This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

TIP PROJECT: U-2707

CONTRACT: C203725

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

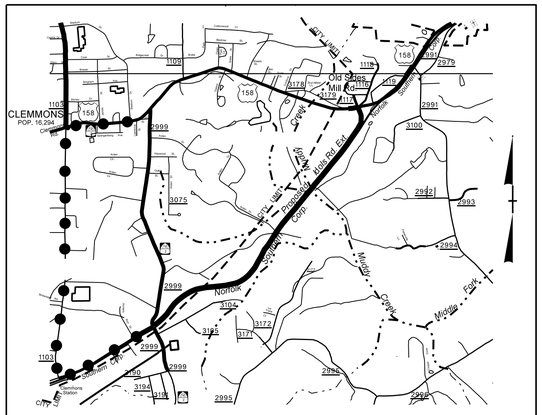
FORSYTH COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2707		

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34845.1.1	STP-3000(1)	P.E.
34845.2.2	STP-3000(1)	RW & UTIL.
34845.3.3	STP-3000(5)	CONST.

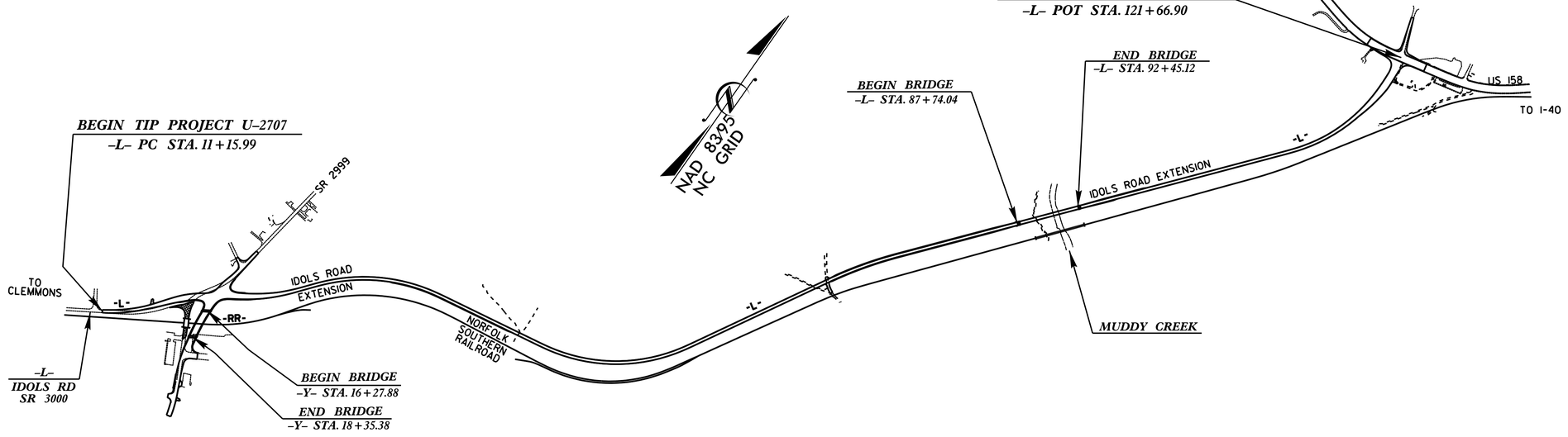
LOCATION: CLEMMONS – SR 3000 (IDOLS ROAD), FROM SR 2999 (HAMPTON ROAD) TO US 158 (CLEMMONS ROAD)

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



VICINITY MAP
FORSYTH COUNTY, NC

OFF SITE DETOUR ROUTE



DESIGN DATA

ADT 2016 = 11,140
ADT 2036 = 17,840
K = 12 %
D = 60 %
T = 4 % *
V = 50 MPH
* TTST =1% DUAL 3%
FUNC CLASS =
URBAN COLLECTOR
SUB REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-2707=2.004 MI

LENGTH STRUCTURE TIP PROJECT U-2707=0.089 MI

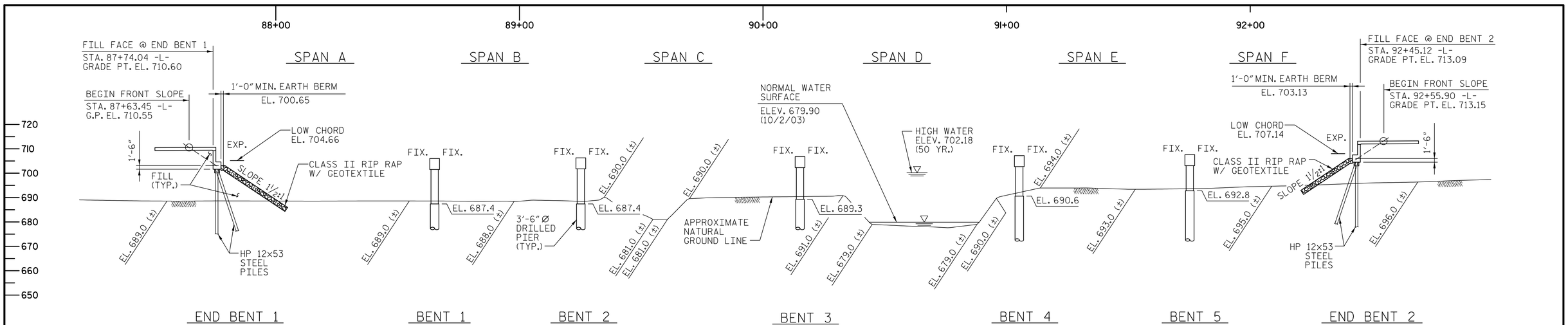
TOTAL LENGTH TIP PROJECT U-2707=2.093 MI

Prepared for the Office of:

2012 STANDARD SPECIFICATIONS

LETTING DATE:
APRIL 19, 2016

STRUCTURES



GRADE DATA -L-

(-)3.5835% (+)0.5286%

PI STA. 75+25.22 -L-
ELEV. = 704.0000
V.C. = 650.000'

SECTION ALONG -L-

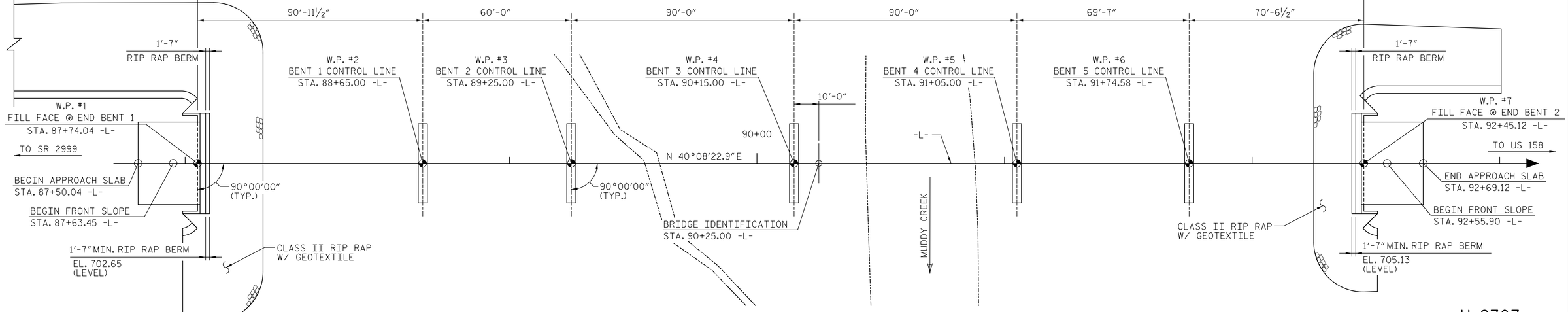
(SECTIONS AT BENTS AND END BENTS ARE AT RIGHT ANGLES)

GRADE DATA -L-

(+)0.5286% (+)2.8885%

PI STA. 94+67.31 -L-
ELEV. = 714.270
V.C. = 350.000'

NAD 83 / NSRS 2007



PLAN

(PILES AND DRILLED PIERS NOT SHOWN IN PLAN VIEW FOR CLARITY)

HYDRAULIC DATA

DESIGN DISCHARGE	18,000 CFS
FREQUENCY OF DESIGN FLOOD	50 YR.
DESIGN HIGH WATER ELEVATION	702.18
DRAINAGE AREA	110 SQ. MI.
BASE DISCHARGE (Q 100)	19,000 CFS
BASE HIGH WATER ELEVATION	702.59

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	26,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	> 100 YR.
OVERTOPPING FLOOD ELEVATION	704.75

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
3/2/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

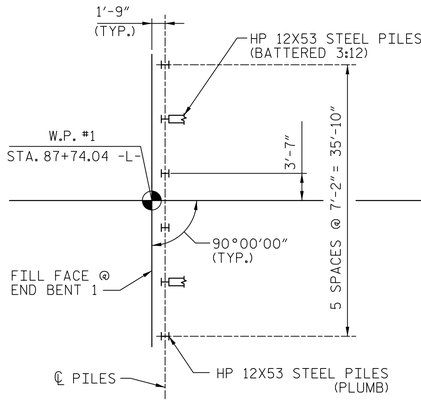
BRIDGE ON SR 3000 (IDOLS ROAD) OVER MUDDY CREEK BETWEEN SR 2999 AND US 158

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-01
1			3			TOTAL SHEETS
2			4			86

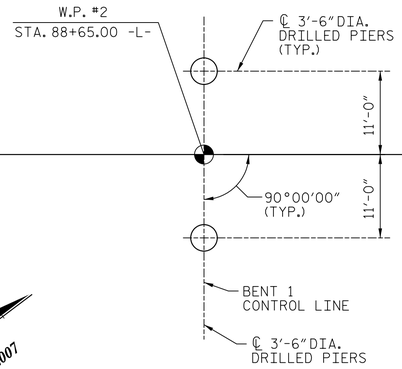
PROJECT NO. U-2707
FORSYTH **COUNTY**
STATION: 90+25.00 -L-

SHEET 1 OF 3 BRIDGE NO. 656

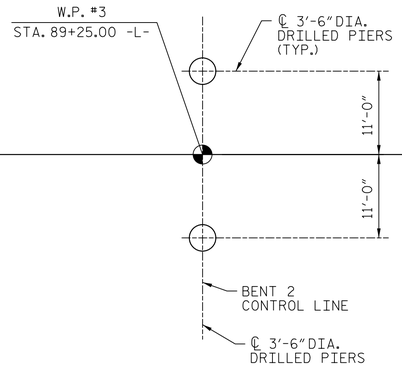
USER: Kyle.Compton
DGN: \\USRAL3P300.na.aecomnet.com\Data\Projects\60446218\400_Technical\450_NCDOT_Std_Tech_Design_Files\Structures\Bridge 656\Cad\400_001_U2707_SMU_S01_GDD.dgn
DATE: 3/2/2016
TIME: 6:46:09 AM



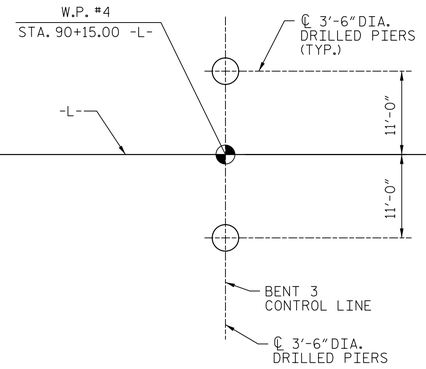
END BENT 1



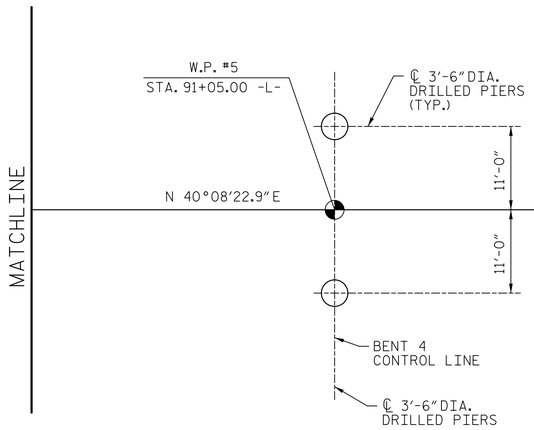
BENT 1



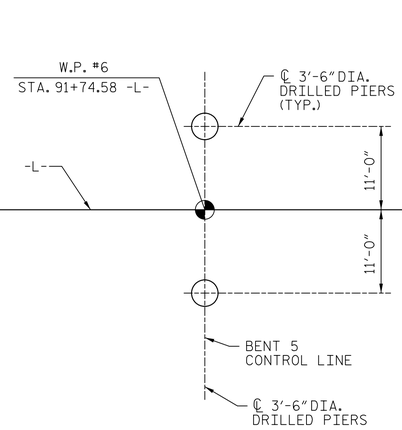
BENT 2



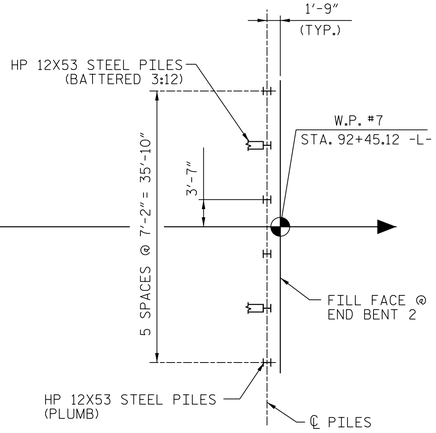
BENT 3



BENT 4



BENT 5



END BENT 2

FOUNDATION LAYOUT PLAN

(DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE)

NOTES:

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

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

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

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

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

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

DRILLED PIERS AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 420 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 25 TSF.

INSTALL DRILLED PIERS AT BENT 1 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 659 FT. (LEFT) AND 656 FT. (RIGHT) WITH THE REQUIRED TIP RESISTANCE.

DRILLED PIERS AT BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 430 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.

INSTALL DRILLED PIERS AT BENT 2 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 659.5 FT. (LEFT) AND 657.5 FT. (RIGHT) WITH THE REQUIRED TIP RESISTANCE.

DRILLED PIERS AT BENT 3 ARE DESIGNED FOR A FACTORED RESISTANCE OF 490 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.

INSTALL DRILLED PIERS AT BENT 3 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 657 FT. (LEFT) AND 654 FT. (RIGHT) WITH THE REQUIRED TIP RESISTANCE.

DRILLED PIERS AT BENT 4 ARE DESIGNED FOR A FACTORED RESISTANCE OF 450 TONS PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 95 TSF (LEFT) AND 25 TSF (RIGHT).

INSTALL DRILLED PIERS AT BENT 4 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 661 FT. (LEFT) AND 667 FT. (RIGHT) WITH THE REQUIRED TIP RESISTANCE.

DRILLED PIERS AT BENT 5 ARE DESIGNED FOR A FACTORED RESISTANCE OF 400 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 40 TSF.

INSTALL DRILLED PIERS AT BENT 5 THAT EXTEND TO AN ELEVATION NO HIGHER THAN 665 FT. (LEFT) AND 668 FT. (RIGHT) WITH THE REQUIRED TIP RESISTANCE.

NOTES (CONT'D.):

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 3. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 677 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT 4. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 682 FT. WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.

THE SCOUR CRITICAL ELEVATION FOR BENTS 1, 2 AND 3 IS ELEVATION 670 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

THE SCOUR CRITICAL ELEVATION FOR BENT 4 IS ELEVATION 675 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

THE SCOUR CRITICAL ELEVATION FOR BENT 5 IS ELEVATION 680 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

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.

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

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

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-

SHEET 2 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

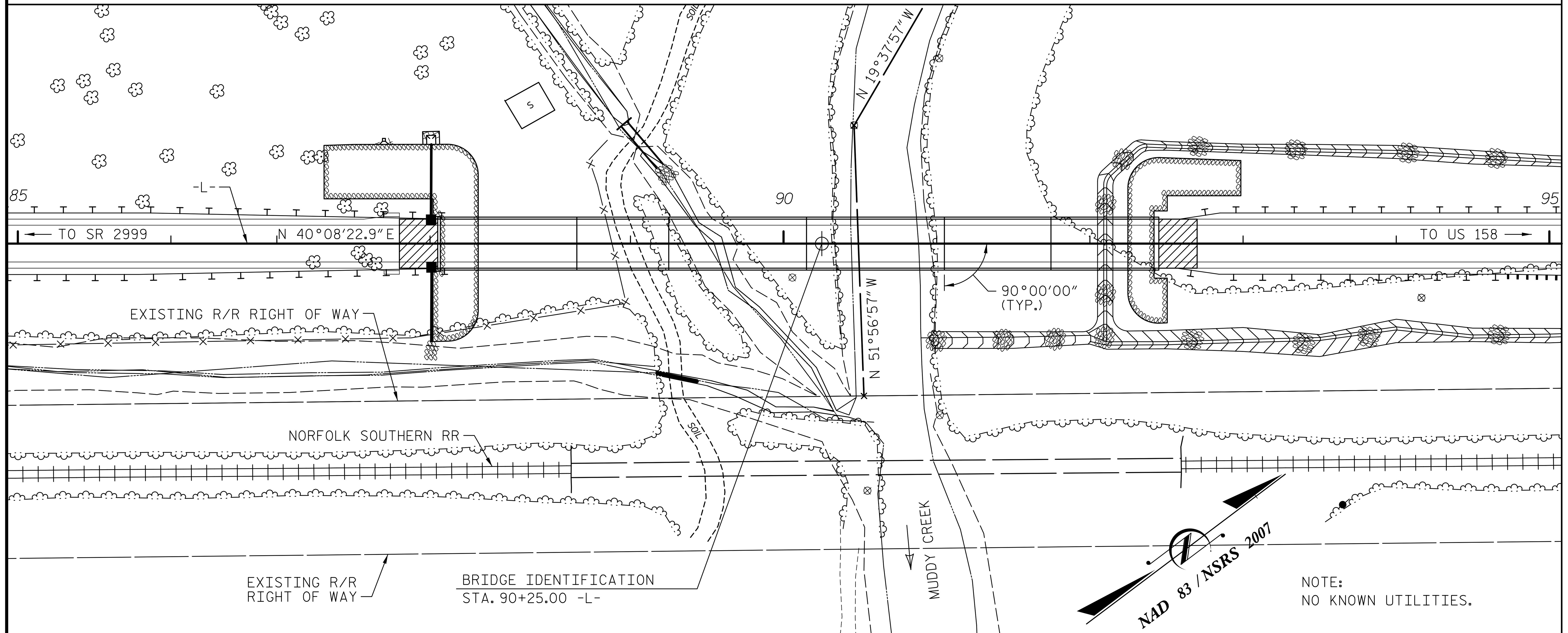
BRIDGE ON SR 3000
(IDOLS ROAD) OVER MUDDY CREEK
BETWEEN SR 2999 AND US 158

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-02
1			3			TOTAL SHEETS
2			4			86

DATE: 1/12/2016
TIME: 9:23:54 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cadd\401_003_U2707_SMU_S02_GX02.dgn

BENCH MARK: BM-7 RAILROAD SPIKE IN BASE OF 18″ELM TREE,
228.64′ LEFT OF STA. 92+06.11 -L-
COORDINATES: N 827892 E 1599239
ELEV. = 693.90



LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

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

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

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

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 SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

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

TOTAL BILL OF MATERIAL

	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	3′-6″Ø DRILLED PIERS IN SOIL	3′-6″Ø DRILLED PIERS NOT IN SOIL	PERMANENT STEEL CASING FOR 3′-6″Ø DRILLED PIER	SPT TESTING	SID INSPECTION	CSL TESTING	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54″ PRESTRESSED CONCRETE GIRDERS		HP 12x53 STEEL PILES		TWO BAR METAL RAIL	1′-2″ x 2′-6″ CONCRETE PARAPET	RIP RAP CLASS II (2′-0″ THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	EXPANSION JOINT SEALS
	SQ. FT.	SQ. FT.	LIN. FT.	LIN. FT.	LIN. FT.	EA.	EA.	EA.	CU. YD.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	LIN. FT.	LIN. FT.	TONS	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE	16217	14956								LUMP SUM			24	1856.7			962.8	977.8			LUMP SUM	LUMP SUM
END BENT 1									29.3		4586				6	210			952	1058		
BENT 1			46.0	14.0					25.3		16474	1865										
BENT 2			45.0	13.0					25.5		16347	1841										
BENT 3			52.0	16.0	26.6				24.7		17324	1983										
BENT 4			41.0	13.0	19.2				24.3		15462	1656										
BENT 5			42.0	11.0					23.3		14944	1561										
END BENT 2									29.2		4586				6	330			565	627		
TOTAL	16217	14956	226.0	67.0	45.8	10	10	5	181.6	LUMP SUM	89723	8906	24	1856.7	12	540	962.8	977.8	1517	1685	LUMP SUM	LUMP SUM

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
3/2/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE ON SR 3000
(IDOLS ROAD) OVER MUDDY CREEK
BETWEEN SR 2999 AND US 158

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-03
						TOTAL SHEETS 86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT					
								DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.14	1	1.75	0.830	1.21	F	E	33.67	0.910	1.14	F	I	47.42	0.80	0.830	1.22	F	I	33.67	
		HL-93 (OPERATING)	N/A	--	1.22	--	1.35	0.830	1.57	F	E	33.67	0.910	1.54	A	I	8.21	0.80	0.800	1.22	F	I	33.67	
		HS-20 (INVENTORY)	36.000	(2)	1.55	55.800	1.75	0.830	1.57	F	E	33.67	0.910	1.55	A	I	8.21	0.80	0.800	1.58	F	I	33.67	
		HS-20 (OPERATING)	36.000	--	1.58	56.880	1.35	0.830	2.04	F	E	33.67	0.910	2.04	A	I	8.21	0.80	0.800	1.58	F	I	33.67	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.50	47.250	1.40	0.830	4.36	F	E	33.67	0.910	4.91	A	I	8.21	0.80	0.800	3.50	F	I	33.67	
		SNGARBS2	20.000	--	2.64	52.800	1.40	0.830	3.28	F	E	33.67	0.910	3.43	A	I	8.21	0.80	0.800	2.64	F	I	33.67	
		SNAGRIS2	22.000	--	2.51	55.220	1.40	0.830	3.12	F	E	33.67	0.910	3.16	A	I	8.21	0.80	0.800	2.51	F	I	33.67	
		SNSCOTTS3	27.250	--	1.74	47.415	1.40	0.830	2.17	F	E	33.67	0.910	2.40	A	I	8.21	0.80	0.800	1.74	F	I	33.67	
		SNAGGRS4	34.925	--	1.47	51.340	1.40	0.830	1.83	F	E	33.67	0.910	1.95	A	I	8.21	0.80	0.800	1.47	F	I	33.67	
		SNS5A	35.550	--	1.43	50.837	1.40	0.830	1.78	F	E	33.67	0.910	1.96	A	I	8.21	0.80	0.800	1.43	F	I	33.67	
		SNS6A	39.950	--	1.32	52.734	1.40	0.830	1.64	F	E	33.67	0.910	1.77	A	I	8.21	0.80	0.800	1.32	F	I	33.67	
		SNS7B	42.000	--	1.26	52.920	1.40	0.830	1.56	F	E	33.67	0.910	1.73	A	I	8.21	0.80	0.800	1.26	F	I	33.67	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.61	53.130	1.40	0.830	2.00	F	E	33.67	0.910	2.12	A	I	8.21	0.80	0.800	1.61	F	I	33.67	
		TNT4A	33.075	--	1.62	53.582	1.40	0.830	2.01	F	E	33.67	0.910	2.09	A	I	8.21	0.80	0.800	1.62	F	I	33.67	
		TNAGRIT4	43.000	--	1.32	56.760	1.40	0.830	1.64	F	E	33.67	0.910	1.64	A	I	8.21	0.80	0.800	1.32	F	I	33.67	
		TNAGRT5A	45.000	--	1.24	55.800	1.40	0.830	1.54	F	E	33.67	0.910	1.61	A	I	8.21	0.80	0.800	1.24	F	I	33.67	
		TNAGRT5B	45.000	(3)	1.22	54.900	1.40	0.830	1.52	F	E	33.67	0.910	1.56	A	I	8.21	0.80	0.800	1.22	F	I	33.67	
		TNT6A	41.600	--	1.33	55.328	1.40	0.830	1.65	F	E	33.67	0.910	1.83	A	I	8.21	0.80	0.800	1.33	F	I	33.67	
		TNT7A	42.000	--	1.34	56.280	1.40	0.830	1.66	F	E	33.67	0.910	1.79	A	I	8.21	0.80	0.800	1.34	F	I	33.67	
		TNT7B	42.000	--	1.39	58.380	1.40	0.830	1.73	F	E	33.67	0.910	1.69	A	I	8.21	0.80	0.800	1.39	F	I	33.67	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1. SPAN LENGTHS SHOWN ARE ℄ BRG. TO ℄ BRG.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

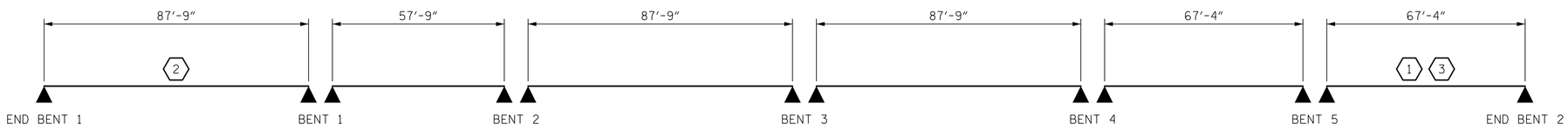
(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER

E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

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

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

SHEET NO. S-04

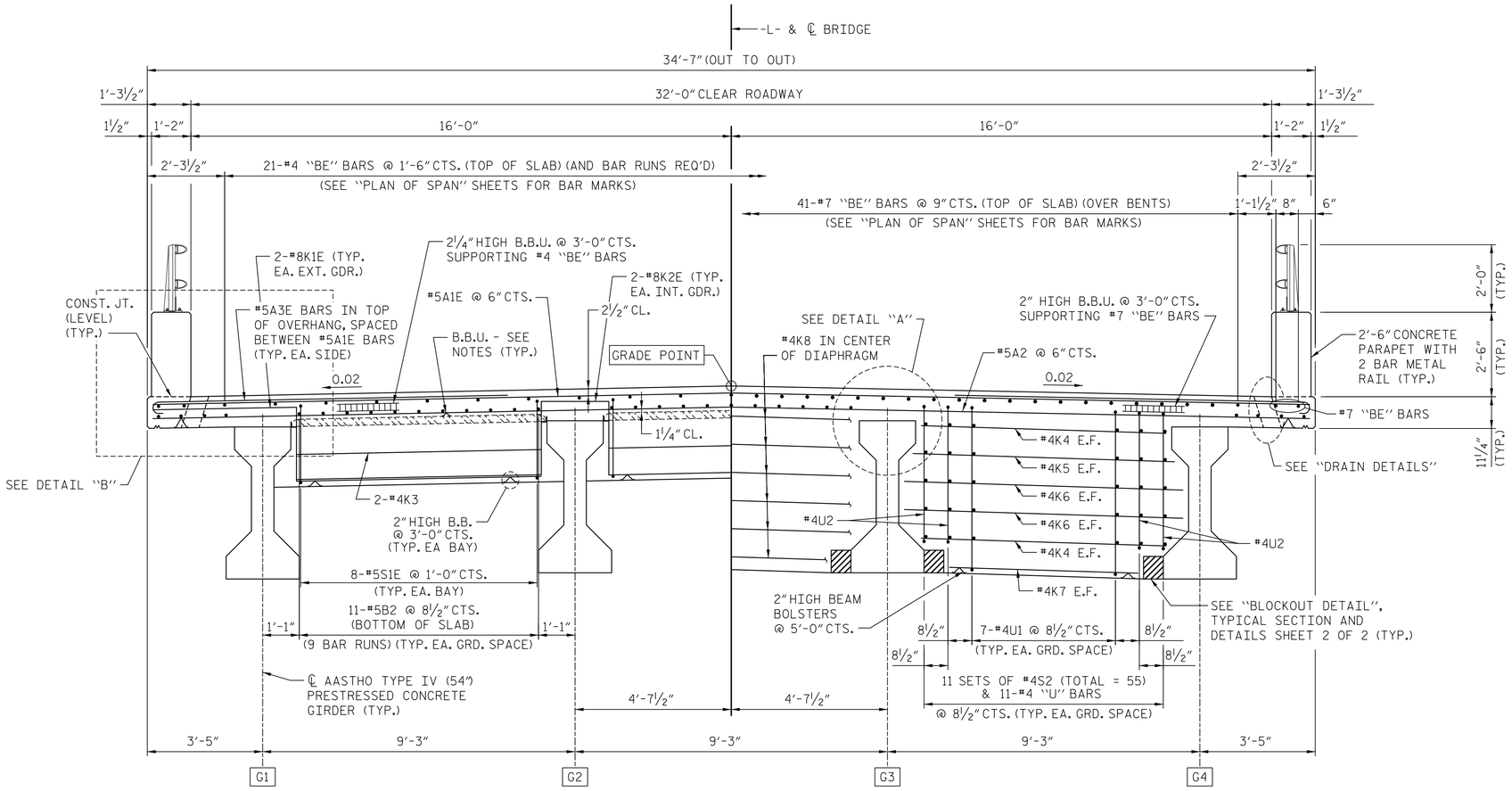
TOTAL SHEETS 86

STD. NO. LRFR1

ASSEMBLED BY : MKT	DATE : 11/2015
CHECKED BY : JCM	DATE : 11/2015
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM

DATE: 1/12/2016
TIME: 9:24:00 AM

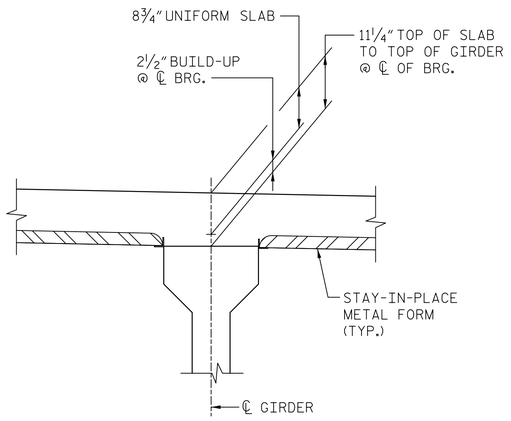
USER: kyle.compton
DGN: R:\Bridge 656\Cadd\401_DOT_U2707_SMU_S04_LRFR.dgn



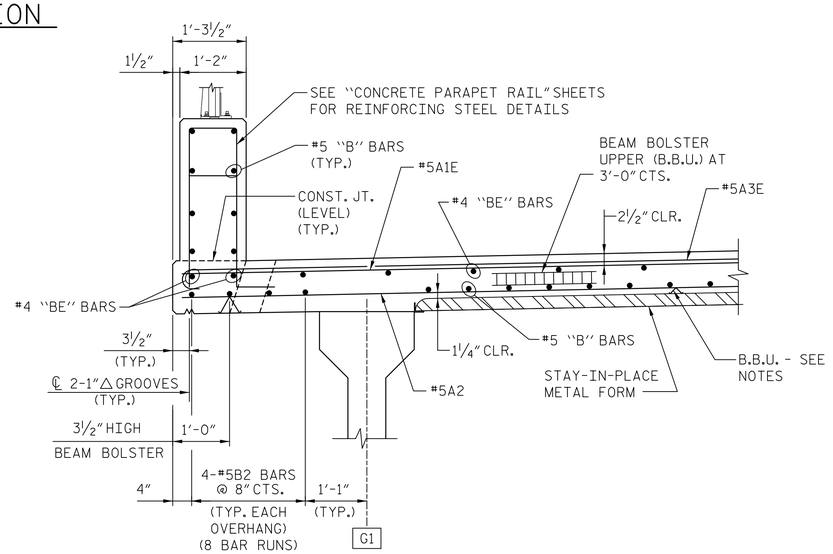
TYPICAL HALF SECTION
(SHOWING END BENT DIAPHRAGMS)

TYPICAL HALF SECTION
(SHOWING CONTINUOUS FOR LIVE LOAD DIAPHRAGMS)

TYPICAL SECTION



DETAIL "A"



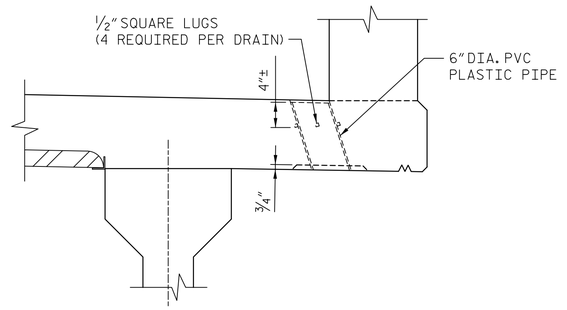
DETAIL "B"

NOTES:

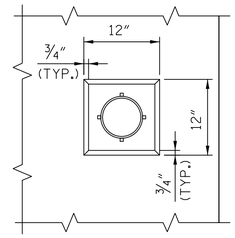
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE STAY-IN-PLACE METAL FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE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

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

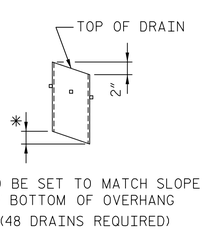
FOR SECTION AT INTERMEDIATE DIAPHRAGMS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE II, III, & IV PRESTRESSED CONCRETE GIRDERS".



ELEVATION



PLAN OF RECESS



PIPE DETAIL

DRAIN NOTES:

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

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

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

DRAIN DETAILS

PROJECT NO. U-2707

FORSYTH **COUNTY**

STATION: 90+25.00 -L-

SHEET 1 OF 2 BRIDGE NO. 656

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 035474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

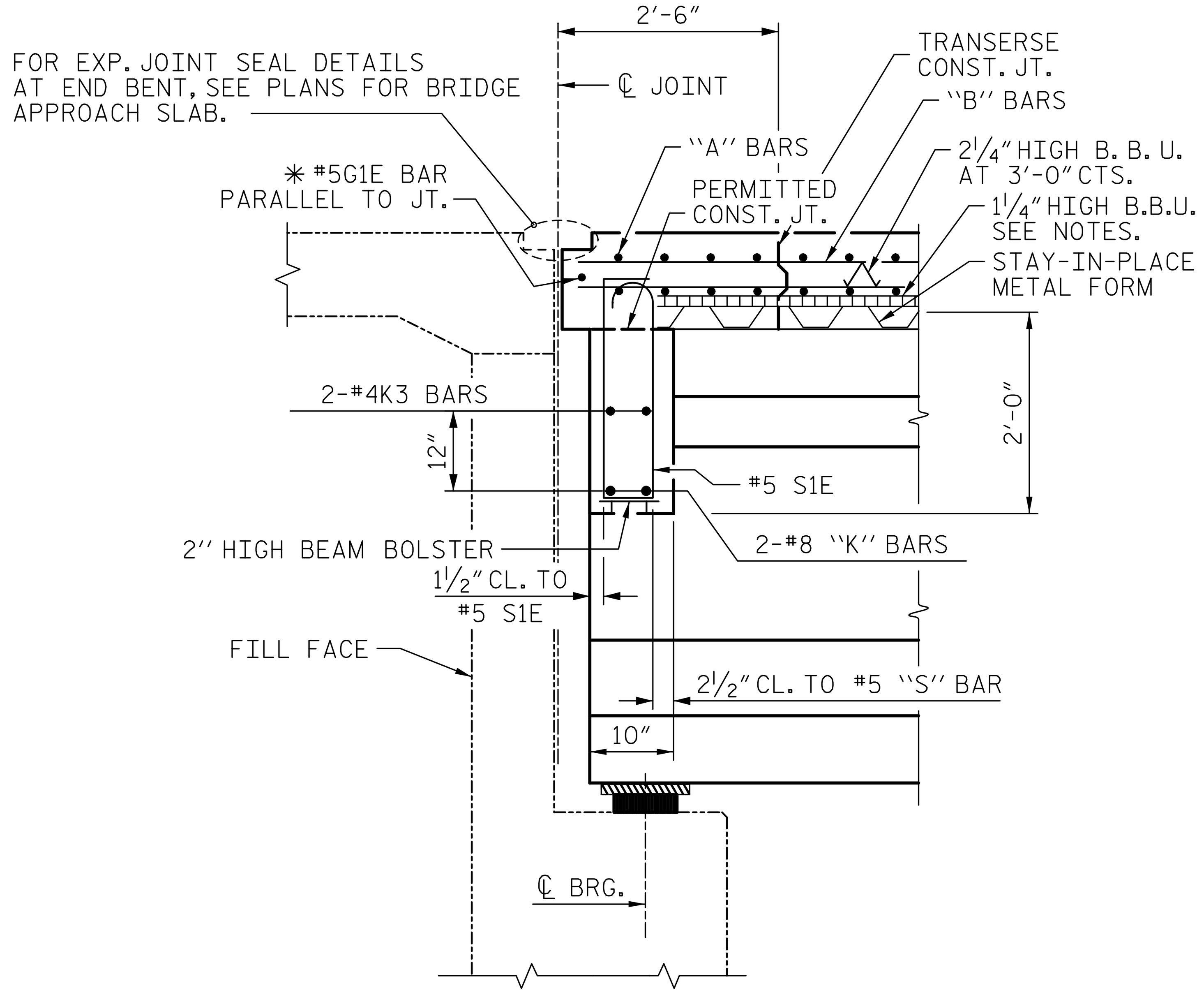
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION
AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-05
						TOTAL SHEETS
						86

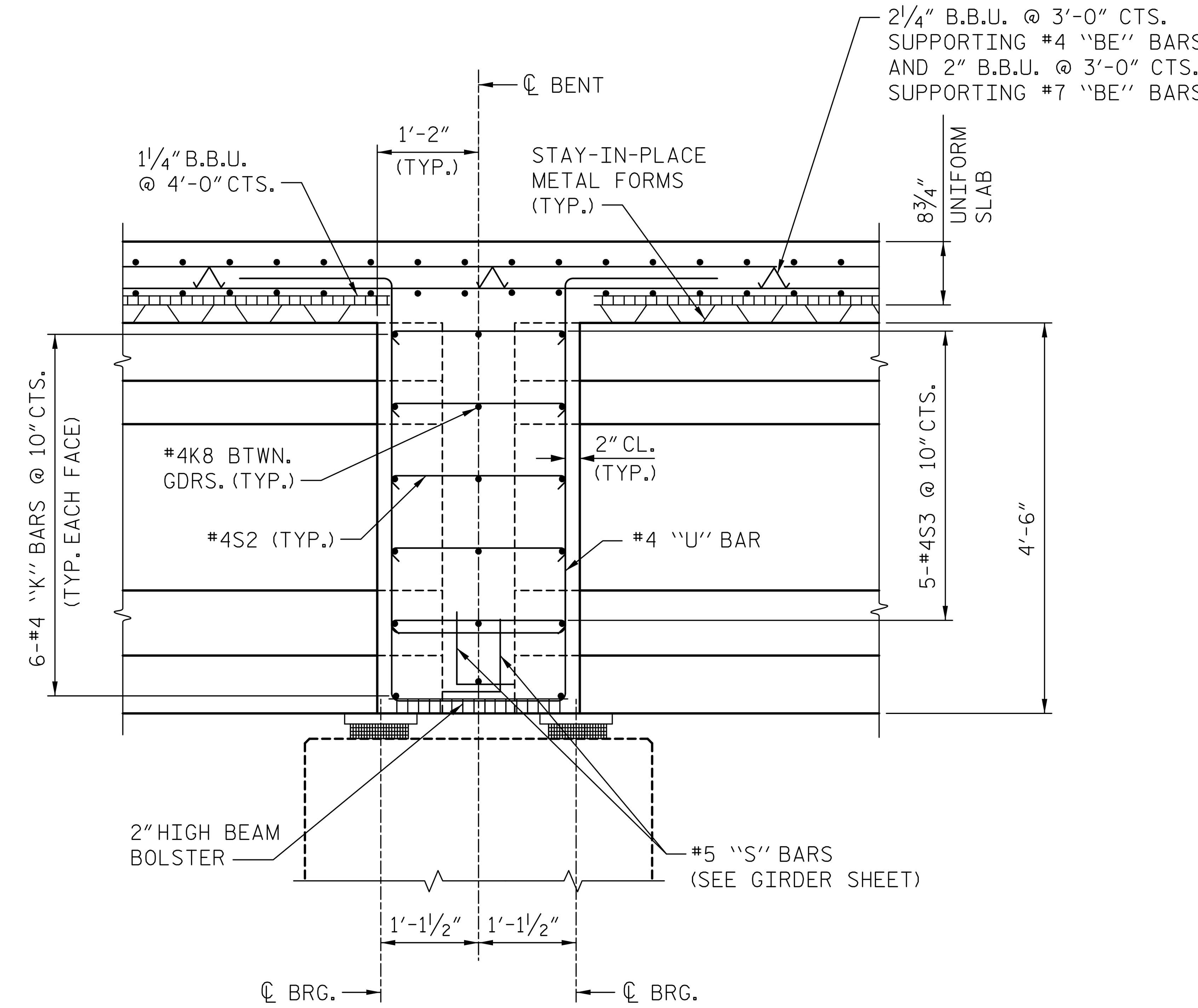
DATE: 1/12/2016
TIME: 9:24:05 AM

USER: kyle.compton
DGN: R:\Bridge Files\Cads\401_003-U2707_SMU_S05_TS01.dgn

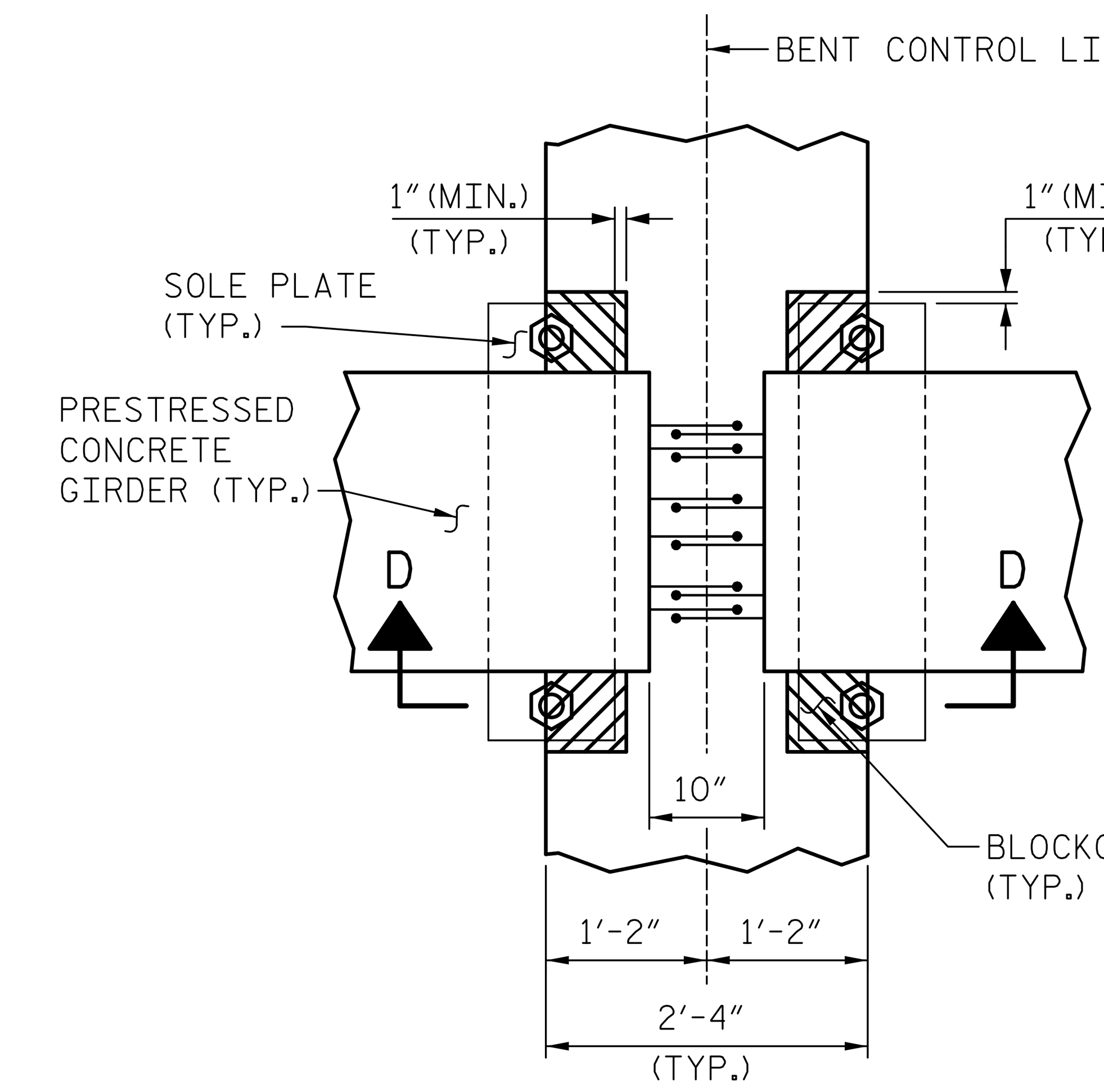


SECTION THRU END BENT DIAPHRAGM

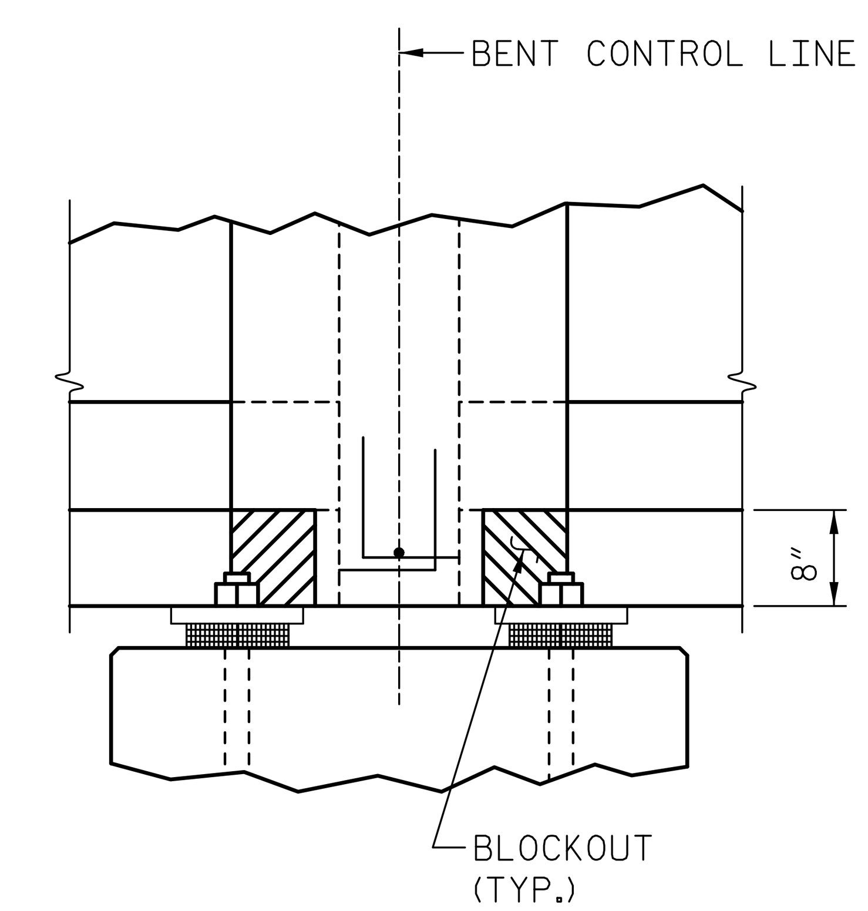
✱ #5G1E BAR MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.



SECTION THRU BENT DIAPHRAGMS



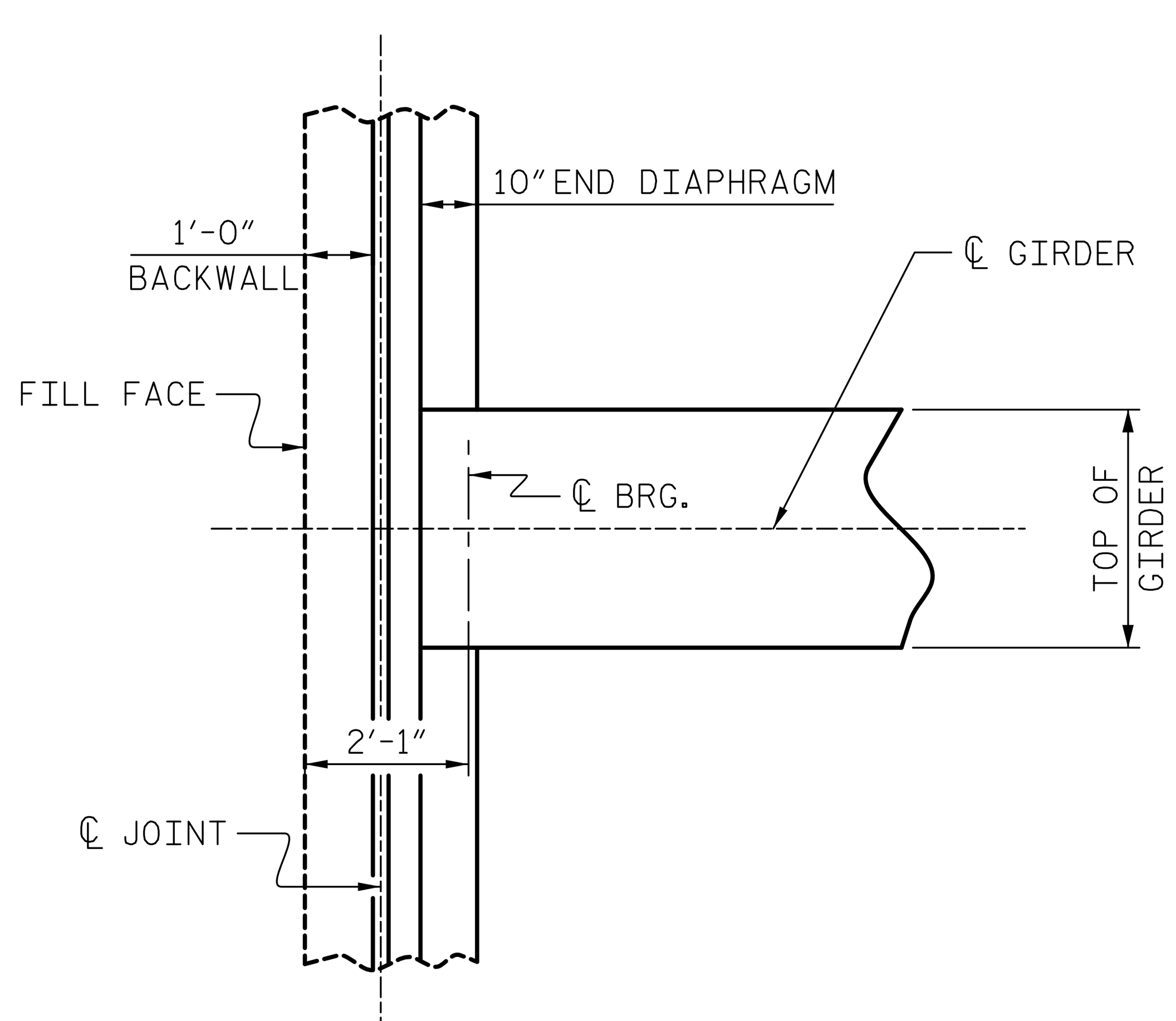
PLAN VIEW



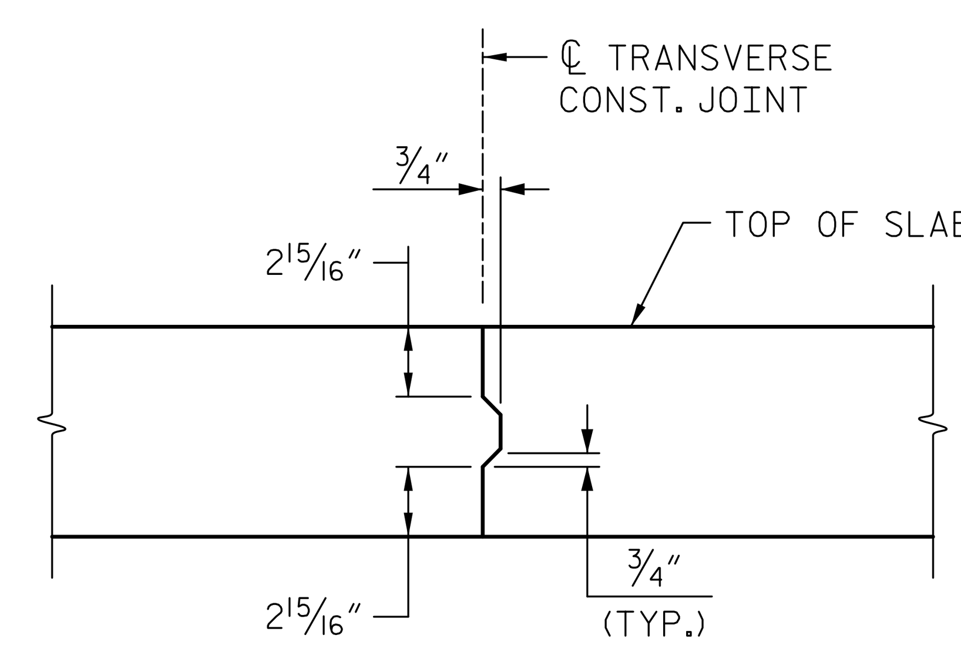
SECTION "D-D"

BLOCKOUT DETAIL

(BENT DIAPHRAGM FOR CONTINUOUS DECK SLAB) (AT INTERIOR BENTS)



END BENT DIAPHRAGM



TRANSVERSE CONSTRUCTION JOINT DETAIL

NOTES: REINFORCING STEEL IN SLAB NOT SHOWN.

LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 2 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

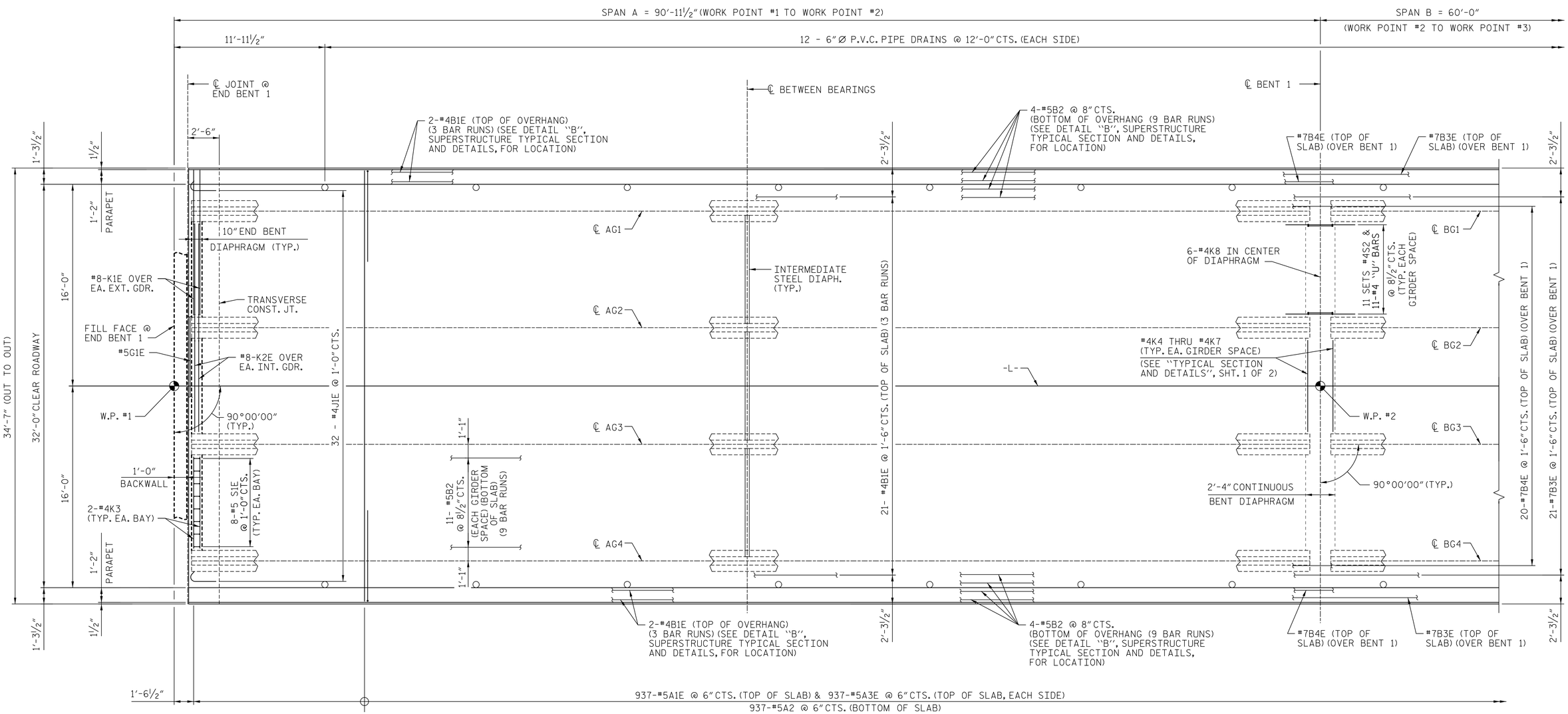
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE TYPICAL SECTION AND DETAILS

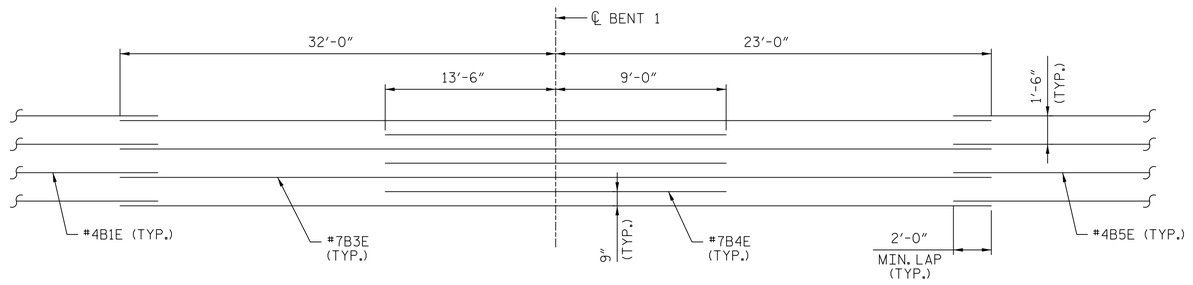
REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S-06
								TOTAL SHEETS 86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



PLAN OF SPAN A AND PARTIAL PLAN OF SPAN B



BENT 1

TOP OF SLAB REINFORCEMENT LAYOUT

NOTES:

FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTIONS "A-A" AND "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.

FOR PLACEMENT OF #4 J1 BARS, SEE "EXPANSION JOINT SEAL DETAILS" SHEET.

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-
SHEET 1 OF 6 BRIDGE NO. 656

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN A AND PARTIAL PLAN OF SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-07
						TOTAL SHEETS 86

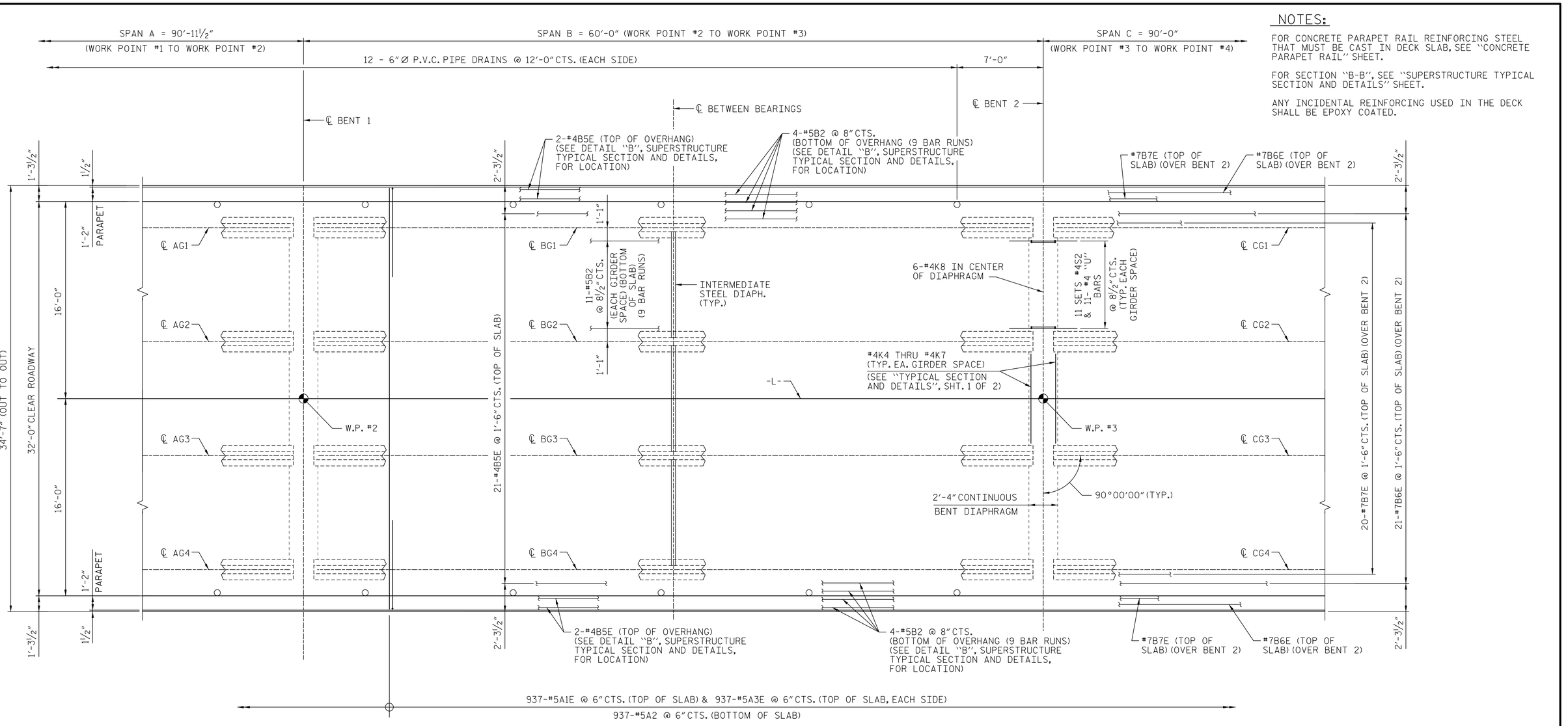
DATE: 1/12/2016
TIME: 9:24:46 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_03_U2707_SMU_S07_PS0.dgn

NOTES:

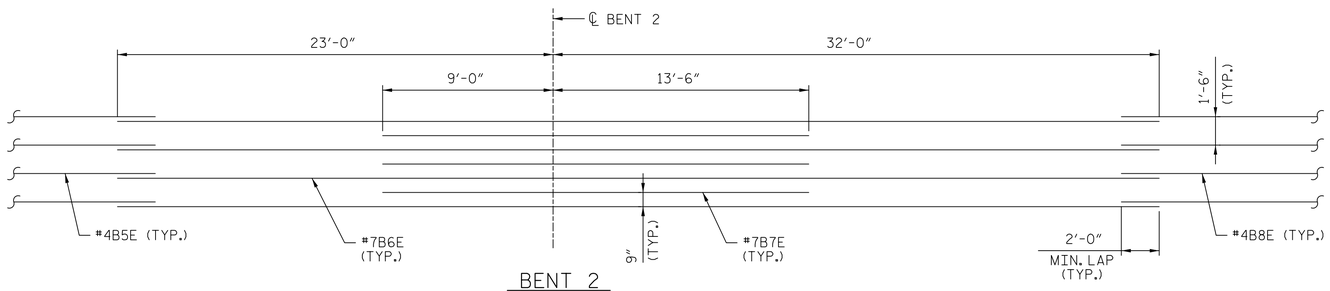
FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTION "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.



PLAN OF SPAN B AND PARTIAL PLAN OF SPANS A & C



BENT 2

TOP OF SLAB REINFORCEMENT LAYOUT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 6 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN B AND PARTIAL PLAN OF SPANS A & C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-08
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

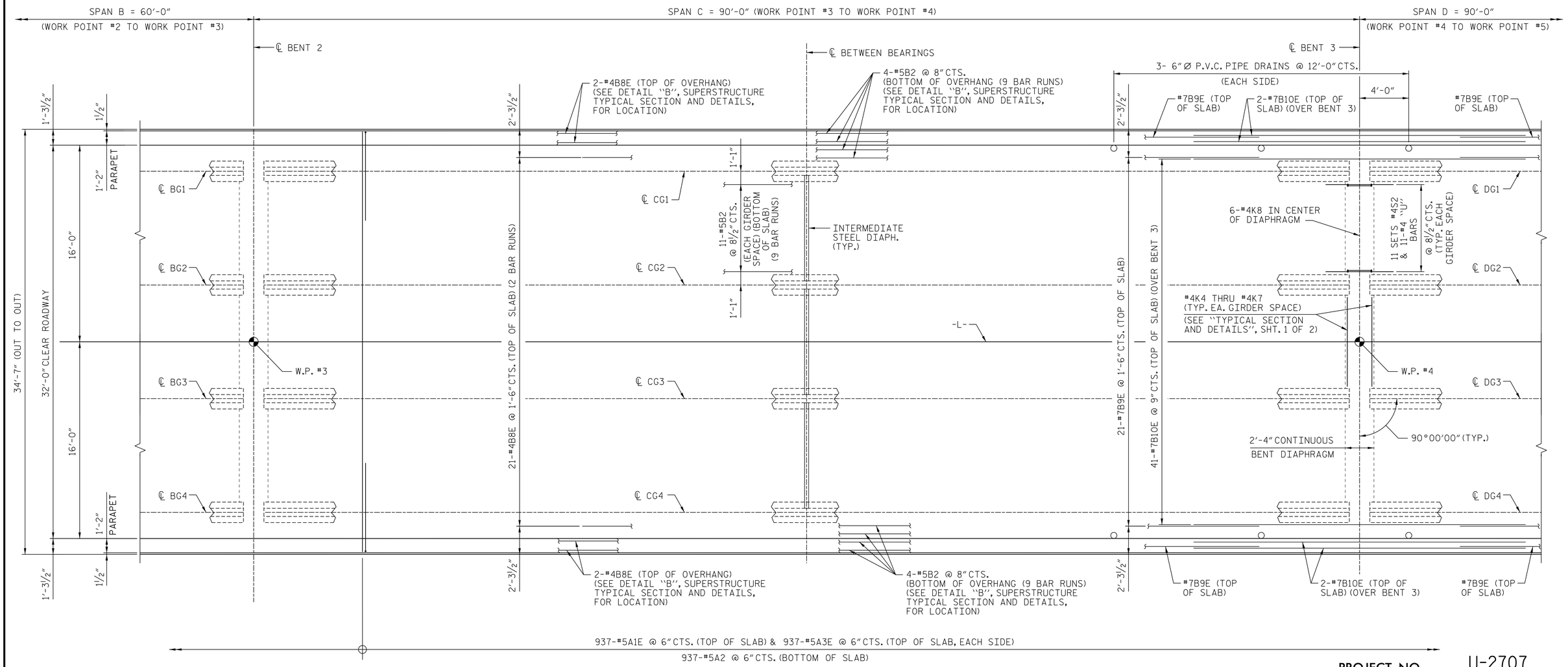
DATE: 1/12/2016
TIME: 9:24:48 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_05_U2707_SMU_508_PS02.dgn

NOTES:

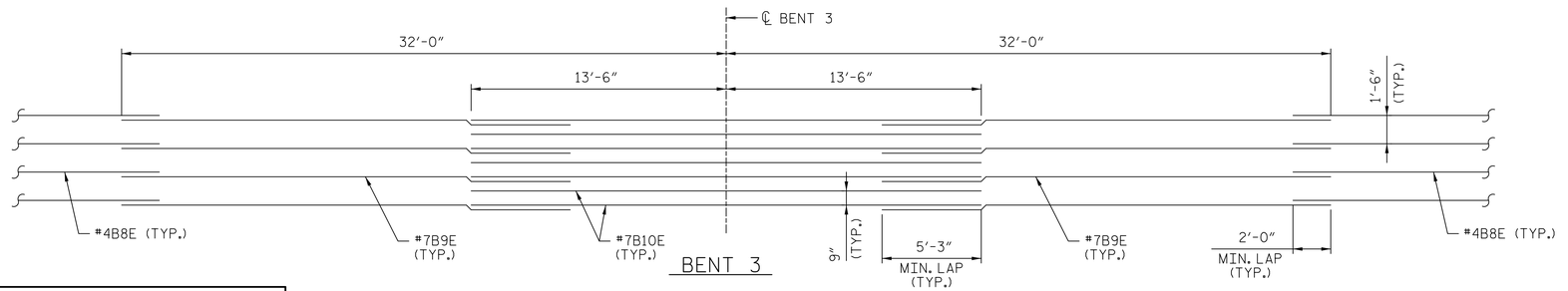
FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTION "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.



PLAN OF SPAN C AND PARTIAL PLAN OF SPANS B & D



TOP OF SLAB REINFORCEMENT LAYOUT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 6 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 035474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN C AND PARTIAL PLAN OF SPANS B & D

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-09
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:52:43 AM

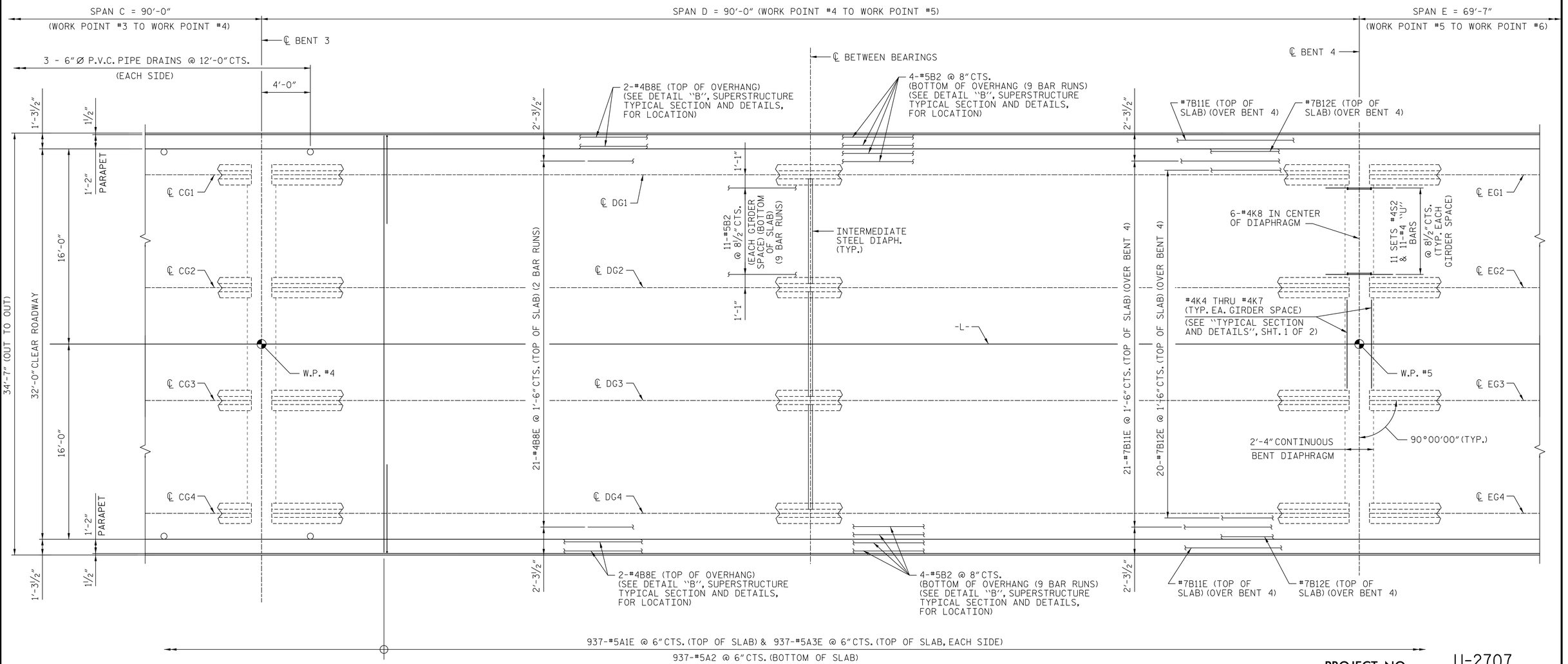
USER: kyle_compton
DGN: RSBridge 656\Cad\400_DET_U2707_SMU_S09_PS03.dgn

NOTES:

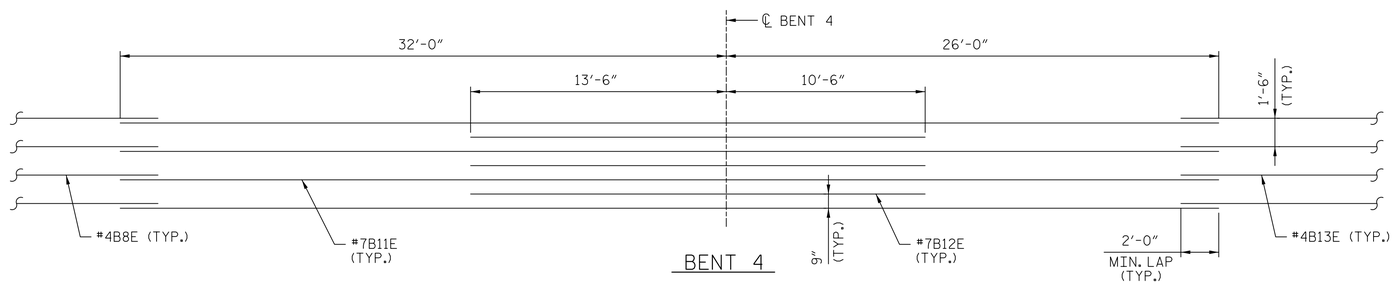
FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTION "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.



PLAN OF SPAN D AND PARTIAL PLAN OF SPANS C & E



TOP OF SLAB REINFORCEMENT LAYOUT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 4 OF 6 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN D AND PARTIAL PLAN OF SPANS C & E

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
						TOTAL SHEETS
						86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

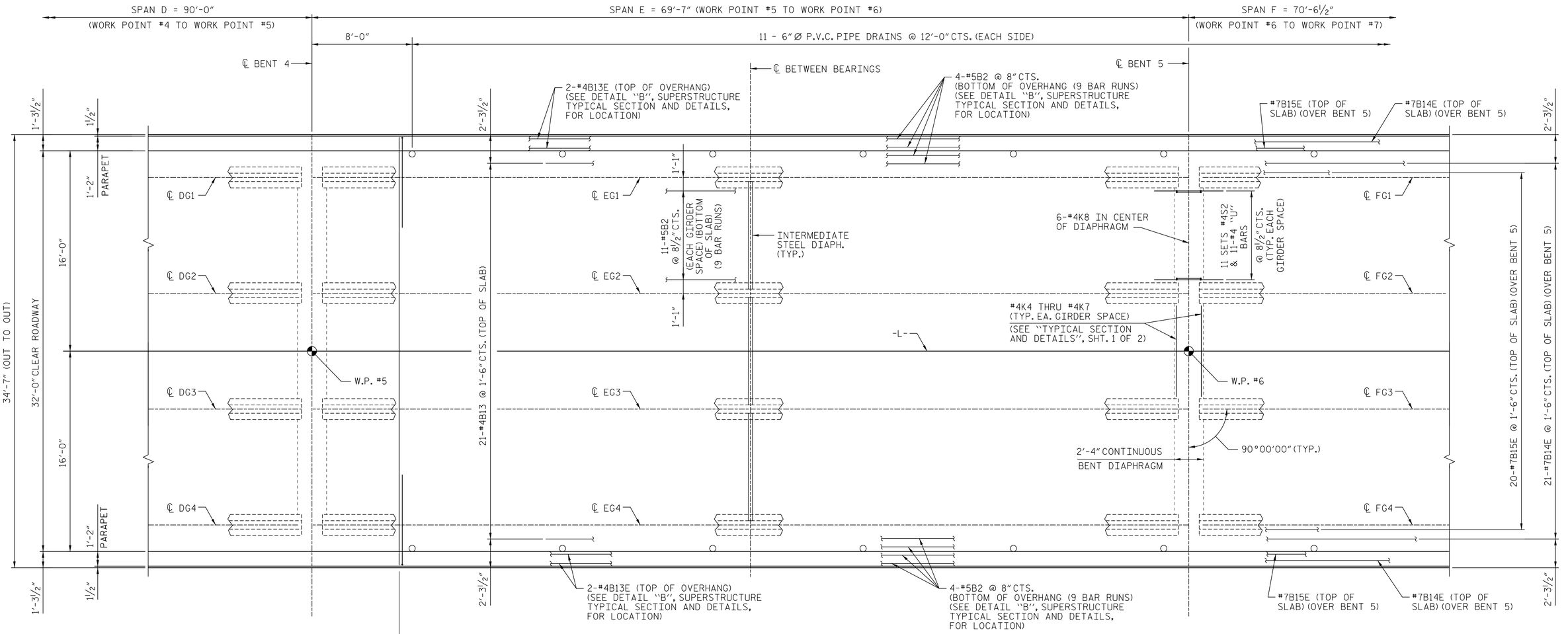
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NOTES:

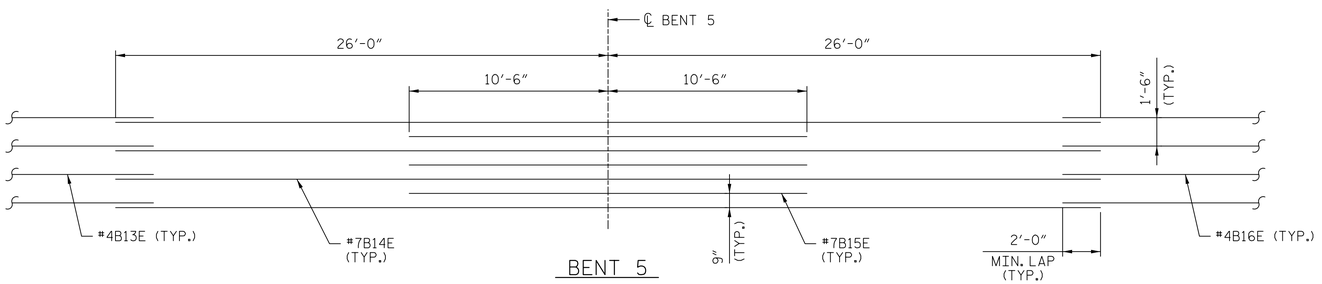
FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTION "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.



PLAN OF SPAN E AND PARTIAL PLAN OF SPANS D & F



BENT 5

TOP OF SLAB REINFORCEMENT LAYOUT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 5 OF 6 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN E AND PARTIAL PLAN OF SPANS D & F

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:24:26 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_02\U2707_SMU_SII_PS05.dgn

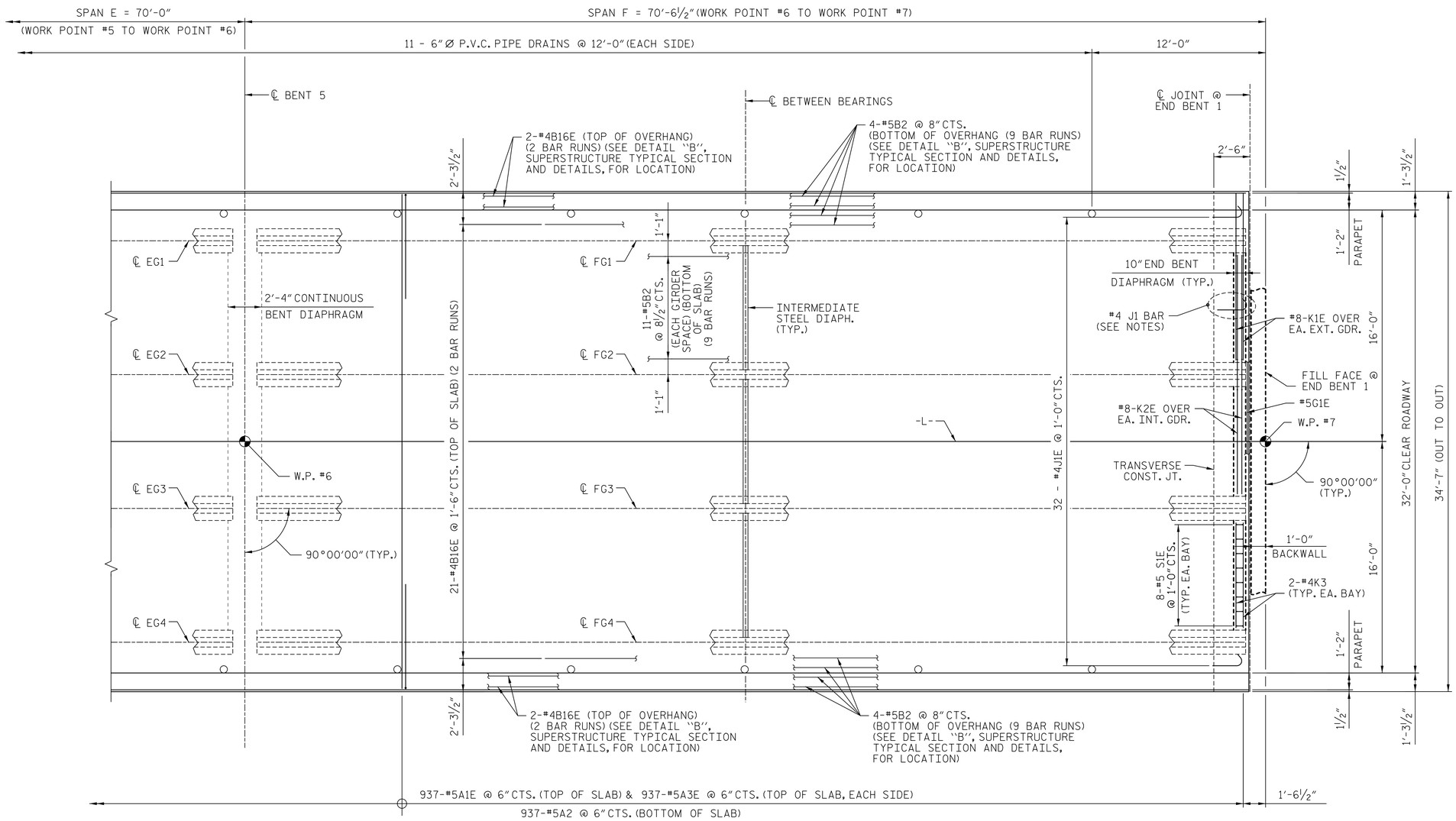
NOTES:

FOR CONCRETE PARAPET RAIL REINFORCING STEEL THAT MUST BE CAST IN DECK SLAB, SEE "CONCRETE PARAPET RAIL" SHEET.

FOR SECTIONS "A-A" AND "B-B", SEE "SUPERSTRUCTURE TYPICAL SECTION AND DETAILS" SHEET.

ANY INCIDENTAL REINFORCING USED IN THE DECK SHALL BE EPOXY COATED.

FOR PLACEMENT OF #4 J1 BARS, SEE "EXPANSION JOINT SEAL DETAILS" SHEET.



PLAN OF SPAN F AND PARTIAL PLAN OF SPAN E

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 6 OF 6 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN F AND PARTIAL PLAN OF SPAN E

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

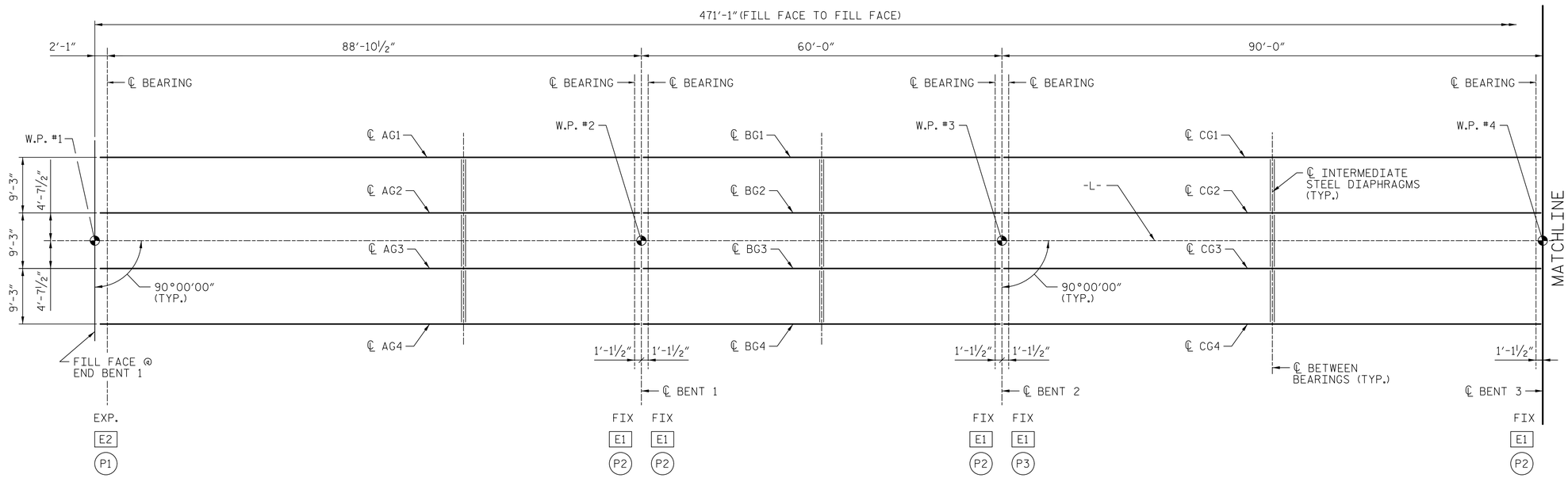
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:24:29 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_023_U2707_SMU_SVE_PS06.dgn

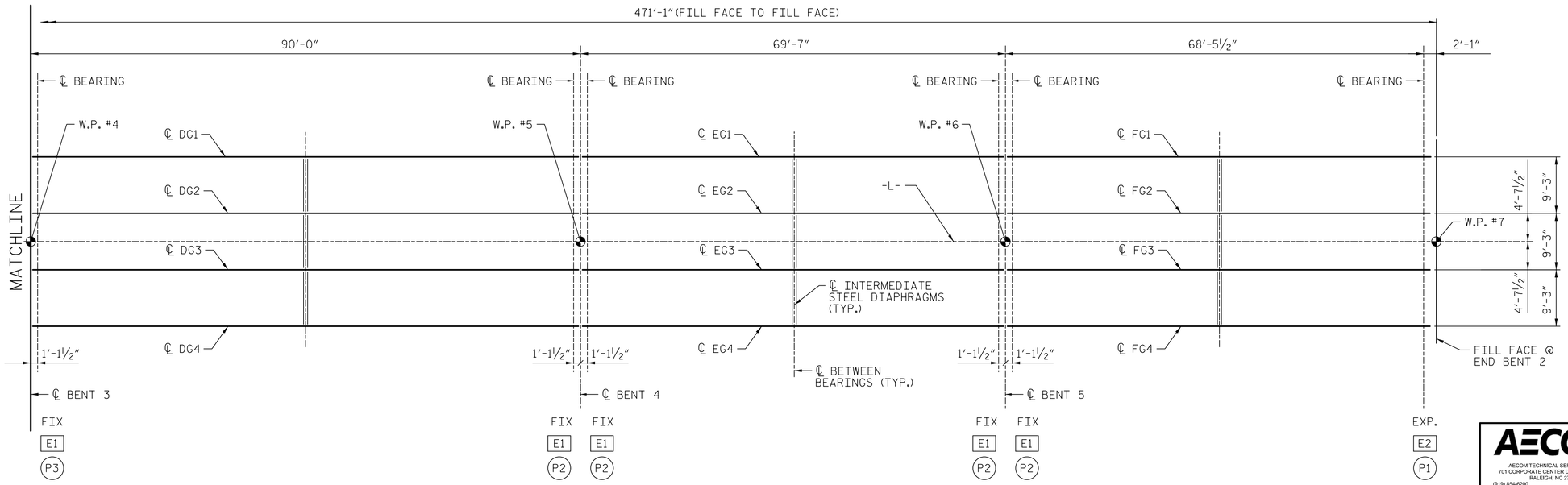
NOTES:

ELASTOMERIC BEARINGS INDICATED THUS: [EN] (N= NUMBER).

SOLE PLATES INDICATED THUS: (PN) (N= NUMBER).



FRAMING PLAN



FRAMING PLAN

DRAWN BY : KHC DATE : 11/2015

CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 037474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13
1			3			TOTAL SHEETS
2			4			86

PROJECT NO. U-2707

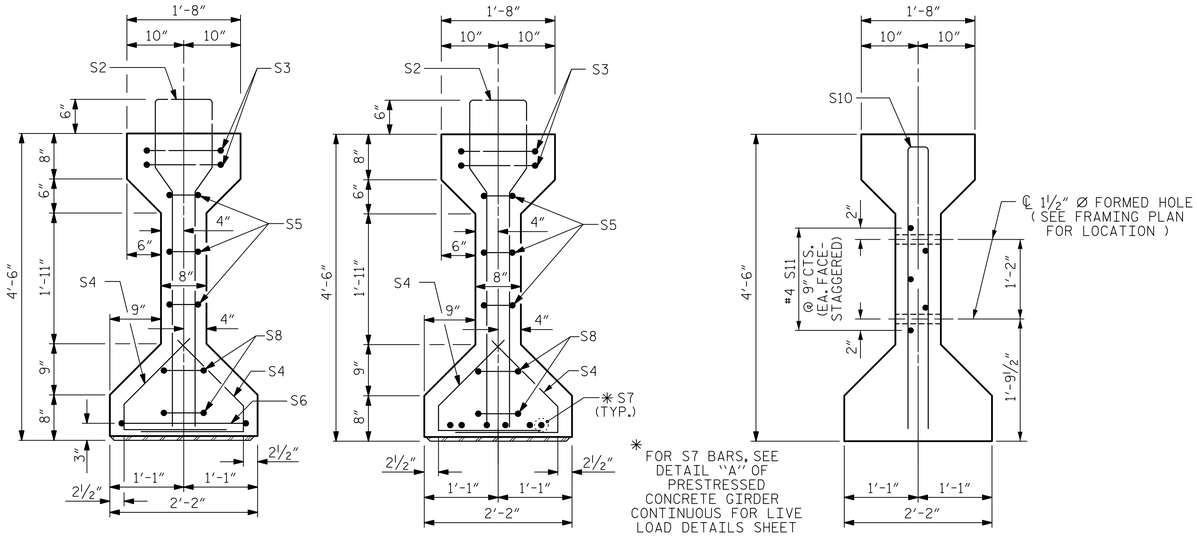
FORSYTH COUNTY

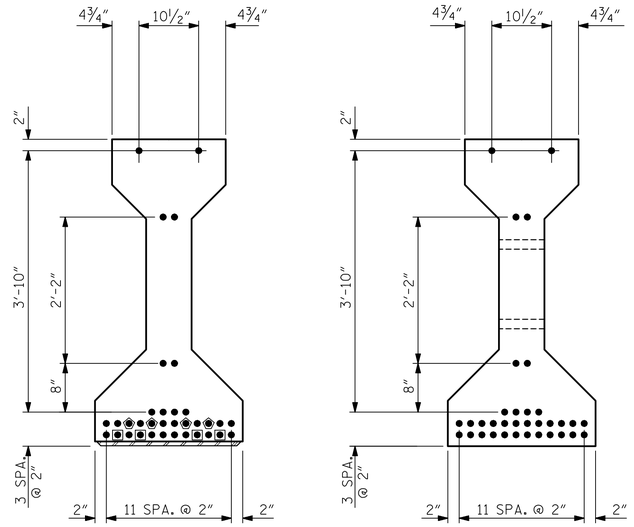
STATION: 90+25.00 -L-

BRIDGE NO. 656

DATE: 1/12/2016
TIME: 9:24:33 AM

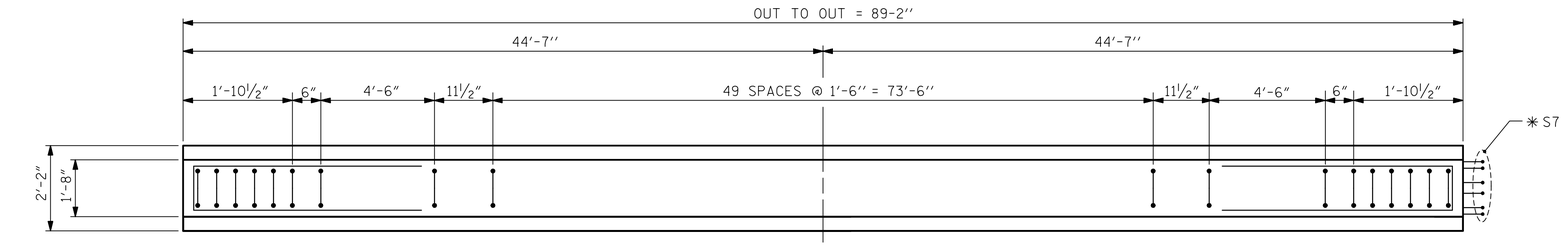
USER: kyle_compton
DGN: RvBridge 656\Cadd\401_025_U2707_SNU_S13_FP.dgn



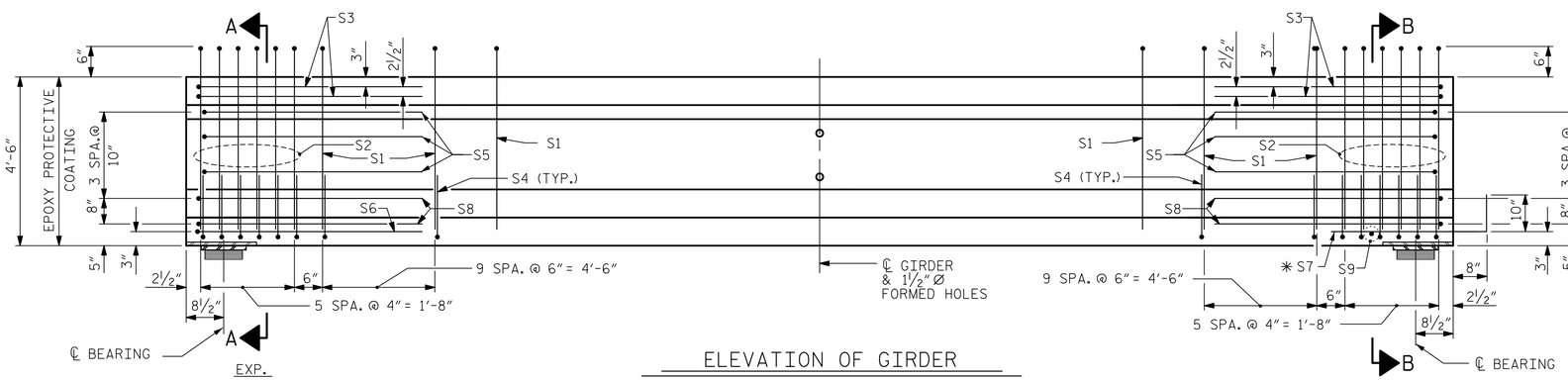


0.6"Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER

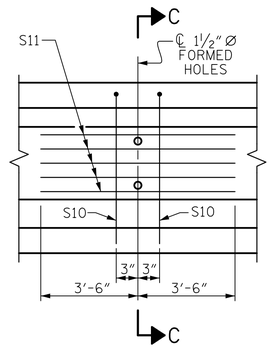


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1,2,3 & 4

0.6" Ø L. R. GRADE 270 STRANDS

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

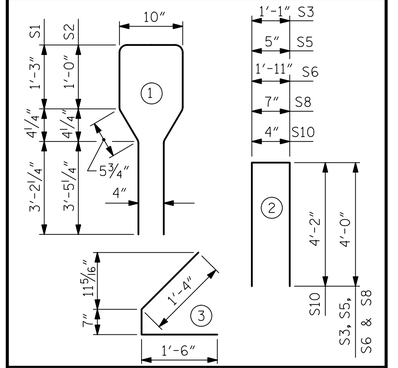
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	70	#4	1	10'-8"	499
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
✳ S7	6	#5	STR	3'-8"	23
S8	4	#4	2	8'-7"	23
S9	1	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	7000 PSI CONCRETE C.Y.	0.6"Ø L.R. STRANDS No.
EXT. & INT. GDRS	990	18.1	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	89'-2"	356'-8"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

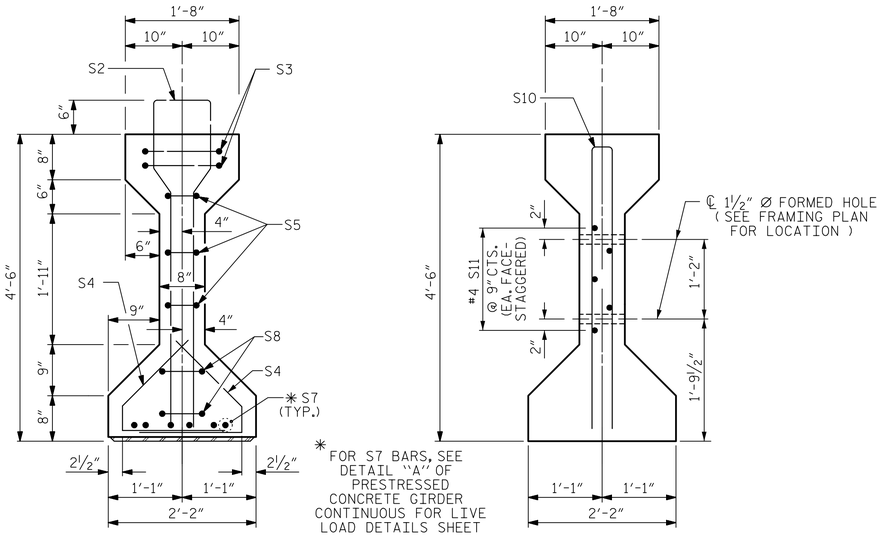
AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

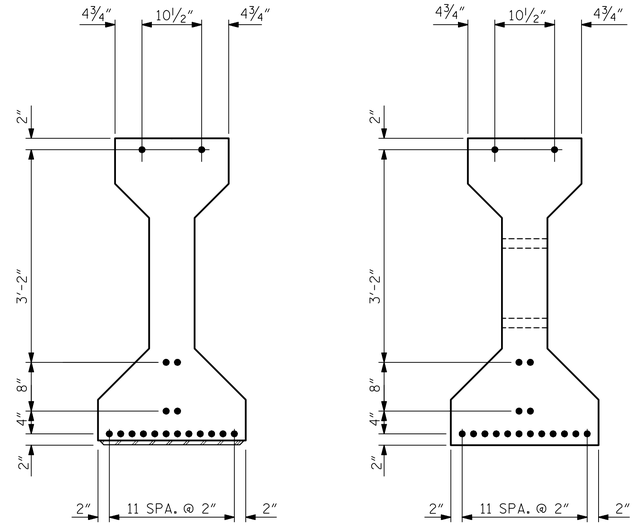
ASSEMBLED BY : KHC	DATE : 10/2015
CHECKED BY : JCM	DATE : 10/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG



SECTION B-B

SECTION C-C

(S1 BARS NOT SHOWN)

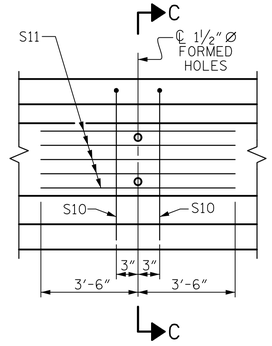


AT END OF GIRDER

AT ℄ OF GIRDER

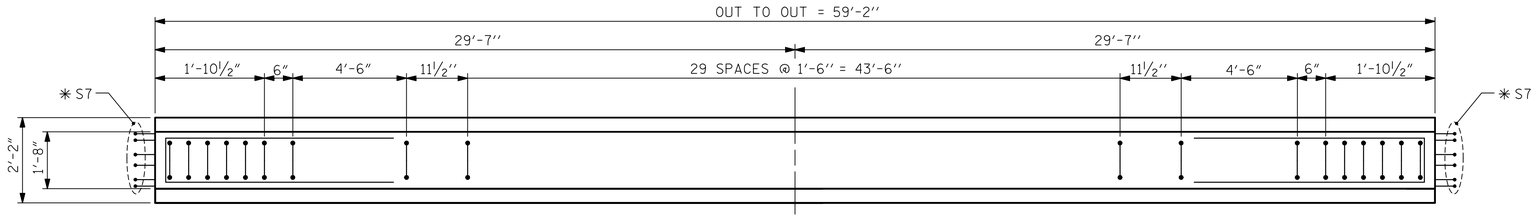
0.6" Ø LOW RELAXATION STRAND LAYOUT

● FULLY BONDED STRANDS

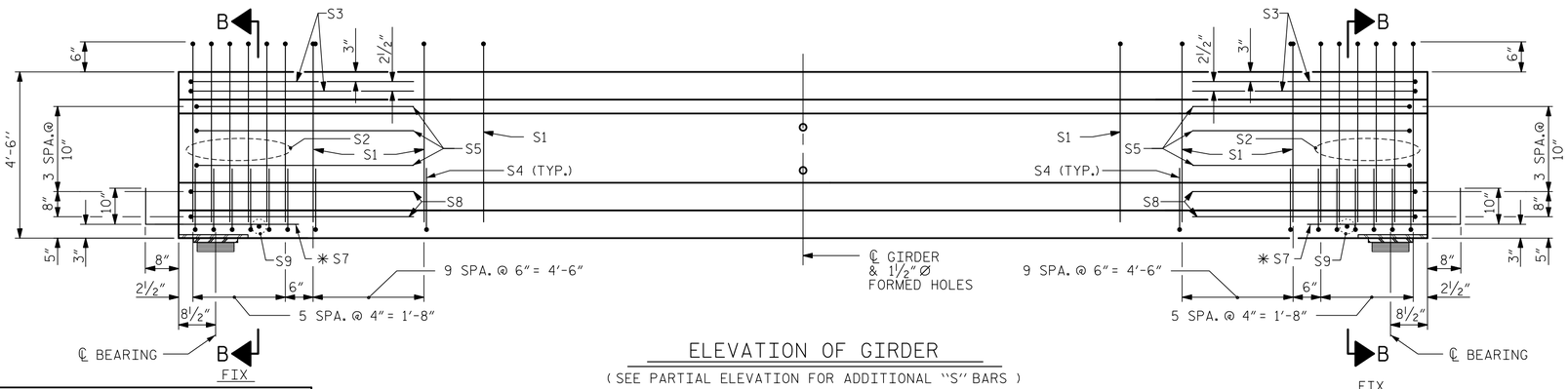


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1,2,3 & 4



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

0.6" Ø L. R. GRADE 270 STRANDS

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

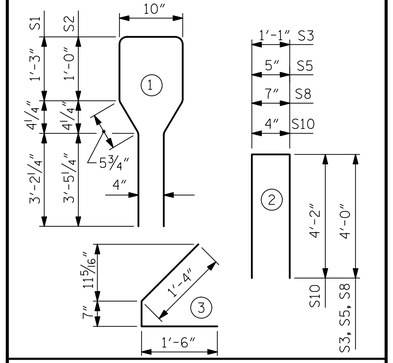
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	50	#4	1	10'-8"	356
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
✳ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	6000 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
EXT. & INT. GDRS	863	12.0	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	59'-2"	236'-8"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 7 BRIDGE NO. 656

ASSEMBLED BY : KHC	DATE : 10/2015	
CHECKED BY : JCM	DATE : 10/2015	
DRAWN BY : ELR 8/91	REV. 5/1/06R	TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11	MAA/GM
	REV. 1/15	MAA/TMG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: Jean C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

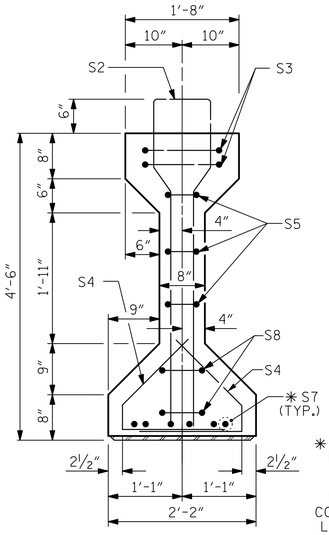
AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG6

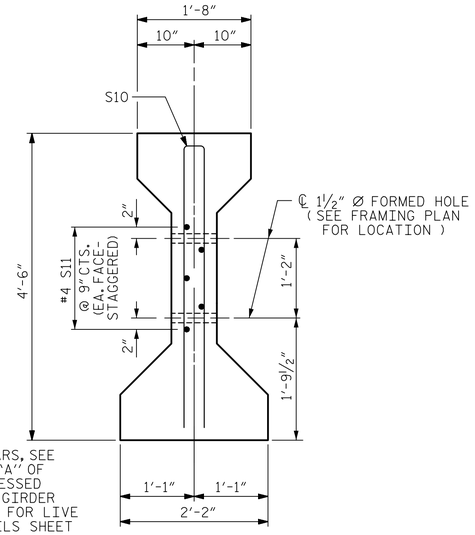
DATE: 1/12/2016
TIME: 9:24:39 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cadd\40_023_U2707_SMU_SIS_PCG02.dgn

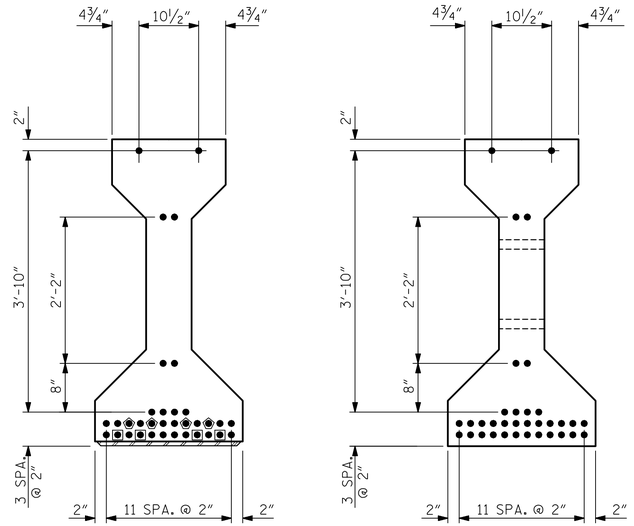


SECTION B-B

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



SECTION C-C
(S1 BARS NOT SHOWN)

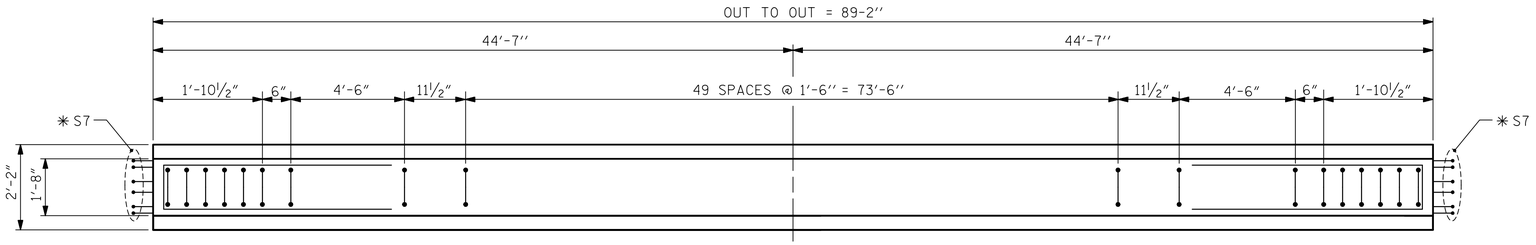


AT END OF GIRDER

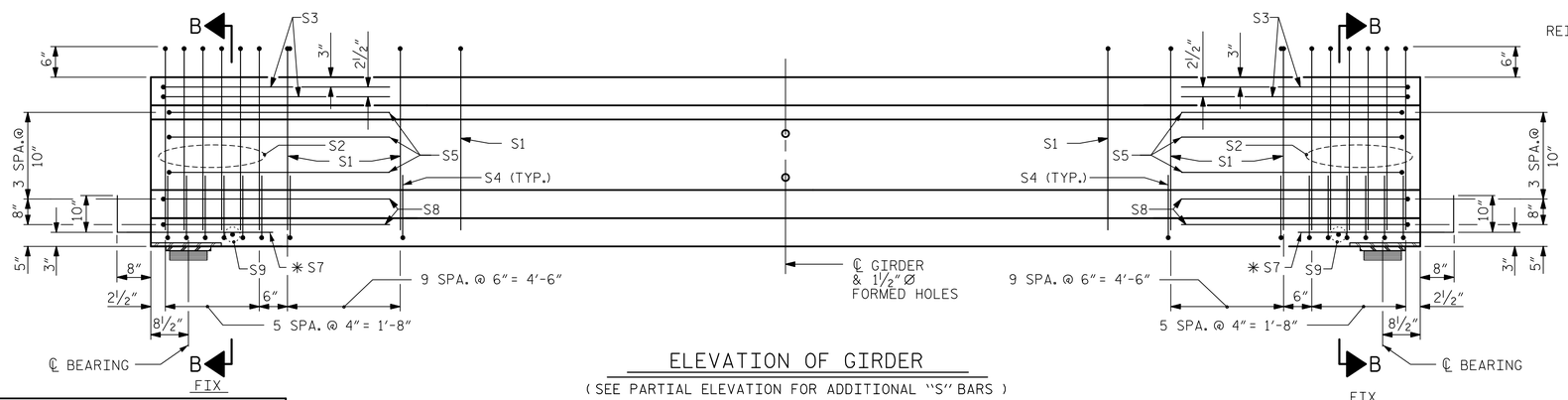
AT ℄ OF GIRDER

0.6"Ø LOW RELAXATION STRAND LAYOUT

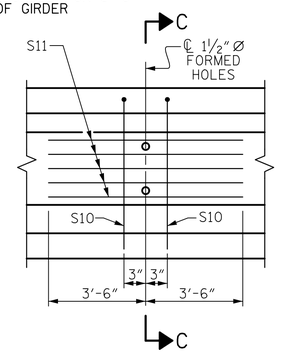
- ● FULLY BONDED STRANDS
- ◙ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER



PLAN OF GIRDER



ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1,2,3 & 4

0.6" Ø L. R. GRADE 270 STRANDS

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

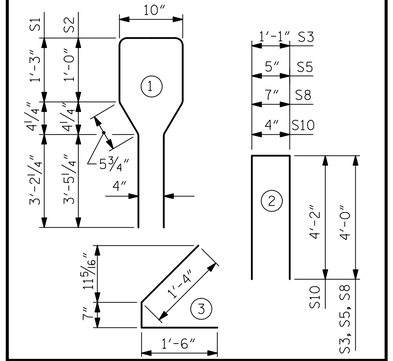
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	70	#4	1	10'-8"	499
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
✳ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	7000 PSI CONCRETE C.Y.	0.6"Ø L.R. STRANDS No.
EXT. & INT. GDRS	1006	18.1	34

GIRDERS REQUIRED

	NUMBER	LENGTH	TOTAL LENGTH
SPAN C	4	89'-2"	356'-8"
SPAN D	4	89'-2"	356'-8"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPANS C & D

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

SHEET NO. S-16

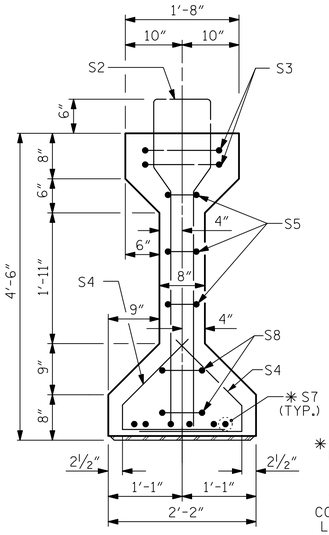
TOTAL SHEETS 86

STD. NO. PCG6

ASSEMBLED BY : KHC	DATE : 10/2015
CHECKED BY : JCM	DATE : 10/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG

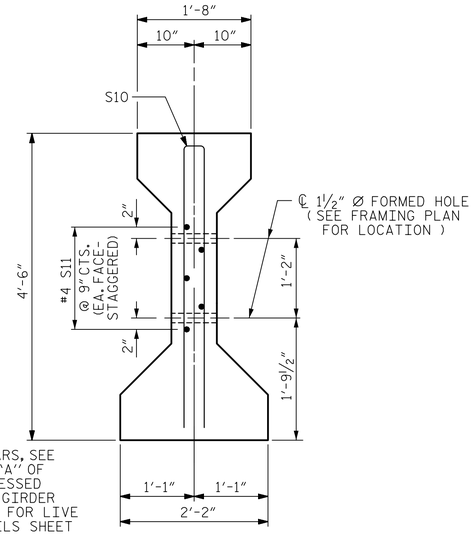
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:24:43 AM
USER: kyle.compton
DGN: K:\Bridge 656\Card\40_03_U2707_SMU_S16_PCG03.dgn

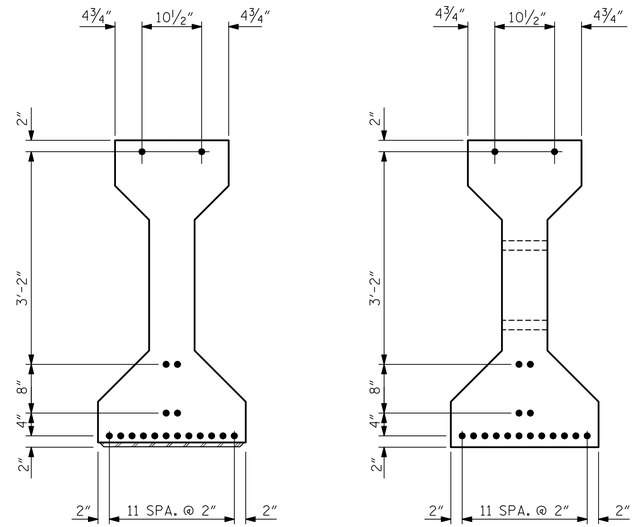


SECTION B-B

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



SECTION C-C
(S1 BARS NOT SHOWN)

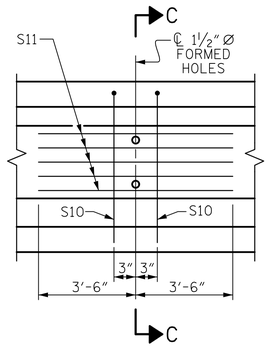


AT END OF GIRDER

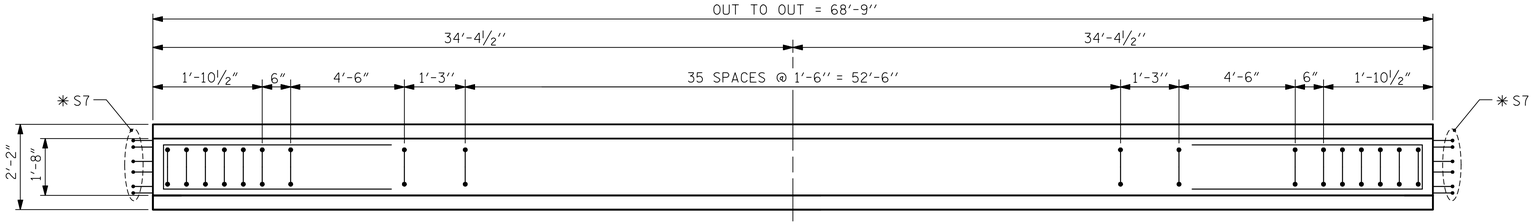
AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

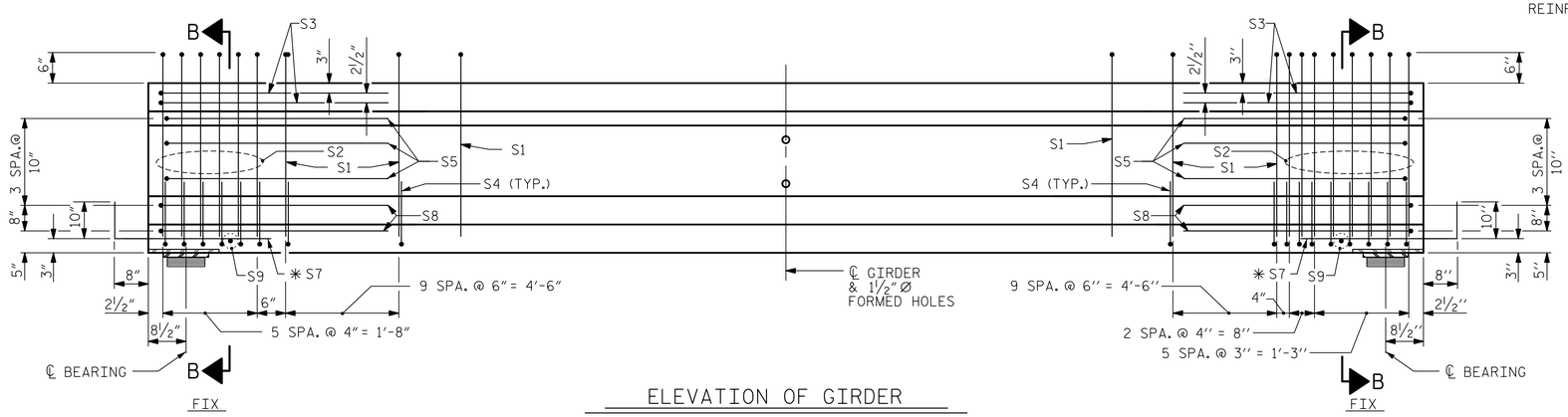
● FULLY BONDED STRANDS



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM
REINFORCING STEEL FOR GIRDER Nos. 1,2,3 & 4



PLAN OF GIRDER



ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

0.6" Ø L. R. GRADE 270 STRANDS

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

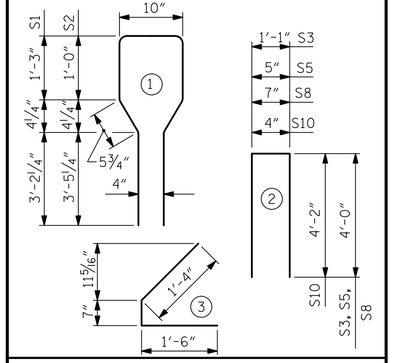
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	56	#4	1	10'-8"	399
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
✳ S7	12	#5	STR	3'-8"	46
S8	4	#4	2	8'-7"	23
S9	2	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	6000 PSI CONCRETE C.Y.	0.6" Ø L.R. STRANDS No.
EXT. & INT. GDRS	906	14.0	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	68'-9"	275'-0"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 4 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: Jean C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD SPAN E

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-17
1			3			TOTAL SHEETS
2			4			86

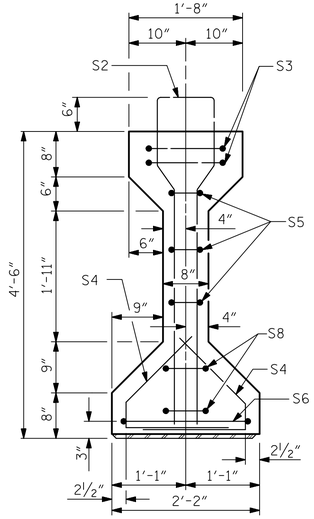
STD. NO. PCG6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

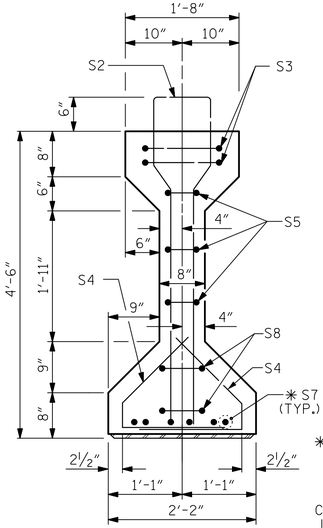
ASSEMBLED BY : KHC	DATE : 10/2015
CHECKED BY : JCM	DATE : 10/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG

DATE: 1/12/2016
TIME: 9:24:46 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\400_033_U2707_SMU_SIT_PCG04.dgn

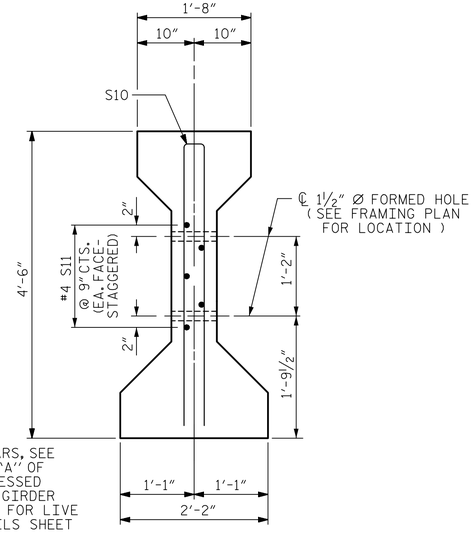


SECTION A-A

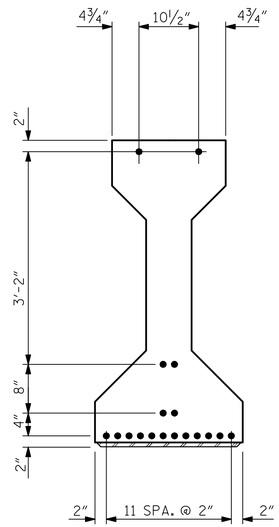


SECTION B-B

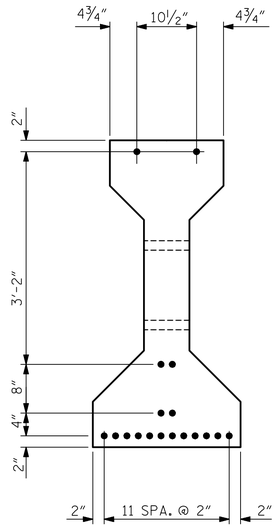
✳ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET



SECTION C-C
(S1 BARS NOT SHOWN)



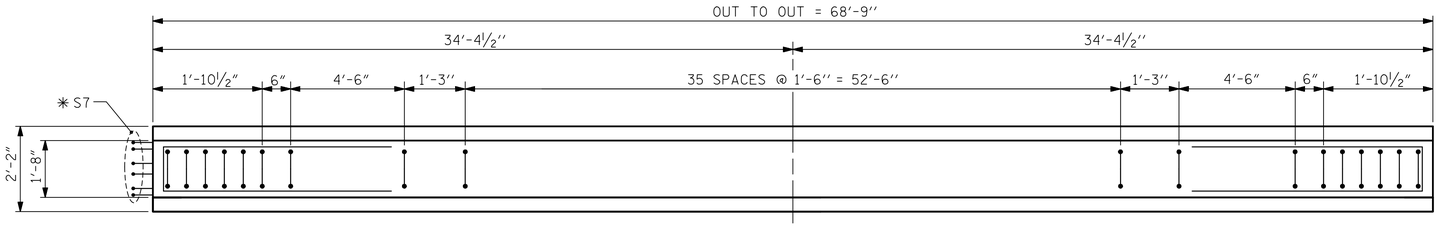
AT END OF GIRDER



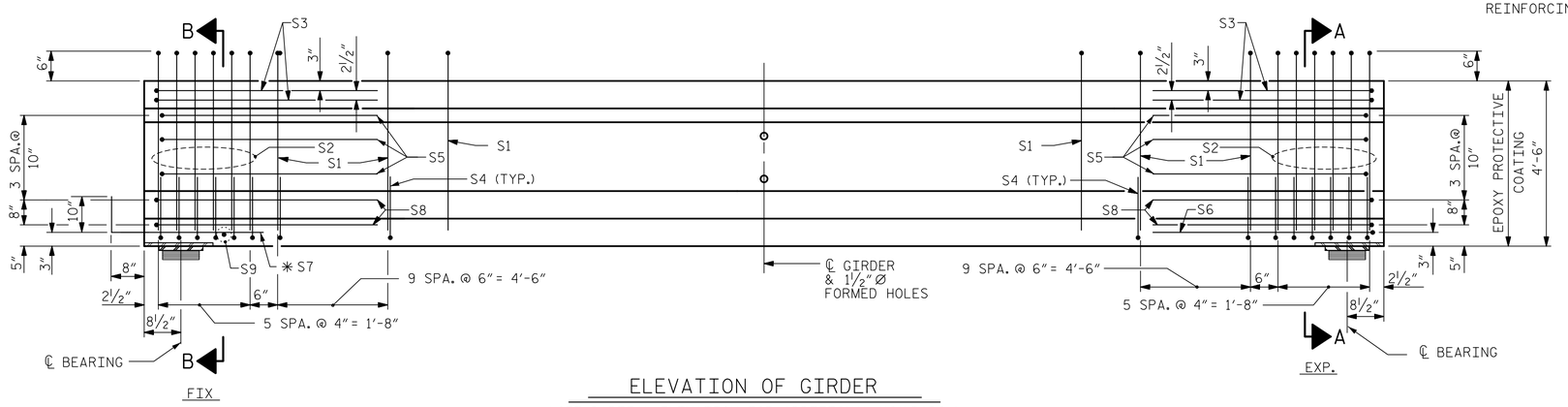
AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

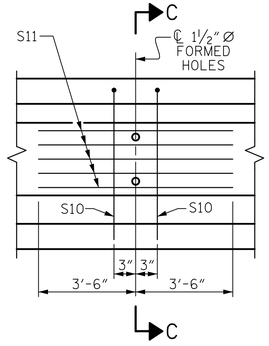
● FULLY BONDED STRANDS



PLAN OF GIRDER



ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM
REINFORCING STEEL FOR GIRDER Nos. 1,2,3 & 4

0.6" Ø L. R. GRADE 270 STRANDS

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

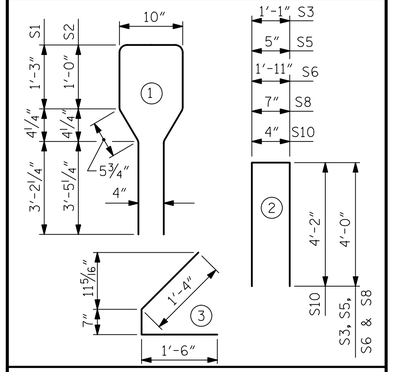
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	56	#4	1	10'-8"	399
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
✳S7	6	#5	STR	3'-8"	23
S8	4	#4	2	8'-7"	23
S9	1	#3	STR	1'-10"	1
S10	2	#5	2	8'-8"	18
S11	5	#4	STR	7'-0"	23

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	6000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXT. & INT. GDRS	890	14.0	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	68'-9"	275'-0"

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-
SHEET 5 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: Jean C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN F

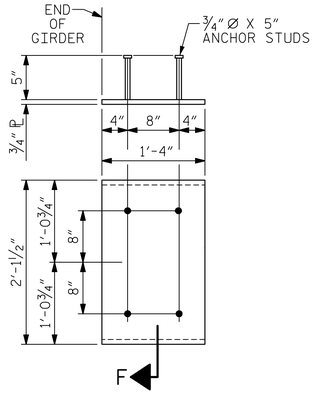
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-18
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG6

ASSEMBLED BY : KHC	DATE : 10/2015
CHECKED BY : JCM	DATE : 10/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:24:49 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cadd\400_035_U2707_SMU_S18_PCG06.dgn



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

(2 REQ'D PER GIRDER)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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.

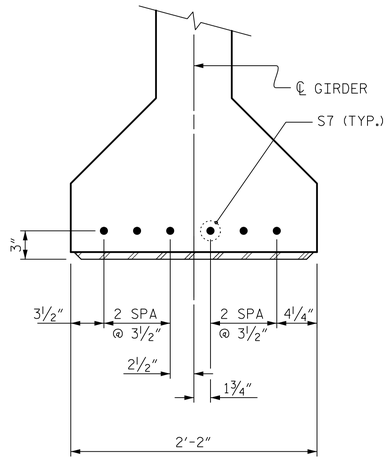
AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5500 PSI FOR SPANS A, C & D AND 4500 PSI FOR SPANS B, E & F.

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

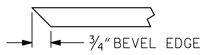
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF ¼".

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.



DETAIL "A"

(FOR AASHTO TYPE IV GIRDERS)



SECTION "F"

(SEE NOTES)

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 6 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

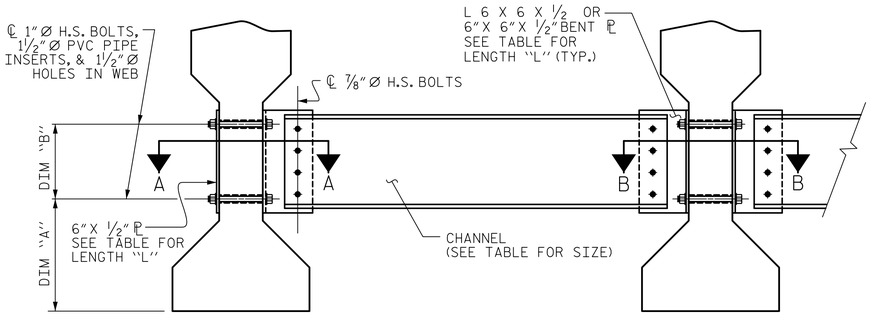
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG9 (Snt. 3)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : ELR 11/91	REV. 10/1/11		MAA/GM
CHECKED BY : GRP 11/91	REV. 1/15		MAA/TMG
	REV. 2/15		MAA/TMG

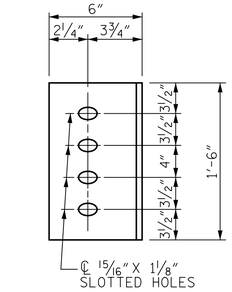
USER: kyle.compton
DGN: R:\Bridge 656\Cadd\400_037_U2707_SMU_S19_PCG06.dgn
DATE: 1/12/2016
TIME: 9:24:52 AM



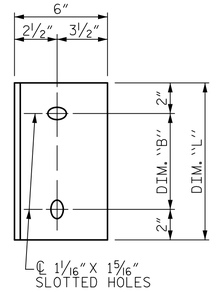
EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

(TYPE IV GIRDER SHOWN)

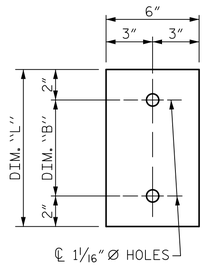


DIAPHRAGM FACE
(TYPE III OR TYPE IV GDR.)



WEB FACE

CONNECTOR PLATE DETAILS



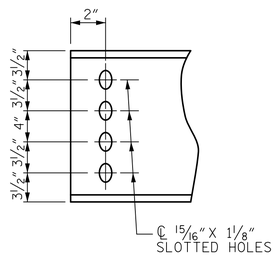
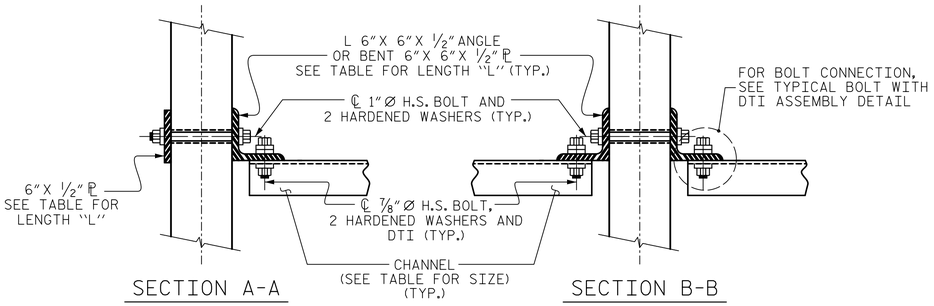


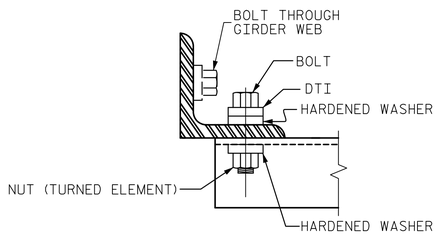
PLATE DETAILS CHANNEL END
(TYPE IV GDR.)



SECTION A-A SECTION B-B

CONNECTION DETAILS

(FOR SKEW = 90°)



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

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

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL ¼ TURN.

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

FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

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

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

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼"PROJECTION BEYOND THE NUT.

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

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

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

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

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9½"	1'-2"	1'-6"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 7 OF 7 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 030474 ENGINEER JOHN C. MORRISON
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

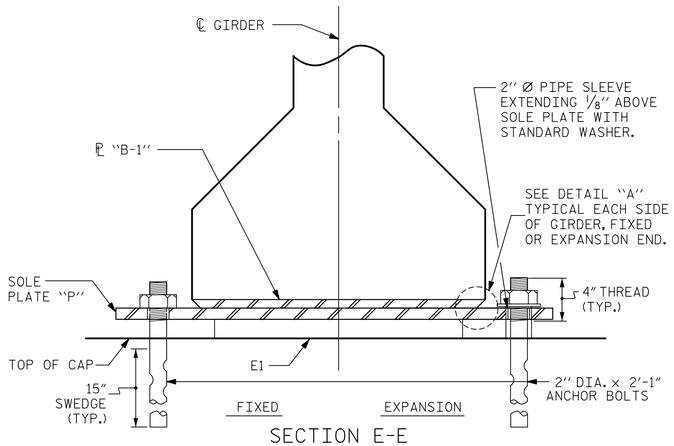
INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE II, III, & IV PRESTRESSED CONCRETE GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-20
1			3			TOTAL SHEETS
2			4			86

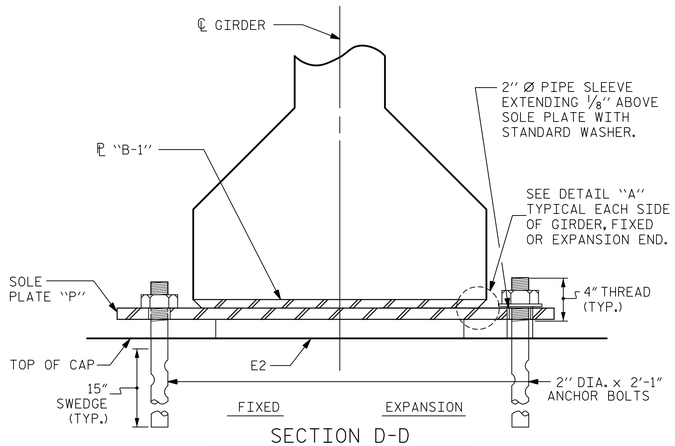
STD. NO. PCG10

ASSEMBLED BY : KHC		DATE : 11/2015
CHECKED BY : JCM		DATE : 11/2015
DRAWN BY : TLA 6/05	ADDED 10/21/05	
CHECKED BY : VC 6/05	REV. 5/1/06RRR	KMM/GM
	REV. 10/1/11	MAA/GM

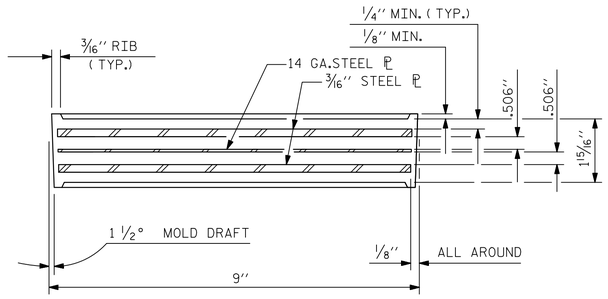
USER: kyle_compton
DGN: RKBridge 656\Cadd\40_039_U2707_SMU_S20_PCG07.dgn
DATE: 1/12/2016
TIME: 9:24:55 AM



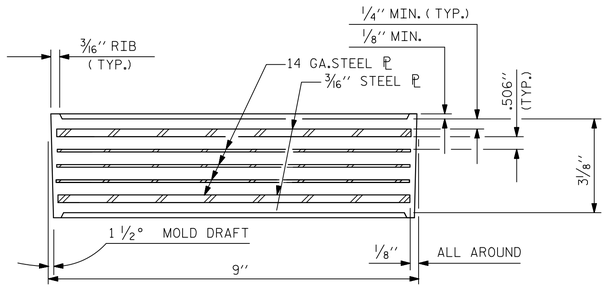
SECTION E-E



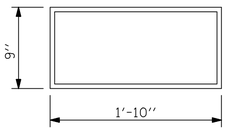
SECTION D-D



TYPICAL SECTION OF ELASTOMERIC BEARINGS



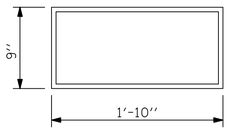
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (40 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

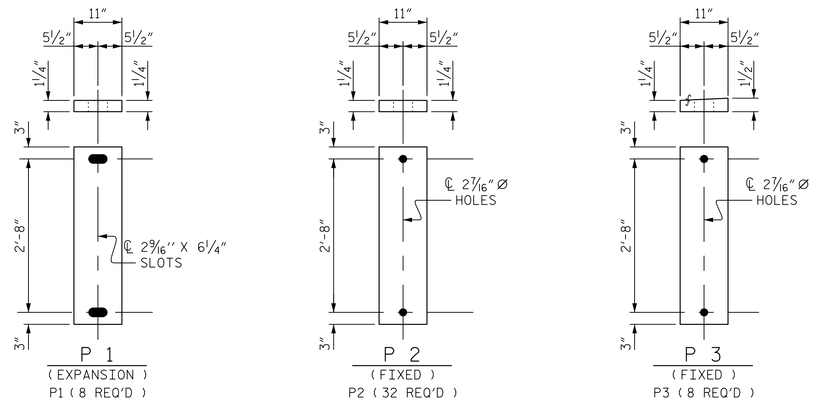
TYPE IV



E2 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

MODIFIED TYPE IV



UP-STATION

SOLE PLATE DETAILS (''P'')

NOTES

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

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

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

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

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

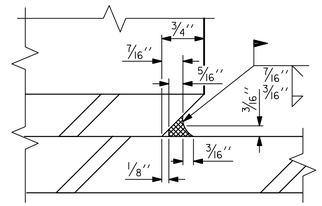
SOLE PLATE ''P'', BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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

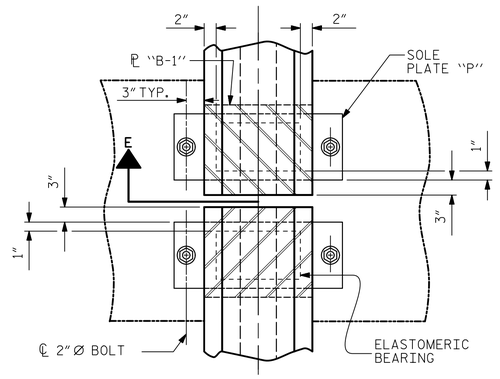
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

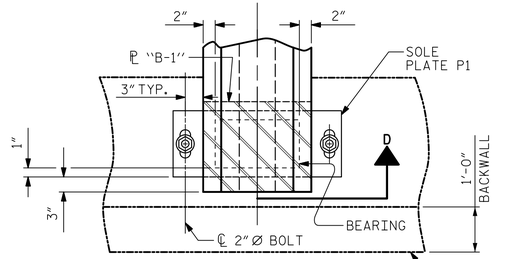


DETAIL ''A''



SECTION AT BENT

(FIXED)



SECTION AT END BENT

(EXPANSION)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE IV	225 k
MODIFIED TYPE IV	300 k

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

ASSEMBLED BY : KHC	DATE : 11/2015		
CHECKED BY : JCM	DATE : 11/2015		
DRAWN BY : WJH 8/89	REV. 10/1/11	MAA/CM	
CHECKED BY : CRK 8/89	REV. 6/13	AAC/MAA	
	REV. 1/15	MAA/TMG	

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-21
1			3			TOTAL SHEETS
2			4			86

STD. NO. EB3 (Snt. 3)

DATE: 1/12/2016
TIME: 9:24:58 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cadd\400_DM_U2707_SMU_S2_BR656.dgn

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPANS A, C, & D GIRDERS 1 & 4										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.102	0.140	0.164	0.172	0.164	0.140	0.102	0.054	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.031	0.061	0.085	0.100	0.106	0.100	0.085	0.061	0.031	0.000
FINAL CAMBER ↑	0	1/4	1/2	11/16	3/4	13/16	3/4	11/16	1/2	1/4	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPANS A, C, & D GIRDERS 2 & 3										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.054	0.102	0.140	0.164	0.172	0.164	0.140	0.102	0.054	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.034	0.067	0.093	0.109	0.115	0.109	0.093	0.067	0.034	0.000
FINAL CAMBER ↑	0	1/4	7/16	9/16	11/16	11/16	11/16	9/16	7/16	1/4	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPAN B GIRDERS 1 & 4										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.018	0.035	0.047	0.056	0.058	0.056	0.047	0.035	0.018	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.006	0.012	0.017	0.020	0.021	0.020	0.017	0.012	0.006	0.000
FINAL CAMBER ↑	0	1/8	1/4	3/8	7/16	7/16	7/16	3/8	1/4	1/8	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPAN B GIRDERS 2 & 3										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.018	0.035	0.047	0.056	0.058	0.056	0.047	0.035	0.018	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.007	0.013	0.019	0.022	0.023	0.022	0.019	0.013	0.007	0.000
FINAL CAMBER ↑	0	1/8	1/4	5/16	3/8	7/16	3/8	5/16	1/4	1/8	0

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPAN E & F GIRDERS 1 & 4										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.021	0.039	0.054	0.063	0.066	0.063	0.054	0.039	0.021	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.011	0.023	0.032	0.037	0.039	0.037	0.032	0.023	0.011	0.000
FINAL CAMBER ↑	0	3/16	1/4	5/16	5/16	5/16	1/4	3/16	1/8	0	

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″DIA. LOW-RELAXATION	SPAN E & F GIRDERS 2 & 3										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.021	0.039	0.054	0.063	0.066	0.063	0.054	0.039	0.021	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.012	0.025	0.035	0.041	0.043	0.041	0.035	0.025	0.012	0.000
FINAL CAMBER ↑	0	1/8	3/16	1/4	1/4	1/4	1/4	1/4	3/16	1/8	0

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

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 039674 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
DEAD LOAD DEFLECTIONS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS
2			4			86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

NOTES:

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

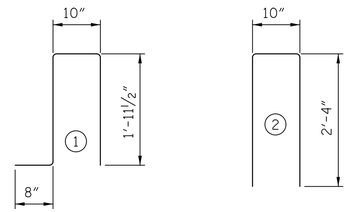
ALL REINFORCING STEEL IN PARAPET RAILS SHALL BE EPOXY COATED.

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

FOR PLAN AND DETAILS OF PARAPET AND END POSTS, SEE "CONCRETE PARAPET AND END POST DETAILS" SHEET.

FOR CONCRETE PARAPET AND END POST DETAILS ON APPROACH SLAB, SEE "BRIDGE APPROACH SLAB DETAILS" SHEET 2 OF 2.

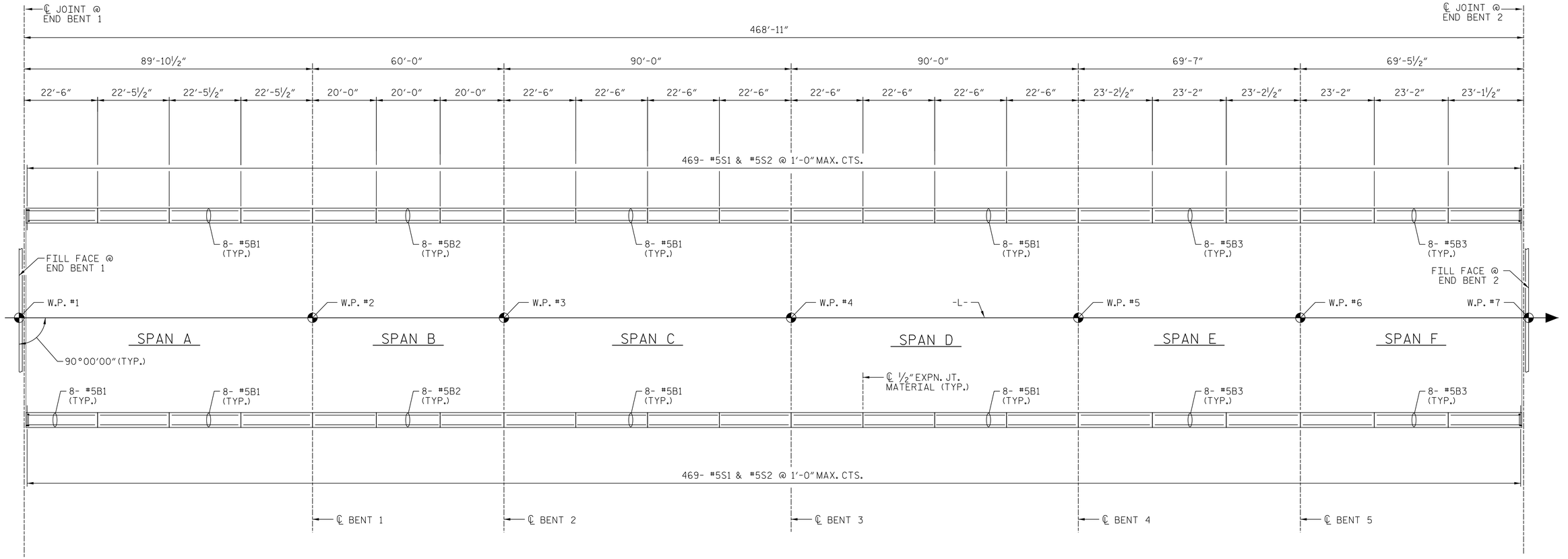
BAR TYPES

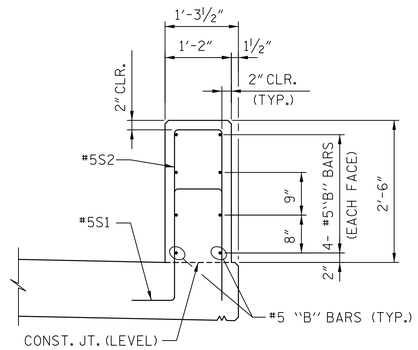


ALL BAR DIMENSIONS ARE OUT TO OUT.

TWO BAR METAL RAIL
BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳B1	192	#5	STR	22'-2"	4439
✳B2	48	#5	STR	19'-8"	985
✳B3	96	#5	STR	22'-10"	2286
✳S1	938	#5	①	5'-5"	5299
✳S2	938	#5	②	5'-6"	5381
✳EPOXY COATED REINFORCING STEEL				LBS.	18390
CLASS AA CONCRETE				C.Y.	101.3
1'-2" x 2'-6" CONCRETE PARAPET				L.F.	937.8





SECTION THRU PARAPET

PLAN OF PARAPET REINFORCING

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE PARAPET RAIL

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

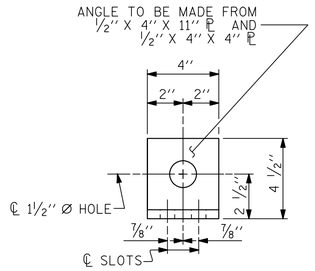
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-23
1			3			TOTAL SHEETS
2			4			86

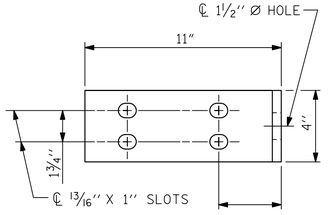
DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DATE: 1/12/2016
TIME: 9:25:04 AM

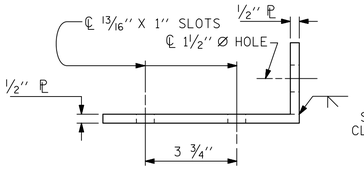
USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_DAS_U2707_SMU_S23_CP.dgn



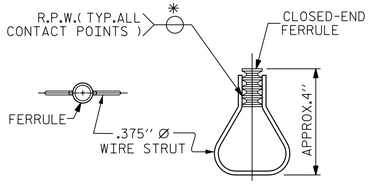
END VIEW (FIX AND EXP.)



ELEVATION



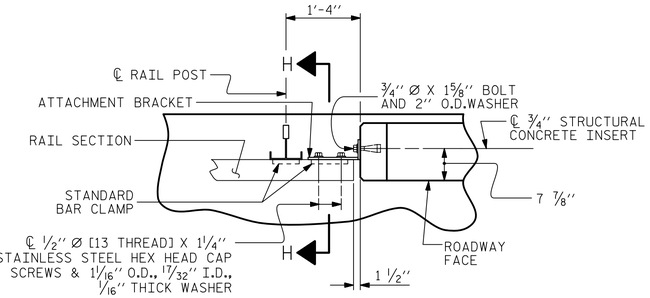
TOP VIEW



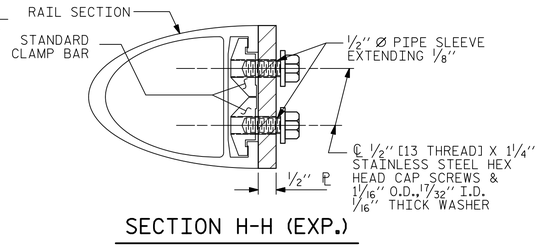
PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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



PLAN - RAIL AND END POST



SECTION H-H (EXP.)

EXPANSION

DETAILS FOR ATTACHING METAL RAIL TO END POST

NOTES

STRUCTURAL CONCRETE INSERT

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

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

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

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

NOTES

METAL RAIL TO END POST CONNECTION

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

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

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

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

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

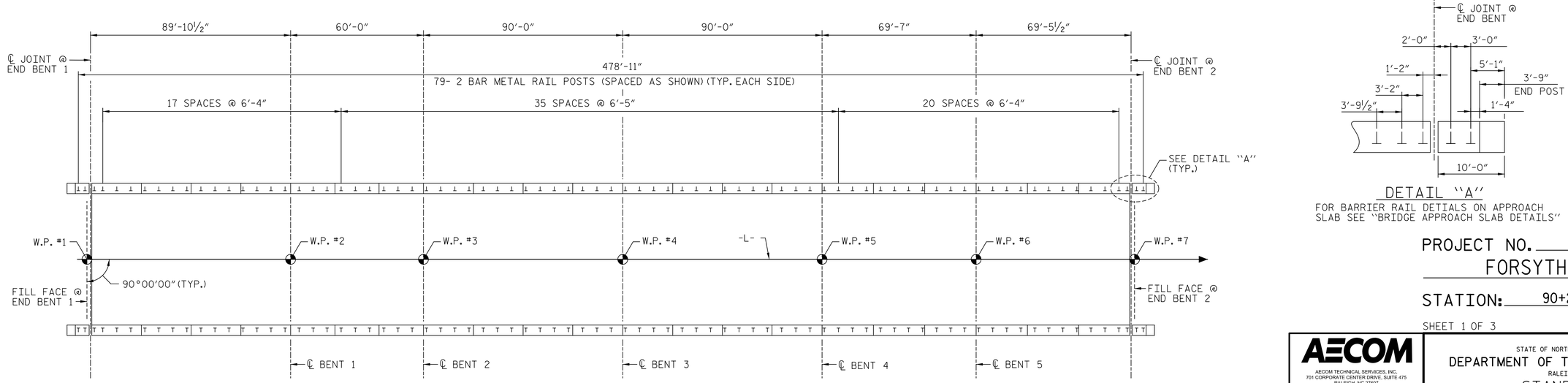
E. ½'' Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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

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

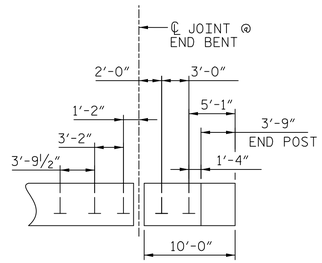
THE COST OF THE ¾'' STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE ½'' PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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



SPAN A SPAN B SPAN C SPAN D SPAN E SPAN F

PLAN OF RAIL POST SPACINGS



DETAIL ''A''

FOR BARRIER RAIL DETIALS ON APPROACH SLAB SEE ''BRIDGE APPROACH SLAB DETAILS''

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS
FOR ONE OR TWO BAR METAL RAILS

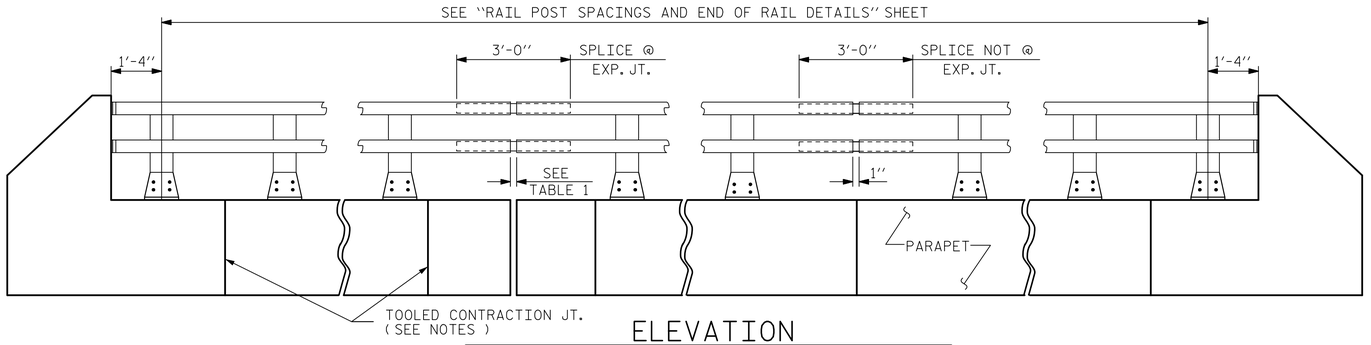
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-24
1			3			TOTAL SHEETS
2			4			86

STD. NO. BMR2

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : FCJ 1/88	REV. 5/7/03	RWW/JTE	
CHECKED BY : CRK 3/89	REV. 5/1/06	TLA/GM	
	REV. 10/1/11	MAA/GM	

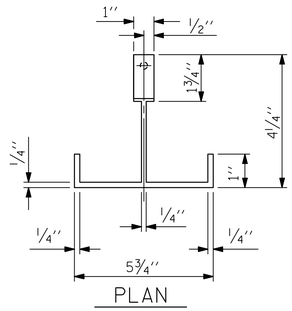
USER: kyle.compton
DGN: R:\Bridge 656\Cadd\400_DAT_U2707_SMU_S24_BMR10.dgn
DATE: 1/12/2016
TIME: 9:25:08 AM



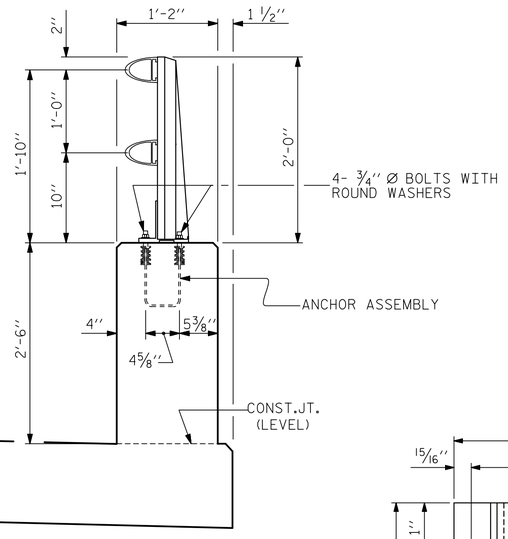
ELEVATION

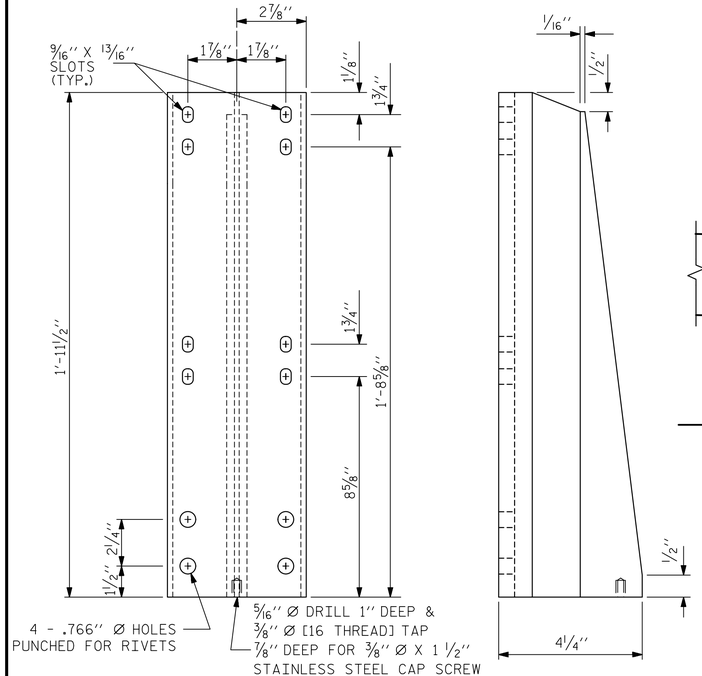
NOTE : FOR ATTACHMENT OF METAL RAIL TO END POST, SEE STANDARD NO. BMR2.

TABLE 1	
℄ EXP. JT. @	RAIL OPENING
END BENT 1	2"
END BENT 2	2"



PLAN

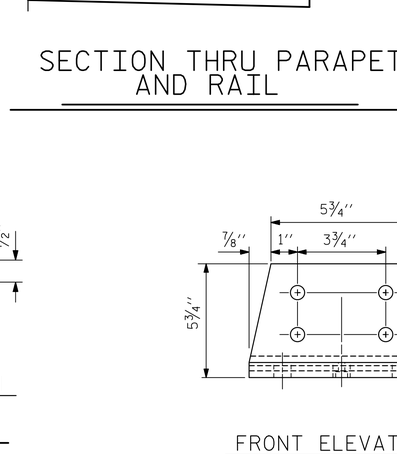


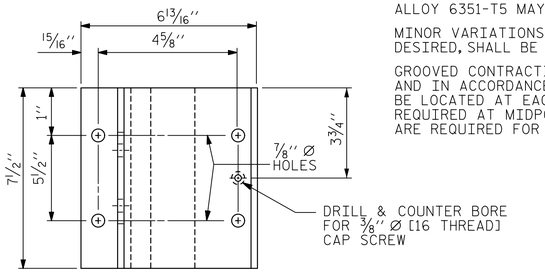


FRONT ELEVATION

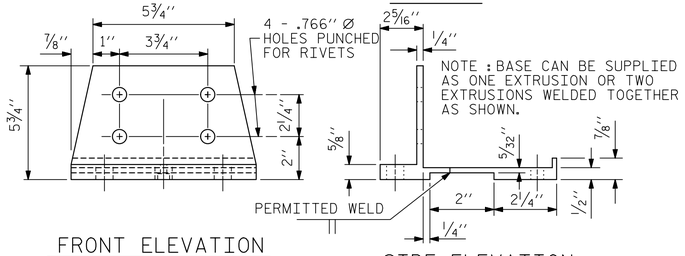
SIDE ELEVATION

DETAILS OF POST





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 LRFDBRIDGE DESIGN SPECIFICATIONS AND MUST BE LISTED ON THE DEPARTMENT'S APPROVED PRODUCTS LIST (APL) UNDER "2 BAR METAL RAIL ALTERNATE". ADJUSTMENTS TO THE CONCRETE PARAPET WILL NOT BE ALLOWED.

ALUMINUM RAILS

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

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

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

GENERAL NOTES

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

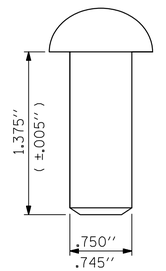
SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

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

PAY LENGTH = 962.8 LIN. FT.



RIVET DETAIL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-25
1			3			TOTAL SHEETS
2			4			86

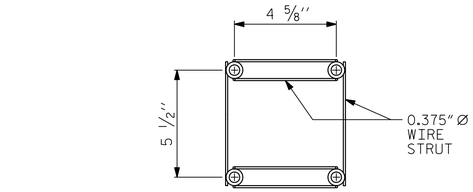
STD. NO. BMR3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : EEM 6/94	REV. 5/1/06	TLA/GM	
CHECKED BY : RGW 6/94	REV. 10/1/11	MAA/GM	
	REV. 6/13	MAA/GM	

DATE: 1/12/2016
TIME: 9:25:51 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\v40_L49_U2707_SMU_S25_ZBMR02.dgn



4-BOLT METAL RAIL ANCHOR ASSEMBLY

(158 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.

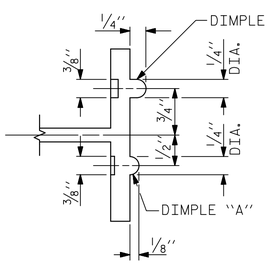
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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.

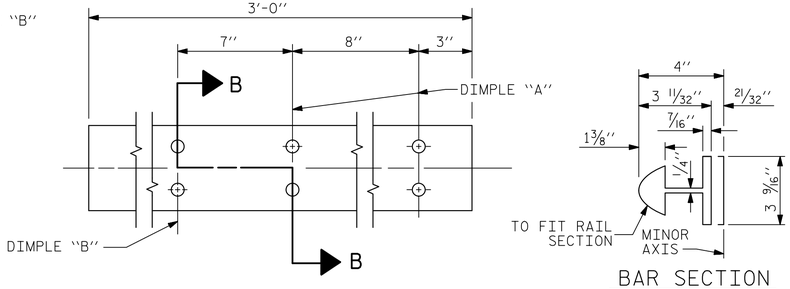
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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.

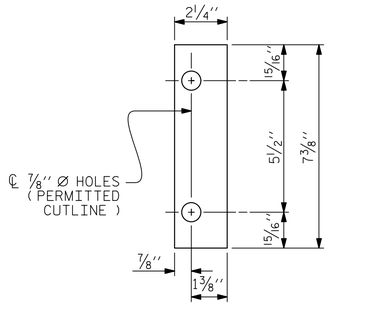


SECTION B - B

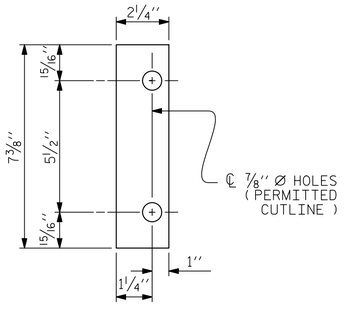


BAR SECTION

EXPANSION BAR DETAILS



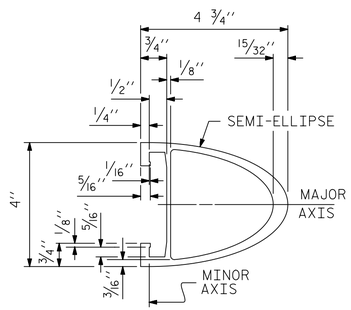
FRONT PLATE



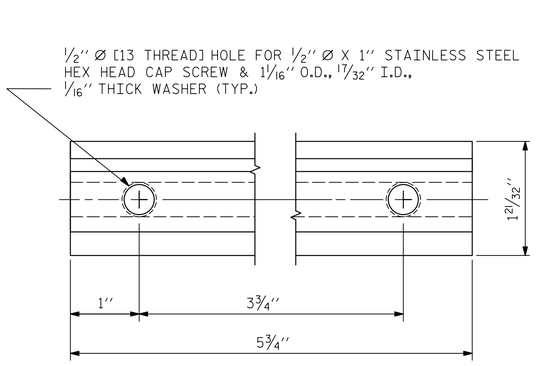
REAR PLATE

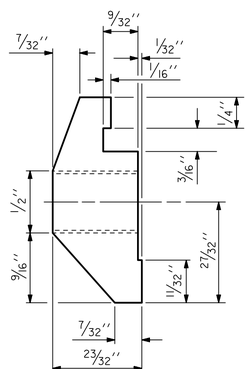
SHIM DETAILS

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



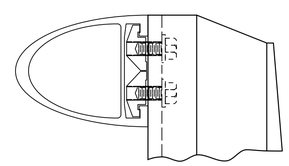
RAIL SECTION



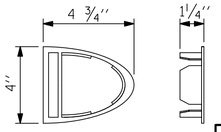


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

ASSEMBLED BY : KHC	DATE : 11/2015
CHECKED BY : JCM	DATE : 11/2015

DRAWN BY : EEM 6/94	REV. 8/16/99	MAB/LES
CHECKED BY : RGW 6/94	REV. 5/1/06R	KMM/GM
	REV. 10/1/11	MAA/GM

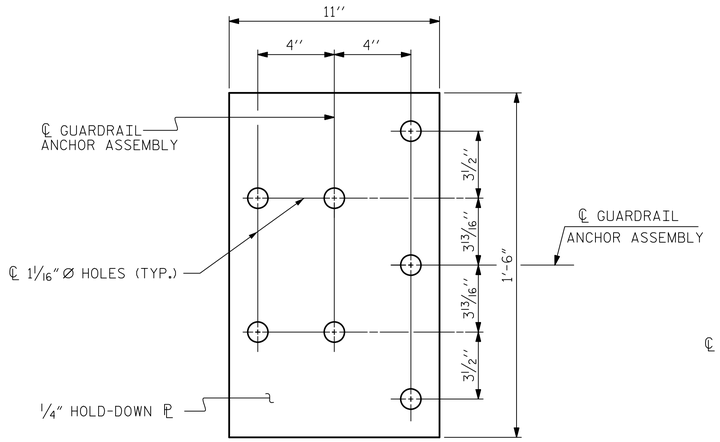
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

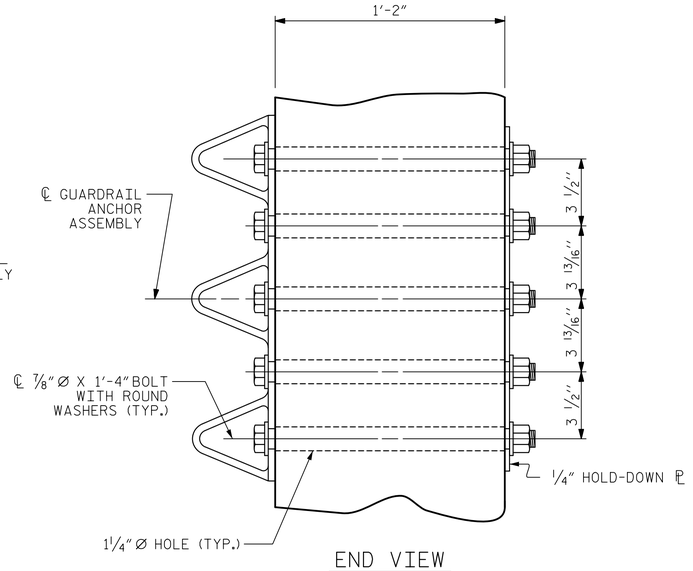
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			86

STD. NO. BMR4

DATE: 1/12/2016
TIME: 9:25:14 AM
USER: kyle.compton
DGN: RGNBridge 656\Cadd\401_051_U2707_SMU_S26_2BMR03.dgn



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.

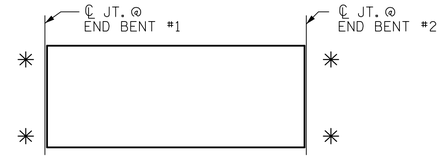
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

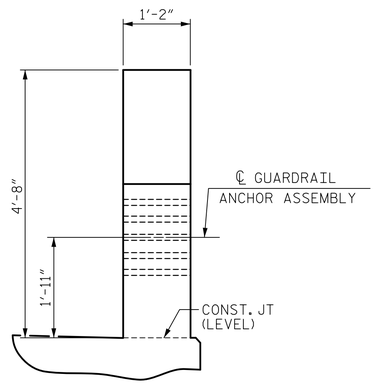
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE END POST TO CLEAR ASSEMBLY BOLTS.

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.

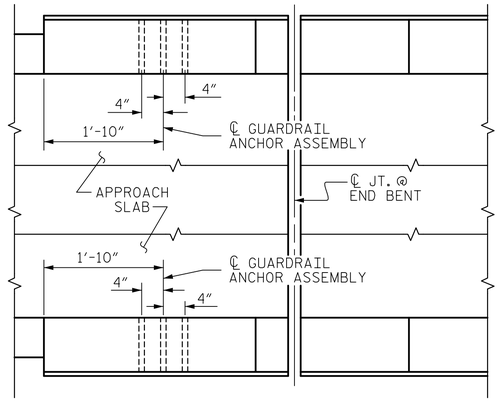


SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION OF GUARDRAIL ATTACHMENT



END VIEW
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-
BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

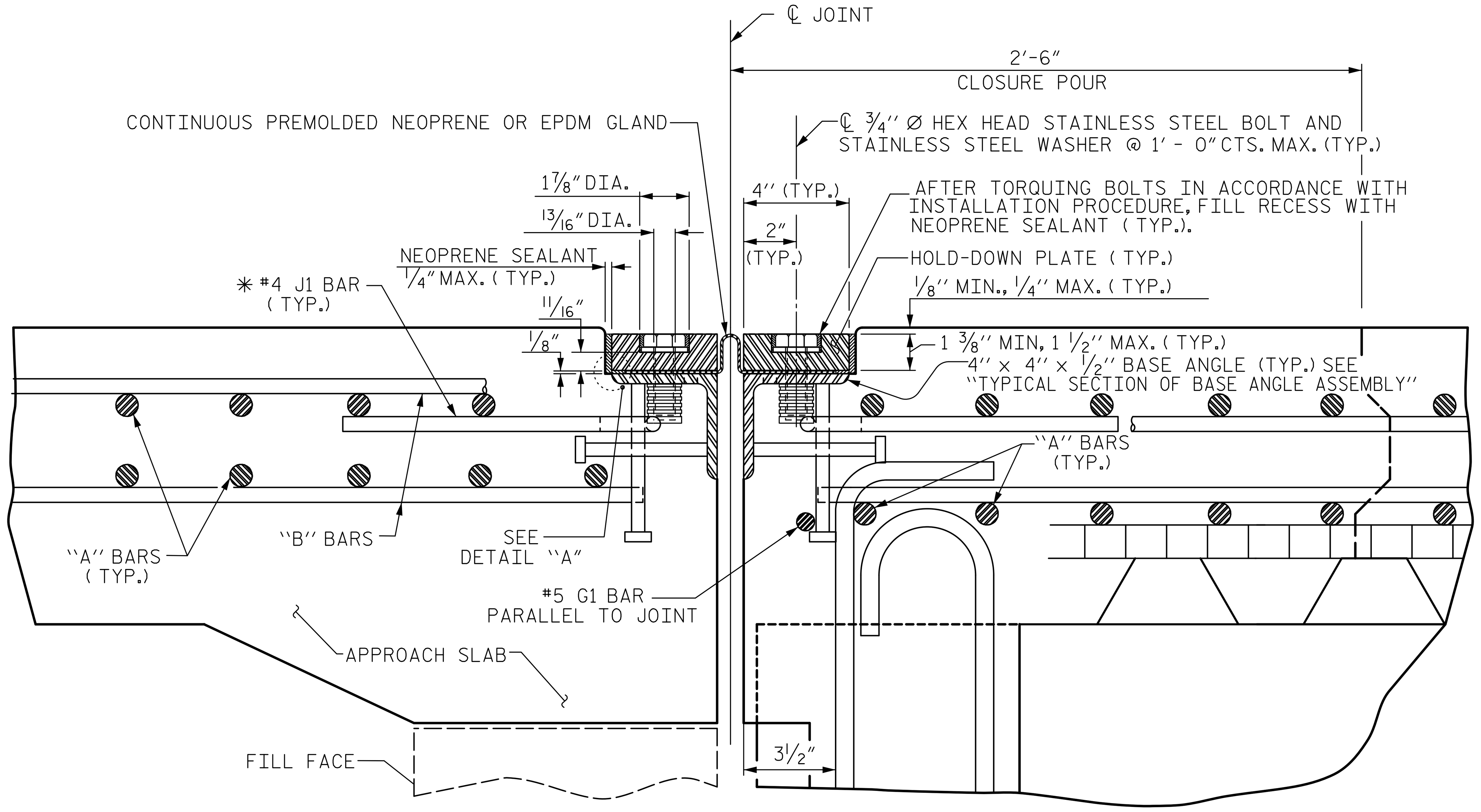
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			86

ASSEMBLED BY : KHC	DATE : 11/2015	
CHECKED BY : JCM	DATE : 11/2015	
DRAWN BY : MAA 5/10	REV. 12/5/11	MAA/GM
CHECKED BY : GM 5/10	REV. 6/13	MAA/GM
	REV. 1/15	MAA/TMG

STD. NO. GRA3 (Sht. 5)

DATE: 1/12/2016
TIME: 9:25:47 AM
USER: kyle.compton
DGN: R:\Bridge Eng\Coord\401_053_U2707_SMU_SGT_GRA3.dgn



EXPANSION JOINT DETAILS

SECTION NORMAL TO JOINT -- PRESTRESSED GIRDER SUPERSTRUCTURE

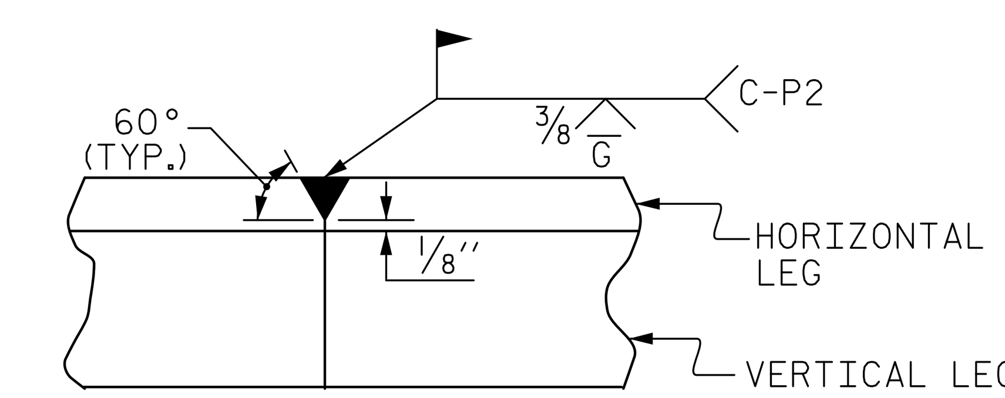
✱ THE QUANTITY OF #4 J1 BARS ON THE BILL OF MATERIAL IS BASED ON 1′-0″ CENTERS. J1 BARS SHALL BE PLACED AT EACH VERTICAL STUD ANCHOR BOLT. IN THE EVENT THAT THE NUMBER OF VERTICAL STUD ANCHORS EXCEEDS THE NUMBER OF J1 BARS SPECIFIED, ADDITIONAL J1 BARS WILL NOT BE REQUIRED.

INSTALLATION PROCEDURE

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

GENERAL NOTES

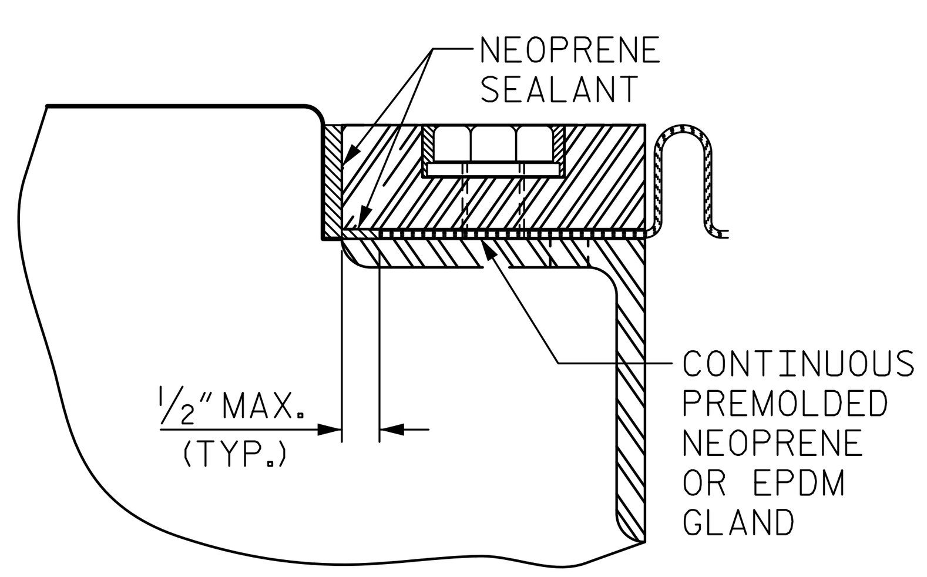
1. FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.
2. ALL PLATES AND ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL HOLD-DOWN BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL CONFORM TO ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS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



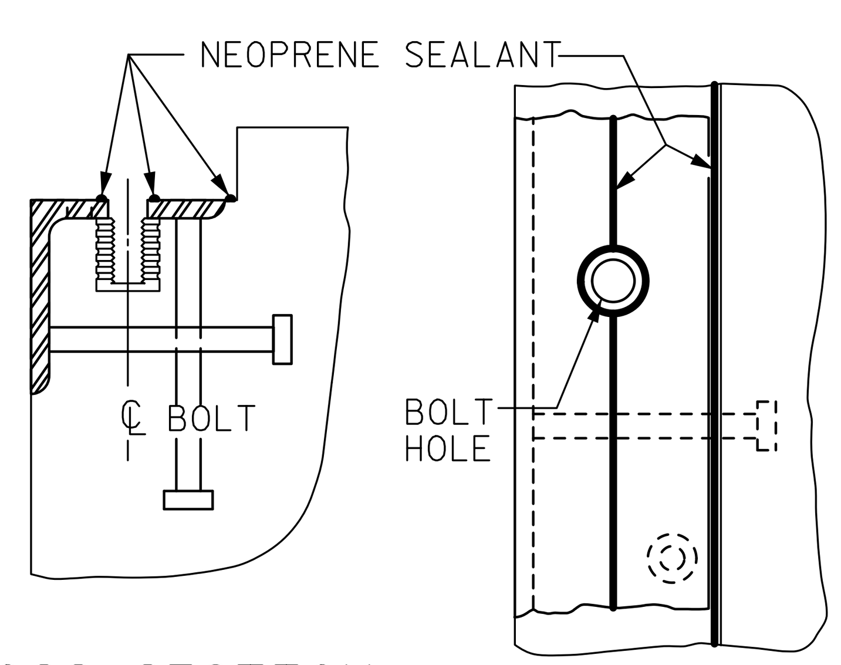
DETAIL- FIELD WELD SPLICE OF BASE ANGLE

MOVEMENT AND SETTING AT JOINT

END BENT NO.	SKEW ANGLE	TOTAL MOVEMENT (ALONG ℄ RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	90°00′00″	1 7/16″	2 1/16″	1 13/16″	1 1/4″
2	90°00′00″	1 7/16″	2 1/16″	1 13/16″	1 1/4″

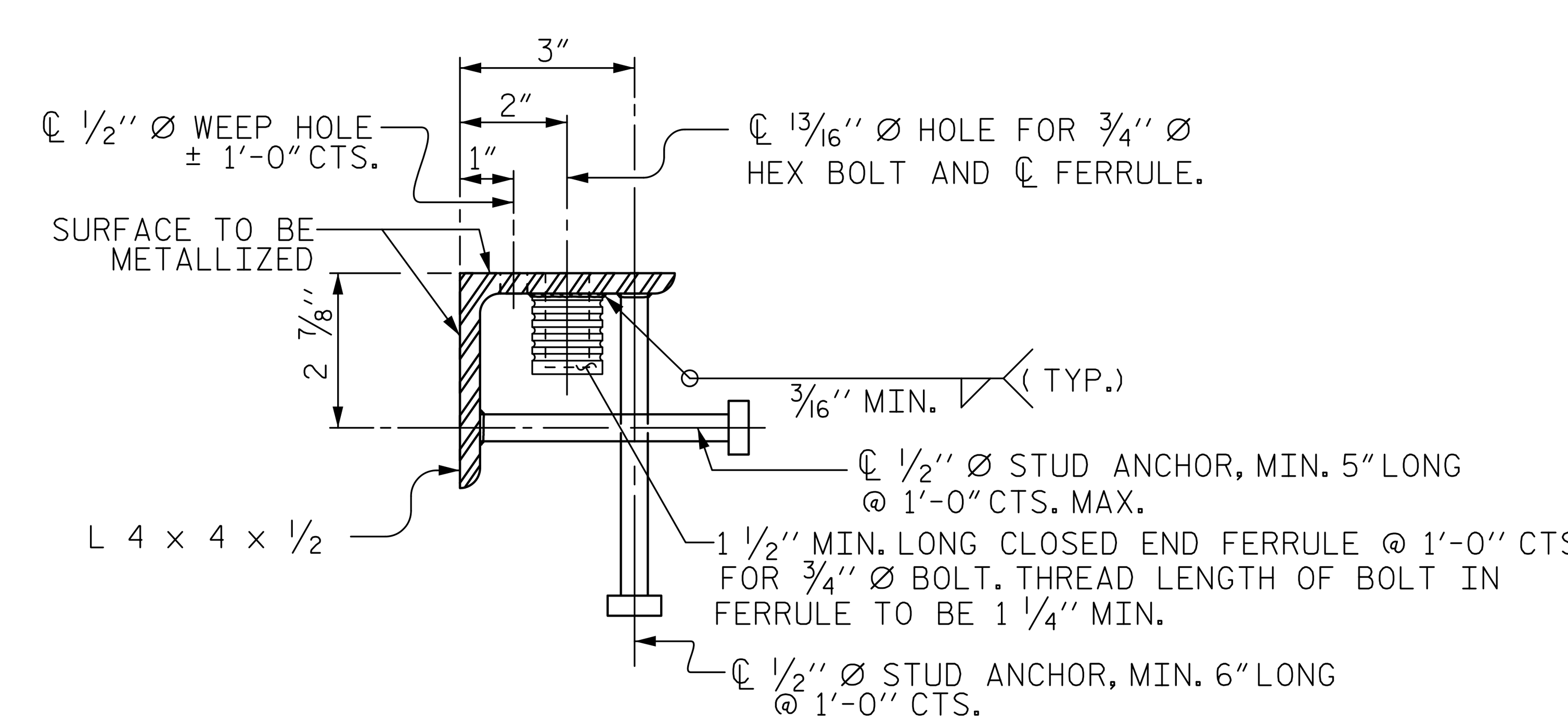


DETAIL "A"



CROSS SECTION   PLAN VIEW

INSTALLATION SKETCH



TYPICAL SECTION OF BASE ANGLE ASSEMBLY

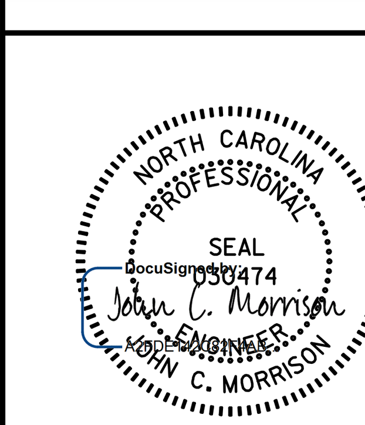
PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-
SHEET 1 OF 2   BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200   www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

EXPANSION JOINT SEAL DETAILS



1/12/2016

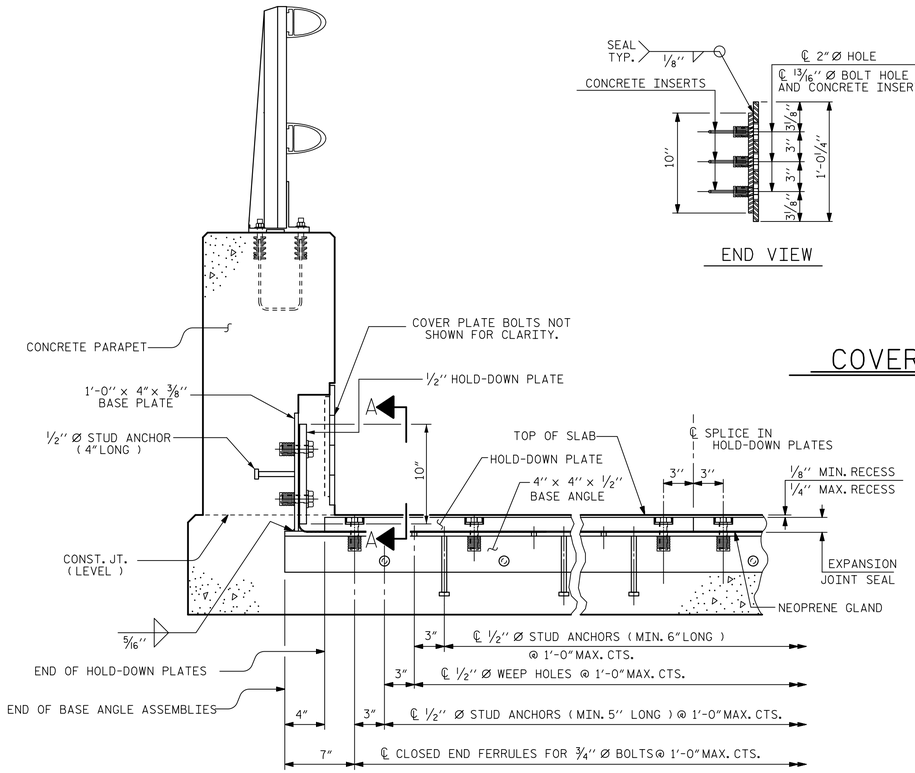
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S-28
TOTAL SHEETS 86

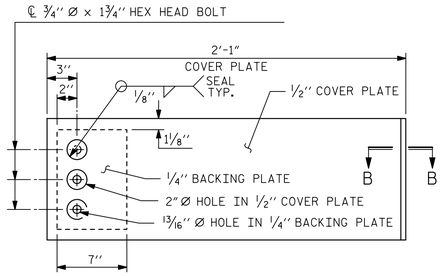
ASSEMBLED BY : KHC		DATE :	11/2015
CHECKED BY : JCM		DATE :	11/2015
DRAWN BY : REK 9/87	REV. 5/7/03R	RWW/JTE	
CHECKED BY : CRK 10/87	REV. 5/1/06R	TLA/GM	
	REV. 10/1/11	MAA/GM	

STD. NO. EJS1 (Sht.1a)



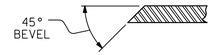
SECTION THRU RAIL NORMAL TO JOINT

END VIEW

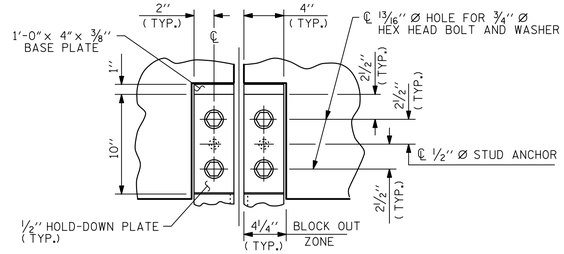


TYPE II - ELEVATION VIEW

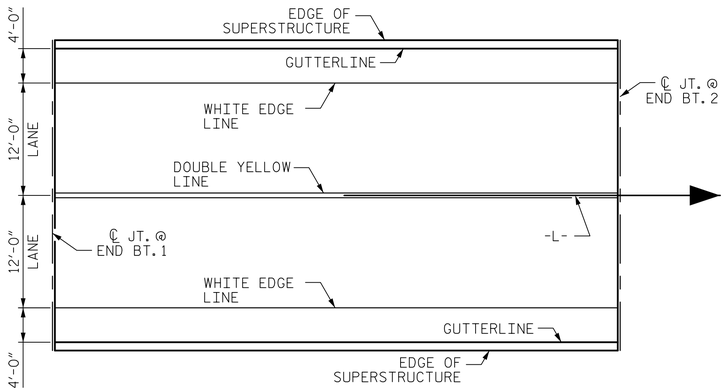
COVER PLATE DETAILS



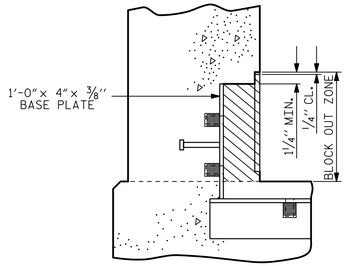
SECTION B - B



SECTION A - A

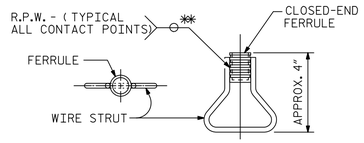


PAVEMENT MARKING ALIGNMENT



BLOCK OUT DETAIL

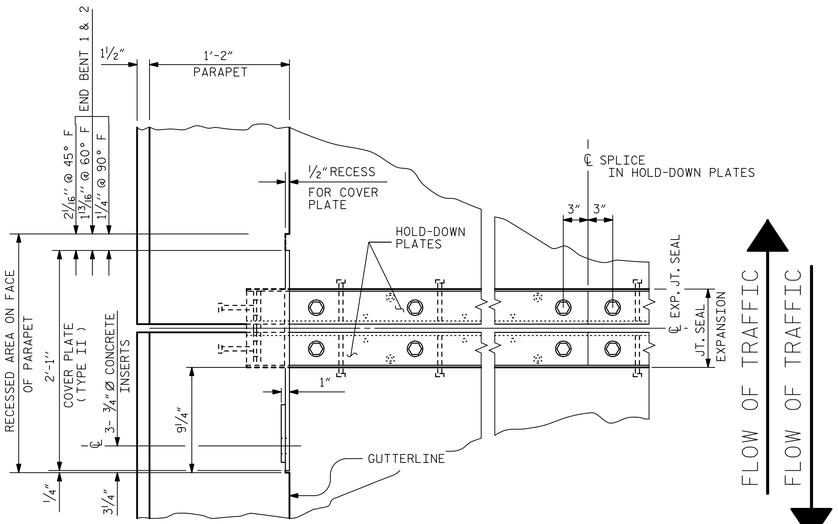
SEE " SECTION A - A " FOR OTHER DETAILS.



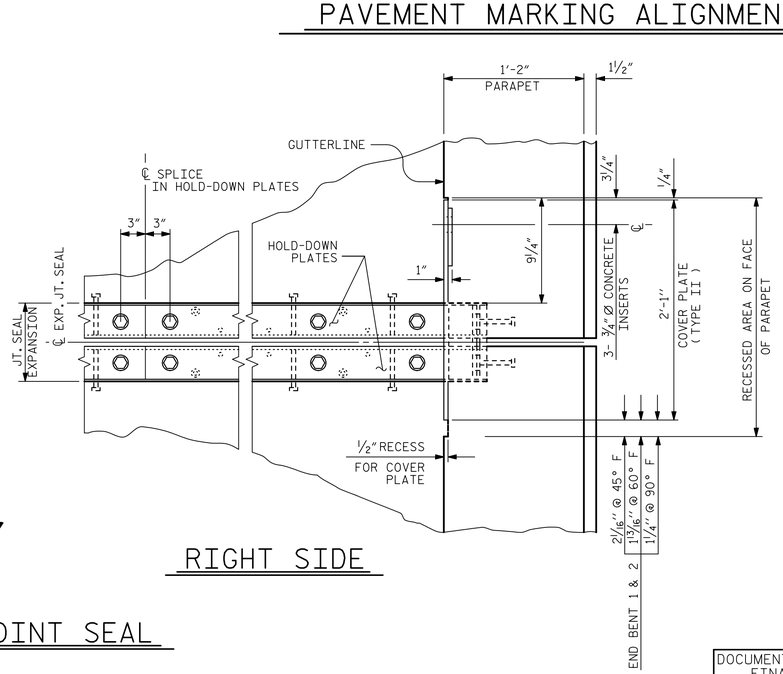
PLAN ELEVATION

CONCRETE INSERT

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



LEFT SIDE



RIGHT SIDE

PLAN OF EXPANSION JOINT SEAL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 2 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 030474 JOHN C. MORRISON ENGINEER
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

EXPANSION JOINT SEAL DETAILS FOR CONCRETE PARAPET RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-29
1			3			TOTAL SHEETS
2			4			86

DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:25:24 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_057_U2707_SMU_S29_E_IS02.dgn

REINFORCING BAR SCHEDULE

SPANS A THRU F

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	937	#5	STR	34′-3″	33472
A2	937	#5	STR	34′-3″	33472
A3E	1874	#5	⑤	7′-7″	14822
B1E	**75**	#4	STR	21′-3″	1065
B2	**369**	#5	STR	54′-0″	20783
B3E	**23**	#7	STR	55′-0″	2586
B4E	**22**	#7	STR	22′-6″	1012
B5E	**25**	#4	STR	18′-0″	301
B6E	**23**	#7	STR	55′-0″	2586
B7E	**22**	#7	STR	22′-6″	1012
B8E	**100**	#4	STR	16′-0″	1069
B9E	**46**	#7	STR	23′-9″	2233
B10E	**45**	#7	STR	27′-0″	2483
B11E	**23**	#7	STR	58′-0″	2727
B12E	**22**	#7	STR	24′-0″	1079
B13E	**25**	#4	STR	21′-7″	360
B14E	**23**	#7	STR	52′-0″	2445
B15E	**22**	#7	STR	21′-0″	944
B16E	**50**	#4	STR	23′-8″	790
G1E	**2**	#5	STR	34′-3″	71
J1E	**64**	#4	⑤	1′-5″	61
K1E	**8**	#8	③	13′-2″	281
K2E	**8**	#8	①	20′-4″	434
K3	**12**	#4	STR	7′-3″	58
K4	**60**	#4	STR	7′-3″	291
K5	**30**	#4	STR	7′-9″	155
K6	**60**	#4	STR	8′-3″	331
K7	**30**	#4	STR	5′-7″	112
K8	**30**	#4	STR	28′-1″	563
S1E	**48**	#5	④	6′-0″	300
S2	**825**	#4	②	2′-9″	1516
U1	**105**	#4	①	15′-2″	1064
U2	**60**	#4	①	13′-6″	541
REINFORCING STEEL					58886
EPOXY COATED REINFORCING STEEL					72133

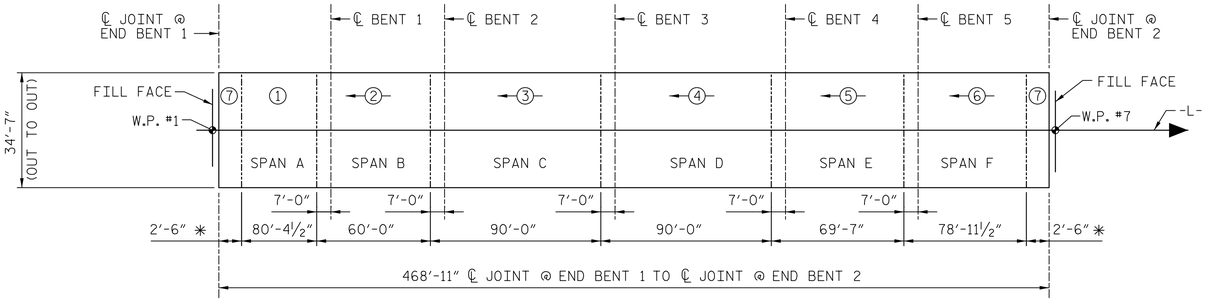
"E" DENOTES EPOXY COATED REINFORCING STEEL.

REINFORCED CONCRETE DECK CLASS AA CONCRETE POUR BREAKDOWN

POUR #1	87.8 CU. YDS.
POUR #2	75.5 CU. YDS.
POUR #3	108.3 CU. YDS.
POUR #4	108.3 CU. YDS.
POUR #5	86.0 CU. YDS.
POUR #6	90.7 CU. YDS.
POUR #7	8.1 CU. YDS.
TOTALS	564.7 CU. YDS.

GROOVING BRIDGE FLOORS

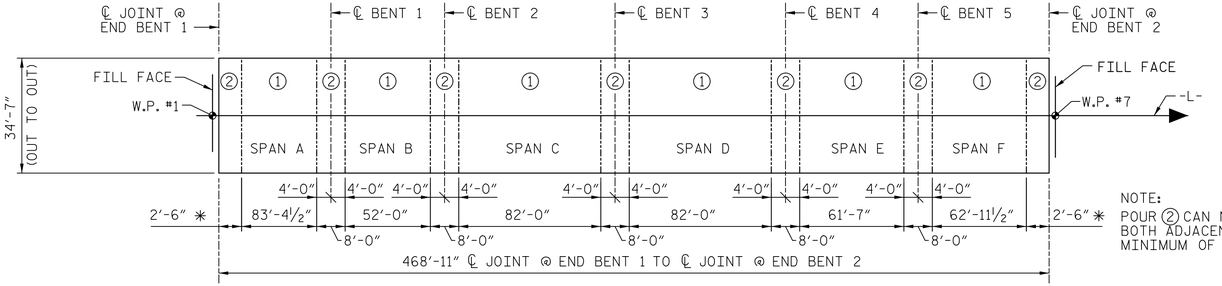
APPROACH SLABS	1,382	SQ.FT.
BRIDGE DECK	13,574	SQ.FT.
TOTAL	14,956	SQ.FT.



SKETCH SHOWING LOCATION OF TRANSVERSE CONSTRUCTION JOINTS AND ORDER OF POURS

—○— INDICATES POUR NUMBER AND DIRECTION

✱ CLOSURE POUR, SEE "STANDARD EXPANSION JOINT SEAL DETAILS" SHEET.

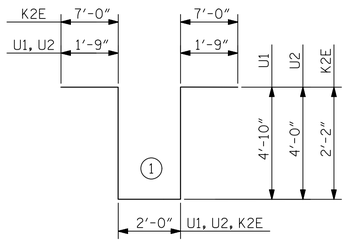


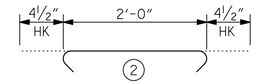
NOTE:
POUR ② CAN NOT BE STARTED UNTIL BOTH ADJACENT ① POURS REACH A MINIMUM OF 3000 PSI.

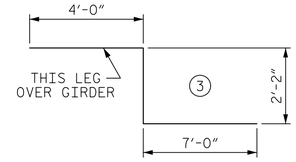
SKETCH SHOWING OPTIONAL LOCATION OF TRANSVERSE CONSTRUCTION JOINTS AND ORDER OF POURS

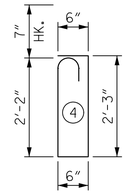
○ INDICATES POUR NUMBER

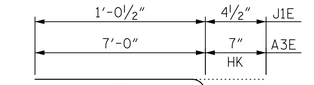
BAR TYPES











ALL BAR DIMENSIONS ARE OUT TO OUT

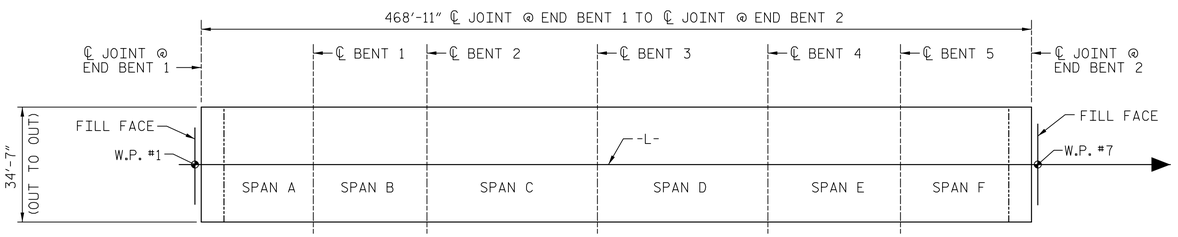
SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
TOTALS✱✱	564.7	58886	72133

✱✱ QUANTITIES FOR CONCRETE PARAPET ARE NOT INCLUDED

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

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



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FT. = 16,217)

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SUPERSTRUCTURE BILL OF MATERIAL

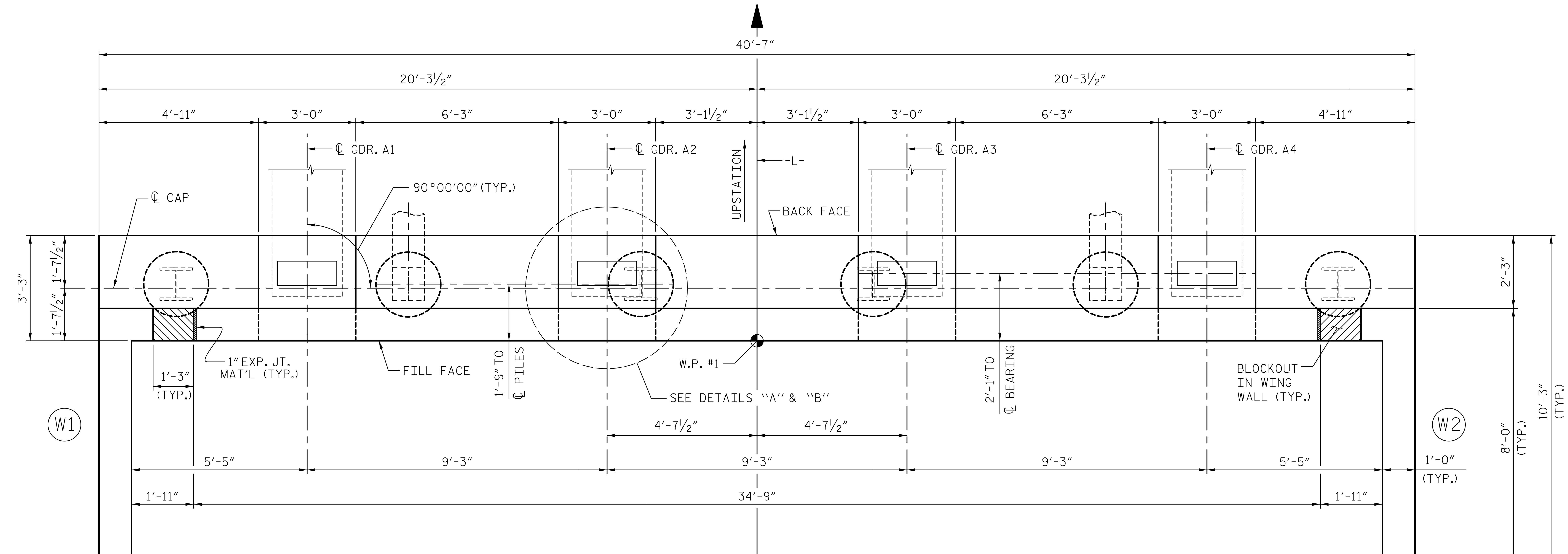
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			TOTAL SHEETS
2			4			86

STD. NO. BOM1

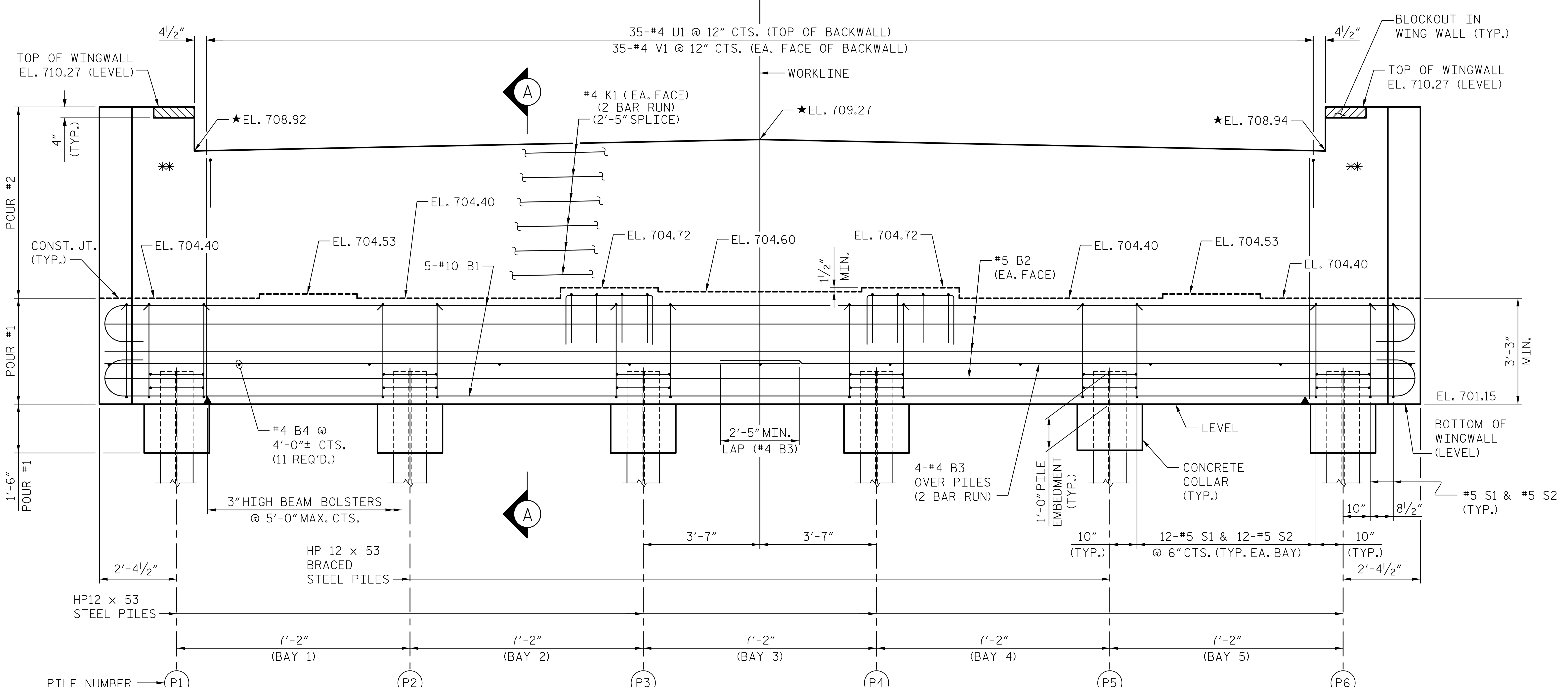
ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : JMB 5/87	REV. 8/16/99		RWW/LES
CHECKED BY : SJD 9/87	REV. 5/1/06		TLA/GM
	REV. 10/1/11		MAA/GM

DATE: 1/12/2016
TIME: 9:25:29 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_059_U2707_SMU_S30_BOM.dgn



PLAN



ELEVATION

NOTES:

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

FOR SECTION A-A, SEE END BENT 1, SHEET 3 OF 3.

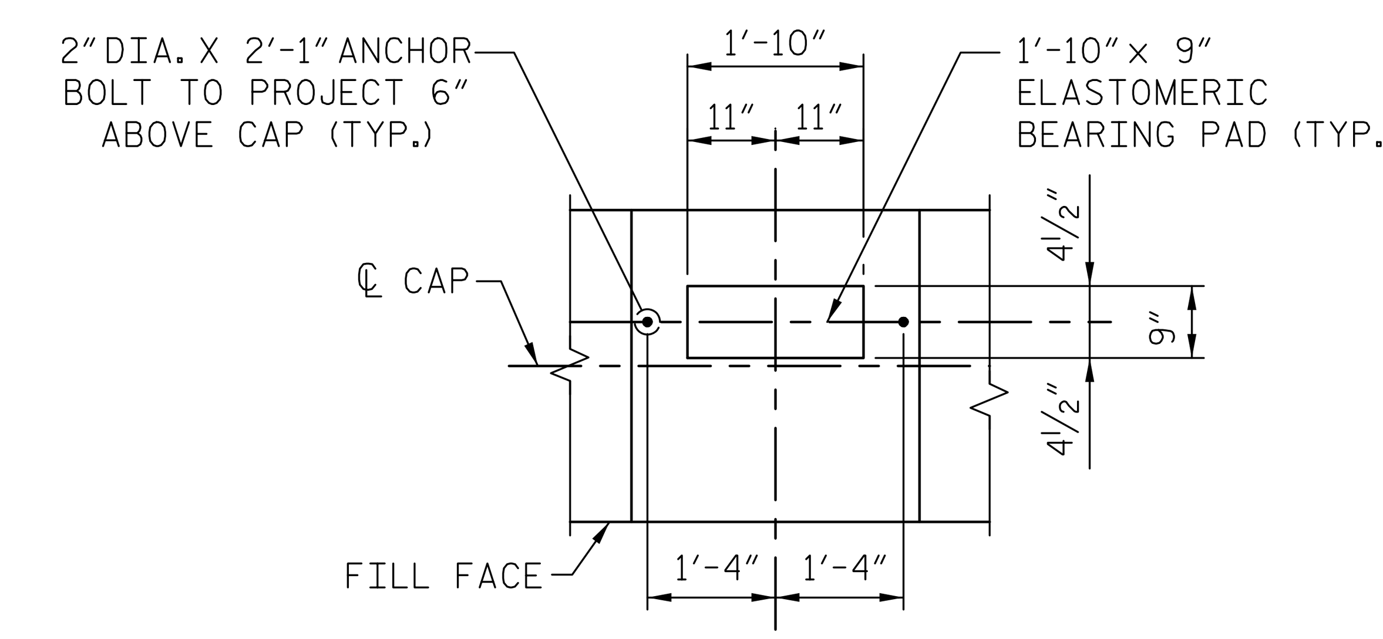
FOR DETAILS OF LOWER WINGWALLS AND REINFORCING STEEL, SEE END BENT 1, SHEET 2 OF 3.

FOR TEMPORARY DRAINAGE DETAILS, SEE END BENT 1, SHEET 3 OF 3.

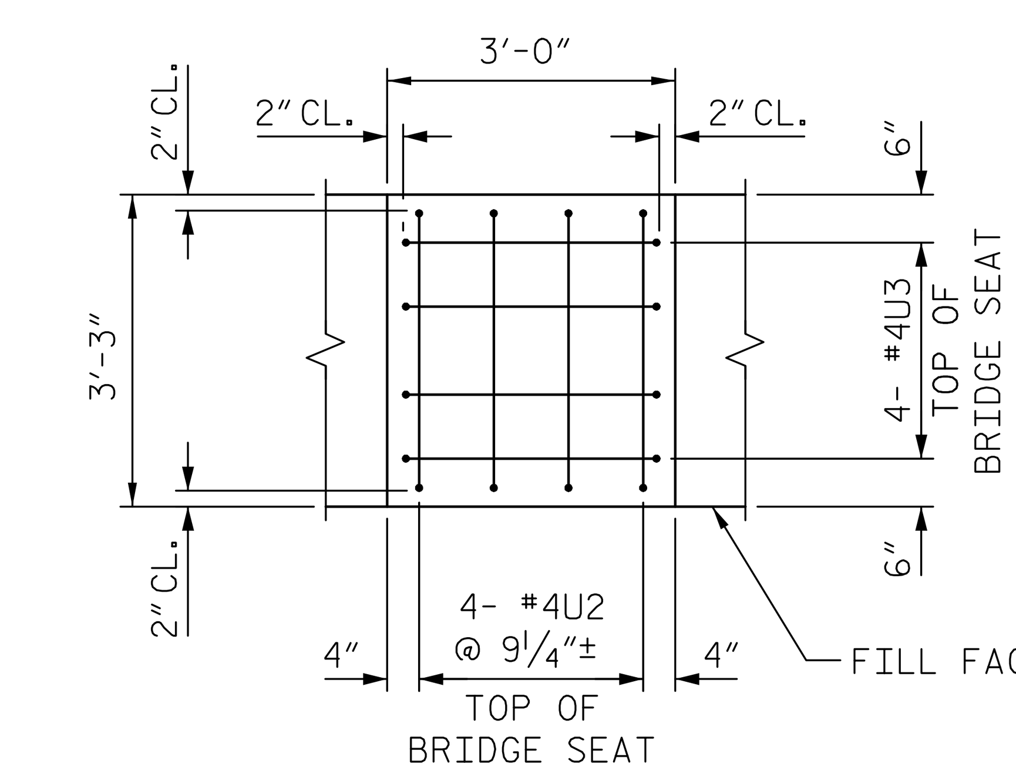
FOR BLOCKOUT IN WINGWALL DETAIL, SEE END BENT 1, SHEET 3 OF 3.

★ THIS ELEVATION TAKEN ON FILL FACE OF THE BACKWALL

⁂ REINFORCING IN WING NOT SHOWN FOR CLARITY. FOR DETAIL, SEE END BENT 1, SHEET 2 OF 3.



DETAIL "A"



DETAIL "B"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 3 BRIDGE NO. 656

AECOM

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1
PLAN AND ELEVATION

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

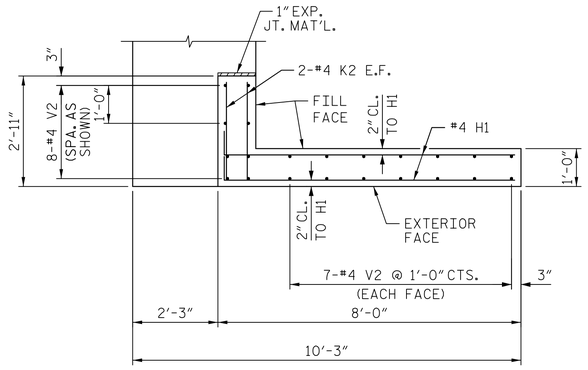
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:

SHEET NO. S-31

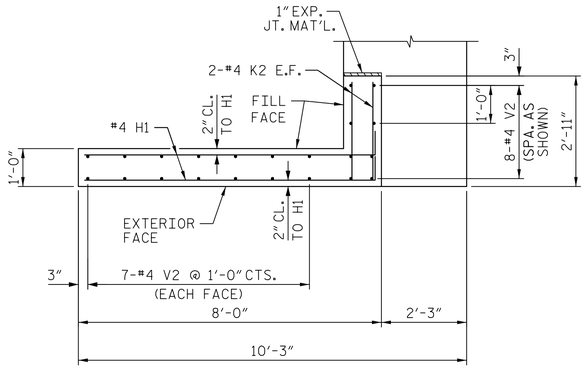
TOTAL SHEETS 86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

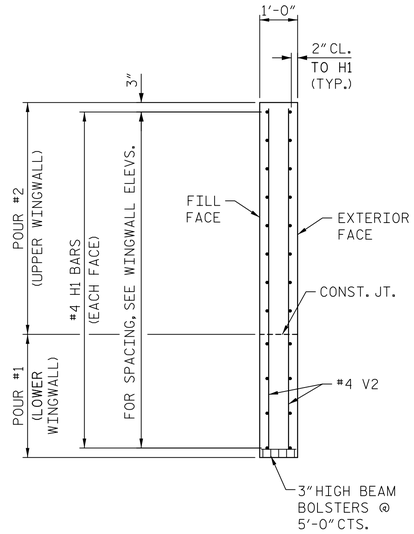
DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



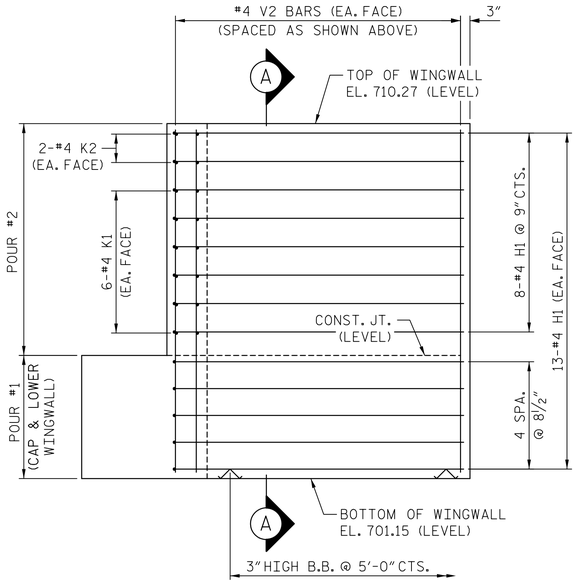
PLAN - WINGWALL 1



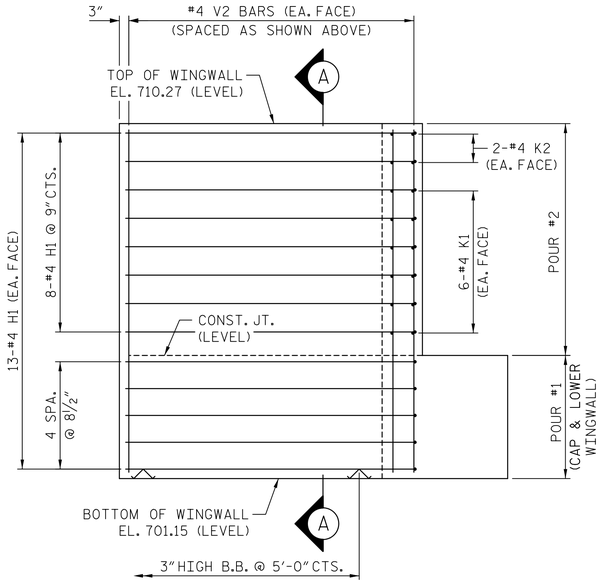
PLAN - WINGWALL 2



SECTION "A-A"



ELEVATION - WINGWALL 1



ELEVATION - WINGWALL 2

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 1
DETAILS

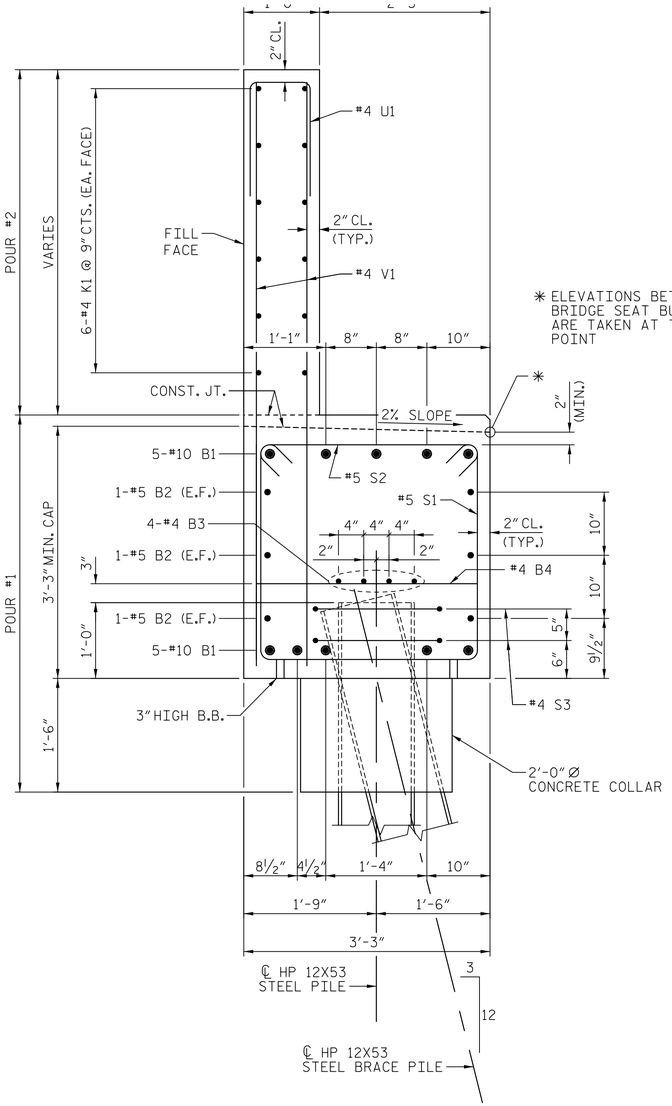
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-32
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

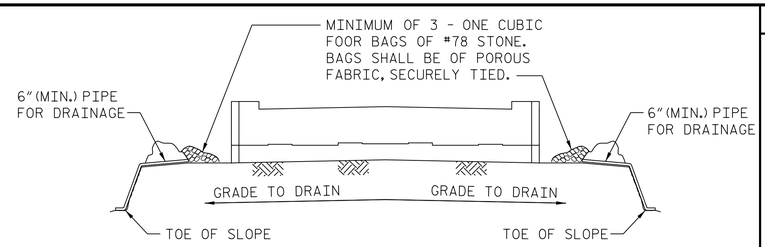
DATE: 1/12/2016
TIME: 9:25:38 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_063_U2707_SMU_S32_EB1_024.dgn



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

SECTION "A-A"

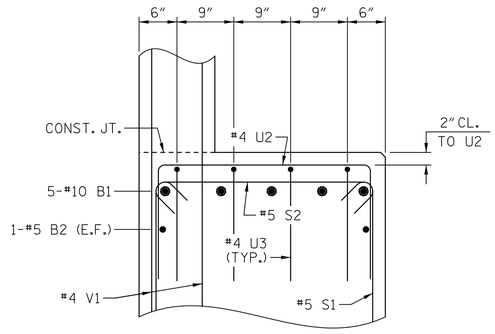


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

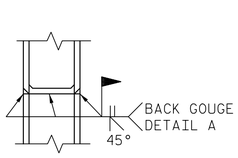
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

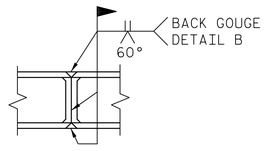
TEMPORARY DRAINAGE AT END BENT



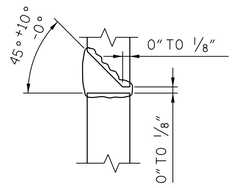
BRIDGE SEAT SECTION



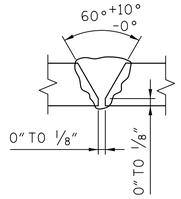
✳✳PILE VERTICAL



✳✳PILE HORIZONTAL OR VERTICAL



DETAIL A

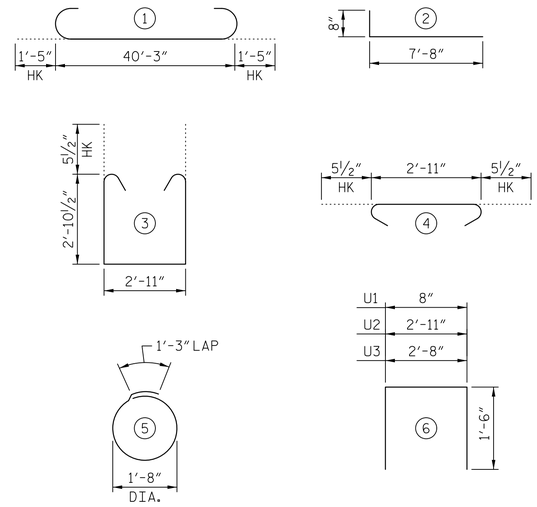


DETAIL B

✳✳POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	①	43'-1"	1854
B2	6	#5	STR	40'-3"	252
B3	8	#4	STR	21'-4"	114
B4	11	#4	STR	2'-11"	21
H1	52	#4	②	8'-4"	289
K1	24	#4	STR	21'-4"	342
K2	8	#4	STR	2'-7"	14
S1	64	#5	③	9'-7"	640
S2	64	#5	④	3'-10"	256
S3	12	#4	⑤	6'-6"	52
U1	35	#4	⑥	3'-8"	86
U2	8	#4	⑥	5'-11"	32
U3	8	#4	⑥	5'-8"	30
V1	70	#4	STR	7'-5"	347
V2	44	#4	STR	8'-9"	257

TOTAL REINFORCING STEEL 4586 LBS.

CLASS A CONCRETE

POUR #1 (CAP, COLLARS & LOWER WINGWALLS)	19.1 C.Y.
POUR #2 (BACKWALL & UPPER WINGWALL)	10.2 C.Y.
TOTAL =	29.3 C.Y.

HP 12x53 STEEL PILES:

NO. = 6 LIN. FT. = 210

NOTES:

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LOCATION SKETCH" SHEET.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE PARAPET AND END POST ARE CAST IF SLIP FORMING IS USED.

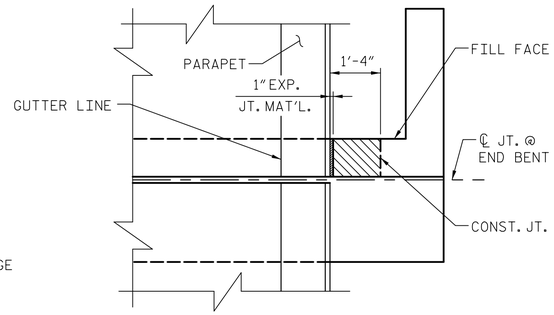
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

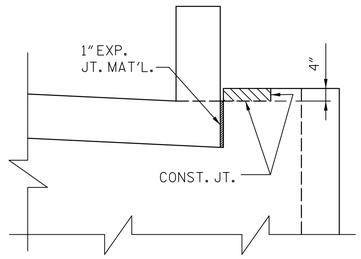
THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BRIDGE SEAT BUILDUPS, SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

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

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



PLAN



ELEVATION

BLOCKOUT IN WINGWALL DETAILS

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. P-0342

NORTH CAROLINA PROFESSIONAL SEAL 033674 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

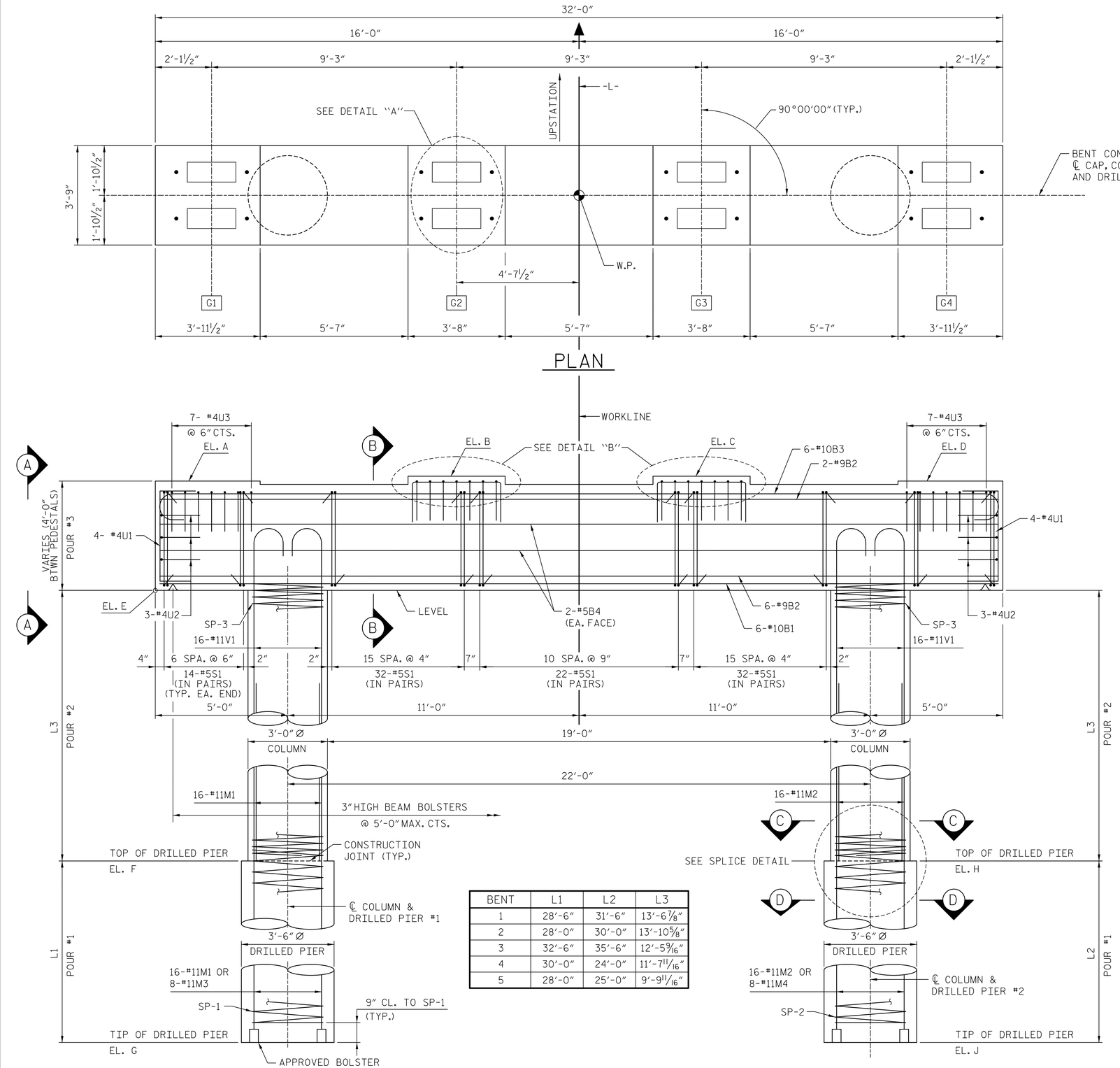
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE END BENT 1 SECTIONS AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
						TOTAL SHEETS 86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



ELEVATION

BENT	L1	L2	L3
1	28'-6"	31'-6"	13'-6⅞"
2	28'-0"	30'-0"	13'-10⅝"
3	32'-6"	35'-6"	12'-5⁹⁄₁₆"
4	30'-0"	24'-0"	11'-7¹¹⁄₁₆"
5	28'-0"	25'-0"	9'-9¹¹⁄₁₆"

NOTES:

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

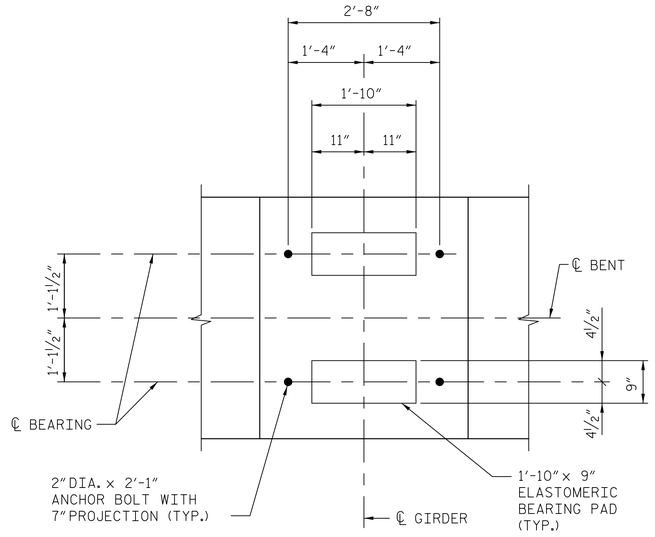
HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.

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

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

SPLICING OF THE LONGITUDINAL BARS IN THE DRILLED PIERS WILL NOT BE PERMITTED.

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



DETAIL "A"

ELEVATIONS									
BENT	EL. A	EL. B	EL. C	EL. D	EL. E	EL. F	EL. G	EL. H	EL. J
1	705.10	705.28	705.28	705.10	700.97	687.40	658.90	687.40	655.90
2	705.41	705.60	705.60	705.41	701.29	687.40	659.40	687.40	657.40
3	705.89	706.07	706.07	705.89	701.76	689.30	656.80	689.30	653.80
4	706.36	706.55	706.55	706.36	702.24	690.60	660.60	690.60	666.60
5	706.73	706.92	706.92	706.73	702.61	692.80	664.80	692.80	667.80

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 3 BRIDGE NO. 656

DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 035474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

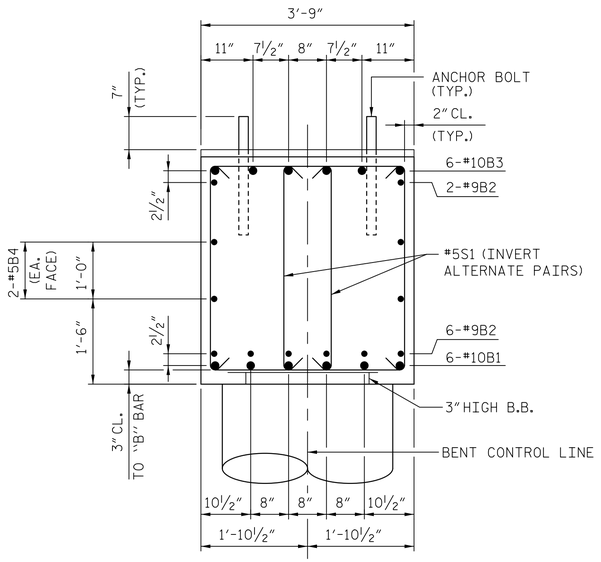
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENTS 1 THRU 5

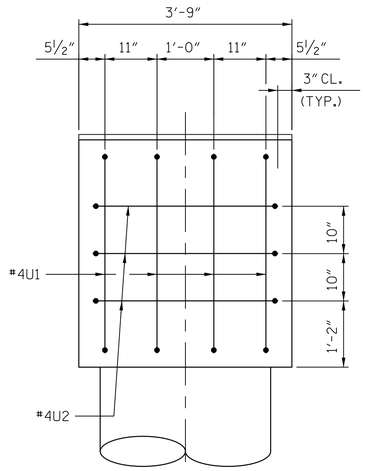
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-34
						TOTAL SHEETS
						86

DATE: 1/12/2016
TIME: 9:25:50 AM

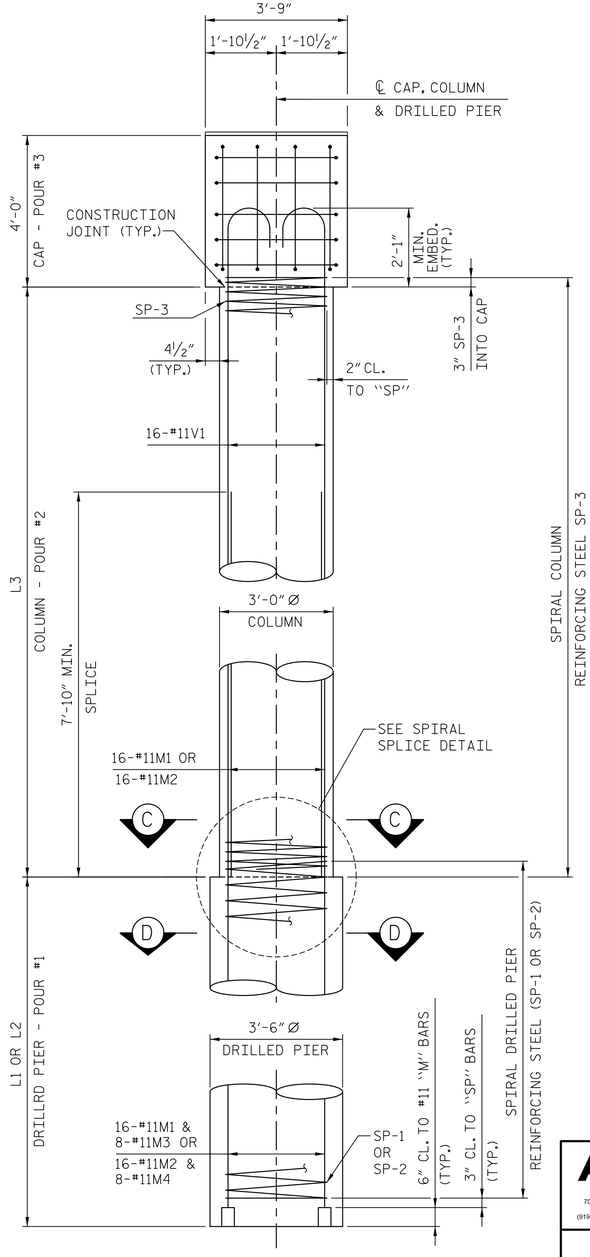
USER: kyle.compton
DGN: RdbridgeE56b\cad\401_067_U2707_SMU_S34_BT01.dgn



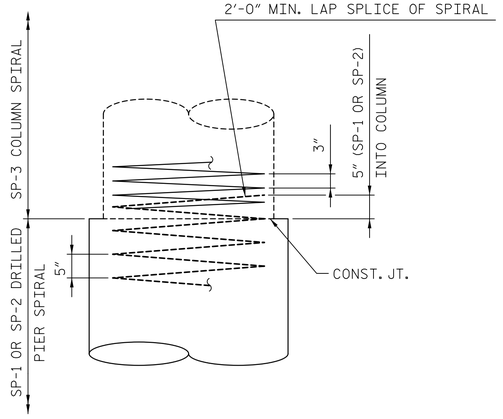
SECTION "B-B"



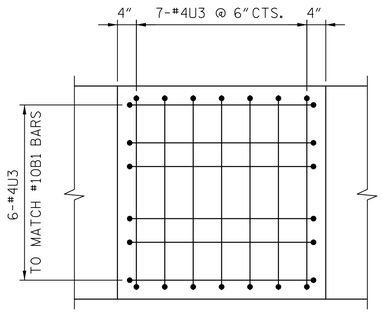
END OF CAP
VIEW "A-A"



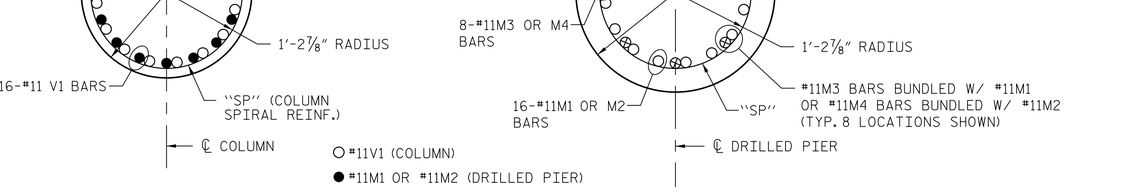
END ELEVATION



SPIRAL SPLICE DETAIL

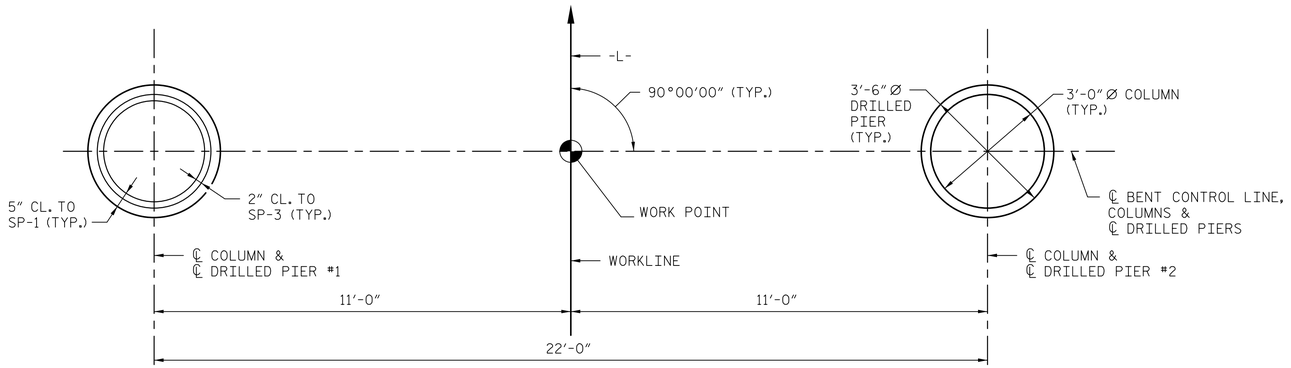


DETAIL "B"



SECTION "C-C"

SECTION "D-D"



PLAN OF DRILLED PIERS

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENTS 1 THRU 5

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
						TOTAL SHEETS 86

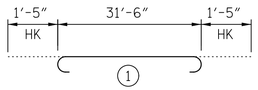
DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

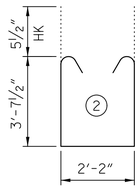
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

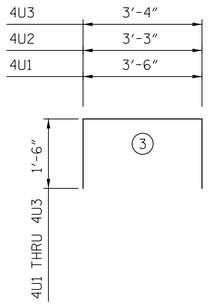
DATE: 1/12/2016
TIME: 9:25:56 AM
USER: kyle.compton
DGN: R:\BrPlge 656\Cadd\400_069_U2707_SM1_S35_BT02.dgn

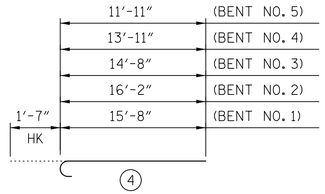
BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.









BILL OF MATERIAL — BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	STR	31′-6″	814
B2	8	#9	STR	31′-6″	857
B3	6	#10	①	34′-4″	886
B4	4	#5	STR	31′-6″	131
M1	16	#11	STR	39′-0″	3315
M2	16	#11	STR	42′-0″	3570
M3	8	#11	STR	28′-0″	1190
M4	8	#11	STR	31′-0″	1318
S1	114	#5	②	10′-4″	1229
U1	8	#4	③	7′-0″	37
U2	6	#4	③	6′-3″	25
U3	40	#4	③	6′-4″	169
V1	32	#11	④	17′-3″	2933
REINFORCING STEEL				LBS.	16474
SP-1	1	**	⑤	553′-6″	577
SP-2	1	**	⑤	611′-0″	637
SP-3	2	***	⑤	487′-0″	651
SPIRAL REINFORCING STEEL				LBS.	1865

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

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

BENT 1 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 2 (COLUMNS)	C.Y.	7.1
POUR 3 (CAP)	C.Y.	18.2
TOTAL CLASS A CONCRETE	C.Y.	25.3
DRILLED PIERS, CONCRETE		
POUR 1	C.Y.	21.4
3′-6″ Ø DRILLED PIERS IN SOIL	LIN. FT.	46.0
3′-6″ Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	14.0
CSL TUBES	LIN. FT.	252.0
PERMANENT STEEL CASING FOR 3′-6″ Ø DRILLED PIERS	LIN. FT.	0.0

BILL OF MATERIAL — BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	STR	31′-6″	814
B2	8	#9	STR	31′-6″	857
B3	6	#10	①	34′-4″	886
B4	4	#5	STR	31′-6″	131
M1	16	#11	STR	39′-0″	3315
M2	16	#11	STR	40′-6″	3443
M3	8	#11	STR	27′-6″	1169
M4	8	#11	STR	29′-6″	1254
S1	114	#5	②	10′-4″	1229
U1	8	#4	③	7′-0″	37
U2	6	#4	③	6′-3″	25
U3	40	#4	③	6′-4″	169
V1	32	#11	④	17′-9″	3018
REINFORCING STEEL				LBS.	16347
SP-1	1	**	⑤	545′-0″	568
SP-2	1	**	⑤	586′-6″	612
SP-3	2	***	⑤	495′-0″	661
SPIRAL REINFORCING STEEL				LBS.	1841

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

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

BENT 2 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 2 (COLUMNS)	C.Y.	7.3
POUR 3 (CAP)	C.Y.	18.2
TOTAL CLASS A CONCRETE	C.Y.	25.5
DRILLED PIERS, CONCRETE		
POUR 1	C.Y.	20.7
3′-6″ Ø DRILLED PIERS IN SOIL	LIN. FT.	45.0
3′-6″ Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	13.0
CSL TUBES	LIN. FT.	244.0
PERMANENT STEEL CASING FOR 3′-6″ Ø DRILLED PIERS	LIN. FT.	0.0

BILL OF MATERIAL — BENT 3

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	STR	31′-6″	814
B2	8	#9	STR	31′-6″	857
B3	6	#10	①	34′-4″	886
B4	4	#5	STR	31′-6″	131
M1	16	#11	STR	43′-0″	3655
M2	16	#11	STR	46′-0″	3910
M3	8	#11	STR	32′-0″	1360
M4	8	#11	STR	35′-0″	1488
S1	114	#5	②	10′-4″	1229
U1	8	#4	③	7′-0″	37
U2	6	#4	③	6′-3″	25
U3	40	#4	③	6′-4″	169
V1	32	#11	④	16′-3″	2763
REINFORCING STEEL				LBS.	17324
SP-1	1	**	⑤	636′-0″	663
SP-2	1	**	⑤	694′-0″	724
SP-3	2	***	⑤	446′-0″	596
SPIRAL REINFORCING STEEL				LBS.	1983

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

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

BENT 3 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 2 (COLUMNS)	C.Y.	6.5
POUR 3 (CAP)	C.Y.	18.2
TOTAL CLASS A CONCRETE	C.Y.	24.7
DRILLED PIERS, CONCRETE		
POUR 1	C.Y.	24.2
3′-6″ Ø DRILLED PIERS IN SOIL	LIN. FT.	52.0
3′-6″ Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	16.0
CSL TUBES	LIN. FT.	284.0
PERMANENT STEEL CASING FOR 3′-6″ Ø DRILLED PIERS	LIN. FT.	26.6

BILL OF MATERIAL — BENT 4

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	STR	31′-6″	814
B2	8	#9	STR	31′-6″	857
B3	6	#10	①	34′-4″	886
B4	4	#5	STR	31′-6″	181
M1	16	#11	STR	40′-6″	3443
M2	16	#11	STR	34′-6″	2933
M3	8	#11	STR	29′-6″	1254
M4	8	#11	STR	23′-6″	999
S1	114	#5	②	10′-4″	1229
U1	8	#4	③	7′-0″	37
U2	6	#4	③	6′-3″	25
U3	40	#4	③	6′-4″	169
V1	32	#11	④	15′-6″	2635
REINFORCING STEEL				LBS.	15462
SP-1	1	**	⑤	586′-6″	612
SP-2	1	**	⑤	462′-6″	482
SP-3	2	***	⑤	421′-0″	562
SPIRAL REINFORCING STEEL				LBS.	1656

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

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

BENT 4 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 2 (COLUMNS)	C.Y.	6.1
POUR 3 (CAP)	C.Y.	18.2
TOTAL CLASS A CONCRETE	C.Y.	24.3
DRILLED PIERS, CONCRETE		
POUR 1	C.Y.	19.2
3′-6″ Ø DRILLED PIERS IN SOIL	LIN. FT.	41.0
3′-6″ Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	13.0
CSL TUBES	LIN. FT.	228.0
PERMANENT STEEL CASING FOR 3′-6″ Ø DRILLED PIERS	LIN. FT.	19.2

BILL OF MATERIAL — BENT 5

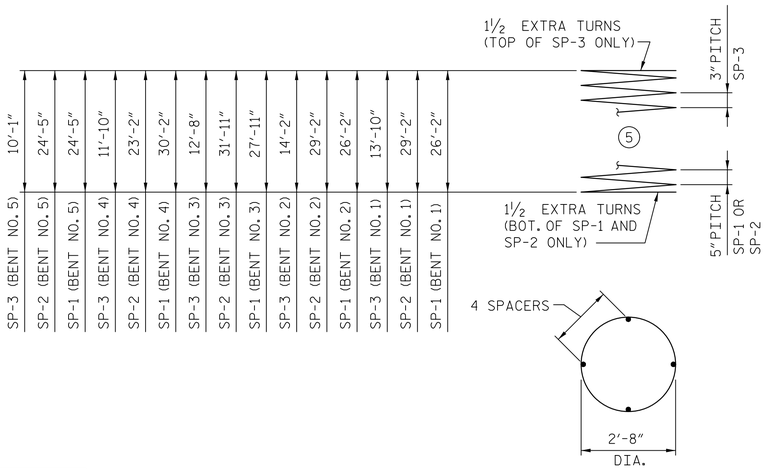
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	STR	31′-6″	814
B2	8	#9	STR	31′-6″	857
B3	6	#10	①	34′-4″	886
B4	4	#5	STR	31′-6″	131
M1	16	#11	STR	38′-6″	3273
M2	16	#11	STR	35′-6″	3018
M3	8	#11	STR	27′-6″	1169
M4	8	#11	STR	24′-6″	1041
S1	114	#5	②	10′-4″	1229
U1	8	#4	③	7′-0″	37
U2	6	#4	③	6′-3″	25
U3	40	#4	③	6′-4″	169
V1	32	#11	④	13′-6″	2295
REINFORCING STEEL				LBS.	14944
SP-1	1	**	⑤	545′-0″	568
SP-2	1	**	⑤	487′-6″	508
SP-3	2	***	⑤	363′-0″	485
SPIRAL REINFORCING STEEL				LBS.	1561

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

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

BENT 5 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 2 (COLUMNS)	C.Y.	5.1
POUR 3 (CAP)	C.Y.	18.2
TOTAL CLASS A CONCRETE	C.Y.	23.3
DRILLED PIERS, CONCRETE		
POUR 1	C.Y.	18.9
3′-6″ Ø DRILLED PIERS IN SOIL	LIN. FT.	42.0
3′-6″ Ø DRILLED PIERS NOT IN SOIL	LIN. FT.	11.0
CSL TUBES	LIN. FT.	224.0
PERMANENT STEEL CASING FOR 3′-6″ Ø DRILLED PIERS	LIN. FT.	0.0



DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 90+25.00 -L-
SHEET 3 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

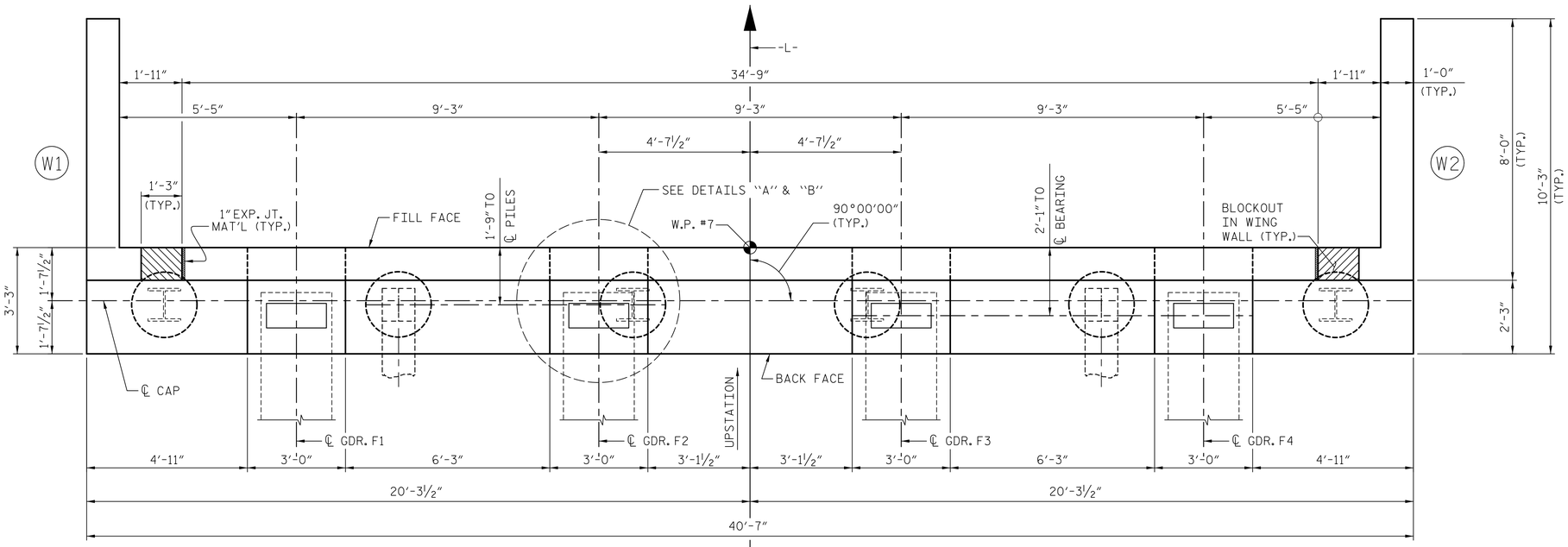
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENTS 1 THRU 5

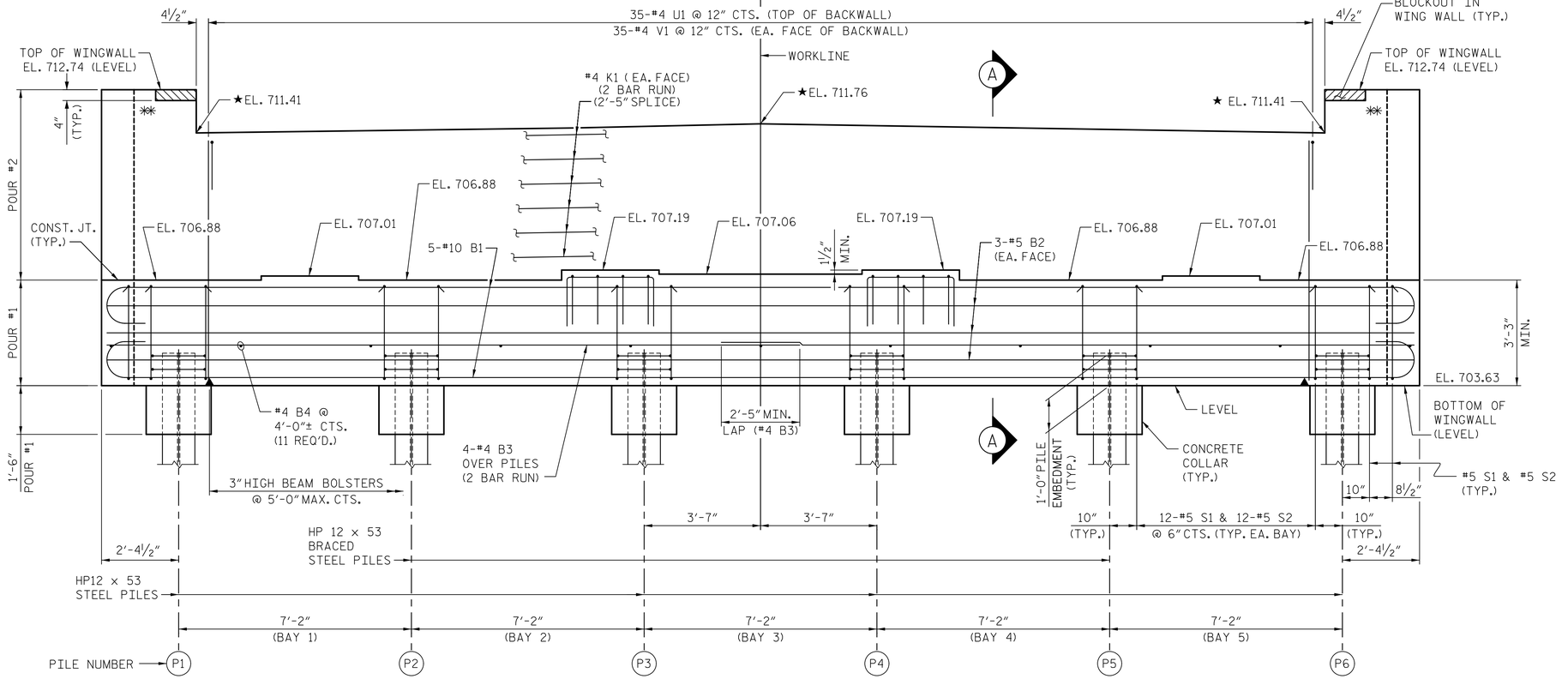
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
						TOTAL SHEETS 86

DATE: 1/12/2016
TIME: 9:25:59 AM

USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_GTI_U2707_SMU_536_BT03.dgn



PLAN



ELEVATION

NOTES:

FOR PILE SPLICE DETAILS, SEE END BENT 2, SHEET 3 OF 3.

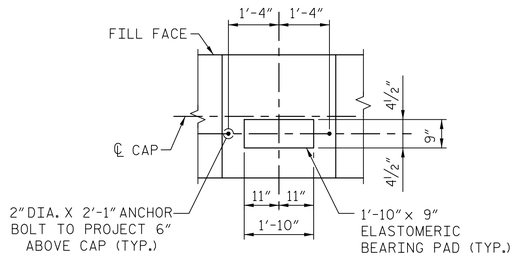
FOR SECTION A-A, SEE END BENT 2, SHEET 3 OF 3.

FOR DETAILS OF LOWER WINGWALLS AND REINFORCING STEEL, SEE END BENT 2, SHEET 2 OF 3.

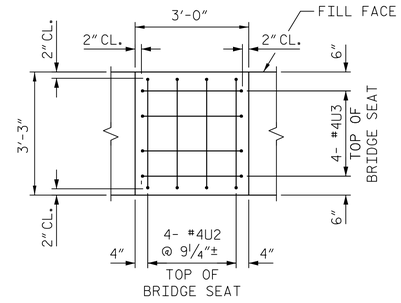
FOR TEMPORARY DRAINAGE DETAILS, SEE END BENT 2, SHEET 3 OF 3.

★ THIS ELEVATION TAKEN ON FILL FACE OF THE BACKWALL.

✻✻ REINFORCING IN WING NOT SHOWN FOR CLARITY, FOR DETAIL, SEE END BENT 2, SHEET 2.



DETAIL ″A″



DETAIL ″B″

(TYP. SEATS 2 AND 3)

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John L. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

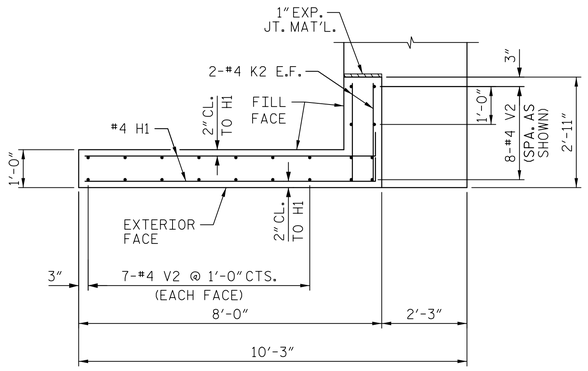
SUBSTRUCTURE
END BENT 2
PLAN AND ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
						TOTAL SHEETS 86

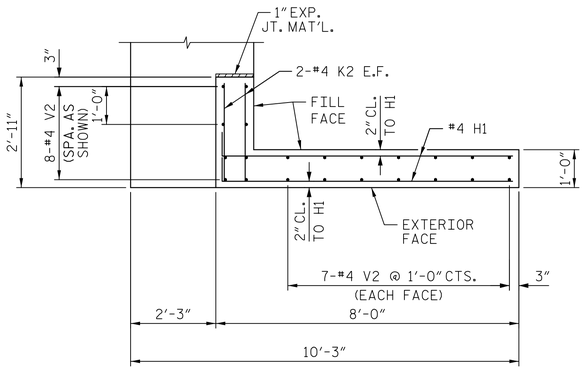
DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

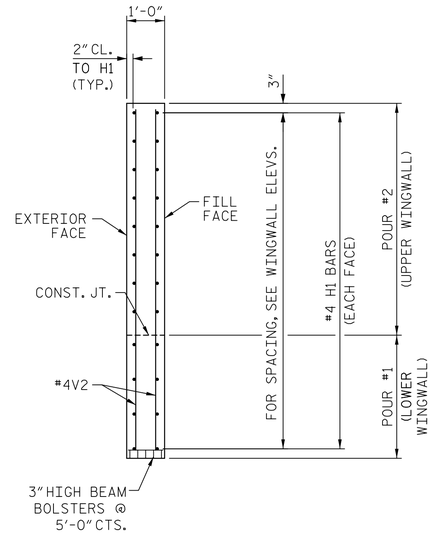
DATE: 1/12/2016
TIME: 9:56:04 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cad\401_073_U2707_SMU_S37_EB2.dgn



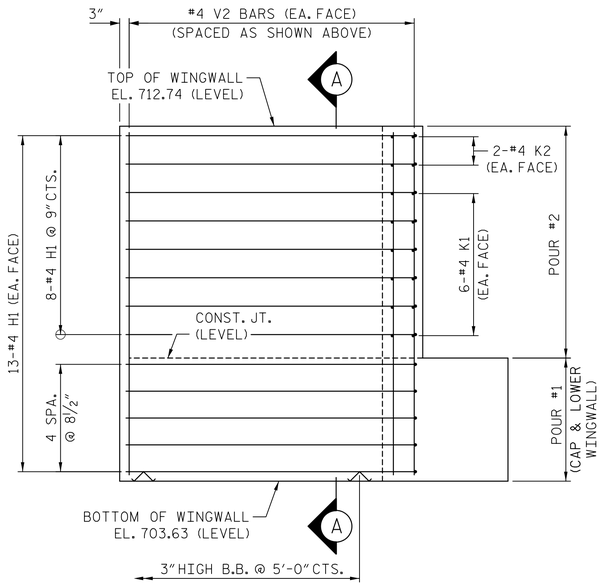
PLAN - WINGWALL 1



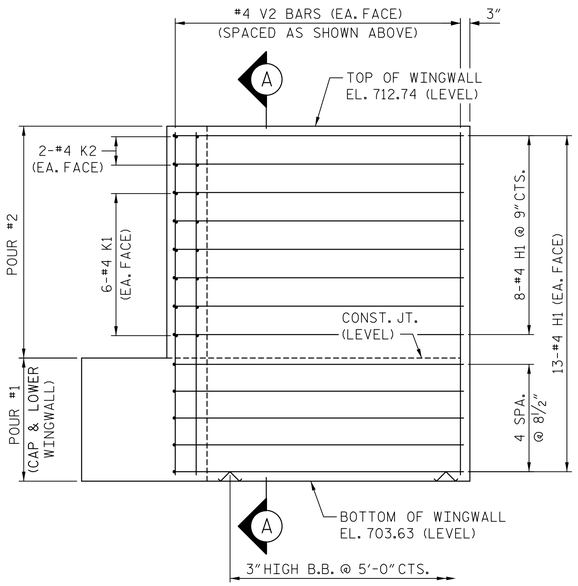
PLAN - WINGWALL 2



SECTION "A-A"



ELEVATION - WINGWALL 1



ELEVATION - WINGWALL 2

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
Signature
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

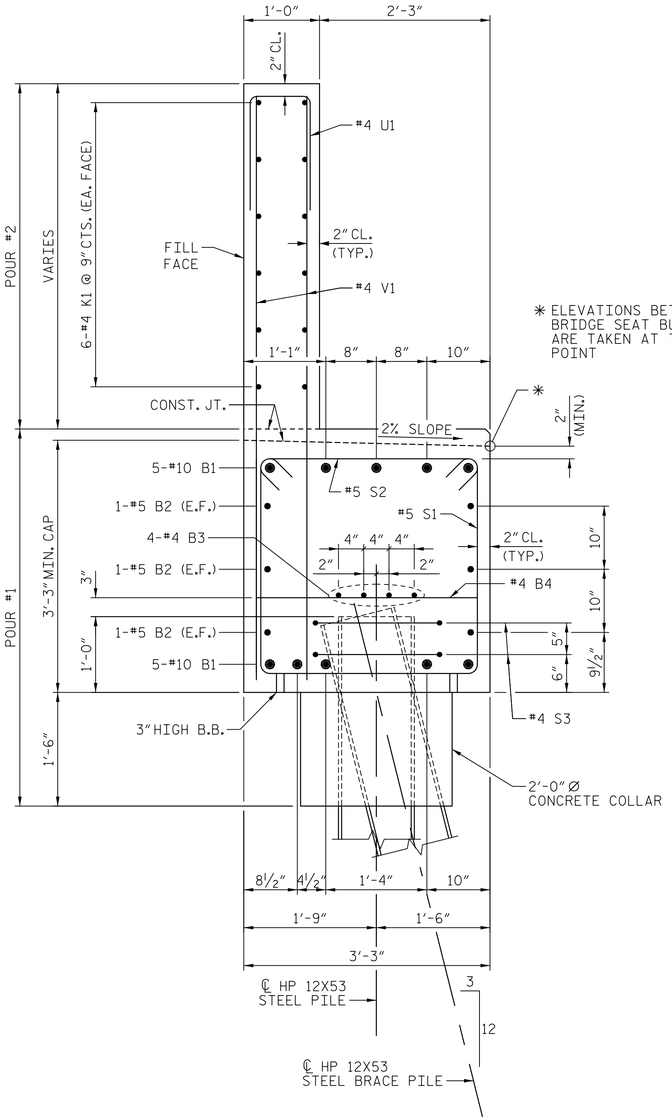
SUBSTRUCTURE
END BENT 2
DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-38
						TOTAL SHEETS
						86

DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

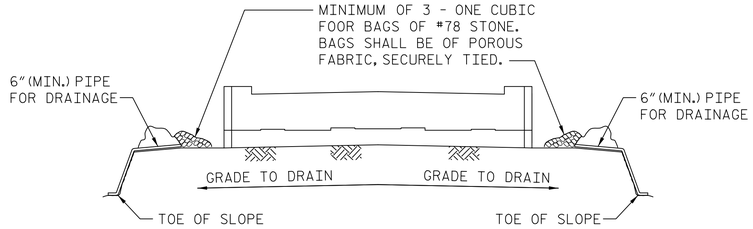
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:26:09 AM
USER: kyle.compton
DGN: R:\Bridge 656\Cadd\401_075_U2707_SMU_538_E82_02.dgn



SECTION "A-A"

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

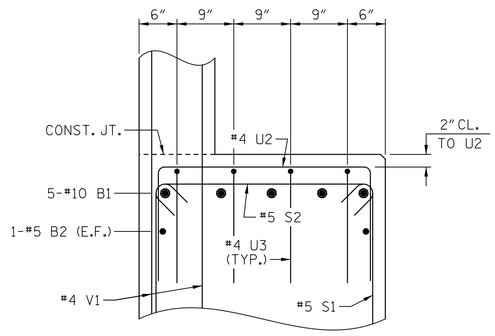


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

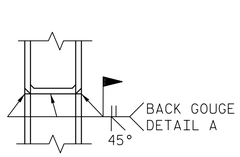
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

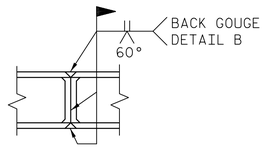
TEMPORARY DRAINAGE AT END BENT



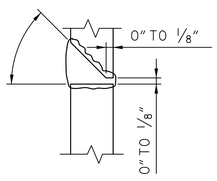
BRIDGE SEAT SECTION



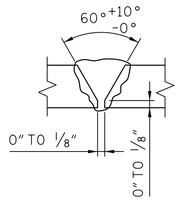
**PILE VERTICAL



**PILE HORIZONTAL OR VERTICAL



DETAIL A

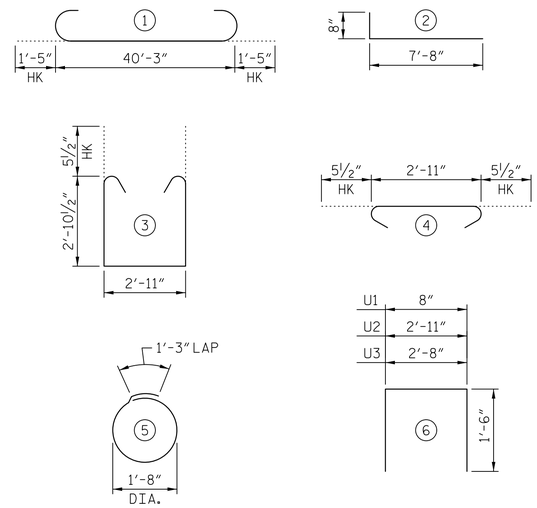


DETAIL B

**POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#10	①	43'-1"	1854
B2	6	#5	STR	40'-3"	252
B3	8	#4	STR	21'-4"	114
B4	11	#4	STR	2'-11"	21
H1	52	#4	②	8'-4"	289
K1	24	#4	STR	21'-4"	342
K2	8	#4	STR	2'-7"	14
S1	64	#5	③	9'-7"	640
S2	64	#5	④	3'-10"	256
S3	12	#4	⑤	6'-6"	52
U1	35	#4	⑥	3'-8"	86
U2	8	#4	⑥	5'-11"	32
U3	8	#4	⑥	5'-8"	30
V1	70	#4	STR	7'-5"	347
V2	44	#4	STR	8'-9"	257

TOTAL REINFORCING STEEL 4586 LBS.

CLASS A CONCRETE

POUR #1 (CAP, COLLARS & LOWER WINGWALLS) 19.1 C.Y.

POUR #2 (BACKWALL & UPPER WINGWALL) 10.1 C.Y.

TOTAL = 29.2 C.Y.

HP 12x53 STEEL PILES

NO. = 6 LIN. FT. = 330

NOTES:

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LOCATION SKETCH" SHEET.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE PARAPET AND END POST ARE CAST IF SLIP FORMING IS USED.

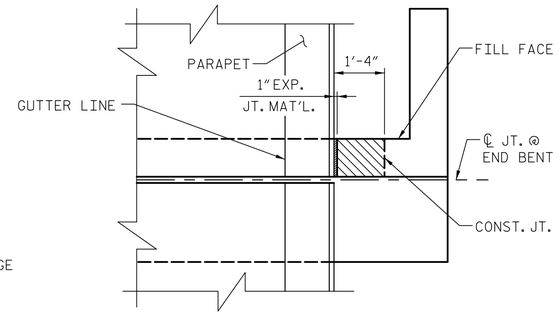
STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

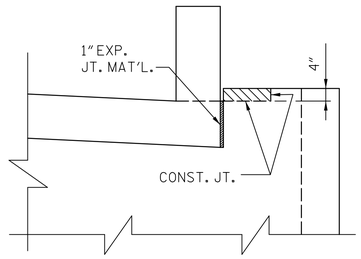
THE TOP SURFACE OF THE END BENT CAP, EXCEPT THE BRIDGE SEAT BUILDUPS, SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.

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

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



PLAN



ELEVATION

BLOCKOUT IN WINGWALL DETAILS

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 3 OF 3 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 033674 ENGINEER JOHN C. MORRISON
DocuSigned by: John L. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT 2
SECTIONS AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-39
						TOTAL SHEETS 86

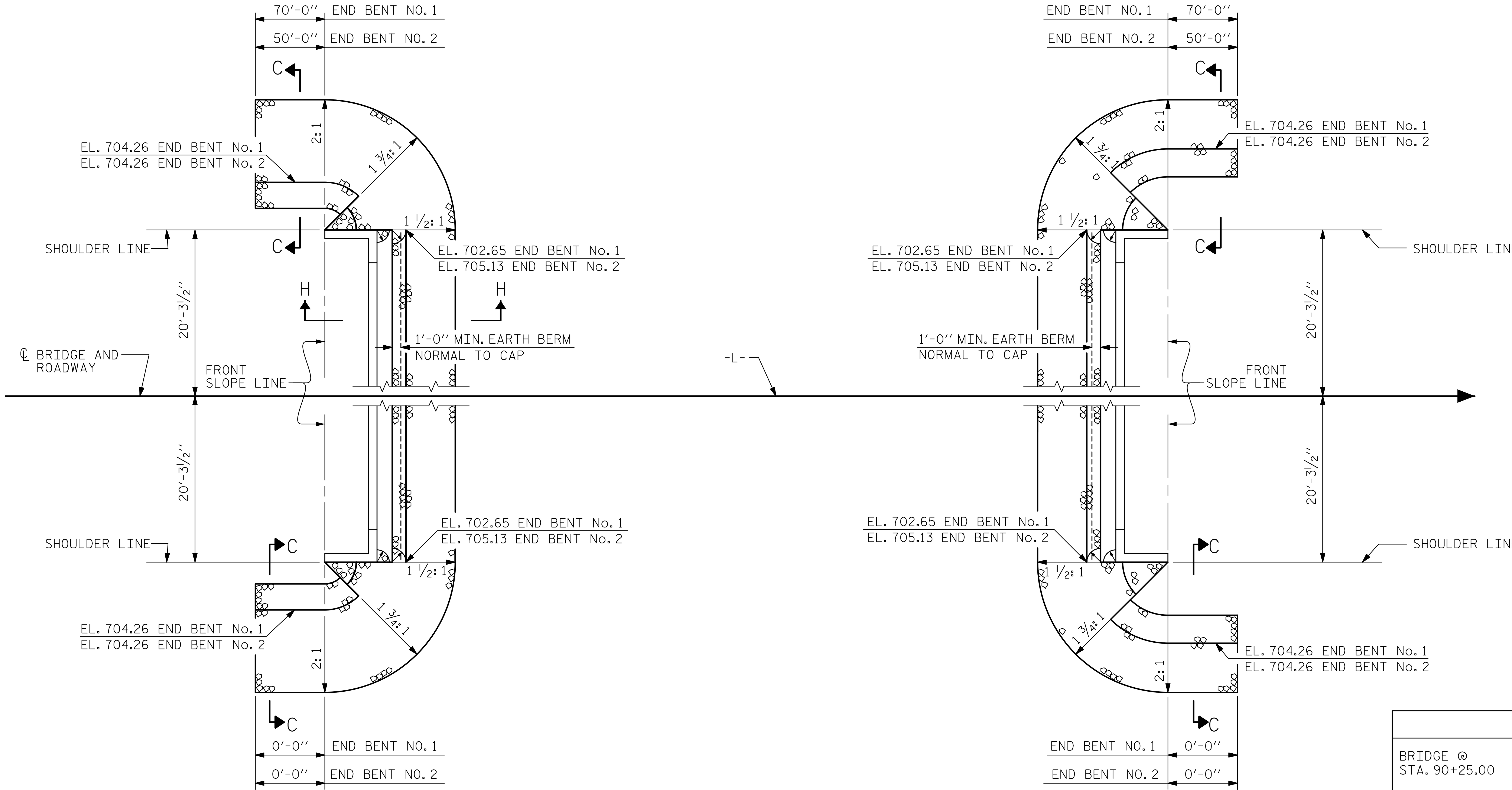
DRAWN BY : MKT DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 9:26:16 AM
USER: kyle.compton
DGN: R:\BrHdge 696\Cad\401_DTT_U2707_SMU_539_EB2_03.dgn

NOTES :

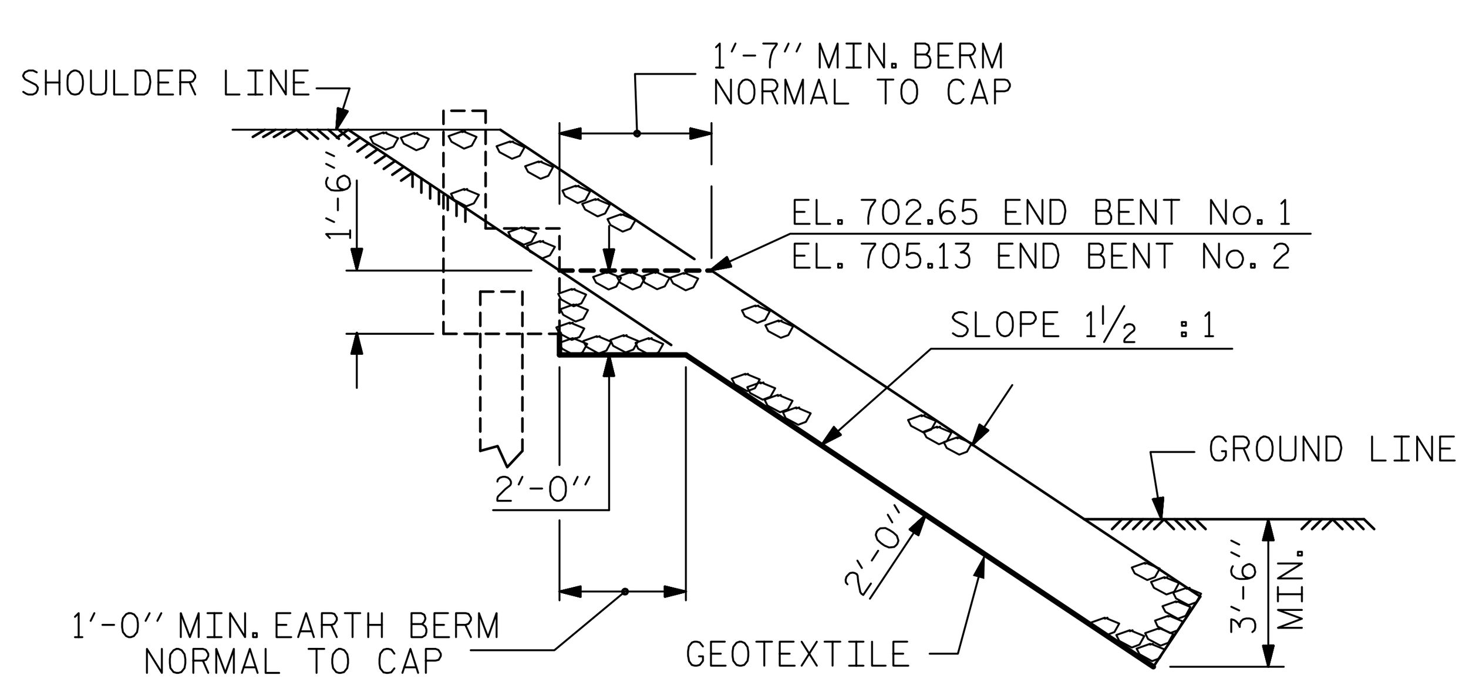
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



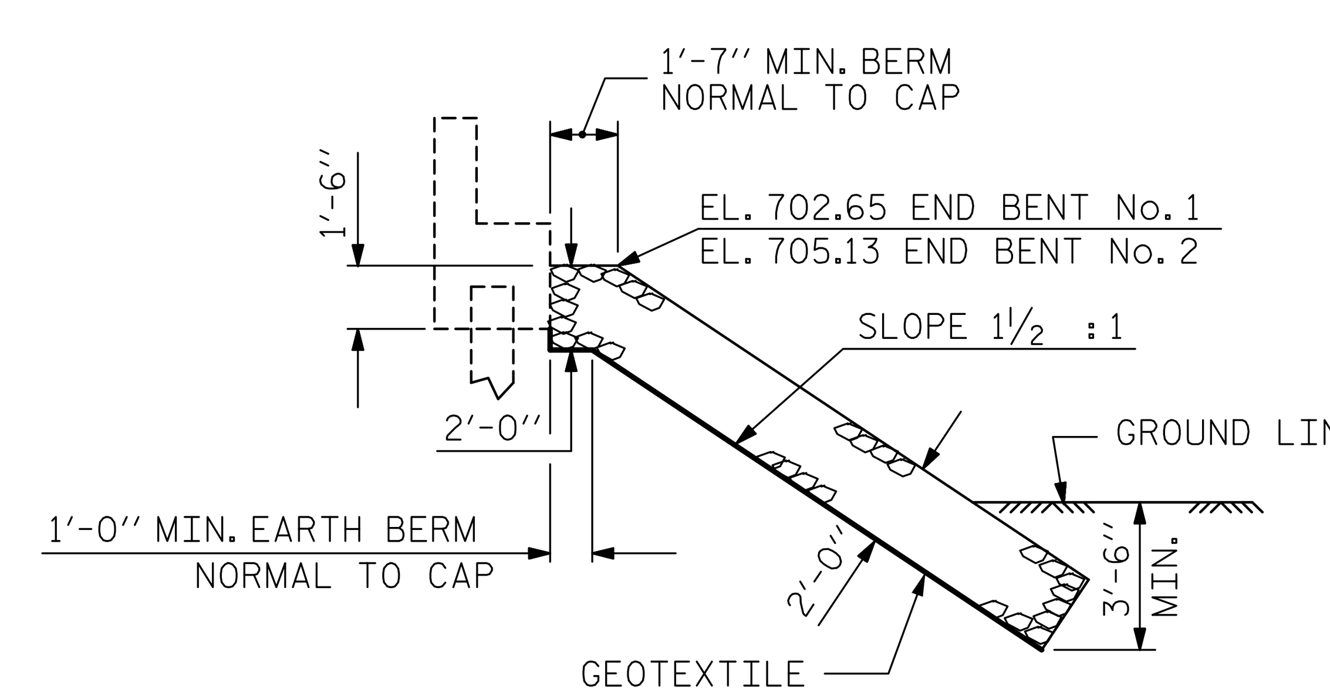
SHOULDER RIP RAP IS HIGHER THAN BERM RIP RAP

BERM RIP RAPPED

ESTIMATED QUANTITIES		
BRIDGE @ STA. 90+25.00	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	952	1058
END BENT 2	565	627

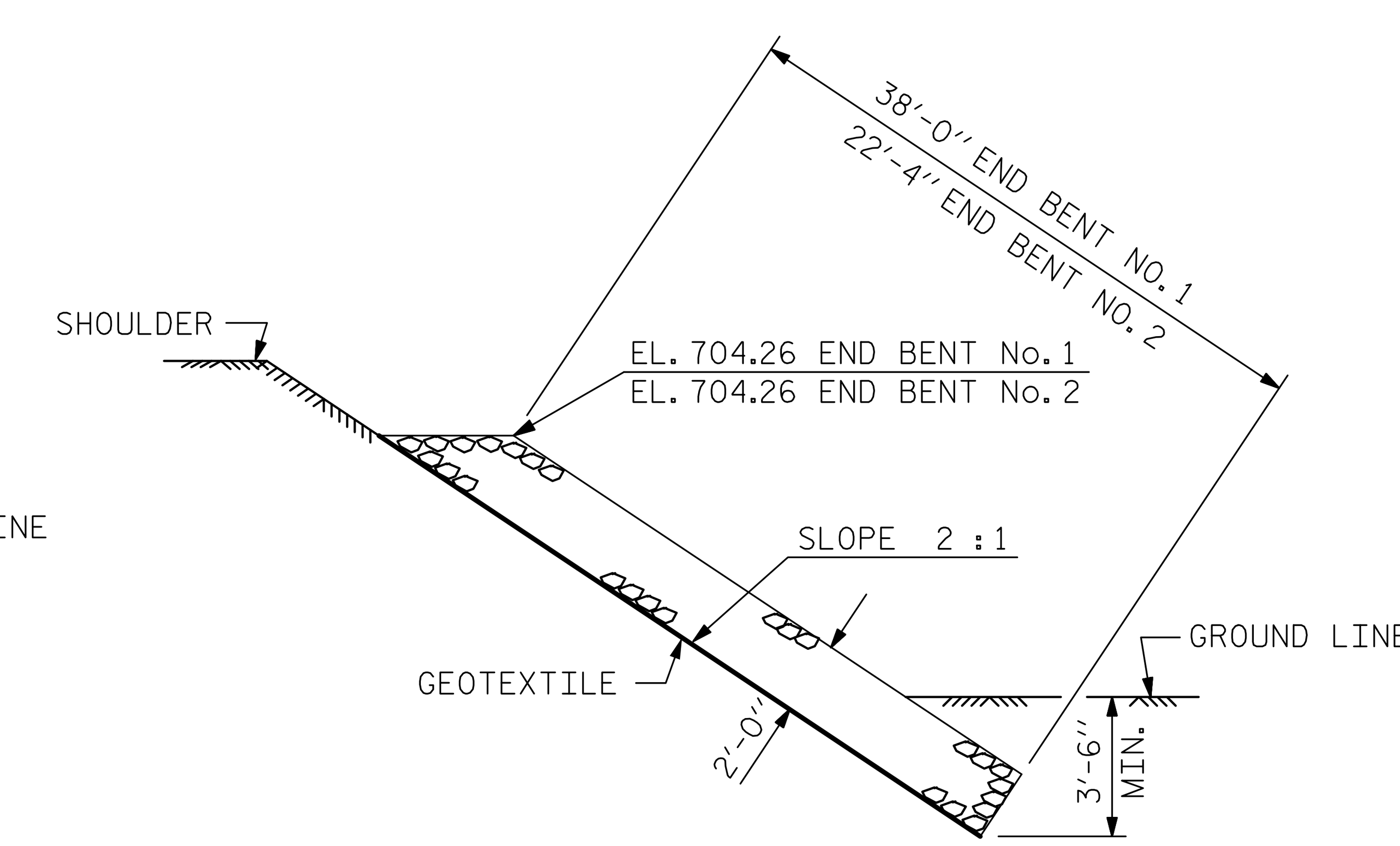


SECTION H-H



℄ SECTION

BERM RIP RAPPED



SECTION C-C

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

BRIDGE NO. 656

AECOM

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

RIP RAP DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

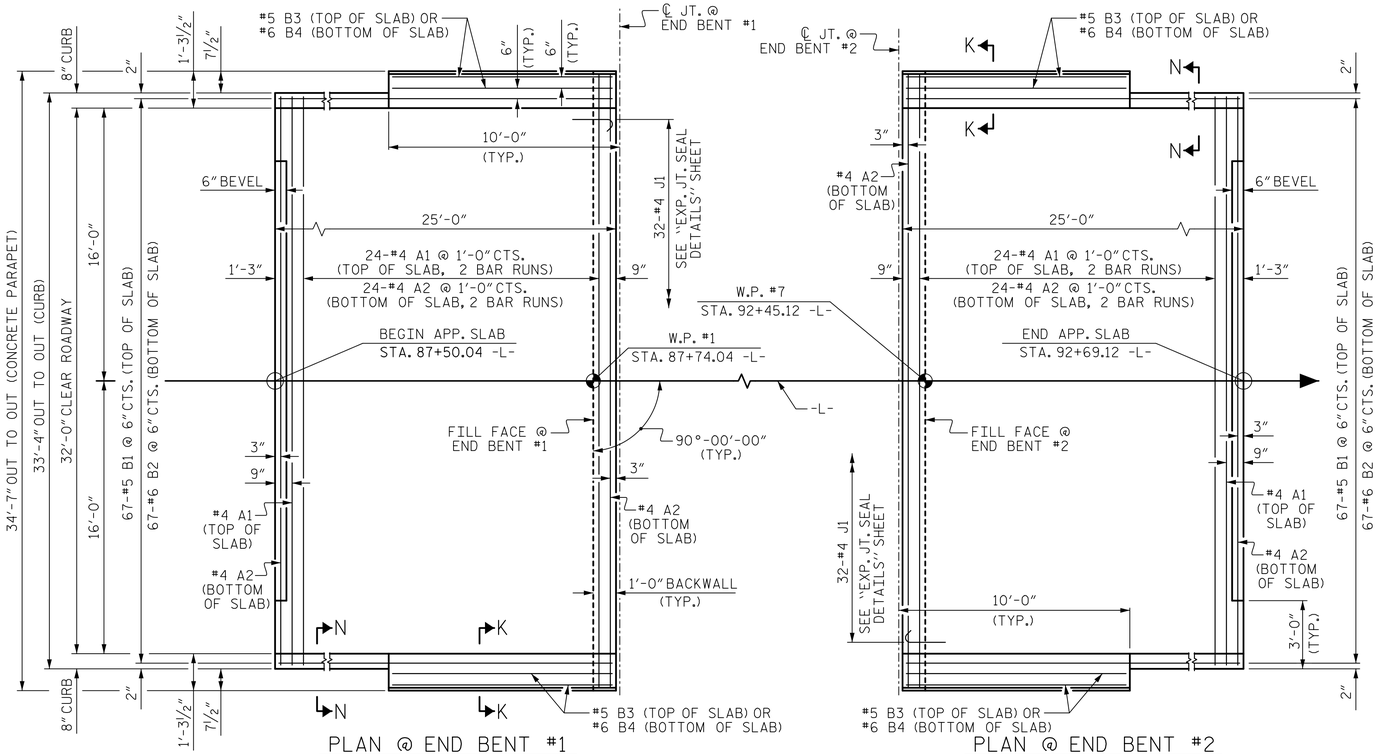
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-40

TOTAL SHEETS 86

ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : REK 1/84		REV. 5/1/06R	TLA/GM
CHECKED BY : RDU 1/84		REV. 10/1/11	MAA/GM
		REV. 12/21/11	MAA/GM

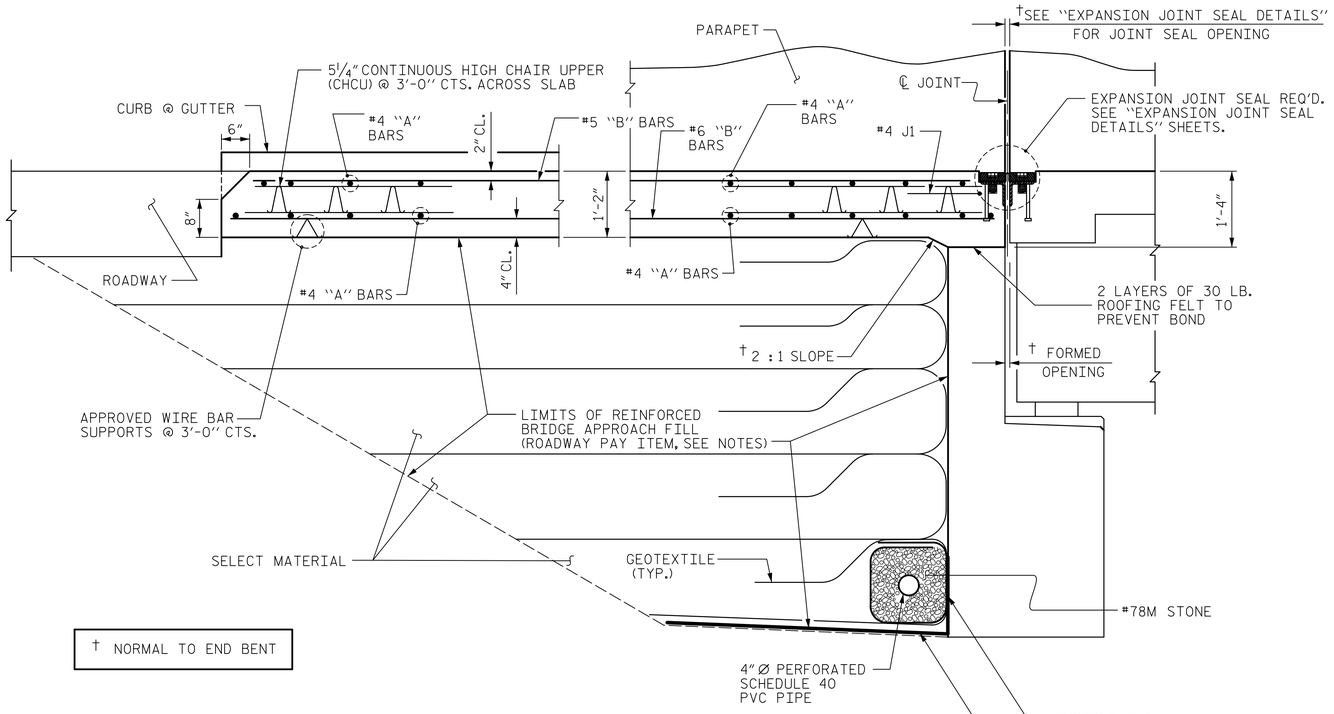
STD. NO. RR1 (Sht. 2)



PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



† NORMAL TO END BENT

SECTION THRU SLAB

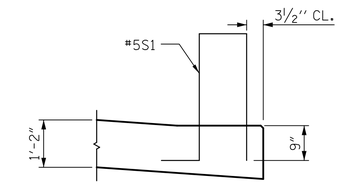
NOTES

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

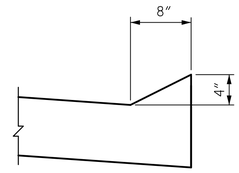
FOR REINFORCED BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, IMPERMEABLE GEOMEMBRANE, 4″ Ø DRAINAGE PIPE, #78M STONE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

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

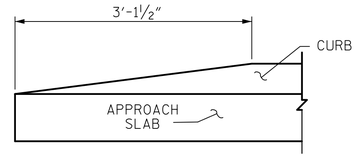
FOR EXPANSION JOINT SEALS, SEE SPECIAL PROVISIONS.



SECTION K-K



SECTION N-N



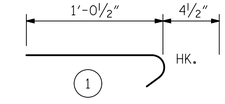
END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

BILL OF MATERIAL
FOR ONE APPROACH SLAB (2 REQUIRED)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	50	#4	STR	18′-2″	605
A2	52	#4	STR	18′-0″	625
✱ B1	67	#5	STR	23′-10″	1665
B2	67	#6	STR	24′-8″	2482
✱ B3	4	#5	STR	9′-8″	40
B4	4	#6	STR	9′-8″	58
✱ J1	32	#4	①	1′-5″	30
REINFORCING STEEL ✱✱				LBS.	2340
✱ EPOXY COATED REINFORCING STEEL ✱✱				LBS.	3165
CLASS AA CONCRETE ✱✱				C. Y.	36.8

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT

✱✱ QUANTITIES FOR PARAPET AND END POST ARE NOT INCLUDED. SEE SHEET 2 OF 2.

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

SPLICE LENGTHS

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

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 1 OF 2 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

SEAL
030474
JOHN C. MORRISON
ENGINEER
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

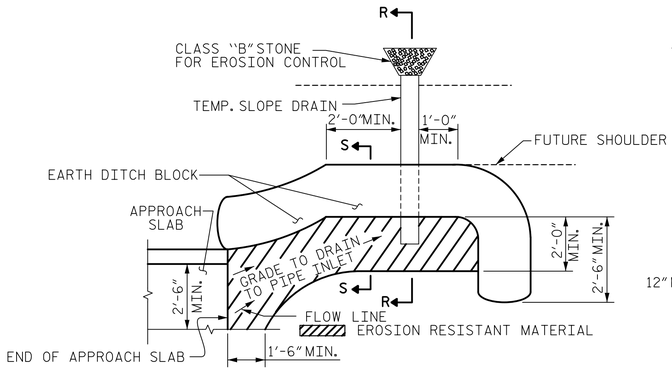
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-41
1			3			TOTAL SHEETS
2			4			86

STD. NO. BAS2 (Sht. 3)

ASSEMBLED BY : KHC	DATE : 11/2015		
CHECKED BY : JCM	DATE : 11/2015		
DRAWN BY : EEM 3/95	REV. 10/1/11	MAA/GM	
CHECKED BY : VAP 3/95	REV. 12/21/11	MAA/GM	
	REV. 6/13	MAA/GM	

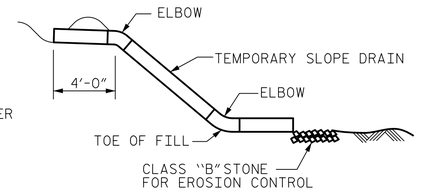
DATE: 1/12/2016
TIME: 9:26:22 AM

USER: kyle.compton
DGN: RvDrHdge 650rCadd1x40_08i_U2707_SMU_S41_AS01.dgn

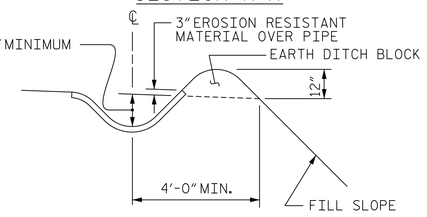


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

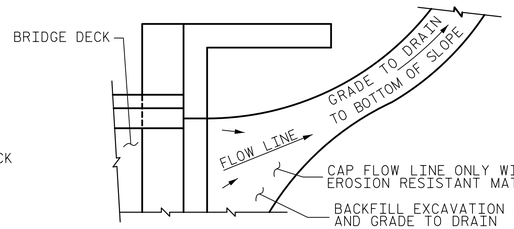
PLAN VIEW



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)

NOTES

THE COST OF THE CONCRETE PARAPET ON THE APPROACH SLAB SHALL BE INCLUDED IN THE LINEAR FOOT CONTRACT PRICE BID FOR "1'-2" X 2'-6" CONCRETE PARAPET".

FOR ADDITIONAL NOTES ON CONCRETE PARAPET AND END POSTS, SEE "SUPERSTRUCTURE CONCRETE PARAPET RAIL".

QUANTITIES FOR CONCRETE PARAPET AND END POST SHOWN ARE FOR 10'-0" SEGMENT LOCATED ON APPROACH SLAB. (TOTAL FOR 4 LOCATIONS)

BAR TYPES

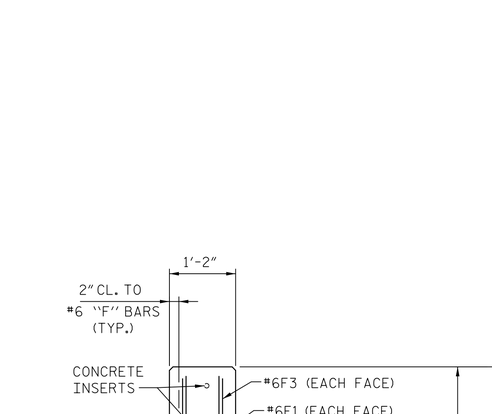
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

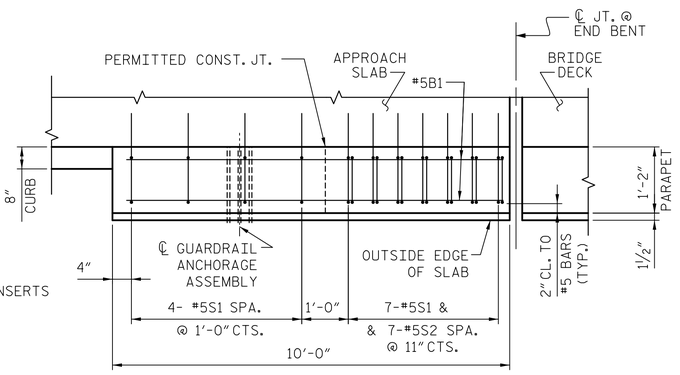
CONCRETE PARAPET AND END POST

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	32	#5	STR	9'-8"	323
✱E1	8	#7	STR	2'-6"	41
✱E2	8	#7	STR	3'-0"	49
✱E3	8	#7	STR	3'-6"	57
✱E4	8	#7	STR	4'-0"	65
✱E5	8	#7	STR	4'-4"	71
✱F1	8	#6	STR	1'-9"	21
✱F2	8	#6	STR	2'-11"	35
✱F3	8	#6	STR	3'-9"	45
✱S1	44	#5	1	5'-5"	249
✱S2	28	#5	2	5'-6"	161

✱EPOXY COATED REINFORCING STEEL	LBS.	1117
CLASS AA CONCRETE	C.Y.	5.1
1'-2" x 2'-6" CONCRETE PARAPET	40.0	LIN. FT.



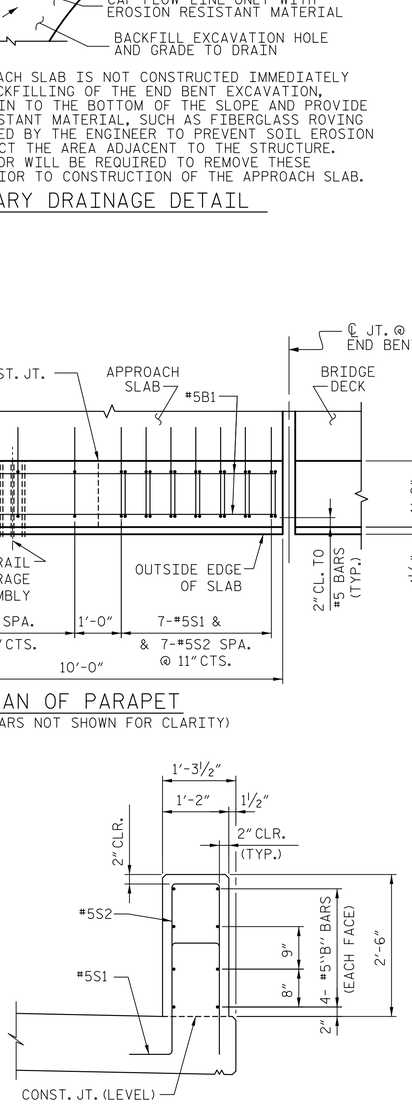
END VIEW



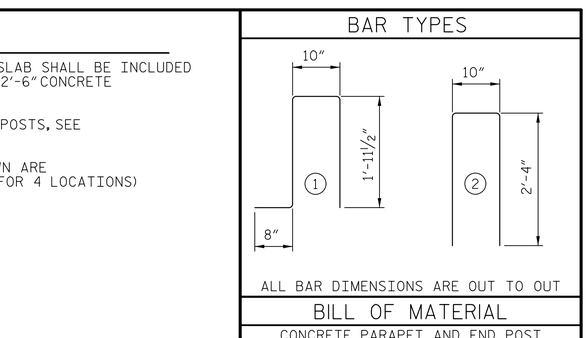
ELEVATION

PLAN OF PARAPET

(#7 "E" BARS NOT SHOWN FOR CLARITY)



SECTION "A-A"



PLAN OF END POST

PARAPET AND END POST FOR TWO BAR METAL RAIL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 90+25.00 -L-

SHEET 2 OF 2 BRIDGE NO. 656

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

BRIDGE APPROACH SLAB DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-42
1			3			TOTAL SHEETS
2			4			86

DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

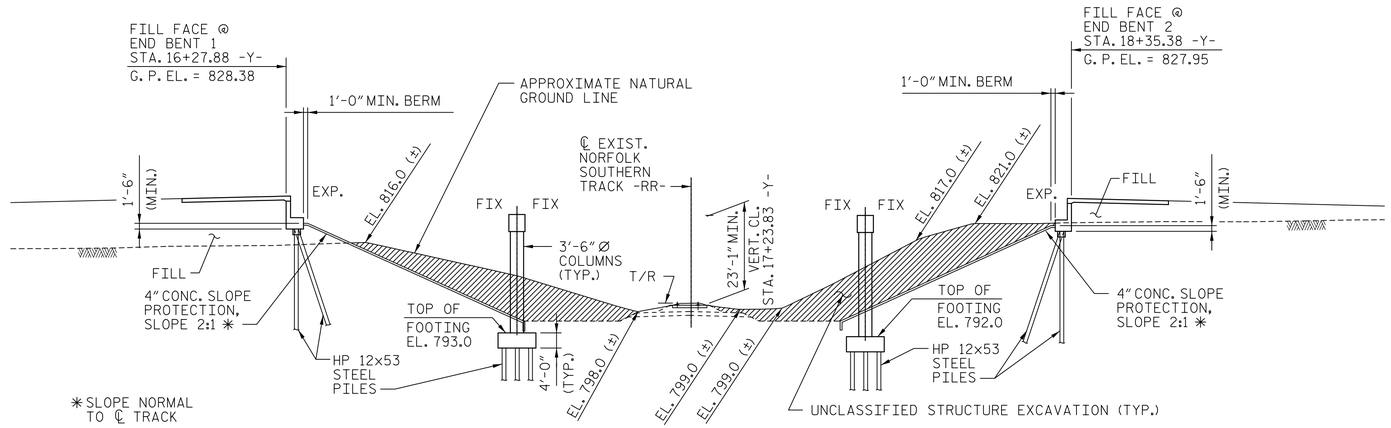
DATE: 1/12/2016
TIME: 9:26:26 AM

USER: kyle_compton
DGN: R:\Bridge 656\Cadd\401_083_U2707_SMU_S42_AS02.dgn

16+00 17+00 18+00 19+00

SPAN A SPAN B SPAN C

840 830 820 810 800 790 780



END BENT 1 BENT 1 BENT 2 END BENT 2

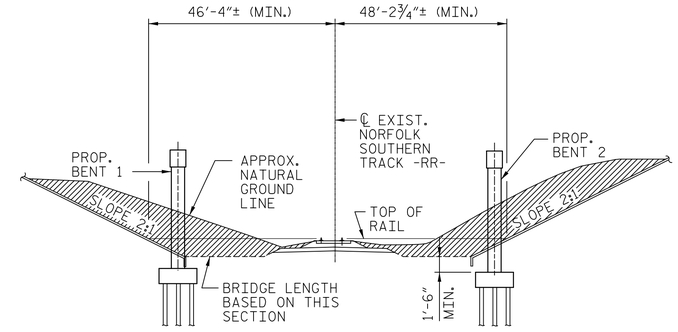
SECTION ALONG -Y-

(SECTIONS AT BENTS AND END BENTS ARE AT RIGHT ANGLES)

GRADE DATA -Y-

(+)2.3400% (-)2.4533%

PI STA. 17+25.00 -Y-
ELEV. = 830.660
K = 44
V.C. = 210.000'



SECTION THRU RAILROAD

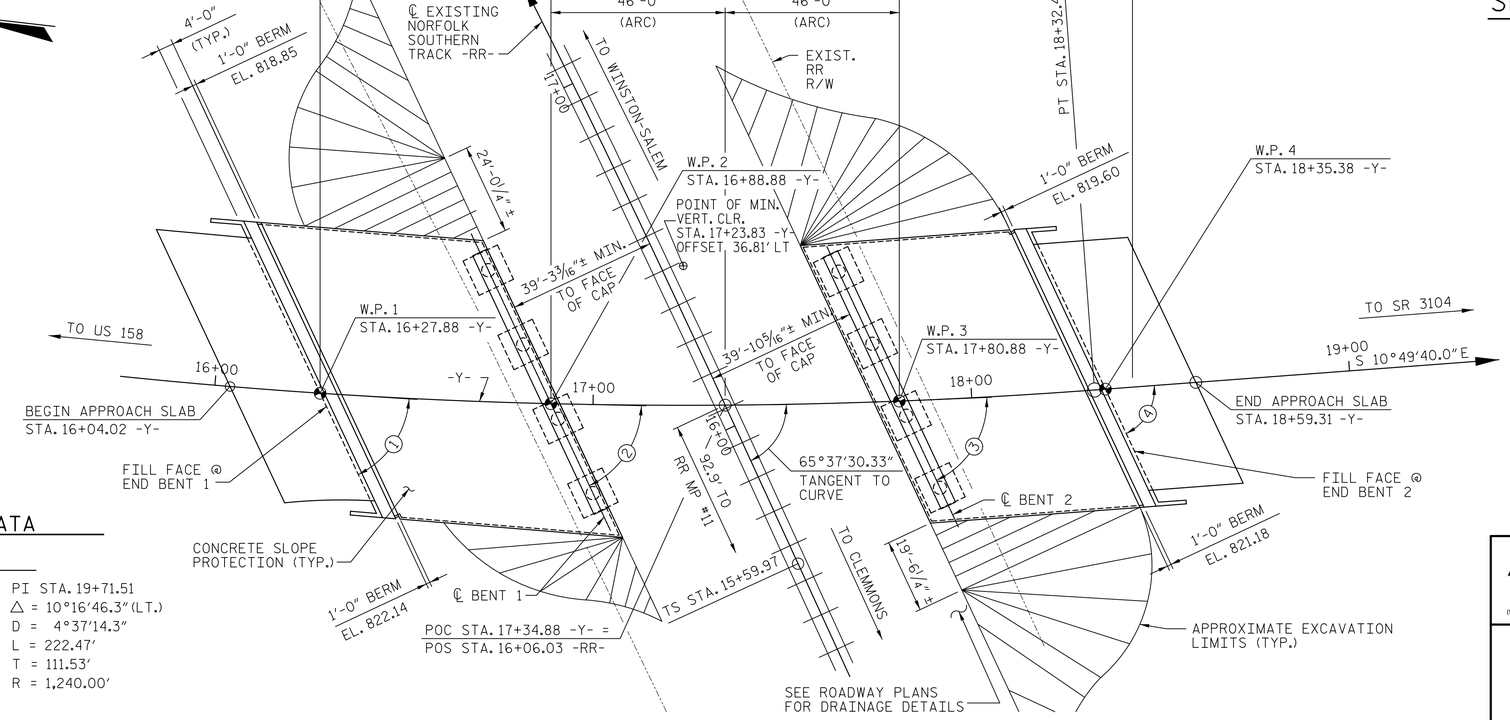
(LOOKING STATION AHEAD ALONG ℄ TRACK)

TOP OF RAIL ELEVATIONS EXISTING NORFOLK SOUTHERN TRACK	
TRACK STATION	LEFT & RIGHT RAIL
STA. 15+50.00	800.849
STA. 16+00.00	800.173
STA. 16+50.00	799.538

NAD 83 / NC GRID

TABLE OF ANGLES	
No.	ANGLE
1	61°03'44"
2	63°28'25"
3	67°06'31"
4	69°08'51"

ANGLES ARE TANGENT TO CURVE



PLAN

(PILES NOT SHOWN IN PLAN VIEW FOR CLARITY)

HORIZONTAL CURVE DATA

-Y-	-RR-	
PI STA. 15+84.89	PIs STA. 17+60.13	PI STA. 19+71.51
△ = 19°45'58.9"(LT.)	θs = 6°55'51.4"	△ = 10°16'46.3"(LT.)
D = 3°57'05.2"	Ls = 300.00'	D = 4°37'14.3"
L = 500.23'	LT = 200.15'	L = 222.47'
T = 252.63'	ST = 100.14'	T = 111.53'
R = 1,450.00'		R = 1,240.00'
SE = 0.03		

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
3/2/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 2999
(HAMPTON ROAD) OVER
NORFOLK SOUTHERN RAILROAD
BETWEEN US 158 AND SR 3104

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-43
1			3			TOTAL SHEETS
2			4			86

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 1 OF 4 BRIDGE NO. 109 MILEPOST #10.98

USER: Kyle.Compton
DGN: \\SRALTYP00.nsacaecomnet.com\Data\Projects\60446218\400_Technical\450_NCDOT_Std_Tech_Design_Files\Structures\Bridge_109\Cadd\402_001_U2707_SMU_S43_B001.dgn
DATE: 3/2/2016
TIME: 6:33:21 AM

FOUNDATION LAYOUT

(1) 65°09'40" TO LONG CHORD

NOTES:

1. FOR PILES, SEE PROJECT SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 70 TONS PER PILE.
3. DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 120 TONS.
4. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
5. DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 110 TONS PER PILE.
6. PILES AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
7. DRIVE PILES AT BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
8. PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT BENT NO. 1. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 779 FT. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
9. CONCRETE IS REQUIRED TO FILL HOLES FOR PILE EXCAVATION AT BENT NO. 1.
10. STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT BENT NO. 1. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
11. PILES AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 95 TONS PER PILE.
12. DRIVE PILES AT BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 160 TONS PER PILE.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030474 JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 2999 (HAMPTON ROAD) OVER NORFOLK SOUTHERN RAILROAD BETWEEN US 158 AND SR 3104

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-44
1			3			TOTAL SHEETS
2			4			86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : KHC	DATE : 10/2015
CHECKED BY : JCM	DATE : 10/2015

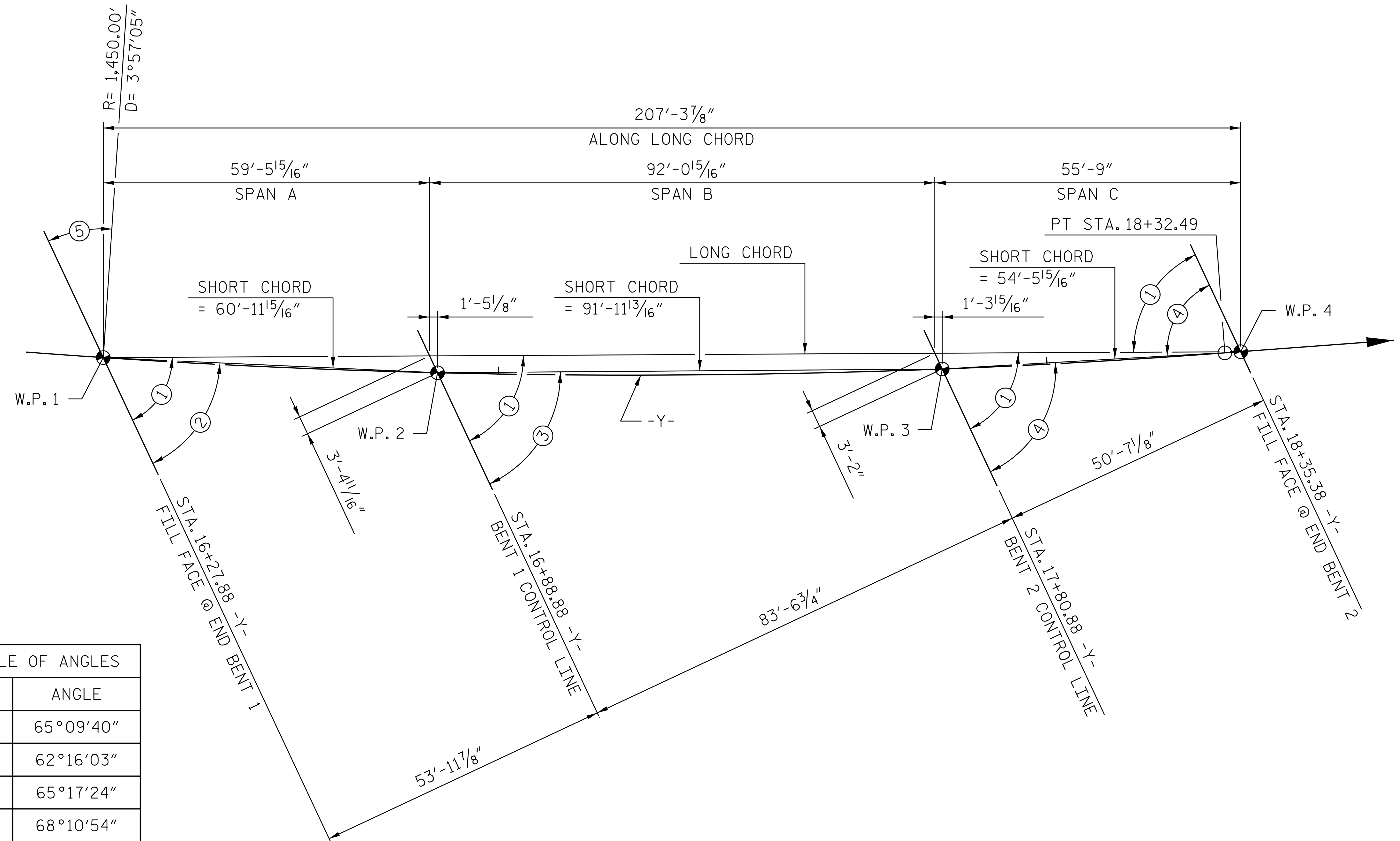


TABLE OF ANGLES	
No.	ANGLE
1	65°09'40"
2	62°16'03"
3	65°17'24"
4	68°10'54"
5	28°56'16"

LONG CHORD LAYOUT

ALL BENTS AND END BENTS ARE PARALLEL

GENERAL NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

THE EXISTING STRUCTURE CONSISTING OF A 3 SPAN CONTINUOUS REINFORCED CONCRETE SLAB SUPERSTRUCTURE WITH SPANS OF 24'-0", 22'-0" AND 24'-0"; CLEAR ROADWAY WIDTH OF 28'-0"; AND REINFORCED CONCRETE END BENTS AND BENTS SUPPORTED ON PRECAST PRESTRESSED CONCRETE PILES; AND HAVING PRECAST CONCRETE BULKHEADS; AND LOCATED 93 FT WEST OF THE PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, THE LOAD LIMIT MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.

RAILROAD TRACKS AND OTHER RAILROAD PROPERTY MUST BE PROTECTED FROM DAMAGE DURING REMOVAL OF THE EXISTING STRUCTURE. THE CONTRACTOR SHALL SUBMIT A DETAILED PROCEDURE FOR DEMOLITION OF THE EXISTING STRUCTURE IN ACCORDANCE WITH THE REQUIREMENTS OUTLINED BY NORFOLK SOUTHERN'S GUIDELINES FOR DESIGN OF HIGHWAY SEPARATION STRUCTURES OVER RAILROAD (OVERHEAD GRADE SEPARATION). DEMOLITION PLANS AND PROCEDURE SHALL BE SUBMITTED TO THE CHIEF ENGINEER BRIDGES & STRUCTURES FOR REVIEW AND APPROVAL PRIOR TO BEGINNING DEMOLITION.

THE SUBSTRUCTURE TYPE INDICATED FOR THE EXISTING BRIDGE IS FROM THE BEST INFORMATION AVAILABLE. SINCE THIS INFORMATION IS IDENTIFIED FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE IDENTIFIED AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

THE RAILROAD TRACK TOP OF RAIL ELEVATIONS SHOWN 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 VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.

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

PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS. THE SKEWED END CONDITION AT EACH END BENT AND BENT IS SUCH THAT THE USE OF 4' WIDE PRESTRESSED CONCRETE DECK PANELS IS NOT POSSIBLE; USE OF 8' WIDE PRESTRESSED CONCRETE DECK PANELS IS NECESSARY.

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 CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON SHEET 1 OF 4 SHALL BE EXCAVATED FOR A DISTANCE OF 90± FEET EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.

WORK SHALL NOT BE STARTED ON THIS BRIDGE UNTIL EXCAVATION IS COMPLETE.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.

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

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
3/2/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

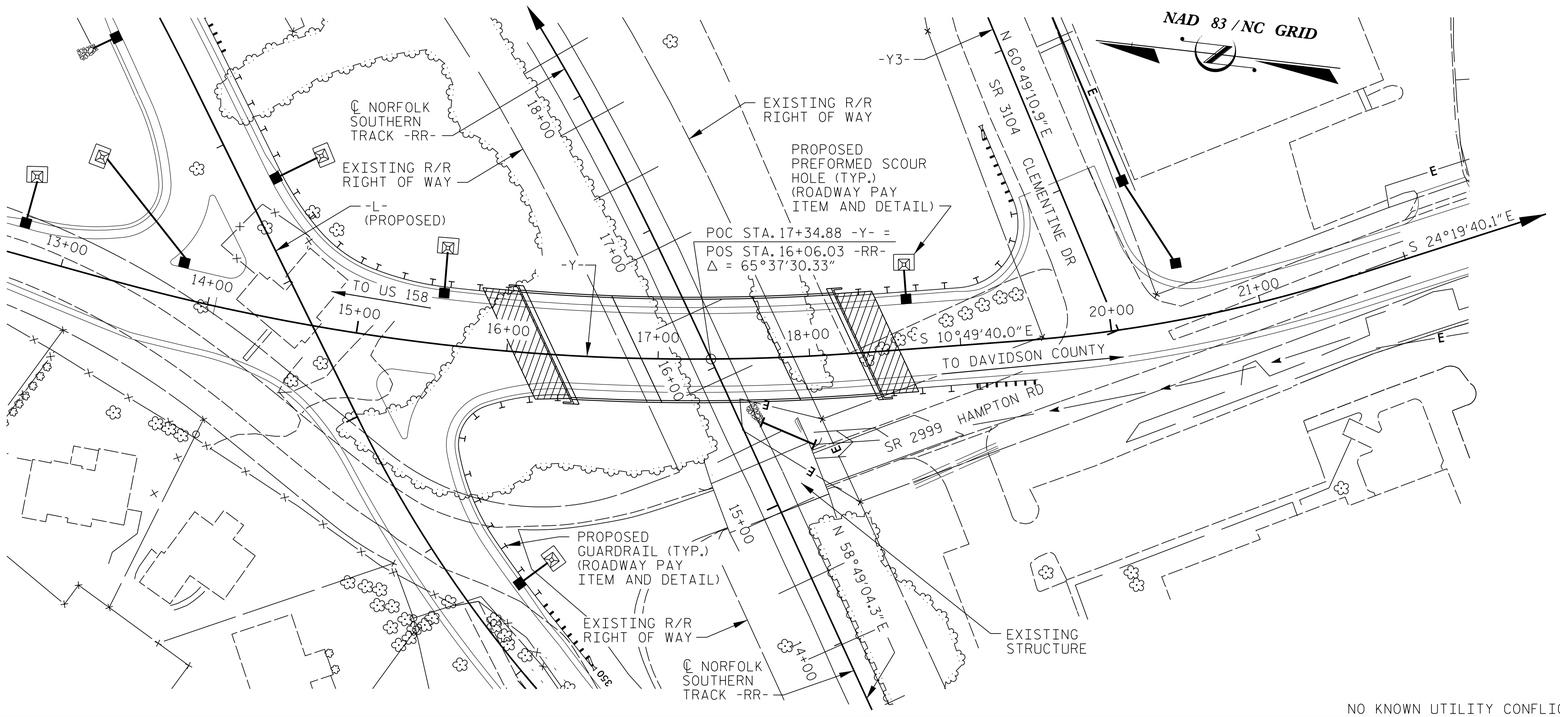
GENERAL DRAWING
FOR BRIDGE ON SR 2999
(HAMPTON ROAD) OVER
NORFOLK SOUTHERN RAILROAD
BETWEEN US 158 AND SR 3104

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-45
1			3			TOTAL SHEETS
2			4			86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

BENCH MARK: BM-3 RAILROAD SPIKE IN BASE OF 18" WHITE OAK,
139.00' RIGHT OF STA. 9+80.00 -Y-
COORDINATES: N 824600 E 1594553
ELEV. = 811.83



NO KNOWN UTILITY CONFLICTS.

LOCATION SKETCH

TOTAL BILL OF MATERIAL

	REMOVAL OF EXISTING STRUCTURE AT STA. 17+34.88 -Y-	PILE EXCAVATION		FOUNDATION EXCAVATION FOR BENT	UNCLASSIFIED STRUCTURE EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		HP 12x53 STEEL PILES		STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" x 2'-6" CONCRETE PARAPET	72" CHAIN LINK FENCE	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	ASBESTOS ASSESSMENT
		IN SOIL	NOT IN SOIL																				
	LUMP SUM	LIN. FT.	LIN. FT.	LUMP SUM	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM	LUMP SUM
SUPERSTRUCTURE						14285	13492		LUMP SUM			24	1615.23				394.2	409.2	406.7		LUMP SUM	LUMP SUM	
END BENT No. 1					LUMP SUM			65.7		10234				17	935					598			
BENT No. 1		276	44	LUMP SUM				151.2		29282	2790			32	640	32							
BENT No. 2				LUMP SUM				150.2		29391	2884			32	1440								
END BENT No. 2					LUMP SUM			59.6		8897				17	1105					533			
TOTAL	LUMP SUM	276	44	LUMP SUM	LUMP SUM	14285	13492	426.7	LUMP SUM	77804	5674	24	1615.23	96	4120	32	394.2	409.2	406.7	1131	LUMP SUM	LUMP SUM	LUMP SUM

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 4 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 036474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
3/1/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE ON SR 2999
(HAMPTON ROAD) OVER
NORFOLK SOUTHERN RAILROAD
BETWEEN US 158 AND SR 3104

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-46
1			3			TOTAL SHEETS
2			4			86

DRAWN BY : KHC DATE : 10/2015
CHECKED BY : JCM DATE : 10/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 3/1/2016
TIME: 2:35:28 PM

USER: MorrisonC
DGN: P:\60446218\400_Technical\450_NCDOT_Std_Tech_Design_Files\Structures\Bridge 109\Cad\402_007_JUTOT_SMU_546.GDN4.dgn

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

LEVEL		VEHICLE	WEIGHT (W) (TONS)	⟨#⟩ CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE						COMMENT NUMBER
							LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR						MOMENT						
								DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	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⟩	1.11	--	1.75	0.85	1.40	B	E	45.13	0.96	1.32	B	E	26.79	0.80	0.85	1.11	B	E	45.13	
		HL-93 (OPERATING)	N/A	--	1.11	--	1.35	0.85	1.81	B	E	45.13	0.96	1.85	B	E	17.63	0.80	0.85	1.11	B	E	45.13	
		HS-20 (INVENTORY)	36.000	⟨2⟩	1.52	54.720	1.75	0.85	1.91	B	E	45.13	0.96	1.82	B	E	17.63	0.80	0.85	1.52	B	E	45.13	
		HS-20 (OPERATING)	36.000	--	1.52	54.720	1.35	0.85	2.47	B	E	45.13	0.96	2.41	B	E	17.63	0.80	0.85	1.52	B	E	45.13	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.55	47.925	1.40	0.85	5.59	B	E	45.13	0.96	5.79	B	E	17.63	0.80	0.85	3.55	B	E	45.13	
		SNGARBS2	20.000	--	2.59	51.800	1.40	0.85	4.08	B	E	45.13	0.96	4.05	B	E	17.63	0.80	0.85	2.59	B	E	45.13	
		SNAGRIS2	22.000	--	2.43	53.460	1.40	0.85	3.83	B	E	45.13	0.96	3.74	B	E	72.63	0.80	0.85	2.43	B	E	45.13	
		SNSCOTTS3	27.250	--	1.77	48.233	1.40	0.85	2.78	B	E	45.13	0.96	2.81	B	E	17.63	0.80	0.85	1.77	B	E	45.13	
		SNAGGRS4	34.925	--	1.46	50.991	1.40	0.85	2.29	B	E	45.13	0.96	2.29	B	E	17.63	0.80	0.85	1.46	B	E	45.13	
		SNS5A	35.550	--	1.42	50.481	1.40	0.85	2.24	B	E	45.13	0.96	2.31	B	E	17.63	0.80	0.85	1.42	B	E	45.13	
		SNS6A	39.950	--	1.30	51.935	1.40	0.85	2.04	B	E	45.13	0.96	2.09	B	E	17.63	0.80	0.85	1.30	B	E	45.13	
		SNS7B	42.000	--	1.24	52.080	1.40	0.85	1.94	B	E	45.13	0.96	2.05	B	E	17.63	0.80	0.85	1.24	B	E	45.13	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.58	52.140	1.40	0.85	2.49	B	E	45.13	0.96	2.52	B	E	17.63	0.80	0.85	1.58	B	E	45.13	
		TNT4A	33.075	--	1.59	52.589	1.40	0.85	2.49	B	E	45.13	0.96	2.46	B	E	17.63	0.80	0.85	1.59	B	E	45.13	
		TNAGRIT4	43.000	--	1.27	54.610	1.40	0.85	1.99	B	E	45.13	0.96	1.93	B	E	17.63	0.80	0.85	1.27	B	E	45.13	
		TNAGRT5A	45.000	--	1.20	54.000	1.40	0.85	1.88	B	E	45.13	0.96	1.91	B	E	17.63	0.80	0.85	1.20	B	E	45.13	
		TNAGRT5B	45.000	⟨3⟩	1.19	53.550	1.40	0.85	1.87	B	E	45.13	0.96	1.83	B	E	17.63	0.80	0.85	1.19	B	E	45.13	
		TNT6A	41.600	--	1.29	53.664	1.40	0.85	2.02	B	E	45.13	0.96	2.17	B	E	17.63	0.80	0.85	1.29	B	E	45.13	
		TNT7A	42.000	--	1.29	54.180	1.40	0.85	2.03	B	E	45.13	0.96	2.13	B	E	17.63	0.80	0.85	1.29	B	E	45.13	
		TNT7B	42.000	--	1.32	55.440	1.40	0.85	2.08	B	E	45.13	0.96	2.00	B	E	17.63	0.80	0.85	1.32	B	E	45.13	

LOAD FACTORS:

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

NOTES:

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

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

⟨#⟩ CONTROLLING LOAD RATING

⟨1⟩ DESIGN LOAD RATING (HL-93)

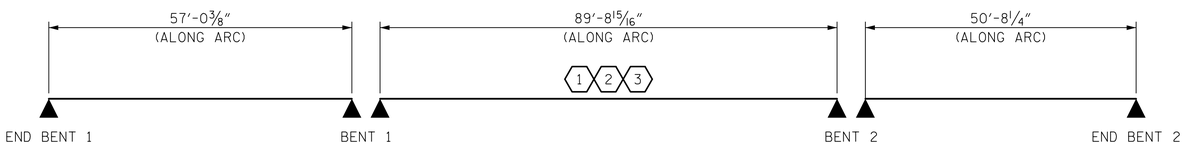
⟨2⟩ DESIGN LOAD RATING (HS-20)

⟨3⟩ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

I - INTERIOR GIRDER
E - EXTERIOR GIRDER



LRFR SUMMARY

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

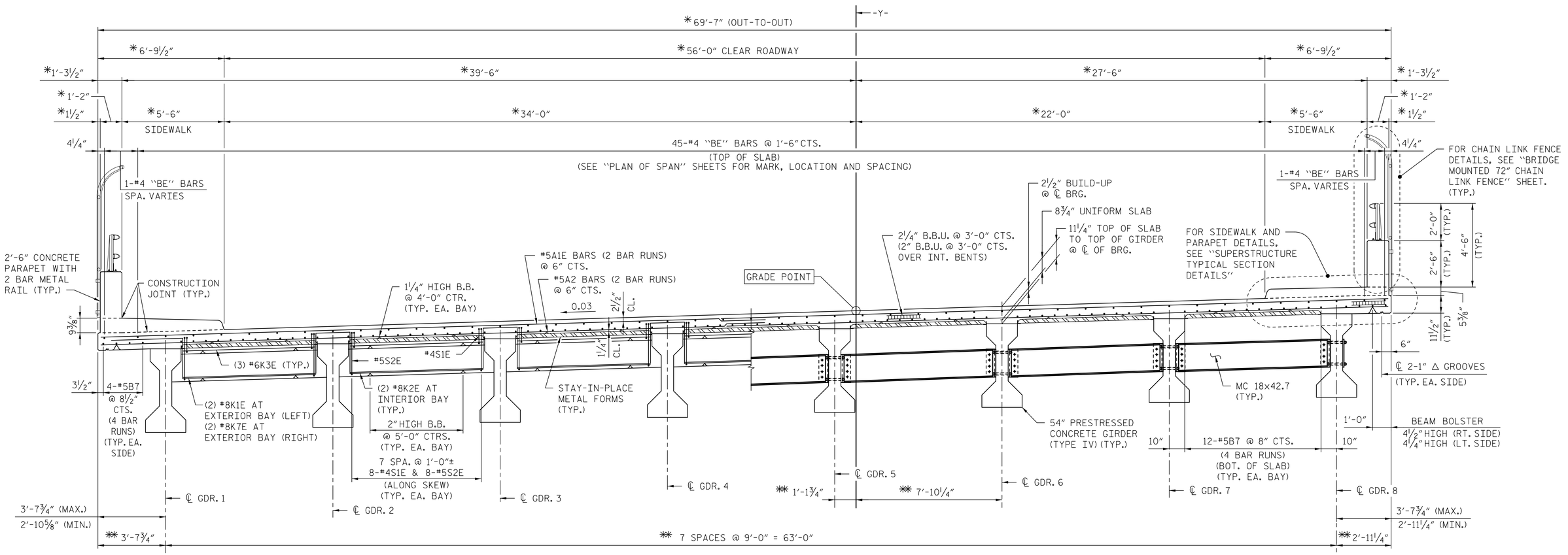
STANDARD

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-47
1			3			TOTAL SHEETS
2			4			86

STD. NO. LRFR1

ASSEMBLED BY : GLH	DATE : 11/2015	
CHECKED BY : MKT	DATE : 11/2015	
DRAWN BY : MAA 1/08	REV. 11/12/08RR	MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM



END DIAPHRAGMS
(AT END BENTS)

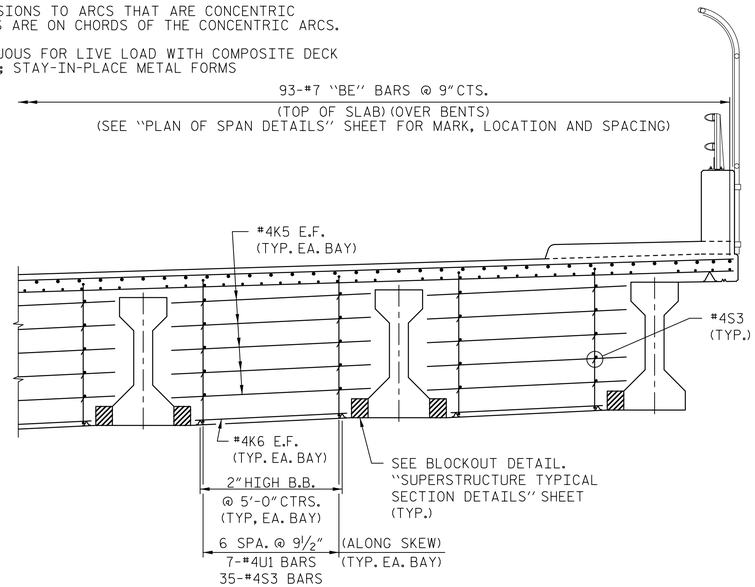
TYPICAL SECTION

INTERMEDIATE DIAPHRAGMS

* DENOTES RADIAL DIMENSION

** DENOTES DIMENSIONS TO ARCS THAT ARE CONCENTRIC TO -Y-, GIRDERS ARE ON CHORDS OF THE CONCENTRIC ARCS.

3 SPAN CONTINUOUS FOR LIVE LOAD WITH COMPOSITE DECK ON 54" GIRDERS; STAY-IN-PLACE METAL FORMS



BENT DIAPHRAGMS
(AT INTERIOR BENTS)

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.) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 1¼" ABOVE THE TOP OF THE REMOVABLE FORM.

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

PARAPET SHALL NOT BE CAST UNTIL CONCRETE SIDEWALK HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

THE JOINT IN DECK SHALL BE SAWED PRIOR TO THE CASTING OF THE SIDEWALK.

FOR INTERMEDIATE DIAPHRAGM DETAILS, SEE "PRESTRESSED CONCRETE GIRDER" SHEET 5 OF 5

FOR END DIAPHRAGM AND BENT DIAPHRAGM SECTIONS, SEE "SUPERSTRUCTURE TYPICAL SECTION DETAILS" SHEET.

DRAWN BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

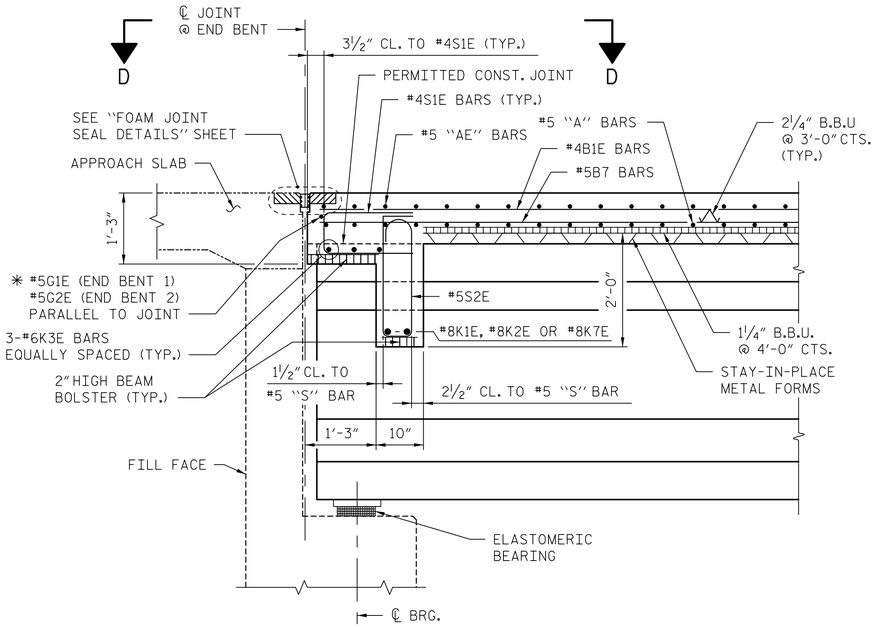
SHEET 1 OF 2 BRIDGE NO. 109

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-48
						TOTAL SHEETS
						86

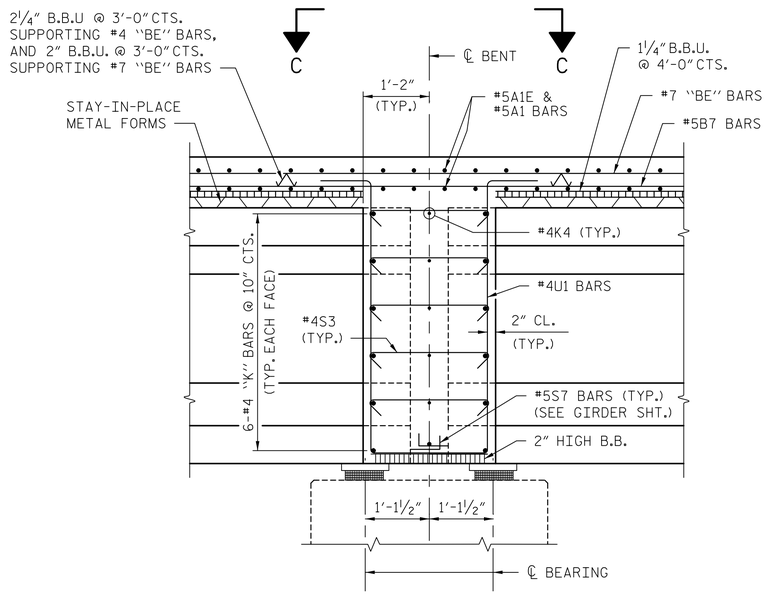
DATE: 1/12/2016
TIME: 8:48:35 AM
USER: kyle.compton
DGN: R:\BrIDge IDs\Cadd\402_DII_U2707_SMU_S48_TS01.dgn



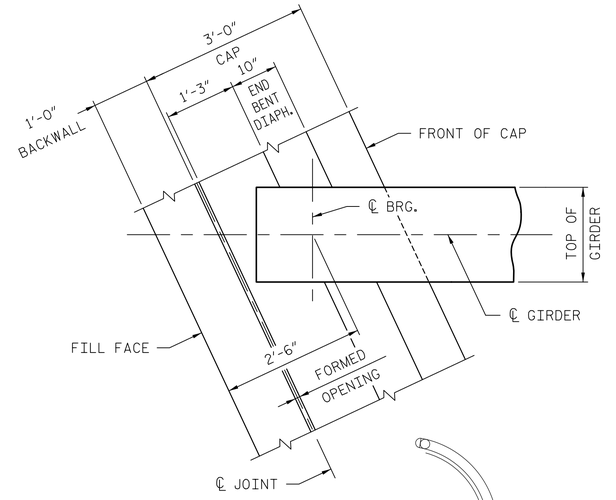
SECTION A-A

(END BENT 1 SHOWN, END BENT 2 SIMILAR)

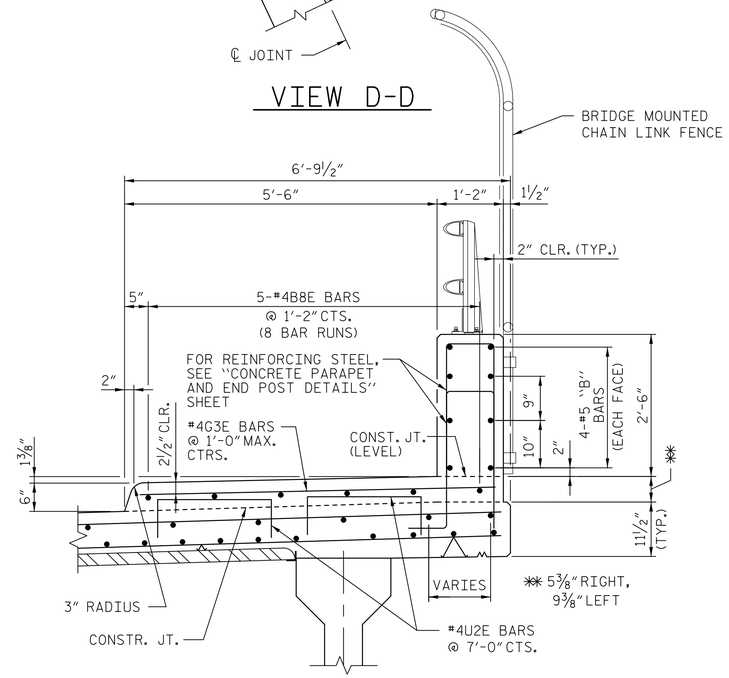
* #5 "G" BARS MAY BE SHIFTED SIGHTLY, AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS.



SECTION B-B

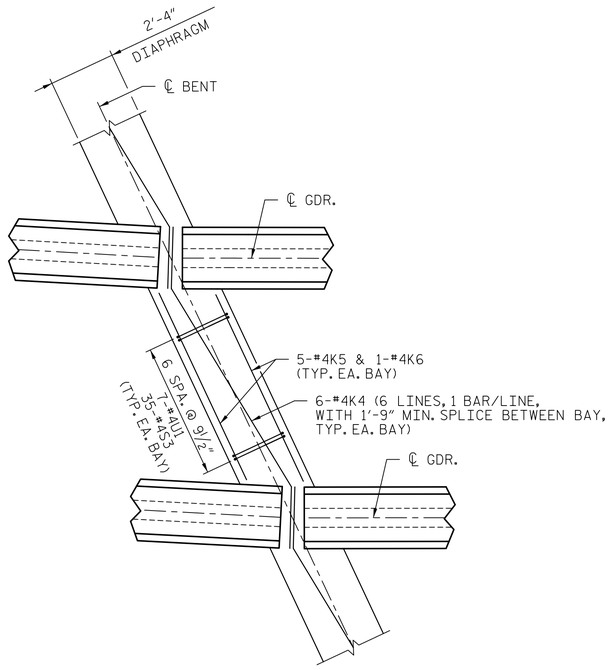


VIEW D-D

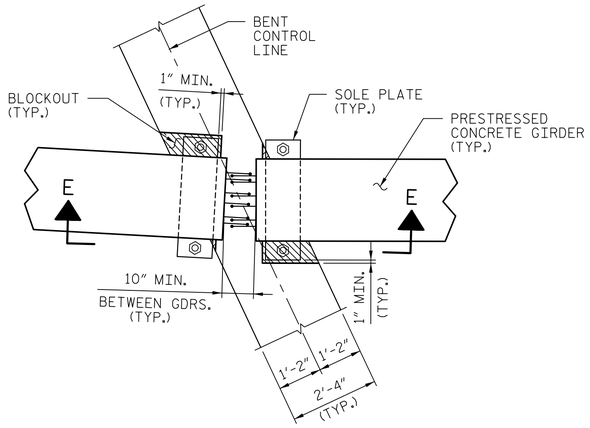


SECTION THRU SIDEWALK

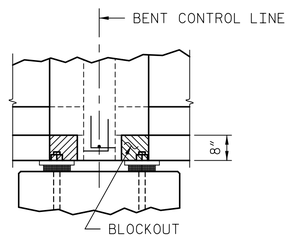
(RIGHT SIDE SHOWN, LEFT SIDE SIMILAR)



VIEW C-C



PLAN VIEW



SECTION E-E

BENT DIAPHRAGM BLOCKOUT DETAIL

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

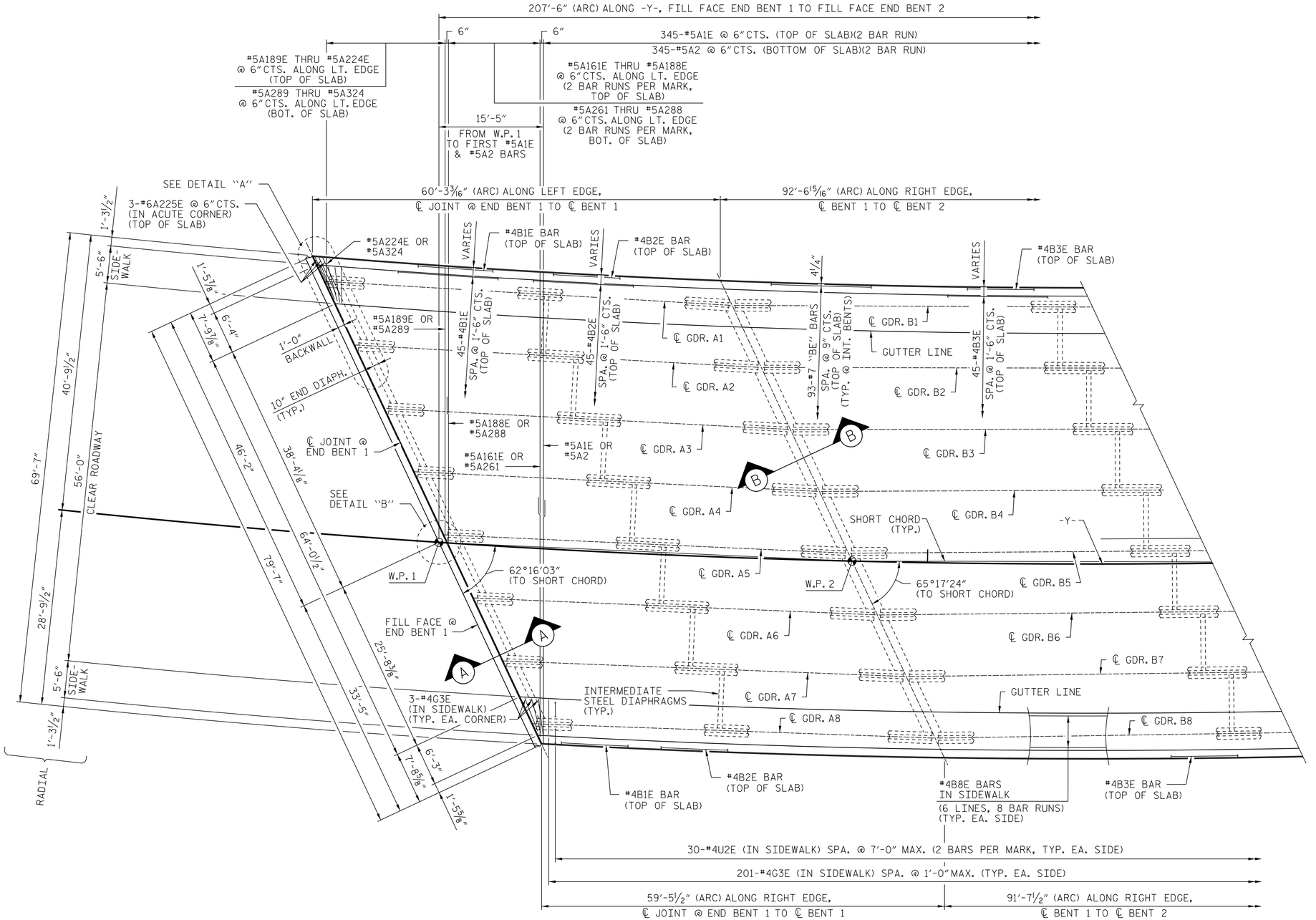
SUPERSTRUCTURE
TYPICAL SECTION DETAILS

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 2 OF 2 BRIDGE NO. 109

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-49
						TOTAL SHEETS
						86

DATE: 1/12/2016
TIME: 8:49:40 AM
USER: kyle_compton
DGN: RKBridge 109Cadd402_013_U2707_SMU_S49_TS02.dgn

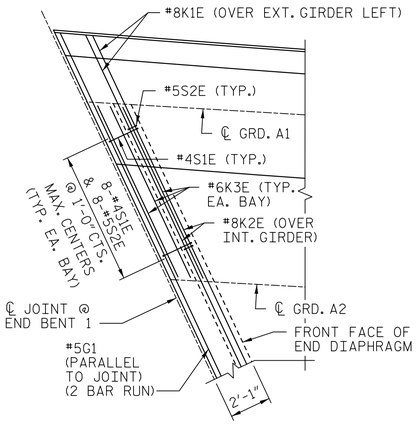


SPAN A

SPAN B

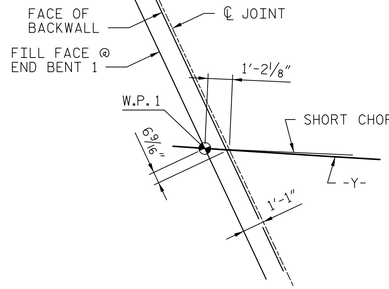
NOTES:

1. FOR POURING SEQUENCE, TRANSVERSE CONST. JOINTS IN DECK SLAB AND TOP "B" BAR LAYOUT, SEE "PLAN OF SPAN DETAILS" SHEET.
2. "A" AND "AE" BARS TO BE PLACED PERPENDICULAR TO -Y-.
3. FOR 2 BAR METAL RAIL PARAPET DIMENSIONS, REINFORCING BAR MARKS AND BAR SPACING, SEE "RAIL POST SPACING AND END POST DETAILS" SHEET.



DETAIL "A"

"A & B" BARS NOT SHOWN



DETAIL "B"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 039474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE PLAN OF SPAN A AND PARTIAL PLAN OF SPAN B

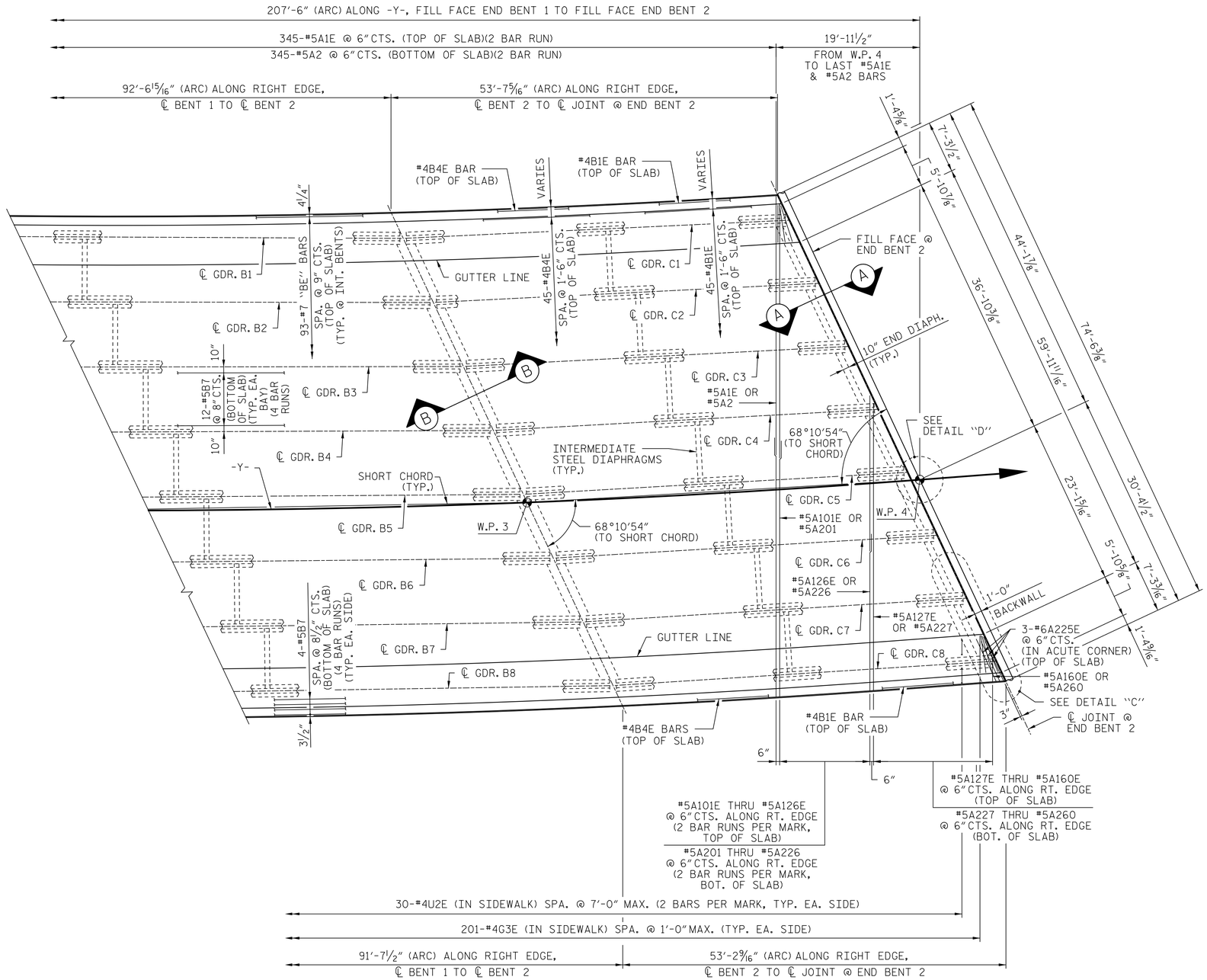
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-50
1	.	.	3			TOTAL SHEETS
2			4			86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DATE: 1/12/2016
TIME: 8:48:44 AM

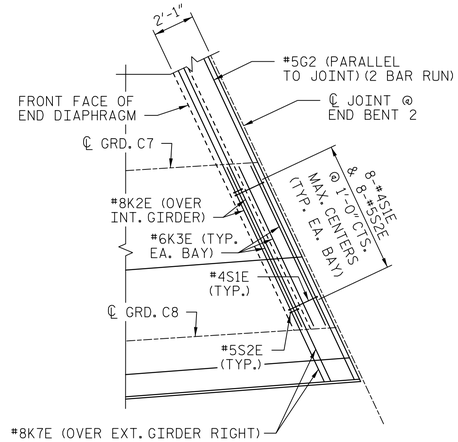
USER: kyle.compton
DGN: R:\Bridge 109\Cad\402_015_U2707_SMU_SSD_PSD.dgn

FOR NOTES, SEE SHEET 1 OF 3.

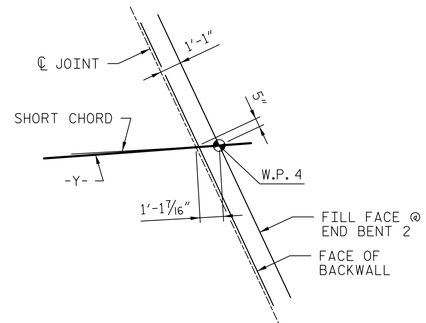


SPAN B

SPAN C



DETAIL "C"
"A & B" BARS NOT SHOWN



DETAIL "D"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

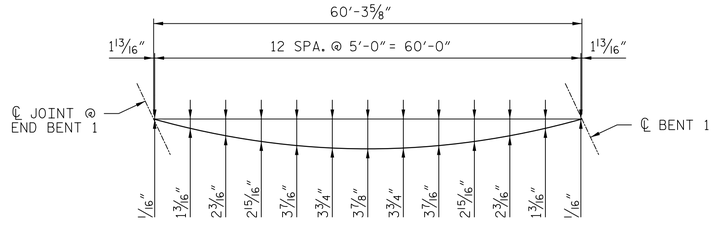
SUPERSTRUCTURE
PARTIAL PLAN OF SPAN B
AND PLAN OF SPAN C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-51
1	.	.	3			TOTAL SHEETS
2			4			86

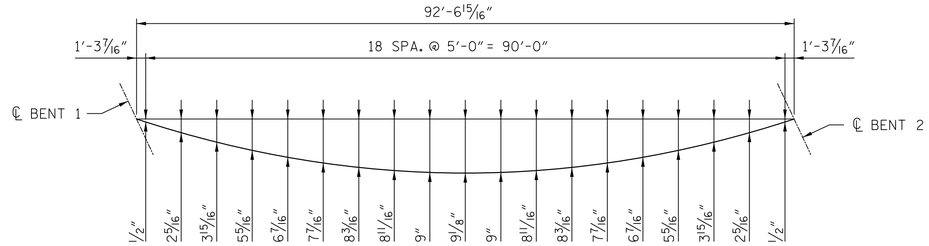
DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

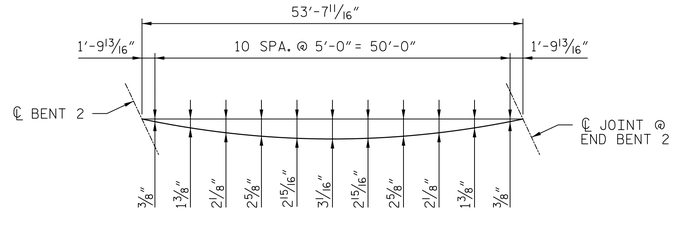
DATE: 1/12/2016
TIME: 8:48:48 AM
USER: kyle.compton
DGN: R:\Bridge 109\Cadd\402_01f_U2707_SMU_S5j_PS02.dgn



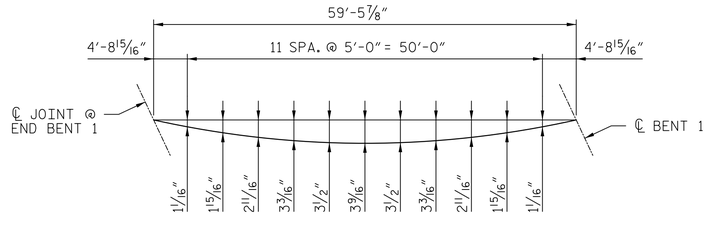
LEFT SIDE - EDGE OF SLAB



LEFT SIDE - EDGE OF SLAB

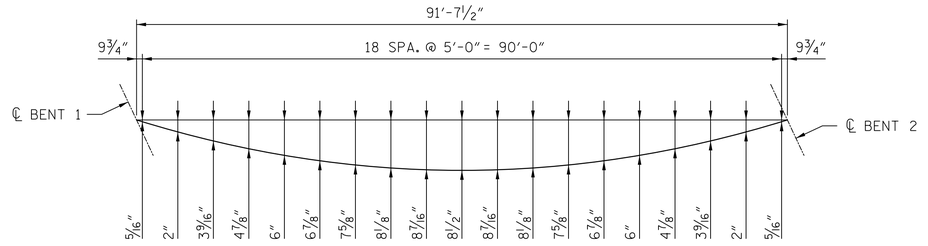


LEFT SIDE - EDGE OF SLAB



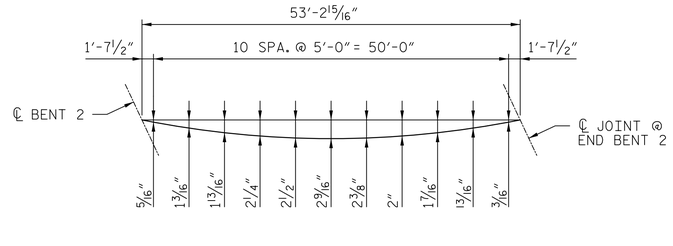
RIGHT SIDE - EDGE OF SLAB

ARC OFFSETS - SPAN A



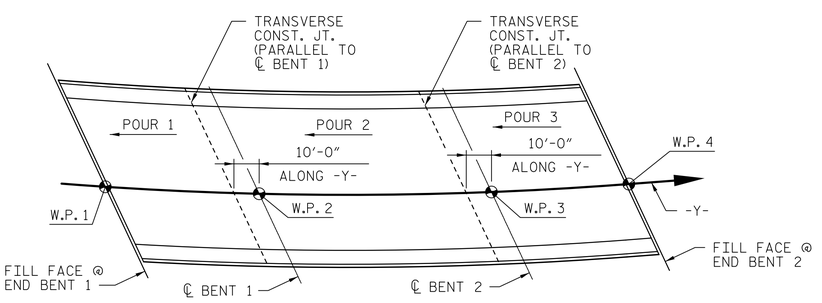
RIGHT SIDE - EDGE OF SLAB

ARC OFFSETS - SPAN B

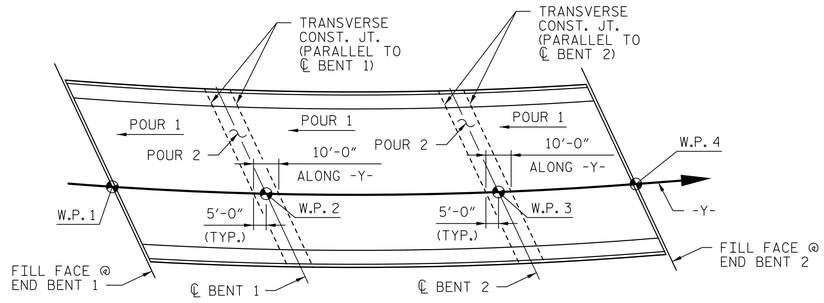


RIGHT SIDE - EDGE OF SLAB

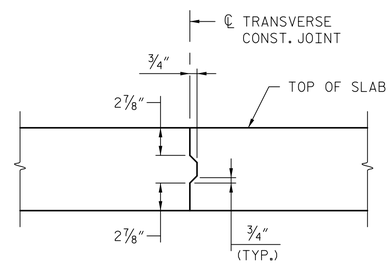
ARC OFFSETS - SPAN C



POURING DIAGRAM



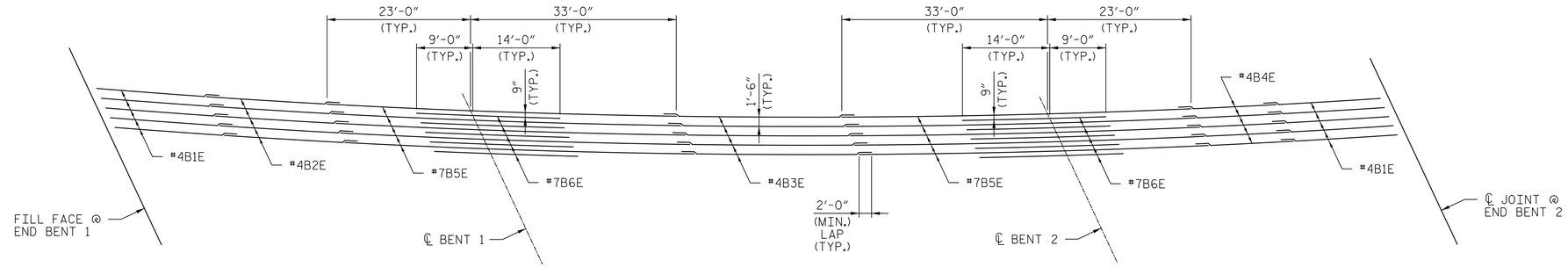
OPTIONAL POURING DIAGRAM



TRANSVERSE CONSTRUCTION JOINT DETAIL

REINFORCING STEEL IN SLAB NOT SHOWN.

LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.



SPAN A SPAN B SPAN C

TOP "B" BAR REINFORCING LAYOUT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN DETAILS

NORTH CAROLINA PROFESSIONAL SEAL D3A474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-52
1	.	.	3			TOTAL SHEETS
2			4			86

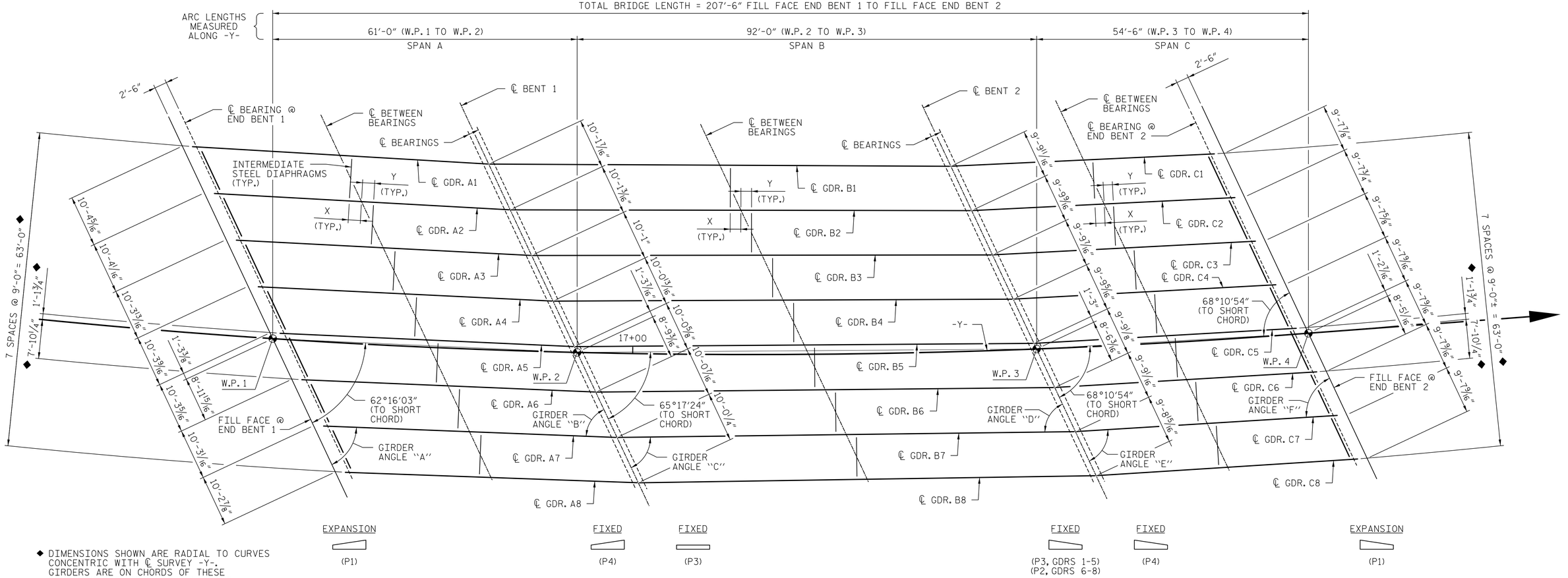
DRAWN BY : DBL DATE : 11/2015
CHECKED BY : JGM DATE : 11/2015

DATE: 1/12/2016
TIME: 8:49:53 AM

USER: kyle.compton
DGN: R:\Bridge 109\Cad\402_D16_U2707_SMU_SSE_PS03.dgn

NOTES:

1. FOR BEARING AND SOLE PLATE SIZES, SEE "ELASTOMERIC BEARING DETAILS" SHEET.



◆ DIMENSIONS SHOWN ARE RADIAL TO CURVES CONCENTRIC WITH ℄ SURVEY -Y-. GIRDERS ARE ON CHORDS OF THESE CONCENTRIC CURVES FOR ALL SPANS.

FRAMING PLAN

	SPAN A		SPAN B		SPAN C	
	X	Y	X	Y	X	Y
G1	-	2'-5 5/16"	-	2'-1 5/8"	-	1'-10 5/16"
G2	2'-5 5/16"	2'-5 1/16"	2'-1 5/8"	2'-1 1/2"	1'-10 5/16"	1'-10 1/8"
G3	2'-5 1/16"	2'-4 13/16"	2'-1 7/16"	2'-1 1/4"	1'-10 1/8"	1'-10"
G4	2'-4 13/16"	2'-4 9/16"	2'-1 1/4"	2'-1 1/16"	1'-10"	1'-9 13/16"
G5	2'-4 5/8"	2'-4 3/8"	2'-1 1/16"	2'-0 7/8"	1'-9 13/16"	1'-9 11/16"
G6	2'-4 3/8"	2'-4 3/16"	2'-0 7/8"	2'-0 11/16"	1'-9 11/16"	1'-9 1/2"
G7	2'-4 1/8"	2'-3 15/16"	2'-0 11/16"	2'-0 1/2"	1'-9 1/2"	1'-9 3/8"
G8	2'-3 15/16"	-	2'-0 1/2"	-	1'-9 3/8"	-

NOTE: DIMENSION X AND Y ARE MEASURED FROM ℄ GIRDERS.

GIRDER	ANGLE "A"	ANGLE "B"	ANGLE "C"	ANGLE "D"	ANGLE "E"	ANGLE "F"
1	61°29'44"	61°29'47"	64°35'43"	64°35'42"	67°33'22"	67°33'19"
2	61°41'32"	61°41'36"	64°46'03"	64°46'03"	67°42'21"	67°42'19"
3	61°53'11"	61°53'15"	64°56'15"	64°56'14"	67°51'13"	67°51'11"
4	62°04'40"	62°04'43"	65°06'18"	65°06'18"	67°59'58"	67°59'56"
5	62°15'58"	62°16'02"	65°16'13"	65°16'13"	68°08'35"	68°08'32"
6	62°27'08"	62°27'11"	65°26'00"	65°25'59"	68°16'38"	68°16'36"
7	62°38'08"	62°38'11"	65°35'39"	65°35'38"	68°24'05"	68°24'03"
8	62°48'58"	62°49'02"	65°45'10"	65°45'09"	68°30'55"	68°30'53"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
FRAMING PLAN

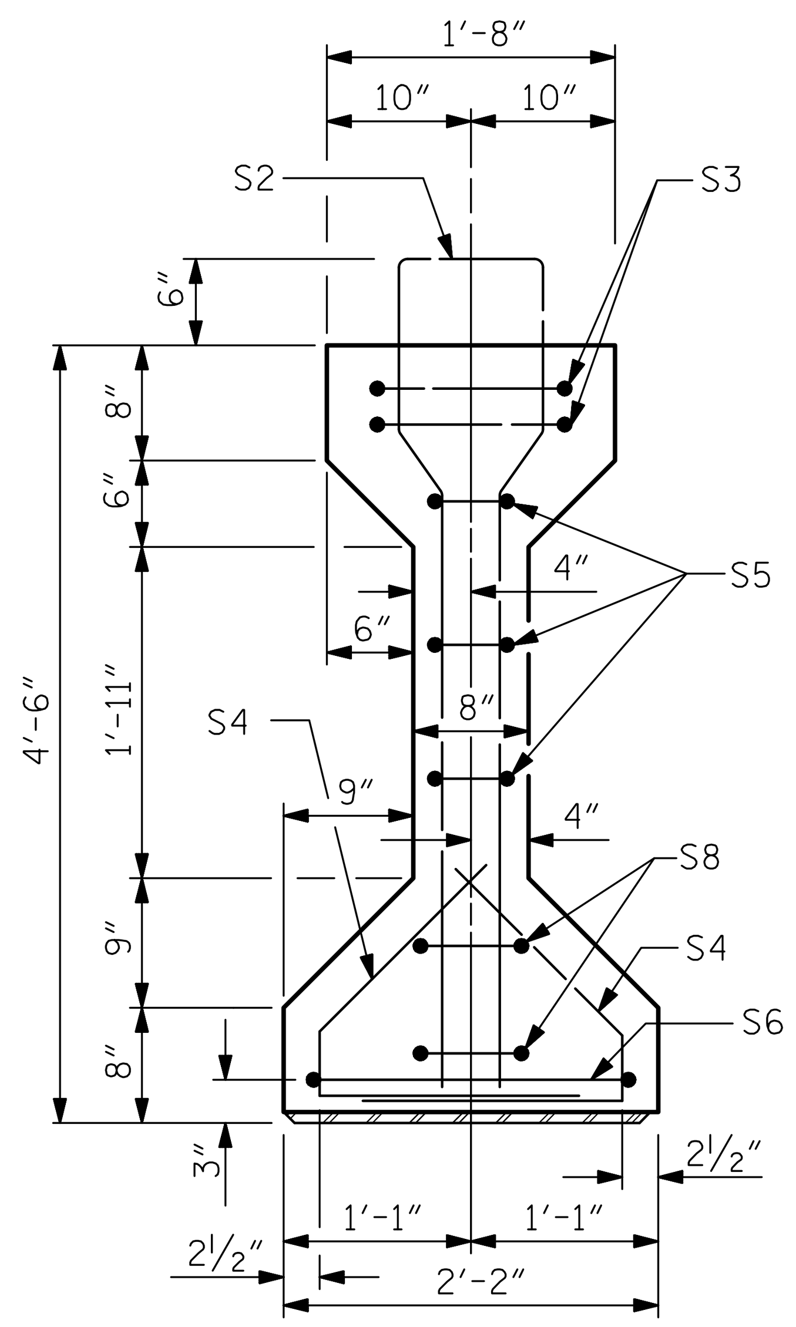
NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 024474 JOHN C. MORRISON ENGINEER
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

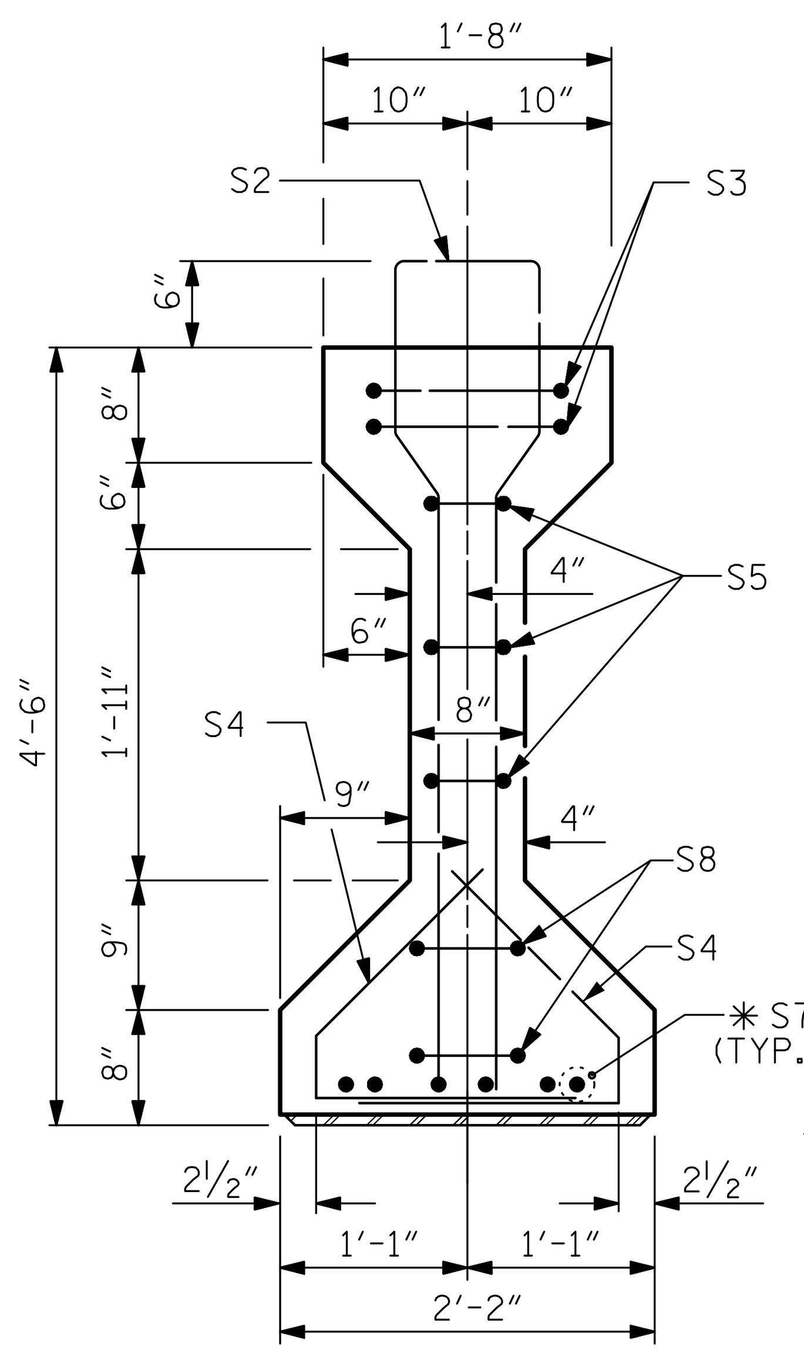
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-53
1	-	-	3			TOTAL SHEETS
2			4			86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

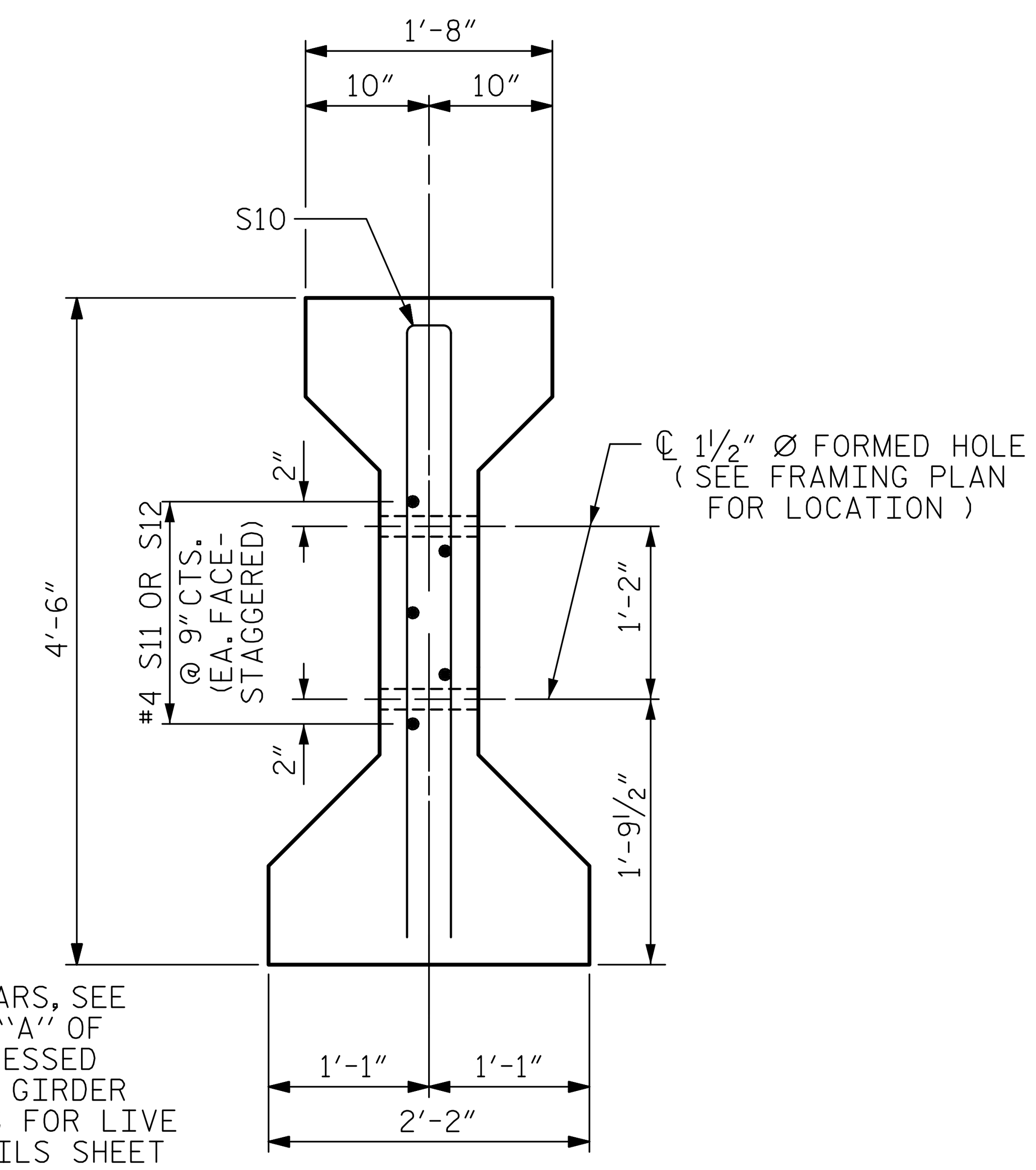
DATE: 1/12/2016
TIME: 8:49:57 AM
USER: kyle_compton
DGN: R:\Bridge 109\Cad\402_02\U2707_SMU_S53_FP01.dgn



SECTION A-A



SECTION B-B

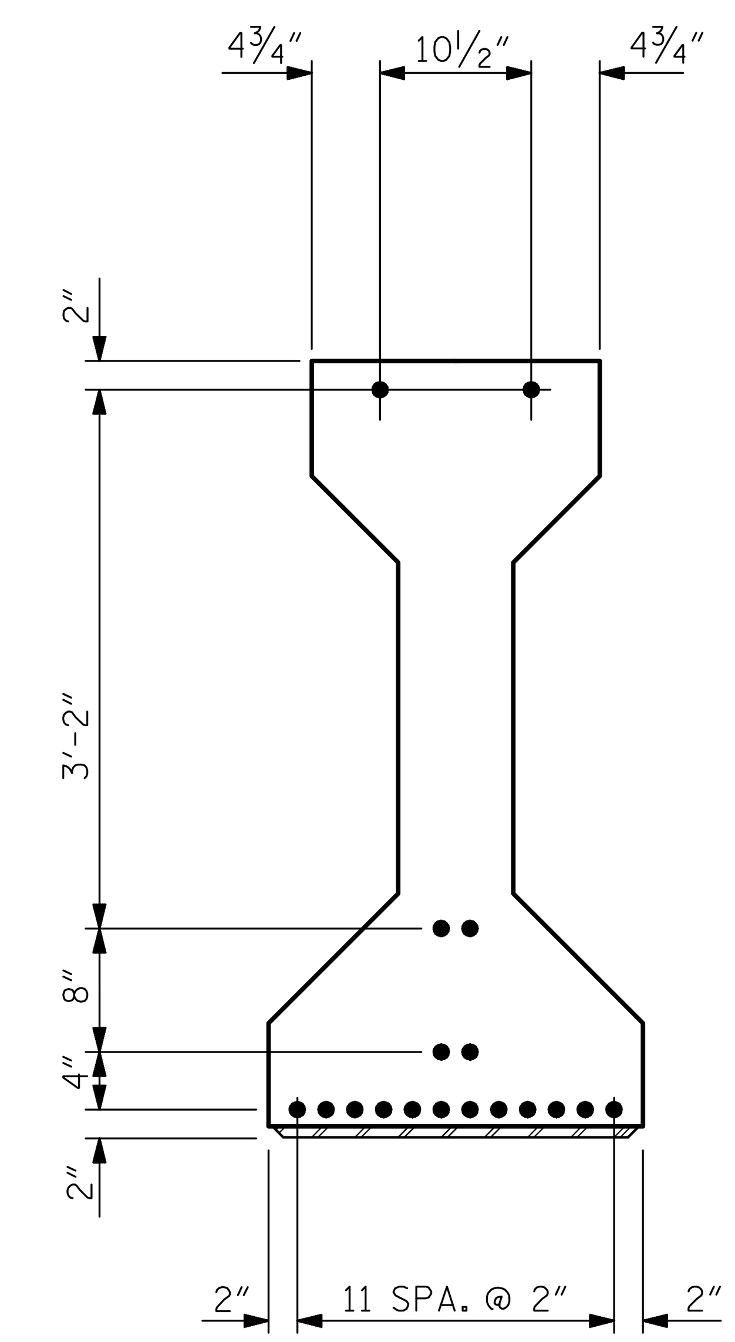


✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

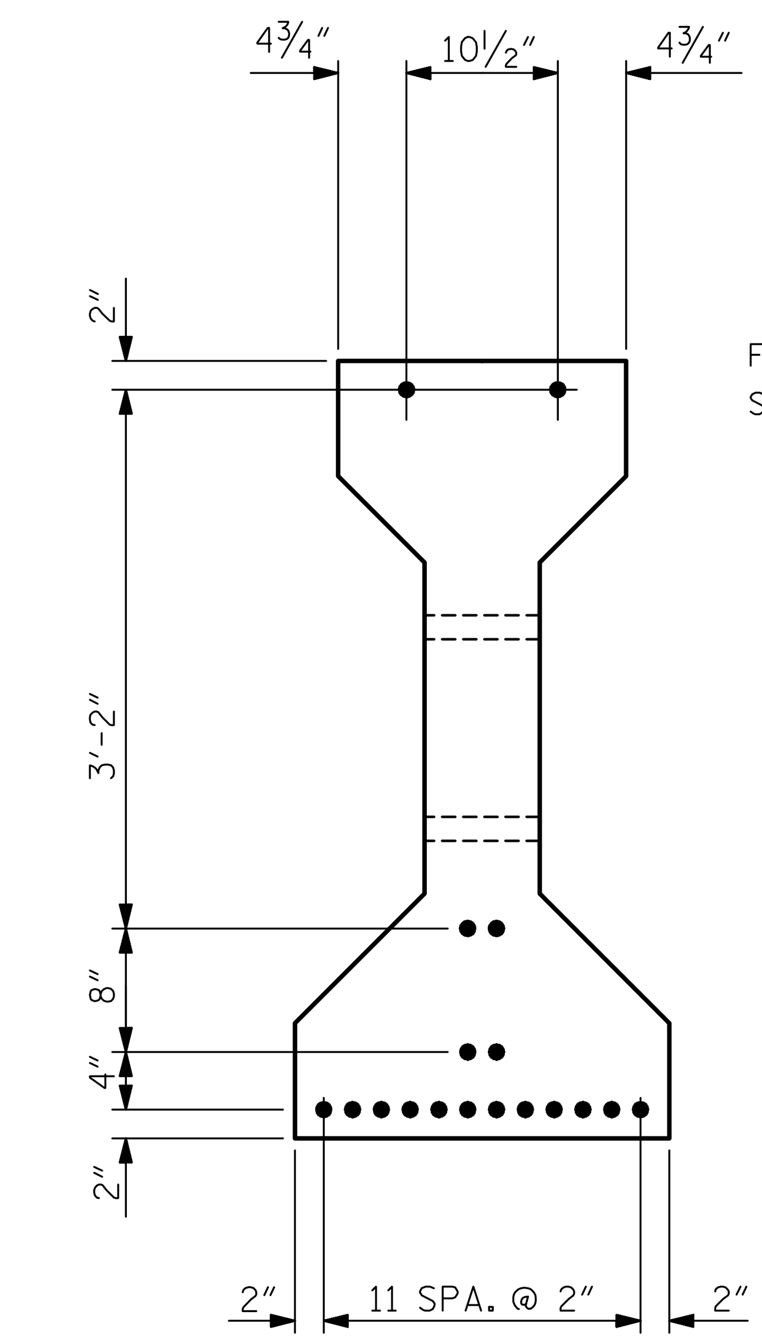
SECTION C-C

(S1 BARS NOT SHOWN)

GDR.	"A"	"B"
A1	58'-10½"	29'-5¼"
A2	58'-9¼"	29'-4⅝"
A3	58'-8"	29'-4"
A4	58'-6¾"	29'-3⅜"
A5	58'-5½"	29'-2¾"
A6	58'-4½"	29'-2¼"
A7	58'-3¼"	29'-1⅝"
A8	58'-2"	29'-1"



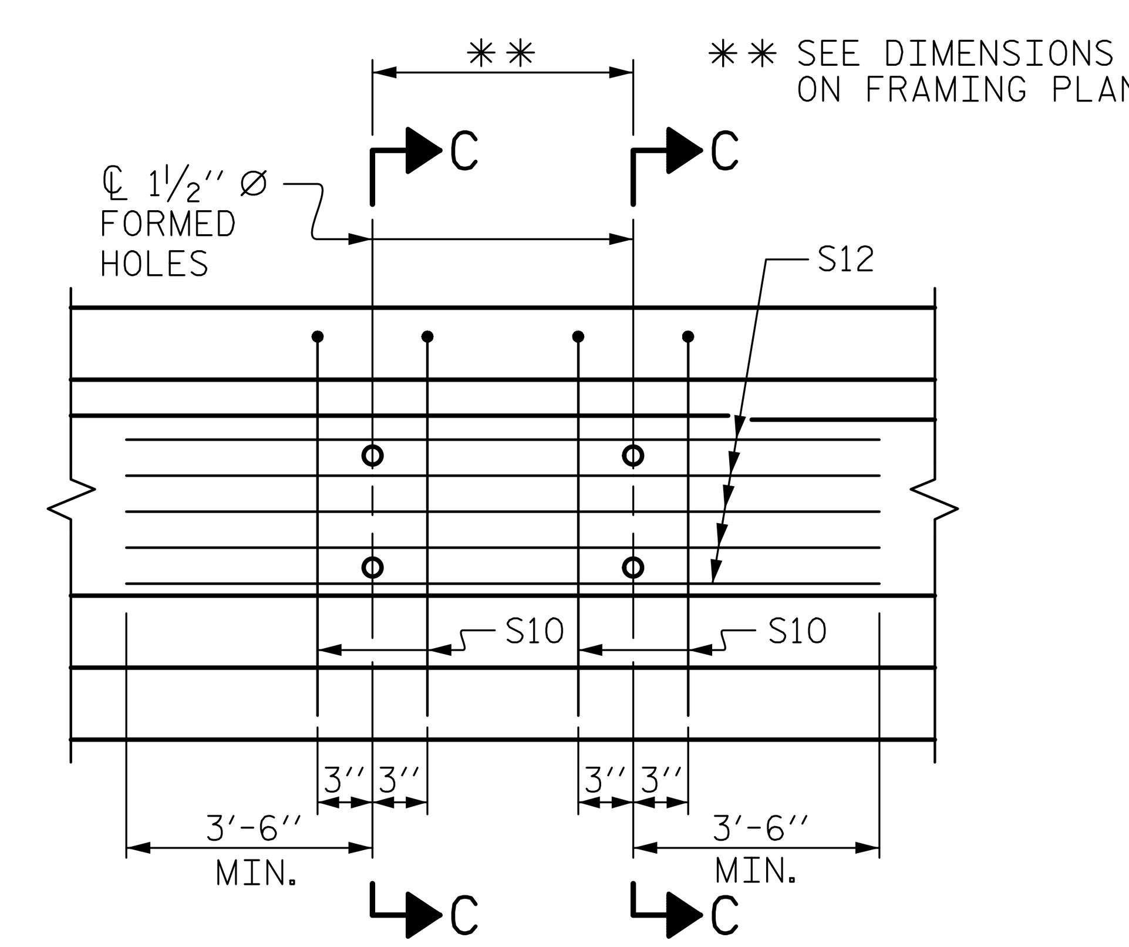
AT END OF GIRDER



AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

● FULLY BONDED STRANDS



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. A2-A7

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

FOR NOTES, SEE SHEET 4 OF 5.

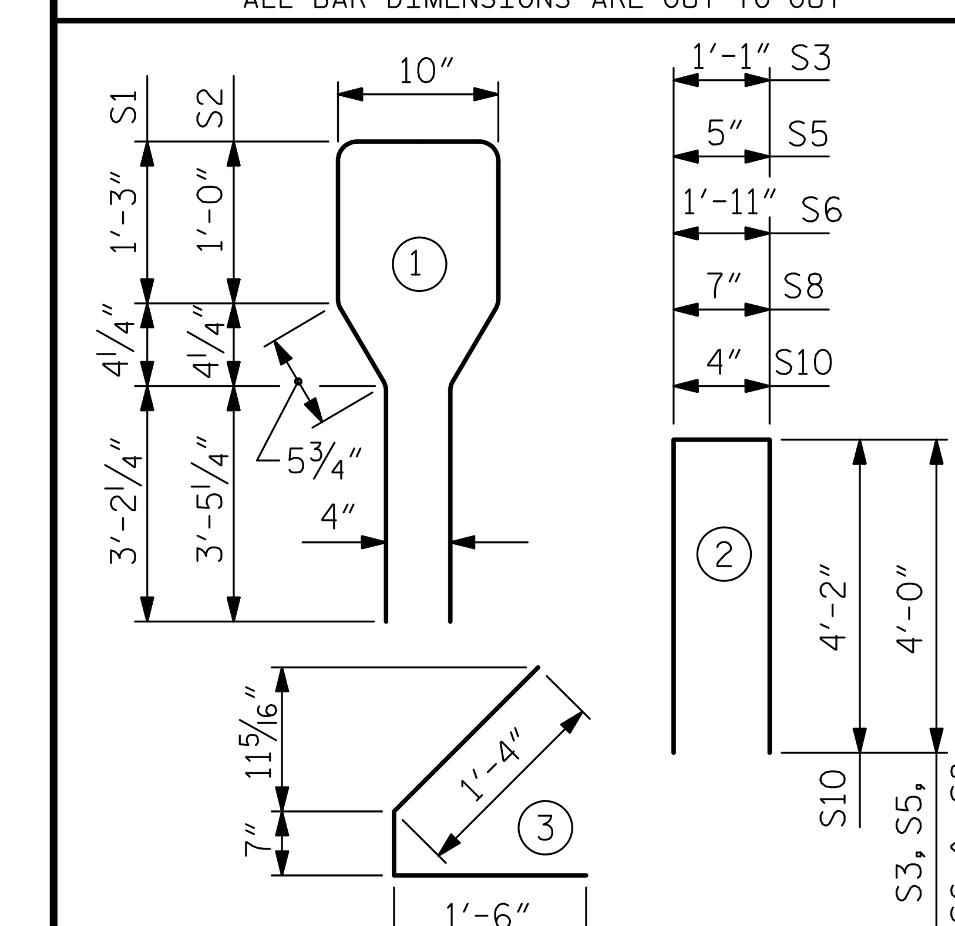
REINFORCING STEEL FOR ONE GIRDER

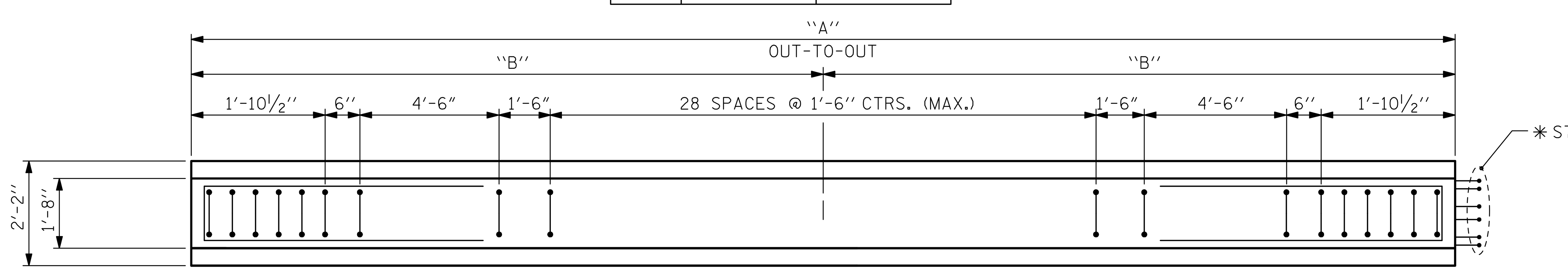
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	49	#4	1	10'-8"	349
	S2	12	#6	1	10'-8"	192
	S3	4	#4	2	9'-1"	24
	S4	64	#4	3	3'-5"	146
	S5	6	#4	2	8'-5"	34
	S6	1	#4	2	9'-11"	7
	✱ S7	6	#5	STR	3'-8"	23
	S8	4	#4	2	8'-7"	23
	S9	1	#3	STR	1'-10"	1
EXTERIOR GDR.	S10	2	#5	2	8'-8"	18
INTERIOR GDR.	S10	4	#5	2	8'-8"	36
EXTERIOR GDR.	S11	5	#4	STR	7'-0"	23
INTERIOR GDR.	S12	5	#4	STR	12'-0"	40

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

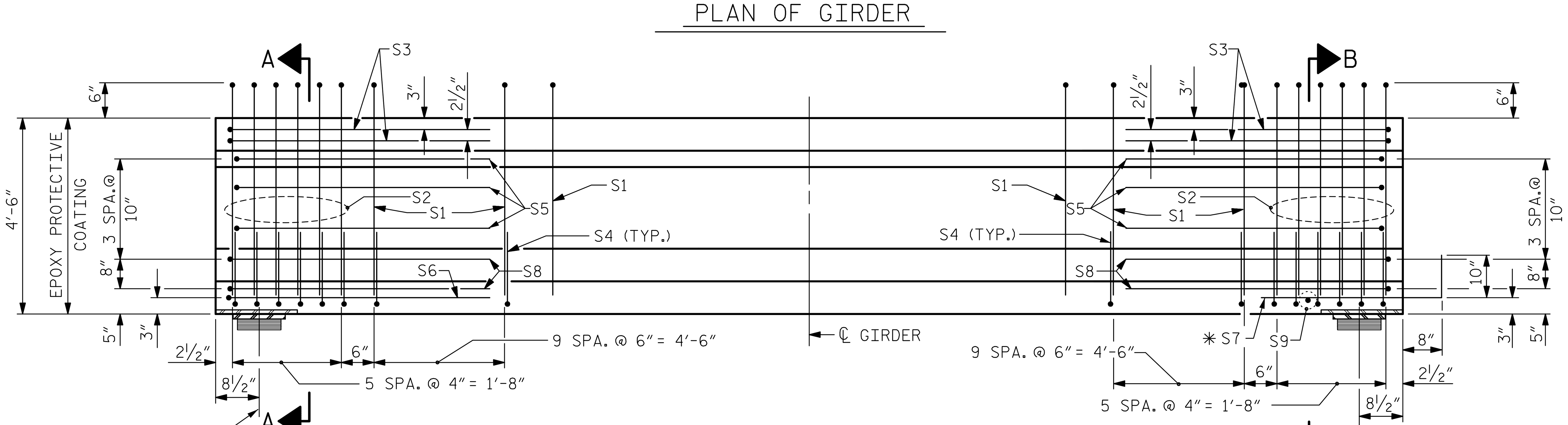
BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT





PLAN OF GIRDER

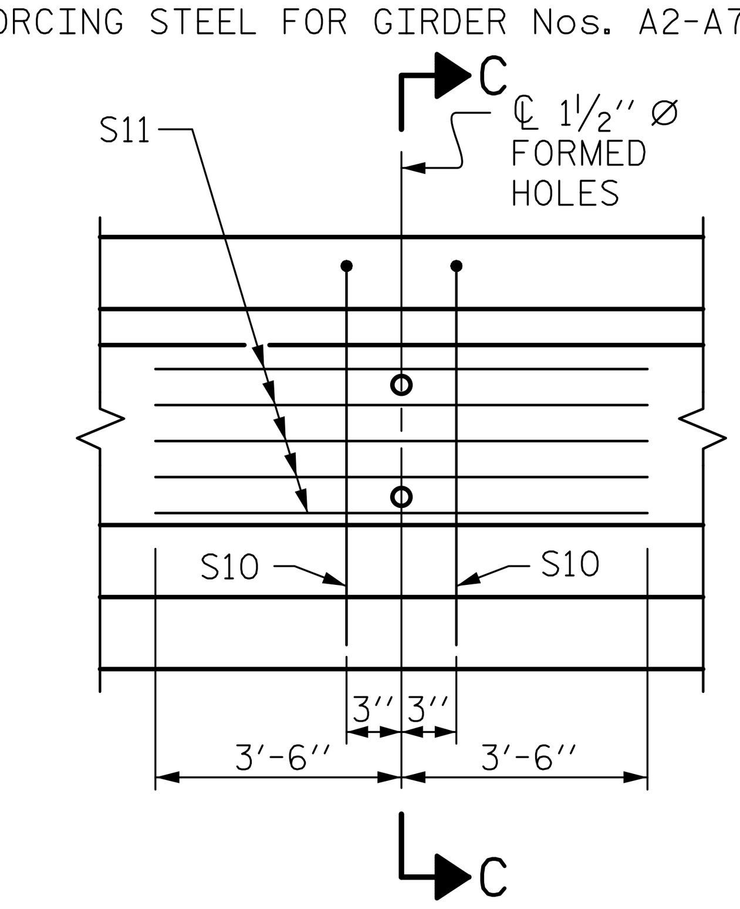


EXP.

ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

FIX



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. A1 & A8

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	6000 PSI CONCRETE	0.6" Ø L. R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	840	11.9 (AVG.)	18
INTERIOR GIRDER	875	11.9 (AVG.)	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
8	SEE TABLE	468'-1¾"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 5 BRIDGE NO. 109

AECOM

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S-54

TOTAL SHEETS 86

STD. NO. PCG6

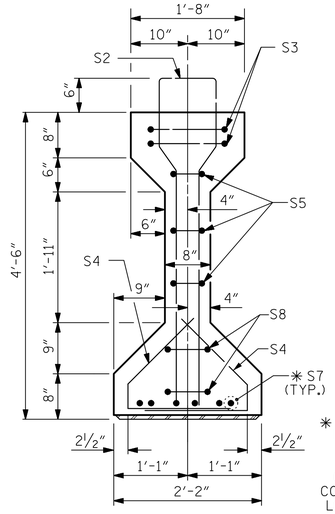
ASSEMBLED BY : KHC DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DRAWN BY : ELR 8/91
CHECKED BY : GRP 8/91

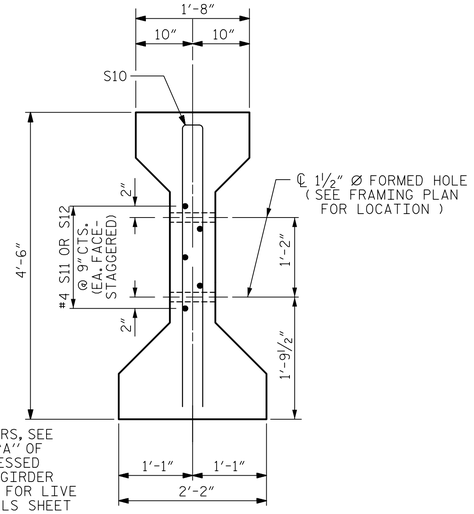
REV. 5/1/06R TLA/GM
REV. 10/1/11 MAA/GM
REV. 1/15 MAA/TMG

DATE: 1/12/2016
TIME: 8:50:03 AM

USER: kyle.compton
DGN: R:\Drafting\09Docs\402.023_U2707_SMU_S54_PCG01.dgn



SECTION B-B

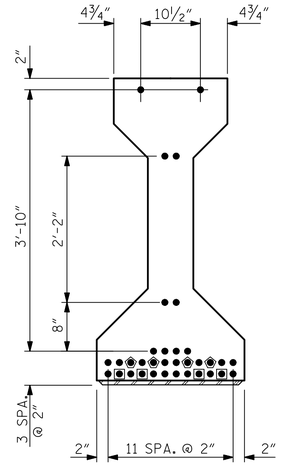


✳ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

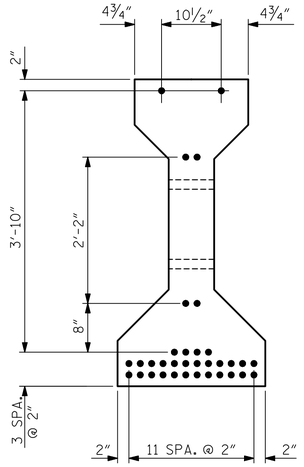
SECTION C-C

(S1 BARS NOT SHOWN)

GDR.	"A"	"B"
B1	91'-8¼"	45'-10⅛"
B2	91'-6½"	45'-9¼"
B3	91'-5"	45'-8½"
B4	91'-3½"	45'-7¾"
B5	91'-2"	45'-7"
B6	91'-0½"	45'-6¼"
B7	90'-11¼"	45'-5⅜"
B8	90'-9¾"	45'-4⅞"



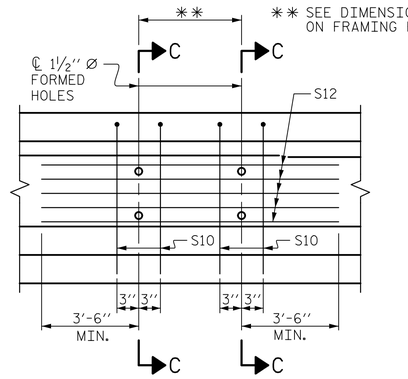
AT END OF GIRDER



AT ℄ OF GIRDER

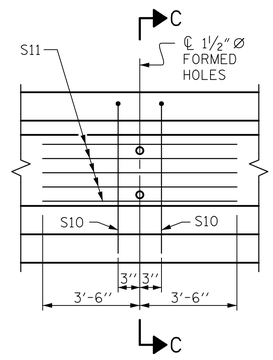
0.6"Ø LOW RELAXATION STRAND LAYOUT

- ● FULLY BONDED STRANDS
- ◙ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER



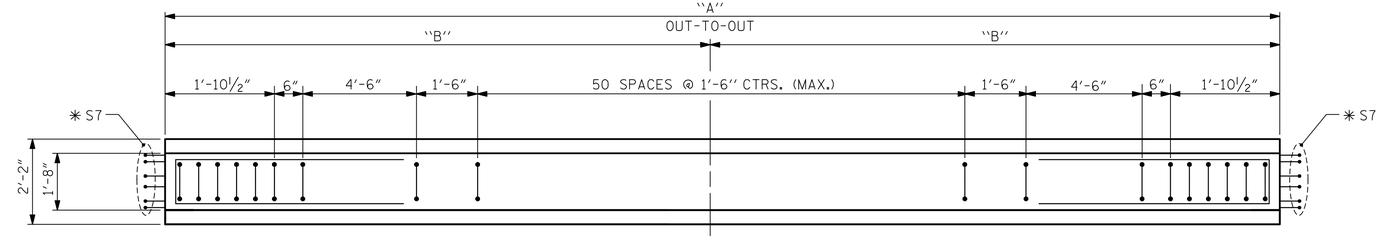
PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. B2-B7

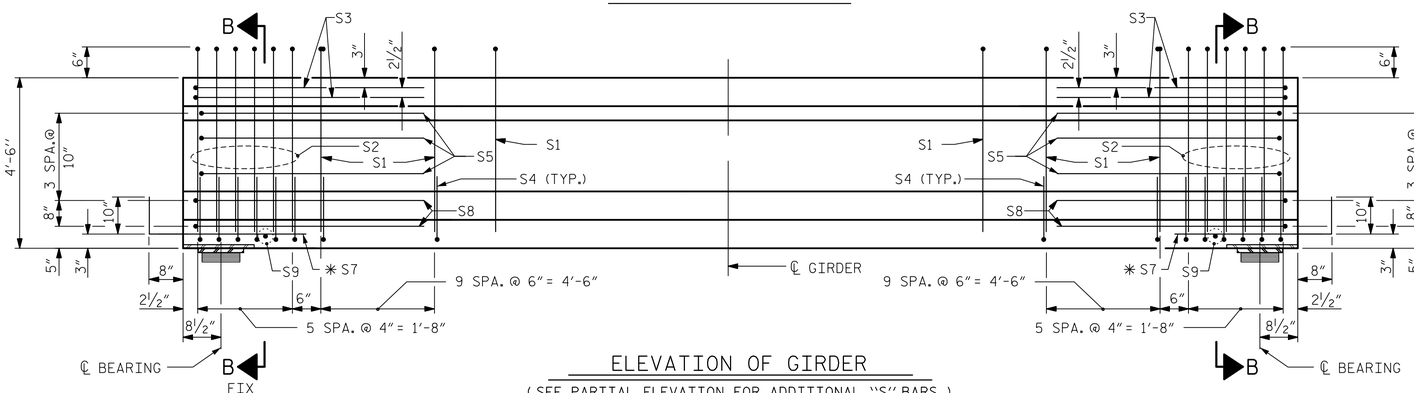


PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. B1 & B8



PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

FOR NOTES, SEE SHEET 4 OF 5.

0.6"Ø L. R. GRADE 270 STRANDS

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

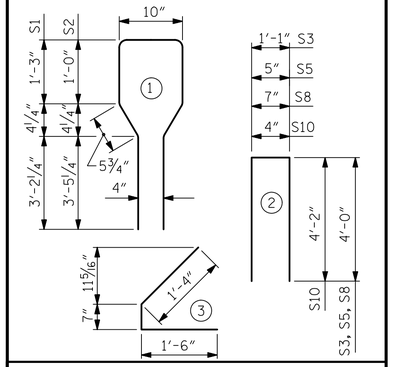
REINFORCING STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	71	#4	1	10'-8"	506
	S2	12	#6	1	10'-8"	192
	S3	4	#4	2	9'-1"	24
	S4	64	#4	3	3'-5"	146
	S5	6	#4	2	8'-5"	34
	✳ S7	12	#5	STR	3'-8"	46
	S8	4	#4	2	8'-7"	23
	S9	2	#3	STR	1'-10"	1
EXTERIOR GDR.	S10	2	#5	2	8'-8"	18
INTERIOR GDR.	S10	4	#5	2	8'-8"	36
EXTERIOR GDR.	S11	5	#4	STR	7'-0"	23
INTERIOR GDR.	S12	5	#4	STR	12'-0"	40

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	7000 PSI CONCRETE C.Y.	0.6"Ø L.R. STRANDS No.
EXTERIOR GIRDER	1013	18.5 (AVG.)	34
INTERIOR GIRDER	1048	18.5 (AVG.)	34

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
8	SEE TABLE	729'-10¾"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 5 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 27474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

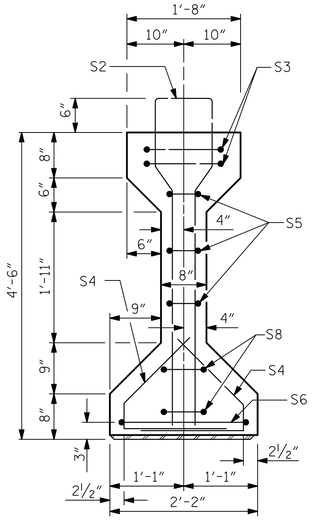
STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN B

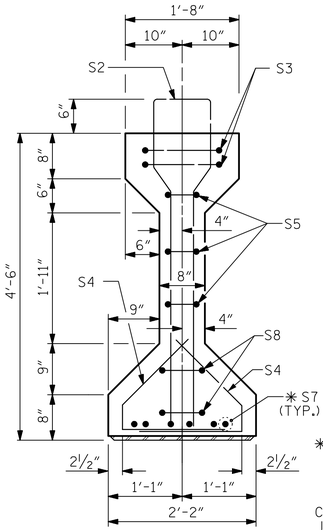
ASSEMBLED BY : KHC	DATE : 11/2015
CHECKED BY : JCM	DATE : 11/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-55
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG6



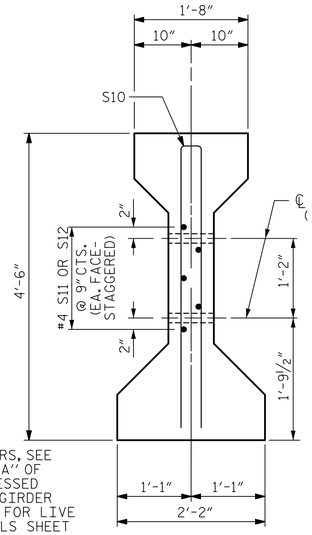
SECTION A-A



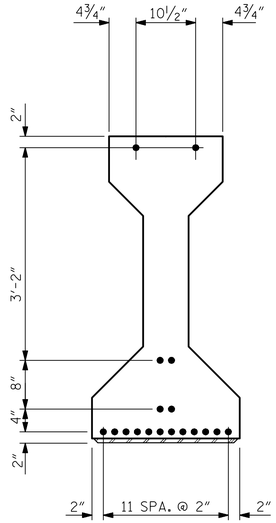
SECTION B-B

GDR.	"A"	"B"
C1	52'-4"	26'-2"
C2	52'-3¼"	26'-1⅝"
C3	52'-2½"	26'-1¼"
C4	52'-2"	26'-1"
C5	52'-1¼"	26'-0⅝"
C6	52'-0¾"	26'-0⅜"
C7	52'-0¼"	26'-0⅛"
C8	52'-0¼"	26'-0⅛"

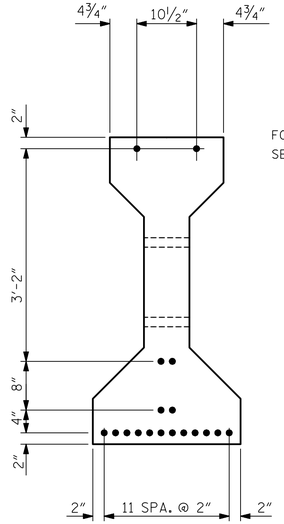
✱ FOR S7 BARS, SEE DETAIL "A" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET



SECTION C-C
(S1 BARS NOT SHOWN)



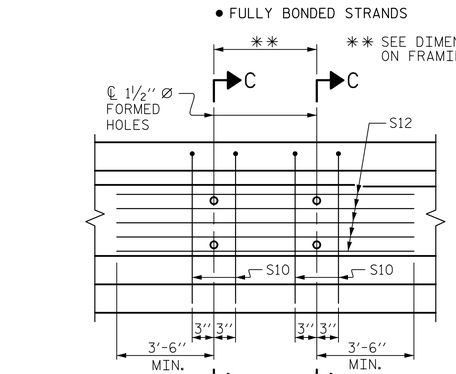
AT END OF GIRDER



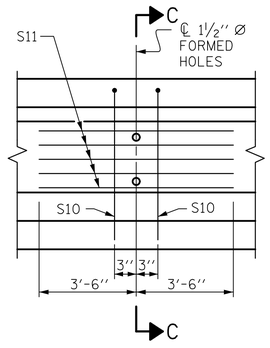
AT ℄ OF GIRDER

FOR NOTES, SEE SHEET 4 OF 5.

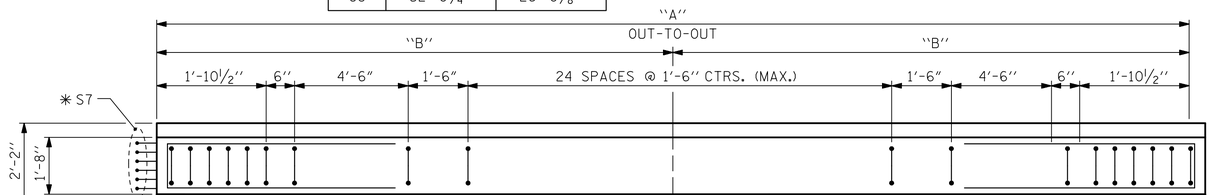
0.6" Ø LOW RELAXATION STRAND LAYOUT



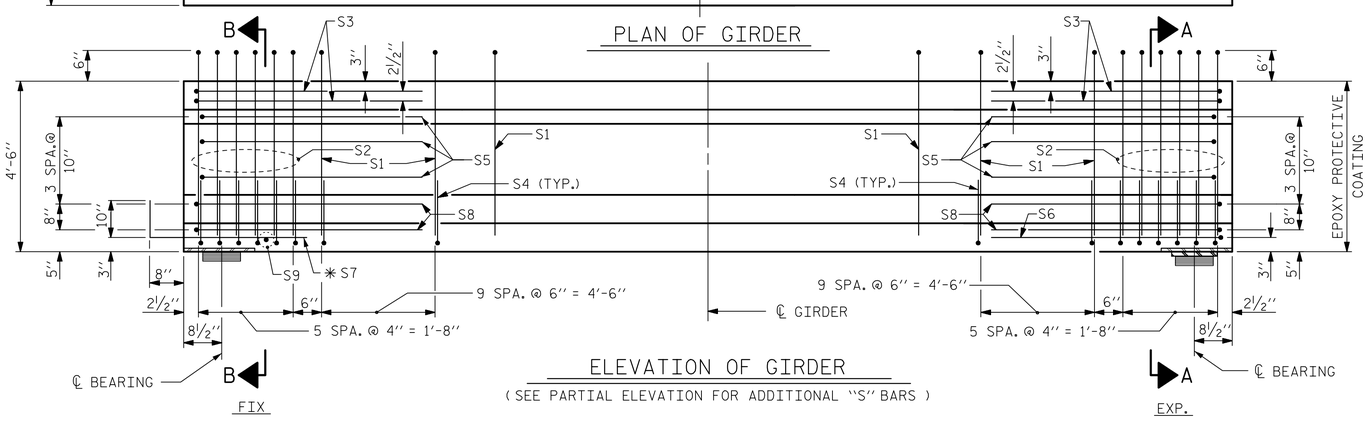
PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. C2-C7



PARTIAL ELEVATION
SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. C1 & C8



PLAN OF GIRDER



ELEVATION OF GIRDER
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)

0.6" Ø L. R. GRADE 270 STRANDS

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

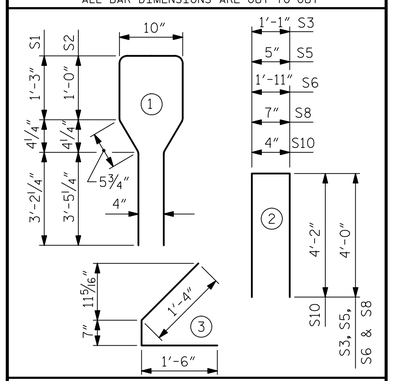
REINFORCING STEEL FOR ONE GIRDER

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	45	#4	1	10'-8"	321
	S2	12	#6	1	10'-8"	192
	S3	4	#4	2	9'-1"	24
	S4	64	#4	3	3'-5"	146
	S5	6	#4	2	8'-5"	34
	S6	1	#4	2	9'-11"	7
	✱S7	6	#5	STR	3'-8"	23
	S8	4	#4	2	8'-7"	23
	S9	1	#3	STR	1'-10"	1
EXTERIOR GDR.	S10	2	#5	2	8'-8"	18
INTERIOR GDR.	S10	4	#5	2	8'-8"	36
EXTERIOR GDR.	S11	5	#4	STR	7'-0"	23
INTERIOR GDR.	S12	5	#4	STR	12'-0"	40

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	6000 PSI CONCRETE C.Y.	0.6"Ø L.R. STRANDS No.
EXTERIOR GIRDER	812	10.6 (AVG.)	18
INTERIOR GIRDER	847	10.6 (AVG.)	18

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
8	SEE TABLE	417'-2¼"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 5 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039474 JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

AASHTO TYPE IV
PRESTRESSED CONCRETE GIRDER
CONTINUOUS FOR LIVE LOAD
SPAN C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-56
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG6

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : KHC	DATE : 11/2015
CHECKED BY : JCM	DATE : 11/2015
DRAWN BY : ELR 8/91	REV. 5/1/06R TLA/GM
CHECKED BY : GRP 8/91	REV. 10/1/11 MAA/GM
	REV. 1/15 MAA/TMG

DATE: 1/12/2016
TIME: 8:50:07 AM
USER: kyle.compton
DGN: R:\Bridge 109\Cad\402_027_U2707_SMU_S56_PCG03.dgn

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPAN A GIRDERS 1, 3 - 6, & 8										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.018	0.034	0.047	0.055	0.058	0.055	0.047	0.034	0.018	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.006	0.013	0.018	0.021	0.022	0.021	0.018	0.013	0.006	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	1/8″	1/4″	3/8″	7/16″	7/16″	7/16″	3/8″	1/4″	1/8″	0″

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPAN A GIRDERS 2 & 7										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.018	0.034	0.047	0.055	0.058	0.055	0.047	0.034	0.018	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.006	0.013	0.018	0.022	0.023	0.022	0.018	0.013	0.006	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	1/8″	1/4″	3/8″	3/8″	7/16″	3/8″	3/8″	1/4″	1/8″	0″

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPAN B GIRDERS 1, 2, 7, & 8										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.055	0.104	0.143	0.167	0.175	0.167	0.143	0.104	0.055	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.037	0.074	0.102	0.121	0.127	0.121	0.102	0.074	0.037	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	3/8″	3/8″	1/2″	9/16″	9/16″	9/16″	1/2″	3/8″	3/16″	0″

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPANS B GIRDERS 3 & 6										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.055	0.104	0.143	0.167	0.175	0.167	0.143	0.104	0.055	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.037	0.072	0.101	0.118	0.125	0.118	0.101	0.072	0.037	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	1/4″	3/8″	1/2″	9/16″	5/8″	9/16″	1/2″	3/8″	1/4″	0″

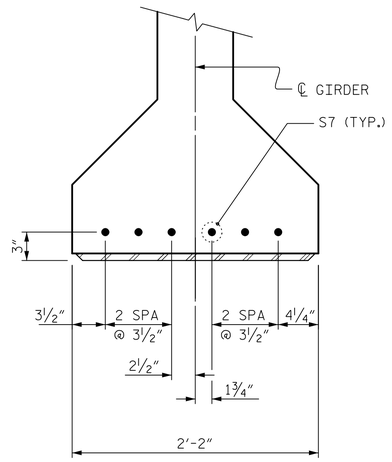
DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPAN B GIRDERS 4 - 5										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.055	0.104	0.143	0.167	0.175	0.167	0.143	0.104	0.055	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.035	0.068	0.095	0.111	0.117	0.111	0.095	0.068	0.035	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	1/4″	7/16″	9/16″	11/16″	11/16″	11/16″	9/16″	7/16″	1/4″	0″

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6″ DIA. LOW-RELAXATION	SPAN C GIRDERS 1 - 8										
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.016	0.030	0.041	0.048	0.050	0.048	0.041	0.030	0.016	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED DL ↓	0.000	0.004	0.008	0.011	0.013	0.014	0.013	0.011	0.008	0.004	0.000
FINAL CAMBER (OR DEFLECTION) ↑	0″	1/8″	1/4″	3/8″	7/16″	7/16″	7/16″	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).



DETAIL ″A″
(FOR AASHTO TYPE IV GIRDERS)

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.

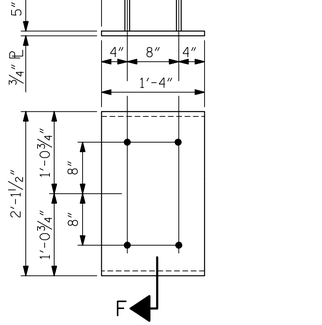
ANCHOR STUDS SHALL CONFORM TO AASHTO M169 GRADES 1010 THROUGH 1020 OR APPROVED EQUAL, AND SHALL MEET THE TYPE ″B″ REQUIREMENTS OF SUBSECTION 7.3 OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.

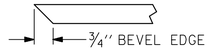
AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2″ BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4500 PSI FOR SPAN A & C, AND 5500 PSI FOR SPAN B.

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″.





SECTION ″F″
(SEE NOTES)

EMBEDDED PLATE ″B-1″ DETAILS FOR AASHTO TYPE IV GIRDER
(2 REQ′D PER GIRDER)

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 4 OF 5 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL DocuSigned by: 030474 John C. Morrison ENGINEER JOHN C. MORRISON
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

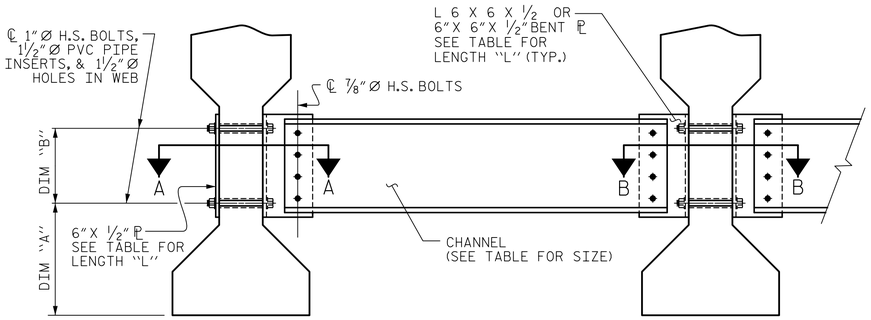
PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS AND DEAD LOAD DEFLECTION TABLES

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-57
1			3			TOTAL SHEETS
2			4			86

STD. NO. PCG9

ASSEMBLED BY : MKT	DATE : 12/2015		
CHECKED BY : JCM	DATE : 12/2015		
DRAWN BY : ELR 11/91	REV. 10/1/11	MAA/GM	
CHECKED BY : GRP 11/91	REV. 1/15	MAA/TMG	
	REV. 2/15	MAA/TMG	

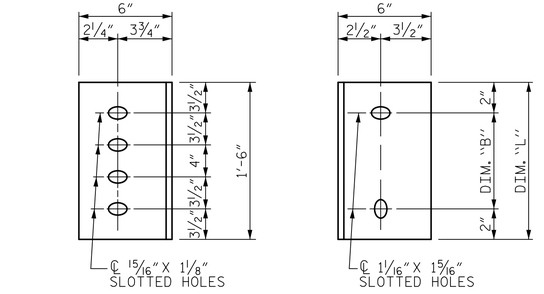
DATE: 1/12/2016
TIME: 8:56:40 AM
USER: kyle.compton
DGN: R:\Bridge 109\Cad\m402_029_U2707_SMU_S57_PCG04.dgn



EXTERIOR GIRDER INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM

(TYPE IV GIRDER SHOWN)



DIAPHRAGM FACE (TYPE IV GDR.) WEB FACE

CONNECTOR PLATE DETAILS

STRUCTURAL STEEL NOTES

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

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

TENSION ON THE ASTM A449 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL ¼ TURN.

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

FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISION AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

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

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

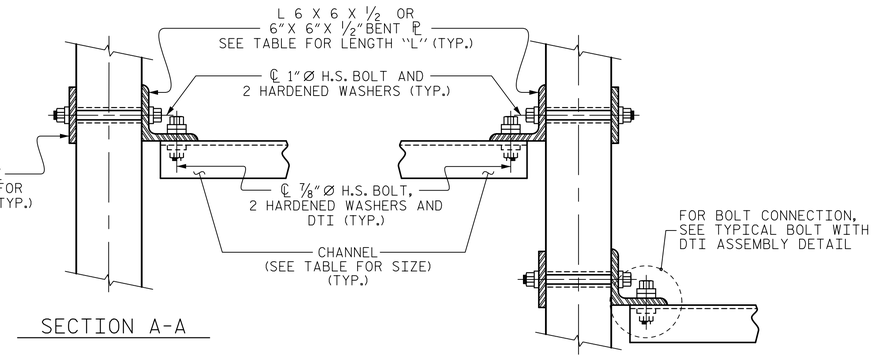
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST ¼" PROJECTION BEYOND THE NUT.

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

CONTRACTOR SHALL 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, TEMPORARY STRUTS SHALL BE PLACED BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED. ALL AASHTO M164 H.S. BOLTS SHALL BE FULLY TIGHTENED AFTER THE STRUTS HAVE BEEN REMOVED.

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

(FOR SKEW < 70° OR SKEW > 110°)

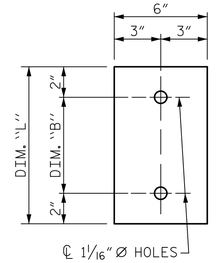
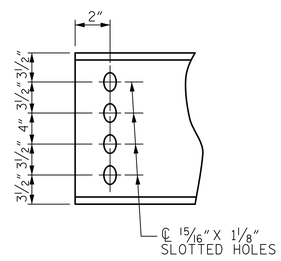


PLATE DETAILS

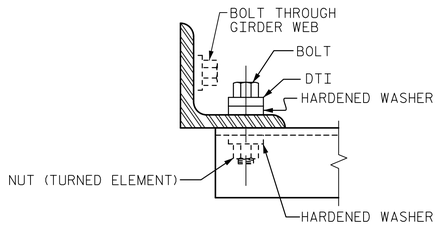


CHANNEL END

(TYPE IV GDR.)

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 × 42.7	1'-9½"	1'-2"	1'-6"



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 5 OF 5 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 030474 John C. Morrison ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR TYPE IV PRESTRESSED CONCRETE GIRDERS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-58
1	.	.	3			TOTAL SHEETS
2			4			86

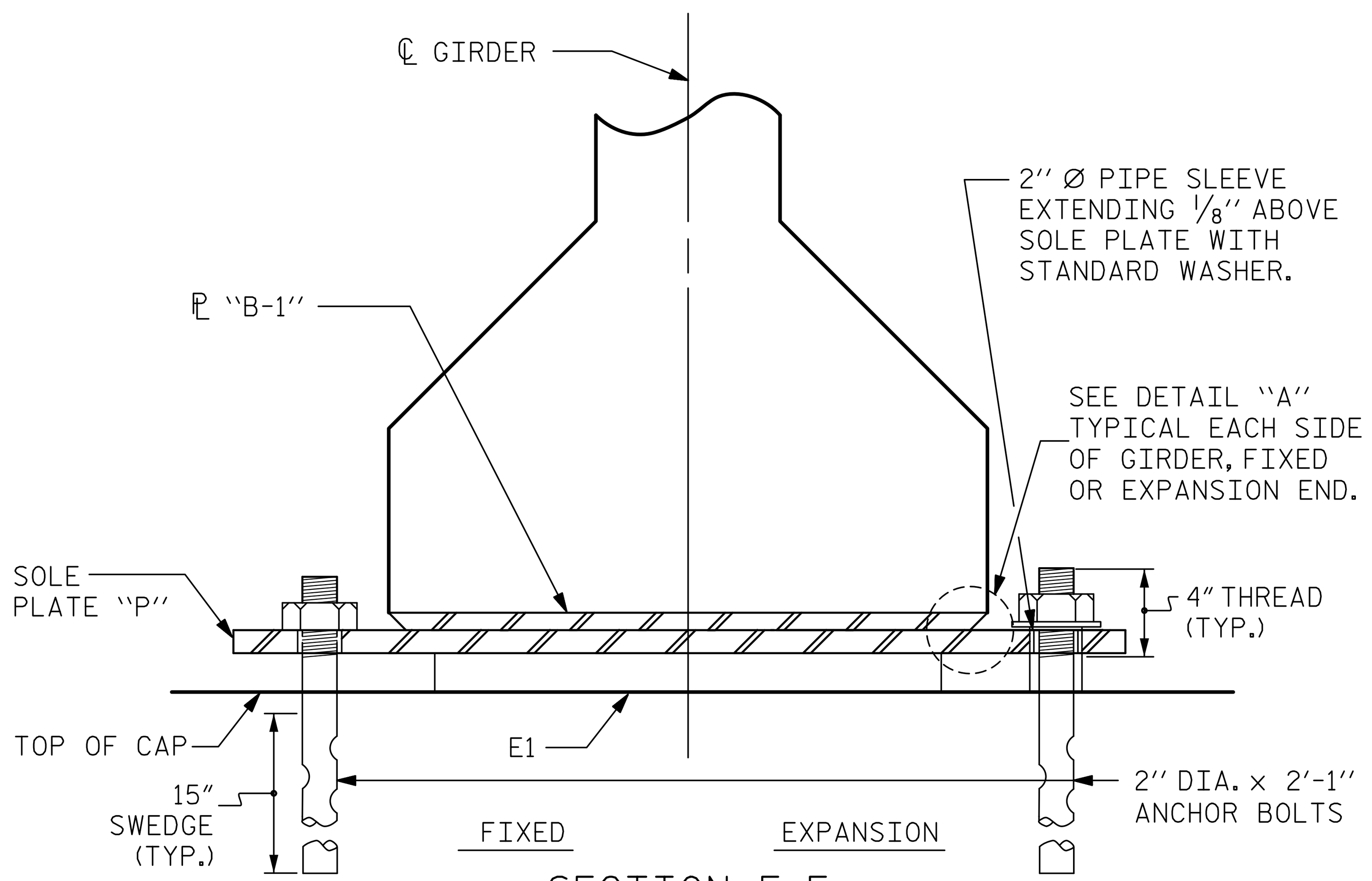
STD. NO. PCGIO

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

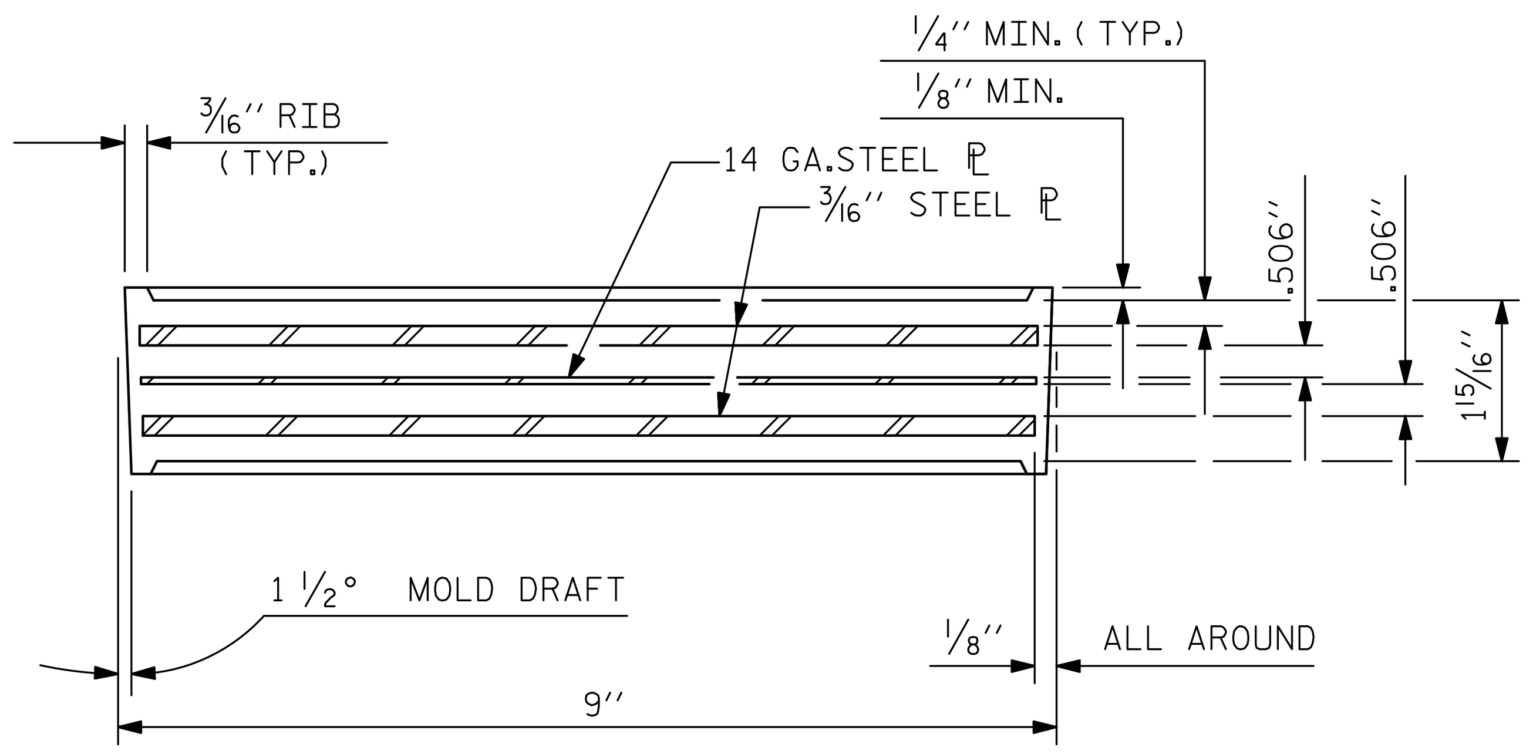
ASSEMBLED BY :	DDL	DATE :	11/2015
CHECKED BY :	JCM	DATE :	11/2015
DRAWN BY :	TLA 6/05	ADDED	10/21/05
CHECKED BY :	VC 6/05	REV. 5/1/06RRR	KMM/GM
		REV. 10/1/11	MAA/GM

DATE: 1/12/2016
TIME: 8:50:3 AM

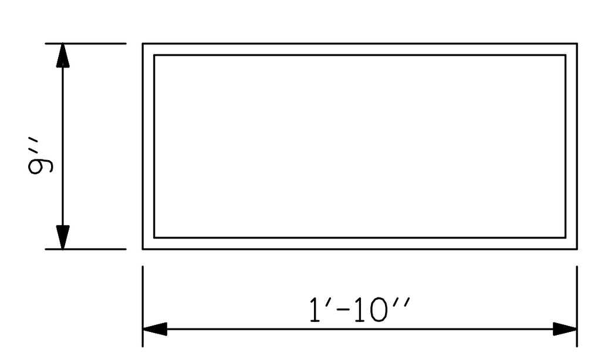
USER: kyle_compton
DGN: RAB1Ridge 109\Cad\442_03_U2707_SMU_S58_PCGIO5.dgn



SECTION E-E



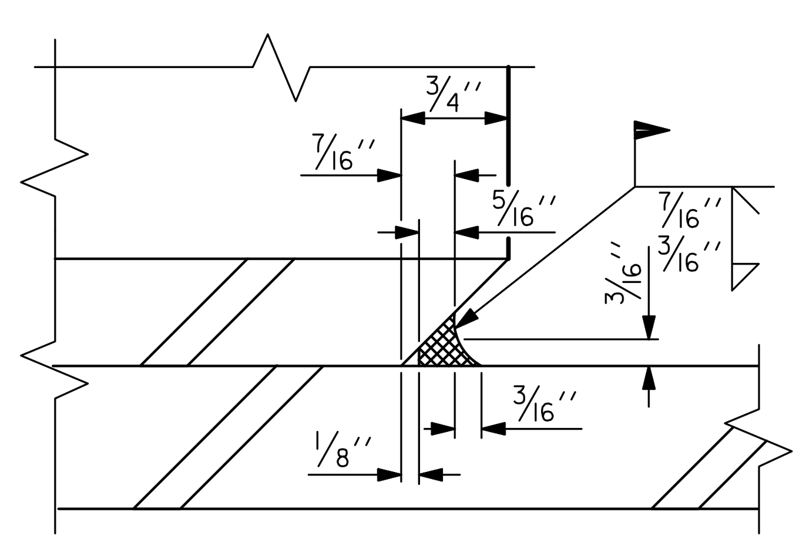
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (48 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV



DETAIL "A"

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. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

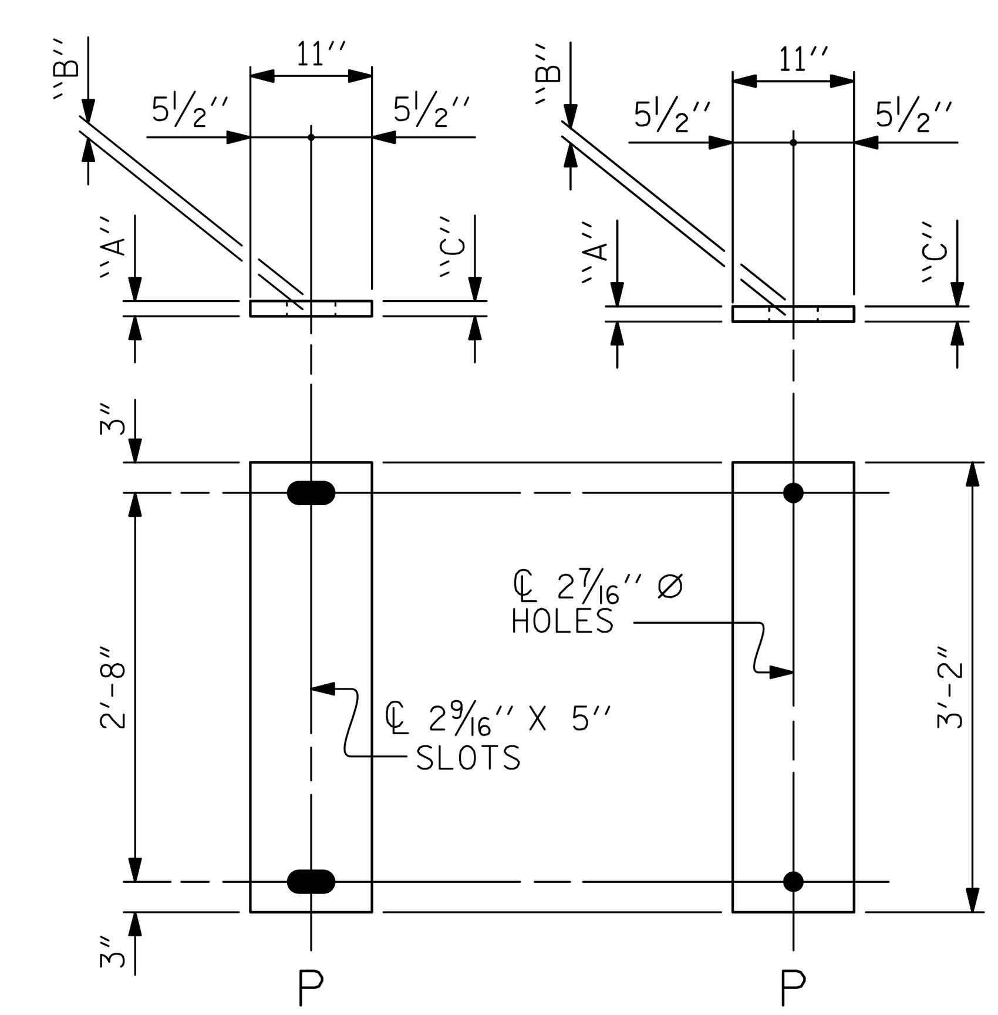
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

TABLE OF SOLE PLATES

TYPE	F/E ✱	"A" (In)	"B" (In)	"C" (In)	No.
P1	E	1 1/4	1 3/8	1 1/2	16
P2	F	1 5/8	1 11/16	1 3/4	3
P3	F	1 1/2	1 1/2	1 1/2	13
P4	F	1 1/4	1 5/16	1 3/8	16

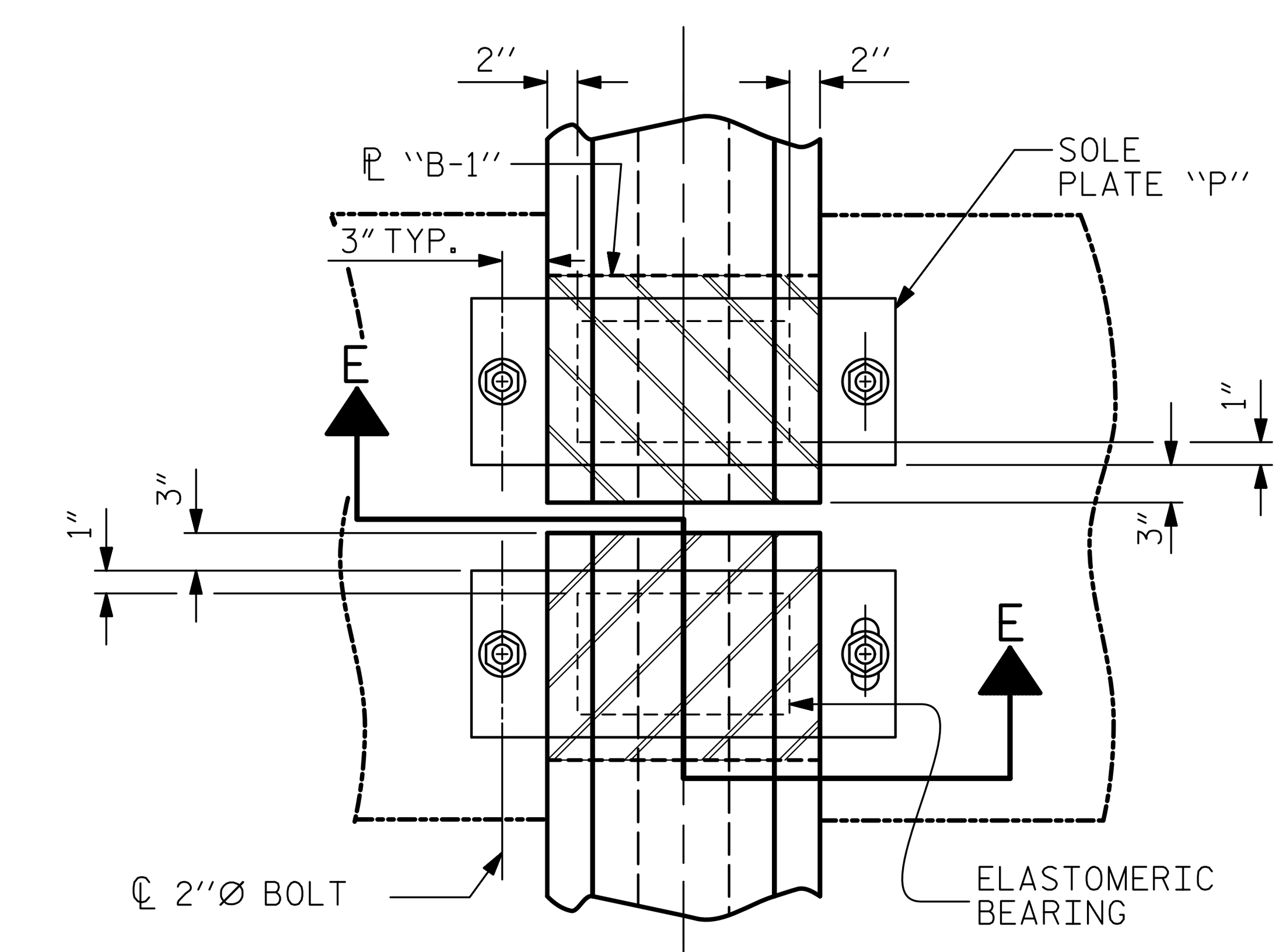
✱ DENOTES FIXED OR EXPANSION



SOLE PLATE DETAILS ("P")

(SEE "FRAMING PLAN" FOR SOLE PLATE "P" LOCATIONS AND PLATE ORIENTATION)

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



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING EXP. BRG. @ END BENT)

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/13/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S-59
1			3			TOTAL SHEETS	86
2			4				

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : KHC	DATE : 11/2015
CHECKED BY : JCM	DATE : 11/2015

DRAWN BY : WJH 8/89	REV. 10/1/11	MAA/GM
CHECKED BY : CRK 8/89	REV. 6/13	AAC/MAA
	REV. 1/15	MAA/TMG

STD. NO. EB3

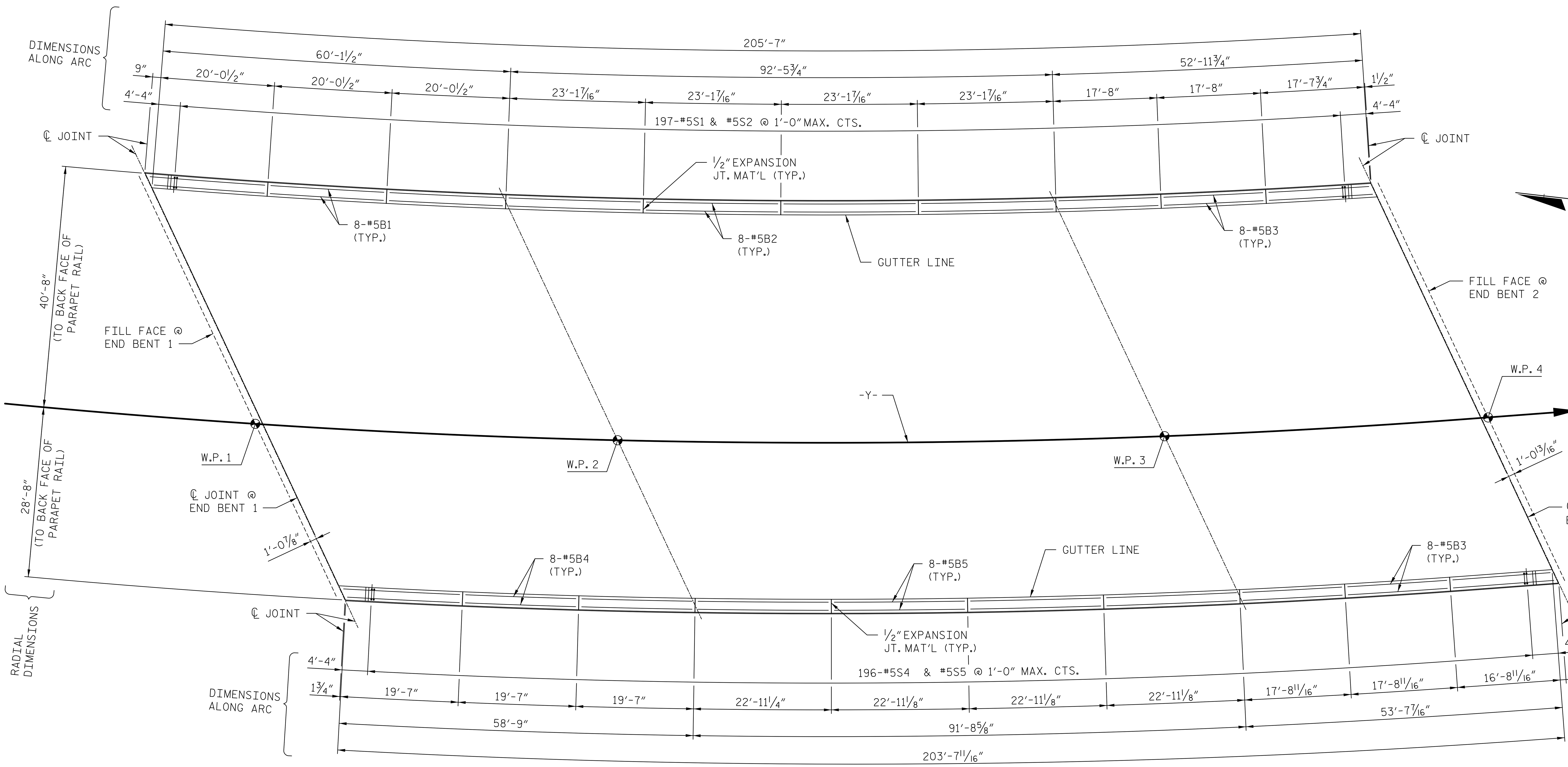
NOTES:

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

ALL REINFORCING STEEL IN PARAPET RAILS SHALL BE EPOXY COATED.

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

FOR PLAN AND DETAILS OF PARAPET AND END POSTS, SEE "CONCRETE PARAPET AND END POST DETAILS" SHEET.



PLAN OF PARAPET REINFORCING

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 2

BRIDGE NO. 109

AECOM

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
CONCRETE PARAPET FOR
TWO BAR METAL RAIL

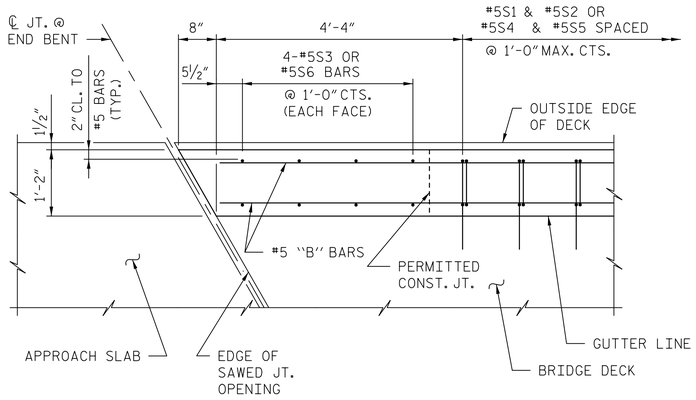
NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S-60
1	-	-	3			TOTAL SHEETS	86
2			4				

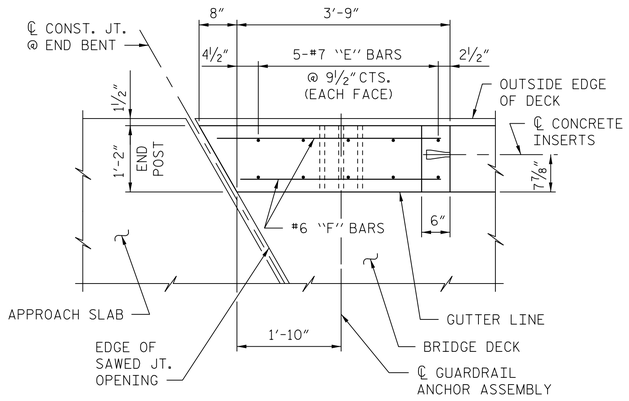
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

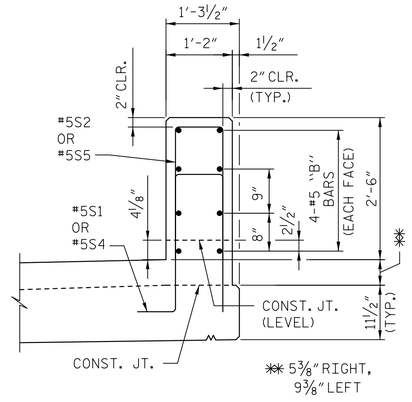


PLAN OF PARAPET

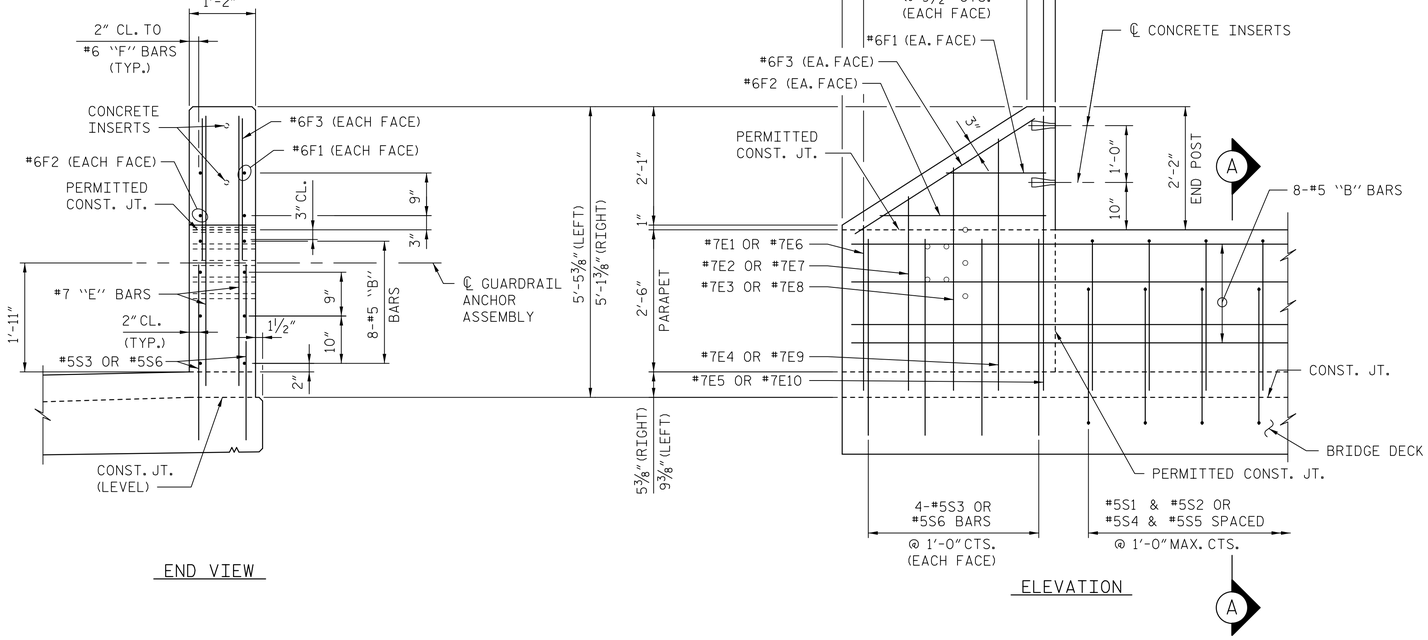
(#7 "E" BARS NOT SHOWN FOR CLARITY)



PLAN OF END POST



SECTION "A-A"



END VIEW

ELEVATION

PARAPET AND END POST FOR TWO BAR RAIL

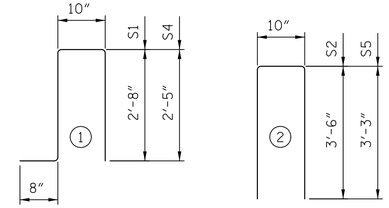
TWO BAR METAL RAIL

BILL OF MATERIAL FOR PARAPET AND END POSTS

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱B1	24	#5	STR.	19′-8″	492
✱B2	32	#5	STR.	22′-9″	759
✱B3	48	#5	STR.	17′-4″	868
✱B4	24	#5	STR.	19′-3″	482
✱B5	32	#5	STR.	22′-7″	754
✱E1	4	#7	STR.	2′-11″	24
✱E2	4	#7	STR.	3′-5″	28
✱E3	4	#7	STR.	3′-11″	32
✱E4	4	#7	STR.	4′-5″	36
✱E5	4	#7	STR.	4′-9″	39
✱E6	4	#7	STR.	3′-3″	27
✱E7	4	#7	STR.	3′-9″	31
✱E8	4	#7	STR.	4′-3″	35
✱E9	4	#7	STR.	4′-9″	39
✱E10	4	#7	STR.	5′-1″	42
✱F1	8	#6	STR.	1′-9″	21
✱F2	8	#6	STR.	2′-11″	35
✱F3	8	#6	STR.	3′-9″	45
✱S1	197	#5	①	6′-10″	1404
✱S2	197	#5	②	7′-10″	1610
✱S3	16	#5	STR.	3′-5″	57
✱S4	196	#5	①	6′-4″	1295
✱S5	196	#5	②	7′-4″	1499
✱S6	16	#5	STR.	3′-9″	63

✱EPOXY COATED REINFORCING STEEL	LBS.	9717
CLASS AA CONCRETE	C.Y.	38.9
1′-2″ × 2′-6″ CONCRETE PARAPET	L.F.	409.2

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

NOTES:

THE #5S3 BARS SHALL BE INSTALLED USING AN ADHESIVE ANCHORING SYSTEM AFTER SAWING THE JOINT. LEVEL TWO FIELD TESTING IS REQUIRED, AND THE YIELD LOAD FOR THE #5S3 BAR IS 18.6 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE THE STANDARD SPECIFICATIONS.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 2 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 037474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE PARAPET AND END POST DETAILS

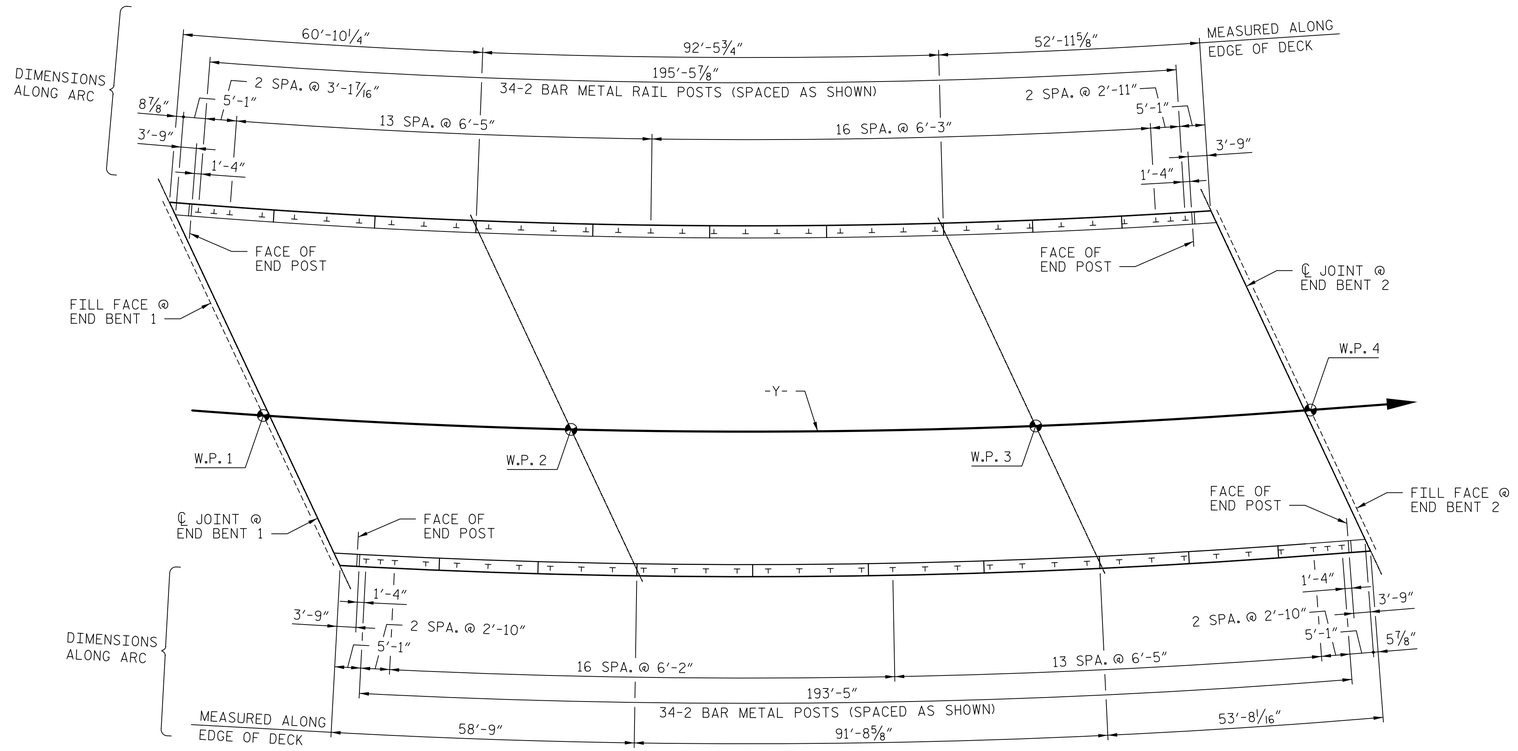
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-61
						TOTAL SHEETS 86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

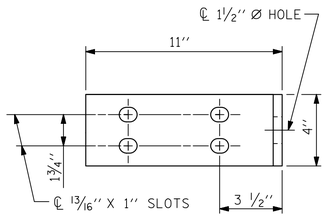
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 8:56:22 AM

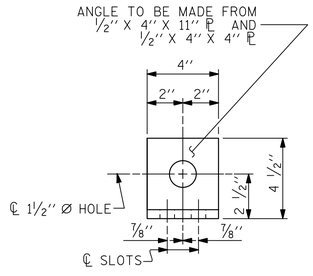
USER: kyle.compton
DGN: R:\Bridge 109\Cad\r402_037_JUT01_SMU_S6i_CP02.dgn



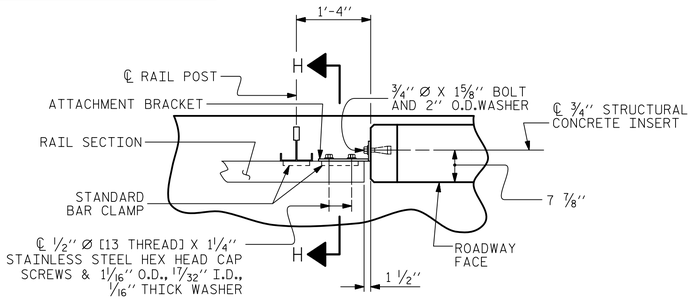
PLAN OF RAIL POST SPACINGS



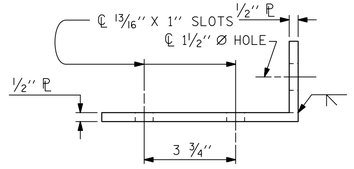
ELEVATION



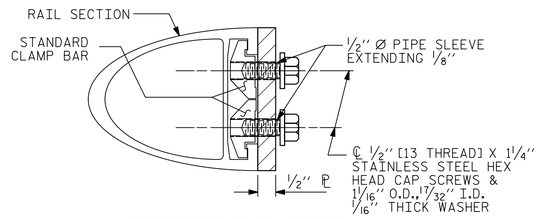
END VIEW (FIX AND EXP.)



PLAN - RAIL AND END POST



TOP VIEW



SECTION H-H (EXP.)

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 1 1/2".

B. 1 - 3/4" Ø X 1 5/8" 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 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

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

NOTES

METAL RAIL TO END POST CONNECTION

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

A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.

B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4"Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4"Ø X 1 5/8" 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).

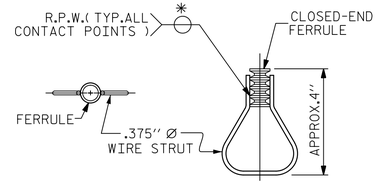
E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.

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 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.

THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" 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 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4"Ø X 6 1/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE 3/4" Ø X 1 5/8" BOLT SHALL APPLY TO THE 3/4"Ø X 6 1/2" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



PLAN ELEVATION

STRUCTURAL CONCRETE INSERT

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

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 23474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

RAIL POST SPACINGS AND END OF RAIL DETAILS

FOR ONE OR TWO BAR METAL RAILS

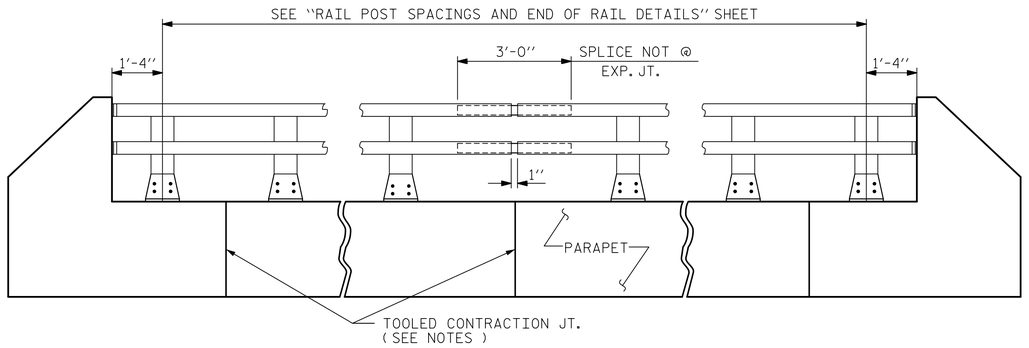
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-62
1			3			TOTAL SHEETS
2			4			86

STD. NO. BMR2

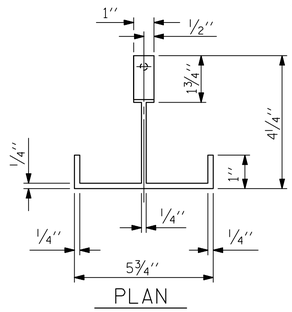
ASSEMBLED BY :	KHC	DATE :	11/2015
CHECKED BY :	JCM	DATE :	11/2015
DRAWN BY : FCJ	1/88	REV. 5/7/03	RWW/JTE
CHECKED BY : CRK	3/89	REV. 5/1/06	TLA/GM
		REV. 10/1/11	MAA/GM

DATE: 1/12/2016
TIME: 8:50:26 AM

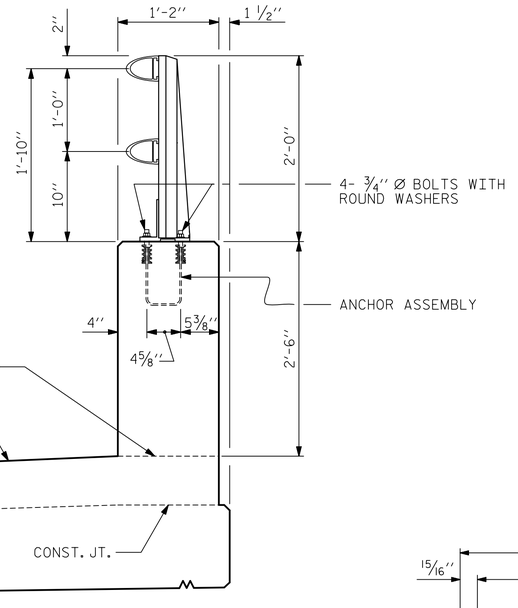
USER: kyle.compton
DGN: RLBridge 109\Cad\402_039_U2707_SMU_S62_2BMR01.dgn



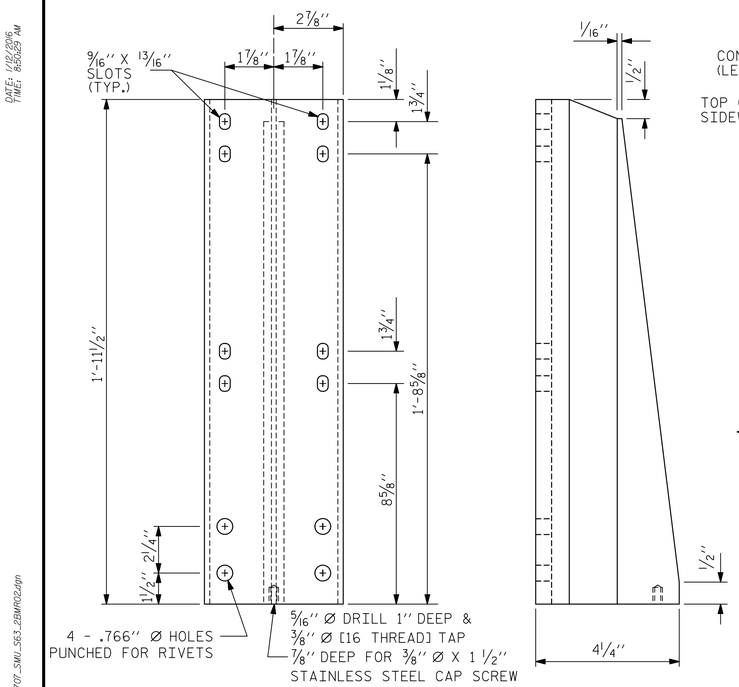
ELEVATION



PLAN

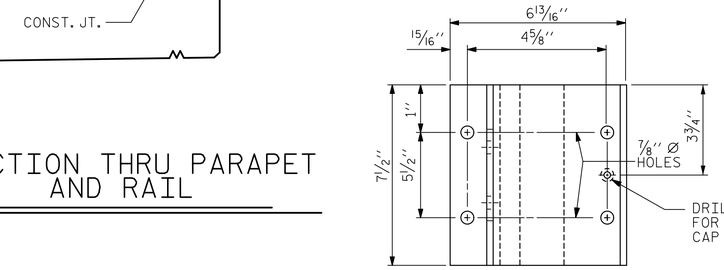


SECTION THRU PARAPET AND RAIL

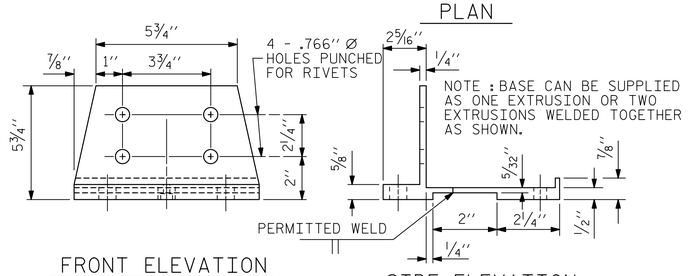


FRONT ELEVATION — SIDE ELEVATION

DETAILS OF POST

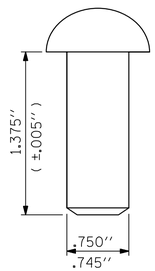


PLAN



FRONT ELEVATION — SIDE ELEVATION

POST BASE DETAILS



RIVET DETAIL

NOTES

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

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

ALUMINUM RAILS

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

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

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

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

GALVANIZED STEEL RAILS

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

GENERAL NOTES

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

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

PAY LENGTH = 394.2 LIN. FT.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 3 BRIDGE NO. 109

ASSEMBLED BY :	KHC	DATE :	11/2015
CHECKED BY :	JCM	DATE :	11/2015
DRAWN BY : EEM 6/94	REV. 5/1/06		TLA/GM
CHECKED BY : RGW 6/94	REV. 10/1/11		MAA/GM
	REV. 6/13		MAA/GM

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

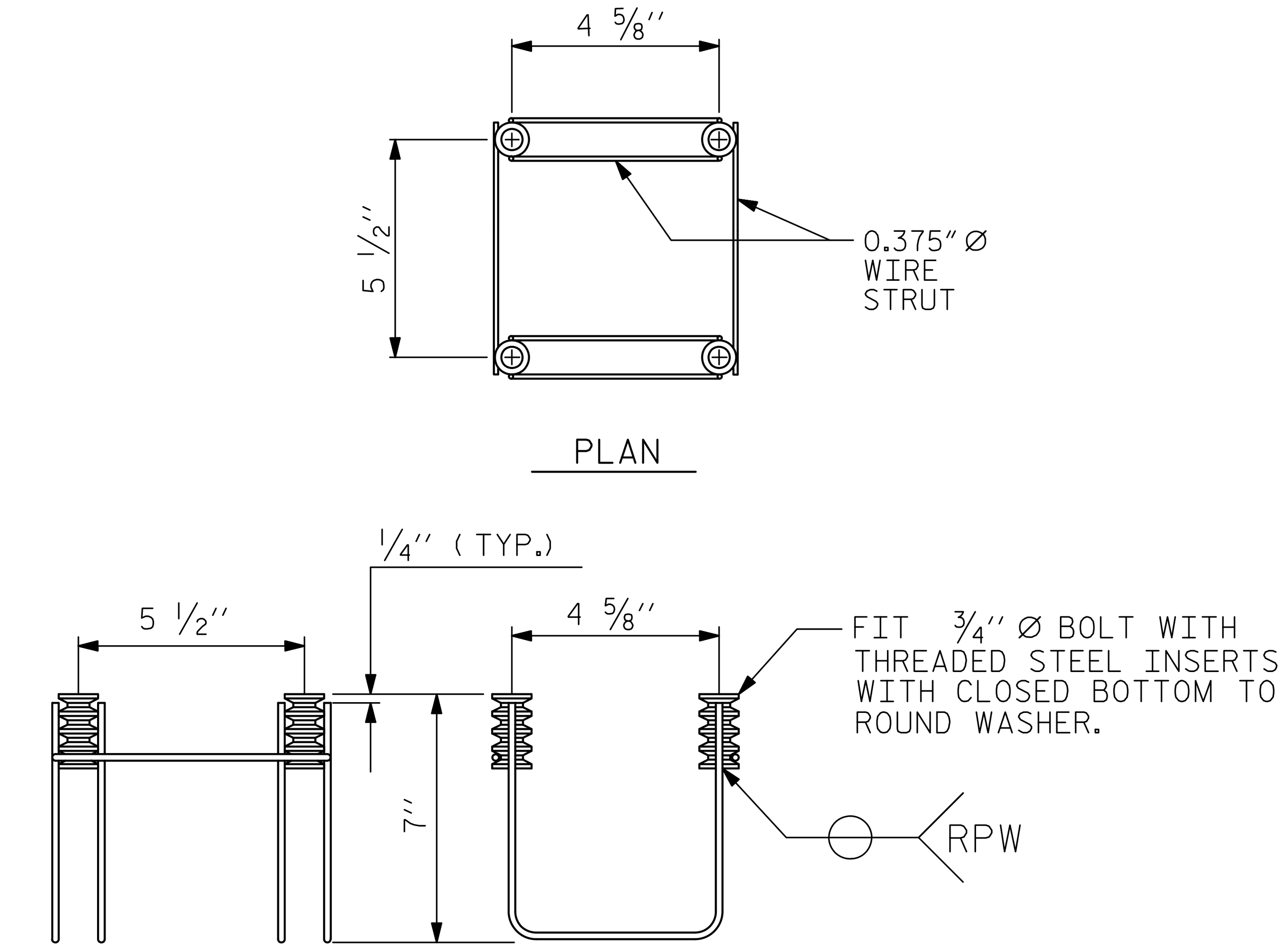
STANDARD

2 BAR METAL RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-63
1			3			TOTAL SHEETS
2			4			86

STD. NO. BMR3

DATE: 1/12/2016
TIME: 8:50:39 AM
USER: kyle.compton
DGN: R:\BrIDge IDN\Cadd\402_04_U2707_SMU_563_2BMR02.dgn



MINIMUM LENGTH OF THREADS IN INSERT (FERRULE): 1¾″

4-BOLT METAL RAIL ANCHOR ASSEMBLY

(68 ASSEMBLIES REQUIRED)

NOTES

STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

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

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

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

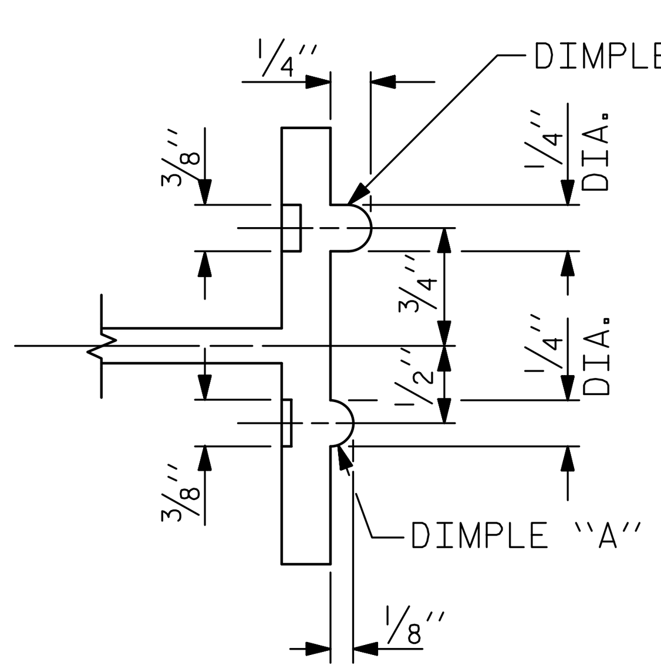
D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.

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

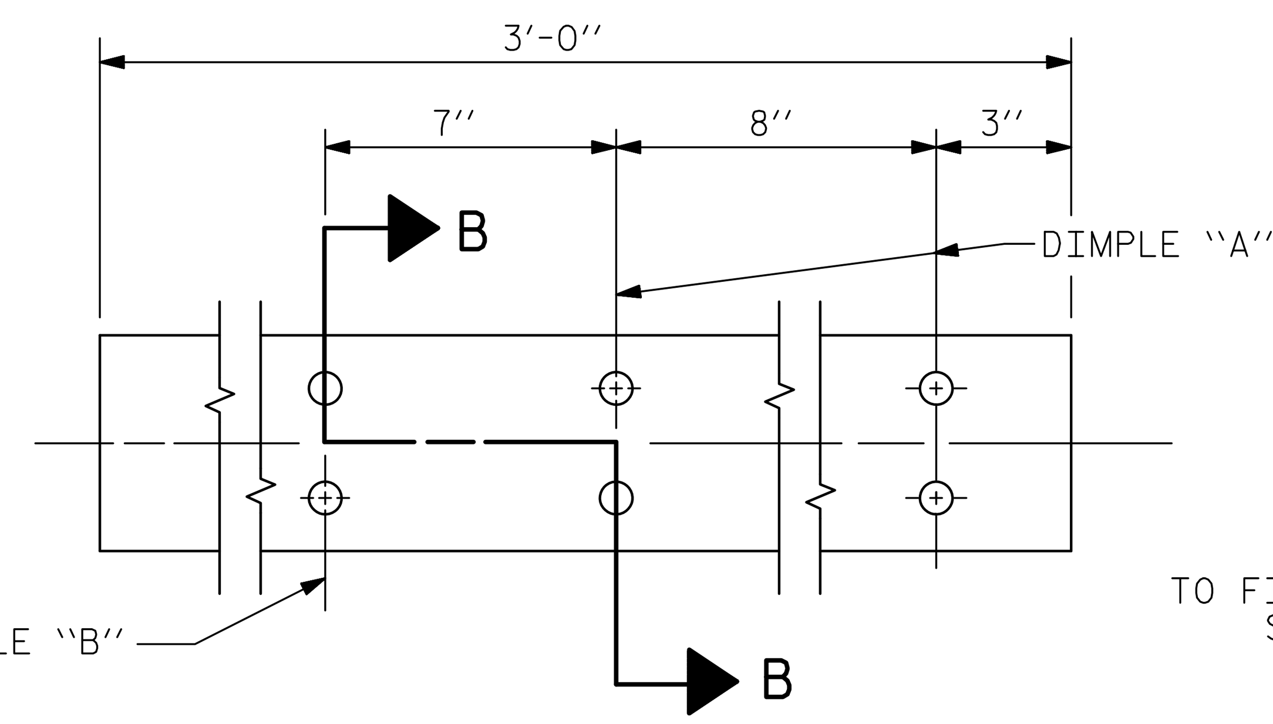
F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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

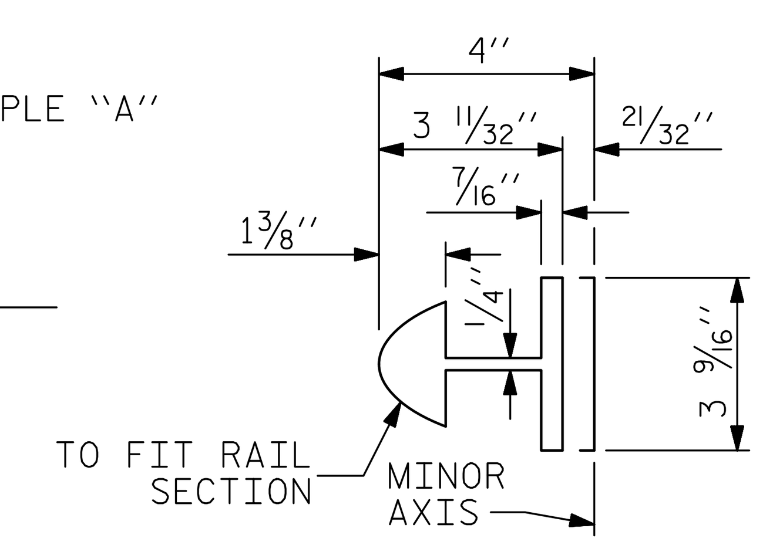
WHEN ADHESIVELY ANCHORED ANCHOR BOLTS ARE USED, BOLTS SHALL MEET THE REQUIREMENTS OF ASTM F593 ALLOY 304 STAINLESS STEEL WITH MINIMUM 75,000 PSI ULTIMATE STRENGTH. NUTS SHALL MEET THE REQUIREMENTS OF ASTM F594 ALLOY 304 STAINLESS STEEL AND WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY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



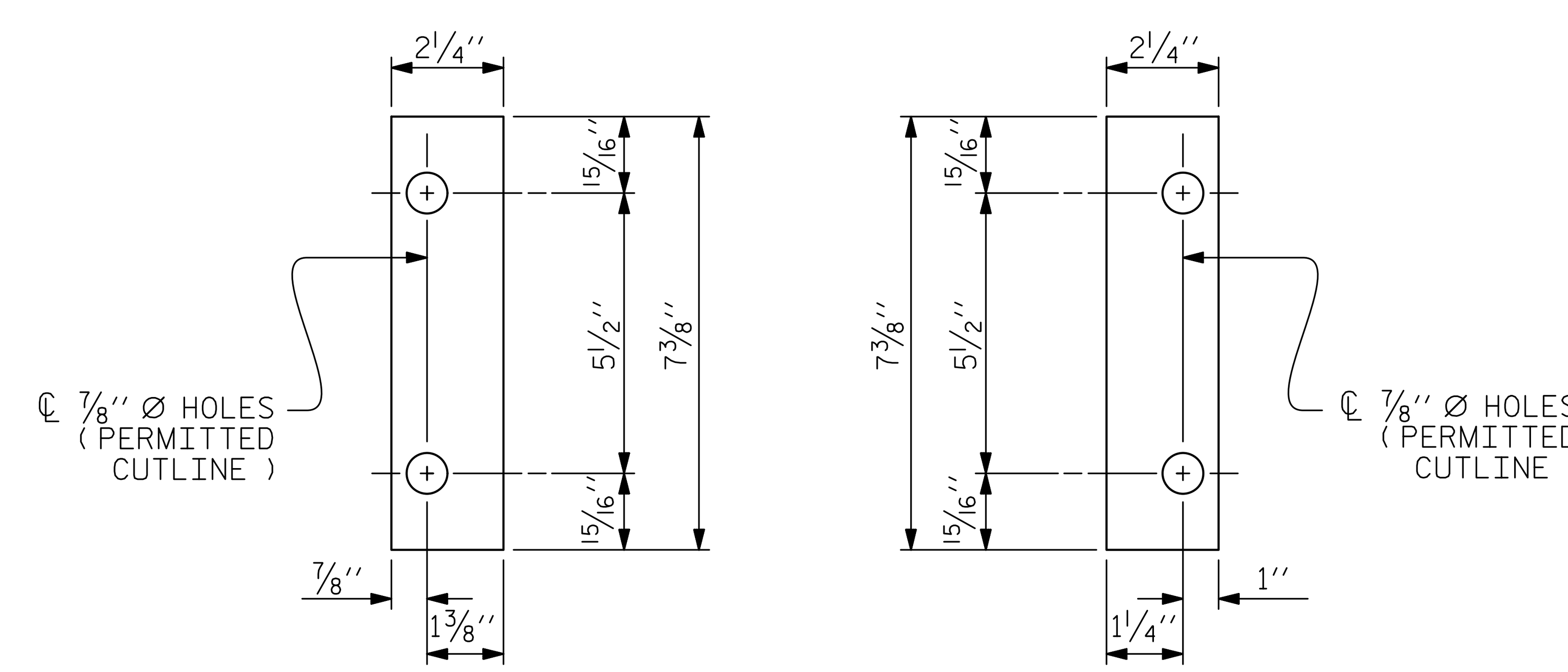
SECTION B - B



EXPANSION BAR DETAILS



BAR SECTION

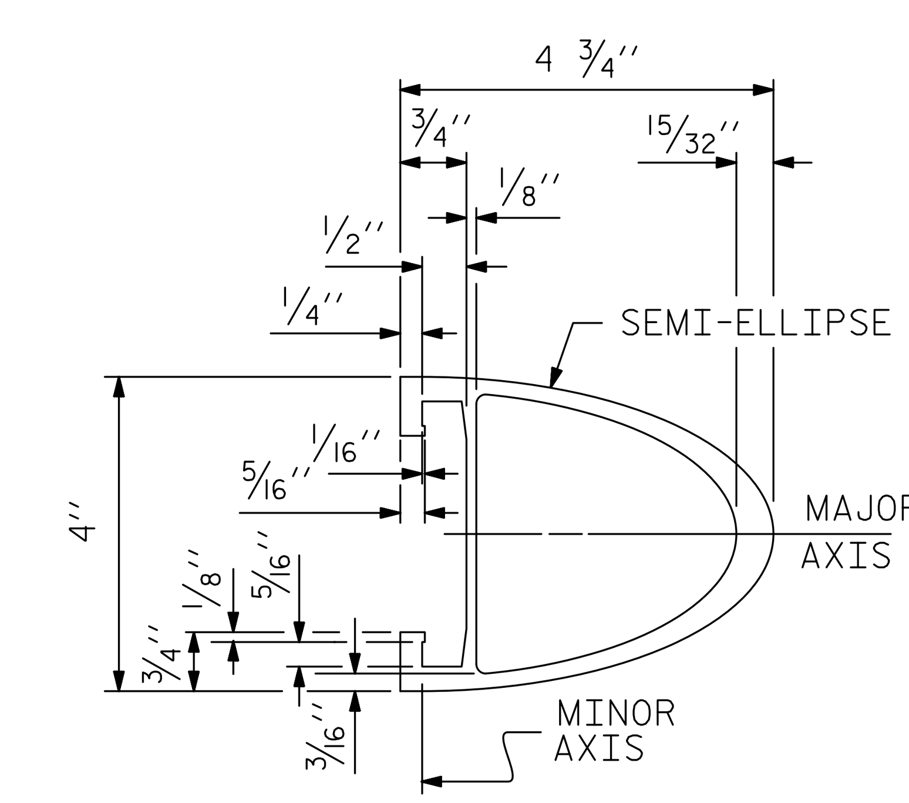


FRONT PLATE

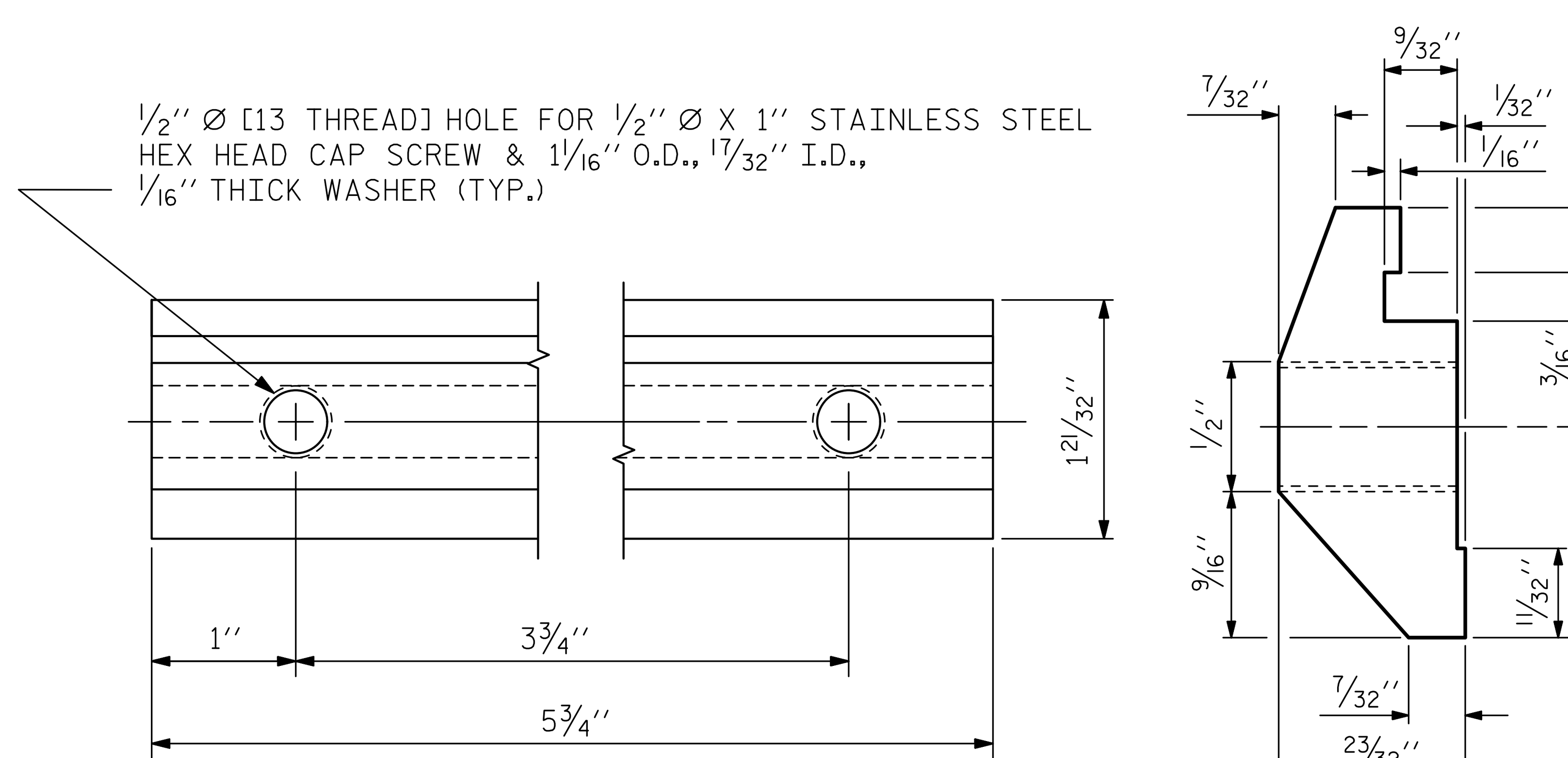
REAR PLATE

SHIM DETAILS

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

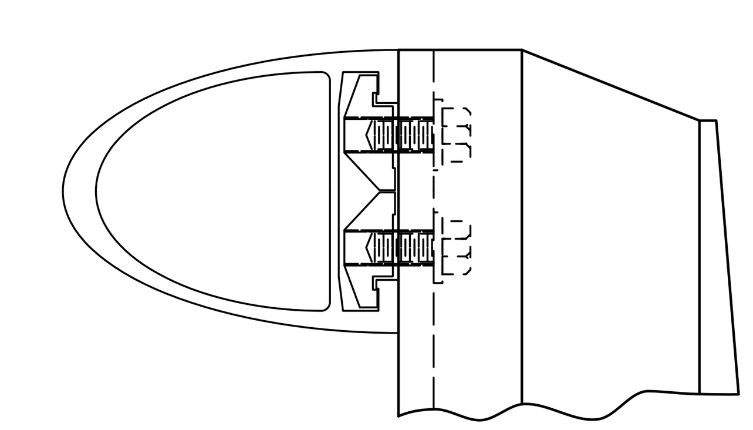


RAIL SECTION

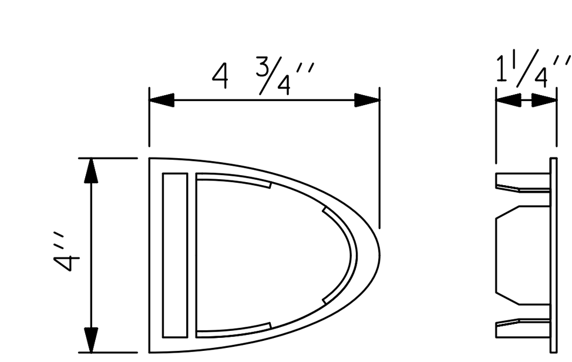


CLAMP BAR DETAIL

(4 REQUIRED PER POST)



CLAMP ASSEMBLY



RAIL CAP

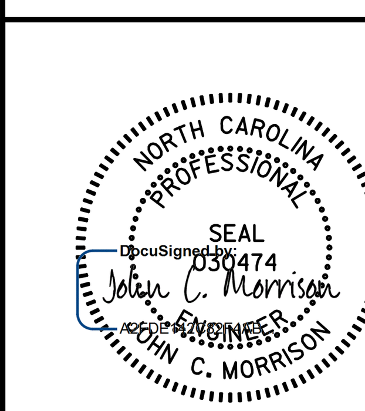
PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 3 BRIDGE NO. 109

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342



1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

2 BAR METAL RAIL

ASSEMBLED BY :	KHC	DATE :	11/2015
CHECKED BY :	JCM	DATE :	11/2015

DRAWN BY : EEM 6/94	REV. 8/16/99	MAB/LES
CHECKED BY : RGW 6/94	REV. 5/1/06R	KMM/GM
	REV. 10/1/11	MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

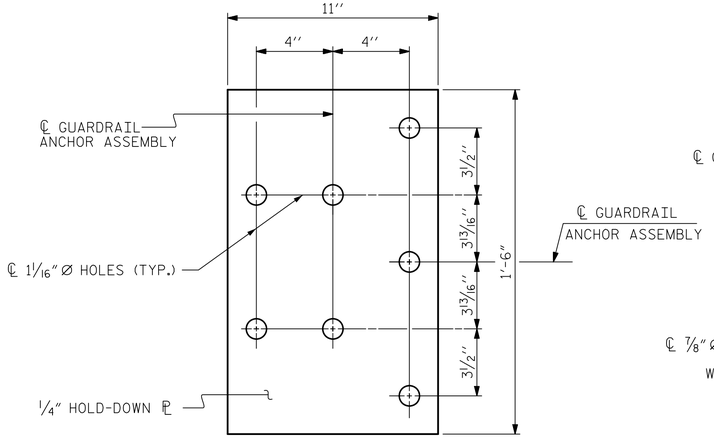
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-64

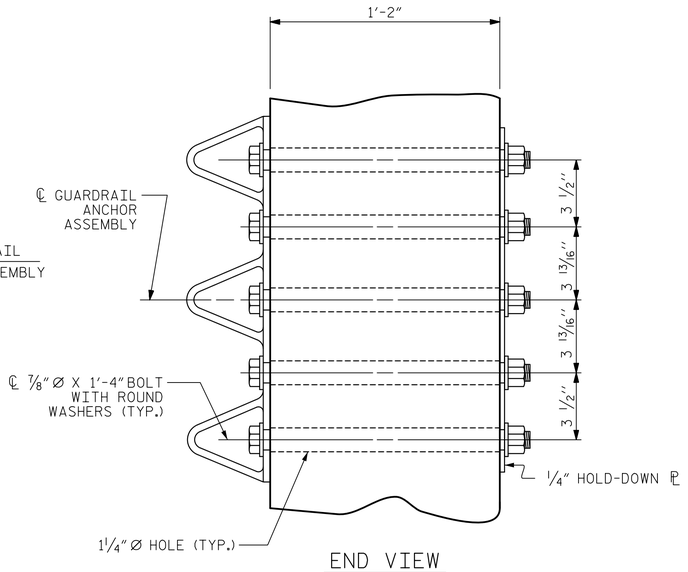
TOTAL SHEETS 86

STD. NO. BMR4

DATE: 1/12/2016 TIME: 8:50:52 AM



PLAN



END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

NOTES

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

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

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

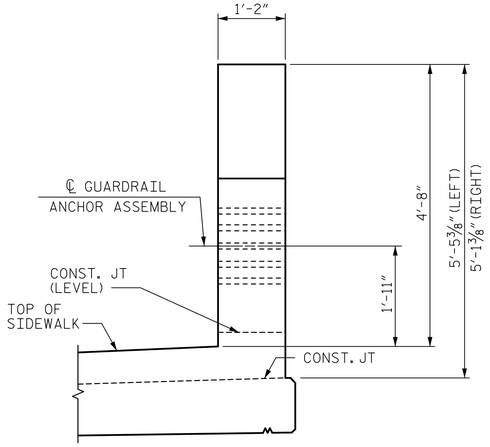
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

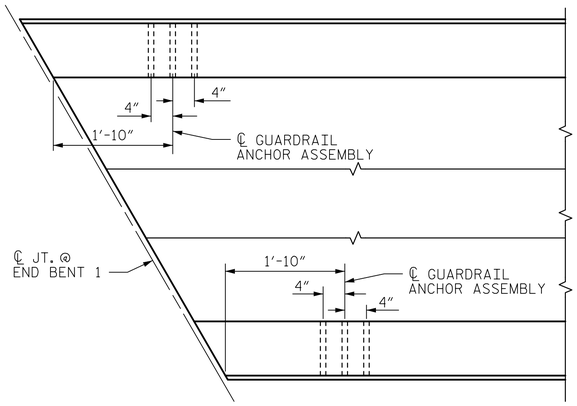
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

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



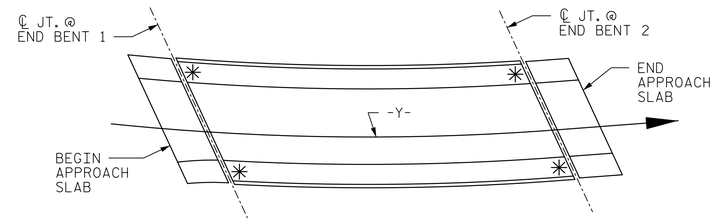
END VIEW
(TWO BAR METAL RAIL)



PLAN

NOTE: GUARDRAIL ANCHOR ASSEMBLIES AT END BENT 1 SHOWN, DETAILS FOR END BENT 2 SIMILAR.

LOCATION OF GUARDRAIL ANCHOR AT END POST



SKETCH SHOWING POINTS OF ATTACHMENT

✳ LOCATION GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 29474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS

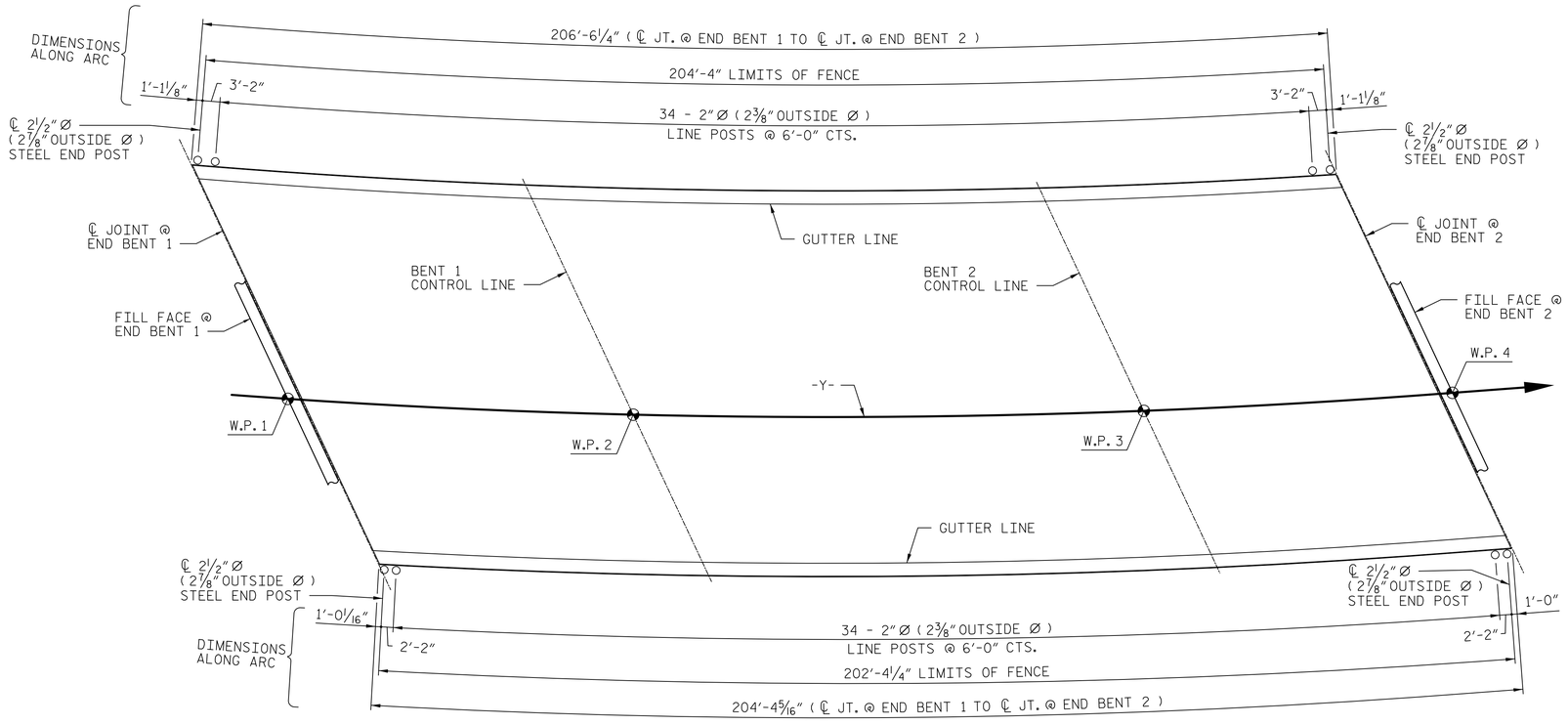
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-65
1			3			TOTAL SHEETS
2			4			86

STD. NO. GRA3

ASSEMBLED BY : KHC		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : MAA 5/10	REV. 12/5/11		MAA/GM
CHECKED BY : GM 5/10	REV. 6/13		MAA/GM
	REV. 1/15		MAA/TMG

DATE: 1/12/2016
TIME: 8:50:35 AM

USER: kyle.compton
DGN: R:\Bridge 109\Cadd\402_046_U2707_SMU_S65_GRA3.dgn



PLAN OF FENCE POST SPACING

TOTAL PAY LENGTH = 406.7 FEET

NOTES:

FOR BRIDGE MOUNTED 72" CHAIN LINK FENCE, SEE SPECIAL PROVISIONS.

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 ¾"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.)

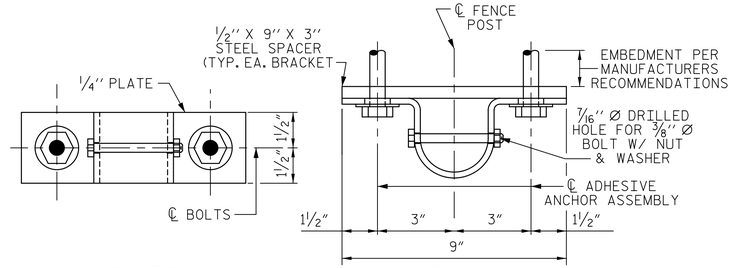
LEVEL ONE FIELD TESTING IS REQUIRED AND THE YIELD LOAD OF THE ANCHOR BOLTS IS 10.0 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS, SEE THE STANDARD SPECIFICATIONS.

ALL FENCE MATERIAL SHALL MEET THE REQUIREMENTS OF SECTION 1050 OF THE STANDARD SPECIFICATIONS, GALVANIZE ALL STEEL PARTS AND HARDWARE IN ACCORDANCE WITH ARTICLE 1076 OF THE STANDARD SPECIFICATIONS.

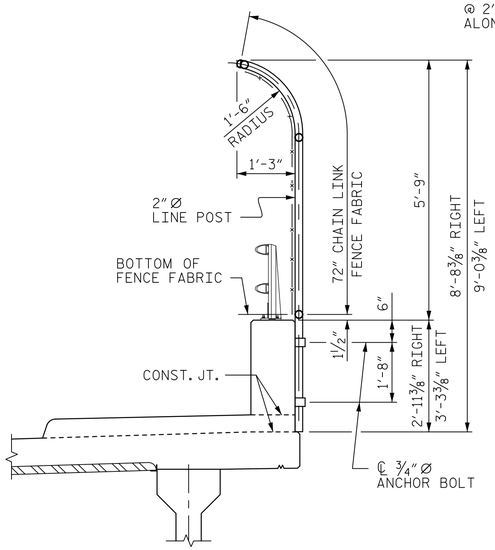
FENCE POST LOCATIONS SHALL BE SHIFTED, AS NECESSARY, TO MAINTAIN 12" MINIMUM DISTANCE FROM ANCHOR BOLT TO JOINTS IN PARAPET.

DIMENSIONS TAKEN ALONG OUTSIDE FACE OF PARAPET.

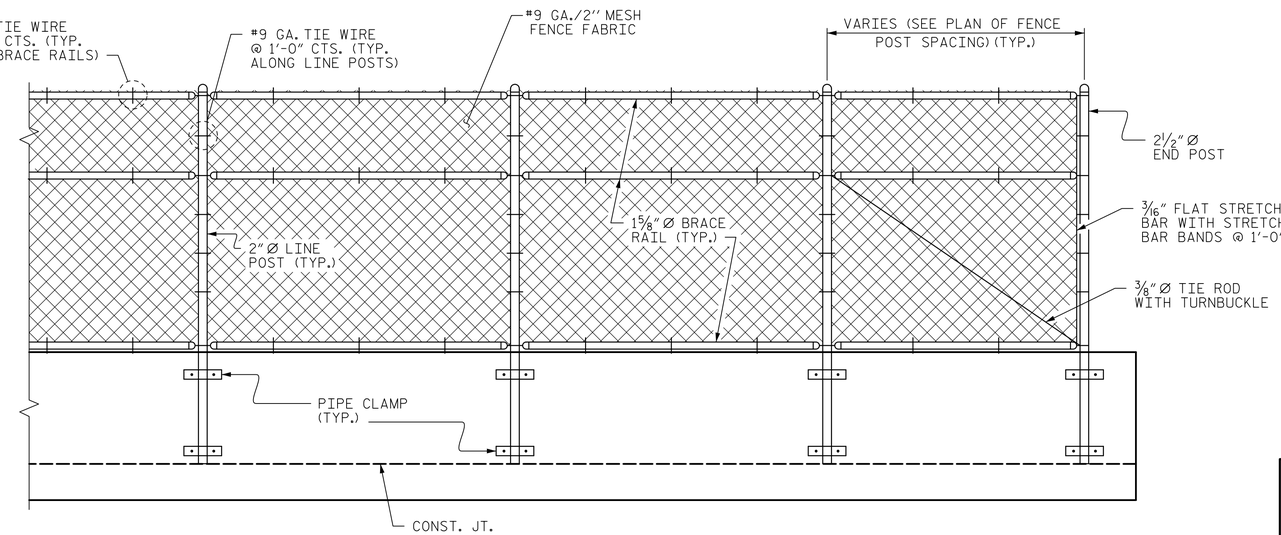
WELDING SHALL BE DONE IN ACCORDANCE WITH ARTICLE 1072-20 OF THE STANDARD SPECIFICATIONS.



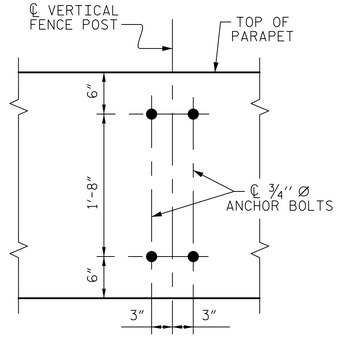
PIPE CLAMP DETAILS



SECTION THRU FENCE



PARTIAL ELEVATION



BOLT SETTING DETAIL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200
www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BRIDGE MOUNTED 72" CHAIN LINK FENCE

NORTH CAROLINA PROFESSIONAL SEAL D5A474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-66
1	.	.	3			TOTAL SHEETS
2			4			86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DATE: 1/12/2016
TIME: 8:50:40 AM

USER: kyle.compton
DGN: R:\Bridge 109\Cad\402_047_U2707_SMU_S66_CLF.dgn

REINFORCING STEEL SCHEDULE

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A1E	690	#5	STR.	35'-11"	25,848
A2	690	#5	STR.	35'-9"	25,728
A101E	2	#5	STR.	35'-6"	74
A102E	2	#5	STR.	35'-0"	73
A103E	2	#5	STR.	34'-5"	72
A104E	2	#5	STR.	33'-10"	71
A105E	2	#5	STR.	33'-4"	70
A106E	2	#5	STR.	32'-9"	68
A107E	2	#5	STR.	32'-3"	67
A108E	2	#5	STR.	31'-8"	66
A109E	2	#5	STR.	31'-1"	65
A110E	2	#5	STR.	30'-7"	64
A111E	2	#5	STR.	30'-0"	63
A112E	2	#5	STR.	29'-6"	62
A113E	2	#5	STR.	28'-11"	60
A114E	2	#5	STR.	28'-4"	59
A115E	2	#5	STR.	27'-10"	58
A116E	2	#5	STR.	27'-3"	57
A117E	2	#5	STR.	26'-9"	56
A118E	2	#5	STR.	26'-2"	55
A119E	2	#5	STR.	25'-7"	54
A120E	2	#5	STR.	25'-1"	52
A121E	2	#5	STR.	24'-6"	51
A122E	2	#5	STR.	24'-0"	50
A123E	2	#5	STR.	23'-5"	49
A124E	2	#5	STR.	22'-10"	48
A125E	2	#5	STR.	22'-4"	47
A126E	2	#5	STR.	21'-9"	46
A127E	1	#5	STR.	39'-11"	42
A128E	1	#5	STR.	38'-10"	41
A129E	1	#5	STR.	37'-8"	39
A130E	1	#5	STR.	36'-7"	38
A131E	1	#5	STR.	35'-6"	37
A132E	1	#5	STR.	34'-5"	36
A133E	1	#5	STR.	33'-4"	35
A134E	1	#5	STR.	32'-2"	34
A135E	1	#5	STR.	31'-1"	33
A136E	1	#5	STR.	30'-0"	31
A137E	1	#5	STR.	28'-11"	30
A138E	1	#5	STR.	27'-9"	29
A139E	1	#5	STR.	26'-8"	28
A140E	1	#5	STR.	25'-7"	27
A141E	1	#5	STR.	24'-6"	26
A142E	1	#5	STR.	23'-4"	24
A143E	1	#5	STR.	22'-3"	23
A144E	1	#5	STR.	21'-2"	22
A145E	1	#5	STR.	20'-1"	21
A146E	1	#5	STR.	18'-11"	20
A147E	1	#5	STR.	17'-10"	19
A148E	1	#5	STR.	16'-9"	18
A149E	1	#5	STR.	15'-8"	16
A150E	1	#5	STR.	14'-7"	15
A151E	1	#5	STR.	13'-5"	14
A152E	1	#5	STR.	12'-4"	13
A153E	1	#5	STR.	11'-3"	12
A154E	1	#5	STR.	10'-2"	11
A155E	1	#5	STR.	9'-0"	10
A156E	1	#5	STR.	7'-11"	8

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A157E	1	#5	STR.	6'-10"	7
A158E	1	#5	STR.	5'-9"	6
A159E	1	#5	STR.	4'-7"	5
A160E	1	#5	STR.	3'-6"	4
A161E	2	#5	STR.	35'-7"	74
A162E	2	#5	STR.	35'-1"	73
A163E	2	#5	STR.	34'-7"	72
A164E	2	#5	STR.	34'-0"	71
A165E	2	#5	STR.	33'-6"	70
A166E	2	#5	STR.	33'-0"	69
A167E	2	#5	STR.	32'-6"	68
A168E	2	#5	STR.	31'-11"	67
A169E	2	#5	STR.	31'-5"	66
A170E	2	#5	STR.	30'-11"	65
A171E	2	#5	STR.	30'-5"	64
A172E	2	#5	STR.	29'-11"	63
A173E	2	#5	STR.	29'-4"	61
A174E	2	#5	STR.	28'-10"	60
A175E	2	#5	STR.	28'-4"	59
A176E	2	#5	STR.	27'-10"	58
A177E	2	#5	STR.	27'-4"	57
A178E	2	#5	STR.	26'-9"	56
A179E	2	#5	STR.	26'-3"	55
A180E	2	#5	STR.	25'-9"	54
A181E	2	#5	STR.	25'-3"	53
A182E	2	#5	STR.	24'-9"	52
A183E	2	#5	STR.	24'-2"	50
A184E	2	#5	STR.	23'-8"	49
A185E	2	#5	STR.	23'-2"	48
A186E	2	#5	STR.	22'-8"	47
A187E	2	#5	STR.	22'-2"	46
A188E	2	#5	STR.	21'-7"	45
A189E	1	#5	STR.	39'-8"	41
A190E	1	#5	STR.	38'-8"	40
A191E	1	#5	STR.	37'-7"	39
A192E	1	#5	STR.	36'-7"	38
A193E	1	#5	STR.	35'-7"	37
A194E	1	#5	STR.	34'-6"	36
A195E	1	#5	STR.	33-6"	35
A196E	1	#5	STR.	32-5"	34
A197E	1	#5	STR.	31'-5"	33
A198E	1	#5	STR.	30'-5"	32
A199E	1	#5	STR.	29'-4"	31
A200E	1	#5	STR.	28'-4"	30
A201E	1	#5	STR.	27'-3"	29
A202E	1	#5	STR.	26'-3"	28
A203E	1	#5	STR.	25'-3"	26
A204E	1	#5	STR.	24'-3"	25
A205E	1	#5	STR.	23'-2"	24
A206E	1	#5	STR.	22'-2"	23
A207E	1	#5	STR.	21'-2"	22
A208E	1	#5	STR.	20'-1"	21
A209E	1	#5	STR.	19'-1"	20
A210E	1	#5	STR.	18'-1"	19
A211E	1	#5	STR.	17'-0"	18
A212E	1	#5	STR.	16'-0"	17
A213E	1	#5	STR.	14'-11"	16
A214E	1	#5	STR.	13'-11"	15
A215E	1	#5	STR.	12'-11"	14

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A216E	1	#5	STR.	11'-10"	12
A217E	1	#5	STR.	10'-10"	11
A218E	1	#5	STR.	9'-10"	10
A219E	1	#5	STR.	8'-9"	9
A220E	1	#5	STR.	7'-9"	8
A221E	1	#5	STR.	6'-9"	7
A222E	1	#5	STR.	5'-9"	6
A223E	1	#5	STR.	4'-8"	5
A224E	1	#5	STR.	3'-8"	4
A225E	6	#6	STR.	6'-0"	54
A201	2	#5	STR.	35'-3"	74
A202	2	#5	STR.	34'-9"	73
A203	2	#5	STR.	34'-2"	71
A204	2	#5	STR.	33'-7"	70
A205	2	#5	STR.	33'-1"	69
A206	2	#5	STR.	32'-6"	68
A207	2	#5	STR.	32'-0"	67
A208	2	#5	STR.	31'-5"	66
A209	2	#5	STR.	30'-10"	64
A210	2	#5	STR.	30'-4"	63
A211	2	#5	STR.	29'-9"	62
A212	2	#5	STR.	29'-3"	61
A213	2	#5	STR.	28'-8"	60
A214	2	#5	STR.	28'-1"	59
A215	2	#5	STR.	27'-7"	58
A216	2	#5	STR.	27'-0"	56
A217	2	#5	STR.	26'-6"	55
A218	2	#5	STR.	25'-11"	54
A219	2	#5	STR.	25'-4"	53
A220	2	#5	STR.	24'-10"	52
A221	2	#5	STR.	24'-3"	51
A222	2	#5	STR.	23'-9"	50
A223	2	#5	STR.	23'-2"	48
A224	2	#5	STR.	22'-7"	47
A225	2	#5	STR.	22'-1"	46
A226	2	#5	STR.	21'-6"	45
A227	1	#5	STR.	39'-11"	42
A228	1	#5	STR.	38'-10"	41
A229	1	#5	STR.	37'-8"	39
A230	1	#5	STR.	36'-7"	38
A231	1	#5	STR.	35'-6"	37
A232	1	#5	STR.	34'-5"	36
A233	1	#5	STR.	33'-4"	35
A234	1	#5	STR.	32'-2"	34
A235	1	#5	STR.	31'-1"	33
A236	1	#5	STR.	30'-0"	31
A237	1	#5	STR.	28'-11"	30
A238	1	#5	STR.	27'-9"	29
A239	1	#5	STR.	26'-8"	28
A240	1	#5	STR.	25'-7"	27
A241	1	#5	STR.	24'-6"	26
A242	1	#5	STR.	23'-4"	24
A243	1	#5	STR.	22'-3"	23
A244	1	#5	STR.	21'-2"	22
A245	1	#5	STR.	20'-1"	21
A246	1	#5	STR.	18'-11"	20
A247	1	#5	STR.	17'-10"	19
A248	1	#5	STR.	16'-9"	18
A249	1	#5	STR.	15'-8"	16

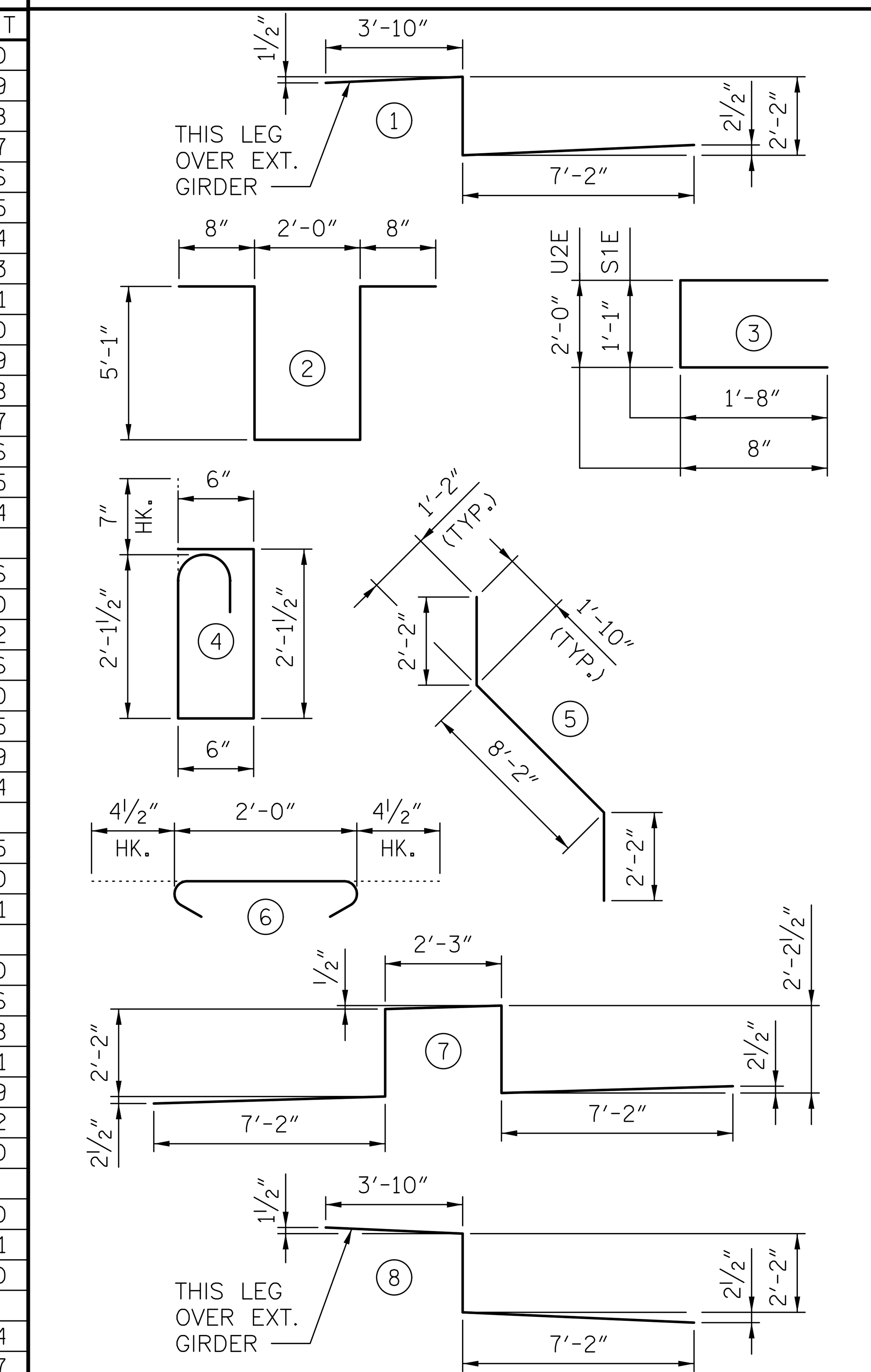
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A250	1	#5	STR.	14'-7"	15
A251	1	#5	STR.	13'-5"	14
A252	1	#5	STR.	12'-4"	13
A253	1	#5	STR.	11'-3"	12
A254	1	#5	STR.	10'-2"	11
A255	1	#5	STR.	9'-0"	10
A256	1	#5	STR.	7'-11"	8
A257	1	#5	STR.	6'-10"	7
A258	1	#5	STR.	5'-9"	6
A259	1	#5	STR.	4'-7"	5
A260	1	#5	STR.	3'-6"	4
A261	2	#5	STR.	35'-4"	74
A262	2	#5	STR.	34'-10"	73
A263	2	#5	STR.	34'-4"	72
A264	2	#5	STR.	33'-9"	71
A265	2	#5	STR.	33'-3"	70
A266	2	#5	STR.	32'-9"	68
A267	2	#5	STR.	32'-3"	67
A268	2	#5	STR.	31'-8"	66
A269	2	#5	STR.	31'-2"	65
A270	2	#5	STR.	30'-8"	64
A271	2	#5	STR.	30'-2"	63
A272	2	#5	STR.	29'-8"	62
A273	2	#5	STR.	29'-1"	61
A274	2	#5	STR.	28'-7"	60
A275	2	#5	STR.	28'-1"	59
A276	2	#5	STR.	27'-7"	58
A277	2	#5	STR.	27'-1"	57
A278	2	#5	STR.	26'-6"	55
A279	2	#5	STR.	26'-0"	54
A280	2	#5	STR.	25'-6"	53
A281	2	#5	STR.	25'-0"	52
A282	2	#5	STR.	24'-6"	51
A283	2	#5	STR.	23'-11"	50
A284	2	#5	STR.	23'-5"	49
A285	2	#5	STR.	22'-11"	48
A286	2	#5	STR.	22'-5"	47
A287	2	#5	STR.	21'-11"	46
A288	2	#5	STR.	21'-4"	45
A289	1	#5	STR.	39'-8"	42
A290	1	#5	STR.	38'-8"	40
A291	1	#5	STR.	37'-7"	39
A292	1	#5	STR.	36'-7"	38
A293	1	#5	STR.	35'-7"	37
A294	1	#5	STR.	34'-6"	36
A295	1	#5	STR.	33-6"	35
A296	1	#5	STR.	32-5"	34
A297	1	#5	STR.	31'-5"	33
A298	1	#5	STR.	30'-5"	32
A299	1	#5	STR.	29'-4"	31
A300	1	#5	STR.	28'-4"	30
A301	1	#5	STR.	27'-3"	29
A302	1	#5	STR.	26'-3"	28
A303	1	#5	STR.	25'-3"	26
A304	1	#5	STR.	24'-3"	25
A305	1	#5	STR.	23'-2"	24
A306	1	#5	STR.	22'-2"	23
A307	1	#5	STR.	21'-2"	22
A308	1	#5	STR.	20'-1"	21

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A309	1	#5	STR.	19'-1"	20
A310	1	#5	STR.	18'-1"	19
A311	1	#5	STR.	17'-0"	18
A312	1	#5	STR.	16'-0"	17
A313	1	#5	STR.	14'-11"	16
A314	1	#5	STR.	13'-11"	15
A315	1	#5	STR.	12'-11"	14
A316	1	#5	STR.	11'-10"	13
A317	1	#5	STR.	10'-10"	11
A318	1	#5	STR.	9'-10"	10
A319	1	#5	STR.	8'-9"	9
A320	1	#5	STR.	7'-9"	8
A321	1	#5	STR.	6'-9"	7
A322	1	#5	STR.	5'-9"	6
A323	1	#5	STR.	4'-8"	5
A324	1	#5	STR.	3'-8"	4
B1E	94	#4	STR.	20'-0"	1,256
B2E	47	#4	STR.	21'-4"	670
B3E	47	#4	STR.	30'-0"	942
B4E	47	#4	STR.	14'-10"	466
B5E	94	#7	STR.	56'-0"	10,760
B6E	92	#7	STR.	23'-0"	4,325
B7	368	#5	STR.	53'-3"	20,439
B8E	96	#4	STR.	27'-6"	1,764
G1E	2	#5	STR.	40'-11"	85
G2E	2	#5	STR.	38'-4"	80
G3E	414	#4	STR.	6'-4"	1,751
K1E	4	#8	(1)	13'-2"	140
K2E	24	#8	(7)	21'-0"	1,346
K3E	42	#6	STR.	7'-7"	478
K4	84	#4	(5)	12'-6"	701
K5	140	#4	STR.	7'-7"	709
K6	28	#4	STR.	6'-0"	112
K7E	4	#8	(8)	13'-2"	140
S1E	112	#4	(3)	4'-5"	330
S2E	112	#5	(4)	5'-10"	681
S3	490	#4	(6)	2'-9"	900
U1	98	#4	(2)	13'-6"	884
U2E	120	#4	(3)	3'-4"	267

REINFORCING STEEL	54,252
EPOXY COATED REINFORCING STEEL	56,190

"E" DENOTES EPOXY COATED REINFORCING STEEL.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

SUPERSTRUCTURE BILL OF MATERIAL

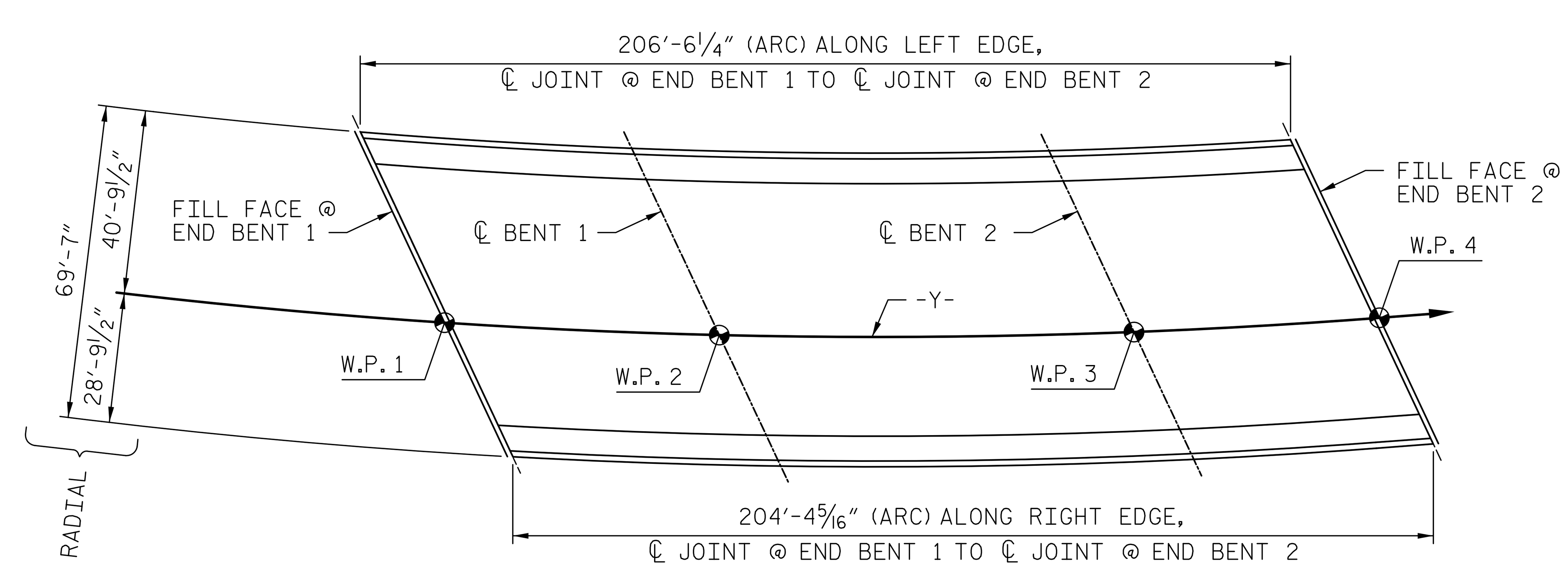
SPANS	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
"A", "B" & "C"		54,252	56,190
POUR 1	114.2		
POUR 2	227.7		
POUR 3	169.2		
SIDEWALKS	45.6		
✱✱TOTALS	556.7	54,252	56,190

✱✱ QUANTITIES FOR END POSTS & PARAPETS ARE INCLUDED ON "RAIL POST SPACING AND END RAIL DETAILS" SHEET.

QUANTITIES FOR APPROACH SLABS ARE INCLUDED ON "BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT" SHEET.

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

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



LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB (SQ. FEET = 14,295)

GROOVING BRIDGE FLOORS

APPROACH SLABS	2637	SQ.FT.
BRIDGE DECK	10855	SQ.FT.
TOTAL	13492	SQ.FT.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

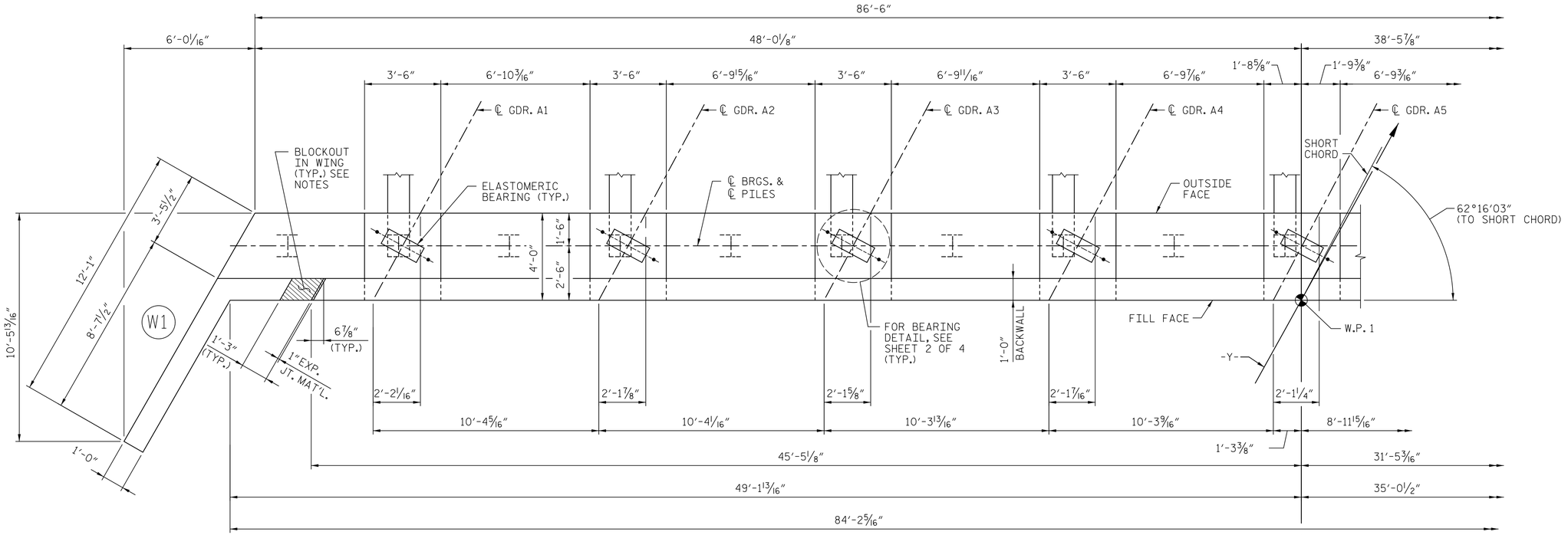
SUPERSTRUCTURE
BILL OF MATERIAL

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

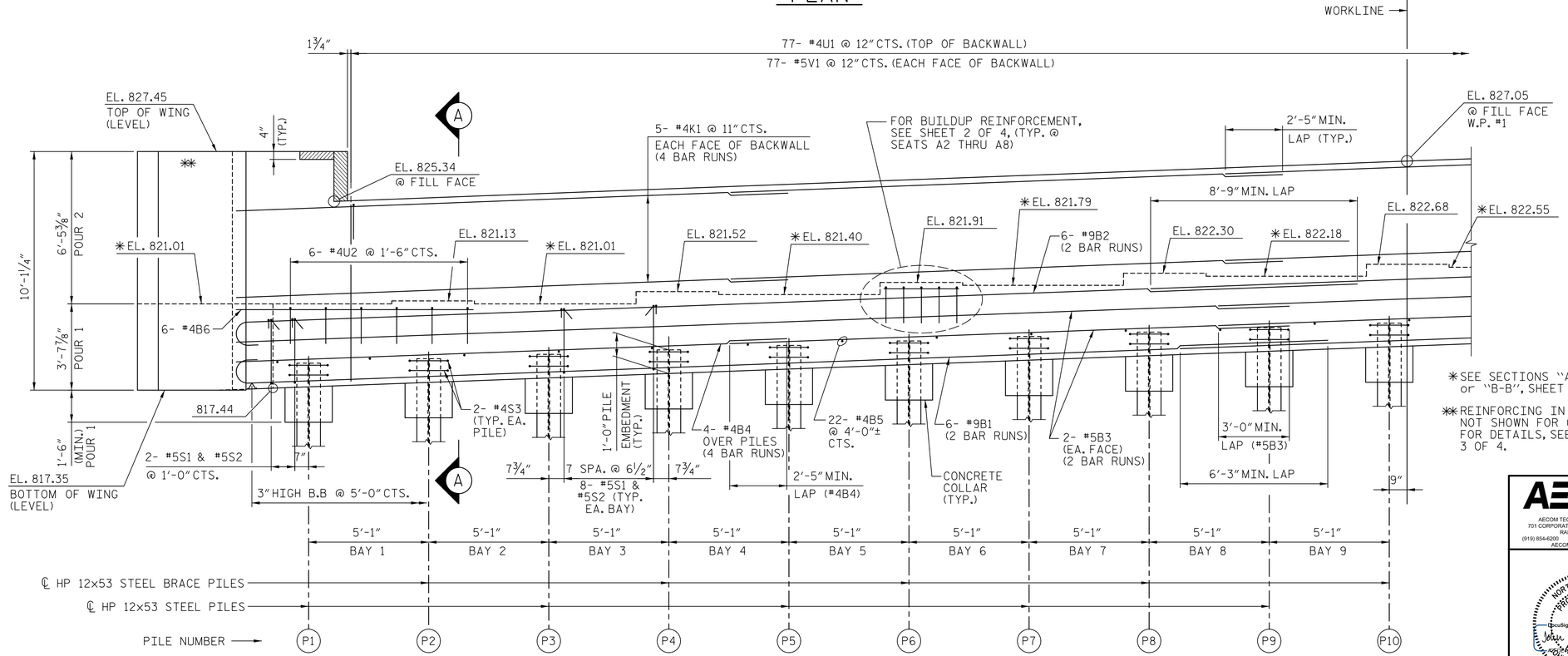
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-67
						TOTAL SHEETS 86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



PLAN



ELEVATION

✳SEE SECTIONS "A-A" or "B-B", SHEET 4 OF 4.

✳✳REINFORCING IN WING NOT SHOWN FOR CLARITY. FOR DETAILS, SEE SHEET 3 OF 4.

NOTES:

SEE SHEET 4 OF 4 FOR NOTES.

TOP OF PILE ELEVATIONS	
1	818.50
2	818.69
3	818.88
4	819.06
5	819.25
6	819.44
7	819.63
8	819.82
9	820.00
10	820.19

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 4 BRIDGE NO. 109

DRAWN BY : MTB DATE : 11/2015

CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 039474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

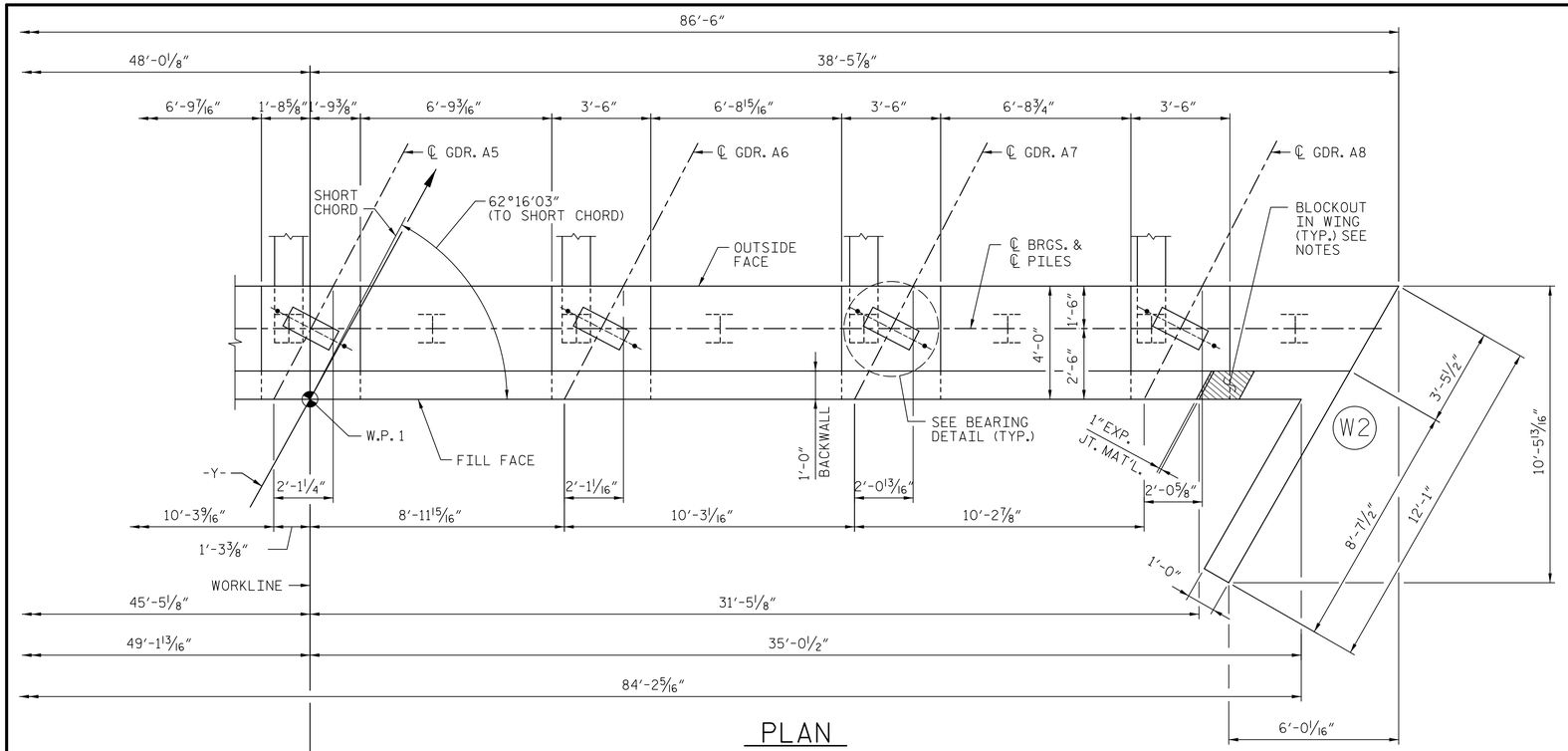
SUBSTRUCTURE

END BENT 1
PLAN AND ELEVATION

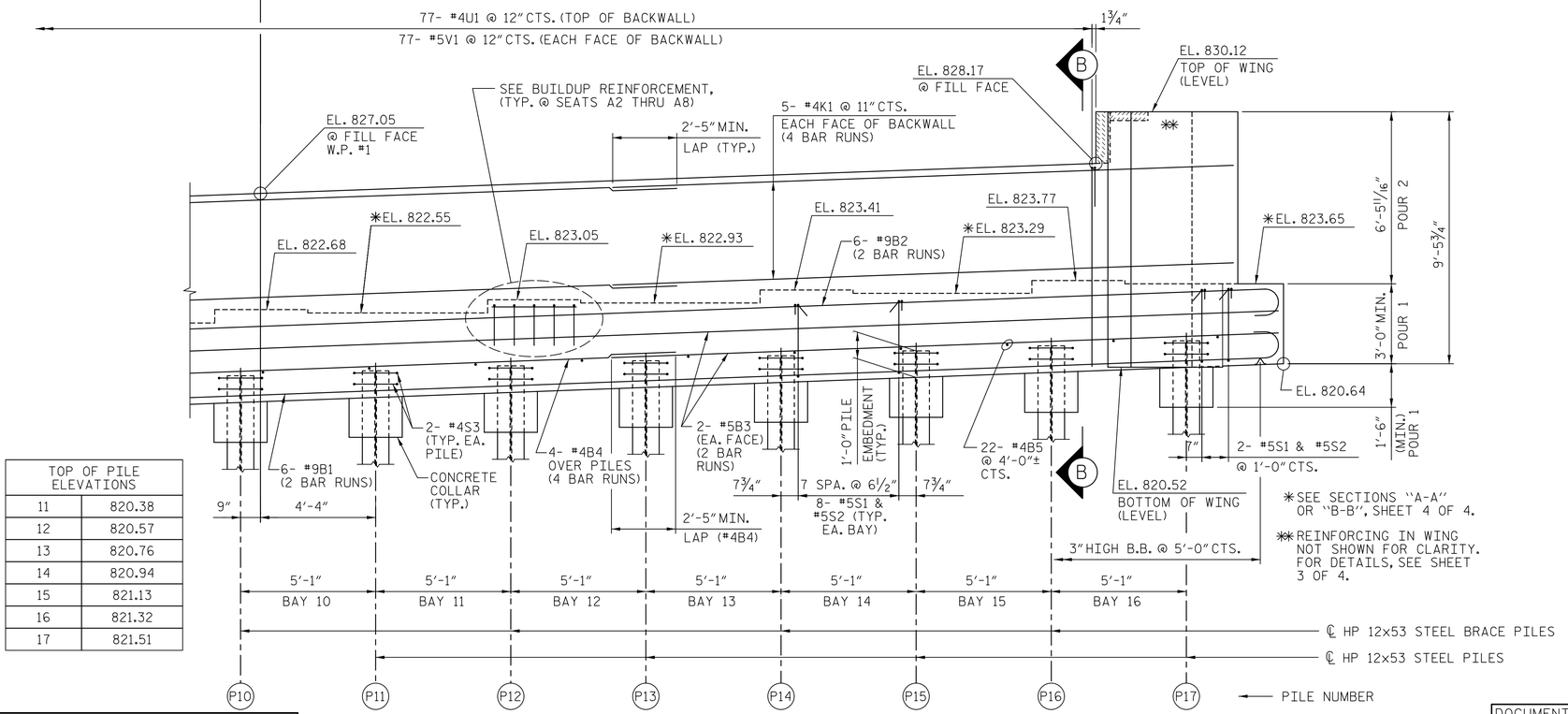
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-68
						TOTAL SHEETS 86

DATE: 1/12/2016
TIME: 8:50:47 AM

USER: kyle.compton
DGN: R:\Bridge 109\Cadd\402_05\U2707_SMU_568_EB1.01.dgn



PLAN



ELEVATION

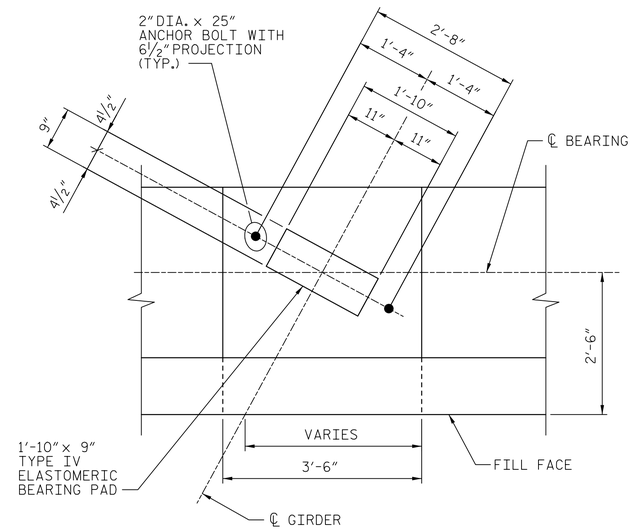
TOP OF PILE ELEVATIONS	
11	820.38
12	820.57
13	820.76
14	820.94
15	821.13
16	821.32
17	821.51

*SEE SECTIONS "A-A" OR "B-B", SHEET 4 OF 4.

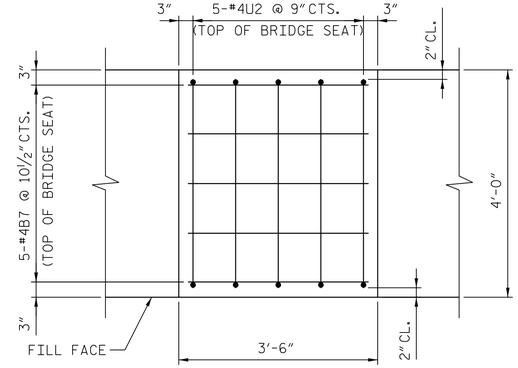
**REINFORCING IN WING NOT SHOWN FOR CLARITY. FOR DETAILS, SEE SHEET 3 OF 4.

NOTES:

SEE SHEET 4 OF 4 FOR NOTES.



BEARING DETAIL



BUILDUP REINFORCEMENT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 038474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

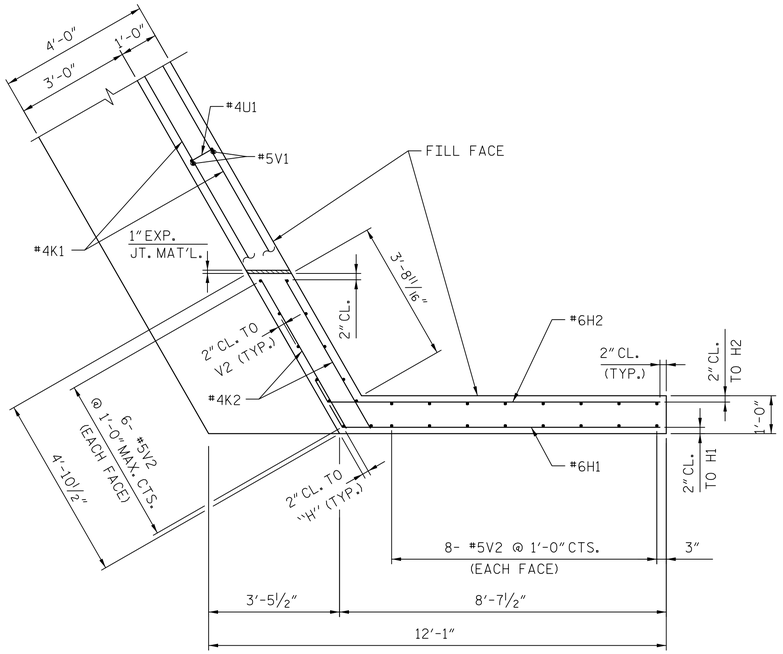
END BENT 1
PLAN AND ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-69
						TOTAL SHEETS 86

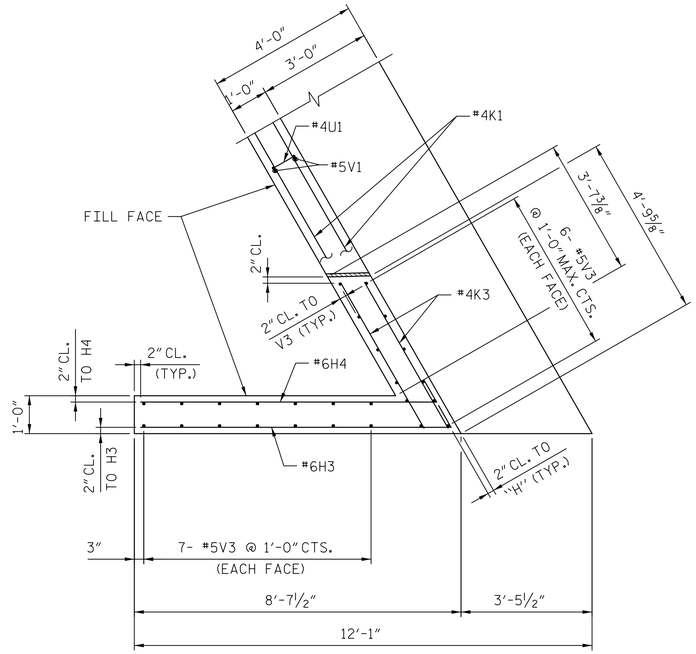
DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

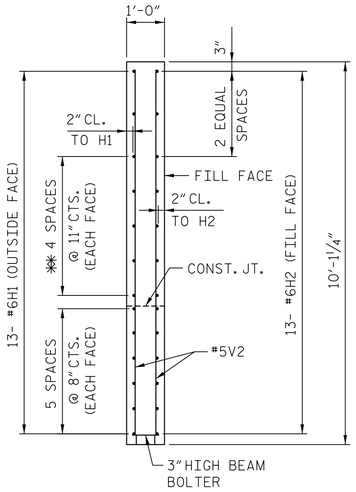
DATE: 1/12/2016
TIME: 8:50:51 AM
USER: kyle_compton
DGN: R:\Bridge 109\Cadd\402_053_U2707_SMU_S69_EBL_02.dgn



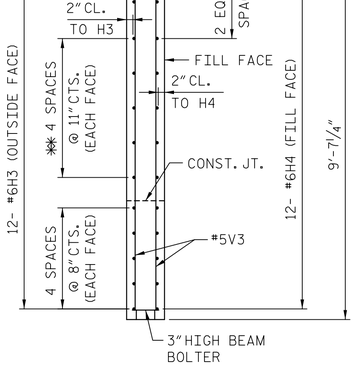
PLAN - WINGWALL 1



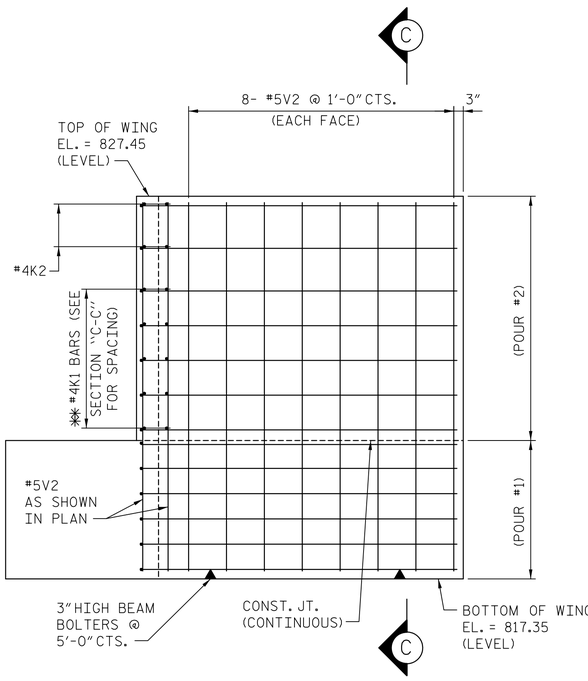
PLAN - WINGWALL 2



SECTION "C-C"

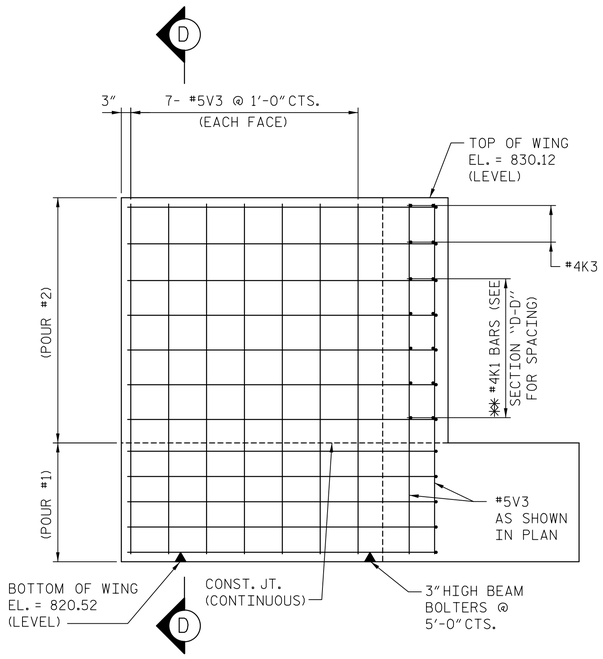


SECTION "D-D"



ELEVATION - WINGWALL 1

✻✻ PLACE #6 'H' BARS TO MATCH #4K1 BARS IN BACKWALL



ELEVATION - WINGWALL 2

✻✻ PLACE #6 'H' BARS TO MATCH #4K1 BARS IN BACKWALL

NOTES:

SEE SHEET 4 OF 4 FOR NOTES.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 039474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 1
SECTIONS AND DETAILS

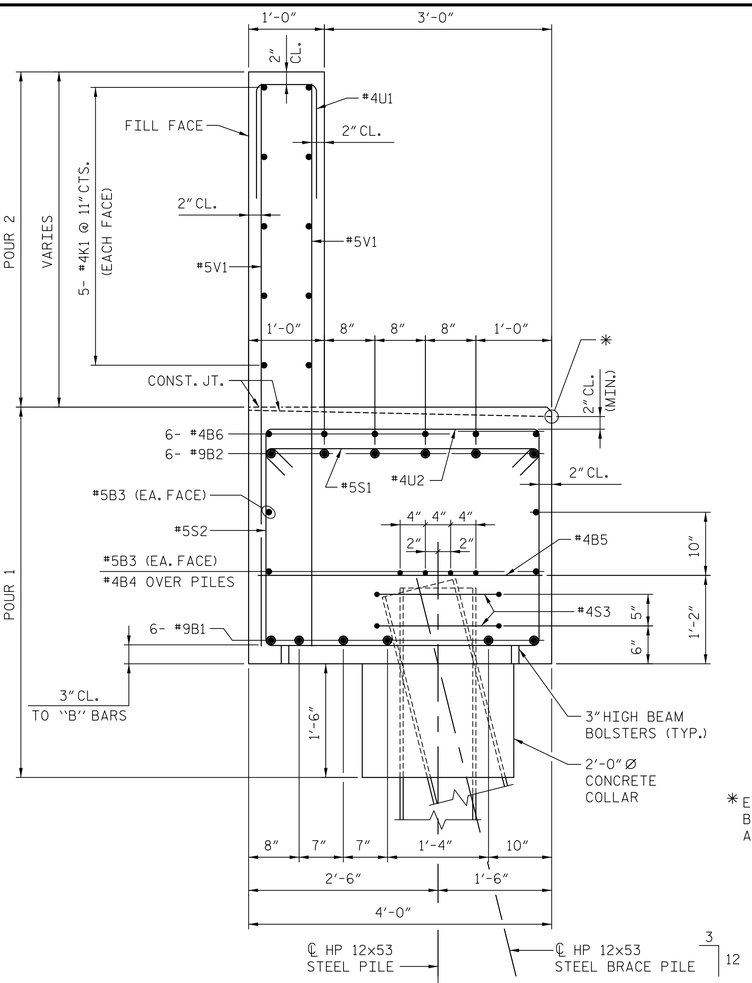
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-70
						TOTAL SHEETS 86

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : DPS DATE : 11/2015

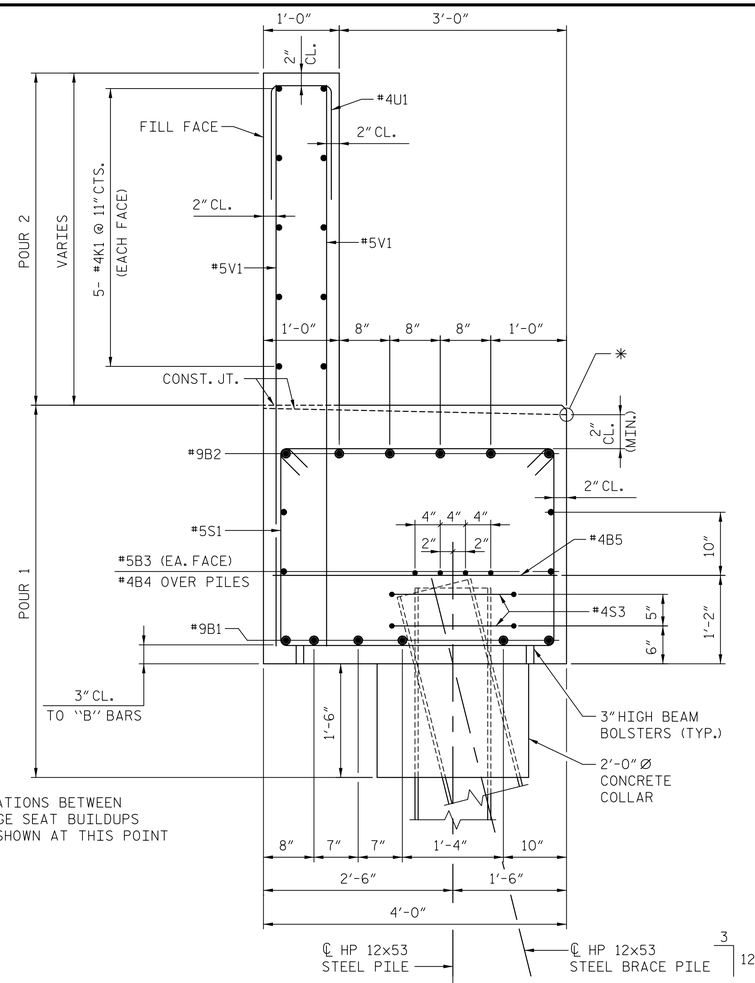
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 8:50:55 AM

USER: kyle.compton
DGN: R:\Bridge 109\Cad\r402_055_U2707_SMU_S70_EB1_03.dgn

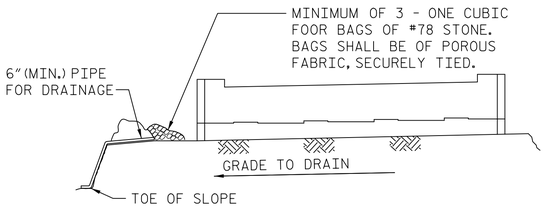


SECTION "A-A"



SECTION "B-B"

* ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT

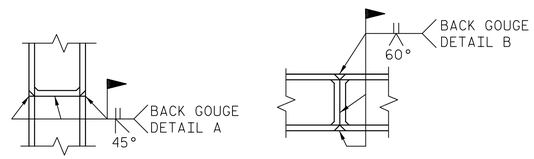


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

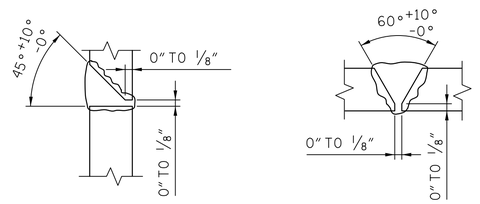
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



** PILE VERTICAL

** PILE HORIZONTAL OR VERTICAL



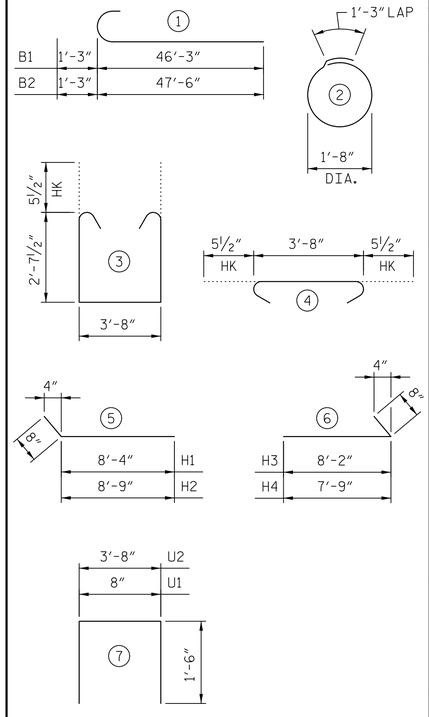
DETAIL A

DETAIL B

** POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	①	47'-6"	1938
B2	12	#9	①	48'-9"	1989
B3	8	#5	STR	44'-8"	373
B4	16	#4	STR	23'-5"	250
B5	22	#4	STR	3'-8"	54
B6	6	#4	STR	10'-0"	40
B7	35	#4	STR	3'-2"	74
H1	13	#6	⑤	9'-0"	176
H2	13	#6	⑤	9'-5"	184
H3	12	#6	⑥	8'-10"	159
H4	12	#6	⑥	8'-5"	152
K1	40	#4	STR	23'-5"	626
K2	4	#4	STR	4'-6"	12
K3	4	#4	STR	4'-5"	12
S1	132	#5	④	4'-7"	631
S2	132	#5	③	9'-10"	1354
S3	34	#4	②	6'-6"	148
U1	77	#4	⑦	3'-8"	189
U2	41	#4	⑦	6'-8"	183
V1	154	#5	STR	7'-3"	1164
V2	28	#5	STR	9'-7"	280
V3	26	#5	STR	9'-1"	246

TOTAL REINFORCING STEEL LBS. 10234

END BENT 1 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR #1 (CAP & LOWER WING)	C.Y.	46.8
POUR 2 (BACKWALL & UPPER WING)	C.Y.	18.9
TOTAL	C.Y.	65.7
HP 12x53 STEEL PILES	NO.	17
	LIN. FT.	935

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LONG CHORD LAYOUT" SHEET.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE PARAPET AND END POST ARE CAST IF SLIP FORMING IS USED.

INSTALL THE 4" DIA. 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.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 4 OF 4 BRIDGE NO. 109

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

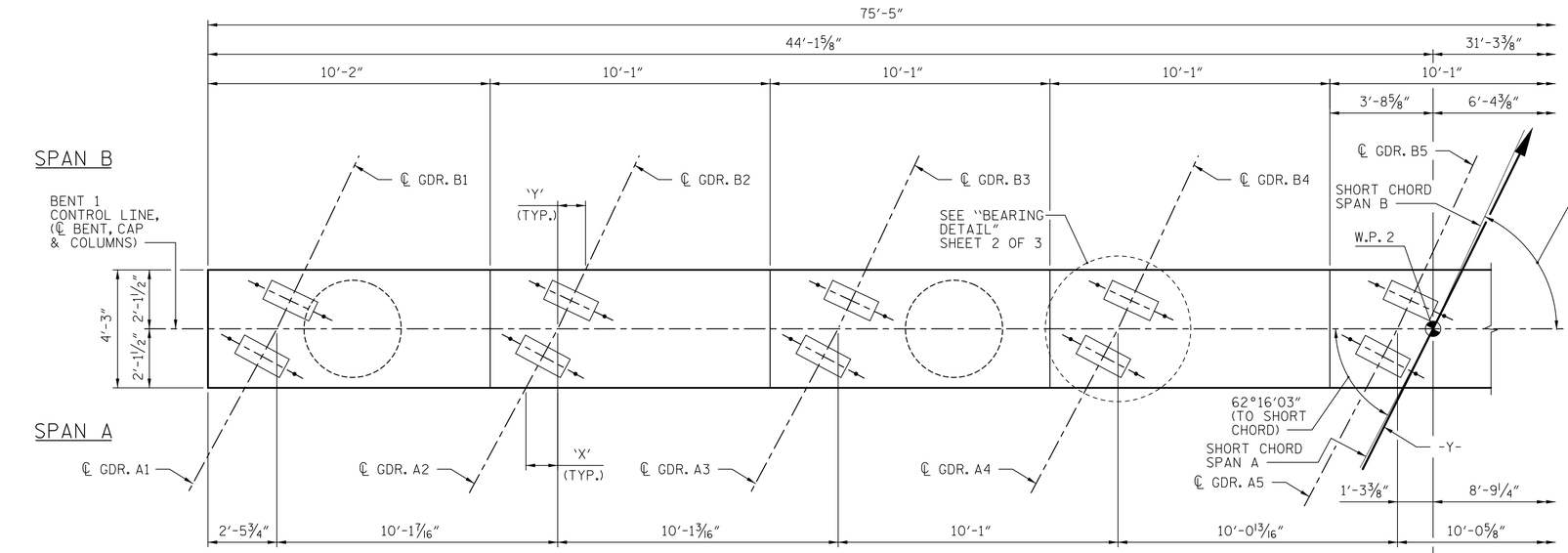
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

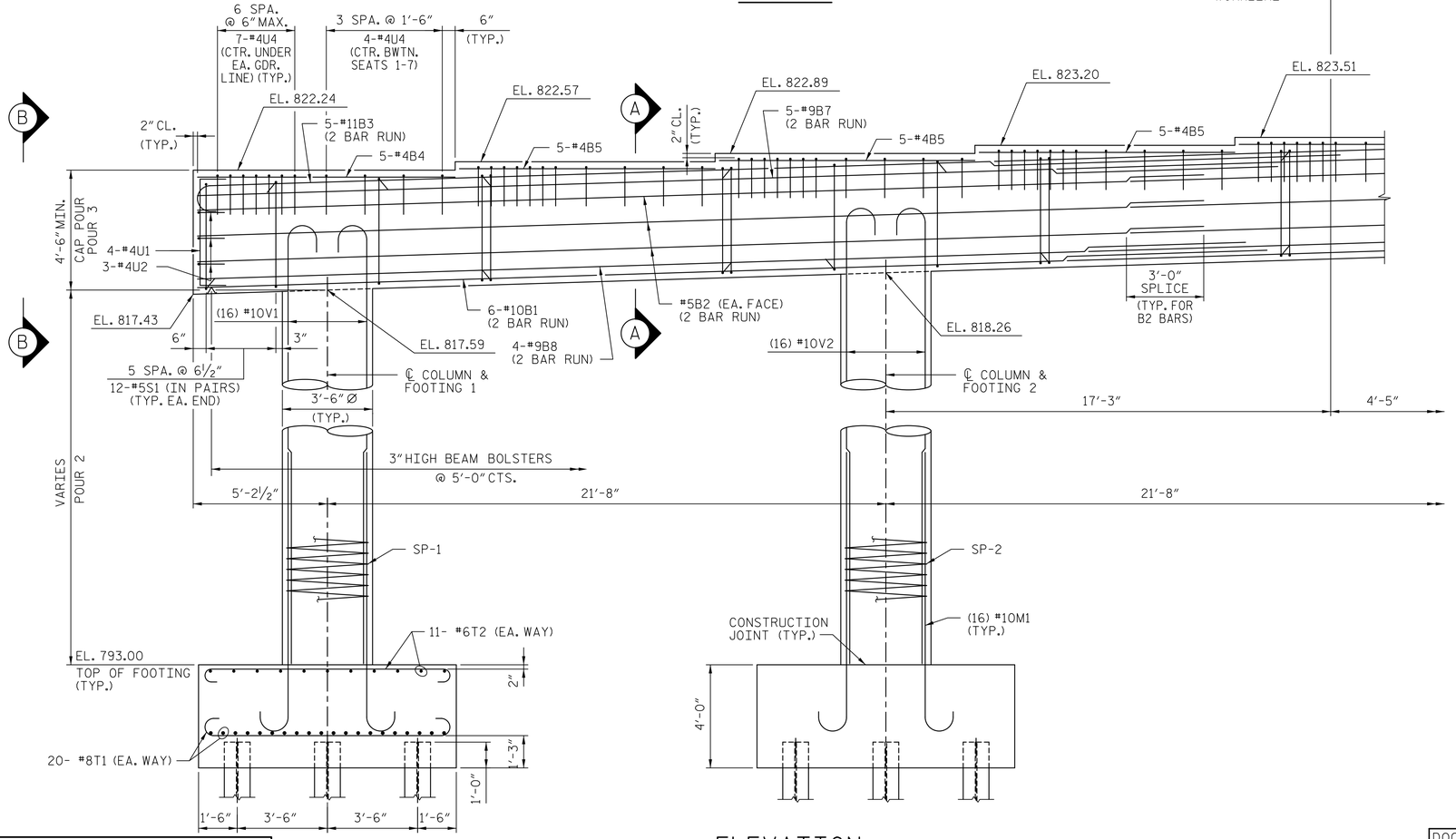
END BENT 1
SECTION AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-71
						TOTAL SHEETS 86

DATE: 1/12/2016
TIME: 8:55:59 AM
USER: kyle.compton
DGN: R:\Bridge IDP\Cadd\402_DST_U2707_SMU_STI_EBI_04.dgn



PLAN



ELEVATION

NOTES:

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

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

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LONG CHORD LAYOUT" SHEET.

FOR PILE SPLICE DETAILS, SEE "END BENT" SHEETS.

GIRDER	'X'	'Y'
1	1′-1⅞″	1′-0⅛″
2	1′-1¾″	1′-0″
3	1′-1⅝″	11¹⁵⁄₁₆″
4	1′-1½″	11¹³⁄₁₆″
5	1′-1⁷⁄₁₆″	11¾″
6	1′-1⁵⁄₁₆″	11¹¹⁄₁₆″
7	1′-1³⁄₁₆″	11⁹⁄₁₆″
8	1′-1⅛″	11½″

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 3 BRIDGE NO. 109

DRAWN BY : DDL DATE : 11/2015

CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL DocuSigned by: 036474 ENGINEER John C. Morrison JOHN C. MORRISON

1/12/2016

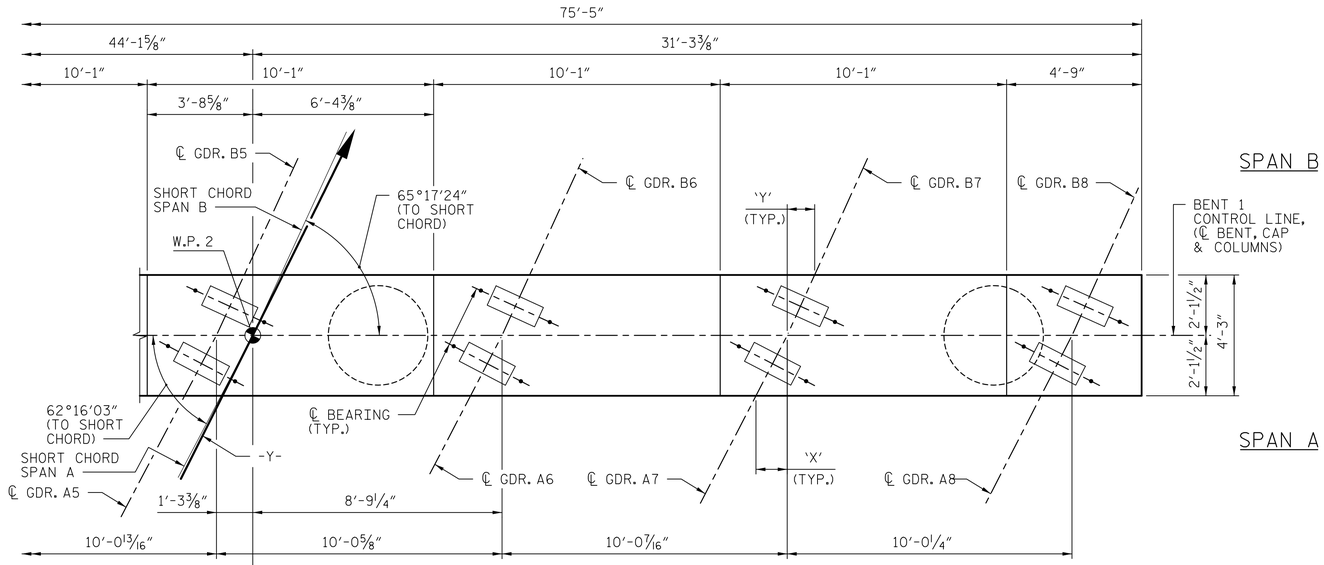
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

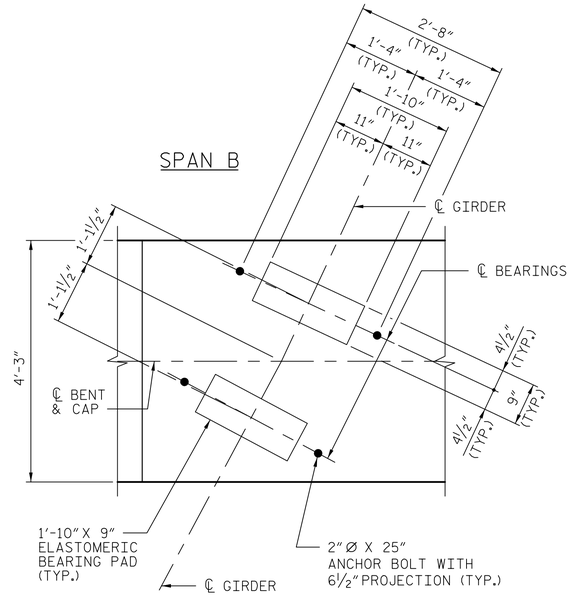
BENT 1
PLAN AND ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-72
						TOTAL SHEETS 86

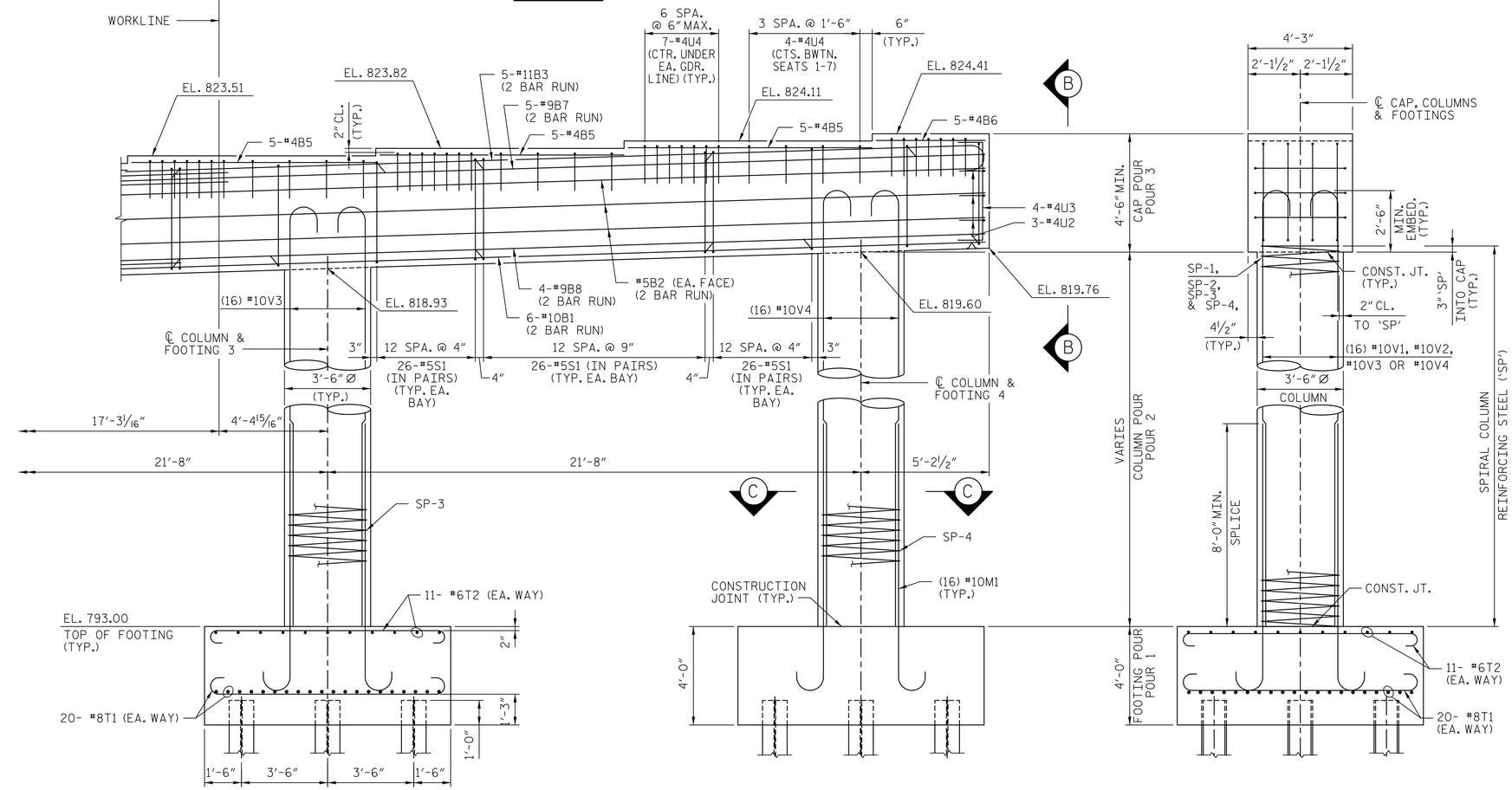
DATE: 1/12/2016
TIME: 8:55:02 AM
USER: kyle.compton
DGN: R:\Bridge Data\Load402_059_U2707_SMU_S72_BI_01.dgn



PLAN



BEARING DETAIL



ELEVATION

END VIEW

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 2 OF 3 BRIDGE NO. 109

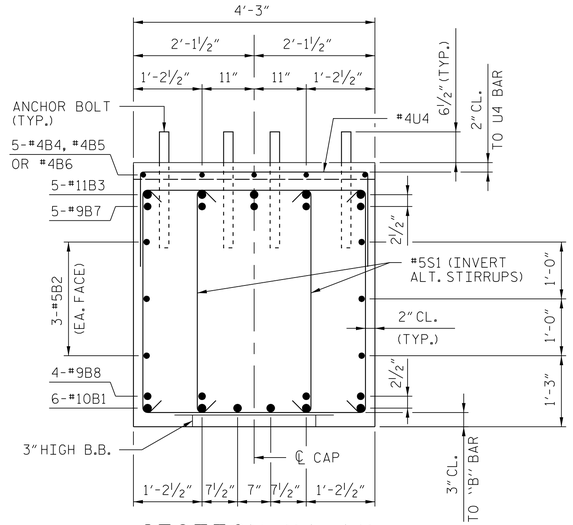
AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

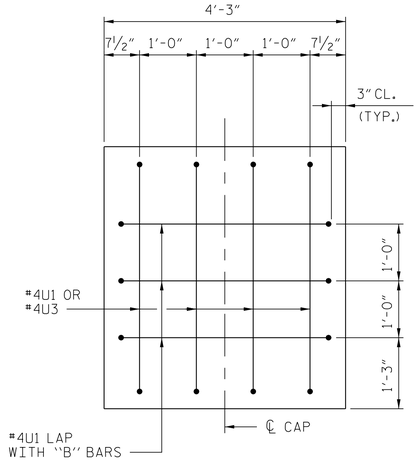
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT 1
PLAN AND ELEVATION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-73
						TOTAL SHEETS 86

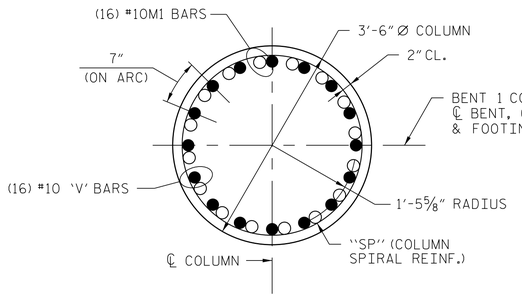


SECTION "A-A"



END VIEW "B-B"

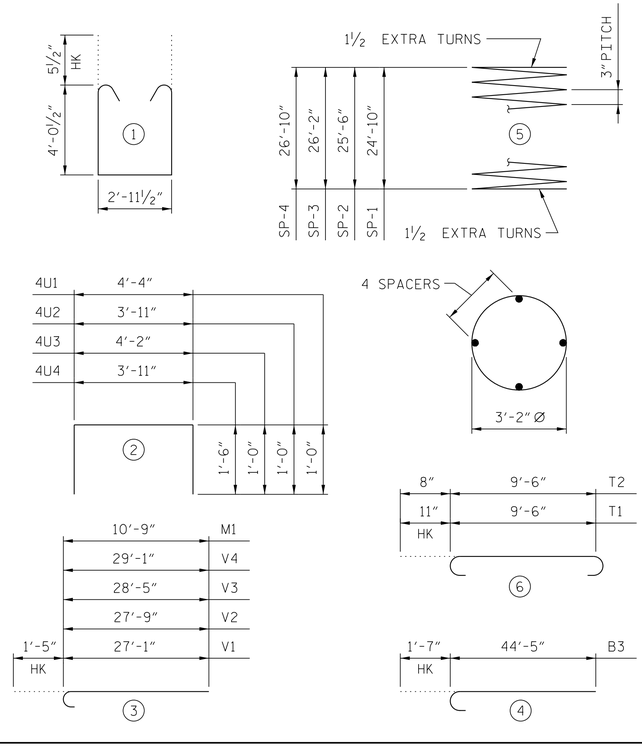
(RIGHT END SHOWN, LEFT END SIMILAR)



SECTION "C-C"

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	STR	41'-7"	2147
B2	12	#5	STR	39'-2"	489
B3	10	#11	④	46'-0"	2445
B4	5	#4	STR	10'-0"	33
B5	30	#4	STR	9'-11"	199
B6	5	#4	STR	4'-5"	15
B7	10	#9	STR	41'-11"	1425
B8	8	#9	STR	40'-8"	1106
M1	64	#10	③	12'-2"	3351
S1	258	#5	①	12'-0"	3229
T1	160	#8	⑥	11'-4"	4842
T2	88	#6	⑥	10'-10"	1432
U1	4	#4	②	6'-4"	16
U2	6	#4	②	5'-11"	24
U3	4	#4	②	6'-2"	17
U4	84	#4	②	6'-11"	388
V1	16	#10	③	28'-6"	1962
V2	16	#10	③	29'-2"	2008
V3	16	#10	③	29'-10"	2054
V4	16	#10	③	30'-6"	2100
REINFORCING STEEL				LBS.	29282
SP-1	1	***	⑤	1004'-11"	671
SP-2	1	***	⑤	1031'-2"	689
SP-3	1	***	⑤	1057'-5"	706
SP-4	1	***	⑤	1083'-6"	724
SPIRAL REINFORCING STEEL				LBS.	2790

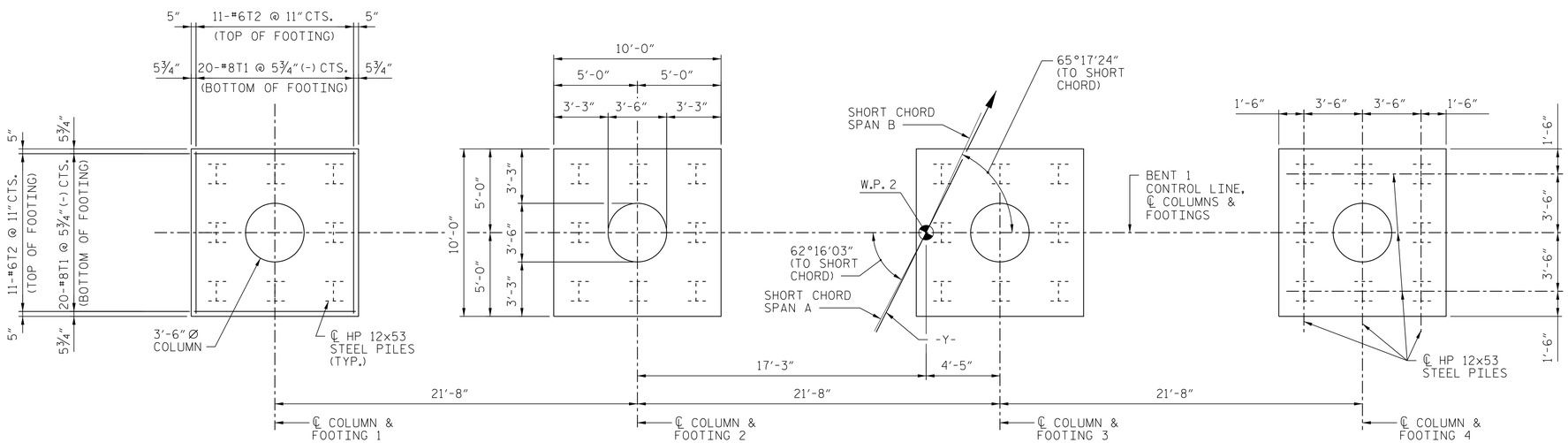
*** THE "SP" SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BENT 1 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 1 (FOOTINGS)	C.Y.	59.2
POUR 2 (COLUMNS)	C.Y.	36.5
POUR 3 (CAP)	C.Y.	55.5
TOTAL CLASS A CONCRETE	C.Y.	151.2
HP 12 x 53 STEEL PILES NO. 32	LIN. FT.	640
STEEL PILE POINTS	EA.	32

SPLICE LENGTHS

BAR SIZE	TOP BAR	BASIC
#9	8'-9"	6'-3"
#10	11'-1"	7'-11"
#11	13'-7"	9'-9"



PLAN OF FOOTINGS

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
3/1/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

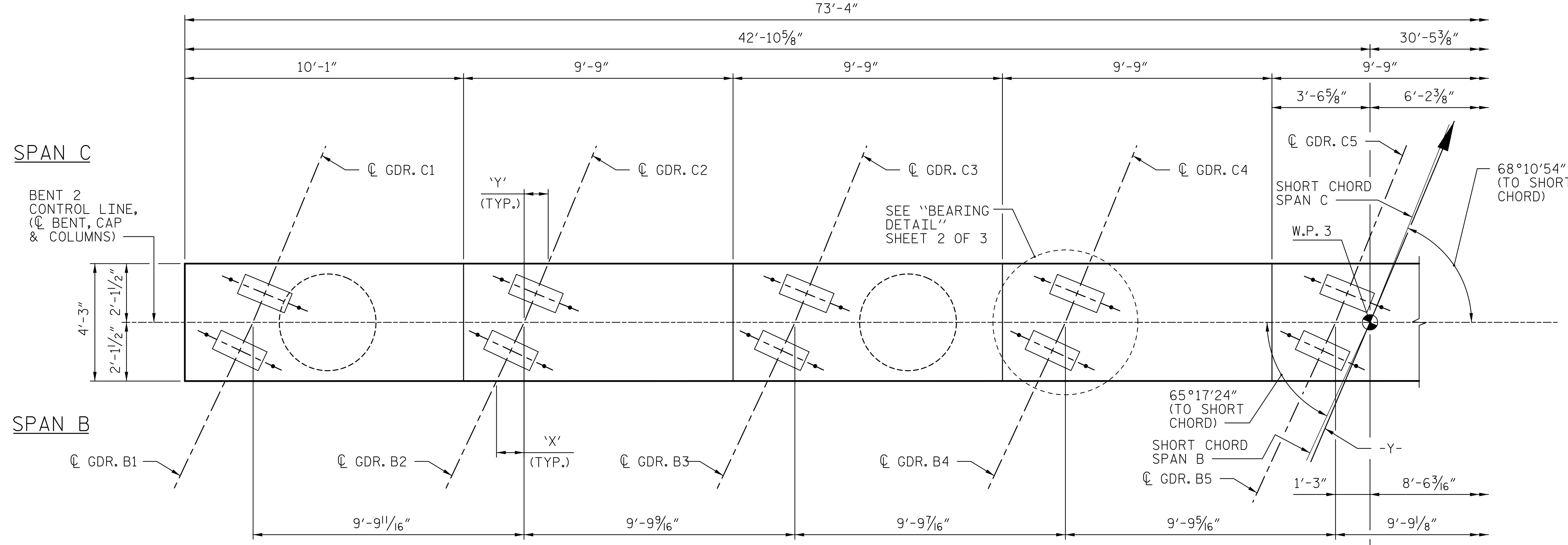
BENT 1
SECTION AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-74
						TOTAL SHEETS
						86

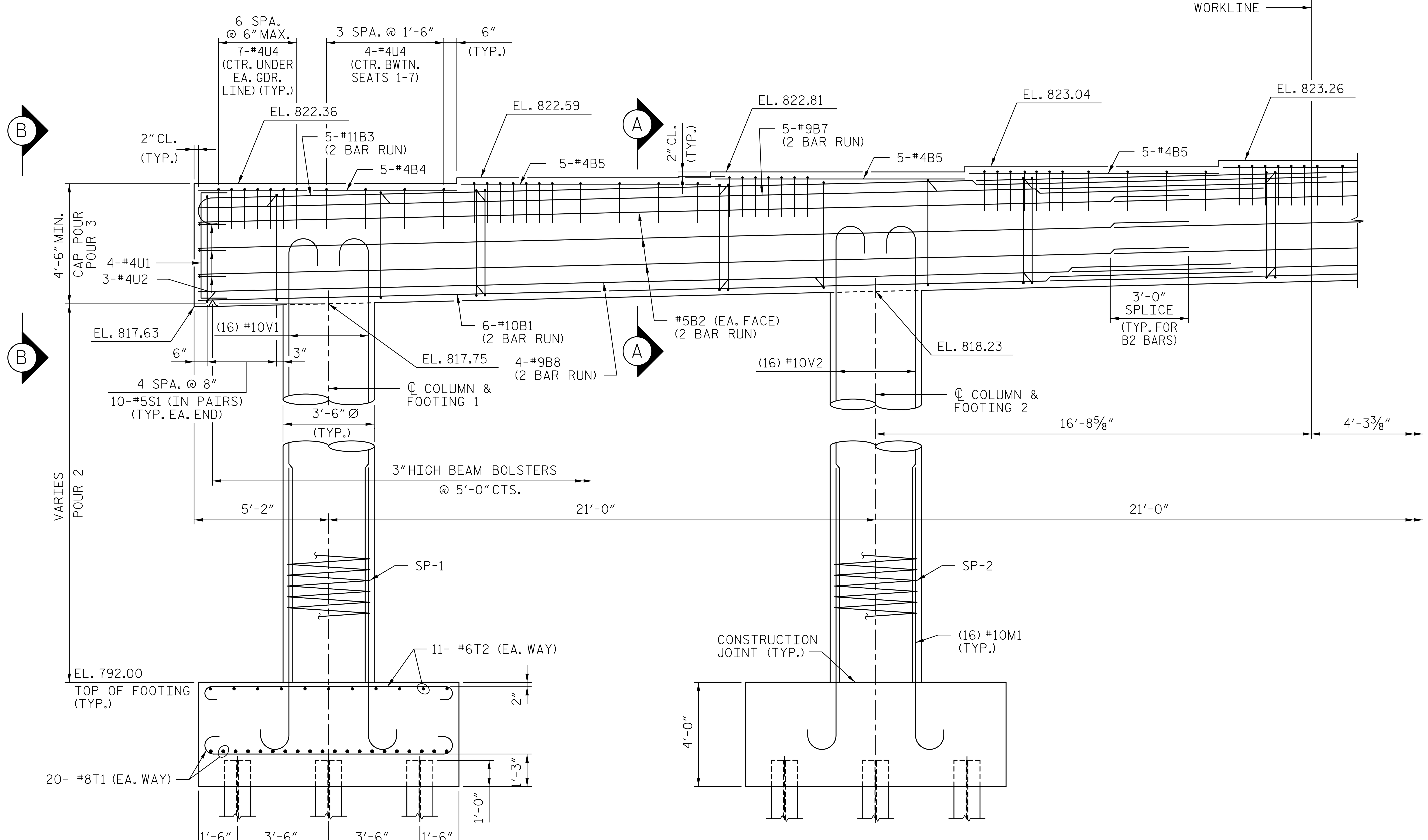
DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 3/1/2016
TIME: 2:40:57 PM
USER: MorrisonC
DGN: P:\60446280\B\400_Technical\450_NCDOT_Std_Tech_Design_Files\Structures\Bridge 109\Cad\402_063_UCTOT_SMU_ST4_BL_03.dgn



PLAN



ELEVATION

NOTES:

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

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

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LONG CHORD LAYOUT" SHEET.

FOR PILE SPLICE DETAILS, SEE "END BENT" SHEETS.

GIRDER	'X'	'Y'
1	1'-0⅛"	10⁹⁄₁₆"
2	1'-0"	10⁷⁄₁₆"
3	11¹⁵⁄₁₆"	10⅜"
4	11¹³⁄₁₆"	10⁵⁄₁₆"
5	11¾"	10¼"
6	11¹¹⁄₁₆"	10³⁄₁₆"
7	11⁹⁄₁₆"	10⅛"
8	11½"	10¹⁄₁₆"

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

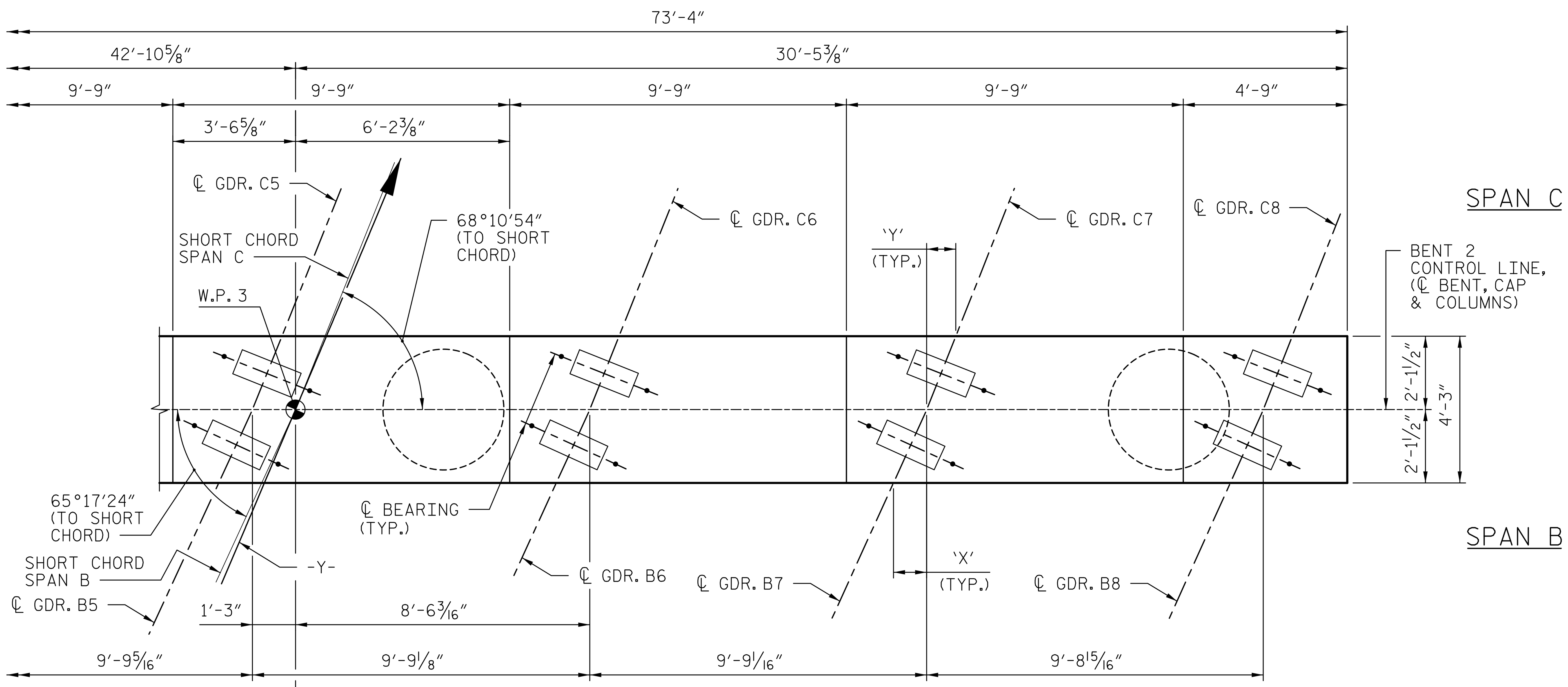
SUPERSTRUCTURE

BENT 2
PLAN AND ELEVATION

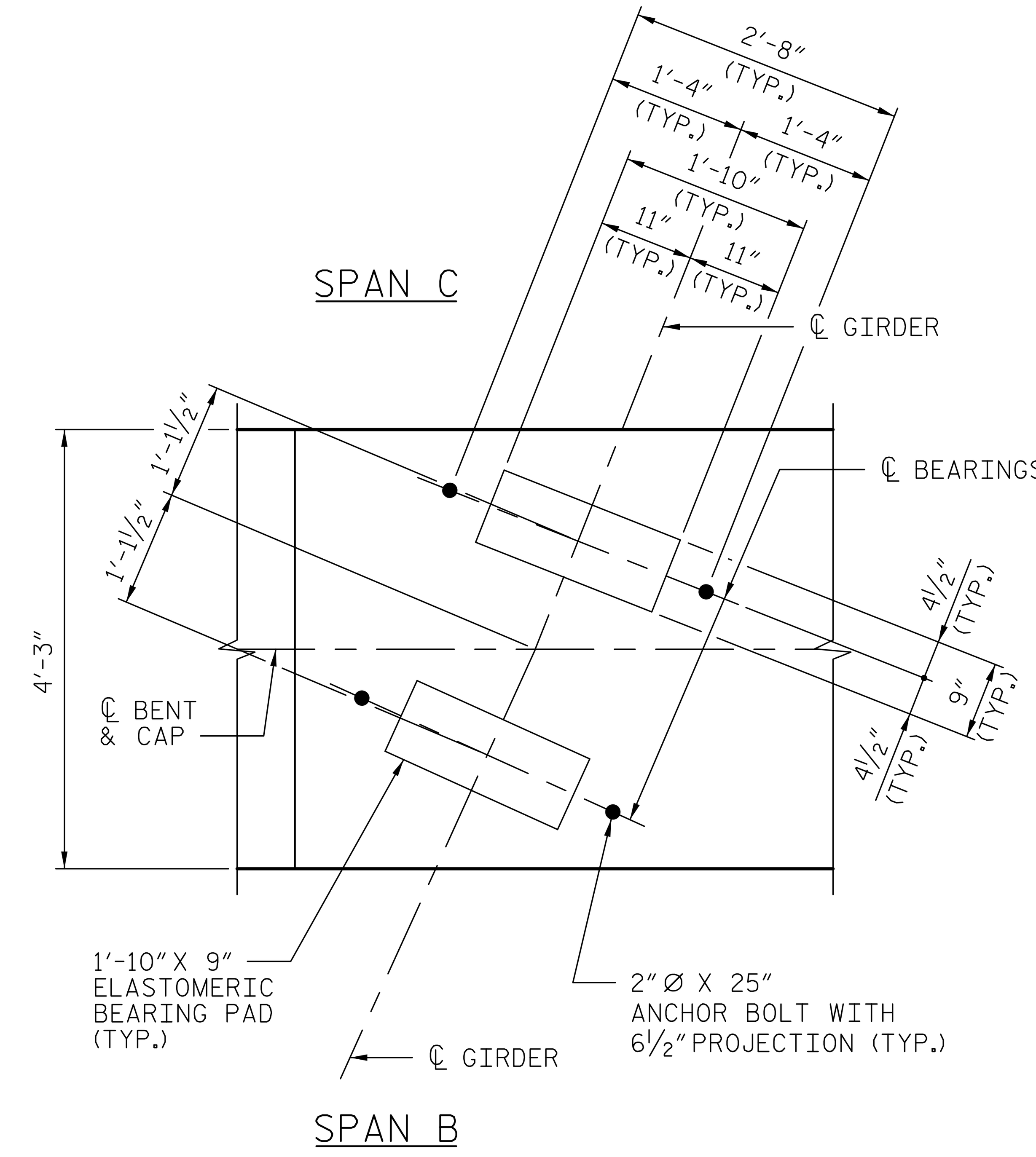
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-75
						TOTAL SHEETS 86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

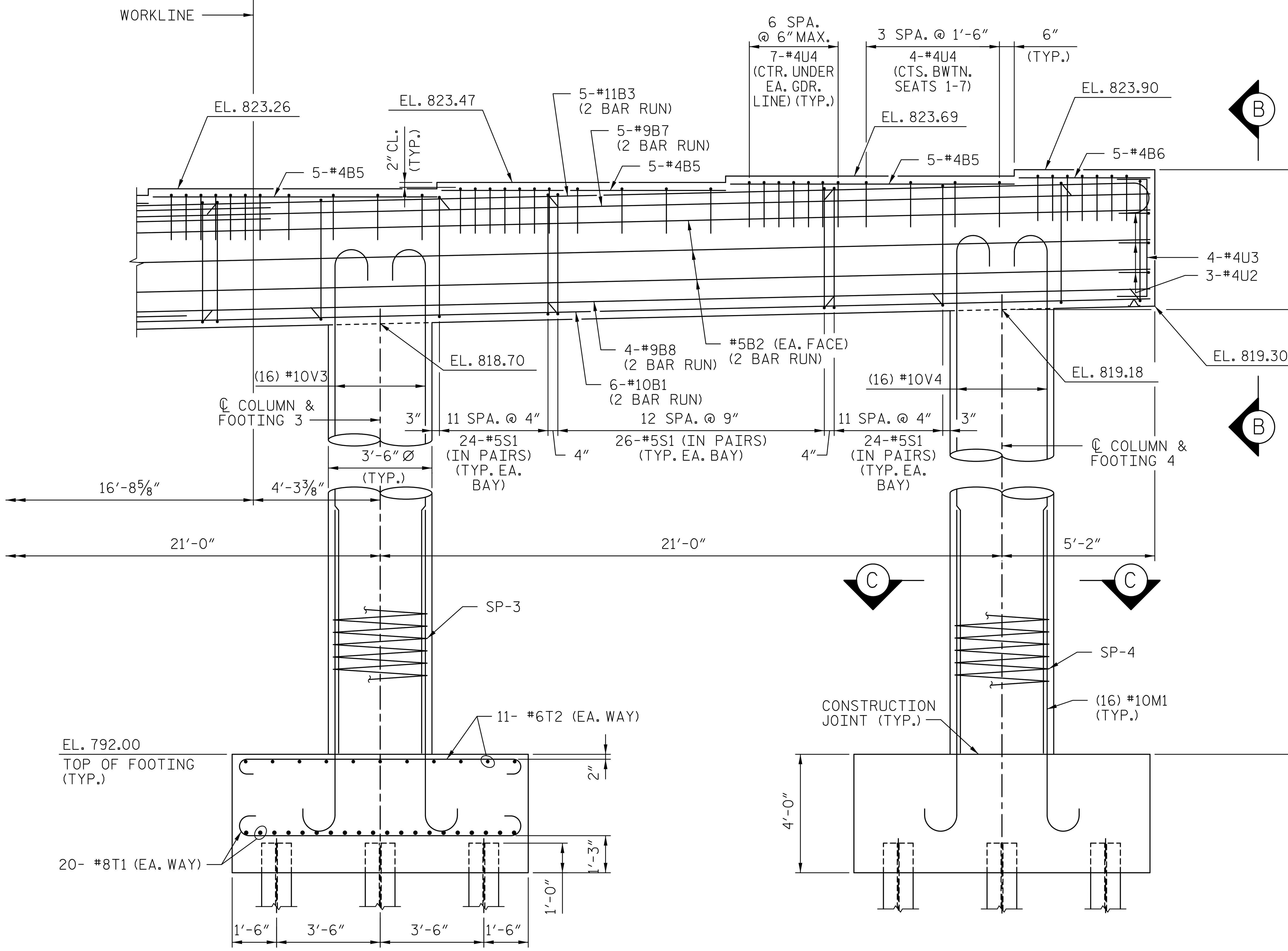
DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



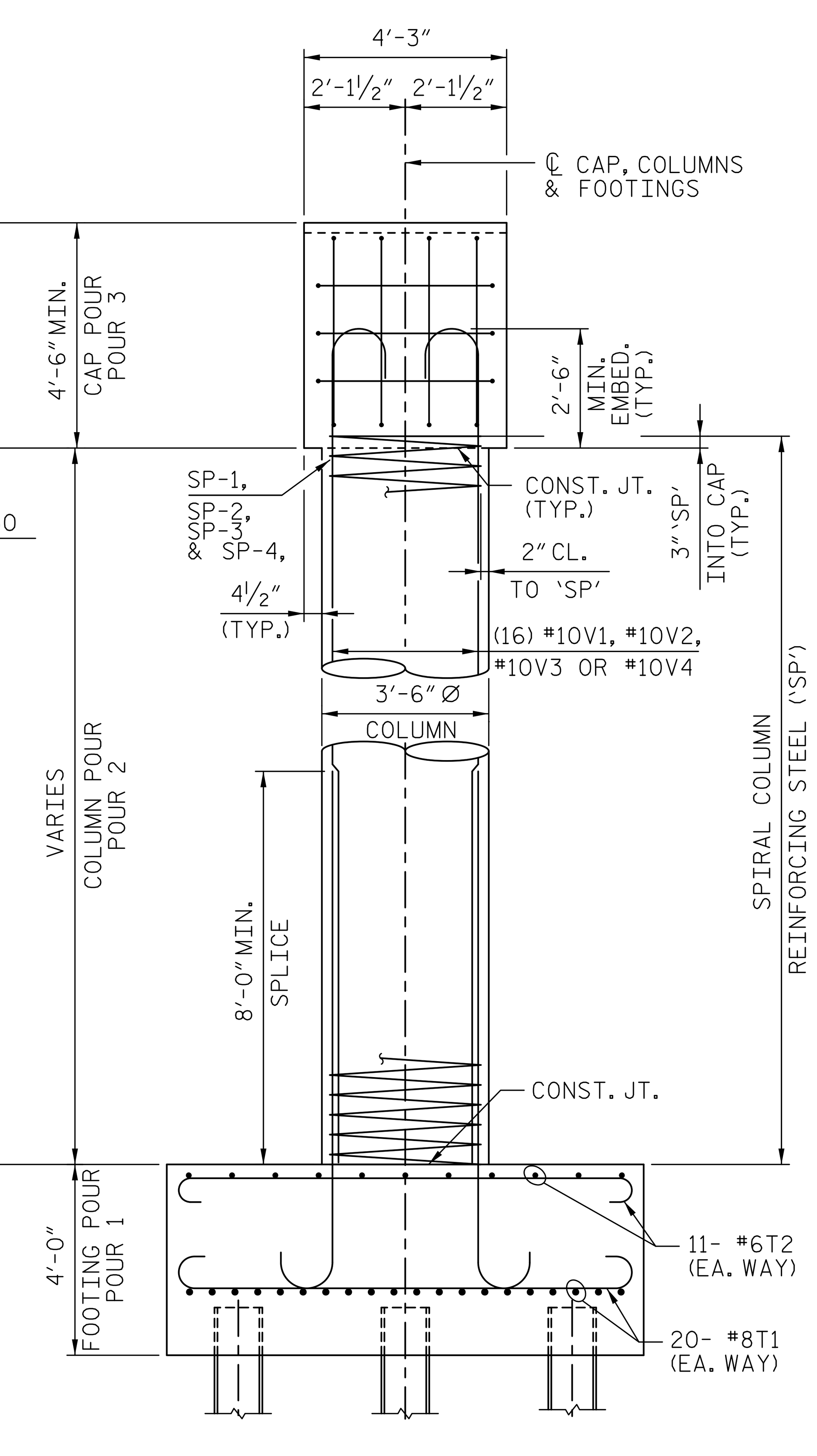
PLAN



BEARING DETAIL



ELEVATION



END VIEW

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 2 OF 3
BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

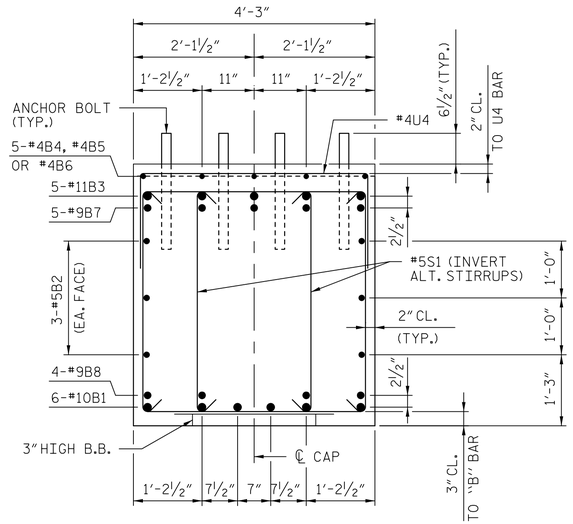
BENT 2
PLAN AND ELEVATION

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
John C. Morrison
1/12/2016

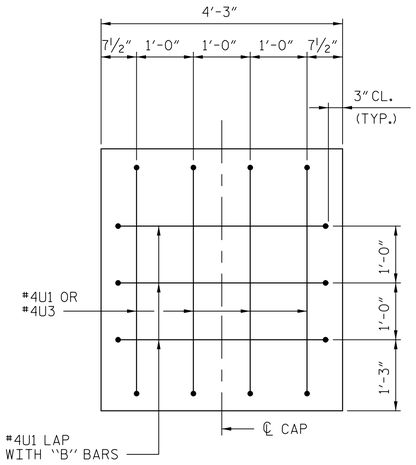
REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S-76
						TOTAL SHEETS	86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

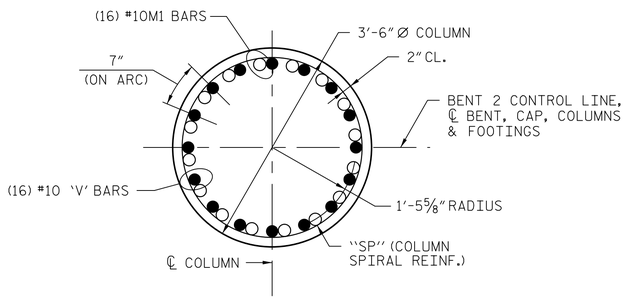


SECTION "A-A"



END VIEW "B-B"

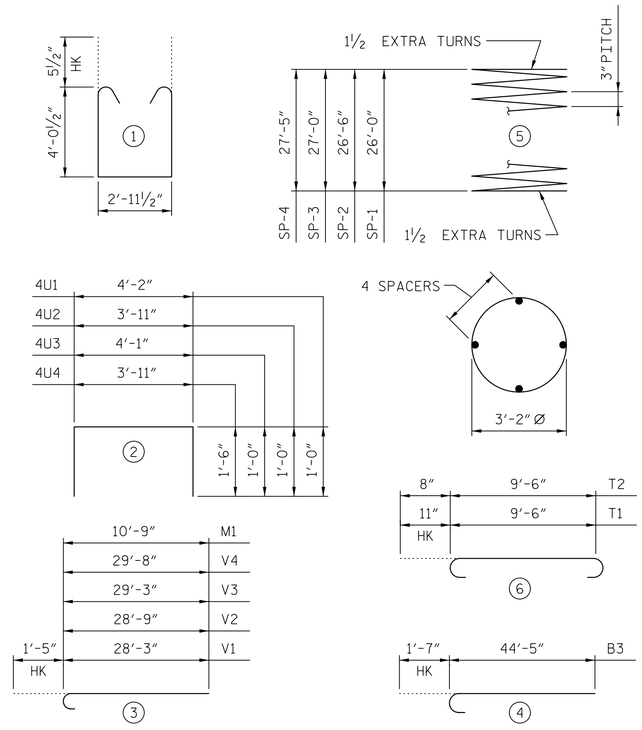
(RIGHT END SHOWN, LEFT END SIMILAR)



SECTION "C-C"

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	STR	40'-6"	2091
B2	12	#5	STR	38'-1"	477
B3	10	#11	④	46'-0"	2445
B4	5	#4	STR	9'-11"	33
B5	30	#4	STR	9'-7"	192
B6	5	#4	STR	4'-5"	15
B7	10	#9	STR	40'-11"	1391
B8	8	#9	STR	39'-8"	1079
M1	64	#10	③	12'-2"	3351
S1	258	#5	①	12'-0"	3229
T1	160	#8	⑥	11'-4"	4842
T2	88	#6	⑥	10'-10"	1432
U1	4	#4	②	6'-2"	16
U2	6	#4	②	5'-11"	24
U3	4	#4	②	6'-1"	16
U4	84	#4	②	6'-11"	388
V1	16	#10	③	29'-8"	2042
V2	16	#10	③	30'-2"	2077
V3	16	#10	③	30'-8"	2111
V4	16	#10	③	31'-1"	2140
REINFORCING STEEL				LBS.	29391
SP-1	1	***	⑤	1050'-9"	702
SP-2	1	***	⑤	1070'-6"	715
SP-3	1	***	⑤	1090'-0"	728
SP-4	1	***	⑤	1106'-6"	739
SPIRAL REINFORCING STEEL				LBS.	2884

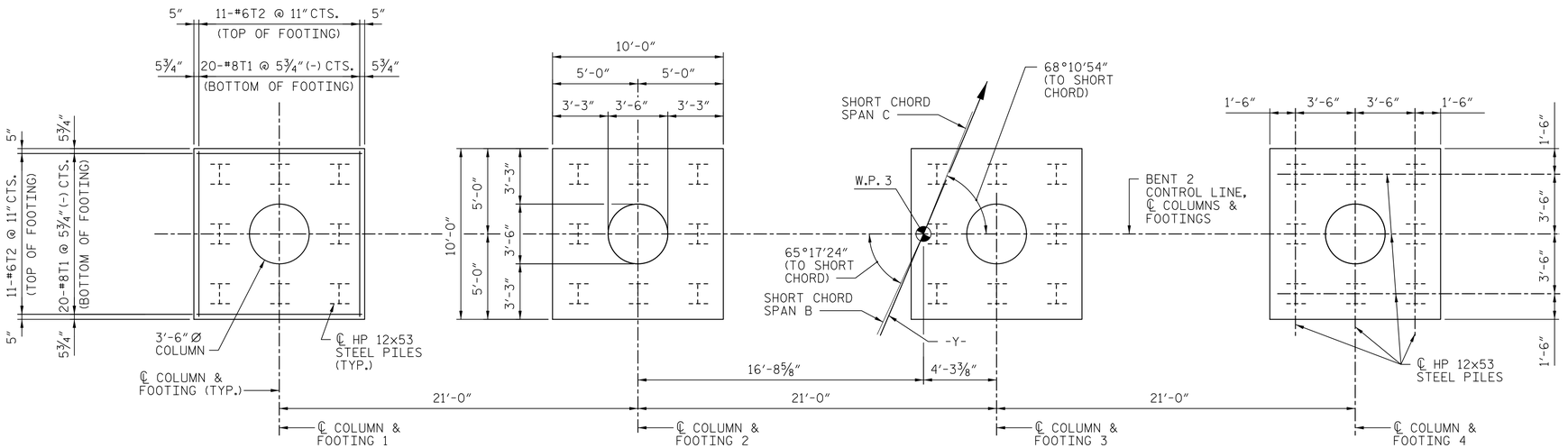
*** THE "SP" SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BENT 2 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR 1 (FOOTINGS)	C.Y.	59.2
POUR 2 (COLUMNS)	C.Y.	37.7
POUR 3 (CAP)	C.Y.	53.3
TOTAL CLASS AA CONCRETE	C.Y.	150.2
HP 12 x 53 STEEL PILES NO. 32	LIN. FT.	1440

SPLICE LENGTHS

BAR SIZE	TOP BAR	BASIC
#9	8'-9"	6'-3"
#10	11'-1"	7'-11"
#11	13'-7"	9'-9"



PLAN OF FOOTINGS

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 3 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

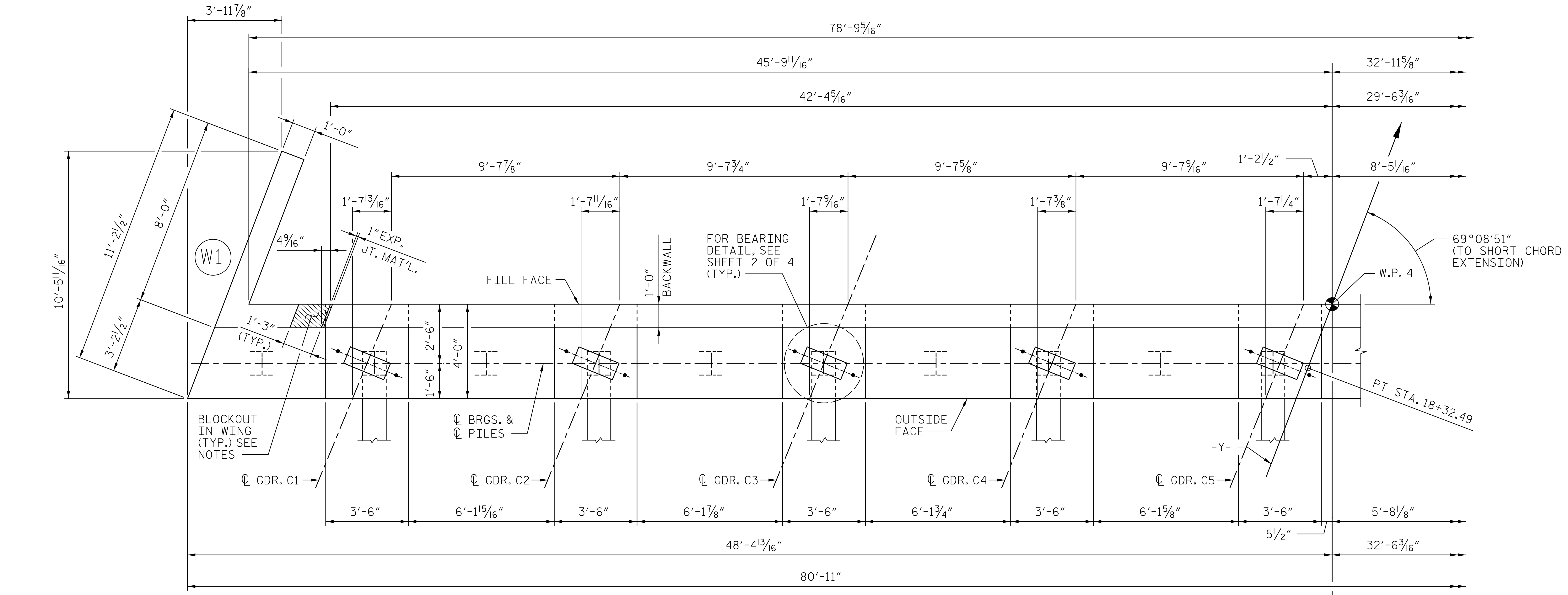
NORTH CAROLINA PROFESSIONAL SEAL 039474 ENGINEER JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

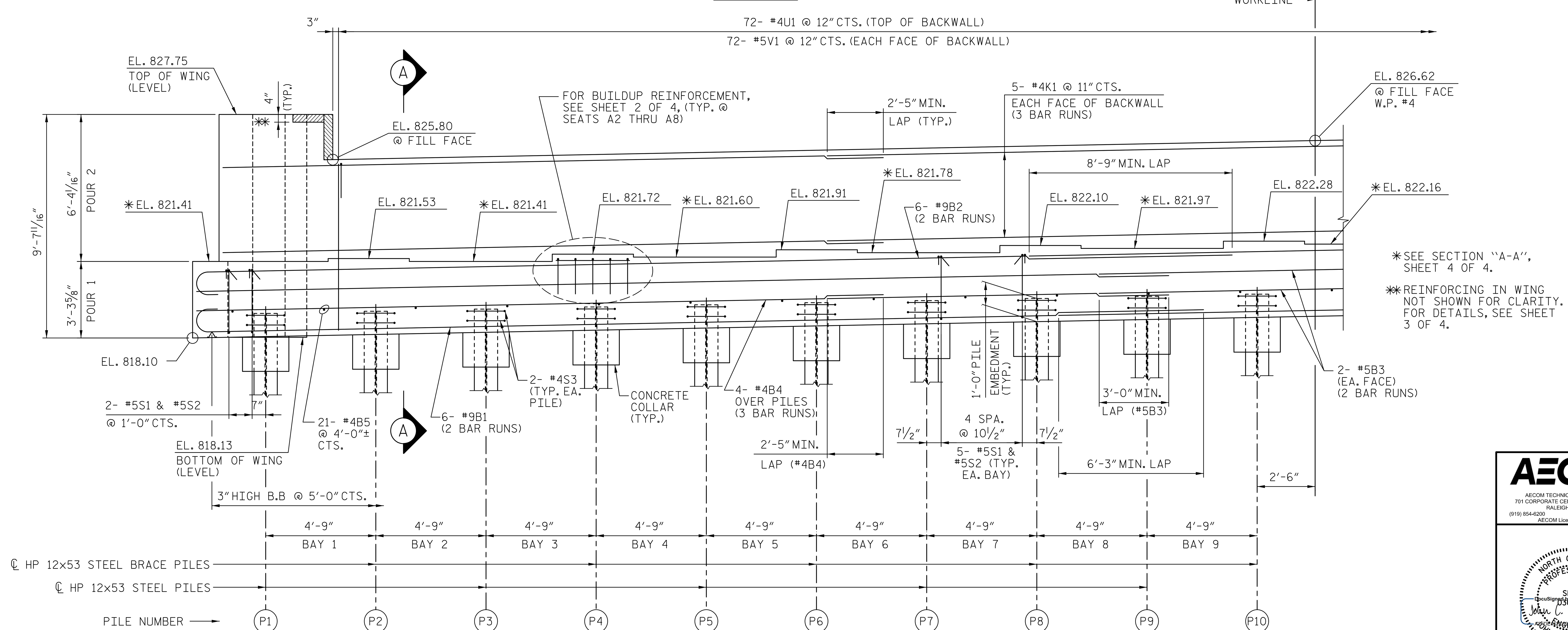
SUPERSTRUCTURE
BENT 2
SECTIONS AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-77
						TOTAL SHEETS 86

DATE: 1/12/2016
TIME: 8:51:23 AM
USER: kyle.compton
DGN: R:\Bridge 109\Cadd\402_069_U2707_SMU_ST1_B2_03.dgn



PLAN



ELEVATION

NOTES:

SEE SHEET 4 OF 4 FOR NOTES.

TOP OF PILE ELEVATIONS	
1	819.15
2	819.25
3	819.34
4	819.43
5	819.52
6	819.62
7	819.71
8	819.80
9	819.90
10	819.99

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 4 BRIDGE NO. 109

AECOM

AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON

1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

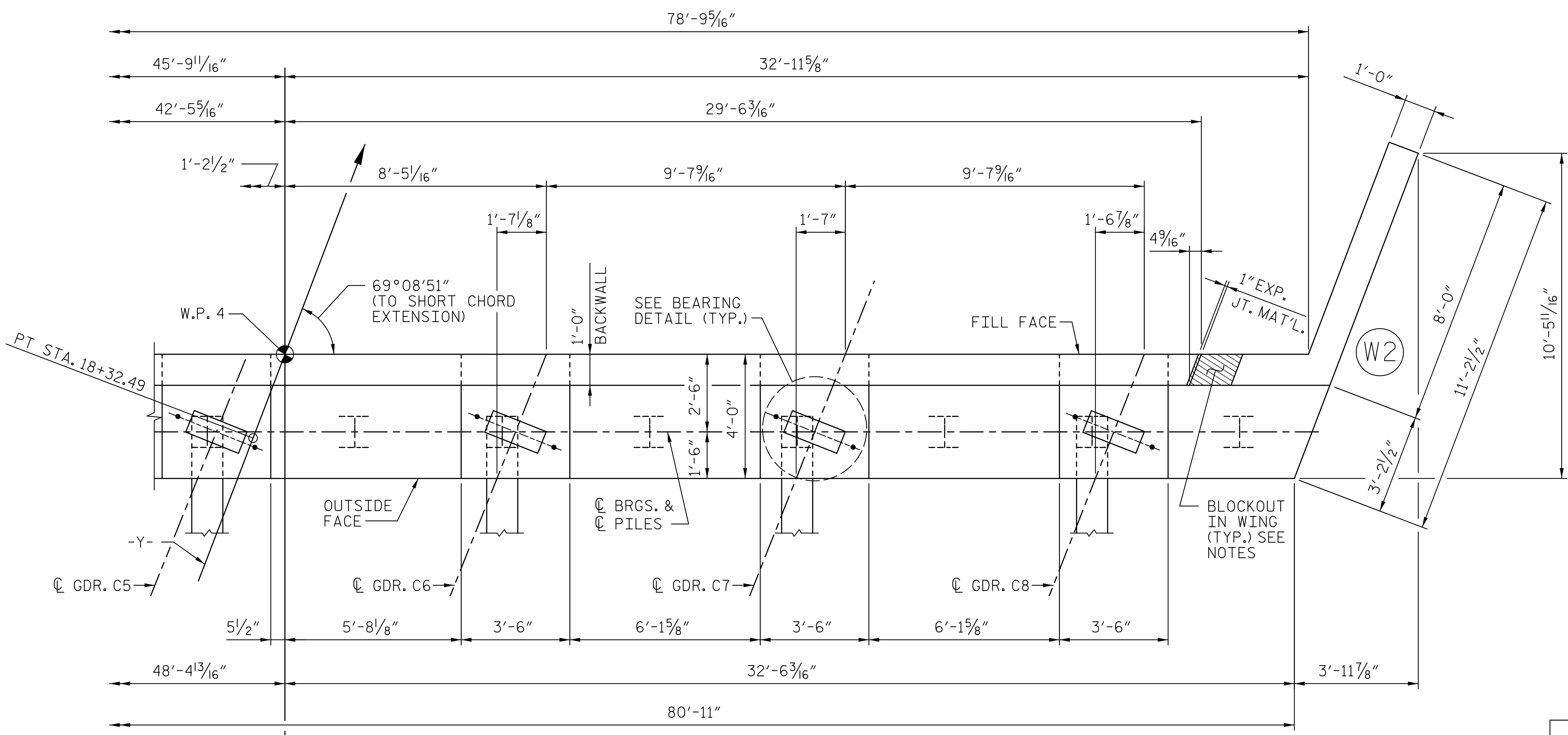
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:

SHEET NO. S-78

TOTAL SHEETS 86

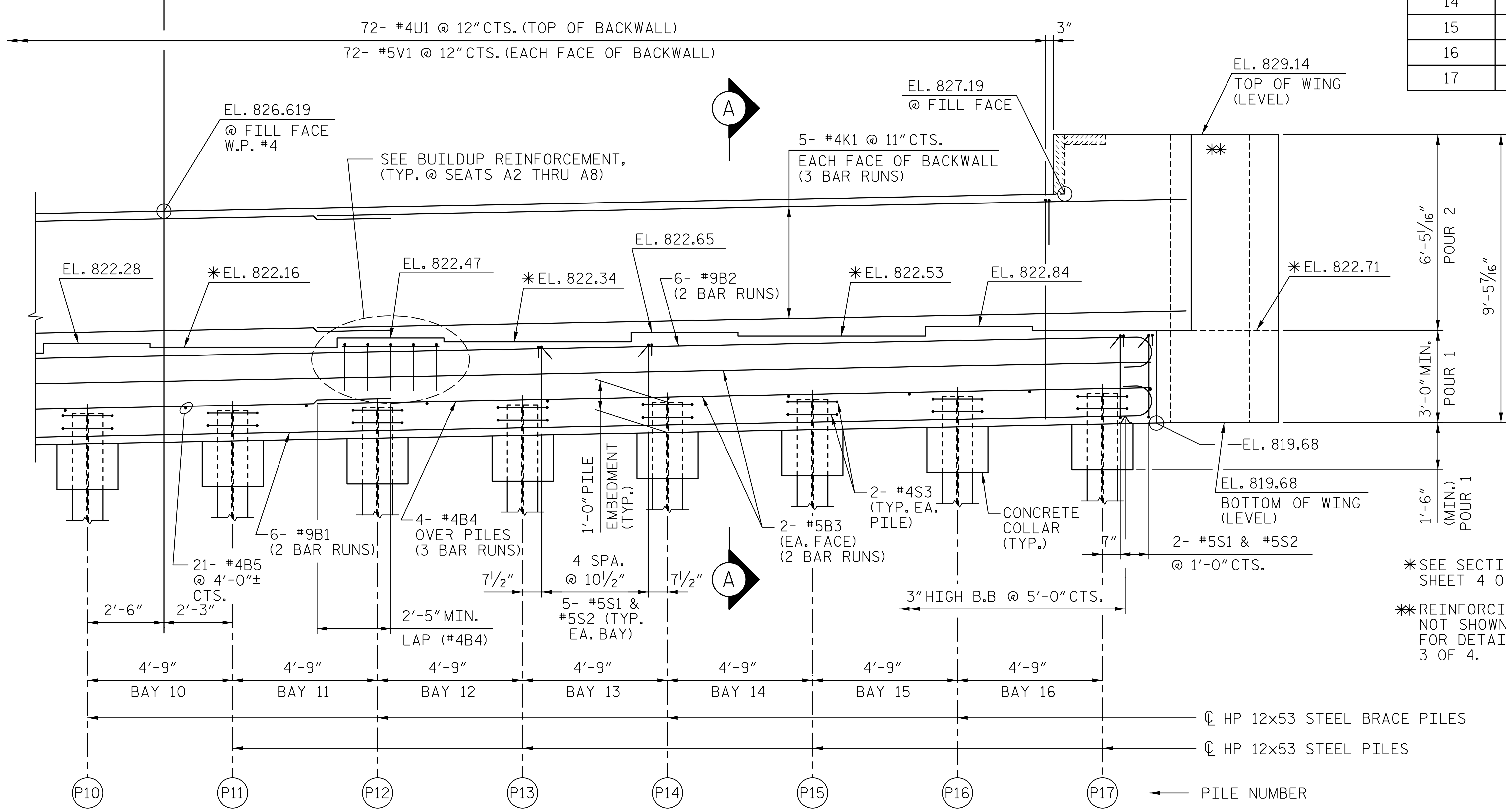
NOTES:

SEE SHEET 4 OF 4 FOR NOTES.



PLAN

WORKLINE

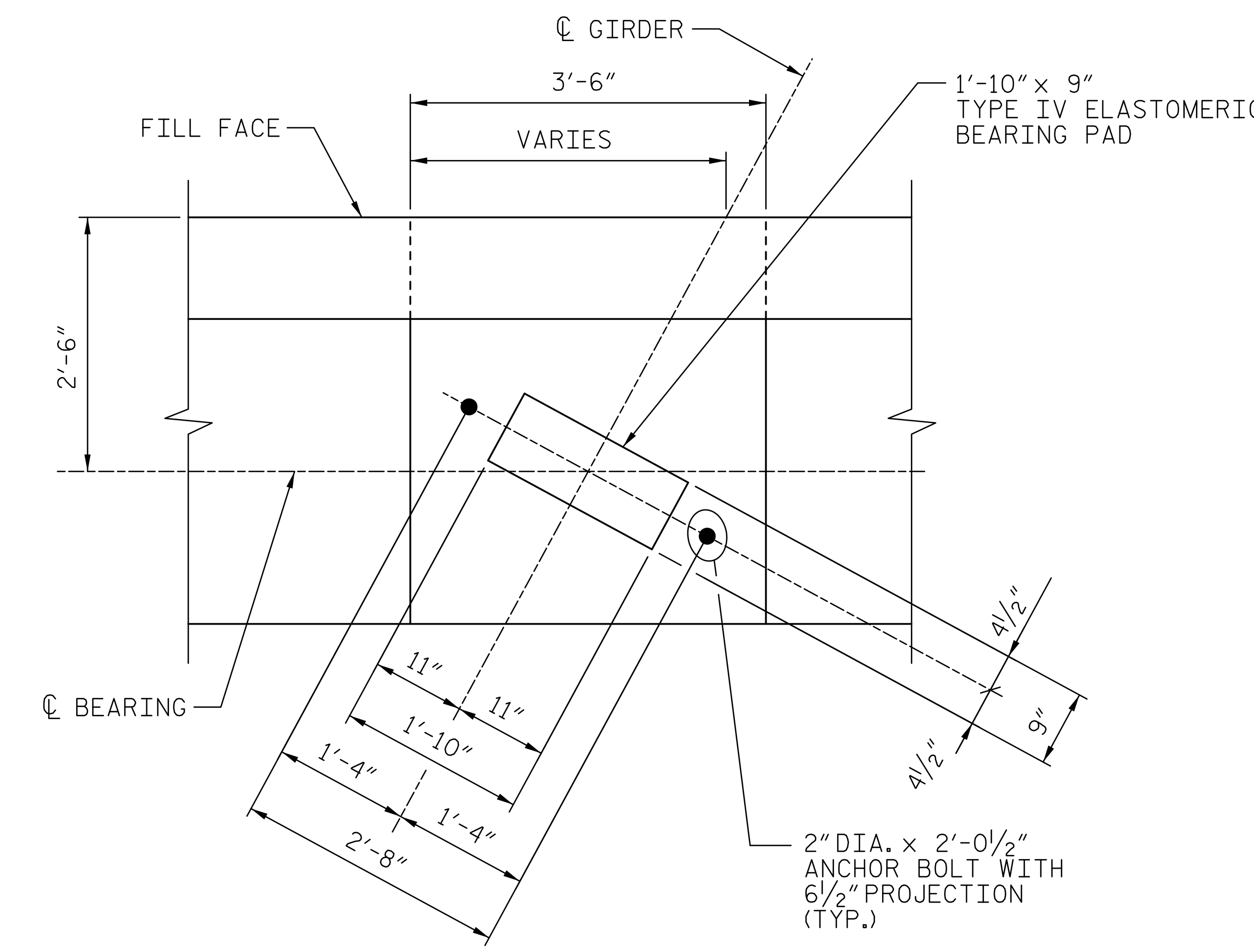


ELEVATION

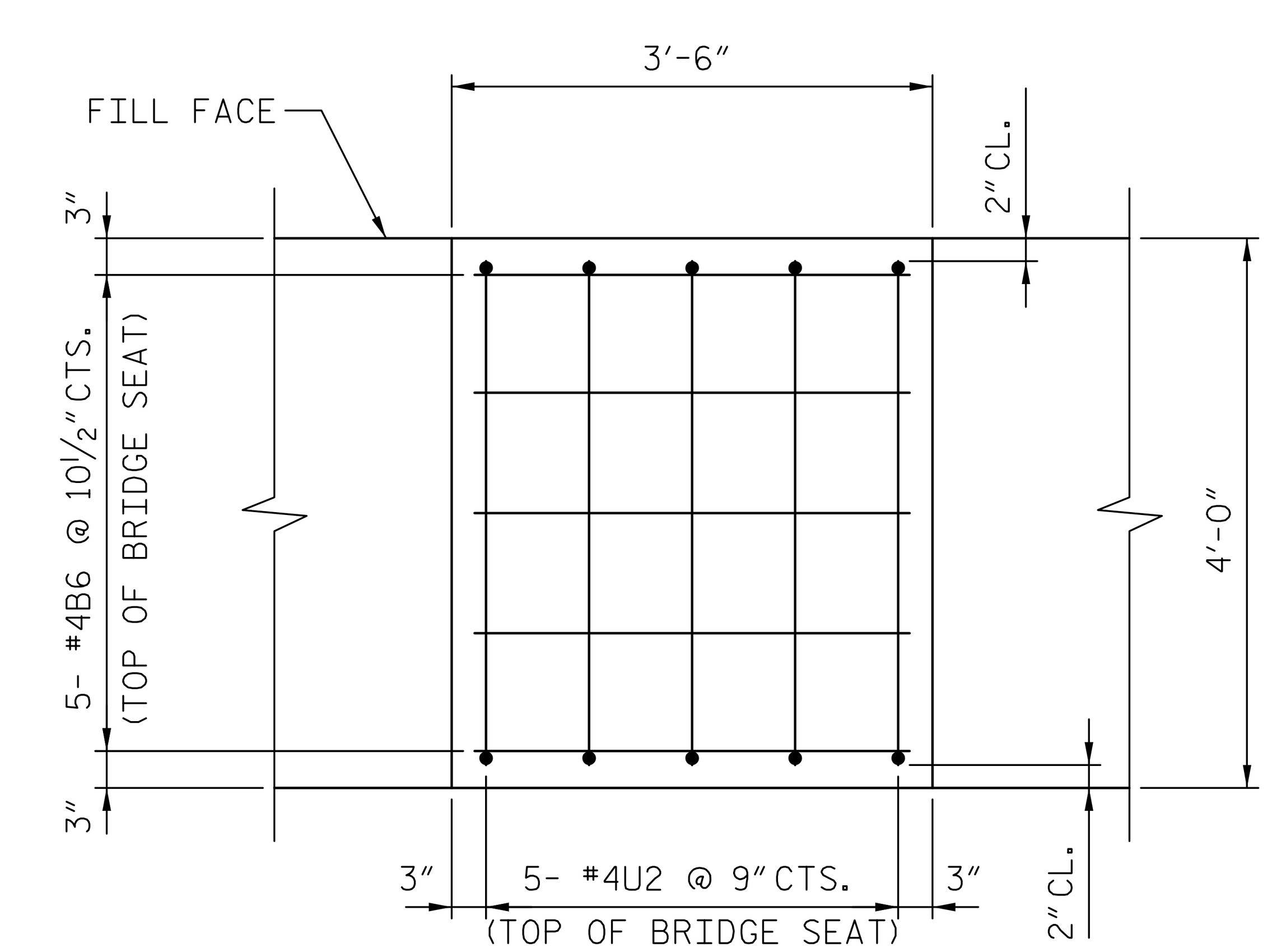
TOP OF PILE ELEVATIONS	
11	820.08
12	820.17
13	820.26
14	820.36
15	820.45
16	820.54
17	820.64

✱ SEE SECTION "A-A", SHEET 4 OF 4.

✱✱ REINFORCING IN WING NOT SHOWN FOR CLARITY. FOR DETAILS, SEE SHEET 3 OF 4.



BEARING DETAIL



BUILDUP REINFORCEMENT

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
PLAN AND ELEVATION

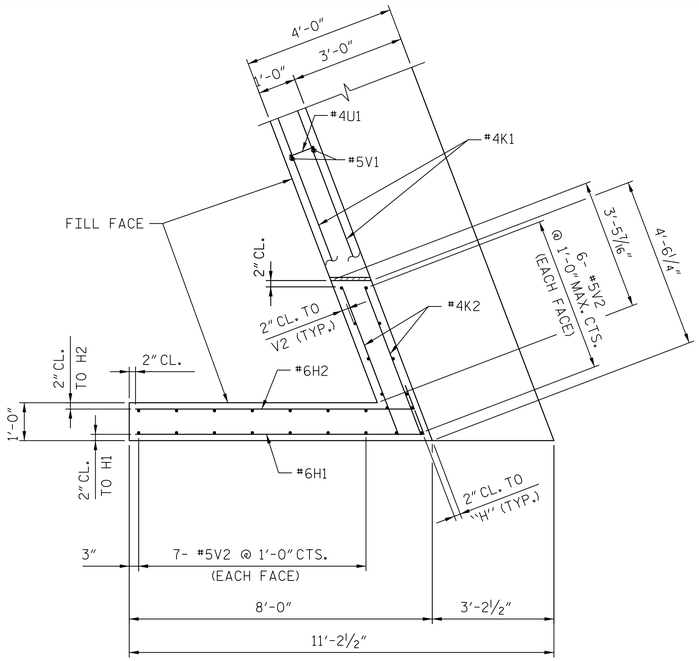
NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	

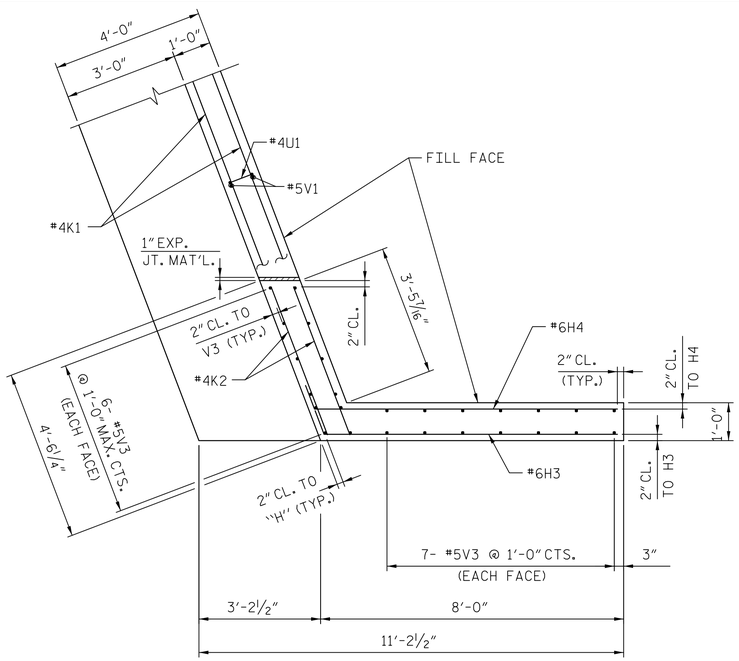
SHEET NO. S-79
TOTAL SHEETS 86

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

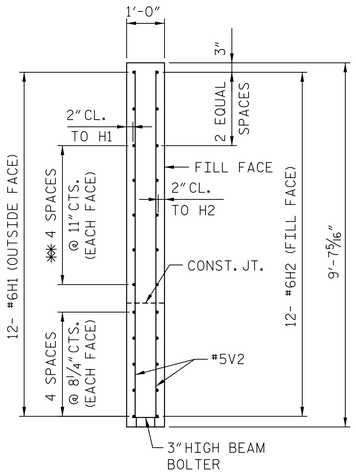
DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015



PLAN - WINGWALL 1



PLAN - WINGWALL 2

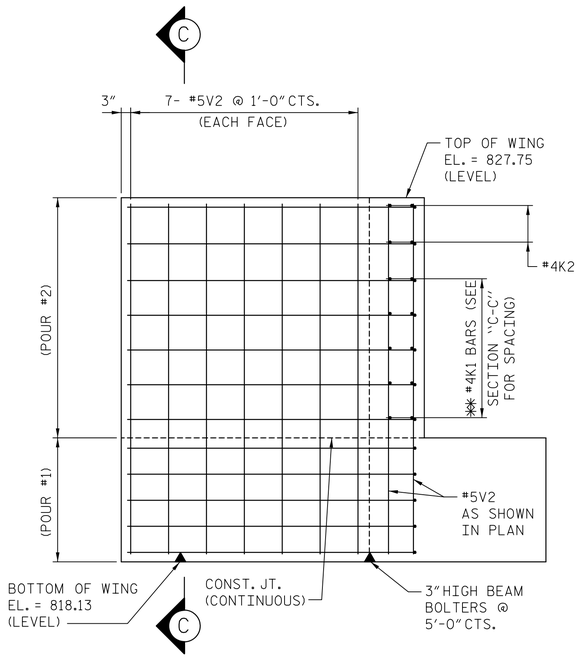


SECTION "C-C"

NOTES:

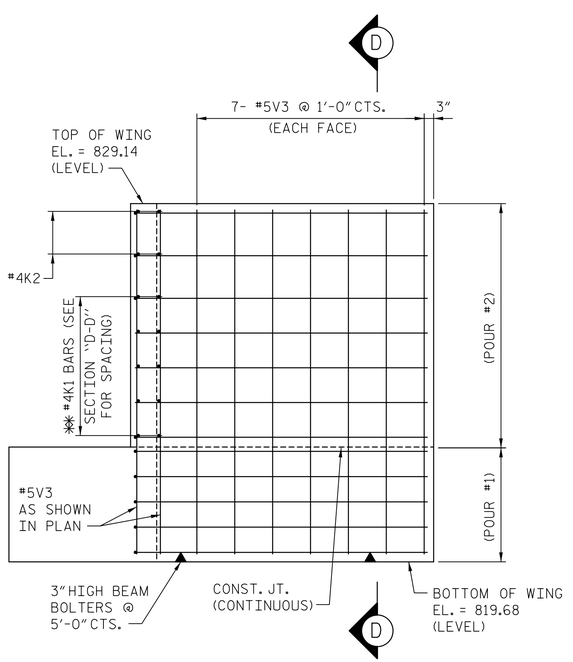
SEE SHEET 4 OF 4 FOR NOTES.

SECTION "D-D"



ELEVATION - WINGWALL 1

✻✻ PLACE #6 'H' BARS TO MATCH #4K1 BARS IN BACKWALL



ELEVATION - WINGWALL 2

✻✻ PLACE #6 'H' BARS TO MATCH #4K1 BARS IN BACKWALL

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : DPS DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 3 OF 4 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

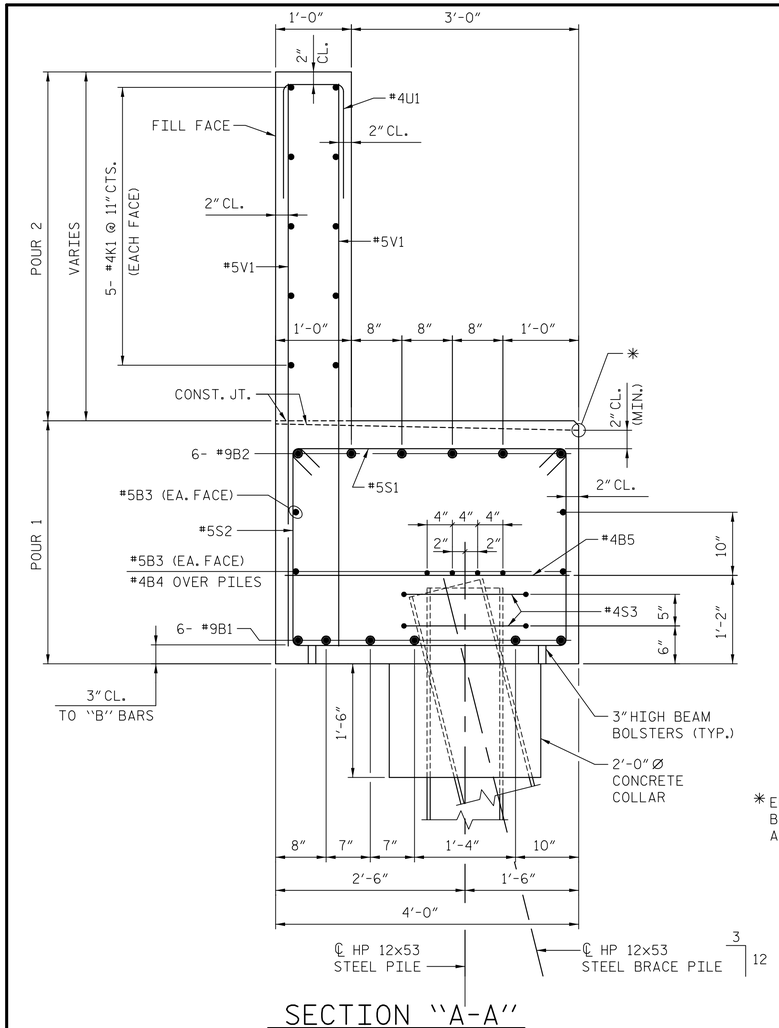
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT 2
SECTIONS AND DETAILS

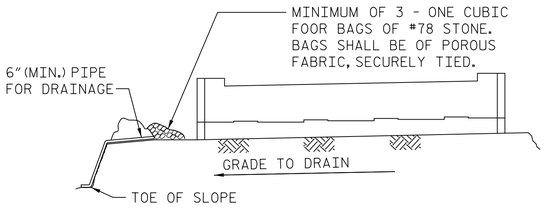
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-80
						TOTAL SHEETS 86

DATE: 1/12/2016
TIME: 8:15:35 AM
USER: kyle_compton
DGN: RKBridge 109\sheet\402_075_U2707_SMU_S80_EB2_03.dgn



*ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT

SECTION "A-A"

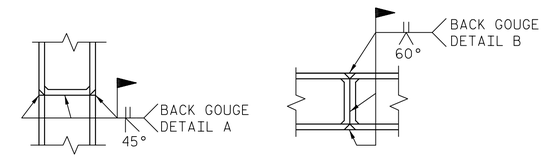


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

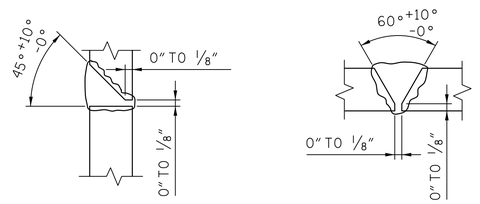
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



*PILE VERTICAL

*PILE HORIZONTAL OR VERTICAL

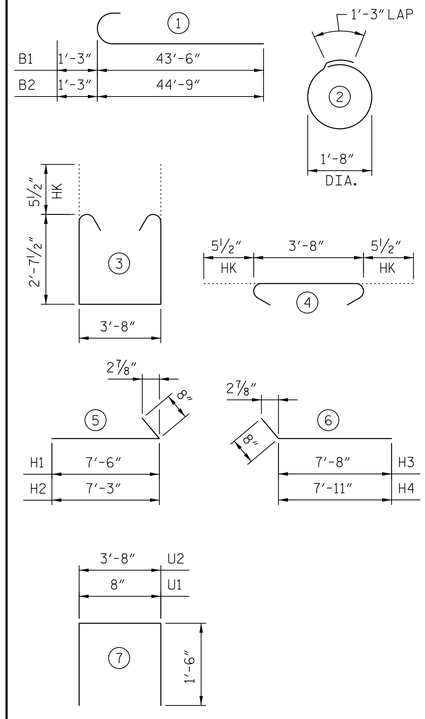


DETAIL A DETAIL B

*POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#9	①	44'-9"	1826
B2	12	#9	①	46'-0"	1877
B3	8	#5	STR	41'-10"	349
B4	12	#4	STR	28'-7"	229
B5	21	#4	STR	3'-8"	51
B6	35	#4	STR	3'-2"	74
H1	12	#6	⑤	8'-2"	147
H2	12	#6	⑤	7'-11"	143
H3	12	#6	⑥	8'-4"	150
H4	12	#6	⑥	8'-7"	155
K1	30	#4	STR	28'-7"	573
K2	8	#4	STR	4'-2"	22
S1	84	#5	④	4'-7"	402
S2	84	#5	③	9'-10"	862
S3	34	#4	②	6'-6"	148
U1	72	#4	⑦	3'-8"	176
U2	35	#4	⑦	6'-8"	156
V1	144	#5	STR	7'-1"	1064
V2	26	#5	STR	9'-2"	249
V3	26	#5	STR	9'-0"	244

TOTAL REINFORCING STEEL LBS. 8897

END BENT 2 TOTAL QUANTITIES

CLASS A CONCRETE		
POUR #1 (CAP & LOWER WING)	C.Y.	42.4
POUR 2 (BACKWALL & UPPER WING)	C.Y.	17.2
TOTAL	C.Y.	59.6
HP 12x53 STEEL PILES	NO.	17
	LIN. FT.	1105

NOTES:

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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

FOR OTHER NOTES, SEE "FOUNDATION LAYOUT" SHEET AND "LONG CHORD LAYOUT" SHEET.

THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAIL (PARAPET AND END POST) ARE CAST IF SLIP FORMING IS USED.

INSTALL THE 4" DIA. 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.

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 4 OF 4 BRIDGE NO. 109

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
1/12/2016

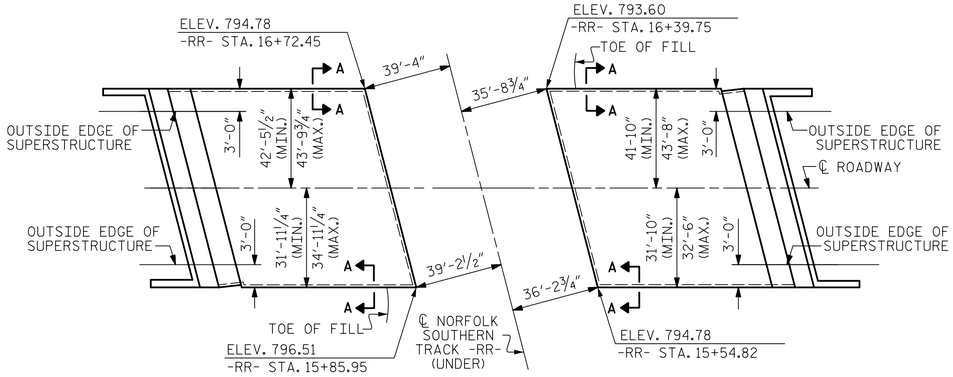
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

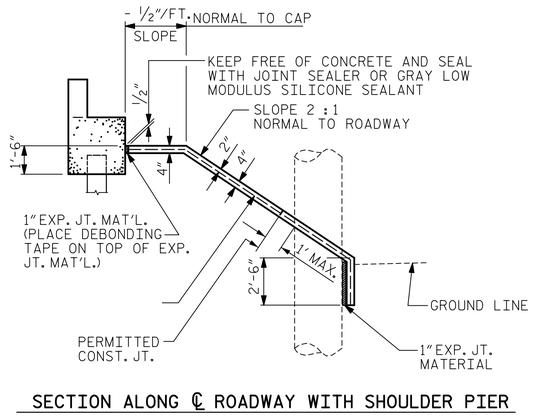
END BENT 2
SECTIONS AND DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-81
						TOTAL SHEETS
						86

DATE: 1/12/2016
TIME: 8:55:39 AM
USER: kyle.compton
DGN: R:\Bridge IDN\Cadd\402_DTT_U2707_SMU_SBI_EB2.DMdgn



PLAN



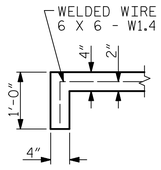
SECTION ALONG ℄ ROADWAY WITH SHOULDER PIER

NOTES:

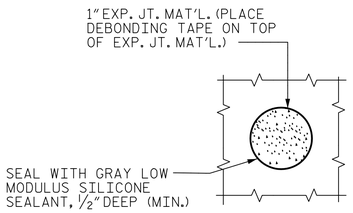
ALTERNATE "A" SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE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

BRIDGE @ STA. 17+34.88 -Y-	4 INCH SLOPE PROTECTION	✳ WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	598	1077
END BENT 2	533	960

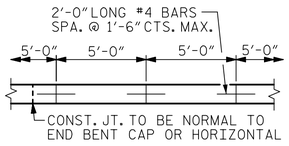
✳ QUANTITY SHOWN IS BASED ON 5' POURS.



SECTION A-A

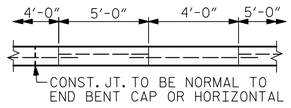


PLAN WHERE CONCRETE SLOPE PROTECTION MUST BE PLACED AROUND A BENT COLUMN



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 2 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 039474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

SLOPE PROTECTION DETAILS

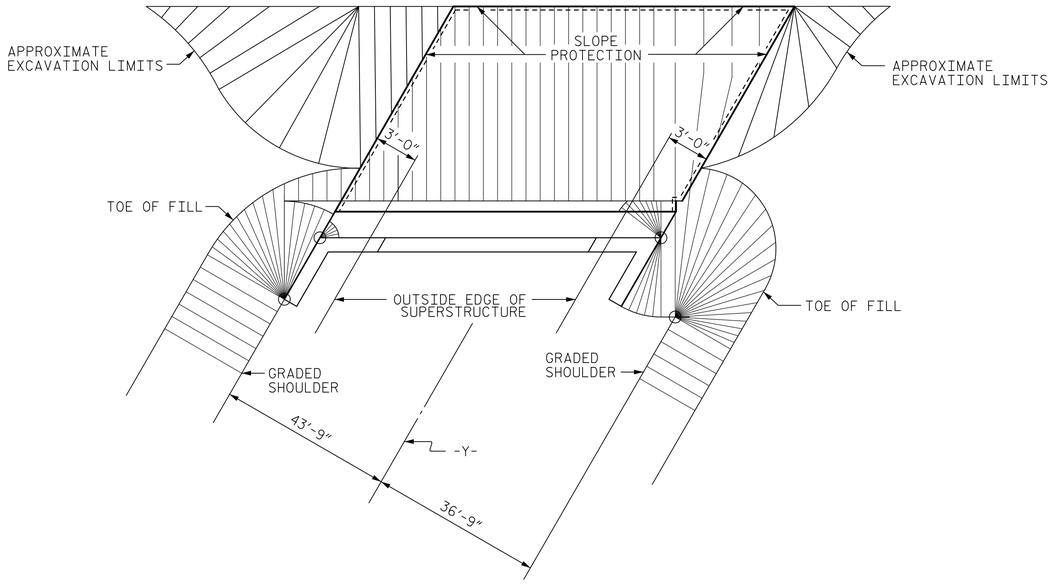
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-82
1			3			TOTAL SHEETS
2			4			86

ASSEMBLED BY :	KHC	DATE :	11/2015
CHECKED BY :	JCM	DATE :	11/2015
DRAWN BY : ELR 5/92	REV. 5/1/06		TLA/GM
CHECKED BY : GRP 6/92	REV. 10/1/11		MAA/GM
	REV. 12/21/11		MAA/GM

STD. NO. SP1 (SHT 2)

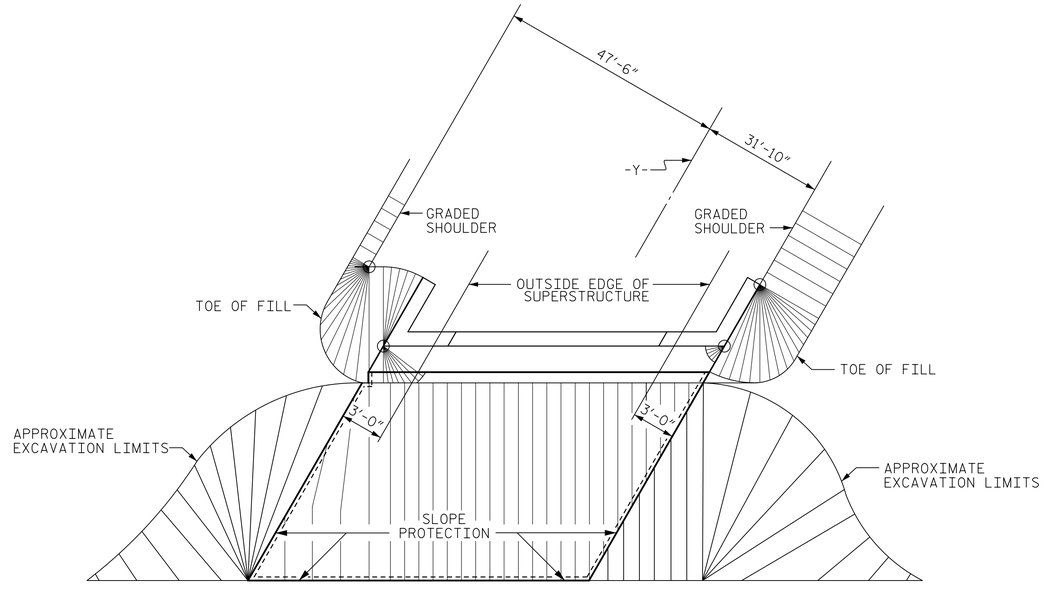
DATE: 1/12/2016
TIME: 8:51:42 AM

USER: kyle_compton
DGN: R:\Bridge 109\Cad\402_079_U2707_SMU_S82_SP01.dgn



PLAN - END BENT 1

(2:1 SLOPE)



PLAN - END BENT 2

(2:1 SLOPE)

PROJECT NO. U-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 2 OF 2 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

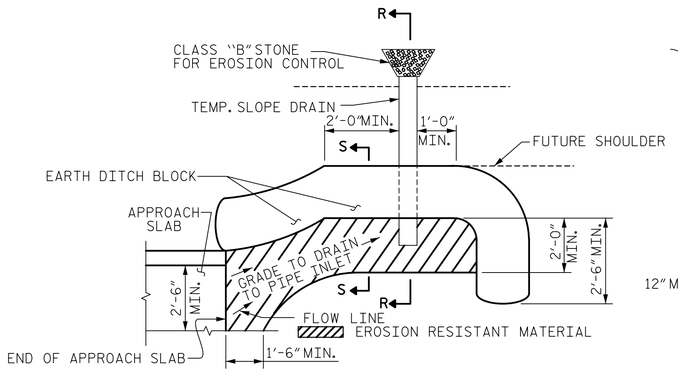
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-83
						TOTAL SHEETS
						86

DRAWN BY : DDL DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

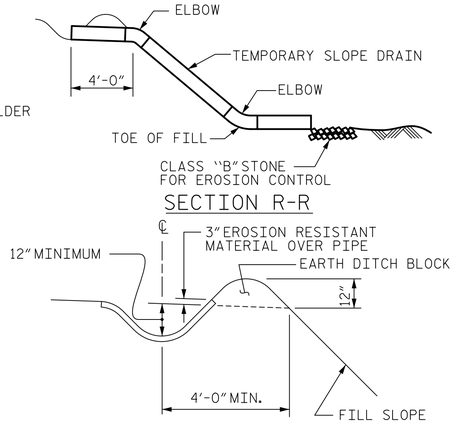
DATE: 1/12/2016
TIME: 8:51:45 AM

USER: kyle_compton
DGN: R:\Bridge 109\Cadd\402_DBI_U2707_SMU_S83_SP02.dgn



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

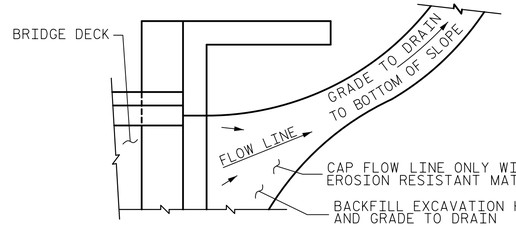
PLAN VIEW



SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

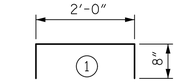
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	75	#4	STR	27'-10"	1394
A2	78	#4	STR	27'-8"	1442
✳B1	133	#5	STR	23'-11"	3318
✳B2	1	#5	STR	21'-2"	22
✳B3	1	#5	STR	14'-6"	15
✳B4	1	#5	STR	9'-10"	10
✳B5	1	#5	STR	6'-0"	6
✳B6	1	#5	STR	2'-8"	3
✳B7	1	#5	STR	23'-6"	25
B8	133	#6	STR	24'-10"	4961
B9	1	#6	STR	21'-2"	32
B10	1	#6	STR	14'-6"	22
B11	1	#6	STR	9'-10"	15
B12	1	#6	STR	6'-0"	9
B13	1	#6	STR	2'-8"	4
B14	1	#6	STR	23'-6"	35
✳B15	10	#4	STR	24'-9"	165
✳G1	52	#4	STR	5'-1"	177
✳U1	20	#4	1	3'-4"	45

REINFORCING STEEL	LBS.	6520
✳EPOXY COATED REINFORCING STEEL	LBS.	5180
CLASS AA CONCRETE		
POUR 1 SLAB	C.Y.	73.3
POUR 2 SIDEWALK	C.Y.	6.3
CLASS AA CONCRETE	C.Y.	79.6

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳A1	75	#4	STR	25'-2"	1261
A2	78	#4	STR	25'-0"	1303
✳B1	134	#5	STR	23'-8"	3308
B2	134	#6	STR	24'-7"	4948
✳B3	10	#4	STR	24'-7"	164
✳G1	52	#4	STR	5'-1"	177
✳U1	20	#4	1	3'-4"	45

REINFORCING STEEL	LBS.	6251
✳EPOXY COATED REINFORCING STEEL	LBS.	4955
CLASS AA CONCRETE		
POUR 1 SLAB	C.Y.	72.5
POUR 2 SIDEWALK	C.Y.	6.4
CLASS AA CONCRETE	C.Y.	78.9

NOTES

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

THE COSTS OF THE SIDEWALK, TEMPORARY DRAINAGE AND TEMPORARY BERM AND SLOPE DRAINS WILL BE PAID FOR UNDER THE LUMP SUM PRICE FOR BRIDGE APPROACH SLAB.

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

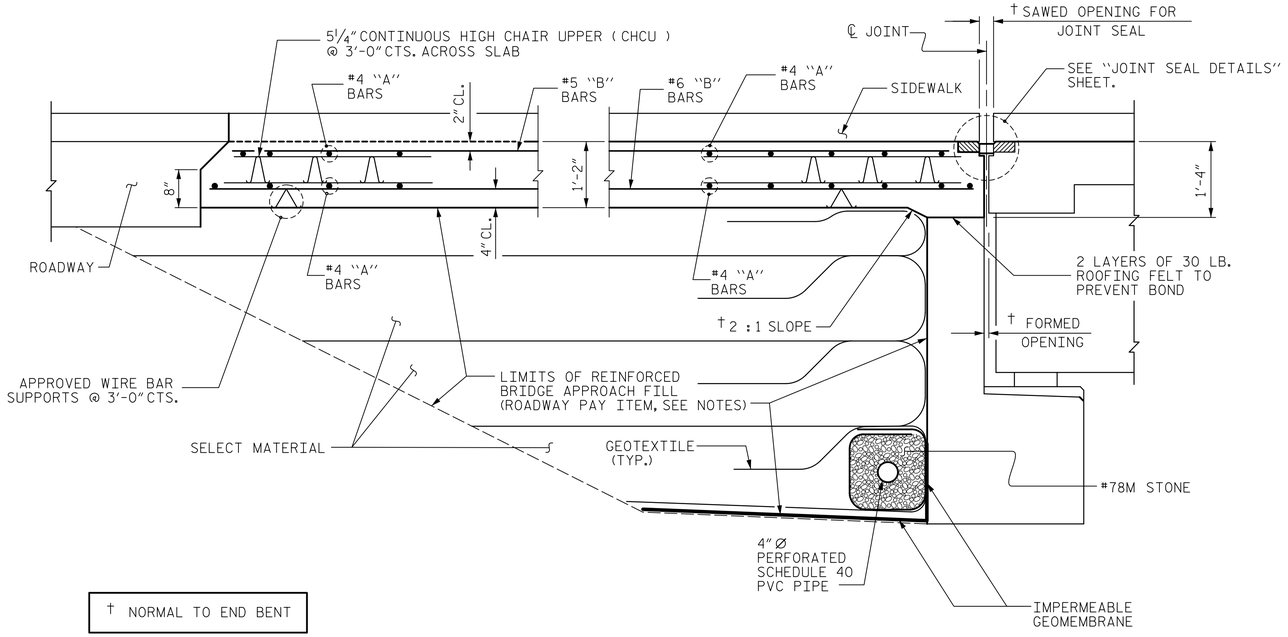
AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE PARAPET AND END POST, AND SIDEWALK.

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 3⅞".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.



† NORMAL TO END BENT

SECTION THRU SLAB

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-2707

FORSYTH COUNTY

STATION: 17+34.88 -Y-

SHEET 1 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-84
1			3			TOTAL SHEETS
2			4			86

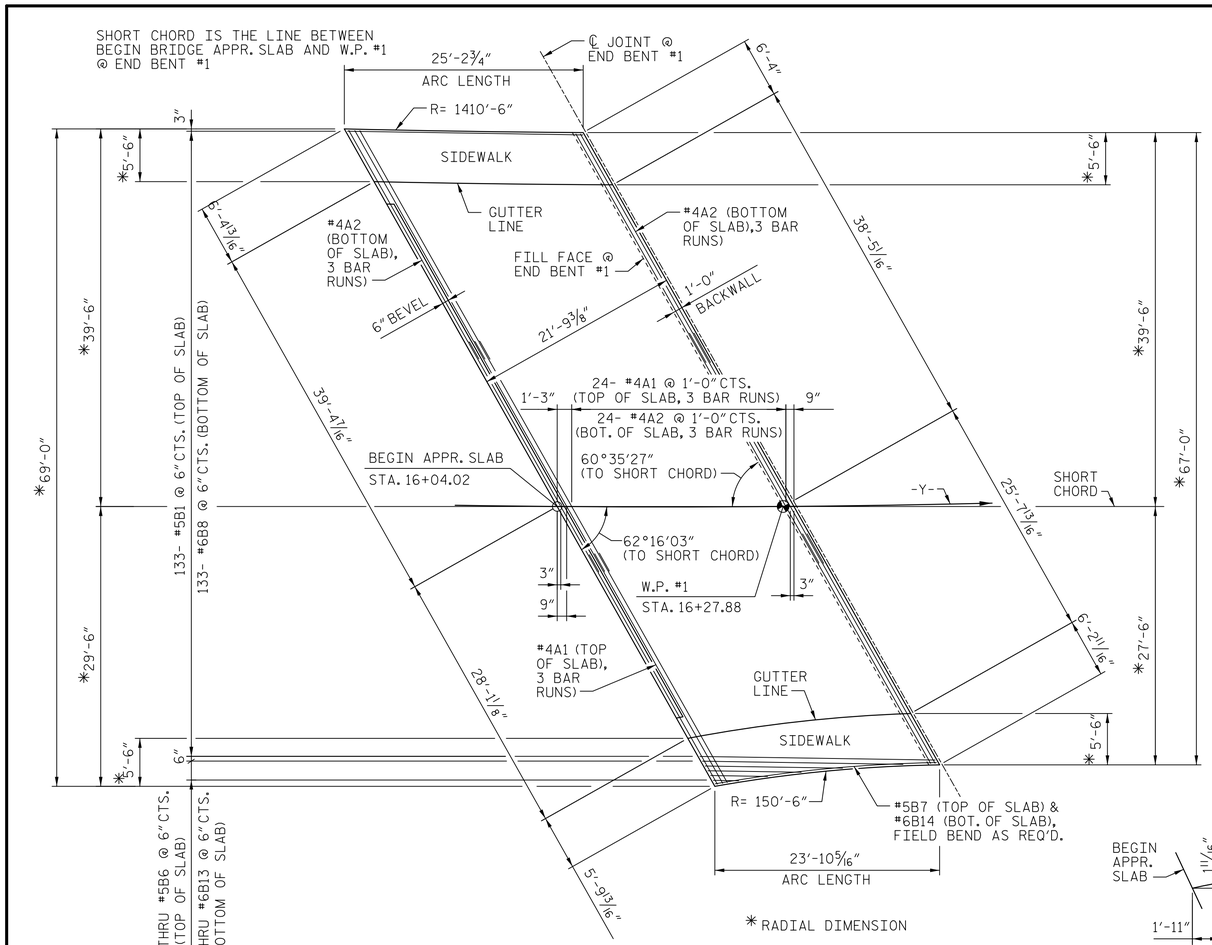
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : MTB		DATE : 11/2015	
CHECKED BY : JCM		DATE : 11/2015	
DRAWN BY : EEM 3/95	REV. 5/7/03R	RWW/JTE	
CHECKED BY : VAP 3/95	REV. 5/1/06RR	KMM/GM	
	REV. 10/1/11	MAA/GM	

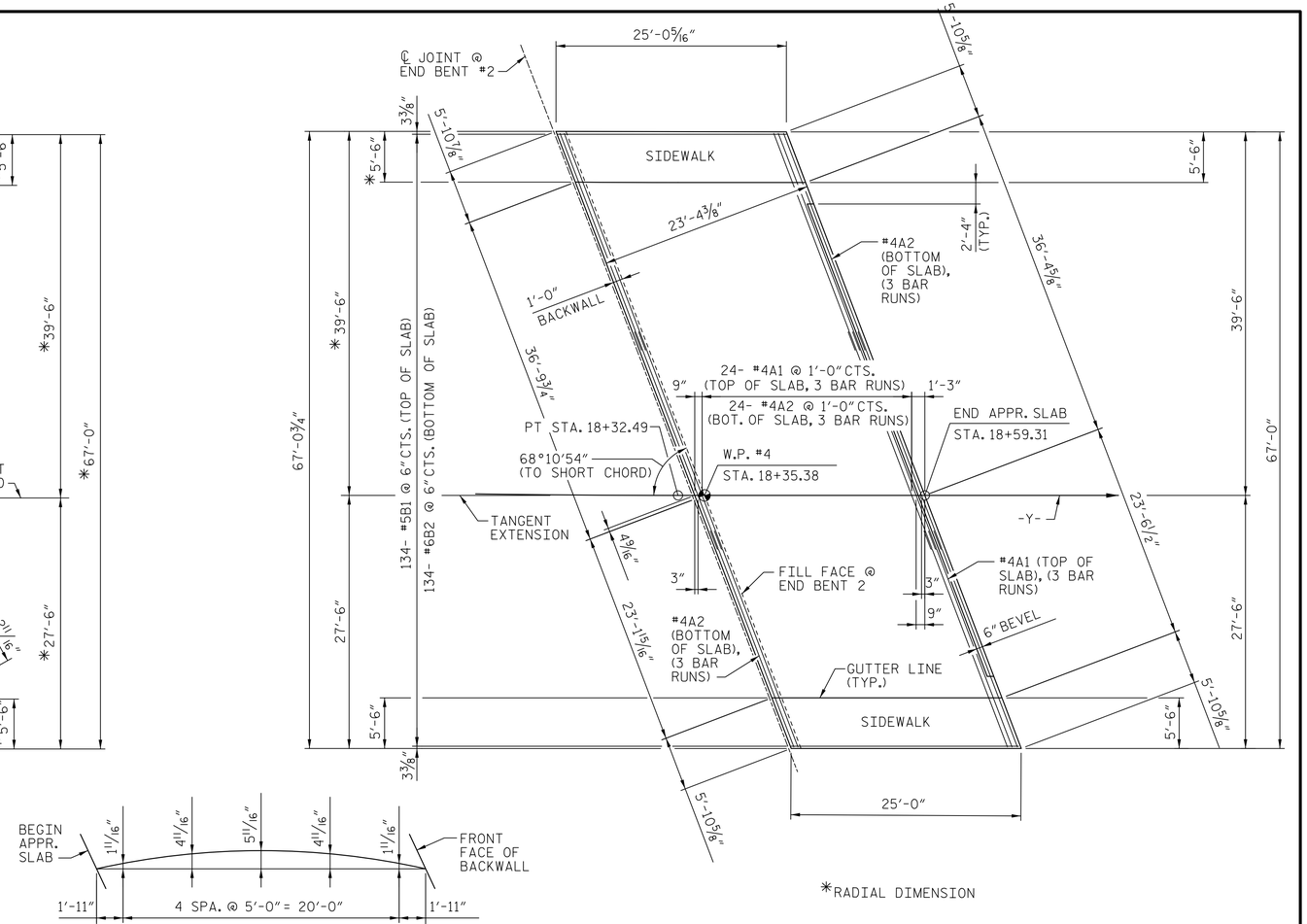
STD. NO. BAS2 (SHT 2a)

DATE: 1/12/2016
TIME: 8:51:48 AM

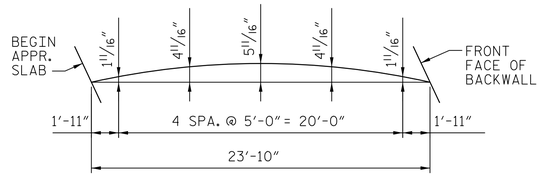
USER: kyle_compton
DGN: R:\Bridge 109\Cadd\402_083_U2707_SMU_SB4_AS01.dgn



PLAN @ END BENT #1

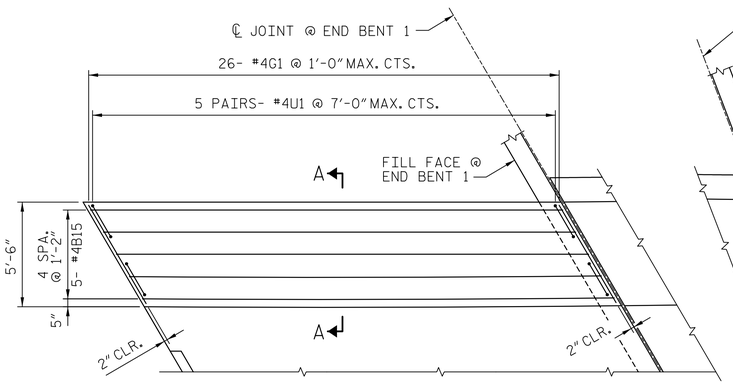


PLAN @ END BENT #2



RIGHT SIDE - EDGE OF SLAB

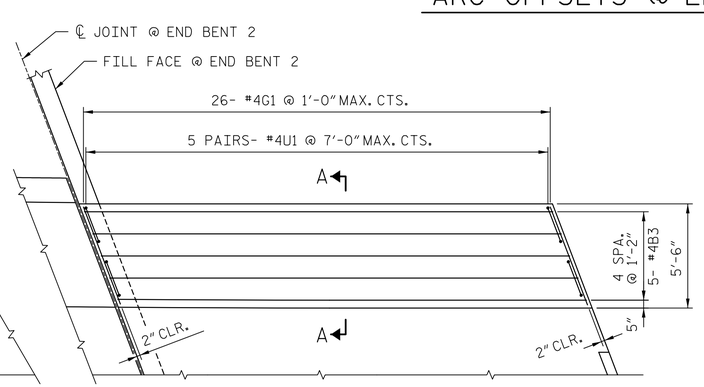
ARC OFFSETS @ END BENT #1



NOTE:
FIELD CUT/BEND #4B15 BARS AT END BENT #1 RIGHT AS REQUIRED.

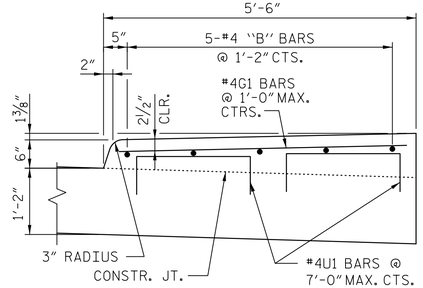
SIDEWALK PLAN

(END BENT #1 LEFT SHOWN, END BENT #1 RIGHT SIMILAR)



SIDEWALK PLAN

(END BENT #2 LEFT SHOWN, END BENT #2 RIGHT SIMILAR)



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

SECTION A-A

SIDEWALK DETAILS

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : MTB DATE : 11/2015
CHECKED BY : JCM DATE : 11/2015

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030474 JOHN C. MORRISON
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

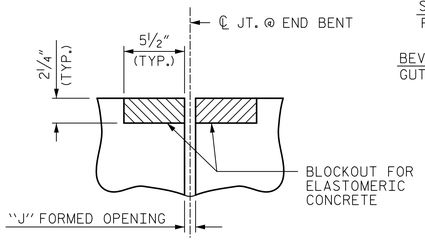
PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-

SHEET 2 OF 3 BRIDGE NO. 109

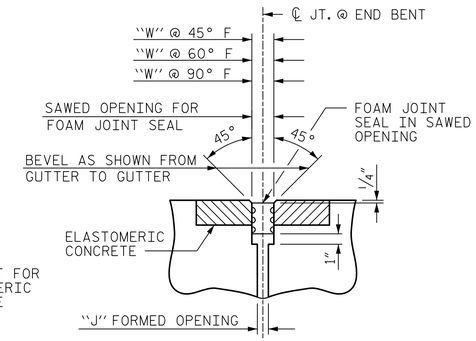
BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-85
1			3			TOTAL SHEETS
2			4			86

DATE: 1/12/2016
TIME: 8:59:59 AM
USER: kyle.compton
DGN: R:\Bridge 109\Cadd\402_085_U2707_SMU_S85_AS02.dgn

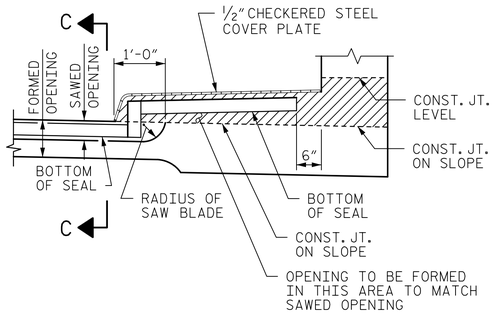


SECTION C-C
FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC
CONCRETE DIMENSIONS)

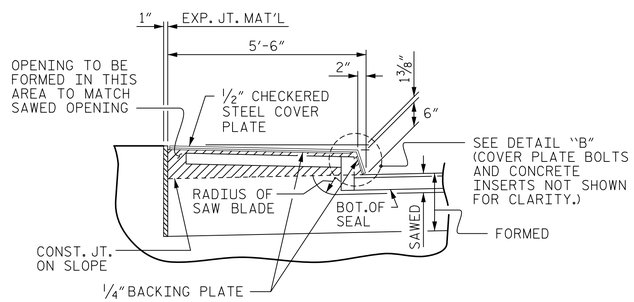


SECTION C-C
FOAM JOINT SEAL
(EXPANSION)

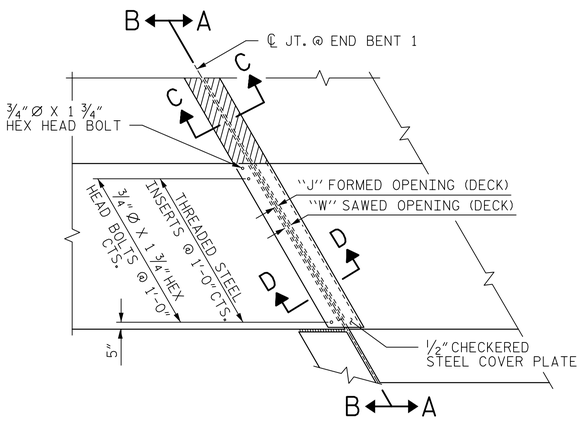
TYPICAL FOAM JOINT SEAL DETAIL



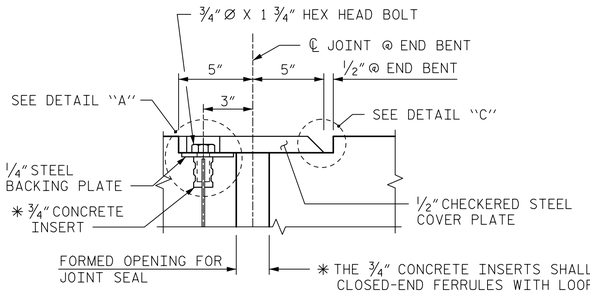
SECTION A-A



SECTION B-B

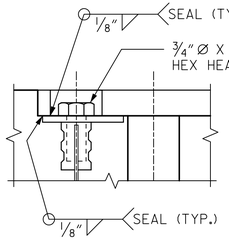


PLAN VIEW OF FOAM JOINT SEAL
WITH COVER PLATE @ END BENT FOR SIDEWALK

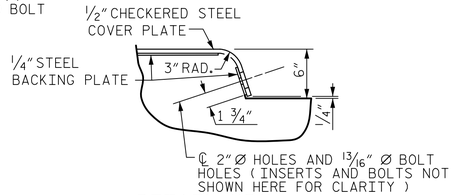


* THE ¾" CONCRETE INSERTS SHALL BE CLOSED-END FERRULES WITH LOOPED WIRE STRUTS ATTACHED TO THEM. THE INSERTS SHALL CONFORM TO AASHTO M169, GRADE 12L14 AND SHALL HAVE A TENSILE WORKING LOAD CAPACITY OF 3000 LBS.

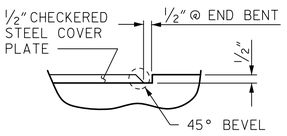
SECTION D-D



DETAIL "A"



DETAIL "B"



DETAIL "C"

JOINT SEAL DETAILS @ END BENT

NOTES

THE STEEL PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 OR APPROVED EQUAL. AFTER FABRICATION, THE PLATES SHALL BE COMMERCIALLY BLAST CLEANED AND EITHER COATED WITH A MINIMUM THICKNESS OF 4 MILS (DRY) OF ZINC-RICH PAINT, GALVANIZED OR METALLIZED TO A MINIMUM THICKNESS OF 6 MILS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

THE ¾" DIAMETER HEX HEAD BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL.

NO SEPARATE PAYMENT WILL BE MADE FOR FURNISHING AND INSTALLING THE COVER PLATE. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR "FOAM JOINT SEALS".

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

MOVEMENT AND SETTING AT FOAM JOINT

END BENT NO.	SKEW ANGLE (TO TAN.)	NOMINAL UNCOMPRESSED SEAL WIDTH	TOTAL MOVEMENT (ALONG ℄ RDWY)	"J" FORMED OPENING	"W" PERPENDICULAR JOINT OPENING AT 30° F	"W" PERPENDICULAR JOINT OPENING AT 60° F	"W" PERPENDICULAR JOINT OPENING AT 90° F
EB1	61°03'44"	2½"	1⅛"	1¼"	2⅛"	1 15/16"	1 9/16"
EB2	69°08'51"	2½"	1⅛"	1¼"	2⅛"	1 15/16"	1 9/16"

TOTAL MOVEMENT IS CALCULATED ALONG THE CENTERLINE OF ROADWAY.
JOINT OPENINGS ARE MEASURED PERPINDICULAR TO THE JOINT.

BILL OF MATERIAL

END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	11.34
2	10.64
TOTAL	21.98

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

PROJECT NO. U-2707
FORSYTH COUNTY
STATION: 17+34.88 -Y-
SHEET 3 OF 3 BRIDGE NO. 109

AECOM
AECOM TECHNICAL SERVICES, INC.
701 CORPORATE CENTER DRIVE, SUITE 475
RALEIGH, NC 27607
(919) 854-6200 www.aecom.com
AECOM License No. F-0342

NORTH CAROLINA PROFESSIONAL SEAL 030474 ENGINEER JOHN C. MORRISON
DocuSigned by: John C. Morrison
1/12/2016

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH
SLAB DETAILS

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

SHEET NO. S-86
TOTAL SHEETS 86

STD. NO. BAS4

ASSEMBLED BY : DDL		DATE :	11/2015
CHECKED BY : JCM		DATE :	11/2015
DRAWN BY : FCJ	11/88	REV. 10/1/11	MAA/GM
CHECKED BY : ARB	11/88	REV. 7/12	MAA/GM
		REV. 6/13	MAA/GM

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DATE: 1/12/2016
TIME: 8:52:32 AM
USER: kyle.compton
DGN: R:\BrIDge 10\Cadd\402.DBT_U2707_SMU_S86_AS03.dgn

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 3/4" 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