

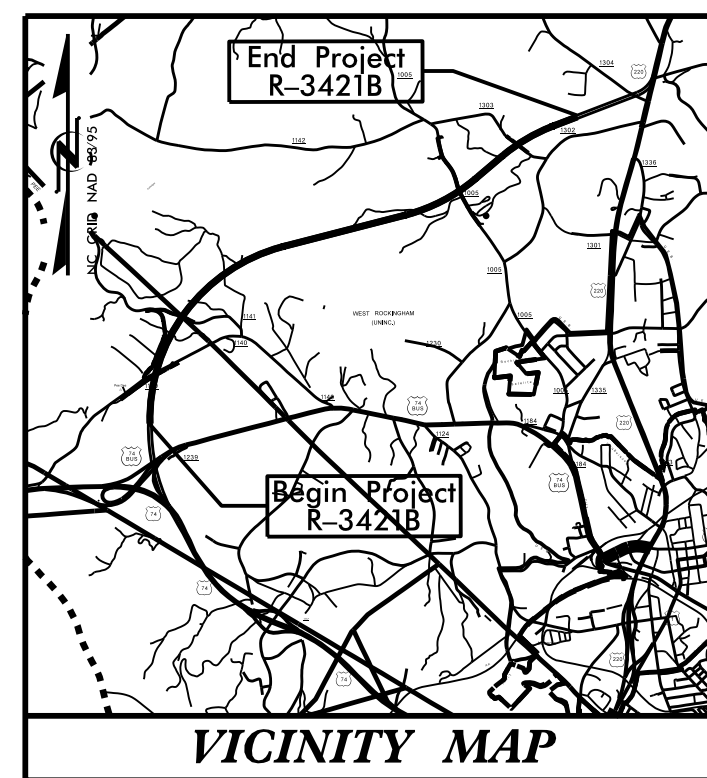
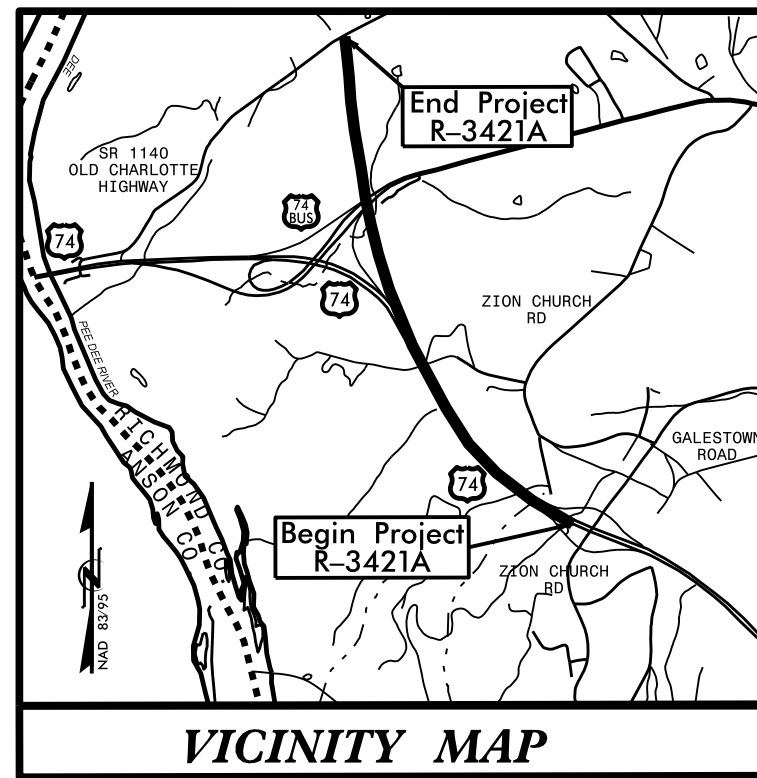
**CONTRACT: C204368 TIP PROJECT: R-3421A/R-3421B**

**STRUCTURES**

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**RICHMOND COUNTY**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3421A	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34542.1.FR4	NHF-0220(75)	P.E.	
34542.2.6	HPPF-0220(030)	R/W,UTIL.	
34542.3.6		CONST.	
	<b>R-3421B</b>		
34542.1.FR3	NHF-0220(76)	P.E.	
34542.2.3	NHF-0220(43)	R/W,UTIL.	
34542.3.7		CONST.	



**R-3421A**

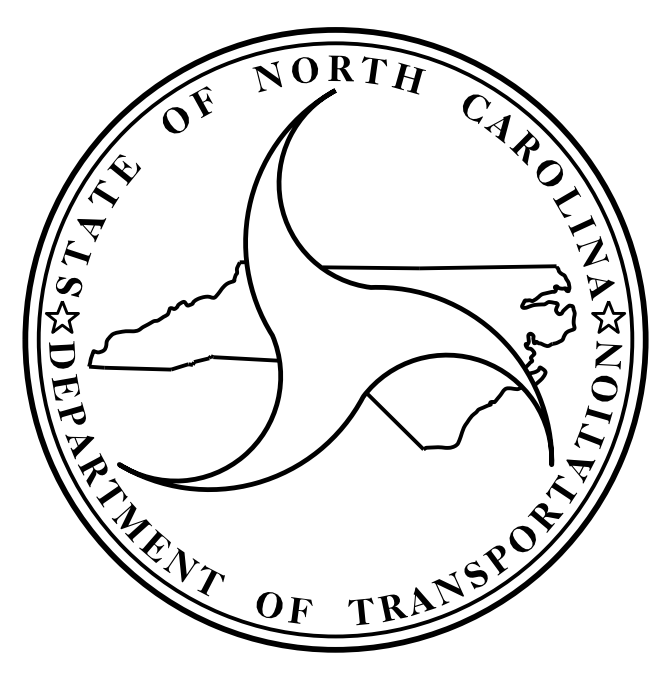
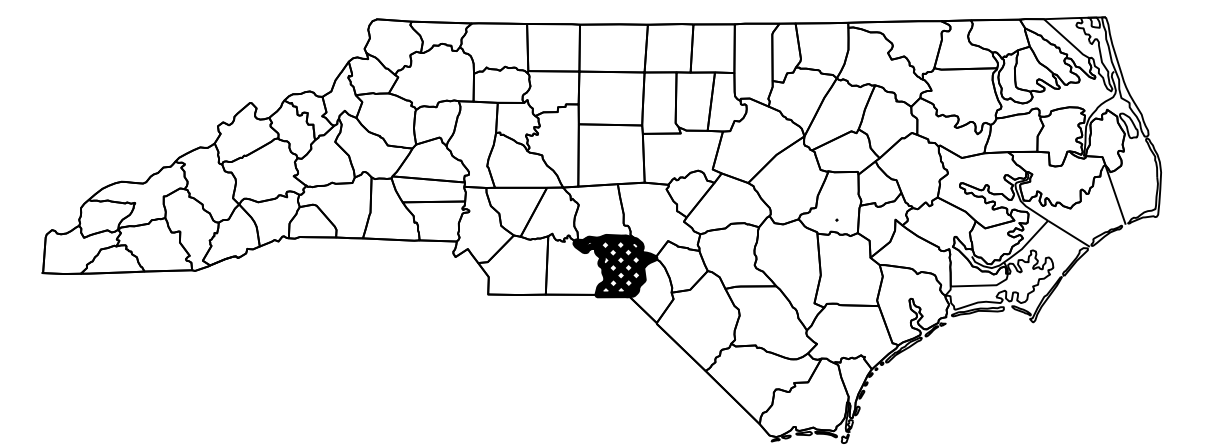
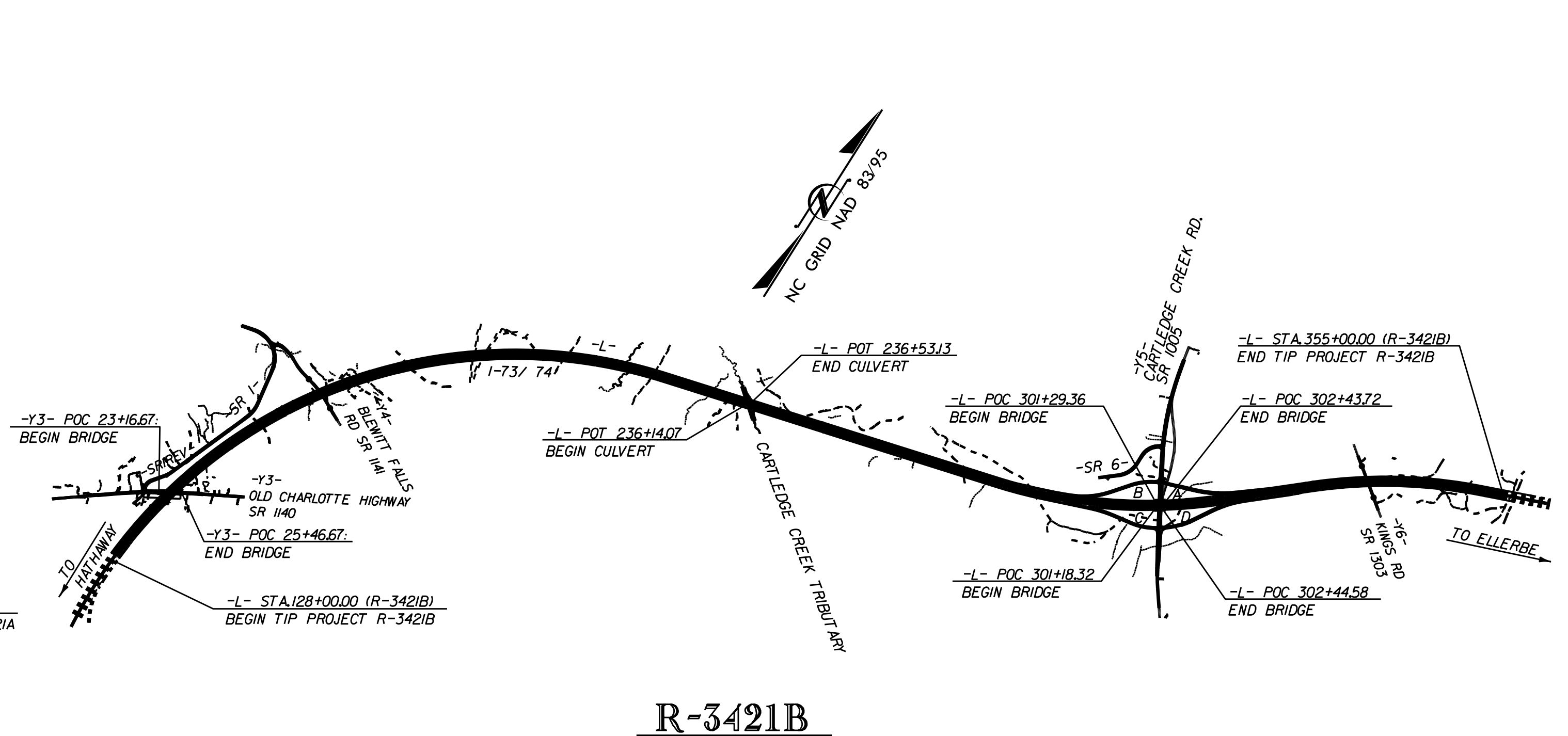
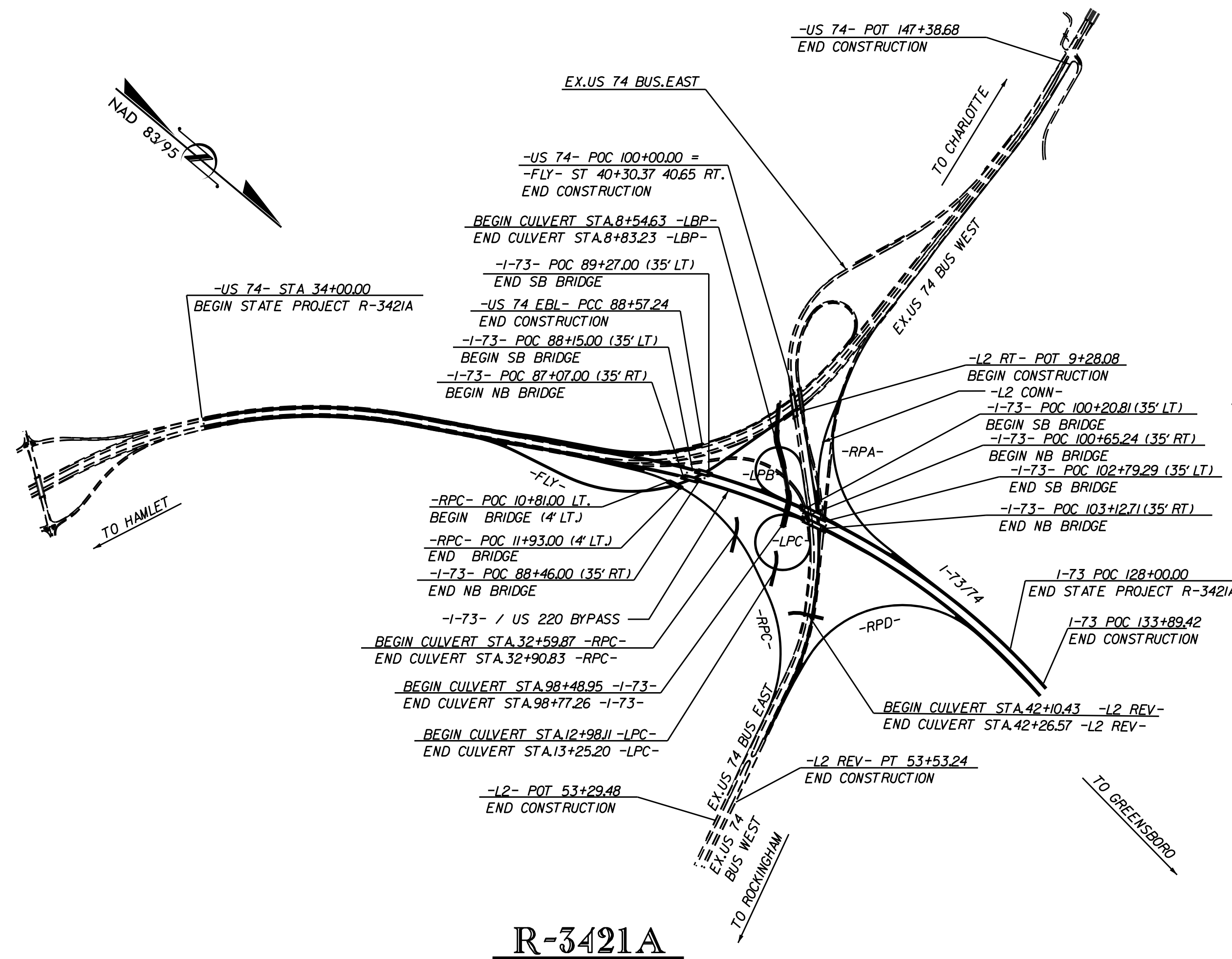
**LOCATION:**  
I-73/74 FROM US 74 BYPASS WEST OF ROCKINGHAM AT SR 1109 (ZION CHURCH RD.) INTERCHANGE TO 0.3 MILES SOUTH OF SR 1140 (OLD CHARLOTTE HWY.)

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

**R-3421B**

**LOCATION:**  
I-73/74 FROM 0.3 MILES SOUTH OF SR 1140 (OLD CHARLOTTE HIGHWAY) TO 0.2 MILES SOUTHWEST OF SR 1304 (HARRINGTON ROAD)

**TYPE OF WORK:**  
GRADING, PAVING, DRAINAGE, CULVERT, STRUCTURES, MSE RETAINING WALLS, & SIGNING



R-3421A	
<b>DESIGN DATA</b>	
ADT (2016)	= 9,330-12,800
ADT (2036)	= 19,900-23,800
K	= 10%
D	= 60%
T	= 26% *
V	= 70 MPH
* (TTST 9% + DUAL 17%)	
FUNC. CLASS = INTERSTATE	

R-3421B	
<b>DESIGN DATA</b>	
ADT (2016)	= 10,400
ADT (2036)	= 19,980
K	= 10%
D	= 60%
T	= 26% *
V	= 70 MPH
* (DUALS 9% + TTST 17%)	
FUNC. CLASS = INTERSTATE STATEWIDE TIER	

PROJECT LENGTH	
LENGTH ROADWAY TIP PROJECT R-3421A	= 1.704 MI
LENGTH STRUCTURE TIP PROJECT R-3421A	= 0.076 MI
TOTAL LENGTH TIP PROJECT R-3421A	= 1.780 MI
(SB LANES WERE USED FOR LENGTH OF PROJECT)	
LENGTH ROADWAY TIP PROJECT R-3421B	= 4.268 MI
LENGTH STRUCTURE TIP PROJECT R-3421B	= 0.031 MI
TOTAL LENGTH TIP PROJECT R-3421B	= 4.299 MI
(-L- LINE USED FOR PROJECT LENGTH)	

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

2018 STANDARD SPECIFICATIONS

LETTING DATE : OCTOBER 15, 2019

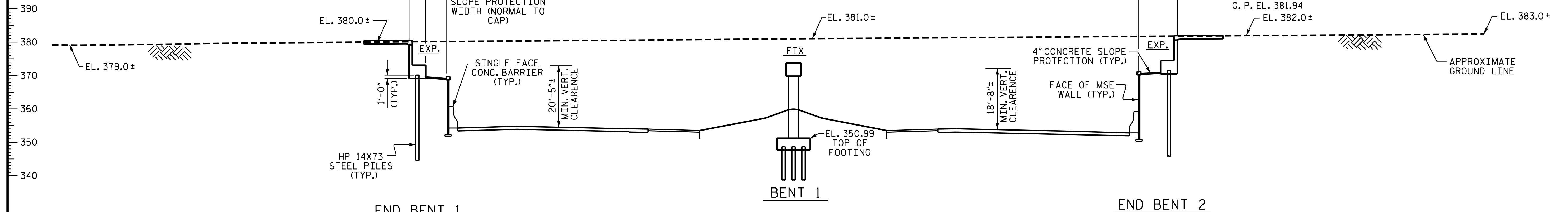
A. KEITH PASCHAL, P.E.  
PROJECT ENGINEER

KRISHNA P. SEDAI, P.E.  
PROJECT DESIGN ENGINEER

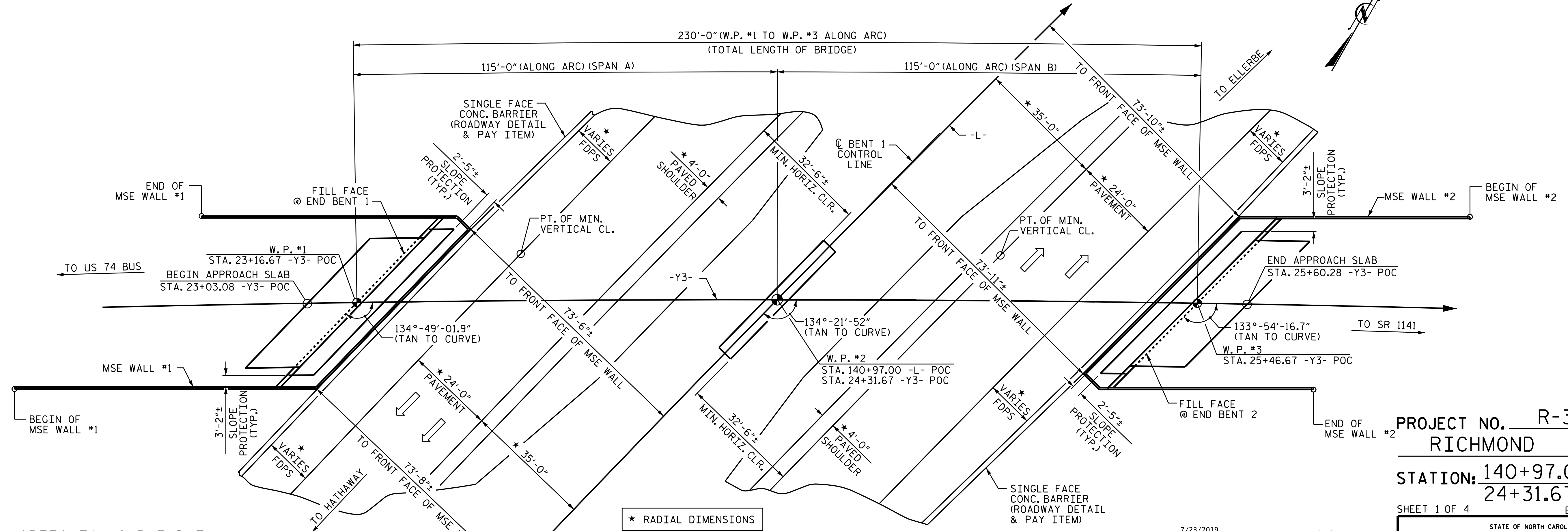
22+25 22+50 22+75 23+00 23+25 23+50 23+75 24+00 24+25 24+50 24+75 25+00 25+25 25+50 25+75

**GRADE DATA -Y3-**

-1.8918% Δ +0.6121%  
 PI STA. 15+20.00  
 EL. 375.66  
 VC = 340



**SECTION ALONG -Y3-**  
 SECTIONS @ BENT & END BENTS ARE AT RIGHT ANGLES



**PLAN**  
 FOUNDATION NOT SHOWN FOR CLARITY  
 END BENTS AND BENT 1 ARE NOT PARALLEL.  
 FOR MSE WALLS DETAILS SEE "MSE RETAINING WALL" SHEETS

**HORIZONTAL CURVE DATA**

-Y3-	-L-
PI STA. 21+23.43	PI STA. 180+84.12
Δ = 8°-41'-34.9" (RT)	Δ = 104°-01'-52.6" (RT)
D = 0°-45'-00.0"	D = 0°-45'-00.0"
L = 1,159.07	L = 13,870.84
T = 580.65	T = 9,783.54
R = 7,639.44	R = 7,639.44

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 140+97.00 -L-  
24+31.67 -Y3-  
 SHEET 1 OF 4 BRIDGE NO. 760243

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER US 220  
 BYPASS ON SR 1140  
 BETWEEN US 74 BUS. & SR 1141

7/23/2019  
 NORTH CAROLINA PROFESSIONAL SEAL 22005  
 ENGINEER  
 A. Keith Paschal

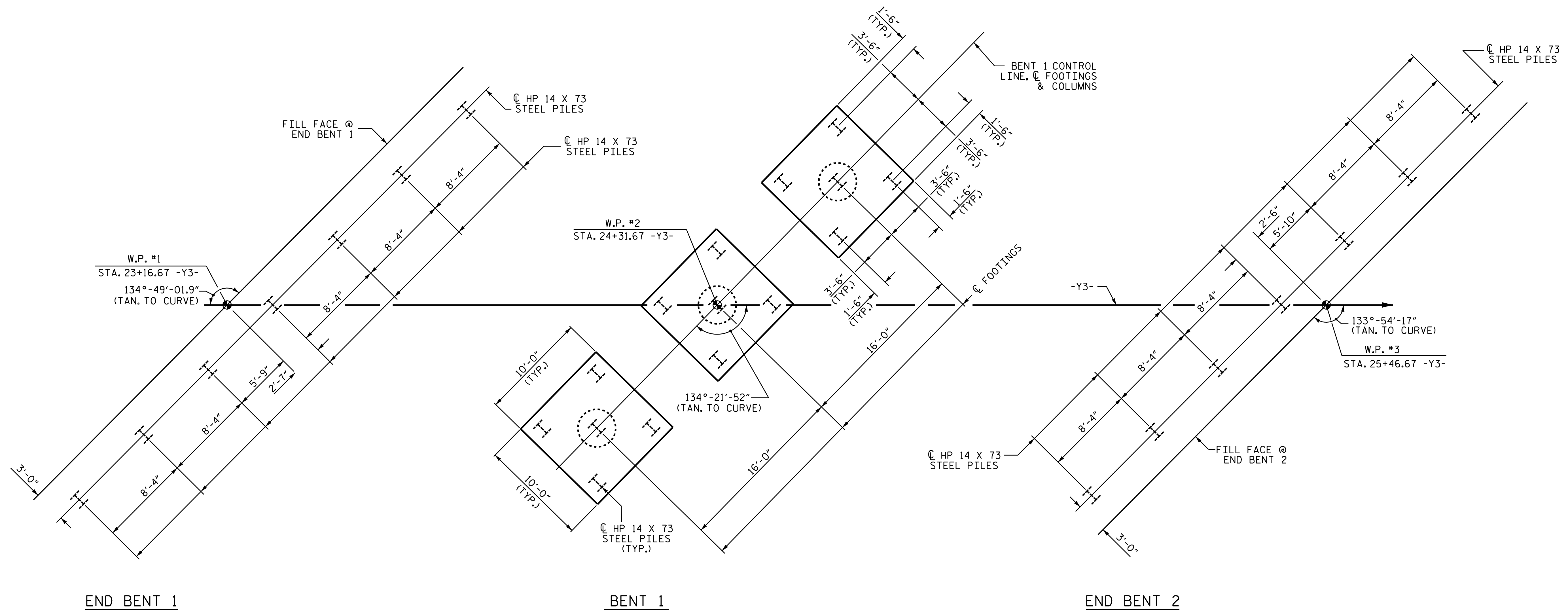
7/24/2019  
 NORTH CAROLINA PROFESSIONAL SEAL 031583  
 ENGINEER  
 KRISHNA PRASAD SEDAI

DRAWN BY: M. G. SHAIKH DATE: 03/2019  
 CHECKED BY: H. LOCKLEAR DATE: 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 03/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-1
1			3			TOTAL SHEETS
2			4			28





END BENT 1

BENT 1

END BENT 2

**FOUNDATION LAYOUT**

DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE.

**NOTES**

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

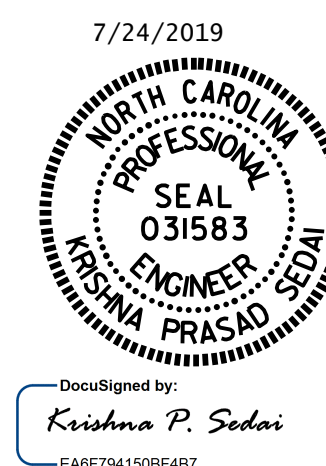
PILES AT END BENT NO.1, BENT 1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 125 TONS PER PILE.

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

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

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 4

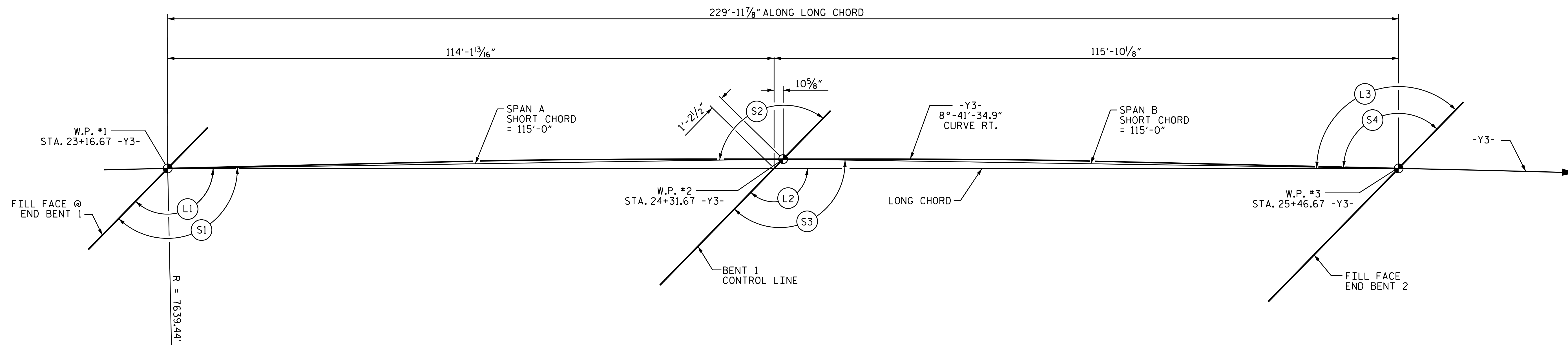


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER US 220  
 BYPASS ON SR 1140  
 BETWEEN US 74 BUS. & SR 1141

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED  
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REVISIONS						SHEET NO.
NO.	By:	DATE:	NO.	By:	DATE:	TOTAL SHEETS
1			3			S6-2
2			4			28

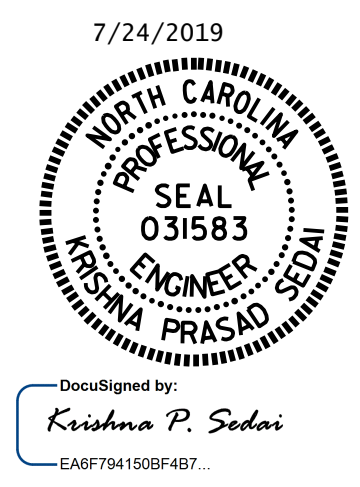


**LONG CHORD LAYOUT**  
 END BENTS AND BENT 1 ARE NOT PARALLEL.

ANGLES			
LONG CHORD	SHORT CHORD		
L1	133°-57'-17"	S1	134°-23'-09"
L2	134°-21'-52"	S2	134°-47'-44"
L3	134°-46'-02"	S3	133°-55'-59"
		S4	134°-20'-09"

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 3 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE OVER US 220  
 BYPASS ON SR 1140  
 BETWEEN US 74 BUS. & SR 1141

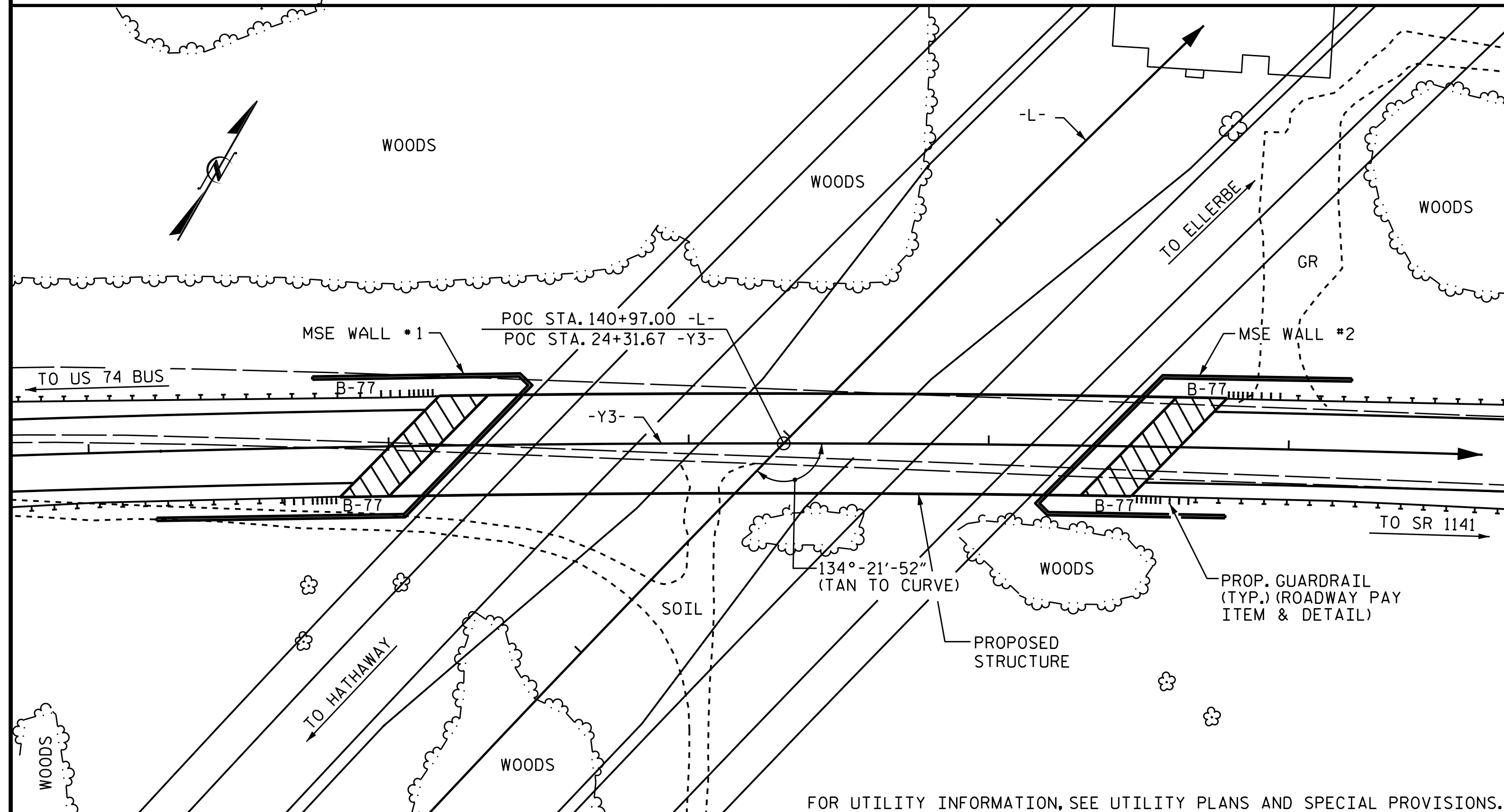
DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S6-3
2			4			28



BM #11: RR SPIKE ON BASE OF POWER POLE, 765.05' RIGHT, STA.148+68.09 -L-, ELEVATION 394.77



LOCATION SKETCH

**NOTES**

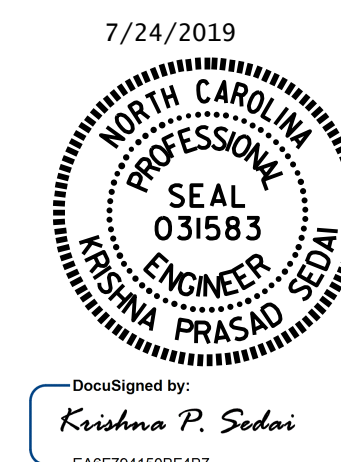
- ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.
- FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.
- WORK SHALL NOT BE STARTED ON THIS BRIDGE UNTIL ROADWAY SECTION HAS BEEN EXCAVATED.
- FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.
- THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- THIS BRIDGE IS LOCATED IN SEISMIC ZONE 2.
- PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
- REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.
- NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.
- 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.

**TOTAL BILL OF MATERIAL**

	FOUNDATION EXCAVATION FOR BENT 1 @ STA. 24+31.67 -Y3-	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS	PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES	HP 14 X 73 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS	FOAM JOINT SEALS	
	LUMP SUM	EA.	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	EA.	NO.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE			7,547	6,899		LUMP SUM			8	888.75			454.20		20.8	LUMP SUM	LUMP SUM
END BENT 1					65.3		6,814			7	7	560					
BENT 1					91.5		14,944	2,328		15	15	825					
END BENT 2					64.0		6,735			7	7	525			20.5		
TOTAL	LUMP SUM	1	7,547	6,899	220.8	LUMP SUM	28,493	2,328	8	888.75	29	29	1,910	454.20	41.3	LUMP SUM	LUMP SUM

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 24+31.67 -Y3-

SHEET 4 OF 4



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 FOR BRIDGE OVER US 220  
 BYPASS ON SR 1140  
 BETWEEN US 74 BUS. & SR 1141

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED  
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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-4	
1			3			TOTAL SHEETS	28
2			4				

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

LOAD FACTORS:

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER				
					LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	MOMENT					SHEAR					LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	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	1.180	---	1.75	0.765	1.451	B	4	54.84	0.954	1.180	B	4	10.97	0.80	0.765	1.249	B	4	54.84		
	HL-93 (OPERATING)	N/A		1.249	---	1.35	0.765	1.881	B	4	54.84	0.954	1.530	B	4	10.97	N/A	---	---	---	---	---		
	HS-20 (INVENTORY)	36.000	②	1.564	56.301	1.75	0.765	2.070	B	4	54.84	0.954	1.564	B	4	32.90	0.80	0.765	1.782	B	4	54.84		
	HS-20 (OPERATING)	36.000		1.782	64.161	1.35	0.765	2.684	B	4	54.84	0.954	2.027	B	4	32.90	N/A	---	---	---	---	---		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.281	57.794	1.40	0.765	6.216	B	4	54.84	0.954	4.739	B	4	32.90	0.80	0.765	4.281	B	4	54.84	
		SNGARBS2	20.000		3.077	61.542	1.40	0.765	4.468	B	4	54.84	0.954	3.342	B	4	32.90	0.80	0.765	3.077	B	4	54.84	
		SNAGRIS2	22.000		2.869	63.118	1.40	0.765	4.166	B	4	54.84	0.954	3.092	B	4	32.90	0.80	0.765	2.869	B	4	54.84	
		SNCOTTS3	27.250		2.127	57.961	1.40	0.765	3.088	B	4	54.84	0.954	2.363	B	4	32.90	0.80	0.765	2.127	B	4	54.84	
		SNAGGRS4	34.925		1.734	60.553	1.40	0.765	2.517	B	4	54.84	0.954	1.942	B	4	32.90	0.80	0.765	1.734	B	4	54.84	
		SNS5A	35.550		1.698	60.377	1.40	0.765	2.466	B	4	54.84	0.954	1.957	B	4	32.90	0.80	0.765	1.698	B	4	54.84	
		SNS6A	39.950		1.541	61.546	1.40	0.765	2.237	B	4	54.84	0.954	1.778	B	4	32.90	0.80	0.765	1.541	B	4	54.84	
		SNS7B	42.000		1.466	61.591	1.40	0.765	2.129	B	4	54.84	0.954	1.737	B	4	32.90	0.80	0.765	1.466	B	4	54.84	
	TRUCK TRACTOR SEMI-TRAILER (TTS1)	TNAGRIT3	33.000		1.874	61.826	1.40	0.765	2.720	B	4	54.84	0.954	2.122	B	4	32.90	0.80	0.765	1.874	B	4	54.84	
		TNT4A	33.075		1.877	62.082	1.40	0.765	2.725	B	4	54.84	0.954	2.076	B	4	32.90	0.80	0.765	1.877	B	4	54.84	
		TNT6A	41.600		1.518	63.162	1.40	0.765	2.204	B	4	54.84	0.954	1.832	B	4	32.90	0.80	0.765	1.518	B	4	54.84	
		TNT7A	42.000		1.517	63.722	1.40	0.765	2.203	B	4	54.84	0.954	1.799	B	4	32.90	0.80	0.765	1.517	B	4	54.84	
		TNT7B	42.000		1.549	65.051	1.40	0.765	2.249	B	4	54.84	0.954	1.703	B	4	32.90	0.80	0.765	1.549	B	4	54.84	
		TNAGRIT4	43.000		1.489	64.020	1.40	0.765	2.162	B	4	54.84	0.954	1.651	B	4	32.90	0.80	0.765	1.489	B	4	54.84	
TNAGT5A	45.000		1.411	63.501	1.40	0.765	2.049	B	4	54.84	0.954	1.630	B	4	32.90	0.80	0.765	1.411	B	4	54.84			
TNAGT5B	45.000		③	1.401	63.030	1.40	0.765	2.034	B	4	54.84	0.954	1.572	B	4	32.90	0.80	0.765	1.401	B	4	54.84		

NOTES:

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

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

# CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

② DESIGN LOAD RATING (HS-20)

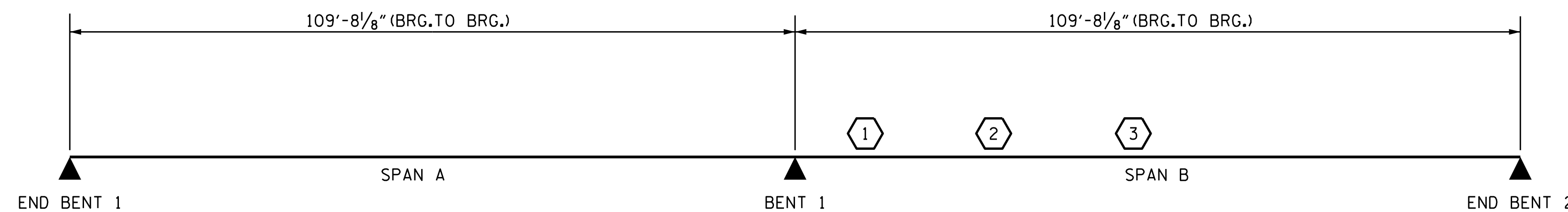
③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

---

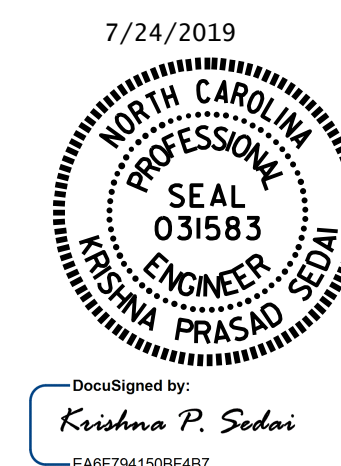
GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S6-5
2			4			28



**NOTES**

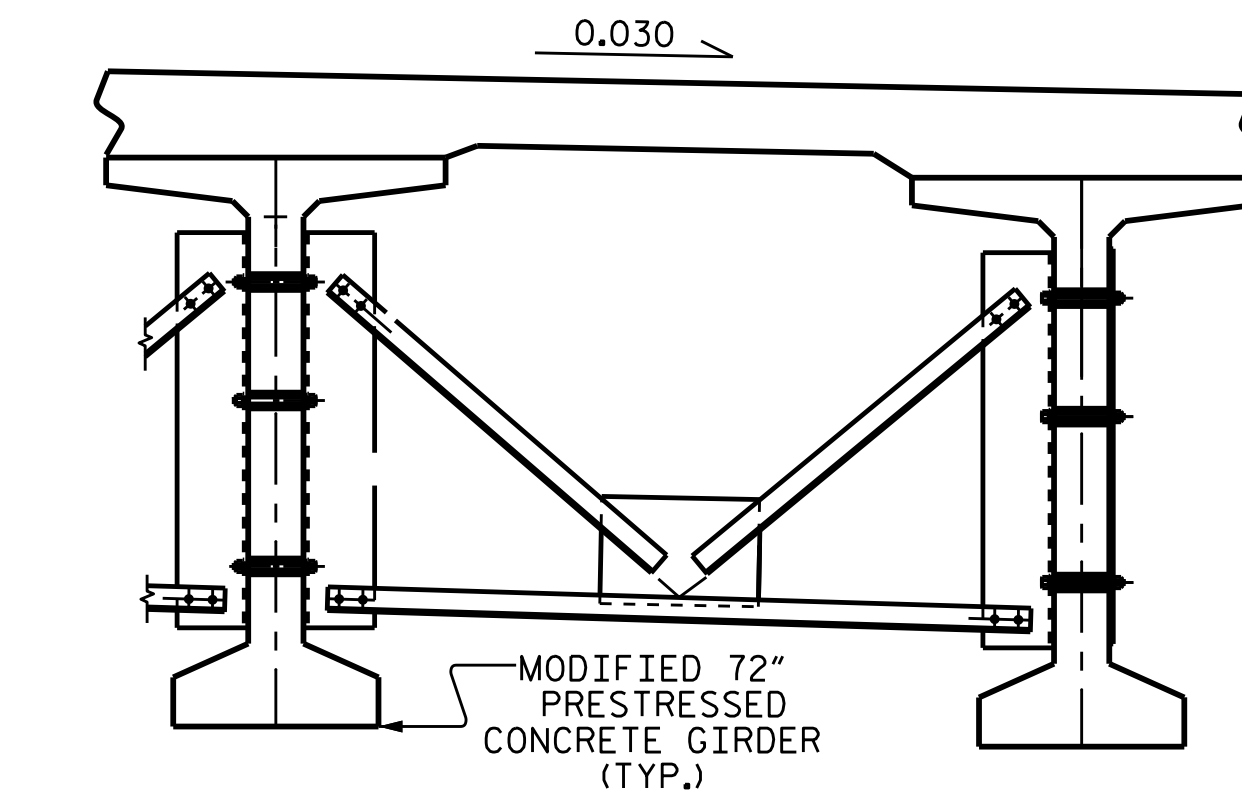
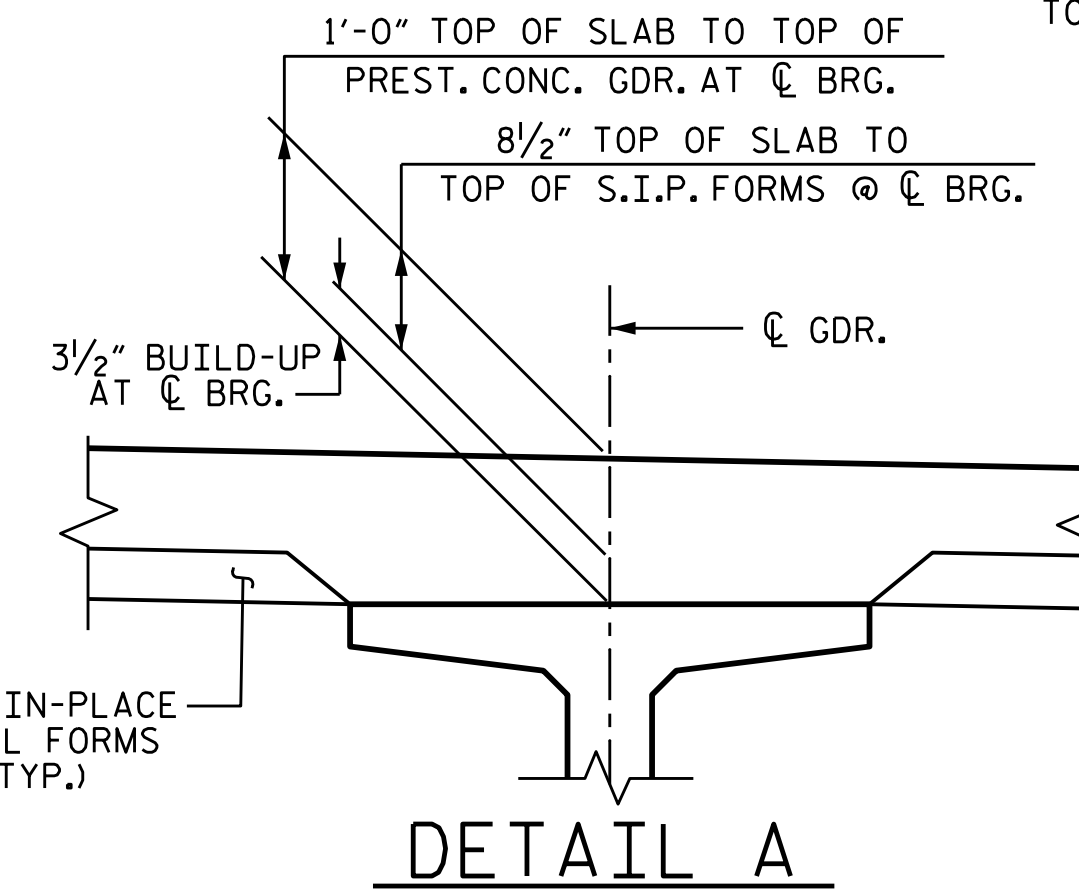
PROVIDE 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.U.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

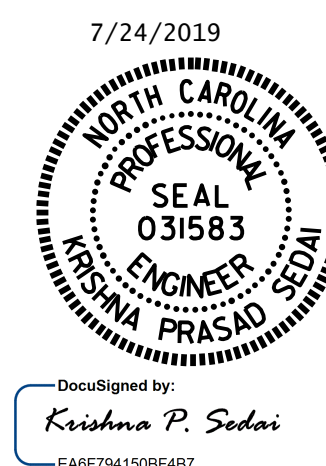
BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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



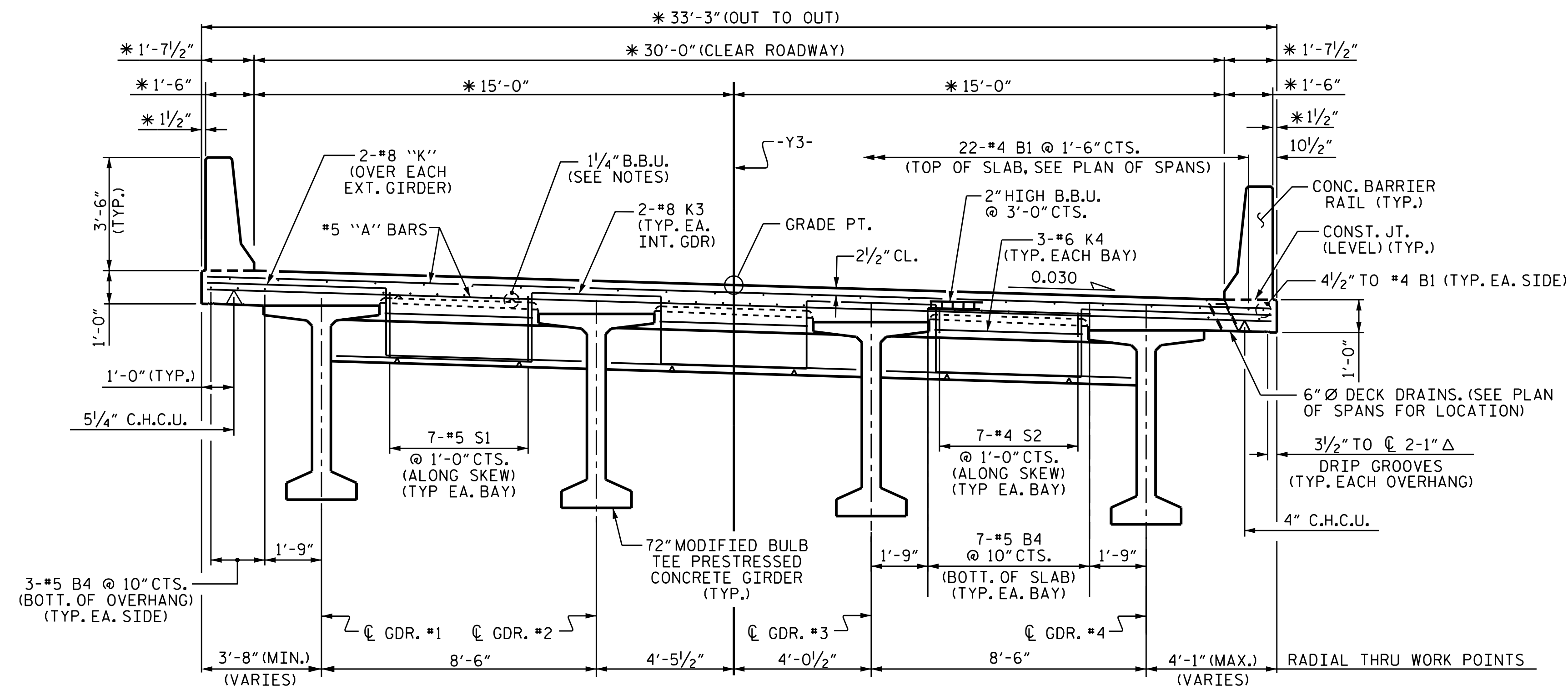
**PART SECTION AT INTERMEDIATE DIAPHRAGM**  
SHOWING INTERMEDIATE DIAPHRAGM  
(FOR INTERMEDIATE STEEL DIAPHRAGMS DETAILS, SEE "INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS" (TYP. EA. BAY))

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 24+31.67 -Y3-  
SHEET 1 OF 2



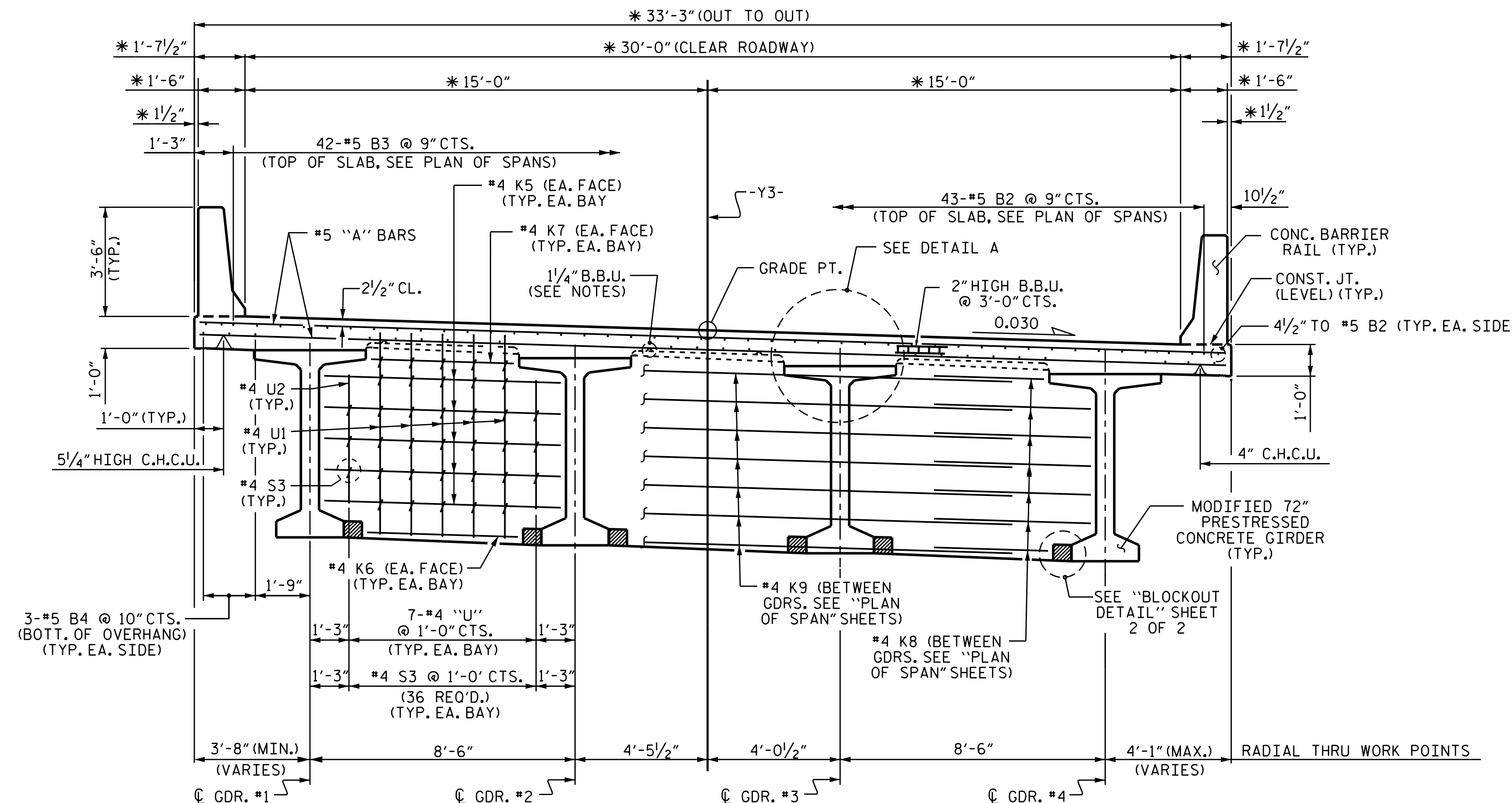
STATE OF NORTH CAROLINA		SHEET NO.	
DEPARTMENT OF TRANSPORTATION		S6-6	
RALEIGH		TOTAL SHEETS	
SUPERSTRUCTURE		28	
TYPICAL SECTION			
REVISIONS			
NO.	BY:	DATE:	
1			
2			

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



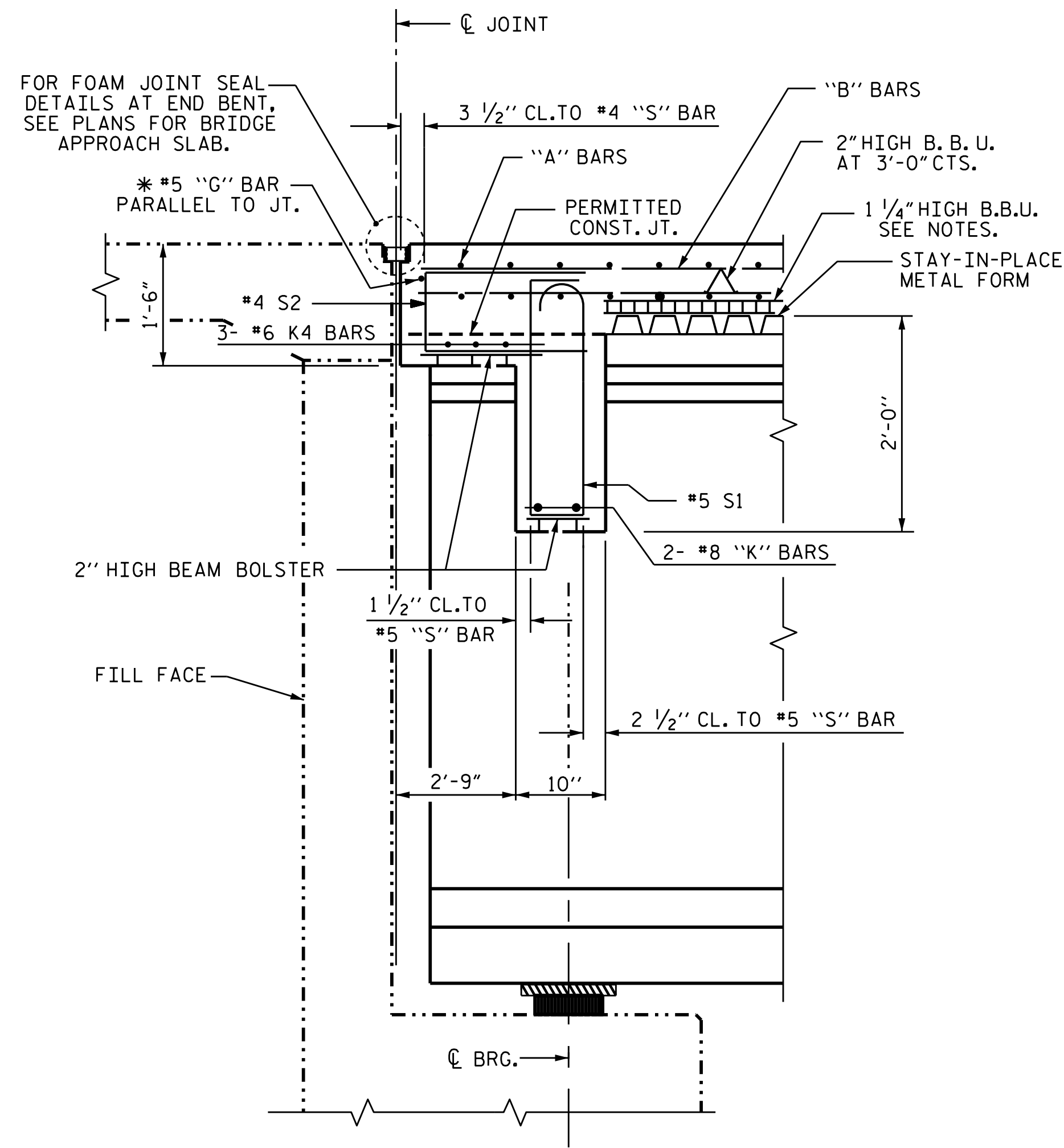
**TYPICAL SECTION**  
SHOWING END BENT DIAPHRAGM

\* RADIAL DIMENSIONS

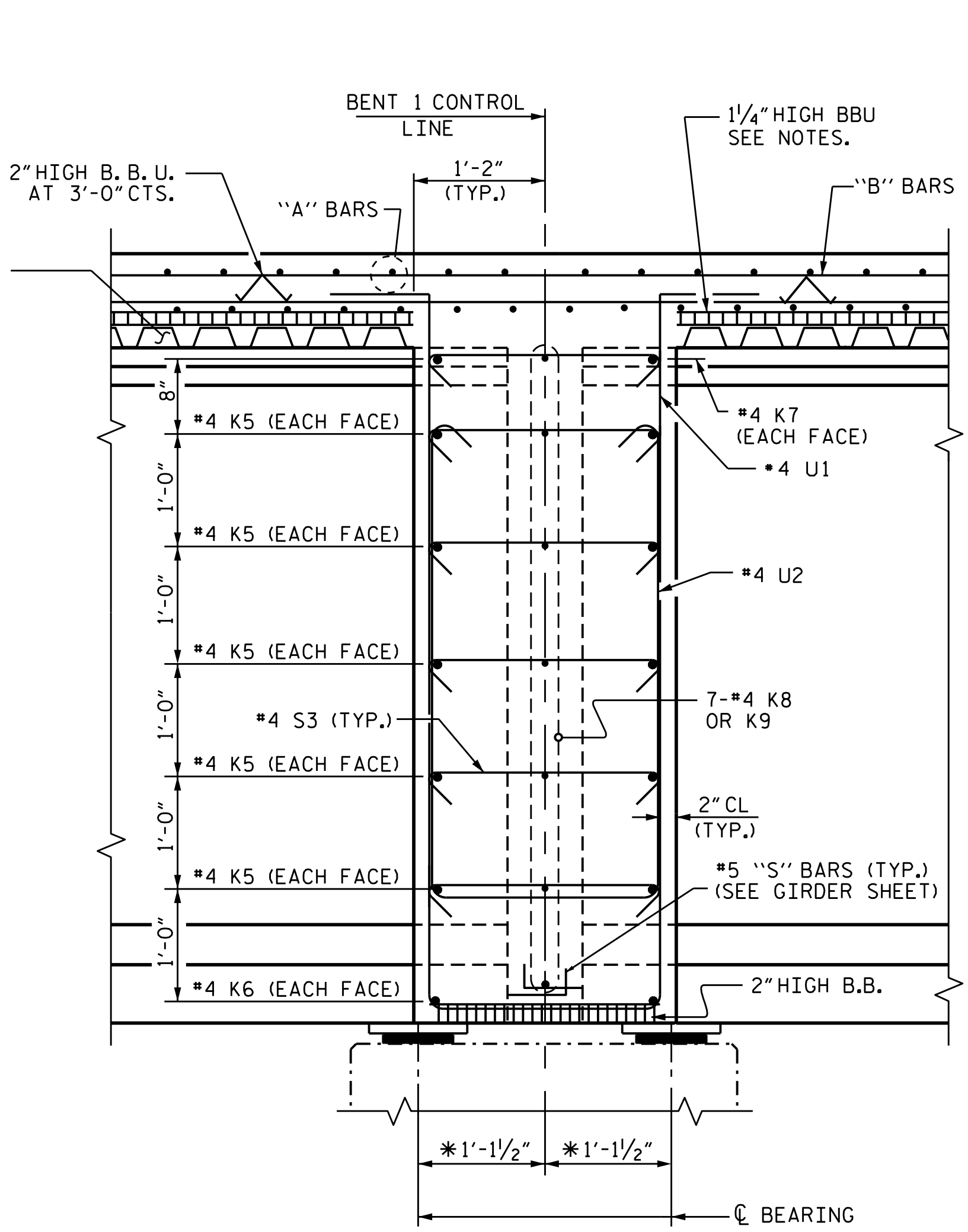


**TYPICAL SECTION**  
SHOWING BENT DIAPHRAGM

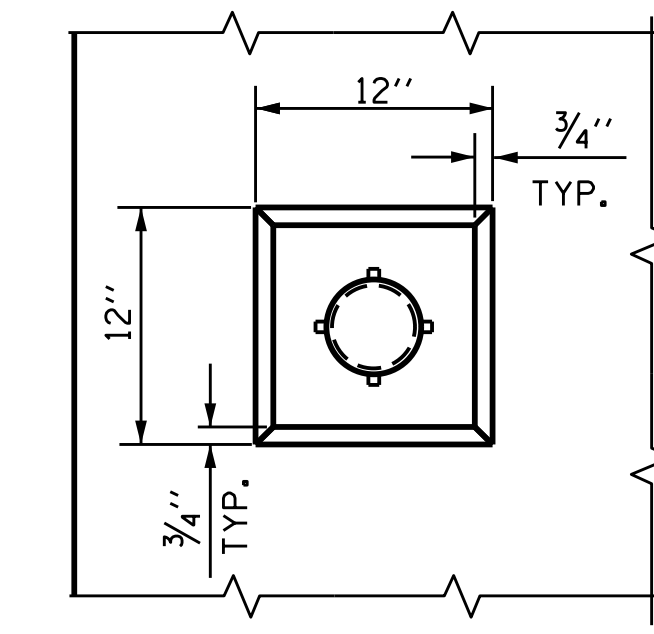
DRAWN BY : M. G. SHAIKH DATE : 03/2019  
CHECKED BY : H. LOCKLEAR DATE : 04/2019  
DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 03/2019



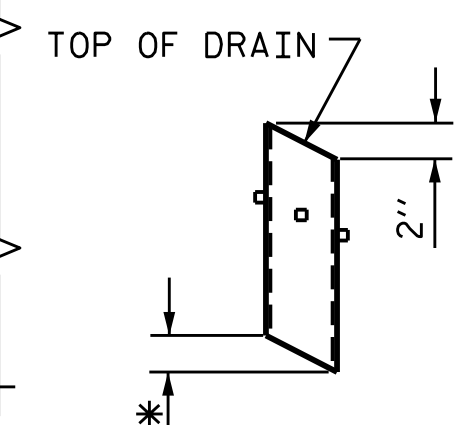
**SECTION @ END BENT**



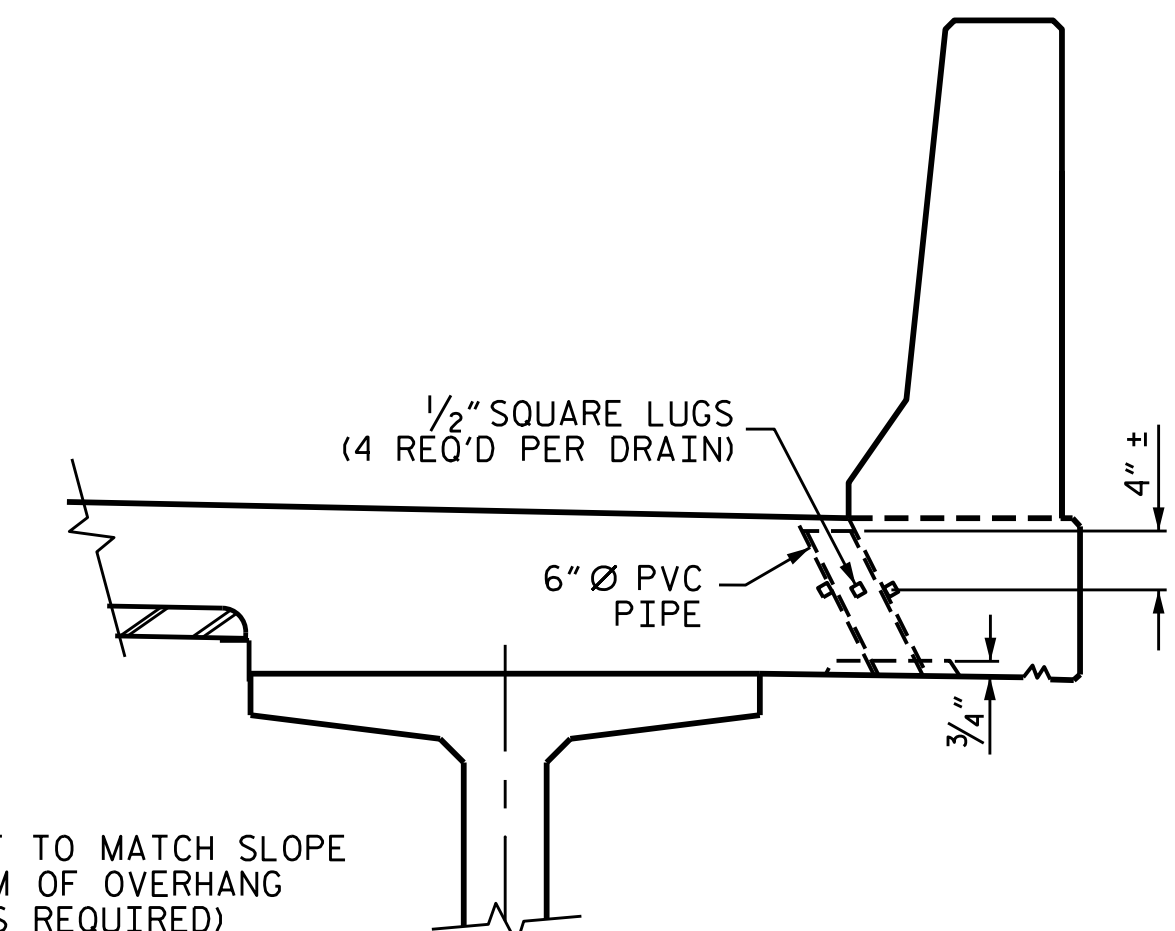
**SECTION THRU BENT**  
\* MEASURED ALONG CL GIRDER



**PLAN OF RECESS**



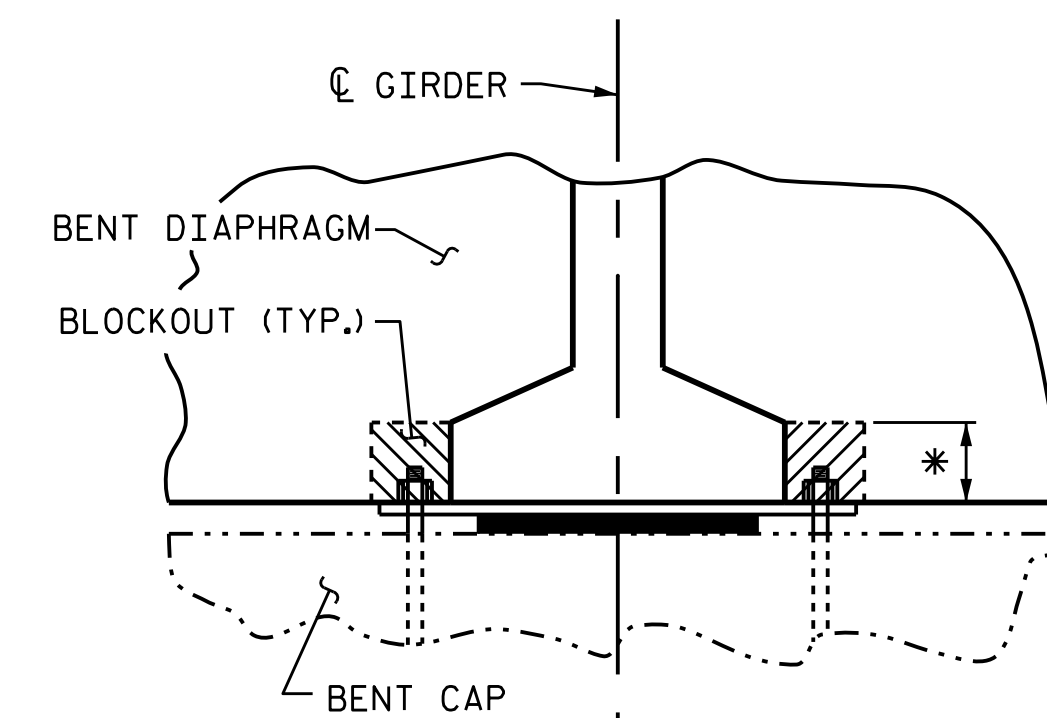
**PIPE DETAIL**



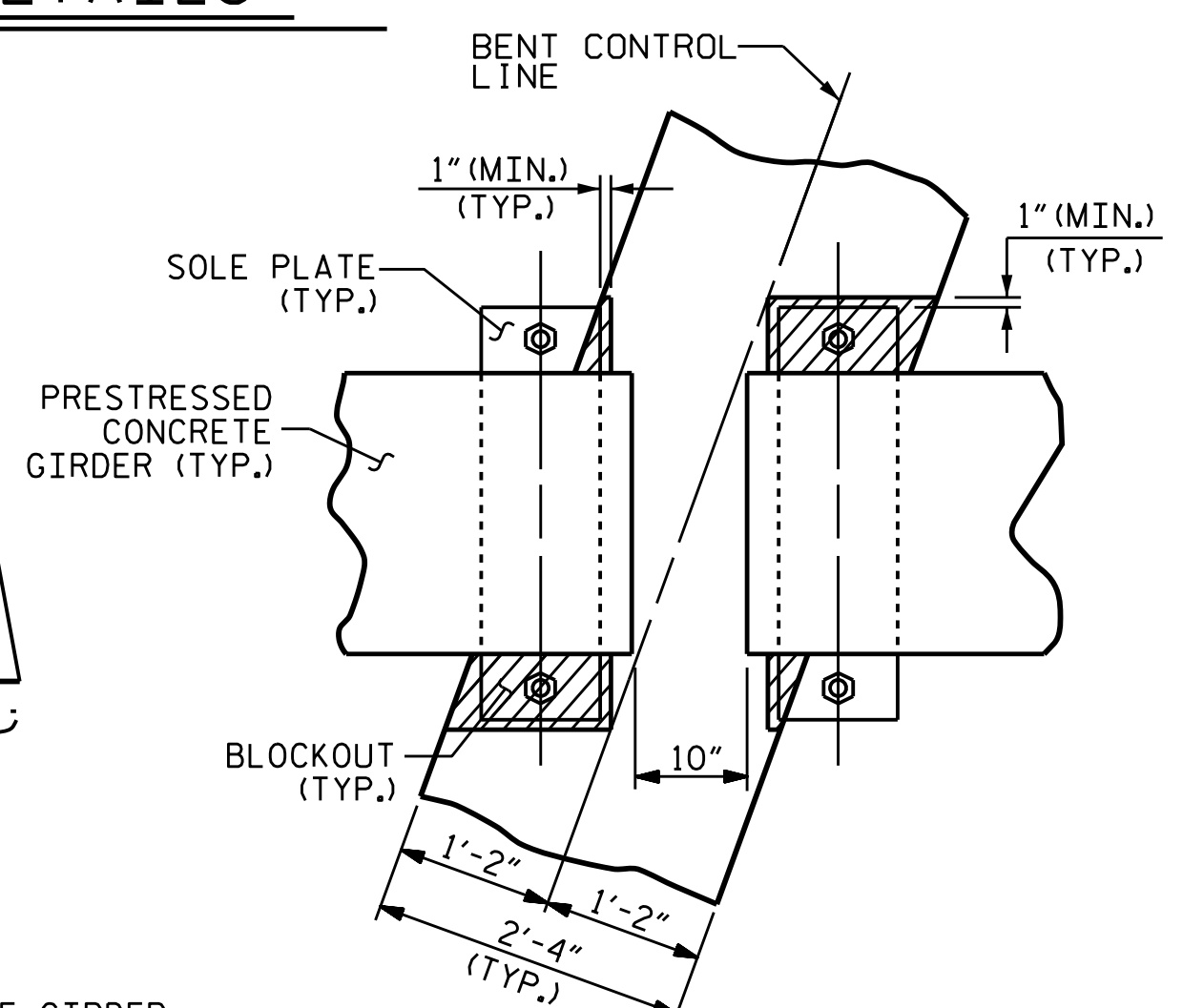
**ELEVATION**

TOP OF FLOOR DRAINS TO BE SET 3/8" BELOW SURFACE OF SLAB.  
 4 - 1/2" SQUARE LUGS TO BE GLUED TO THE P.V.C. PLASTIC PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.  
 THE 6" Ø PVC PIPE AND FITTINGS SHALL BE SCHEDULE 40 AND CONFORM TO ASTM D1785.

**DRAIN DETAILS**

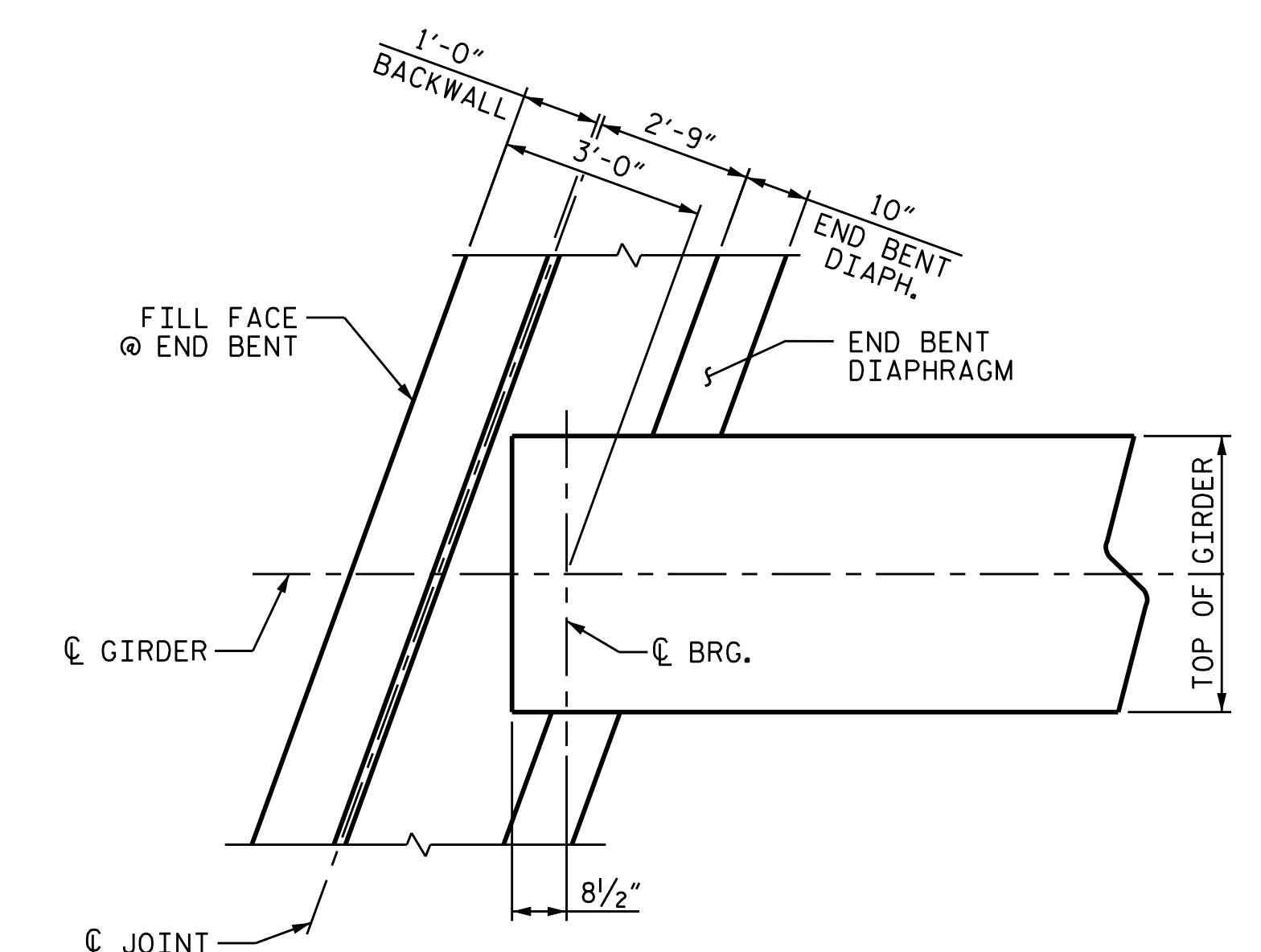


**SECTION**

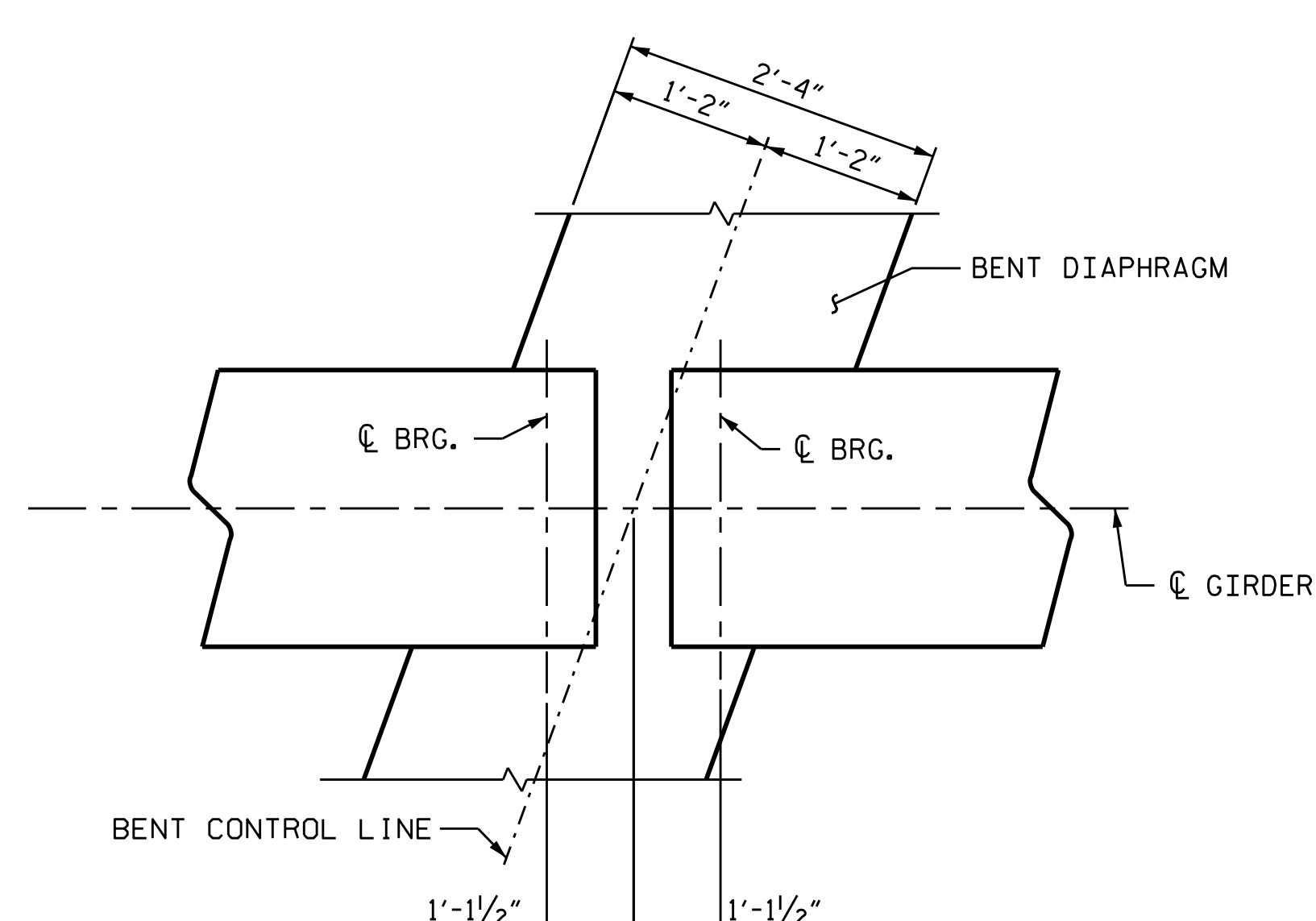


**PLAN**

**BENT DIAPHRAGM BLOCKOUT DETAIL**



**END BENT DIAPHRAGM**

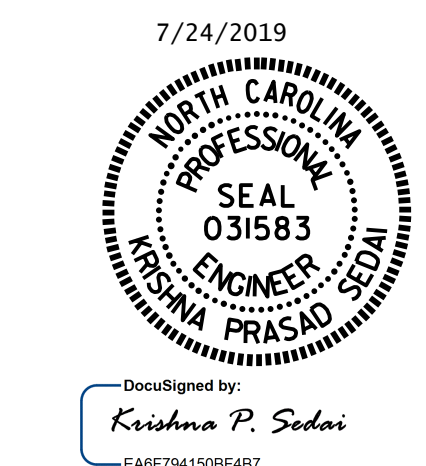


**BENT DIAPHRAGM**

**PLAN**

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 2



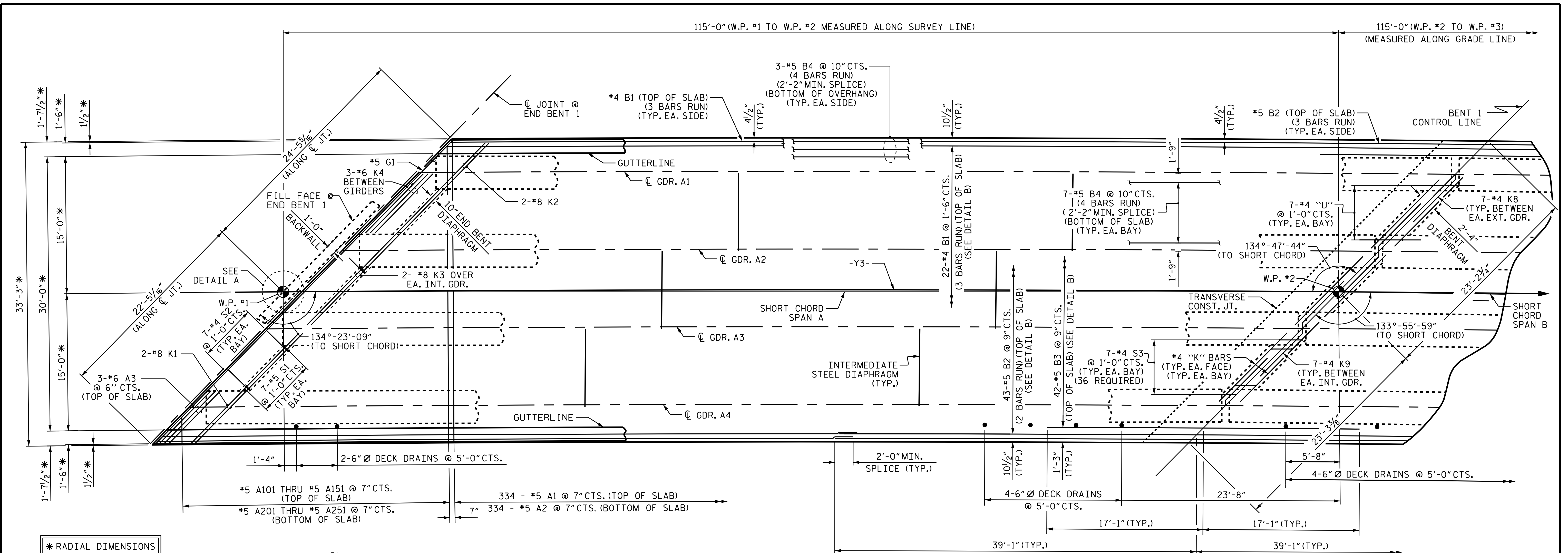
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TYPICAL SECTION

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 03/2019

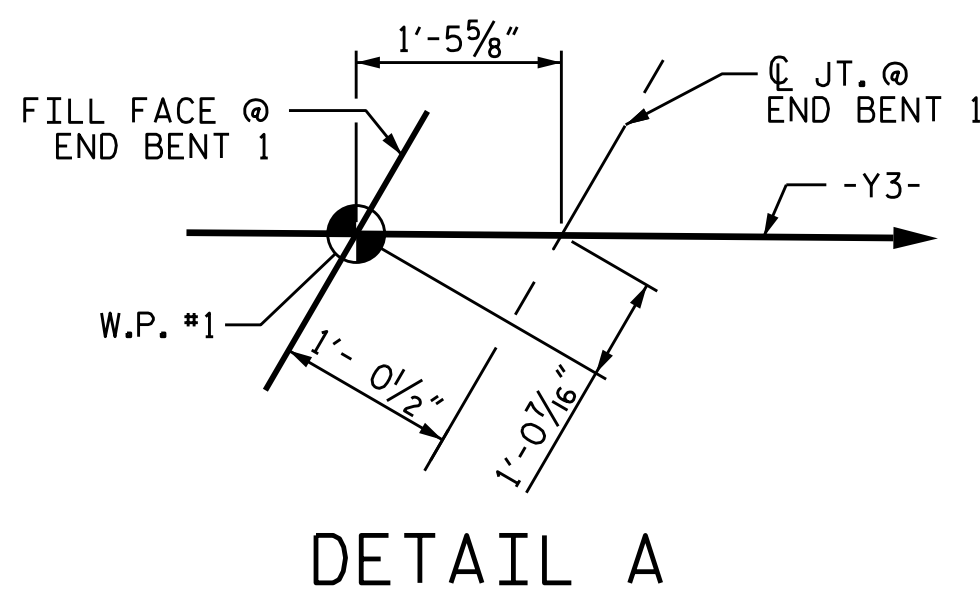
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-7
1			3			TOTAL SHEETS
2			4			28

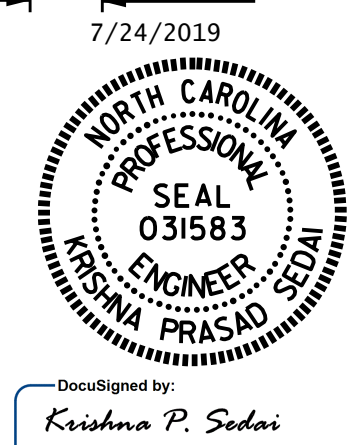
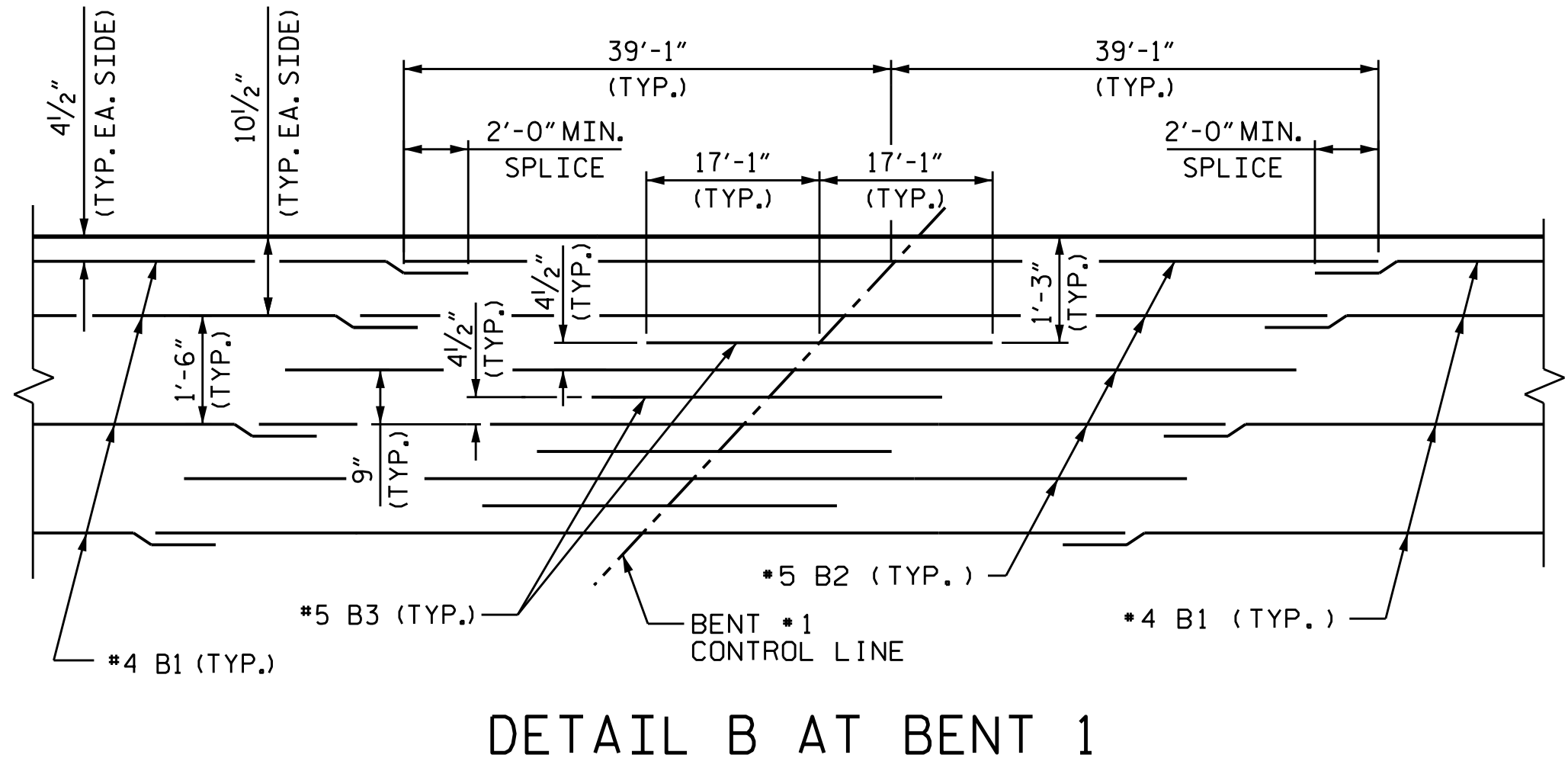
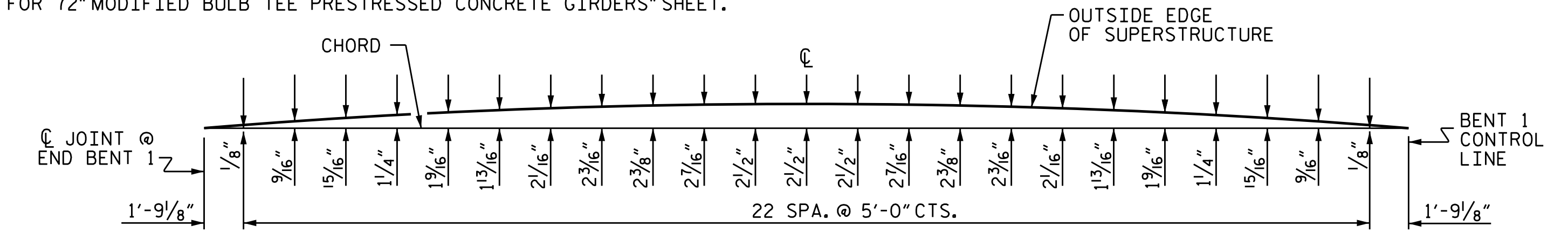




\* RADIAL DIMENSIONS



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



PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

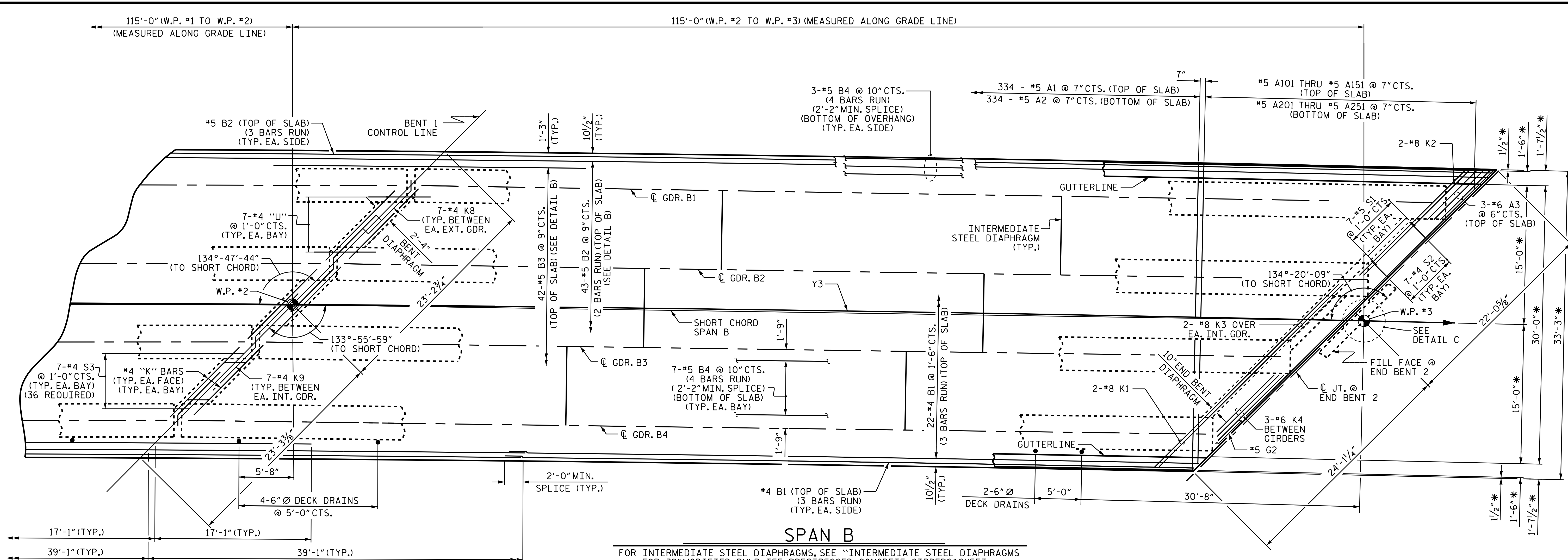
PLAN OF SPAN A

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-8	
1			3			TOTAL SHEETS 28	
2			4				

DRAWN BY: M. G. SHAIKH DATE: 03/2019  
 CHECKED BY: H. LOCKLEAR DATE: 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 03/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

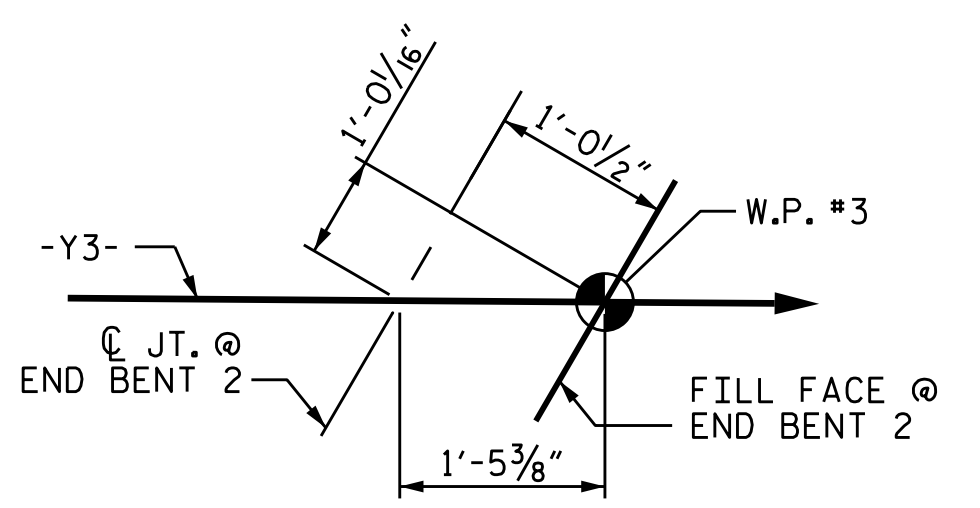




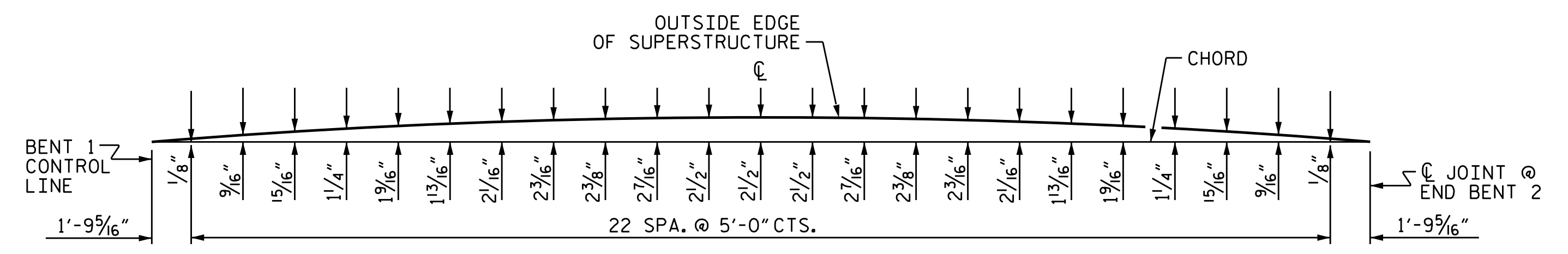
**SPAN B**

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

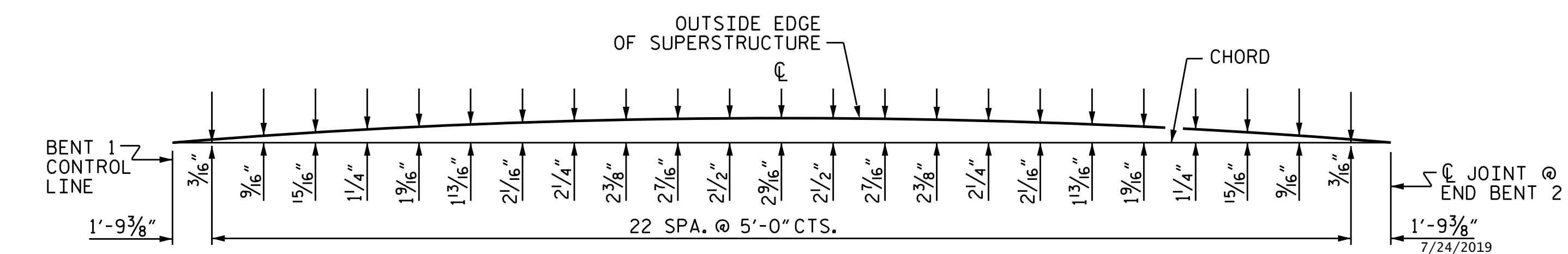
\* RADIAL DIMENSIONS



**DETAIL C**

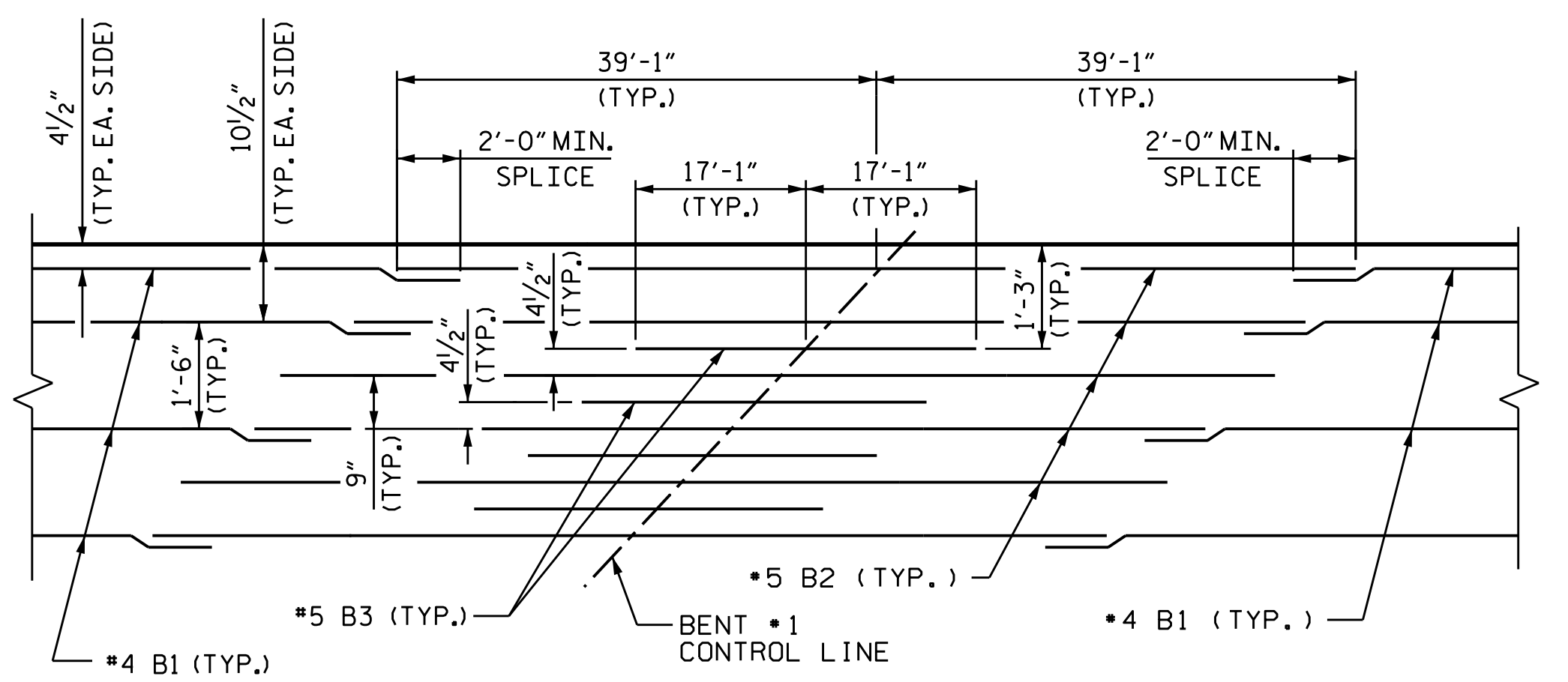


**LEFT OUTSIDE EDGE**



**RIGHT OUTSIDE EDGE**

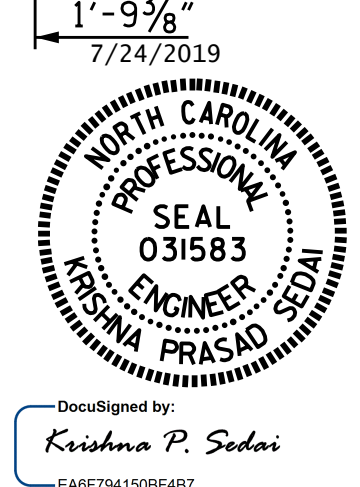
**ARC OFFSETS**



**DETAIL B AT BENT 1**

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 2



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**PLAN OF SPAN B**

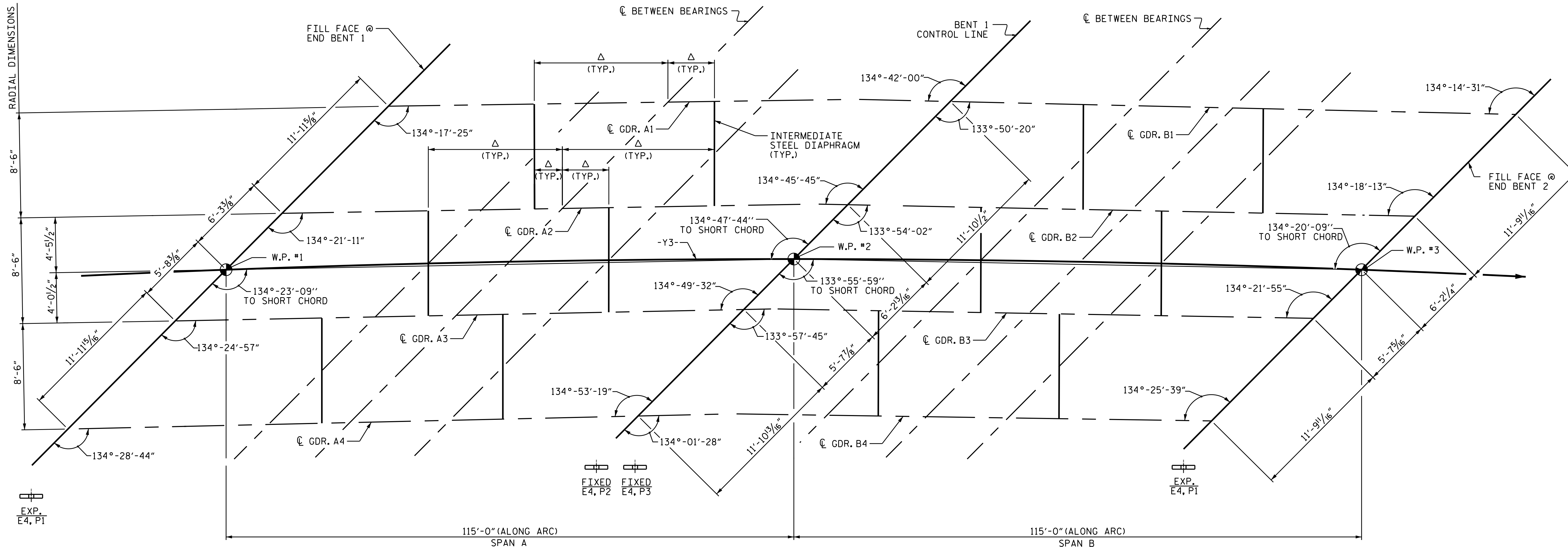
DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD : E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-9
1			3			TOTAL SHEETS
2			4			28

23-JUL-2019 13:59  
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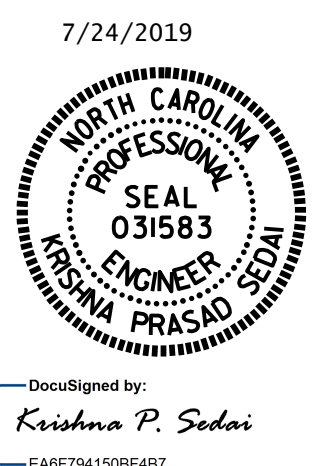


**GIRDER LAYOUT**

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

△ - SEE "PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS" SHEET, SHEET 2 OF 4.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-



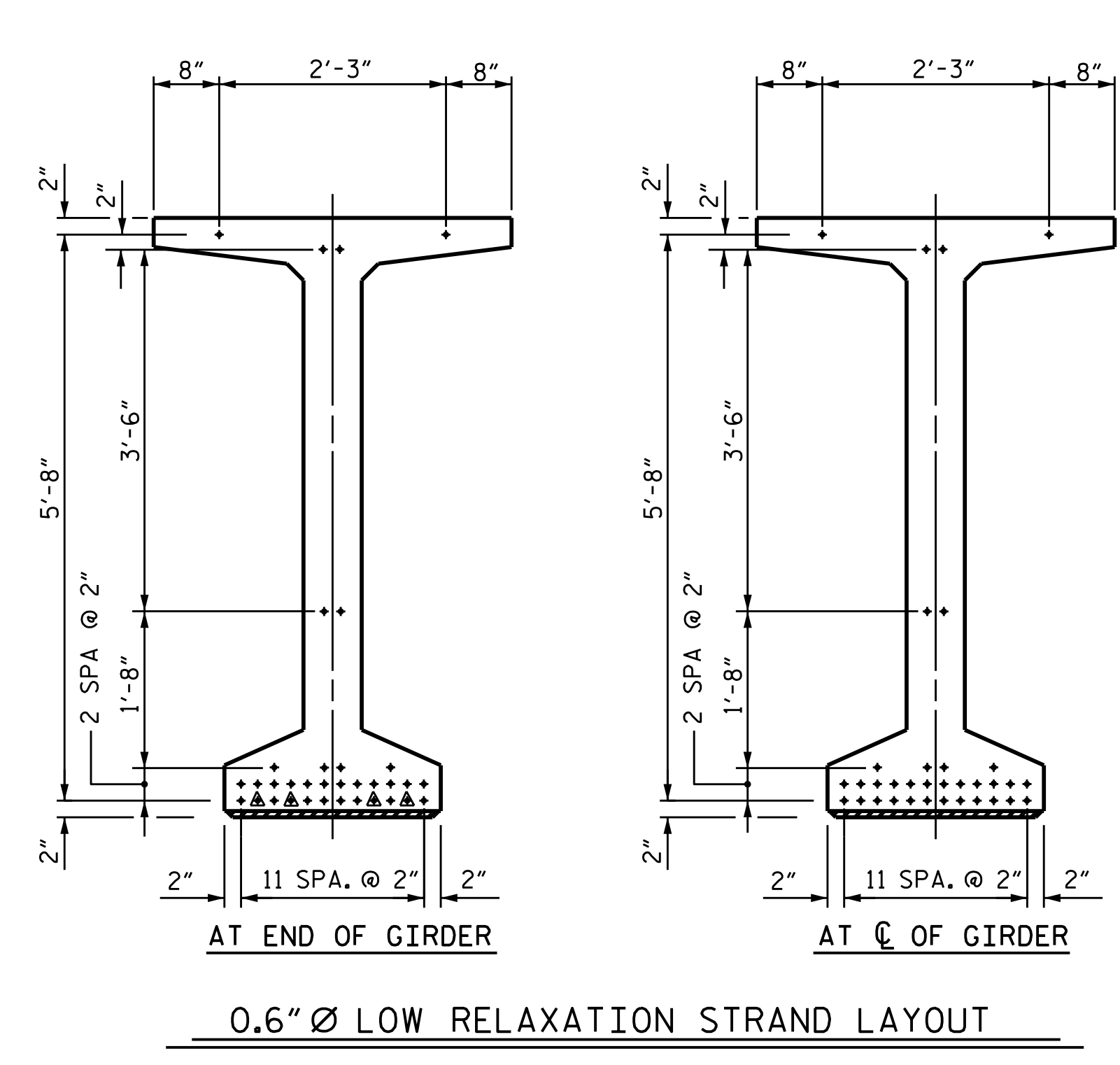
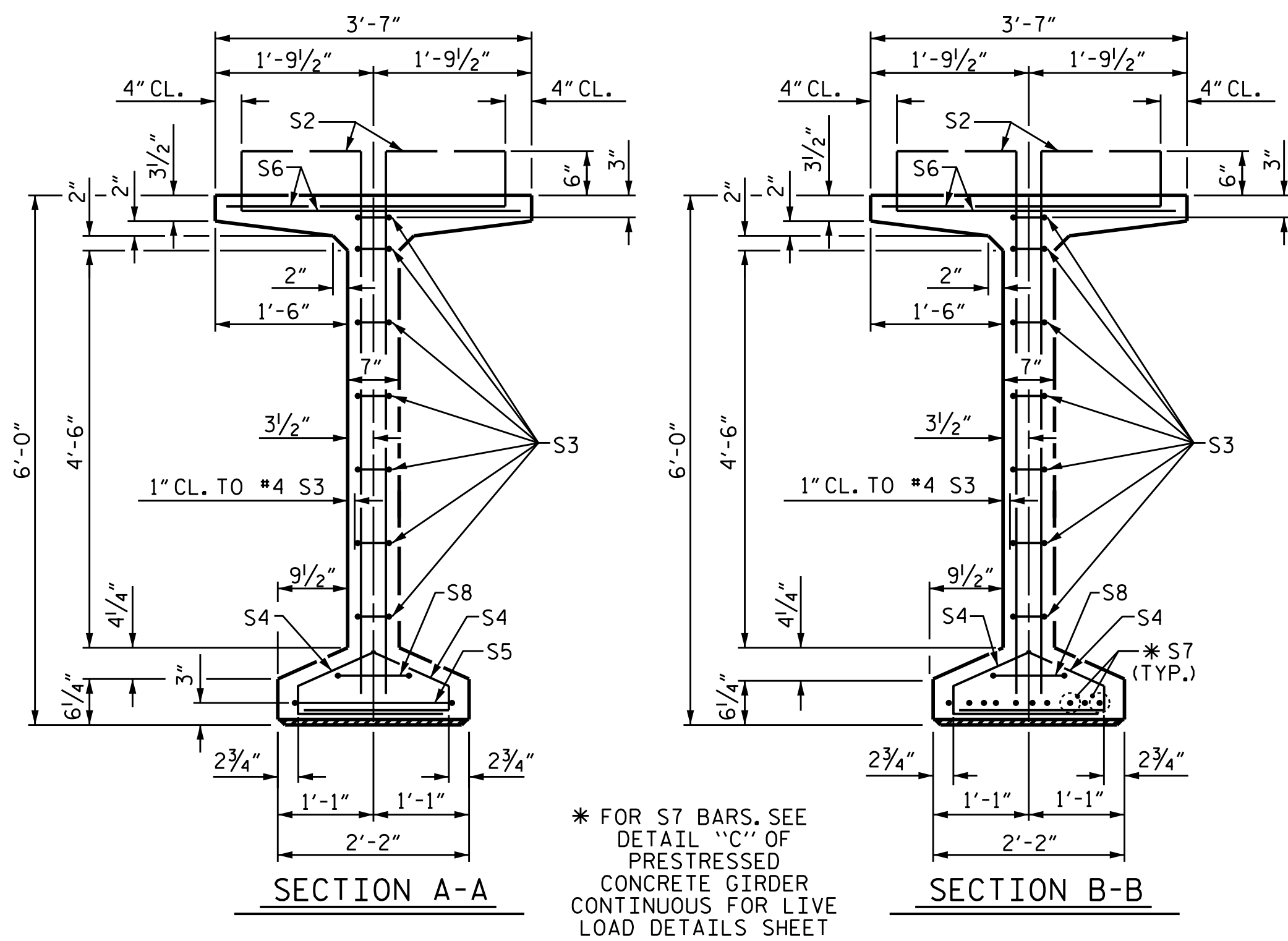
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**FRAMING PLAN**

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

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 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-10
1			3			TOTAL SHEETS
2			4			28

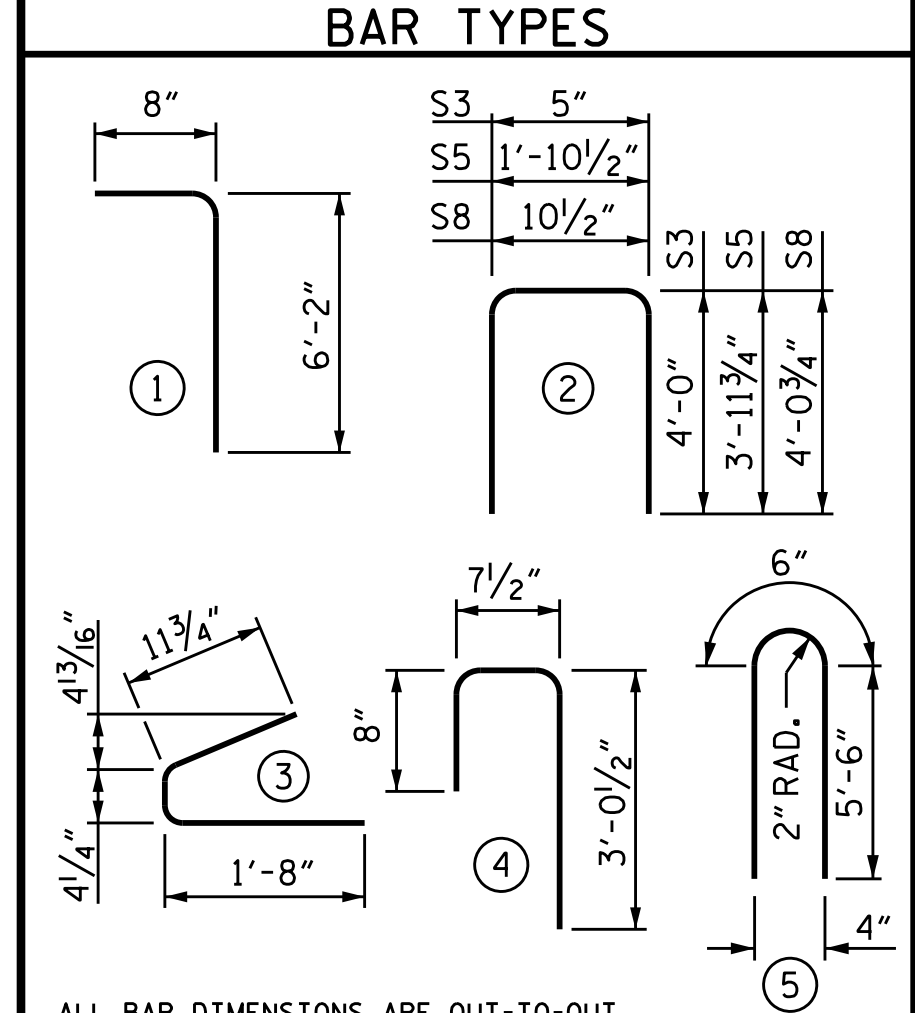


DEBONDING LEGEND  
 ◆ FULLY BONDED STRANDS  
 ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER

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

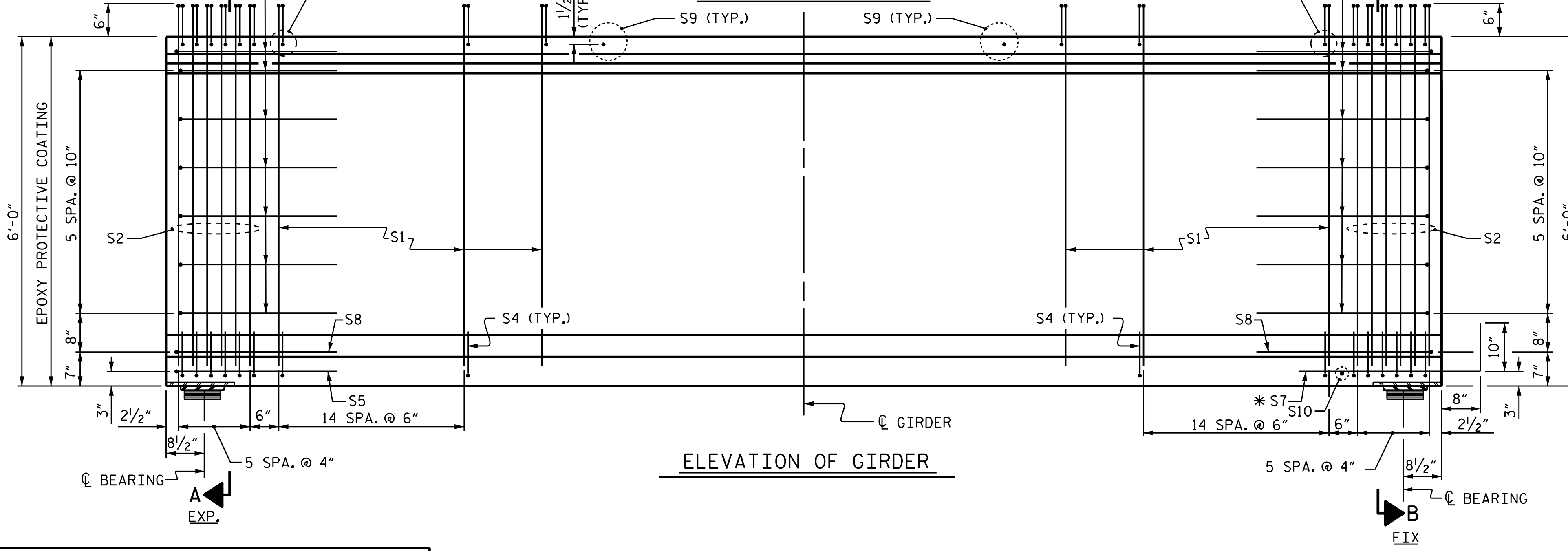
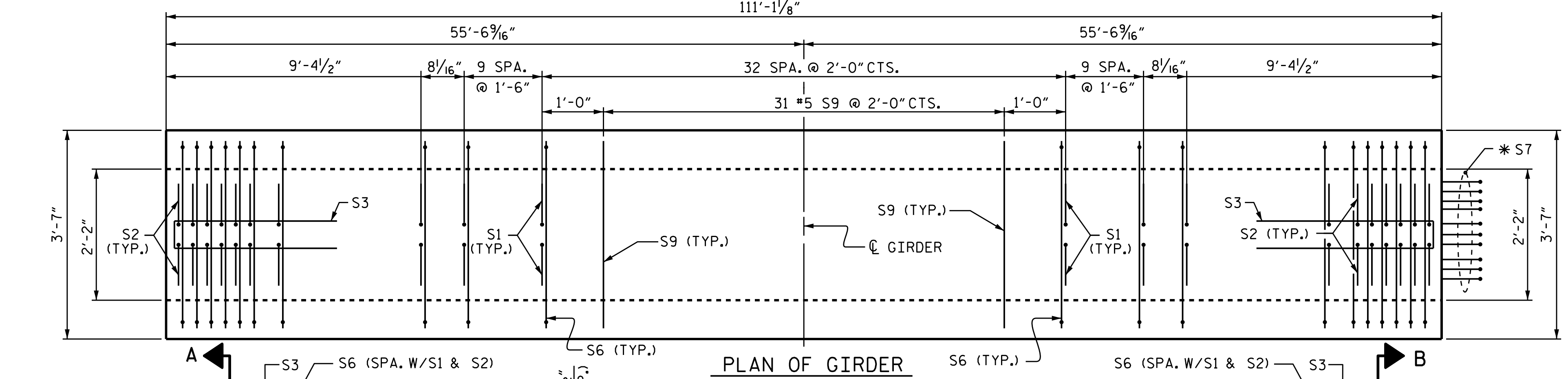
REINFORCING STEEL FOR ONE GDR						
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	
S1	162	#4	1	6'-10"	739	
S2	24	#5	1	6'-10"	171	
S3	14	#4	2	8'-5"	79	
S4	84	#4	3	3'-0"	168	
S5	1	#5	2	9'-10"	10	
S6	186	#5	4	4'-4"	841	
* S7	10	#5	STR	3'-8"	38	
S8	2	#5	2	9'-0"	19	
S9	31	#5	STR	3'-3"	105	
S10	1	#3	STR	1'-10"	1	
EXTERIOR GDR.	S11	8	#5	5	11'-6"	96
INTERIOR GDR.	S11	16	#5	5	11'-6"	192
EXTERIOR GDR.	S12	16	#4	STR	8'-0"	86
INTERIOR GDR.	S13	16	#4	STR	21'-1"	225

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



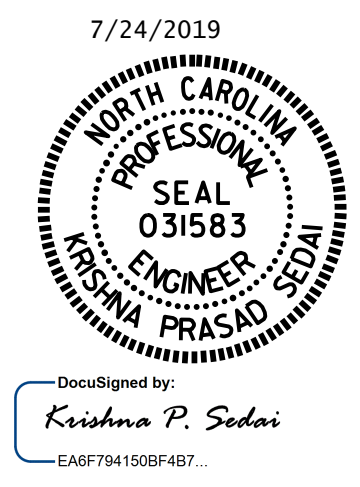
QUANTITIES FOR ONE GIRDER			
	REINFORCING STEEL	8,000PSI CONCRETE	0.6" Ø L.R. STRANDS
	LB.	C.Y.	No.
GIRDER 1 & 4	2,353	23.8	34
GIRDER 2 & 3	2,588	23.8	34

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
8	111'-1 1/8"	888.75'



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RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 1 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 72" PRESTRESSED CONCRETE  
 MODIFIED BULB TEE  
 CONTINUOUS FOR LIVE LOAD  
 (SPANS A & B)

DRAWN BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

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 SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-11
1			3			TOTAL SHEETS 28
2			4			



**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.

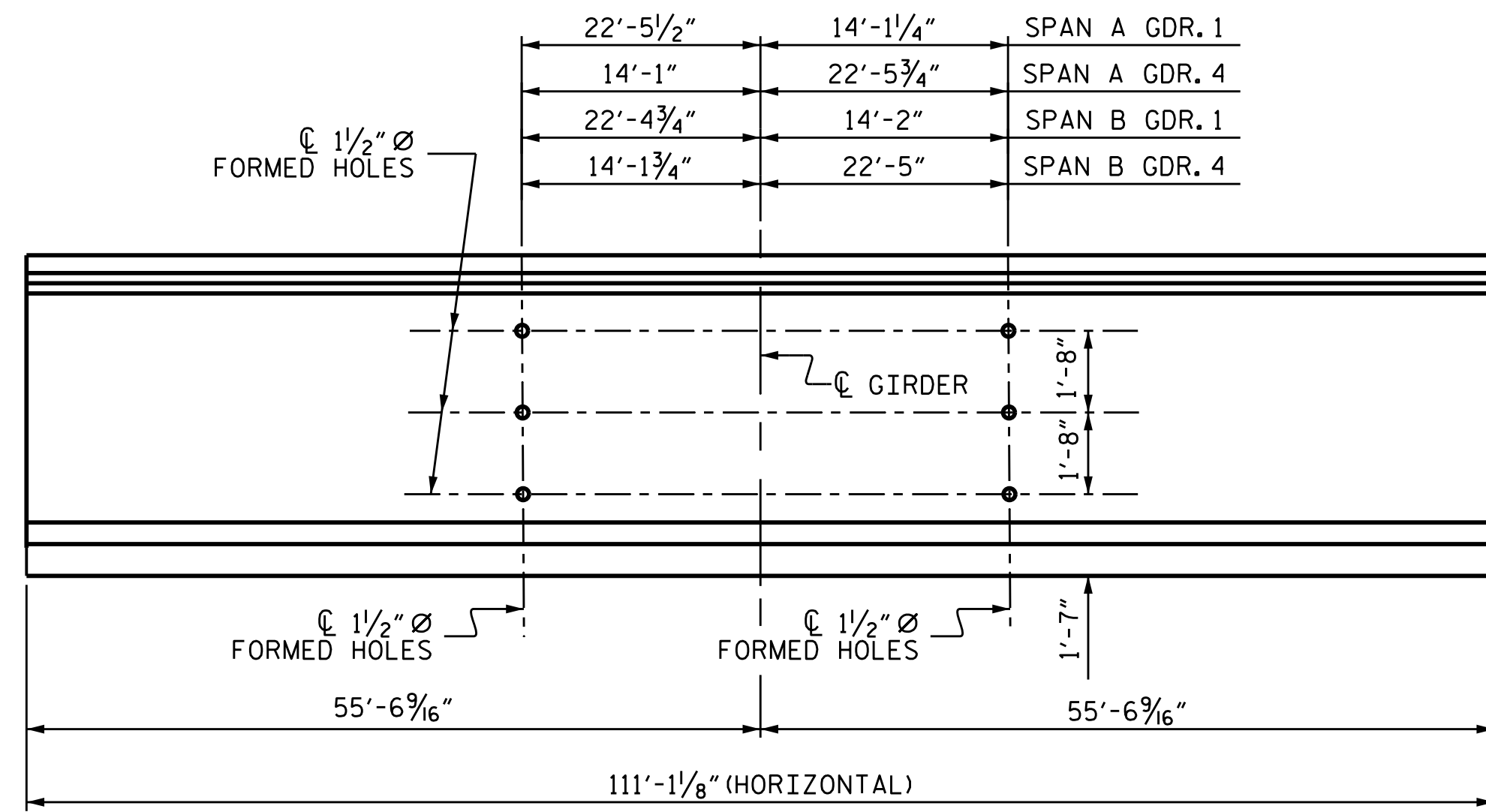
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 6100 PSI.

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

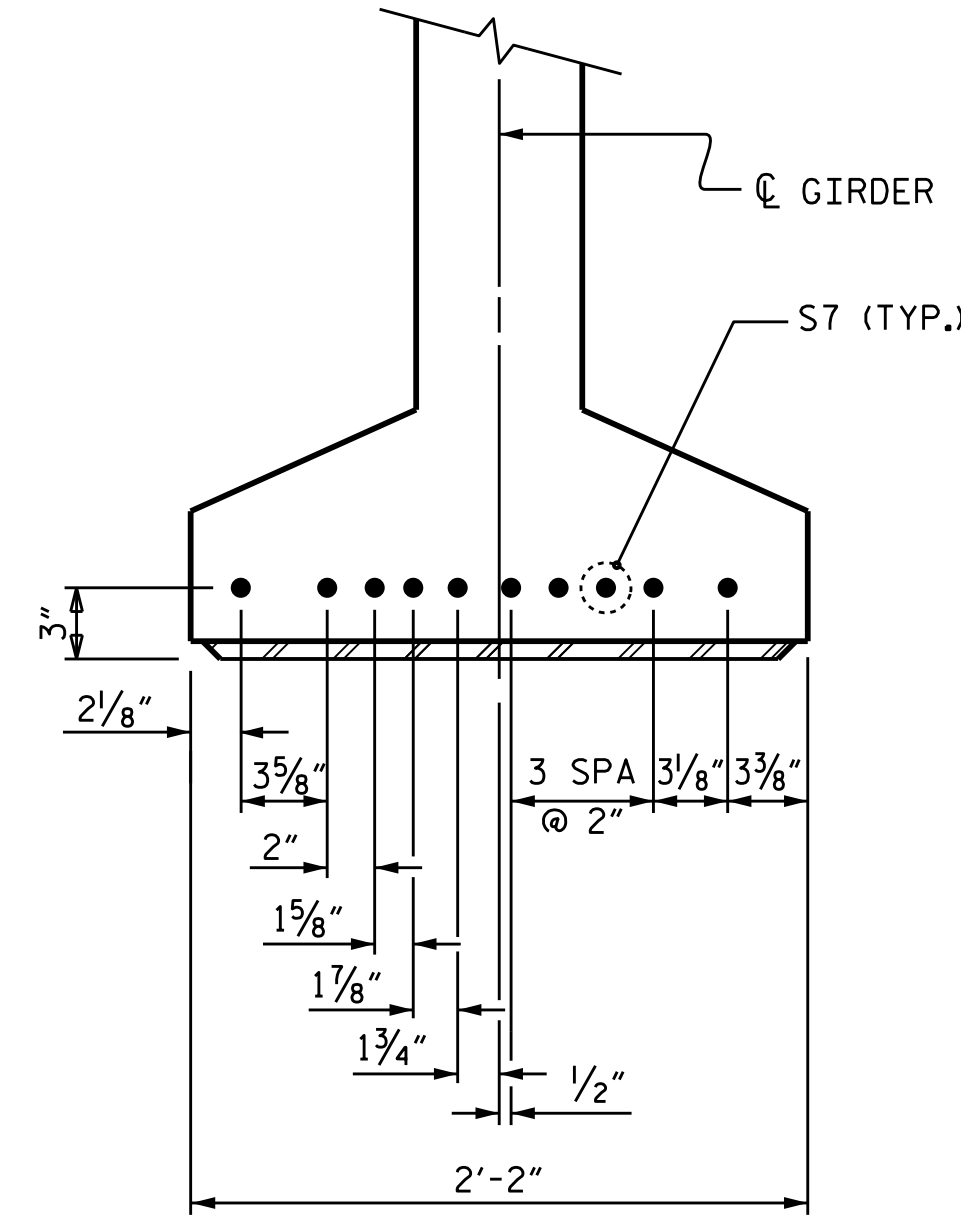
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

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

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

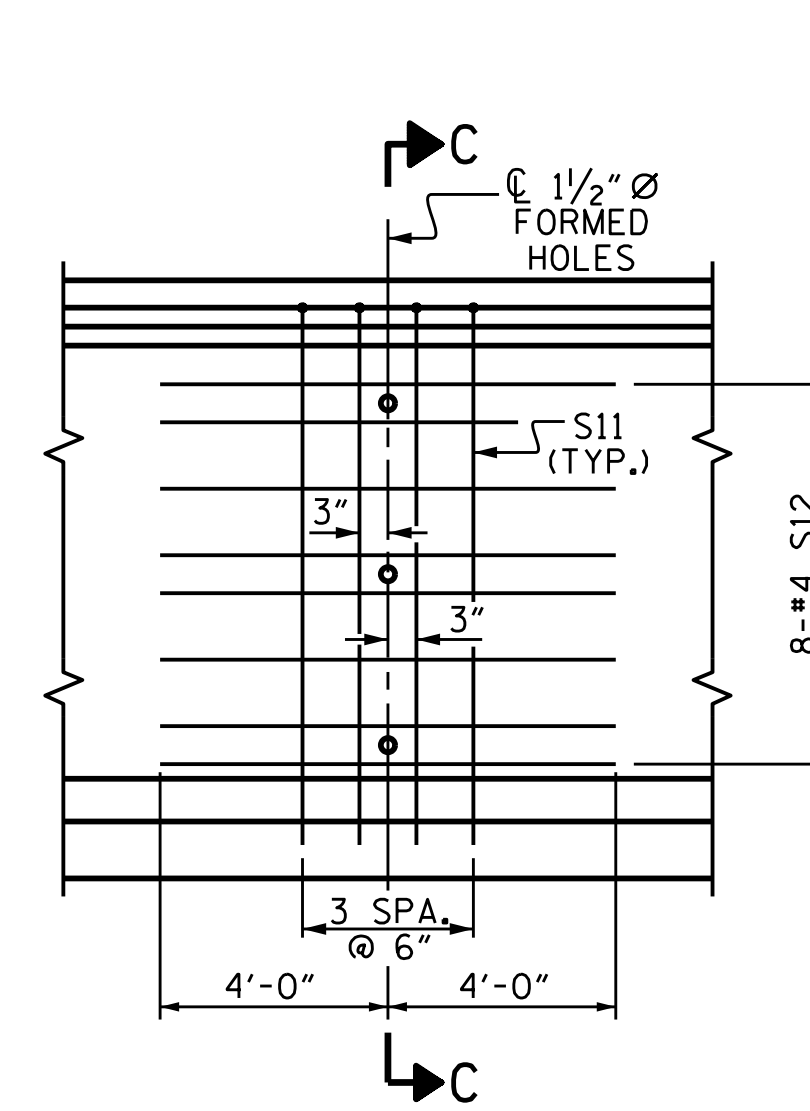


**EXTERIOR GIRDERS**



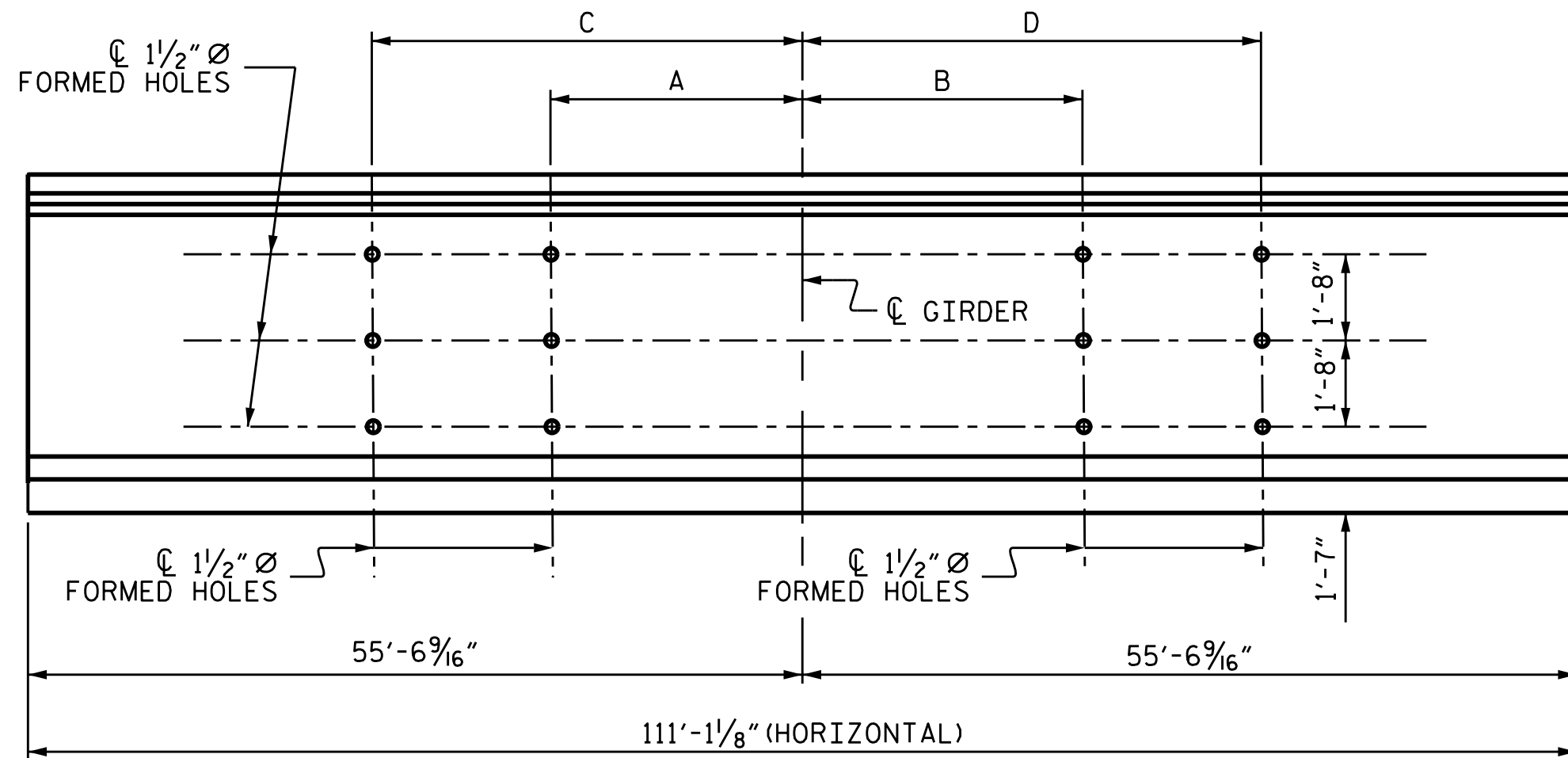
**DETAIL "C"**

(FOR 72" MODIFIED BULB TEES)



**PARTIAL ELEVATION**

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR EXTERIOR GIRDERS



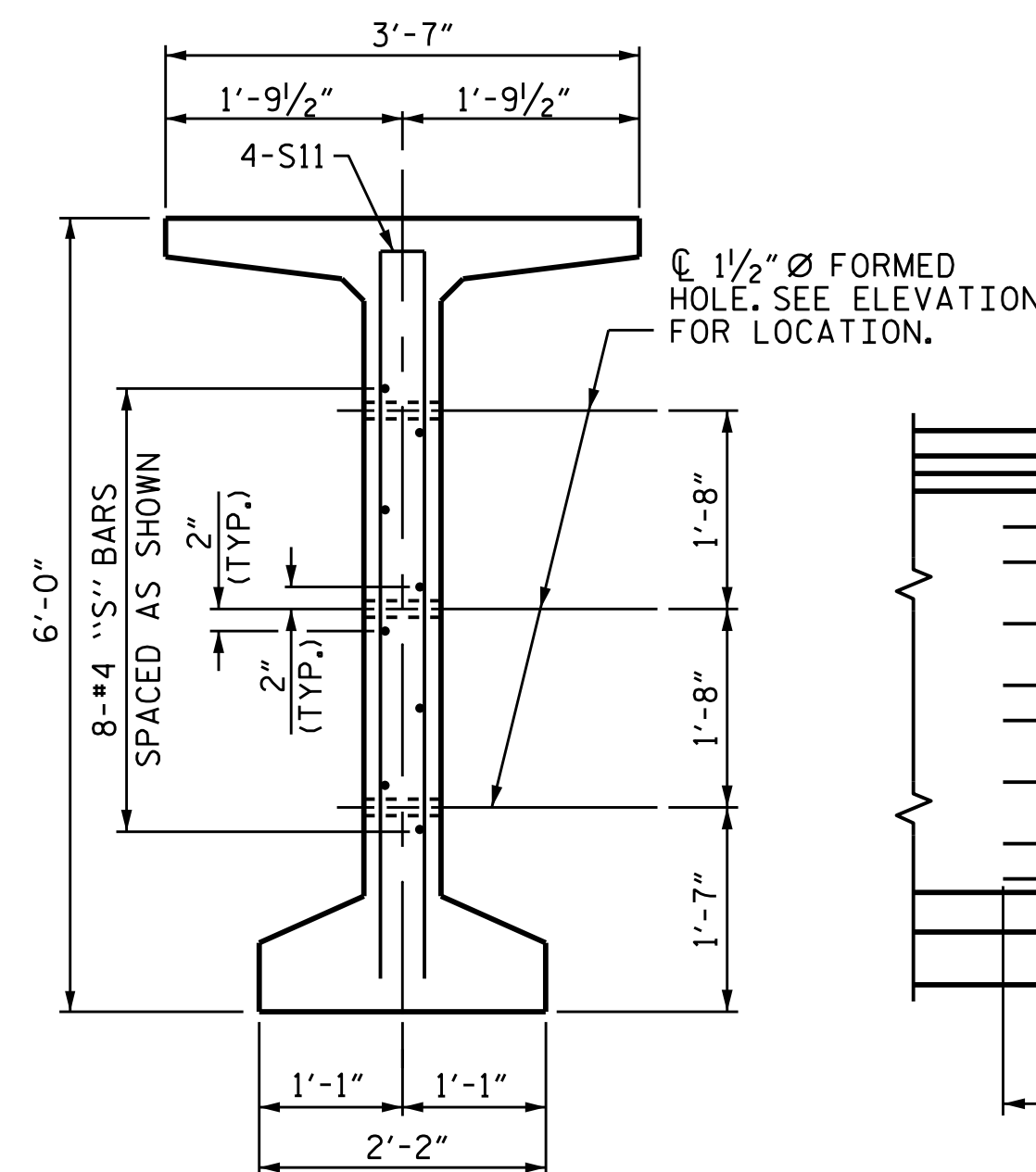
**INTERIOR GIRDERS**

0.6" Ø LOW RELAXATION		ALL GIRDERS																				
TWENTIETH POINTS		0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
CAMBER (GIRDER ALONE IN PLACE)	↑	0.000	0.032	0.062	0.091	0.118	0.141	0.161	0.177	0.189	0.196	0.198	0.196	0.189	0.177	0.161	0.141	0.118	0.091	0.062	0.032	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.019	0.038	0.056	0.072	0.087	0.099	0.108	0.116	0.120	0.122	0.120	0.116	0.109	0.099	0.087	0.072	0.056	0.038	0.019	0.000
FINAL CAMBER	↑	0	1/8"	5/16"	7/16"	9/16"	5/8"	3/4"	13/16"	7/8"	15/16"	15/16"	15/16"	7/8"	13/16"	3/4"	5/8"	9/16"	7/16"	5/16"	1/8"	0

**DEAD LOAD DEFLECTION TABLE**

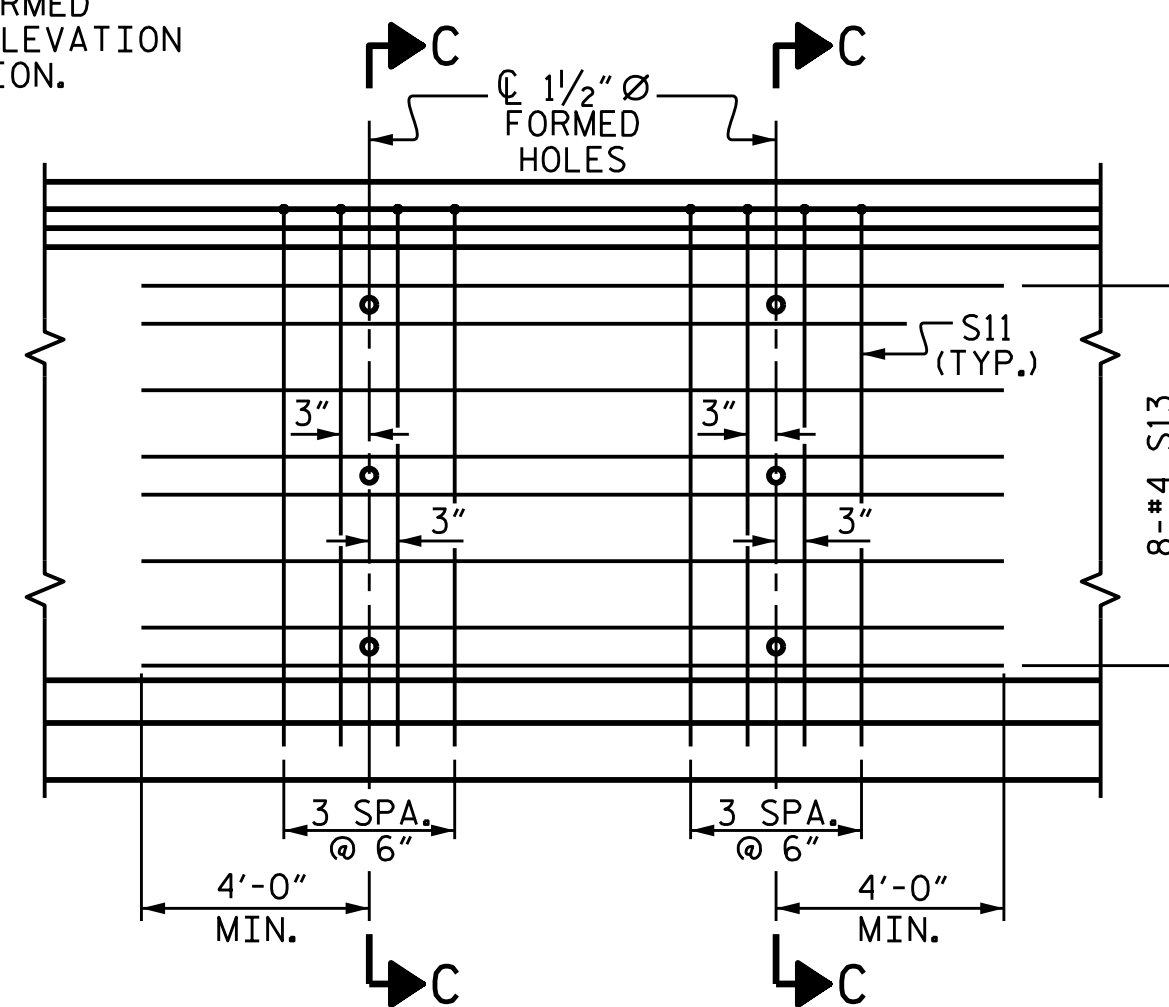
DIAPHRAGM PLACEMENT				
GIRDER NO.	A	B	C	D
GIRDER A2	14'-1 1/4"	14'-1 1/8"	22'-5 1/2"	22'-5 1/2"
GIRDER A3	14'-1 1/2"	14'-1"	22'-5 3/4"	22'-5 1/2"
GIRDER B2	14'-2"	14'-1 7/8"	22'-4 3/4"	22'-4 3/4"
GIRDER B3	14'-1 7/8"	14'-1 3/4"	22'-5"	22'-4 3/4"

**BOLT HOLE PLACEMENT DETAILS**



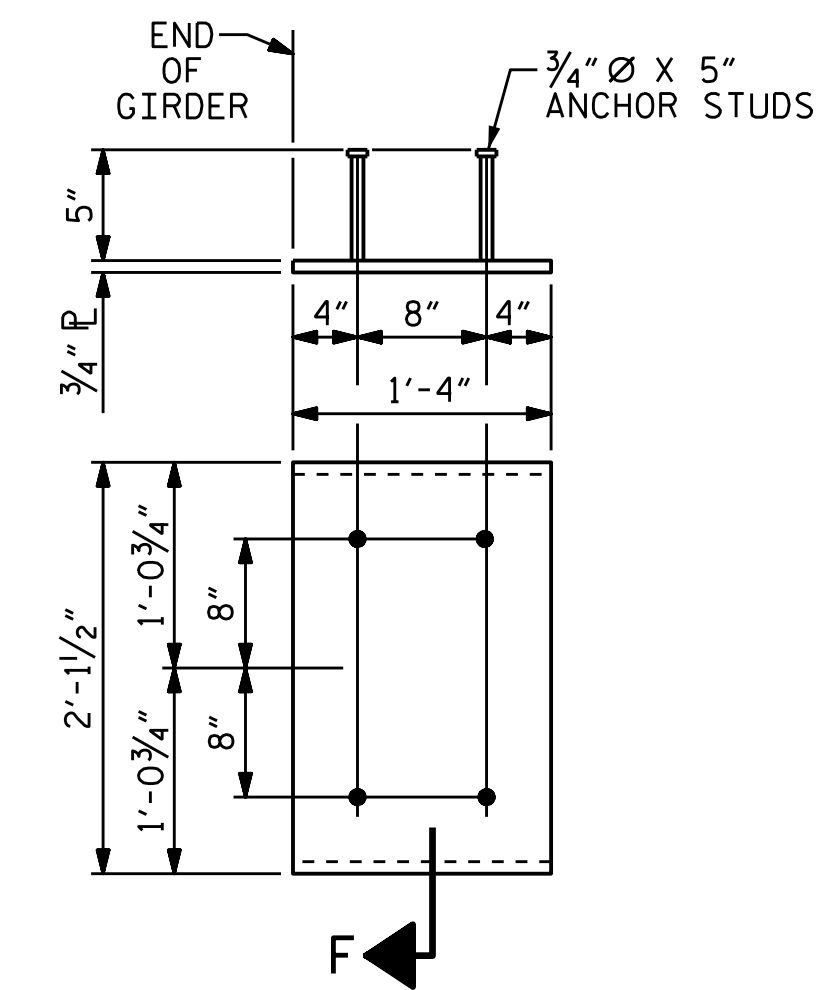
**SECTION C-C**

(S1, S6 AND S9 BARS NOT SHOWN)



**PARTIAL ELEVATION**

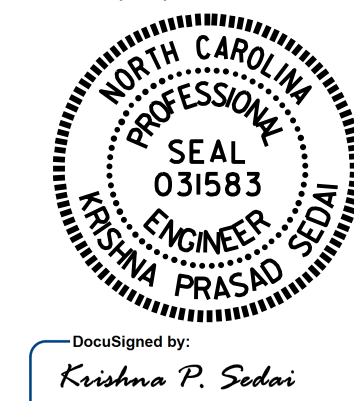
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR INTERIOR GIRDERS



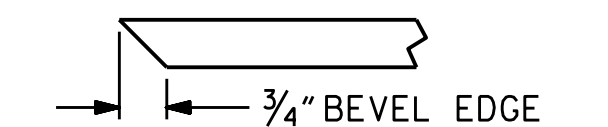
**EMBEDDED PLATE "B-1" DETAILS**

(2 REQ'D PER GIRDER)

7/24/2019



DocuSigned by: Krishna P. Sedai



**SECTION "F"**

(SEE NOTES)

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 DETAILS

ASSEMBLED BY : M. G. SHAIKH	DATE : 03/2019
CHECKED BY : H. LOCKLEAR	DATE : 04/2019
DRAWN BY : ELR 11/91	REV. 1/15 MAA/TMC
CHECKED BY : GRP 11/91	REV. 2/15 MAA/TMC
	REV. 12/17 MAA/THC

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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-12	
1			3			TOTAL SHEETS	
2			4			28	

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 A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM. 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.

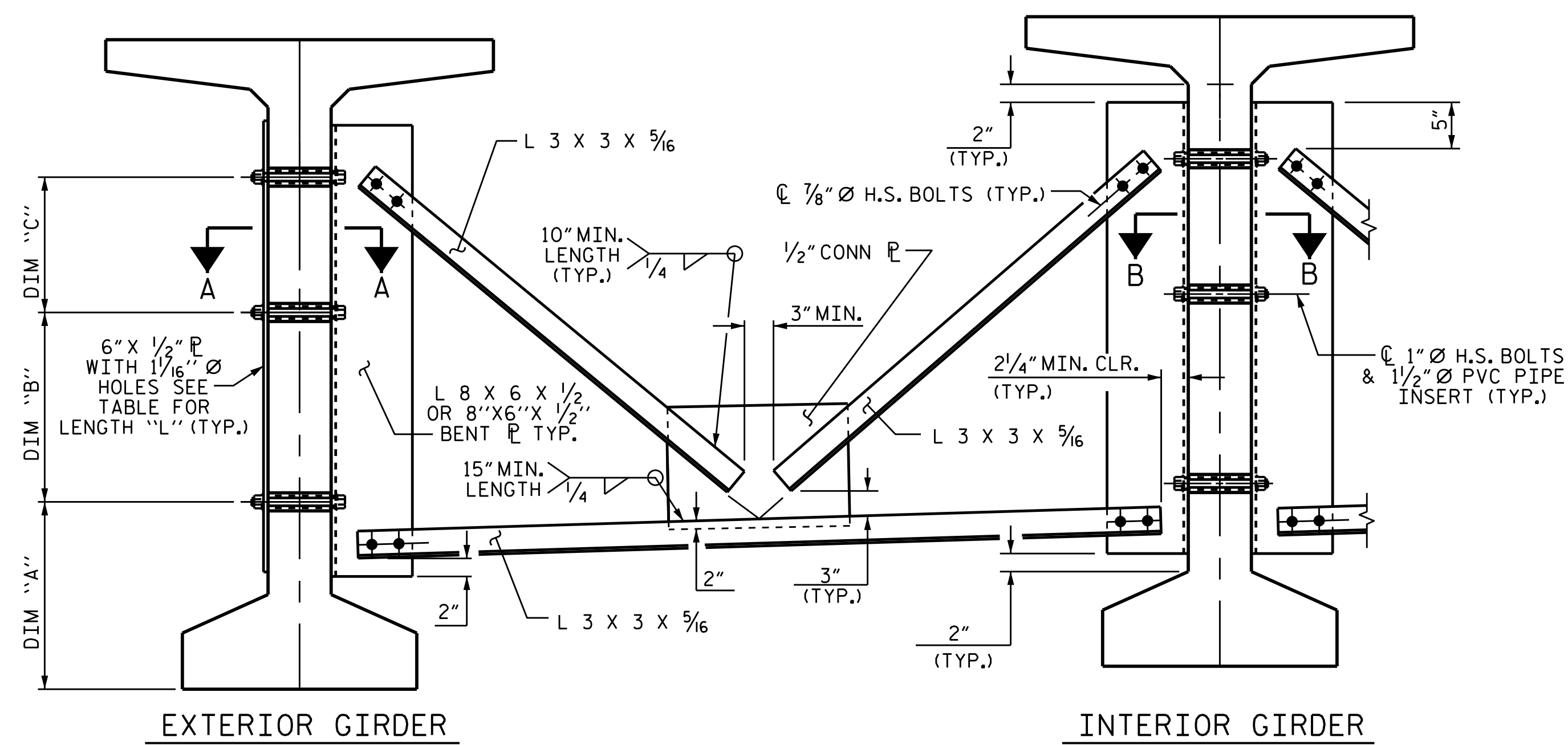
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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.

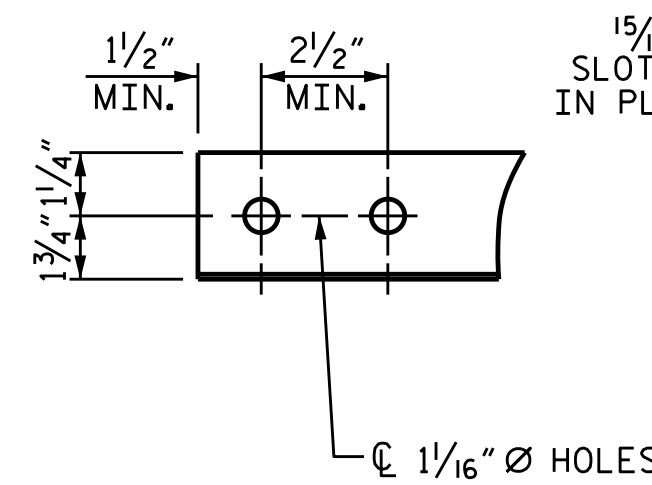
IN THE EXTERIOR BAYS, PLACE TEMPORARY STRUTS BETWEEN PRESTRESSED GIRDERS ADJACENT TO THE STEEL DIAPHRAGMS. STRUTS SHALL REMAIN IN PLACE 3 DAYS AFTER CONCRETE IS PLACED.

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



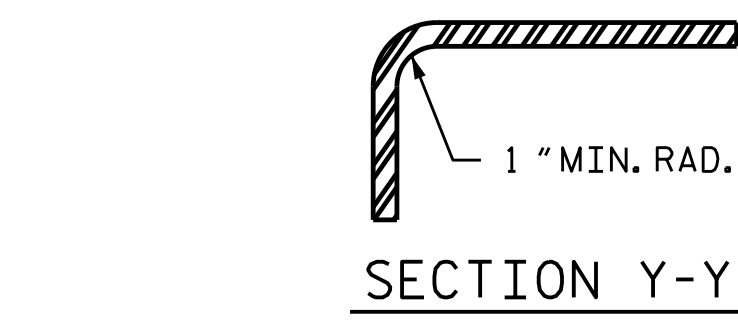
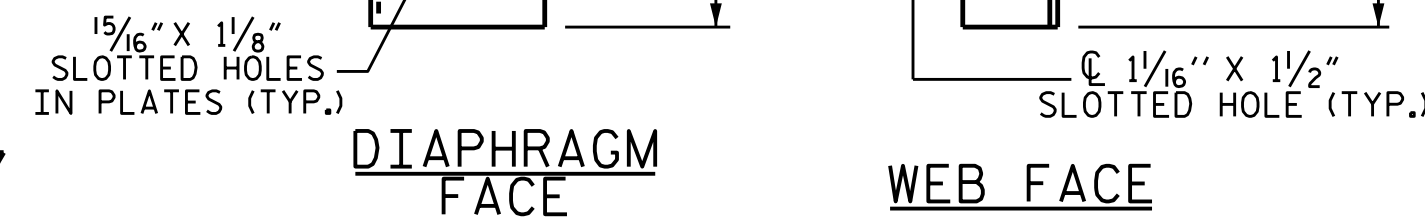
PART SECTION AT INTERMEDIATE DIAPHRAGM

(72" BULB TEE GIRDER SHOWN)

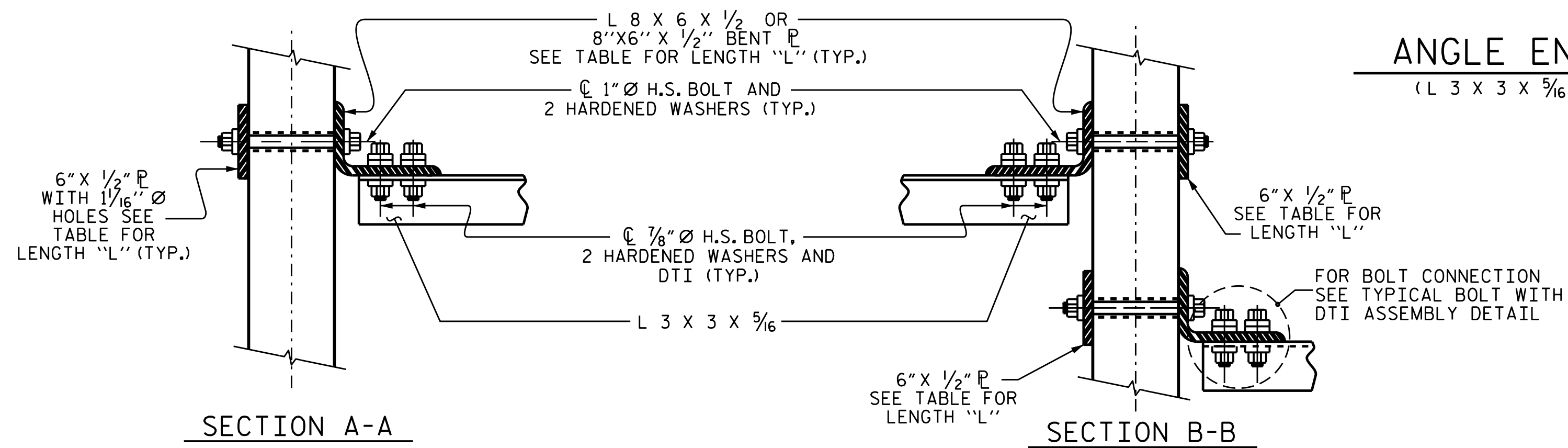


ANGLE END

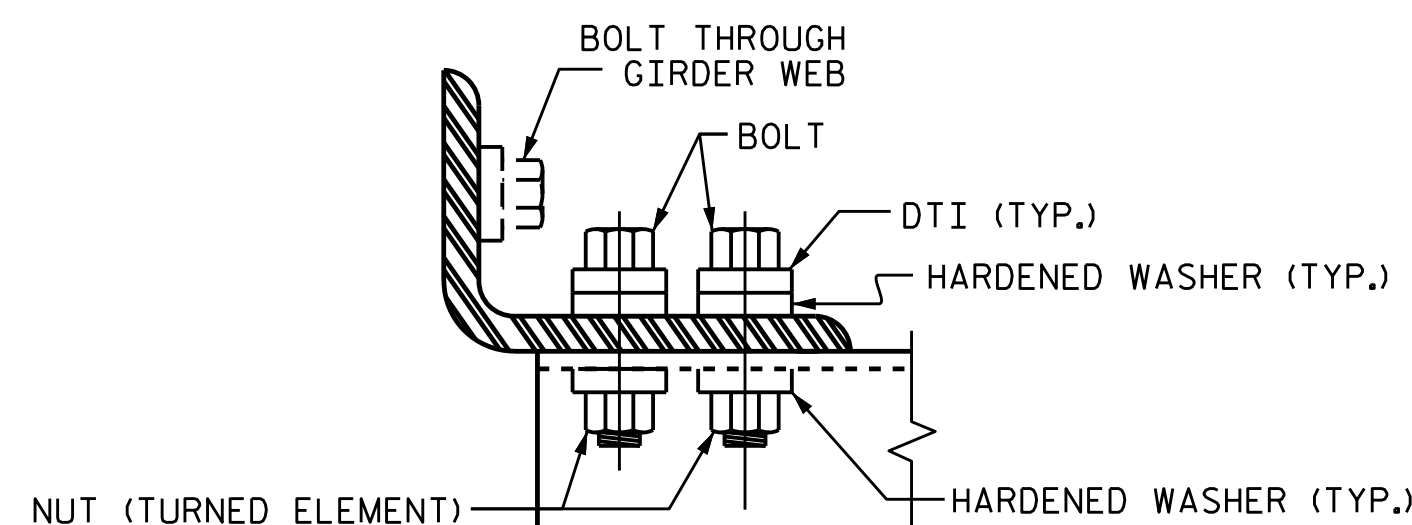
(L 3 X 3 X 5/16)



CONNECTOR PLATE DETAIL



CONNECTION DETAILS



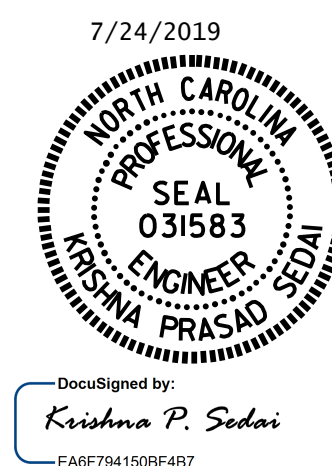
BOLT WITH DTI ASSEMBLY DETAIL

TABLE

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

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 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:	S6-13
1			3			TOTAL SHEETS
2			4			28

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : M. G. SHAIKH DATE : 03/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DRAWN BY : RWW 11/09 REV. 10/17/11 MAA/GM  
 CHECKED BY : GM 11/09 REV. 12/17 MAA/THC



**NOTES**

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

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

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

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

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

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

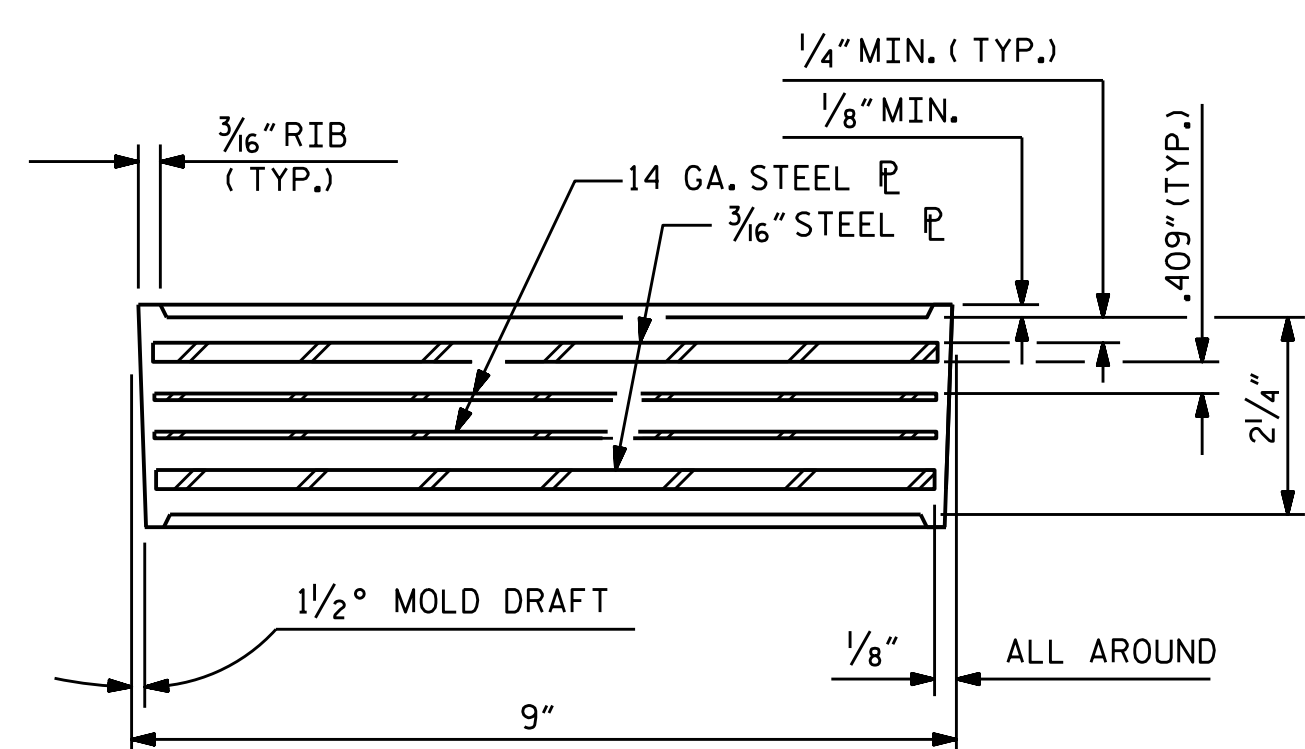
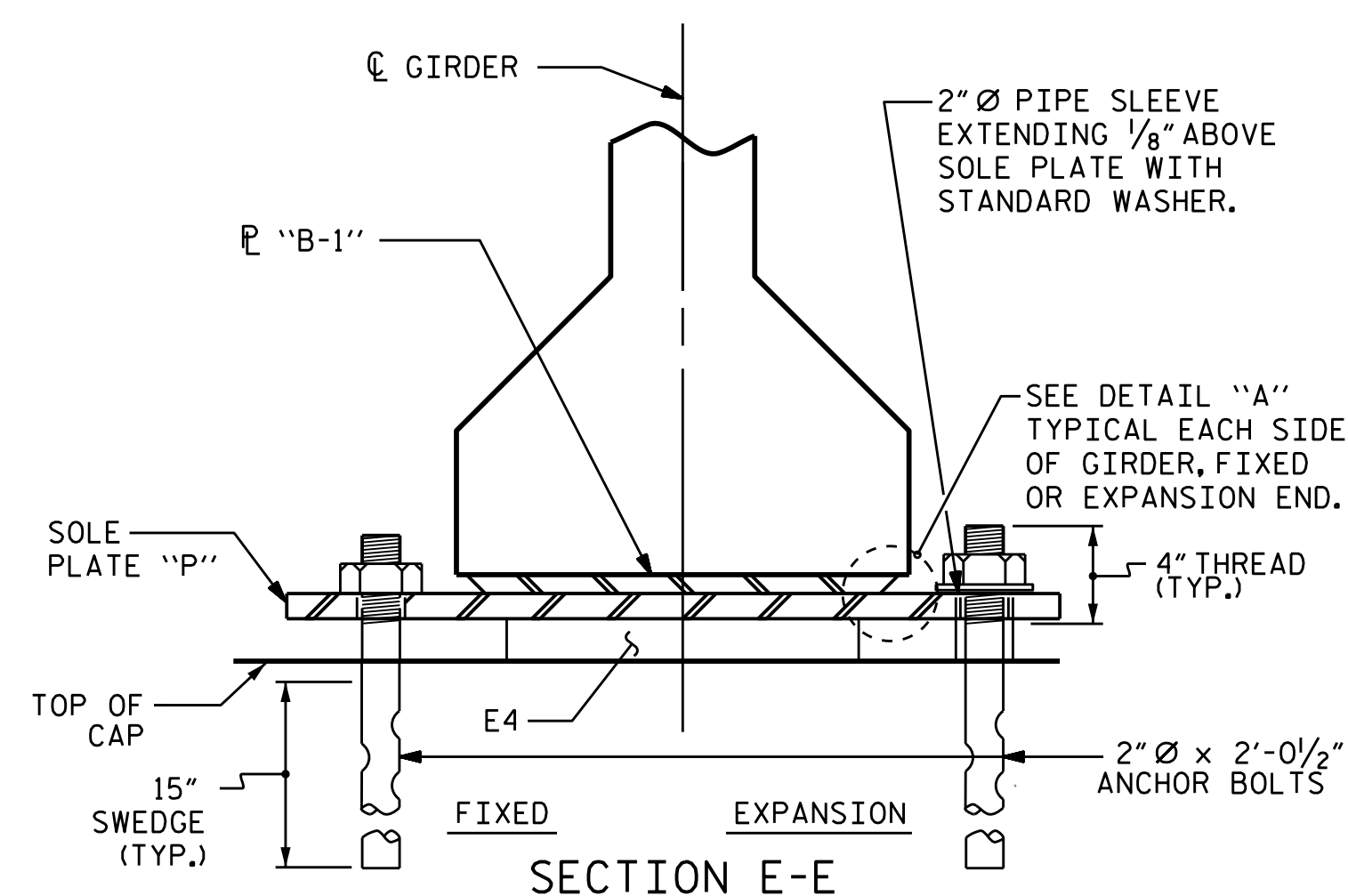
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. NO SHOP DRAWINGS ARE REQUIRED FOR ANCHOR BOLTS, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

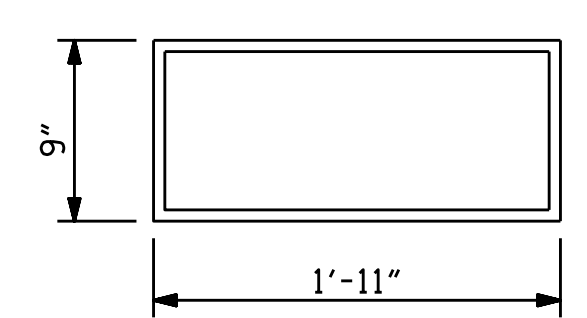
THE ELASTOMER IN THE STEEL REINFORCED BEARINGS SHALL HAVE A SHEAR MODULUS OF 0.160 KSI, IN ACCORDANCE WITH AASHTO M251.

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

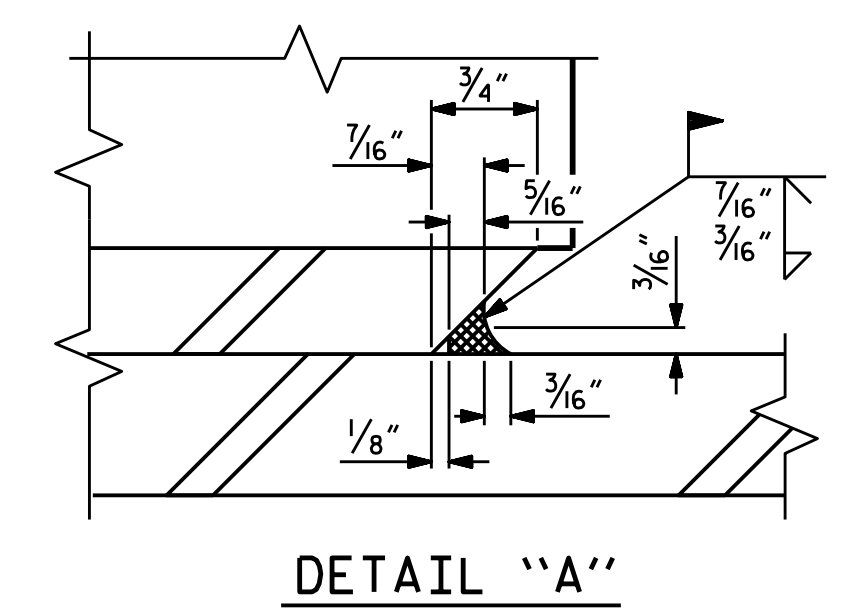
ALL SOLE PLATES SHALL BE AASHTO M270 GRADE 36.



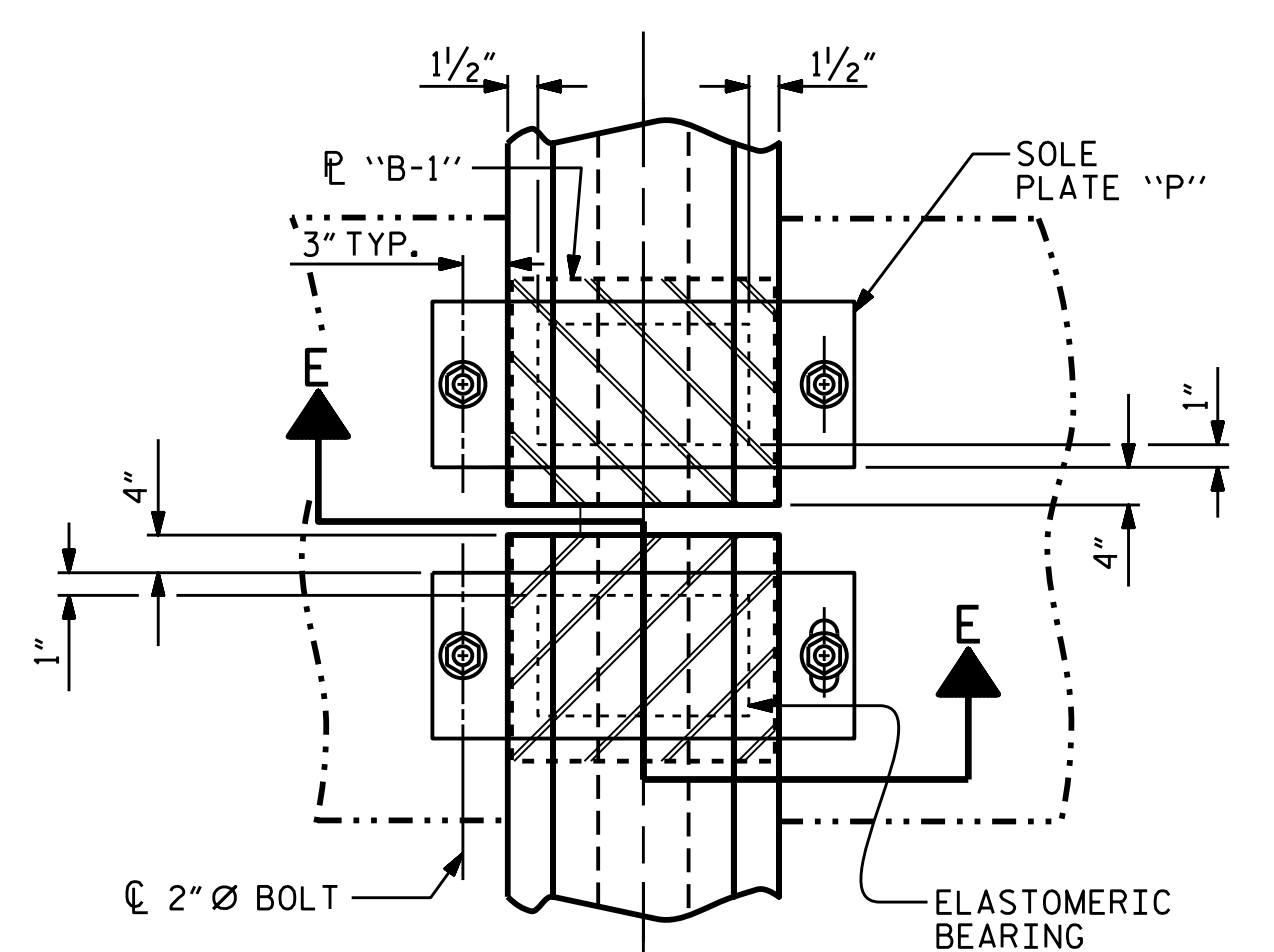
TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (16 REQ'D)  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE V

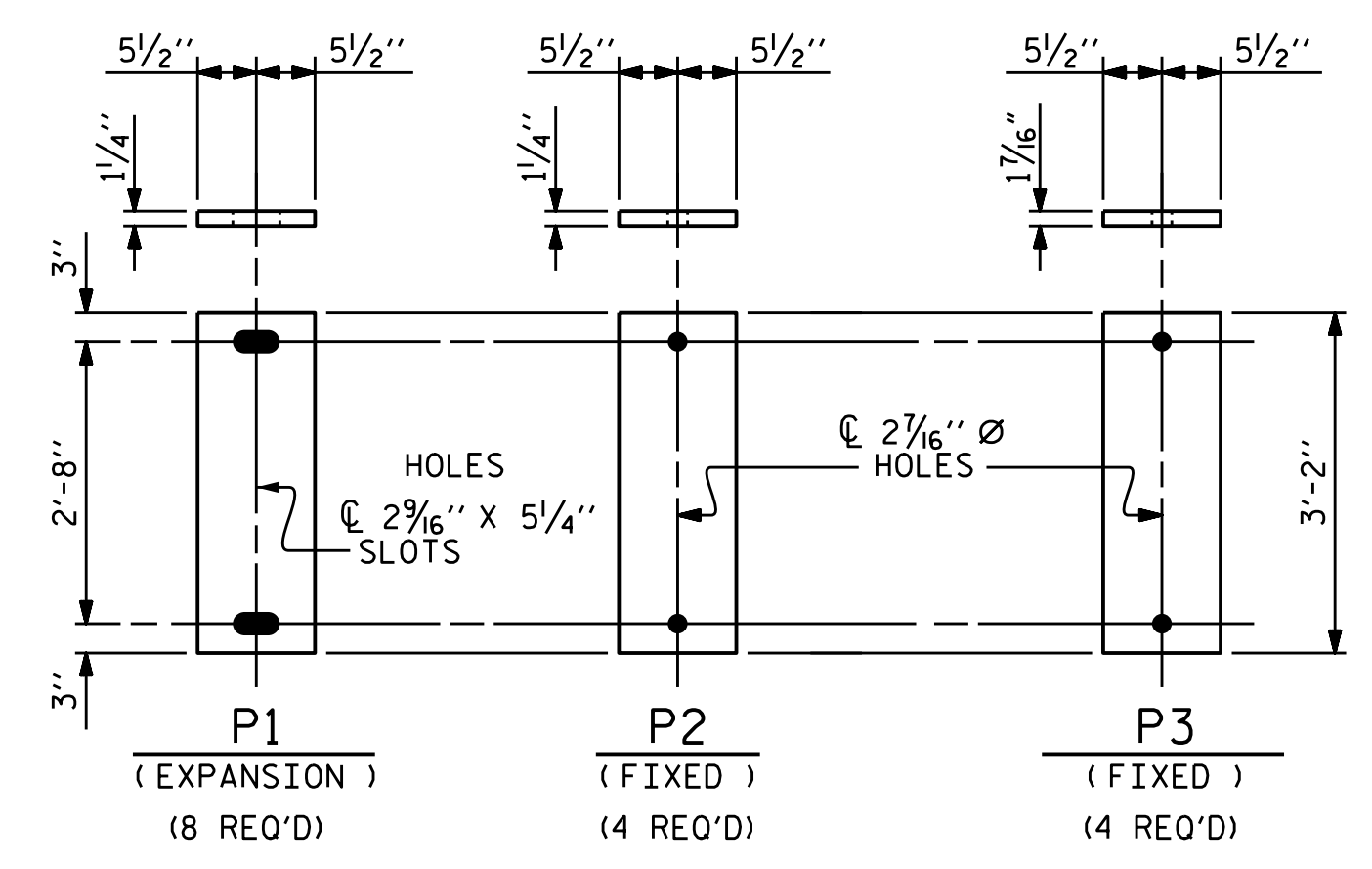


DETAIL "A"



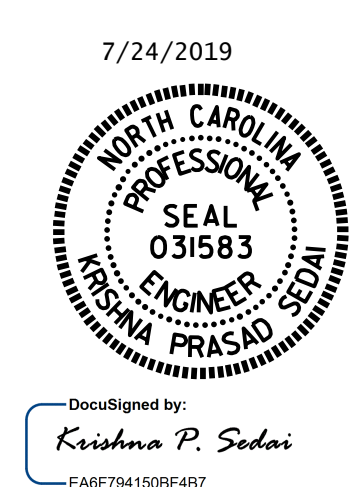
TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)  
TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)

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



SOLE PLATE DETAILS ("P")

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 24+31.67 -Y3-

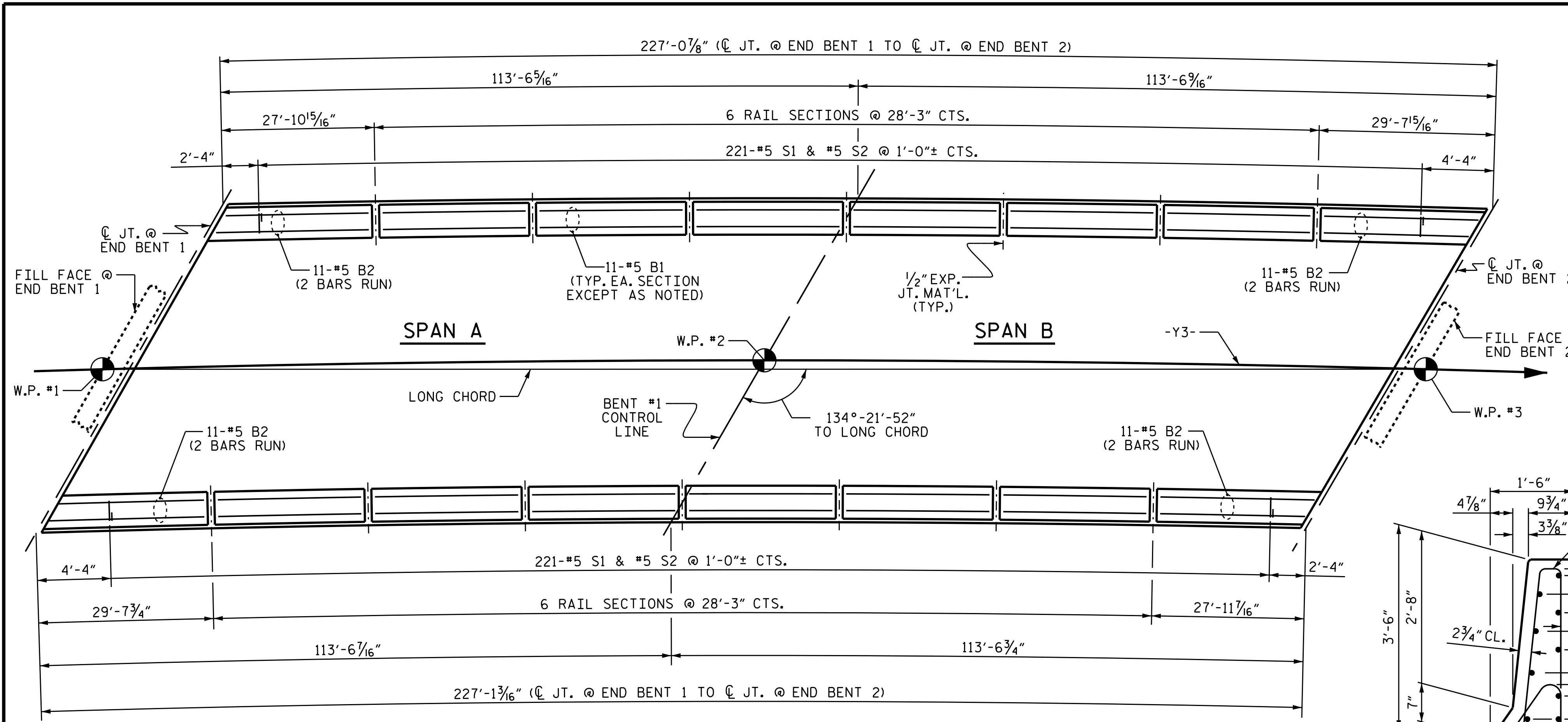


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
ELASTOMERIC BEARING  
DETAILS  
PRESTRESSED CONCRETE GIRDER  
SUPERSTRUCTURE

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-14	
1			3			TOTAL SHEETS	
2			4			28	

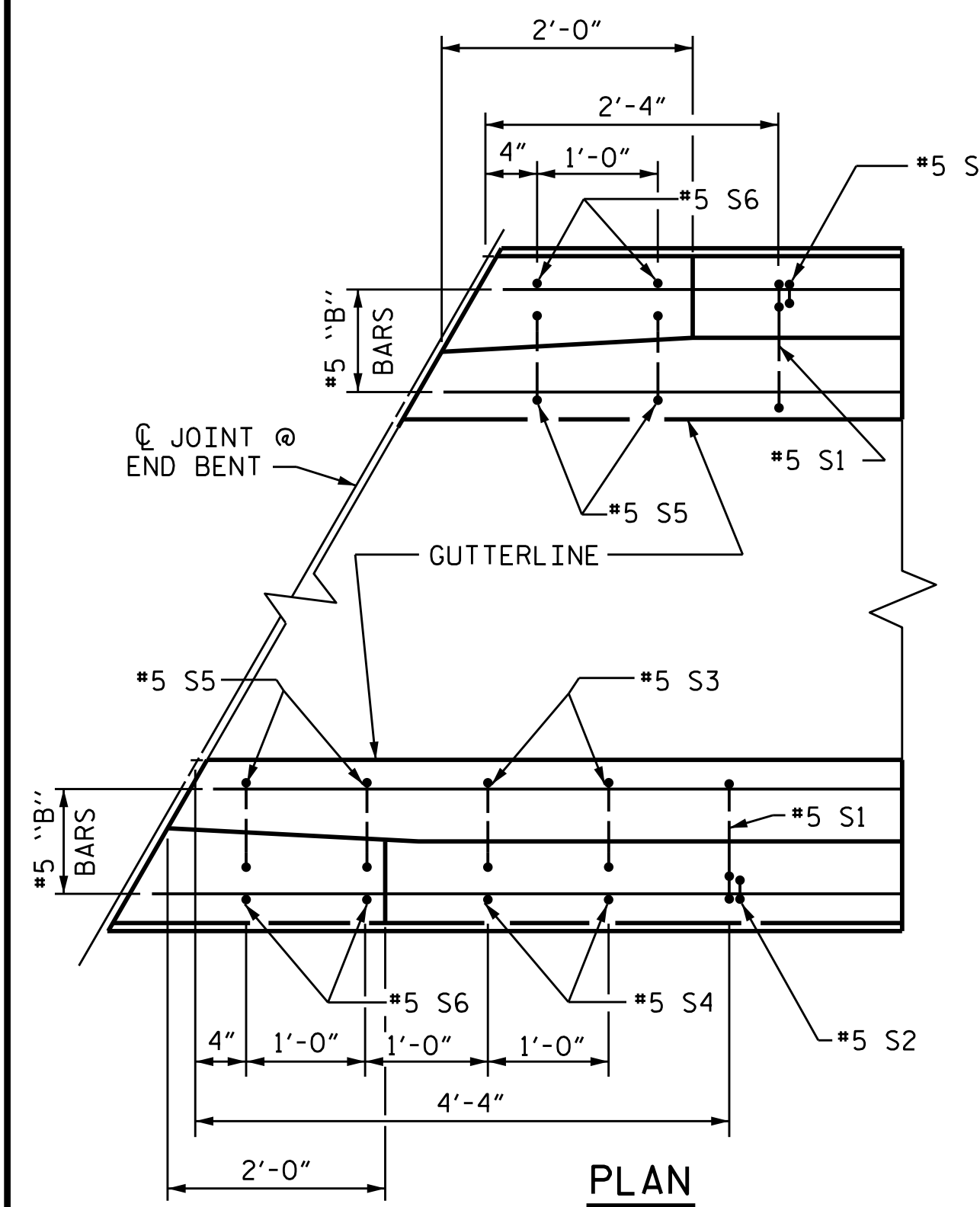
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ASSEMBLED BY : M. G. SHAIKH	DATE : 03/2019
CHECKED BY : H. LOCKLEAR	DATE : 04/2019
DRAWN BY : EEM	2/97
CHECKED BY : VAP	2/97
REV. 6/13	AAC/MAA
REV. 1/15	MAA/TMG
REV. 12/17	MAA/THC

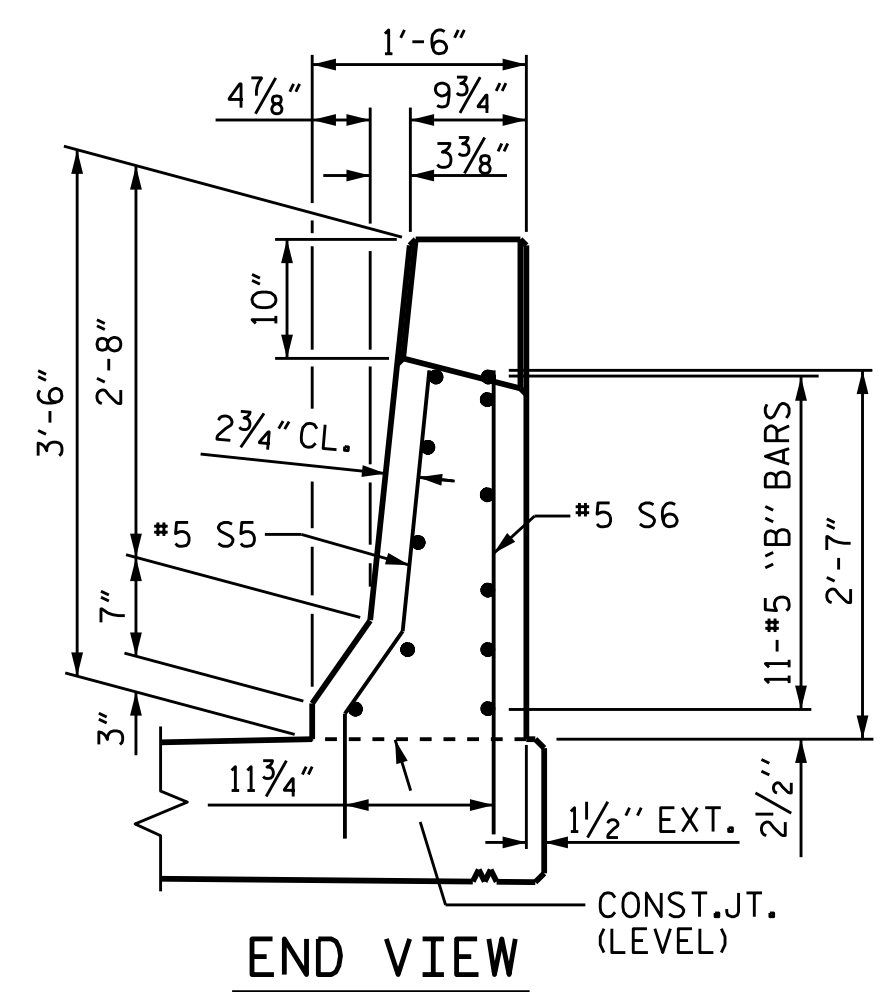


**PLAN**

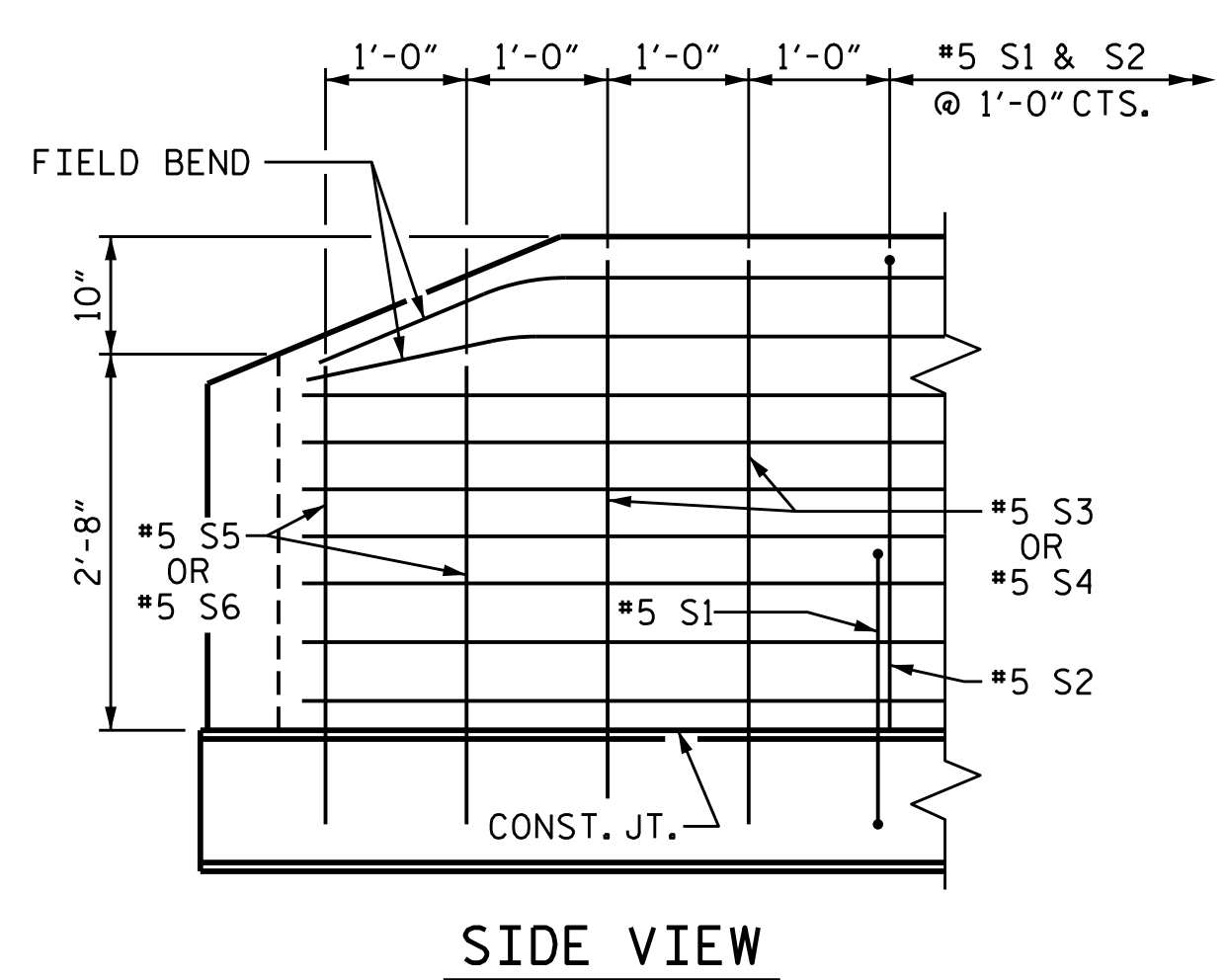
FOR REINFORCING STEEL IN THIS AREA SEE "BARRIER RAIL - END OF RAIL DETAILS"



**PLAN**



**END VIEW**



**SIDE VIEW**

**END OF RAIL DETAILS**

FOR ADHESIVE ANCHORING AT SAWED JOINTS

**NOTES**

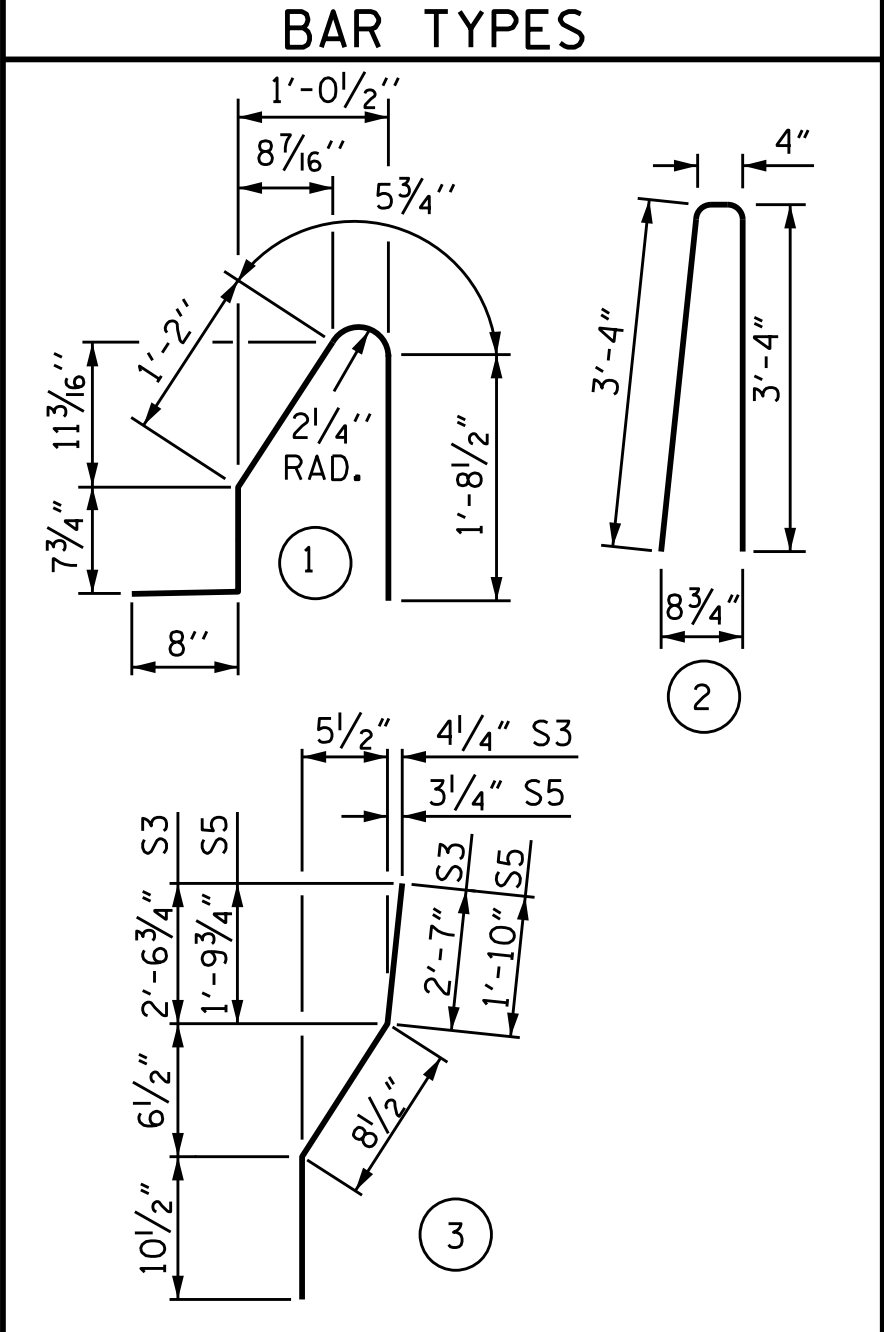
THE BARRIER RAIL IN EACH SPAN SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT SPAN HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

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

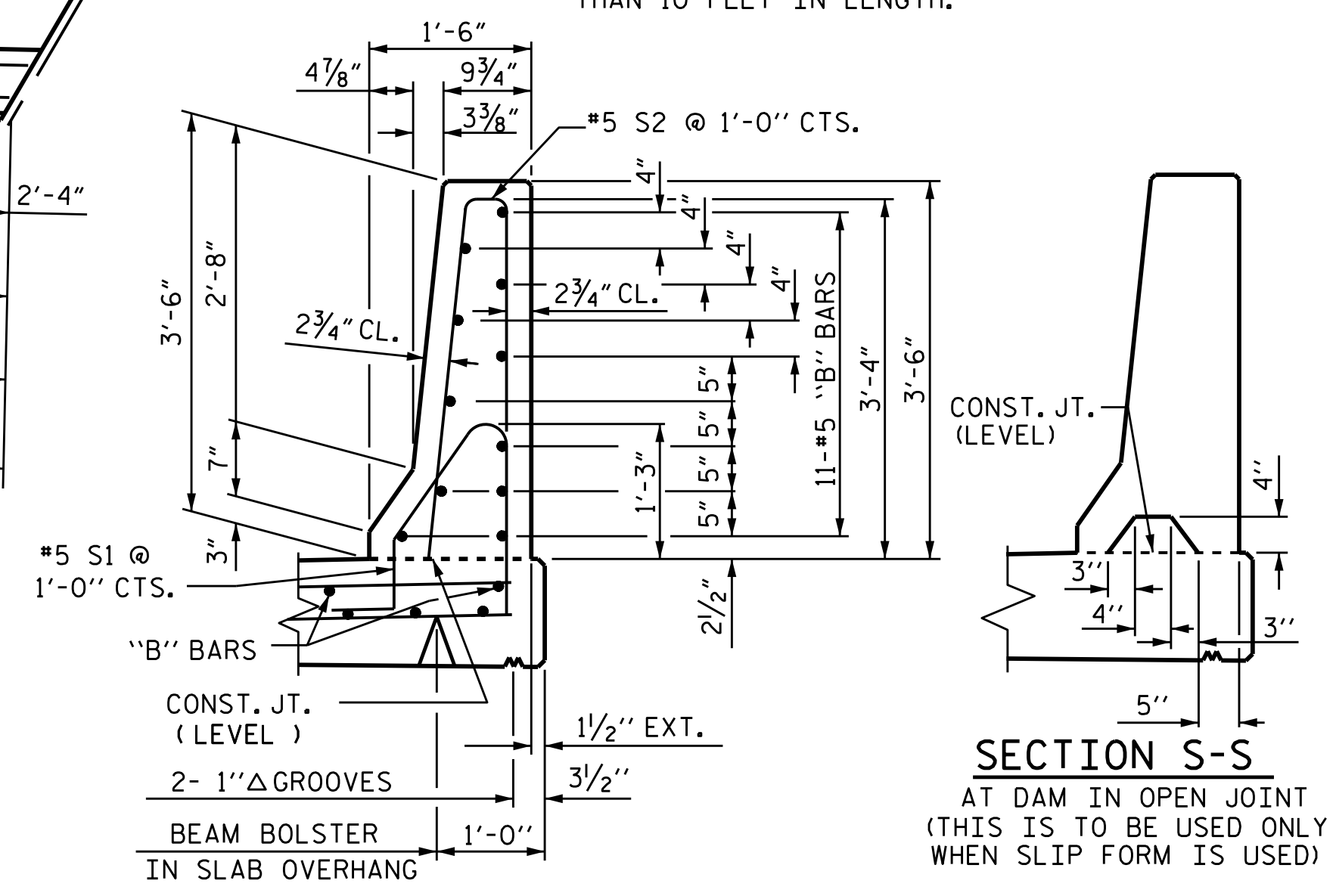
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS, THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN BARRIER RAIL EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS 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.



ALL BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL**

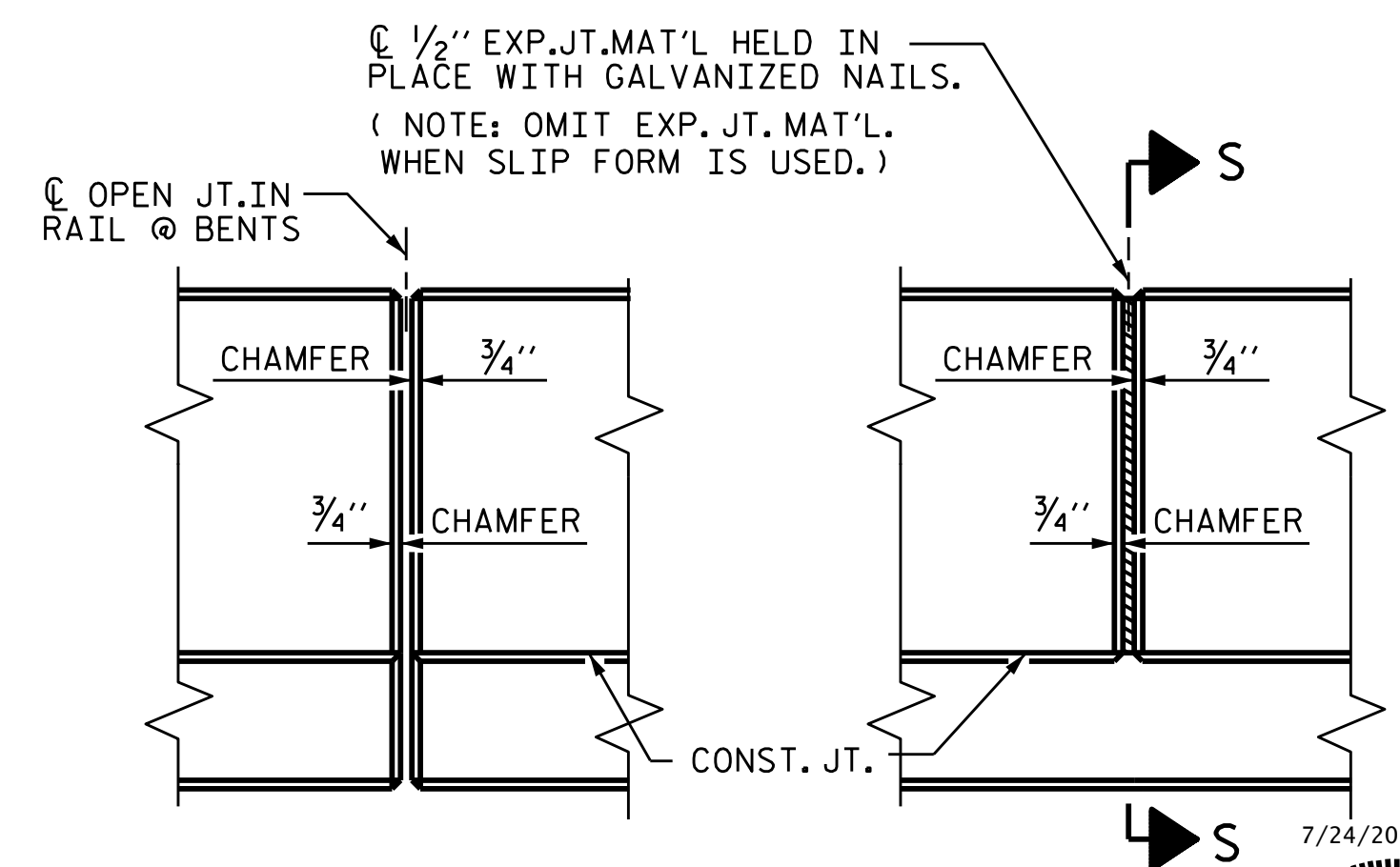
FOR CONCRETE BARRIER RAIL ONLY					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	132	#5	STR	27'-10"	3832
* B2	88	#5	STR	16'-4"	1499
* S1	442	#5	1	4'-8"	2151
* S2	442	#5	2	7'-0"	3227
* S3	4	#5	3	4'-2"	17
* S4	4	#5	STR	4'-0"	17
* S5	8	#5	3	3'-5"	29
* S6	8	#5	STR	3'-3"	27
* EPOXY COATED REINFORCING STEEL					10799 LBS.
CLASS AA CONCRETE					61.8 CU. YDS.
CONCRETE BARRIER RAIL					454.2 LIN. FT.



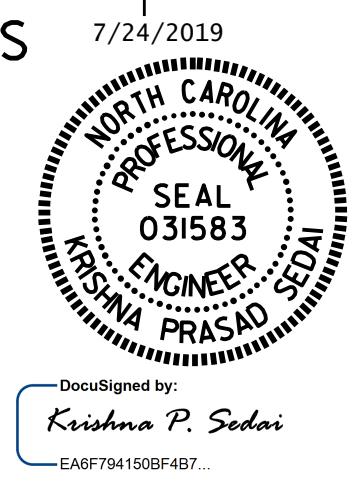
**SECTION S-S**

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

**SECTION THRU RAIL**



**ELEVATION AT EXPANSION JOINTS BARRIER RAIL DETAILS**



ASSEMBLED BY : M. G. SHAIKH	DATE : 03/2019
CHECKED BY : H. LOCKLEAR	DATE : 04/2019
DRAWN BY : ARB 5/87	REV. 7/12 MAA/GM
CHECKED BY : SJD 9/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-15	
1			3			TOTAL SHEETS 28	
2			4				



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.)

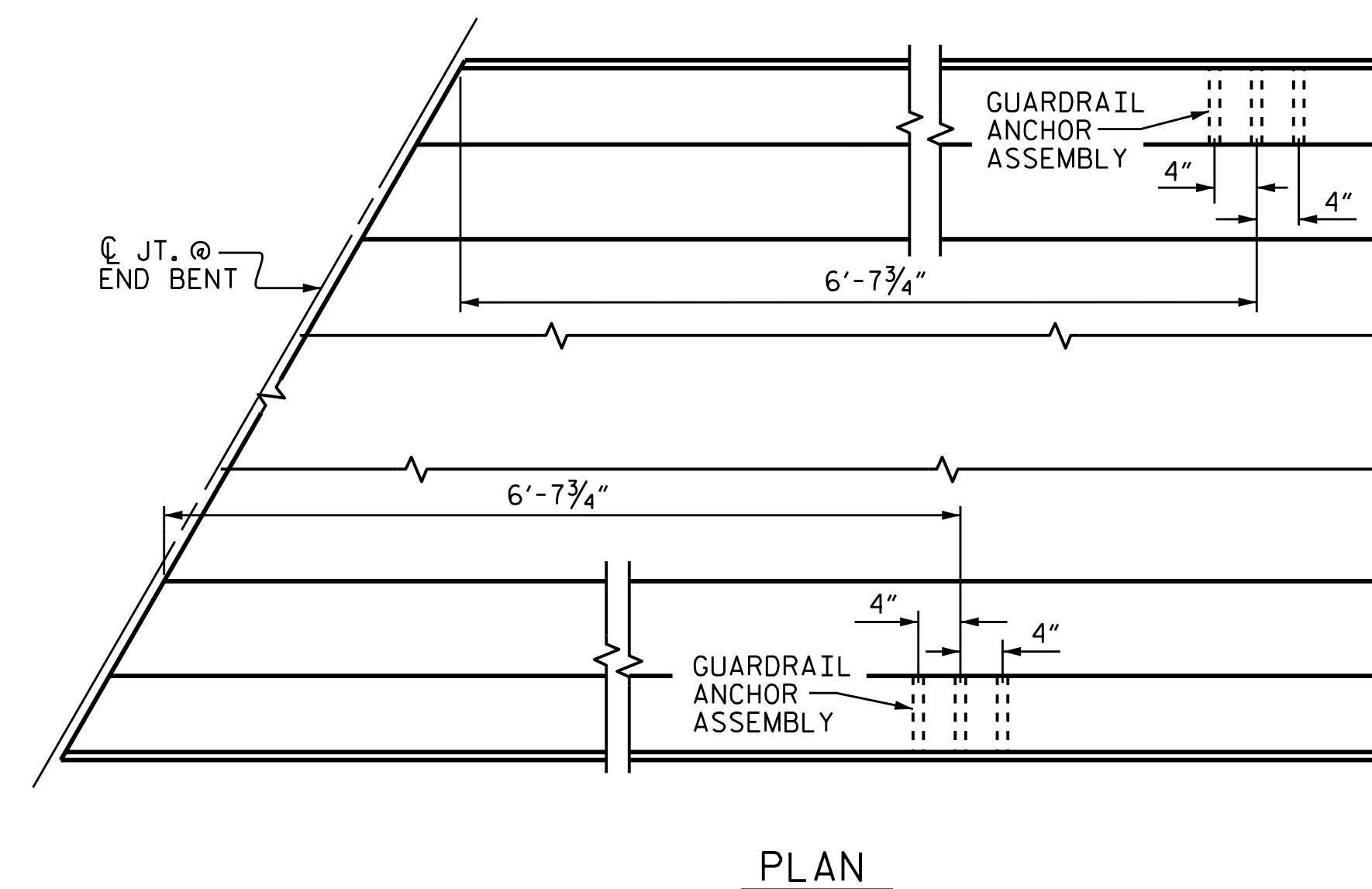
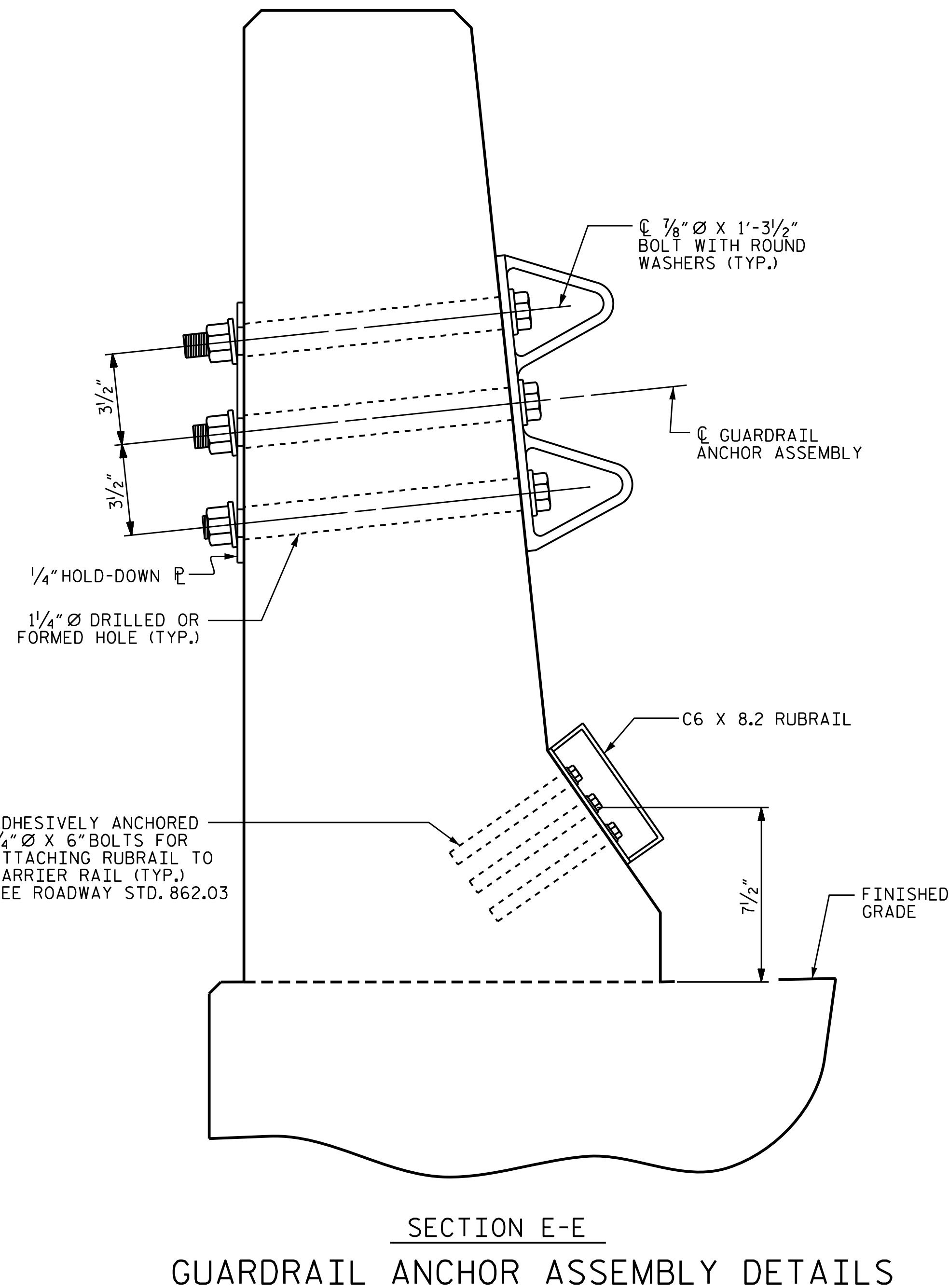
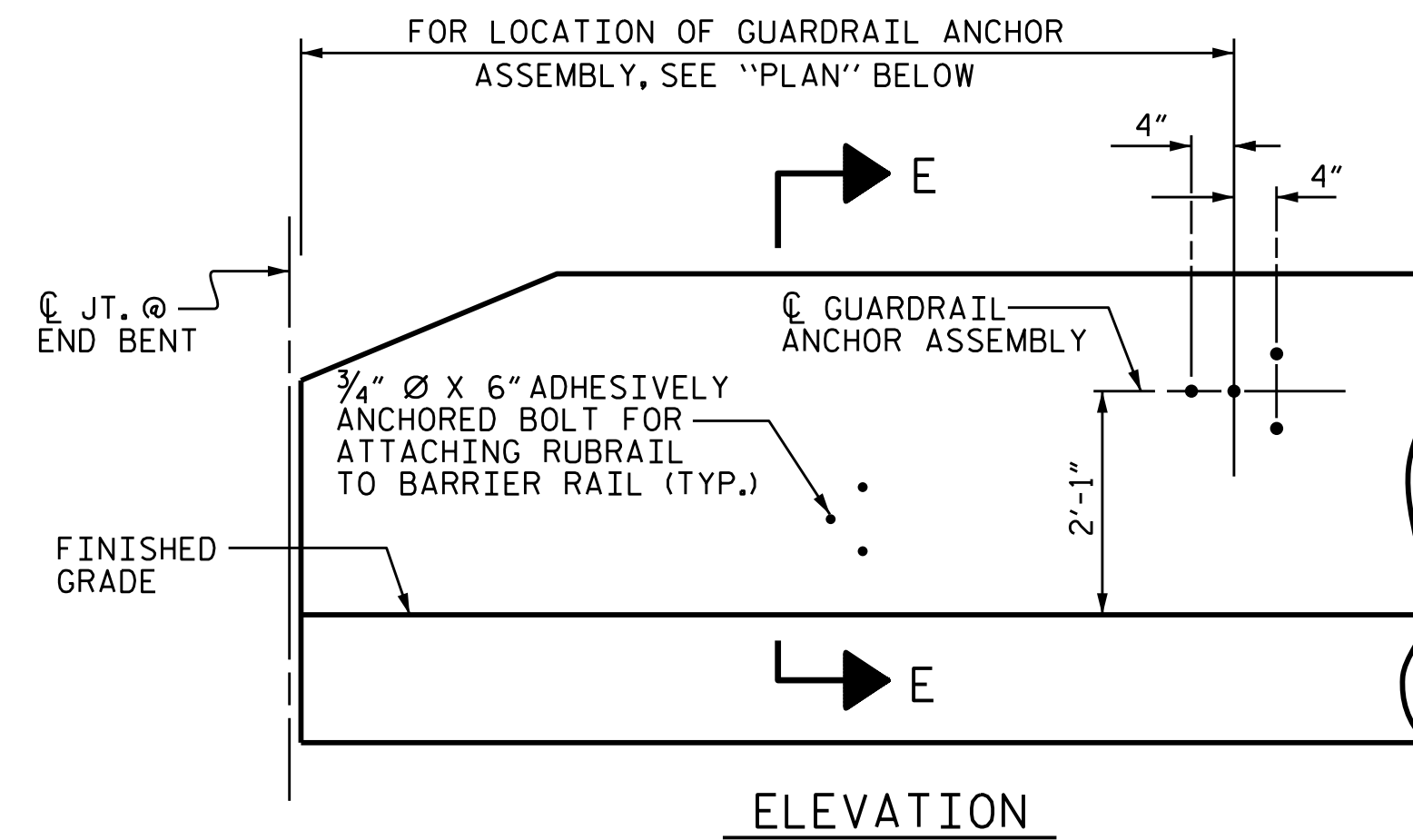
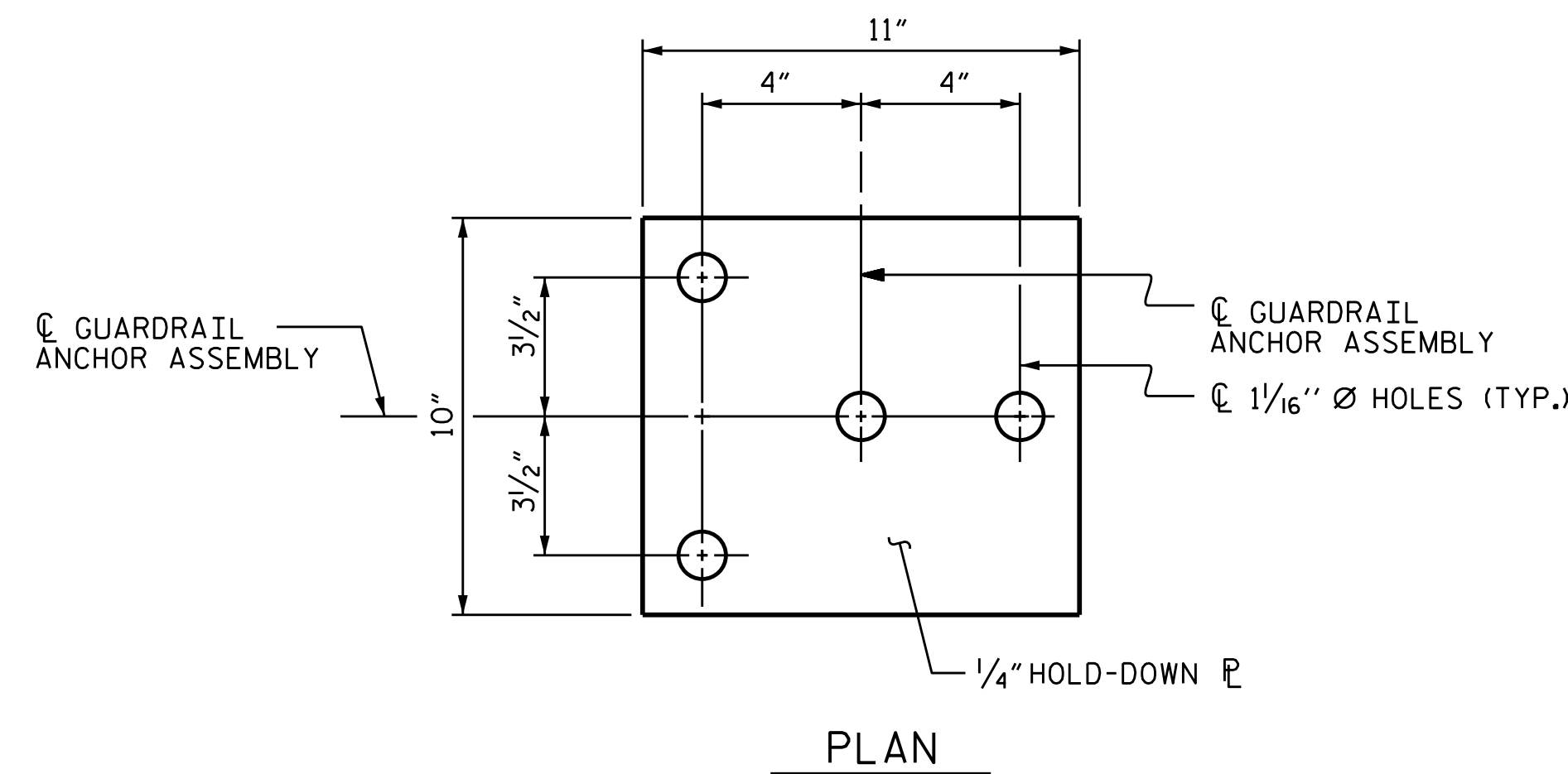
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.

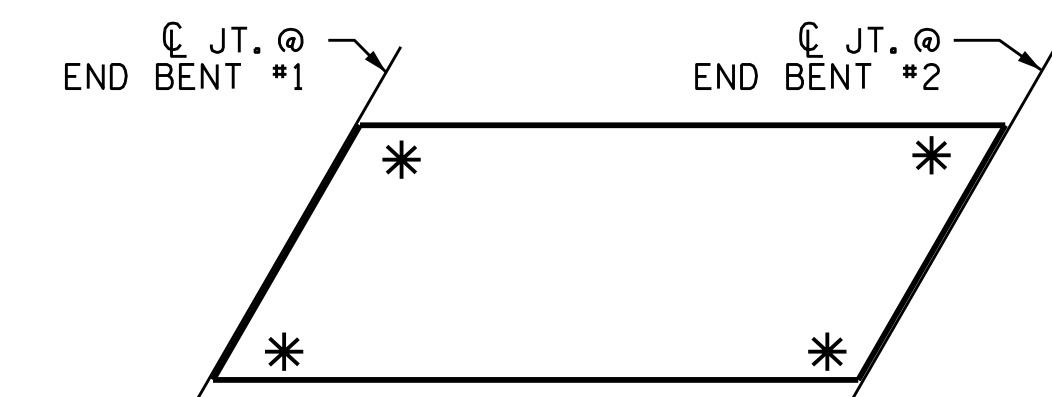
THE 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.

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.



LOCATION OF ANCHORS FOR GUARDRAIL

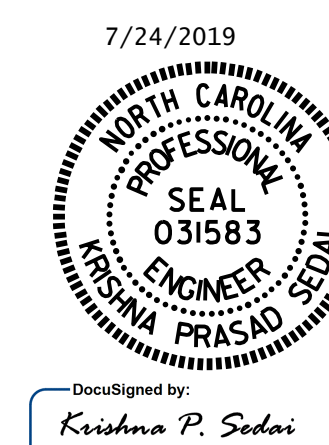
END BENT #1 SHOWN, END BENT #2 SIMILAR.



SKETCH SHOWING POINTS OF ATTACHMENTS

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 GUARDRAIL ANCHORAGE  
 FOR BARRIER RAIL

ASSEMBLED BY : M. G. SHAIKH	DATE : 03/2019
CHECKED BY : H. LOCKLEAR	DATE : 04/2019
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

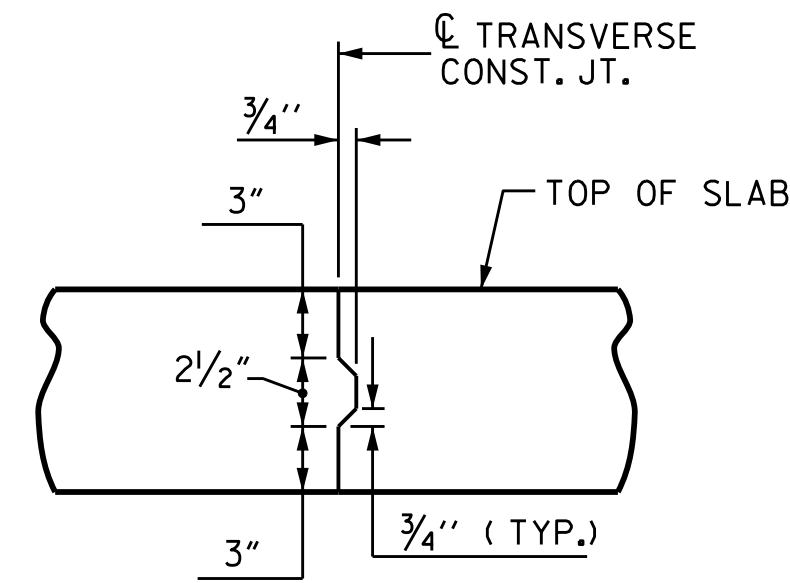
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-16
1			3			TOTAL SHEETS
2			4			28



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"			



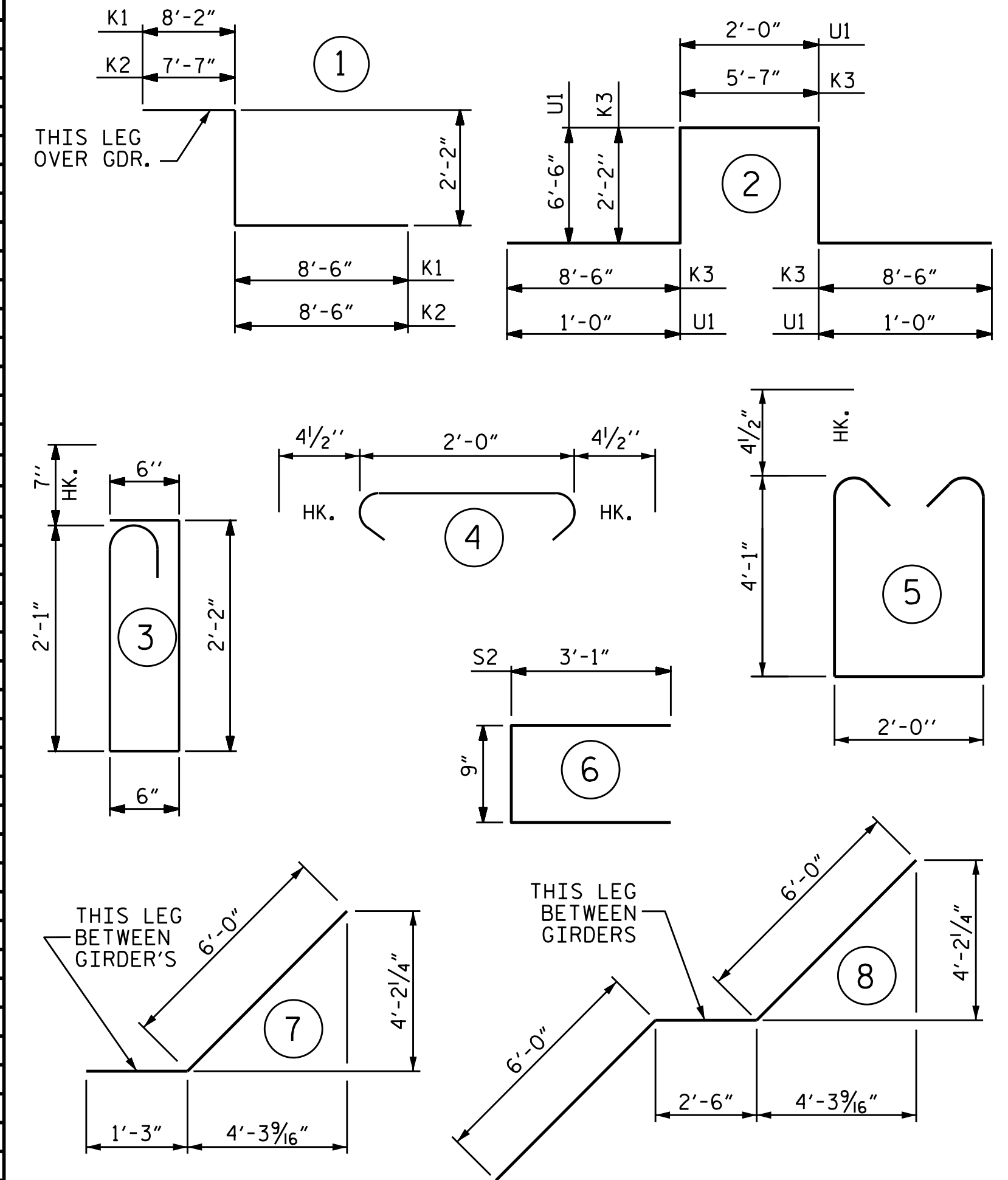
### TRANSVERSE CONSTRUCTION JOINT DETAIL

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

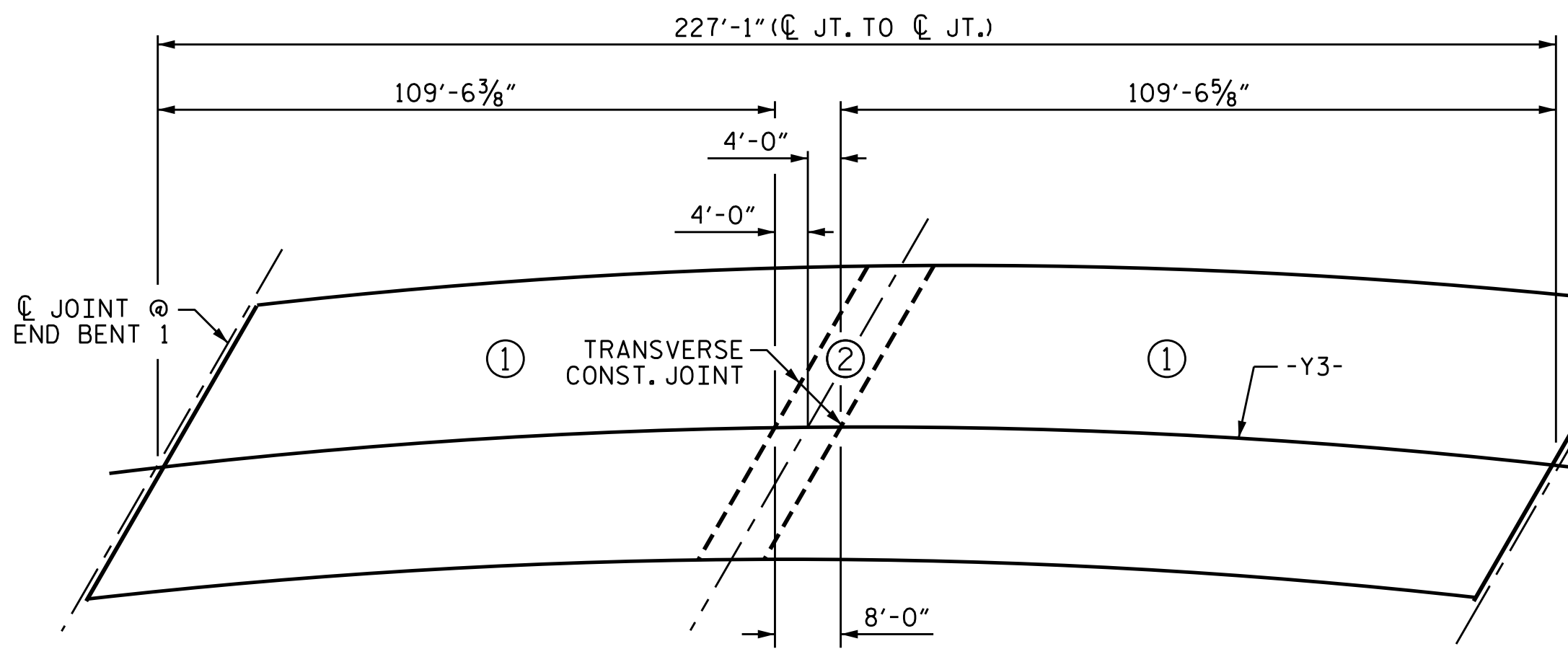
### BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT			
* A1	334	#5	STR	32'-11"	11467	* A142	2	#5	STR	7'-11"	17	A235	2	#5	STR	12'-1"	25
A2	334	#5	STR	32'-11"	11467	* A143	2	#5	STR	7'-4"	15	A236	2	#5	STR	11'-6"	24
* A3	6	#6	STR	8'-1"	73	* A144	2	#5	STR	6'-8"	14	A237	2	#5	STR	10'-10"	23
						* A145	2	#5	STR	6'-1"	13	A238	2	#5	STR	10'-3"	21
* A101	2	#5	STR	32'-4"	67	* A146	2	#5	STR	5'-6"	11	A239	2	#5	STR	9'-8"	20
* A102	2	#5	STR	31'-9"	66	* A147	2	#5	STR	4'-11"	10	A240	2	#5	STR	9'-1"	19
* A103	2	#5	STR	31'-2"	65	* A148	2	#5	STR	4'-4"	9	A241	2	#5	STR	8'-10"	18
* A104	2	#5	STR	30'-7"	64	* A149	2	#5	STR	3'-9"	8	A242	2	#5	STR	7'-11"	17
* A105	2	#5	STR	30'-0"	63	* A150	2	#5	STR	3'-1"	6	A243	2	#5	STR	7'-4"	15
* A106	2	#5	STR	29'-4"	61	* A151	2	#5	STR	2'-6"	5	A244	2	#5	STR	6'-8"	14
* A107	2	#5	STR	28'-9"	60						A245	2	#5	STR	6'-1"	13	
* A108	2	#5	STR	28'-2"	59	A201	2	#5	STR	32'-4"	67	A246	2	#5	STR	5'-6"	11
* A109	2	#5	STR	27'-7"	58	A202	2	#5	STR	31'-9"	66	A247	2	#5	STR	4'-11"	10
* A110	2	#5	STR	27'-0"	56	A203	2	#5	STR	31'-2"	65	A248	2	#5	STR	4'-4"	9
* A111	2	#5	STR	26'-5"	55	A204	2	#5	STR	30'-7"	64	A249	2	#5	STR	3'-9"	8
* A112	2	#5	STR	25'-9"	54	A205	2	#5	STR	30'-0"	63	A250	2	#5	STR	3'-1"	6
* A113	2	#5	STR	25'-2"	52	A206	2	#5	STR	29'-4"	61	A251	2	#5	STR	2'-6"	5
* A114	2	#5	STR	24'-7"	51	A207	2	#5	STR	28'-9"	60						
* A115	2	#5	STR	24'-0"	50	A208	2	#5	STR	28'-2"	59	* B1	144	#4	STR	26'-9"	2573
* A116	2	#5	STR	23'-5"	49	A209	2	#5	STR	27'-7"	58	* B2	43	#5	STR	40'-4"	1809
* A117	2	#5	STR	22'-10"	48	A210	2	#5	STR	27'-0"	56	* B3	42	#5	STR	34'-2"	1497
* A118	2	#5	STR	22'-2"	46	A211	2	#5	STR	26'-5"	55	B4	108	#5	STR	58'-3"	6562
* A119	2	#5	STR	21'-7"	45	A212	2	#5	STR	25'-9"	54						
* A120	2	#5	STR	21'-0"	44	A213	2	#5	STR	25'-2"	52	* G1	1	#5	STR	46'-4"	48
* A121	2	#5	STR	20'-5"	43	A214	2	#5	STR	24'-7"	51	* G2	1	#5	STR	45'-8"	48
* A122	2	#5	STR	19'-10"	41	A215	2	#5	STR	24'-0"	50						
* A123	2	#5	STR	19'-3"	40	A216	2	#5	STR	23'-5"	49	* K1	4	#8	1	18'-10"	201
* A124	2	#5	STR	18'-7"	39	A217	2	#5	STR	22'-10"	48	* K2	4	#8	1	18'-3"	195
* A125	2	#5	STR	18'-0"	38	A218	2	#5	STR	22'-2"	46	* K3	8	#8	2	26'-11"	575
* A126	2	#5	STR	17'-5"	36	A219	2	#5	STR	21'-7"	45	* K4	18	#6	STR	6'-4"	171
* A127	2	#5	STR	16'-10"	35	A220	2	#5	STR	21'-0"	44	K5	30	#4	STR	10'-7"	212
* A128	2	#5	STR	16'-3"	34	A221	2	#5	STR	20'-5"	43	K6	6	#4	STR	6'-9"	27
* A129	2	#5	STR	15'-8"	33	A222	2	#5	STR	19'-10"	41	K7	6	#4	STR	6'-4"	25
* A130	2	#5	STR	15'-1"	31	A223	2	#5	STR	19'-3"	40	K8	14	#4	7	7'-3"	68
* A131	2	#5	STR	14'-6"	30	A224	2	#5	STR	18'-7"	39	K9	14	#4	8	14'-6"	136
* A132	2	#5	STR	13'-10"	29	A225	2	#5	STR	18'-0"	38						
* A133	2	#5	STR	13'-3"	28	A226	2	#5	STR	17'-5"	36	* S1	42	#5	3	5'-10"	256
* A134	2	#5	STR	12'-8"	26	A227	2	#5	STR	16'-10"	35	* S2	42	#4	6	6'-11"	194
* A135	2	#5	STR	12'-1"	25	A228	2	#5	STR	16'-3"	34	* S3	108	#4	4	2'-9"	198
* A136	2	#5	STR	11'-6"	24	A229	2	#5	STR	15'-8"	33						
* A137	2	#5	STR	10'-10"	23	A230	2	#5	STR	15'-1"	31	U1	15	#4	2	17'-0"	170
* A138	2	#5	STR	10'-3"	21	A231	2	#5	STR	14'-6"	30	U2	6	#4	5	10'-11"	44
* A139	2	#5	STR	9'-8"	20	A232	2	#5	STR	13'-10"	29						
* A140	2	#5	STR	9'-1"	19	A233	2	#5	STR	13'-3"	28						
* A141	2	#5	STR	8'-10"	18	A234	2	#5	STR	12'-8"	26						
														REINFORCING STEEL =	20,763	LBS	
														* EPOXY COATED REINF. STEEL =	20,961	LBS	

### BAR TYPES

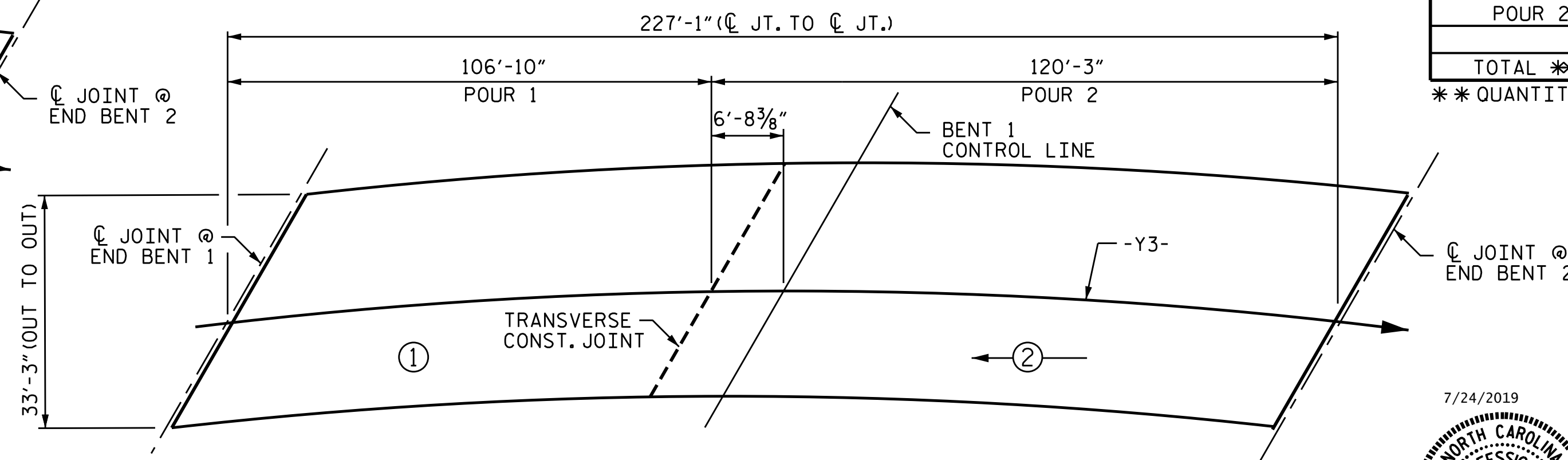


ALL BAR DIMENSIONS ARE OUT TO OUT



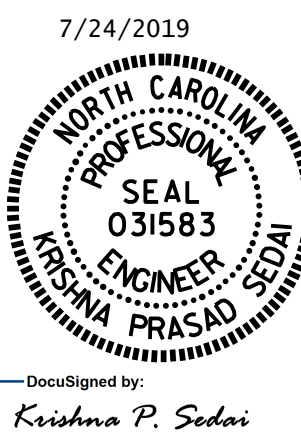
### OPTIONAL POURING SEQUENCE

POUR 2 CANNOT BE STARTED UNTIL BOTH ADJACENT 1 POURS REACH A MINIMUM OF 3000 PSI.



### POURING SEQUENCE AND LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB

(SQ. FT. = 7,547)



DocuSigned by: Krishna P. Sedai

EAGF7941508F487...

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NO. 1, 2; BY: ; DATE: ; NO. 3, 4; BY: ; DATE: ; TOTAL SHEETS 28

SUPERSTRUCTURE BILL OF MATERIAL			
	CLASS AA CONCRETE	REINFORCING STEEL	* EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
SPANS A & B		20,763	20,961
POUR 1	125.5		
POUR 2	158.7		
TOTAL **	284.2	20,763	20,961

\*\* QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 24+31.67 -Y3-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

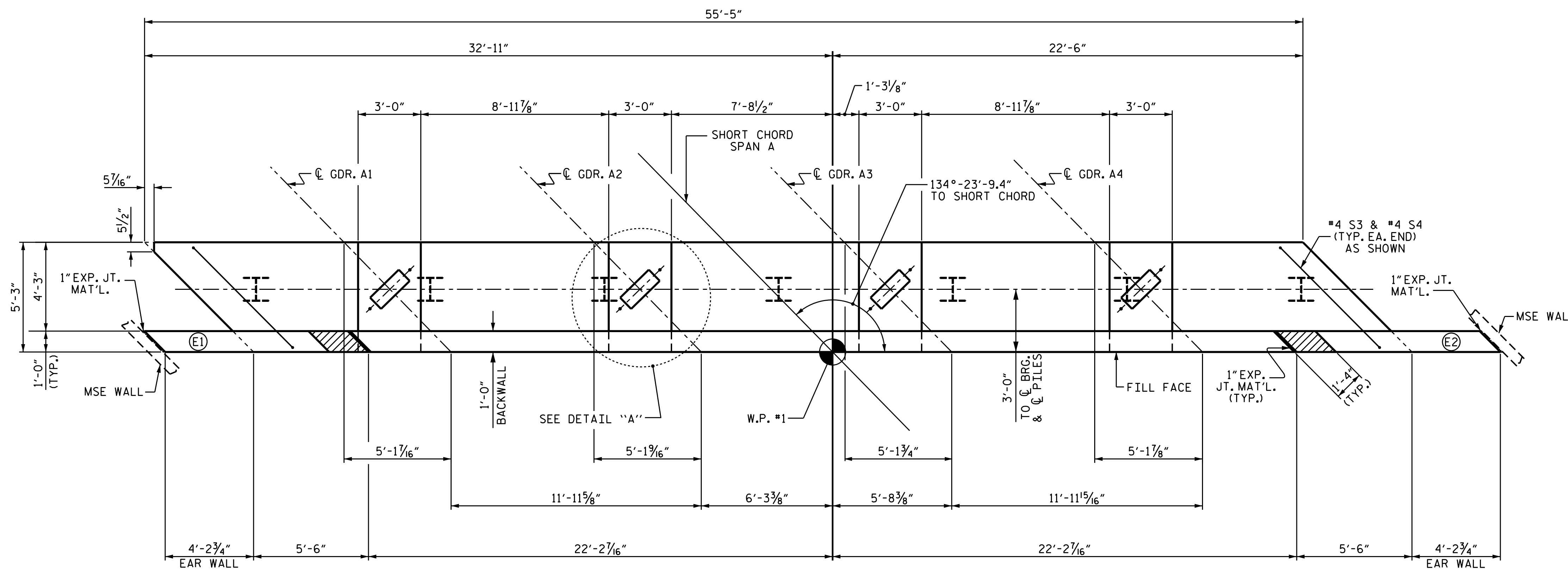
SUPERSTRUCTURE BILL OF MATERIAL			
REVISIONS			
NO.	BY:	DATE:	DESCRIPTION:
1			
2			

SHEET NO. S6-17  
TOTAL SHEETS 28

DRAWN BY: M. G. SHAIKH DATE: 04/2019  
CHECKED BY: H. LOCKLEAR DATE: 04/2019  
DESIGN ENGINEER OF RECORD: E. BAYISSA DATE: 03/2019

GROOVING BRIDGE FLOORS		
APPROACH SLABS	783	SO.FT.
BRIDGE DECK	6,116	SO.FT.
TOTAL	6,899	SO.FT.





PLAN

**NOTES**

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

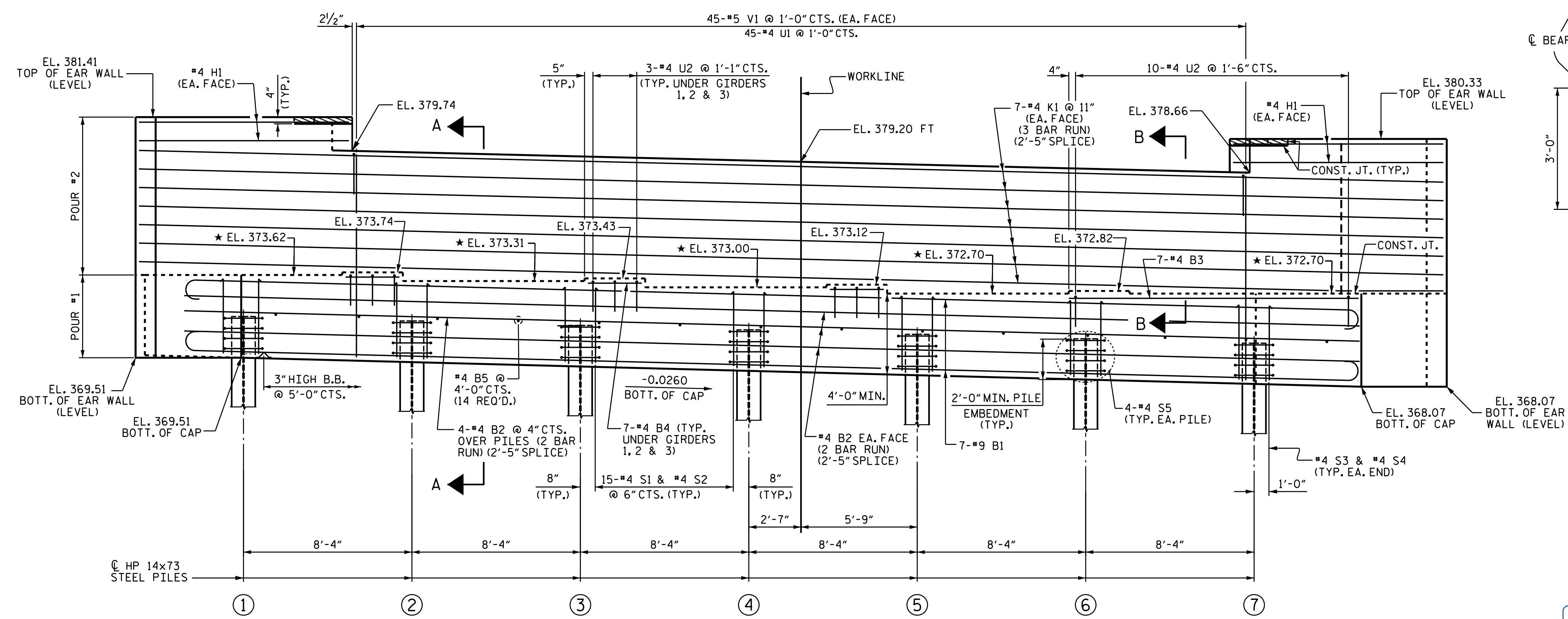
THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

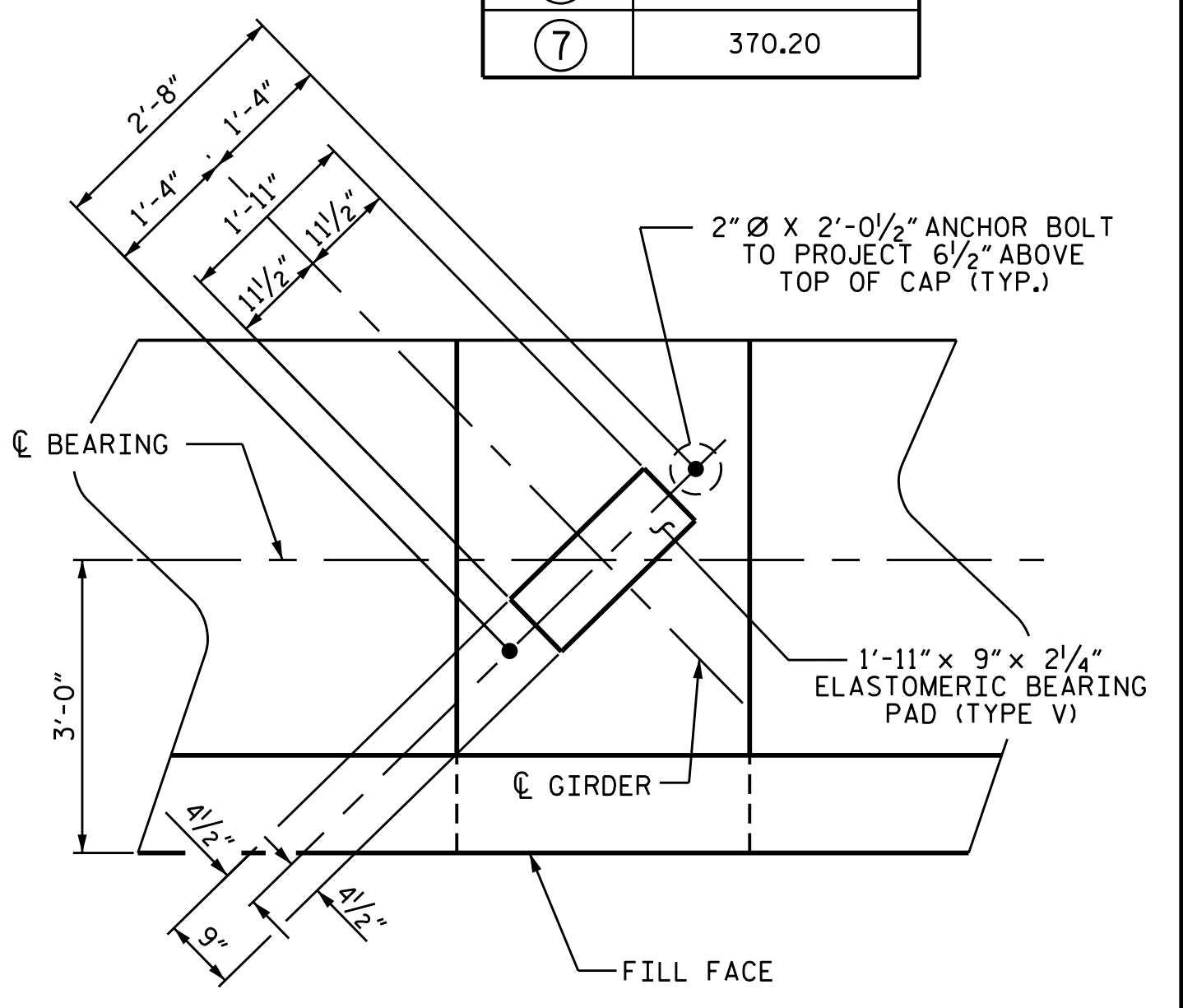
FOR LOCATION OF ELEVATIONS BETWEEN BUILDUPS, SEE SECTIONS ON SHEET 3 OF 3.

FOR MSE RETAINING WALL, SEE SPECIAL PROVISIONS.

TOP OF PILE ELEVATIONS	
①	371.52
②	371.28
③	371.06
④	370.85
⑤	370.63
⑥	370.41
⑦	370.20



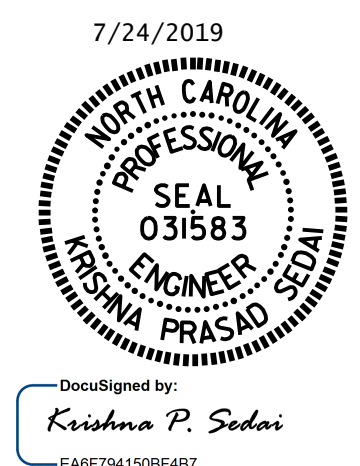
ELEVATION



DETAIL "A"  
(TYP. EACH GDR.)

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 1 OF 3

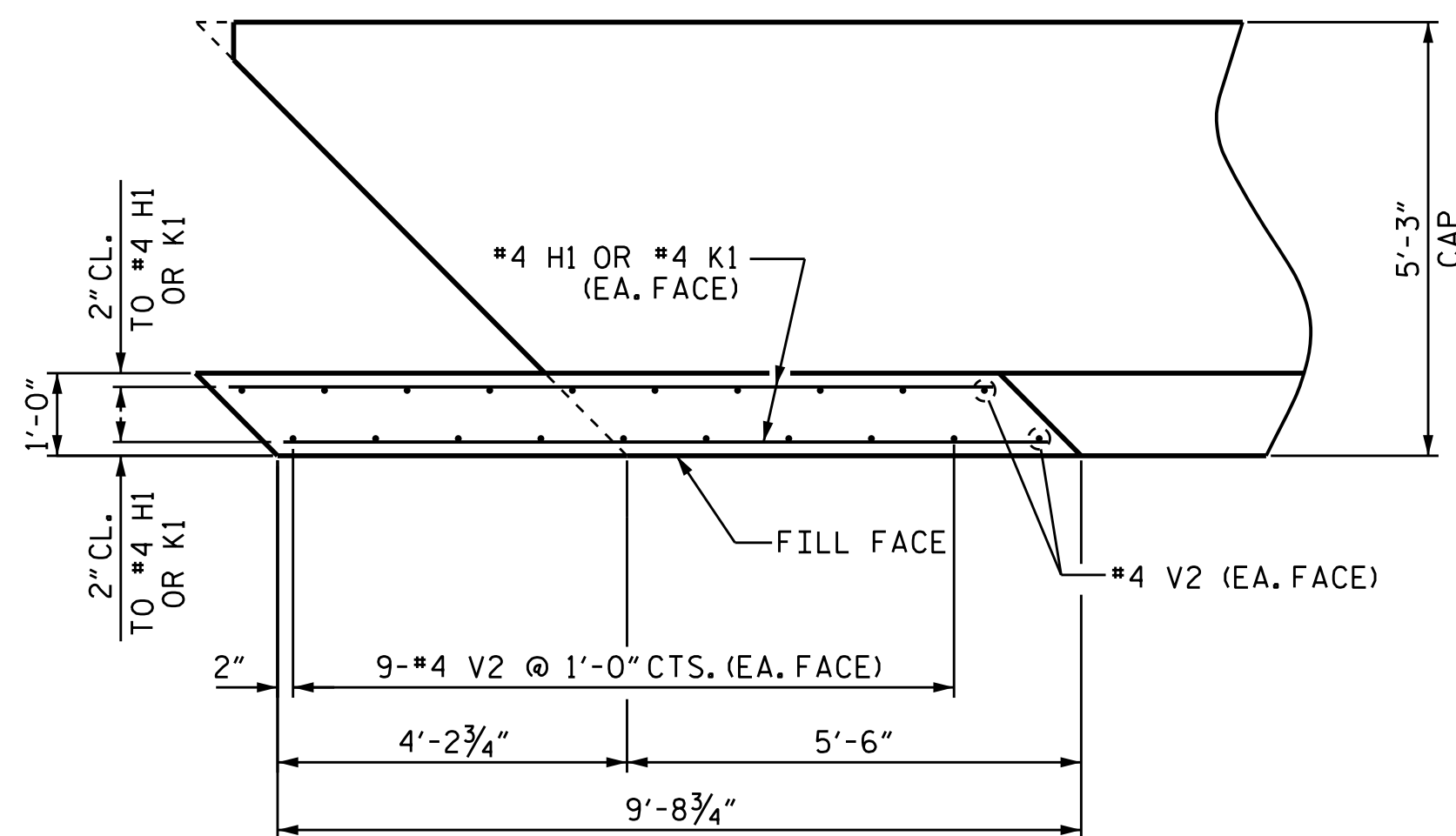


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1

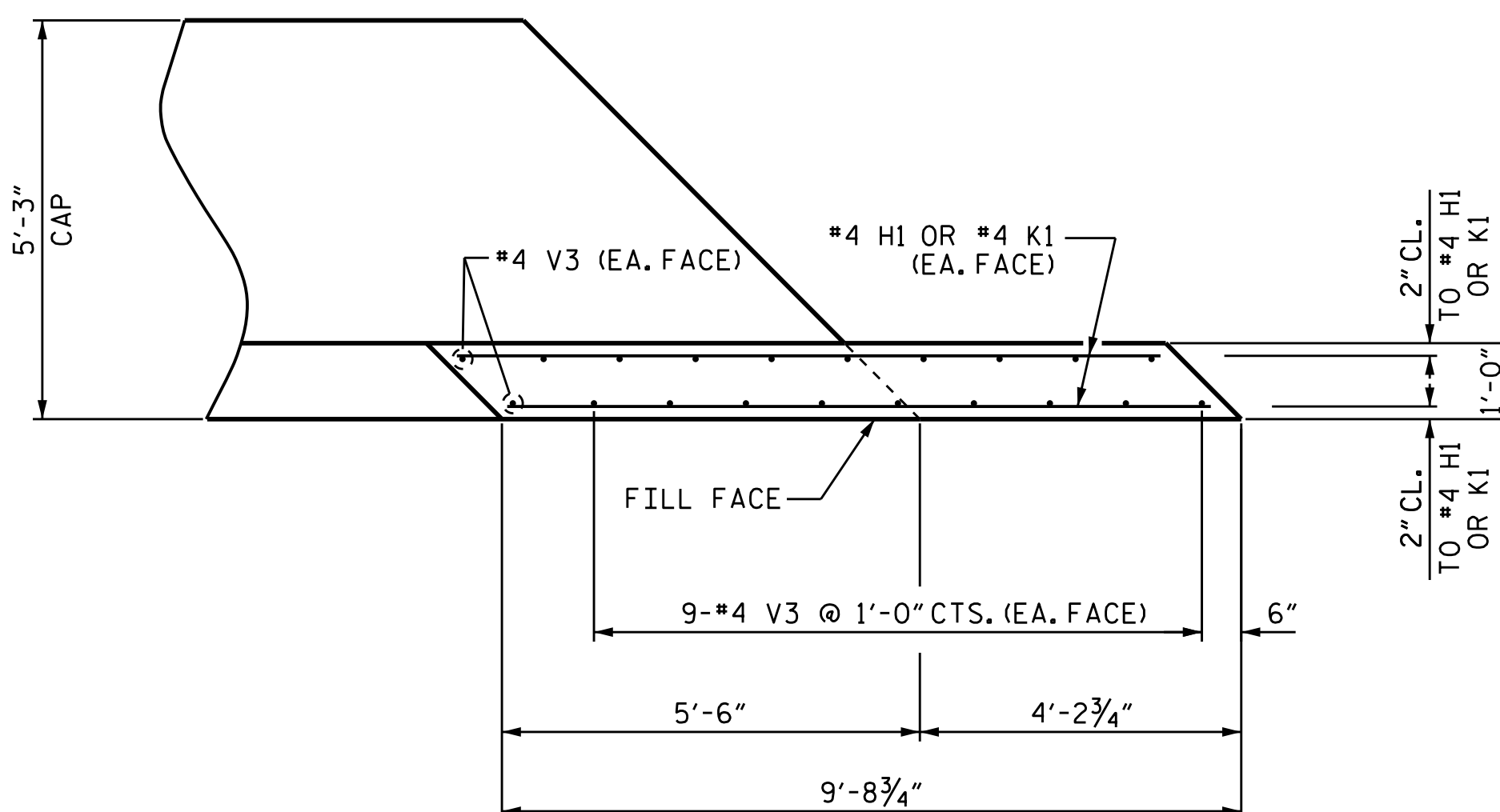
DRAWN BY: A. SORSENGINH/T. H. FANG DATE: 3/2019  
 CHECKED BY: J. TILLMAN DATE: 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

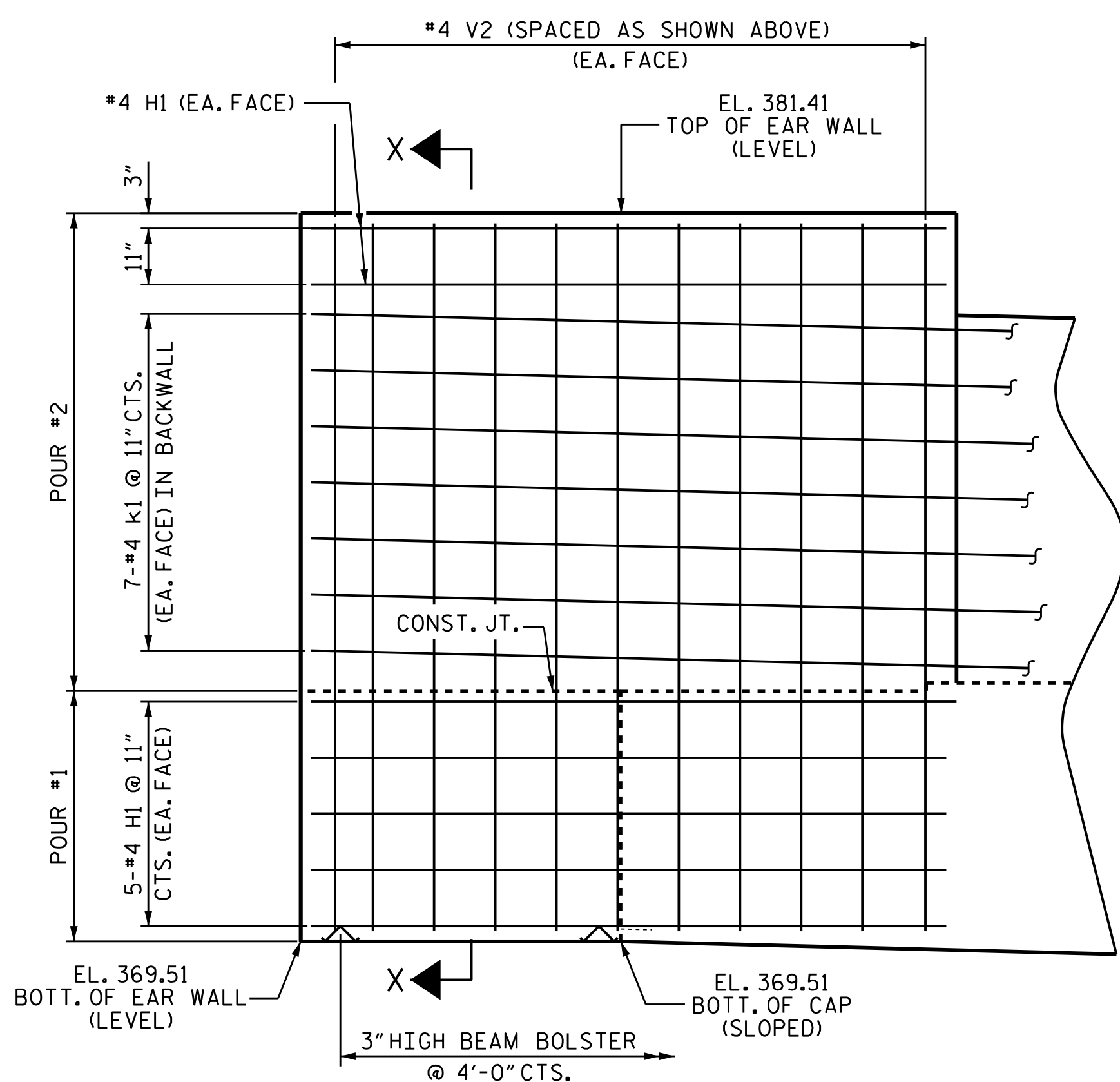
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-18	
1			3			TOTAL SHEETS 28	
2			4				



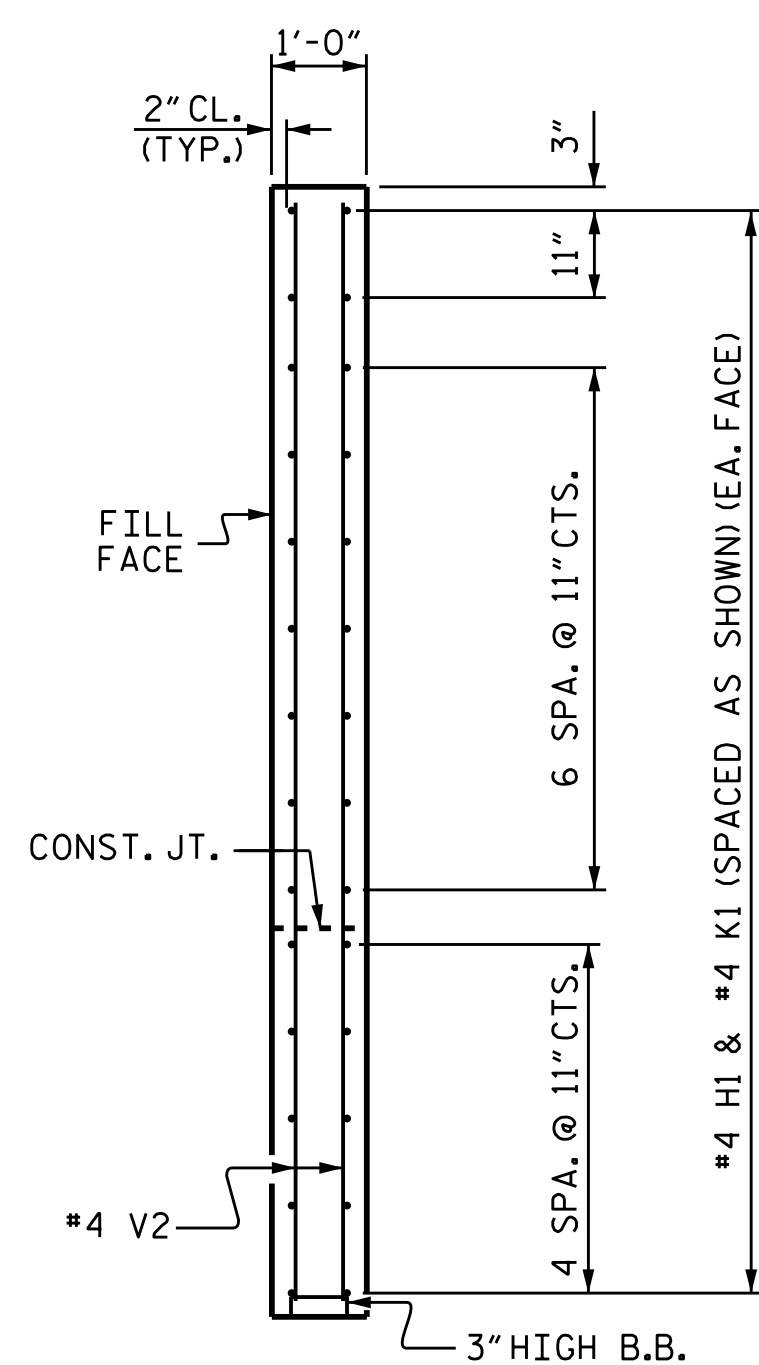
PLAN OF EAR WALL (E1)



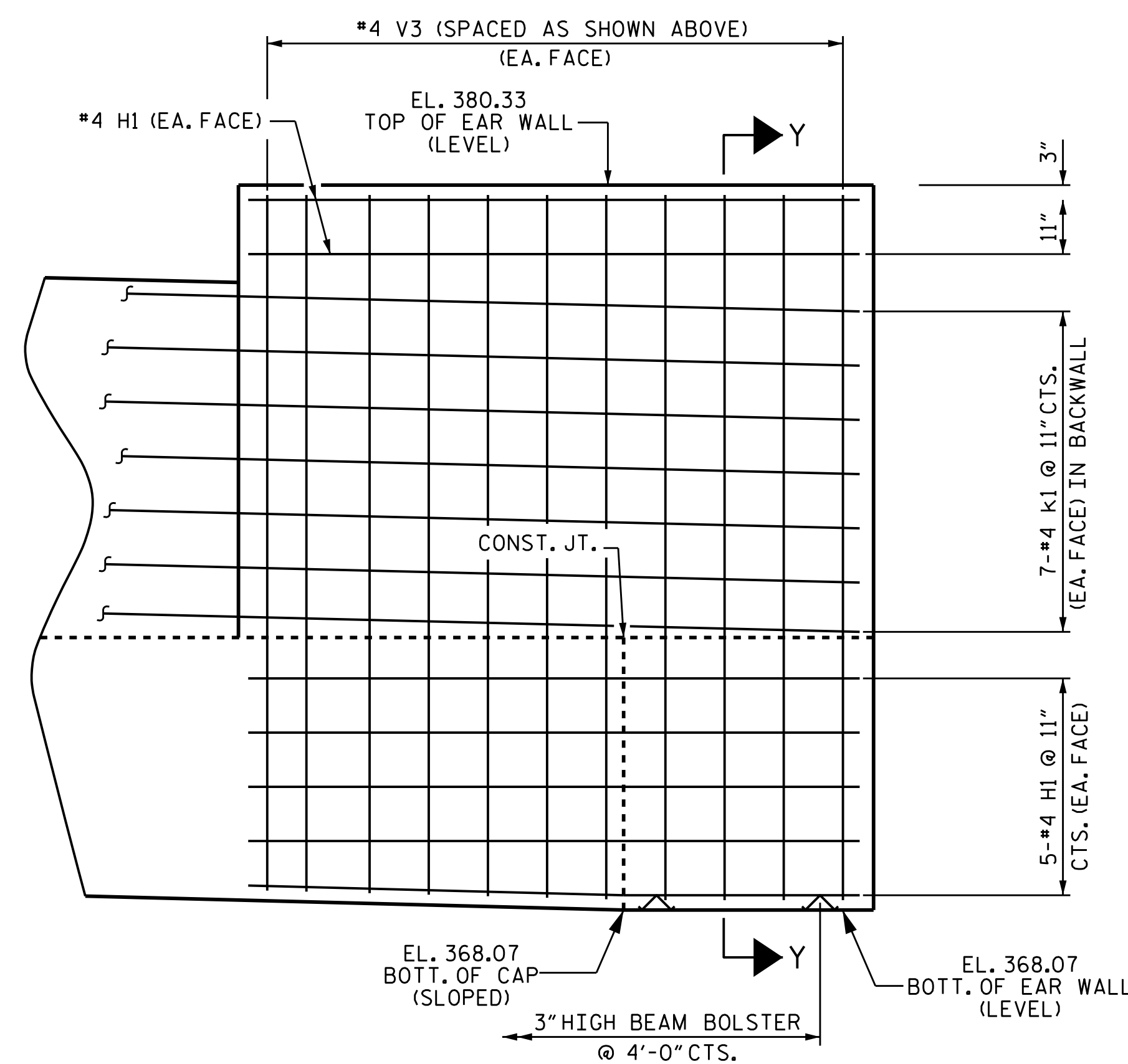
PLAN OF EAR WALL (E2)



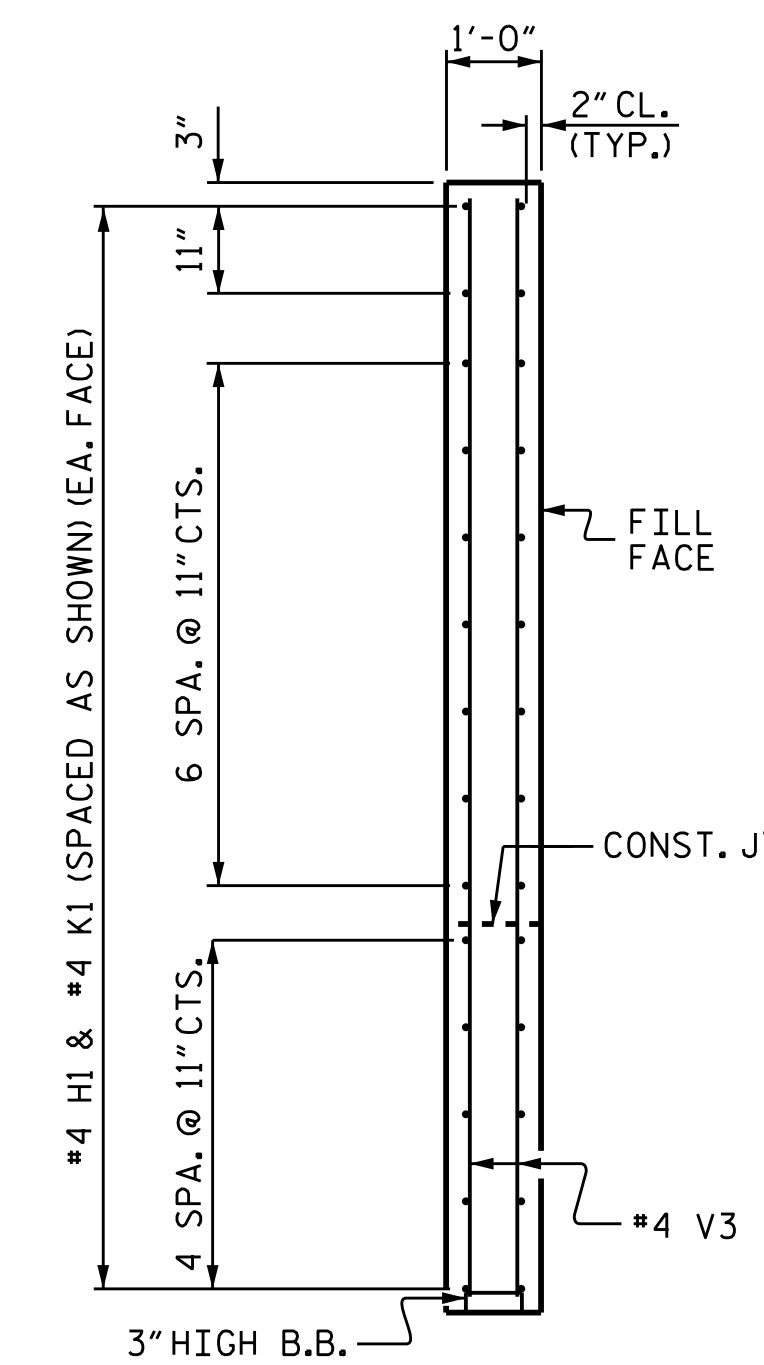
ELEVATION OF EAR WALL (E1)



SECTION X-X



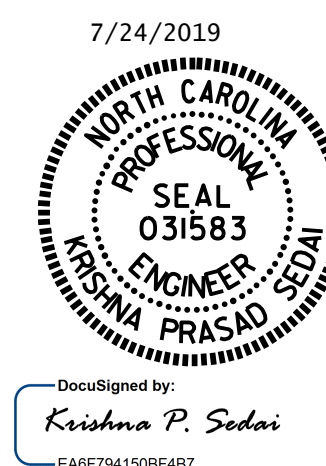
ELEVATION OF EAR WALL (E2)



SECTION Y-Y

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 3



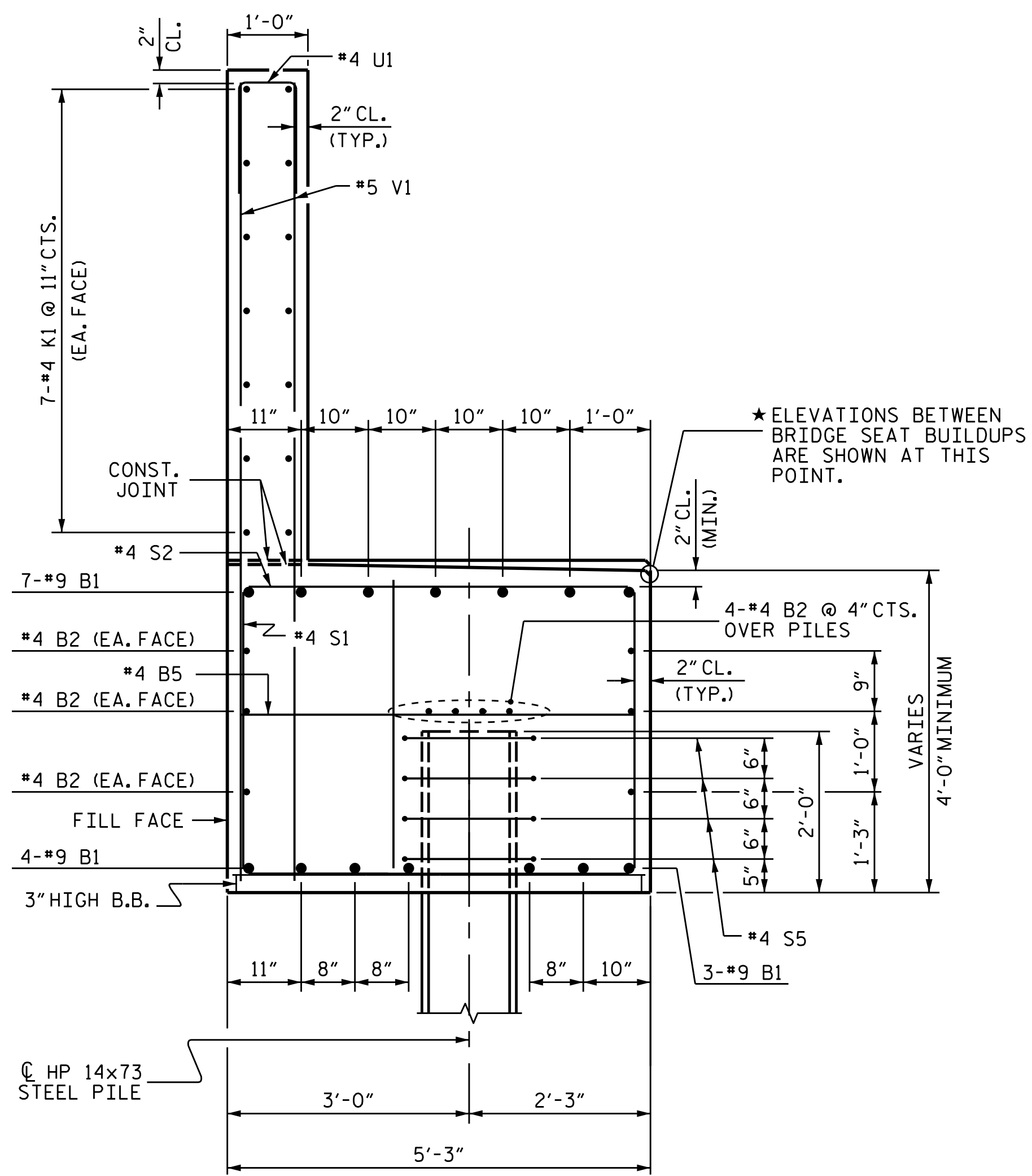
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1

DRAWN BY : A. SORSENGINH/T. H. FANG DATE : 3/2019  
 CHECKED BY : J. TILLMAN DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 4/2019

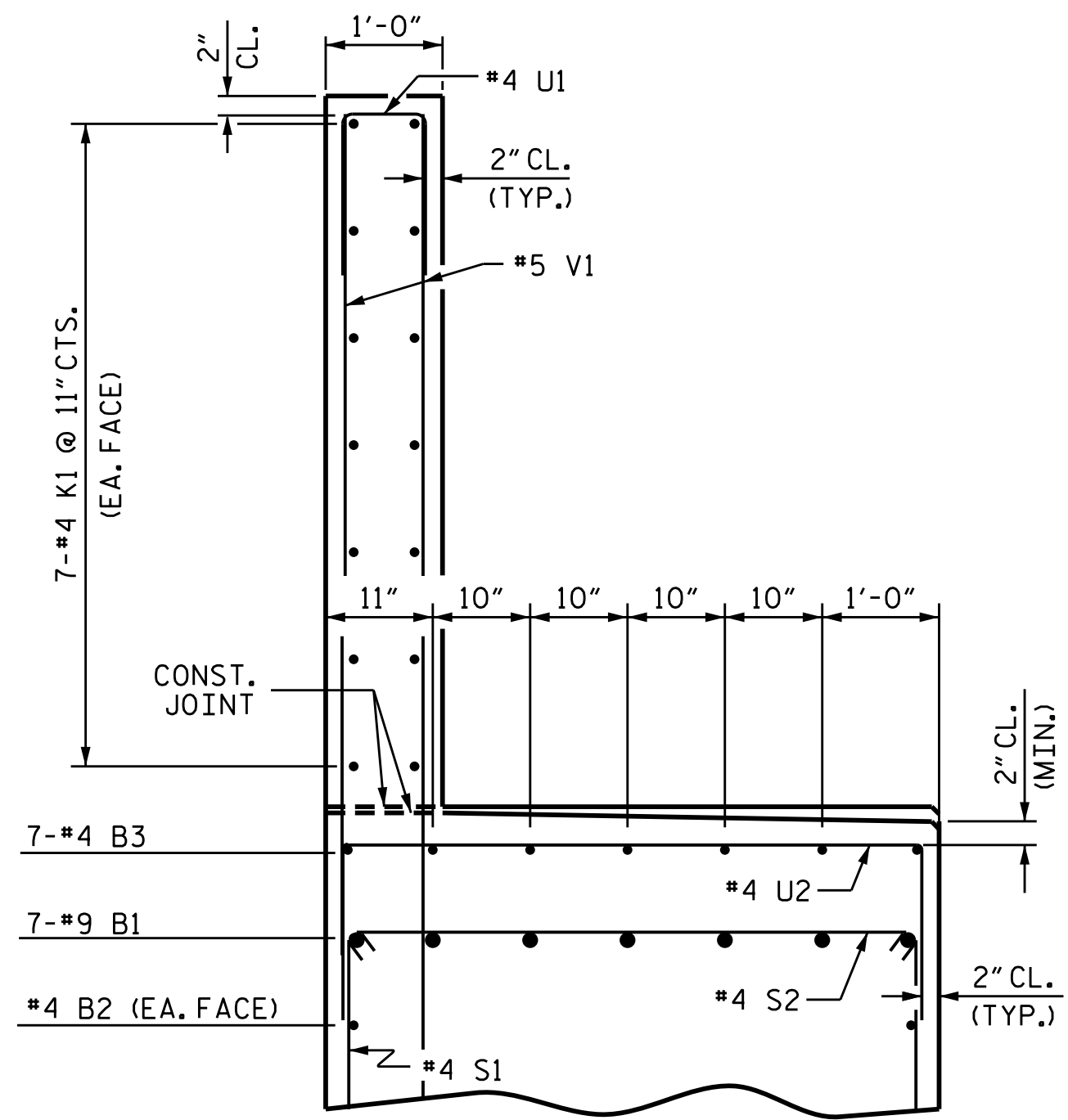
DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-19	
1			3			TOTAL SHEETS	
2			4			28	

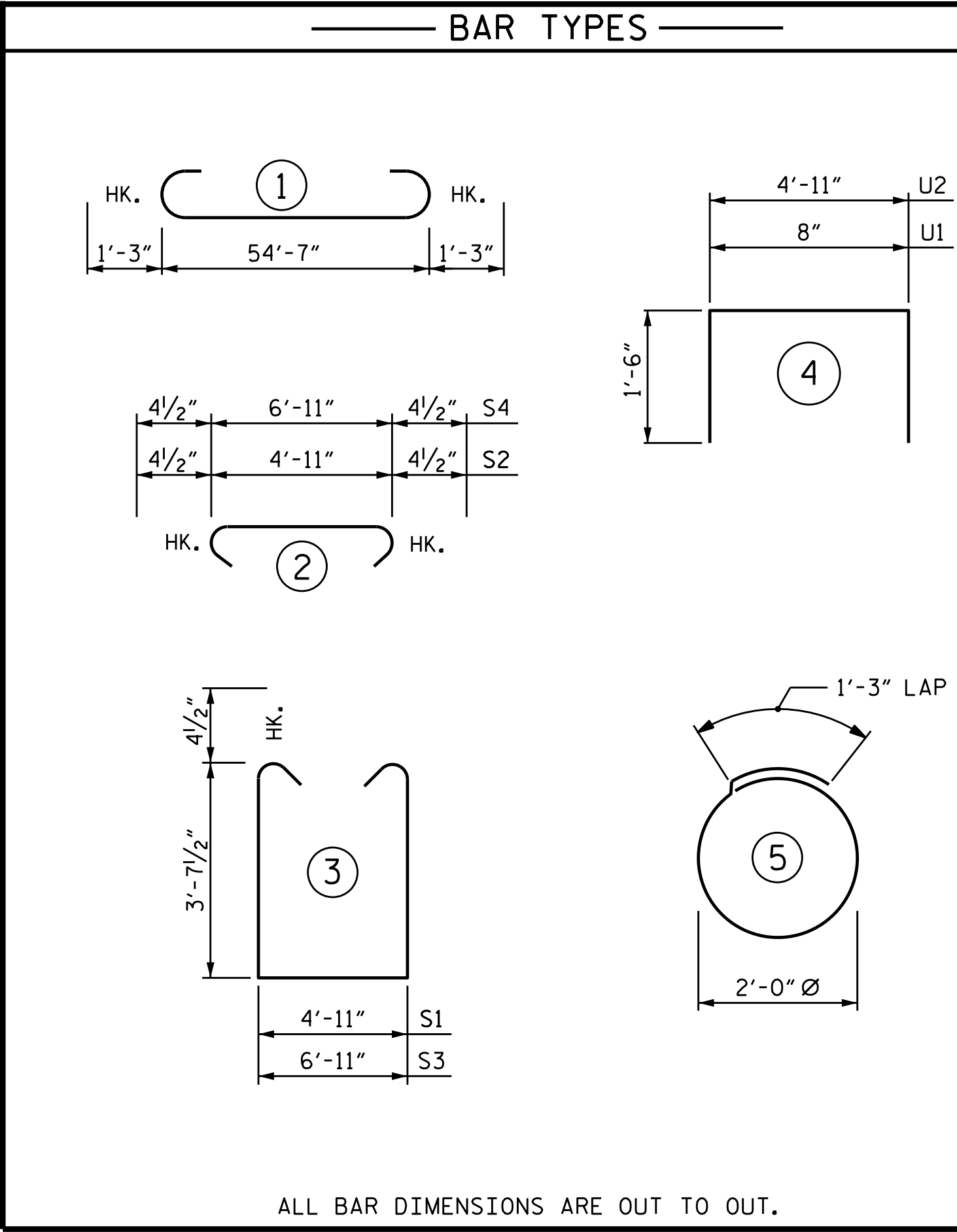




**SECTION A-A**

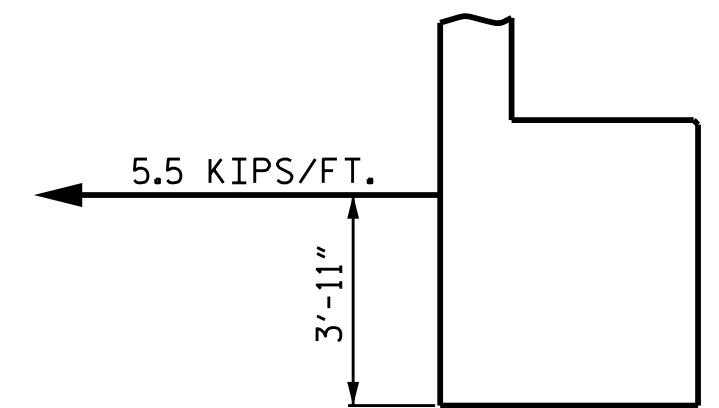


**PARTIAL SECTION B-B**



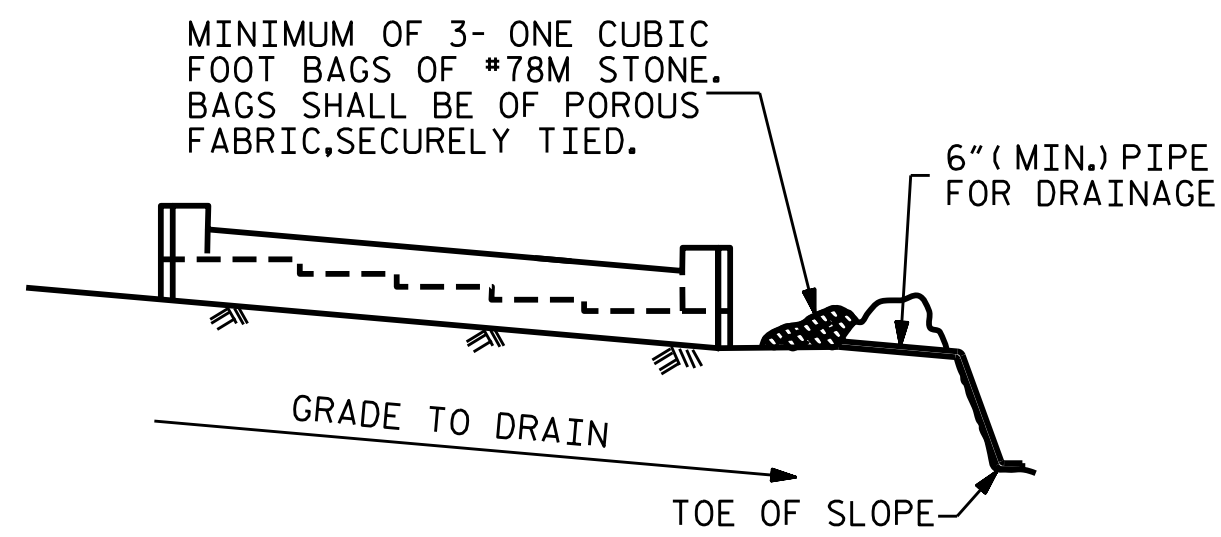
ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
END BENT 1					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#9	1	57'-1"	2717
B2	20	#4	STR	28'-9"	384
B3	7	#4	STR	14'-4"	67
B4	21	#4	STR	2'-8"	37
B5	14	#4	STR	4'-11"	46
H1	28	#4	STR	9'-3"	173
K1	42	#4	STR	22'-9"	638
S1	90	#4	3	12'-11"	777
S2	90	#4	2	5'-8"	341
S3	2	#4	3	14'-11"	20
S4	2	#4	2	7'-8"	10
S5	28	#4	5	7'-7"	142
U1	45	#4	4	3'-8"	110
U2	19	#4	4	7'-11"	100
V1	90	#5	STR	10'-0"	939
V2	20	#4	STR	11'-6"	154
V3	20	#4	STR	11'-11"	159
REINFORCING STEEL					6,814 LBS.
CLASS A CONCRETE					
POUR 1: CAP, LOWER EAR WALLS					49.6 C.Y.
POUR 2: BACKWALL & UPPER EAR WALLS					15.7 C.Y.
TOTAL					65.3 C.Y.
HP 14 x 73 STEEL PILES					
No. 7					560 LIN. FT.



**GALVANIZED REINFORCING STRAP LOAD DETAIL**

GALVANIZED REINFORCING STRAPS SHALL BE ATTACHED TO THE END BENT FOR DESIGN CRITERIA AND DETAILS, SEE "MECHANICALLY STABILIZED EARTH RETAINING WALL" SPECIAL PROVISIONS.



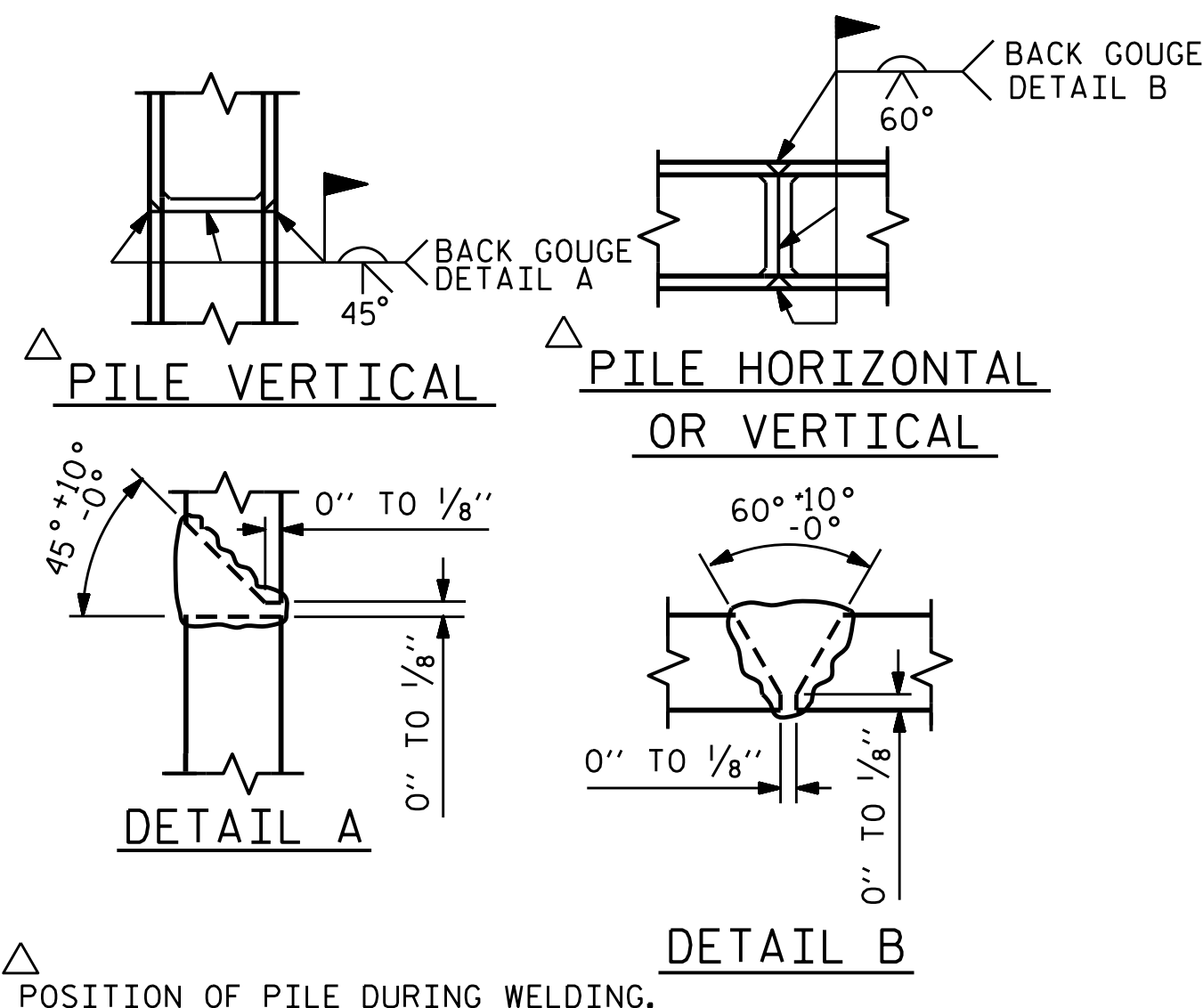
MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.

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 DETEIORATED AND LOST THEIR EFFECTIVENESS.

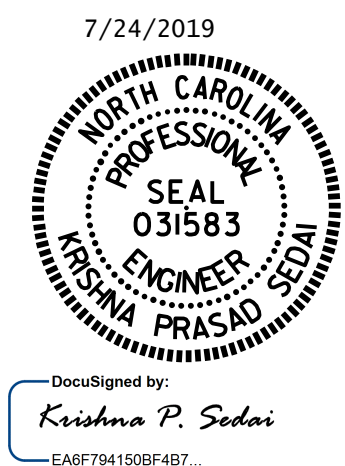
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

**TEMPORARY DRAINAGE AT END BENT**



**PILE SPLICE DETAILS**

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-  
 SHEET 3 OF 3

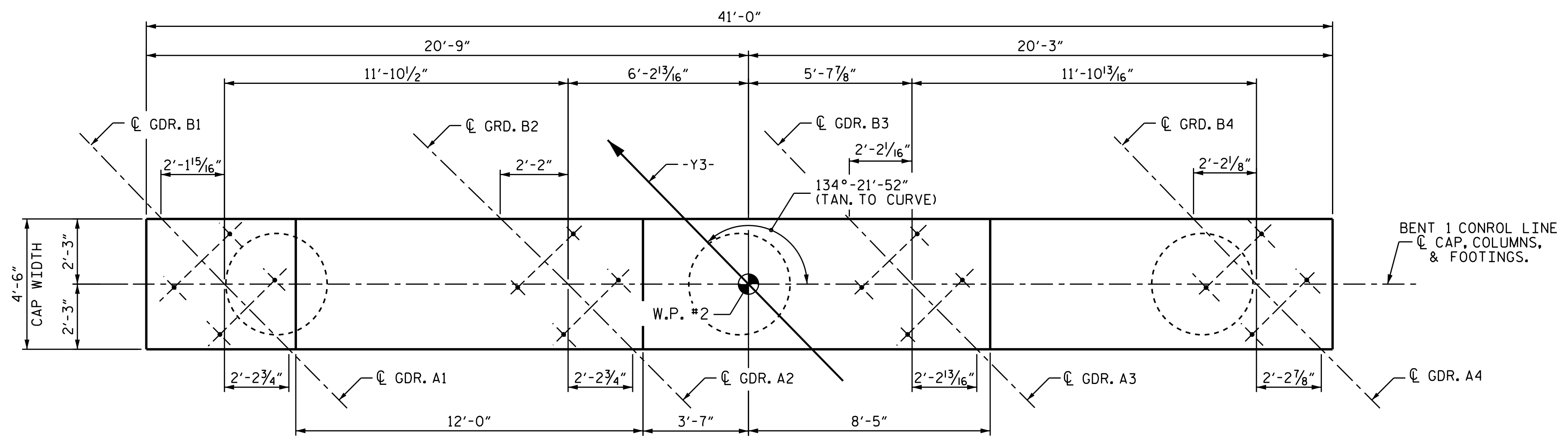


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-20
1			3			TOTAL SHEETS
2			4			28

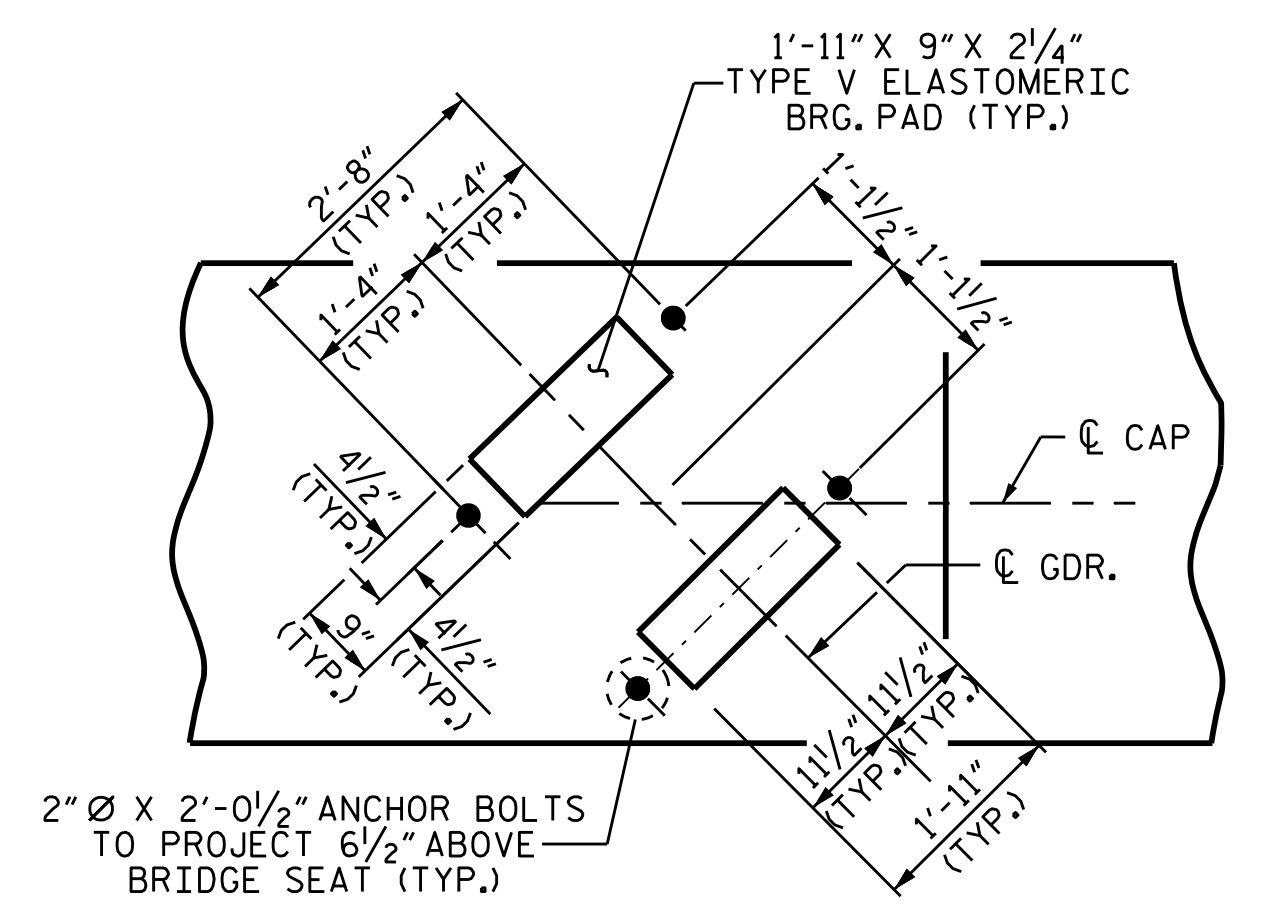
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DRAWN BY : A. SORSENGINH/T. H. FANG DATE : 3/2019  
 CHECKED BY : J. TILLMAN DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 4/2019

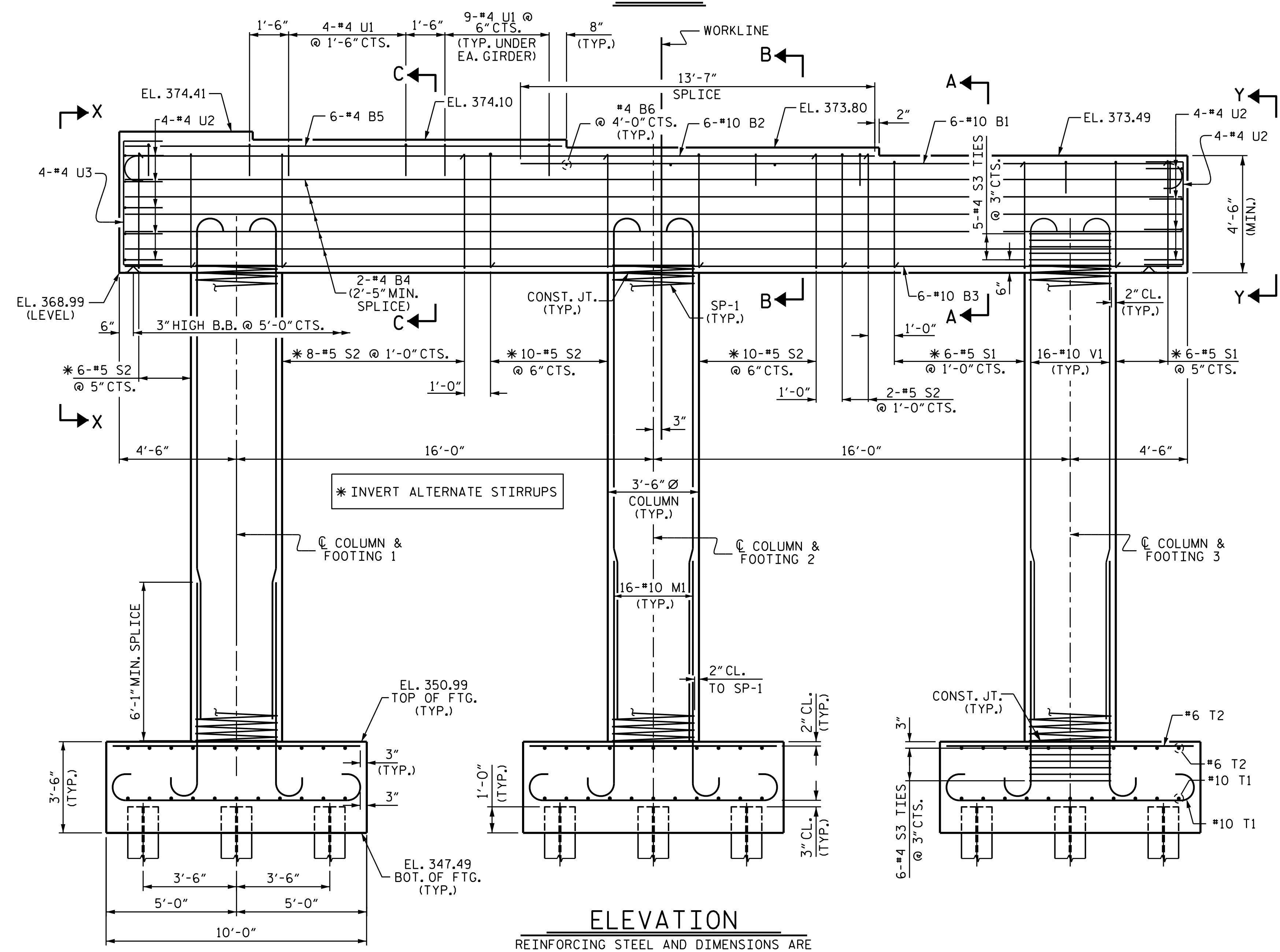


**PLAN**

**NOTES:**  
 STIRRUPS AND U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 THE CONTRACTOR SHALL ALIGN THE "V" & "M" BARS AS SHOWN IN THE PLAN OF COLUMNS. HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.  
 FOR PILE SPLICE DETAILS, SEE SHEET 2 OF 2.

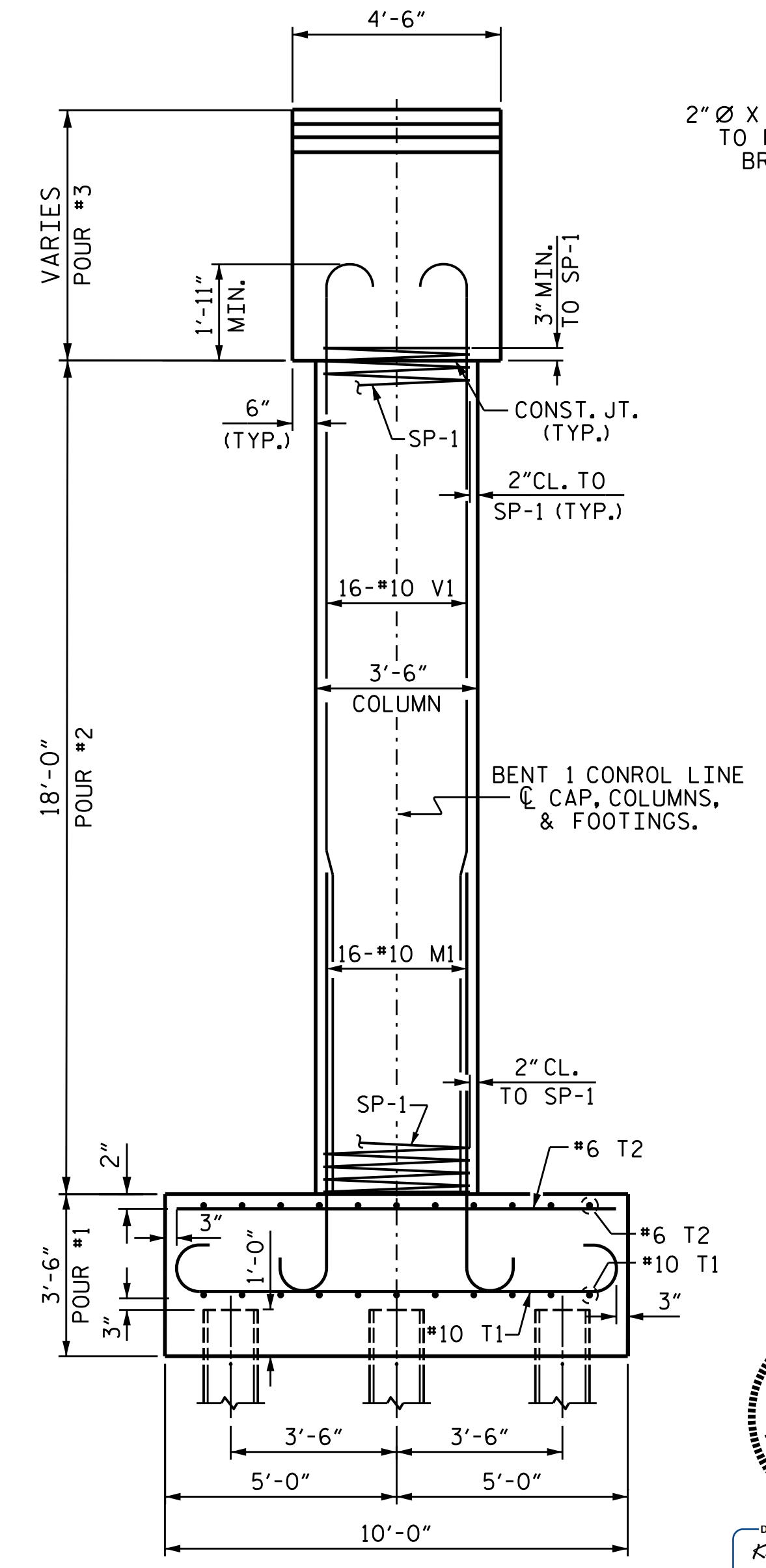


**DETAIL A**  
(TYP. EA. GIRDER.)

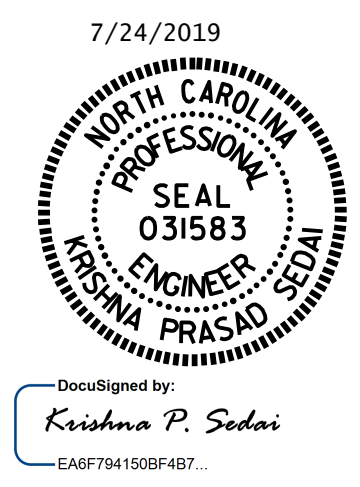


**ELEVATION**

REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH COLUMN AND FOOTING



**END ELEVATION**



PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

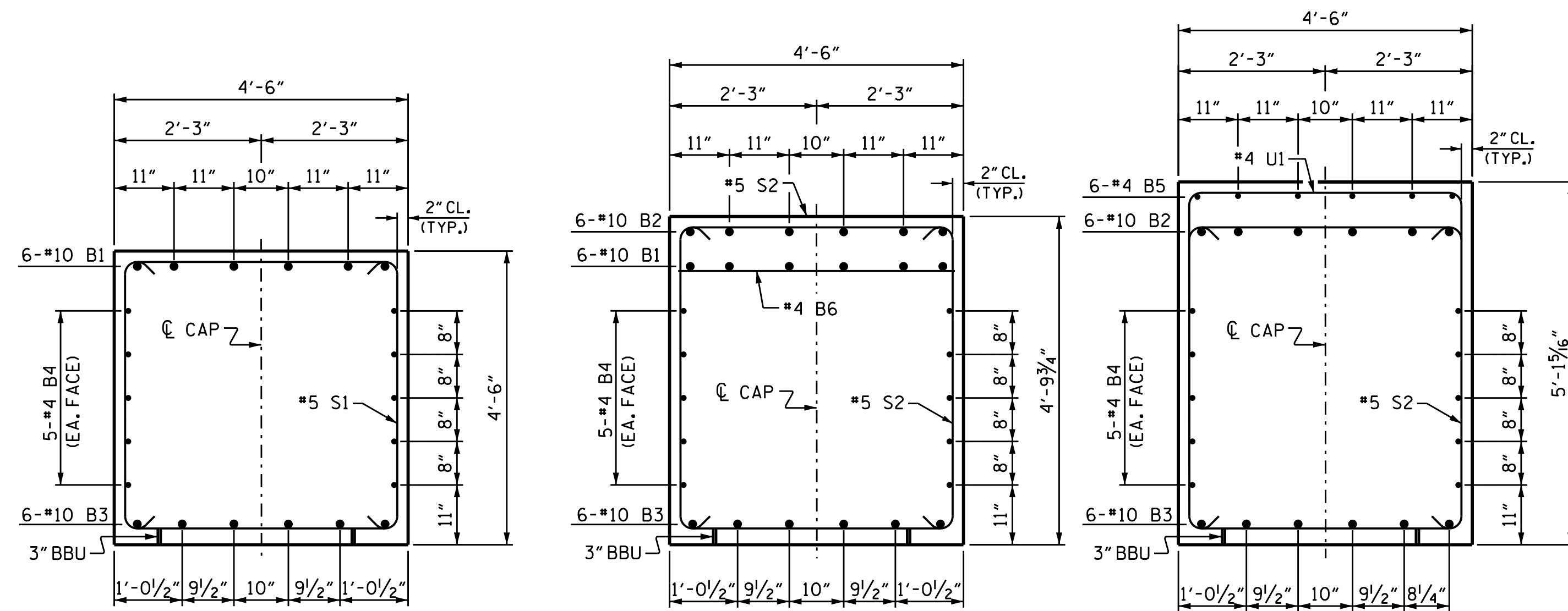
SHEET 1 OF 2  
 DEPARTMENT OF NORTH CAROLINA TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
**BENT 1**

DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : J. TILLMAN DATE : 4/2019  
 DESIGN ENGINEER OF RECORD : A. SORSENGINH DATE : 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-21	
1			3			TOTAL SHEETS 28	
2			4				

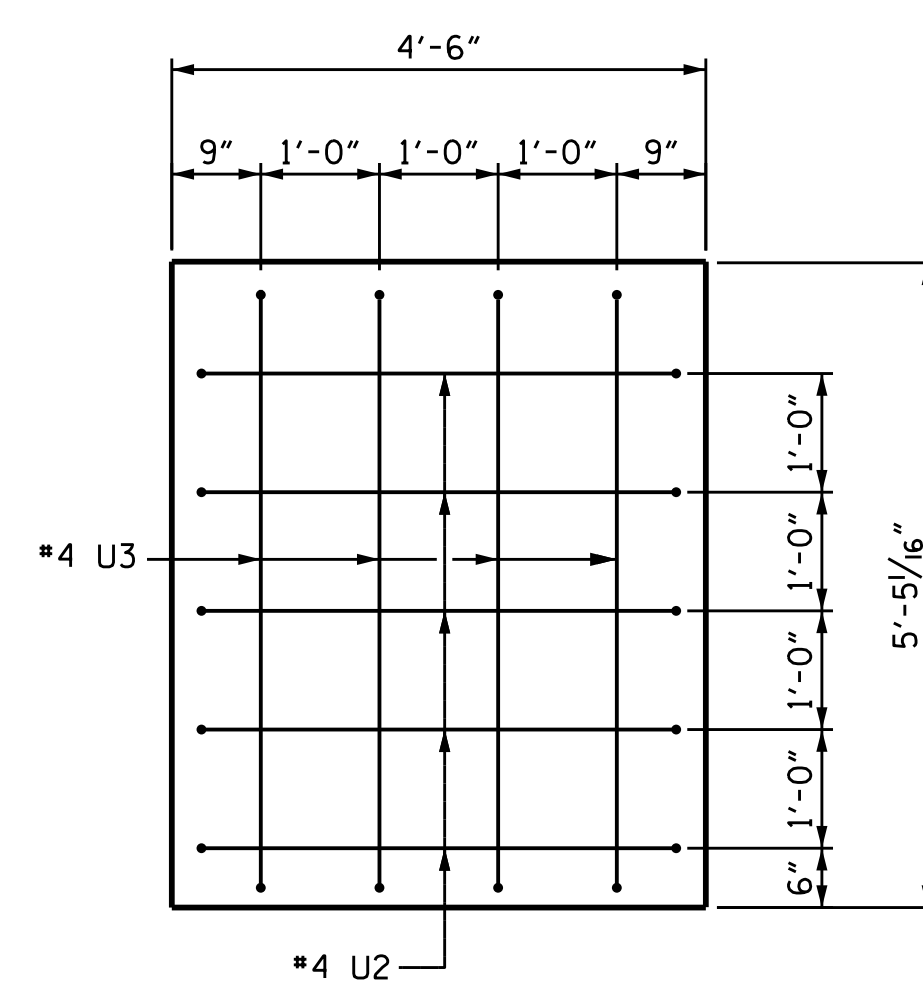




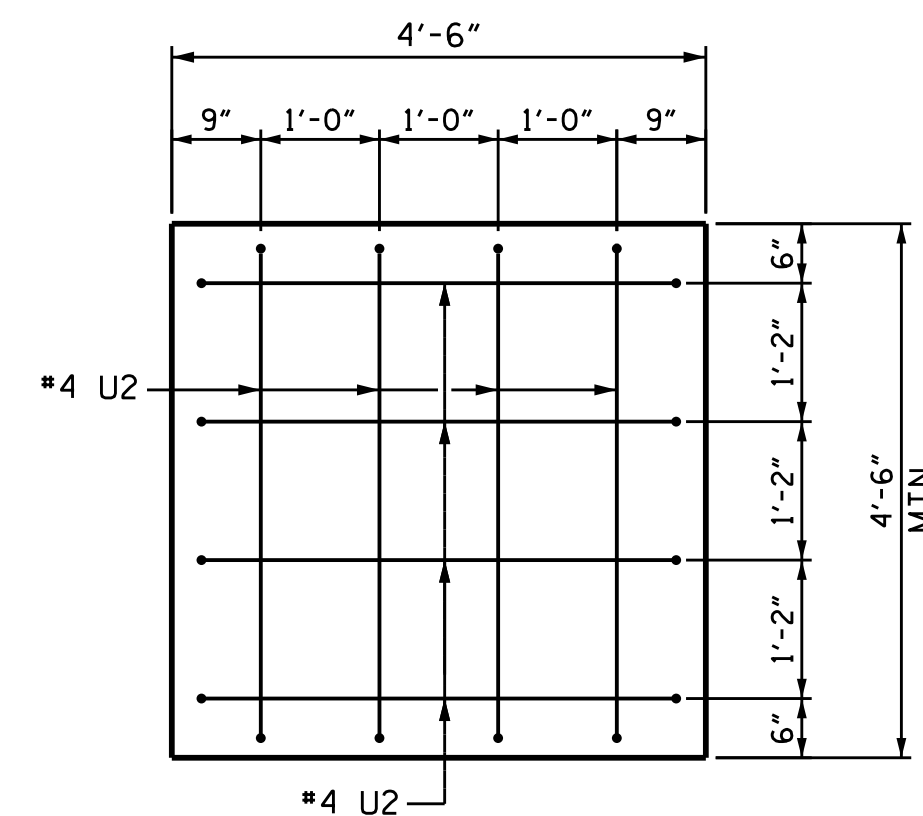
SECTION A-A

SECTION B-B

SECTION C-C

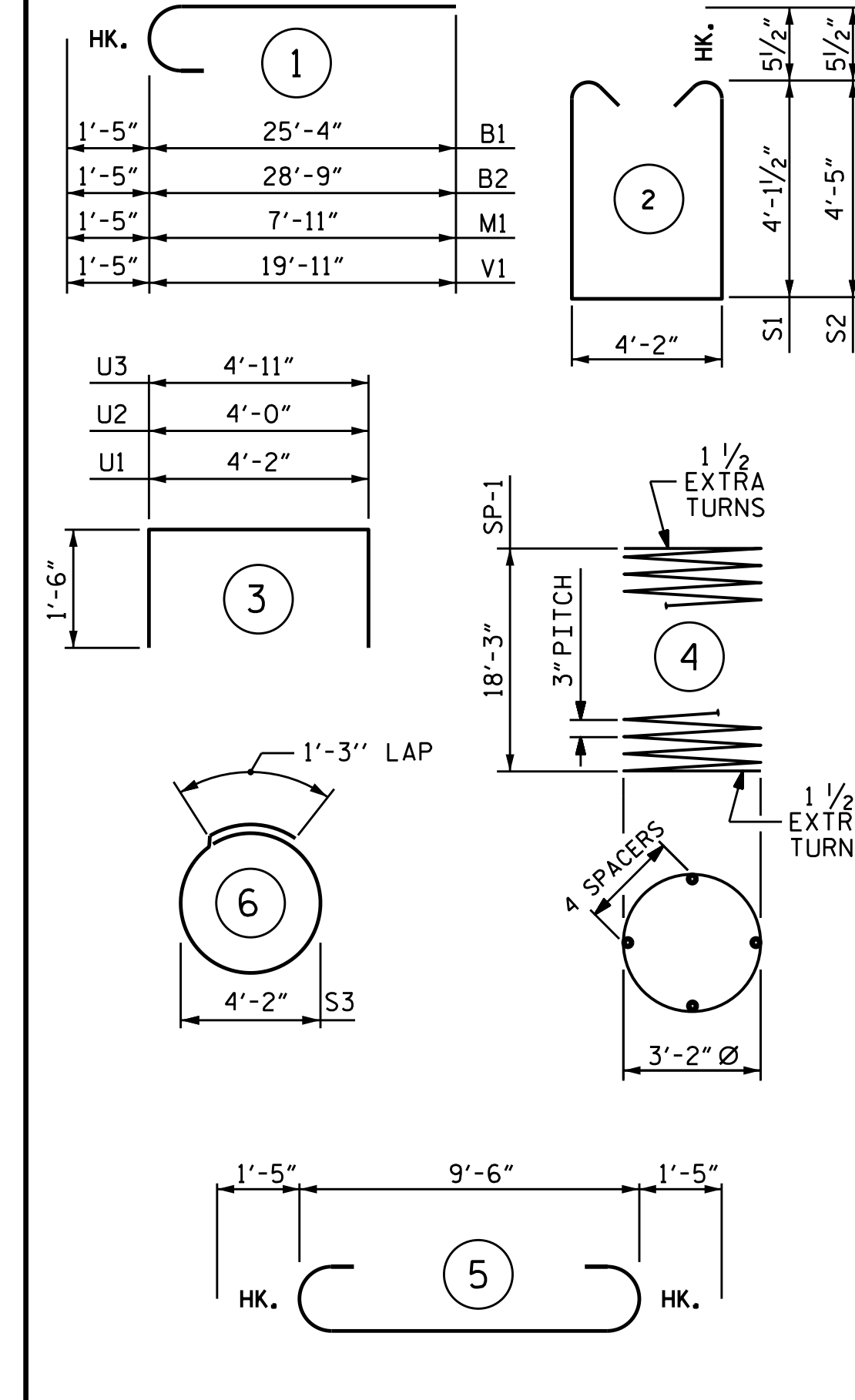


VIEW X-X

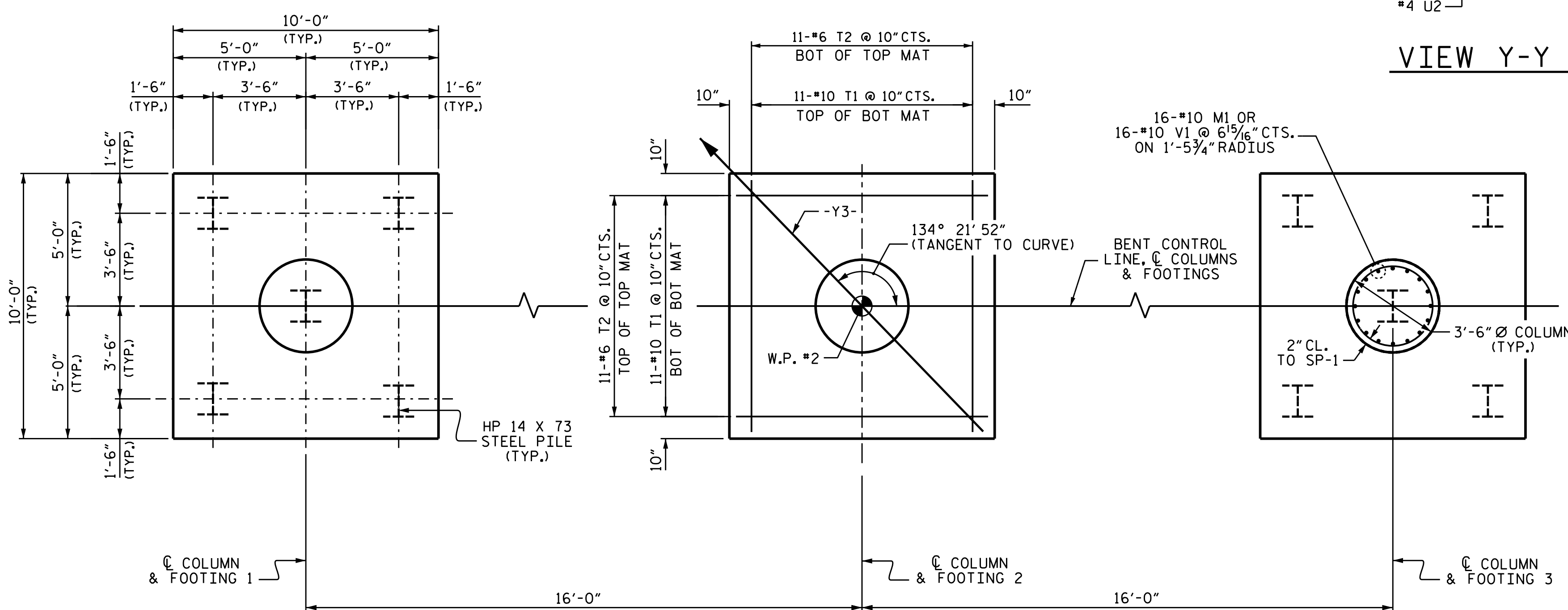


VIEW Y-Y

BILL OF MATERIAL					
BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	26'-9"	691
B2	6	#10	1	30'-2"	779
B3	6	#10	STR	40'-8"	1050
B4	20	#4	STR	21'-7"	288
B5	6	#4	STR	16'-10"	67
B6	4	#4	STR	4'-2"	11
M1	48	#10	1	9'-4"	1928
S1	12	#5	2	13'-4"	167
S2	36	#5	2	13'-11"	523
S3	33	#4	6	14'-4"	316
T1	66	#10	5	12'-4"	3503
T2	66	#6	STR	9'-6"	942
U1	40	#4	3	7'-2"	191
U2	13	#4	3	7'-0"	61
U3	4	#4	3	7'-11"	21
V1	48	#10	1	21'-4"	4406
REINFORCING STEEL =				14,944	LBS
SP-1	3	**	5	743'-11"	2328
SPIRAL COLUMN REINFORCING STEEL =				2,328	LBS
*THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W-31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.					
CLASS A CONCRETE (C.Y.)					
POUR #1 (FOOTINGS) =				C.Y.	38.9
POUR #2 (COLUMNS) =				C.Y.	19.2
POUR #3 (CAP) =				C.Y.	33.4
TOTAL CLASS A CONCRETE				C.Y.	91.5
HP 14 X 73 STEEL PILES					
No. 15				LIN. FT.	825

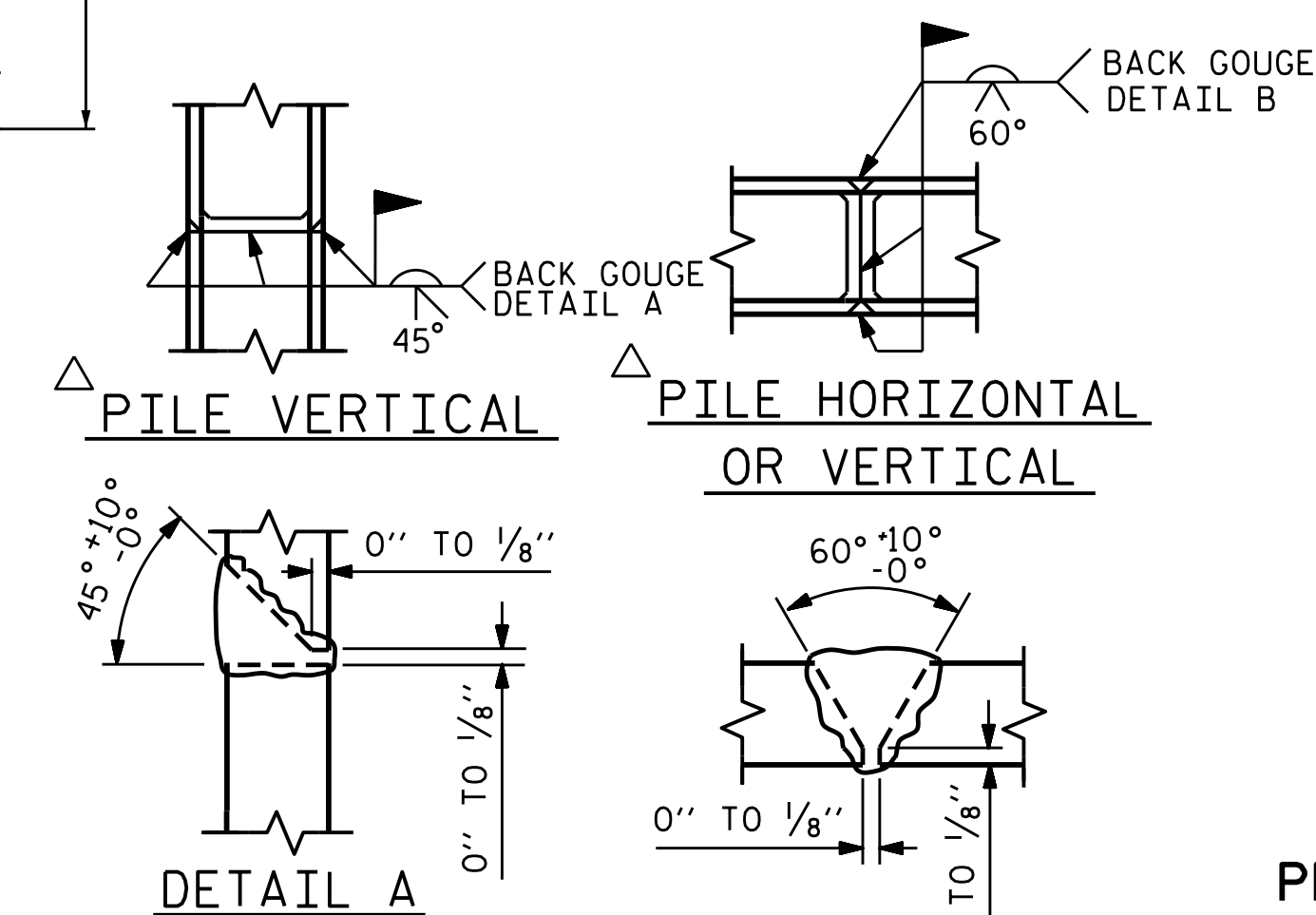


ALL BAR DIMENSIONS ARE OUT TO OUT.



PLAN OF FOOTINGS

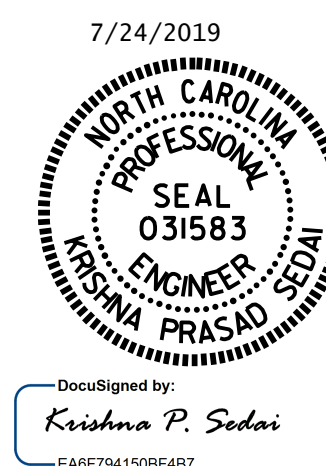
REINFORCING STEEL, PILES AND DIMENSIONS ARE TYPICAL FOR EACH COLUMN AND FOOTING



PILE SPLICE DETAILS

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 2 OF 2

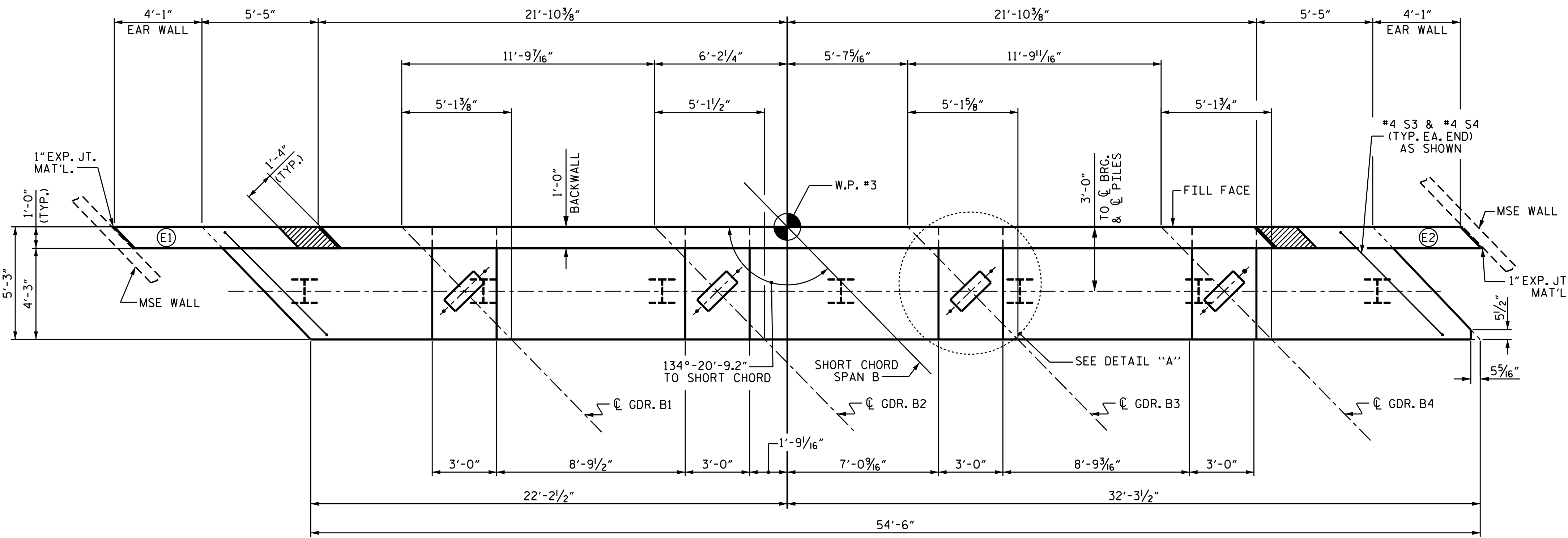


REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DRAWN BY : A. SORSENGINH DATE : 3/2019  
 CHECKED BY : J. TILLMAN DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SHEET NO.	
S6-22	TOTAL SHEETS 28



PLAN

**NOTES**

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

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

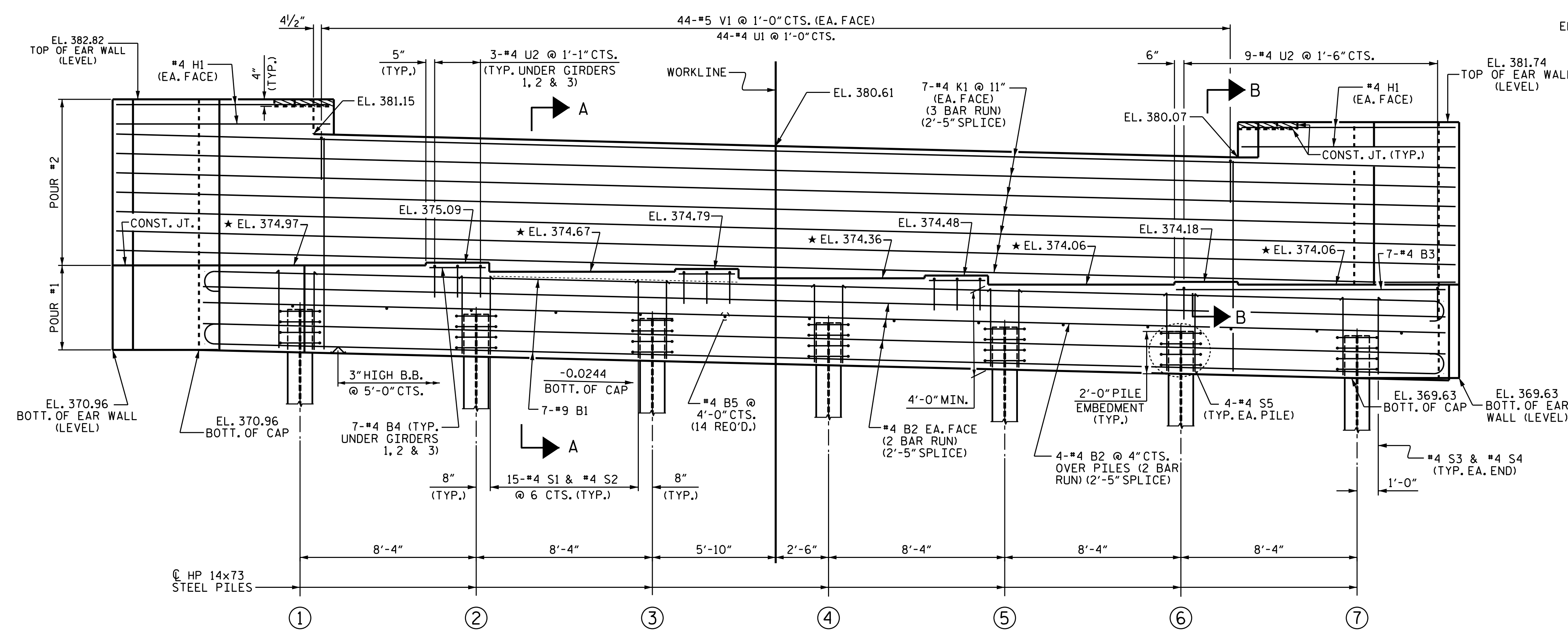
THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

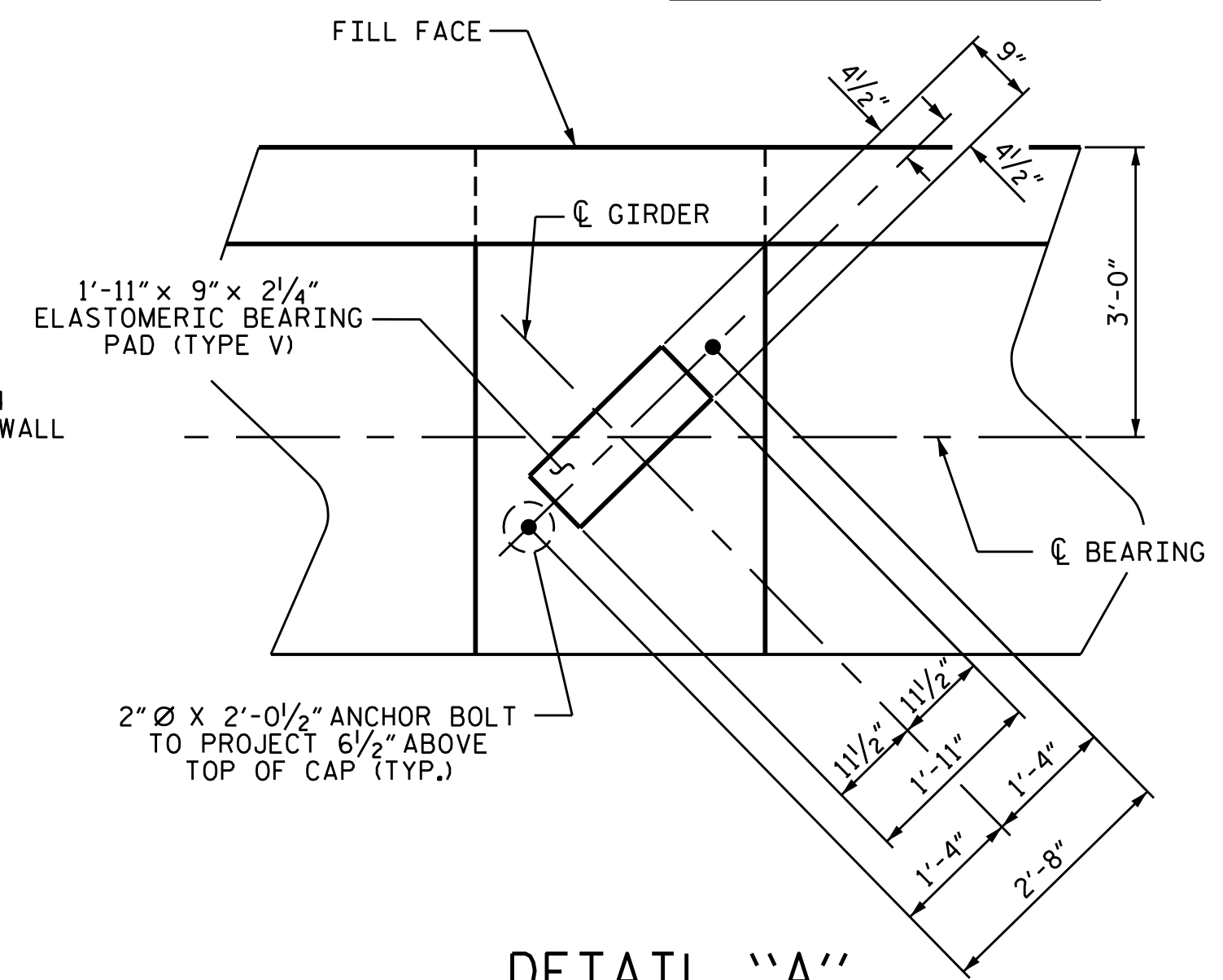
FOR LOCATION OF ELEVATIONS BETWEEN BUILDUPS, SEE SECTIONS ON SHEET 3 OF 3.

FOR MSE RETAINING WALL, SEE SPECIAL PROVISIONS.

TOP OF PILE ELEVATIONS	
①	372.86
②	372.66
③	372.45
④	372.25
⑤	372.05
⑥	371.84
⑦	371.64

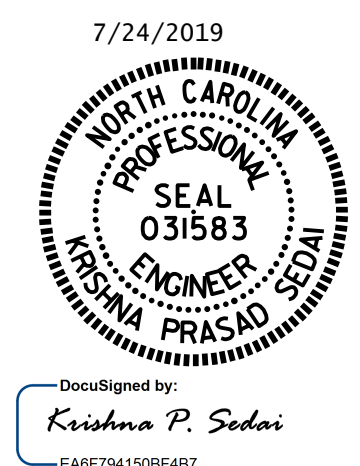


ELEVATION



DETAIL "A"  
(TYP. EACH GDR.)

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-  
 SHEET 1 OF 3



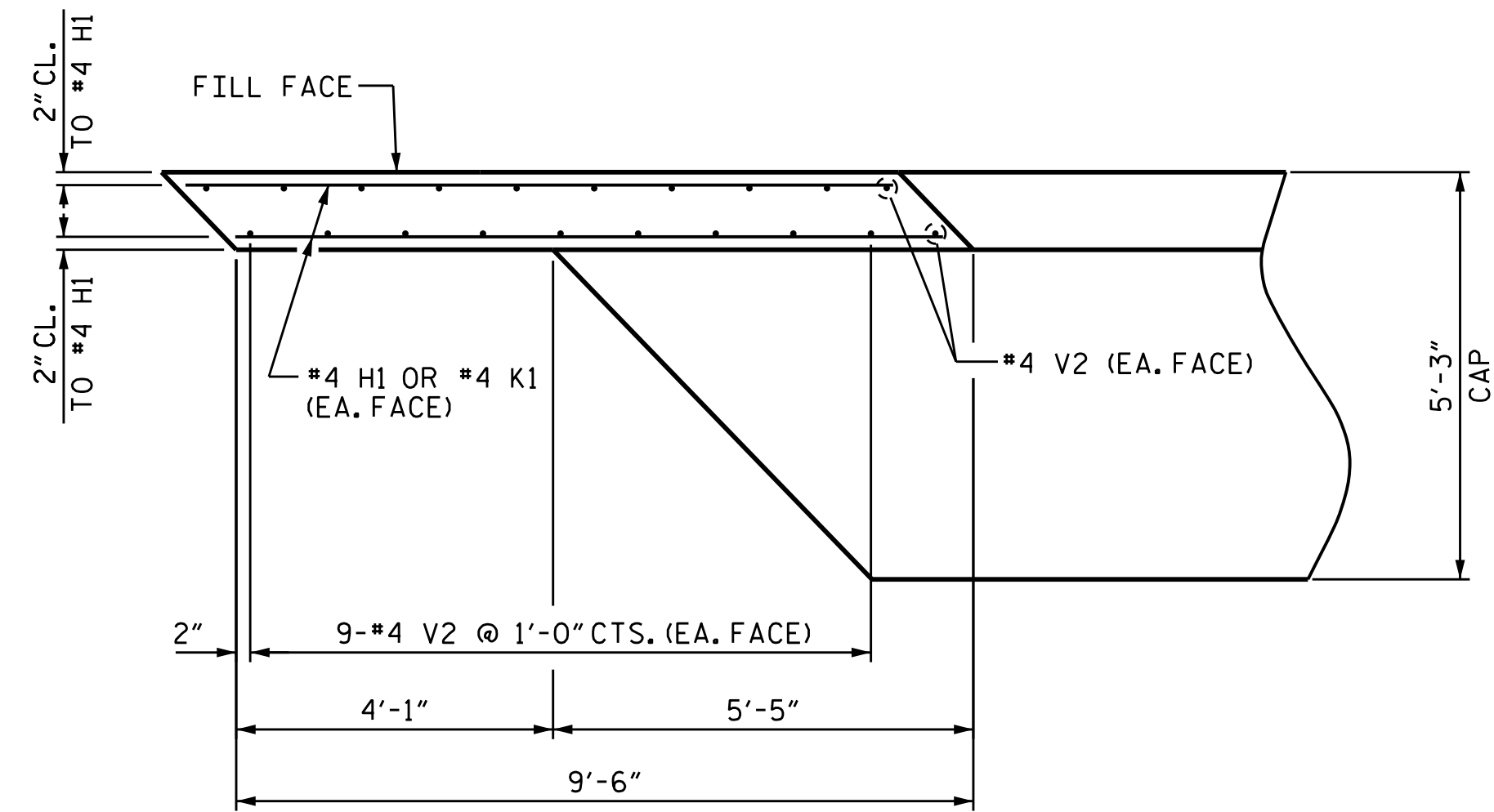
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2

DRAWN BY: A. SORSENGINH/T. H. FANG DATE: 3/2019  
 CHECKED BY: J. TILLMAN DATE: 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 4/2019

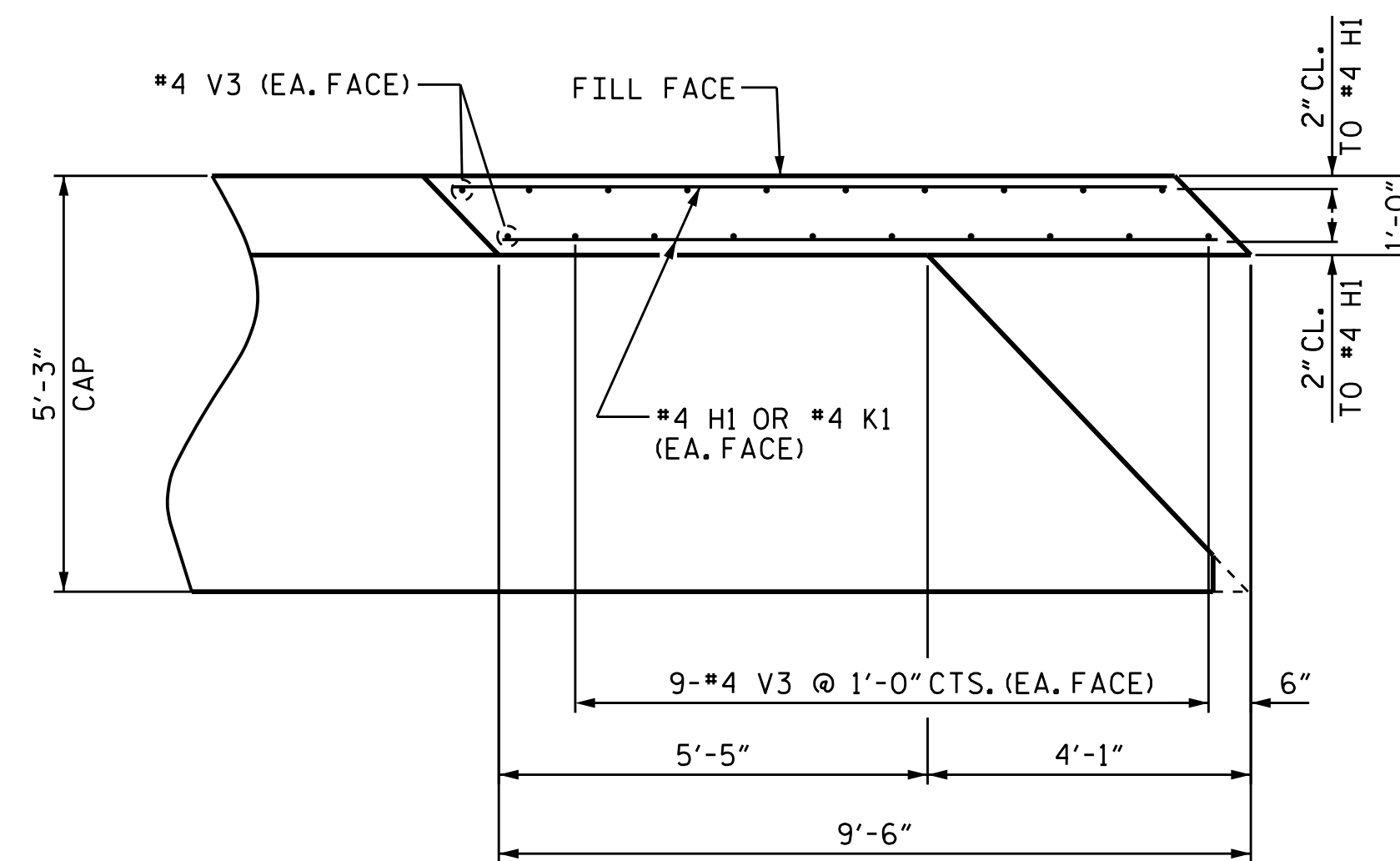
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-23	
1			3			TOTAL SHEETS	
2			4			28	

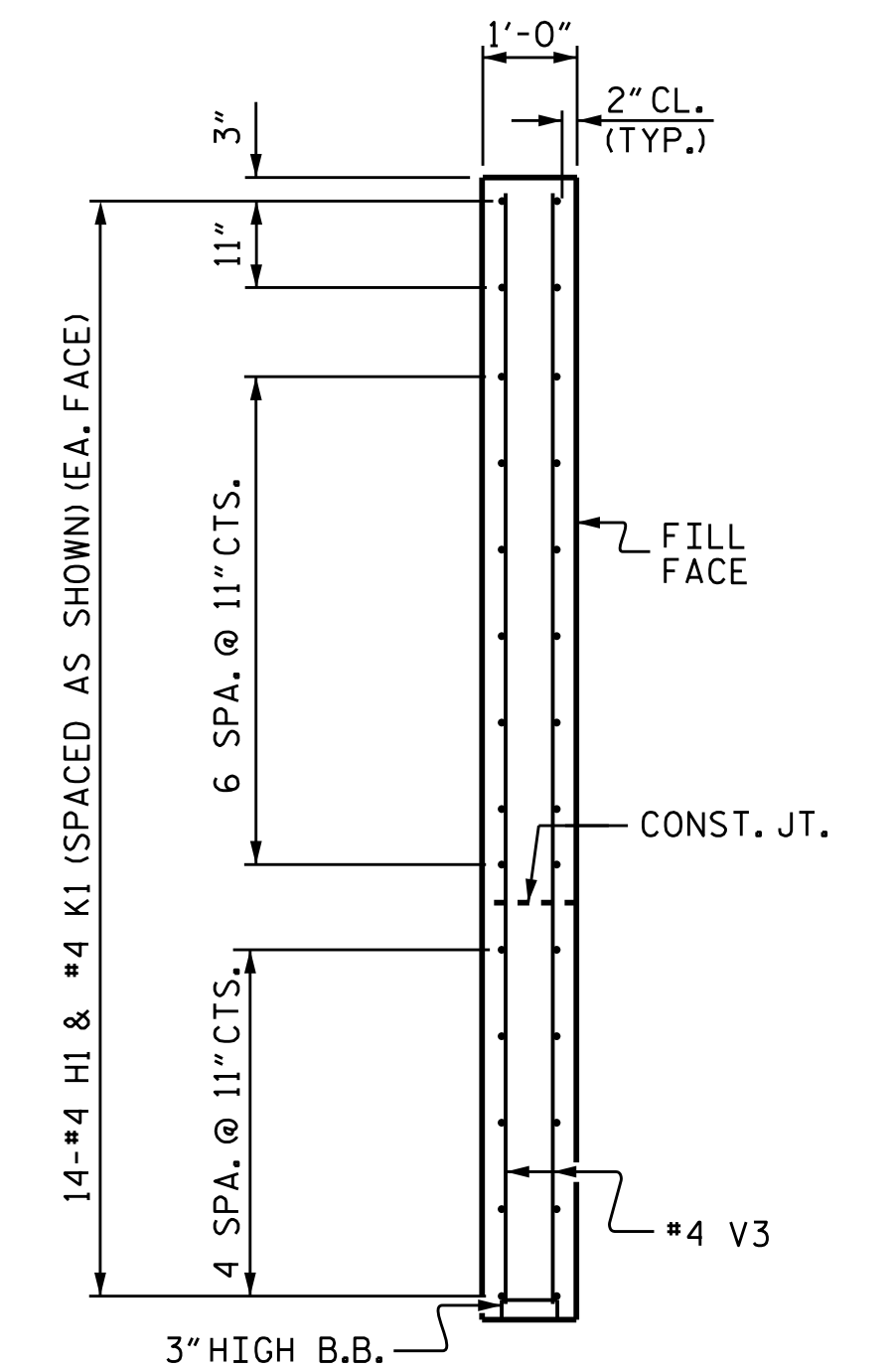




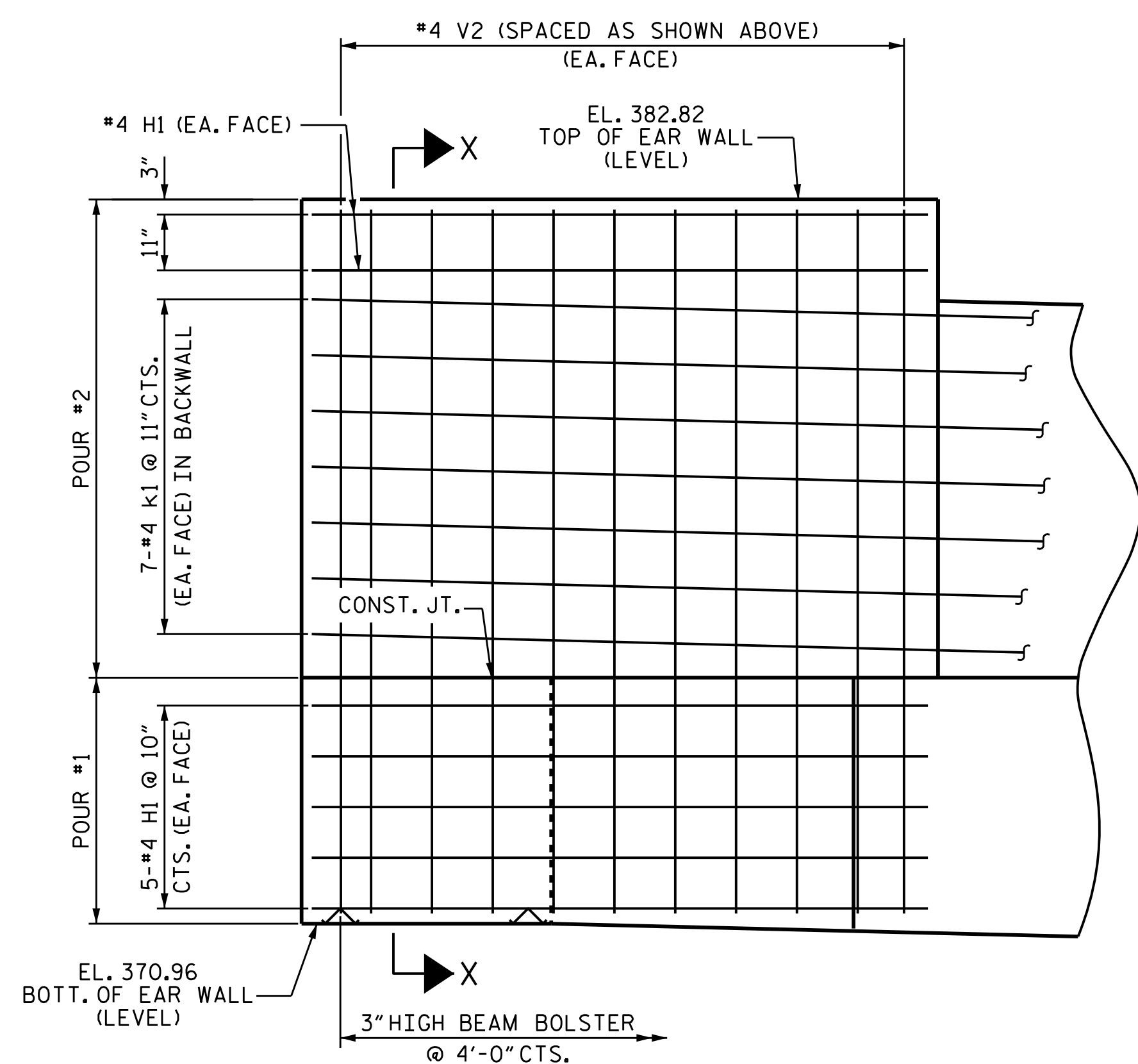
PLAN OF EAR WALL (E1)



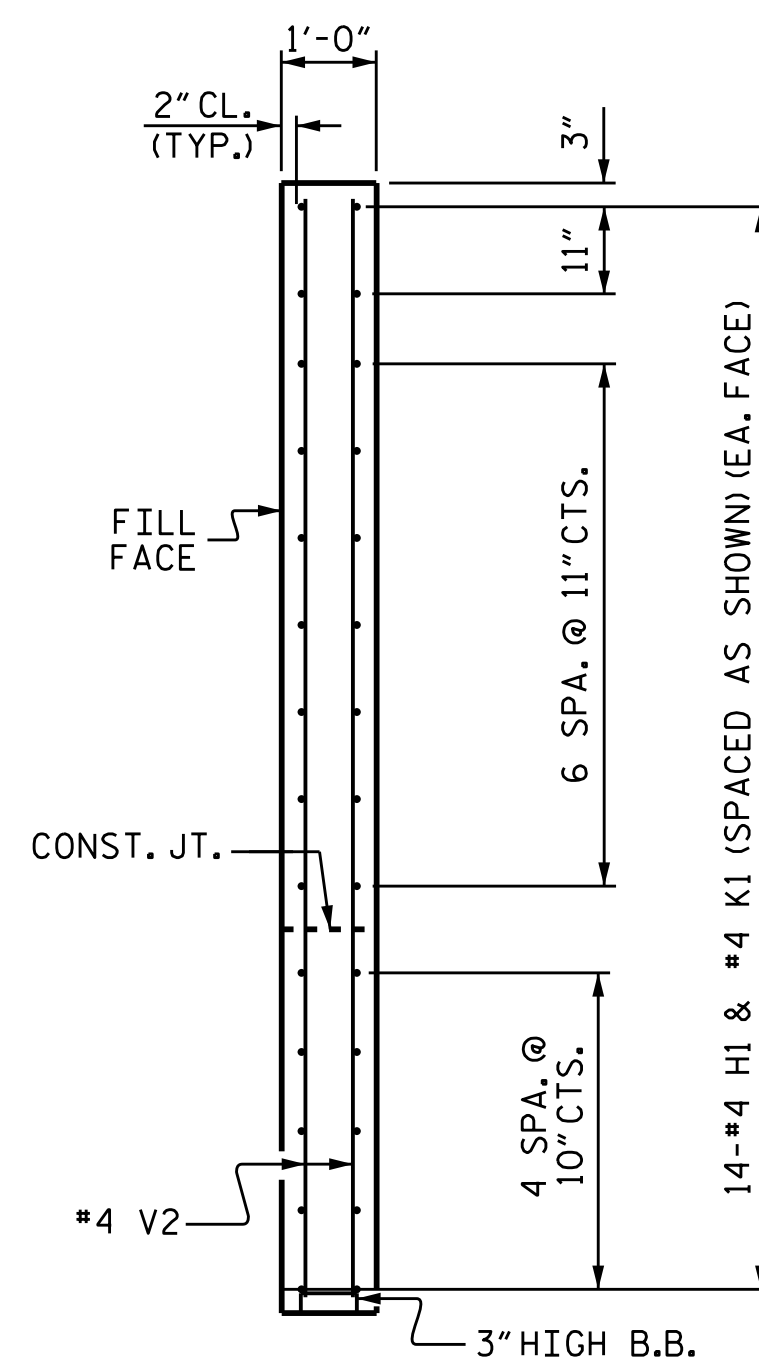
PLAN OF EAR WALL (E1)



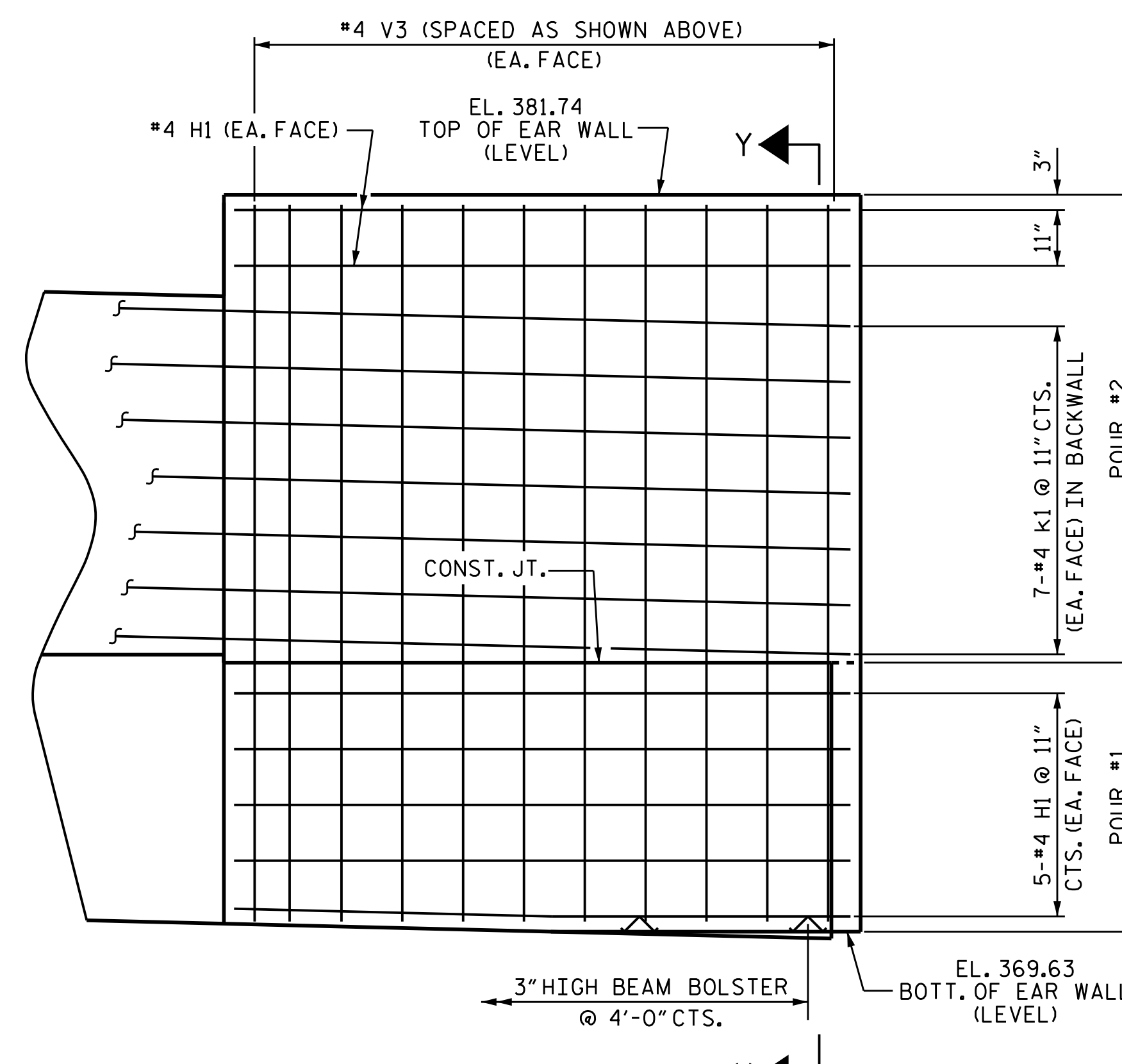
SECTION Y-Y



ELEVATION OF EAR WALL (E1)

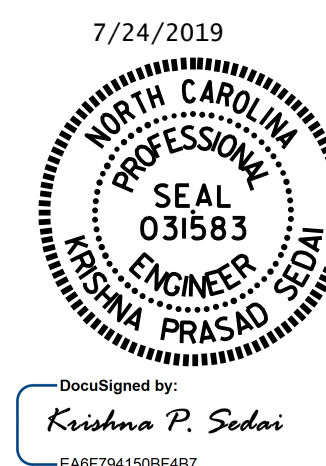


SECTION X-X



ELEVATION OF EAR WALL (E1)

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-  
 SHEET 2 OF 3

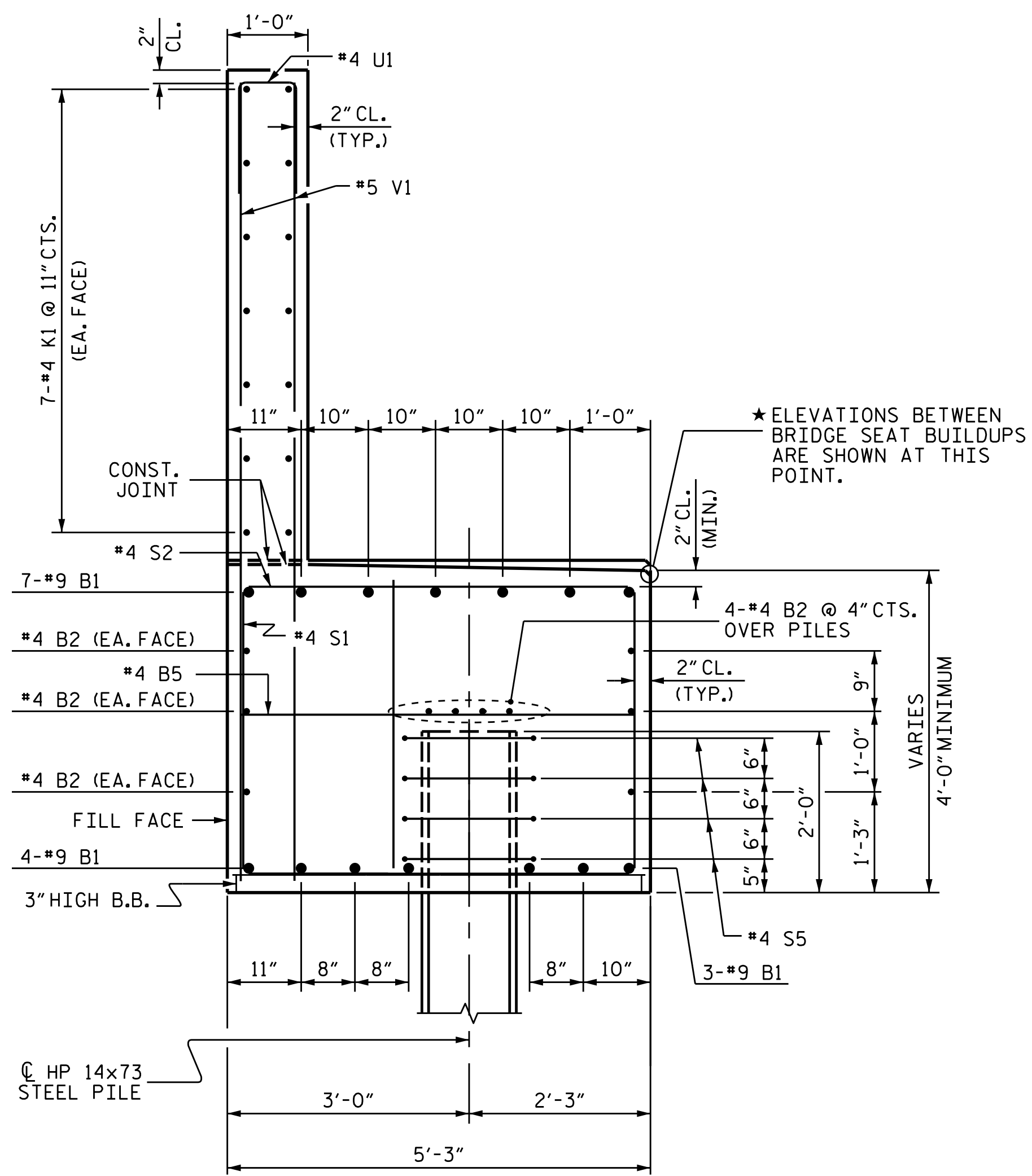


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2

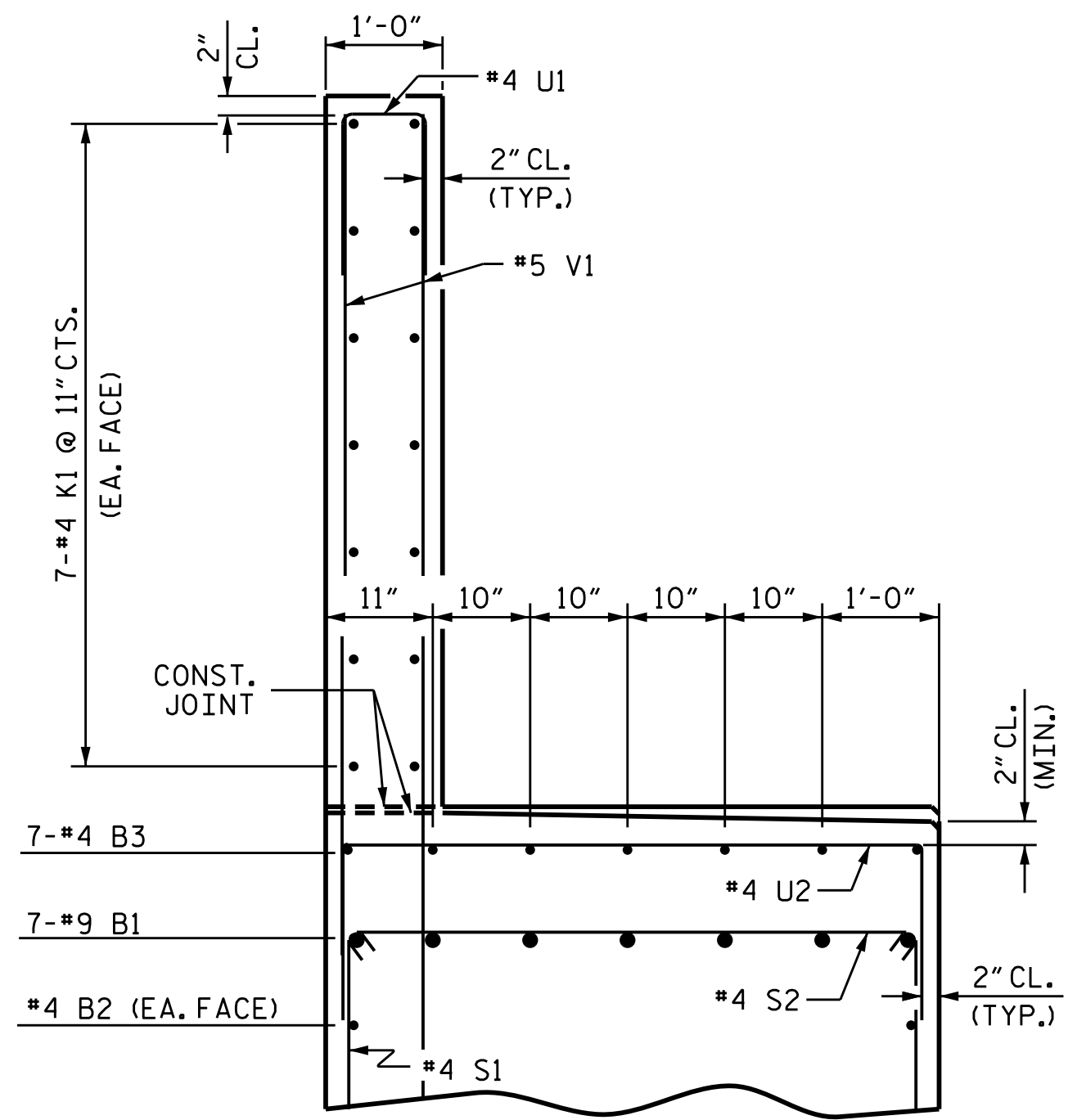
DRAWN BY : A. S./T. H. FANG DATE : 3/2019  
 CHECKED BY : J. TILLMAN DATE : 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE : 4/2019

DOCUMENT NOT CONSIDERED  
 FINAL UNLESS ALL  
 SIGNATURES COMPLETED

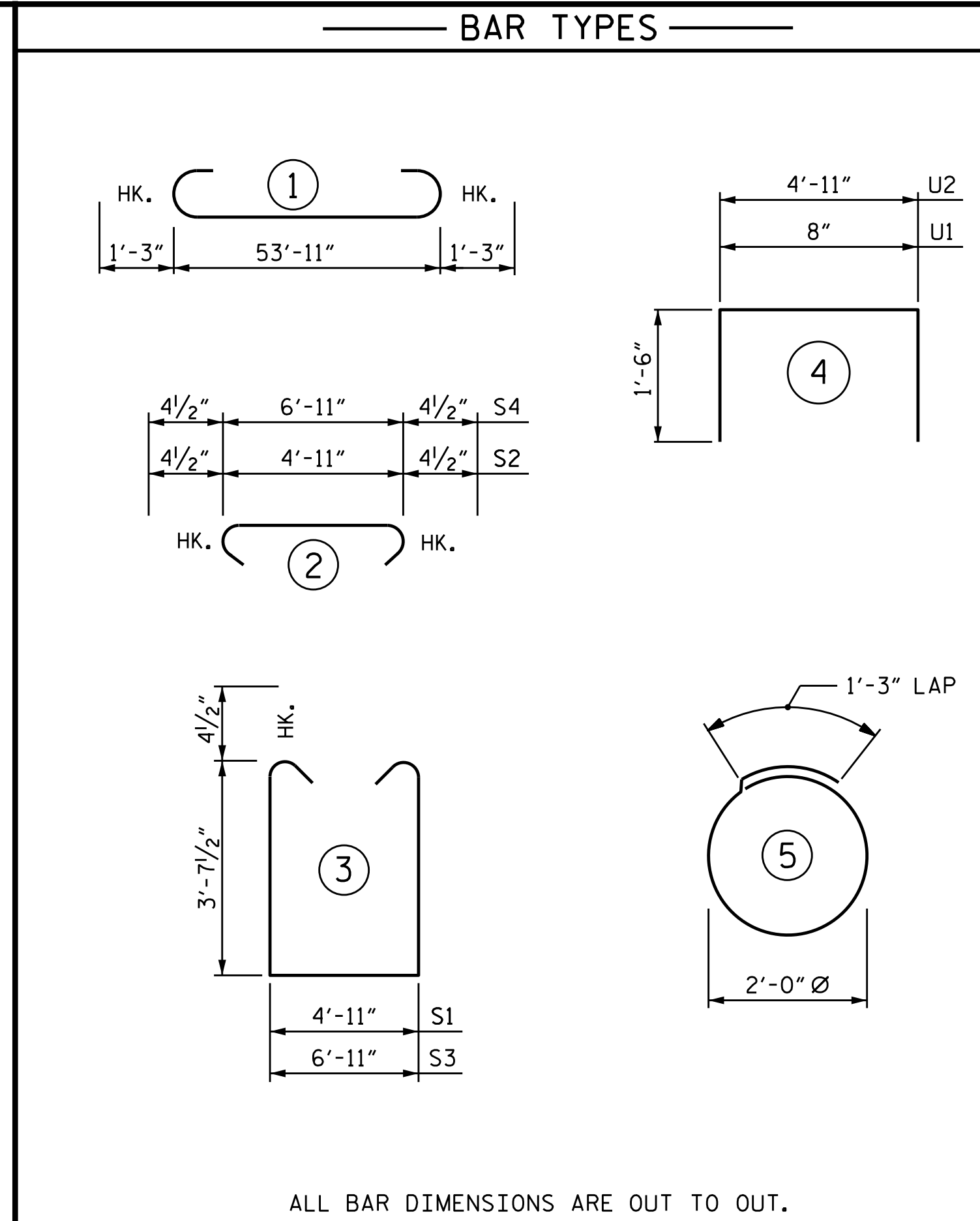
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-24	
1			3			TOTAL SHEETS	
2			4			28	



SECTION A-A

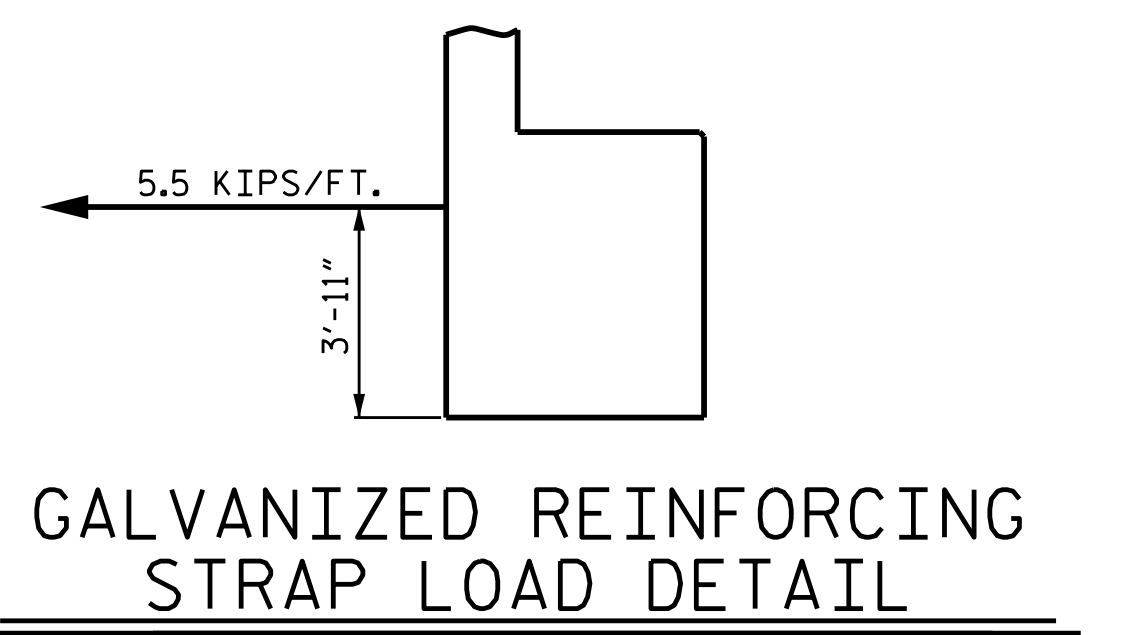


PARTIAL SECTION B-B

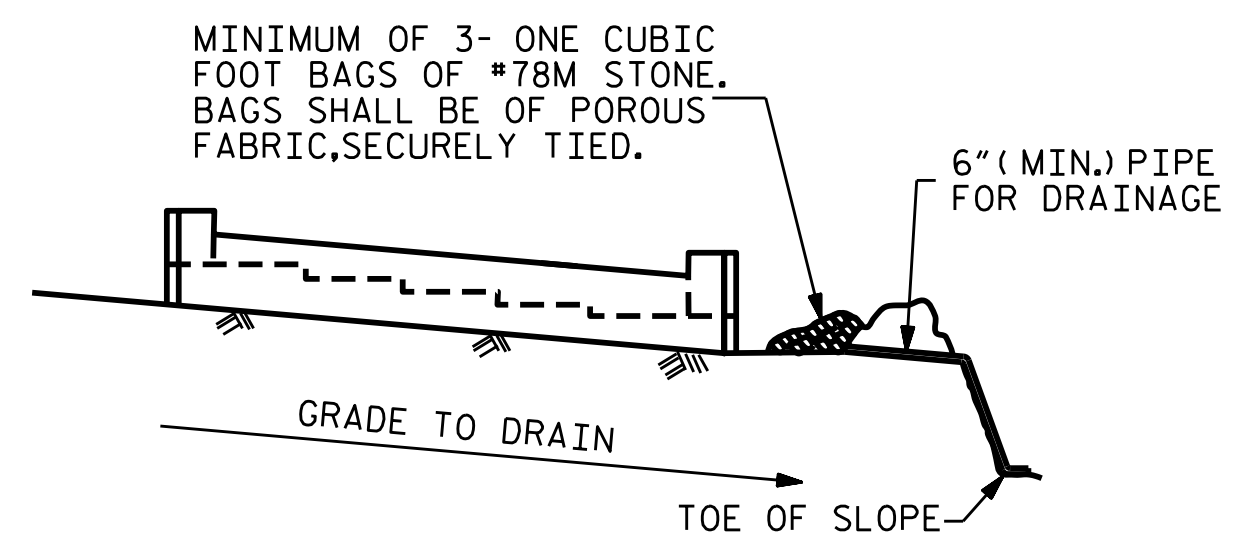


ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
END BENT 2					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	14	#9	1	56'-5"	2685
B2	20	#4	STR	28'-4"	379
B3	7	#4	STR	12'-9"	60
B4	21	#4	STR	2'-8"	37
B5	14	#4	STR	4'-11"	46
H1	28	#4	STR	9'-1"	170
K1	42	#4	STR	22'-8"	636
S1	90	#4	3	12'-11"	777
S2	90	#4	2	5'-8"	341
S3	2	#4	3	14'-11"	20
S4	2	#4	2	7'-8"	10
S5	28	#4	5	7'-7"	142
U1	44	#4	4	3'-8"	108
U2	18	#4	4	7'-11"	95
V1	88	#5	STR	10'-0"	918
V2	20	#4	STR	11'-6"	154
V3	20	#4	STR	11'-9"	157
REINFORCING STEEL					6,735 LBS.
CLASS A CONCRETE					
POUR 1: CAP, LOWER EAR WALLS					48.6 C.Y.
POUR 2: BACKWALL & UPPER EAR WALLS					15.4 C.Y.
TOTAL					64.0 C.Y.
HP 14 x 73 STEEL PILES					
No. 7					525 LIN. FT.



GALVANIZED REINFORCING STRAPS SHALL BE ATTACHED TO THE END BENT FOR DESIGN CRITERIA AND DETAILS, SEE "MECHANICALLY STABILIZED EARTH RETAINING WALL" SPECIAL PROVISIONS.



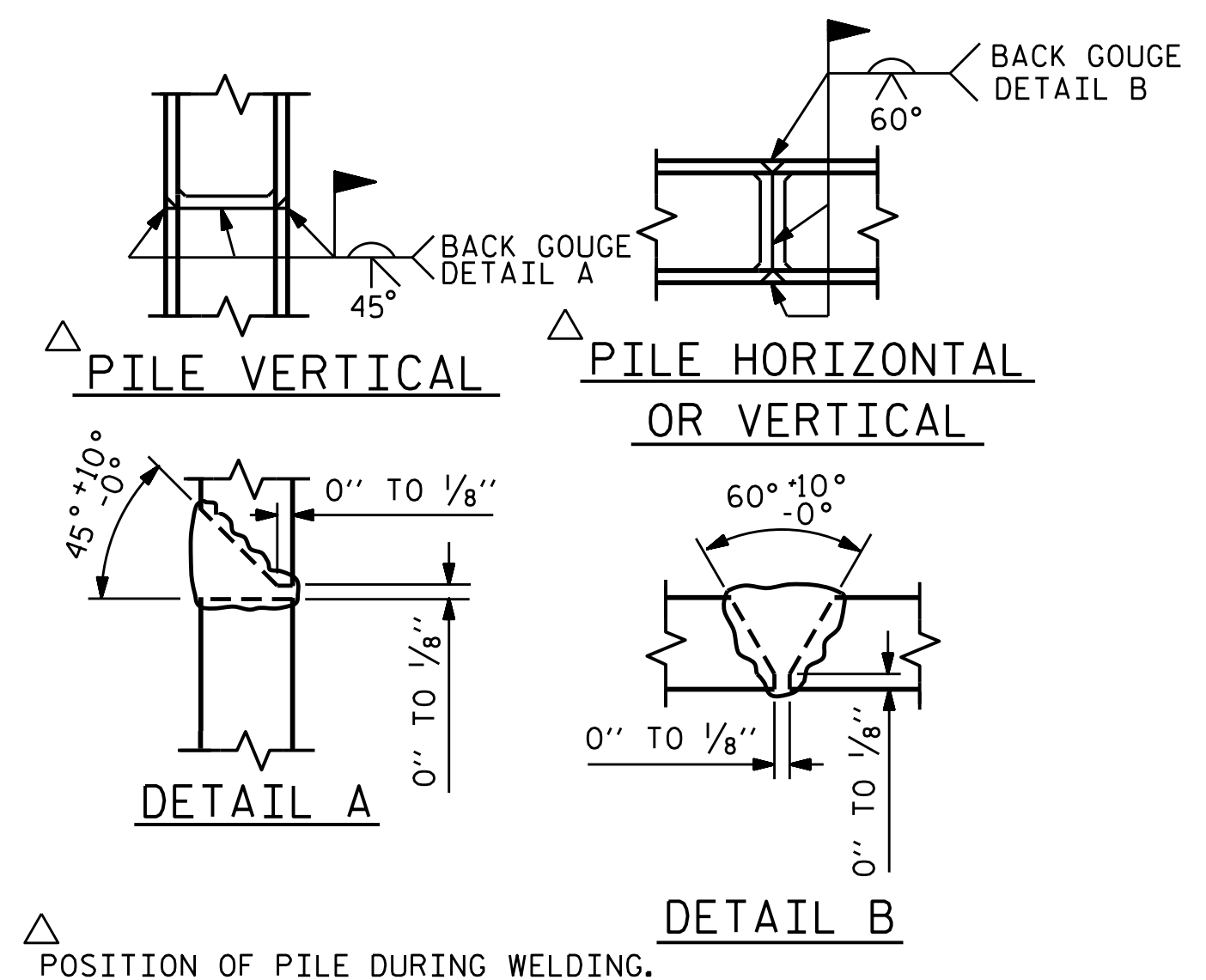
MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.

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.

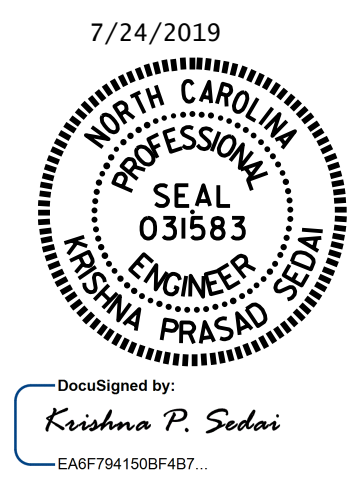
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

TEMPORARY DRAINAGE AT END BENT



PILE SPLICE DETAILS

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-  
 SHEET 3 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2

DRAWN BY: A. SORSENGINH/T. H. FANG DATE: 3/2019  
 CHECKED BY: J. TILLMAN DATE: 4/2019  
 DESIGN ENGINEER OF RECORD: A. SORSENGINH DATE: 4/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S6-25
1			3			TOTAL SHEETS
2			4			28

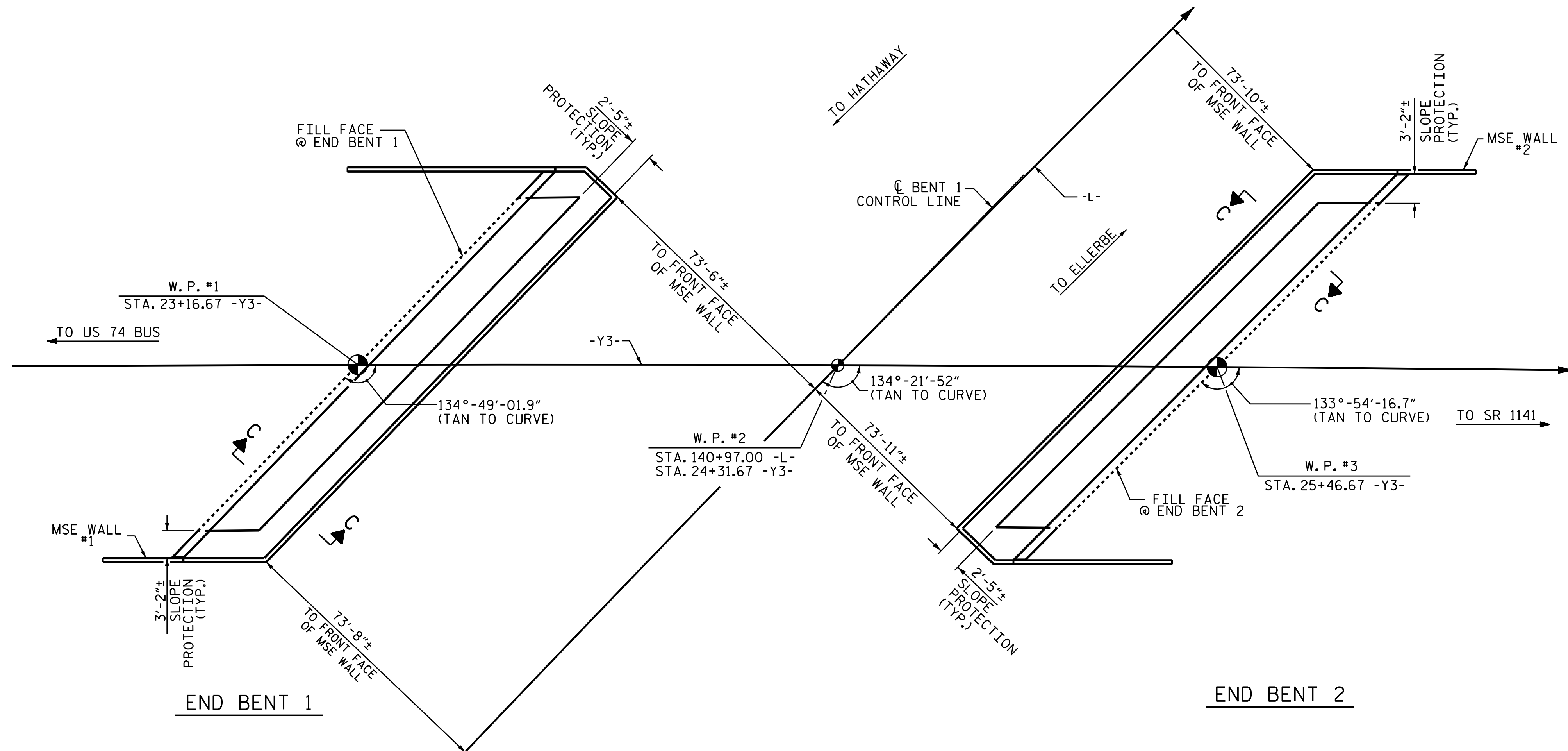


**GENERAL NOTES**

SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. 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.

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.

MSE WALL AND WING WALL CONSTRUCTION SHALL BE COMPLETED PRIOR TO START ON SLOPE PROTECTION CONSTRUCTION.

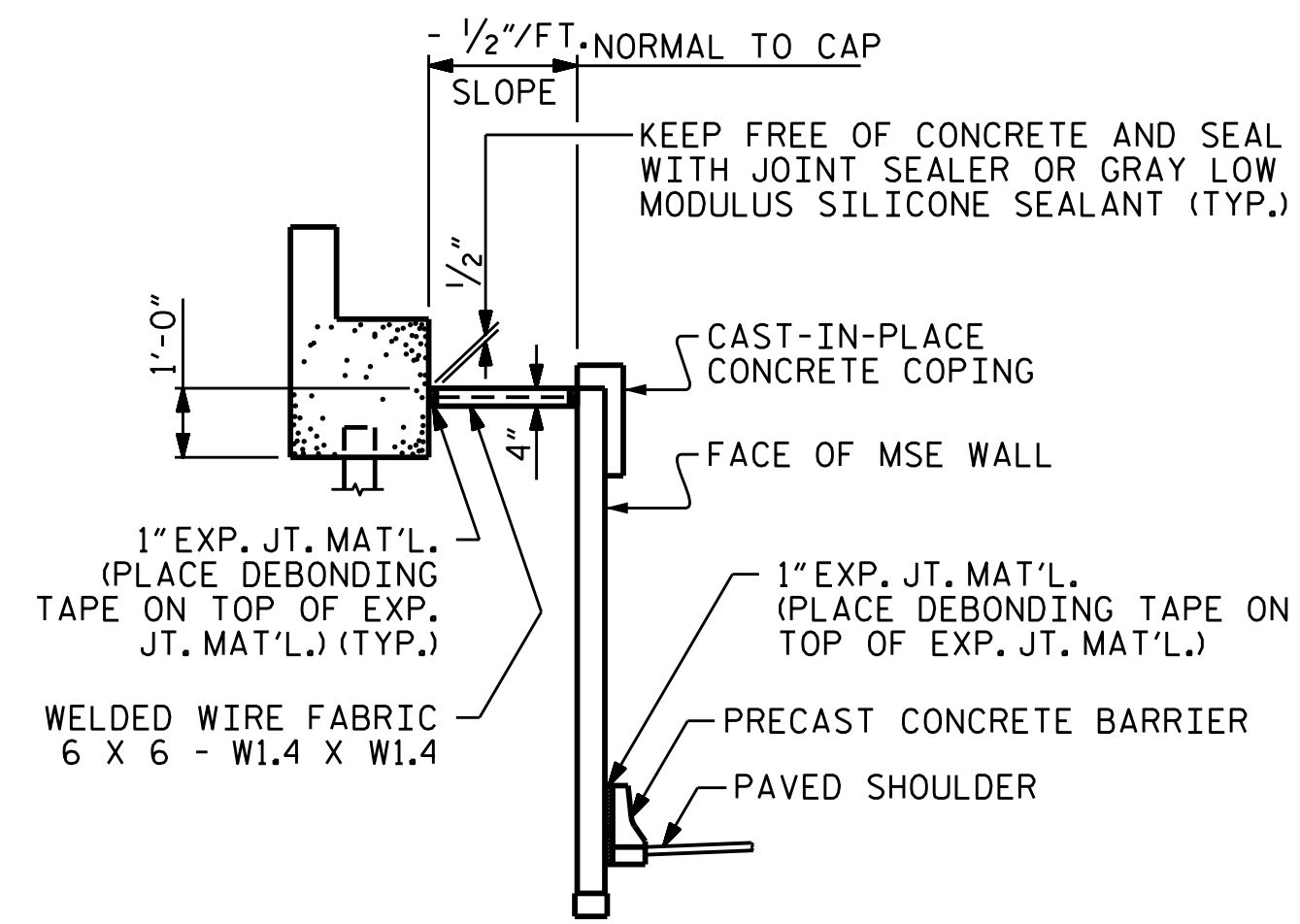


**PLAN**

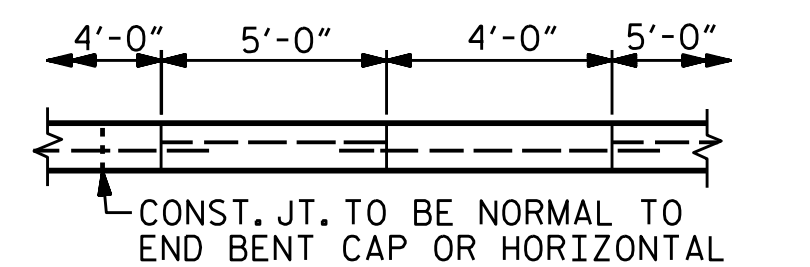
FOR DETAILS & QUANTITIES OF MSE WALL, SEE "MSE RETAINING WALL" ON SHEETS W-1 THRU W-6.

BRIDGE @ STA. 24+31.67 -Y3-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	20.8	42
END BENT 2	20.5	43

\* QUANTITY SHOWN IS BASED ON 5' POURS.

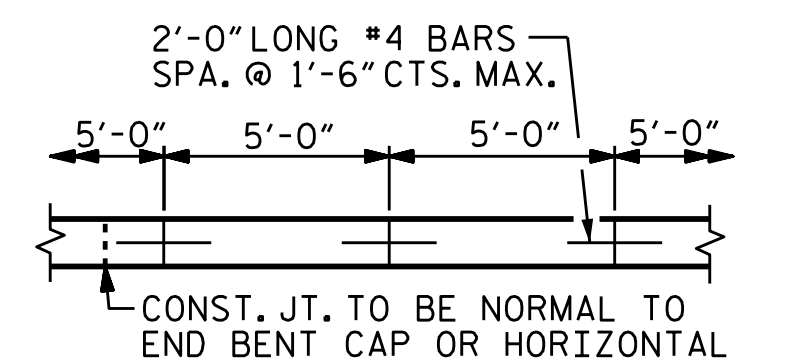


**SECTION C-C**



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

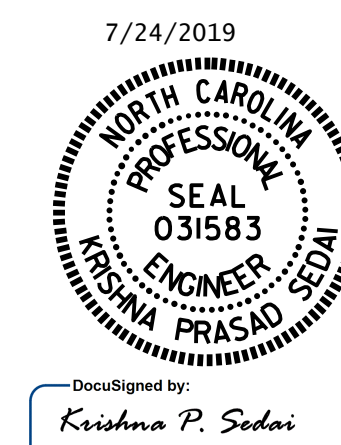
**OPTIONAL POURING DETAIL**



STRIP WIDTHS MAY VARY IN CURVED PORTION.

**POURING DETAIL**

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-



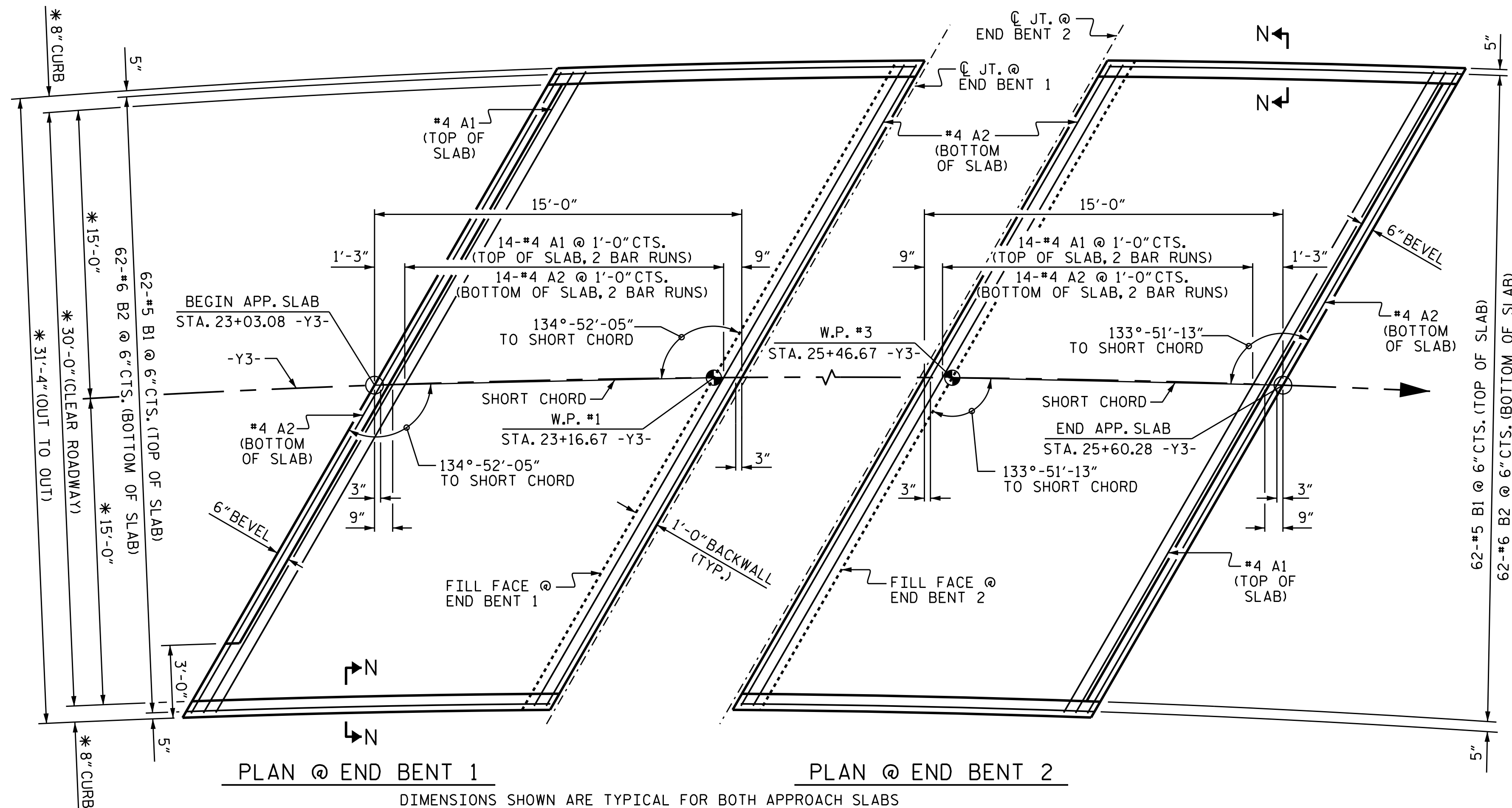
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SLOPE PROTECTION DETAILS**

DRAWN BY : M. G. SHAIKH DATE : 04/2019  
 CHECKED BY : H. LOCKLEAR DATE : 04/2019  
 DESIGN ENGINEER OF RECORD: E. BAYISSA DATE : 03/2019

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S6-26
2			4			28

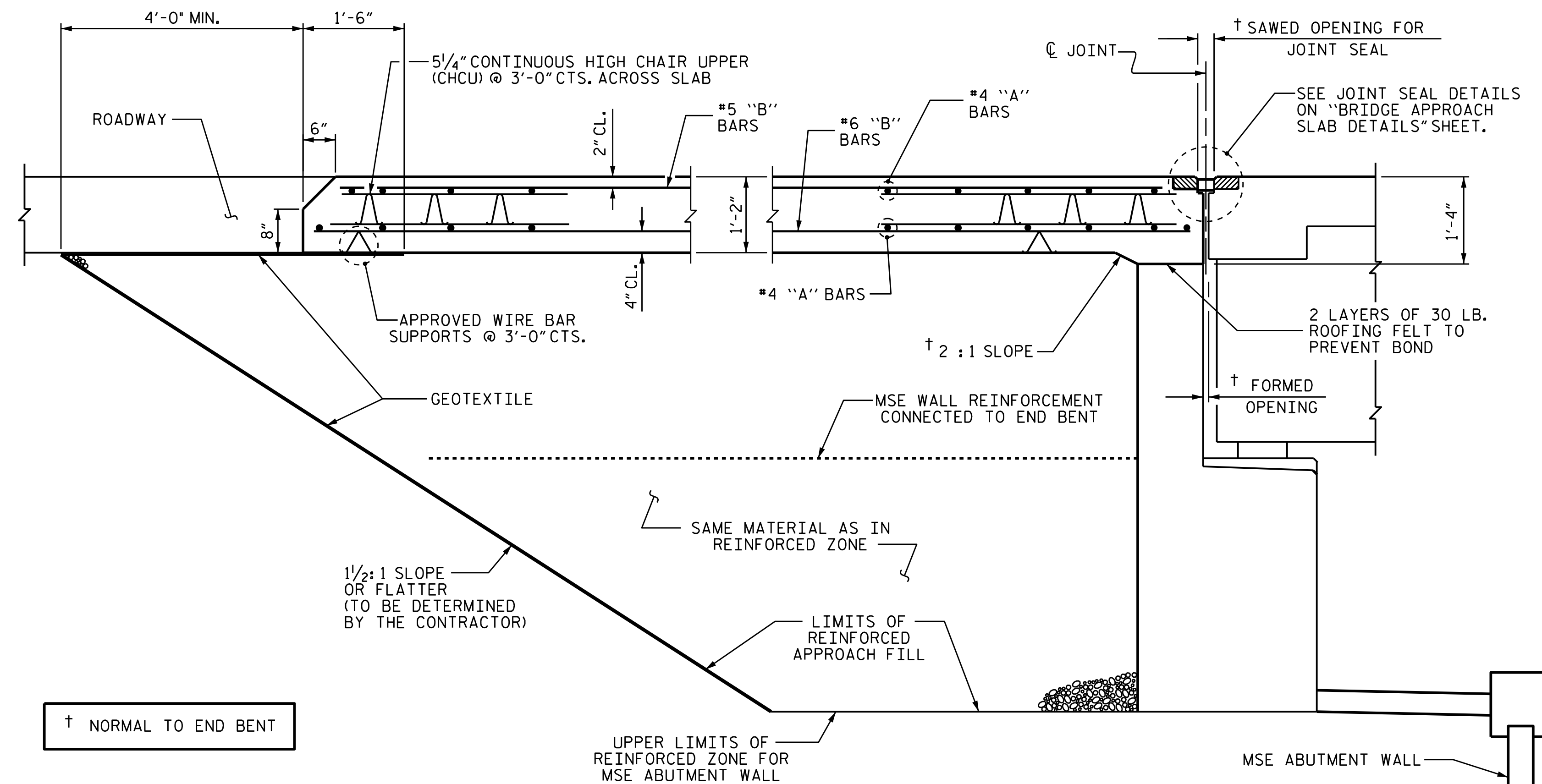


PLAN @ END BENT 1

PLAN @ END BENT 2

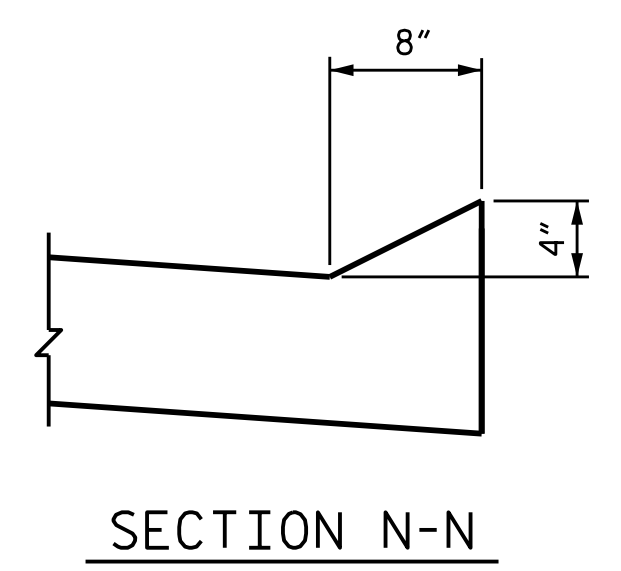
DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS

\* RADIAL DIMENSION

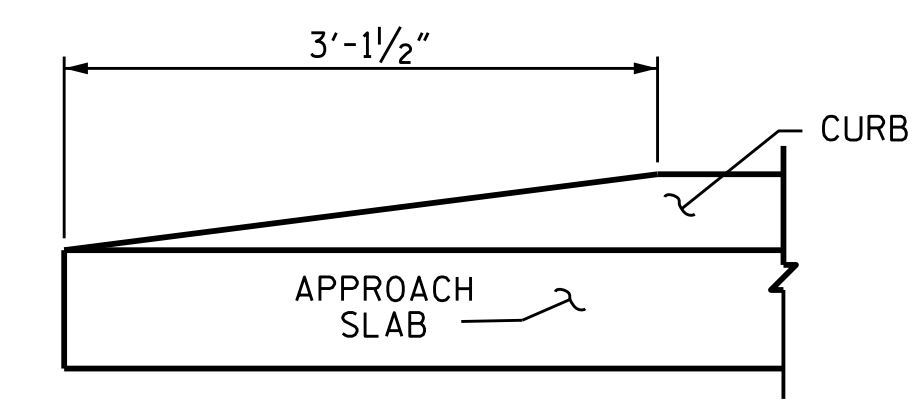


SECTION THRU SLAB

(TYPE III - REINFORCED APPROACH FILL)



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, MSE WALL REINFORCEMENT AND BACKFILL MATERIAL SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

BACKFILL MATERIAL SHALL BE THE SAME MATERIAL USED IN THE MSE REINFORCED ZONE.

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

THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL OR PARAPET AND END POST.

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.

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 END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	30	#4	STR	22'-10"	458
A2	32	#4	STR	22'-9"	486
REINFORCING STEEL LBS. 1844					
* EPOXY COATED REINFORCING STEEL LBS. 1342					
CLASS AA CONCRETE C. Y. 20.8					
APPROACH SLAB AT END BENT 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	30	#4	STR	22'-10"	458
A2	32	#4	STR	22'-9"	486
REINFORCING STEEL LBS. 1844					
* EPOXY COATED REINFORCING STEEL LBS. 1342					
CLASS AA CONCRETE C. Y. 20.8					

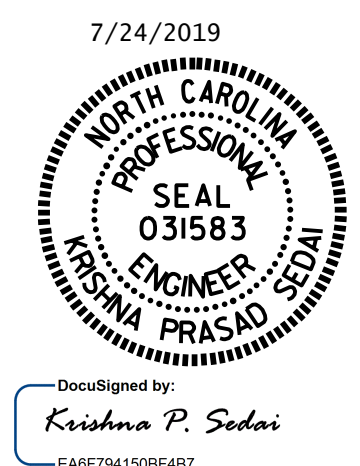
SPLICE LENGTHS

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

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 24+31.67 -Y3-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR FLEXIBLE PAVEMENT

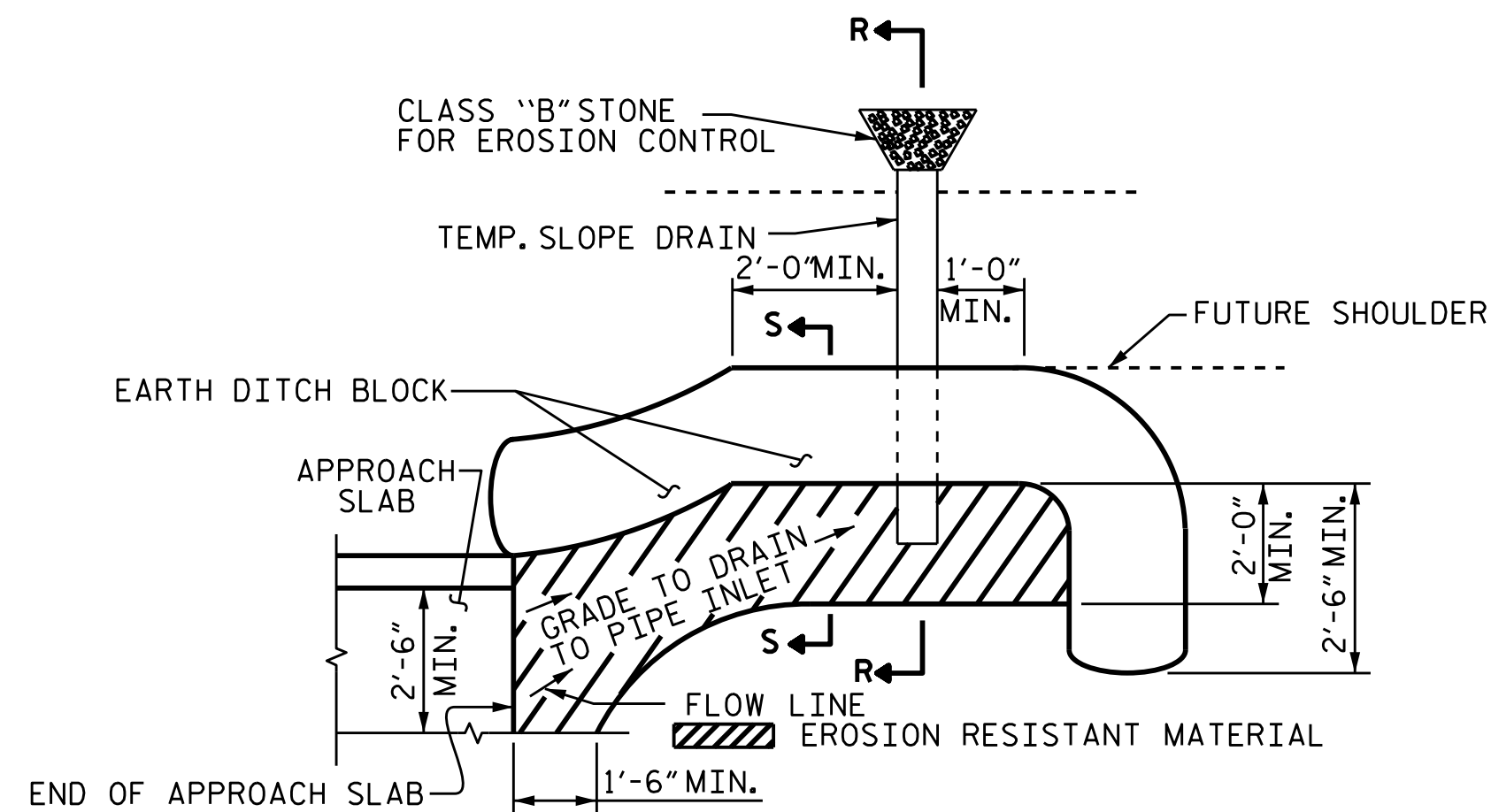
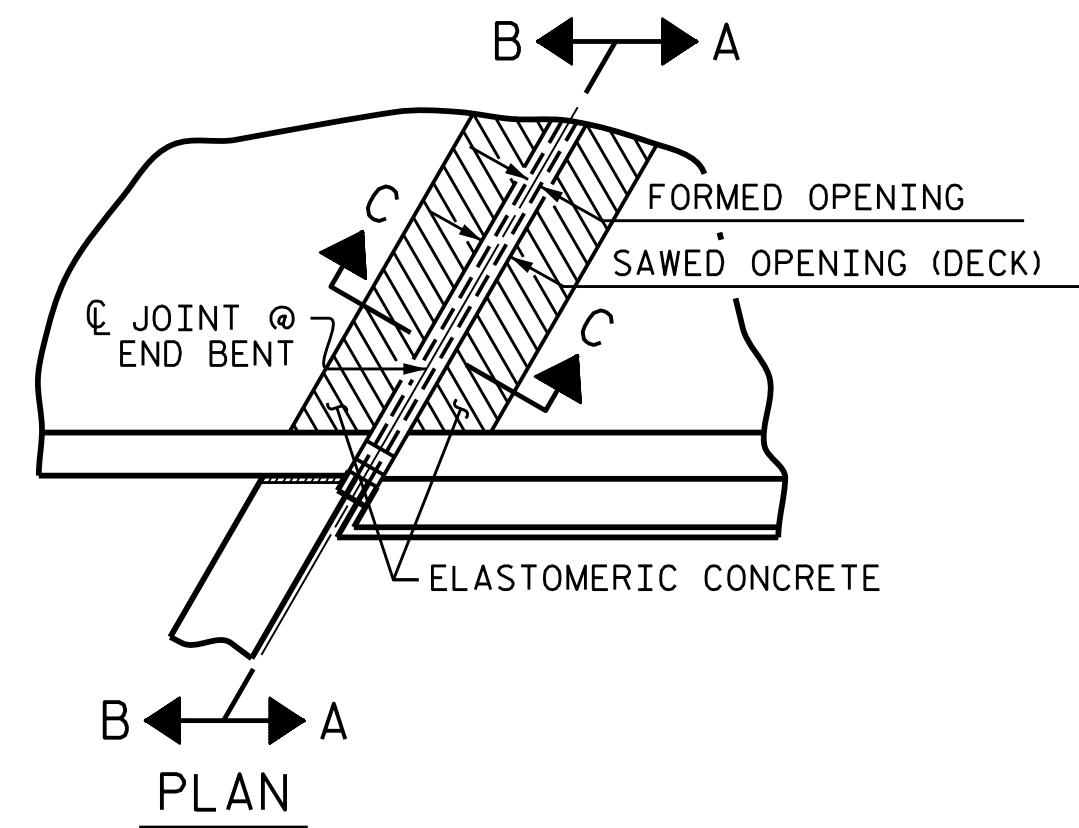
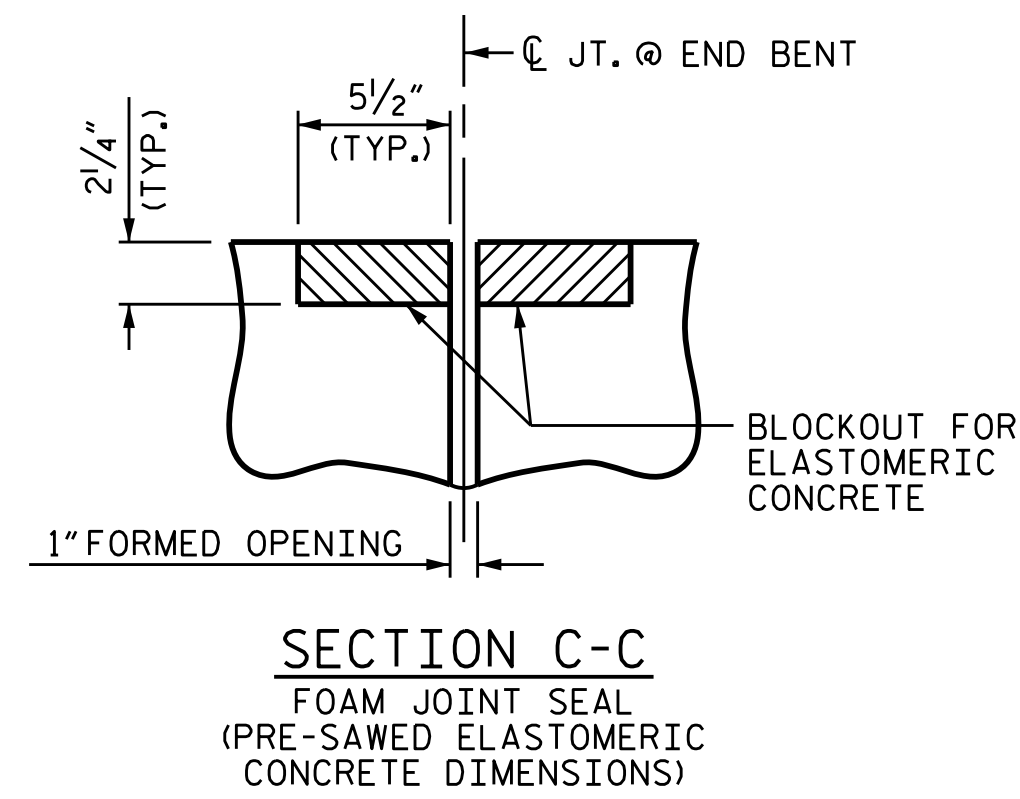


DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

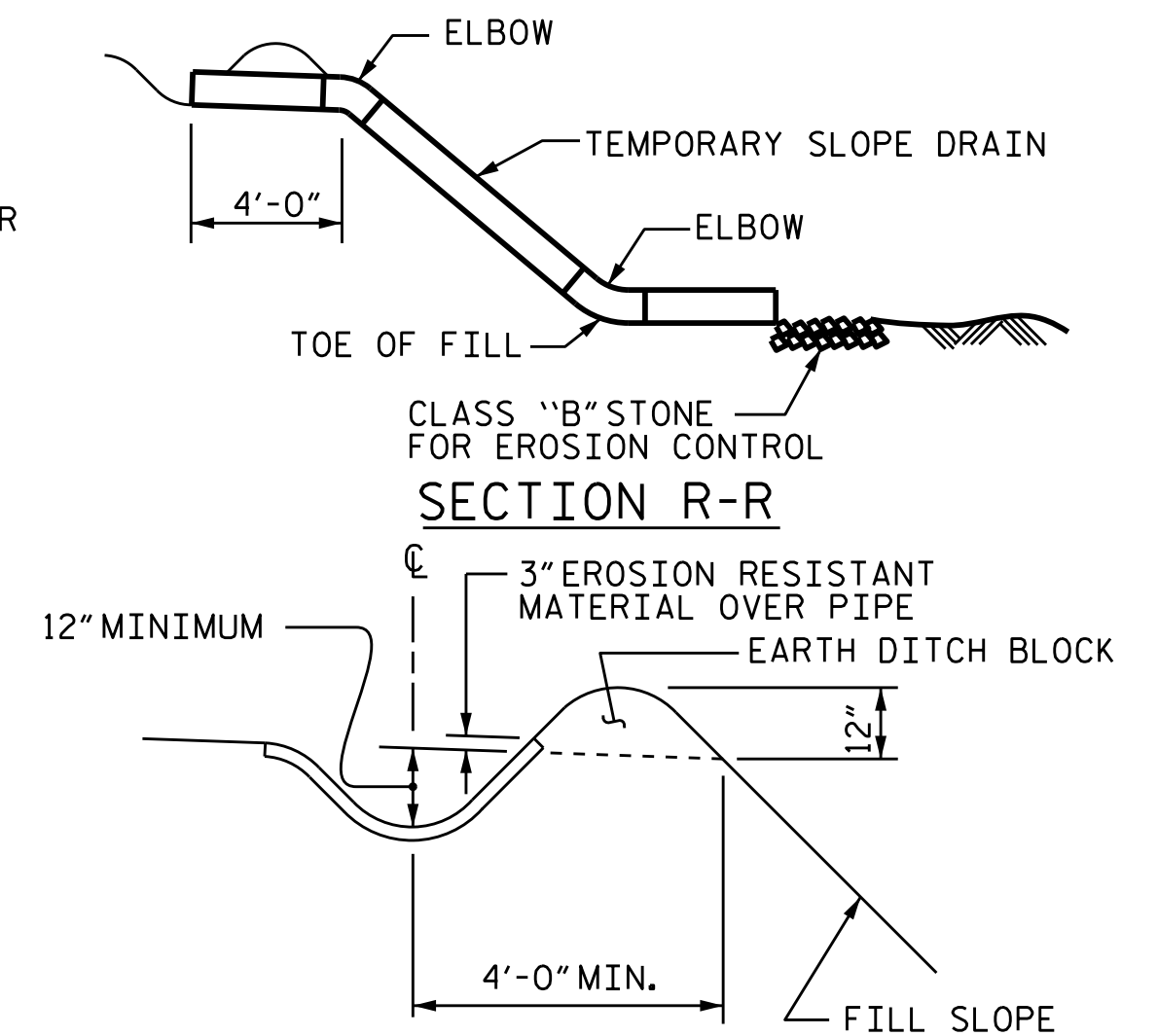
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S6-27
2			4			28

ASSEMBLED BY : M. G. SHAIKH	DATE : 04/2019
CHECKED BY : H. LOCKLEAR	DATE : 04/2019
DRAWN BY : EEM	3/95
CHECKED BY : VAP	3/95
REV. 6/13	MAA/GM
REV. 12/17	MAA/THC
REV. 06/19	BNB/THC





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.

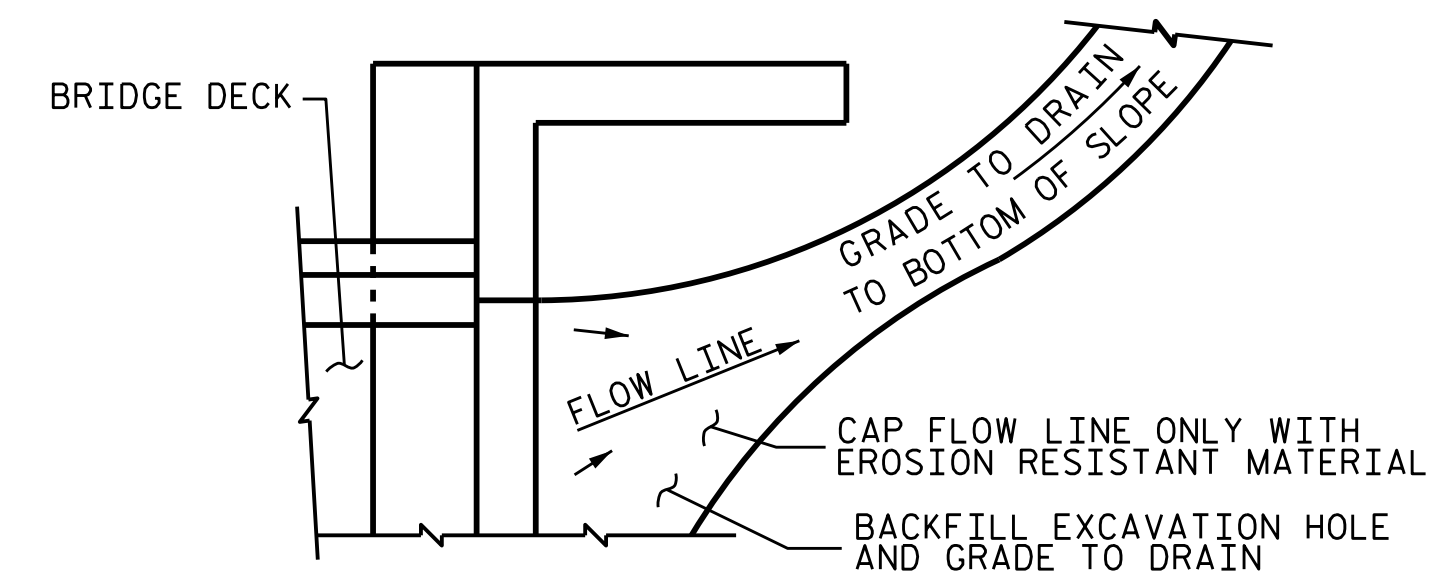


SECTION S-S

PLAN VIEW

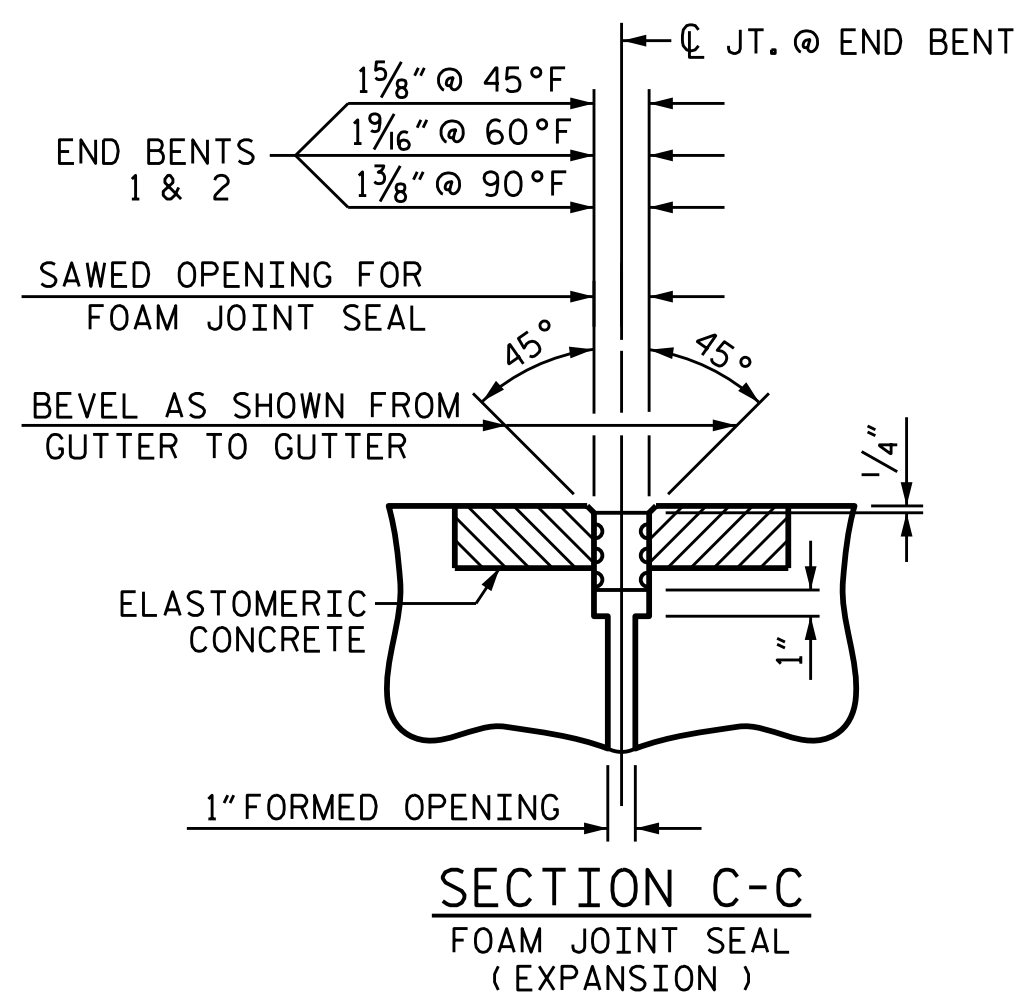
**TEMPORARY BERM AND SLOPE DRAIN DETAILS**

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

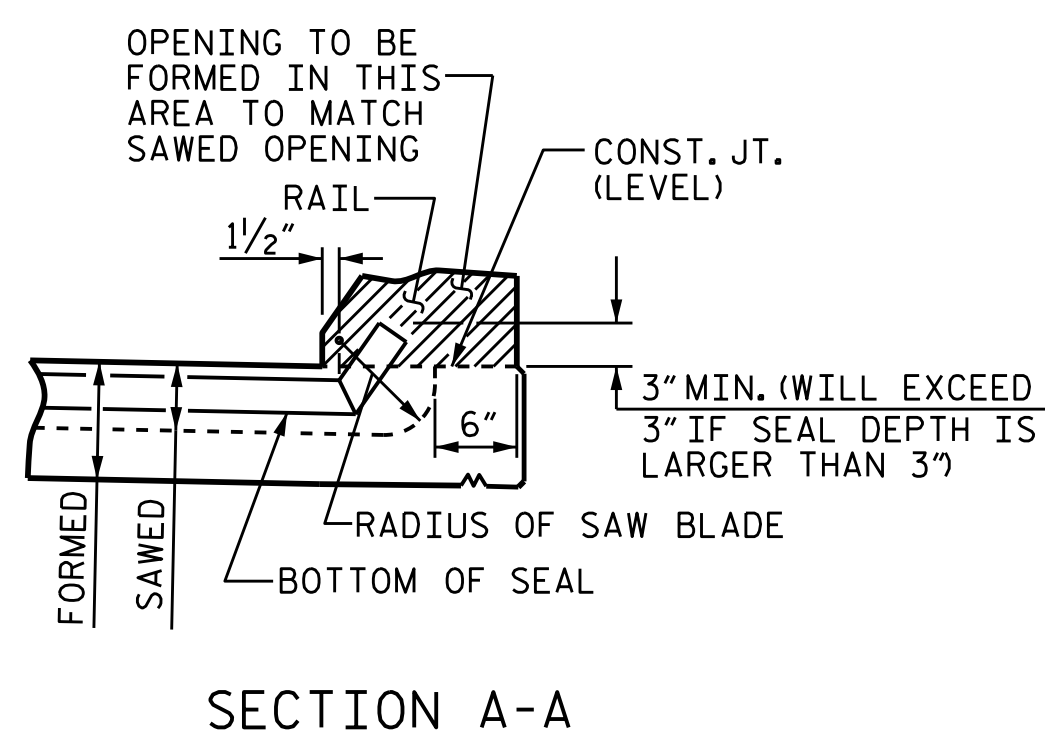


NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

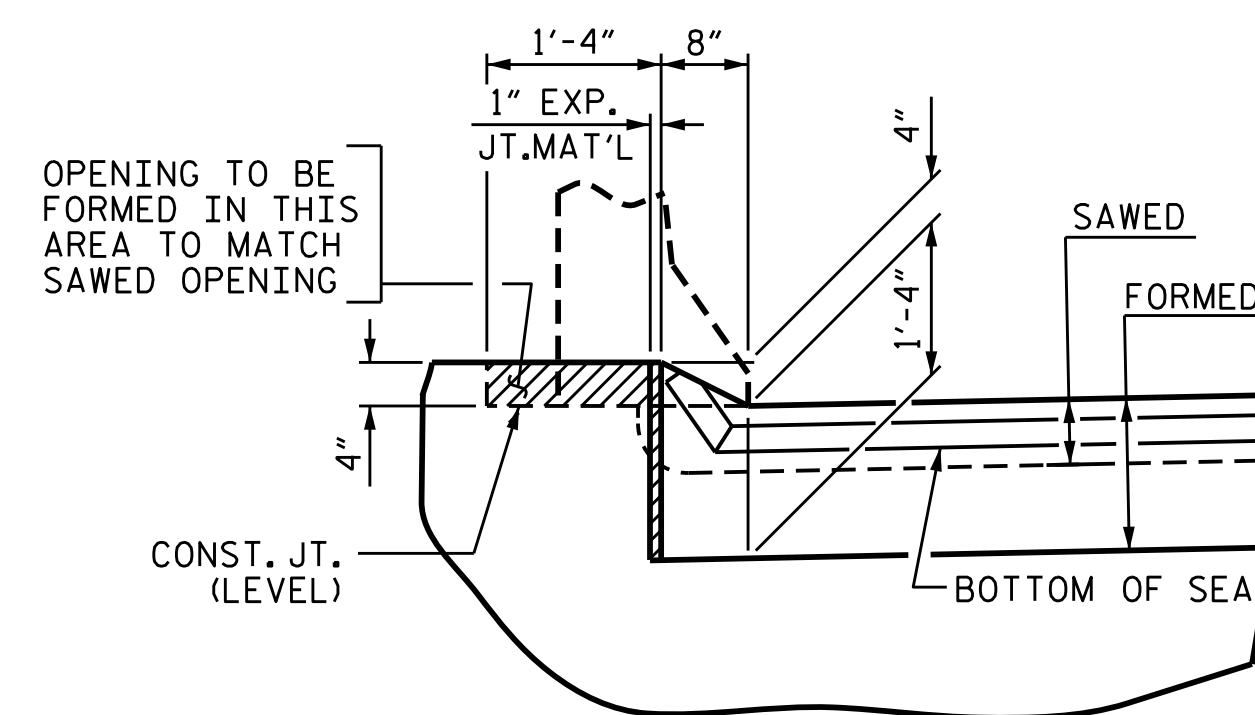
TEMPORARY DRAINAGE DETAIL



SECTION C-C  
FOAM JOINT SEAL  
(EXPANSION)



SECTION A-A



SECTION B-B

**JOINT SEAL DETAILS @ END BENT**

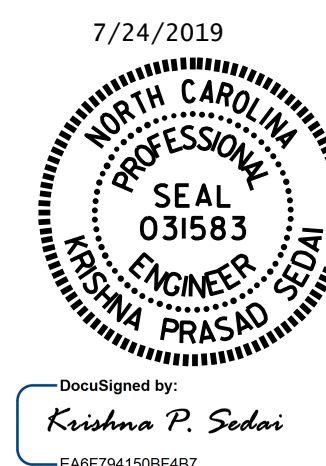
FOAM JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.  
THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE BARRIER RAIL.

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	7.60
2	7.50
TOTAL	15.1

\* BASED ON THE MINIMUM BLOCKOUT SHOWN.

ASSEMBLED BY :	M. G. SHAIKH	DATE :	04/2019
CHECKED BY :	H. LOCKLEAR	DATE :	04/2019
DRAWN BY :	FCJ	11/88	REV. 6/13
CHECKED BY :	ARB	11/88	REV. 12/17
			REV. 5/18

23-JUL-2019 14:00  
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ksedal



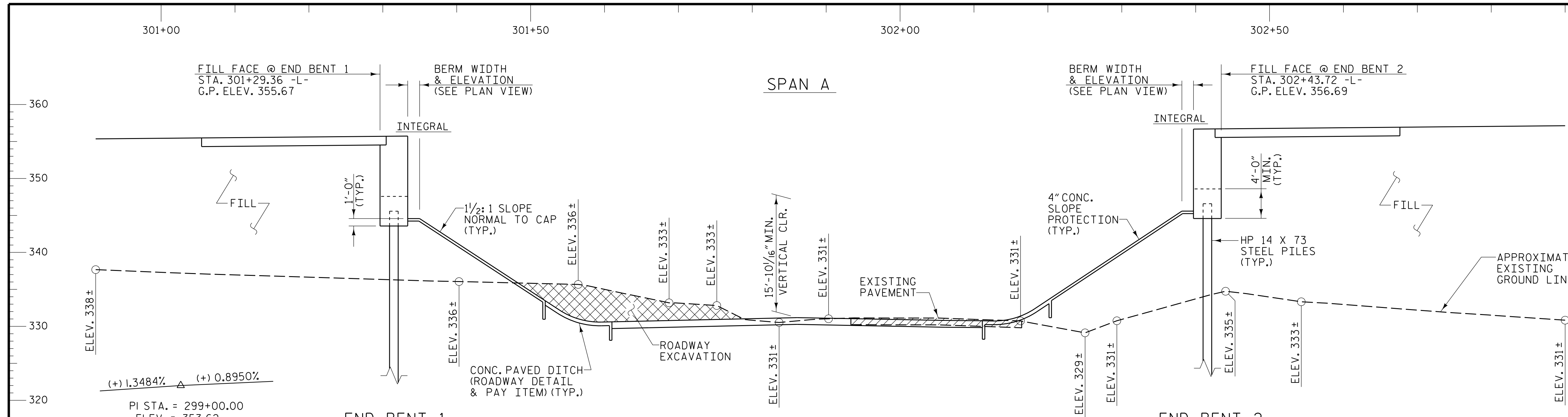
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 24+31.67 -Y3-

SHEET 2 OF 2

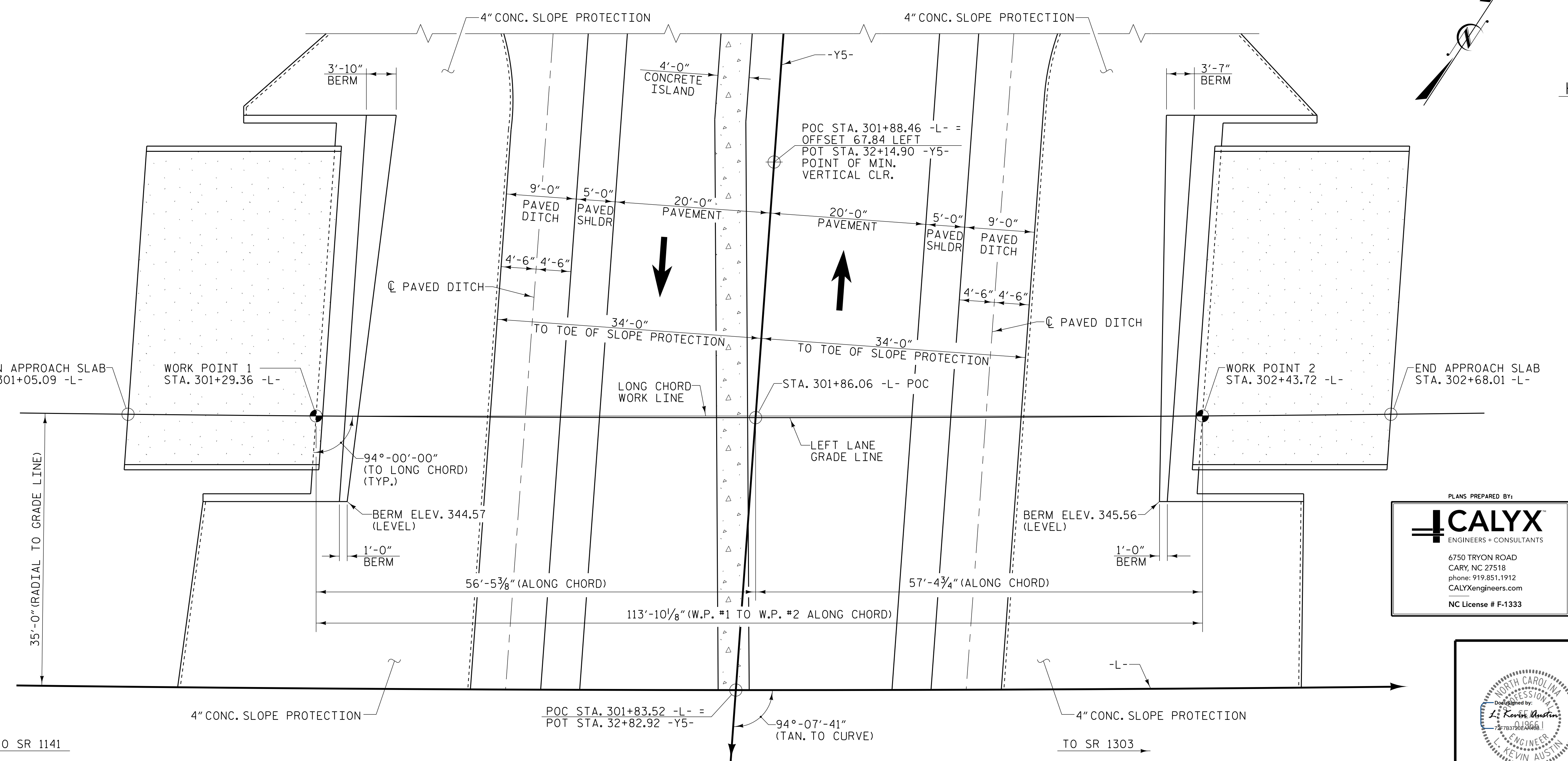
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD BRIDGE APPROACH SLAB DETAILS					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S6-28					TOTAL SHEETS 28

STD. NO. BAS4 (SHT 1b)



GRADE DATA -L-  
 PI STA. = 299+00.00  
 ELEV. = 353.62  
 VC = 300.00'

SECTION ALONG LEFT LANE WORK LINE  
 SECTIONS @ END BENTS ARE AT RIGHT ANGLES



HORIZONTAL CURVE DATA -L-

PI STA. = 293+86.98 -L-  
 $\Delta = 24^\circ-20'-00.0''$  (LT)  
 $D = 0^\circ-45'-00.0''$   
 $L = 3244.44'$   
 $T = 1647.05'$   
 $R = 7639.44'$

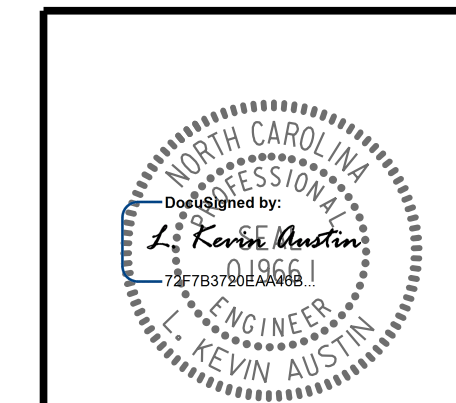
GRADE DATA -Y5-  
 $\Delta = (-) 3.5760\%$   
 STA. = 29+90.00  
 ELEV. = 340.38  
 STA. = 34+40.00  
 ELEV. = 324.29

6/10/2019 3:25:04 PM R:\Structures\Left Lane\N421B LEFT SMU.GD.01.dgn  
 DRAWN BY : W. B. ALLEN DATE : 5/15  
 CHECKED BY : Z. H. BROWN DATE : 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

PLAN  
 PILES NOT SHOWN FOR CLARITY

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
 6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333



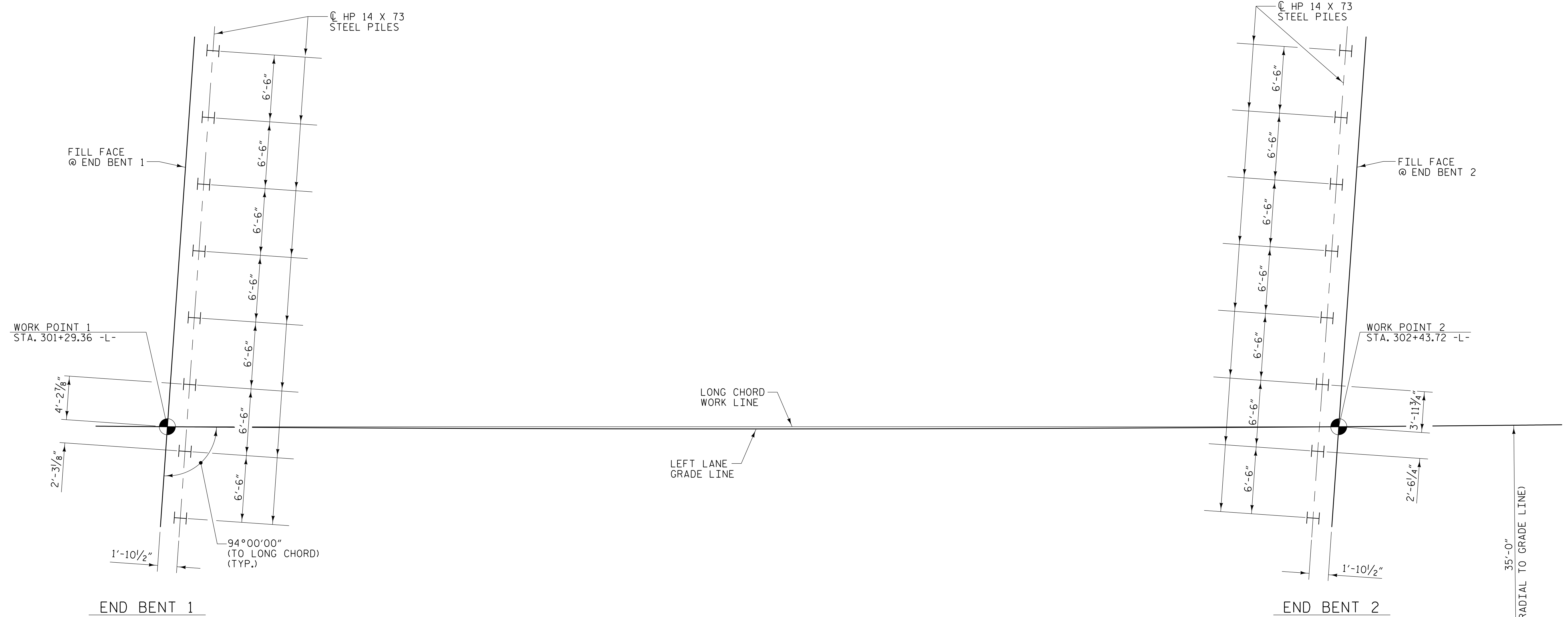
PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L- POC  
=32+82.92 -Y5- POT  
 SHEET 1 OF 4 BRIDGE NO. 244

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING**  
 BRIDGE ON -L- (I-73/74)  
 OVER -Y5- (SR 1005)  
 BETWEEN SR 1141 & SR 1303  
**LEFT LANE**

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

DWG. NO. BL-1





### FOUNDATION LAYOUT

ALL PILES AT END BENT 1 AND END BENT 2 ARE HP 14 X 73.  
 DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE.

### NOTES

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 145 TONS PER PILE. DRIVE PILES TO A REQUIRED DRIVING RESISTANCE OF 245 TONS PER PILE.
- TESTING THE PILES WITH PDA DURING DRIVING, RESTRIKING, OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FEET OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO.1 AND 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**

BRIDGE ON -L- (I-73/74)  
 OVER -Y5- (SR 1005)  
 BETWEEN SR 1141 & SR 1303

LEFT LANE

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333

Professional Engineer Seal for L. Kevin Austin, State of North Carolina, License No. 72783, dated 6/11/2019.

DRAWN BY :	W. B. ALLEN	DATE :	7/15
CHECKED BY :	Z. H. BROWN	DATE :	8/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

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 UNLESS ALL SIGNATURES COMPLETED**

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

DWG. NO. BL-2

6/10/2019 3:25:50 PM R:\Structures\Left Lane\R3421B\LEFT\_SMU\_FL\_01.dgn

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 2.

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

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

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

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

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

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

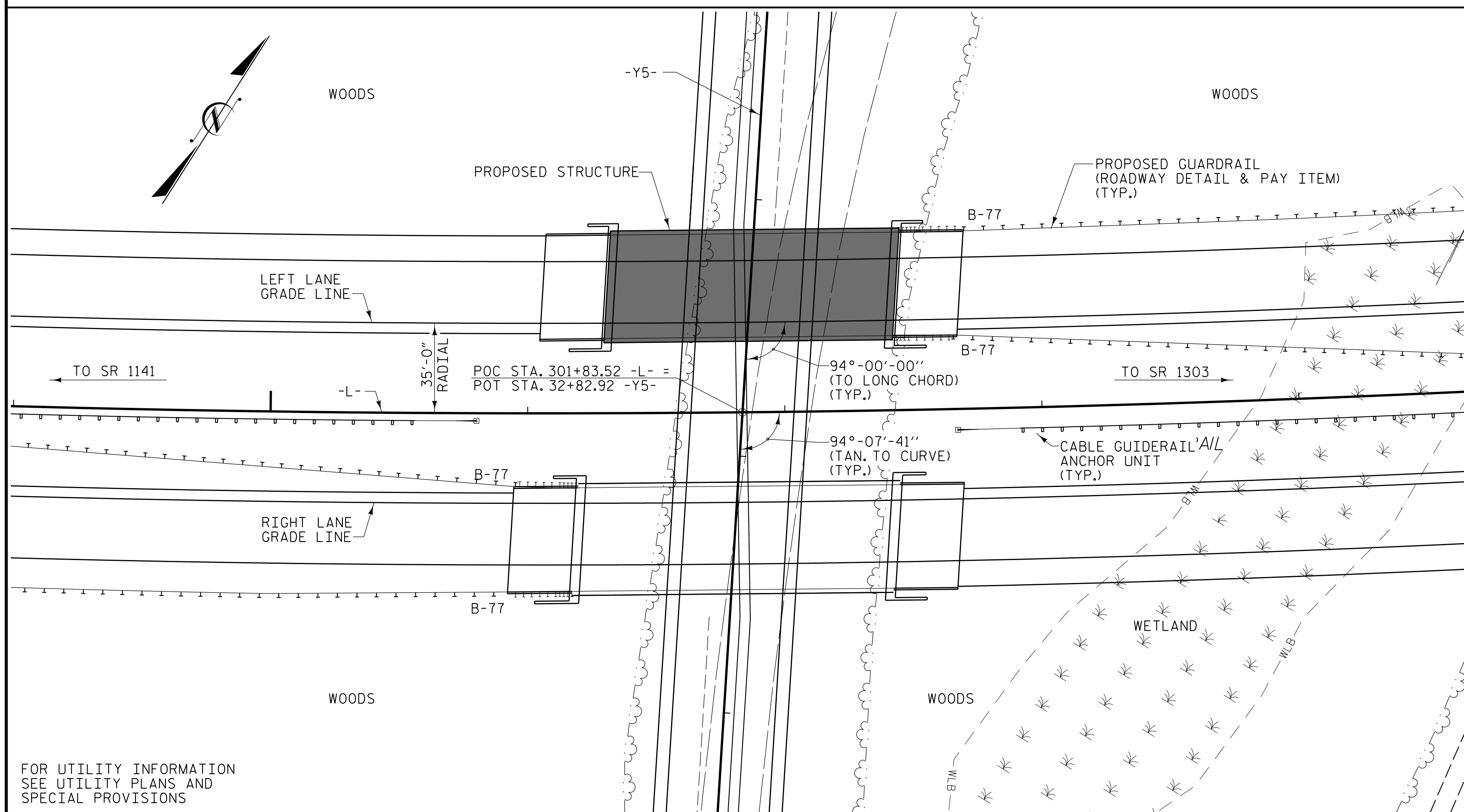
NEEDLE BEAMS WILL NOT BE ALLOWED UNLESS OTHERWISE CALLED FOR ON THE PLANS OR APPROVED BY THE ENGINEER.

FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.

TOTAL BILL OF MATERIAL

	PDA TESTING	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	MODIFIED 72" PRESTRESSED CONCRETE GIRDERS		PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES	HP 14 X 73 STEEL PILES		CONCRETE BARRIER RAIL	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
	EACH	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	NO.	FEET	EACH	NO.	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE		4952	6003		LUMP SUM		5	557.50				224.33		LUMP SUM
END BENT 1				46.6		6850			8	8	400		300	
END BENT 2				46.7		6850			8	8	360		312	
TOTAL	1	4952	6003	93.3	LUMP SUM	13,700	5	557.50	16	16	760	224.33	612	LUMP SUM

BM #24: R/R SPIKE ON BASE OF 20" PINE; 193.54' LEFT OF STA. 315+96.71 -L-, ELEVATION 354.26'



LOCATION SKETCH

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 BRIDGE ON -L- (I-73/74)  
 OVER -Y5- (SR 1005)  
 BETWEEN SR 1141 & SR 1303

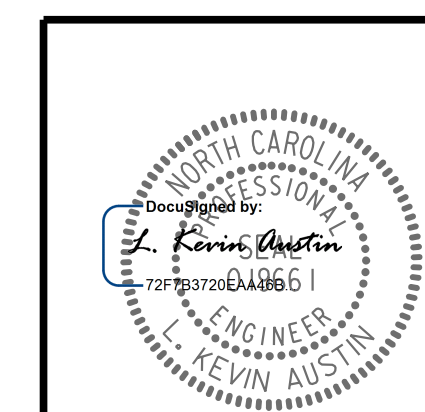
LEFT LANE

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:	SHEET NO.
1			3			S7-3
2			4			TOTAL SHEETS 25

PLANS PREPARED BY:

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DWG. NO. BL-3

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FOR UTILITY INFORMATION  
 SEE UTILITY PLANS AND  
 SPECIAL PROVISIONS

DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15



LOAD FACTORS:

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

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 ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)
DESIGN LOAD RATING		HL-93 (INVENTORY)	N/A	①	1.30	--	1.75	0.855	1.36	A	ER	55.04	0.893	1.48	A	I	99.07	0.80	0.855	1.30	A	ER	55.04	
		HL-93 (OPERATING)	N/A		1.76	--	1.35	0.855	1.76	A	ER	55.04	0.893	1.96	A	I	99.07	N/A	--	--	--	--	--	
		HS-20 (INVENTORY)	36.000	②	1.86	66.96	1.75	0.855	1.94	A	ER	55.04	0.893	2.07	A	I	11.01	0.80	0.855	1.86	A	ER	55.04	
		HS-20 (OPERATING)	36.000		2.52	90.72	1.35	0.855	2.52	A	ER	55.04	0.893	2.72	A	I	99.07	N/A	--	--	--	--	--	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		4.83	60.38	1.40	0.855	6.33	A	ER	55.04	0.893	7.26	A	I	99.07	0.80	0.855	4.83	A	ER	55.04	
		S3C	21.500		2.82	60.63	1.40	0.855	3.70	A	ER	55.04	0.893	4.20	A	I	11.01	0.80	0.855	2.82	A	ER	55.04	
		S3A	22.750		2.67	60.74	1.40	0.855	3.50	A	ER	55.04	0.893	3.97	A	I	99.07	0.80	0.855	2.67	A	ER	55.04	
		S4A	26.750		2.34	62.60	1.40	0.855	3.06	A	ER	55.04	0.893	3.43	A	I	11.01	0.80	0.855	2.34	A	ER	55.04	
		S5A	30.500		2.06	62.83	1.40	0.855	2.69	A	ER	55.04	0.893	3.09	A	I	11.01	0.80	0.855	2.06	A	ER	55.04	
		S6A	34.500		1.86	64.17	1.40	0.855	2.43	A	ER	55.04	0.893	2.76	A	I	11.01	0.80	0.855	1.86	A	ER	55.04	
		S7B	38.500		1.68	64.68	1.40	0.855	2.20	A	ER	55.04	0.893	2.54	A	I	11.01	0.80	0.855	1.68	A	ER	55.04	
		S7A	40.000	③	1.65	66.00	1.40	0.855	2.16	A	ER	55.04	0.893	2.56	A	I	11.01	0.80	0.855	1.65	A	ER	55.04	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.28	64.41	1.40	0.855	2.98	A	ER	55.04	0.893	3.30	A	I	99.07	0.80	0.855	2.28	A	ER	55.04	
		T5B	32.000		2.01	64.32	1.40	0.855	2.62	A	ER	55.04	0.893	3.07	A	I	11.01	0.80	0.855	2.01	A	ER	55.04	
		T6A	36.000		1.83	65.88	1.40	0.855	2.39	A	ER	55.04	0.893	2.78	A	I	99.07	0.80	0.855	1.83	A	ER	55.04	
		T7A	40.000		1.68	67.20	1.40	0.855	2.20	A	ER	55.04	0.893	2.55	A	I	11.01	0.80	0.855	1.68	A	ER	55.04	
	T7B	40.000		1.76	70.40	1.40	0.855	2.31	A	ER	55.04	0.893	2.44	A	I	99.07	0.80	0.855	1.76	A	ER	55.04		

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)

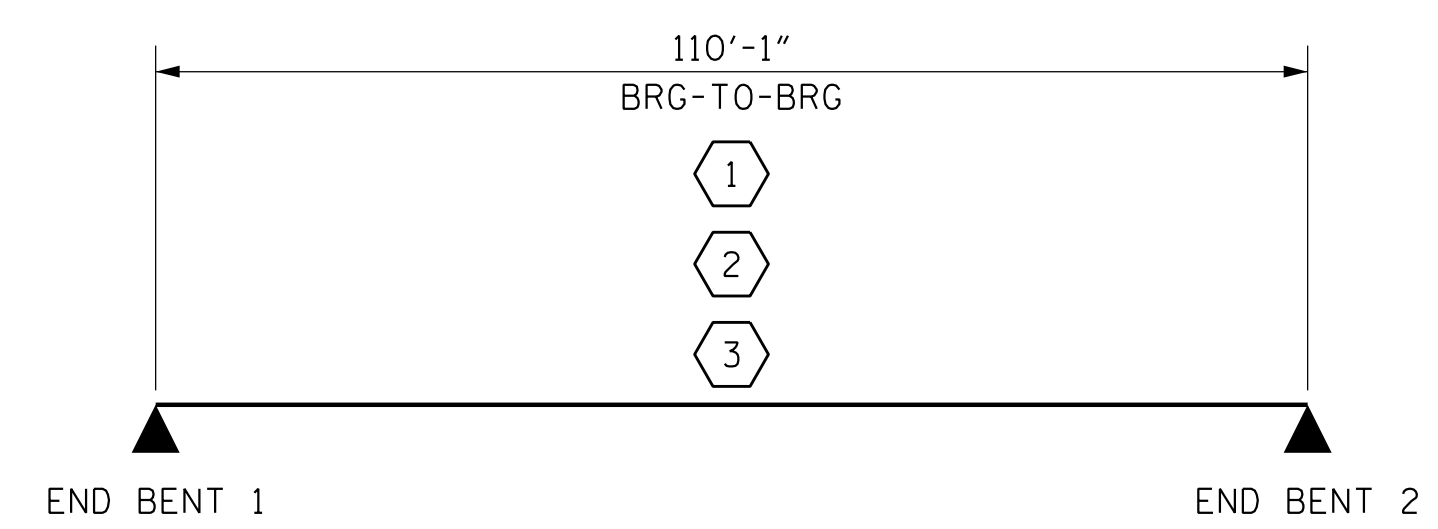
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 4 OF 4

PLANS PREPARED BY:

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THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*Kevin Austin*  
 PROFESSIONAL ENGINEER  
 NORTH CAROLINA  
 License # 17873

6/11/2019

DWG. NO. BL-4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S7-4
1			3			TOTAL SHEETS
2			4			25

6/7/2019 3:55:37 PM R:\Structures\Left\LRFR\SUMMARY.LRFR.Dwg

ASSEMBLED BY : W. B. ALLEN DATE : 3/19  
 CHECKED BY : Z. H. BROWN DATE : 4/19

DRAWN BY : MAA 1/08 REV. 11/12/08RR MAA/GM  
 CHECKED BY : GM/DI 2/08 REV. 10/1/11 MAA/GM  
 REV. 12/17 MAA/THC

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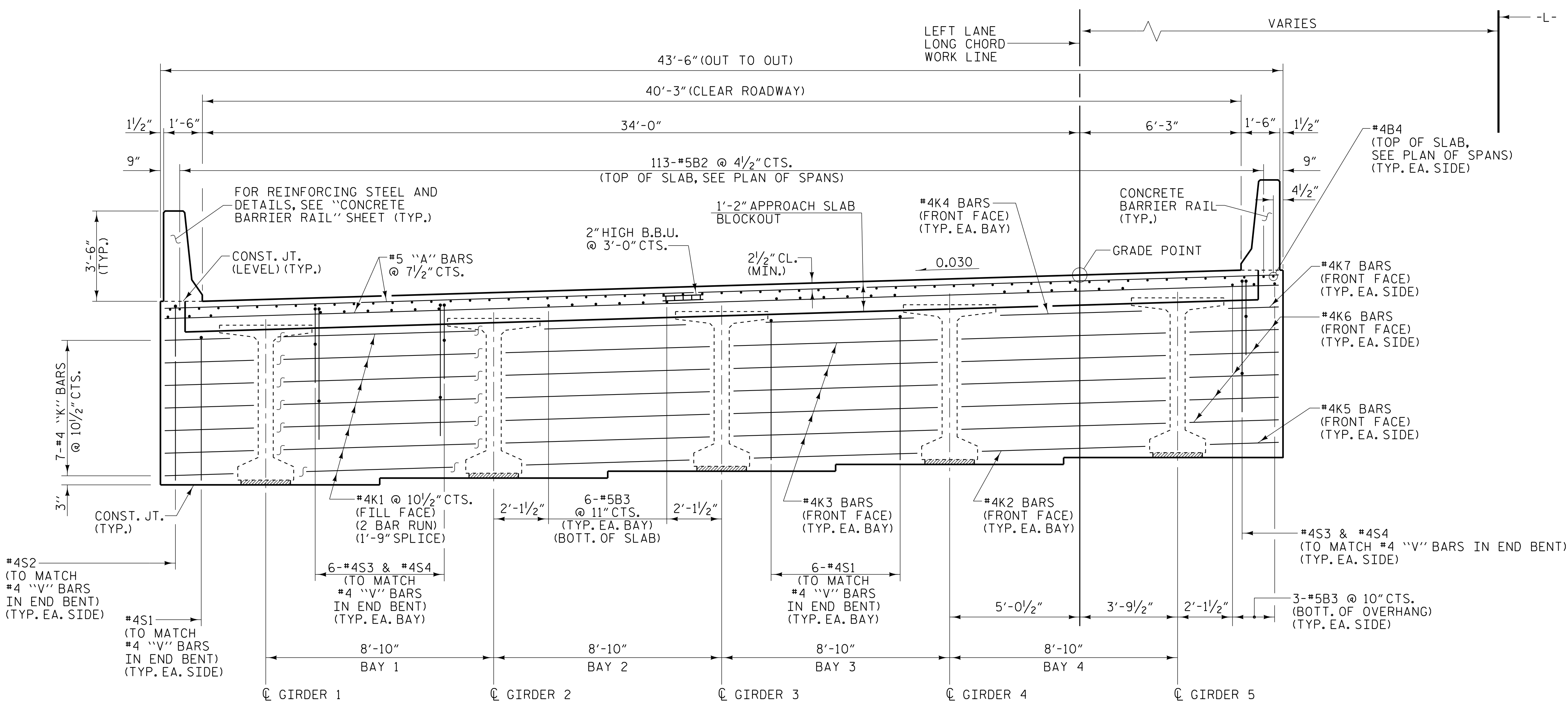
**NOTES**

PROVIDE 1 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

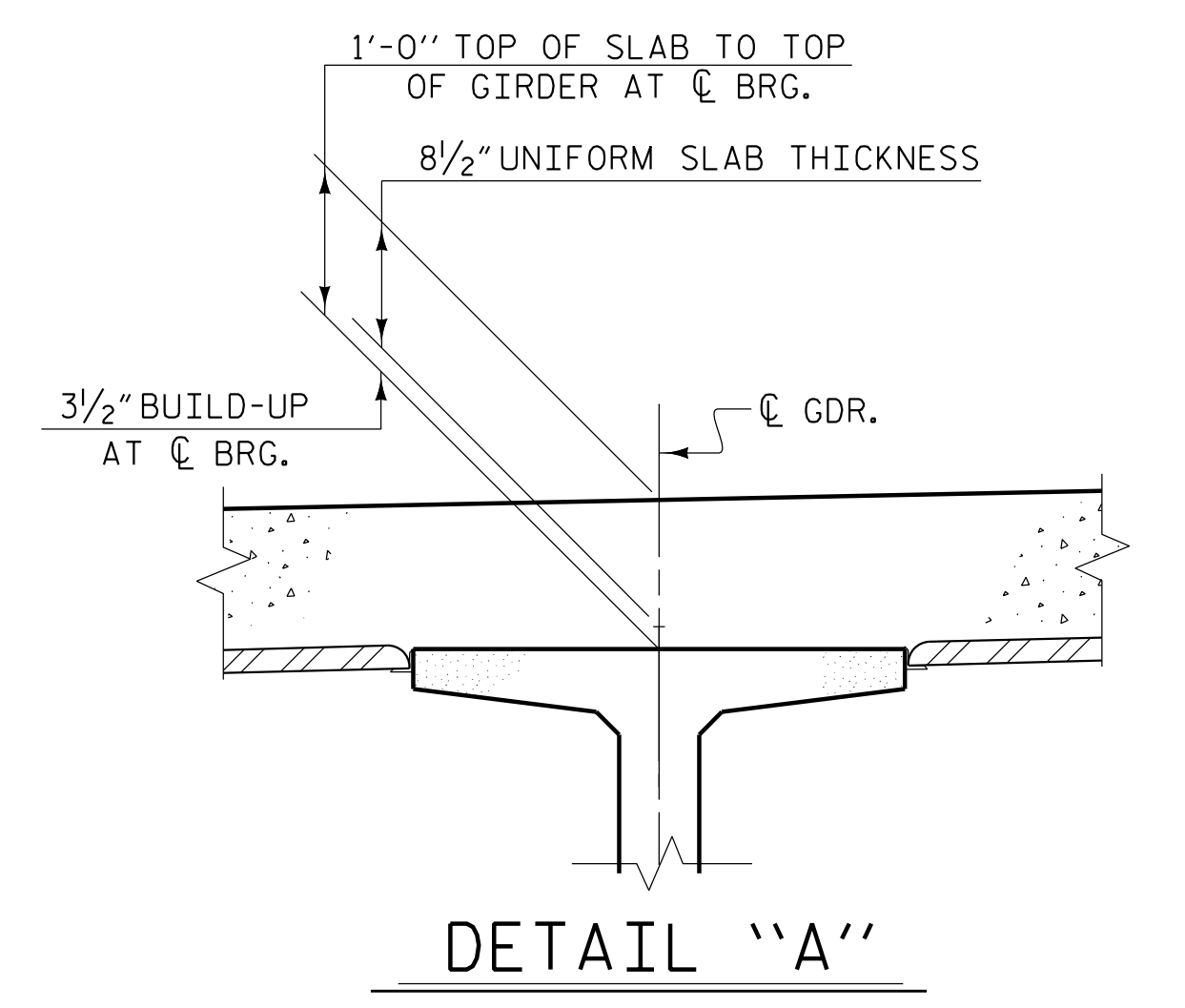
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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

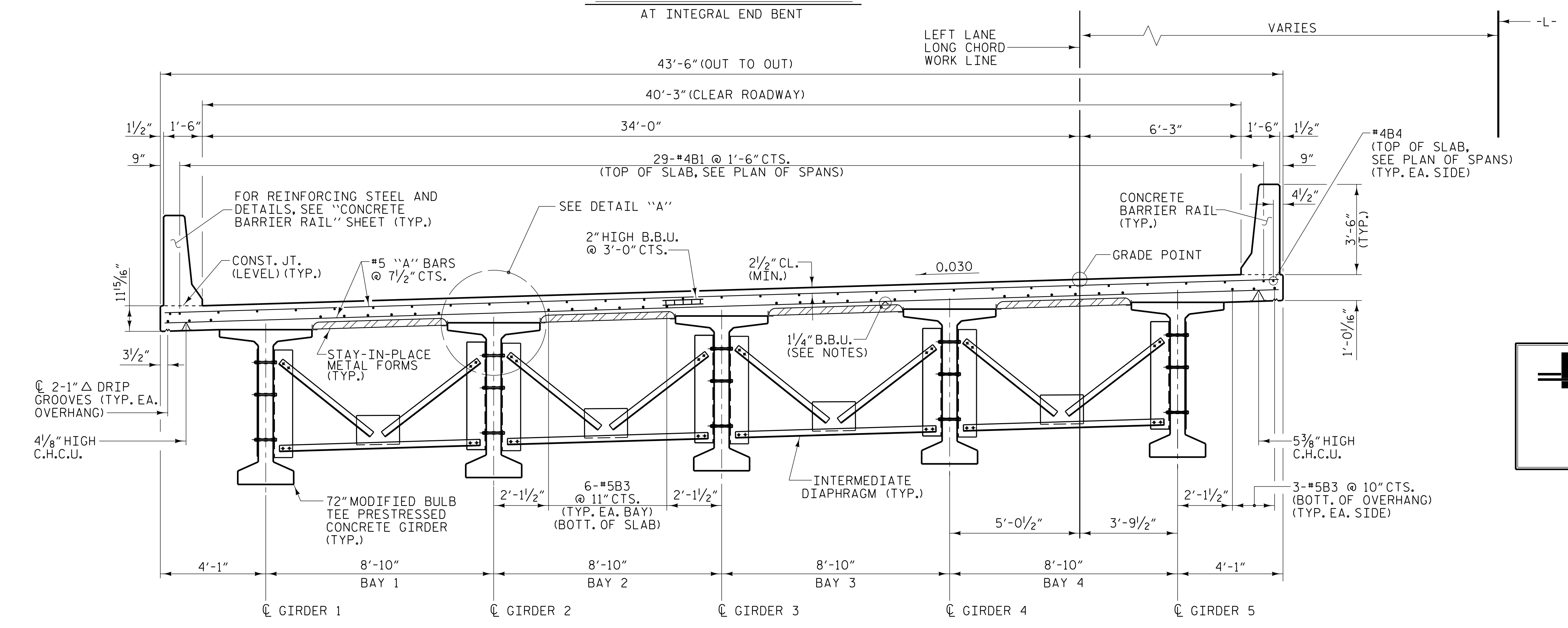
BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.



**TYPICAL SECTION**  
AT INTEGRAL END BENT

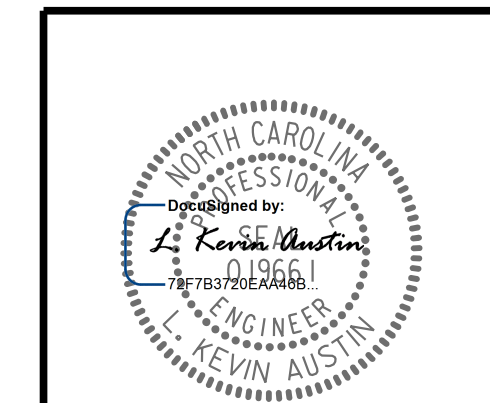


**DETAIL "A"**



**TYPICAL SECTION**  
SHOWING INTERMEDIATE DIAPHRAGM

PLANS PREPARED BY:  
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PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

SHEET 1 OF 2  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
**TYPICAL SECTION**  
LEFT LANE

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

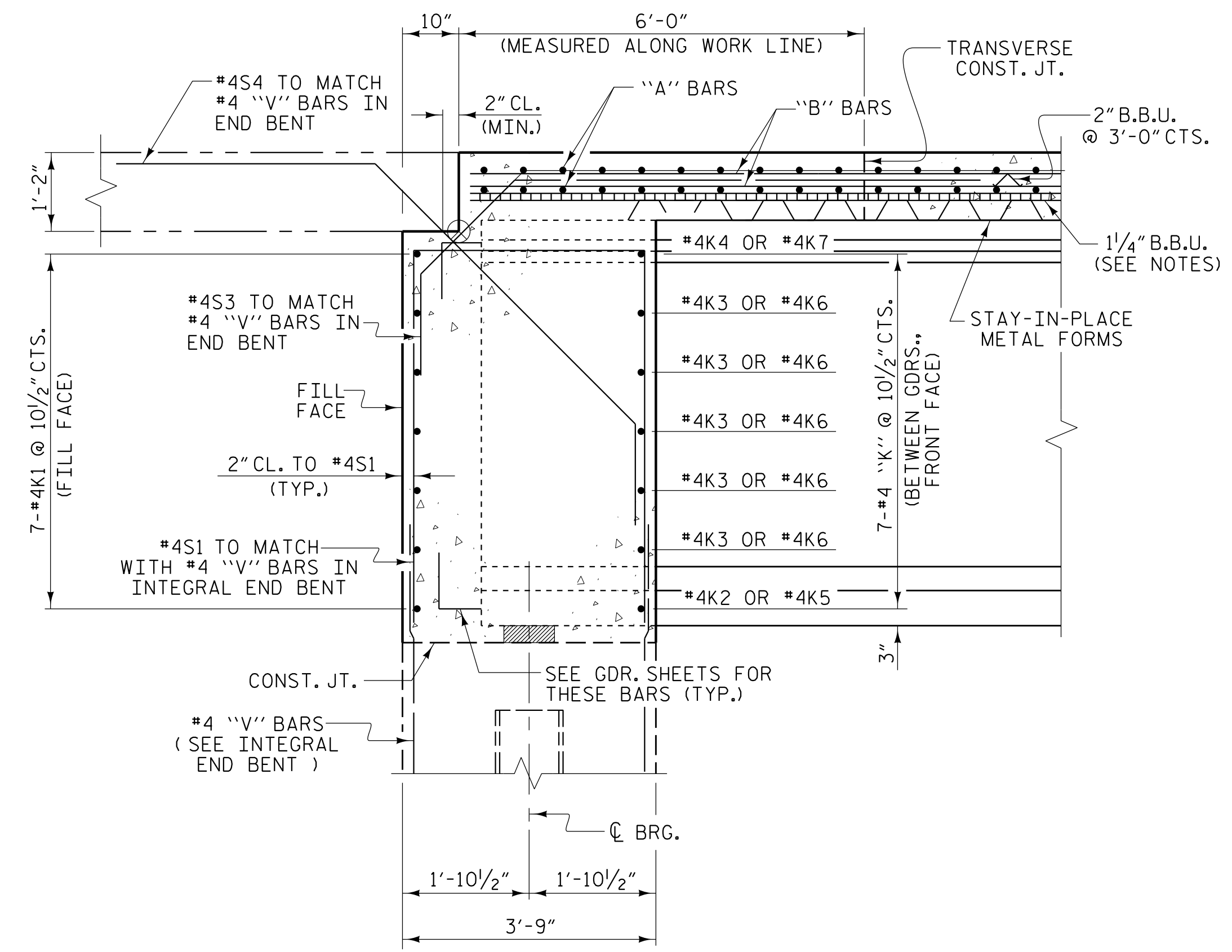
DRAWN BY : W. B. ALLEN DATE : 5/15  
CHECKED BY : Z. H. BROWN DATE : 6/15  
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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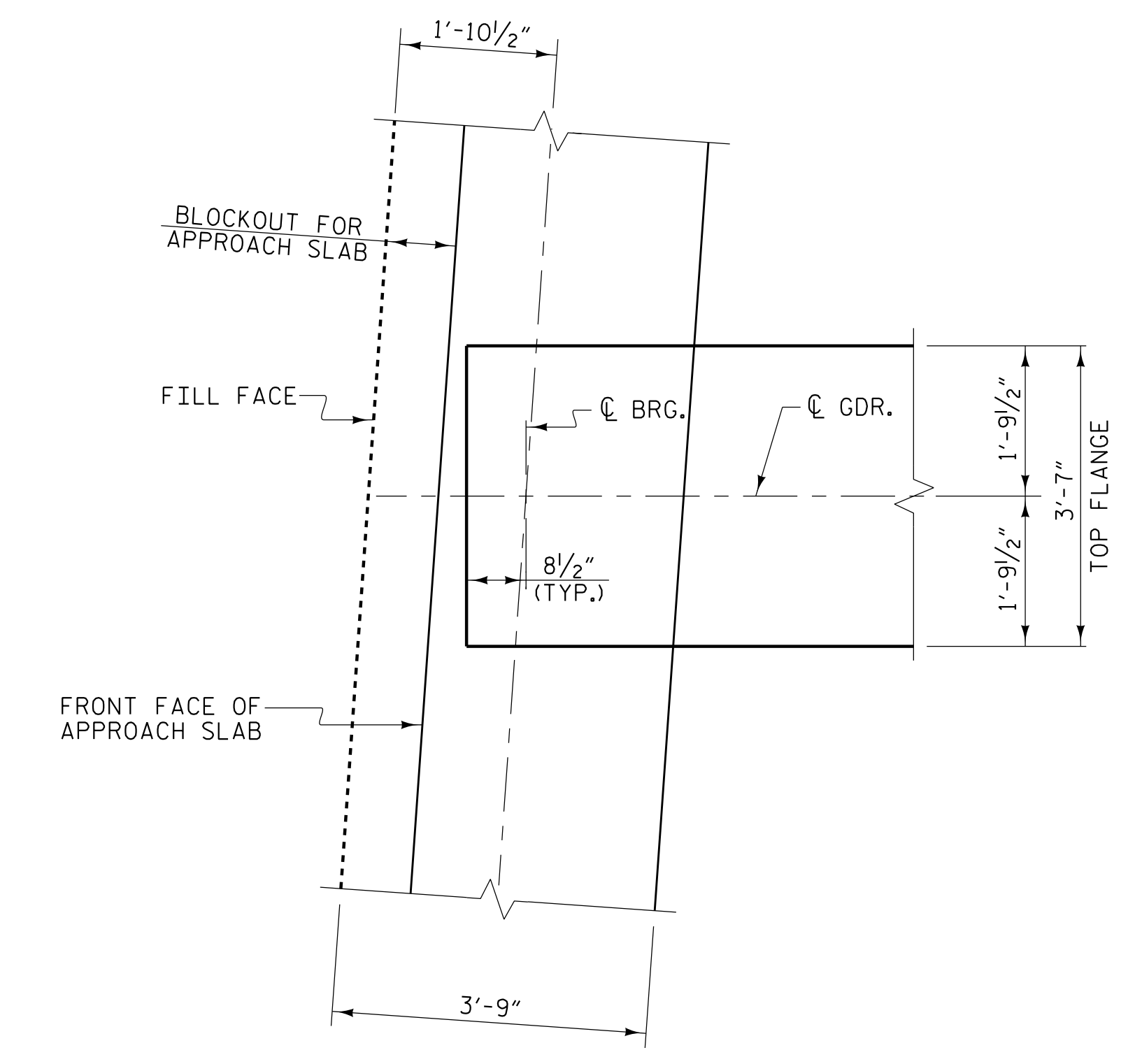
6/11/2019  
DWG. NO. BL-5

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SECTION THRU INTEGRAL END BENTS



PLAN OF GIRDER AT END BENT

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DRAWN BY : W. B. ALLEN DATE : 5/15  
 CHECKED BY : Z. H. BROWN DATE : 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

PLANS PREPARED BY:

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6/11/2019

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

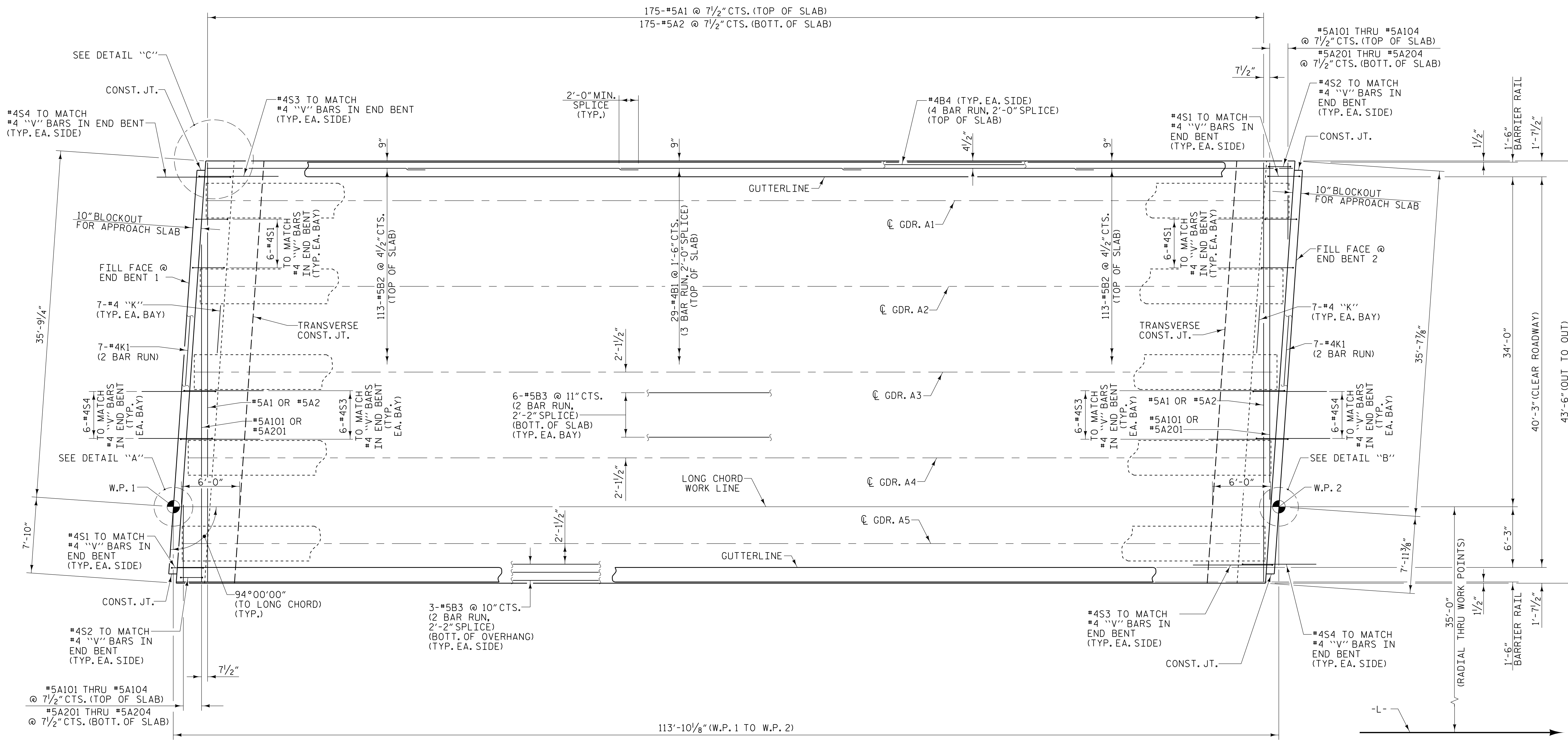
SUPERSTRUCTURE  
 TYPICAL SECTION  
 DETAILS

LEFT LANE

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

DWG. NO. BL- 6

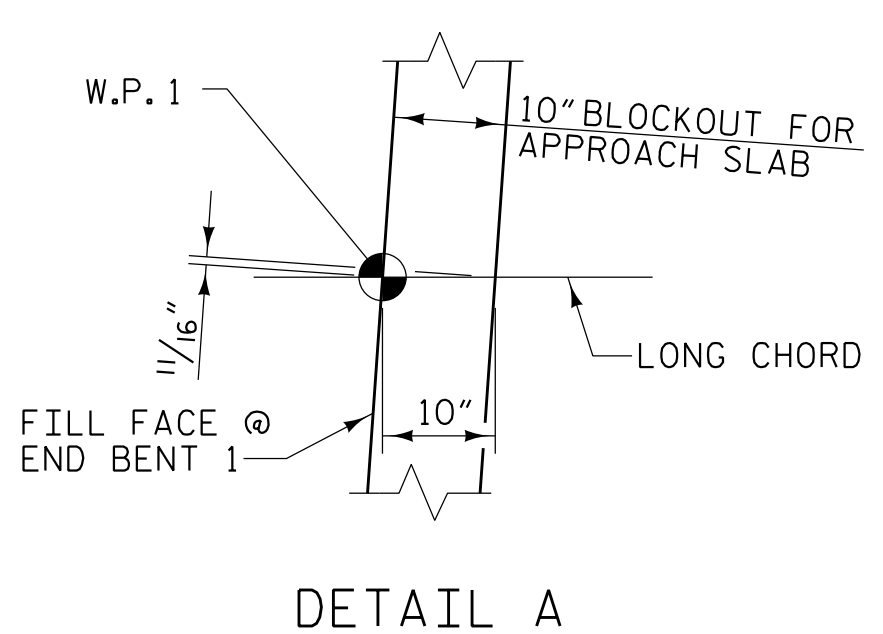


**SPAN A**

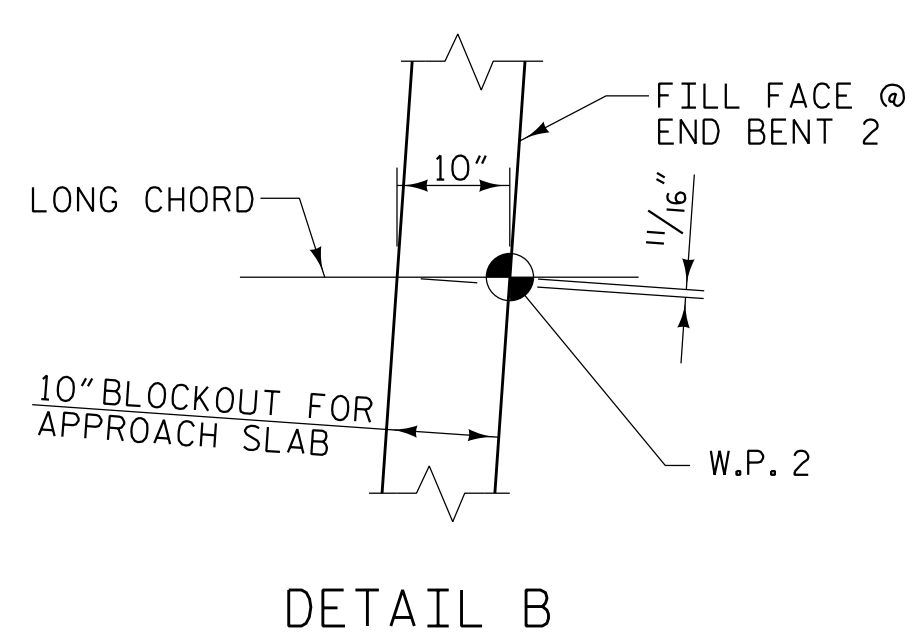
**NOTES**

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.  
 FOR POUR SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

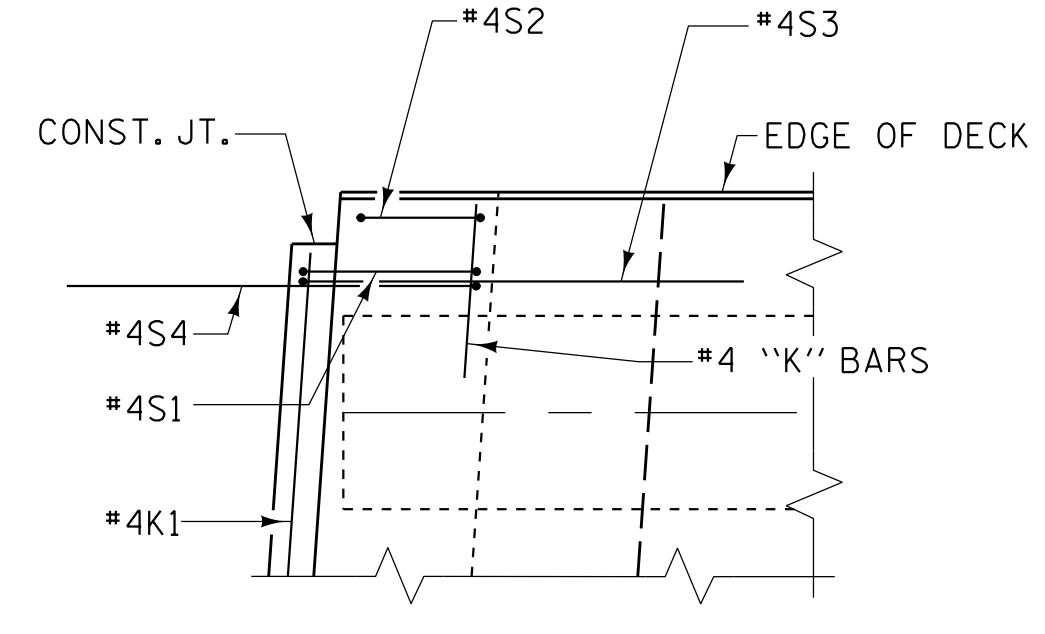
PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-



**DETAIL A**



**DETAIL B**



**DETAIL C**  
(ALL CORNERS SIMILAR)

PLANS PREPARED BY:  
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STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPAN A  
 LEFT LANE

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

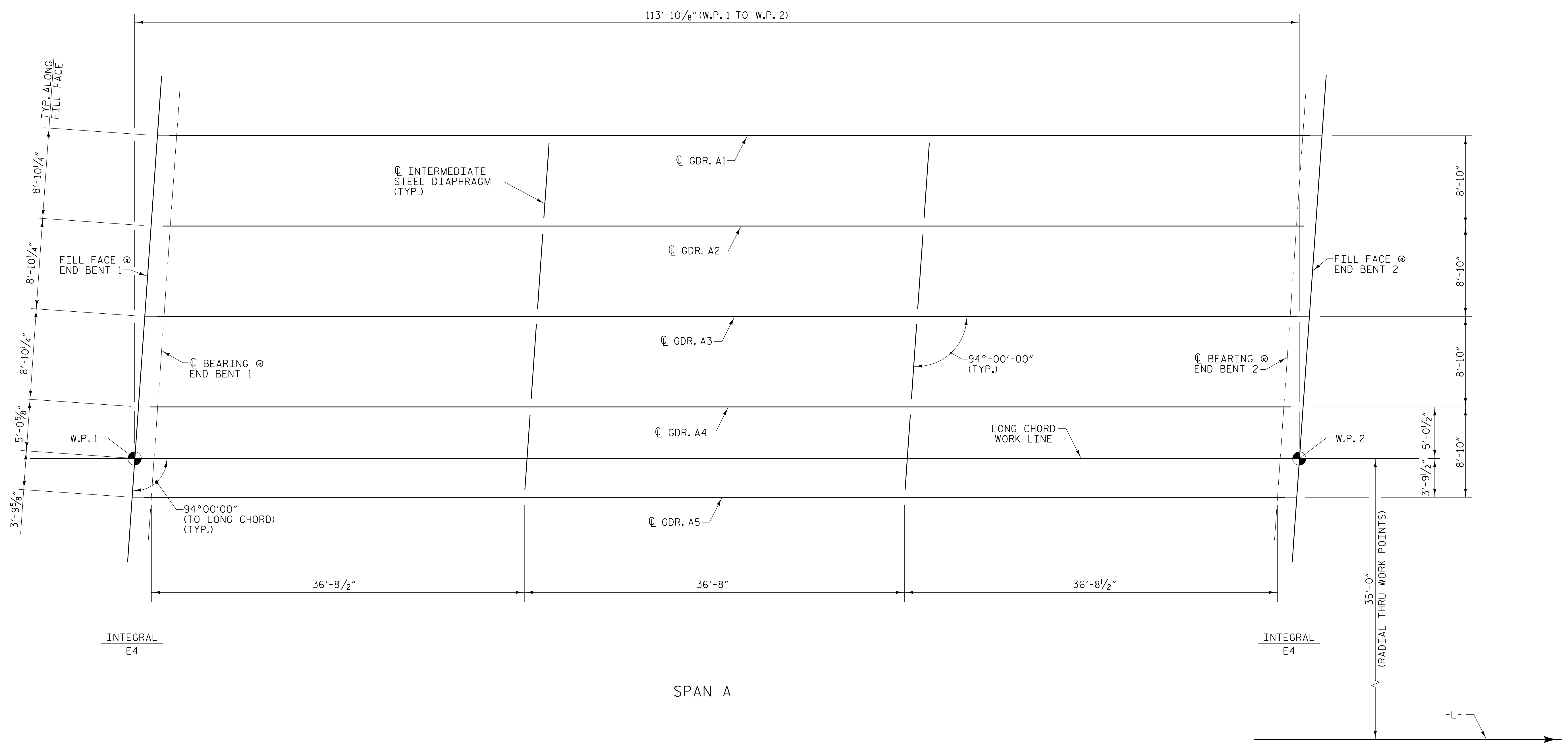
DRAWN BY : W. B. ALLEN DATE : 5/15  
 CHECKED BY : Z. H. BROWN DATE : 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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DWG. NO. BL-7

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### FRAMING PLAN

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

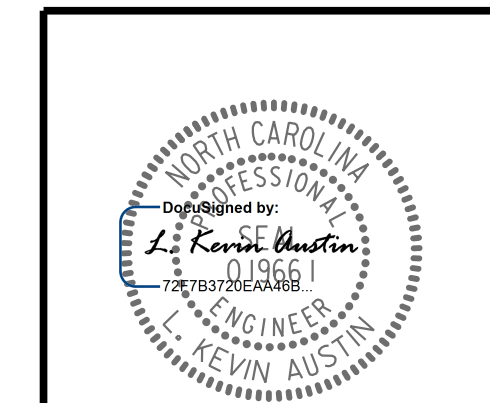
PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 FRAMING PLAN  
 LEFT LANE

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

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 CARY, NC 27518  
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 CALYXengineers.com  
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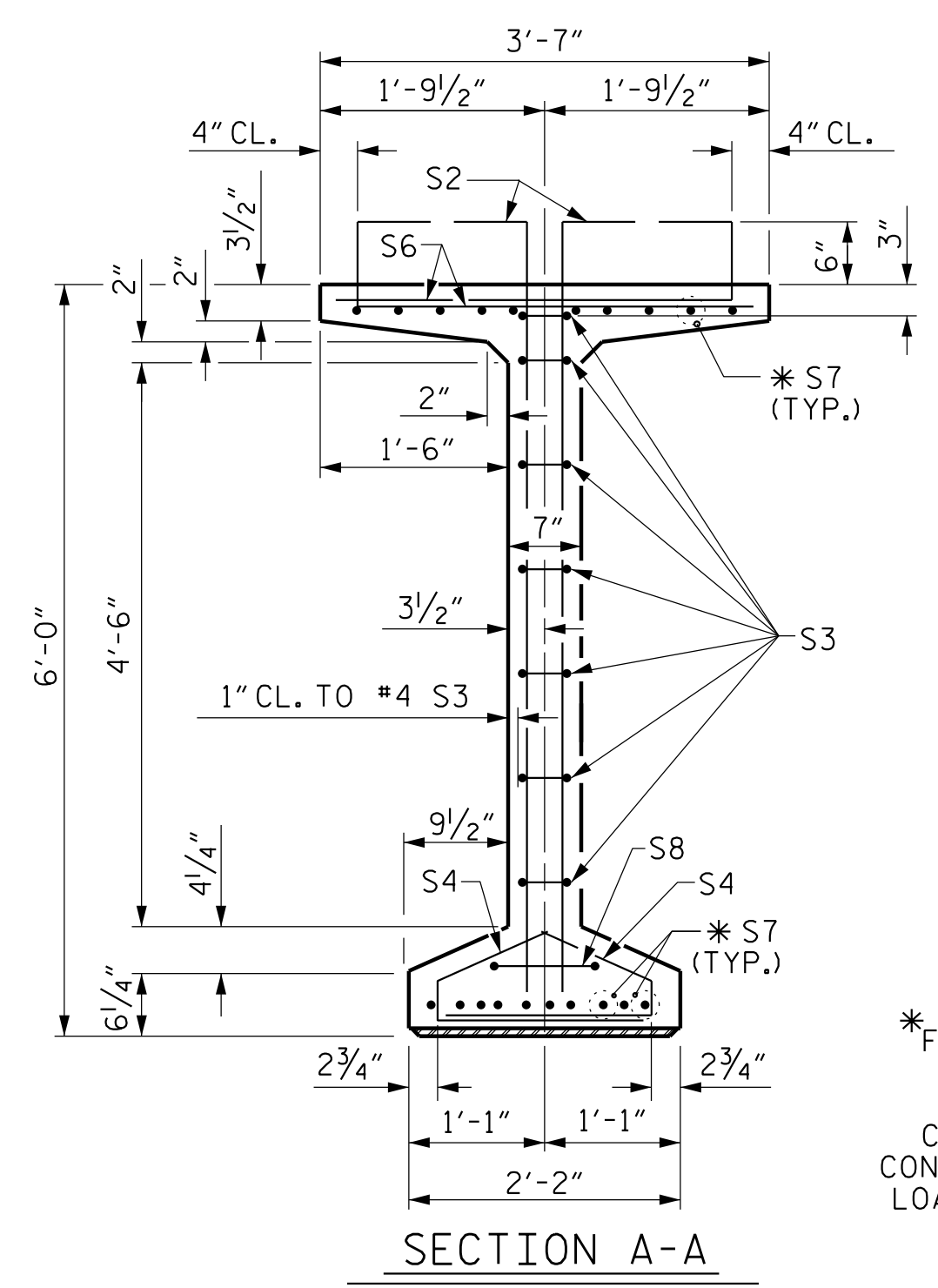
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			25
2			4			

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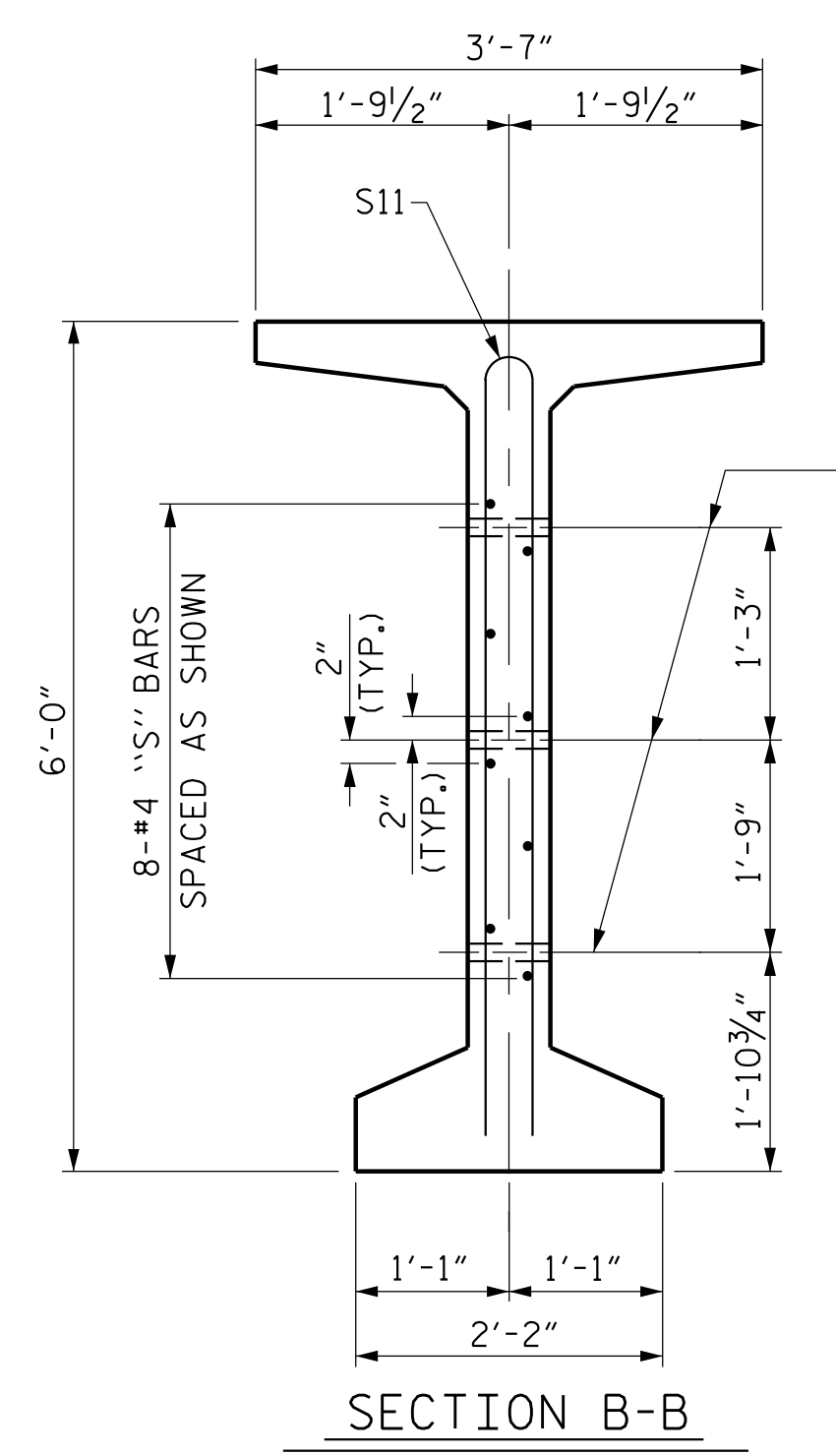
DWG. NO. BL-8

DRAWN BY :	W. B. ALLEN	DATE :	5/15
CHECKED BY :	Z. H. BROWN	DATE :	6/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

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SECTION A-A



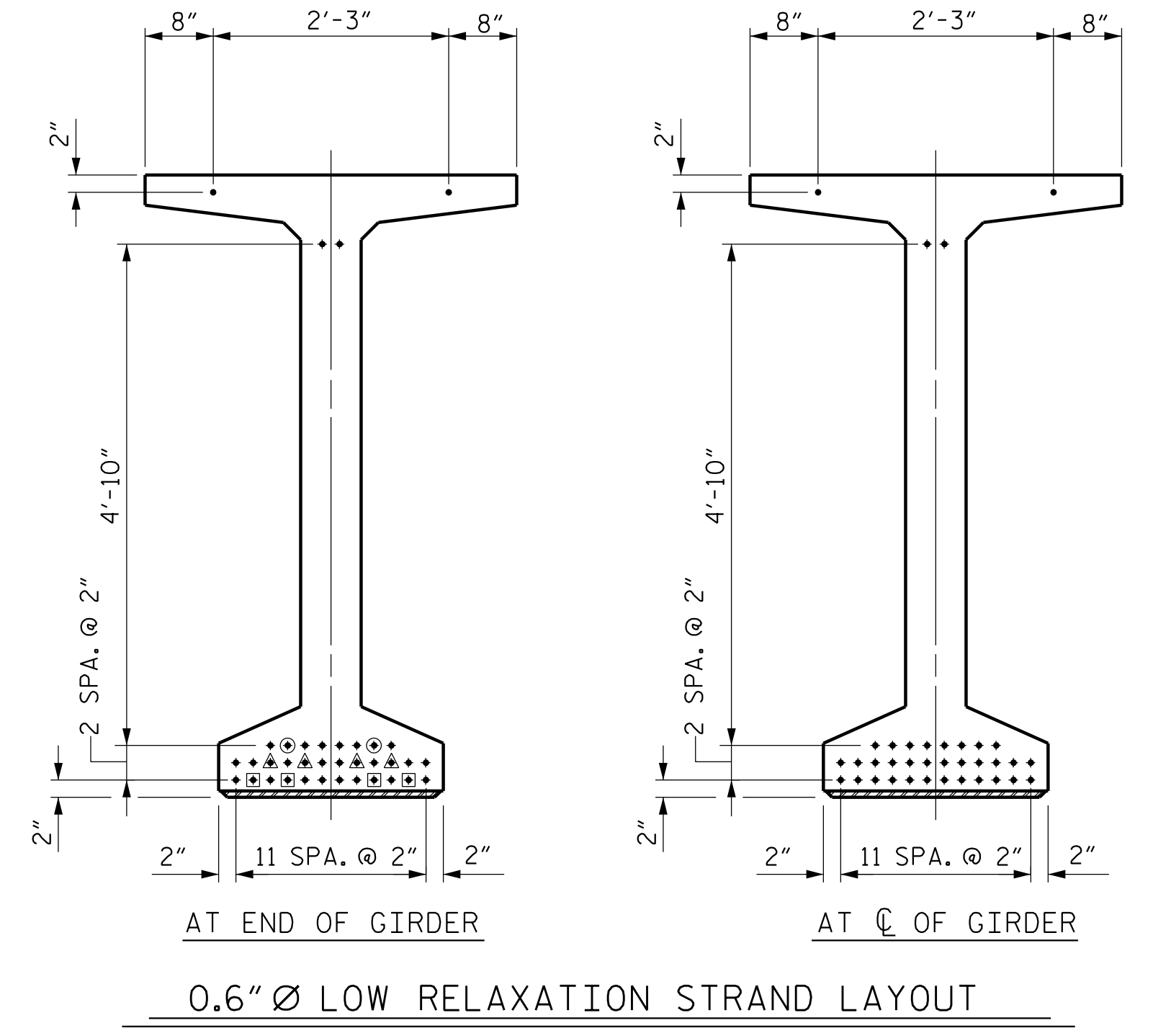
SECTION B-B

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

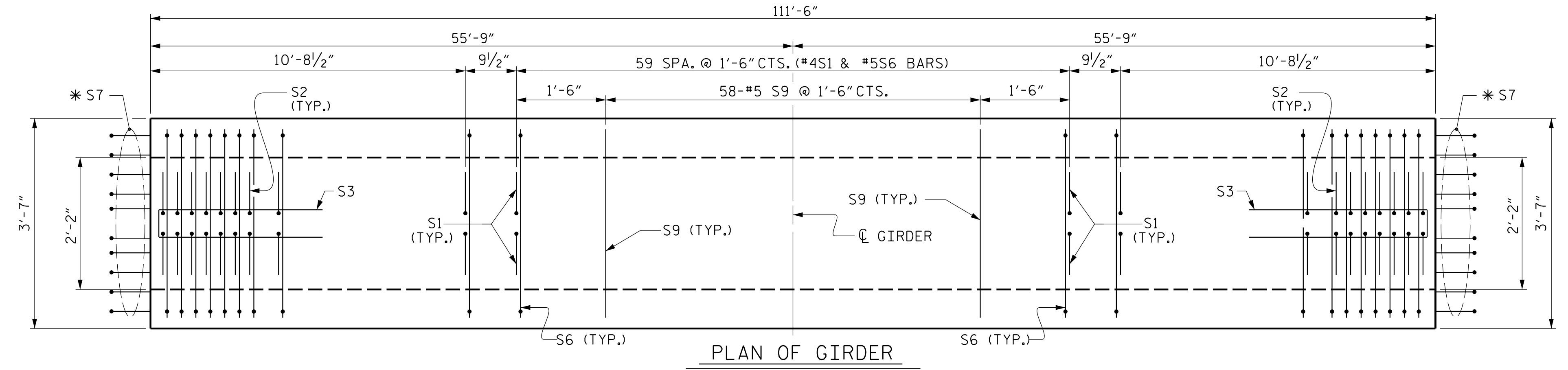
1/2" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

DEBONDING LEGEND

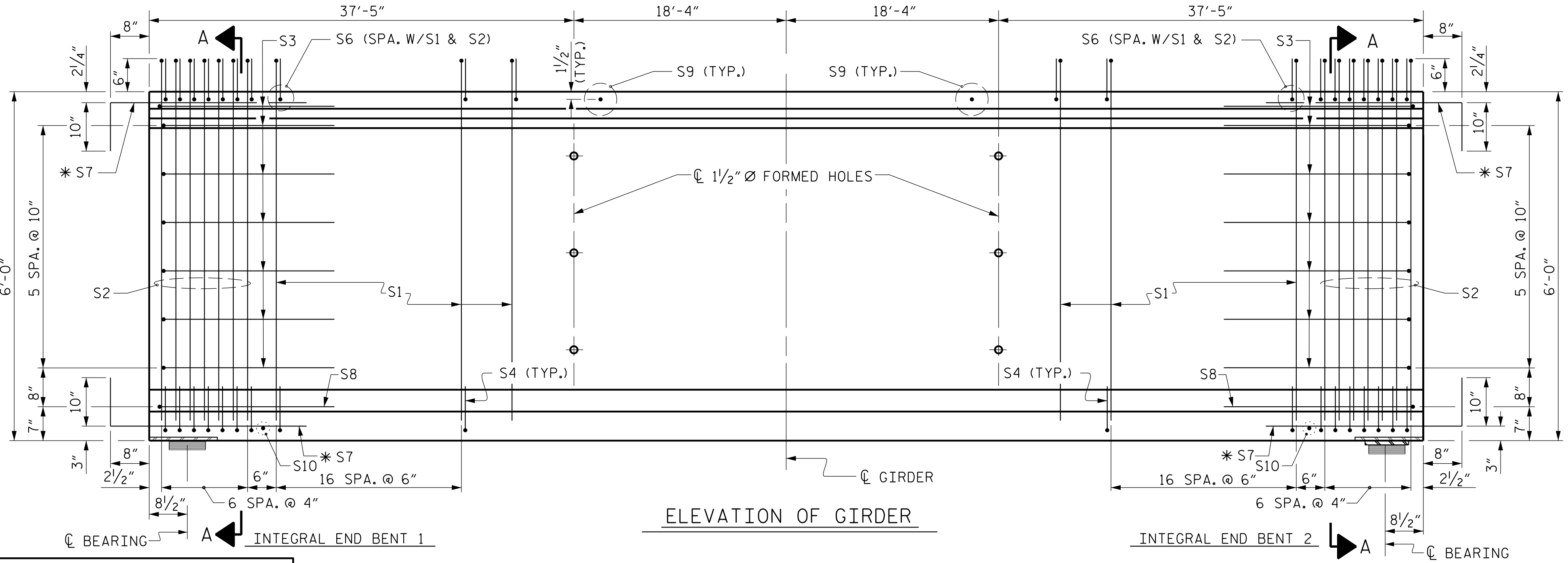
- FULLY BONDED STRANDS
- ◻ STRANDS DEBONDED FOR 8'-0" FROM END OF GIRDER
- ▲ STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
- STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER



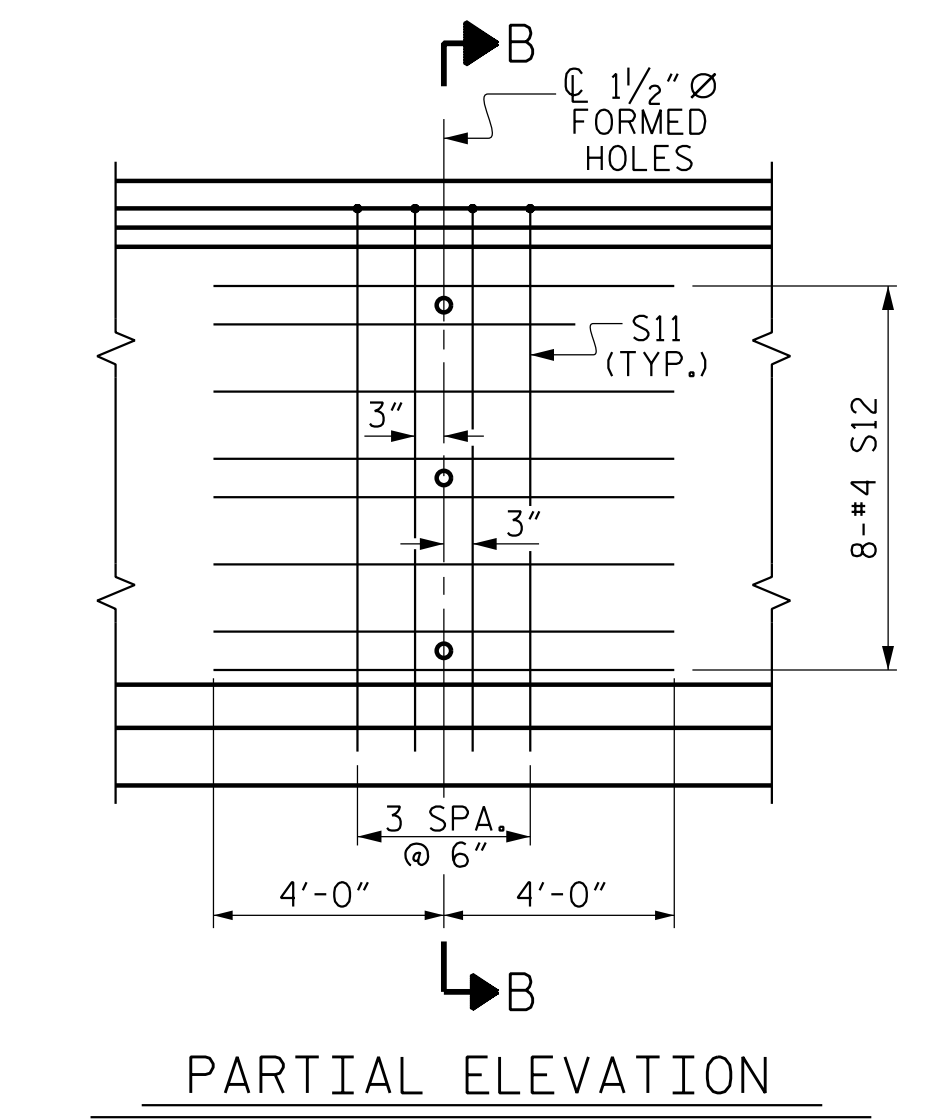
0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

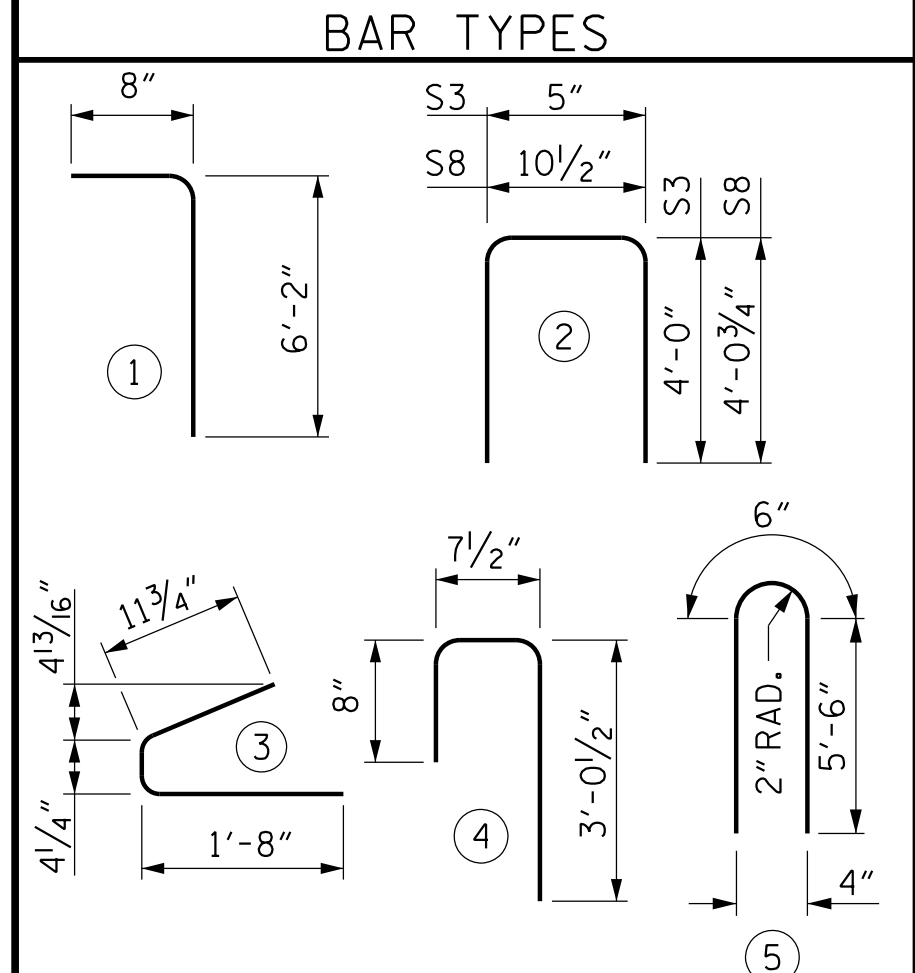


PARTIAL ELEVATION  
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER

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	188	#4	1	6'-10"	858
S2	28	#5	1	6'-10"	200
S3	14	#4	2	8'-5"	79
S4	96	#4	3	3'-0"	192
S6	216	#5	4	4'-4"	976
*S7	40	#5	STR	3'-8"	153
S8	2	#5	2	9'-0"	19
S9	58	#5	STR	3'-3"	197
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86

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



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.
2857	23.9	36

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
5	111'-6"	557'-6"

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 72" PRESTRESSED CONCRETE  
 MODIFIED BULB TEE  
 CONTINUOUS FOR LIVE LOAD  
 LEFT LANE

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*Kevin Austin*  
 L. ENGINEER  
 7/27/2019

6/11/2019

DWG. NO. BL-9

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : EEM 2/6/97	REV. 6/13
CHECKED BY : VAP 2/6/97	REV. 1/15
	REV. 12/17
MAA/GM	
MAA/TMG	
MAA/THC	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S7-9
1			3			TOTAL SHEETS
2			4			25



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 7200 PSI.

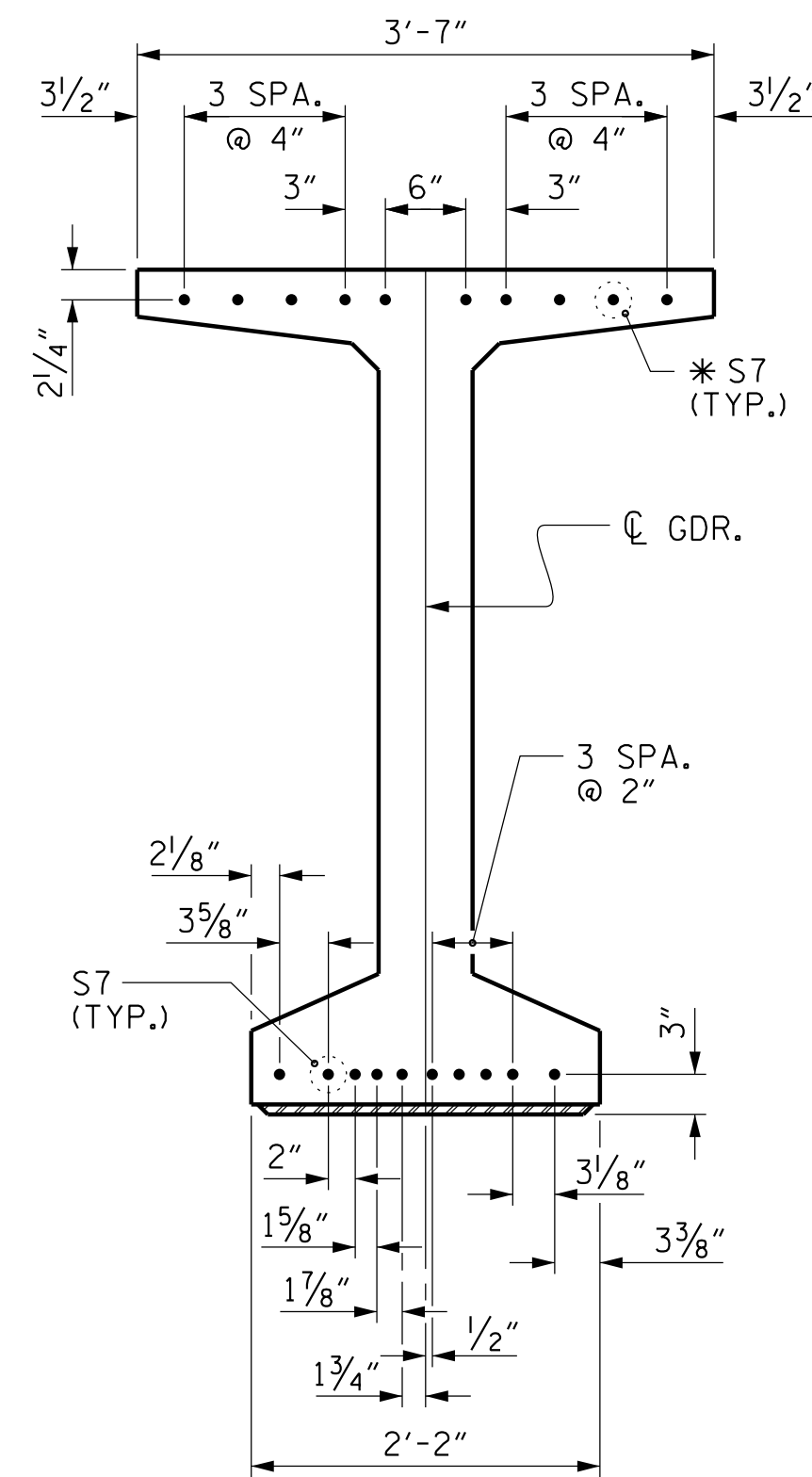
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

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

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

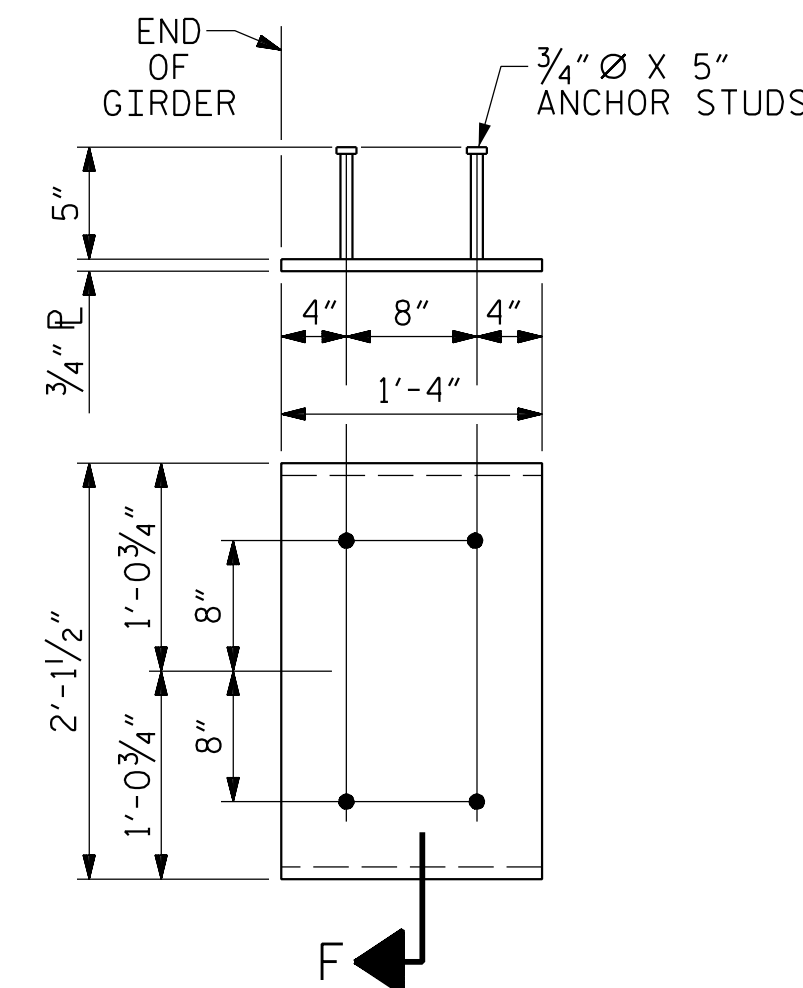
A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63" AND 72" MODIFIED BULB TEES ONLY.

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



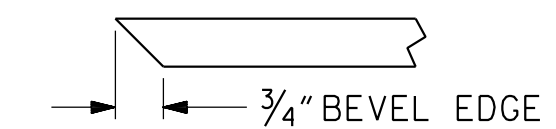
DETAIL "C"

(FOR 72" MODIFIED BULB TEES)



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

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

DEAD LOAD DEFLECTION TABLE FOR GIRDERS - SPAN A

0.6" Ø LOW RELAXATION	GIRDERS 1 & 5																				
	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
TWENTIETH POINTS	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.033	0.066	0.096	0.124	0.149	0.170	0.187	0.199	0.207	0.209	0.207	0.199	0.187	0.170	0.149	0.124	0.096	0.066	0.033	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.019	0.038	0.055	0.073	0.087	0.102	0.111	0.119	0.123	0.126	0.123	0.119	0.111	0.102	0.087	0.073	0.055	0.038	0.019	0.0
FINAL CAMBER ↑	0.0	3/16"	5/16"	1/2"	5/8"	11/16"	13/16"	7/8"	15/16"	1"	1"	1"	15/16"	7/8"	13/16"	11/16"	5/8"	1/2"	3/16"	3/16"	0.0
0.6" Ø LOW RELAXATION	GIRDERS 2 - 4																				
	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
TWENTIETH POINTS	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.033	0.066	0.096	0.124	0.149	0.170	0.187	0.199	0.207	0.209	0.207	0.199	0.187	0.170	0.149	0.124	0.096	0.066	0.033	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.018	0.037	0.054	0.072	0.085	0.099	0.108	0.117	0.120	0.122	0.120	0.117	0.108	0.099	0.085	0.072	0.054	0.037	0.018	0.0
FINAL CAMBER ↑	0.0	3/16"	3/8"	1/2"	5/8"	3/4"	7/8"	15/16"	1"	1"	1 1/16"	1"	1"	15/16"	7/8"	3/4"	5/8"	1/2"	3/8"	3/16"	0.0

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 PRESTRESSED CONCRETE GIRDER  
 CONTINUOUS FOR LIVE LOAD  
 DETAILS  
 LEFT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S7-10
1			3			TOTAL SHEETS
2			4			25

PLANS PREPARED BY:  
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 CALYXengineers.com  
 NC License # F-1333

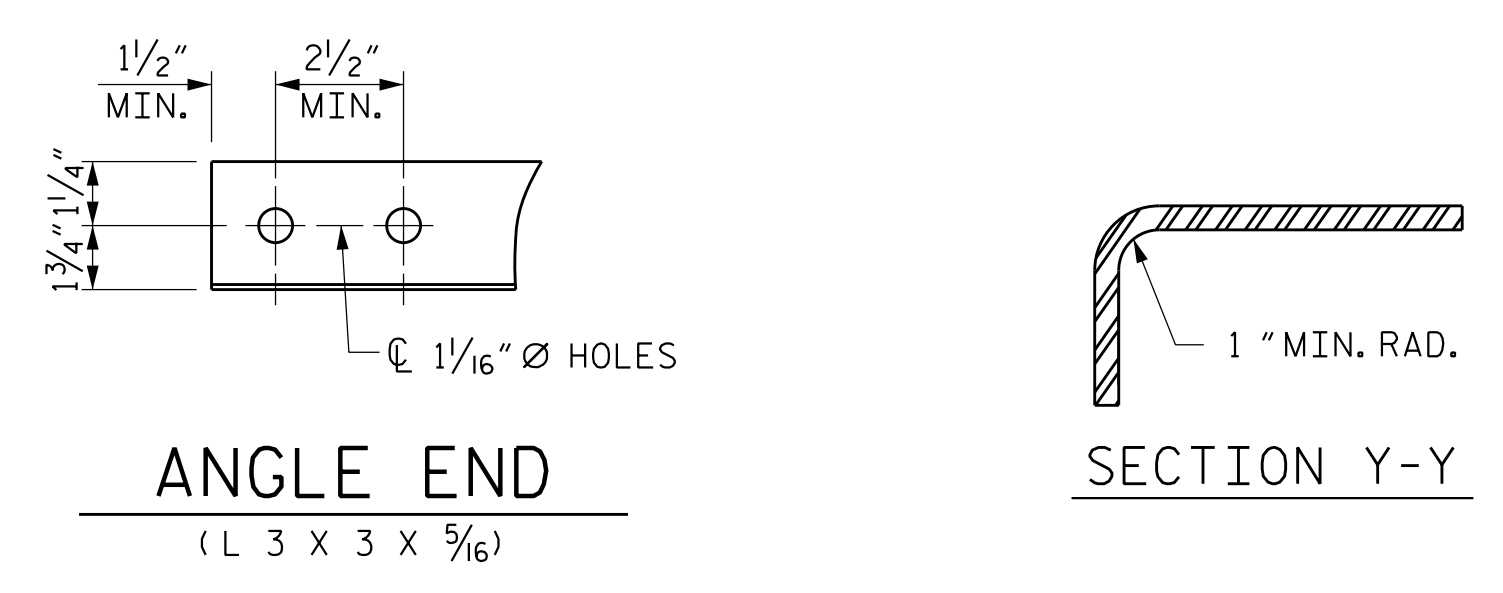
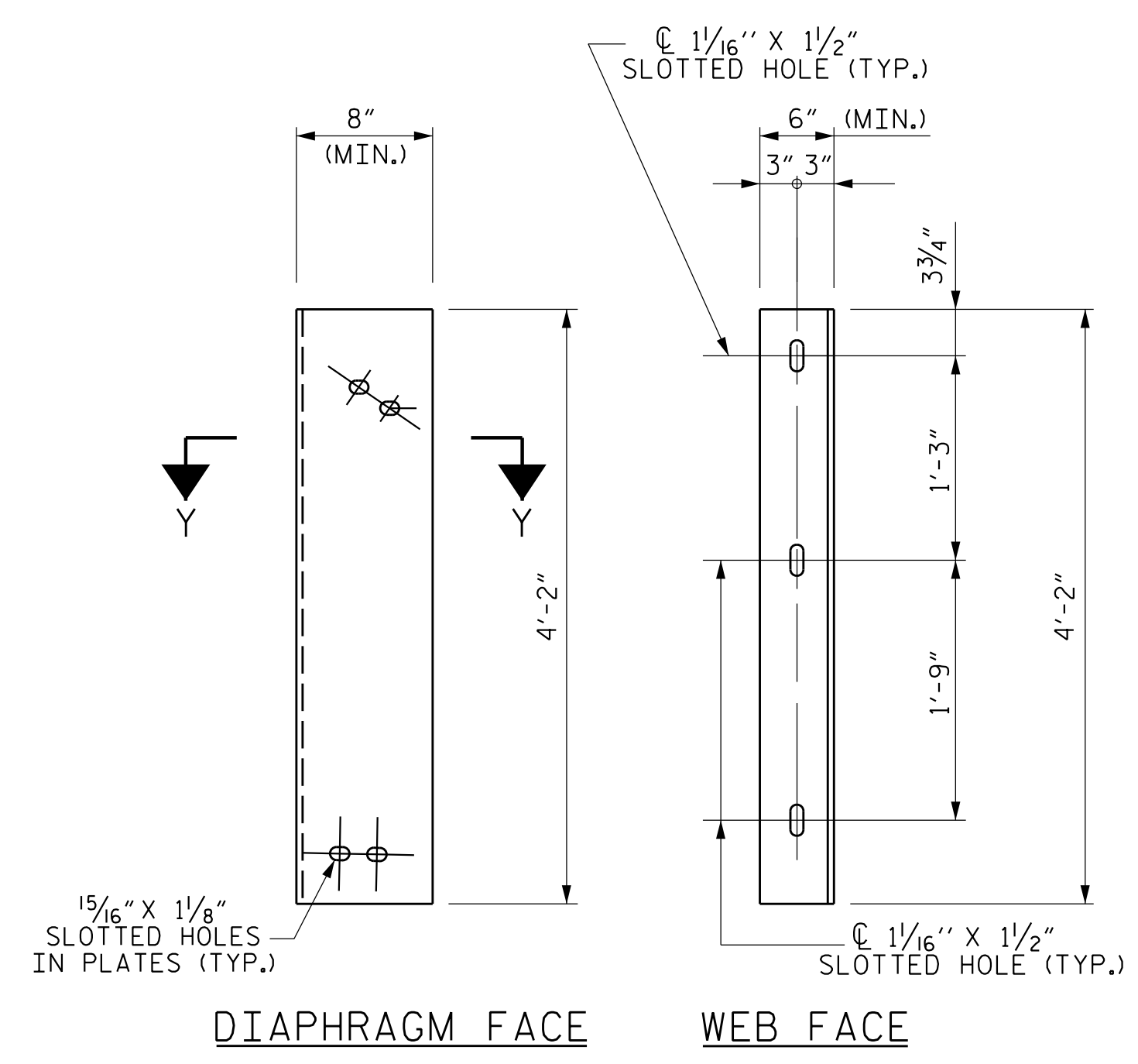
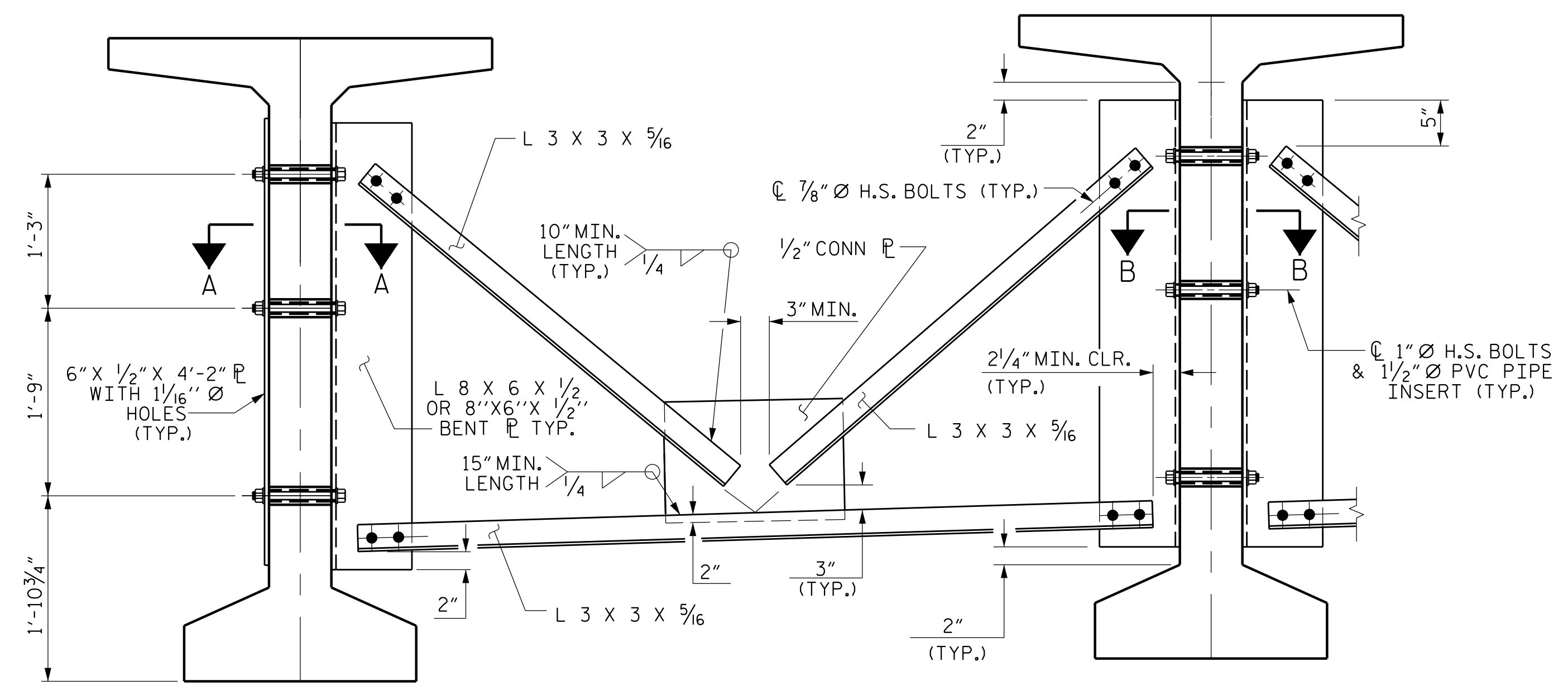
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*L. Kevin Austin*  
 L. KEVIN AUSTIN  
 PROFESSIONAL ENGINEER  
 013681  
 2/27/2017  
 6/11/2019

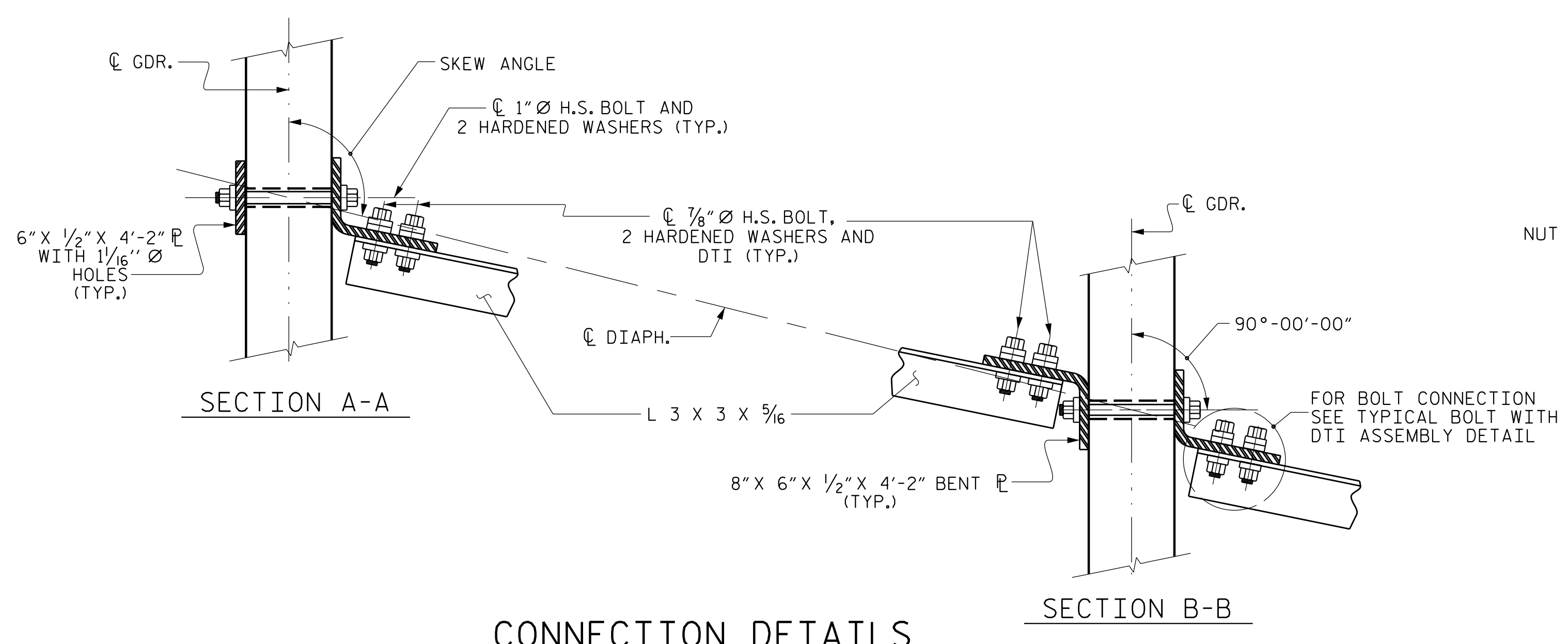
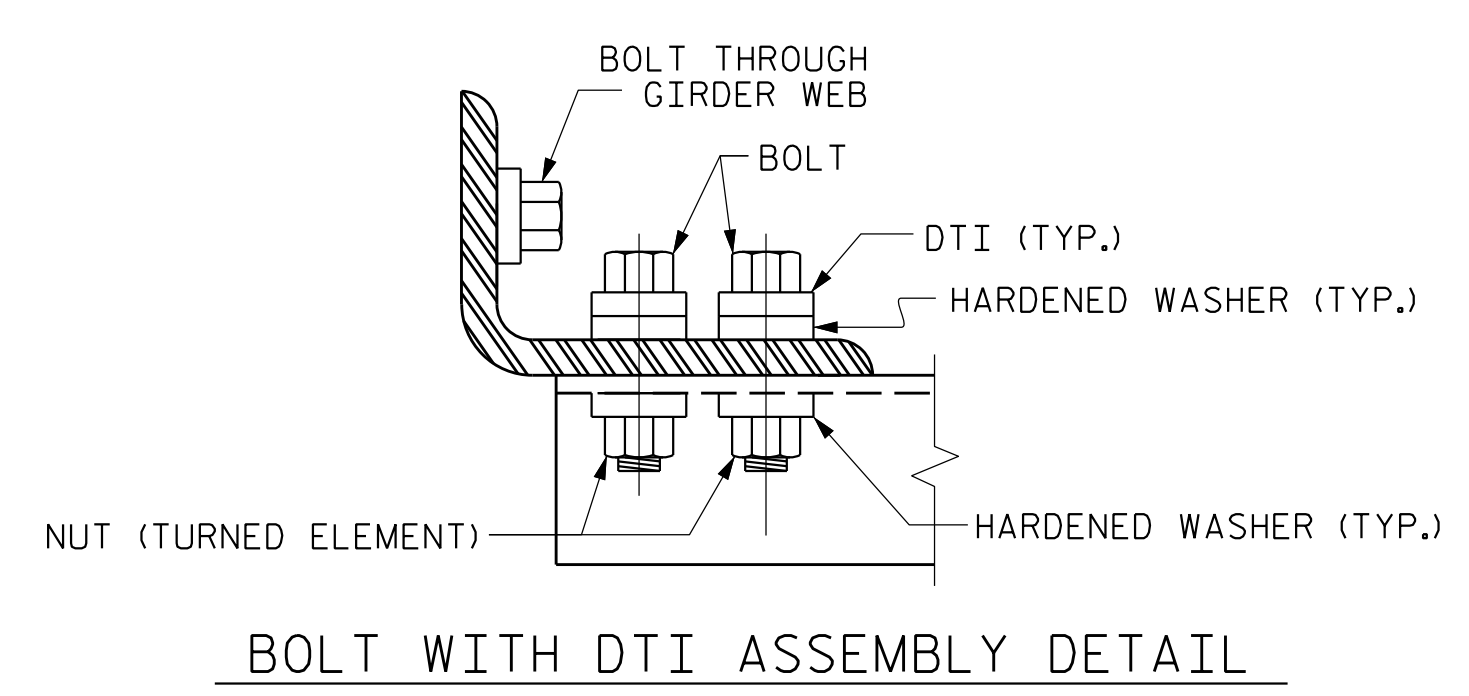
DWG. NO. BL-10

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ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : <b>3/19</b>
CHECKED BY : <b>Z. H. BROWN</b>	DATE : <b>4/19</b>
DRAWN BY : <b>ELR 11/91</b>	REV. 1/15 MAA/TMG
CHECKED BY : <b>GRP 11/91</b>	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC



**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 A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, 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.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

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

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

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 CALYXengineers.com  
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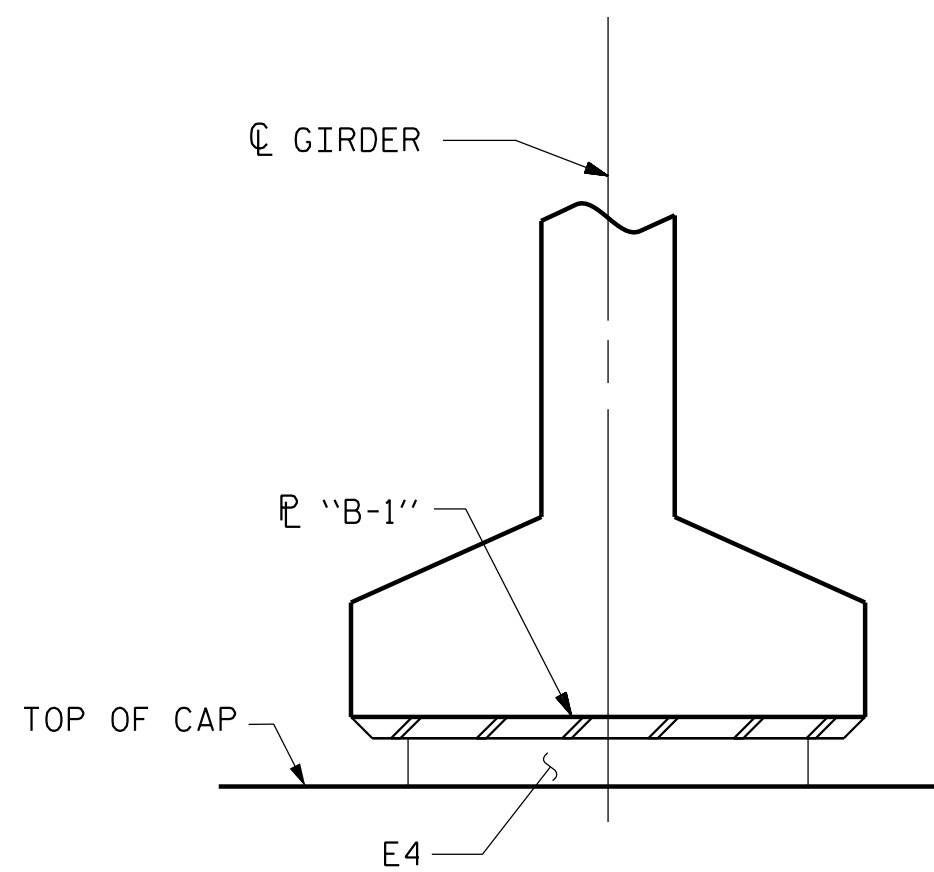
*Kevin Austin*  
 L. KEVIN AUSTIN  
 P.E. ENGINEER  
 6/11/2019

DWG. NO. BL-11

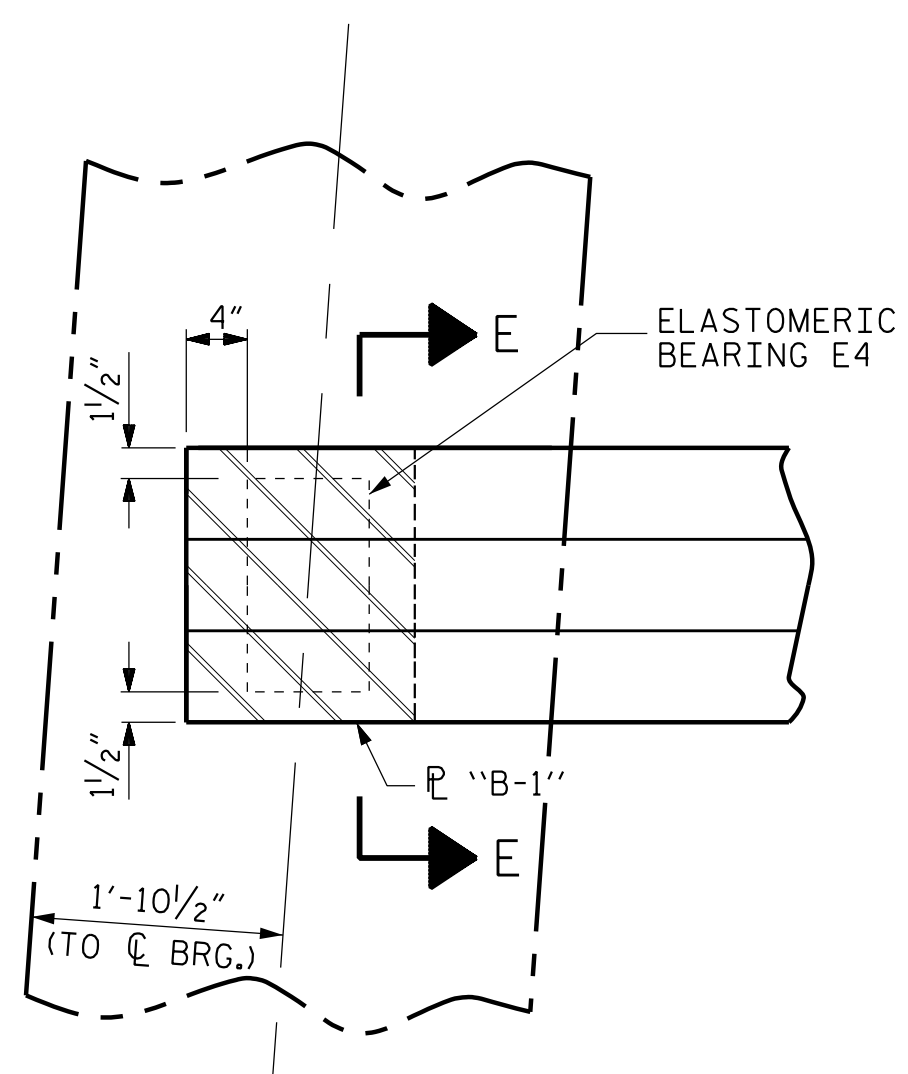
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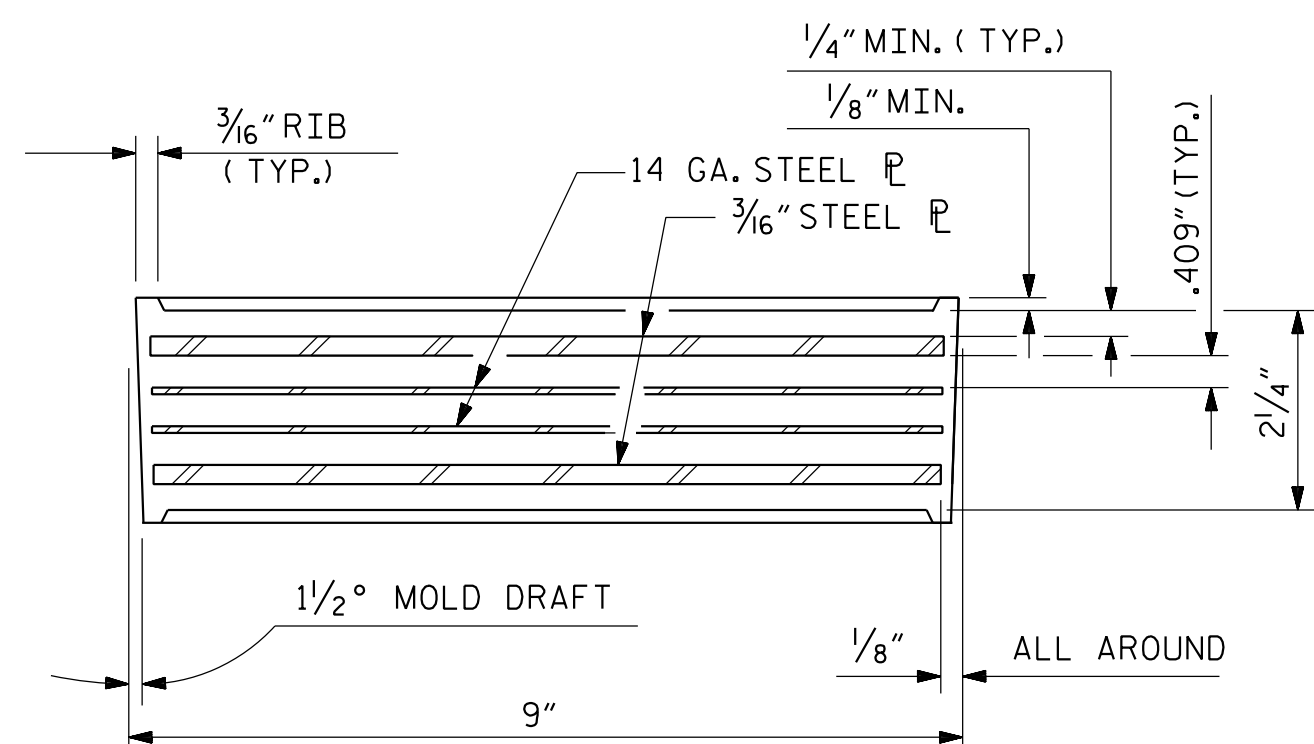




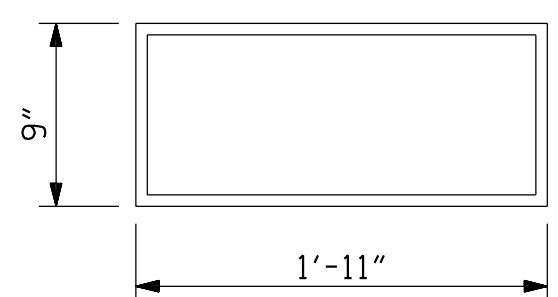
SECTION E-E



PLAN VIEW @ END BENT  
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (10 REQ'D )  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE V

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

NOTES

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

PLANS PREPARED BY:

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6/11/2019

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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
ELASTOMERIC BEARING  
DETAILS  
PRESTRESSED CONCRETE GIRDER  
SUPERSTRUCTURE  
LEFT LANE

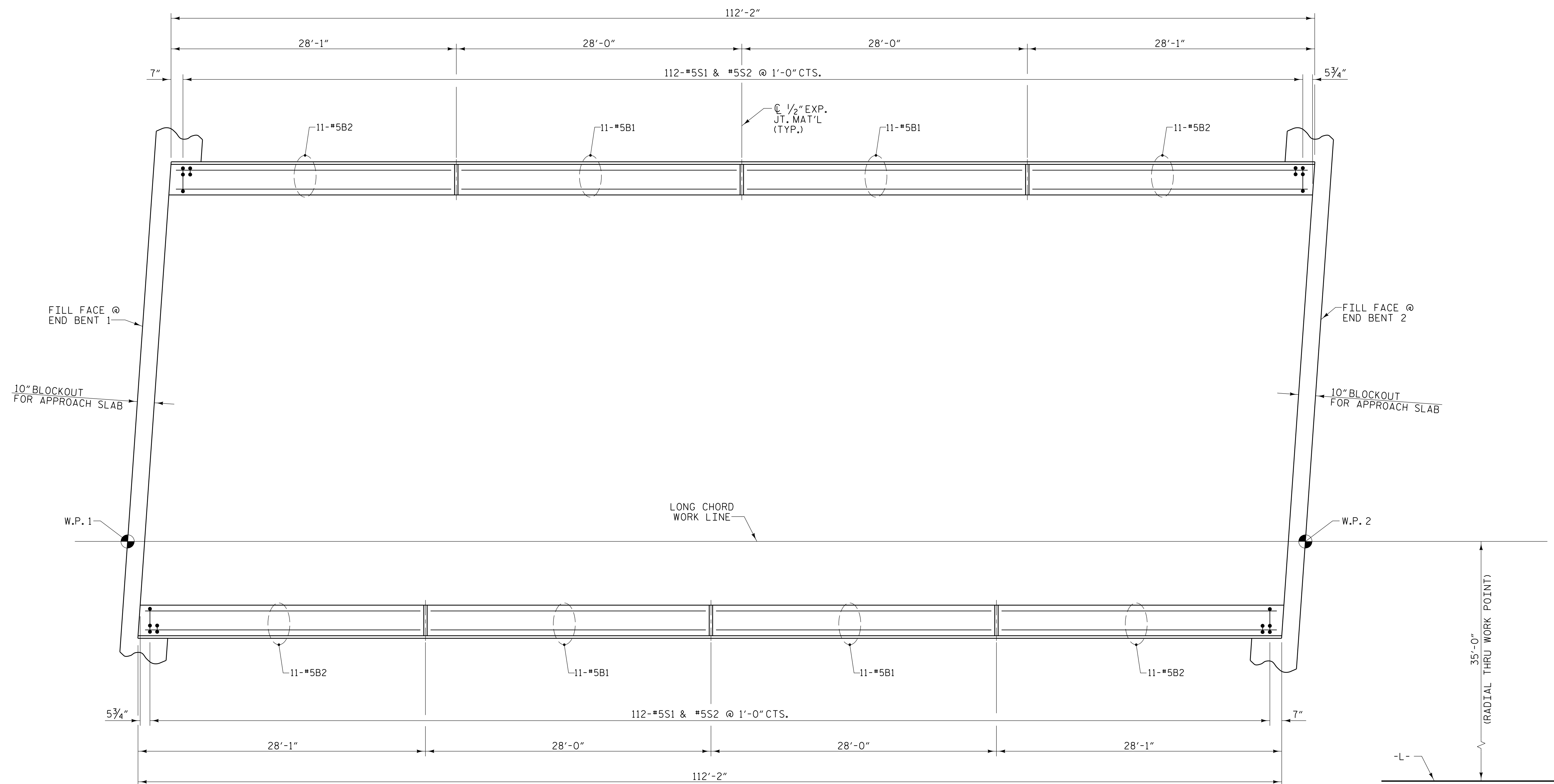
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S7-12
1			3			TOTAL SHEETS
2			4			25

STD. NO. EB4 (SHT 1)

ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : 3/19
CHECKED BY : <b>Z. H. BROWN</b>	DATE : 4/19
DRAWN BY : EEM 2/97	REV. 6/13 AAC/MAA
CHECKED BY : VAP 2/97	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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SPAN A

PLAN OF BARRIER RAIL

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 CONCRETE  
 BARRIER RAIL  
 LEFT LANE

PLANS PREPARED BY:  
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2			4			

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DRAWN BY : W. B. ALLEN DATE : 5/15  
 CHECKED BY : Z. H. BROWN DATE : 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

DWG. NO. BL-13

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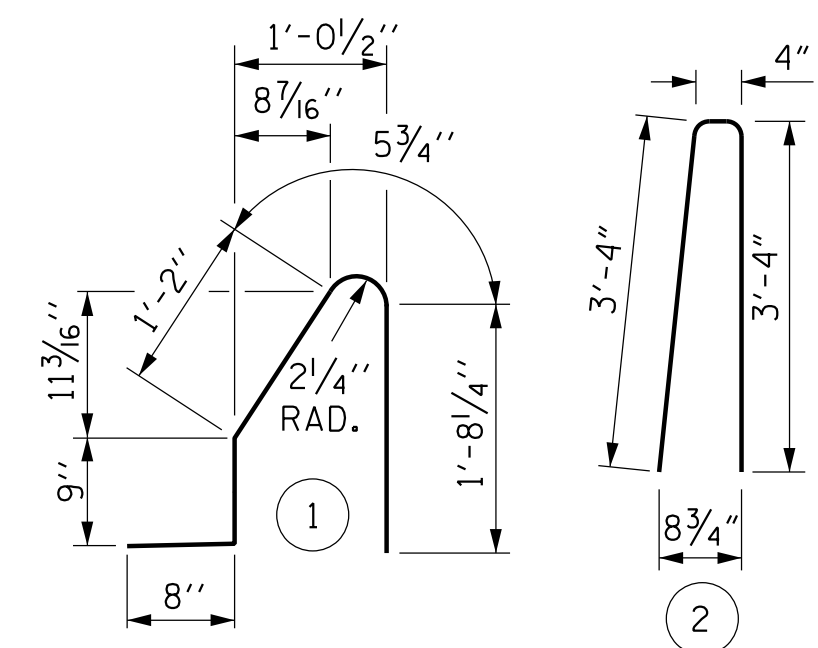
NOTES

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

ALL REINFORCING STEEL IN BARRIER RAILS SHALL BE EPOXY COATED.

GROOVED CONTRACTION JOINTS, 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.

BAR TYPES

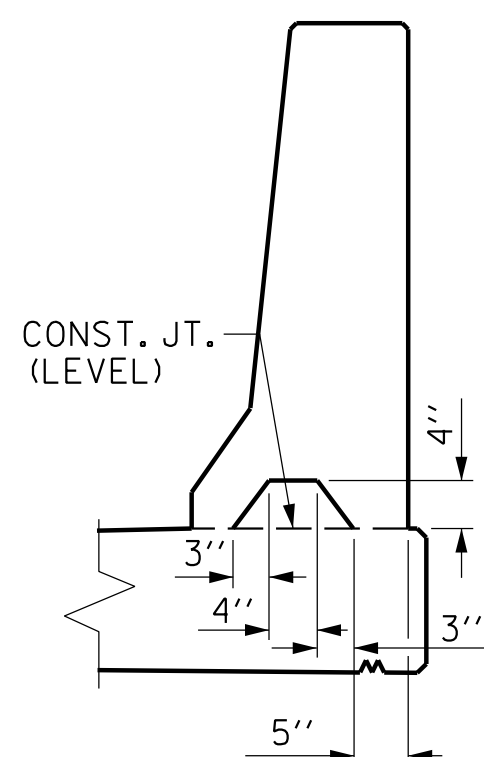
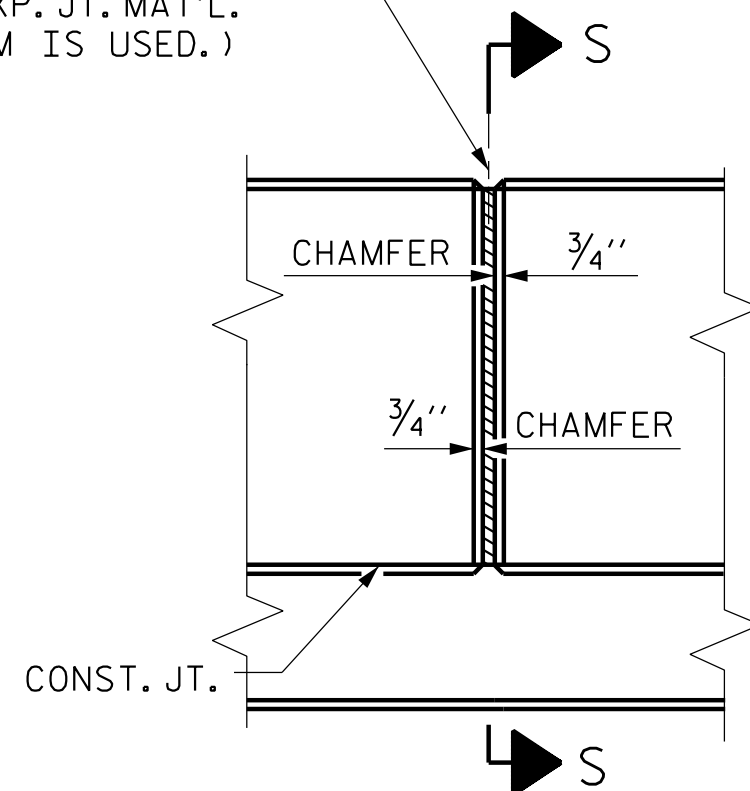


ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR CONCRETE BARRIER RAIL ONLY					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* B1	44	#5	STR	27'-7"	1266
* B2	44	#5	STR	27'-8"	1270
* S1	224	#5	1	4'-9"	1110
* S2	224	#5	2	7'-0"	1635
* EPOXY COATED REINFORCING STEEL 5281 LBS.					
CLASS AA CONCRETE 30.5 CU. YDS.					
CONCRETE BARRIER RAIL 224.33 LIN. FT.					

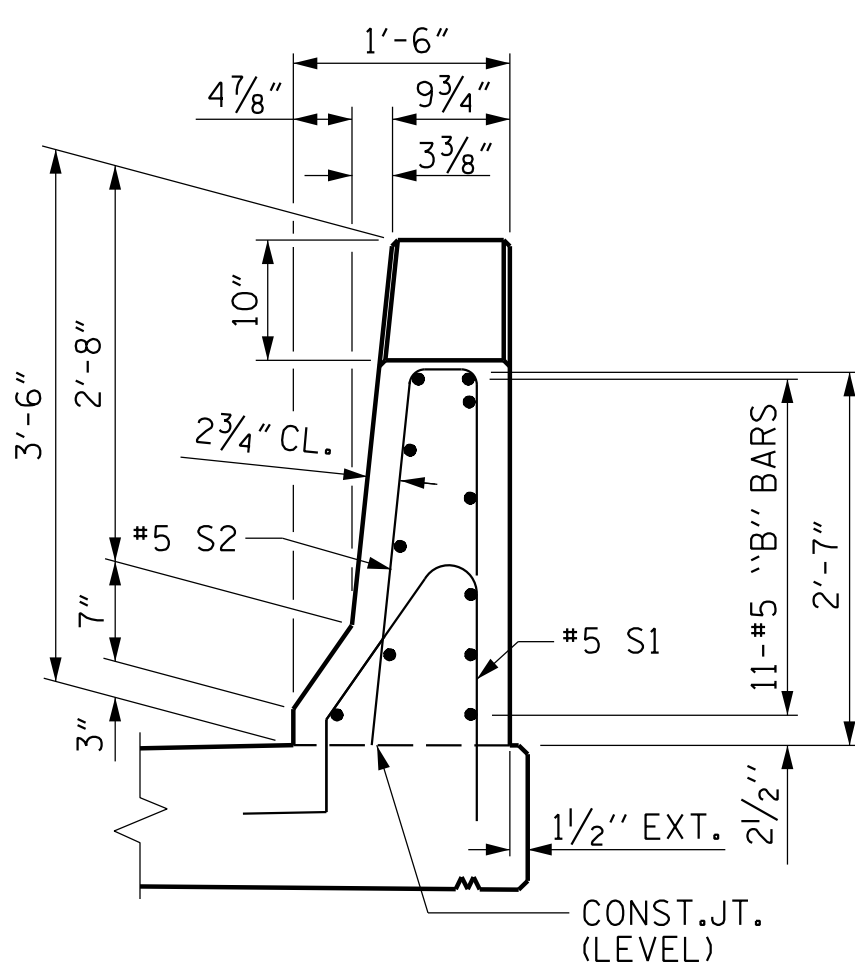
1/2" EXP. JT. MAT'L HELD IN PLACE WITH GALVANIZED NAILS.  
( NOTE: OMIT EXP. JT. MAT'L. WHEN SLIP FORM IS USED.)



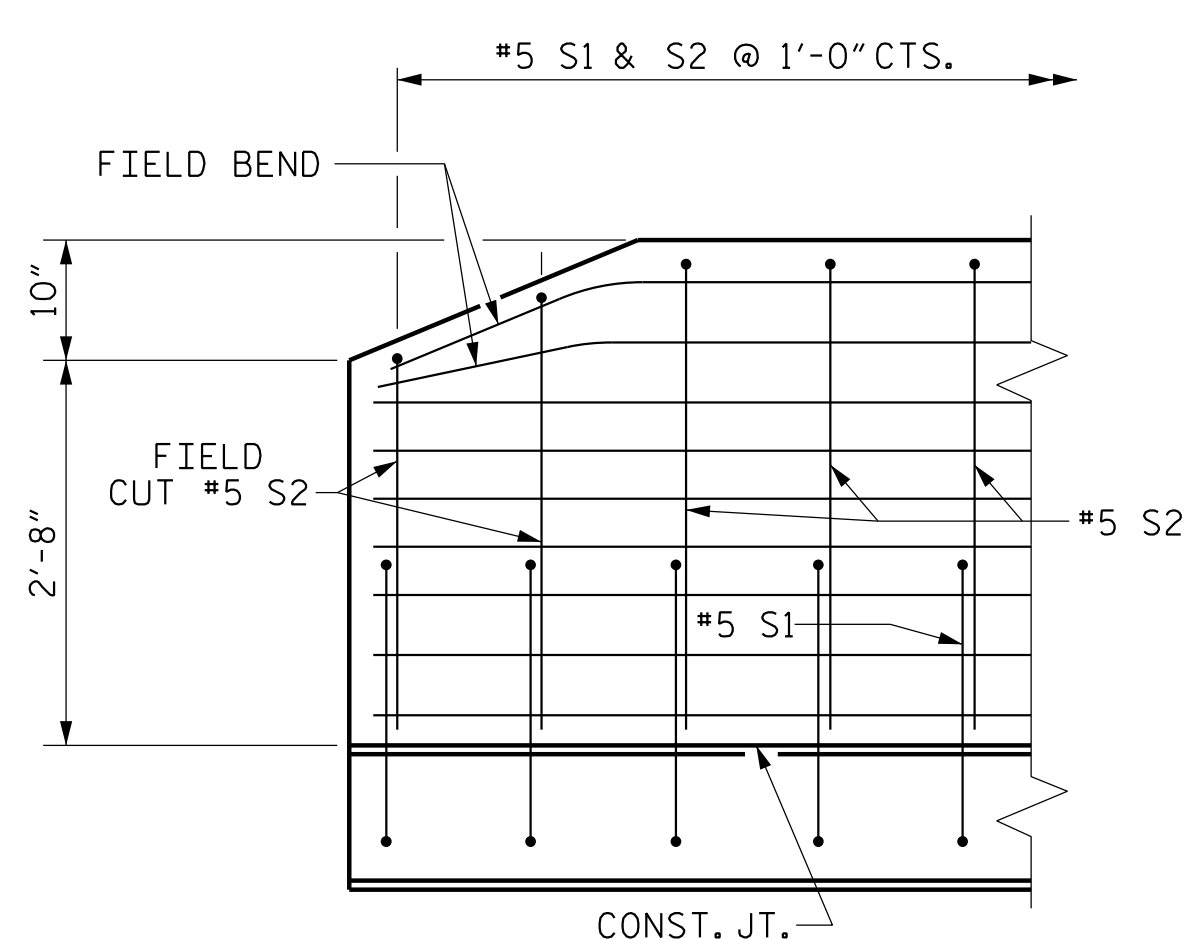
SECTION S-S  
AT DAM IN OPEN JOINT  
(THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)

ELEVATION AT EXPANSION JOINTS

BARRIER RAIL DETAILS

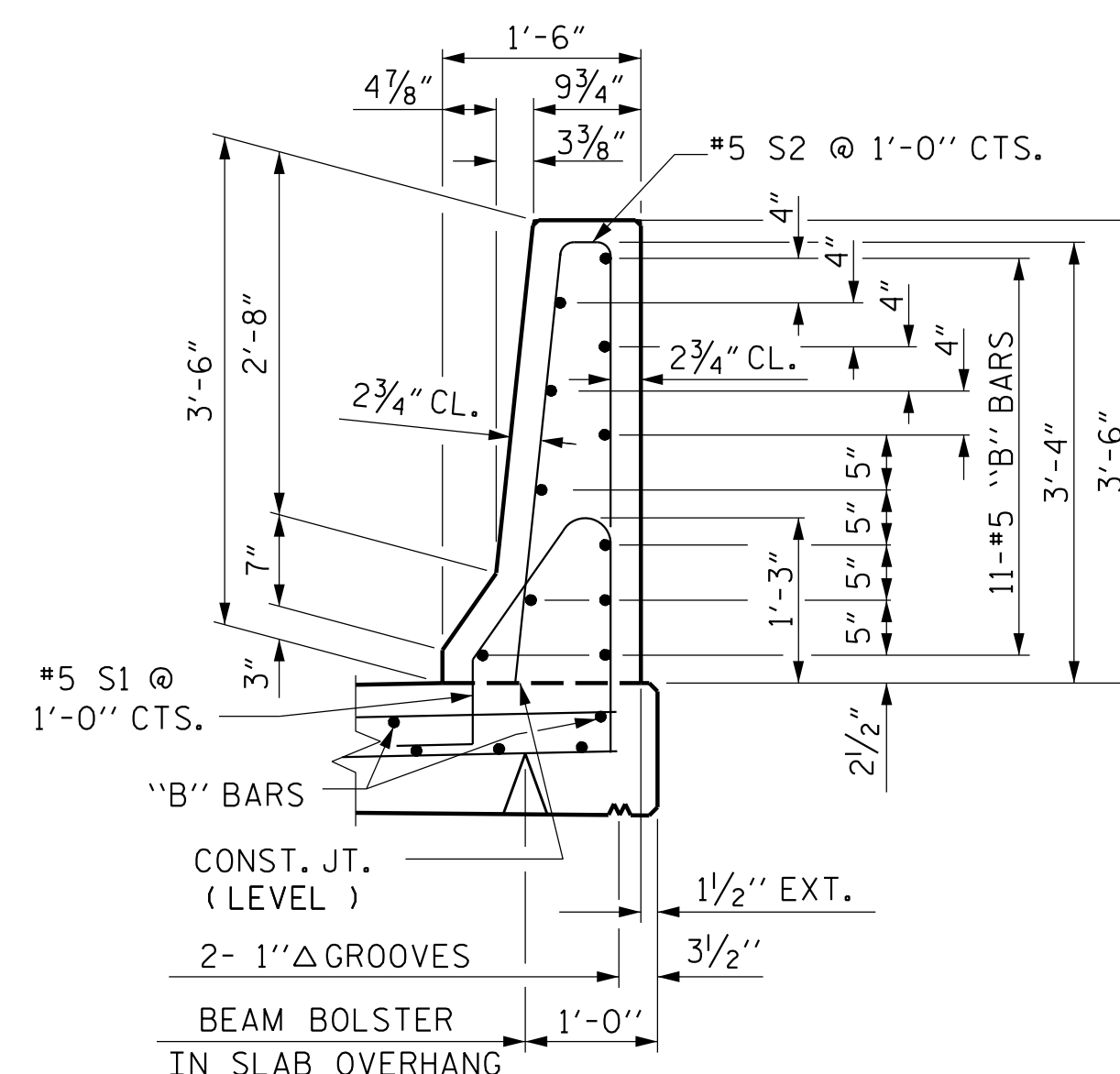


END VIEW



SIDE VIEW

END OF RAIL DETAILS



SECTION THRU RAIL

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

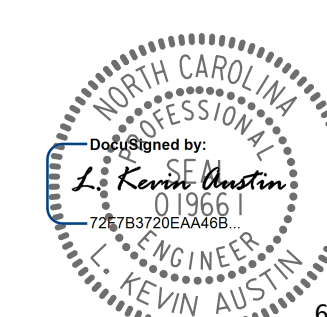
STANDARD  
CONCRETE  
BARRIER RAIL  
LEFT LANE

REVISIONS

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

SHEET NO.  
S7-14  
TOTAL SHEETS  
25

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6/11/2019

DWG. NO. BL-14

PLANS PREPARED BY:

**CALYX**  
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6750 TRYON ROAD  
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phone: 919.851.1912  
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NC License # F-1333

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : ARB 5/87	REV. 7/12 MAA/GM
CHECKED BY : SJD 9/87	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD-DOWN PLATE AND 4 - 1/8" 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 1/8" 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.)

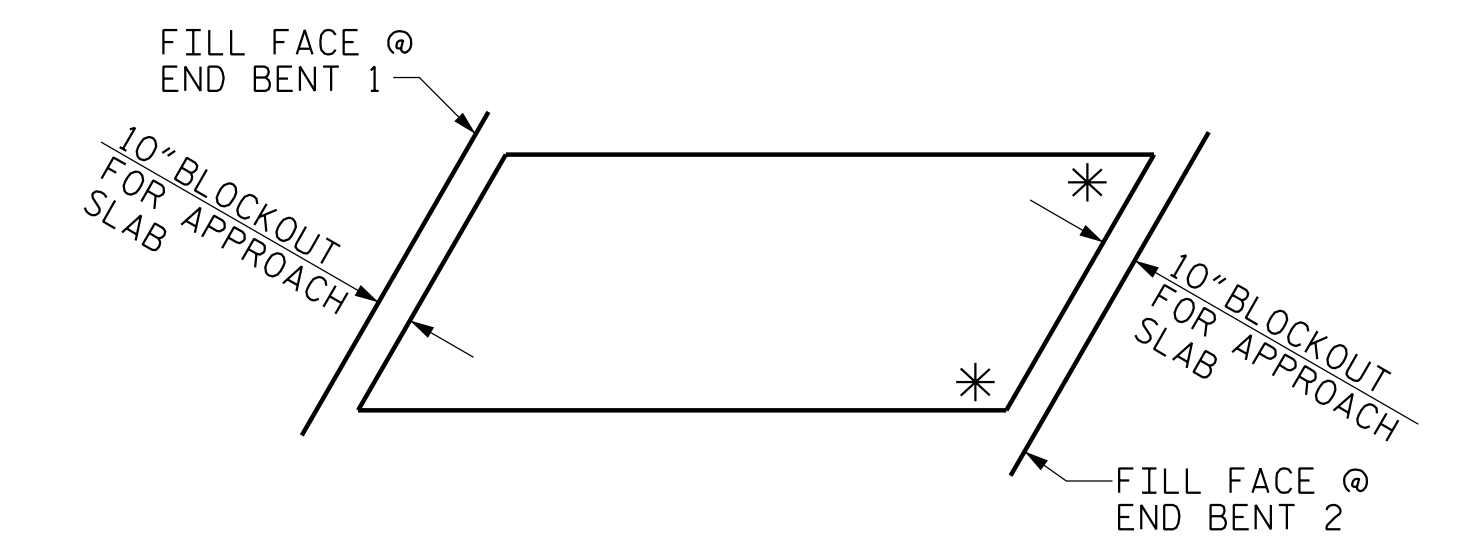
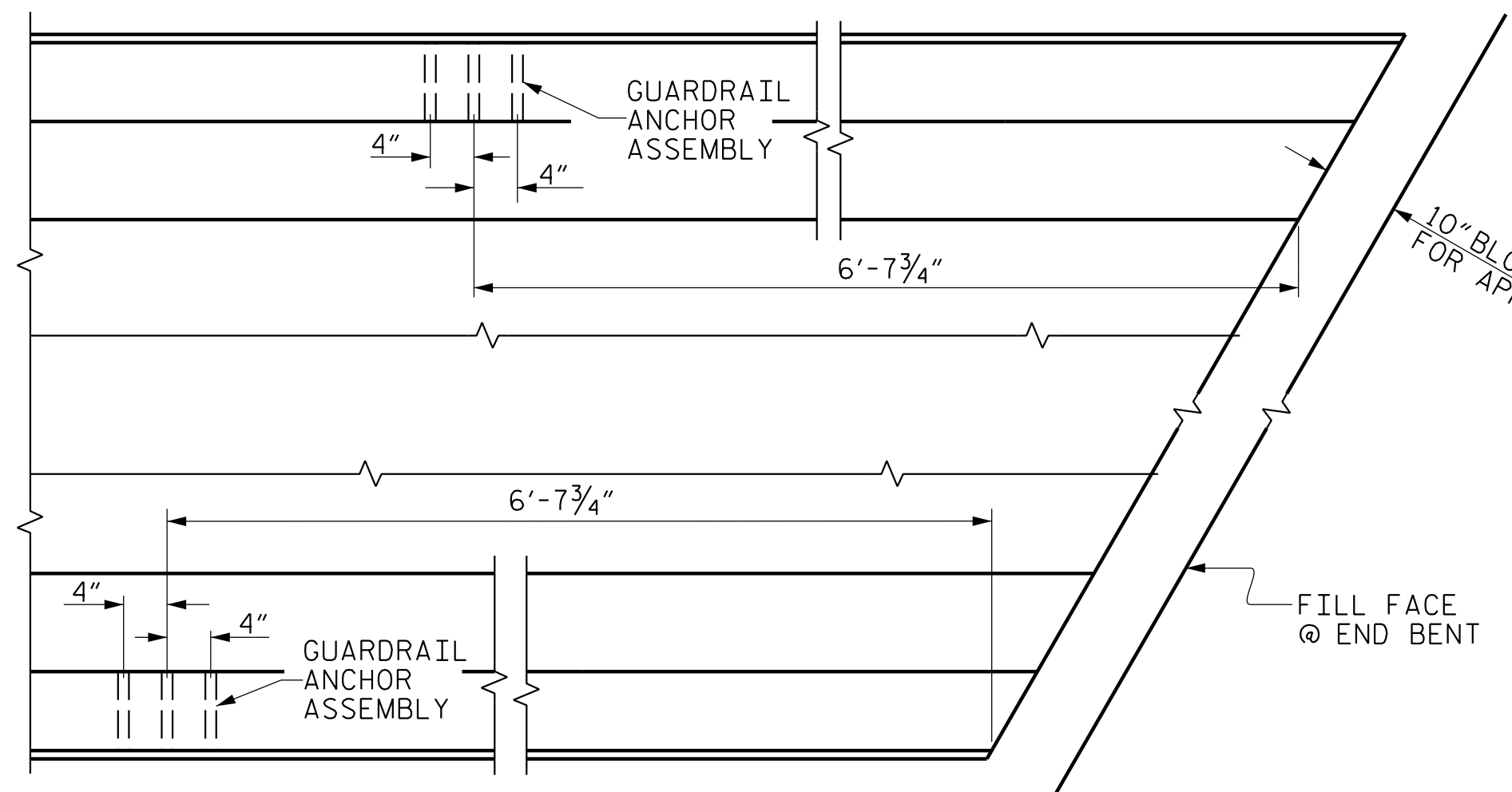
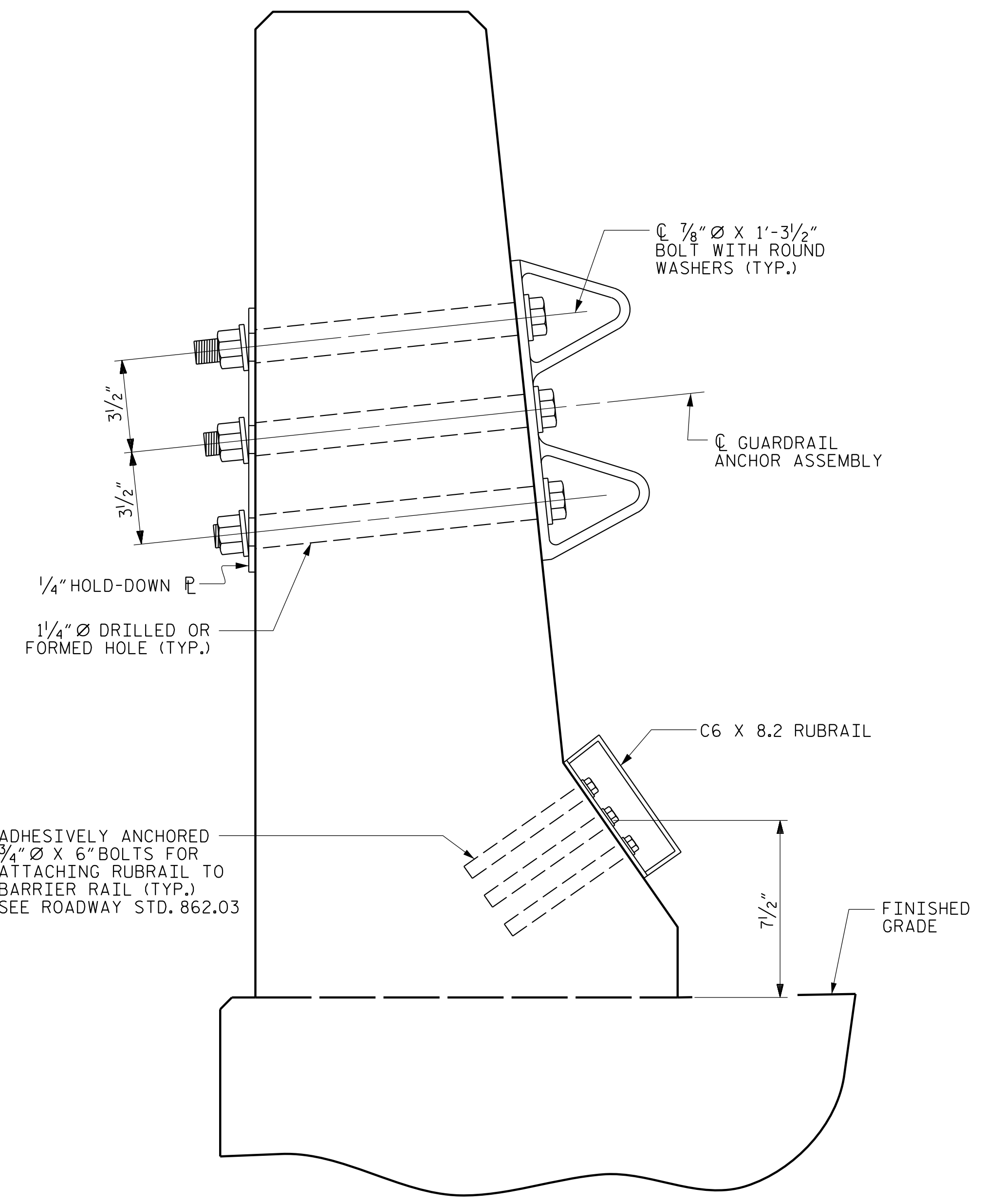
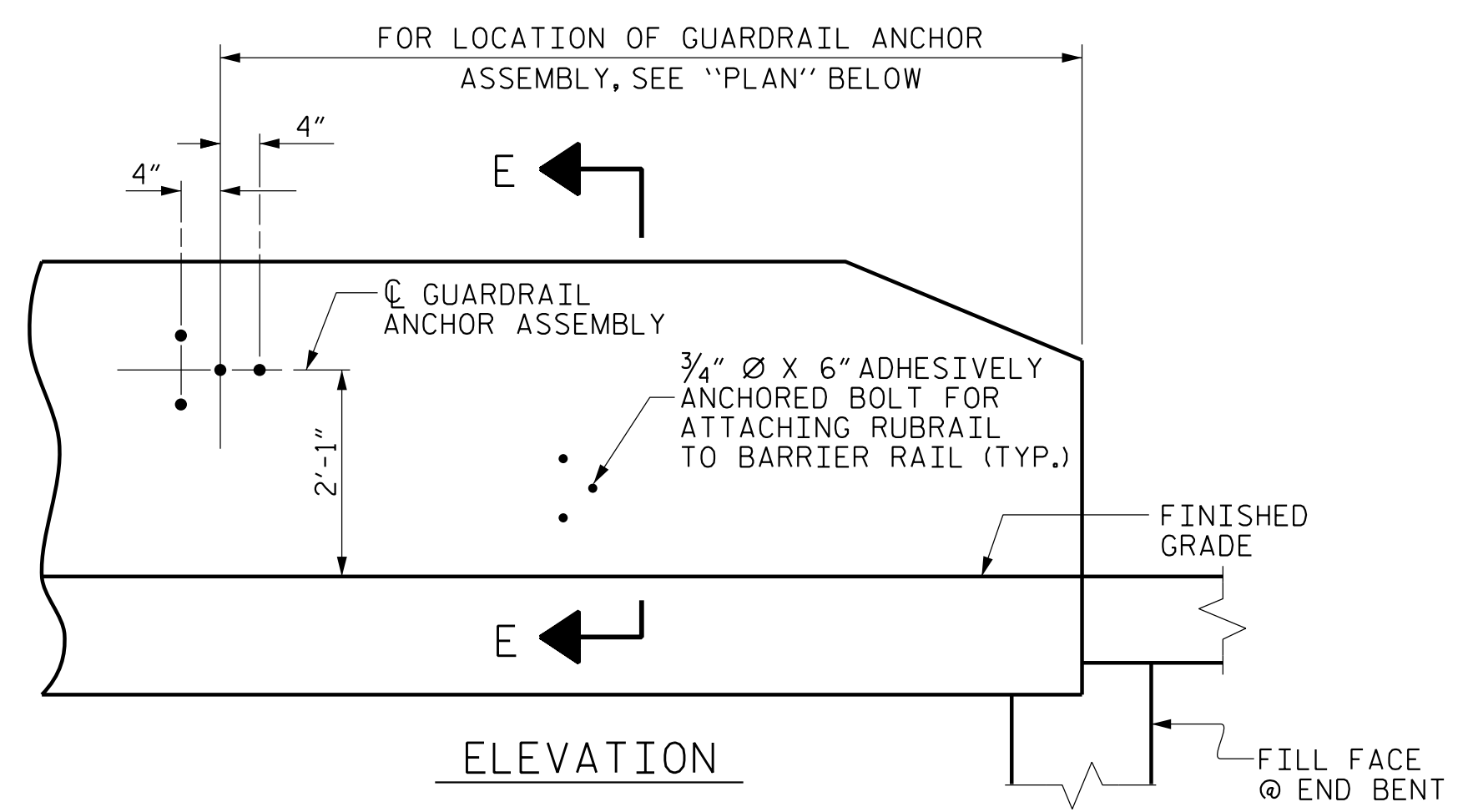
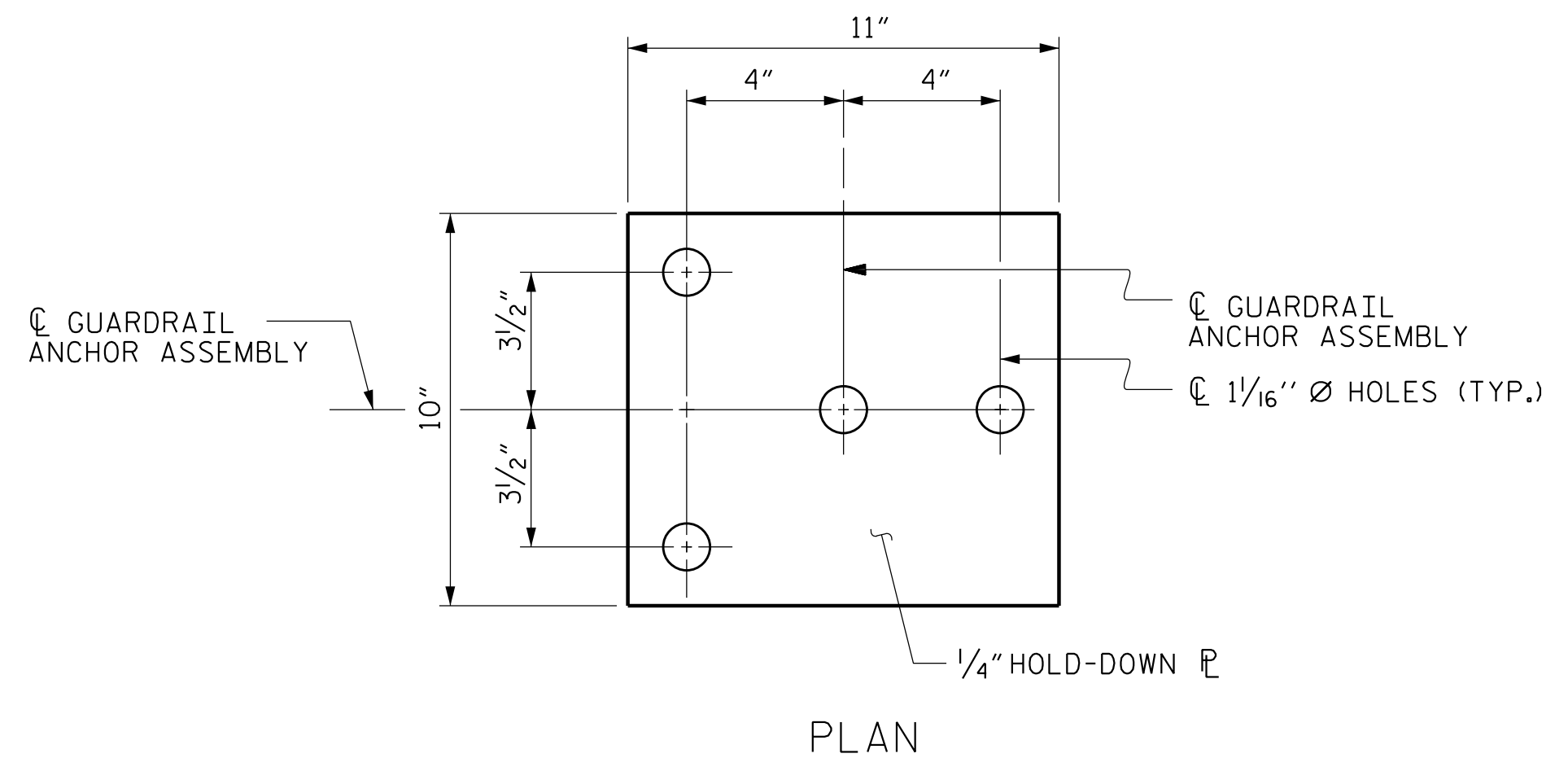
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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.



**LOCATION OF ANCHORS FOR GUARDRAIL**

END BENT 2 SHOWN.

**SKETCH SHOWING POINTS OF ATTACHMENTS**

\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

**SECTION E-E  
 GUARDRAIL ANCHOR ASSEMBLY DETAILS**

ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : <b>3/19</b>
CHECKED BY : <b>Z. H. BROWN</b>	DATE : <b>4/19</b>
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

PLANS PREPARED BY:

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 ENGINEERS + CONSULTANTS

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 CALYXengineers.com  
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THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*L. Kevin Austin*  
 L. KEVIN AUSTIN  
 PROFESSIONAL ENGINEER  
 013681  
 2/27/2019  
 6/11/2019

DWG. NO. BL-15

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD  
 GUARDRAIL ANCHORAGE  
 FOR BARRIER RAIL**

LEFT LANE

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

SHEET NO. **S7-15**  
 TOTAL SHEETS 25

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

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

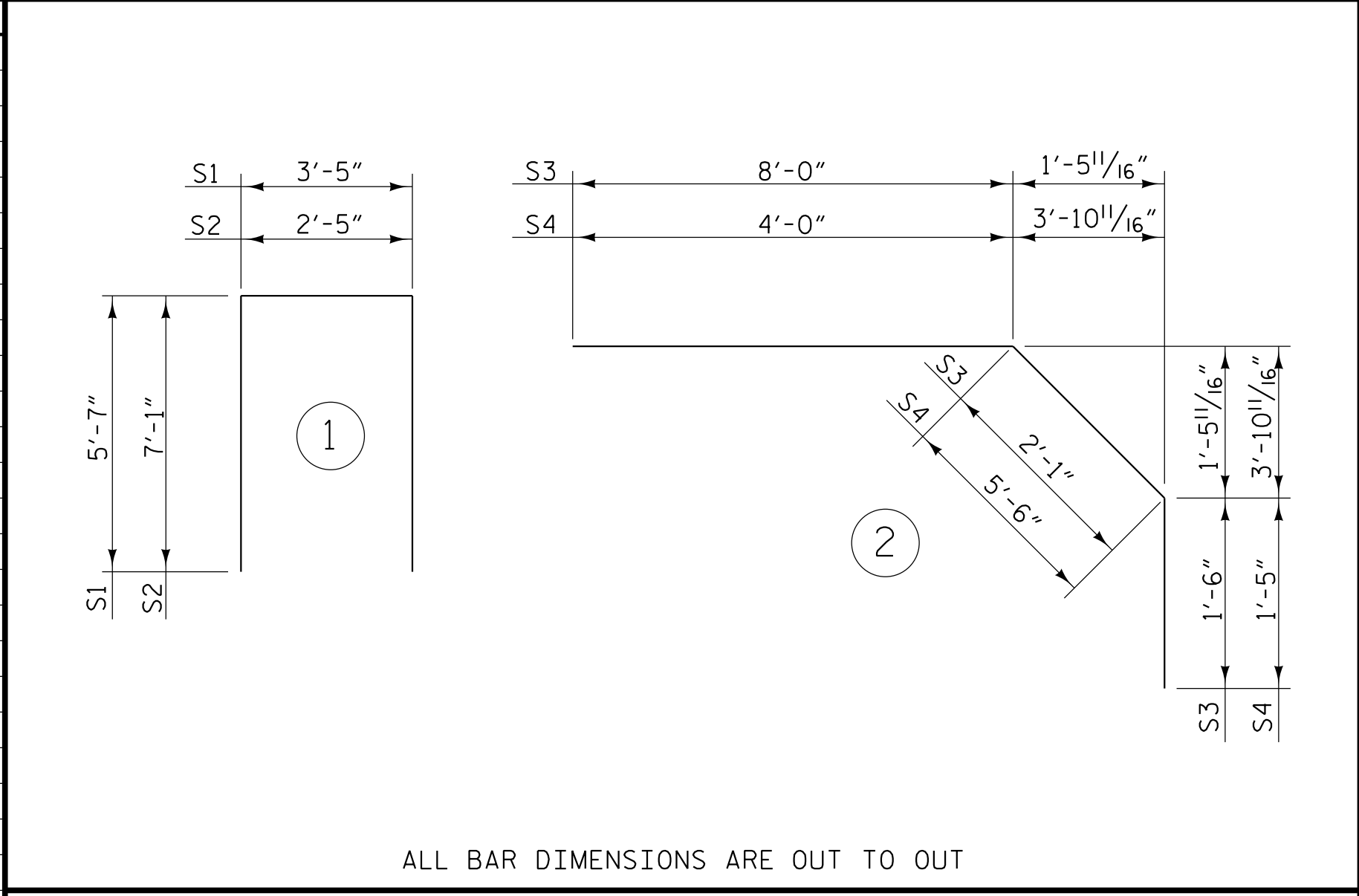
**GROOVING BRIDGE FLOORS**

APPROACH SLABS	1825	SQ. FT.
BRIDGE DECK	4178	SQ. FT.
TOTAL	6003	SQ. FT.

**BAR SCHEDULE**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	175	#5	STR	43'-2"	7879
A2	175	#5	STR	43'-2"	7879
* A101	2	#5	STR	34'-8"	72
* A102	2	#5	STR	25'-9"	54
* A103	2	#5	STR	16'-10"	35
* A104	2	#5	STR	7'-11"	17
A201	2	#5	STR	34'-8"	72
A202	2	#5	STR	25'-9"	54
A203	2	#5	STR	16'-10"	35
A204	2	#5	STR	7'-11"	17
* B1	87	#4	STR	25'-0"	1453
* B2	226	#5	STR	22'-6"	5304
B3	60	#5	STR	57'-0"	3567
* B4	8	#4	STR	29'-6"	158
K1	28	#4	STR	21'-7"	404
K2	8	#4	STR	6'-4"	34
K3	40	#4	STR	7'-11"	212
K4	8	#4	STR	6'-10"	37
K5	4	#4	STR	2'-8"	7
K6	20	#4	STR	3'-5"	46
K7	4	#4	STR	3'-2"	8
* S1	52	#4	1	14'-7"	507
* S2	4	#4	1	16'-7"	44
* S3	52	#4	2	11'-7"	402
* S4	52	#4	2	10'-11"	379
REINFORCING STEEL				LBS.	12372
* EPOXY COATED REINFORCING STEEL				LBS.	16304

**BAR TYPES**

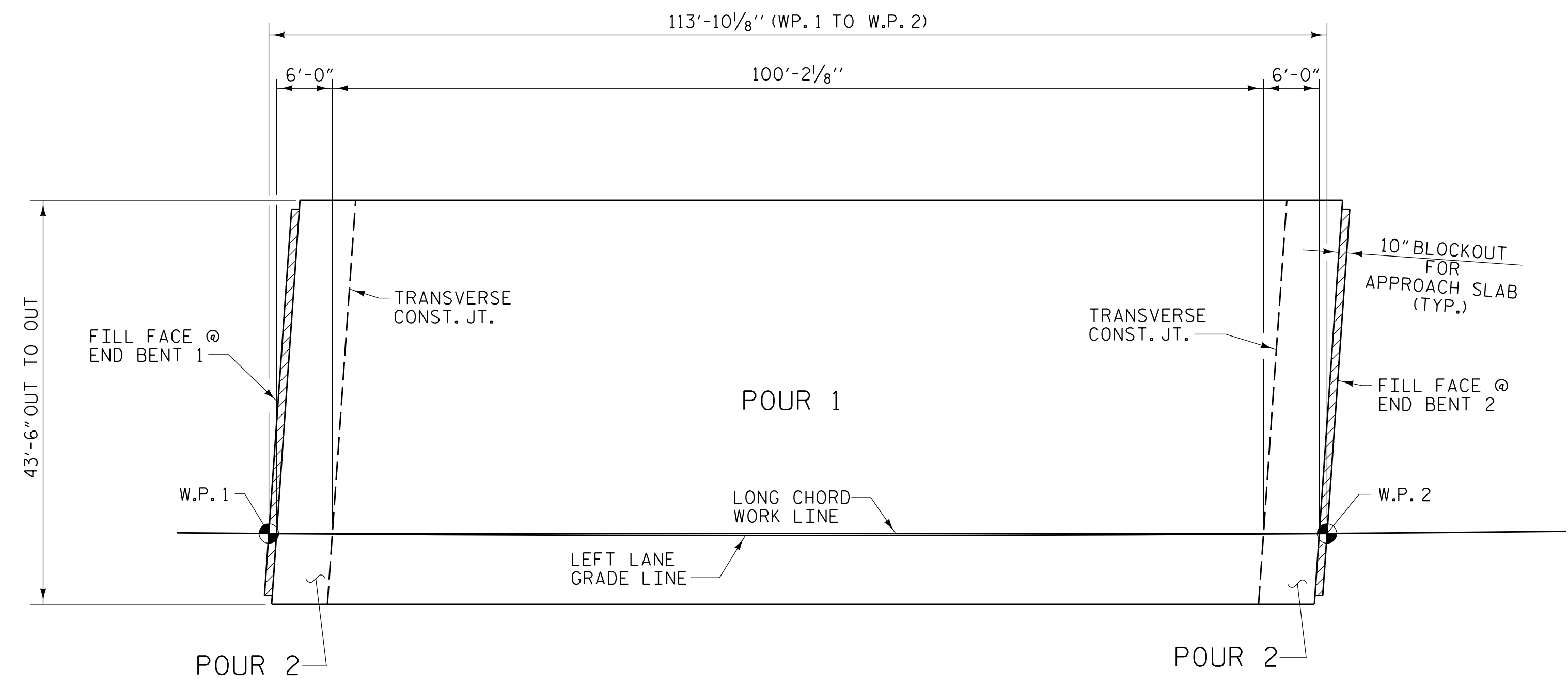


ALL BAR DIMENSIONS ARE OUT TO OUT

**SUPERSTRUCTURE BILL OF MATERIAL**

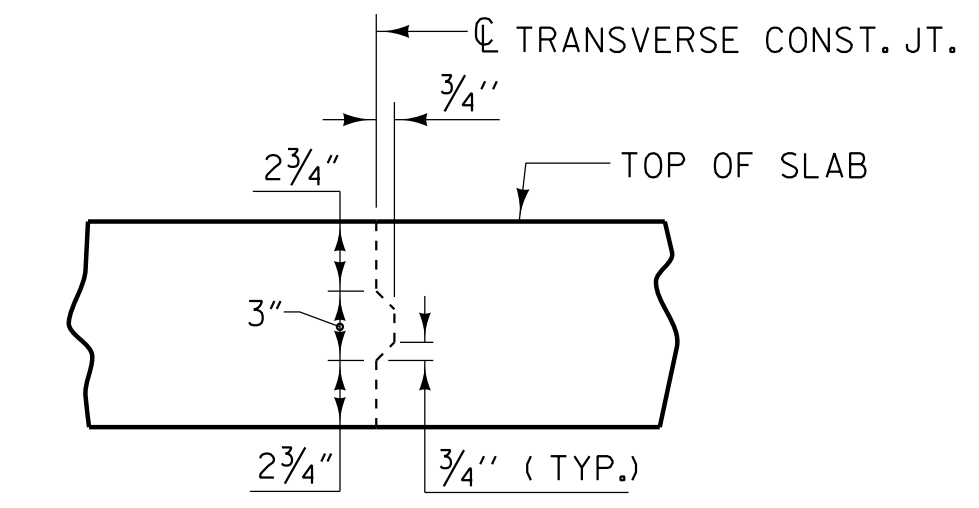
	CLASS AA CONCRETE (CU. YDS.)	REINFORCING STEEL (LBS.)	* EPOXY COATED REINFORCING STEEL (LBS.)
POUR 1	145.1		
POUR 2	85.7		
** TOTALS	230.8	12372	16304

\*\* QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.



**POURING SEQUENCE AND LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB**

(SQ. FT. = 4,952)



**TRANSVERSE CONSTRUCTION JOINT DETAIL**

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

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 BILL OF MATERIAL  
 LEFT LANE

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
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 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
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DESIGNED BY:  
 L. Kevin Austin  
 01951  
 727837000000  
 ENGINEER  
 L. KEVIN AUSTIN  
 6/11/2019

REVISIONS						SHEET NO.
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2			4			

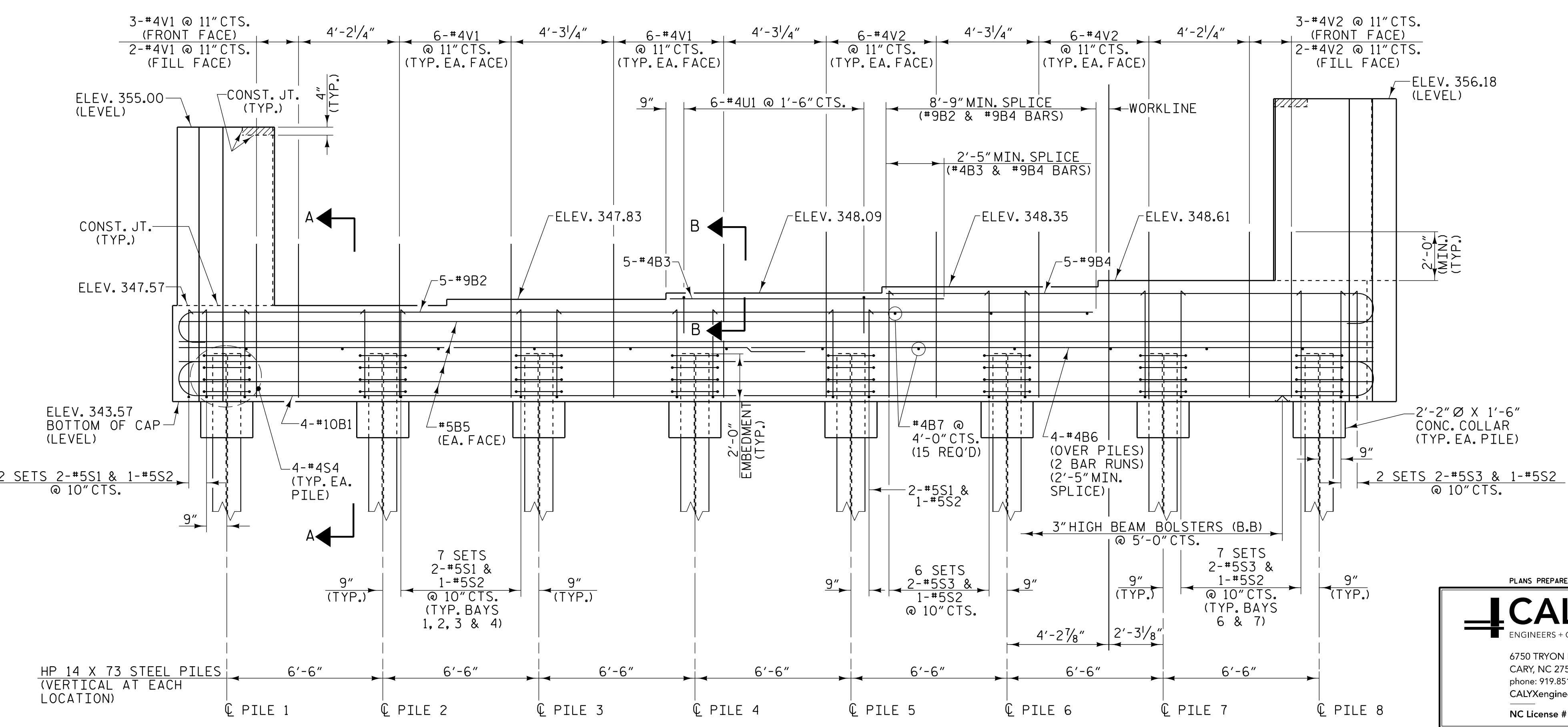
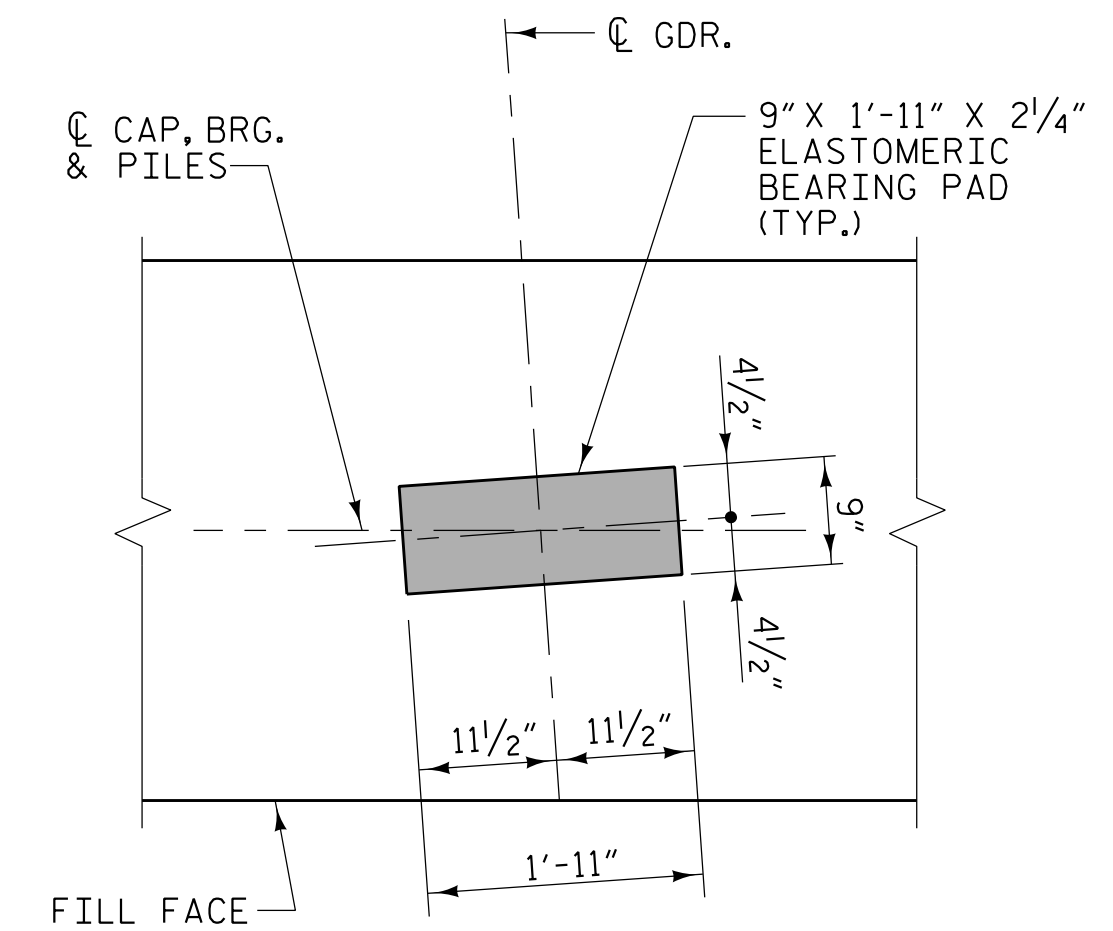
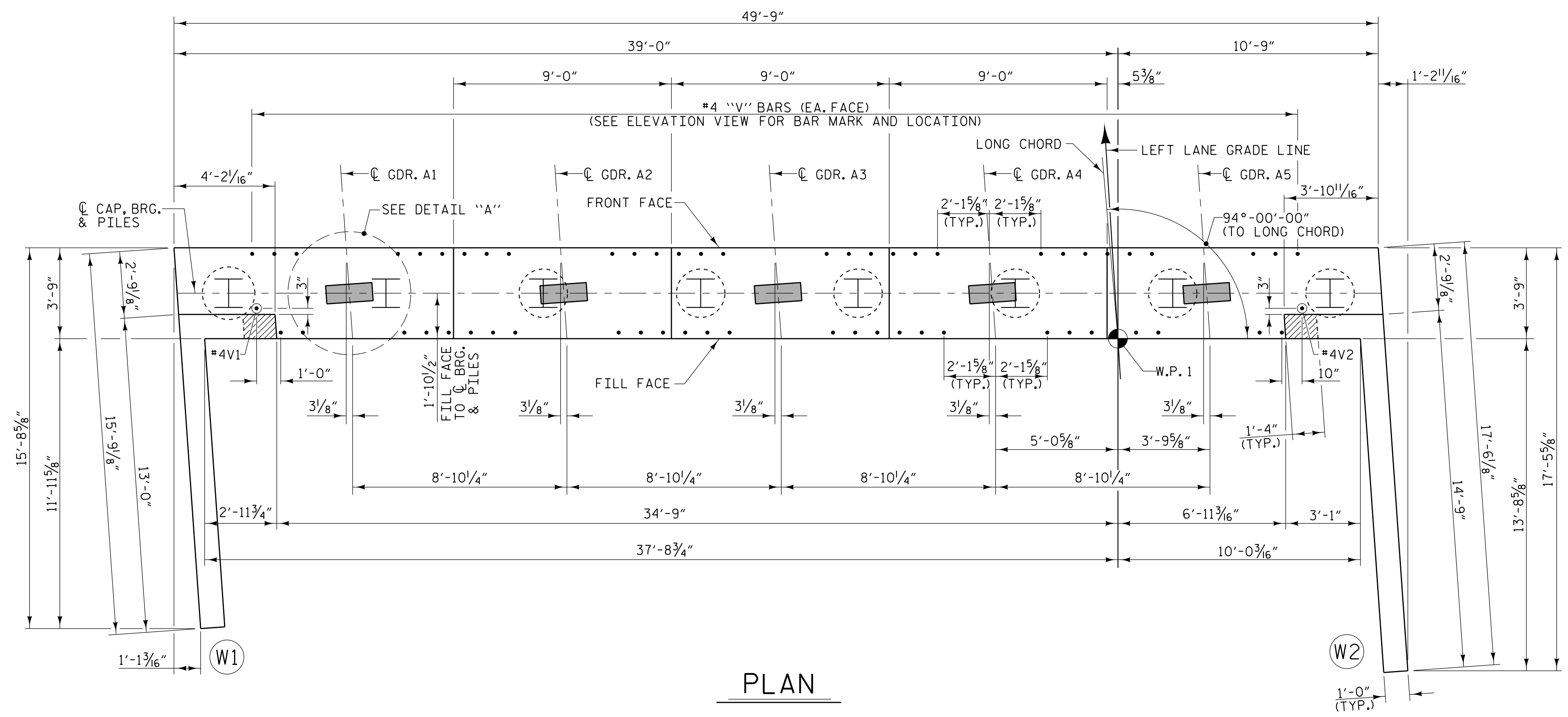
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DWG. NO. BL-16

DRAWN BY: W. B. ALLEN DATE: 6/15  
 CHECKED BY: Z. H. BROWN DATE: 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE: 9/15

NOTES

#4UI BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4V1 BARS.  
 THE CONCRETE IN THE SHADED AREA OF THE WING WALL SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.



PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
**INTEGRAL  
 END BENT 1**  
 LEFT LANE

PLANS PREPARED BY:  
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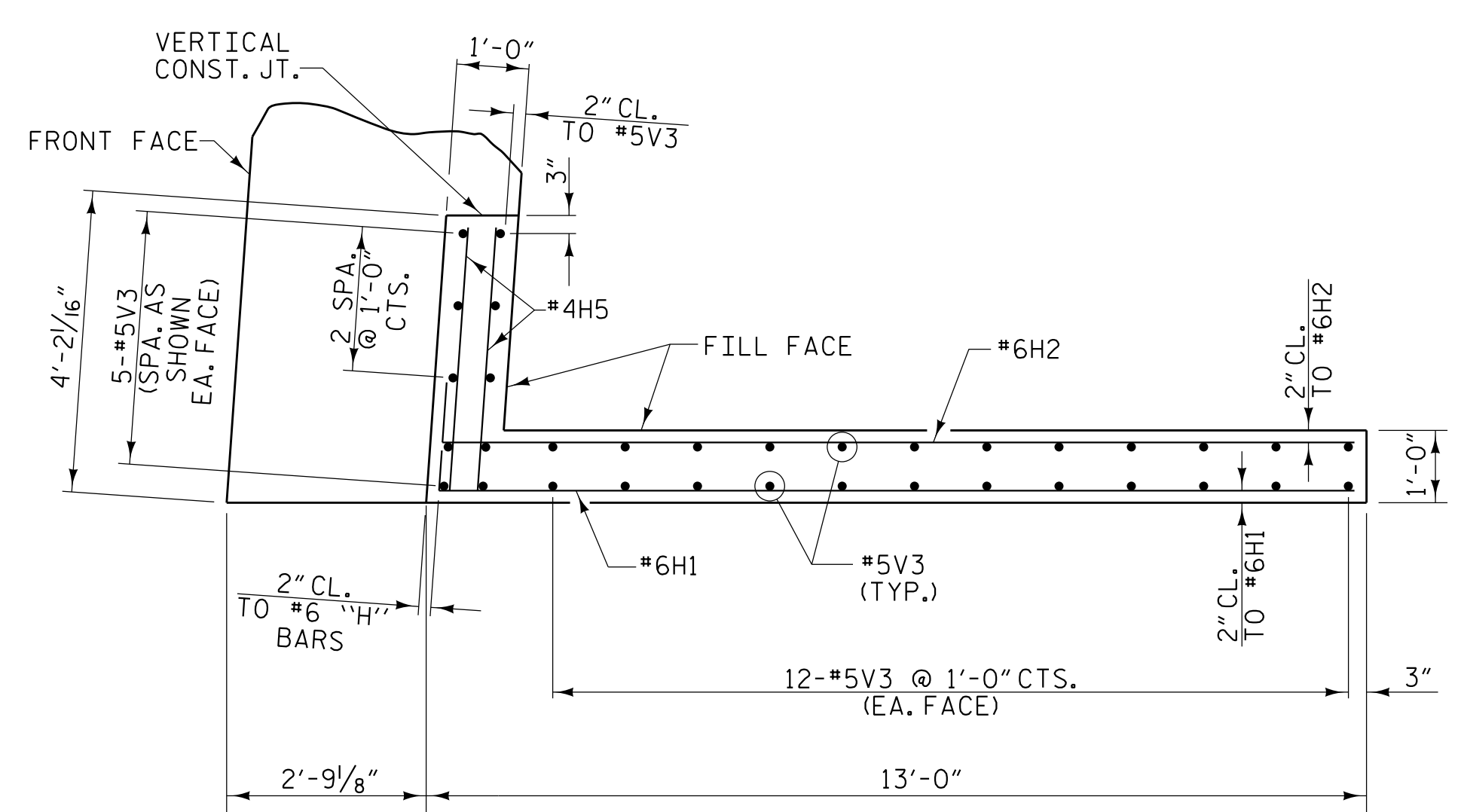
DRAWN BY: W. B. ALLEN DATE: 6/15  
 CHECKED BY: Z. H. BROWN DATE: 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE: 9/15

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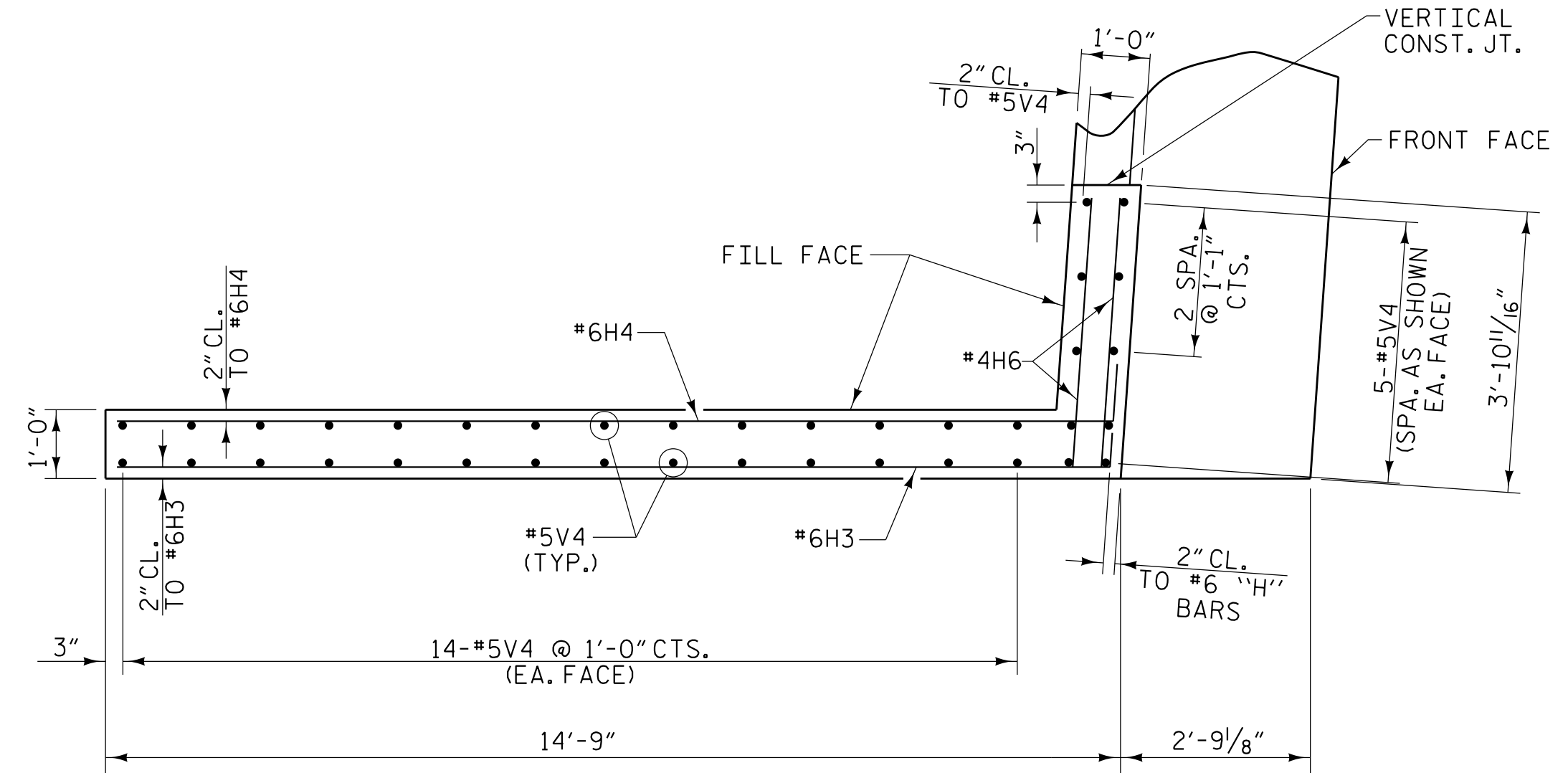
6/11/2019  
 DWG. NO. BL-17

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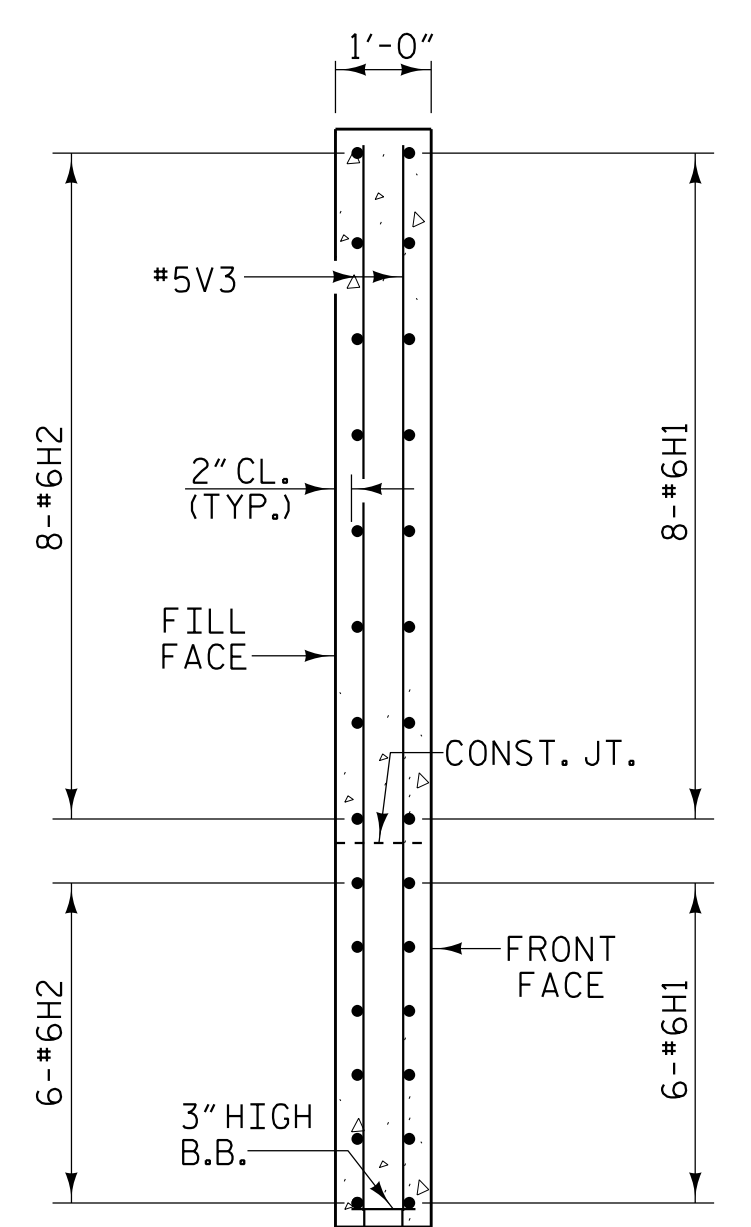




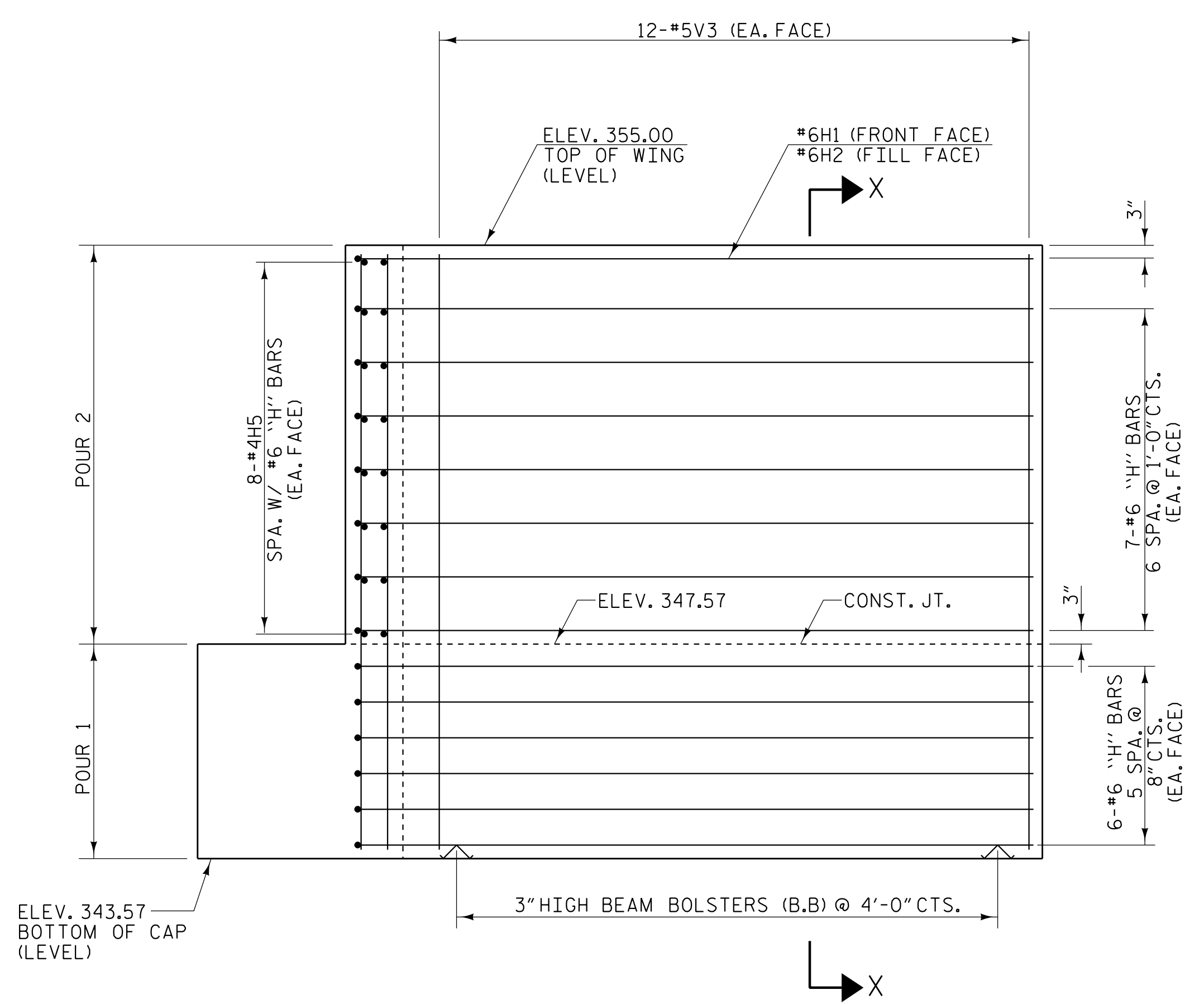
PLAN OF LEFT WING - W1



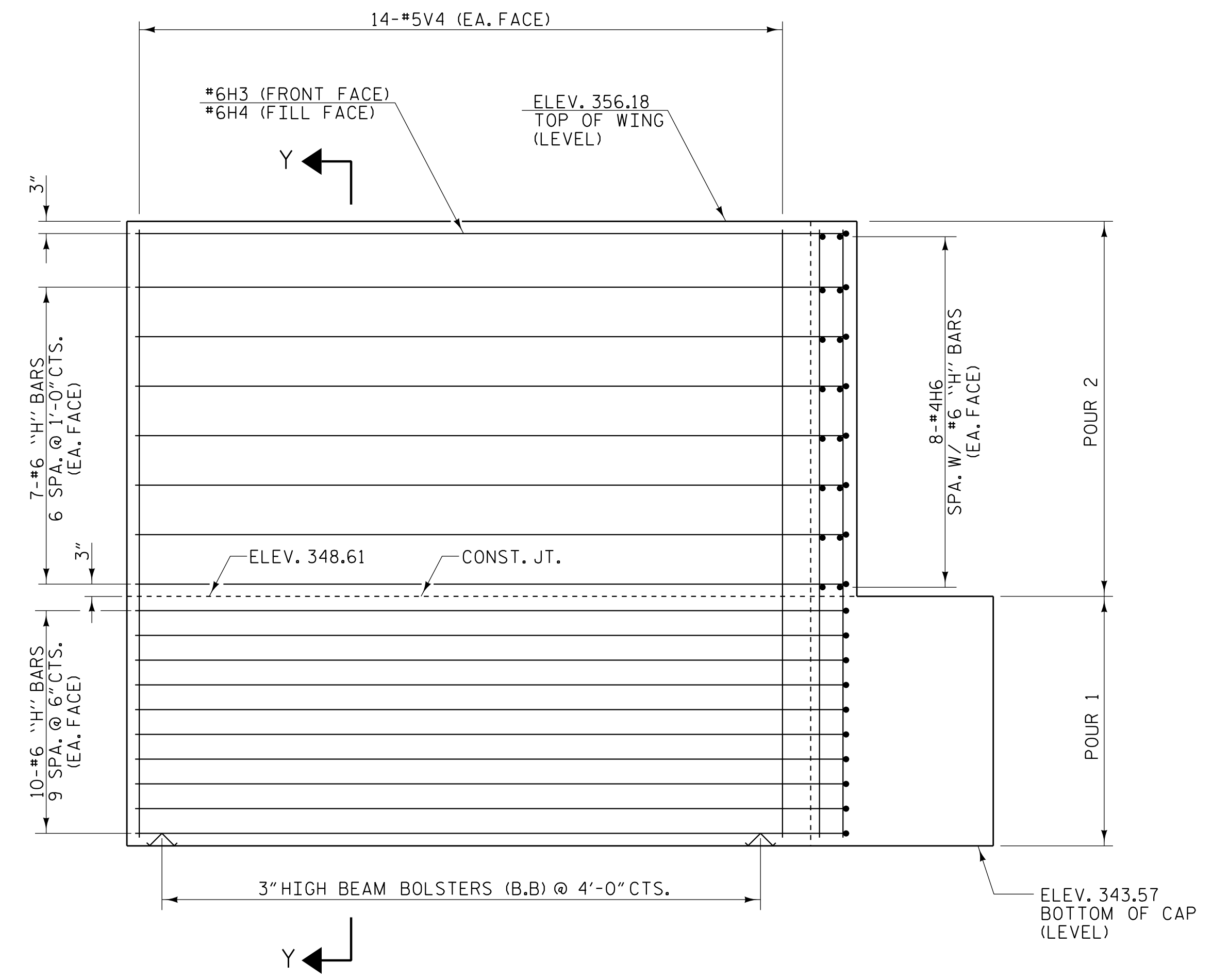
PLAN OF RIGHT WING - W2



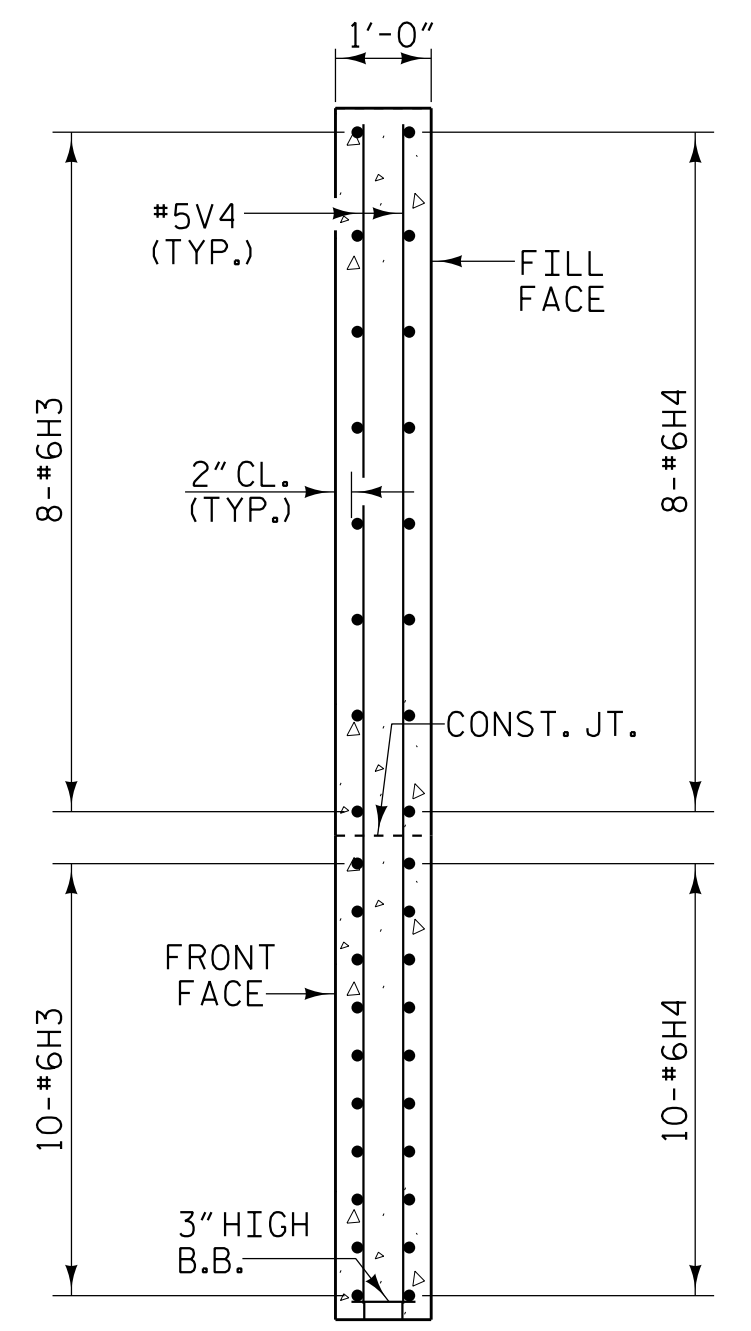
SECTION X-X



ELEVATION OF LEFT WING - W1



ELEVATION OF RIGHT WING - W2



SECTION Y-Y

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

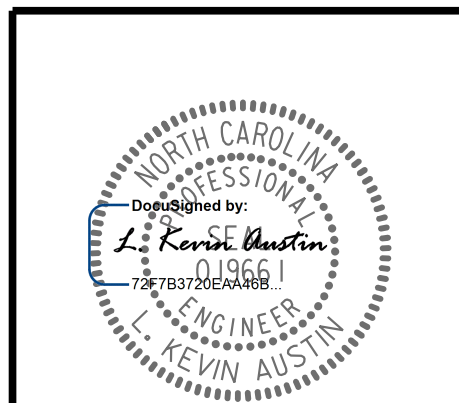
SUBSTRUCTURE  
 INTEGRAL  
 END BENT 1  
 LEFT LANE

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2			4				

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

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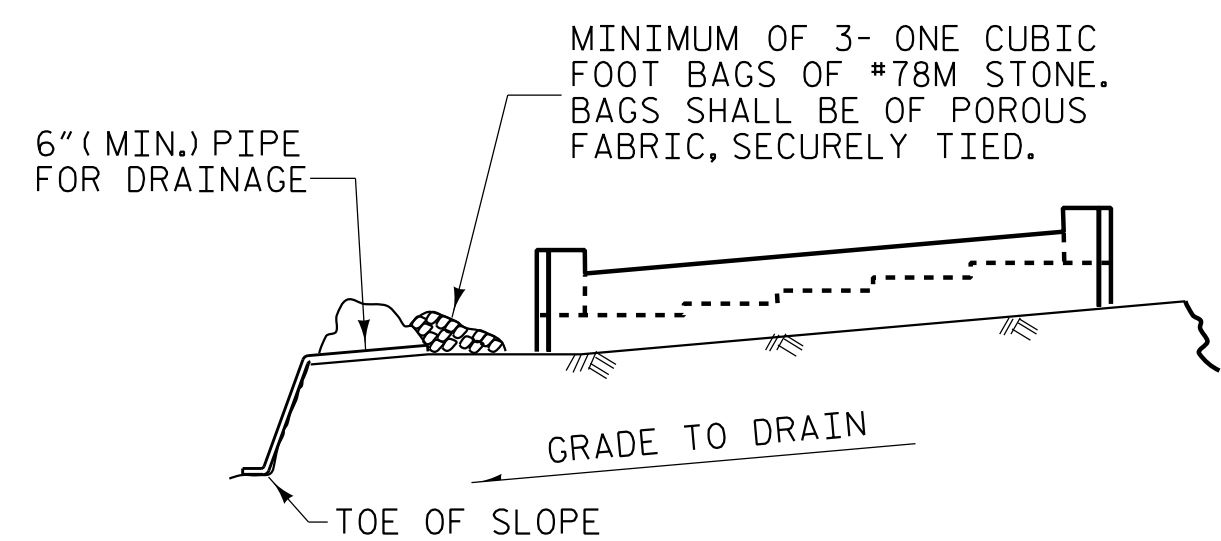


6/11/2019  
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 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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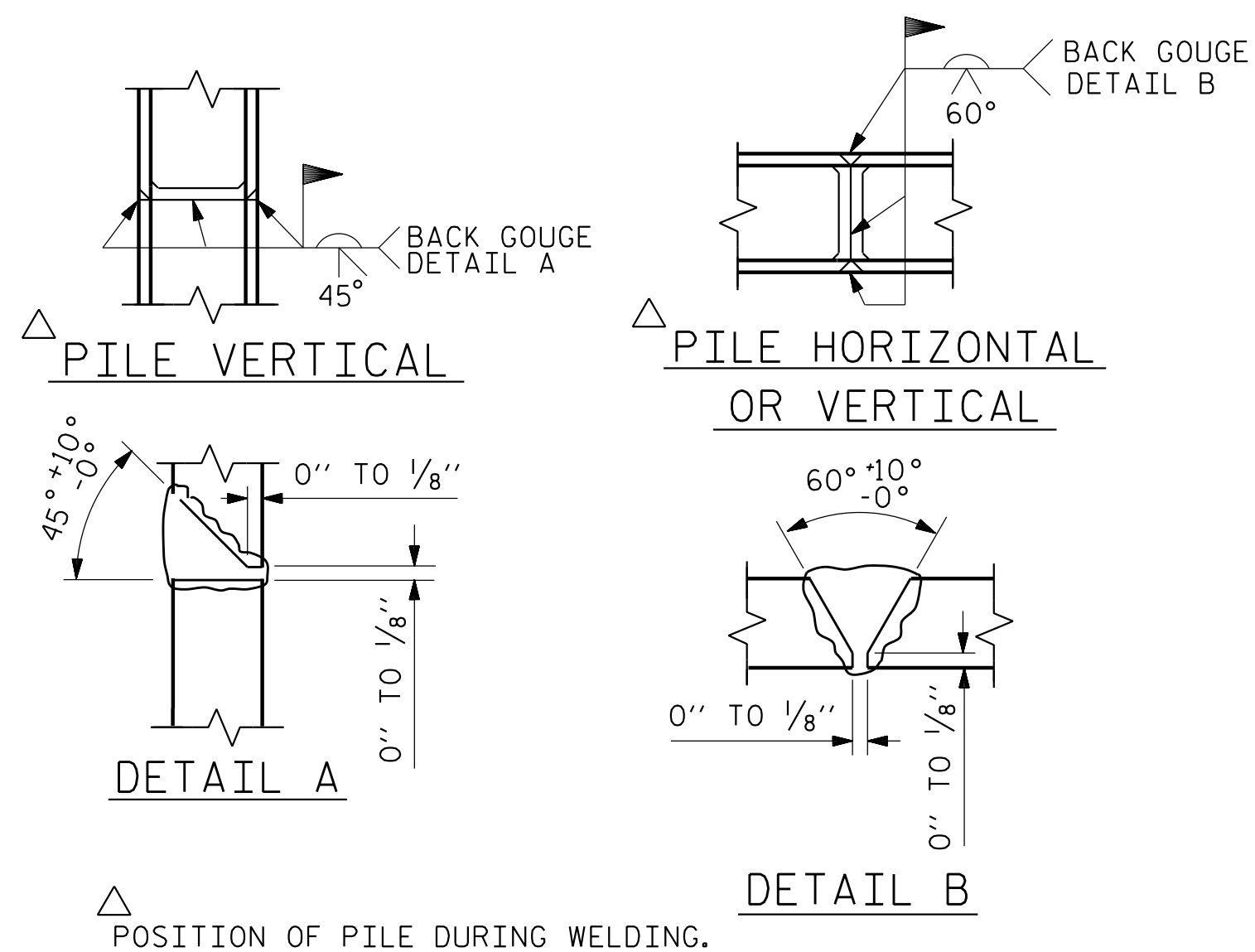


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

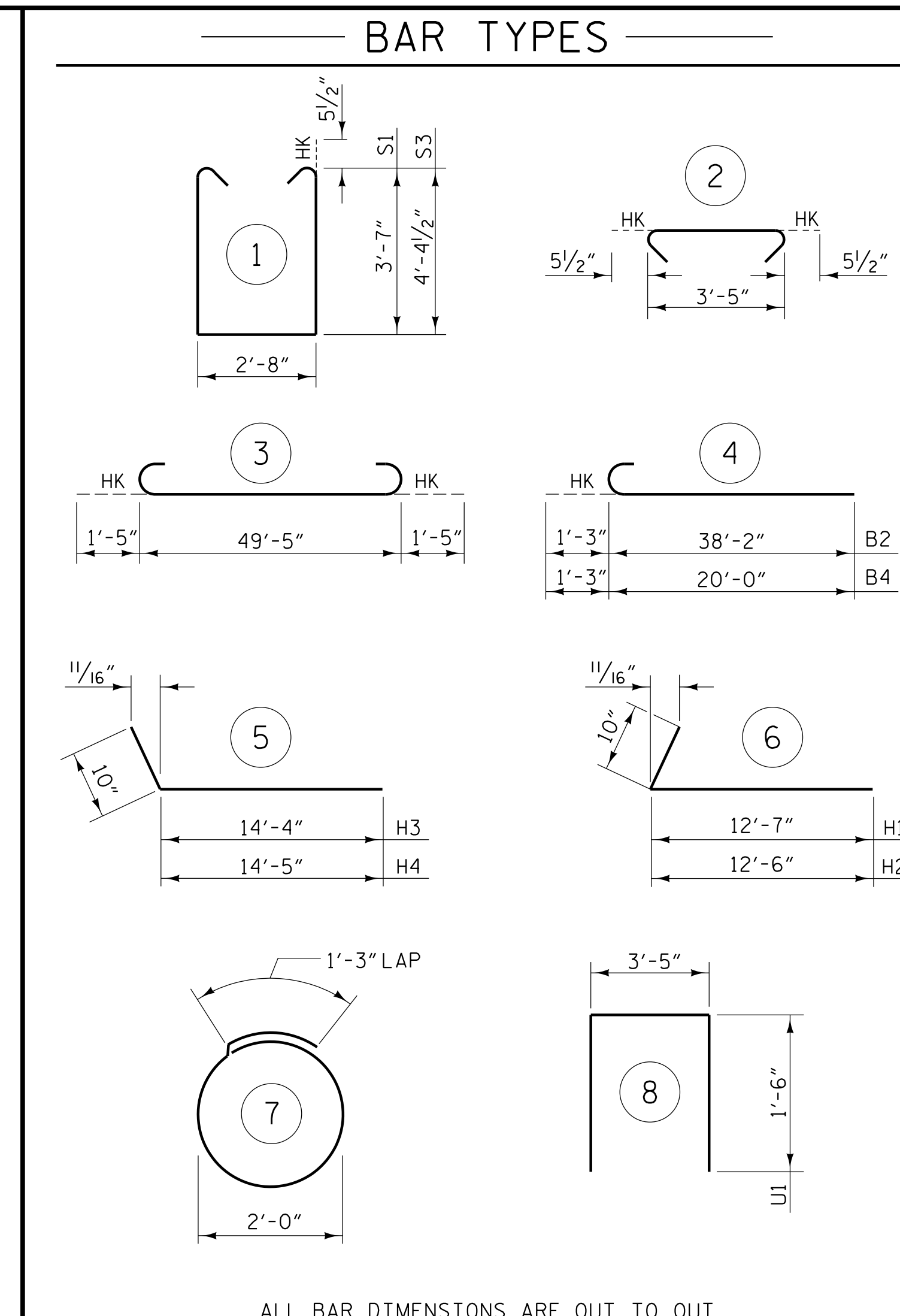
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

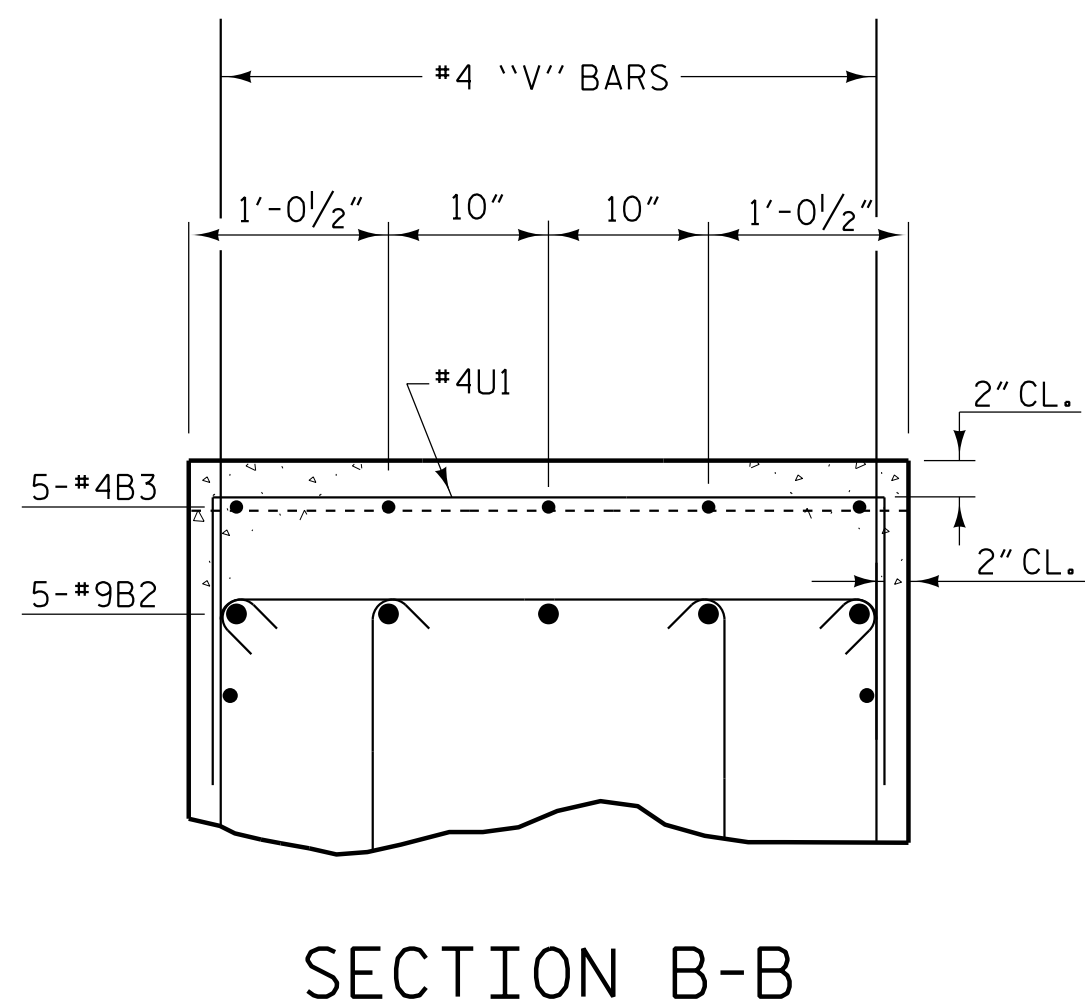
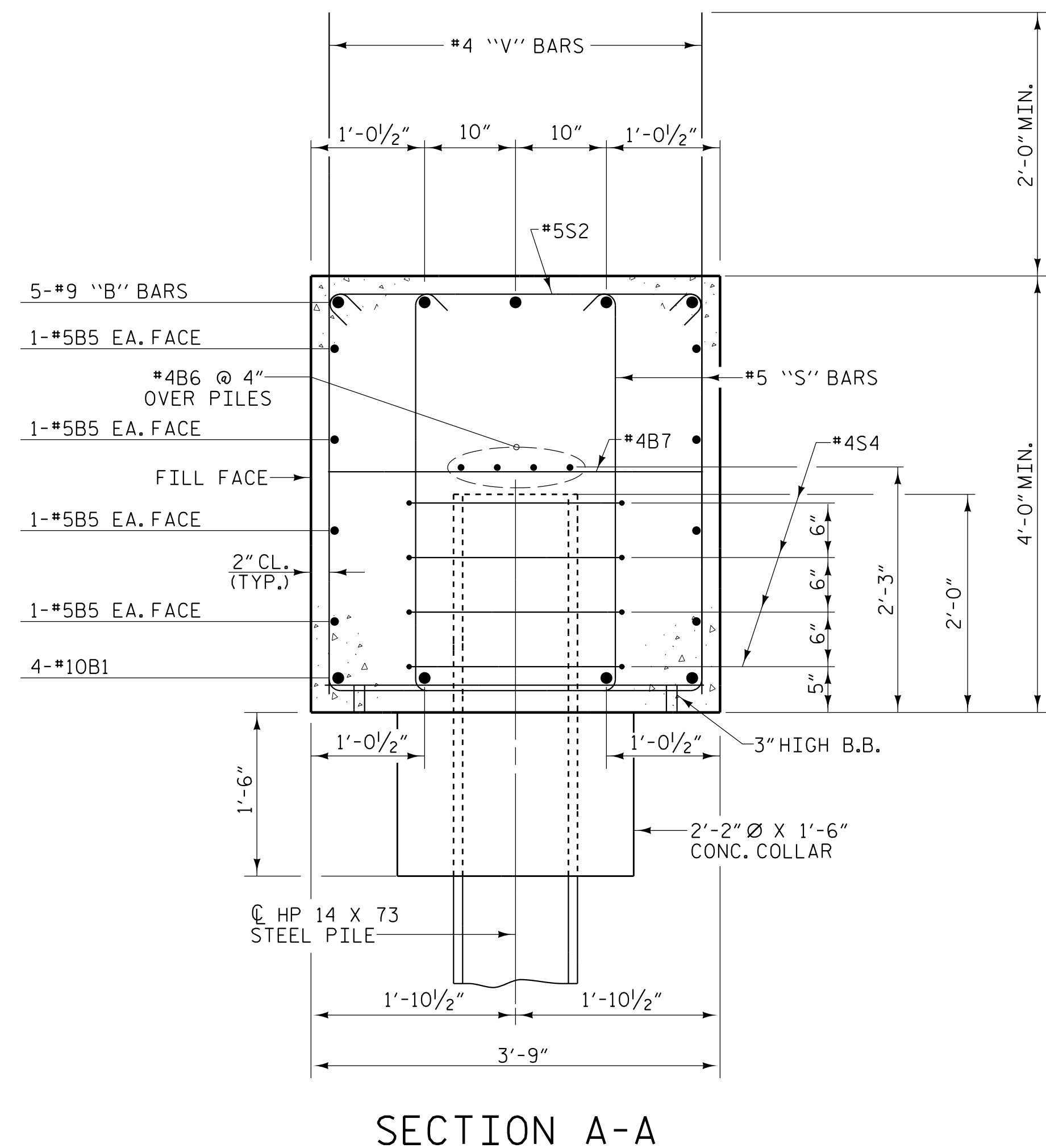
### TEMPORARY DRAINAGE AT END BENT



### PILE SPLICE DETAILS



BILL OF MATERIAL					
INTEGRAL END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	52'-3"	899
B2	5	#9	4	39'-5"	670
B3	5	#4	STR	11'-5"	38
B4	5	#9	4	21'-3"	361
B5	8	#5	STR	49'-5"	412
B6	8	#4	STR	25'-11"	138
B7	15	#4	STR	3'-5"	34
H1	14	#6	6	13'-5"	282
H2	14	#6	6	13'-4"	280
H3	18	#6	5	15'-2"	410
H4	18	#6	5	15'-3"	412
H5	16	#4	STR	3'-7"	38
H6	16	#4	STR	3'-9"	40
S1	62	#5	1	10'-9"	695
S2	53	#5	2	4'-4"	240
S3	44	#5	1	12'-4"	566
S4	32	#4	7	7'-7"	162
V1	30	#4	STR	6'-5"	129
V2	30	#4	STR	6'-11"	139
V3	34	#5	STR	11'-1"	393
V4	38	#5	STR	12'-3"	486
U1	6	#4	8	6'-5"	26
TOTAL REINFORCING STEEL					6850 lbs.
CLASS "A" CONCRETE - CU. YARDS					
POUR 1- CAP, COLLARS & LOWER WINGS					37.2 cu. yds.
POUR 2- UPPER WINGS					9.4 cu. yds.
TOTAL					46.6 cu. yds.
HP 14 X 73 STEEL PILES					
8 PILES REQUIRED - LIN. FEET					400
PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES					8 EA.



ALL BAR DIMENSIONS ARE OUT TO OUT

6/7/2019 3:16:02 PM RA\Structures\Left Lane\421B LEFT SMU\ELI03.dgn

DRAWN BY : W. B. ALLEN DATE : 6/15  
CHECKED BY : Z. H. BROWN DATE : 7/15  
DESIGN ENGINEER OF RECORD : L. K. AUSTIN DATE : 9/15

PLANS PREPARED BY:  
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUBSTRUCTURE  
INTEGRAL END BENT 1  
LEFT LANE  
DESIGNED BY:  
L. Kevin Austin  
REGISTERED PROFESSIONAL ENGINEER  
NO. 78370  
6/11/2019

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

SHEET 3 OF 3

REVISIONS						SHEET NO.
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1			3			TOTAL SHEETS
2			4			25

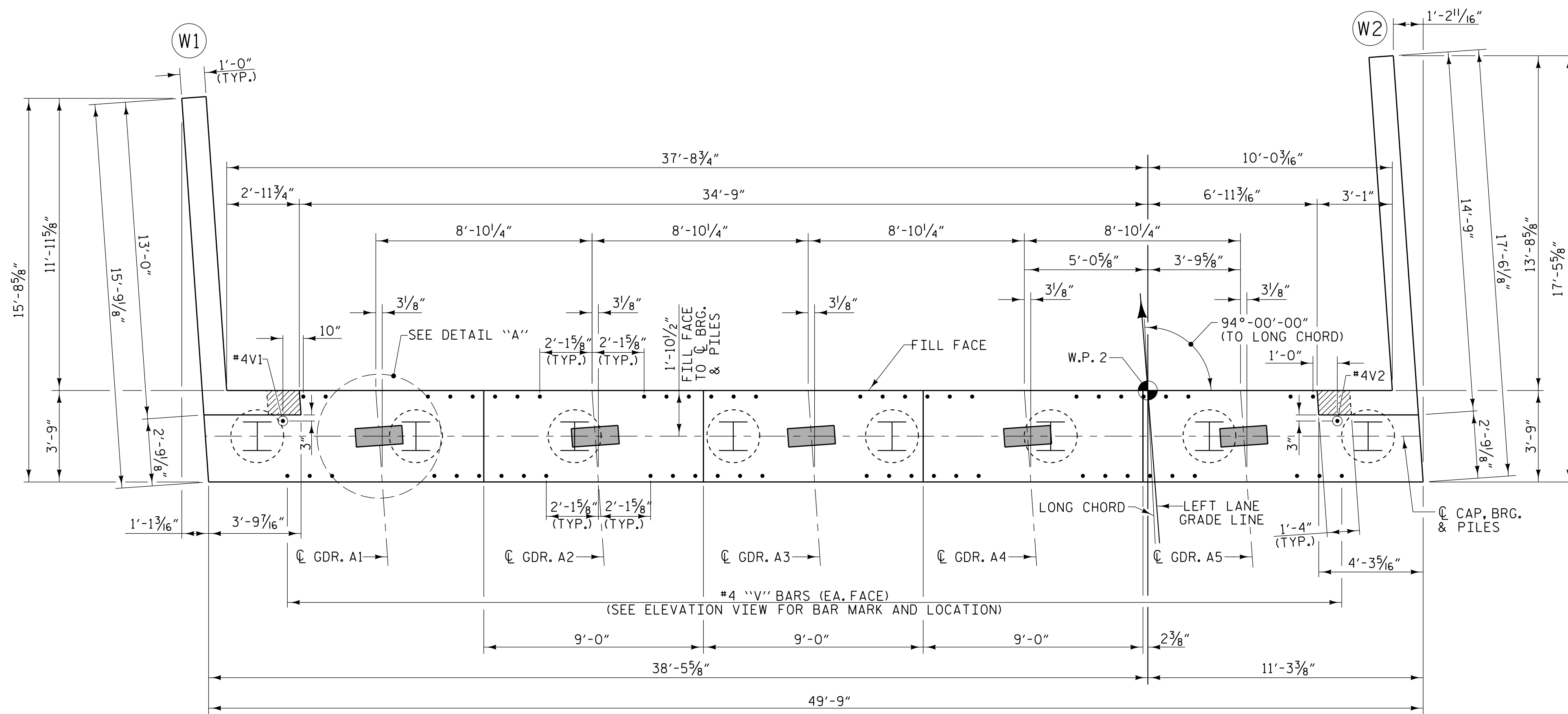
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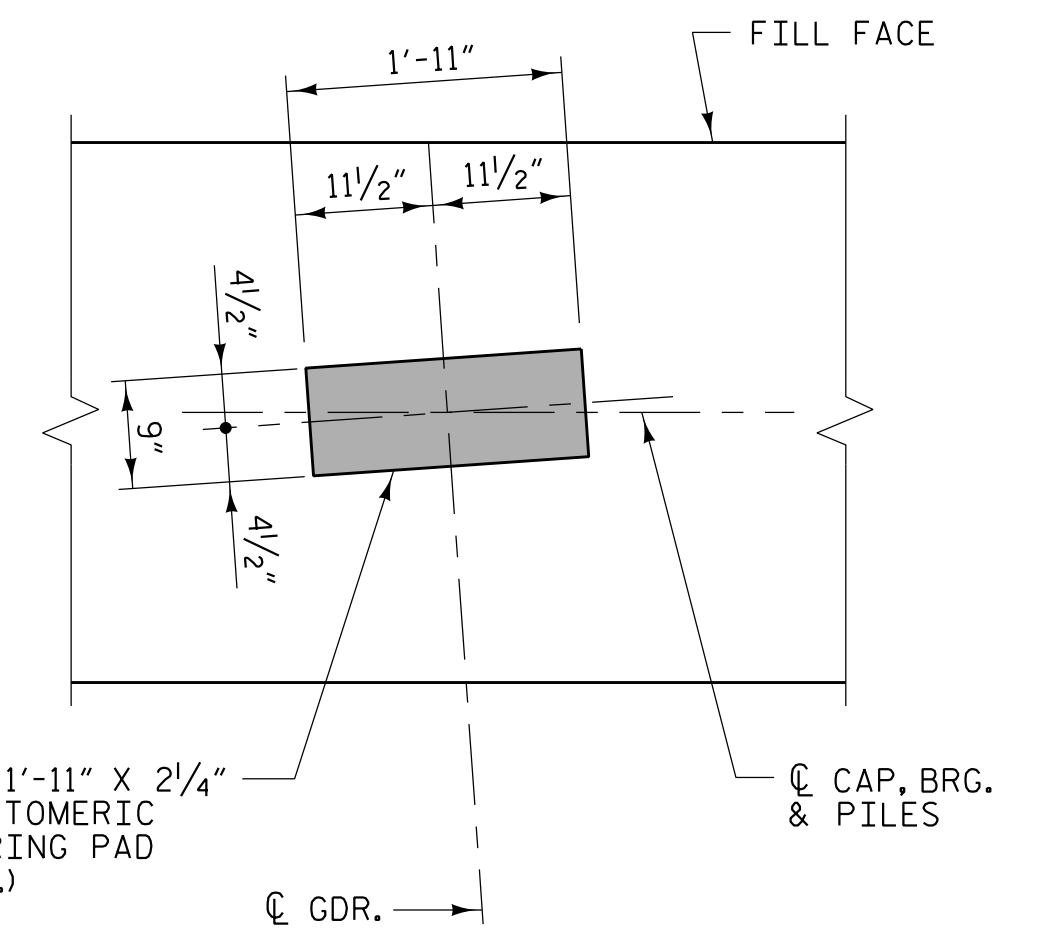


NOTES

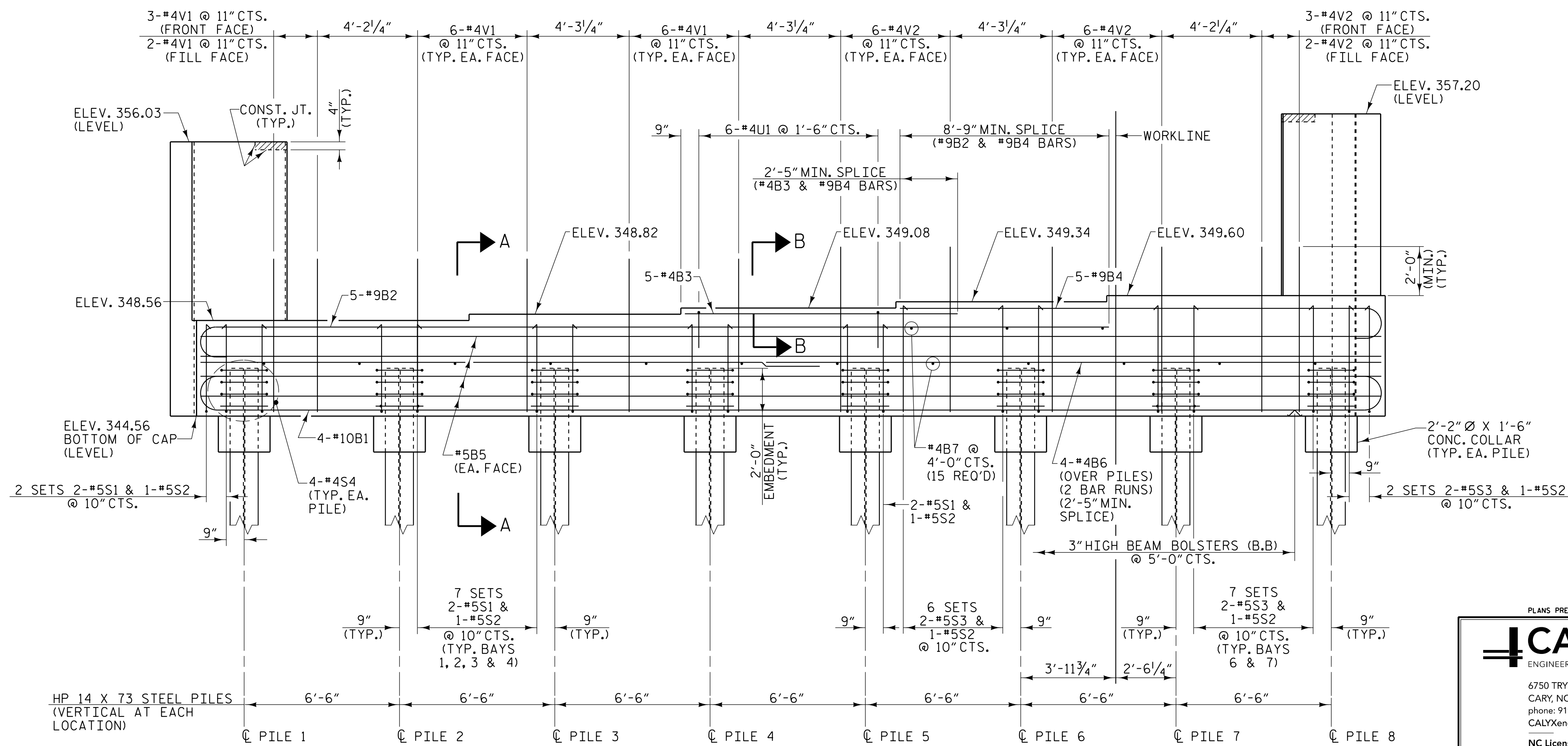
#4UI BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4V1 BARS.  
 THE CONCRETE IN THE SHADED AREA OF THE WING WALL SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.



PLAN



DETAIL "A"  
(TYP. EACH GIRDER)



ELEVATION

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

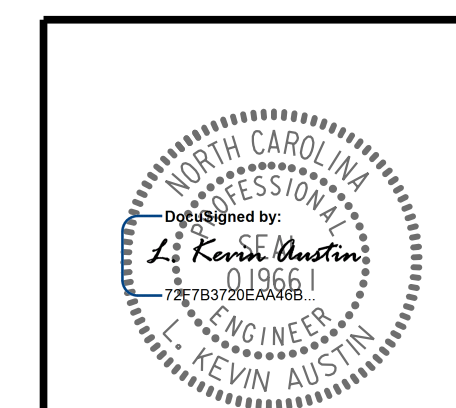
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2  
 LEFT LANE

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

PLANS PREPARED BY:

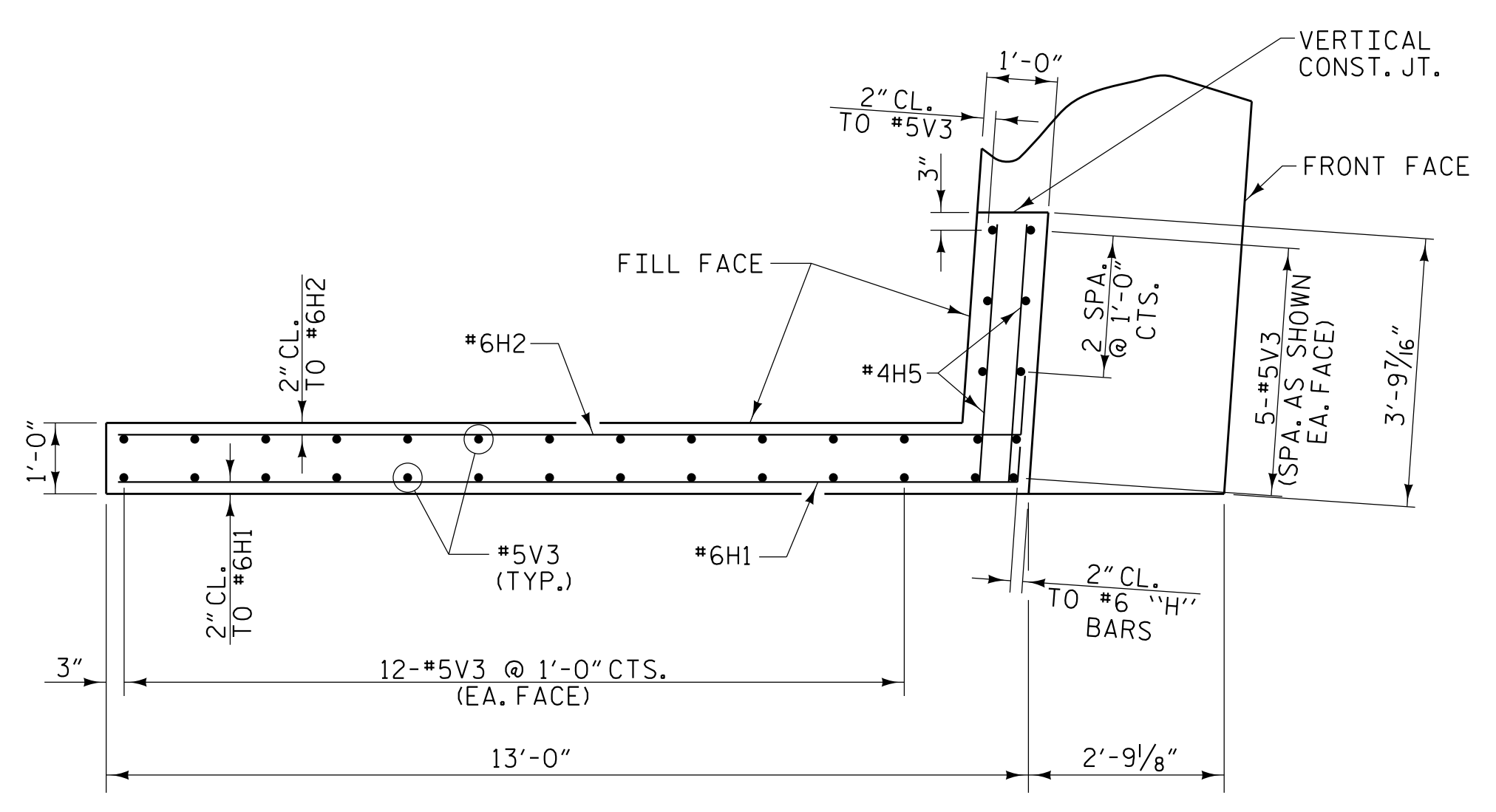
6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333



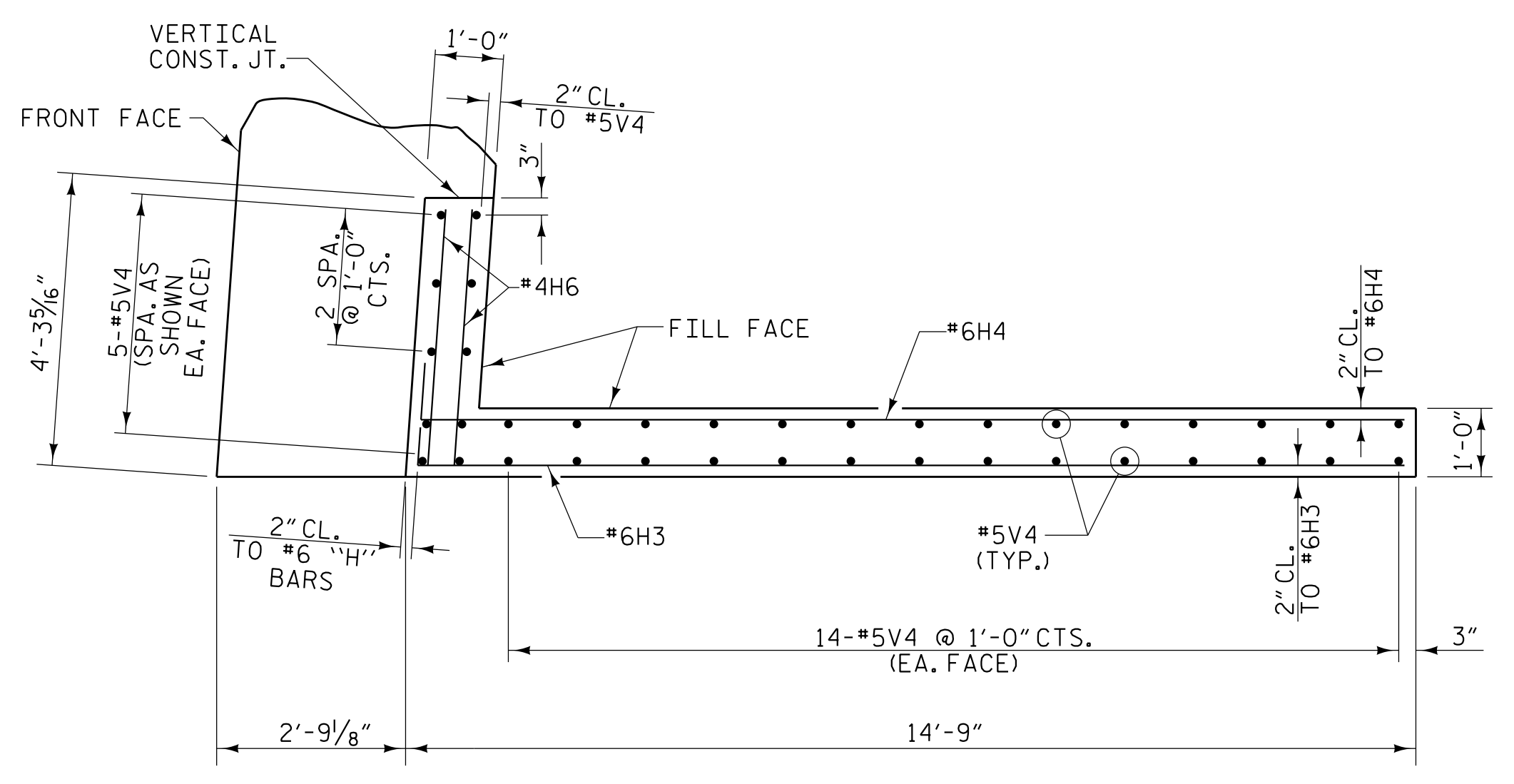
6/11/2019  
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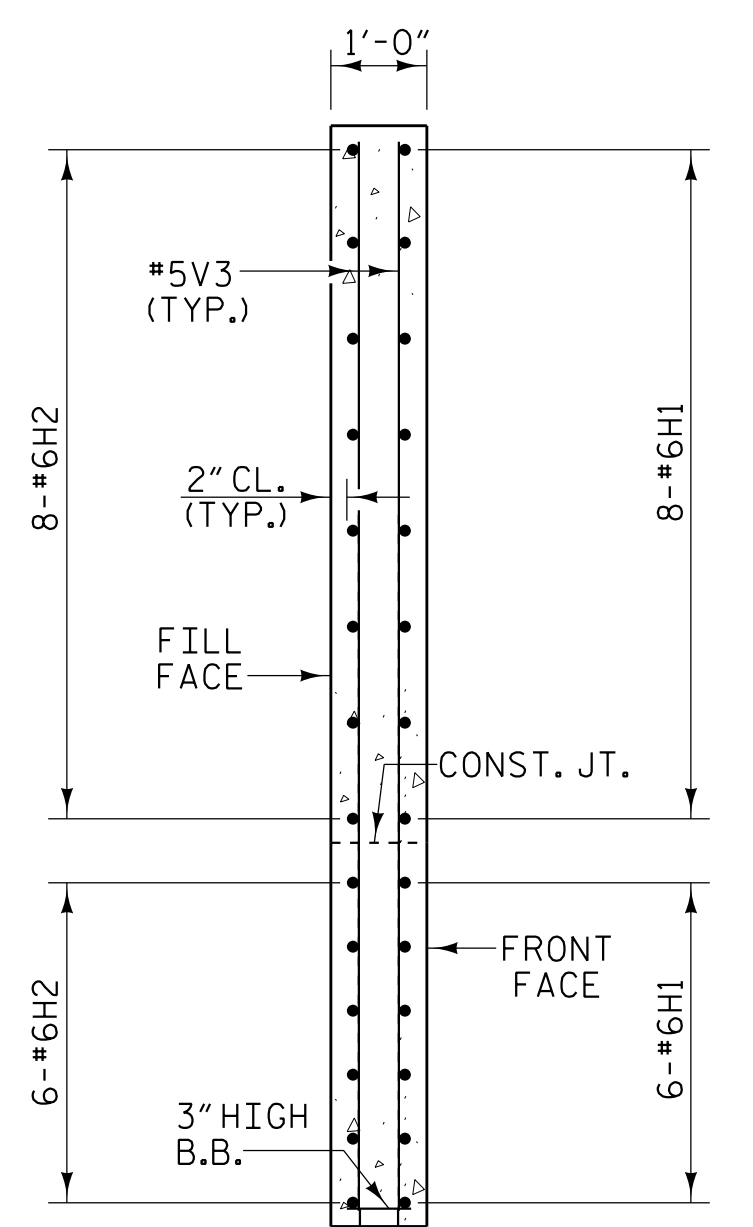
DRAWN BY : W. B. ALLEN DATE : 6/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15



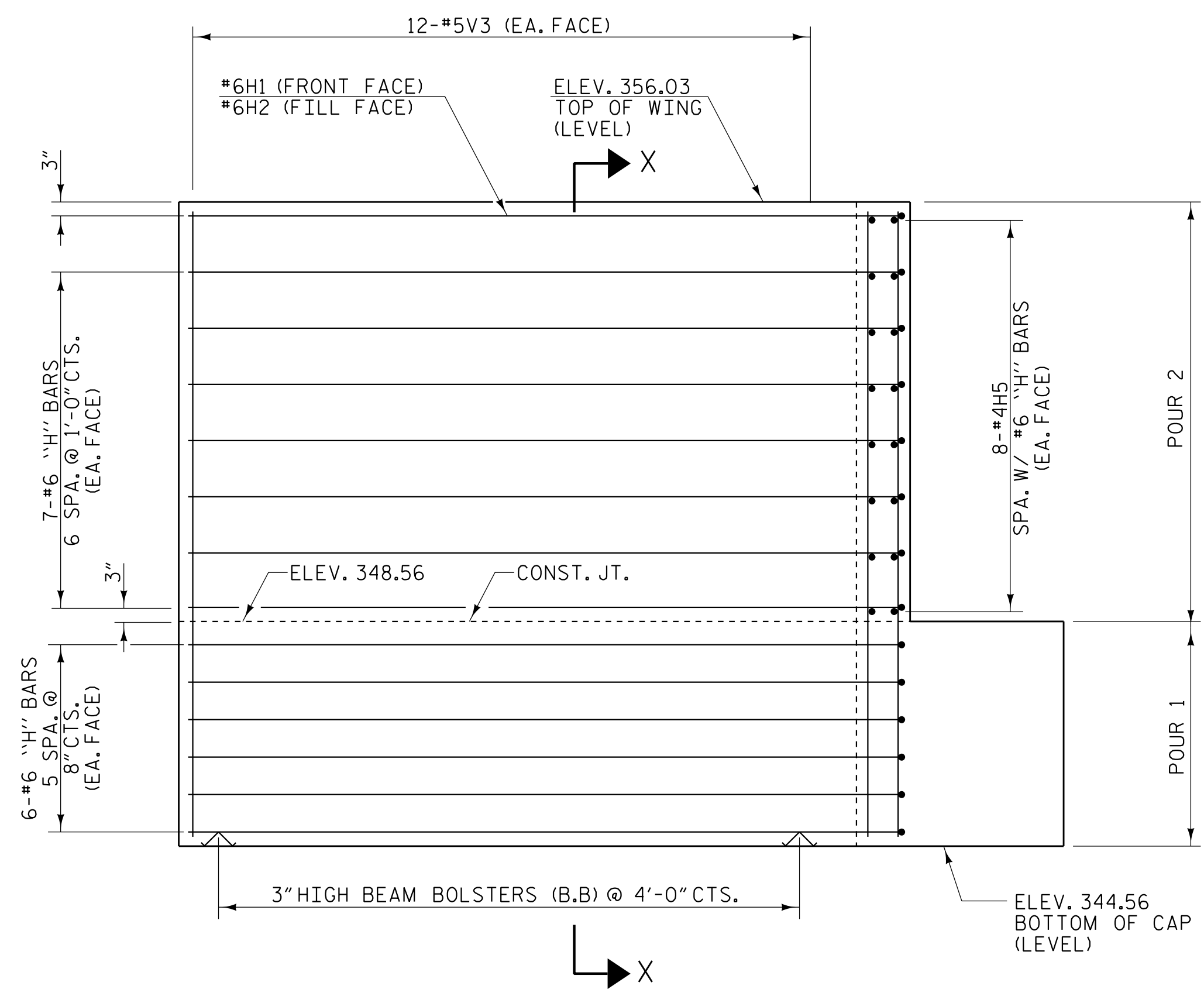
PLAN OF LEFT WING - W1



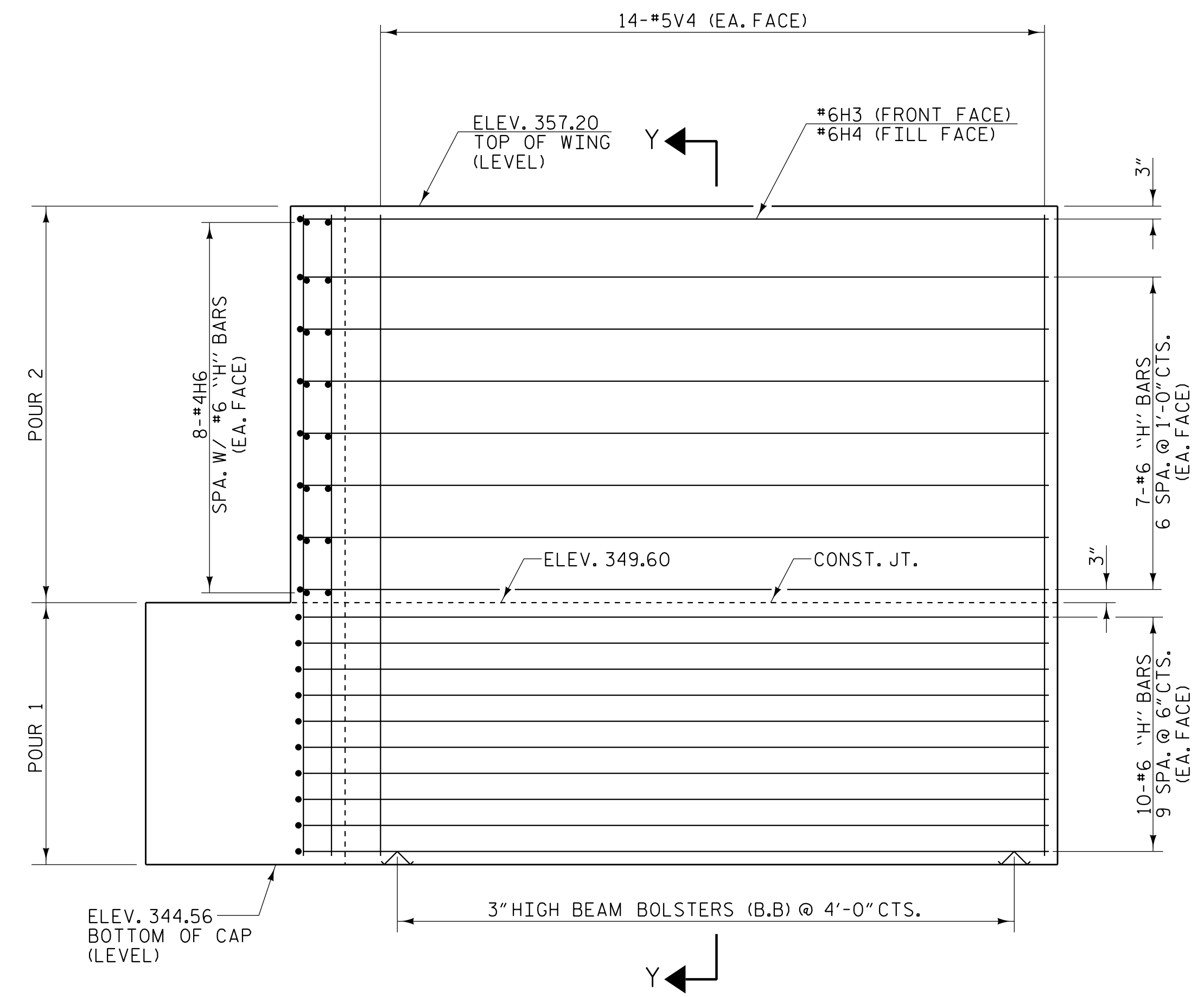
PLAN OF RIGHT WING - W2



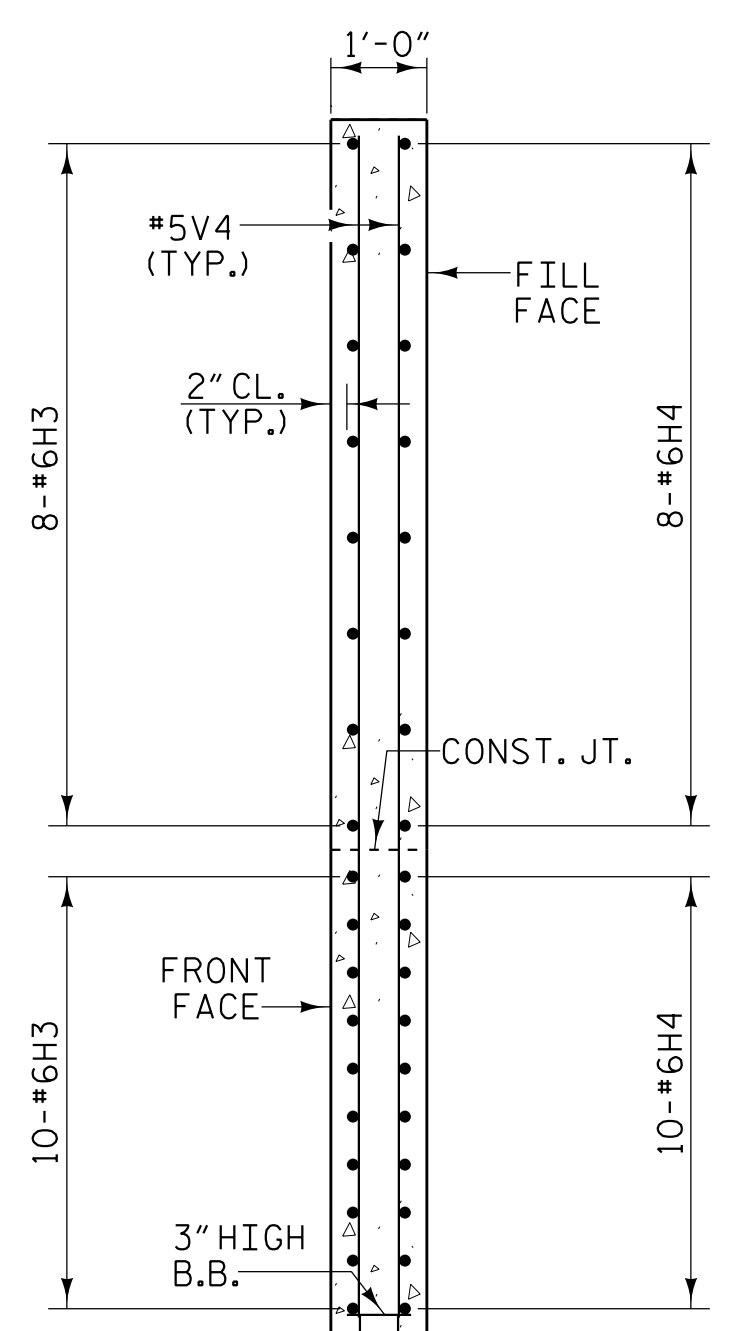
SECTION X-X



ELEVATION OF LEFT WING - W1



ELEVATION OF RIGHT WING - W2



SECTION Y-Y

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2

LEFT LANE

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

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333



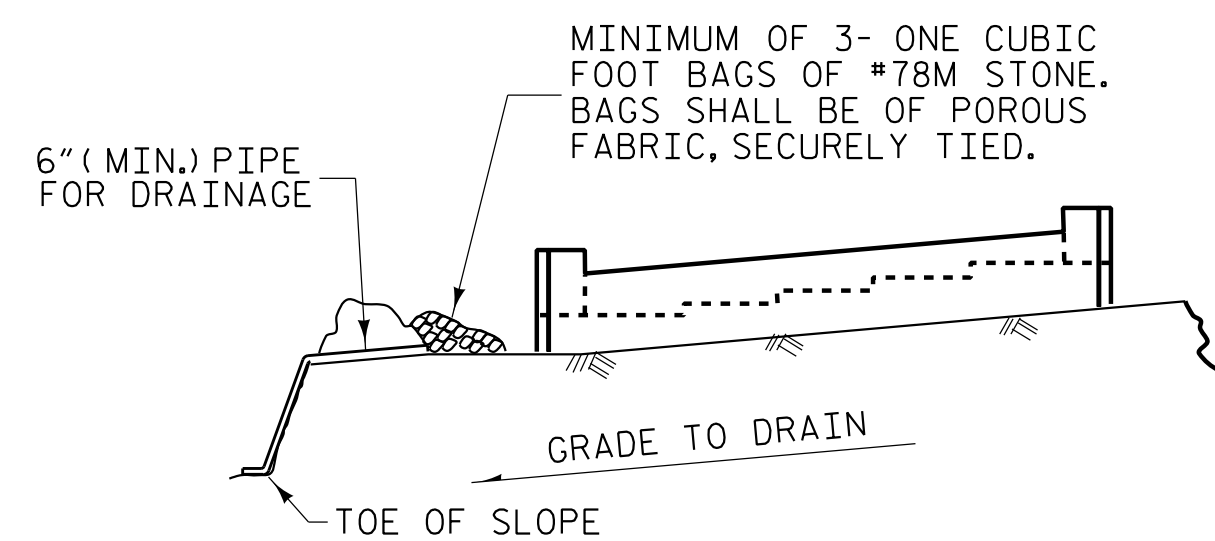
6/11/2019  
 DWG. NO. BL-21

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 UNLESS ALL SIGNATURES COMPLETED**

DRAWN BY :	W. B. ALLEN	DATE :	6/15
CHECKED BY :	Z. H. BROWN	DATE :	7/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

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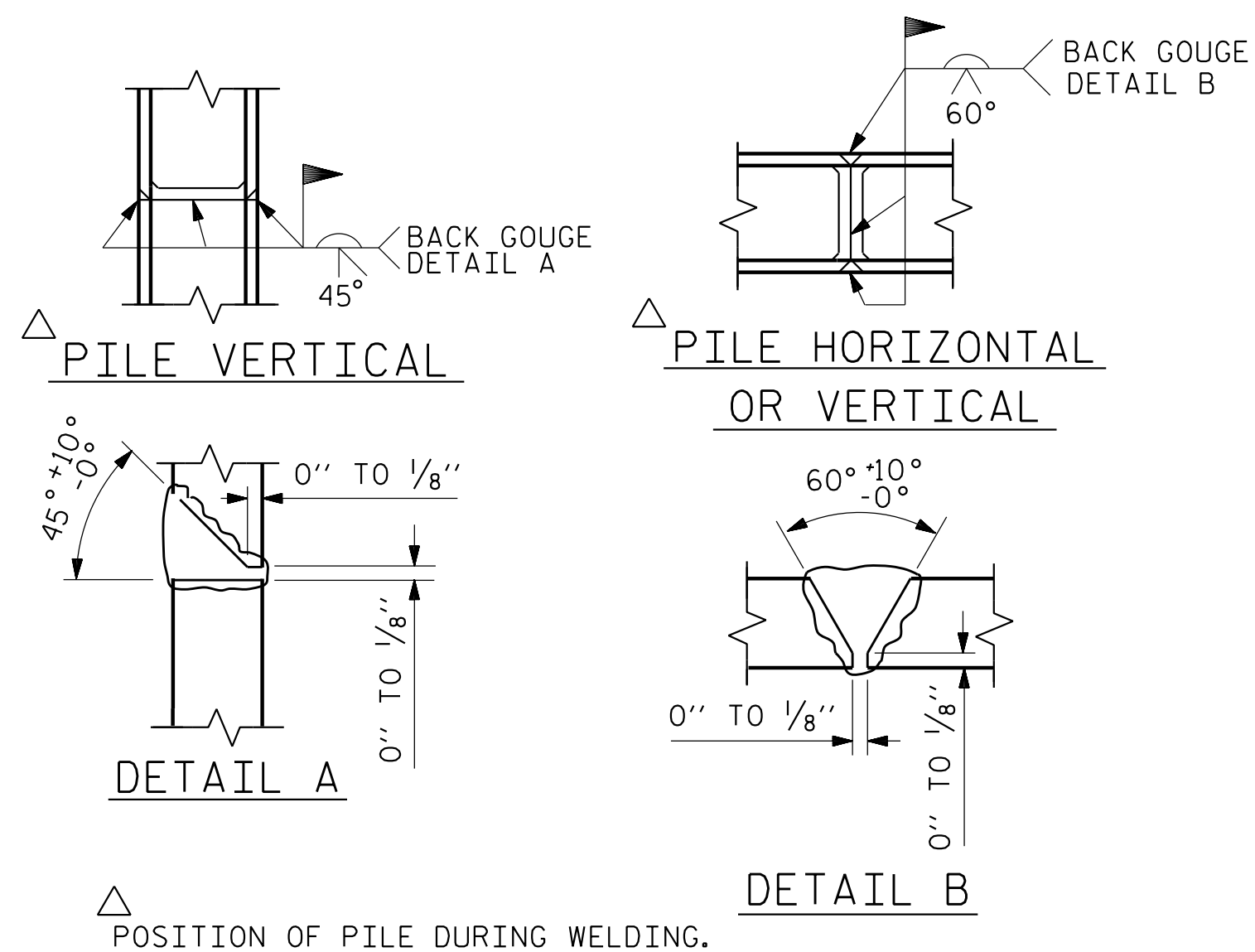


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

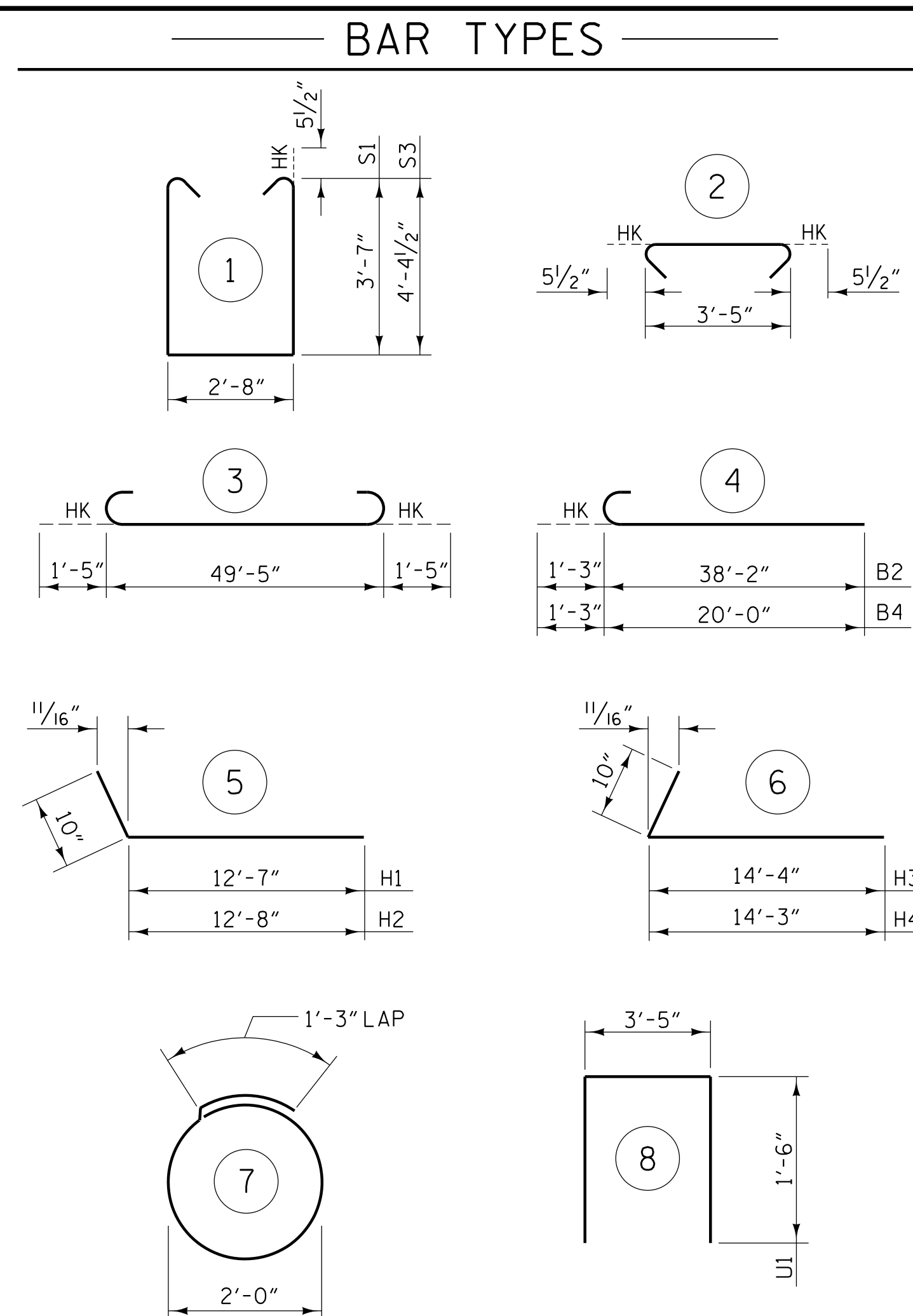
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

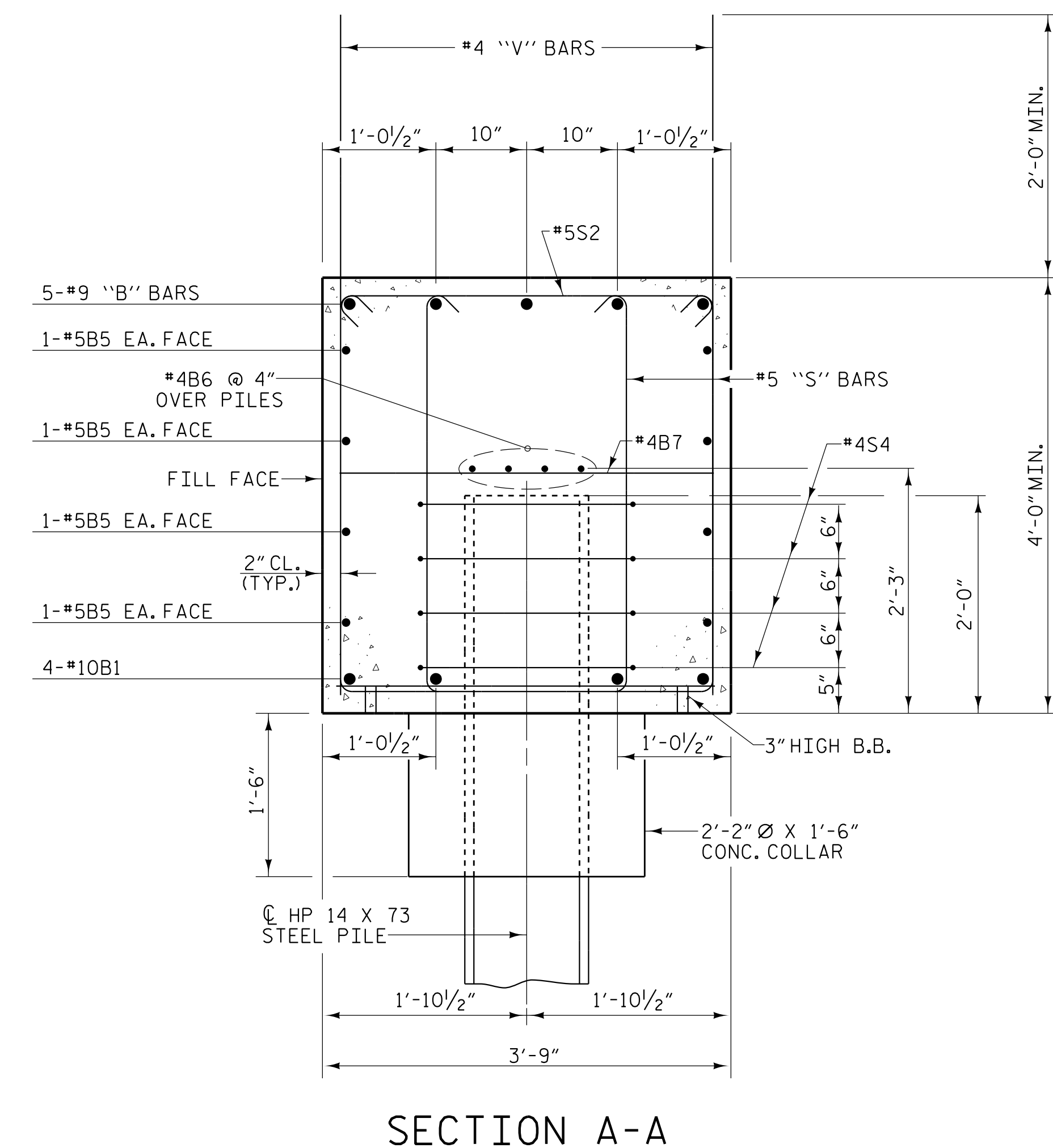


ALL BAR DIMENSIONS ARE OUT TO OUT

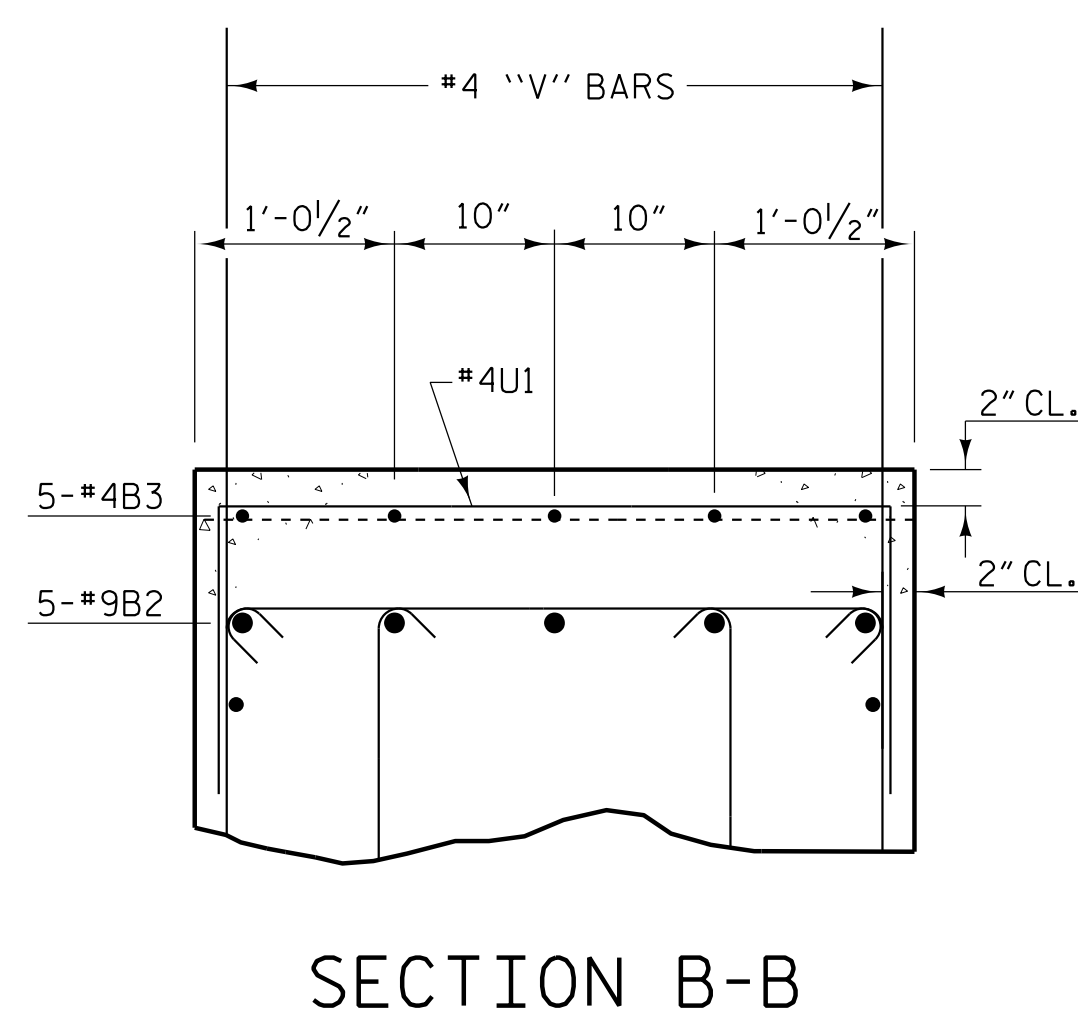
### BILL OF MATERIAL

#### INTEGRAL END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	52'-3"	899
B2	5	#9	4	39'-5"	670
B3	5	#4	STR	11'-5"	38
B4	5	#9	4	21'-3"	361
B5	8	#5	STR	49'-5"	412
B6	8	#4	STR	25'-11"	138
B7	15	#4	STR	3'-5"	34
H1	14	#6	5	13'-5"	282
H2	14	#6	5	13'-6"	284
H3	18	#6	6	15'-2"	410
H4	18	#6	6	15'-1"	408
H5	16	#4	STR	3'-7"	38
H6	16	#4	STR	3'-9"	40
S1	62	#5	1	10'-9"	695
S2	53	#5	2	4'-4"	240
S3	44	#5	1	12'-4"	566
S4	32	#4	7	7'-7"	162
V1	30	#4	STR	6'-5"	129
V2	30	#4	STR	6'-11"	139
V3	34	#5	STR	11'-1"	393
V4	38	#5	STR	12'-3"	486
U1	6	#4	8	6'-5"	26
TOTAL REINFORCING STEEL					6850 lbs.
CLASS "A" CONCRETE - CU. YARDS					
POUR 1- CAP, COLLARS & LOWER WINGS					37.2 cu. yds.
POUR 2- UPPER WINGS					9.5 cu. yds.
TOTAL					46.7 cu. yds.
HP 14 X 73 STEEL PILES					360
8 PILES REQUIRED - LIN. FEET					
PILE DRIVING EQUIPMENT					8 EA.
SETUP FOR					
HP 14 X 73 STEEL PILES					



### SECTION A-A



### SECTION B-B

6/7/2019 3:16:07 PM R:\Structures\Left Lane\421B LEFT SMU\E2\_03.dgn

DRAWN BY : W. B. ALLEN DATE : 6/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD : L. K. AUSTIN DATE : 9/15

PLANS PREPARED BY:

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6/11/2019

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DWG. NO. BL-22

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

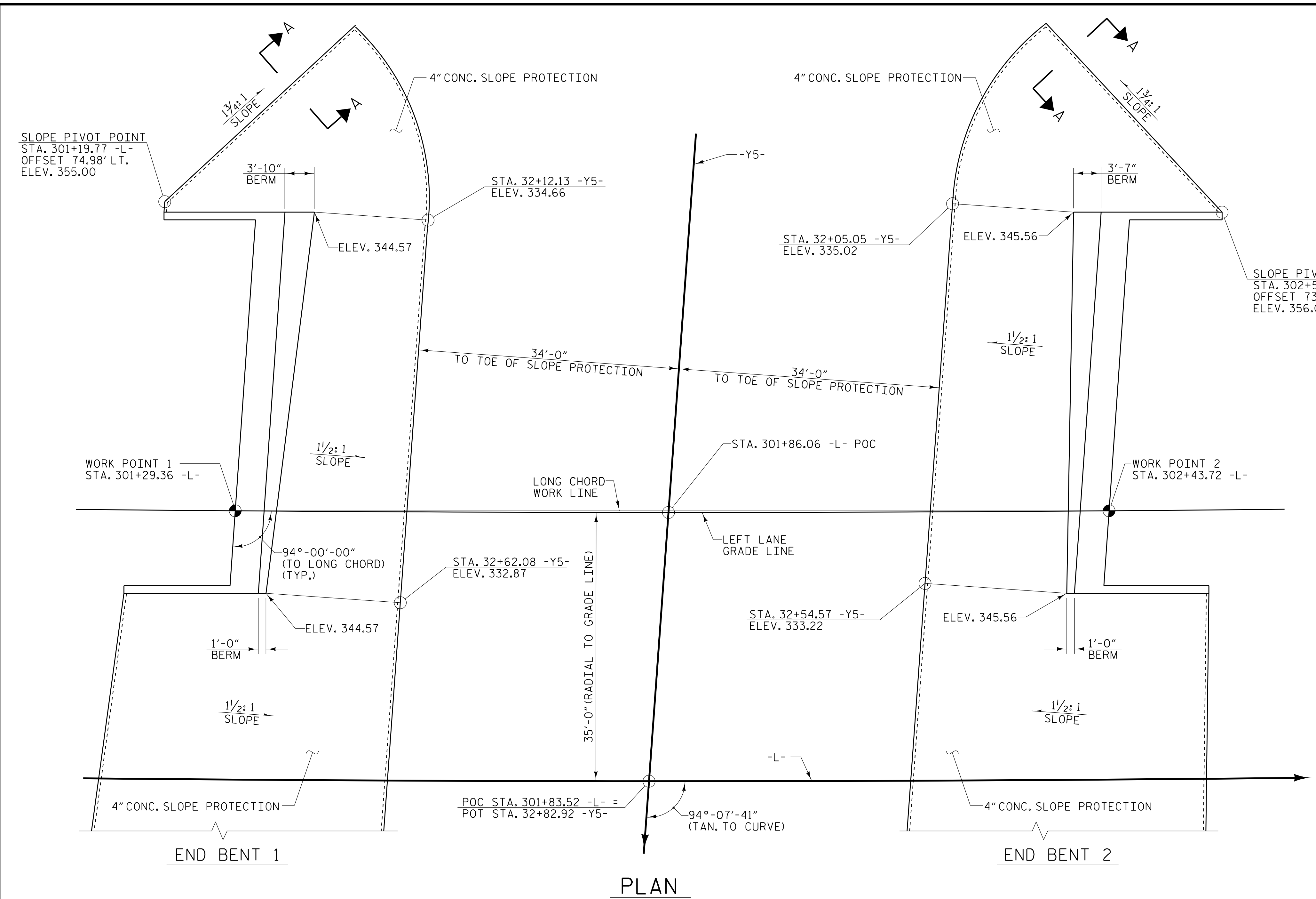
SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2**

LEFT LANE

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



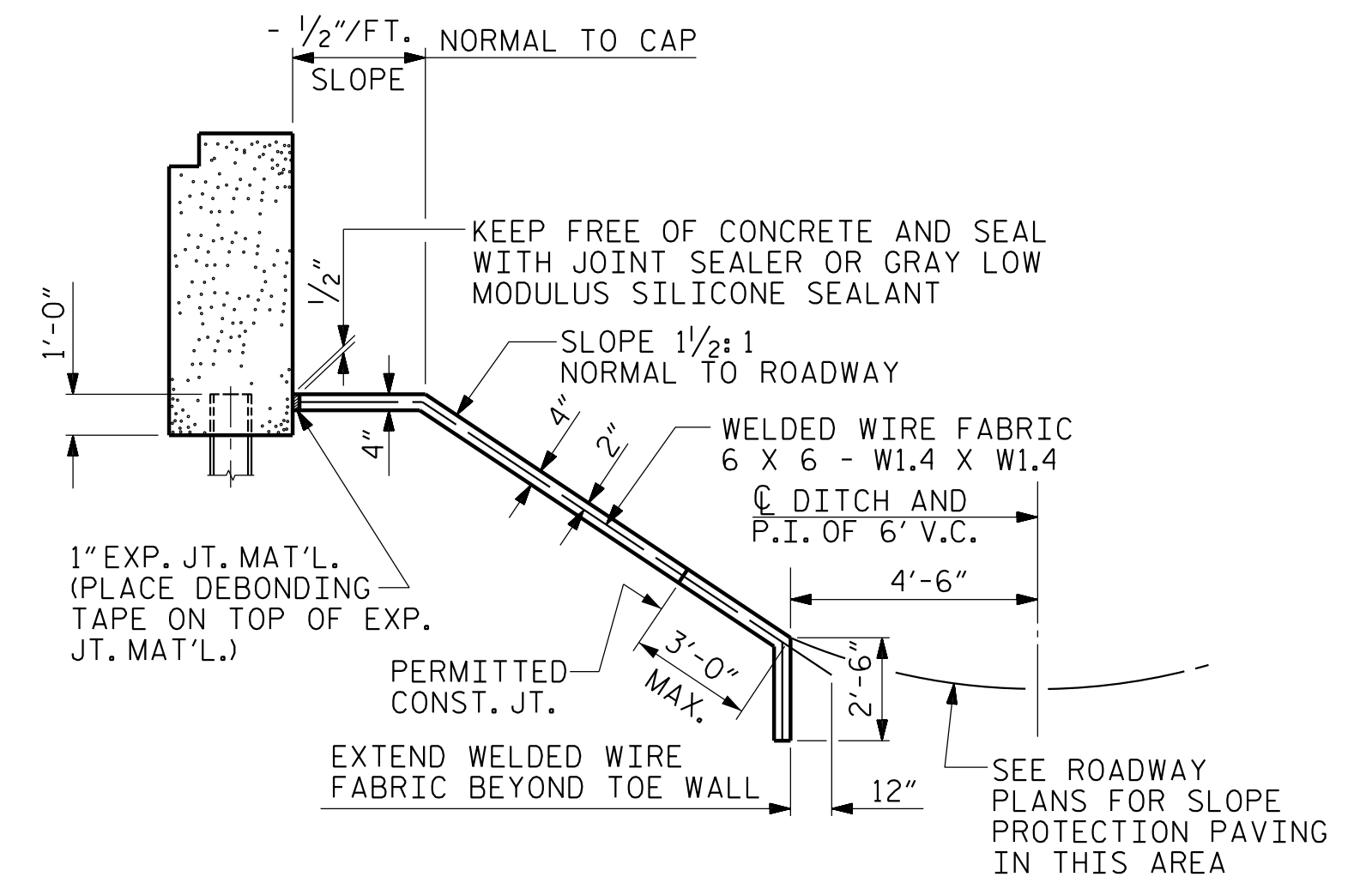
PLAN

GENERAL NOTES

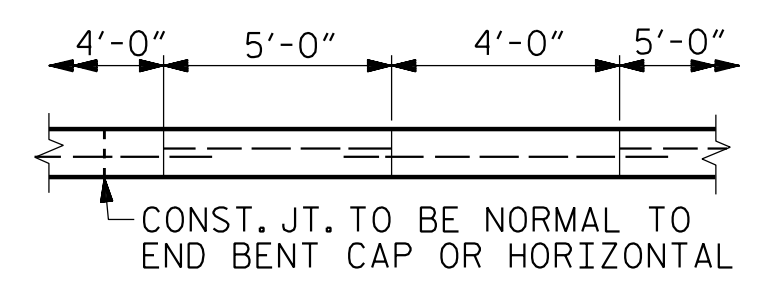
STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4\"/>

BRIDGE @ STA. 301+83.52 -L-	4\"/>	
	SQUARE YARDS	* WELDED WIRE FABRIC 60 INCHES WIDE APPROX. L.F.
END BENT 1	300	600
END BENT 2	312	625

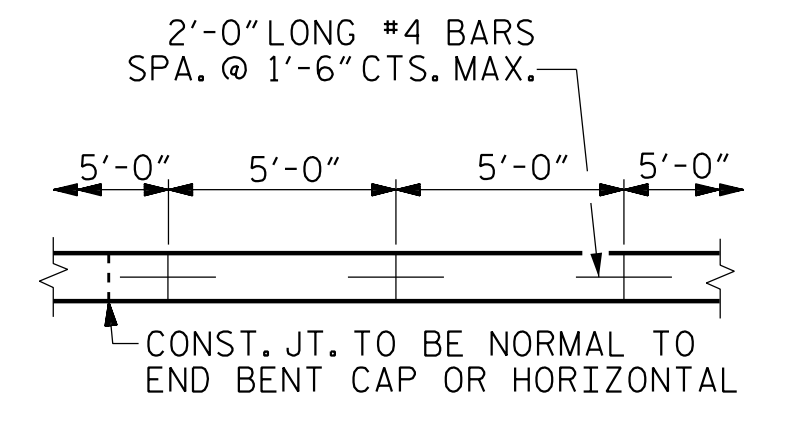
\* QUANTITY SHOWN IS BASED ON 5' POURS.



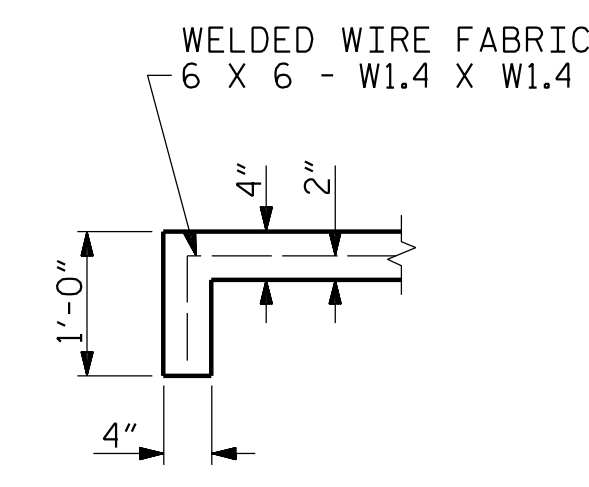
SECTION ALONG C ROADWAY



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



POURING DETAIL  
STRIP WIDTHS MAY VARY IN CURVED PORTION.



SECTION A-A

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
**SLOPE PROTECTION  
 DETAILS**  
 LEFT LANE

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

PLANS PREPARED BY:  
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 CALYXengineers.com  
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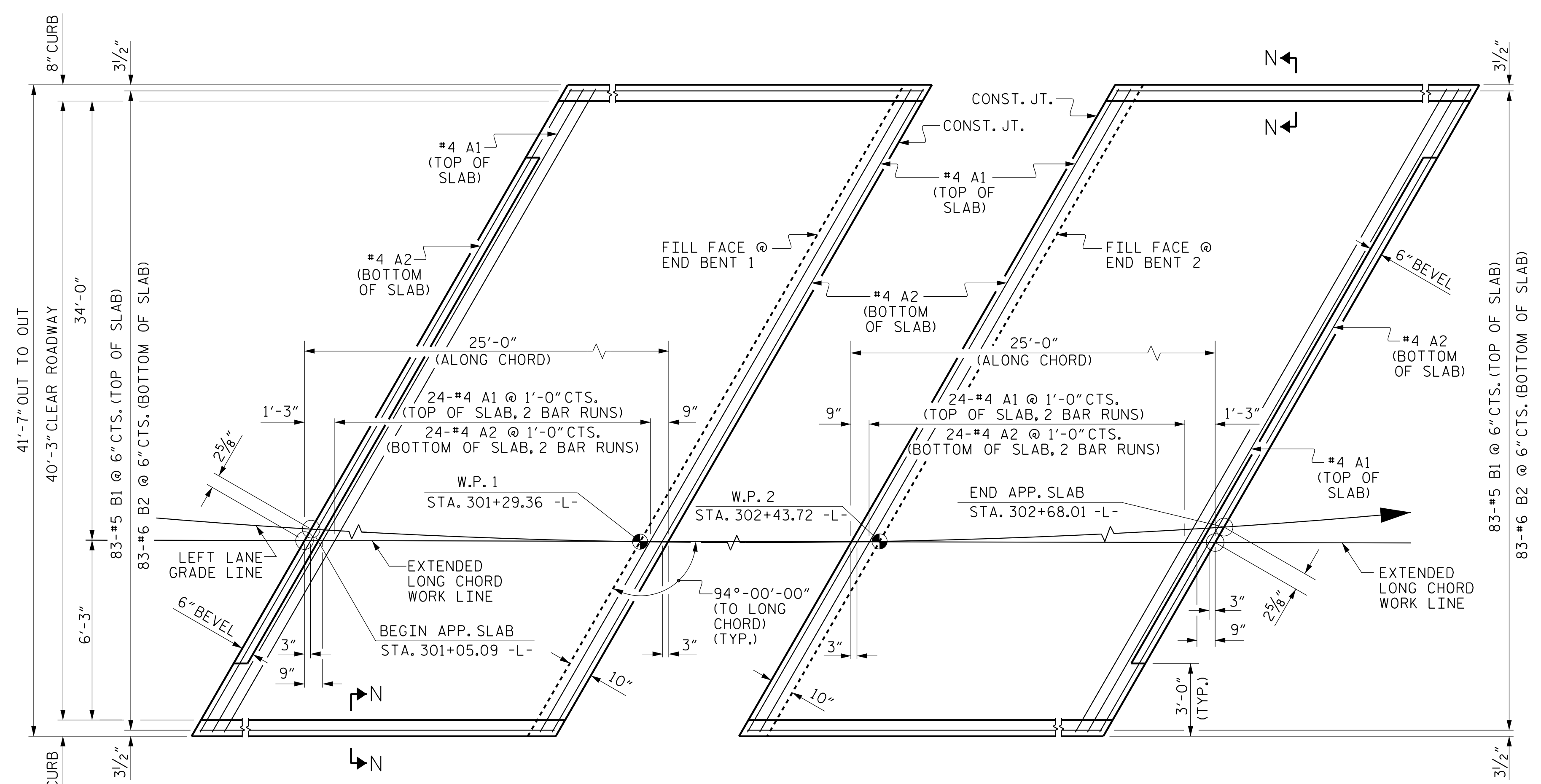
THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

DWG. NO. BL-23

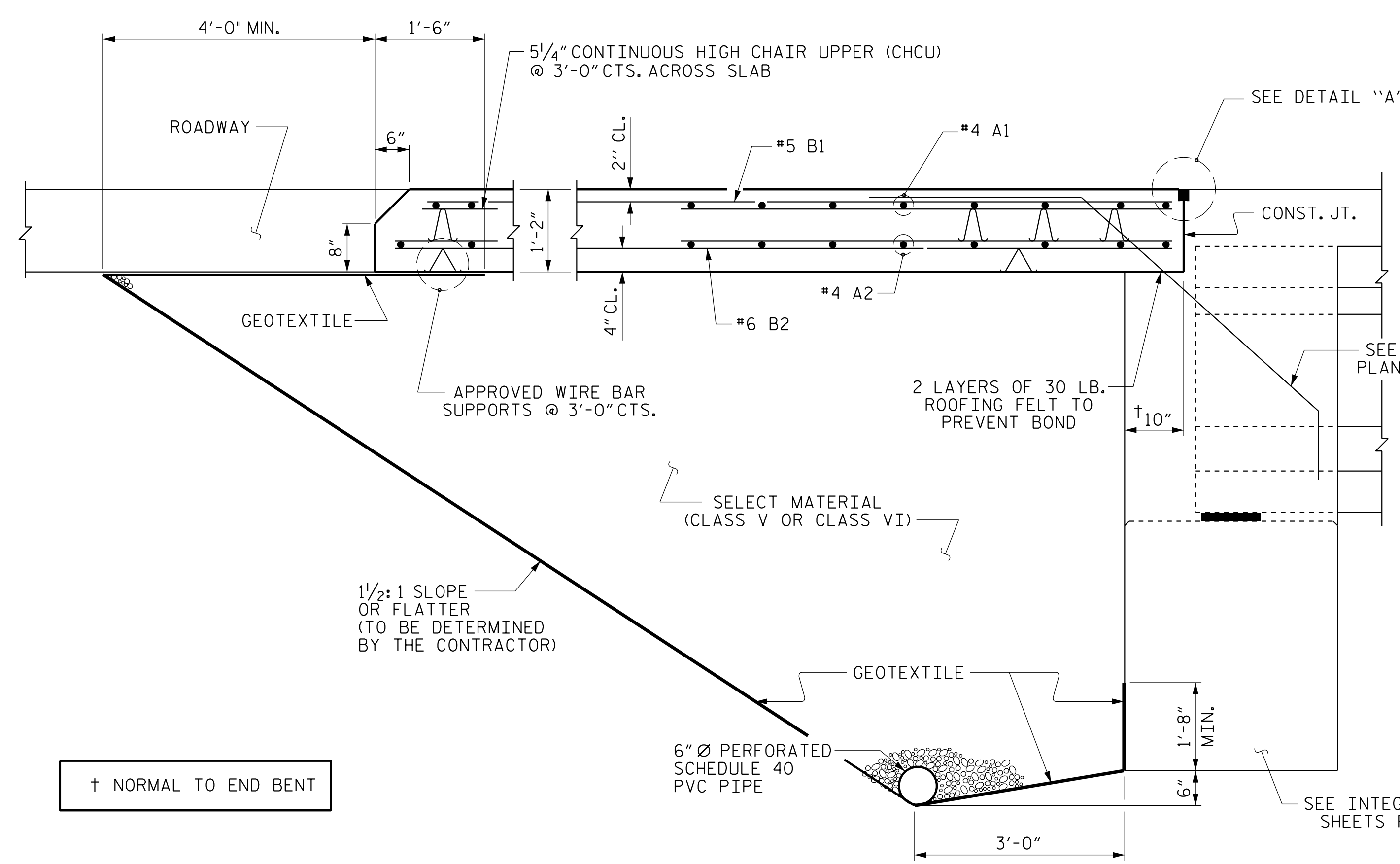
**DOCUMENT NOT CONSIDERED FINAL  
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ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : 3/19
CHECKED BY : <b>Z. H. BROWN</b>	DATE : 4/19
DRAWN BY : ELR 5/92	REV. 12/21/11 MAA/GM
CHECKED BY : GRP 6/92	REV. 1/16 MAA/TMG
	REV. 12/17 MAA/THC

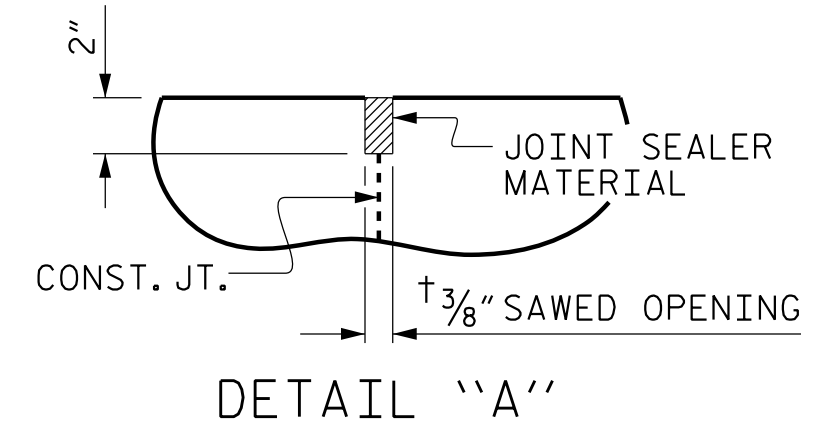




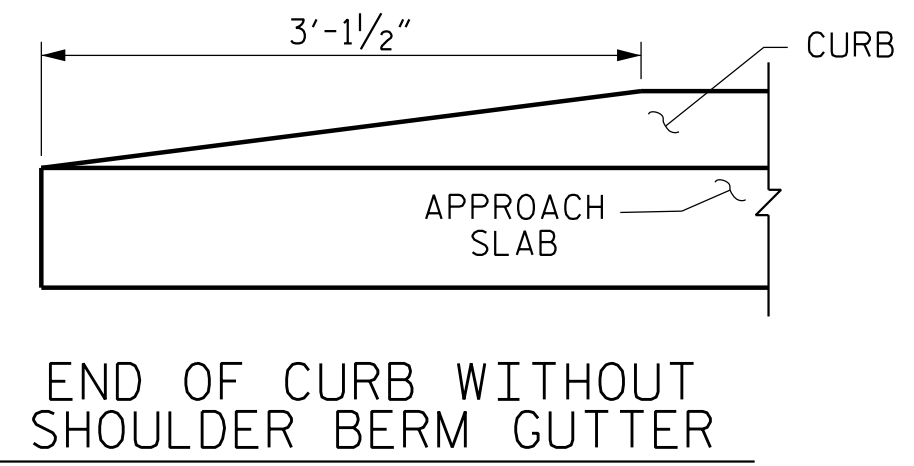
PLAN @ END BENT 1  
 PLAN @ END BENT 2  
 DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



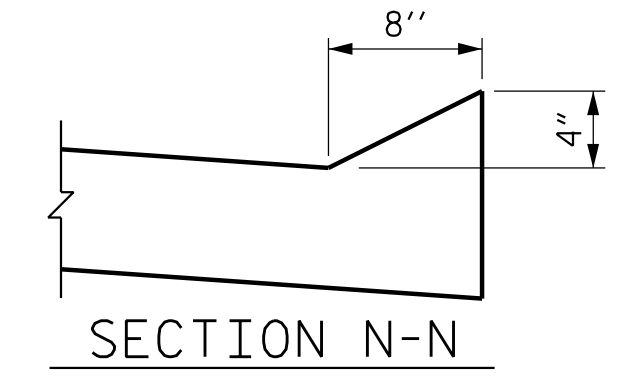
SECTION THRU SLAB  
 (TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE I IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL

FOR ONE APPROACH SLAB (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	21'-9"	756
A2	52	#4	STR	21'-7"	750
* B1	83	#5	STR	24'-1"	2085
B2	83	#6	STR	24'-8"	3075
REINFORCING STEEL				LBS.	3825
* EPOXY COATED REINFORCING STEEL				LBS.	2841
CLASS AA CONCRETE				C. Y.	45.0

SPLICE LENGTHS

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

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR INTEGRAL ABUTMENT  
 WITH FLEXIBLE PAVEMENT  
 LEFT LANE

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

PLANS PREPARED BY:

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 CALYXengineers.com  
 NC License # F-1333

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

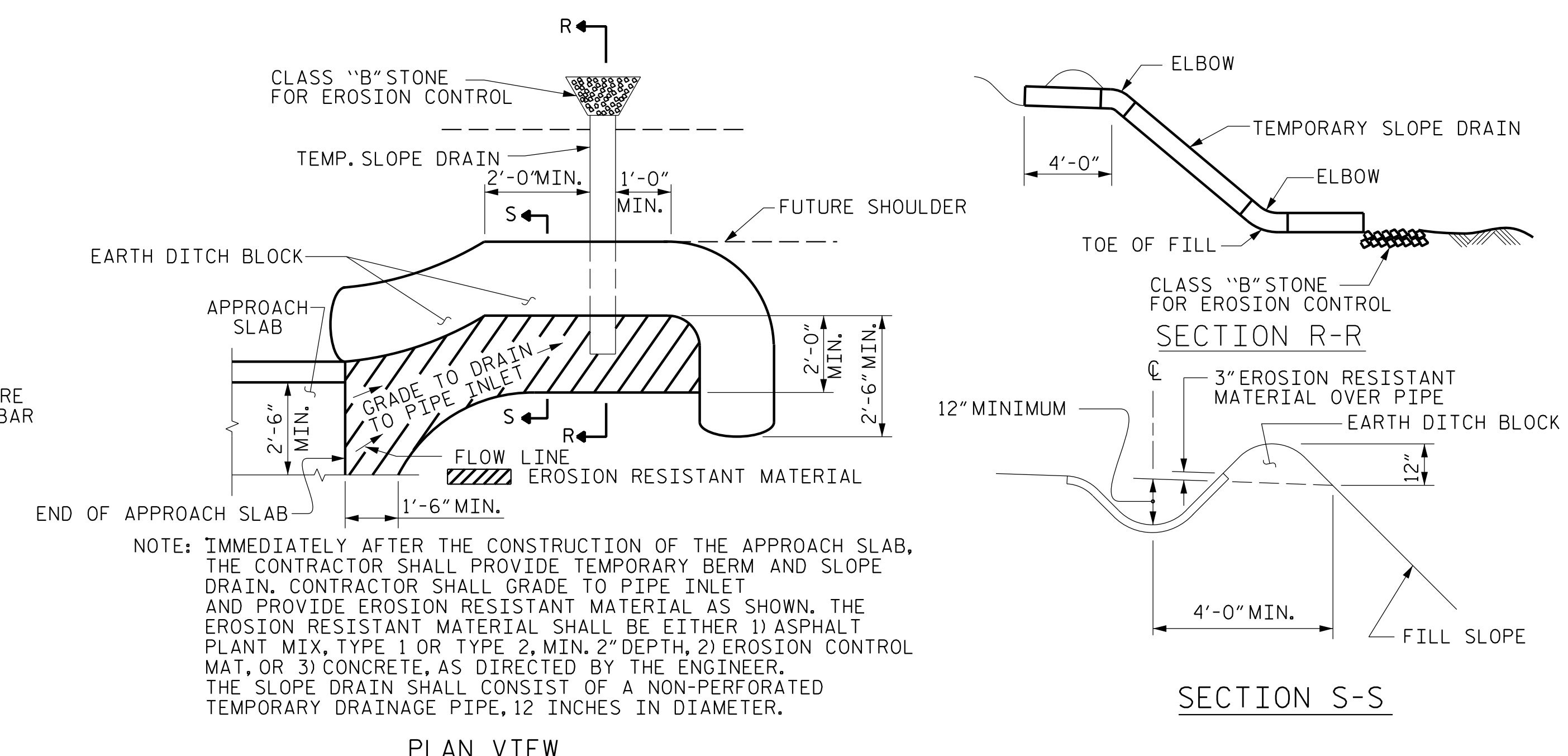
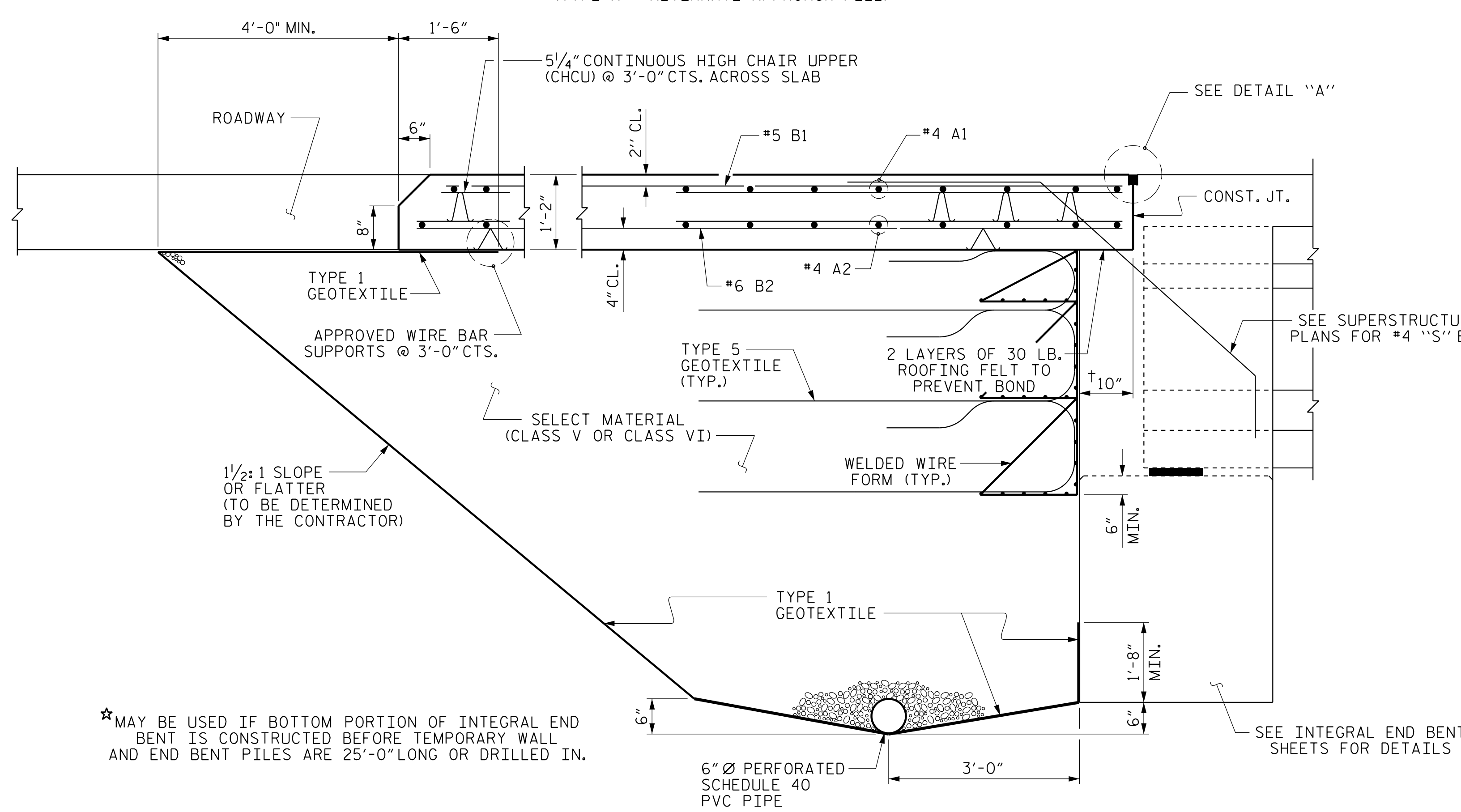
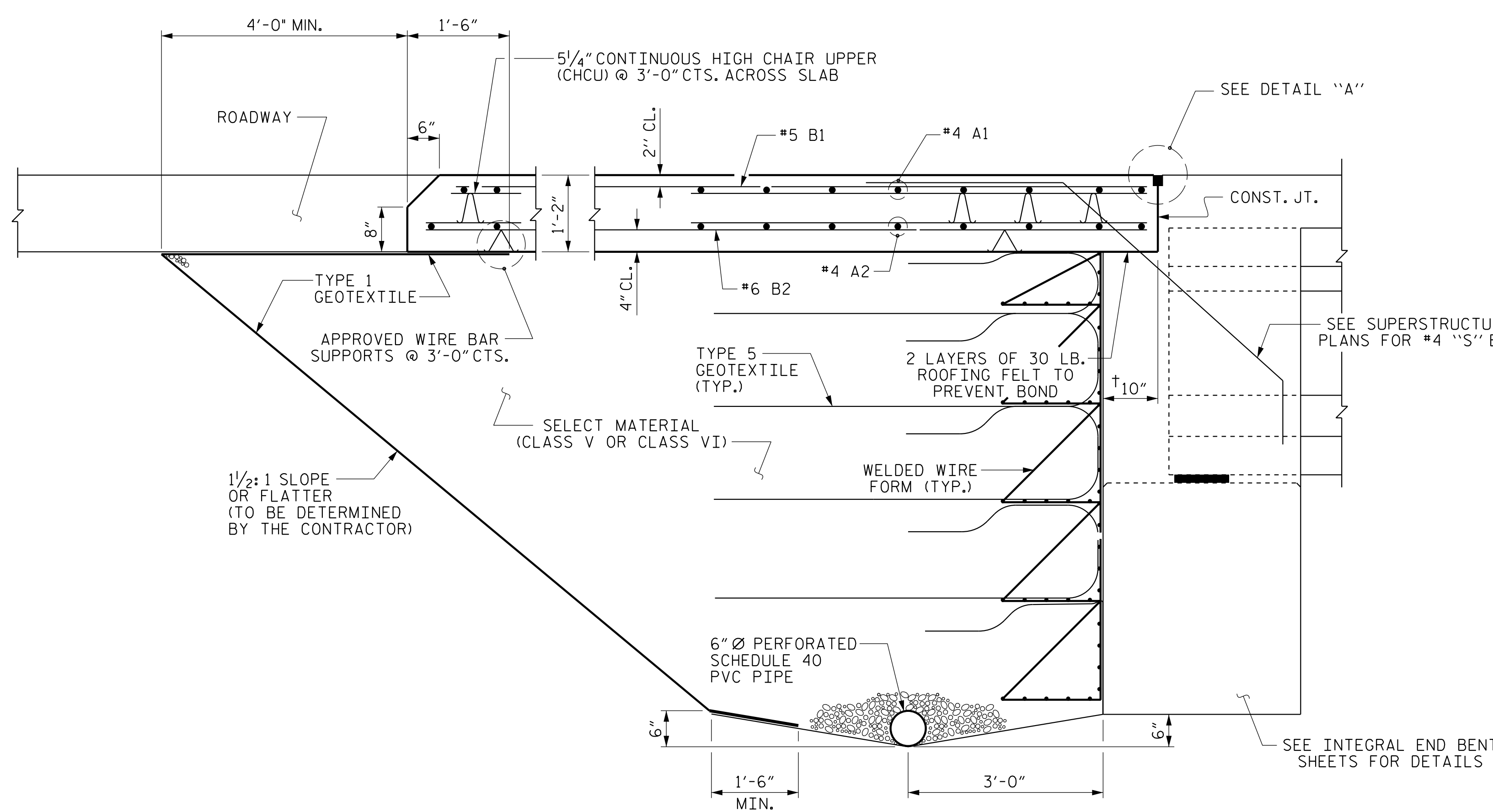
6/11/2019  
 DWG. NO. BL-24

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC





**TEMPORARY BERM AND SLOPE DRAIN DETAILS**  
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

**NOTES**

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

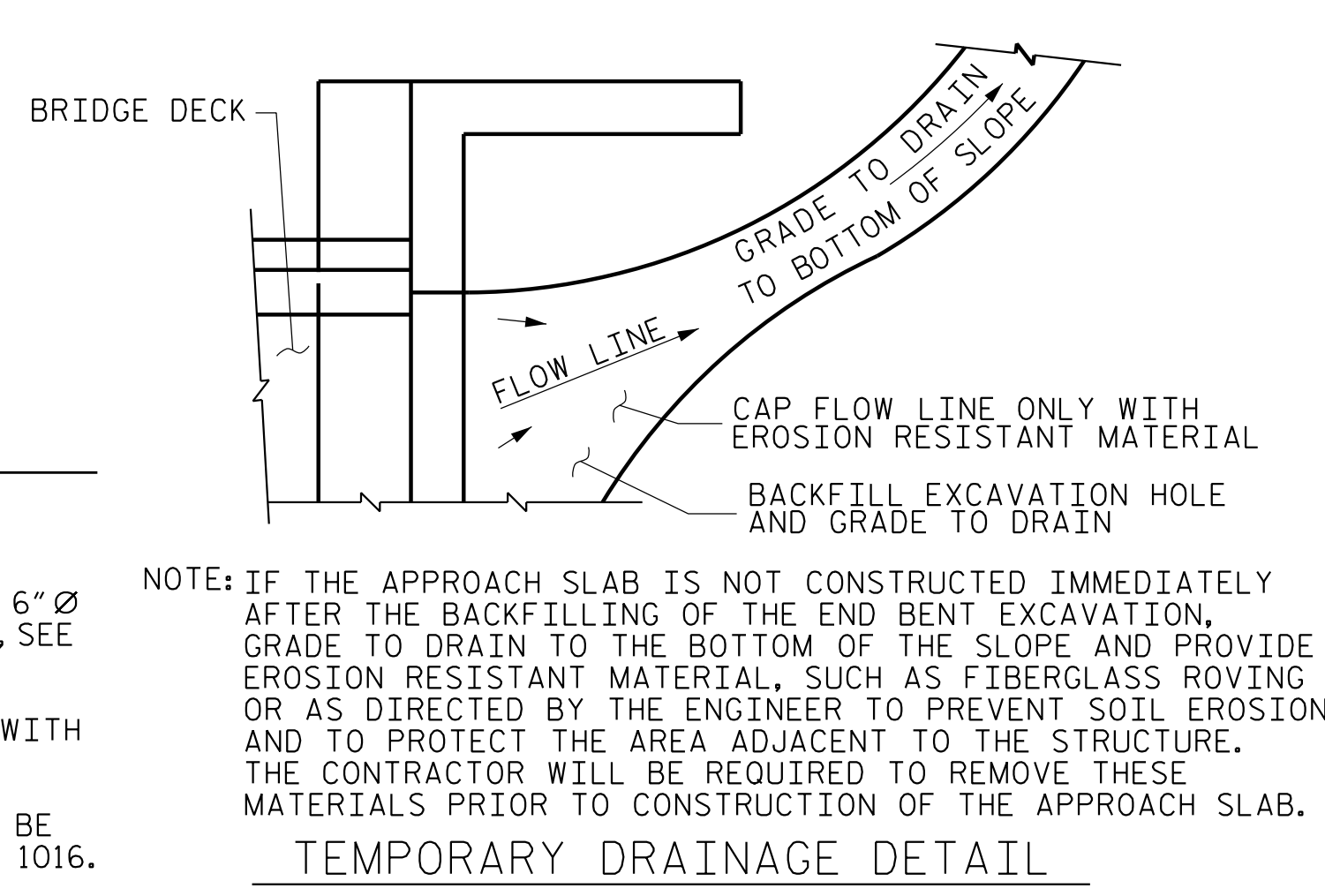
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.



PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD BRIDGE APPROACH SLAB DETAILS					
LEFT LANE					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S7-25
					TOTAL SHEETS 25

PLANS PREPARED BY:

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THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*L. Kevin Austin*  
L. KEVIN AUSTIN  
REGISTERED PROFESSIONAL ENGINEER  
NO. 011361  
EXPIRES 12/31/2025  
6/11/2019

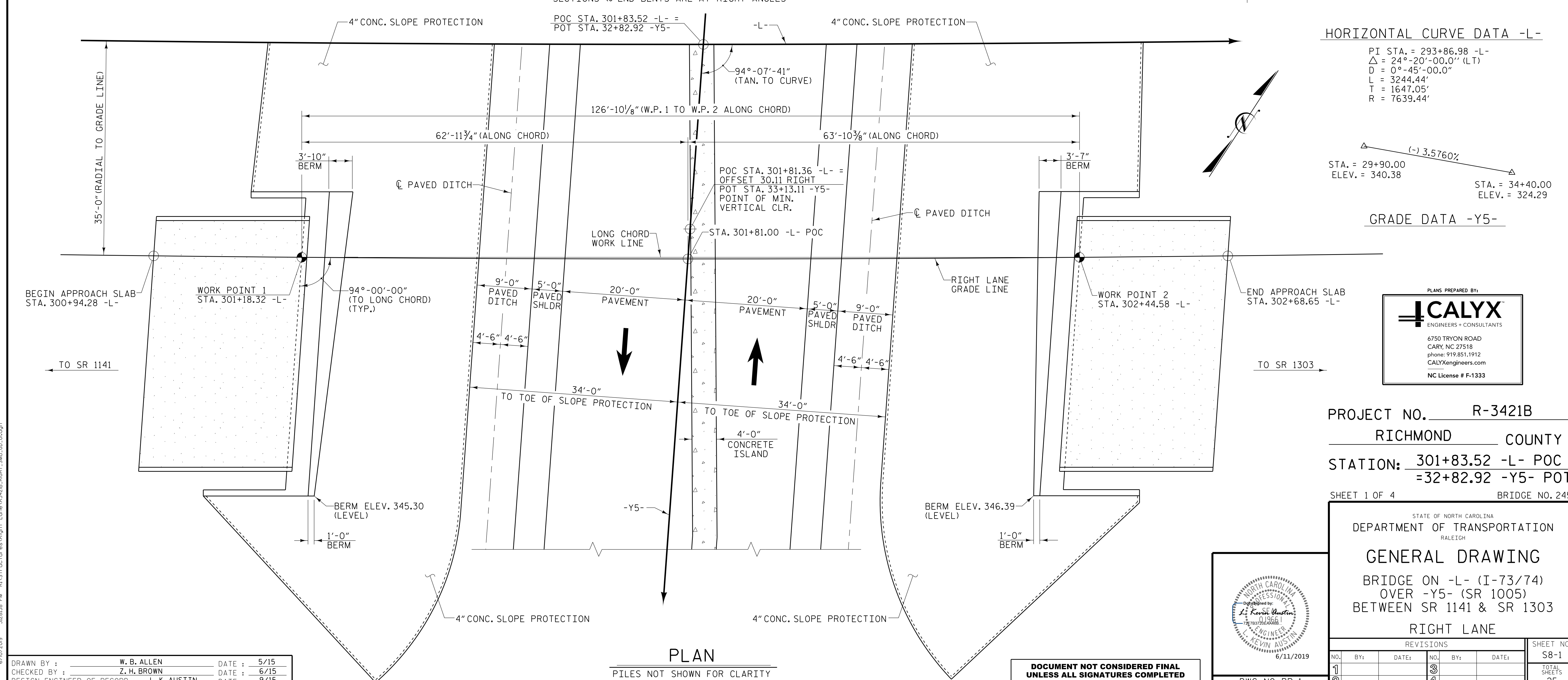
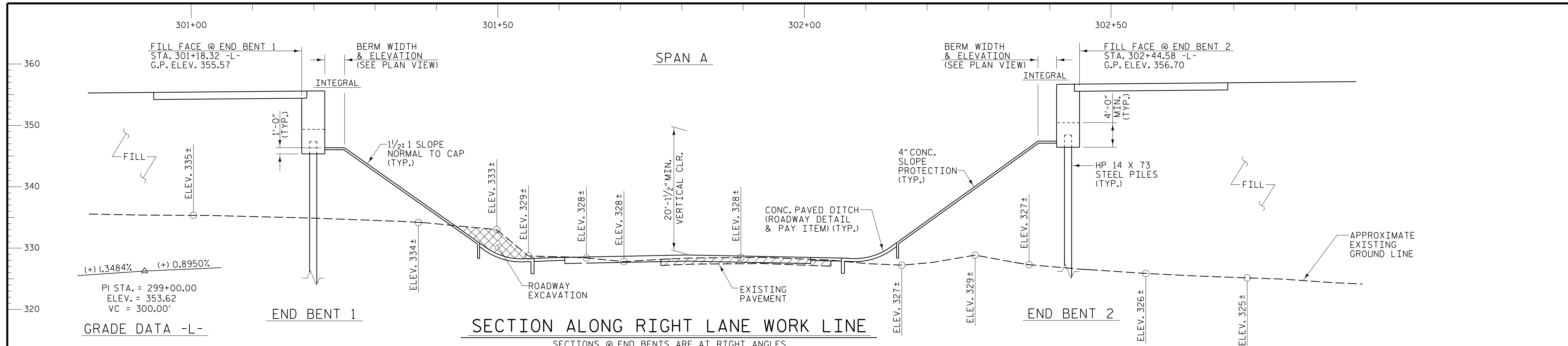
DWG. NO. BL-25

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

**SECTION THRU SLAB**  
(TYPE A - ALTERNATE APPROACH FILL)





**HORIZONTAL CURVE DATA -L-**  
 PI STA. = 293+86.98 -L-  
 $\Delta = 24^\circ-20'-00.0''$  (LT)  
 $D = 0^\circ-45'-00.0''$   
 $L = 3244.44'$   
 $T = 1647.05'$   
 $R = 7639.44'$

**GRADE DATA -Y5-**  
 $\Delta = (-) 3.5760\%$   
 STA. = 29+90.00  
 ELEV. = 340.38  
 STA. = 34+40.00  
 ELEV. = 324.29

PLANS PREPARED BY:

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PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L- POC  
=32+82.92 -Y5- POT  
 SHEET 1 OF 4 BRIDGE NO. 245

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 BRIDGE ON -L- (I-73/74)  
 OVER -Y5- (SR 1005)  
 BETWEEN SR 1141 & SR 1303  
 RIGHT LANE

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

SHEET NO. S8-1  
 TOTAL SHEETS 25

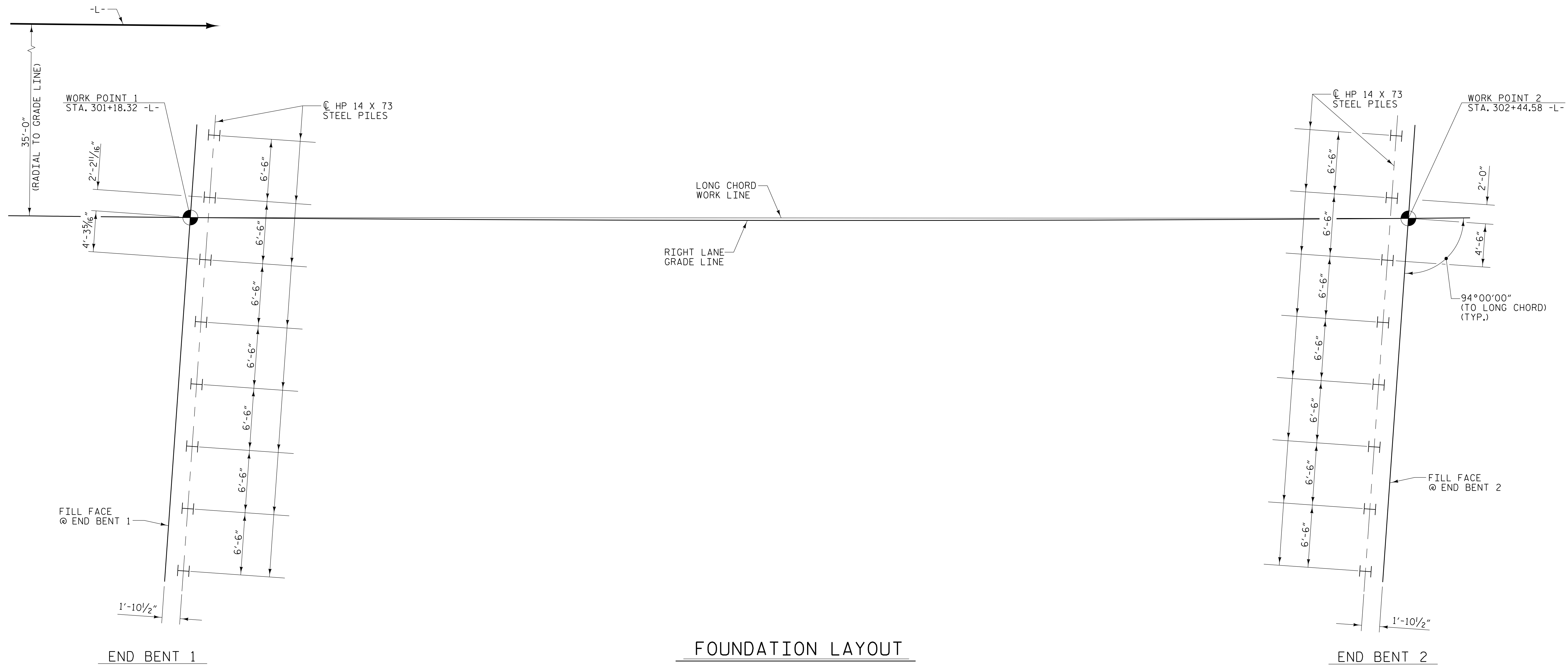
DRAWN BY : W. B. ALLEN DATE : 5/15  
 CHECKED BY : Z. H. BROWN DATE : 6/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

**PLAN**  
 PILES NOT SHOWN FOR CLARITY

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

DWG. NO. BR-1

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### FOUNDATION LAYOUT

ALL PILES AT END BENT 1 AND END BENT 2 ARE HP 14 X 73.  
 DIMENSIONS LOCATING PILES ARE SHOWN TO THE PILE CENTERLINE.

#### NOTES

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT NO.1 AND END BENT NO.2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 150 TONS PER PILE.
- DRIVE PILES TO A REQUIRED DRIVING RESISTANCE OF 250 TONS PER PILE.
- TESTING THE PILES WITH PDA DURING DRIVING, RESTRIKING, OR REDRIVING MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- OBSERVE A 1 MONTH WAITING PERIOD AFTER CONSTRUCTING THE EMBANKMENT TO WITHIN 2 FEET OF FINISHED GRADE BEFORE BEGINNING END BENT CONSTRUCTION AT END BENT NO.1 AND 2. FOR BRIDGE WAITING PERIODS, SEE ROADWAY PLANS AND SPECIAL PROVISIONS.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

## GENERAL DRAWING

BRIDGE ON -L- (I-73/74)  
 OVER -Y5- (SR 1005)  
 BETWEEN SR 1141 & SR 1303

RIGHT LANE

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

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NORTH CAROLINA  
 PROFESSIONAL ENGINEER  
 L. KEVIN AUSTIN  
 727832024000

6/11/2019

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

SHEET NO. **S8-2**  
 TOTAL SHEETS **25**

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DWG. NO. BR-2

6/10/2019 3:28:39 PM RA:\Structures\Right\_Lane\AR3421B\RIGHT\_SML\F.L.01.dgn

DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15





LOAD FACTORS:

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

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 ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVE-LOAD FACTORS ( $\gamma_{LL}$ )	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION		DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.10	--	1.75	0.855	1.26	A	ER	61.54	0.893	1.28	A	I	12.31	0.80	0.855	1.10	A	ER	61.54		
	HL-93 (OPERATING)	N/A		1.63	--	1.35	0.855	1.63	A	ER	61.54	0.893	1.69	A	I	12.31	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.62	58.32	1.75	0.855	1.85	A	ER	61.54	0.893	1.85	A	I	12.31	0.80	0.855	1.62	A	ER	61.54		
	HS-20 (OPERATING)	36.000		2.40	86.40	1.35	0.855	2.40	A	ER	61.54	0.893	2.43	A	I	12.31	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SH	12.500		4.28	53.50	1.40	0.855	6.09	A	ER	61.54	0.893	6.56	A	I	12.31	0.80	0.855	4.28	A	ER	61.54	
		S3C	21.500		2.50	53.75	1.40	0.855	3.56	A	ER	61.54	0.893	3.78	A	I	12.31	0.80	0.855	2.50	A	ER	61.54	
		S3A	22.750		2.37	53.92	1.40	0.855	3.37	A	ER	61.54	0.893	3.58	A	I	12.31	0.80	0.855	2.37	A	ER	61.54	
		S4A	26.750		2.06	55.11	1.40	0.855	2.93	A	ER	61.54	0.893	3.08	A	I	12.31	0.80	0.855	2.06	A	ER	61.54	
		S5A	30.500		1.82	55.51	1.40	0.855	2.58	A	ER	61.54	0.893	2.77	A	I	110.77	0.80	0.855	1.82	A	ER	61.54	
		S6A	34.500		1.63	56.24	1.40	0.855	2.32	A	ER	61.54	0.893	2.45	A	I	12.31	0.80	0.855	1.63	A	ER	61.54	
		S7B	38.500		1.48	56.98	1.40	0.855	2.10	A	ER	61.54	0.893	2.26	A	I	12.31	0.80	0.855	1.48	A	ER	61.54	
		S7A	40.000	③	1.45	58.00	1.40	0.855	2.06	A	ER	61.54	0.893	2.25	A	I	12.31	0.80	0.855	1.45	A	ER	61.54	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	T4A	28.250		2.01	56.78	1.40	0.855	2.85	A	ER	61.54	0.893	2.96	A	I	12.31	0.80	0.855	2.01	A	ER	61.54	
		T5B	32.000		1.76	56.32	1.40	0.855	2.51	A	ER	61.54	0.893	2.73	A	I	12.31	0.80	0.855	1.76	A	ER	61.54	
		T6A	36.000		1.60	57.60	1.40	0.855	2.28	A	ER	61.54	0.893	2.46	A	I	110.77	0.80	0.855	1.60	A	ER	61.54	
		T7A	40.000		1.47	58.80	1.40	0.855	2.09	A	ER	61.54	0.893	2.25	A	I	110.77	0.80	0.855	1.47	A	ER	61.54	
	T7B	40.000		1.53	61.20	1.40	0.855	2.18	A	ER	61.54	0.893	2.16	A	I	12.31	0.80	0.855	1.53	A	ER	61.54		

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)

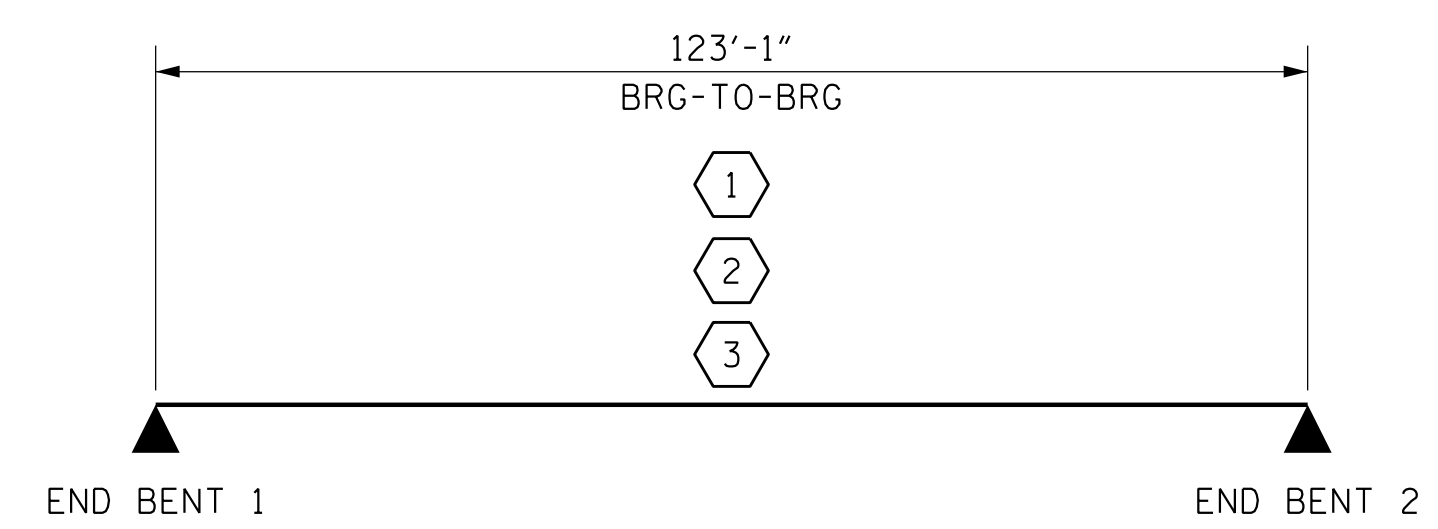
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

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



LRFR SUMMARY

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
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THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*Kevin Austin*  
 L. ENGINEER  
 6/11/2019

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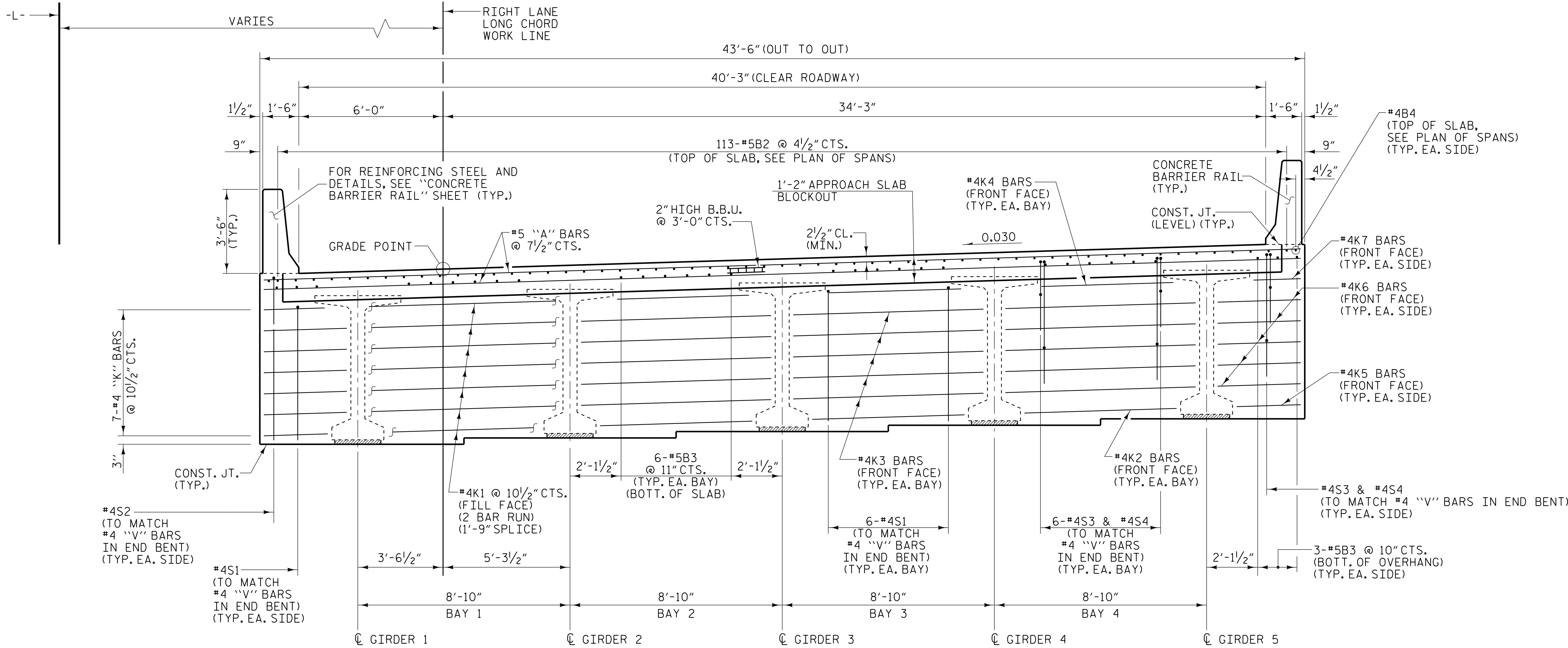
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NO.	BY:	DATE:	NO.	BY:	DATE:	S8-4
1			3			TOTAL SHEETS
2			4			25

DWG. NO. BR-4

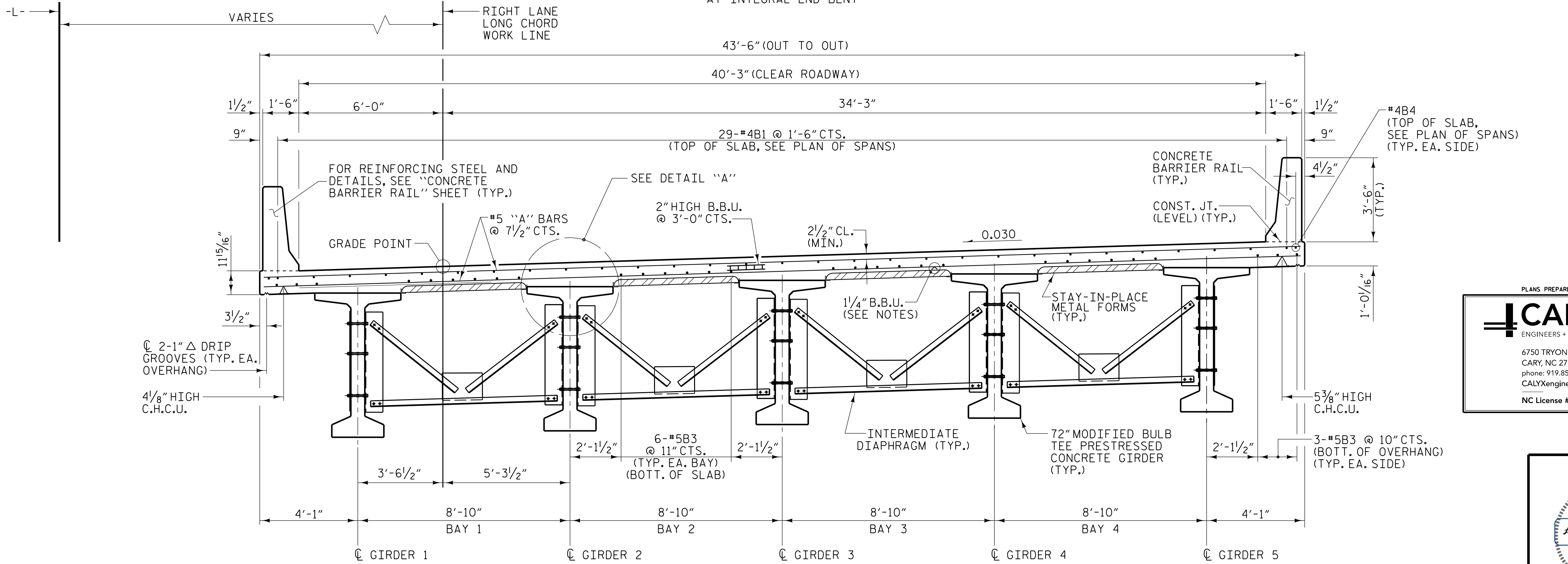
STD. NO. LRFR2

ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : 3/19
CHECKED BY : <b>Z. H. BROWN</b>	DATE : 4/19
DRAWN BY : MAA 1/08	REV. 11/12/08RR MAA/GM
CHECKED BY : GM/DI 2/08	REV. 10/1/11 MAA/GM
	REV. 12/17 MAA/THC





**TYPICAL SECTION**  
AT INTEGRAL END BENT



**TYPICAL SECTION**  
SHOWING INTERMEDIATE DIAPHRAGM

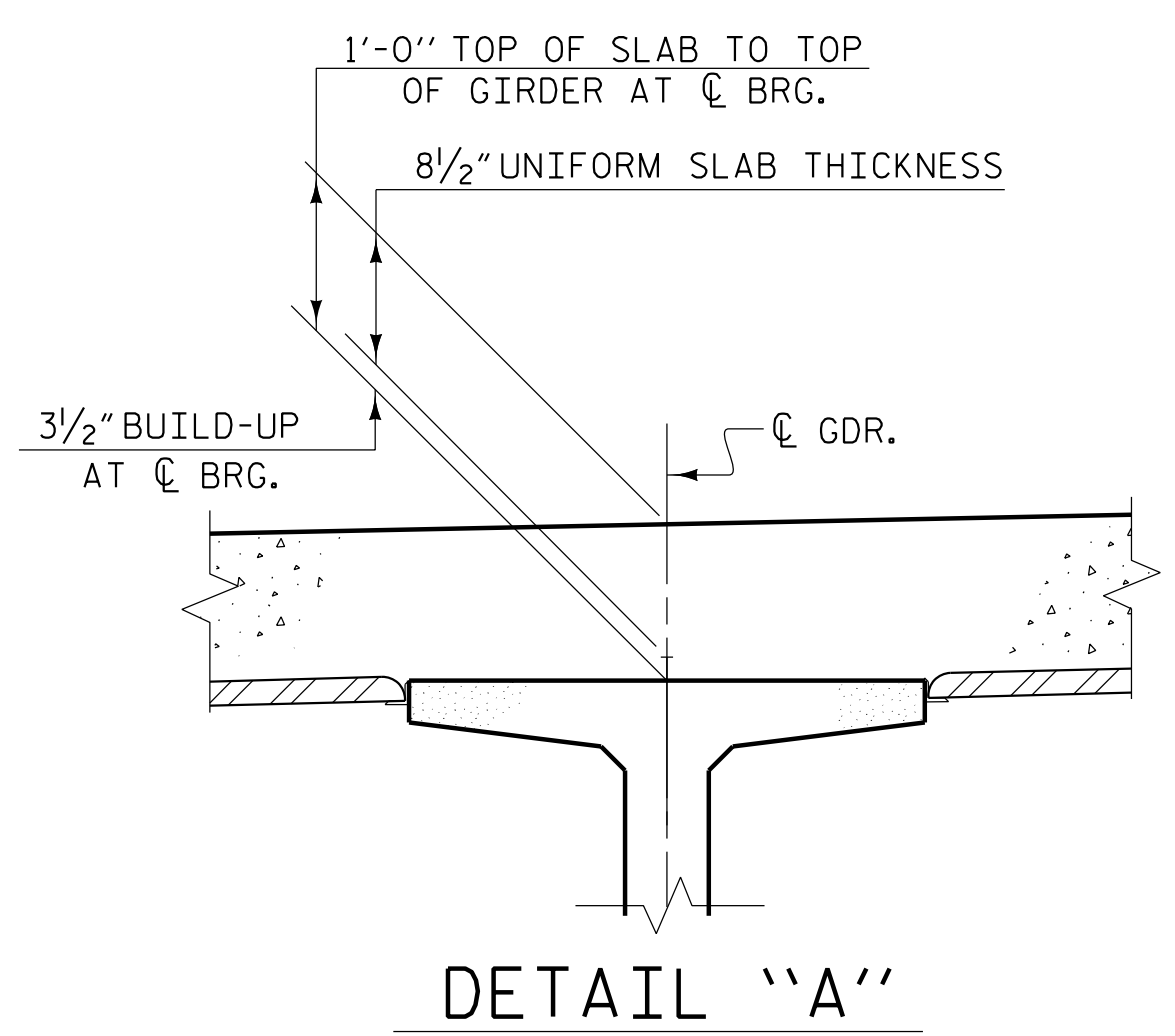
**NOTES**

PROVIDE 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2 1/2" ABOVE THE TOP OF THE REMOVABLE FORM.

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

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

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



**DETAIL "A"**

PLANS PREPARED BY:

**CALYX**  
ENGINEERS + CONSULTANTS

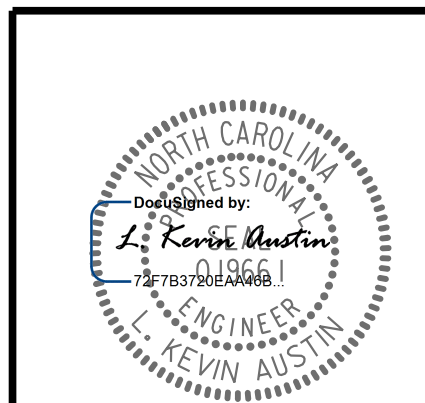
6750 TRYON ROAD  
CARY, NC 27518  
PHONE: 919.851.1912  
CALYXengineers.com  
NC License # F-1333

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**SUPERSTRUCTURE**  
**TYPICAL SECTION**  
RIGHT LANE



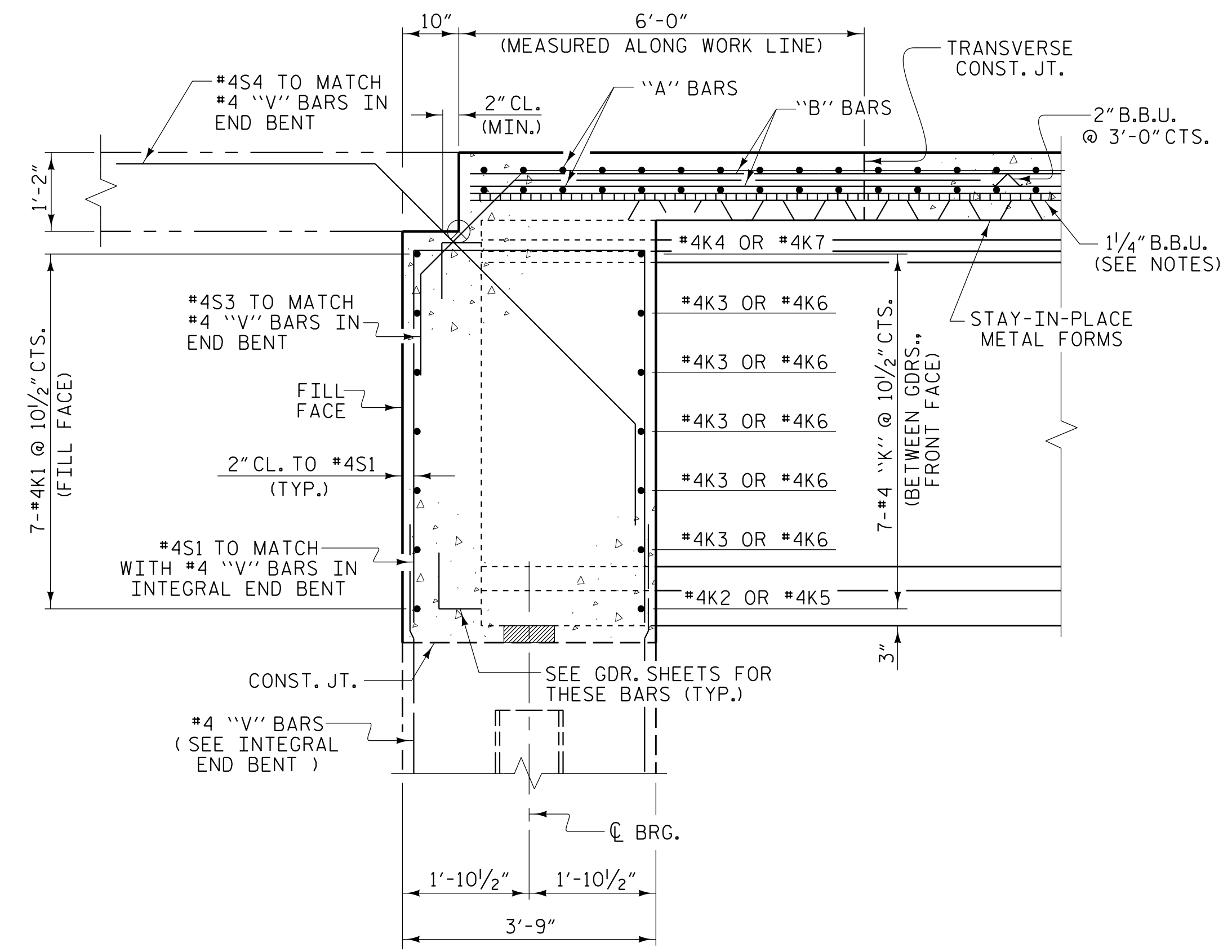
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NO.	BY:	DATE:	NO.	BY:	DATE:	S8-5	
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2			4			25	

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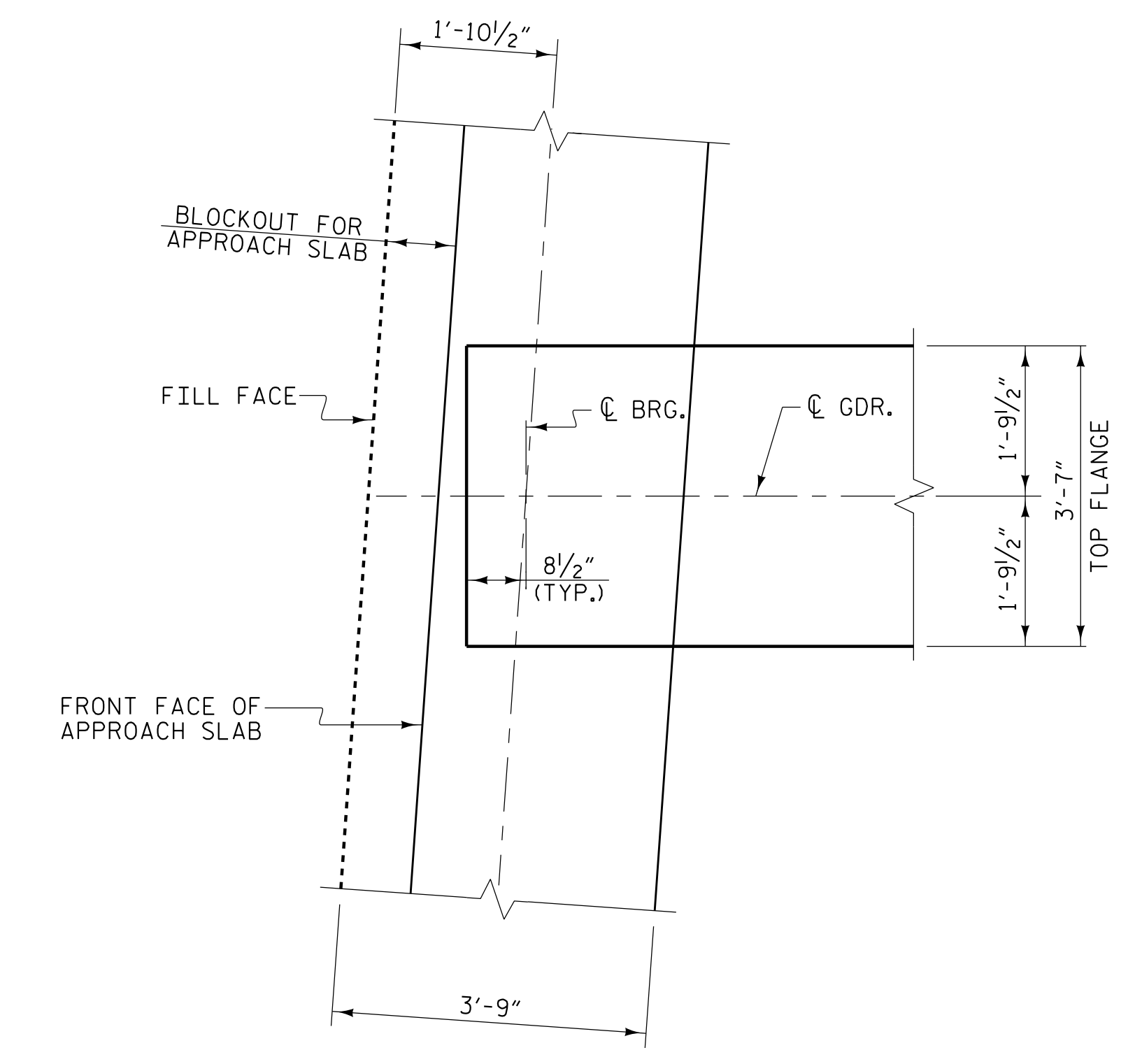
DRAWN BY : W. B. ALLEN DATE : 7/15  
CHECKED BY : Z. H. BROWN DATE : 7/15  
DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

DWG. NO. BR-5

6/7/2019 2:45:03 PM RA:\Structures\Right Lane\RA3421B\_RIGHT\_SML1.TS.dgn



SECTION THRU INTEGRAL END BENTS



PLAN OF GIRDER AT END BENT

6/7/2019 2:45:14 PM R:\Structures\Right Lane\R3421B\RIGHT\_SMU\_TS\_02.dgn

DRAWN BY :	W. B. ALLEN	DATE :	7/15
CHECKED BY :	Z. H. BROWN	DATE :	7/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

PLANS PREPARED BY:

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PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

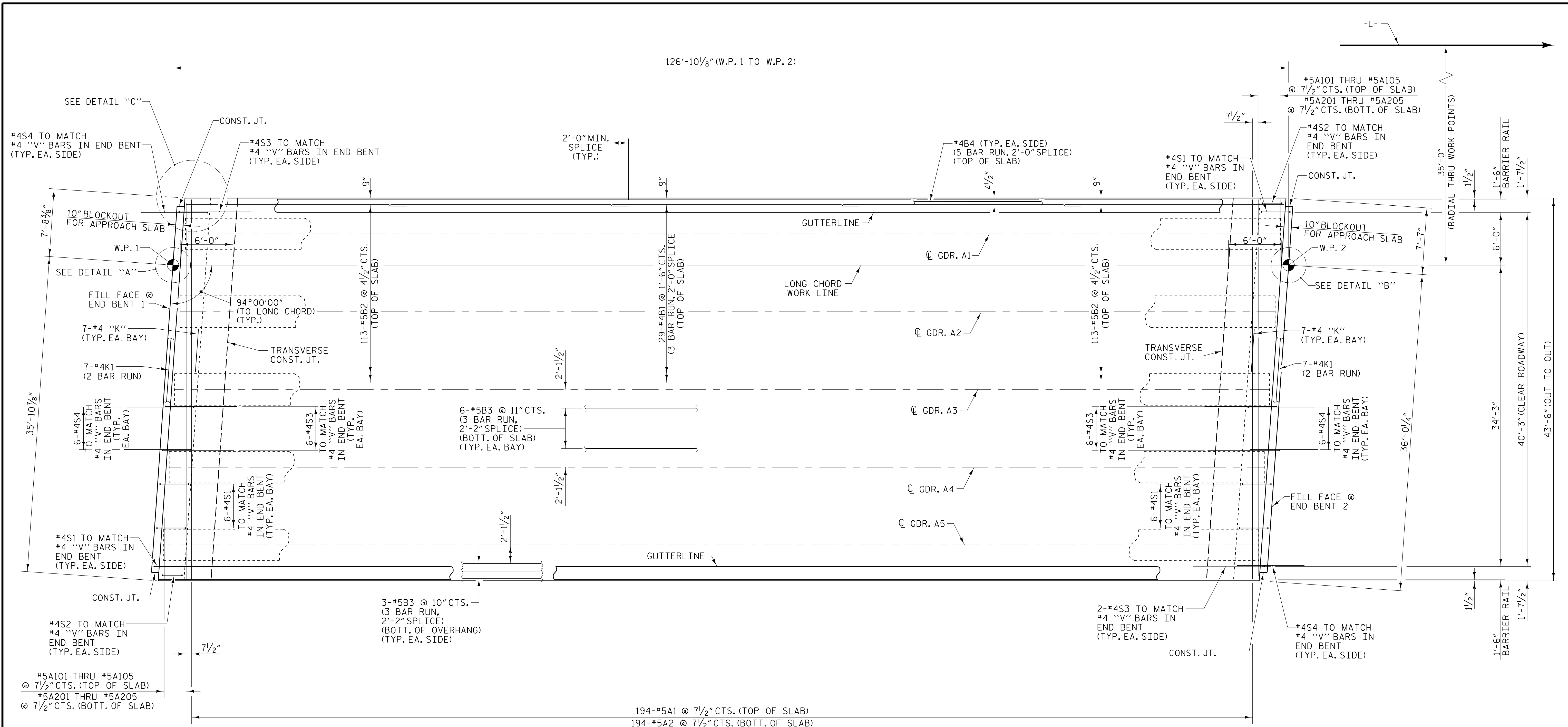
SUPERSTRUCTURE  
TYPICAL SECTION  
DETAILS  
RIGHT LANE

**DOCUMENT NOT CONSIDERED FINAL  
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REVISIONS						SHEET NO.
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1			3			S8-6
2			4			TOTAL SHEETS 25

DWG. NO. BR-6



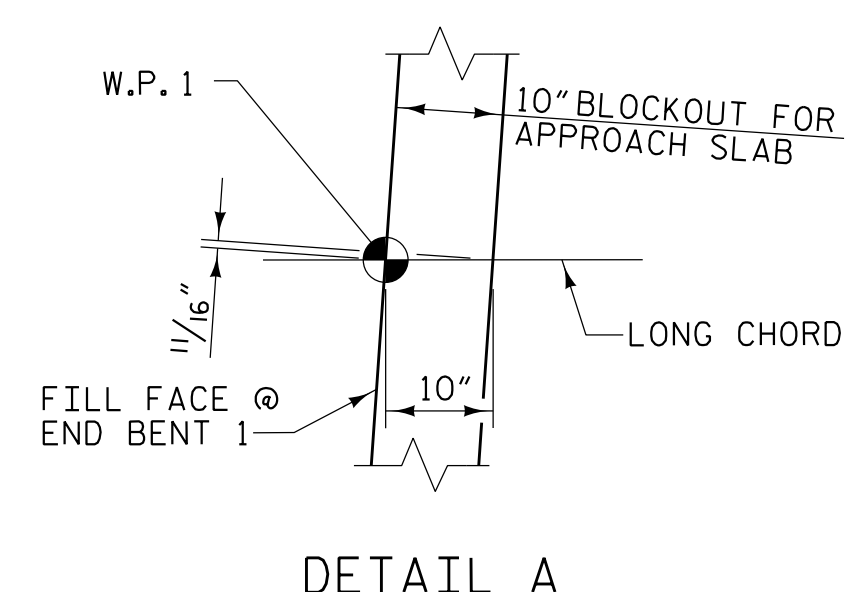


**SPAN A**

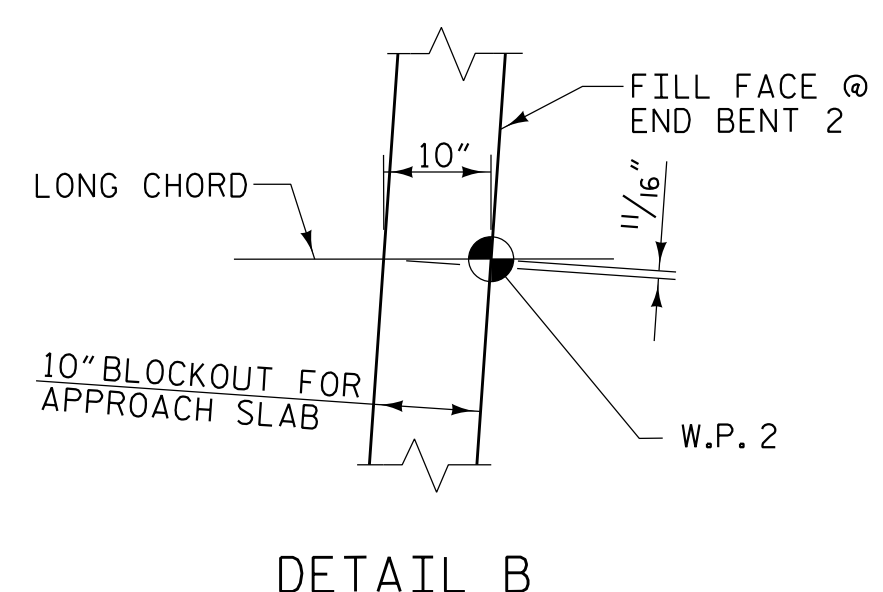
**NOTES**

FOR BARRIER RAIL DETAILS AND REINFORCING STEEL, SEE "CONCRETE BARRIER RAIL" SHEET.  
 FOR POUR SEQUENCE AND TRANSVERSE CONSTRUCTION JOINT DETAIL, SEE "SUPERSTRUCTURE BILL OF MATERIAL" SHEET.

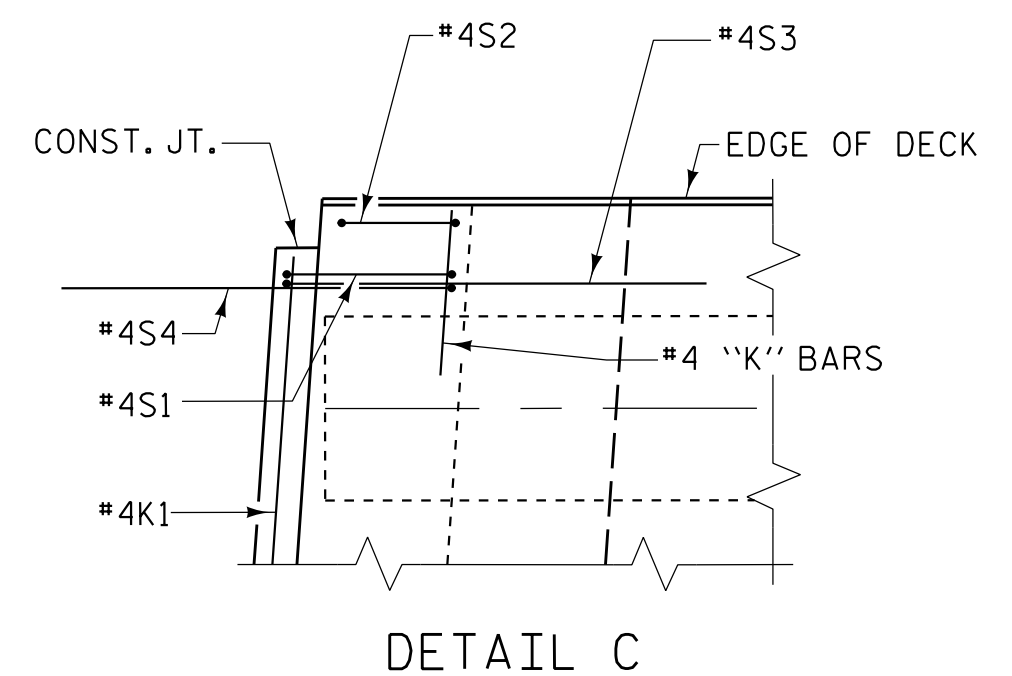
PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-



**DETAIL A**

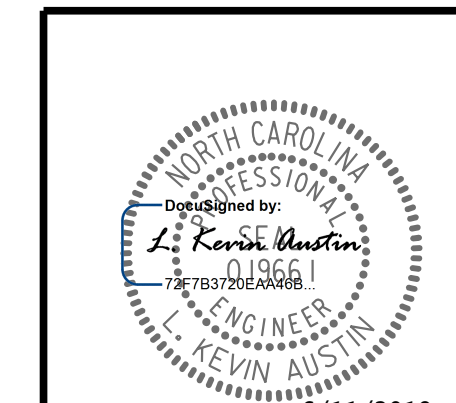


**DETAIL B**



**DETAIL C**  
 (ALL CORNERS SIMILAR)

PLANS PREPARED BY:  
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 CALYXengineers.com  
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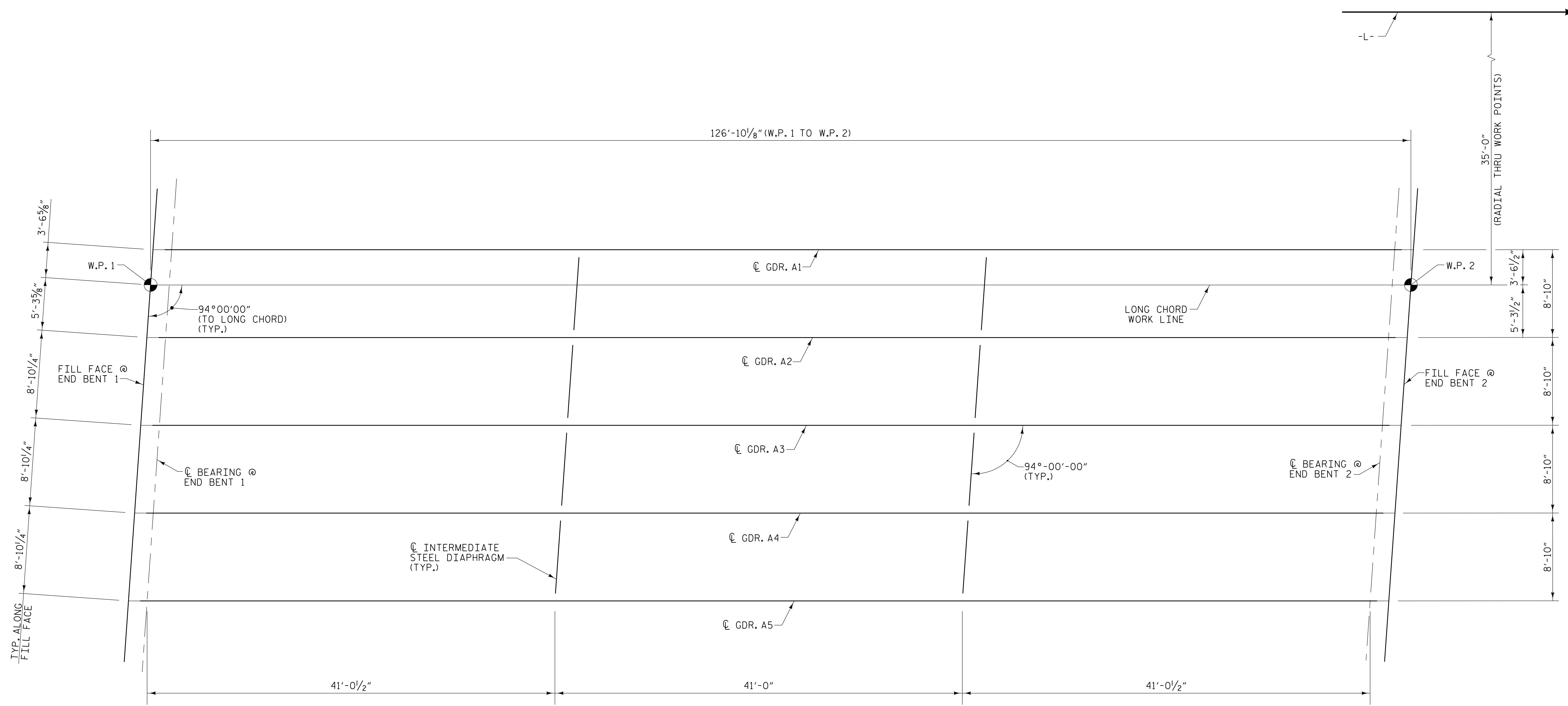
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE**  
**PLAN OF SPAN A**  
 RIGHT LANE

DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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

DWG. NO. BR-7



INTEGRAL E4

INTEGRAL E4

SPAN A

### FRAMING PLAN

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

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

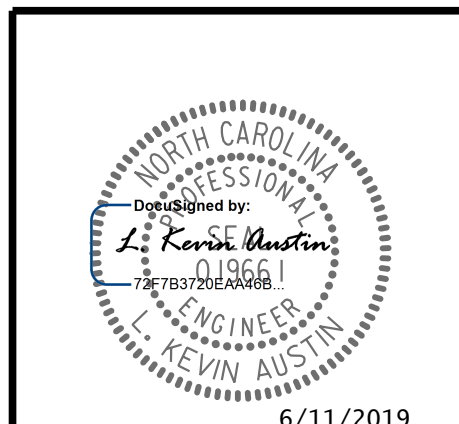
SUPERSTRUCTURE  
 FRAMING PLAN

RIGHT LANE

PLANS PREPARED BY:

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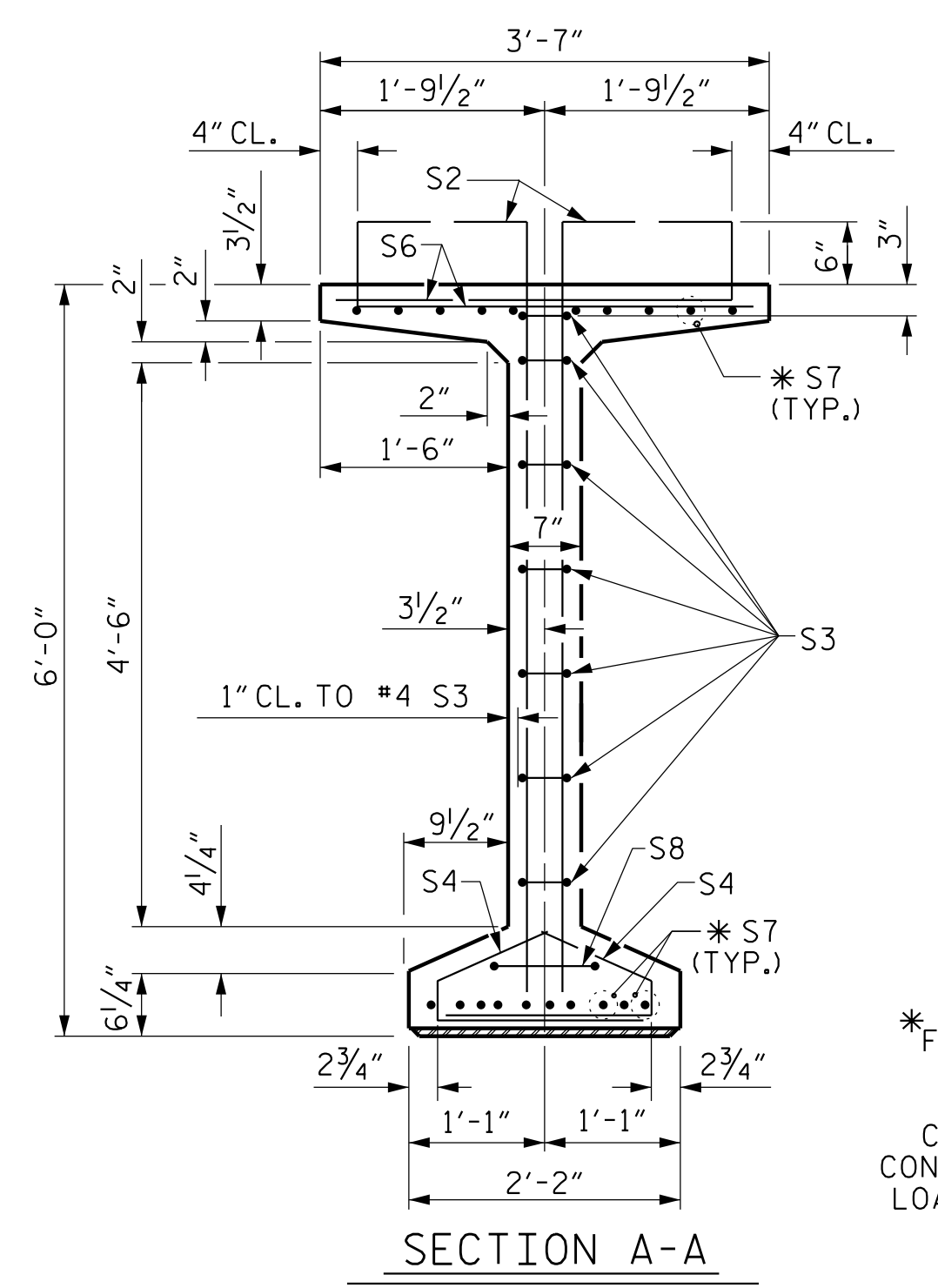
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CHECKED BY :	Z. H. BROWN	DATE :	7/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

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2			4			

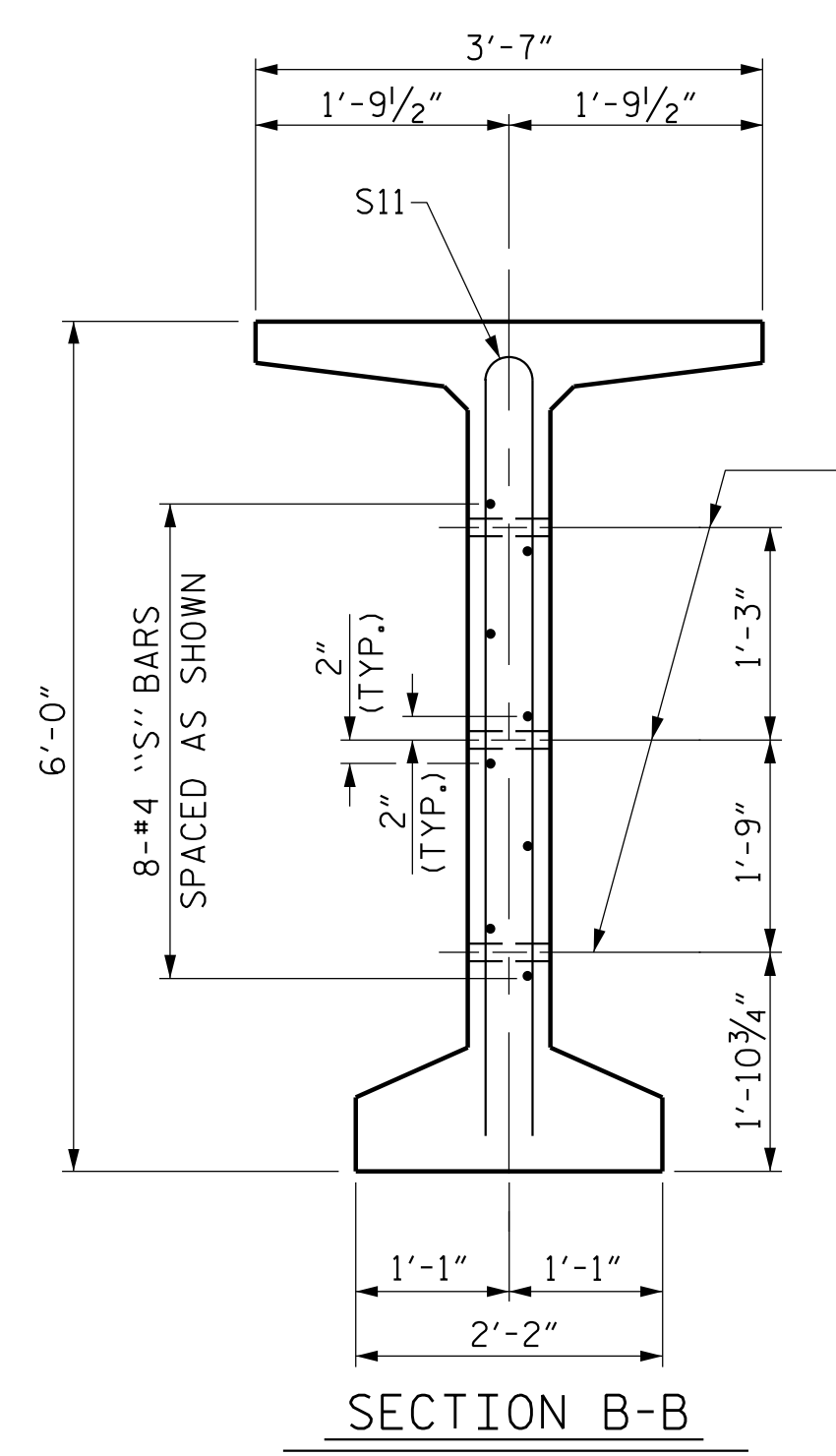
DWG. NO. BR-8

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SECTION A-A

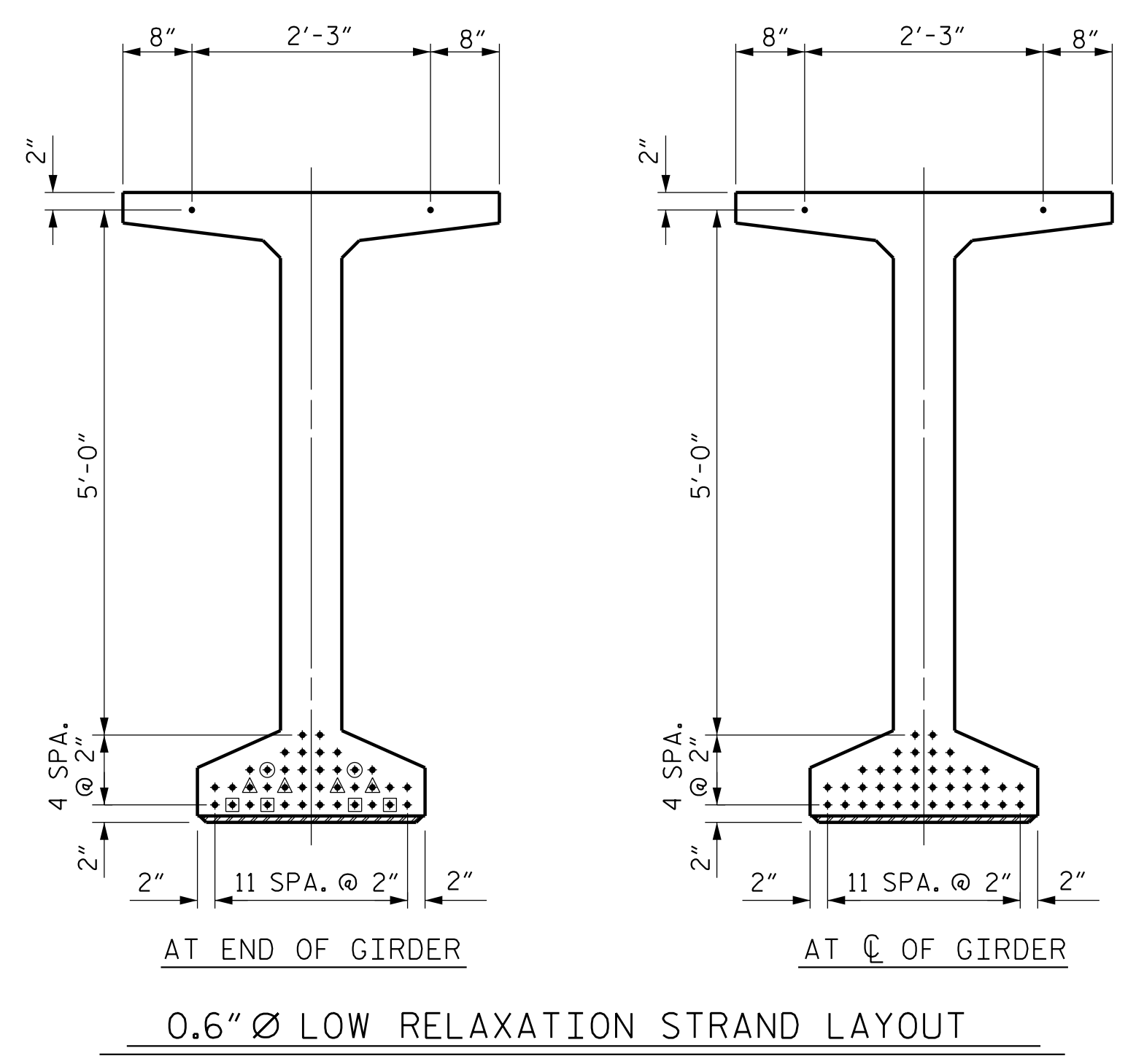


SECTION B-B

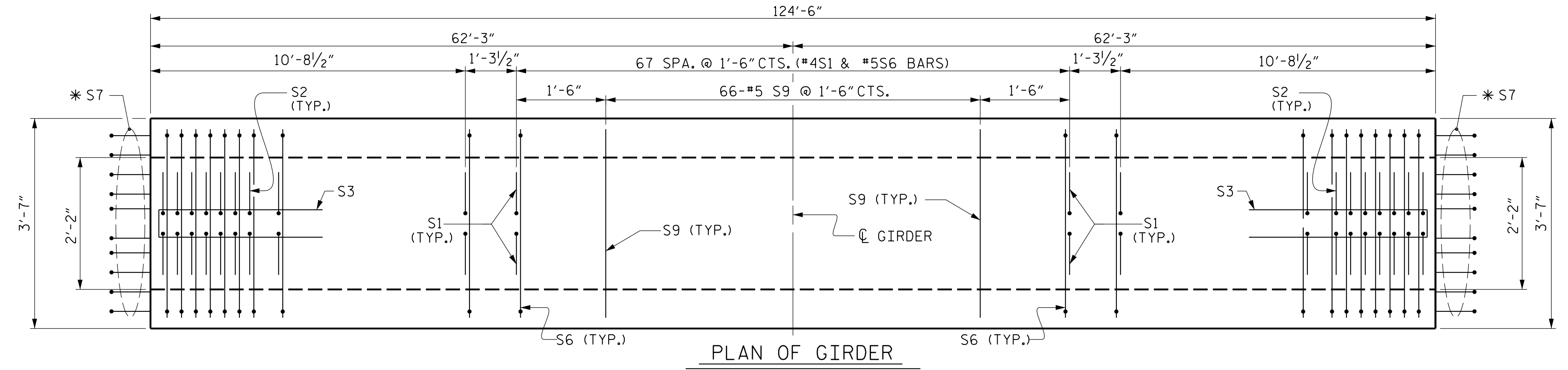
\*FOR S7 BARS. SEE DETAIL "C" OF PRESTRESSED CONCRETE GIRDER CONTINUOUS FOR LIVE LOAD DETAILS SHEET

1/2" Ø FORMED HOLE. SEE ELEVATION FOR LOCATION. FOR DIM. "A", "B" & "C" SEE "INTERMEDIATE STEEL DIAPHRAGMS" SHEET.)

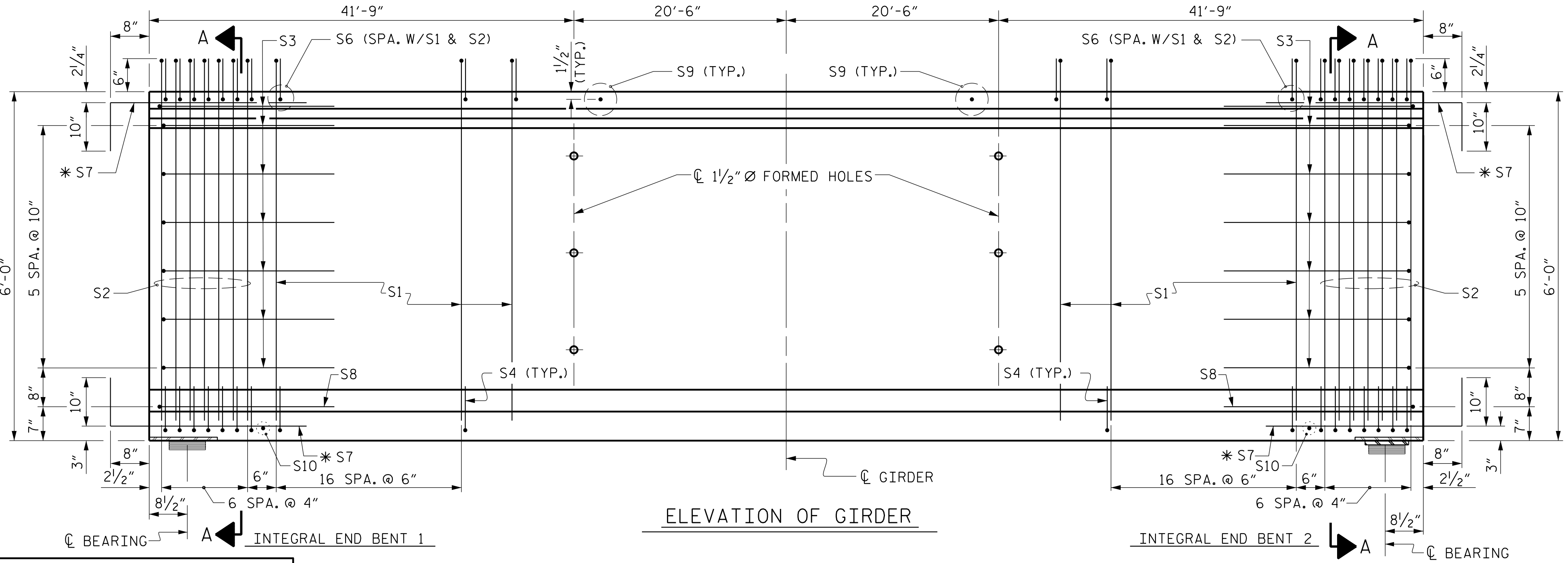
- DEBONDING LEGEND
- FULLY BONDED STRANDS
  - STRANDS DEBONDED FOR 14'-0" FROM END OF GIRDER
  - STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER
  - STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER



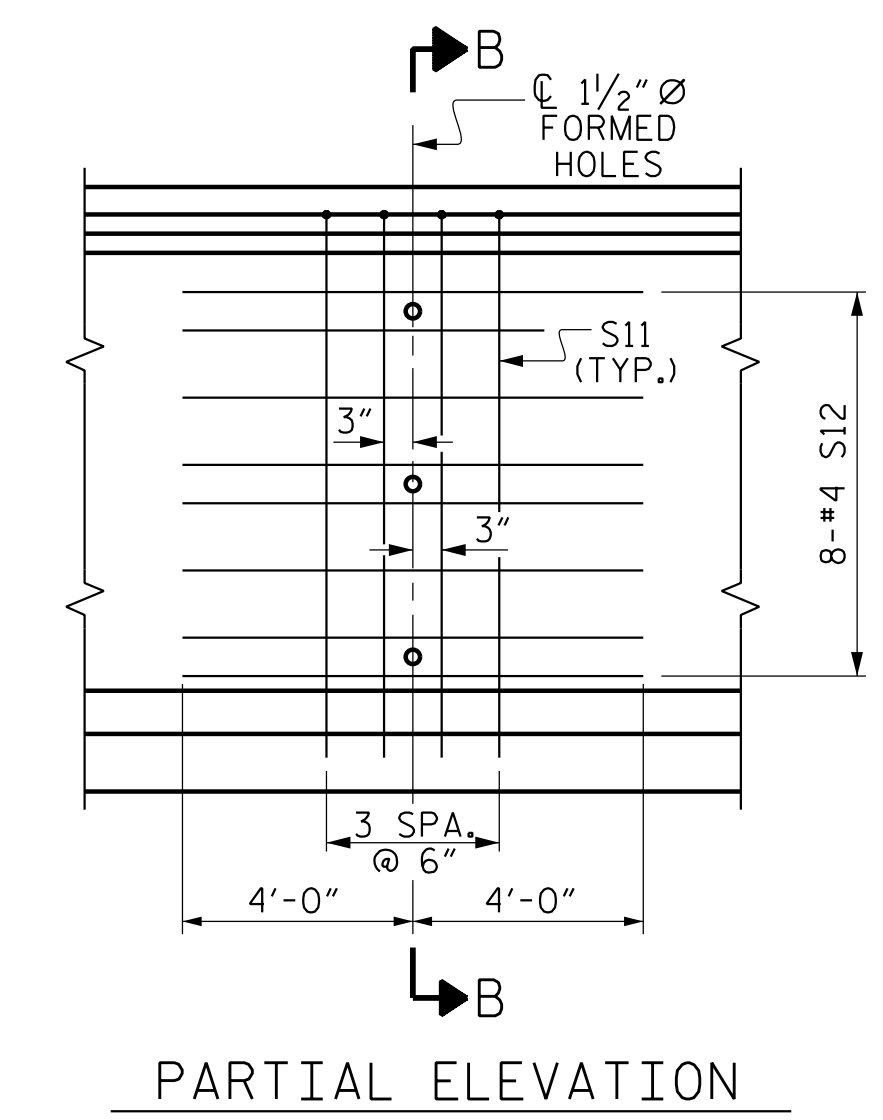
0.6" Ø LOW RELAXATION STRAND LAYOUT



PLAN OF GIRDER



ELEVATION OF GIRDER

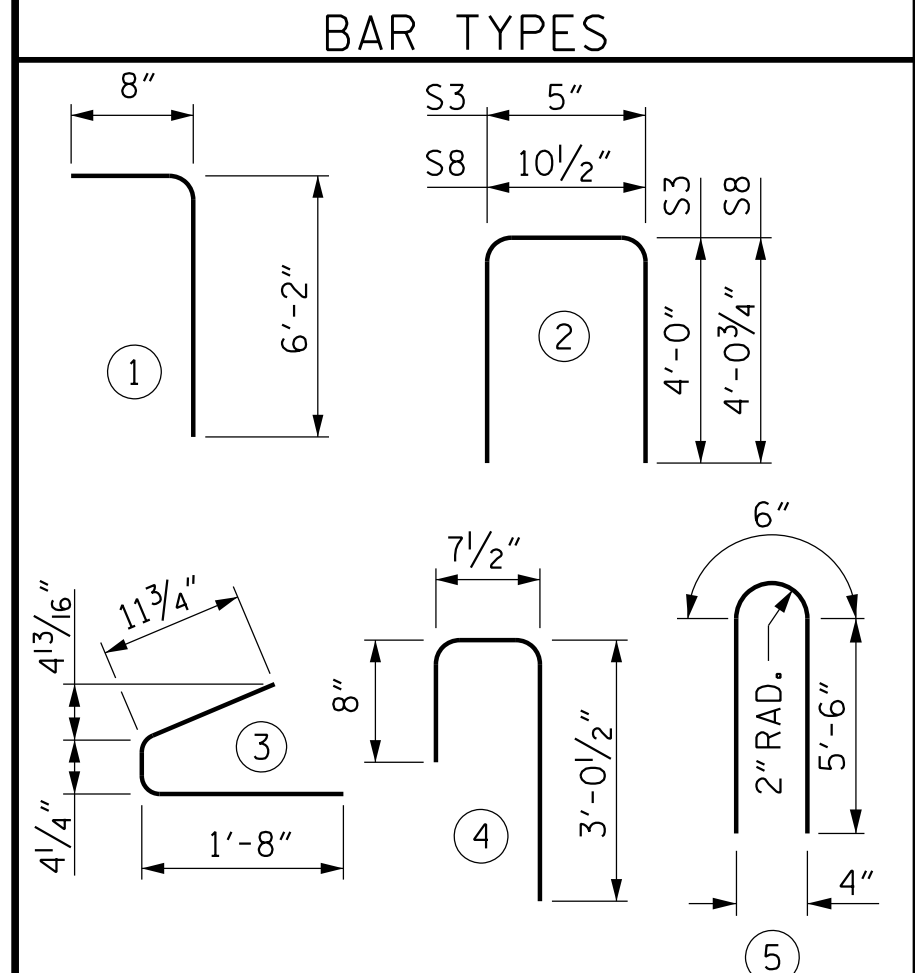


PARTIAL ELEVATION  
SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER

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	204	#4	1	6'-10"	931
S2	28	#5	1	6'-10"	200
S3	14	#4	2	8'-5"	79
S4	96	#4	3	3'-0"	192
S6	232	#5	4	4'-4"	1049
*S7	40	#5	STR	3'-8"	153
S8	2	#5	2	9'-0"	19
S9	66	#5	STR	3'-3"	224
S10	2	#3	STR	1'-10"	1
S11	8	#5	5	11'-6"	96
S12	16	#4	STR	8'-0"	86

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



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.
3030	26.7	40

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
5	124'-6"	622'-6"

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 72" PRESTRESSED CONCRETE  
 MODIFIED BULB TEE  
 CONTINUOUS FOR LIVE LOAD  
 RIGHT LANE

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

SHEET NO. S8-9  
 TOTAL SHEETS 25

PLANS PREPARED BY:

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : EEM 2/6/97	REV. 6/13
CHECKED BY : VAP 2/6/97	REV. 1/15
	REV. 12/17
MAA/GM	
MAA/TMG	
MAA/THC	

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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 7200 PSI.

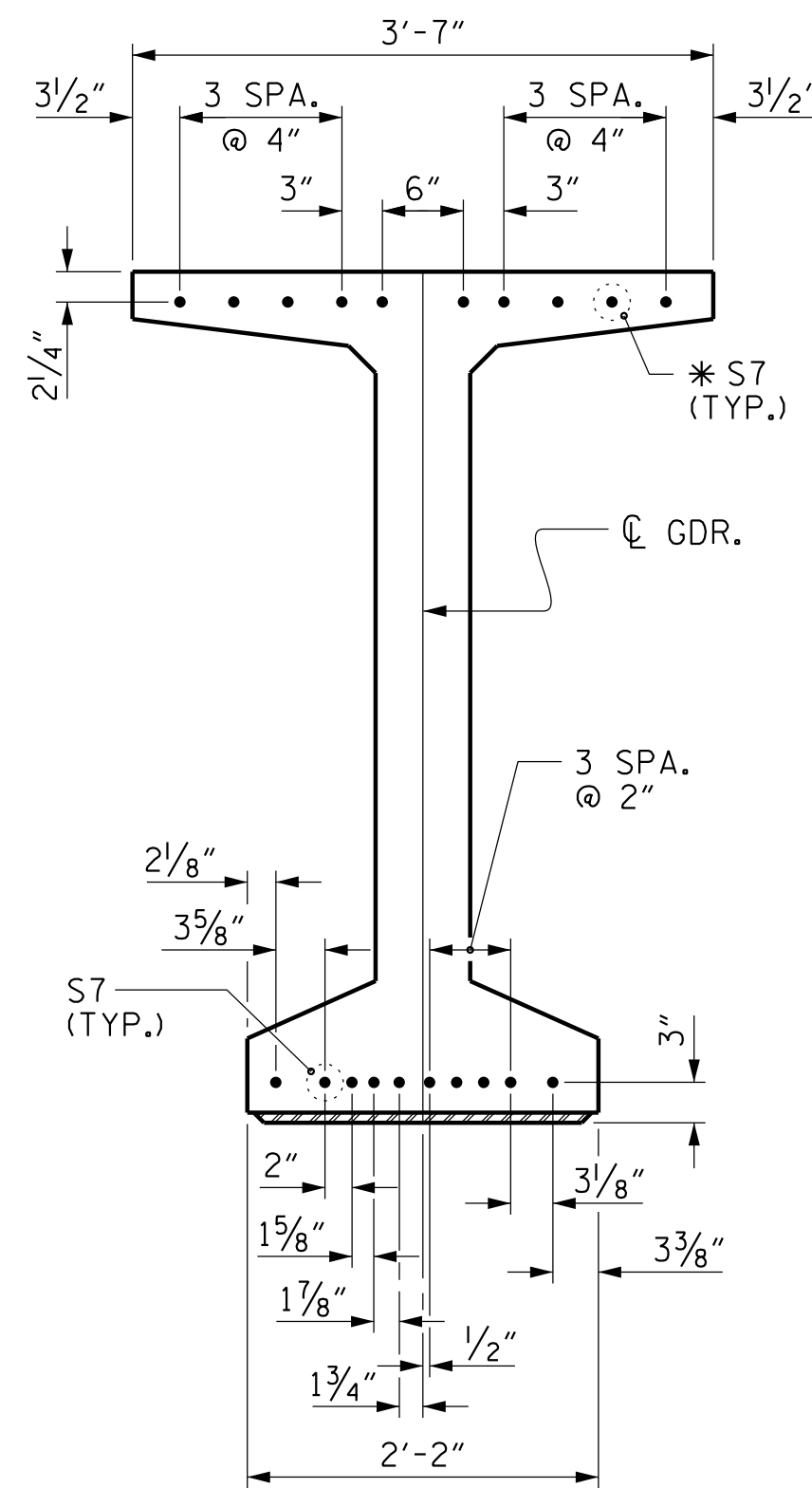
DEPENDING ON THE TYPE OF SYSTEM USED TO SUPPORT THE DECK SLAB FORMS, PRESET ANCHORS MAY BE NECESSARY IN THE PRESTRESSED CONCRETE GIRDER.

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

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

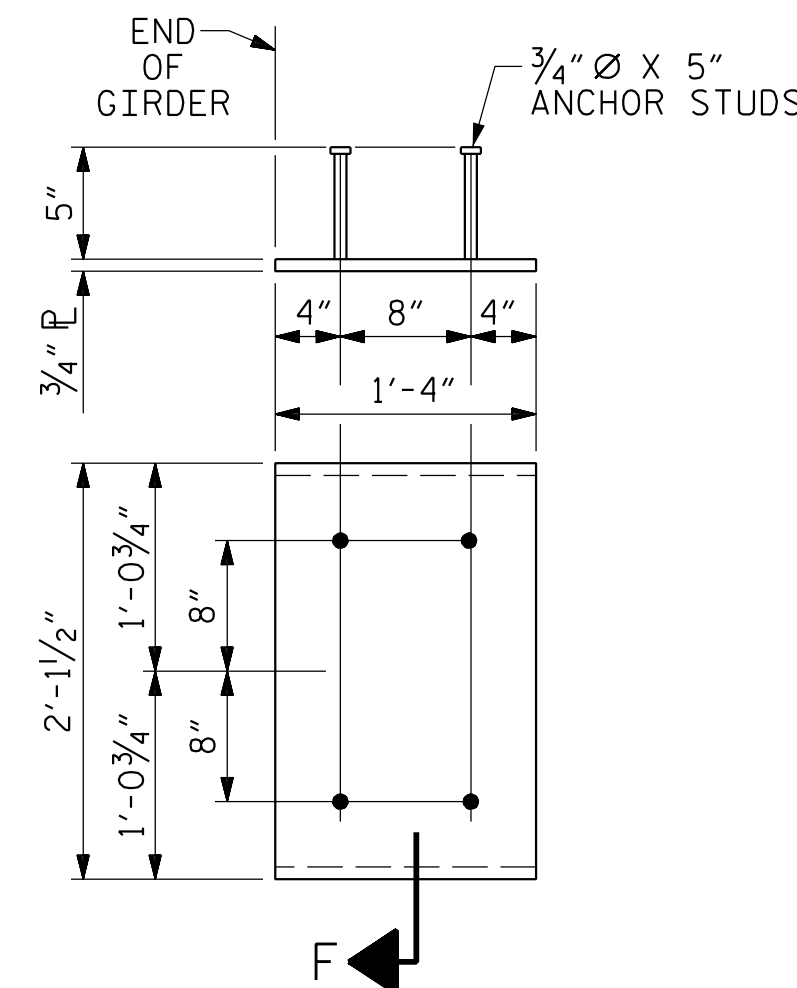
A 2" x 2" CHAMFER IS ALLOWED AT THE INTERSECTION OF THE WEB AND THE BOTTOM FLANGE OF THE 63" AND 72" MODIFIED BULB TEES ONLY.

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



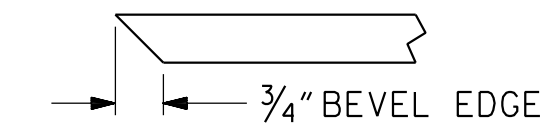
DETAIL "C"

(FOR 72" MODIFIED BULB TEES)



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

(2 REQ'D PER GIRDER)



SECTION "F"

(SEE NOTES)

DEAD LOAD DEFLECTION TABLE FOR GIRDERS - SPAN A

0.6" Ø LOW RELAXATION	GIRDERS 1 & 5																				
	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
TWENTIETH POINTS	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.051	0.101	0.148	0.191	0.229	0.261	0.287	0.305	0.317	0.321	0.317	0.305	0.287	0.261	0.229	0.191	0.148	0.101	0.051	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.029	0.059	0.087	0.115	0.137	0.159	0.173	0.187	0.191	0.196	0.191	0.187	0.173	0.159	0.137	0.115	0.087	0.059	0.029	0.0
FINAL CAMBER ↑	0.0	1/4"	1/2"	3/4"	5/8"	11/16"	1/4"	3/8"	1/2"	5/8"	1/2"	3/4"	1/2"	3/8"	1/4"	1/8"	1/16"	1/16"	1/8"	1/4"	0.0
0.6" Ø LOW RELAXATION	GIRDERS 2 - 4																				
	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
TWENTIETH POINTS	0	.05	.1	.15	.2	.25	.3	.35	.4	.45	.5	.55	.6	.65	.7	.75	.8	.85	.9	.95	0
CAMBER (GIRDER ALONE IN PLACE) ↑	0.0	0.051	0.101	0.148	0.191	0.229	0.261	0.287	0.305	0.317	0.321	0.317	0.305	0.287	0.261	0.229	0.191	0.148	0.101	0.051	0.0
* DEFLECTION DUE TO SUPERIMPOSED D.L. ↓	0.0	0.029	0.057	0.085	0.112	0.133	0.155	0.168	0.182	0.187	0.191	0.187	0.182	0.168	0.155	0.133	0.112	0.085	0.057	0.029	0.0
FINAL CAMBER ↑	0.0	1/4"	1/2"	3/4"	5/8"	11/16"	1/4"	3/8"	1/2"	5/8"	1/2"	3/4"	1/2"	3/8"	1/4"	1/8"	1/16"	1/16"	1/8"	1/4"	0.0

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 3

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:
1			3		
2			4		

TOTAL SHEETS: 25

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
 6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333

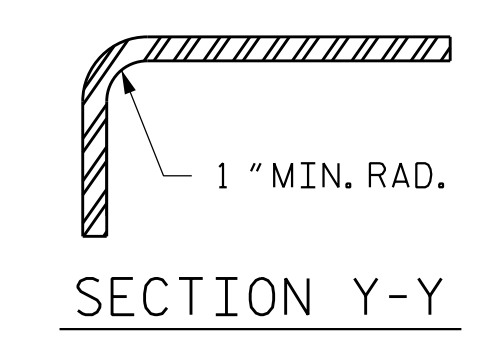
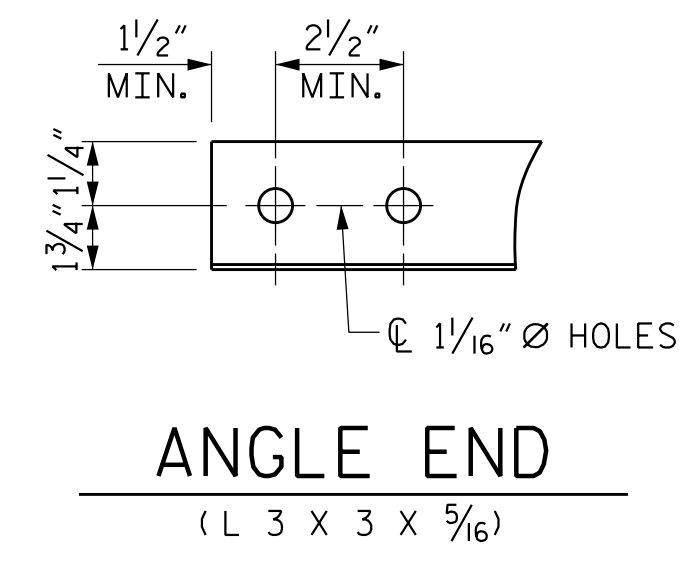
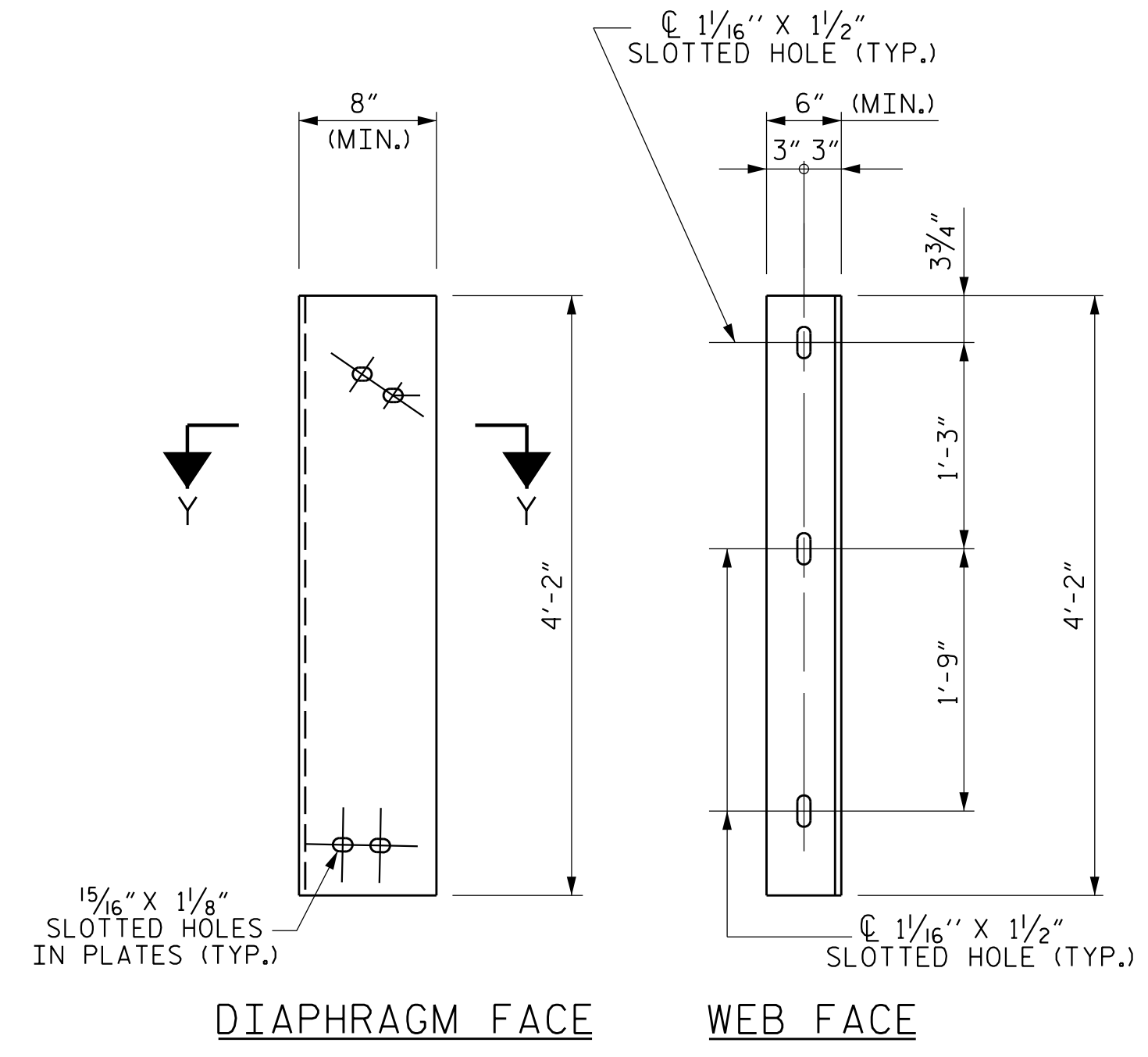
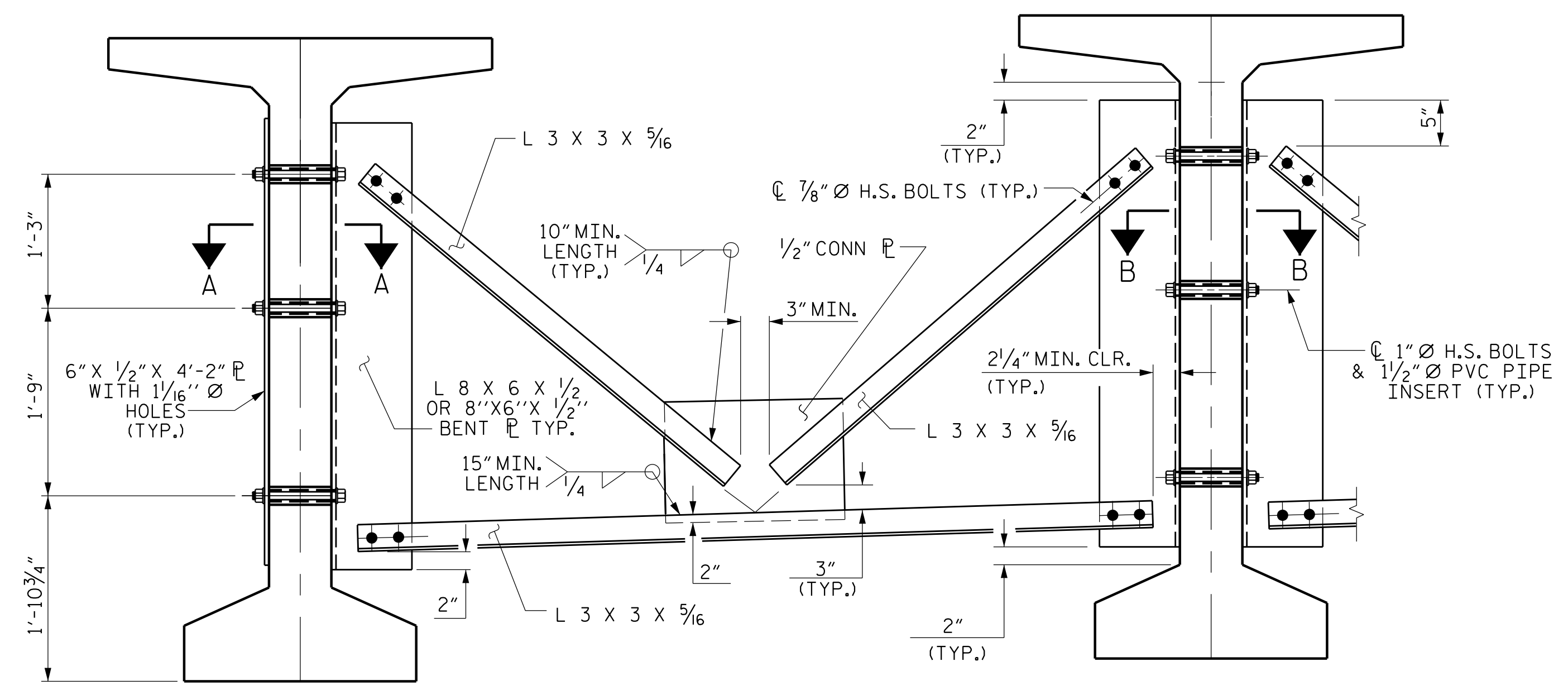
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6/11/2019  
 DWG. NO. BR-10

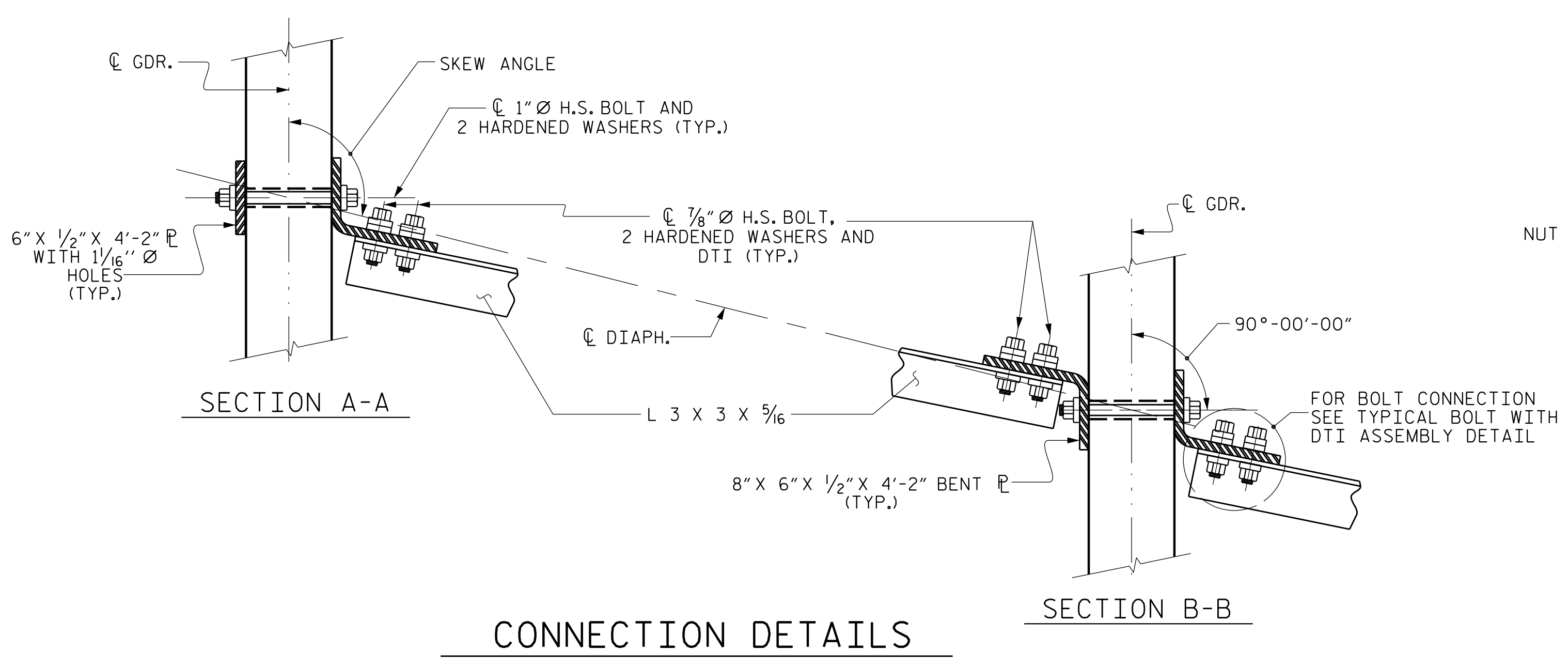
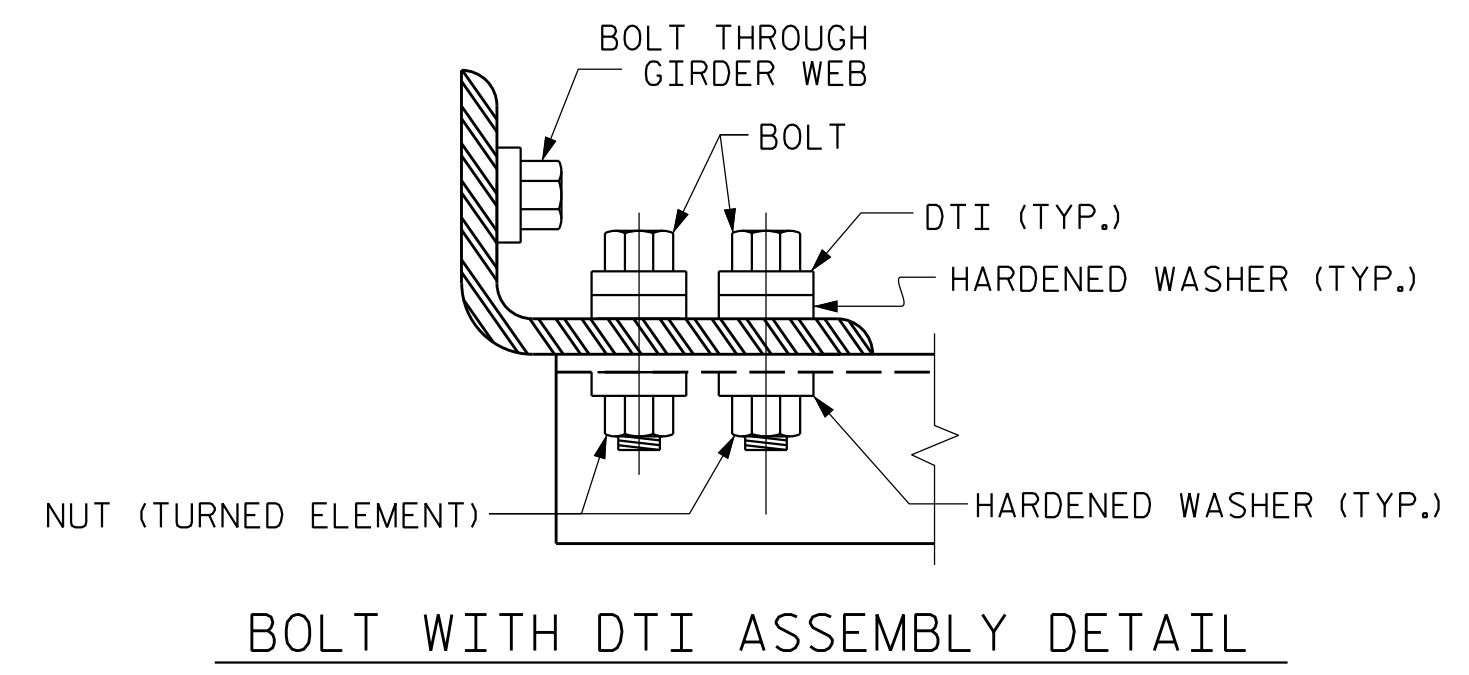
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ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : <b>3/19</b>
CHECKED BY : <b>Z. H. BROWN</b>	DATE : <b>4/19</b>
DRAWN BY : <b>ELR 11/91</b>	REV. 1/15 MAA/TMG
CHECKED BY : <b>GRP 11/91</b>	REV. 2/15 MAA/TMG
	REV. 12/17 MAA/THC





**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 A THERMAL SPRAYED COATING WITH A SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE DEPARTMENTS THERMAL SPRAYED COATINGS (METALLIZATION) PROGRAM, 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.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

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PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
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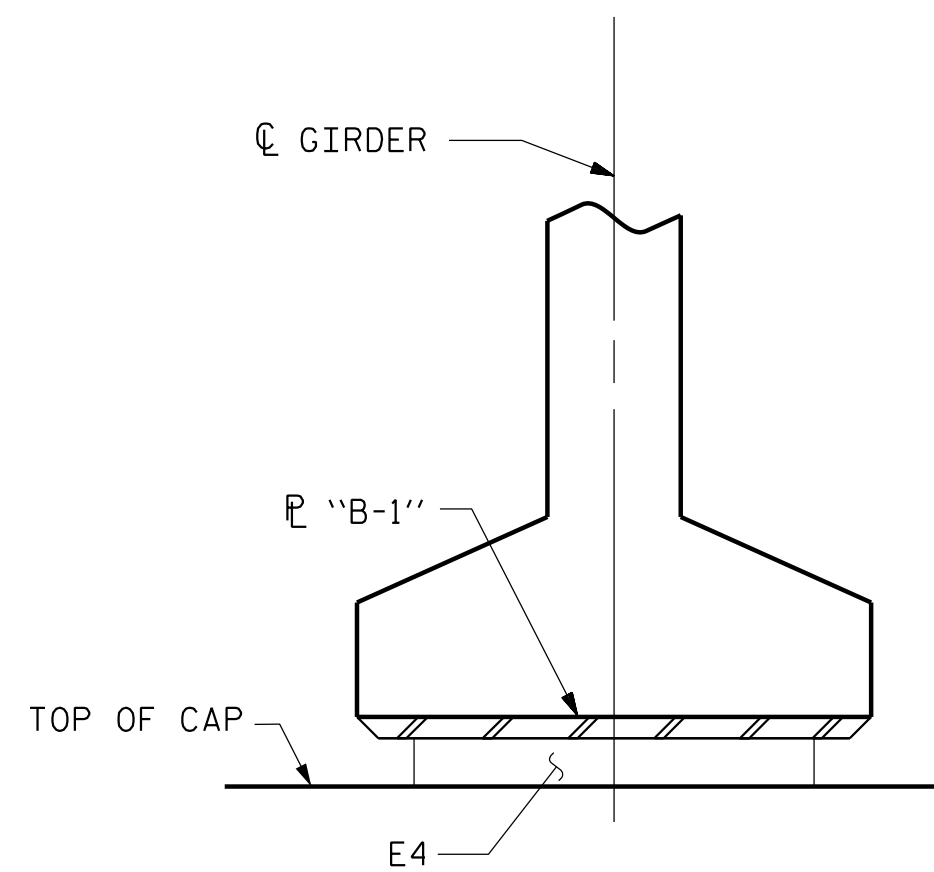
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*Kevin Austin*  
 L. ENGINEER  
 6/11/2019

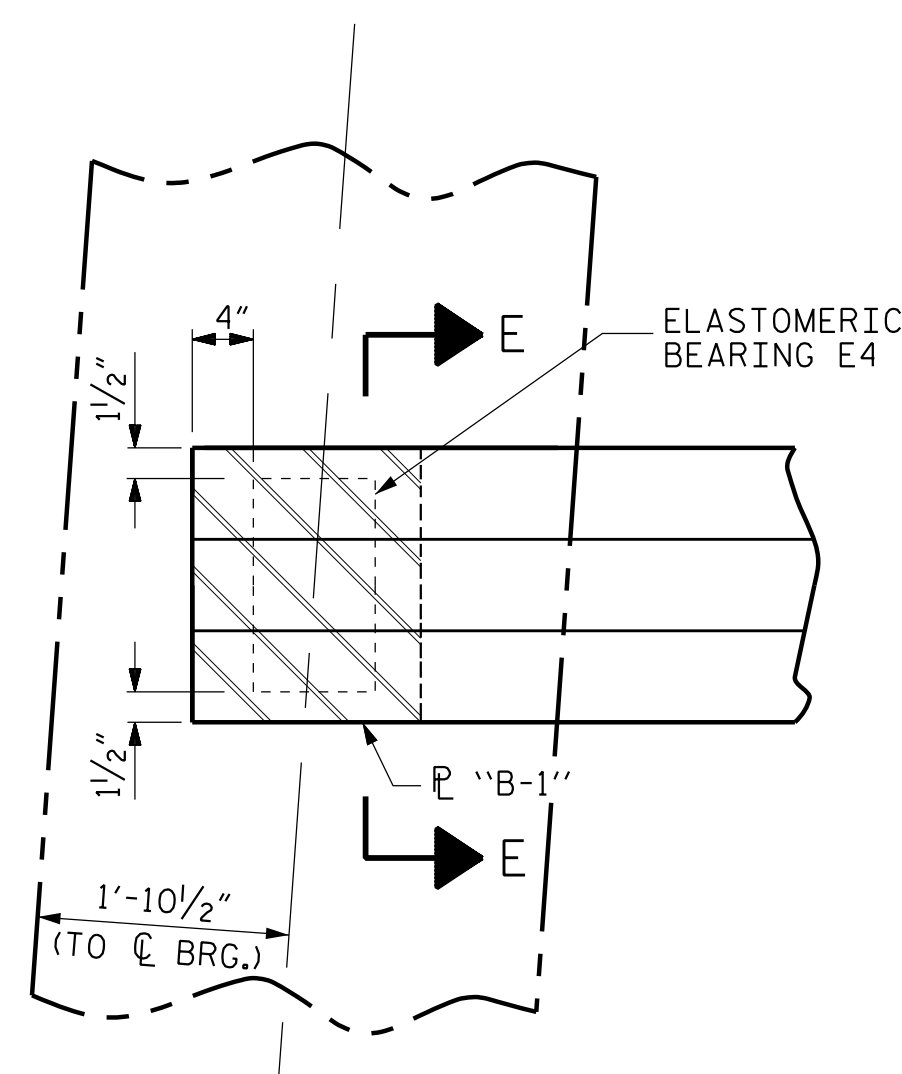
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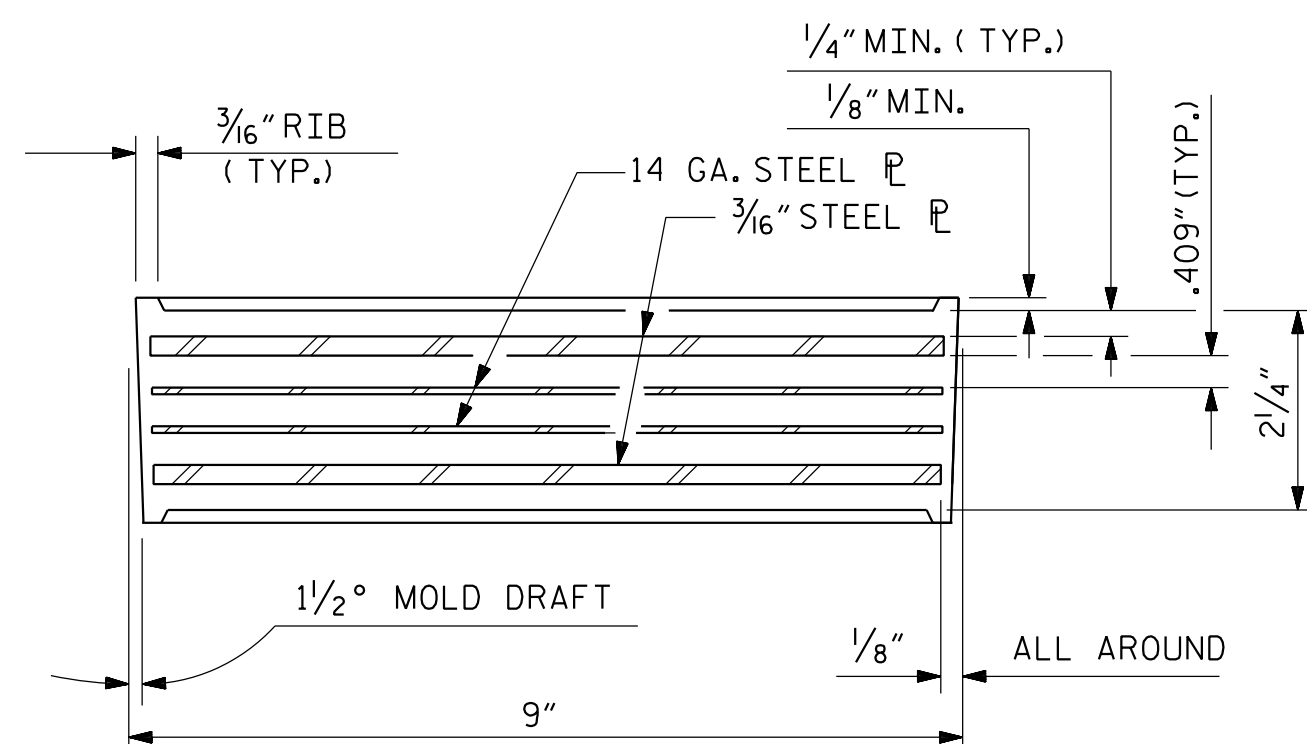
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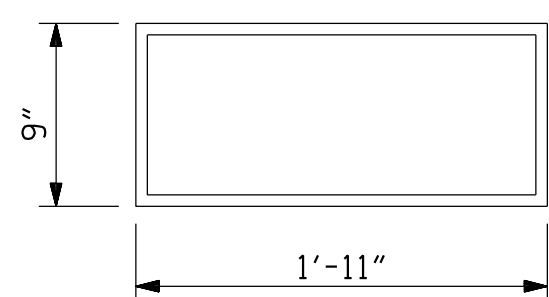
SECTION E-E



PLAN VIEW @ END BENT  
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



TYPICAL SECTION OF ELASTOMERIC BEARINGS



E4 (10 REQ'D )  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE V

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

NOTES

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
STATION: 301+83.52 -L-

PLANS PREPARED BY:

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NC License # F-1333

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6/11/2019

DWG. NO. BR-12

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
ELASTOMERIC BEARING  
DETAILS  
PRESTRESSED CONCRETE GIRDER  
SUPERSTRUCTURE  
RIGHT LANE

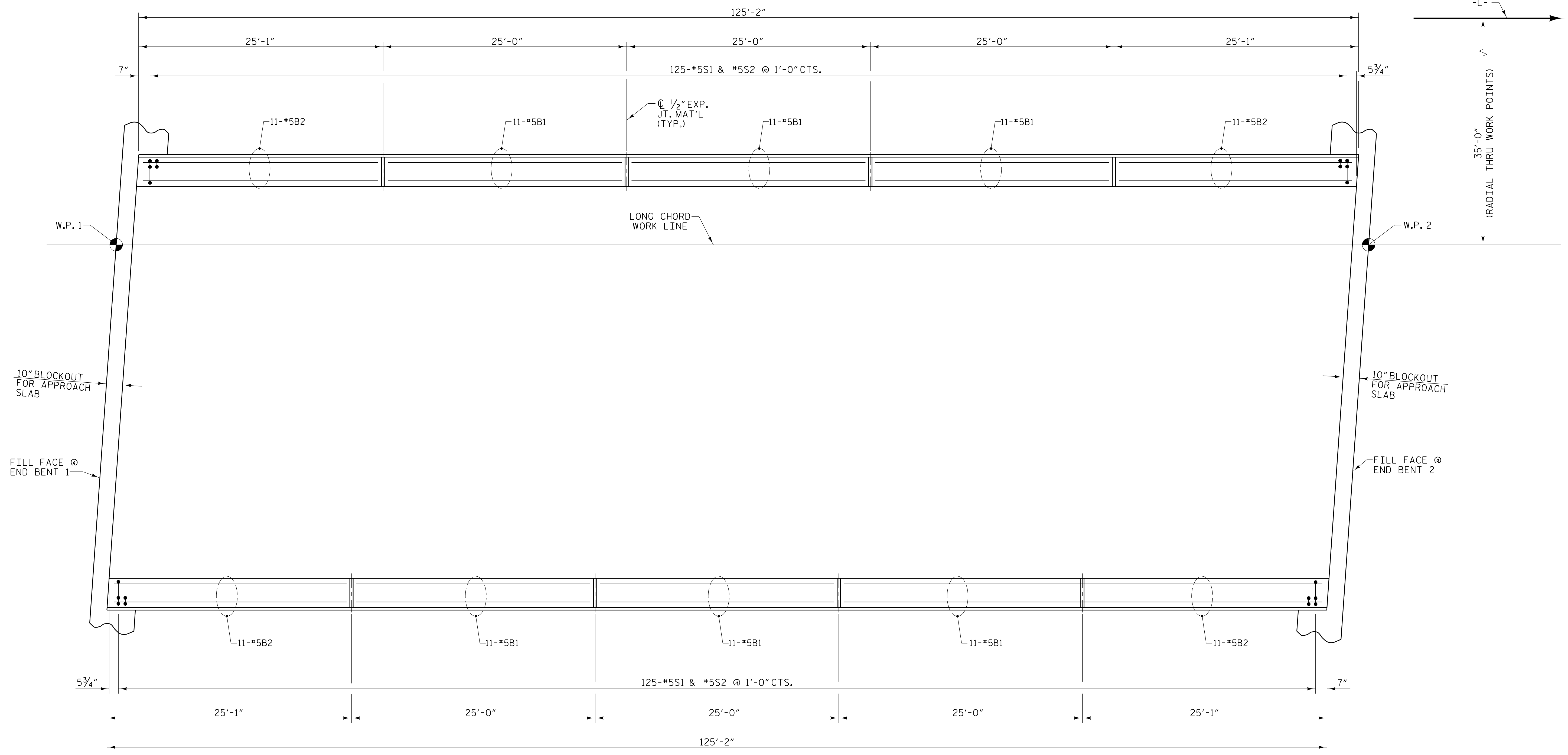
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NO.	BY:	DATE:	NO.	BY:	DATE:	S8-12
1			3			TOTAL SHEETS
2			4			25

STD. NO. EB4 (SHT 1)

ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : 3/19
CHECKED BY : <b>Z. H. BROWN</b>	DATE : 4/19
DRAWN BY : EEM 2/97	REV. 6/13 AAC/MAA
CHECKED BY : VAP 2/97	REV. 1/15 MAA/TMG
	REV. 12/17 MAA/THC

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SPAN A

PLAN OF BARRIER RAIL

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
**CONCRETE  
 BARRIER RAIL**  
 RIGHT LANE

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
 6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333

Professional Engineer Seal for L. Kevin Austin, State of North Carolina, License No. 019951, dated 6/11/2019.

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DRAWN BY :	W. B. ALLEN	DATE :	7/15
CHECKED BY :	Z. H. BROWN	DATE :	7/15
DESIGN ENGINEER OF RECORD:	L. K. AUSTIN	DATE :	9/15

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S8-13
1			3			TOTAL SHEETS
2			4			25

DWG. NO. BR-13

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**NOTES**

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD-DOWN PLATE AND 4 - 1/8" 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 1/8" 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.)

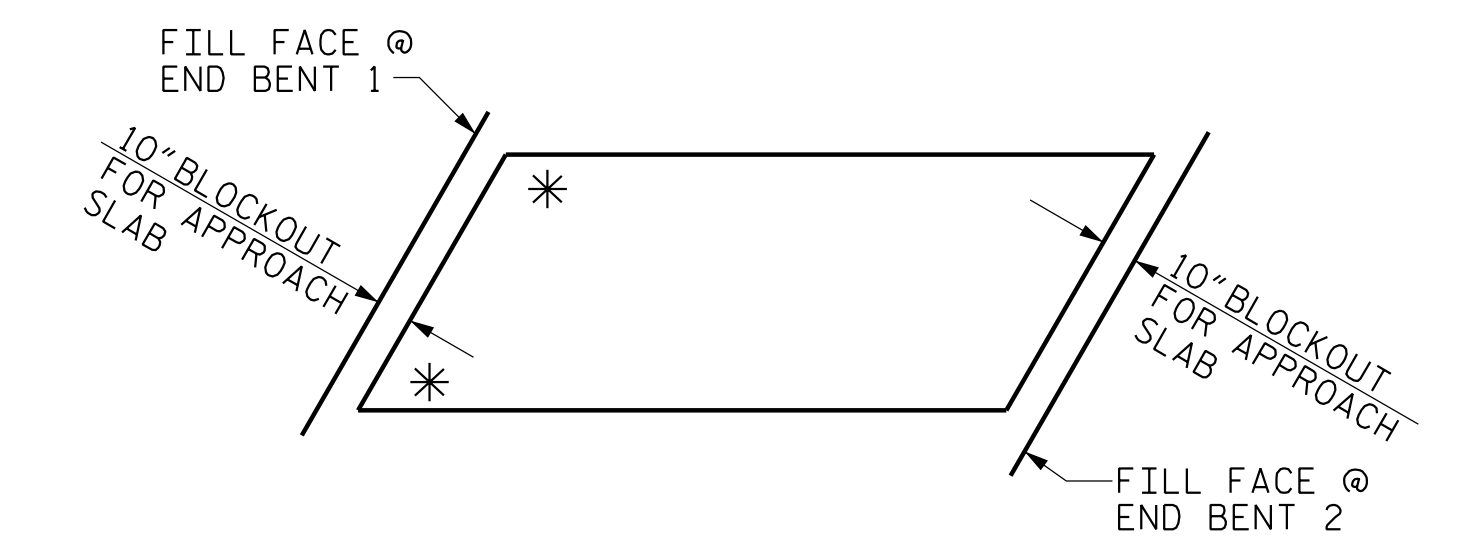
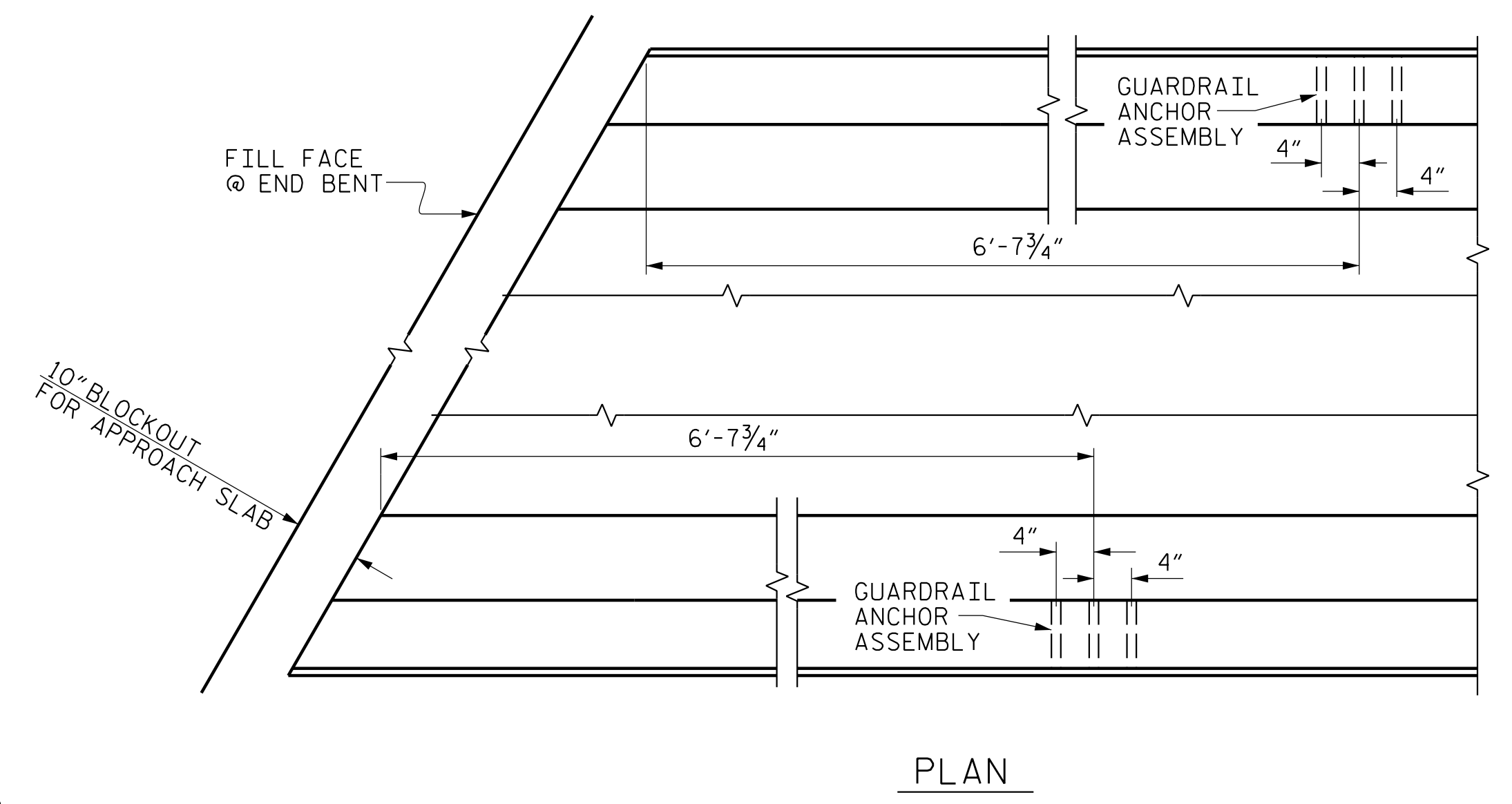
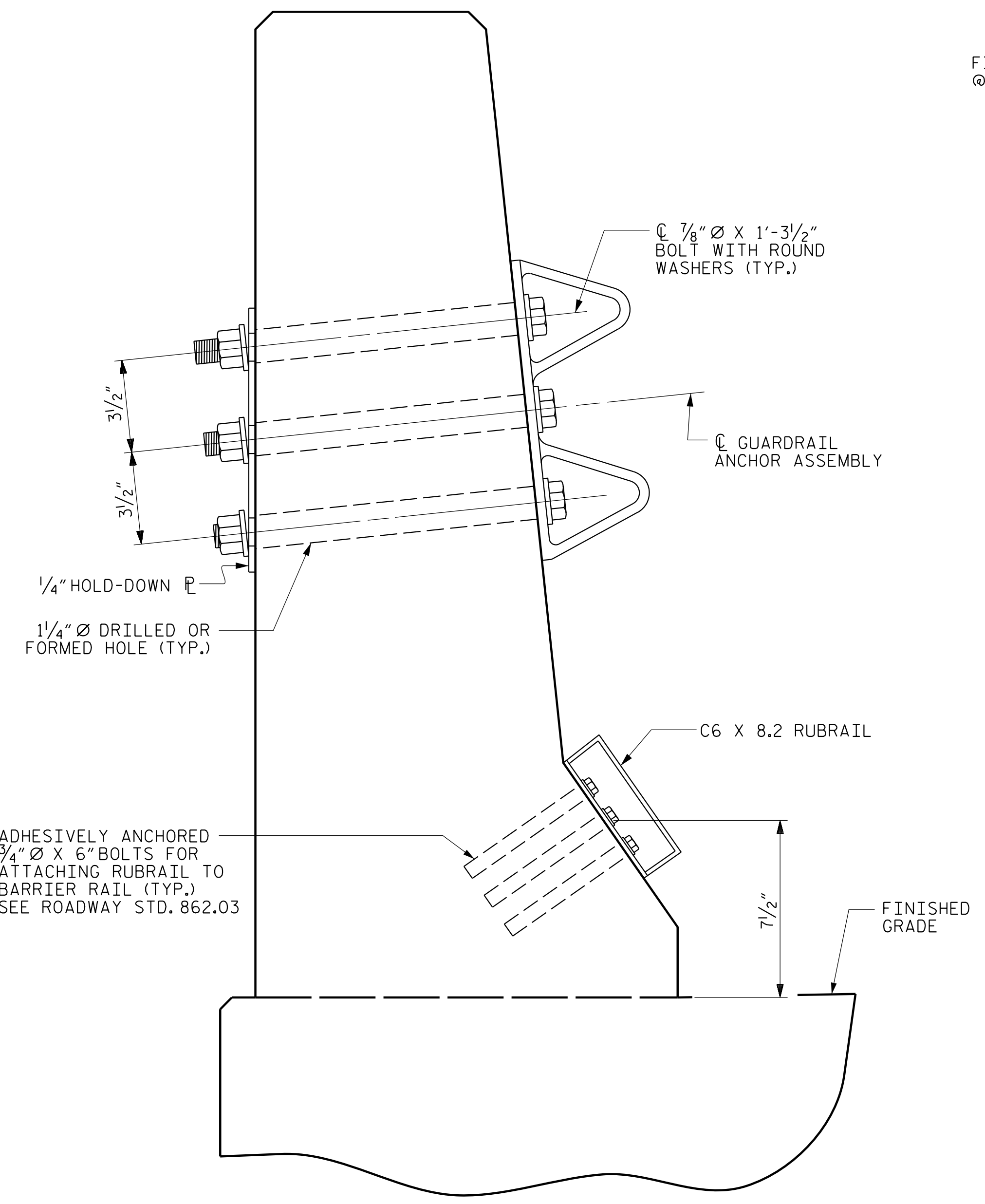
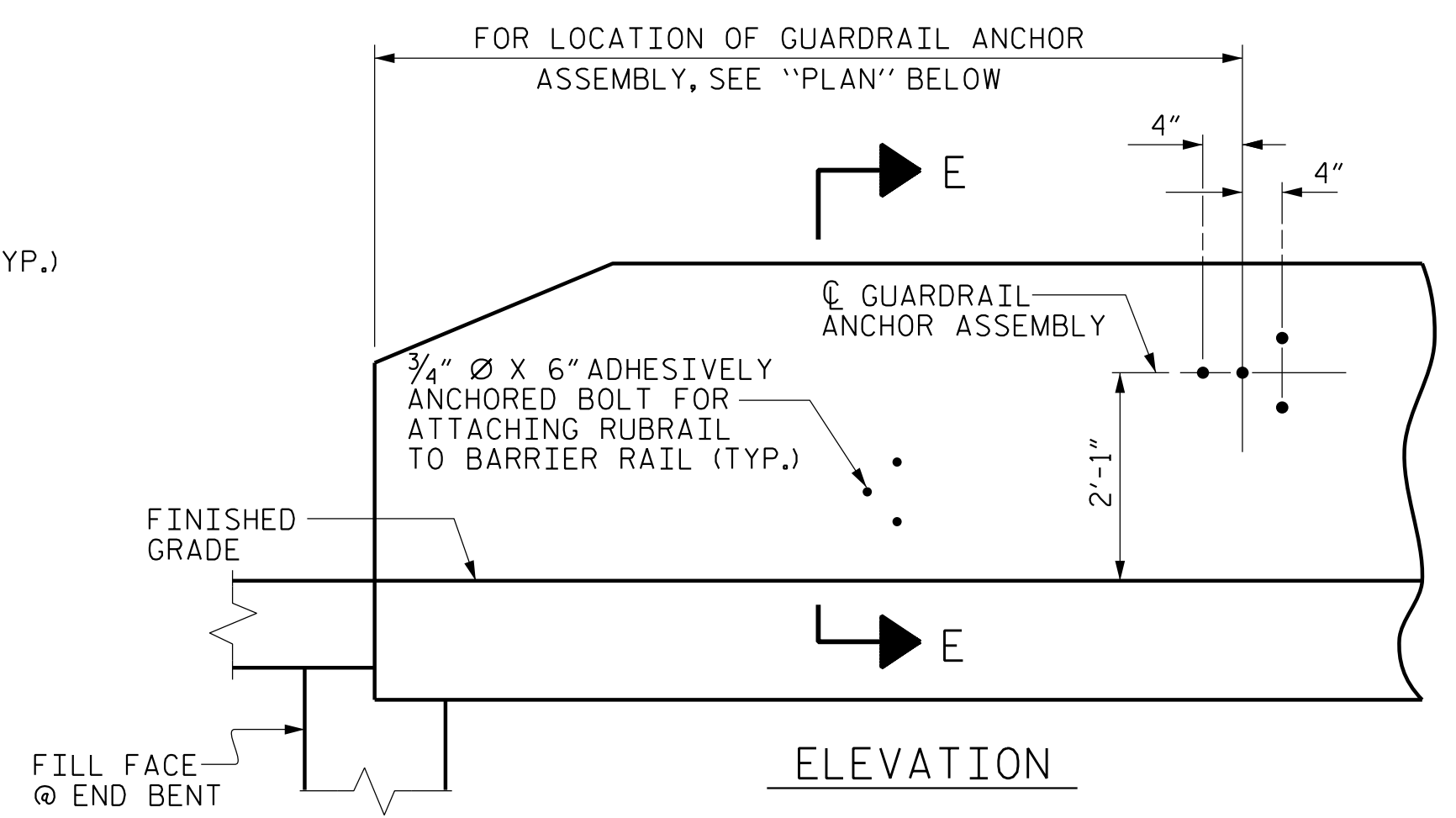
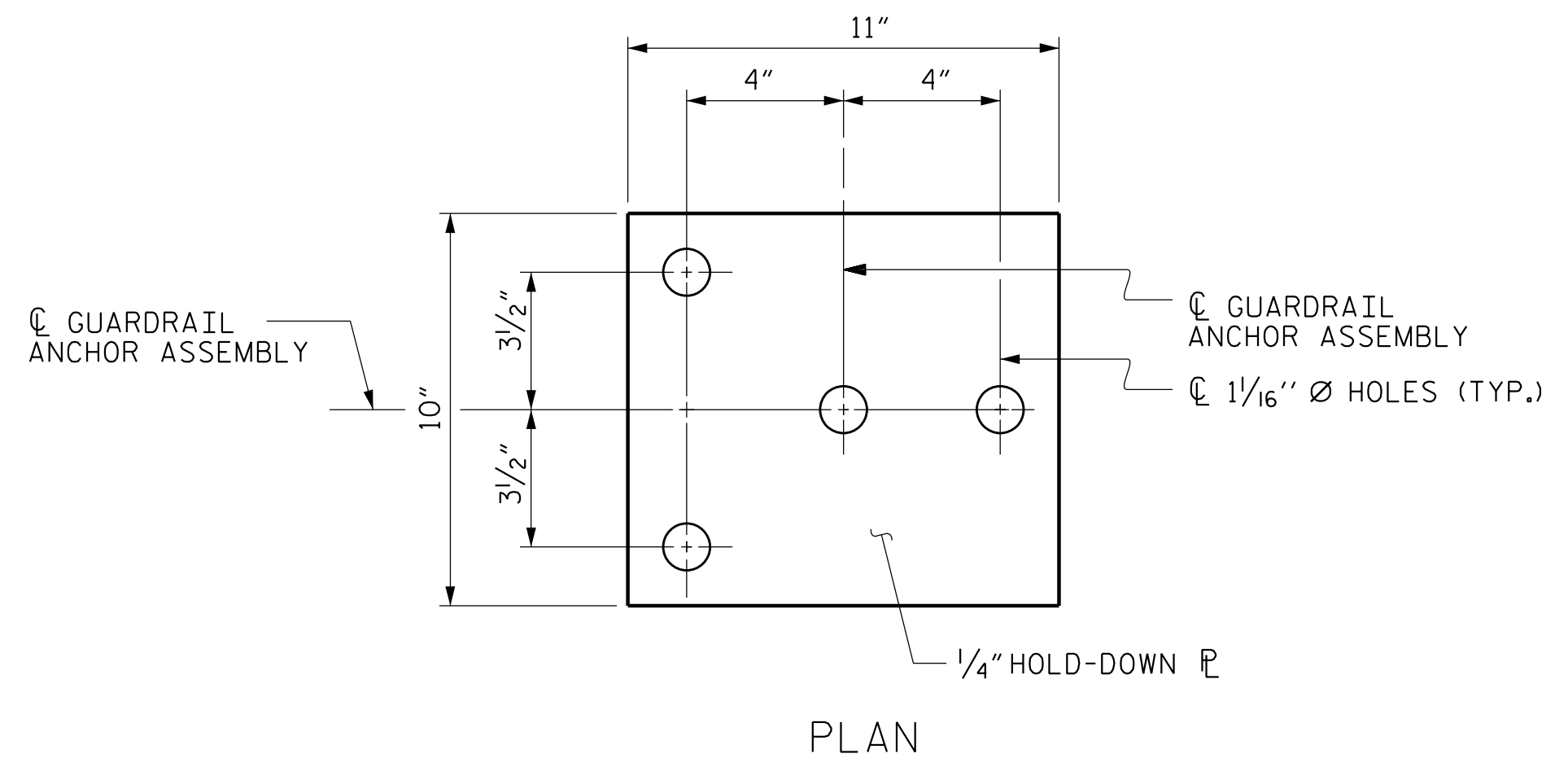
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

**LOCATION OF ANCHORS FOR GUARDRAIL**

END BENT 1 SHOWN.

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD  
 GUARDRAIL ANCHORAGE  
 FOR BARRIER RAIL**  
 RIGHT LANE

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

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
 6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
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 NC License # F-1333

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**SECTION E-E  
 GUARDRAIL ANCHOR ASSEMBLY DETAILS**

ASSEMBLED BY : <b>W. B. ALLEN</b>	DATE : <b>3/19</b>
CHECKED BY : <b>Z. H. BROWN</b>	DATE : <b>4/19</b>
DRAWN BY : TLA 5/06	REV. 7/12 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

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

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

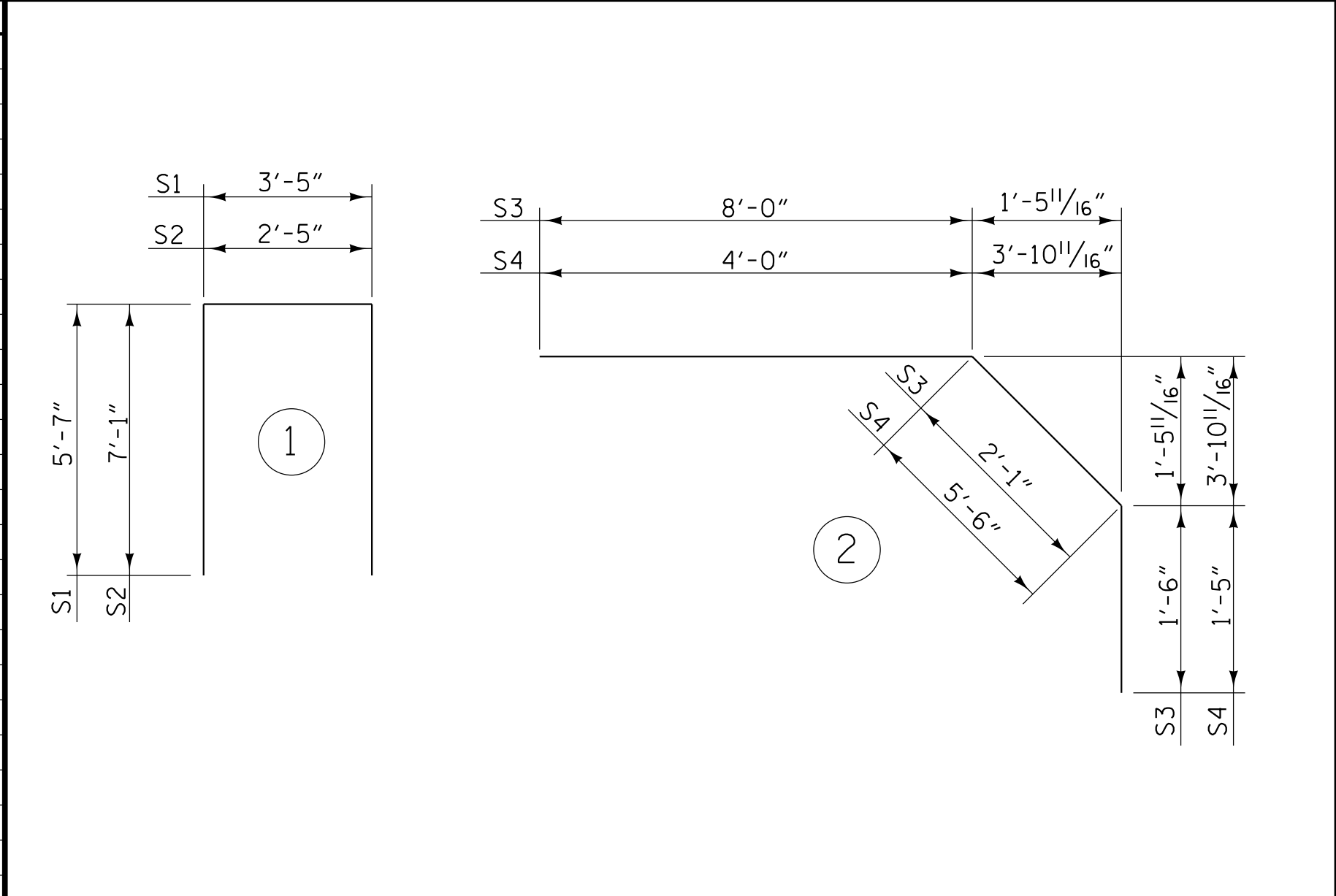
**GROOVING BRIDGE FLOORS**

ITEM	AMOUNT	UNIT
APPROACH SLABS	1825	SQ. FT.
BRIDGE DECK	4663	SQ. FT.
<b>TOTAL</b>	<b>6488</b>	<b>SQ. FT.</b>

**BAR SCHEDULE**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	194	#5	STR	43'-2"	8734
A2	194	#5	STR	43'-2"	8734
* A101	2	#5	STR	42'-9"	89
* A102	2	#5	STR	33'-10"	71
* A103	2	#5	STR	24'-10"	52
* A104	2	#5	STR	15'-11"	33
* A105	2	#5	STR	7'-0"	15
A201	2	#5	STR	42'-9"	89
A202	2	#5	STR	33'-10"	71
A203	2	#5	STR	24'-10"	52
A204	2	#5	STR	15'-11"	33
A205	2	#5	STR	7'-0"	15
* B1	87	#4	STR	27'-7"	1603
* B2	226	#5	STR	25'-1"	5913
B3	90	#5	STR	43'-1"	4044
* B4	10	#4	STR	26'-7"	178
K1	28	#4	STR	21'-7"	404
K2	8	#4	STR	6'-4"	34
K3	40	#4	STR	7'-11"	212
K4	8	#4	STR	6'-10"	37
K5	4	#4	STR	2'-8"	7
K6	20	#4	STR	3'-5"	46
K7	4	#4	STR	3'-2"	8
* S1	52	#4	1	14'-7"	507
* S2	4	#4	1	16'-7"	44
* S3	52	#4	2	11'-7"	402
* S4	52	#4	2	10'-11"	379
REINFORCING STEEL				LBS.	13786
* EPOXY COATED REINFORCING STEEL				LBS.	18020

**BAR TYPES**

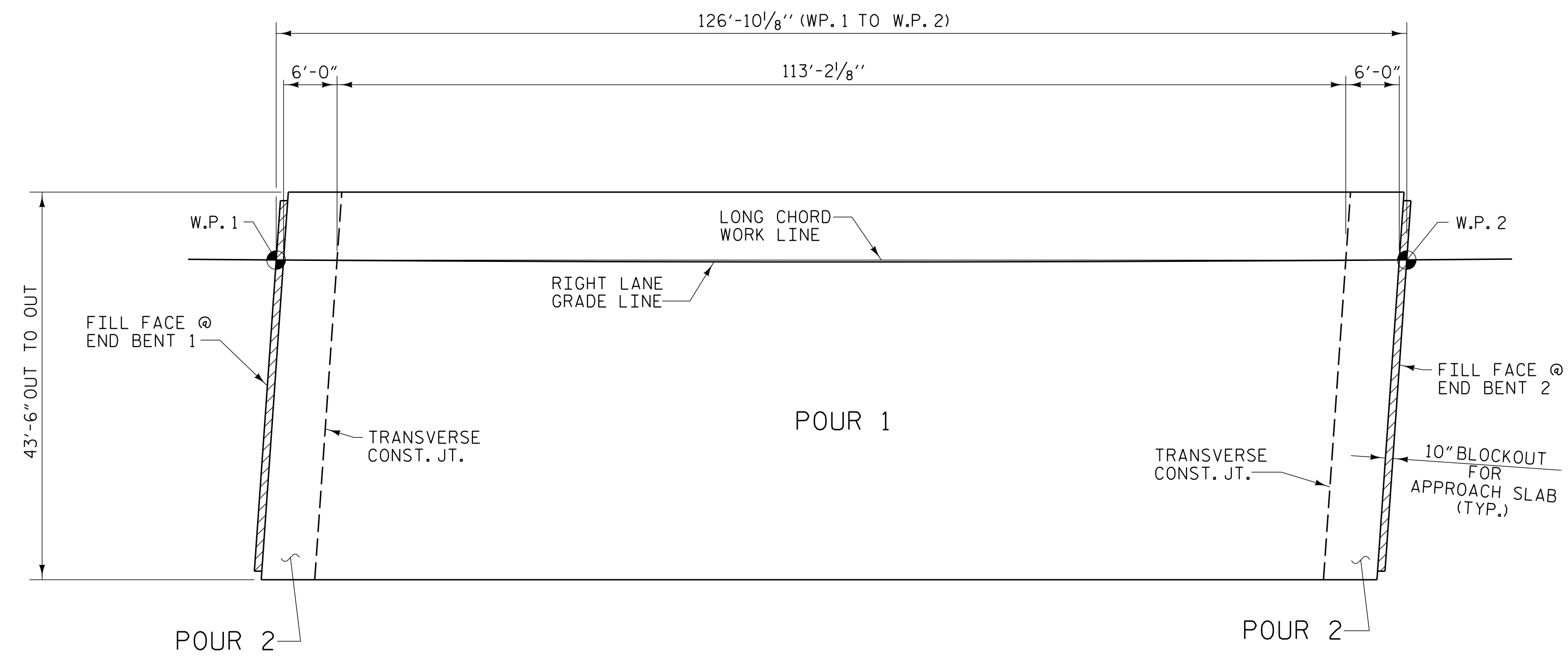


ALL BAR DIMENSIONS ARE OUT TO OUT

**SUPERSTRUCTURE BILL OF MATERIAL**

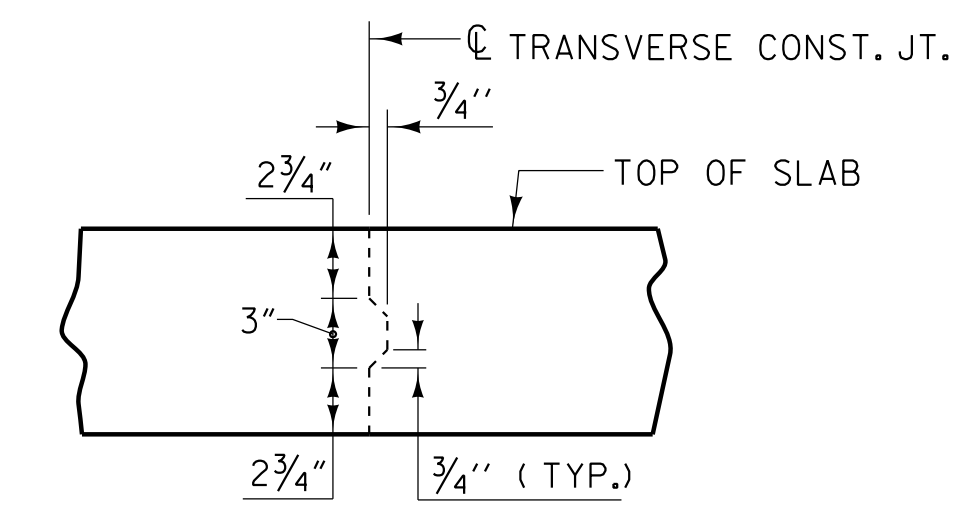
	CLASS AA CONCRETE (CU. YDS.)	REINFORCING STEEL (LBS.)	* EPOXY COATED REINFORCING STEEL (LBS.)
POUR 1	160.0		
POUR 2	85.8		
<b>** TOTALS</b>	<b>245.8</b>	<b>13786</b>	<b>18020</b>

\*\* QUANTITIES FOR BARRIER RAIL ARE NOT INCLUDED.



**POURING SEQUENCE AND LAYOUT FOR COMPUTING AREA OF REINFORCED CONCRETE DECK SLAB**

(SQ. FT. = 5,518)



**TRANSVERSE CONSTRUCTION JOINT DETAIL**

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

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

PLANS PREPARED BY:  
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 CALYXengineers.com  
 NC License # F-1333

Professional Engineer Seal for L. Kevin Austin, State of North Carolina, License No. 019951, dated 6/11/2019.

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE  
 BILL OF MATERIAL**  
 RIGHT LANE

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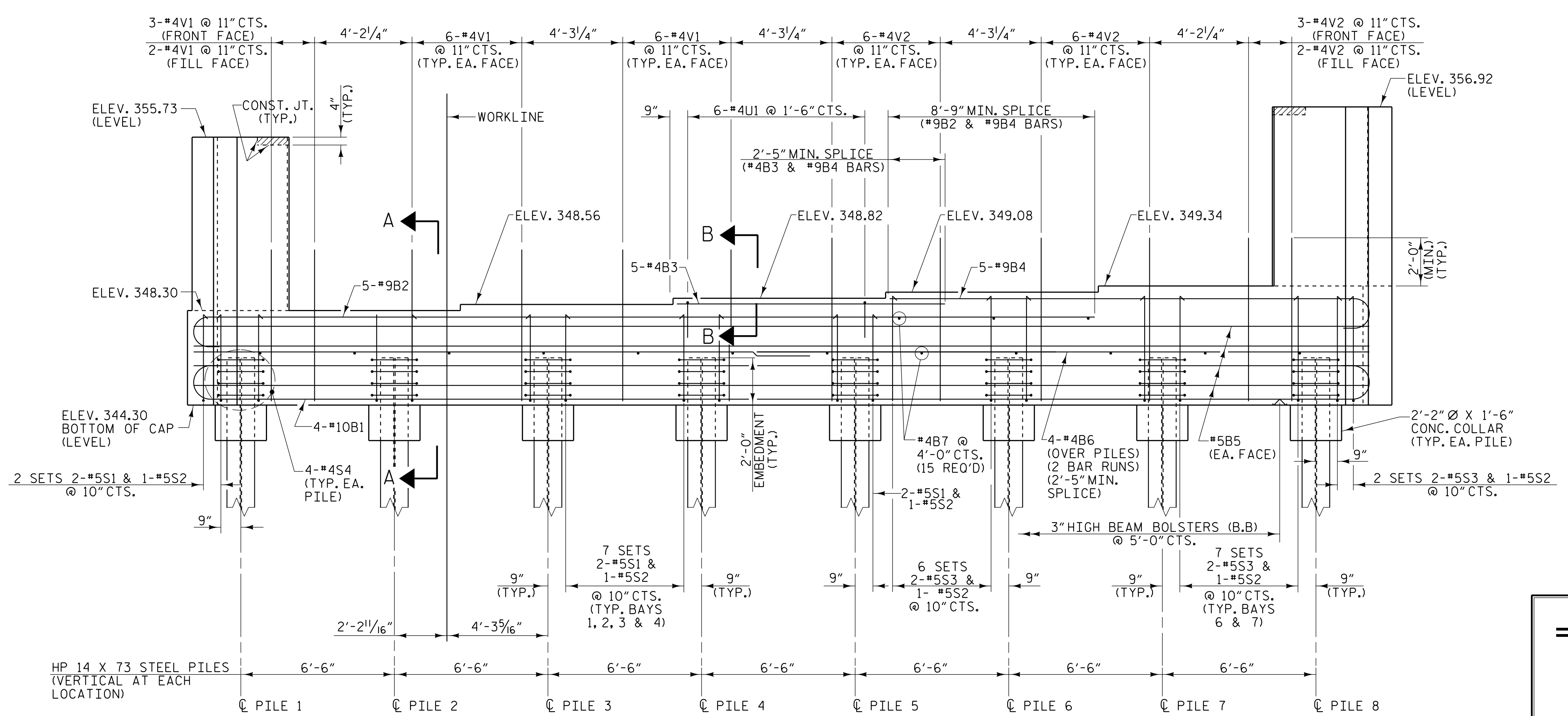
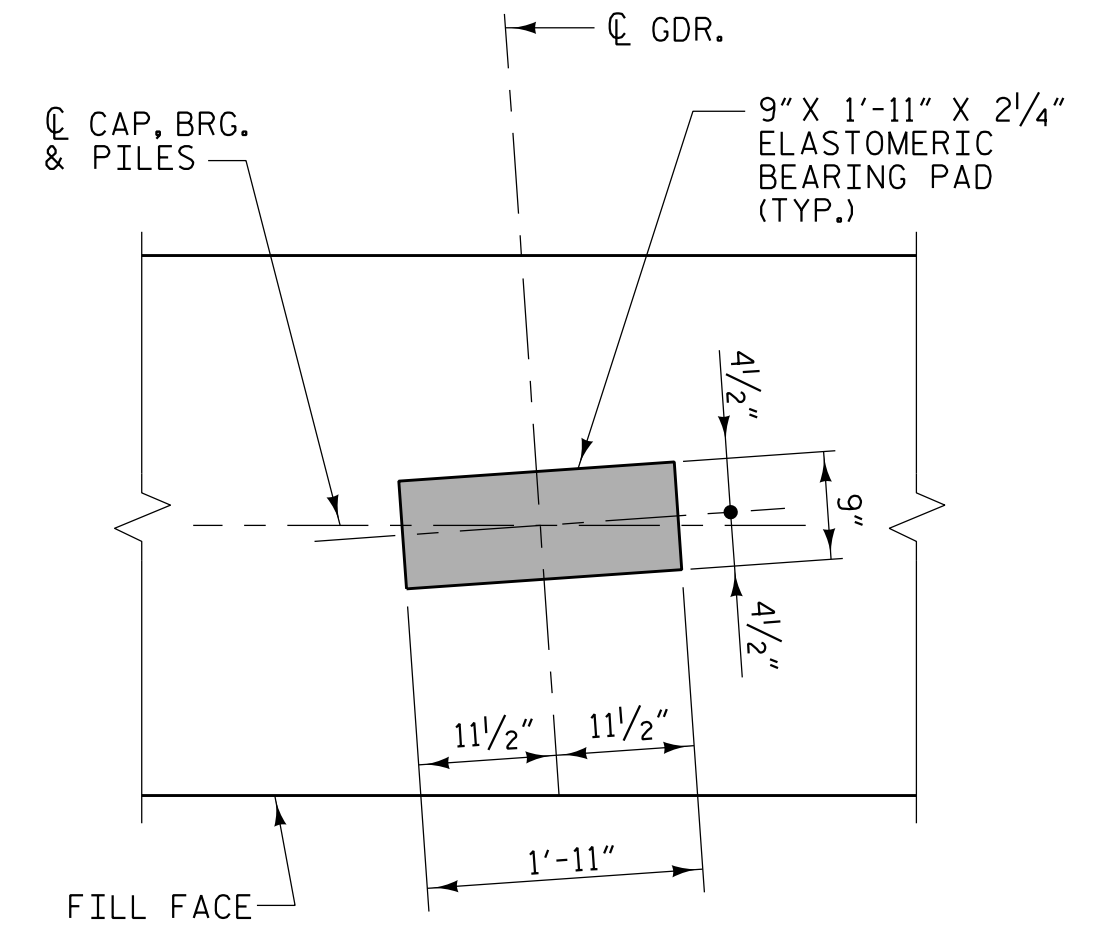
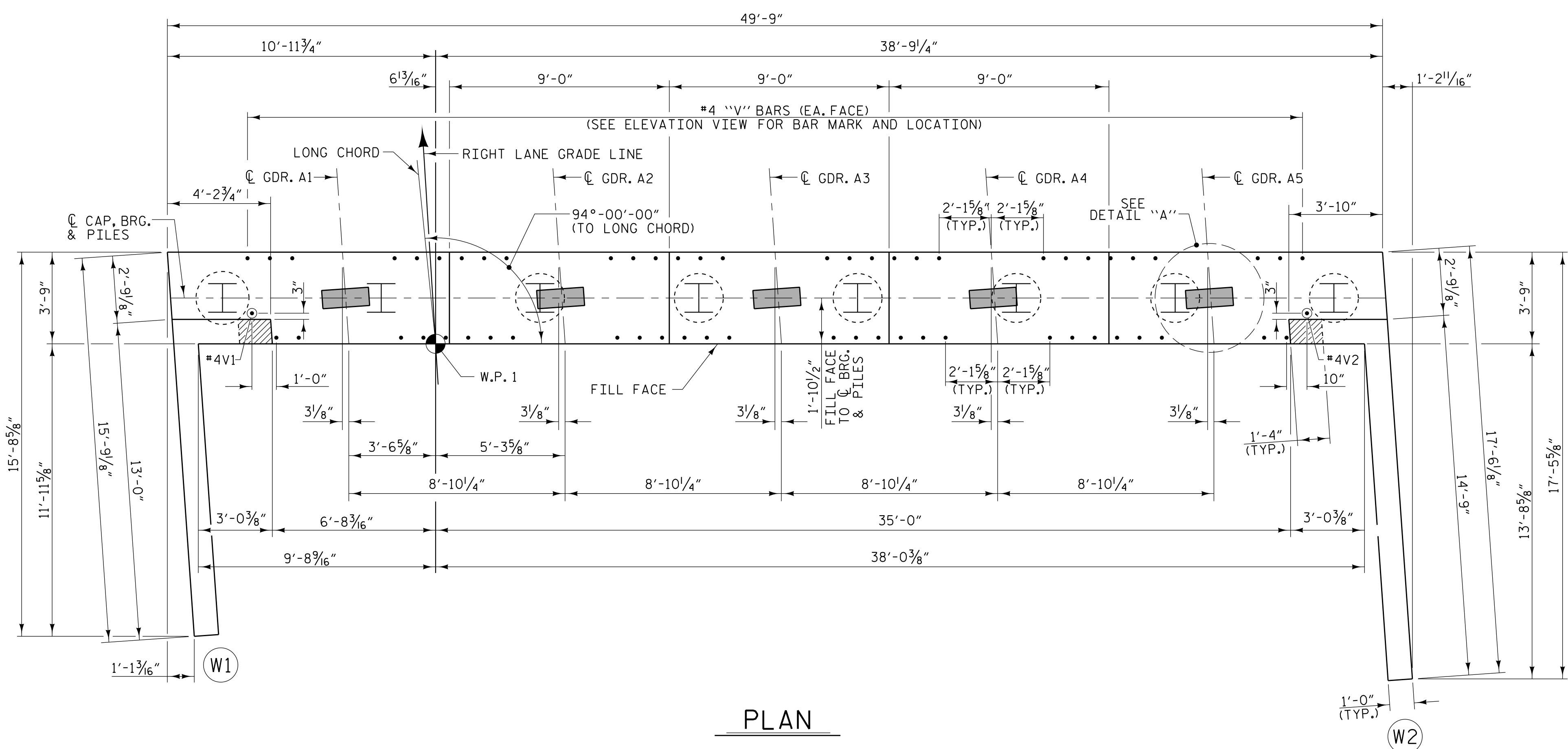
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2			4			TOTAL SHEETS 25

DWG. NO. BR-16



NOTES

\*4U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR #4V1 BARS.  
 THE CONCRETE IN THE SHADED AREA OF THE WING WALL SHALL BE POURED AFTER THE BARRIER RAILS ARE CAST IF SLIP FORMING IS USED.



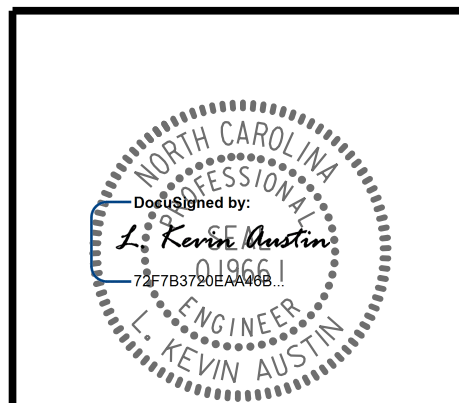
PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
**INTEGRAL  
 END BENT 1**  
 RIGHT LANE

PLANS PREPARED BY:  
**CALYX**  
 ENGINEERS + CONSULTANTS  
 6750 TRYON ROAD  
 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXengineers.com  
 NC License # F-1333



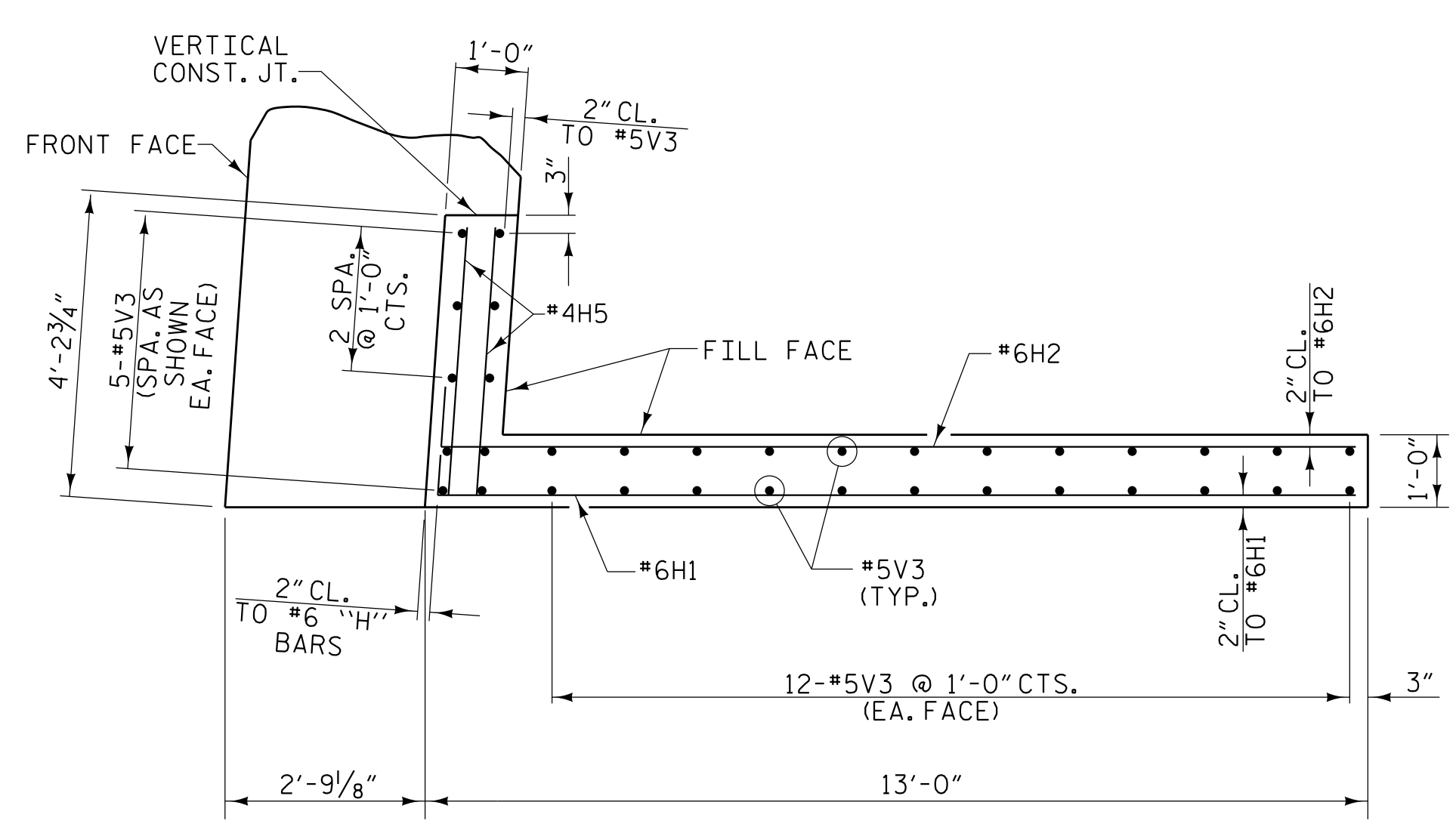
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NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			25
2			4			

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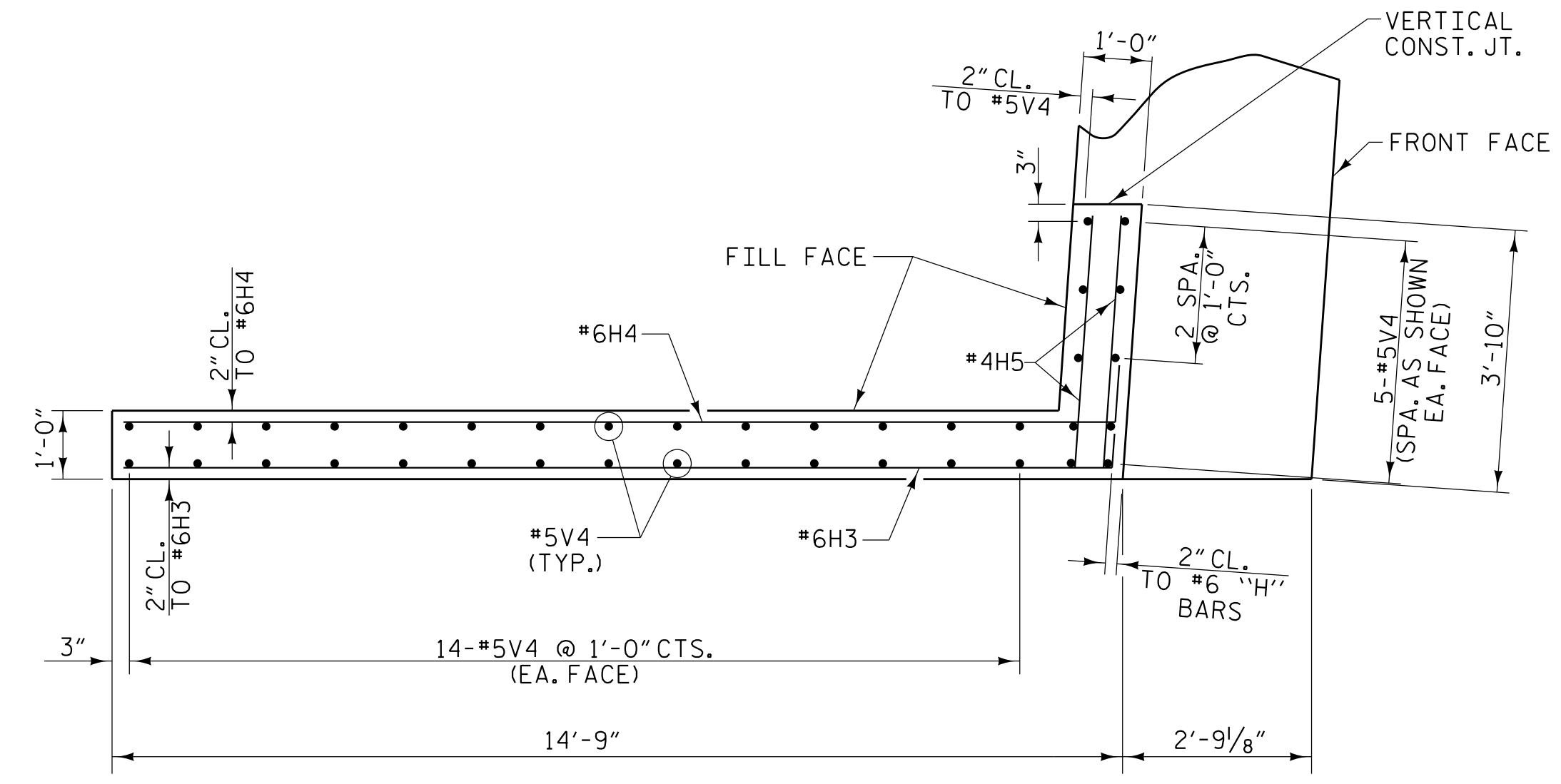
DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

DWG. NO. BR-17

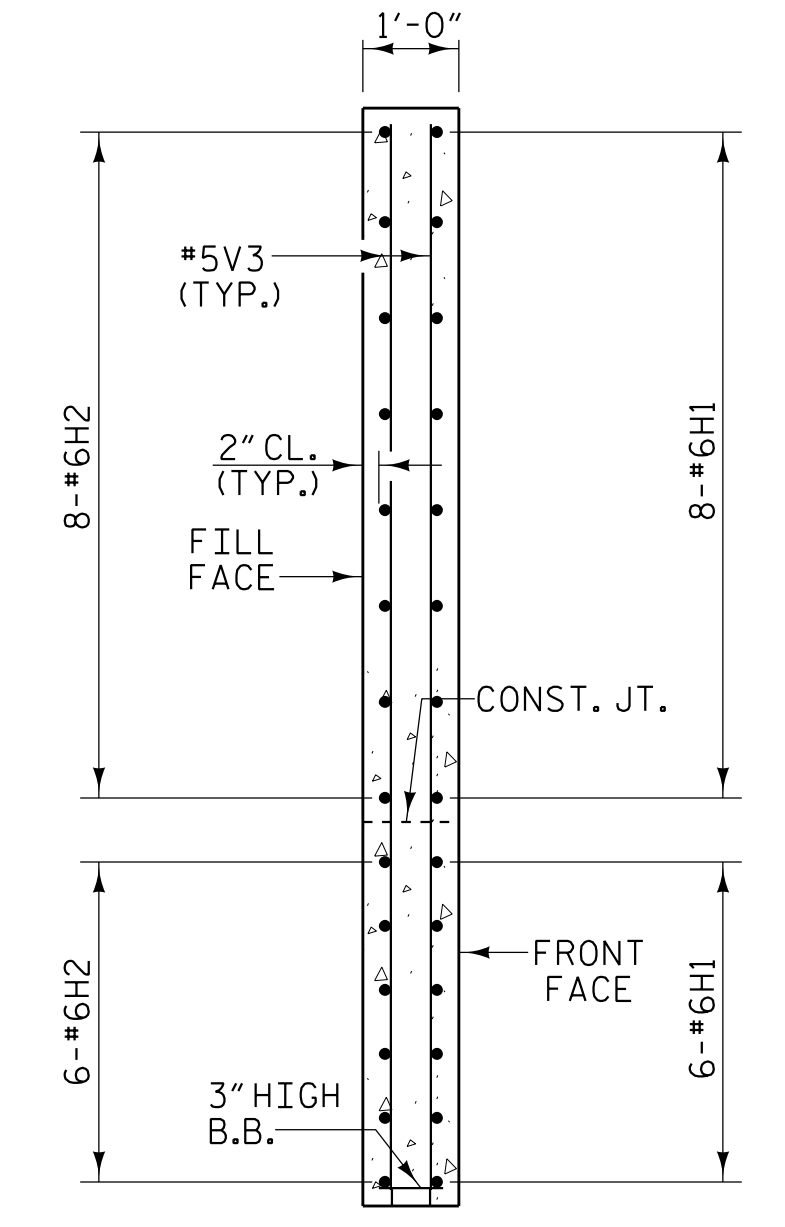
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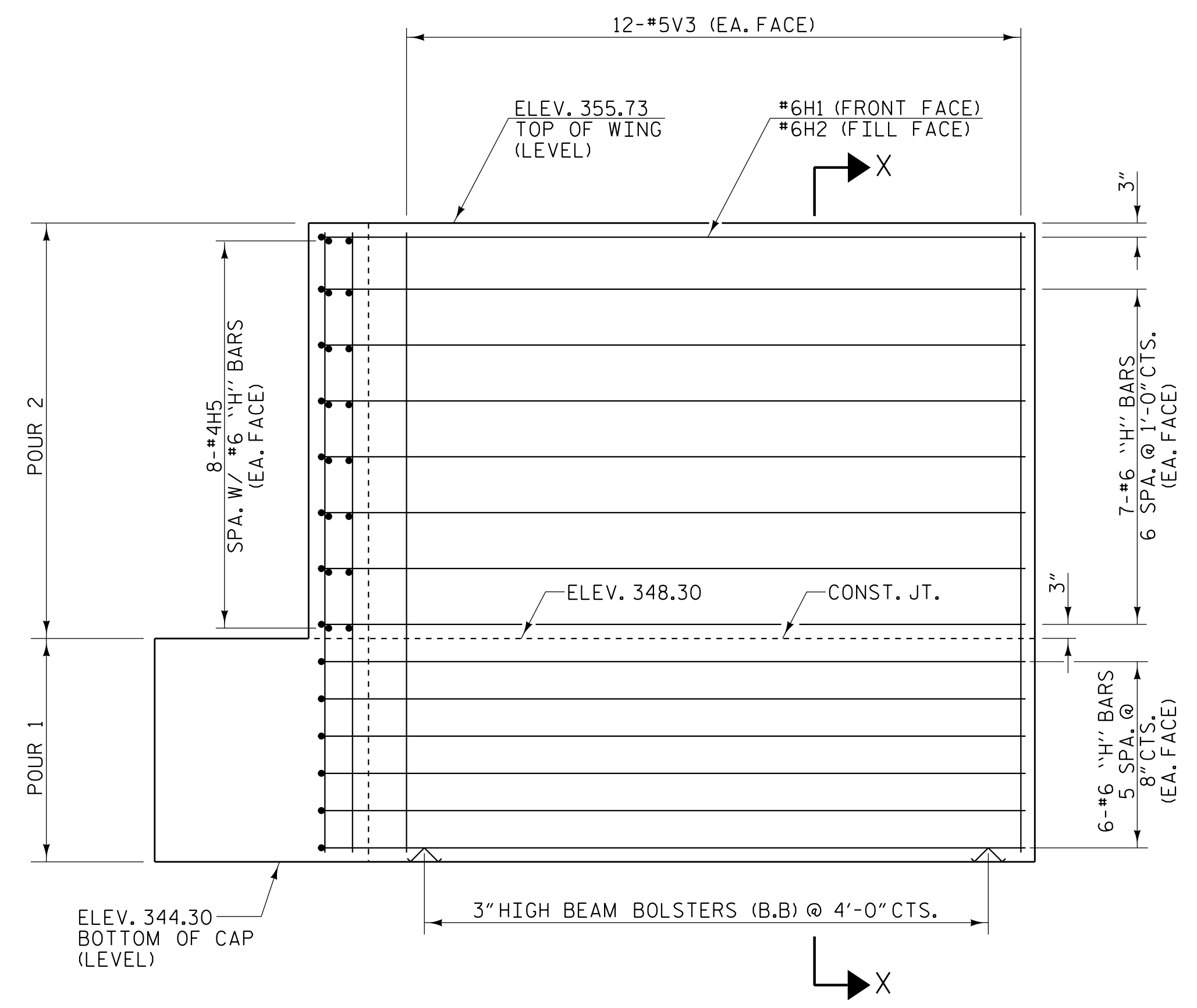
PLAN OF LEFT WING - W1



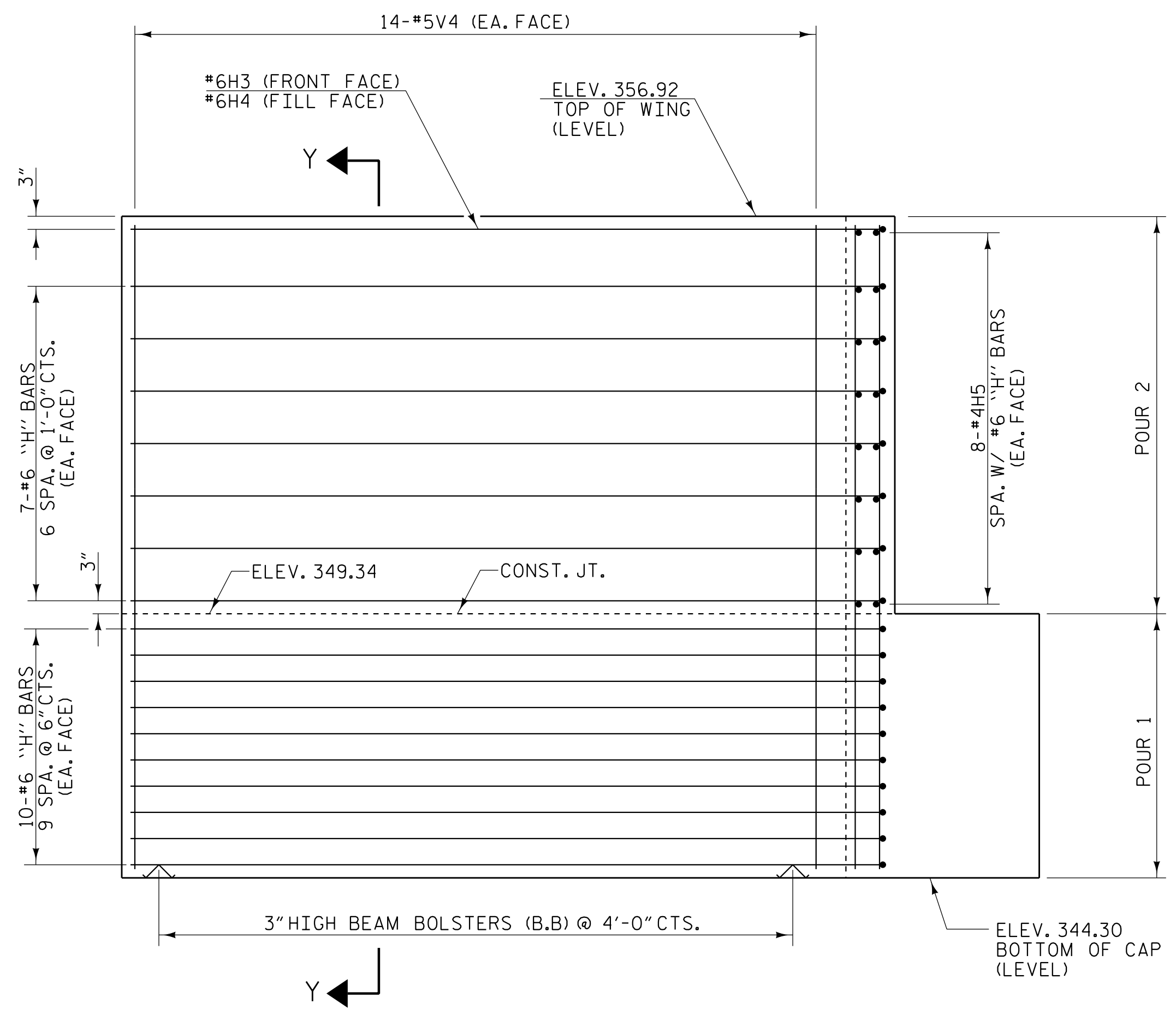
PLAN OF RIGHT WING - W2



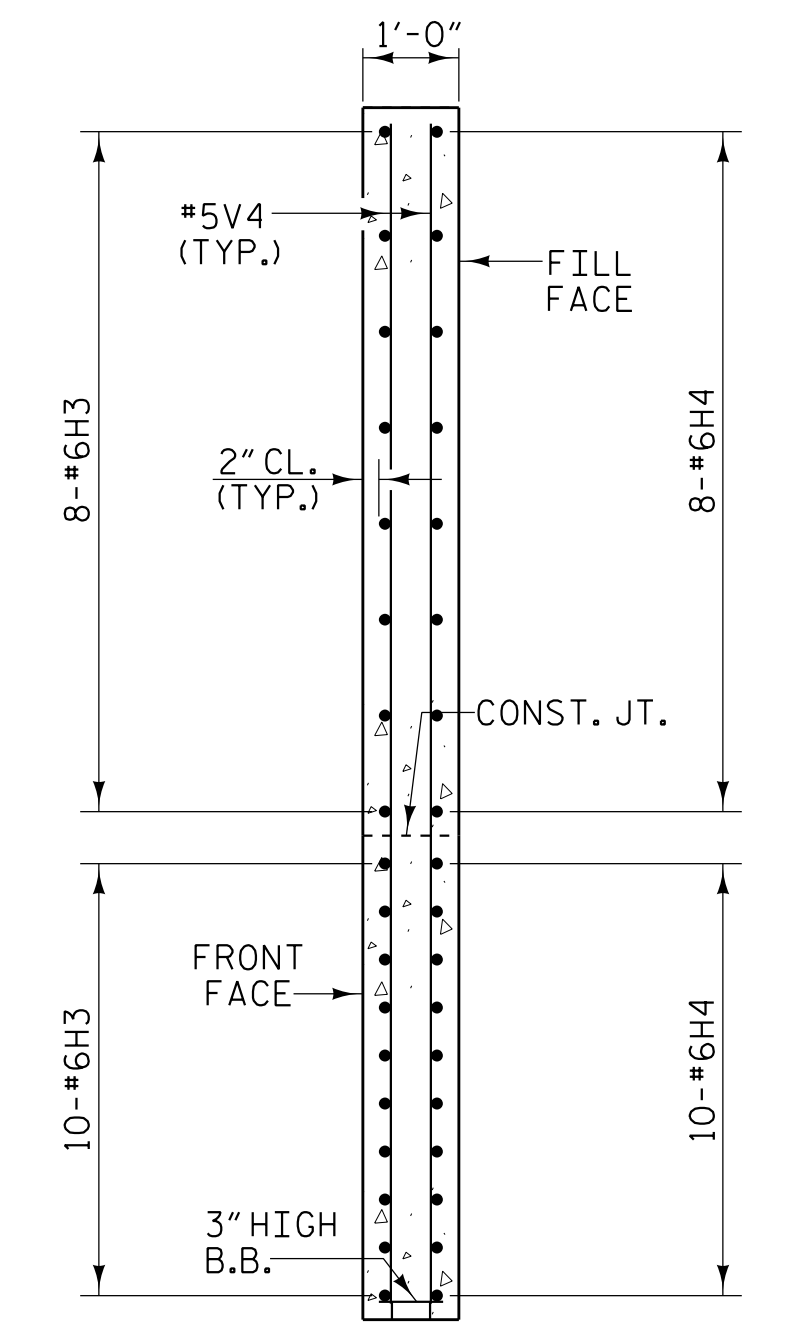
SECTION X-X



ELEVATION OF LEFT WING - W1



ELEVATION OF RIGHT WING - W2



SECTION Y-Y

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

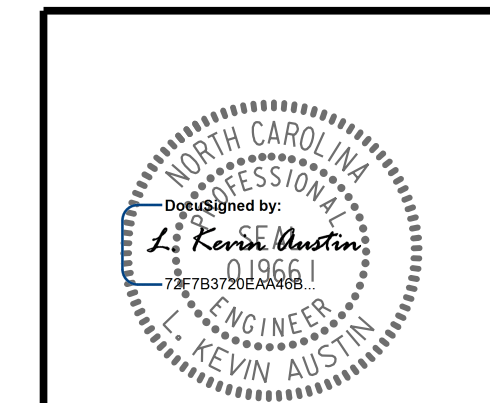
SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 INTEGRAL  
 END BENT 1  
 RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S8-18
1			3			TOTAL SHEETS
2			4			25

PLANS PREPARED BY:

6750 TRYON ROAD  
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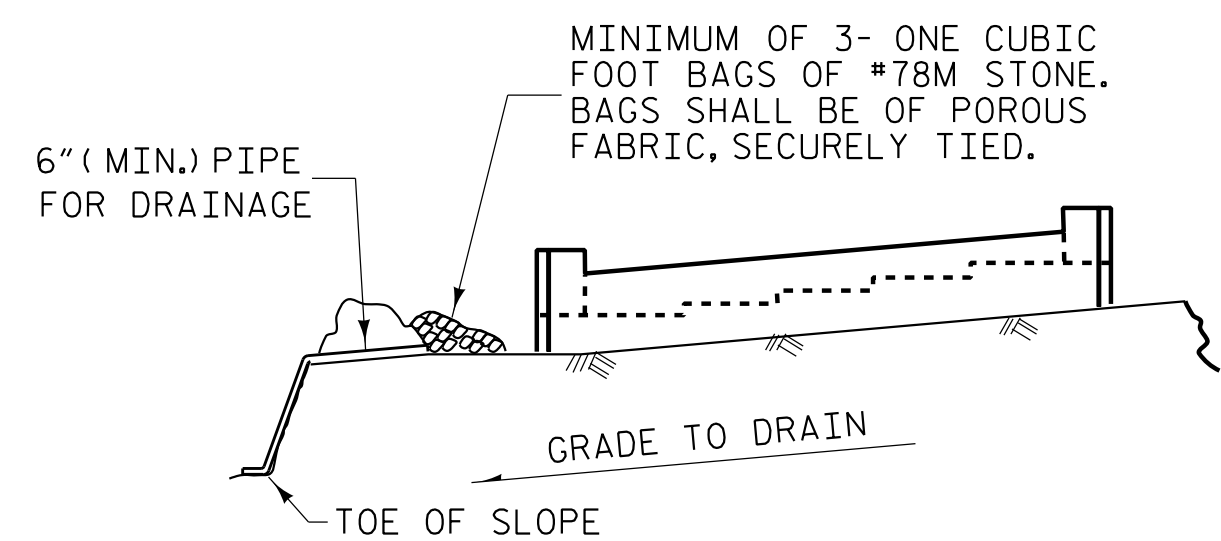
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DWG. NO. BR-18

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DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15



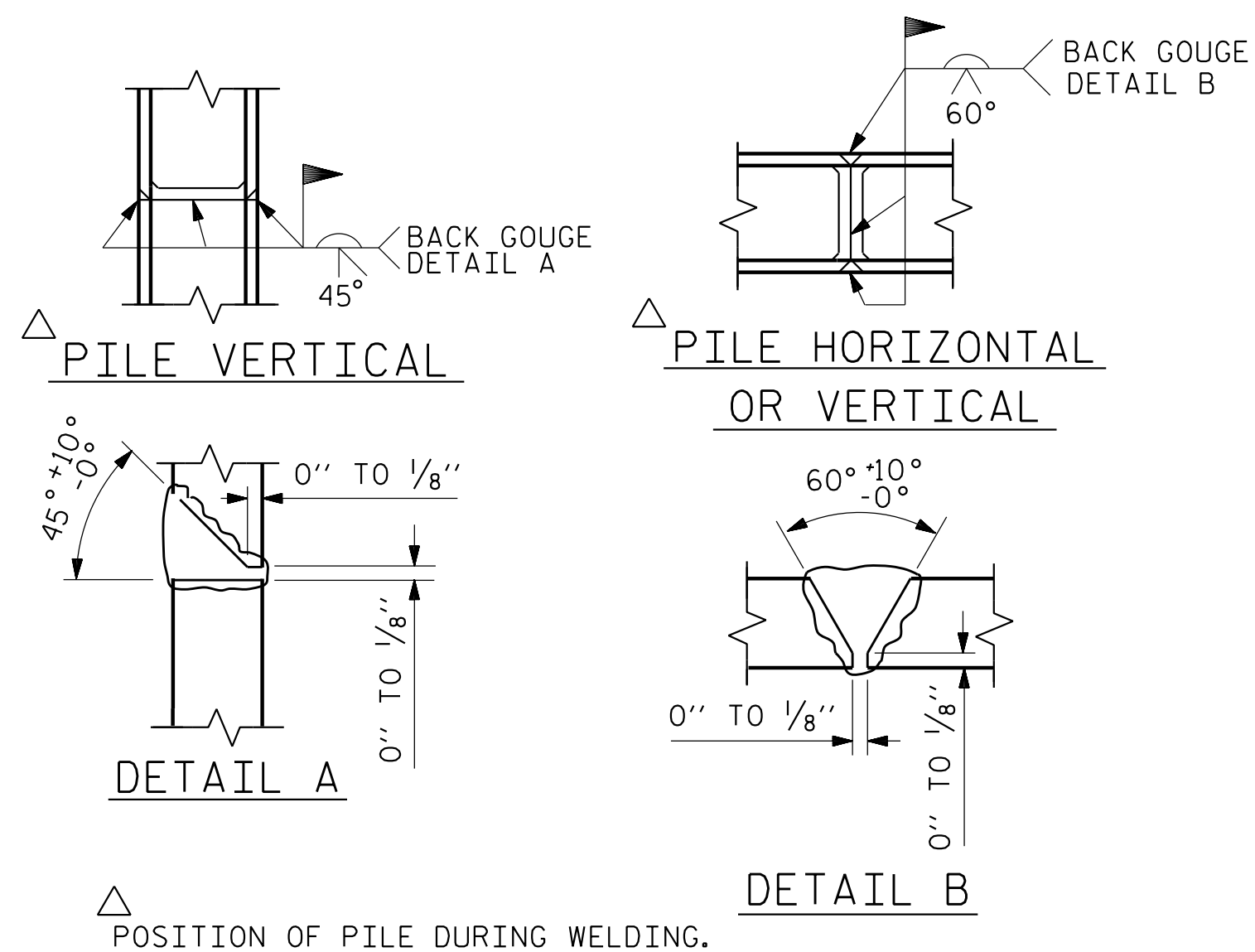


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

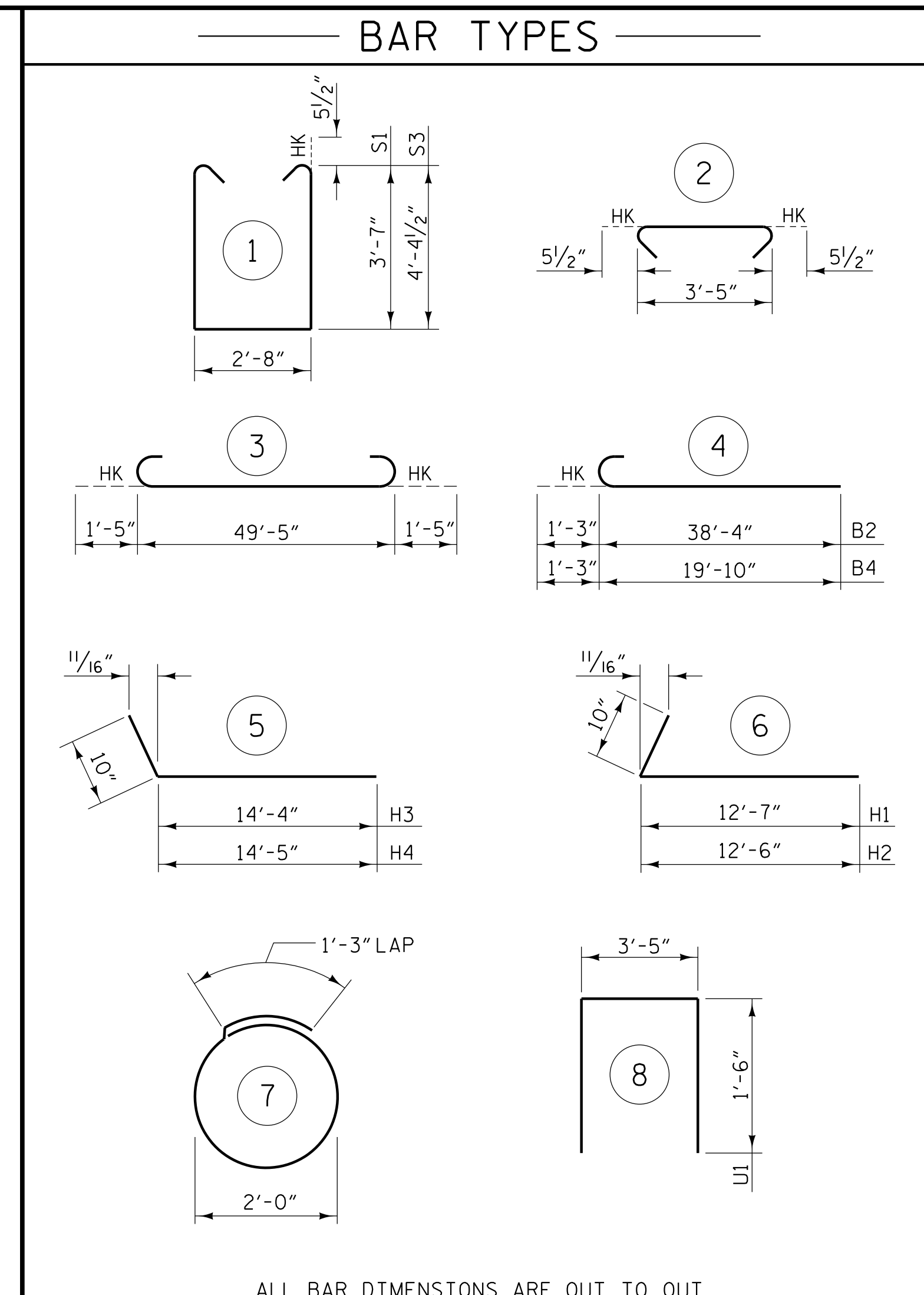
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

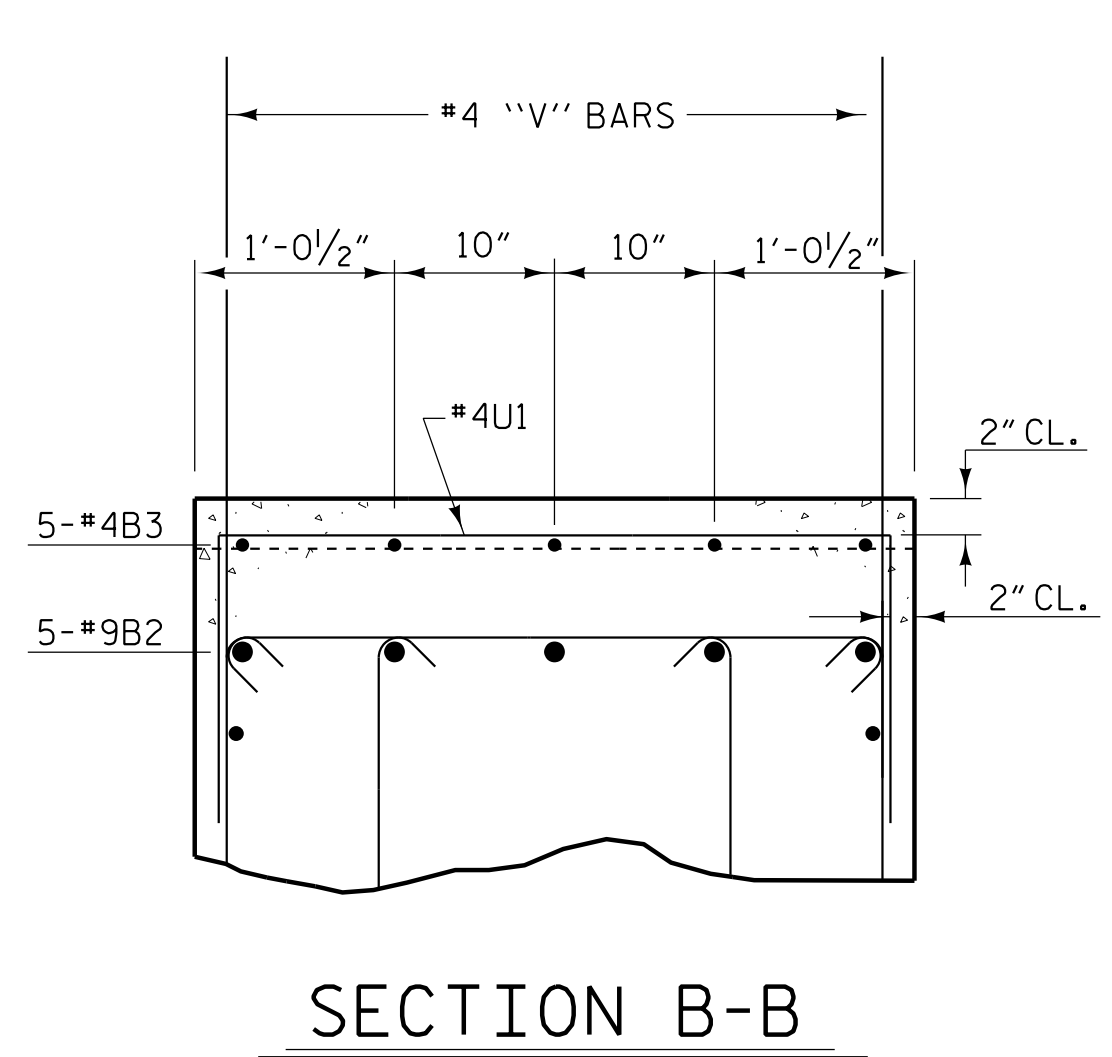
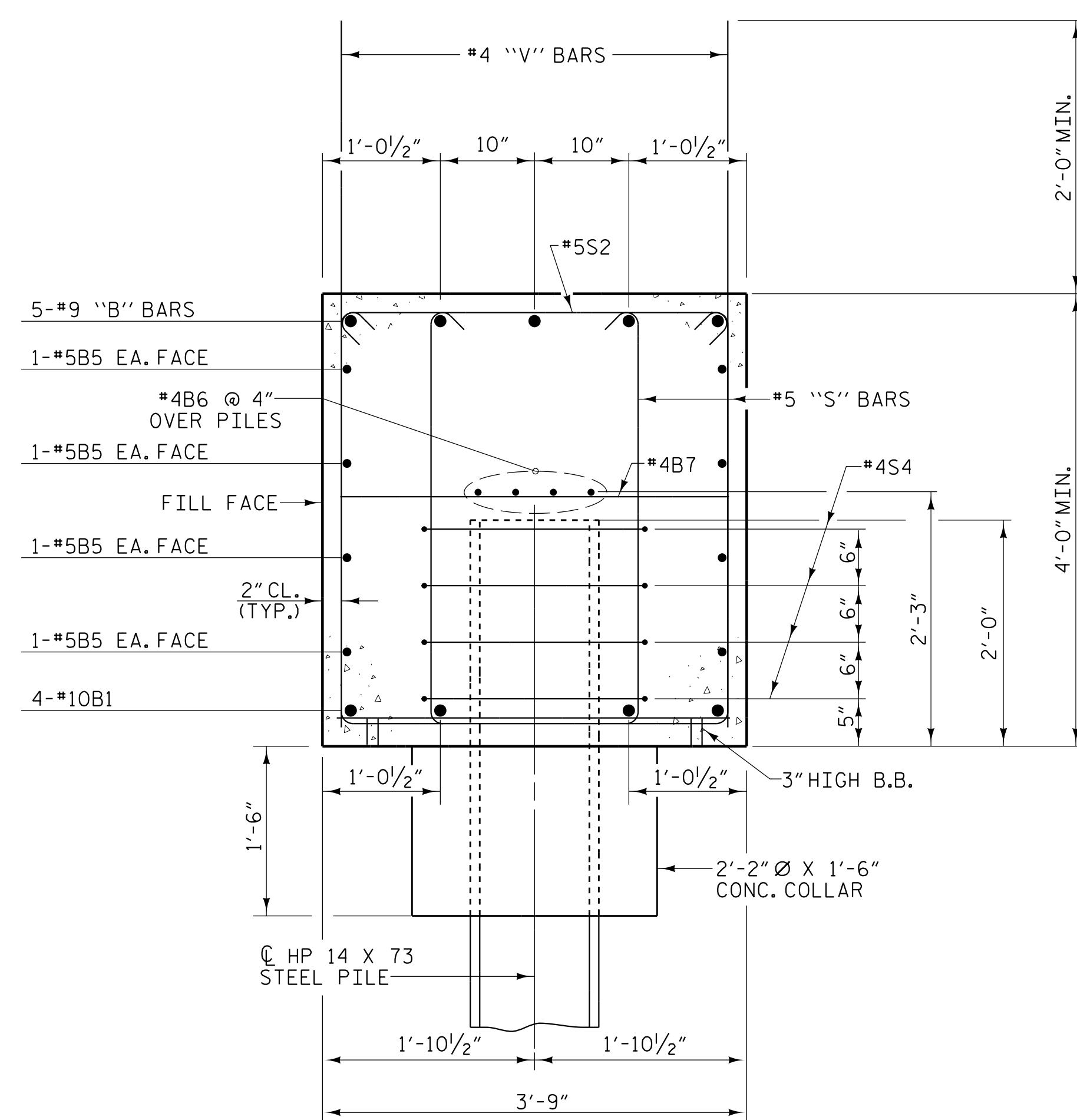
### TEMPORARY DRAINAGE AT END BENT



### PILE SPLICE DETAILS



BILL OF MATERIAL					
INTEGRAL END BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	52'-3"	899
B2	5	#9	4	39'-7"	673
B3	5	#4	STR	11'-5"	38
B4	5	#9	4	21'-1"	358
B5	8	#5	STR	49'-5"	412
B6	8	#4	STR	25'-11"	138
B7	15	#4	STR	3'-5"	34
H1	14	#6	6	13'-5"	282
H2	14	#6	6	13'-4"	280
H3	18	#6	5	15'-2"	410
H4	18	#6	5	15'-3"	412
H5	32	#4	STR	3'-8"	78
S1	62	#5	1	10'-9"	695
S2	53	#5	2	4'-4"	240
S3	44	#5	1	12'-4"	566
S4	32	#4	7	7'-7"	162
V1	30	#4	STR	6'-5"	129
V2	30	#4	STR	6'-11"	139
V3	34	#5	STR	11'-1"	393
V4	38	#5	STR	12'-3"	486
U1	6	#4	8	6'-5"	26
TOTAL REINFORCING STEEL					6850 lbs.
CLASS "A" CONCRETE - CU. YARDS					
POUR 1- CAP, COLLARS & LOWER WINGS				37.2 cu. yds.	
POUR 2- UPPER WINGS				9.4 cu. yds.	
TOTAL					46.6 cu. yds.
HP 14 X 73 STEEL PILES					
8 PILES REQUIRED - LIN. FEET				440	
PILE DRIVING EQUIPMENT					
SET UP FOR HP 14 X 73 STEEL PILES				8 EA.	



PLANS PREPARED BY:

**CALYX**  
ENGINEERS + CONSULTANTS

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NC License # F-1333

Professional Engineer Seal for Kevin Austin, License # 11951

6/11/2019

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
**INTEGRAL END BENT 1**  
 RIGHT LANE

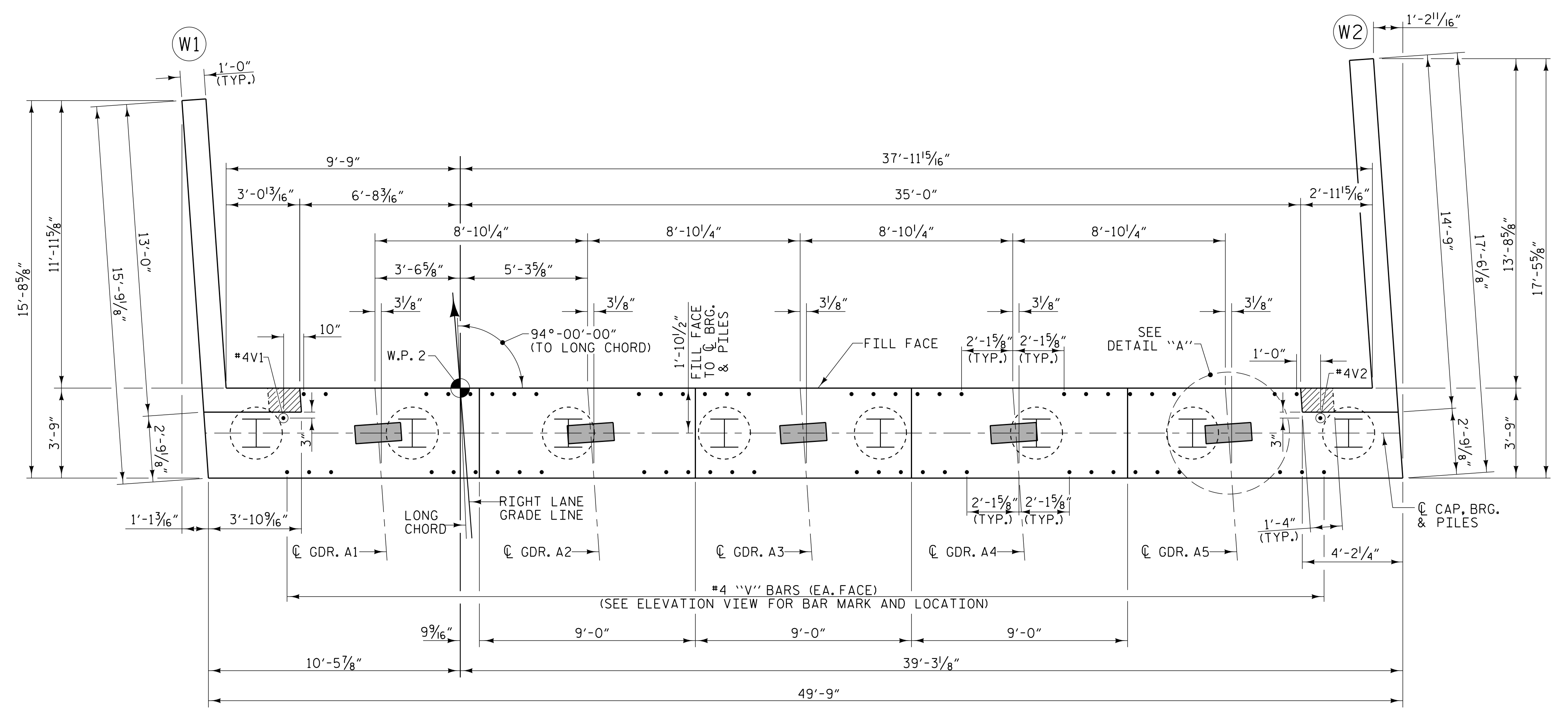
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S8-19
1			3			TOTAL SHEETS
2			4			25

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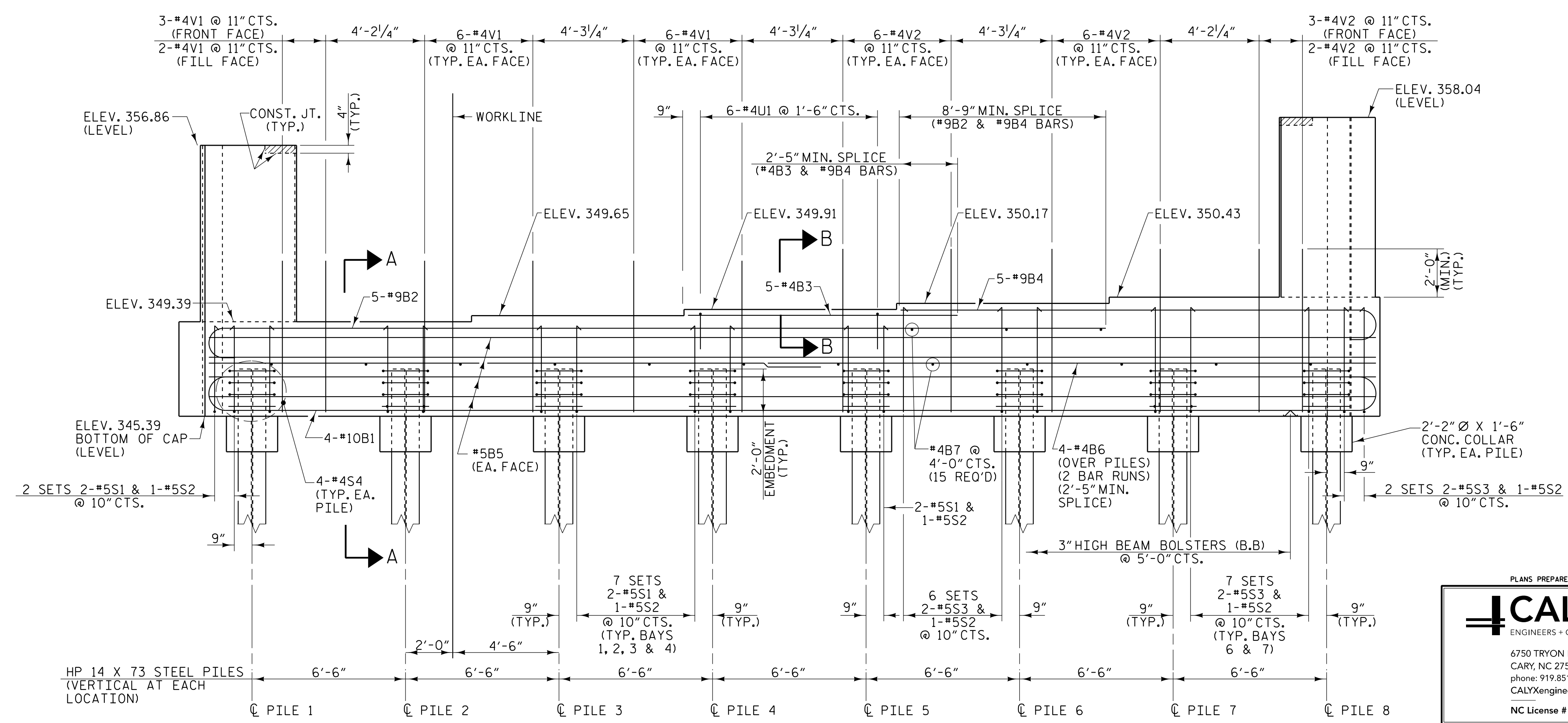
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DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15



PLAN

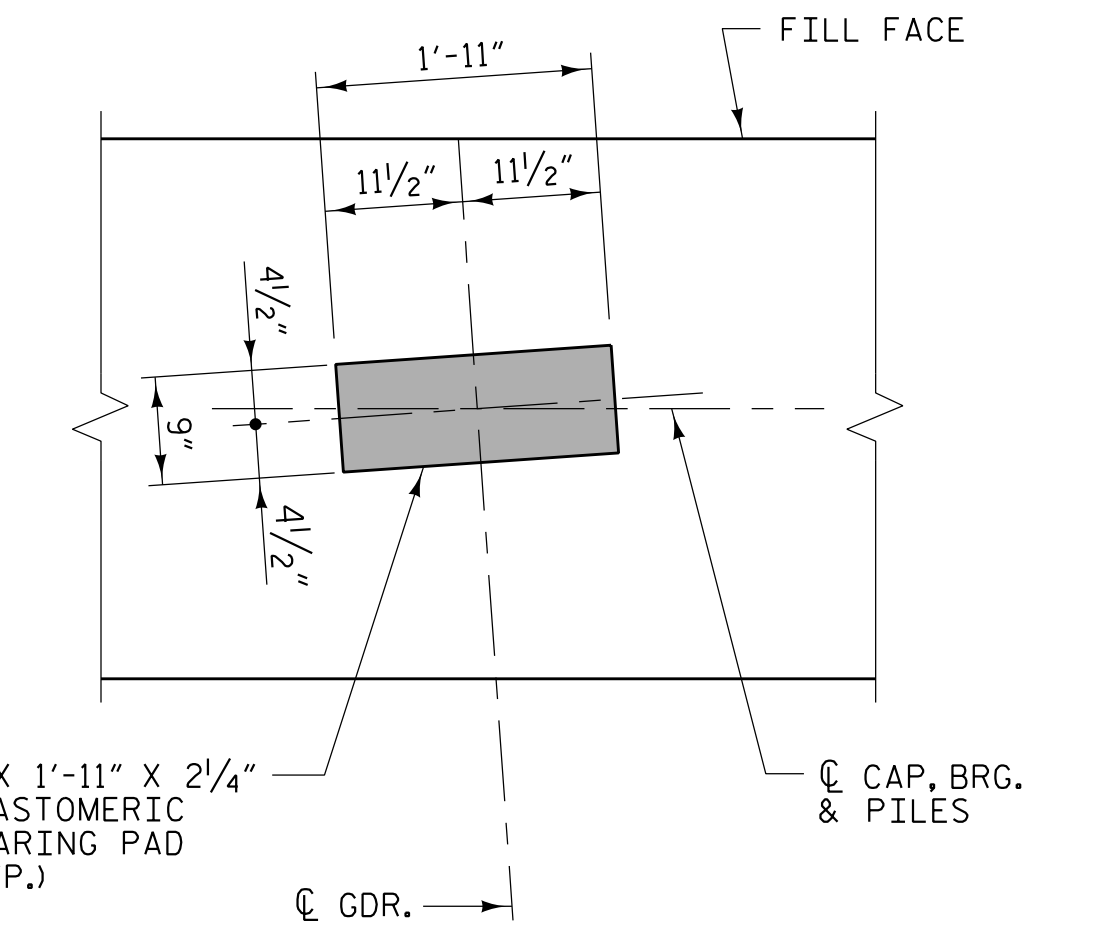


ELEVATION

**NOTES**

\*4U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR \*4V1 BARS.

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



DETAIL "A"  
(TYP. EACH GIRDER)

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 3

PLANS PREPARED BY:

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 CALYXengineers.com  
 NC License # F-1333



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
**INTEGRAL  
 END BENT 2**  
 RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S8-20
1			3			TOTAL SHEETS
2			4			25

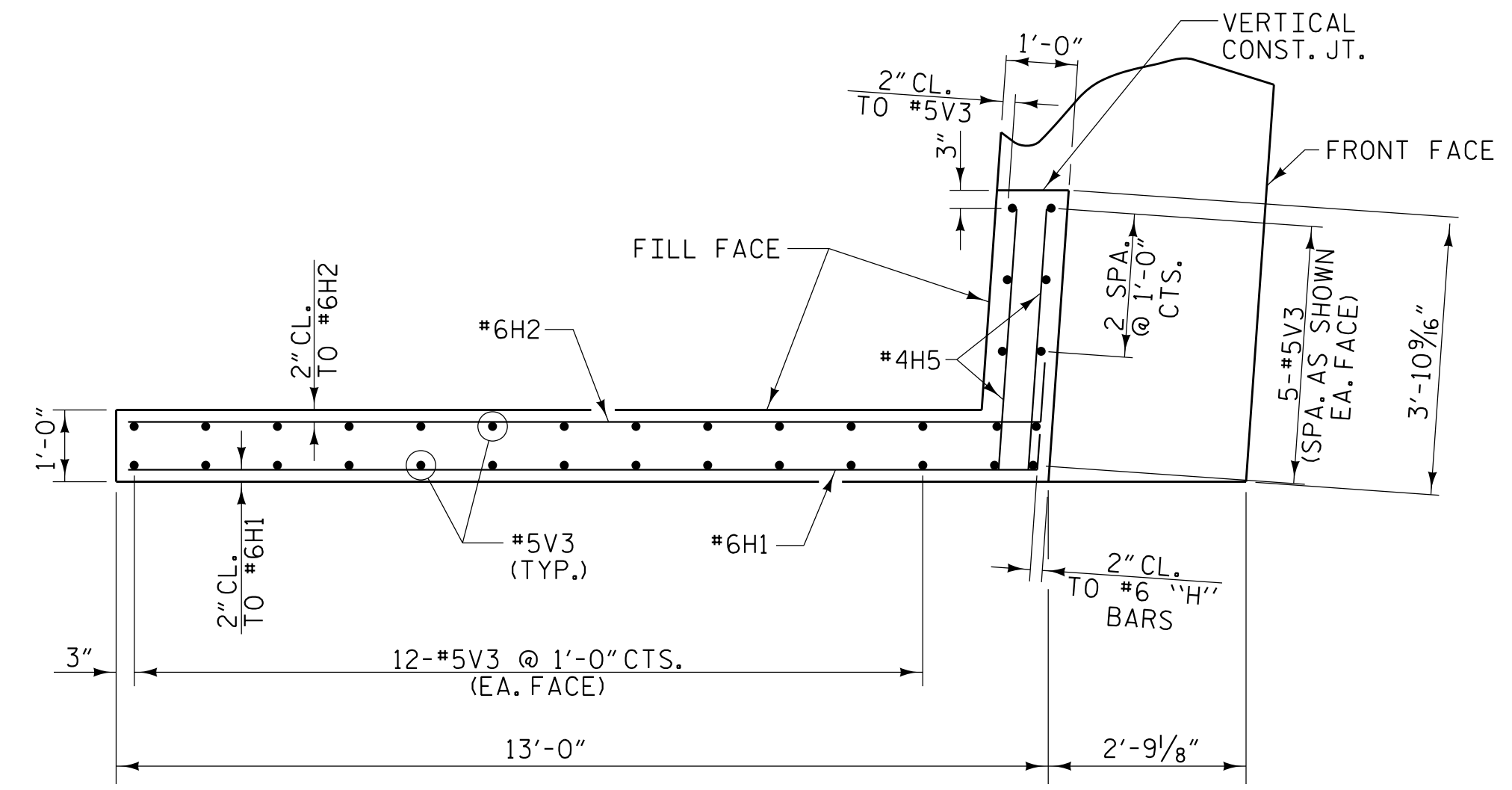
DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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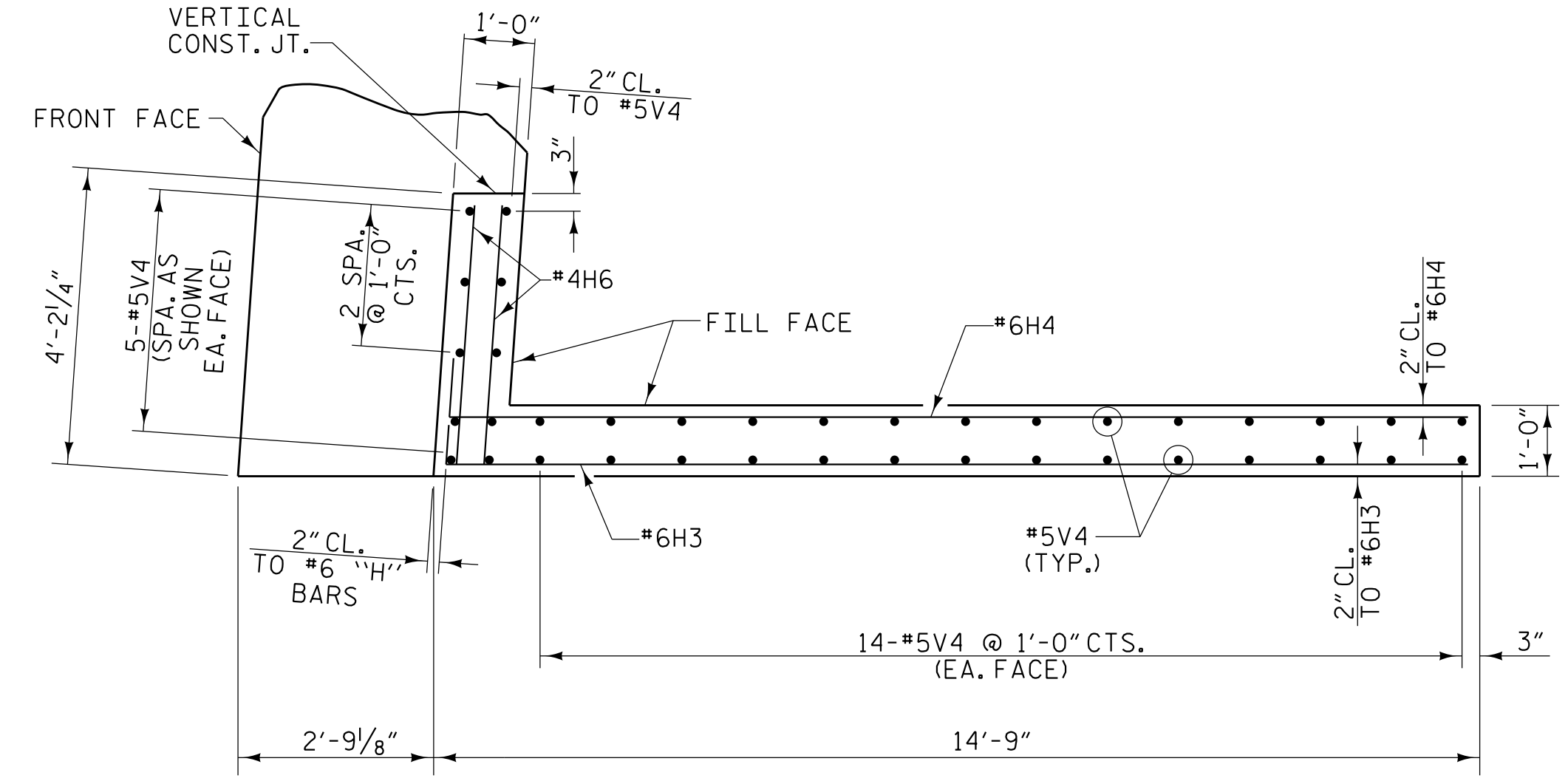
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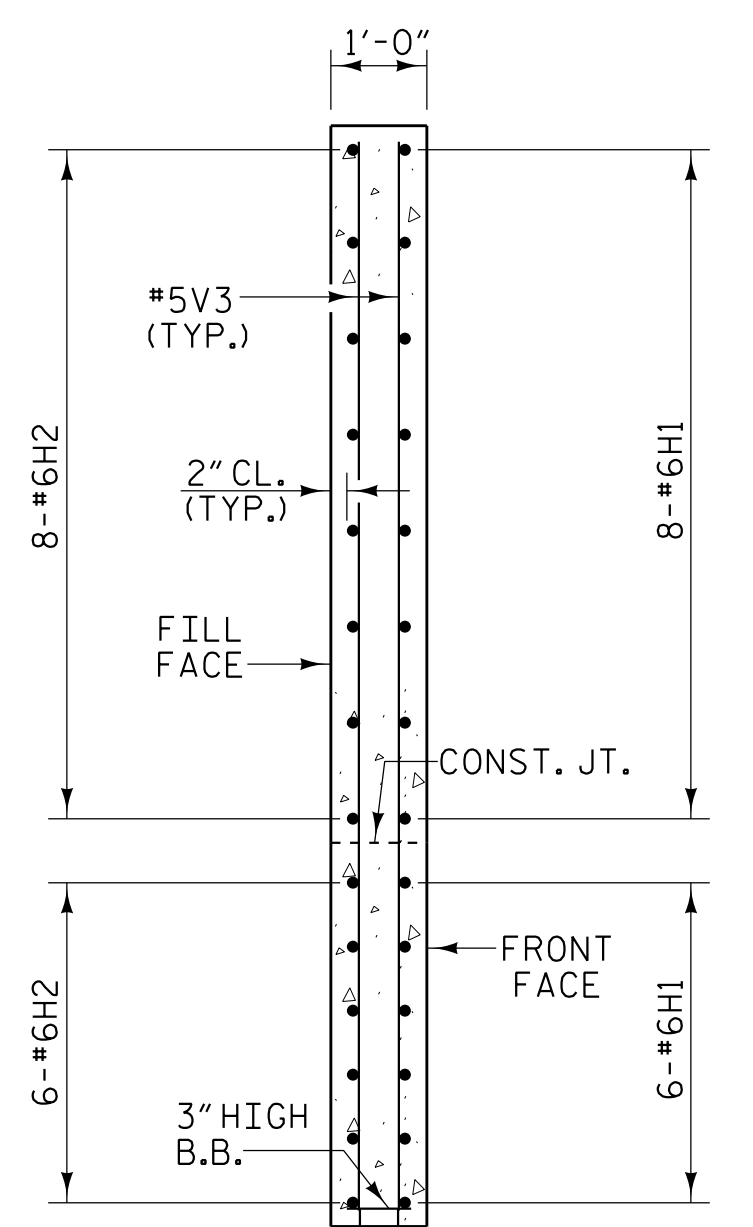




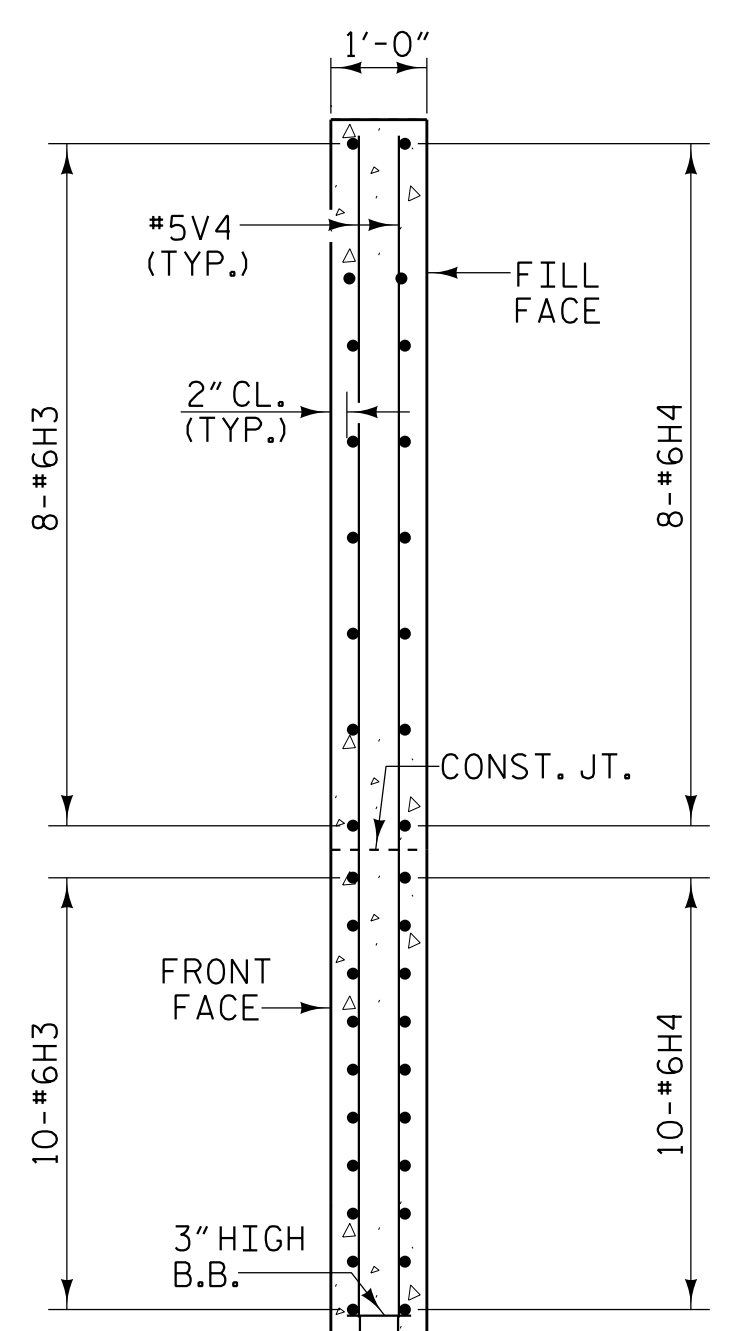
PLAN OF LEFT WING - W1



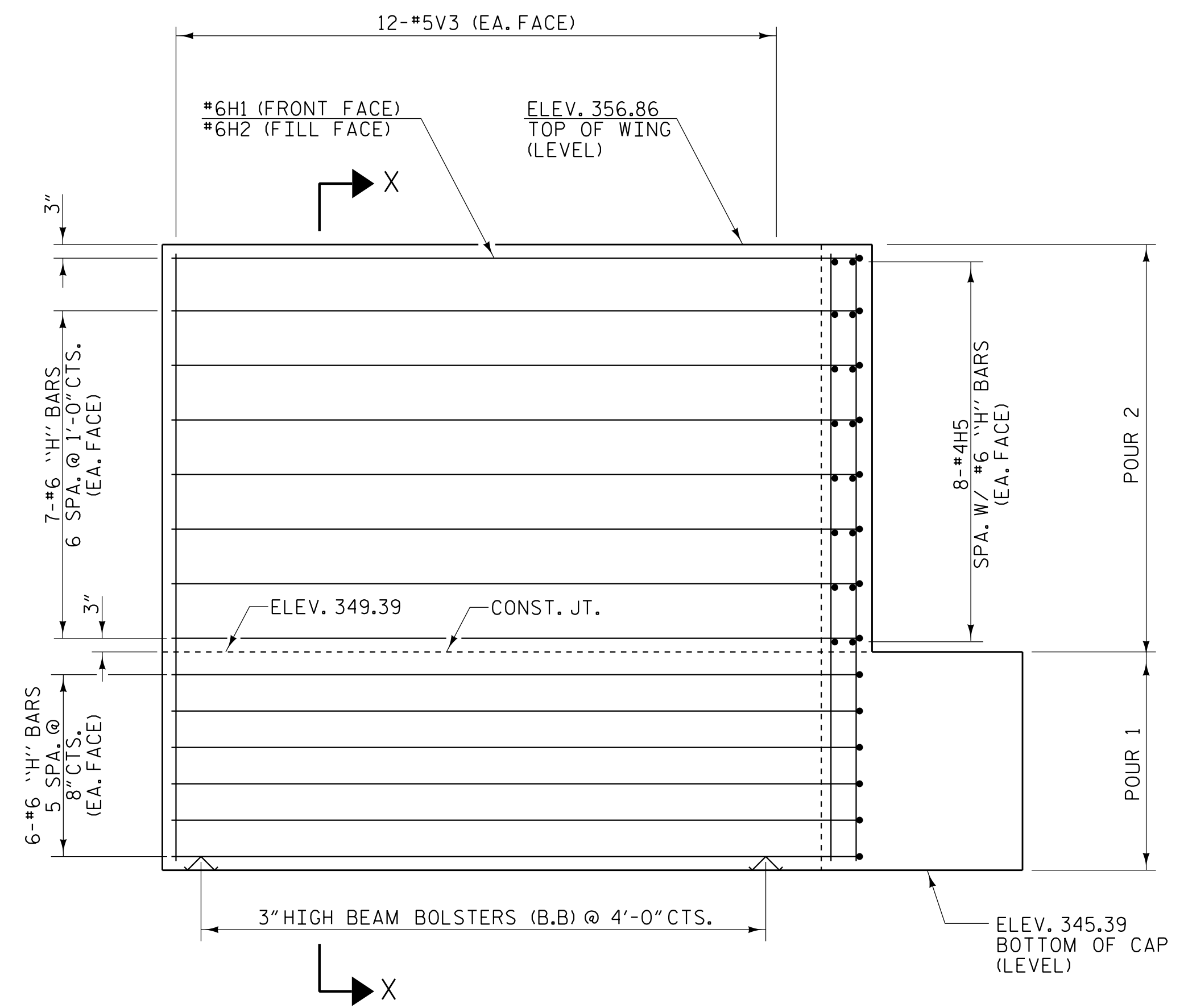
PLAN OF RIGHT WING - W2



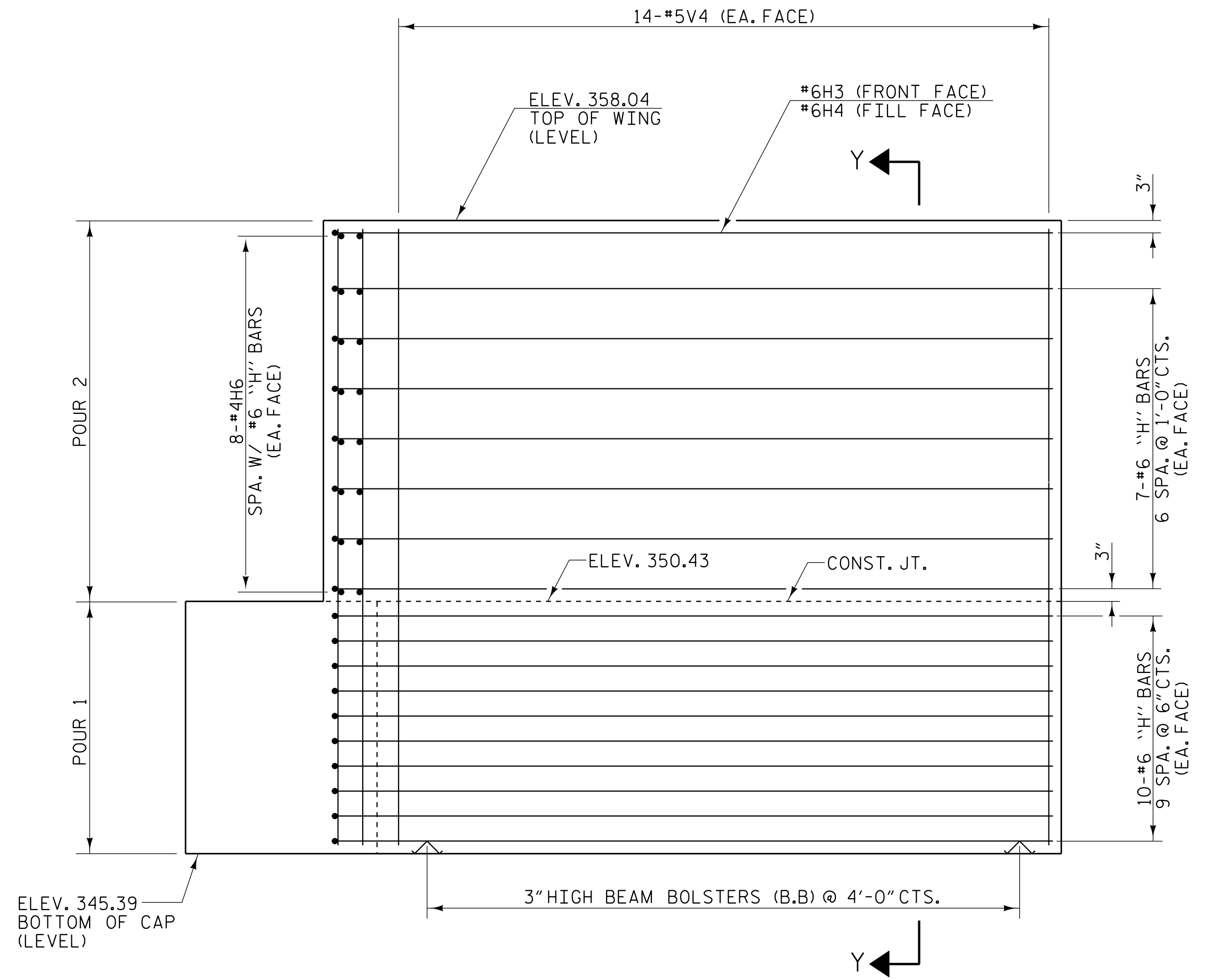
SECTION X-X



SECTION Y-Y



ELEVATION OF LEFT WING - W1



ELEVATION OF RIGHT WING - W2

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

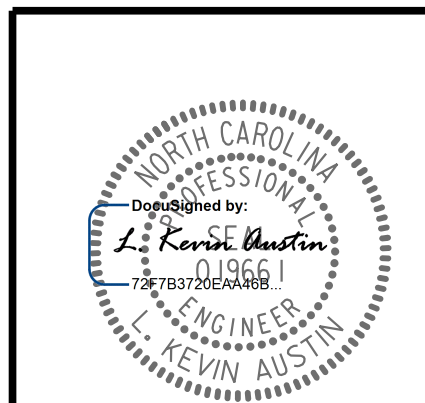
SUBSTRUCTURE  
 INTEGRAL  
 END BENT 2  
 RIGHT LANE

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S8-21
1			3			TOTAL SHEETS
2			4			25

PLANS PREPARED BY:

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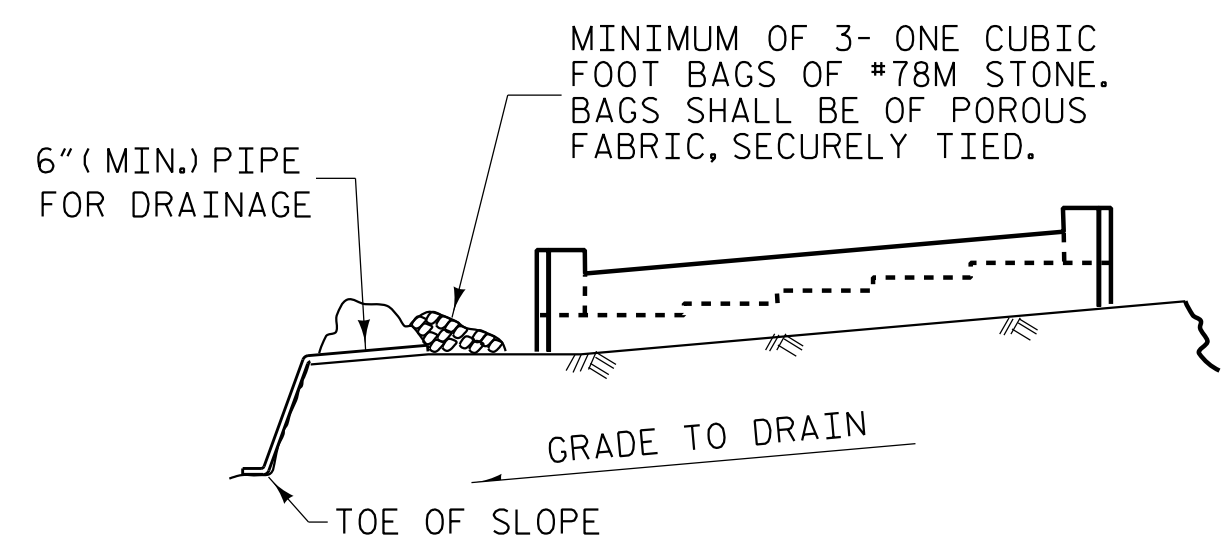


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DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

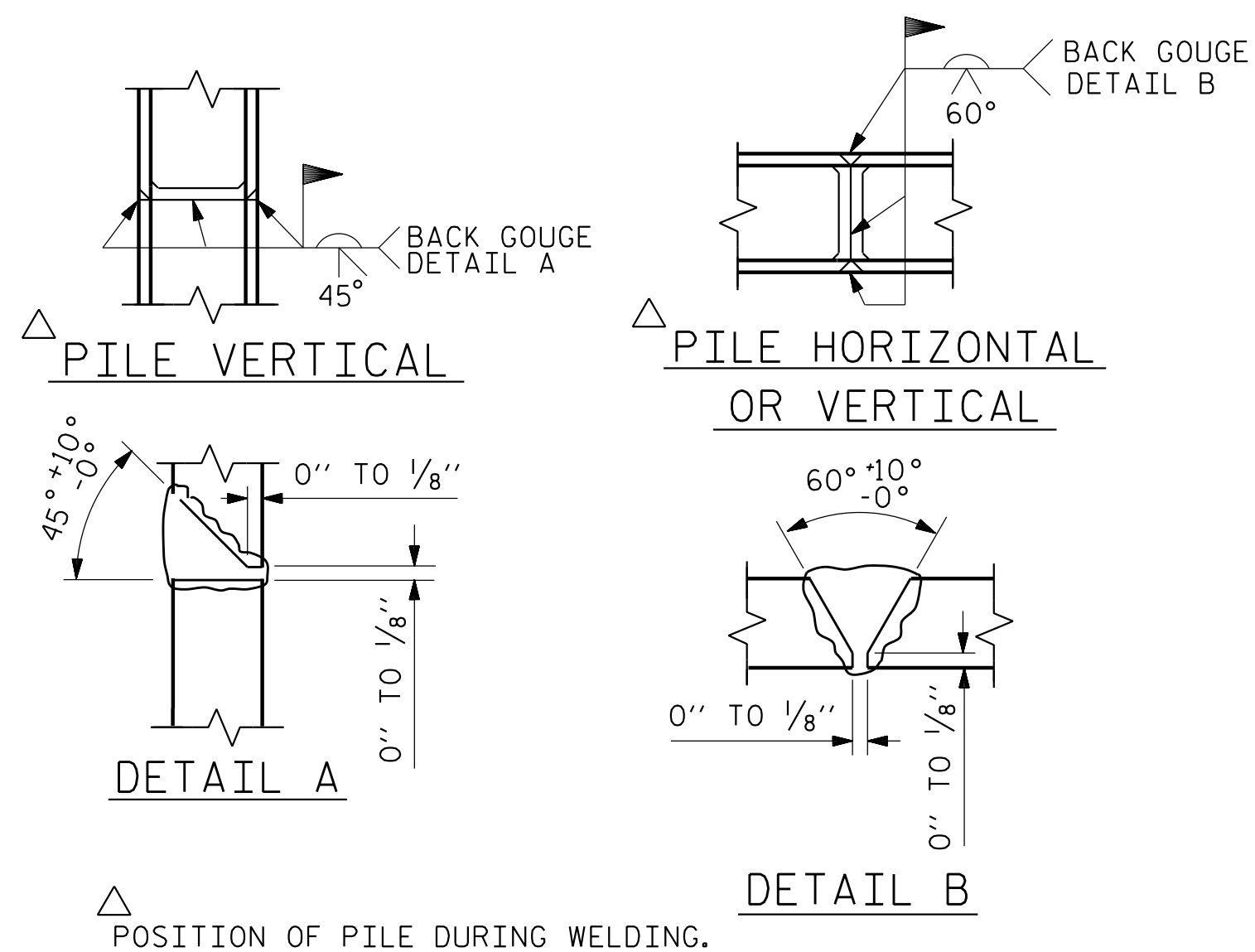


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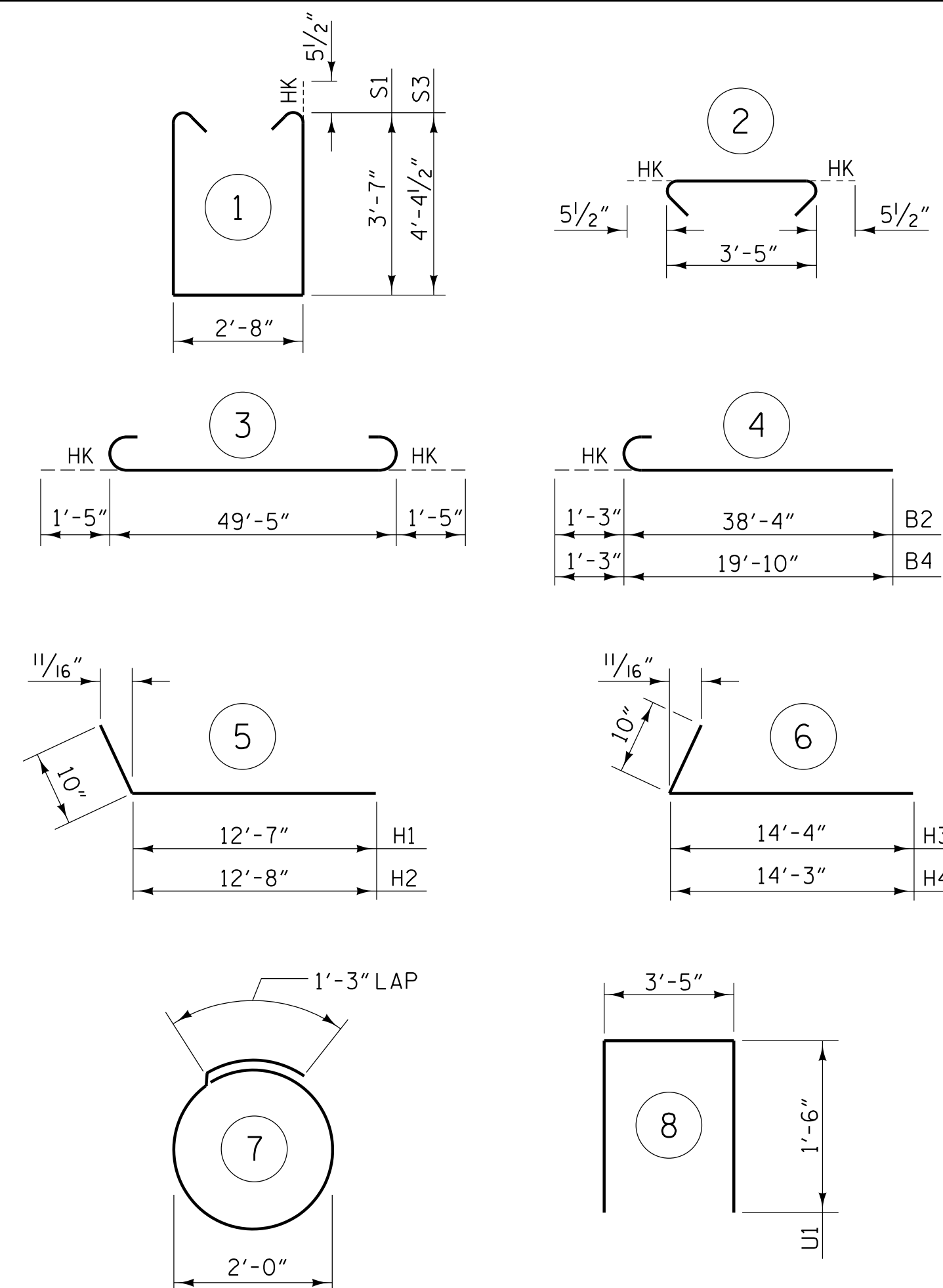
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR THE SEVERAL PAY ITEMS.

### TEMPORARY DRAINAGE AT END BENT



### PILE SPLICE DETAILS

### BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

### BILL OF MATERIAL

#### INTEGRAL END BENT 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#10	3	52'-3"	899
B2	5	#9	4	39'-7"	673
B3	5	#4	STR	11'-5"	38
B4	5	#9	4	21'-1"	358
B5	8	#5	STR	49'-5"	412
B6	8	#4	STR	25'-11"	138
B7	15	#4	STR	3'-5"	34

H1	14	#6	5	13'-5"	282
H2	14	#6	5	13'-6"	284
H3	18	#6	6	15'-2"	410
H4	18	#6	6	15'-1"	408
H5	16	#4	STR	3'-8"	39
H6	16	#4	STR	3'-7"	38

S1	62	#5	1	10'-9"	695
S2	53	#5	2	4'-4"	240
S3	44	#5	1	12'-4"	566
S4	32	#4	7	7'-7"	162

V1	30	#4	STR	6'-5"	129
V2	30	#4	STR	6'-11"	139
V3	34	#5	STR	11'-1"	393
V4	38	#5	STR	12'-3"	486

U1	6	#4	8	6'-5"	26
----	---	----	---	-------	----

TOTAL REINFORCING STEEL 6849 lbs.

CLASS "A" CONCRETE - CU. YARDS

POUR 1- CAP, COLLARS & LOWER WINGS 37.2 cu. yds.

POUR 2- UPPER WINGS 9.4 cu. yds.

TOTAL 46.6 cu. yds.

HP 14 X 73 STEEL PILES 8 PILES REQUIRED - LIN. FEET 440

PILE DRIVING EQUIPMENT SETUP FOR HP 14 X 73 STEEL PILES 8 EA.

PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 INTEGRAL END BENT 2  
 RIGHT LANE

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

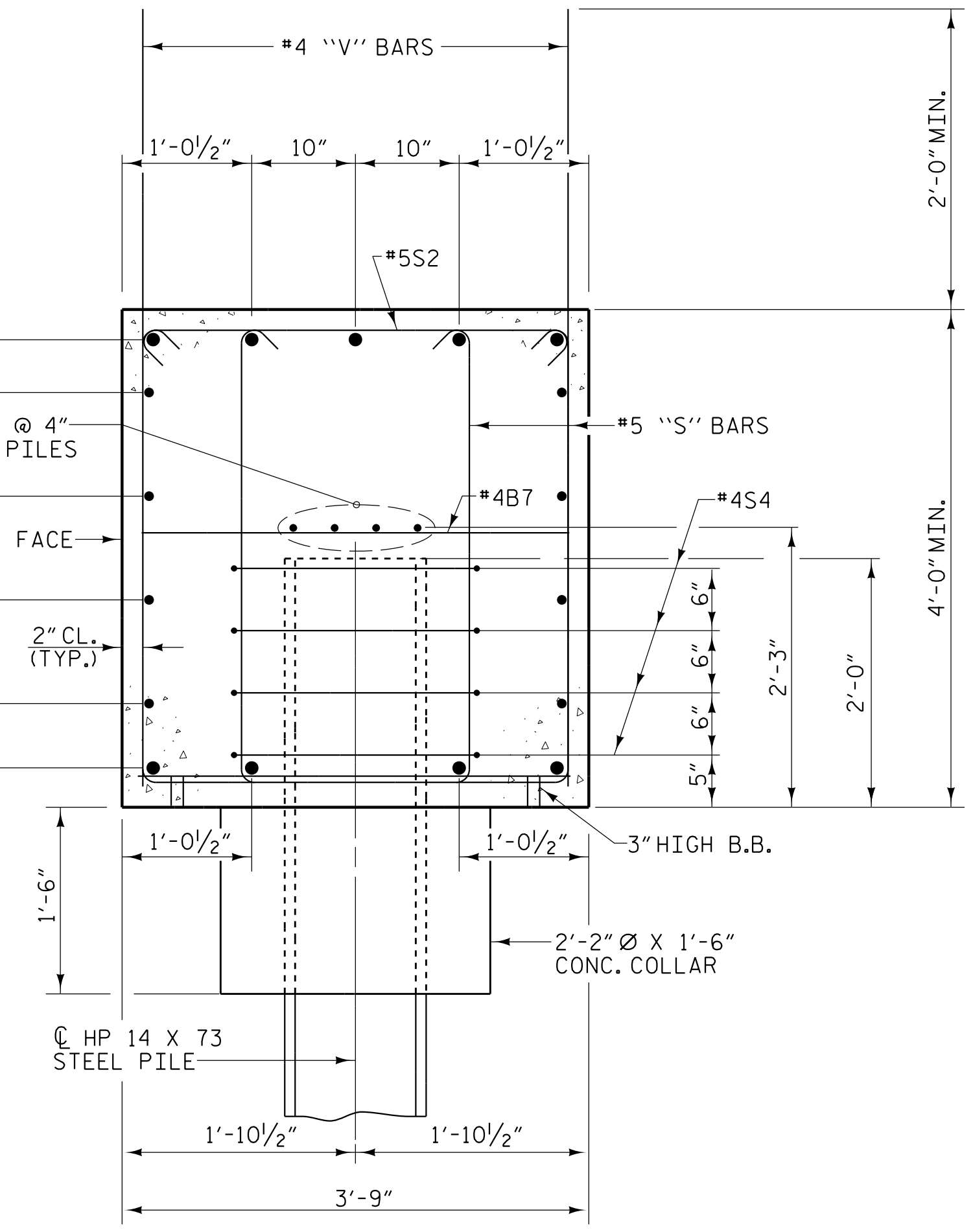
DWG. NO. BR-22

PLANS PREPARED BY:

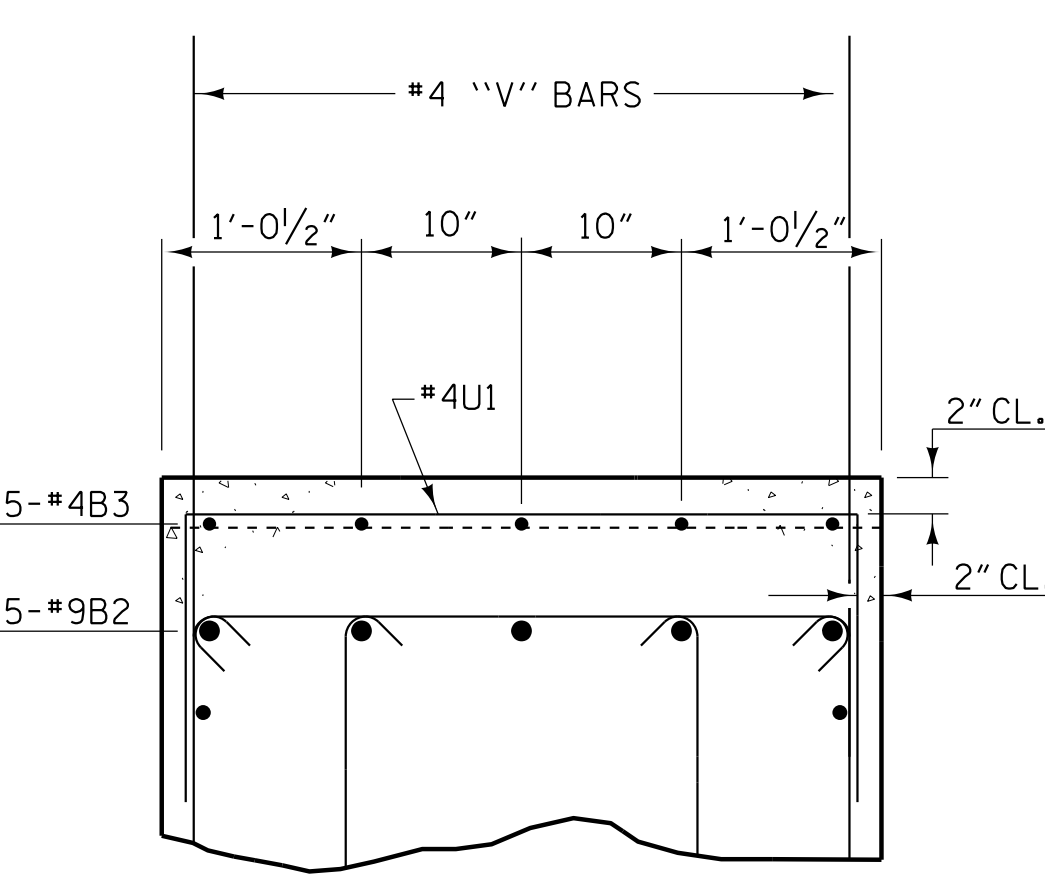
**CALYX**  
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 CALYXengineers.com  
 NC License # F-1333

Professional Engineer Seal for Kevin Austin, License # 019951, State of North Carolina.



### SECTION A-A



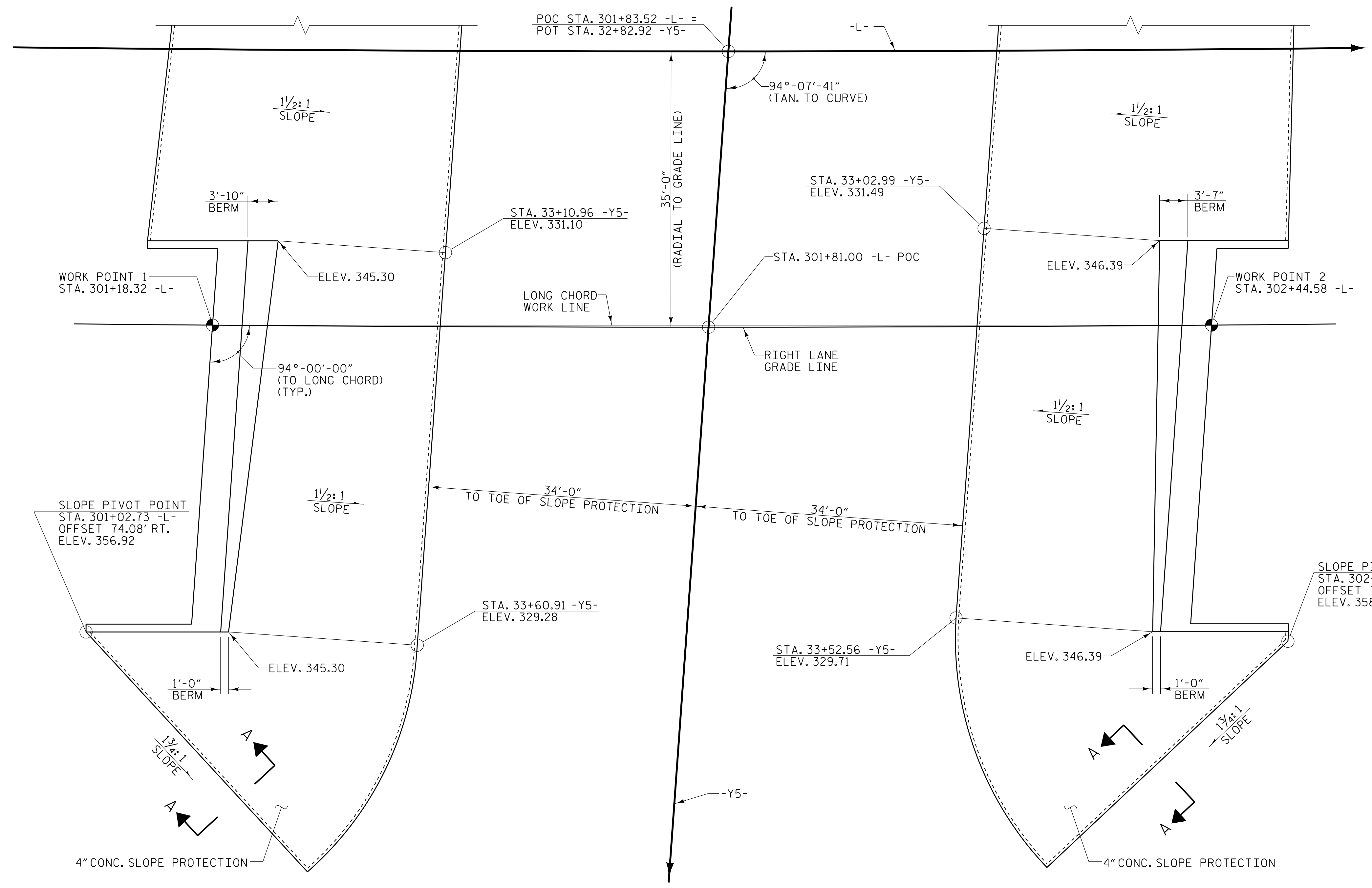
### SECTION B-B

DRAWN BY : W. B. ALLEN DATE : 7/15  
 CHECKED BY : Z. H. BROWN DATE : 7/15  
 DESIGN ENGINEER OF RECORD: L. K. AUSTIN DATE : 9/15

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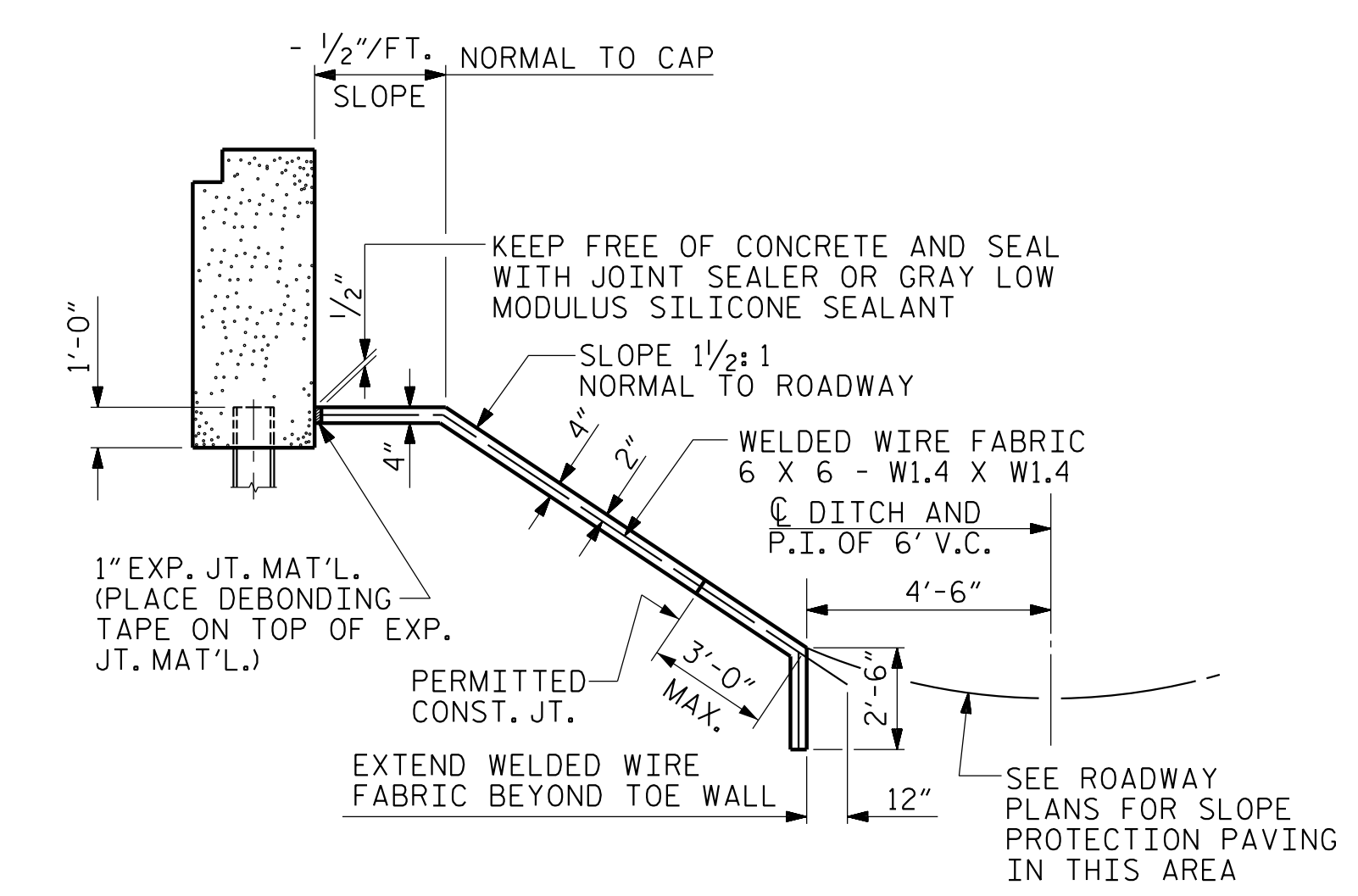


**GENERAL NOTES**

STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING. SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 301+83.52 -L-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	378	760
END BENT 2	386	775

\* QUANTITY SHOWN IS BASED ON 5' POURS.

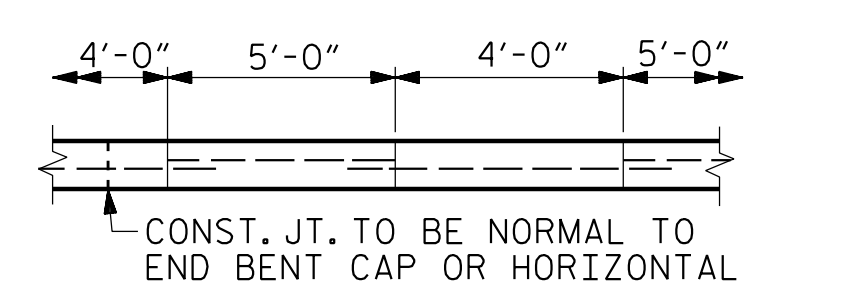


SECTION ALONG C ROADWAY

END BENT 1

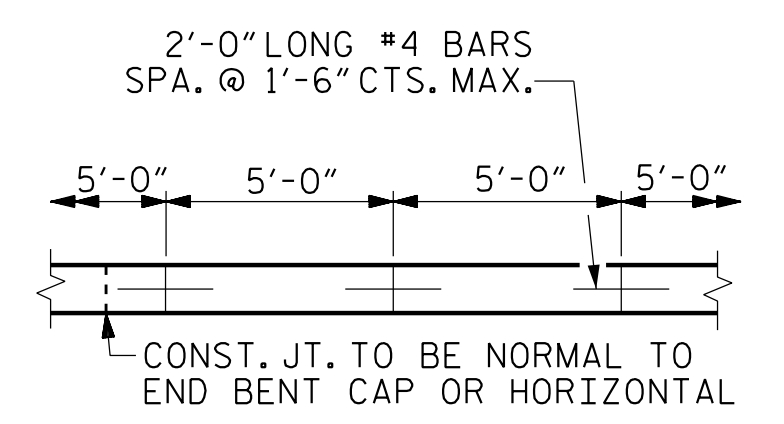
END BENT 2

**PLAN**



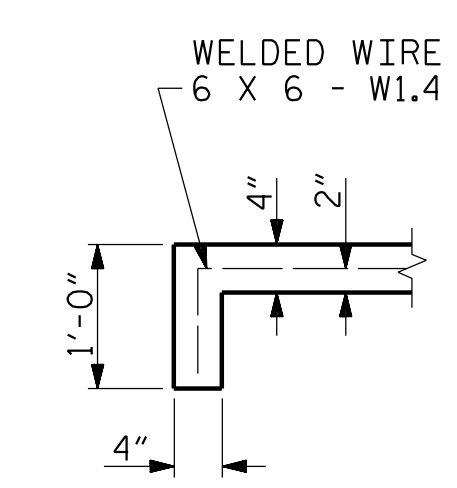
POUR A 4'-0" STRIP FIRST. STRIP WIDTHS MAY VARY IN CURVED PORTION.

OPTIONAL POURING DETAIL



STRIP WIDTHS MAY VARY IN CURVED PORTION.

POURING DETAIL



SECTION A-A

PLANS PREPARED BY:

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ENGINEERS + CONSULTANTS

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PHONE: 919.851.1912  
CALYXEngineers.com  
NC License # F-1333

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

6/11/2019

DWG. NO. BR-23

PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

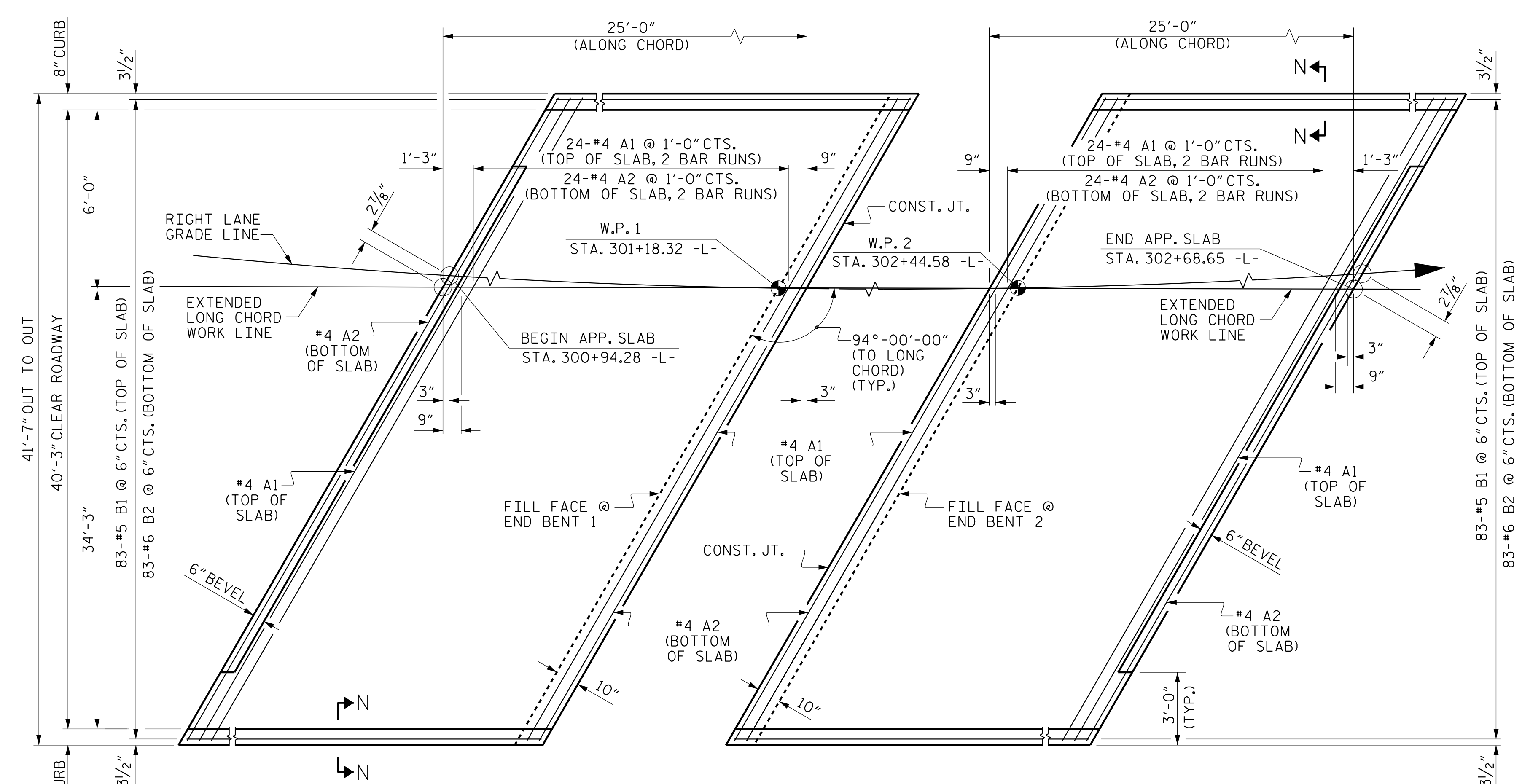
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
**SLOPE PROTECTION  
 DETAILS**  
 RIGHT LANE

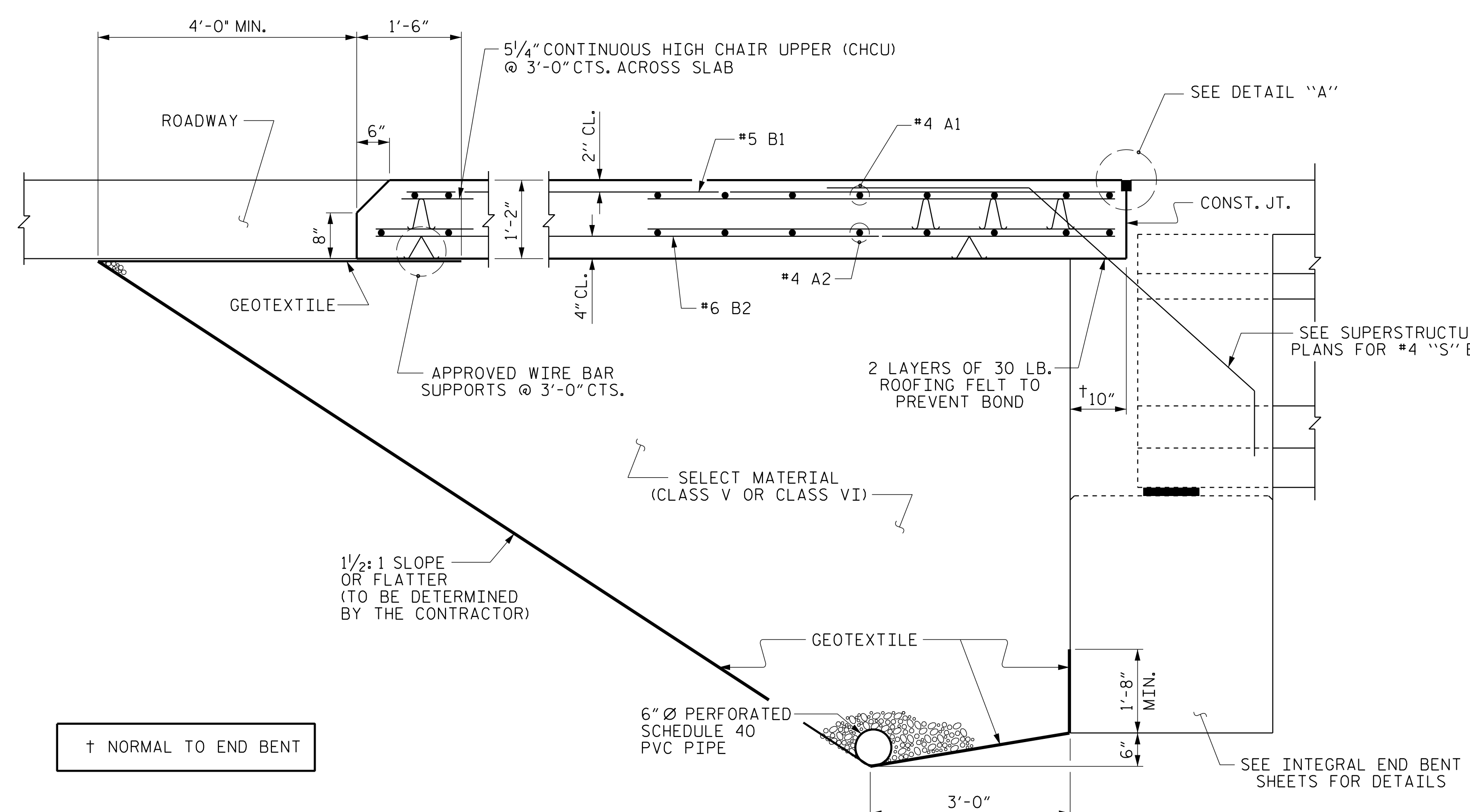
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			25
2			4			

ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : ELR 5/92	REV. 12/21/11 MAA/GM
CHECKED BY : GRP 6/92	REV. 1/16 MAA/TMG
	REV. 12/17 MAA/THC

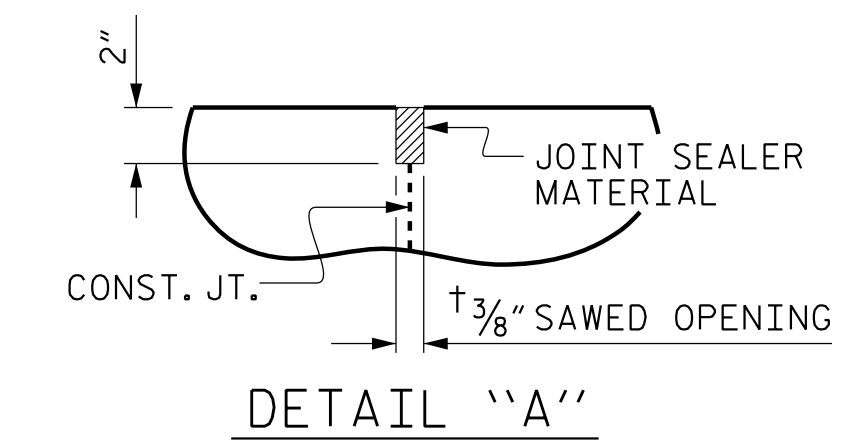
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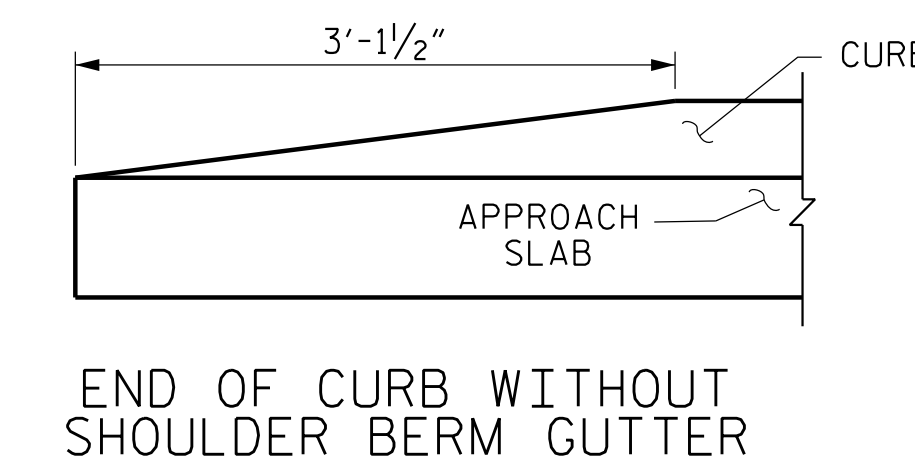
PLAN @ END BENT 1  
 PLAN @ END BENT 2  
 DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS



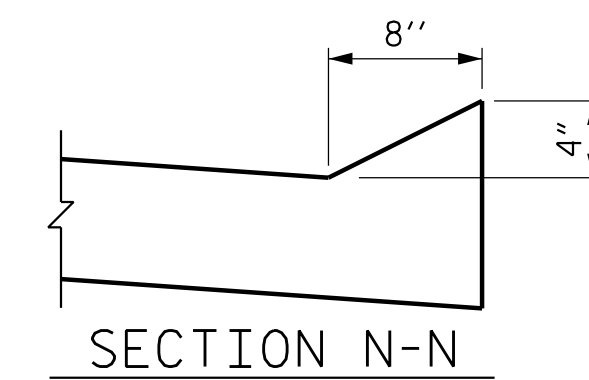
SECTION THRU SLAB  
 (TYPE I - STANDARD APPROACH FILL)



DETAIL "A"



END OF CURB WITHOUT SHOULDER BERM GUTTER



SECTION N-N

NOTES

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

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE SHALL BE TYPE 1 IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.

AT THE CONTRACTORS OPTION, "TYPE A - ALTERNATE APPROACH FILL" IN LIEU OF "TYPE I - STANDARD APPROACH FILL" MAY BE CONSTRUCTED AT NO ADDITIONAL COST TO THE DEPARTMENT. SEE SHEET 2 OF 2 FOR DETAILS AND NOTES.

BILL OF MATERIAL  
 FOR ONE APPROACH SLAB  
 (2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	21'-9"	756
A2	52	#4	STR	21'-7"	750
* B1	83	#5	STR	24'-1"	2085
B2	83	#6	STR	24'-8"	3075
REINFORCING STEEL				LBS.	3825
* EPOXY COATED REINFORCING STEEL				LBS.	2841
CLASS AA CONCRETE				C. Y.	45.0

SPLICE LENGTHS

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

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
CHECKED BY : Z. H. BROWN	DATE : 4/19
DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
CHECKED BY : GM 5/06	REV. 6/13 MAA/GM
	REV. 12/17 MAA/THC

PLANS PREPARED BY:

**CALYX**  
 ENGINEERS + CONSULTANTS

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 CARY, NC 27518  
 phone: 919.851.1912  
 CALYXEngineers.com  
 NC License # F-1333

THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:

*Kevin Austin*  
 L. ENGINEER  
 6/11/2019

DWG. NO. BL-24

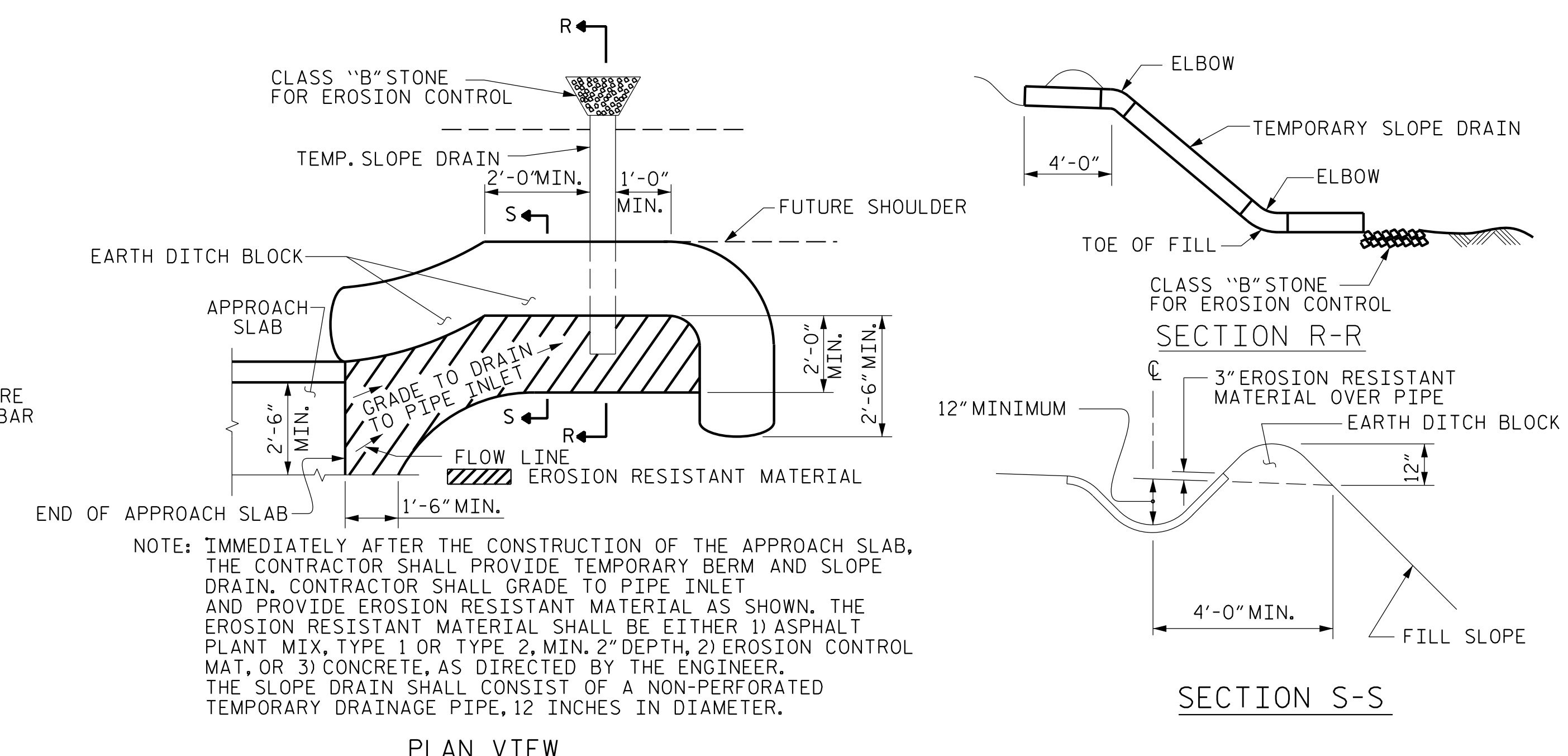
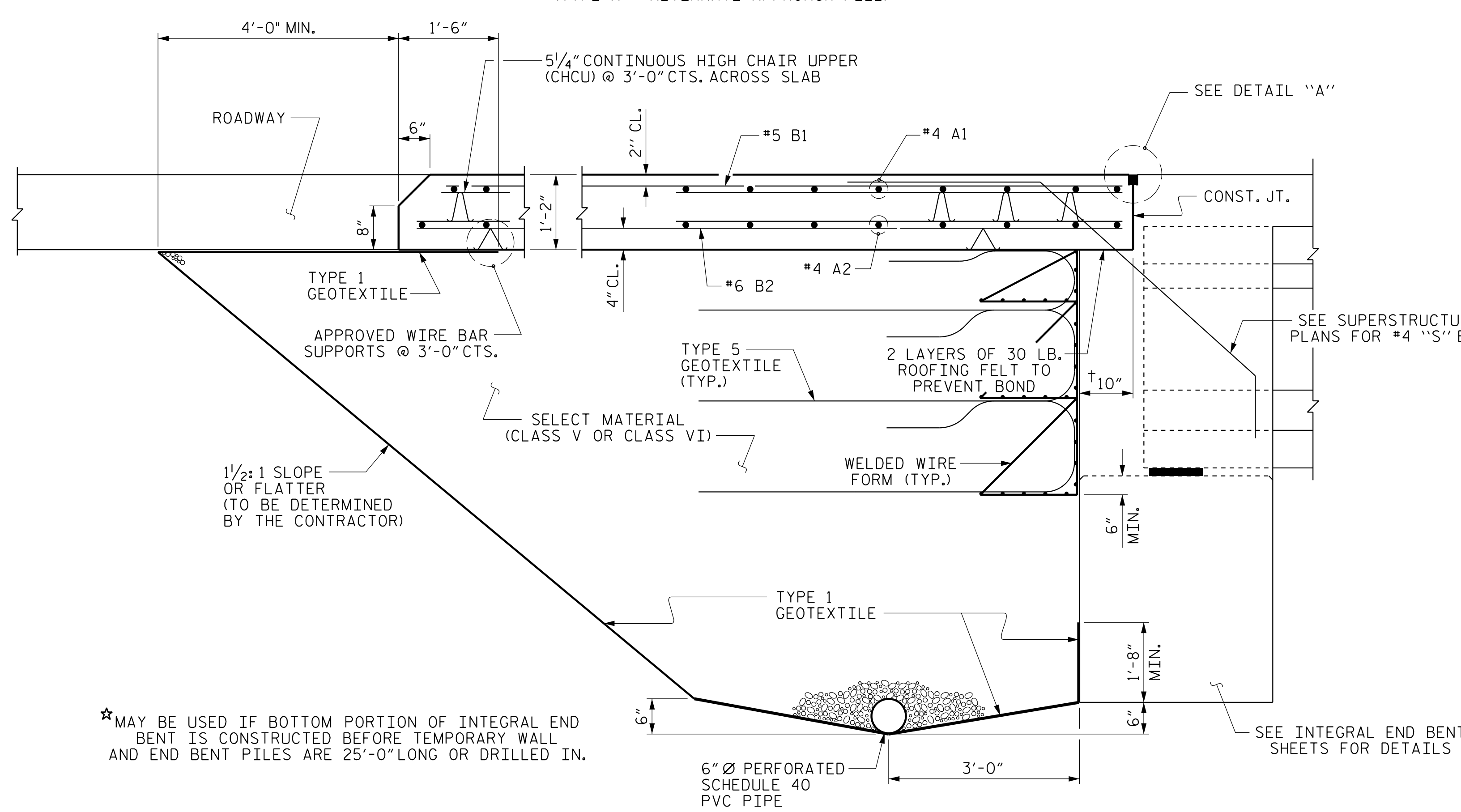
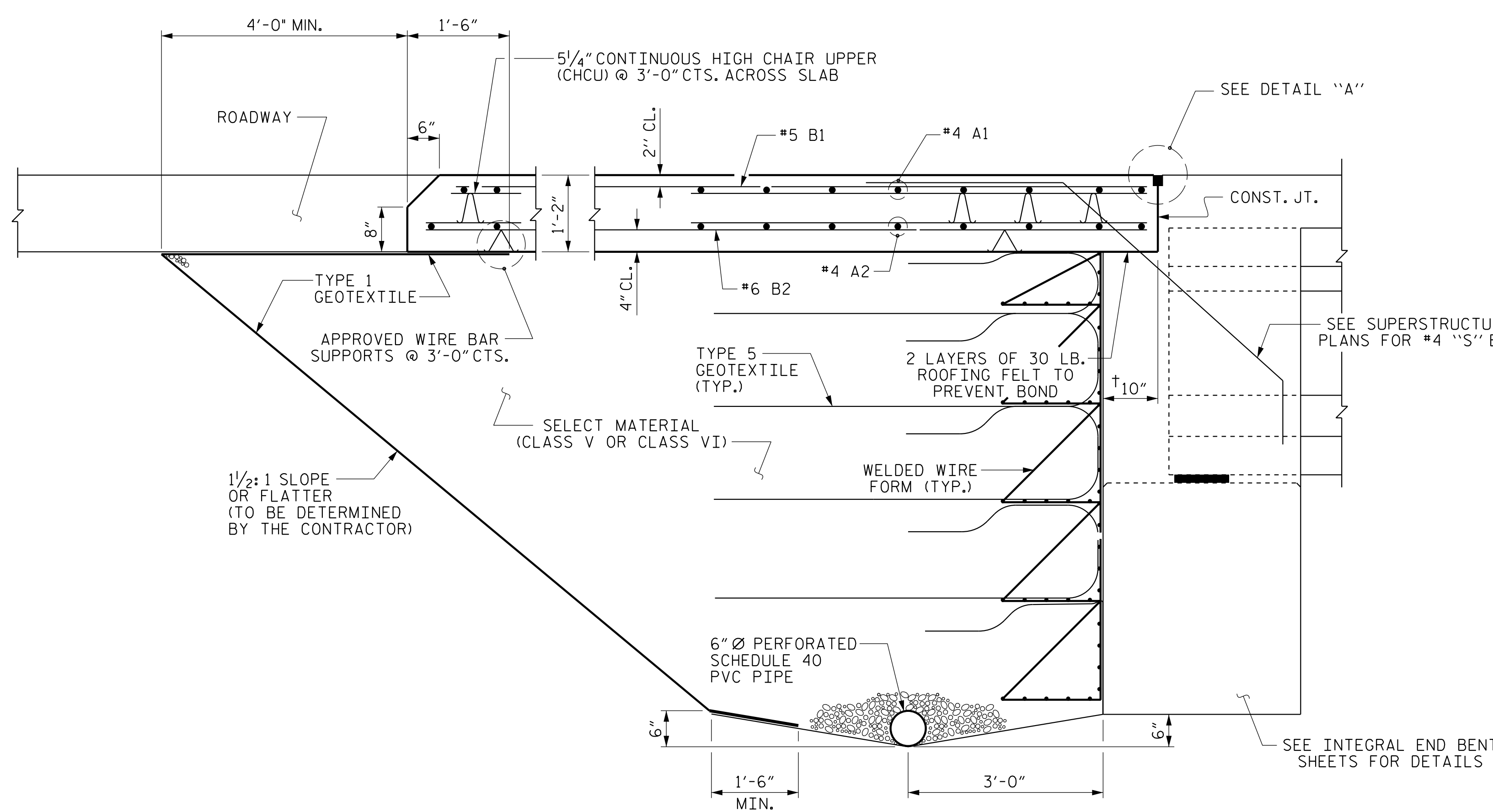
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PROJECT NO. R-3421B  
 RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT WITH FLEXIBLE PAVEMENT RIGHT LANE					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. S8-24					TOTAL SHEETS 25





**TEMPORARY BERM AND SLOPE DRAIN DETAILS**  
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

**NOTES**

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

FOR TEMPORARY GEOTEXTILE WALL INCLUDING GEOTEXTILE, 6" Ø DRAINAGE PIPE, WELDED WIRE FORM, AND SELECT MATERIAL, SEE ROADWAY PLANS.

GEOTEXTILE (TYPE 1 OR TYPE 5) SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS SECTION 1056.

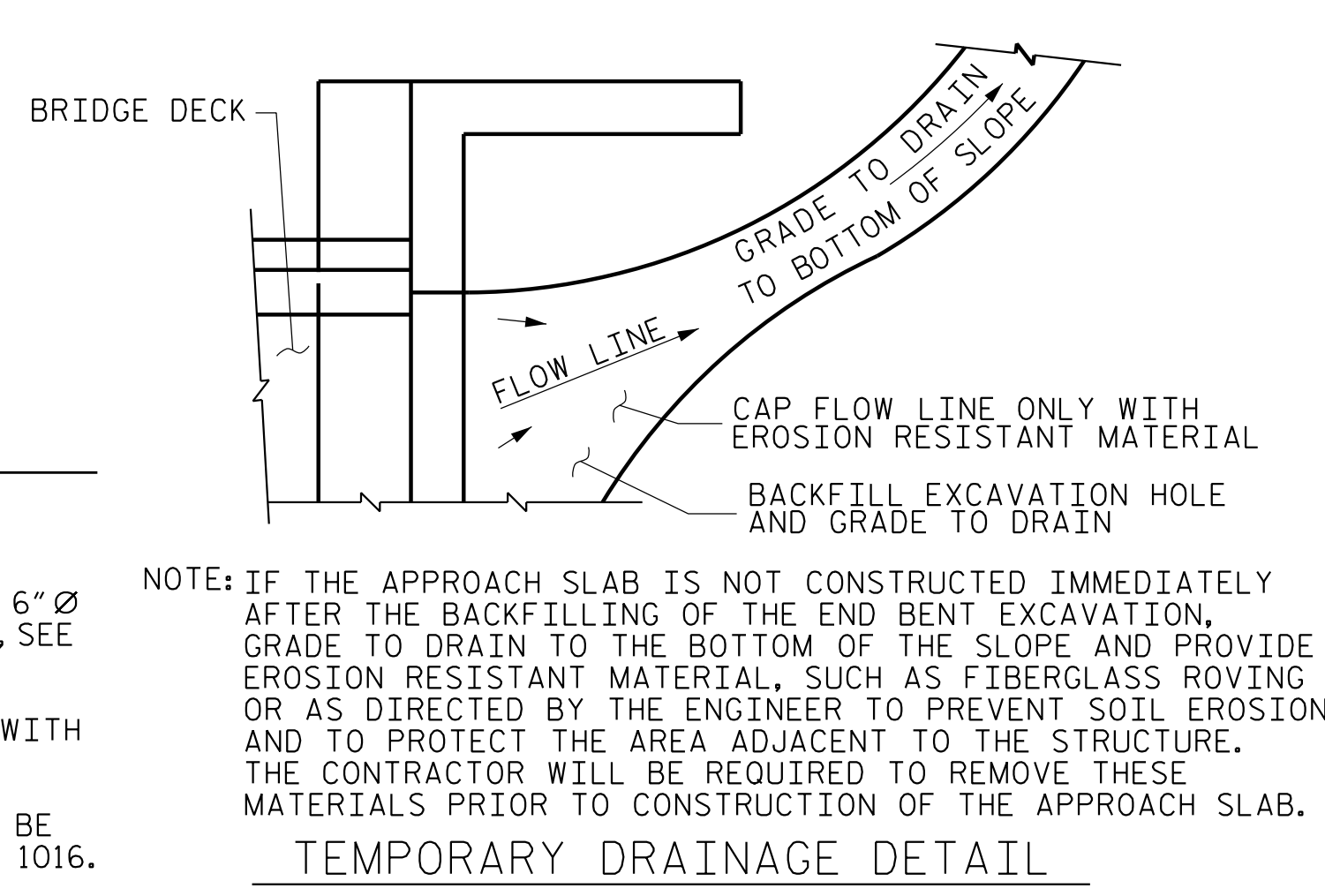
SELECT MATERIAL BACKFILL (CLASS V OR CLASS VI) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

SELECT MATERIAL BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

FOR THE 6" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

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.



PROJECT NO. R-3421B  
RICHMOND COUNTY  
 STATION: 301+83.52 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 BRIDGE APPROACH  
 SLAB DETAILS  
 RIGHT LANE

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

PLANS PREPARED BY:

**CALYX**  
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 phone: 919.851.1912  
 CALYXEngineers.com  
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*Kevin Austin*  
 PROFESSIONAL ENGINEER  
 6/11/2019

DWG. NO. BR-25

**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

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ASSEMBLED BY : W. B. ALLEN	DATE : 3/19
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DRAWN BY : TLA 10/05	REV. 12/21/11 MAA/GM
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	REV. 12/17 MAA/THC

**SECTION THRU SLAB**  
 (TYPE A - ALTERNATE APPROACH FILL)