TIP PROJECT: R-2707C

CONTRACT: C203905

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2707C	1	

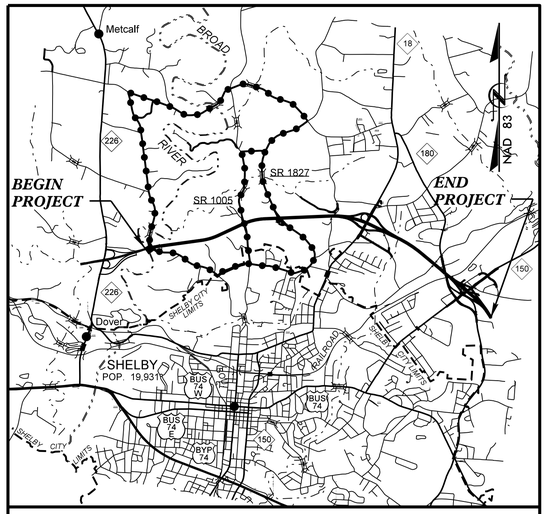
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34497.1.4		P.E.
34497.2.FS9	NHF-0074(152)	ROW
34497.2.FSU4	NHF-0074(152)	UTILITY
34497.3.6	NHF-0074(152)	CONST

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CLEVELAND COUNTY

LOCATION: ***US 74 SHELBY BYPASS FROM EAST OF NC 226 TO EAST OF NC 150***

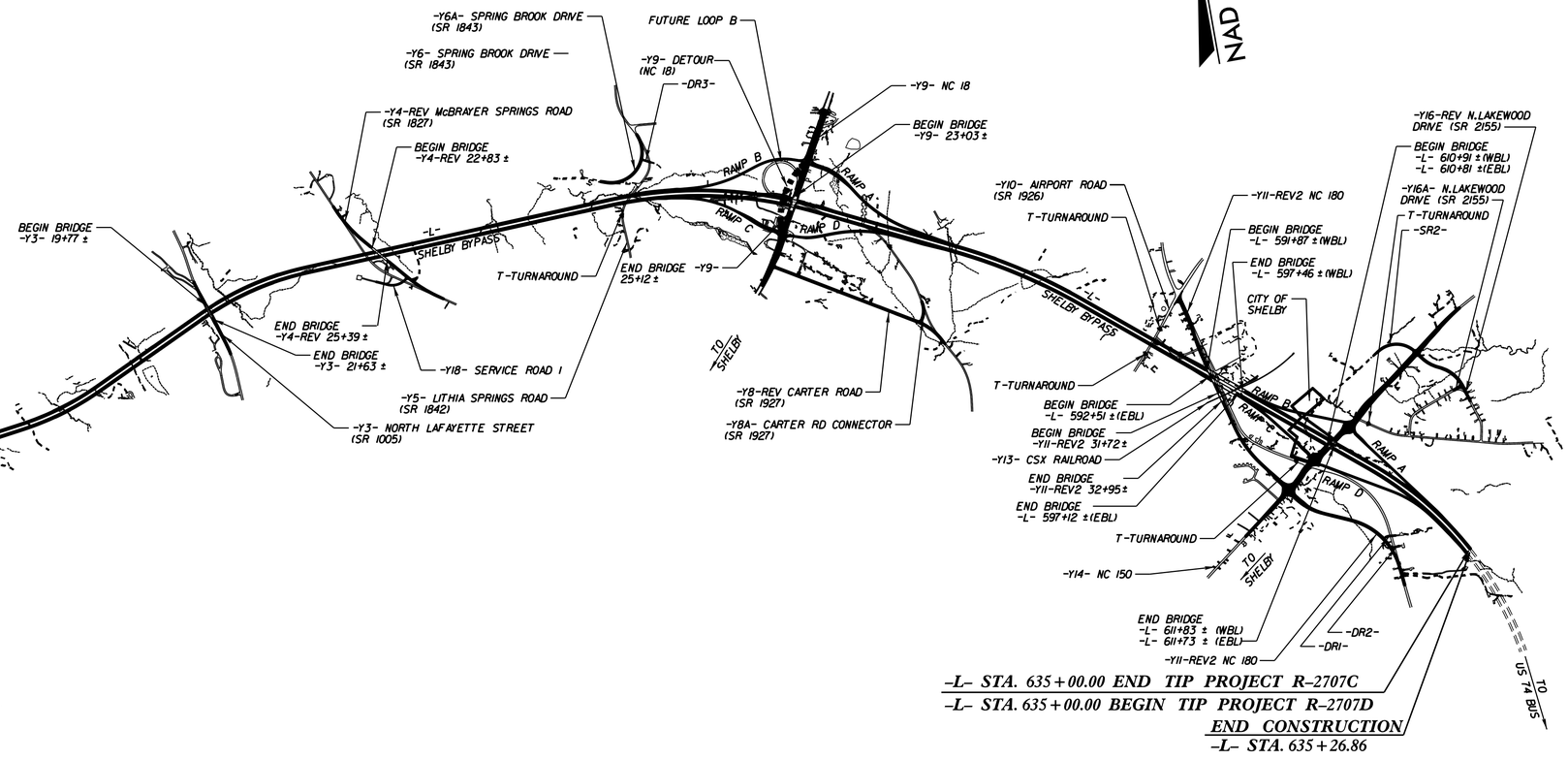
TYPE OF WORK: GRADING, PAVING, DRAINAGE, SIGNING, RETAINING WALLS, CULVERTS, AND STRUCTURES



VICINITY MAP

-----OFFSITE DETOURS

NAD 83/95



STRUCTURES

EQUATION:
-L- STA. 382+00.17 BK
END TIP PROJECT R-2707B =
-L- STA. 382+00.00 AH
BEGIN TIP PROJECT R-2707C

-L- STA. 635+00.00 END TIP PROJECT R-2707C
-L- STA. 635+00.00 BEGIN TIP PROJECT R-2707D
END CONSTRUCTION
-L- STA. 635+26.86

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DESIGN DATA

ADT 2017 = 21,010
ADT 2037 = 35,110
K = 11 %
D = 55 %
T = 14 % *
V = 70 MPH
FUNC CLASS = FREEWAY
(* TTST 9% DUAL 5%)
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2707C	= 4.591 MILES
LENGTH STRUCTURES TIP PROJECT R-2707C	= 0.201 MILES
LENGTH TIP PROJECT R-2707C	= 4.792 MILES

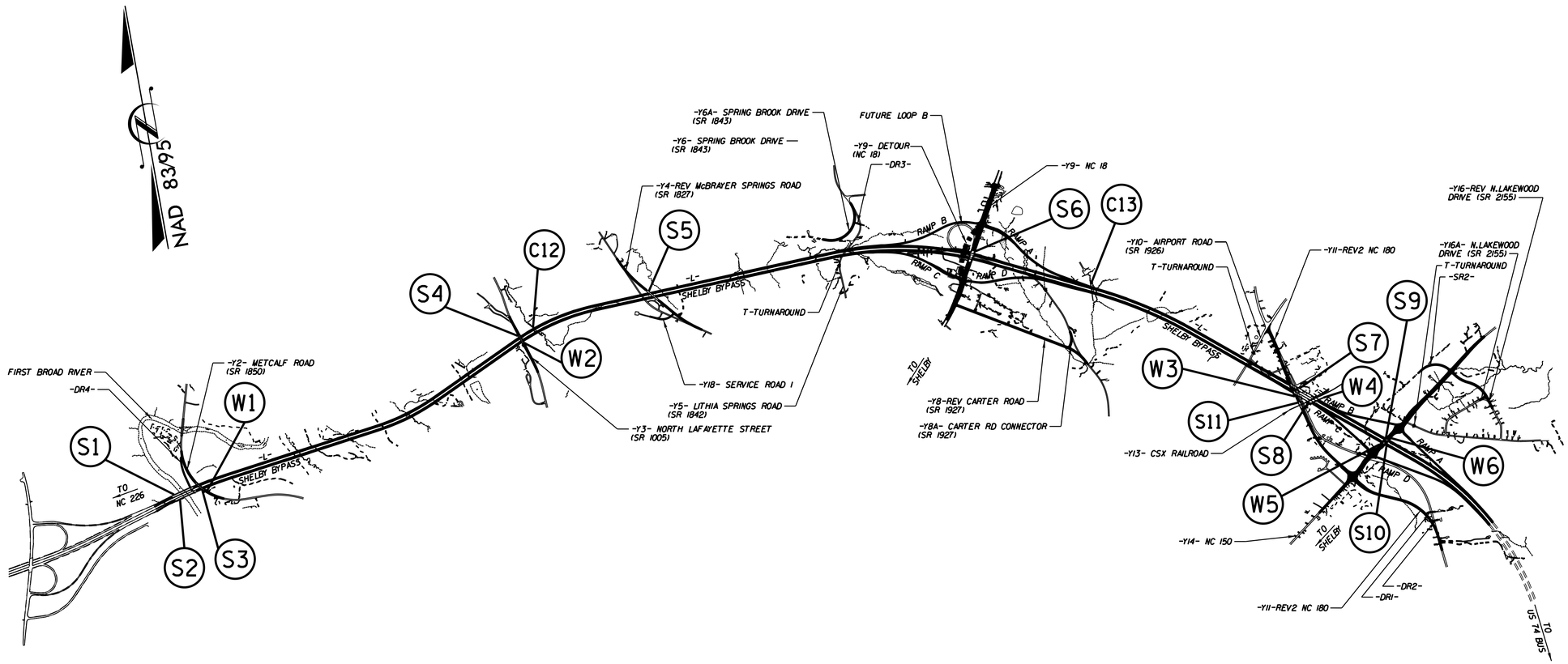
NOTE : PROJECT LENGTH BASED ON WBL

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

2012 STANDARD SPECIFICATIONS

LETTING DATE :

May 16, 2017



INDEX

STR	STATION	DESCRIPTION	SHEETS
S1	384+50.00 -L- (LEFT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER FIRST BROAD RIVER (LEFT LANE)	S1-1 THRU S1-36
S2	384+50.00 -L- (RIGHT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER FIRST BROAD RIVER (RIGHT LANE)	S2-1 THRU S2-36
S3	29+07.16 -Y2-	BRIDGE ON SR 1850 OVER US 74/SHELBY BYPASS	S3-1 THRU S3-36
S4	20+70.23 -Y3-	BRIDGE ON SR 1005 OVER US 74/SHELBY BYPASS	S4-1 THRU S4-29
S5	24+05.50 -Y4-	BRIDGE ON SR 1827 OVER US 74/SHELBY BYPASS	S5-1 THRU S5-29
S6	24+07.99 -Y9-	BRIDGE ON NC 18 OVER US 74/SHELBY BYPASS	S6-1 THRU S6-37
S7	596+50.98 -L- (LEFT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER CSX RR & NORTH POST RD.(LEFT LANE)	S7-1 THRU S7-56

INDEX

STR	STATION	DESCRIPTION	SHEETS
S8	596+50.98 -L- (RIGHT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER CSX RR & NORTH POST RD.(RIGHT LANE)	S8-1 THRU S8-44
S9	611+32.01 -L- (LEFT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER NC 150 (LEFT LANE)	S9-1 THRU S9-25
S10	611+32.01 -L- (RIGHT LANE)	BRIDGE ON US 74/SHELBY BYPASS OVER NC 150 (RIGHT LANE)	S10-1 THRU S10-25
S11	32+31.41 -Y11REV2-	BRIDGE ON NC 180 OVER CSX RR	S11-1 THRU S11-27
C12	453+07.00 -L-	SINGLE 8 FT. X 8 FT. RCBC	C12-01 THRU C12-05
C13	553+27.00 -L-	SINGLE 9 FT. X 7 FT. RCBC	C13-01 THRU C13-05
W1-W6	-	RETAINING WALLS	W-1 THRU W-9

PROJECT NO. R-2707C
CLEVELAND COUNTY

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

INDEX SHEET

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

28-MAR-2017 09:01
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jpadams

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 4 BRIDGE NO. 466

SEAL 033939 — NORTH CAROLINA PROFESSIONAL ENGINEER — JUSTIN MARK ROBINSON — 3/9/2017

RS&H

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8601 Six Forks Road, Suite 260
919-926-4100 FAX 919-846-9080
www.rsandh.com
North Carolina License Nos. 50073 * F-0493 * C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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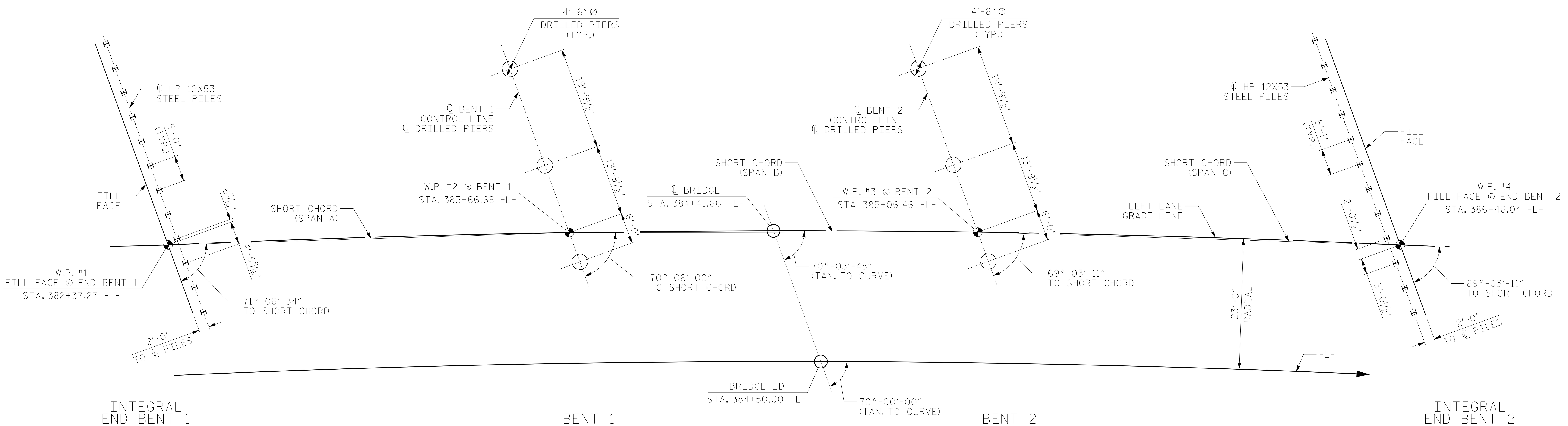

FOUNDATION LAYOUT PLAN

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO PILE AND DRILLED PIER CENTERLINE.

NOTES

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

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

FOR DRILLED PIERS, SEE SECTION 411 OF STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 670.6 FEET AND A PENETRATION OF 9 FEET INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICIATIONS.

DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 835 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 30 TSF.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND BENT NO. 2 IS 679 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO.1 AND BENT NO. 2. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 690 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

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

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

DRILLED-IN PILES ARE REQUIRED FOR INTEGRAL END BENT NO. 2. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 713 FT. FILL THE BOTTOM 3 FT OF HOLES FOR PILE EXCAVATION WITH CONCRETE AND THE REST OF THE HOLES WITH CLASS II OR CLASS III SELECT MATERIAL THAT MEETS SECTION 1016 OF THE STANDARD SPECIFICATIONS FOR PILE EXCAVATION, SEE SECTION 450 OF THE SPECIFICATIONS.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

DRILLED-IN PILES AT END BENT NO. 2 THAT DO NOT HAVE A MINIMUM PENETRATION OF 3 FEET INTO ROCK AS DEFINED BY ARTICLE 411 OF THE STANDARD SPECIFICATIONS WILL BE DRIVEN TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/9/2017

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

STR. #1

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

3/8/2017
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leblancm

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

ANGLES	
LONG CHORD	SHORT CHORD
L1 = 70°-03'-45"	S1 = 71°-06'-34"
	S2 = 70°-06'-00"
	S3 = 69°-03'-11"

HORIZONTAL CURVE DATA -L-

P.I. STA. = 387+18.94
Δ = 8°-50'-30.4" (RT.)
D = 0°-45'-00.0"
L = 1,178.90'
T = 590.62'
R = 7,639.44'
S.E. = 0.03

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 3 OF 4

SEAL
JUSTIN MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
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RALEIGH

GENERAL DRAWING

LEFT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

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

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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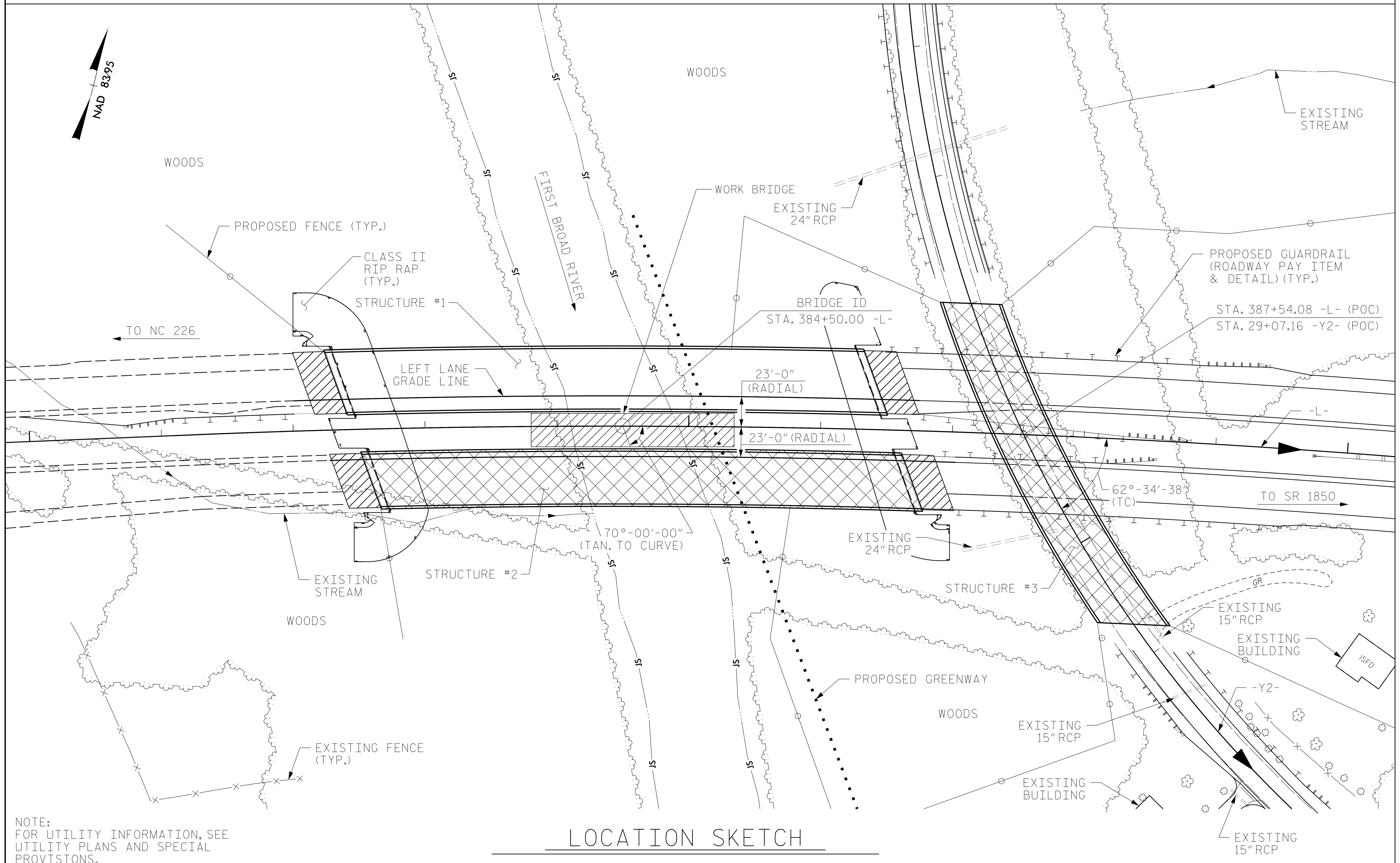
BENCH MARK #17: 8 INCH NAIL IN BASE OF 20 INCH SYCAMORE 93.83' LEFT OF STA. 385+52.11 -L-, EL. 707.47'



NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR PLACING LOAD ON STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

THE 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.

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

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND NO. 2 IS ELEVATION 679. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE THE TEMPORARY ACCESS AT STATION 384+50.00 -L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

HYDRAULIC DATA

DESIGN DISCHARGE	= 20,200 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS
DESIGN HIGH WATER ELEVATION	= 716.2
DRAINAGE AREA	= 226 SQ. MI.
BASE DISCHARGE (Q100)	= 23,400 CFS
BASE HIGH WATER ELEVATION	= 717.69

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE	= >31,700 CFS
FREQUENCY OF OVERTOPPING FLOOD	= >500 YRS+
OVERTOPPING FLOOD ELEVATION	= 733.80

TOTAL BILL OF MATERIALS

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ACCESS AT STA. 384+50.00 -L-	4'-6" Ø DRILLED PIER IN SOIL	4'-6" Ø DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-6" DIA. DRILLED PIER	CSL TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	74" MODIFIED PRESTRESSED CONCRETE GIRDERS		PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL
	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	APPROX. LBS.	NO.	LIN. FT.	LIN. FT.	LIN. FT.
SUPERSTRUCTURE						20,101	19,672		LUMP SUM			15	2027.3		
END BENT No. 1								52.2		9,348					
BENT No. 1		85.1	27.0	54.0	1			69.8		21,459	4,702				
BENT No. 2		76.1	27.0	54.0	1			71.9		21,045	4,587				
END BENT No. 2								52.2		9,413				84	36
TOTAL	LUMP SUM	161.2	54.0	108.0	2	20,101	19,672	246.1	LUMP SUM	61,265	9,289	15	2027.3	84	36

	HP 12x53 STEEL PILES		STEEL PILE POINTS	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	NO.	LIN. FT.	EACH	EACH	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE					816.3			LUMP SUM
END BENT No. 1	12	480	12	12		400	490	
BENT No. 1								
BENT No. 2								
END BENT No. 2	12	240	12	12		265	325	
TOTAL	24	720	24	24	816.3	665	815	LUMP SUM

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 01/2017
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — JASON MARK ROBINSON
4/7/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
LEFT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

SHEET NO. S1-4
TOTAL SHEETS 36

STR. #1

4/6/2017
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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
							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)	1.34	--	1.75	0.89	1.53	B	EL	68.9	1.050	1.34	B	I	124.5	0.80	0.79	1.39	B	I	68.9	
		HL-93 (OPERATING)	N/A		1.77	--	1.35	0.89	1.98	B	EL	68.9	1.050	1.77	B	I	124.5	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.99	71.640	1.75	0.89	2.32	B	EL	68.9	1.050	1.99	B	I	124.5	0.80	0.79	2.11	B	I	68.9	
		HS-20 (OPERATING)	36.000		2.62	94.320	1.35	0.89	3.01	B	EL	68.9	1.050	2.62	B	I	124.5	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		5.18	69.930	1.40	0.89	7.14	B	EL	68.9	1.050	6.56	B	I	124.5	0.80	0.79	5.18	B	I	68.9	
		SNGARBS2	20.000		3.67	73.400	1.40	0.89	5.06	B	EL	68.9	1.050	4.51	B	I	124.5	0.80	0.79	3.67	B	I	68.9	
		SNAGRIS2	22.000		3.40	74.800	1.40	0.89	4.69	B	EL	68.9	1.050	4.13	B	I	124.5	0.80	0.79	3.40	B	I	68.9	
		SNCOTTS3	27.250		2.57	70.033	1.40	0.89	3.55	B	EL	68.9	1.050	3.20	B	I	124.5	0.80	0.79	2.57	B	I	68.9	
		SNAGGRS4	34.925		2.08	72.644	1.40	0.89	2.86	B	EL	68.9	1.050	2.55	B	I	124.5	0.80	0.79	2.08	B	I	68.9	
		SNS5A	35.550		2.03	72.167	1.40	0.89	2.81	B	EL	68.9	1.050	2.55	B	I	124.5	0.80	0.79	2.03	B	I	68.9	
		SNS6A	39.950		1.84	73.508	1.40	0.89	2.53	B	EL	68.9	1.050	2.28	B	I	124.5	0.80	0.79	1.84	B	I	68.9	
		SNS7B	42.000		1.75	73.500	1.40	0.89	2.41	B	EL	68.9	1.050	2.20	B	I	124.5	0.80	0.79	1.75	B	I	68.9	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		2.23	73.590	1.40	0.89	3.08	B	EL	68.9	1.050	2.76	B	I	124.5	0.80	0.79	2.23	B	I	68.9	
		TNT4A	33.075		2.23	73.757	1.40	0.89	3.08	B	EL	68.9	1.050	2.73	B	I	124.5	0.80	0.79	2.23	B	I	68.9	
		TNT6A	41.600		1.80	74.880	1.40	0.89	2.48	B	EL	68.9	1.050	2.28	B	I	124.5	0.80	0.79	1.80	B	I	68.9	
		TNT7A	42.000		1.80	75.600	1.40	0.89	2.48	B	EL	68.9	1.050	2.25	B	I	124.5	0.80	0.79	1.80	B	I	68.9	
		TNT7B	42.000		1.84	77.280	1.40	0.89	2.54	B	EL	68.9	1.050	2.18	B	I	124.5	0.80	0.79	1.84	B	I	68.9	
		TNAGRIT4	43.000		1.76	75.680	1.40	0.89	2.43	B	EL	68.9	1.050	2.11	B	I	124.5	0.80	0.79	1.76	B	I	68.9	
		TNAGT5A	45.000		1.67	75.150	1.40	0.89	2.31	B	EL	68.9	1.050	2.05	B	I	124.5	0.80	0.79	1.67	B	I	68.9	
		TNAGT5B	45.000	(3)	1.66	74.700	1.40	0.89	2.29	B	EL	68.9	1.050	2.01	B	I	124.5	0.80	0.79	1.66	B	I	68.9	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1. TRANSFORMING ALL PRESTRESSING TENDONS.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

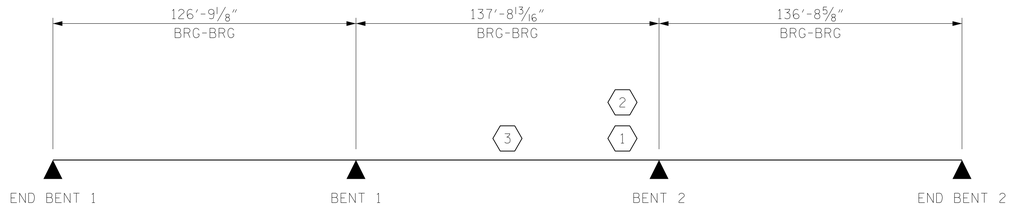
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

SECTION PROPERTIES SPAN B - INTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	74	82.5
AREA	IN^2	885.1	1599.1
Ixx	IN^4	640172	1331347
Ycg	IN	36.56	55.17
SELF WT.	PLF	922.0	2037.6
EFF. WIDTH	IN	-	126.0

SECTION PROPERTIES PROVIDED AT MIDSPAN

SECTION PROPERTIES SPAN B - EXTERIOR			
	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	74	82.5
AREA	IN^2	885.1	1510.0
Ixx	IN^4	640172	1280580
Ycg	IN	36.56	53.81
SELF WT.	PLF	922.0	1898.4
EFF. WIDTH	IN	-	110.3

SECTION PROPERTIES PROVIDED AT MIDSPAN

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-5
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : MAL DATE : 03/2017
CHECKED BY : TLC DATE : 03/2017
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STR. #1

NOTES

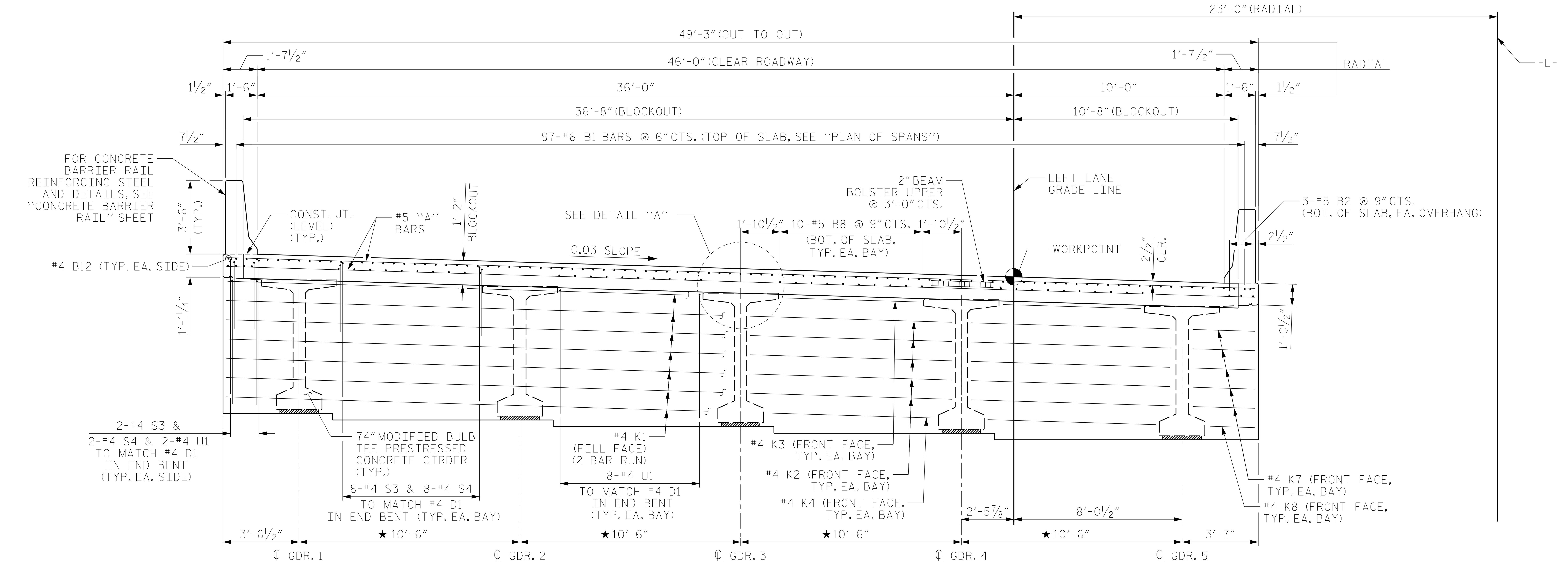
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER @ 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK @ 4'-0" CTS. WITH A HEIGHT TO PROVIDE 2½" CLEAR DISTANCE ABOVE THE FORMS.

LONGITUDINAL REINFORCING STEEL ("B" BARS) MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

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

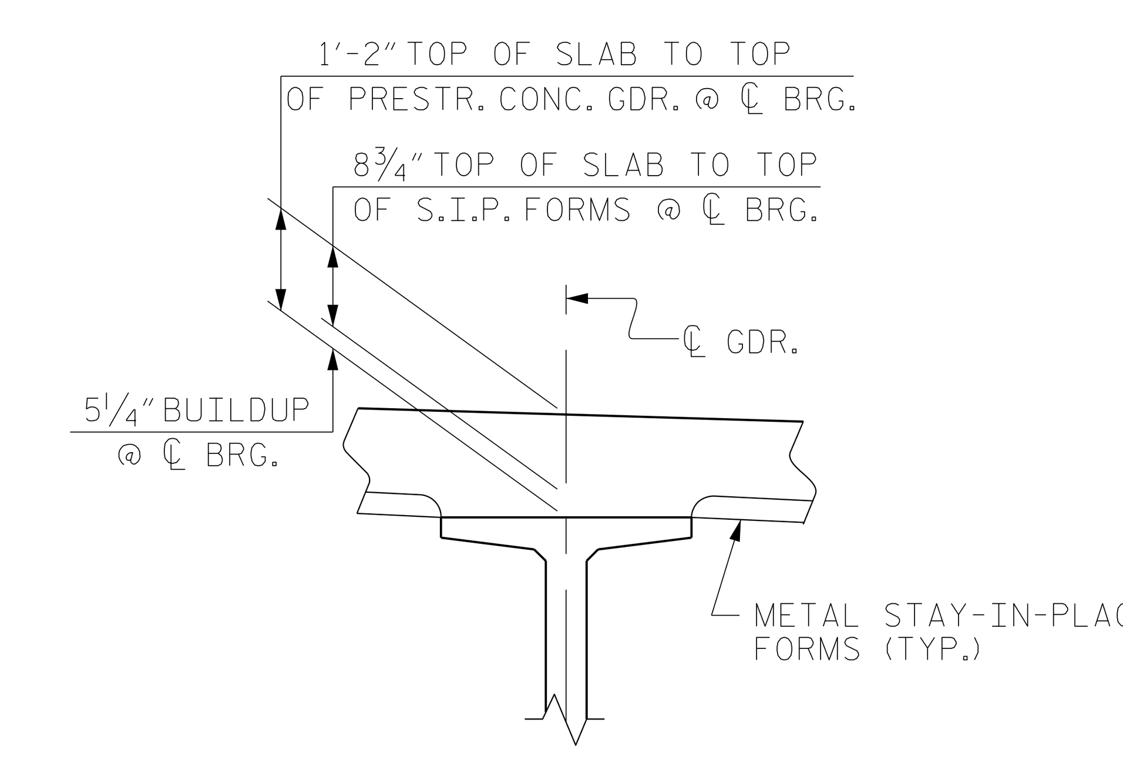
B.O.S. = BOTTOM OF SLAB



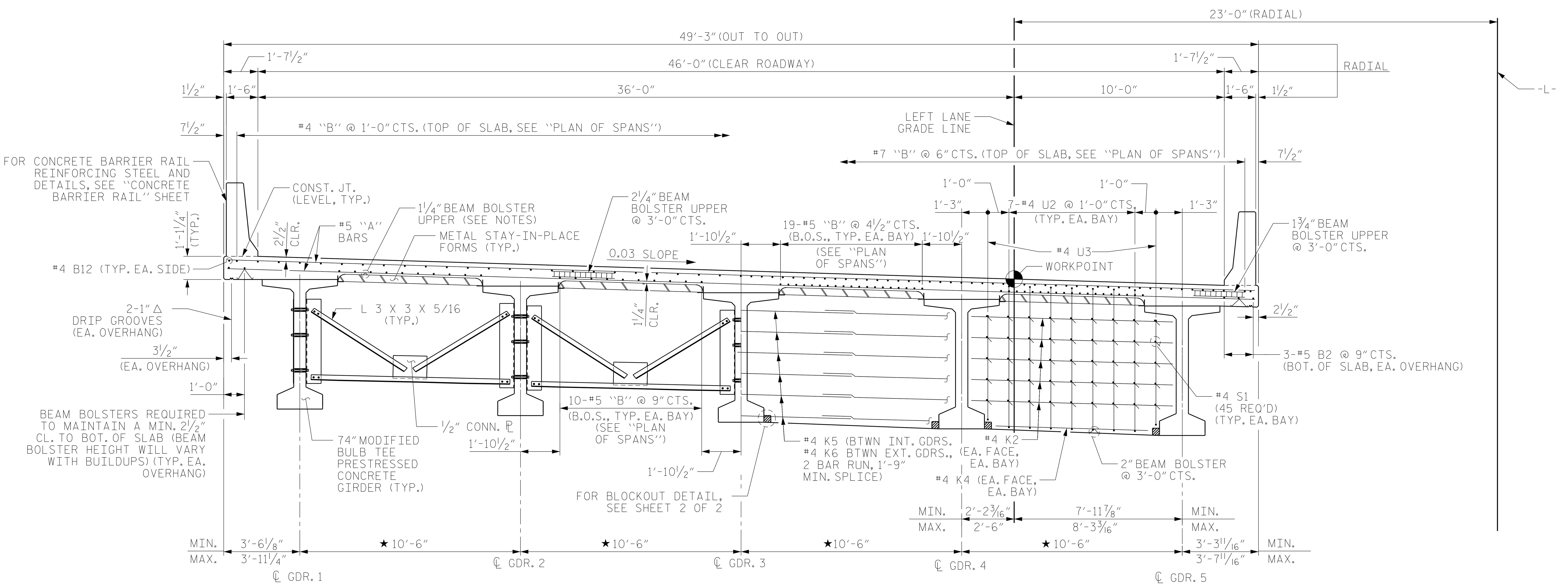
TYPICAL SECTION AT INTEGRAL END BENTS

END BENT 1 SHOWN, END BENT 2 SIMILAR

★ DIMENSIONS ARE PARALLEL TO SHORT CHORD OF RESPECTIVE SPAN



DETAIL "A"



SECTION AT INTERMEDIATE DIAPHRAGM

SECTION AT CONTINUOUS BENT DIAPHRAGM

TYPICAL SECTION

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

LEFT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035931 DUSTIN MARK ROBINSON
3/9/2017

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

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DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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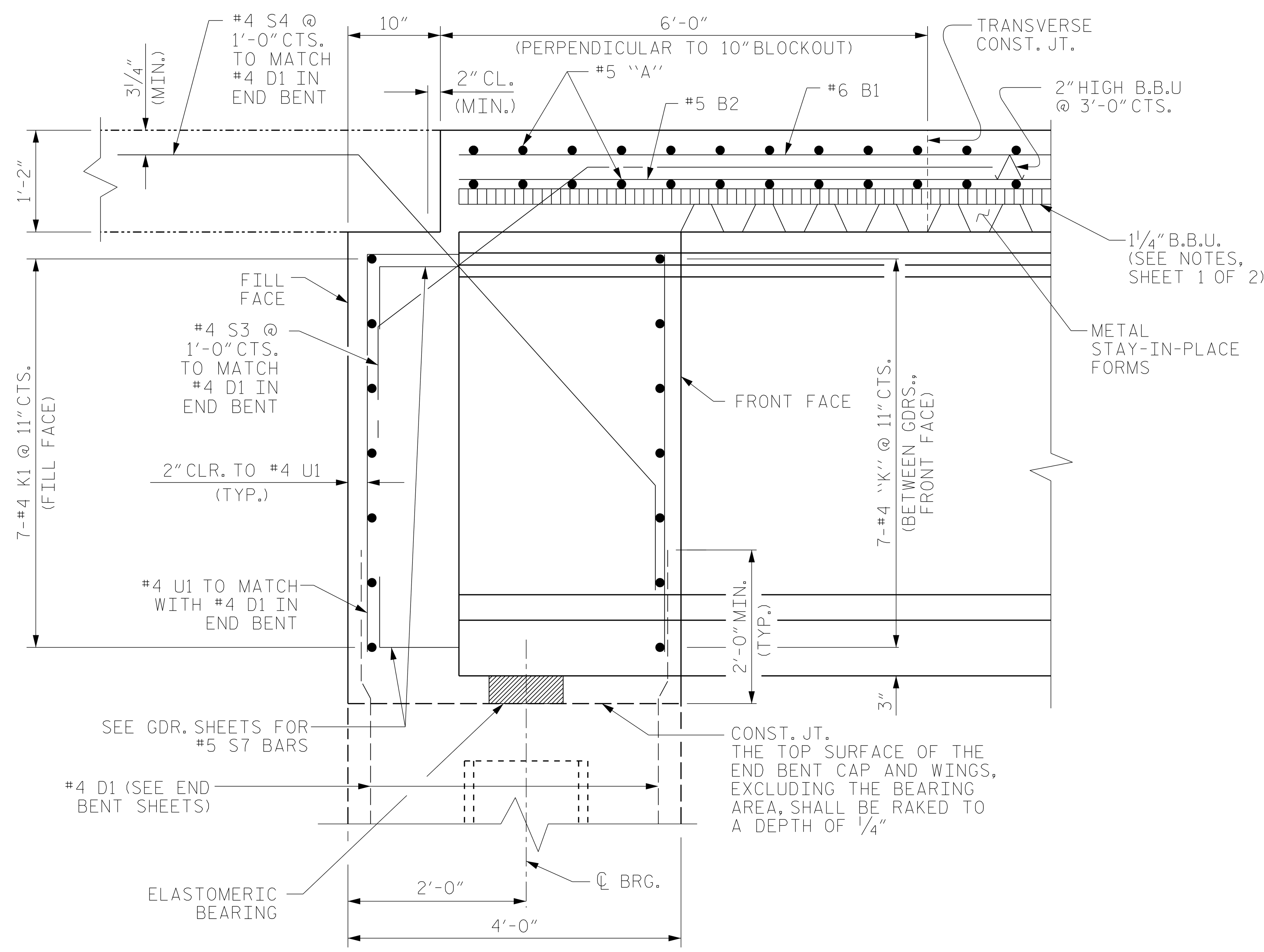
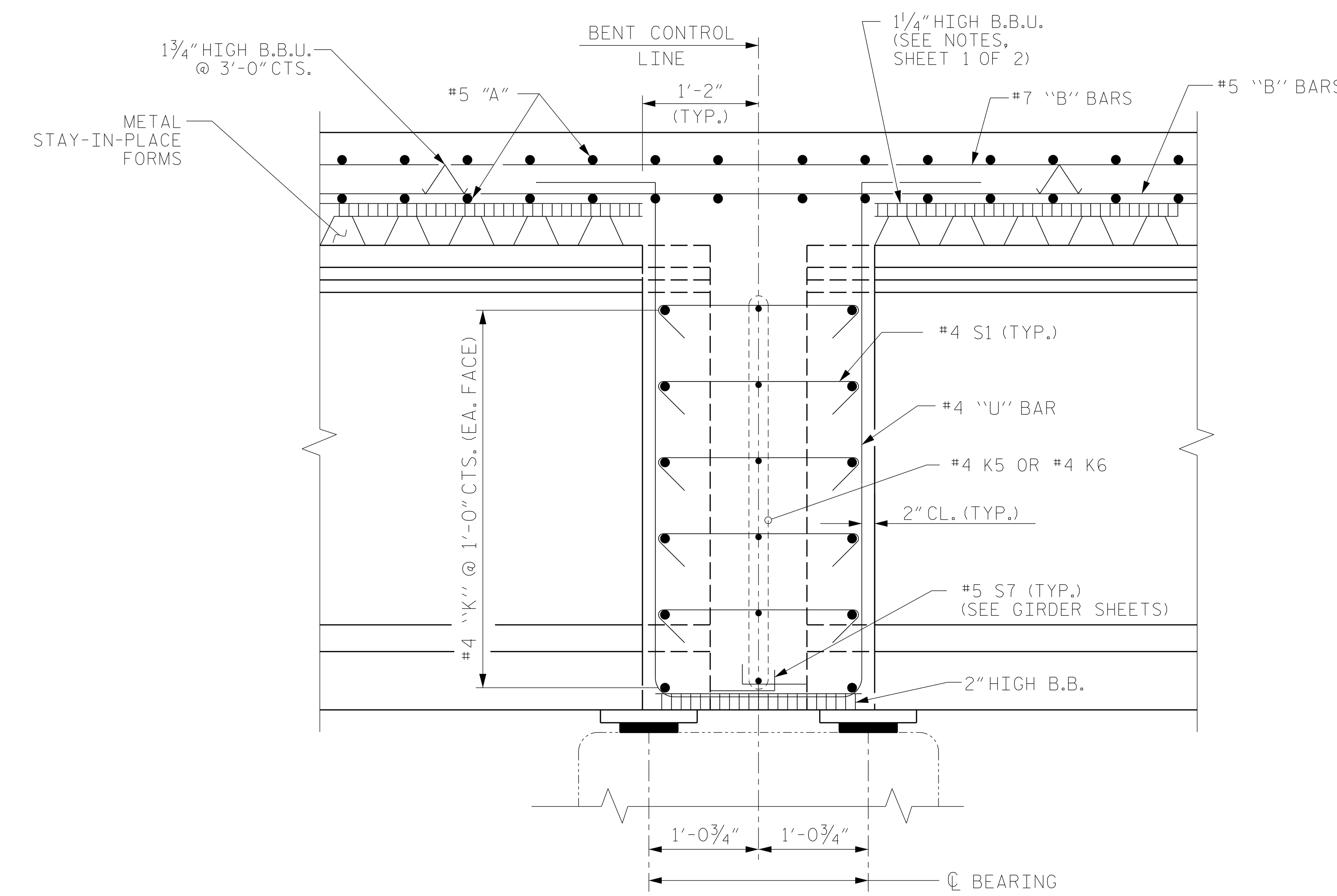
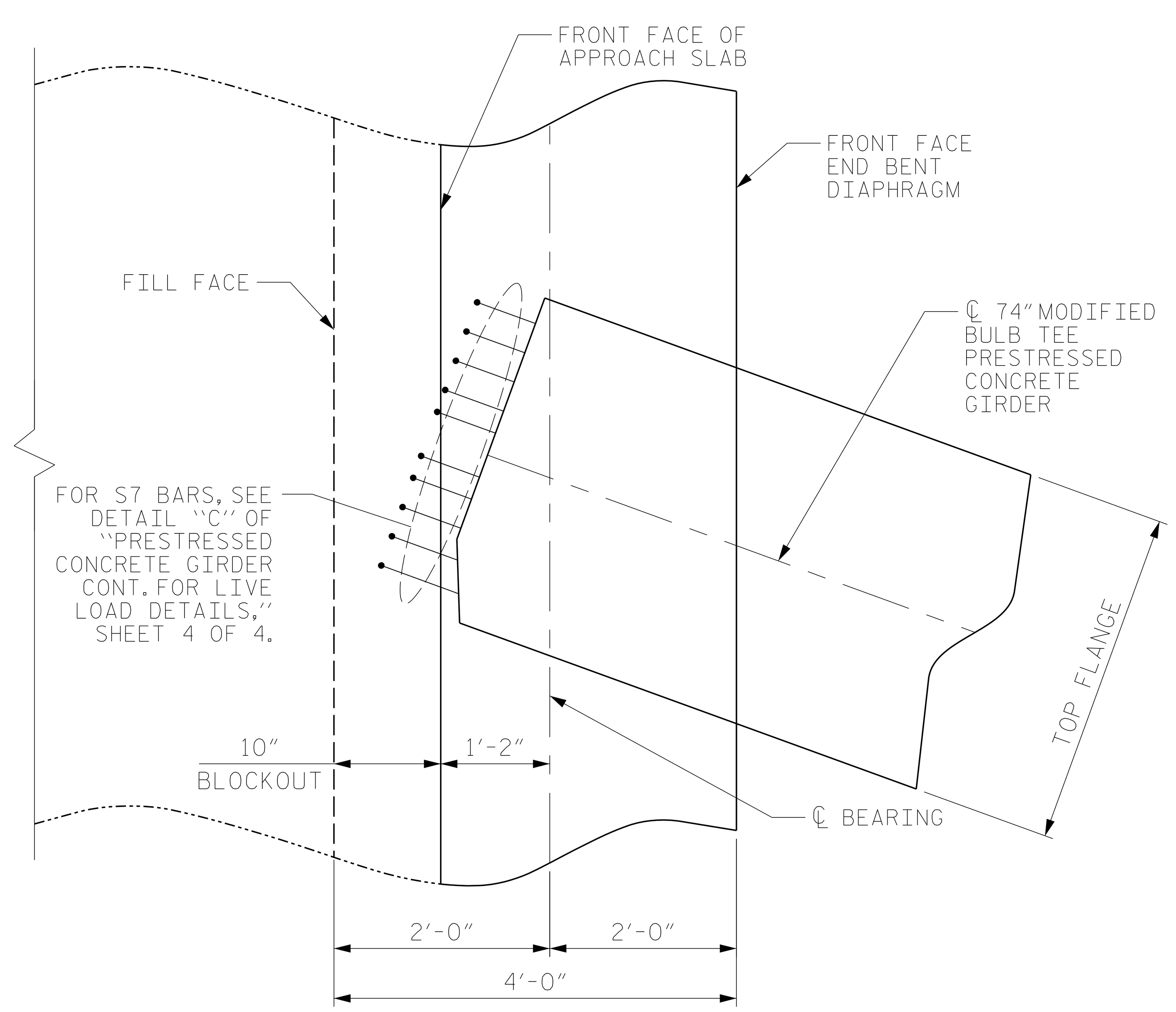
leblancm



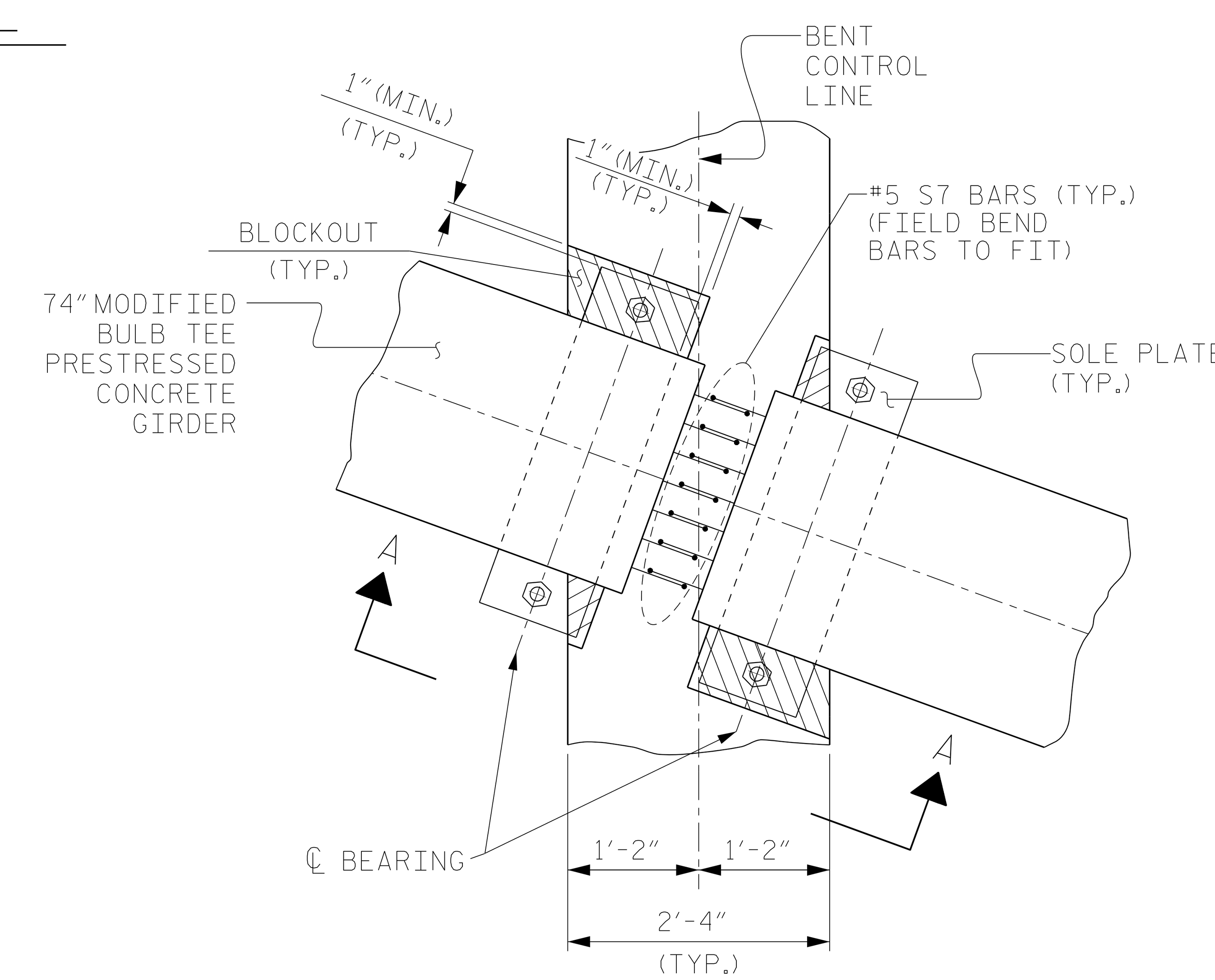
SECTION THRU INTEGRAL END BENT



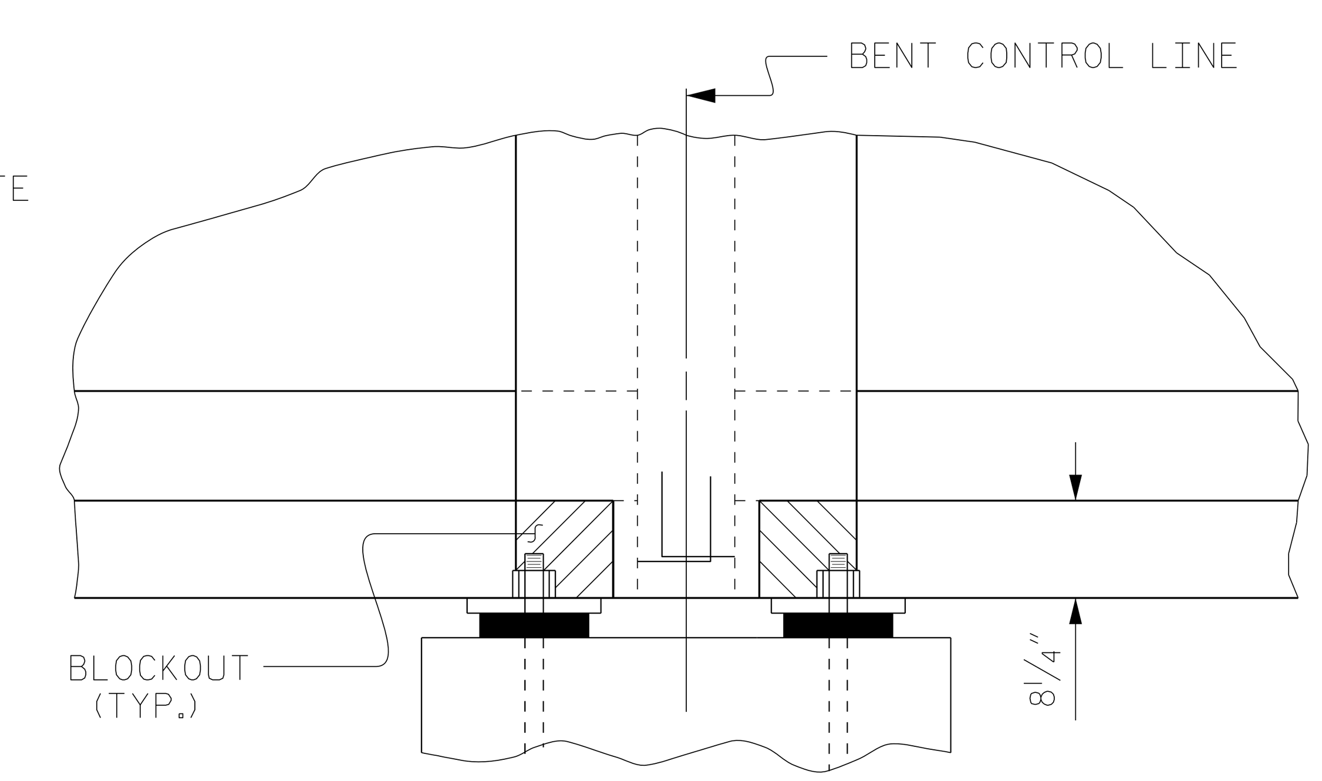
SECTION THRU CONTINUOUS BENT DIAPHRAGM



PLAN OF GIRDER @ INTEGRAL END BENT



PLAN VIEW



SECTION A-A

BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS
LEFT LANE

SEAL 039316 — NORTH CAROLINA PROFESSIONAL ENGINEER — MARK ROBINSON
3/9/2017

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

SHEET NO. S1-7
TOTAL SHEETS 36

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DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

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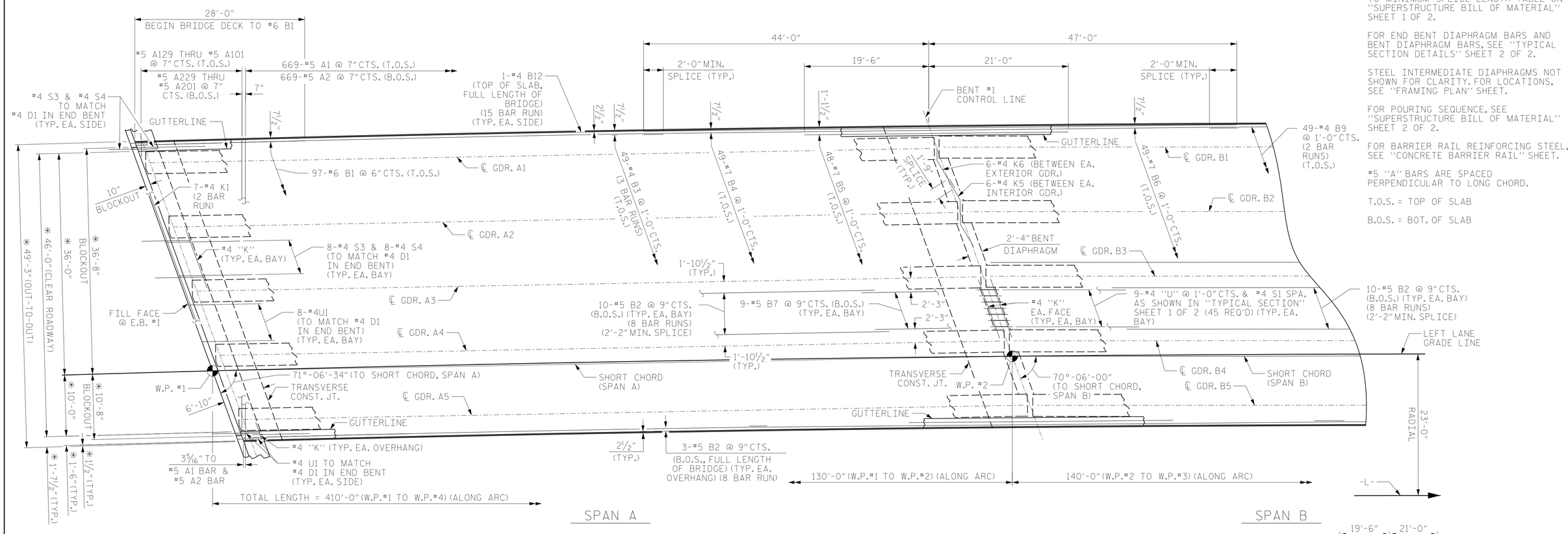
STR. #1



NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

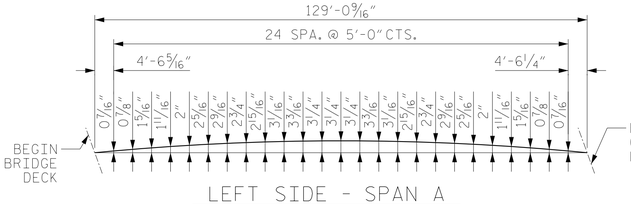
#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S. = TOP OF SLAB

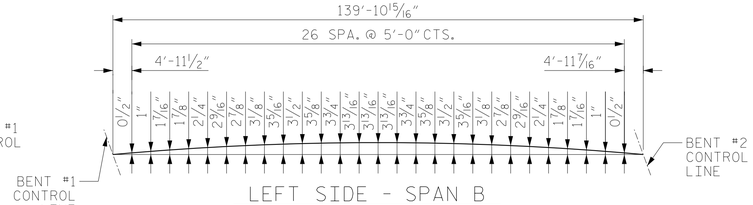
B.O.S. = BOT. OF SLAB

PARTIAL PLAN OF SPANS

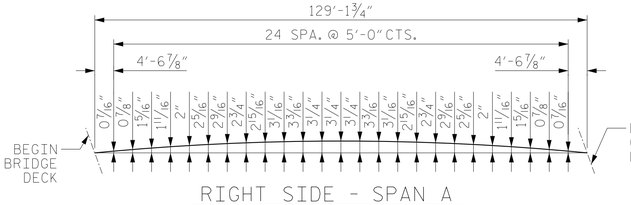
* RADIAL DIMENSIONS



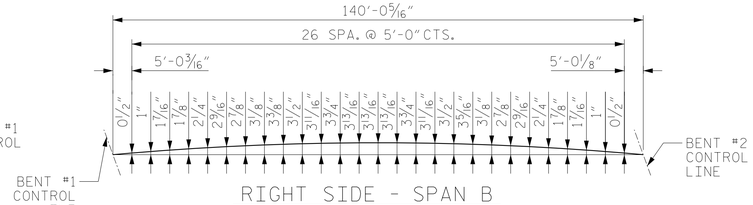
LEFT SIDE - SPAN A



LEFT SIDE - SPAN B

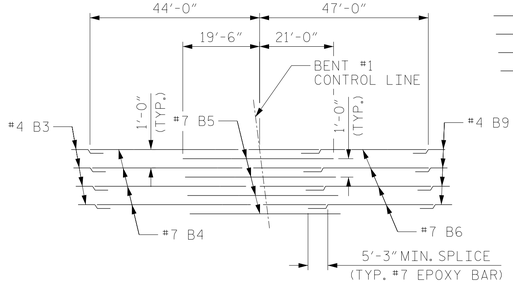


RIGHT SIDE - SPAN A

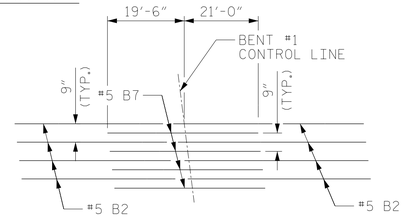


RIGHT SIDE - SPAN B

ARC OFFSETS



TOP OF SLAB REINFORCING STEEL LAYOUT



BOTTOM OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039949 ENGINEER JUSTIN MARK ROBINSON
Registered to: Justin Mark Robinson
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

LEFT LANE

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

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STR. #1

NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

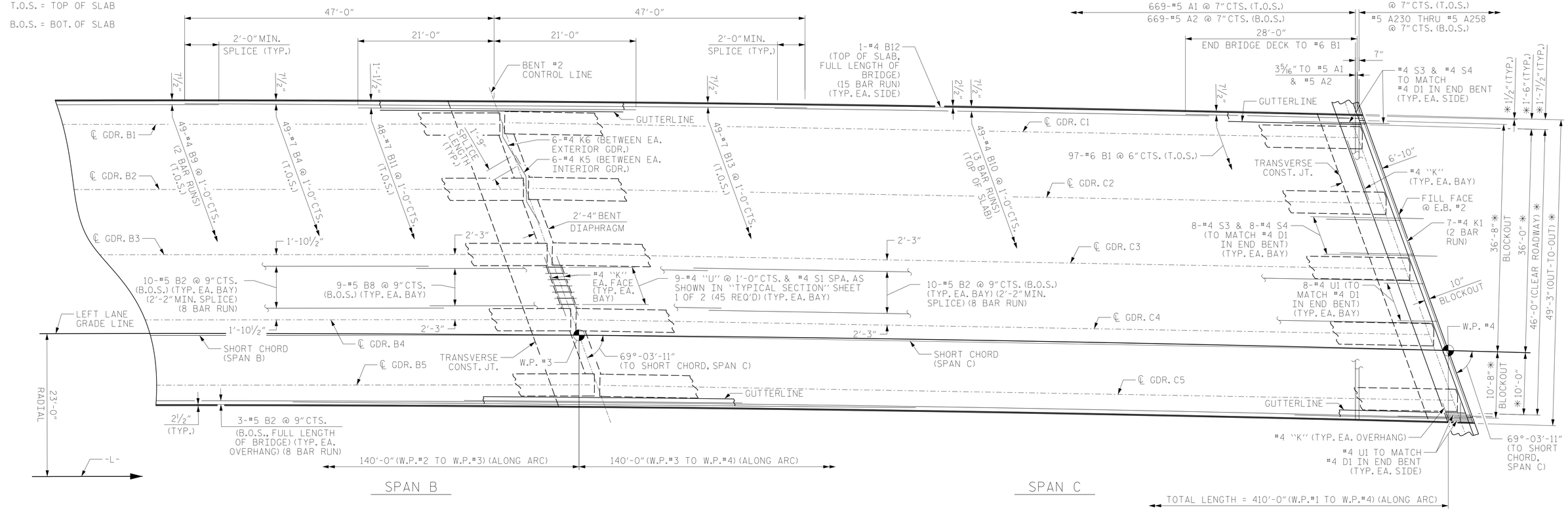
FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

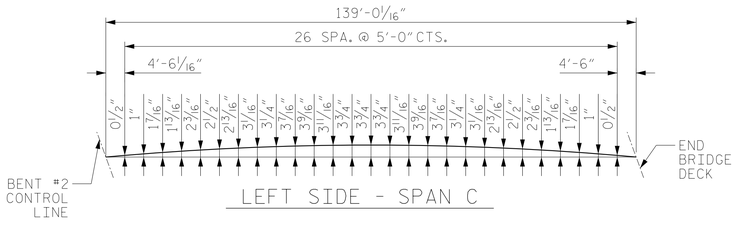
T.O.S. = TOP OF SLAB

B.O.S. = BOT. OF SLAB

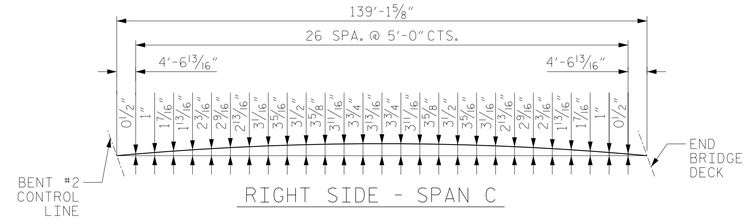


PARTIAL PLAN OF SPANS

*RADIAL DIMENSIONS

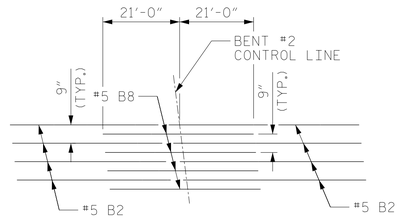


LEFT SIDE - SPAN C

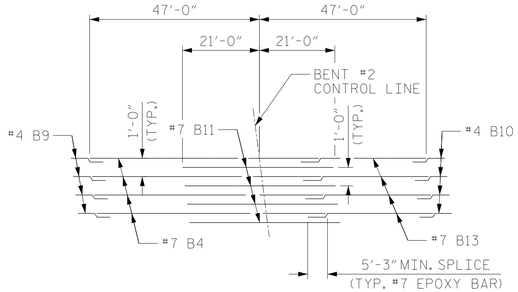


RIGHT SIDE - SPAN C

ARC OFFSETS



BOTTOM OF SLAB REINFORCING STEEL LAYOUT



TOP OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

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RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

LEFT LANE

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

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STR. #1

FRAMING PLAN

END BENT DIAPHRAGMS & BENT DIAPHRAGMS ARE NOT SHOWN

DIMENSIONS TO INTERMEDIATE DIAPHRAGM LOCATIONS ARE SHOWN ON GIRDER SHEETS

ALL DIMENSIONS ARE TO THE FILL FACE OR CONTROL LINE OF EACH BENT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

FRAMING PLAN
SPANS A, B & C

LEFT LANE

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

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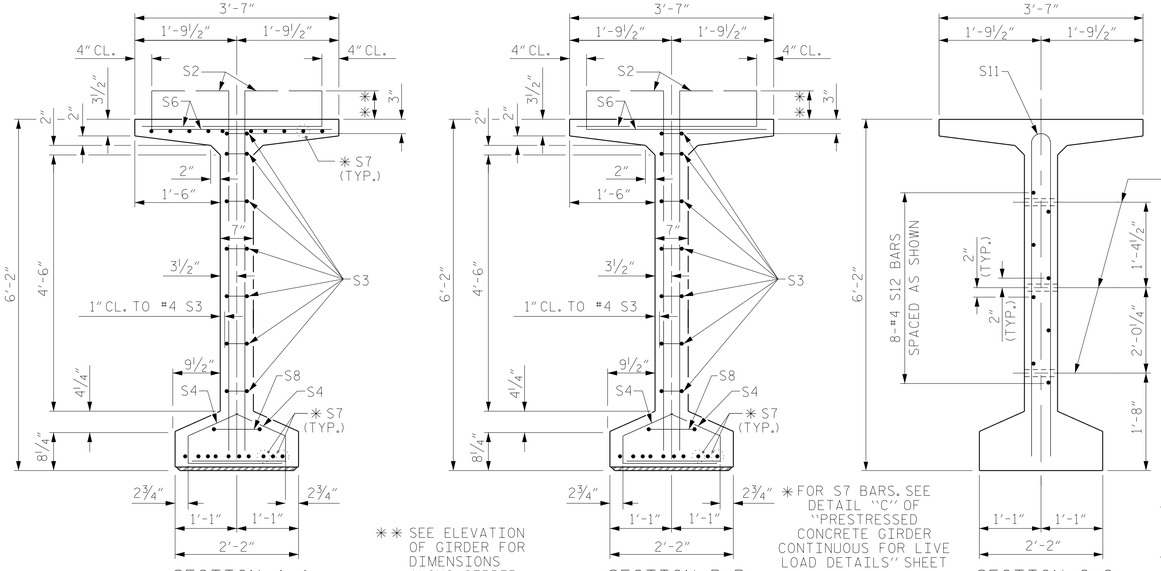


SECTION A-A

SECTION B-B

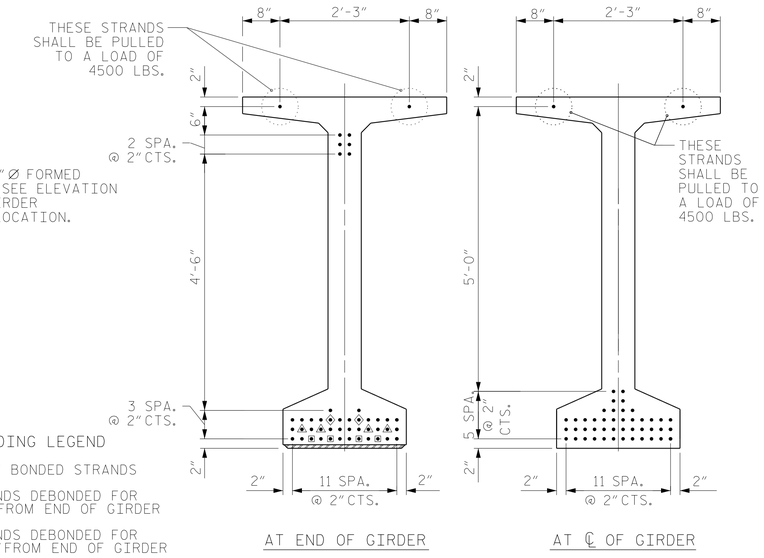
✱✱ SEE ELEVATION OF GIRDER FOR DIMENSIONS ALONG GIRDER

SECTION C-C

✱ FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET 4 OF 4.

℄ 1½" Ø FORMED HOLE. SEE ELEVATION OF GIRDER FOR LOCATION.

(S1 AND S9 BARS NOT SHOWN)



AT END OF GIRDER

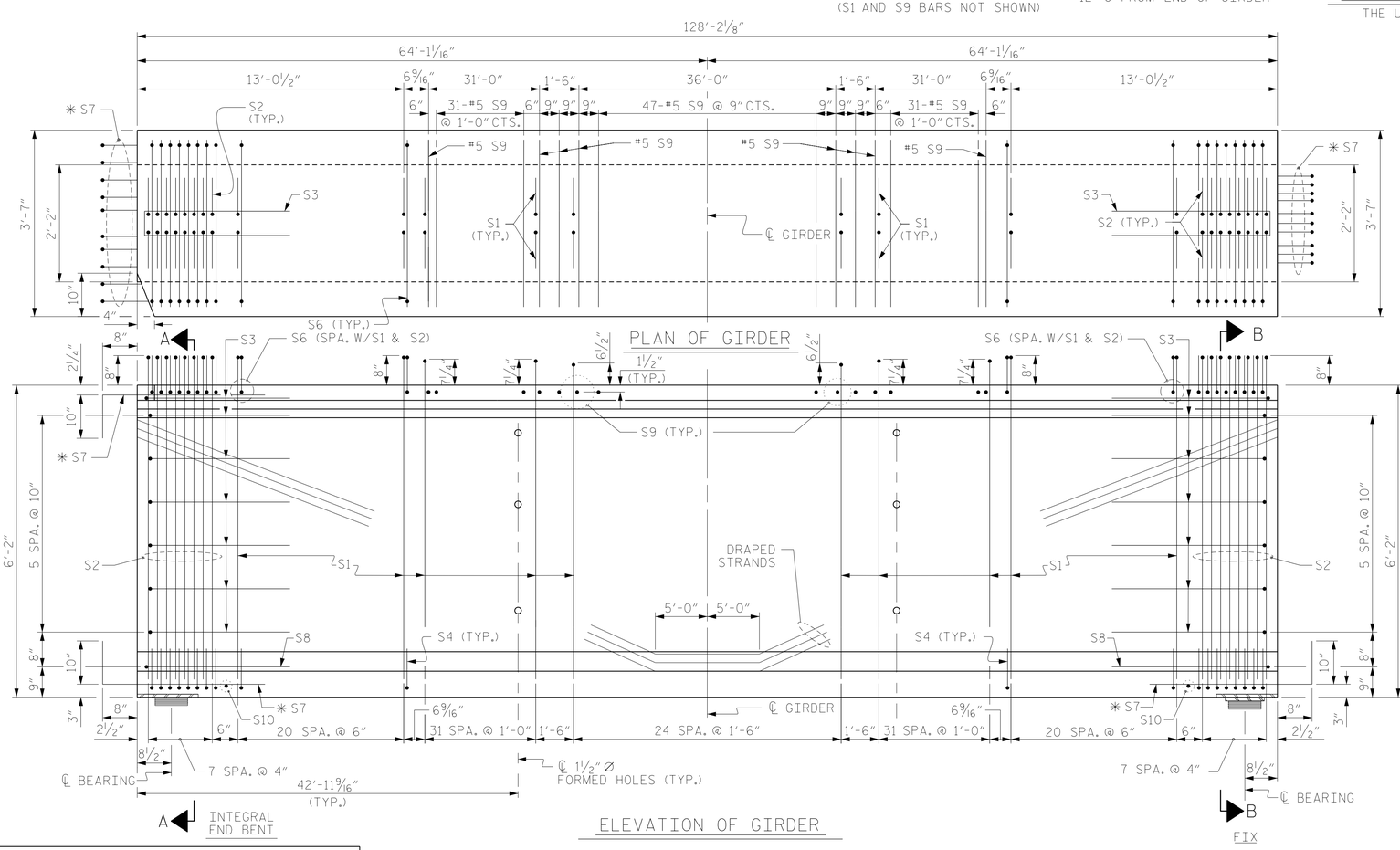
AT ℄ OF GIRDER

DEBONDING LEGEND

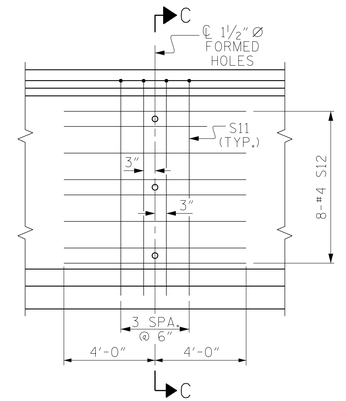
- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 20.1 KIPS (46 STRANDS REQUIRED)



ELEVATION OF GIRDER



PARTIAL ELEVATION

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

0.6" Ø L. R. GRADE 270 STRANDS

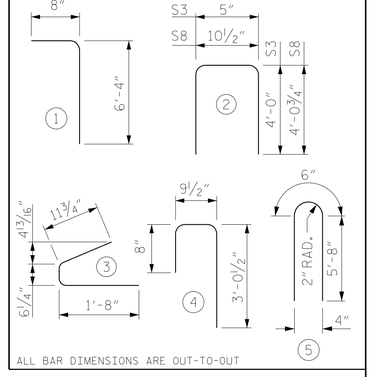
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	262	#4	1	7'-0"	1225
S2	32	#5	1	7'-0"	234
S3	14	#4	2	8'-5"	79
S4	116	#4	3	3'-2"	245
S6	116	#5	4	4'-6"	544
✱ S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	117	#5	STR	3'-3"	397
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3044	29.2	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	128'-2⅛"	640'-10⅝"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038243 JUSTIN MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD SPAN A
LEFT LANE

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

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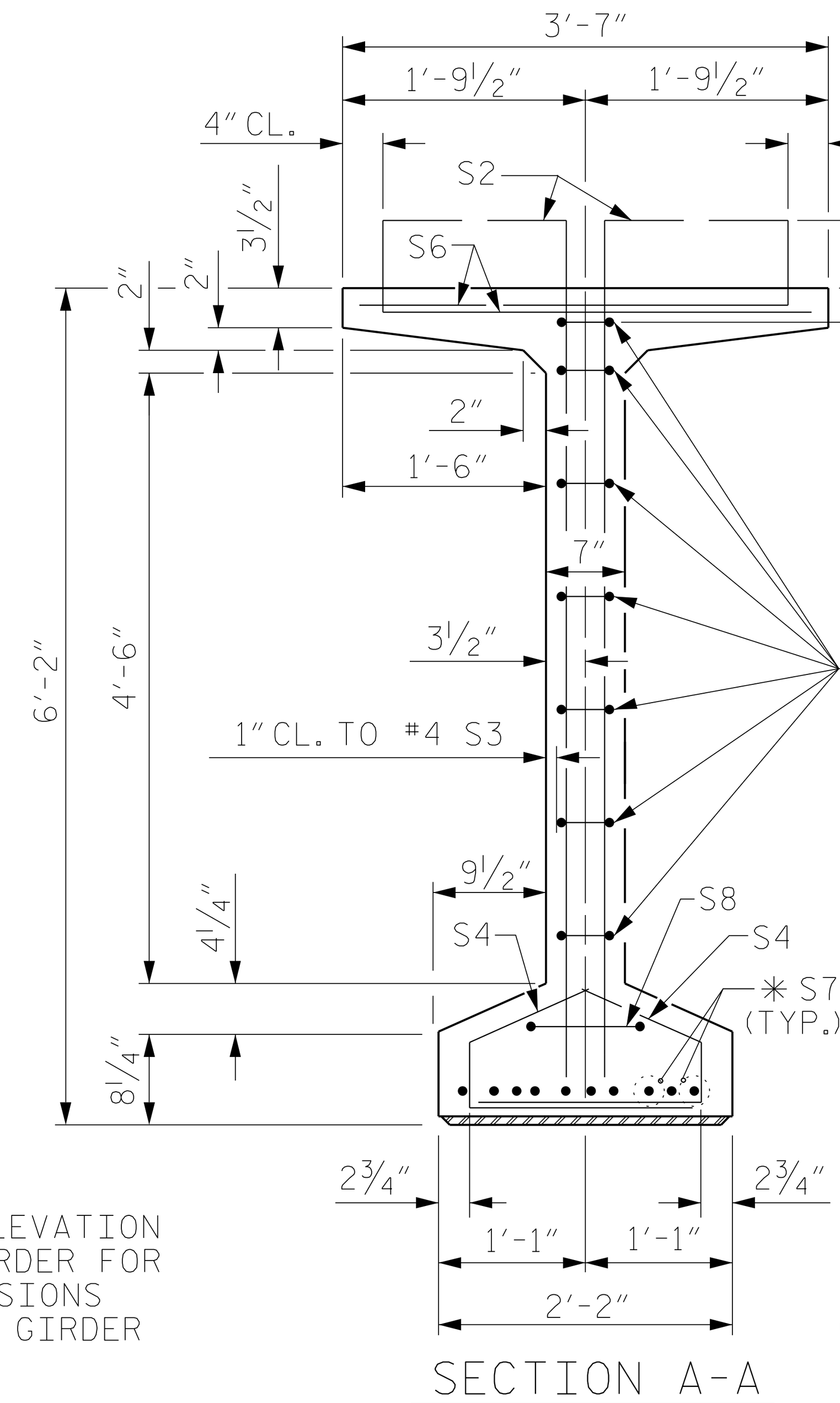
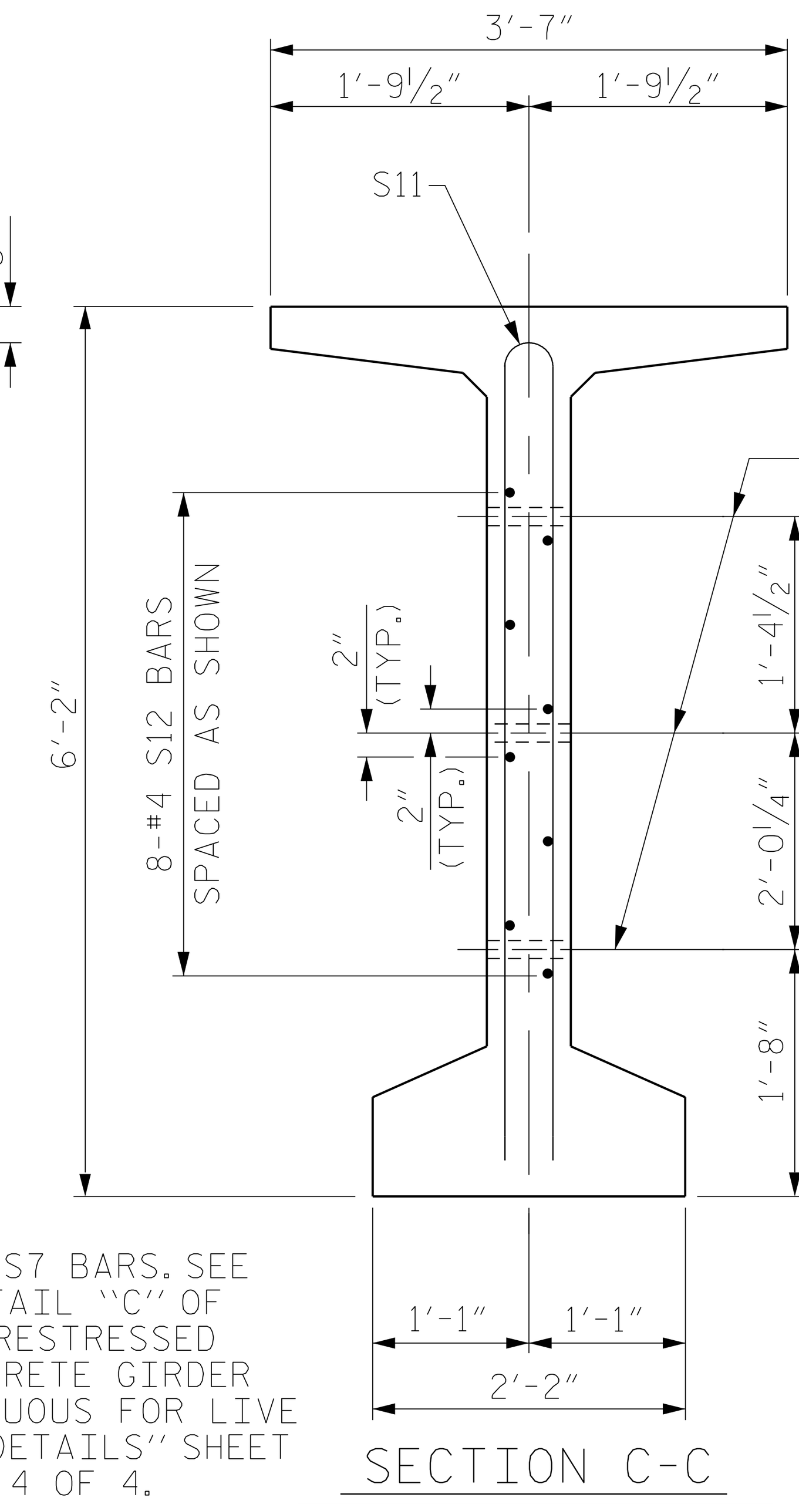
STR. #1



SECTION A-A

∗∗ SEE ELEVATION OF GIRDER FOR DIMENSIONS ALONG GIRDER

∗ FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET 4 OF 4.

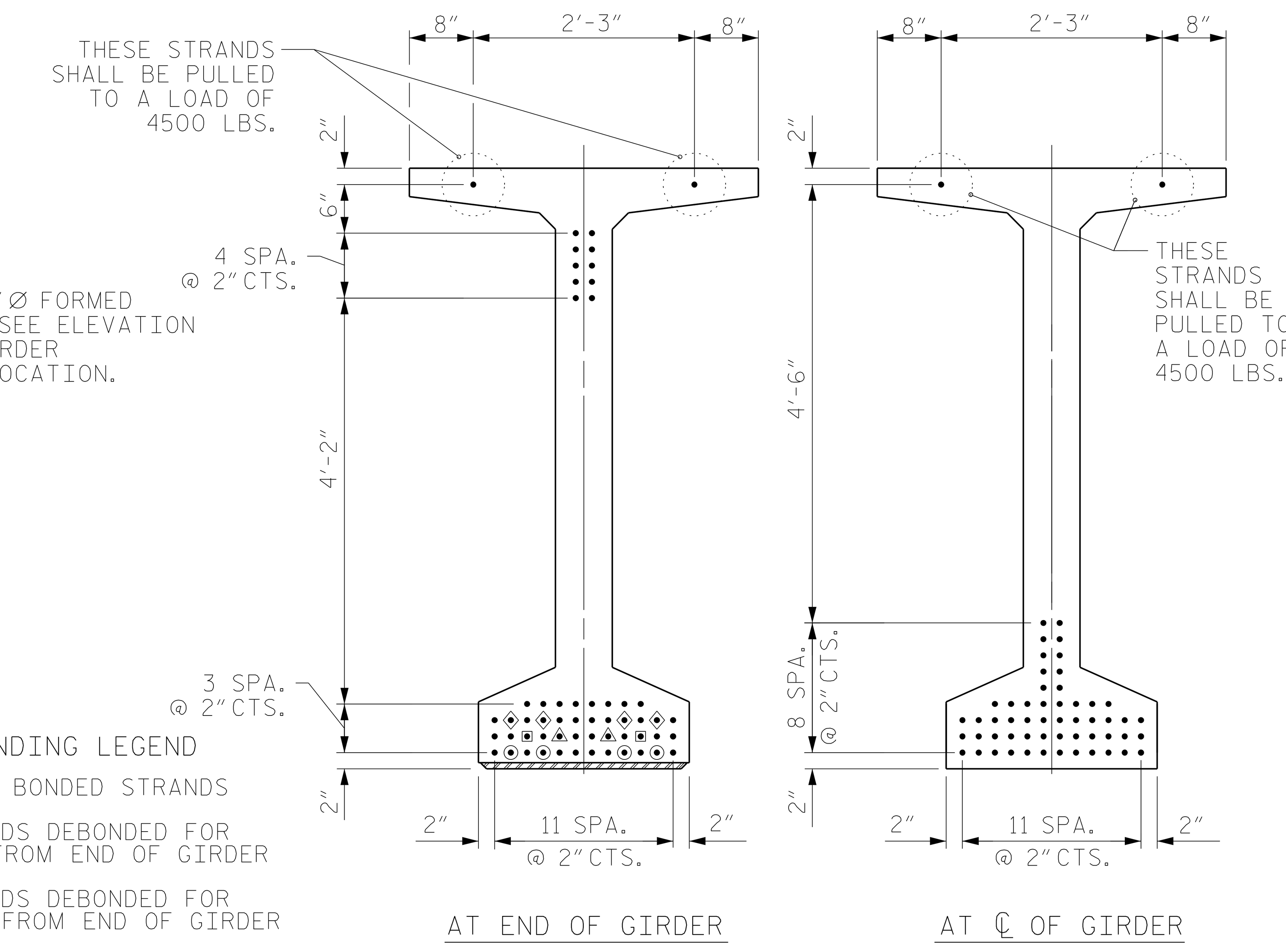


SECTION C-C

(S1 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 8′-0″ FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10′-0″ FROM END OF GIRDER
- ▣ STRANDS DEBONDED FOR 12′-0″ FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 14′-0″ FROM END OF GIRDER



0.6″ Ø LOW RELAXATION STRAND LAYOUT

THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 27.2 KIPS (56 STRANDS REQUIRED)

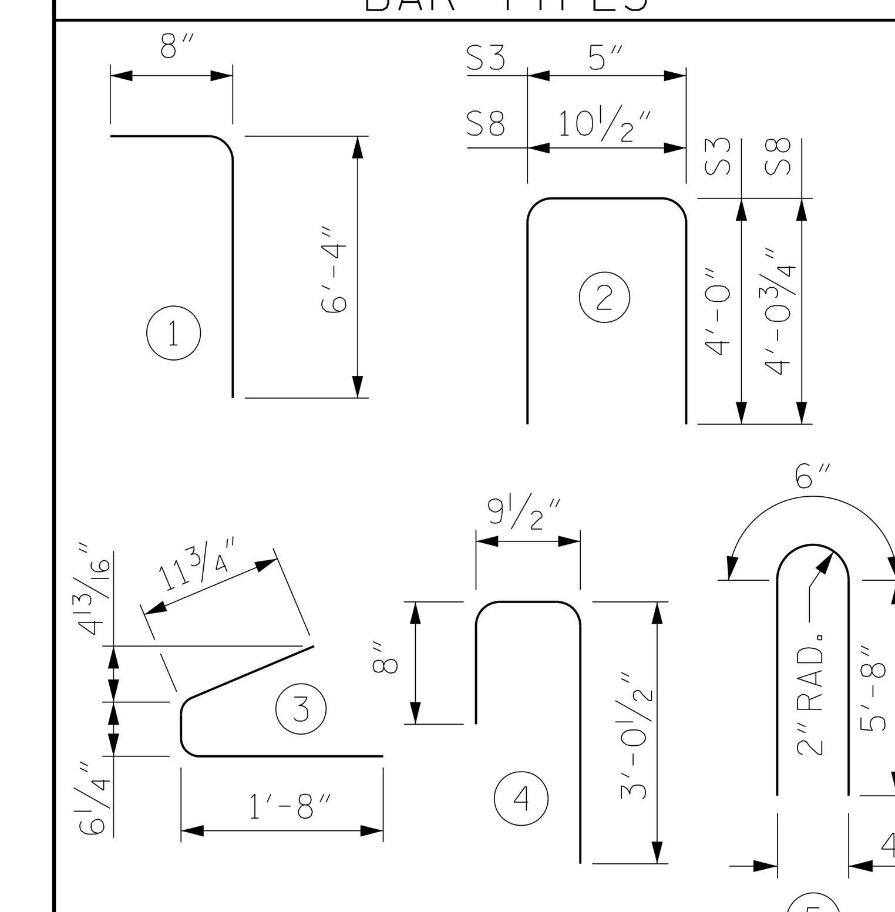
0.6″ Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

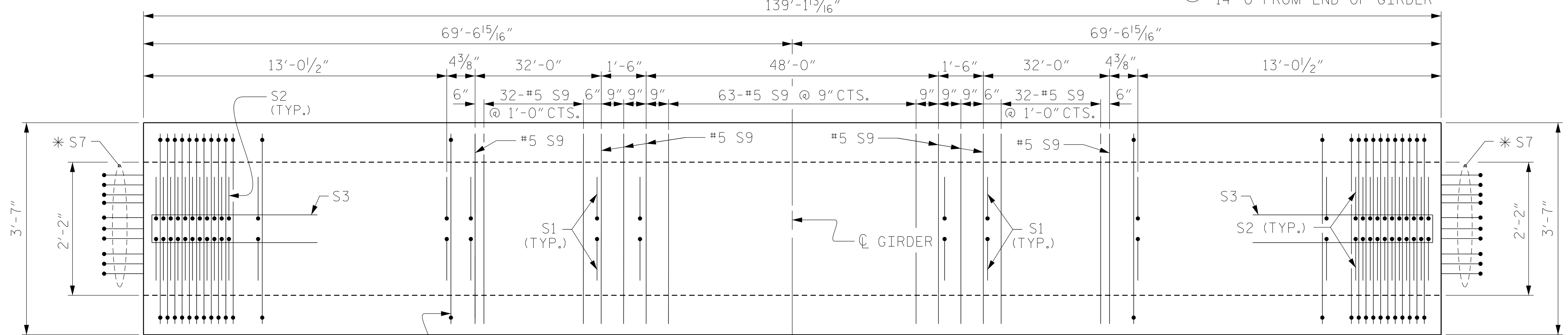
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	278	#4	1	7′-0″	1300
S2	44	#5	1	7′-0″	321
S3	14	#4	2	8′-5″	79
S4	116	#4	3	3′-2″	245
S6	128	#5	4	4′-6″	601
∗ S7	20	#5	STR	3′-8″	76
S8	2	#5	2	9′-0″	19
S9	135	#5	STR	3′-3″	458
S10	2	#3	STR	1′-10″	1
S11	8	#5	5	11′-10″	99
S12	16	#4	STR	8′-0″	86

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

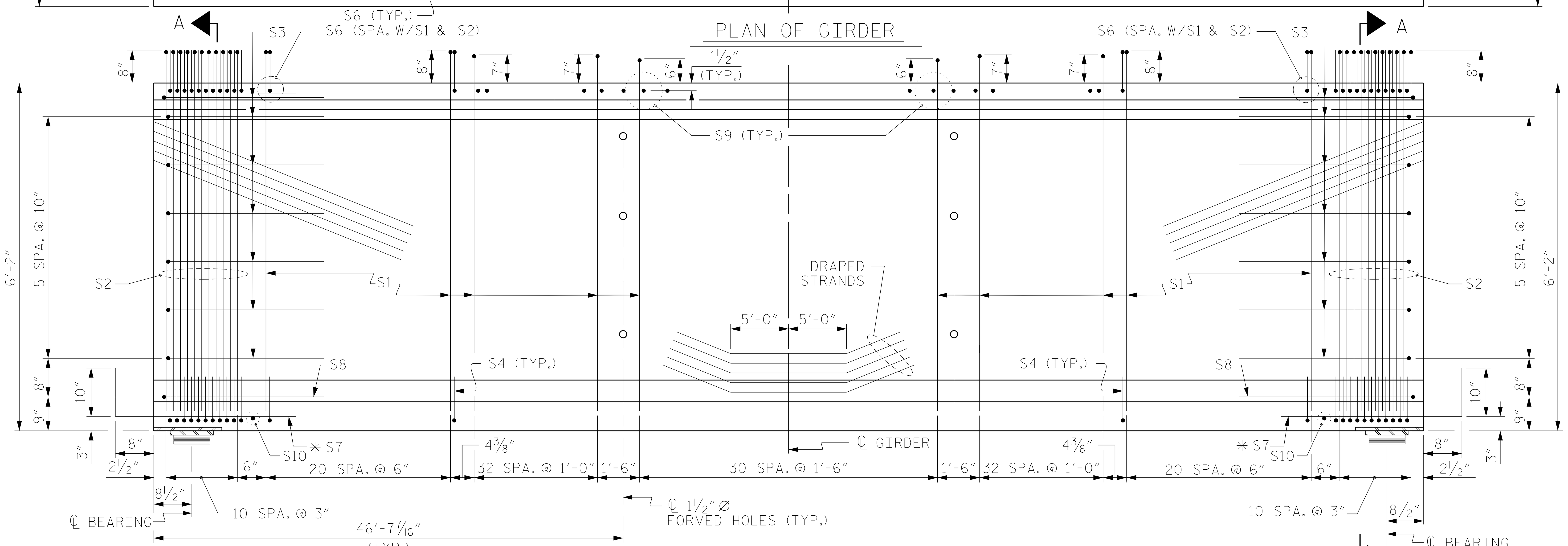
BAR TYPES



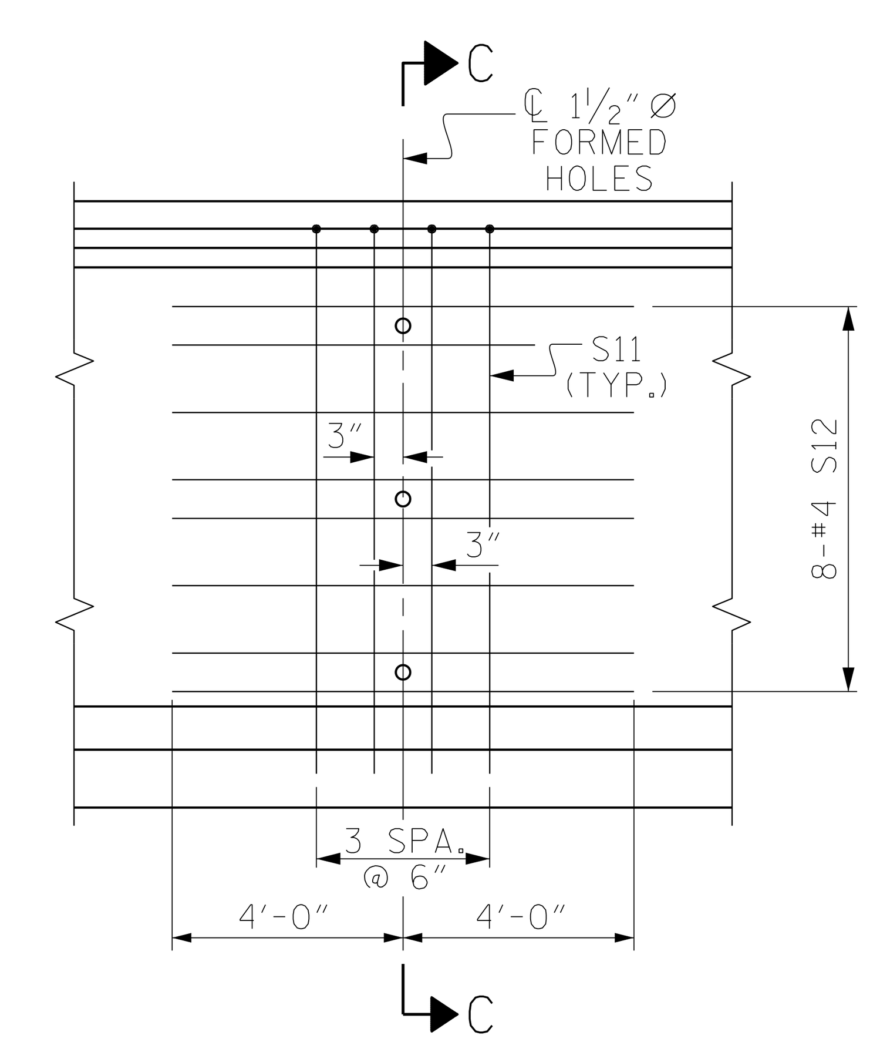
ALL BAR DIMENSIONS ARE OUT-TO-OUT



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

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

QUANTITIES FOR ONE GIRDER		
REINFORCING STEEL	9000 PSI CONCRETE	0.6″ Ø L.R. STRANDS
LB.	C.Y.	No.
3285	31.7	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	139′-1^13/16″	695′-9⁹⁄₁₆″

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74″ PRESTRESSED CONCRETE MODIFIED BULB TEE
CONTINUOUS FOR LIVE LOAD
SPAN B
LEFT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033463 — JUSTIN MARK ROBINSON — 3/9/2017

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STR. #1

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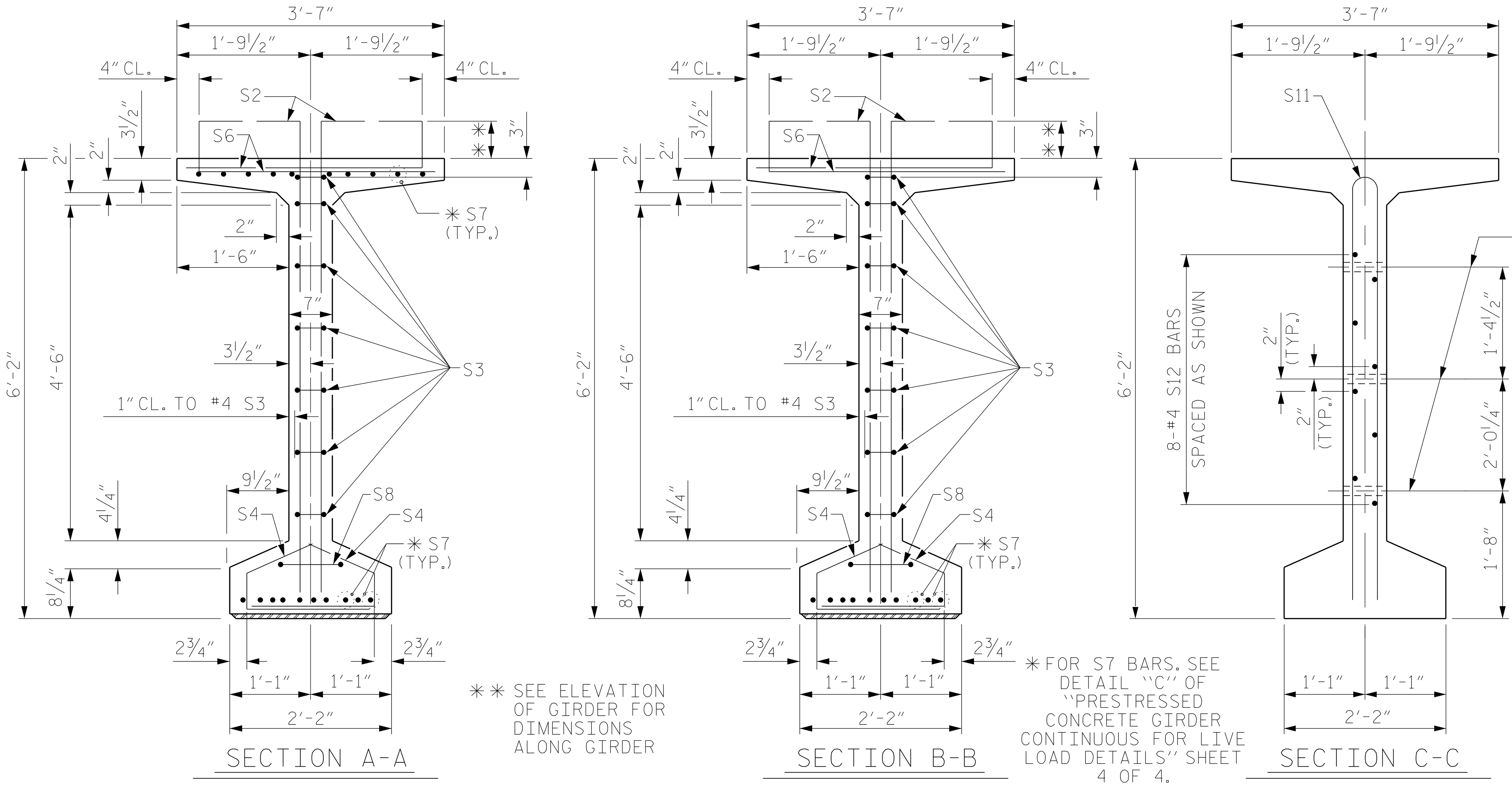
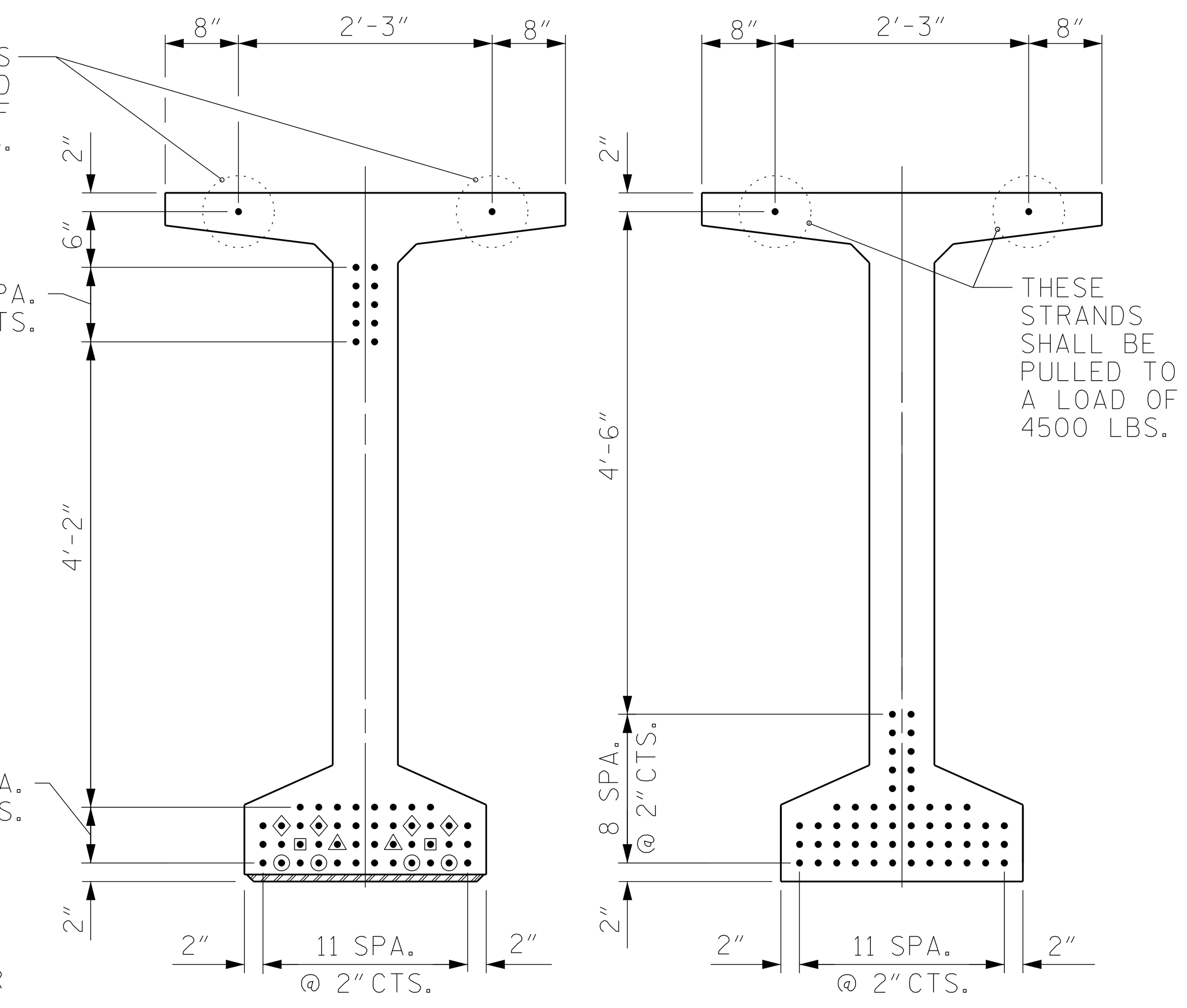


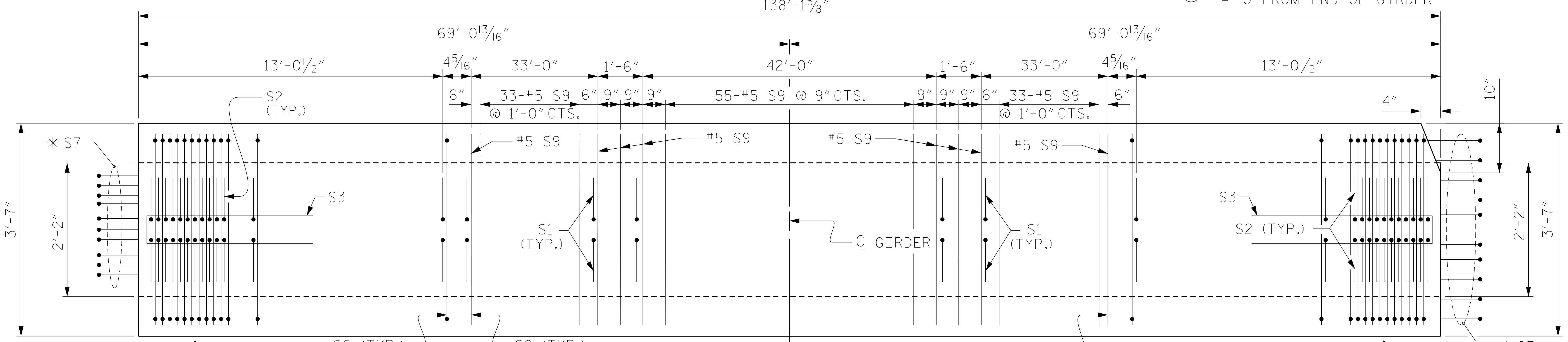
DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER

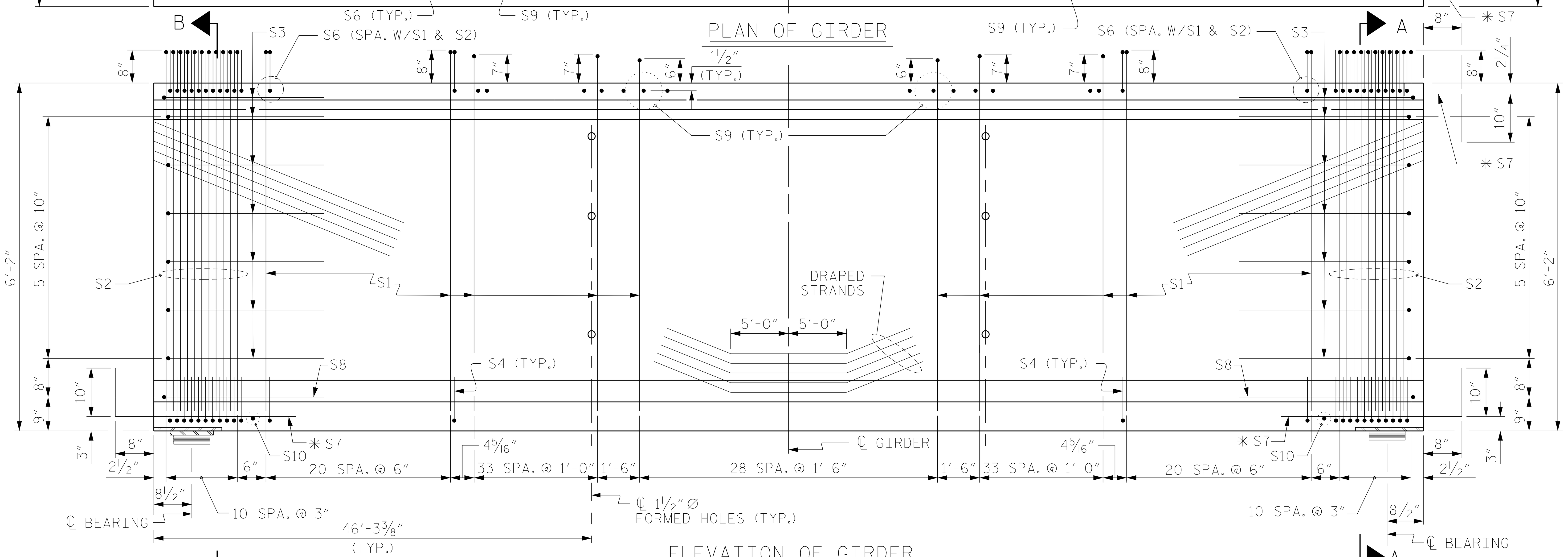


0.6"Ø LOW RELAXATION STRAND LAYOUT

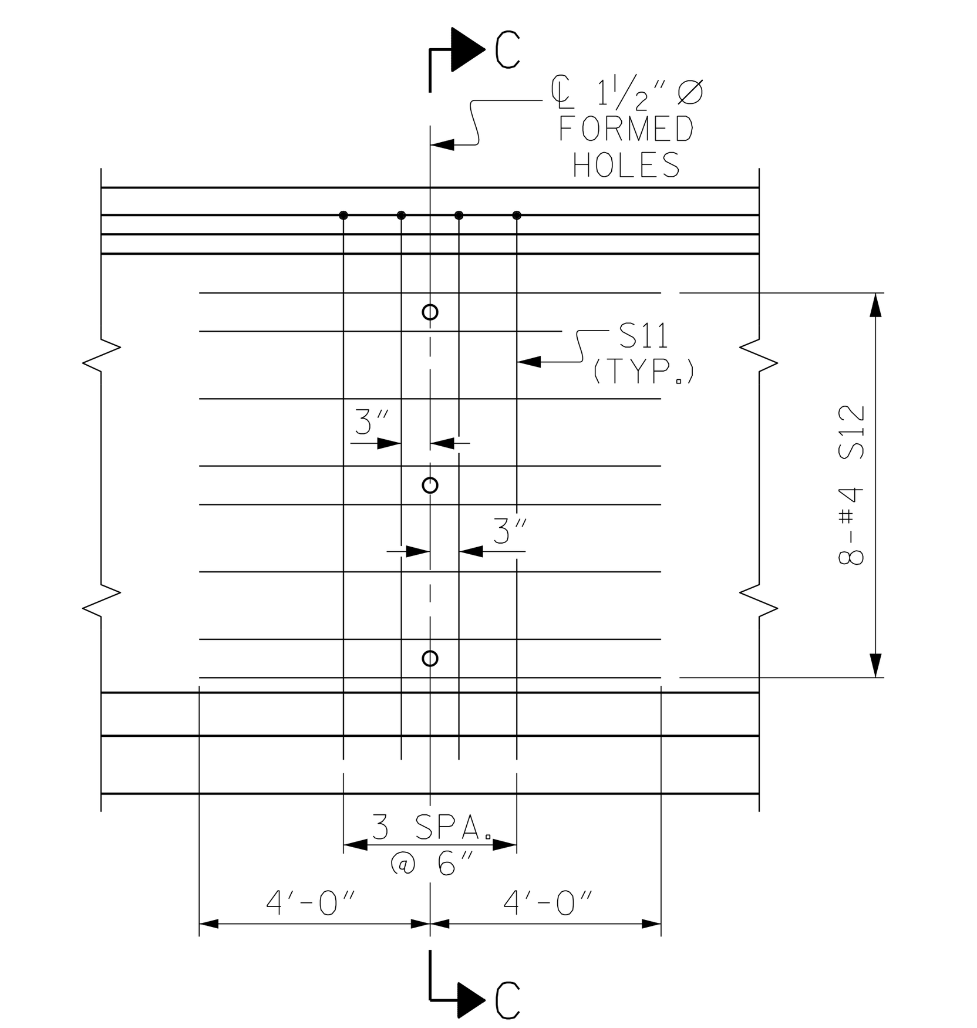
THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 27.4 KIPS (56 STRANDS REQUIRED)



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

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

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

REINFORCING STEEL FOR ONE GDR

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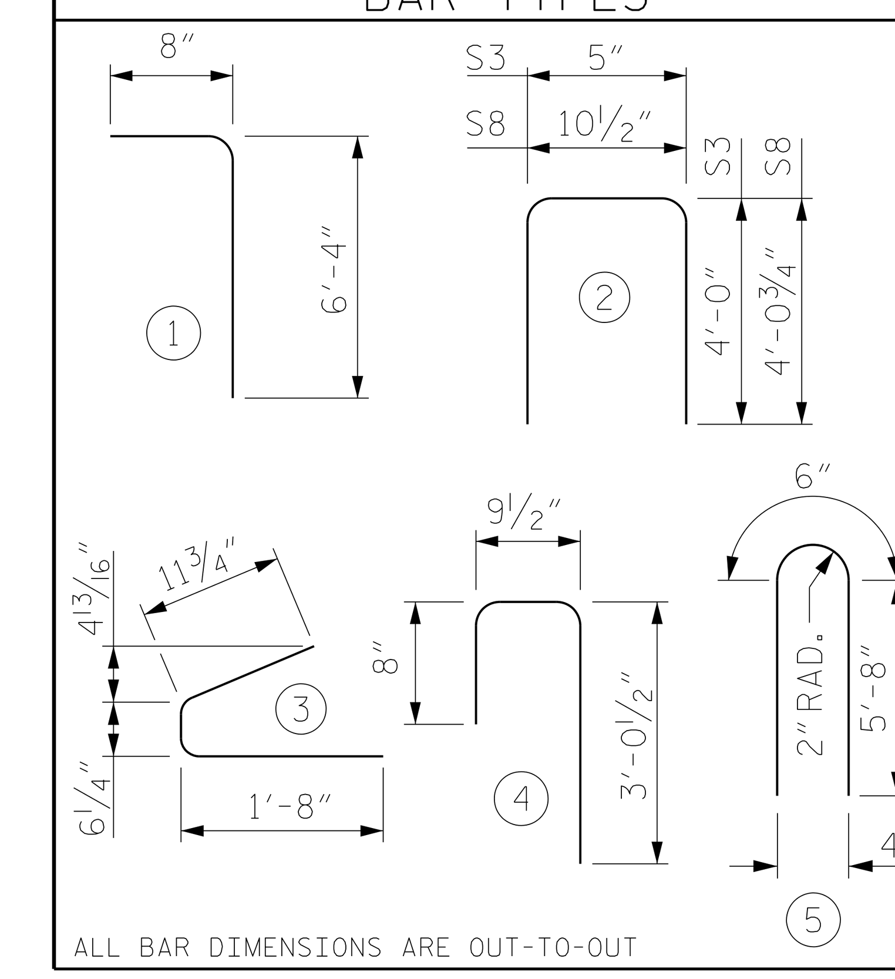
S6	128	#5	4	4'-6"	601
* S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	129	#5	STR	3'-3"	437
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

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

BAR TYPES



QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	9000 PSI CONCRETE	0.6"Ø L.R. STRANDS
LB.	C.Y.	No.
3303	31.4	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	138'-1⅝"	690'-8⅛"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 3 OF 4

SEAL 033962 — MARK ROBINSON — PROFESSIONAL ENGINEER — NORTH CAROLINA — 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD
SPAN C
LEFT LANE

REVISIONS							SHEET NO.
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1			3				TOTAL SHEETS
2			4				36

STR. #1

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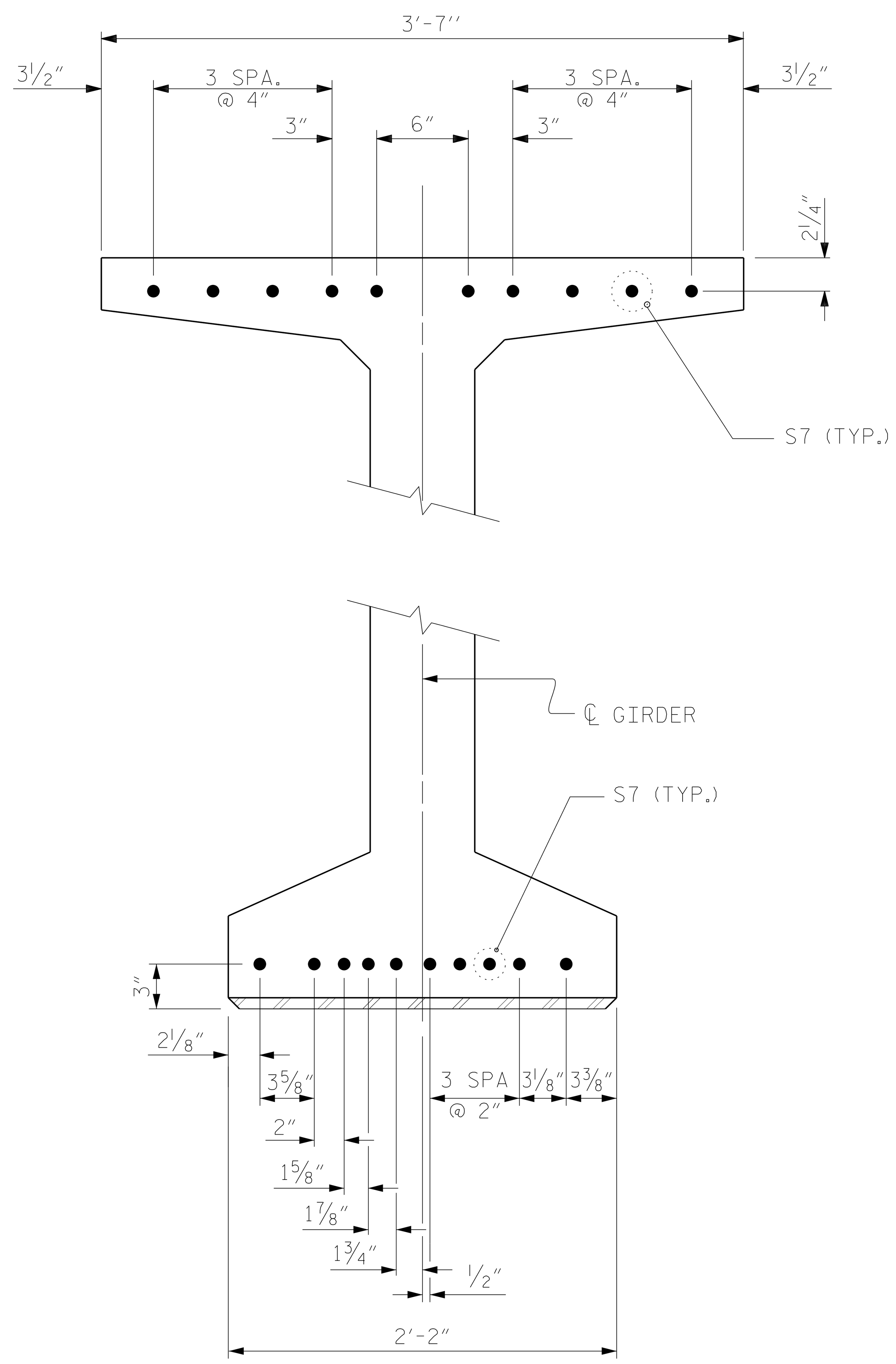
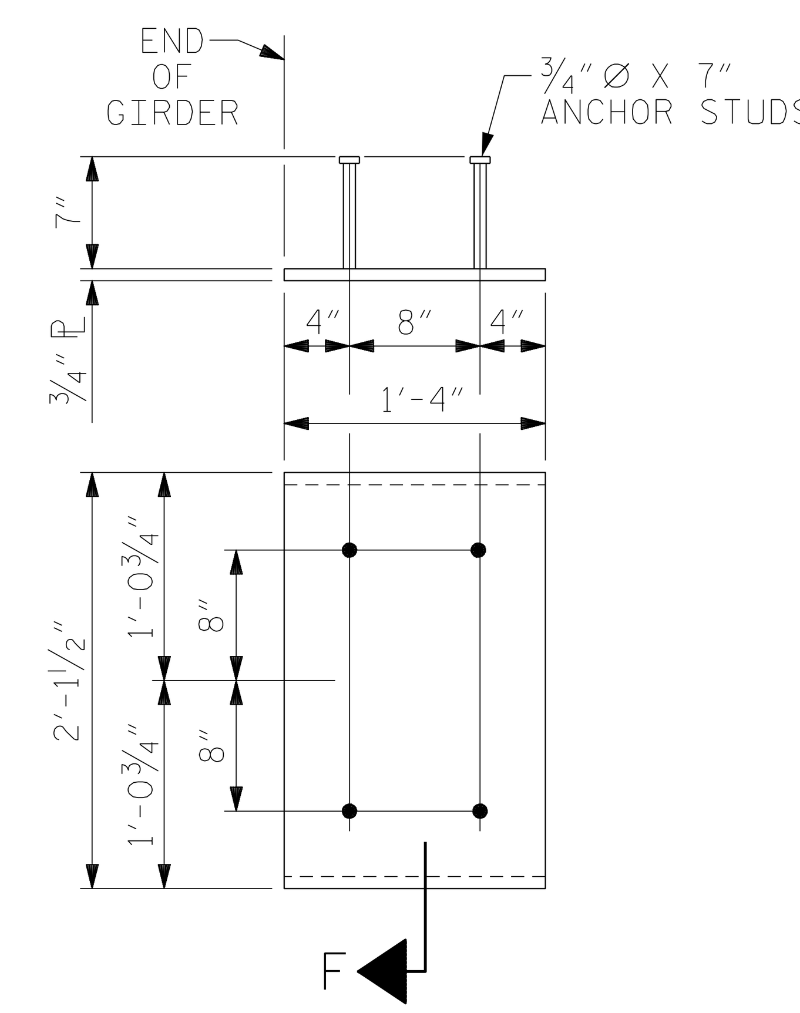
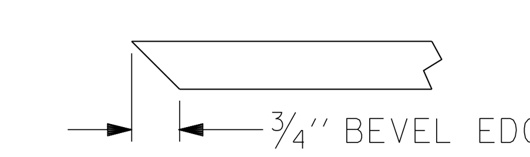


DETAIL "C"



EMBEDDED PLATE "B-1" DETAILS FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

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 7200 PSI FOR SPAN A AND 7700 PSI FOR SPANS B AND C.

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

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

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

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 74" MODIFIED PRESTRESSED CONCRETE GIRDER.

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

LEFT LANE

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STD. NO. PCG9

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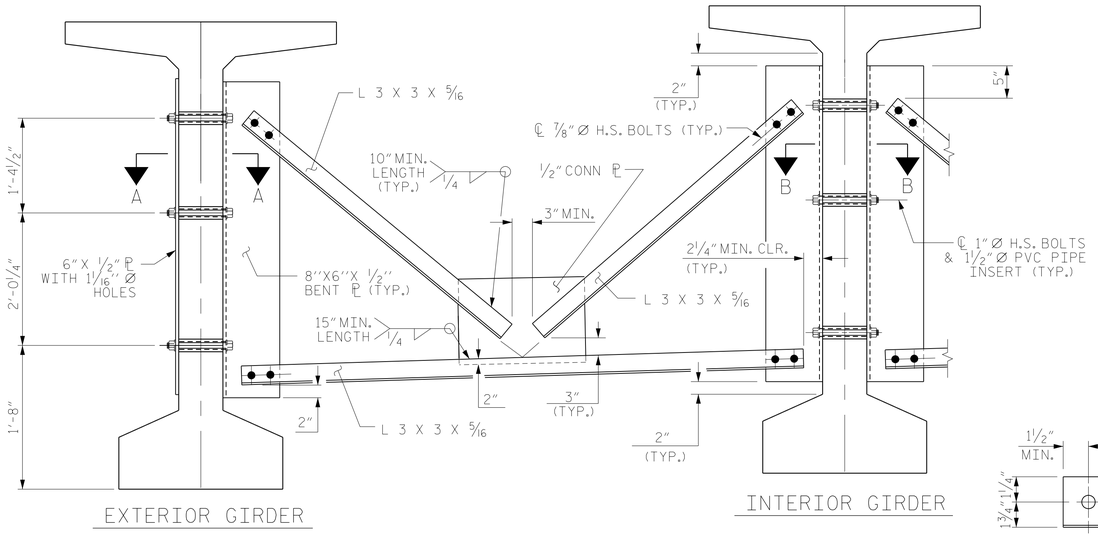
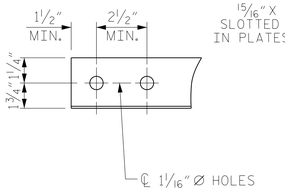


EXTERIOR GIRDER

INTERIOR GIRDER

PART SECTION AT INTERMEDIATE DIAPHRAGM



ANGLE END
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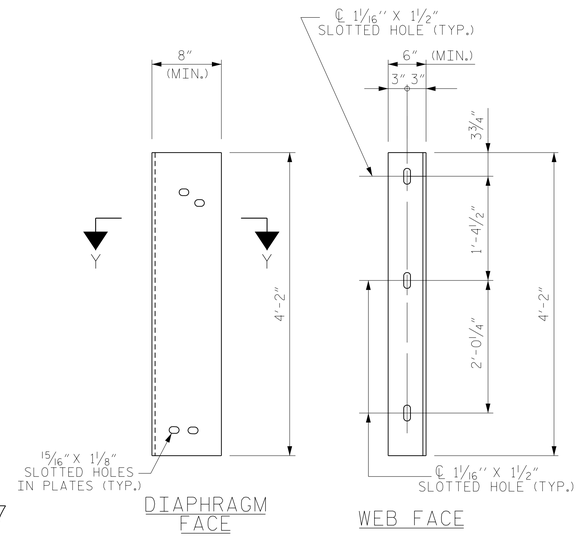
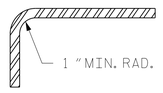




SECTION Y-Y

CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

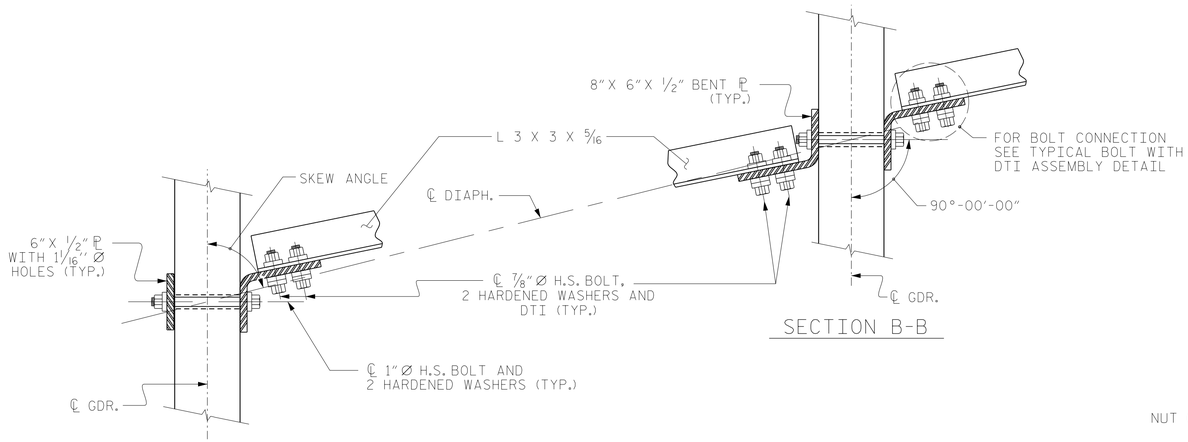
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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

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

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

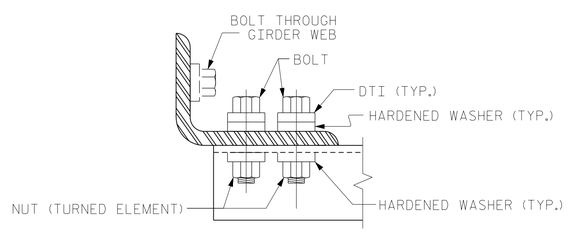
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



SECTION B-B

SECTION A-A

CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Designed by: Justin Robinson
DocuSigned by: 2C9A9DE5-29BA-433E-A421-F41E9C8A72B9
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

INTERMEDIATE STEEL DIAPHRAGMS

LEFT LANE

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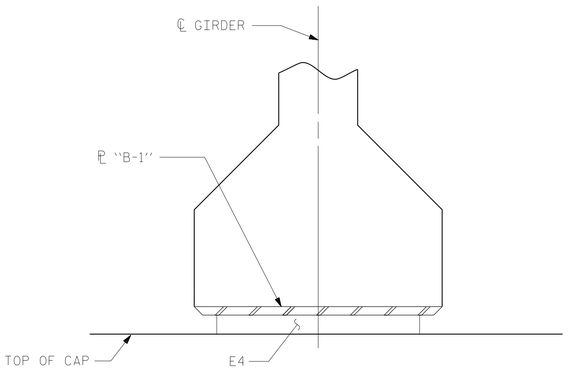

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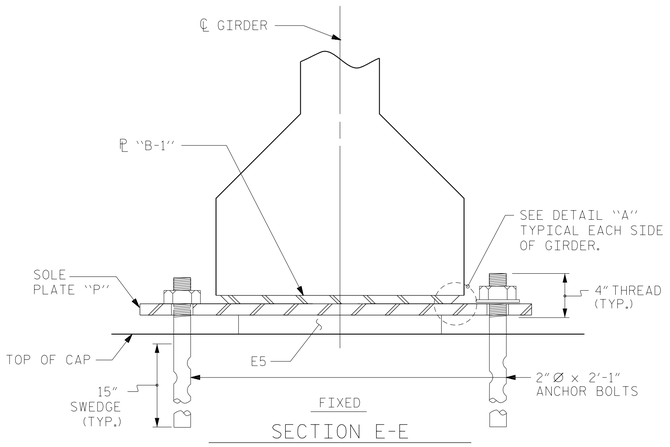
SECTION D-D



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SECTION E-E

NOTES

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

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

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

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

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

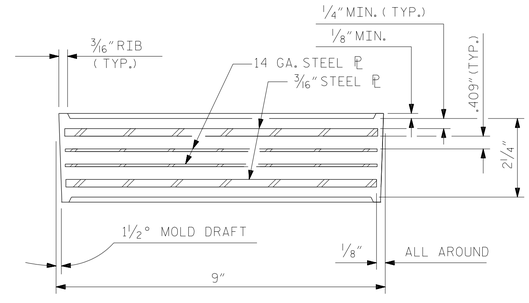
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

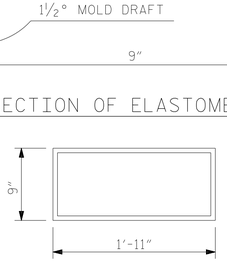
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



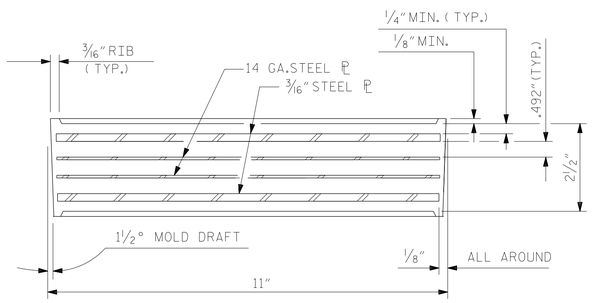
TYPICAL SECTION OF ELASTOMERIC BEARINGS



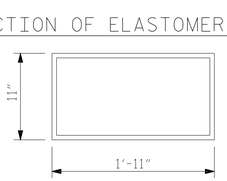
E4 (10 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



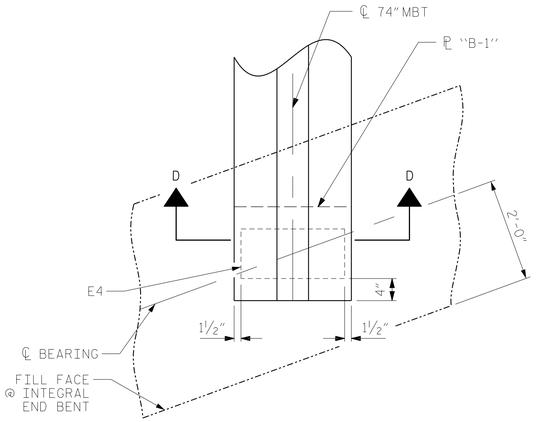
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E5 (20 REQ'D)

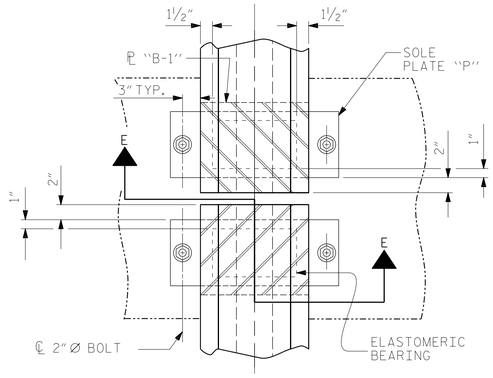
PLAN VIEW OF ELASTOMERIC BEARING

TYPE VI



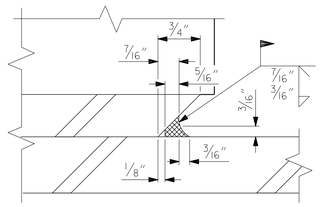
PLAN VIEW AT END BENTS

NOTE: BOTTOM FLANGE OF 74" MBT SHOWN, TOP FLANGE NOT SHOW FOR CLARITY

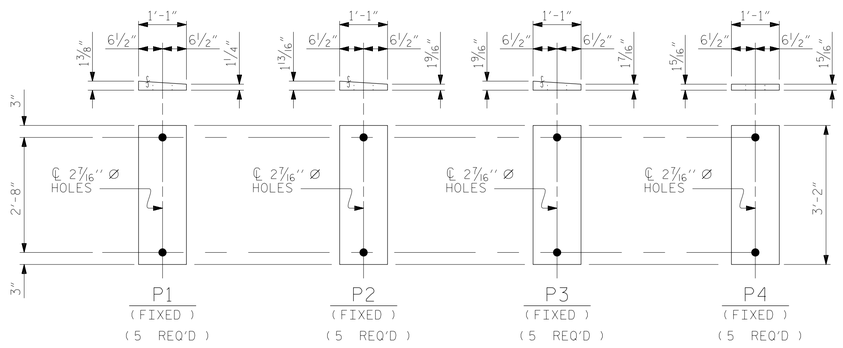


TYPICAL PLAN

(SHOWING CONTINUOUS BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 k
TYPE VI	420 k

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER MALCOLM MARK ROBINSON
3/9/2017

RS&H

RS&H Architects-Engineers-Planners, Inc.
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North Carolina License Nos. 50073 ° F-0493 ° C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

LEFT LANE

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

DRAWN BY :	MAL	DATE : 11/2016
CHECKED BY :	JMR	DATE : 12/2016
DESIGN ENGINEER OF RECORD:	MAL	DATE : 11/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

3/8/2017
\\RALFILE01\Transportation\P\1031709001 R-2707C Bridges\Structures\Working DGN\401_031_R2707C_SMU_BG16_S1-16.dgn
leblancm

STD. NO. EB4

STR. #1

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN A

GIRDER 1 (EXTERIOR)

0.6"Ø LOW RELAXATION																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.026	0.052	0.076	0.098	0.118	0.134	0.148	0.157	0.163	0.165	0.163	0.157	0.148	0.134	0.118	0.098	0.076	0.052	0.026	0.000
FINAL CAMBER ↑	0''	5/16''	5/8''	7/8''	1 1/8''	1 3/8''	1 9/16''	1 11/16''	1 13/16''	1 7/8''	1 15/16''	1 7/8''	1 13/16''	1 11/16''	1 9/16''	1 3/8''	1 1/8''	7/8''	5/8''	5/16''	0''

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.057	0.084	0.109	0.130	0.149	0.163	0.174	0.181	0.183	0.181	0.174	0.163	0.149	0.130	0.109	0.084	0.057	0.029	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	13/16''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	13/16''	9/16''	1/4''	0''

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.057	0.084	0.109	0.130	0.149	0.164	0.174	0.181	0.183	0.181	0.174	0.164	0.149	0.130	0.109	0.084	0.057	0.029	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	9/16''	1/4''	0''

GIRDER 4 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.057	0.084	0.109	0.130	0.149	0.164	0.174	0.181	0.183	0.181	0.174	0.164	0.149	0.130	0.109	0.084	0.057	0.029	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	9/16''	1/4''	0''

GIRDER 5 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.025	0.049	0.071	0.092	0.111	0.126	0.139	0.148	0.153	0.155	0.153	0.148	0.139	0.126	0.111	0.092	0.071	0.049	0.025	0.000
FINAL CAMBER ↑	0''	5/16''	5/8''	15/16''	1 3/16''	1 7/16''	1 5/8''	1 13/16''	1 15/16''	2''	2''	2''	1 15/16''	1 13/16''	1 5/8''	1 7/16''	1 3/16''	15/16''	5/8''	5/16''	0''

SPAN B

GIRDER 1 (EXTERIOR)

0.6"Ø LOW RELAXATION																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.375	0.390	0.394	0.390	0.375	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.036	0.072	0.105	0.136	0.163	0.186	0.205	0.218	0.226	0.229	0.226	0.218	0.205	0.186	0.163	0.136	0.105	0.072	0.036	0.000
FINAL CAMBER ↑	0''	5/16''	5/8''	15/16''	1 3/16''	1 7/16''	1 5/8''	1 3/4''	1 7/8''	1 15/16''	2''	1 15/16''	1 7/8''	1 3/4''	1 5/8''	1 7/16''	1 3/16''	15/16''	5/8''	5/16''	0''

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.375	0.390	0.394	0.390	0.375	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.040	0.079	0.116	0.150	0.180	0.206	0.226	0.241	0.250	0.253	0.250	0.241	0.226	0.206	0.180	0.150	0.116	0.079	0.040	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	9/16''	1/4''	0''

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.375	0.390	0.394	0.390	0.375	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.040	0.079	0.116	0.150	0.180	0.206	0.226	0.241	0.250	0.253	0.250	0.241	0.226	0.206	0.180	0.150	0.116	0.079	0.040	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	9/16''	1/4''	0''

GIRDER 4 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.375	0.390	0.394	0.390	0.375	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.040	0.079	0.116	0.150	0.180	0.206	0.226	0.241	0.250	0.253	0.250	0.241	0.226	0.206	0.180	0.150	0.116	0.079	0.040	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	9/16''	1/4''	0''

GIRDER 5 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.375	0.390	0.394	0.390	0.375	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
∗ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.034	0.067	0.098	0.127	0.152	0.173	0.190	0.203	0.211	0.213	0.211	0.203	0.190	0.173	0.152	0.127	0.098	0.067	0.034	0.000
FINAL CAMBER ↑	0''	3/8''	11/16''	1''	1 5/16''	1 9/16''	1 3/4''	1 15/16''	2 1/16''	2 1/8''	2 3/16''	2 1/8''	2 1/16''	1 15/16''	1 3/4''	1 9/16''	1 5/16''	1''	11/16''	3/8''	0''

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

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 MALCOLM ARTHUR MARK ROBINSON
Digitally signed by Malcolm Robinson
3/9/2017

RS&H Architects-Engineers-Planners, Inc.
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919-926-4100 FAX 919-846-9080
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North Carolina License Nos. 50073 ° F-0493 ° C-28

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPANS A & B

LEFT LANE

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

STR. #1

3/8/2017
\\RALFILE01\Transportation\P\1031709001 R-2707C Bridges\Structures\Working DGN\401_033_R2707C_SMU_DL17_S1-17.dgn
leblancm

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN C

0.6" Ø LOW RELAXATION

GIRDER 1 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.035	0.070	0.102	0.132	0.158	0.180	0.198	0.211	0.219	0.222	0.219	0.211	0.198	0.180	0.158	0.132	0.102	0.070	0.035	0.000
FINAL CAMBER ↑	0"	5/16"	5/8"	15/16"	1 3/16"	1 7/16"	1 5/8"	1 13/16"	1 15/16"	2"	2 1/16"	2"	1 15/16"	1 13/16"	1 5/8"	1 7/16"	1 3/16"	15/16"	5/8"	5/16"	0"

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.039	0.077	0.113	0.146	0.175	0.199	0.219	0.234	0.242	0.245	0.242	0.234	0.219	0.199	0.175	0.146	0.113	0.077	0.039	0.000
FINAL CAMBER ↑	0"	1/4"	9/16"	13/16"	1 1/16"	1 1/4"	1 7/16"	1 9/16"	1 11/16"	1 3/4"	1 3/4"	1 3/4"	1 11/16"	1 9/16"	1 7/16"	1 1/4"	1 1/16"	13/16"	9/16"	1/4"	0"

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.039	0.077	0.113	0.146	0.175	0.200	0.219	0.234	0.243	0.246	0.243	0.234	0.219	0.200	0.175	0.146	0.113	0.077	0.039	0.000
FINAL CAMBER ↑	0"	1/4"	9/16"	13/16"	1 1/16"	1 1/4"	1 7/16"	1 9/16"	1 11/16"	1 3/4"	1 3/4"	1 3/4"	1 11/16"	1 9/16"	1 7/16"	1 1/4"	1 1/16"	13/16"	9/16"	1/4"	0"

GIRDER 4 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.039	0.077	0.113	0.146	0.175	0.200	0.219	0.234	0.243	0.246	0.243	0.234	0.219	0.200	0.175	0.146	0.113	0.077	0.039	0.000
FINAL CAMBER ↑	0"	1/4"	9/16"	13/16"	1 1/16"	1 1/4"	1 7/16"	1 9/16"	1 11/16"	1 3/4"	1 3/4"	1 3/4"	1 11/16"	1 9/16"	1 7/16"	1 1/4"	1 1/16"	13/16"	9/16"	1/4"	0"

GIRDER 5 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.033	0.065	0.095	0.123	0.148	0.168	0.185	0.197	0.205	0.207	0.205	0.197	0.185	0.168	0.148	0.123	0.095	0.065	0.033	0.000
FINAL CAMBER ↑	0"	3/8"	11/16"	1"	1 5/16"	1 9/16"	1 13/16"	2"	2 1/8"	2 3/16"	2 3/16"	2 3/16"	2 1/8"	2"	1 13/16"	1 9/16"	1 5/16"	1"	11/16"	3/8"	0"

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

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 2

SEAL 039313 — JUSTIN MARK ROBINSON — 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPAN C

LEFT LANE

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

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DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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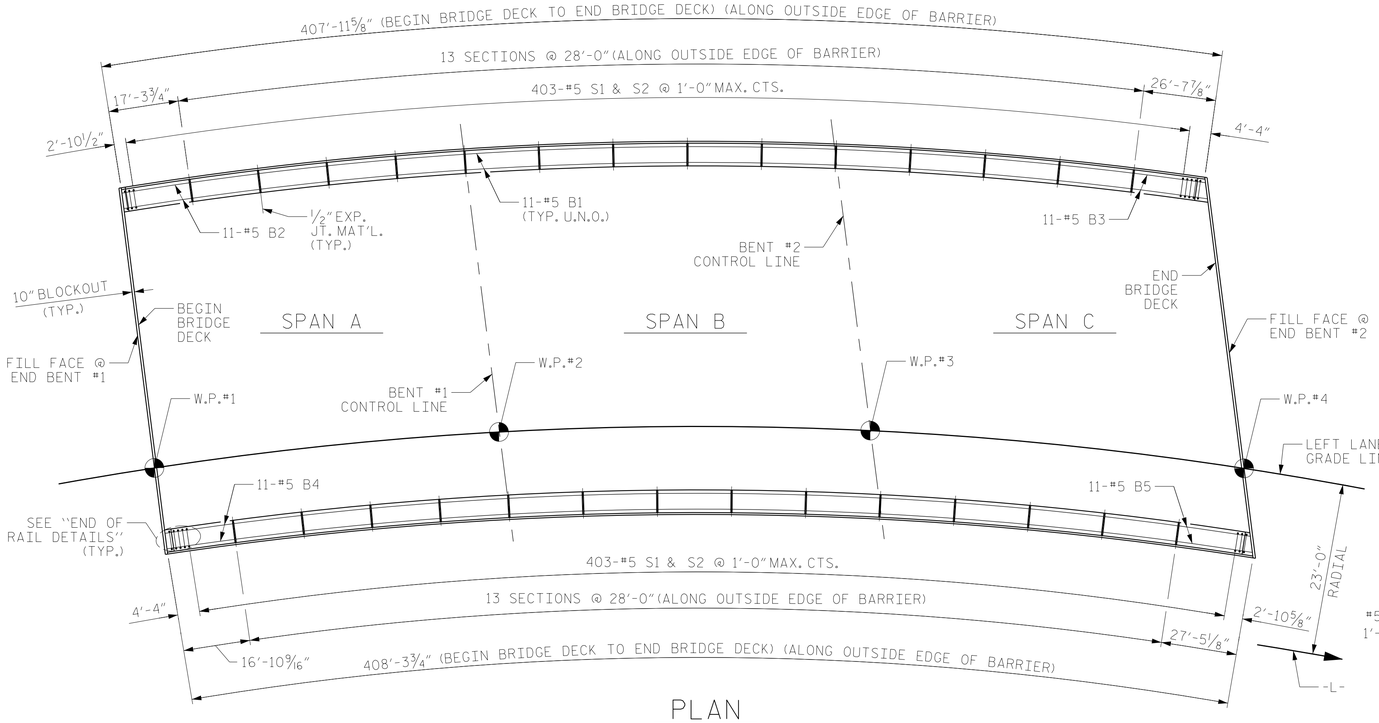


PLAN

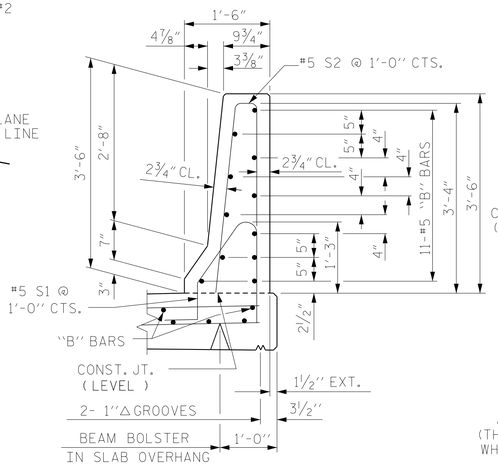
NOTES

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

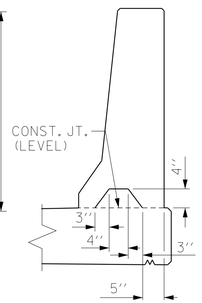
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

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



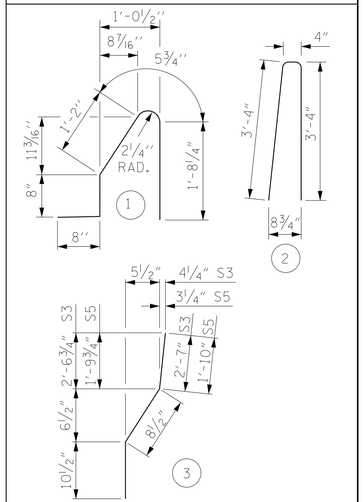
SECTION THRU RAIL



SECTION S-S

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

BAR TYPES



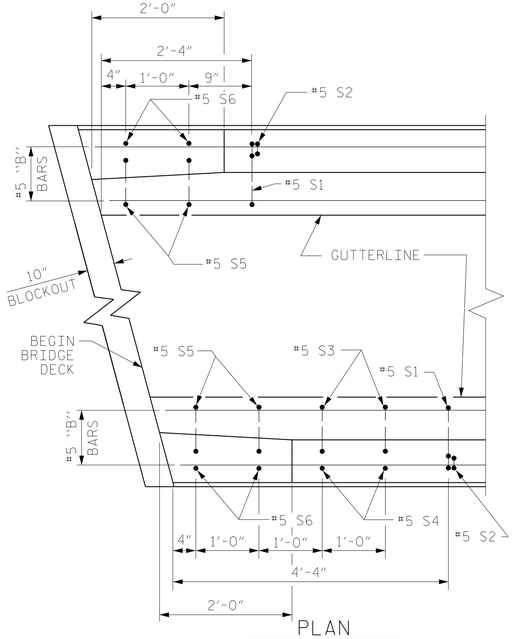
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

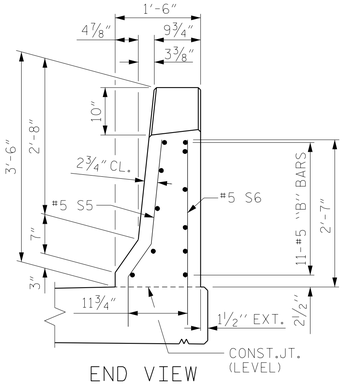
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	286	#5	STR	27'-8"	8253
✳ B2	11	#5	STR	16'-5"	188
✳ B3	11	#5	STR	26'-3"	301
✳ B4	11	#5	STR	16'-6"	189
✳ B5	11	#5	STR	26'-5"	303
✳ S1	806	#5	1	4'-8"	3923
✳ S2	806	#5	2	7'-0"	5885
✳ S3	4	#5	3	4'-2"	17
✳ S4	4	#5	STR	4'-0"	17
✳ S5	8	#5	3	3'-5"	29
✳ S6	8	#5	STR	3'-3"	27

✳ EPOXY COATED REINFORCING STEEL	19,132 LBS.
CLASS AA CONCRETE	111.0 CU. YDS.
CONCRETE BARRIER RAIL	816.3 LIN. FT.

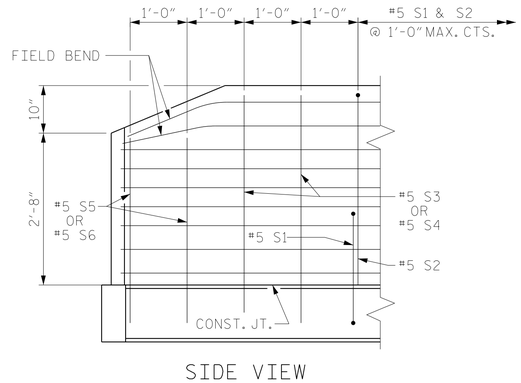


PLAN

BEGIN BRIDGE SHOWN, END BRIDGE SIMILAR



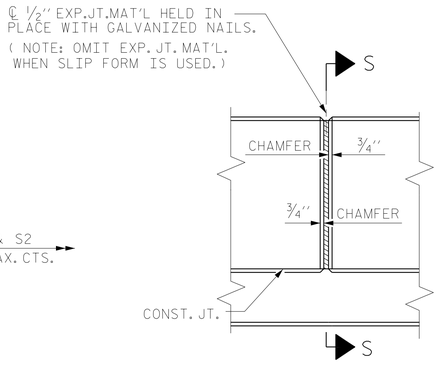
END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

DRAWN BY :	MAL	DATE :	11/2016
CHECKED BY :	JMR	DATE :	11/2016
DESIGN ENGINEER OF RECORD:	MAL	DATE :	11/2016

3/8/2017
\\RALFILE01\Transportation\P\1031709001 R-2707C Bridges\Structures\Working DGN\401_037_R2707C_SMU_BR19_S1-19.dgn
leblancm

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039213 JUSTIN MARK ROBINSON
Designed by: Justin Robinson
3/9/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

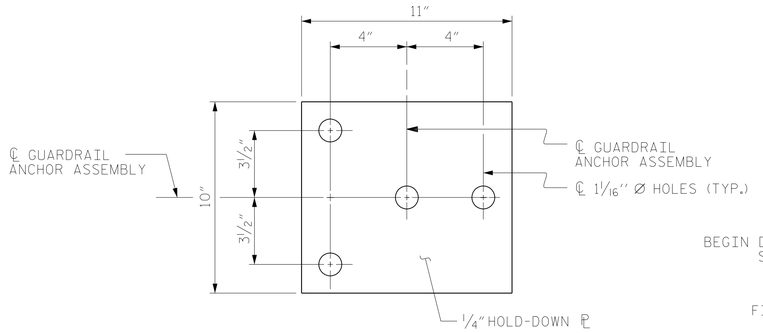
SUPERSTRUCTURE

CONCRETE BARRIER RAIL

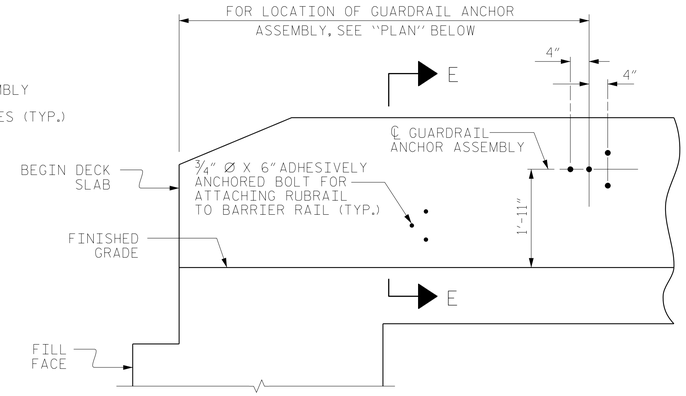
LEFT LANE

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

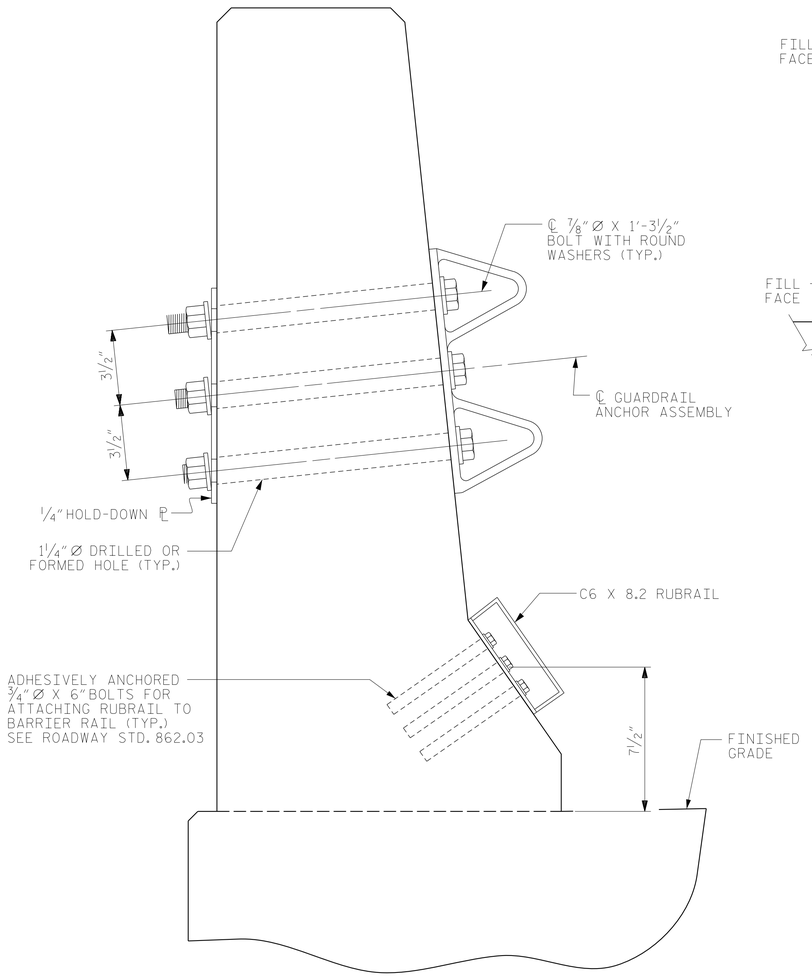
STR. #1



PLAN

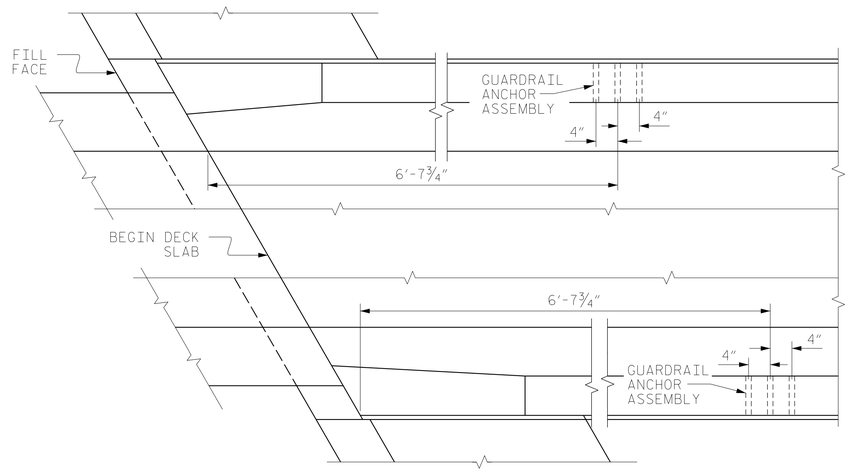


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

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

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

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

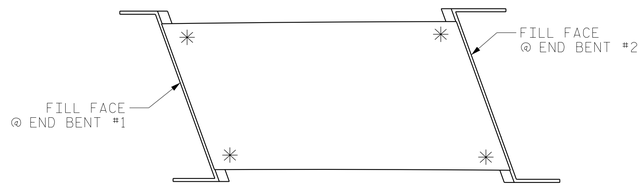
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

ASSEMBLED BY :	MAL	DATE :	11/2016
CHECKED BY :	JMR	DATE :	11/2016
DRAWN BY : TLA	5/06	REV. 10/1/11	MAA/GM
CHECKED BY : GM	5/06	REV. 7/12	MAA/GM
		REV. 6/13	MAA/GM

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3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

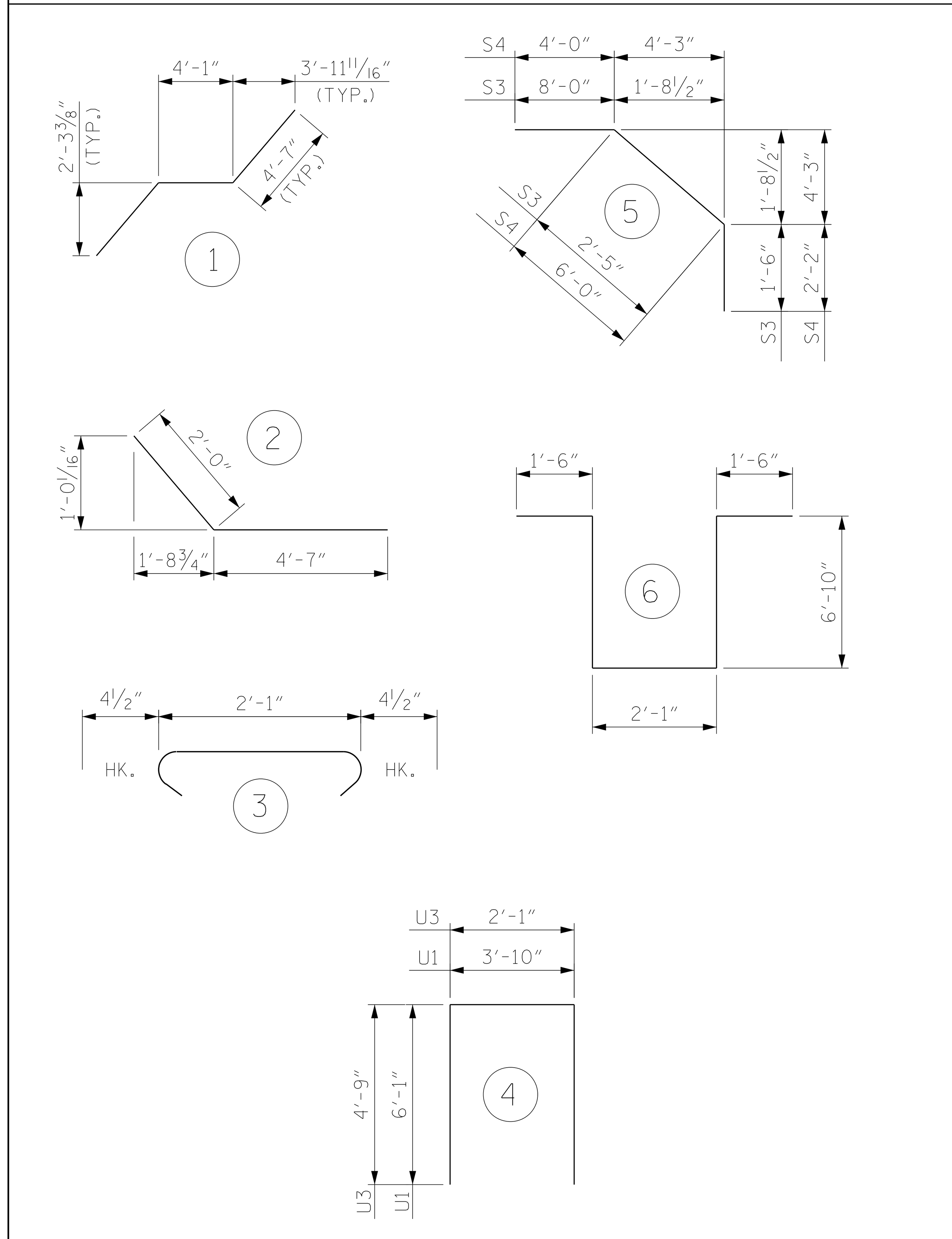
LEFT LANE

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

STD. NO. GRA2

STR. #1

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	669	#5	STR	48'-11"	34132	* A144	1	#5	STR	25'-5"	27	A231	1	#5	STR	46'-2"	48	K4	24	#4	STR	8'-5"	135
A2	669	#5	STR	48'-11"	34132	* A145	1	#5	STR	23'-10"	25	A232	1	#5	STR	44'-7"	47	K5	36	#4	1	13'-3"	319
						* A146	1	#5	STR	22'-3"	23	A233	1	#5	STR	42'-11"	45	K6	24	#4	2	6'-7"	106
* A101	1	#5	STR	47'-9"	50	* A147	1	#5	STR	20'-8"	22	A234	1	#5	STR	41'-4"	43	K7	20	#4	STR	3'-1"	41
* A102	1	#5	STR	46'-1"	48	* A148	1	#5	STR	19'-1"	20	A235	1	#5	STR	39'-9"	41	K8	4	#4	STR	2'-3"	6
* A103	1	#5	STR	44'-6"	46	* A149	1	#5	STR	17'-6"	18	A236	1	#5	STR	38'-2"	40						
* A104	1	#5	STR	42'-10"	45	* A150	1	#5	STR	15'-10"	17	A237	1	#5	STR	36'-7"	38	S1	360	#4	3	2'-10"	681
* A105	1	#5	STR	41'-3"	43	* A151	1	#5	STR	14'-3"	15	A238	1	#5	STR	35'-0"	37	* S3	72	#4	5	11'-11"	573
* A106	1	#5	STR	39'-7"	41	* A152	1	#5	STR	12'-8"	13	A239	1	#5	STR	33'-5"	35	* S4	72	#4	5	12'-2"	585
* A107	1	#5	STR	38'-0"	40	* A153	1	#5	STR	11'-1"	12	A240	1	#5	STR	31'-10"	33						
* A108	1	#5	STR	36'-4"	38	* A154	1	#5	STR	9'-6"	10	A241	1	#5	STR	30'-2"	31	U1	72	#4	4	16'-0"	770
* A109	1	#5	STR	34'-9"	36	* A155	1	#5	STR	7'-11"	8	A242	1	#5	STR	28'-7"	30	U2	56	#4	6	18'-9"	701
* A110	1	#5	STR	33'-1"	35	* A156	1	#5	STR	6'-4"	7	A243	1	#5	STR	27'-0"	28	U3	16	#4	4	11'-7"	124
* A111	1	#5	STR	31'-6"	33	* A157	1	#5	STR	4'-9"	5	A244	1	#5	STR	25'-5"	27						
* A112	1	#5	STR	29'-10"	31	* A158	1	#5	STR	3'-2"	3	A245	1	#5	STR	23'-10"	25						
* A113	1	#5	STR	28'-3"	29							A246	1	#5	STR	22'-3"	23						
* A114	1	#5	STR	26'-7"	28	A201	1	#5	STR	47'-9"	50	A247	1	#5	STR	20'-8"	22						
* A115	1	#5	STR	25'-0"	26	A202	1	#5	STR	46'-1"	48	A248	1	#5	STR	19'-1"	20						
* A116	1	#5	STR	23'-4"	24	A203	1	#5	STR	44'-6"	46	A249	1	#5	STR	17'-6"	18						
* A117	1	#5	STR	21'-9"	23	A204	1	#5	STR	42'-10"	45	A250	1	#5	STR	15'-10"	17						
* A118	1	#5	STR	20'-1"	21	A205	1	#5	STR	41'-3"	43	A251	1	#5	STR	14'-3"	15						
* A119	1	#5	STR	18'-6"	19	A206	1	#5	STR	39'-7"	41	A252	1	#5	STR	12'-8"	13						
* A120	1	#5	STR	16'-10"	18	A207	1	#5	STR	38'-0"	40	A253	1	#5	STR	11'-1"	12						
* A121	1	#5	STR	15'-3"	16	A208	1	#5	STR	36'-4"	38	A254	1	#5	STR	9'-6"	10						
* A122	1	#5	STR	13'-7"	14	A209	1	#5	STR	34'-9"	36	A255	1	#5	STR	7'-11"	8						
* A123	1	#5	STR	12'-0"	13	A210	1	#5	STR	33'-1"	35	A256	1	#5	STR	6'-4"	7						
* A124	1	#5	STR	10'-4"	11	A211	1	#5	STR	31'-6"	33	A257	1	#5	STR	4'-9"	5						
* A125	1	#5	STR	8'-9"	9	A212	1	#5	STR	29'-10"	31	A258	1	#5	STR	3'-2"	3						
* A126	1	#5	STR	7'-1"	7	A213	1	#5	STR	28'-3"	29												
* A127	1	#5	STR	5'-6"	6	A214	1	#5	STR	26'-7"	28	* B1	194	#6	STR	27'-10"	8110						
* A128	1	#5	STR	3'-11"	4	A215	1	#5	STR	25'-0"	26	B2	368	#5	STR	52'-11"	20311						
* A129	1	#5	STR	2'-3"	2	A216	1	#5	STR	23'-4"	24	* B3	147	#4	STR	22'-0"	2160						
* A130	1	#5	STR	47'-8"	50	A217	1	#5	STR	21'-9"	23	* B4	98	#7	STR	60'-0"	12019						
* A131	1	#5	STR	46'-2"	48	A218	1	#5	STR	20'-1"	21	* B5	48	#7	STR	40'-6"	3974						
* A132	1	#5	STR	44'-7"	47	A219	1	#5	STR	18'-6"	19	* B6	49	#7	STR	36'-3"	3631						
* A133	1	#5	STR	42'-11"	45	A220	1	#5	STR	16'-10"	18	B7	36	#5	STR	40'-6"	1521						
* A134	1	#5	STR	41'-4"	43	A221	1	#5	STR	15'-3"	16	B8	36	#5	STR	42'-0"	1577						
* A135	1	#5	STR	39'-9"	41	A222	1	#5	STR	13'-7"	14	* B9	98	#4	STR	26'-0"	1702						
* A136	1	#5	STR	38'-2"	40	A223	1	#5	STR	12'-0"	13	* B10	147	#4	STR	24'-3"	2381						
* A137	1	#5	STR	36'-7"	38	A224	1	#5	STR	10'-4"	11	* B11	48	#7	STR	42'-0"	4121						
* A138	1	#5	STR	35'-0"	37	A225	1	#5	STR	8'-9"	9	* B12	30	#4	STR	29'-3"	586						
* A139	1	#5	STR	33'-5"	35	A226	1	#5	STR	7'-1"	7	* B13	49	#7	STR	39'-3"	3931						
* A140	1	#5	STR	31'-10"	33	A227	1	#5	STR	5'-6"	6												
* A141	1	#5	STR	30'-2"	31	A228	1	#5	STR	3'-11"	4	K1	28	#4	STR	28'-3"	528						
* A142	1	#5	STR	28'-7"	30	A229	1	#5	STR	2'-3"	2	K2	120	#4	STR	10'-1"	808						
* A143	1	#5	STR	27'-0"	28	A230	1	#5	STR	47'-8"	50	K3	8	#4	STR	6'-11"	37						

REINFORCING STEEL	63,324 LBS.
* EPOXY COATED REINFORCING STEEL	79,432 LBS.

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	2,122	SQ.FT.
BRIDGE DECK	17,550	SQ.FT.
TOTAL	19,672	SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	194.3		
POUR 2	260.1		
POUR 3	260.1		
POUR 4	114.6		
TOTALS**	829.1	63,324 LBS.	79,432 LBS.

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

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

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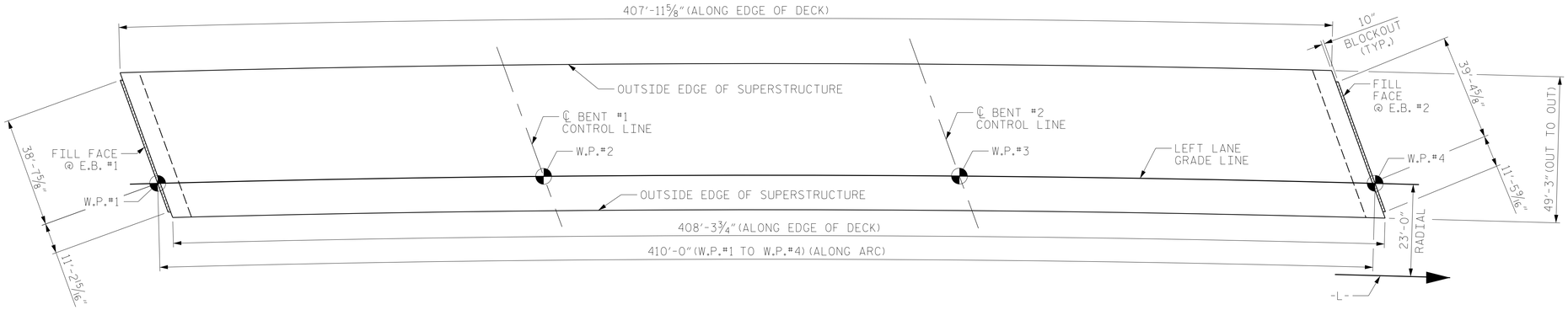
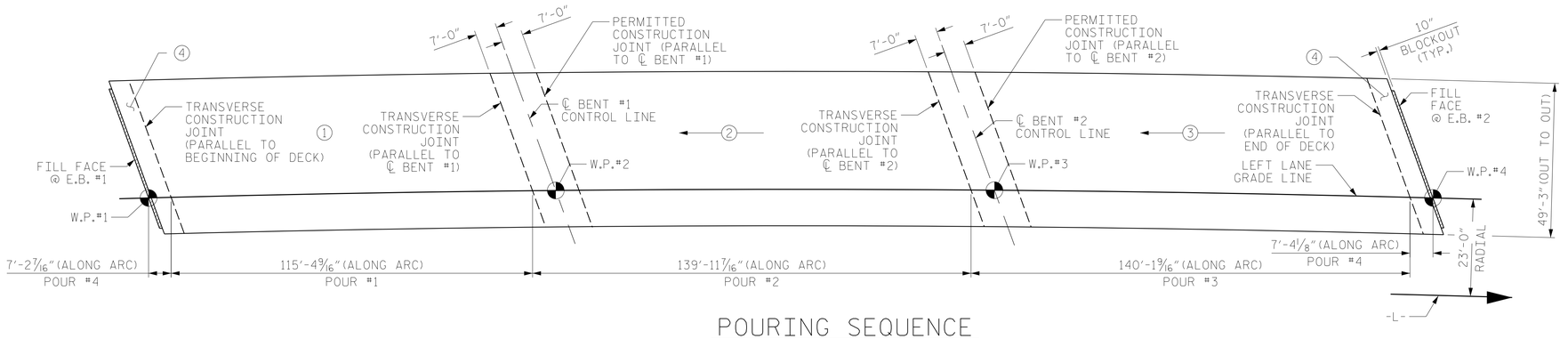
NOTE: BENT & INTEGRAL END BENT DIAPHRAGMS ARE PART OF SUPERSTRUCTURE POUR.

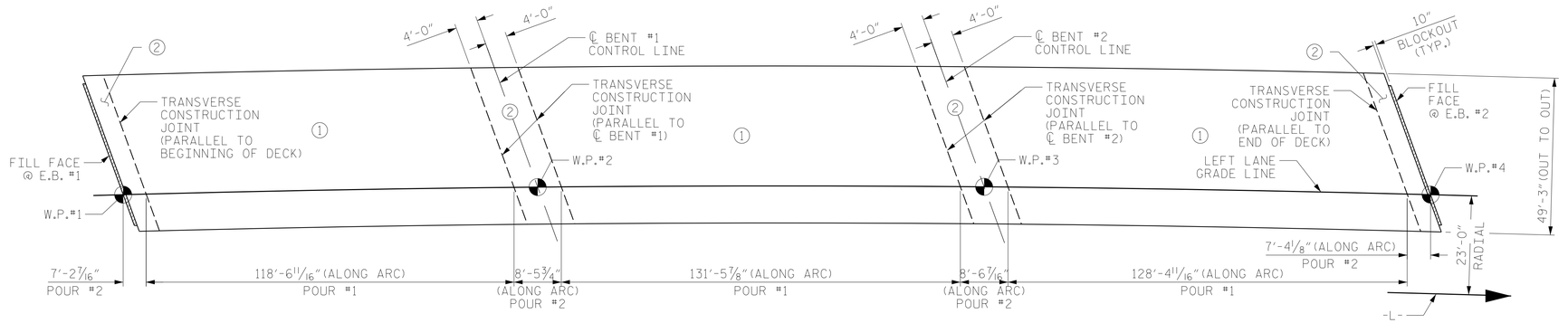


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 20,101)

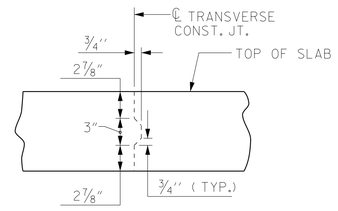


POURING SEQUENCE



OPTIONAL POURING SEQUENCE

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



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039213 ENGINEER JUSTIN MARK ROBINSON
Digitally signed by Justin Robinson
DN: cn=Justin Robinson, o=RS&H, ou=ENGINEERING, email=justin.robinson@rsandh.com, c=US
3/9/2017

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SUPERSTRUCTURE

BILL OF MATERIAL

LEFT LANE

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STR. #1

NOTES:

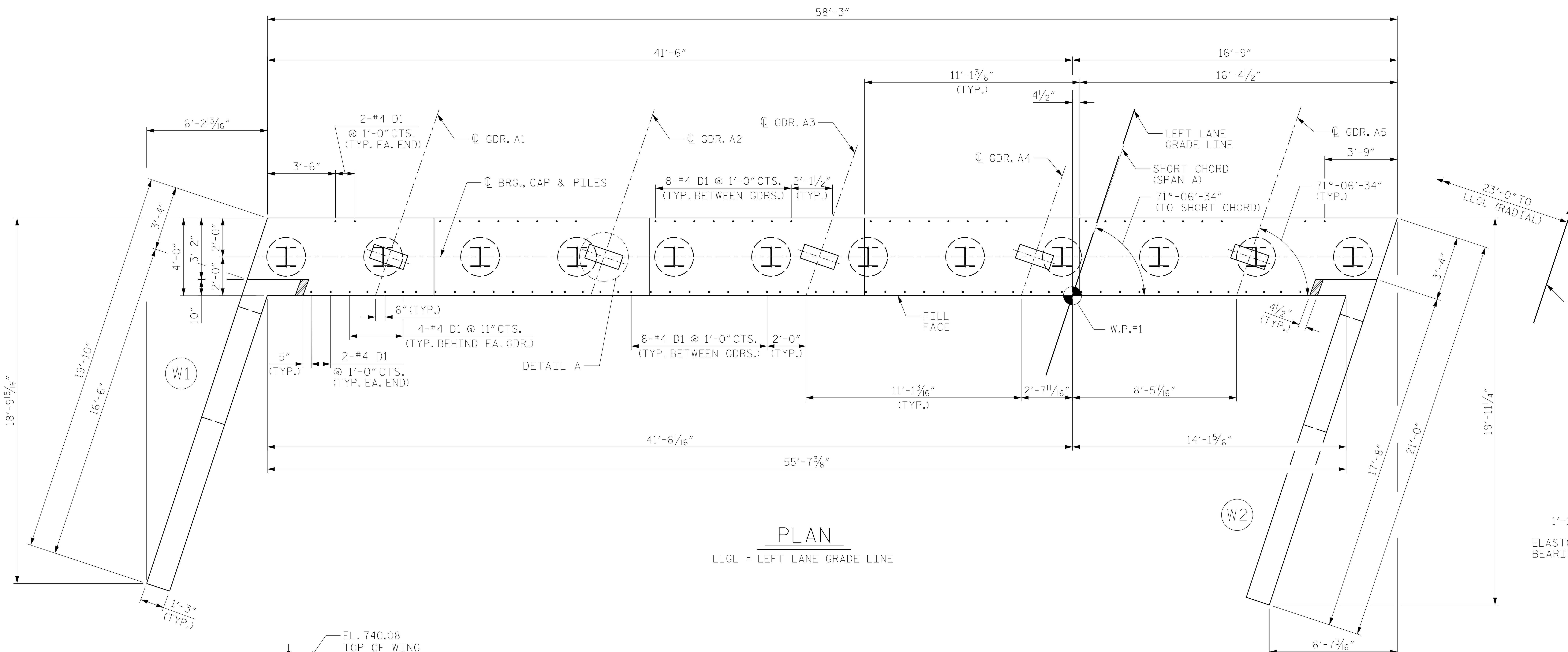
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

STIRRUPS MAY BE SHIFTED SLIGHTLY TO AVOID #4 D1 BARS IN CAP.

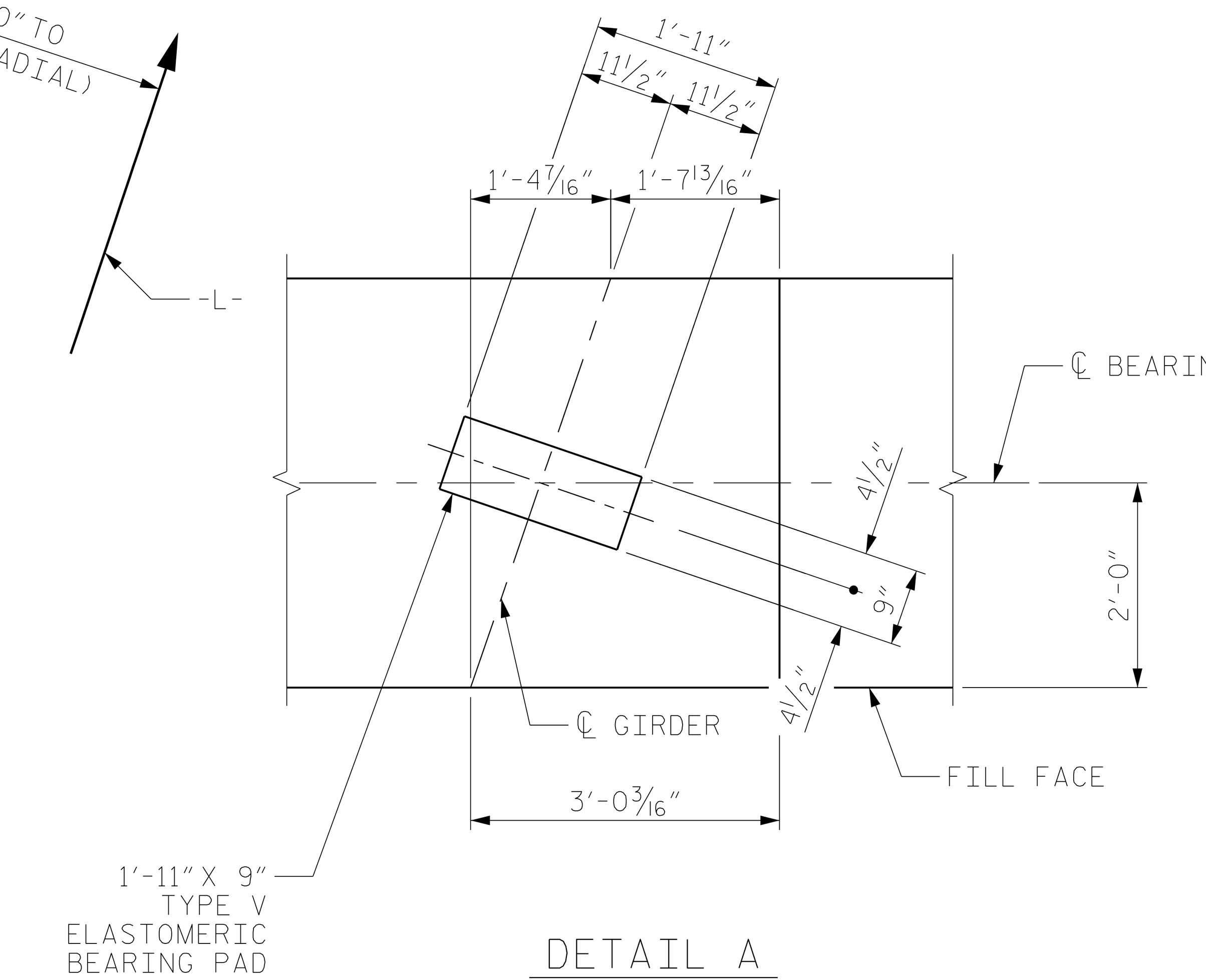
SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

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



PLAN

LLGL = LEFT LANE GRADE LINE

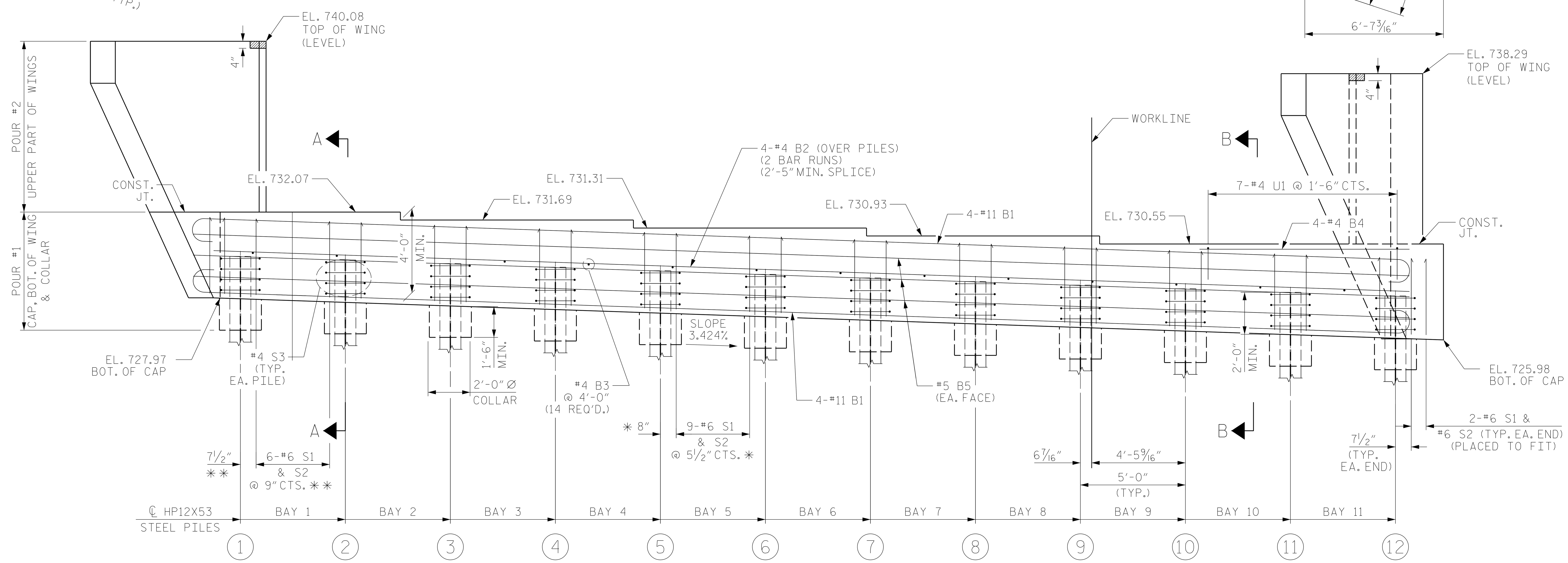


DETAIL A

DIMENSIONS TYP. EA. BRG.
PILE NOT SHOWN FOR CLARITY

TOP OF PILE ELEVATIONS

PILE	ELEVATION
1	729.96
2	729.79
3	729.62
4	729.45
5	729.27
6	729.10
7	728.93
8	728.76
9	728.59
10	728.42
11	728.25
12	728.08



ELEVATION

* = TYPICAL BAY 4 THRU BAY 8
** = TYPICAL BAY 1 THRU BAY 3 AND BAY 9 THRU BAY 11

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CLEVELAND COUNTY
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SHEET 1 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 034893 JUSTIN MARK ROBINSON 3/9/2017

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SUBSTRUCTURE

INTEGRAL END BENT NO. 1
LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-23
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STR. #1

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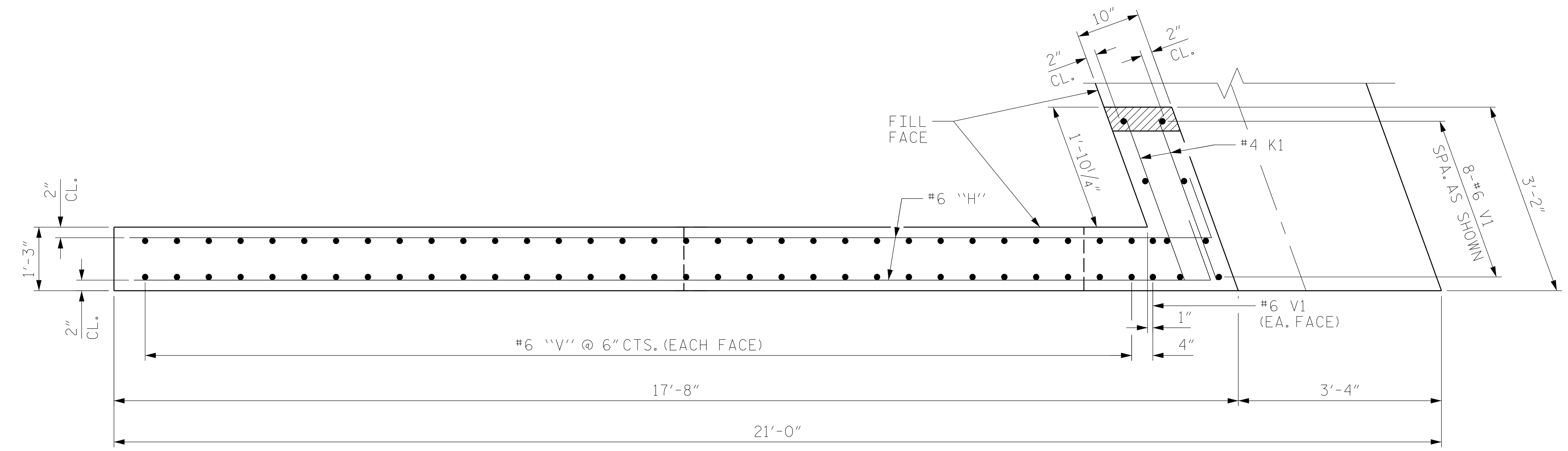
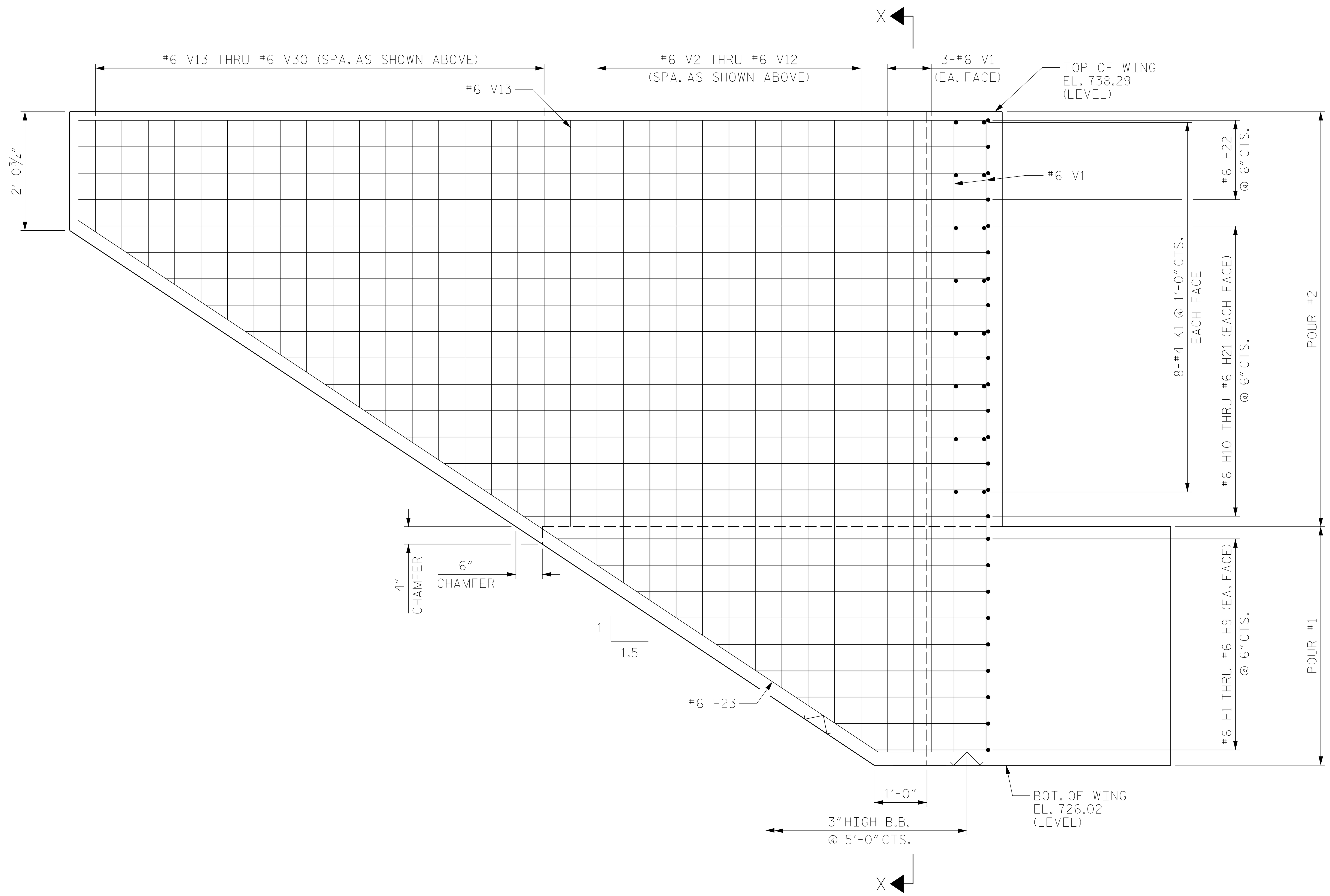
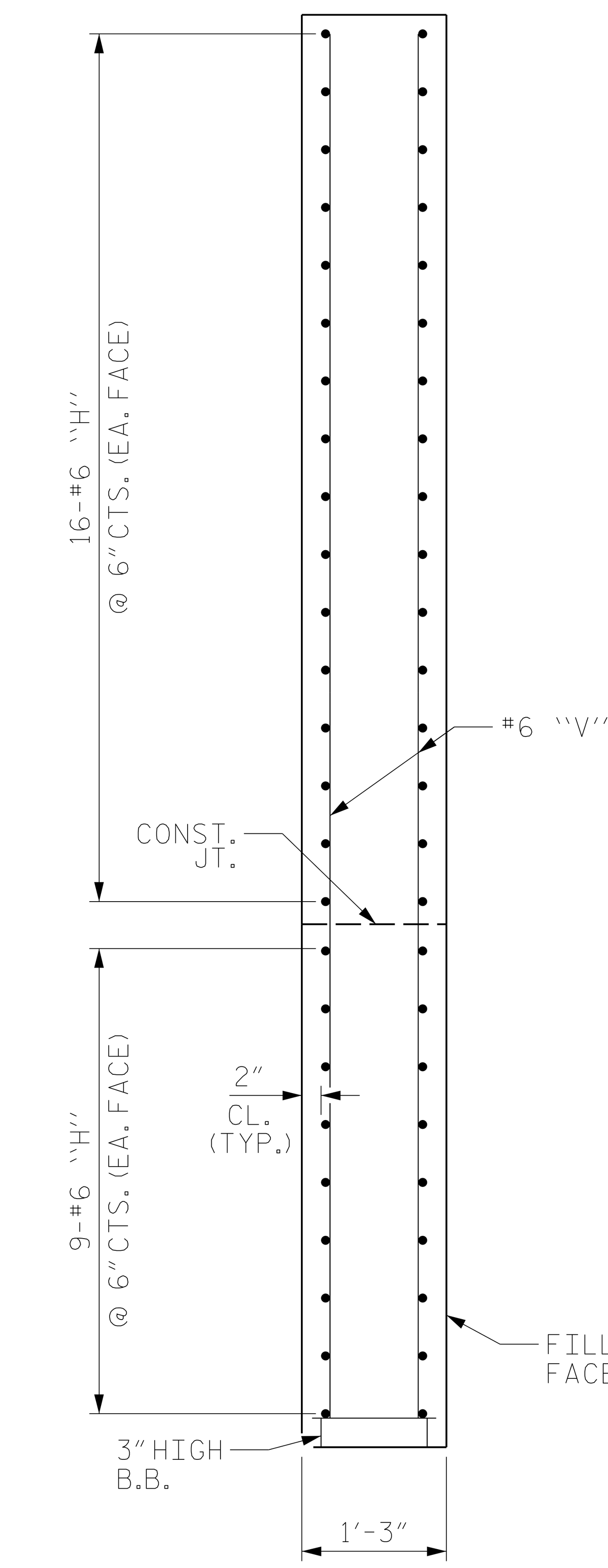


PLAN OF WING - W2



ELEVATION OF WING - W2



SECTION X-X

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL
END BENT NO. 1

LEFT LANE

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2			4				

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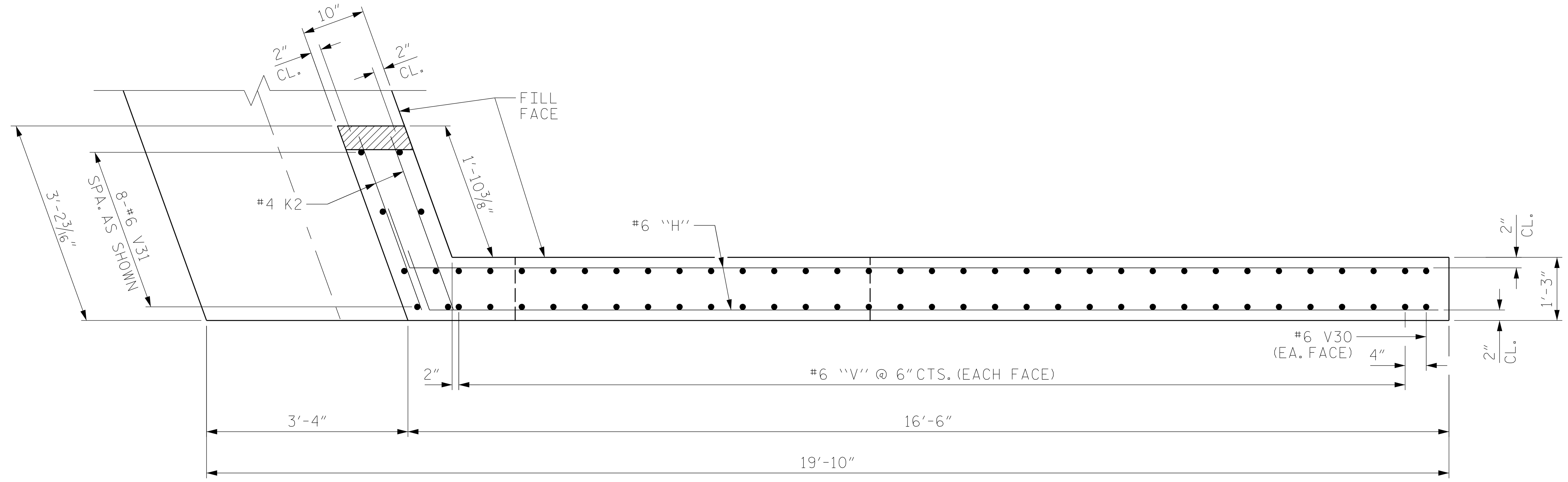
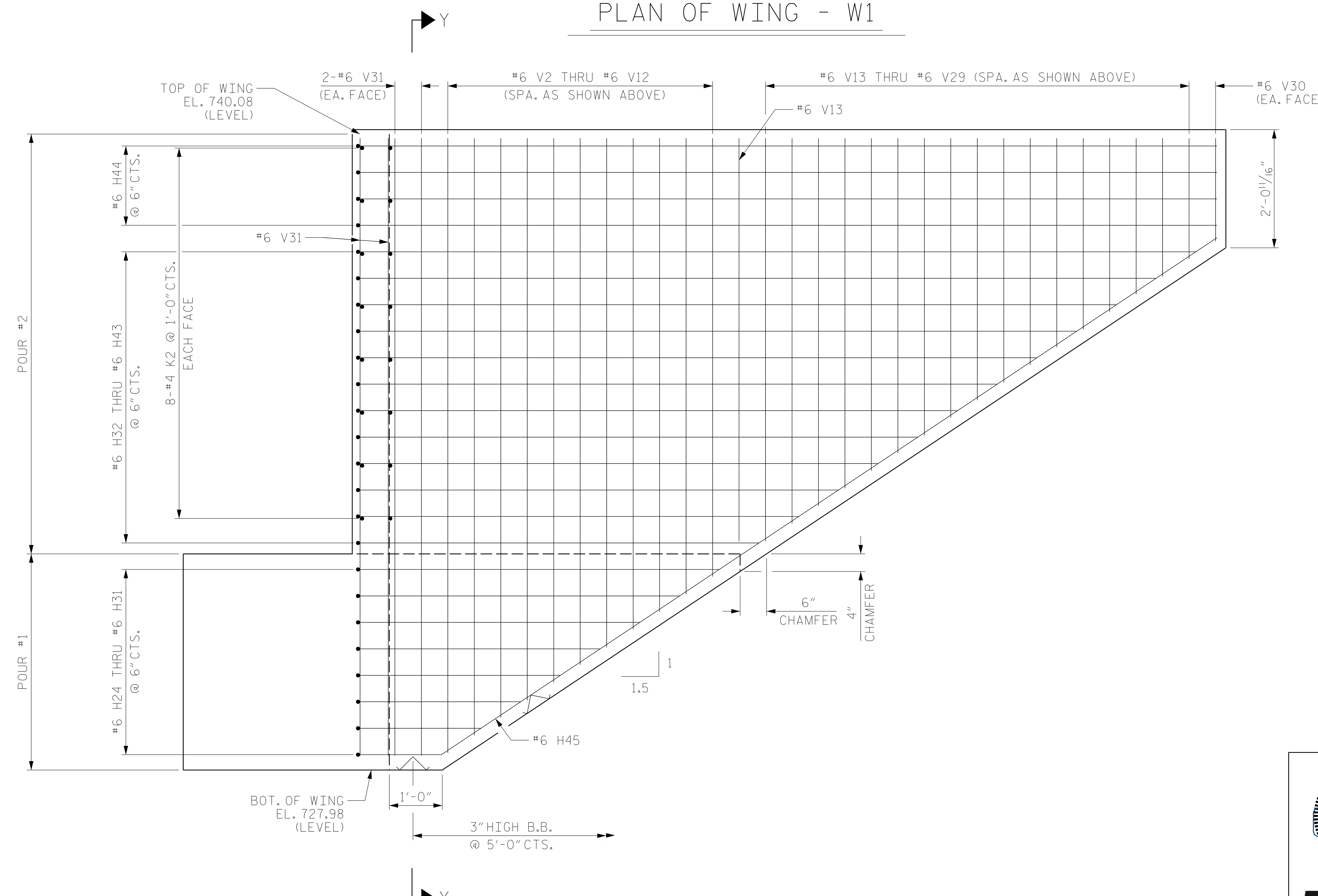
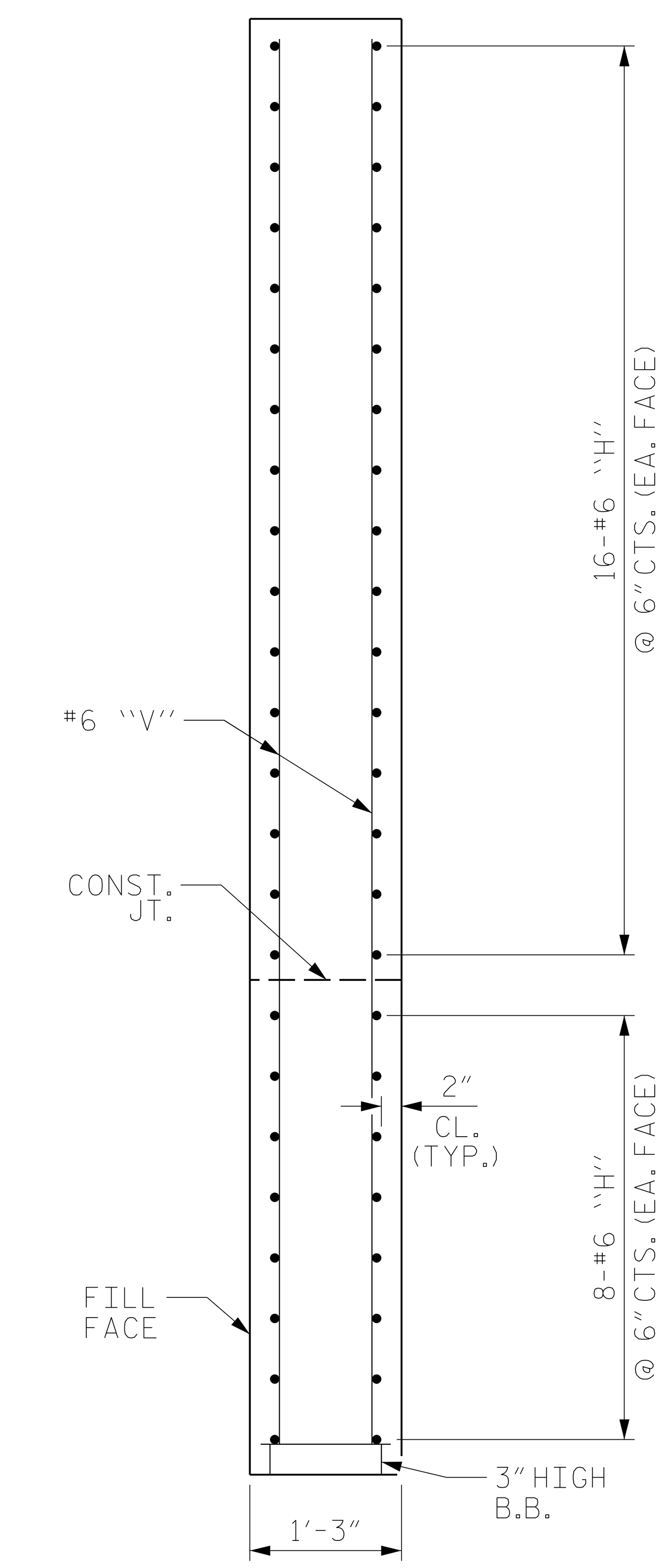


PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — MARK ROBINSON — 3/9/2017

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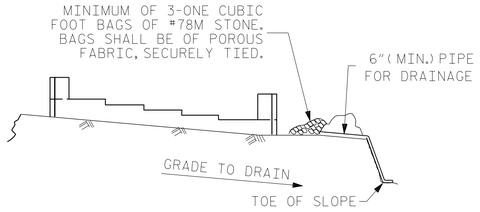
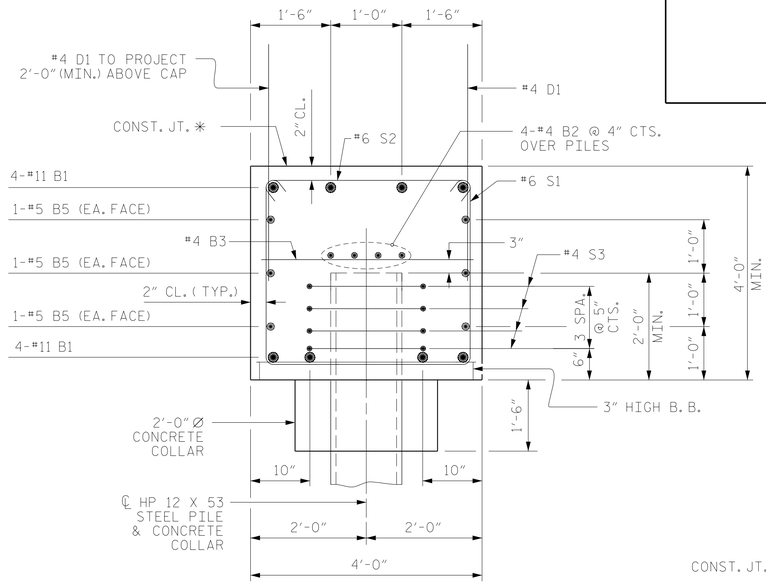


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

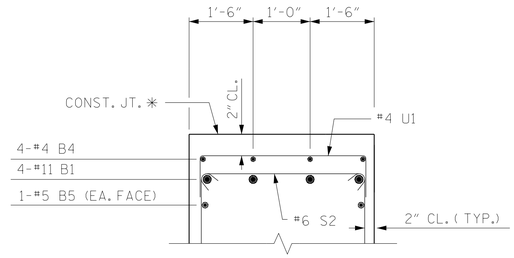
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



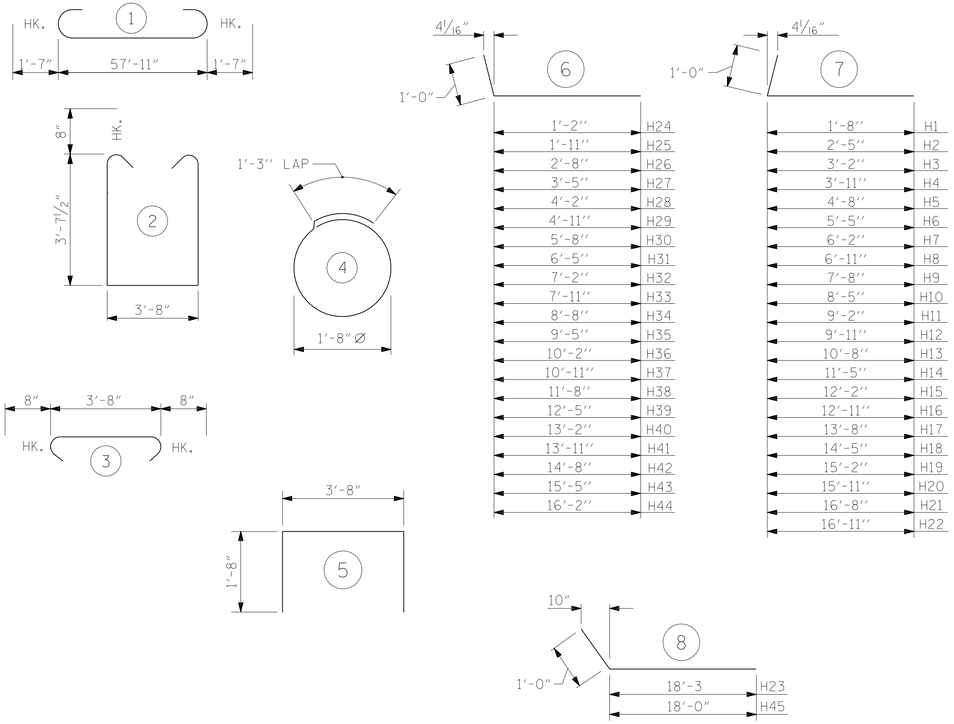
SECTION A-A

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



PARTIAL SECTION B-B

BAR TYPES



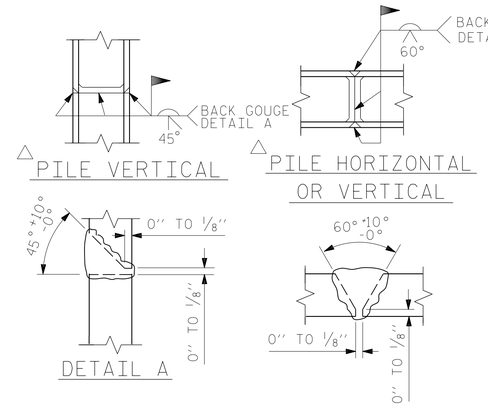
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT NO. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	61'-1"	2596	H42	2	#6	6	15'-8"	47
B2	8	#4	STR	29'-0"	155	H43	2	#6	6	16'-5"	49
B3	14	#4	STR	3'-8"	34	H44	8	#6	6	17'-2"	206
B4	4	#4	STR	10'-0"	27	H45	2	#6	8	19'-0"	57
B5	6	#5	STR	57'-11"	362						
						K1	16	#4	STR	2'-8"	29
D1	92	#4	STR	4'-0"	246	K2	16	#4	STR	2'-8"	29
H1	2	#6	7	2'-8"	8	S1	85	#6	2	12'-3"	1564
H2	2	#6	7	3'-5"	10	S2	85	#6	3	5'-0"	638
H3	2	#6	7	4'-2"	13	S3	48	#4	4	6'-6"	208
H4	2	#6	7	4'-11"	15						
H5	2	#6	7	5'-8"	17	U1	7	#4	5	7'-0"	33
H6	2	#6	7	6'-5"	19						
H7	2	#6	7	7'-2"	22	V1	14	#6	STR	11'-11"	251
H8	2	#6	7	7'-11"	24	V2	4	#6	STR	11'-7"	70
H9	2	#6	7	8'-8"	26	V3	4	#6	STR	11'-3"	68
H10	2	#6	7	9'-5"	28	V4	4	#6	STR	10'-11"	66
H11	2	#6	7	10'-2"	31	V5	4	#6	STR	10'-7"	64
H12	2	#6	7	10'-11"	33	V6	4	#6	STR	10'-3"	62
H13	2	#6	7	11'-8"	35	V7	4	#6	STR	9'-11"	60
H14	2	#6	7	12'-5"	37	V8	4	#6	STR	9'-7"	58
H15	2	#6	7	13'-2"	40	V9	4	#6	STR	9'-3"	56
H16	2	#6	7	13'-11"	42	V10	4	#6	STR	8'-11"	54
H17	2	#6	7	14'-8"	44	V11	4	#6	STR	8'-7"	52
H18	2	#6	7	15'-5"	46	V12	4	#6	STR	8'-3"	50
H19	2	#6	7	16'-2"	49	V13	8	#6	STR	7'-7"	91
H20	2	#6	7	16'-11"	51	V14	4	#6	STR	7'-3"	44
H21	2	#6	7	17'-8"	53	V15	4	#6	STR	6'-11"	42
H22	8	#6	7	17'-11"	215	V16	4	#6	STR	6'-7"	40
H23	2	#6	8	19'-3"	58	V17	4	#6	STR	6'-3"	38
H24	2	#6	6	2'-2"	7	V18	4	#6	STR	5'-11"	36
H25	2	#6	6	2'-11"	9	V19	4	#6	STR	5'-7"	34
H26	2	#6	6	3'-8"	11	V20	4	#6	STR	5'-3"	32
H27	2	#6	6	4'-5"	13	V21	4	#6	STR	4'-11"	30
H28	2	#6	6	5'-2"	16	V22	4	#6	STR	4'-7"	28
H29	2	#6	6	5'-11"	18	V23	4	#6	STR	4'-3"	26
H30	2	#6	6	6'-8"	20	V24	4	#6	STR	3'-11"	24
H31	2	#6	6	7'-5"	22	V25	4	#6	STR	3'-7"	22
H32	2	#6	6	8'-2"	25	V26	4	#6	STR	3'-3"	20
H33	2	#6	6	8'-11"	27	V27	4	#6	STR	2'-11"	18
H34	2	#6	6	9'-8"	29	V28	4	#6	STR	2'-7"	16
H35	2	#6	6	10'-5"	31	V29	4	#6	STR	2'-3"	14
H36	2	#6	6	11'-2"	34	V30	4	#6	STR	2'-0"	12
H37	2	#6	6	11'-11"	36	V31	12	#6	STR	11'-8"	210
H38	2	#6	6	12'-8"	38						
H39	2	#6	6	13'-5"	40						
H40	2	#6	6	14'-2"	43						
H41	2	#6	6	14'-11"	45						

PILE DRIVING EQUIPMENT SETUP	NO. 12
REINFORCING STEEL	9,348 LBS.
CLASS A CONCRETE	
POUR #1	
CAP, CONCRETE COLLARS & LOWER PART OF WINGS	40.9 C.Y.
POUR #2	
UPPER PART OF WINGS	11.3 C.Y.
TOTAL	52.2 C.Y.
HP 12 X 53 STEEL PILES	
NO. 12	480 LIN. FT.
STEEL PILE POINTS	NO.: 12



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

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RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

LEFT LANE

REVISIONS						SHEET NO.
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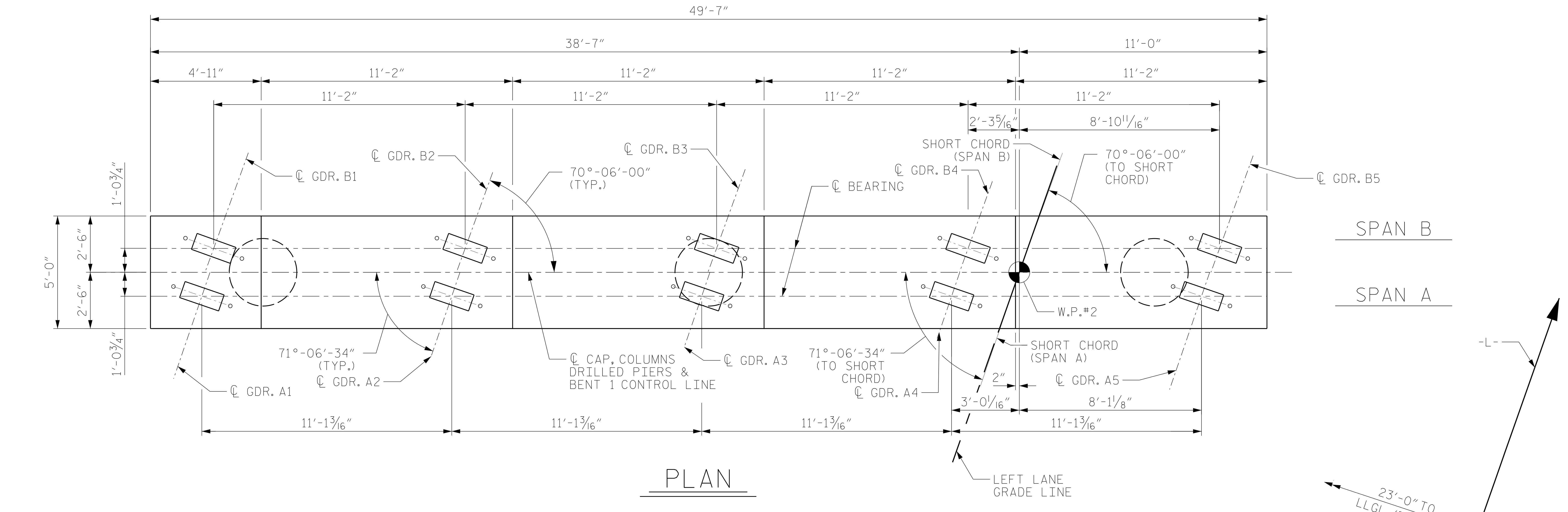
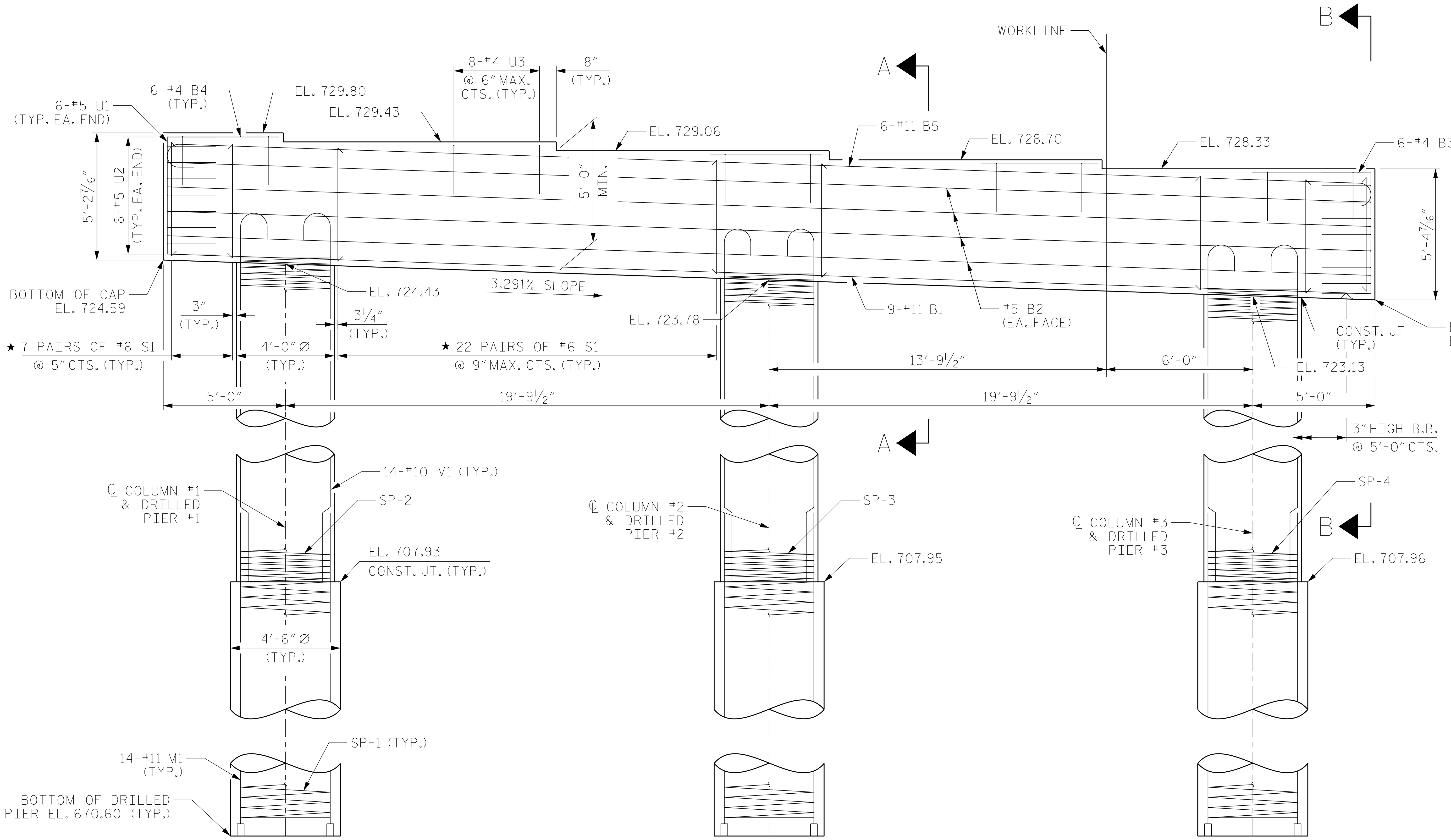


PLAN



ELEVATION

NOTES:

FOR SECTION A-A AND VIEW B-B, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

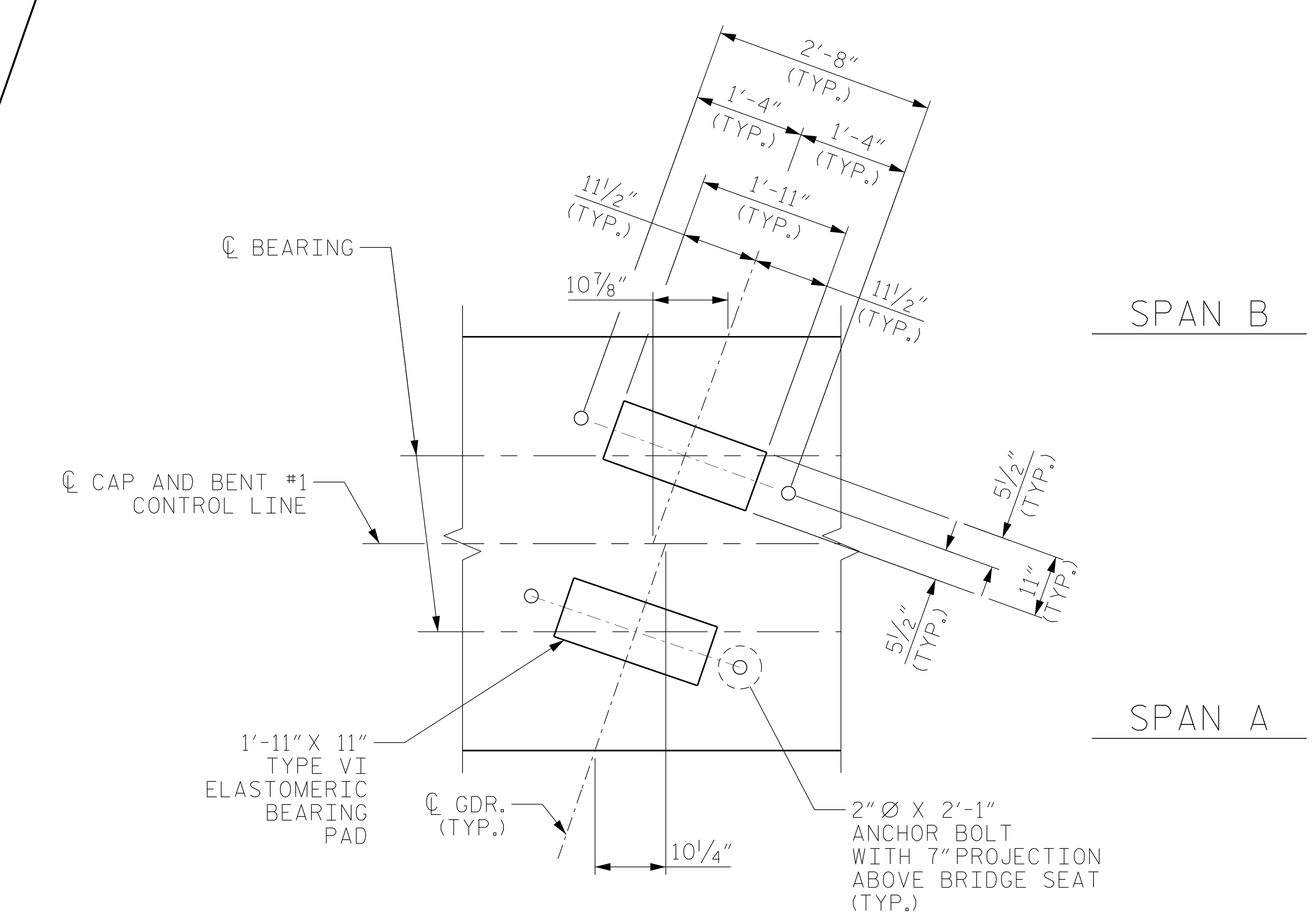
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE #6 S1 STIRRUP PAIRS.

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

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

LLGL = LEFT LANE GRADE LINE



DETAIL A

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1

LEFT LANE

3/9/2017

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2			4		

SHEET NO. S1-27
TOTAL SHEETS 36

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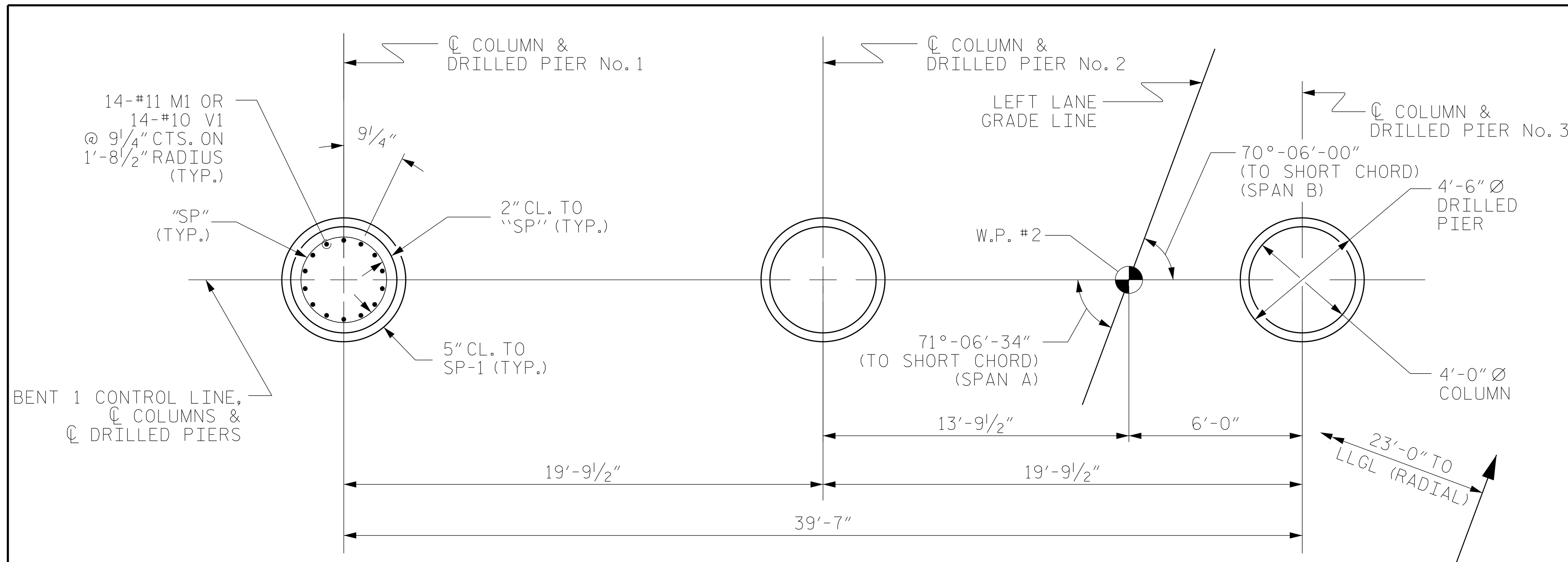
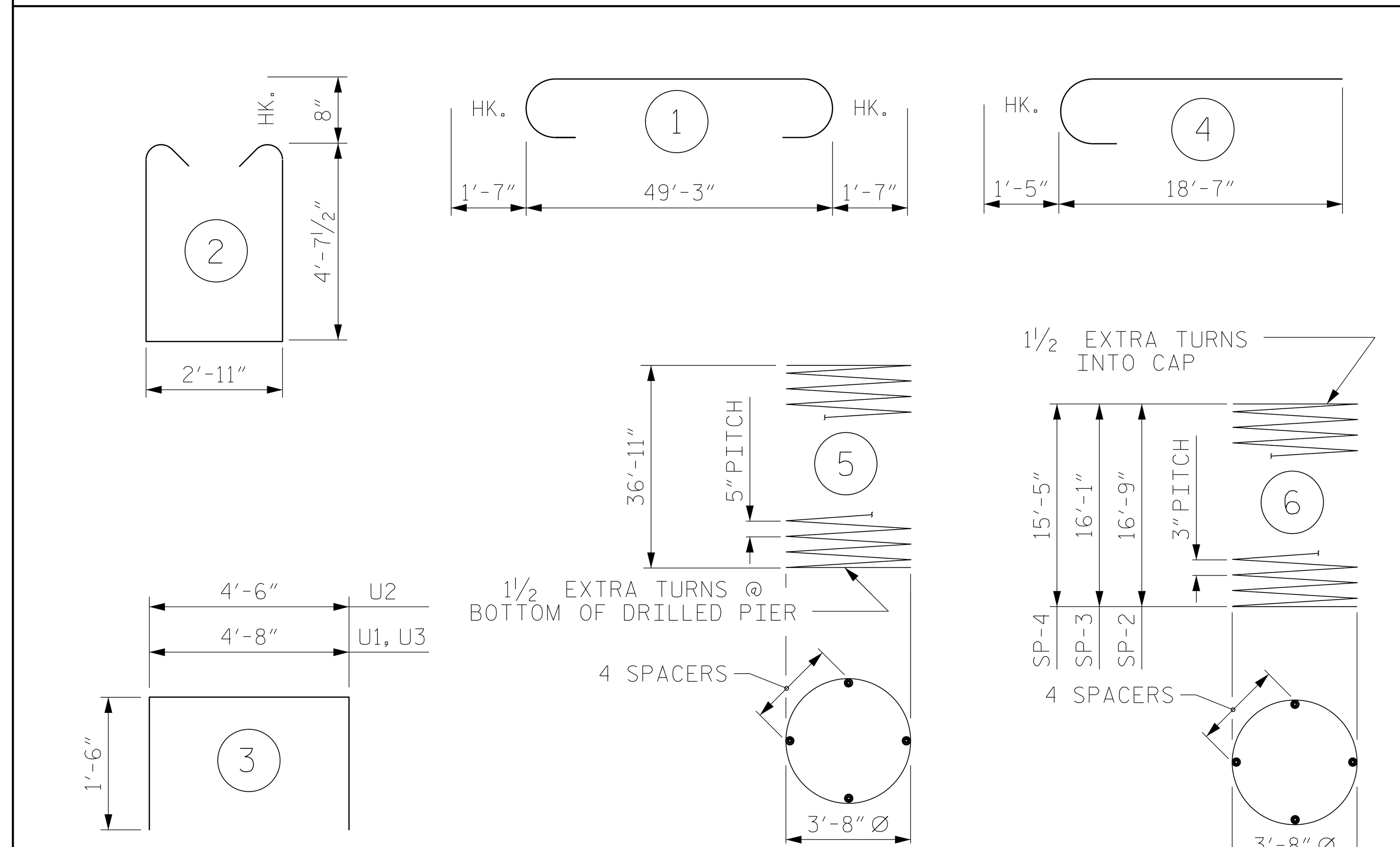


PLAN OF DRILLED PIERS & COLUMNS

LLGL = LEFT LANE GRADE LINE

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL FOR BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#11	STR	49'-3"	2355
B2	8	#5	STR	49'-3"	411
B3	6	#4	STR	6'-0"	24
B4	30	#4	STR	4'-7"	92
B5	6	#11	1	52'-5"	1671
M1	42	#11	STR	47'-3"	10544
S1	116	#6	2	13'-6"	2352
U1	12	#5	3	7'-8"	96
U2	12	#5	3	7'-6"	94
U3	40	#4	3	7'-8"	205
V1	42	#10	4	20'-0"	3615
REINFORCING STEEL (FOR BENT 1)					21,459 LBS.
SP-1	3	**	5	1022'-9"	3200
SP-2	1	*	6	778'-1"	520
SP-3	1	*	6	751'-10"	502
SP-4	1	*	6	718'-5"	480
SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1)					4,702 LBS.

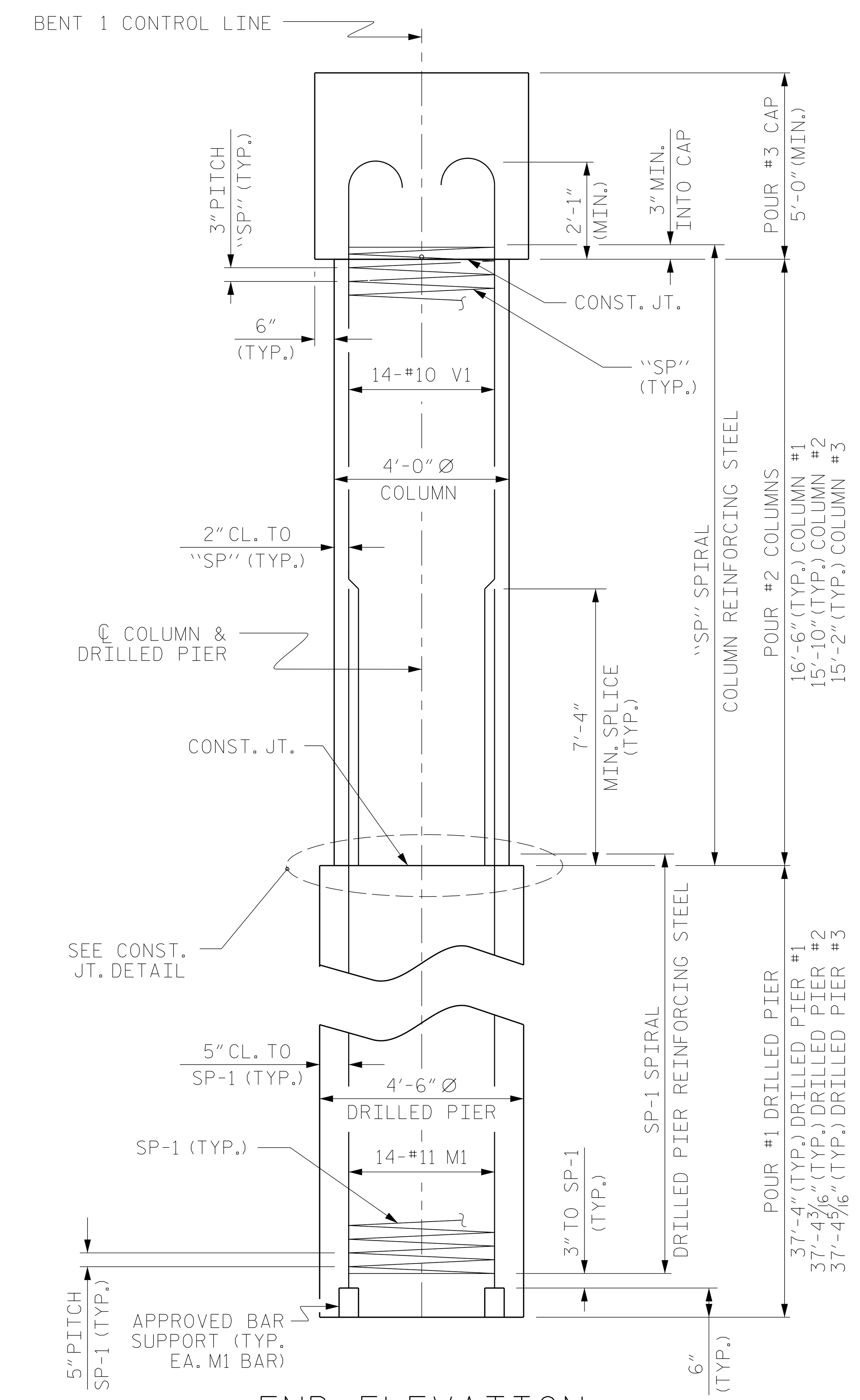
** THE "SP" SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

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

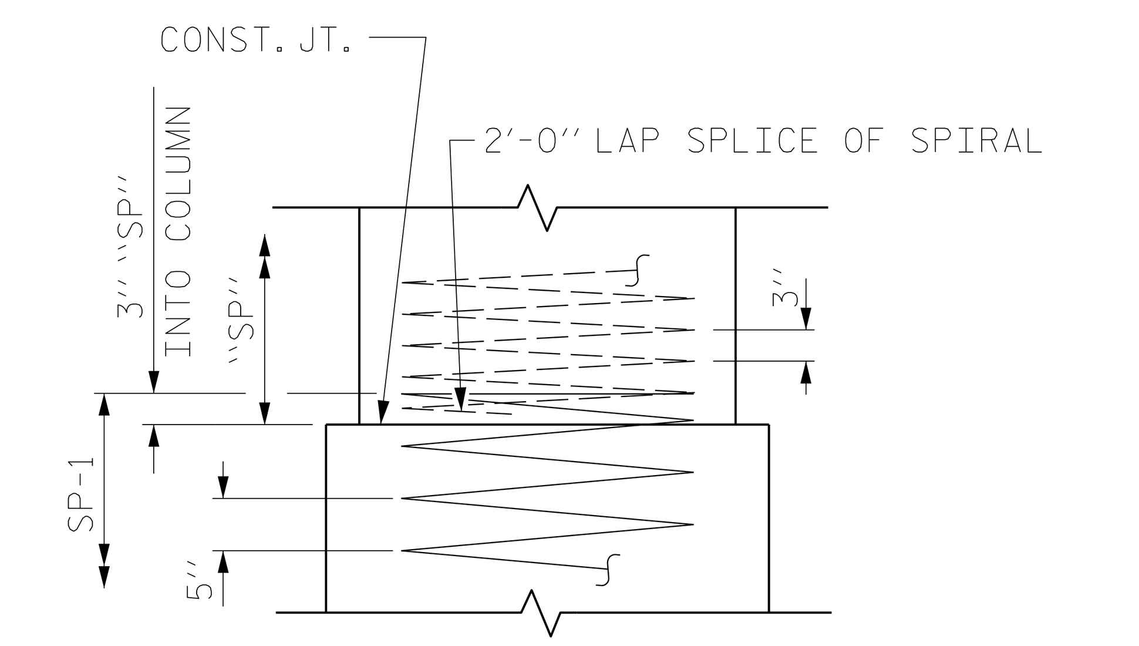
CLASS A CONCRETE BREAKDOWN (FOR BENT 1)	
POUR #2 (COLUMNS)	22.1 C.Y.
POUR #3 (CAP)	47.7 C.Y.
TOTAL CLASS A CONCRETE	69.8 C.Y.

DRILLED PIERS: (FOR BENT 1)	
DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	66.0 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	27.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	85.0 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIER	54 LIN. FT.
△ CSL TUBES	466.0 LIN. FT.

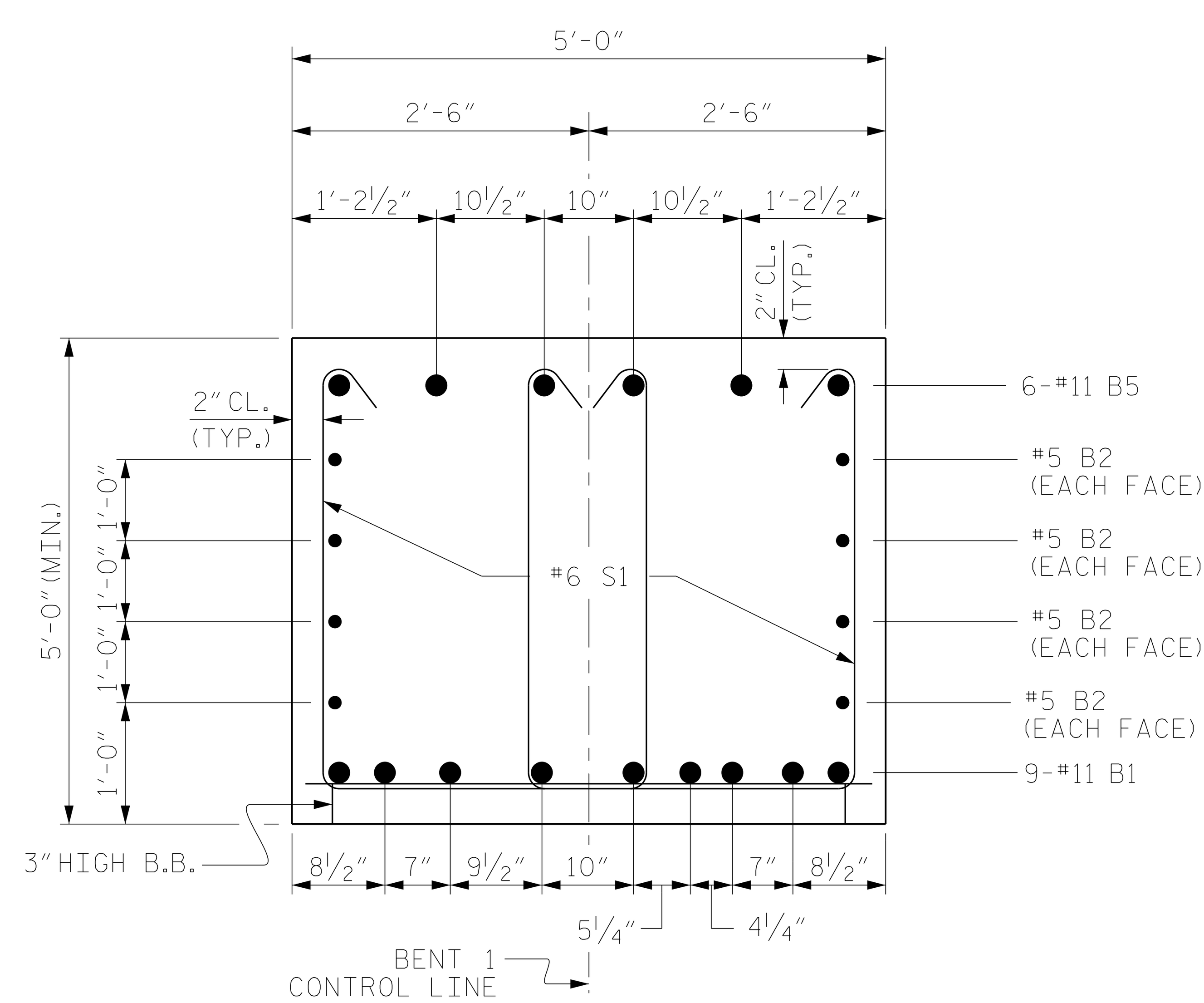
△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.



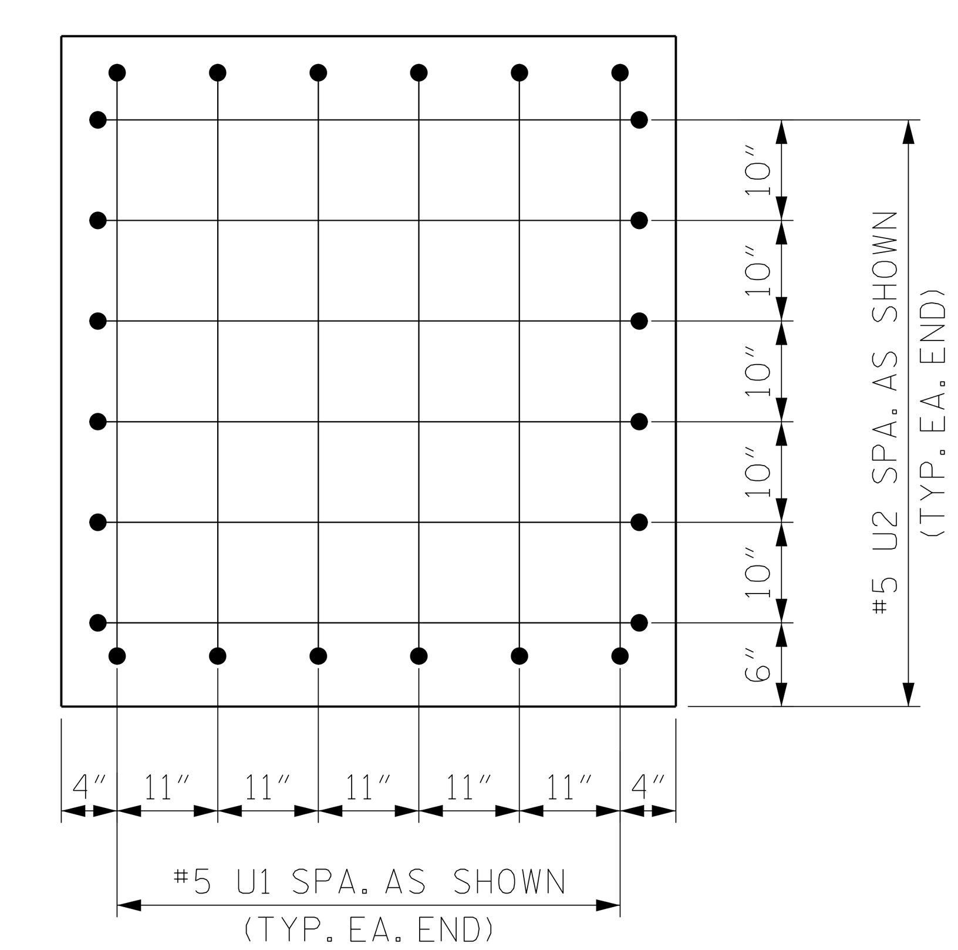
END ELEVATION



CONSTRUCTION JOINT DETAIL

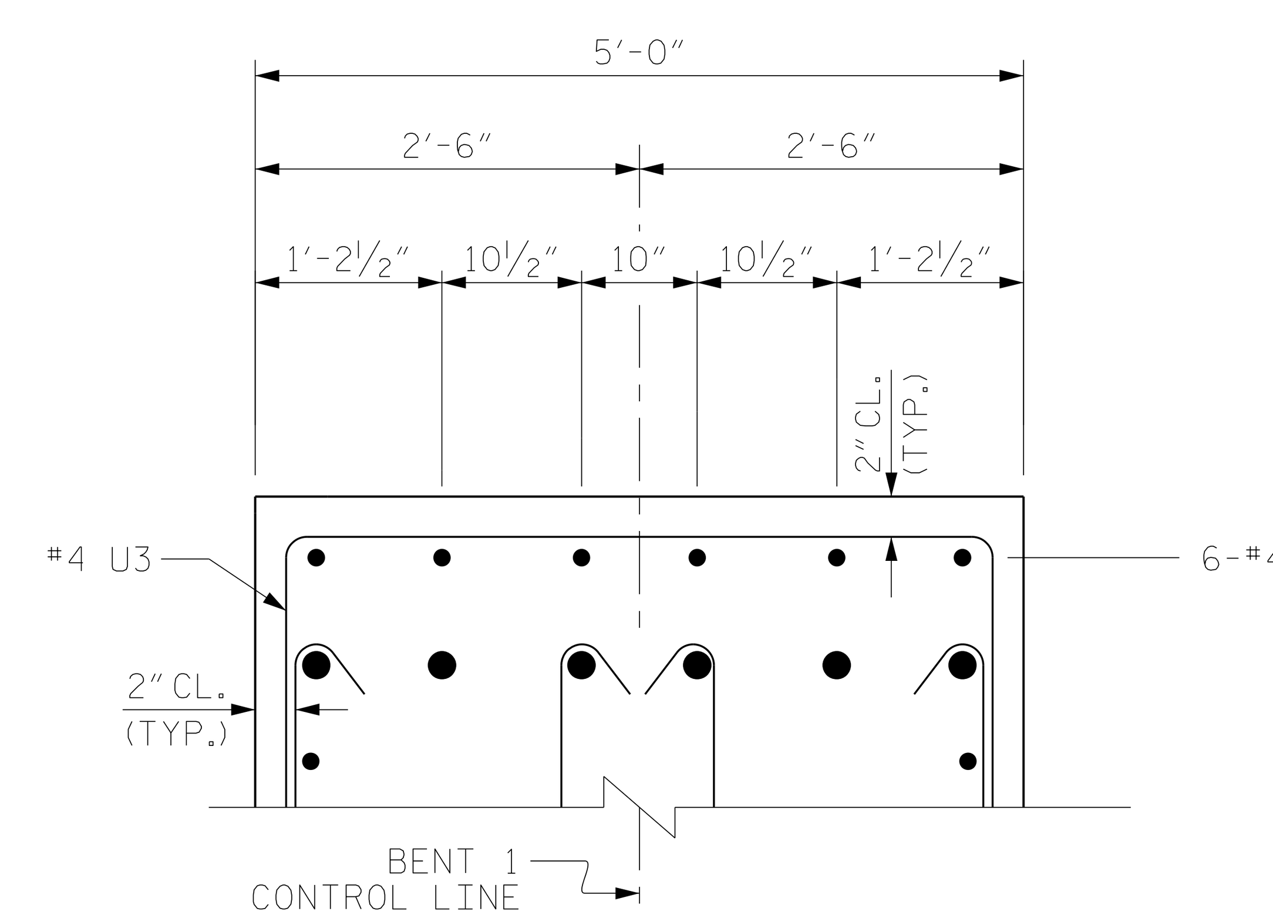


SECTION A-A



END OF CAP VIEW

(TYPICAL BOTH ENDS)



VIEW B-B

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1 DETAILS

LEFT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — MARK ROBINSON

3/21/2017

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

SHEET NO. S1-28
TOTAL SHEETS 36

DRAWN BY :	MAL	DATE :	11/2016
CHECKED BY :	JMR	DATE :	12/2016
DESIGN ENGINEER OF RECORD:	MAL	DATE :	11/2016

STR. #1

3/21/2017
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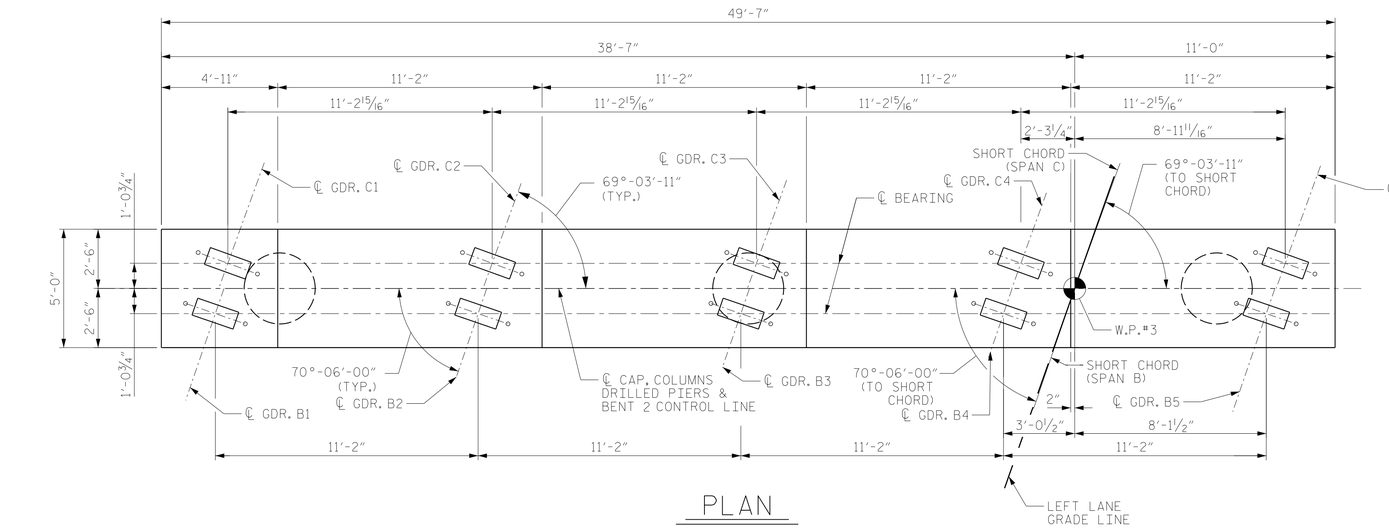
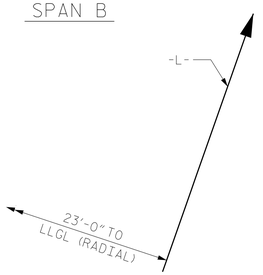
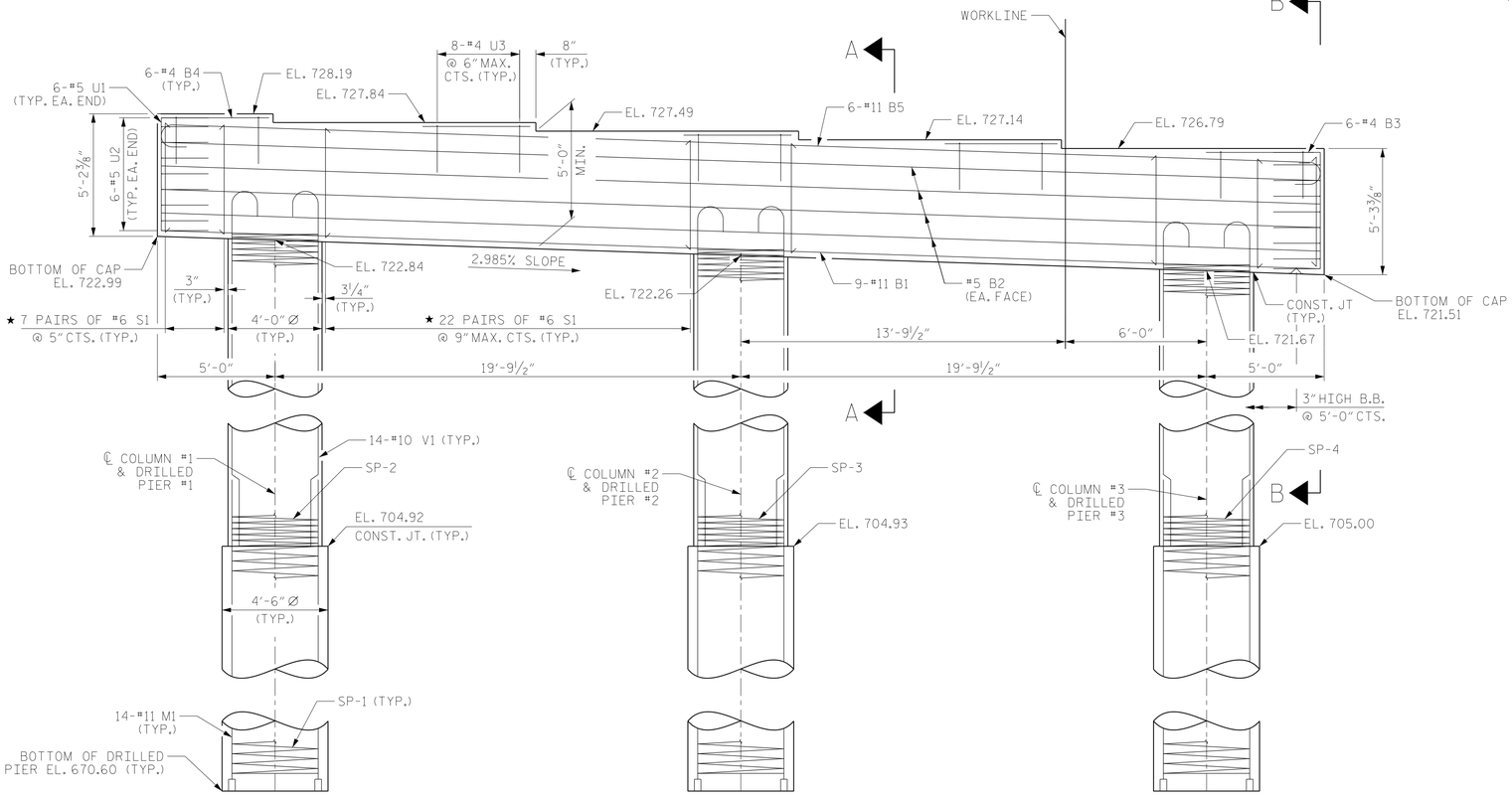


PLAN





ELEVATION

NOTES:

FOR SECTION A-A AND VIEW B-B, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

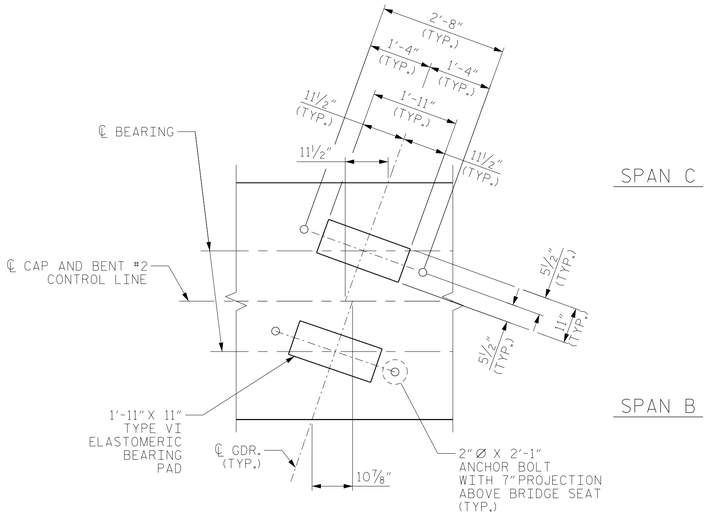
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE #6 S1 STIRRUP PAIRS.

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

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

LLGL = LEFT LANE GRADE LINE



DETAIL A

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039218 ENGINEER JUSTIN MARK ROBINSON
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 2

LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S1-29
1			3			TOTAL SHEETS
2			4			36

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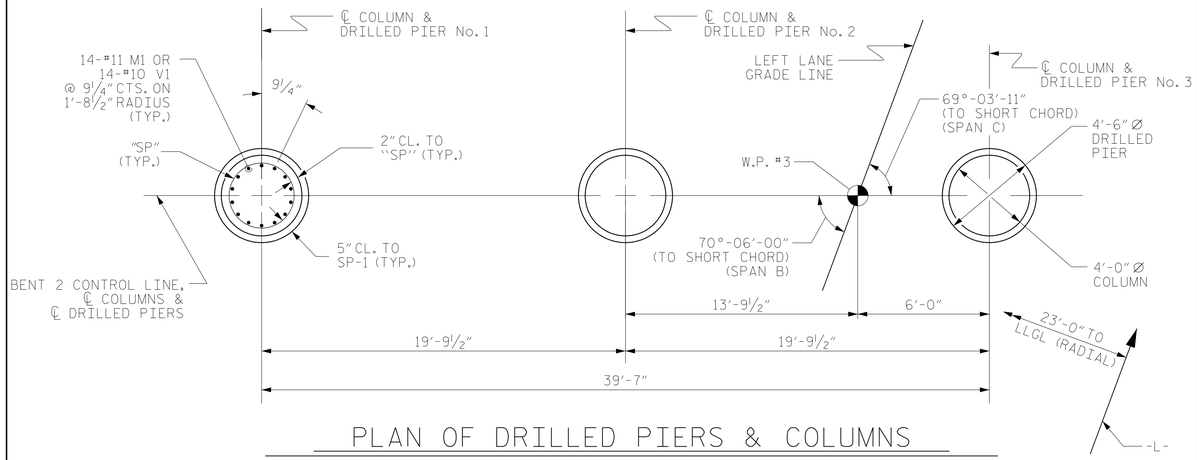
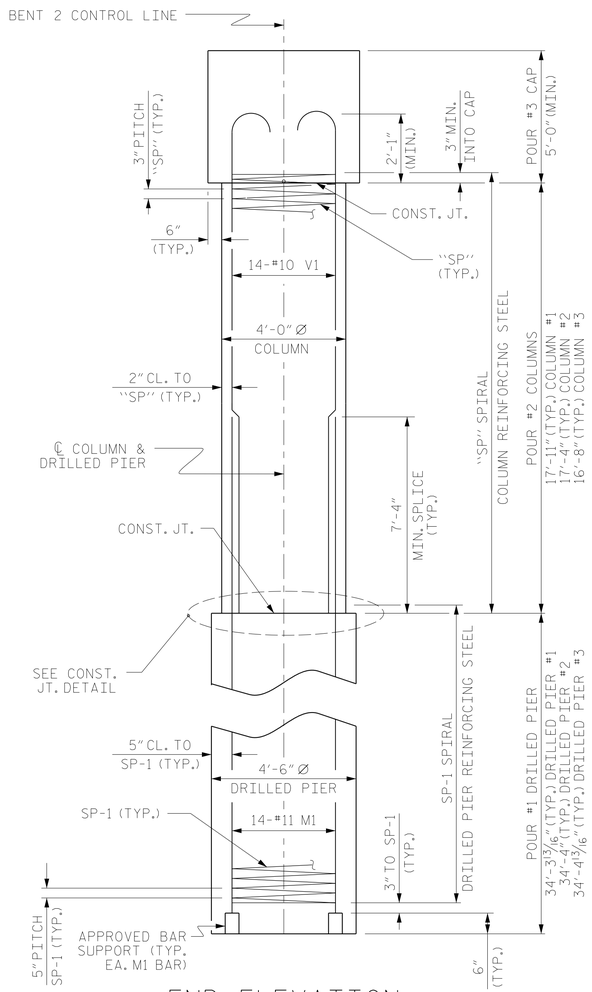
STR. #1

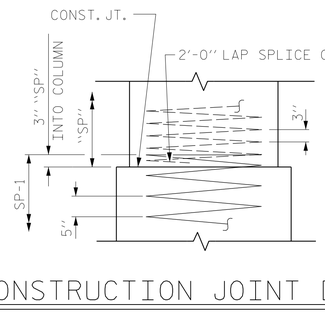


PLAN OF DRILLED PIERS & COLUMNS

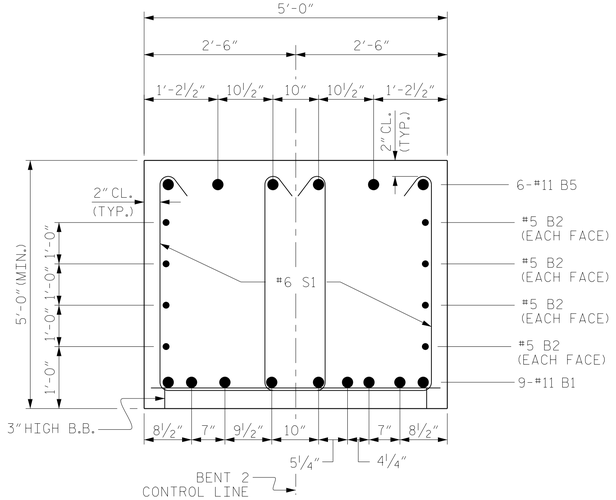
LLGL = LEFT LANE GRADE LINE



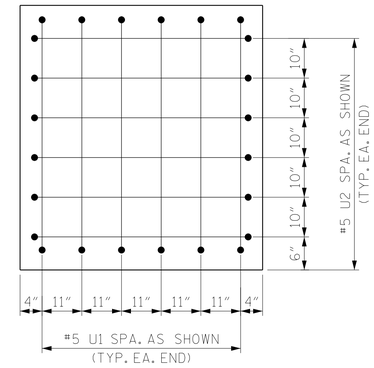
END ELEVATION



CONSTRUCTION JOINT DETAIL

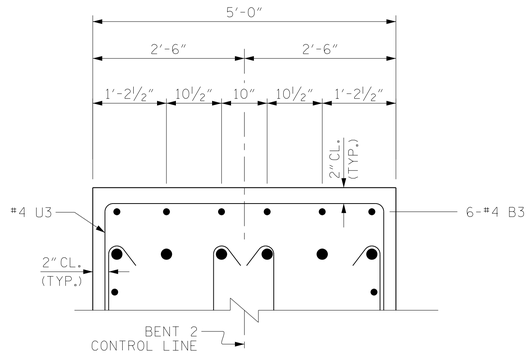


SECTION A-A



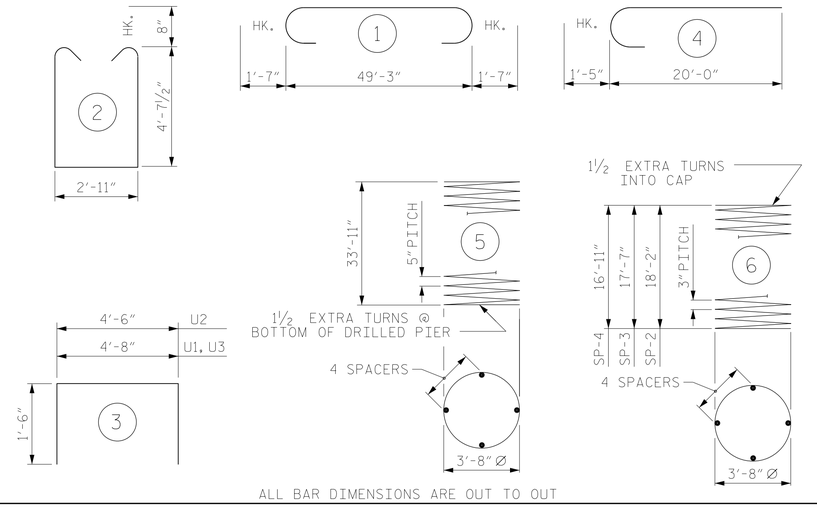
END OF CAP VIEW

(TYPICAL BOTH ENDS)



VIEW B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	9	#11	STR	49'-3"	2355
B2	8	#5	STR	49'-3"	411
B3	6	#4	STR	6'-0"	24
B4	30	#4	STR	4'-7"	92
B5	6	#11	1	52'-5"	1671
M1	42	#11	STR	44'-3"	9874
S1	116	#6	2	13'-6"	2352
U1	12	#5	3	7'-8"	96
U2	12	#5	3	7'-6"	94
U3	40	#4	3	7'-8"	205
V1	42	#10	4	21'-5"	3871

REINFORCING STEEL (FOR BENT 2) 21,045 LBS.

SP-1	3	**	5	943'-2"	2951
SP-2	1	*	6	843'-5"	563
SP-3	1	*	6	820'-2"	548
SP-4	1	*	6	786'-7"	525

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 2) 4,587 LBS.

** 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

CLASS A CONCRETE BREAKDOWN (FOR BENT 2)

POUR #2 (COLUMNS)	24.2 C.Y.
POUR #3 (CAP)	47.7 C.Y.
TOTAL CLASS A CONCRETE	71.9 C.Y.

DRILLED PIERS: (FOR BENT 2)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	60.8 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	27.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	76.1 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIER	54 LIN. FT.
△ CSL TUBES	430.2 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

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RALEIGH

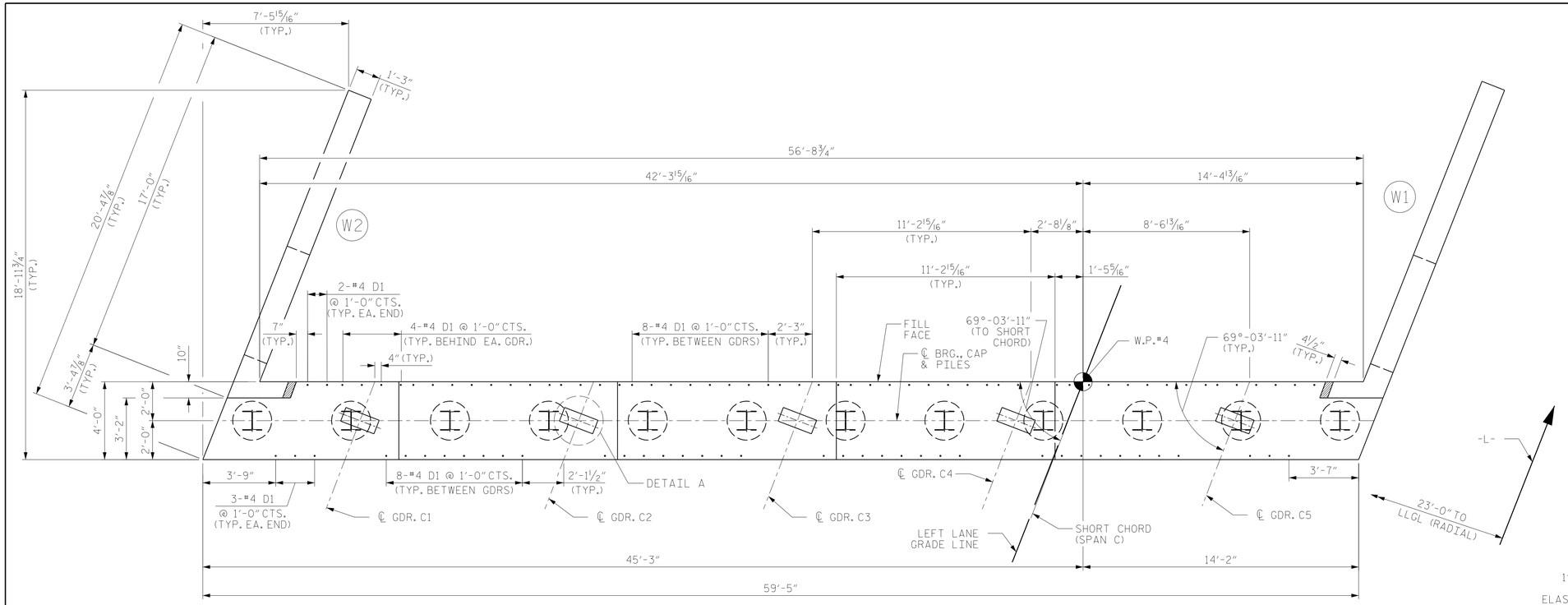
SUBSTRUCTURE

BENT NO. 2 DETAILS

LEFT LANE

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

STR. #1



PLAN

LLGL = LEFT LANE GRADE LINE

NOTES:

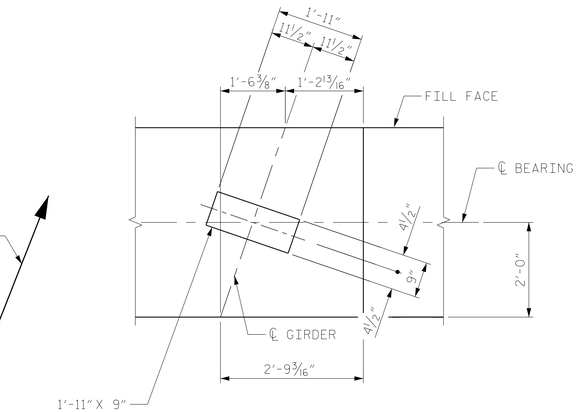
THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS, SEE THE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.

FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

STIRRUPS MAY BE SHIFTED SLIGHTLY TO AVOID #4 D1 BARS IN CAP.

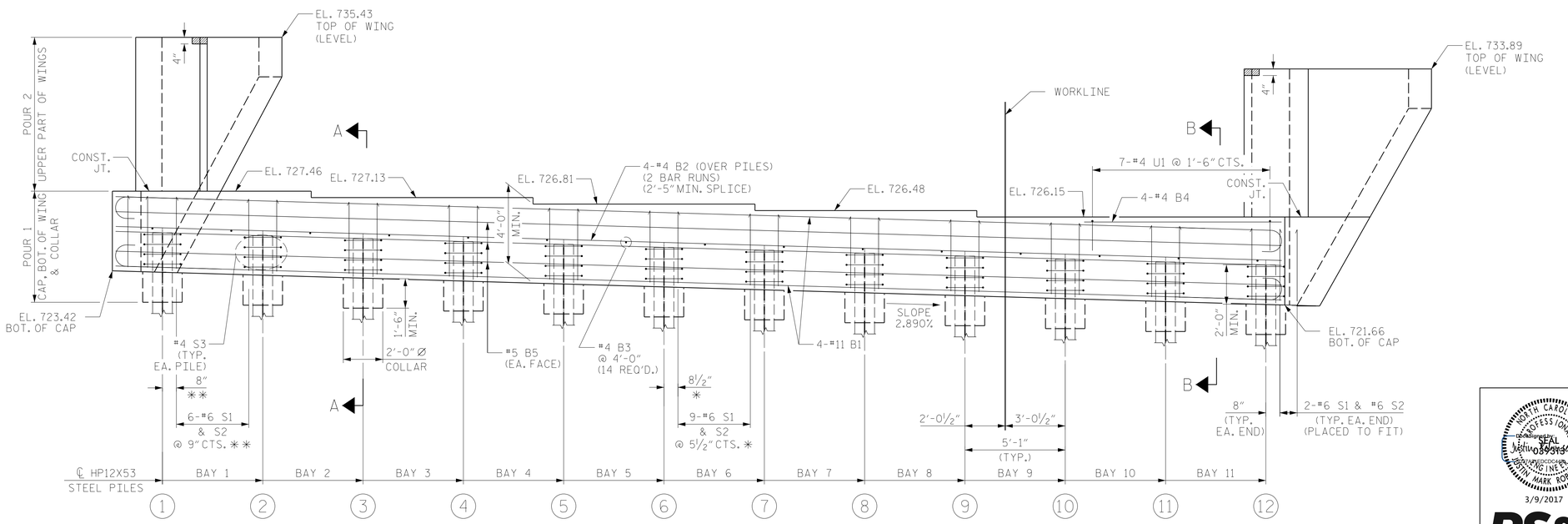
SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

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



DETAIL A

DIMENSIONS TYP. EA. BRG. PILE NOT SHOWN FOR CLARITY



ELEVATION

* = TYPICAL BAY 4 THRU BAY 8
** = TYPICAL BAY 1 THRU BAY 3 AND BAY 9 THRU BAY 11

TOP OF PILE ELEVATIONS

PILE	ELEVATION
1	725.37
2	725.22
3	725.07
4	724.93
5	724.78
6	724.63
7	724.48
8	724.33
9	724.18
10	724.04
11	723.89
12	723.74

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 4

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SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

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

STR. #1

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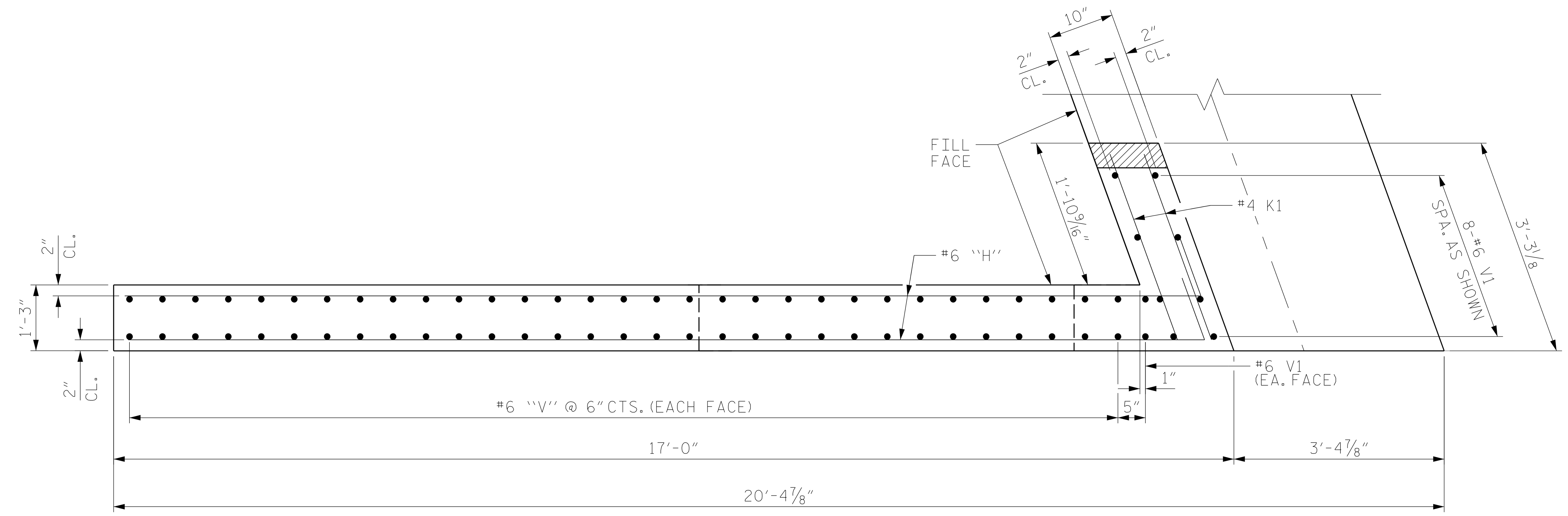
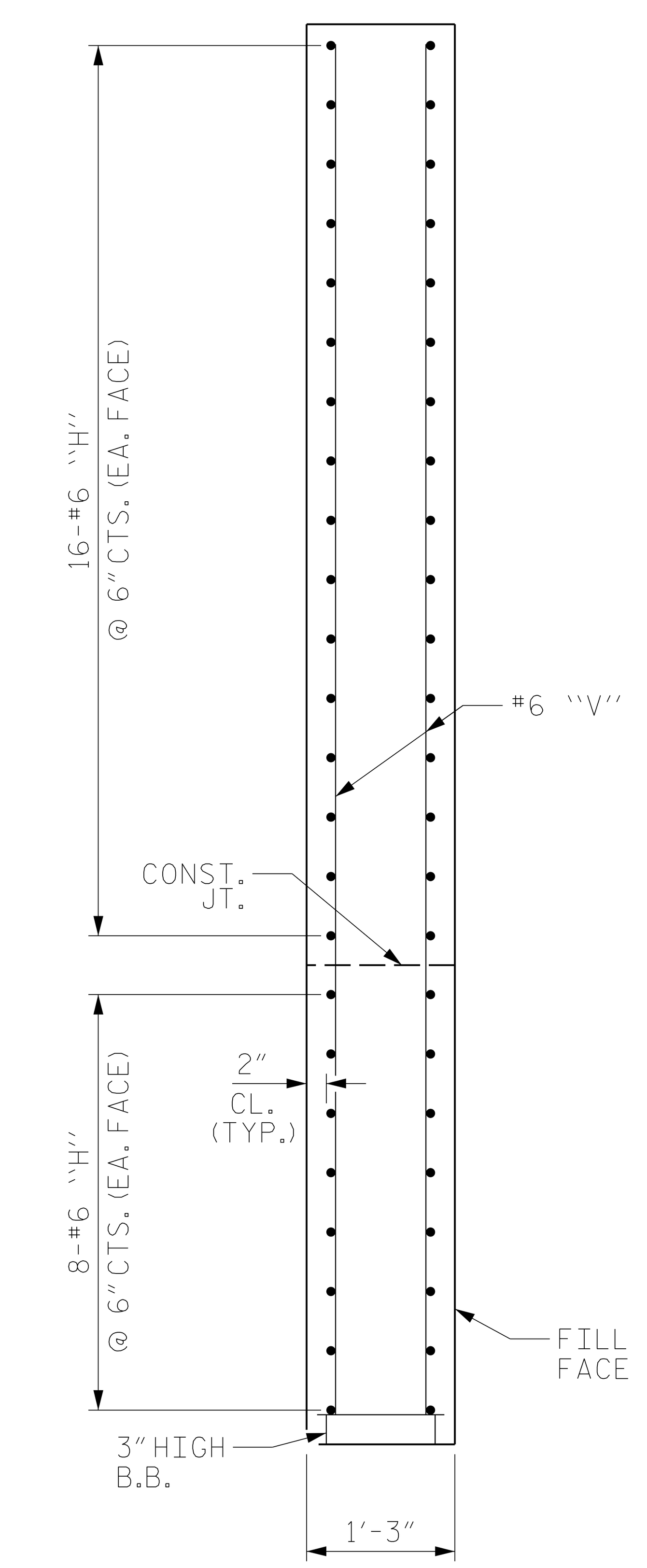
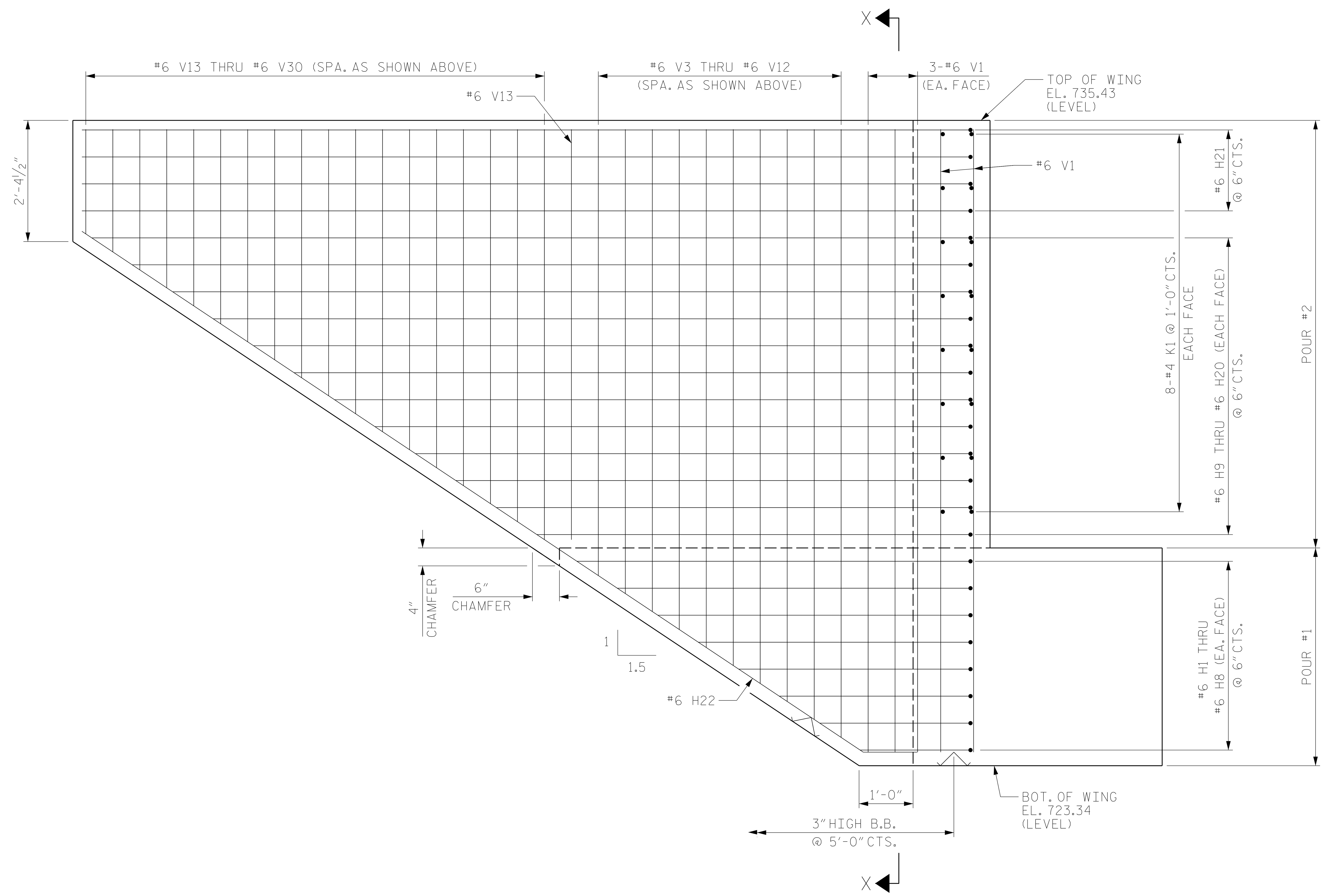


PLAN OF WING - W2



SECTION X-X



ELEVATION OF WING - W2

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

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

DRAWN BY : MAL DATE : 11/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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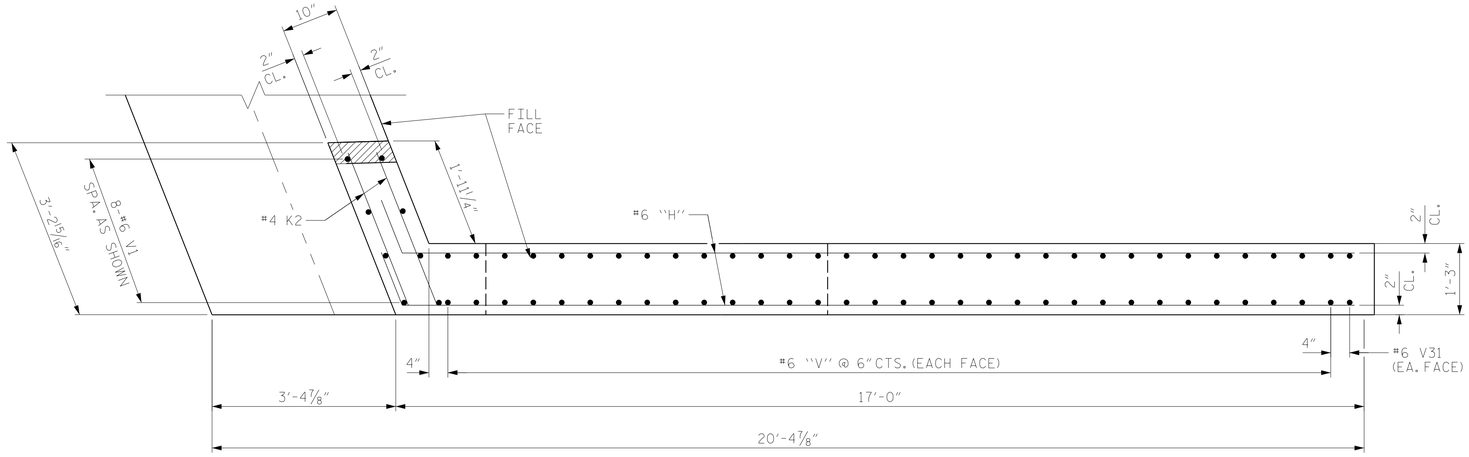
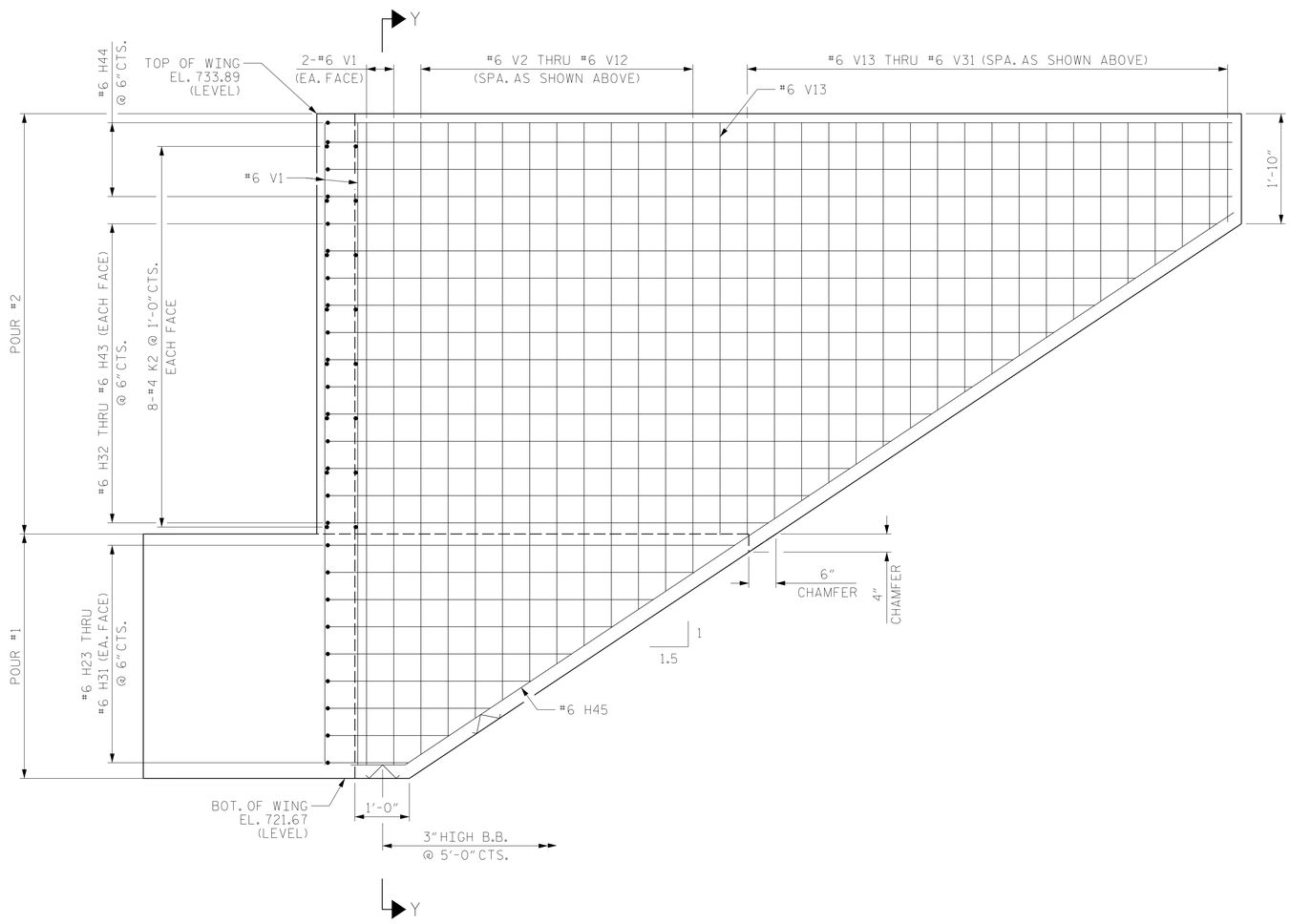
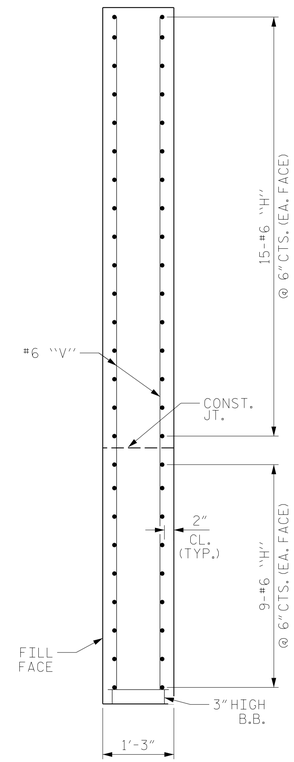


PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 3 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

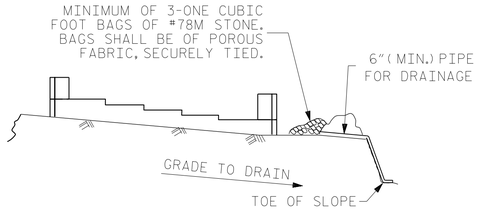
SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

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

STR. #1

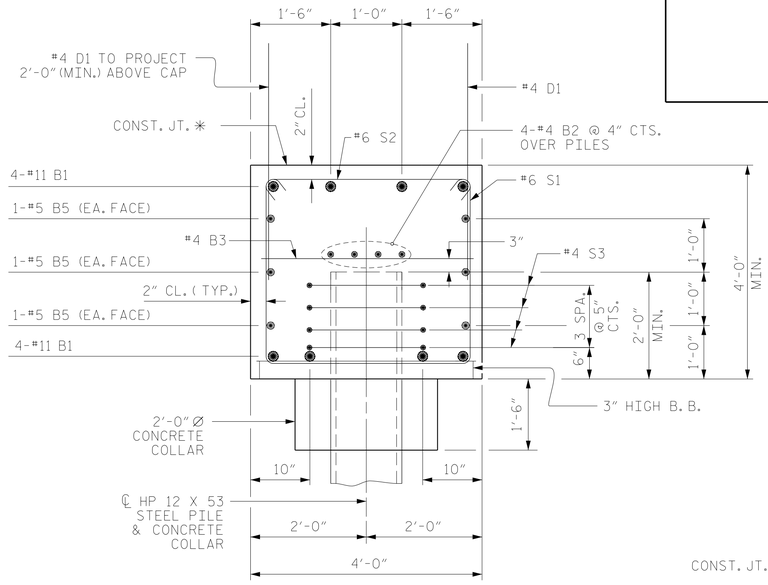


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

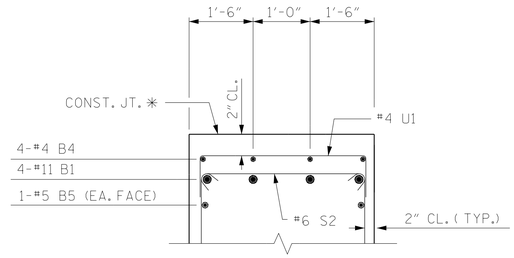
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



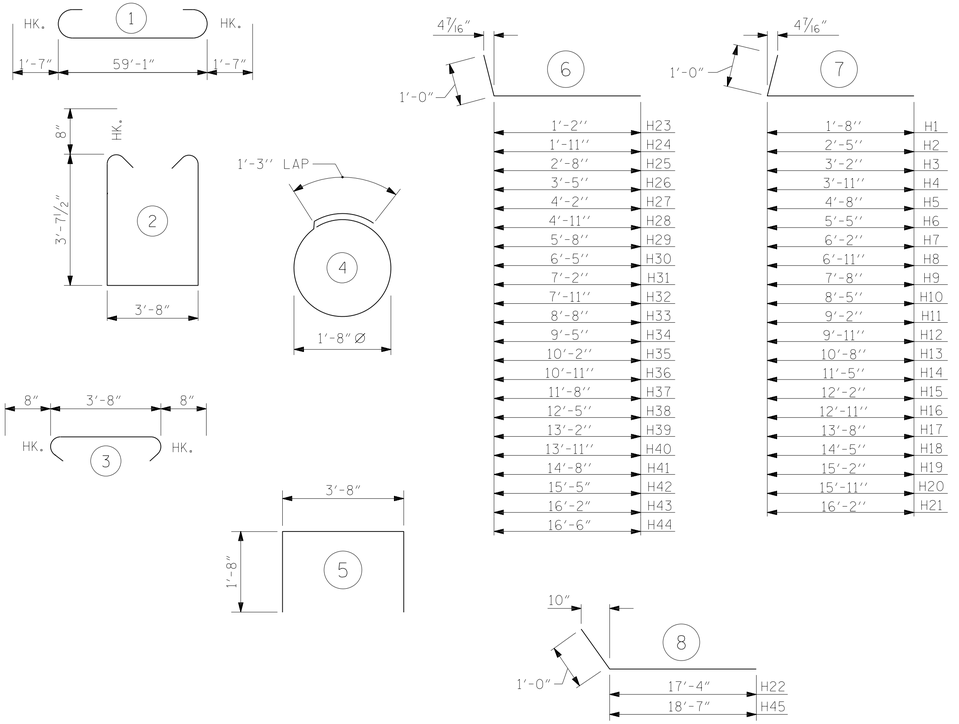
SECTION A-A

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



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

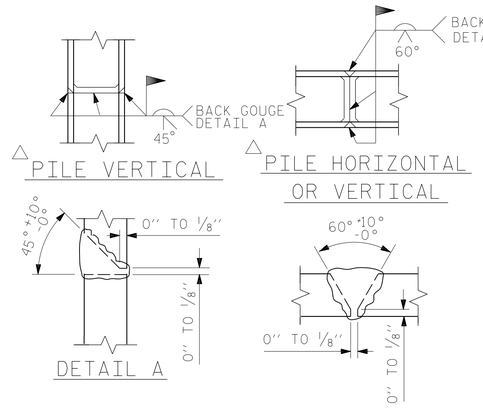
BILL OF MATERIAL

END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	62'-3"	2646	H42	2	#6	6	16'-5"	49
B2	8	#4	STR	30'-0"	160	H43	2	#6	6	17'-2"	52
B3	14	#4	STR	3'-8"	34	H44	8	#6	6	17'-6"	210
B4	4	#4	STR	10'-0"	27	H45	2	#6	8	19'-7"	59
B5	6	#5	STR	59'-1"	370						
						K1	16	#4	STR	3'-0"	32
D1	94	#4	STR	4'-0"	251	K2	16	#4	STR	2'-9"	29
H1	2	#6	7	2'-8"	8	S1	85	#6	2	12'-3"	1564
H2	2	#6	7	3'-5"	10	S2	85	#6	3	5'-0"	638
H3	2	#6	7	4'-2"	13	S3	48	#4	4	6'-6"	208
H4	2	#6	7	4'-11"	15						
H5	2	#6	7	5'-8"	17	U1	7	#4	5	7'-0"	33
H6	2	#6	7	6'-5"	19						
H7	2	#6	7	7'-2"	22	V1	26	#6	STR	11'-8"	456
H8	2	#6	7	7'-11"	24	V2	4	#6	STR	11'-7"	70
H9	2	#6	7	8'-8"	26	V3	4	#6	STR	11'-3"	68
H10	2	#6	7	9'-5"	28	V4	4	#6	STR	10'-11"	66
H11	2	#6	7	10'-2"	31	V5	4	#6	STR	10'-7"	64
H12	2	#6	7	10'-11"	33	V6	4	#6	STR	10'-3"	62
H13	2	#6	7	11'-8"	35	V7	4	#6	STR	9'-11"	60
H14	2	#6	7	12'-5"	37	V8	4	#6	STR	9'-7"	58
H15	2	#6	7	13'-2"	40	V9	4	#6	STR	9'-3"	56
H16	2	#6	7	13'-11"	42	V10	4	#6	STR	8'-11"	54
H17	2	#6	7	14'-8"	44	V11	4	#6	STR	8'-7"	52
H18	2	#6	7	15'-5"	46	V12	4	#6	STR	8'-3"	50
H19	2	#6	7	16'-2"	49	V13	8	#6	STR	7'-7"	91
H20	2	#6	7	16'-11"	51	V14	4	#6	STR	7'-3"	44
H21	8	#6	7	17'-2"	206	V15	4	#6	STR	6'-11"	42
H22	2	#6	8	18'-4"	55	V16	4	#6	STR	6'-7"	40
H23	2	#6	6	2'-2"	7	V17	4	#6	STR	6'-3"	38
H24	2	#6	6	2'-11"	9	V18	4	#6	STR	5'-11"	36
H25	2	#6	6	3'-8"	11	V19	4	#6	STR	5'-7"	34
H26	2	#6	6	4'-5"	13	V20	4	#6	STR	5'-3"	32
H27	2	#6	6	5'-2"	16	V21	4	#6	STR	4'-11"	30
H28	2	#6	6	5'-11"	18	V22	4	#6	STR	4'-7"	28
H29	2	#6	6	6'-8"	20	V23	4	#6	STR	4'-3"	26
H30	2	#6	6	7'-5"	22	V24	4	#6	STR	3'-11"	24
H31	2	#6	6	8'-2"	25	V25	4	#6	STR	3'-7"	22
H32	2	#6	6	8'-11"	27	V26	4	#6	STR	3'-3"	20
H33	2	#6	6	9'-8"	29	V27	4	#6	STR	2'-11"	18
H34	2	#6	6	10'-5"	31	V28	4	#6	STR	2'-7"	16
H35	2	#6	6	11'-2"	34	V29	4	#6	STR	2'-3"	14
H36	2	#6	6	11'-11"	36	V30	4	#6	STR	1'-11"	12
H37	2	#6	6	12'-8"	38	V31	2	#6	STR	1'-10"	6
H38	2	#6	6	13'-5"	40						
H39	2	#6	6	14'-2"	43						
H40	2	#6	6	14'-11"	45						
H41	2	#6	6	15'-8"	47						

PILE DRIVING EQUIPMENT SETUP NO. 12

REINFORCING STEEL	9,413 LBS.
CLASS A CONCRETE	
POUR #1	
CAP, CONCRETE COLLARS & LOWER PART OF WINGS	41.4 C. Y.
POUR #2	
UPPER PART OF WINGS	11.3 C. Y.
TOTAL	52.2 C. Y.
HP 12 X 53 STEEL PILES	
NO. 12	240 LIN. FT.
STEEL PILE POINTS	NO.: 12



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 MARK ROBINSON
Digitally signed by MARK ROBINSON
DocuSigned by: 2C9A9DE5-29BA-433E-A421-F41E9C8A72B9
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

LEFT LANE

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

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DRAWN BY :	MAL	DATE : 11/2016
CHECKED BY :	JMR	DATE : 12/2016
DESIGN ENGINEER OF RECORD:	MAL	DATE : 11/2016

3/8/2017
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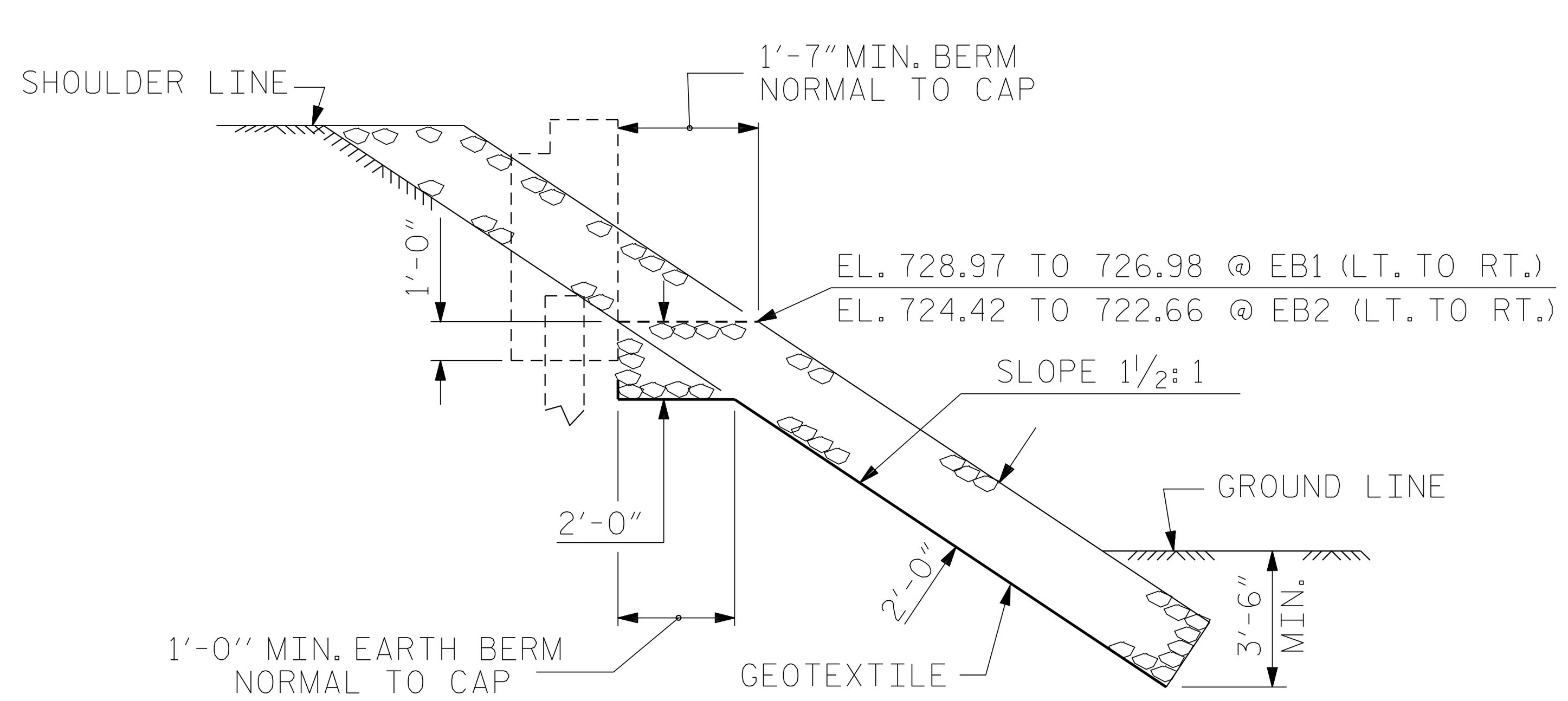
leblancm

STR. #1

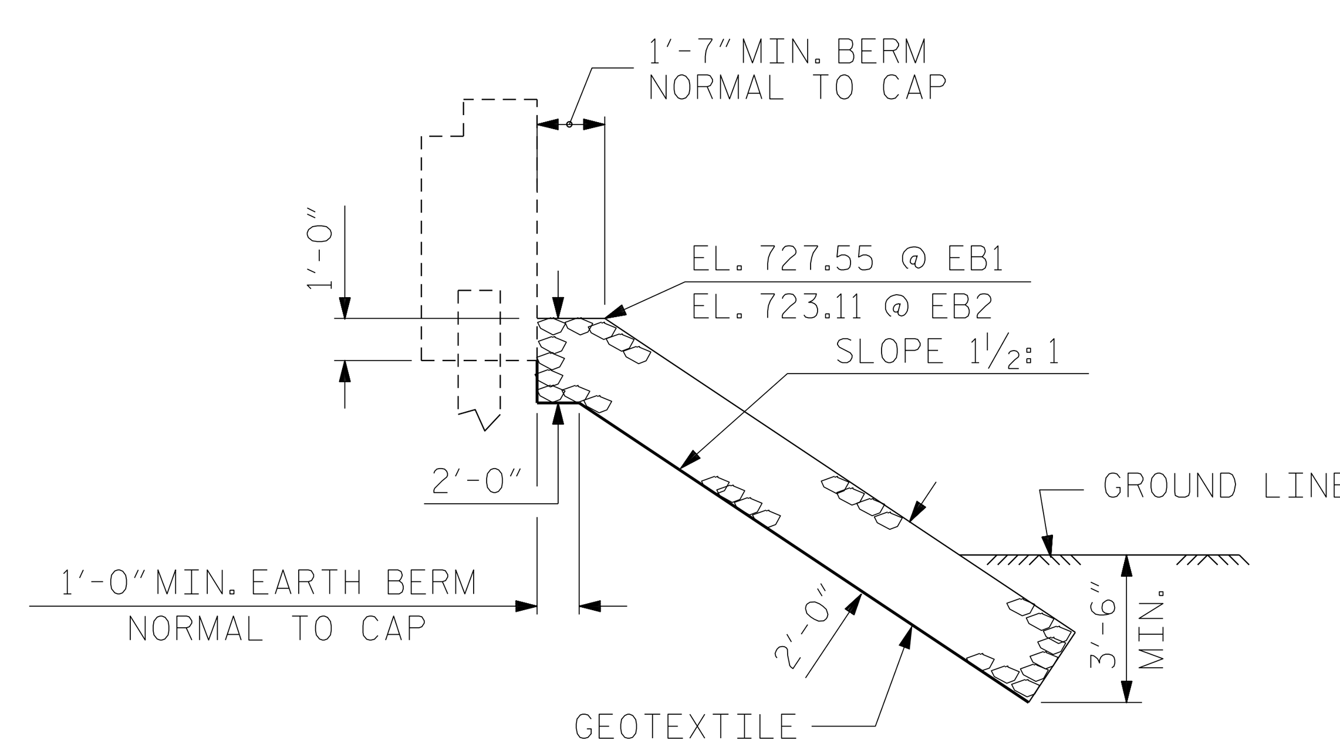
NOTES

FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

ESTIMATED QUANTITIES		
BRIDGE @ STA. 384+50.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	400	490
END BENT 2	265	325

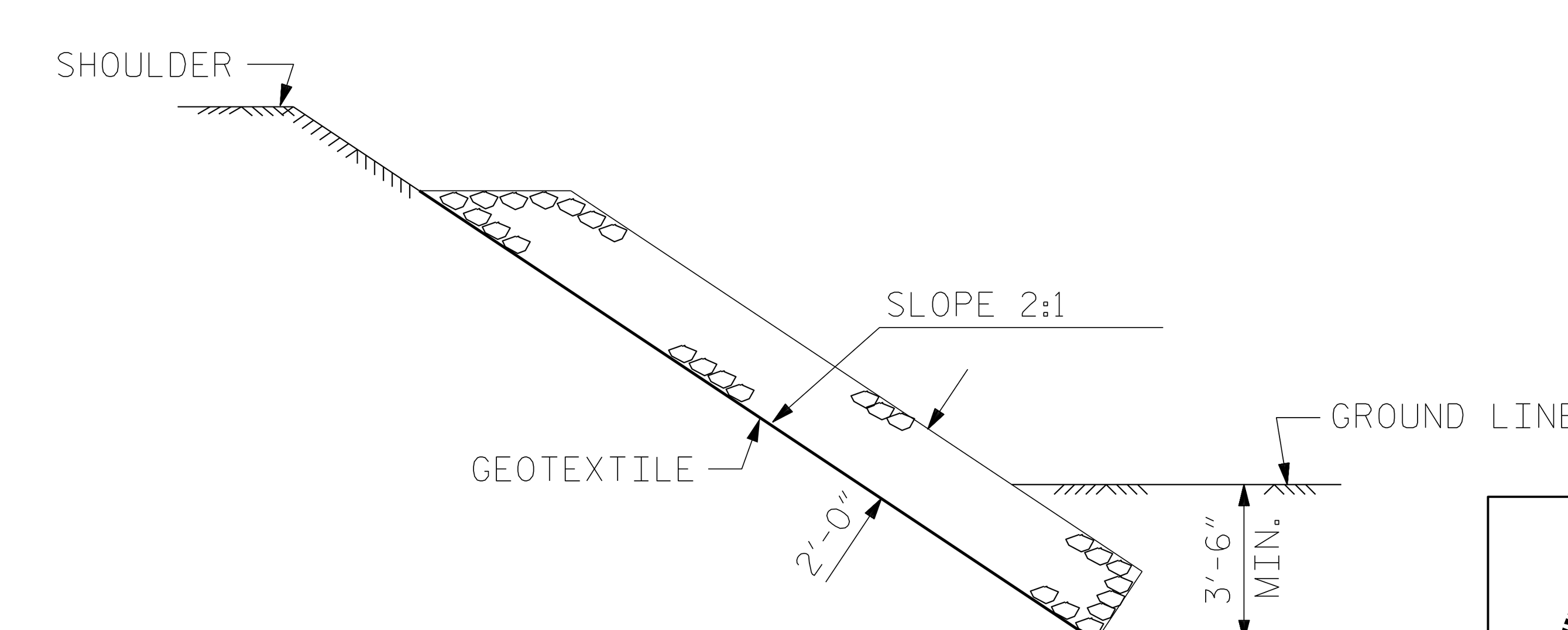


VIEW H-H



LEFT LANE GRADE LINE SECTION

BERM RIP RAPPED



SECTION C-C

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SEAL 039413 — NORTH CAROLINA PROFESSIONAL ENGINEER — JUSTIN MARK ROBINSON
3/9/2017

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RIP RAP DETAILS

LEFT LANE

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

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DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #1

3/8/2017
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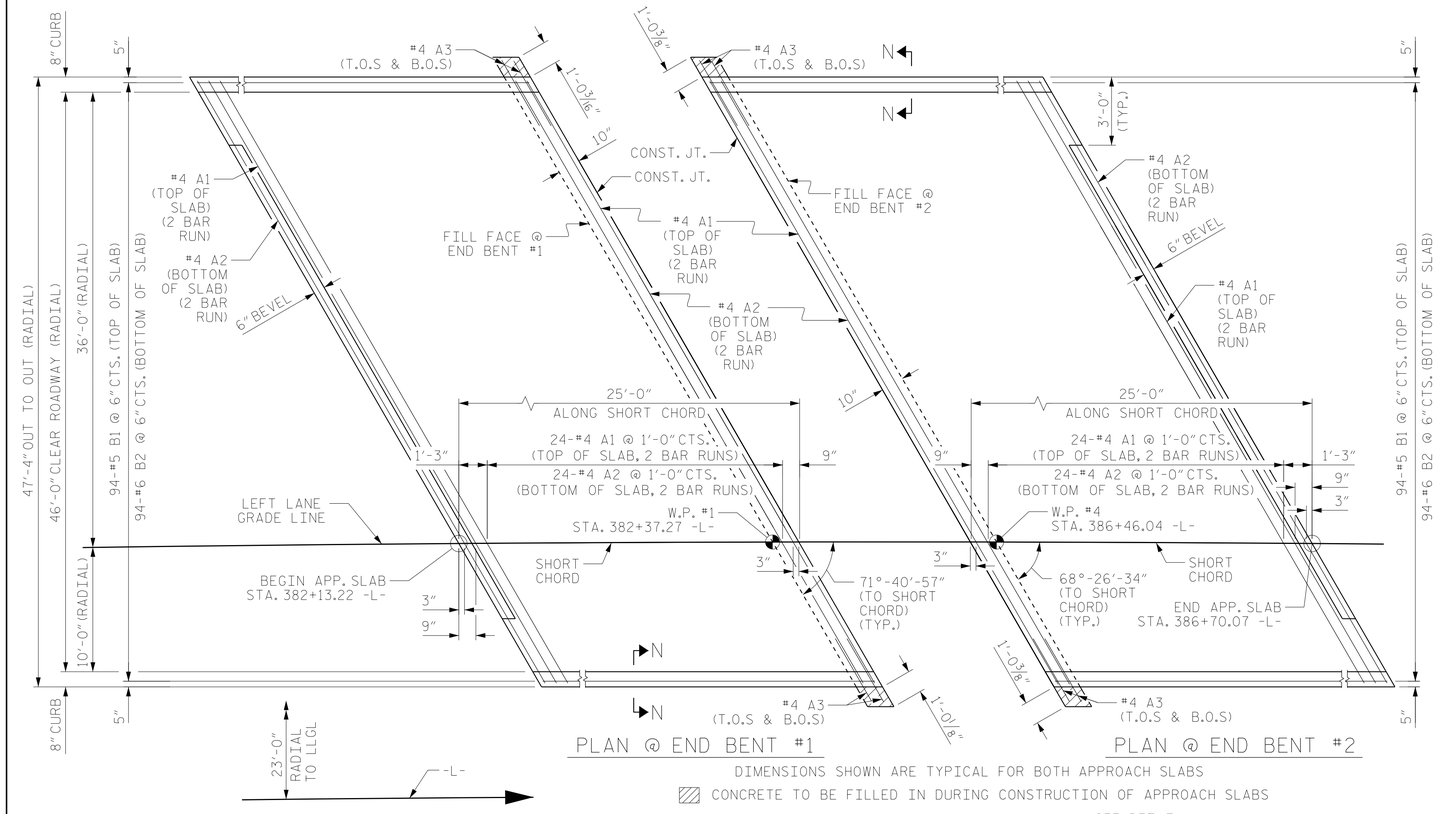


NOTES

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

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

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

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

ARC OFFSETS ARE NEGLIGIBLE AND THEREFORE NOT SHOWN.

T.O.S. = TOP OF SLAB

B.O.S. = BOTTOM OF SLAB

BILL OF MATERIAL

APPROACH SLAB @ E.B. #1

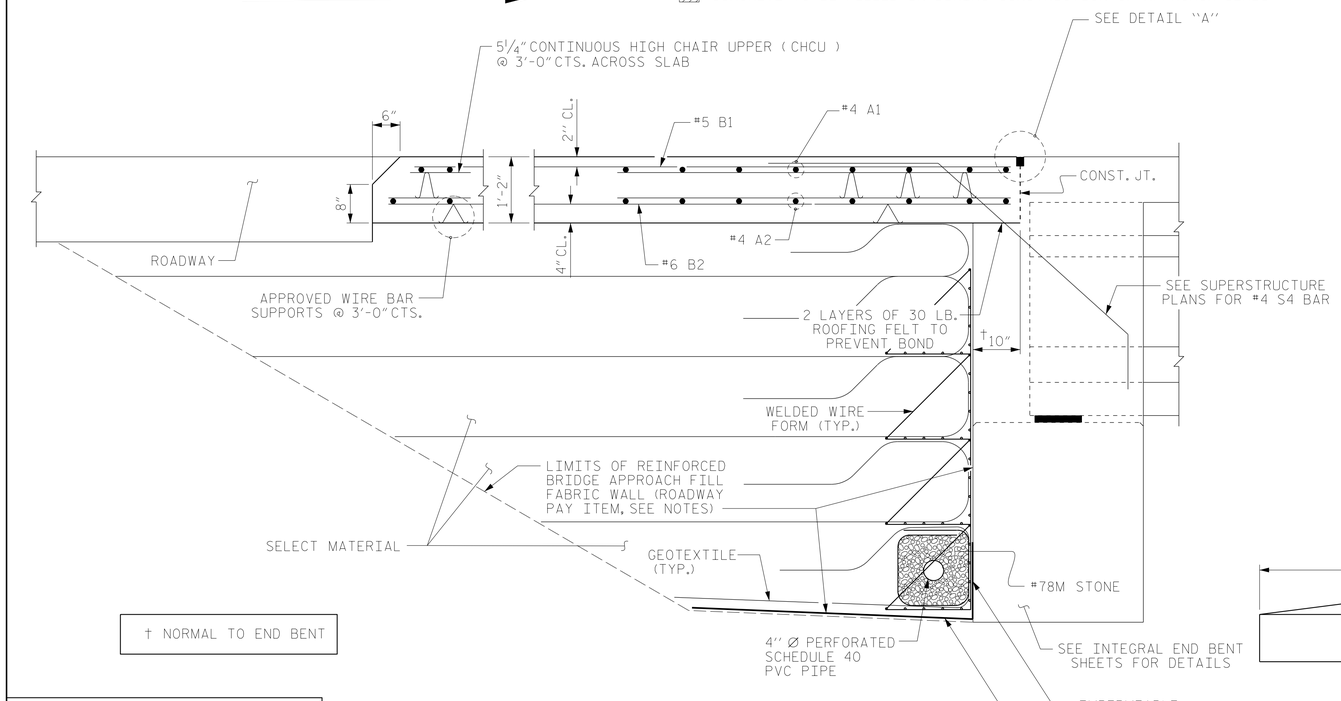
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#4	STR	25'-10''	897
A2	52	#4	STR	25'-8''	892
✳ A3	8	#4	STR	3'-0''	16
✳ B1	94	#5	STR	24'-1''	2361
B2	94	#6	STR	24'-7''	3471
REINFORCING STEEL					4,363 LBS.
✳ EPOXY COATED REINFORCING STEEL					3,274 LBS.
CLASS AA CONCRETE					51.2 C.Y.

APPROACH SLAB @ E.B. #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	52	#4	STR	25'-10''	897
A2	52	#4	STR	25'-8''	892
✳ A3	8	#4	STR	3'-0''	16
✳ B1	94	#5	STR	24'-1''	2361
B2	94	#6	STR	24'-7''	3471
REINFORCING STEEL					4,363 LBS.
✳ EPOXY COATED REINFORCING STEEL					3,274 LBS.
CLASS AA CONCRETE					51.2 C.Y.

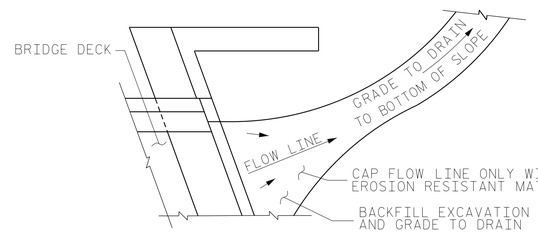
SPLICE LENGTHS

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



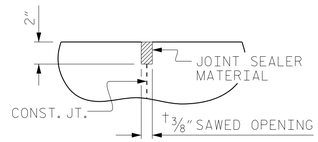
† NORMAL TO END BENT

SECTION THRU SLAB

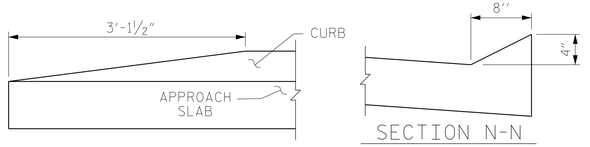


NOTE:
IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL



DETAIL ''A''



END OF CURB WITHOUT SHOULDER BERM GUTTER

SECTION N-N

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039318 JUSTIN MARK ROBINSON 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

LEFT LANE

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

ASSEMBLED BY :	MAL	DATE :	11/2016
CHECKED BY :	JMR	DATE :	12/2016
DRAWN BY : TLA 10/05	REV. 10/1/11		MAA/GM
CHECKED BY : GM 5/06	REV. 12/21/11		MAA/GM
	REV. 6/13		MAA/GM

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3/8/2017
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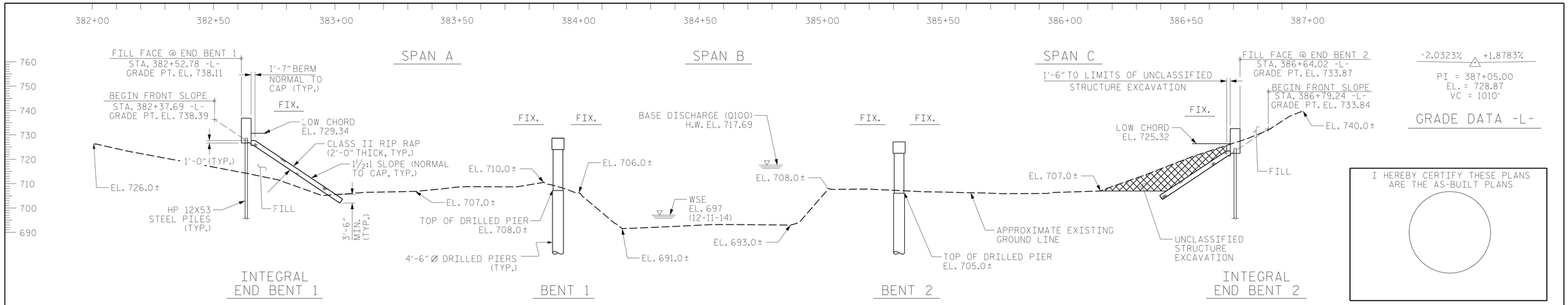
leblancm

STD. NO. BAS5

STR. #1



-2.0323% +1.8783%

PI = 387+05.00
EL. = 728.87
VC = 1010'

GRADE DATA -L-

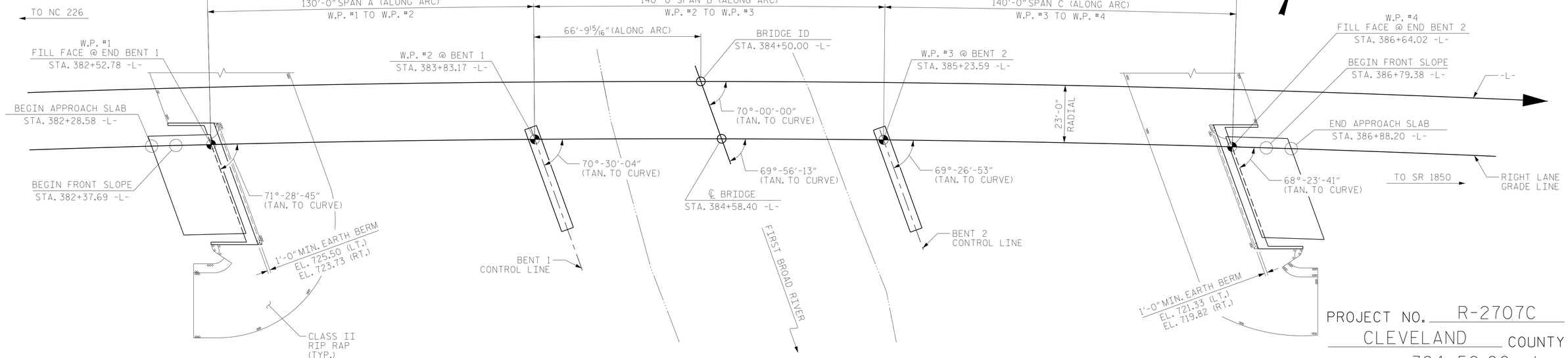
I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

SECTION ALONG RIGHT LANE GRADE LINE

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

HORIZONTAL CURVE DATA -L-

P.I. STA. = 387+18.94
Δ = 8°-50'-30.4"(RT.)
D = 0°-45'-00.0"
L = 1,178.90'
T = 590.62'
R = 7,639.44'
S.E. = 0.03



PLAN ALONG RIGHT LANE GRADE LINE

(FOR CLARITY, PILES AND COLUMNS ARE NOT SHOWN IN PLAN VIEW)

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 1 OF 4 BRIDGE NO. 467

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
Documents signed by: Justin Robinson
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-1
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : PDS DATE : 11/2016
CHECKED BY : TLC DATE : 01/2017
DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

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leblancm

STR. #2

FOUNDATION LAYOUT PLAN

DIMENSIONS LOCATING PILES AND DRILLED PIERS ARE SHOWN TO PILE AND DRILLED PIER CENTERLINE.

FOUNDATION NOTES

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

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

FOR DRILLED PIERS, SEE SECTION 411 OF STANDARD SPECIFICATIONS.

INSTALL DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 670.6 FEET AND A PENETRATION OF 9 FEET INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.

DRILLED PIERS AT BENT NO. 1 AND BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 635 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 30 TSF.

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND BENT NO. 2 IS 679 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO.1 AND BENT NO. 2. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 690 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

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

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

DRILLED-IN PILES ARE REQUIRED FOR INTEGRAL END BENT NO. 2. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 713 FT. FILL THE BOTTOM 3 FT OF HOLES FOR PILE EXCAVATION WITH CONCRETE AND THE REST OF THE HOLES WITH CLASS II OR CLASS III SELECT MATERIAL THAT MEETS SECTION 1016 OF THE STANDARD SPECIFICATIONS FOR PILE EXCAVATION, SEE SECTION 450 OF THE SPECIFICATIONS.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

DRILLED-IN PILES AT END BENT NO. 2 THAT DO NOT HAVE A MINIMUM PENETRATION OF 3 FEET INTO ROCK AS DEFINED BY ARTICLE 411 OF THE STANDARD SPECIFICATIONS WILL BE DRIVEN TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 4

3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

REVISIONS								SHEET NO.
NO.	BY:	DATE:		NO.	BY:	DATE:		S2-2
1				3				TOTAL SHEETS
2				4				36

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

STR. #2

3/8/2017
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leblancm

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

ANGLES	
LONG CHORD	SHORT CHORD
L1 = 69°-56'-13"	S1 = 70°-59'-25"
	S2 = 69°-58'-29"
	S3 = 68°-55'-17"

HORIZONTAL CURVE DATA -L-

P.I. STA. = 387+18.94
Δ = 8°-50'-30.4" (RT.)
D = 0°-45'-00.0"
L = 1,178.90'
T = 590.62'
R = 7,639.44'
S.E. = 0.03

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 3 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033913 JUSTIN MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

RIGHT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-3
1			3			TOTAL SHEETS
2			4			36

STR. #2

DRAWN BY : PDS DATE : 11/2016
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DESIGN ENGINEER OF RECORD: MAL DATE : 11/2016

3/8/2017
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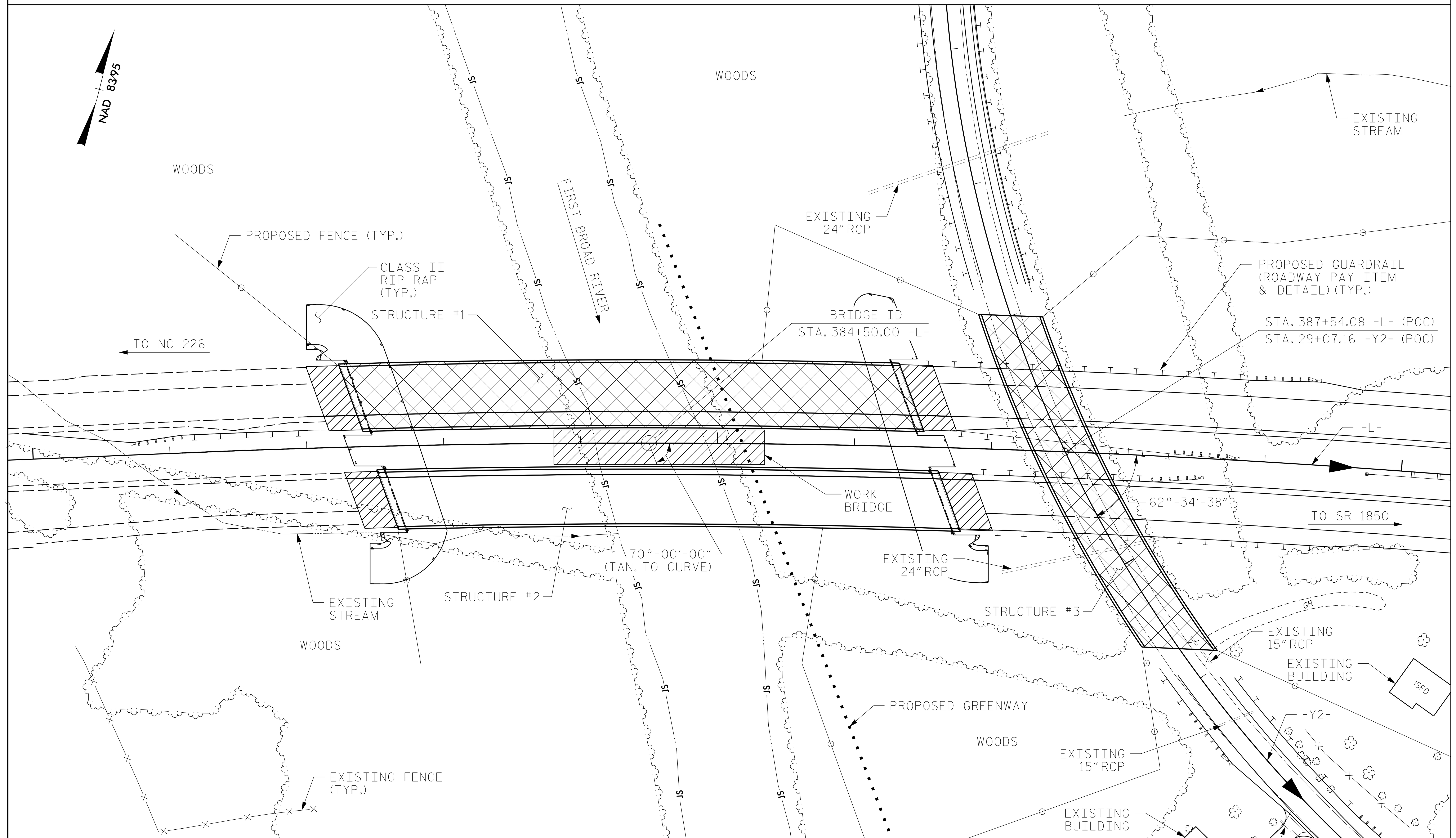
BENCH MARK #17: 8 INCH NAIL IN BASE OF 20 INCH SYCAMORE 93.83' LEFT OF STA. 385+52.11 -L-, EL. 707.47'



NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

FOR PLACING LOAD ON STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

THE 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.

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

THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND NO. 2 IS ELEVATION 679. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

THE MATERIAL SHOWN IN THE CROSS-HATCHED AREA ON GENERAL DRAWING SHEET 1 OF 4 SHALL BE EXCAVATED FOR A DISTANCE OF 23 FT LEFT AND 70 FT RIGHT OF RIGHT LANE GRADE LINE AT END BENT 2 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.

THE CONTRACTOR WILL BE REQUIRED TO CONSTRUCT, MAINTAIN AND AFTERWARDS REMOVE THE TEMPORARY ACCESS AT STATION 384+50.00 -L- FOR USE DURING CONSTRUCTION OF THE PROPOSED STRUCTURE.

FOR CONSTRUCTION, MAINTENANCE AND REMOVAL OF TEMPORARY ACCESS, SEE SPECIAL PROVISIONS.

FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.

TOTAL BILL OF MATERIALS

	CONSTRUCTION, MAINTENANCE & REMOVAL OF TEMP. ACCESS AT STA. 384+50.00 -L-	UNCLASSIFIED STRUCTURE EXCAVATION	4'-6"Ø DRILLED PIER IN SOIL	4'-6"Ø DRILLED PIER NOT IN SOIL	PERMANENT STEEL CASING FOR 4'-6" DIA. DRILLED PIER	CSL TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	74" MODIFIED PRESTRESSED CONCRETE GIRDERS		PILE EXCAVATION IN SOIL	PILE EXCAVATION NOT IN SOIL
	LUMP SUM	LUMP SUM	LIN. FT.	LIN. FT.	LIN. FT.	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	APPROX. LBS.	NO.	LIN. FT.	LIN. FT.	LIN. FT.
SUPERSTRUCTURE							17,661	16,827		LUMP SUM			12	1,621.85		
END BENT No. 1									47.5		8,647					
BENT No. 1			85.0	27.0	54.0				62.5		20,079	4,601				
BENT No. 2			76.0	27.0	54.0				64.1		19,678	4,478				
END BENT No. 2		LUMP SUM							47.2		8,619				77	33
TOTAL	LUMP SUM	LUMP SUM	161	54	108	2	17,661	16,827	221.3	LUMP SUM	57,023	9,079	12	1,621.85	77	33

	HP 12X53 STEEL PILES		STEEL PILE POINTS	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS
	NO.	LIN. FT.	EACH	EACH	LIN. FT.	TONS	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE					816.7			LUMP SUM
END BENT No. 1	11	440	11	11		500	550	
BENT No. 1								
BENT No. 2								
END BENT No. 2	11	165	11	11		450	500	
TOTAL	22	605	22	22	816.7	950	1,050	LUMP SUM

HYDRAULIC DATA

DESIGN DISCHARGE = 20,200 CFS
FREQUENCY OF DESIGN FLOOD = 50 YRS
DESIGN HIGH WATER ELEVATION = 716.2
DRAINAGE AREA = 226 SQ. MI.
BASE DISCHARGE (Q100) = 23,400 CFS
BASE HIGH WATER ELEVATION = 717.69

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = >31,700 CFS
FREQUENCY OF OVERTOPPING FLOOD = >500 YRS+
OVERTOPPING FLOOD ELEVATION = 733.80

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 4 OF 4

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DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
RIGHT LANE BRIDGE OVER FIRST BROAD RIVER ON US 74 SHELBY BYPASS BETWEEN NC 226 AND SR 1850

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1			3			TOTAL SHEETS
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STR. #2

4/6/2017
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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	(#) CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT					
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	(1)	1.07	--	1.75	0.95	1.27	A	EL	63.4	1.14	1.16	B	I	13.21	0.80	0.87	1.07	A	I	63.4	
		HL-93 (OPERATING)	N/A		1.54	--	1.35	0.95	1.64	A	EL	63.4	1.14	1.54	B	I	13.21	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	(2)	1.59	57.240	1.75	0.95	1.88	A	EL	63.4	1.14	1.73	B	I	13.21	0.80	0.87	1.59	A	I	63.4	
		HS-20 (OPERATING)	36.000		2.27	81.720	1.35	0.95	2.44	A	EL	63.4	1.14	2.27	B	I	124.53	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.89	52.515	1.40	0.95	5.73	A	EL	63.4	1.14	5.70	B	I	13.21	0.80	0.87	3.89	A	I	63.4	
		SNGARBS2	20.000		2.77	55.400	1.40	0.95	4.08	A	EL	63.4	1.14	3.91	B	I	124.53	0.80	0.87	2.77	A	I	63.4	
		SNAGRIS2	22.000		2.57	56.540	1.40	0.95	3.79	A	EL	63.4	1.14	3.58	B	I	13.21	0.80	0.87	2.57	A	I	63.4	
		SNCOTTS3	27.250		1.93	52.593	1.40	0.95	2.85	A	EL	63.4	1.14	2.78	B	I	124.53	0.80	0.87	1.93	A	I	63.4	
		SNAGGRS4	34.925		1.56	54.483	1.40	0.95	2.31	A	EL	63.4	1.14	2.22	B	I	13.21	0.80	0.87	1.56	A	I	63.4	
		SNS5A	35.550		1.53	54.392	1.40	0.95	2.26	A	EL	63.4	1.14	2.21	B	I	124.53	0.80	0.87	1.53	A	I	63.4	
		SNS6A	39.950		1.39	55.531	1.40	0.95	2.04	A	EL	63.4	1.14	1.98	B	I	124.53	0.80	0.87	1.39	A	I	63.4	
		SNS7B	42.000		1.32	55.440	1.40	0.95	1.95	A	EL	63.4	1.14	1.91	B	I	124.53	0.80	0.87	1.32	A	I	63.4	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.68	55.440	1.40	0.95	2.48	A	EL	63.4	1.14	2.40	B	I	13.21	0.80	0.87	1.68	A	I	63.4	
		TNT4A	33.075		1.69	55.897	1.40	0.95	2.49	A	EL	63.4	1.14	2.36	B	I	13.21	0.80	0.87	1.69	A	I	63.4	
		TNT6A	41.600		1.36	56.576	1.40	0.95	2.01	A	EL	63.4	1.14	1.98	B	I	13.21	0.80	0.87	1.36	A	I	63.4	
		TNT7A	42.000		1.36	57.120	1.40	0.95	2.00	A	EL	63.4	1.14	1.95	B	I	124.53	0.80	0.87	1.36	A	I	63.4	
		TNT7B	42.000		1.39	58.380	1.40	0.95	2.06	A	EL	63.4	1.14	1.89	B	I	13.21	0.80	0.87	1.39	A	I	63.4	
		TNAGRIT4	43.000		1.33	57.190	1.40	0.95	1.96	A	EL	63.4	1.14	1.83	B	I	124.53	0.80	0.87	1.33	A	I	63.4	
		TNAGT5A	45.000		1.26	56.700	1.40	0.95	1.86	A	EL	63.4	1.14	1.78	B	I	13.21	0.80	0.87	1.26	A	I	63.4	
		TNAGT5B	45.000	(3)	1.26	56.700	1.40	0.95	1.85	A	EL	63.4	1.14	1.74	B	I	124.53	0.80	0.87	1.26	A	I	63.4	

LOAD FACTORS:

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

NOTES:

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

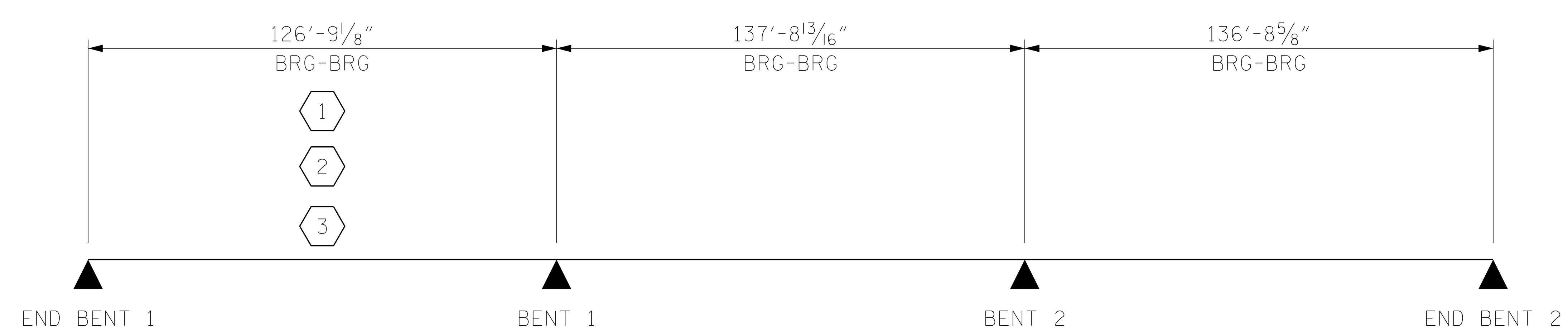
ALLOWABLE STRESSES FOR SERVICE III LIMIT STATE ARE AS REQUIRED FOR DESIGN.

COMMENTS:

1. TRANSFORMING ALL PRESTRESSING TENDONS.
2.
3.
4.

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

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



LRFR SUMMARY

SECTION PROPERTIES SPAN A & B - INTERIOR	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	74	82.75
AREA	IN^2	885.1	1707.6
Ixx	IN^4	640172	1390848
Ycg	IN	36.56	56.70
SELF WT.	PLF	922.0	2207.1
EFF. WIDTH	IN	-	141.0

SECTION PROPERTIES PROVIDED AT MIDSPAN

SECTION PROPERTIES SPAN A - EXTERIOR	UNITS	NON-COMPOSITE	COMPOSITE
HEIGHT	IN	74	82.75
AREA	IN^2	885.1	1586.8
Ixx	IN^4	640172	1329038
Ycg	IN	36.56	55.05
SELF WT.	PLF	922.0	2018.5
EFF. WIDTH	IN	-	120.3

SECTION PROPERTIES PROVIDED AT MIDSPAN

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

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3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-5
1			3			TOTAL SHEETS
2			4			36

STR. #2

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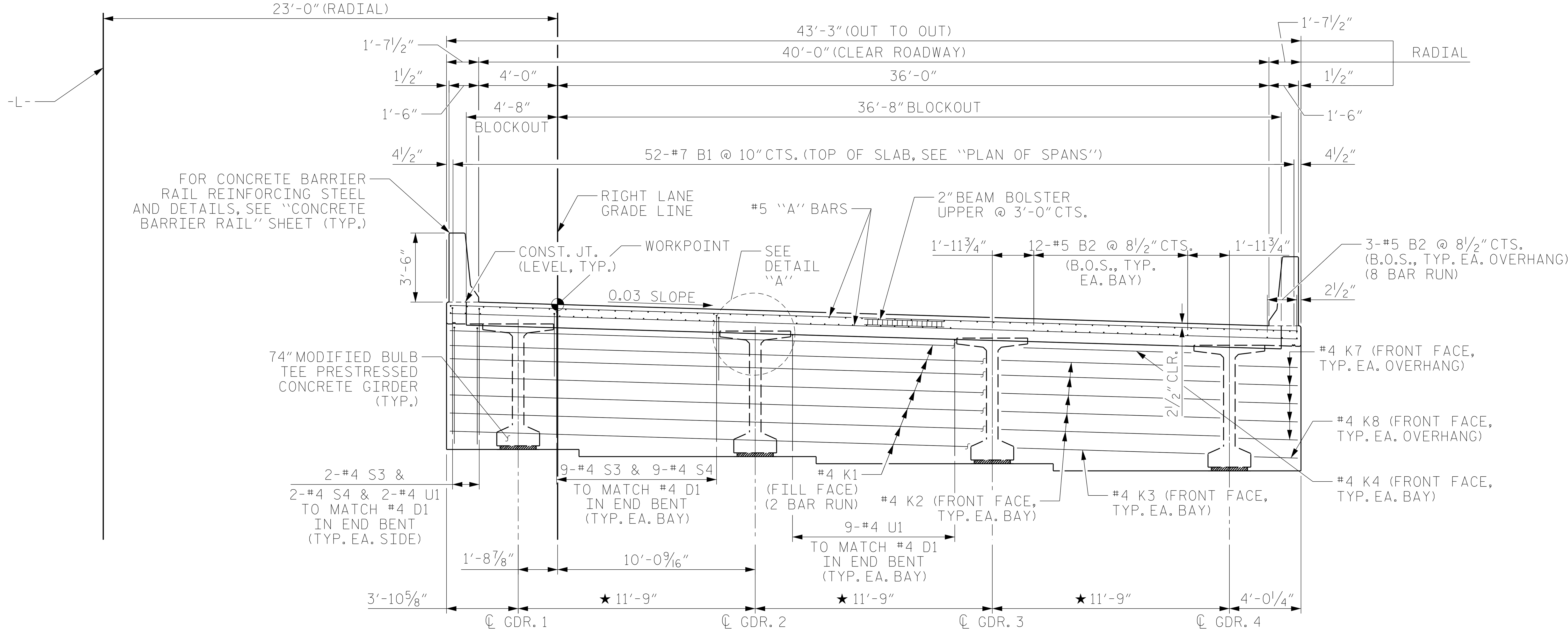


TYPICAL SECTION AT INTEGRAL END BENTS

END BENT 1 SHOWN, END BENT 2 SIMILAR

★ DIMENSIONS ARE PARALLEL TO SHORT CHORD OF RESPECTIVE SPAN

NOTES

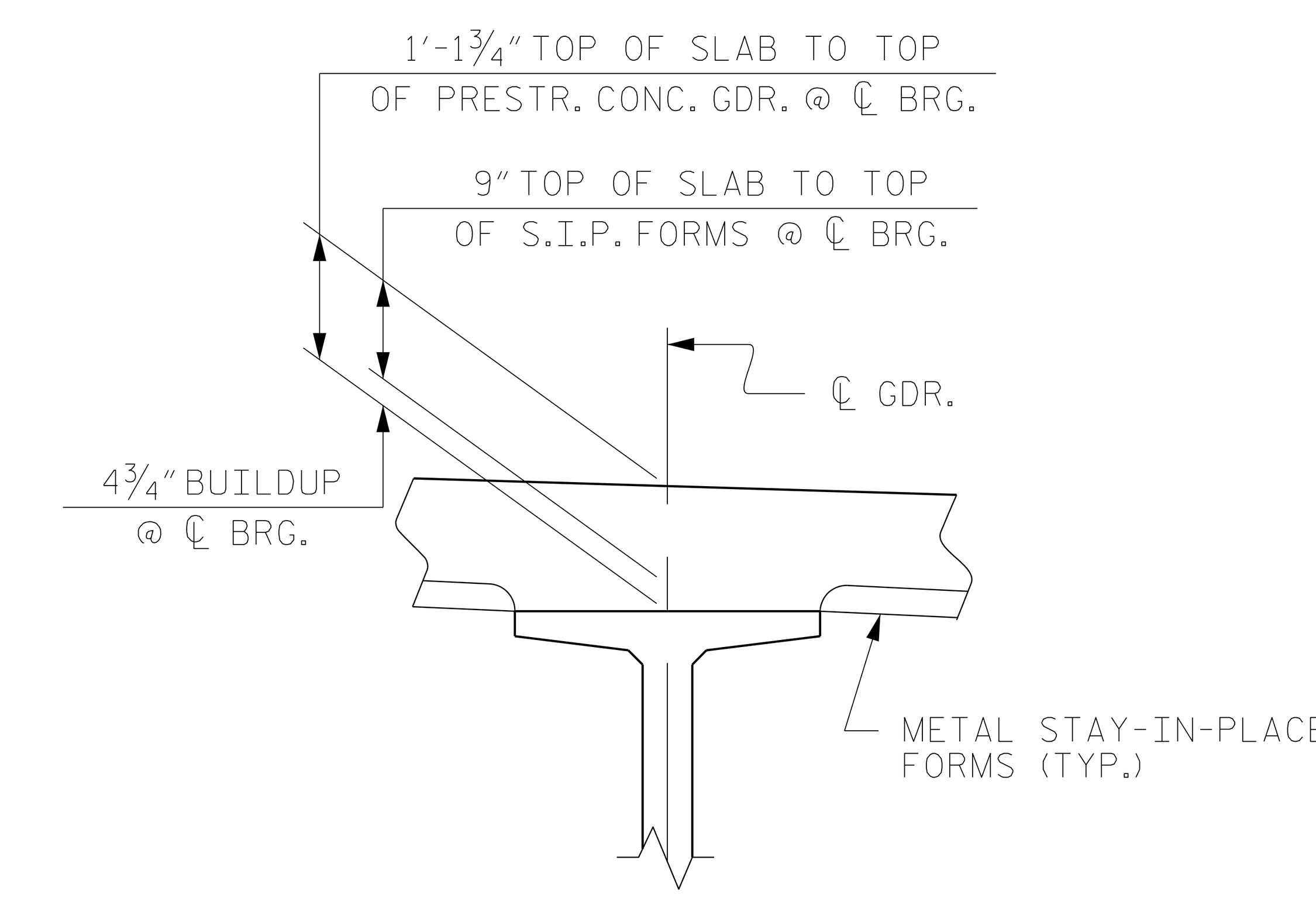
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE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

LONGITUDINAL REINFORCING STEEL ('B' BARS) MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

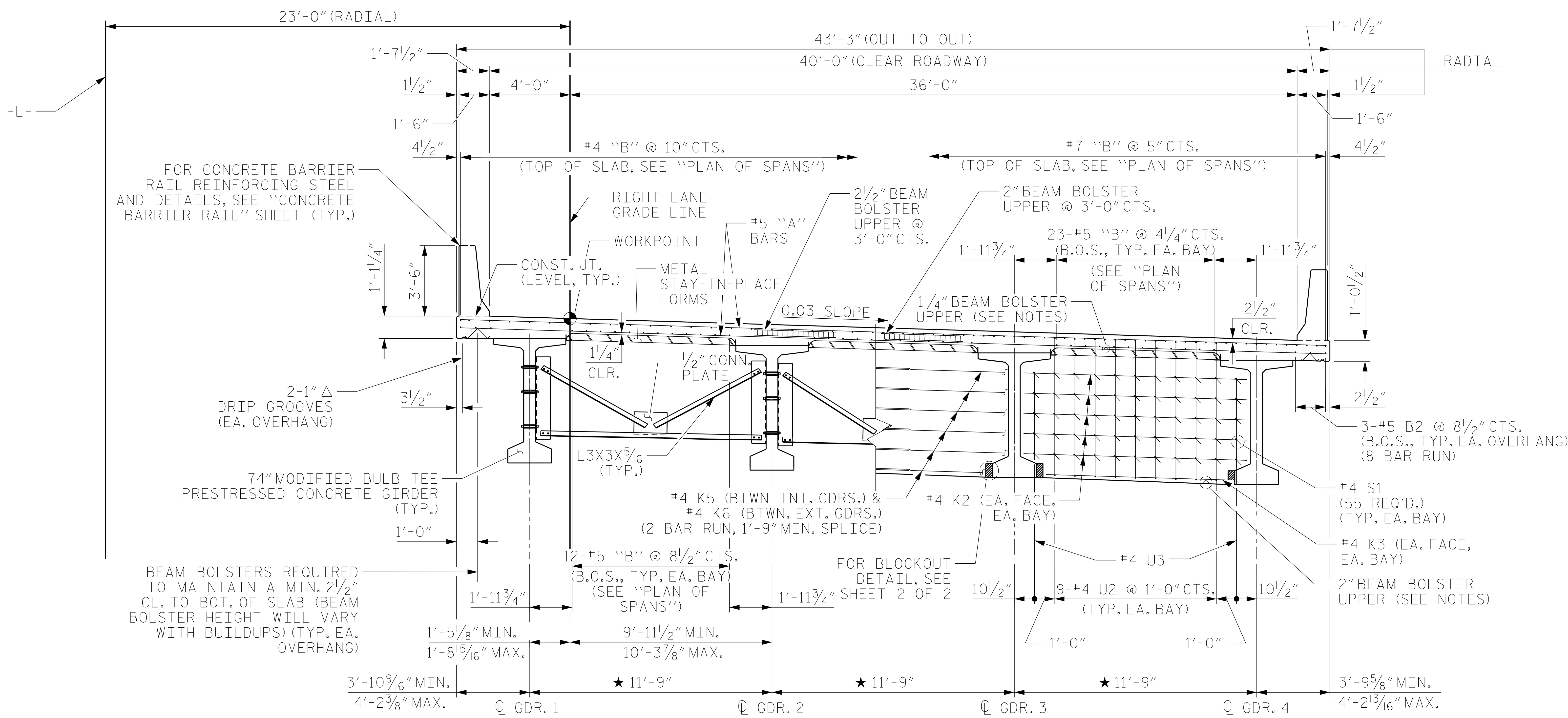
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

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

B.O.S. = BOTTOM OF SLAB



DETAIL "A"



SECTION AT INTERMEDIATE DIAPHRAGM — SECTION AT CONTINUOUS BENT DIAPHRAGM

TYPICAL SECTION

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — JUSTIN MARK ROBINSON — 3/9/2017

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STATE OF NORTH CAROLINA
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SUPERSTRUCTURE

TYPICAL SECTION

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-6
1			3			TOTAL SHEETS
2			4			36

STR. #2

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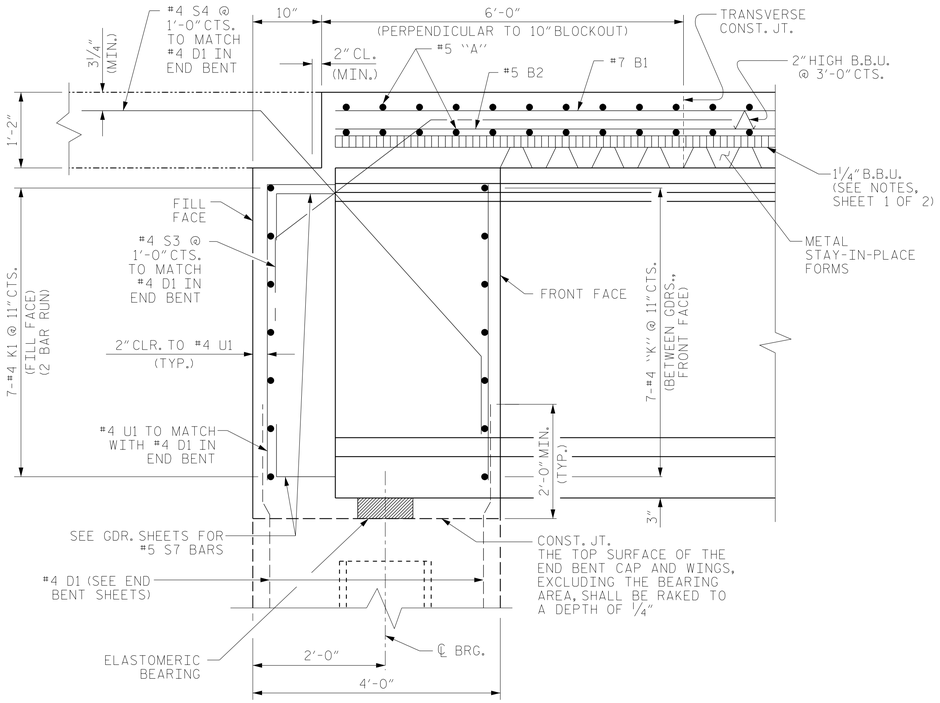
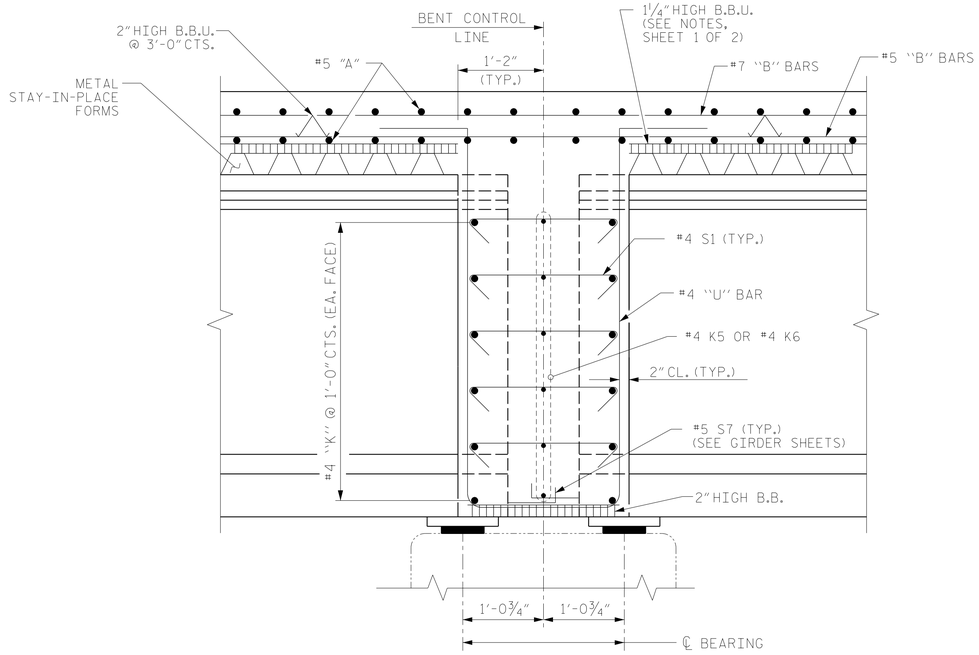
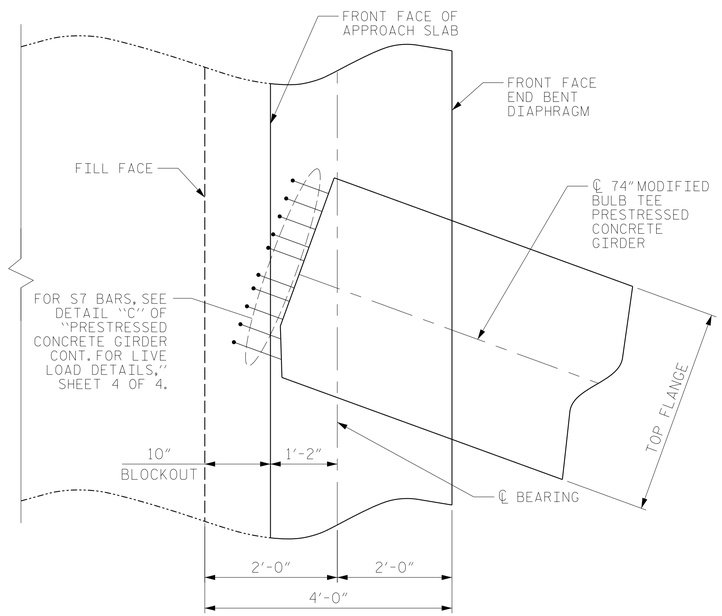


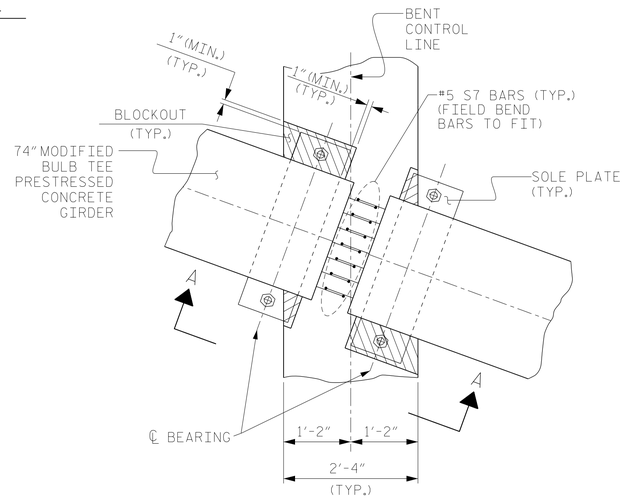
SECTION THRU INTEGRAL END BENT



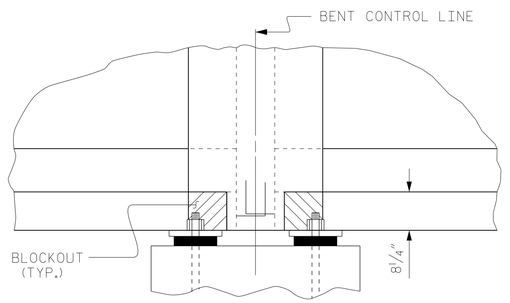
SECTION THRU CONTINUOUS BENT DIAPHRAGM



PLAN OF GIRDER @ INTEGRAL END BENT



PLAN VIEW



SECTION A-A

BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-7
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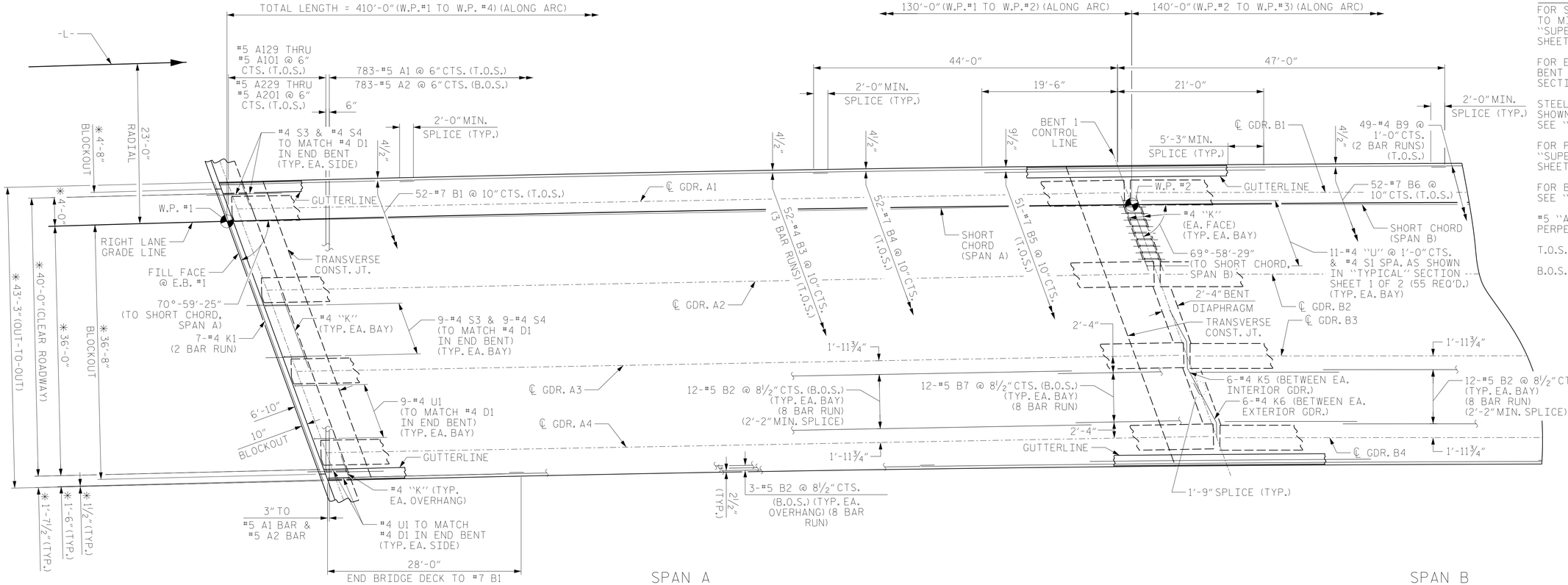
STR. #2



SPAN A

SPAN B

NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

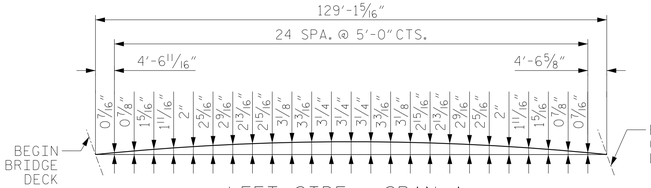
#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S. = TOP OF SLAB

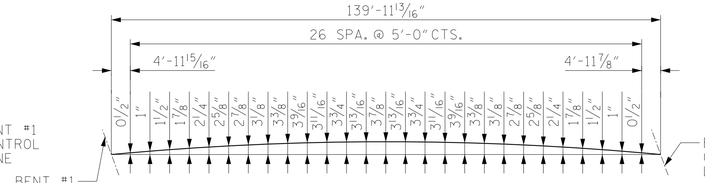
B.O.S. = BOT. OF SLAB

PARTIAL PLAN OF SPANS

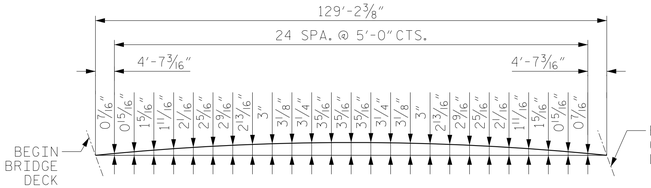
✳ RADIAL DIMENSIONS



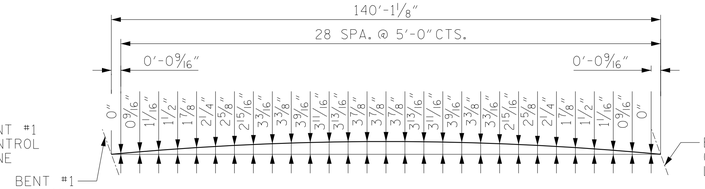
LEFT SIDE - SPAN A



LEFT SIDE - SPAN B

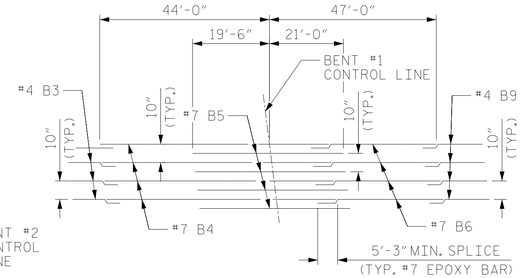


RIGHT SIDE - SPAN A

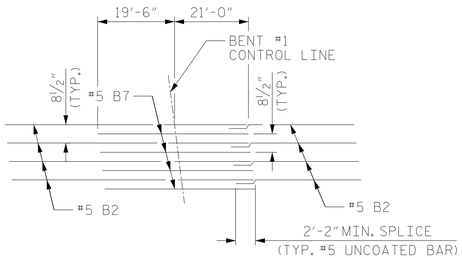


RIGHT SIDE - SPAN B

ARC OFFSETS



TOP OF SLAB REINFORCING STEEL LAYOUT



BOTTOM OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039212 ENGINEER MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-8
1			3			TOTAL SHEETS
2			4			36

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leblancm

STR. #2

NOTES

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION DETAILS" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.

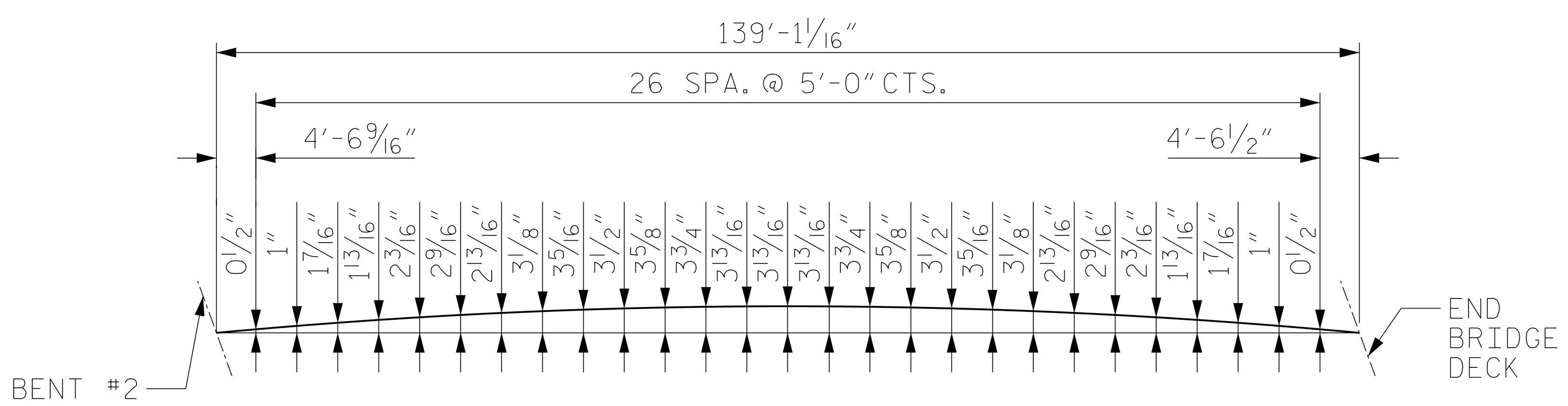
#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S. = TOP OF SLAB

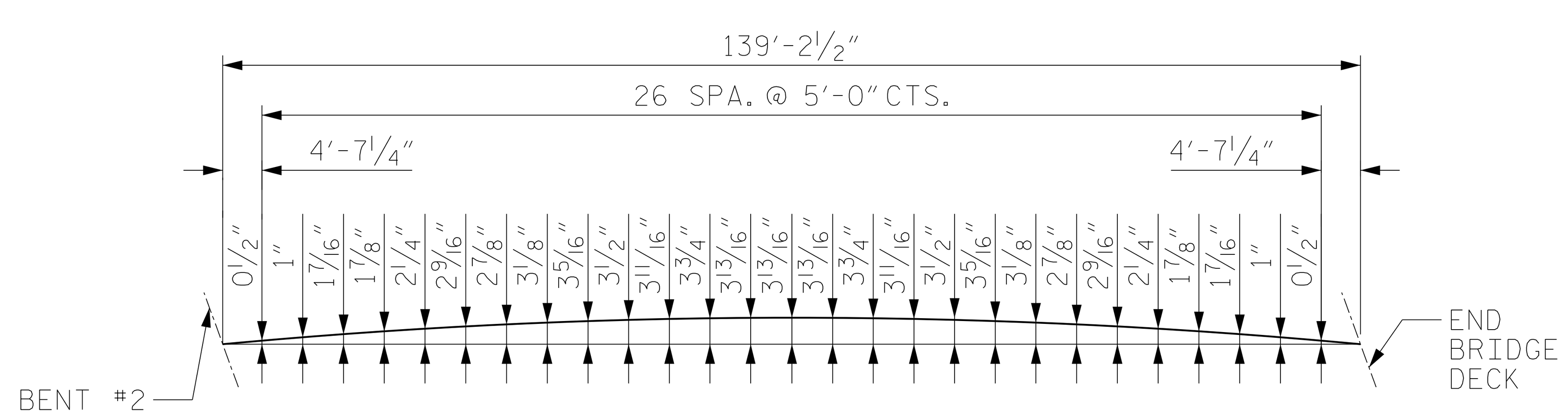
B.O.S. = BOT. OF SLAB

PARTIAL PLAN OF SPANS

∗ RADIAL DIMENSIONS

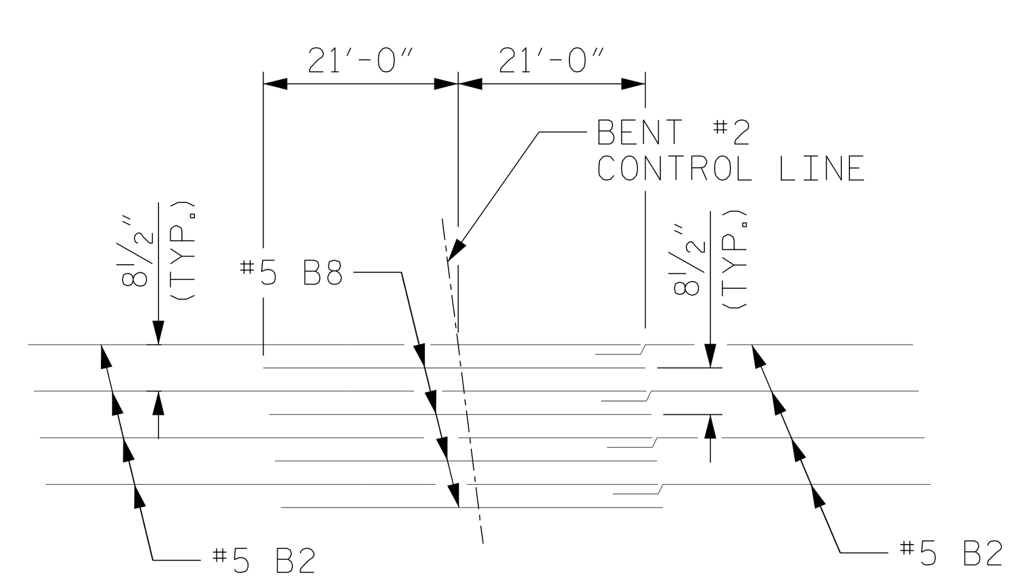


LEFT SIDE - SPAN C

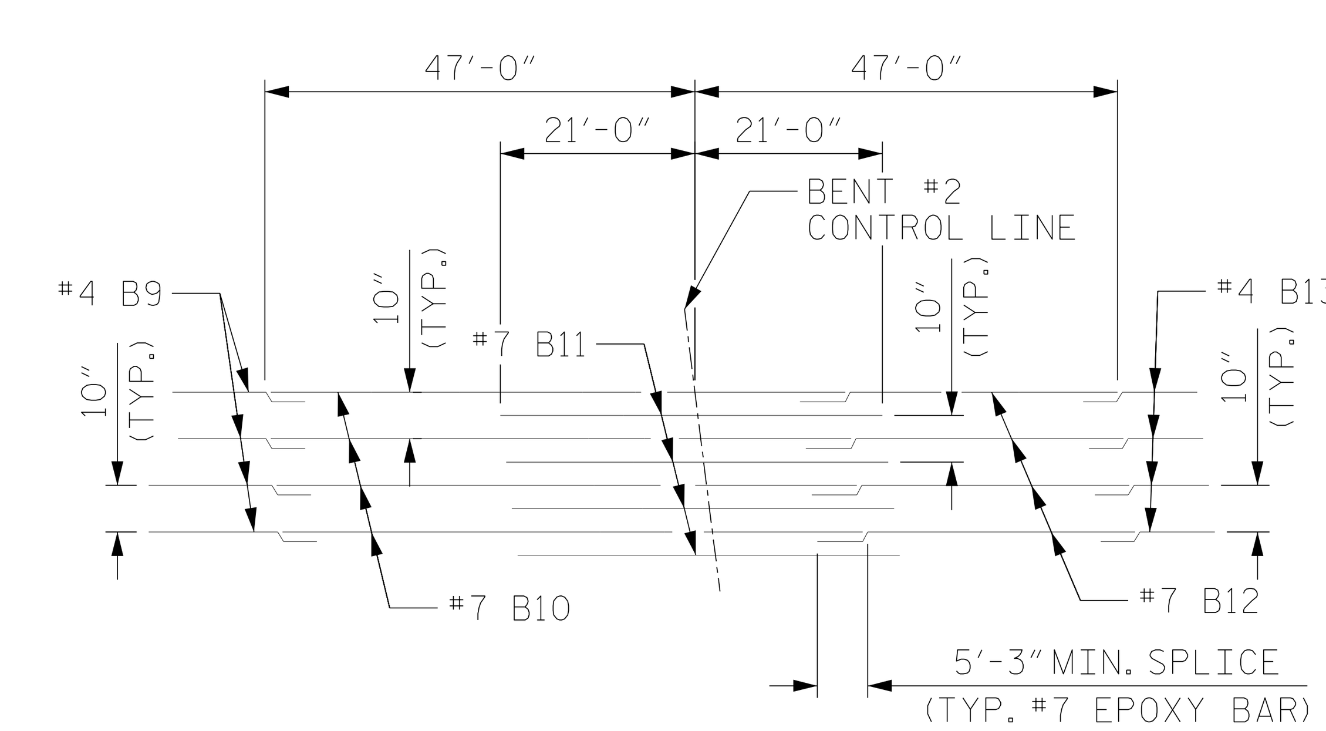


RIGHT SIDE - SPAN C

ARC OFFSETS



BOTTOM OF SLAB REINFORCING STEEL LAYOUT



TOP OF SLAB REINFORCING STEEL LAYOUT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

SEAL 036447 — JUSTIN MARK ROBINSON — NORTH CAROLINA PROFESSIONAL ENGINEER — 3/9/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

PLAN OF SPANS

RIGHT LANE

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S2-9
1			3					TOTAL SHEETS
2			4					36

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leblancm

FRAMING PLAN

END BENT DIAPHRAGMS & BENT DIAPHRAGMS ARE NOT SHOWN

DIMENSIONS TO INTERMEDIATE DIAPHRAGM LOCATIONS ARE SHOWN ON GIRDER SHEETS

ALL DIMENSIONS ARE TO THE FILL FACE OR CONTROL LINE OF EACH BENT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER — MARTIN MARK ROBINSON — 3/9/2017

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DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

FRAMING PLAN SPANS A, B & C

RIGHT LANE

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2			4				36

STR. #2

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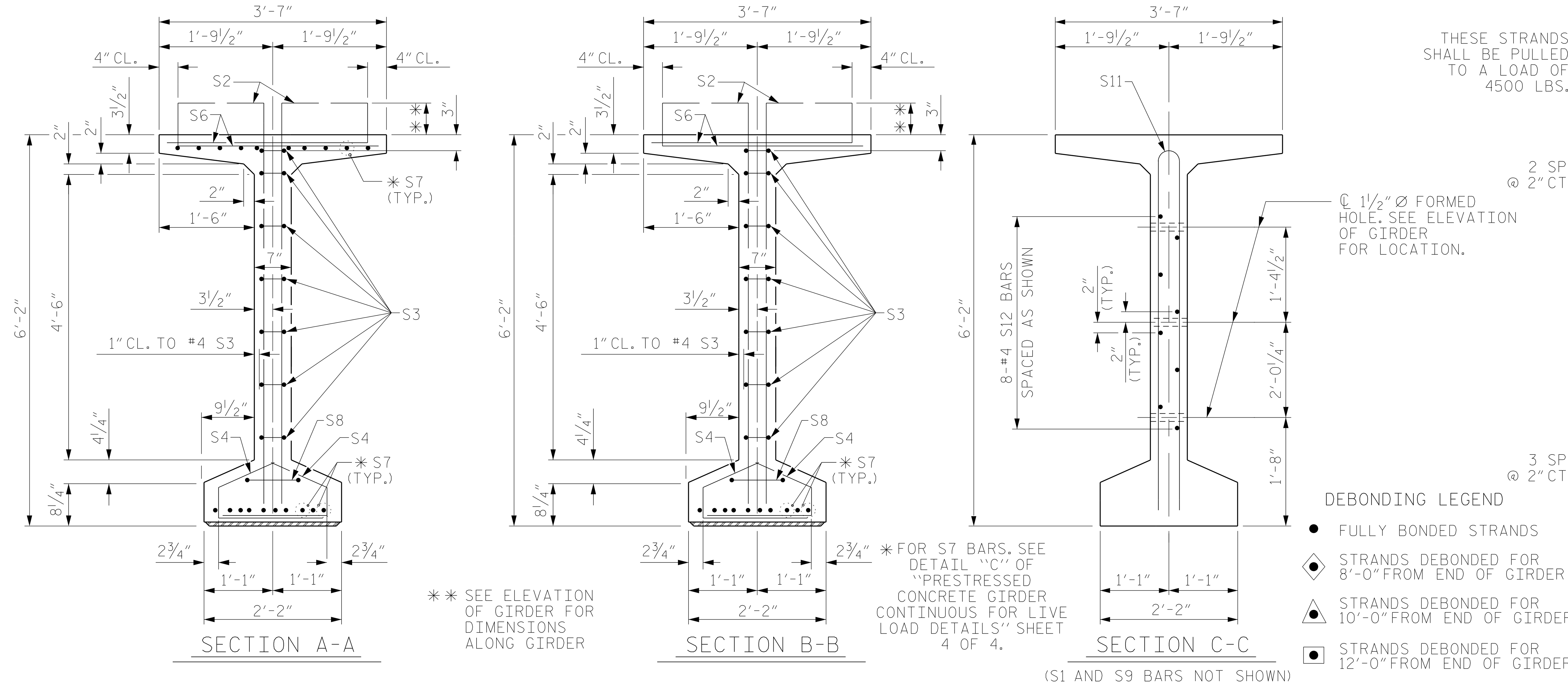
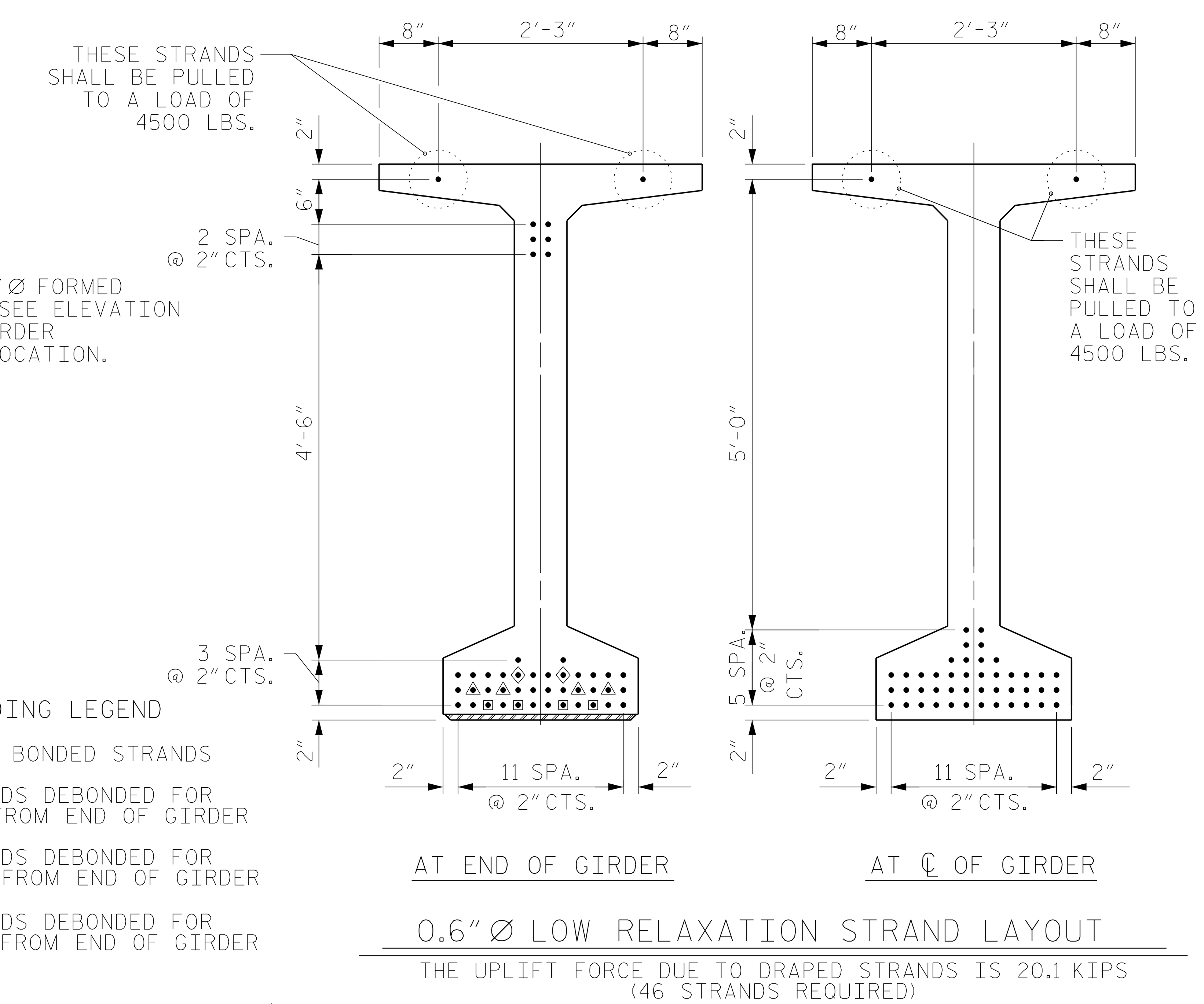




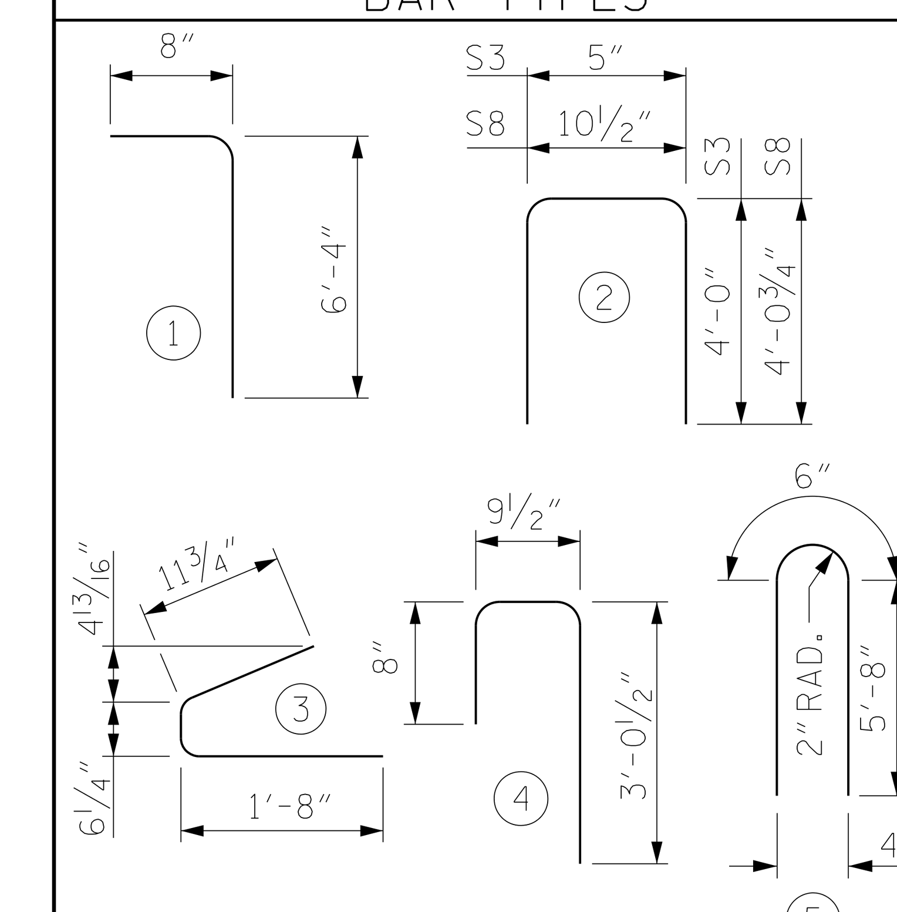
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

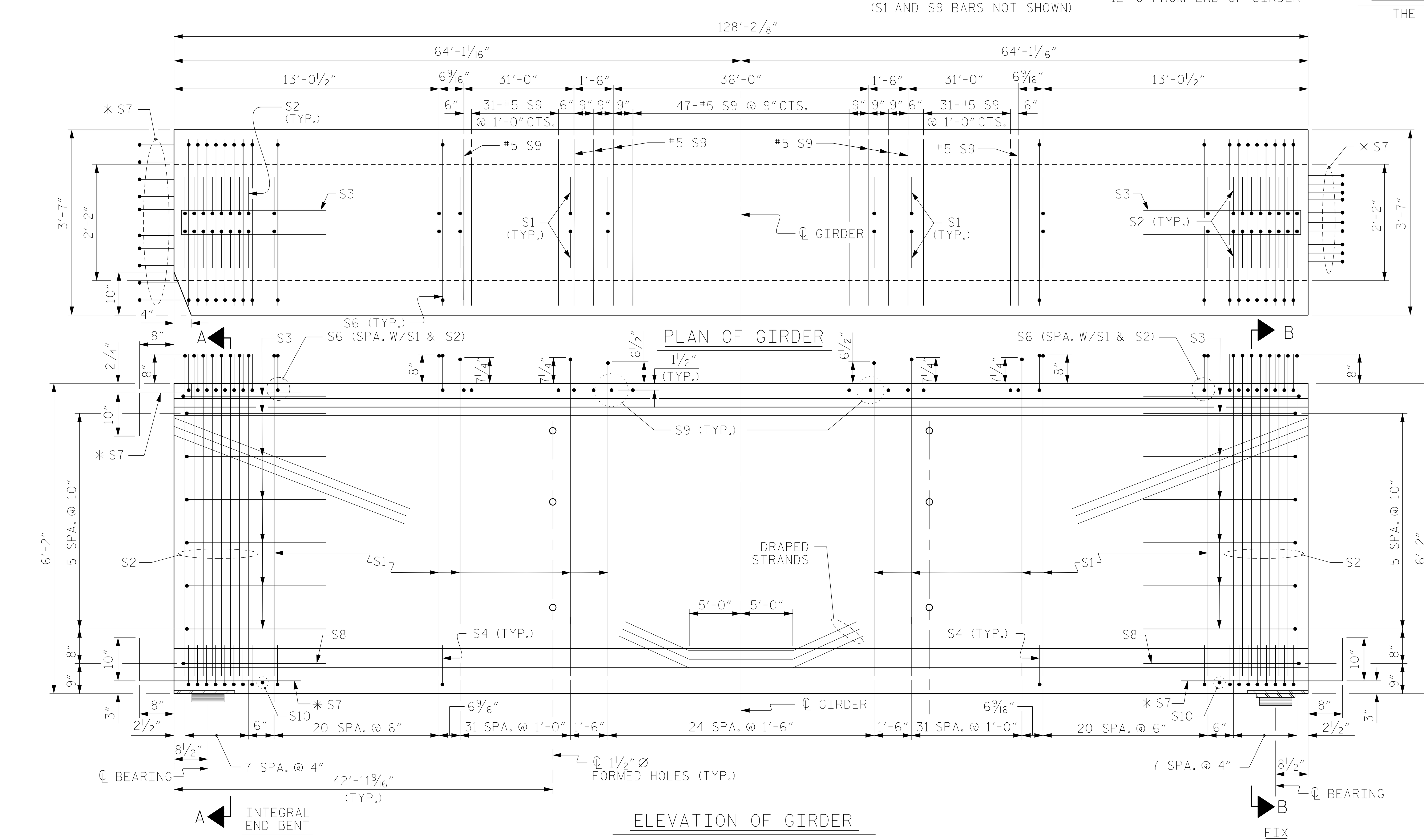
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	262	#4	1	7'-0"	1225
S2	32	#5	1	7'-0"	234
S3	14	#4	2	8'-5"	79
S4	116	#4	3	3'-2"	245
S6	116	#5	4	4'-6"	544
* S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	117	#5	STR	3'-3"	397
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

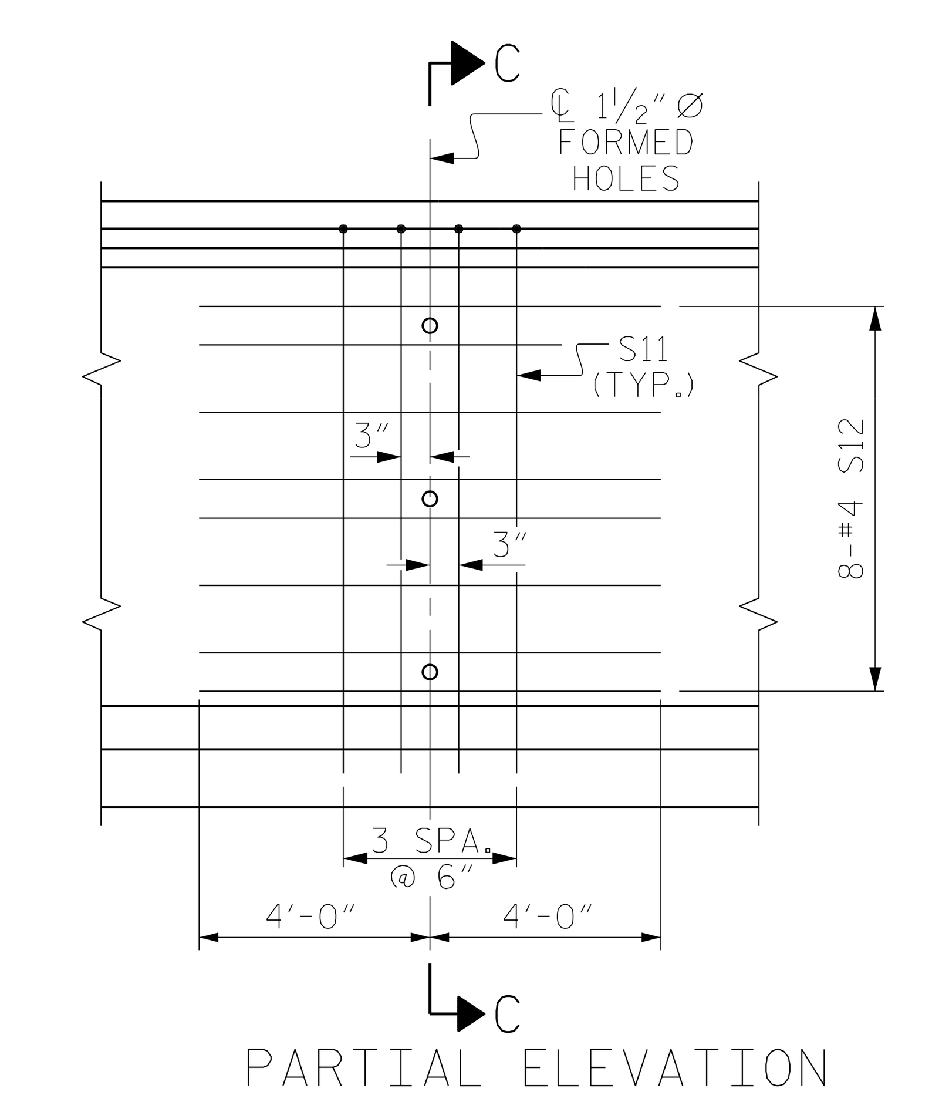
* NOTE: S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT





QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	9000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
	3044	29.2	46

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	128'-2⅛"	512'-8½"

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74" PRESTRESSED CONCRETE MODIFIED BULB TEE
CONTINUOUS FOR LIVE LOAD
SPAN A
RIGHT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — MARK ROBINSON
3/9/2017

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1			3			TOTAL SHEETS
2			4			36

STR. #2

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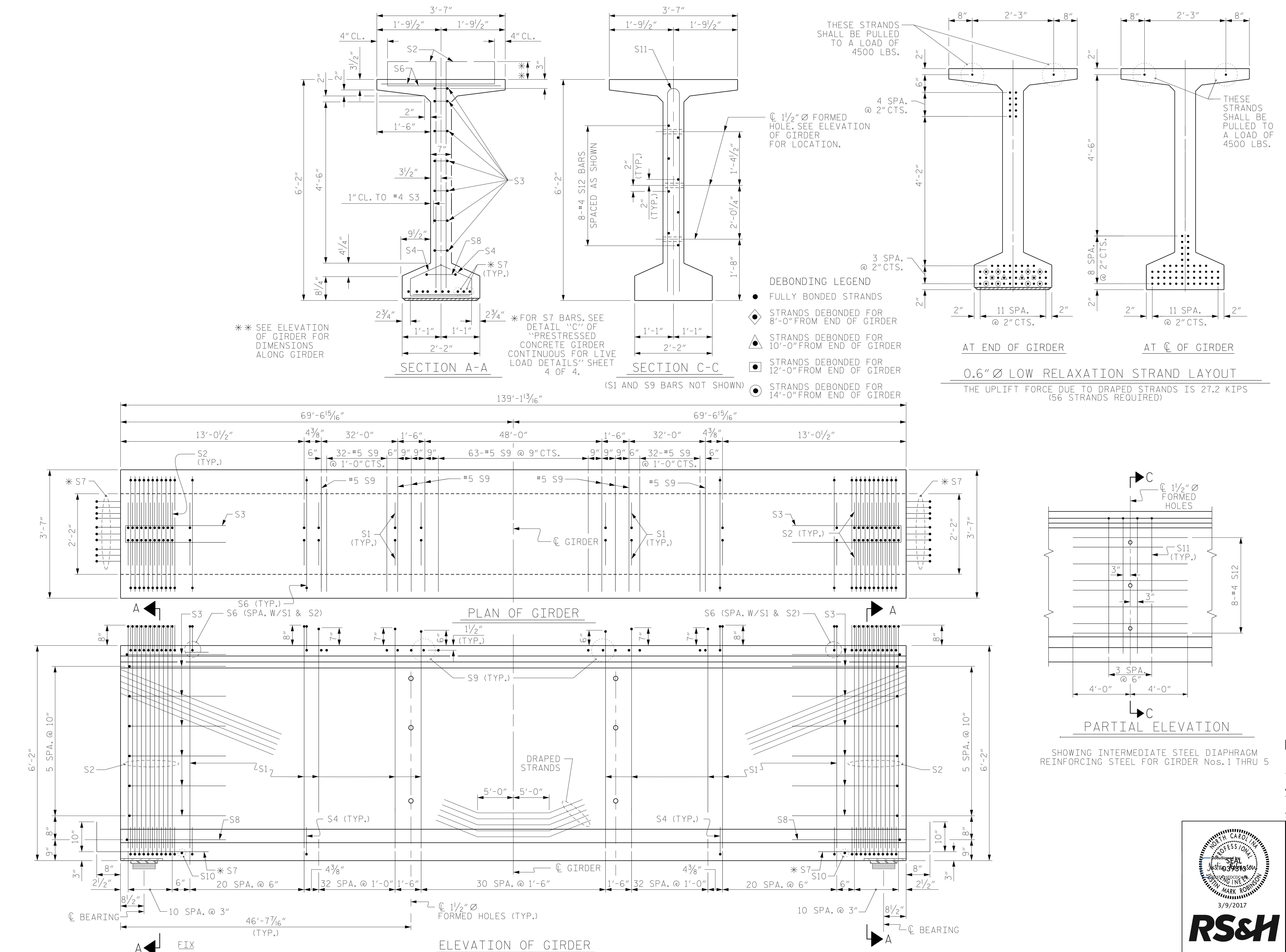
leblancm



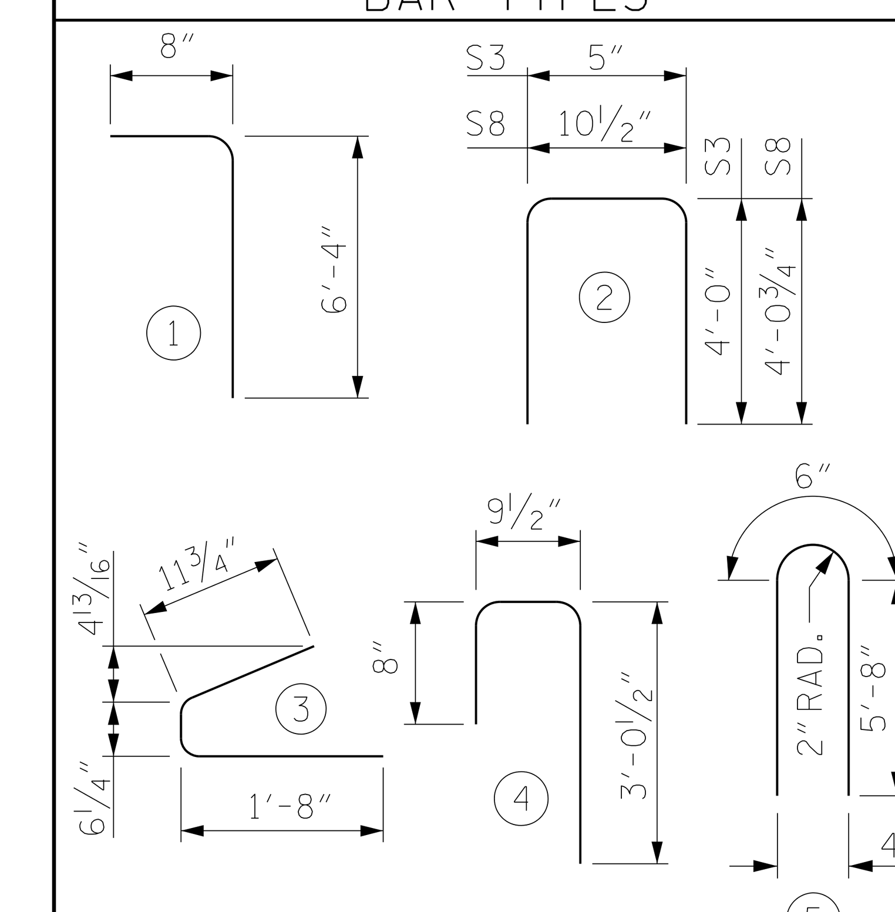
0.6" Ø L.R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	278	#4	1	7'-0"	1300
S2	44	#5	1	7'-0"	321
S3	14	#4	2	8'-5"	79
S4	116	#4	3	3'-2"	245
S6	128	#5	4	4'-6"	601
* S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S9	135	#5	STR	3'-3"	458
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

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

BAR TYPES



QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	9000 PSI CONCRETE	0.6" Ø L.R. STRANDS
LB.	C.Y.	No.
3285	31.7	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	139'-1 13/16"	556'-7 1/4"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74" PRESTRESSED CONCRETE MODIFIED BULB TEE
CONTINUOUS FOR LIVE LOAD
SPAN B
RIGHT LANE

SEAL 039316 — NORTH CAROLINA PROFESSIONAL ENGINEER — JUSTIN MARK ROBINSON
3/9/2017

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1			3				
2			4				

SHEET NO. S2-12
TOTAL SHEETS 36

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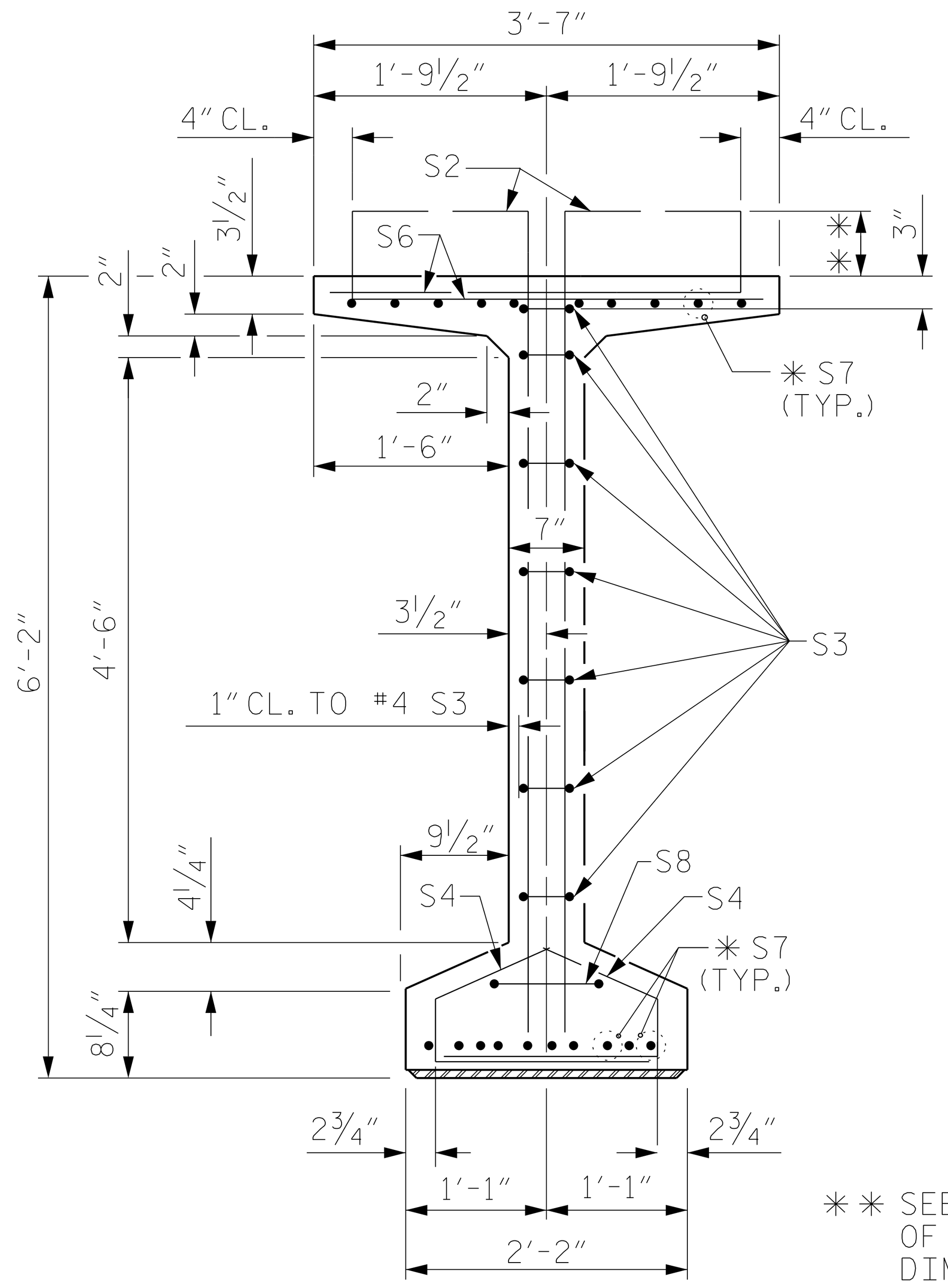
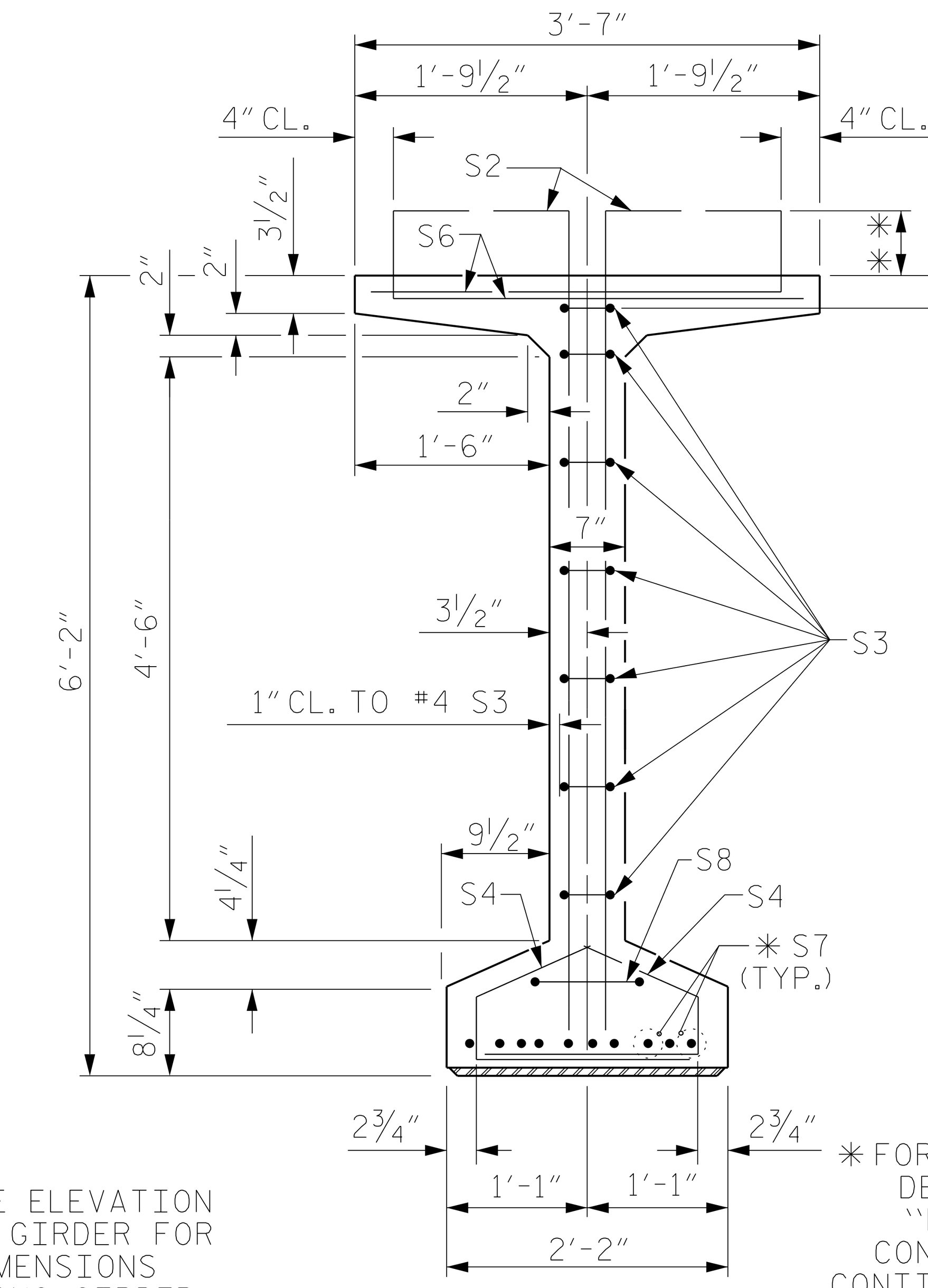
STR. #2



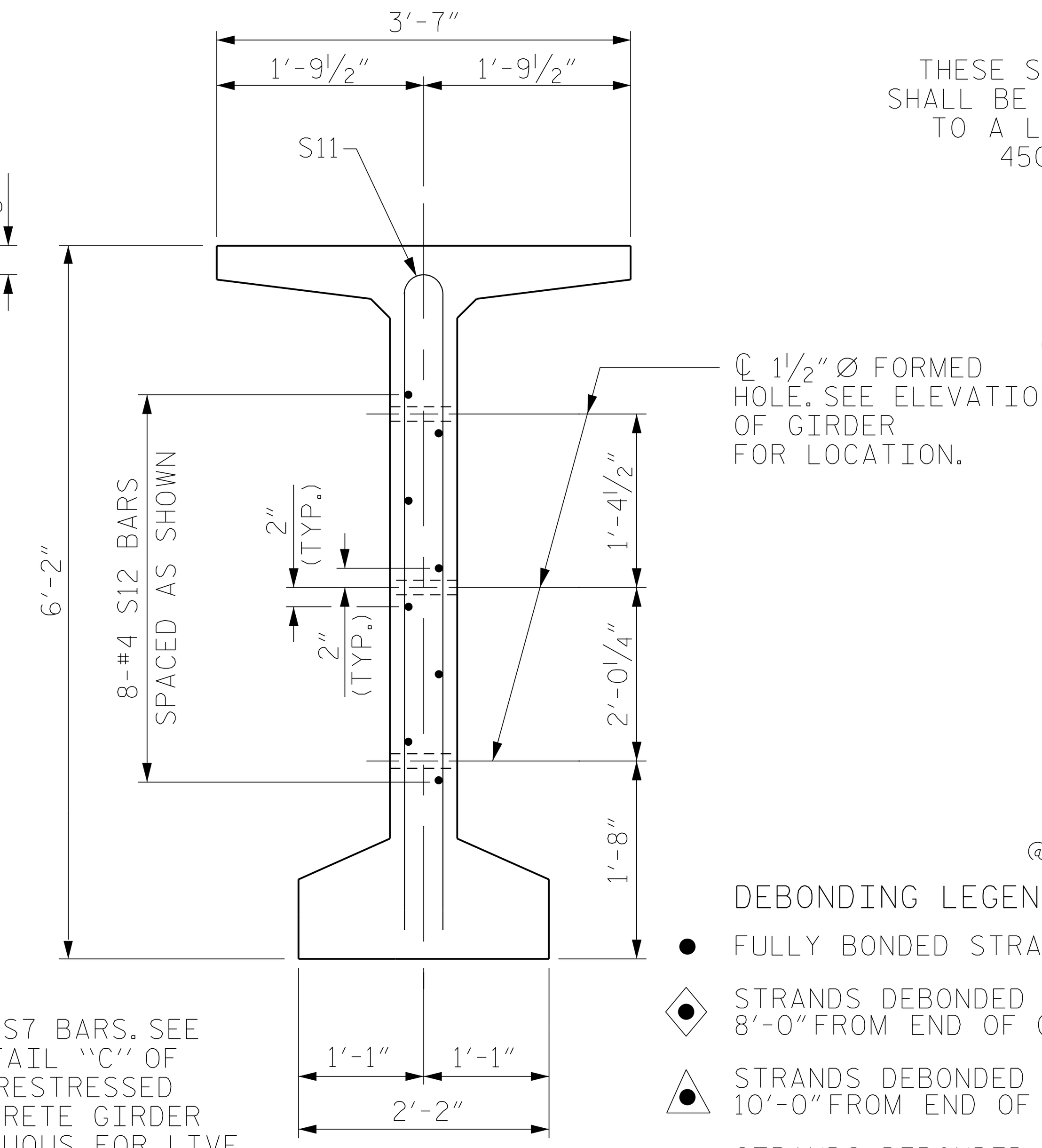
SECTION A-A



SECTION B-B

✱✱ SEE ELEVATION OF GIRDER FOR DIMENSIONS ALONG GIRDER

✱ FOR S7 BARS, SEE DETAIL "C" OF "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET 4 OF 4.

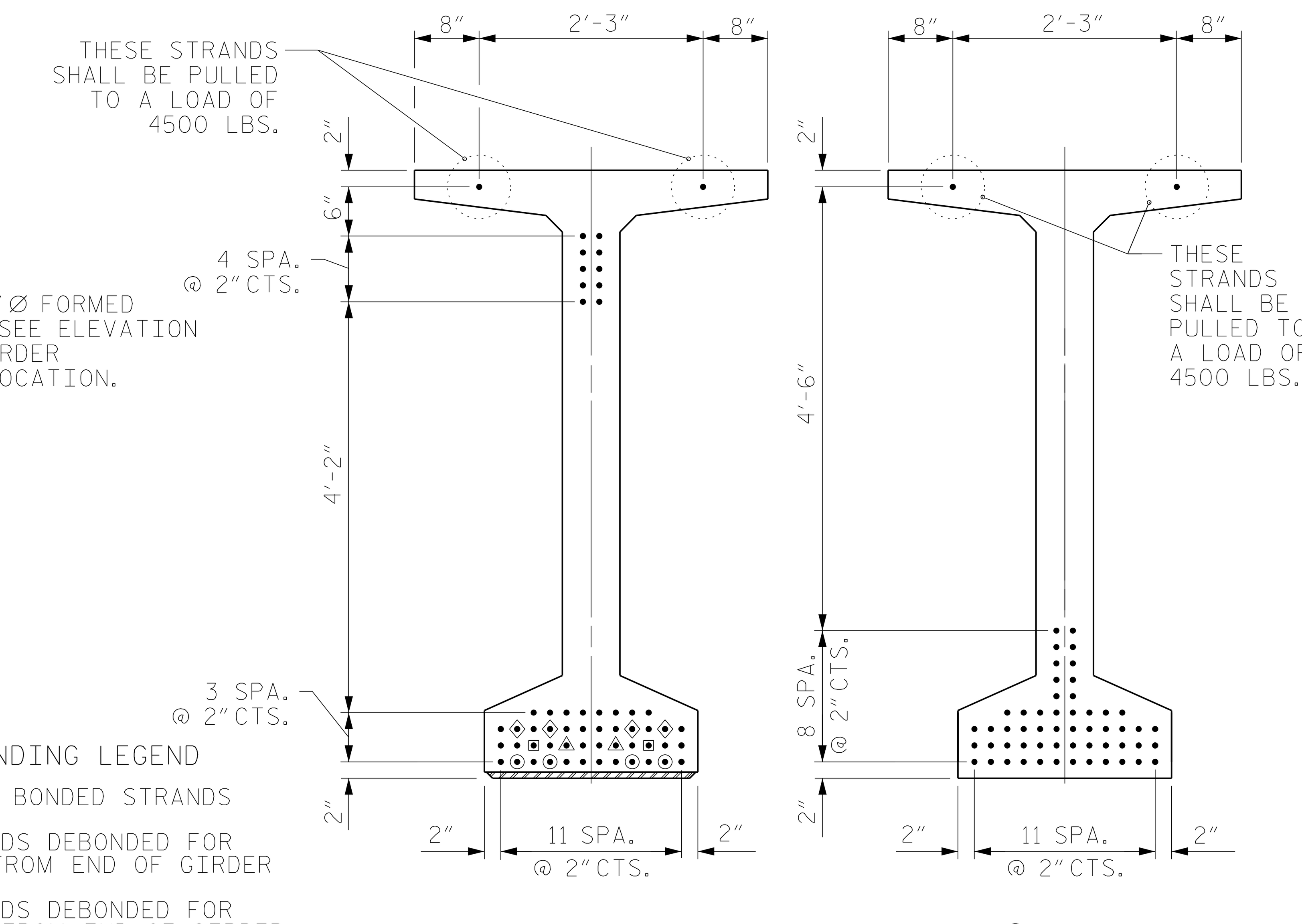


SECTION C-C

(S1 AND S9 BARS NOT SHOWN)

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ◈ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ■ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT

THE UPLIFT FORCE DUE TO DRAPED STRANDS IS 27.4 KIPS (56 STRANDS REQUIRED)

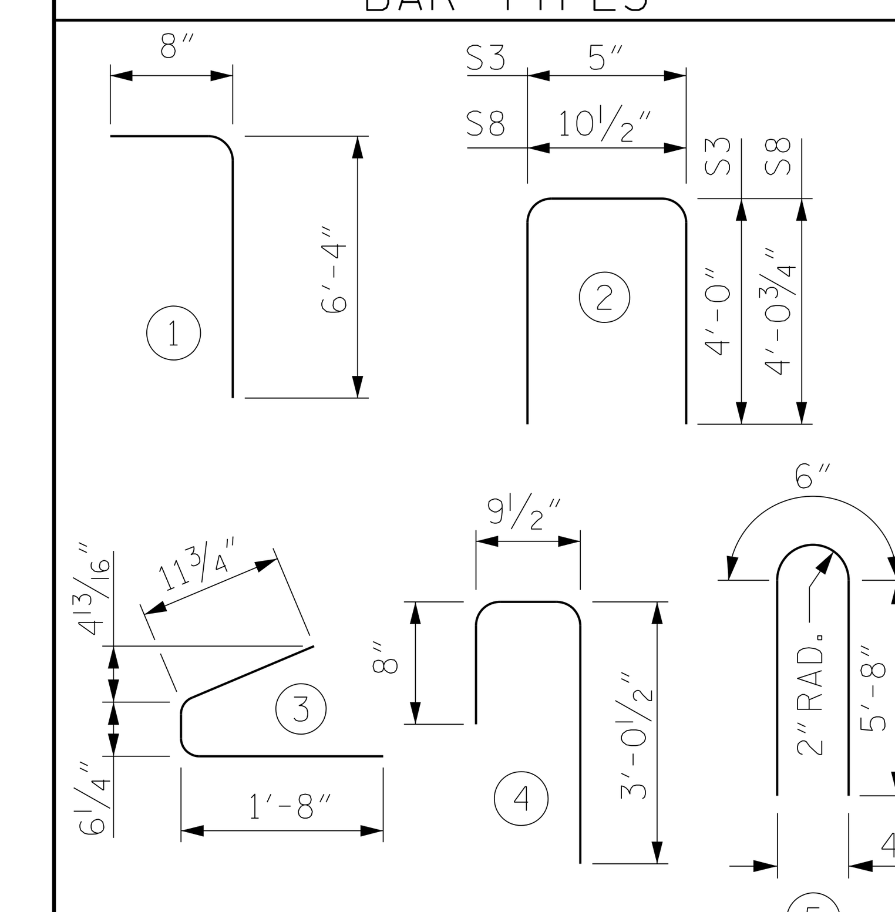
0.6" Ø L.R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

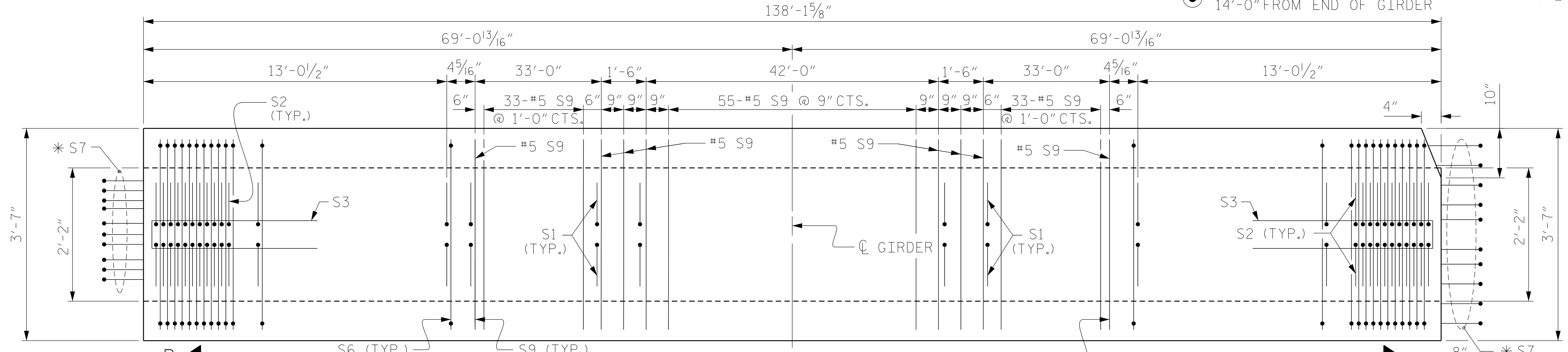
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	278	#4	1	7'-0"	1300
S2	44	#5	1	7'-0"	321
S3	14	#4	2	8'-5"	79
S4	116	#4	3	3'-2"	245
S6	128	#5	4	4'-6"	601
✱ S7	30	#5	STR	3'-8"	115
S8	2	#5	2	9'-0"	19
S9	129	#5	STR	3'-3"	437
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-10"	99
S12	16	#4	STR	8'-0"	86

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

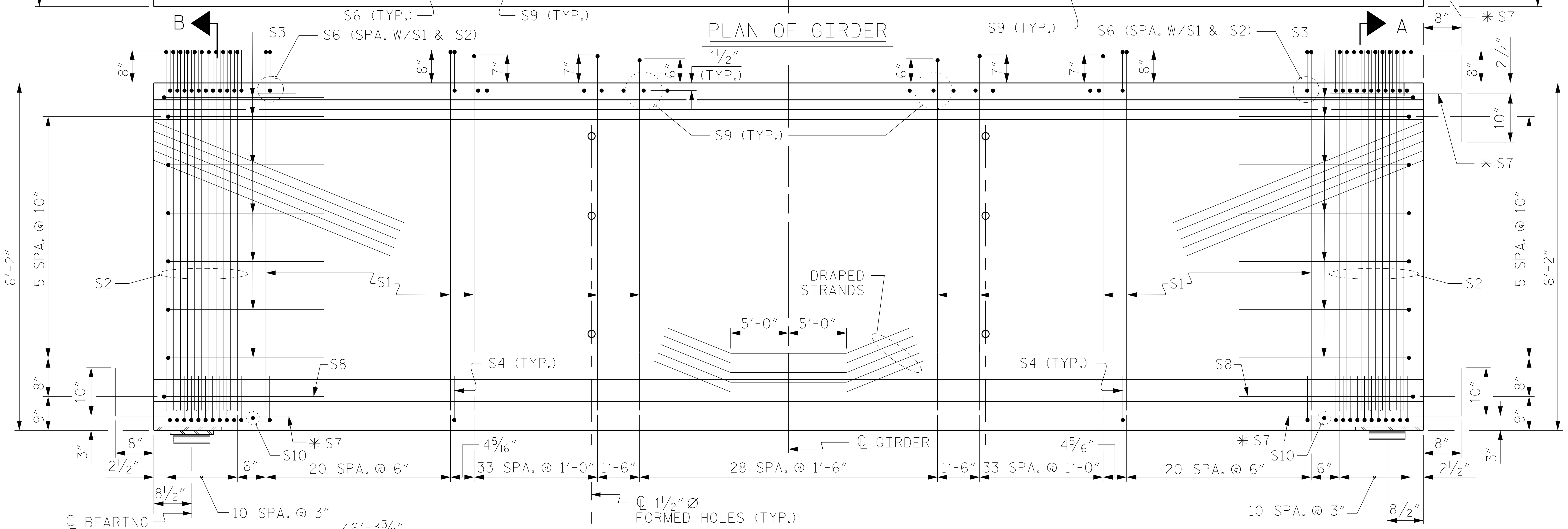
BAR TYPES



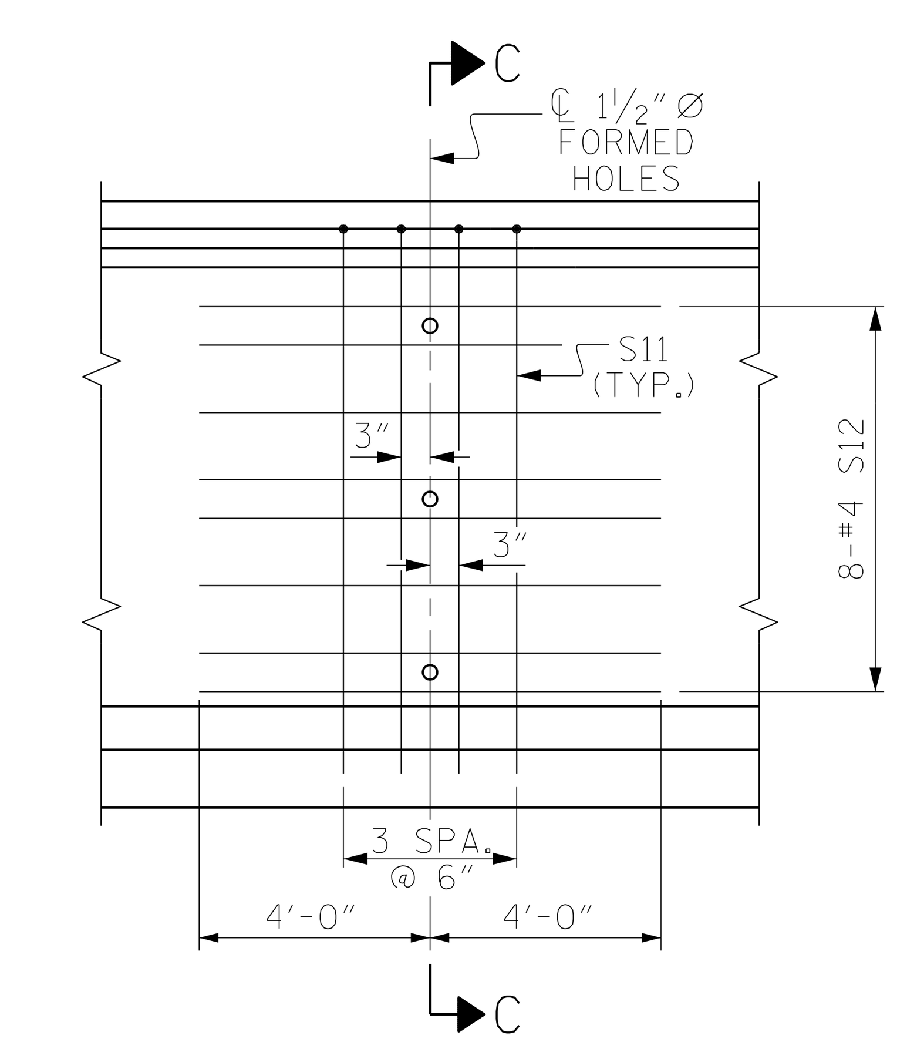
ALL BAR DIMENSIONS ARE OUT-TO-OUT



PLAN OF GIRDER



ELEVATION OF GIRDER



PARTIAL ELEVATION

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

QUANTITIES FOR ONE GIRDER

REINFORCING STEEL	9000 PSI CONCRETE	0.6" Ø L.R. STRANDS
LB.	C.Y.	No.
3303	31.4	56

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	138'-1⅝"	552'-6½"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 3 OF 4

SEAL 039313 — JUSTIN MARK ROBINSON — 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
74" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD
SPAN C
RIGHT LANE

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

SHEET NO. S2-13
TOTAL SHEETS 36

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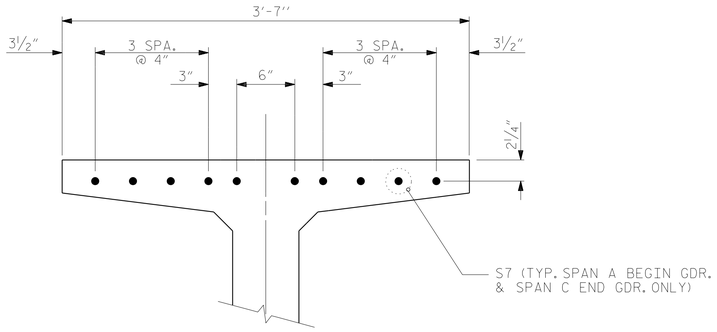
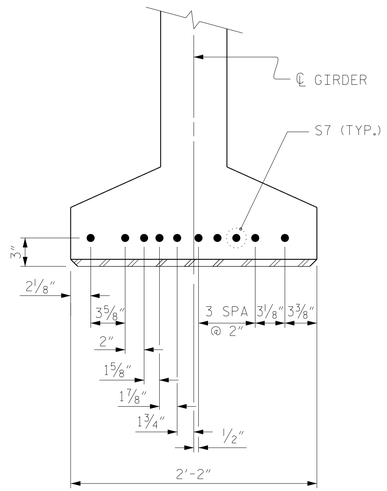
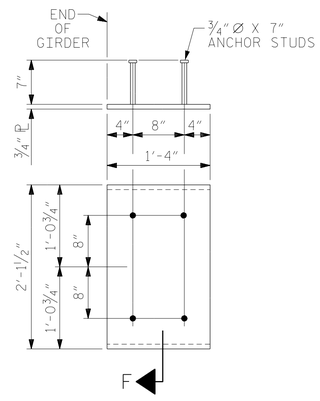


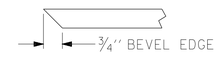


DETAIL "C"



EMBEDDED PLATE "B-1" DETAILS FOR 74" MODIFIED PRESTRESSED CONCRETE GIRDER

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

EMBEDDED PLATE "B-1" SHALL BE GALVANIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

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 7200 PSI FOR SPAN A AND 7700 PSI FOR SPANS B AND C.

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

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

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

A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 74" MODIFIED PRESTRESSED CONCRETE GIRDER.

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

ASSEMBLED BY :	PDS	DATE :	11/2016
CHECKED BY :	TLC	DATE :	01/2017
DRAWN BY : ELR 11/91	REV. 10/1/11		MAA/GM
CHECKED BY : GRP 11/91	REV. 1/15		MAA/TMG
	REV. 2/15		MAA/TMG

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON

Digitally signed by Justin Robinson

3/20/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-14
1			3			TOTAL SHEETS
2			4			36

STD. NO. PCG9 STR. #2

3/20/2017
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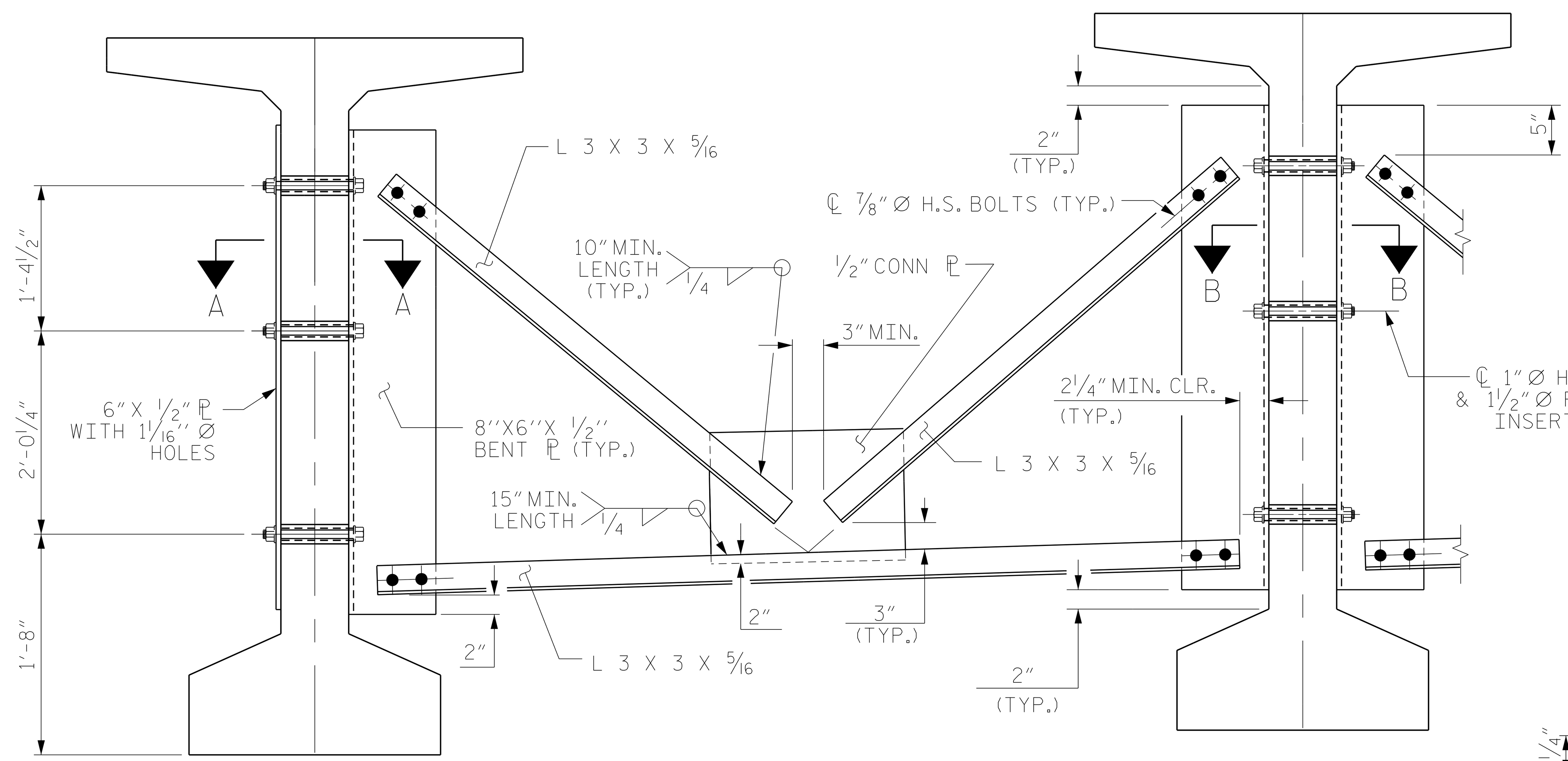
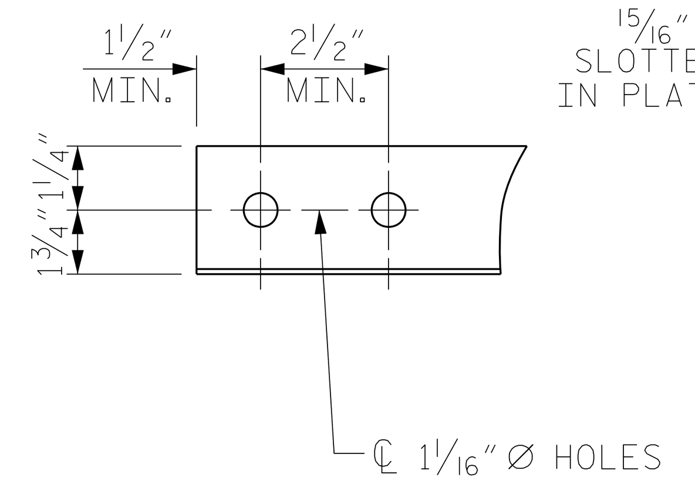
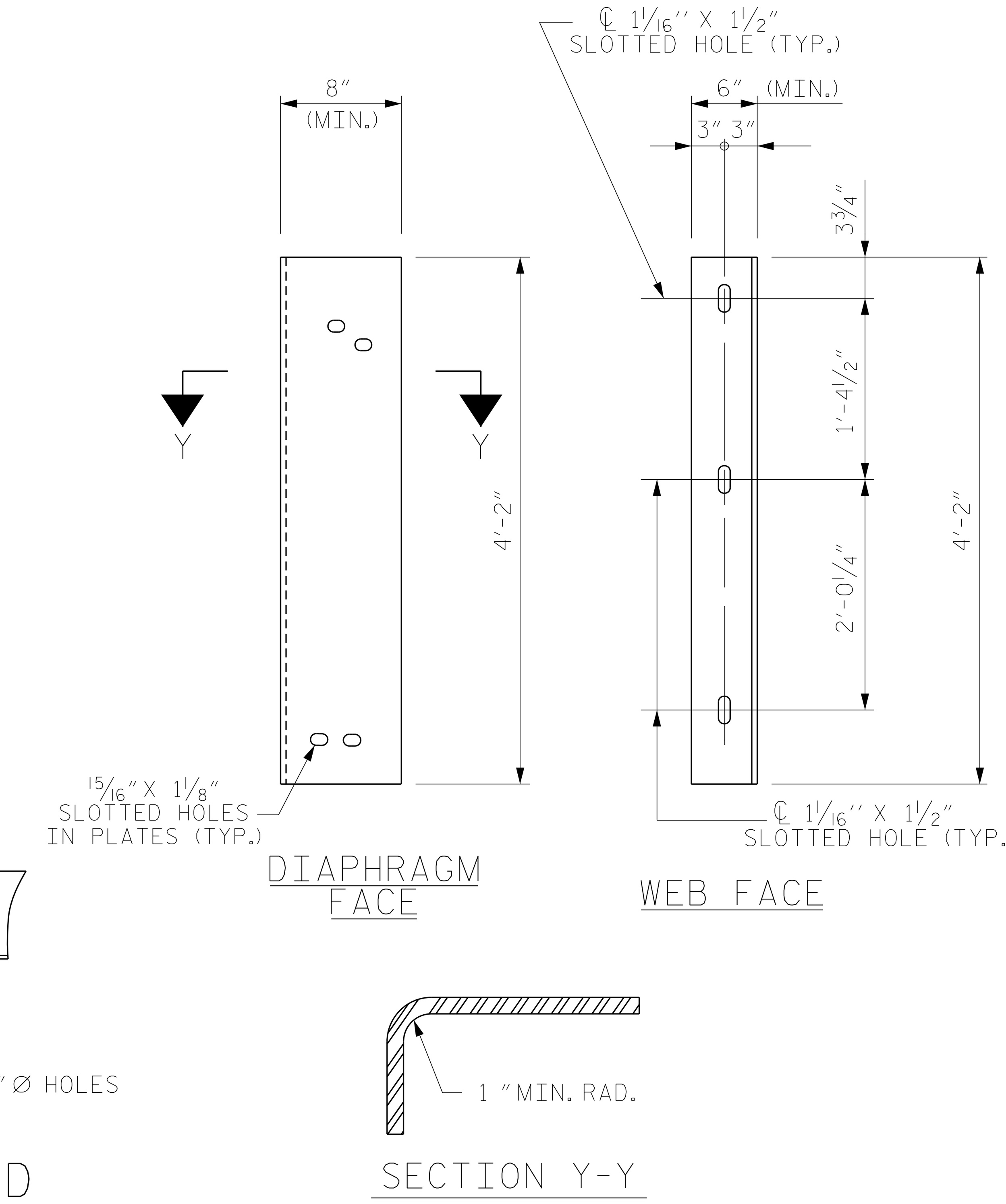


PART SECTION AT INTERMEDIATE DIAPHRAGM



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



CONNECTOR PLATE DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

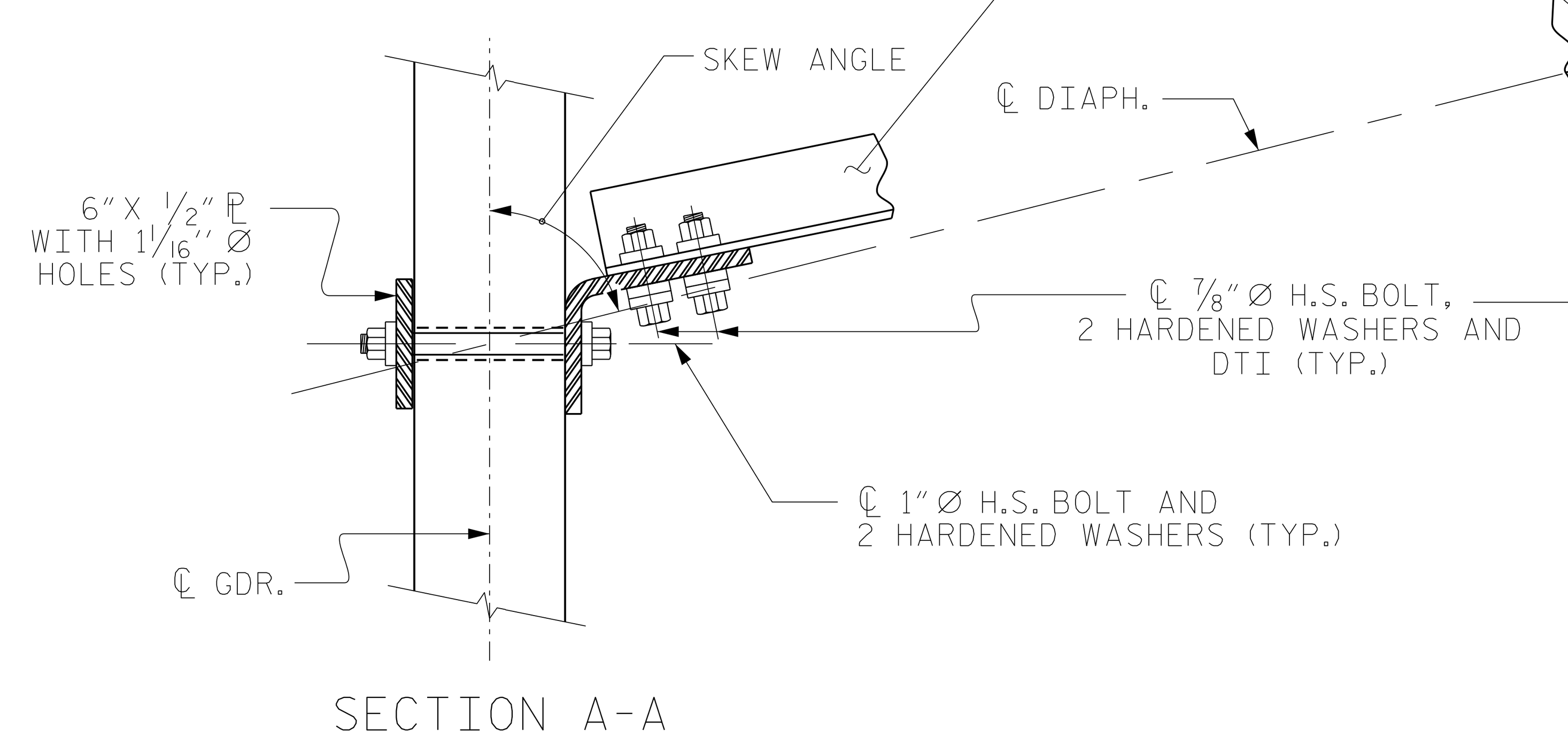
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

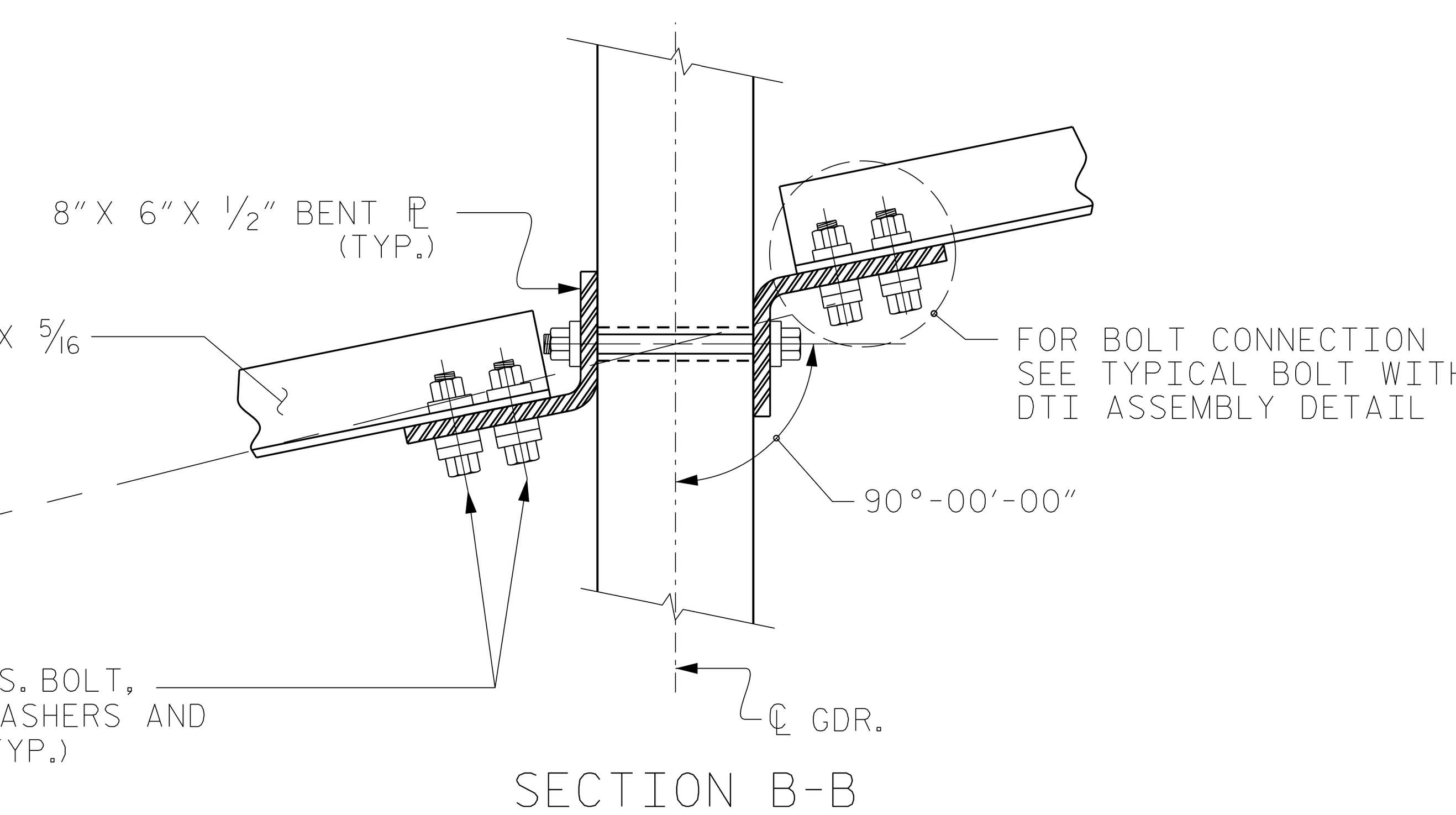
INTERMEDIATE DIAPHRAGM ASSEMBLY SHALL COMPLY WITH SECTION 1072 OF THE STANDARD SPECIFICATIONS.

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

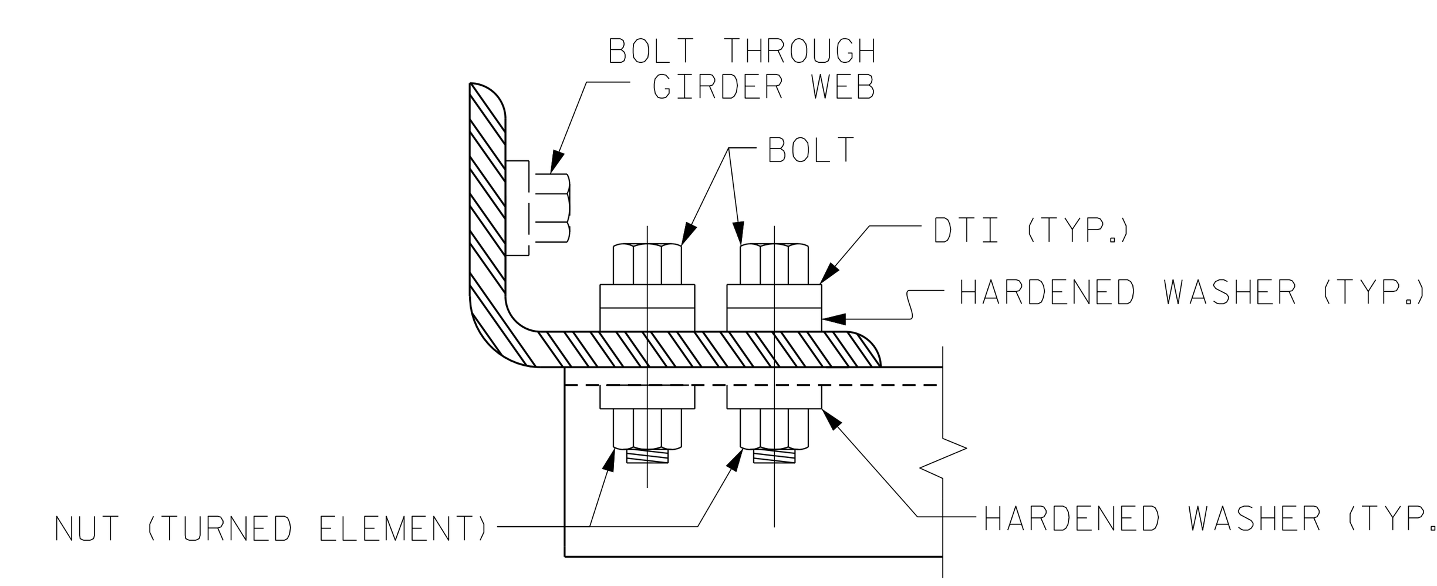
IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

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





CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SEAL 032813 — JUSTIN MARK ROBINSON — 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

INTERMEDIATE STEEL DIAPHRAGMS

RIGHT LANE

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S2-15
1			3				TOTAL SHEETS
2			4				36

STR. #2

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DESIGN ENGINEER OF RECORD:	MAL	DATE :	11/2016

3/8/2017
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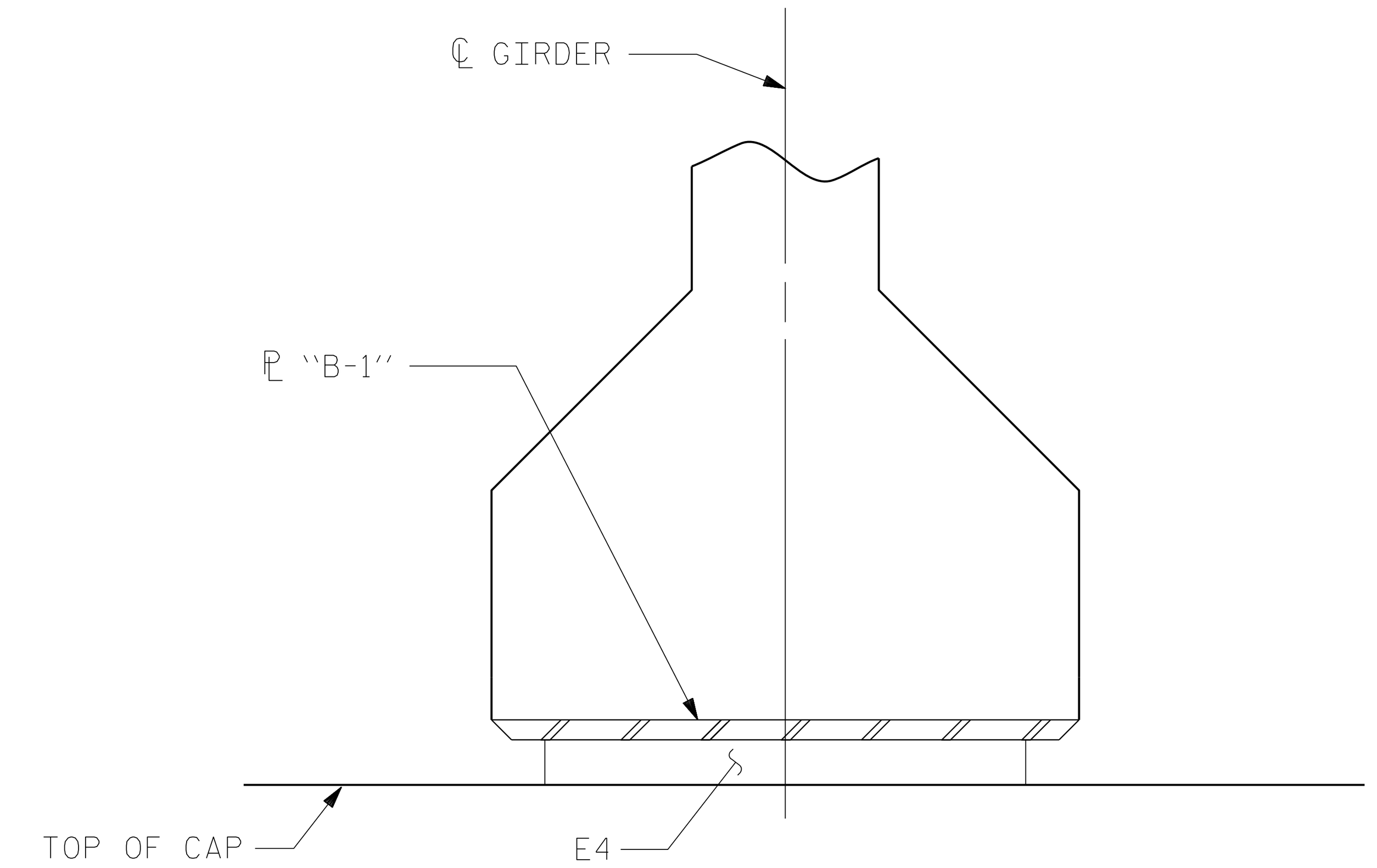

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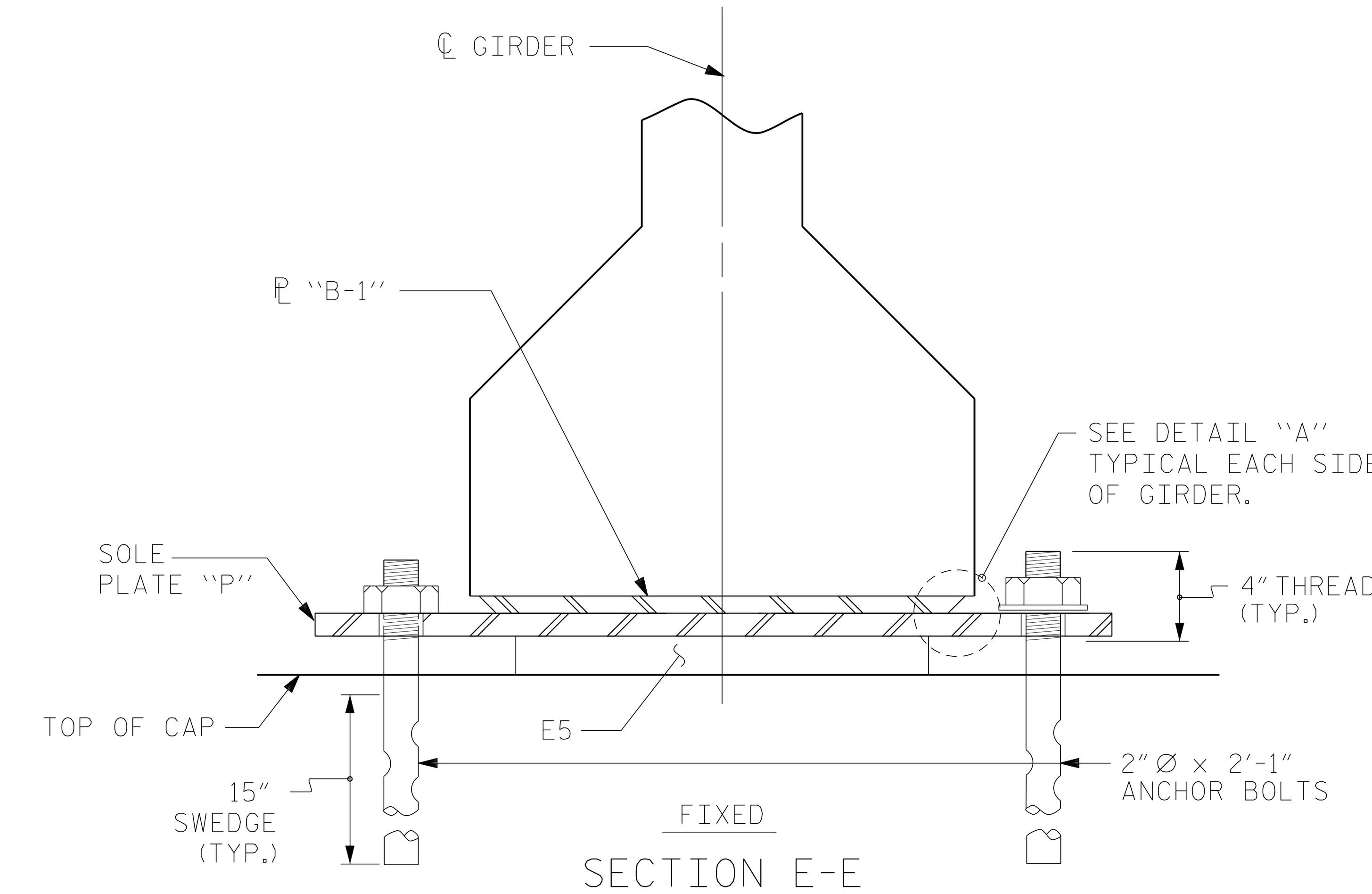
SECTION D-D



FIXED

SECTION E-E

NOTES

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

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

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

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

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

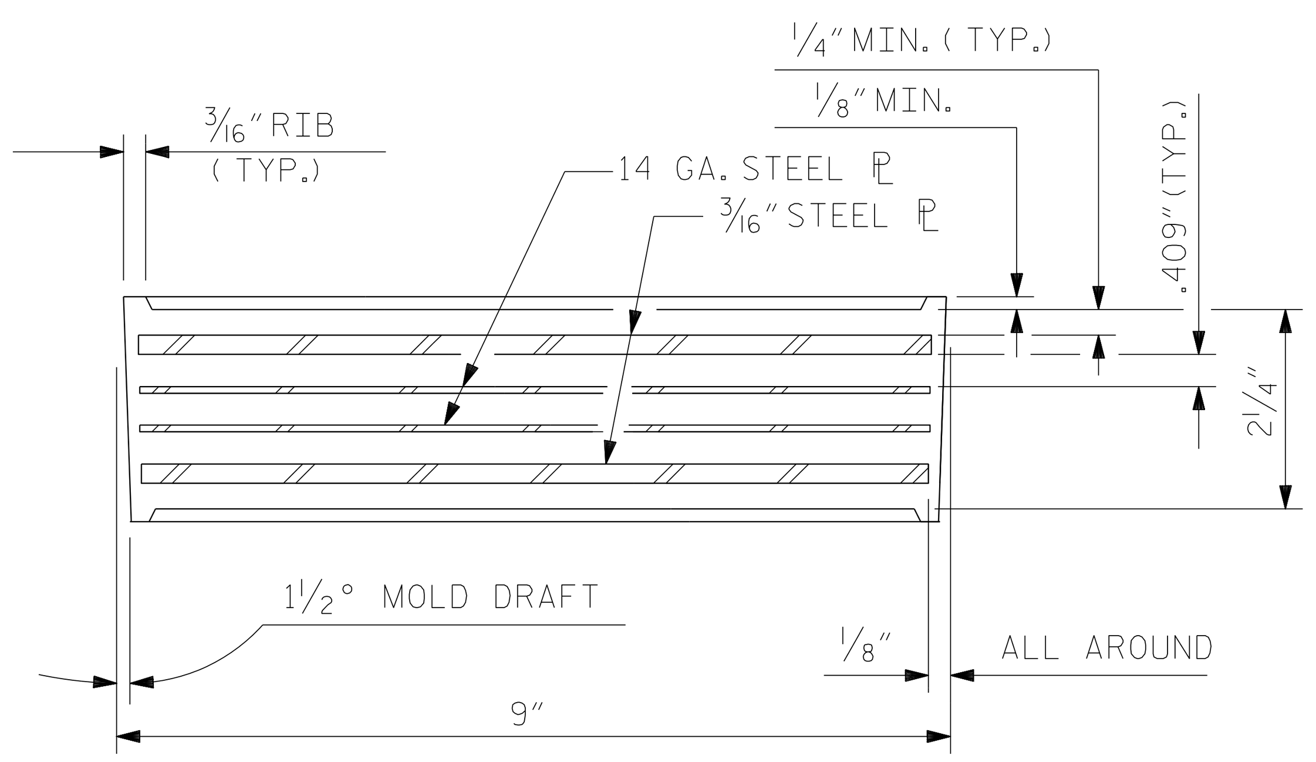
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

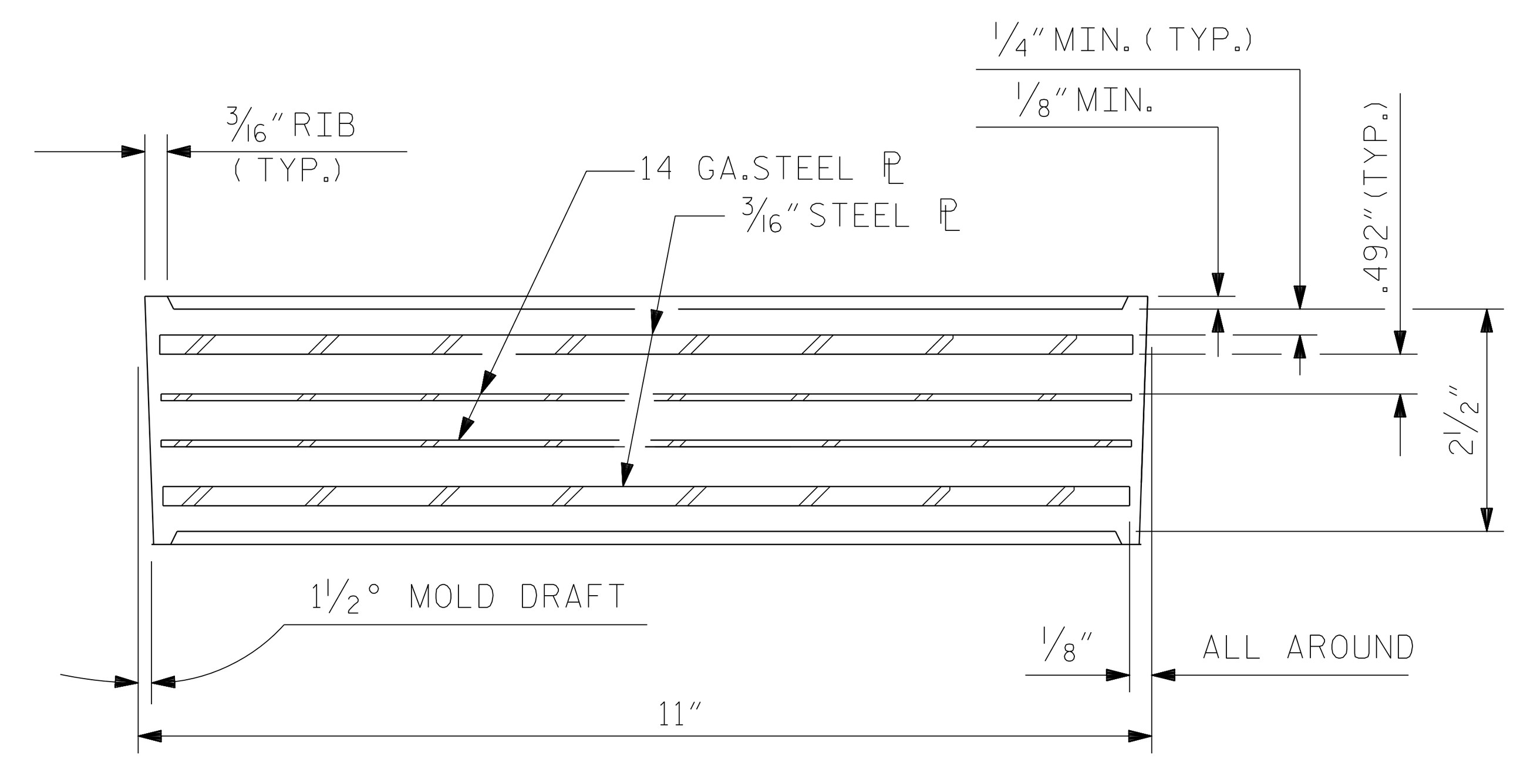
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

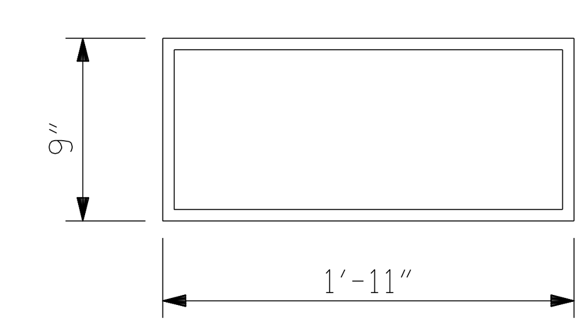
ALL BEARING PLATES SHALL BE AASHTO M270 GRADE 36.



TYPICAL SECTION OF ELASTOMERIC BEARINGS



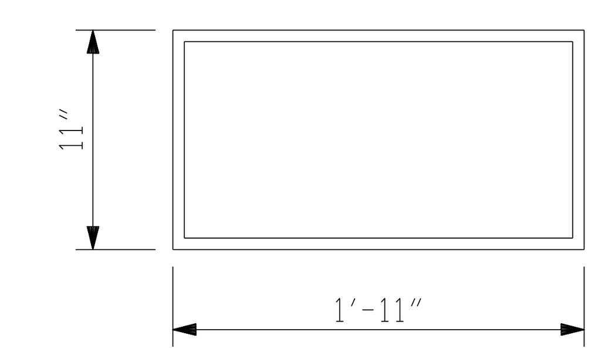
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (8 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

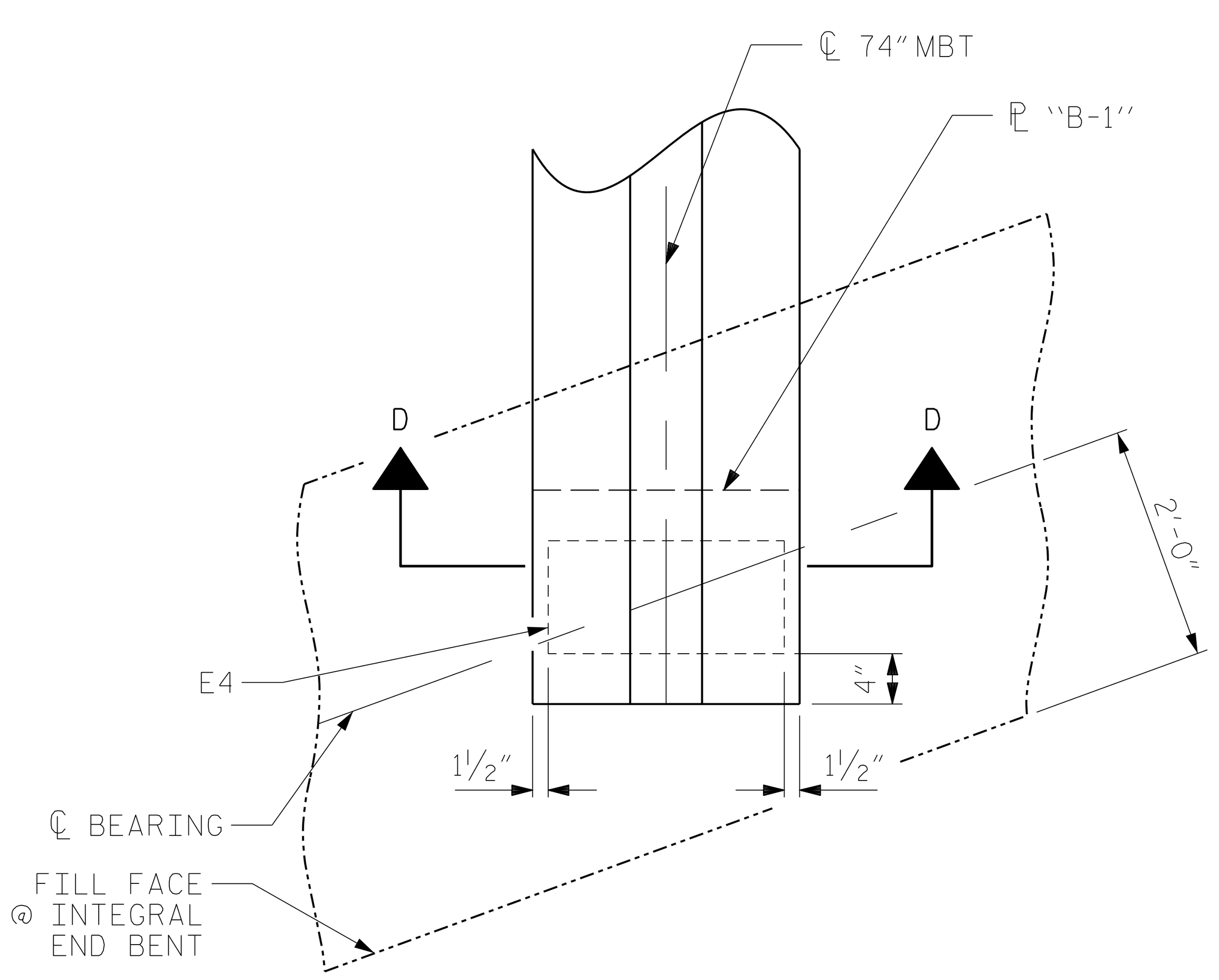
TYPE V



E5 (16 REQ'D)

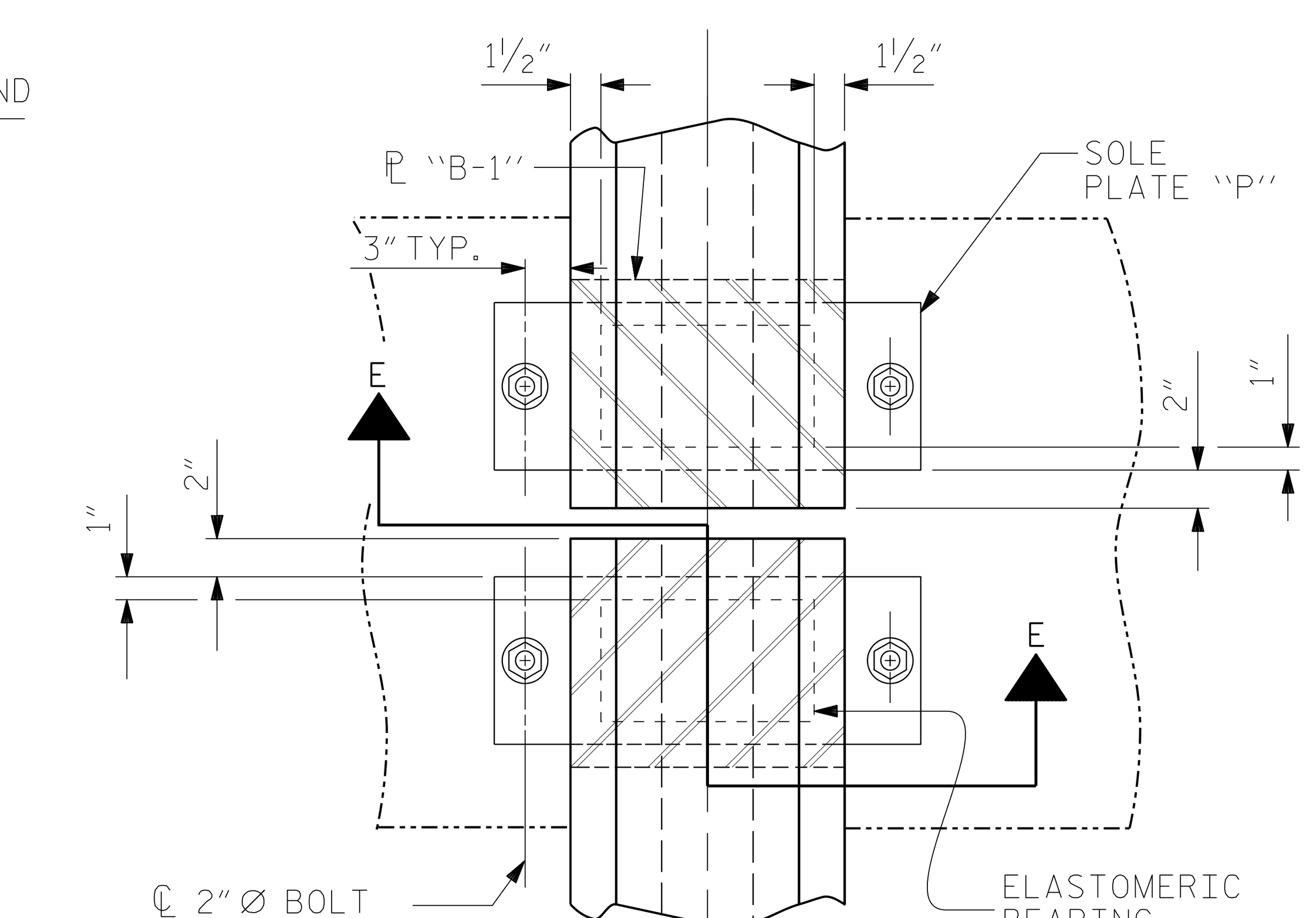
PLAN VIEW OF ELASTOMERIC BEARING

TYPE VI



PLAN VIEW AT END BENTS

NOTE: BOTTOM FLANGE OF 74" MBT SHOWN, TOP FLANGE NOT SHOW FOR CLARITY



TYPICAL PLAN

(SHOWING CONTINUOUS BENT)

MAXIMUM ALLOWABLE SERVICE LOADS	
D.L.+L.L. (NO IMPACT)	
TYPE V	365 k
TYPE VI	420 k

PROJECT NO. R-2707C

CLEVELAND COUNTY

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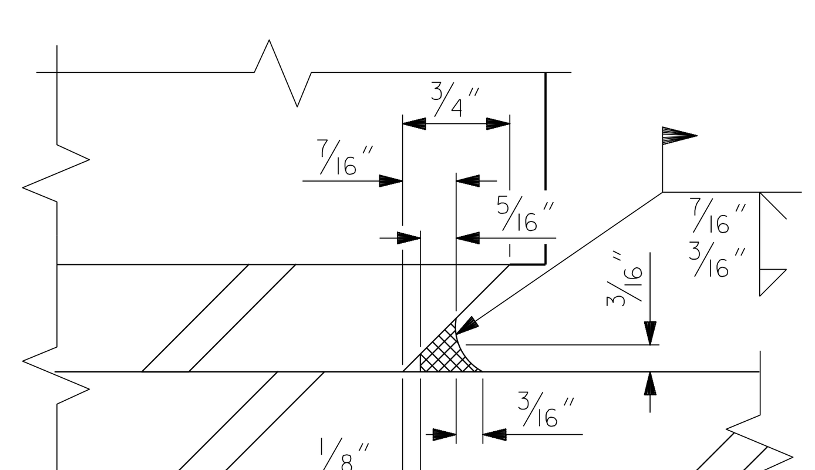
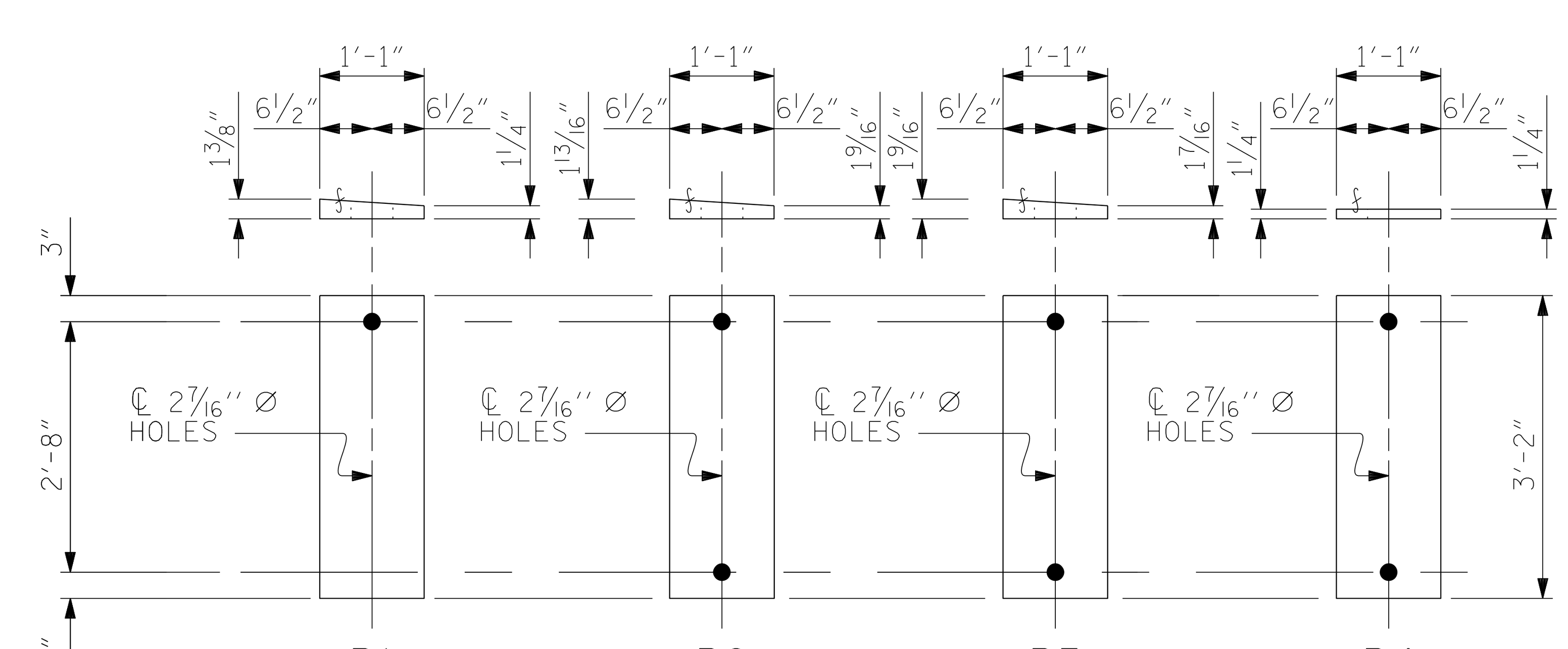
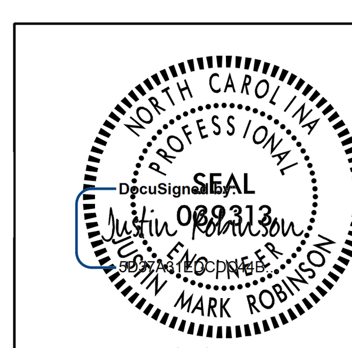


DETAIL "A"



P1	P2	P3	P4
(FIXED)	(FIXED)	(FIXED)	(FIXED)
(4 REQ'D)	(4 REQ'D)	(4 REQ'D)	(4 REQ'D)

SOLE PLATE DETAILS ("P")



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

ELASTOMERIC BEARING DETAILS

RIGHT LANE

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CHECKED BY : TLC	DATE : 01/2017	
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2			4			36

STD. NO. EB4　STR. #2

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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

SPAN A

GIRDER 1 (EXTERIOR)

0.6"Ø LOW RELAXATION																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.029	0.058	0.085	0.109	0.131	0.150	0.165	0.175	0.182	0.184	0.182	0.175	0.165	0.150	0.131	0.109	0.085	0.058	0.029	0.000
FINAL CAMBER ↑	0''	1/4''	1/2''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 5/8''	1 5/8''	1 11/16''	1 5/8''	1 5/8''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	1/2''	1/4''	0''

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.032	0.064	0.094	0.121	0.146	0.166	0.183	0.195	0.202	0.204	0.202	0.195	0.183	0.166	0.146	0.121	0.094	0.064	0.032	0.000
FINAL CAMBER ↑	0''	1/4''	7/16''	11/16''	7/8''	1''	1 3/16''	1 5/16''	1 3/8''	1 7/16''	1 7/16''	1 7/16''	1 3/8''	1 5/16''	1 3/16''	1''	7/8''	11/16''	7/16''	1/4''	0''

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.032	0.064	0.094	0.121	0.146	0.166	0.183	0.195	0.202	0.204	0.202	0.195	0.183	0.166	0.146	0.121	0.094	0.064	0.032	0.000
FINAL CAMBER ↑	0''	1/4''	7/16''	11/16''	7/8''	1''	1 3/16''	1 5/16''	1 3/8''	1 7/16''	1 7/16''	1 7/16''	1 3/8''	1 5/16''	1 3/16''	1''	7/8''	11/16''	7/16''	1/4''	0''

GIRDER 4 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.052	0.102	0.149	0.193	0.231	0.264	0.290	0.309	0.320	0.324	0.320	0.309	0.290	0.264	0.231	0.193	0.149	0.102	0.052	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.028	0.056	0.082	0.105	0.127	0.144	0.159	0.169	0.175	0.178	0.175	0.169	0.159	0.144	0.127	0.105	0.082	0.056	0.028	0.000
FINAL CAMBER ↑	0''	5/16''	9/16''	13/16''	1 1/16''	1 1/4''	1 7/16''	1 9/16''	1 11/16''	1 3/4''	1 3/4''	1 3/4''	1 11/16''	1 9/16''	1 7/16''	1 1/4''	1 1/16''	13/16''	9/16''	5/16''	0''

SPAN B

GIRDER 1 (EXTERIOR)

0.6"Ø LOW RELAXATION																						
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.376	0.390	0.394	0.390	0.376	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.041	0.080	0.118	0.152	0.182	0.208	0.229	0.244	0.253	0.256	0.253	0.244	0.229	0.208	0.182	0.152	0.118	0.080	0.041	0.000
FINAL CAMBER ↑	0''	1/4''	1/2''	3/4''	1''	1 3/16''	1 3/8''	1 1/2''	1 9/16''	1 5/8''	1 5/8''	1 5/8''	1 9/16''	1 1/2''	1 3/8''	1 3/16''	1''	3/4''	1/2''	1/4''	0''

GIRDER 2 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.376	0.390	0.394	0.390	0.376	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.045	0.089	0.130	0.168	0.202	0.230	0.253	0.270	0.280	0.283	0.280	0.270	0.253	0.230	0.202	0.168	0.130	0.089	0.045	0.000
FINAL CAMBER ↑	0''	3/16''	7/16''	5/8''	13/16''	15/16''	1 1/16''	1 3/16''	1 1/4''	1 5/16''	1 5/16''	1 5/16''	1 1/4''	1 3/16''	1 1/16''	15/16''	13/16''	5/8''	7/16''	3/16''	0''

GIRDER 3 (INTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.376	0.390	0.394	0.390	0.376	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.045	0.089	0.130	0.168	0.202	0.230	0.253	0.270	0.280	0.283	0.280	0.270	0.253	0.230	0.202	0.168	0.130	0.089	0.045	0.000
FINAL CAMBER ↑	0''	3/16''	7/16''	5/8''	13/16''	15/16''	1 1/16''	1 3/16''	1 1/4''	1 5/16''	1 5/16''	1 5/16''	1 1/4''	1 3/16''	1 1/16''	15/16''	13/16''	5/8''	7/16''	3/16''	0''

GIRDER 4 (EXTERIOR)

TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.063	0.124	0.181	0.234	0.281	0.321	0.353	0.376	0.390	0.394	0.390	0.376	0.353	0.321	0.281	0.234	0.181	0.124	0.063	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.039	0.077	0.112	0.145	0.174	0.198	0.218	0.232	0.241	0.244	0.241	0.232	0.218	0.198	0.174	0.145	0.112	0.077	0.039	0.000
FINAL CAMBER ↑	0''	5/16''	9/16''	13/16''	1 1/16''	1 5/16''	1 1/2''	1 5/8''	1 3/4''	1 13/16''	1 13/16''	1 13/16''	1 3/4''	1 5/8''	1 1/2''	1 5/16''	1 1/16''	13/16''	9/16''	5/16''	0''

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

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PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 039919 ENGINEER Justin Mark Robinson
DocuSigned by: Justin Robinson
3/9/2017

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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPANS A & B

RIGHT LANE

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			36

STR. #2

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPAN C																				
GIRDER 1 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.039	0.078	0.114	0.147	0.177	0.202	0.222	0.236	0.245	0.248	0.245	0.236	0.222	0.202	0.177	0.147	0.114	0.078	0.039	0.000
FINAL CAMBER ↑	0''	1/4''	9/16''	13/16''	1''	1 1/4''	1 3/8''	1 9/16''	1 5/8''	1 11/16''	1 11/16''	1 11/16''	1 5/8''	1 9/16''	1 3/8''	1 1/4''	1''	13/16''	9/16''	1/4''	0''
GIRDER 2 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.044	0.086	0.126	0.163	0.196	0.223	0.246	0.262	0.272	0.275	0.272	0.262	0.246	0.223	0.196	0.163	0.126	0.086	0.044	0.000
FINAL CAMBER ↑	0''	3/16''	7/16''	5/8''	13/16''	1''	1 1/8''	1 1/4''	1 5/16''	1 3/8''	1 3/8''	1 3/8''	1 5/16''	1 1/4''	1 1/8''	1''	13/16''	5/8''	7/16''	3/16''	0''
GIRDER 3 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.044	0.086	0.126	0.163	0.196	0.223	0.246	0.262	0.272	0.275	0.272	0.262	0.246	0.223	0.196	0.163	0.126	0.086	0.044	0.000
FINAL CAMBER ↑	0''	3/16''	7/16''	5/8''	13/16''	1''	1 1/8''	1 1/4''	1 5/16''	1 3/8''	1 3/8''	1 3/8''	1 5/16''	1 1/4''	1 1/8''	1''	13/16''	5/8''	7/16''	3/16''	0''
GIRDER 4 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.062	0.123	0.180	0.232	0.279	0.318	0.350	0.372	0.386	0.391	0.386	0.372	0.350	0.318	0.279	0.232	0.180	0.123	0.062	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.038	0.074	0.109	0.140	0.168	0.192	0.211	0.225	0.233	0.236	0.233	0.225	0.211	0.192	0.168	0.140	0.109	0.074	0.038	0.000
FINAL CAMBER ↑	0''	5/16''	9/16''	7/8''	1 1/8''	1 5/16''	1 1/2''	1 11/16''	1 3/4''	1 13/16''	1 7/8''	1 13/16''	1 3/4''	1 11/16''	1 1/2''	1 5/16''	1 1/8''	7/8''	9/16''	5/16''	0''

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

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 2

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Justin Robinson
3/9/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION SPAN C

RIGHT LANE

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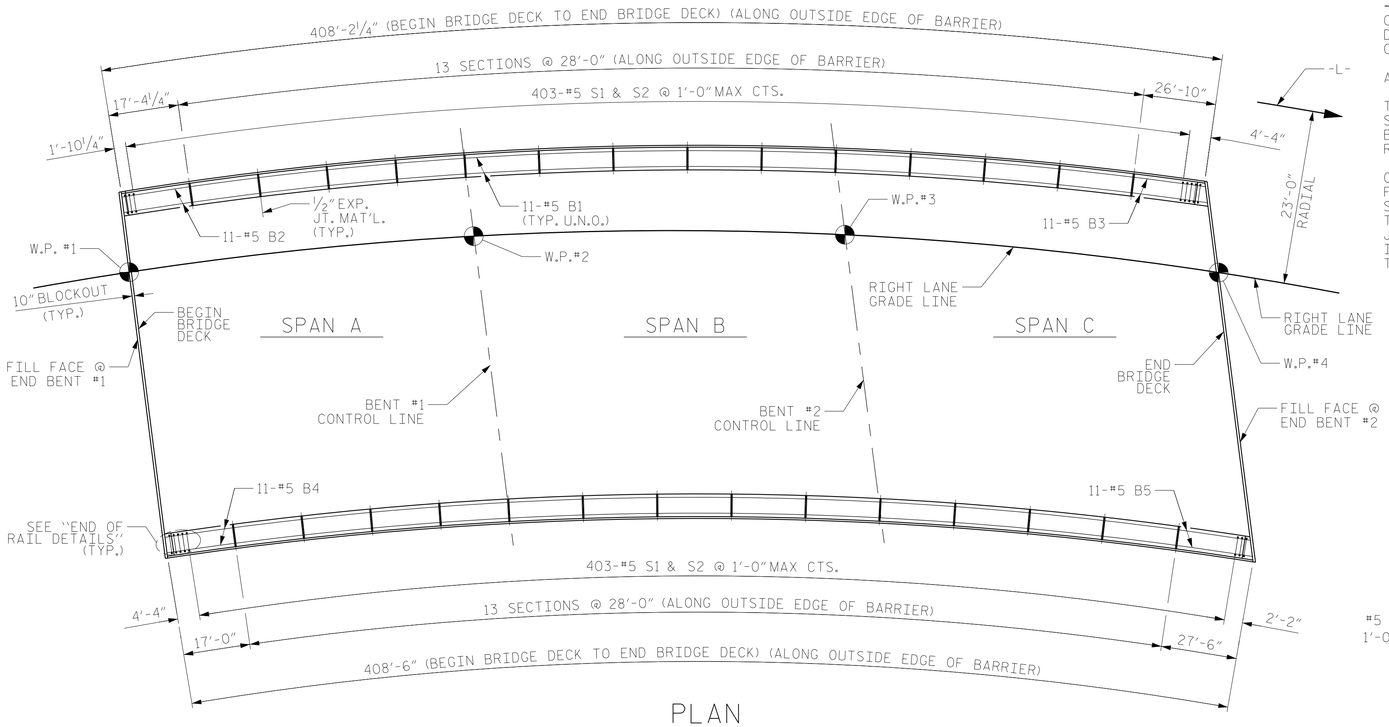
STR. #2



PLAN

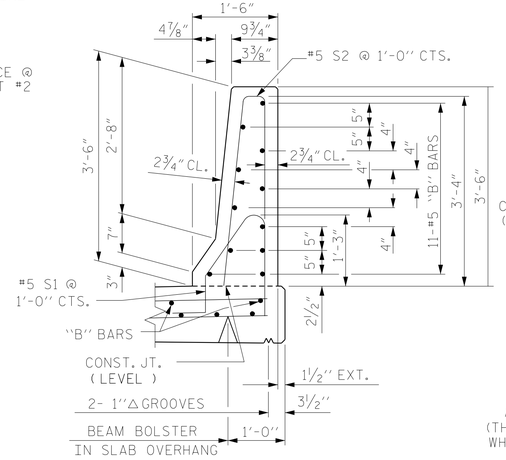
NOTES

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

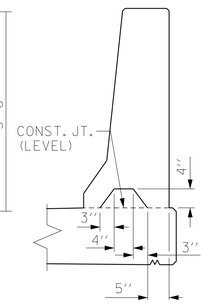
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

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

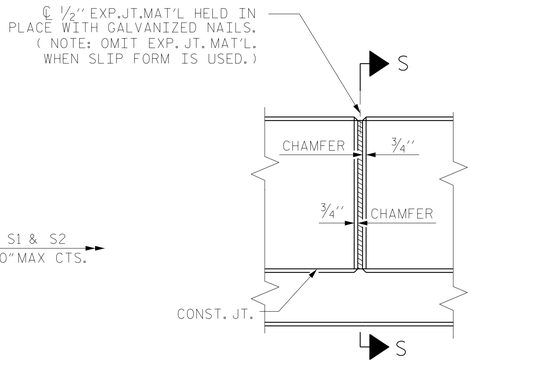


SECTION THRU RAIL



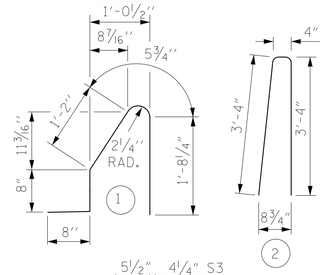
SECTION S-S

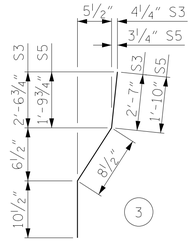
AT DAM IN OPEN JOINT
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



ELEVATION AT EXPANSION JOINTS

BAR TYPES





ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

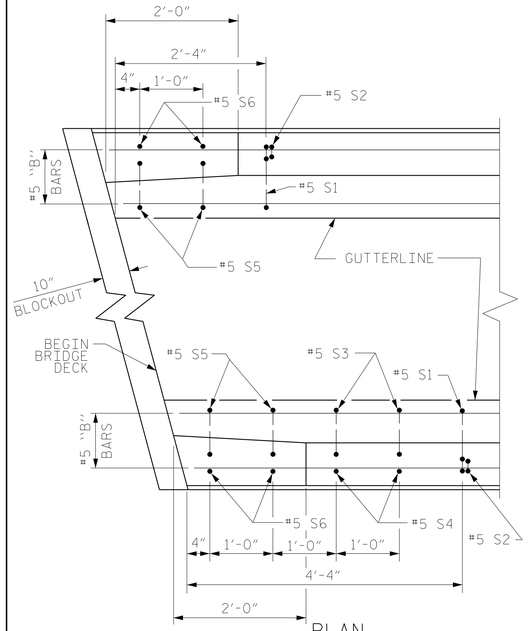
FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ B1	286	#5	STR	27'-8"	8253
✳ B2	11	#5	STR	17'-0"	195
✳ B3	11	#5	STR	26'-6"	304
✳ B4	11	#5	STR	16'-8"	191
✳ B5	11	#5	STR	27'-2"	312
✳ S1	806	#5	1	4'-8"	3923
✳ S2	806	#5	2	7'-0"	5885
✳ S3	4	#5	3	4'-2"	17
✳ S4	4	#5	STR	4'-0"	17
✳ S5	8	#5	3	3'-5"	29
✳ S6	8	#5	STR	3'-3"	27

✳ EPOXY COATED REINFORCING STEEL 19,153 LBS.

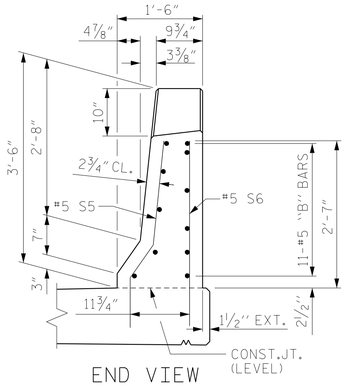
CLASS AA CONCRETE 111.1 CU. YDS.

CONCRETE BARRIER RAIL 816.7 LIN. FT.

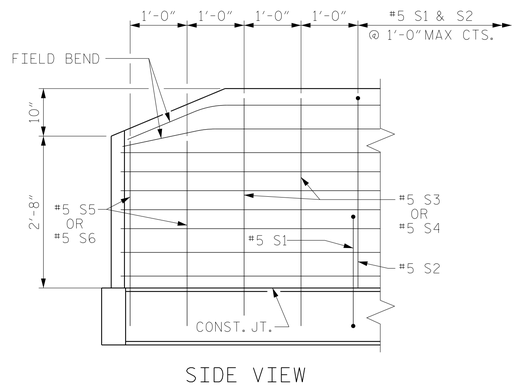


PLAN

BEGIN BRIDGE SHOWN, END BRIDGE SIMILAR



END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

BARRIER RAIL DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

CONCRETE BARRIER RAIL

RIGHT LANE

DRAWN BY :	PDS	DATE :	11/2016
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DESIGN ENGINEER OF RECORD:	MAL	DATE :	11/2016

3/9/2017

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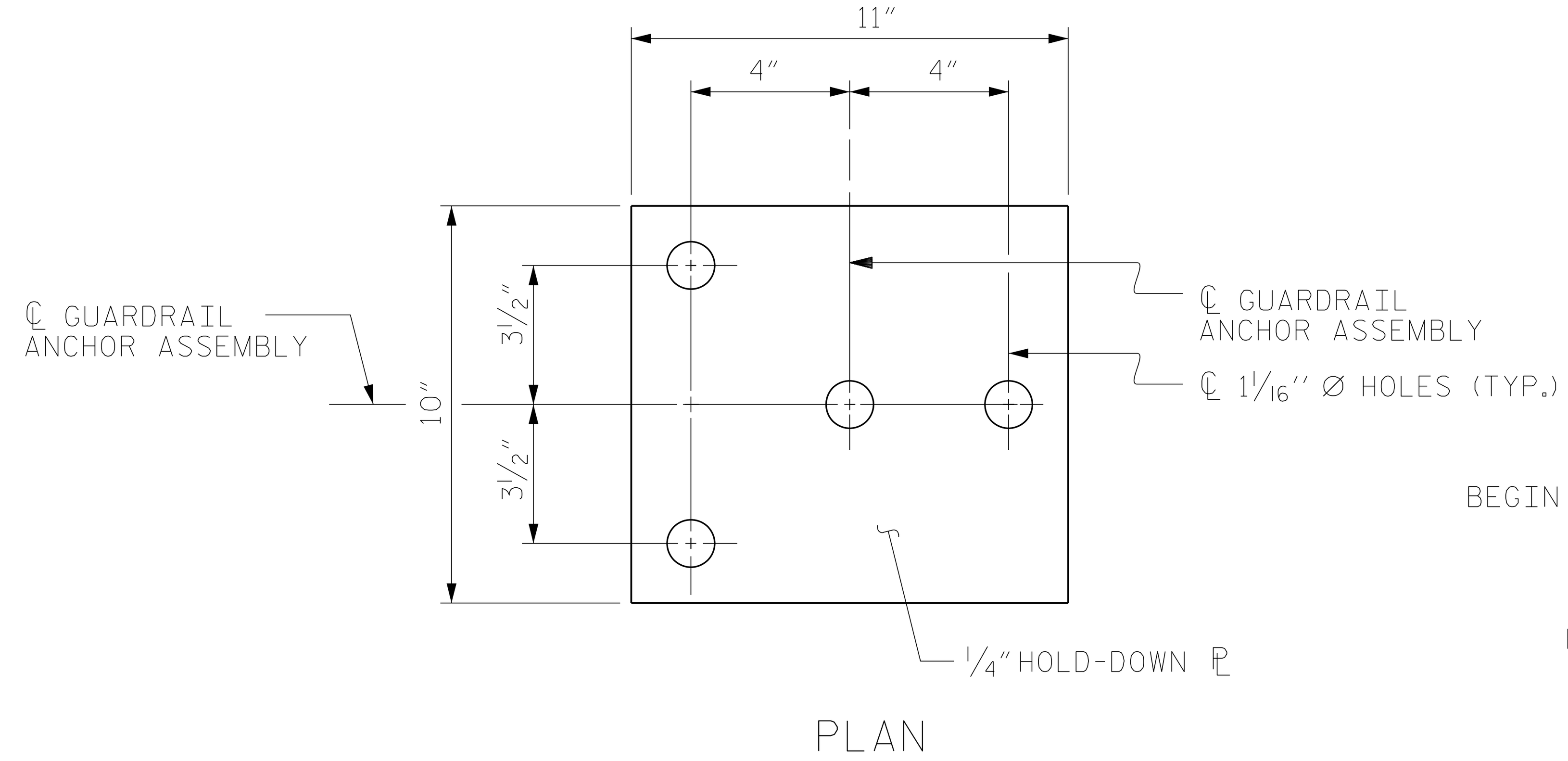
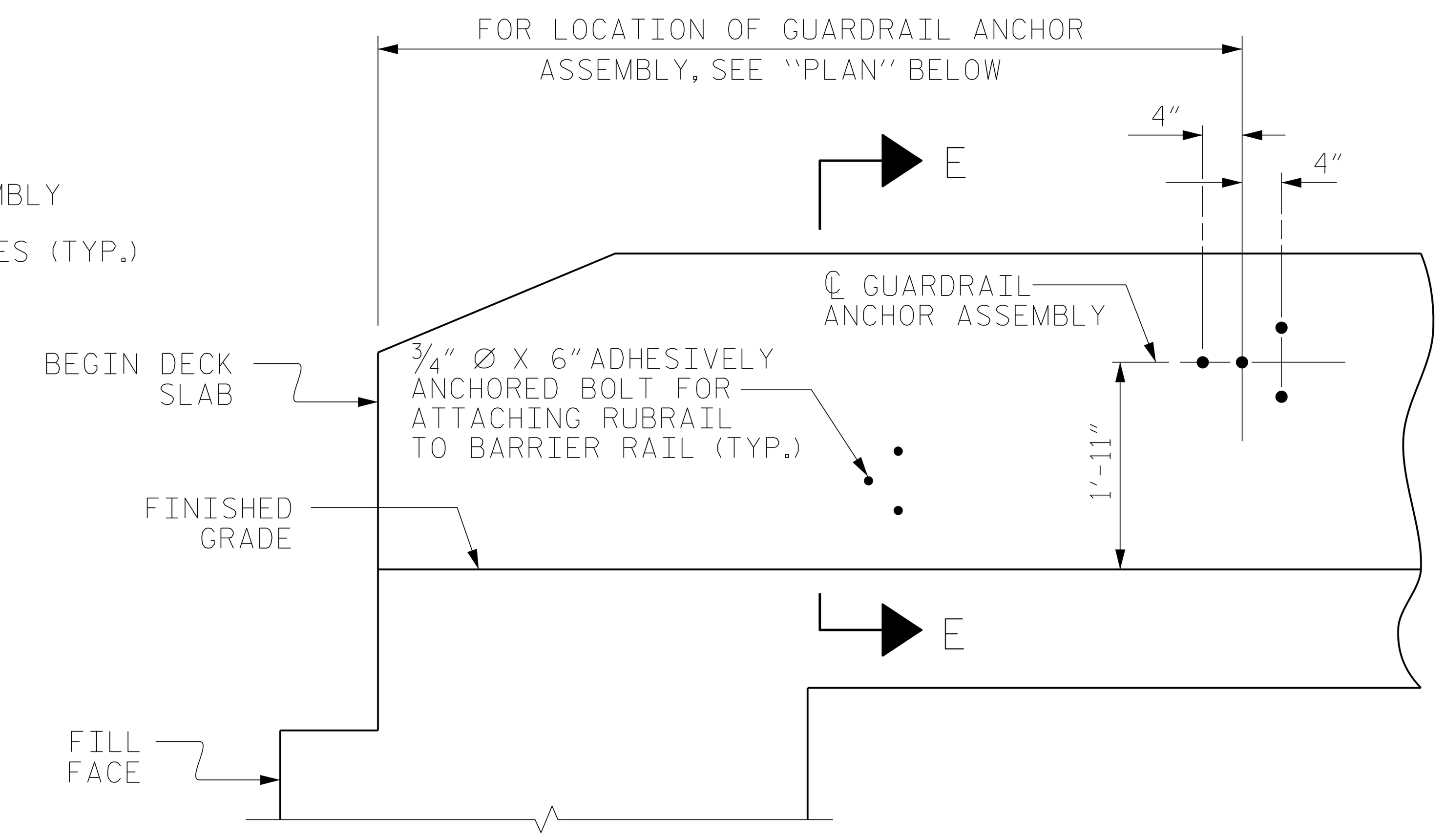
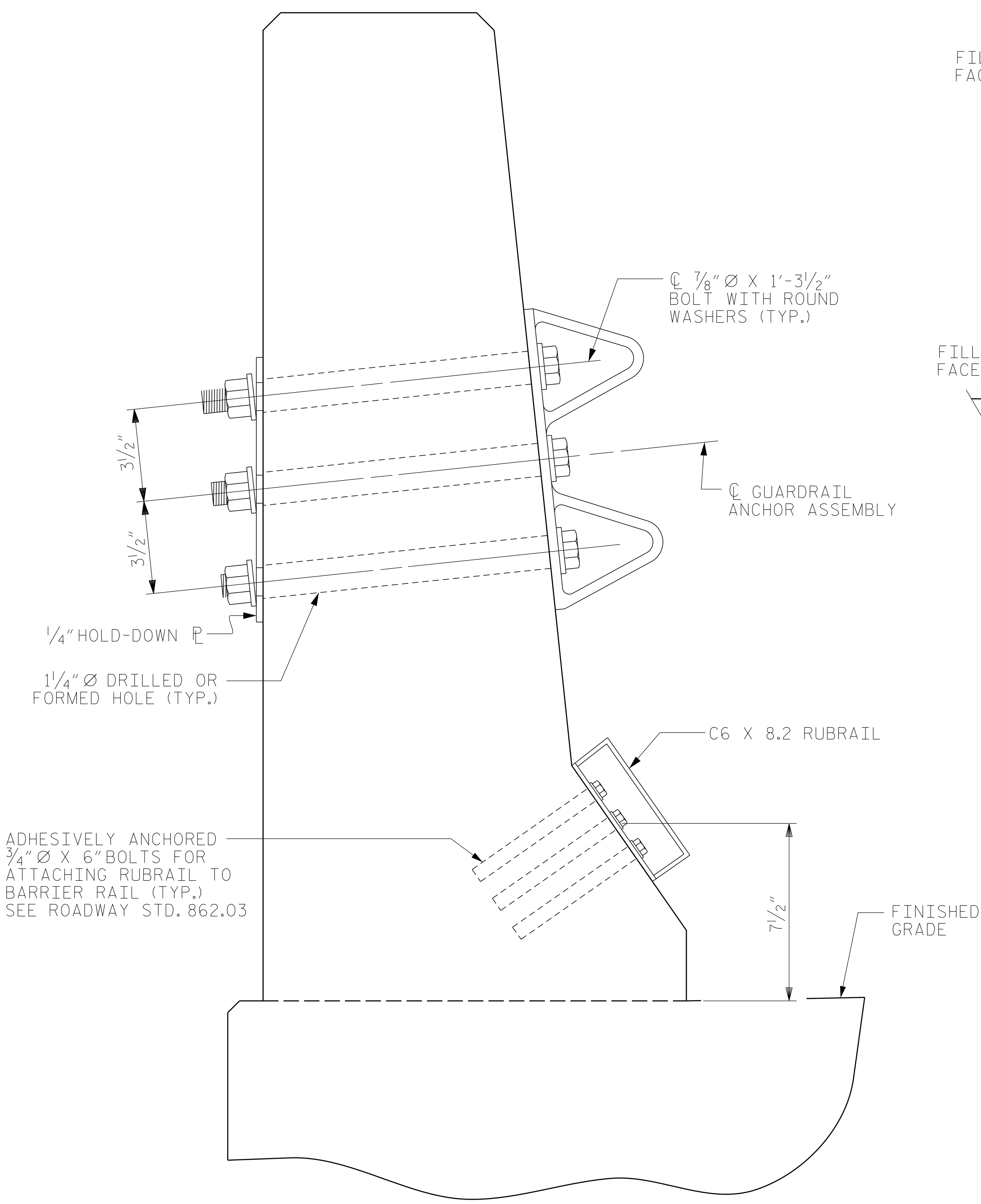
STD. NO. CBR1 STR. #2



PLAN

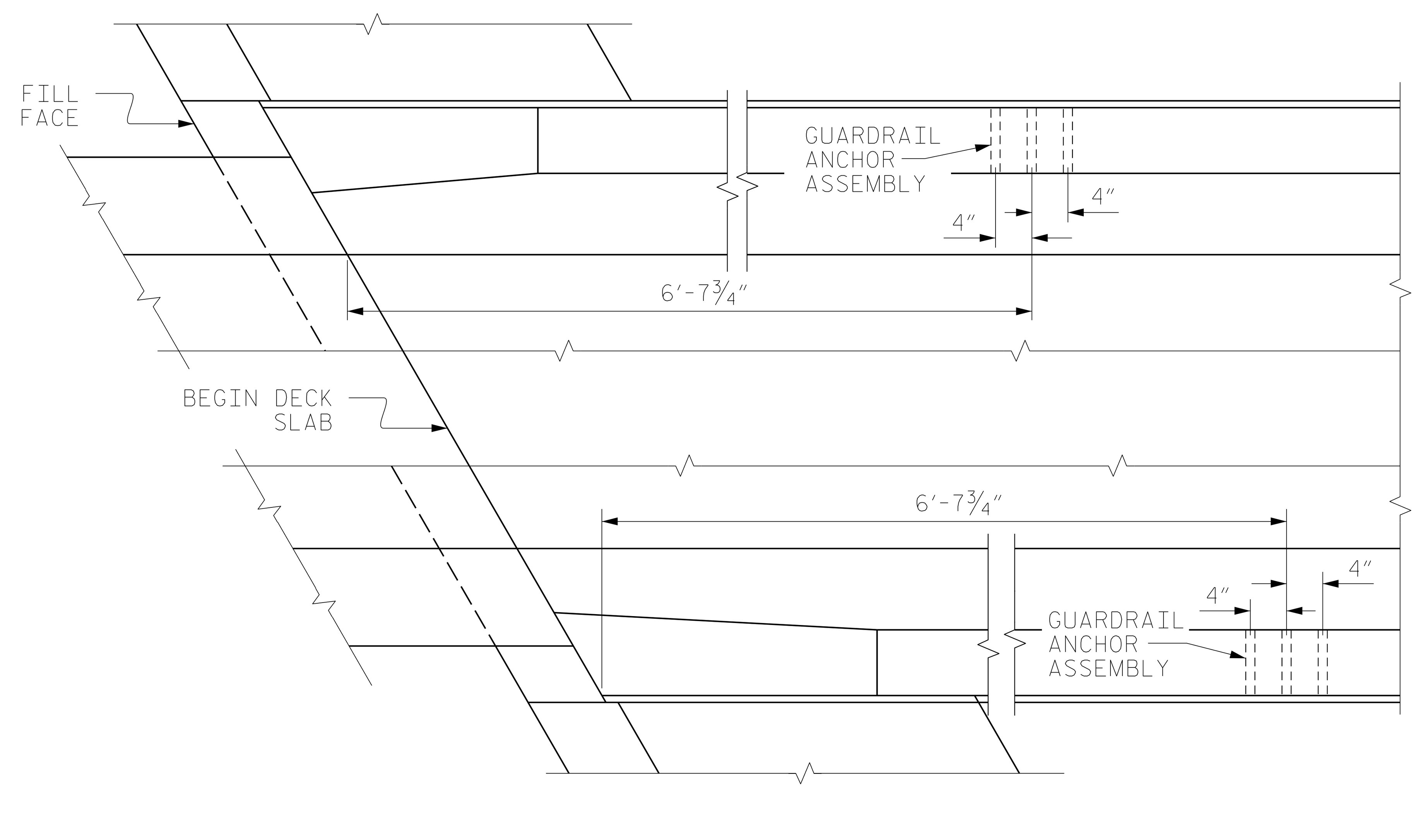


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

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

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

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

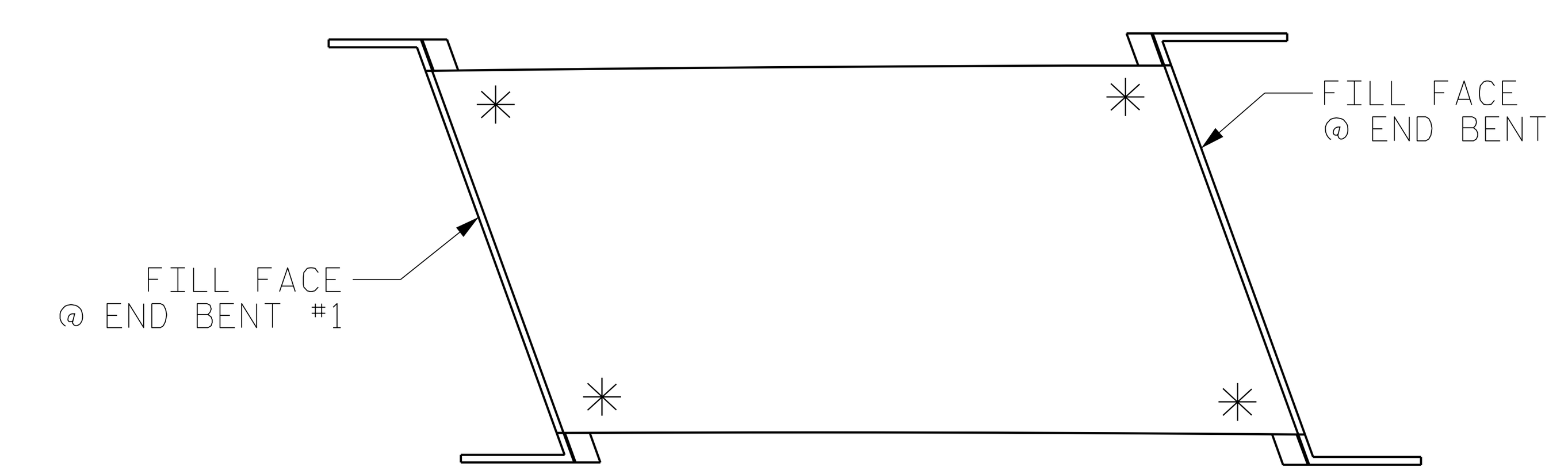
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

RIGHT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — MARK ROBINSON — 3/9/2017

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CHECKED BY : GM 5/06	REV. 7/12	MAA/GM
	REV. 6/13	MAA/GM

STD. NO. GRA2   STR. #2

3/8/2017
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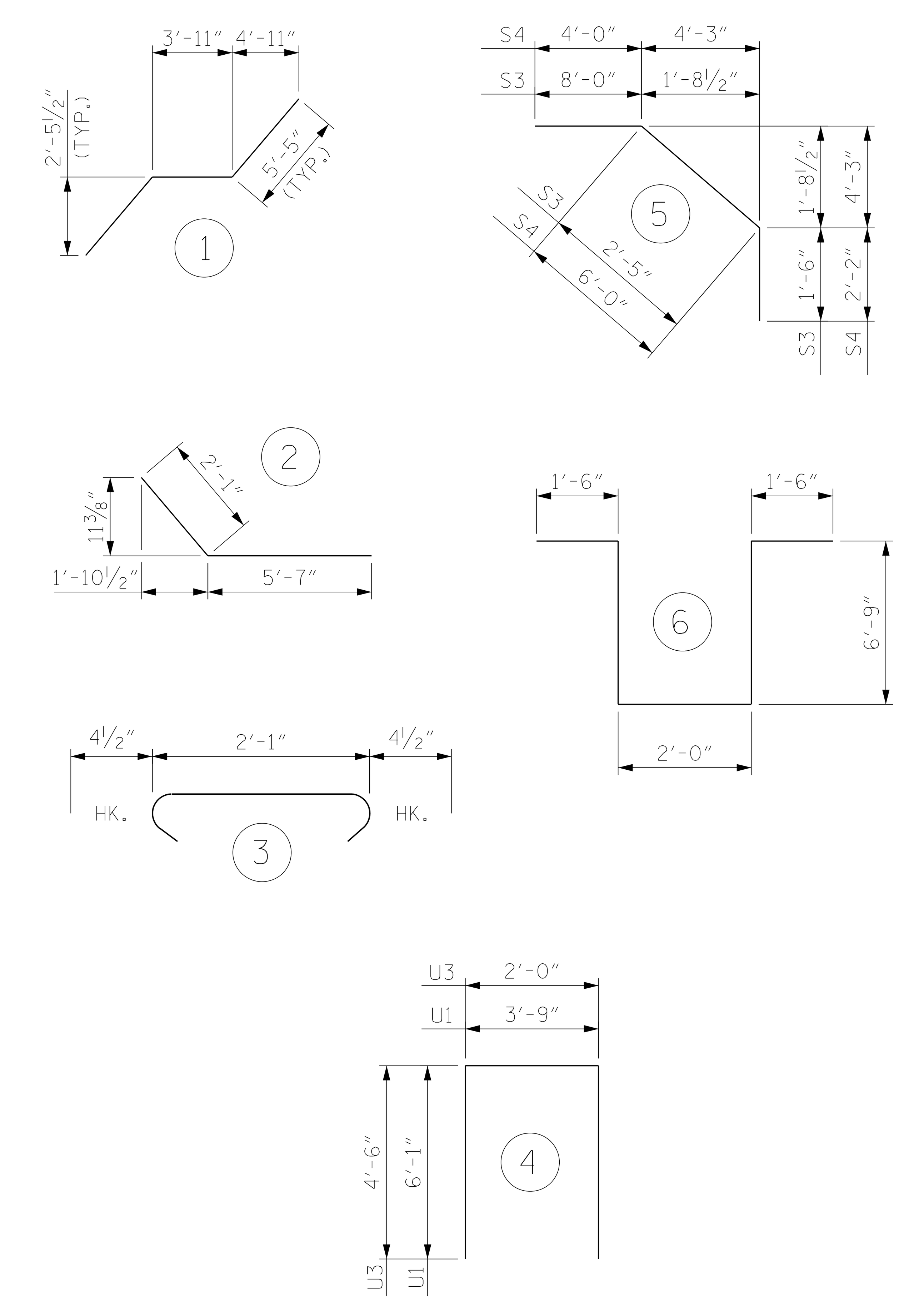
BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*	A1	783	#5	STR	42'-11"	35049
	A2	783	#5	STR	42'-11"	35049
*	A101	1	#5	STR	41'-9"	44
*	A102	1	#5	STR	40'-5"	42
*	A103	1	#5	STR	39'-0"	41
*	A104	1	#5	STR	37'-7"	39
*	A105	1	#5	STR	36'-3"	38
*	A106	1	#5	STR	34'-10"	36
*	A107	1	#5	STR	33'-6"	35
*	A108	1	#5	STR	32'-1"	33
*	A109	1	#5	STR	30'-8"	32
*	A110	1	#5	STR	29'-4"	31
*	A111	1	#5	STR	27'-11"	29
*	A112	1	#5	STR	26'-7"	28
*	A113	1	#5	STR	25'-2"	26
*	A114	1	#5	STR	23'-10"	25
*	A115	1	#5	STR	22'-5"	23
*	A116	1	#5	STR	21'-0"	22
*	A117	1	#5	STR	19'-8"	21
*	A118	1	#5	STR	18'-3"	19
*	A119	1	#5	STR	16'-11"	18
*	A120	1	#5	STR	15'-6"	16
*	A121	1	#5	STR	14'-1"	15
*	A122	1	#5	STR	12'-9"	13
*	A123	1	#5	STR	11'-4"	12
*	A124	1	#5	STR	10'-0"	10
*	A125	1	#5	STR	8'-7"	9
*	A126	1	#5	STR	7'-3"	8
*	A127	1	#5	STR	5'-10"	6
*	A128	1	#5	STR	4'-5"	5
*	A129	1	#5	STR	3'-1"	3
*	A130	1	#5	STR	41'-9"	44
*	A131	1	#5	STR	40'-5"	42
*	A132	1	#5	STR	39'-1"	41
*	A133	1	#5	STR	37'-9"	39
*	A134	1	#5	STR	36'-4"	38
*	A135	1	#5	STR	35'-0"	37
*	A136	1	#5	STR	33'-8"	35
*	A137	1	#5	STR	32'-4"	34
*	A138	1	#5	STR	30'-11"	32
*	A139	1	#5	STR	29'-7"	31
*	A140	1	#5	STR	28'-3"	29
*	A141	1	#5	STR	26'-11"	28
*	A142	1	#5	STR	25'-6"	27
*	A143	1	#5	STR	24'-2"	25

	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*	A144	1	#5	STR	22'-10"	24
*	A145	1	#5	STR	21'-6"	22
*	A146	1	#5	STR	20'-1"	21
*	A147	1	#5	STR	18'-9"	20
*	A148	1	#5	STR	17'-5"	18
*	A149	1	#5	STR	16'-1"	17
*	A150	1	#5	STR	14'-8"	15
*	A151	1	#5	STR	13'-4"	14
*	A152	1	#5	STR	12'-0"	13
*	A153	1	#5	STR	10'-7"	11
*	A154	1	#5	STR	9'-3"	10
*	A155	1	#5	STR	7'-11"	8
*	A156	1	#5	STR	6'-7"	7
*	A157	1	#5	STR	5'-2"	5
*	A158	1	#5	STR	3'-10"	4
*	A159	1	#5	STR	2'-6"	3
	A201	1	#5	STR	41'-9"	44
	A202	1	#5	STR	40'-5"	42
	A203	1	#5	STR	39'-0"	41
	A204	1	#5	STR	37'-7"	39
	A205	1	#5	STR	36'-3"	38
	A206	1	#5	STR	34'-10"	36
	A207	1	#5	STR	33'-6"	35
	A208	1	#5	STR	32'-1"	33
	A209	1	#5	STR	30'-8"	32
	A210	1	#5	STR	29'-4"	31
	A211	1	#5	STR	27'-11"	29
	A212	1	#5	STR	26'-7"	28
	A213	1	#5	STR	25'-2"	26
	A214	1	#5	STR	23'-10"	25
	A215	1	#5	STR	22'-5"	23
	A216	1	#5	STR	21'-0"	22
	A217	1	#5	STR	19'-8"	21
	A218	1	#5	STR	18'-3"	19
	A219	1	#5	STR	16'-11"	18
	A220	1	#5	STR	15'-6"	16
	A221	1	#5	STR	14'-1"	15
	A222	1	#5	STR	12'-9"	13
	A223	1	#5	STR	11'-4"	12
	A224	1	#5	STR	10'-0"	10
	A225	1	#5	STR	8'-7"	9
	A226	1	#5	STR	7'-3"	8
	A227	1	#5	STR	5'-10"	6
	A228	1	#5	STR	4'-5"	5
	A229	1	#5	STR	3'-1"	3

	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
	A230	1	#5	STR	41'-9"	44
	A231	1	#5	STR	40'-5"	42
	A232	1	#5	STR	39'-1"	41
	A233	1	#5	STR	37'-9"	39
	A234	1	#5	STR	36'-4"	38
	A235	1	#5	STR	35'-0"	37
	A236	1	#5	STR	33'-8"	35
	A237	1	#5	STR	32'-4"	34
	A238	1	#5	STR	30'-11"	32
	A239	1	#5	STR	29'-7"	31
	A240	1	#5	STR	28'-3"	29
	A241	1	#5	STR	26'-11"	28
	A242	1	#5	STR	25'-6"	27
	A243	1	#5	STR	24'-2"	25
	A244	1	#5	STR	22'-10"	24
	A245	1	#5	STR	21'-6"	22
	A246	1	#5	STR	20'-1"	21
	A247	1	#5	STR	18'-9"	20
	A248	1	#5	STR	17'-5"	18
	A249	1	#5	STR	16'-1"	17
	A250	1	#5	STR	14'-8"	15
	A251	1	#5	STR	13'-4"	14
	A252	1	#5	STR	12'-0"	13
	A253	1	#5	STR	10'-7"	11
	A254	1	#5	STR	9'-3"	10
	A255	1	#5	STR	7'-11"	8
	A256	1	#5	STR	6'-7"	7
	A257	1	#5	STR	5'-2"	5
	A258	1	#5	STR	3'-10"	4
	A259	1	#5	STR	2'-6"	3
*	B1	104	#7	STR	27'-10"	5917
	B2	336	#5	STR	53'-2"	18632
*	B3	156	#4	STR	21'-10"	2275
*	B4	104	#7	STR	60'-0"	12755
*	B5	51	#7	STR	40'-6"	4222
*	B6	52	#7	STR	36'-3"	3853
	B7	33	#5	STR	40'-6"	1394
*	B8	33	#5	STR	42'-0"	1446
*	B9	104	#4	STR	26'-1"	1812
*	B10	52	#7	STR	60'-0"	6377
*	B11	51	#7	STR	42'-0"	4378
*	B12	52	#7	STR	39'-3"	4172
*	B13	156	#4	STR	24'-2"	2518
	K1	24	#4	STR	24'-5"	391

	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
	K2	84	#4	STR	11'-6"	645
	K3	6	#4	STR	9'-2"	37
	K4	18	#4	STR	8'-4"	100
	K5	24	#4	1	14'-9"	236
	K6	24	#4	2	7'-8"	123
	K7	20	#4	STR	3'-0"	40
	K8	4	#4	STR	2'-2"	6
	S1	330	#4	3	2'-9"	606
*	S3	64	#4	5	11'-11"	509
*	S4	64	#4	5	12'-2"	520
	U1	64	#4	4	15'-11"	680
	U2	54	#4	6	18'-6"	667
	U3	12	#4	4	11'-0"	88

REINFORCING STEEL	60,067 LBS.
*EPOXY COATED REINFORCING STEEL	87,176 LBS.

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,734	SQ.FT.
BRIDGE DECK	15,093	SQ.FT.
TOTAL	16,827	SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	183.3		
POUR 2	241.4		
POUR 3	241.7		
POUR 4	119.7		
TOTALS**	786.1	60,067 LBS.	87,176 LBS.

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. R-2707C
CLEVELAND COUNTY
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SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039318 KEVIN MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
BILL OF MATERIAL

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-21
1			3			TOTAL SHEETS
2			4			36

STR. #2

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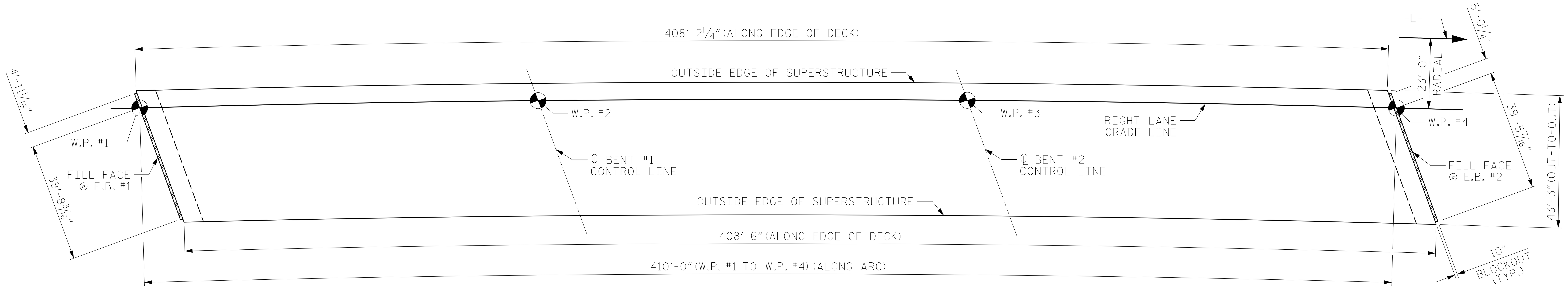
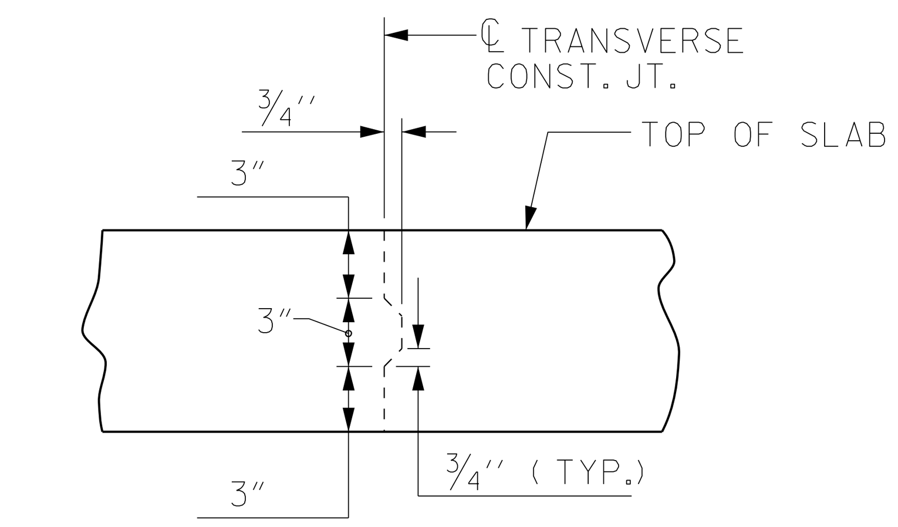
NOTE: BENT & INTEGRAL END BENT DIAPHRAGMS ARE PART OF SUPERSTRUCTURE POUR.



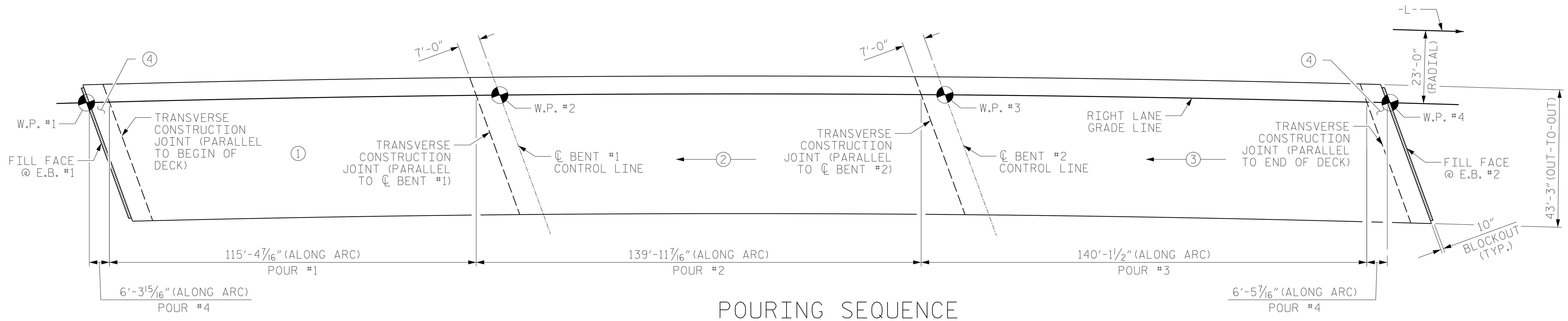
LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 17,661)

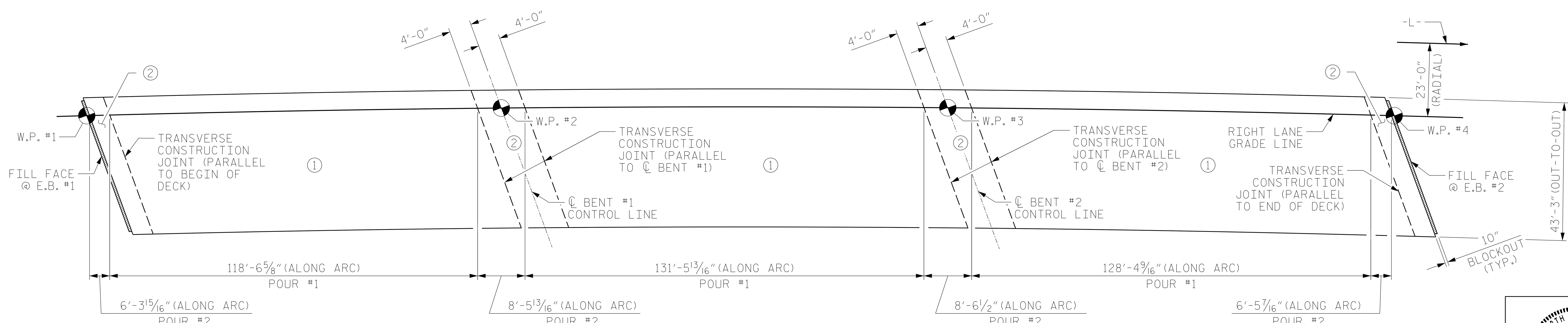


TRANSVERSE CONSTRUCTION JOINT DETAIL

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



POURING SEQUENCE



OPTIONAL POURING SEQUENCE

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

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SUPERSTRUCTURE

BILL OF MATERIAL

RIGHT LANE

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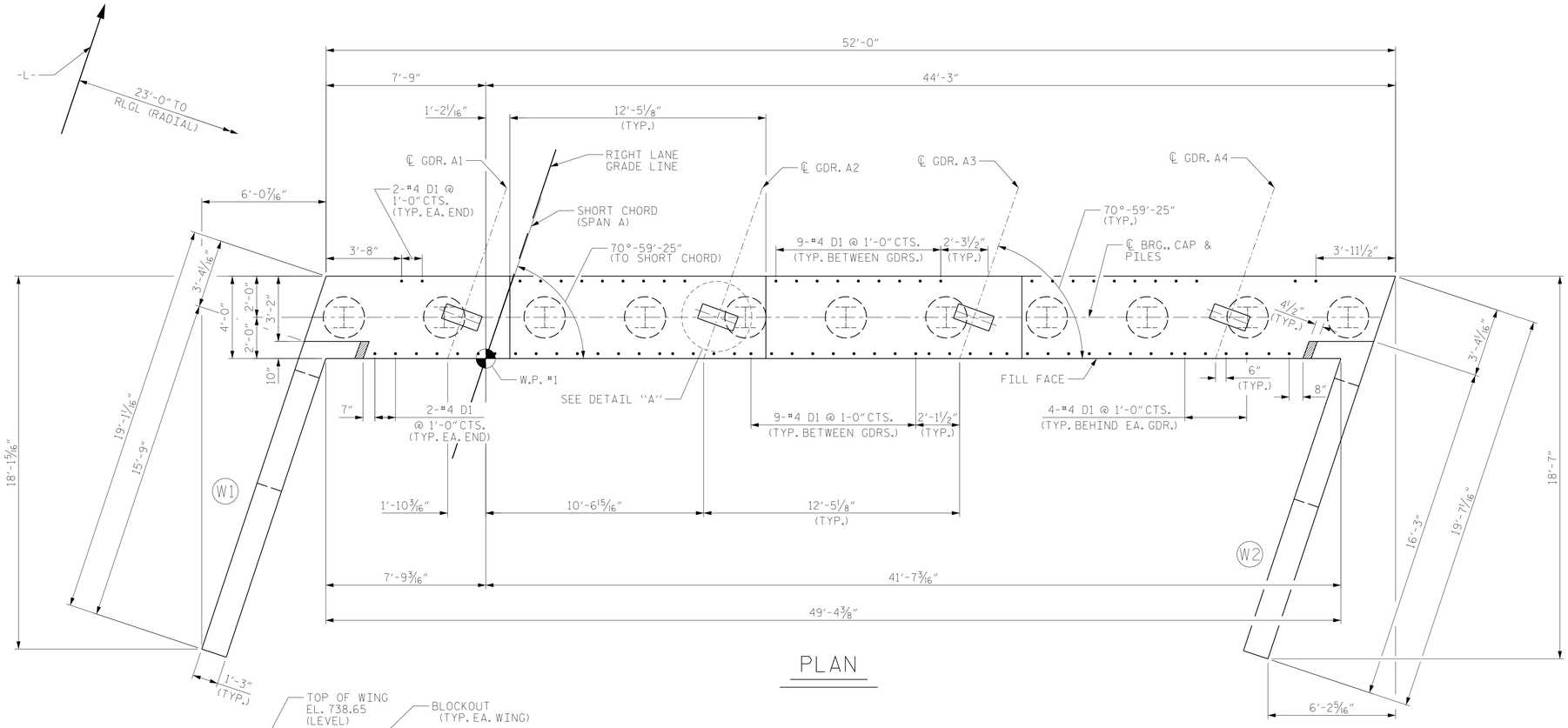
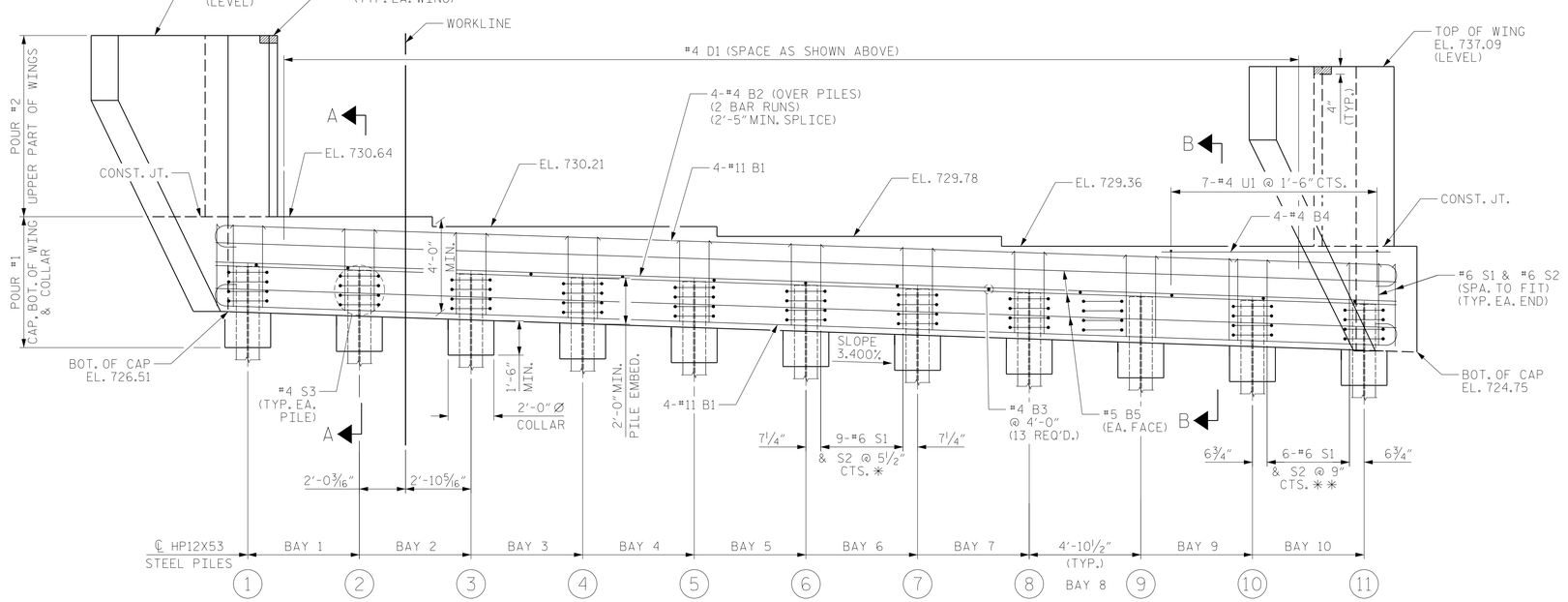
STR. #2



PLAN



ELEVATION

✳ = TYPICAL BAY 4 THRU BAY 7
✳✳ = TYPICAL BAY 1 THRU BAY 3 AND BAY 8 THRU BAY 10

NOTES

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

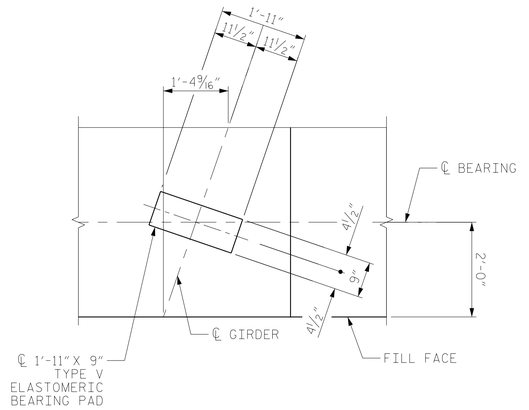
FOR SECTION A-A AND SECTION B-B, SEE SHEET 4 OF 4.

STIRRUPS MAY BE SHIFTED SLIGHTLY TO AVOID #4 D1 BARS IN CAP.

SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

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

RLGL = RIGHT LANE GRADE LINE



DETAIL "A"
DIMENSIONS TYP. EA. BRG. PILE NOT SHOWN FOR CLARITY

TOP OF PILE ELEVATIONS

PILE	ELEVATION
1	728.47
2	728.30
3	728.14
4	727.97
5	727.81
6	727.64
7	727.48
8	727.31
9	727.15
10	726.98
11	726.82

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SHEET 1 OF 4

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NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER MARK ROBINSON
DocuSigned by:
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

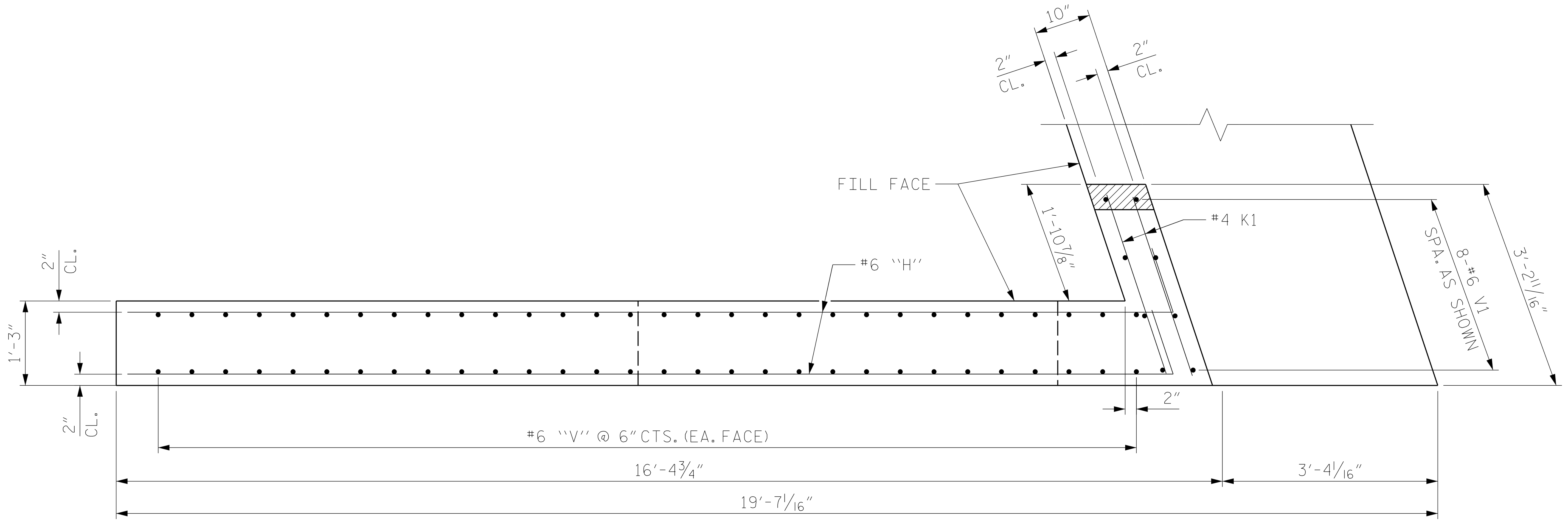
SUBSTRUCTURE

INTEGRAL END BENT NO. 1

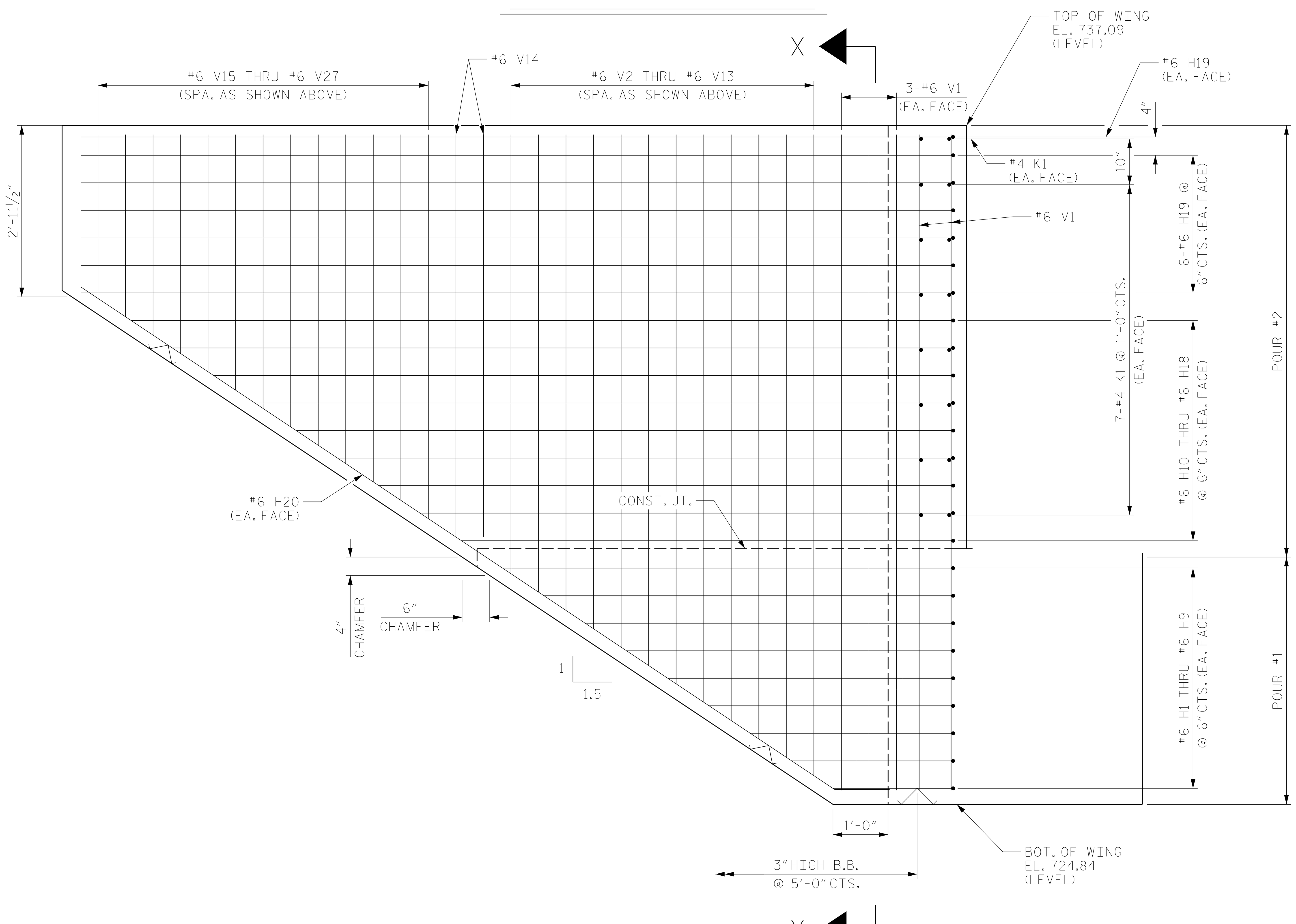
RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-23
1			3			TOTAL SHEETS
2			4			36

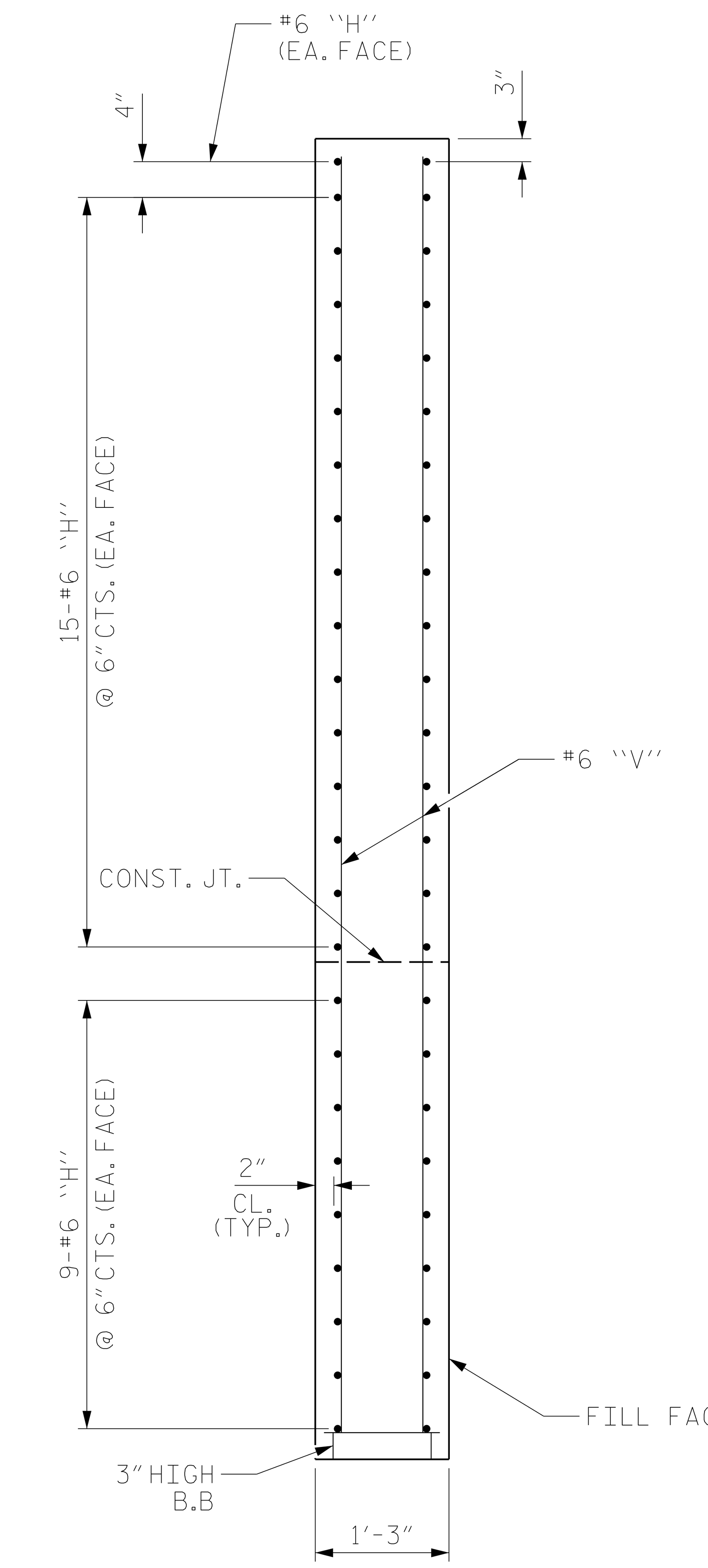
STR. #2



PLAN OF WING - W2



ELEVATION OF WING - W2



SECTION X-X

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUBSTRUCTURE

INTEGRAL
END BENT NO. 1

RIGHT LANE

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1			3		
2			4		

SHEET NO. S2-24
TOTAL SHEETS 36

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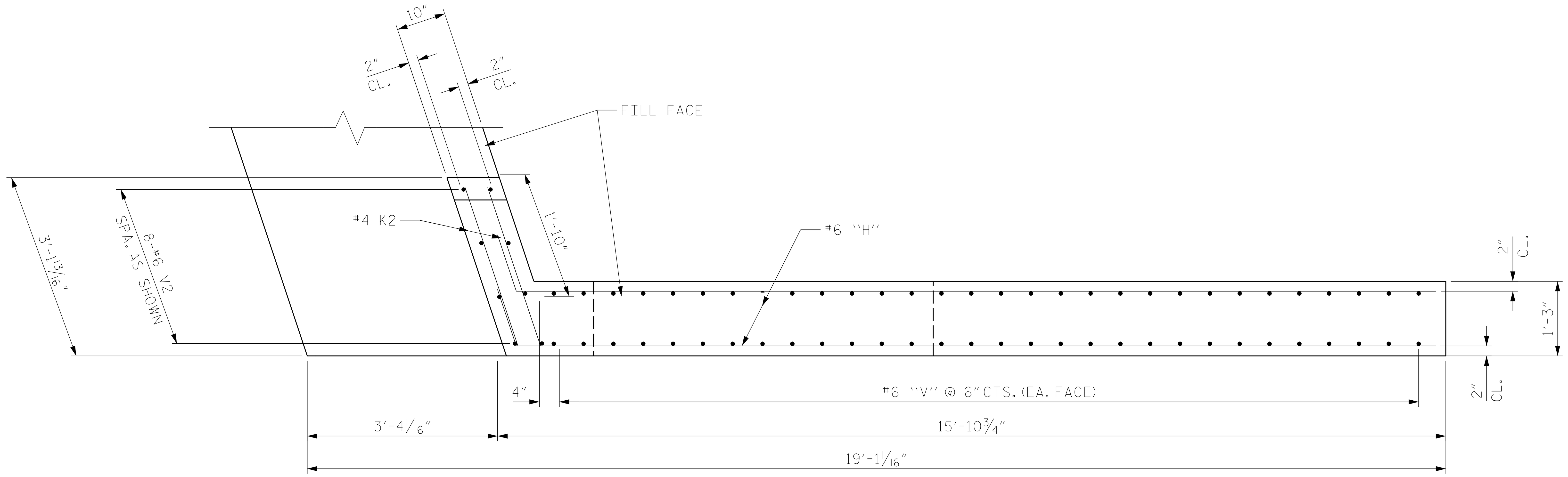
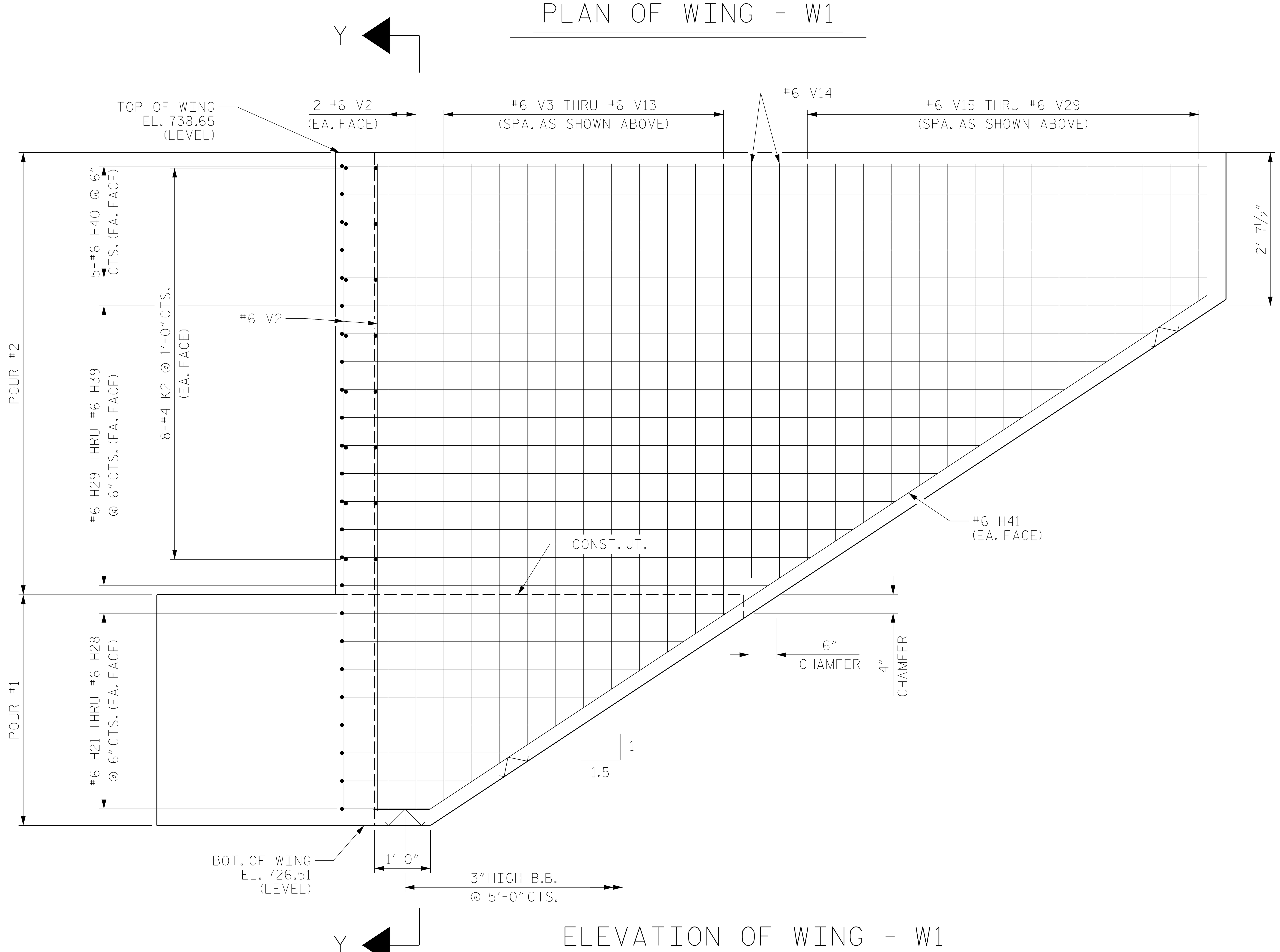
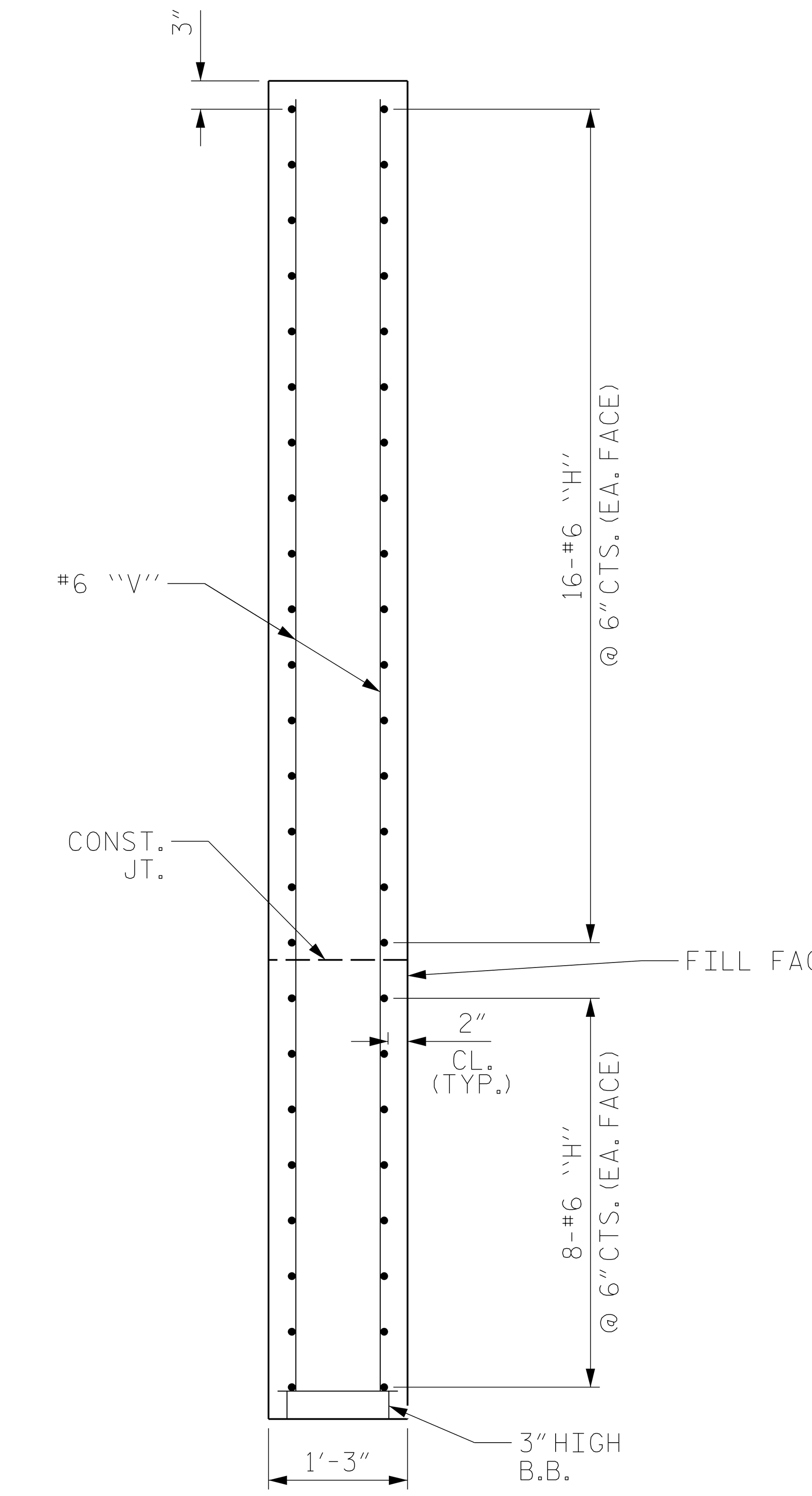


PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 3 OF 4

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SUBSTRUCTURE

INTEGRAL
END BENT NO. 1

RIGHT LANE

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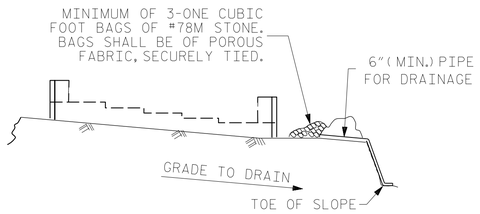
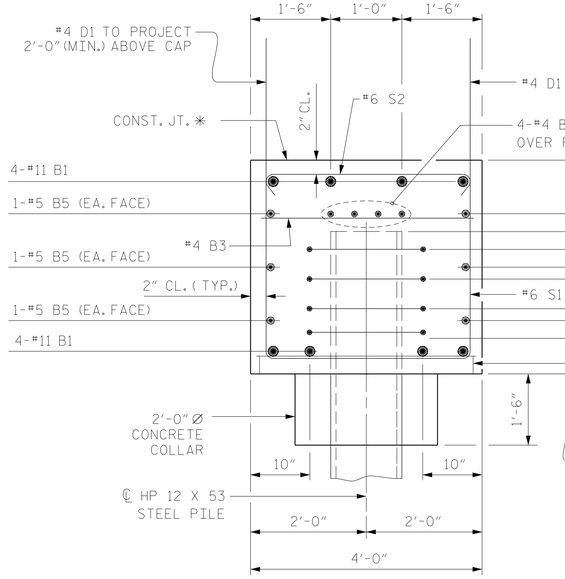


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

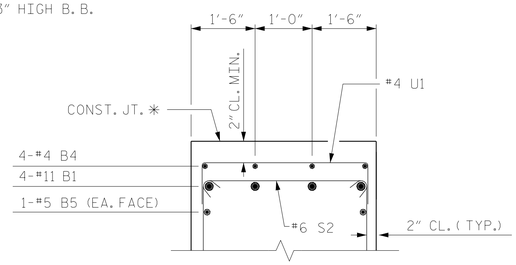
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



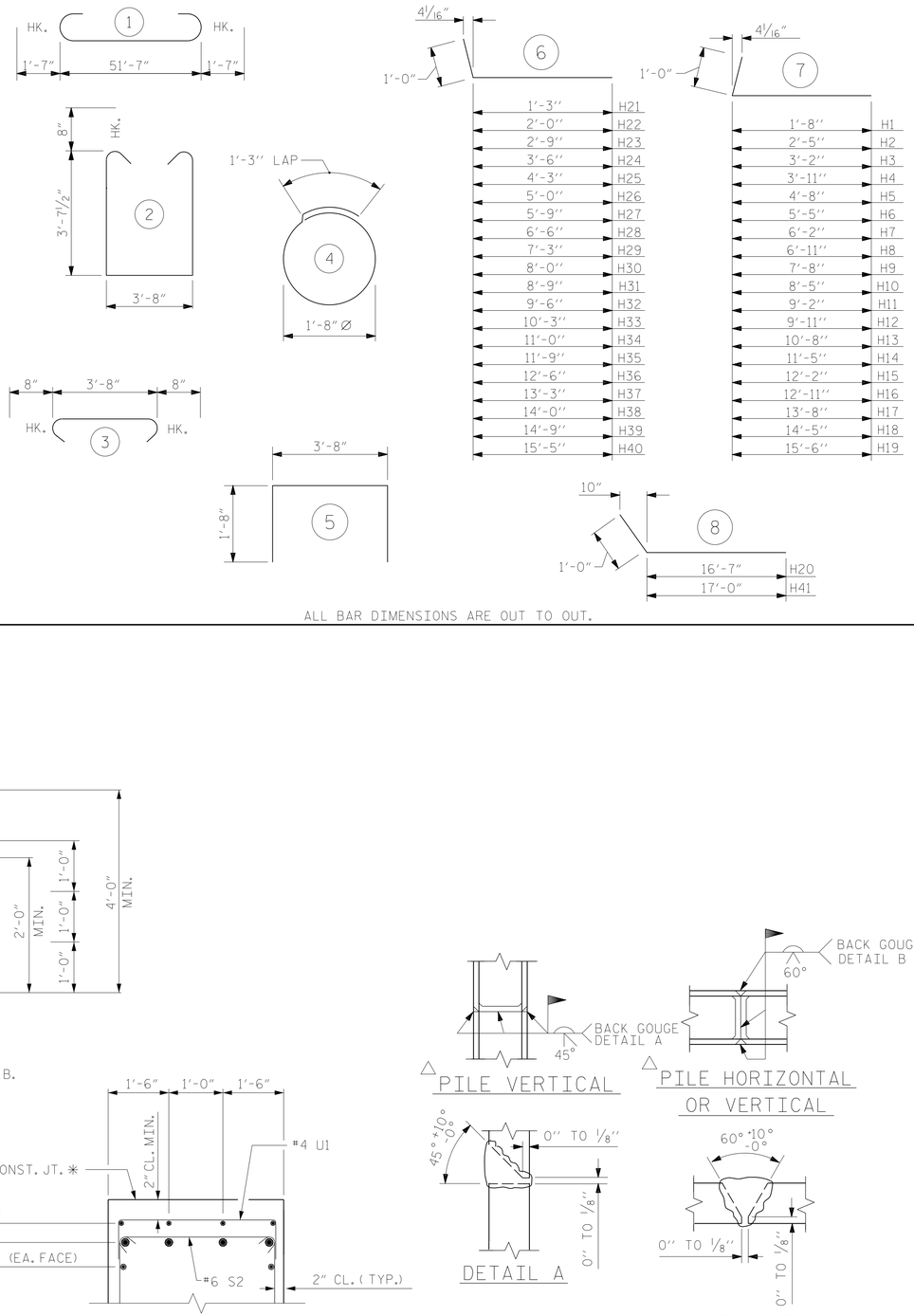
SECTION A-A

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



PARTIAL SECTION B-B

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT NO. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	54'-9"	2327	K1	16	#4	STR	2'-10"	30
B2	8	#4	STR	27'-1"	145	K2	16	#4	STR	2'-9"	29
B3	13	#4	STR	3'-8"	32						
B4	4	#4	STR	10'-0"	27	S1	76	#6	2	12'-3"	1398
B5	6	#5	STR	51'-7"	323	S2	76	#6	3	5'-0"	571
						S3	44	#4	4	6'-6"	191
D1	78	#4	STR	4'-0"	208						
						U1	7	#4	5	7'-0"	33
H1	2	#6	7	2'-8"	8						
H2	2	#6	7	3'-5"	10	V1	14	#6	STR	11'-11"	251
H3	2	#6	7	4'-2"	13	V2	14	#6	STR	11'-8"	245
H4	2	#6	7	4'-11"	15	V3	4	#6	STR	11'-4"	68
H5	2	#6	7	5'-8"	17	V4	4	#6	STR	11'-0"	66
H6	2	#6	7	6'-5"	19	V5	4	#6	STR	10'-8"	64
H7	2	#6	7	7'-2"	22	V6	4	#6	STR	10'-4"	62
H8	2	#6	7	7'-11"	24	V7	4	#6	STR	10'-0"	60
H9	2	#6	7	8'-8"	26	V8	4	#6	STR	9'-8"	58
H10	2	#6	7	9'-5"	28	V9	4	#6	STR	9'-4"	56
H11	2	#6	7	10'-2"	31	V10	4	#6	STR	9'-0"	54
H12	2	#6	7	10'-11"	33	V11	4	#6	STR	8'-8"	52
H13	2	#6	7	11'-8"	35	V12	4	#6	STR	8'-4"	50
H14	2	#6	7	12'-5"	37	V13	4	#6	STR	8'-0"	48
H15	2	#6	7	13'-2"	40	V14	8	#6	STR	7'-4"	88
H16	2	#6	7	13'-11"	42	V15	4	#6	STR	7'-0"	42
H17	2	#6	7	14'-8"	44	V16	4	#6	STR	6'-8"	40
H18	2	#6	7	15'-5"	46	V17	4	#6	STR	6'-4"	38
H19	14	#6	7	16'-6"	347	V18	4	#6	STR	6'-0"	36
H20	2	#6	8	17'-7"	53	V19	4	#6	STR	5'-8"	34
H21	2	#6	6	2'-3"	7	V20	4	#6	STR	5'-4"	32
H22	2	#6	6	3'-0"	9	V21	4	#6	STR	5'-0"	30
H23	2	#6	6	3'-9"	11	V22	4	#6	STR	4'-8"	28
H24	2	#6	6	4'-6"	14	V23	4	#6	STR	4'-4"	26
H25	2	#6	6	5'-3"	16	V24	4	#6	STR	4'-0"	24
H26	2	#6	6	6'-0"	18	V25	4	#6	STR	3'-8"	22
H27	2	#6	6	6'-9"	20	V26	4	#6	STR	3'-4"	20
H28	2	#6	6	7'-6"	23	V27	4	#6	STR	2'-11"	18
H29	2	#6	6	8'-3"	25	V28	2	#6	STR	2'-8"	8
H30	2	#6	6	9'-0"	27	V29	2	#6	STR	2'-4"	7
H31	2	#6	6	9'-9"	29						
H32	2	#6	6	10'-6"	32						
H33	2	#6	6	11'-3"	34						
H34	2	#6	6	12'-0"	36						
H35	2	#6	6	12'-9"	38						
H36	2	#6	6	13'-6"	41						
H37	2	#6	6	14'-3"	43						
H38	2	#6	6	15'-0"	45						
H39	2	#6	6	15'-9"	47						
H40	10	#6	6	16'-5"	247						
H41	2	#6	8	18'-0"	54						

PILE DRIVING EQUIPMENT SETUP NO. 11

REINFORCING STEEL	8,647 LBS.
CLASS A CONCRETE	
POUR #1	
CAP, CONCRETE COLLARS & LOWER PART OF WINGS	36.4 C. Y.
POUR #2	
UPPER PART OF WINGS	11.1 C. Y.
TOTAL	47.5 C. Y.
HP 12 X 53 STEEL PILES	
NO. 11	440 LIN. FT.
STEEL PILE POINTS	NO.: 11

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039918 MARK ROBINSON
3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-26
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : PDS DATE : 11/2016
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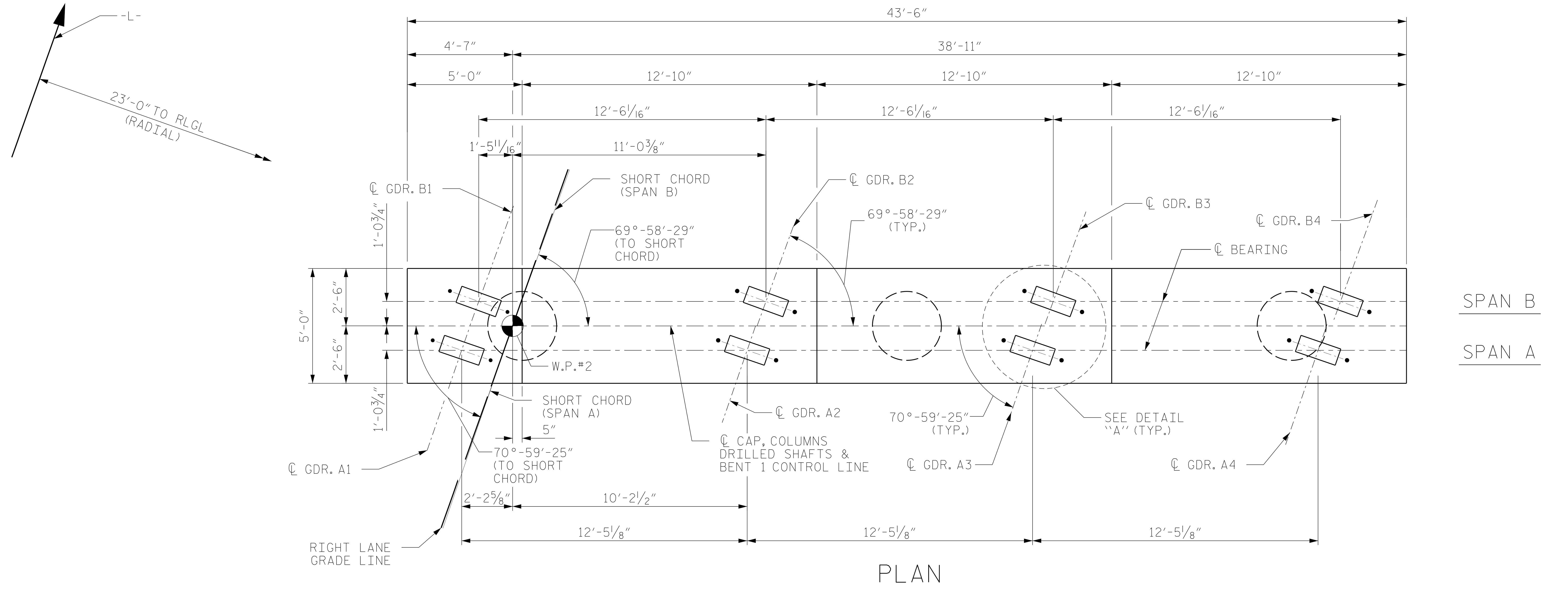
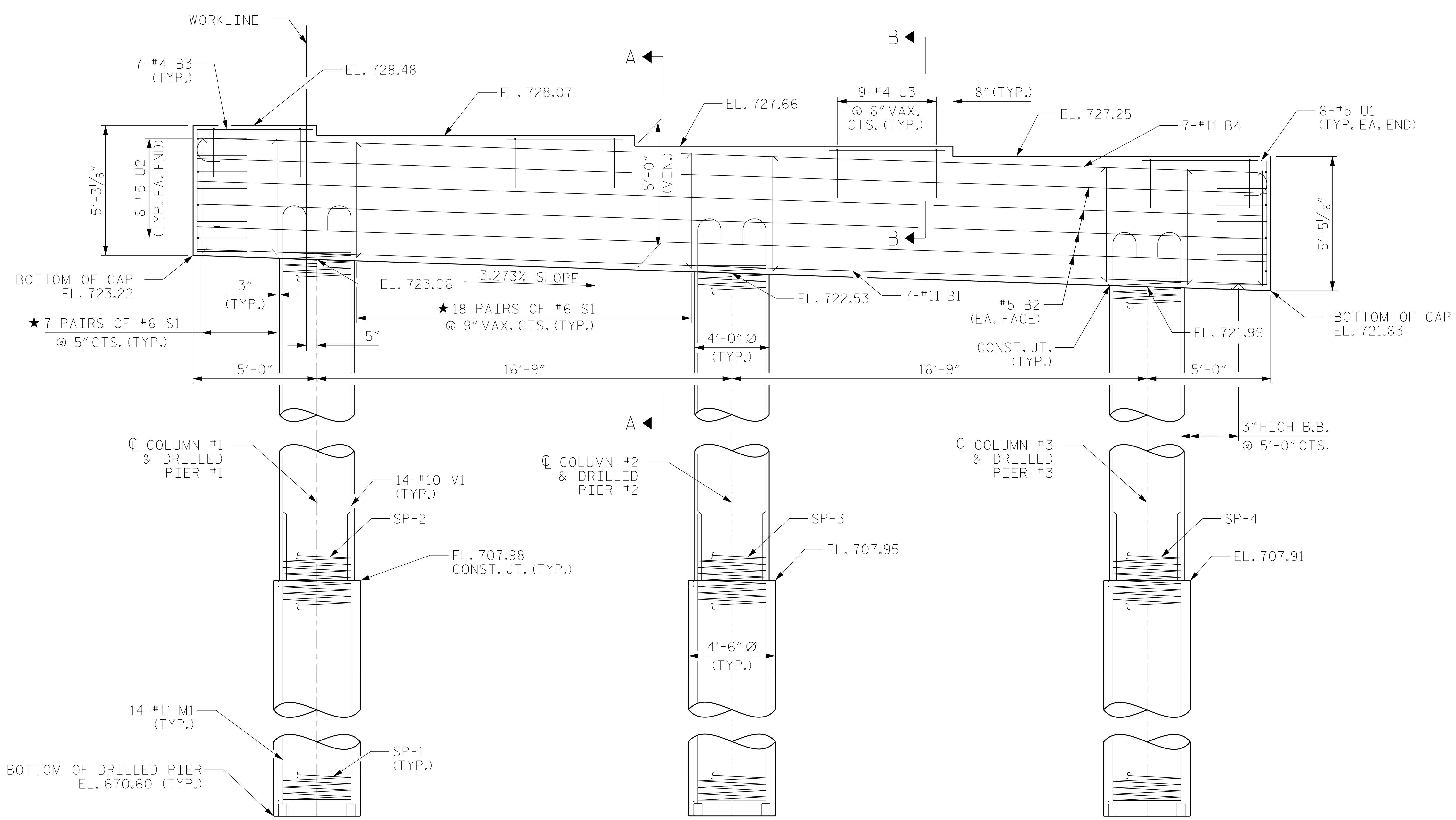
STR. #2



PLAN



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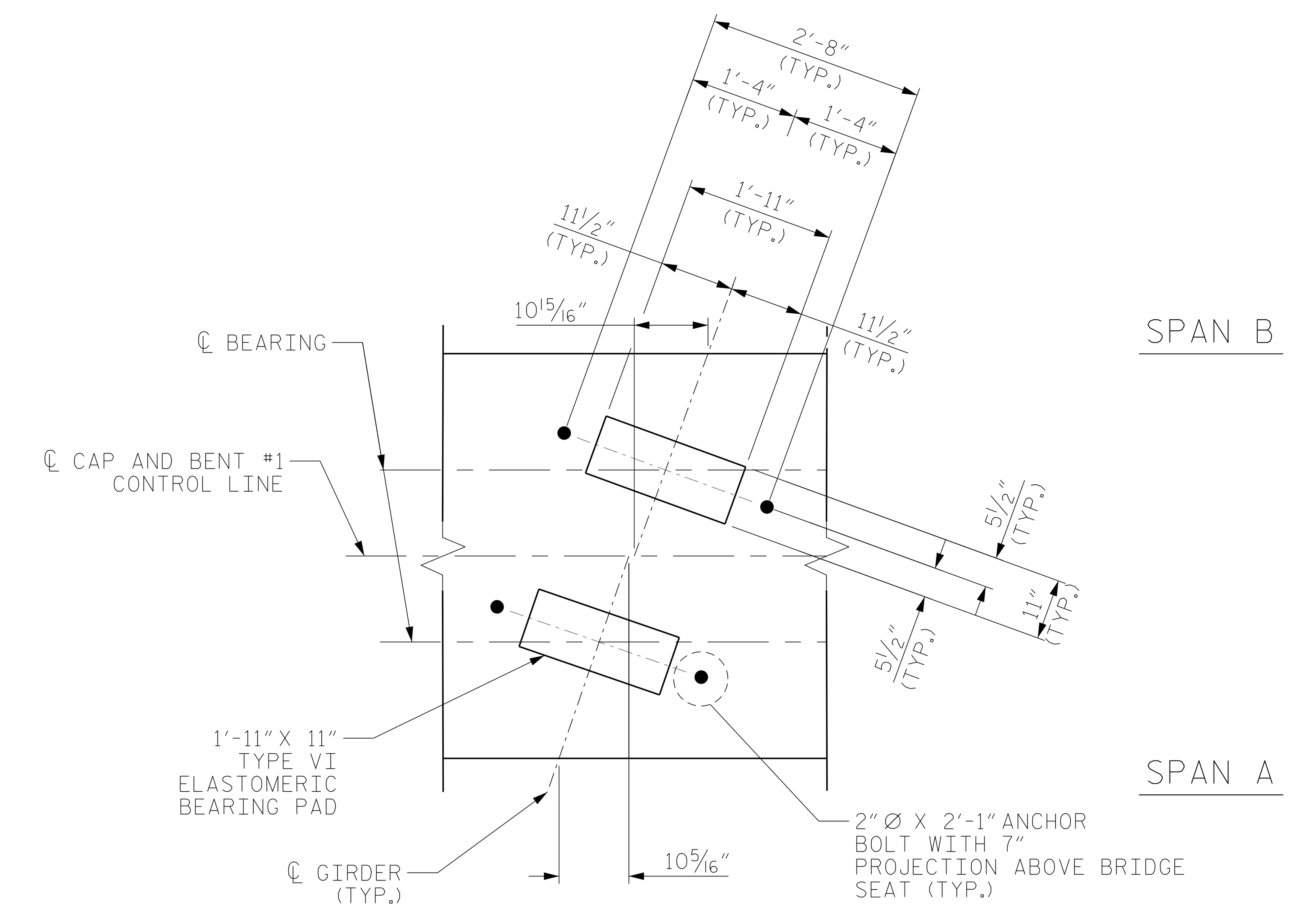

DETAIL "A"

DIMENSIONS ARE TYPICAL
FOR EACH GIRDER

NOTES

FOR SECTION A-A AND VIEW B-B, SEE SHEET 2 OF 2.

FOR REINFORCING STEEL BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

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

★ INVERT ALTERNATE #6 S1 STIRRUP PAIRS.

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

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

RLGL = RIGHT LANE GRADE LINE

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039590 — JUSTIN MARK ROBINSON
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-27
1			3			TOTAL SHEETS
2			4			36

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STR. #2

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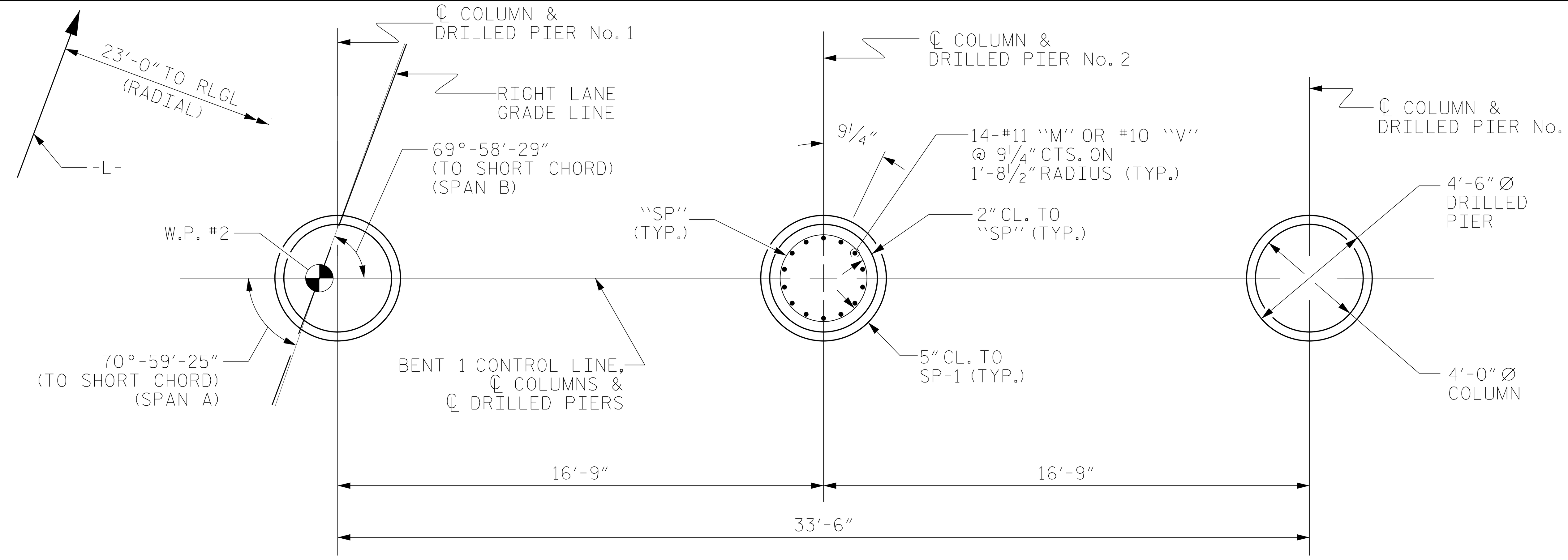
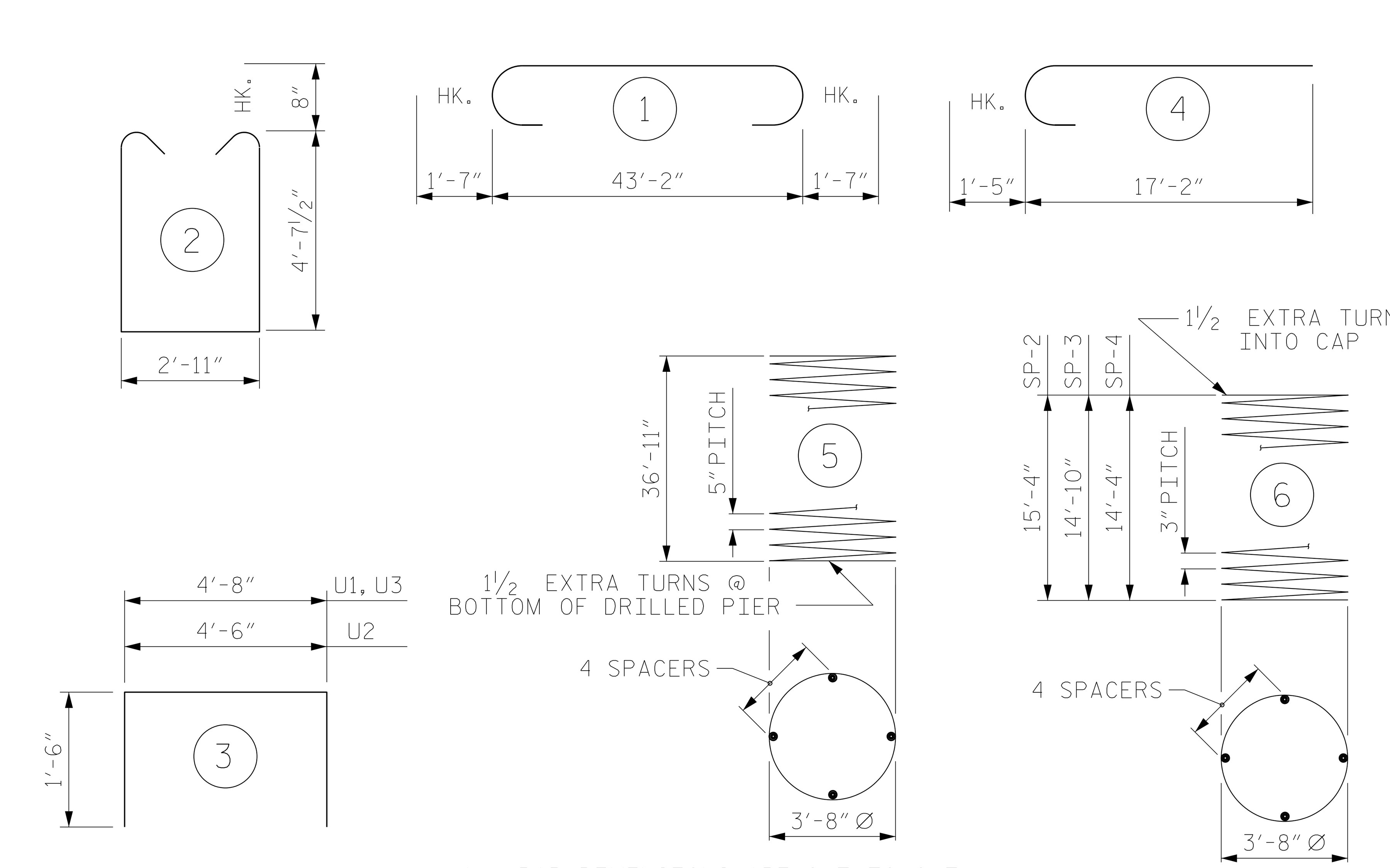


PLAN OF DRILLED PIERS & COLUMNS

NOTE: RLGL = RIGHT LANE GRADE LINE

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	STR	43'-2"	1,605
B2	8	#5	STR	43'-2"	360
B3	28	#4	STR	4'-8"	87
B4	7	#11	1	46'-4"	1,723
M1	42	#11	STR	47'-3"	10,544
S1	100	#6	2	13'-6"	2,028
U1	12	#5	3	7'-8"	96
U2	12	#5	3	7'-6"	94
U3	36	#4	3	7'-8"	184
V1	42	#10	4	18'-7"	3,358

REINFORCING STEEL (FOR BENT 1) 20,079 LBS.

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	3	**	5	1025'-7"	3,209
SP-2	1	*	6	717'-8"	479
SP-3	1	*	6	694'-11"	464
SP-4	1	*	6	672'-1"	449

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1) 4,601 LBS.

** THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

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

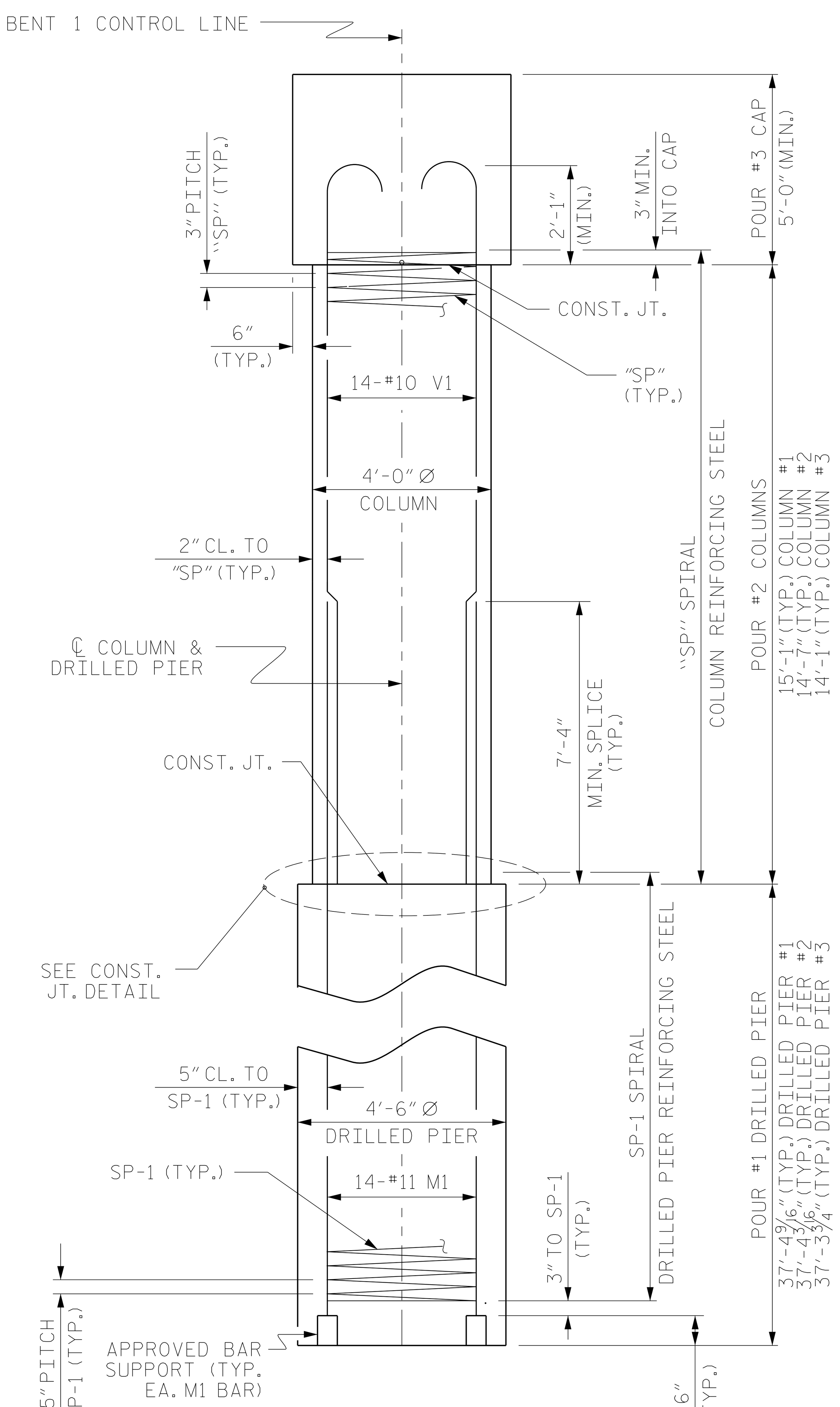
CLASS A CONCRETE BREAKDOWN (FOR BENT 1)

POUR #2 (COLUMNS)	20.4 C.Y.
POUR #3 (CAP)	42.1 C.Y.
TOTAL CLASS A CONCRETE	62.5 C.Y.

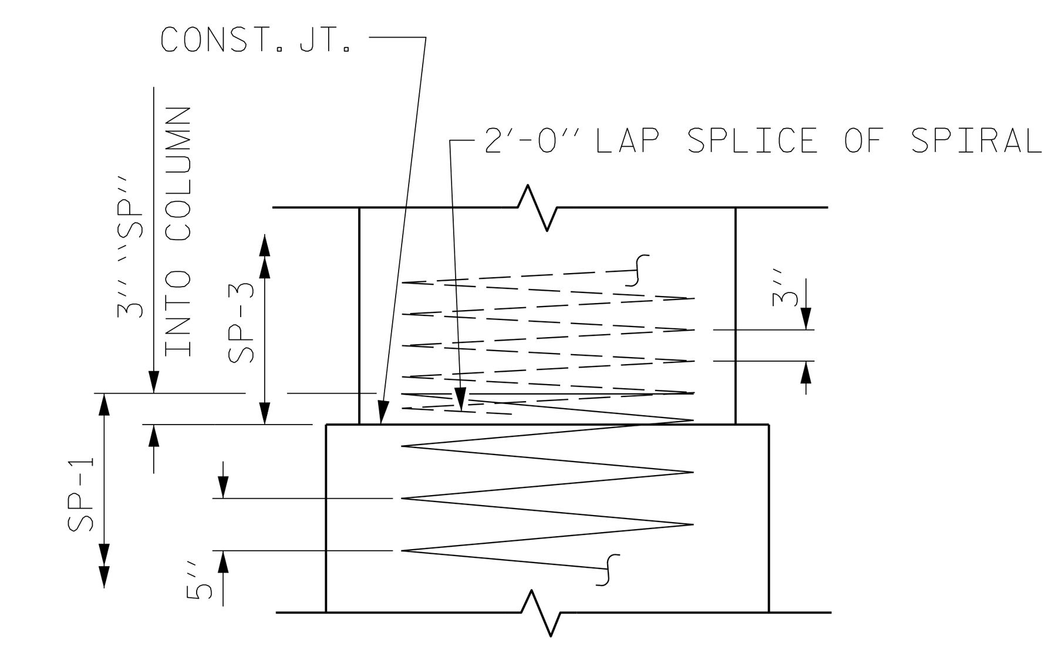
DRILLED PIERS: (FOR BENT 1)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	66.0 C.Y.
4'-6" Ø DRILLED PIER NOT IN SOIL	27.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	85.0 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	54 LIN. FT.
△ CSL TUBES	467.0 LIN. FT.

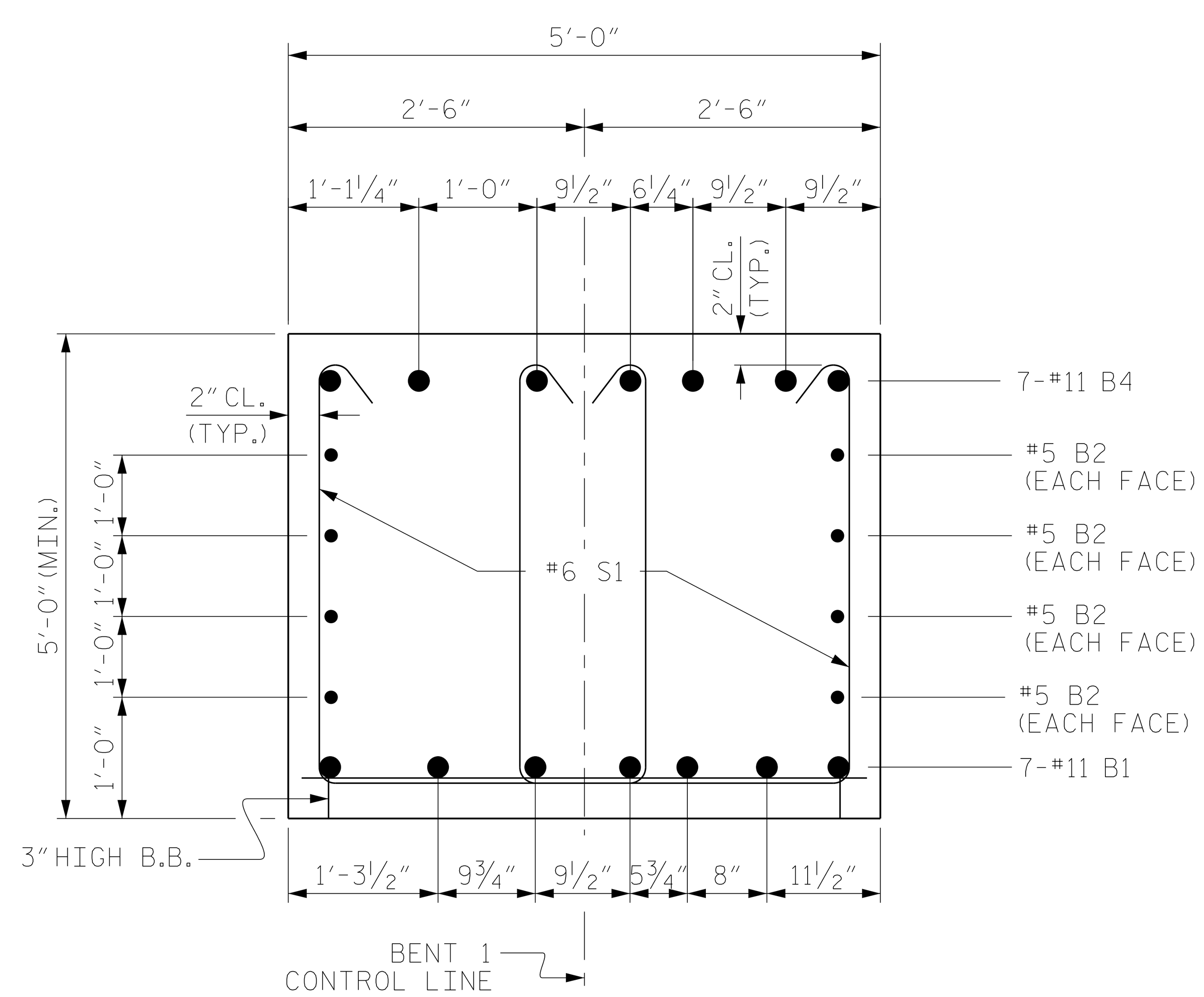
△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.



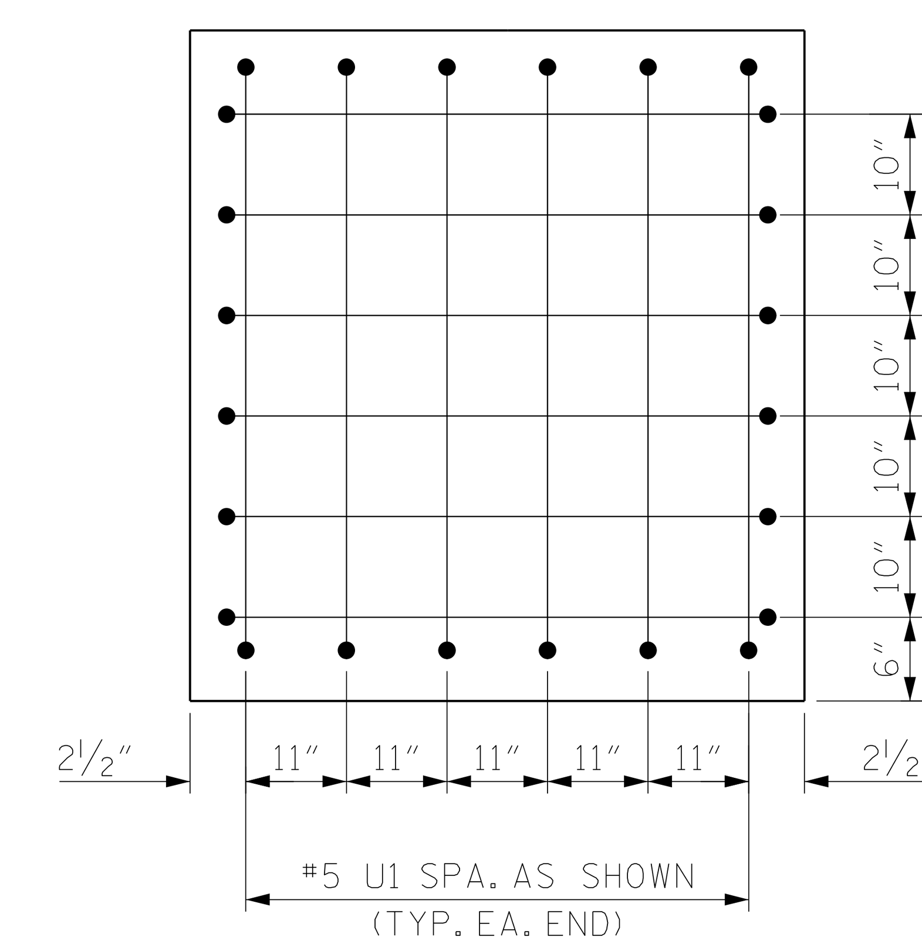
END ELEVATION



CONSTRUCTION JOINT DETAIL

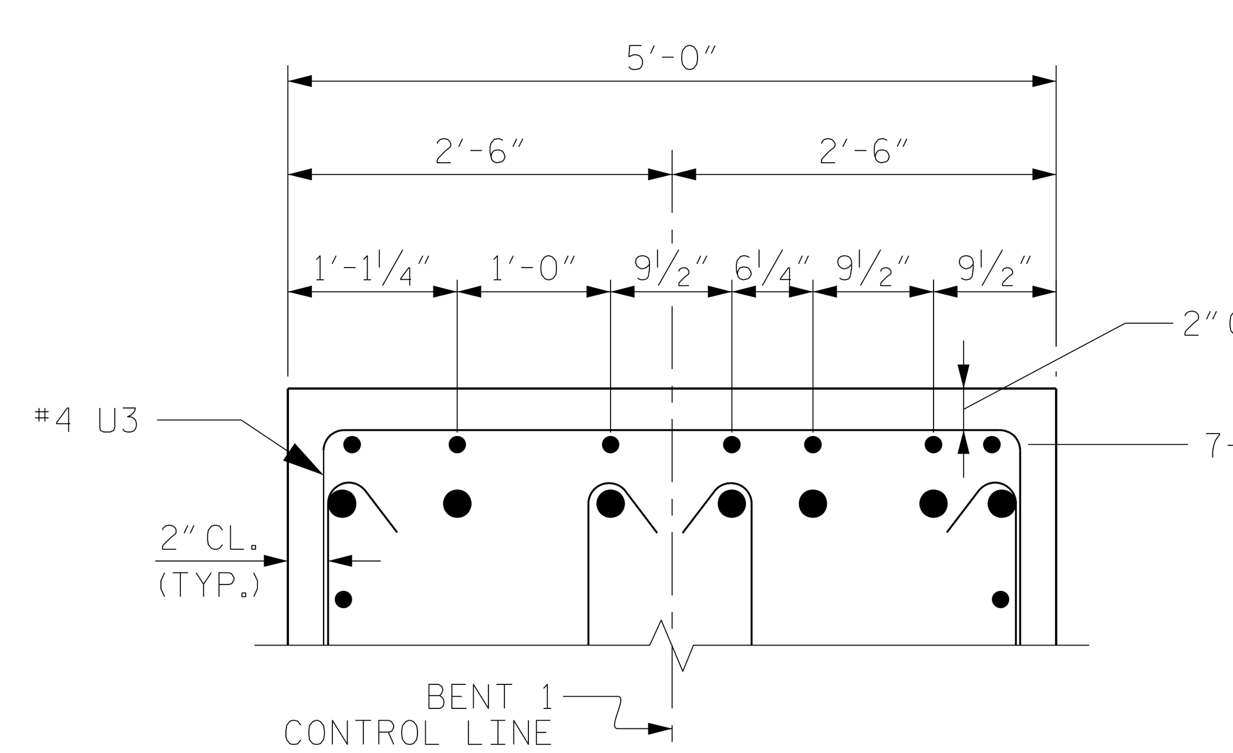


SECTION THRU CAP



END OF CAP VIEW

(TYPICAL BOTH ENDS)



VIEW B-B

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON — DocuSigned by: Justin Robinson — 3/21/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 1
DETAILS

RIGHT LANE

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

SHEET NO. S2-28

TOTAL SHEETS 36

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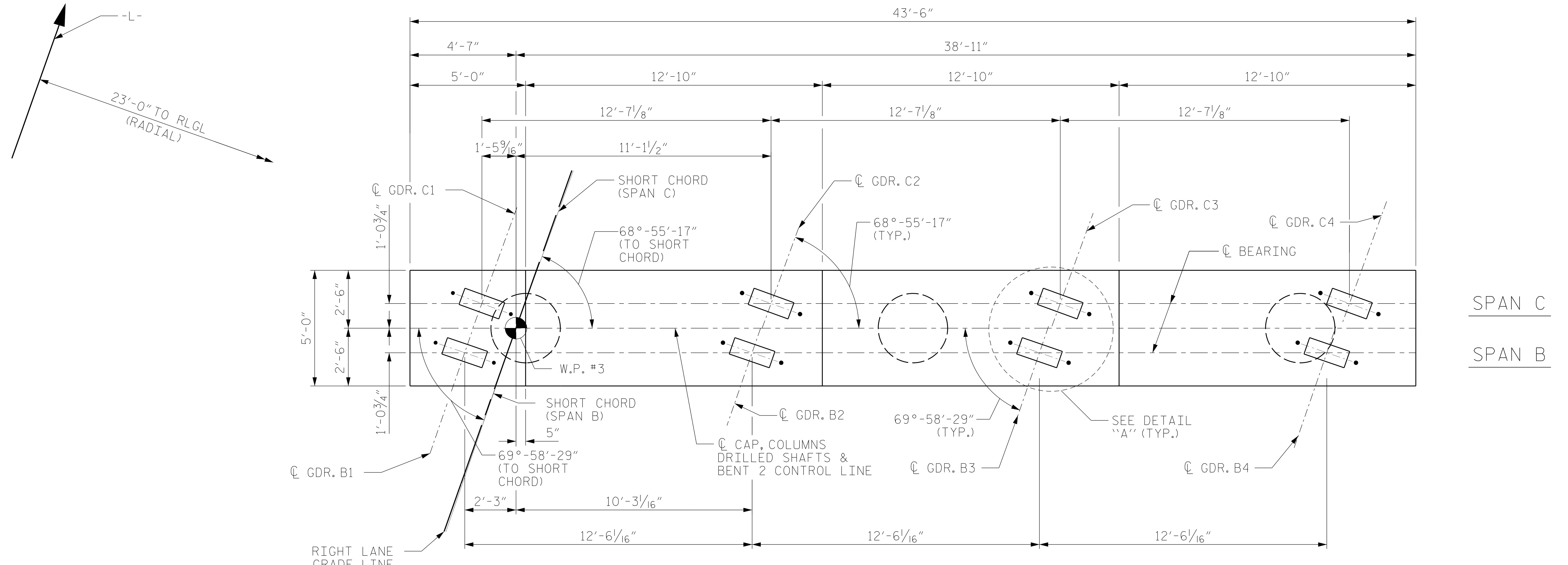
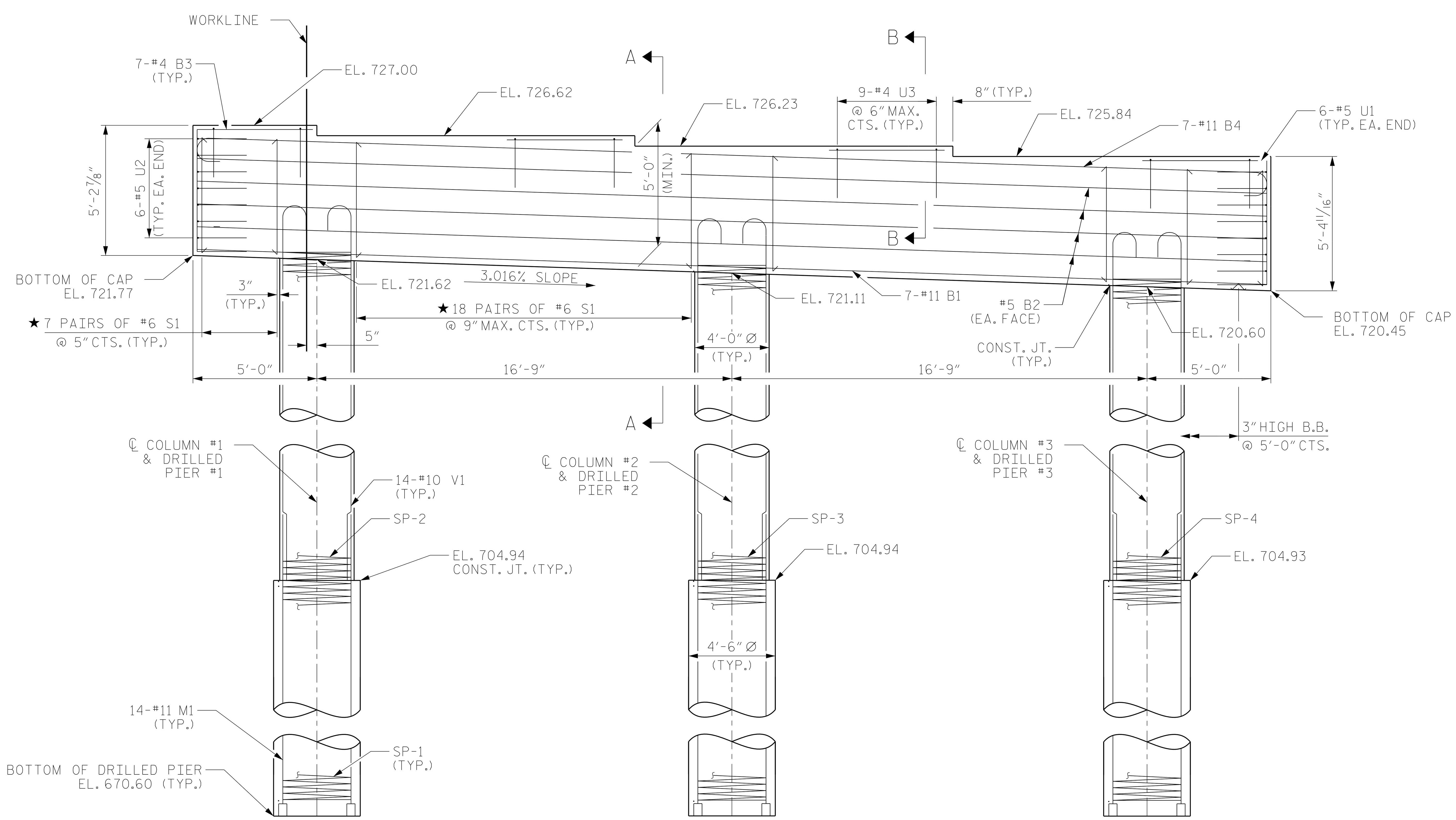
leblancm

STR. #2



PLAN



ELEVATION

NOTES

FOR SECTION A-A AND VIEW B-B, SEE SHEET 2 OF 2.

FOR REINFORCING STEEL BILL OF MATERIAL, SEE SHEET 2 OF 2.

STIRRUPS AND U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

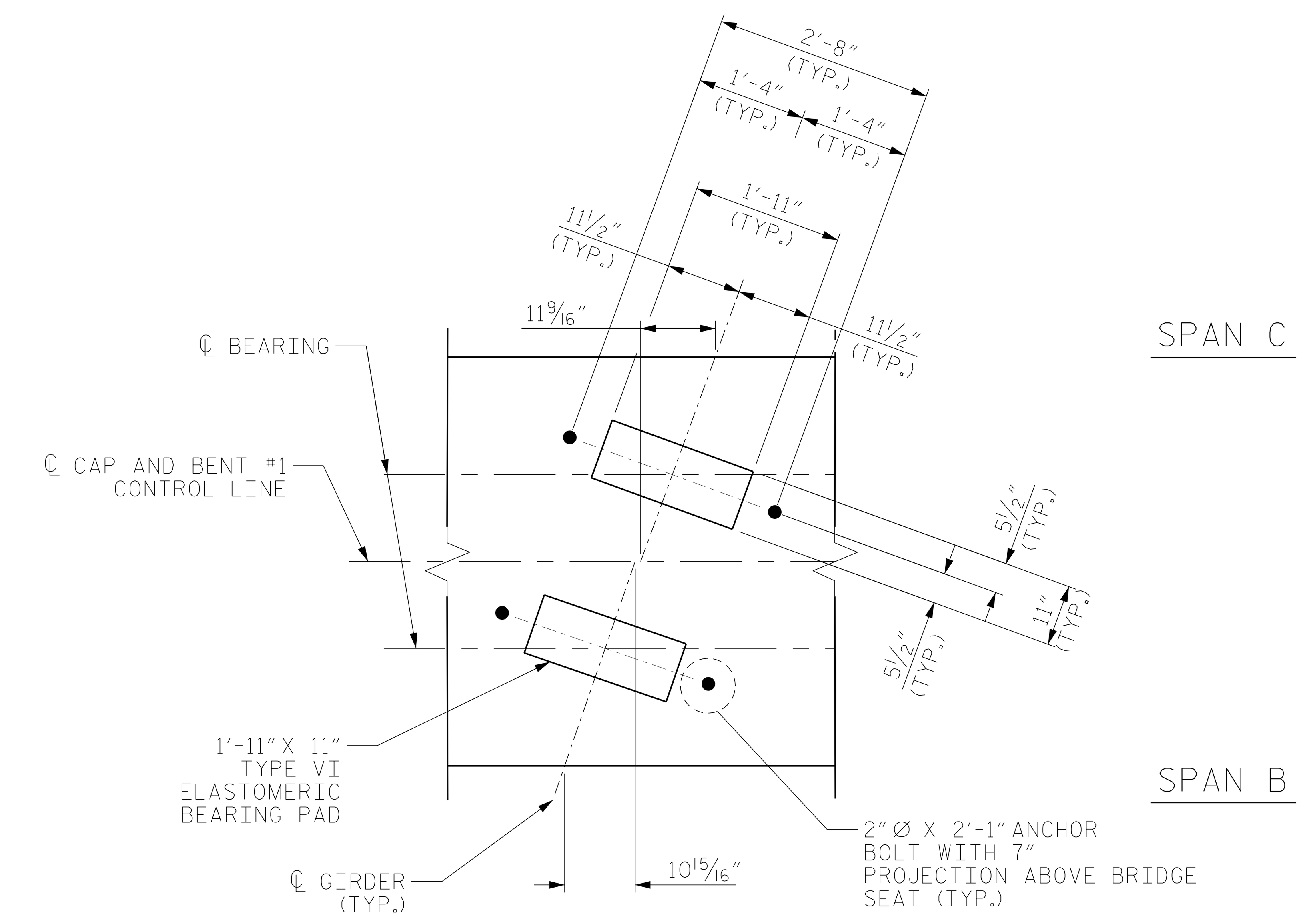
ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL."

★ INVERT ALTERNATE #6 S1 STIRRUP PAIRS.

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

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

RLGL = RIGHT LANE GRADE LINE



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 2

RIGHT LANE

SEAL — NORTH CAROLINA PROFESSIONAL ENGINEER — MARK ROBINSON
3/9/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-29
1			3			TOTAL SHEETS
2			4			36

STR. #2

DRAWN BY :	PDS	DATE :	11/2016
CHECKED BY :	TLC	DATE :	01/2017
DESIGN ENGINEER OF RECORD:	MAL	DATE :	11/2016

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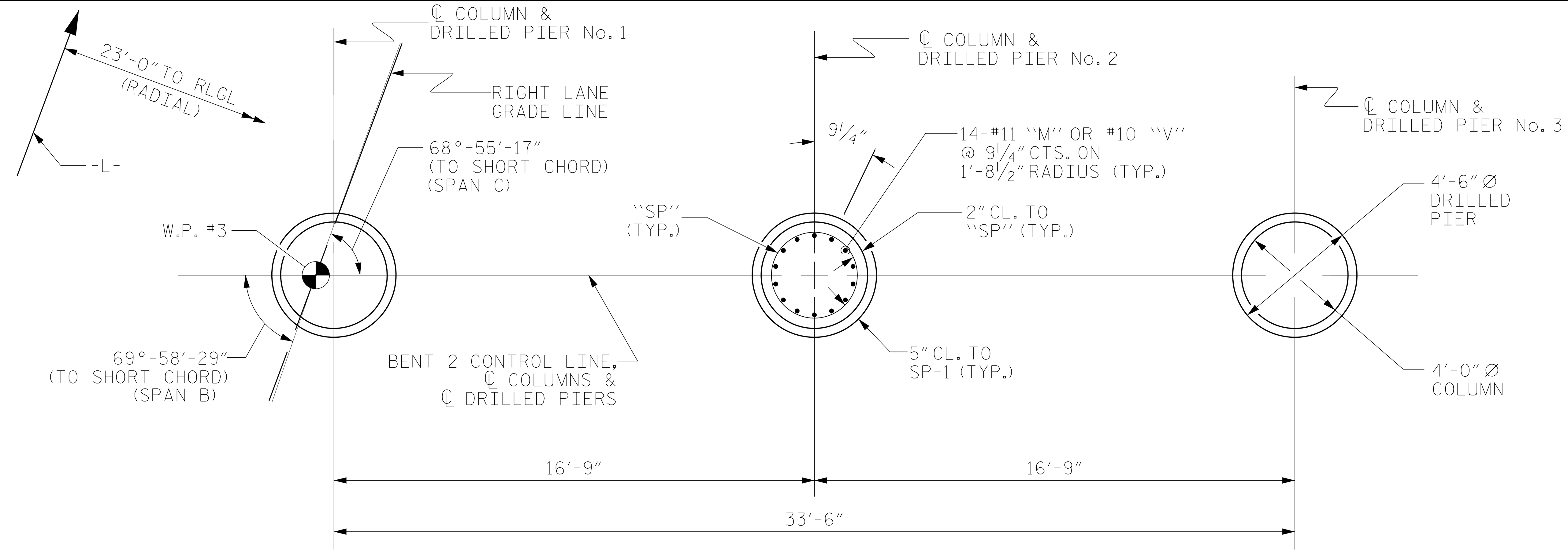
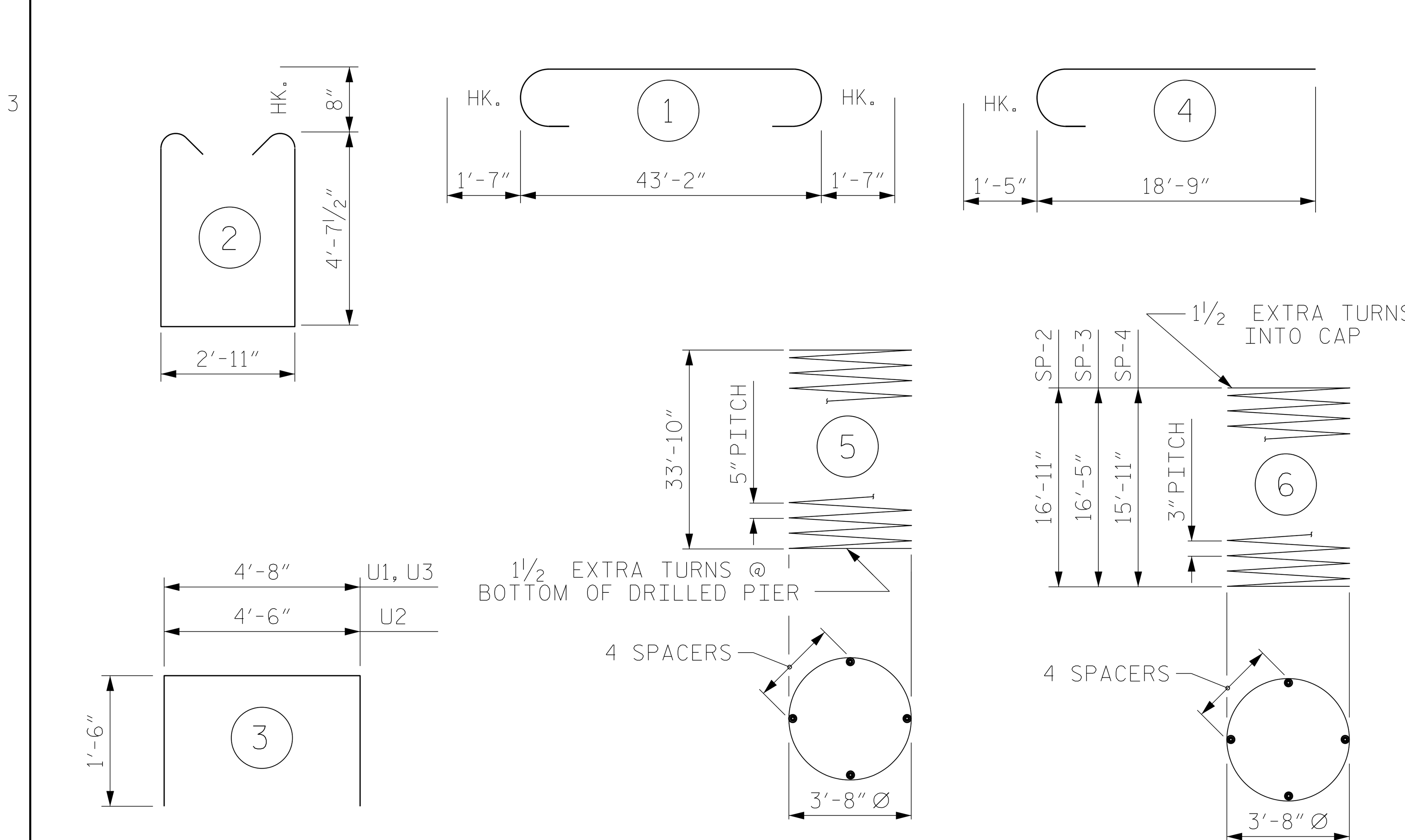


PLAN OF DRILLED PIERS & COLUMNS

NOTE: RLGL = RIGHT LANE GRADE LINE

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	7	#11	STR	43'-2"	1,605
B2	8	#5	STR	43'-2"	360
B3	28	#4	STR	4'-8"	87
B4	7	#11	1	46'-4"	1,723
M1	42	#11	STR	44'-2"	9,856
S1	100	#6	2	13'-6"	2,028
U1	12	#5	3	7'-8"	96
U2	12	#5	3	7'-6"	94
U3	36	#4	3	7'-8"	184
V1	42	#10	4	20'-2"	3,645

REINFORCING STEEL (FOR BENT 2) 19,678 LBS.

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	3	**	5	940'-4"	2,942
SP-2	1	*	6	788'-10"	527
SP-3	1	*	6	766'-1"	512
SP-4	1	*	6	743'-4"	497

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 2) 4,478 LBS.

** THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR

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

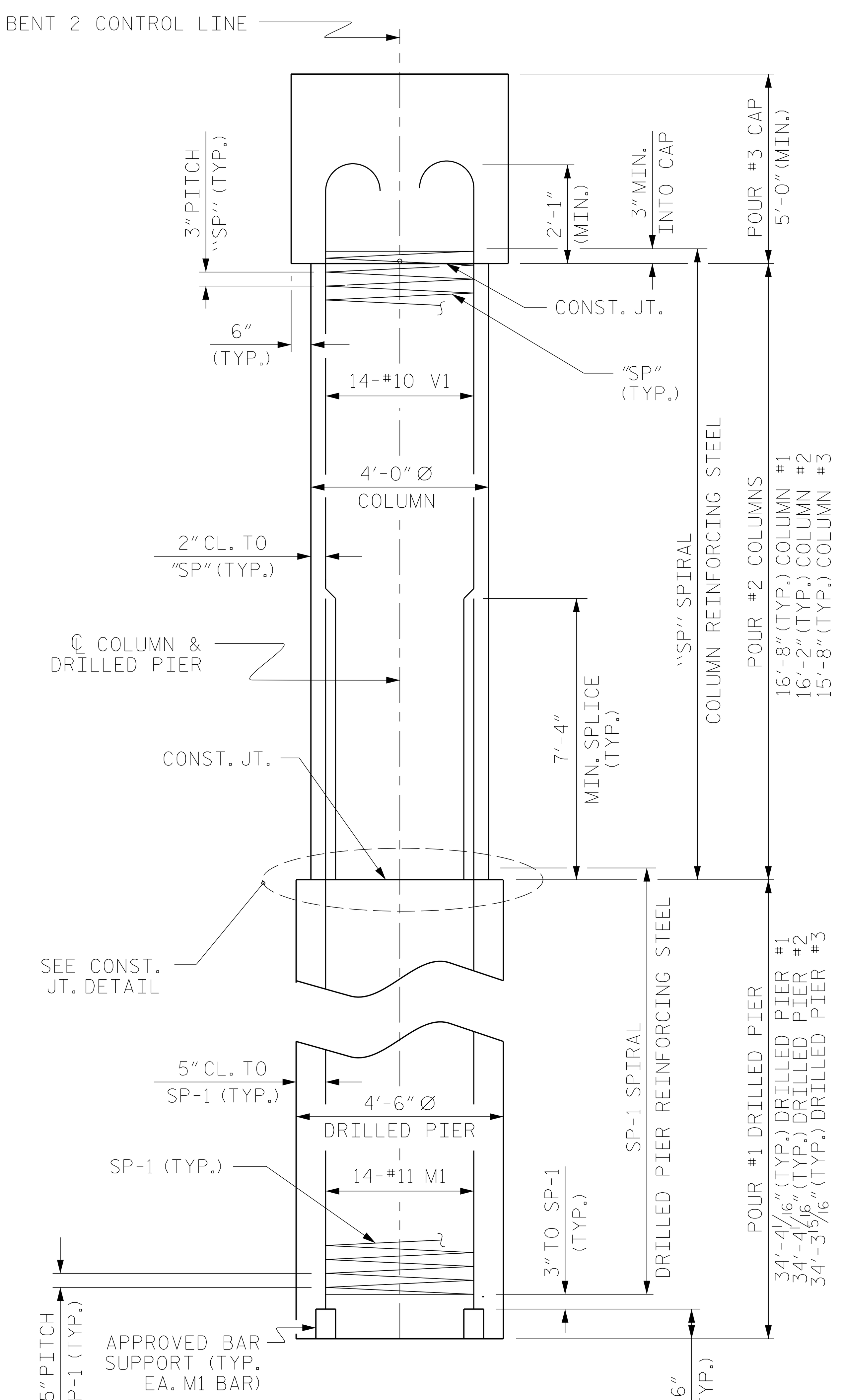
CLASS A CONCRETE BREAKDOWN (FOR BENT 2)

POUR #2 (COLUMNS)	22.6 C.Y.
POUR #3 (CAP)	41.5 C.Y.
TOTAL CLASS A CONCRETE	64.1 C.Y.

DRILLED PIERS: (FOR BENT 2)

DRILLED PIER CONCRETE POUR #1 (DRILLED PIERS)	60.7 CY
4'-6" Ø DRILLED PIER NOT IN SOIL	27.0 LIN. FT.
4'-6" Ø DRILLED PIER IN SOIL	76.0 LIN. FT.
PERMANENT STEEL CASING FOR 4'-6" Ø DRILLED PIERS	54 LIN. FT.
△ CSL TUBES	430.0 LIN. FT.

△ NO SEPERATE PAYMENT WILL BE MADE FOR CSL TUBES. CSL TUBES WILL BE INCLUDED IN THE UNIT BID PRICE FOR DRILLED PIERS.



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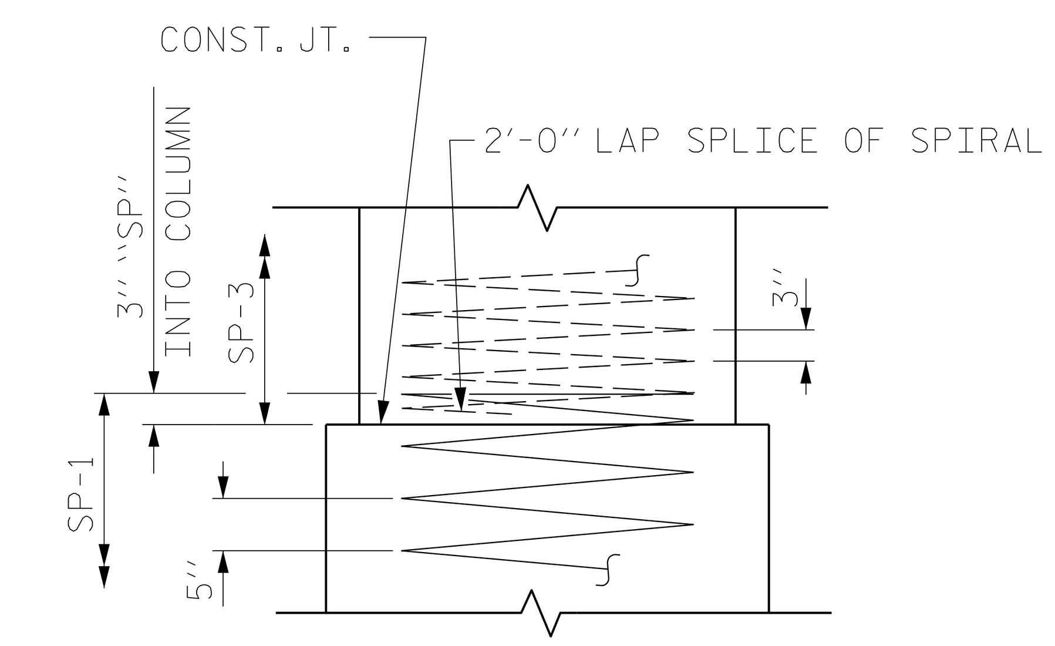
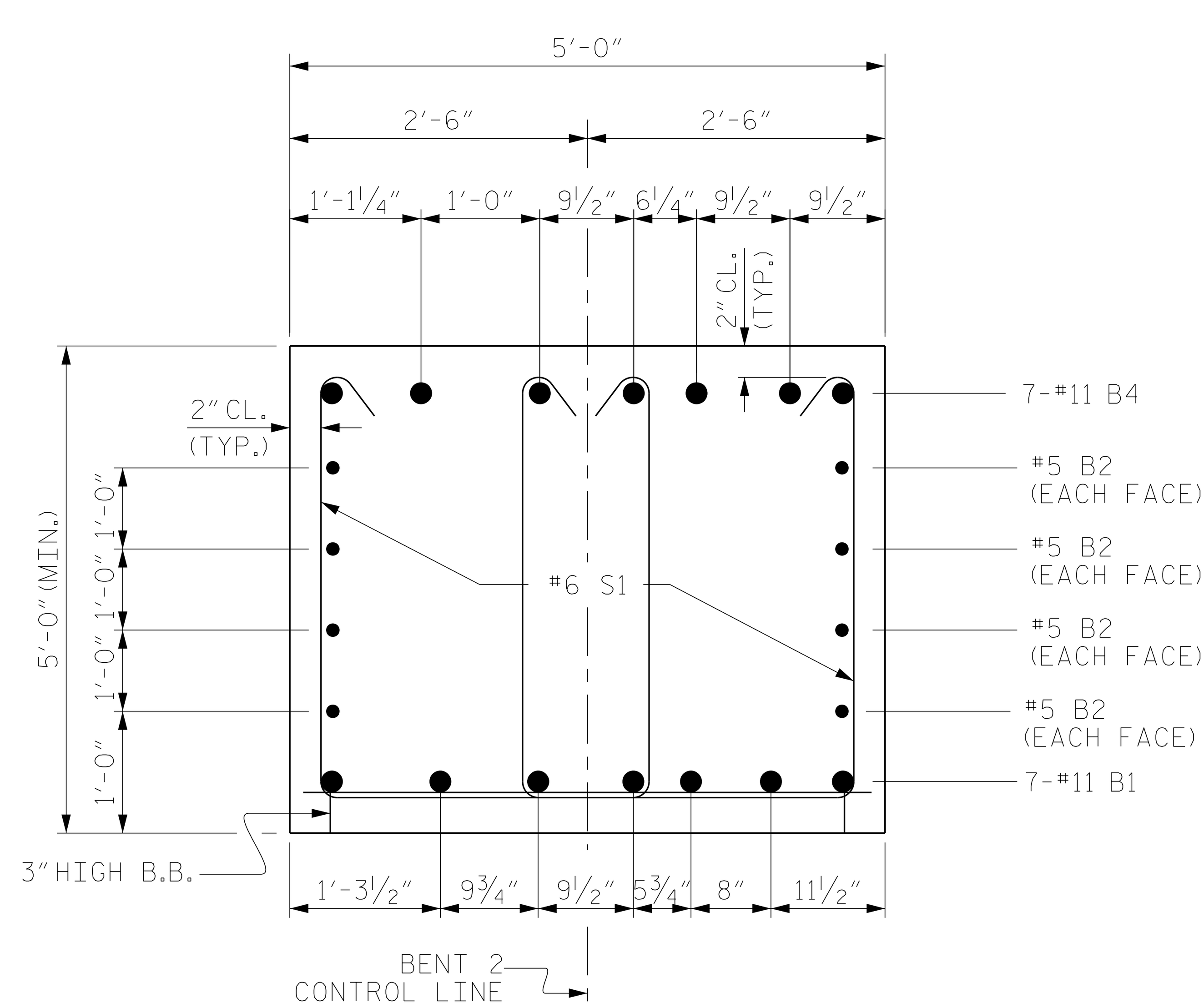
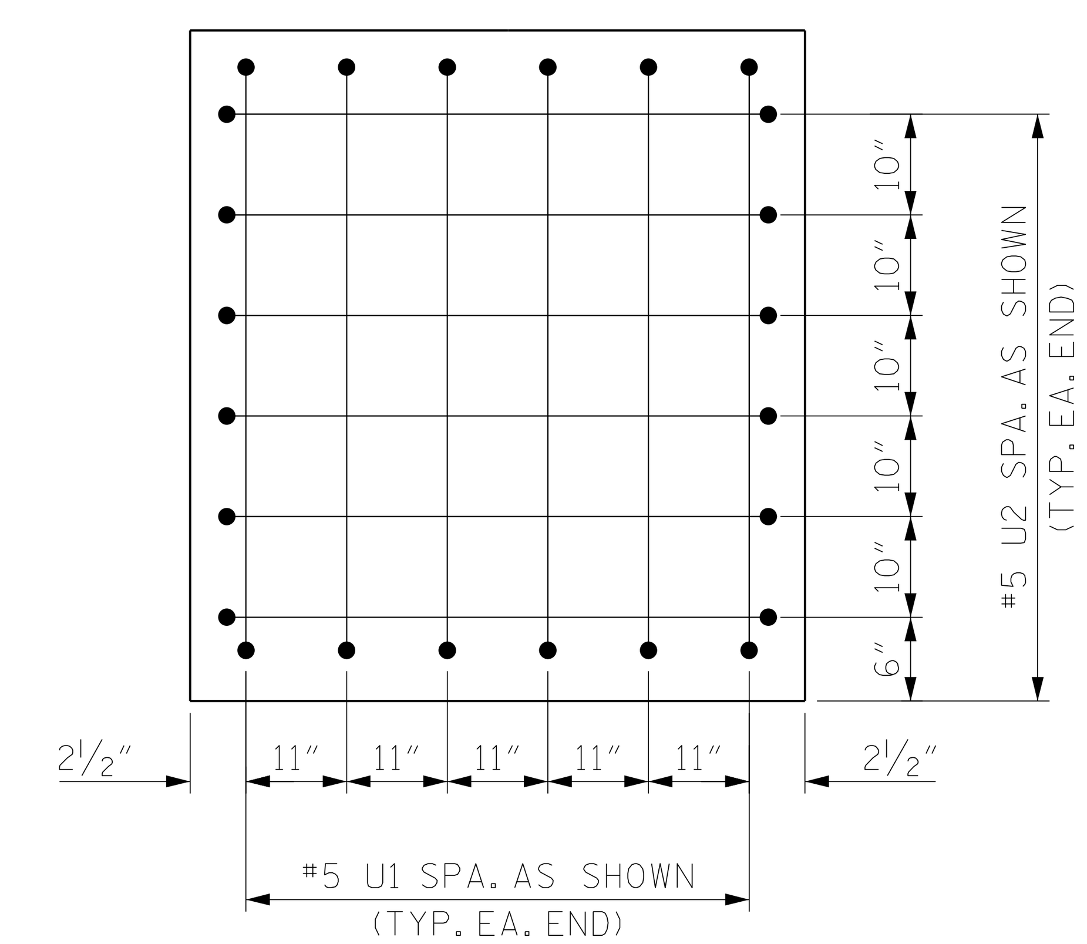


CONSTRUCTION JOINT DETAIL

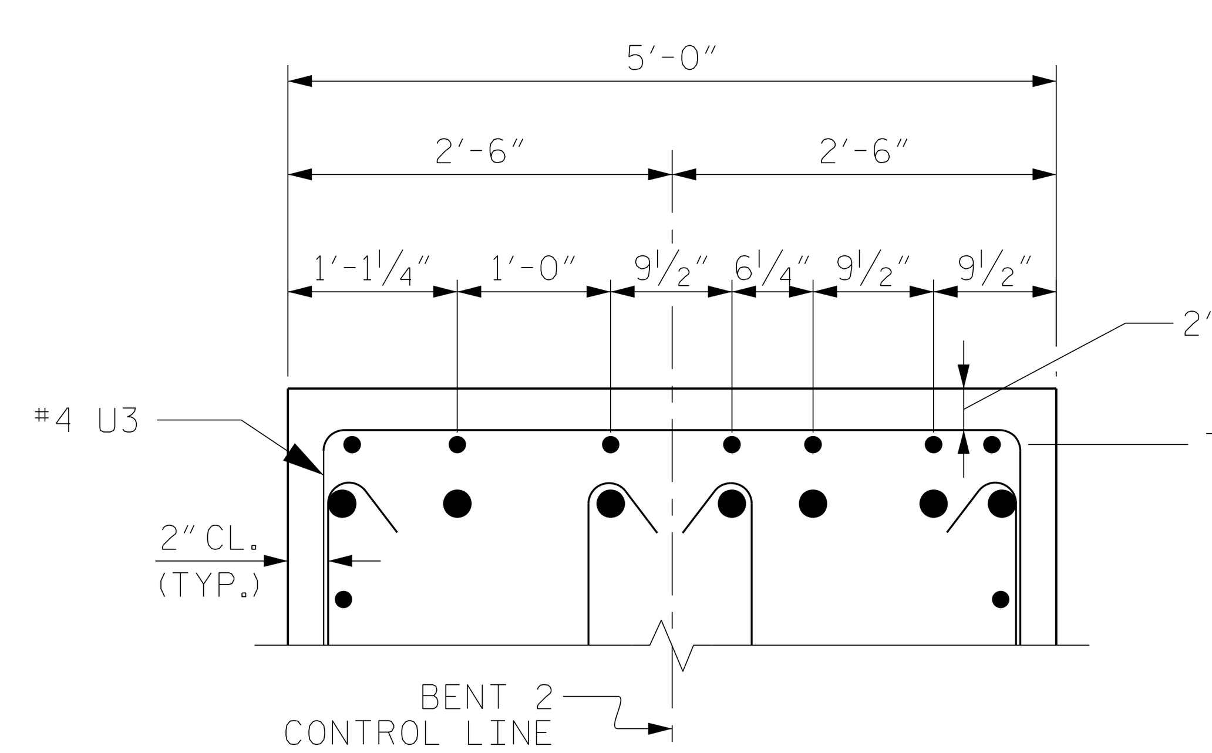


SECTION THRU CAP



END OF CAP VIEW

(TYPICAL BOTH ENDS)



VIEW B-B

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — JUSTIN MARK ROBINSON

3/21/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

BENT NO. 2 DETAILS

RIGHT LANE

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

REVISIONS

SHEET NO. S2-30

TOTAL SHEETS 36

STR. #2

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NOTES

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

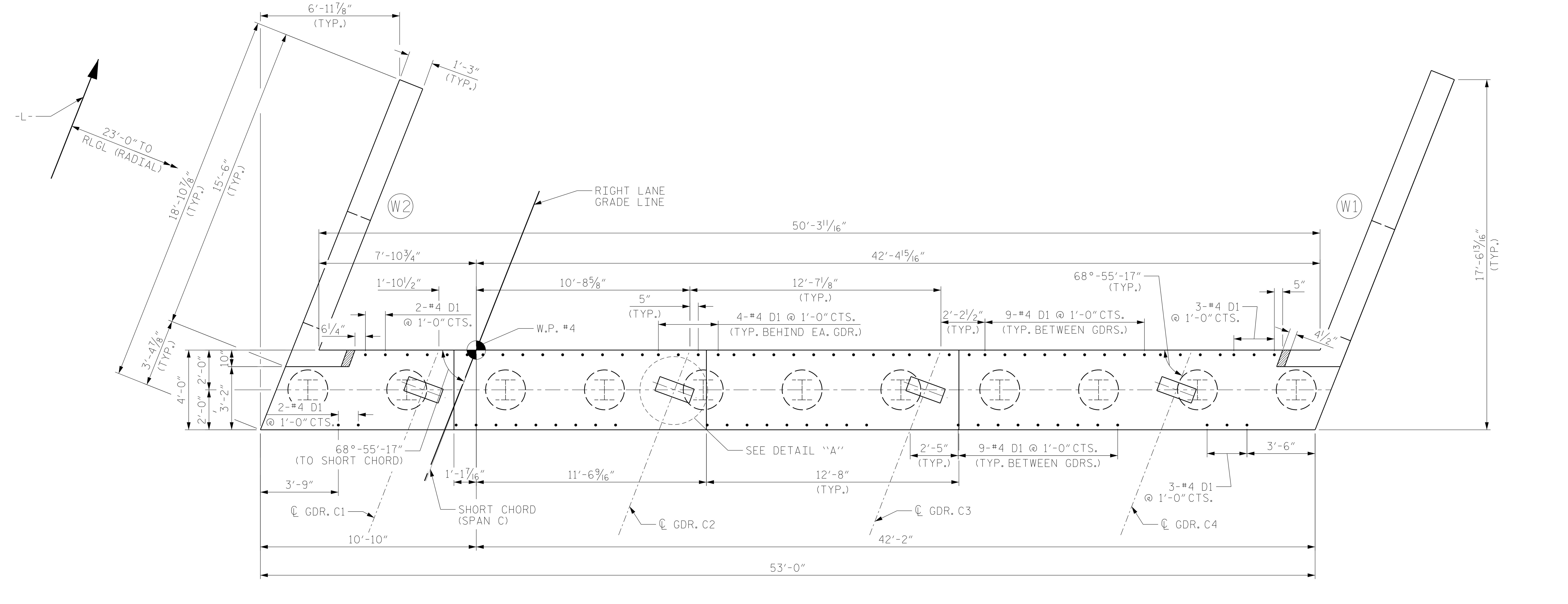
FOR SECTION A-A, SEE SHEET 4 OF 4.

STIRRUPS MAY BE SHIFTED SLIGHTLY TO AVOID #4 D1 BARS IN CAP.

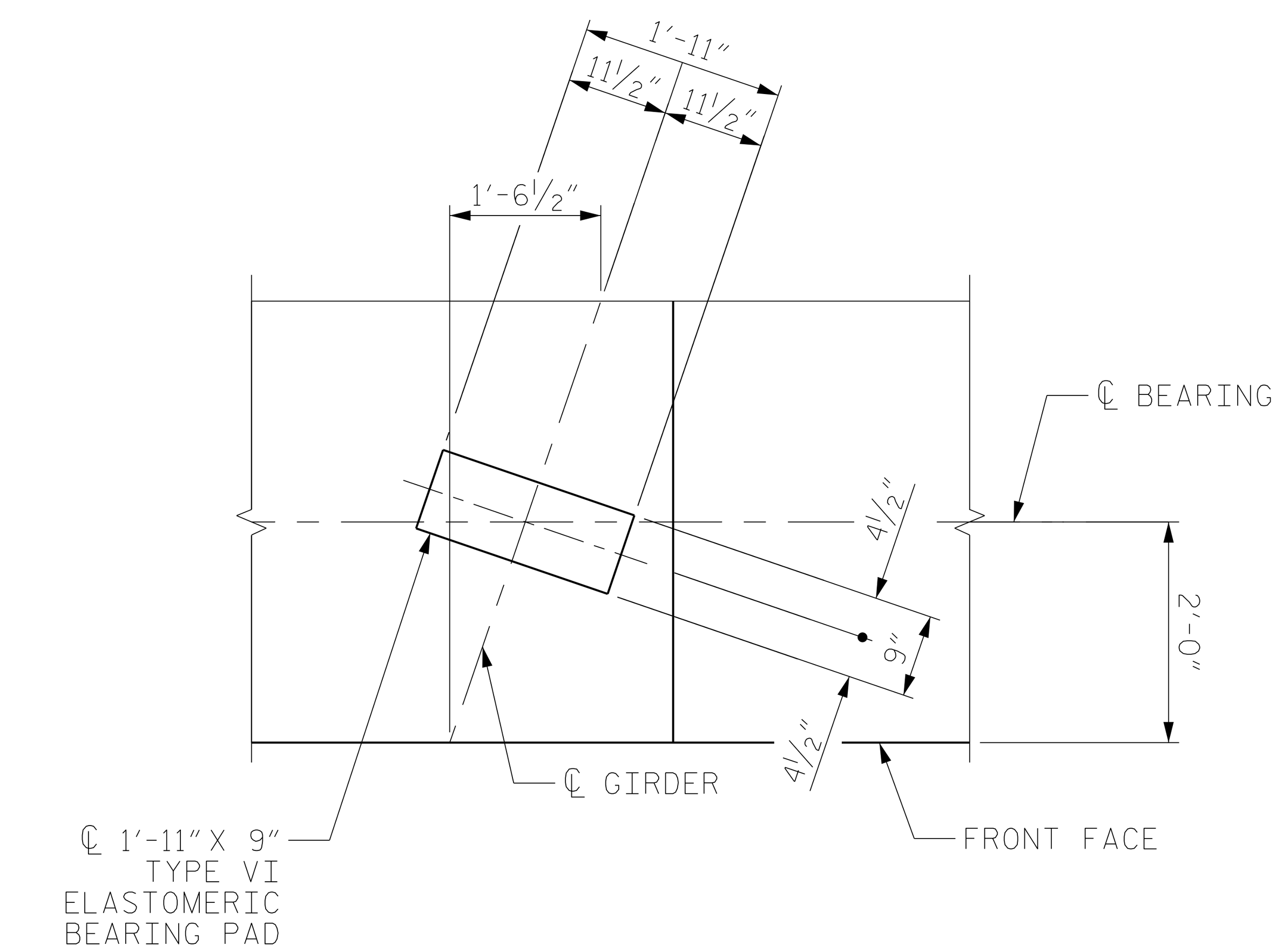
SEE SUPERSTRUCTURE SHEETS FOR UPPER PART OF INTEGRAL END BENT DETAILS.

RLGL = RIGHT LANE GRADE LINE

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



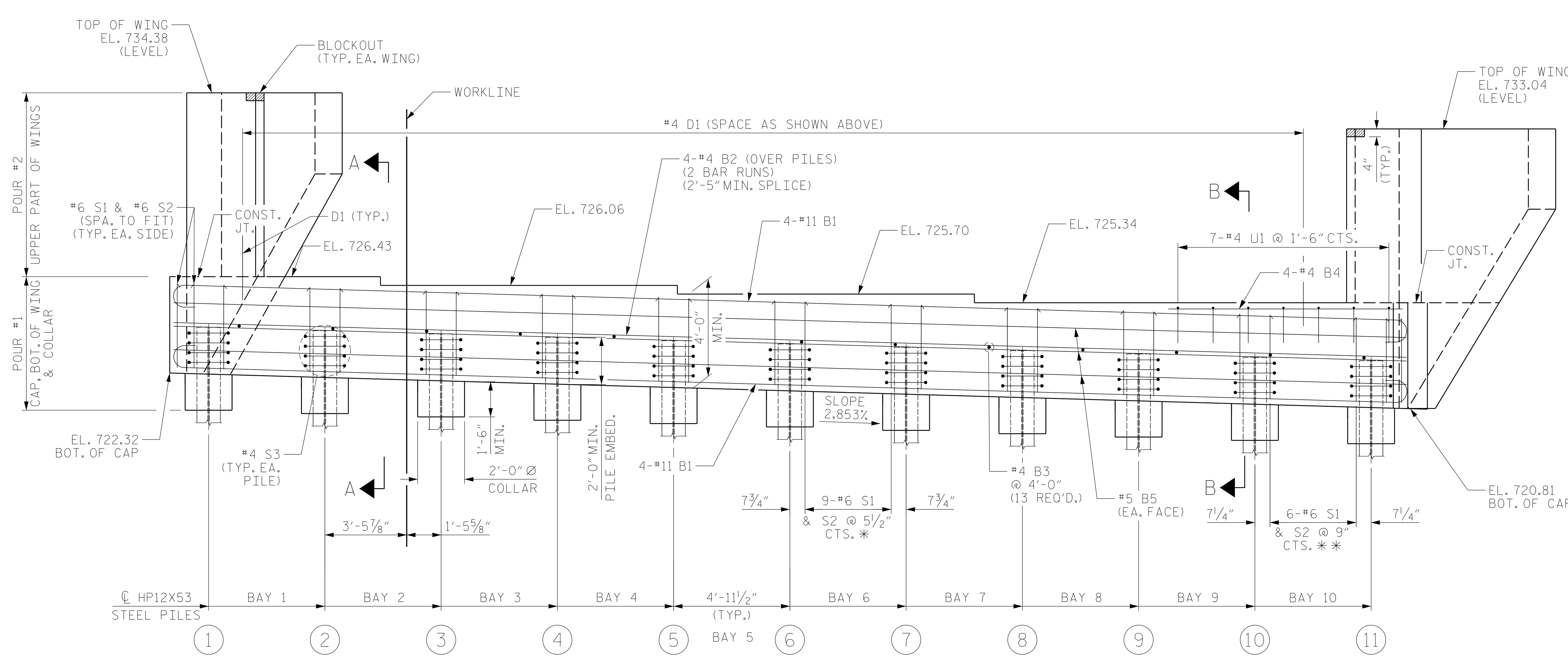
PLAN



DETAIL "A"

DIMENSIONS TYP. EA. BRG.
PILE NOT SHOWN FOR CLARITY

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
1	724.28
2	724.14
3	724.00
4	723.85
5	723.71
6	723.57
7	723.43
8	723.28
9	723.14
10	723.00
11	722.85



ELEVATION

✻ = TYPICAL BAY 4 THRU BAY 7
✻✻ = TYPICAL BAY 1 THRU BAY 3 AND BAY 8 THRU BAY 10

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 1 OF 4

SEAL 030970 — KEVIN MARK ROBINSON — 3/9/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

RIGHT LANE

REVISIONS							SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:		S2-31
1			3				TOTAL SHEETS 36
2			4				

STR. #2

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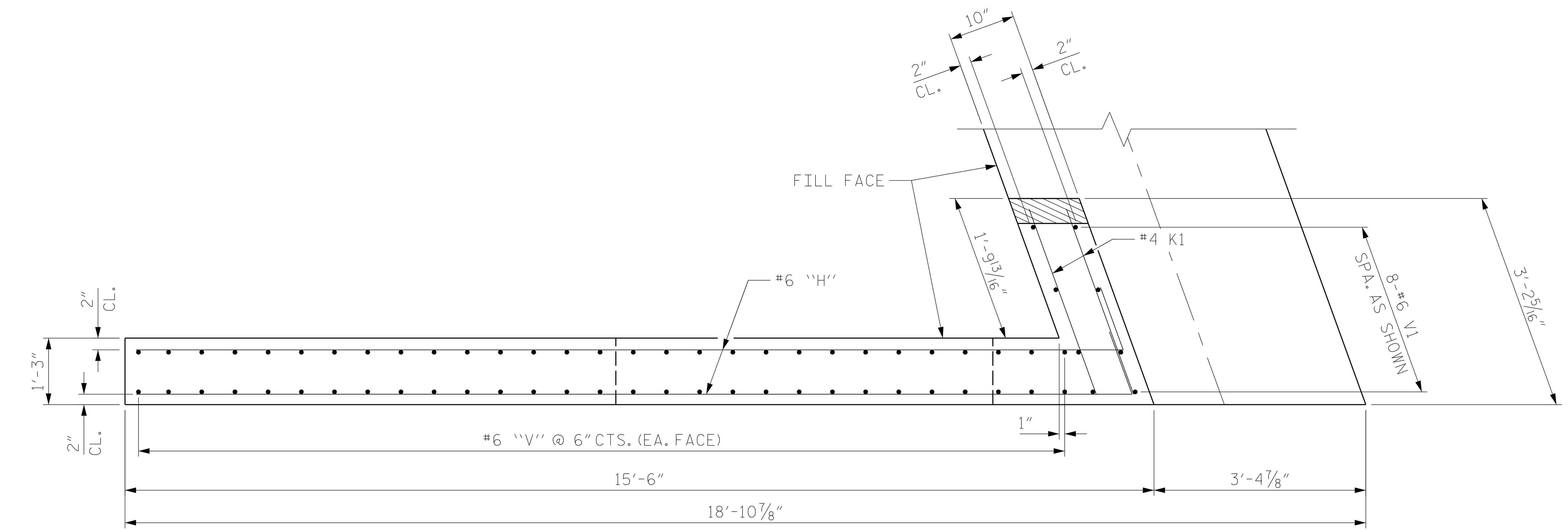
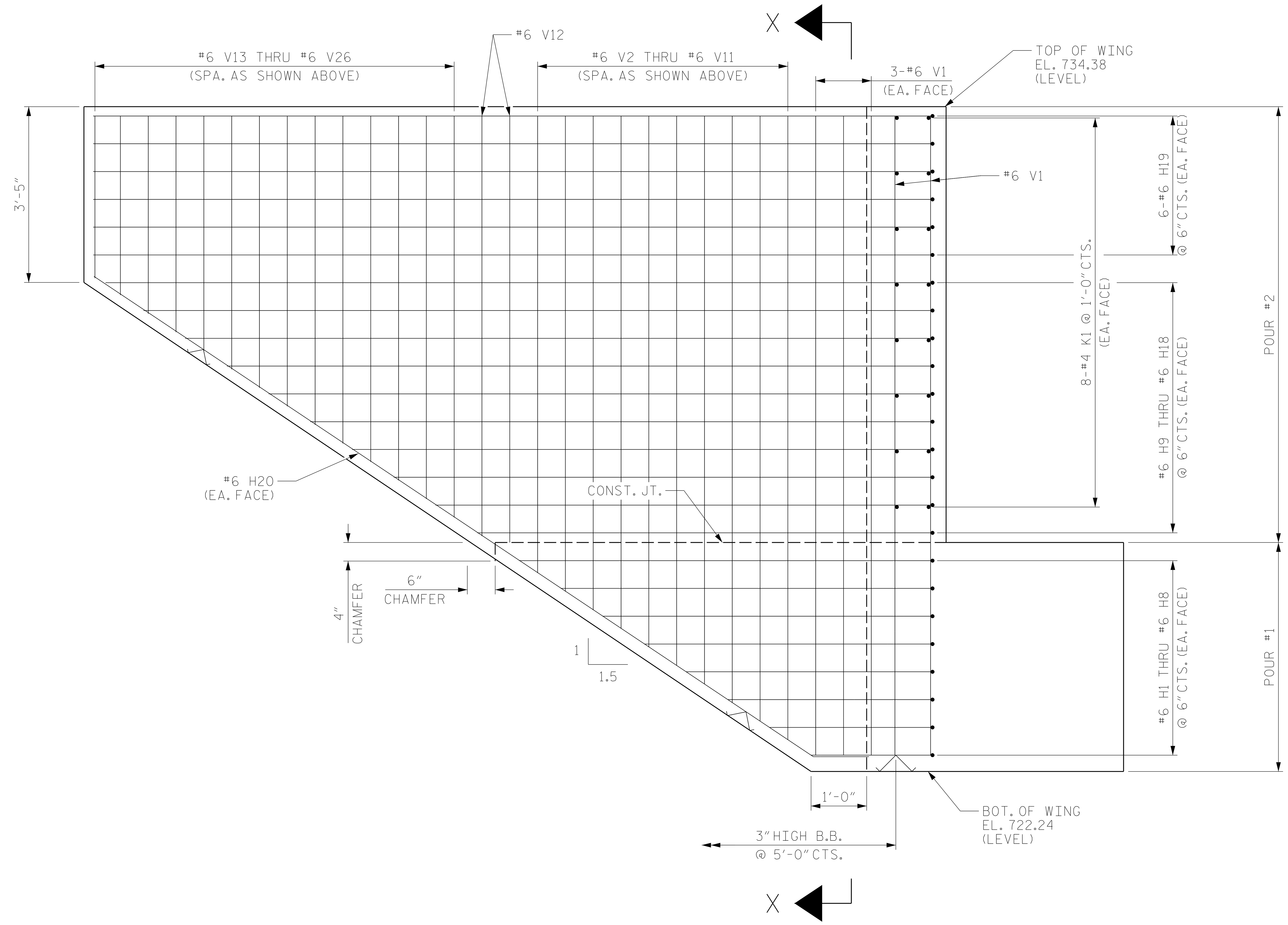
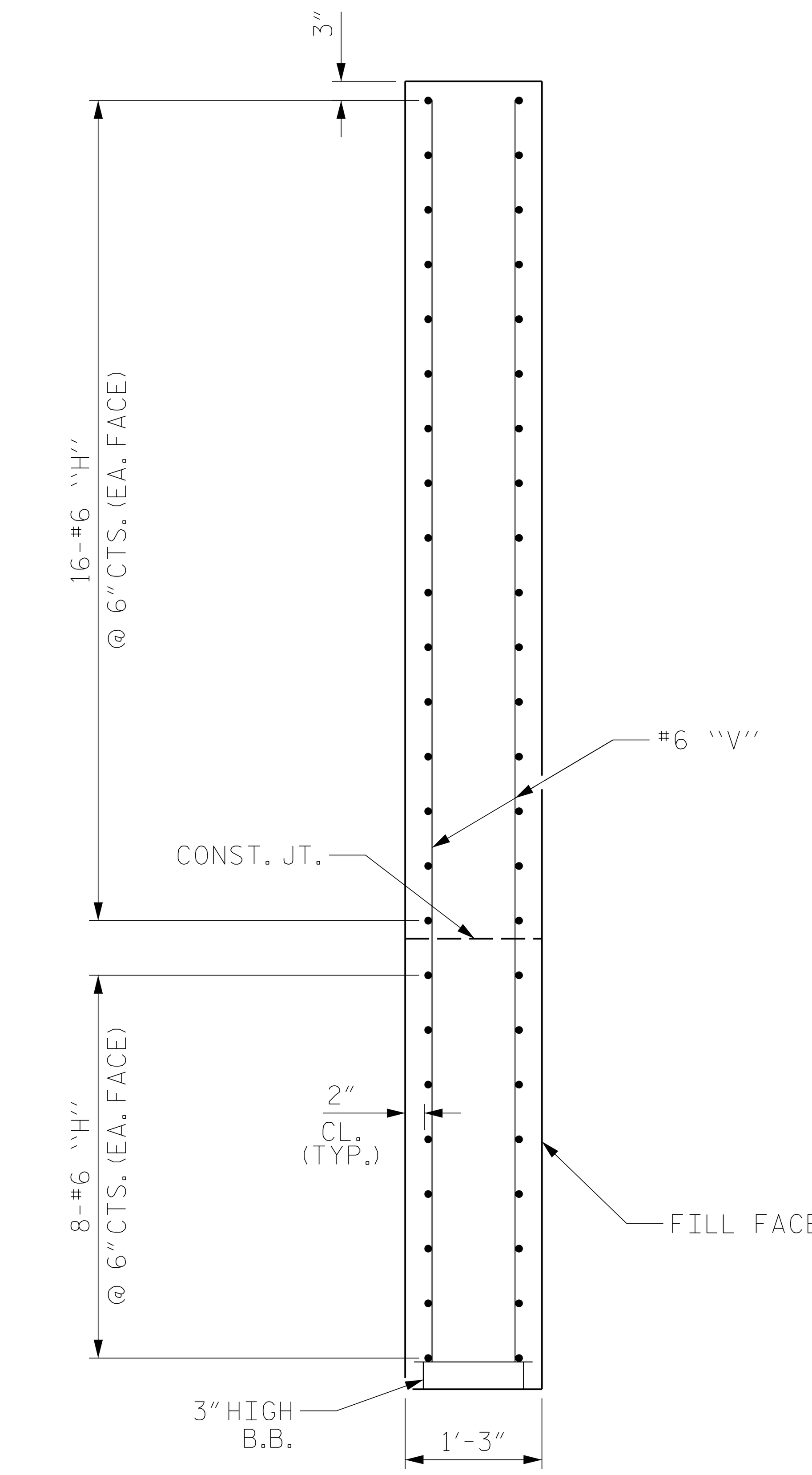


PLAN OF WING - W2



ELEVATION OF WING - W2



SECTION X-X

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 384+50.00 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL END BENT NO. 2

RIGHT LANE

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JUSTIN MARK ROBINSON
3/9/2017

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2			4			

SHEET NO. S2-32
TOTAL SHEETS 36

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STR. #2

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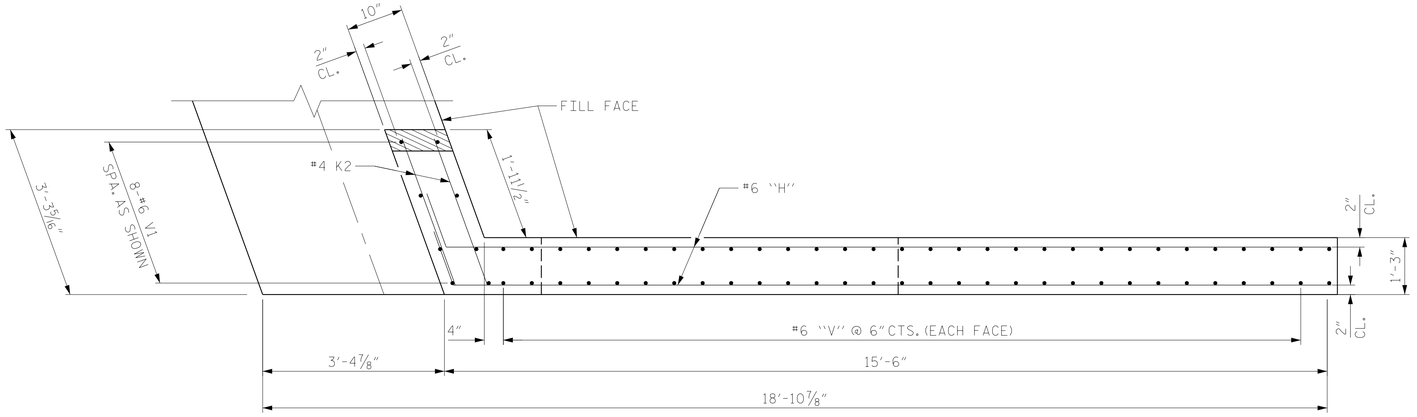
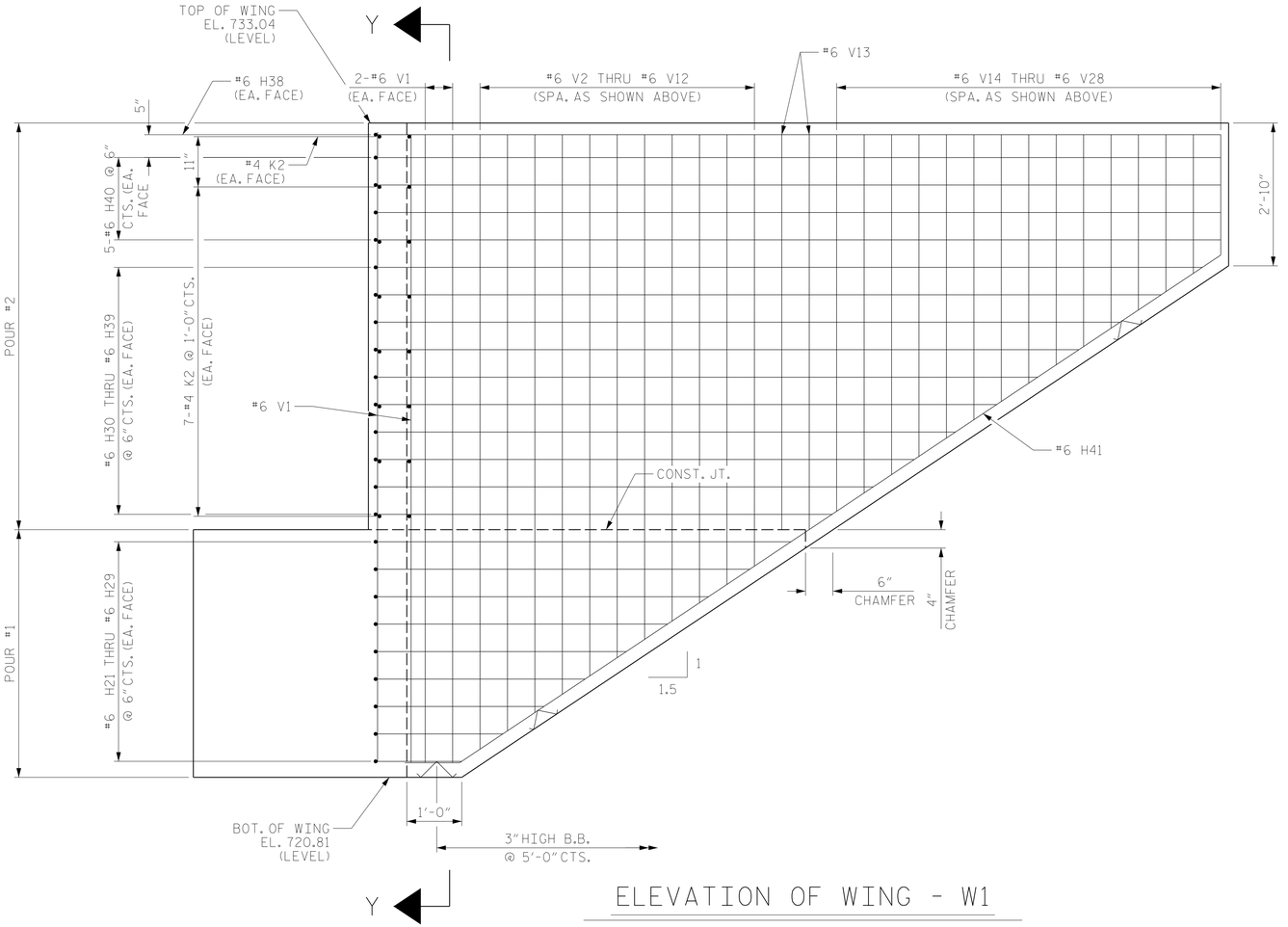
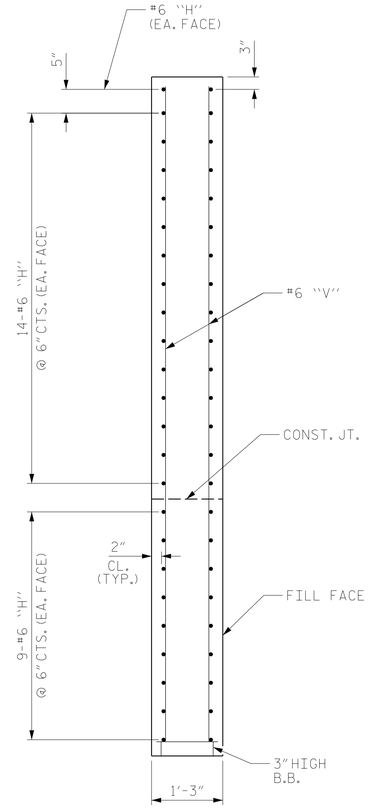


PLAN OF WING - W1



ELEVATION OF WING - W1



SECTION Y-Y

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 3 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

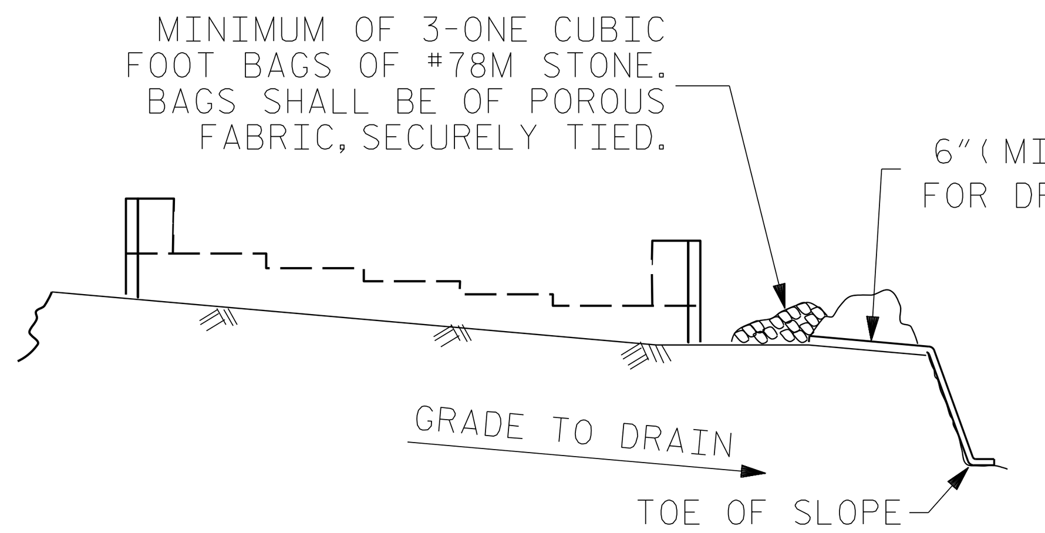
SUBSTRUCTURE

INTEGRAL END BENT NO. 2

RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S2-33
1			3			TOTAL SHEETS
2			4			36

STR. #2



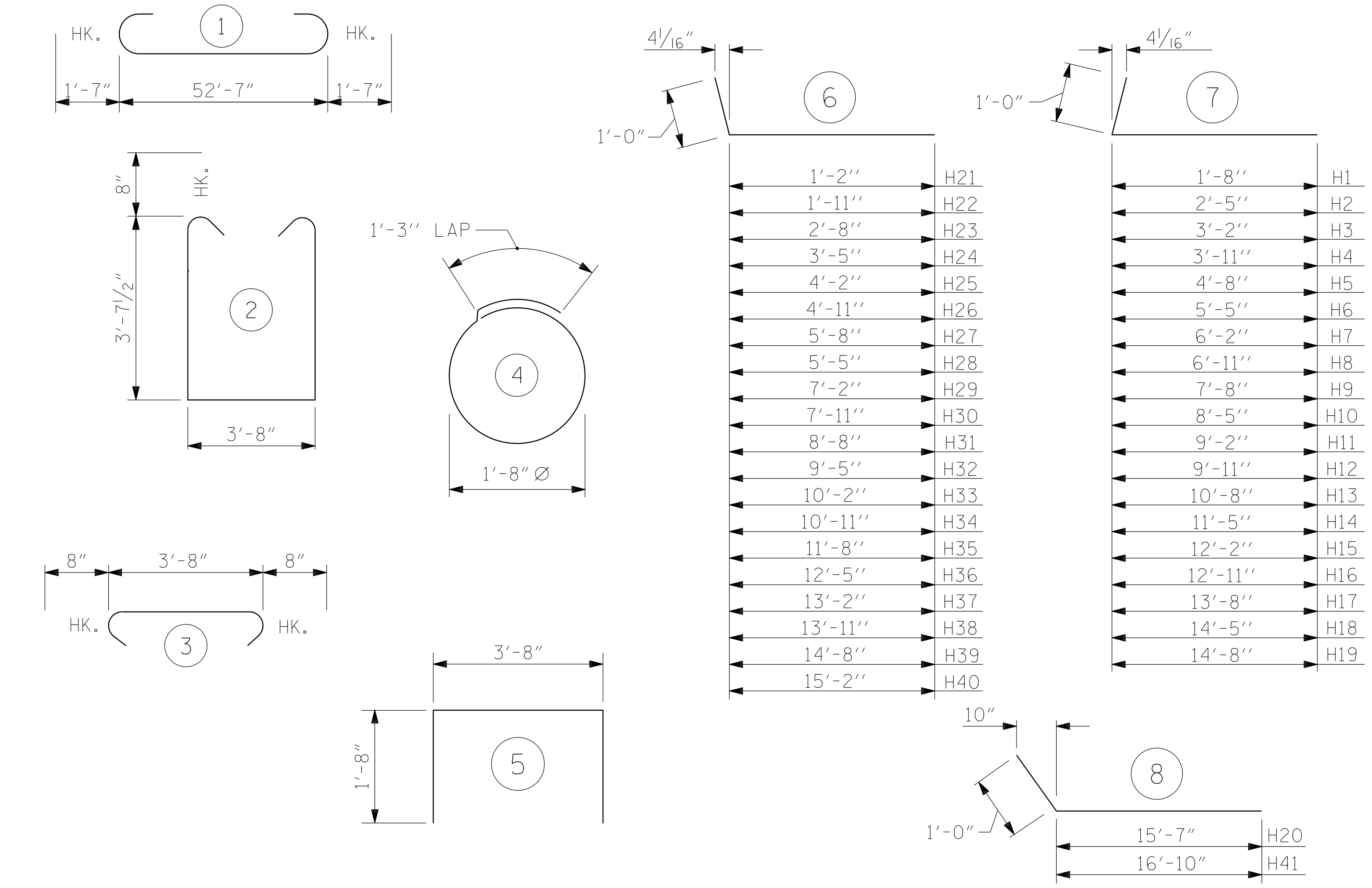
BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT

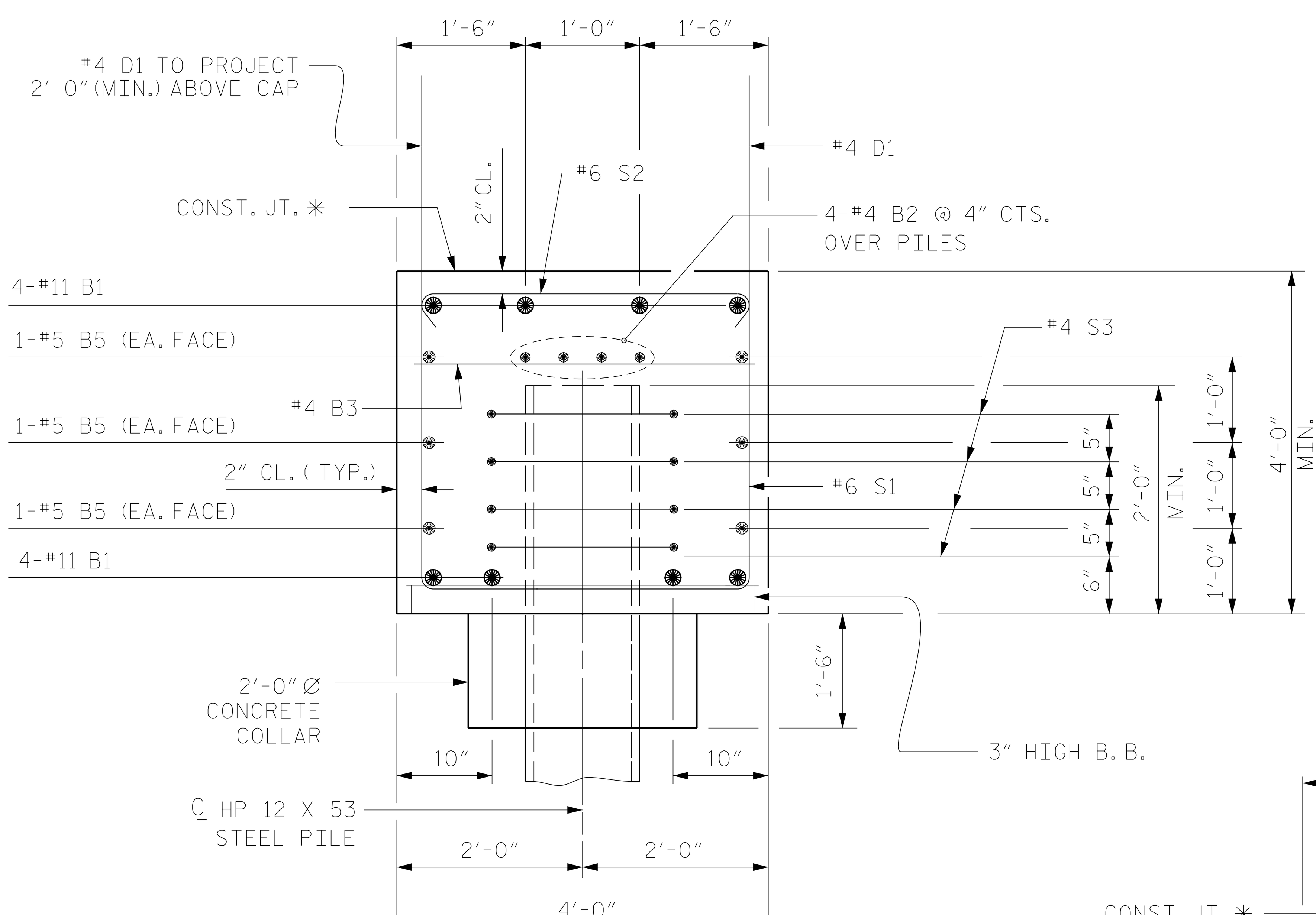
BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

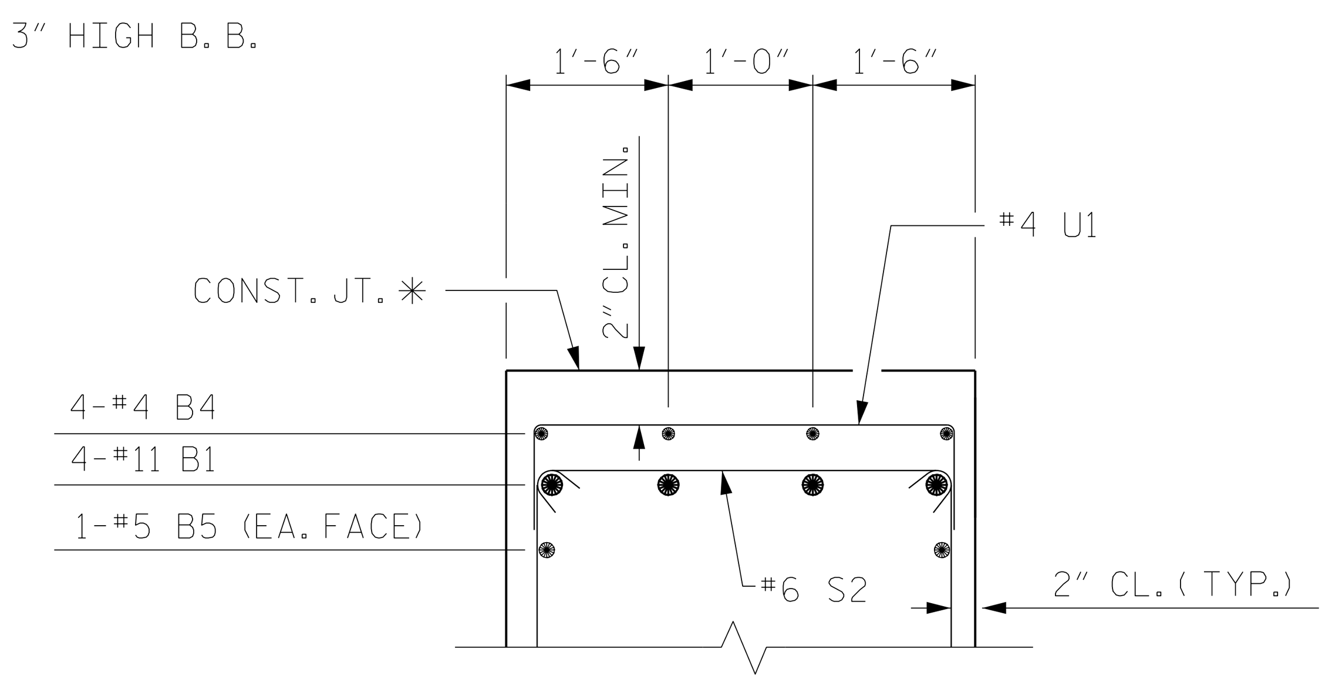
BILL OF MATERIAL
END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	55′-9″	2370	K1	16	#4	STR	2′-10″	30
B2	8	#4	STR	27′-7″	147	K2	16	#4	STR	2′-9″	29
B3	13	#4	STR	3′-8″	32						
B4	4	#4	STR	10′-0″	27	S1	76	#6	2	12′-3″	1398
B5	6	#5	STR	52′-7″	329	S2	76	#6	3	5′-0″	571
						S3	44	#4	4	6′-6″	191
D1	80	#4	STR	4′-0″	214						
						U1	7	#4	5	7′-0″	33
H1	2	#6	7	2′-8″	8						
H2	2	#6	7	3′-5″	10	V1	26	#6	STR	11′-9″	459
H3	2	#6	7	4′-2″	13	V2	4	#6	STR	11′-6″	69
H4	2	#6	7	4′-11″	15	V3	4	#6	STR	11′-2″	67
H5	2	#6	7	5′-8″	17	V4	4	#6	STR	10′-10″	65
H6	2	#6	7	6′-5″	19	V5	4	#6	STR	10′-6″	63
H7	2	#6	7	7′-2″	22	V6	4	#6	STR	10′-2″	61
H8	2	#6	7	7′-11″	24	V7	4	#6	STR	9′-10″	59
H9	2	#6	7	8′-8″	26	V8	4	#6	STR	9′-6″	57
H10	2	#6	7	9′-5″	28	V9	4	#6	STR	9′-2″	55
H11	2	#6	7	10′-2″	31	V10	4	#6	STR	8′-10″	53
H12	2	#6	7	10′-11″	33	V11	4	#6	STR	8′-6″	51
H13	2	#6	7	11′-8″	35	V12	6	#6	STR	8′-2″	74
H14	2	#6	7	12′-5″	37	V13	6	#6	STR	7′-6″	68
H15	2	#6	7	13′-2″	40	V14	4	#6	STR	7′-2″	43
H16	2	#6	7	13′-11″	42	V15	4	#6	STR	6′-10″	41
H17	2	#6	7	14′-8″	44	V16	4	#6	STR	6′-6″	39
H18	2	#6	7	15′-5″	46	V17	4	#6	STR	6′-2″	37
H19	12	#6	7	15′-8″	282	V18	4	#6	STR	5′-10″	35
H20	2	#6	8	16′-7″	50	V19	4	#6	STR	5′-6″	33
H21	2	#6	6	2′-2″	7	V20	4	#6	STR	5′-2″	31
H22	2	#6	6	2′-11″	9	V21	4	#6	STR	4′-10″	29
H23	2	#6	6	3′-8″	11	V22	4	#6	STR	4′-6″	27
H24	2	#6	6	4′-5″	13	V23	4	#6	STR	4′-2″	25
H25	2	#6	6	5′-2″	16	V24	4	#6	STR	3′-10″	23
H26	2	#6	6	5′-11″	18	V25	4	#6	STR	3′-6″	21
H27	2	#6	6	6′-8″	20	V26	4	#6	STR	3′-2″	19
H28	2	#6	6	6′-5″	19	V27	2	#6	STR	2′-10″	9
H29	2	#6	6	8′-2″	25	V28	2	#6	STR	2′-6″	8
H30	2	#6	6	8′-11″	27						
H31	2	#6	6	9′-8″	29						
H32	2	#6	6	10′-5″	31						
H33	2	#6	6	11′-2″	34						
H34	2	#6	6	11′-11″	36						
H35	2	#6	6	12′-8″	38						
H36	2	#6	6	13′-5″	40						
H37	2	#6	6	14′-2″	43						
H38	2	#6	6	14′-11″	45						
H39	2	#6	6	15′-8″	47	REINFORCING STEEL					8,619 LBS.
H40	10	#6	6	16′-2″	243	CLASS A CONCRETE					
H41	2	#6	8	17′-10″	54	POUR #1					
PILE DRIVING EQUIPMENT SETUP					NO. 11	CAP, CONCRETE COLLARS & LOWER PART OF WINGS					36.6 C. Y.
						POUR #2					
						UPPER PART OF WINGS					10.6 C. Y.
						TOTAL					47.2 C. Y.
						HP 12 X 53 STEEL PILES NO. 11					165 LIN. FT.
						STEEL PILE POINTS					NO.: 11

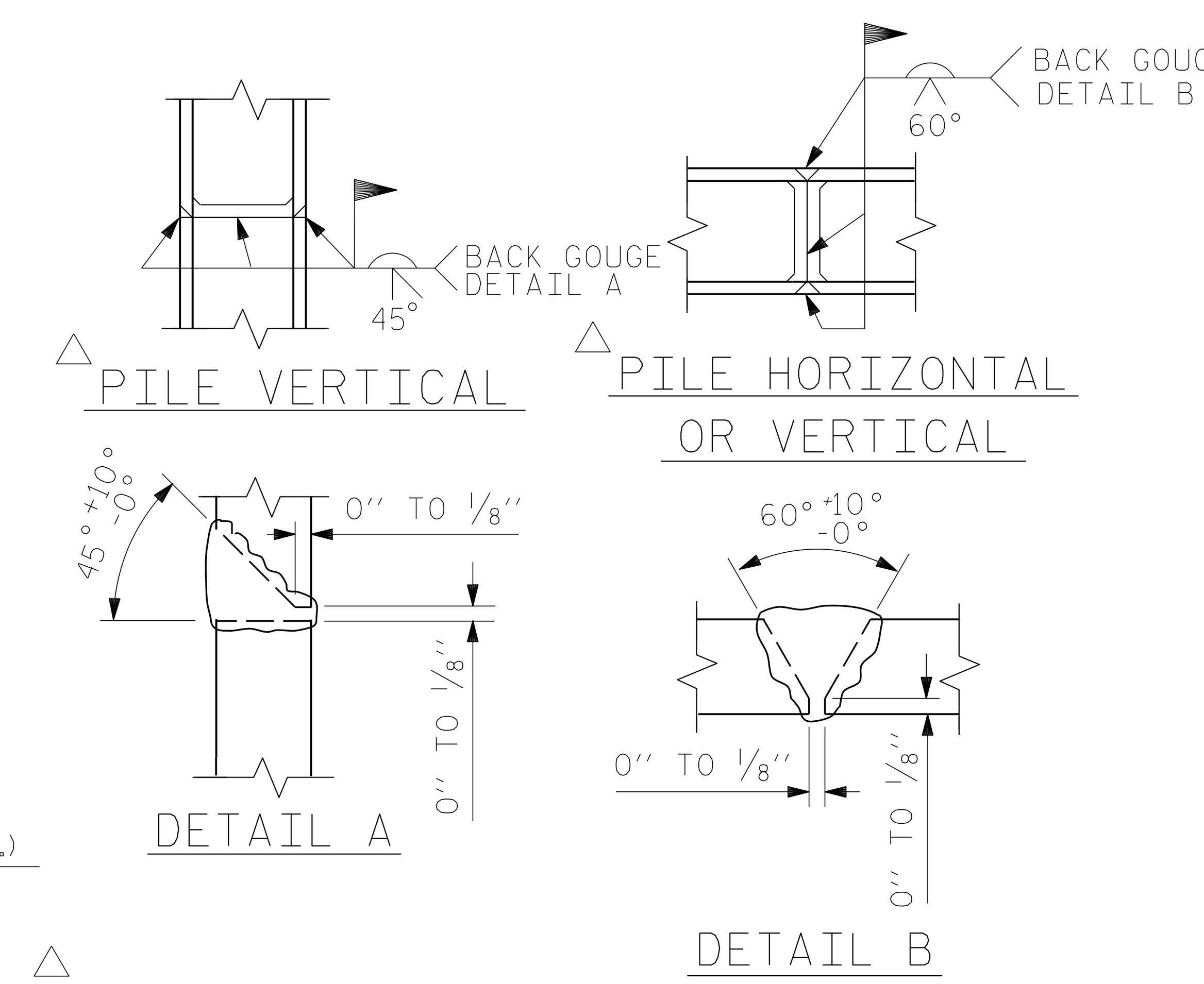


SECTION A-A

✻ THE TOP SURFACE OF THE END BENT CAP & WINGS, EXCLUDING THE BEARING AREA, SHALL BE RAKED TO A DEPTH OF ¼″.



PARTIAL SECTION B-B



△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

INTEGRAL
END BENT NO. 2

RIGHT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — JUSTIN MARK ROBINSON
3/9/2017

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STR. #2

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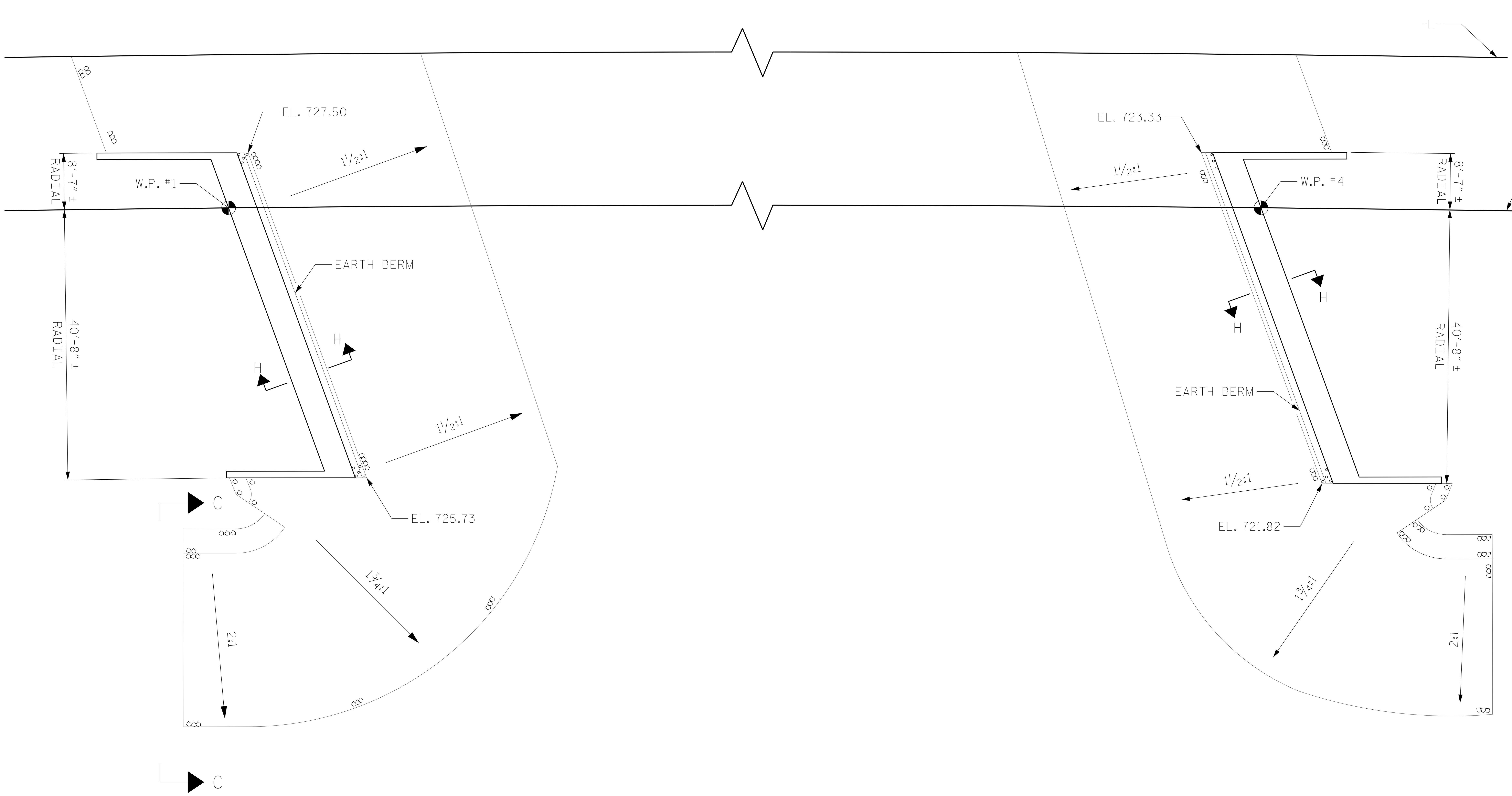
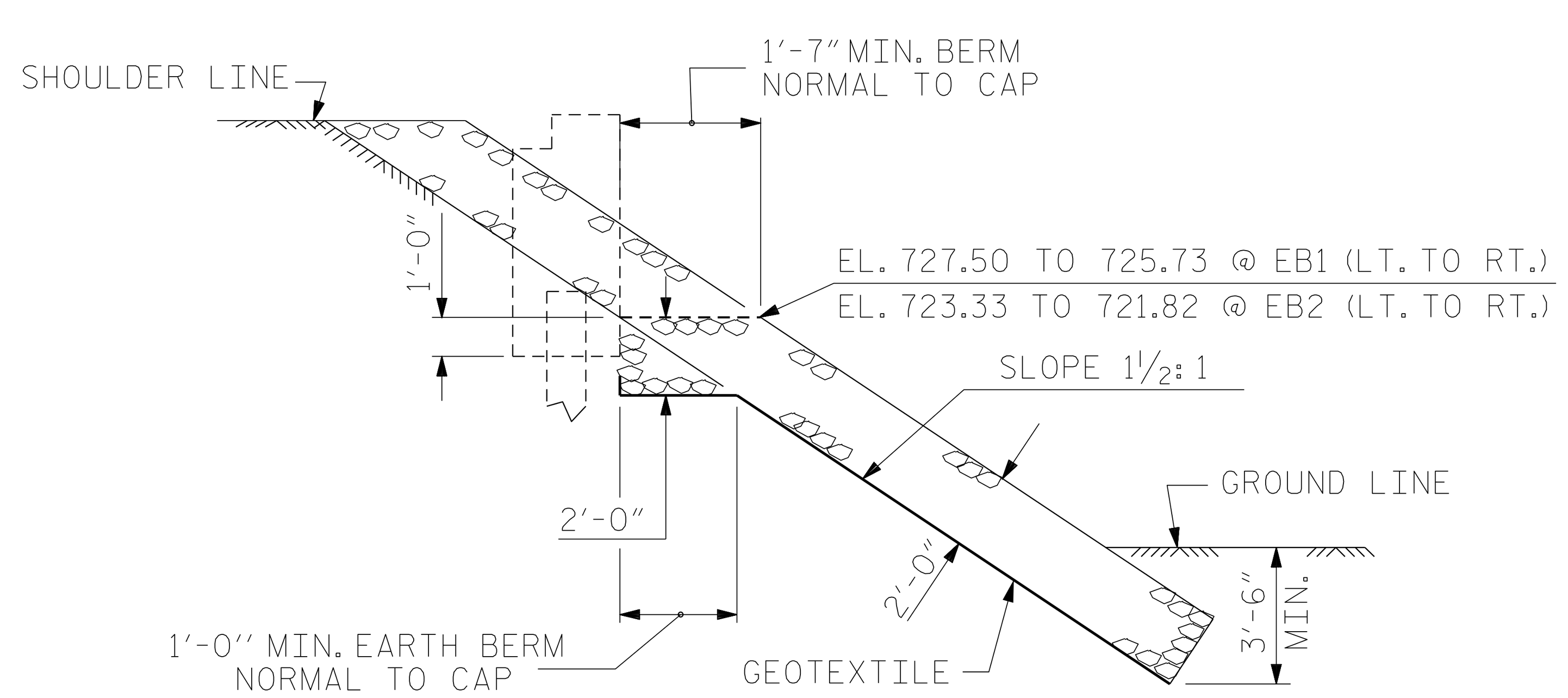
NOTES

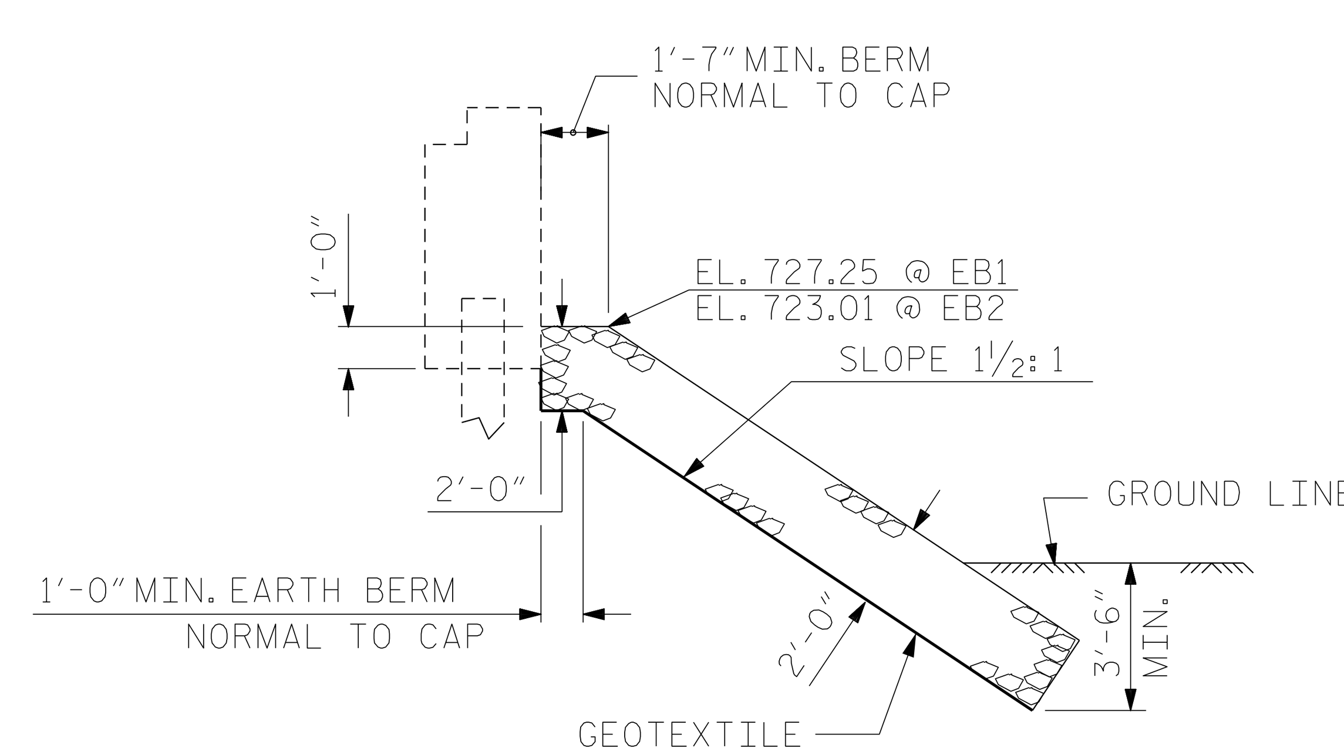
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



ESTIMATED QUANTITIES		
BRIDGE @ STA. 384+50.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	500	550
END BENT 2	450	500

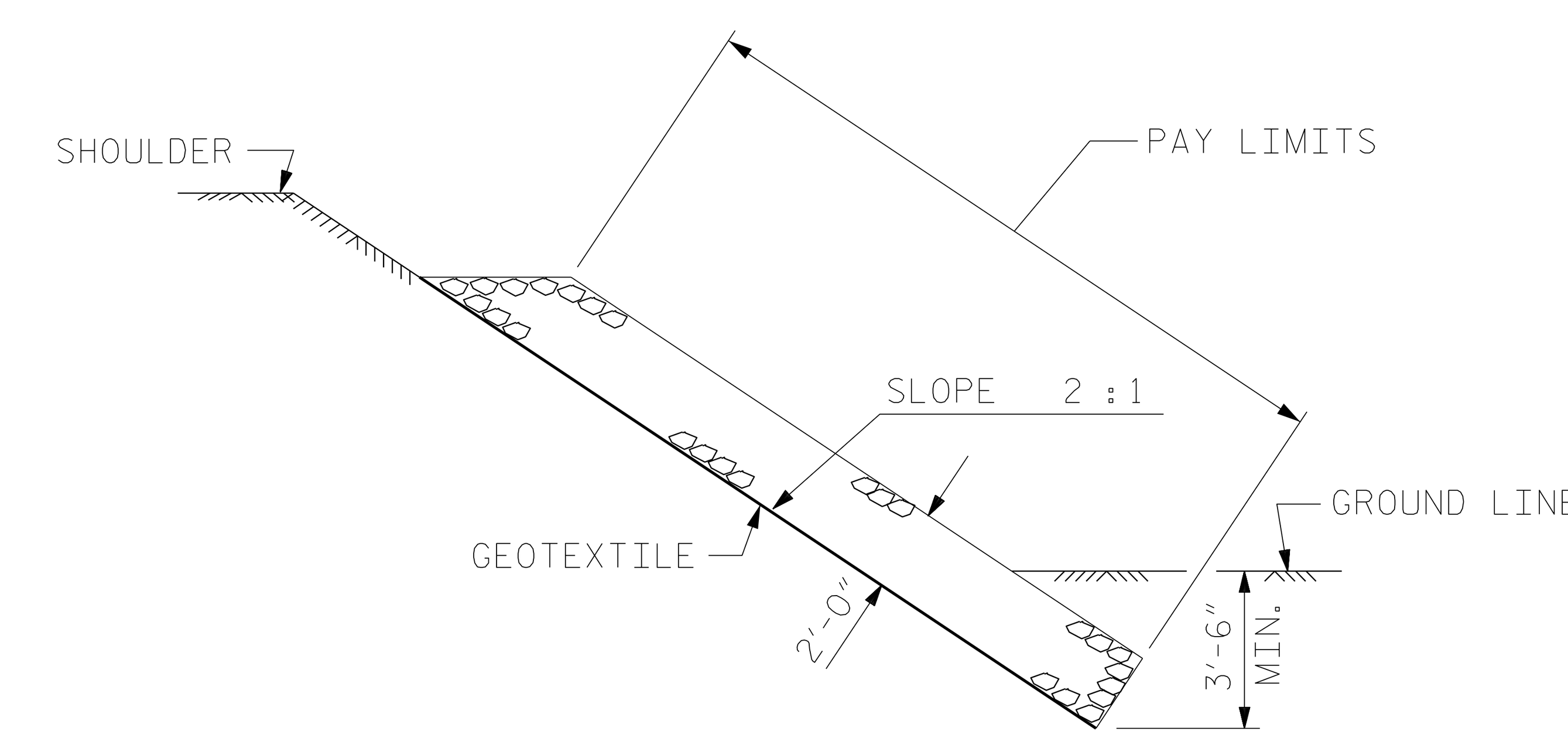


SECTION H-H



RIGHT LANE GRADE LINE SECTION

BERM RIP RAPPED



SECTION C-C

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

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RIP RAP DETAILS

RIGHT LANE

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STR. #2

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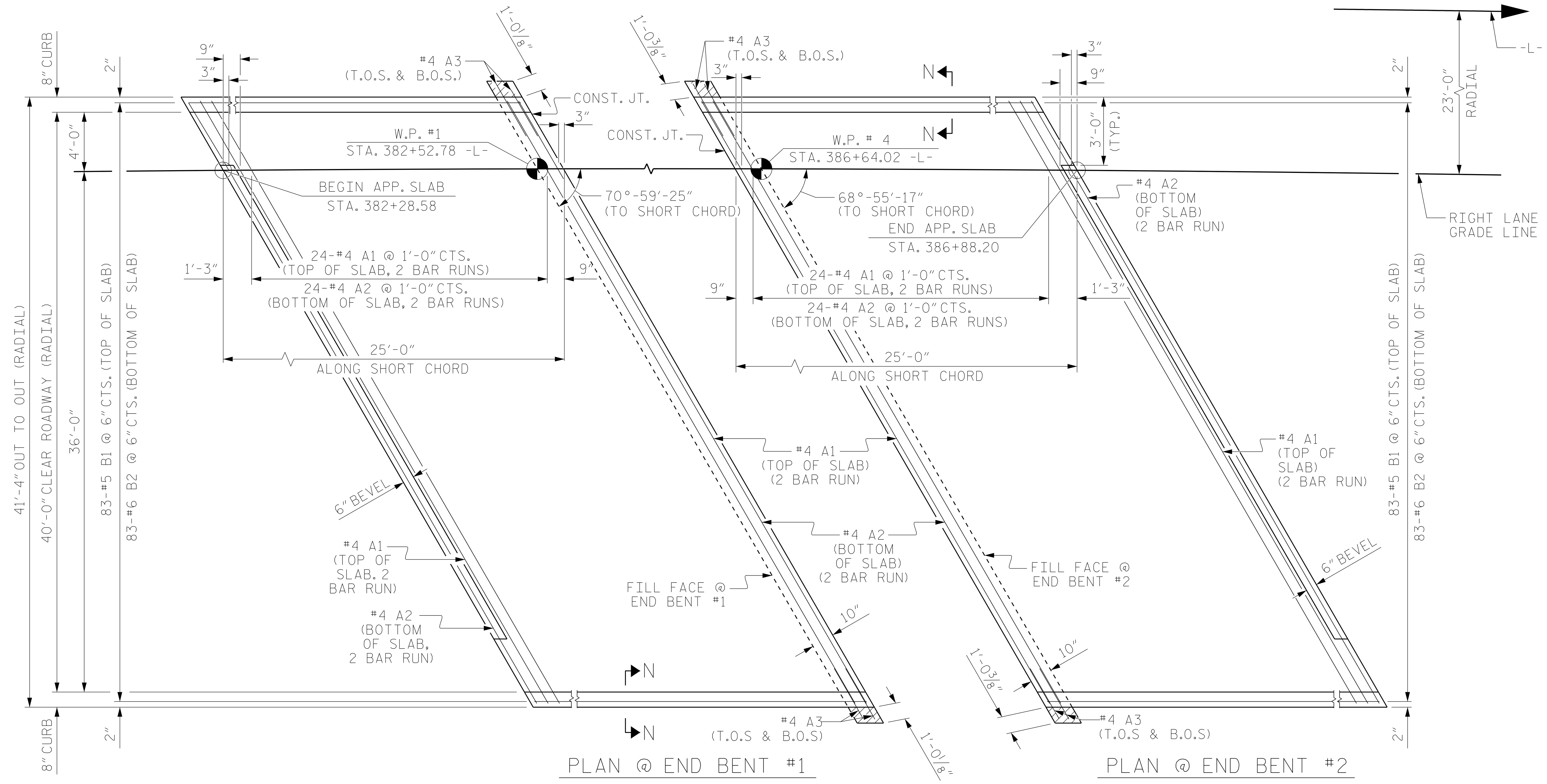


DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

CONCRETE TO BE FILLED IN DURING CONSTRUCTION OF APPROACH SLABS

NOTES

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

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

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

THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

ARC OFFSETS ARE NEGLIGIBLE AND THEREFORE NOT SHOWN.

T.O.S. = TOP OF SLAB

B.O.S. = BOTTOM OF SLAB

BILL OF MATERIAL

APPROACH SLAB @ E.B. #1

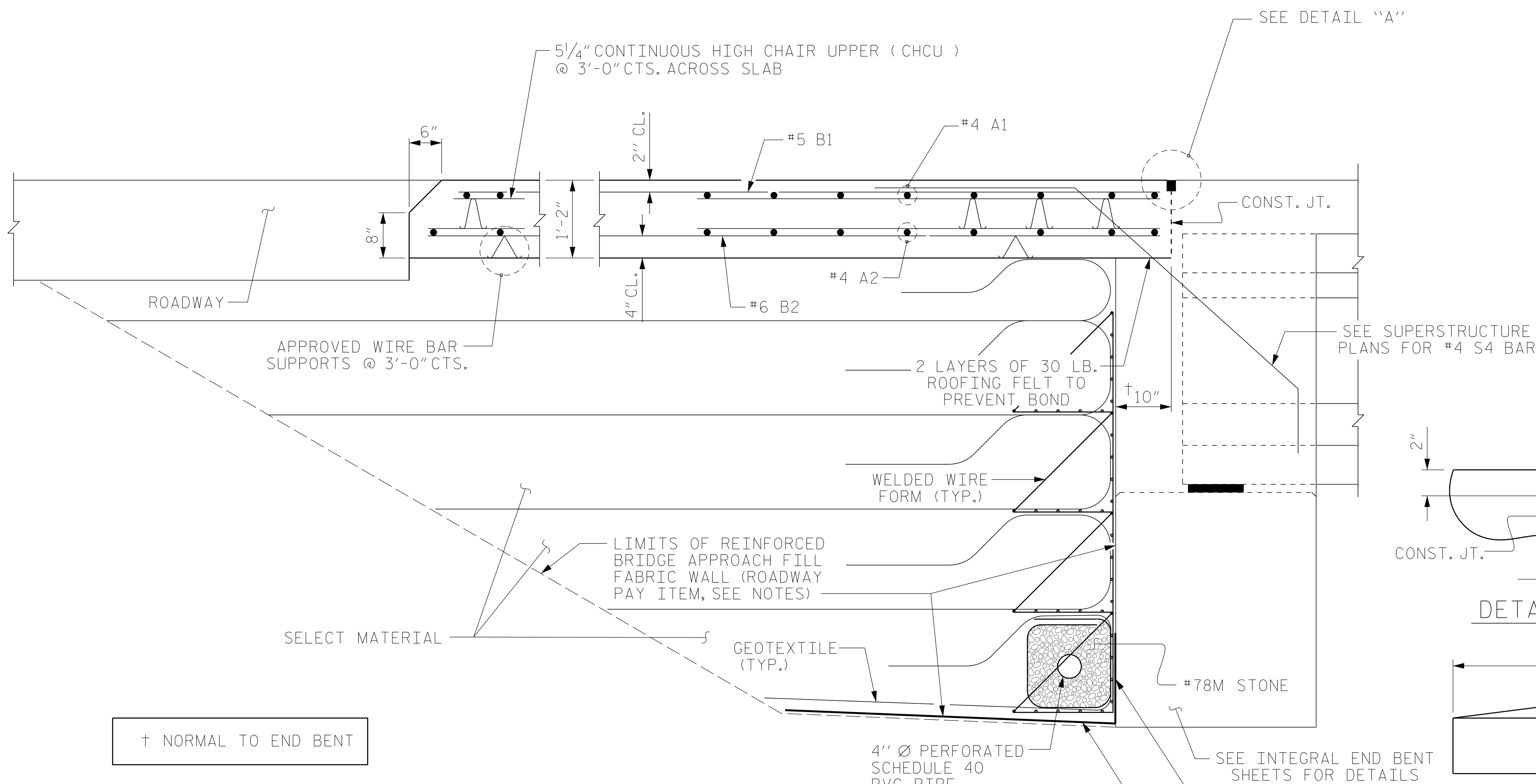
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	52	#4	STR	22'-9"	790
A2	52	#4	STR	22'-7"	784
✱ A3	8	#4	STR	3'-0"	16
✱ B1	83	#5	STR	24'-1"	2085
B2	83	#6	STR	24'-7"	3065
REINFORCING STEEL					3,849 LBS.
✱ EPOXY COATED REINFORCING STEEL					2,891 LBS.
CLASS AA CONCRETE					45.5 C.Y.

APPROACH SLAB @ E.B. #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✱ A1	52	#4	STR	22'-9"	790
A2	52	#4	STR	22'-7"	784
✱ A3	8	#4	STR	3'-0"	16
✱ B1	83	#5	STR	24'-1"	2085
B2	83	#6	STR	24'-7"	3065
REINFORCING STEEL					3,849 LBS.
✱ EPOXY COATED REINFORCING STEEL					2,891 LBS.
CLASS AA CONCRETE					45.5 C.Y.

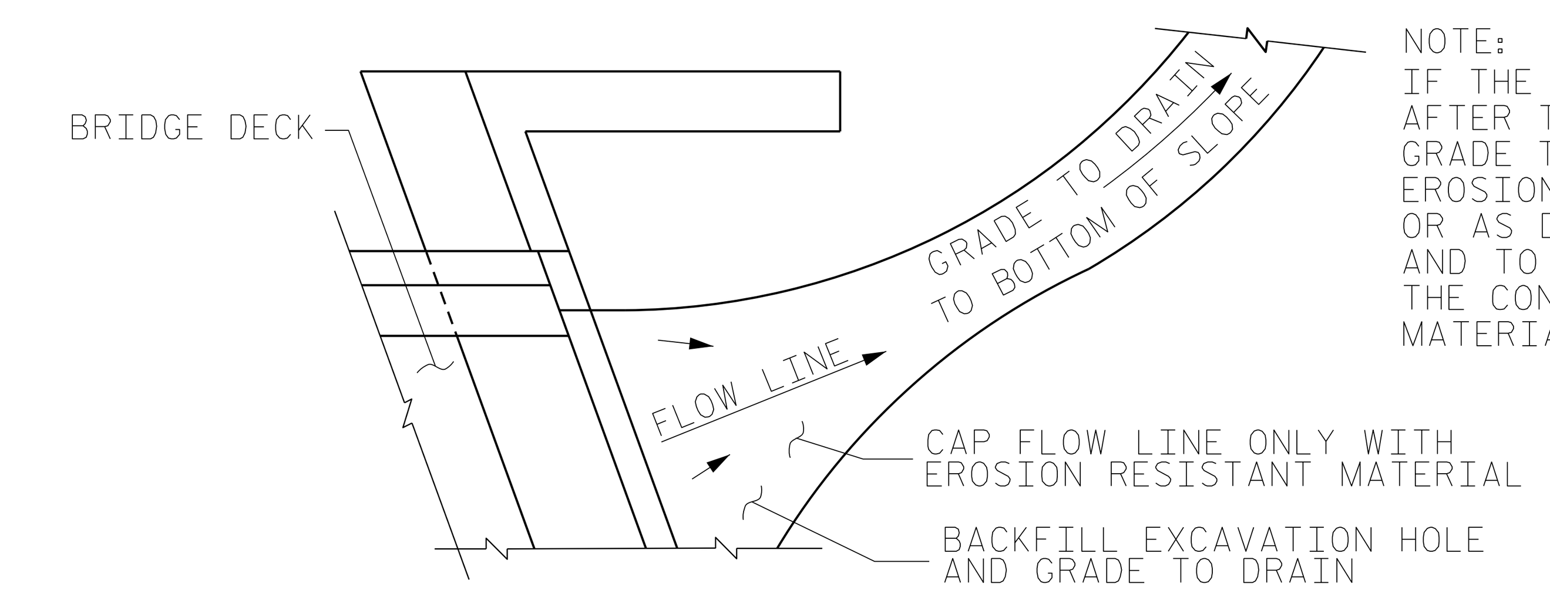
SPLICE LENGTHS

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



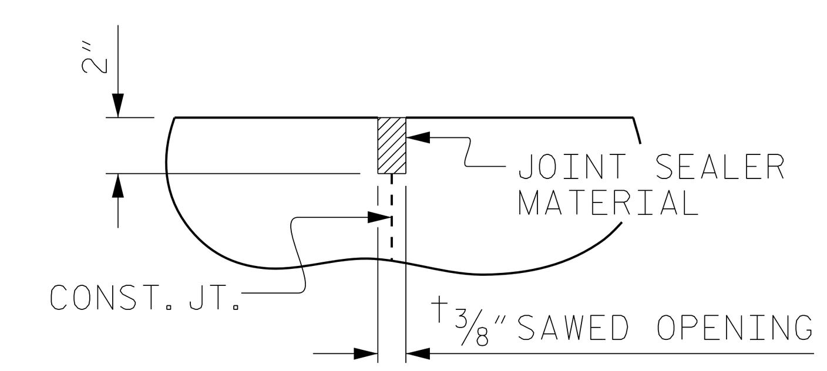
† NORMAL TO END BENT

SECTION THRU SLAB

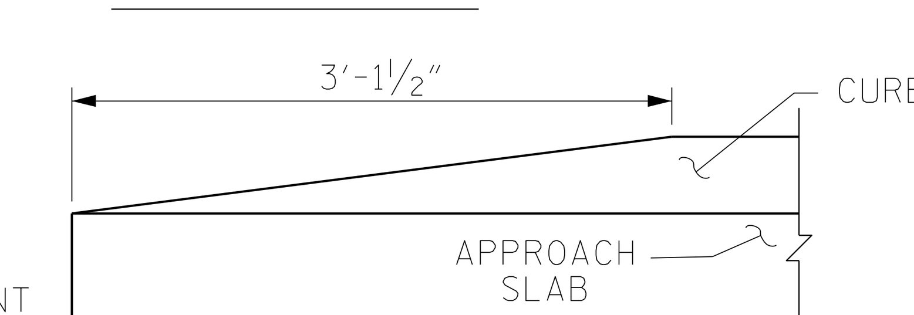


NOTE:
IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

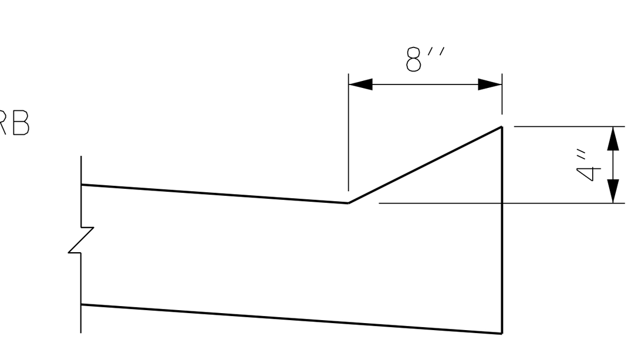
TEMPORARY DRAINAGE DETAIL



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 384+50.00 -L-

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT

RIGHT LANE

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 JUSTIN MARK ROBINSON
3/9/2017

RS&H

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1			3			TOTAL SHEETS	36
2			4				

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CHECKED BY : GM 5/06	REV. 12/21/11	MAA/GM
	REV. 6/13	MAA/GM

STD. NO. BAS5

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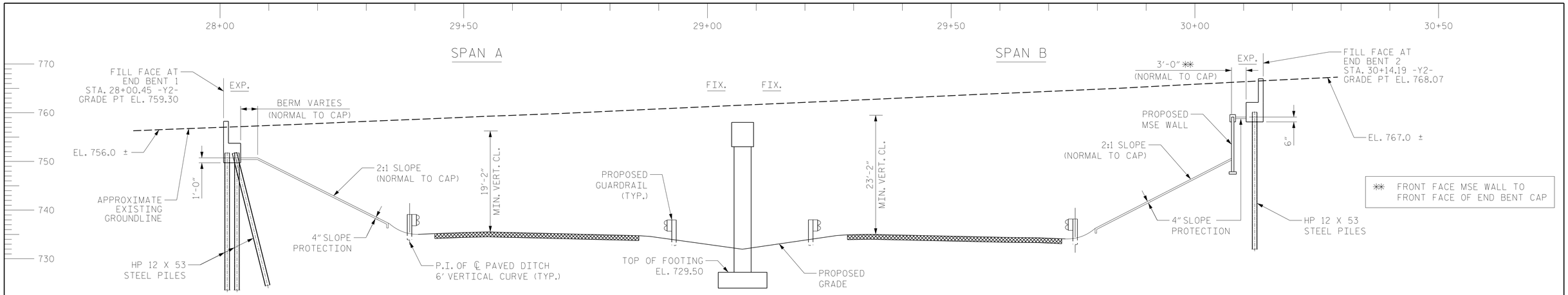


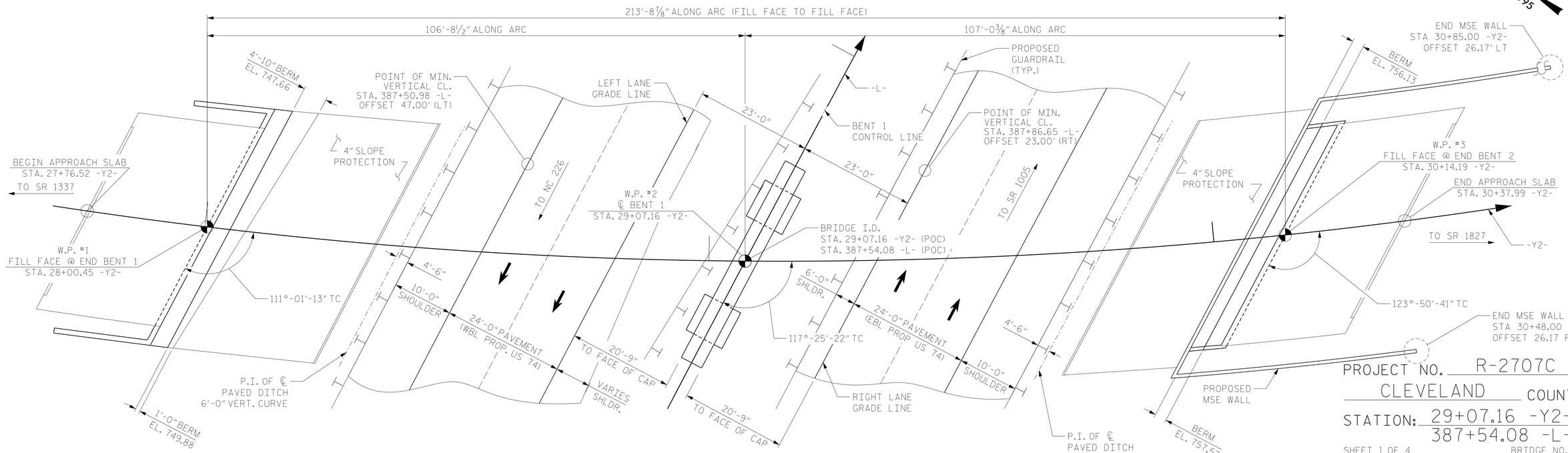
4.100%

PT STA. = 23+85.00 -Y2-
EL. 742.27

VERTICAL GRADE DATA -Y2-

SECTION ALONG ℄ -Y2-

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



PLAN

(PILES AND COLUMNS ARE NOT SHOWN IN PLAN VIEW FOR CLARITY)
DIMENSIONS SHOWN WITH RESPECT TO -L- ARE RADIAL DIMENSIONS.

HORIZONTAL CURVE DATA

-L-	-Y2-
P.I. STA. = 387+18.94	P.I. STA. = 31+27.15
Δ = 8°-50'-30.4"(RT)	Δ = 96°-06'-18.7"(LT)
D = 0°-45'-00.0"	D = 6°-00'-00.0"
L = 1178.90'	L = 1601.75'
T = 590.62'	T = 1062.52'
R = 7639.44'	R = 954.93'
SE = .03	SE = .06

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-
387+54.08 -L-
SHEET 1 OF 4 BRIDGE NO. 468

DRAWN BY :	MKO	DATE :	12/2016
CHECKED BY :	JMR	DATE :	12/2016
DESIGN ENGINEER OF RECORD:	MKO	DATE :	12/2016

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3/2/2017

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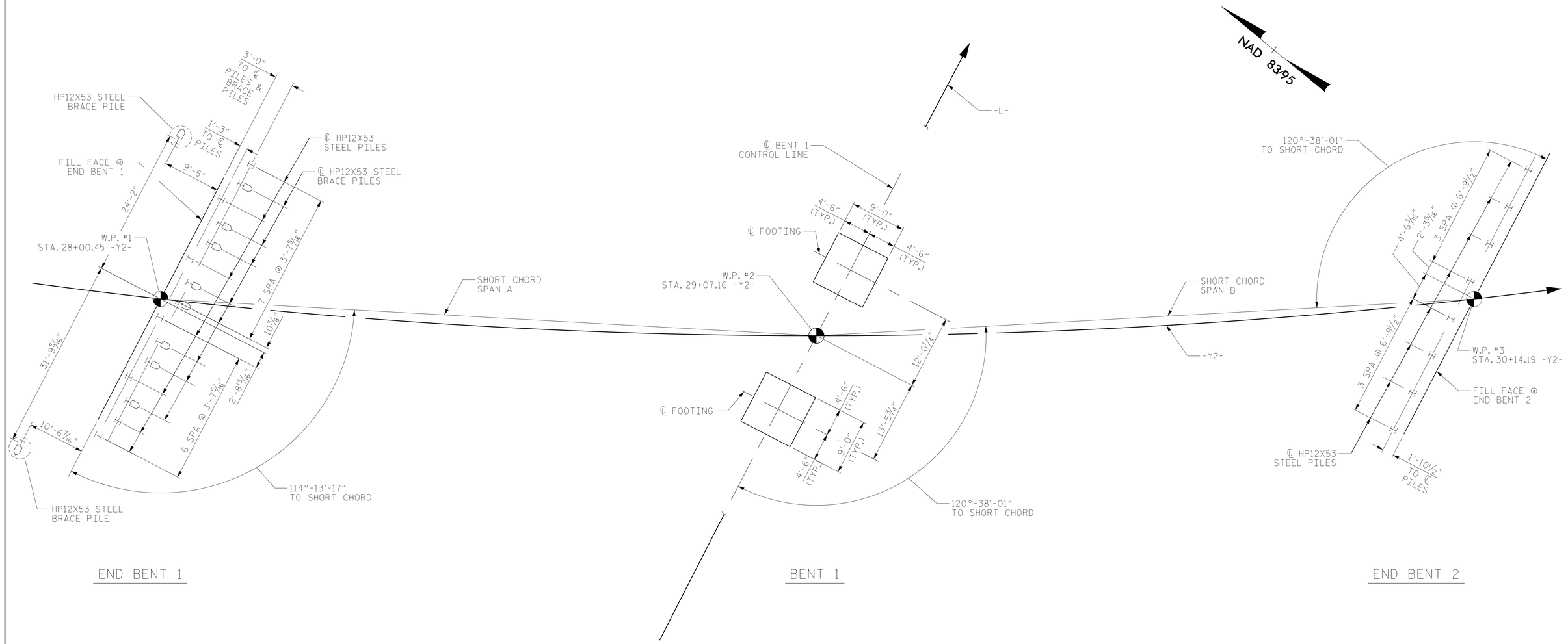
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWINGS

BRIDGE OVER US 74
(SHELBY BYPASS)
ON SR 1850 BETWEEN
SR 1344 AND SR 1827

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



END BENT 1 | BENT 1 | END BENT 2

NOTES:

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

PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

DRIVE PILES AT END BENT NO. 1 TO A REQURIED DRIVING RESISTANCE OF 175 TONS PER PILE.

DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.

PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.

THE SPREAD FOOTING AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 36 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 80 TSF JUST BEFORE PLACING CONCRETE.

STEEL H-PILES POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

DRILLED-IN PILES ARE REQUIRED FOR END BENT NO. 2. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATION 731.5 FT. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

CONCRETE IS REQUIRED TO FILL HOLES FOR PILE EXCAVATION AT END BENT NO. 2.

FOUNDATION LAYOUT

DIMENSIONS TO PILES ARE SHOWN TO PILE CENTERLINE.

BRACE PILES AT END BENTS SHALL BE BATTERED AT 3:12.

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 4

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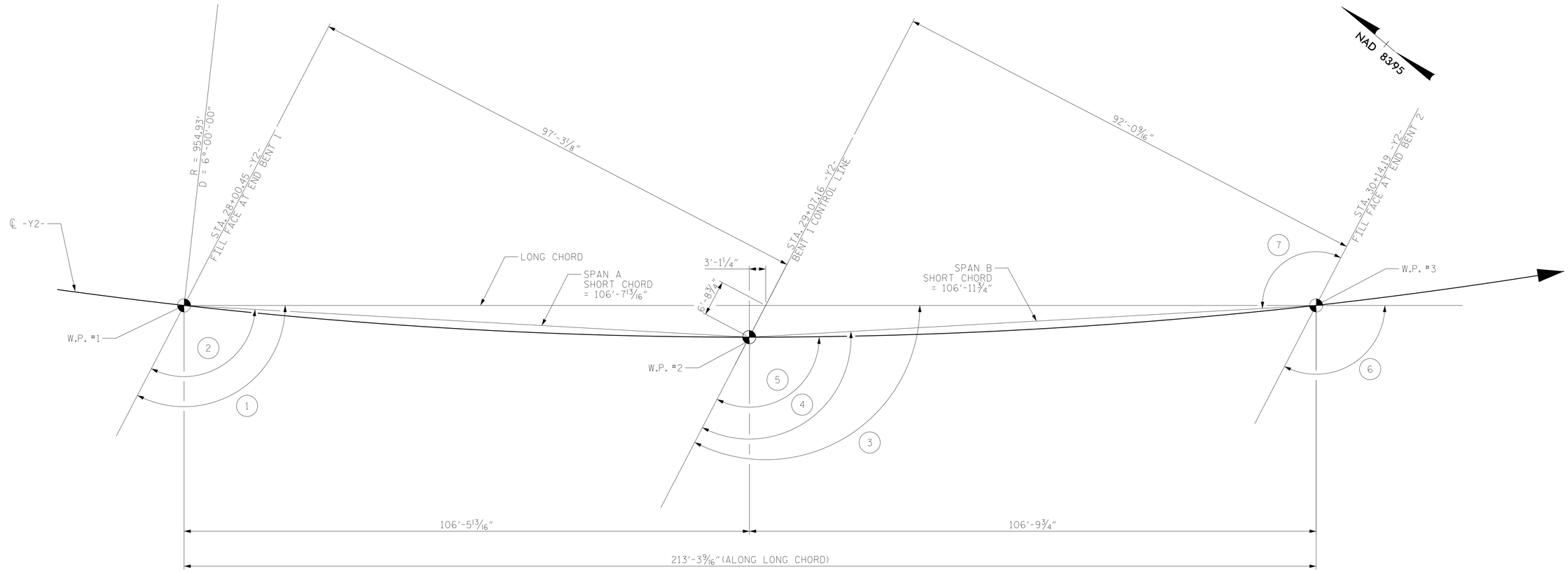
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 74
(SHELBY BYPASS)
ON SR 1850 BETWEEN
SR 1344 AND SR 1827

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



ANGLES

1. 117°-25'-57"
2. 114°-13'-17"
3. 117°-25'-57"
4. 120°-38'-01"
5. 117°-25'-22" TC
6. 117°-25'-57"
7. 120°-38'-01"

HORIZONTAL CURVE DATA -Y2-

P.I. STA. = 31+27.15
Δ = 96°-06'-18.7"(LT)
D = 6°-00'-00.0"
L = 1601.75'
T = 1062.52'
R = 954.93'
SE = .06

LONG CHORD LAYOUT

NOTE: ALL BENTS ARE PARALLEL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 3 OF 4

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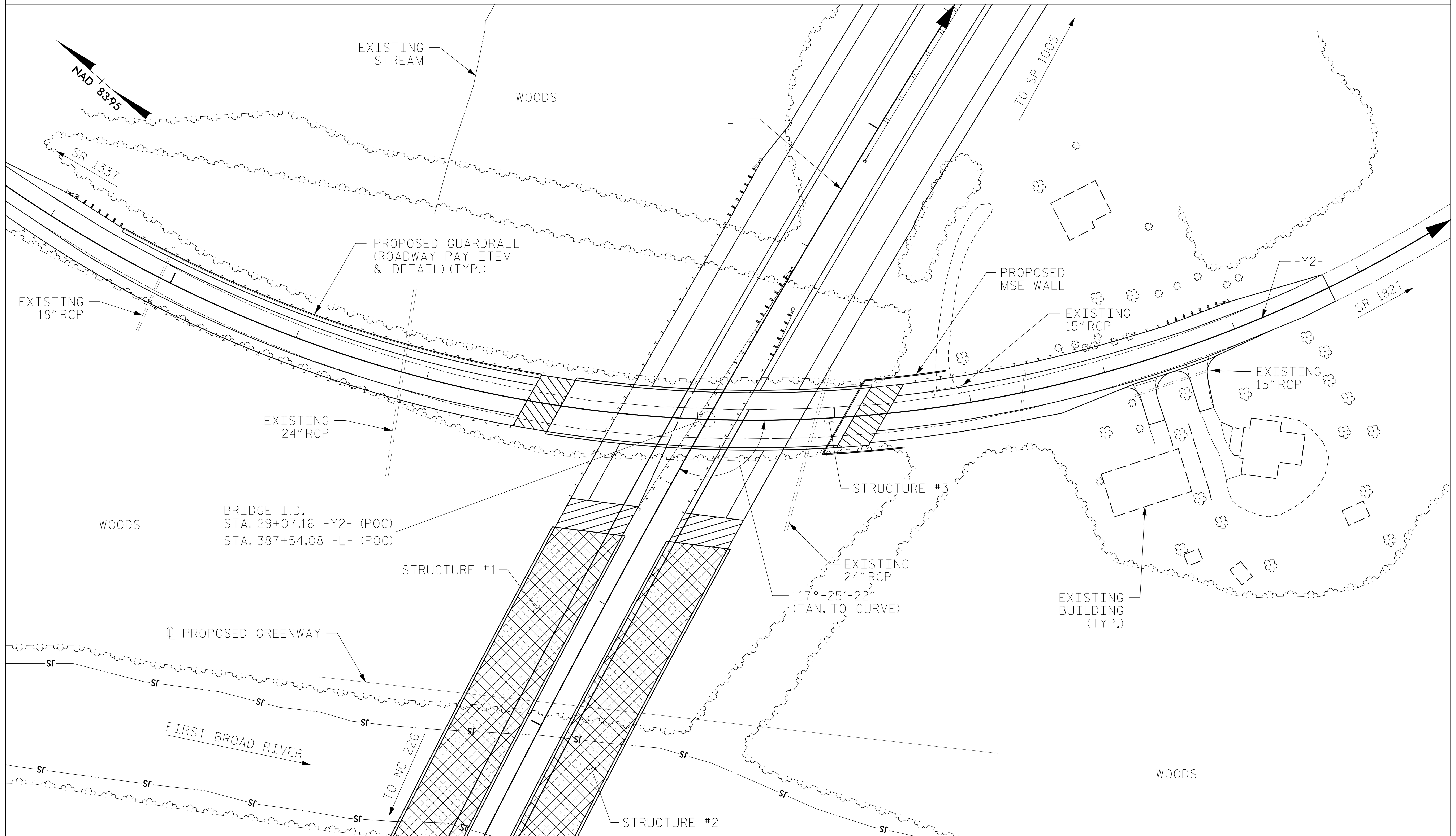
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 74
(SHELBY BYPASS)
ON SR 1850 BETWEEN
SR 1344 AND SR 1827

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

BENCH MARK #18: 8 INCH NAIL IN BASE OF 20 INCH WHITE OAK 28.12' LEFT OF STA. 30+98.41 -Y2-, EL. 778.74'



NOTE:
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

NOTES:

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.

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

THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

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

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE EXCAVATION NOT IN SOIL	HP 12X53 STEEL PILES		STEEL PILE POINTS	PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	VERTICAL CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	LIN. FT.	NO.	LIN. FT.	EACH	EA.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		8,927	9,522		LUMP SUM			10	1,043.38						422.9		LUMP SUM	LUMP SUM
END BENT 1				63.9		8,796					17	510	17	17		143		
BENT 1	LUMP SUM			85.5		13,408	1,307											
END BENT 2				44.1		7,226				80	8	240		8		175		
TOTAL	LUMP SUM	8,927	9,522	193.5	LUMP SUM	29,430	1,307	10	1,043.38	80	25	750	17	25	422.9	318	LUMP SUM	LUMP SUM

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 4 OF 4

SEAL 039313 NORTH CAROLINA PROFESSIONAL ENGINEER JUSTIN MARK ROBINSON
3/20/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING

BRIDGE OVER US 74 (SHELBY BYPASS) ON SR 1850 BETWEEN SR 1344 AND SR 1827

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

SHEET NO. S3-4
TOTAL SHEETS 36

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DESIGN ENGINEER OF RECORD : MKO DATE : 12/2016

3/20/2017
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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT					
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.12	- -	1.75	0.99	1.15	A	ER	51.26	1.09	1.38	B	EL	30.75	0.80	0.99	1.12	A	ER	51.26	
		HL-93 (OPERATING)	N/A		1.49	- -	1.35	0.99	1.49	A	ER	51.26	1.09	1.90	B	EL	103.44	N/A	- -	- -	- -	- -	- -	
		HS-20 (INVENTORY)	36.000	2	1.57	56.52	1.75	0.99	1.61	A	ER	51.26	1.09	2.02	B	EL	103.44	0.80	0.99	1.57	A	ER	51.26	
		HS-20 (OPERATING)	36.000		2.09	75.24	1.35	0.99	2.09	A	ER	51.26	1.09	2.62	B	EL	103.44	N/A	- -	- -	- -	- -	- -	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.74	50.49	1.40	0.99	4.8	A	ER	51.26	1.09	6.30	B	EL	103.44	0.80	0.99	3.74	A	ER	51.26	
		SNGARBS2	20.000		2.7	5.40	1.40	0.99	3.47	A	ER	51.26	1.09	4.39	B	EL	103.44	0.80	0.99	2.7	A	ER	51.26	
		SNAGRIS2	22.000		2.52	55.44	1.40	0.99	3.24	A	ER	51.26	1.09	4.04	B	EL	103.44	0.80	0.99	2.52	A	ER	51.26	
		SNCOTTS3	27.250		1.86	50.69	1.40	0.99	2.39	A	ER	51.26	1.09	3.14	B	EL	103.44	0.80	0.99	1.86	A	ER	51.26	
		SNAGGRS4	34.925		1.52	53.09	1.40	0.99	1.95	A	ER	51.26	1.09	2.54	B	EL	103.44	0.80	0.99	1.52	A	ER	51.26	
		SNS5A	35.550		1.49	52.97	1.40	0.99	1.91	A	ER	51.26	1.09	2.54	B	EL	103.44	0.80	0.99	1.49	A	ER	51.26	
		SNS6A	39.950		1.35	53.93	1.40	0.99	1.74	A	ER	51.26	1.09	2.29	B	EL	103.44	0.80	0.99	1.35	A	ER	51.26	
		SNS7B	42.000		1.29	54.18	1.40	0.99	1.65	A	ER	51.26	1.09	2.22	B	EL	103.44	0.80	0.99	1.29	A	ER	51.26	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.65	54.45	1.40	0.99	2.11	A	ER	51.26	1.09	2.75	B	EL	103.44	0.80	0.99	1.65	A	ER	51.26	
		TNT4A	33.075		1.65	54.57	1.40	0.99	2.12	A	ER	51.26	1.09	2.71	B	EL	103.44	0.80	0.99	1.65	A	ER	51.26	
		TNT6A	41.600		1.34	55.74	1.40	0.99	1.71	A	ER	51.26	1.09	2.31	B	EL	103.44	0.80	0.99	1.34	A	ER	51.26	
		TNT7A	42.000		1.34	56.28	1.40	0.99	1.71	A	ER	51.26	1.09	2.28	B	EL	103.44	0.80	0.99	1.34	A	ER	51.26	
		TNT7B	42.000		1.38	57.96	1.40	0.99	1.77	A	ER	51.26	1.09	2.20	B	EL	103.44	0.80	0.99	1.38	A	ER	51.26	
		TNAGRIT4	43.000		1.31	56.33	1.40	0.99	1.68	A	ER	51.26	1.09	2.13	B	EL	103.44	0.80	0.99	1.31	A	ER	51.26	
		TNAGT5A	45.000		1.24	55.80	1.40	0.99	1.59	A	ER	51.26	1.09	2.08	B	EL	103.44	0.80	0.99	1.24	A	ER	51.26	
		TNAGT5B	45.000	3	1.23	55.35	1.40	0.99	1.58	A	ER	51.26	1.09	2.03	B	EL	103.44	0.80	0.99	1.23	A	ER	51.26	

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

1.
2.
3.
4.

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

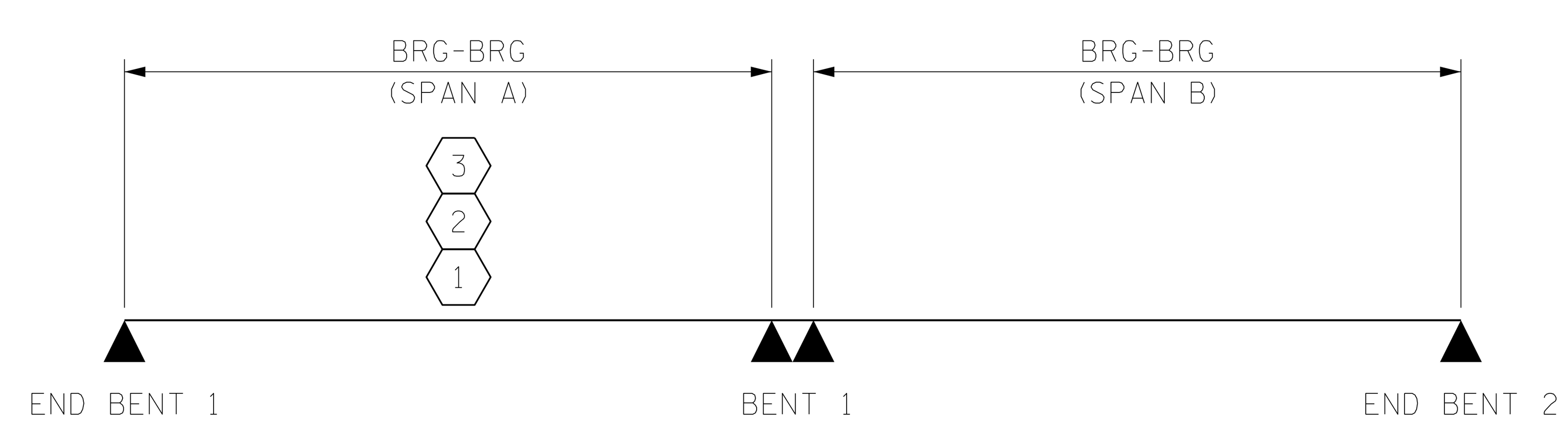
(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING ✱✱

✱✱ SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



℄ BRG - ℄ BRG GIRDER LENGTHS		
GIRDER	SPAN A	SPAN B
1	103′-4 1/4″	103′-6 7/16″
2	103′-1 7/8″	103′-2 5/16″
3	102′-11 9/16″	102′-10 5/16″
4	102′-9 5/16″	102′-6 1/2″
5	102′-7 3/16″	102′-2 13/16″

LRFR SUMMARY

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 036781 — JUSTIN MARK ROBINSON — 3/2/2017

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

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

STD. NO. LRFR1

ASSEMBLED BY : MKO		DATE : 11/2016
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CHECKED BY : GM/DI 2/08	REV. 10/1/11	MAA/GM

2/28/2017
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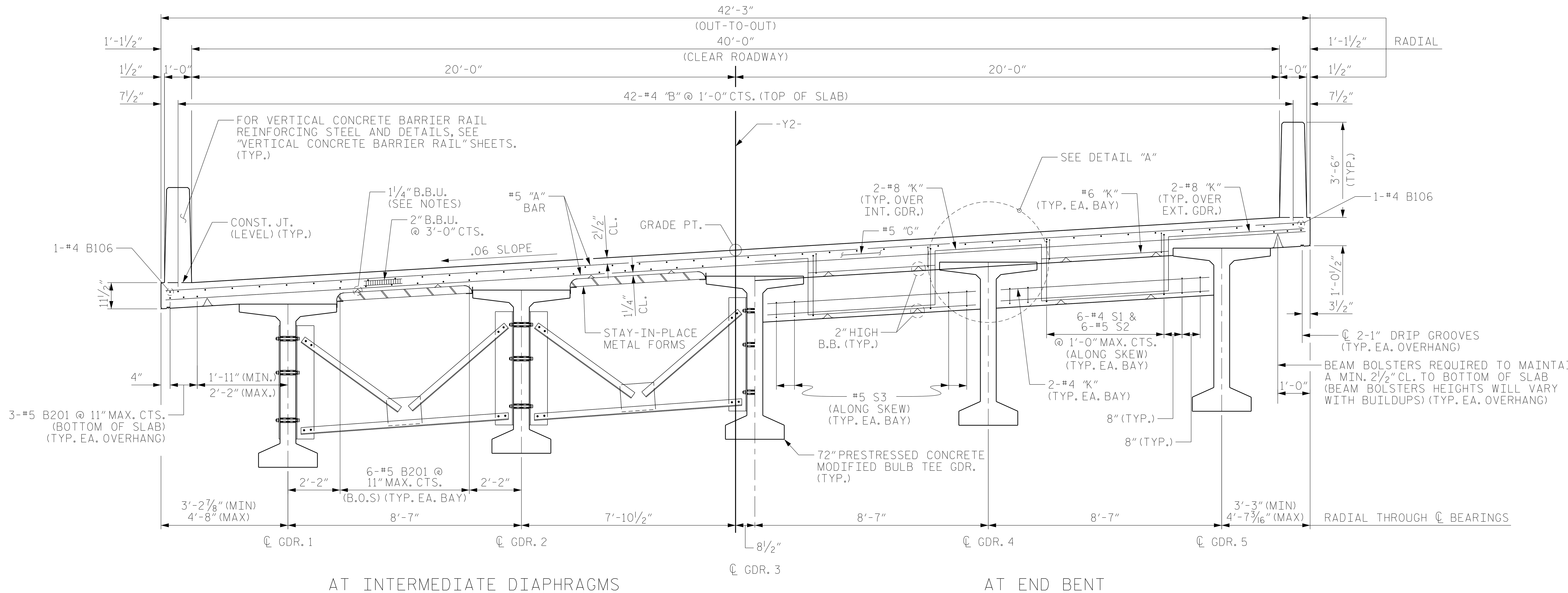


TYPICAL SECTION

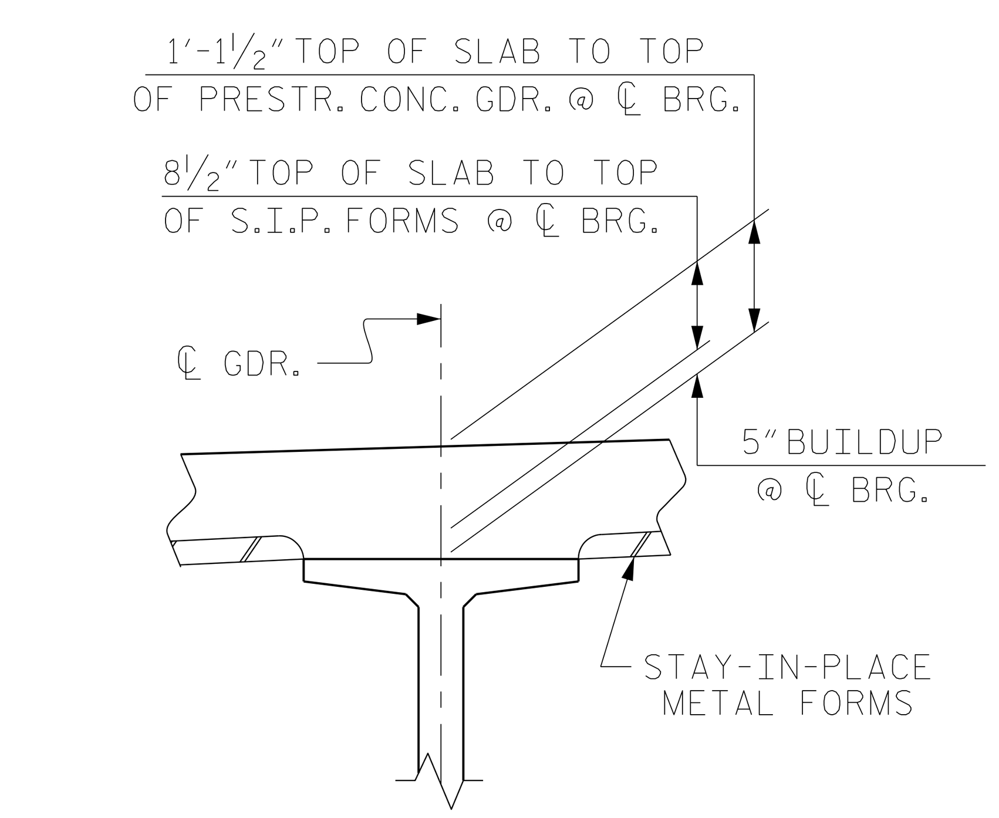
(B.O.S = BOTTOM OF SLAB)

NOTES:

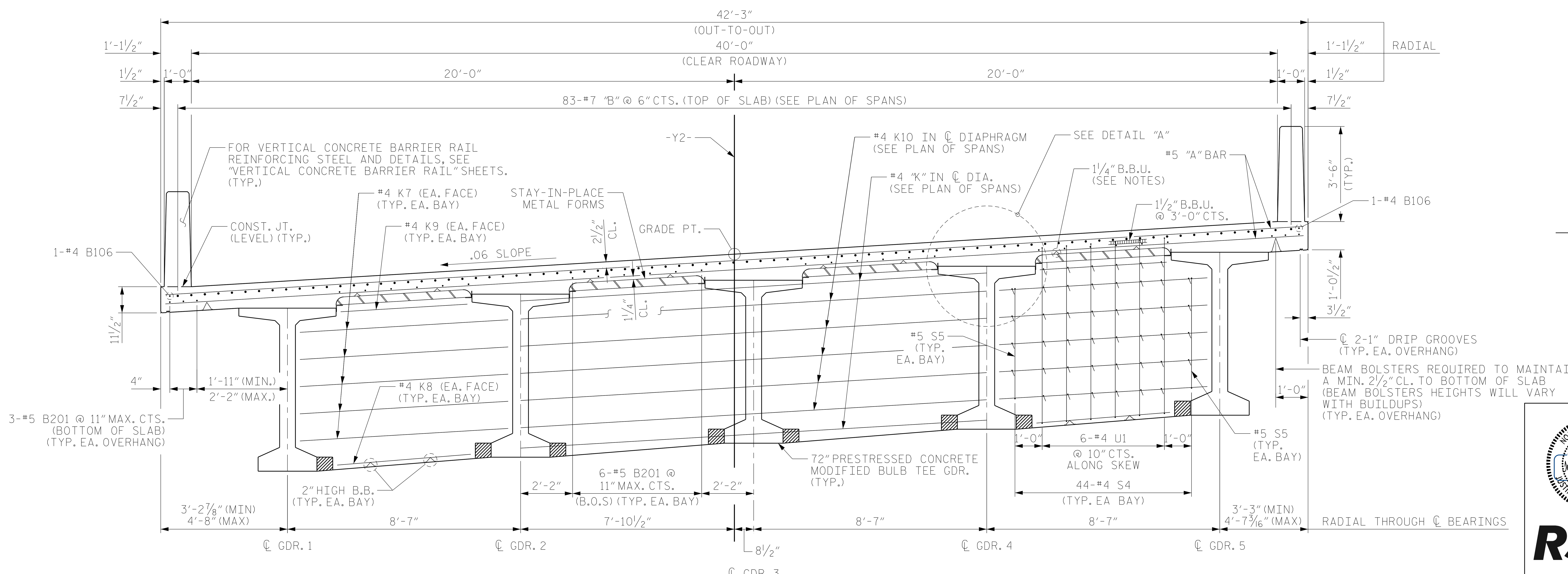
PROVIDE 1¼" HIGH BEAM BOLSTERS UPPERS AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (CHCM) AT 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2½" ABOVE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

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

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



DETAIL "A"



TYPICAL SECTION AT BENT DIAPHRAGM

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

TYPICAL SECTION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 035373 JUSTIN MARK ROBINSON 3/2/2017

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REVISIONS					
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1			3		
2			4		

SHEET NO.
S3-6
TOTAL SHEETS
36

2/28/2017
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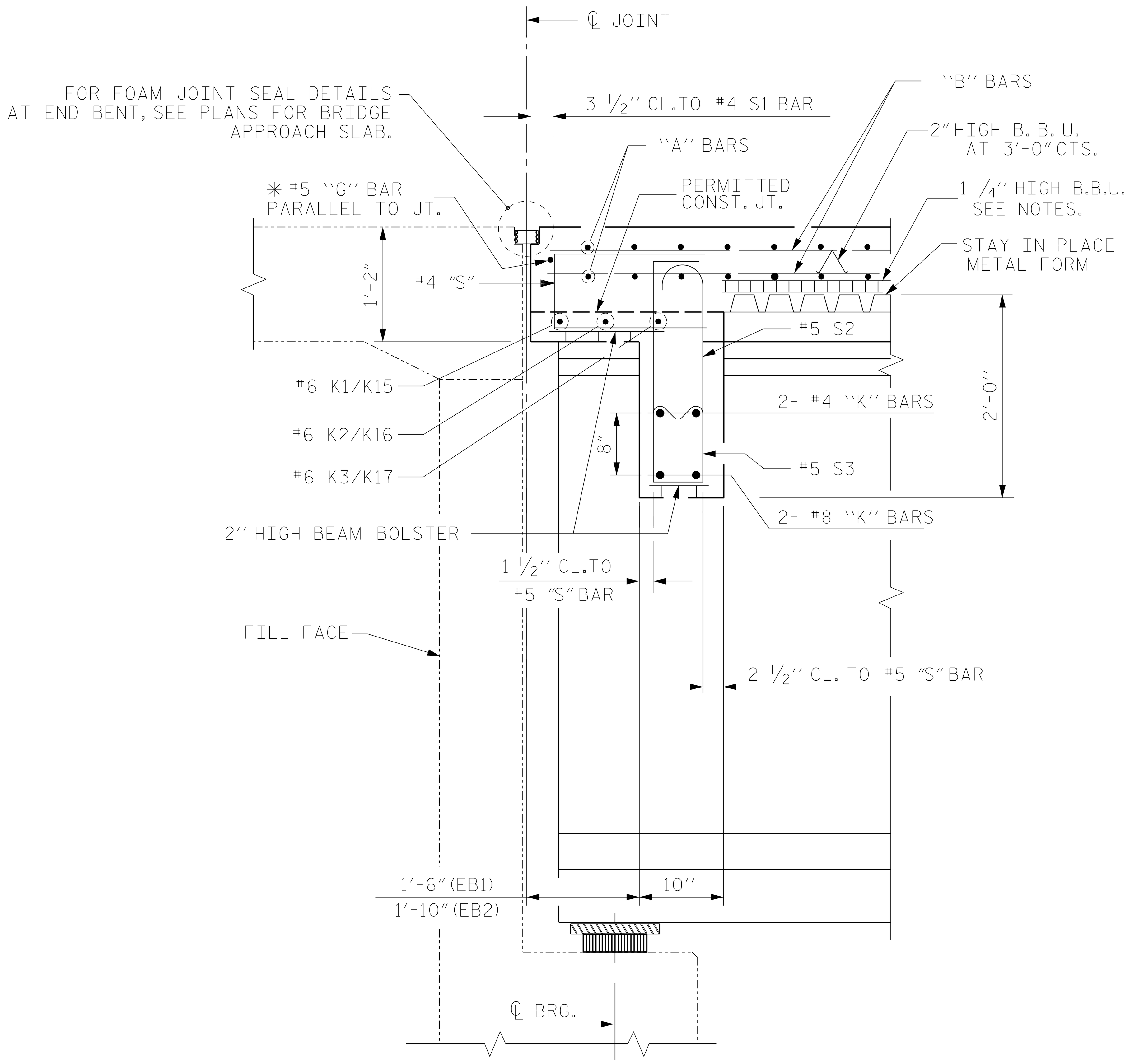
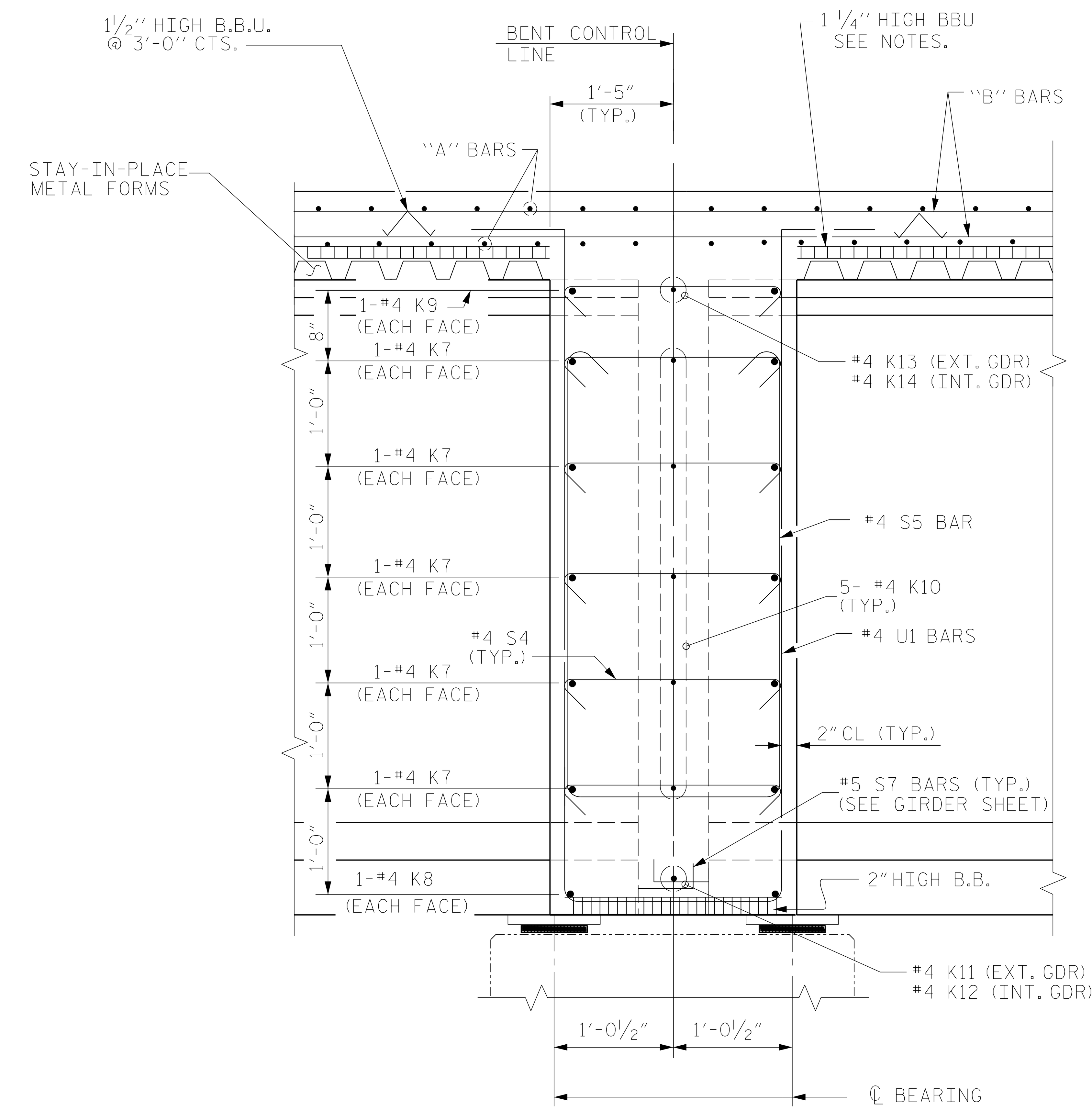
NOTES:
FOR NOTES, SEE SHEET 1 OF 2.



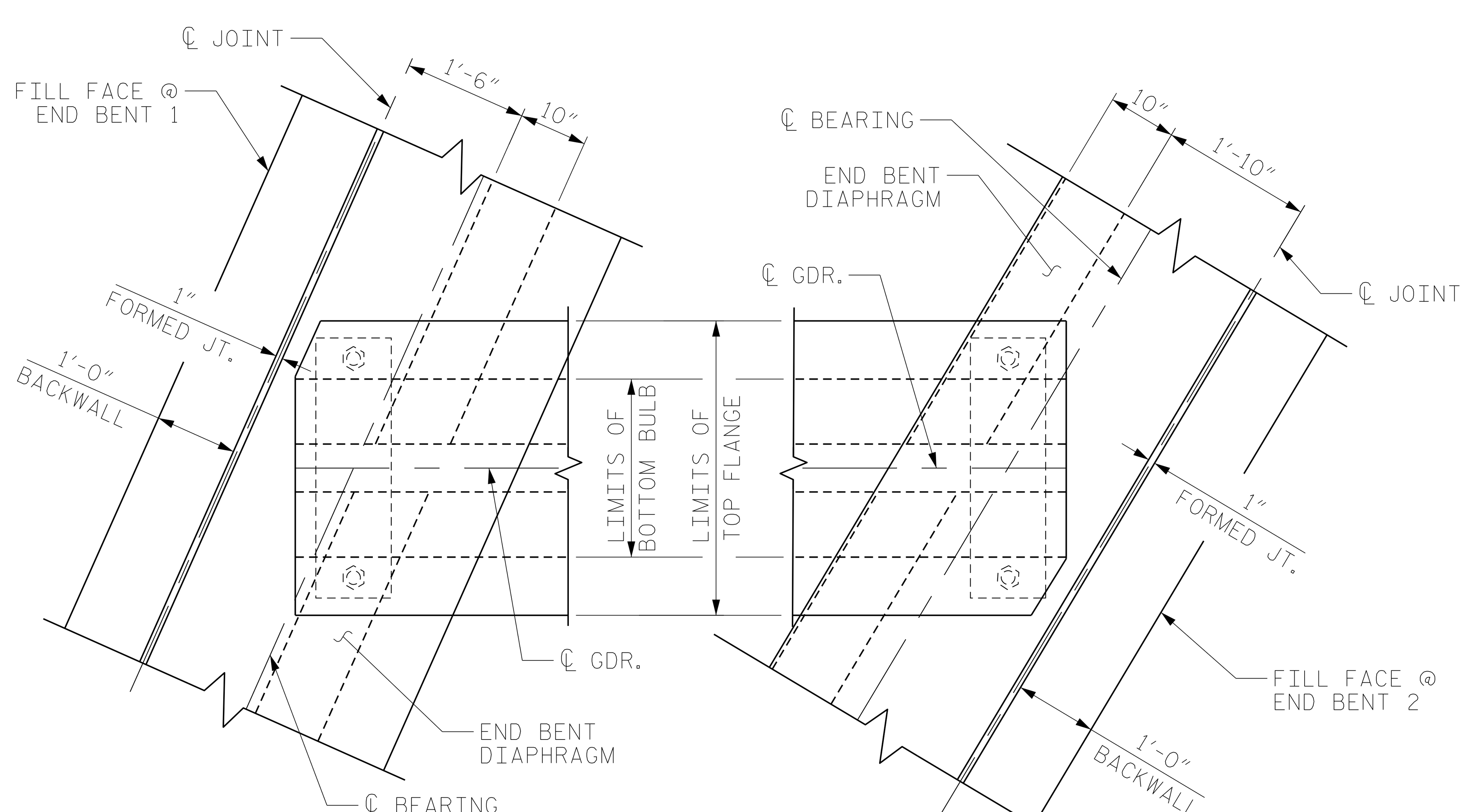
SECTION AT END BENT DIAPHRAGM

✳ "G" BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR REINFORCING STEEL & STIRRUPS



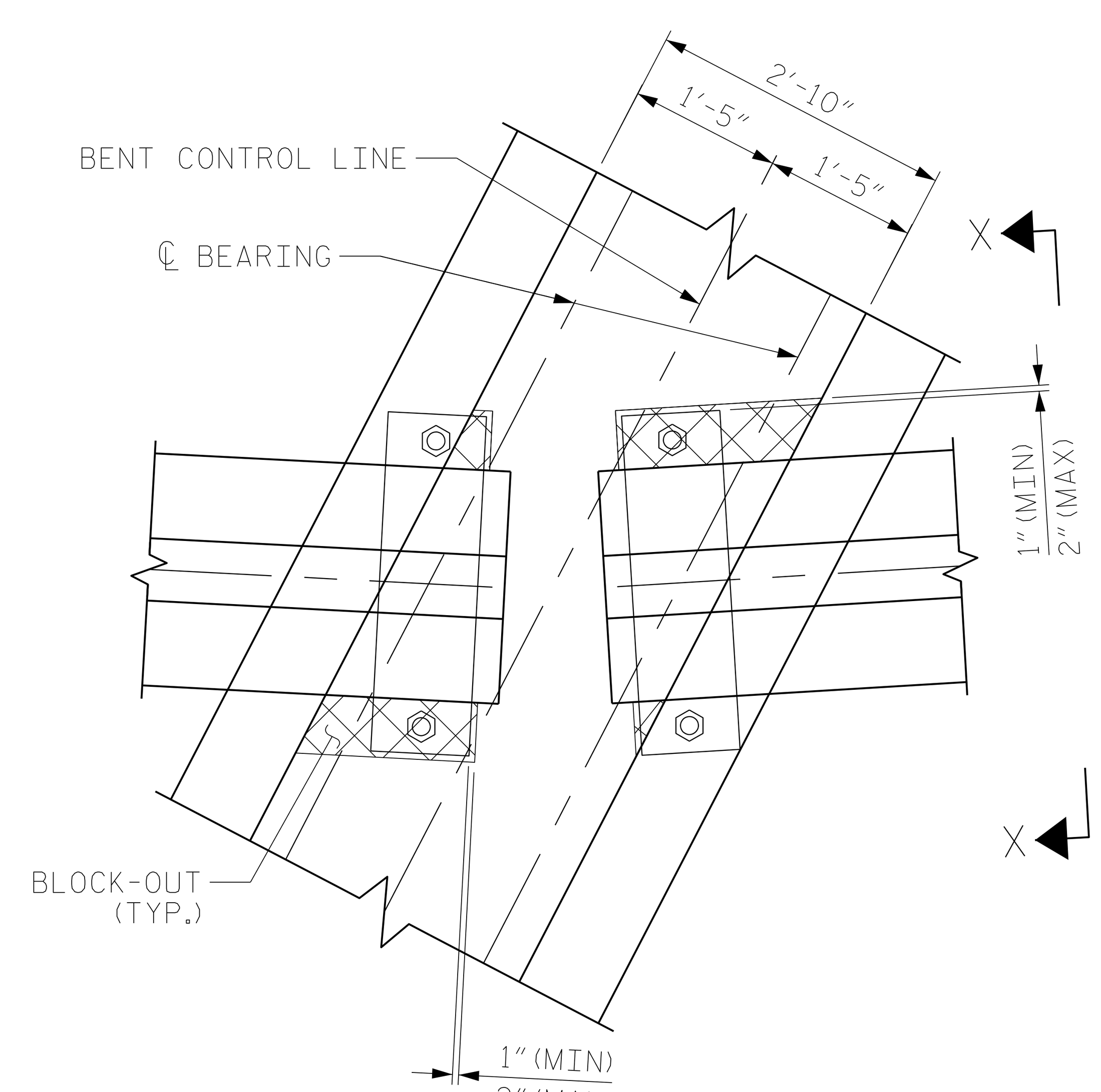
SECTION AT BENT DIAPHRAGM

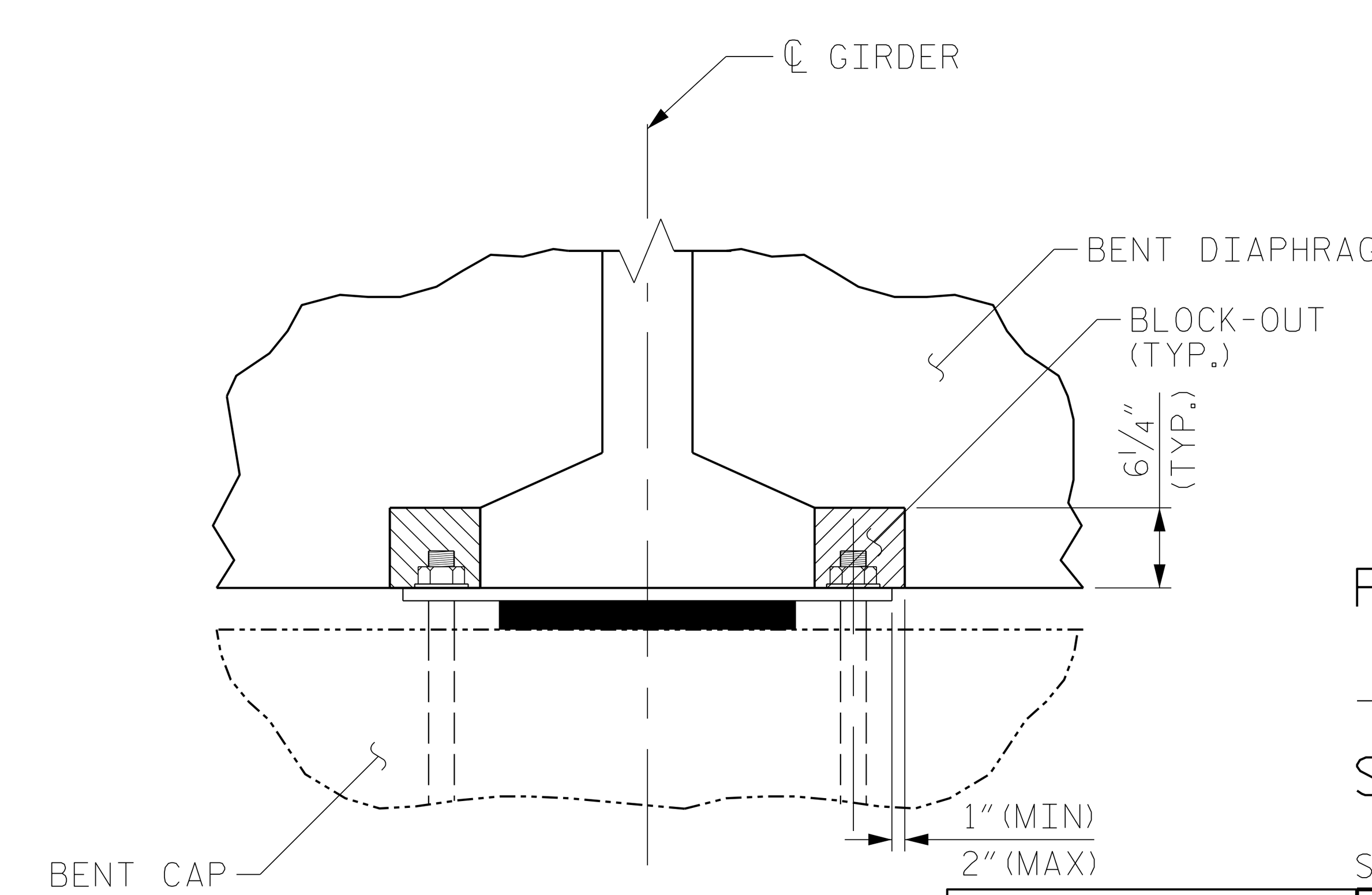
FOR PLACEMENT OF K11 THRU K14 BARS, SEE "PLAN OF SPAN" SHEETS



END BENT DIAPHRAGM

FOR FLANGE CLIP DETAILS, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET 4 OF 4.





BENT DIAPHRAGM BLOCKOUT DETAIL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 2 OF 2

SEAL 035816 — NORTH CAROLINA PROFESSIONAL ENGINEER — KEVIN MARK ROBINSON — 3/2/2017

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SUPERSTRUCTURE

TYPICAL SECTION DETAILS

REVISIONS							SHEET NO.
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1			3				TOTAL SHEETS
2			4				36

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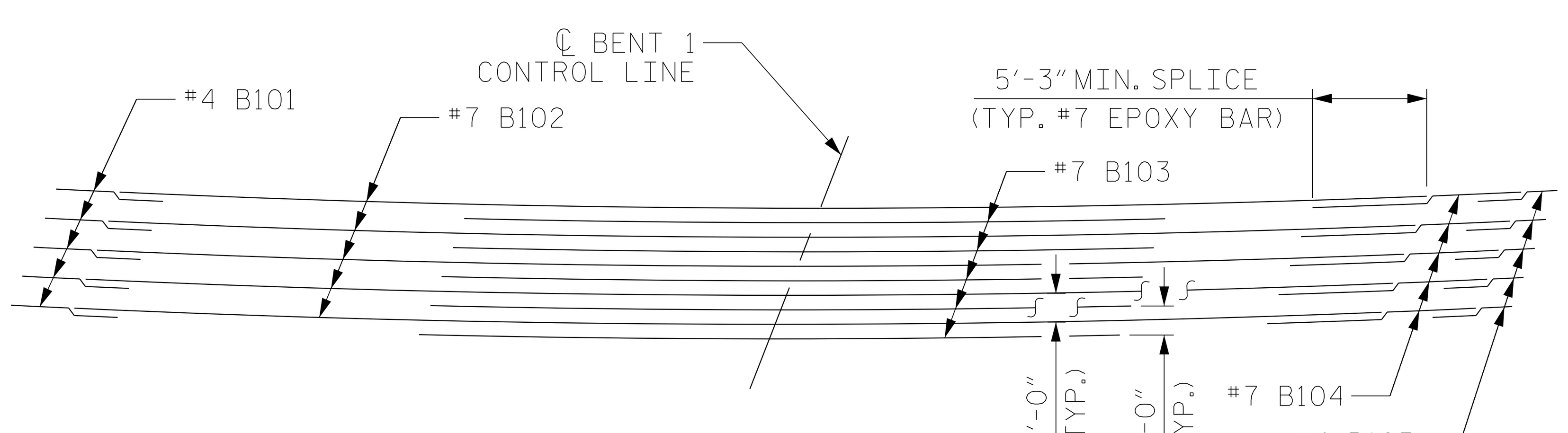
PLAN OF SPAN A



TOP OF SLAB REINFORCING STEEL LAYOUT

NOTES:

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION" SHEET 2 OF 2.

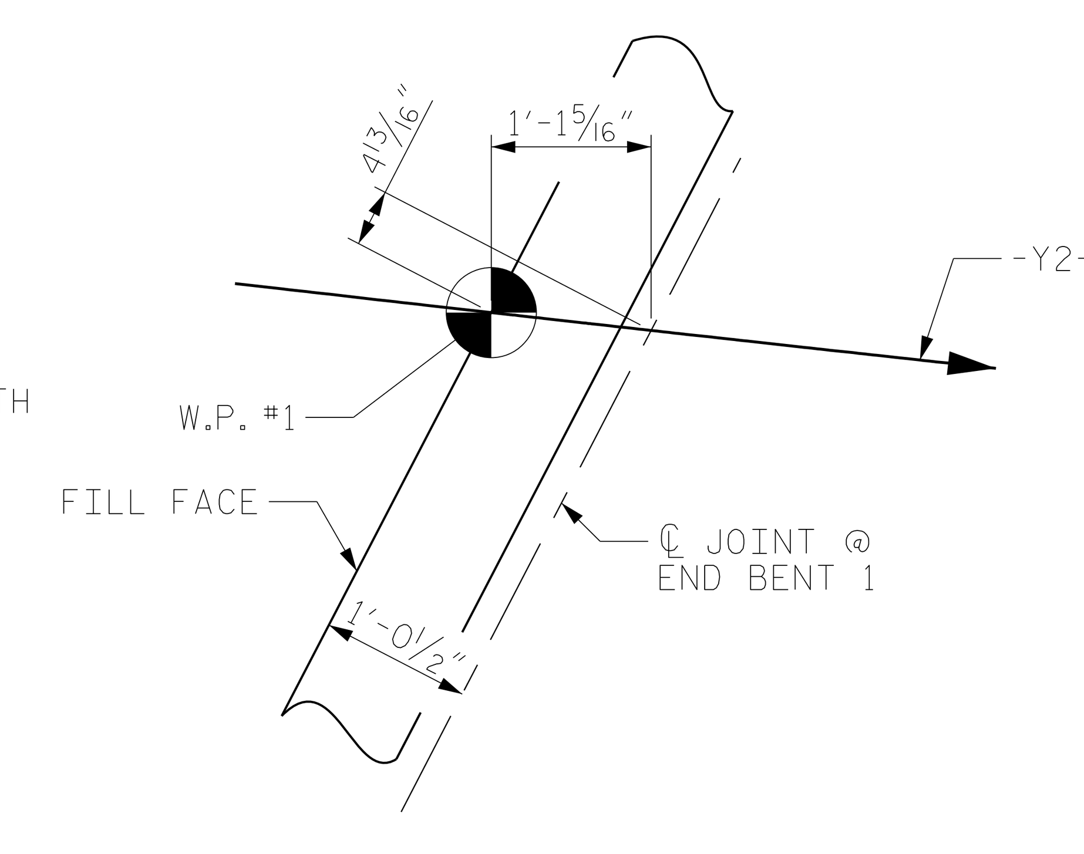
STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN SPAN A" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "VERTICAL CONCRETE BARRIER RAIL" SHEETS.

#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S = TOP OF SLAB



DETAIL A

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-
SHEET 1 OF 3

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PLAN OF SPAN A

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

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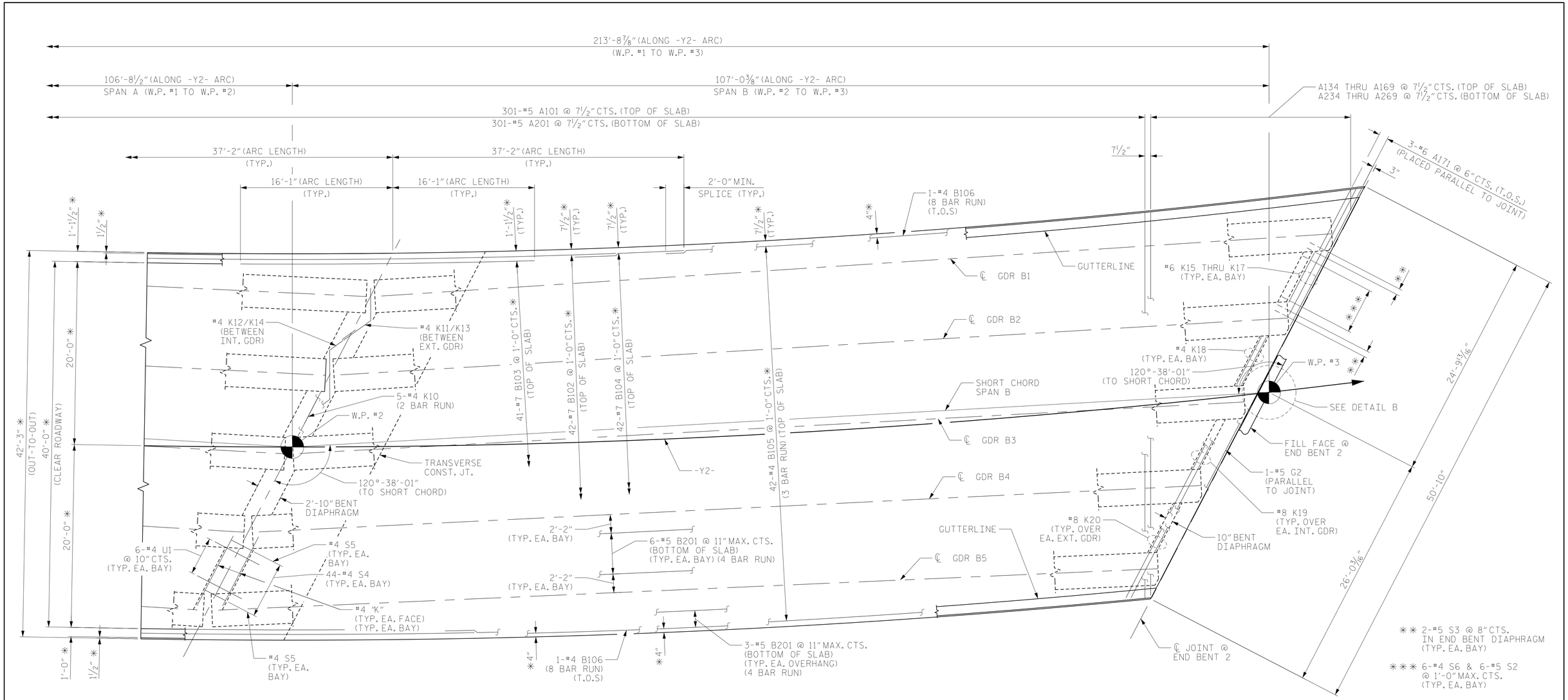
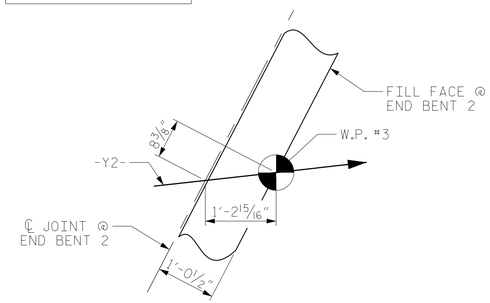


PLAN OF SPAN B

✳ RADIAL DIMENSION



DETAIL B

NOTES:

FOR SPLICE LENGTHS NOT SHOWN, REFER TO MINIMUM SPLICE LENGTH TABLE ON "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 1 OF 2.

FOR END BENT DIAPHRAGM BARS AND BENT DIAPHRAGM BARS, SEE "TYPICAL SECTION" SHEET 2 OF 2.

STEEL INTERMEDIATE DIAPHRAGMS NOT SHOWN FOR CLARITY. FOR LOCATIONS, SEE "FRAMING PLAN SPAN B" SHEET.

FOR POURING SEQUENCE, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET 2 OF 2.

FOR BARRIER RAIL REINFORCING STEEL, SEE "VERTICAL CONCRETE BARRIER RAIL" SHEETS.

FOR TOP OF SLAB REINFORCING STEEL LAYOUT, SEE "PLAN OF SPAN A" SHEET.

#5 "A" BARS ARE SPACED PERPENDICULAR TO LONG CHORD.

T.O.S = TOP OF SLAB

PROJECT NO. R-2707C
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SHEET 2 OF 3

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NORTH CAROLINA PROFESSIONAL SEAL — Justin Mark Robinson — ENGINEER
3/2/2017

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RALEIGH
SUPERSTRUCTURE
PLAN OF SPAN B

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

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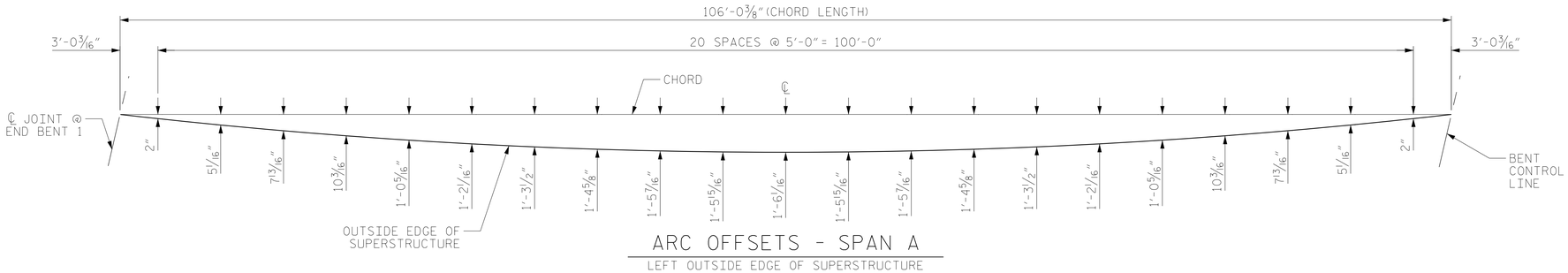
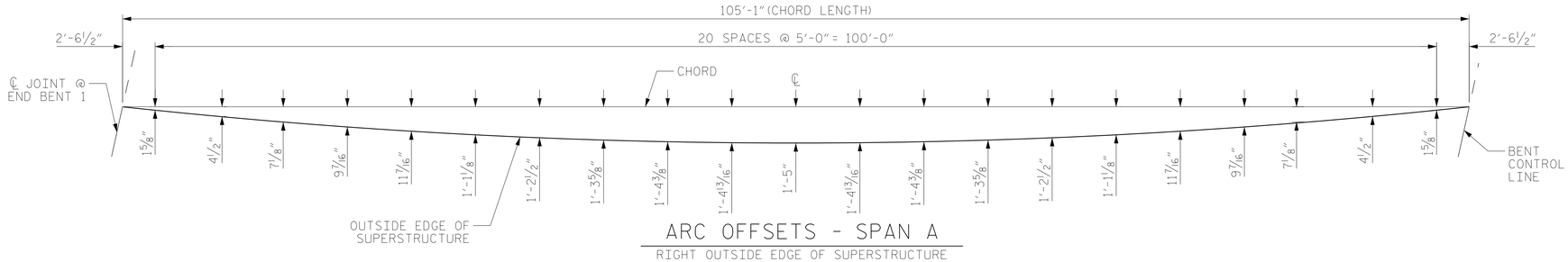


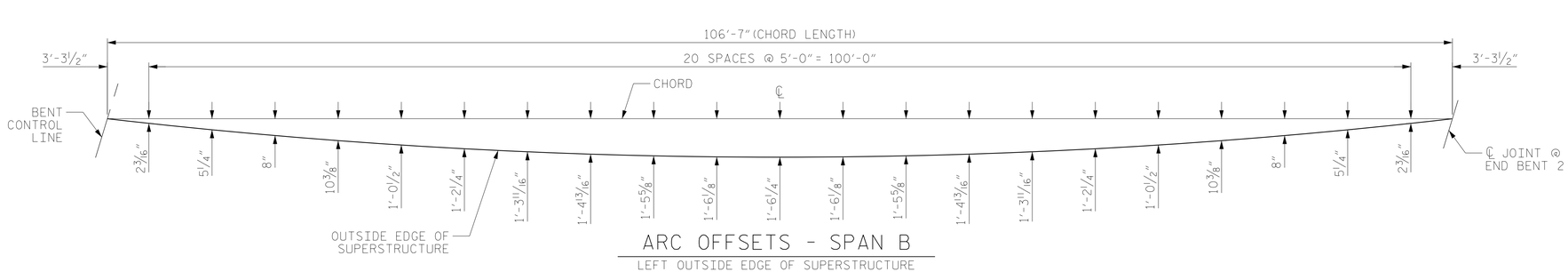
ARC OFFSETS - SPAN A

LEFT OUTSIDE EDGE OF SUPERSTRUCTURE



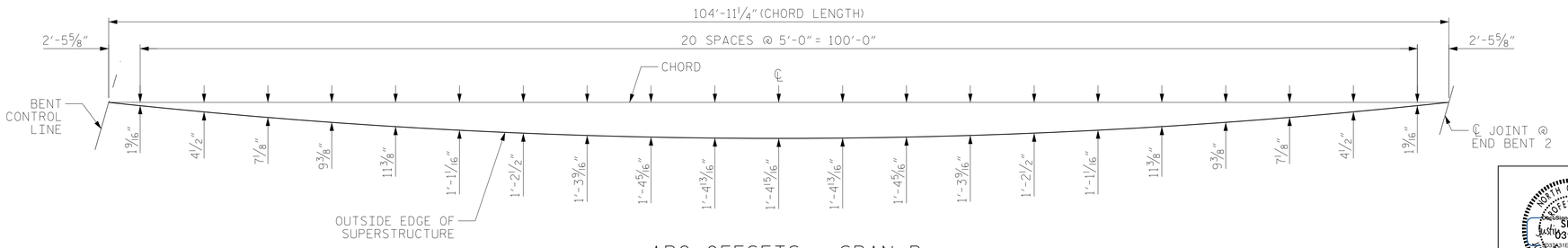
ARC OFFSETS - SPAN A

RIGHT OUTSIDE EDGE OF SUPERSTRUCTURE



ARC OFFSETS - SPAN B

LEFT OUTSIDE EDGE OF SUPERSTRUCTURE



ARC OFFSETS - SPAN B

RIGHT OUTSIDE EDGE OF SUPERSTRUCTURE

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 039313 MARK ROBINSON
3/2/2017

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SUPERSTRUCTURE

ARC OFFSETS

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

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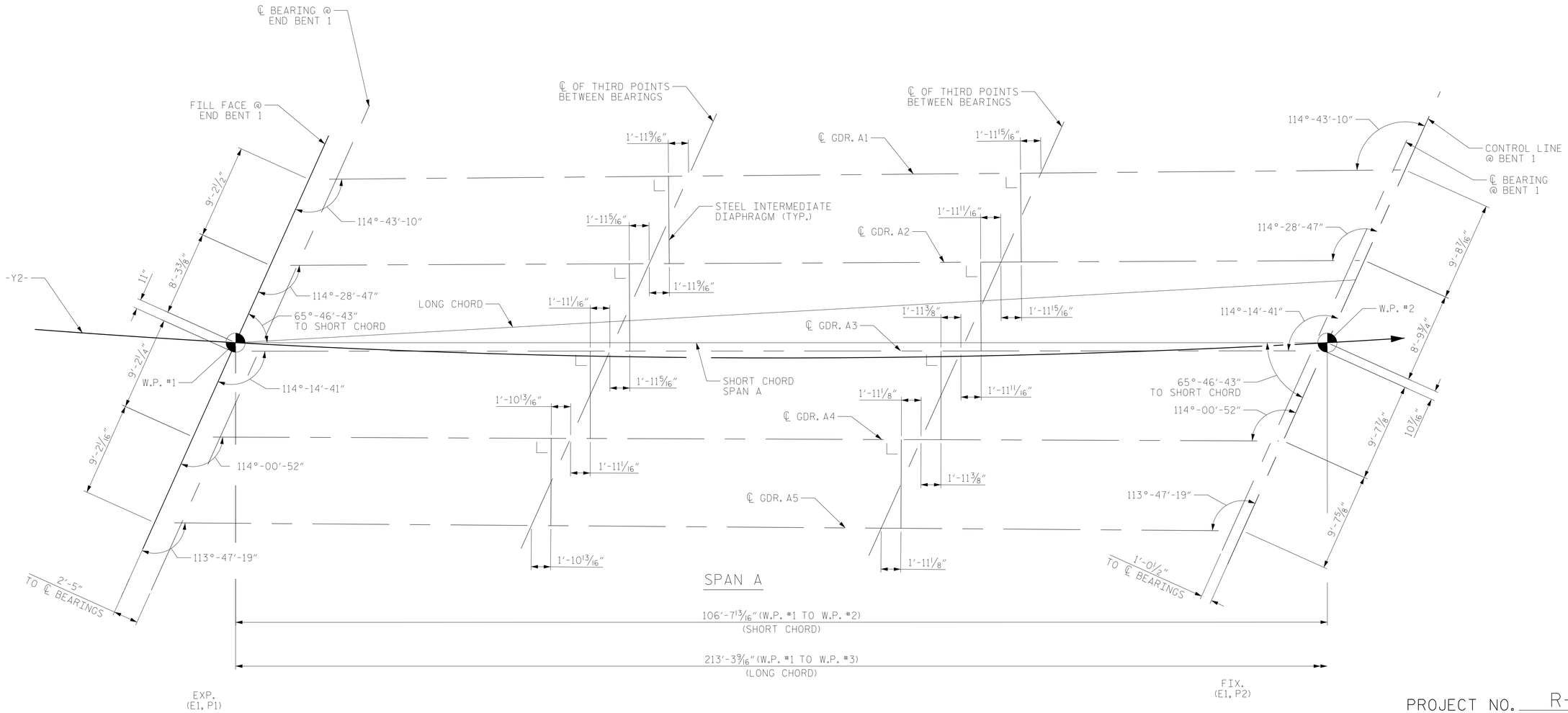

FRAMING PLAN

END BENT DIAPHRAGMS AND BENT DIAPHRAGMS ARE NOT SHOWN

NOTES:

FOR DIMENSIONS TO STEEL INTERMEDIATE DIAPHRAGMS, SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS," SHEET 3 OF 4.

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

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 2

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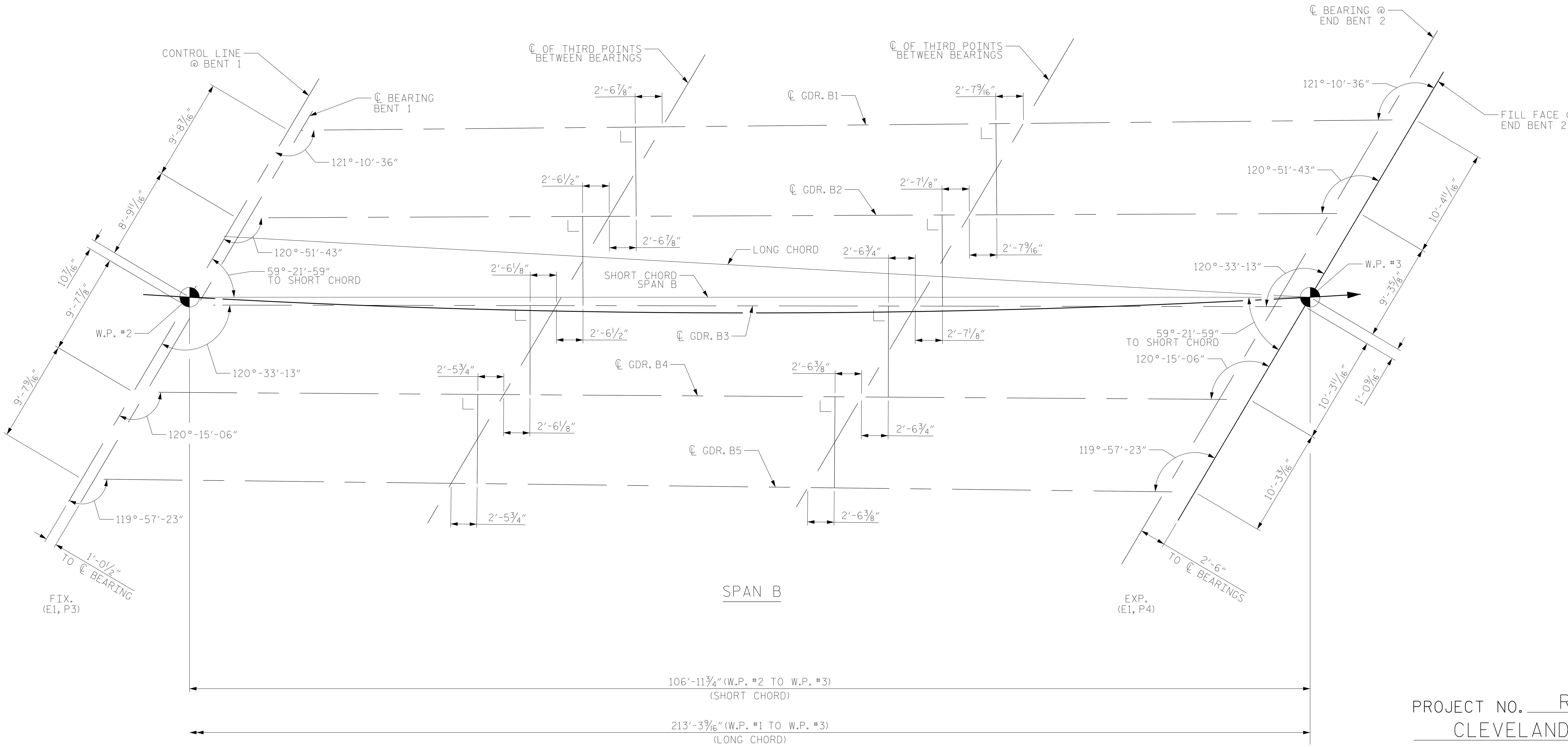
SUPERSTRUCTURE

FRAMING PLAN
SPAN A

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-11
1			3			TOTAL SHEETS
2			4			36



PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 2

FRAMING PLAN

END BENT DIAPHRAGMS AND BENT DIAPHRAGMS ARE NOT SHOWN

NOTES

FOR DIMENSIONS TO STEEL INTERMEDIATE DIAPHRAGMS, SEE "PRESTRESSED CONCRETE FIRDER CONTINUOUS FOR LIVE LOAD DETAILS," SHEET 3 OF 4.

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

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FRAMING PLAN
SPAN B

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NO.	BY:	DATE:	NO.	BY:	DATE:	S3-12
1			3			TOTAL SHEETS
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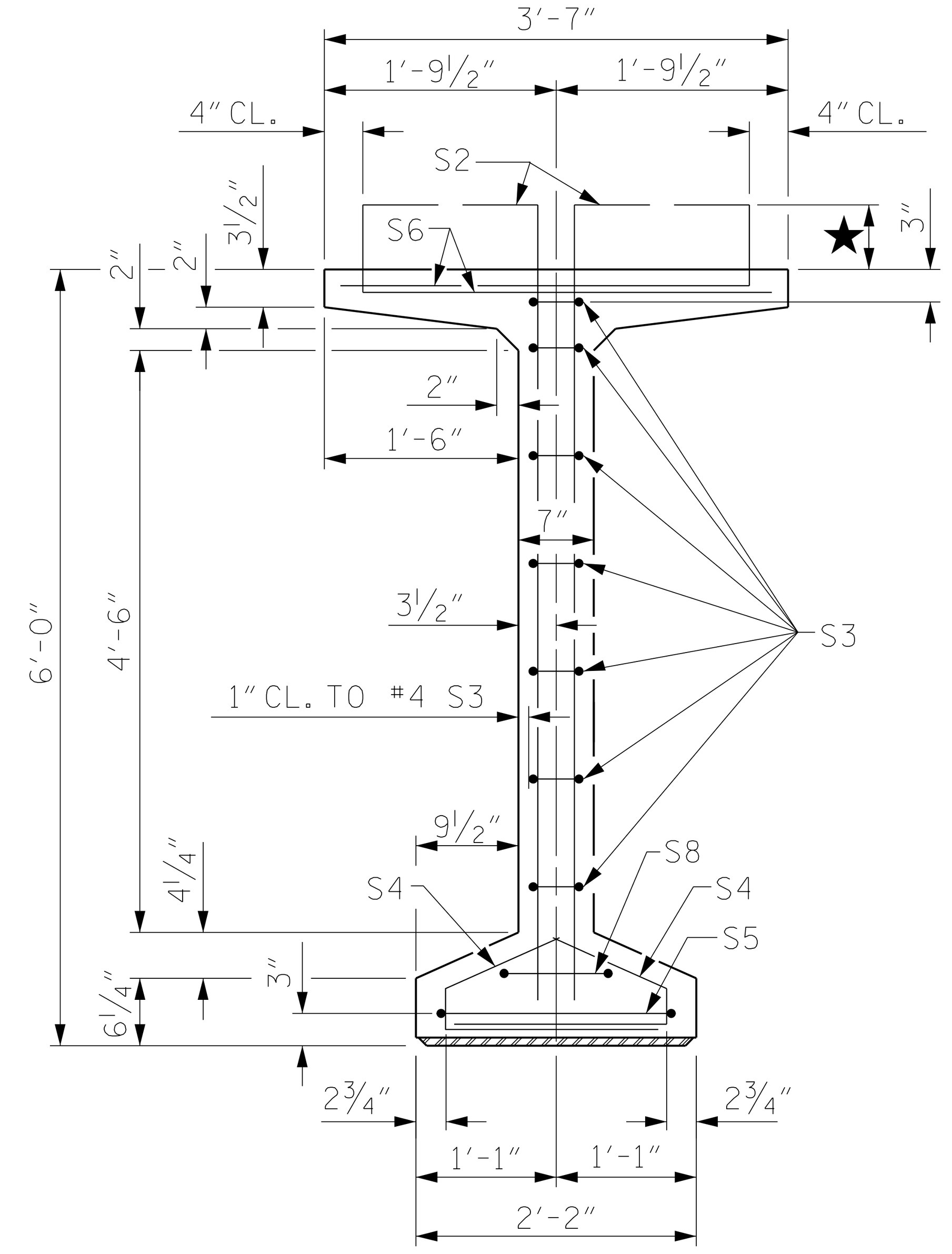
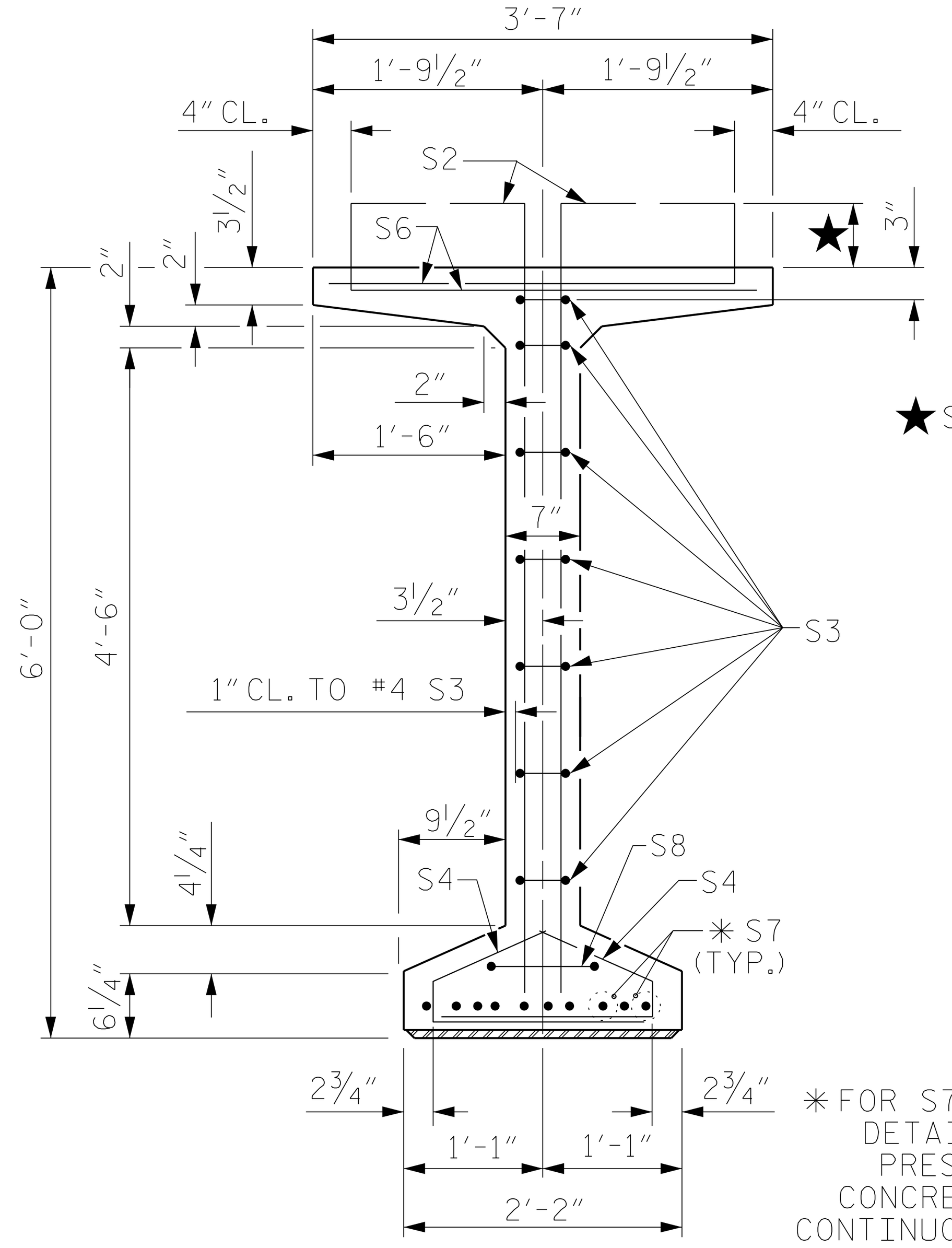


SECTION A-A



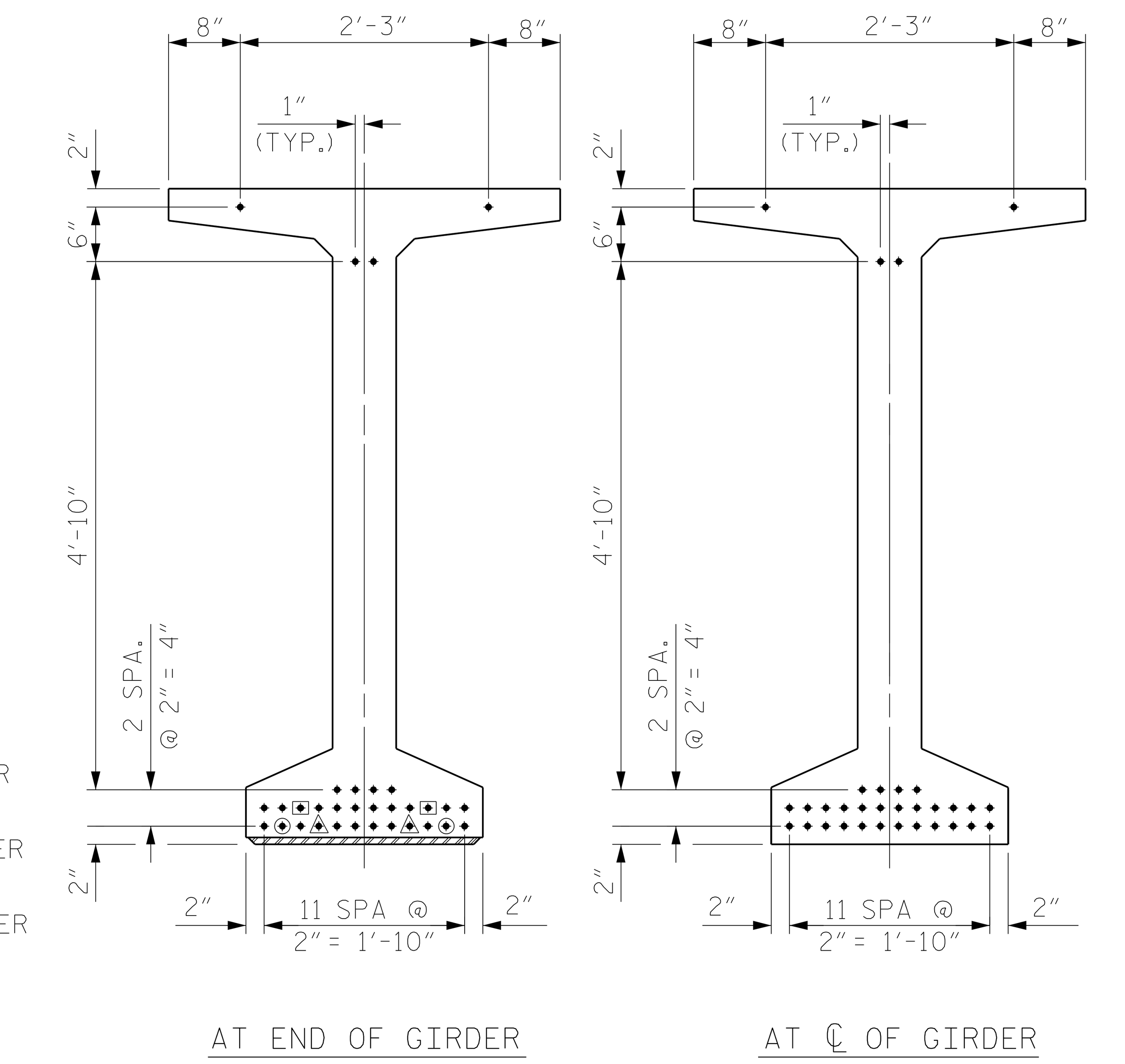
SECTION B-B

★ SEE "ELEVATION OF GIRDER" FOR DOWEL PROJECTION

✱ FOR S7 BARS, SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET 4 OF 4

DEBONDING LEGEND

- ● FULLY BONDED STRANDS
- ▣ STRANDS DEBONDED FOR 5'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- ◉ STRANDS DEBONDED FOR 20'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT
(32 STRANDS REQUIRED)

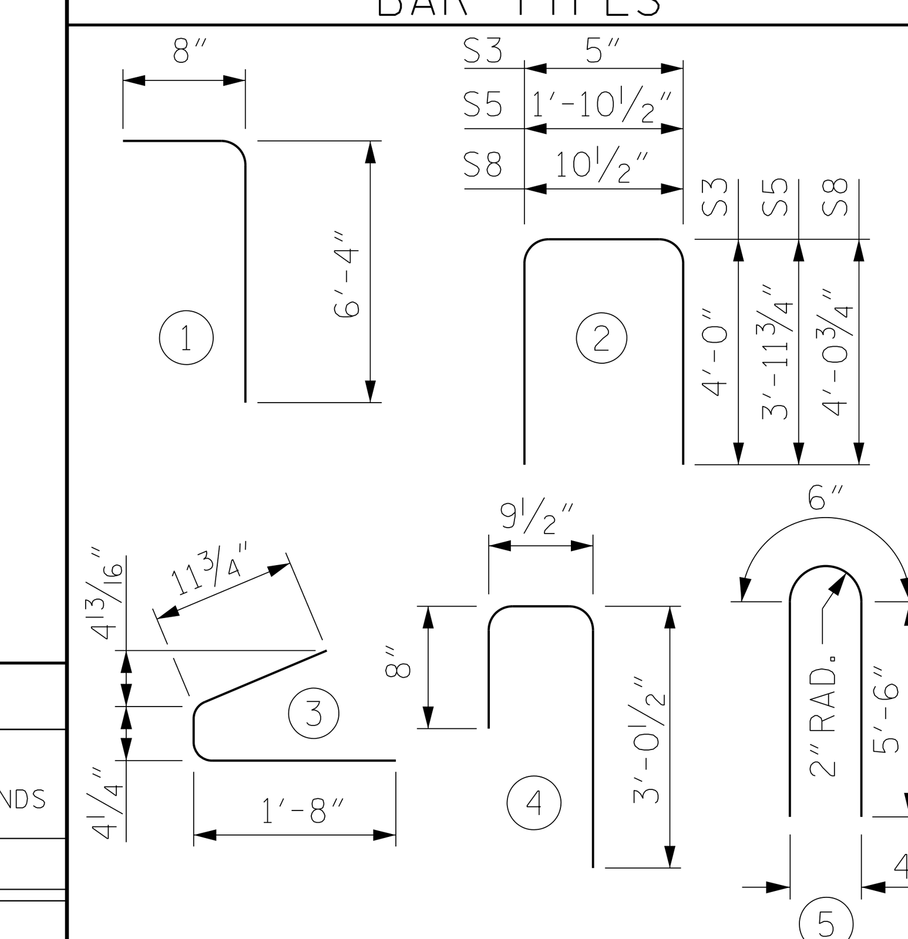
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
	S1	178	#4	1	7'-0"	832
	S2	24	#5	1	7'-0"	175
	S3	14	#4	2	8'-5"	79
	S4	92	#4	3	3'-0"	184
	S5	1	#5	2	9'-10"	10
	S6	92	#5	4	4'-6"	432
	✱ S7	10	#5	STR	3'-8"	38
	S8	2	#5	2	9'-0"	19
	S9	109	#5	STR	3'-3"	369
	S10	1	#3	STR	1'-10"	1
GDR A1 & A5	S11	8	#5	5	11'-6"	96
GDR A2, A3, A4	S11	16	#5	5	11'-6"	192
GDR A1 & A5	S12	16	#4	STR	8'-0"	86
GDR A2, A3, A4	S13	16	#4	STR	12'-0"	128

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT

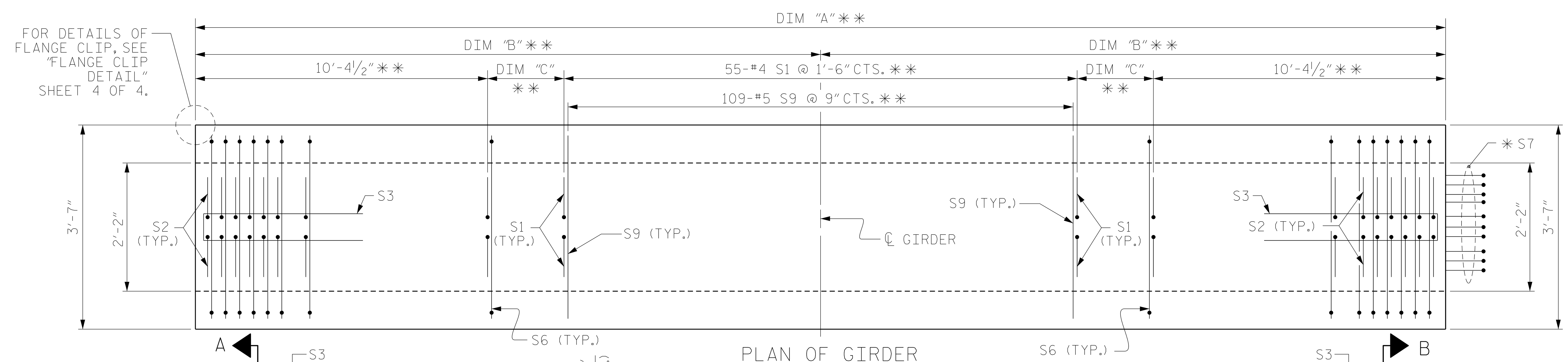
GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	SEE TABLE	521'-11 3/16"

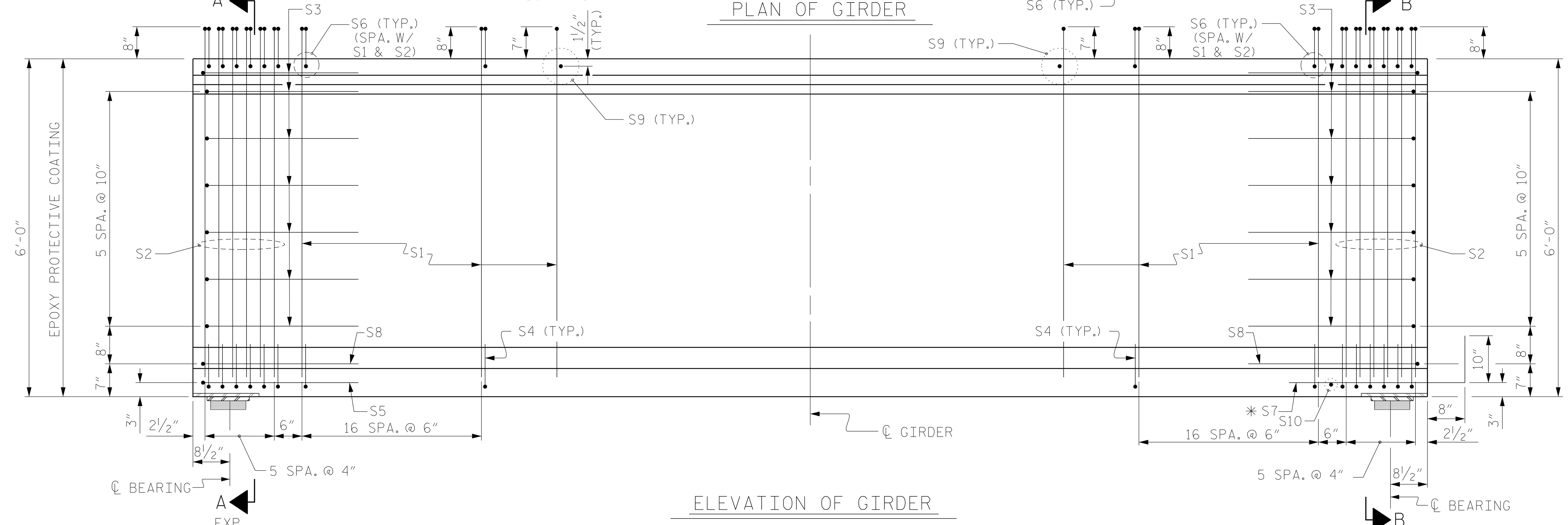
QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL (LB.)	8000 PSI CONCRETE (C.Y.)	0.6" Ø L.R. STRANDS (No.)
GIRDER A1	2321	22.4	32
GIRDER A2	2459	22.4	32
GIRDER A3	2459	22.4	32
GIRDER A4	2459	22.3	32
GIRDER A5	2321	22.3	32

FOR DETAILS OF FLANGE CLIP, SEE "FLANGE CLIP DETAIL" SHEET 4 OF 4.



PLAN OF GIRDER

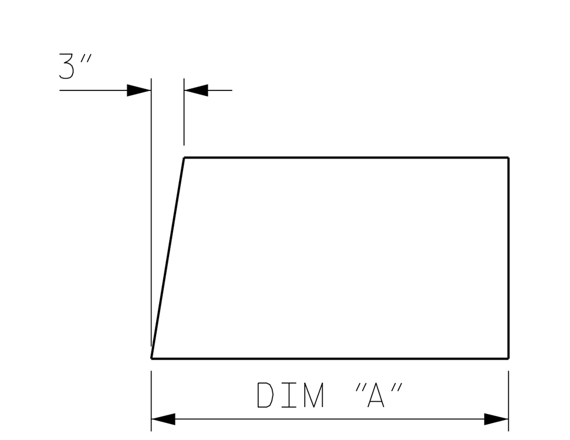


ELEVATION OF GIRDER

✱✱ SLOPED DIMENSION

GIRDERS DIMENSION TABLE

GDR. #	DIM "A"	DIM "B"	DIM "C"
A1	104'-9¼"	52'-4⅝"	1'-6⅛"
A2	104'-6⅞"	52'-3 7/16"	1'-4 15/16"
A3	104'-4 9/16"	52'-2 5/16"	1'-3 13/16"
A4	104'-2 5/16"	52'-1 3/16"	1'-2 11/16"
A5	104'-0 3/16"	52'-0⅛"	1'-1⅝"



GIRDER BEVEL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 4

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

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

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

SHEET NO. S3-13
TOTAL SHEETS 36

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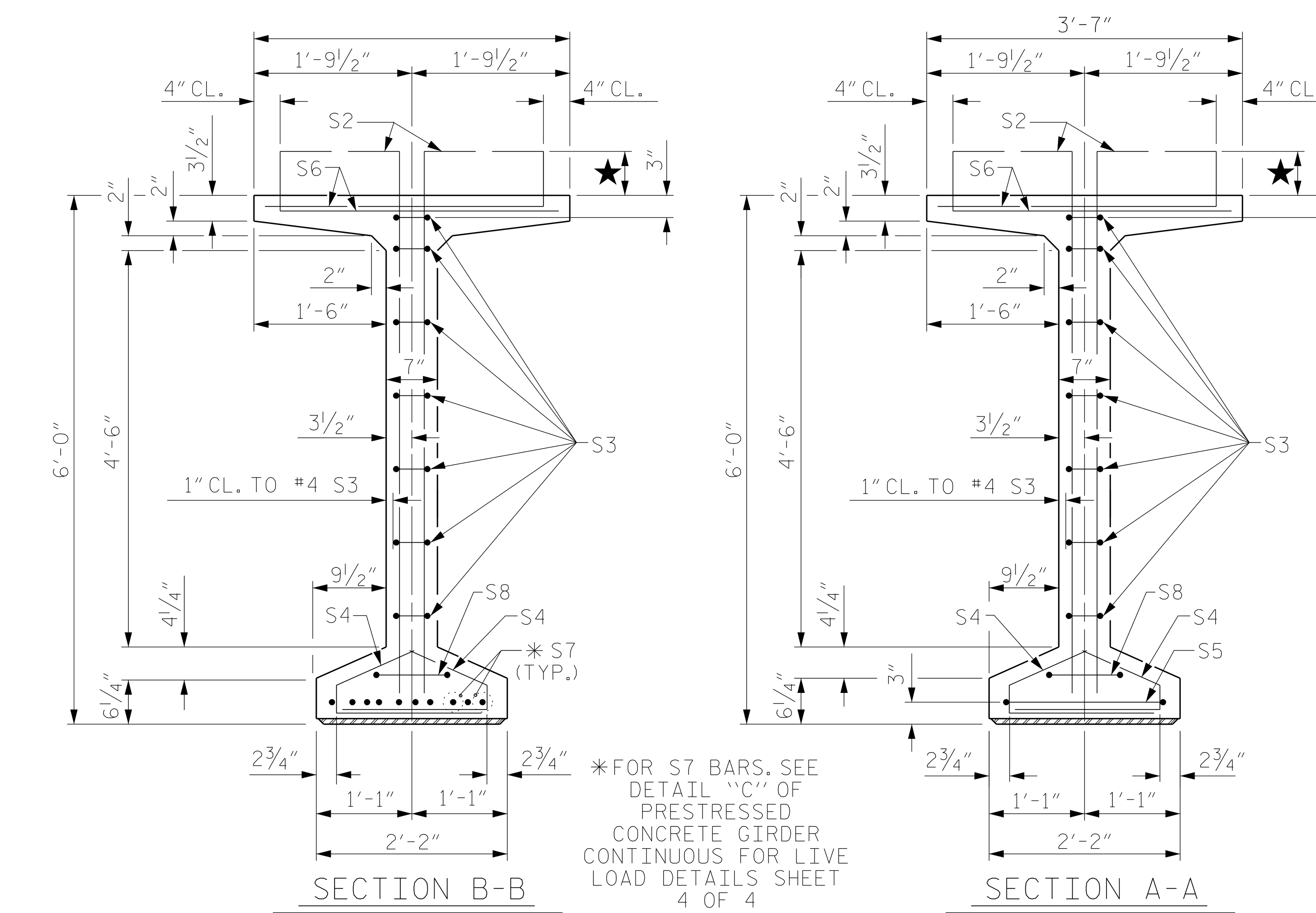
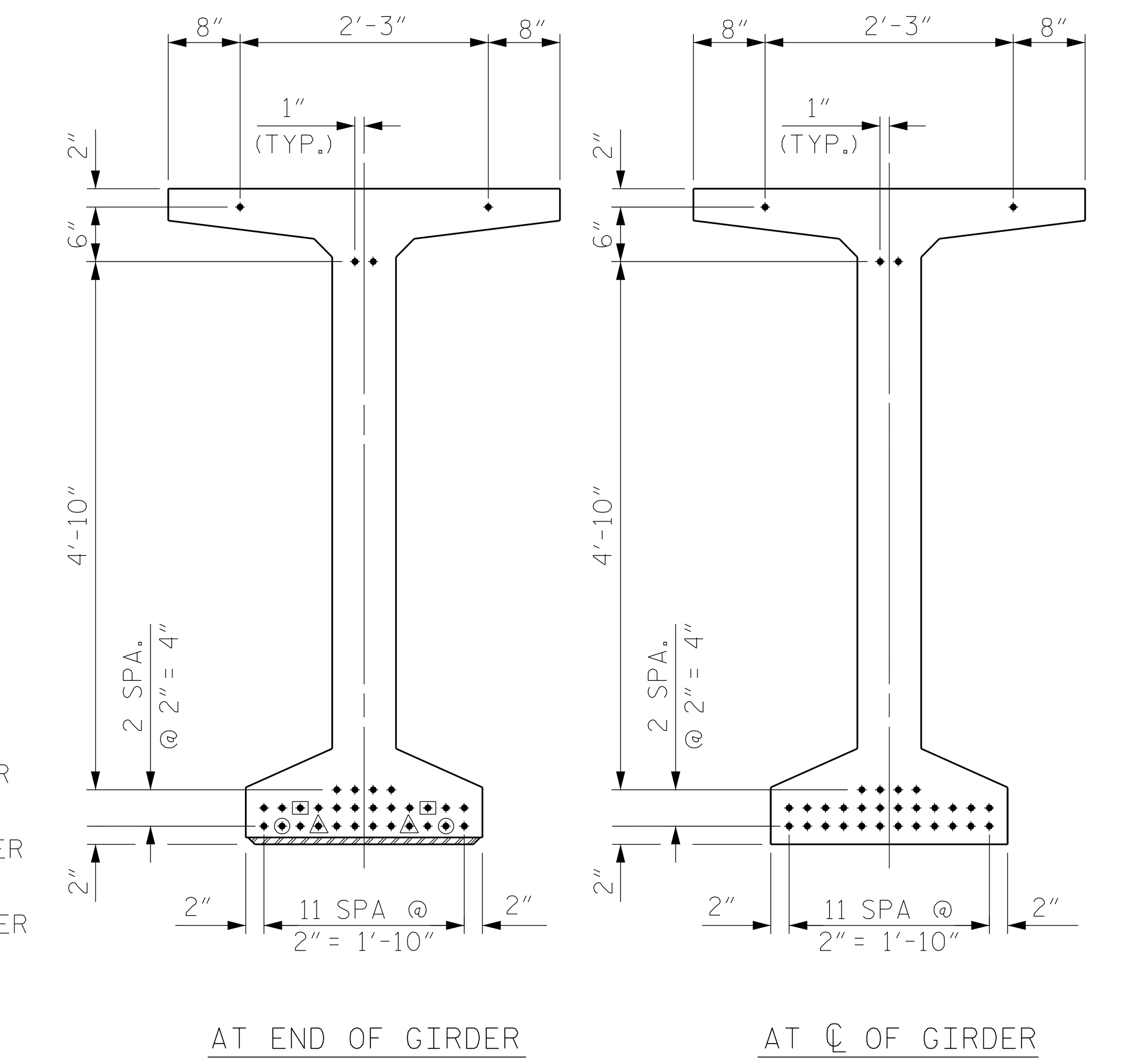


DEBONDING LEGEND

- FULLY BONDED STRANDS
- STRANDS DEBONDED FOR 5'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 10'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 20'-0" FROM END OF GIRDER



0.6" Ø LOW RELAXATION STRAND LAYOUT
(32 STRANDS REQUIRED)

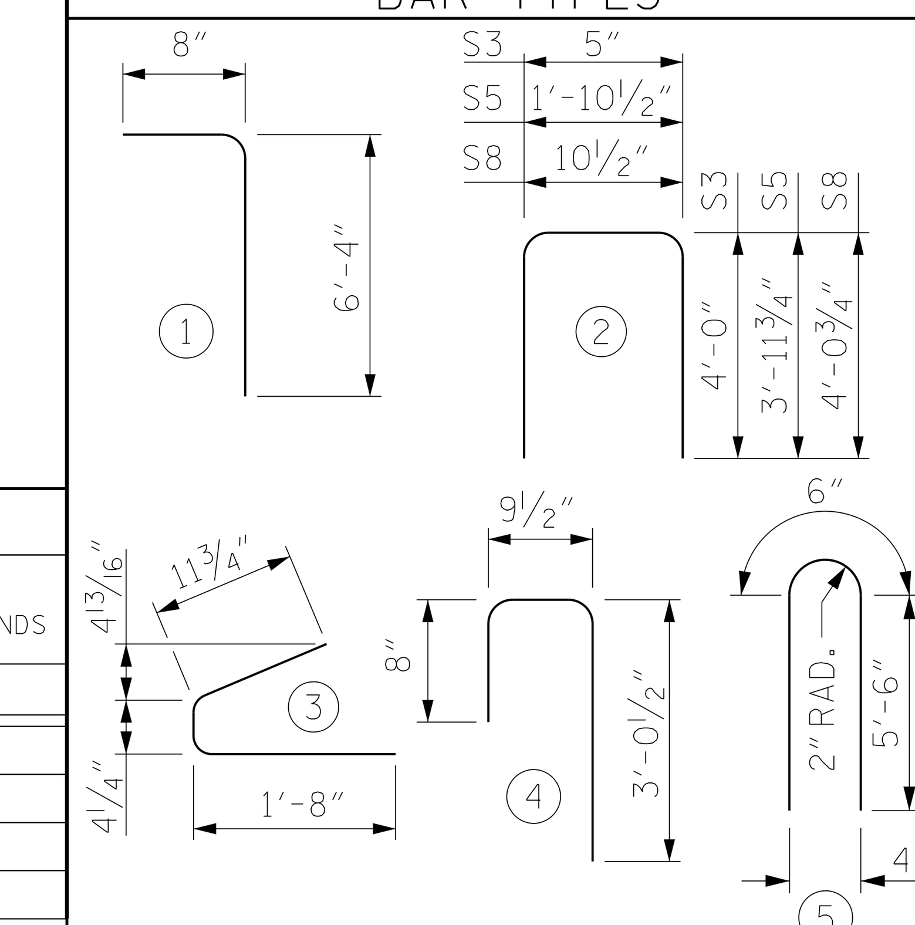
0.6" Ø L. R. GRADE 270 STRANDS		
AREA (SQUARE INCHES)	ULTIMATE STRENGTH (LBS. PER STRAND)	APPLIED PRESTRESS (LBS. PER STRAND)
0.217	58,600	43,950

REINFORCING STEEL FOR ONE GDR

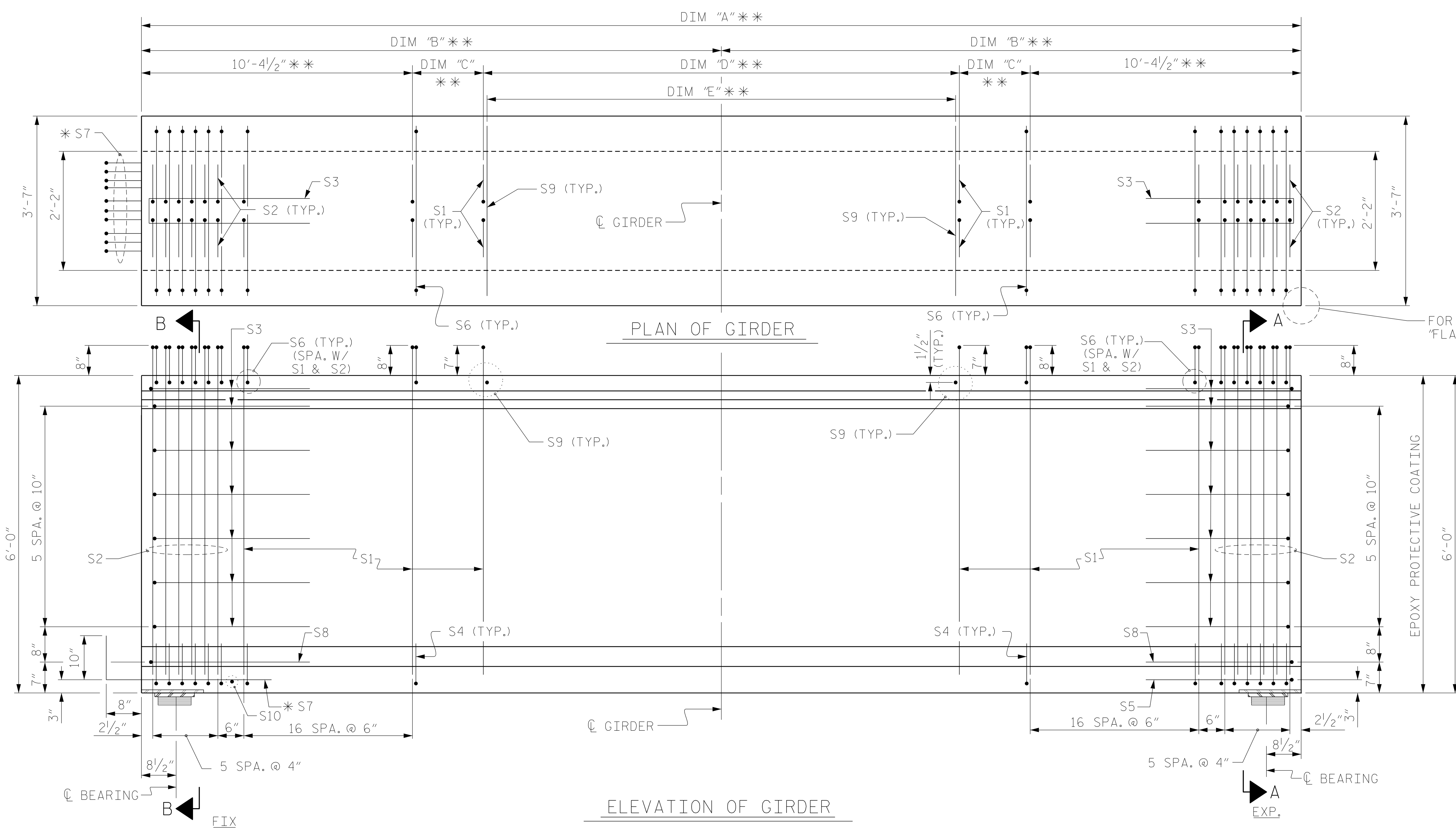
	BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
GDR. B1	S1	180	#4	1	7'-0"	842
GDR. B2, B3, B4, B5	S1	178	#4	1	7'-0"	832
	S2	24	#5	1	7'-0"	175
	S3	14	#4	2	8'-5"	79
	S4	92	#4	3	3'-0"	184
	S5	1	#5	2	9'-10"	10
	S6	92	#5	4	4'-6"	432
	* S7	10	#5	STR	3'-8"	38
	S8	2	#5	2	9'-0"	19
GDR. B1	S9	111	#5	STR	3'-3"	376
GDR. B2, B3, B4, B5	S9	109	#5	STR	3'-3"	369
	S10	1	#3	STR	1'-10"	1
GDR. B1 & B5	S11	8	#5	5	11'-6"	96
GDR. B2, B3, B4	S11	16	#5	5	11'-6"	192
GDR. B1 & B5	S12	16	#4	STR	8'-0"	86
GDR. B2, B3, B4	S13	16	#4	STR	13'-3"	142

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

BAR TYPES



ALL BAR DIMENSIONS ARE OUT-TO-OUT



** SLOPED DIMENSION

QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER B1	2338	22.5	32
GIRDER B2	2473	22.4	32
GIRDER B3	2473	22.3	32
GIRDER B4	2473	22.3	32
GIRDER B5	2321	22.2	32

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
5	SEE TABLE	521'-5⅜"

GIRDER DIMENSION TABLE

GDR. #	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
B1	104'-11 7/16"	52'-5¾"	10¼"	56-#4 S1 @ 1'-6" CTS.	111-#5 S9 @ 9" CTS.
B2	104'-7 5/16"	52'-3⅝"	1'-5 3/16"	55-#4 S1 @ 1'-6" CTS.	109-#5 S9 @ 9" CTS.
B3	104'-3 5/16"	52'-1 11/16"	1'-3 3/16"	55-#4 S1 @ 1'-6" CTS.	109-#5 S9 @ 9" CTS.
B4	103'-11½"	51'-11¾"	1'-1¼"	55-#4 S1 @ 1'-6" CTS.	109-#5 S9 @ 9" CTS.
B5	103'-7 13/16"	51'-9⅞"	11 7/16"	55-#4 S1 @ 1'-6" CTS.	109-#5 S9 @ 9" CTS.

PROJECT NO. R-2707C
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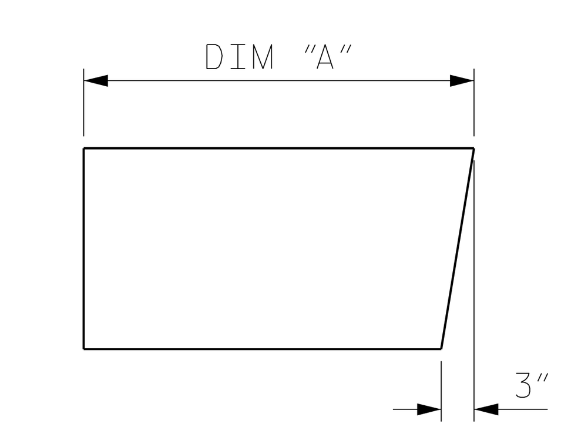
STATION: 29+07.16 -Y2-

SHEET 2 OF 4



GIRDER BEVEL

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STATE OF NORTH CAROLINA
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RALEIGH

SUPERSTRUCTURE

72" PRESTRESSED CONCRETE MODIFIED BULB TEE CONTINUOUS FOR LIVE LOAD

SPAN B

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

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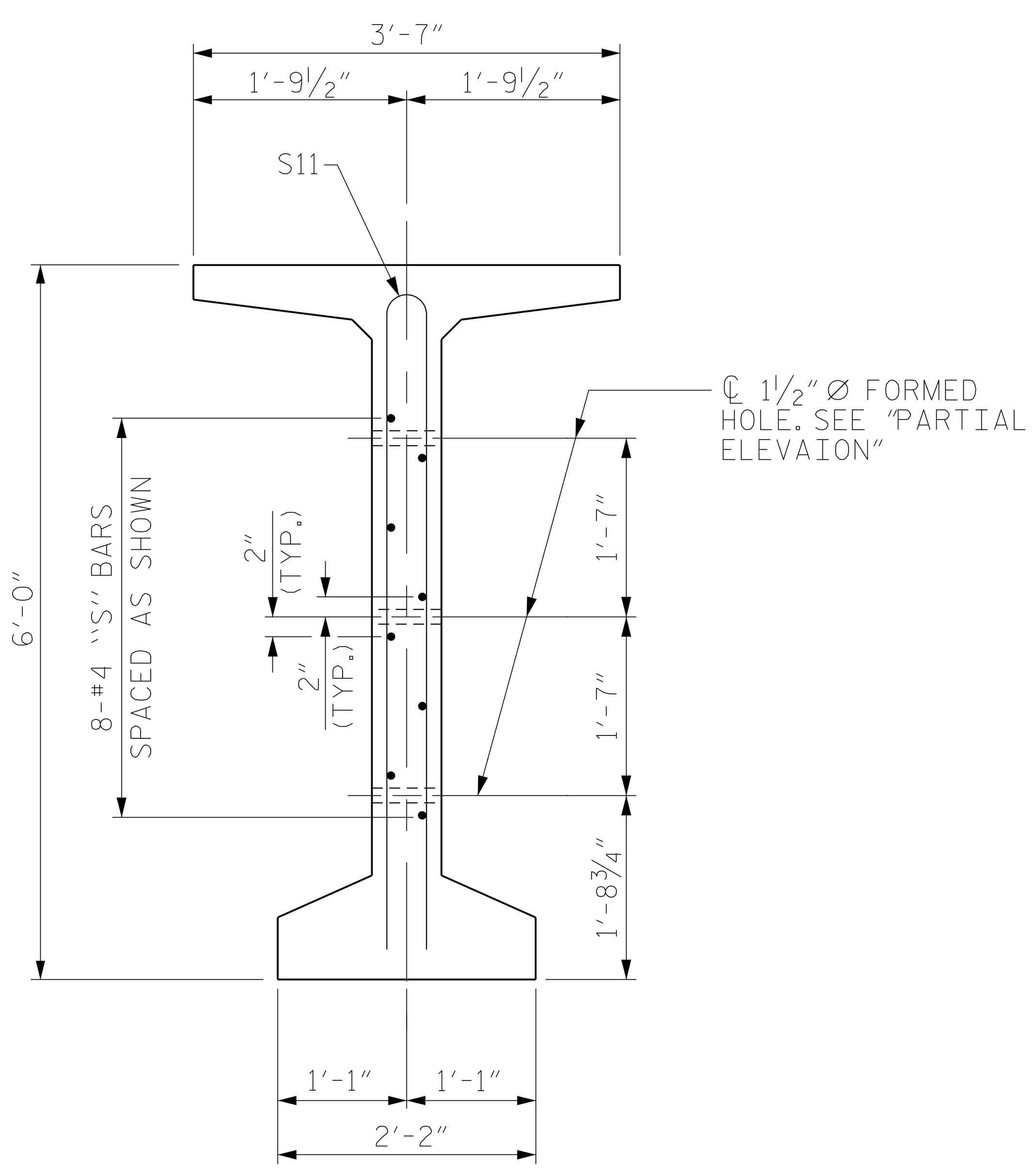
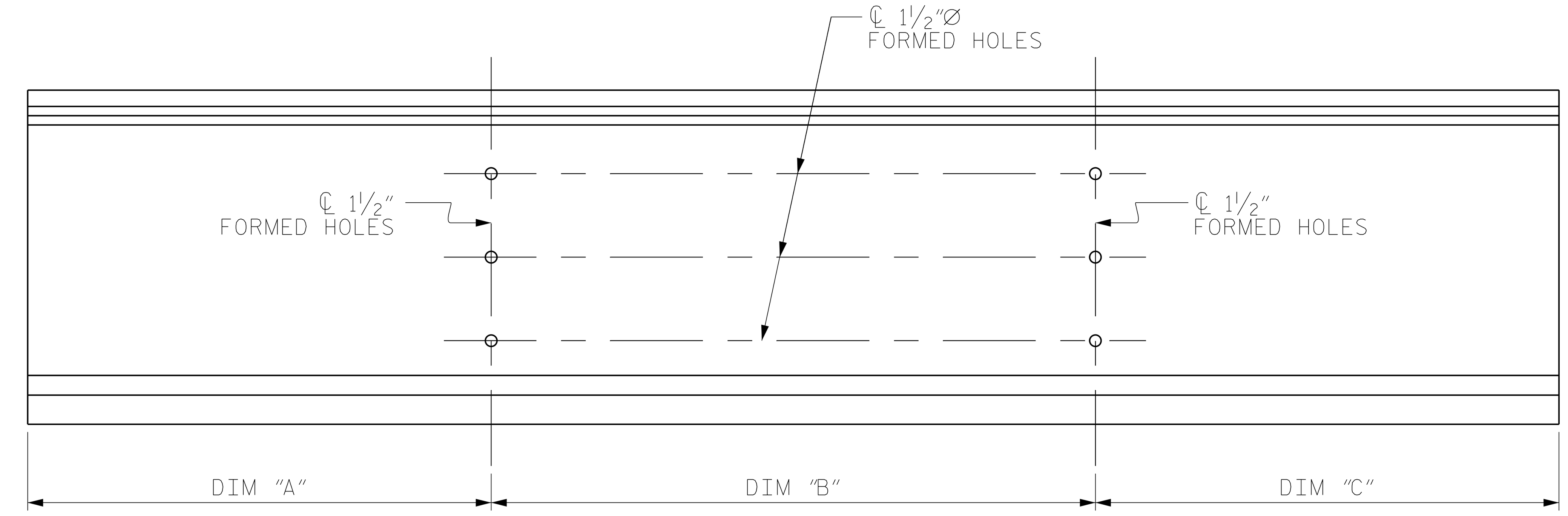
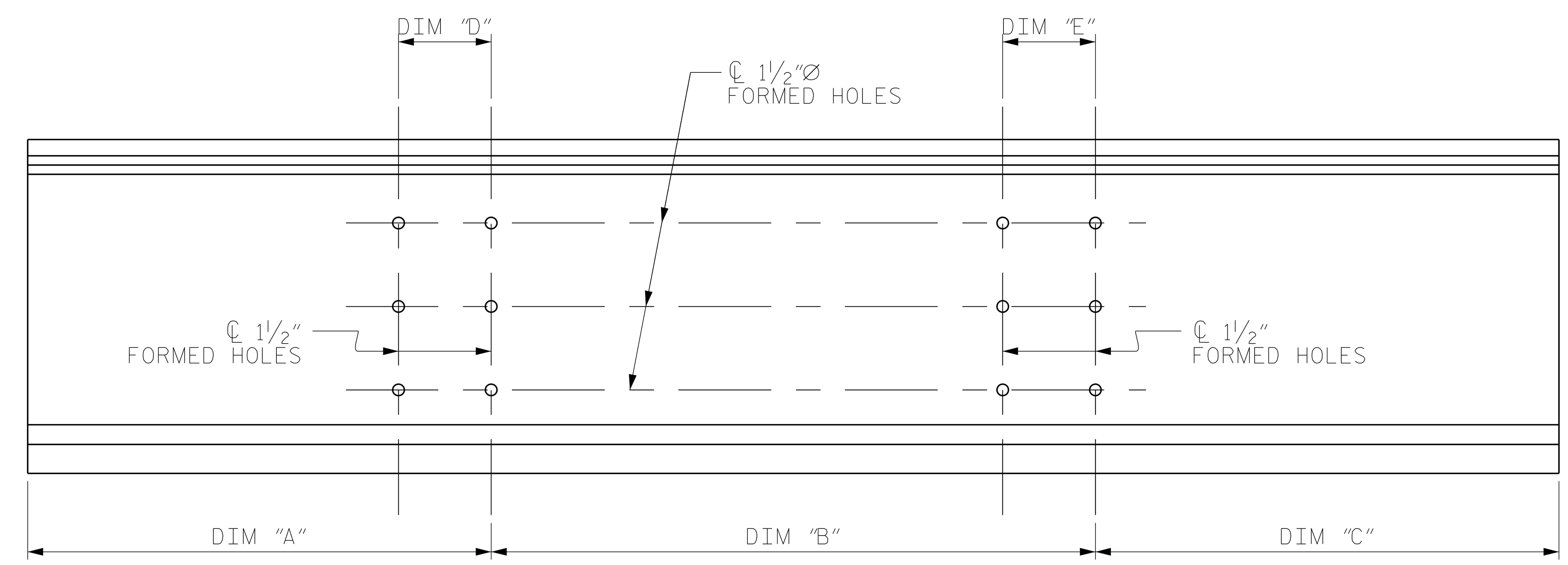


SECTION C-C

(S1, S6 AND S9 BARS NOT SHOWN)

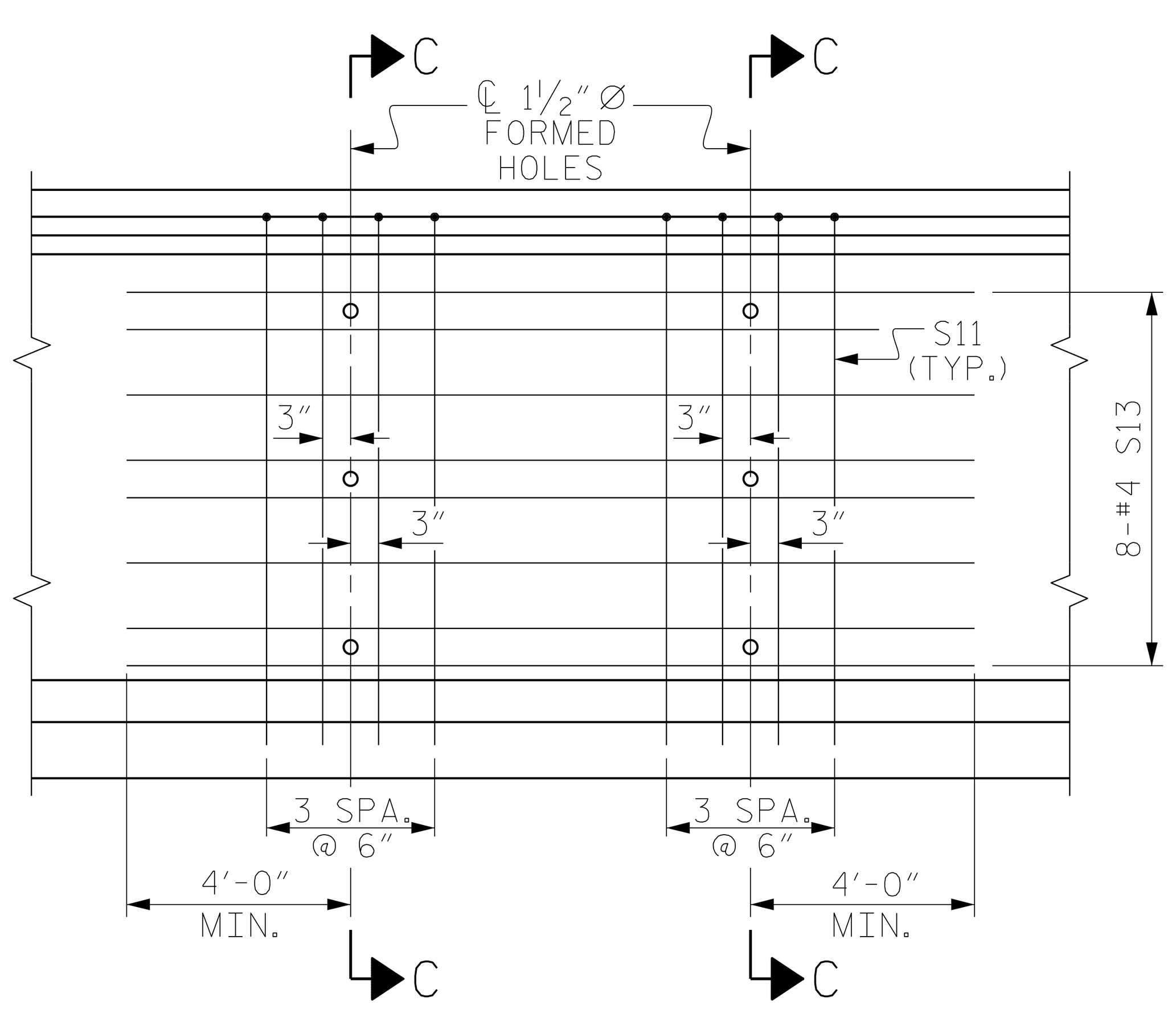


EXTERIOR GIRDERS - SPANS A & B

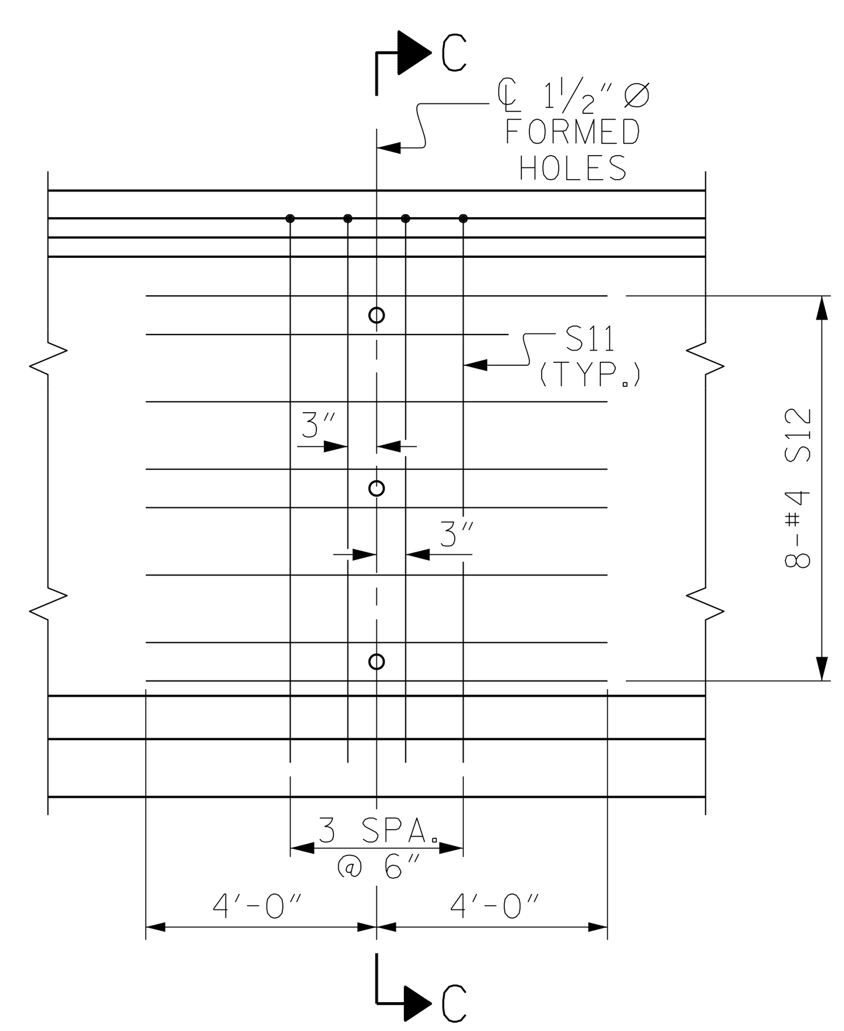


INTERIOR GIRDERS - SPANS A & B

BOLT HOLE PLACEMENT



INTERIOR GIRDER



EXTERIOR GIRDER

PARTIAL ELEVATION

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDERS

BOLT HOLE PLACEMENT DIMENSIONS

GDR. NO.	SPAN A					SPAN B				
	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
1	33'-2 1/2"	34'-4 11/16"	37'-2 1/16"	-	-	32'-7 15/16"	34'-5 1/8"	37'-10 3/8"	-	-
2	37'-0 13/16"	34'-4 11/16"	33'-1 3/8"	3'-10 13/16"	3'-11 5/8"	37'-8 1/4"	34'-5 1/8"	32'-5 15/16"	5'-1 5/16"	5'-2 11/16"
3	36'-11 13/16"	34'-3 7/8"	33'-0 7/8"	3'-10 5/16"	3'-11 1/16"	37'-6 9/16"	34'-3 3/4"	34'-5"	5'-0 9/16"	5'-1 7/8"
4	36'-10 13/16"	34'-3 1/8"	33'-0 3/8"	3'-9 13/16"	3'-10 9/16"	37'-4 15/16"	34'-2 1/2"	32'-4 1/16"	4'-11 7/8"	5'-1 1/8"
5	36'-9 7/8"	34'-2 7/16"	32'-11 7/8"	-	-	37'-3 3/8"	34'-1 1/4"	32'-3 1/4"	-	-

PROJECT NO. R-2707C
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SHEET 3 OF 4

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SUPERSTRUCTURE

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

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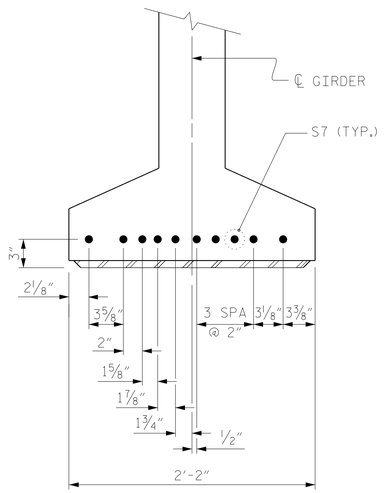
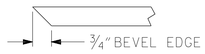
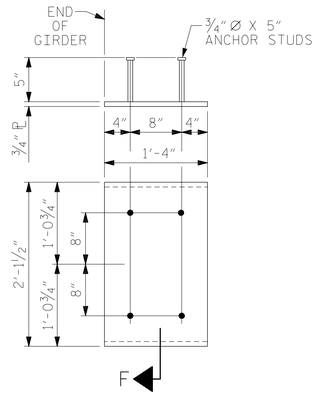


DETAIL "C"
(FOR 72" MODIFIED BULB TEES)



SECTION "F"
(SEE NOTES)



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

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

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

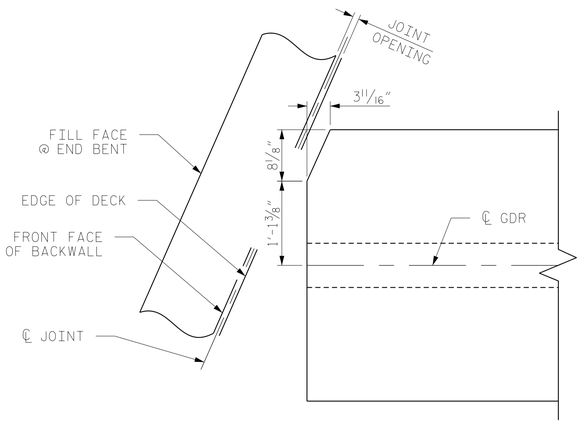
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5000 PSI.

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

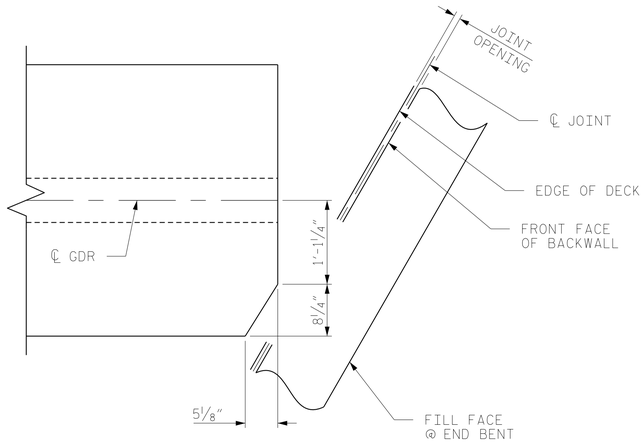
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

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

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



END BENT 1



END BENT 2

FLANGE CLIP DETAIL

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STATION: 29+07.16 -Y2-

SHEET 4 OF 4

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		REV. 2/15	MAA/TMG

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STANDARD

PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

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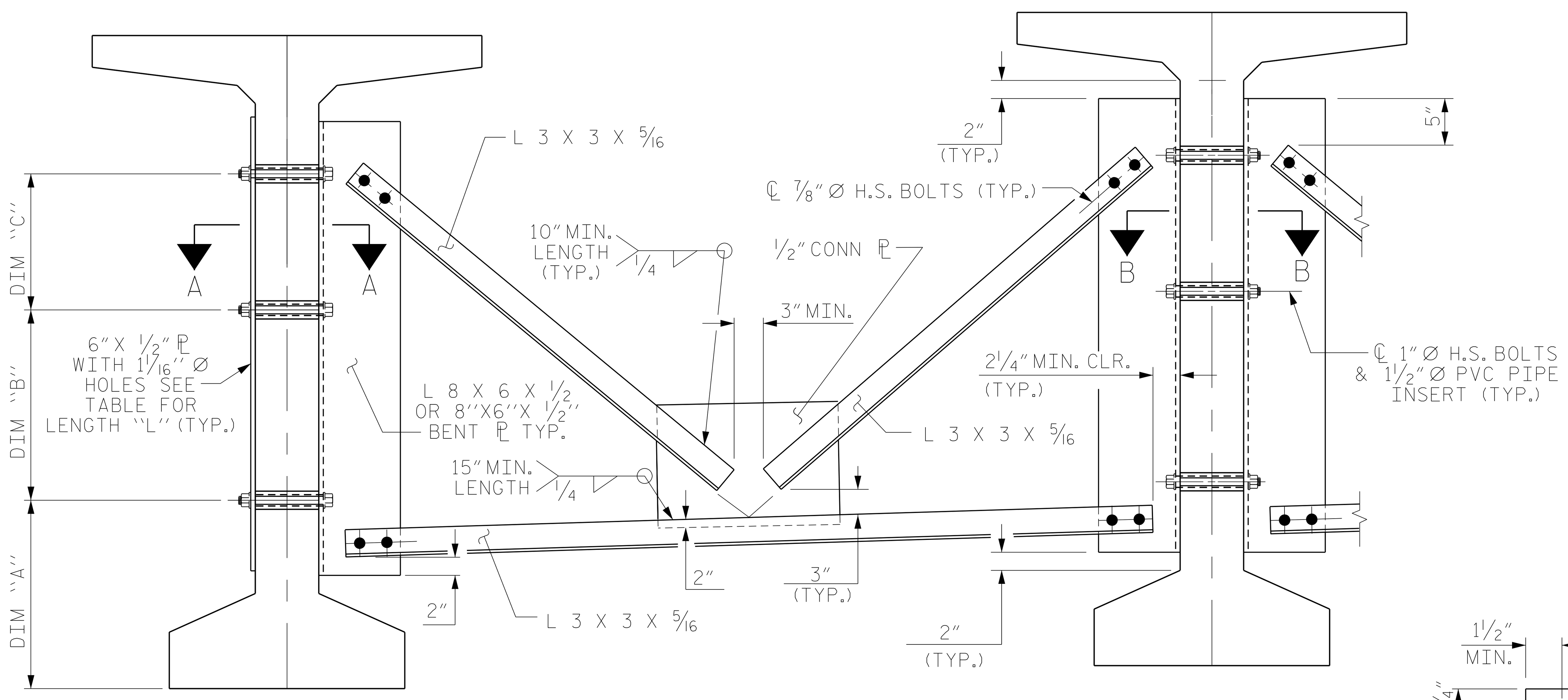
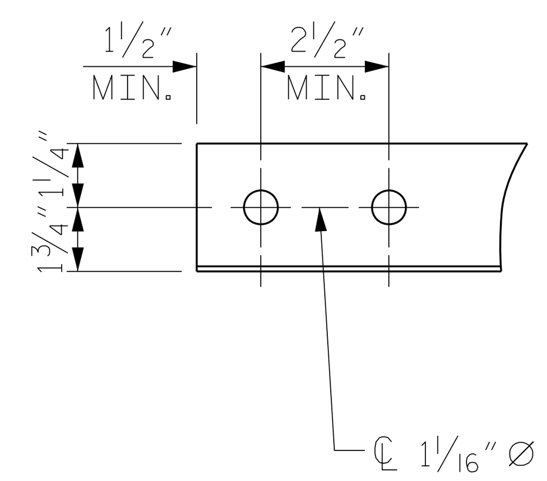


EXTERIOR GIRDER

INTERIOR GIRDER

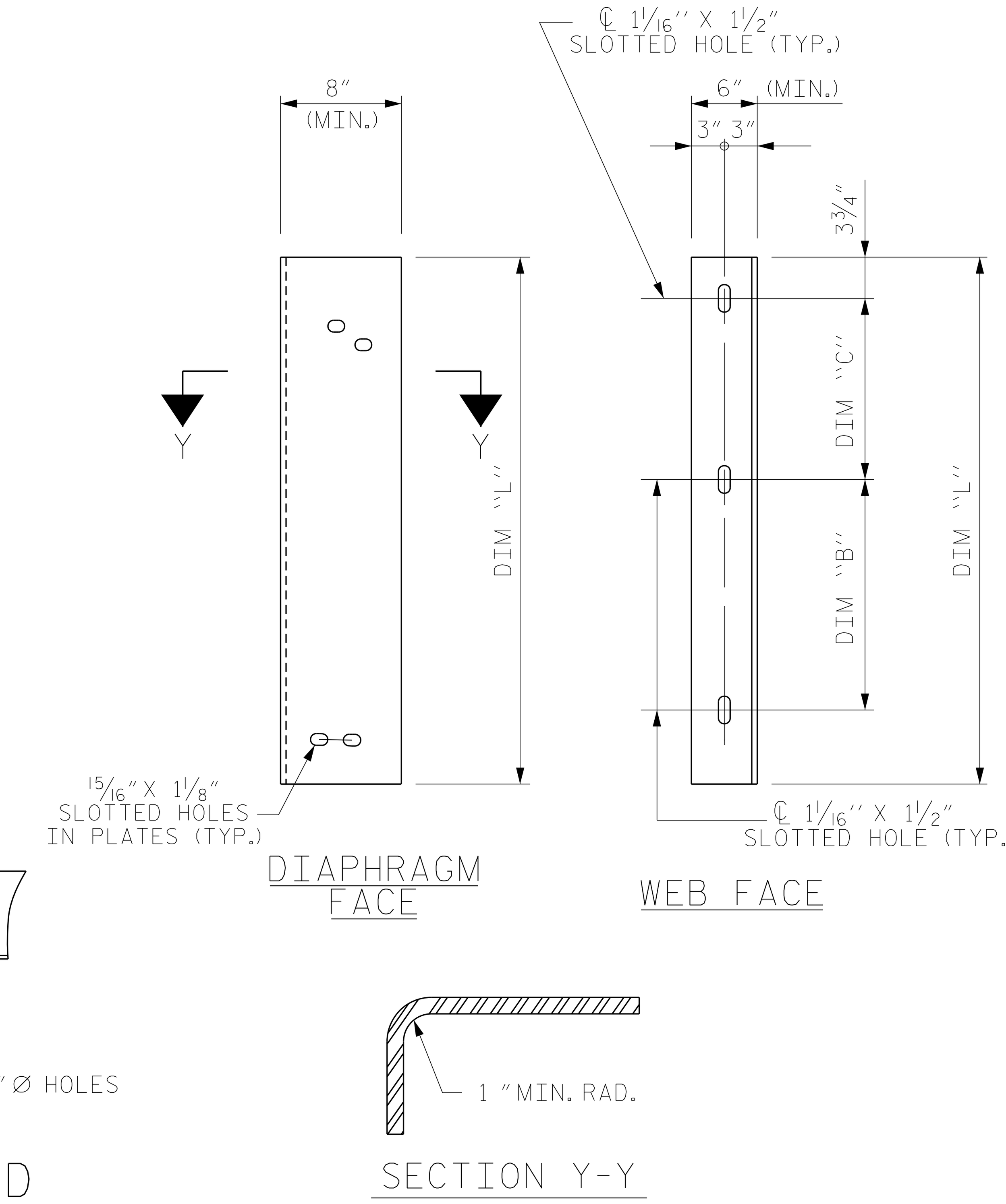
PART SECTION AT INTERMEDIATE DIAPHRAGM

(72" BULB TEE GIRDER)

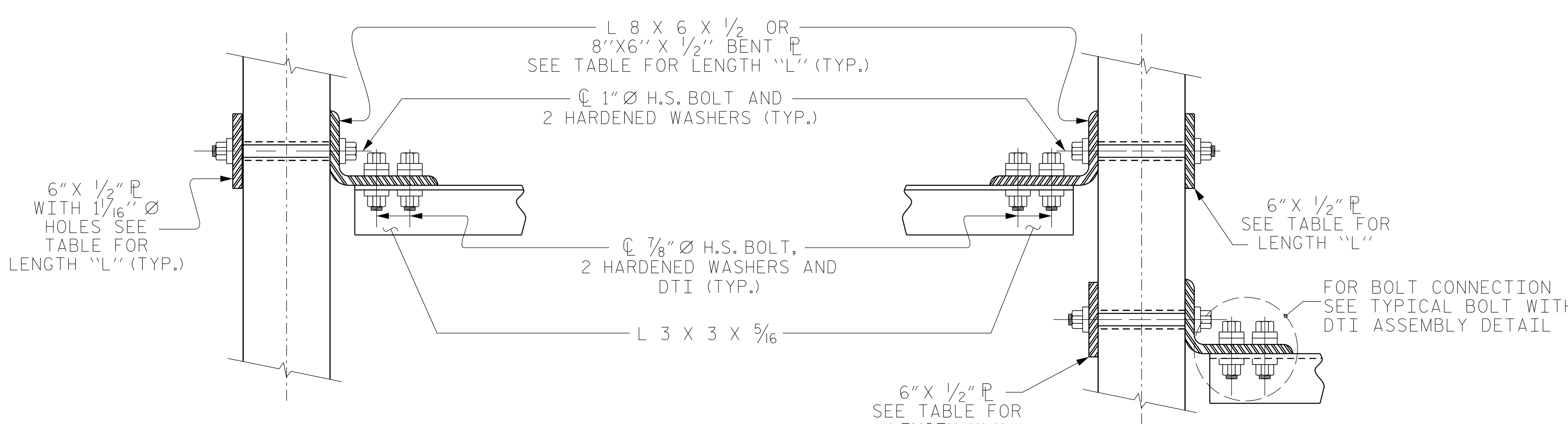


ANGLE END

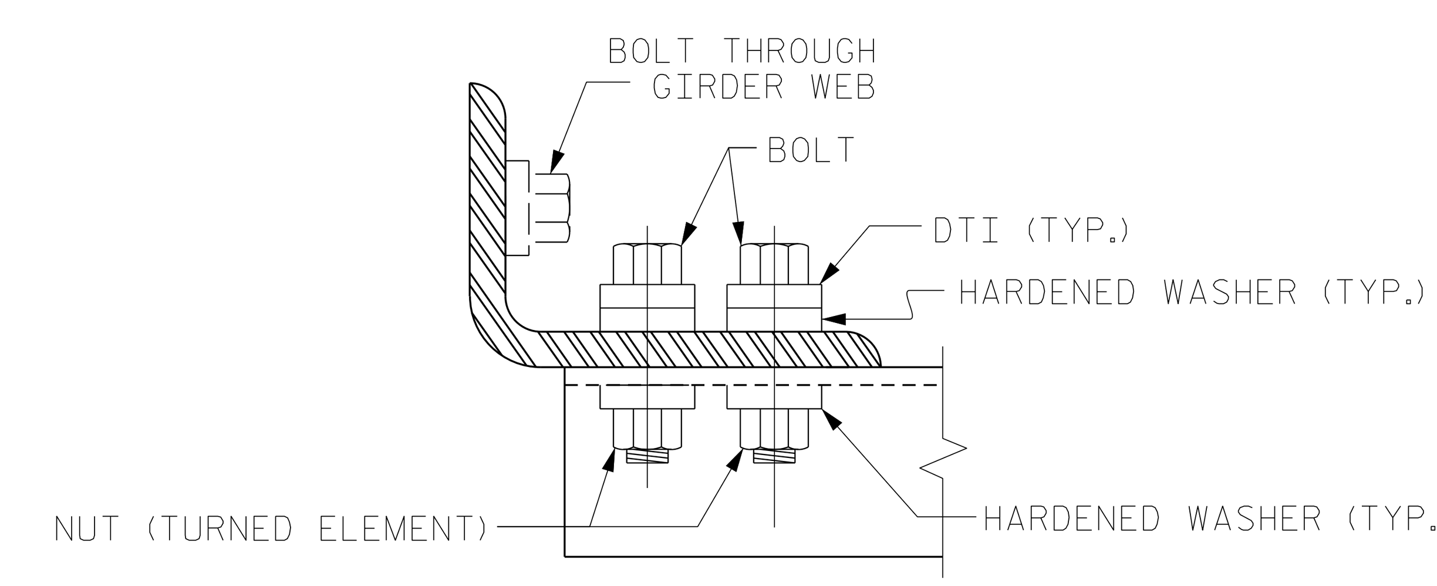
(L 3 X 3 X 5/16)



CONNECTOR PLATE DETAIL



CONNECTION DETAILS



BOLT WITH DTI ASSEMBLY DETAIL

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

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

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

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

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

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

TABLE

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

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CLEVELAND COUNTY

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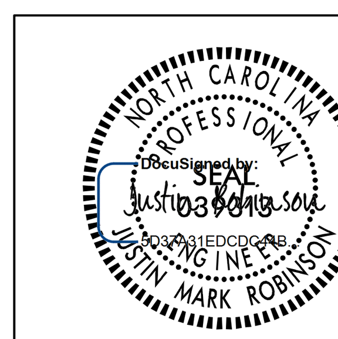

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DEPARTMENT OF TRANSPORTATION
RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-17
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2			4			36

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CHECKED BY : GM 11/09		REV. 10/1/11	MAA/GM

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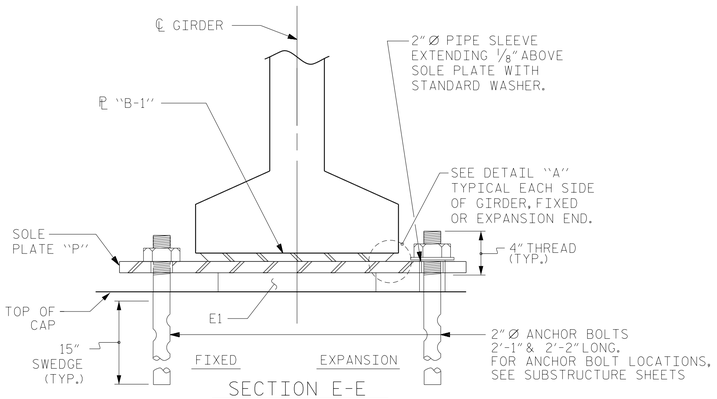
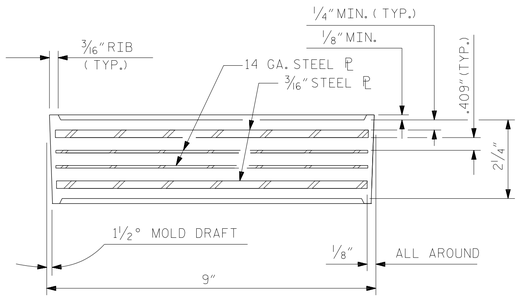
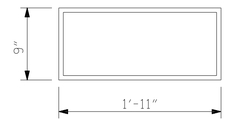


SECTION E-E



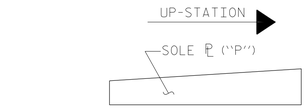
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E1 (20 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE V



SOLE ℄ PLACEMENT DETAIL

NOTES

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

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

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

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

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

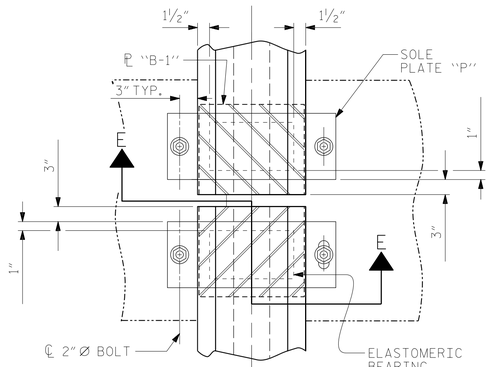
SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

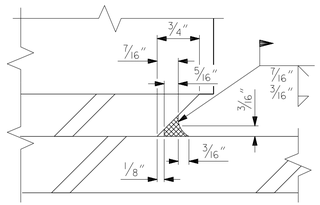
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

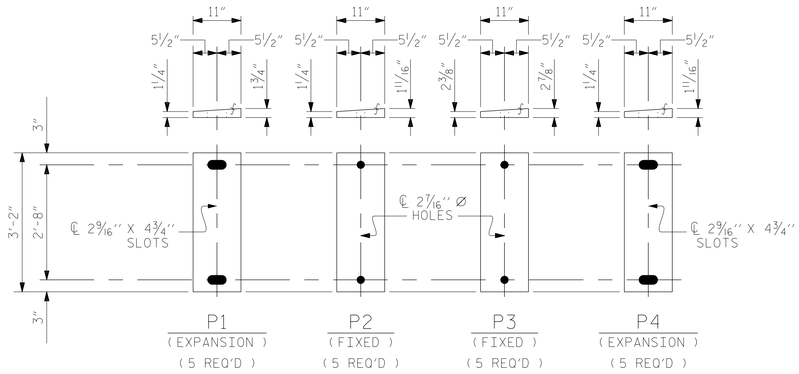


TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

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3/2/2017

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RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

PRESTRESSED CONCRETE GIRDER SUPERSTRUCTURE

REVISIONS						SHEET NO.
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DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION																						
	SPAN A																					
	GIRDER 1 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.031	0.062	0.091	0.117	0.140	0.160	0.176	0.187	0.195	0.197	0.195	0.187	0.176	0.160	0.140	0.117	0.091	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.012	0.025	0.036	0.046	0.056	0.063	0.070	0.074	0.077	0.078	0.077	0.074	0.070	0.063	0.056	0.046	0.036	0.025	0.012	0.000
FINAL CAMBER ↑	0	1/4"	7/16"	11/16"	7/8"	1"	1 3/16"	1 1/4"	1 3/8"	1 7/16"	1 7/16"	1 7/16"	1 3/8"	1 1/4"	1 3/16"	1"	7/8"	11/16"	7/16"	1/4"	0
	GIRDER 2 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.031	0.062	0.090	0.117	0.140	0.160	0.176	0.187	0.194	0.197	0.194	0.187	0.176	0.160	0.140	0.117	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.025	0.036	0.047	0.056	0.064	0.070	0.075	0.078	0.079	0.078	0.075	0.070	0.064	0.056	0.047	0.036	0.025	0.013	0.000
FINAL CAMBER ↑	0	3/16"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	3/16"	0
	GIRDER 3 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.031	0.062	0.090	0.117	0.140	0.160	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.160	0.140	0.117	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.012	0.025	0.036	0.046	0.056	0.064	0.070	0.074	0.077	0.078	0.077	0.074	0.070	0.064	0.056	0.046	0.036	0.025	0.012	0.000
FINAL CAMBER ↑	0	1/4"	7/16"	5/8"	7/8"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	7/8"	5/8"	7/16"	1/4"	0
	GIRDER 4 (INTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.031	0.062	0.090	0.116	0.140	0.159	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.159	0.140	0.116	0.090	0.062	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.012	0.024	0.036	0.046	0.055	0.063	0.069	0.074	0.077	0.078	0.077	0.074	0.069	0.063	0.055	0.046	0.036	0.024	0.012	0.000
FINAL CAMBER ↑	0	1/4"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	1/4"	0
	GIRDER 5 (EXTERIOR)																					
TWENTIETH POINTS	0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.000	0.031	0.061	0.090	0.116	0.140	0.159	0.175	0.186	0.193	0.196	0.193	0.186	0.175	0.159	0.140	0.116	0.090	0.061	0.031	0.000
✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.000	0.013	0.025	0.037	0.048	0.058	0.066	0.072	0.077	0.080	0.081	0.080	0.077	0.072	0.066	0.058	0.048	0.037	0.025	0.013	0.000
FINAL CAMBER ↑	0	3/16"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 5/16"	1 3/8"	1 3/8"	1 3/8"	1 5/16"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	3/16"	0

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

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

DRAWN BY : MKO DATE : 12/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MKO DATE : 12/2016

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NORTH CAROLINA PROFESSIONAL SEAL 038248 ENGINEER JUSTIN MARK ROBINSON
DocuSigned by: Justin Robinson
3/2/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION SPAN A

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

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION

SPAN B

GIRDER 1 (EXTERIOR)

TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.031	0.062	0.091	0.117	0.141	0.160	0.176	0.188	0.195	0.197	0.195	0.188	0.176	0.160	0.141	0.117	0.091	0.062	0.031	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.013	0.025	0.036	0.047	0.056	0.064	0.070	0.075	0.078	0.079	0.078	0.075	0.070	0.064	0.056	0.047	0.036	0.025	0.013	0.000
FINAL CAMBER	↑	0	3/16"	7/16"	11/16"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	11/16"	7/16"	3/16"	0

GIRDER 2 (INTERIOR)

TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.031	0.062	0.090	0.117	0.140	0.160	0.176	0.187	0.194	0.197	0.194	0.187	0.176	0.160	0.140	0.117	0.090	0.062	0.031	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.013	0.025	0.036	0.047	0.056	0.064	0.071	0.075	0.078	0.079	0.078	0.075	0.071	0.064	0.056	0.047	0.036	0.025	0.013	0.000
FINAL CAMBER	↑	0	3/16"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	3/16"	0

GIRDER 3 (INTERIOR)

TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.031	0.062	0.090	0.116	0.140	0.159	0.175	0.187	0.194	0.196	0.194	0.187	0.175	0.159	0.140	0.116	0.090	0.062	0.031	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.012	0.024	0.036	0.046	0.056	0.063	0.070	0.074	0.077	0.078	0.077	0.074	0.070	0.063	0.056	0.046	0.036	0.024	0.012	0.000
FINAL CAMBER	↑	0	1/4"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	1/4"	0

GIRDER 4 (INTERIOR)

TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.031	0.061	0.090	0.116	0.139	0.159	0.175	0.186	0.193	0.196	0.193	0.186	0.175	0.159	0.139	0.116	0.090	0.061	0.031	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.012	0.024	0.035	0.046	0.055	0.063	0.069	0.073	0.076	0.077	0.076	0.073	0.069	0.063	0.055	0.046	0.035	0.024	0.012	0.000
FINAL CAMBER	↑	0	1/4"	7/16"	11/16"	13/16"	1"	1 1/8"	1 1/4"	1 3/8"	1 3/8"	1 7/16"	1 3/8"	1 3/8"	1 1/4"	1 1/8"	1"	13/16"	11/16"	7/16"	1/4"	0

GIRDER 5 (EXTERIOR)

TWENTIETH POINTS		0	.05	.10	.15	.20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.031	0.061	0.090	0.116	0.139	0.159	0.174	0.186	0.193	0.195	0.193	0.186	0.174	0.159	0.139	0.116	0.090	0.061	0.031	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.013	0.025	0.037	0.047	0.057	0.065	0.071	0.076	0.079	0.080	0.079	0.076	0.071	0.065	0.057	0.047	0.037	0.025	0.013	0.000
FINAL CAMBER	↑	0	3/16"	7/16"	5/8"	13/16"	1"	1 1/8"	1 1/4"	1 5/16"	1 3/8"	1 3/8"	1 3/8"	1 5/16"	1 1/4"	1 1/8"	1"	13/16"	5/8"	7/16"	3/16"	0

* INCLUDES SLAB, BUILDUPS, STAY-IN-PLACE FORMS, BARRIERS AND FUTURE WEARING SURFACE
ALL VALUES ARE SHOWN IN FEET (DECIMAL FORM), EXCEPT "FINAL CAMBER", WHICH IS GIVEN IN INCHES (FRACTION FORM).

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL — JUSTIN MARK ROBINSON
3/2/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

DEAD LOAD DEFLECTION
SPAN B

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1			3		
2			4		

SHEET NO. S3-20
TOTAL SHEETS 36

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PLAN OF BARRIER RAIL

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 2

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033703 JUSTIN MARK ROBINSON
3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
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SUPERSTRUCTURE

VERTICAL CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-21
1			3			TOTAL SHEETS
2			4			36

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DESIGN ENGINEER OF RECORD : MKO DATE : 12/2016

2/28/2017
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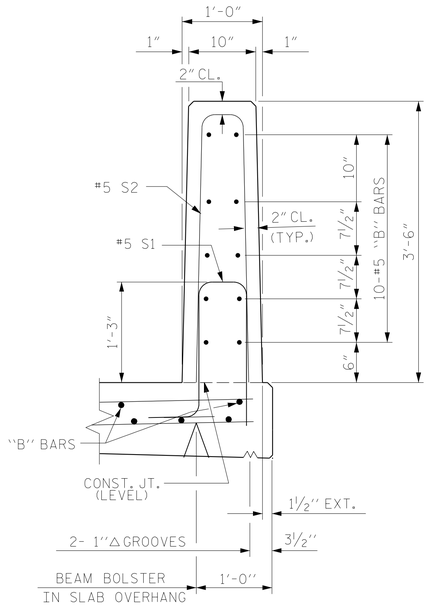
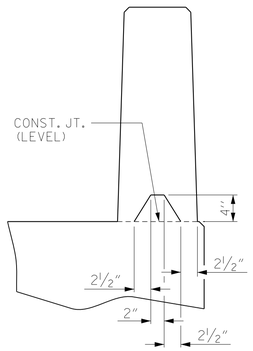
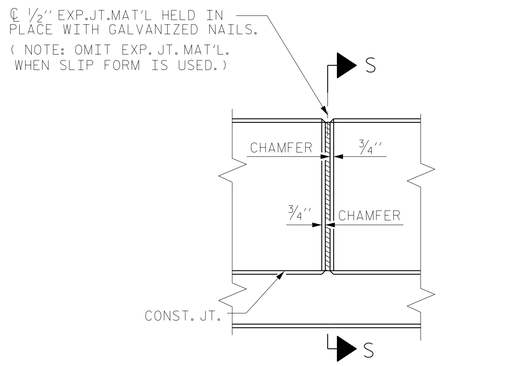


SECTION THRU RAIL



SECTION S-S

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



ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

NOTES

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

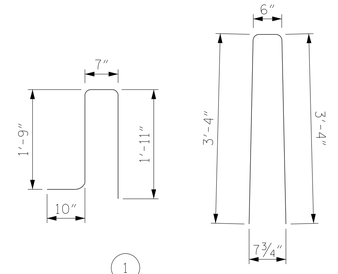
WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF VERTICAL CONCRETE BARRIER RAIL.

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S3 & S4 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3 & S4 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

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

BAR TYPES



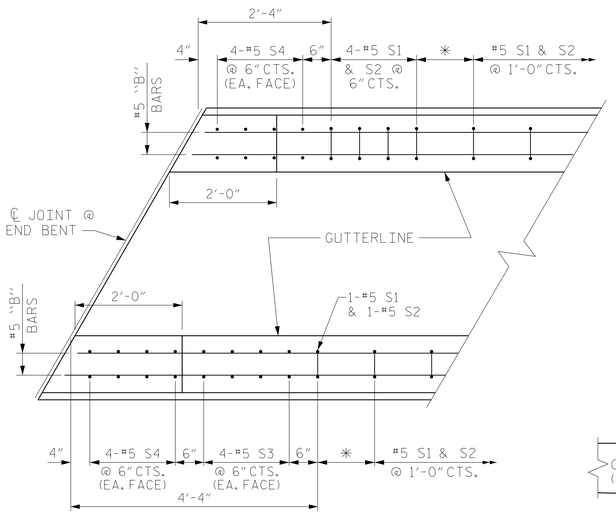
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR VERTICAL CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	120	#5	STR	29'-7"	3703
* B2	10	#5	STR	15'-5"	161
* B3	10	#5	STR	15'-11"	166
* B4	10	#5	STR	14'-8"	153
* B5	10	#5	STR	14'-5"	150
* S1	415	#5	1	5'-1"	2200
* S2	415	#5	2	7'-2"	3102
* S3	16	#5	STR	4'-0"	67
* S4	32	#5	STR	3'-6"	117

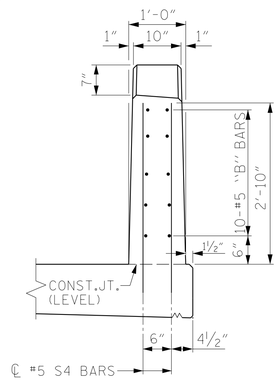
* EPOXY COATED REINFORCING STEEL	9819 LBS.
CLASS AA CONCRETE	50.2 CU. YDS.
VERTICAL CONCRETE BARRIER RAIL	422.9 LIN. FT.



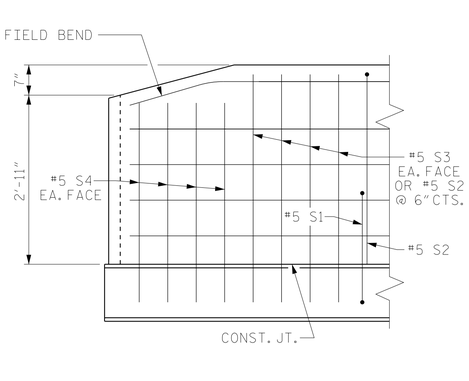
PLAN

PLAN SHOWN TANGENT FOR CLARITY
DIMENSIONS SHOWN ARE ALONG ARC LENGTH

* FOR REINFORCEMENT SPACING, SEE "PLAN OF BARRIER RAIL" SHEET 1 OF 2.



END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

ASSEMBLED BY :	MKO	DATE :	11/2016
CHECKED BY :	JMR	DATE :	12/2016
DRAWN BY : MAA 5/10	REV. 10/1/11		MAA/GM
CHECKED BY : GM 5/10	REV. 12/5/11		MAA/GM
	REV. 6/13		MAA/GM

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NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JOHN MARK ROBINSON
Digitally signed by
3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
STANDARD

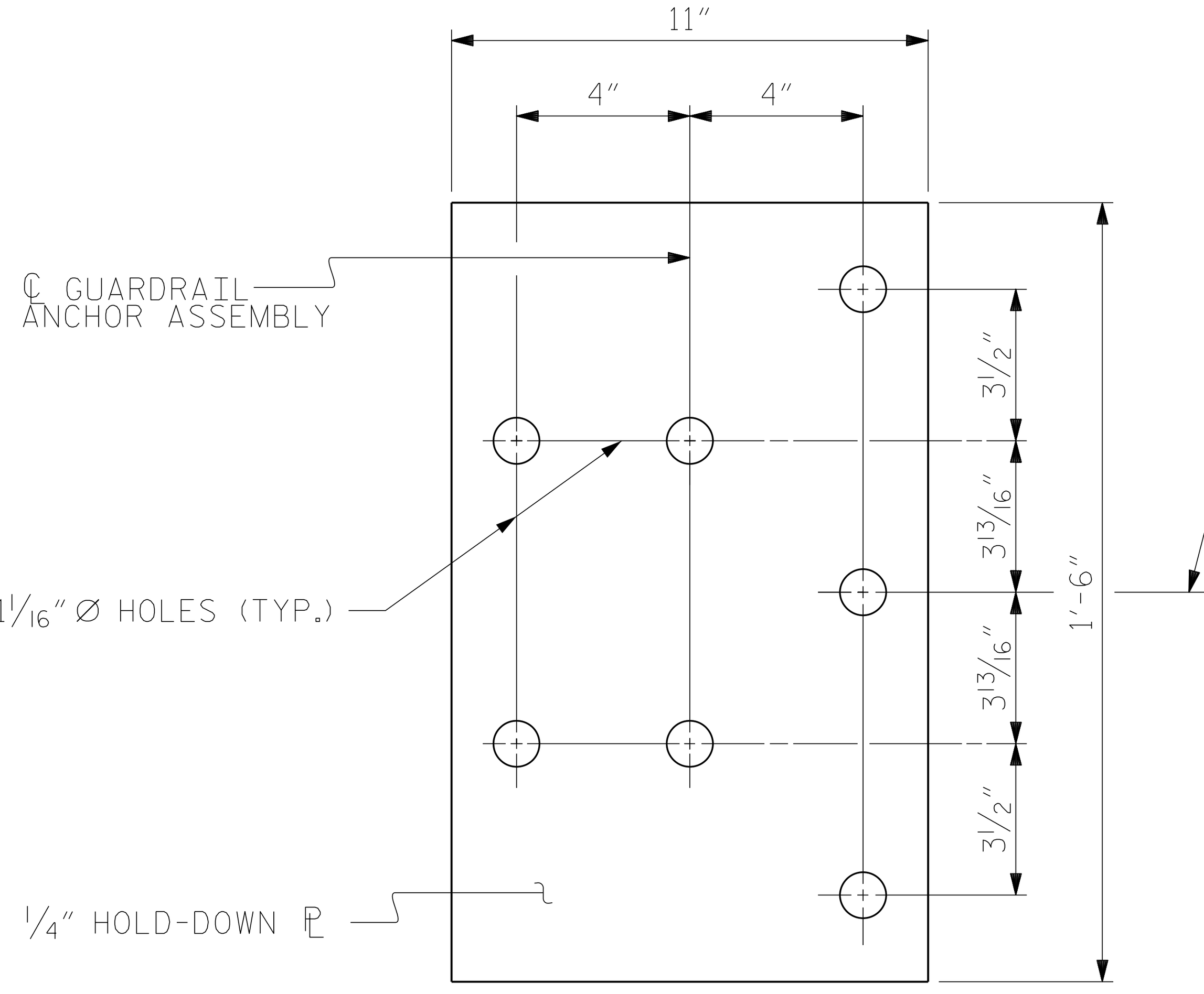
VERTICAL CONCRETE BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-22
1			3			TOTAL SHEETS
2			4			36

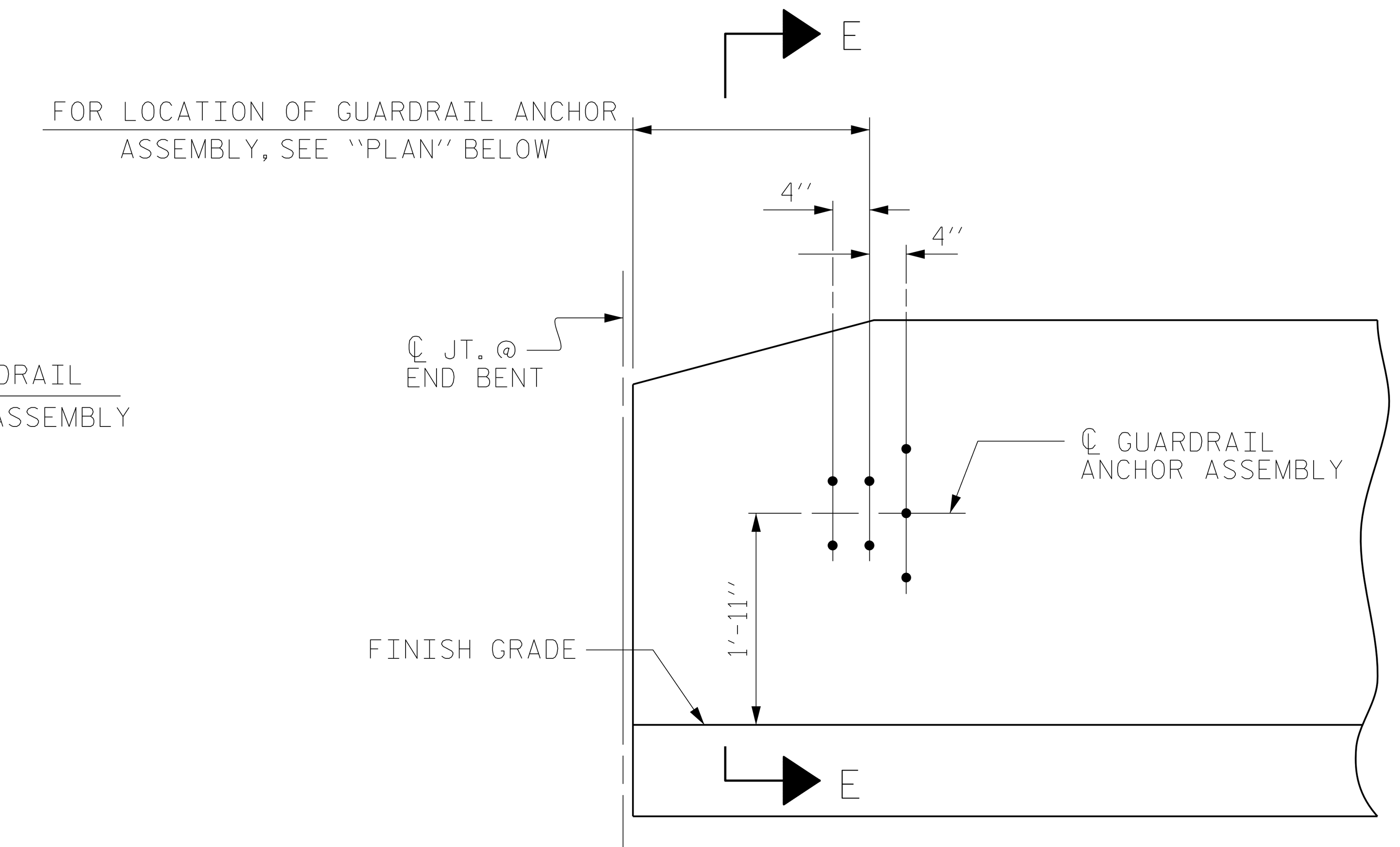
PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 2 OF 2

STD. NO. CBR2



PLAN



ELEVATION

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.)

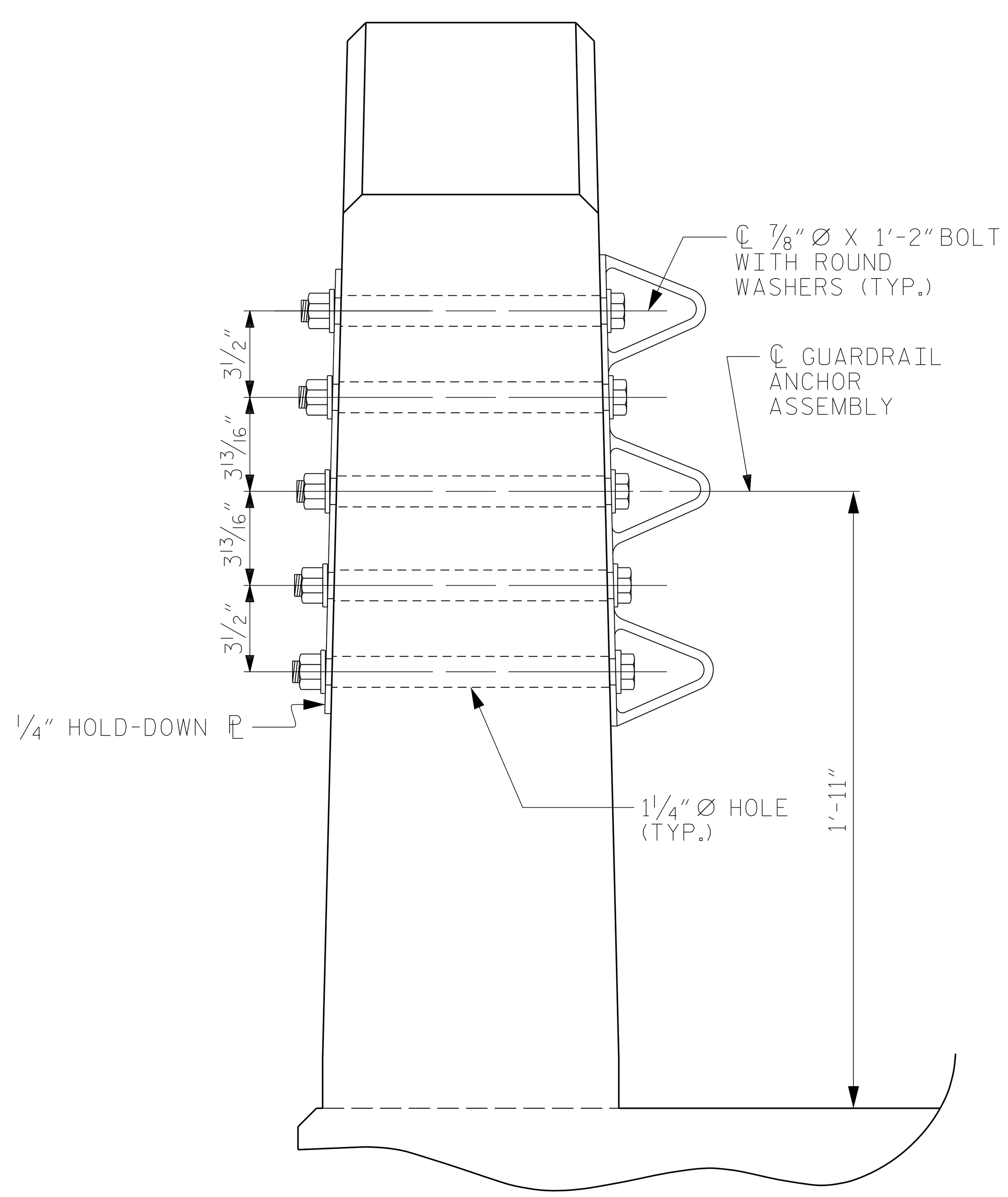
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

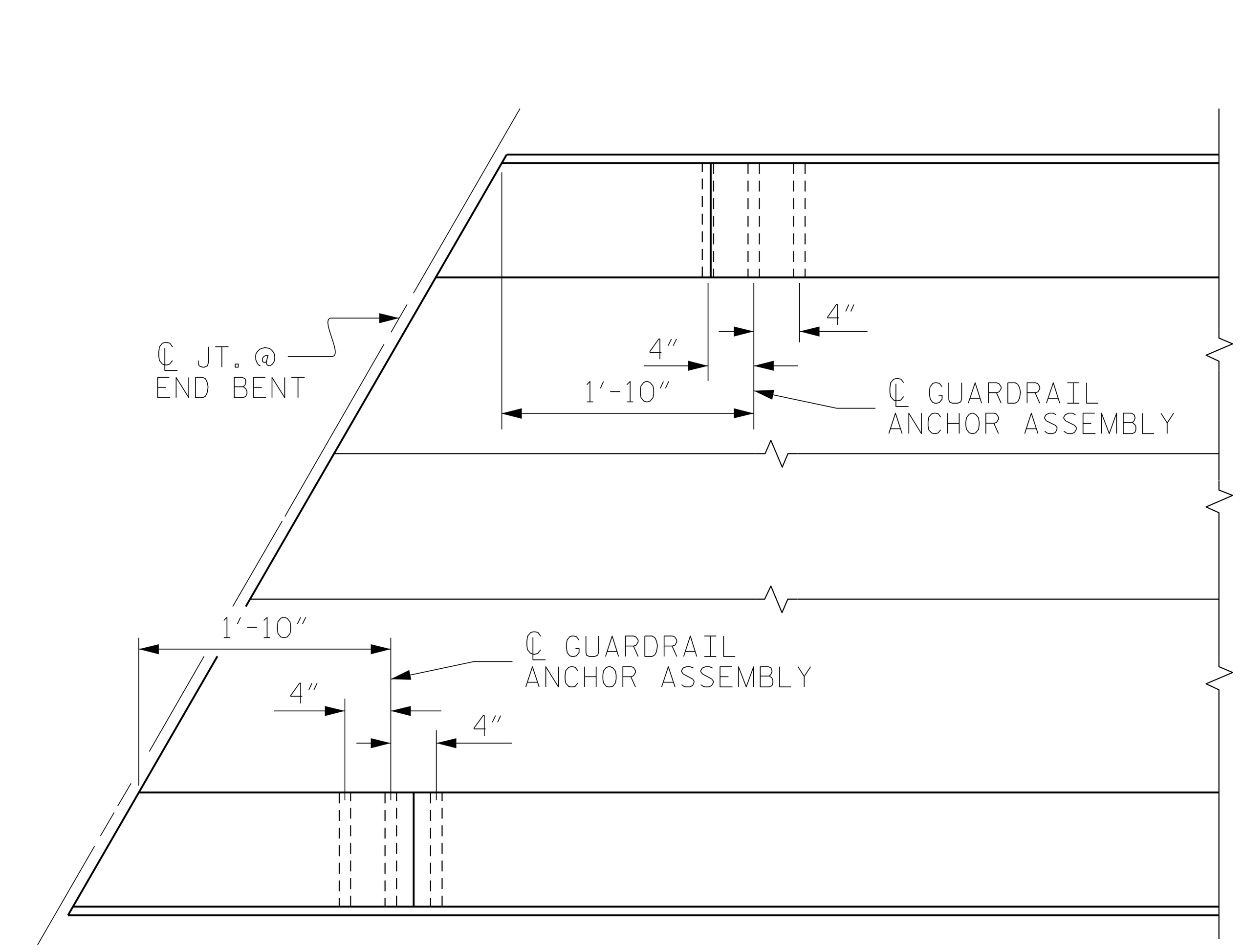
THE VERTICAL REINFORCING BARS MAY BE SHIFTED SLIGHTLY IN THE VERTICAL CONCRETE BARRIER RAIL TO CLEAR ASSEMBLY BOLTS.

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.



SECTION E-E

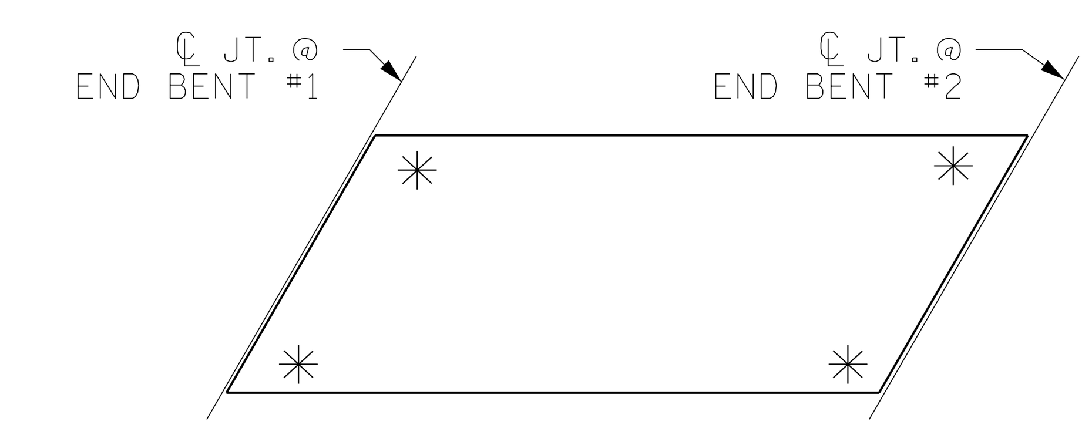
GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

END BENT 1 SHOWN, END BENT 2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENT

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SEAL 039873 — JUSTIN MARK ROBINSON, PROFESSIONAL ENGINEER, NORTH CAROLINA — 3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
GUARDRAIL ANCHORAGE DETAILS FOR VERTICAL CONCRETE BARRIER RAIL

ASSEMBLED BY :	MKO	DATE : 12/2016
CHECKED BY :	JMR	DATE : 12/2016

DRAWN BY : MAA 5/10	REV. 12/5/11	MAA/GM
CHECKED BY : GM 5/10	REV. 6/13	MAA/GM
	REV. 1/15	MAA/TMG

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

STD. NO. GRA3

2/28/2017
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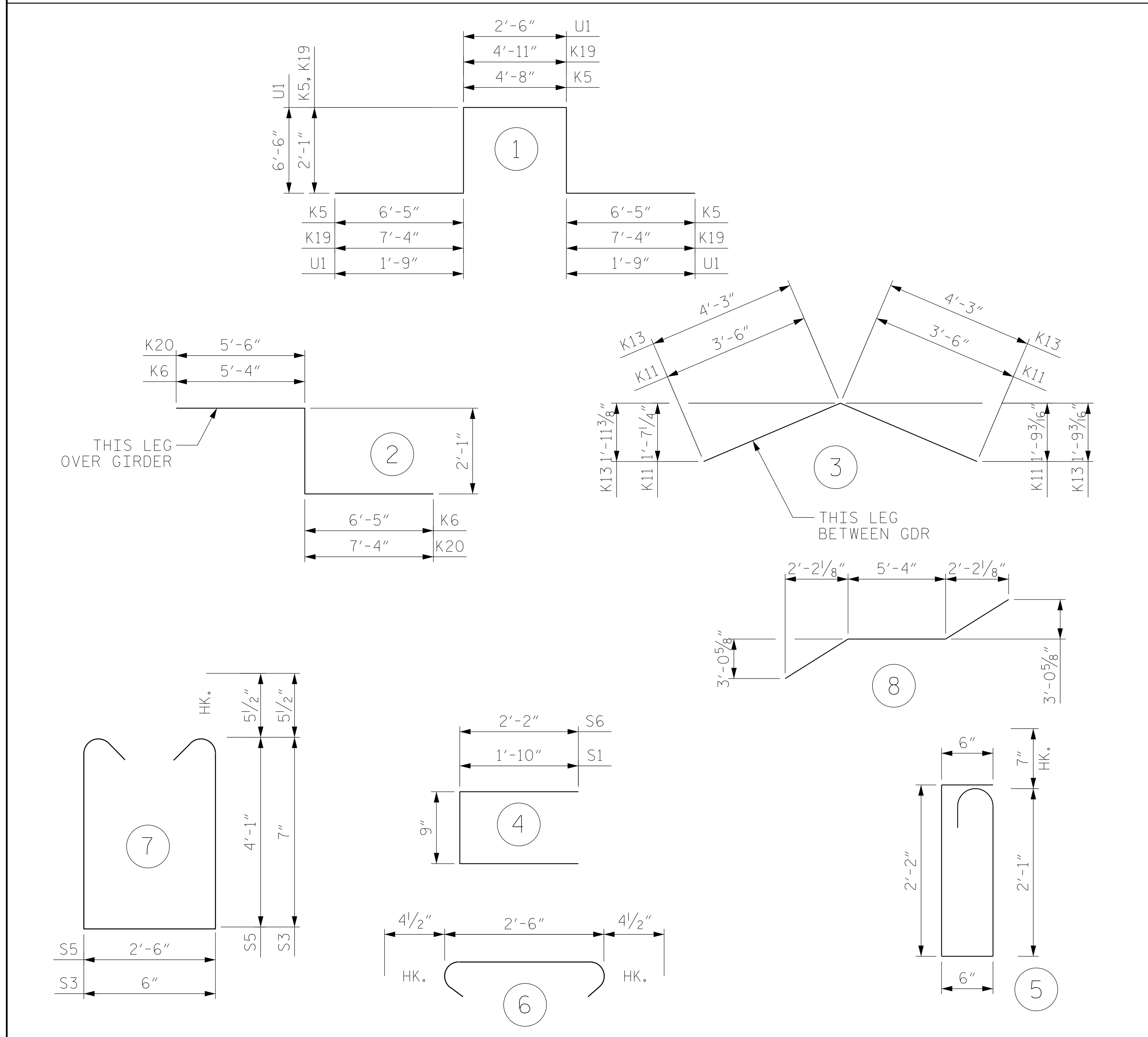
oconnorm

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A101	301	#5	STR	41'-11"	13159
*A102	1	#5	STR	2'-6"	3
*A103	1	#5	STR	3'-9"	4
*A104	1	#5	STR	5'-0"	5
*A105	1	#5	STR	6'-4"	7
*A106	1	#5	STR	7'-7"	8
*A107	1	#5	STR	8'-10"	9
*A108	1	#5	STR	10'-2"	11
*A109	1	#5	STR	11'-5"	12
*A110	1	#5	STR	12'-8"	13
*A111	1	#5	STR	13'-11"	15
*A112	1	#5	STR	15'-3"	16
*A113	1	#5	STR	16'-6"	17
*A114	1	#5	STR	17'-9"	19
*A115	1	#5	STR	19'-1"	20
*A116	1	#5	STR	20'-4"	21
*A117	1	#5	STR	21'-7"	23
*A118	1	#5	STR	22'-10"	24
*A119	1	#5	STR	24'-2"	25
*A120	1	#5	STR	25'-5"	27
*A121	1	#5	STR	26'-8"	28
*A122	1	#5	STR	27'-11"	29
*A123	1	#5	STR	29'-3"	31
*A124	1	#5	STR	30'-6"	32
*A125	1	#5	STR	31'-9"	33
*A126	1	#5	STR	33'-0"	34
*A127	1	#5	STR	34'-3"	36
*A128	1	#5	STR	35'-7"	37
*A129	1	#5	STR	36'-10"	38
*A130	1	#5	STR	38'-1"	40
*A131	1	#5	STR	39'-4"	41
*A132	1	#5	STR	40'-7"	42
*A133	1	#5	STR	41'-11"	44
*A134	1	#5	STR	41'-11"	44
*A135	1	#5	STR	40'-9"	43
*A136	1	#5	STR	39'-7"	41
*A137	1	#5	STR	38'-6"	40
*A138	1	#5	STR	37'-4"	39
*A139	1	#5	STR	36'-2"	38
*A140	1	#5	STR	35'-1"	37
*A141	1	#5	STR	33'-11"	35
*A142	1	#5	STR	32'-9"	34
*A143	1	#5	STR	31'-8"	33
*A144	1	#5	STR	30'-6"	32
*A145	1	#5	STR	29'-4"	31
*A146	1	#5	STR	28'-3"	29
*A147	1	#5	STR	27'-1"	28
*A148	1	#5	STR	25'-11"	27
*A149	1	#5	STR	24'-10"	26

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A150	1	#5	STR	23'-8"	25
*A151	1	#5	STR	22'-7"	24
*A152	1	#5	STR	21'-5"	22
*A153	1	#5	STR	20'-3"	21
*A154	1	#5	STR	19'-2"	20
*A155	1	#5	STR	18'-0"	19
*A156	1	#5	STR	16'-11"	18
*A157	1	#5	STR	15'-9"	16
*A158	1	#5	STR	14'-7"	15
*A159	1	#5	STR	13'-6"	14
*A160	1	#5	STR	12'-4"	13
*A161	1	#5	STR	11'-3"	12
*A162	1	#5	STR	10'-1"	11
*A163	1	#5	STR	9'-0"	9
*A164	1	#5	STR	7'-10"	8
*A165	1	#5	STR	6'-9"	7
*A166	1	#5	STR	5'-7"	6
*A167	1	#5	STR	4'-6"	5
*A168	1	#5	STR	3'-4"	3
*A169	1	#5	STR	2'-3"	2
*A170	3	#6	STR	5'-0"	23
*A171	3	#6	STR	7'-3"	33
A201	301	#5	STR	41'-11"	13159
A202	1	#5	STR	2'-6"	3
A203	1	#5	STR	3'-9"	4
A204	1	#5	STR	5'-0"	5
A205	1	#5	STR	6'-4"	7
A206	1	#5	STR	7'-7"	8
A207	1	#5	STR	8'-10"	9
A208	1	#5	STR	10'-2"	11
A209	1	#5	STR	11'-5"	12
A210	1	#5	STR	12'-8"	13
A211	1	#5	STR	13'-11"	15
A212	1	#5	STR	15'-3"	16
A213	1	#5	STR	16'-6"	17
A214	1	#5	STR	17'-9"	19
A215	1	#5	STR	19'-1"	20
A216	1	#5	STR	20'-4"	21
A217	1	#5	STR	21'-7"	23
A218	1	#5	STR	22'-10"	24
A219	1	#5	STR	24'-2"	25
A220	1	#5	STR	25'-5"	27
A221	1	#5	STR	26'-8"	28
A222	1	#5	STR	27'-11"	29
A223	1	#5	STR	29'-3"	31
A224	1	#5	STR	30'-6"	32
A225	1	#5	STR	31'-9"	33
A226	1	#5	STR	33'-0"	34
A227	1	#5	STR	34'-3"	36

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
A228	1	#5	STR	35'-7"	37
A229	1	#5	STR	36'-10"	38
A230	1	#5	STR	38'-1"	40
A231	1	#5	STR	39'-4"	41
A232	1	#5	STR	40'-7"	42
A233	1	#5	STR	41'-11"	44
A234	1	#5	STR	41'-11"	44
A235	1	#5	STR	40'-9"	43
A236	1	#5	STR	39'-7"	41
A237	1	#5	STR	38'-6"	40
A238	1	#5	STR	37'-4"	39
A239	1	#5	STR	36'-2"	38
A240	1	#5	STR	35'-1"	37
A241	1	#5	STR	33'-11"	35
A242	1	#5	STR	32'-9"	34
A243	1	#5	STR	31'-8"	33
A244	1	#5	STR	30'-6"	32
A245	1	#5	STR	29'-4"	31
A246	1	#5	STR	28'-3"	29
A247	1	#5	STR	27'-1"	28
A248	1	#5	STR	25'-11"	27
A249	1	#5	STR	24'-10"	26
A250	1	#5	STR	23'-8"	25
A251	1	#5	STR	22'-7"	24
A252	1	#5	STR	21'-5"	22
A253	1	#5	STR	20'-3"	21
A254	1	#5	STR	19'-2"	20
A255	1	#5	STR	18'-0"	19
A256	1	#5	STR	16'-11"	18
A257	1	#5	STR	15'-9"	16
A258	1	#5	STR	14'-7"	15
A259	1	#5	STR	13'-6"	14
A260	1	#5	STR	12'-4"	13
A261	1	#5	STR	11'-3"	12
A262	1	#5	STR	10'-1"	11
A263	1	#5	STR	9'-0"	9
A264	1	#5	STR	7'-10"	8
A265	1	#5	STR	6'-9"	7
A266	1	#5	STR	5'-7"	6
A267	1	#5	STR	4'-6"	5
A268	1	#5	STR	3'-4"	3
A269	1	#5	STR	2'-3"	2
*B101	126	#4	STR	24'-11"	2097
*B102	42	#7	STR	60'-0"	5151
*B103	41	#7	STR	32'-2"	2696
*B104	42	#7	STR	19'-7"	1681
*B105	126	#4	STR	25'-1"	2111
*B106	16	#4	STR	28'-4"	303

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B201	120	#5	STR	54'-9"	6853
* G1	1	#5	STR	44'-11"	47
* G2	1	#5	STR	50'-5"	53
* K1	4	#6	STR	7'-7"	46
* K2	4	#6	STR	6'-5"	39
* K3	4	#6	STR	5'-2"	31
K4	8	#4	STR	8'-2"	44
* K5	6	#8	1	21'-8"	347
* K6	4	#8	2	13'-10"	148
K7	40	#4	STR	8'-7"	229
K8	8	#4	STR	6'-9"	36
K9	8	#4	STR	5'-3"	28
K10	10	#4	STR	20'-5"	136
K11	2	#4	3	7'-0"	9
K12	3	#4	8	12'-10"	26
K13	2	#4	3	8'-6"	11
K14	3	#4	8	12'-10"	26
* K15	4	#6	STR	8'-8"	52
* K16	4	#6	STR	7'-4"	44
* K17	4	#6	STR	5'-11"	36
K18	8	#4	STR	9'-2"	49
* K19	6	#8	1	23'-9"	380
* K20	4	#8	2	14'-11"	159
* S1	24	#4	4	4'-5"	71
* S2	48	#5	5	5'-10"	292
* S3	32	#5	7	2'-7"	86
S4	176	#4	6	3'-3"	382
S5	8	#5	7	11'-7"	97
* S6	24	#4	4	5'-1"	81
U1	24	#4	1	19'-0"	305

REINFORCING STEEL 22961 LBS.
*EPOXY COATED REINFORCING STEEL 30737 LBS.

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,757	SQ.FT.
BRIDGE DECK	7,765	SQ.FT.
TOTAL	9,522	SQ.FT.

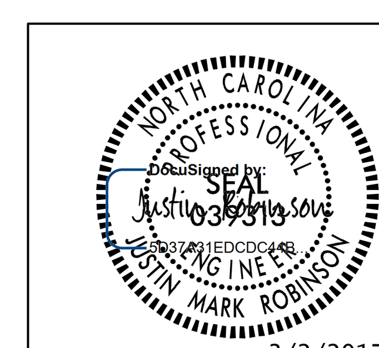
SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	135.1		
POUR 2	185.9		
TOTALS**	321.0	22961 LBS.	30737 LBS.

** QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 2



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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE

BILL OF MATERIAL

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

SHEET NO. S3-24
TOTAL SHEETS 36

DRAWN BY : MKO DATE : 12/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MKO DATE : 12/2016

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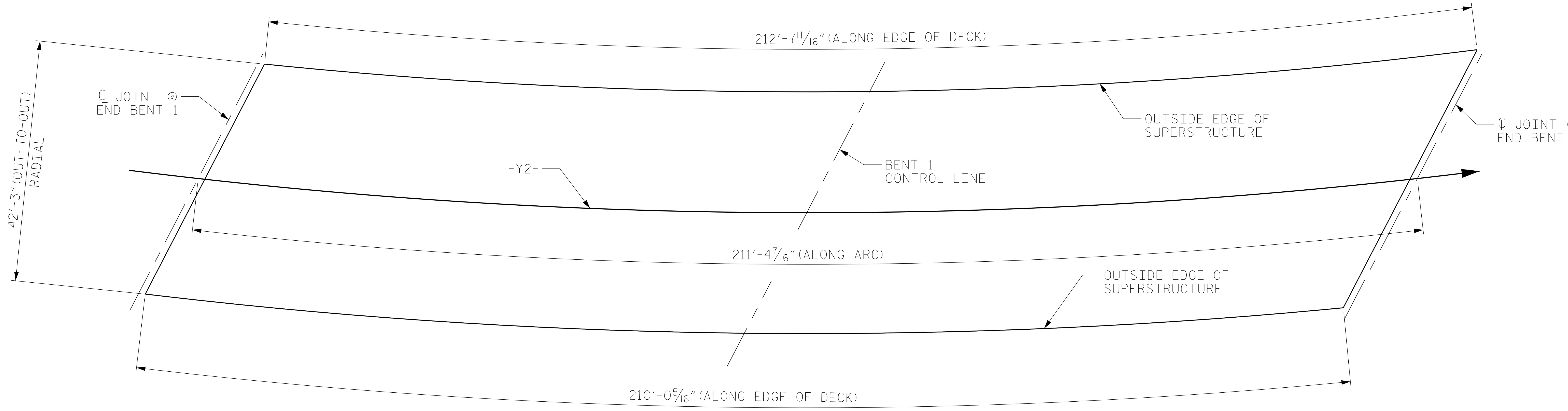
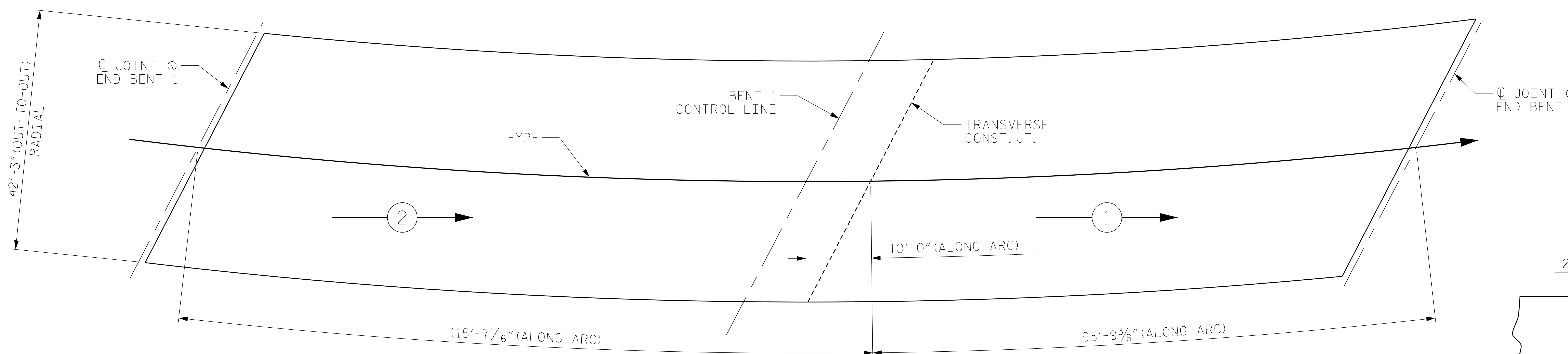
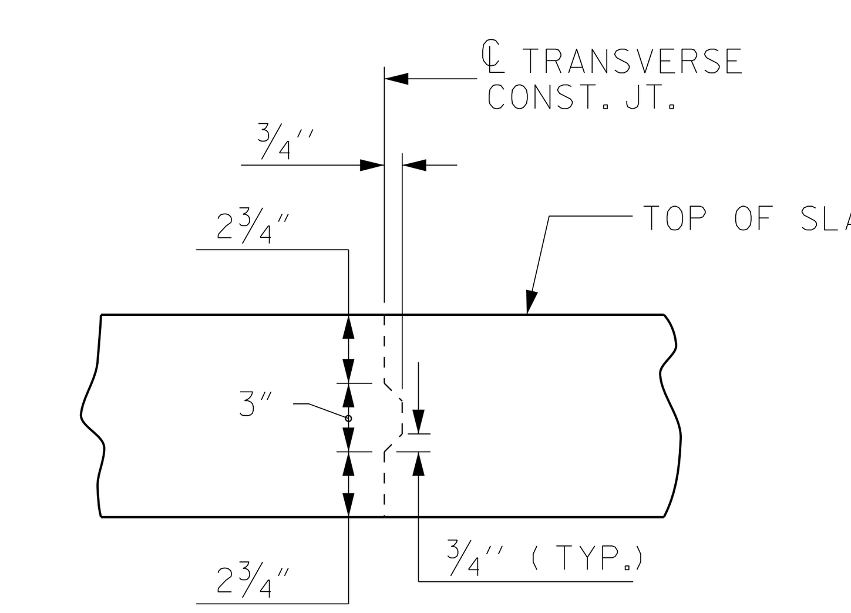


LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT = 8,927)

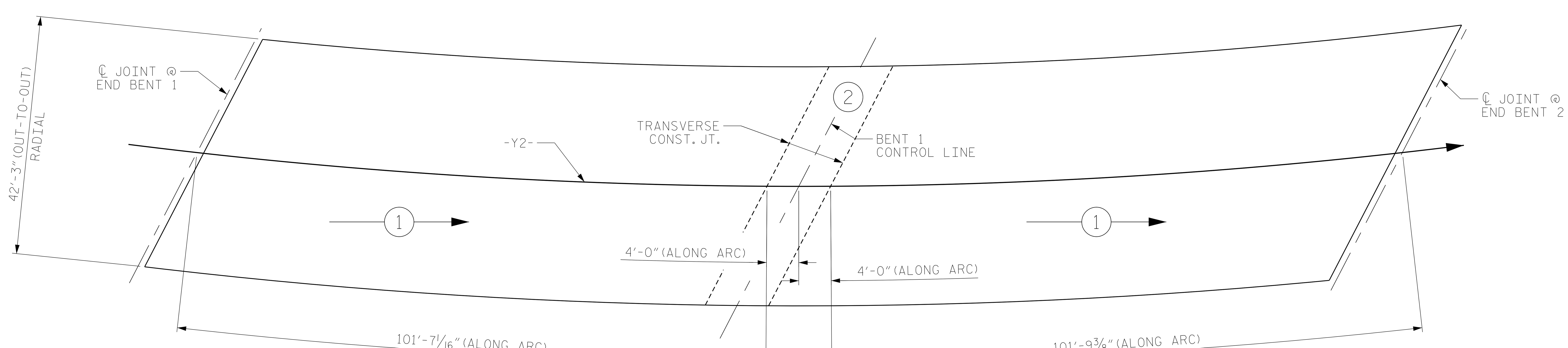


POURING SEQUENCE



TRANSVERSE CONSTRUCTION JOINT DETAIL

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



OPTIONAL POURING SEQUENCE

POUR (2) CAN NOT BE STARTED UNTIL BOTH ADJACENT (1) POURS REACH A MINIMUM OF 3000 PSI

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 2 OF 2

SEAL 039313 — JUSTIN MARK ROBINSON — PROFESSIONAL ENGINEER — NORTH CAROLINA
3/2/2017

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DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
BILL OF MATERIAL

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

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DRAWN BY : MKO DATE : 12/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MKO DATE : 12/2016

2/28/2017
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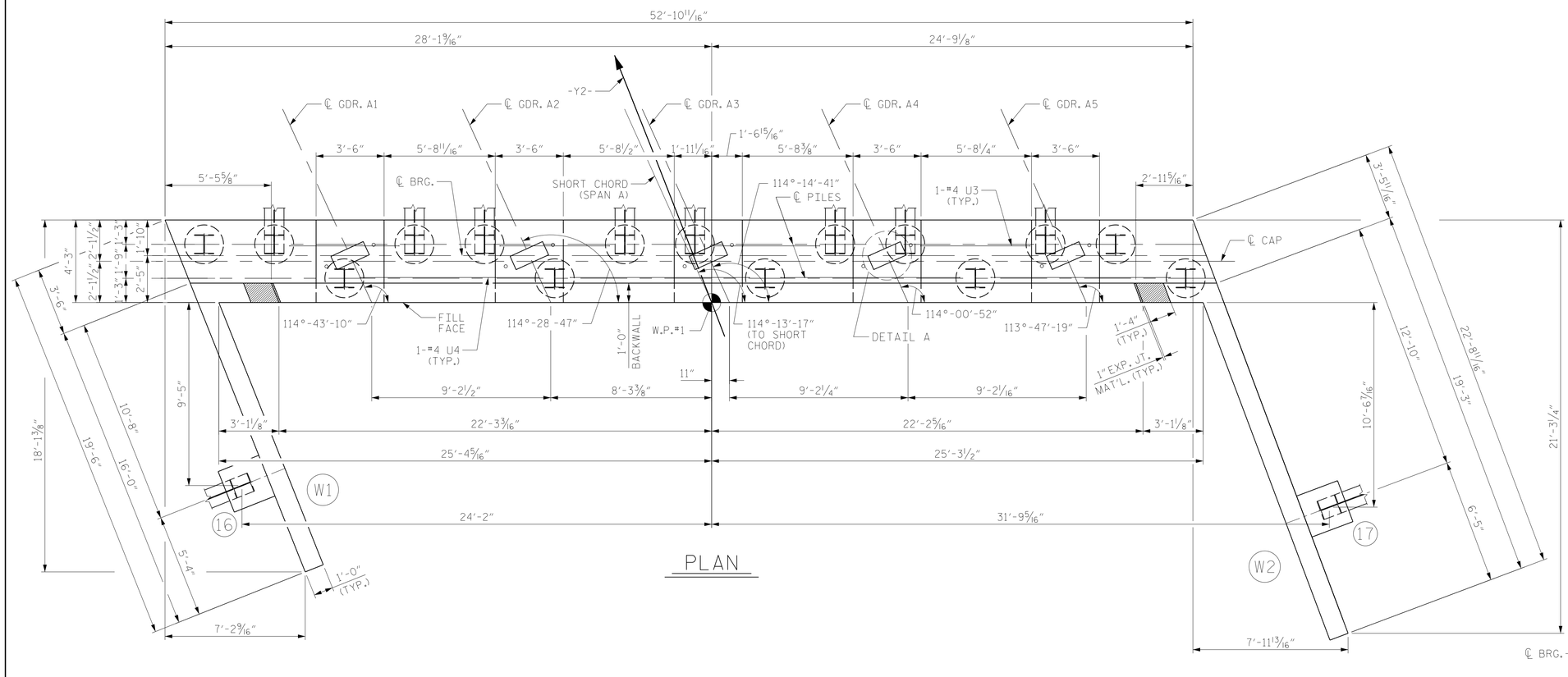


PLAN

NOTES

STIRRUPS AND B3 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

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

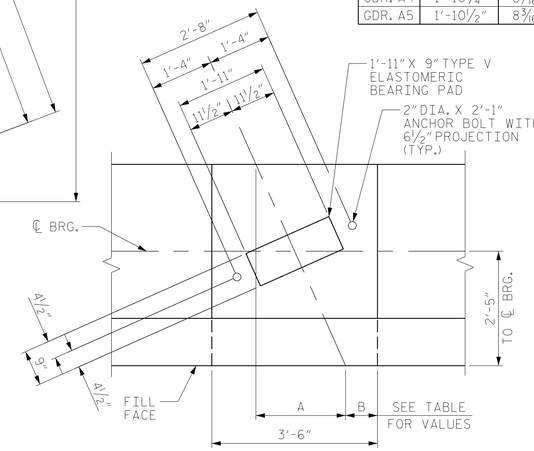
BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

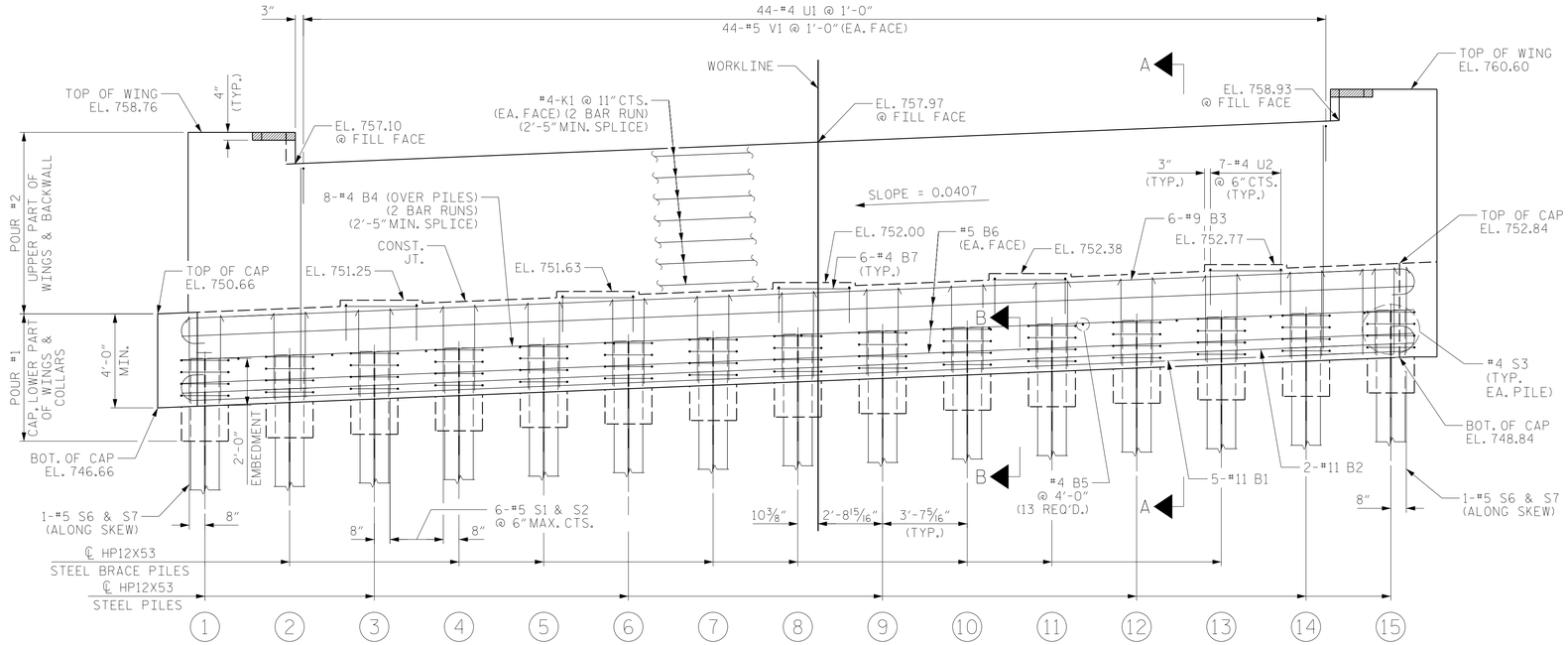
INSTALL THE 4" DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILL, SEE ROADWAY PLANS. REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN.

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 IS CAST IF SLIP FORMING IS USED.

	A	B
GDR. A1	1'-11 1/2"	7 5/8"
GDR. A2	1'-11 1/4"	7 13/16"
GDR. A3	1'-10 15/16"	7 15/16"
GDR. A4	1'-10 3/4"	8 1/16"
GDR. A5	1'-10 1/2"	8 3/16"



DETAIL A
DIMENSIONS TYP. EA. BRG.
PILE NOT SHOWN FOR CLARITY



ELEVATION
WINGS NOT SHOWN FOR CLARITY

TOP OF PILE ELEVATIONS

PILE	ELEVATION
1	748.77
2	748.92
3	749.07
4	749.21
5	749.36
6	749.51
7	749.65
8	749.80
9	749.95
10	750.09
11	750.24
12	750.39
13	750.53
14	750.68
15	750.83
16	748.73
17	750.86

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PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 033995 ENGINEER JUSTIN MARK ROBINSON
3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 1

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

DRAWN BY : MAL, MKO DATE : 12/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MKO DATE : 12/2016

2/28/2017
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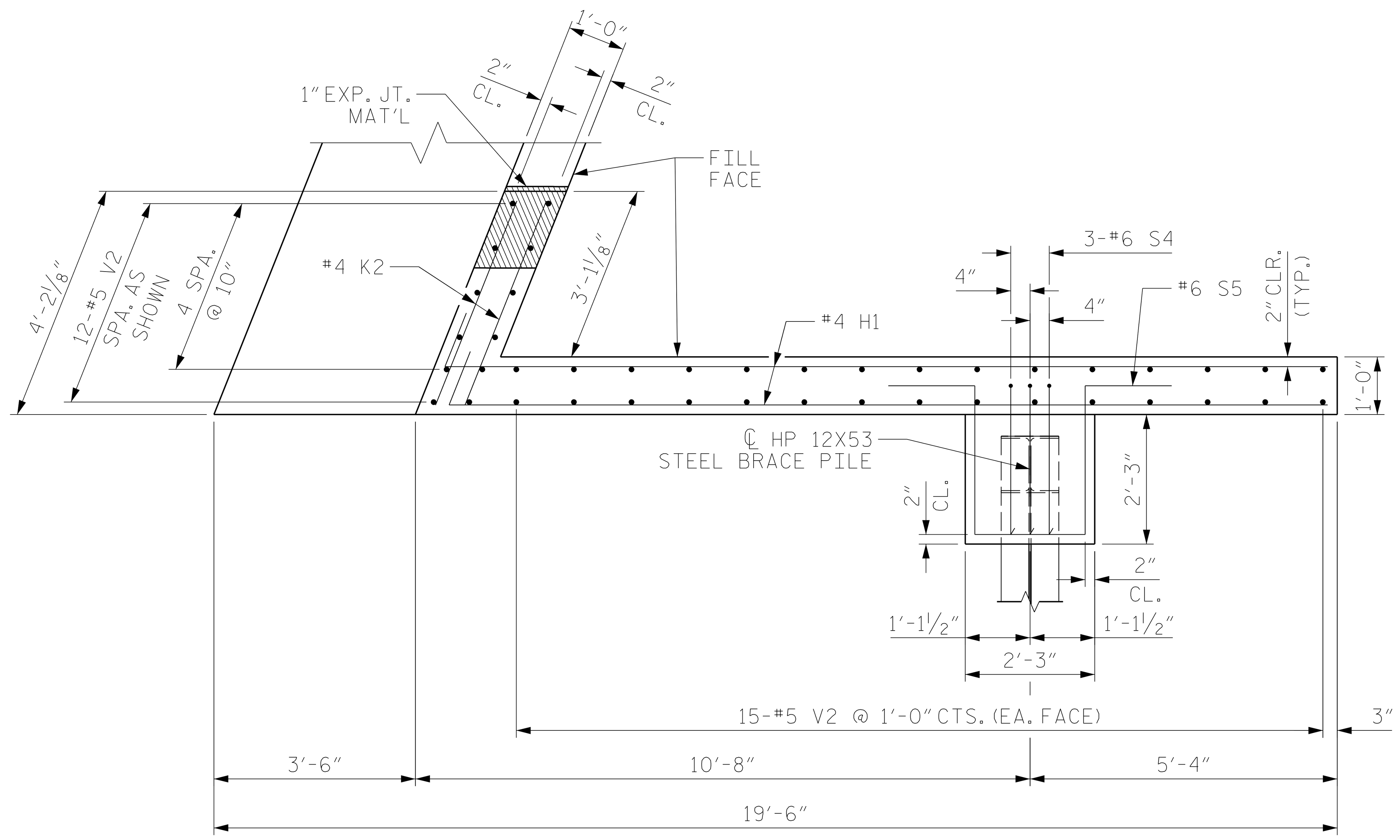
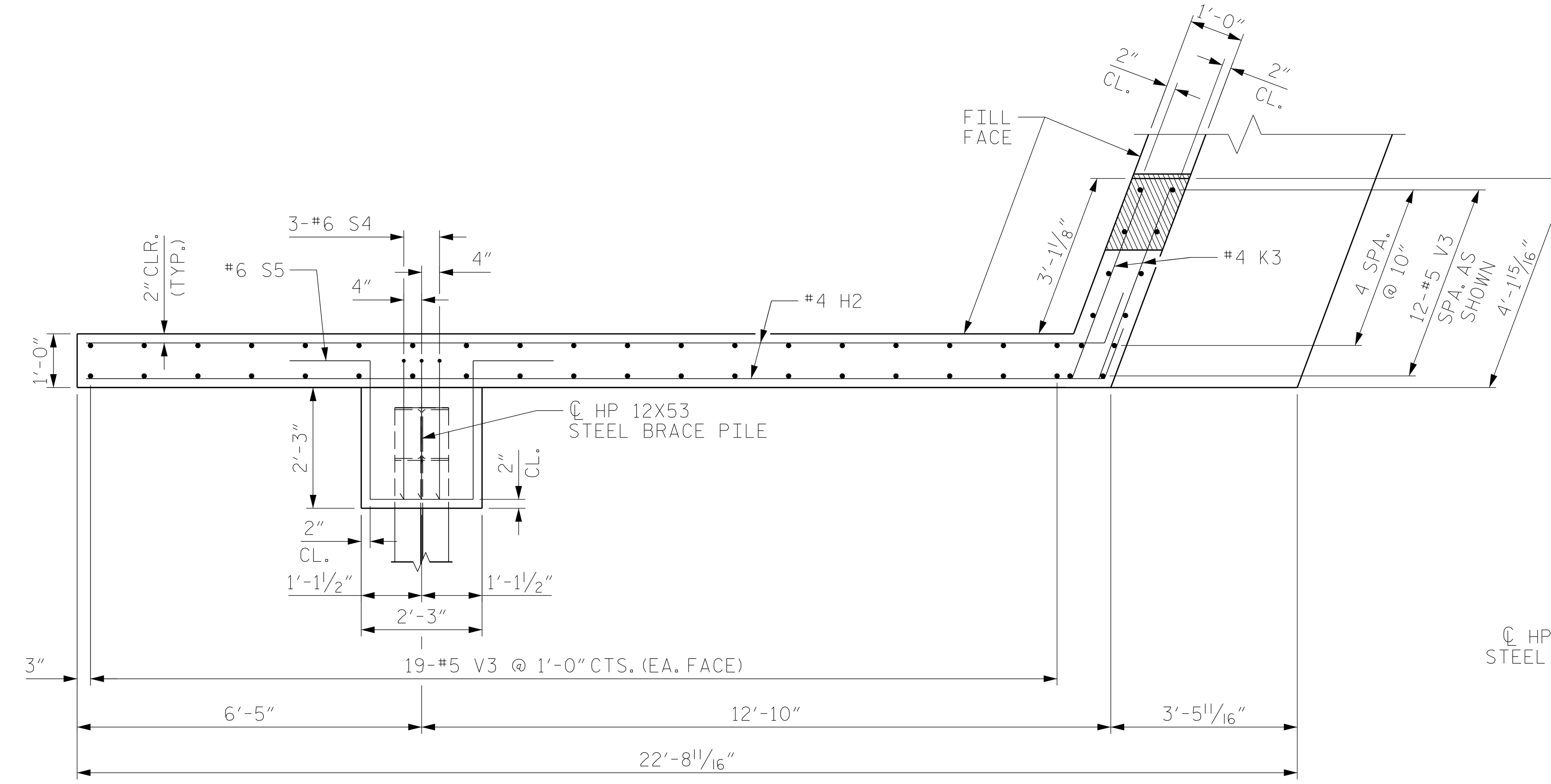
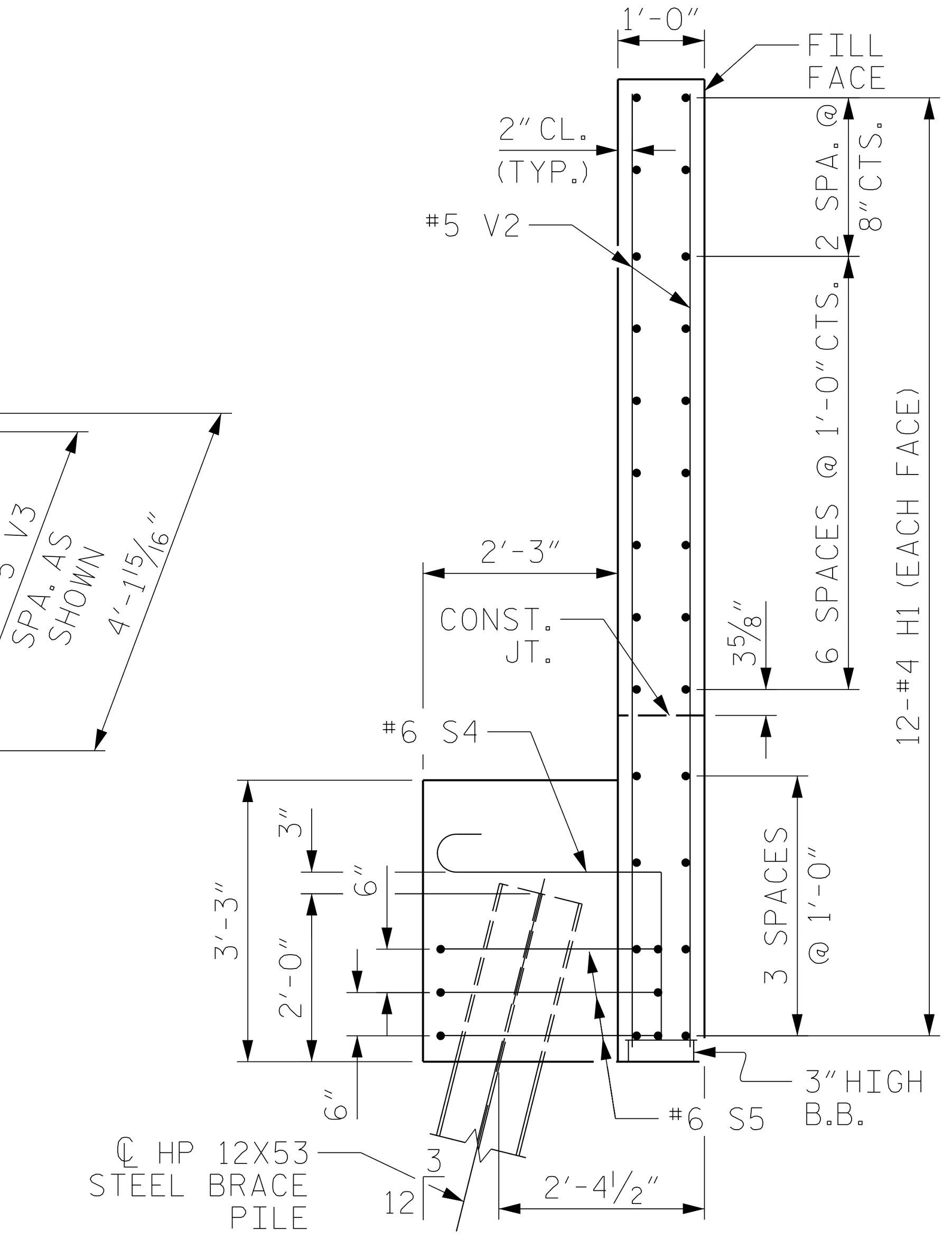


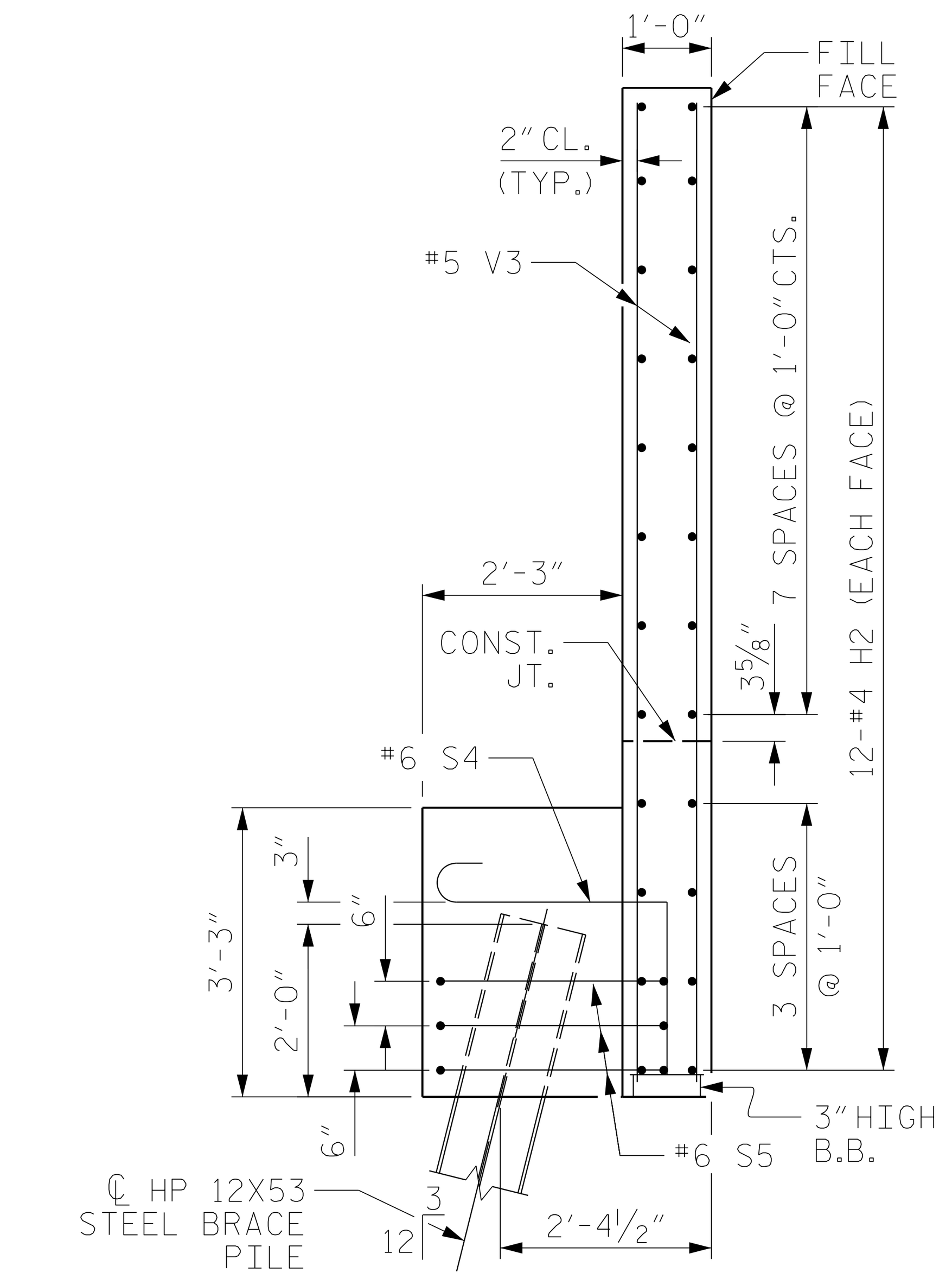
PLAN OF LEFT WING W1



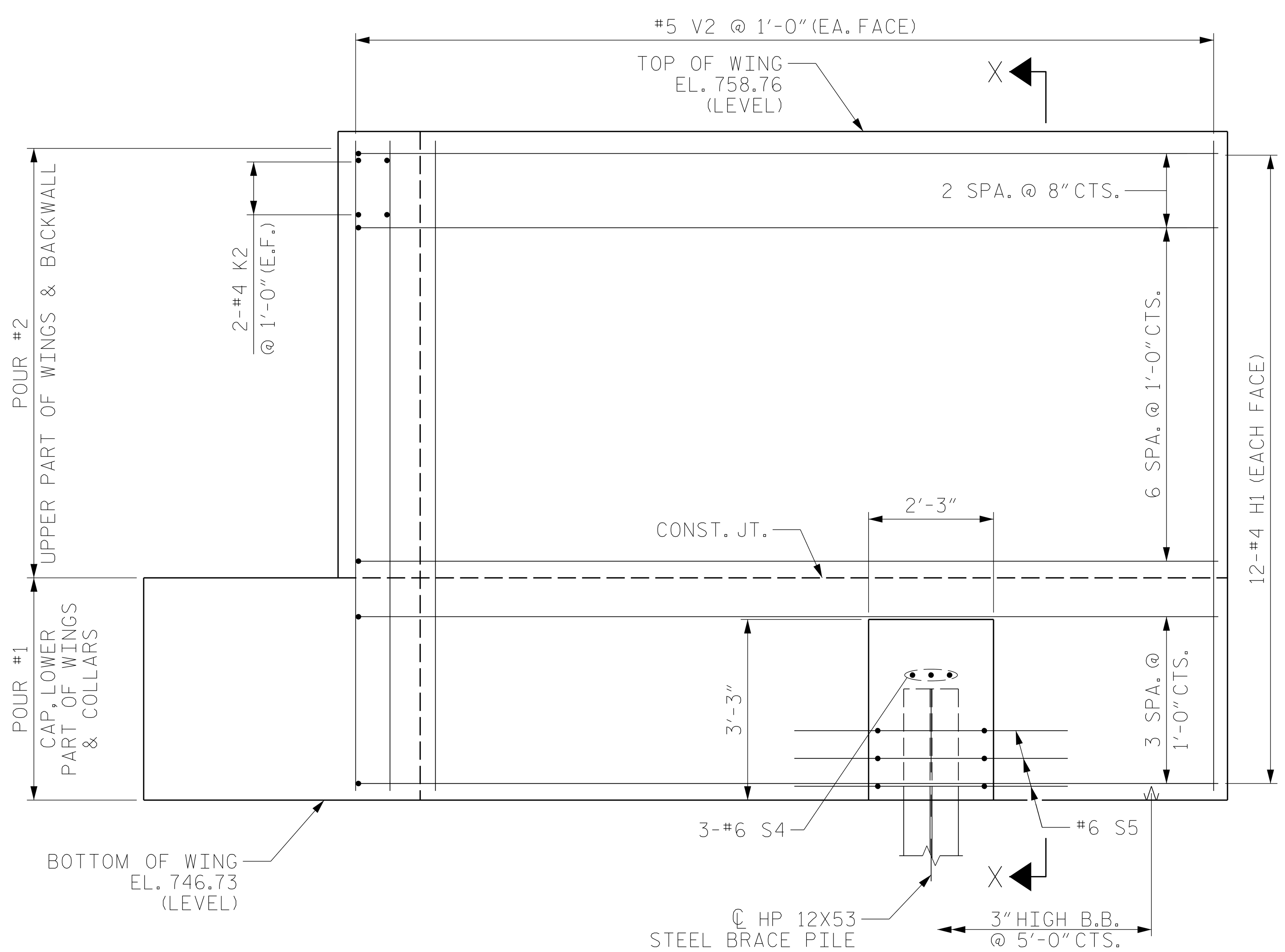
PLAN OF RIGHT WING W2



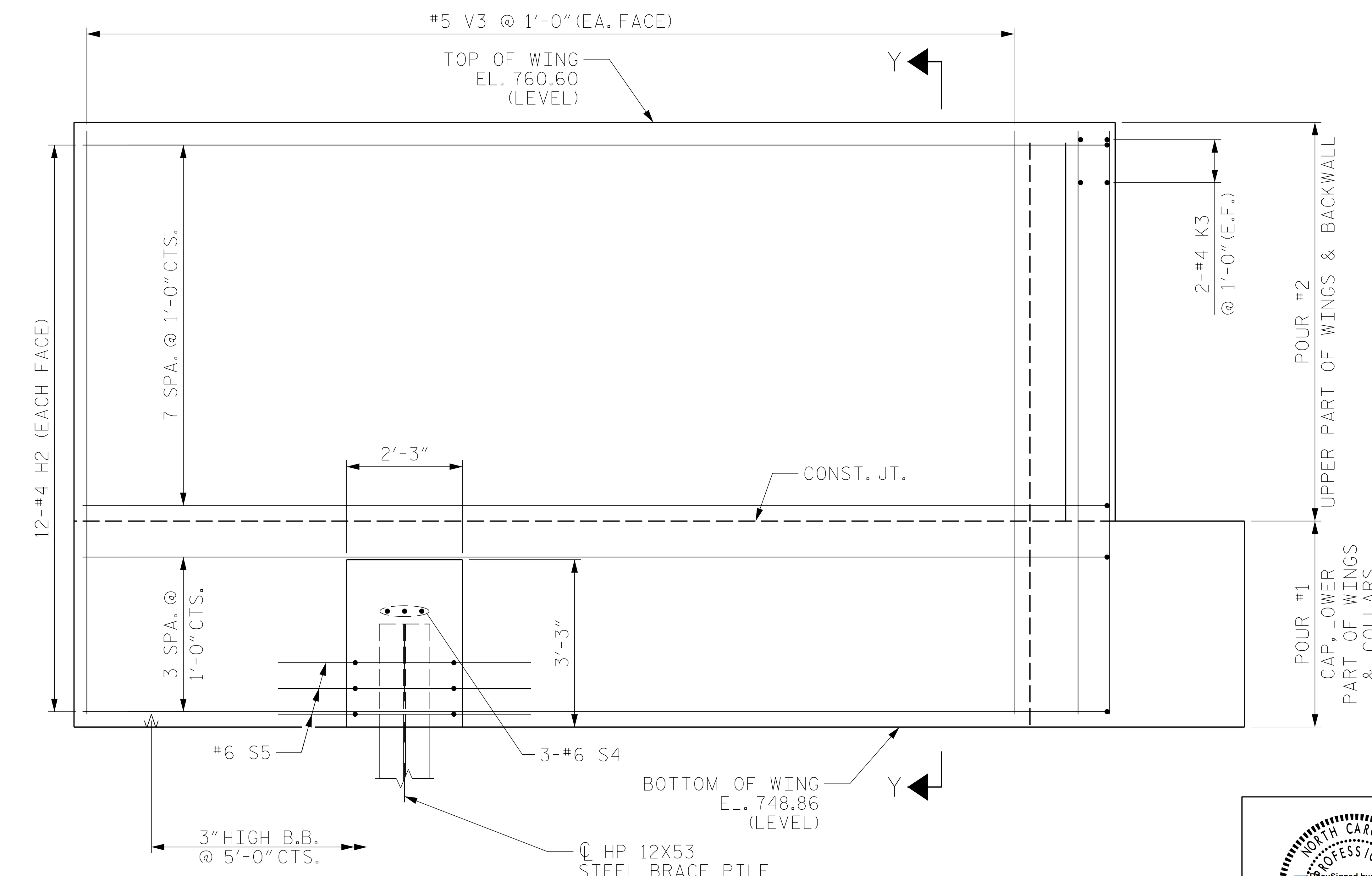
SECTION X-X



SECTION Y-Y



ELEVATION OF LEFT WING W1



ELEVATION OF RIGHT WING W2

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 3

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SUBSTRUCTURE

END BENT NO. 1

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			36

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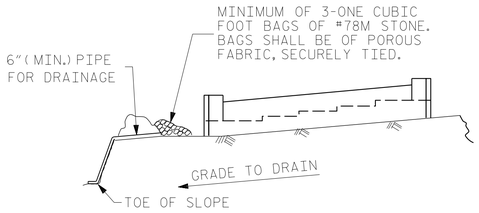
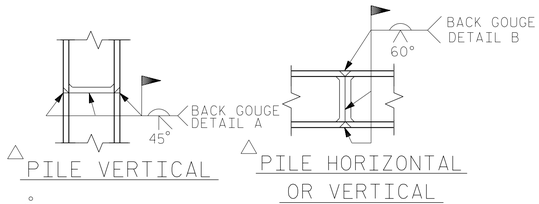


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

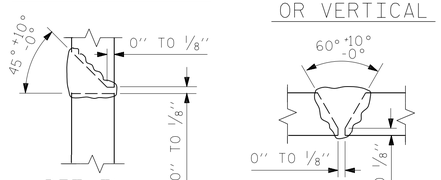
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

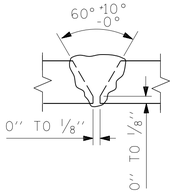


△ PILE VERTICAL

△ PILE HORIZONTAL OR VERTICAL



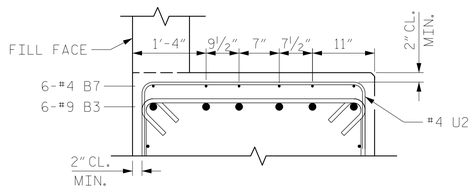
DETAIL A



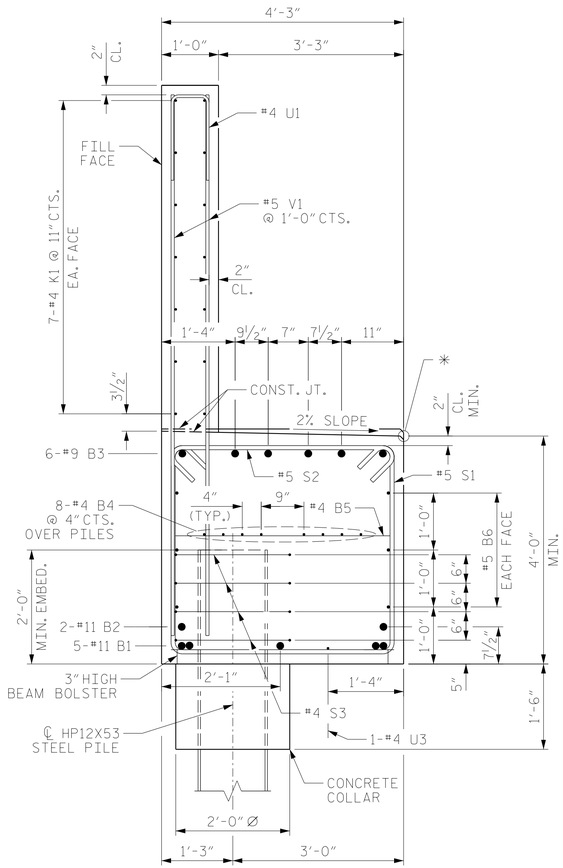
DETAIL B

△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS

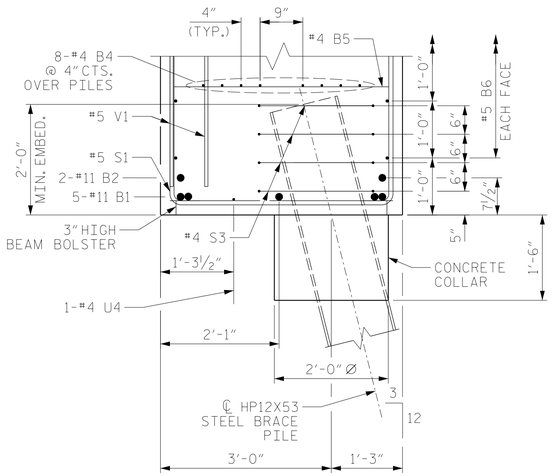


PARTAIL SECTION AT BRIDGE SEAT



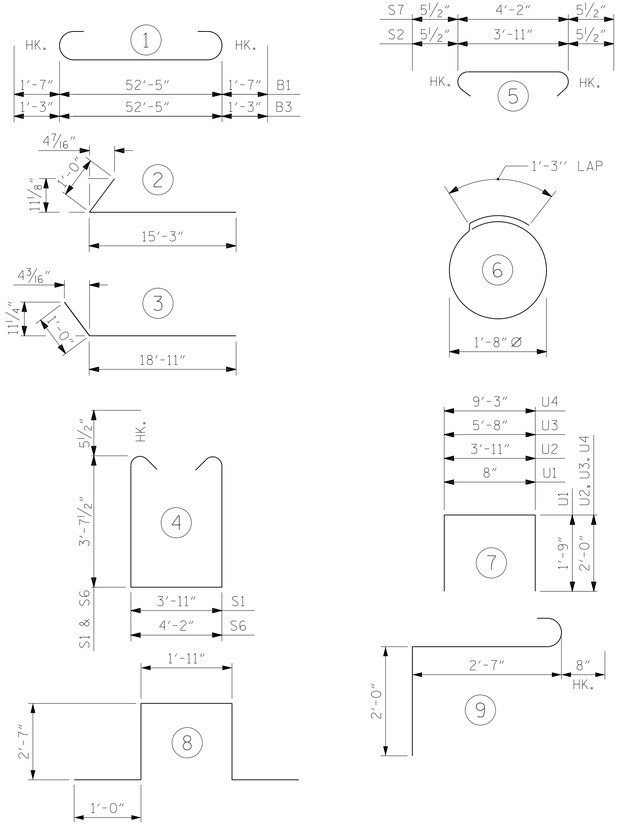
SECTION A-A

✳ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT



SECTION B-B

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	5	#11	1	55'-7"	1477
B2	2	#11	STR	52'-5"	557
B3	6	#9	1	54'-11"	1120
B4	16	#4	STR	27'-5"	293
B5	13	#4	STR	3'-11"	34
B6	6	#5	STR	52'-5"	328
B7	30	#4	STR	3'-2"	63
H1	24	#4	2	16'-3"	261
H2	24	#4	3	19'-11"	319
K1	28	#4	STR	27'-5"	513
K2	4	#4	STR	3'-9"	10
K3	4	#4	STR	3'-9"	10
S1	84	#5	4	12'-1"	1059
S2	84	#5	5	4'-10"	423
S3	60	#4	6	6'-6"	261
S4	6	#6	9	5'-3"	47
S5	6	#6	8	9'-1"	82
S6	2	#5	4	12'-4"	26
S7	2	#5	5	5'-1"	11
U1	44	#4	7	4'-2"	122
U2	35	#4	7	7'-11"	185
U3	4	#4	7	9'-8"	26
U4	4	#4	7	13'-3"	35
V1	44	#5	STR	9'-6"	436
V2	42	#5	STR	11'-7"	507
V3	50	#5	STR	11'-4"	591

REINFORCING STEEL 8,796 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1 CAP, LOWER PART OF WING & COLLARS 41.7 C.Y.

POUR #2 UPPER PART OF WING & BACKWALL 22.2 C.Y.

TOTAL CLASS A CONCRETE 63.9 C.Y.

HP 12 X 53 STEEL PILES

NO: 17 LIN. FT.= 510

STEEL PILE POINTS NO. = 17

PILE DRIVING EQUIPMENT SETUP

HP 12 X 53 NO. = 17

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 3 OF 3

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END BENT NO. 1

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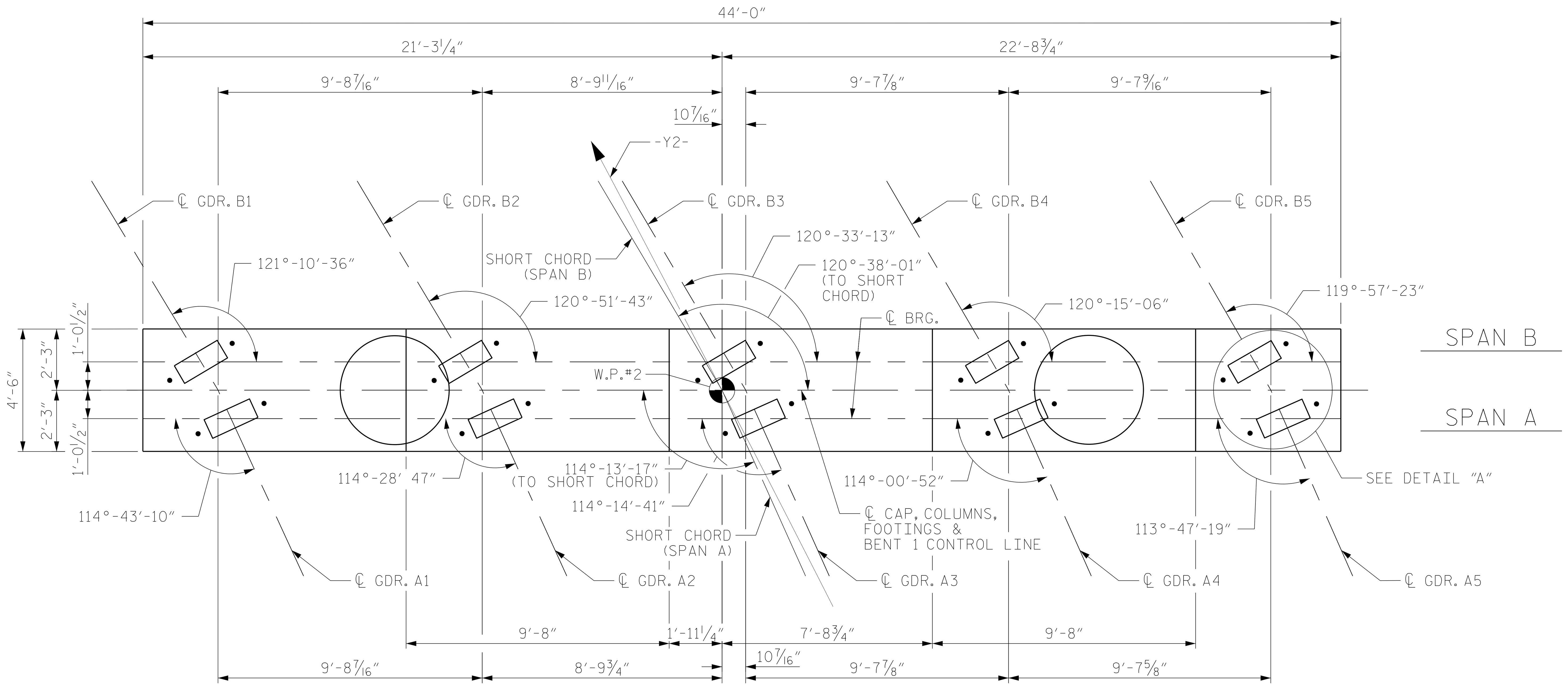
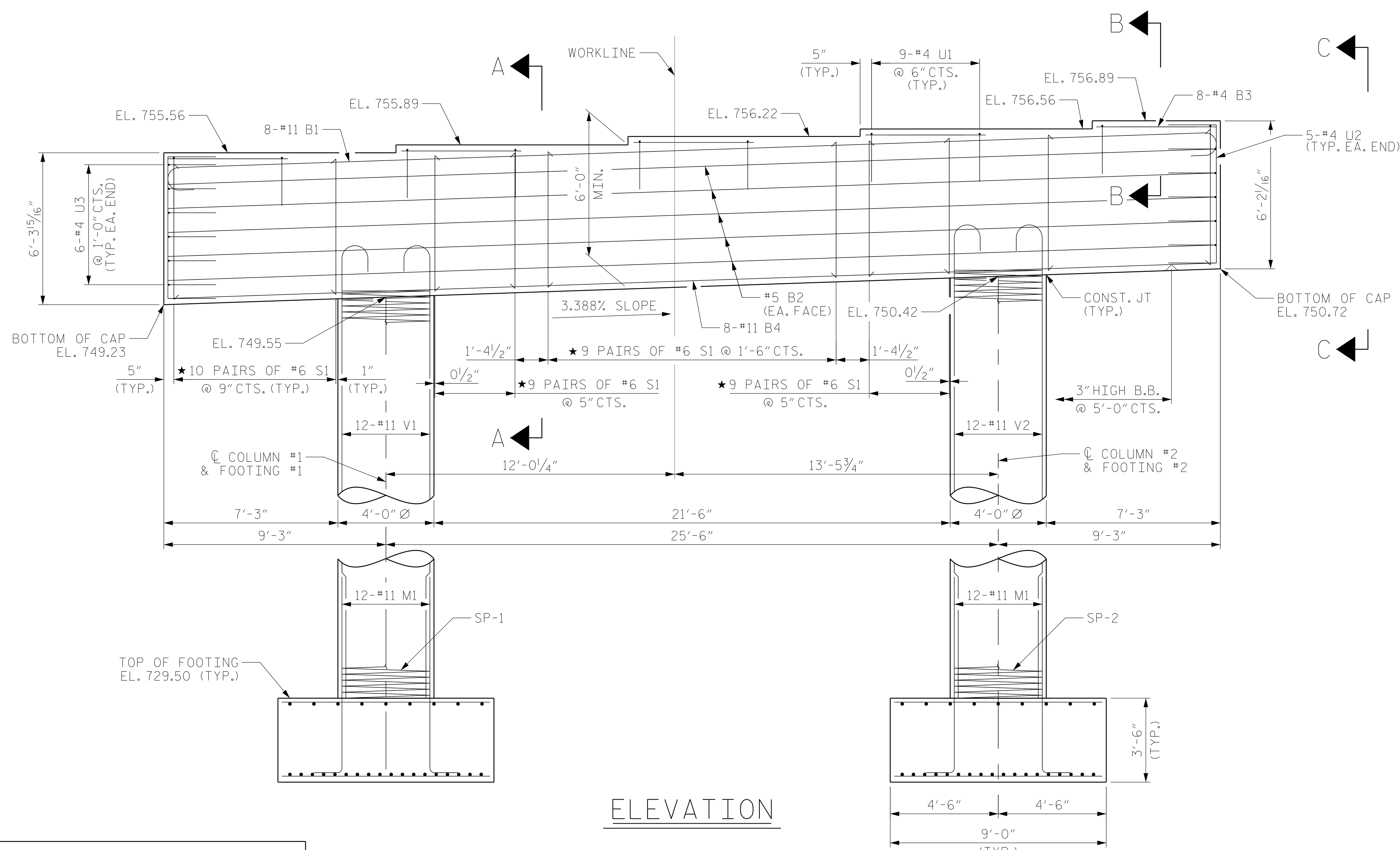


PLAN



ELEVATION

NOTES:

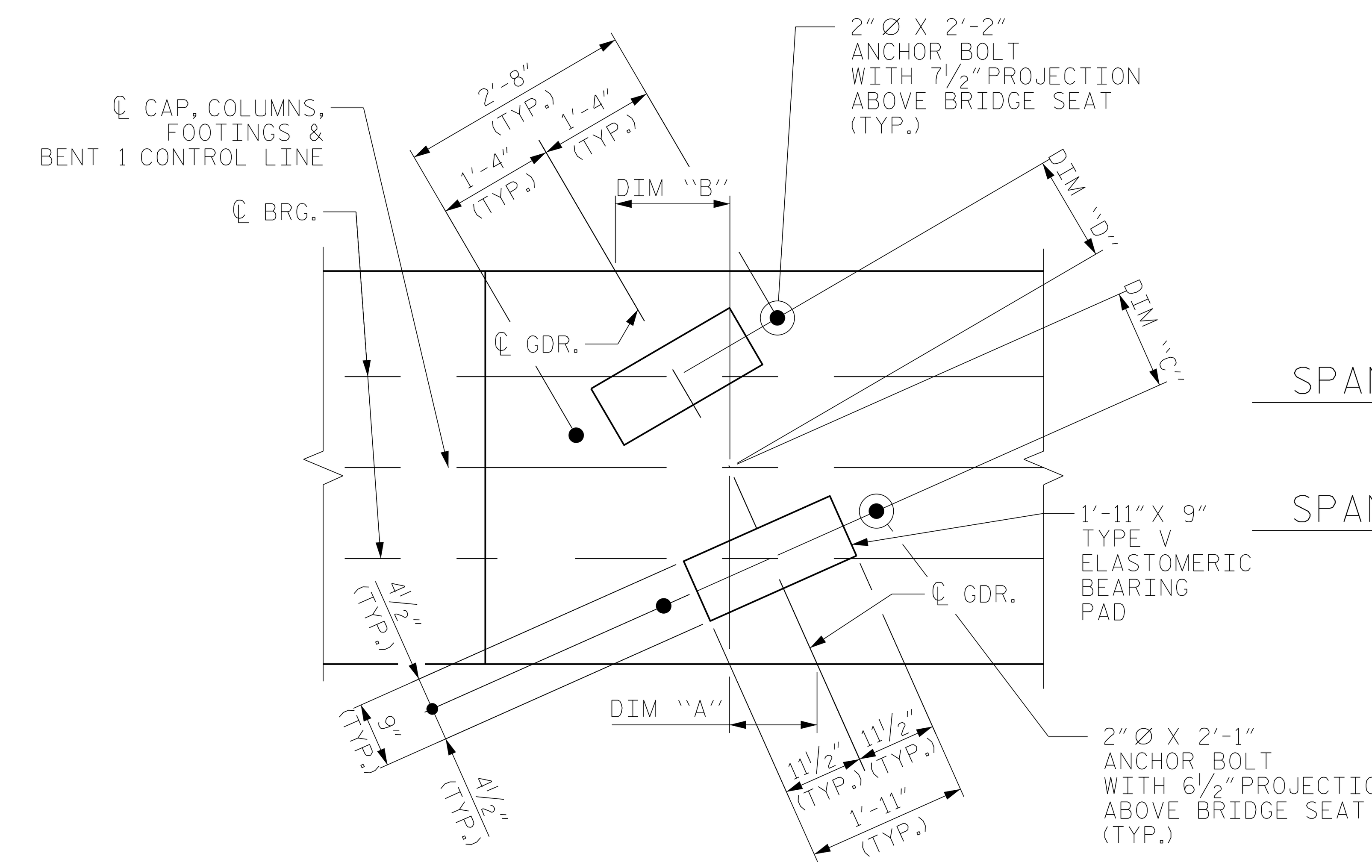
FOR SECTION A-A AND SECTION B-B, SEE SHEET 2 OF 2.

FOR REINFORCING BILL OF MATERIAL, SEE SHEET 2 OF 2.

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

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

★ INVERT ALTERNATE PAIRS OF #6 S1 STIRRUPS.



DETAIL "A"

DIMENSIONS ARE TYPICAL FOR EACH GIRDER

SPAN A			SPAN B		
GIRDER	DIM "A"	DIM "C"	GIRDER	DIM "B"	DIM "D"
A1	1'-0 7/16"	1'-1 3/4"	B1	1'-4 5/16"	1'-2 5/8"
A2	1'-0 5/16"	1'-1 3/4"	B2	1'-4 1/8"	1'-2 9/16"
A3	1'-0 3/16"	1'-1 11/16"	B3	1'-3 15/16"	1'-2 1/2"
A4	1'-0"	1'-1 11/16"	B4	1'-3 3/4"	1'-2 1/2"
A5	11 7/8"	1'-1 11/16"	B5	1'-3 9/16	1'-2 7/16"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 1 OF 2

SEAL 3/2/2017

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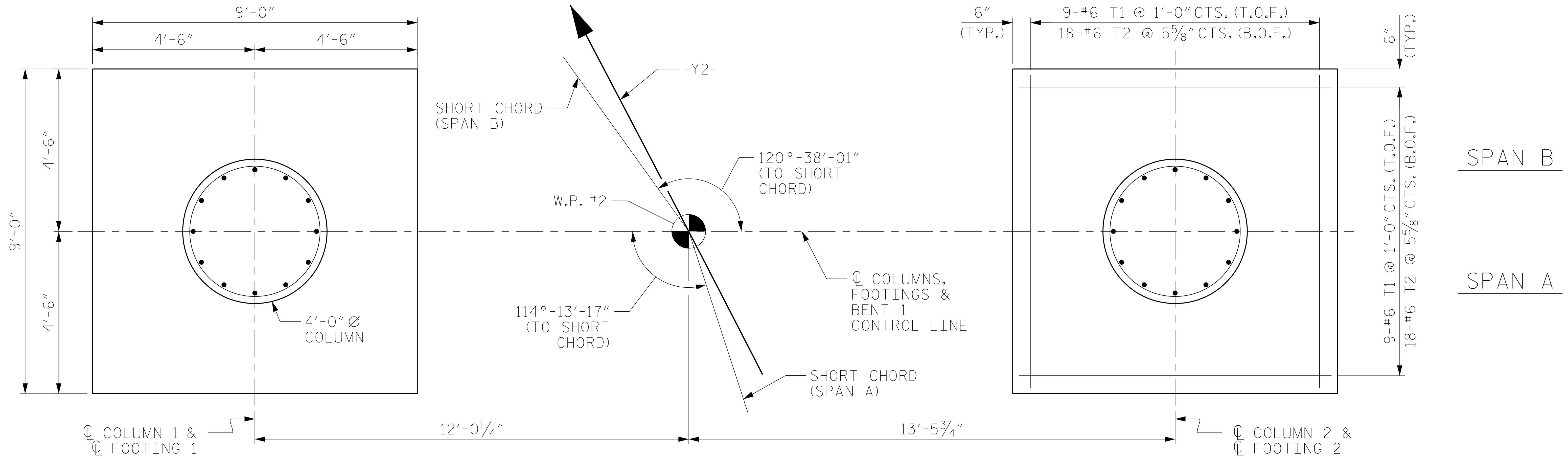
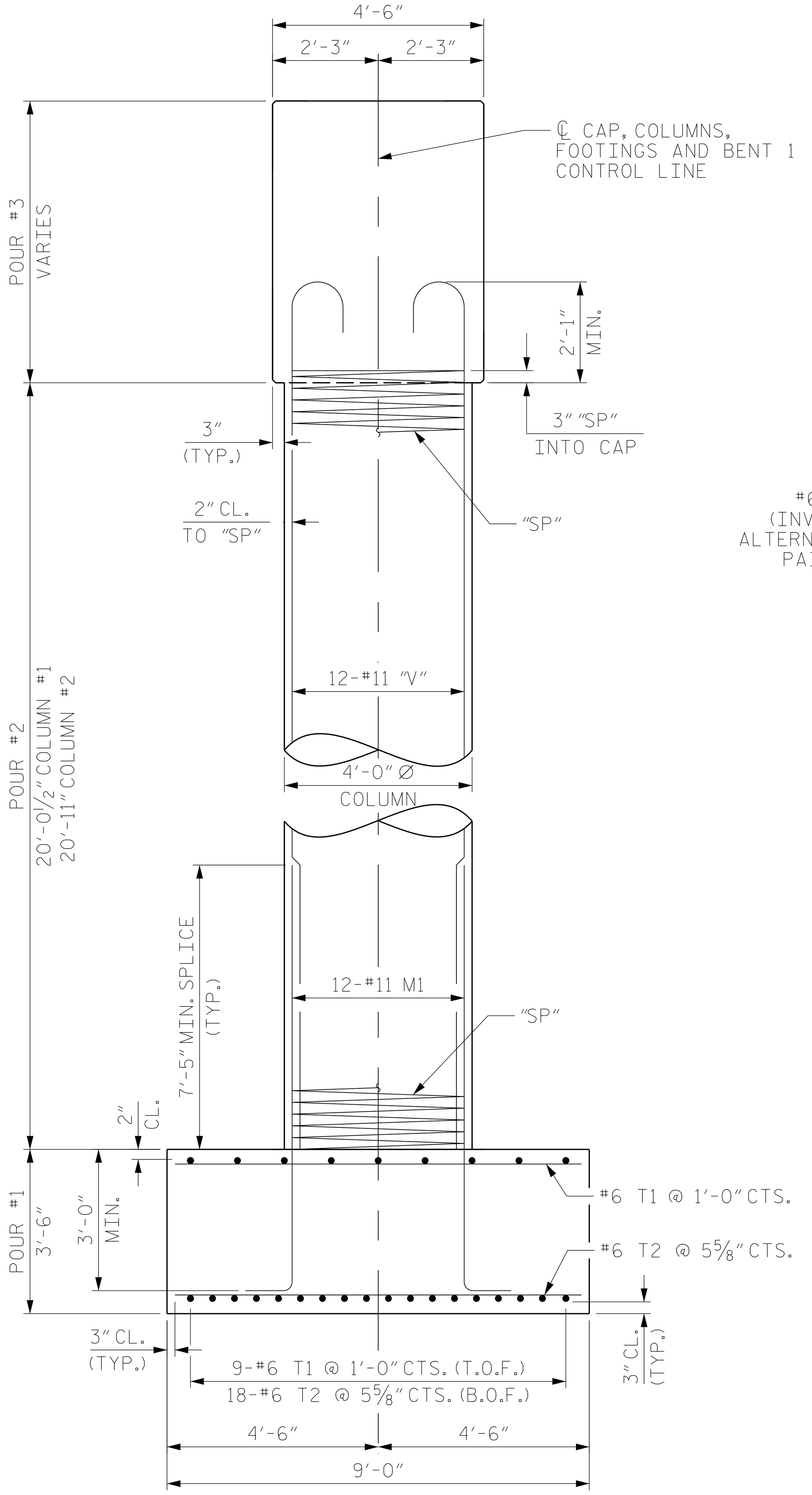
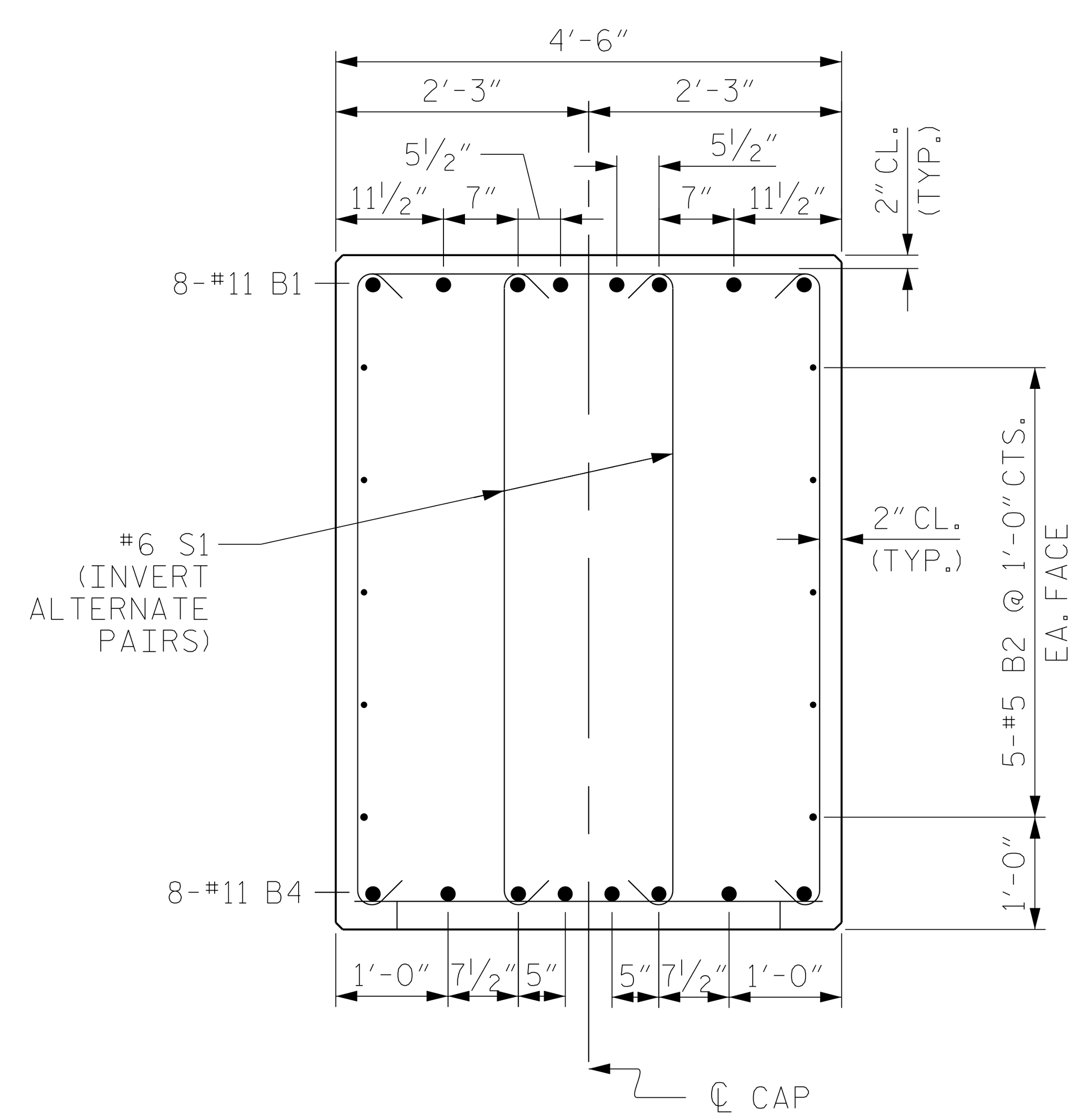


PLAN OF FOOTINGS

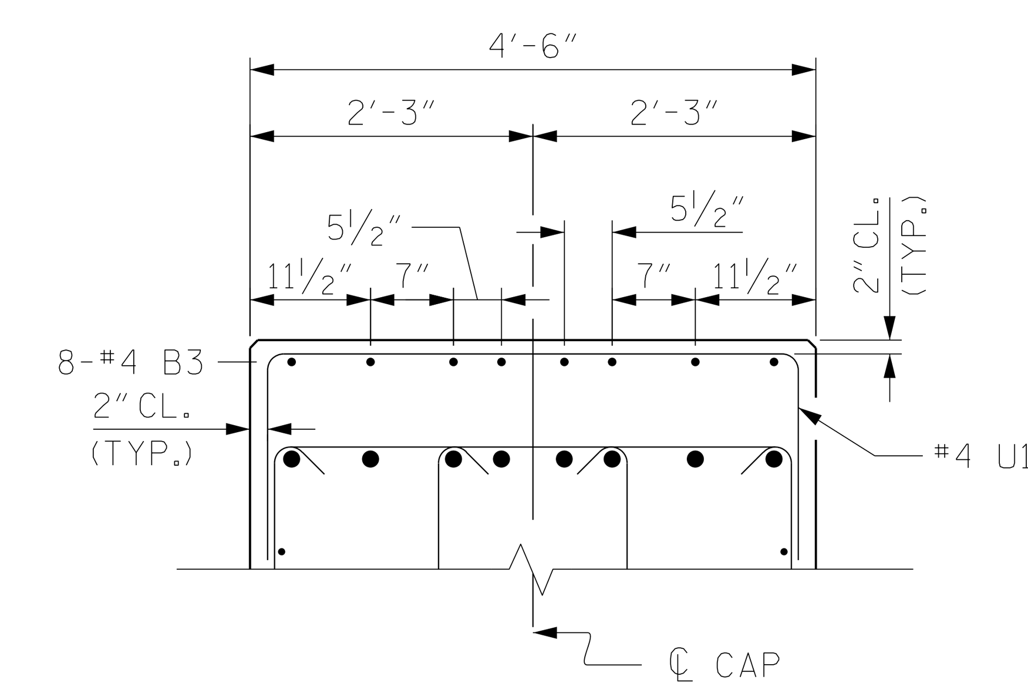
ALL DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH FOOTING



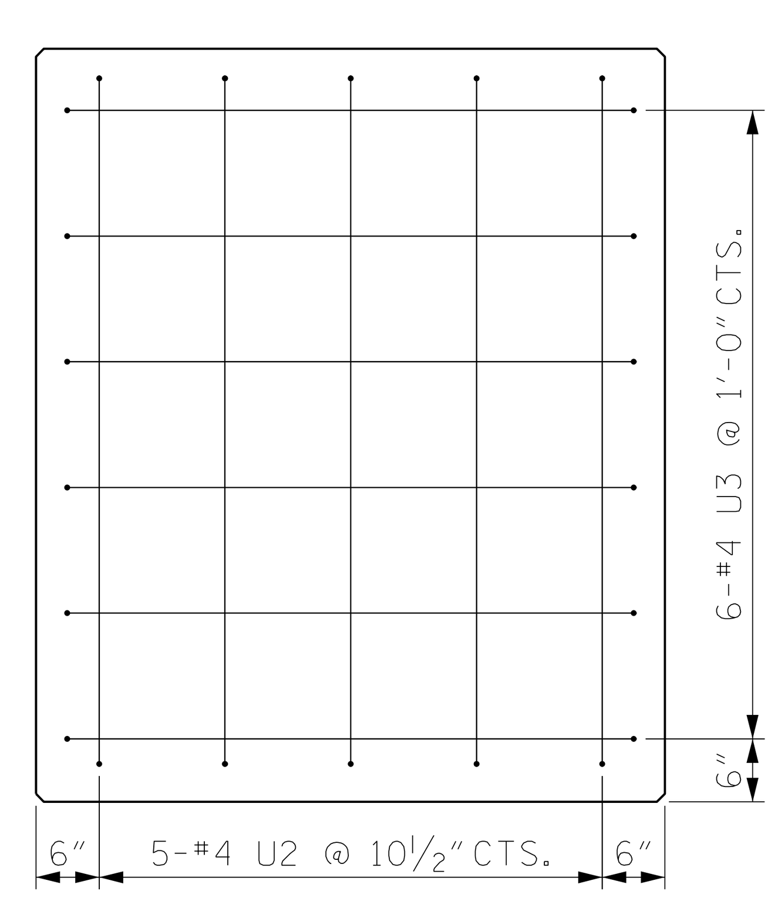
END VIEW



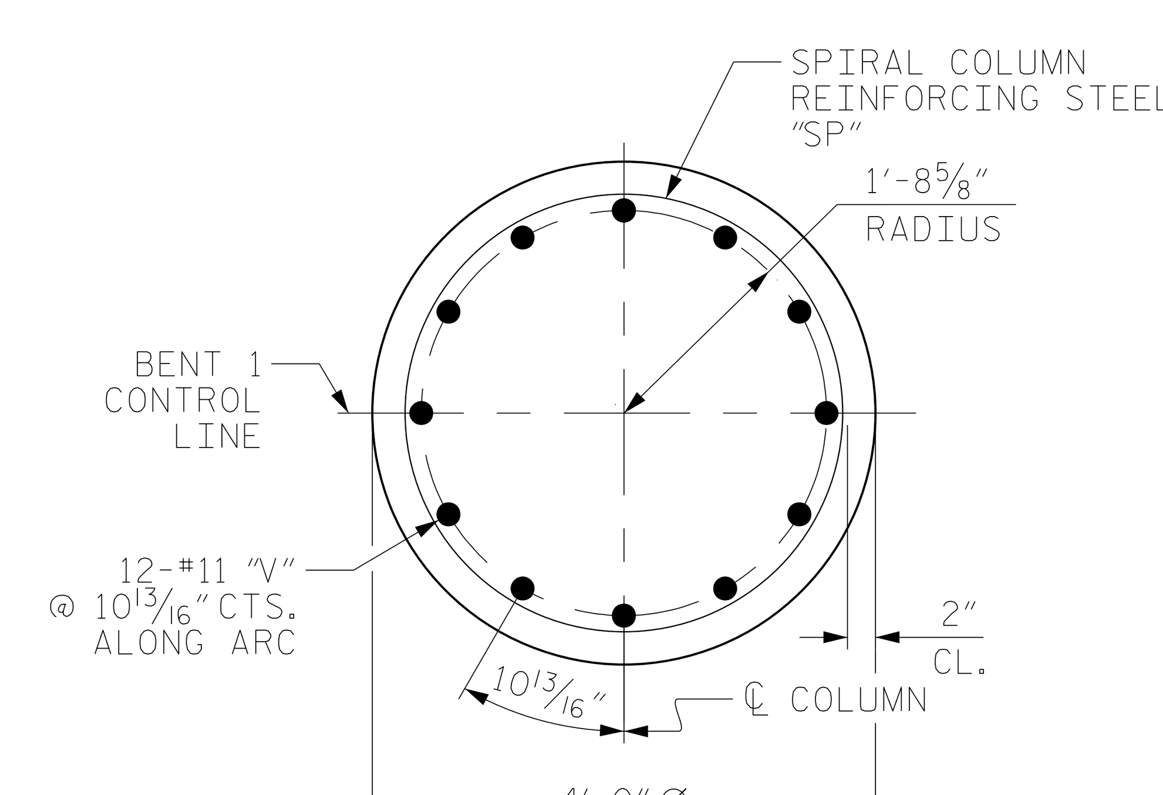
SECTION A-A



SECTION B-B



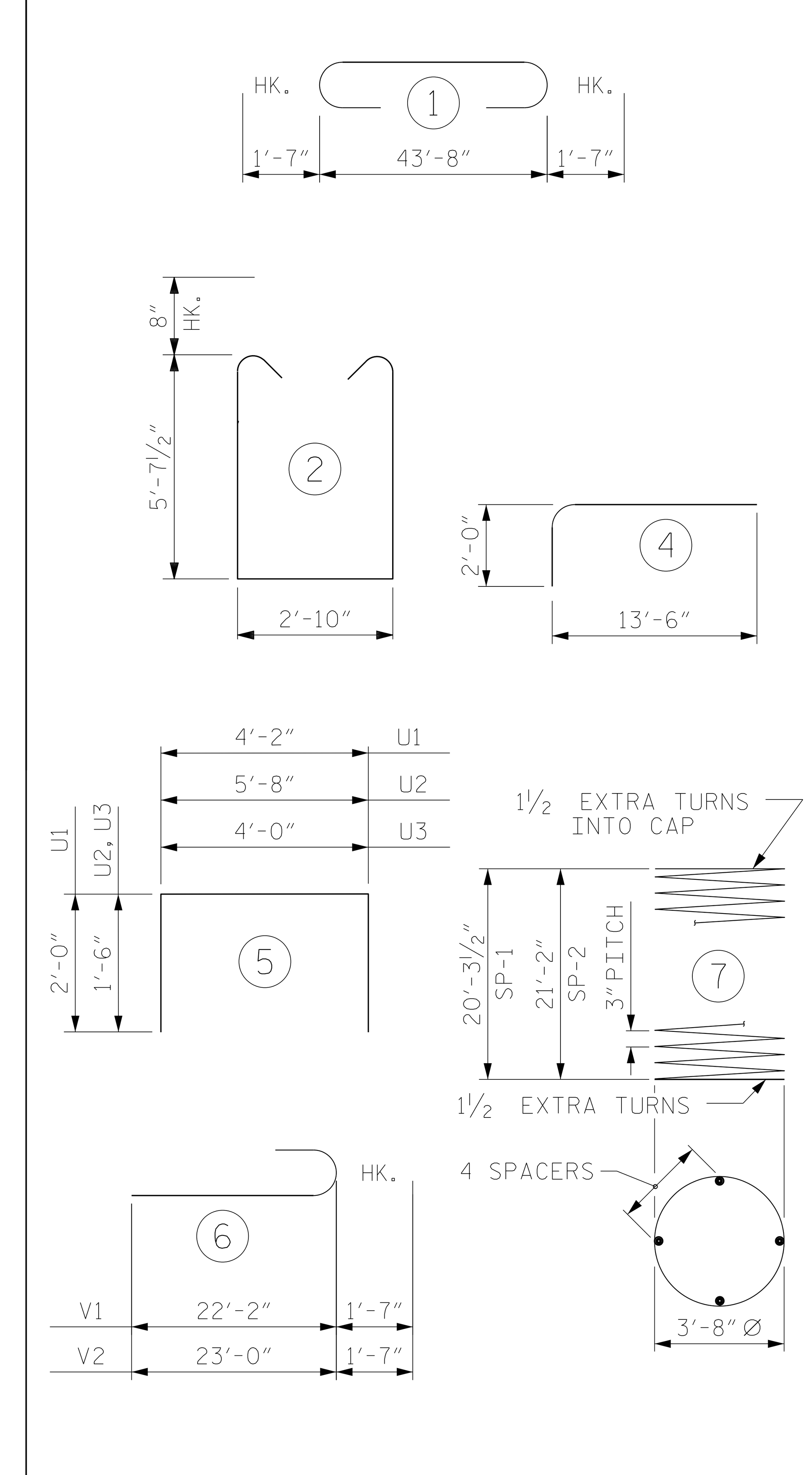
VIEW C-C



COLUMN SECTION

DIMENSIONS AND REINFORCING STEEL ARE TYPICAL FOR EACH COLUMN

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

FOR BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	46'-10"	1991
B2	10	#5	STR	43'-8"	455
B3	40	#4	STR	5'-0"	134
B4	8	#11	STR	43'-8"	1856
M1	24	#11	4	15'-6"	1976
S1	94	#6	2	15'-5"	2177
T1	36	#6	STR	8'-6"	460
T2	72	#6	STR	8'-6"	919
U1	45	#4	5	8'-2"	245
U2	10	#4	5	8'-8"	58
U3	12	#4	5	7'-0"	56
V1	12	#11	6	23'-9"	1514
V2	12	#11	6	24'-7"	1567
REINFORCING STEEL					13,408 LBS.
SP-1	4	✱	7	958'-9"	640
SP-2	4	✱	7	998'-8"	667

SPIRAL COLUMN REINFORCING STEEL (FOR BENT 1) 1307 LBS.

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

CLASS A CONCRETE BREAKDOWN (FOR BENT 1)	
POUR #1 (FOOTINGS)	21.0 C.Y.
POUR #2 (COLUMNS)	19.1 C.Y.
POUR #3 (CAP)	45.4 C.Y.
TOTAL CLASS A CONCRETE	85.5 C.Y.

FOUNDATION EXCAVATION FOR BENT — LUMP SUM

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 2

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BENT NO. 1 DETAILS

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NOTES

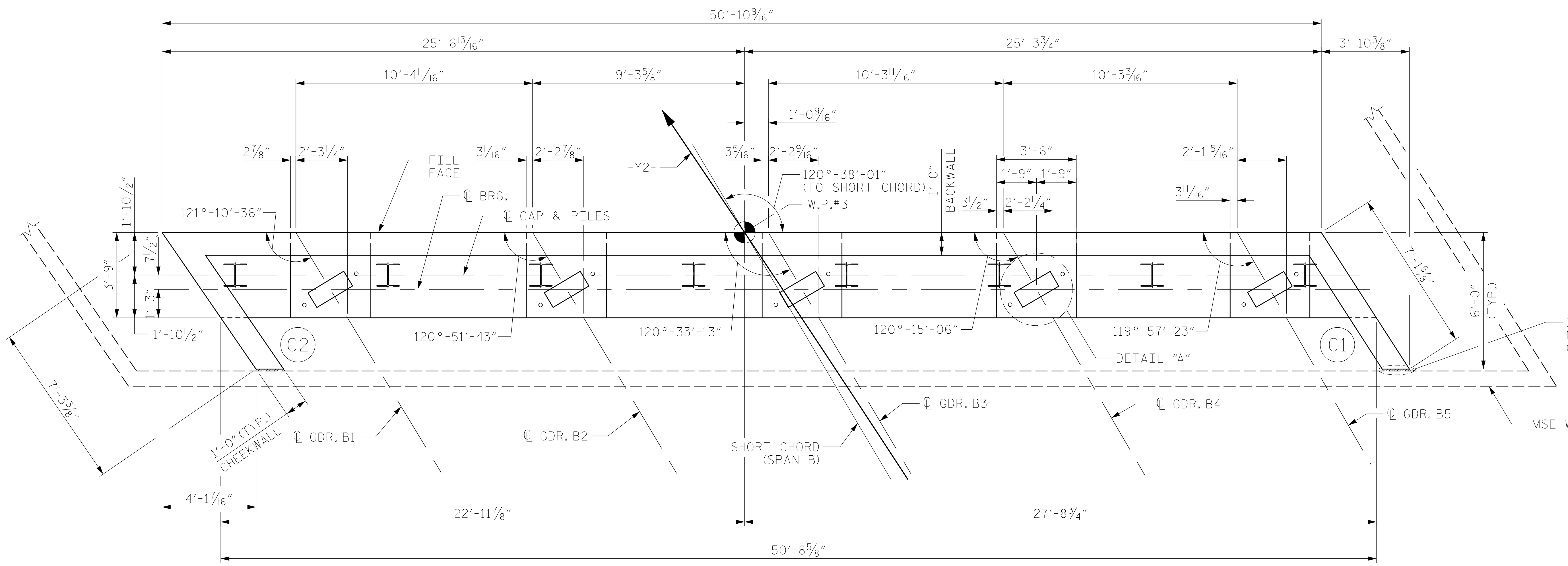
STIRRUPS, B4 & U2 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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

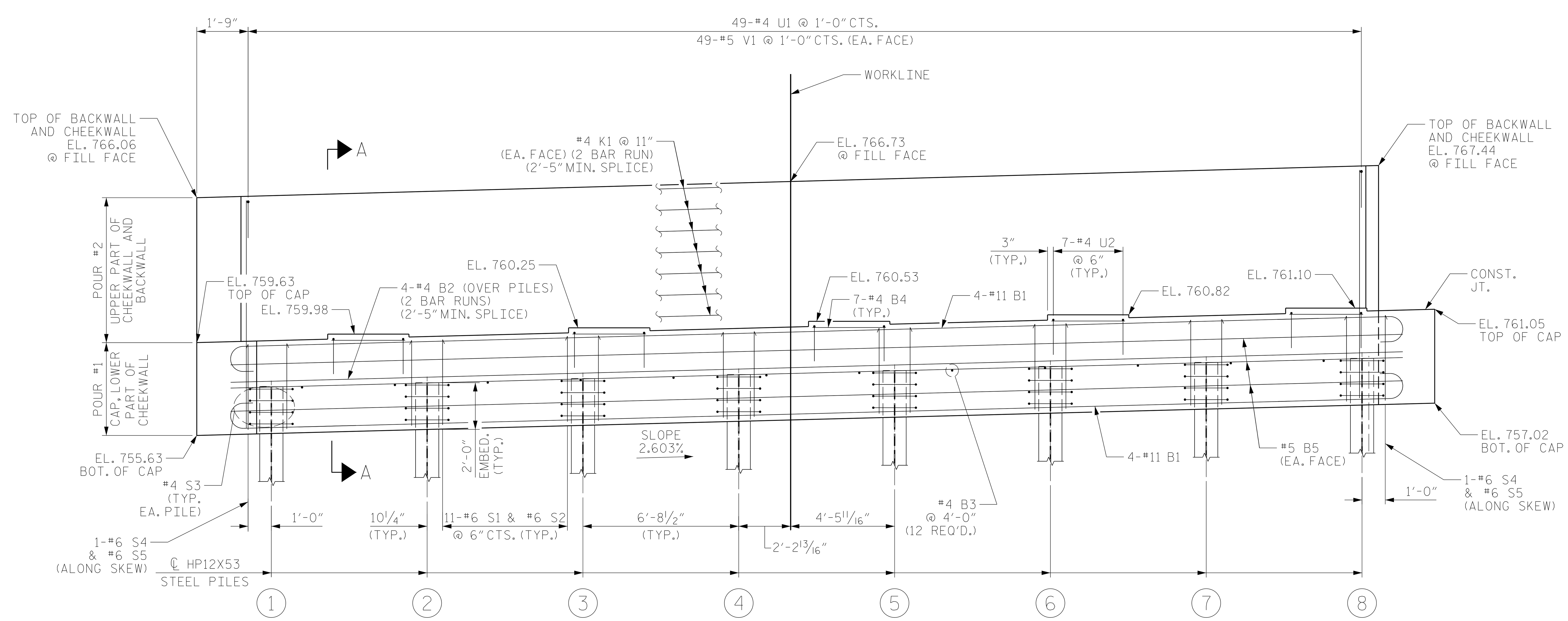
THE TOP SURFACE AREAS OF THE END BENT CAP SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

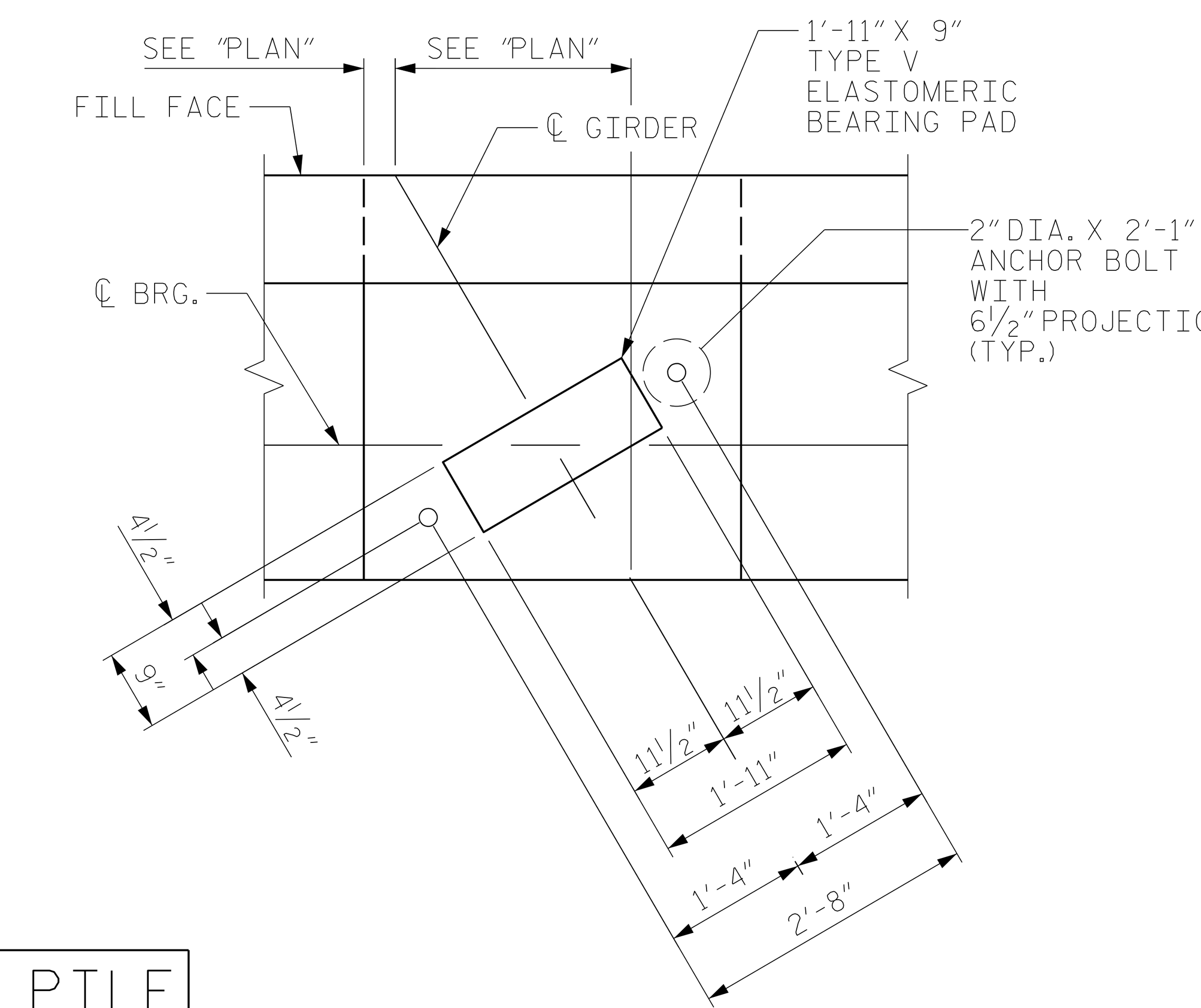


PLAN



ELEVATION

CHEEKWALLS NOT SHOWN FOR CLARITY



DETAIL "A"

DIMENSIONS TYP. EA. GDR. PILES NOT SHOWN FOR CLARITY

TOP OF PILE ELEVATIONS

PILE	ELEVATION
1	757.71
2	757.89
3	758.06
4	758.24
5	758.41
6	758.59
7	758.76
8	758.94

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 1 OF 3

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SUBSTRUCTURE

END BENT NO. 2

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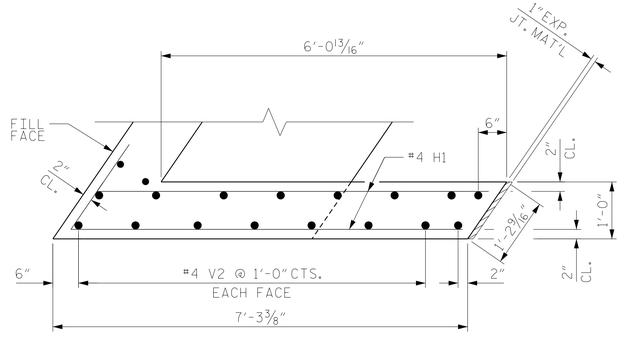
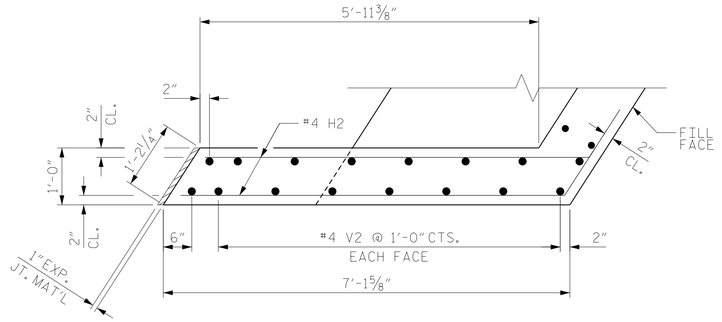
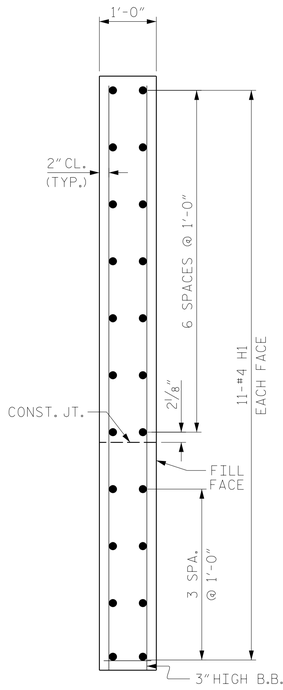


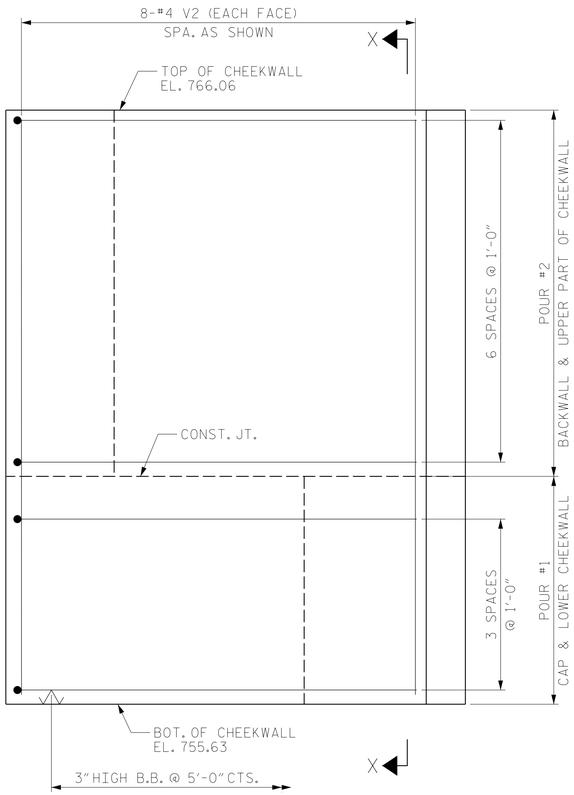
PLAN OF LEFT CHEEKWALL C2



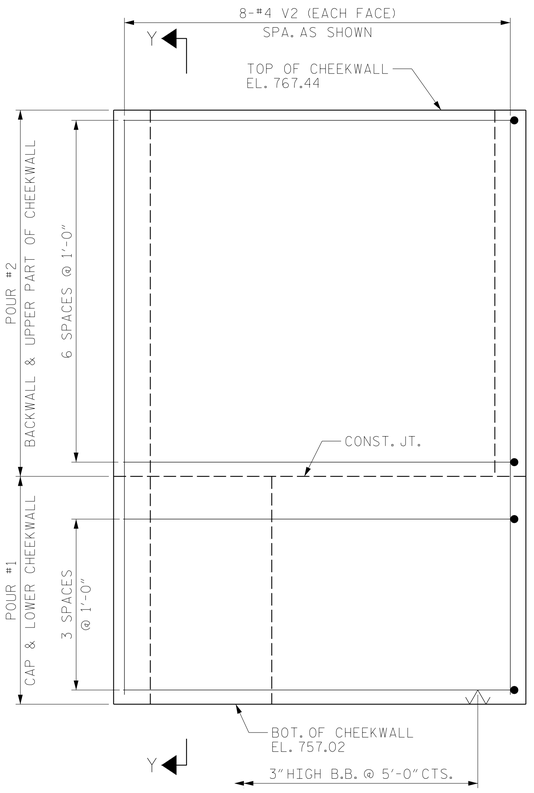
PLAN OF RIGHT CHEEKWALL C1



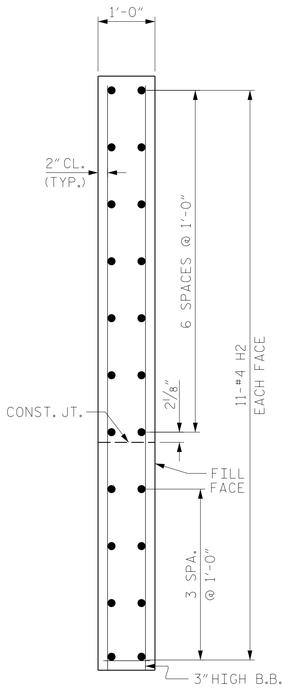
SECTION X-X



ELEVATION OF LEFT CHEEKWALL C2



ELEVATION OF RIGHT CHEEKWALL C1



SECTION Y-Y

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 3

STATE OF NORTH CAROLINA
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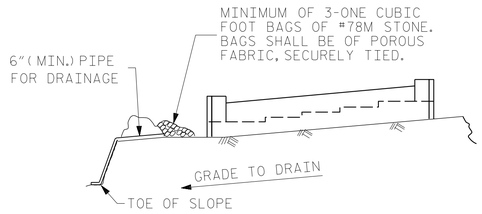


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

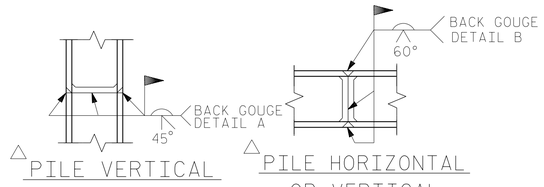
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

TEMPORARY DRAINAGE AT END BENT

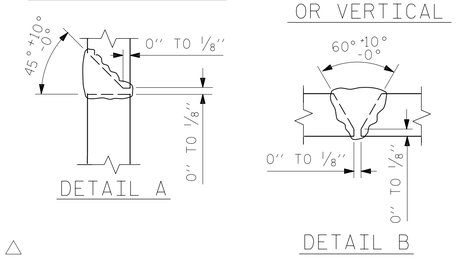
NOTES

THE CONTRACTOR SHALL DESIGN, FURNISH AND INSTALL, A TIE BACK SYSTEM CAPABLE OF RESISTING THE FOLLOWING HORIZONTAL FORCES: 9.5 K/FT UNDER STRENGTH LOADING DEMAND AND 6.6 K/FT UNDER SERVICE LOADING DEMAND. THE CONTRACTOR MAY CHANGE THE STRAP LOCATION SHOWN ABOVE AS LONG AS THE FORCE IS RECALCULATED FOR THE NEW LOCATION. THE TIE BACK SYSTEM SHALL BE SUBMITTED FOR APPROVAL BY THE ENGINEER IN THE FORM OF SHOP DRAWINGS.



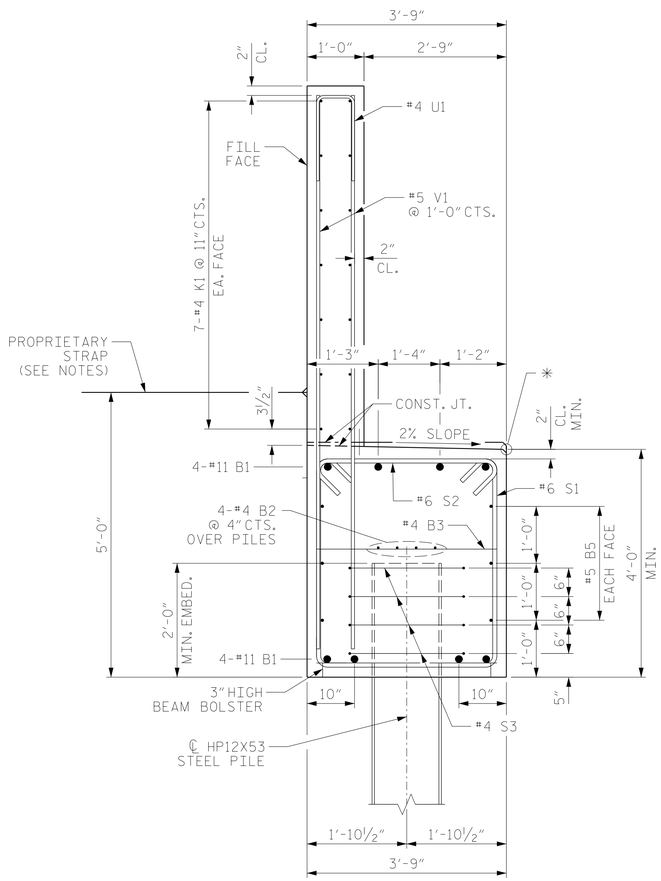
△PILE VERTICAL

△PILE HORIZONTAL OR VERTICAL



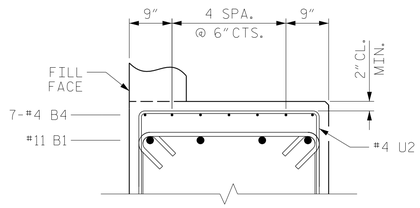
△POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



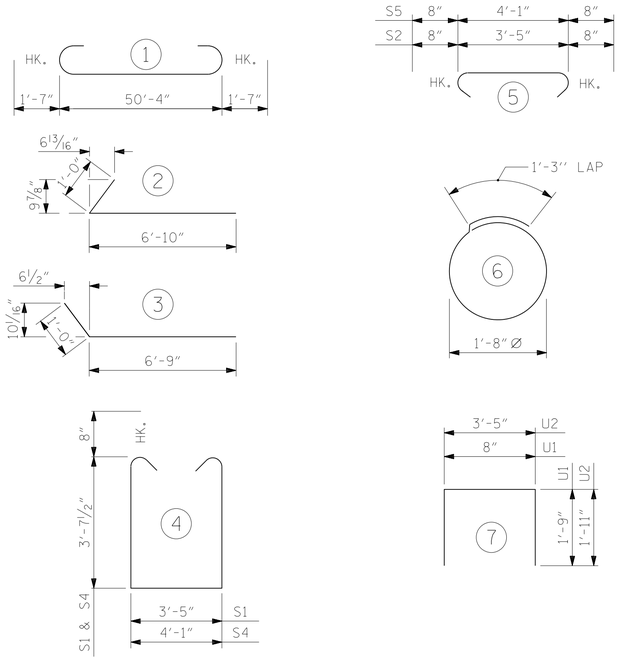
SECTION A-A

*ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT



SECTION THRU BRIDGE SEAT

BAR TYPE



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

END BENT #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#11	1	53'-6"	2274
B2	8	#4	STR	26'-1"	139
B3	12	#4	STR	3'-5"	27
B4	35	#4	STR	3'-2"	74
B5	6	#5	STR	50'-4"	315
H1	22	#4	2	7'-10"	115
H2	22	#4	3	7'-9"	114
K1	28	#4	STR	26'-6"	496
S1	77	#6	4	12'-0"	1388
S2	77	#6	5	4'-9"	549
S3	32	#4	6	6'-6"	139
S4	2	#6	4	12'-8"	38
S5	2	#6	5	5'-5"	16
U1	49	#4	7	4'-2"	136
U2	35	#4	7	7'-3"	170
V1	98	#5	STR	10'-0"	1022
V2	32	#4	STR	10'-0"	214
REINFORCING STEEL					7,226 LBS.

CLASS A CONCRETE BREAKDOWN

POUR #1	CAP & LOWER PART OF CHEEKWALL	29.5 C.Y.
POUR #2	UPPER PART OF CHEEKWALL & BACKWALL	14.6 C.Y.
TOTAL CLASS A CONCRETE		44.1 C.Y.

HP 12 X 53 STEEL PILES

NO: 8 LIN. FT.= 240

PILE DRIVING EQUIPMENT SETUP

HP 12 X 53 No. 8

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 038313 JUSTIN MARK ROBINSON

3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

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

DRAWN BY : MAL, MKO DATE : 12/2016
CHECKED BY : JMR DATE : 12/2016
DESIGN ENGINEER OF RECORD: MKO DATE : 12/2016

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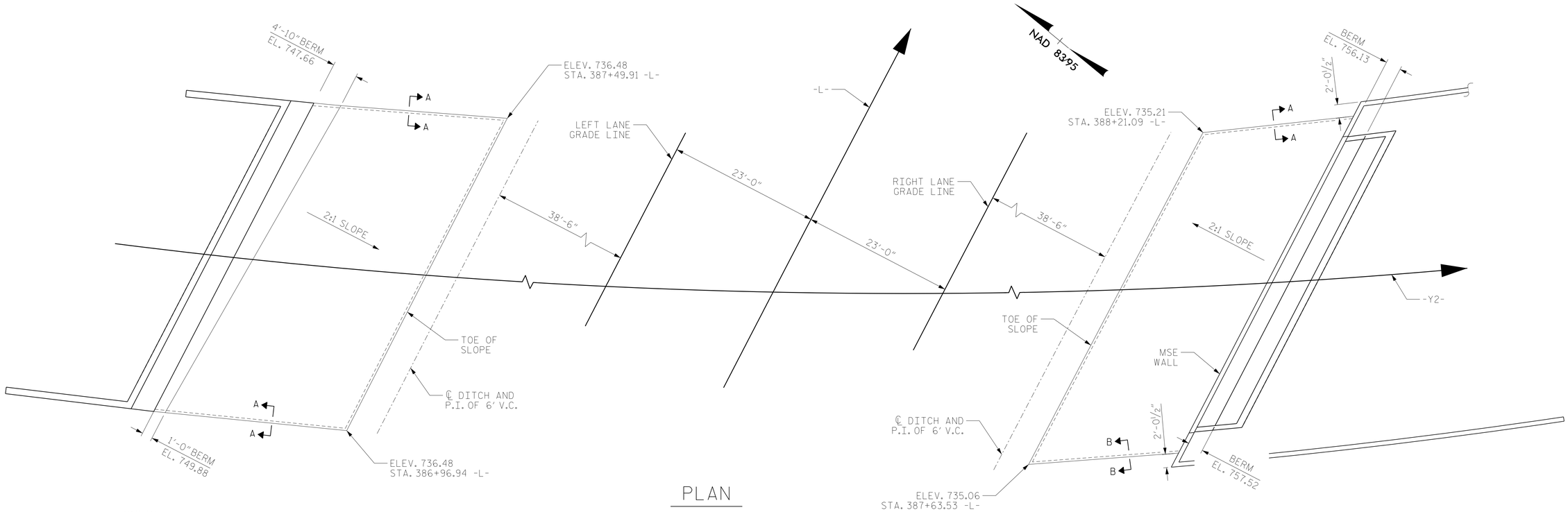


PLAN

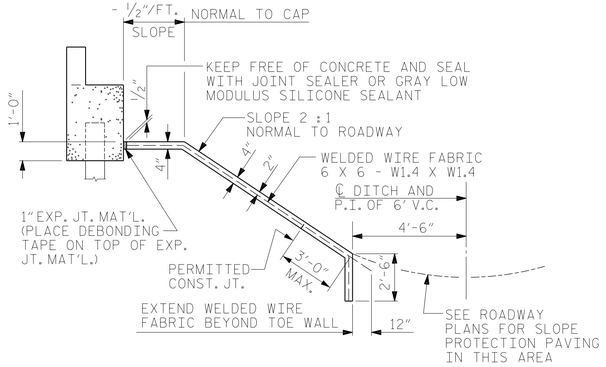
NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

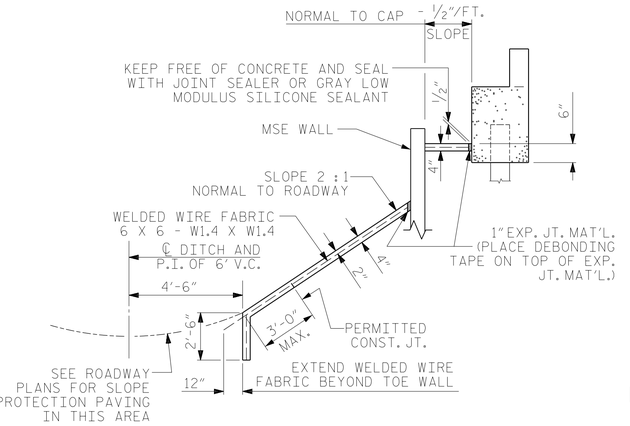
SLOPE PROTECTION SHALL CONSIST OF 4'' POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS ''B''. THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60'' WIDE. SLOPE PROTECTION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

BRIDGE @ STA. 29+07.16 -Y2-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	143	292
END BENT 2	175	332

* QUANTITY SHOWN IS BASED ON 5' POURS.



SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH
END BENT 1



SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH
END BENT 2

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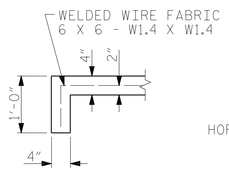
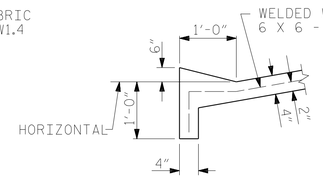
PROJECT NO. R-2707C

CLEVELAND COUNTY

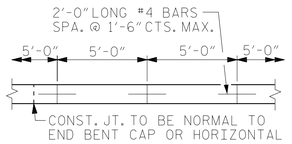
STATION: 29+07.16 -Y2-



SECTION A-A

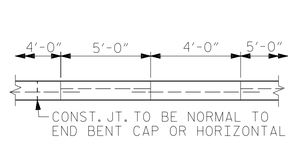


SECTION B-B



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL

NORTH CAROLINA PROFESSIONAL SEAL 039313 ENGINEER JOHN MARK ROBINSON
3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S3-34
1			3			TOTAL SHEETS
2			4			36

DRAWN BY :	MKO	DATE : 12/2016
CHECKED BY :	JMR	DATE : 12/2016
DESIGN ENGINEER OF RECORD:	MKO	DATE : 12/2016

2/28/2017
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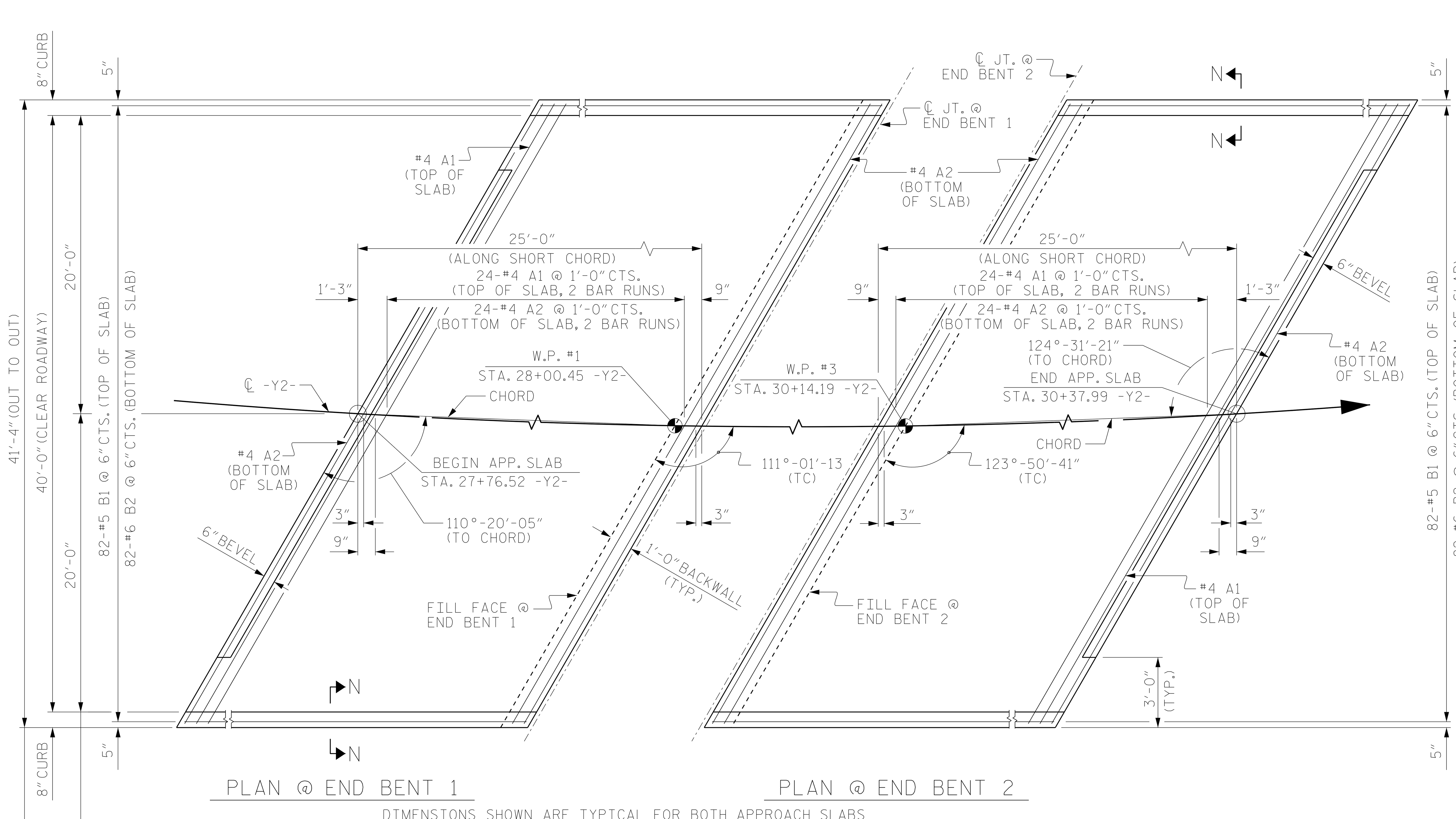


PLAN @ END BENT 1

PLAN @ END BENT 2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

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.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL OR PARAPET AND END POST.

"A" BARS TO BE PLACED PARALLEL TO SKEW AND SPACED ALONG SHORT CHORD.

"B" BARS TO BE PLACED PARALLEL TO SHORT CHORD.

WITH FOAM JOINT SEAL

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

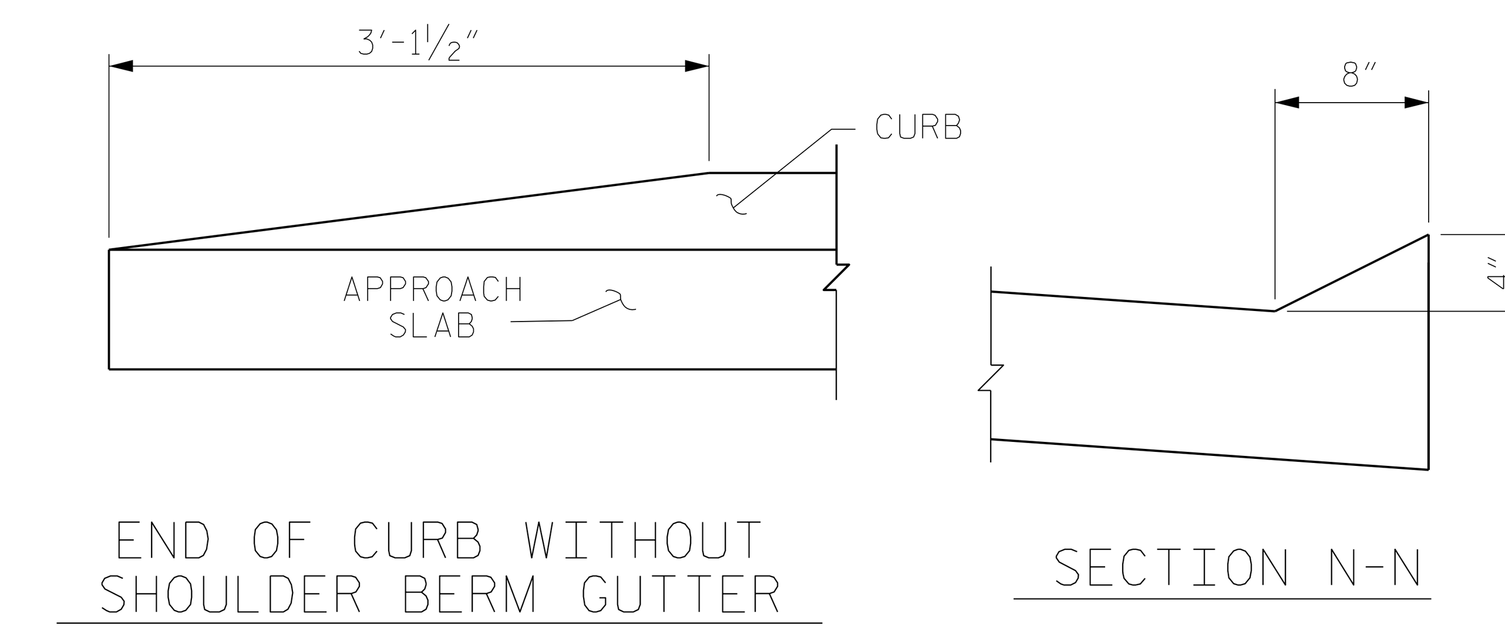
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	23'-0"	768
A2	52	#4	STR	22'-11"	796
* B1	82	#5	STR	24'-0"	2053
B2	82	#6	STR	24'-5"	3007
REINFORCING STEEL				LBS.	3803
* EPOXY COATED REINFORCING STEEL				LBS.	2821
CLASS AA CONCRETE				C.Y.	44.7

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	26'-2"	874
A2	52	#4	STR	26'-0"	903
* B1	82	#5	STR	24'-0"	2053
B2	82	#6	STR	24'-5"	3007
REINFORCING STEEL				LBS.	3910
* EPOXY COATED REINFORCING STEEL				LBS.	2927
CLASS AA CONCRETE				C.Y.	44.7

SPLICE LENGTHS

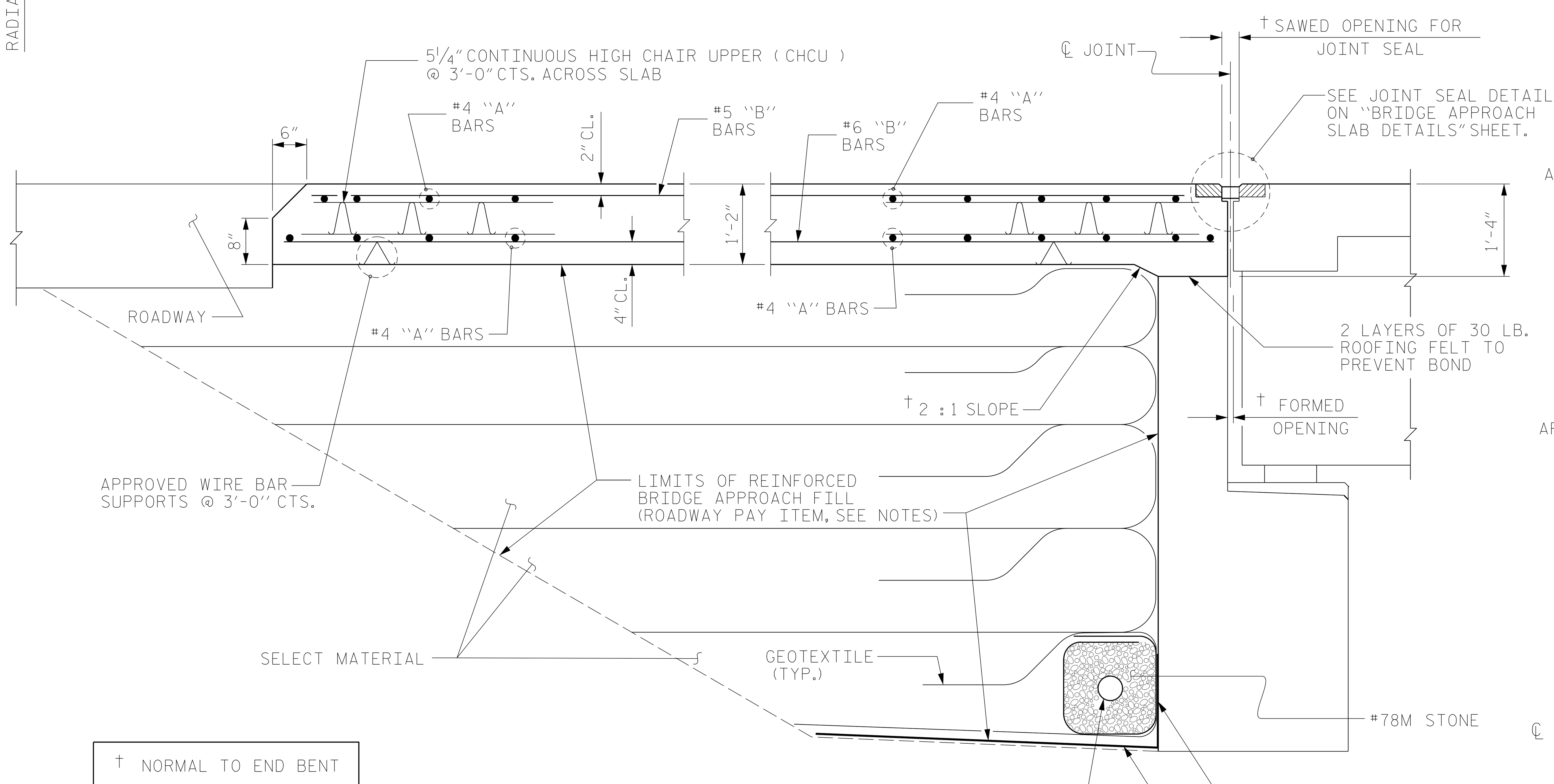
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"



END OF CURB WITHOUT SHOULDER BERM GUTTER

SECTION N-N

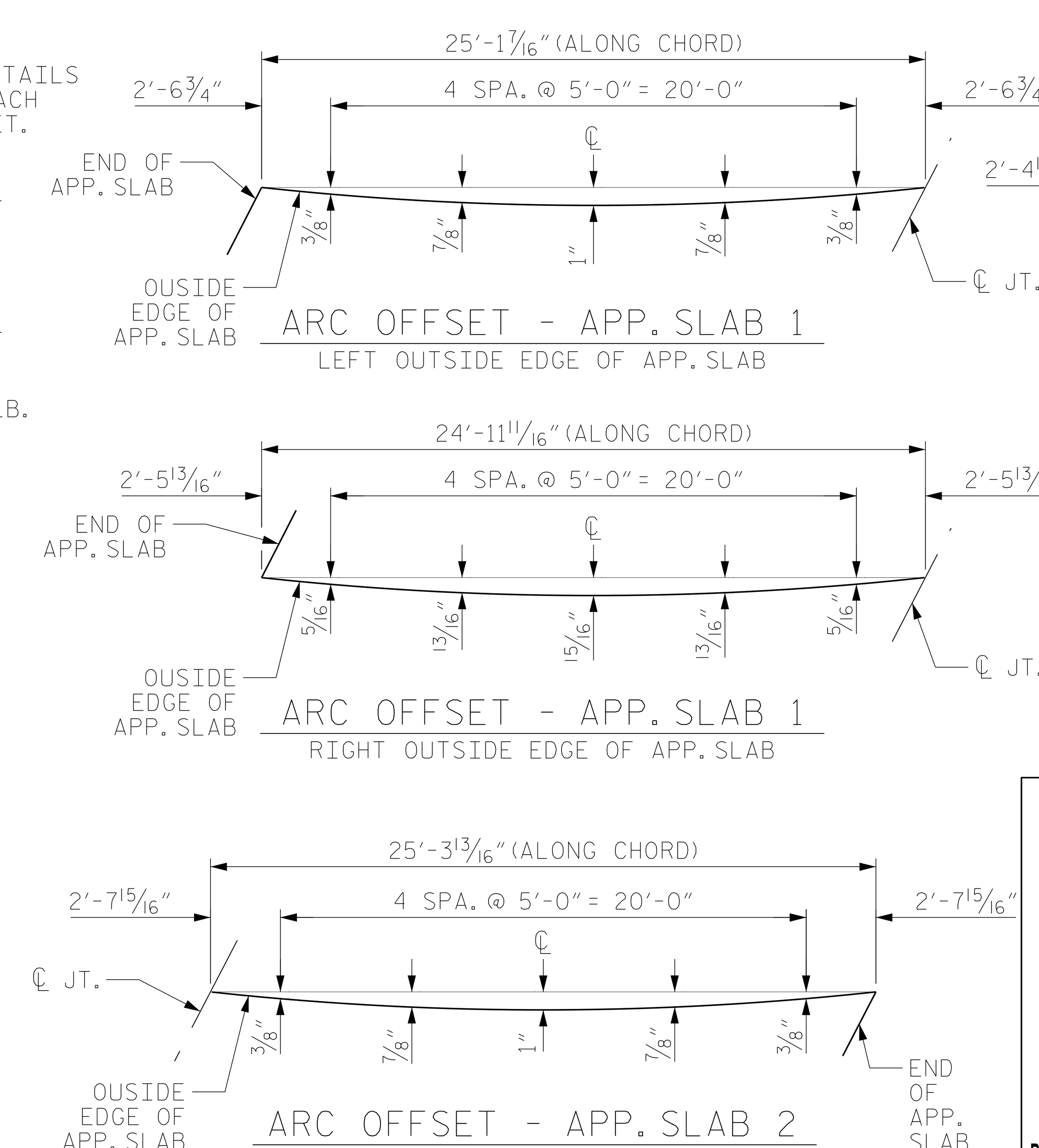
CURB DETAILS



† NORMAL TO END BENT

SECTION THRU SLAB

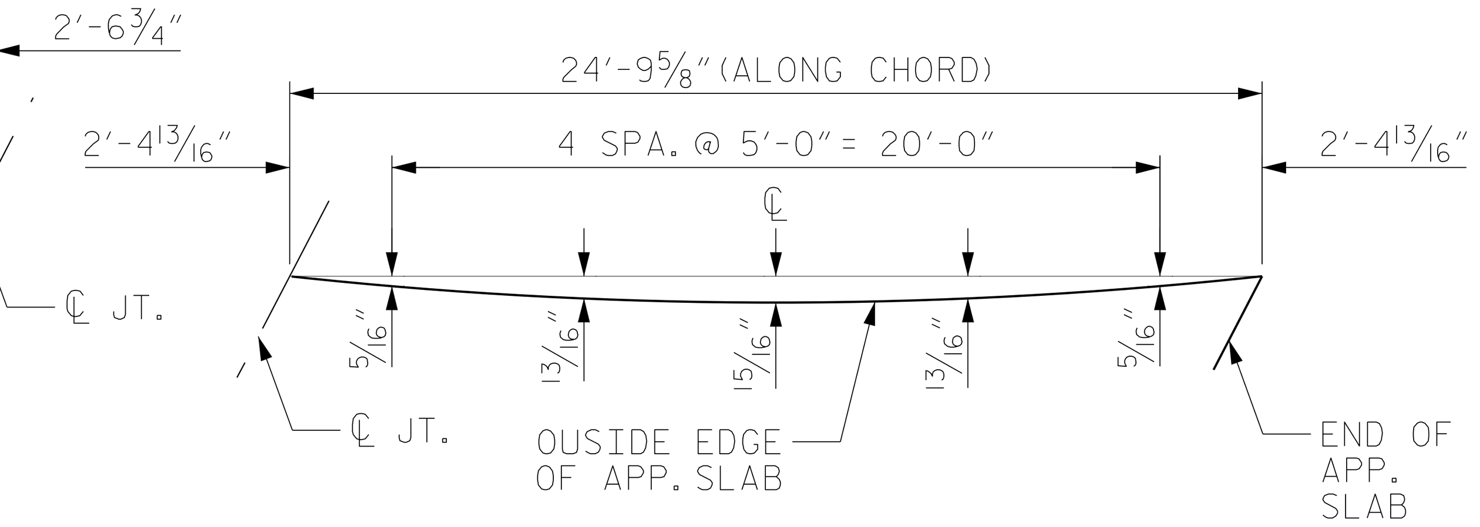
END BENT 1 SHOWN. FOR SECTION AT END BENT 2, SEE SHEET 2 OF 2.



ARC OFFSET - APP. SLAB 1
LEFT OUTSIDE EDGE OF APP. SLAB

ARC OFFSET - APP. SLAB 1
RIGHT OUTSIDE EDGE OF APP. SLAB

ARC OFFSET - APP. SLAB 2
LEFT OUTSIDE EDGE OF APP. SLAB



ARC OFFSET - APP. SLAB 2
RIGHT OUTSIDE EDGE OF APP. SLAB

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 29+07.16 -Y2-

SHEET 1 OF 2

3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

ASSEMBLED BY :	MKO	DATE : 12/2016
CHECKED BY :	JMR	DATE : 12/2016

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

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

SHEET NO. S3-35
TOTAL SHEETS 36

STD. NO. BAS2

2/28/2017
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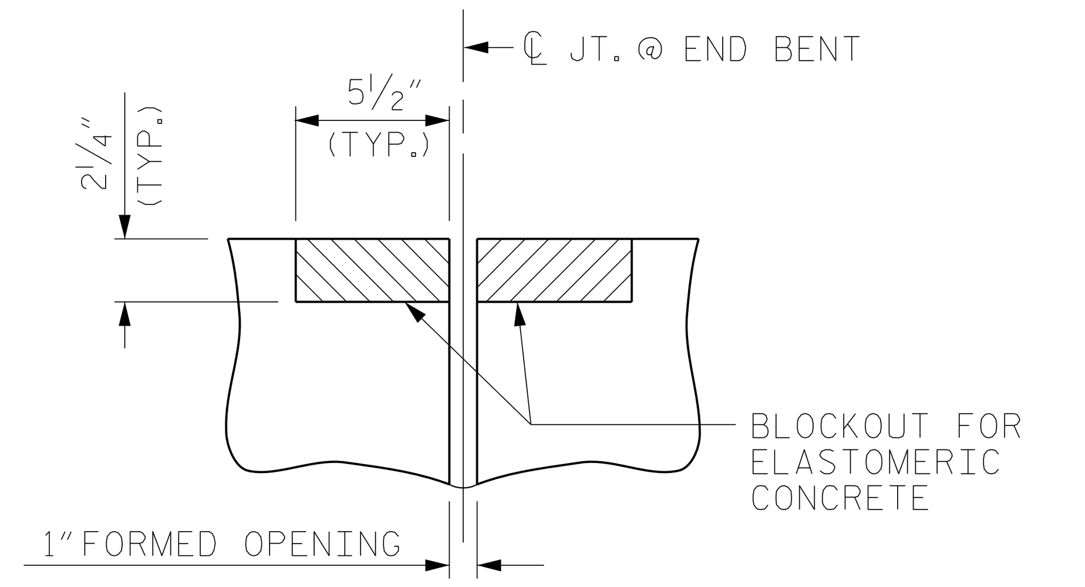
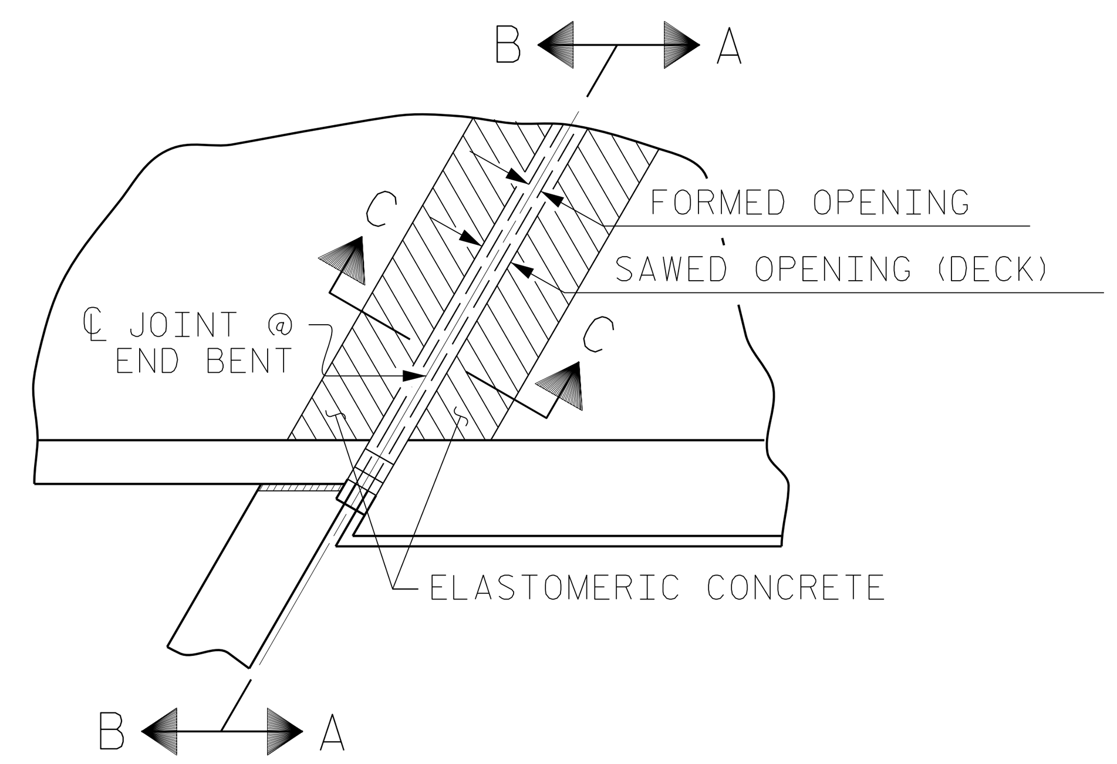
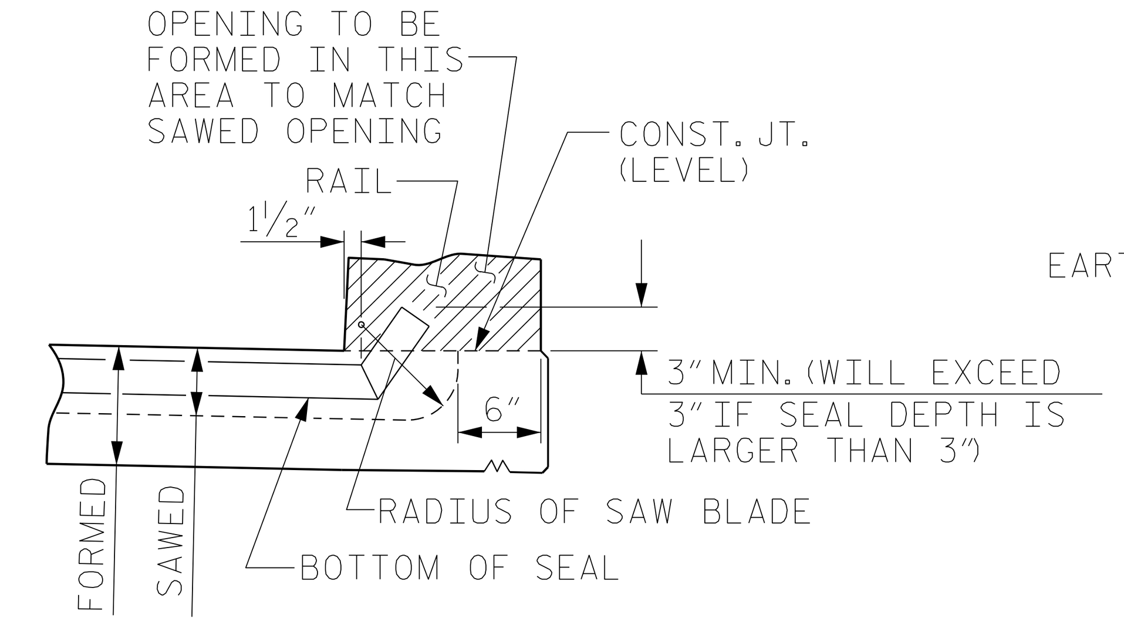


SECTION C-C

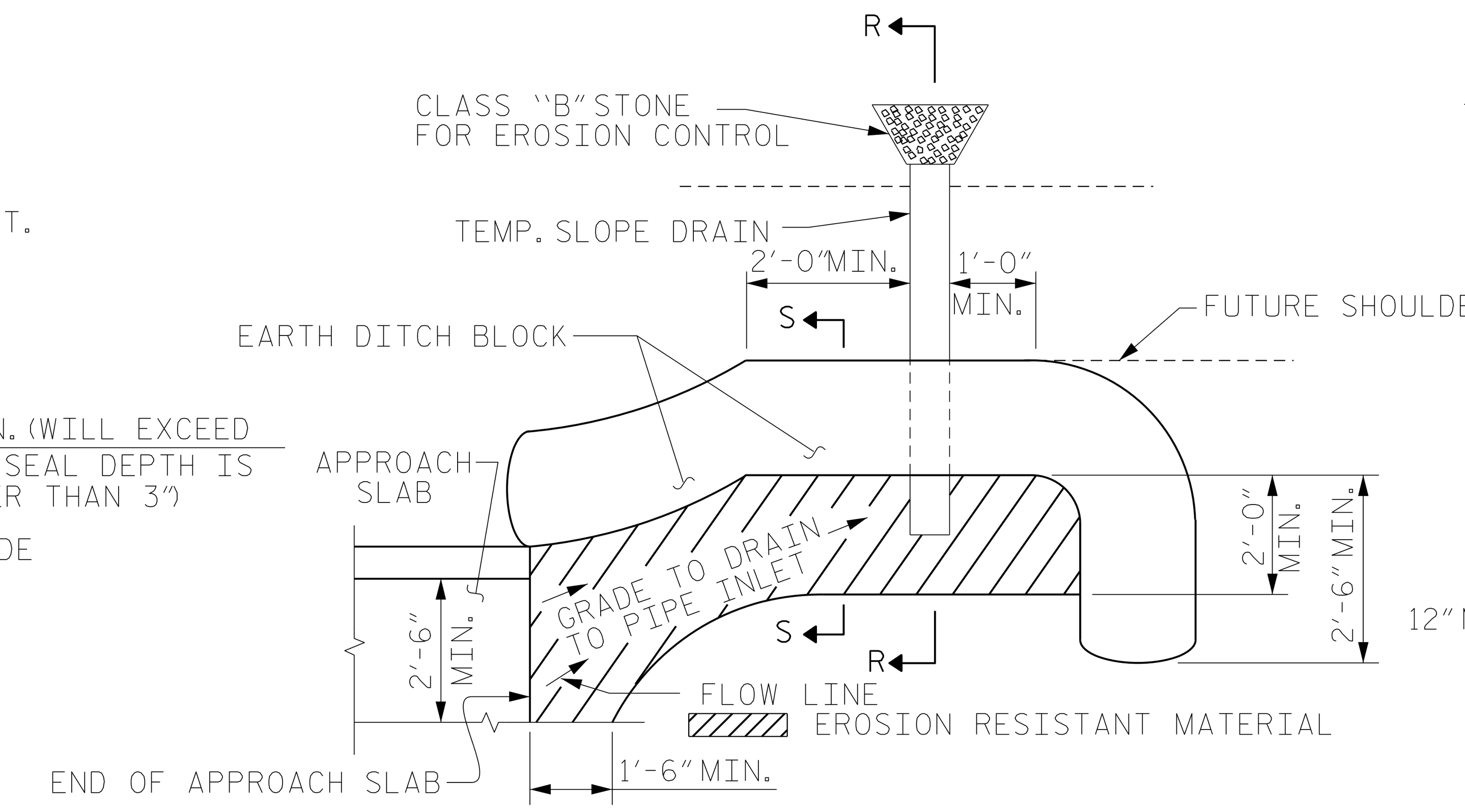
FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC
CONCRETE DIMENSIONS)



PLAN

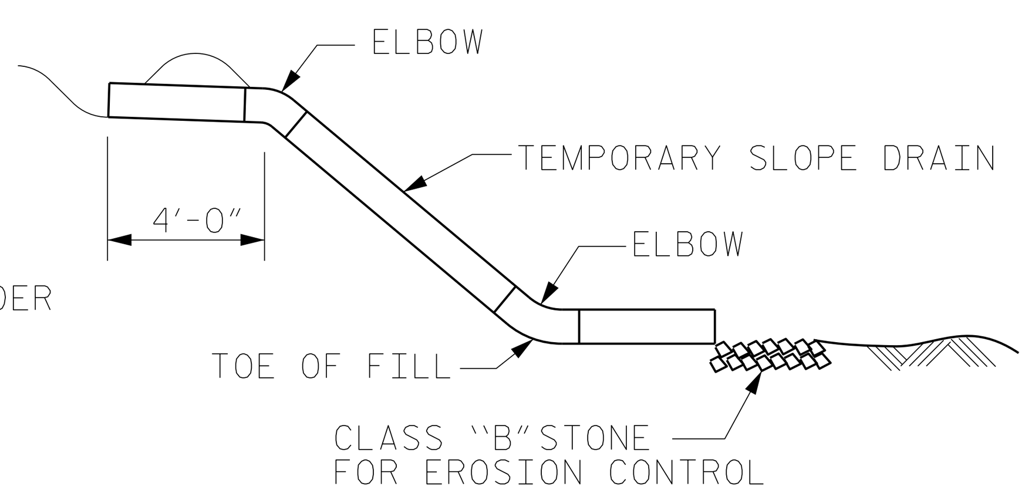


SECTION A-A

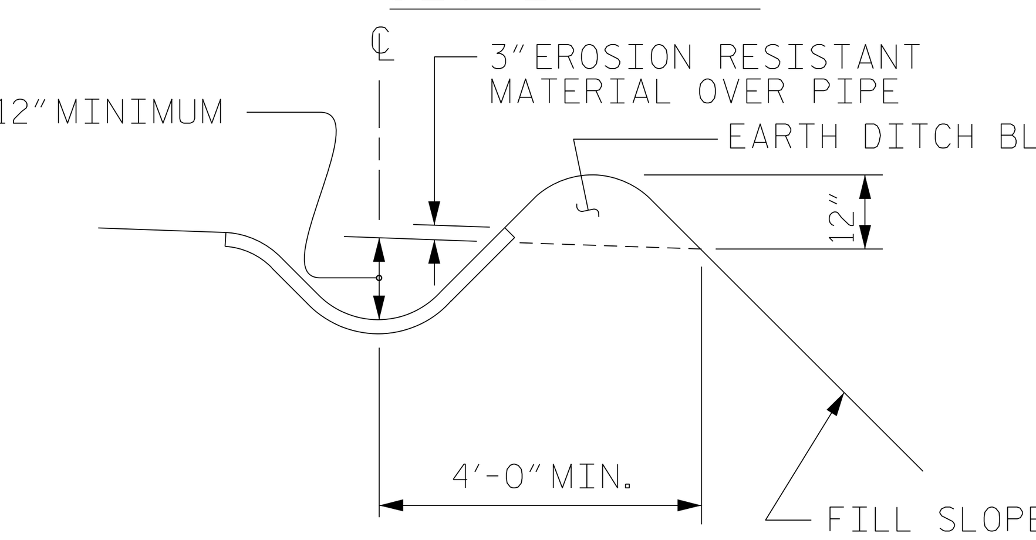


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

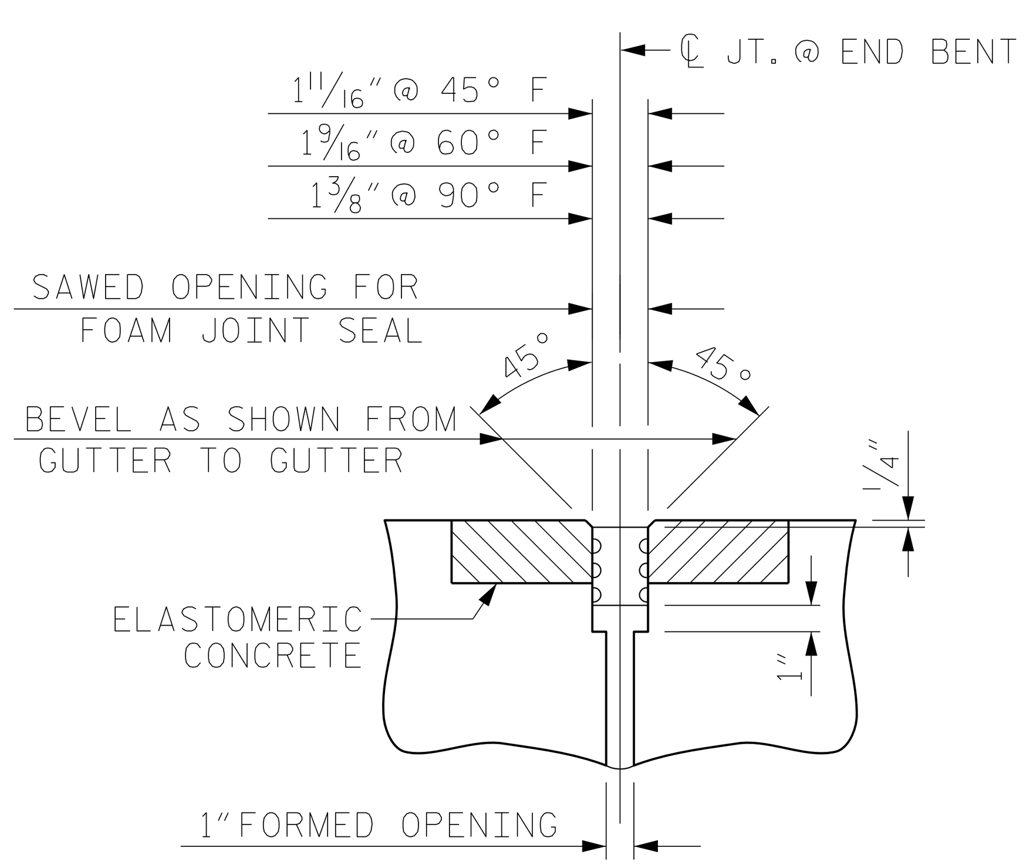
PLAN VIEW



SECTION R-R

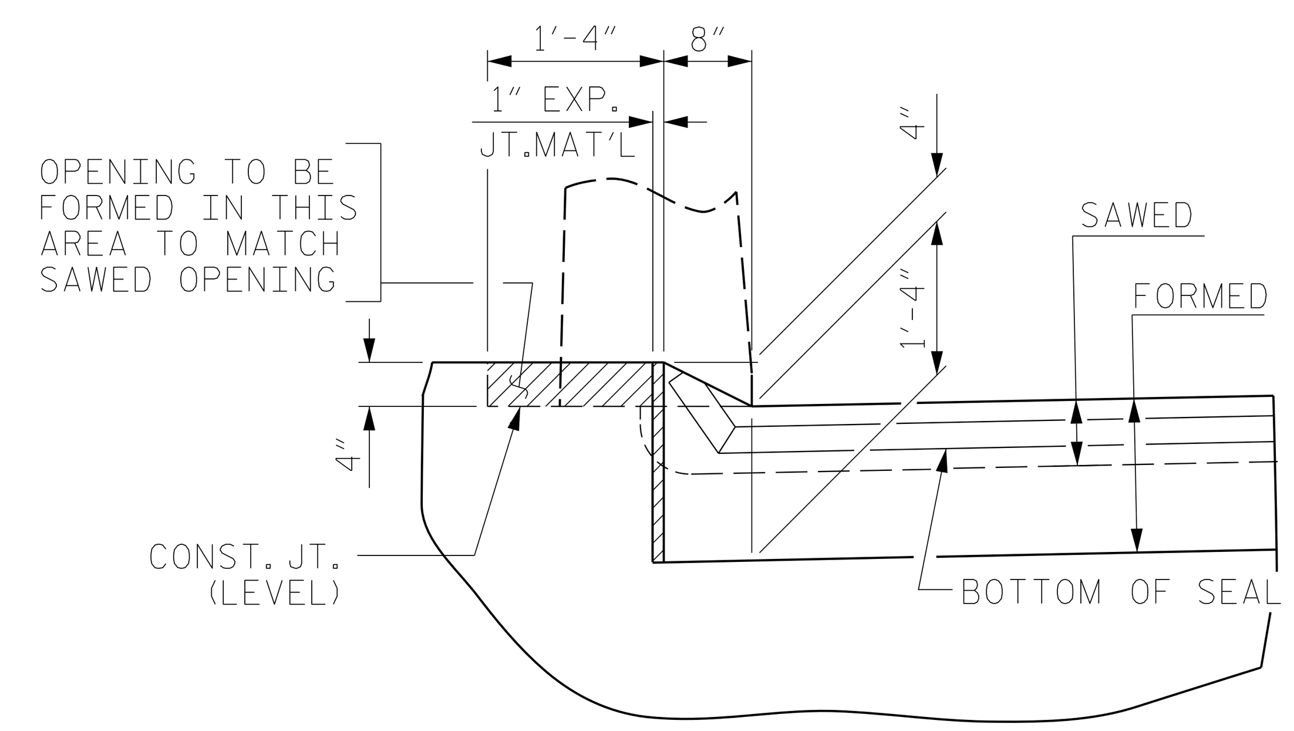


SECTION S-S



SECTION C-C

FOAM JOINT SEAL
(EXPANSION)

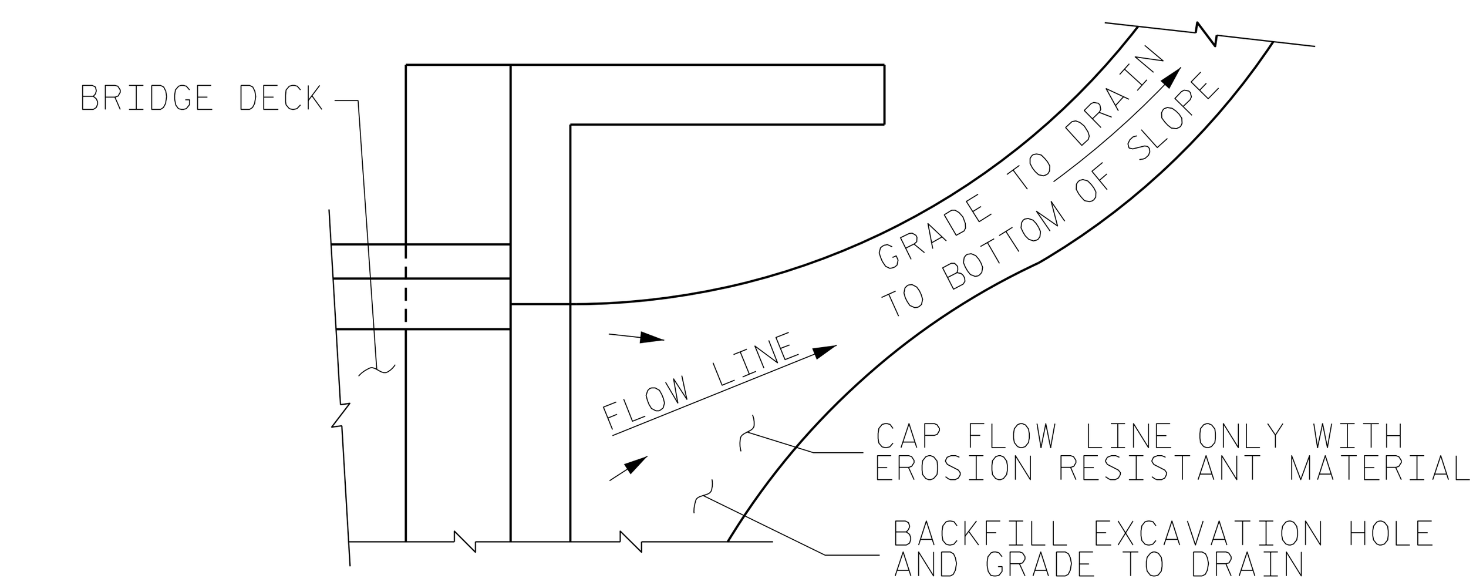


SECTION B-B

JOINT SEAL DETAILS @ END BENT

FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

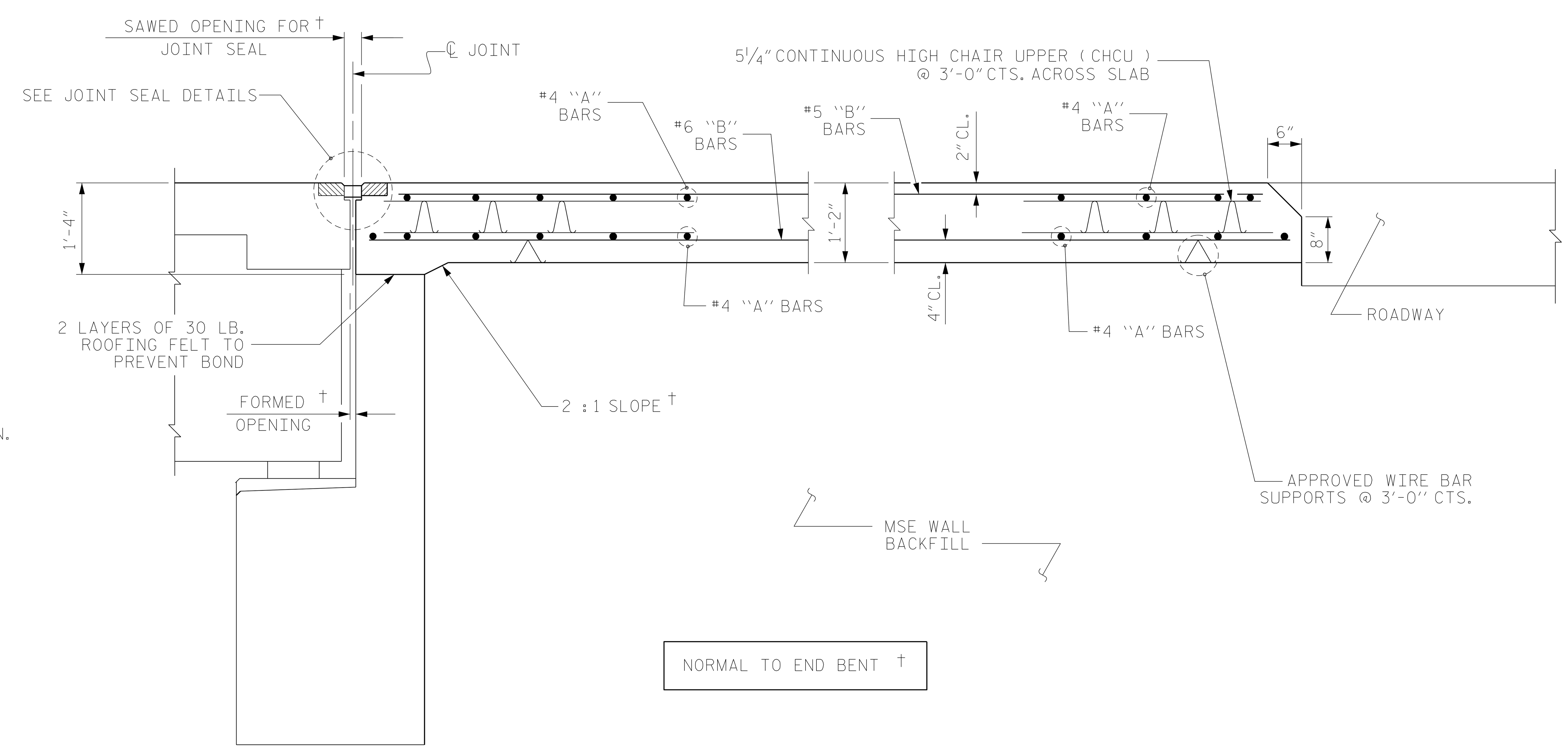


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



SECTION THRU SLAB

END BENT 2 SHOWN.

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE ✻ (CU. FT.)
1	7.4
2	8.3
TOTAL	15.7

✻ BASED ON THE MINIMUM BLOCKOUT SHOWN.

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 29+07.16 -Y2-

SHEET 2 OF 2

SEAL 033913 — NORTH CAROLINA PROFESSIONAL ENGINEER — JUSTIN MARK ROBINSON — 3/2/2017

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

APPROACH SLAB DETAILS

ASSEMBLED BY :	MKO	DATE : 12/2016
CHECKED BY :	JMR	DATE : 12/2016

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

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2			4		

SHEET NO. S3-36

TOTAL SHEETS 36

2/28/2017
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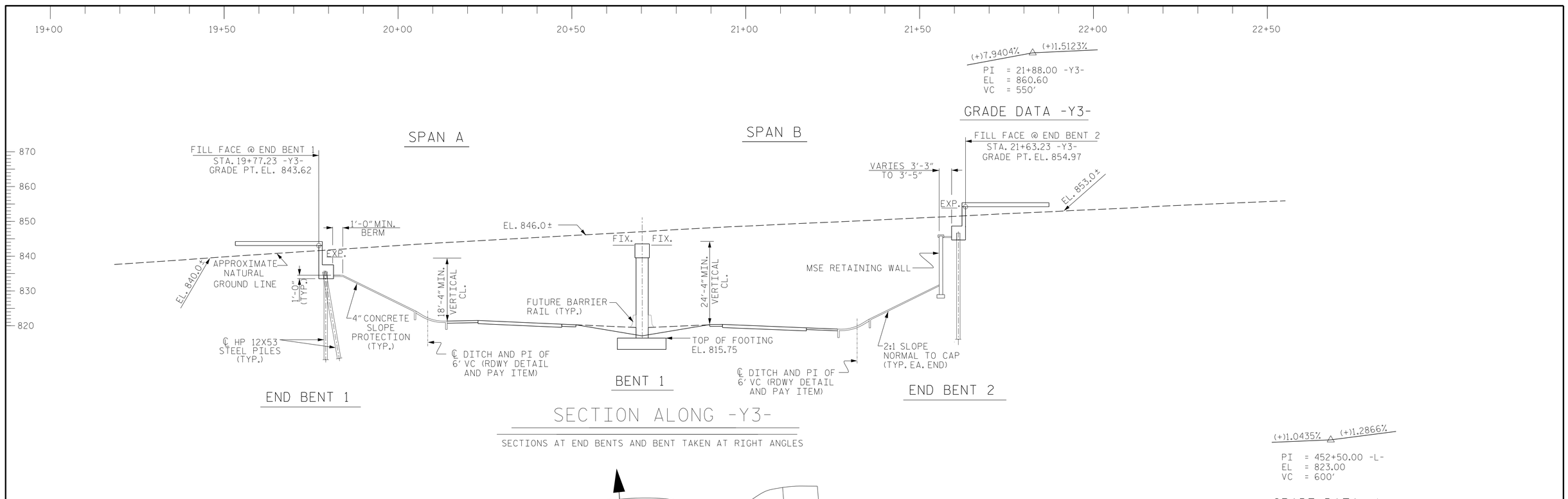

DocuSigned by: Jeff Loftus FE51DC02E67044B... 3/24/2017

SEAL 041425 NORTH CAROLINA PROFESSIONAL ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT
450+02.49 -L- POS

SHEET 1 OF 4 BRIDGE NO. 469

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING FOR BRIDGE OVER US 74/SHELBY BYPASS ON SR 1005 (N LAFAYETTE ST.) BETWEEN SR 1840 AND SR 1827

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-1
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE : 08/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

3/24/2017
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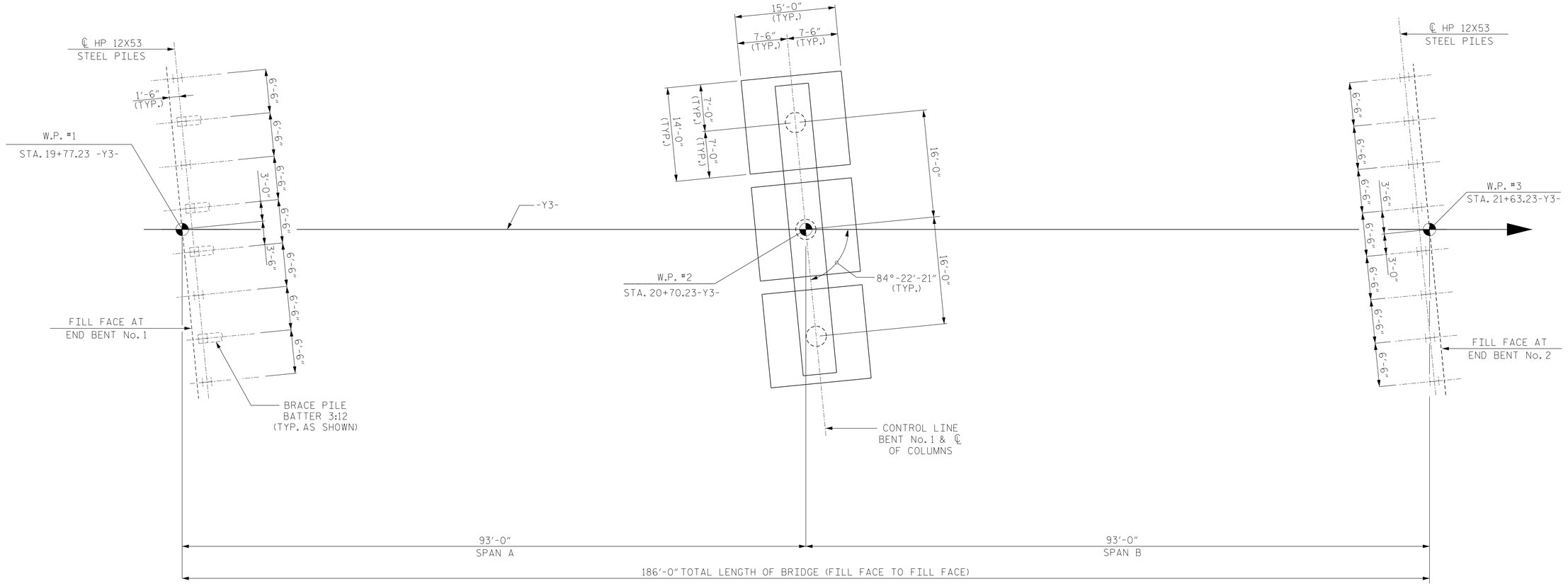
R 2707C_SITE 3



FOUNDATION NOTES

1. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.
3. DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.
4. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
5. DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 170 TONS PER PILE.
6. THE SPREAD FOOTINGS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 6 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 13.5 TSF JUST BEFORE PLACING CONCRETE.

SPECIAL NOTE

1. FOR BENT 1 (LT), UNDERCUT TO ELEVATION 808 SHOULD BE ANTICIPATED. ENGINEER SHALL VERIFY FOOTING ARE BEARING ON WEATHERED ROCK OR ROCK. ANY UNDERCUT SHALL BE BACKFILLED WITH A MINIMUM CLASS B CONCRETE.

FOUNDATION LAYOUT

ALL BENTS ARE PARALLEL

DIMENSIONS LOCATING PILES ARE SHOWN TO PILE CENTERLINE AT BOTTOM OF CAP

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 4

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794AB... 2/6/2017

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STATE OF NORTH CAROLINA
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FOUNDATION LAYOUT

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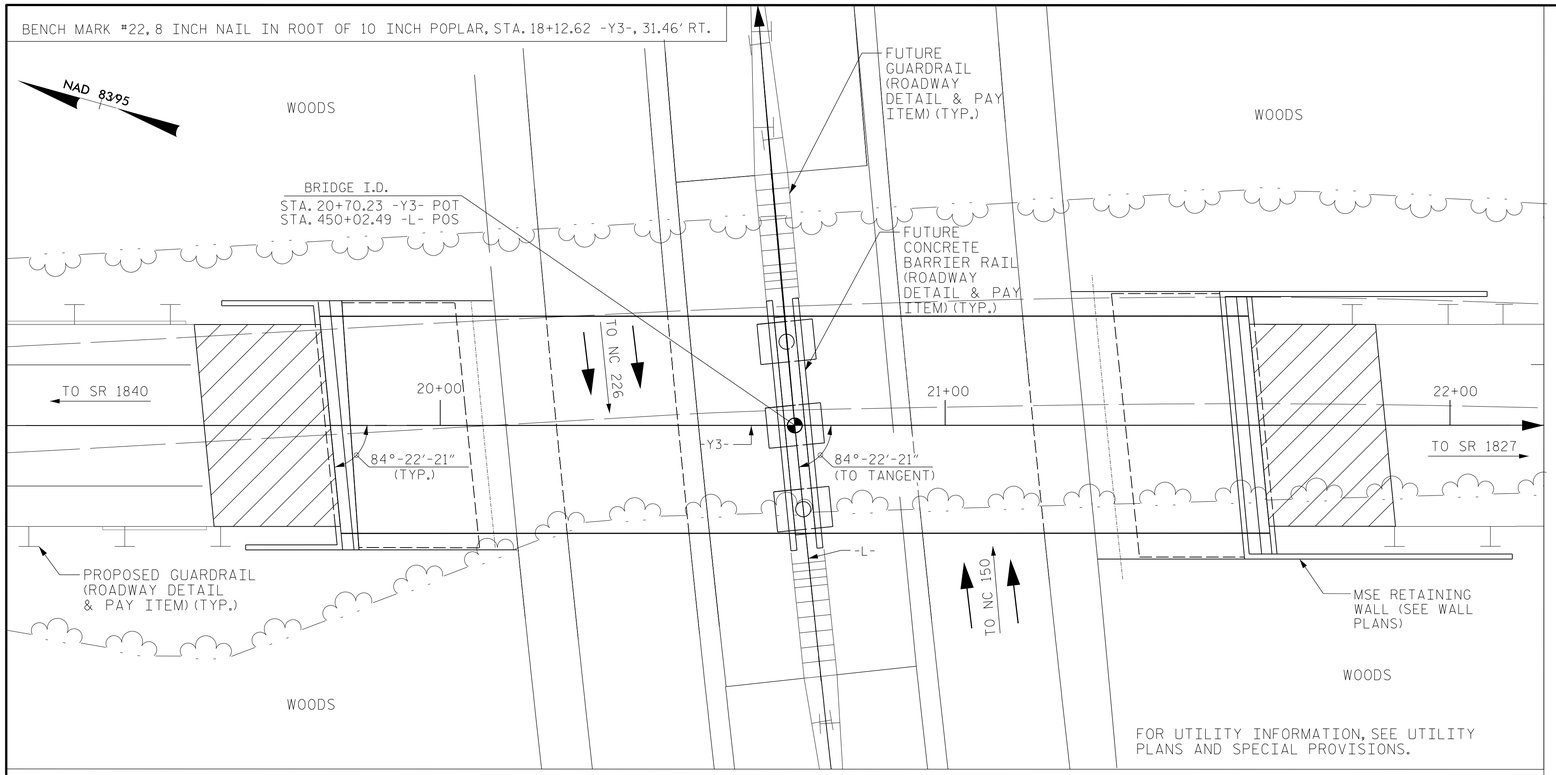

LOCATION SKETCH

1. ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING
2. THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS
3. THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.
4. THE ELEVATION(S) AND CLEARANCE(S) SHOWN ON THE PLANS AT THE POINT(S) OF MINIMUM VERTICAL CLEARANCE ARE FROM THE BEST INFORMATION AVAILABLE. PRIOR TO BEGINNING BRIDGE CONSTRUCTION, VERIFY THE ELEVATION(S) ON THE EXISTING PAVEMENT AND CHECK THE CLEARANCE. REPORT ANY VARIATIONS TO THE ENGINEER. ANY PLAN REVISIONS NECESSARY TO ACHIEVE THE REQUIRED MINIMUM VERTICAL CLEARANCE WILL BE PROVIDED BY THE DEPARTMENT.
5. REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
6. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
7. FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
8. FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
9. FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
10. FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
11. FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS
12. FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
13. NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
14. THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2" AT END BENTS 1 & 2.
15. FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.
16. FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.
17. FOR FOUNDATION NOTES, SEE SHEET S4-2.
18. 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.

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT 1	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOOR	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 12X53 STEEL PILES	HP 12X53 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEAL
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS	LBS	NO.	LIN. FT.	EACH	No.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		7,954	8,558		LUMP SUM			8	729'-0"				367.81		LUMP SUM	LUMP SUM
END BENT No. 1				43.8		6,720				8	8	200		168		
BENT No. 1	LUMP SUM			131.9		24,444	1,599									
END BENT No. 2				35.1		5,138				8	8	380		175		
TOTAL	LUMP SUM	7,954	8,558	210.8	LUMP SUM	36,302	1,599	8	729'-0"	16	16	580	367.81	343	LUMP SUM	LUMP SUM

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NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M LOFTUS

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SHEET 3 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER
US 74/SHELBY BYPASS
ON SR 1005 (N LAFAYETTE ST.)
BETWEEN SR 1840 AND SR 1827

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3/28/2017
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LOAD AND RESISTANCE FACTOR RATING (LRFR) SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

LEVEL		VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W × RF	STRENGTH I LIMIT STATE											SERVICE III LIMIT STATE						COMMENT NUMBER
								MOMENT					SHEAR						MOMENT						
							LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS (γ_{LL})	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	1	1.36	--	1.75	0.950	1.99	A	E	44.8	1.118	1.46	B	I	8.40	0.80	0.874	1.36	A	I	44.8	
		HL-93 (OPERATING)	N/A		1.89	--	1.35	0.950	2.54	A	E	44.8	1.118	1.89	B	I	8.40	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	2	1.84	66.24	1.75	0.950	2.64	A	E	44.8	1.118	1.97	B	I	35.7	0.80	0.874	1.84	A	I	44.8	
		HS-20 (OPERATING)	36.000		2.50	90.00	1.35	0.950	3.43	A	E	44.8	1.118	2.50	B	I	35.7	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		3.39	45.76	1.40	0.950	7.41	A	E	44.8	1.118	5.04	A	I	54.0	0.80	0.874	3.39	B	I	44.8	
		SNGARBS2	20.000		2.49	49.80	1.40	0.950	5.39	B	E	54.0	1.118	3.78	A	I	54.0	0.80	0.874	2.49	A	I	44.8	
		SNAGRIS2	22.000		2.33	51.26	1.40	0.950	5.06	B	E	54.0	1.118	3.56	A	I	54.0	0.80	0.874	2.33	A	I	44.8	
		SNCOTTS3	27.250		1.69	46.05	1.40	0.950	3.66	A	E	44.8	1.118	2.68	A	I	54.0	0.80	0.874	1.69	A	I	44.8	
		SNAGGRS4	34.925		1.40	48.89	1.40	0.950	3.04	B	E	54.0	1.118	2.21	A	I	54.0	0.80	0.874	1.40	A	I	44.8	
		SNS5A	35.550		1.38	49.05	1.40	0.950	2.98	A	E	35.7	1.118	2.26	A	I	54.0	0.80	0.874	1.38	A	I	44.8	
		SNS6A	39.950		1.25	49.93	1.40	0.950	2.72	B	E	54.0	1.118	2.09	A	I	54.0	0.80	0.874	1.25	A	I	44.8	
		SNS7B	42.000		1.19	49.98	1.40	0.950	2.59	A	E	44.8	1.118	2.08	A	I	54.0	0.80	0.874	1.19	A	I	44.8	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.54	50.82	1.40	0.950	3.34	B	E	54.0	1.118	2.40	B	I	35.7	0.80	0.874	1.54	A	I	44.8	
		TNT4A	33.075		1.53	50.60	1.40	0.950	3.31	B	E	54.0	1.118	2.57	A	I	54.0	0.80	0.874	1.53	A	I	44.8	
		TNT6A	41.600		1.25	52.00	1.40	0.950	2.71	A	E	44.8	1.118	2.18	A	I	81.3	0.80	0.874	1.25	A	I	44.8	
		TNT7A	42.000		1.25	52.50	1.40	0.950	2.71	A	E	35.7	1.118	2.14	A	I	54.0	0.80	0.874	1.25	A	I	44.8	
		TNT7B	42.000		1.28	53.76	1.40	0.950	2.76	B	E	54.0	1.118	2.02	A	I	54.0	0.80	0.874	1.28	A	I	44.8	
		TNAGRIT4	43.000		1.23	52.89	1.40	0.950	2.66	B	E	54.0	1.118	2.02	B	I	35.7	0.80	0.874	1.23	A	I	44.8	
		TNAGT5A	45.000		1.16	52.20	1.40	0.950	2.53	B	E	54.0	1.118	1.97	A	I	81.3	0.80	0.874	1.16	A	I	44.8	
		TNAGT5B	45.000	3	1.15	51.75	1.40	0.950	2.49	A	E	44.8	1.118	1.87	A	I	54.0	0.80	0.874	1.15	A	I	44.8	

LOAD FACTORS:

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

(#) CONTROLLING LOAD RATING

(1) DESIGN LOAD RATING (HL-93)

(2) DESIGN LOAD RATING (HS-20)

(3) LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

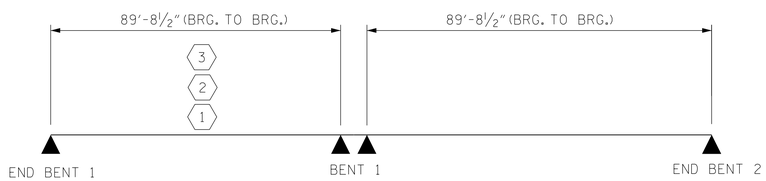
GIRDER LOCATION

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

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.



LRFR SUMMARY

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 2/6/2017

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CLEVELAND COUNTY

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SHEET 4 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

LRFR SUMMARY FOR PRESTRESSED CONCRETE GIRDERS

(NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-4
1			3			TOTAL SHEETS
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STR. #4

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2/6/2017
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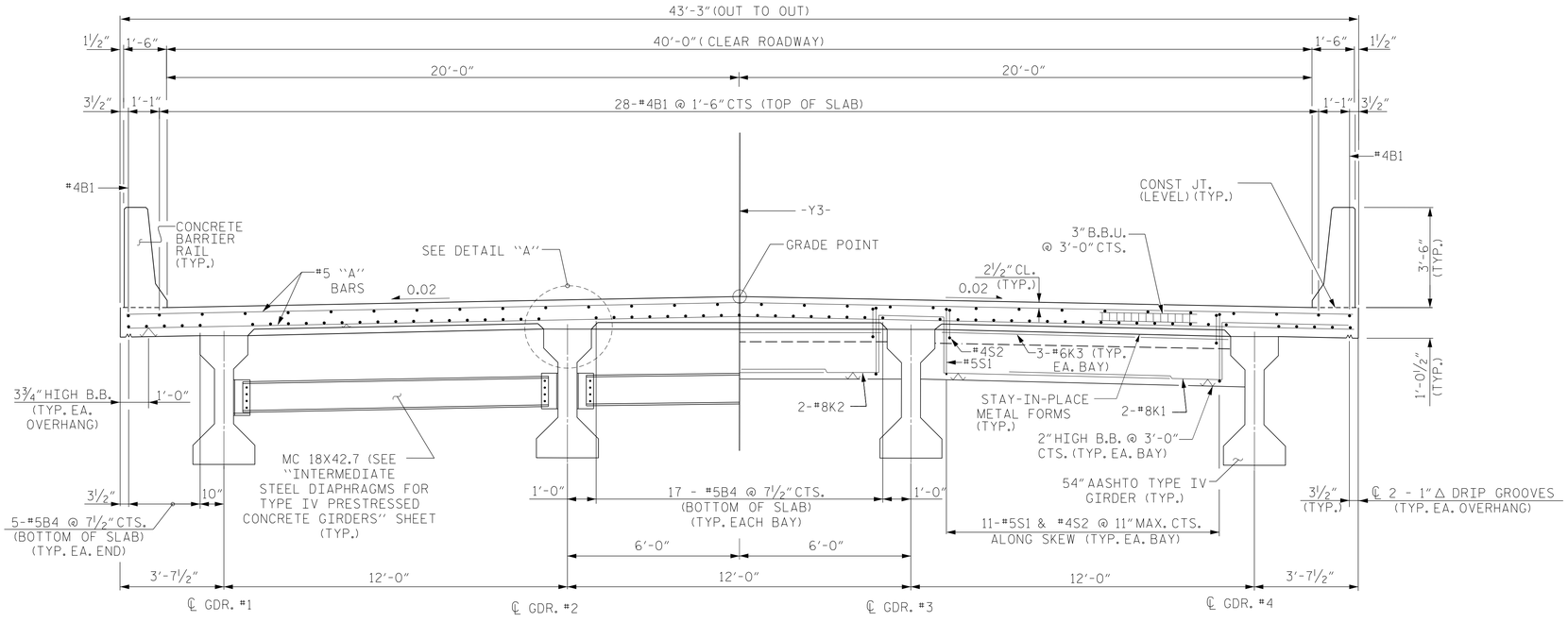


TYPICAL SECTION

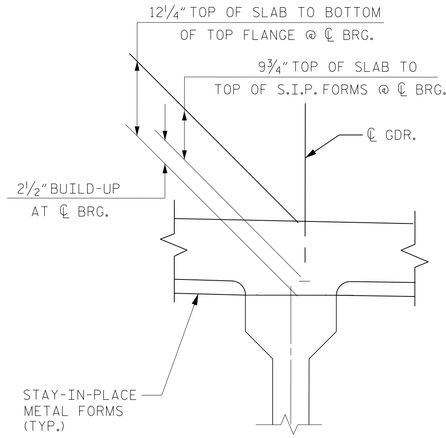
SHOWING INTERMEDIATE DIAPHRAGM

TYPICAL SECTION

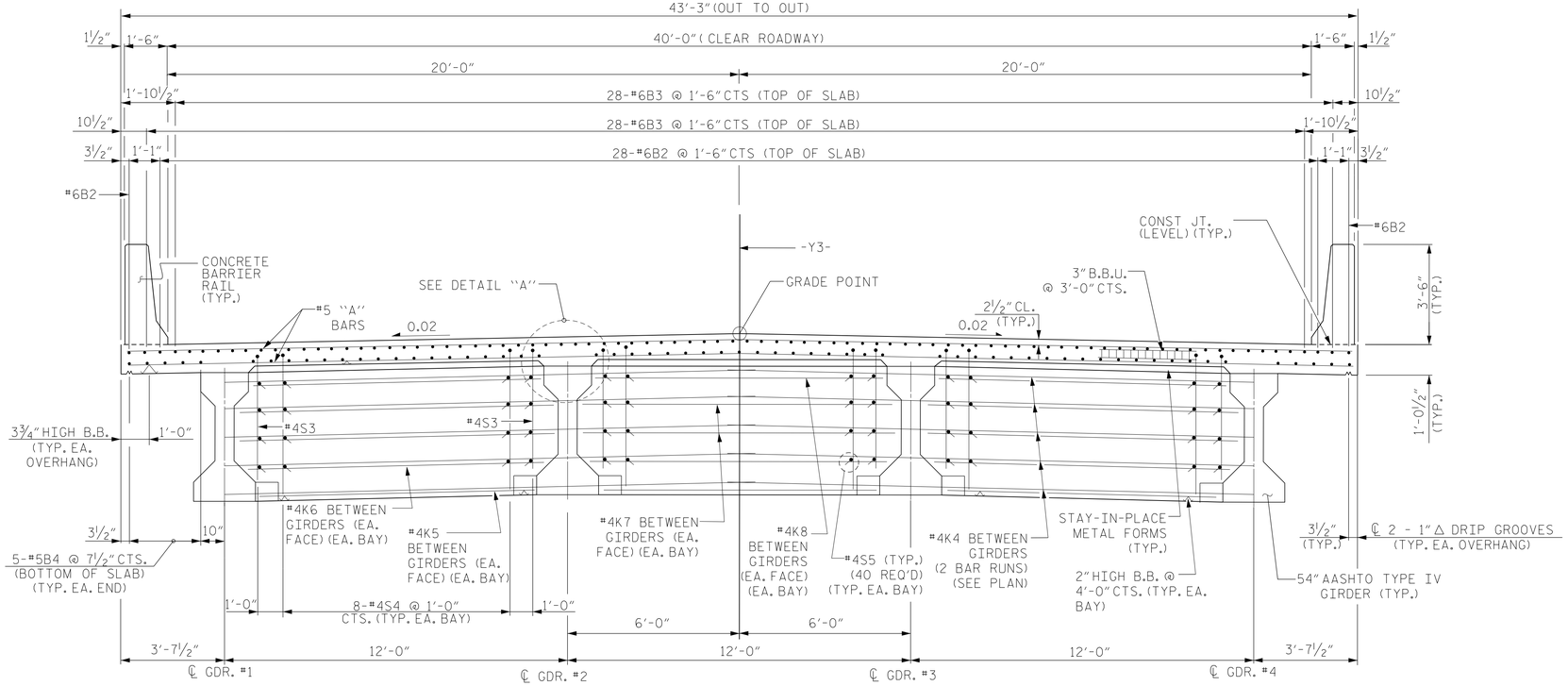
SHOWING END-BENT DIAPHRAGMS

NOTES:

1. PROVIDE 1¼" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF 'A' BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF 'A' BARS A CLEAR DISTANCE OF 2½" ABOVE THE TOP OF THE REMOVABLE FORM.
2. LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.
3. PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.



DETAIL "A"



TYPICAL SECTION

SHOWING INTERIOR BENT DIAPHRAGMS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

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SUPERSTRUCTURE

TYPICAL SECTION

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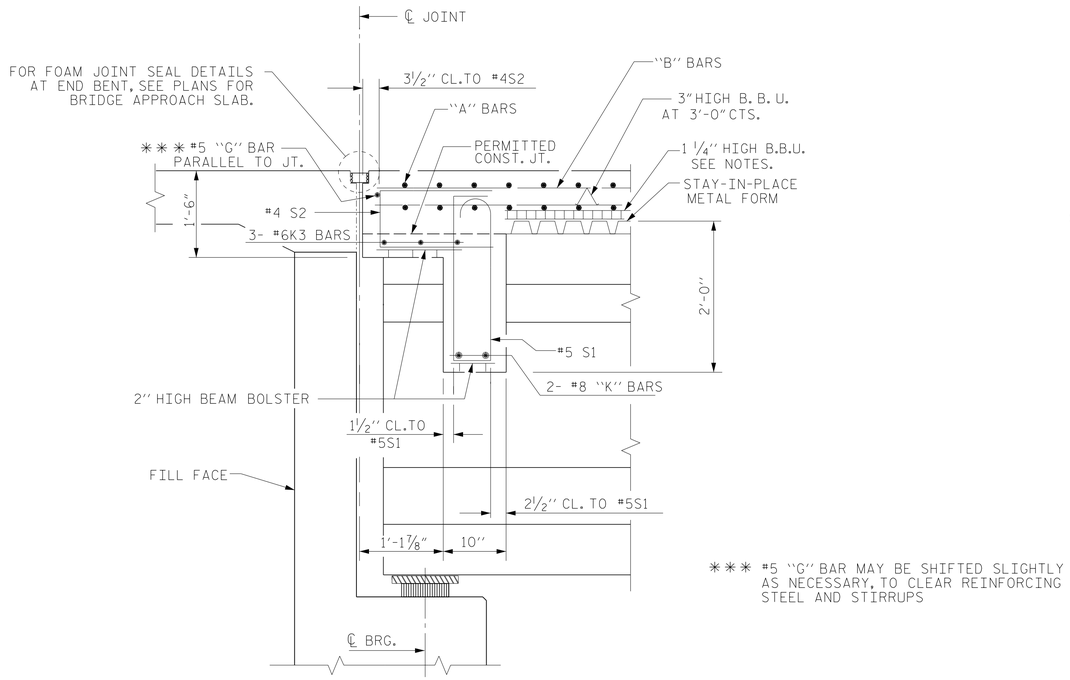
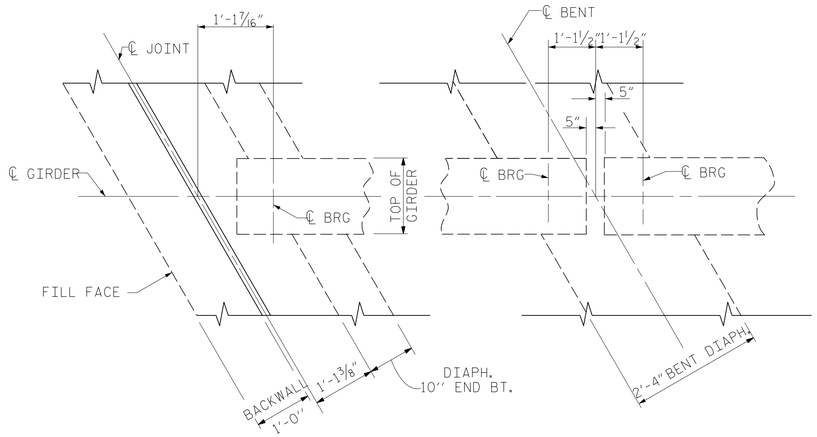


SECTION @ END BENT DIAPHRAGM

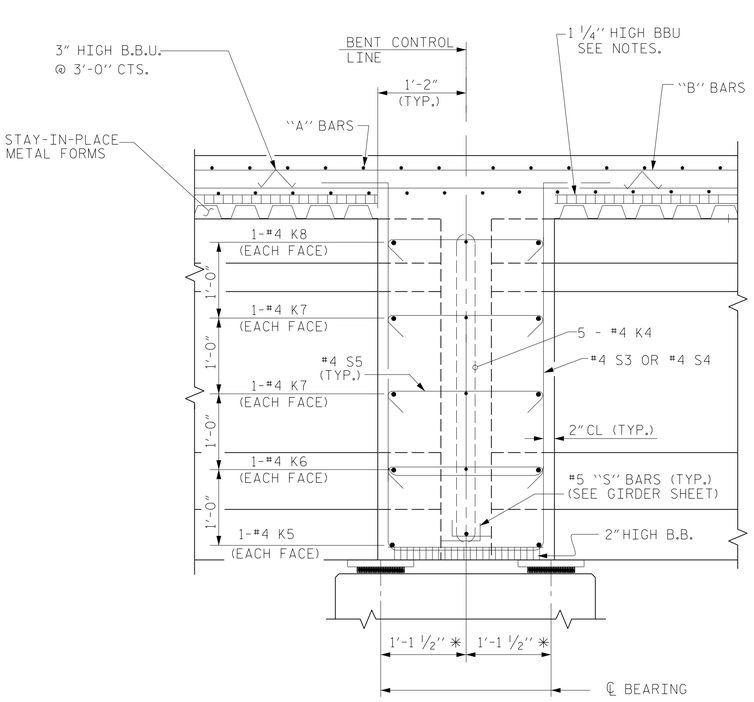
* * * #5 "G" BAR MAY BE SHIFTED SLIGHTLY AS NECESSARY, TO CLEAR REINFORCING STEEL AND STIRRUPS



END BENT DIAPHRAGM

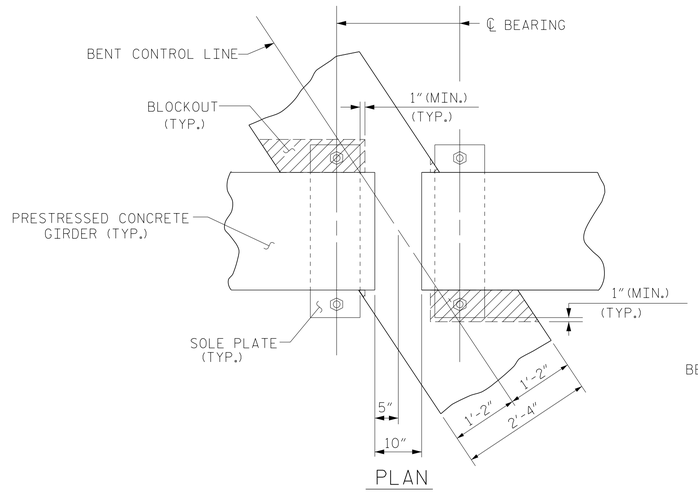
BENT DIAPHRAGM

PLAN

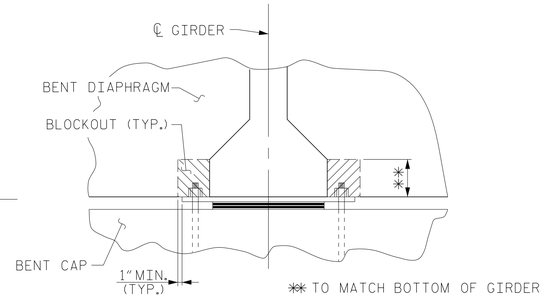


SECTION @ BENT DIAPHRAGM

* MEASURED ALONG GIRDER



PLAN



SECTION

BENT DIAPHRAGM BLOCK-OUT DETAIL

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
TYPICAL SECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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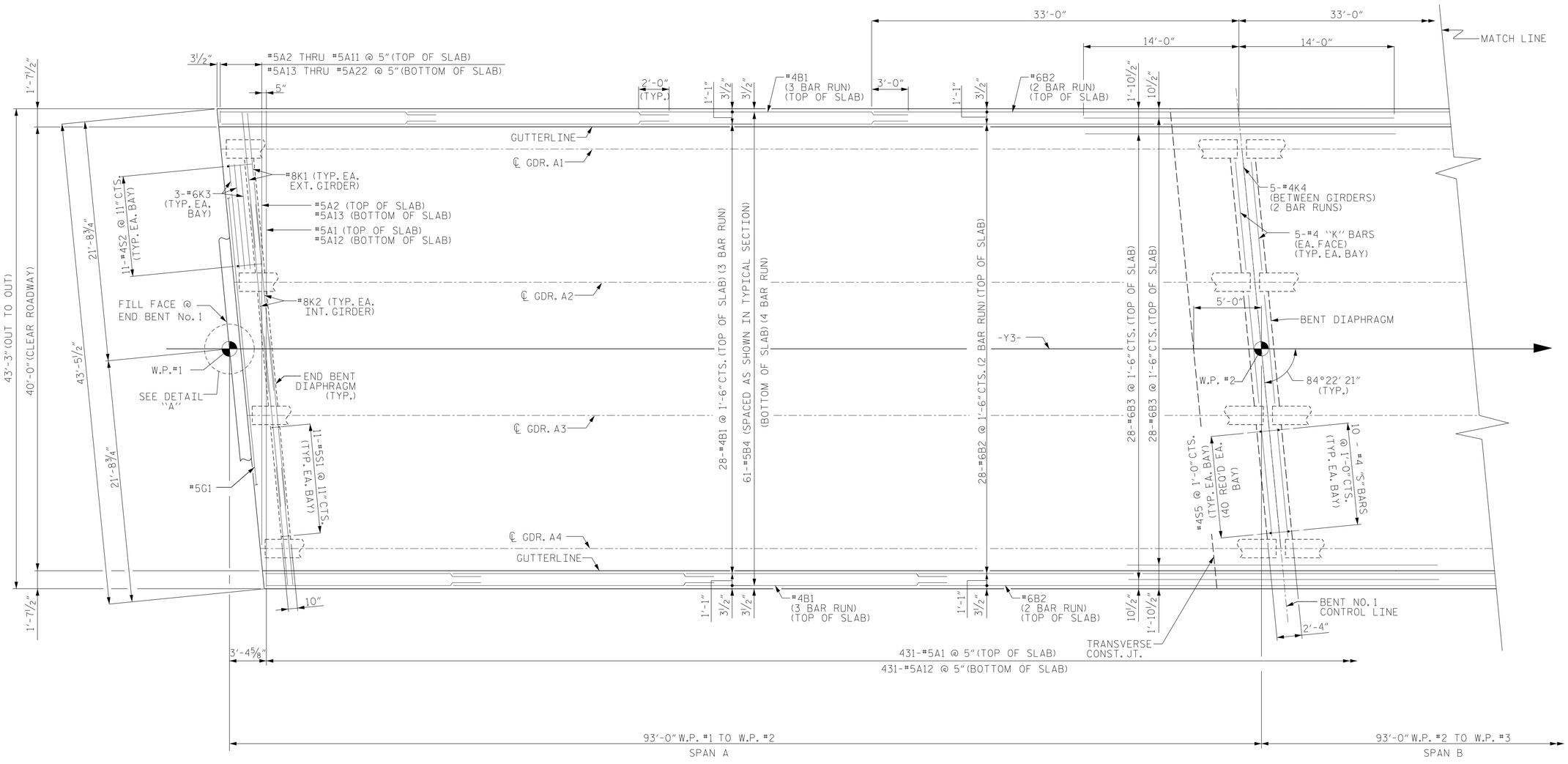
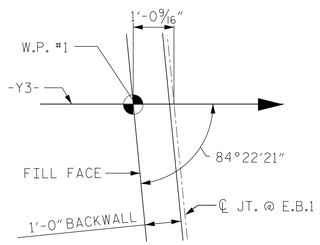


PLAN OF SPAN A & PARTIAL SPAN B



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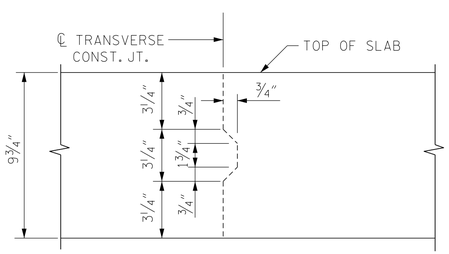

TRANSVERSE CONSTRUCTION JOINT DETAIL

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN A

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 2/6/2017

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Firm License No. C-1051
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-7
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE : 07/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

R 2707C_SITE 3
2/6/2017
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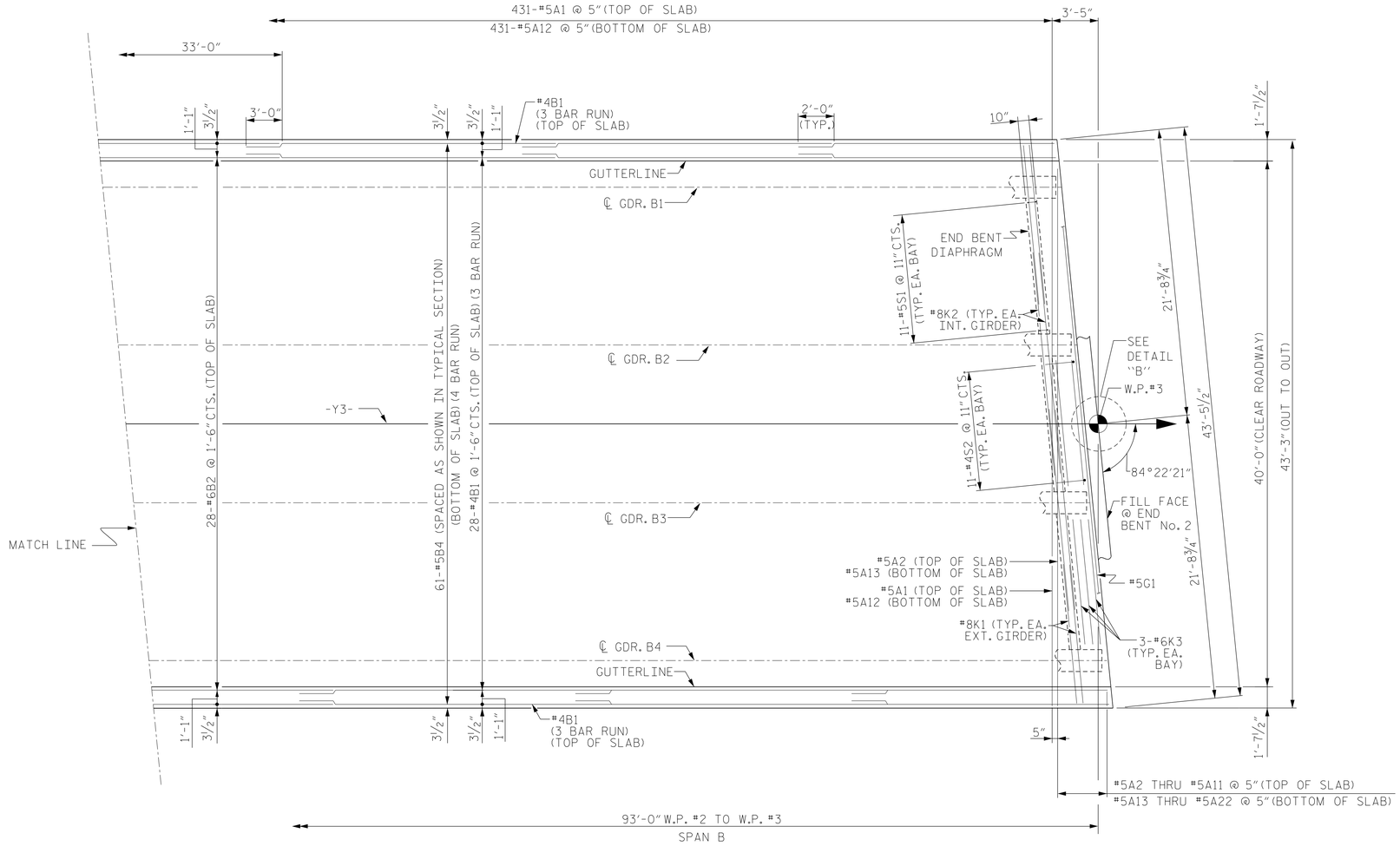
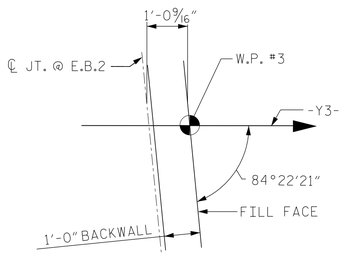
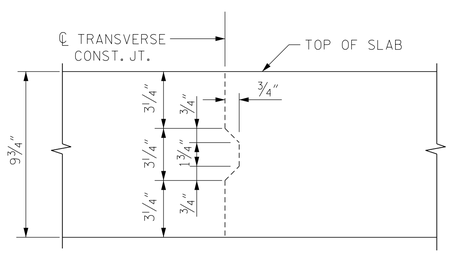


PARTIAL PLAN OF SPAN B



DETAIL "B"



TRANSVERSE CONSTRUCTION JOINT DETAIL

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

DRAWN BY: H.ASSFOURA DATE : 07/16
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PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 20+70.23-Y3- POT
SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
PLAN OF SPAN B

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 041425 JEFFREY M. LOFTUS

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FE51DC02E6794A8...

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1			3			TOTAL SHEETS
2			4			29

STR. #4

R 2707C_SITE 3
2/6/2017
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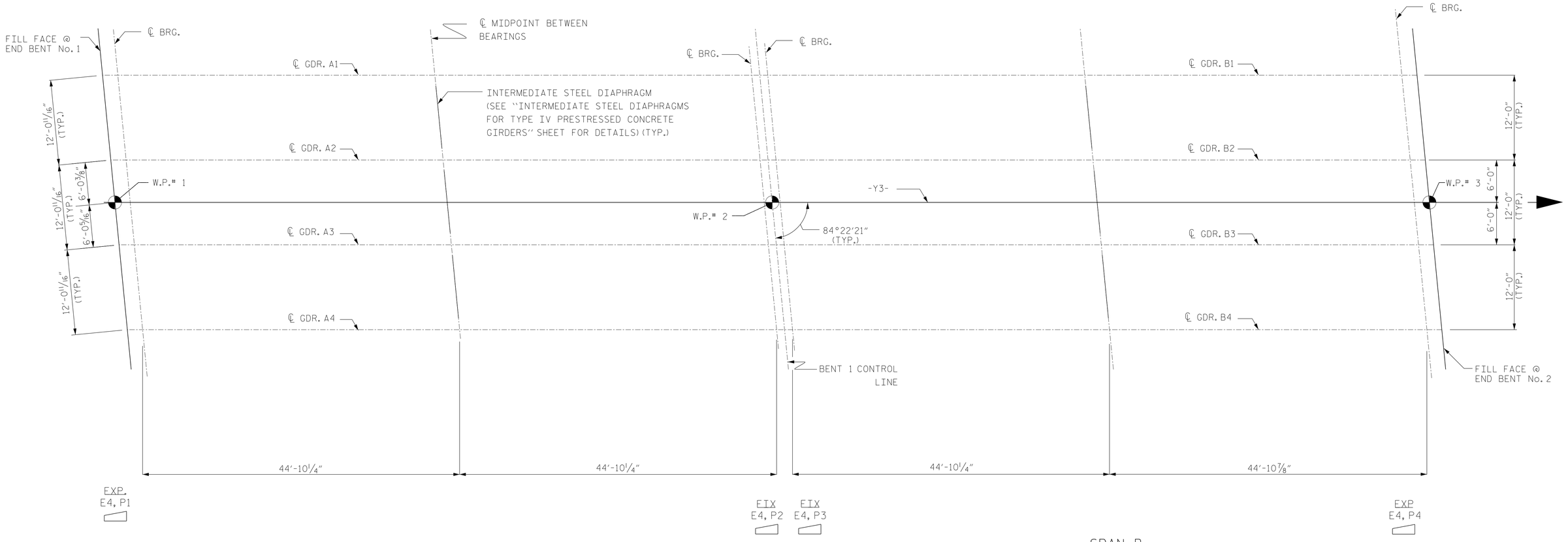

FRAMING PLAN

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STATE OF NORTH CAROLINA
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SUPERSTRUCTURE
FRAMING PLAN

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-9
1			3			TOTAL SHEETS
2			4			29

STR. #4

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2/6/2017
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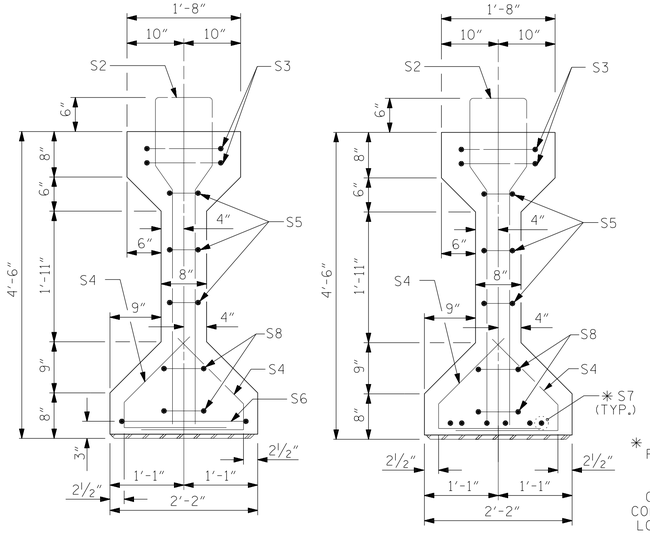
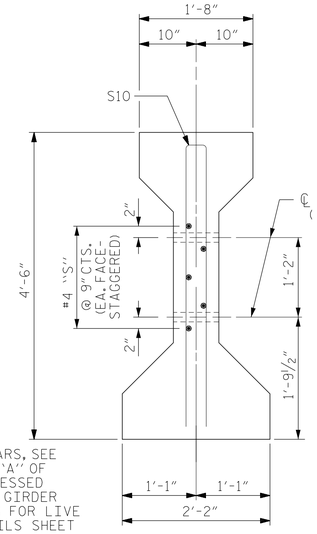


SECTION A-A

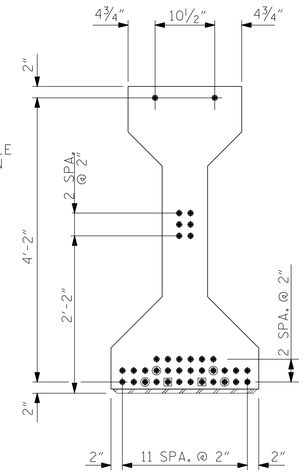
SECTION B-B

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

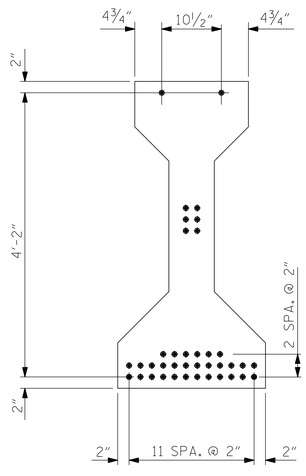


SECTION C-C

(S1 BARS NOT SHOWN)



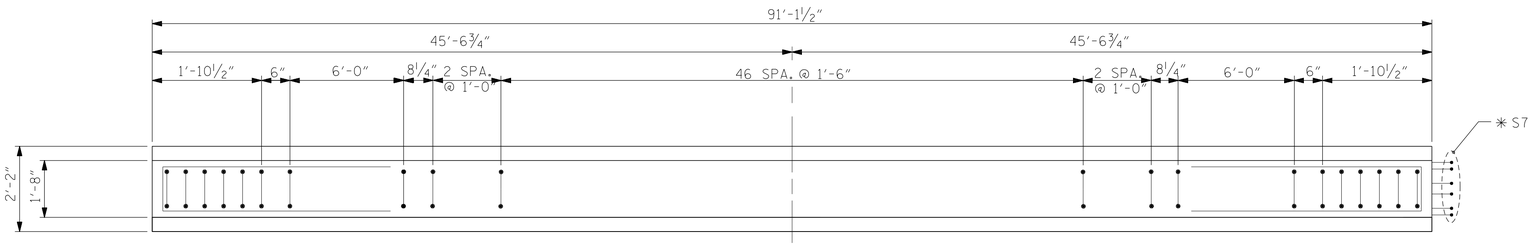
AT END OF GIRDER



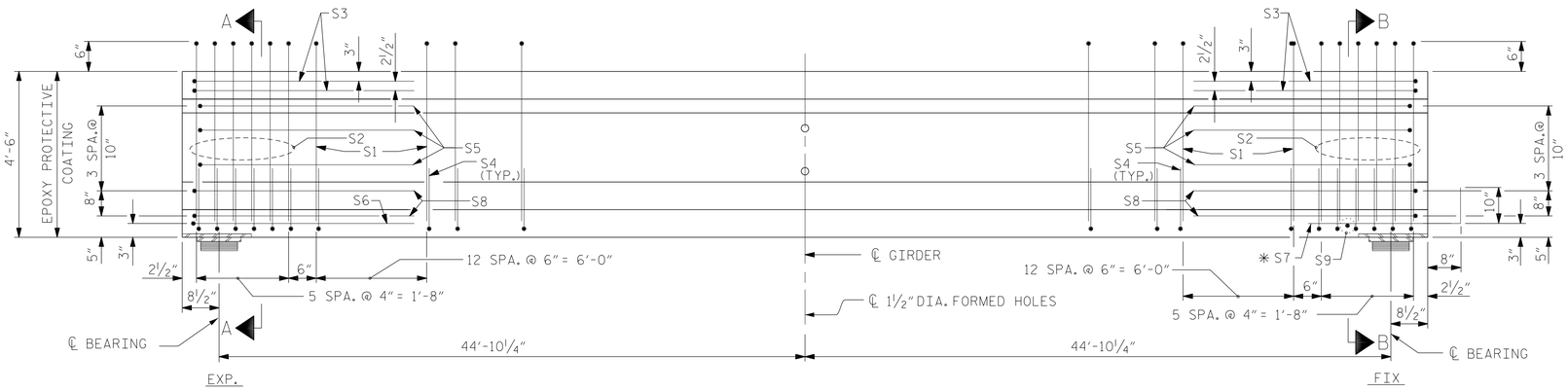
AT ℄ OF GIRDER

0.6" Ø LOW RELAXATION STRAND LAYOUT

• FULLY BONDED STRANDS
□ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
○ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER

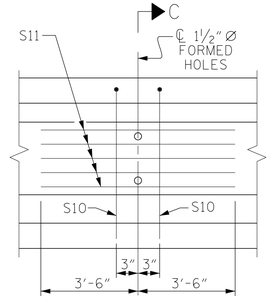


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER Nos. 1 THRU 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

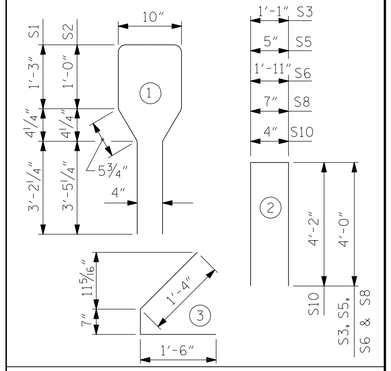
REINFORCING STEEL FOR ONE GIRDER

BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	77	#5	1	10'-8"	857
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	88	#4	3	3'-5"	201
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"	24

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL	8,000 PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
EXTERIOR GIRDER	1404	18.5	38
INTERIOR GIRDER	1404	18.5	38

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
4	91'-1½"	364'-6"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

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

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 2/6/2017

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REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			29

STR. #4

STD. NO. PCG6

DRAWN BY: H.ASSFOURA DATE : 07/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

R 2707C_SITE 3
2/6/2017
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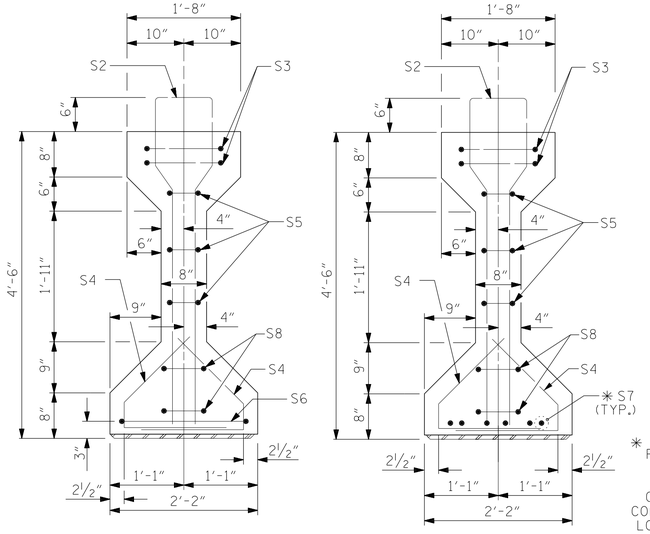
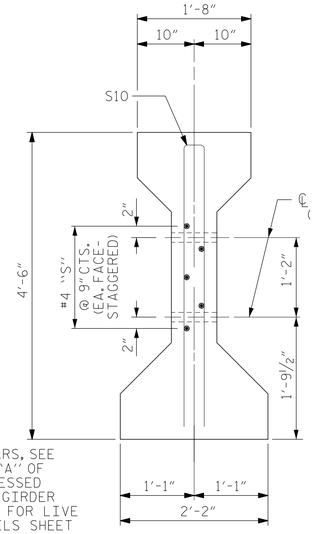


SECTION A-A

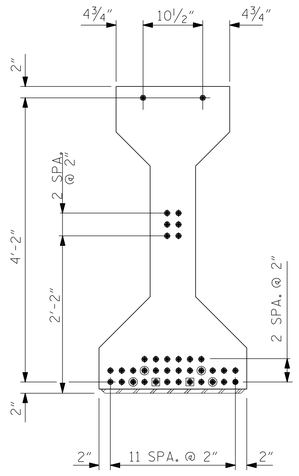
SECTION B-B

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

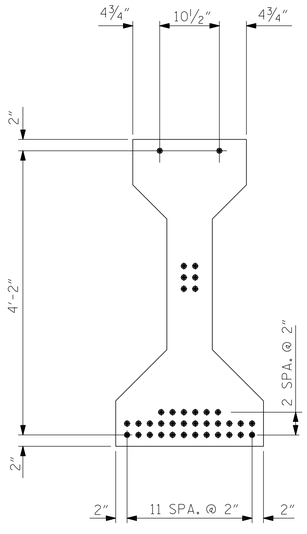


SECTION C-C

(S1 BARS NOT SHOWN)



AT END OF GIRDER



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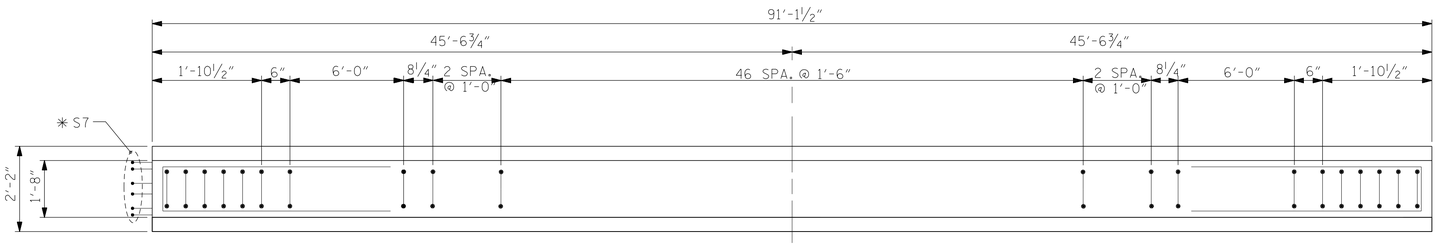
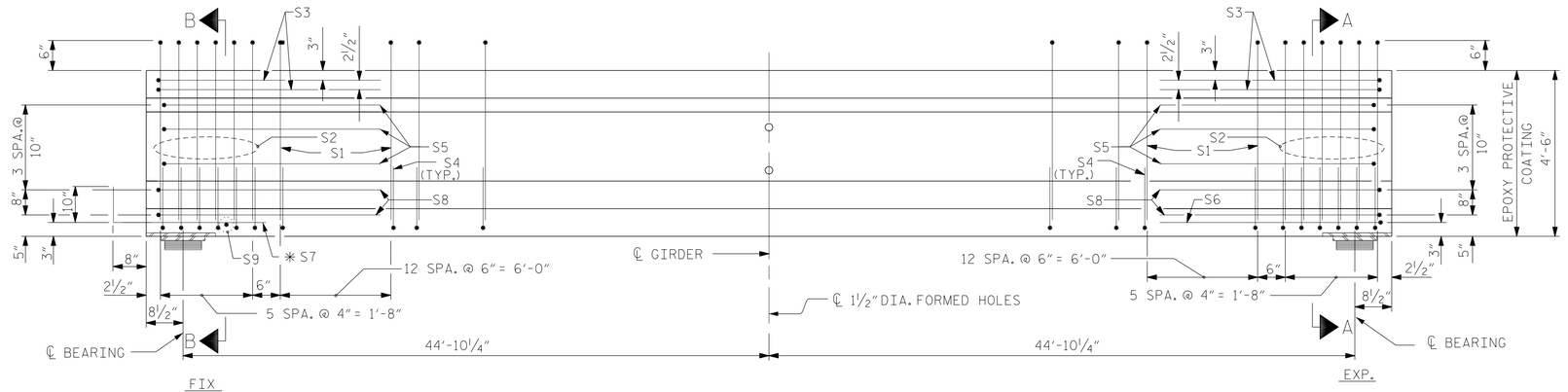
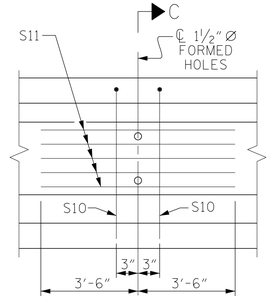


PLAN OF GIRDER



ELEVATION OF GIRDER

(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



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

BAR TYPES

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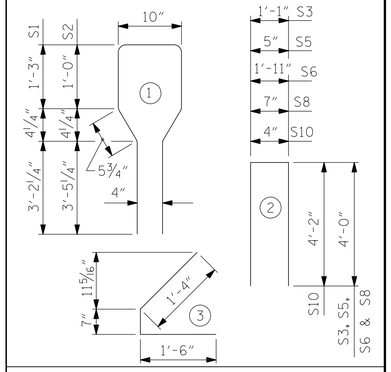

QUANTITIES FOR ONE GIRDER

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	LB.	C.Y.	No.
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GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
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PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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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:	S4-11
1			3			TOTAL SHEETS
2			4			29

STR. #4

STD. NO. PCG6

DRAWN BY:	H.ASSFOURA	DATE :	07/16
CHECKED BY:	J.LOFTUS	DATE :	11/16
DESIGN ENGINEER OF RECORD:	J.LOFTUS	DATE :	01/17

R 2707C_SITE 3

2/6/2017
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USER:default

NOTES

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

ALL REINFORCING STEEL SHALL BE GRADE 60.

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

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

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

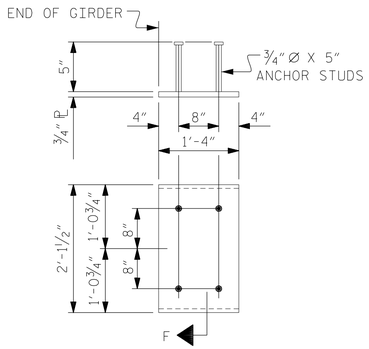
AT ENDS OF GIRDERS TO BE EMBEDDED IN CONCRETE DIAPHRAGMS OR END WALLS, PRESTRESSING STRANDS MAY EXTEND A MAXIMUM OF 2" BEYOND THE GIRDER ENDS. OTHERWISE, PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE GIRDER ENDS.

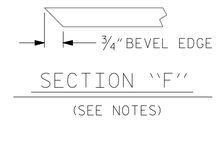
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6000 PSI.

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

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

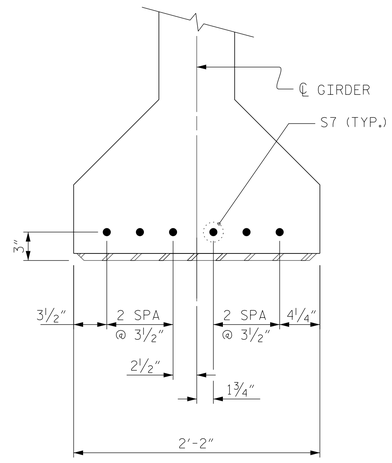
FOR EMBEDDED CLIPS FOR PRESTRESSED CONCRETE GIRDERS, SEE SPECIAL PROVISIONS.





SECTION "F"
(SEE NOTES)

EMBEDDED PLATE "B-1" DETAILS
TWO EMBEDDED PLATES "B-1" ARE REQUIRED FOR EACH GIRDER.



DETAIL "A"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 3 OF 3

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-12
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STR. #4

DRAWN BY:	H.ASSFOURA	DATE : 07/16
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R-2707C SITE 3
BRIDGE B5102

2/6/2017
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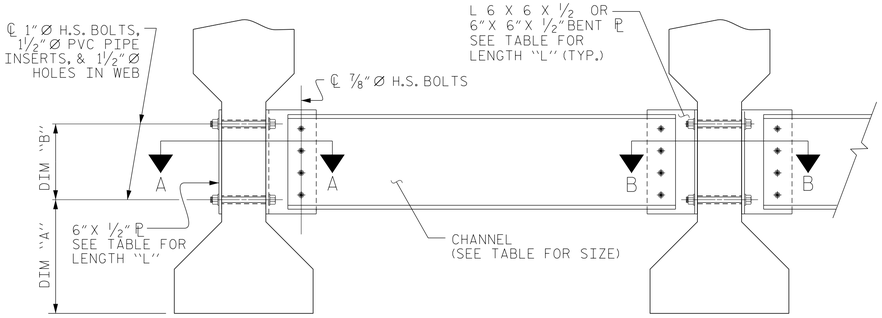
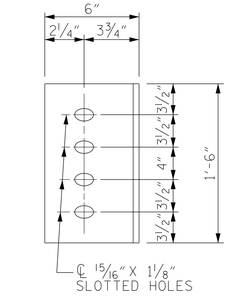
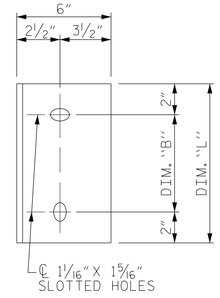


PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE



WEB FACE

CONNECTOR PLATE DETAILS

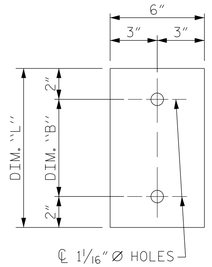
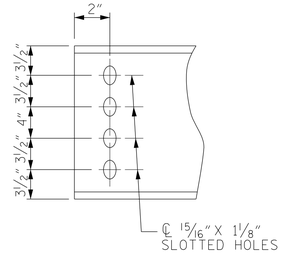
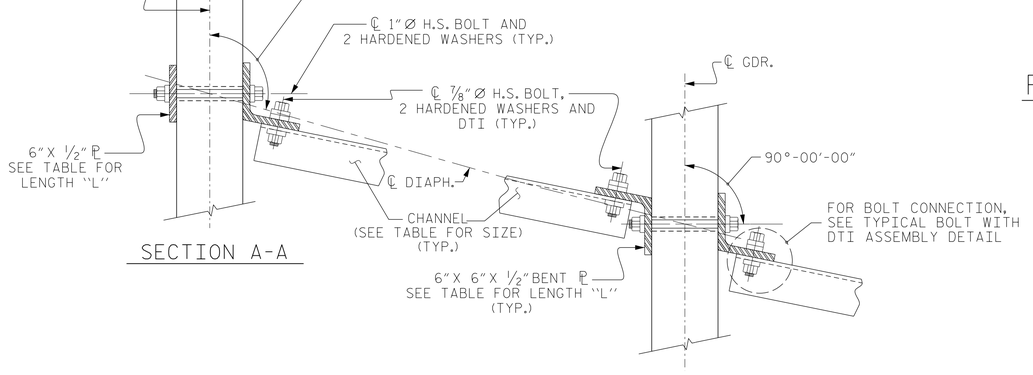


PLATE DETAILS

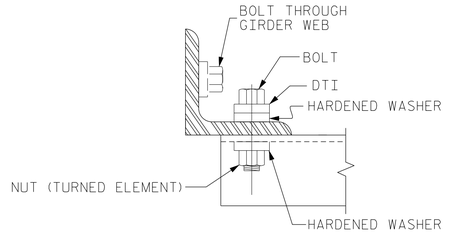


CHANNEL END



CONNECTION DETAILS

(90°< SKEW ≤ 110° SHOWN
70°< SKEW < 90° SIM.)



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. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 2/6/2017

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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:	S4-13
1			3			TOTAL SHEETS
2			4			29

DRAWN BY: H.ASSFOURA DATE: 07/16
CHECKED BY: J.LOFTUS DATE: 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE: 01/17

STR. #4

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2/6/2017
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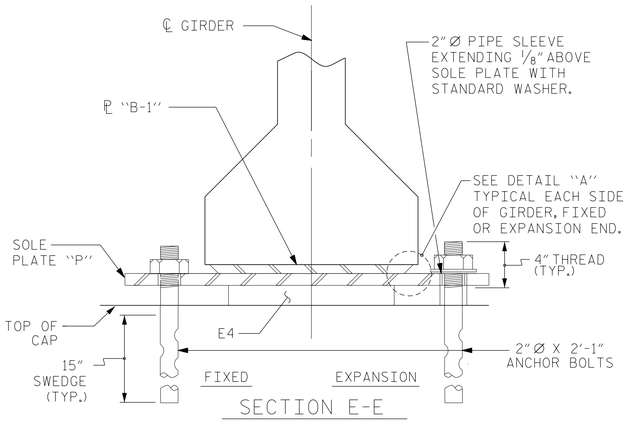
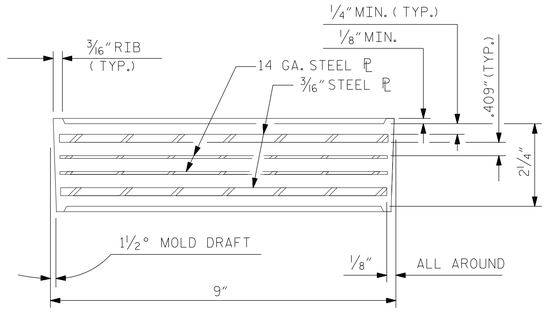
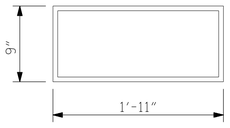


SECTION E-E



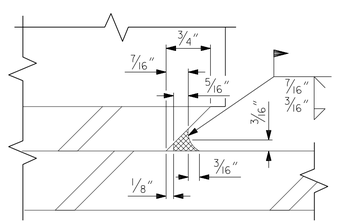
TYPICAL SECTION OF ELASTOMERIC BEARINGS



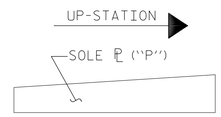
E4 (16 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

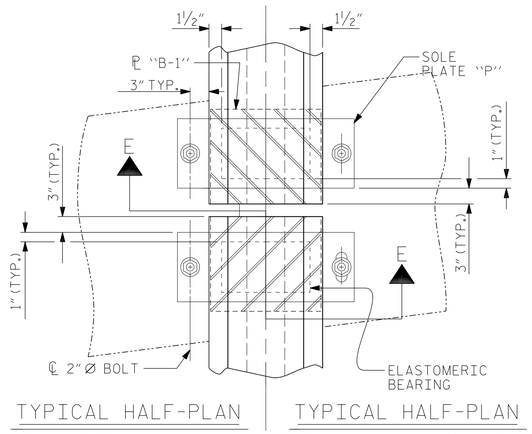
TYPE V



DETAIL "A"

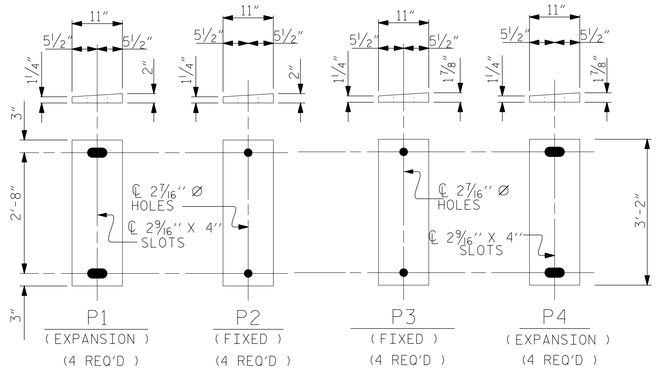


SOLE ℄ PLACEMENT DETAIL



TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



SOLE PLATE DETAILS ("P")

NOTES

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

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

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

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

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

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

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

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

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

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

ELASTOMERIC BEARING DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-14
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY:	H.ASSFOURA	DATE : 07/16
CHECKED BY:	J.LOFTUS	DATE : 11/16
DESIGN ENGINEER OF RECORD:	J.LOFTUS	DATE : 01/17

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2/6/2017
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DEAD LOAD DEFLECTION TABLE - SPAN A

0.6 Ø LOW RELAXATION

GIRDER	TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
A1	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.039	0.077	0.106	0.124	0.130	0.123	0.103	0.074	0.037	0
	FINAL CAMBER ▲	0	1/4"	7/16"	9/16"	5/8"	11/16"	5/8"	9/16"	7/16"	1/4"	0
A2	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.047	0.092	0.127	0.149	0.156	0.148	0.125	0.089	0.045	0
	FINAL CAMBER ▲	0	1/8"	1/4"	5/16"	5/16"	3/8"	3/8"	5/16"	1/4"	3/16"	0
A3	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.047	0.092	0.127	0.149	0.156	0.148	0.125	0.089	0.045	0
	FINAL CAMBER ▲	0	1/8"	1/4"	5/16"	5/16"	3/8"	3/8"	5/16"	1/4"	3/16"	0
A4	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.039	0.077	0.106	0.124	0.130	0.123	0.103	0.074	0.037	0
	FINAL CAMBER ▲	0	1/4"	7/16"	9/16"	5/8"	11/16"	5/8"	9/16"	7/16"	1/4"	0

DEAD LOAD DEFLECTION TABLE - SPAN B

0.6 Ø LOW RELAXATION

GIRDER	TENTH POINTS	℄ BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	℄ BRG.
B1	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.036	0.072	0.101	0.120	0.127	0.121	0.104	0.075	0.038	0
	FINAL CAMBER ▲	0	1/4"	7/16"	5/8"	11/16"	11/16"	11/16"	9/16"	7/16"	1/4"	0
B2	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.045	0.089	0.125	0.148	0.156	0.149	0.127	0.092	0.047	0
	FINAL CAMBER ▲	0	3/16"	1/4"	5/16"	3/8"	3/8"	5/16"	5/16"	1/4"	1/8"	0
B3	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.045	0.089	0.125	0.148	0.156	0.149	0.127	0.092	0.047	0
	FINAL CAMBER ▲	0	3/16"	1/4"	5/16"	3/8"	3/8"	5/16"	5/16"	1/4"	1/8"	0
B4	CAMBER (GIRDER ALONE IN PLACE) ▲	0	0.059	0.111	0.152	0.177	0.186	0.177	0.152	0.111	0.059	0
	✳ DEFLECTION DUE TO SUPERIMPOSED D.L. ▼	0	0.036	0.072	0.101	0.120	0.127	0.121	0.104	0.075	0.038	0
	FINAL CAMBER ▲	0	1/4"	7/16"	5/8"	11/16"	11/16"	11/16"	9/16"	7/16"	1/4"	0

✳ INCLUDES FUTURE WEARING SURFACE

ALL VALUES ARE GIVEN IN FEET (DECIMAL FORMAT), EXCEPT "FINAL CAMBER" WHICH IS GIVEN IN INCHES

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DEAD LOAD DEFLECTION
FOR PRESTRESSED
CONCRETE GIRDER

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-15
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE : 07/16
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2/6/2017
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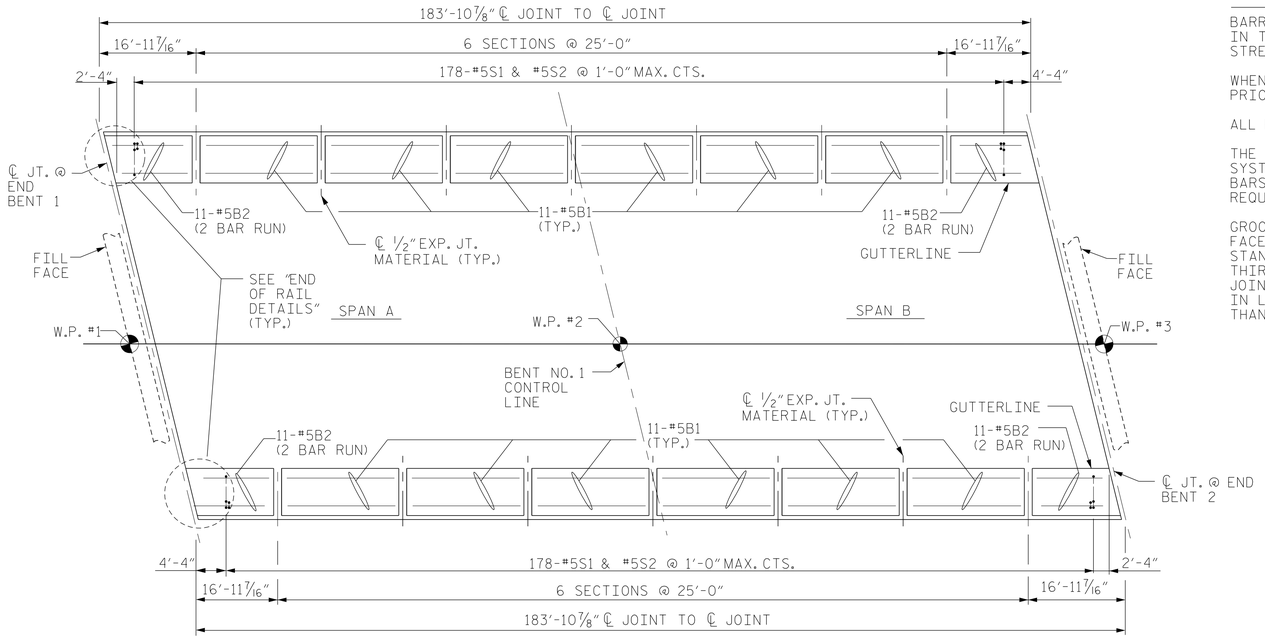
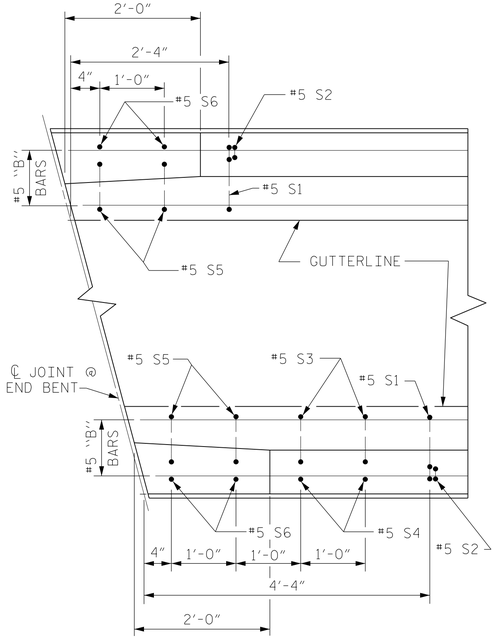
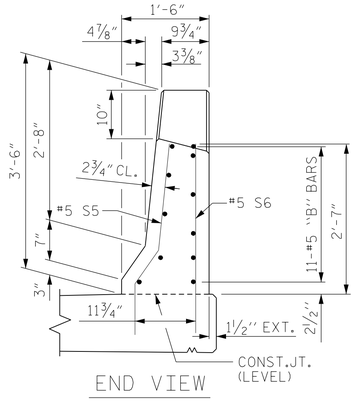
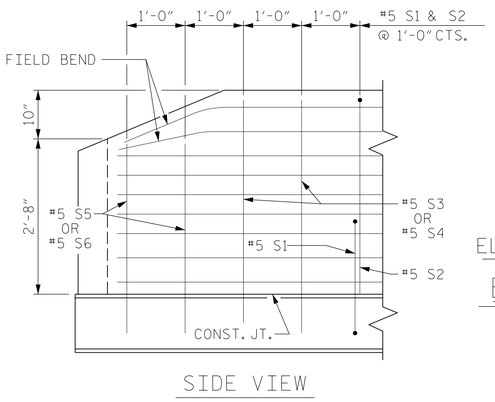




PLAN



END VIEW



SIDE VIEW

END OF RAIL DETAILS

FOR ADHESIVE ANCHORING AT SAWED JOINTS

NOTES

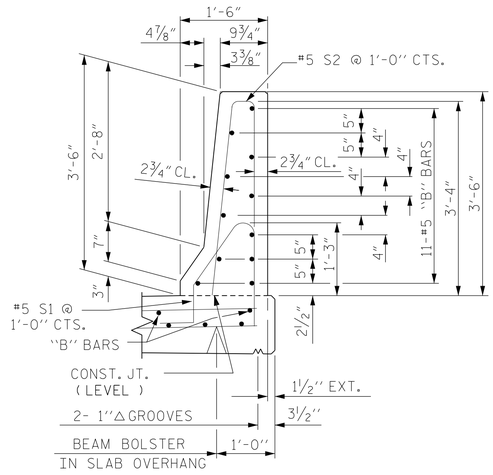
BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

WHEN FOAM JOINT SEAL IS REQUIRED, THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL.

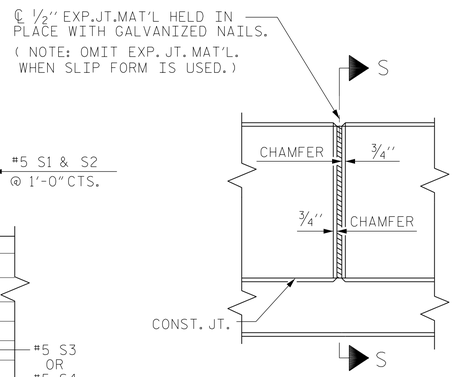
ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

THE #5 S3, S4, S5 AND S6 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3, S4, S5 AND S6 BARS IS 18.6 KIPS. FIELD TESTING FOR THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.

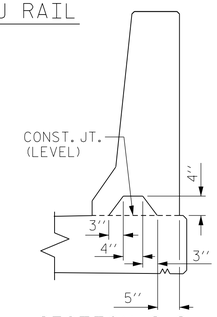
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS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



SECTION THRU RAIL



ELEVATION AT EXPANSION JOINTS

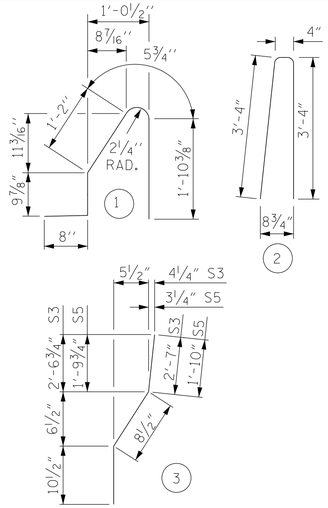


SECTION S-S

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

BARRIER RAIL DETAILS

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	132	#5	STR	24'-7"	3385
* B2	88	#5	STR	10'-1"	925
* S1	356	#5	1	5'-0"	1857
* S2	356	#5	2	7'-0"	2599
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27

* EPOXY COATED REINFORCING STEEL	8,856 LBS.
CLASS AA CONCRETE	49.7 CU. YDS.
CONCRETE BARRIER RAIL	367.81 LIN. FT.

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

CONCRETE BARRIER RAIL

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794AB... 2/6/2017

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-16
1			3			TOTAL SHEETS
2			4			29

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STR. #4

2/6/2017
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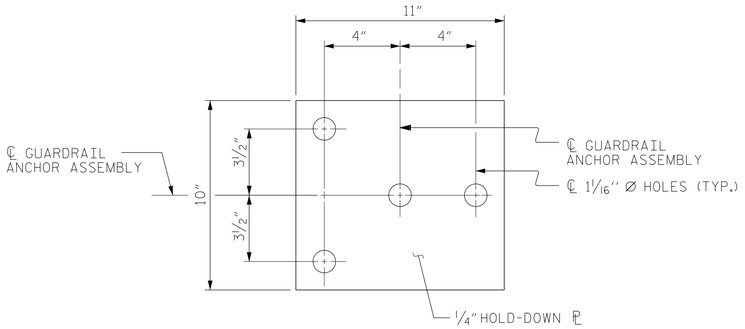
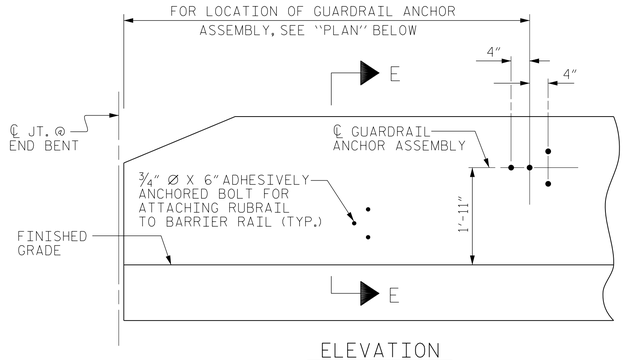
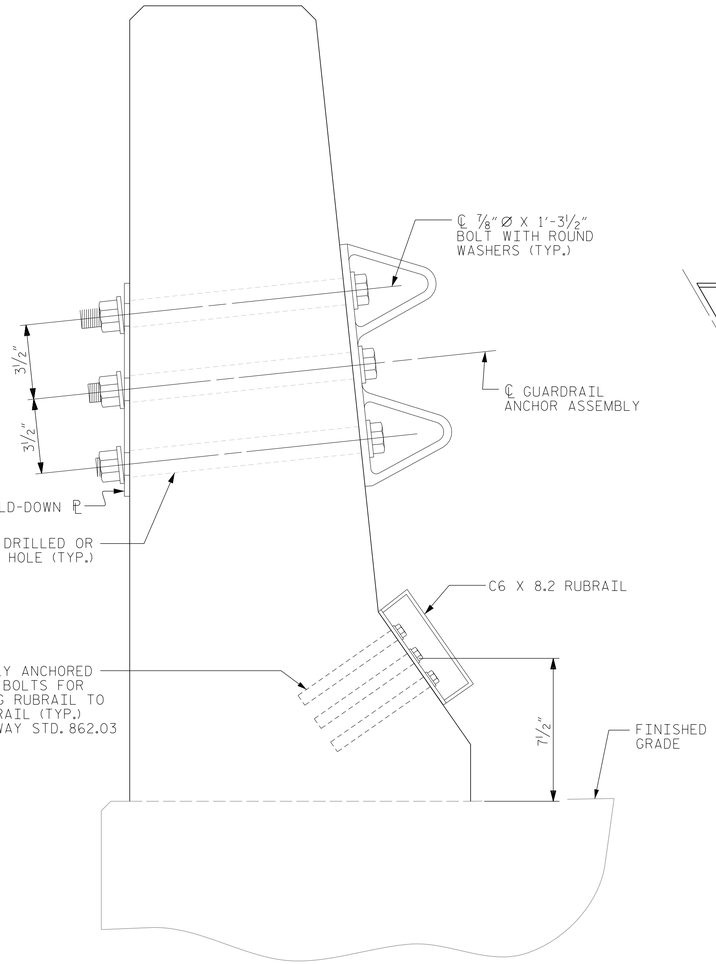


PLAN

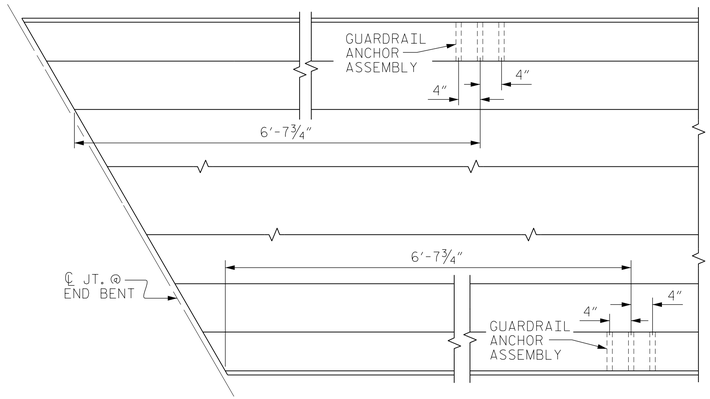


ELEVATION



SECTION E-E

GUARDRAIL ANCHOR ASSEMBLY DETAILS



PLAN

LOCATION OF ANCHORS FOR GUARDRAIL

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

NOTES

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

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

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

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

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

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

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

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

SKETCH SHOWING POINTS OF ATTACHMENTS

✳ DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

GUARDRAIL ANCHORAGE FOR BARRIER RAIL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-17
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE : 07/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

R 2707C_SITE 3
2/6/2017
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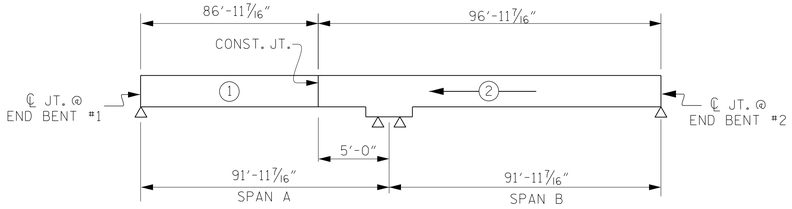
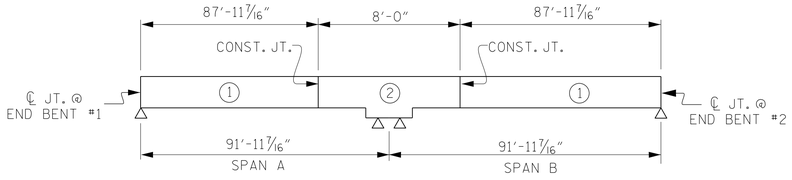


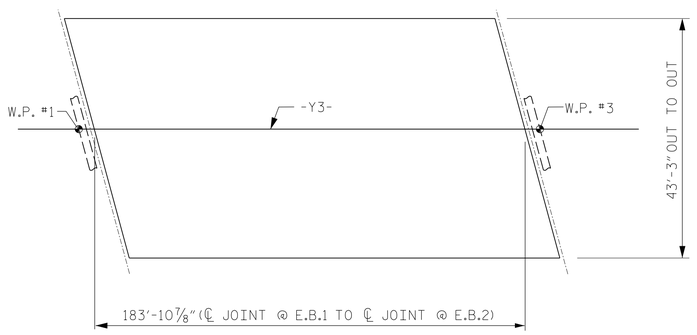
POURING SEQUENCE

(#) = INDICATES POUR NUMBER AND DIRECTION OF POUR



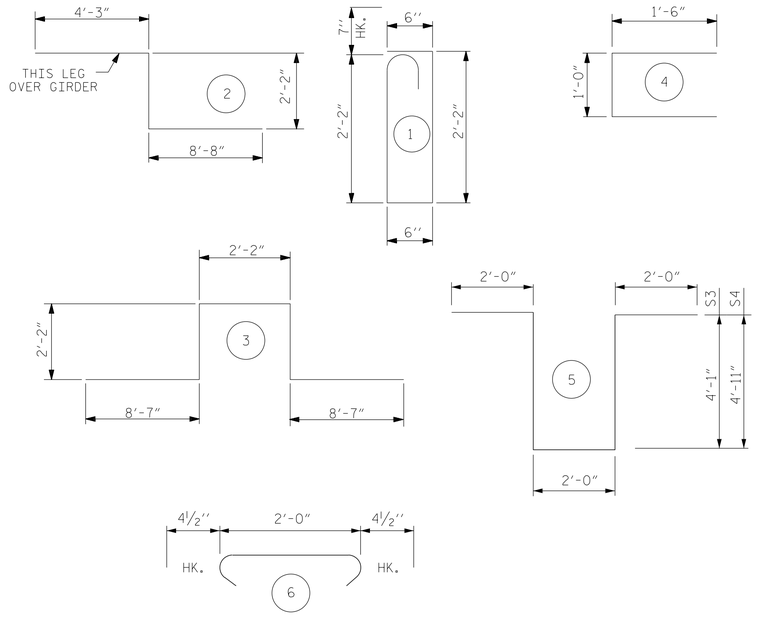
OPTIONAL POURING SEQUENCE

(#) = INDICATES POUR NUMBER



LAYOUT OF COMPUTED AREA REINFORCED CONCRETE DECK SLAB (SQ.FT= 7,954)

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
✳ A1	431	#5	STR	42′-11″	19,292	✳ B1	180	#4	STR	21′-11″	2,635
✳ A2	2	#5	STR	39′-1″	82	✳ B2	60	#6	STR	34′-6″	3,109
✳ A3	2	#5	STR	34′-11″	73	✳ B3	56	#6	STR	28′-0″	2,355
✳ A4	2	#5	STR	30′-8″	64	B4	244	#5	STR	47′-6″	12,088
✳ A5	2	#5	STR	26′-5″	55						
✳ A6	2	#5	STR	22′-3″	46	✳ G1	2	#5	STR	43′-1″	90
✳ A7	2	#5	STR	18′-0″	38						
✳ A8	2	#5	STR	13′-9″	29	✳ K1	8	#8	2	15′-1″	322
✳ A9	2	#5	STR	9′-6″	20	✳ K2	8	#8	3	23′-8″	506
✳ A10	2	#5	STR	5′-4″	11	✳ K3	18	#6	STR	9′-11″	268
✳ A11	2	#5	STR	1′-1″	2	K4	10	#4	STR	19′-1″	127
						K5	6	#4	STR	9′-6″	38
A12	431	#5	STR	42′-11″	19,292	K6	6	#4	STR	10′-6″	42
A13	2	#5	STR	39′-1″	82	K7	12	#4	STR	11′-0″	88
A14	2	#5	STR	34′-11″	73	K8	6	#4	STR	10′-0″	40
A15	2	#5	STR	30′-8″	64						
A16	2	#5	STR	26′-5″	55	✳ S1	66	#5	1	5′-11″	407
A17	2	#5	STR	22′-3″	46	✳ S2	66	#4	4	4′-0″	176
A18	2	#5	STR	18′-0″	38	S3	6	#4	5	14′-2″	57
A19	2	#5	STR	13′-9″	29	S4	24	#4	5	15′-10″	254
A20	2	#5	STR	9′-6″	20	S5	120	#4	6	2′-9″	220
A21	2	#5	STR	5′-4″	11						
A22	2	#5	STR	1′-1″	2						

REINFORCING STEEL	32,666 LBS.
✳EPOXY REINFORCING STEEL	29,580 LBS.

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

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

GROOVING BRIDGE FLOORS

APPROACH SLABS	1,769	SQ.FT.
BRIDGE DECK	6,789	SQ.FT.
TOTAL	8,558	SQ.FT.

SUPERSTRUCTURE BILL OF MATERIAL

	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR 1	126.0		
POUR 2	140.5		
TOTALS✳✳	266.5	32,666	29,580

✳✳QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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SUPERSTRUCTURE BILL OF MATERIAL

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-18
1			3			TOTAL SHEETS
2			4			29

STR. #4

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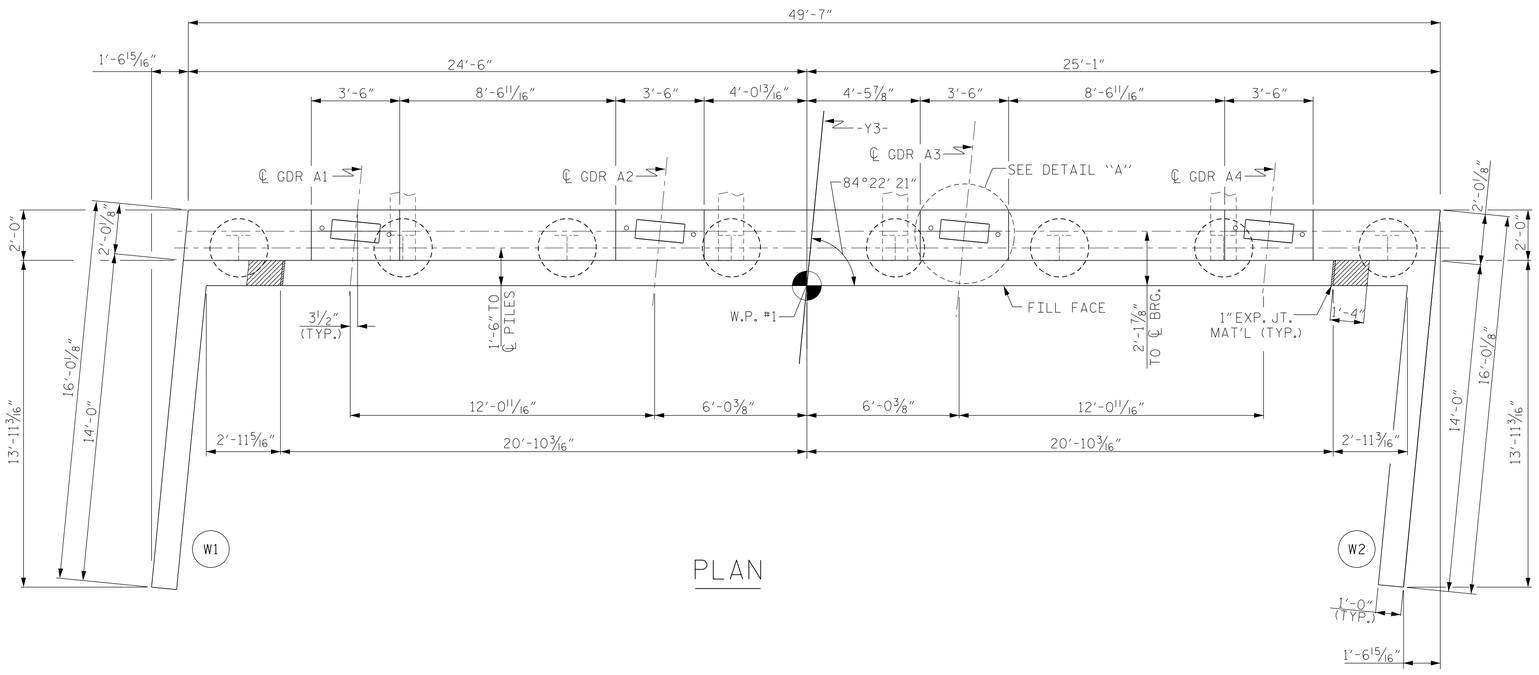
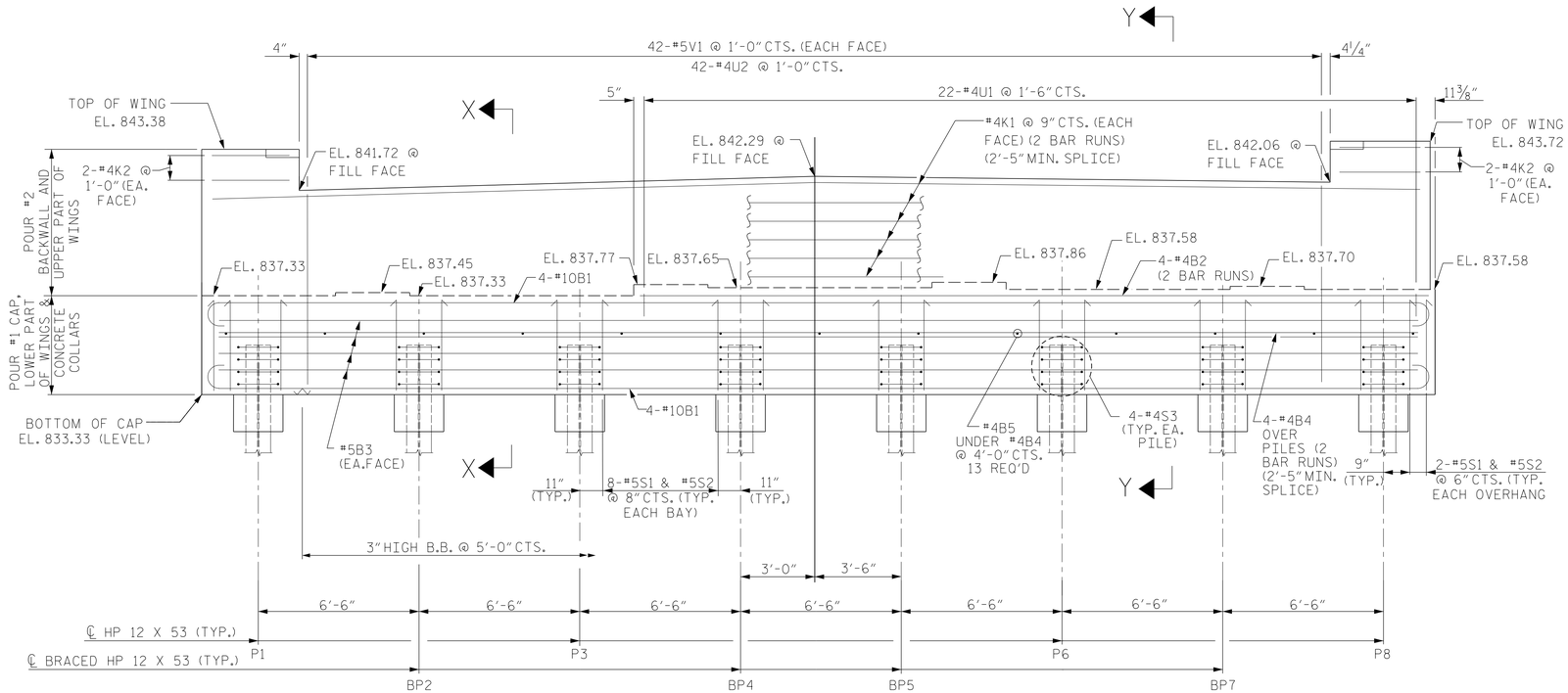


PLAN



ELEVATION

WINGS NOT SHOWN FOR CLARITY.
FOR SECTIONS X-X & Y-Y, SEE SHEET 3 OF 3.
CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN VIEW FOR CLARITY.
SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", END BENT No.1 SHEET 3 OF 3.

NOTES

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

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

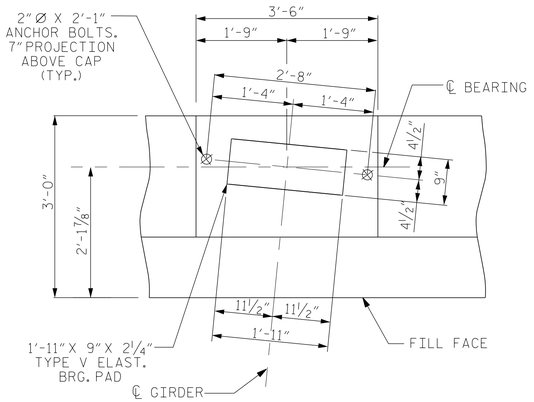
FOR BEARING DETAILS, SEE ELASTOMERIC BEARING DETAILS SHEET.

FOR PILE SPLICE DETAILS, SEE SHEET 3 OF 3.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

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.



DETAIL "A"

PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 20+70.23-Y3- POT

SHEET 1 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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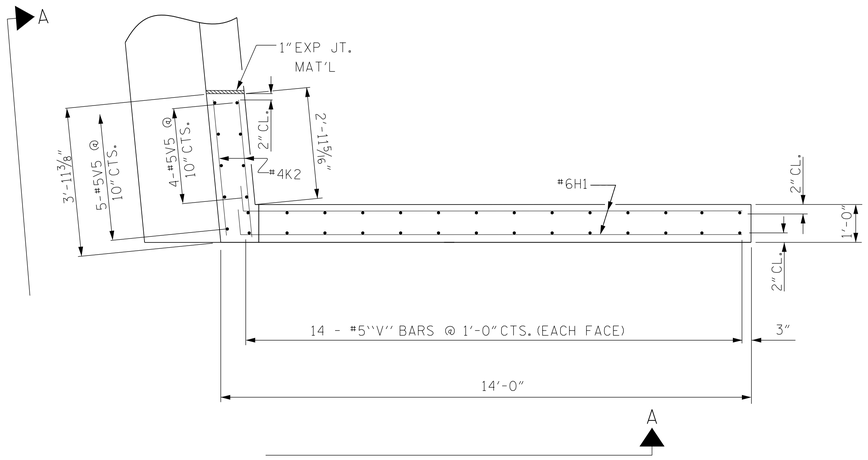
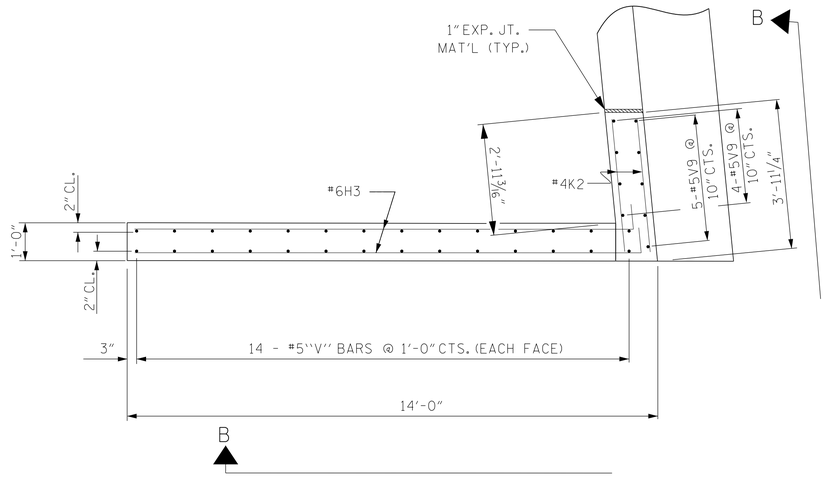
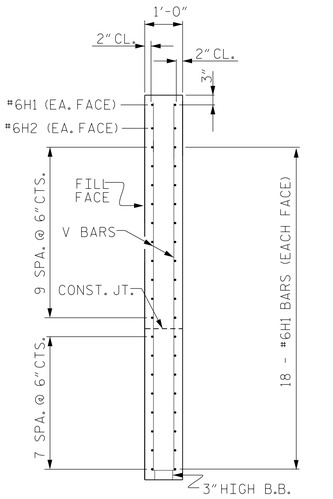


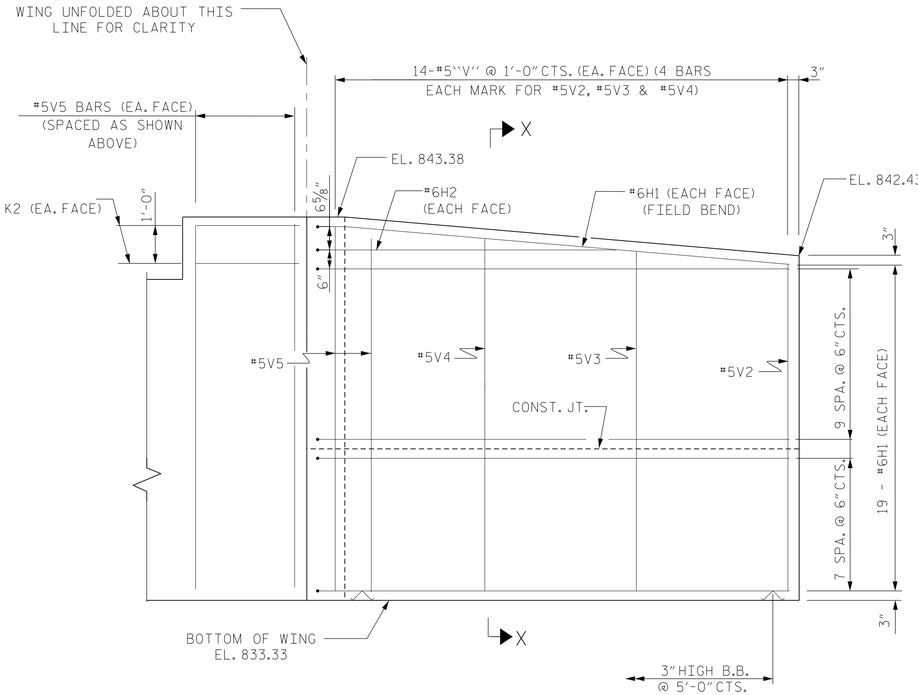
PLAN OF WING (W1)



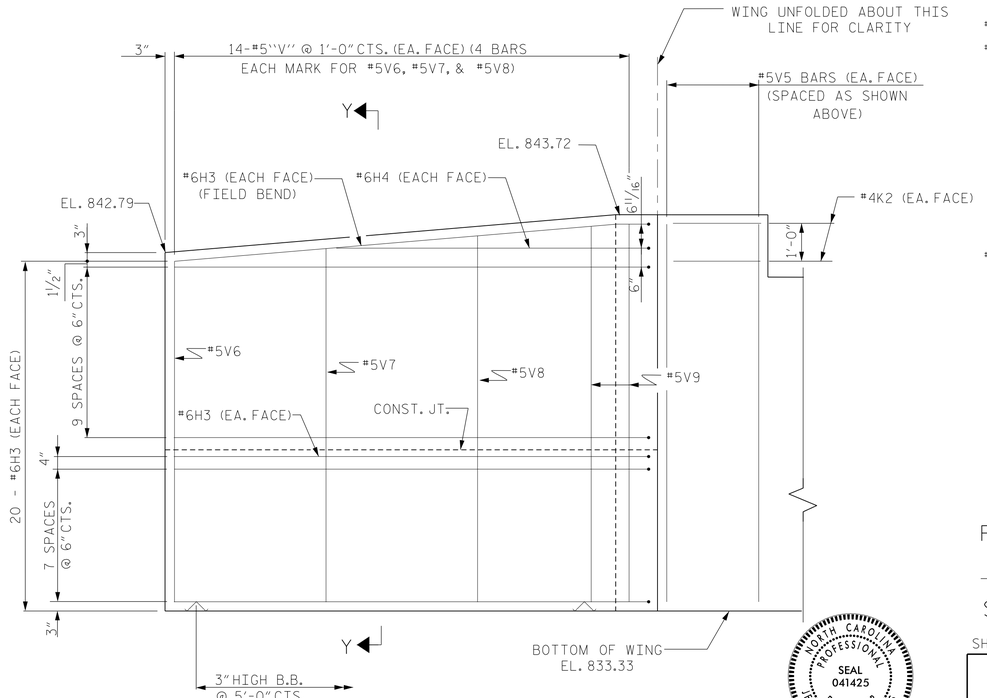
PLAN OF WING (W2)



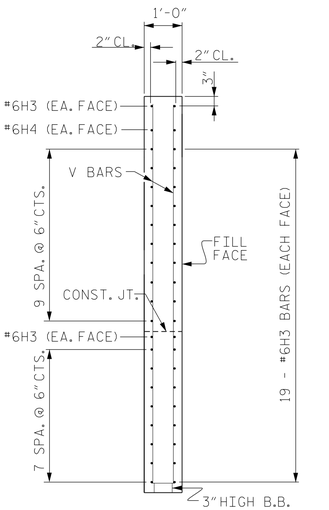
SECTION X-X



VIEW A-A



VIEW B-B



SECTION Y-Y

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT NO.1
WING DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STR. #4

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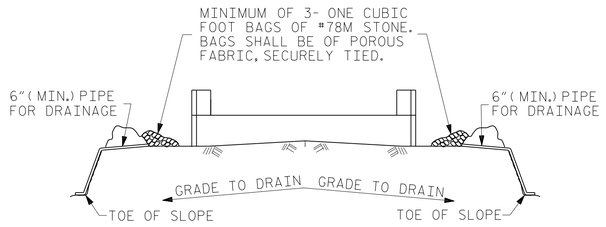
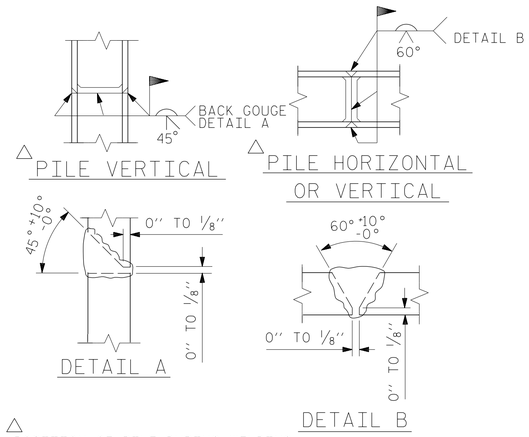


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

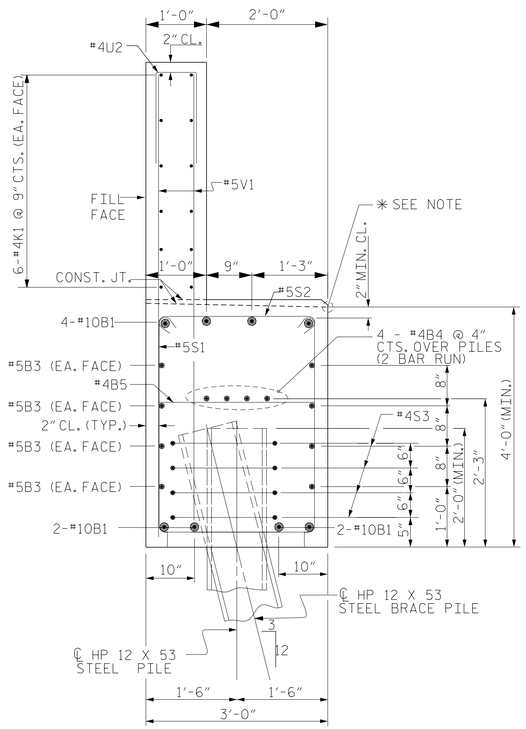
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



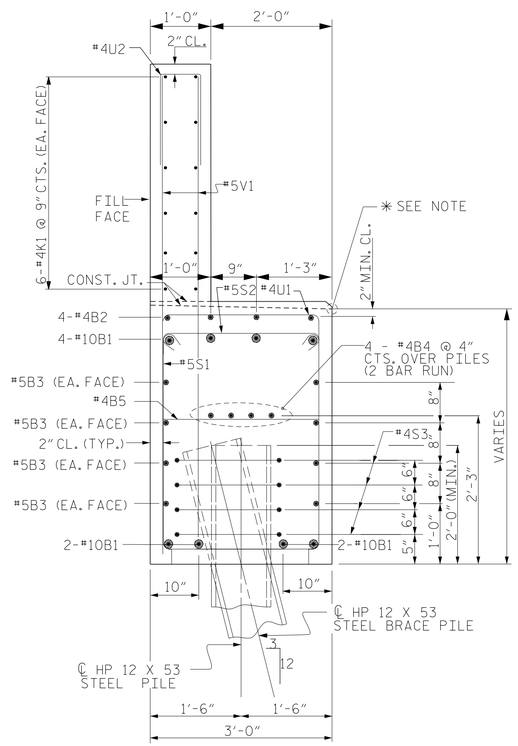
△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION X-X

(CONCRETE COLLAR NOT SHOWN FOR CLARITY)
(SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL")



SECTION Y-Y

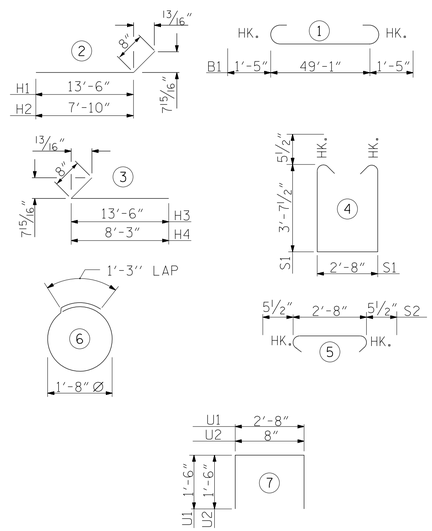
(CONCRETE COLLAR NOT SHOWN FOR CLARITY)
(SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL")

NOTES:

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

✳ ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
FOR END BENT NO. 1

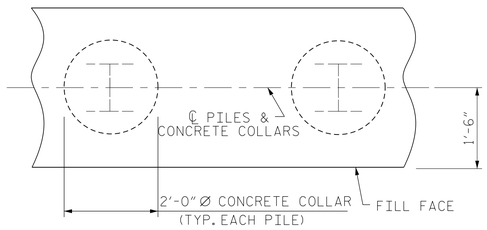
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	1	51'-11"	1,787
B2	8	#4	STR	17'-5"	93
B3	8	#5	STR	49'-2"	410
B4	8	#4	STR	25'-10"	138
B5	13	#4	STR	2'-8"	23
H1	38	#5	2	14'-2"	561
H2	2	#5	2	8'-6"	18
H3	40	#5	3	14'-2"	591
H4	2	#5	3	8'-11"	19
K1	24	#4	STR	25'-10"	414
K2	8	#4	STR	3'-7"	19
S1	60	#5	4	10'-10"	678
S2	60	#5	5	3'-7"	224
S3	32	#4	6	6'-6"	139
U1	22	#4	7	5'-8"	83
U2	42	#4	7	3'-8"	103
V1	84	#5	STR	7'-11"	694
V2	8	#5	STR	8'-8"	72
V3	8	#5	STR	9'-0"	75
V4	8	#5	STR	9'-4"	78
V5	13	#5	STR	9'-8"	131
V6	8	#5	STR	9'-0"	75
V7	8	#5	STR	9'-4"	78
V8	8	#5	STR	9'-8"	81
V9	13	#5	STR	10'-0"	136

REINFORCING STEEL (FOR END BENT NO. 1) 6,720 LBS.

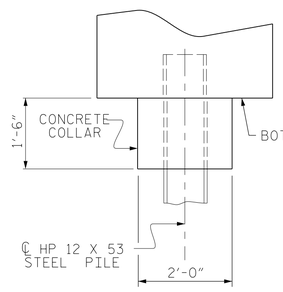
CLASS A CONCRETE BREAKDOWN

POUR #1	CAP & LOWER PART OF WINGS	29.1 C.Y.
POUR #2	BACKWALL & UPPER PART OF WINGS	14.7 C.Y.
TOTAL CLASS A CONCRETE		43.8 C.Y.

HP 12 X 53 STEEL PILES
NO: 8 LIN. FT.= 200



PLAN



ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 3 OF 3

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
END BENT NO.1
DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STR. #4

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CHECKED BY:	J.LOFTUS	DATE : 11/16
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2/6/2017
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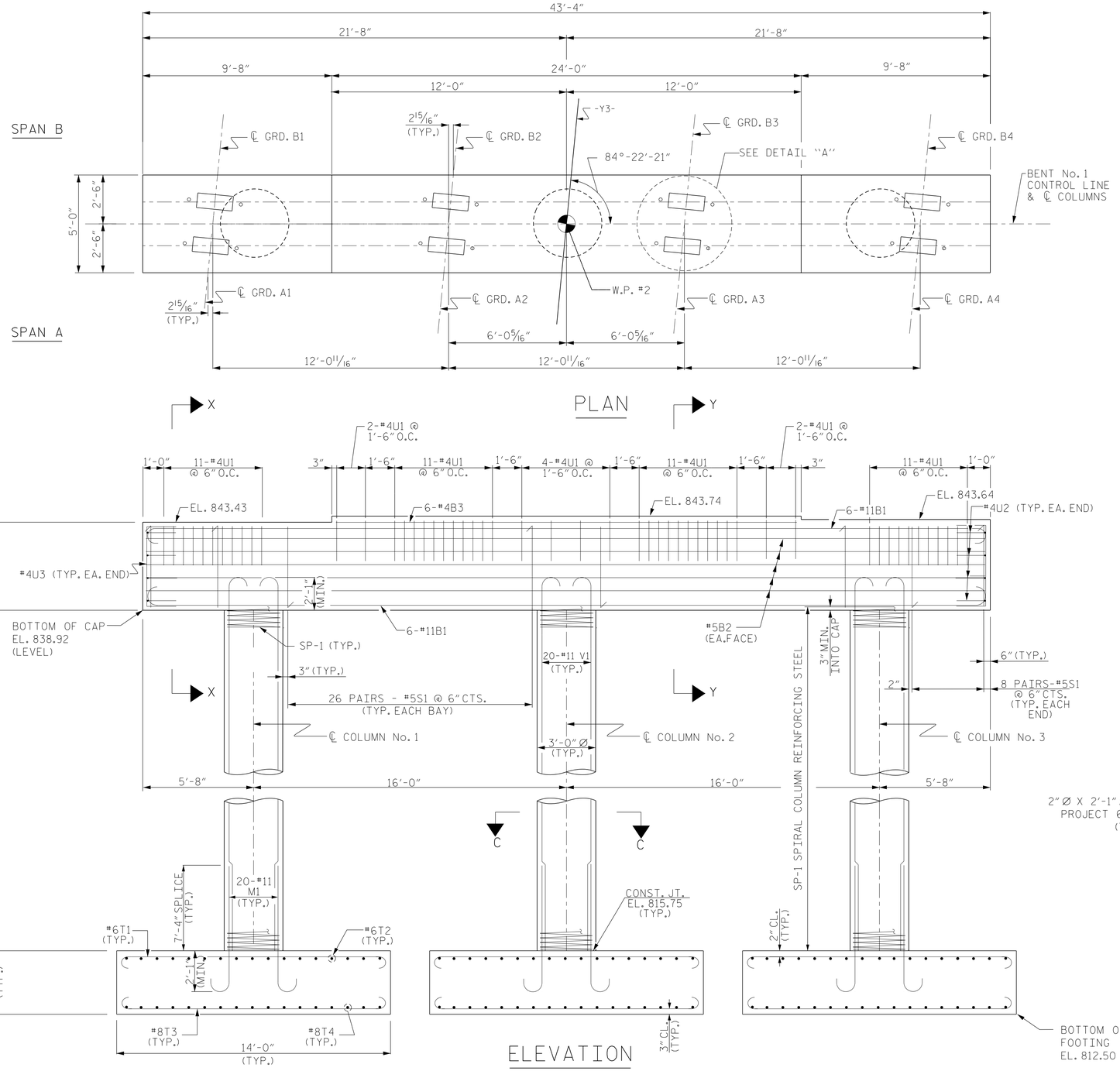
USER:default

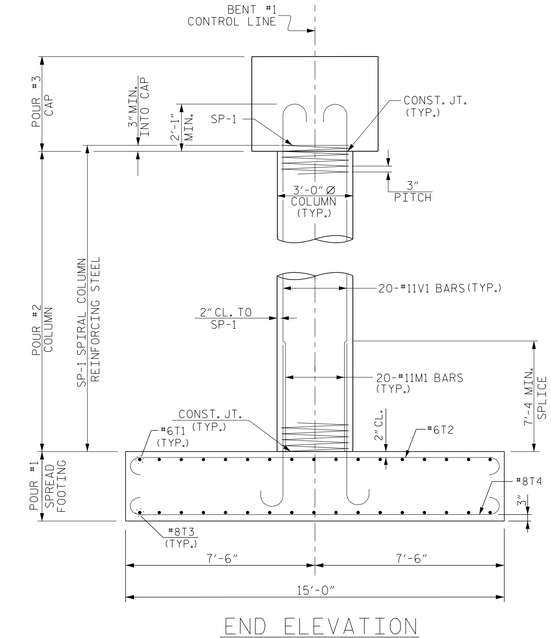
NOTES

STIRRUPS TO BE PLACED VERTICALLY AND INVERTED ALTERNATELY.

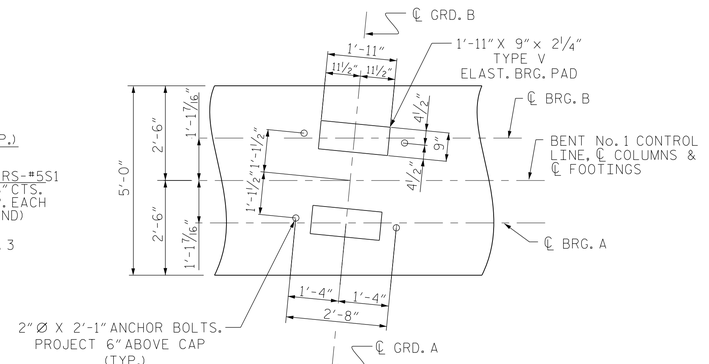
STIRRUPS AND "U" BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.

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





END ELEVATION



DETAIL "A"

(DIMENSIONS ARE TYP. FOR EACH GIRDER)
(COLUMNS NOT SHOWN FOR CLARITY)

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A8... 2/6/2017

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1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE: 10/16
CHECKED BY: J.LOFTUS DATE: 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE: 01/17

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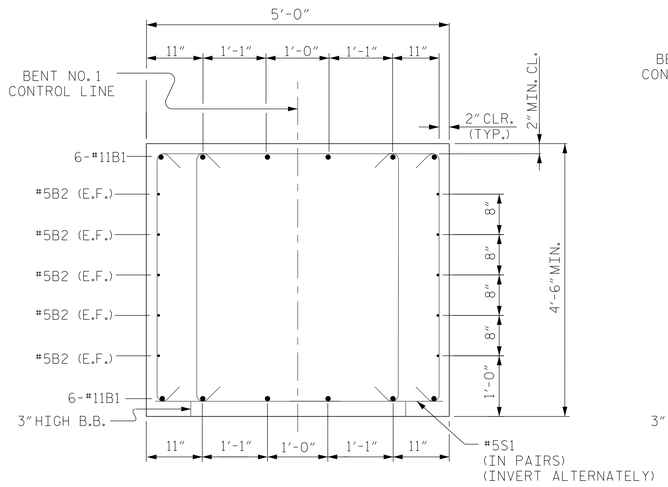
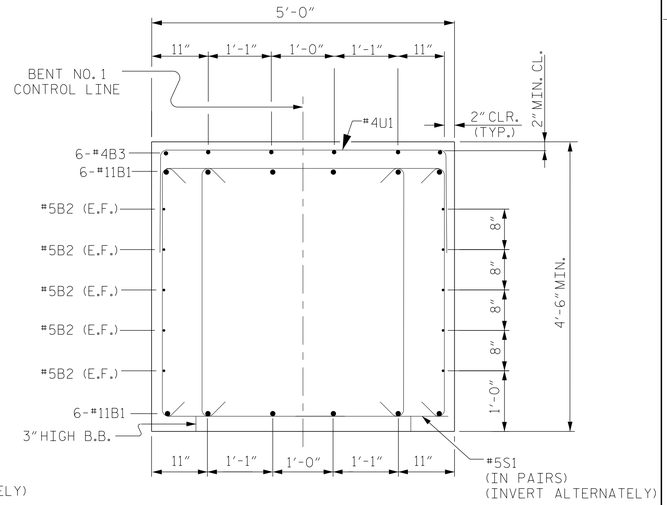
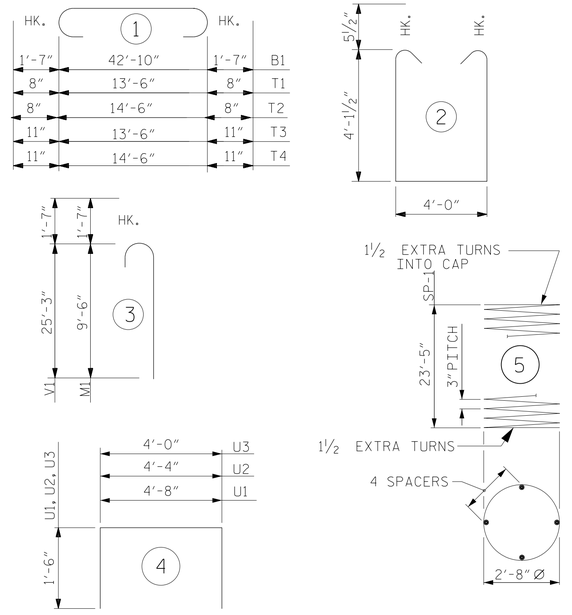


SECTION X-X



SECTION Y-Y

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
FOR BENT NO. 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#11	1	46'-0"	2,933
B2	10	#5	STR	43'-0"	448
B3	6	#4	STR	23'-7"	95
M1	60	#11	3	11'-1"	3,533
S1	136	#5	2	13'-2"	1,868
T1	51	#6	1	14'-10"	1,136
T2	51	#6	1	15'-10"	1,213
T3	51	#8	1	15'-4"	2,088
T4	51	#8	1	16'-4"	2,224
U1	52	#4	4	7'-8"	266
U2	8	#4	4	7'-4"	39
U3	10	#4	4	7'-0"	47
V1	60	#11	3	26'-10"	8,554

REINFORCING STEEL (BENT NO. 1) 24,444 LBS.

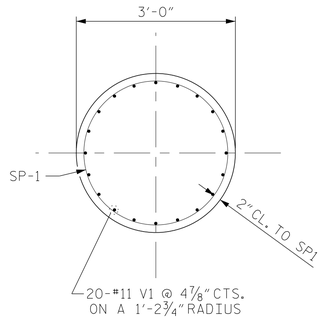
SP-1	3	*	5	797'-8"	1,599

SPIRAL COLUMN REINFORCING STEEL (BENT NO. 1) 1,599 LBS.

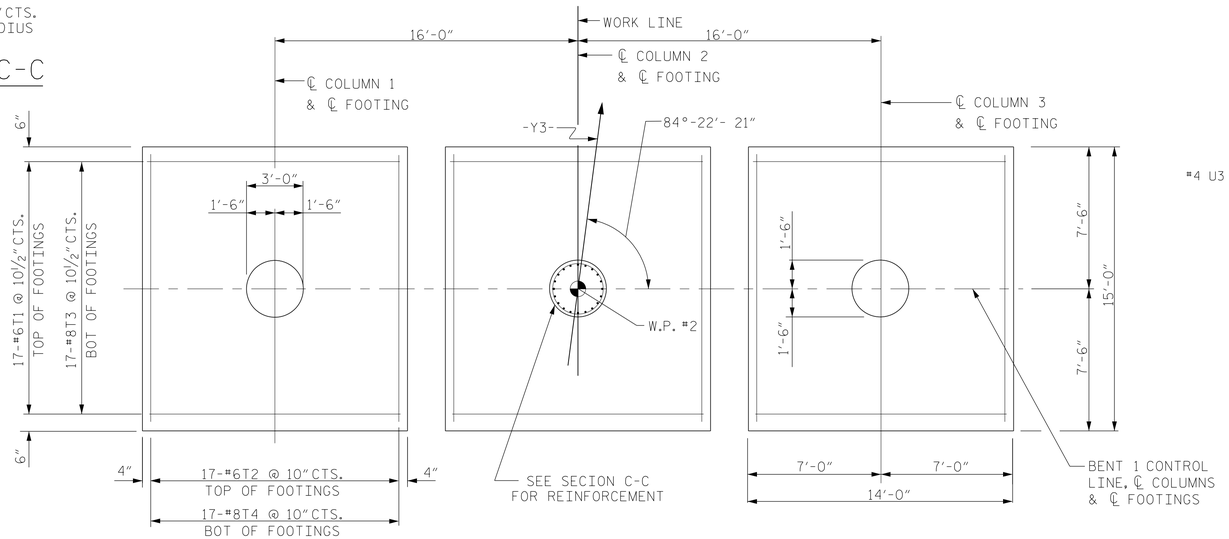
* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR

CLASS A CONCRETE BREAKDOWN (FOR ONE BENT)

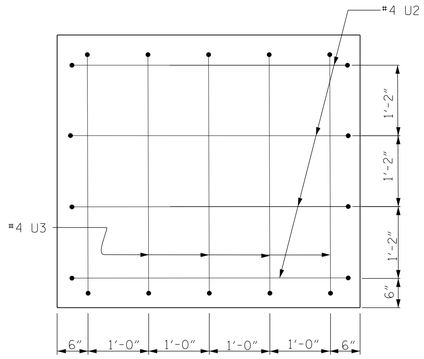
POUR #1 (FOOTINGS)	75.8 C.Y.
POUR #2 (COLUMNS)	18.2 C.Y.
POUR #3 (CAP)	37.9 C.Y.
TOTAL CLASS A CONCRETE	131.9 C.Y.
FOUNDATION EXCAVATION	LUMP SUM



SECTION C-C



PLAN OF FOOTINGS



END OF CAP VIEW

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT NO. 1

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794A9... 2/6/2017

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DRAWN BY: H.ASSFOURA DATE : 10/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

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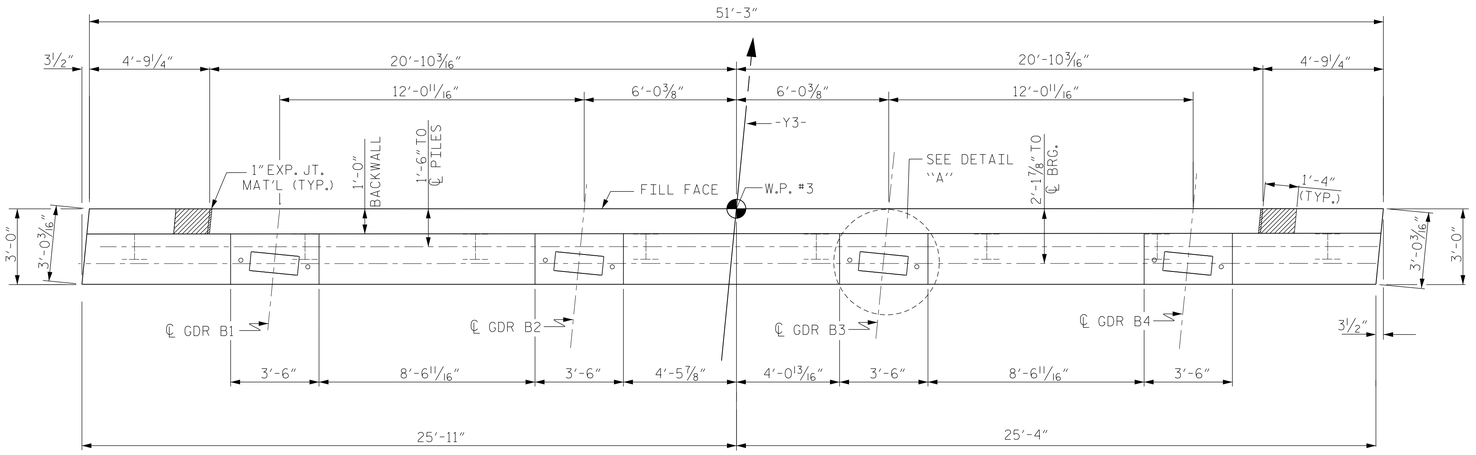
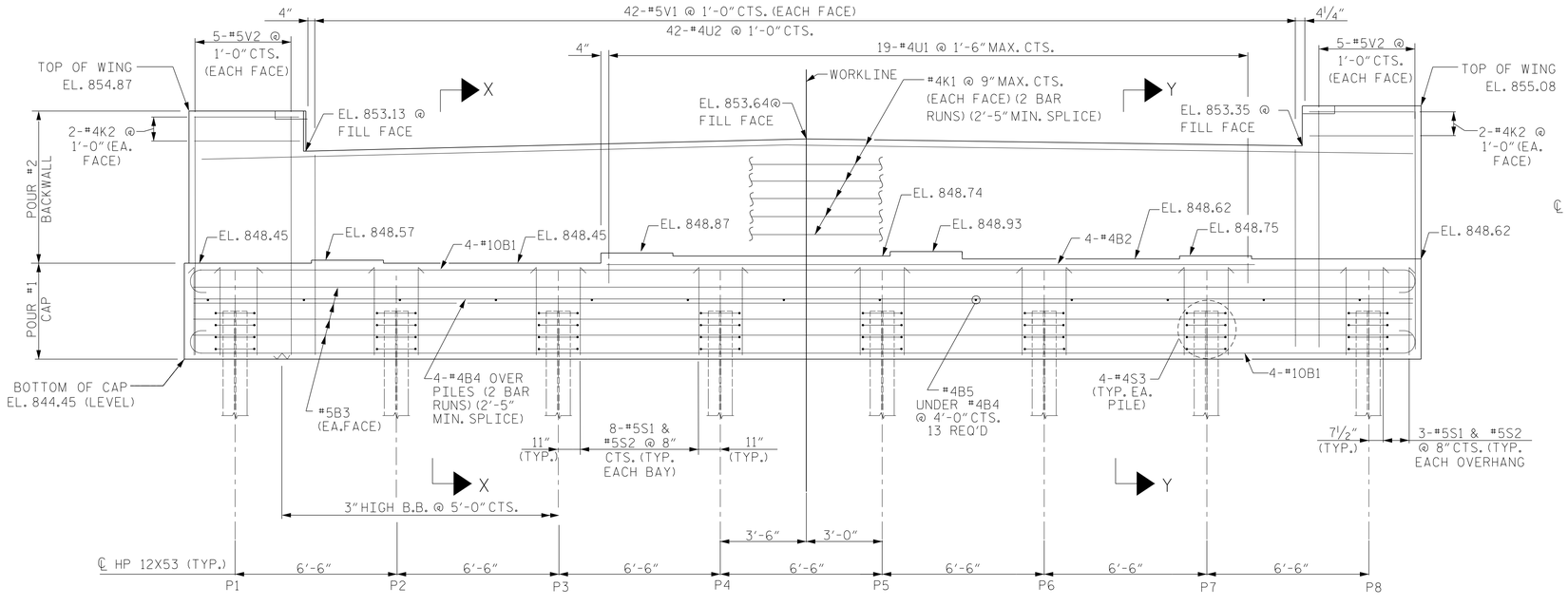
STR. #4



PLAN



ELEVATION

FOR SECTIONS X-X & Y-Y, SEE SHEET 2 OF 2.

NOTES

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

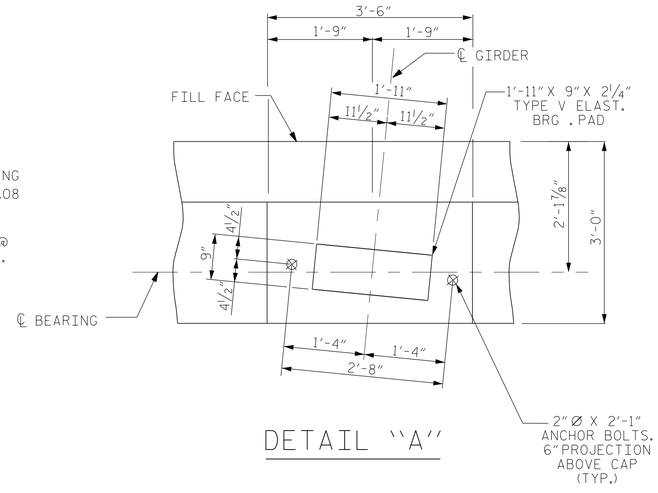
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

FOR BEARING DETAILS, SEE ELASTOMERIC BEARING DETAILS SHEET.

FOR PILE SPLICE DETAILS, SEE SHEET 2 OF 2.

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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



DETAIL "A"

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE

END BENT NO. 2

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M LOFTUS

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DRAWN BY:	H.ASSFOURA	DATE : 09/16
CHECKED BY:	J.LOFTUS	DATE : 11/16
DESIGN ENGINEER OF RECORD:	J.LOFTUS	DATE : 01/17

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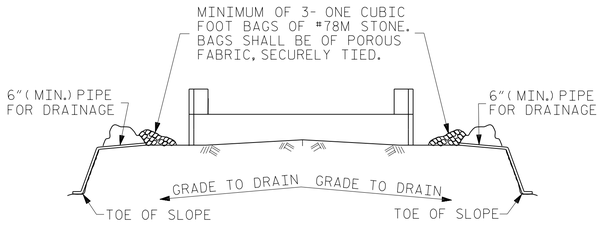
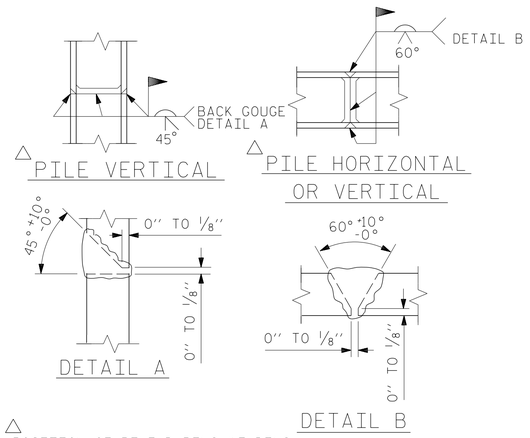


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

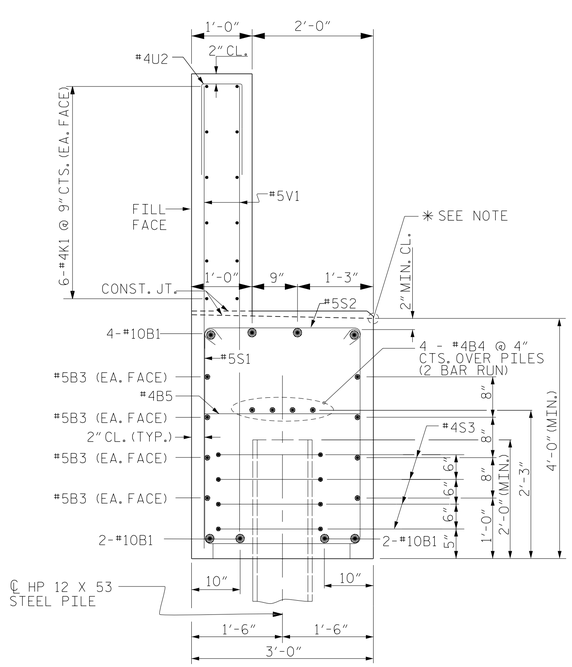
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT

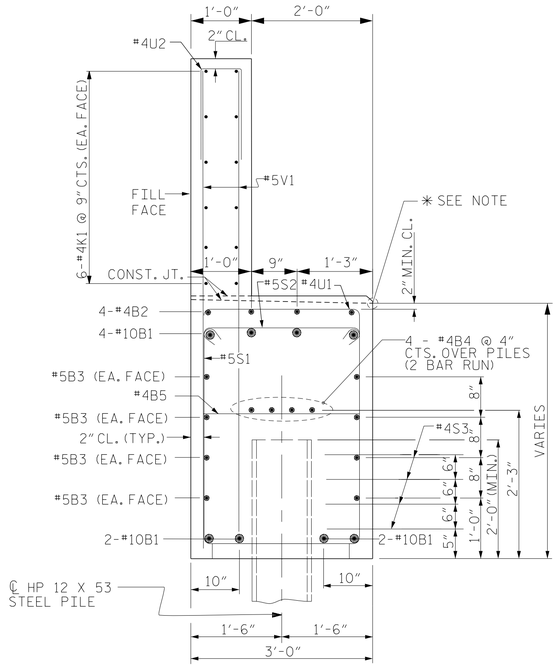


△ POSITION OF PILE DURING WELDING.

PILE SPLICE DETAILS



SECTION X-X



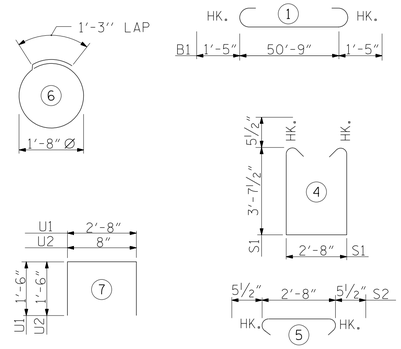
SECTION Y-Y

NOTES:

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

✳ ELEVATIONS BETWEEN BRIDGE SEAT BUILDUPS ARE SHOWN AT THIS POINT.

BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL
FOR END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	1	53'-7"	1,845
B2	4	#4	STR	27'-6"	73
B3	8	#5	STR	50'-10"	424
B4	8	#4	STR	26'-7"	142
B5	13	#4	STR	2'-8"	23
K1	24	#4	STR	26'-8"	428
K2	8	#4	STR	4'-5"	24
S1	62	#5	4	10'-10"	701
S2	62	#5	5	3'-7"	232
S3	32	#4	6	6'-6"	139
U1	19	#4	7	5'-8"	72
U2	42	#4	7	3'-8"	103
V1	84	#5	STR	8'-3"	723
V2	20	#5	STR	10'-0"	209

REINFORCING STEEL (FOR END BENT NO. 2) 5,138 LBS.

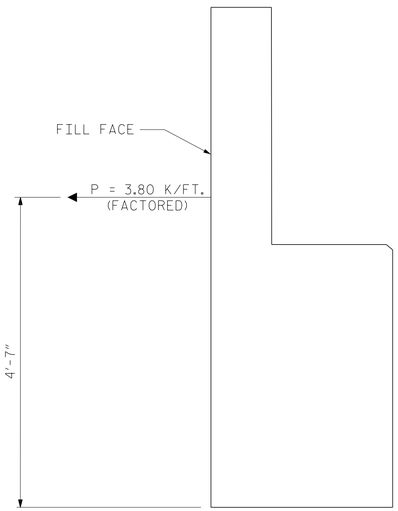
CLASS A CONCRETE BREAKDOWN

POUR #1 CAP & LOWER PART OF WINGS 25.4 C.Y.

POUR #2 BACKWALL & UPPER PART OF WINGS 9.7 C.Y.

TOTAL CLASS A CONCRETE 35.1 C.Y.

HP 12 X 53 STEEL PILES
NO: 8 LIN. FT.= 380



TIE BACK DETAILS

(DETAIL SHOWING TIE BACK RESTRAINT FOR END BENT #2)
FOR MSE RETAINING WALLS, SEE GEOTECHNICAL SPECIAL PROVISIONS

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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SUBSTRUCTURE
END BENT NO. 2
DETAILS

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NO.	BY:	DATE:	NO.	BY:	DATE:	S4-25
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE: 08/16
CHECKED BY: J.LOFTUS DATE: 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE: 01/17

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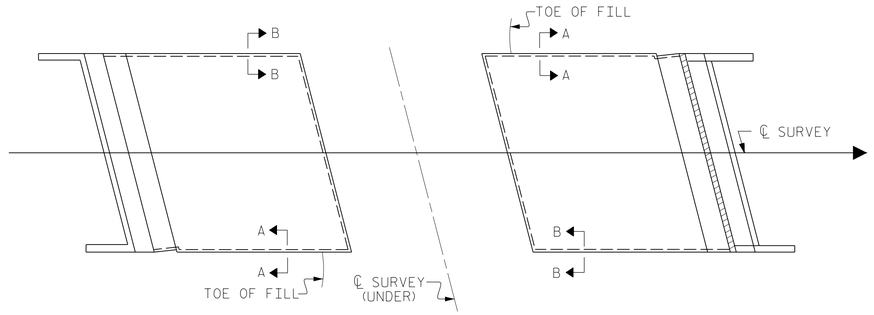
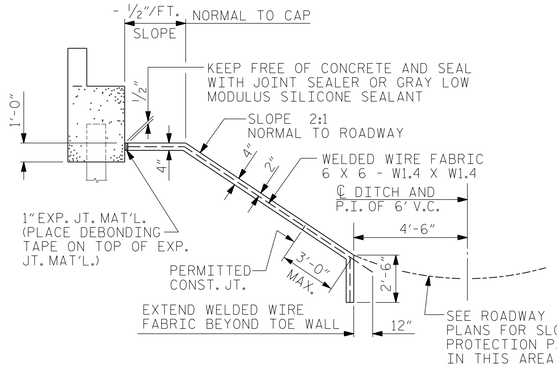
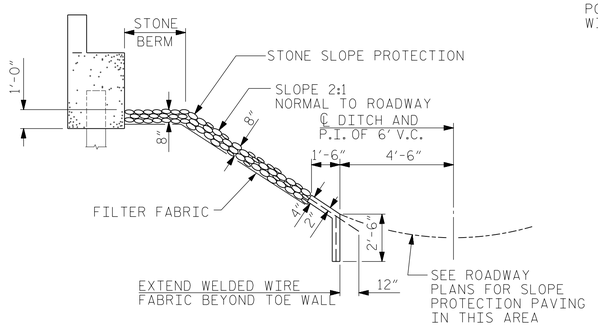


PLAN



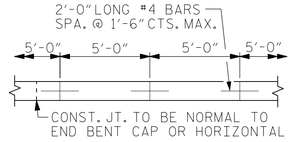
SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH

DETAILS FOR ALTERNATE "A"



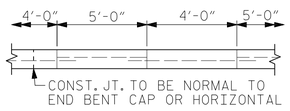
SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH

DETAILS FOR ALTERNATE "B"



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



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

OPTIONAL POURING DETAIL

GENERAL NOTES

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. THE CONTRACTOR, AT HIS OPTION, MAY USE ALTERNATE "B" ONLY FOR HIGHWAY OVER HIGHWAY GRADE SEPARATIONS WITH 2:1 END BENT SLOPE IN RURAL, UNPOPULATED AREAS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

ALTERNATE "A"

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.

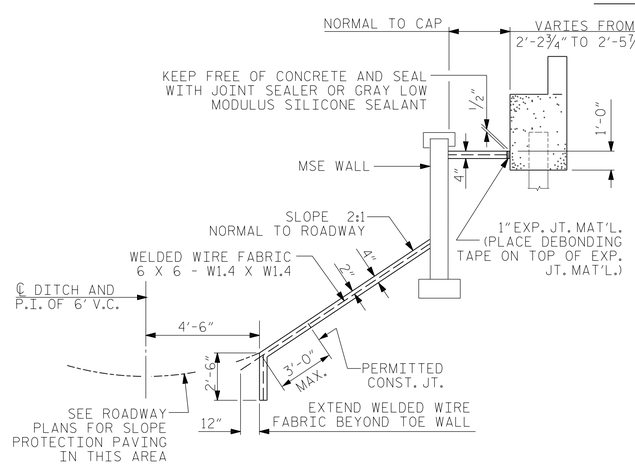
ALTERNATE "B"

ALTERNATE "B" SHALL CONSIST OF A COMBINATION CONCRETE SLAB AND STONE SLOPE PROTECTION. THE CONCRETE PORTIONS SHALL CONSIST OF PAVED STRIPS ALONG THE DITCH AS SHOWN IN THE DETAILS. FILTER FABRIC AND 8" OF STONE SHALL BE PLACED OVER THE REMAINING AREA SHOWN ON THE PLANS TO BE COVERED WITH SLOPE PROTECTION. CONCRETE SHALL BE CLASS "B". THE COST OF THE CONCRETE, FILTER FABRIC, STONE AND WELDED WIRE FABRIC 6 X 6 - W1.4 X W1.4, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION. SUBGRADING, STONE TYPE, STONE SIZING, AND HERBICIDE PROTECTION, SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE HERBICIDE TYPE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO APPLICATION.

BRIDGE @ STA. 20+70.23 -Y3-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	168	371
END BENT 2	175	350

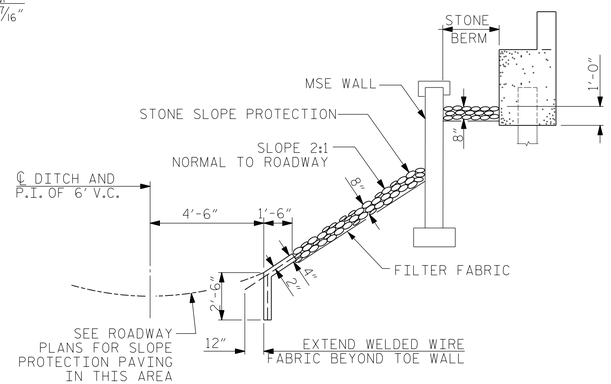
* QUANTITY SHOWN IS BASED ON 5' POURS.

END BENT NO. 1



SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH

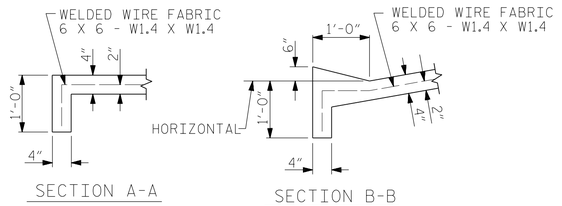
DETAILS FOR ALTERNATE "A"

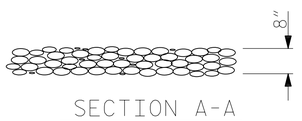


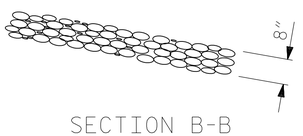
SECTION ALONG ℄ ROADWAY WHEN FILL CATCHES IN DITCH

DETAILS FOR ALTERNATE "B"

END BENT NO. 2







PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E6794AB... 2/6/2017

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SHEET NO. S4-26

TOTAL SHEETS 29

STR. #4

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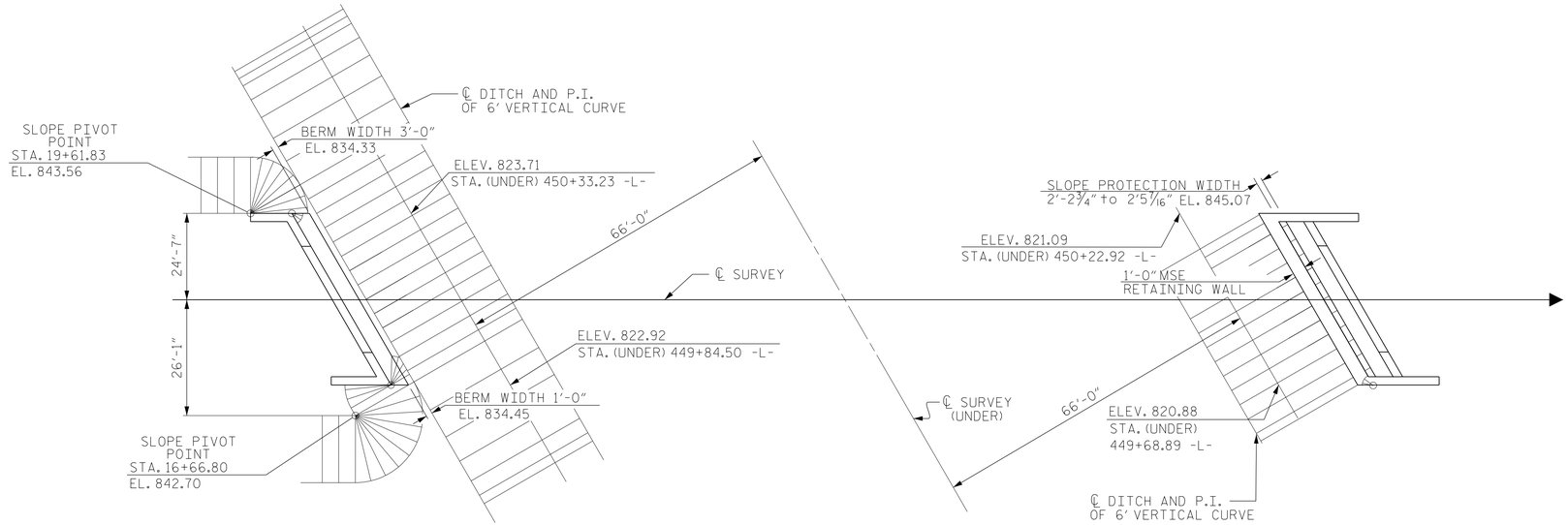
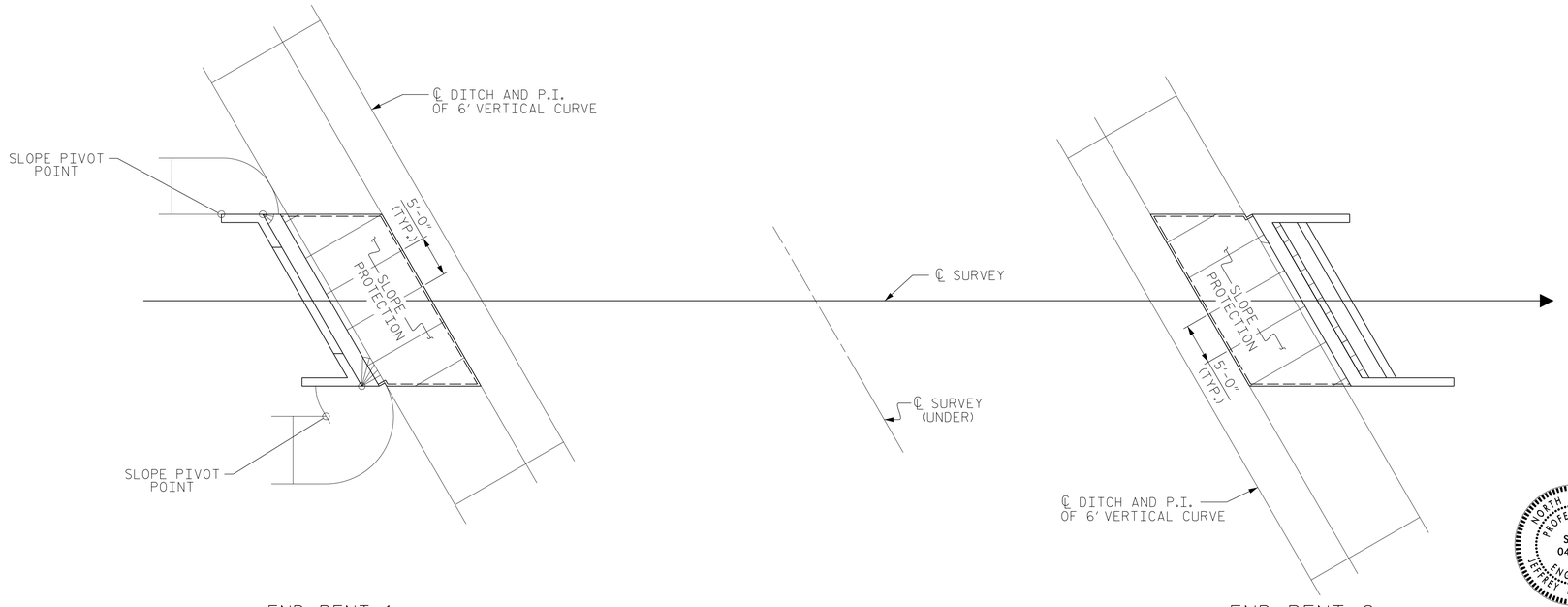


END BENT 1

END BENT 2

PLAN - GRADING



END BENT 1

END BENT 2

PLAN - CONCRETE PLACEMENT

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SLOPE PROTECTION
DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus 2/6/2017
FE51DC02E6794A8...

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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-27
1			3			TOTAL SHEETS
2			4			29

STR. #4

DRAWN BY: H.ASSFOURA DATE : 11/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

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2/6/2017
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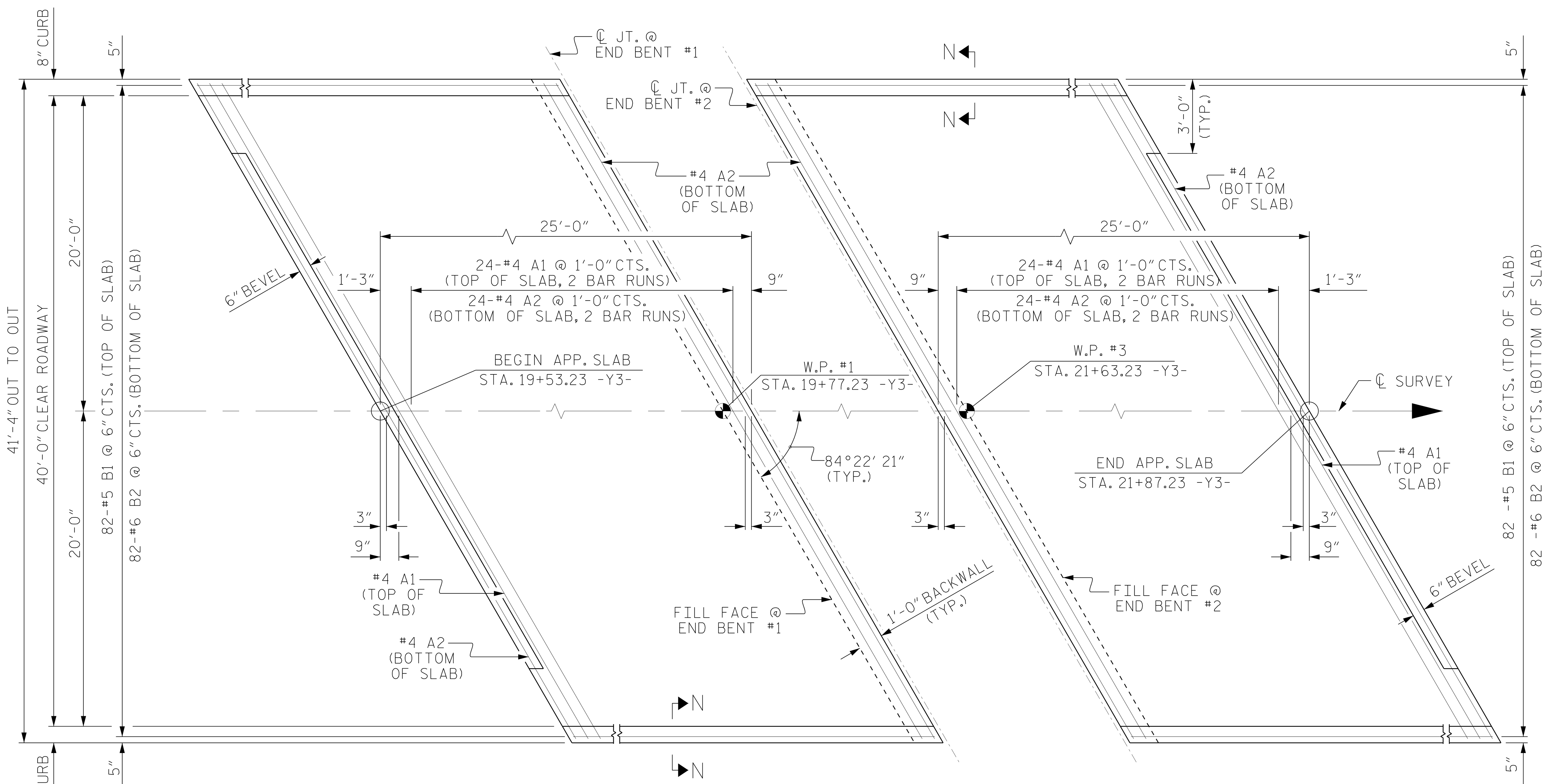


PLAN @ END BENT #1

PLAN @ END BENT #2

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

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 @ END BENT #1 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 BARRIER RAIL OR PARAPET AND END POST.

FOR FOAM JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE FOAM JOINT SEAL SHALL BE 2".

FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.

BILL OF MATERIAL

APPROACH SLAB AT EB #1

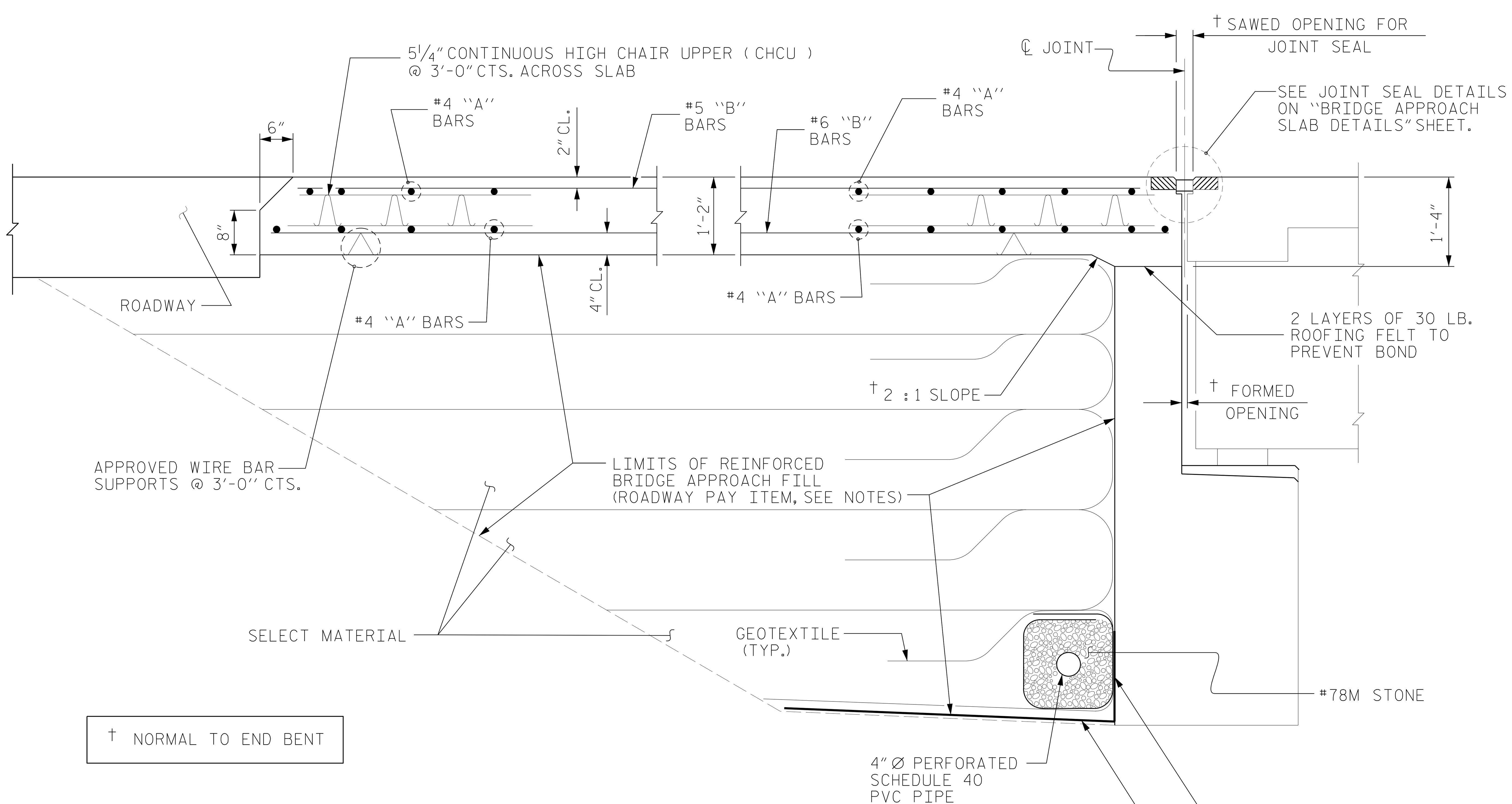
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	21'-8"	724
A2	52	#4	STR	21'-6"	747
* B1	82	#5	STR	24'-2"	2067
B2	82	#6	STR	24'-8"	3038
REINFORCING STEEL				3785 LBS.	
* EPOXY COATED REINFORCING STEEL				2791 LBS.	
CLASS AA CONCRETE				44.9 C.Y.	

APPROACH SLAB AT EB #2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	50	#4	STR	21'-8"	724
A2	52	#4	STR	21'-6"	747
* B1	82	#5	STR	24'-2"	2067
B2	82	#6	STR	24'-8"	3038
REINFORCING STEEL				3785 LBS.	
* EPOXY COATED REINFORCING STEEL				2791 LBS.	
CLASS AA CONCRETE				44.9 C.Y.	

SPLICE LENGTHS

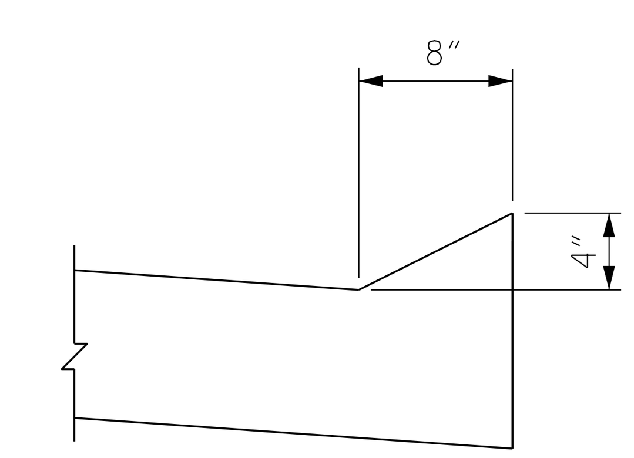
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"



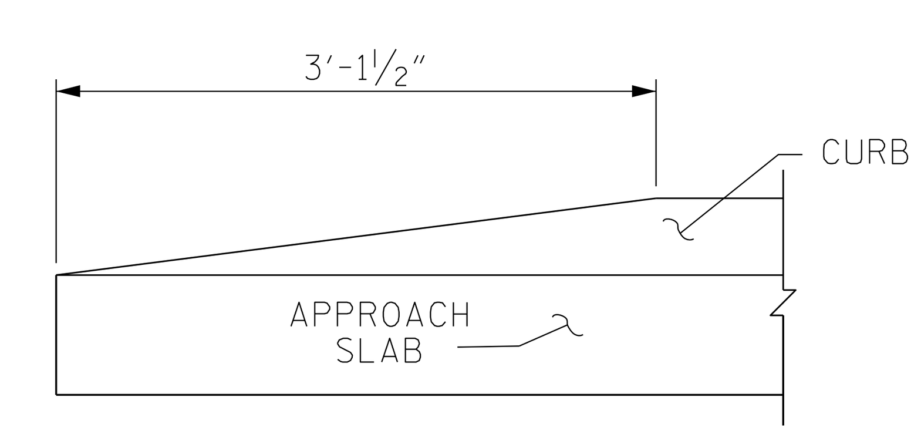
† NORMAL TO END BENT

SECTION THRU SLAB

@ END BENT #1, FOR END BENT #2 SEE SHEET 2 OF 2



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 041425 JEFFREY M. LOFTUS

DocuSigned by: Jeff Loftus FE51DC02E8794A9... 2/6/2017

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PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 1 OF 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT

REVISIONS							
NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.	S4-28
1			3			TOTAL SHEETS	29
2			4				

DRAWN BY:	H.ASSFOURA	DATE:	07/16
CHECKED BY:	J.LOFTUS	DATE:	11/16
DESIGN ENGINEER OF RECORD:	J.LOFTUS	DATE:	01/17

STR. #4

(SHT 2a)

R 2707C_SITE 3

2/6/2017
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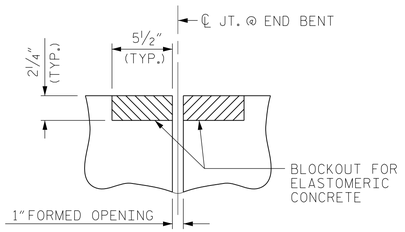
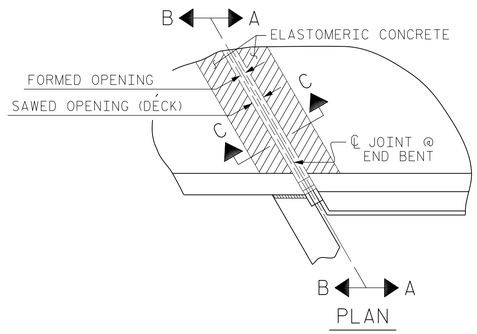
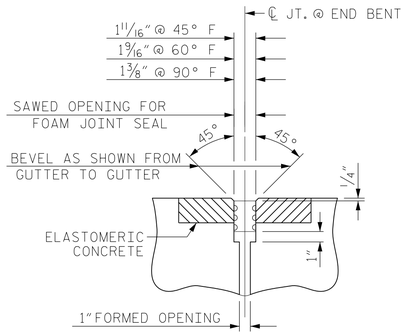


SECTION C-C

FOAM JOINT SEAL
(PRE-SAWED ELASTOMERIC CONCRETE DIMENSIONS)

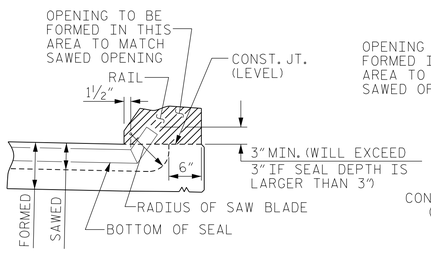


PLAN

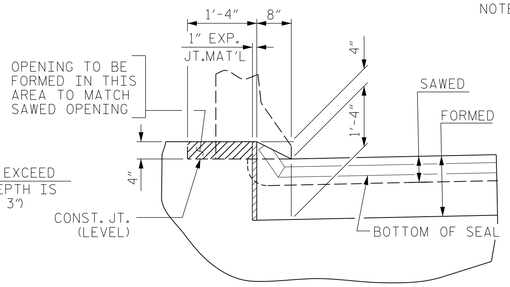


SECTION C-C

FOAM JOINT SEAL
(EXPANSION)



SECTION A-A



SECTION B-B

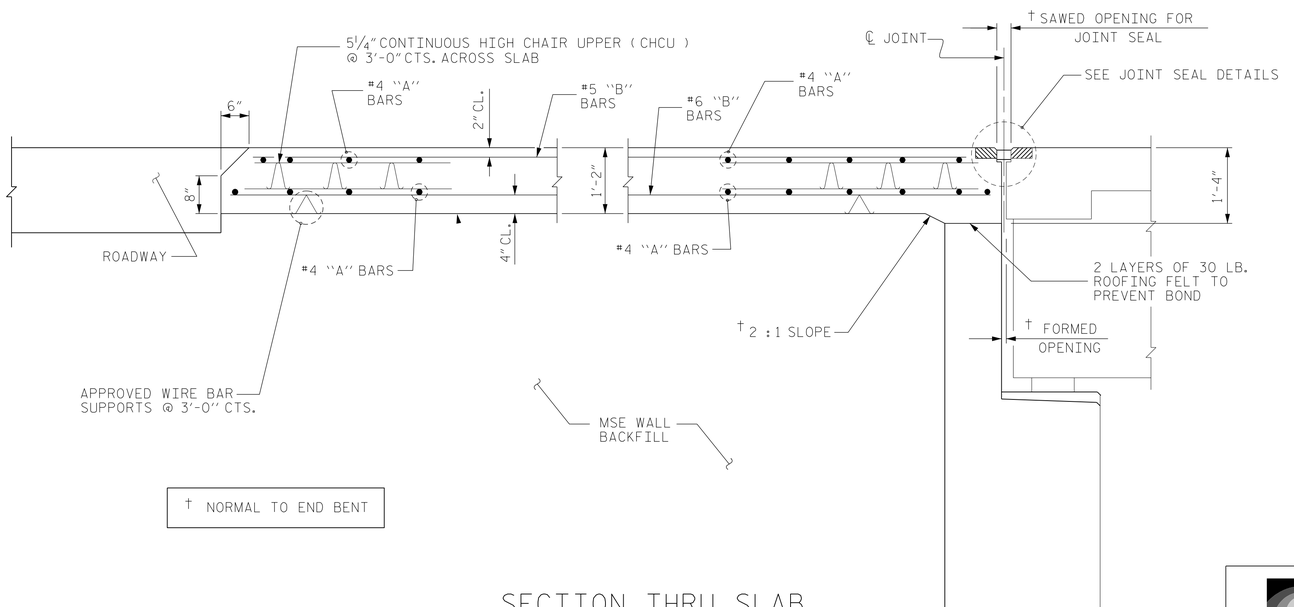
JOINT SEAL DETAILS @ END BENT

FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	6.9
2	6.9
TOTAL	13.8

* BASED ON THE MINIMUM BLOCKOUT SHOWN.

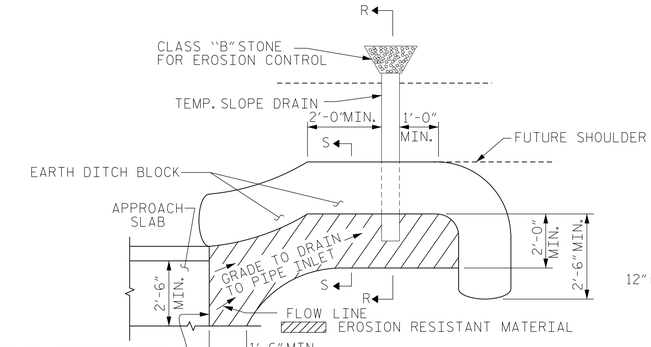


† NORMAL TO END BENT

SECTION THRU SLAB

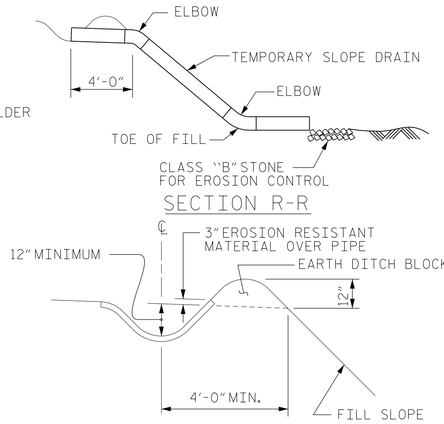
@ END BENT #2

NOTE: FOR MSE RETAINING WALLS, SEE GEOTECHNICAL SPECIAL PROVISIONS



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

PLAN VIEW

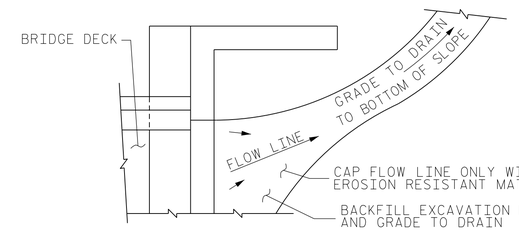


SECTION R-R

SECTION S-S

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



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

TEMPORARY DRAINAGE DETAIL

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 20+70.23-Y3- POT

SHEET 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD

BRIDGE APPROACH SLAB DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S4-29
1			3			TOTAL SHEETS
2			4			29

STR. #4

STD. NO. BAS4

DRAWN BY: H.ASSFOURA DATE : 07/16
CHECKED BY: J.LOFTUS DATE : 11/16
DESIGN ENGINEER OF RECORD: J.LOFTUS DATE : 01/17

2/6/2017
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USER:default

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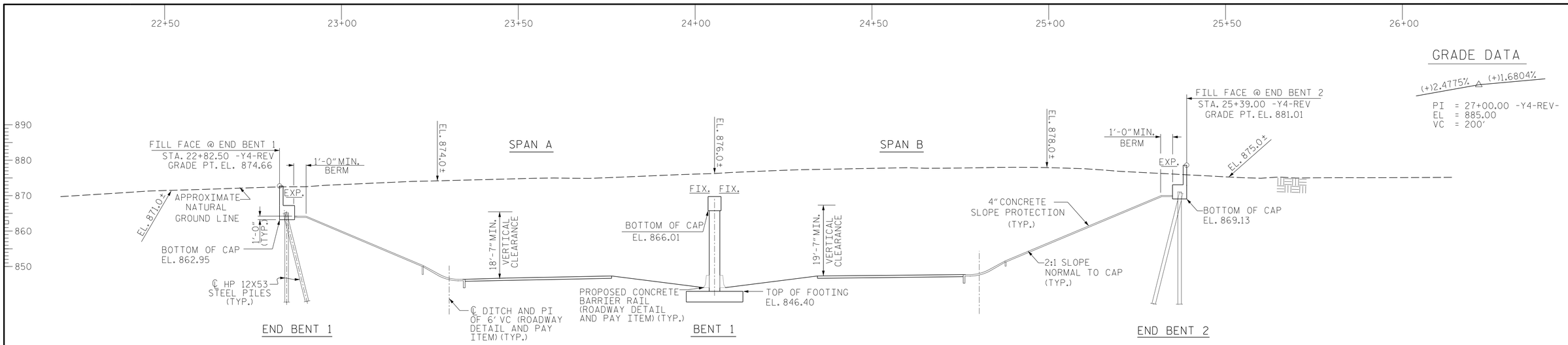
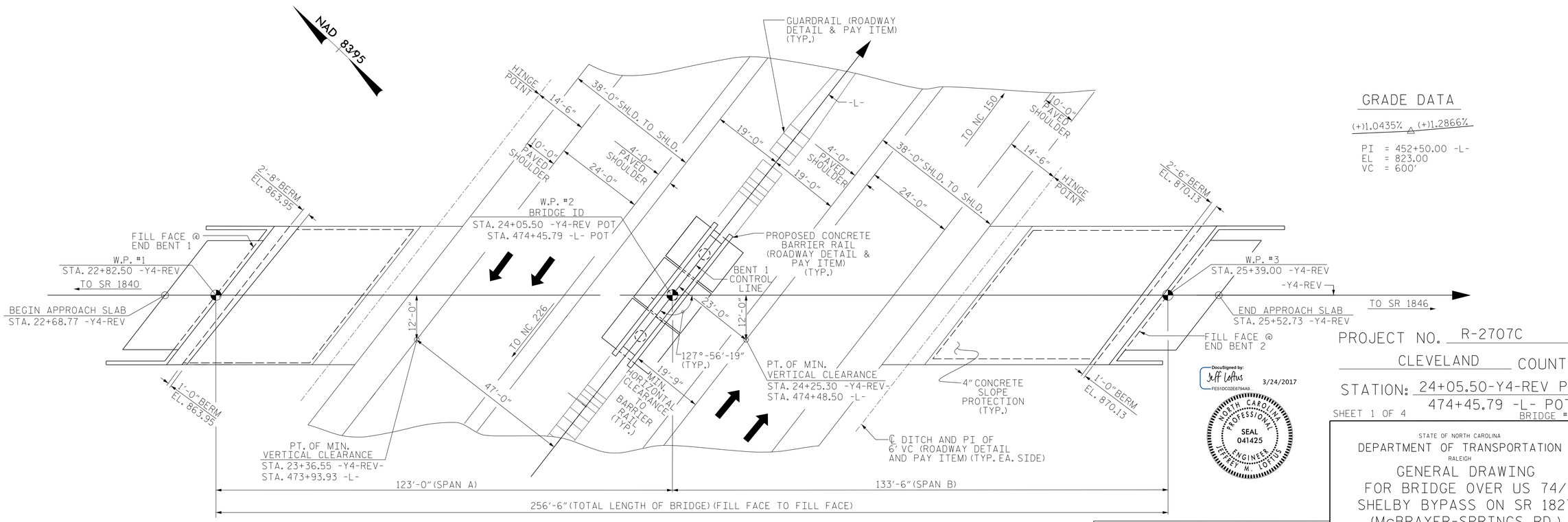


SECTION ALONG -Y4- REV

SECTIONS AT BENT AND END BENTS ARE TAKEN AT RIGHT ANGLES



PLAN

PILES NOT SHOWN IN PLAN VIEW FOR CLARITY

PROJECT NO. R-2707C

CLEVELAND COUNTY

STATION: 24+05.50-Y4-REV POT
474+45.79 -L- POT

SHEET 1 OF 4

BRIDGE #470

STR. #5

DocuSigned by: Jeff Loftus FE51DC022E67044B 3/24/2017

SEAL 041425 NORTH CAROLINA PROFESSIONAL ENGINEER JEFFREY M. LOFTUS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER US 74/
SHELBY BYPASS ON SR 1827
(McBRAYER-SPRINGS RD.)
BETWEEN SR 1840 AND SR 1846

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S5-1
1			3			TOTAL SHEETS
2			4			29

DRAWN BY:	H.ASSFOURA	DATE : 02/16
CHECKED BY:	J. LOFTUS	DATE : 11/16
DESIGN ENGINEER OF RECORD:	J. LOFTUS	DATE : 01/17

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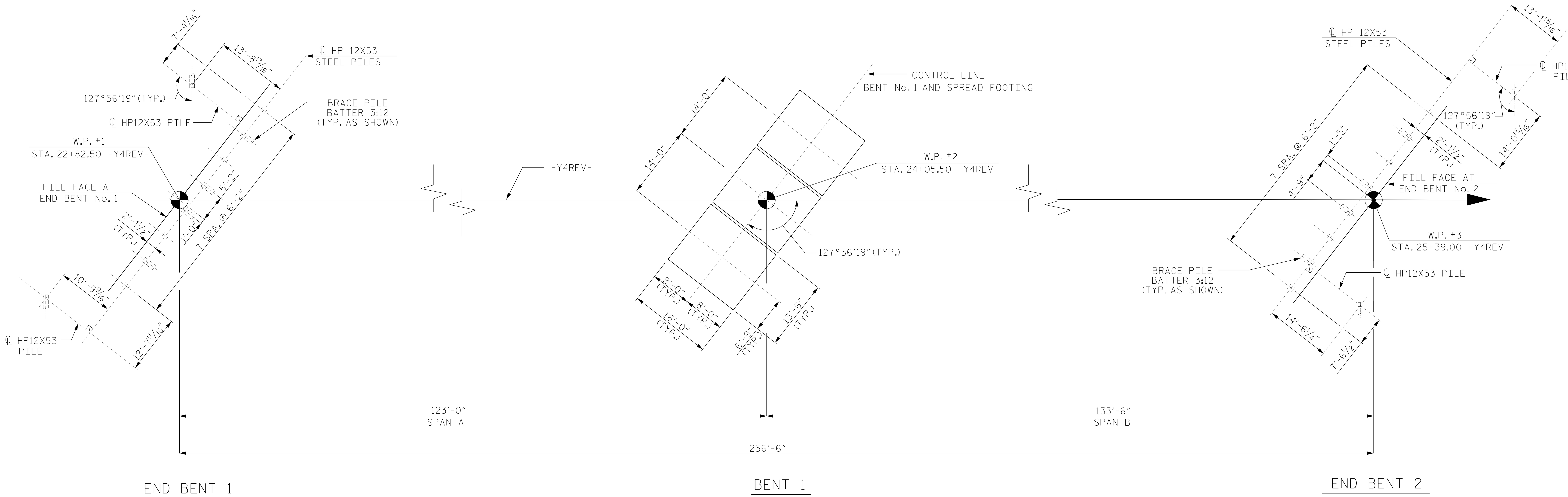

FOUNDATION LAYOUT

DIMENSIONS LOCATING PILES ARE SHOWN
TO PILE CENTERLINE AT BOTTOM OF CAP

NOTES

1. FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 105 TONS PER PILE.
3. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 100 TONS PER PILE.
4. DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 175 TONS PER PILE.
5. IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 40 TO 50 FT.-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING EQUIPMENT IN ACCORDANCE WITH THE PILE PROVISION.
6. THE SPREAD FOOTINGS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 3 TSF. CHECK FIELD CONDITIONS FOR THE REQUIRED RESISTANCE OF 6.6 TSF JUST BEFORE PLACING CONCRETE.
7. FOOTING EXCAVATIONS AT BENT NO. 1 WILL EXTEND INTO MATERIAL THAT DETERIORATES WHEN EXPOSED TO THE ELEMENTS. CHECK FIELD CONDITIONS TO THE REQUIRED RESISTANCE AND PLACE CONCRETE IMMEDIATELY AFTER THE EXCAVATION IS COMPLETED.

DRAWN BY: H.ASSFOURA DATE: 03/16
CHECKED BY: J. LOFTUS DATE: 11/16
DESIGN ENGINEER OF RECORD: J. LOFTUS DATE: 01/17

DocuSigned by: Jeff Loftus 3/24/2017

NORTH CAROLINA PROFESSIONAL SEAL 041425 ENGINEER JEFFREY M. LOFTUS

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PROJECT NO. R-2707C
CLEVELAND COUNTY
STATION: 24+05.50-Y4-REV POT
SHEET 2 OF 4

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

FOUNDATION LAYOUT

REVISIONS								SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:			S5-2
1			3					TOTAL SHEETS
2			4					29

STR. #5

3/24/2017
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