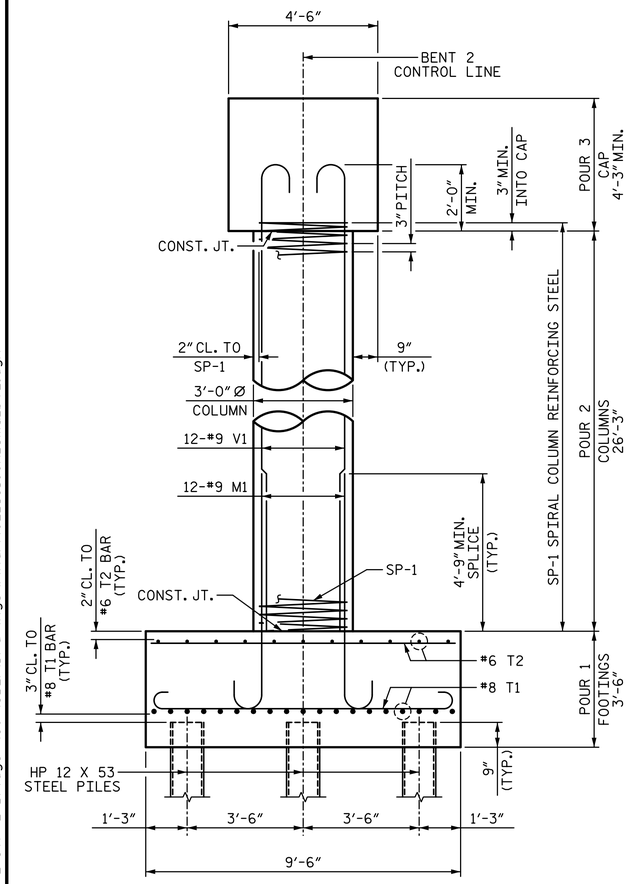
www.simpsonengr.com
LICENSURE NO. C-2521

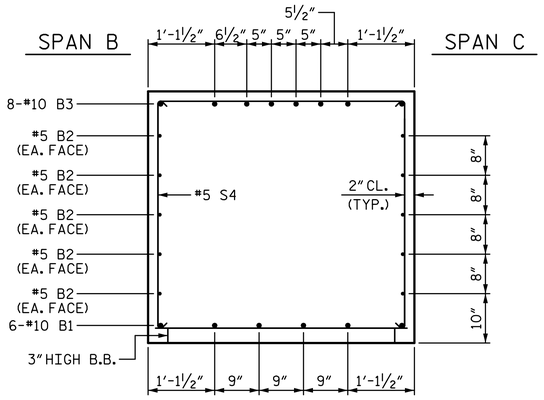
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

9/11/2015 10:16:49 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_bt2.dgn

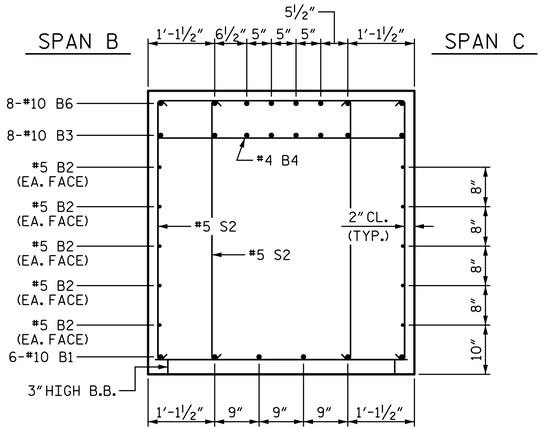


END ELEVATION

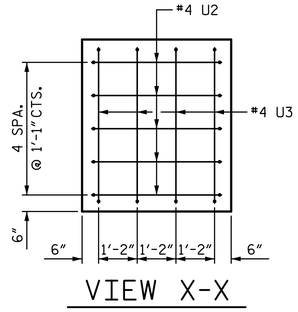
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



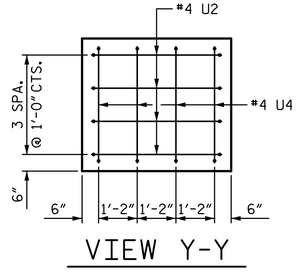
SECTION A-A



SECTION B-B

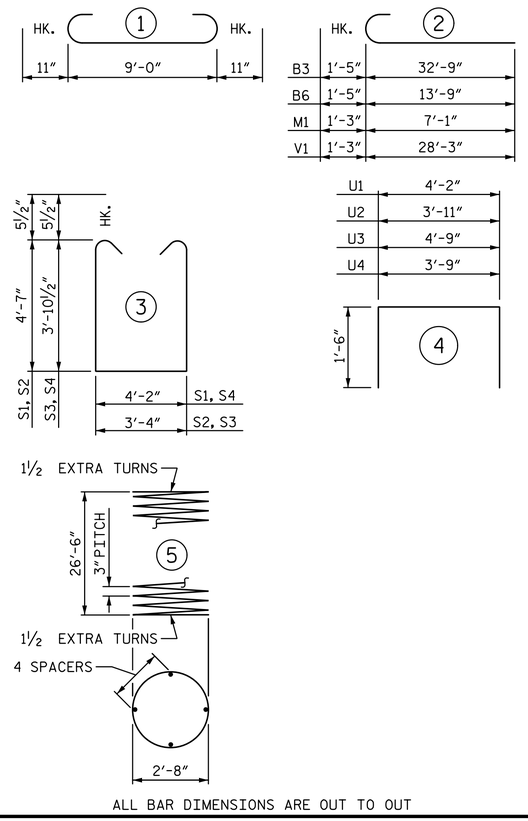


VIEW X-X



VIEW Y-Y

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 2

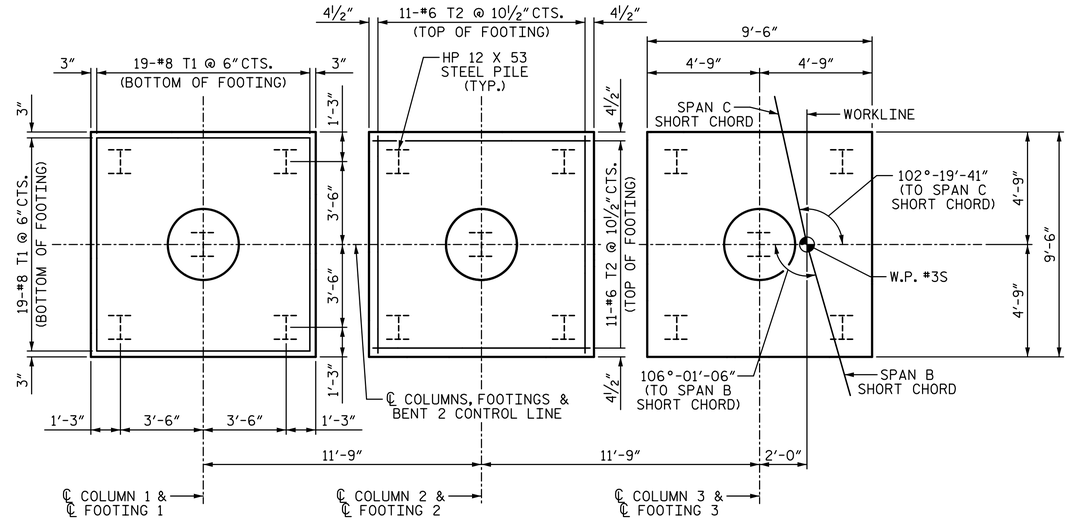
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	32'-10"	848
B2	10	5	STR	32'-10"	342
B3	8	10	2	34'-2"	1176
B4	4	4	STR	4'-2"	11
B5	8	4	STR	9'-3"	49
B6	8	10	2	15'-2"	522
B7	8	4	STR	4'-5"	24
M1	36	9	2	8'-4"	1020
S1	9	5	3	14'-3"	134
S2	24	5	3	13'-5"	336
S3	36	5	3	12'-0"	451
S4	9	5	3	12'-10"	120
T1	114	8	1	10'-10"	3297
T2	66	6	STR	9'-0"	892
U1	40	4	4	7'-2"	191
U2	9	4	4	6'-11"	42
U3	4	4	4	7'-9"	21
U4	4	4	4	6'-9"	18
V1	36	9	2	29'-6"	3611
SP-1	3	*	5	899'-4"	1802

REINFORCING STEEL	13105 LB
SPIRAL COL. REINF. STEEL	1802 LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	20.7 CY
POUR 3 (CAP)	26.1 CY
TOTAL	81.9 CY

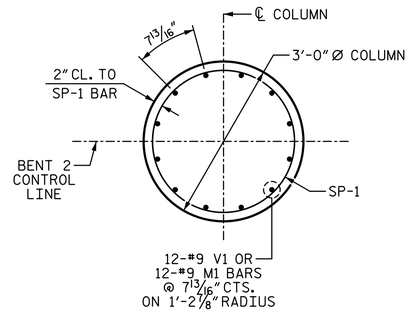
HP 12 X 53 STEEL PILES	
NO. 15	905 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-42
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

PLANS PREPARED BY:

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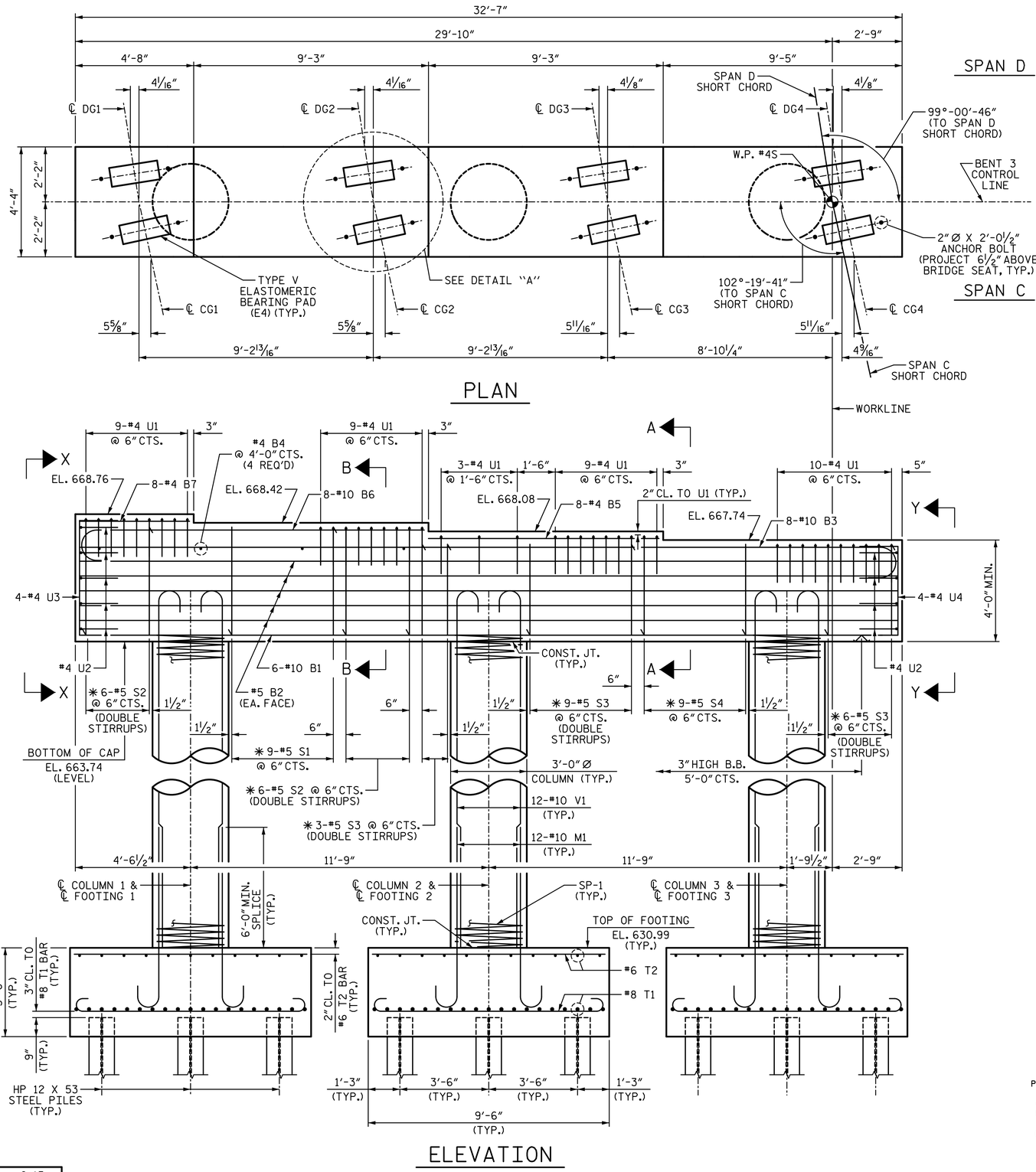
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18054 ENGINEER JOHN A. BATTS
3/22/2017

DRAWN BY:	T. BANKOVICH	DATE: 9-15
CHECKED BY:	J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE: 9-15



NOTES:

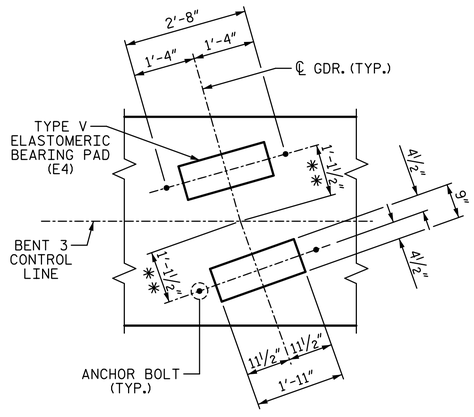
℣ INVERT ALTERNATE STIRRUPS.

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

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL "A"

(TYP. EA. GIRDER)
(℣℣ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 3

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-43
1			3			TOTAL SHEETS
2			4			S02-51

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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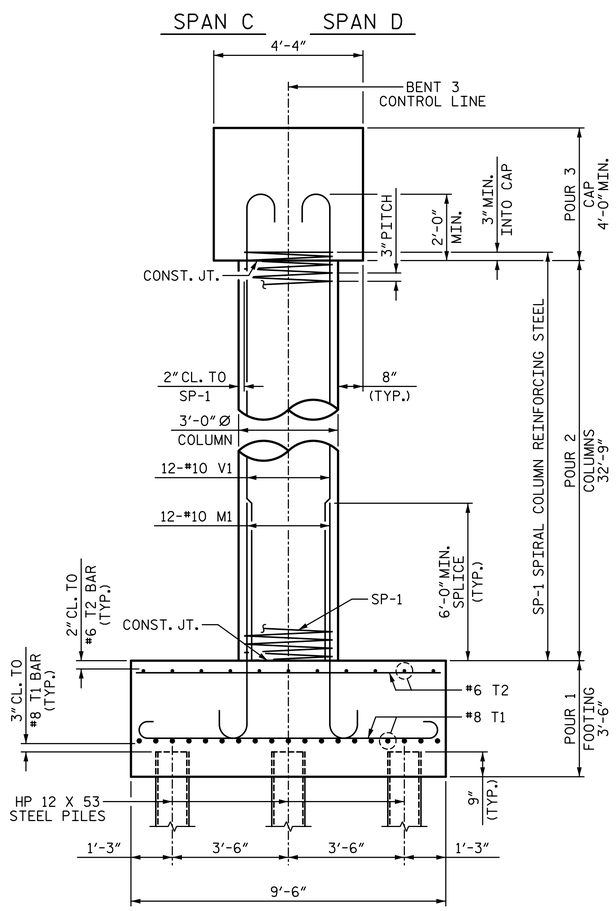
LICENSURE NO. C-2521

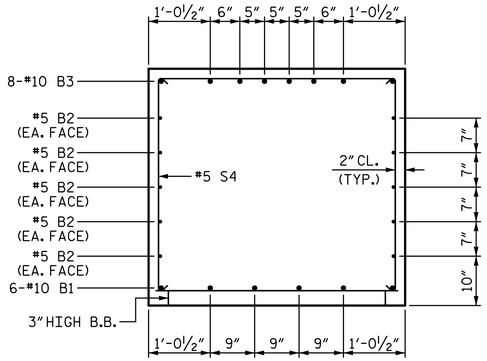
NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
9/11/2015

STR. #2

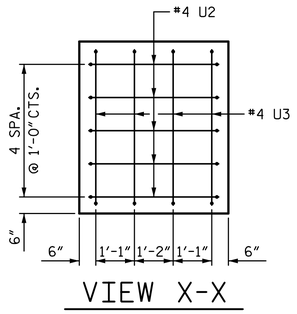


END ELEVATION

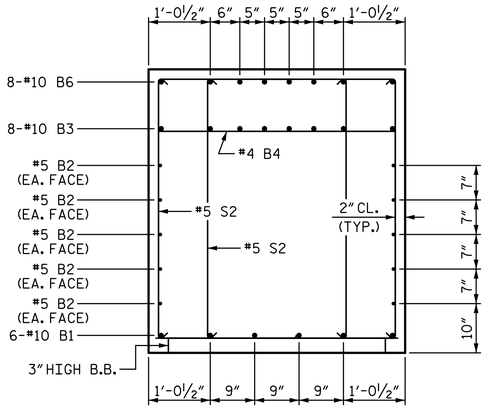
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



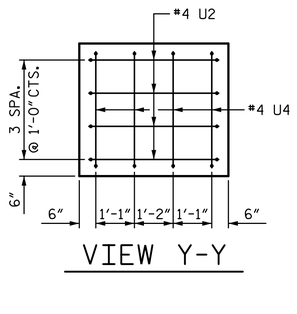
SECTION A-A



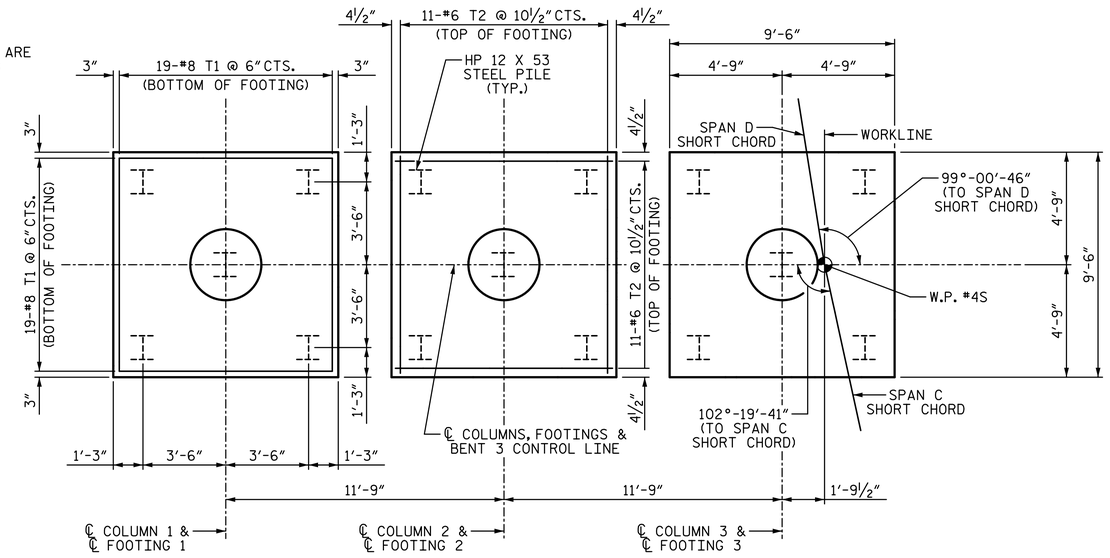
VIEW X-X



SECTION B-B



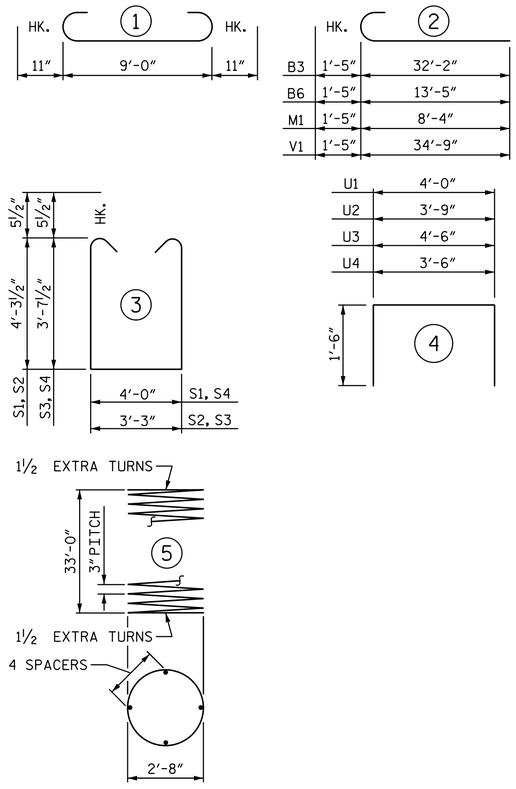
VIEW Y-Y



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 3

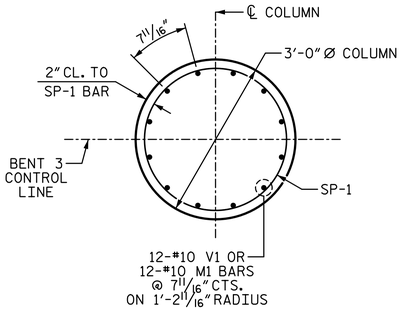
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	32'-3"	833
B2	10	5	STR	32'-3"	336
B3	8	10	2	33'-7"	1156
B4	4	4	STR	4'-0"	11
B5	8	4	STR	9'-1"	49
B6	8	10	2	14'-10"	511
B7	8	4	STR	4'-3"	23
M1	36	10	2	9'-9"	1510
S1	9	5	3	13'-6"	127
S2	24	5	3	12'-9"	319
S3	36	5	3	11'-5"	429
S4	9	5	3	12'-2"	114
T1	114	8	1	10'-10"	3297
T2	66	6	STR	9'-0"	892
U1	40	4	4	7'-0"	187
U2	9	4	4	6'-9"	41
U3	4	4	4	7'-6"	20
U4	4	4	4	6'-6"	17
V1	36	10	2	36'-2"	5603
SP-1	3	*	5	1113'-10"	2232

REINFORCING STEEL	15475 LB
SPIRAL COL. REINF. STEEL	2232 LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	25.8 CY
POUR 3 (CAP)	23.2 CY
TOTAL	84.1 CY

HP 12 X 53 STEEL PILES	
NO. 15	750 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 3

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-44
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
3/22/2017

3/22/2017 8:30:09 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_bt3.dgn

NOTES:

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

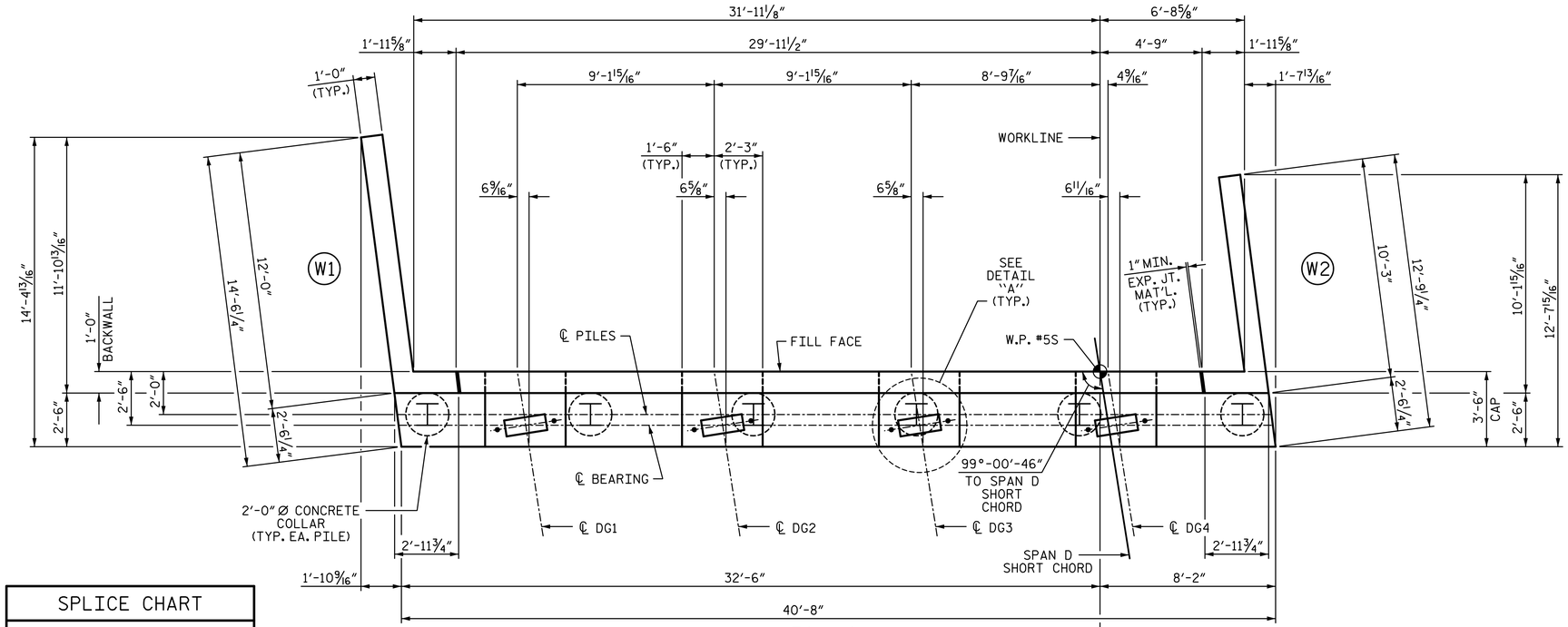
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

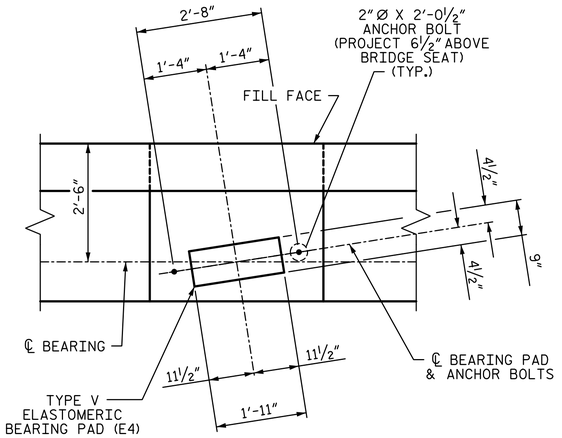
THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

▲ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTIONS A-A AND B-B SHEET 3 OF 3.



PLAN

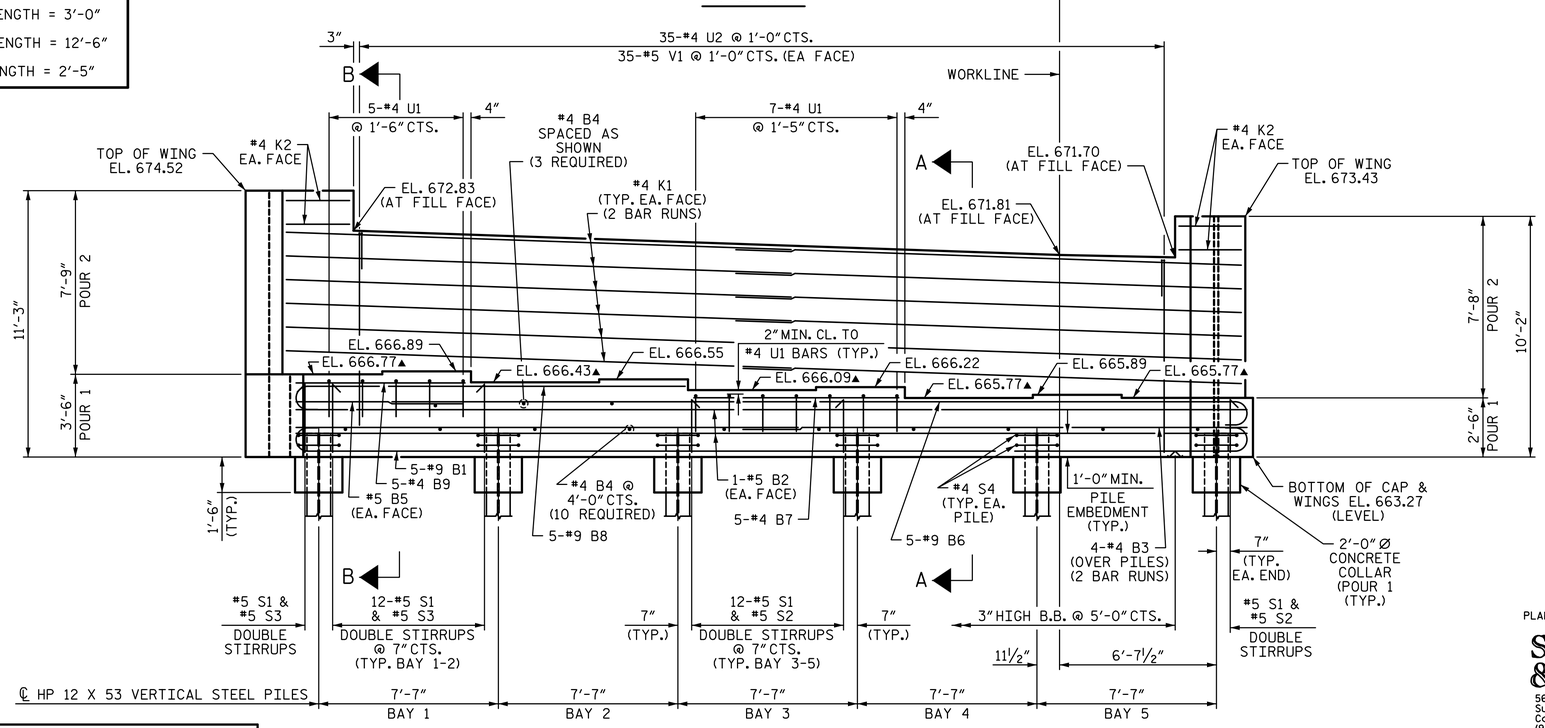


DETAIL "A"

(TYP. EA. GIRDER)

SPLICE CHART

#4 B3 SPLICE LENGTH = 2'-5"
#5 B5 SPLICE LENGTH = 3'-0"
#9 B6 SPLICE LENGTH = 12'-6"
#4 K1 SPLICE LENGTH = 2'-5"



ELEVATION

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 2

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-45
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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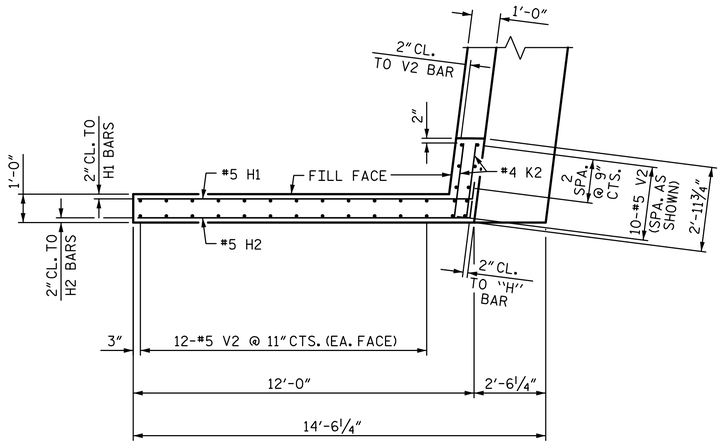
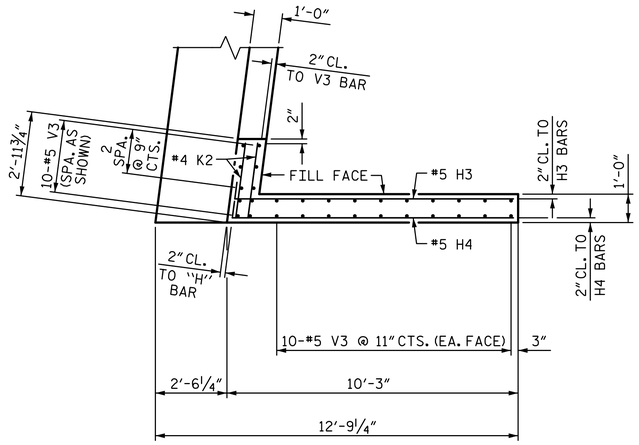
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS

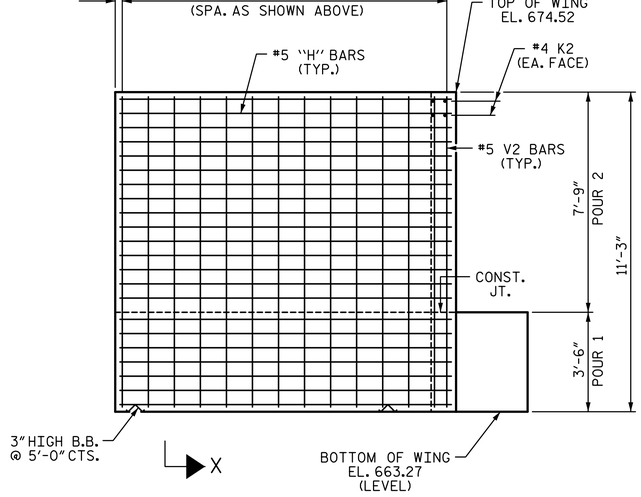
9/11/2015



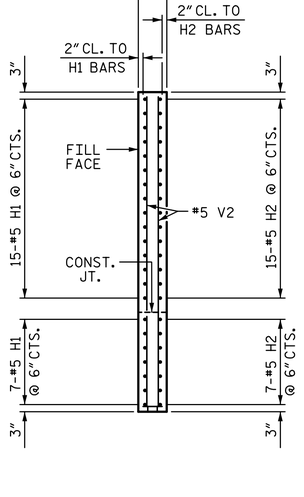
PLAN OF WING (W1)



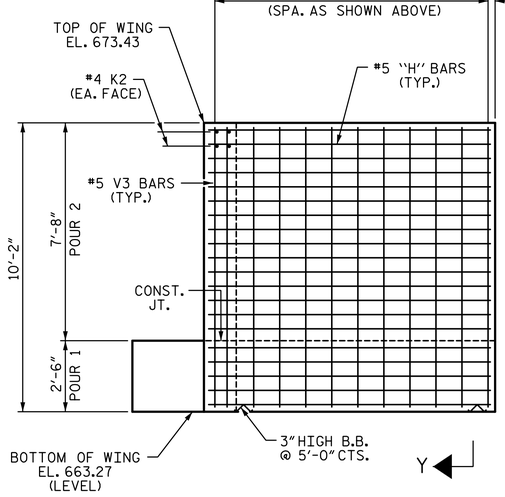
PLAN OF WING (W2)



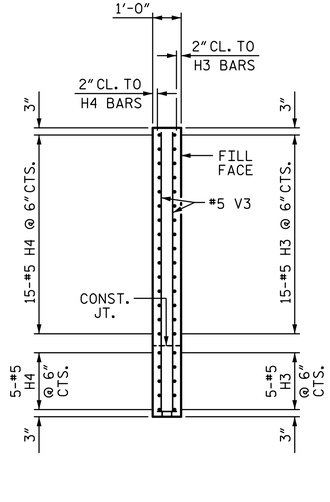
ELEVATION OF WING (W1)



SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

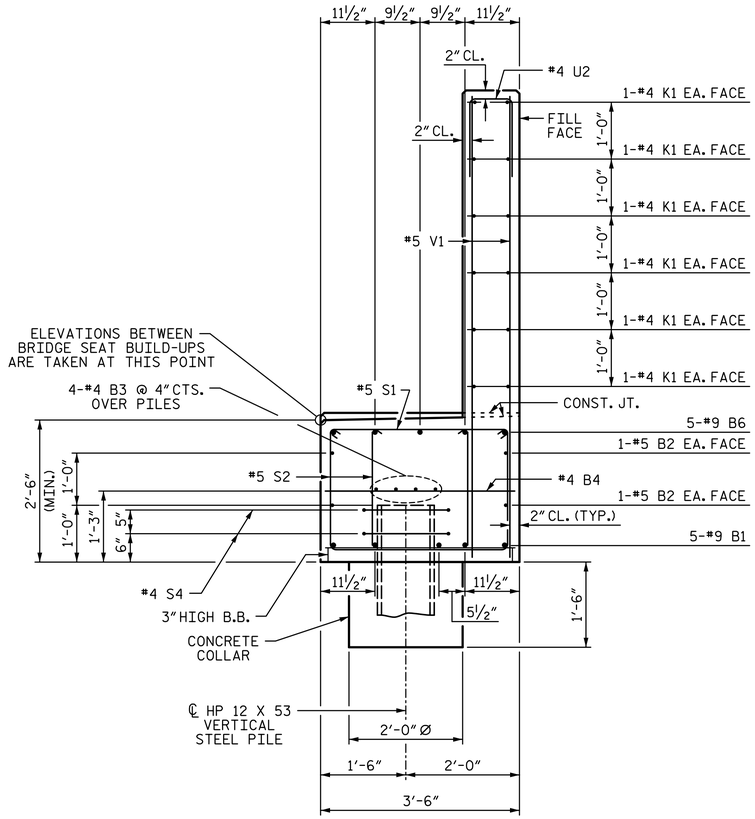
END BENT 2

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-46
1			3			TOTAL SHEETS
2			4			S02-51

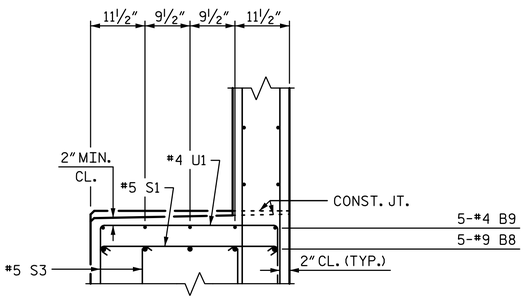
STR. #2

9/11/2015 10:16:50 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 2 Bridge 436 (SBL)\Drawings\Final\402_U3109A_smu_eb2.dgn

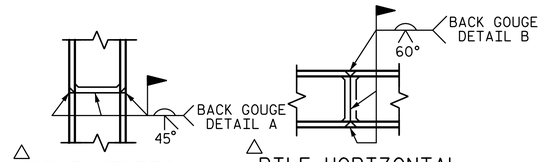


SECTION A-A

(TIEBACK NOT SHOWN FOR CLARITY)

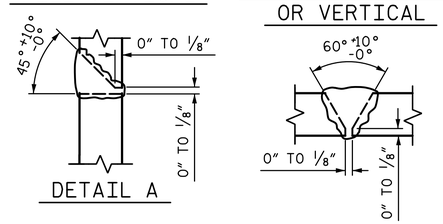


SECTION B-B



△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL

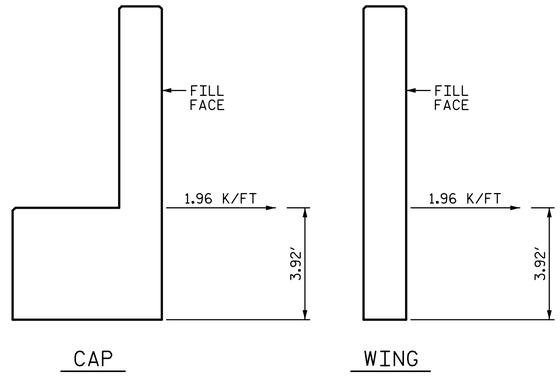


DETAIL A

DETAIL B

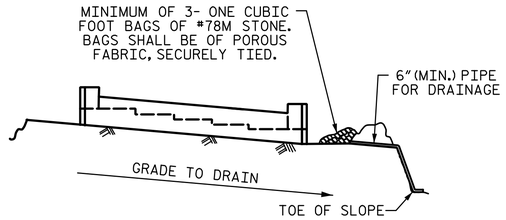
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



CAP WING

TIEBACK DETAILS



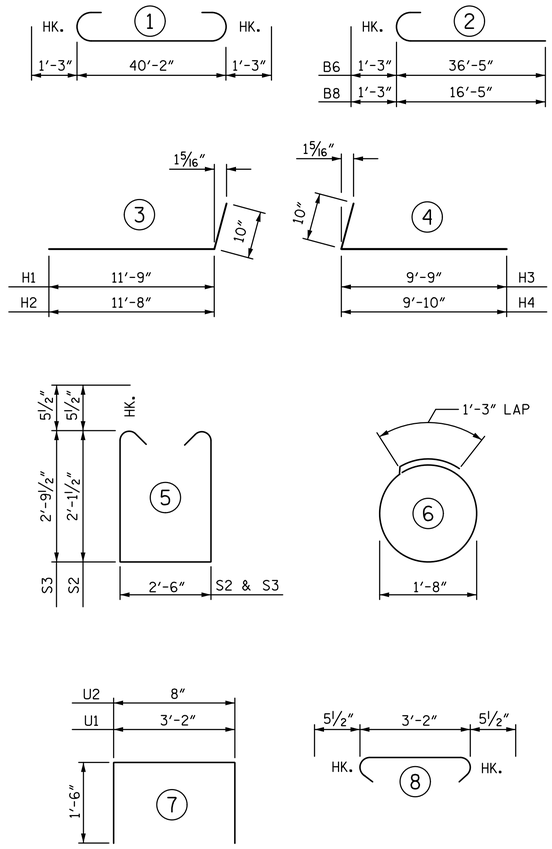
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	9	1	42'-8"	725
B2	4	5	STR	40'-4"	168
B3	8	4	STR	21'-5"	114
B4	13	4	STR	3'-2"	27
B5	2	5	STR	6'-11"	14
B6	5	9	2	37'-8"	640
B7	5	4	STR	8'-9"	29
B8	5	9	2	17'-8"	300
B9	5	4	STR	6'-9"	23
H1	22	5	3	12'-7"	289
H2	22	5	3	12'-6"	287
H3	20	5	4	10'-7"	221
H4	20	5	4	10'-8"	223
K1	24	4	STR	21'-5"	343
K2	8	4	STR	2'-7"	14
S1	62	5	8	4'-1"	264
S2	37	5	5	7'-8"	296
S3	50	5	5	9'-0"	469
S4	12	4	6	6'-6"	52
U1	12	4	7	6'-2"	49
U2	35	4	7	3'-8"	86
V1	70	5	STR	7'-11"	578
V2	34	5	STR	10'-10"	384
V3	30	5	STR	9'-9"	305

TOTAL REINFORCING STEEL	5900 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	18.9 CY
POUR 2	
(BACKWALL AND UPPER WINGS)	15.2 CY
TOTAL CLASS "A" CONCRETE	34.1 CY
HP 12 X 53 STEEL PILES	
NO. 6	495 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	6 EA

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-47
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
SIMPSON ENGINEERING & ASSOCIATES
5640 Dillard Drive
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Cary, NC 27518
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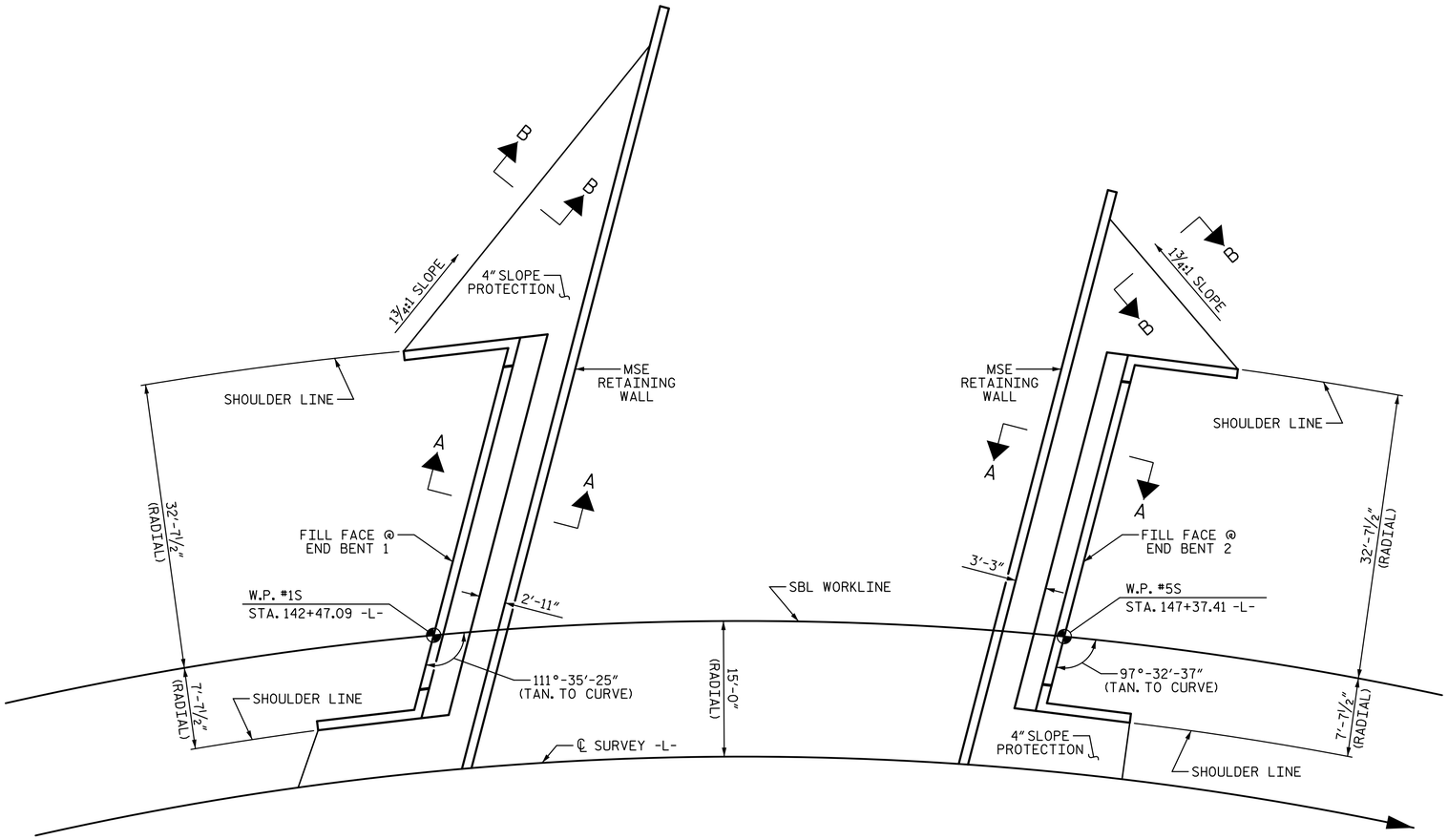
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18854 ENGINEER JOHN A. BATTS
3/22/2017



@ END BENT 1

@ END BENT 2

PLAN OF SLOPE PROTECTION

GENERAL 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.

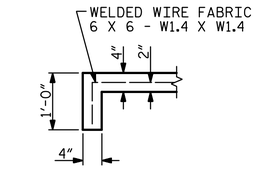
SLOPE PROTECTION NOTES:

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.

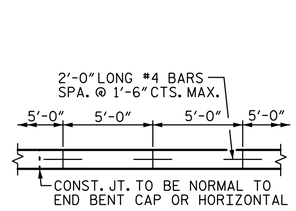
ESTIMATED QUANTITIES

BRIDGE @ STA. 146+61.35 -L-	4" SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SY	APPROX. LF
END BENT 1	65	118
END BENT 2	45	82

* QUANTITY SHOWN BASED ON 5'-0" POURS

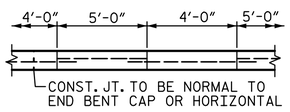


SECTION B-B



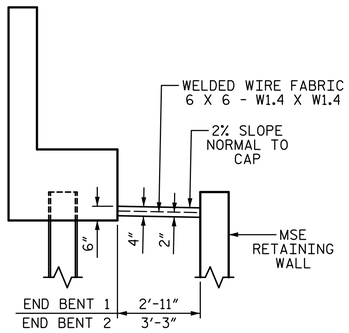
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POUR DETAIL



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

OPTIONAL POUR DETAIL



SECTION A-A

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-48
1			3			TOTAL SHEETS
2			4			S02-51

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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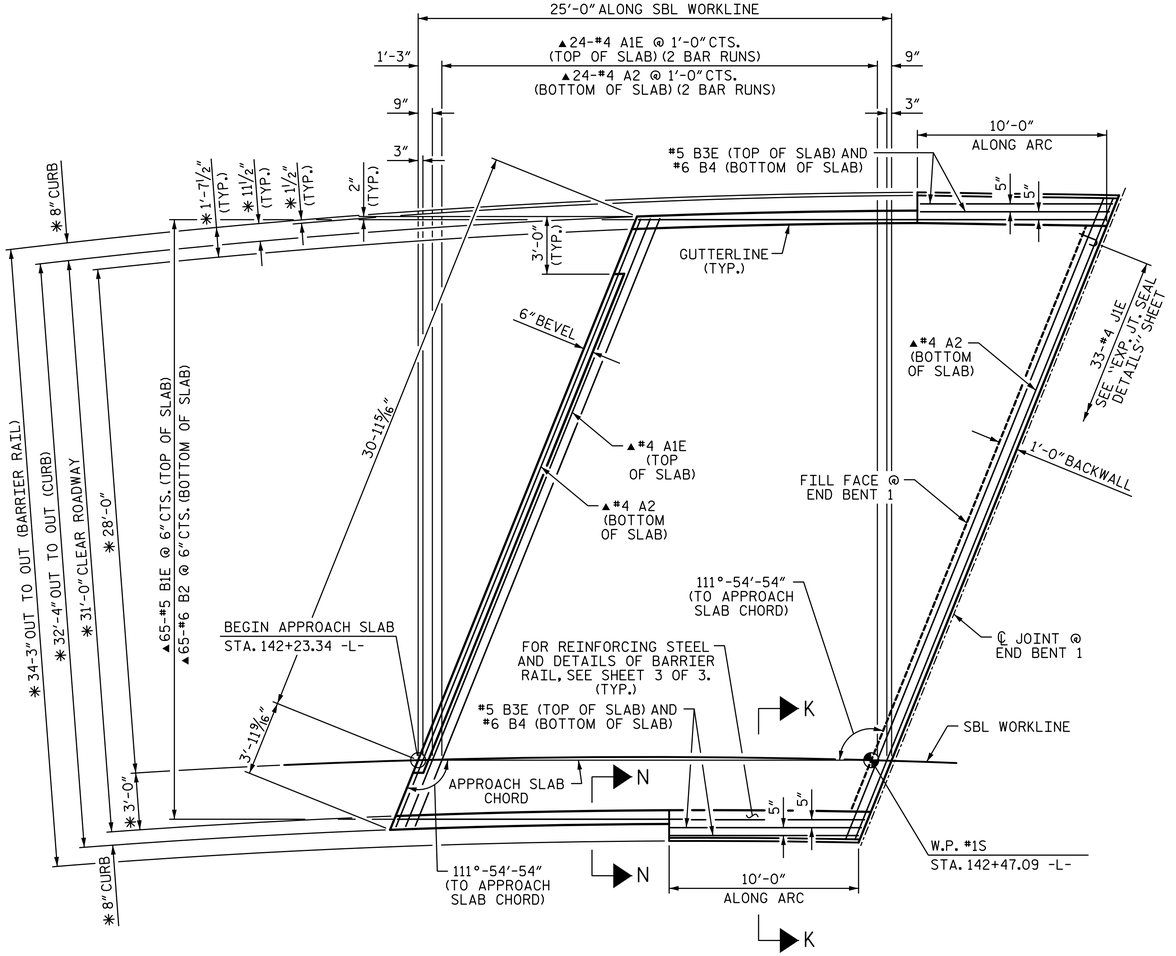
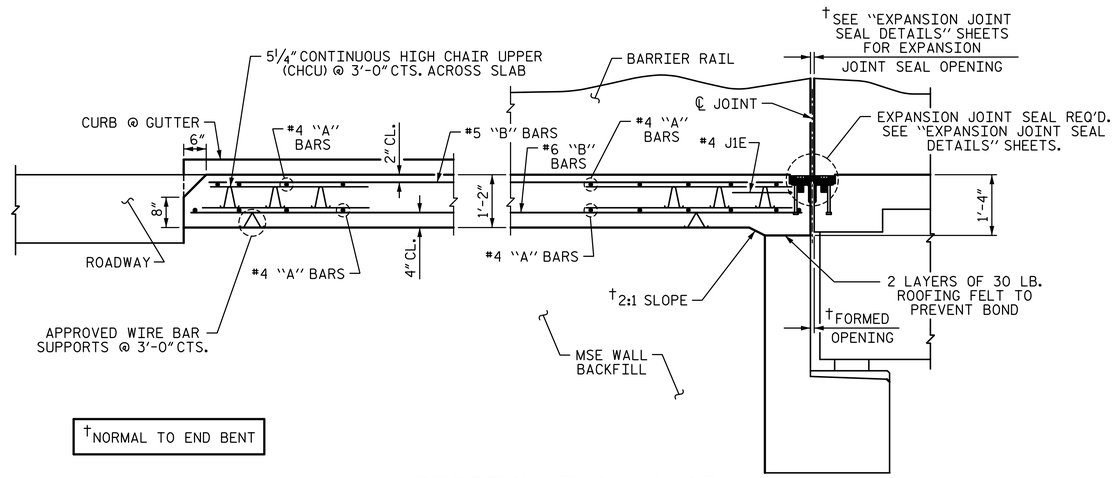
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18656 ENGINEER JOHN A. BATTS
9/11/2015

STR. #2



PLAN @ END BENT 1



†NORMAL TO END BENT

SECTION THRU SLAB

BACKWALL RESTRAINTS ON END BENT NOT SHOWN FOR CLARITY.

NOTES:

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

FOR MSE WALL BACKFILL, SEE SHEET W-4.

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.

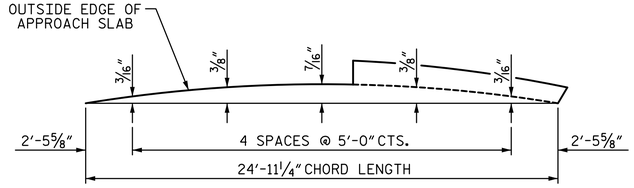
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED. ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

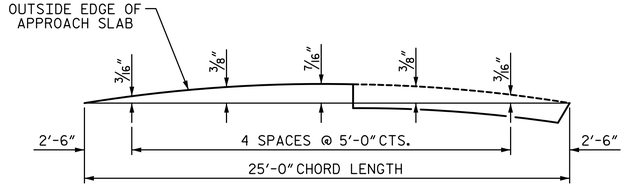
✳RADIAL DIMENSION

▲ "A" BARS ARE TO BE PLACED PARALLEL TO FILL FACE. "B" BARS ARE TO BE PLACED PARALLEL TO THE APPROACH SLAB CHORD.

FOR SECTIONS K-K AND N-N, SEE SHEET 2 OF 3.



LEFT SIDE



RIGHT SIDE

ARC OFFSETS @ END BENT 1

BILL OF MATERIAL

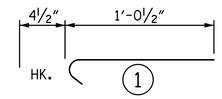
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	50	4	STR	19'-3"	643
A2	52	4	STR	19'-1"	663
B1E	65	5	STR	23'-9"	1610
B2	65	6	STR	24'-7"	2400
B3E	4	5	STR	9'-6"	40
B4	4	6	STR	9'-6"	57
J1E	33	4	1	1'-5"	31

REINFORCING STEEL	3120 LB
EPOXY COATED REINFORCING STEEL	2324 LB
CLASS "AA" CONCRETE BREAKDOWN POUR 1 (SLAB & CURB)✳✳	36.0 CY

"E" INDICATES EPOXY COATED REINFORCING STEEL.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED, SEE SHEET 3 OF 3.

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-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-49
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
3/22/2017

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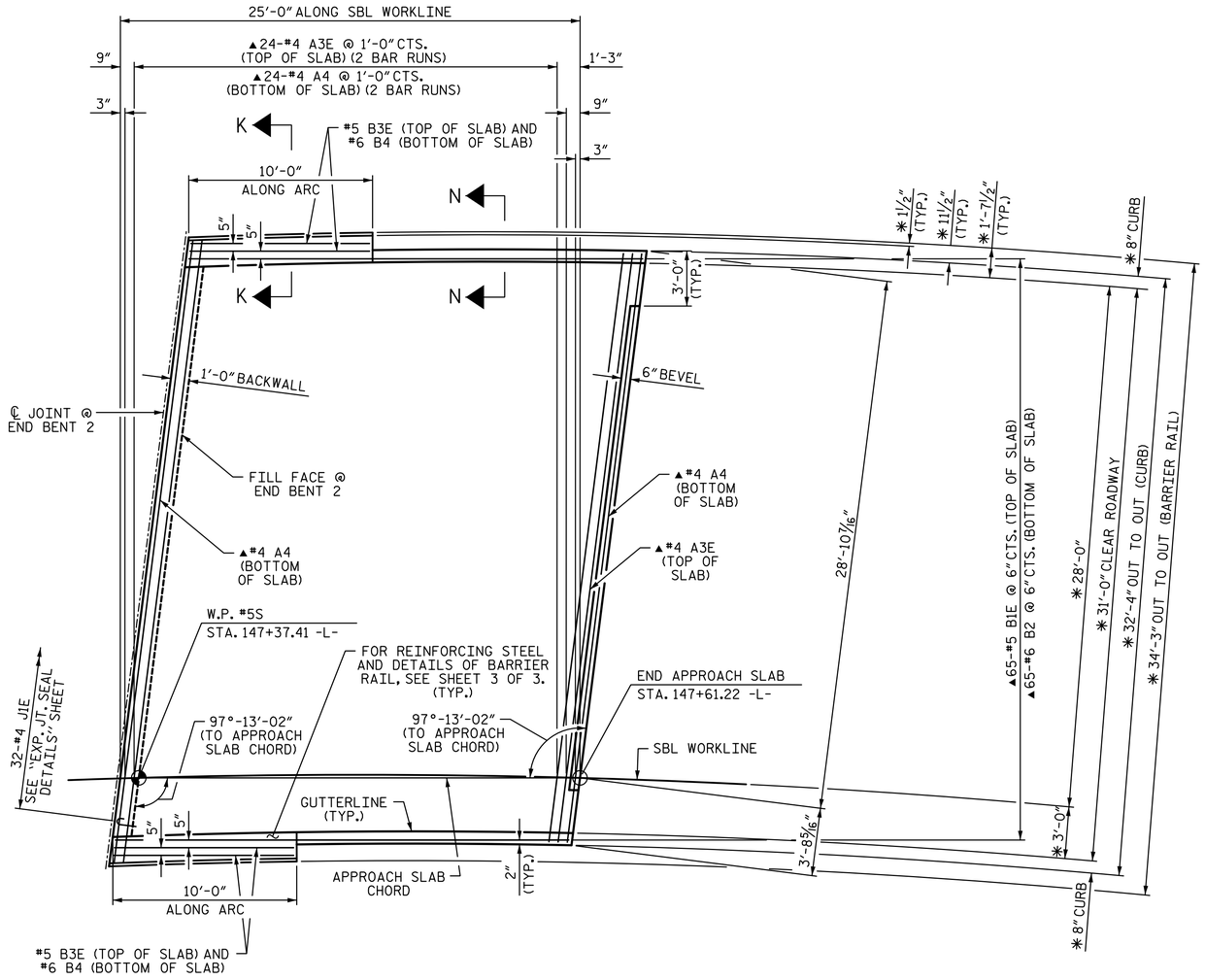


PLAN @ END BENT 2

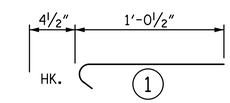
NOTES:

SEE NOTES SHEET 1 OF 3.

BILL OF MATERIAL					
APPROACH SLAB AT EB 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A3E	50	4	STR	18'-2"	607
A4	52	4	STR	18'-0"	625
B1E	65	5	STR	23'-9"	1610
B2	65	6	STR	24'-7"	2400
B3E	4	5	STR	9'-6"	40
B4	4	6	STR	9'-6"	57
J1E	32	4	1	1'-5"	30
REINFORCING STEEL					3082 LB
EPOXY COATED REINFORCING STEEL					2287 LB
CLASS "AA" CONCRETE BREAKDOWN POUR 1 (SLAB & CURB)✱✱					36.0 CY

"E" INDICATES EPOXY COATED REINFORCING STEEL.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

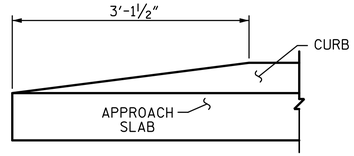
✱✱ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED, SEE SHEET 3 OF 3.

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

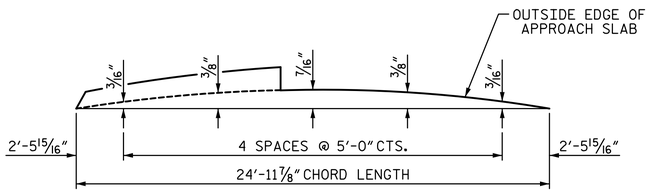
SECTION K-K

(ALSO SEE "END VIEW @ EXP. JOINTS" ON SHEET 3 OF 3)

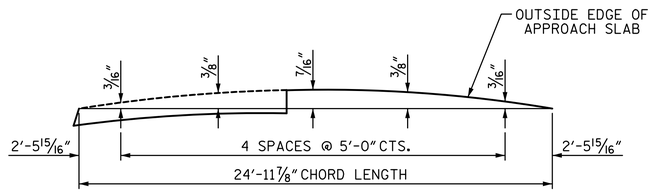


END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



LEFT SIDE



RIGHT SIDE

ARC OFFSETS @ END BENT 2

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(SBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-50
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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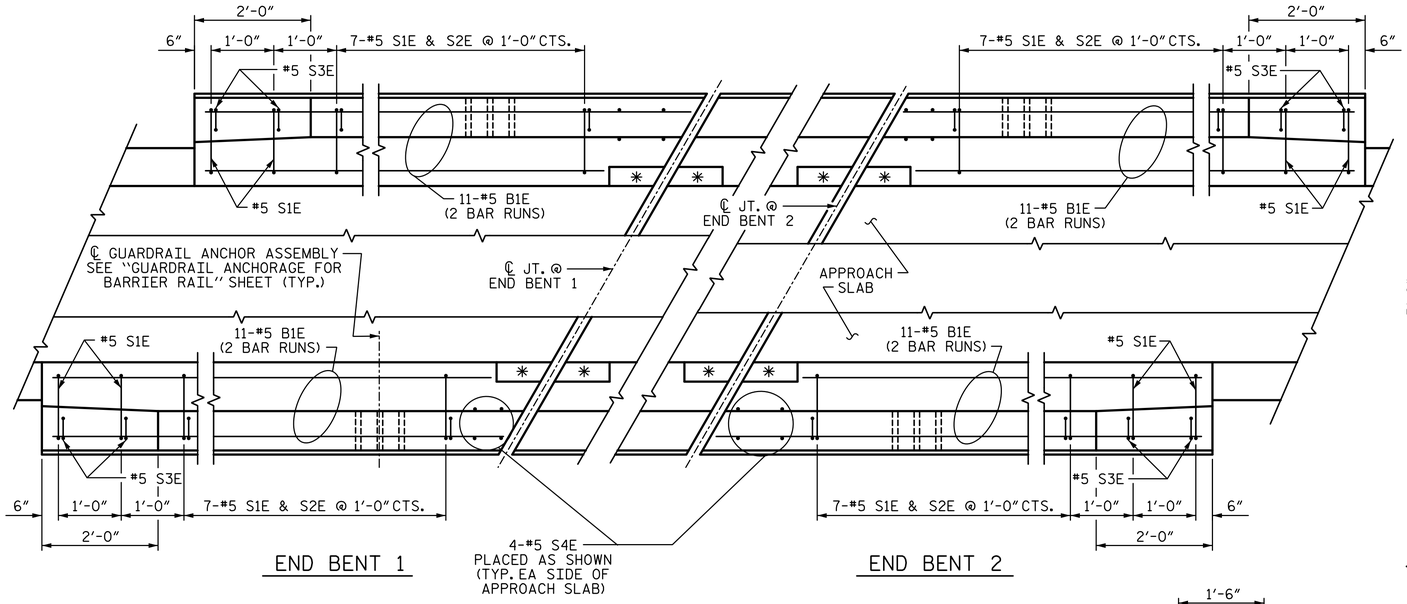
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18036 ENGINEER JOHN A. BATTS
9/11/2015



END BENT 1 END BENT 2

PLAN OF BARRIER RAIL

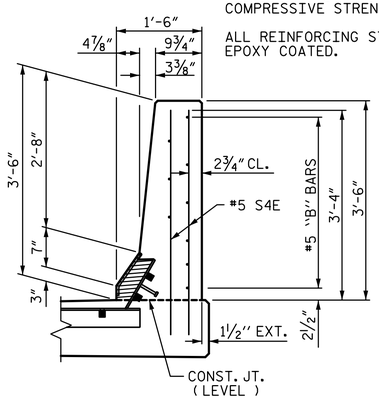
*FOR BLOCKOUT DETAILS, SEE "EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL" SHEET 2 OF 2.

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".

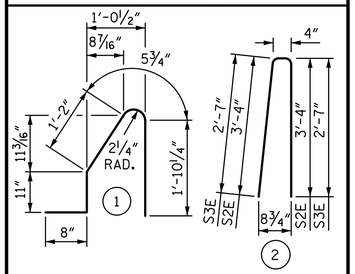
THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.



END VIEW @ EXP. JOINTS

BAR TYPES



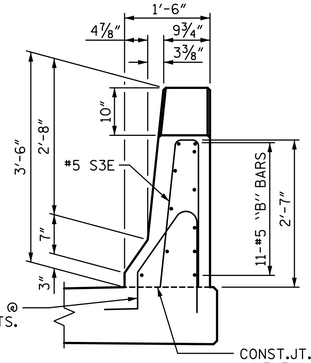
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

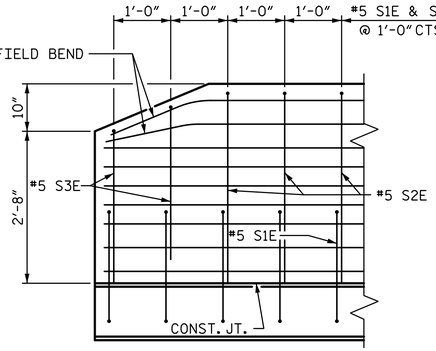
BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	88	5	STR	6'-10"	627
S1E	36	5	1	5'-1"	191
S2E	28	5	2	7'-0"	204
S3E	8	5	2	5'-6"	46
S4E	16	5	STR	4'-0"	67
EPOXY COATED REINFORCING STEEL					1135 LB
CLASS "AA" CONCRETE					5.4 CY
CONCRETE BARRIER RAIL					40.8 LF

"E" INDICATES EPOXY COATED REINFORCING STEEL

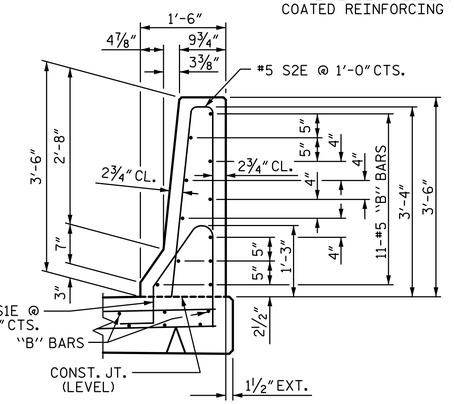


END VIEW

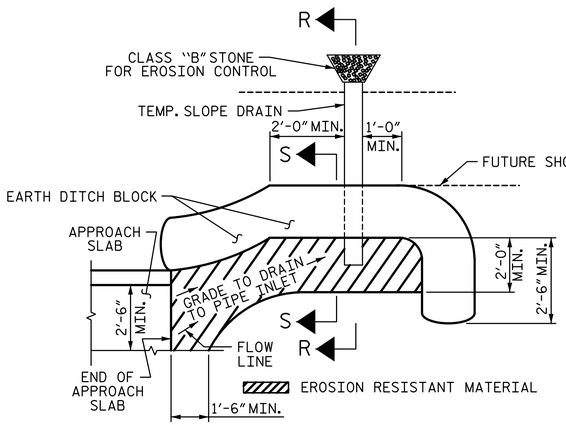


SIDE VIEW

END OF RAIL DETAILS

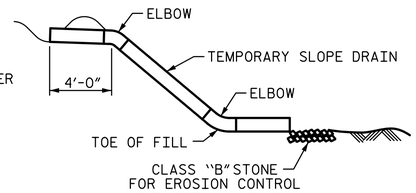


SECTION THRU RAIL

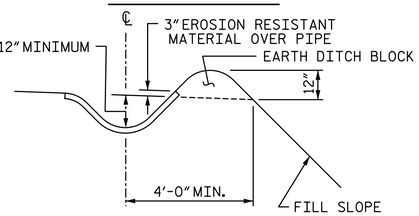


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

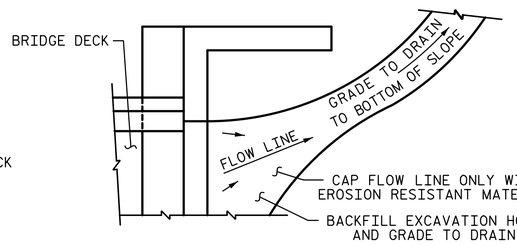
PLAN VIEW



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)

DRAWN BY:	S.D. COOPER	DATE: 9-15
CHECKED BY:	J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE: 9-15

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
9/11/2015

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(SBL)

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 3 OF 3

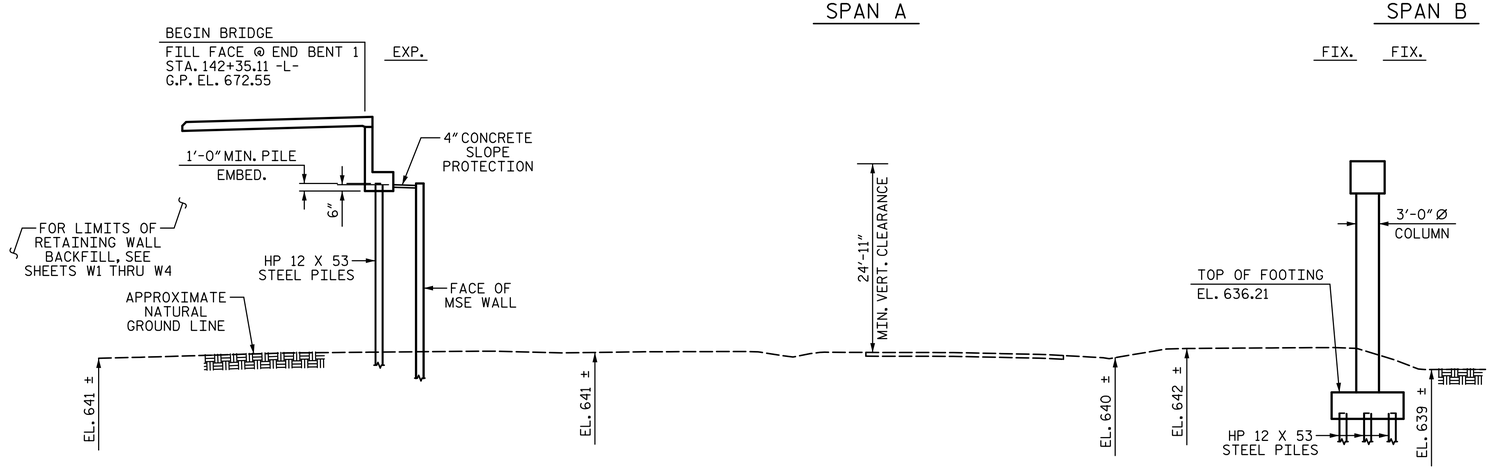
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S02-51
1			3			TOTAL SHEETS
2			4			S02-51

STR. #2

142+00 143+00 144+00

SPAN A SPAN B

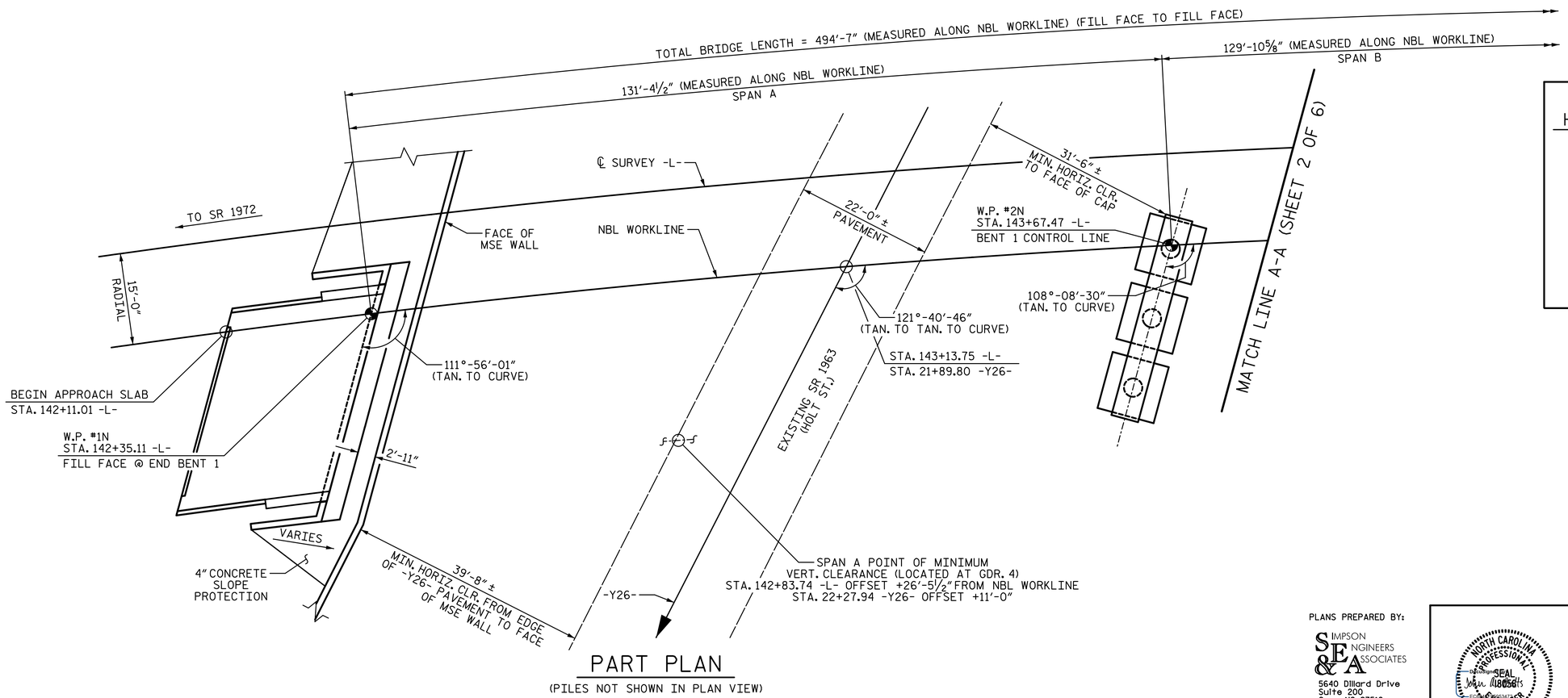
FIX. FIX.



END BENT 1 BENT 1

PART SECTION ALONG NBL WORKLINE

(SECTIONS @ END BENT AND BENT @ RIGHT ANGLES)



PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

(+)5.1600% (-)5.2000%

PVI STA. 145+00.00
EL. = 689.41
VC = 1035'

GRADE DATA -L-

HORIZONTAL CURVE DATA -L-

PIs 141+33.32 -L-
θs = 2°-51'-53.2"
Ls = 200.00'
LT = 133.35'
ST = 66.68'

PI STA. 156+58.38 -L-
Δ = 72°-11'-58.8"(RT.)
D = 2°-51'-53.2"
L = 2,520.24'
T = 1,458.42'
R = 2,000.00'

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 1 OF 6 BRIDGE #435
MILE POST H-30

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-1
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
2/10/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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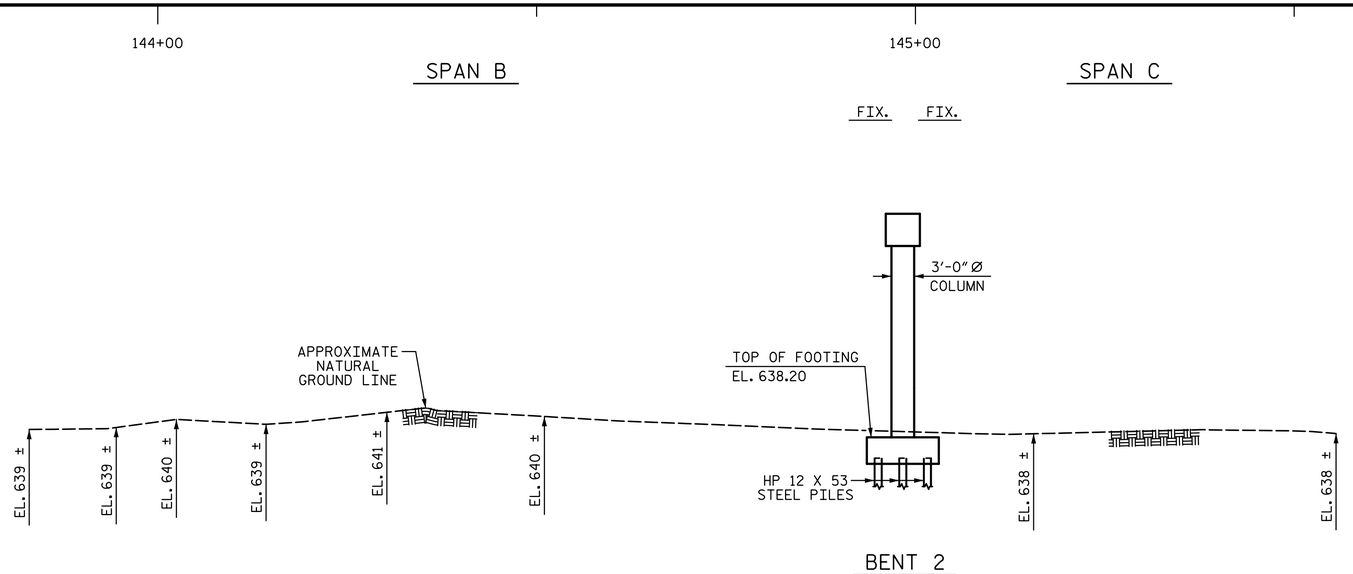
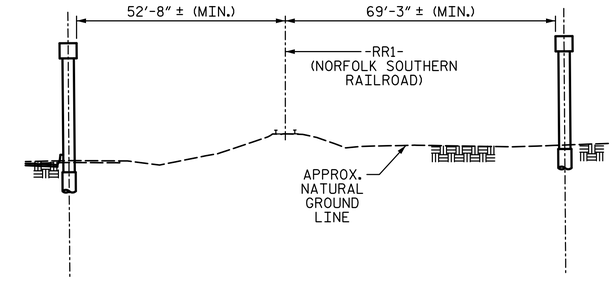


BENT 2

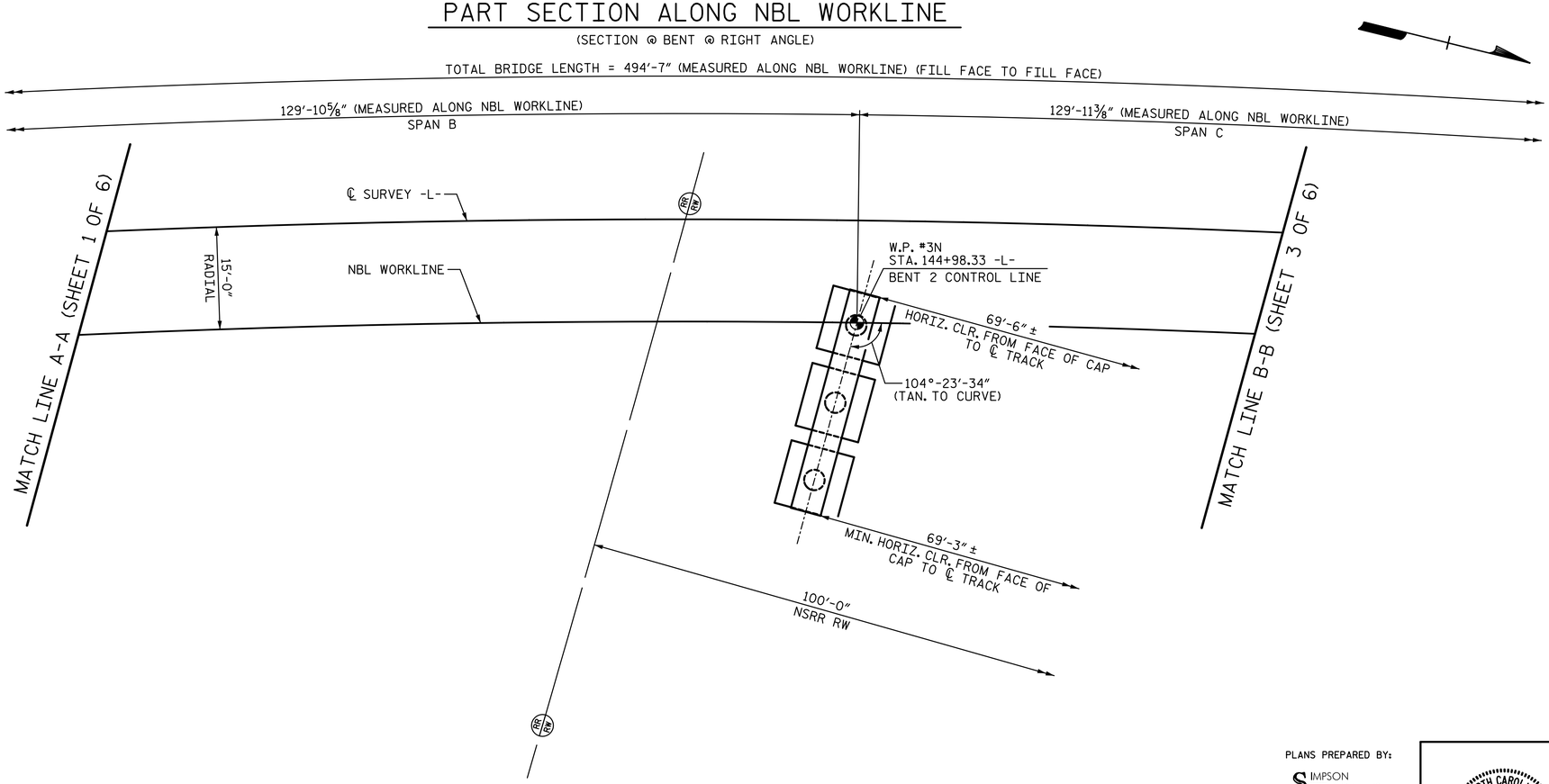
PART SECTION ALONG NBL WORKLINE

(SECTION @ BENT @ RIGHT ANGLE)



SECTION THRU RAILROAD

(SECTION TAKEN AT RIGHT ANGLE TO RAILROAD)
(SPAN C LENGTH BASED ON THIS SECTION)
LOOKING TOWARD MILE POST H-30



PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 2 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-2
1			3			TOTAL SHEETS
2			4			S03-53

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DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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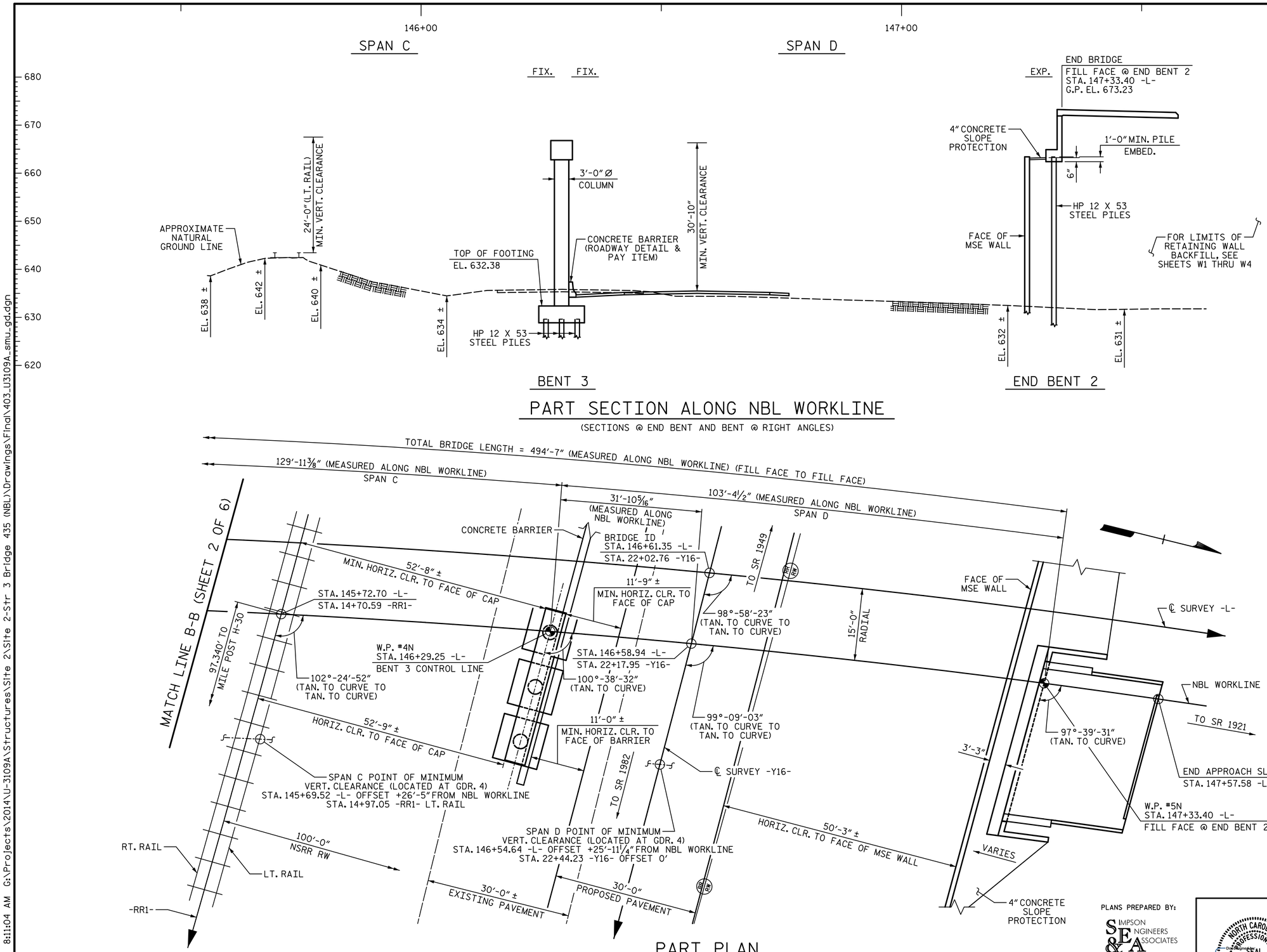

PART SECTION ALONG NBL WORKLINE

(SECTIONS @ END BENT AND BENT @ RIGHT ANGLES)

PART PLAN

(PILES NOT SHOWN IN PLAN VIEW)

HORIZONTAL CURVE DATA -Y16-

PI STA. 20+70.99
Δ = 6°-03'-45.0" (RT.)
D = 0°-42'-58.3"
L = 846.48'
T = 423.64'
R = 8,000.00'

TOP OF RAIL ELEVATIONS

STA. -RR1-	LT. RAIL	RT. RAIL
11+23.48	640.23	640.03
11+70.95	640.60	640.38
12+17.57	640.99	640.79
12+65.92	641.37	641.16
13+13.78	641.80	641.61
13+58.89	642.22	642.03
14+05.88	642.70	642.51
14+53.39	643.17	642.99
15+02.14	643.67	643.48
15+32.90	643.98	643.80
15+87.93	644.56	644.39
16+33.21	645.01	644.87

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-
SHEET 3 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-3
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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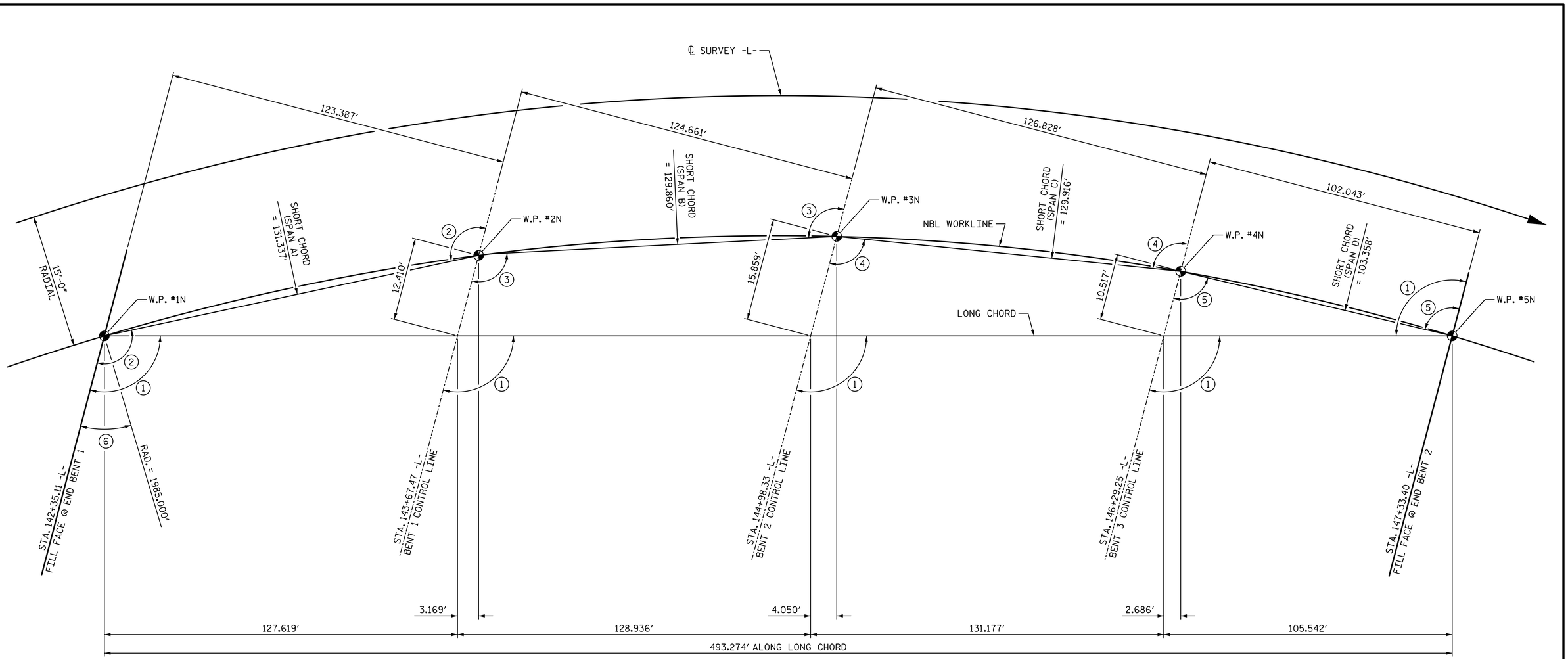
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017



LONG CHORD LAYOUT

(WORK POINT STATIONS SHOWN ARE GIVEN ALONG ℄ SURVEY -L-)
(ALL END BENTS AND BENTS ARE PARALLEL)

ANGLES

1. 104°-47′-45″(TO LONG CHORD)
2. 110°-02′-15″(TO SHORT CHORD - SPAN A)
3. 106°-16′-02″(TO SHORT CHORD - SPAN B)
4. 102°-31′-03″(TO SHORT CHORD - SPAN C)
5. 99°-09′-01″(TO SHORT CHORD - SPAN D)
6. 21°-56′-01″

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CHECKED BY: J.A. BATTS DATE: 9-15
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1/6/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-

SHEET 4 OF 6

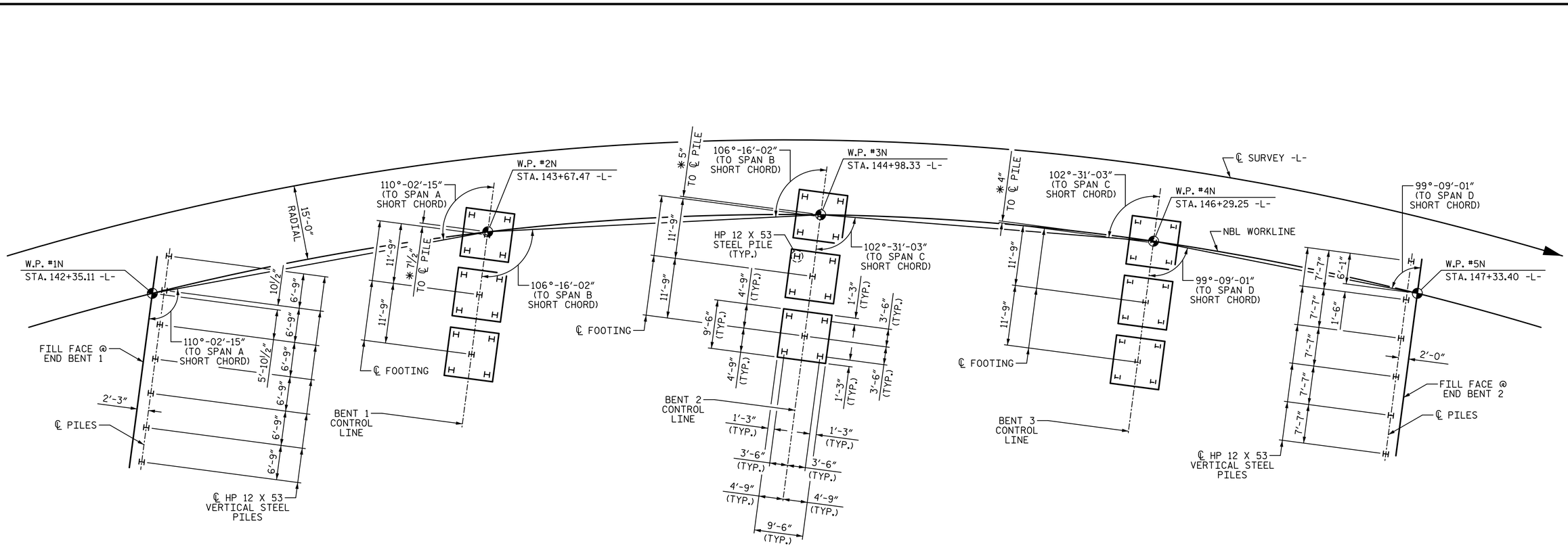
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-4
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3



END BENT 1 | BENT 1 | BENT 2 | BENT 3 | END BENT 2

FOUNDATION LAYOUT

(DIMENSIONS LOCATING PILES ARE TO THE PILE CENTERLINE AT THE BOTTOM OF THE CAP OR FOOTING)
(* DIMENSION SHOWN IS MEASURED FROM BENT WORK LINE TO ℄ PILE, SEE "BENT" SHEETS.)
(DIMENSIONS AND PILE LOCATIONS ARE TYPICAL FOR EACH FOOTING)

FOUNDATION NOTES:

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PILES AT END BENT 1 AND END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.

PILES AT BENT 1, BENT 2, AND BENT 3 ARE DESIGNED FOR A FACTORED RESISTANCE OF 140 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 200 TONS PER PILE.

DRIVE PILES AT BENT 1, BENT 2, AND BENT 3 TO A REQUIRED DRIVING RESISTANCE OF 235 TONS PER PILE.

IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENGERGY IN THE RANGE OF 55,745 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT 1, BENT 1, BENT 2, BENT 3, AND END BENT 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

IF PILES ARE INSTALLED AFTER MSE WALL CONSTRUCTION, USE A FORM TO BLOCK OUT PILE LOCATIONS DURING WALL CONSTRUCTION. DRIVE PILES INSIDE FORM AND FILL FORM WITH NON-EXCAVATABLE FLOWABLE FILL PER ARTICLE 340-2 OF THE STANDARD SPECIFICATIONS.

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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NORTH CAROLINA PROFESSIONAL SEAL 18066 ENGINEER JOHN A. BATTS
1/6/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-
SHEET 5 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-5
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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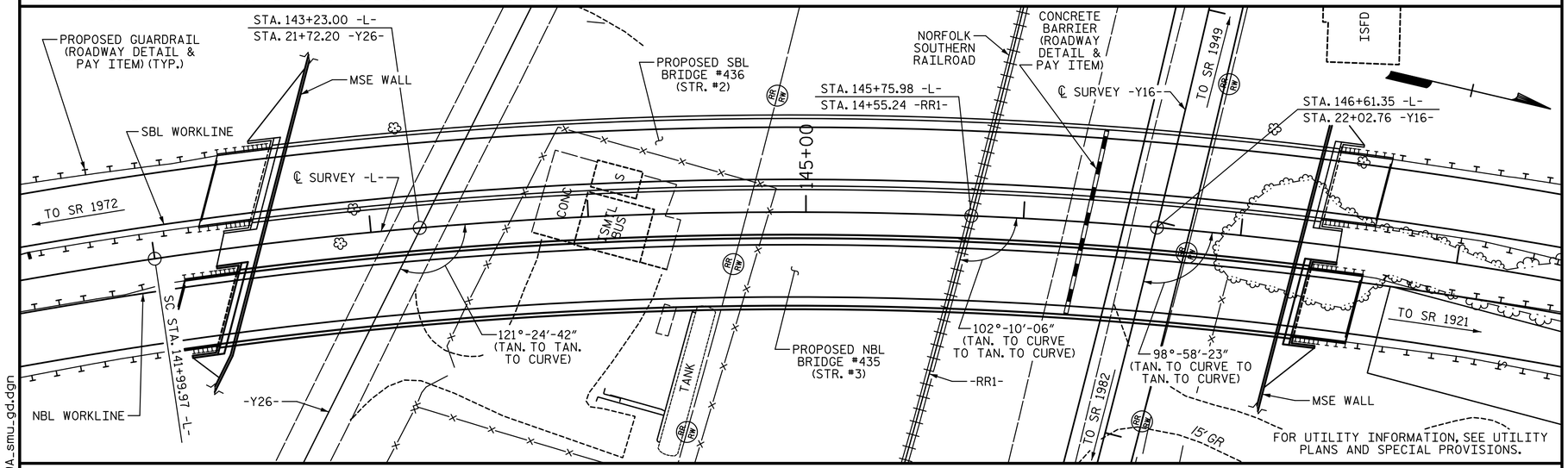
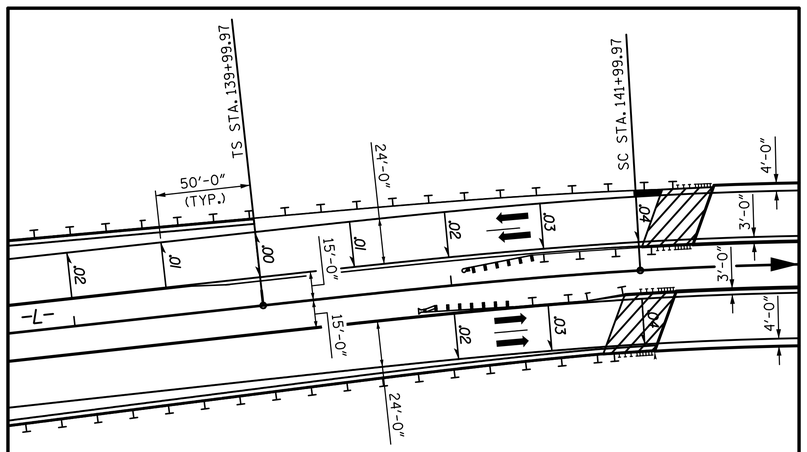
BM #8 CHISLED MARK ON SW CORNER OF CONCRETE PAD, STA. 148+53.00 -L-, 284.00' RT., EL. 643.49



LOCATION SKETCH

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP HP 12 X 53 STEEL PILES	HP 12 X 53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS	ELECTRICAL CONDUIT SYSTEM FOR SIGNALS
	LS	SF	SF	CY	LS	LB	LB	NO	LF	EA	NO	LF	LF	SY	LS	LS	LS
SUPERSTRUCTURE		16869	15095		LS			16	1952.58				1026.2		LS	LS	LS
END BENT 1				43.4		7280				7	7	580		40			
BENT 1	LS			82.9		13165	1802			15	15	865					
BENT 2	LS			81.1		12987	1736			15	15	905					
BENT 3	LS			82.4		15132	2083			15	15	825					
END BENT 2				34.3		6204				6	6	570		50			
TOTAL	LS	16869	15095	324.1	LS	54768	5621	16	1952.58	58	58	3745	1026.2	90	LS	LS	LS



SUPERELEVATION TRANSITION DETAIL

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.

THE ELEVATIONS AND CLEARANCES SHOWN ON THE PLANS AT THE POINTS OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATION(S) 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.

THE RAILROAD TRACK TOP OF RAIL ELEVATIONS ON THE PLANS ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE TOP OF RAIL ELEVATIONS AND REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

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

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

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

WORK SHALL NOT BE STARTED ON BENT 3 UNTIL -Y16- ROADWAY SECTION HAS BEEN EXCAVATED.

FOR ELECTRICAL CONDUIT SYSTEM, SEE SPECIAL PROVISIONS.

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
2/13/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-
22+02.76 -Y16-
SHEET 6 OF 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

FOR NBL BRIDGE ON NC 119 OVER HOLT ST., NORFOLK SOUTHERN RAILROAD (NSRR) AND US 70 BETWEEN SR 1972 AND SR 1921 (NBL)

REVISIONS						SHEET NO.
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STR. #3

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS $\gamma_{(LL)}$	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 $\gamma_{(LL)}$	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.12	- -	1.75	0.787	1.33	D	EL	49.9	0.746	1.16	D	I	29.6	0.80	0.787	**1.12**	C	EL	63.9	
		HL-93 (OPERATING)	N/A		1.65	- -	1.35	0.787	1.73	D	EL	49.9	0.747	1.65	C	I	25.1	N/A	- -	- -	- -	- -	- -	
		HS-20 (INVENTORY)	36.000	2	1.67	60.1	1.75	0.787	1.86	D	EL	49.9	0.747	1.76	C	I	25.1	0.80	0.787	**1.67**	C	EL	63.9	
		HS-20 (OPERATING)	36.000		2.36	85.0	1.35	0.787	2.41	D	EL	49.9	0.747	2.36	C	I	25.1	N/A	- -	- -	- -	- -	- -	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.26	44.0	1.40	0.787	5.52	D	EL	49.9	0.747	6.12	C	I	25.1	0.80	0.787	3.26	D	EL	49.9	
		SNGARBS2	20.000		2.32	46.4	1.40	0.787	4.00	D	EL	49.9	0.747	4.17	C	I	25.1	0.80	0.787	2.32	C	EL	63.9	
		SNAGRIS2	22.000		2.16	47.5	1.40	0.787	3.74	D	EL	49.9	0.747	3.81	C	I	25.1	0.80	0.787	2.16	C	EL	63.9	
		SNCOTTS3	27.250		1.62	44.1	1.40	0.787	2.74	D	EL	49.9	0.747	2.88	C	I	25.1	0.80	0.787	1.62	D	EL	49.9	
		SNAGGRS4	34.925		1.31	45.8	1.40	0.787	2.25	D	EL	49.9	0.747	2.27	C	I	25.1	0.80	0.787	1.31	C	EL	63.9	
		SNS5A	35.550		1.29	45.9	1.40	0.787	2.20	D	EL	49.9	0.747	2.27	C	I	25.1	0.80	0.787	1.29	C	EL	63.9	
		SNS6A	39.950		1.16	46.3	1.40	0.787	2.00	D	EL	49.9	0.747	2.03	C	I	25.1	0.80	0.787	1.16	C	EL	63.9	
		SNS7B	42.000		1.11	46.6	1.40	0.787	1.90	D	EL	49.9	0.747	1.96	C	I	25.1	0.80	0.787	1.11	C	EL	63.9	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.41	46.5	1.40	0.787	2.43	D	EL	49.9	0.747	2.49	C	I	25.1	0.80	0.787	1.41	C	EL	63.9	
		TNT4A	33.075		1.42	47.0	1.40	0.787	2.44	D	EL	49.9	0.747	2.44	C	I	25.1	0.80	0.787	1.42	C	EL	63.9	
		TNT6A	41.600		1.14	47.4	1.40	0.787	1.98	D	EL	49.9	0.747	2.04	C	I	25.1	0.80	0.787	1.14	C	EL	63.9	
		TNT7A	42.000		1.14	47.9	1.40	0.787	1.98	D	EL	49.9	0.747	2.01	C	I	25.1	0.80	0.787	1.14	C	EL	63.9	
		TNT7B	42.000		1.16	48.7	1.40	0.787	2.02	D	EL	49.9	0.747	1.93	C	I	25.1	0.80	0.787	1.16	C	EL	63.9	
		TNAGRIT4	43.000		1.12	48.2	1.40	0.787	1.94	D	EL	49.9	0.747	1.86	C	I	25.1	0.80	0.787	1.12	C	EL	63.9	
		TNAGT5A	45.000		1.06	47.7	1.40	0.787	1.84	D	EL	49.9	0.747	1.82	C	I	25.1	0.80	0.787	1.06	C	EL	63.9	
		TNAGT5B	45.000	3	1.05	47.3	1.40	0.787	1.82	D	EL	49.9	0.747	1.76	C	I	25.1	0.80	0.787	**1.05**	C	EL	63.9	

LOAD FACTORS:

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

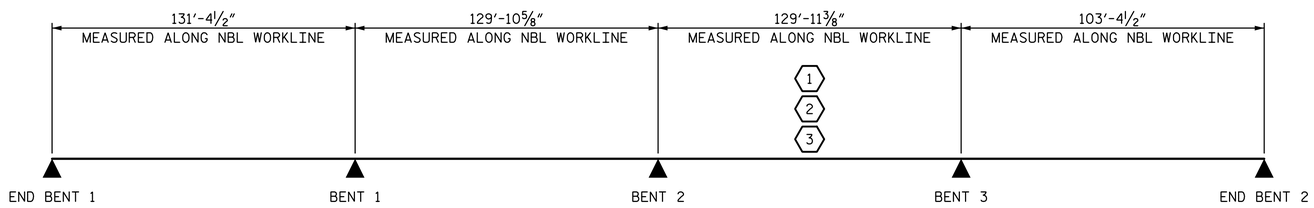
NOTES:

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. DISTANCE FROM LEFT END OF SPAN ARE MEASURED FROM ℄ BEARING.



LRFR SUMMARY

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)
(NBL)

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

SHEET NO. S03-7

TOTAL SHEETS S03-53

PLANS PREPARED BY:

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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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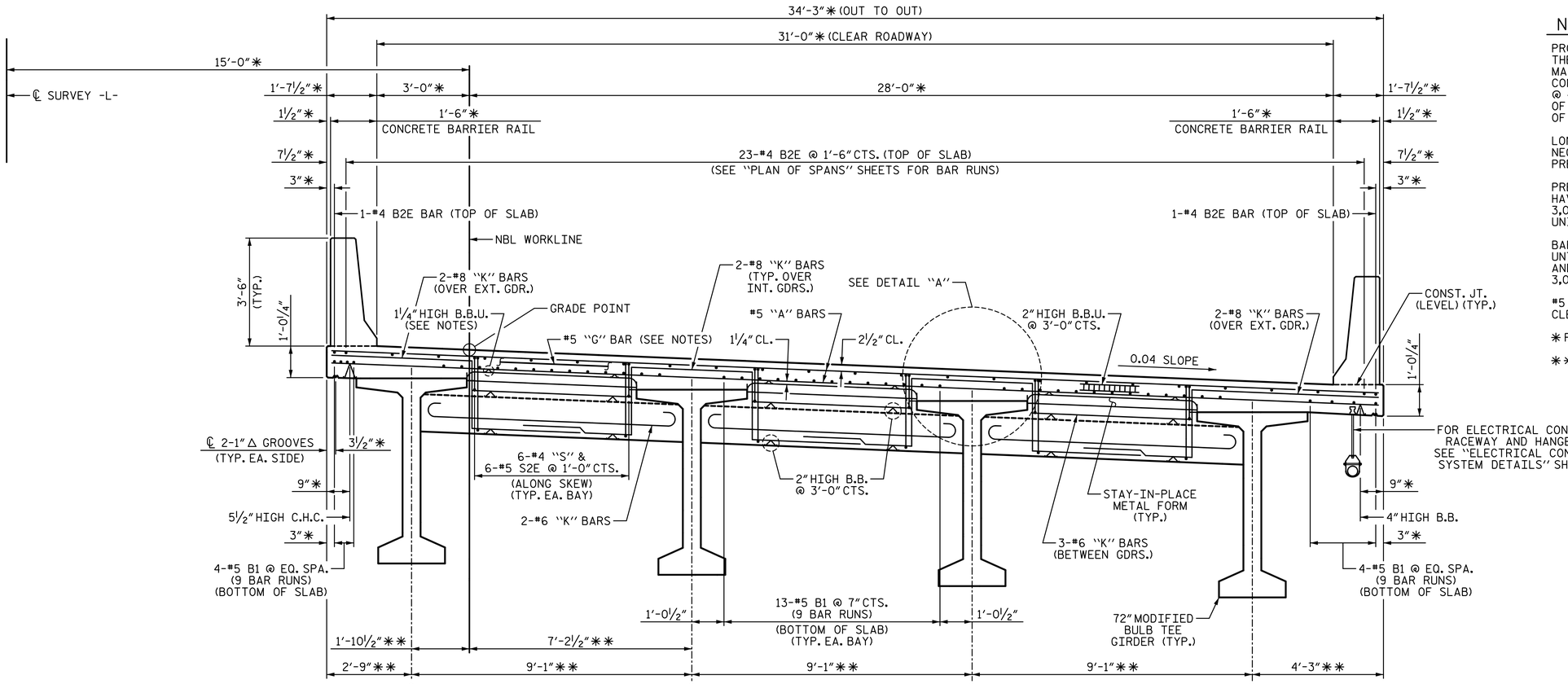


TYPICAL SECTION

(SHOWING END BENT DIAPHRAGMS)

NOTES:

PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE STAY-IN-PLACE METAL 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.

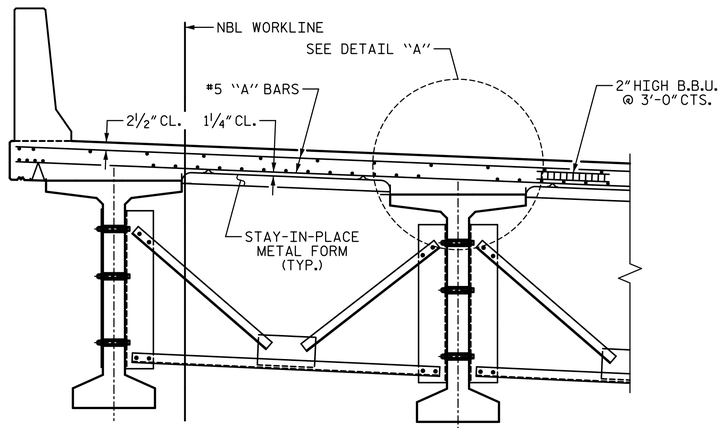
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

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

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

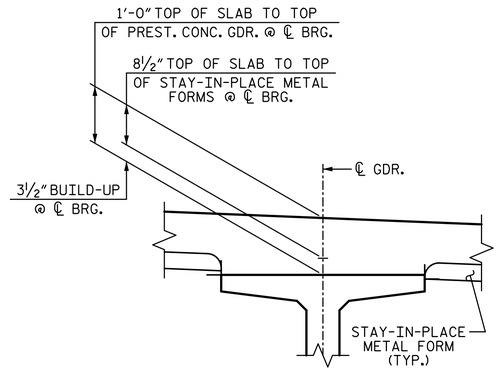
* RADIAL DIMENSION

** RADIAL THRU W.P.



PARTIAL TYPICAL SECTION

(SHOWING INTERMEDIATE DIAPHRAGMS)



DETAIL "A"

(TYP. EA. GDR.)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-8
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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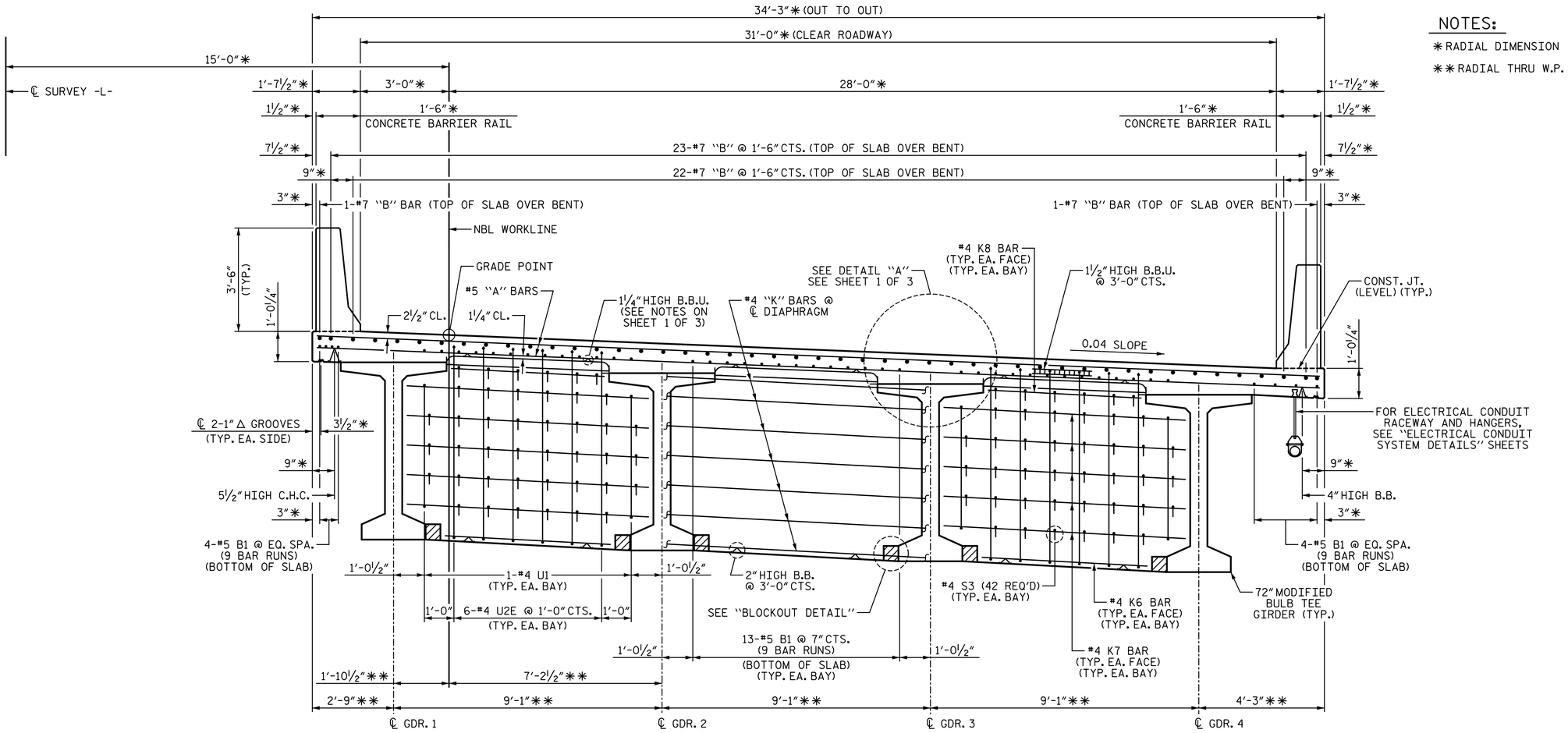


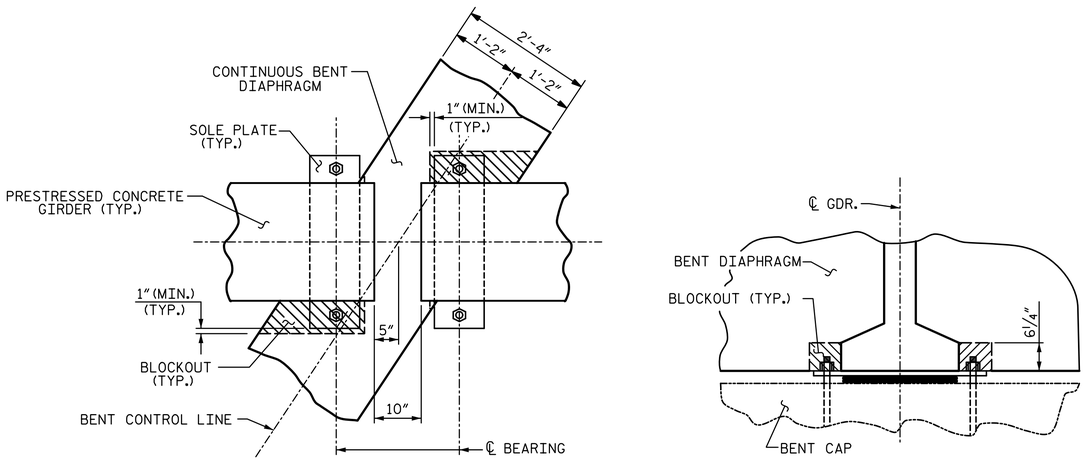
NOTES:

✱ RADIAL DIMENSION

✱✱ RADIAL THRU W.P.

TYPICAL SECTION

(SHOWING CONTINUOUS BENT DIAPHRAGMS)



PLAN

SECTION

CONTINUOUS BENT DIAPHRAGM BLOCK-OUT DETAIL

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-9
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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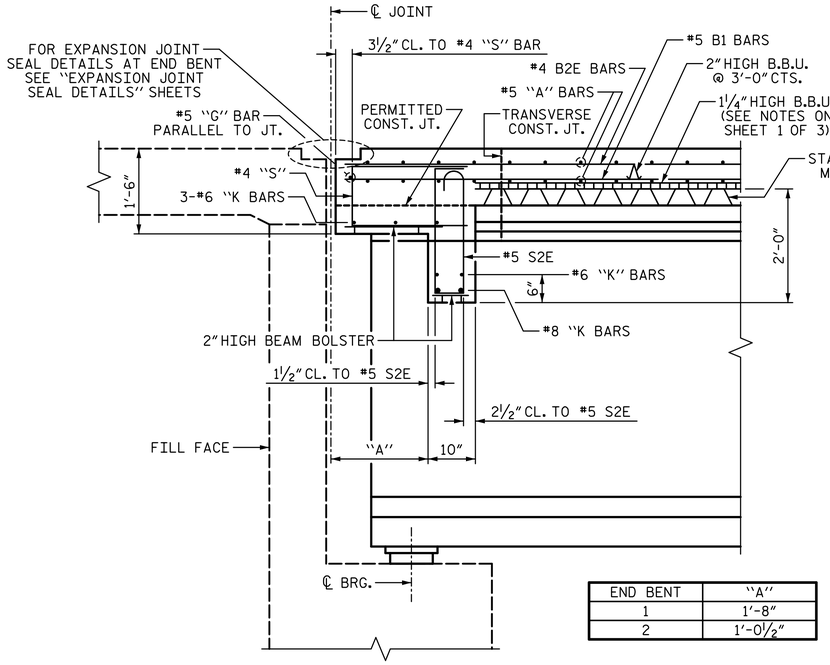
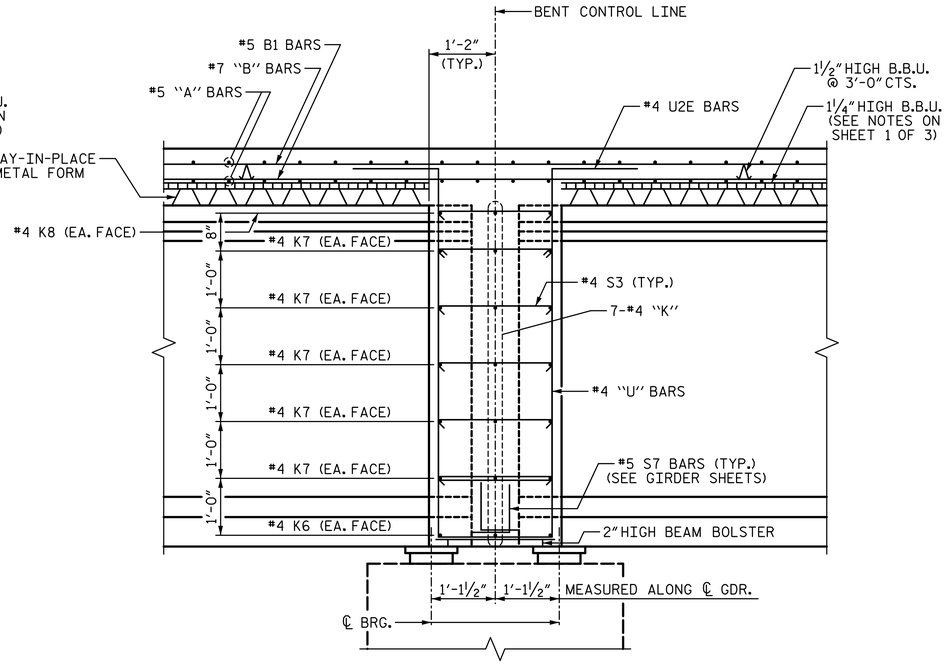


END BENT	"A"
1	1'-8"
2	1'-0½"

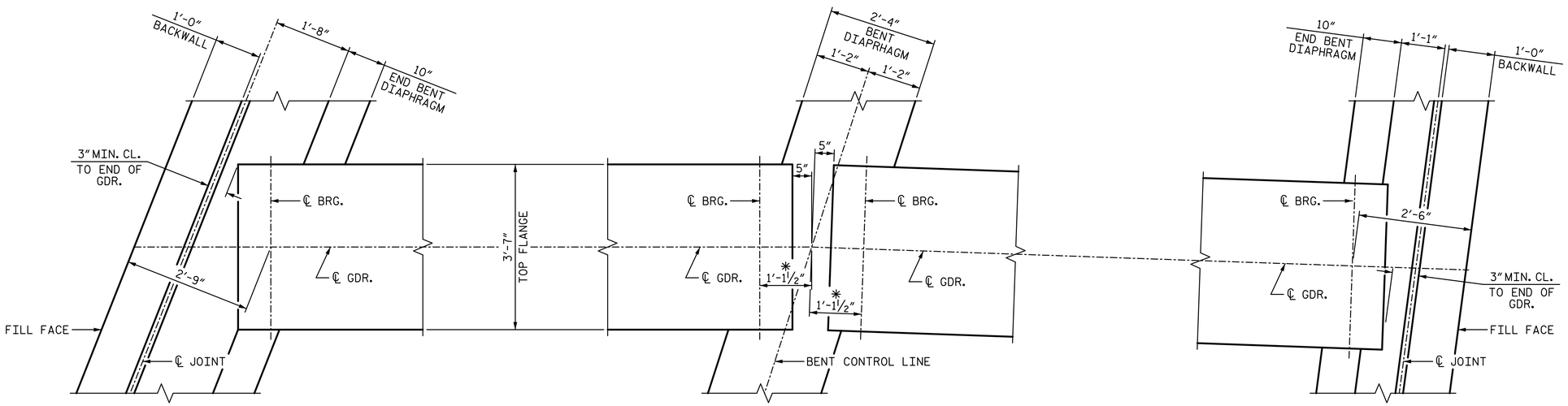
SECTION A-A



SECTION B-B

NOTES:

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



END BENT 1

BENT DIAPHRAGM
(BENT 1 SHOWN, BENTS 2 & 3 SIMILAR)
✱ MEASURED ALONG ℄ GIRDER

END BENT 2

PLAN OF DIAPHRAGMS

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

TYPICAL SECTION

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-10
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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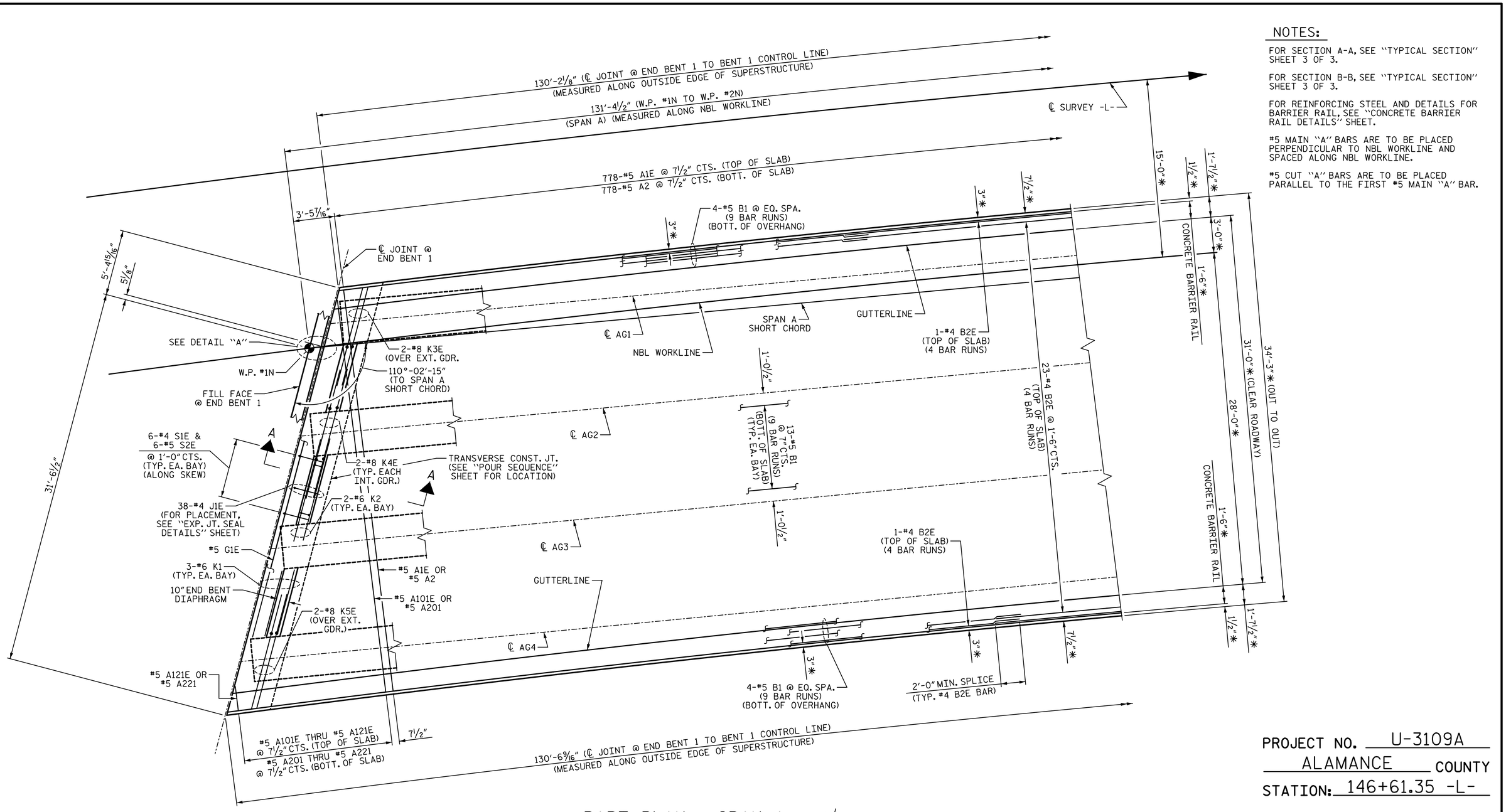


NOTES:

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

FOR SECTION B-B, SEE "TYPICAL SECTION" SHEET 3 OF 3.

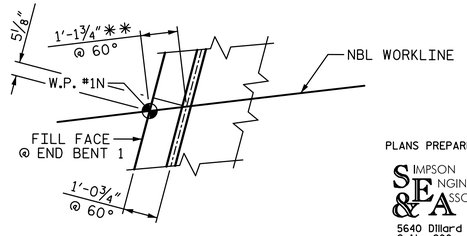
FOR REINFORCING STEEL AND DETAILS FOR BARRIER RAIL, SEE "CONCRETE BARRIER RAIL DETAILS" SHEET.

#5 MAIN "A" BARS ARE TO BE PLACED PERPENDICULAR TO NBL WORKLINE AND SPACED ALONG NBL WORKLINE.

#5 CUT "A" BARS ARE TO BE PLACED PARALLEL TO THE FIRST #5 MAIN "A" BAR.

PART PLAN - SPAN A

* RADIAL DIMENSION



DETAIL "A"

** MEASURED ALONG NBL WORKLINE

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-11
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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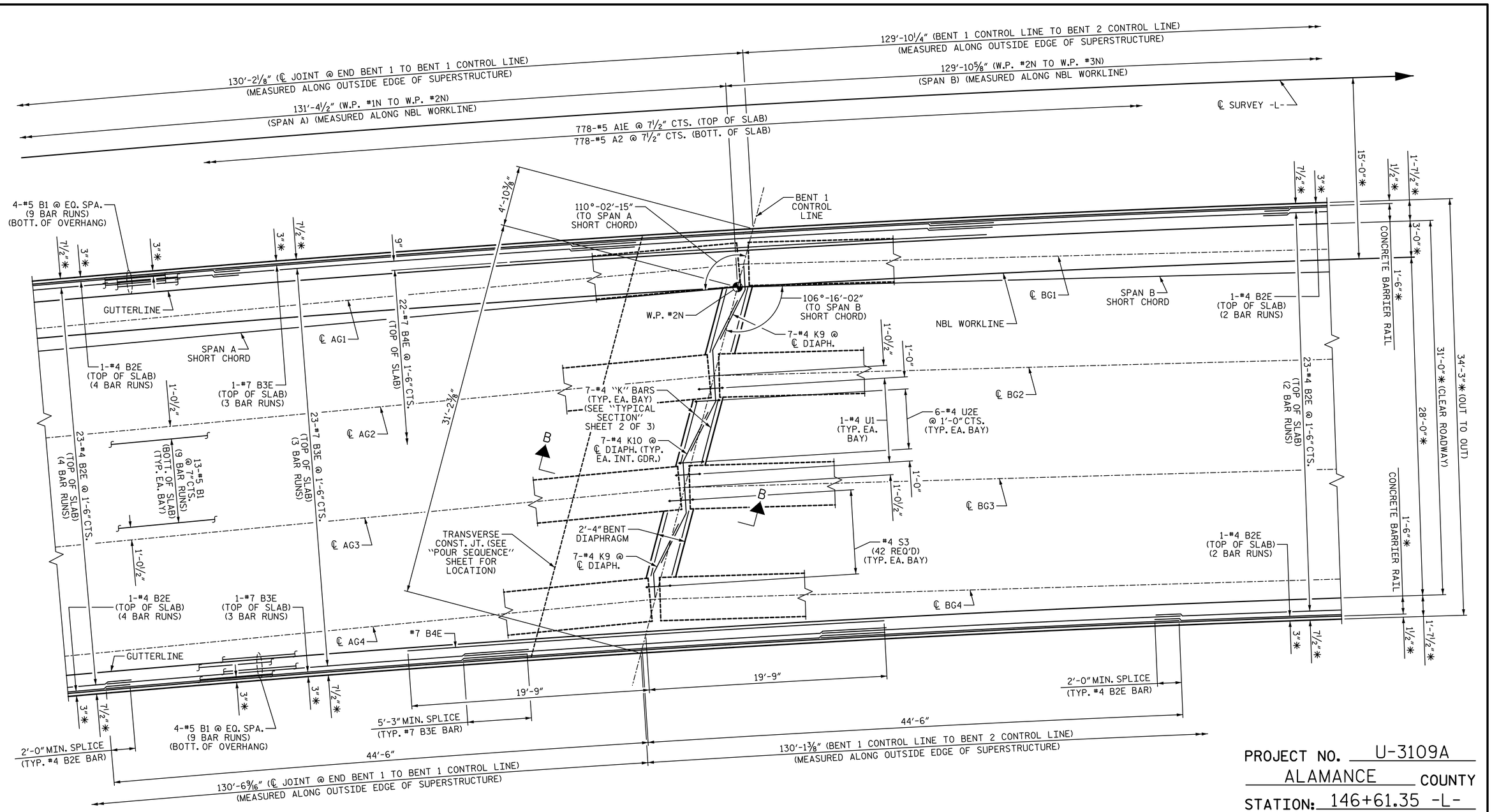
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
Digitally signed by John A. Batts
1/6/2017



PART PLAN - SPAN A AND SPAN B

*RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-12
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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NORTH CAROLINA PROFESSIONAL SEAL 18054 ENGINEER JOHN A. BATTS
1/6/2017

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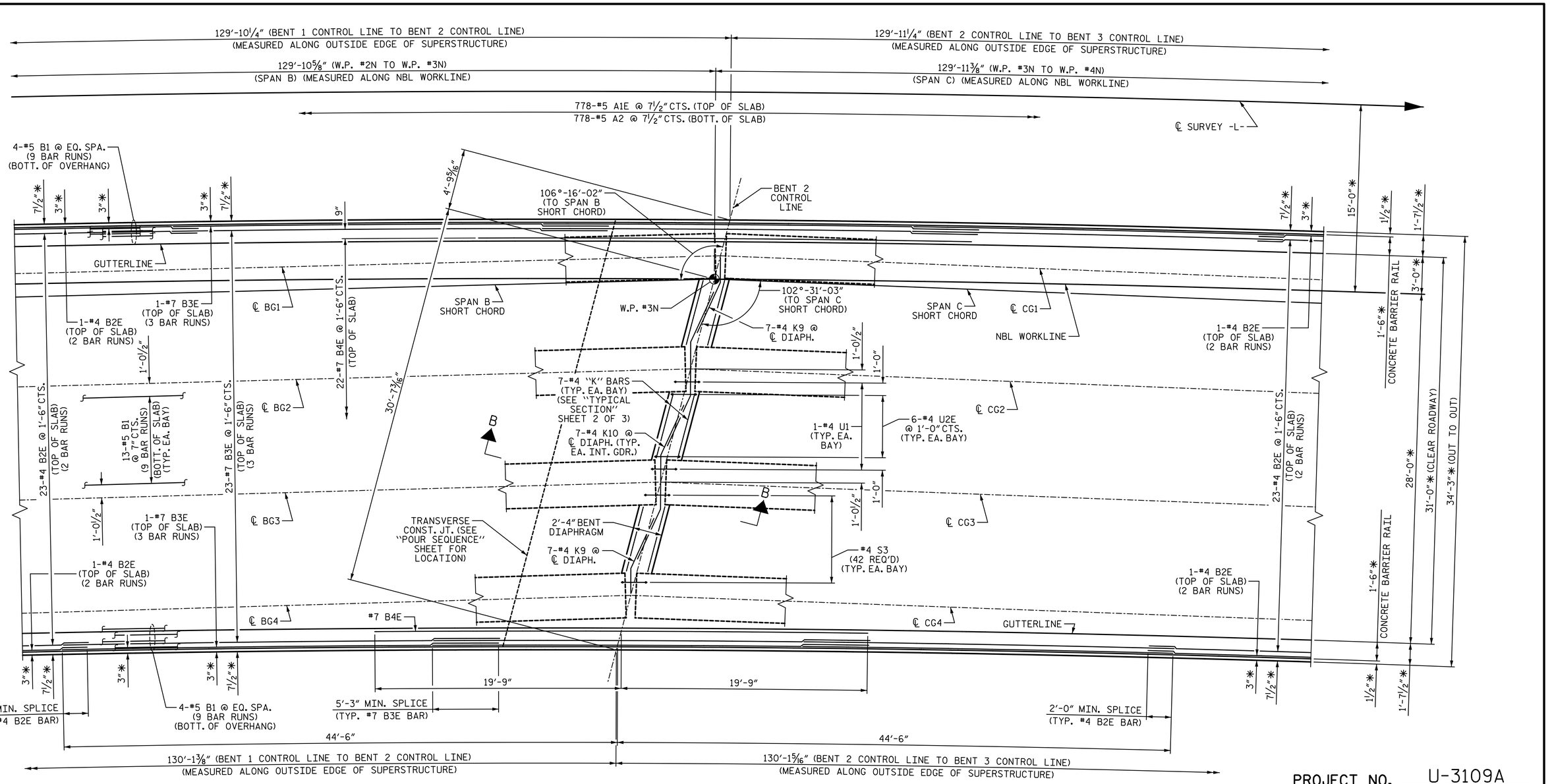
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15



PART PLAN - SPAN B AND SPAN C

✱ RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-13
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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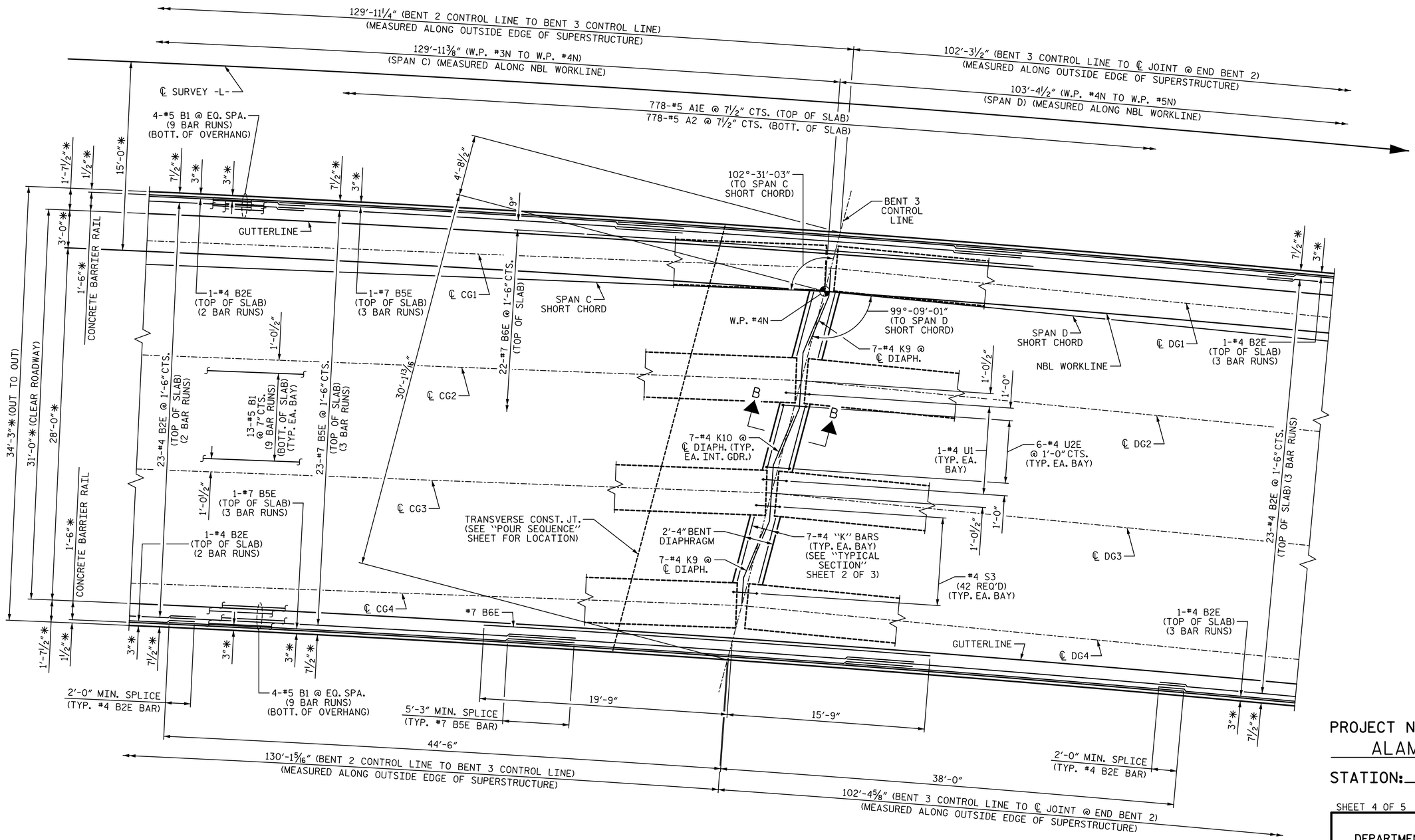

PART PLAN - SPAN C AND SPAN D

*RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 4 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PLAN OF SPANS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-14
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 19056 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
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DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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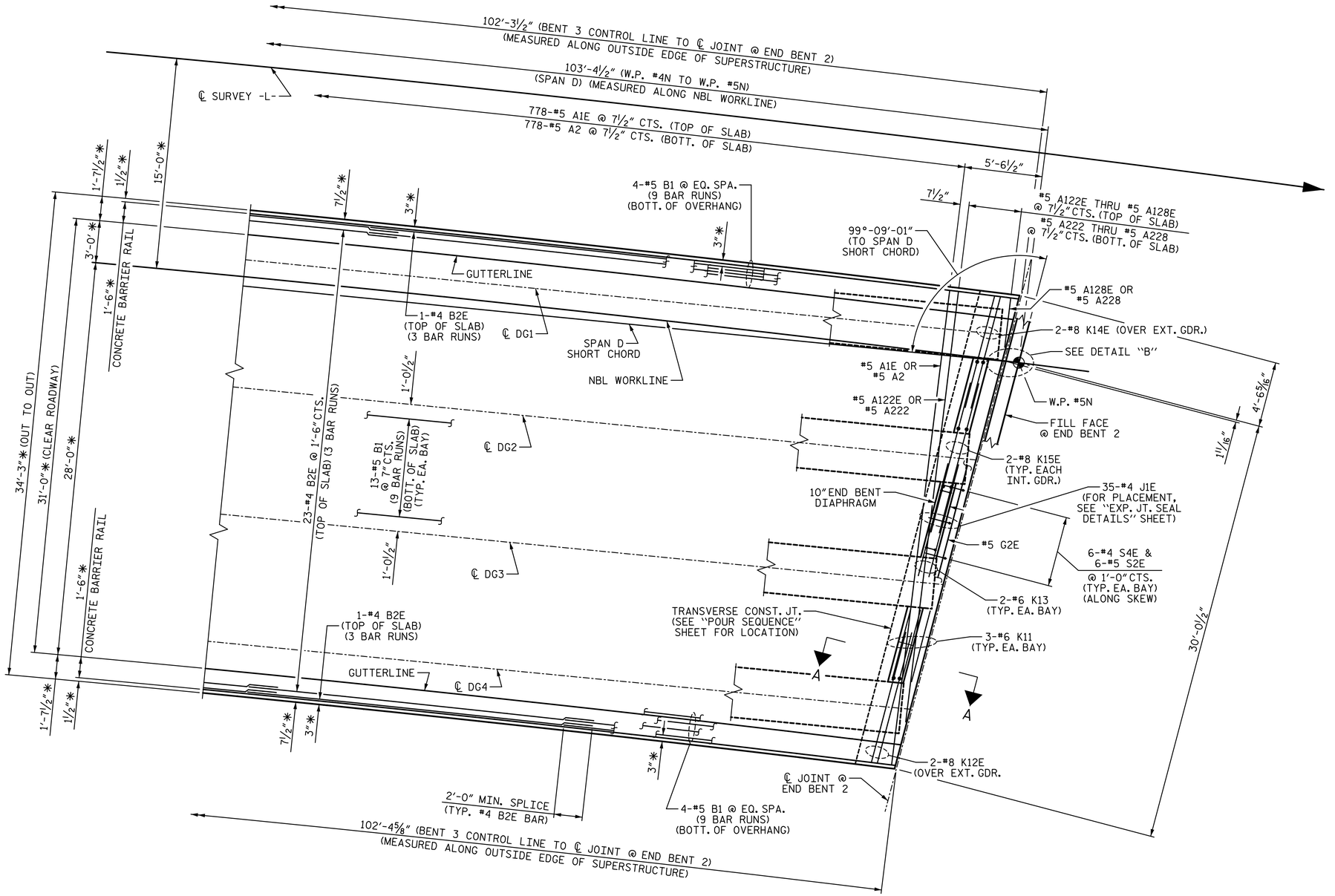

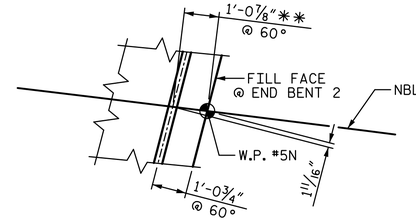

DETAIL "B"

**MEASURED ALONG NBL WORKLINE

PART PLAN - SPAN D

*RADIAL DIMENSION

FOR NOTES, SEE SHEET 1 OF 5

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 5 OF 5

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-15
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
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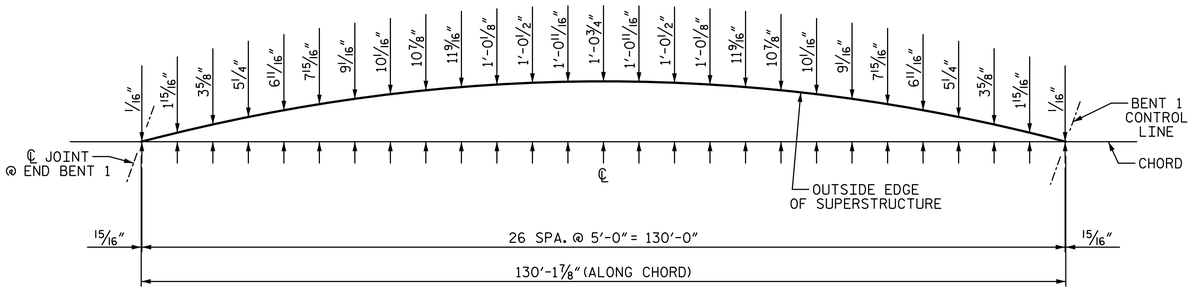
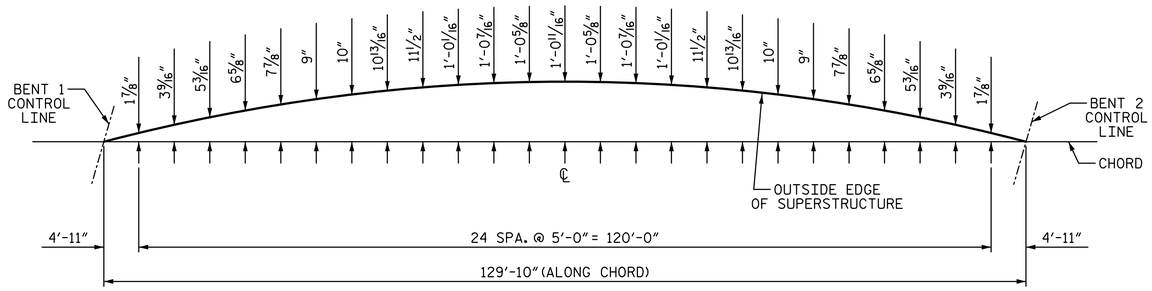


SPAN A ARC OFFSETS (LT SIDE)



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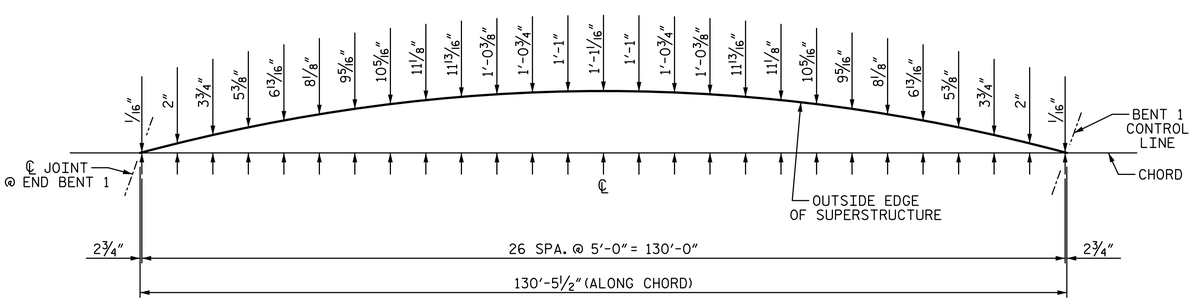

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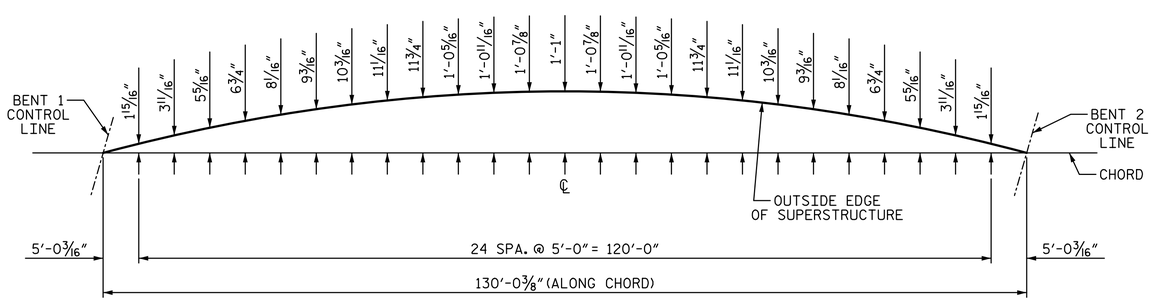

SPAN B ARC OFFSETS (RT SIDE)

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 19056 ENGINEER JOHN A. BATTS
1/6/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 2

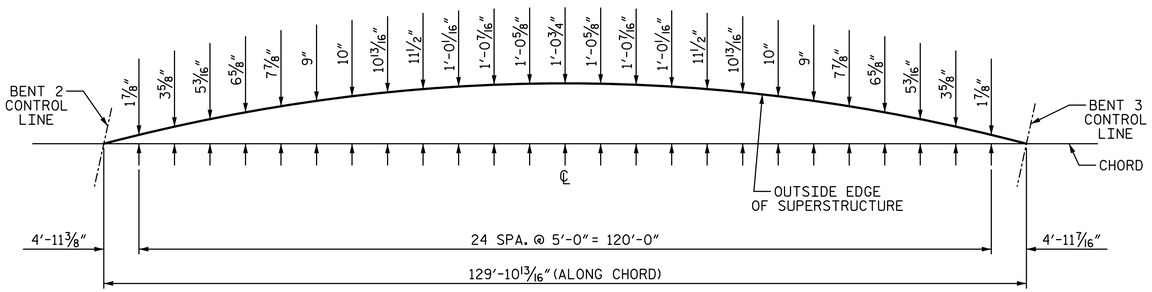
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

ARC OFFSETS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-16
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3



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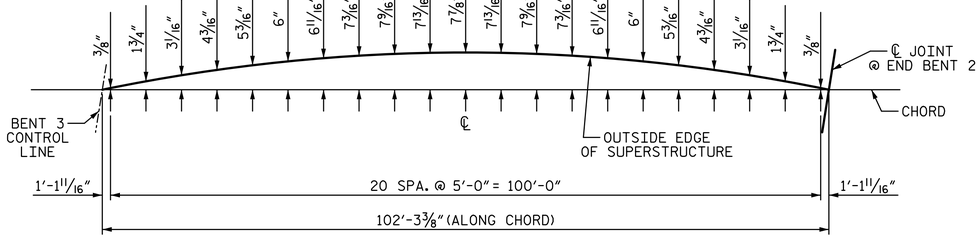

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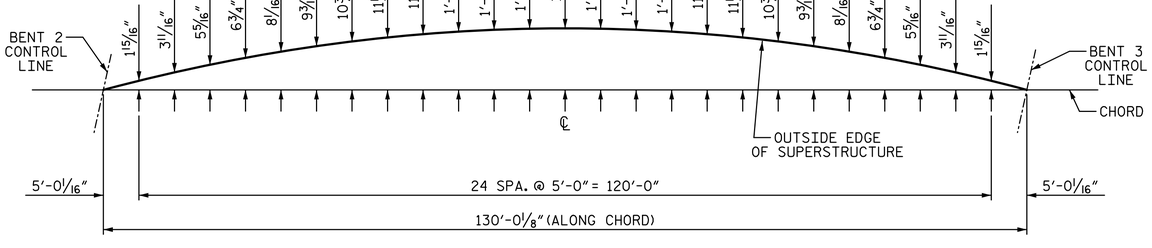
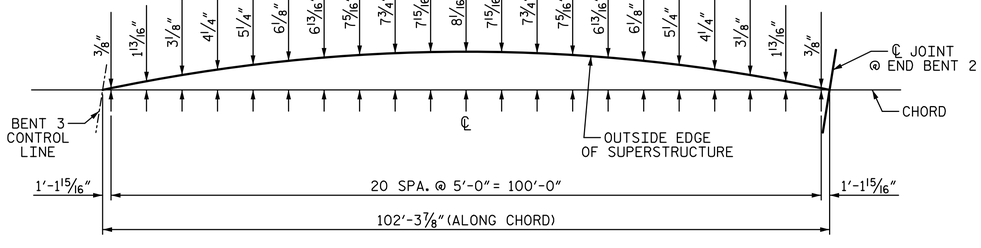


SPAN C ARC OFFSETS (RT SIDE)



SPAN D ARC OFFSETS (RT SIDE)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ARC OFFSETS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-17
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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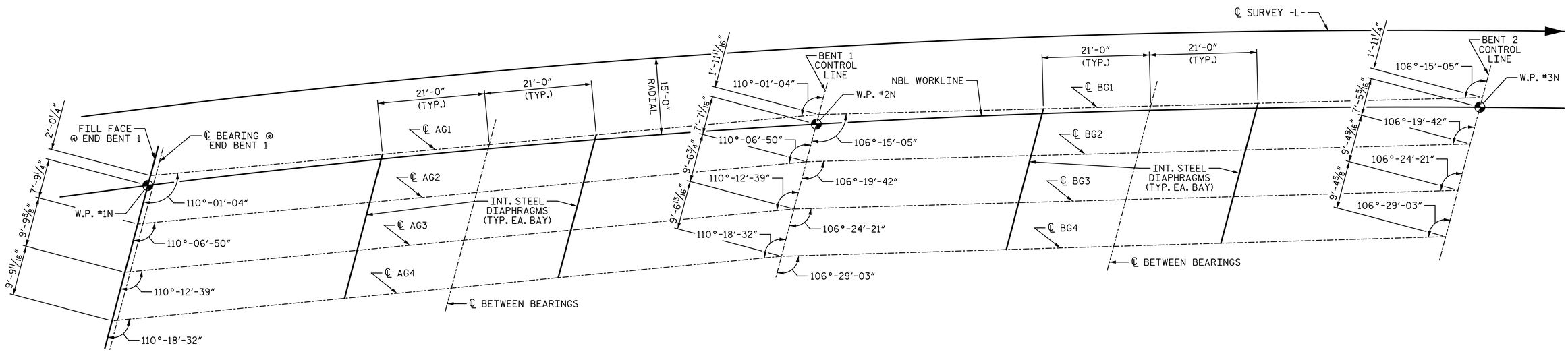

EXP. P1, E4 — SPAN A — FIX. P2, E4 FIX. P3, E4 — SPAN B — FIX. P4, E4 FIX. P4, E4

PARTIAL GIRDER LAYOUT

(END BENT 1, BENT 1 AND BENT 2 ARE PARALLEL)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GIRDER LAYOUT

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-18
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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NORTH CAROLINA PROFESSIONAL SEAL 036656 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
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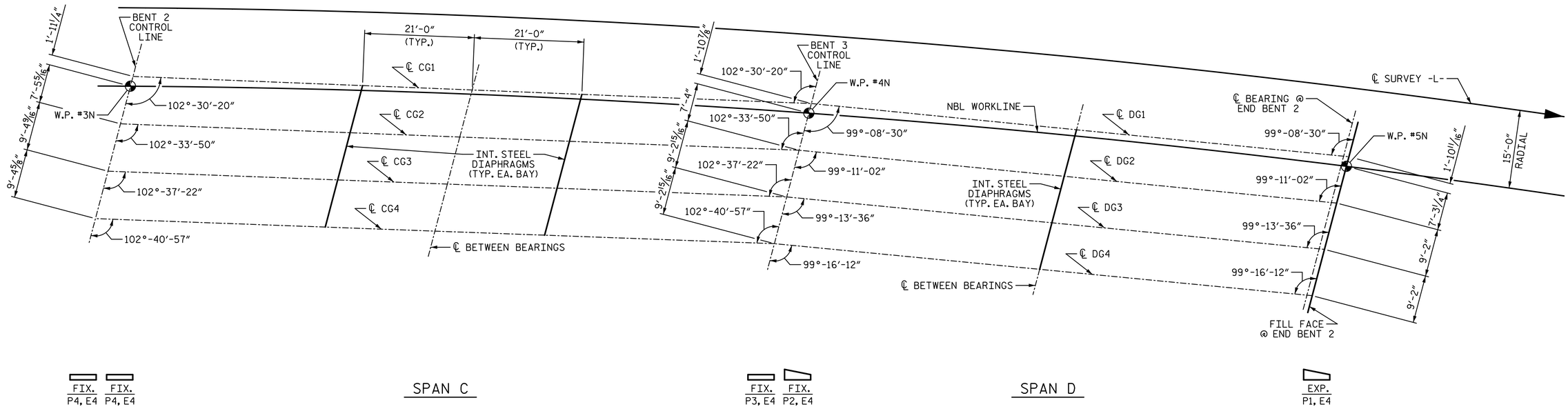

FIX. P4, E4 FIX. P4, E4 — SPAN C — FIX. P3, E4 FIX. P2, E4 — SPAN D — EXP. P1, E4

PARTIAL GIRDER LAYOUT

(BENT 2, BENT 3 AND END BENT 2 ARE PARALLEL)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GIRDER LAYOUT

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-19
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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NORTH CAROLINA PROFESSIONAL SEAL 18856 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
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DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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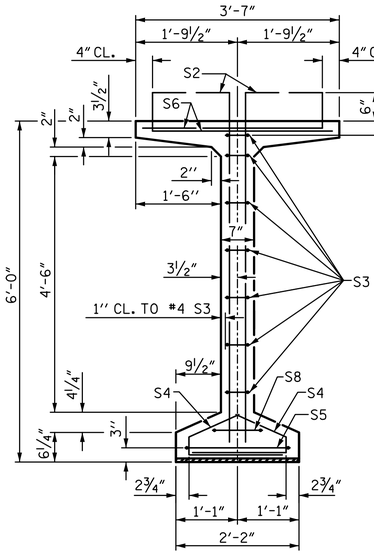
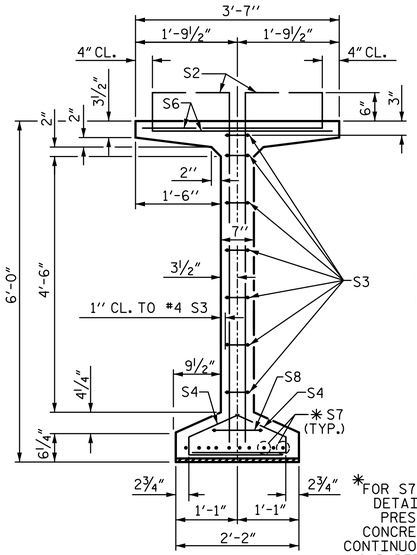
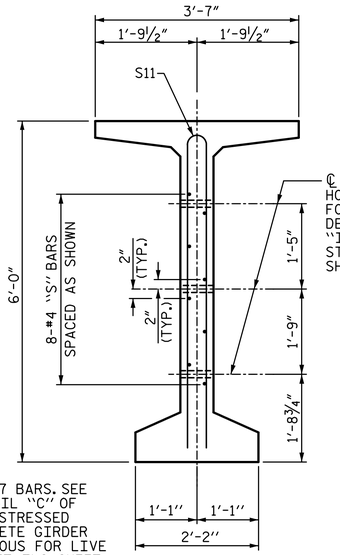


SECTION A-A



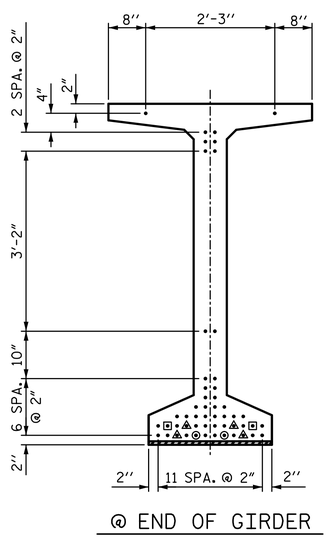
SECTION B-B



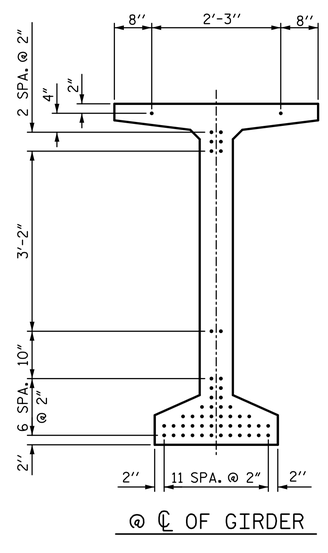
SECTION C-C

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

(S1, S6 AND S9 BARS NOT SHOWN)

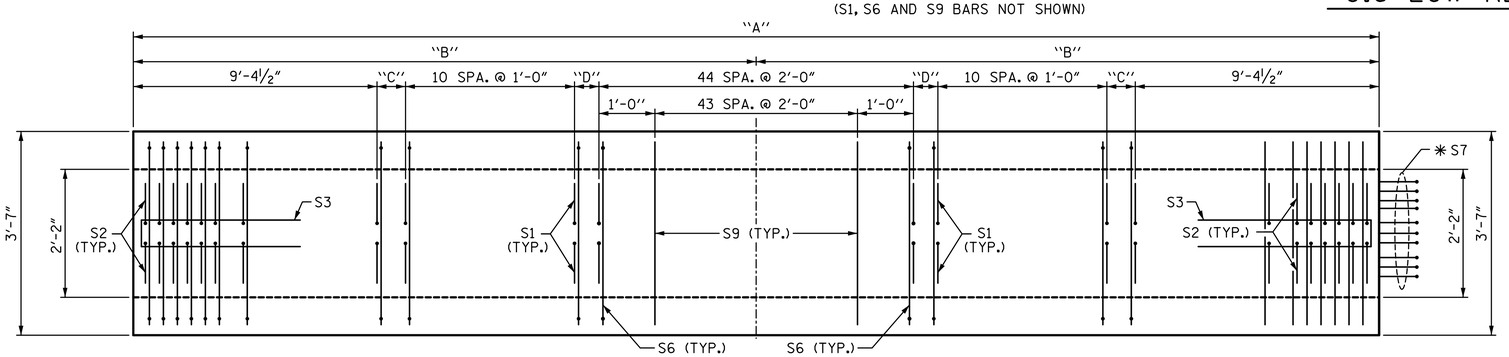


@ END OF GIRDER



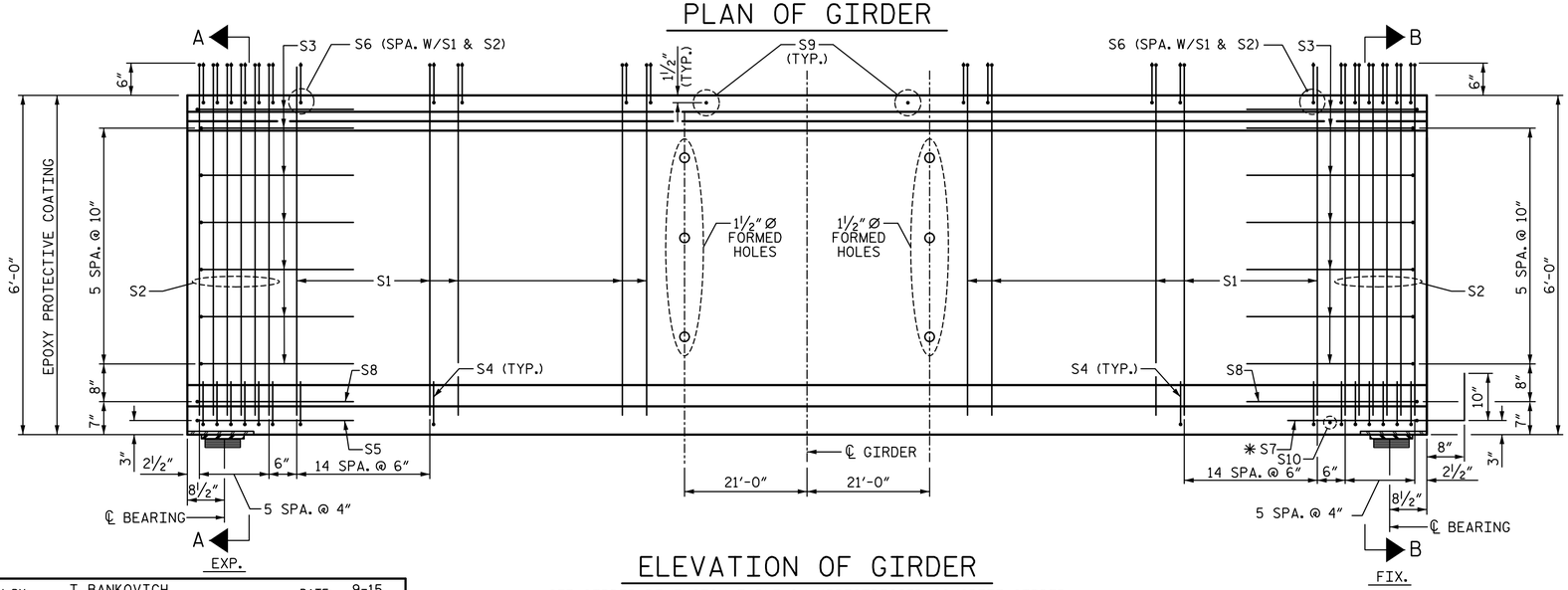
@ ℄ OF GIRDER

0.6" LOW RELAXATION STRAND LAYOUT



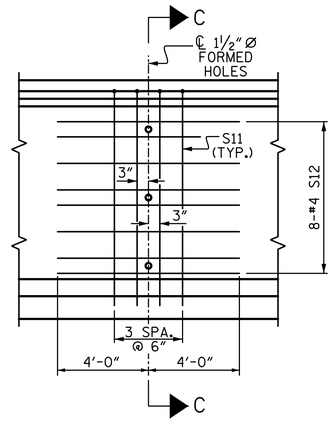
PLAN OF GIRDER

- FULLY DEBONDED STRAND
- ▣ STRAND DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◬ STRAND DEBONDED FOR 20'-0" FROM END OF GIRDER
- ⊙ STRAND DEBONDED FOR 28'-0" FROM END OF GIRDER



ELEVATION OF GIRDER

SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"



PARTIAL ELEVATION

(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS)

0.6" Ø L. R. GRADE 270 STRANDS

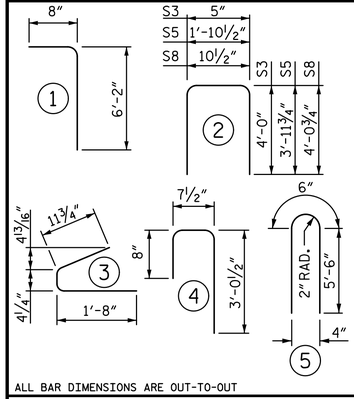
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	194	4	1	6'-10"	886
S2	24	5	1	6'-10"	171
S3	14	4	2	8'-5"	79
S4	84	4	3	3'-0"	168
S5	1	5	2	9'-10"	10
S6	218	5	4	4'-4"	985
✱S7	10	5	STR	3'-8"	38
S8	2	5	2	9'-0"	19
S9	44	5	STR	3'-3"	149
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

SPAN A	REINFORCING STEEL	9,000 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
ALL GIRDERS	2688	27.6	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	"A"	515.22

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A
(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-20
1			3			TOTAL SHEETS
2			4			S03-53

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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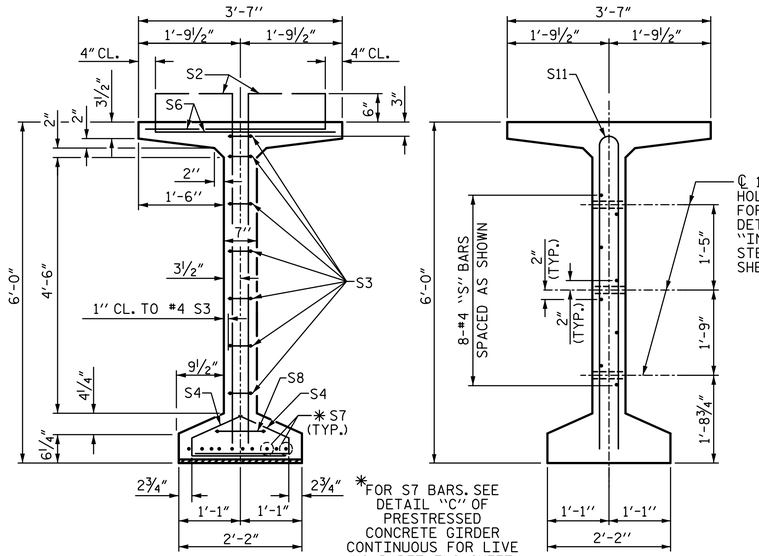
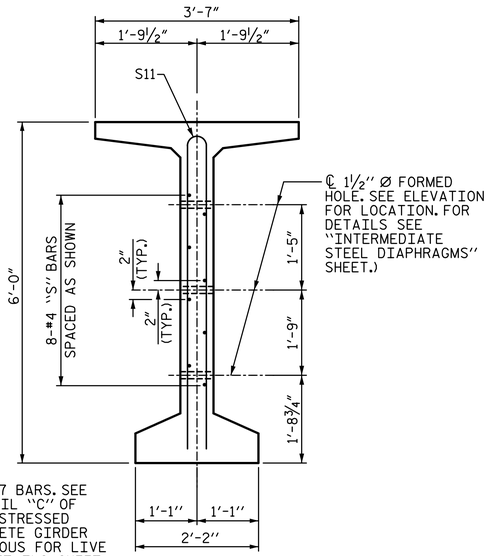
NORTH CAROLINA PROFESSIONAL SEAL 18696 ENGINEER JOHN A. BATTS
1/6/2017

STR. #3



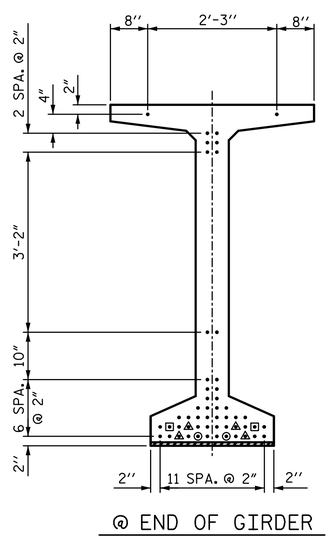
SECTION B-B

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

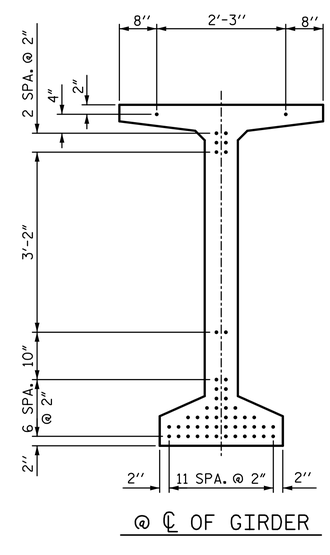


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

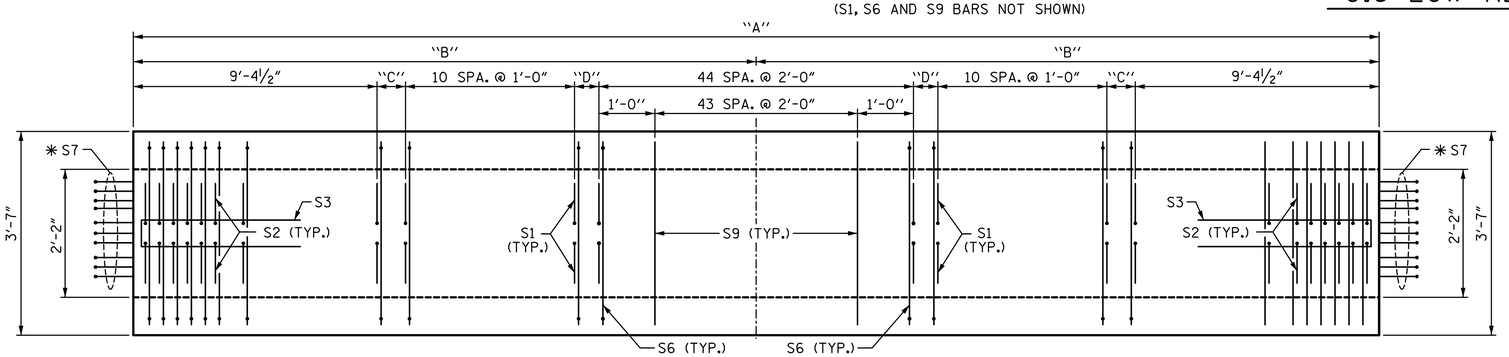


@ END OF GIRDER



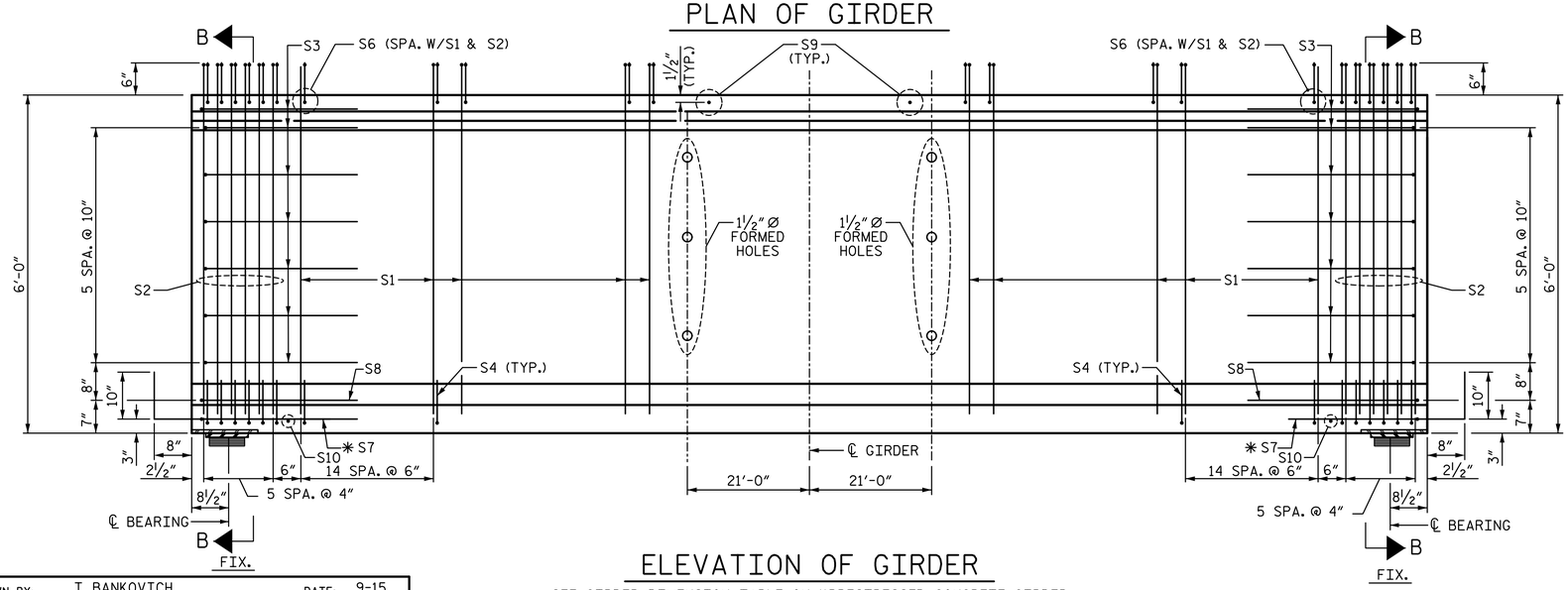
@ ℄ OF GIRDER

0.6" LOW RELAXATION STRAND LAYOUT



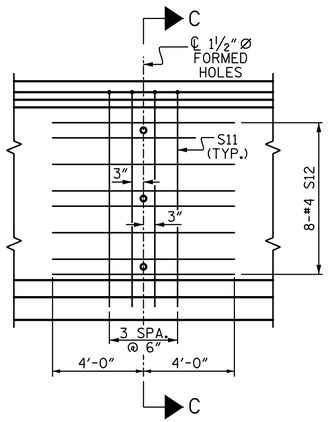
PLAN OF GIRDER

- FULLY DEBONDED STRAND
- ▣ STRAND DEBONDED FOR 16'-0" FROM END OF GIRDER
- ◬ STRAND DEBONDED FOR 20'-0" FROM END OF GIRDER
- ⊙ STRAND DEBONDED FOR 28'-0" FROM END OF GIRDER



ELEVATION OF GIRDER

SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"



PARTIAL ELEVATION

(SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR ALL GIRDERS)

0.6" ℄ L. R. GRADE 270 STRANDS

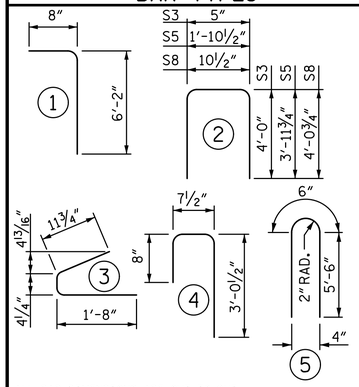
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	194	4	1	6'-10"	886
S2	24	5	1	6'-10"	171
S3	14	4	2	8'-5"	79
S4	84	4	3	3'-0"	168
S6	218	5	4	4'-4"	985
✱S7	20	5	STR	3'-8"	76
S8	2	5	2	9'-0"	19
S9	44	5	STR	3'-3"	149
S10	2	3	STR	1'-10"	1
S11	8	5	5	11'-6"	96
S12	16	4	STR	8'-0"	86

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

SPAN	REINFORCING STEEL (LB.)	9,000 PSI CONCRETE (C.Y.)	0.6" ℄ L.R. STRANDS (No.)
SPAN B	2716	27.7	52
SPAN C	2716	27.7	52

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4 (SPAN B)	"A"	516.36
4 (SPAN C)	"A"	516.48

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-21
1			3			TOTAL SHEETS
2			4			S03-53

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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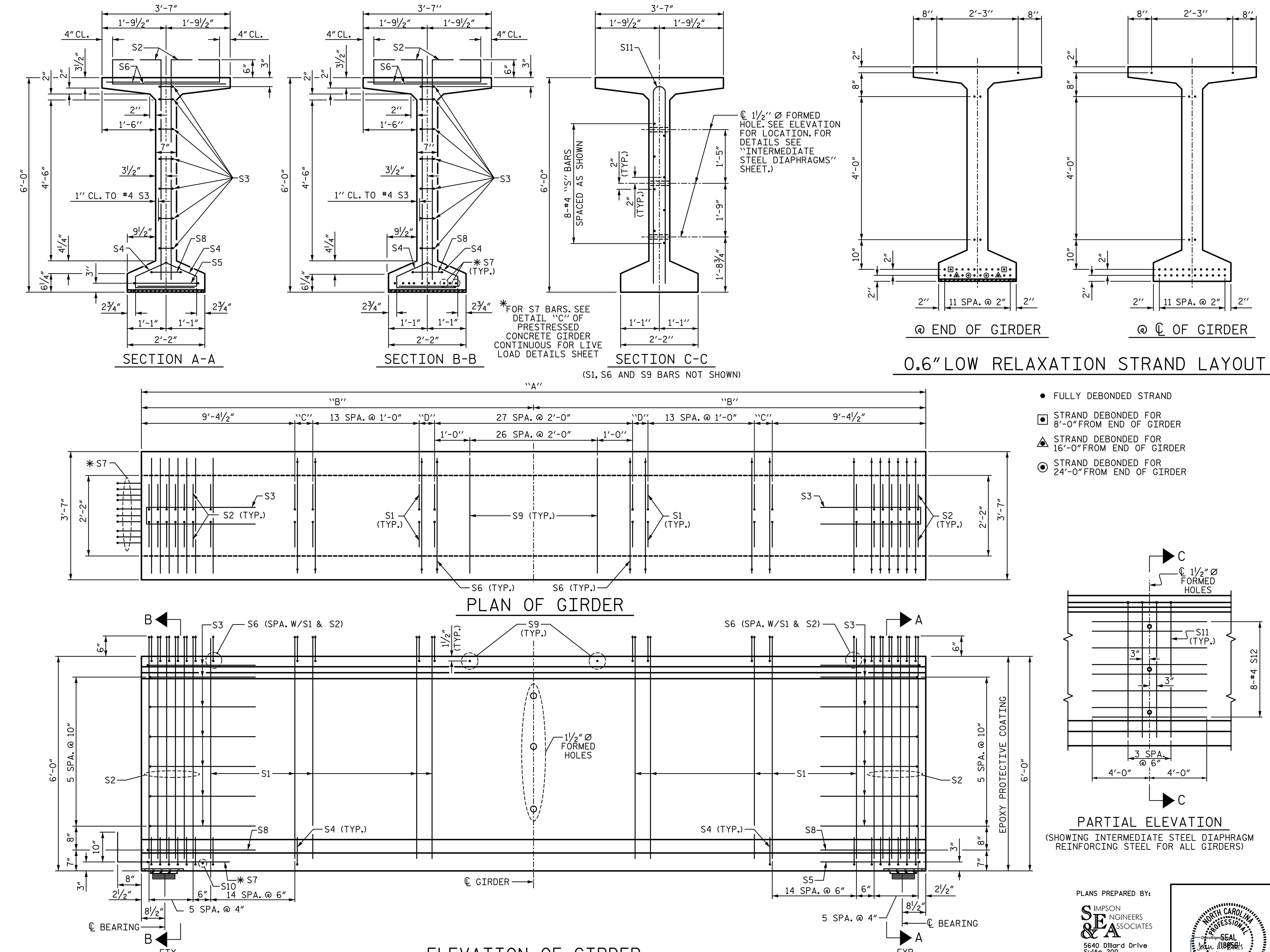
NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
1/6/2017

STR. #3



SEE GIRDER DIMENSION TABLE ON "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET FOR DIMENSIONS "A", "B", "C" AND "D"

0.6" Ø L. R. GRADE 270 STRANDS

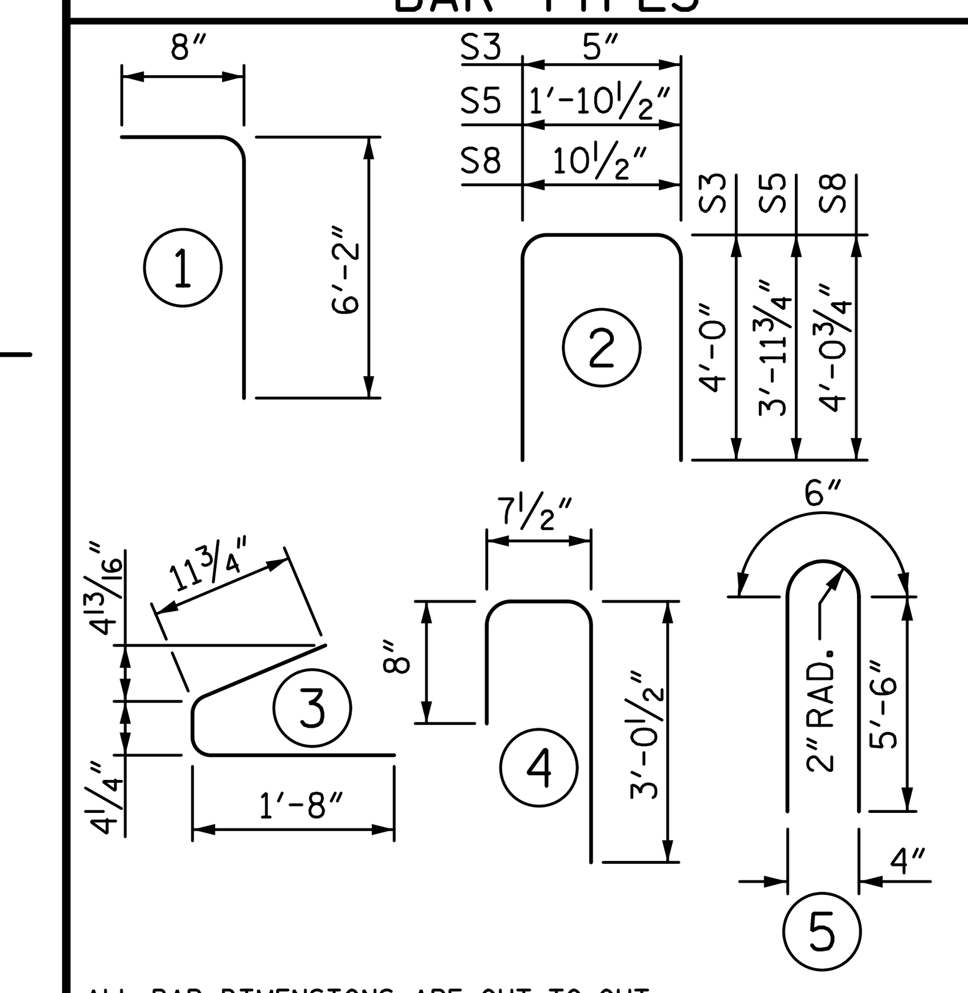
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GIRDER

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
S1	172	4	1	6'-10"	785
S2	24	5	1	6'-10"	171
S3	14	4	2	8'-5"	79
S4	84	4	3	3'-0"	168
S5	1	5	2	9'-10"	10
S6	196	5	4	4'-4"	886
* S7	10	5	STR	3'-8"	38
S8	2	5	2	9'-0"	19
S9	27	5	STR	3'-3"	92
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

SPAN D	REINFORCING STEEL (LB.)	6,000 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
ALL GIRDERS	2340	21.7	30

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	"A"	404.52

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD
SPAN D
(NBL)

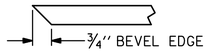
PLANS PREPARED BY:
SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 18856 JOHN A. BATTS
1/6/2017

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S03-22
1			3				TOTAL SHEETS
2			4				S03-53

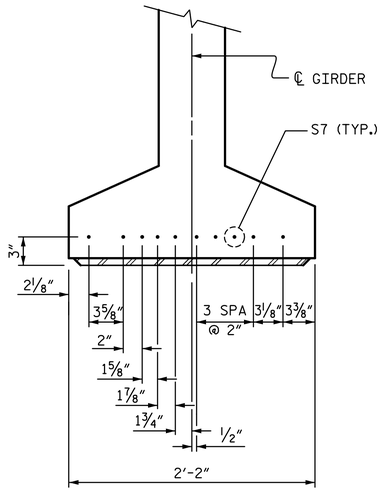
DRAWN BY: T. BANKOVICH	DATE: 9-15
CHECKED BY: J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS	DATE: 9-15

STR. #3

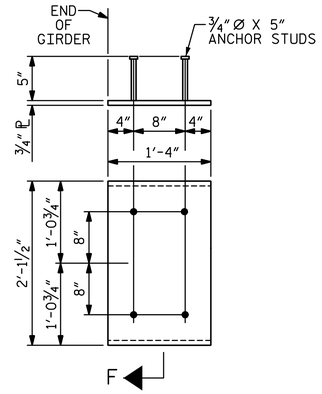


SECTION "F"

(SEE NOTES)



DETAIL "C"



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

(2 REQ'D PER GIRDER)

GIRDER DIMENSION TABLE

GIRDER	"A"	"B"	"C"	"D"
AG1	128'-8 1/4"	64'-4 1/8"	6"	5 5/8"
AG2	128'-9 1/8"	64'-4 9/16"	6"	6 1/16"
AG3	128'-10 1/8"	64'-5 1/16"	6"	6 9/16"
AG4	128'-11 1/8"	64'-5 9/16"	6"	7 1/16"
BG1	129'-0 1/4"	64'-6 1/8"	6"	7 5/8"
BG2	129'-0 3/4"	64'-6 3/8"	6"	7 7/8"
BG3	129'-1 3/8"	64'-6 11/16"	6"	8 3/16"
BG4	129'-2"	64'-7"	6"	8 1/2"
CG1	129'-0 7/8"	64'-6 7/16"	6"	7 15/16"
CG2	129'-1 1/4"	64'-6 5/8"	6"	8 1/8"
CG3	129'-1 5/8"	64'-6 13/16"	6"	8 5/16"
CG4	129'-2"	64'-7"	6"	8 1/2"
DG1	101'-1 3/8"	50'-6 11/16"	6"	8 3/16"
DG2	101'-1 1/2"	50'-6 3/4"	6"	8 1/4"
DG3	101'-1 5/8"	50'-6 13/16"	6"	8 5/16"
DG4	101'-1 3/4"	50'-6 7/8"	6"	8 3/8"

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 7000 PSI FOR SPAN A, SPAN B AND SPAN C.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4700 PSI FOR SPAN D.

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

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

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 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 GIRDERS, SEE SPECIAL PROVISIONS.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

DRAWN BY: T. BANKOVICH DATE: 9-15

CHECKED BY: J.A. BATTS DATE: 9-15

DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 19056 ENGINEER JOHN A. BATTS
Digitally Signed
3/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

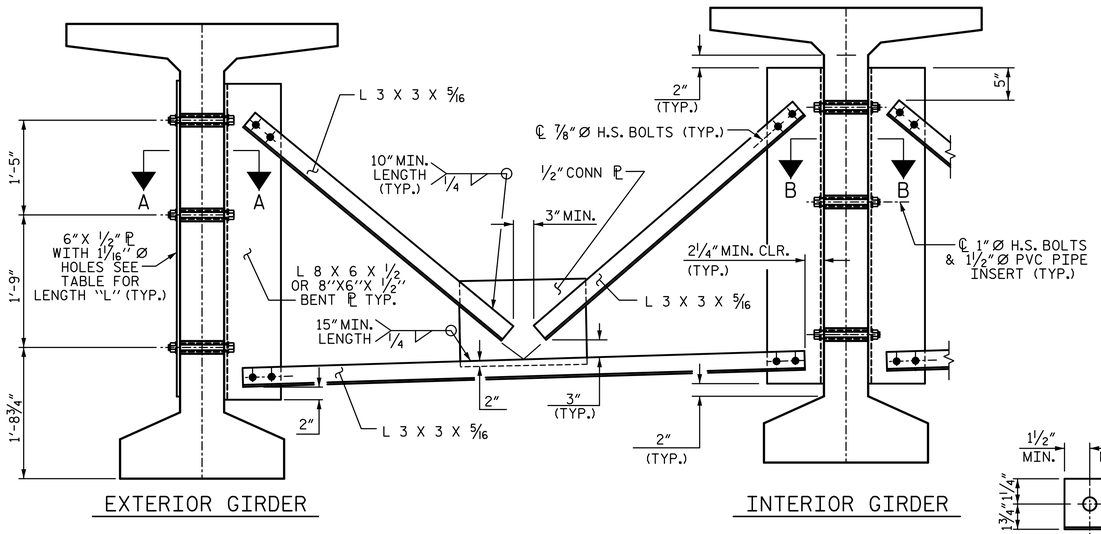
PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-23
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

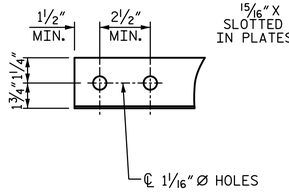
3/22/2017 8:31:36 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 3 Bridge 435 (NBL)\Drawings\Final\403_U3109A_smu_pcg.dgn



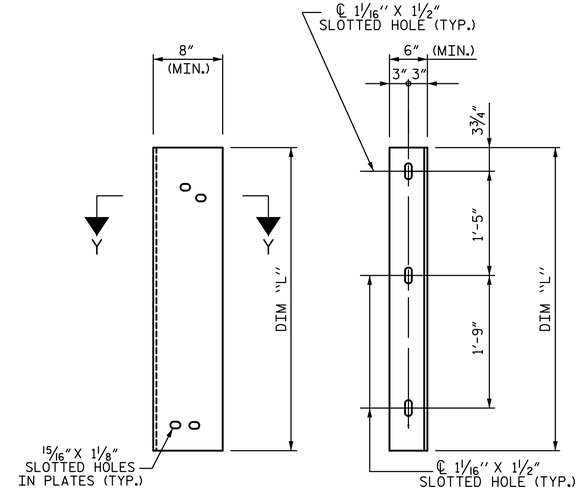
EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

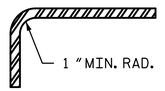


ANGLE END
(L 3 X 3 X 5/16)



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.

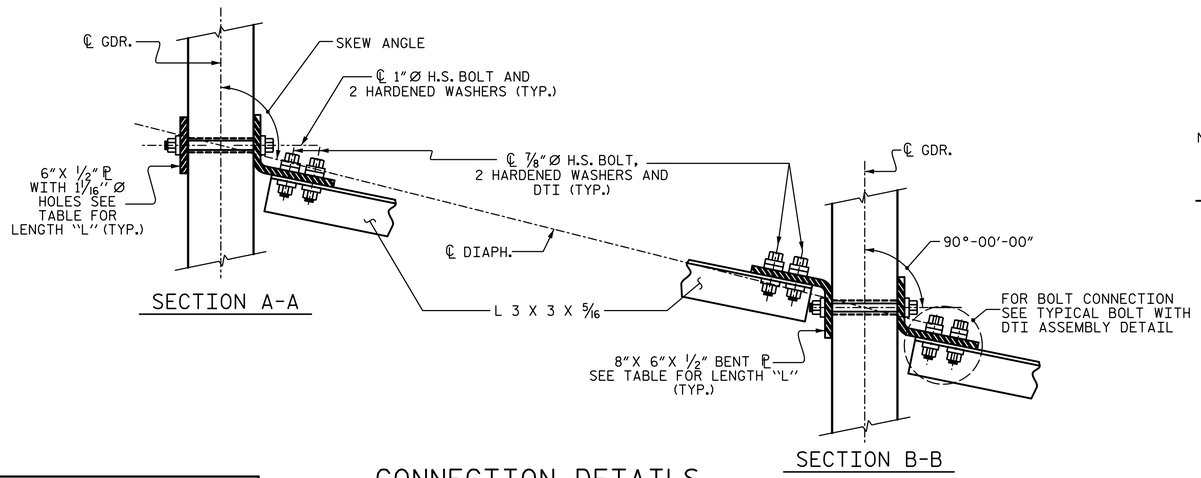
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.

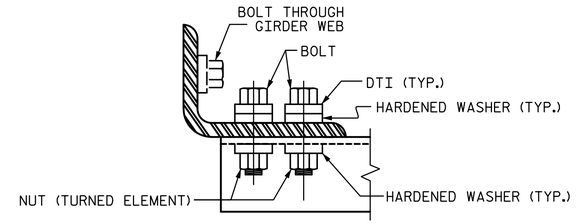


SECTION A-A

SECTION B-B

CONNECTION DETAILS

TABLE	
GIRDER TYPE	DIM "L"
72" BULB TEE	4'-2"



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
INTERMEDIATE STEEL DIAPRHAGM FOR 72" MODIFIED BULB TEE PREST. CONCRETE GIRDER
(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-24
1			3			TOTAL SHEETS
2			4			S03-53

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
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www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

STR. #3

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDER 1																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.032	0.066	0.099	0.129	0.155	0.178	0.196	0.209	0.217	0.220	0.217	0.209	0.196	0.178	0.155	0.129	0.099	0.066	0.032	0
FINAL CAMBER ↑	0	3/16″	1/4″	3/8″	7/16″	9/16″	5/8″	11/16″	11/16″	3/4″	3/4″	3/4″	11/16″	11/16″	5/8″	9/16″	7/16″	3/8″	1/4″	3/16″	0
	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDERS 2 & 3																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.033	0.070	0.104	0.135	0.163	0.187	0.206	0.220	0.228	0.231	0.228	0.220	0.206	0.187	0.163	0.135	0.104	0.070	0.033	0
FINAL CAMBER ↑	0	1/8″	1/4″	5/16″	3/8″	7/16″	1/2″	9/16″	9/16″	5/8″	5/8″	5/8″	9/16″	9/16″	1/2″	7/16″	3/8″	5/16″	1/4″	1/8″	0
	SPANS A, B & C																				
0.6″ Ø LOW RELAXATION	GIRDER 4																				
TWENTIETH POINTS	0	.05	.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	0.045	0.088	0.130	0.167	0.201	0.229	0.252	0.268	0.278	0.282	0.278	0.268	0.252	0.229	0.201	0.167	0.130	0.088	0.045	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.031	0.065	0.097	0.127	0.153	0.175	0.193	0.206	0.214	0.217	0.214	0.206	0.193	0.175	0.153	0.127	0.097	0.065	0.031	0
FINAL CAMBER ↑	0	3/16″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	3/4″	13/16″	3/4″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	3/16″	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDER 1																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.029	0.044	0.058	0.070	0.080	0.088	0.094	0.098	0.099	0.098	0.094	0.088	0.080	0.070	0.058	0.044	0.029	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	3/4″	13/16″	3/4″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	1/8″	0
	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDERS 2 & 3																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.031	0.046	0.061	0.073	0.084	0.093	0.099	0.103	0.104	0.103	0.099	0.093	0.084	0.073	0.061	0.046	0.031	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	7/16″	1/2″	9/16″	5/8″	11/16″	11/16″	3/4″	11/16″	11/16″	5/8″	9/16″	1/2″	7/16″	3/8″	1/4″	1/8″	0
	SPAN D																				
0.6″ Ø LOW RELAXATION	GIRDER 4																				
TWENTIETH POINTS	0	.05	.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	0.026	0.051	0.075	0.097	0.117	0.133	0.146	0.156	0.162	0.164	0.162	0.156	0.146	0.133	0.117	0.097	0.075	0.051	0.026	0
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0	0.014	0.029	0.043	0.057	0.069	0.079	0.087	0.093	0.096	0.098	0.096	0.093	0.087	0.079	0.069	0.057	0.043	0.029	0.014	0
FINAL CAMBER ↑	0	1/8″	1/4″	3/8″	1/2″	9/16″	5/8″	11/16″	3/4″	13/16″	13/16″	13/16″	3/4″	11/16″	5/8″	9/16″	1/2″	3/8″	1/4″	1/8″	0

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

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION AND GIRDER CAMBER

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-25
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
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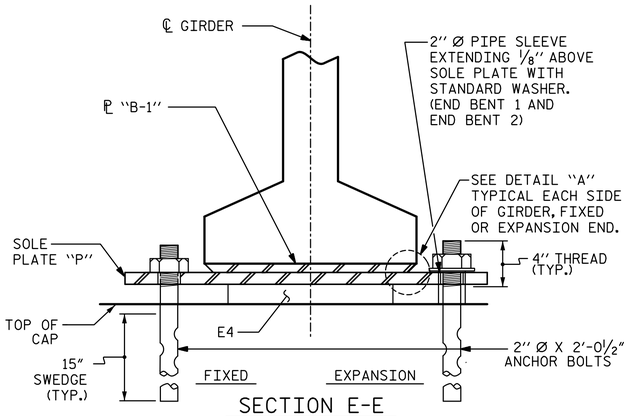
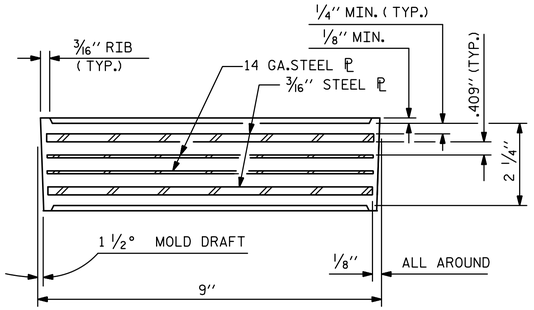
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 036056 ENGINEER JOHN A. BATTS
1/6/2017

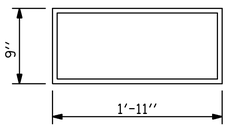
DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15



SECTION E-E



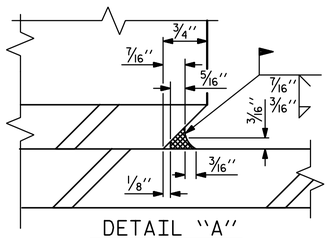
TYPICAL SECTION OF ELASTOMERIC BEARINGS



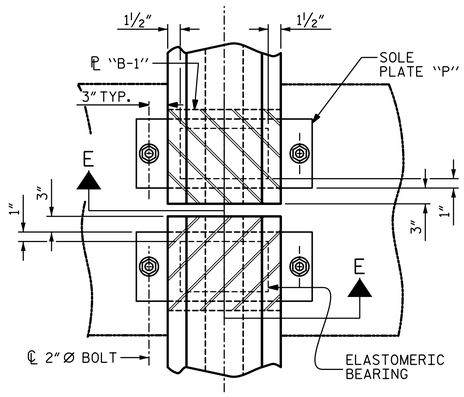
E4 (32 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V

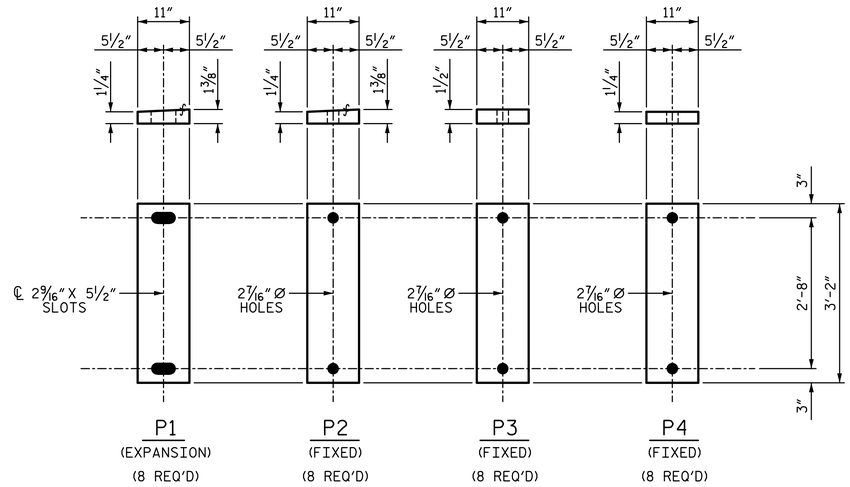


DETAIL "A"



TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



SOLE PLATE DETAILS ("P")

(SEE GIRDER LAYOUT SHEETS FOR ORIENTATION OF BEVELED SOLE PLATES.)

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.

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
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ELASTOMERIC BEARING DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-26
1			3			TOTAL SHEETS
2			4			S03-53

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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18854 ENGINEER JOHN A. BATTS
1/6/2017

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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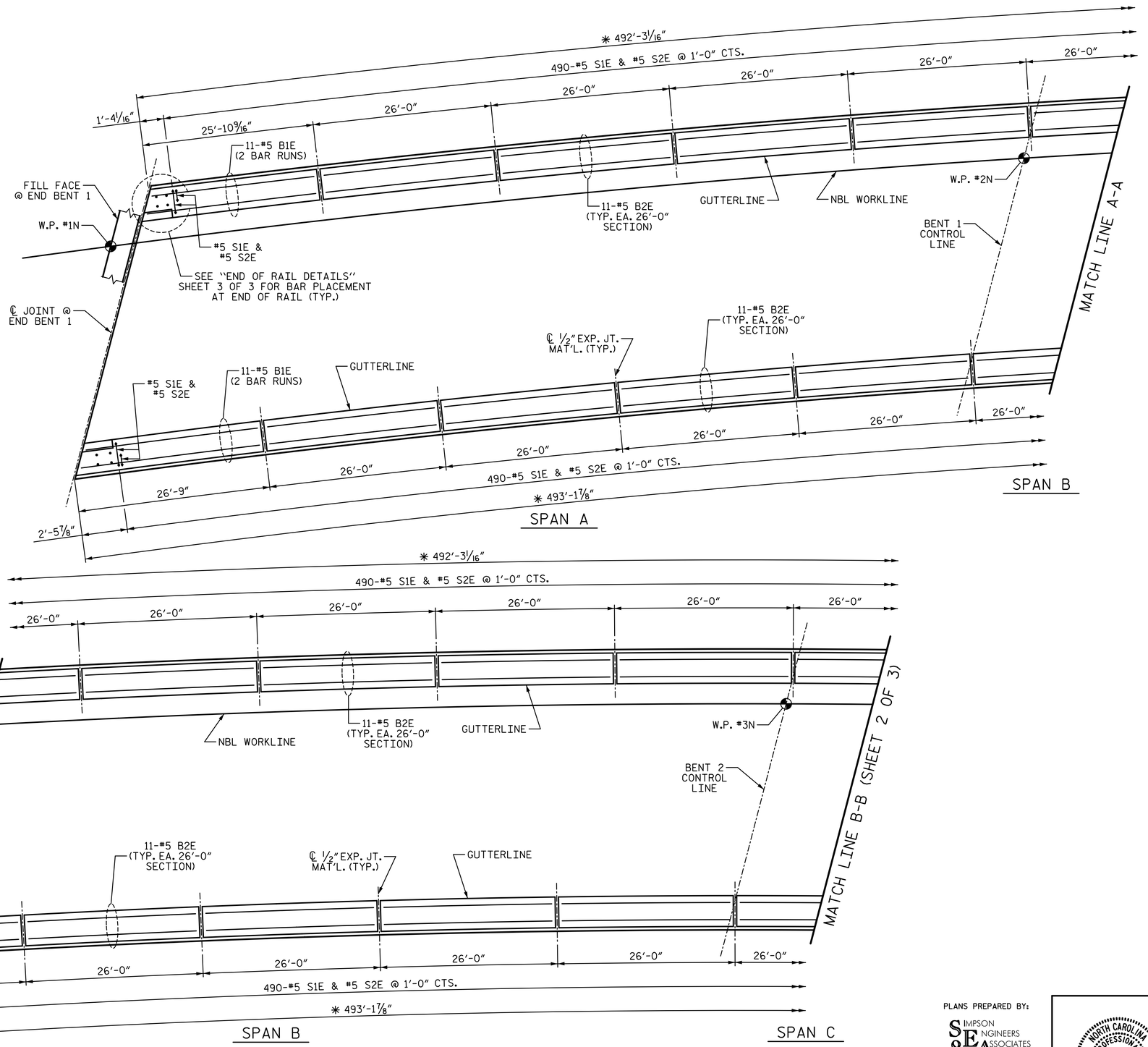

PART PLAN OF BARRIER RAIL

ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL
✱ @ 60° F

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NORTH CAROLINA PROFESSIONAL SEAL 018554 ENGINEER JOHN A. BATTS
1/6/2017

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ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
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CONCRETE BARRIER RAIL

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-27
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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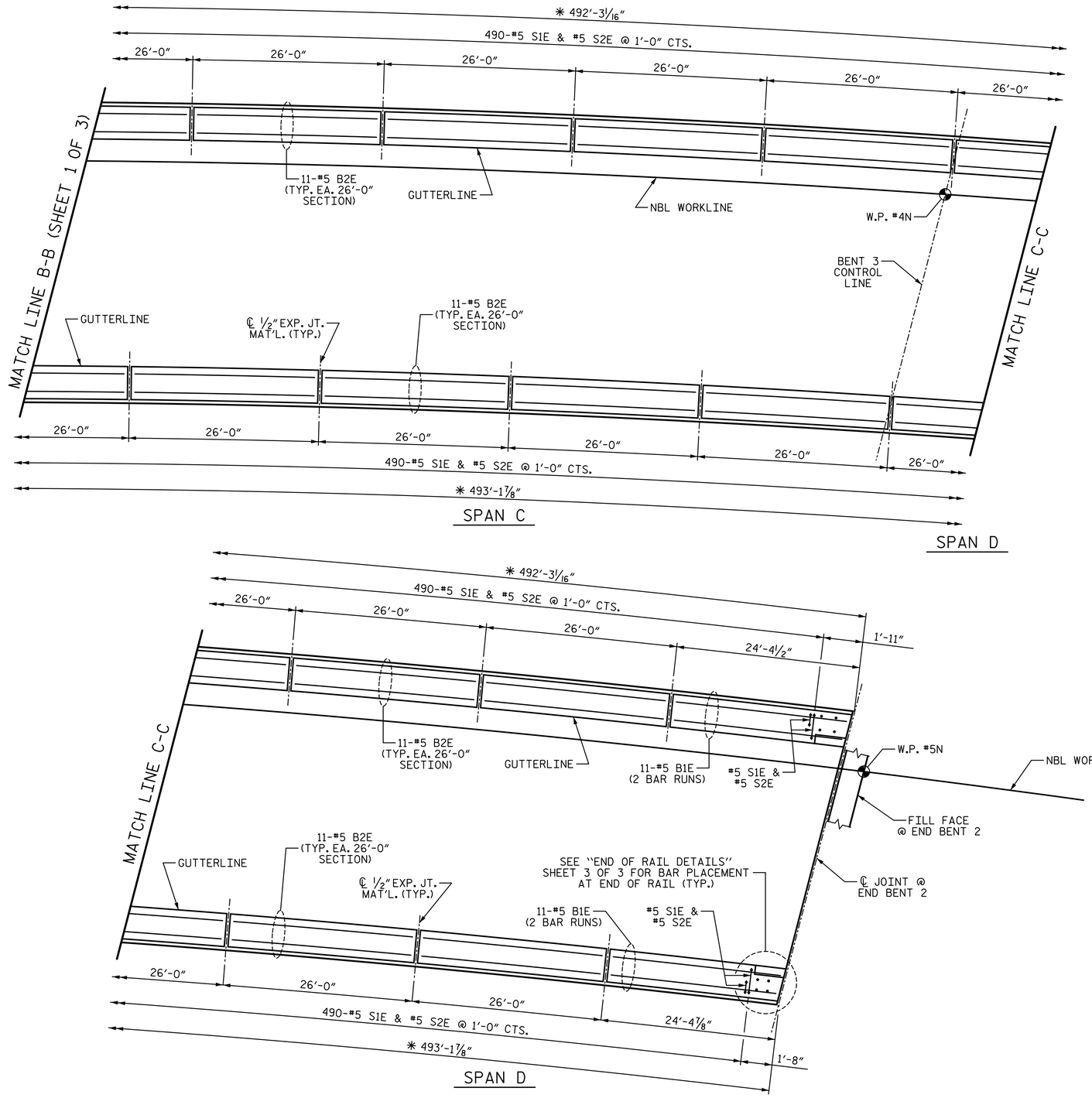

PART PLAN OF BARRIER RAIL

ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE FACE OF BARRIER RAIL
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NORTH CAROLINA PROFESSIONAL SEAL 18054 ENGINEER JOHN A. BATTS
1/6/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-28
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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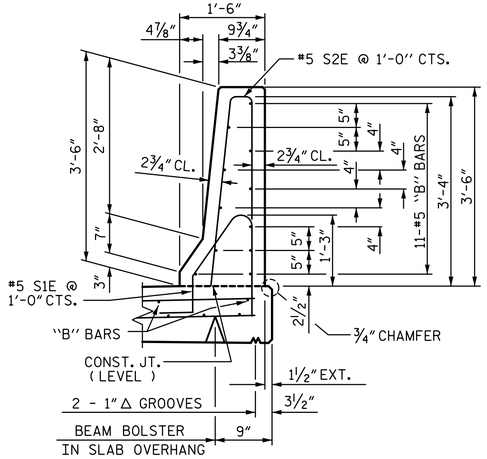
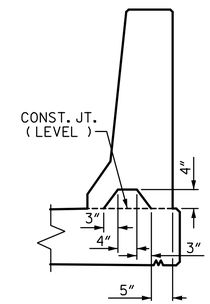
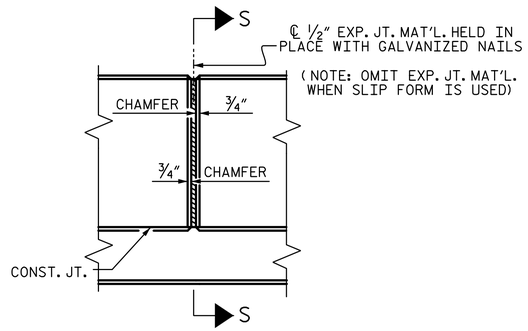


SECTION THRU RAIL



SECTION S-S

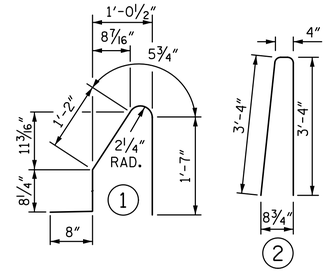
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY
WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
FOR CONCRETE BARRIER RAIL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	88	5	STR	14'-8"	1346
B2E	374	5	STR	25'-7"	9980
S1E	980	5	1	4'-7"	4685
S2E	980	5	2	7'-0"	7155
S3E	16	5	STR	4'-0"	67
EPOXY COATED REINFORCING STEEL					23233 LB
CLASS "AA" CONCRETE					133.8 CY
CONCRETE BARRIER RAIL					985.4 LF

"E" INDICATES EPOXY COATED
REINFORCING STEEL

NOTES:

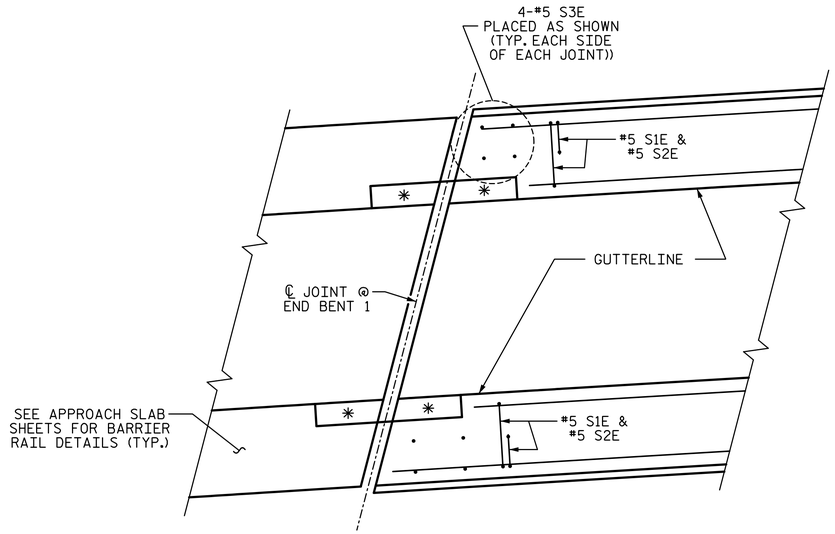
THE BARRIER RAIL IN EACH CONTINUOUS UNIT AND ON APPROACH SLABS SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT CONTINUOUS UNIT AND APPROACH SLAB HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

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

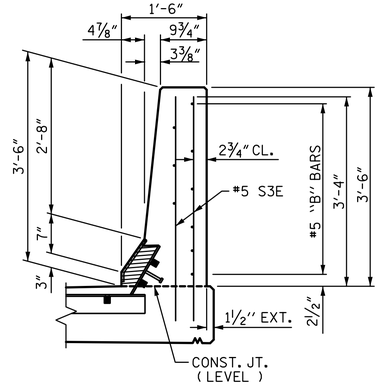
THE #5 S1E AND S2E BARS MAY BE SHIFTED AS NECESSARY TO MAINTAIN A 2" MINIMUM CLEARANCE FROM THE CENTERLINE OF THE EXPANSION JOINTS IN BARRIER RAIL SECTIONS.

FOR DETAILS, QUANTITIES AND LIN. FEET FOR CONCRETE BARRIER RAIL ON APPROACH SLAB, SEE "BRIDGE APPROACH SLAB DETAILS" SHEETS.



PLAN

(END BENT 1 SHOWN, END BENT 2 SIMILAR)
✱ FOR BLOCK OUT DETAILS SEE "EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL" SHEET 2 OF 2



END VIEW @ EXP. JOINTS

END OF RAIL DETAILS @ EXP. JOINTS

PROJECT NO. U-3109A
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STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
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CONCRETE
BARRIER RAIL

(NBL)

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
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STR. #3

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CHECKED BY: J.A. BATTS DATE: 9-15
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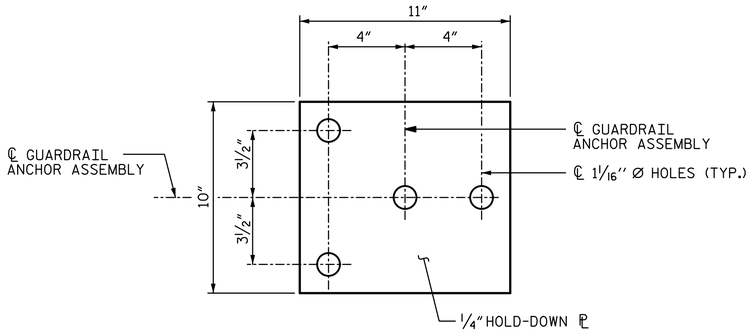
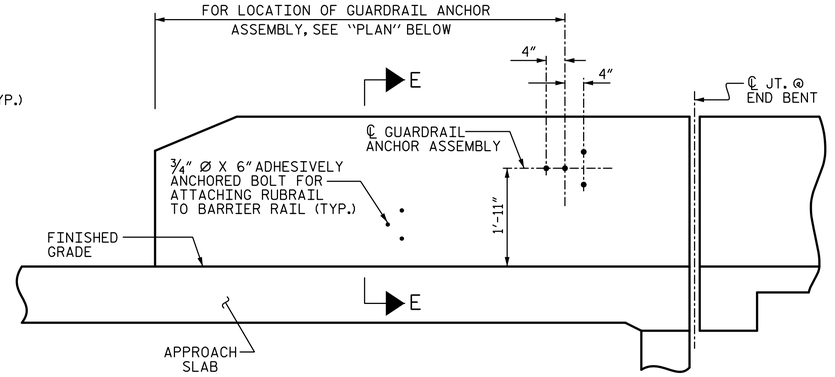
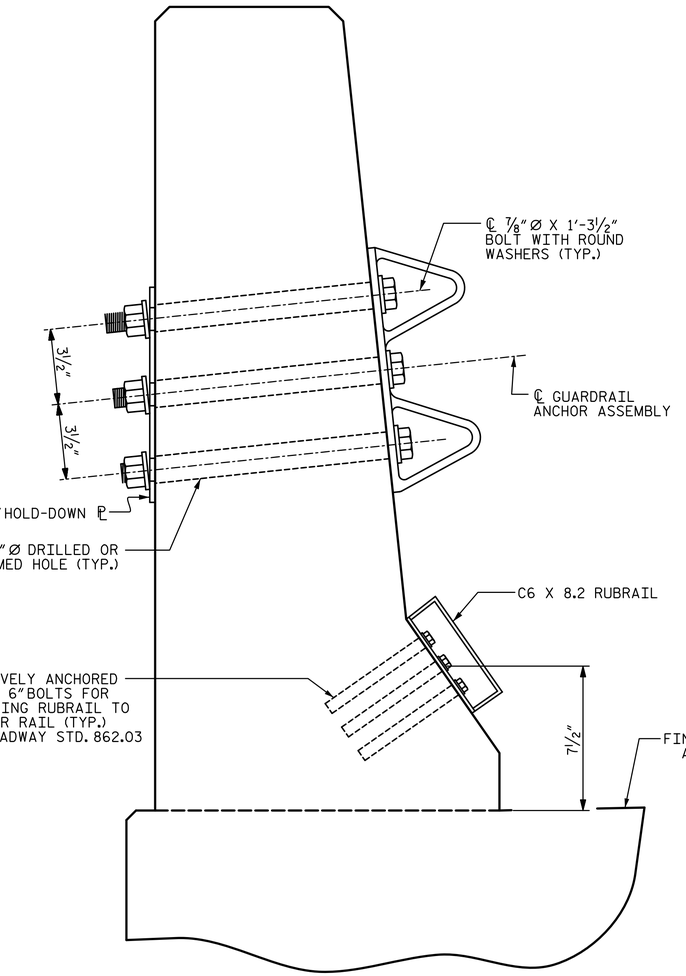


PLAN



ELEVATION



SECTION E-E

GUARDAIL ANCHOR ASSEMBLY DETAILS

PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

NOTES:

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

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

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

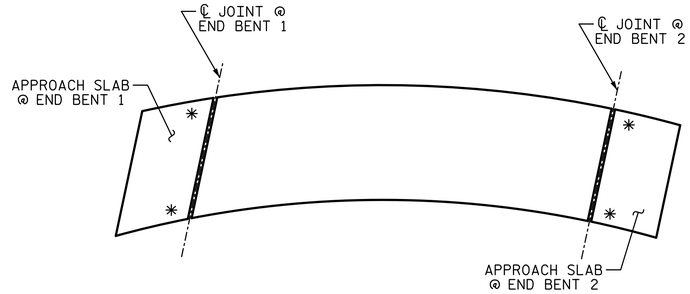
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS AND LOCATION OF THE RUBRAIL.



SKETCH SHOWING POINTS OF ATTACHMENT

* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

DRAWN BY:	T. BANKOVICH	DATE:	9-15
CHECKED BY:	J.A. BATTS	DATE:	9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE:	9-15

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1/6/2017

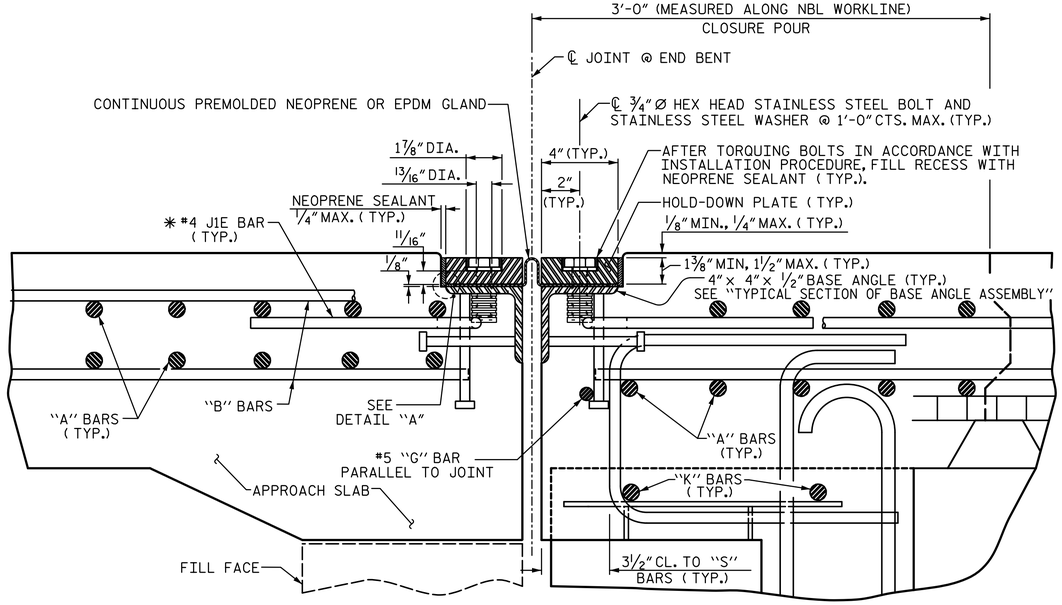
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-30
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3



EXPANSION JOINT DETAILS

(SECTION NORMAL TO JOINT)
(END BENT 1 SHOWN, END BENT 2 SIMILAR)

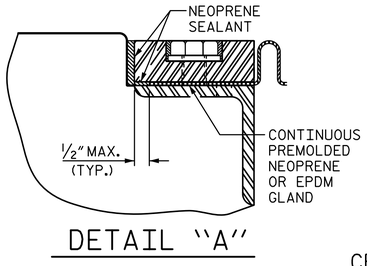
* THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED, ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE:

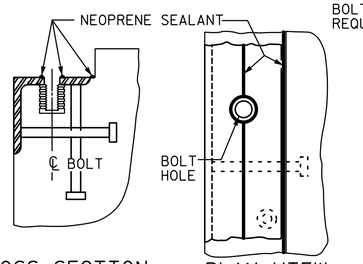
1. A TEMPLATE OR OTHER SUITABLE DEVICE SHALL BE USED TO FORM THE TOP OF THE EXPANSION JOINT SEAL BLOCKOUT TO THE PROPER DEPTH AND WIDTH. THE TEMPLATE SHALL BE 4 1/8" TO 4 1/4" WIDE AND OF SUCH THICKNESS AS TO PROVIDE FOR CORRECT FINAL ELEVATION OF TOP OF HOLD-DOWN PLATES. THE TEMPLATE SHALL BE ATTACHED 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.

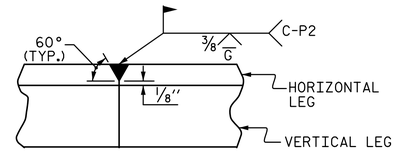


DETAIL "A"

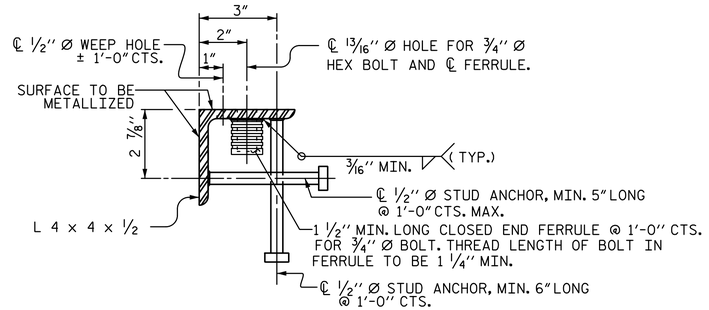


CROSS SECTION PLAN VIEW

INSTALLATION SKETCH



DETAIL - FIELD WELD SPLICE OF BASE ANGLE



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

MOVEMENT AND SETTING AT JOINT

END BENT	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	111°-56'-01"	1"	1 5/8"	1 1/2"	1 1/8"
2	97°-39'-31"	13/16"	1 9/16"	1 7/16"	1 1/8"

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-31
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
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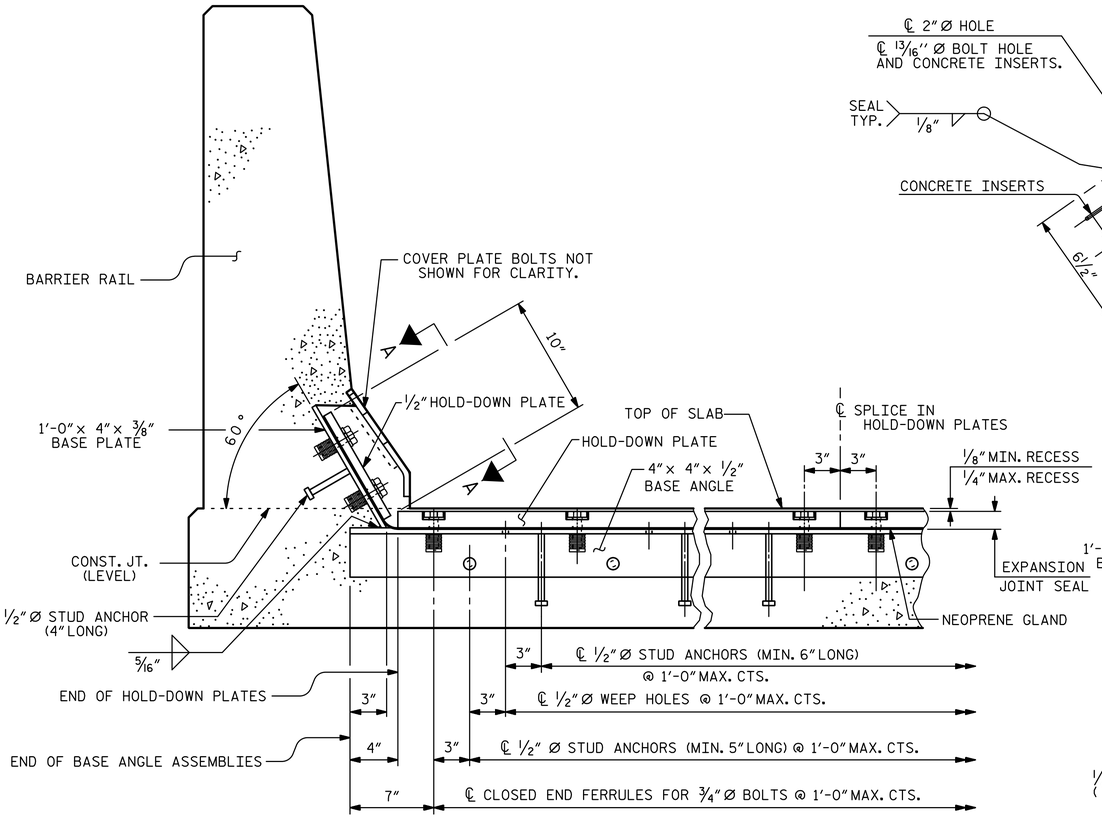
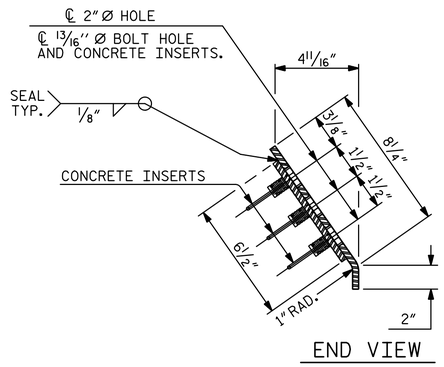
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

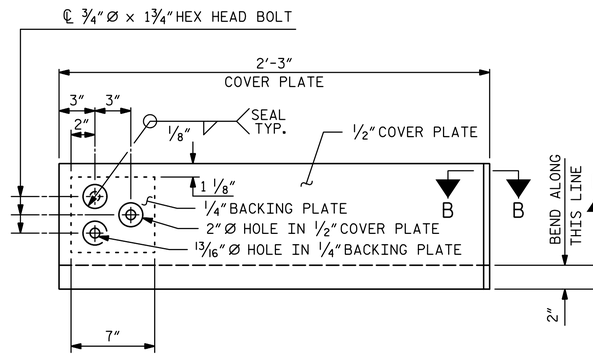
DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15



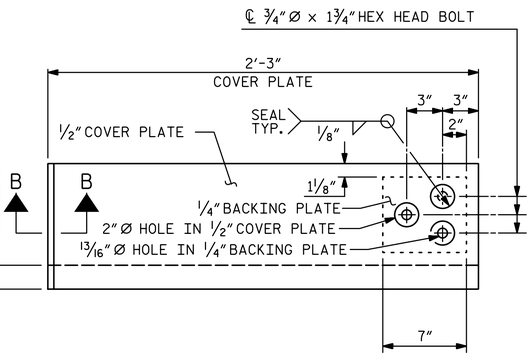
SECTION THRU RAIL NORMAL TO JOINT



END VIEW

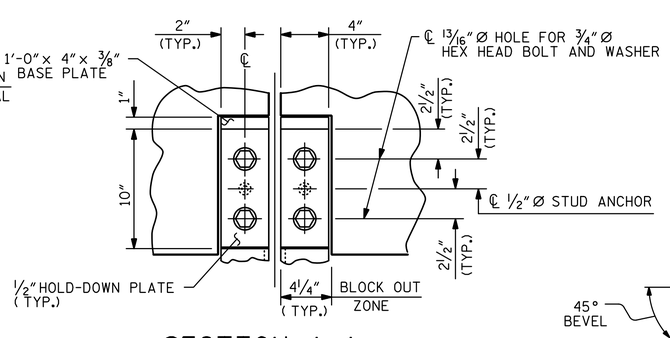


TYPE I - ELEVATION VIEW

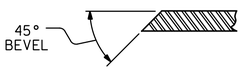


TYPE II - ELEVATION VIEW

COVER PLATE DETAILS



SECTION A-A



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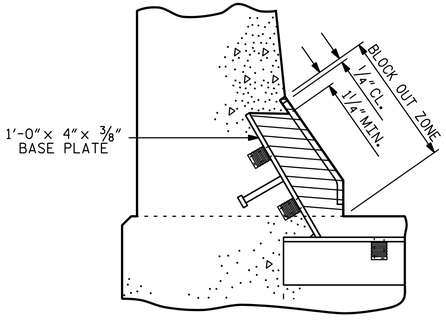
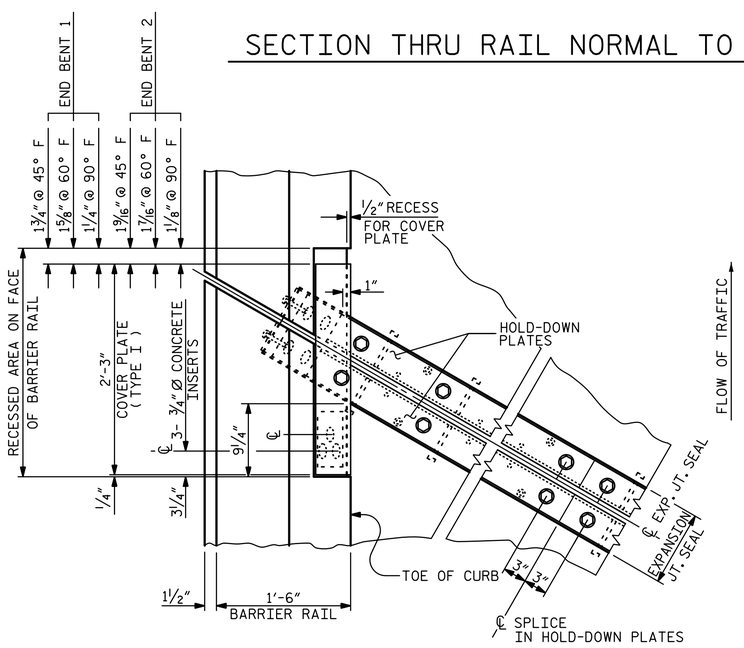
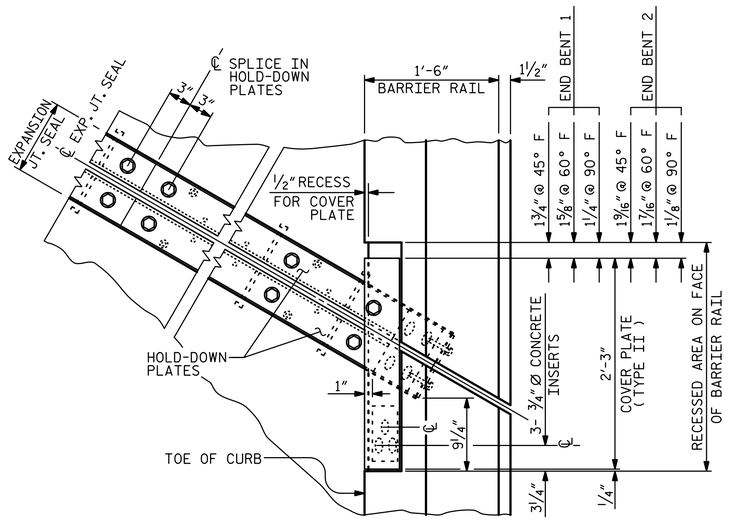


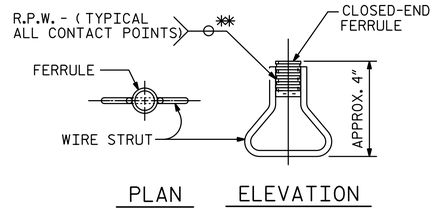
BLOCK OUT DETAIL

SEE "SECTION A-A" FOR OTHER DETAILS



PLAN OF EXPANSION JOINT SEAL





CONCRETE INSERT

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

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-32
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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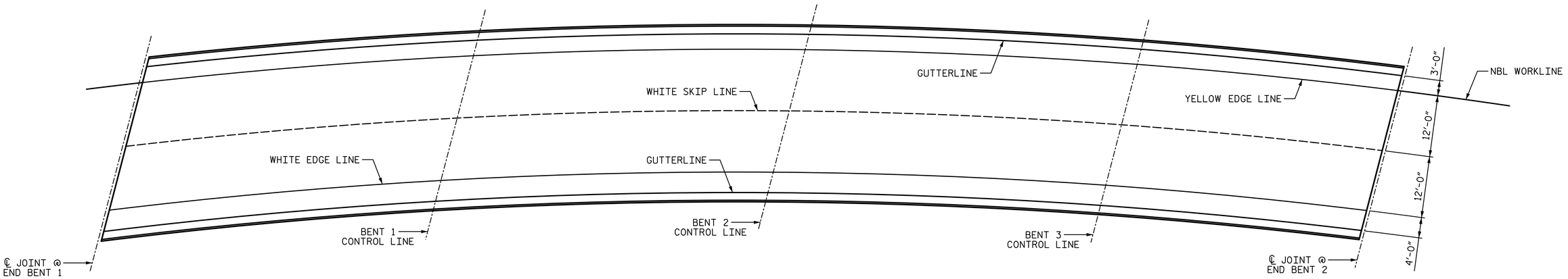
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017



PAVEMENT MARKING ALIGNMENT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

PAVEMENT MARKING ALIGNMENT

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-33
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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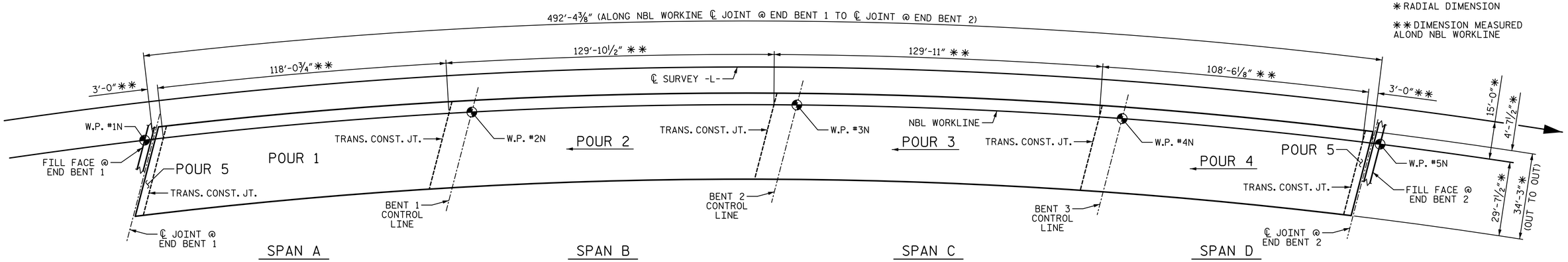
NOTES:

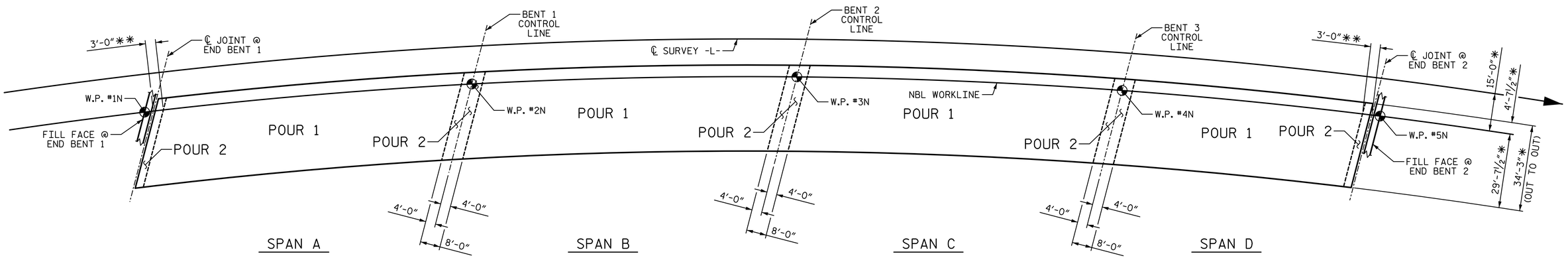
* RADIAL DIMENSION

** DIMENSION MEASURED ALOND NBL WORKLINE



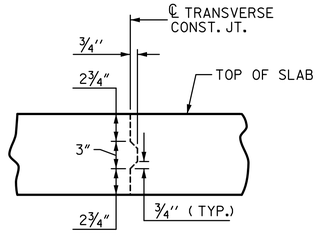
POUR SEQUENCE AND LAYOUT FOR COMPUTING REINFORCED CONCRETE DECK SLAB AREA

(SQ. FT. = 16,869)



OPTIONAL POUR SEQUENCE

POUR 2 CANNOT BE STARTED UNTIL BOTH ADJACENT POUR 1 HAVE REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.



TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN,
LONGITUDINAL REINFORCING STEEL SHALL BE
CONTINUOUS THRU JOINT

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
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POUR SEQUENCE

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-34
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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1/6/2017

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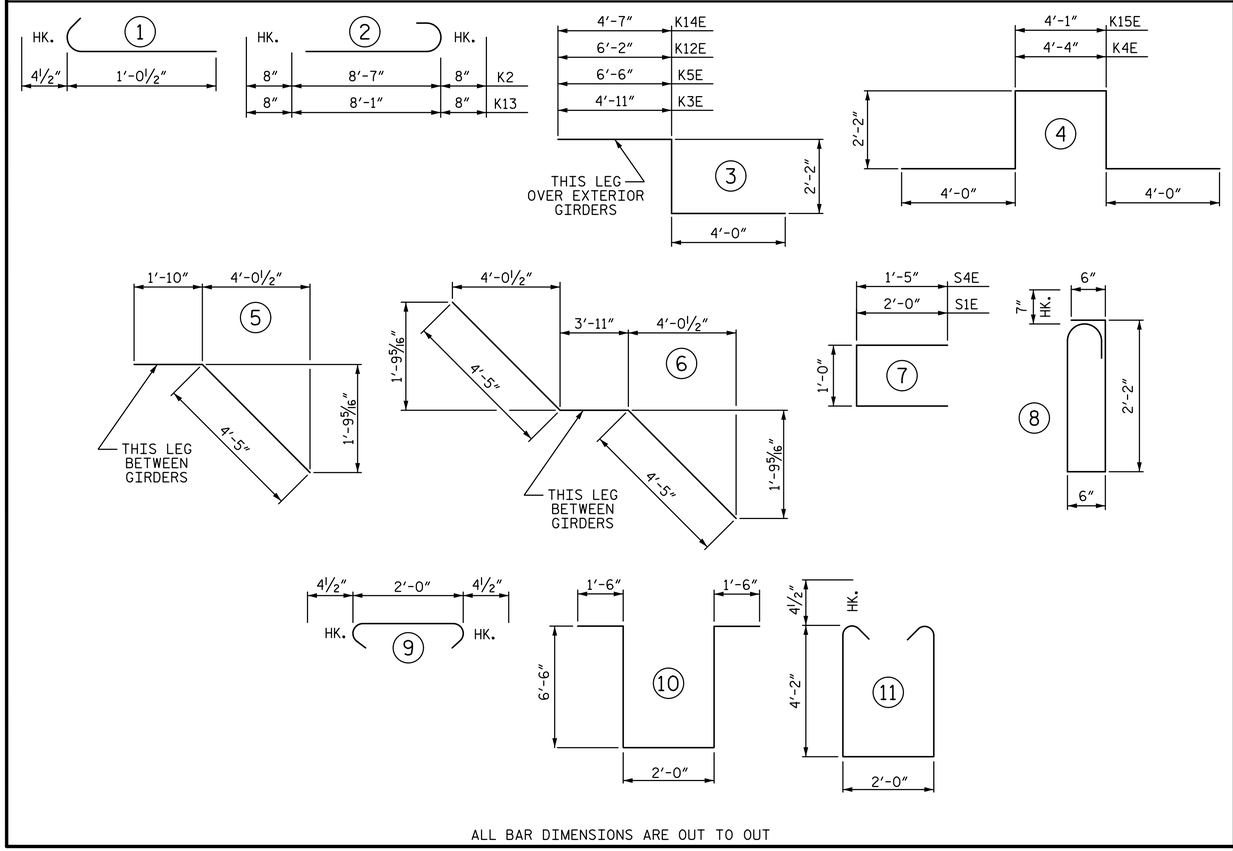
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

SPANS A, B, C, & D

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	778	5	STR	33′-11″	27522
A2	778	5	STR	33′-11″	27522
A101E	1	5	STR	33′-1″	35
A102E	1	5	STR	31′-7″	33
A103E	1	5	STR	30′-0″	31
A104E	1	5	STR	28′-5″	30
A105E	1	5	STR	26′-11″	28
A106E	1	5	STR	25′-4″	26
A107E	1	5	STR	23′-10″	25
A108E	1	5	STR	22′-3″	23
A109E	1	5	STR	20′-8″	22
A110E	1	5	STR	19′-2″	20
A111E	1	5	STR	17′-7″	18
A112E	1	5	STR	16′-0″	17
A113E	1	5	STR	14′-6″	15
A114E	1	5	STR	12′-11″	13
A115E	1	5	STR	11′-5″	12
A116E	1	5	STR	9′-10″	10
A117E	1	5	STR	8′-3″	9
A118E	1	5	STR	6′-9″	7
A119E	1	5	STR	5′-2″	5
A120E	1	5	STR	3′-7″	4
A121E	1	5	STR	2′-1″	2
A122E	1	5	STR	30′-9″	32
A123E	1	5	STR	26′-2″	27
A124E	1	5	STR	21′-7″	23
A125E	1	5	STR	17′-0″	18
A126E	1	5	STR	12′-6″	13
A127E	1	5	STR	7′-11″	8
A128E	1	5	STR	3′-4″	3
A201	1	5	STR	33′-1″	35
A202	1	5	STR	31′-7″	33
A203	1	5	STR	30′-0″	31
A204	1	5	STR	28′-5″	30
A205	1	5	STR	26′-11″	28
A206	1	5	STR	25′-4″	26
A207	1	5	STR	23′-10″	25
A208	1	5	STR	22′-3″	23
A209	1	5	STR	20′-8″	22
A210	1	5	STR	19′-2″	20
A211	1	5	STR	17′-7″	18
A212	1	5	STR	16′-0″	17
A213	1	5	STR	14′-6″	15
A214	1	5	STR	12′-11″	13
A215	1	5	STR	11′-5″	12

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A216	1	5	STR	9′-10″	10
A217	1	5	STR	8′-3″	9
A218	1	5	STR	6′-9″	7
A219	1	5	STR	5′-2″	5
A220	1	5	STR	3′-7″	4
A221	1	5	STR	2′-1″	2
A222	1	5	STR	30′-9″	32
A223	1	5	STR	26′-2″	27
A224	1	5	STR	21′-7″	23
A225	1	5	STR	17′-0″	18
A226	1	5	STR	12′-6″	13
A227	1	5	STR	7′-11″	8
A228	1	5	STR	3′-4″	3
B1	423	5	STR	57′-2″	25221
B2E	275	4	STR	23′-7″	4332
B3E	150	7	STR	33′-3″	10194
B4E	44	7	STR	39′-6″	3552
B5E	75	7	STR	31′-0″	4752
B6E	22	7	STR	35′-6″	1596
G1E	1	5	STR	36′-6″	38
G2E	1	5	STR	34′-2″	36
J1E	73	4	1	1′-5″	69
K1	9	6	STR	5′-6″	74
K2	6	6	2	9′-11″	89
K3E	2	8	3	11′-1″	59
K4E	4	8	4	16′-8″	178
K5E	2	8	3	12′-8″	68
K6	18	4	STR	5′-7″	67
K7	90	4	STR	8′-5″	506
K8	18	4	STR	5′-5″	65
K9	42	4	5	6′-3″	175
K10	42	4	6	12′-9″	358
K11	9	6	STR	5′-2″	70
K12E	2	8	3	12′-4″	66
K13	6	6	2	9′-5″	85
K14E	2	8	3	10′-9″	57
K15E	4	8	4	16′-5″	175
S1E	18	4	7	5′-0″	60
S2E	36	5	8	5′-11″	222
S3	378	4	9	2′-9″	694
S4E	18	4	7	3′-10″	46
U1	18	4	11	11′-1″	133
U2E	54	4	10	18′-0″	649

REINFORCING STEEL 55568 LB

EPOXY COATED
REINFORCING STEEL 54180 LB

"E" INDICATES EPOXY COATED REINFORCING STEEL

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS "AA" CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	CY	LB	LB
POUR 1	134.9	--	--
POUR 2	162.2	--	--
POUR 3	162.3	--	--
POUR 4	137.2	--	--
POUR 5	9.5	--	--
TOTAL	606.1	55568	54180

**QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.
SEE "POUR SEQUENCE" SHEET FOR LOCATION OF POURS.

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	1,333	SQ. FT.
BRIDGE DECK	13,762	SQ. FT.
TOTAL	15,095	SQ. FT.

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

BILL OF MATERIAL

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-35
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
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NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
Documents Signed Electronically
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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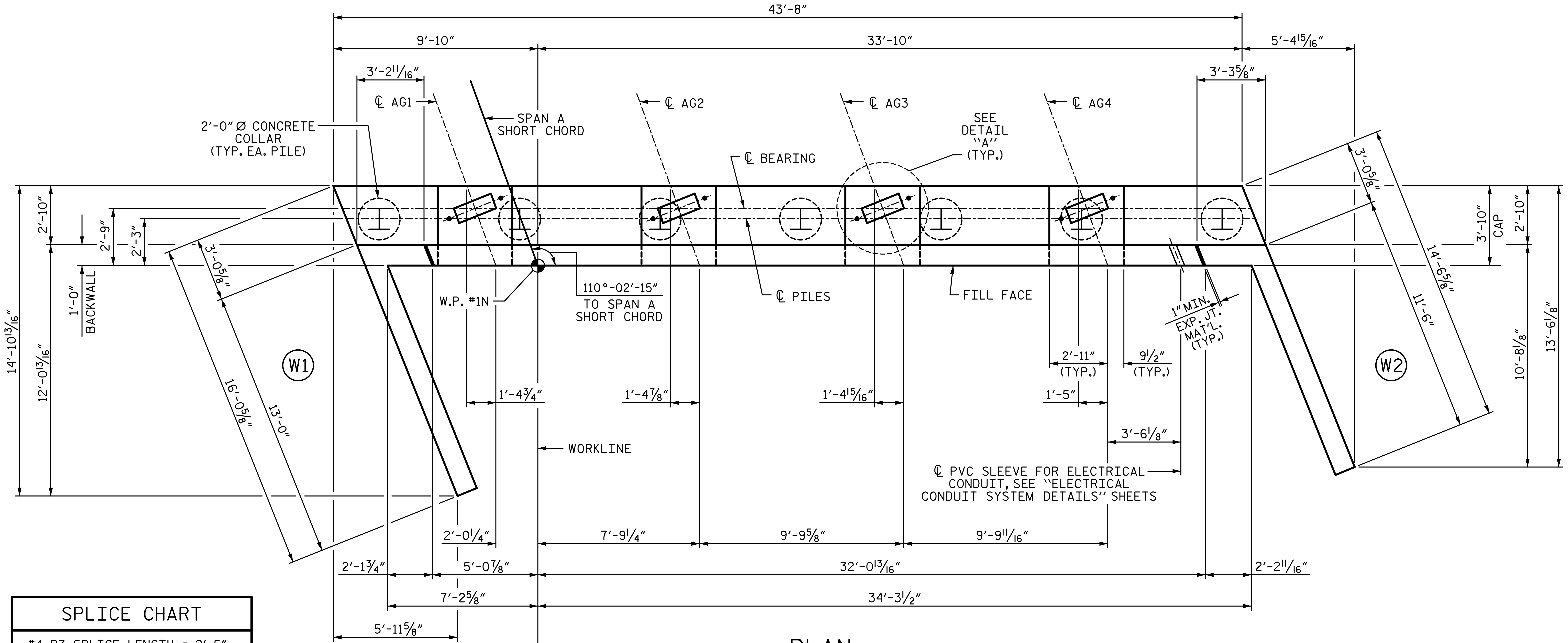
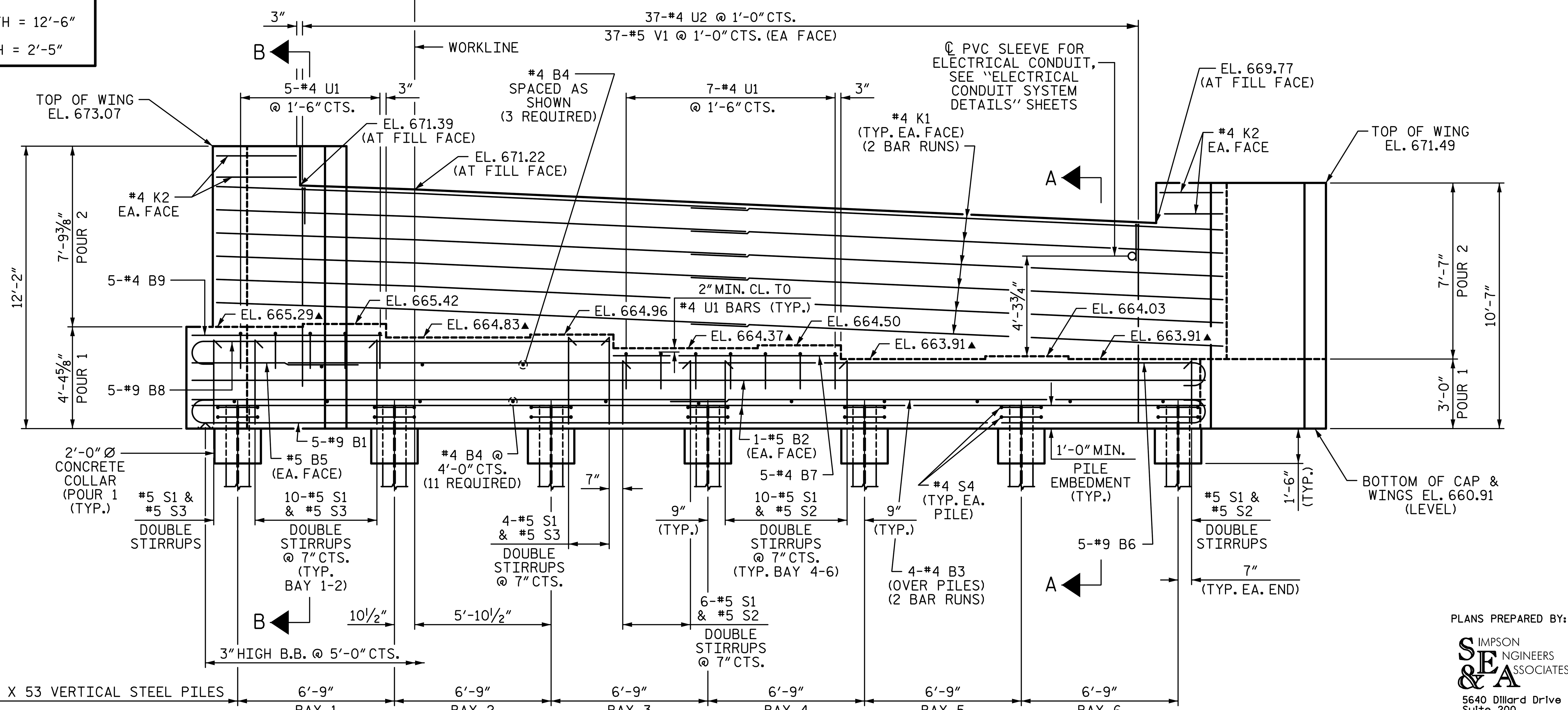


PLAN

SPLICE CHART

#4 B3 SPLICE LENGTH = 2'-5"
#5 B5 SPLICE LENGTH = 3'-0"
#9 B6 SPLICE LENGTH = 12'-6"
#4 K1 SPLICE LENGTH = 2'-5"



ELEVATION

NOTES:

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

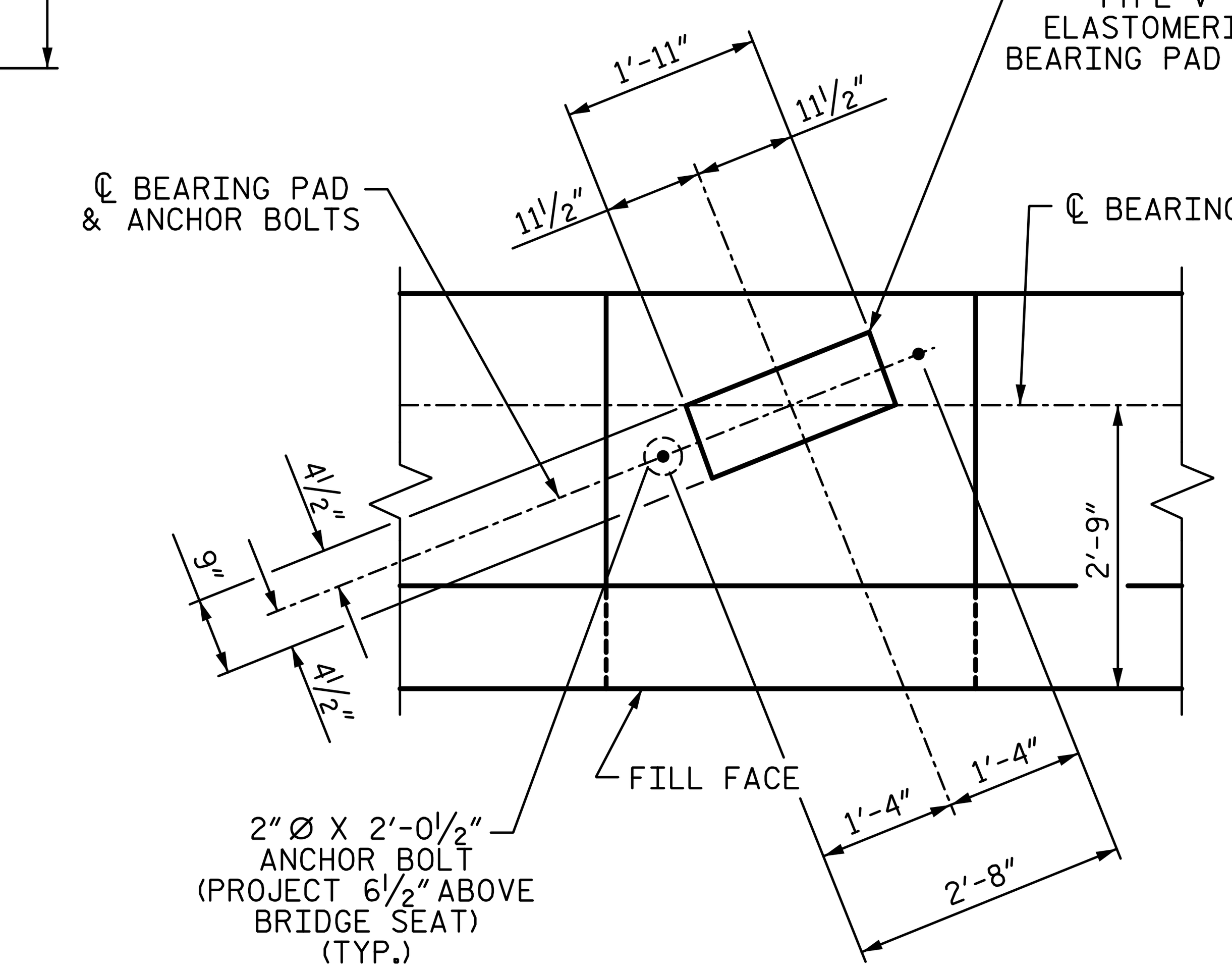
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

▲ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTIONS A-A AND B-B SHEET 3 OF 3.



DETAIL "A"

(TYP. EA. GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(NBL)

PLANS PREPARED BY:

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 18065 JOHN A. BATTS
1/6/2017

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

SHEET NO. S03-36
TOTAL SHEETS S03-53

DRAWN BY:	S.D. COOPER	DATE:	9-15
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DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE:	9-15

STR. #3

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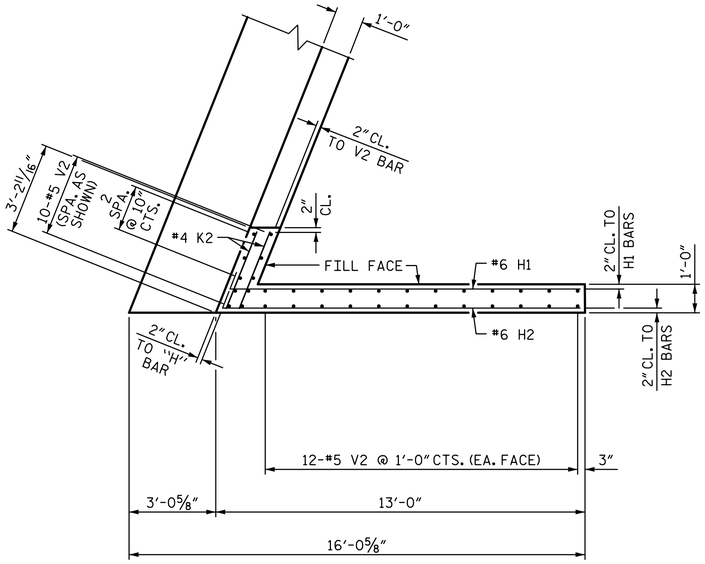
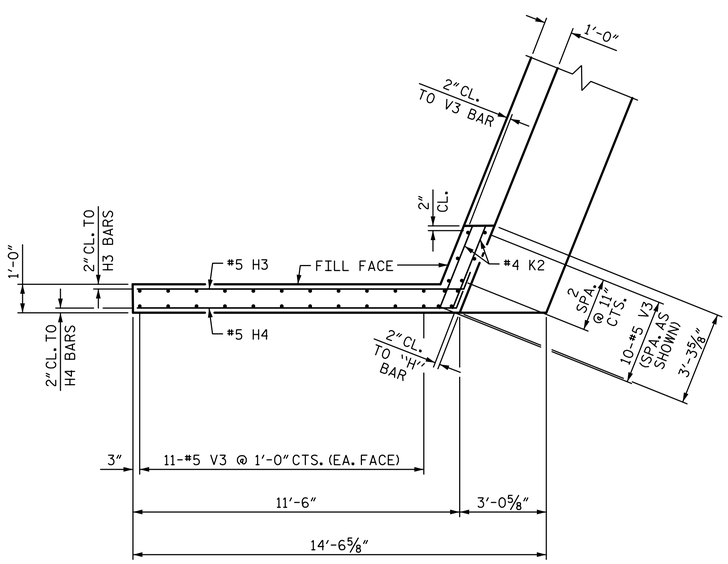
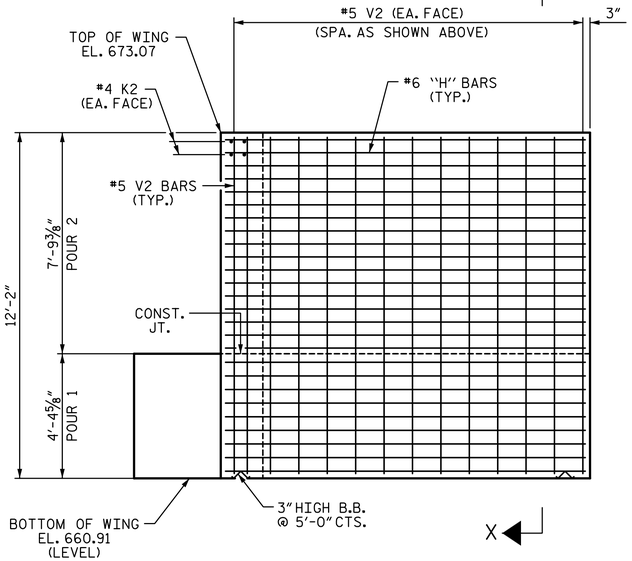


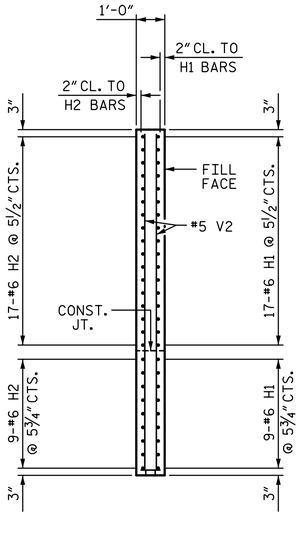
PLAN OF WING (W1)



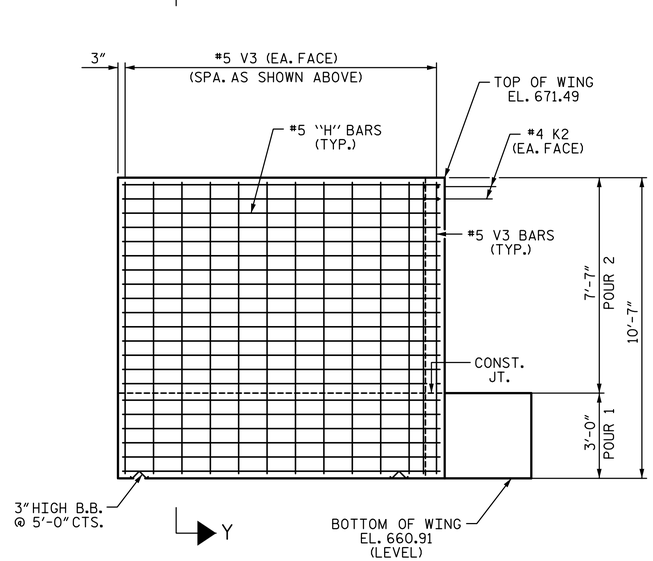
PLAN OF WING (W2)



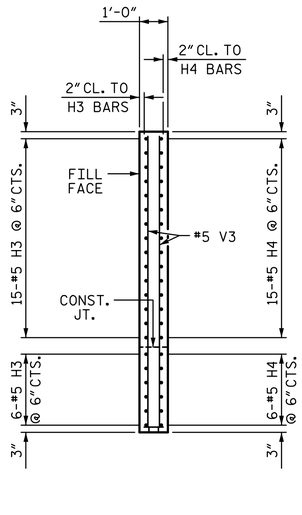
ELEVATION OF WING (W1)



SECTION X-X



ELEVATION OF WING (W2)



SECTION Y-Y

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-37
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES

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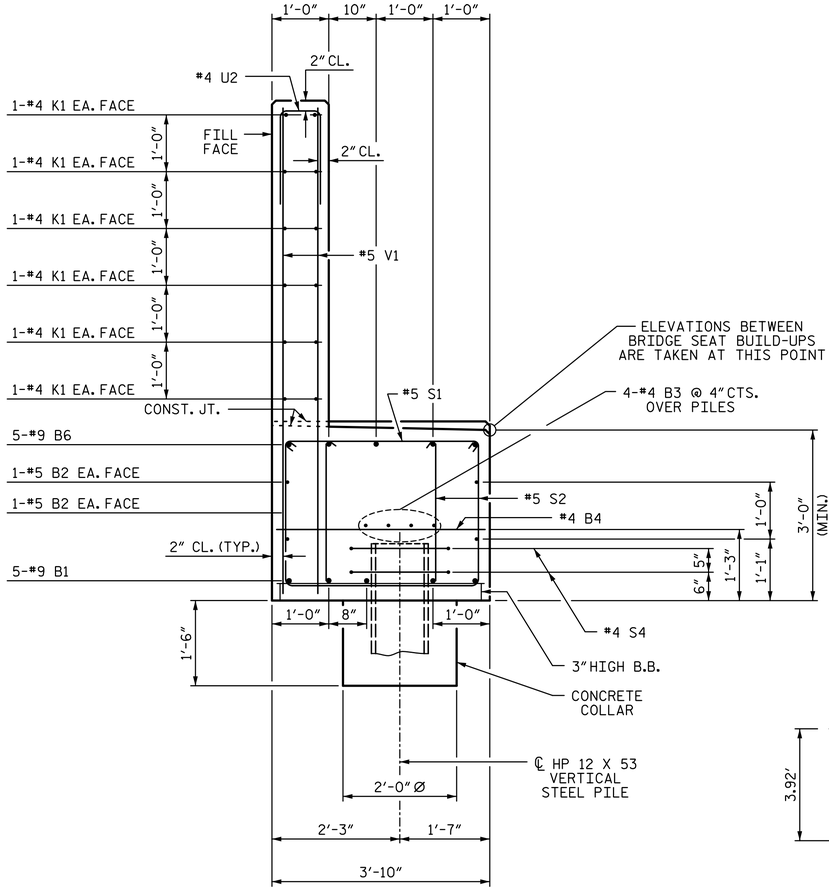
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS

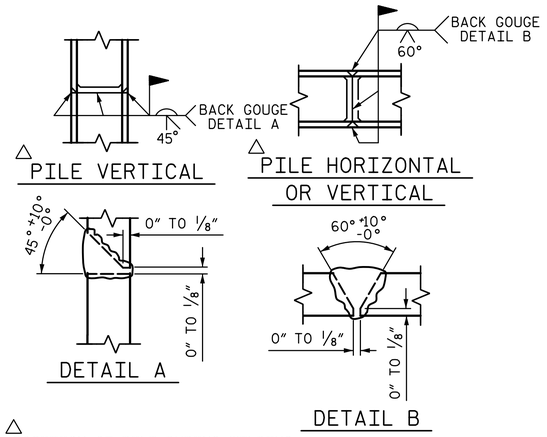
1/6/2017

1/6/2017 8:11:13 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 3 Bridge 435 (NBL)\Drawings\Final\403_U3109A_smu_eb1.dgn

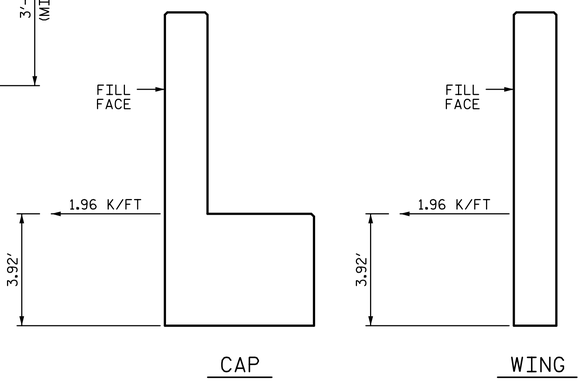


SECTION A-A

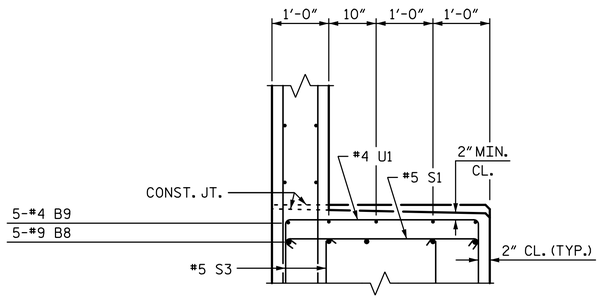
(TIEBACK NOT SHOWN FOR CLARITY)



PILE SPLICE DETAILS

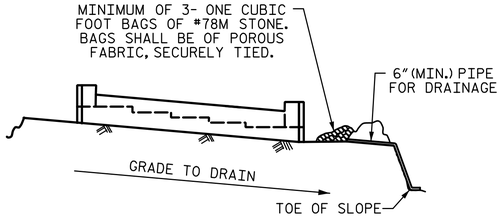


CAP WING



SECTION B-B

TIEBACK DETAILS



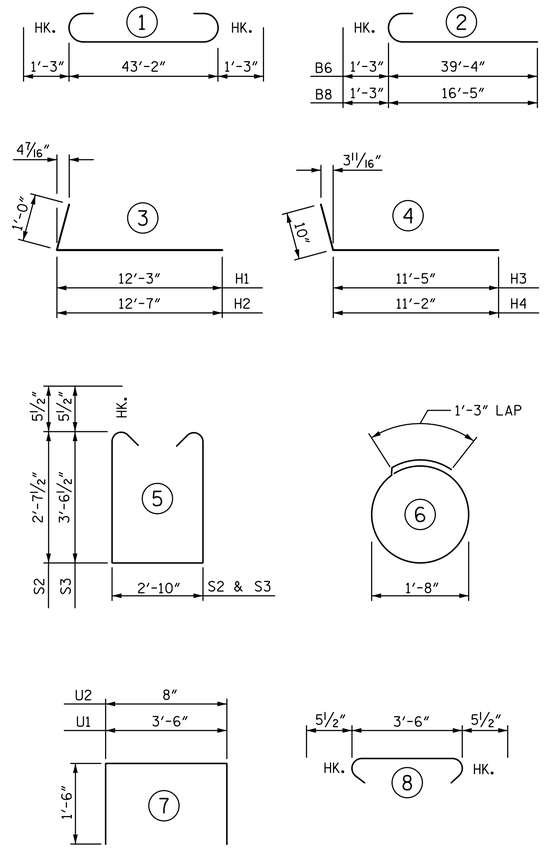
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	9	1	45'-8"	776
B2	4	5	STR	43'-4"	181
B3	8	4	STR	22'-11"	122
B4	14	4	STR	3'-6"	33
B5	2	5	STR	7'-0"	15
B6	5	9	2	40'-7"	690
B7	5	4	STR	9'-5"	31
B8	5	9	2	17'-8"	300
B9	5	4	STR	6'-9"	23
H1	26	6	3	13'-3"	517
H2	26	6	3	13'-7"	530
H3	21	5	4	12'-3"	268
H4	21	5	4	12'-0"	263
K1	24	4	STR	22'-11"	367
K2	8	4	STR	2'-10"	15
S1	62	5	8	4'-5"	286
S2	74	5	5	9'-0"	695
S3	50	5	5	10'-10"	565
S4	14	4	6	6'-6"	61
U1	12	4	7	6'-6"	52
U2	37	4	7	3'-8"	91
V1	74	5	STR	8'-4"	643
V2	34	5	STR	11'-9"	417
V3	32	5	STR	10'-2"	339

TOTAL REINFORCING STEEL	7280 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	26.8 CY
POUR 2	
(BACKWALL AND UPPER WINGS)	16.6 CY
TOTAL CLASS "A" CONCRETE	43.4 CY
HP 12 X 53 STEEL PILES	
NO. 7	580 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	7 EA

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 19058 ENGINEER JOHN A. BATTS
3/22/2017

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

END BENT 1

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-38
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

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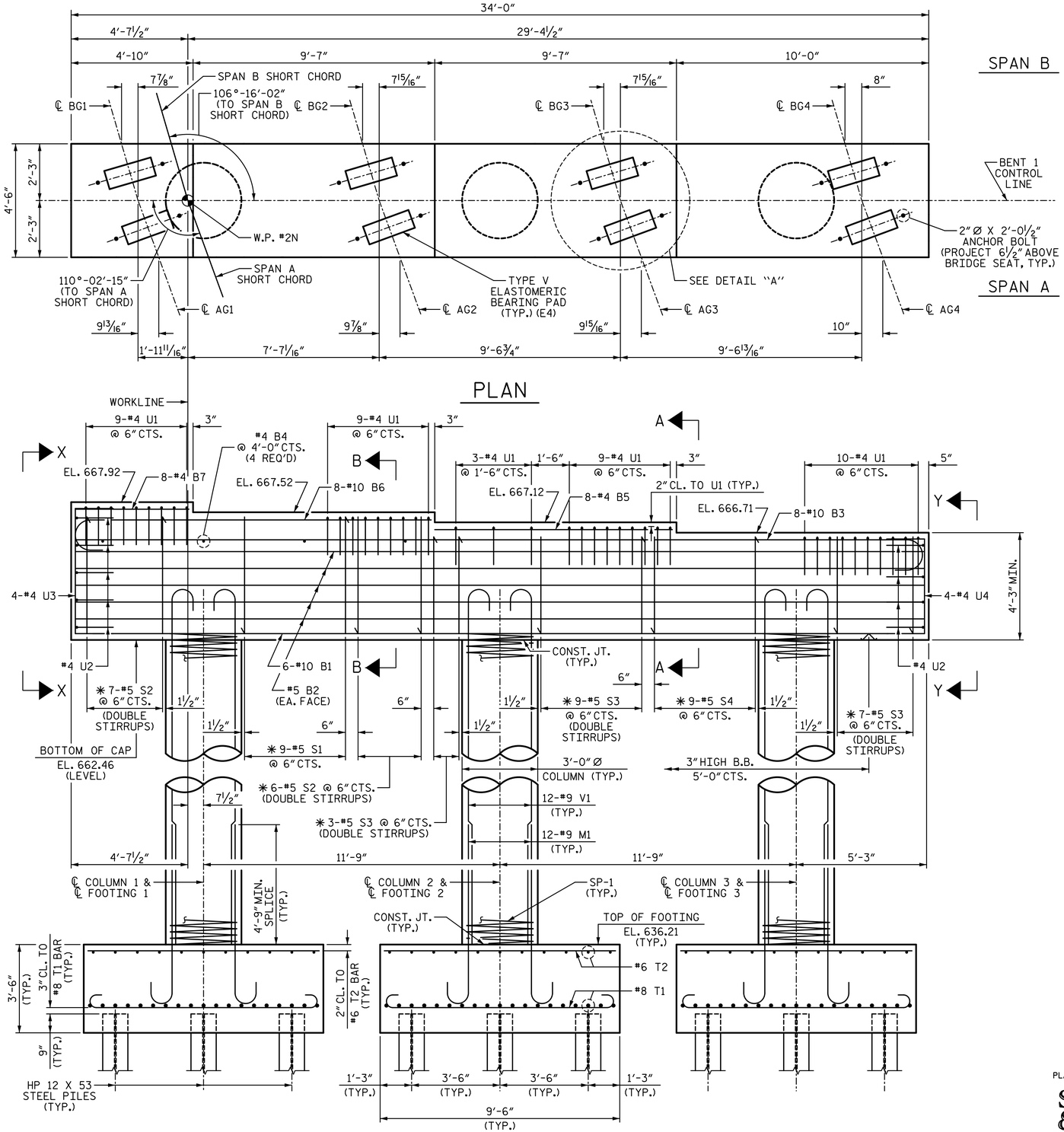


NOTES:

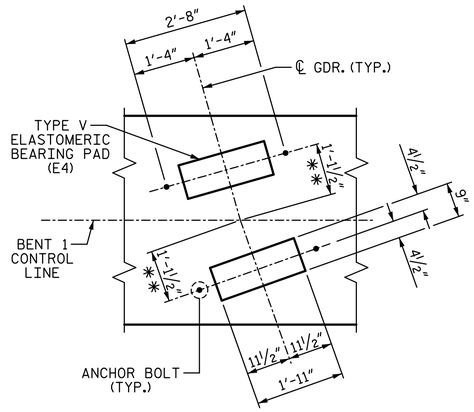
✱ INVERT ALTERNATE STIRRUPS.

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

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL "A"

(TYP. EA. GIRDER)
(✱✱ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 1

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-39
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

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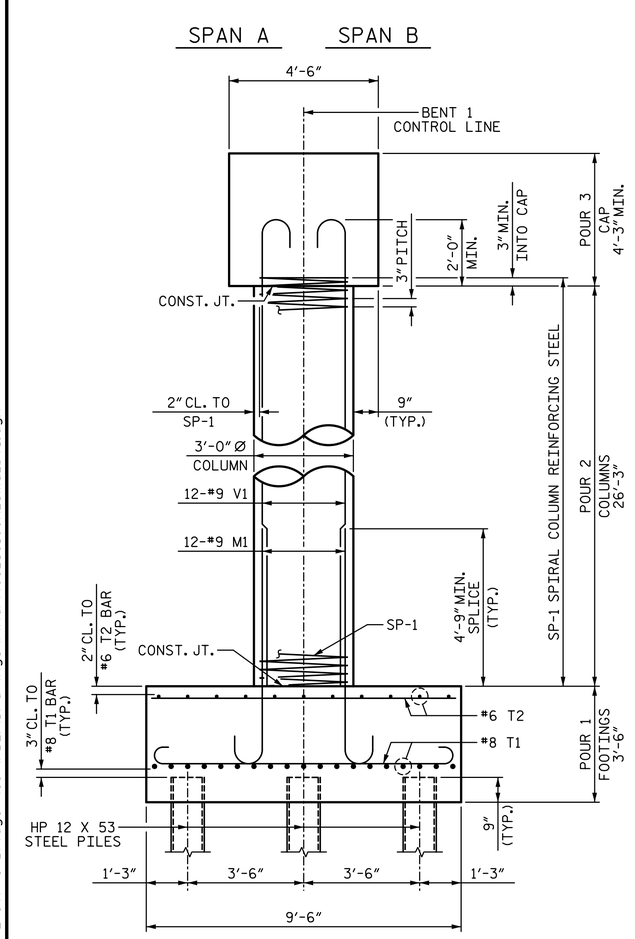
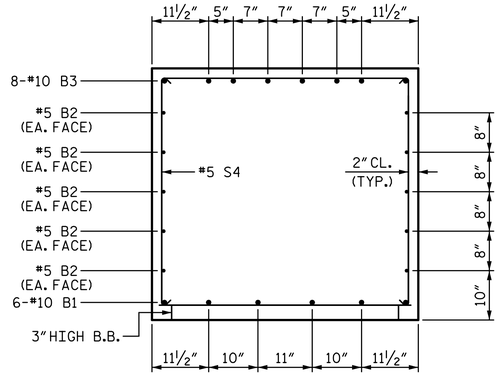
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18054 ENGINEER JOHN A. BATTS
1/6/2017

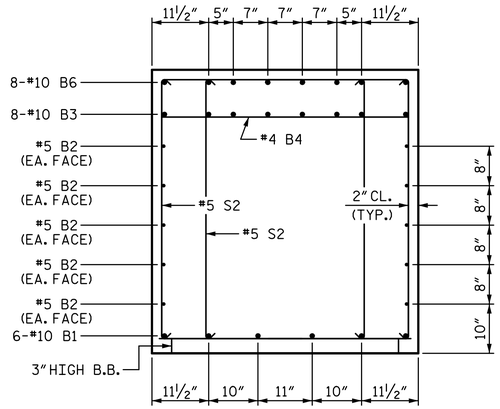


END ELEVATION

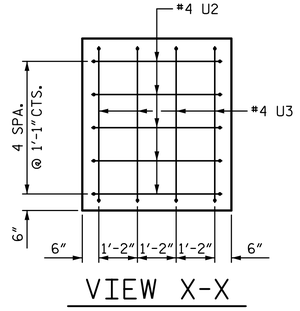
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



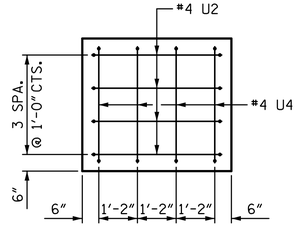
SECTION A-A



SECTION B-B

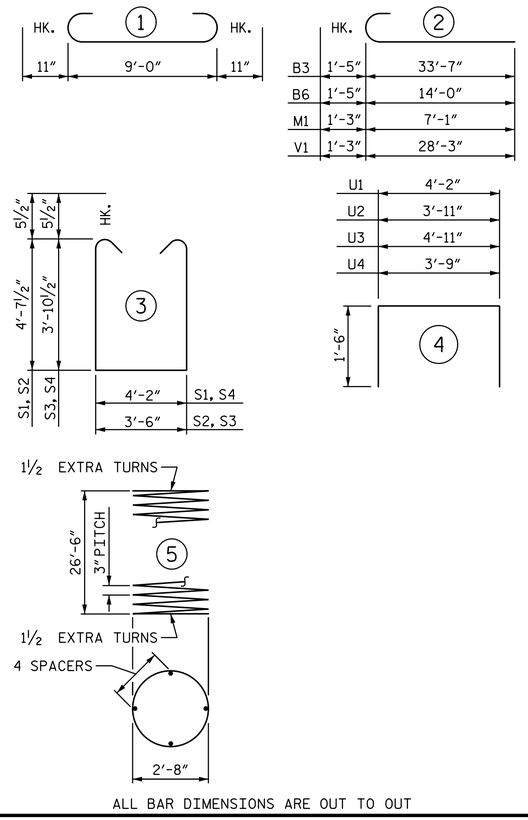


VIEW X-X



VIEW Y-Y

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 1

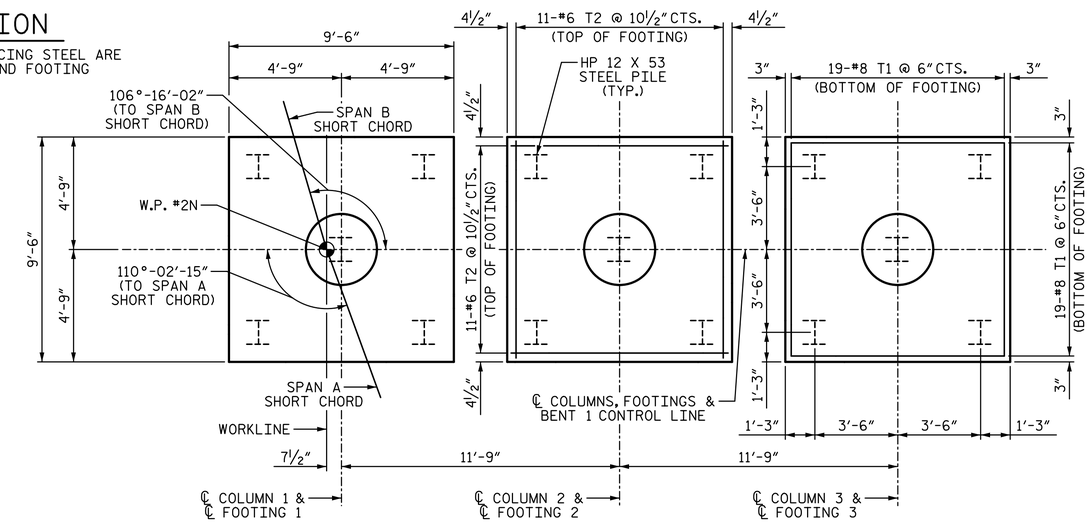
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	33'-8"	869
B2	10	5	STR	33'-8"	351
B3	8	10	2	35'-0"	1205
B4	4	4	STR	4'-2"	11
B5	8	4	STR	9'-5"	50
B6	8	10	2	15'-5"	531
B7	8	4	STR	4'-6"	24
M1	36	9	2	8'-4"	1020
S1	9	5	3	14'-4"	135
S2	26	5	3	13'-8"	371
S3	32	5	3	12'-2"	406
S4	9	5	3	12'-10"	120
T1	114	8	1	10'-10"	3297
T2	66	6	STR	9'-0"	892
U1	40	4	4	7'-2"	191
U2	9	4	4	6'-11"	42
U3	4	4	4	7'-11"	21
U4	4	4	4	6'-9"	18
V1	36	9	2	29'-6"	3611
SP-1	3	*	5	899'-4"	1802

REINFORCING STEEL	13165 LB
SPIRAL COL. REINF. STEEL	1802 LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	20.7 CY
POUR 3 (CAP)	27.1 CY
TOTAL	82.9 CY

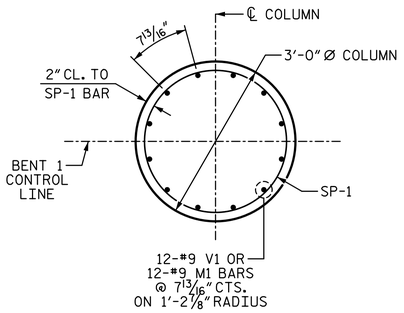
HP 12 X 53 STEEL PILES	
NO. 15	865 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 1

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-40
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:

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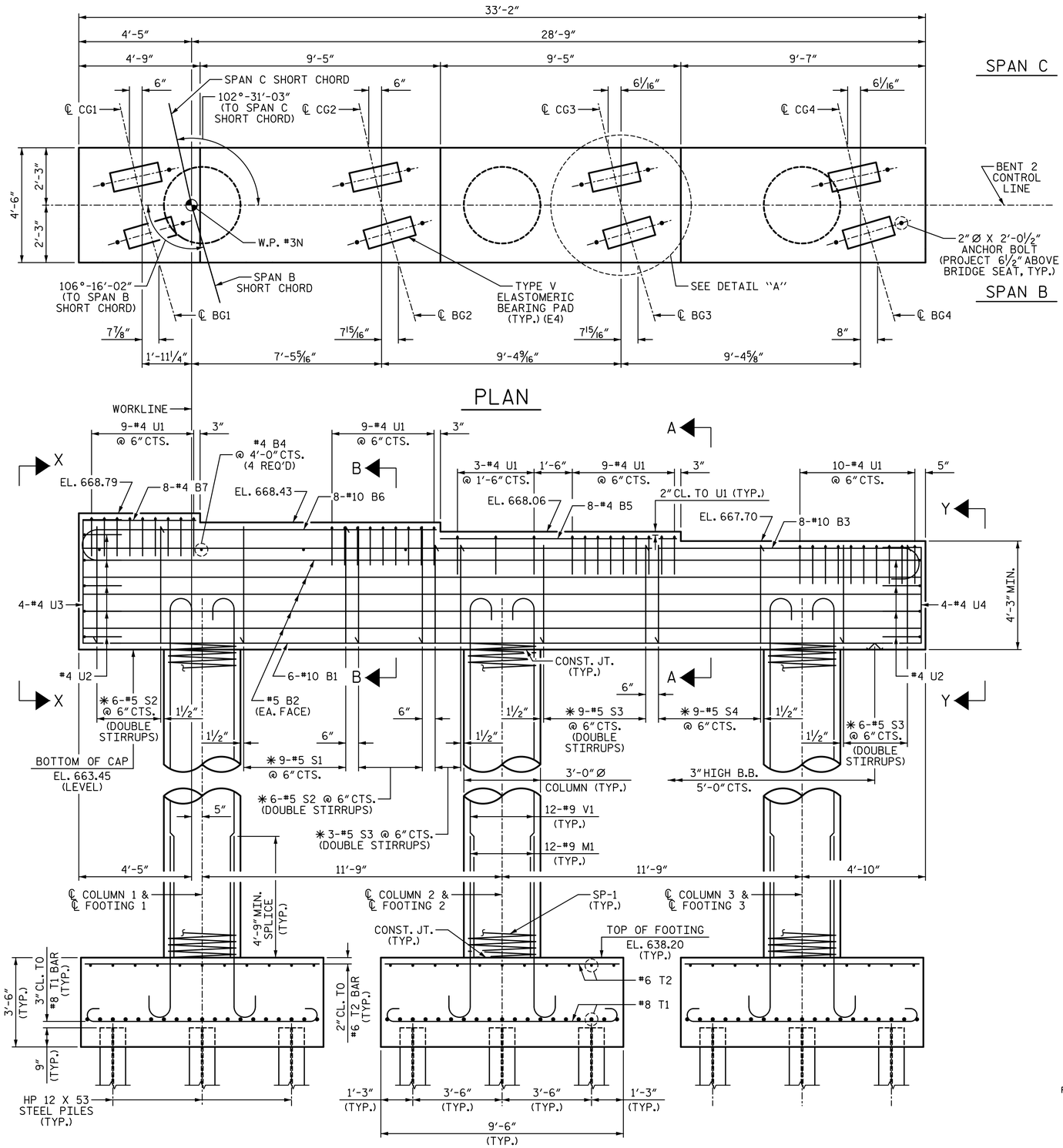
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18656 ENGINEER JOHN A. BATTS
3/22/2017

DRAWN BY:	T. BANKOVICH	DATE: 9-15
CHECKED BY:	J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE: 9-15



NOTES:

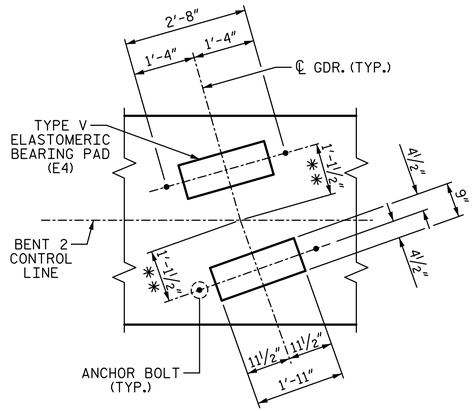
✱ INVERT ALTERNATE STIRRUPS.

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

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL "A"

(TYP. EA. GIRDER)
(✱✱ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUBSTRUCTURE

BENT 2

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-41
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

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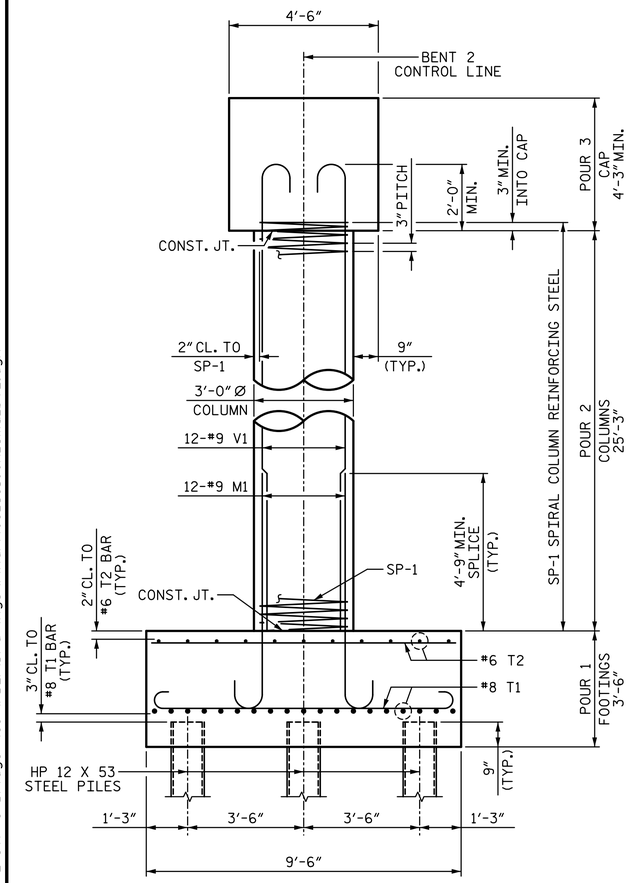
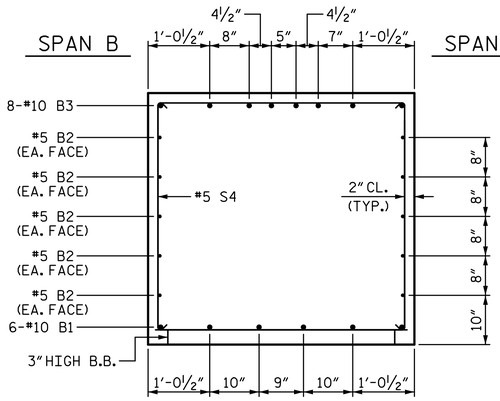
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18656 ENGINEER JOHN A. BATTS
Digitally Signed
1/6/2017

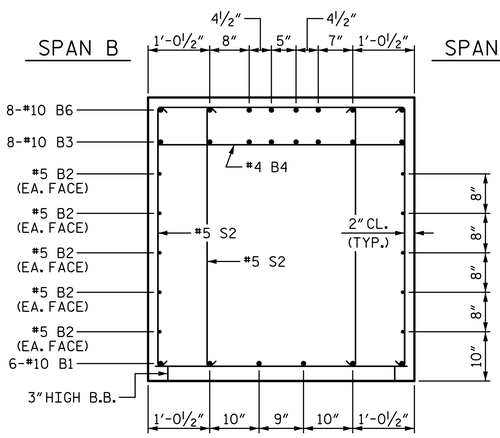


END ELEVATION

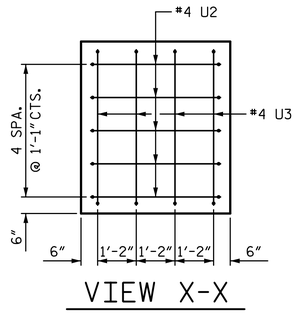
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



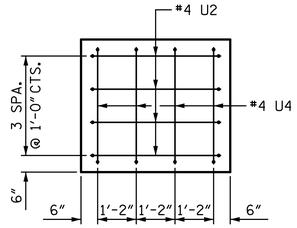
SECTION A-A



SECTION B-B

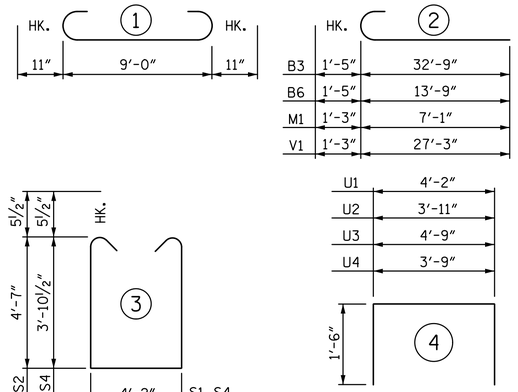


VIEW X-X



VIEW Y-Y

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 2

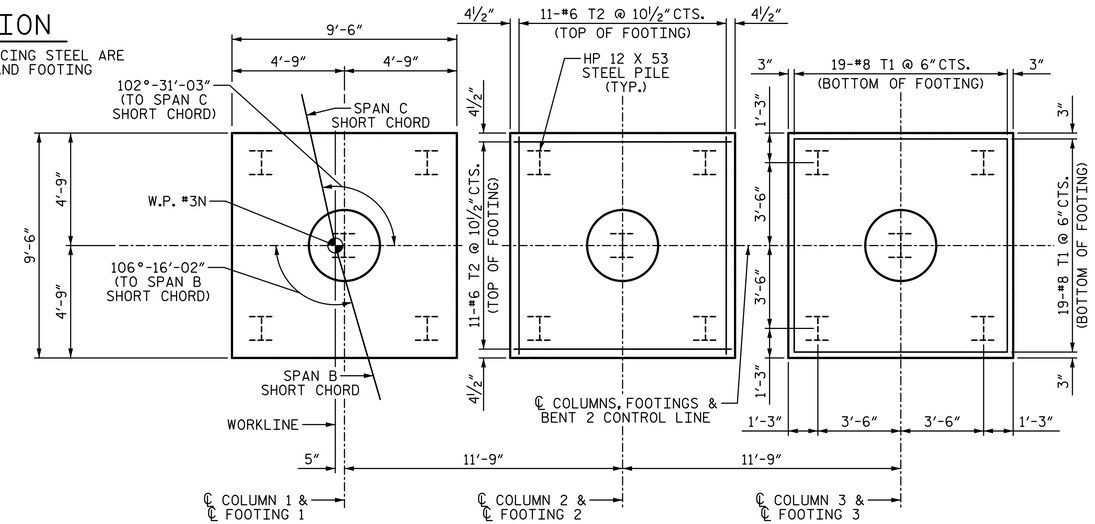
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	32'-10"	848
B2	10	5	STR	32'-10"	342
B3	8	10	2	34'-2"	1176
B4	4	4	STR	4'-2"	11
B5	8	4	STR	9'-3"	49
B6	8	10	2	15'-2"	522
B7	8	4	STR	4'-5"	24
M1	36	9	2	8'-4"	1020
S1	9	5	3	14'-3"	134
S2	24	5	3	13'-6"	338
S3	36	5	3	12'-1"	454
S4	9	5	3	12'-10"	120
T1	114	8	1	10'-10"	3297
T2	66	6	STR	9'-0"	892
U1	40	4	4	7'-2"	191
U2	9	4	4	6'-11"	42
U3	4	4	4	7'-9"	21
U4	4	4	4	6'-9"	18
V1	36	9	2	28'-6"	3488
SP-1	3	*	5	866'-4"	1736

REINFORCING STEEL	12987	LB
SPIRAL COL. REINF. STEEL	1736	LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	19.9 CY
POUR 3 (CAP)	26.1 CY
TOTAL	81.1 CY

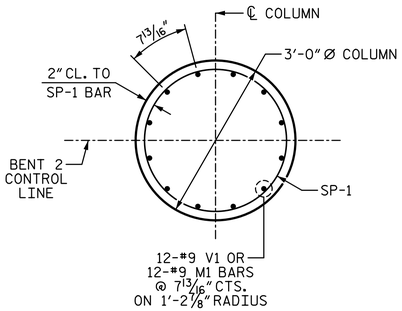
HP 12 X 53 STEEL PILES	
NO. 15	905 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 2

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-42
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES
5640 Dillard Drive
Suite 200
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(919) 852-0468
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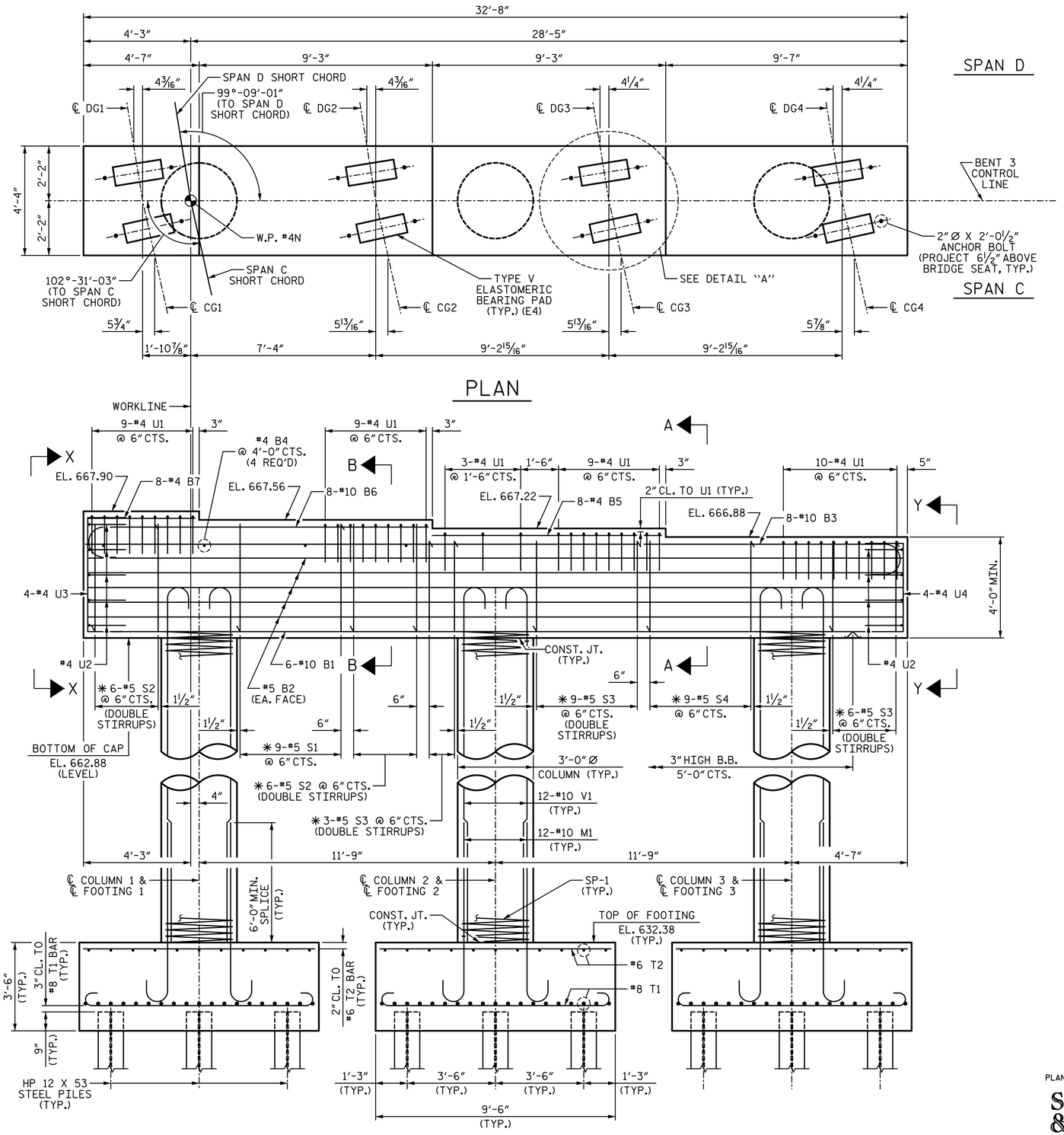
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18058 ENGINEER JOHN A. BATTS
3/22/2017

DRAWN BY:	T. BANKOVICH	DATE:	9-15
CHECKED BY:	J.A. BATTS	DATE:	9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE:	9-15



NOTES:

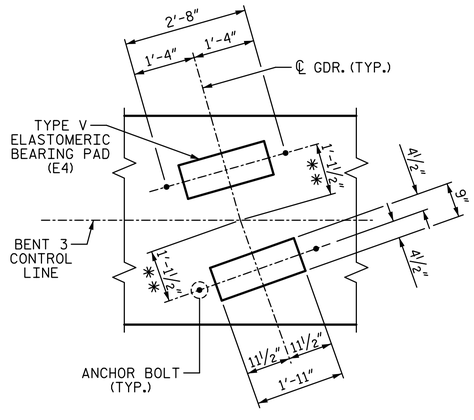
✱ INVERT ALTERNATE STIRRUPS.

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

HOOKS ON ″M″ & ″V″ BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

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

SEE GENERAL DRAWING ″FOUNDATION LAYOUT″ FOR ADDITIONAL NOTES FOR DRIVING PILES.



DETAIL ″A″

(TYP. EA. GIRDER)
(✱✱ MEASURED ALONG ℄ GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT 3

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-43
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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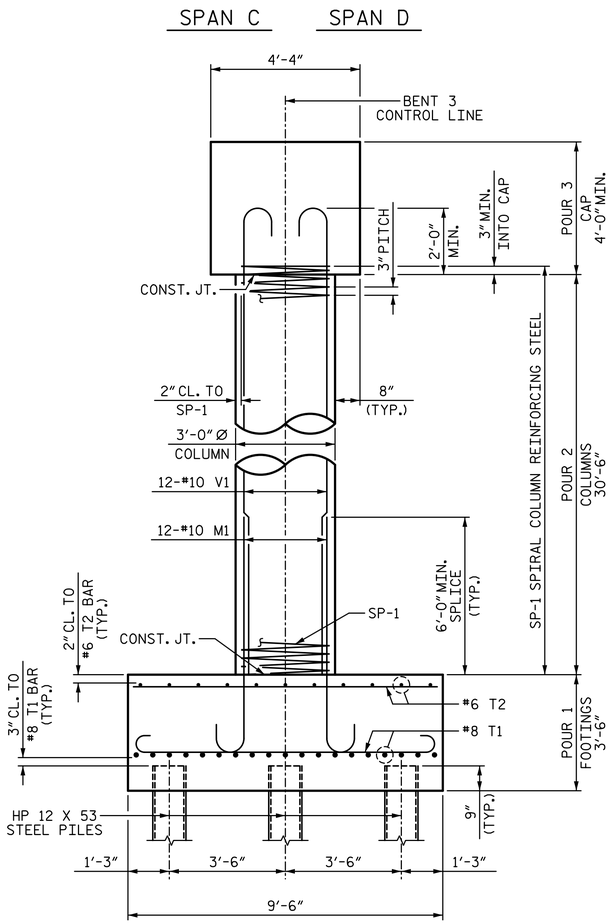
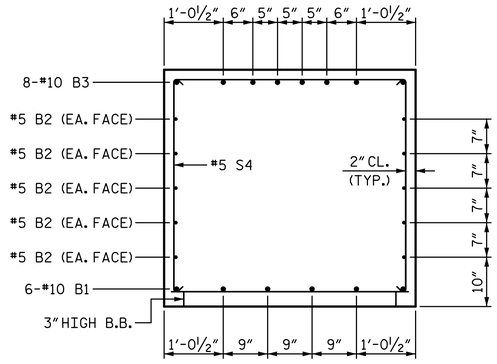
NORTH CAROLINA PROFESSIONAL SEAL 18068 ENGINEER JOHN A. BATTS
Digitally Signed
1/6/2017

SPAN C SPAN D

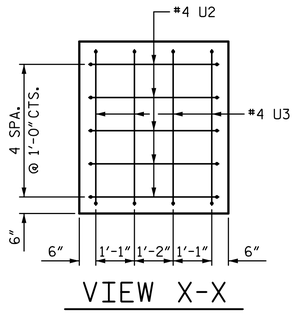


END ELEVATION

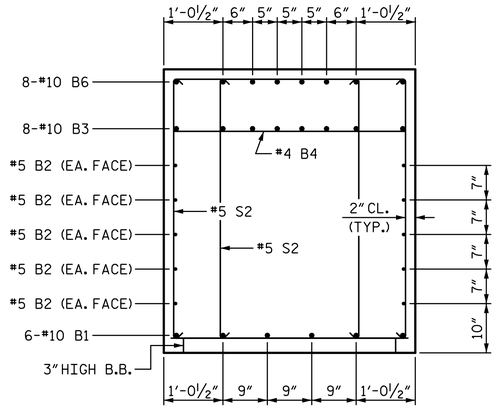
DETAILS, DIMENSIONS & REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN AND FOOTING



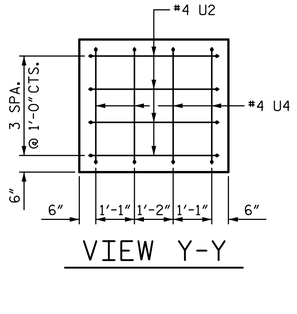
SECTION A-A



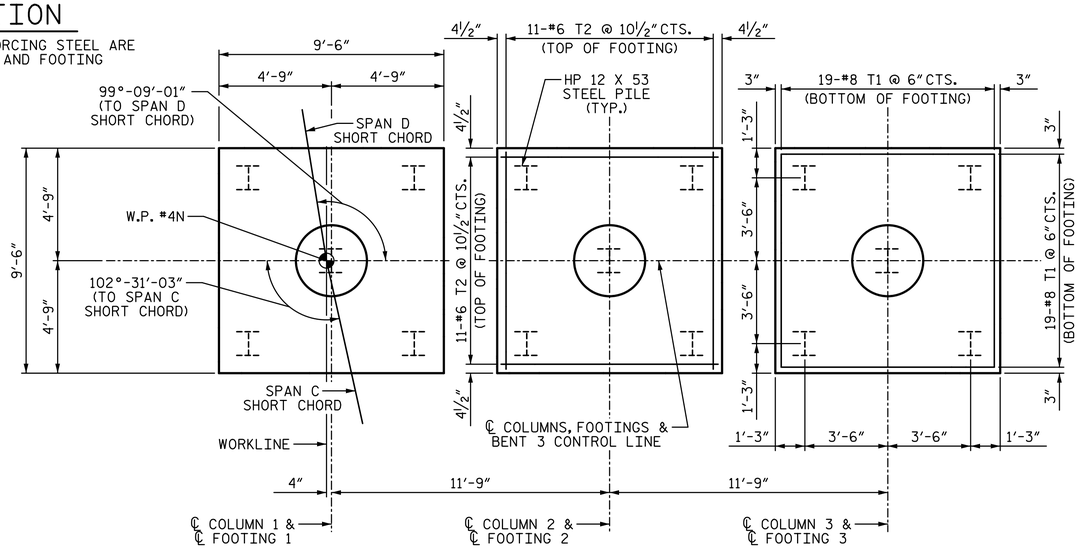
VIEW X-X



SECTION B-B



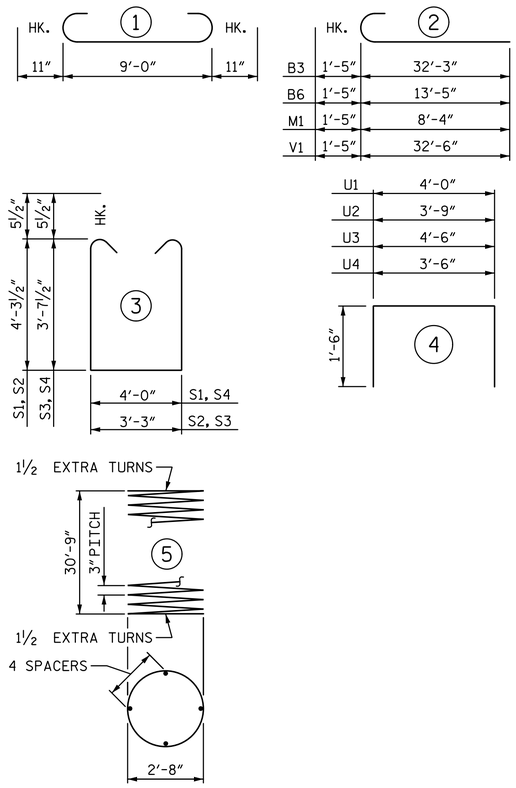
VIEW Y-Y



PLAN OF FOOTINGS

PILE PLACEMENT, DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BENT 3

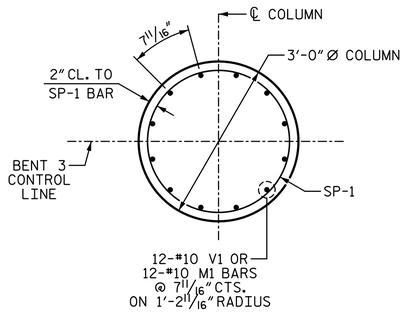
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	10	STR	32′-4″	835
B2	10	5	STR	32′-4″	337
B3	8	10	2	33′-8″	1159
B4	4	4	STR	4′-0″	11
B5	8	4	STR	9′-1″	49
B6	8	10	2	14′-10″	511
B7	8	4	STR	4′-3″	23
M1	36	10	2	9′-9″	1510
S1	9	5	3	13′-6″	127
S2	24	5	3	12′-9″	319
S3	36	5	3	11′-5″	429
S4	9	5	3	12′-2″	114
T1	114	8	1	10′-10″	3297
T2	66	6	STR	9′-0″	892
U1	40	4	4	7′-0″	187
U2	9	4	4	6′-9″	41
U3	4	4	4	7′-6″	20
U4	4	4	4	6′-6″	17
V1	36	10	2	33′-11″	5254
SP-1	3	*	5	1039′-7″	2083

REINFORCING STEEL	15132 LB
SPIRAL COL. REINF. STEEL	2083 LB

CLASS "A" CONCRETE BREAKDOWN	
POUR 1 (FOOTINGS)	35.1 CY
POUR 2 (COLUMNS)	24.0 CY
POUR 3 (CAP)	23.3 CY
TOTAL	82.4 CY

HP 12 X 53 STEEL PILES	
NO. 15	825 LF
PILE DRIVING EQUIPMENT SETUP FOR HP 12 X 53 STEEL PILES	15 EA

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



PLAN OF COLUMN

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

PLANS PREPARED BY:

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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18066 ENGINEER JOHN A. BATTS
Digitally Signed
3/22/2017

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

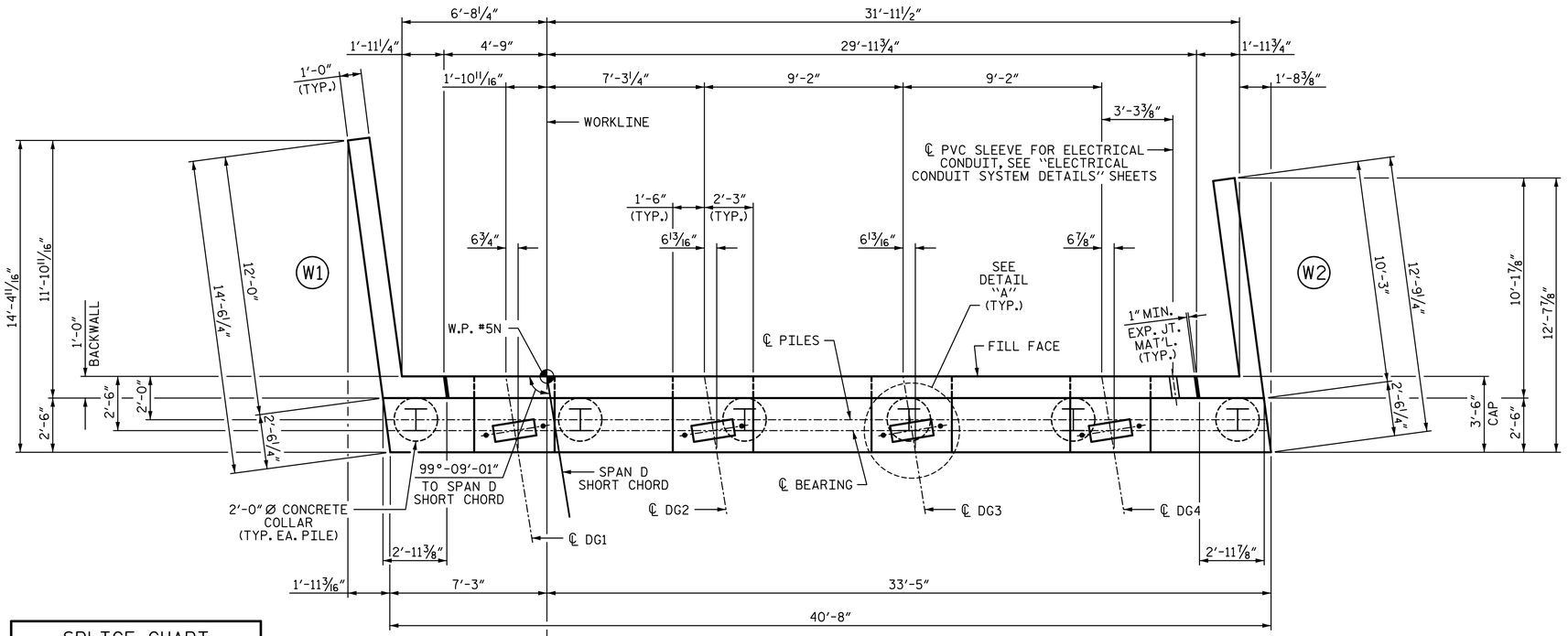
BENT 3

(NBL)

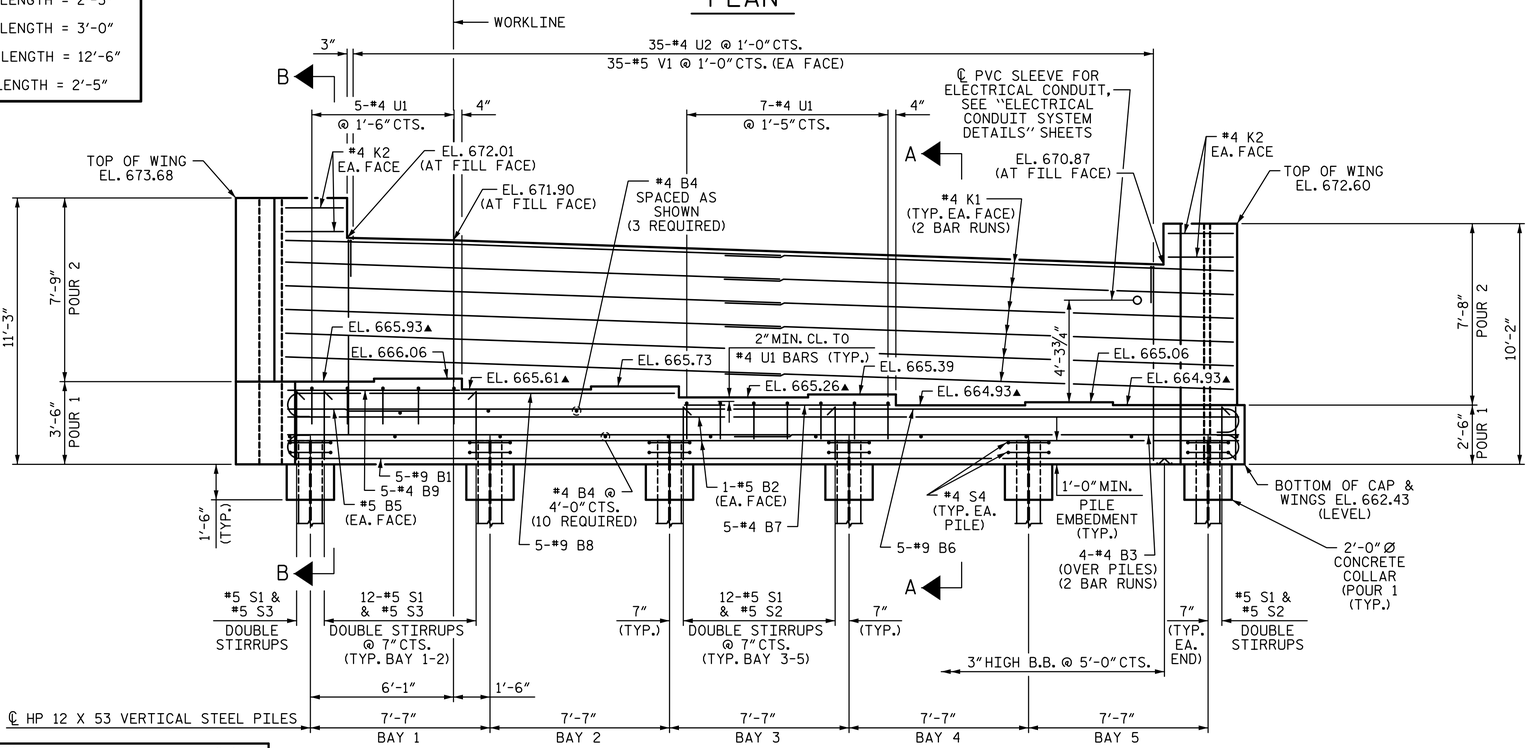
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-44
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY:	T. BANKOVICH	DATE: 9-15
CHECKED BY:	J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE: 9-15



PLAN



ELEVATION

SPLICE CHART

#4 B3 SPLICE LENGTH = 2'-5"
#5 B5 SPLICE LENGTH = 3'-0"
#9 B6 SPLICE LENGTH = 12'-6"
#4 K1 SPLICE LENGTH = 2'-5"

NOTES:

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

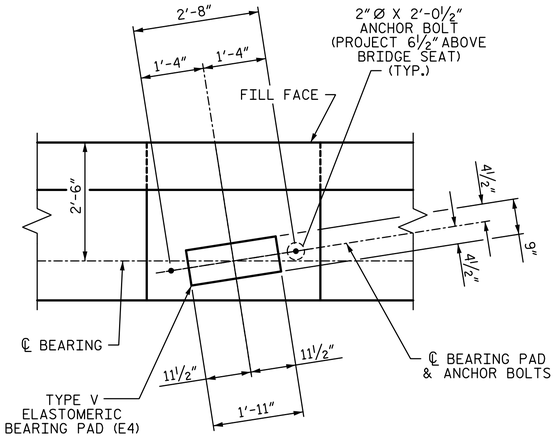
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

SEE GENERAL DRAWING "FOUNDATION LAYOUT" FOR ADDITIONAL NOTES FOR DRIVING PILES.

▲ FOR LOCATION OF ELEVATIONS BETWEEN BRIDGE SEAT BUILD-UPS, SEE SECTIONS A-A AND B-B SHEET 3 OF 3.



DETAIL "A"

(TYP. EA. GIRDER)

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-45
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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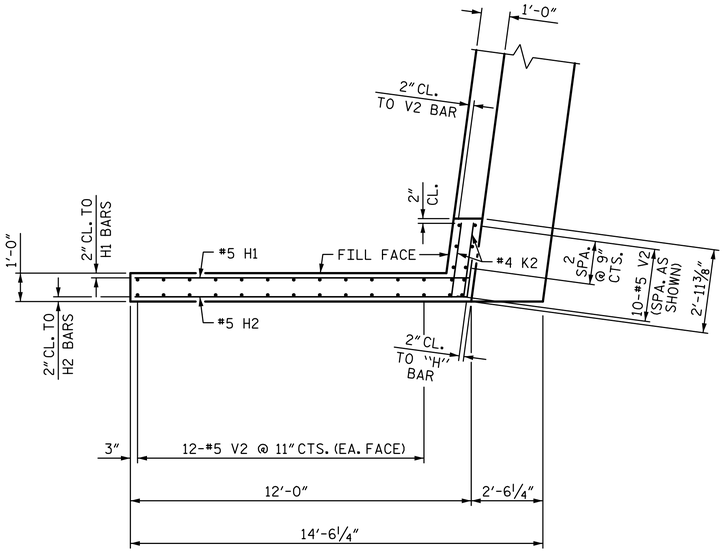
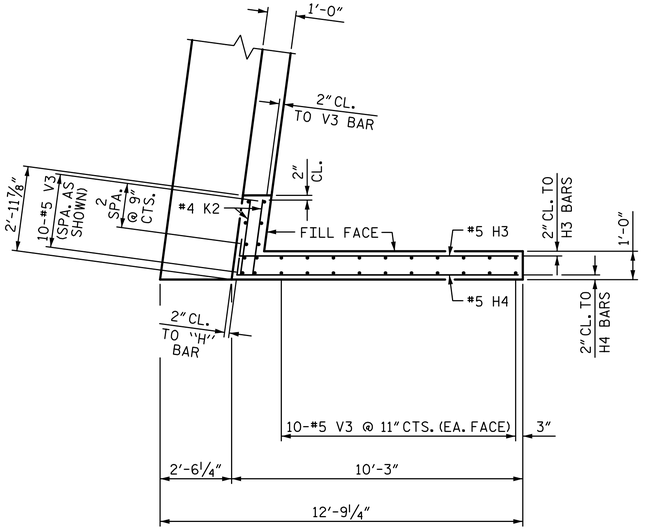
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18006 ENGINEER JOHN A. BATTS
1/6/2017

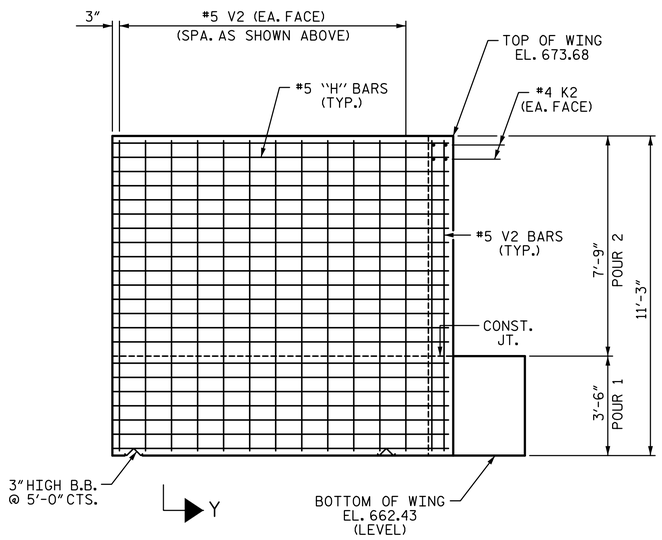


PLAN OF WING (W1)

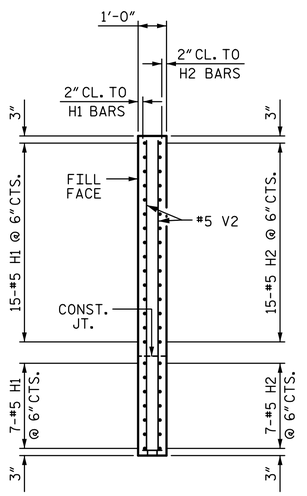


PLAN OF WING (W2)

Y

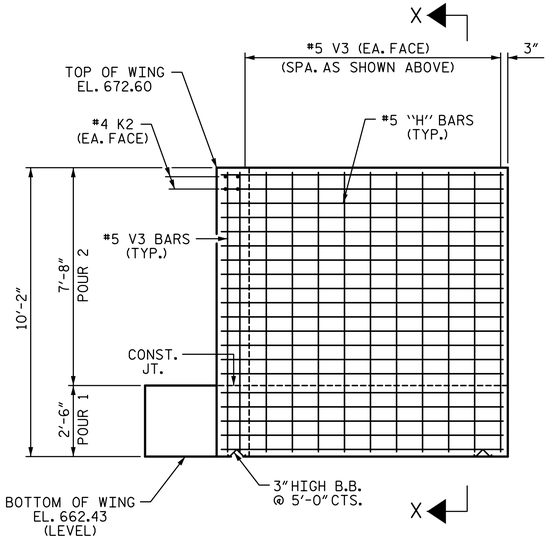


ELEVATION OF WING (W1)

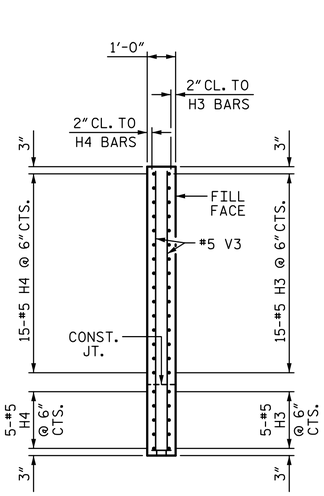


SECTION Y-Y

X



ELEVATION OF WING (W2)



SECTION X-X

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-46
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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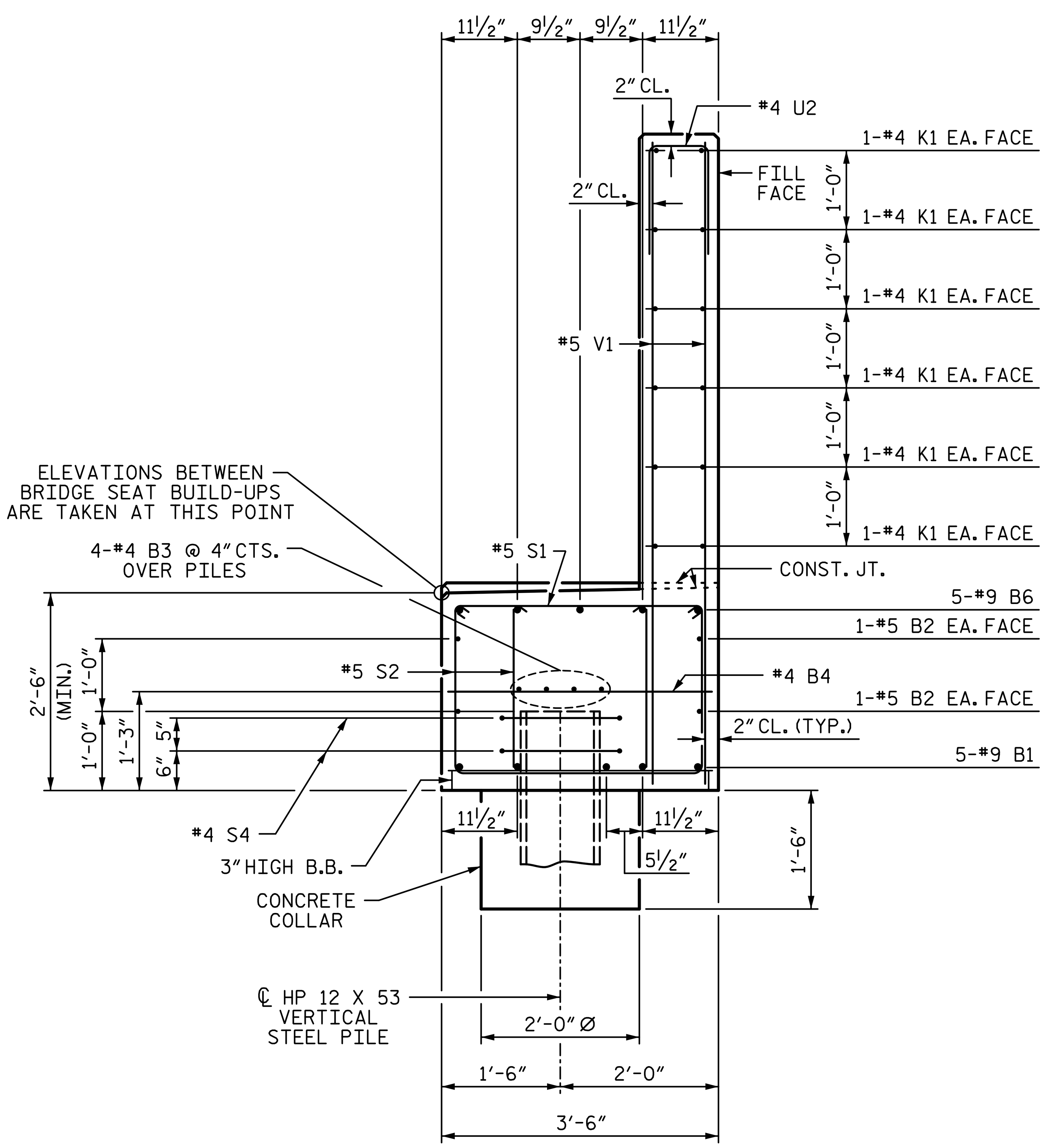
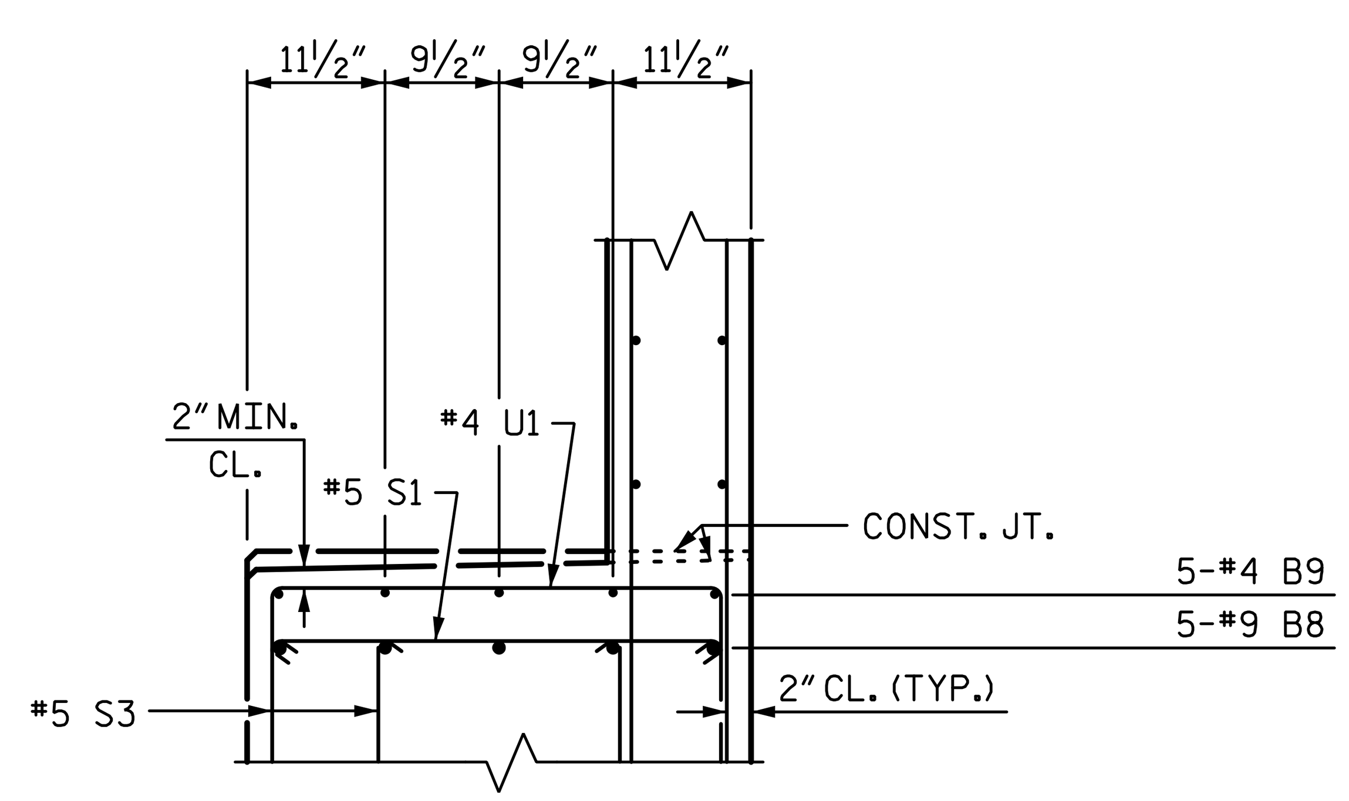
NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

1/6/2017 8:11:16 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 3 Bridge 435 (NBL)\Drawings\Final\403_U3109A_smu_eb2.dgn

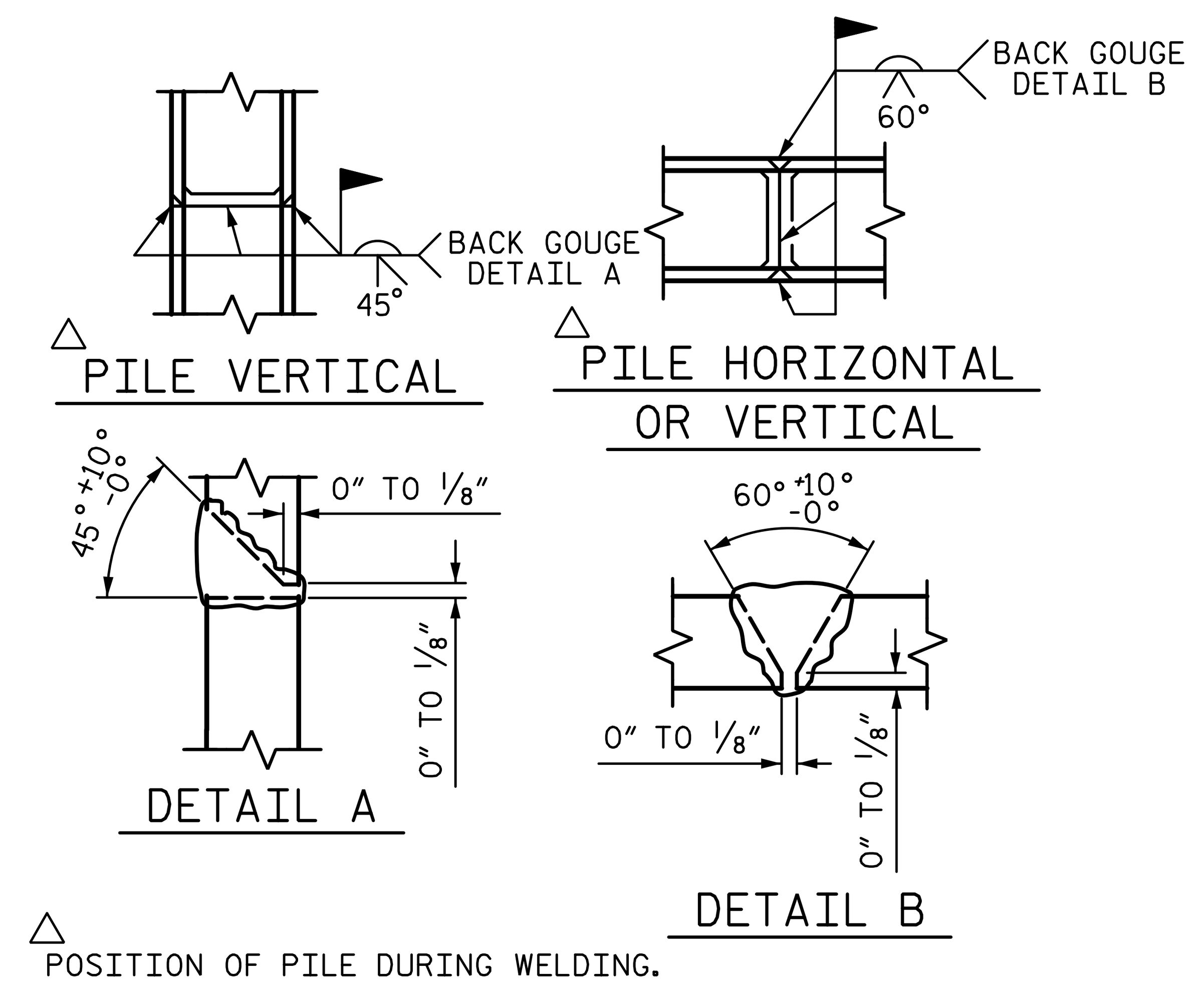


SECTION A-A

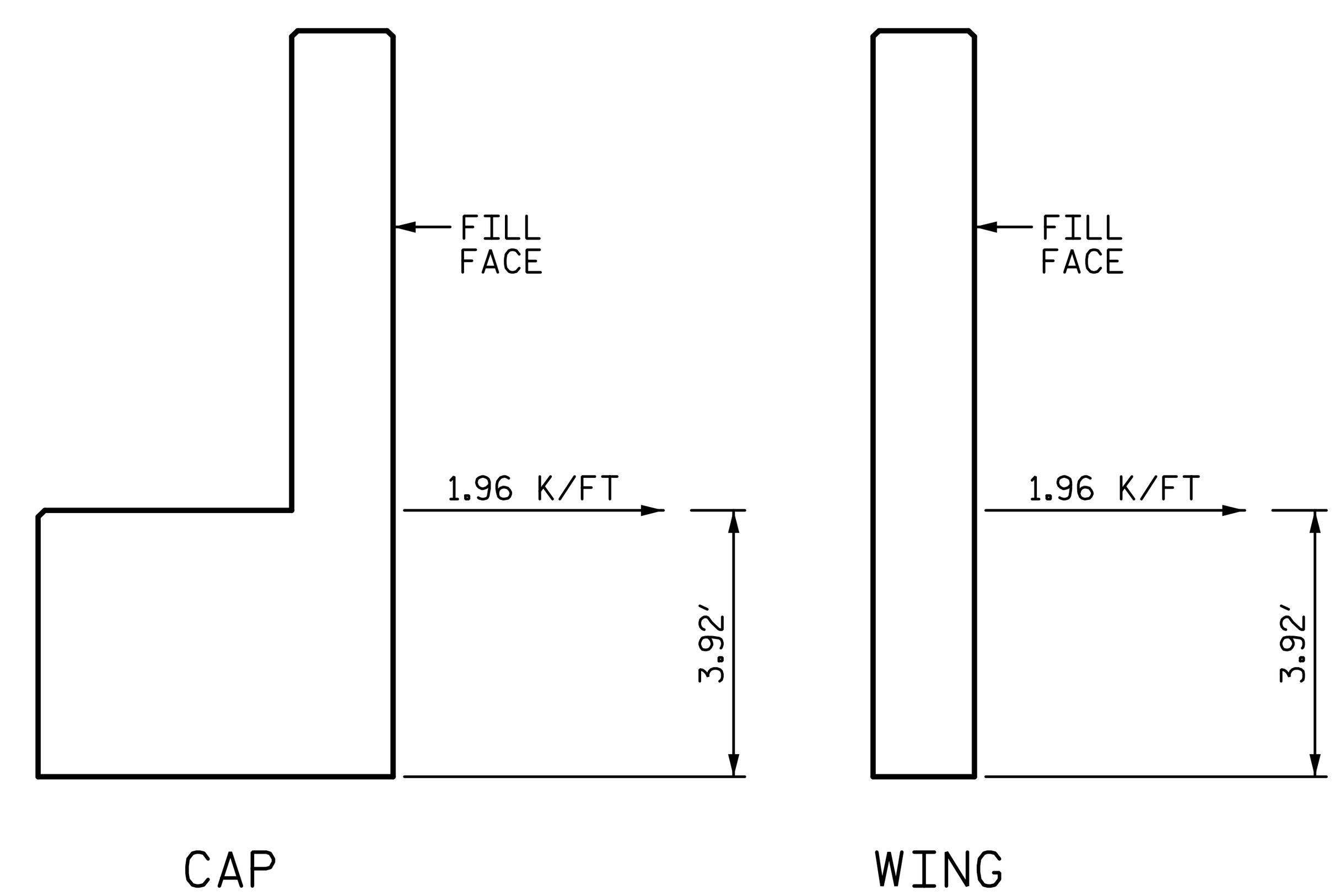
(TIEBACK NOT SHOWN FOR CLARITY)



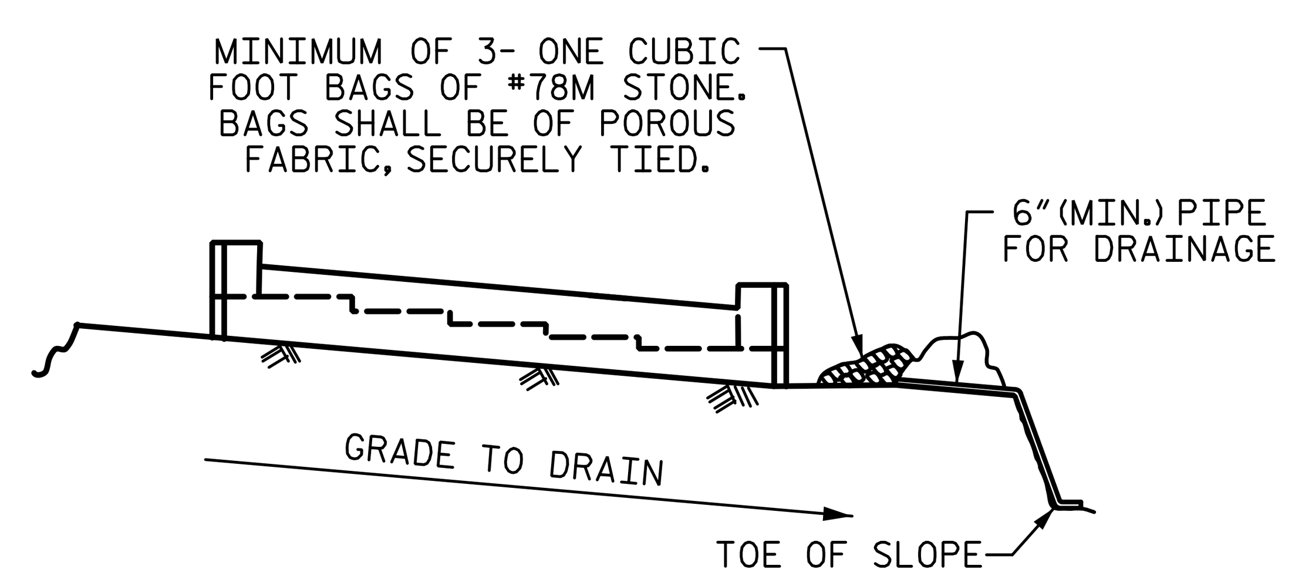
SECTION B-B



PILE SPLICE DETAILS



TIEBACK DETAILS



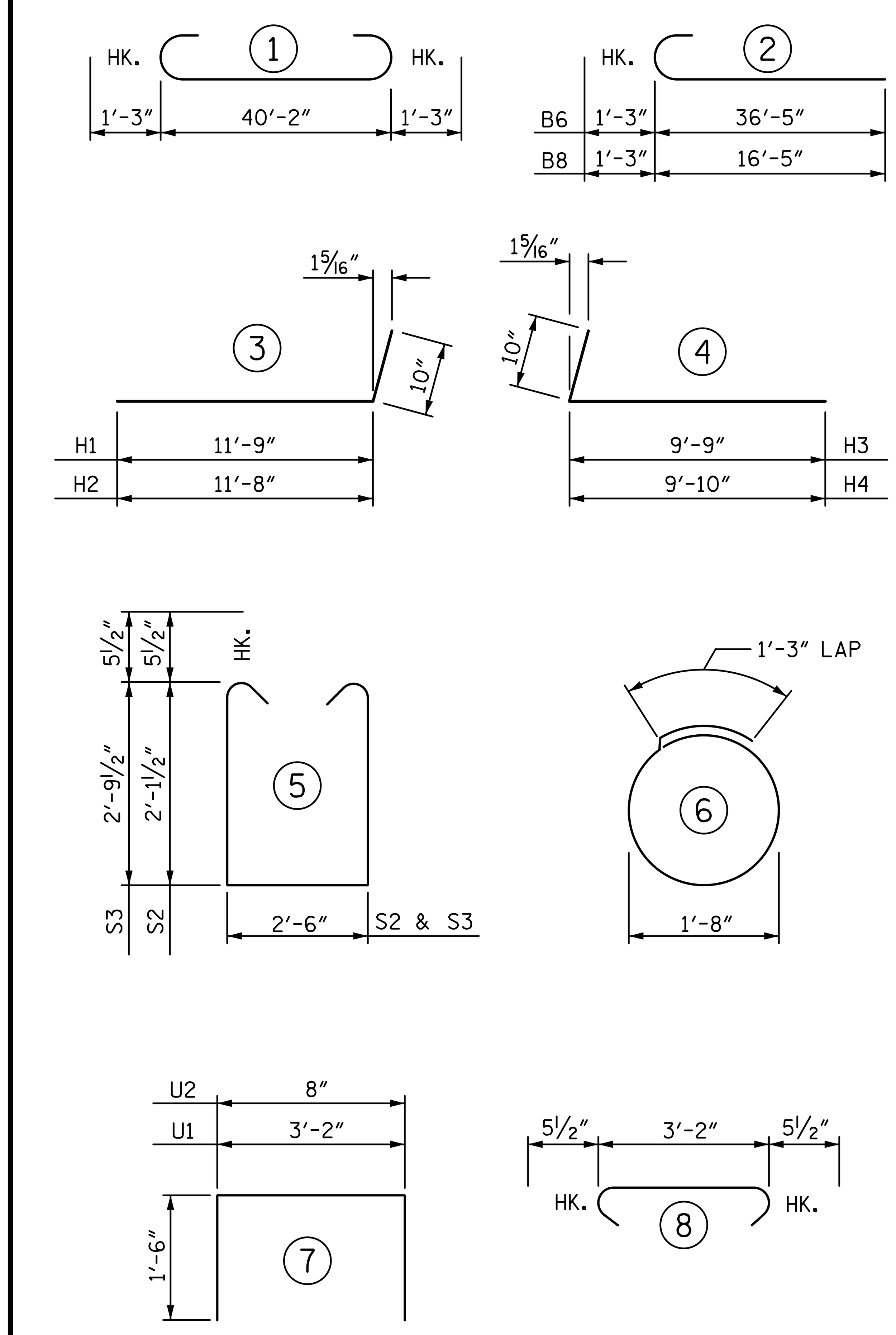
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL
END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	9	1	42′-8″	725
B2	4	5	STR	40′-4″	168
B3	8	4	STR	21′-5″	114
B4	13	4	STR	3′-2″	27
B5	2	5	STR	6′-11″	14
B6	5	9	2	37′-8″	640
B7	5	4	STR	8′-10″	30
B8	5	9	2	17′-8″	300
B9	5	4	STR	7′-3″	24
H1	22	5	3	12′-7″	289
H2	22	5	3	12′-6″	287
H3	20	5	4	10′-7″	221
H4	20	5	4	10′-8″	223
K1	24	4	STR	21′-5″	343
K2	8	4	STR	2′-7″	14
S1	62	5	8	4′-1″	264
S2	74	5	5	7′-8″	592
S3	50	5	5	9′-0″	469
S4	12	4	6	6′-6″	52
U1	12	4	7	6′-2″	49
U2	35	4	7	3′-8″	86
V1	70	5	STR	8′-0″	584
V2	34	5	STR	10′-10″	384
V3	30	5	STR	9′-9″	305

TOTAL REINFORCING STEEL	6204 LB
CLASS "A" CONCRETE BREAKDOWN	
POUR 1	
(CAP, COLLARS, & LOWER WINGS)	19.1 CY
POUR 2	
(BACKWALL AND UPPER WINGS)	15.2 CY
TOTAL CLASS "A" CONCRETE	34.3 CY
HP 12 X 53 STEEL PILES	
NO. 6	570 LF
PILE DRIVING EQUIPMENT SETUP	
FOR HP 12 X 53 STEEL PILES	6 EA

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2

(NBL)

PLANS PREPARED BY:

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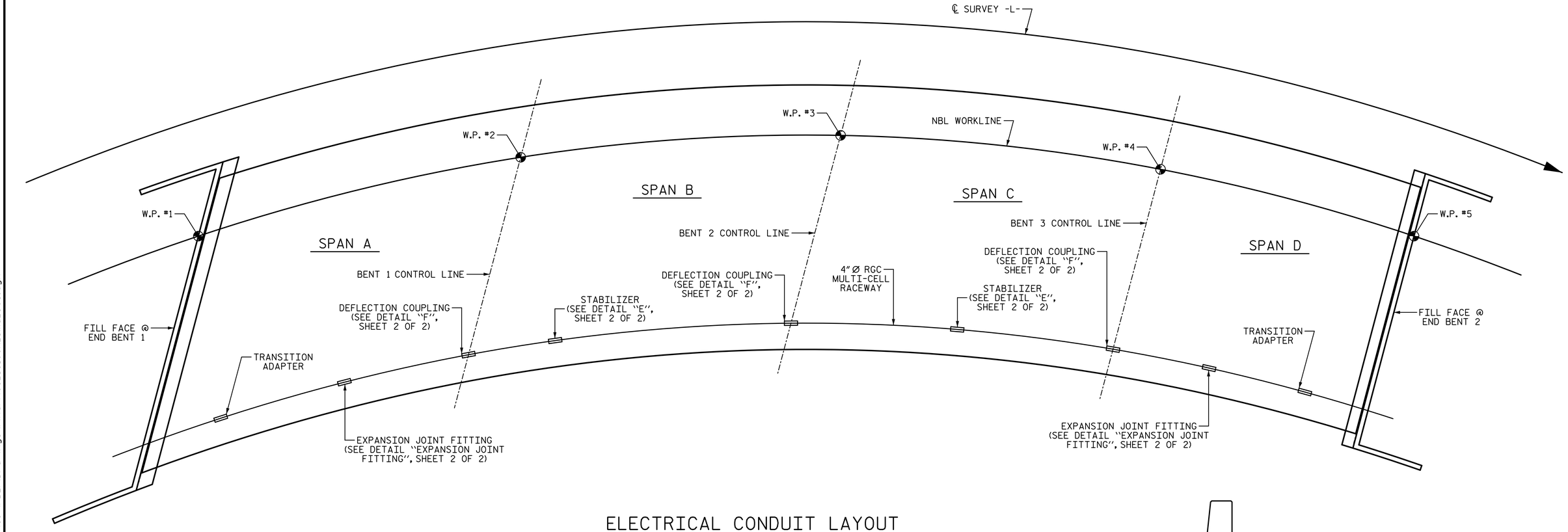
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 18055 JOHN A. BATTS
3/22/2017

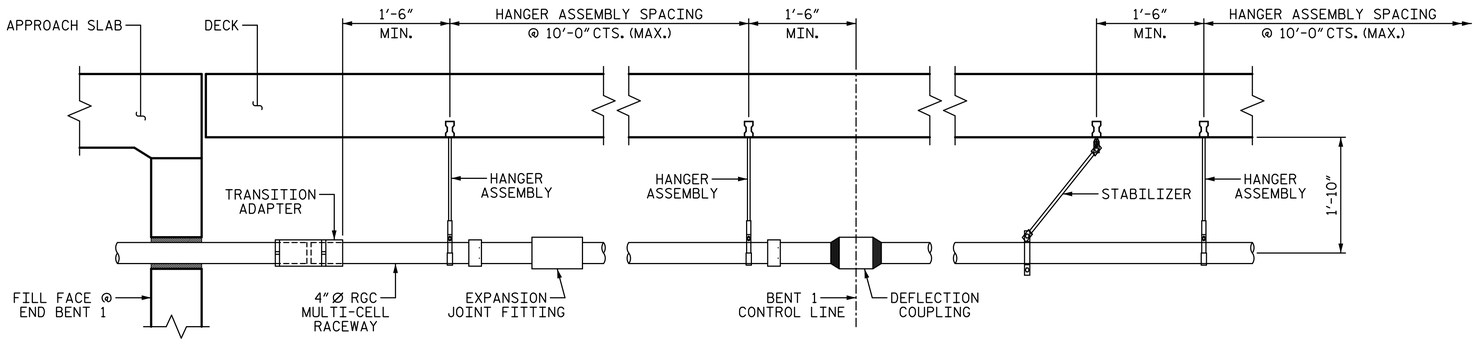
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S03-47
1			3					TOTAL SHEETS
2			4					S03-53

DRAWN BY: S.D. COOPER	DATE: 9-15
CHECKED BY: J.A. BATTS	DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS	DATE: 9-15

STR. #3



ELECTRICAL CONDUIT LAYOUT



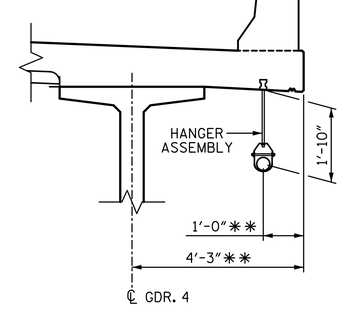
END BENT 1

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

BENT 1

(BENT 1 SHOWN, BENT 2 AND BENT 3 SIMILAR)

PART ELEVATION



CONDUIT LOCATION

**RADIAL THRU W.P.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 1 OF 2

DRAWN BY: T. BANKOVICH DATE: 9-15

CHECKED BY: J.A. BATTS DATE: 9-15

DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:

SIMPSON ENGINEERS & ASSOCIATES

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LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS

1/6/2017

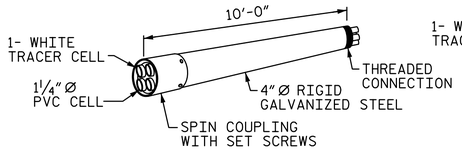
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELECTRICAL CONDUIT SYSTEM DETAILS

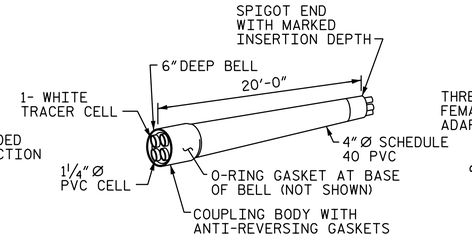
(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-48
1			3			TOTAL SHEETS
2			4			S03-53

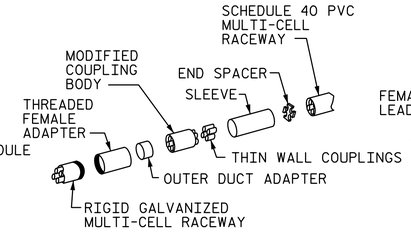
STR. #3



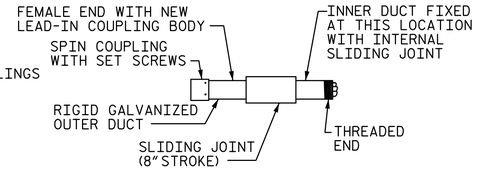
RIGID GALVANIZED (RGC) MULTI-CELL RACEWAY



SCHEDULE 40 PVC MULTI-CELL RACEWAY



TRANSITION ADAPTER



EXPANSION JOINT FITTING

DETAIL "D"

4" MULTI-CELL COMPONENTS

NOTES:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE TOTAL QUANTITY OF CONDUIT NEEDED TO COMPLETE THE WORK AND THAT THE CONDUIT(S) ARE PLACED AT THE NOTED DIMENSION AND ABOVE THE BOTTOM OF THE GIRDER.

THE INSTALLATION OF THE CONDUIT SYSTEM SHALL BE PAID FOR AS LUMP SUM. THE PRICE SHALL INCLUDE ALL CONDUIT, HANGERS, STABILIZERS, EXPANSION JOINTS, CONCRETE INSERTS, PVC SLEEVES AND ALL NECESSARY HARDWARE TO COMPLETE THE WORK.

THE CONTRACTOR SHALL FIELD VERIFY THAT THE CONDUIT SYSTEM IS NOT IN CONFLICT WITH THE GUARDRAIL POSTS.

SEE DETAIL "C" FOR HANGER ASSEMBLY INSTALLATION.

INSTALL SLEEVES PARALLEL TO GIRDERS. SEE DETAIL "B" FOR SLEEVE INSTALLATION.

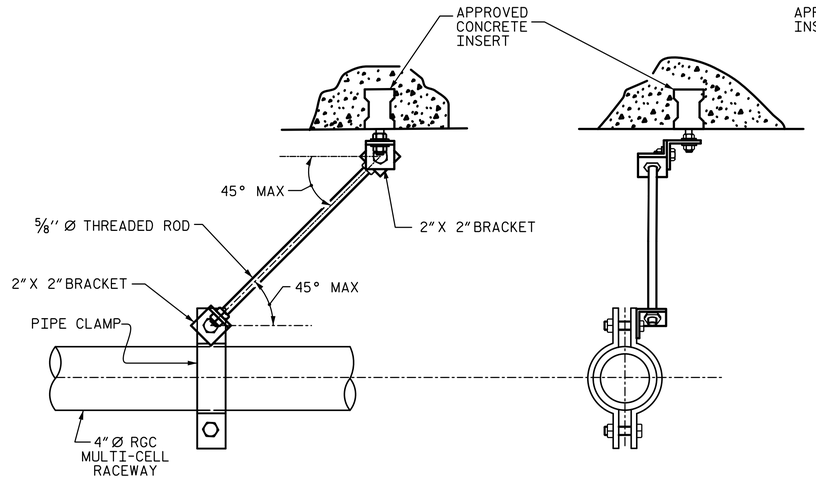
PROVIDE TRANSITION ADAPTER AND EXPANSION JOINT FOR CONDUIT AT END BENT 1 AND END BENT 2.

INSTALL STABILIZERS AT THIRD POINTS BETWEEN DECK EXPANSION JOINTS. STABILIZER CAN NOT BE USED INSTEAD OF A HANGER ASSEMBLY.

THE CONCRETE SCREW INSERT SHALL HAVE A ROD SIZE OF ⅝" AND A PULL FORCE OF 1260 lbs.

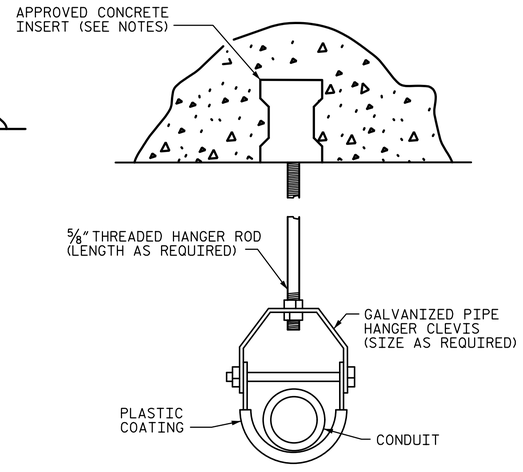
FOR ELECTRICAL CONDUIT SYSTEM, SEE SPECIAL PROVISIONS.

INSTALL DEFLECTION COUPLER AT EACH BENT. SEE DETAIL "F".



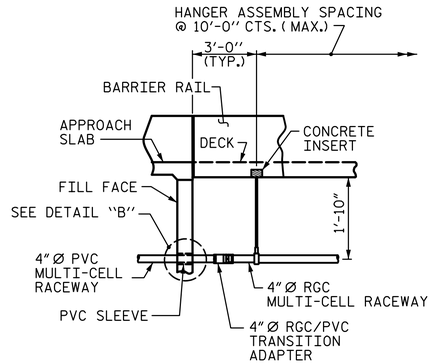
DETAIL "E"

STABILIZER

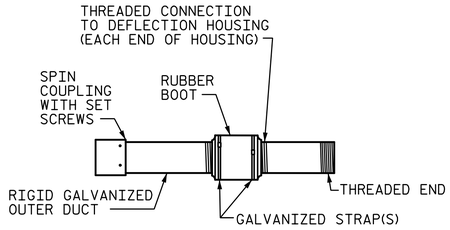


DETAIL "C"

HANGER ASSEMBLY

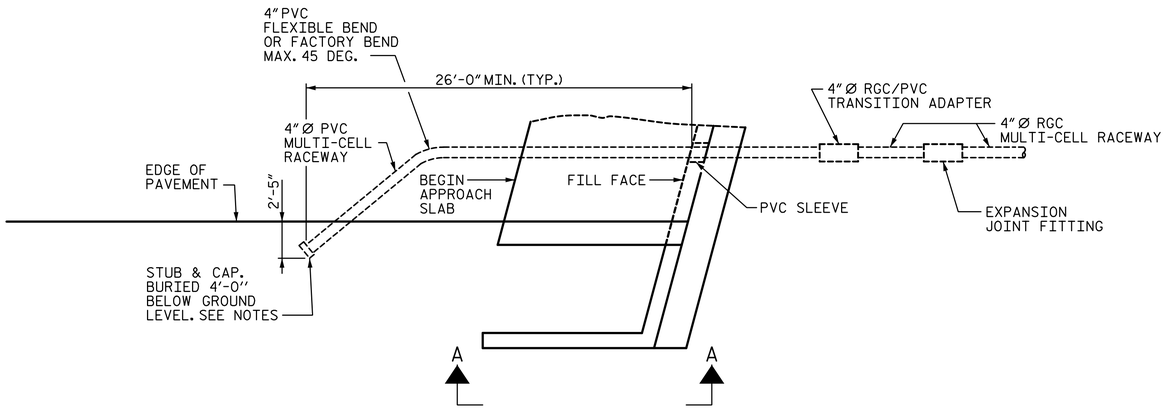


VIEW A-A



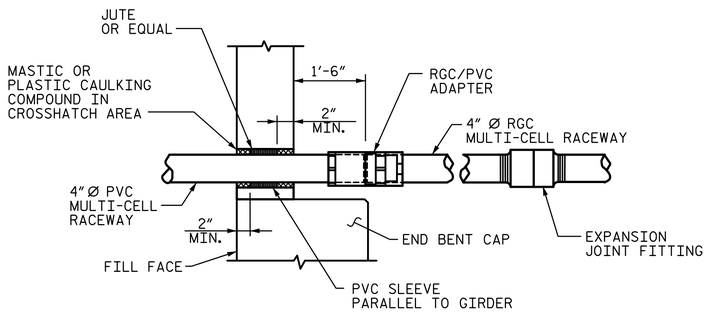
DETAIL "F"

DEFLECTION COUPLING



DETAIL "A"

TERMINATION OF CONDUIT AT WING WALL
(END BENT 1 SHOWN, END BENT 2 SIMILAR.)



DETAIL "B"

PVC SLEEVE INSTALLATION & RGC/PVC ADAPTER AT BACKWALL.

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

ELECTRICAL CONDUIT SYSTEM DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-49
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
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(919) 852-0598 (Fax)
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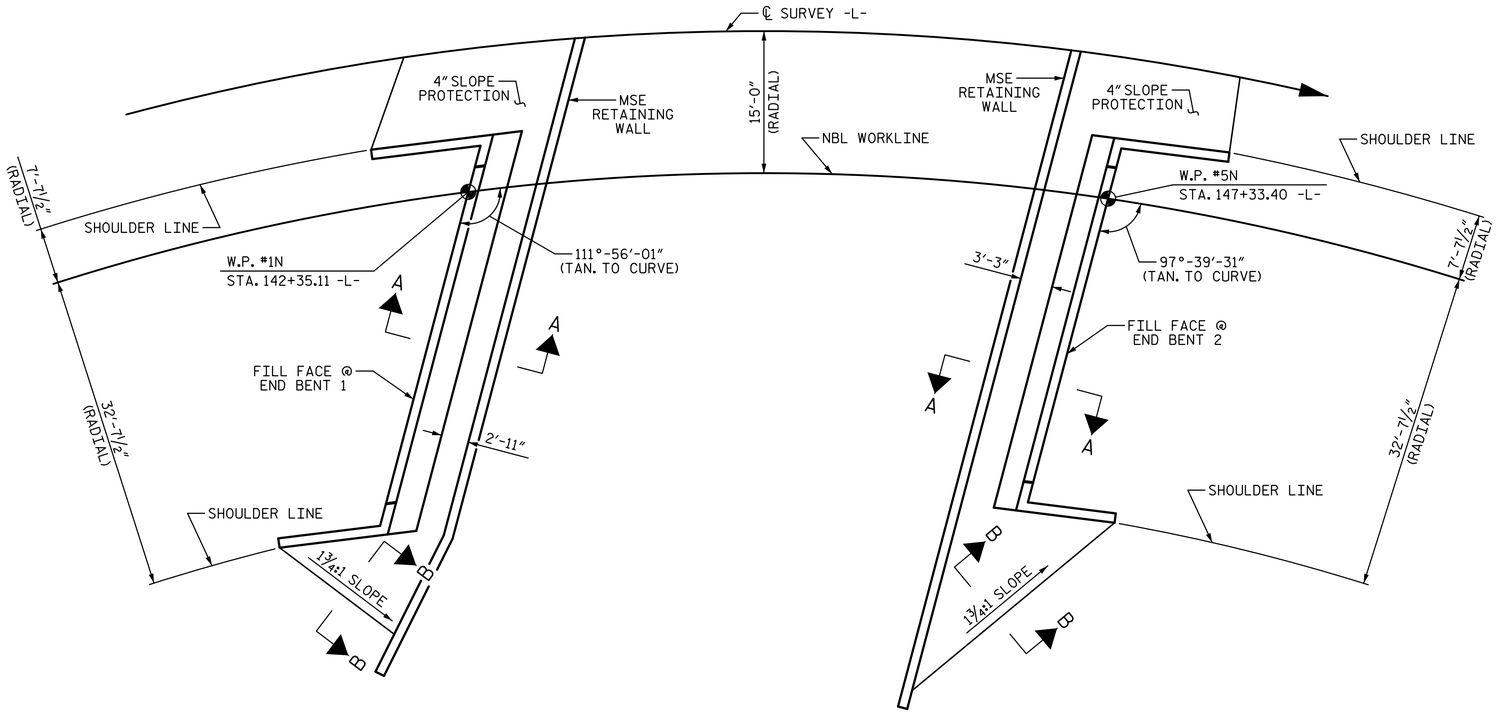
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 18056 ENGINEER JOHN A. BATTS
1/6/2017

DRAWN BY: T. BANKOVICH DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

ELECTRIC CONDUIT DETAILS

1/6/2017 8:11:16 AM G:\Projects\2014\U-3109A\Structures\Site 2\Site 2-Str 3 Bridge 435 (NBL)\Drawings\Final\403_U3109A_smu_ecs.dgn



@ END BENT 1

@ END BENT 2

PLAN OF SLOPE PROTECTION

GENERAL 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.

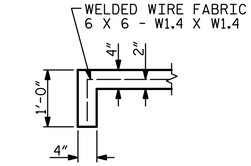
SLOPE PROTECTION NOTES:

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.

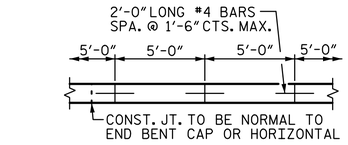
ESTIMATED QUANTITIES

BRIDGE @ STA. 146+61.35 -L-	4″ SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SY	APPROX. LF
END BENT 1	40	72
END BENT 2	50	90

✳ QUANTITY SHOWN BASED ON 5′-0″ POURS

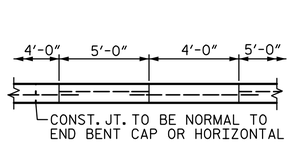


SECTION B-B



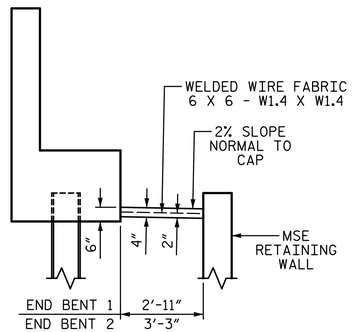
STRIP WIDTHS MAY VARY IN CURVED PORTION.

POUR DETAIL



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

OPTIONAL POUR DETAIL



SECTION A-A

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-50
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
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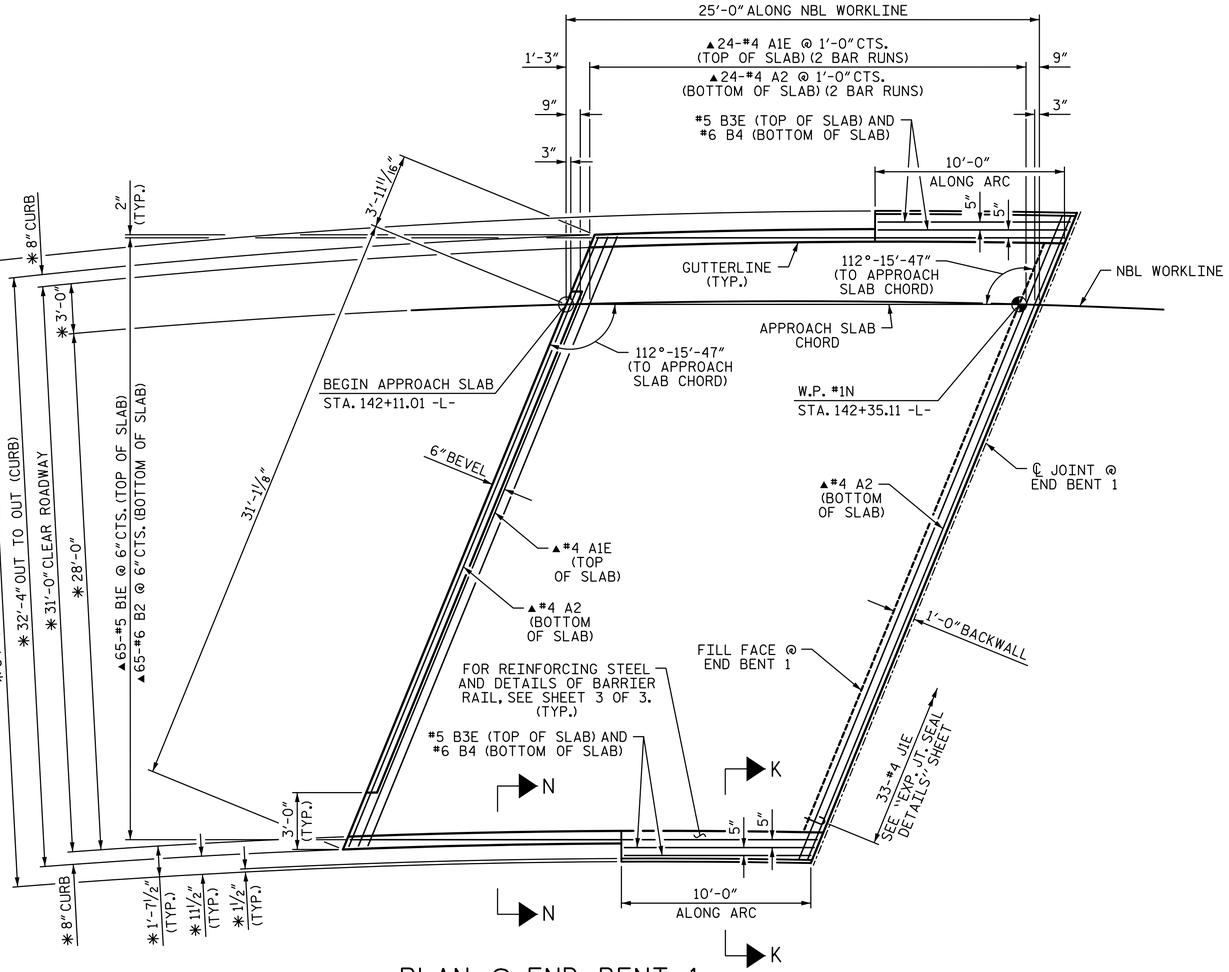
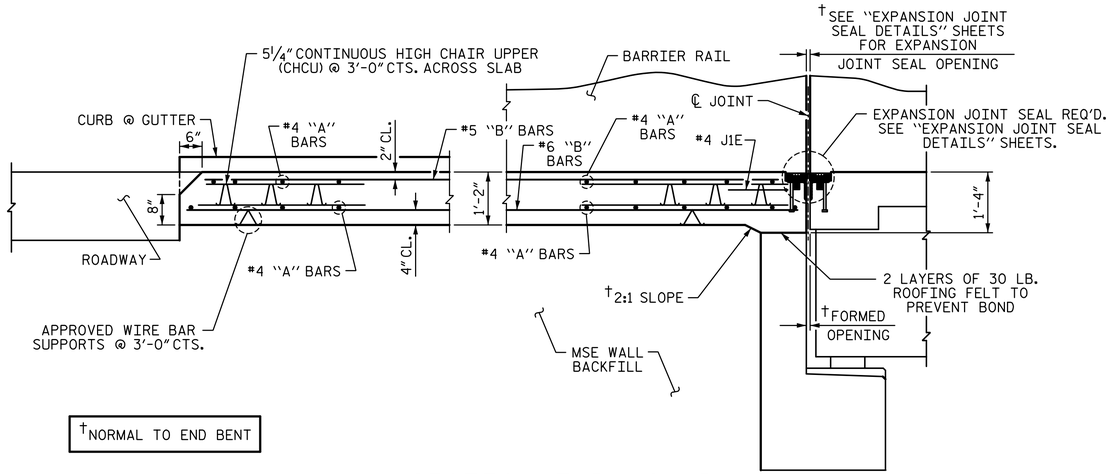
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

DRAWN BY:	T. BANKOVICH	DATE:	9-15
CHECKED BY:	J.A. BATTS	DATE:	9-15
DESIGN ENGINEER OF RECORD:	J.A. BATTS	DATE:	9-15



PLAN @ END BENT 1



†NORMAL TO END BENT

SECTION THRU SLAB

BACKWALL RESTRAINTS ON END BENT NOT SHOWN FOR CLARITY.

NOTES:

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

FOR MSE WALL BACKFILL, SEE SHEET W-4.

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.

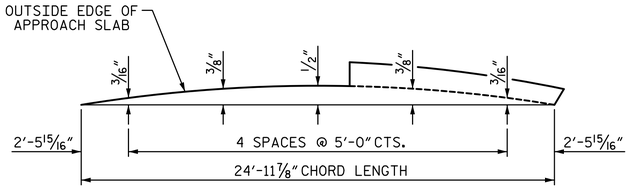
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.

THE QUANTITY OF #4 J1E BARS ON THE BILL OF MATERIAL IS BASED ON 1'-0" CENTERS. J1E BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1E BARS SPECIFIED. ADDITIONAL J1E BARS WILL NOT BE REQUIRED.

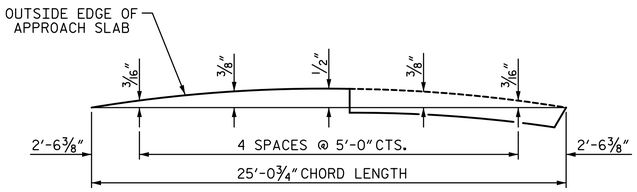
✳RADIAL DIMENSION

▲ "A" BARS ARE TO BE PLACED PARALLEL TO FILL FACE. "B" BARS ARE TO BE PLACED PARALLEL TO THE APPROACH SLAB CHORD.

FOR SECTIONS K-K AND N-N, SEE SHEET 2 OF 3.



LEFT SIDE



RIGHT SIDE

ARC OFFSETS @ END BENT 1

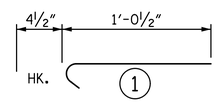
BILL OF MATERIAL
APPROACH SLAB AT EB 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	50	4	STR	19'-3"	643
A2	52	4	STR	19'-1"	663
B1E	65	5	STR	23'-9"	1610
B2	65	6	STR	24'-7"	2400
B3E	4	5	STR	9'-6"	40
B4	4	6	STR	9'-6"	57
J1E	33	4	1	1'-5"	31

REINFORCING STEEL	3120 LB
EPOXY COATED REINFORCING STEEL	2324 LB
CLASS "AA" CONCRETE BREAKDOWN POUR 1 (SLAB & CURB)✳✳	36.0 CY

"E" INDICATES EPOXY COATED REINFORCING STEEL.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

✳✳ QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED, SEE SHEET 3 OF 3.

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-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-51
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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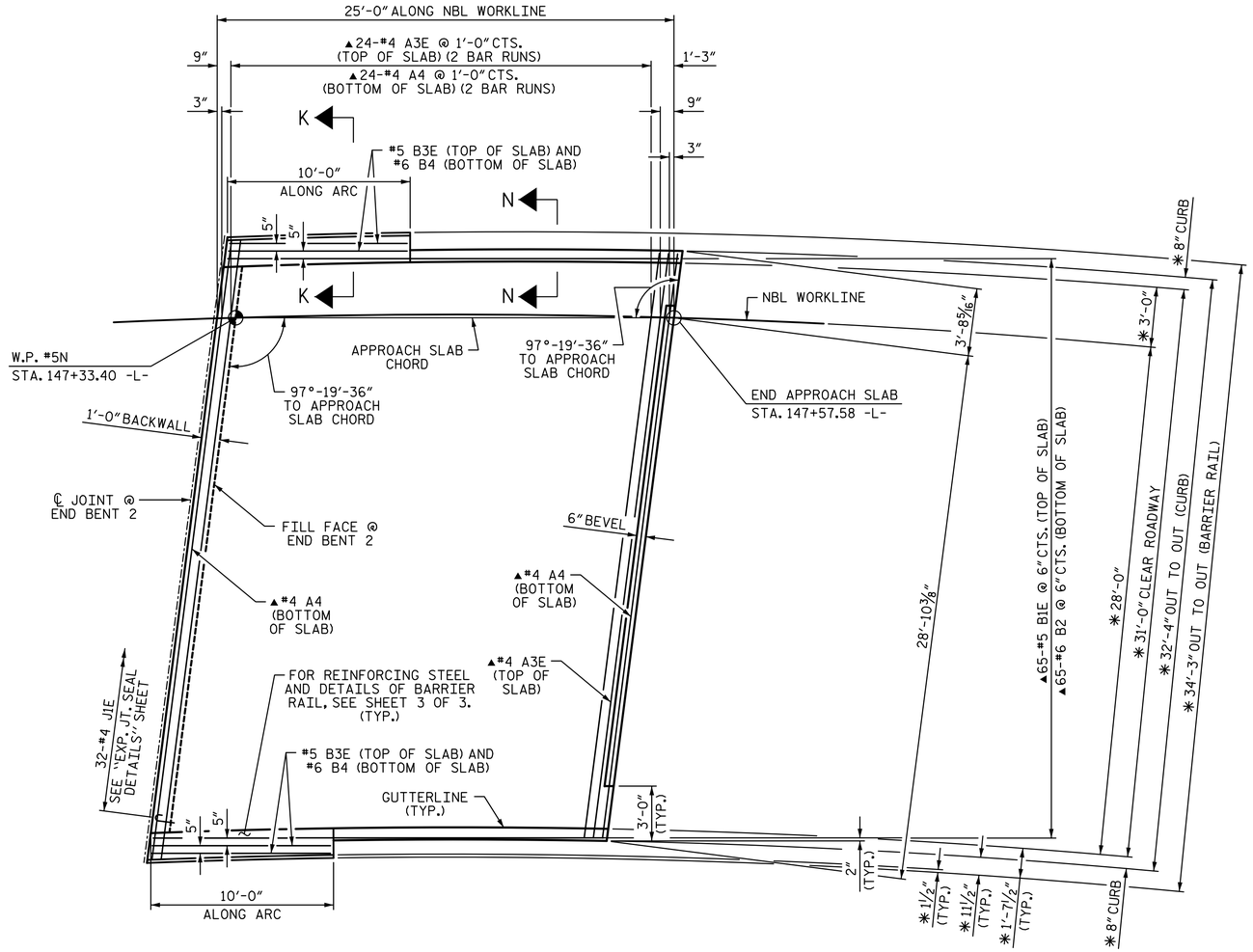
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 19058 ENGINEER JOHN A. BATTS
3/22/2017



PLAN @ END BENT 2

NOTES:

SEE NOTES SHEET 1 OF 3.

BILL OF MATERIAL

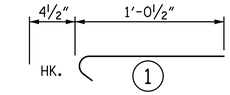
APPROACH SLAB AT EB 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A3E	50	4	STR	18'-2"	607
A4	52	4	STR	18'-0"	625
B1E	65	5	STR	23'-9"	1610
B2	65	6	STR	24'-7"	2400
B3E	4	5	STR	9'-6"	40
B4	4	6	STR	9'-6"	57
J1E	32	4	1	1'-5"	30

REINFORCING STEEL	3082 LB
EPOXY COATED REINFORCING STEEL	2287 LB
CLASS "AA" CONCRETE BREAKDOWN POUR 1 (SLAB & CURB)**	36.0 CY

"E" INDICATES EPOXY COATED REINFORCING STEEL.

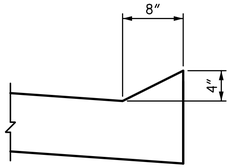
BAR TYPES



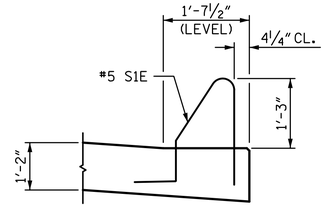
ALL BAR DIMENSIONS ARE OUT TO OUT

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

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

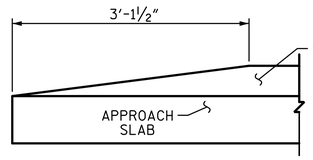


SECTION N-N



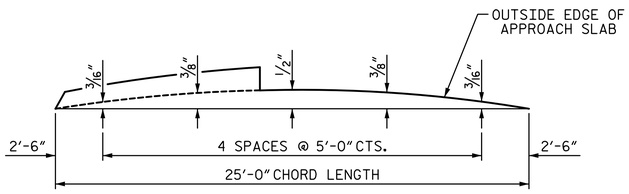
SECTION K-K

(ALSO SEE "END VIEW @ EXP. JOINTS" ON SHEET 3 OF 3)

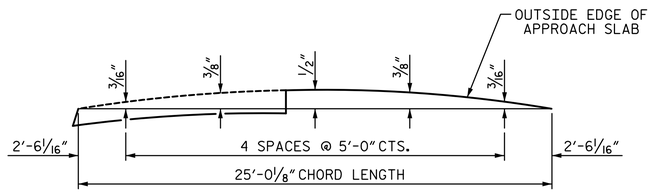


END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS



LEFT SIDE



RIGHT SIDE

ARC OFFSETS @ END BENT 2

PROJECT NO. U-3109A

ALAMANCE COUNTY

STATION: 146+61.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-52
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PLANS PREPARED BY:
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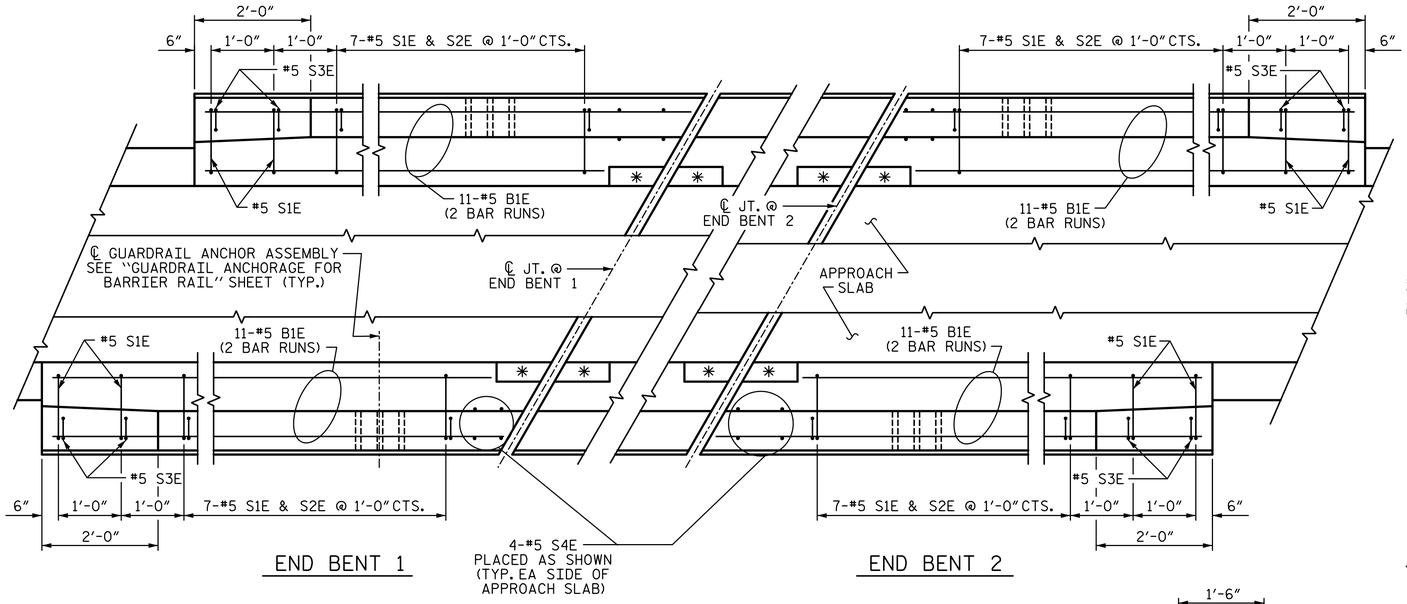
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 15068 ENGINEER JOHN A. BATTS
1/6/2017



PLAN OF BARRIER RAIL

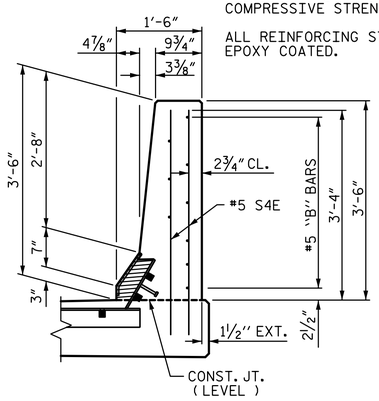
*FOR BLOCKOUT DETAILS, SEE "EXPANSION JOINT SEAL DETAILS FOR BARRIER RAIL" SHEET 2 OF 2.

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".

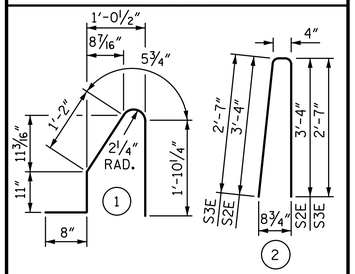
THE BARRIER RAIL ON EACH APPROACH SLAB SHALL NOT BE CAST UNTIL ALL APPROACH SLAB CONCRETE HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.



END VIEW @ EXP. JOINTS

BAR TYPES



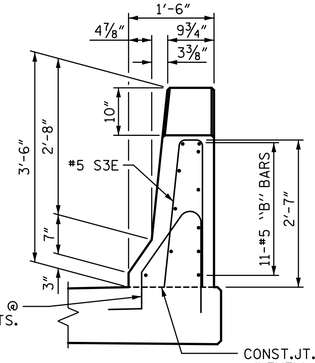
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

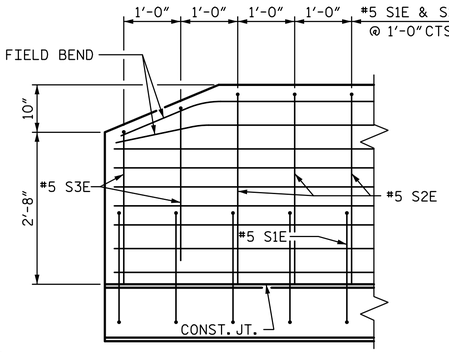
BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1E	88	5	STR	6'-10"	627
S1E	36	5	1	5'-1"	191
S2E	28	5	2	7'-0"	204
S3E	8	5	2	5'-6"	46
S4E	16	5	STR	4'-0"	67
EPOXY COATED REINFORCING STEEL					1135 LB
CLASS "AA" CONCRETE					5.4 CY
CONCRETE BARRIER RAIL					40.8 LF

"E" INDICATES EPOXY COATED REINFORCING STEEL

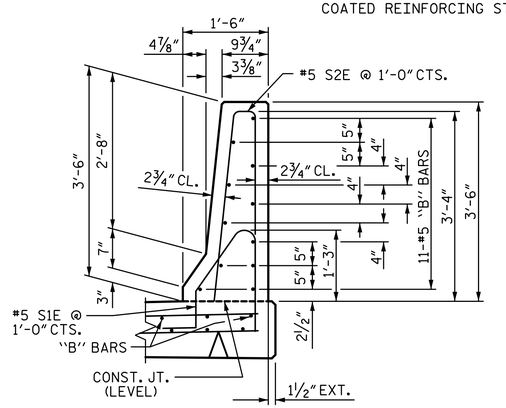


END VIEW

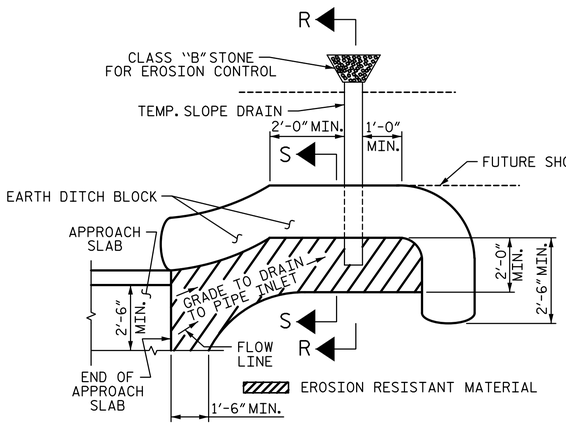


SIDE VIEW

END OF RAIL DETAILS

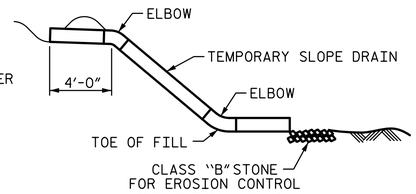


SECTION THRU RAIL

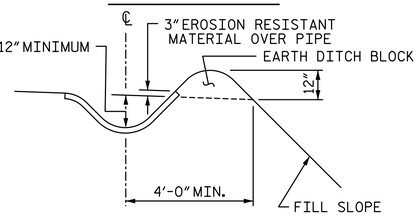


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

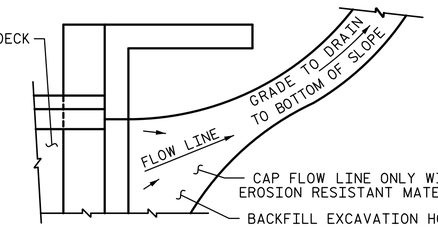
PLAN VIEW



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)

DRAWN BY: S.D. COOPER DATE: 9-15
CHECKED BY: J.A. BATTS DATE: 9-15
DESIGN ENGINEER OF RECORD: J.A. BATTS DATE: 9-15

PROJECT NO. U-3109A
ALAMANCE COUNTY
STATION: 146+61.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

(NBL)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S03-53
1			3			TOTAL SHEETS
2			4			S03-53

STR. #3

PLANS PREPARED BY:
SIMPSON ENGINEERING & ASSOCIATES
5640 Dillard Drive
Suite 200
Cary, NC 27518
(919) 852-0468
(919) 852-0598 (Fax)
www.simpsonengr.com
LICENSURE NO. C-2521

NORTH CAROLINA PROFESSIONAL SEAL 19056 ENGINEER JOHN A. BATTS
1/6/2017

STANDARD NOTES

DESIGN DATA:

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

MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

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

CONCRETE:

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

CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

DOWELS:

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

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

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

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

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

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

REINFORCING STEEL:

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

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

STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE ¾" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

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

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

HANDRAILS AND POSTS:

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

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN

REV. 6-16-95 EEM (c) RGW REV. 5-7-03 RWW (c) JTE REV. 10-1-11 MAA (c) GM
REV. 8-16-99 RWW (c) LES REV. 5-1-06 TLA (c) GM

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jpaddams