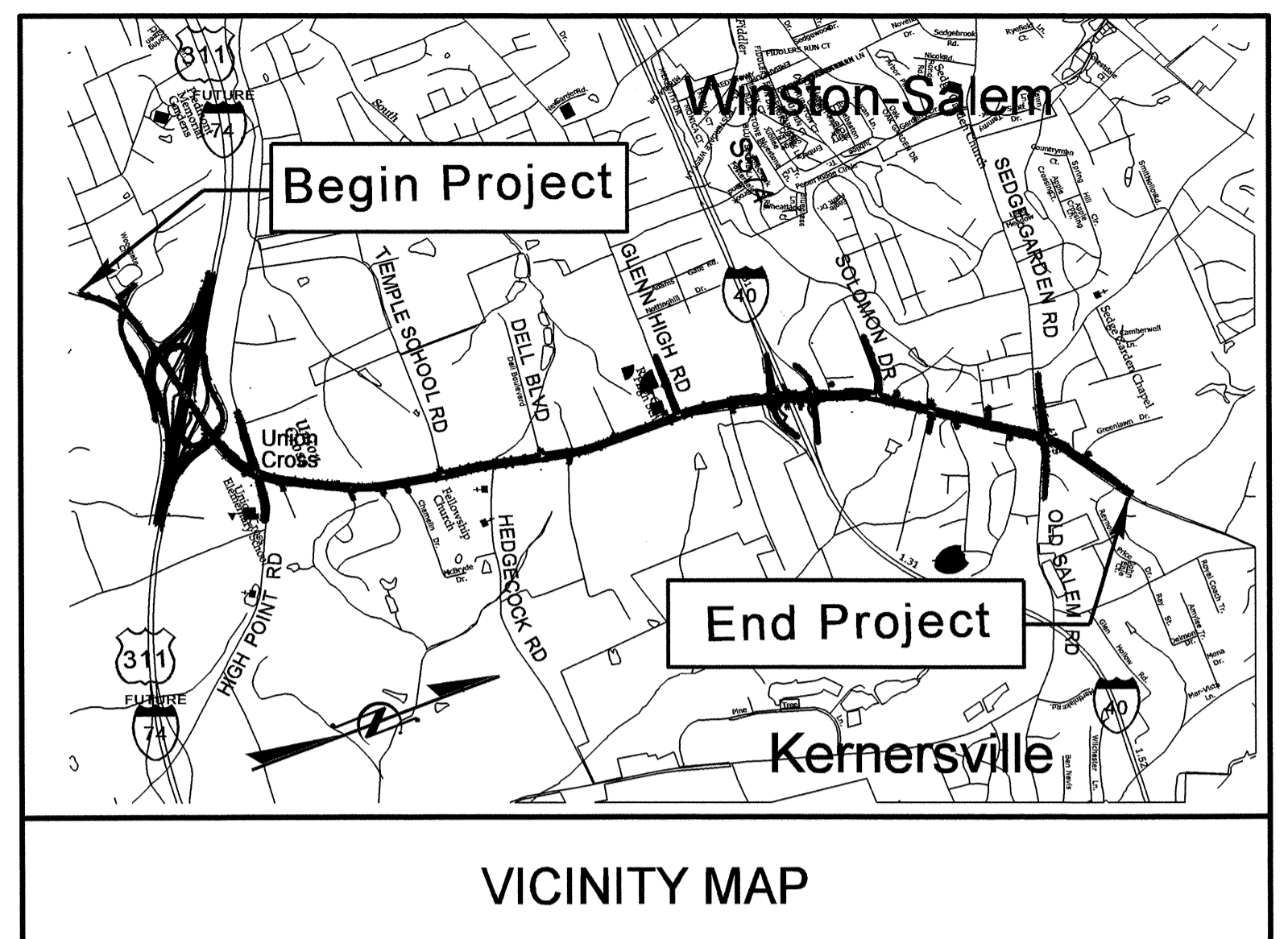


09/08/99

TIP PROJECT: U-4909

CONTRACT: C202745




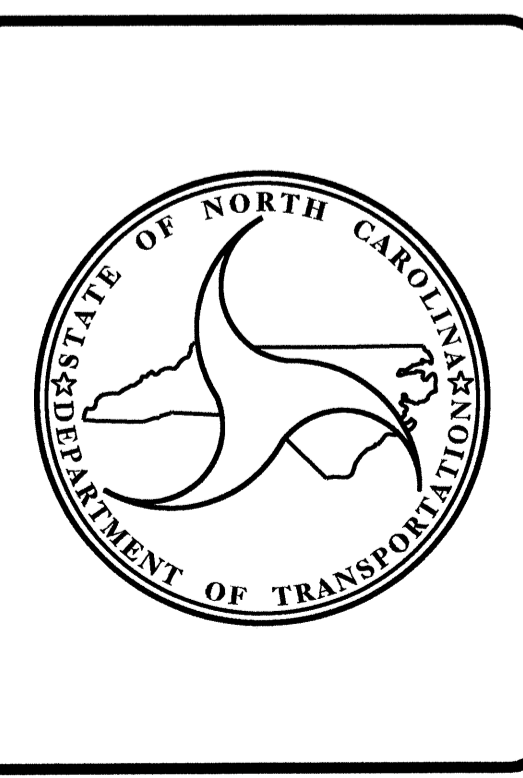
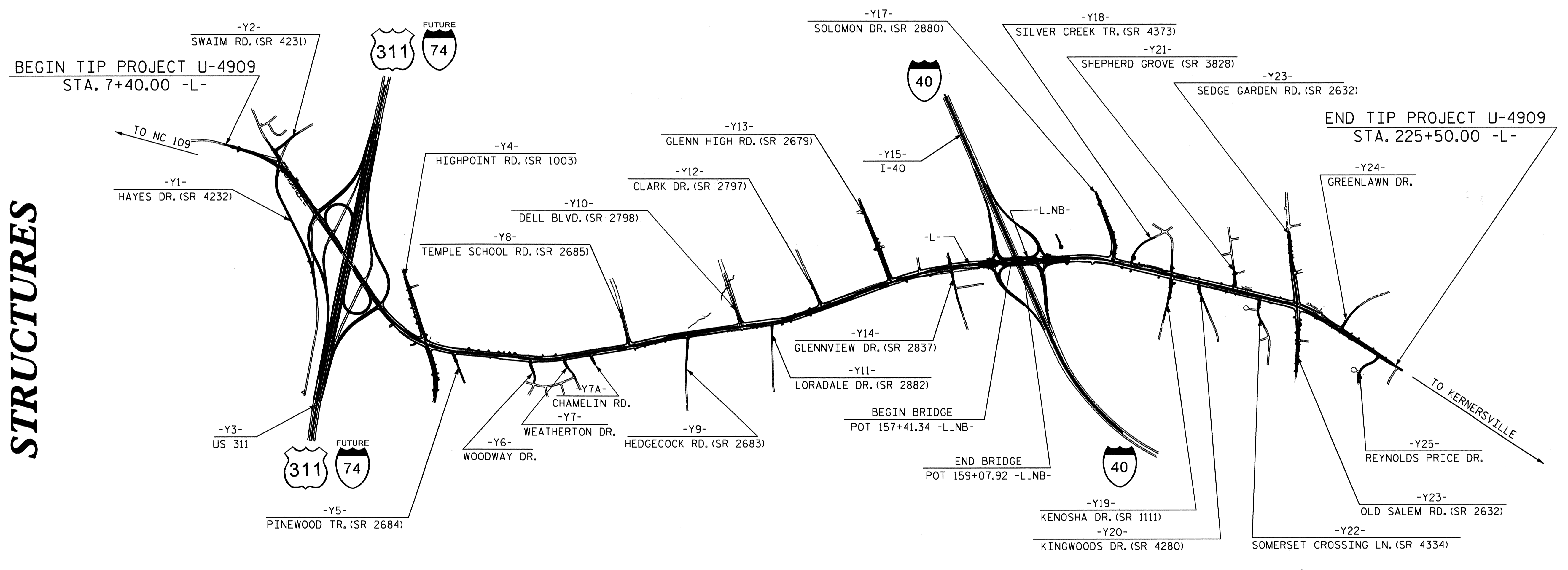
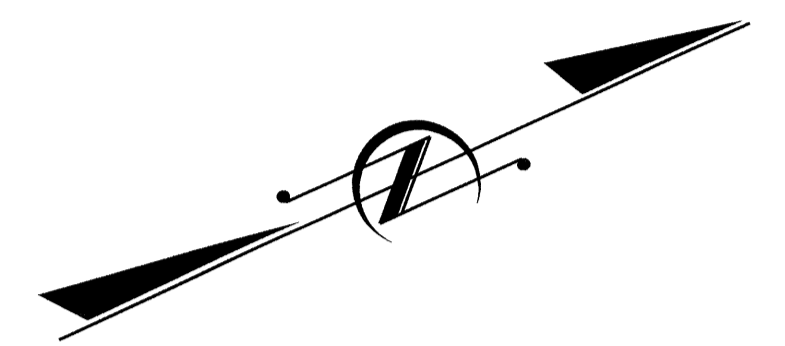
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

# FORSYTH COUNTY

LOCATION: WINSTON-SALEM - SR 2643 (UNION CROSS RD.) FROM  
SR 2691 (WALLBURG RD) TO SR 2632 (SEdge GARDEN RD.)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4909		
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
40278.1.1	STP-2643(2)	PE	
40278.2.1	STP-2643(3)	R / W	
40278.3.1	STP-2643(5)	CONSTRUCTION	

**DESIGN DATA**

ADT 2011 = 25,120  
ADT 2031 = 41,520  
DHV = 10 %  
D = 60 %  
\* T = 9 %  
\* \* V = 50 MPH  
\* TTST 3% DUAL 6%

FUNCTIONAL CLASSIFICATION  
URBAN COLLECTOR

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT U-4909 = 4.099 MILES  
LENGTH STRUCTURE TIP PROJECT U-4909 = 0.032 MILES  
TOTAL LENGTH TIP PROJECT U-4909 = 4.131 MILES

PLANS PREPARED IN THE OFFICE OF:  
DIVISION OF HIGHWAYS

2006 STANDARD SPECIFICATIONS

LETTING DATE:  
January 17, 2012

Q. H. NGUYEN, P.E.  
PROJECT ENGINEER

MARC G. CHEEK, P.E.  
PROJECT DESIGN ENGINEER

STRUCTURE DESIGN UNIT  
1000 BIRCH RIDGE DRIVE  
RALEIGH, N.C. 27610

DIVISION OF HIGHWAYS  
STATE OF NORTH CAROLINA

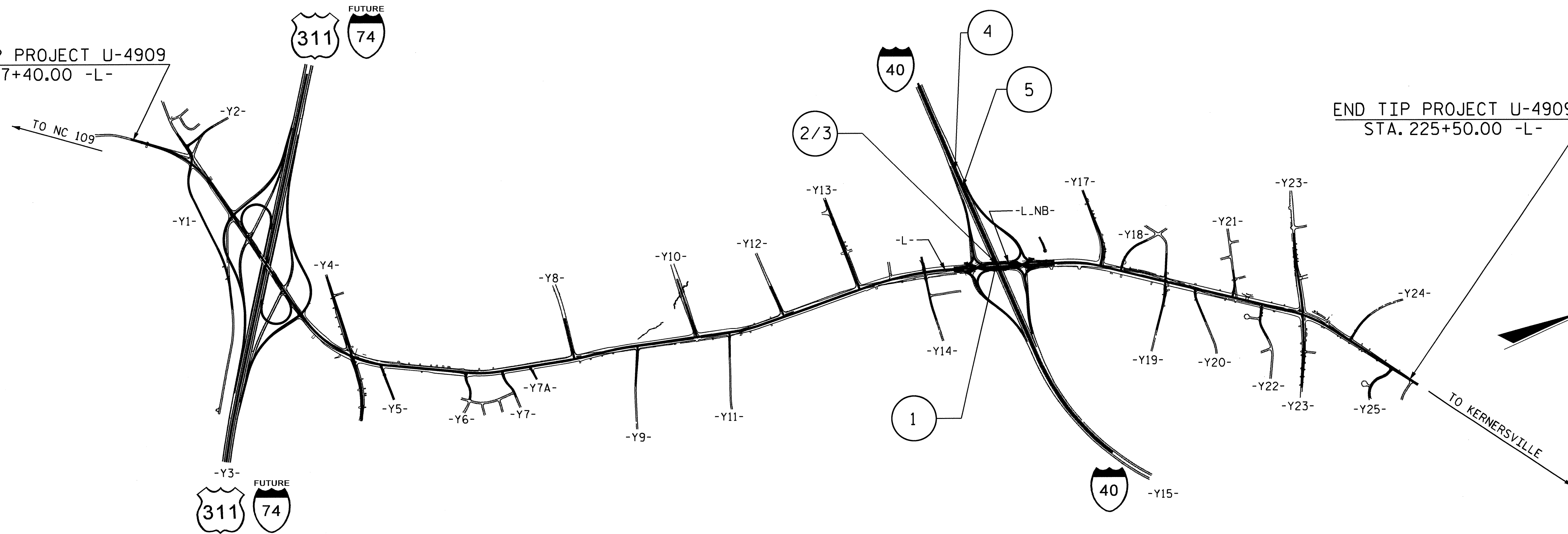
STATE DESIGN ENGINEER  
DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION

APPROVED  
DIVISION ADMINISTRATOR DATE

26-JUL-2011 10:50  
RAS:STRUCTUR.es\FINAL\U-4909\_SD\_STR\*1.01.TSH.dgn  
dahodge

BEGIN TIP PROJECT U-4909  
STA. 7+40.00 -L-

END TIP PROJECT U-4909  
STA. 225+50.00 -L-



INDEX			
STR. No.	STATION	DESCRIPTION	SHEET NUMBERS
1	158+24.63 -L.NB-	BRIDGE ON SR 2643 OVER INTERSTATE 40	S-1 THRU S-36
2/3	158+24.63 -L.NB-	MSE RETAINING WALLS	W-1 THRU W-4
4	11+90.00 -Y15 SPC-	MSE RETAINING WALL	W-5 THRU W-8
5	12+20.85 -Y15 SPD-	MSE RETAINING WALL	W-5 THRU W-8

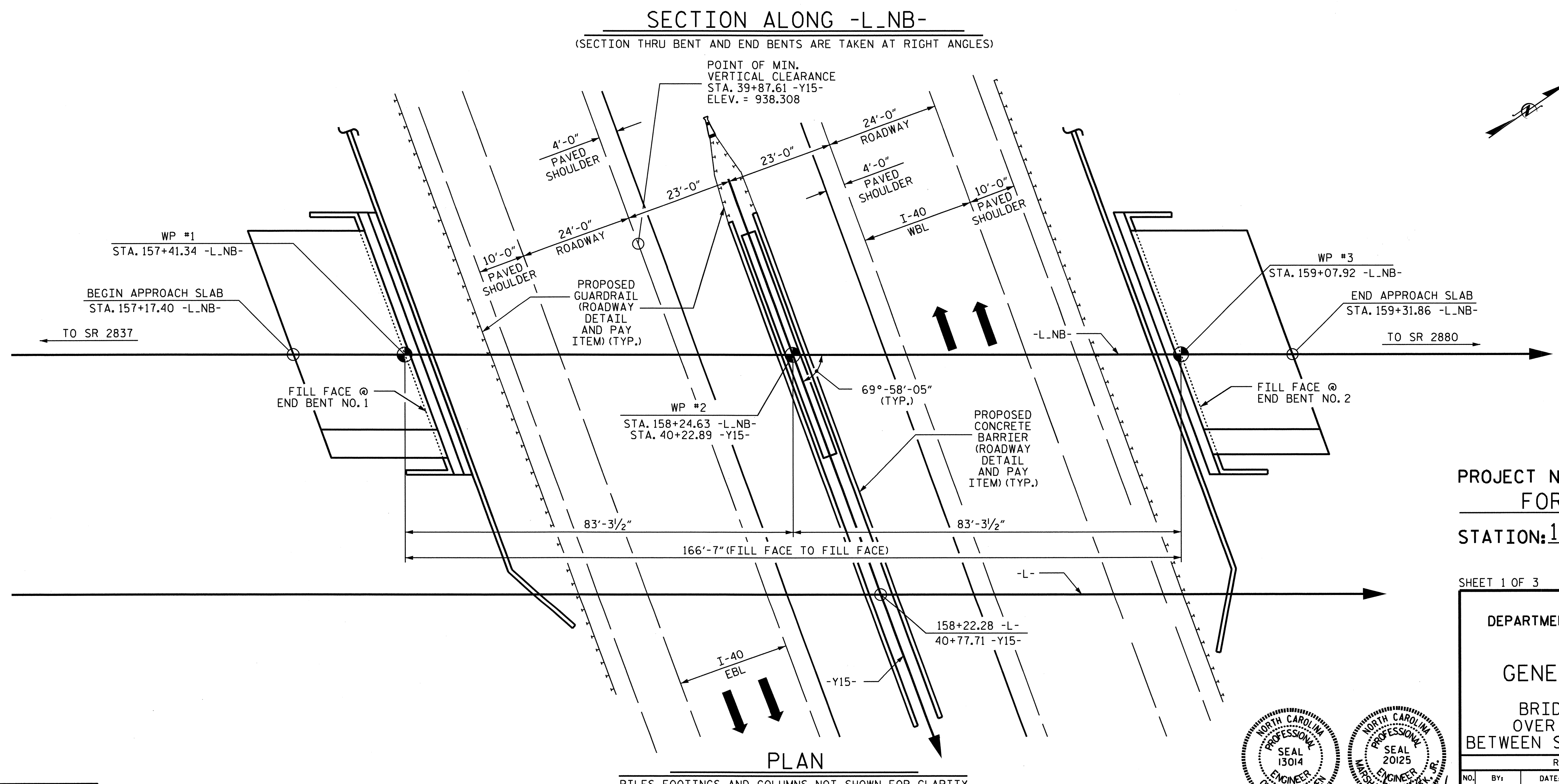
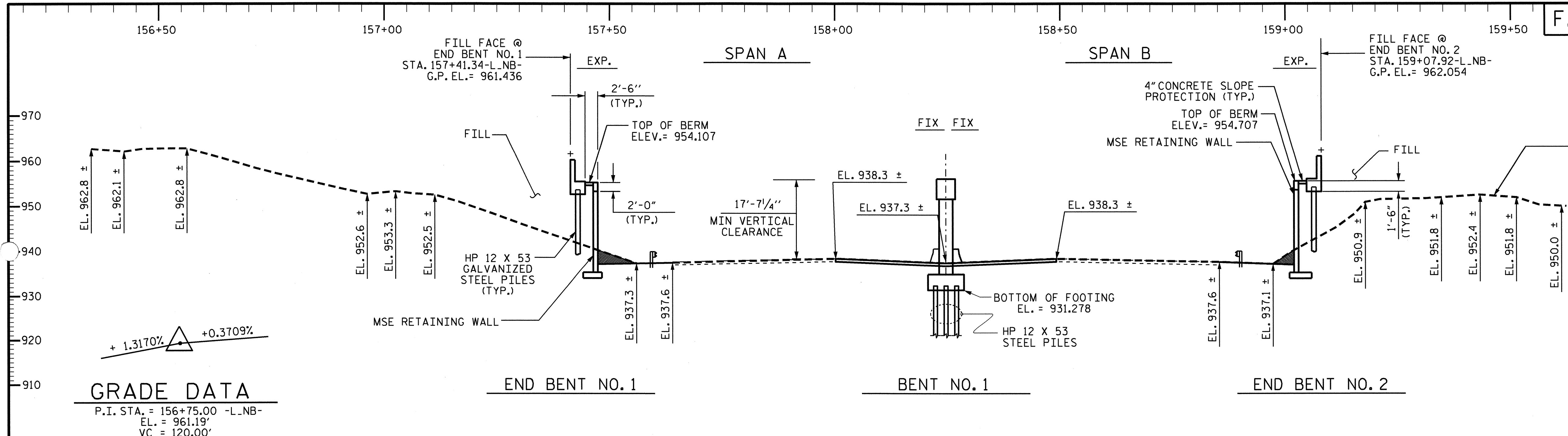
PROJECT NO. U-4909  
FORSYTH COUNTY  
STATION: \_\_\_\_\_

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STRUCTURE INDEX



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



PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-  
40+22.89 -Y15-

SHEET 1 OF 3 BRIDGE #665

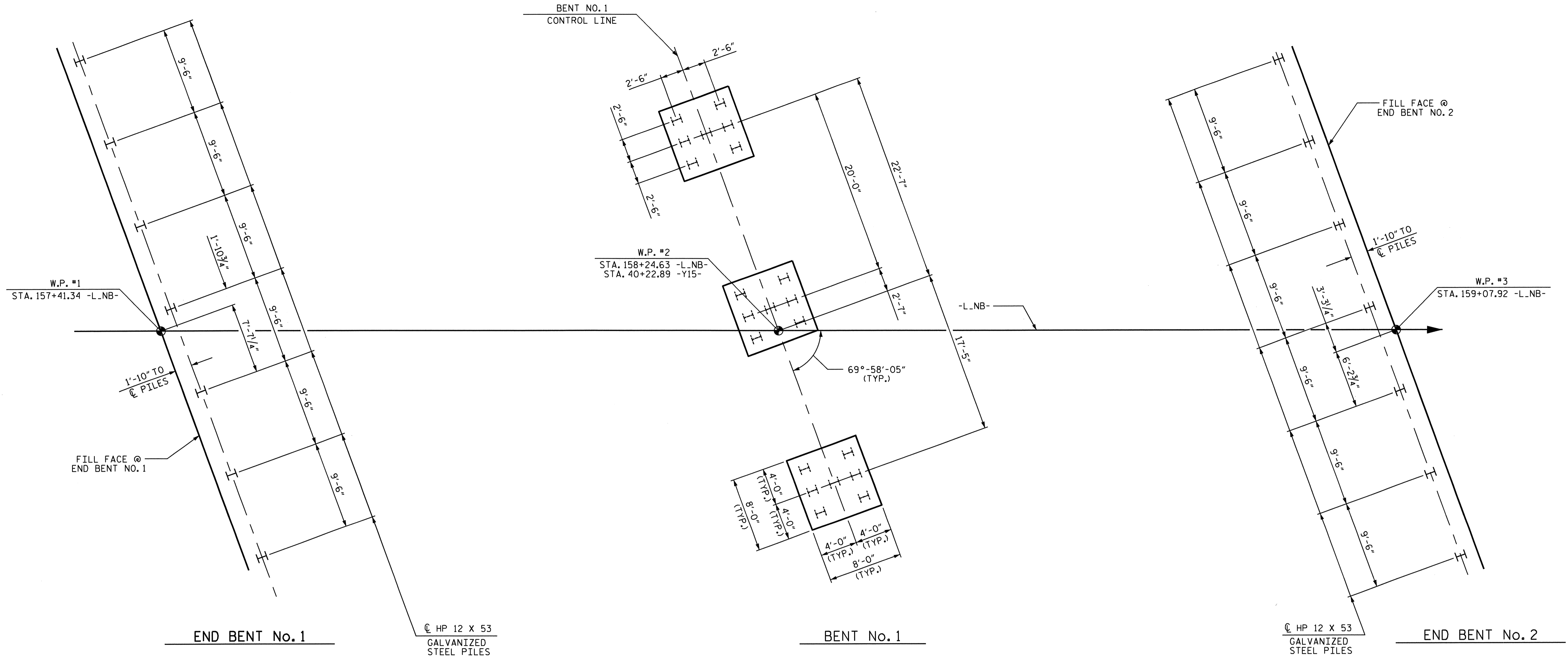
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR  
 BRIDGE ON SR 2643  
 OVER INTERSTATE 40  
 BETWEEN SR 2837 AND SR 2880

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



DRAWN BY : A.L. FIGUEROA DATE : 05-23-11  
 CHECKED BY : M.G. CHEEK DATE : 07-13-11



**FOUNDATION LAYOUT**

PILES AT END BENTS ARE HP 12 X 53 GALVANIZED STEEL PILES.  
PILES AT BENT ARE HP 12 X 53 STEEL PILES.

**NOTES**

- FOR PILES, SEE SPECIAL PROVISIONS.
- PILES AT END BENT NO.1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.
- DRIVE PILES AT END BENT NO.1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 192 TONS PER PILE.
- PILES AT BENT NO.1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 110 TONS PER PILE.
- DRIVE PILES AT BENT NO.1 TO A REQUIRED DRIVING RESISTANCE OF 183 TONS PER PILE.

PROJECT NO. U-4909  
FORSYTH COUNTY  
STATION: 158+24.63 -L-NB-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**GENERAL DRAWING**  
FOR  
BRIDGE ON SR 2643  
OVER INTERSTATE 40  
BETWEEN SR 2837 AND SR 2880



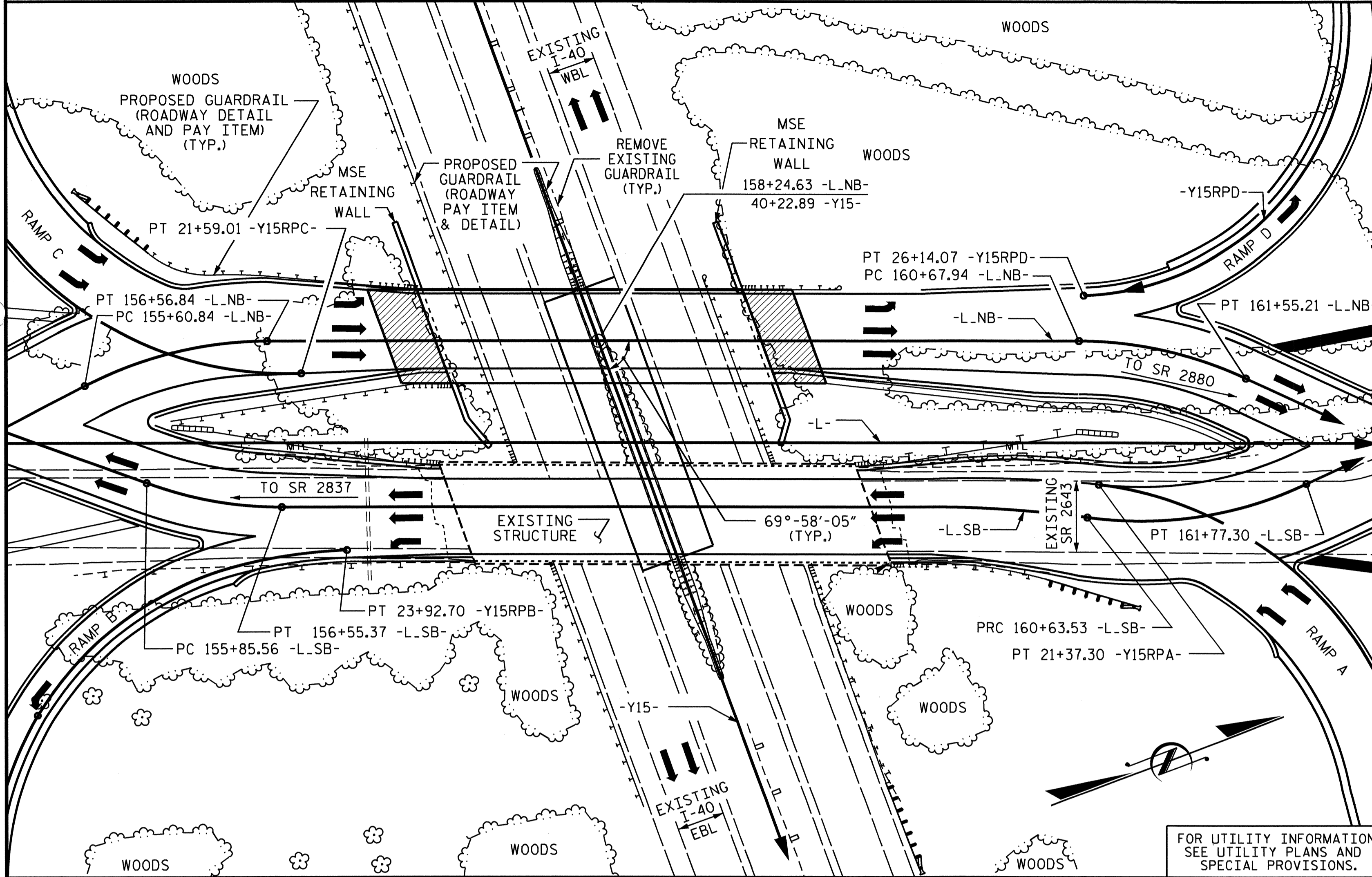
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-2
1			3			TOTAL SHEETS
2			4			36

DRAWN BY : A.L. FIGUEROA DATE : 06-21-11  
CHECKED BY : M.G. CHEEK DATE : 07-12-11

25-AUG-2011 14:05  
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dahodge

NC005

BENCHMARK #15: RAILROAD SPIKE IN EASTERN BASE OF POWER POLE ON PECAN ROAD;  
1056' LEFT OF -BL- STATION 151+14.70; ELEVATION = 959.81



LOCATION SKETCH

NOTES

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.  
FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.  
THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.  
PRESTRESSED CONCRETE DECK PANELS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.  
REMOVABLE FORMS MAY BE USED IN LIEU OF METAL STAY-IN-PLACE FORMS IN ACCORDANCE WITH ARTICLE 420-3 OF THE STANDARD SPECIFICATIONS.  
FOR MAINTENANCE AND PROTECTION OF TRAFFIC BENEATH PROPOSED STRUCTURE, SEE SPECIAL PROVISIONS.  
THE CLASS AA CONCRETE IN THE BRIDGE DECK SHALL CONTAIN FLY ASH OR GROUND GRANULATED BLAST FURNACE SLAG AT THE SUBSTITUTION RATE SPECIFIED IN ARTICLE 1024-1 AND IN ACCORDANCE WITH ARTICLES 1024-5 AND 1024-6 OF THE STANDARD SPECIFICATIONS. NO PAYMENT WILL BE MADE FOR THIS SUBSTITUTION AS IT IS CONSIDERED INCIDENTAL TO THE COST OF THE REINFORCED CONCRETE DECK SLAB.  
THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO THE VARIOUS PAY ITEMS.

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 PRESTRESSED CONCRETE MEMBERS, SEE SPECIAL PROVISIONS.  
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
FOR CURING CONCRETE, SEE SPECIAL PROVISIONS.  
FOR FORMS FOR CONCRETE BRIDGE DECK, SEE SPECIAL PROVISIONS.  
FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

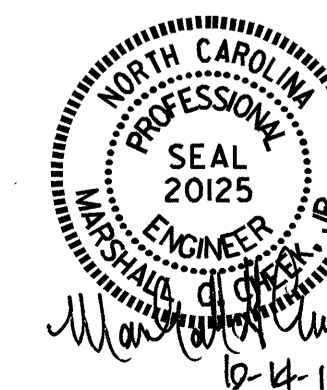
TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	54" PRESTRESSED CONCRETE GIRDERS	HP 12 X 53 STEEL PILES	HP 12 X 53 GALVANIZED STEEL PILES	TWO BAR METAL RAIL	CONCRETE BARRIER RAIL	1'-2" x 2'-6" CONCRETE PARAPET	4" CONCRETE SLOPE PROTECTION	ELASTOMERIC BEARINGS	EVAZOTE JOINT SEALS
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YARDS	LUMP SUM	LBS.	LBS.	NO. LN. FT.	NO. LN. FT.	NO. LN. FT.	LN. FT.	LN. FT.	LN. FT.	SQ. YD.	LUMP SUM	LUMP SUM
SUPERSTRUCTURE		8287	8198		LUMP SUM			12 974.25			156.35	164.36	164.36		LUMP SUM	LUMP SUM
END BENT NO. 1				37.2		6,067				7 390				14		
BENT NO. 1	LUMP SUM			72.5		11,446	1,172		21 735							
END BENT NO. 2				37.3		6,086				7 475				14		
TOTAL	LUMP SUM	8287	8198	147.0	LUMP SUM	23,599	1,172	12 974.25	21 735	14 865	156.35	164.36	164.36	28	LUMP SUM	LUMP SUM

PROJECT NO. U-4909  
FORSYTH COUNTY  
STATION: 158+24.63-L\_NB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
GENERAL DRAWING  
FOR  
BRIDGE ON SR 2643  
OVER INTERSTATE 40  
BETWEEN SR 2837 AND SR 2880



DRAWN BY : A.L. FIGUEROA DATE : 05-23-11  
CHECKED BY : M.G. CHEEK DATE : 8/11

14-OCT-2011 14:15  
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REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-3
1			3			TOTAL SHEETS
2			4			36

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 (LRFD) 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								
						LIVELOAD FACTORS	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)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.13	--	1.75	0.845	1.40	A	ER	39.886	0.892	1.13	A	ER	23.932	0.80	0.845	1.10	A	ER	39.886		
	HL-93(0pr)	N/A	--	1.47	--	1.35	0.845	1.82	A	ER	39.886	0.892	1.47	A	ER	23.932	N/A	--	--	--	--	--		
	HS-20(Inv)	36.000	2	1.40	50.40	1.75	0.845	1.87	A	ER	39.886	0.892	1.40	A	ER	23.932	0.80	0.845	1.47	A	ER	39.886		
	HS-20(0pr)	36.000	--	1.81	65.16	1.35	0.845	2.42	A	ER	39.886	0.892	1.81	A	ER	23.932	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SV	SNSH	13.500	--	3.37	45.50	1.4	0.845	5.37	A	ER	39.886	0.892	4.06	A	ER	23.932	0.80	0.845	3.37	A	ER	39.886	
		SNGARBS2	20.000	--	2.49	49.80	1.4	0.845	3.96	A	ER	39.886	0.892	2.92	A	ER	23.932	0.80	0.845	2.49	A	ER	39.886	
		SNAGRIS2	22.000	--	2.35	51.70	1.4	0.845	3.73	A	ER	39.886	0.892	2.72	A	ER	23.932	0.80	0.845	2.35	A	ER	39.886	
		SNCOTTS3	27.250	--	1.68	45.78	1.4	0.845	2.67	A	ER	39.886	0.892	2.03	A	ER	23.932	0.80	0.845	1.68	A	ER	39.886	
		SNAGGRS4	34.925	--	1.39	48.55	1.4	0.845	2.22	A	ER	39.886	0.892	1.70	A	ER	23.932	0.80	0.845	1.39	A	ER	39.886	
		SNS5A	35.550	--	1.36	48.35	1.4	0.845	2.17	A	ER	39.886	0.892	1.74	A	ER	23.932	0.80	0.845	1.36	A	ER	39.886	
	TTST	SNS6A	39.950	--	1.25	49.94	1.4	0.845	1.98	A	ER	39.886	0.892	1.59	A	ER	23.932	0.80	0.845	1.25	A	ER	39.886	
		SNS7B	42.000	--	1.19	49.98	1.4	0.845	1.89	A	ER	39.886	0.892	1.58	A	ER	23.932	0.80	0.845	1.19	A	ER	39.886	
		TNAGRIT3	33.000	--	1.52	50.16	1.4	0.845	2.42	A	ER	39.886	0.892	1.89	A	ER	23.932	0.80	0.845	1.52	A	ER	39.886	
		TNT4A	33.075	--	1.52	50.27	1.4	0.845	2.42	A	ER	39.886	0.892	1.83	A	ER	23.932	0.80	0.845	1.52	A	ER	39.886	
		TNT6A	41.600	--	1.24	51.58	1.4	0.845	1.98	A	ER	39.886	0.892	1.70	A	ER	23.932	0.80	0.845	1.24	A	ER	39.886	
		TNT7A	42.000	--	1.25	52.50	1.4	0.845	1.98	A	ER	39.886	0.892	1.66	A	ER	23.932	0.80	0.845	1.25	A	ER	39.886	
TNT7B	42.000	--	1.28	53.76	1.4	0.845	2.04	A	ER	39.886	0.892	1.53	A	ER	23.932	0.80	0.845	1.28	A	ER	39.886			
TNAGRIT4	43.000	--	1.23	52.89	1.4	0.845	1.95	A	ER	39.886	0.892	1.48	A	ER	23.932	0.80	0.845	1.23	A	ER	39.886			
TNAGT5A	45.000	--	1.16	52.20	1.4	0.845	1.84	A	ER	39.886	0.892	1.48	A	ER	23.932	0.80	0.845	1.16	A	ER	39.886			
TNAGT5B	45.000	3	1.14	51.30	1.4	0.845	1.82	A	ER	39.886	0.892	1.41	A	ER	23.932	0.80	0.845	1.14	A	ER	39.886			

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)

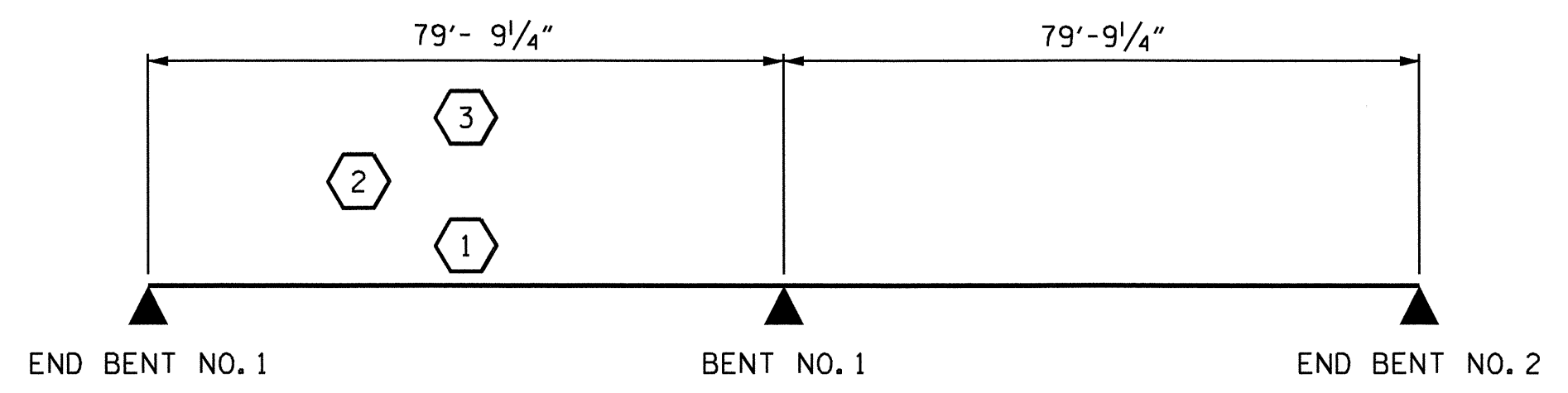
③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

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GIRDER LOCATION

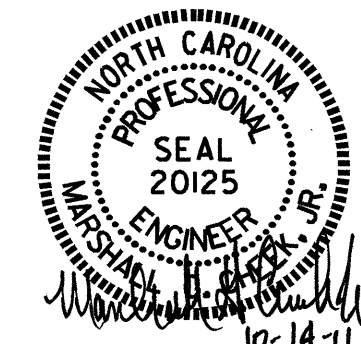
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 EL - EXTERIOR LEFT GIRDER  
 ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

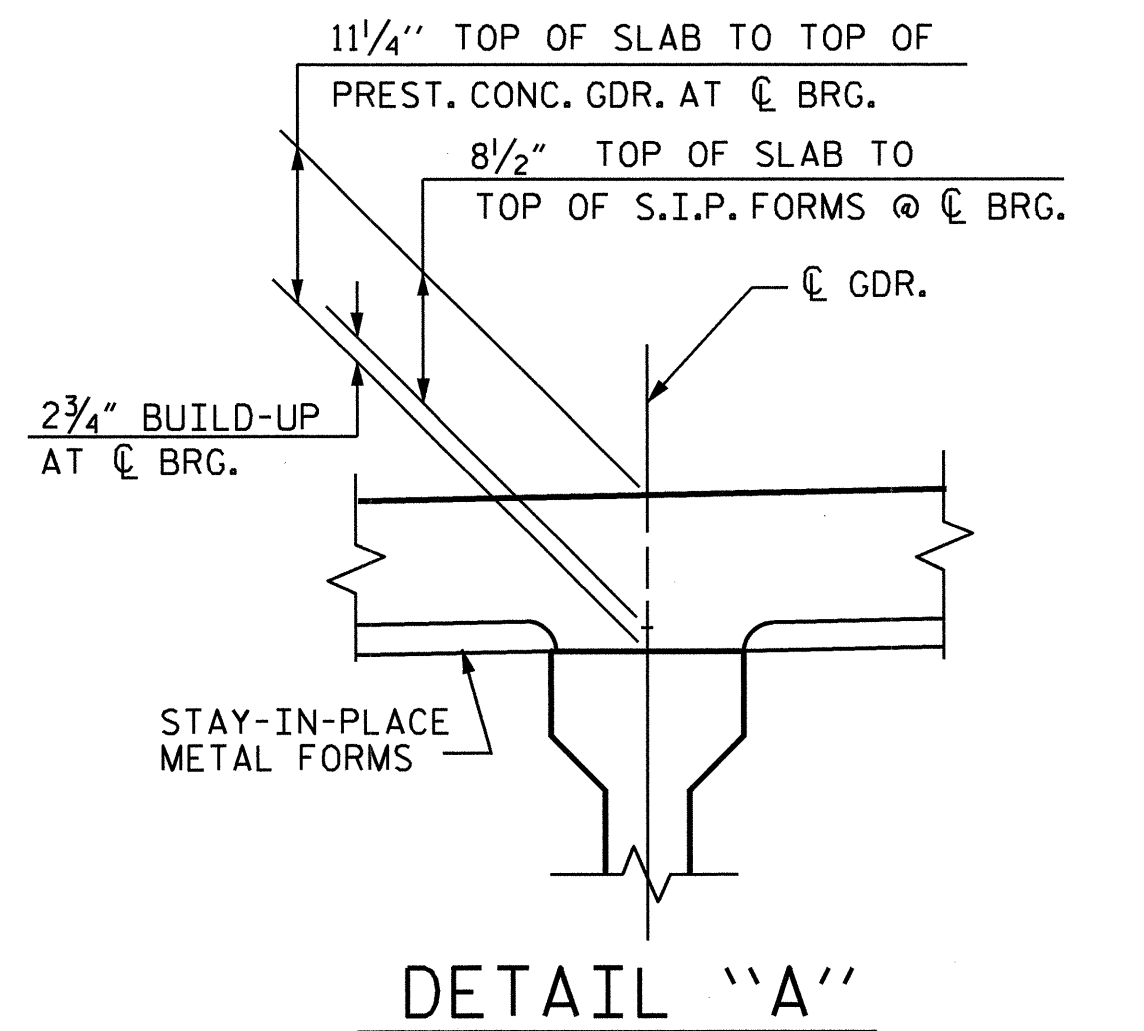
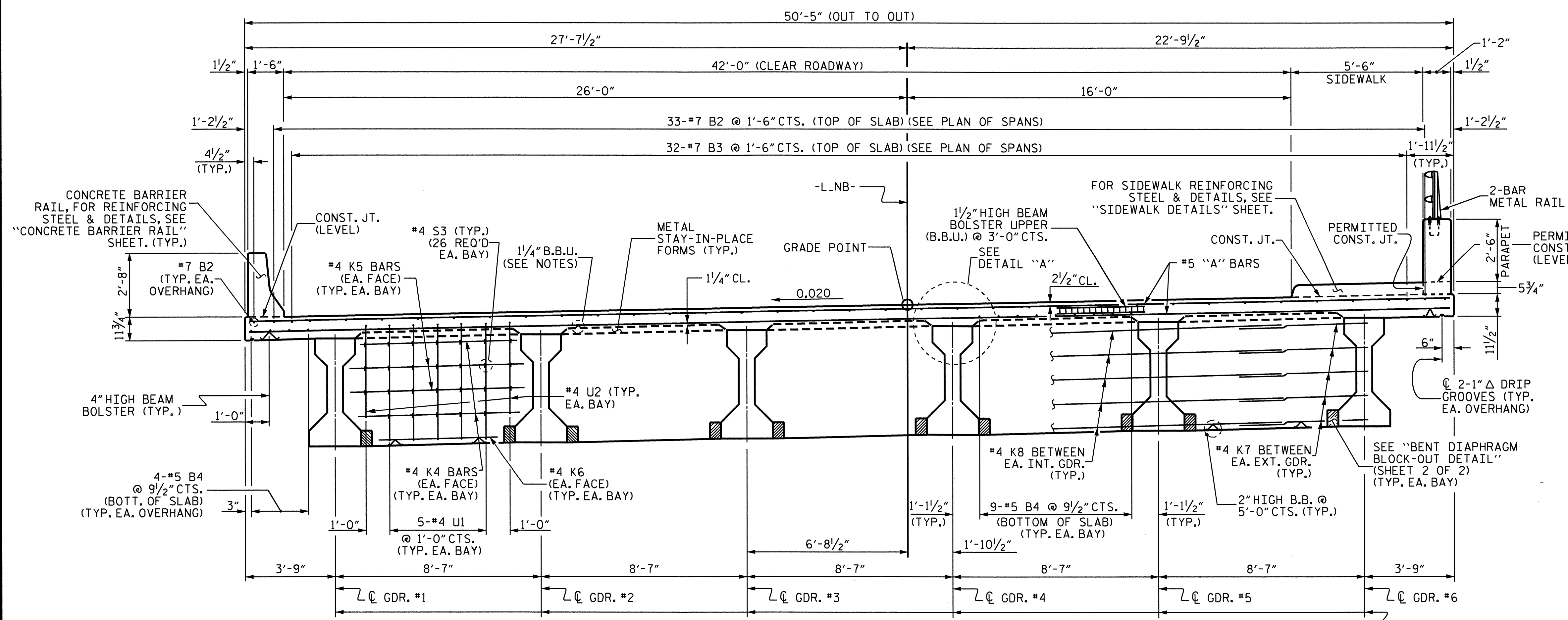
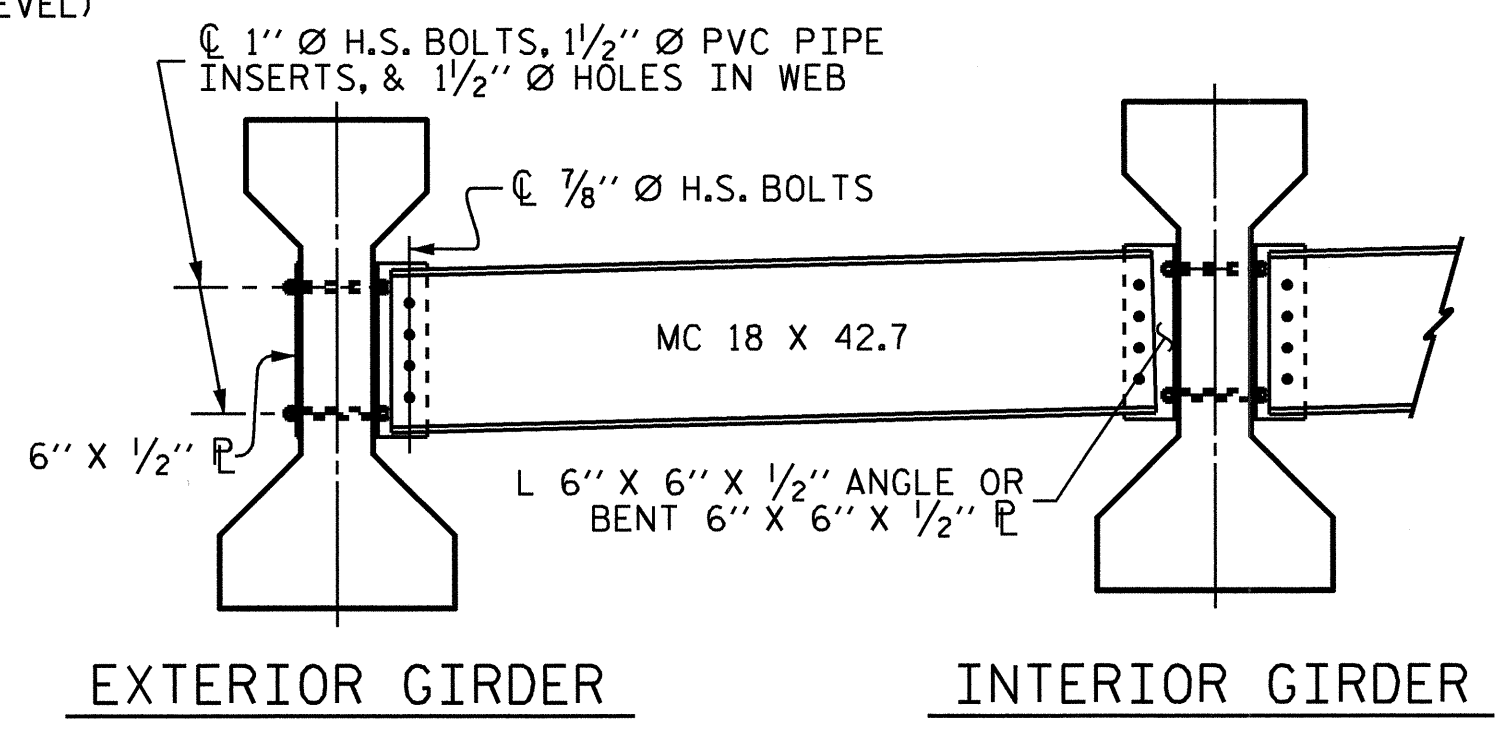
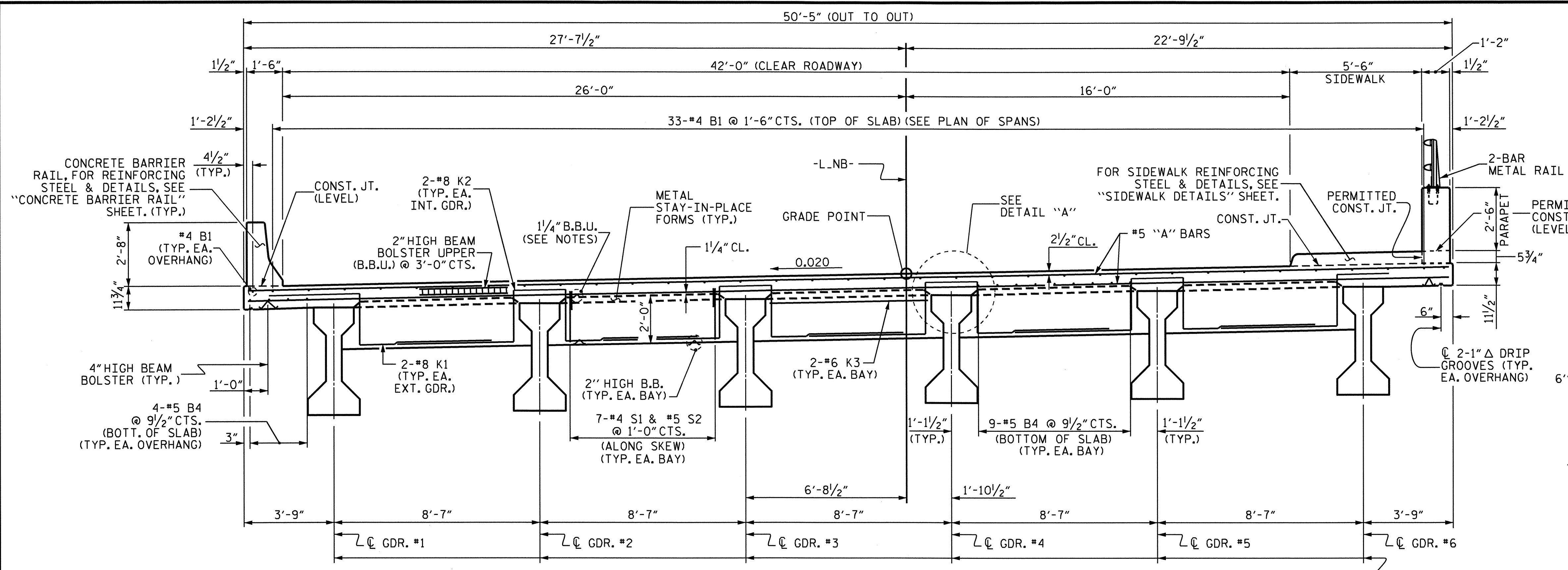
PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

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



ASSEMBLED BY : B. MATHEW	DATE : 07/2011
CHECKED BY : M.G. CHEEK	DATE : 07/2011
DRAWN BY : MAA 1/08	REV. 11/12/OBR MAA/GM
CHECKED BY : GM/DI 2/08	

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



PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L\_NB-

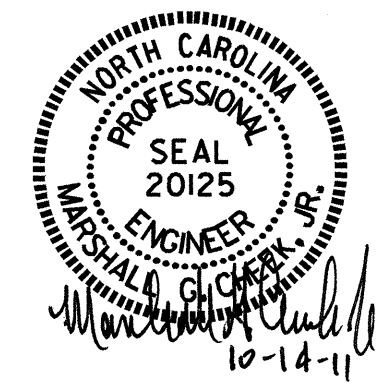
SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE TYPICAL SECTIONS**

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

DRAWN BY : W.D. CRUTCHER      DATE : 3-10-11  
 CHECKED BY : M.G. CHEEK      DATE : 5-11



25-AUG-2011 14:03  
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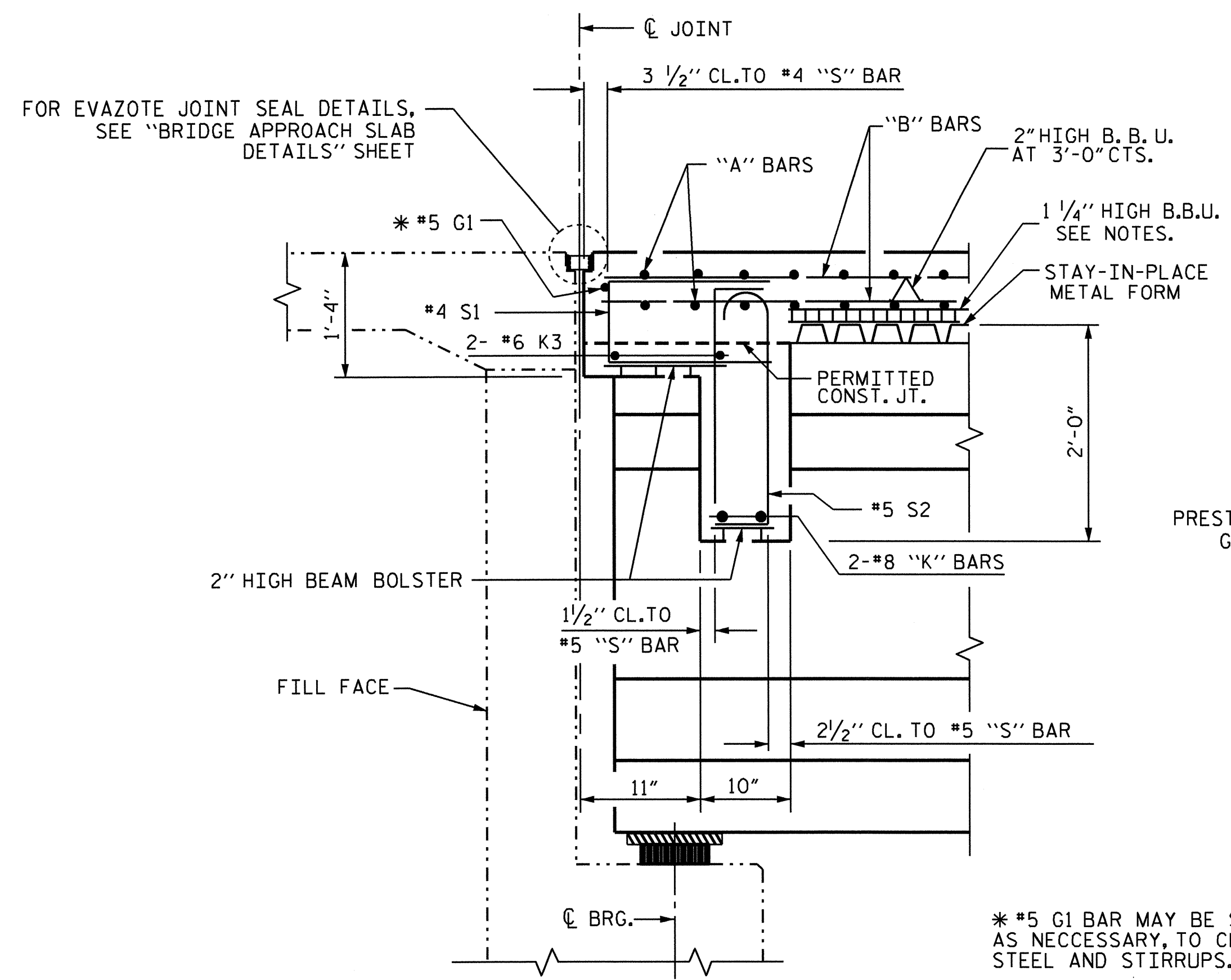
**NOTES**

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.

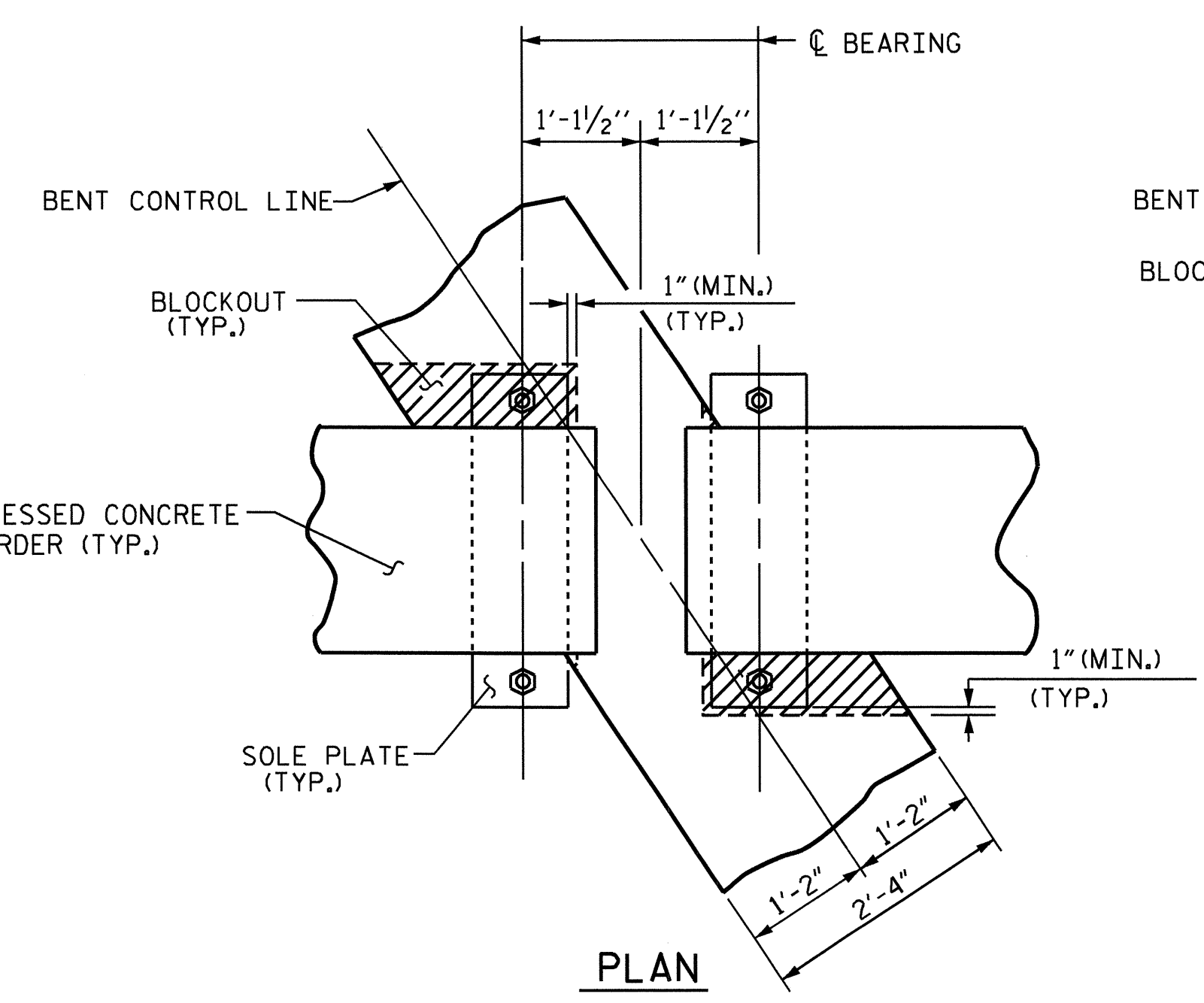
LONGITUDINAL STEEL MAY BE SHIFTED SLIGHTLY, AS NECESSARY, TO AVOID INTERFERENCE WITH STIRRUPS IN PRESTRESSED CONCRETE GIRDERS.

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.

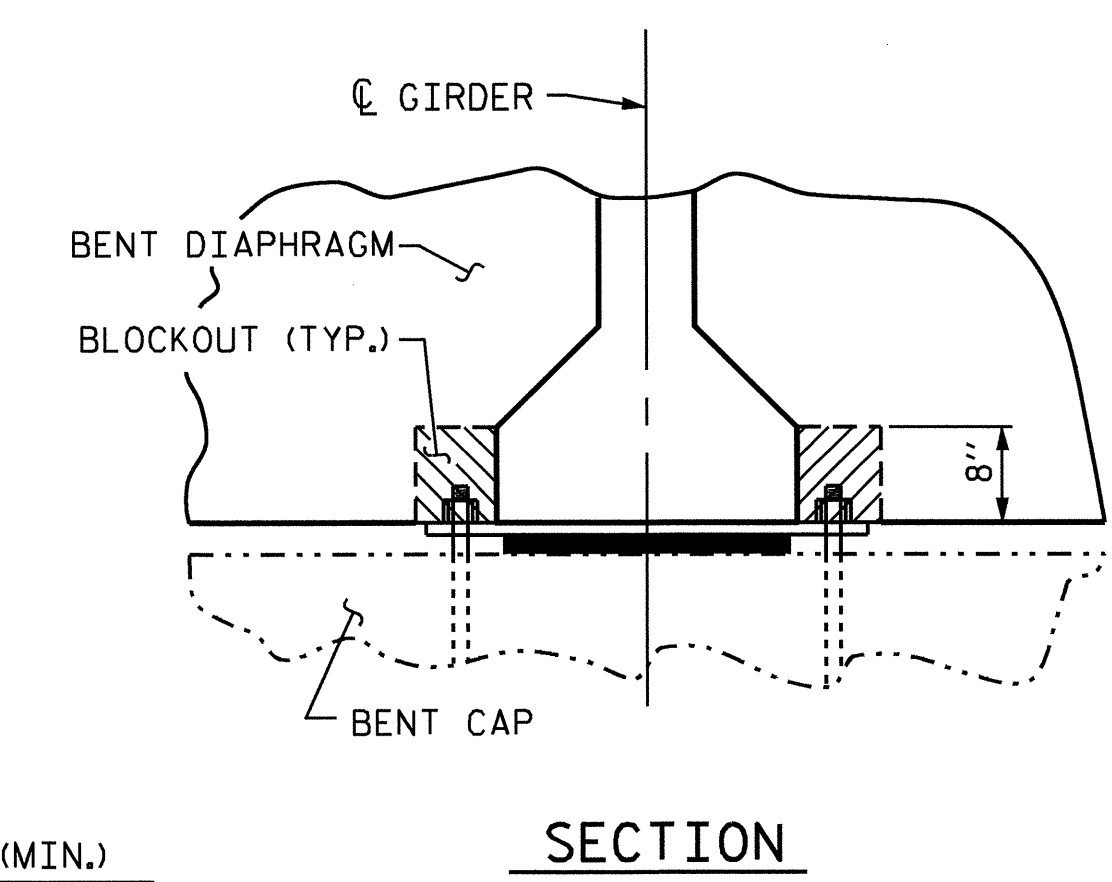
BARRIER RAIL AND SIDEWALK IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.



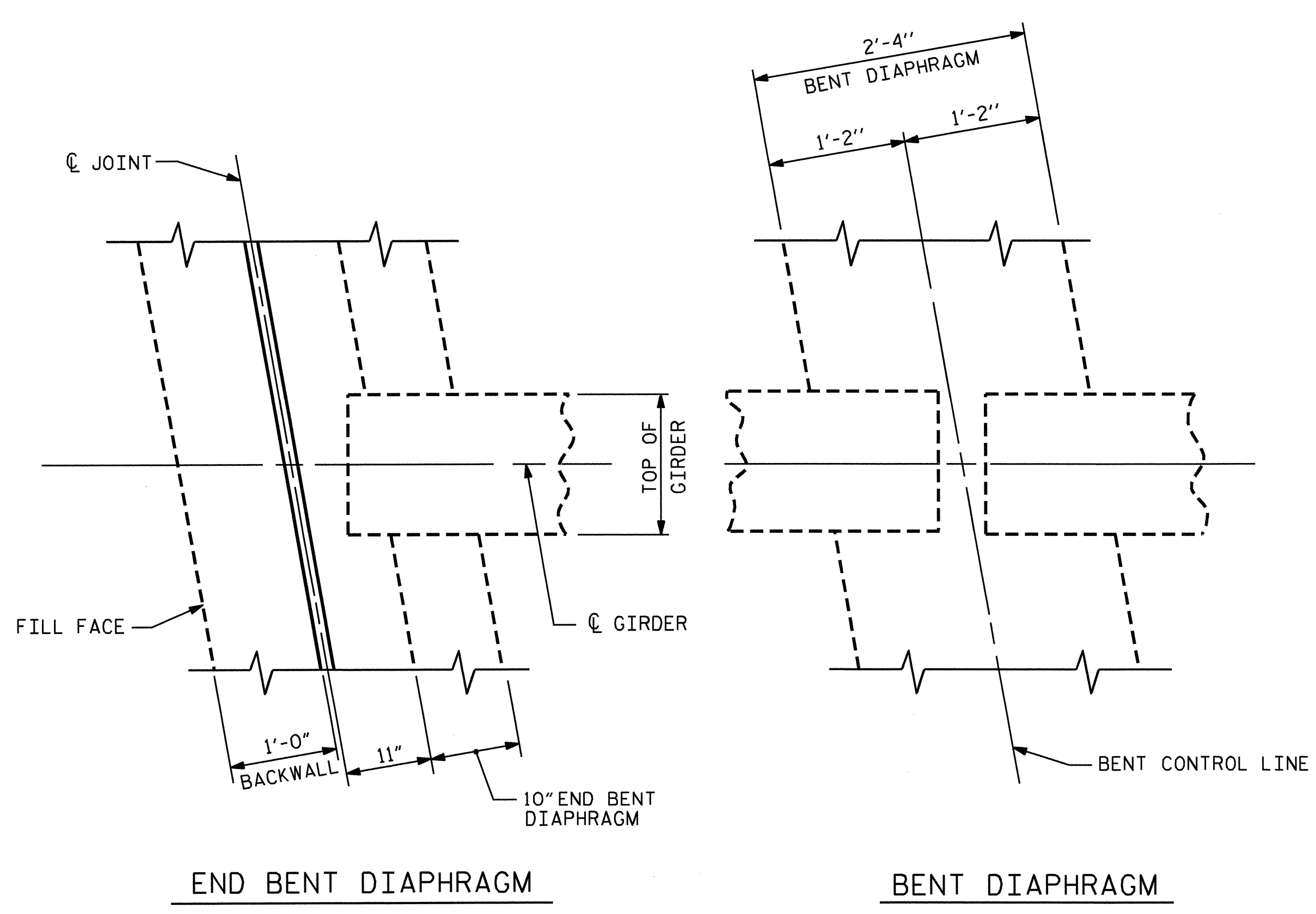
**SECTION THRU END BENT DIAPHRAGM**



**BENT DIAPHRAGM BLOCK-OUT DETAIL**



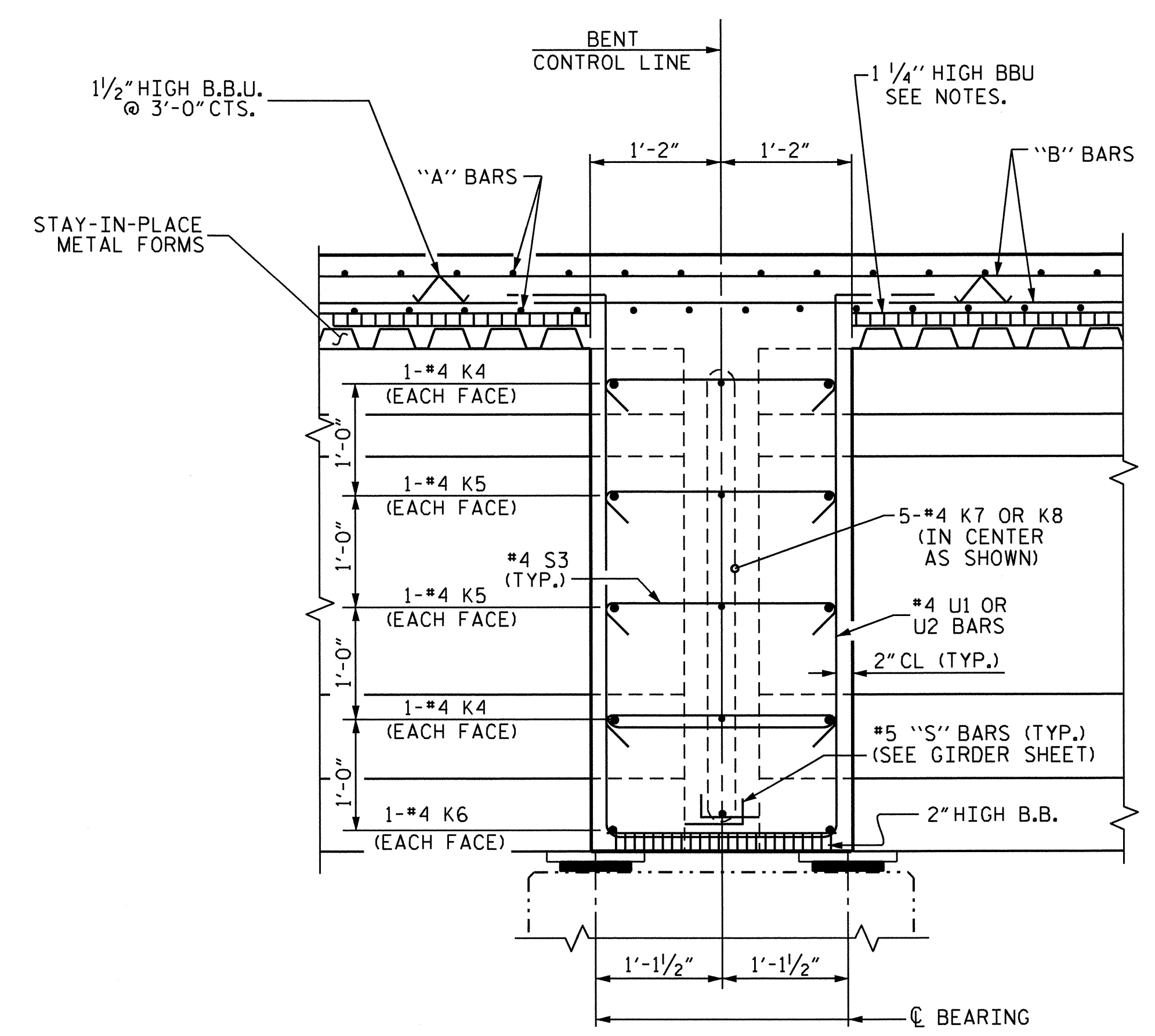
**SECTION**



**END BENT DIAPHRAGM**

**BENT DIAPHRAGM**

**PLAN**



**SECTION THRU BENT DIAPHRAGM**

PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 2 OF 2

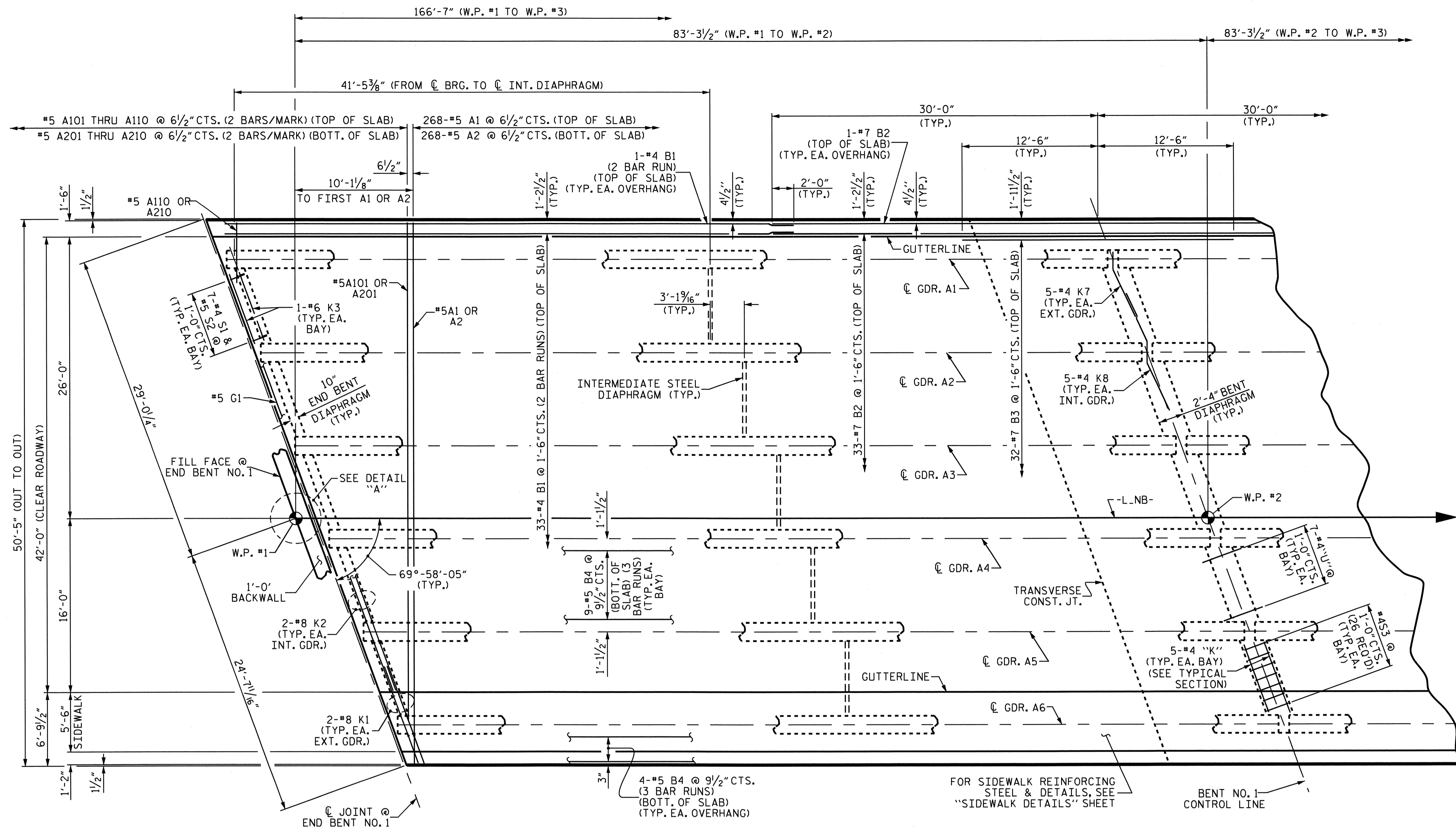
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TYPICAL SECTION  
 DETAILS



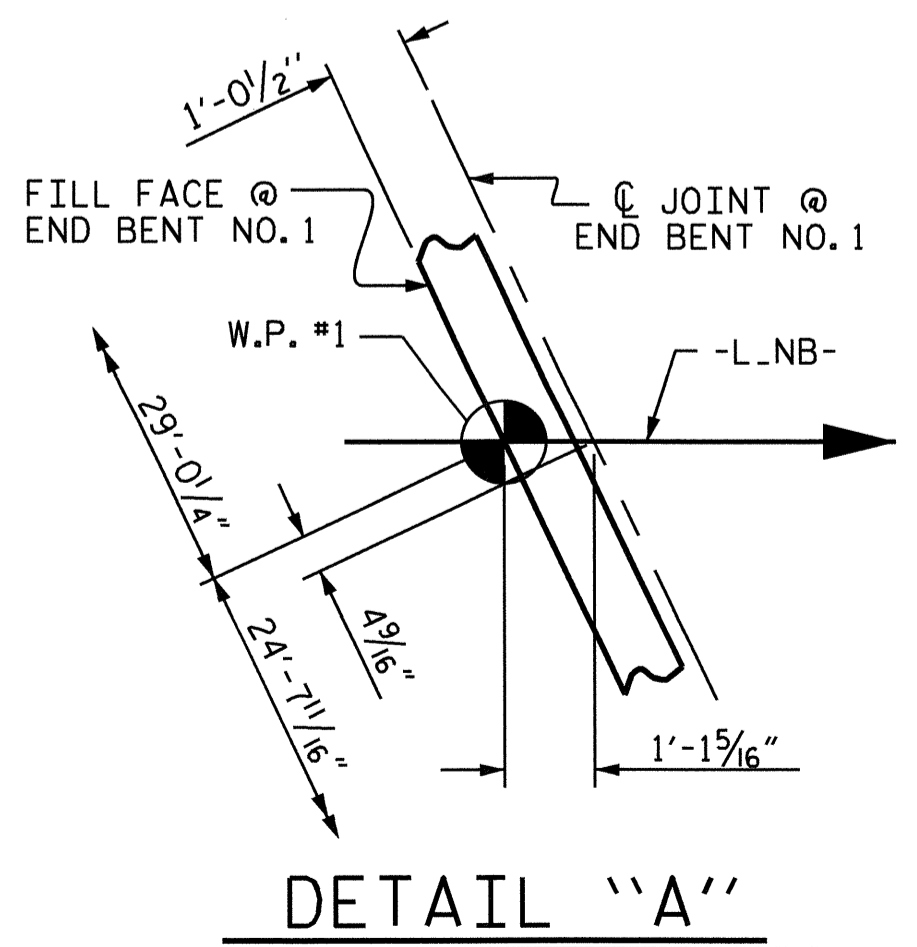
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			36

DRAWN BY: W.D. CRUTCHER DATE: 3-10-11  
 CHECKED BY: M.G. CHEEK DATE: 5-11





PLAN OF SPAN A



PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

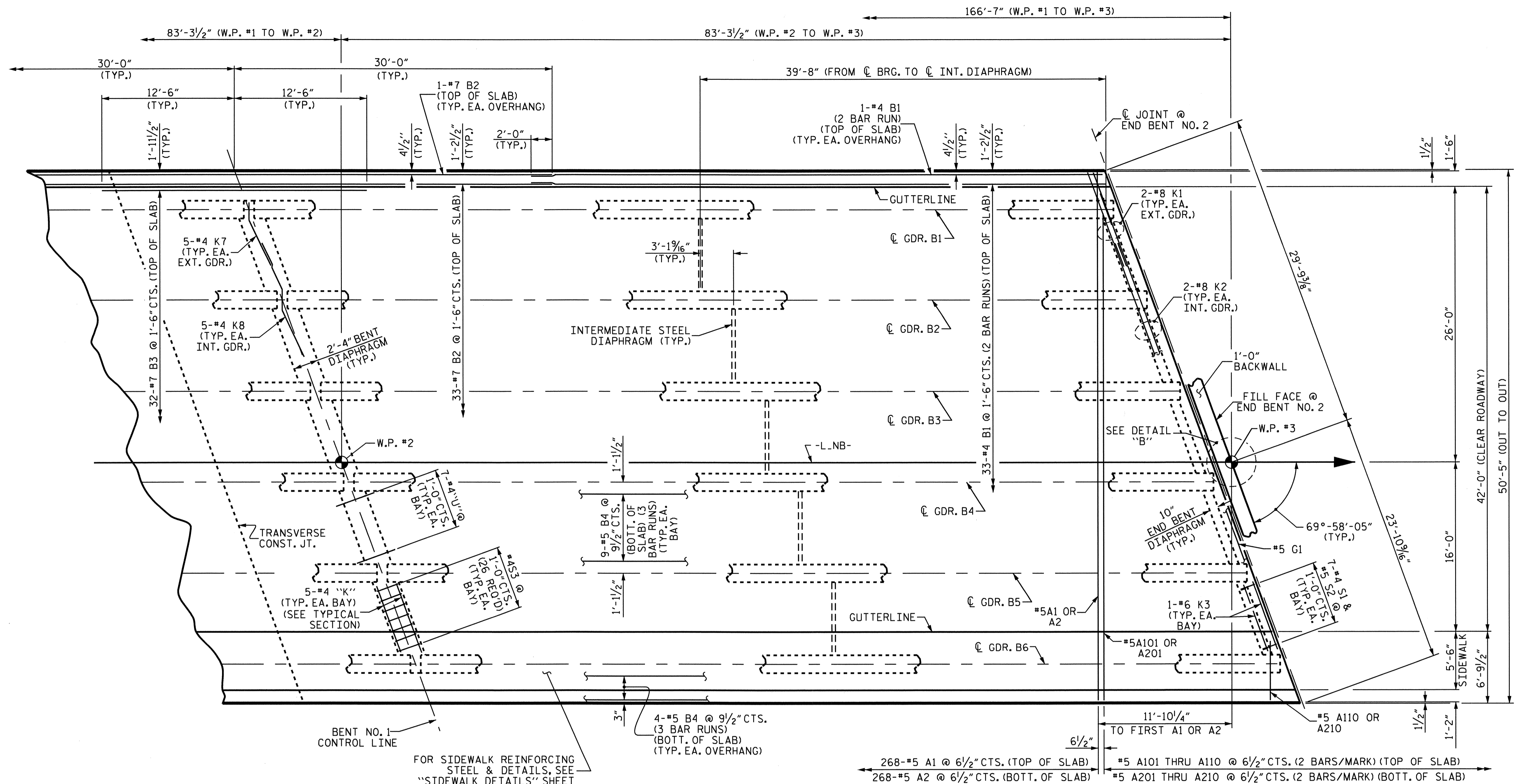
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPAN A



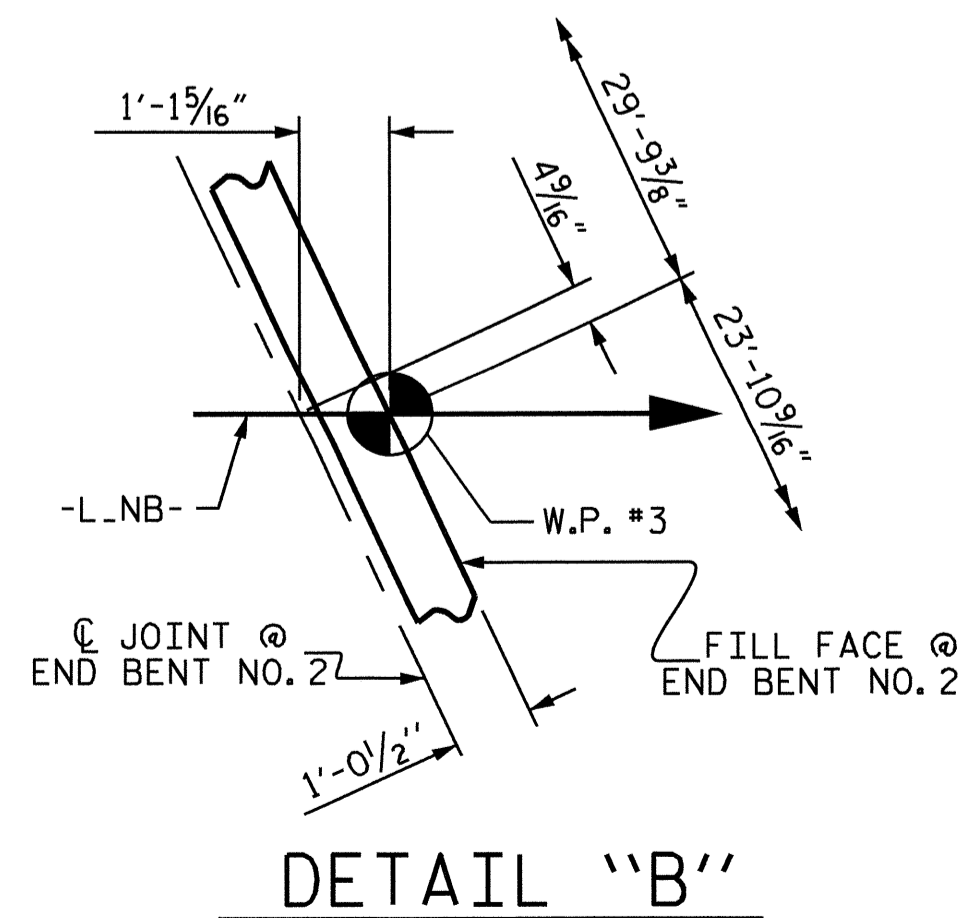
DRAWN BY : W.D. CRUTCHER DATE : 3-14-11  
 CHECKED BY : M.G. CHEEK DATE : 5-11

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

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 dahodge



PLAN OF SPAN B



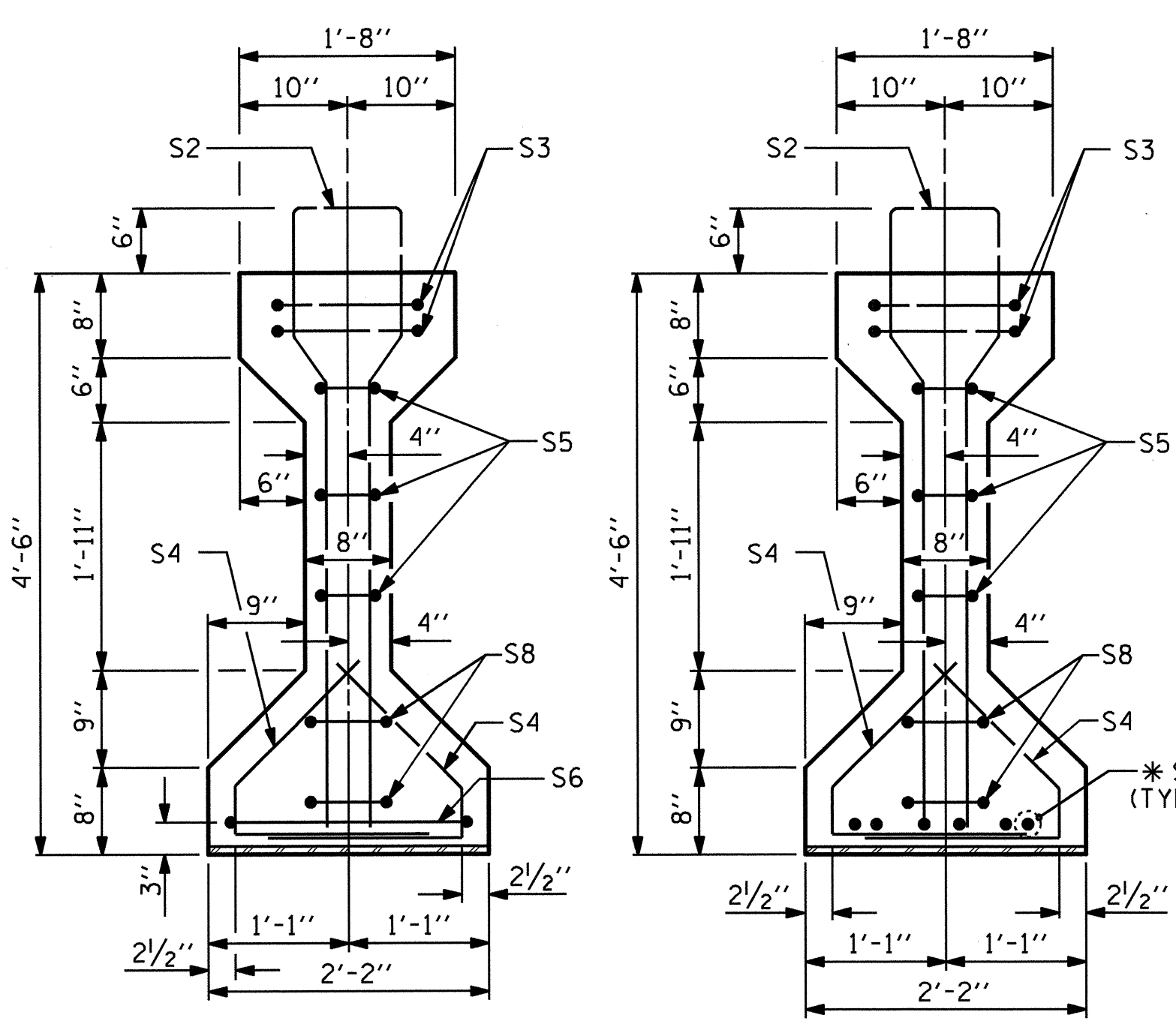
PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L\_NB-

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUPERSTRUCTURE PLAN OF SPAN B					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					S-8
					TOTAL SHEETS 36

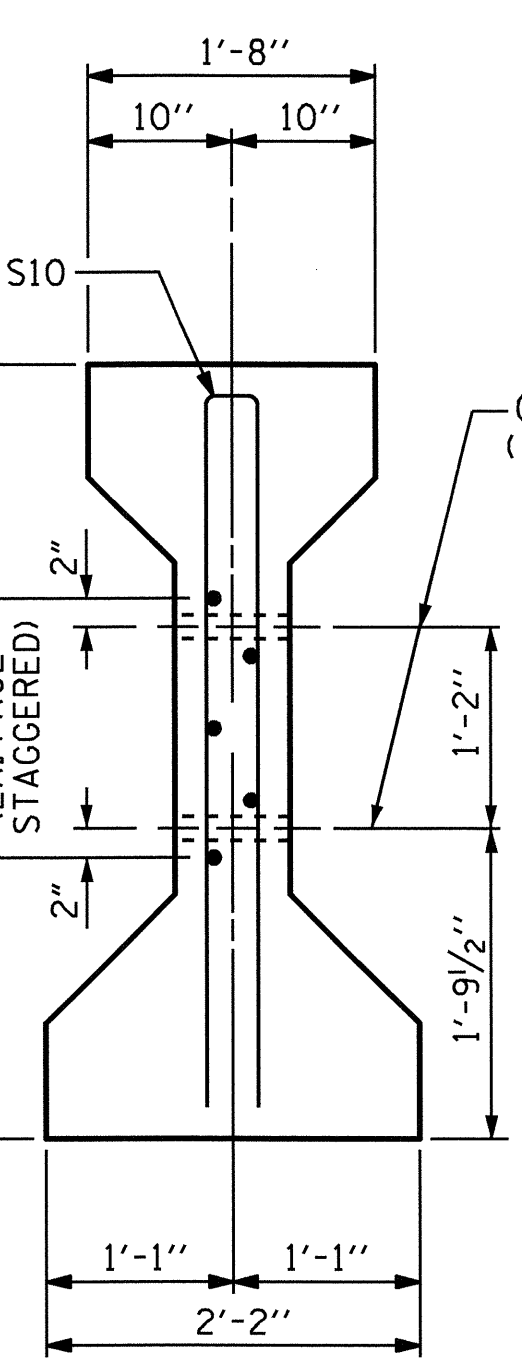


DRAWN BY: W.D. CRUTCHER DATE: 3-14-11  
 CHECKED BY: M.G. CHEEK DATE: 5-11

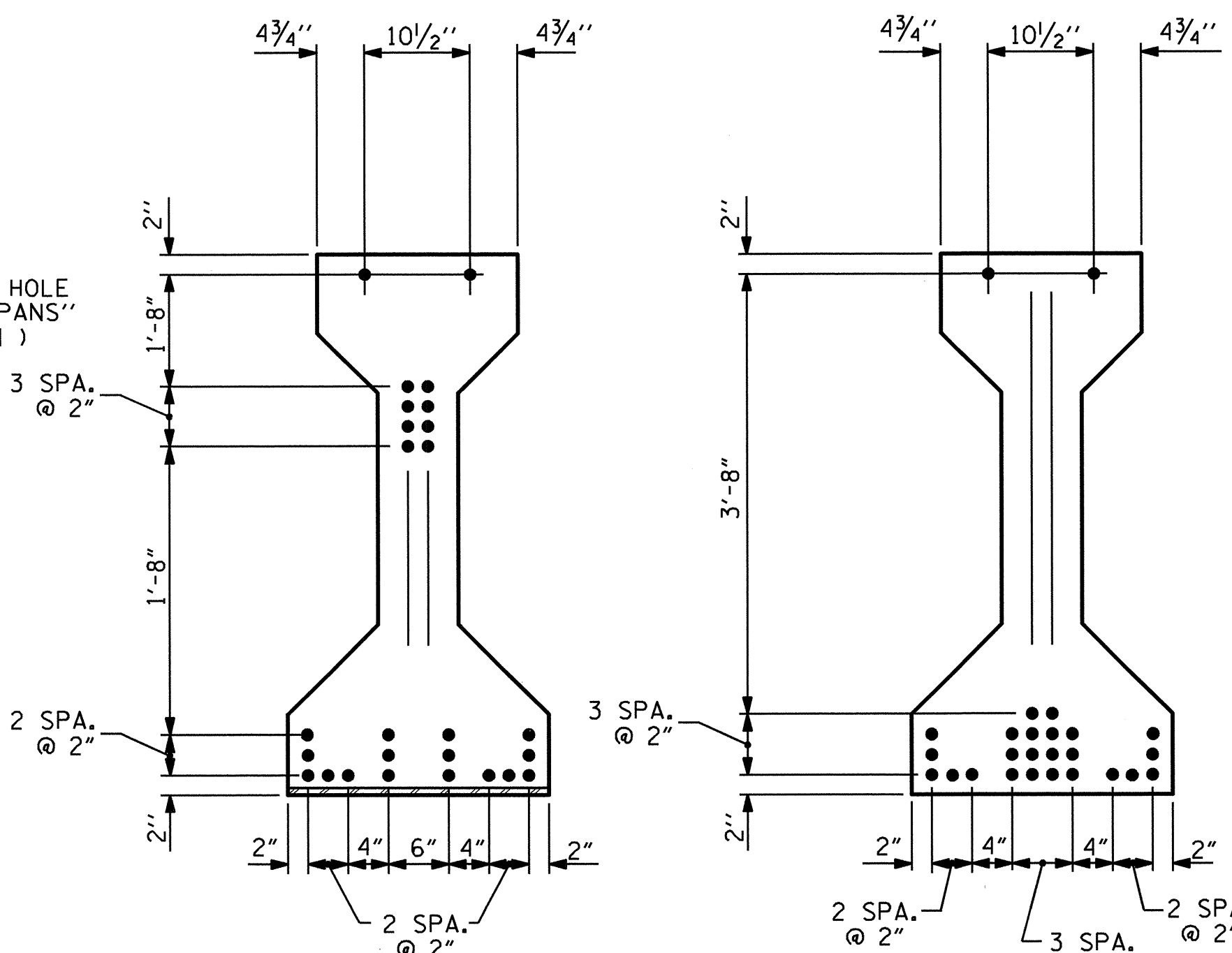
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 dphodge



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



1/2" Ø FORMED HOLE (SEE "PLAN OF SPANS" FOR LOCATION)



AT END OF GIRDER  
AT C OF GIRDER  
0.6" Ø LOW RELAXATION STRAND LAYOUT

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

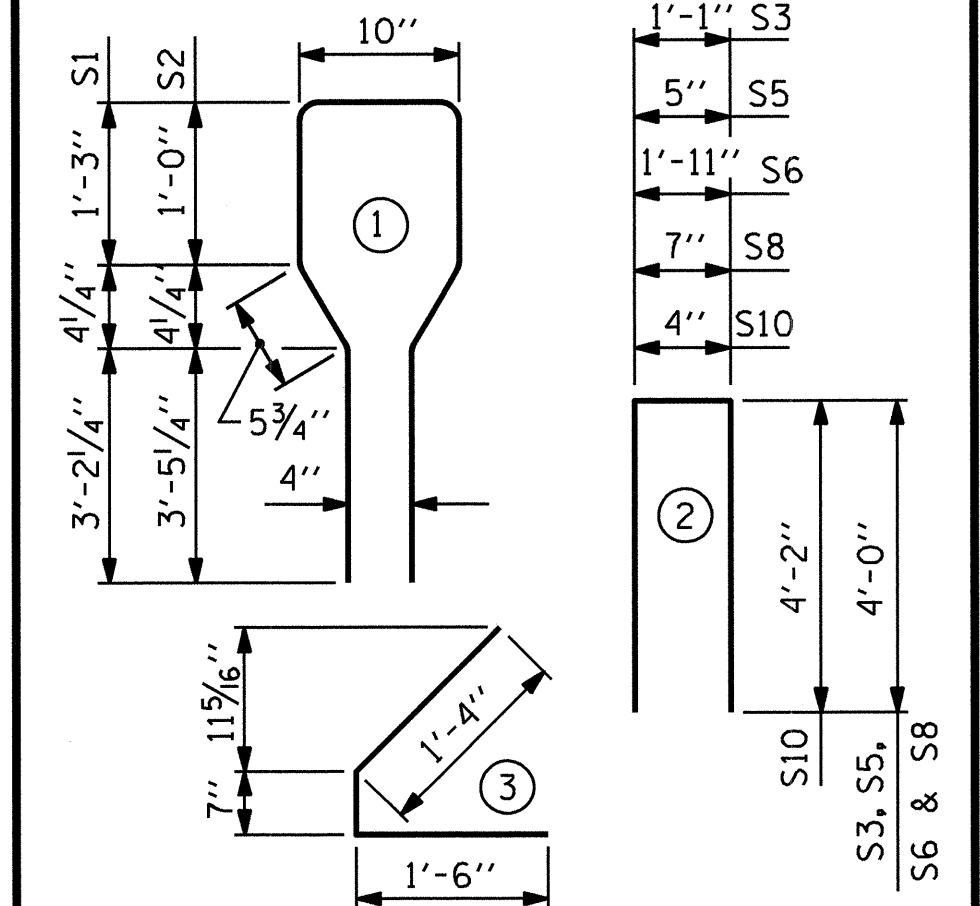
REINFORCING STEEL FOR ONE GIRDER					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	75	#4	1	10'-8"	534
S2	12	#6	1	10'-8"	192
S3	4	#4	2	9'-1"	24
S4	64	#4	3	3'-5"	146
S5	6	#4	2	8'-5"	34
S6	1	#4	2	9'-11"	7
*S7	6	#5	STR	3'-8"	23
S8	4	#4	2	8'-7"	23
S9	1	#3	STR	1'-10"	1
EXTERIOR GDR. S10	2	#5	2	8'-8"	18
INTERIOR GDR. S10	4	#5	2	8'-8"	36
EXTERIOR GDR. S11	5	#4	STR	7'-0"	23
INTERIOR GDR. S12	5	#4	STR	10'-2"	34

EXTERIOR GDR. S10  
INTERIOR GDR. S10  
EXTERIOR GDR. S11  
INTERIOR GDR. S12

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

BAR TYPES

ALL BAR DIMENSIONS ARE OUT-TO-OUT



QUANTITIES FOR ONE GIRDER

	REINFORCING STEEL LB.	5000 PSI CONCRETE C.Y.	0.6" Ø L. R. STRANDS
EXTERIOR GIRDER	1025	16.5	26
INTERIOR GIRDER	1054	16.5	26

GIRDERS REQUIRED

NUMBER	LENGTH	TOTAL LENGTH
SPAN A	6	81'-2 1/4"
SPAN B	6	81'-2 1/4"

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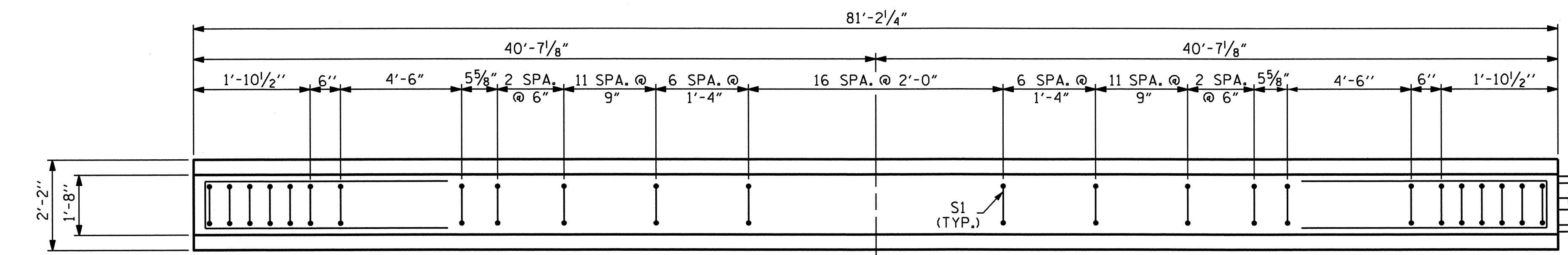
SHEET 1 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
AASHTO TYPE IV  
PRESTRESSED CONCRETE GIRDER  
CONTINUOUS FOR LIVE LOAD

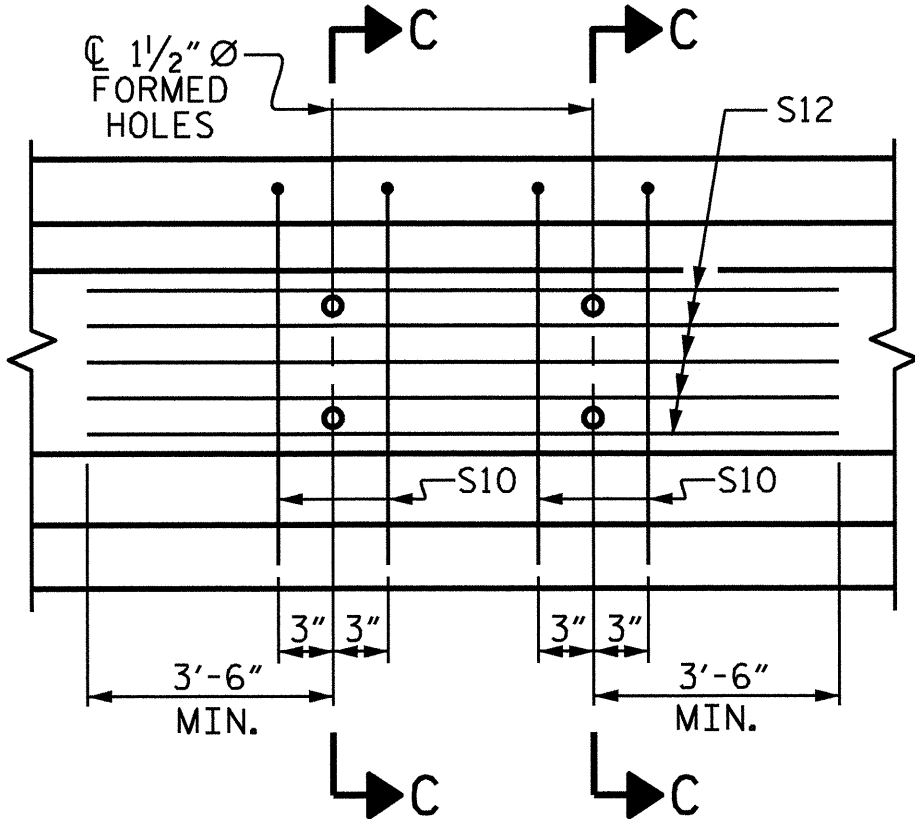
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.	
S-9	
TOTAL SHEETS	
36	

STD. NO. PCG6

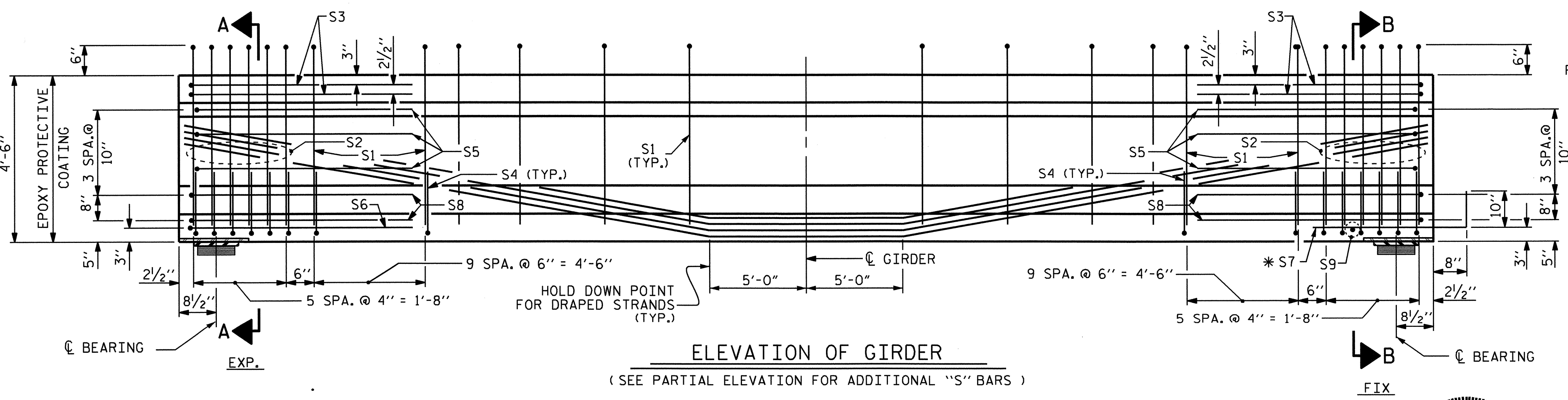


PLAN OF GIRDER



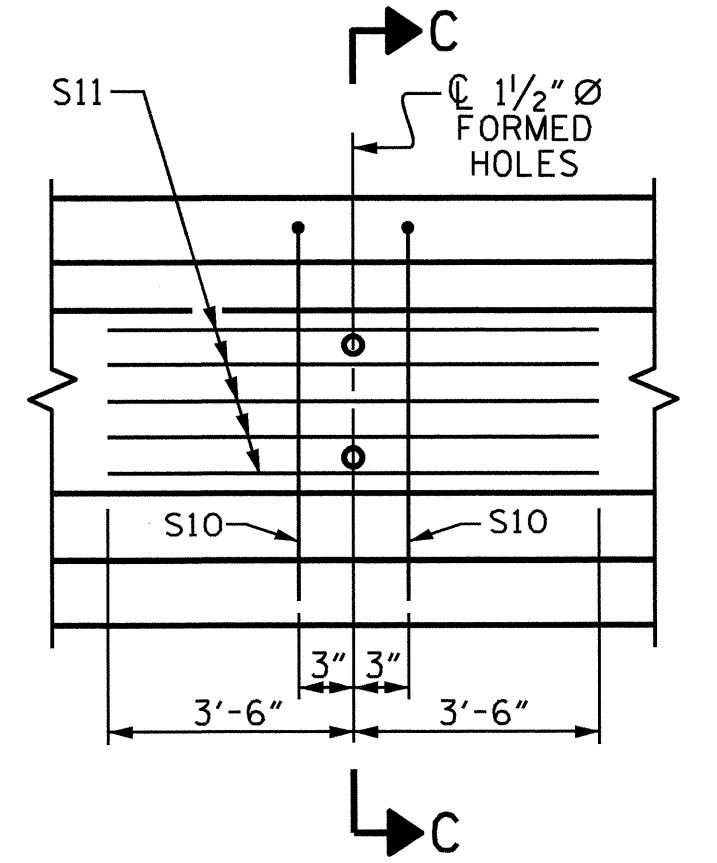
PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDERS #2 THRU #5



ELEVATION OF GIRDER

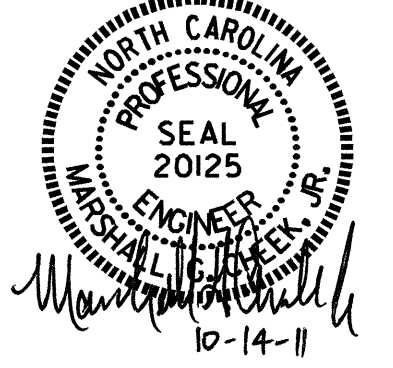
(SEE PARTIAL ELEVATION FOR ADDITIONAL "S" BARS)



PARTIAL ELEVATION

SHOWING INTERMEDIATE DIAPHRAGM REINFORCING STEEL FOR GIRDER #1 AND #6

ASSEMBLED BY : W.D. CRUTCHER	DATE : 3-16-11
CHECKED BY : M.G. CHEEK	DATE : 5-11
DRAWN BY : ELR 8/91	REV. 7/17/98 RWW/LES
CHECKED BY : GRP 8/91	REV. 10/17/00R RWW/LES
	REV. 5/1/06R TLA/GM



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. BEVEL EDGES OF PLATE "B-1" TO GIVE CLOSE FIT BUT NOT TIGHT FIT TO STEEL CASTING FORM.

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

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

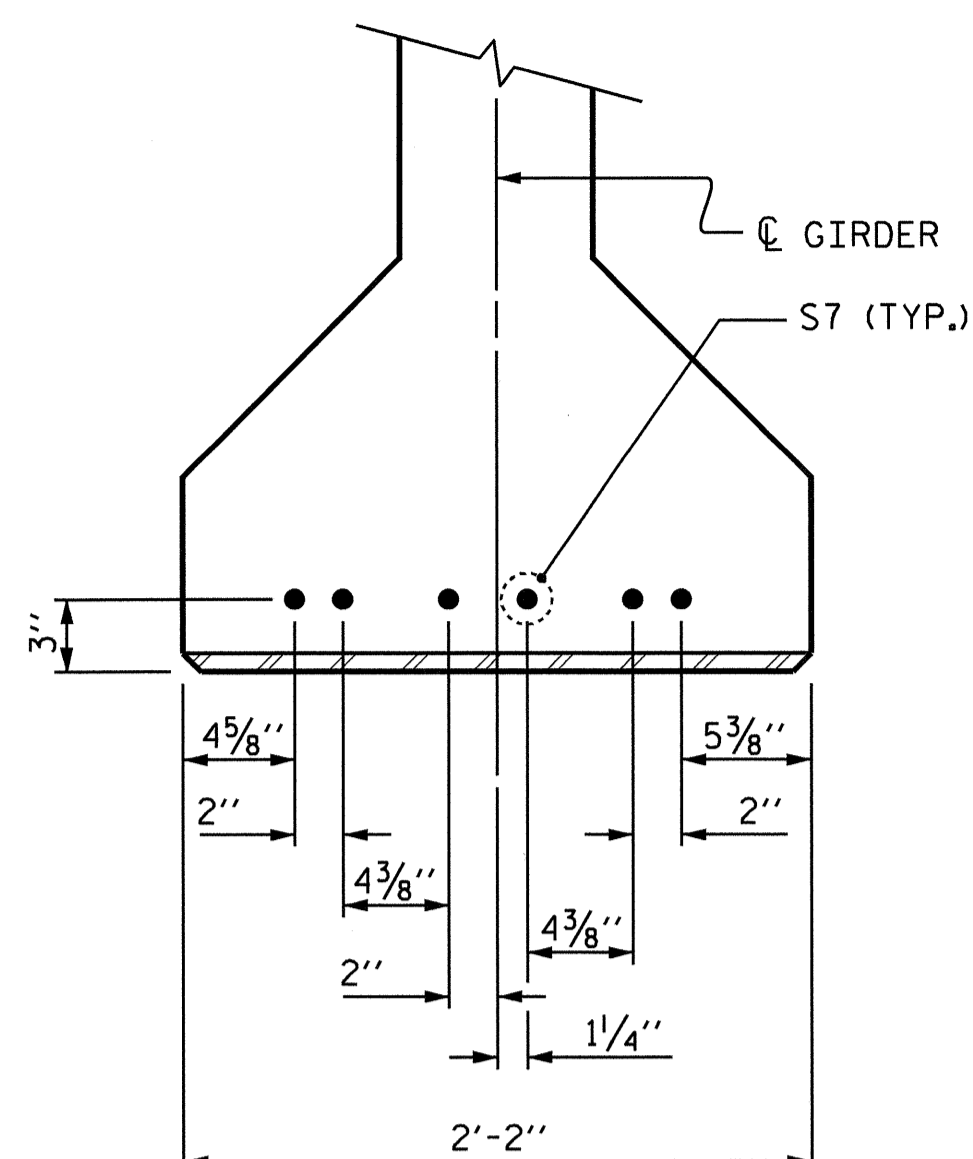
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4000 PSI.

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.

FOR PRESTRESSED CONCRETE MEMBERS, SEE SPECIAL PROVISIONS.



DETAIL "A"

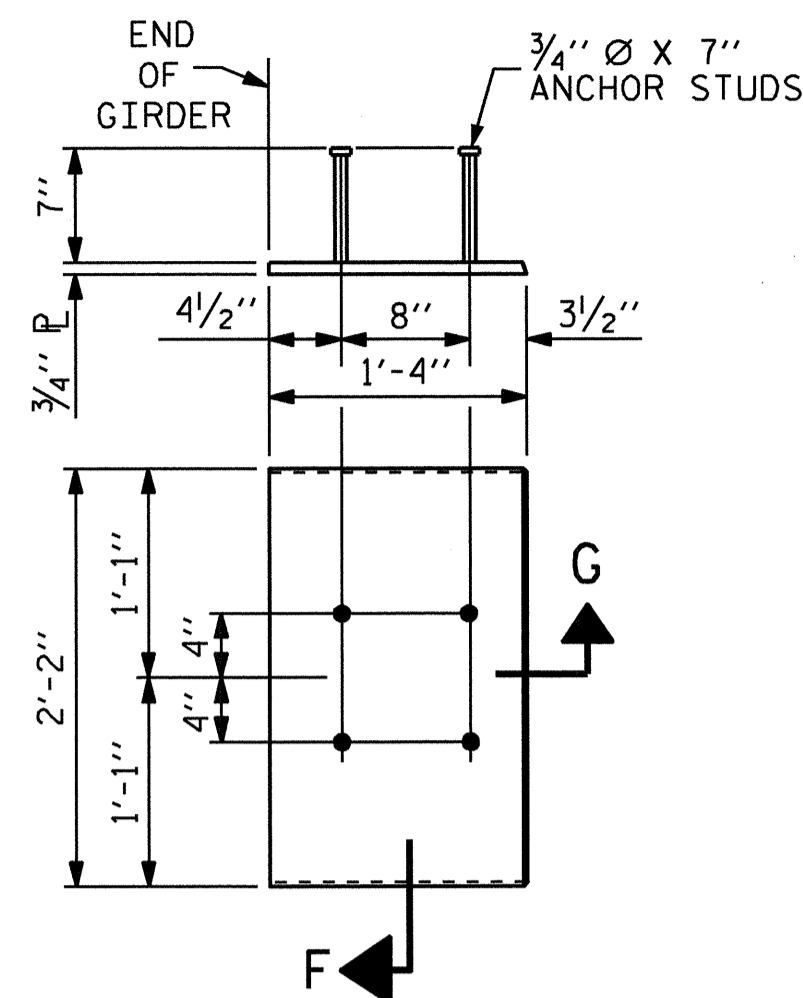
1/4" BEVEL EDGE

SECTION "G"

3/4" BEVEL EDGE

SECTION "F"

(SEE NOTES)



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

(2 REQ'D PER GIRDER)

DEAD LOAD DEFLECTION TABLE FOR GIRDERS

0.6" Ø LOW RELAXATION	SPANS A & B																																	
	GIRDER #1												GIRDERS #2 THRU #5												GIRDER 6									
	TENTH POINTS	℄ BRG.	.1	.2	.3	.4	.5	.6	.7	.8	.9	℄ BRG.	℄ BRG.	.1	.2	.3	.4	.5	.6	.7	.8	.9	℄ BRG.	℄ BRG.	.1	.2	.3	.4	.5	.6	.7	.8	.9	℄ BRG.
CAMBER ( GIRDER ALONE IN PLACE )	↑	0.000	0.058	0.110	0.150	0.176	0.185	0.176	0.150	0.110	0.058	0.000	0.000	0.058	0.110	0.150	0.176	0.185	0.176	0.150	0.110	0.058	0.000	0.000	0.058	0.110	0.150	0.176	0.185	0.176	0.150	0.110	0.058	0.000
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0.000	0.027	0.050	0.069	0.081	0.085	0.081	0.069	0.050	0.027	0.000	0.000	0.027	0.051	0.070	0.082	0.087	0.082	0.070	0.051	0.027	0.000	0.000	0.028	0.052	0.071	0.084	0.088	0.084	0.071	0.052	0.028	0.000
FINAL CAMBER	↑	0	3/8"	11/16"	1"	1 1/8"	1 3/16"	1 1/8"	1"	11/16"	3/8"	0	0	3/8"	11/16"	1 5/16"	1 1/8"	1 3/16"	1 1/8"	1 5/16"	1 1/16"	3/8"	0	0	3/8"	11/16"	1 5/16"	1 1/8"	1 3/16"	1 1/8"	1 5/16"	1 1/16"	3/8"	0

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

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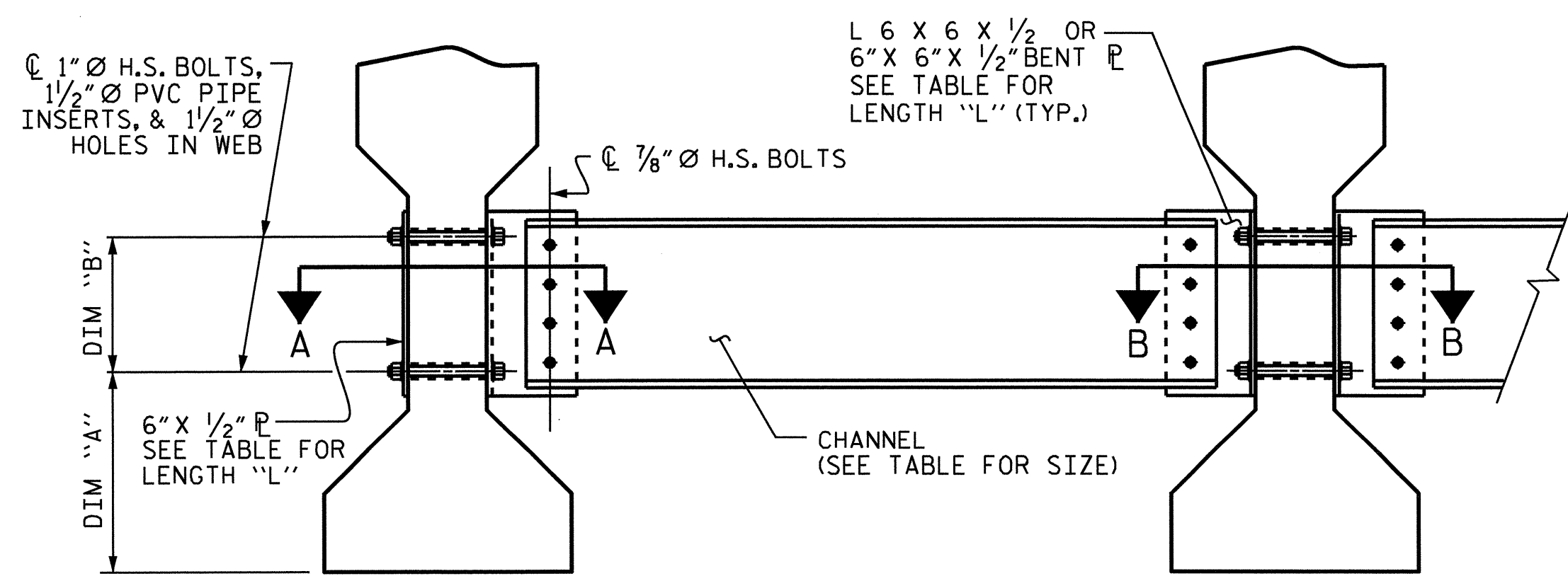
SHEET 2 OF 3

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

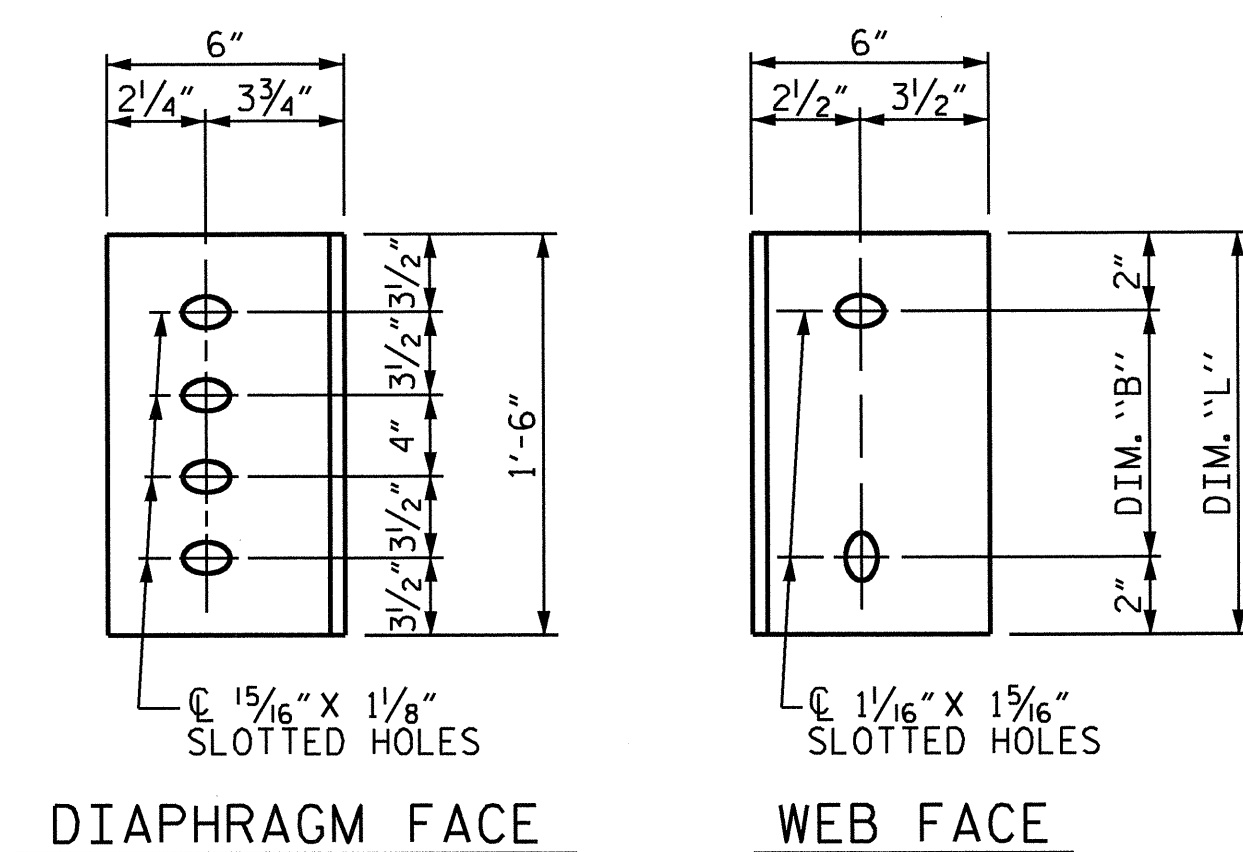


ASSEMBLED BY : W.D. CRUTCHER DATE : 3-16-11  
CHECKED BY : M.G. CHEEK DATE : 5-11  
DRAWN BY : ELR 11/91 REV. 10/17/00 RWW/LES  
CHECKED BY : GRP 11/91 REV. 7/10/01RR LES/RDR  
REV. 5/1/06 TLA/GM

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



EXTERIOR GIRDER INTERIOR GIRDER  
PART SECTION AT INTERMEDIATE DIAPHRAGM



DIAPHRAGM FACE WEB FACE  
CONNECTOR PLATE DETAILS

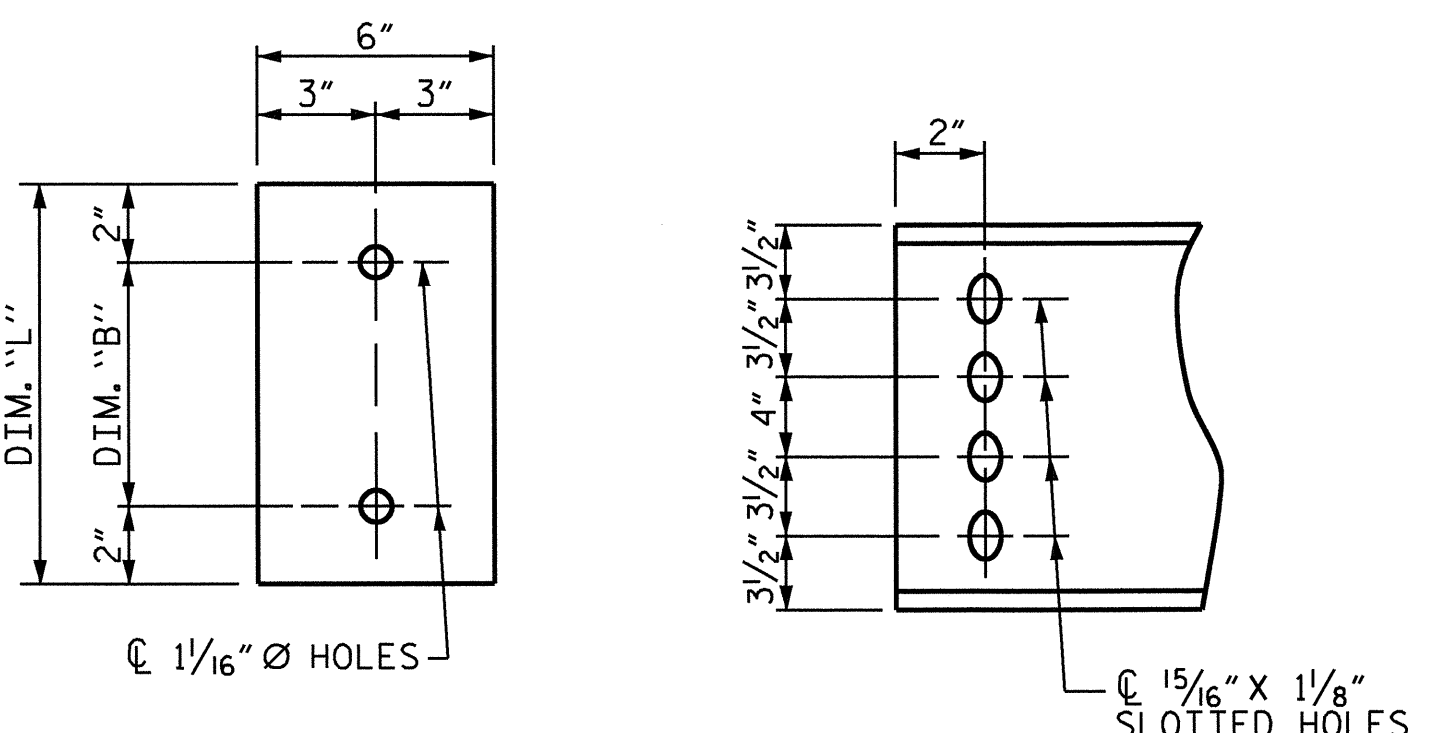
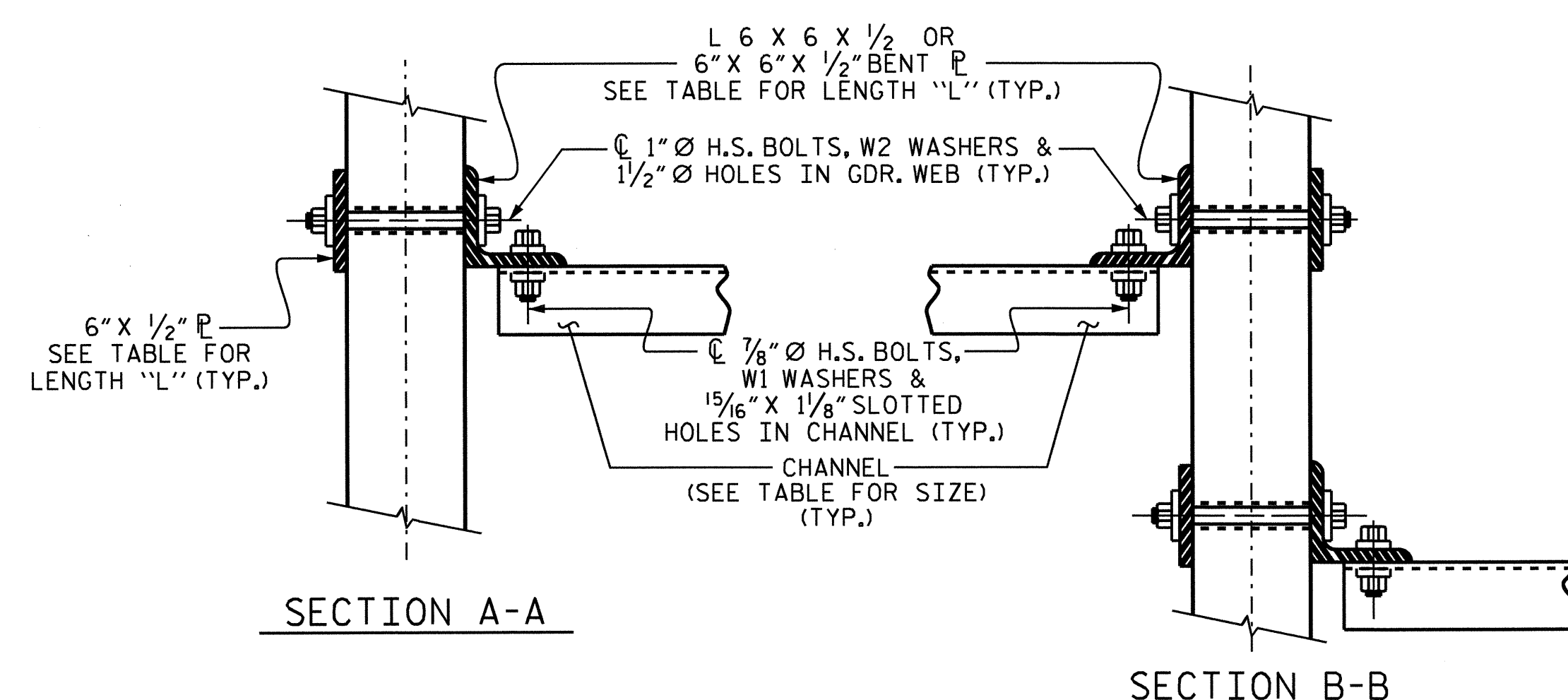
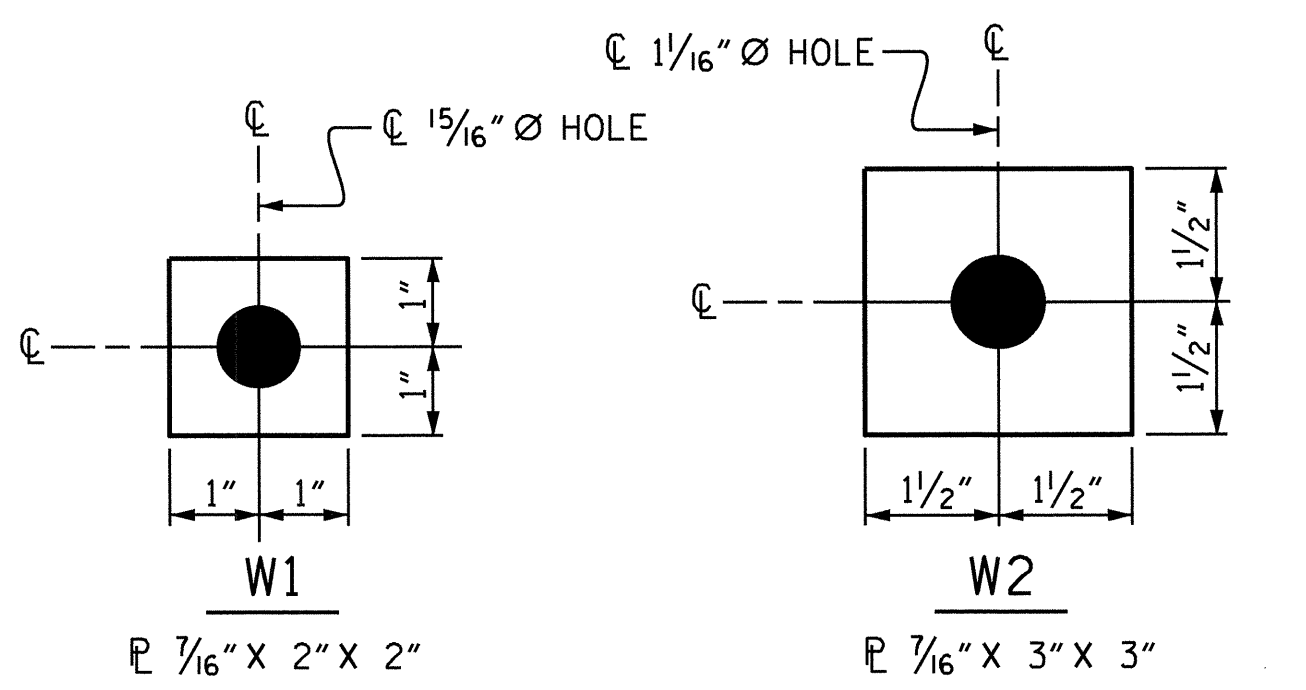


PLATE DETAILS CHANNEL END



SECTION A-A SECTION B-B  
CONNECTION DETAILS



USE WITH 7/8" HVY. HEX NUTS & DIRECT TENSION INDICATOR WASHERS AT DIAPHRAGM CHANNEL TO CONNECTOR PLATE CONNECTIONS  
USE WITH 1" HVY. HEX NUTS AT CONNECTOR PLATE TO GIRDER CONNECTIONS

WASHER DETAILS

STRUCTURAL STEEL NOTES

ALL INTERMEDIATE DIAPHRAGM STEEL, CONNECTOR PLATES AND PLATE WASHERS SHALL BE AASHTO M270 GRADE 50 OR APPROVED EQUAL.  
TENSION ON THE AASHTO M164 BOLTS THROUGH THE CHANNEL MEMBER SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR DIRECT TENSION INDICATORS, SEE SPECIAL PROVISIONS.  
TENSION ON THE AASHTO M164 BOLTS THROUGH THE GIRDER WEB SHALL BE SNUG TIGHTENED FOLLOWED BY AN ADDITIONAL 1/4 TURN.  
THE PLATES, BENT PLATES, CHANNELS, ANGLES, AND PLATE WASHERS SHALL BE GALVANIZED OR METALLIZED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.  
FOR METALLIZATION, APPLY AN 8 MIL THICK 99.99 PERCENT ZINC (W-Zn-1) THERMAL SPRAYED COATING WITH A 0.5 MIL THICK SEAL COAT TO ALL STEEL DIAPHRAGM SURFACES IN ACCORDANCE WITH THE THERMAL SPRAYED COATINGS SPECIAL PROVISIONS AND SECTION 442 OF THE STANDARD SPECIFICATIONS.

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

USE A MINIMUM 7/16" THICK PLATE WASHER WITH STANDARD HOLES UNDER EACH BOLT HEAD AND NUT. THE PLATE WASHERS SHALL HAVE SUFFICIENT SIZE TO COVER THE HOLES AFTER INSTALLATION. HARDENED WASHERS AND DIRECT TENSION INDICATORS ARE TO BE USED IN CONJUNCTION WITH THE PLATE WASHERS IN THE CHANNEL MEMBER CONNECTION.

FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF 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.

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

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

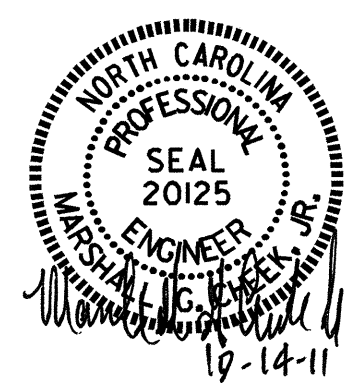
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.

TABLE

GIRDER TYPE	CHANNEL SIZE	DIM "A"	DIM "B"	DIM "L"
IV	MC 18 x 42.7	1'-9 1/2"	1'-2"	1'-6"

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SHEET 3 OF 3



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
INTERMEDIATE  
STEEL DIAPHRAGMS  
FOR TYPE IV  
PRESTRESSED CONCRETE  
GIRDERS

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

ASSEMBLED BY : W.D. CRUTCHER DATE : 3-17-11  
CHECKED BY : M.G. CHEEK DATE : 5-11  
DRAWN BY : TLA 6/05  
CHECKED BY : VC 6/05  
ADDED 10/21/05  
REV. 5/1/06RR KMM/GM

**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 BURIED WITH A SHARP POINTED TOOL.

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

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

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

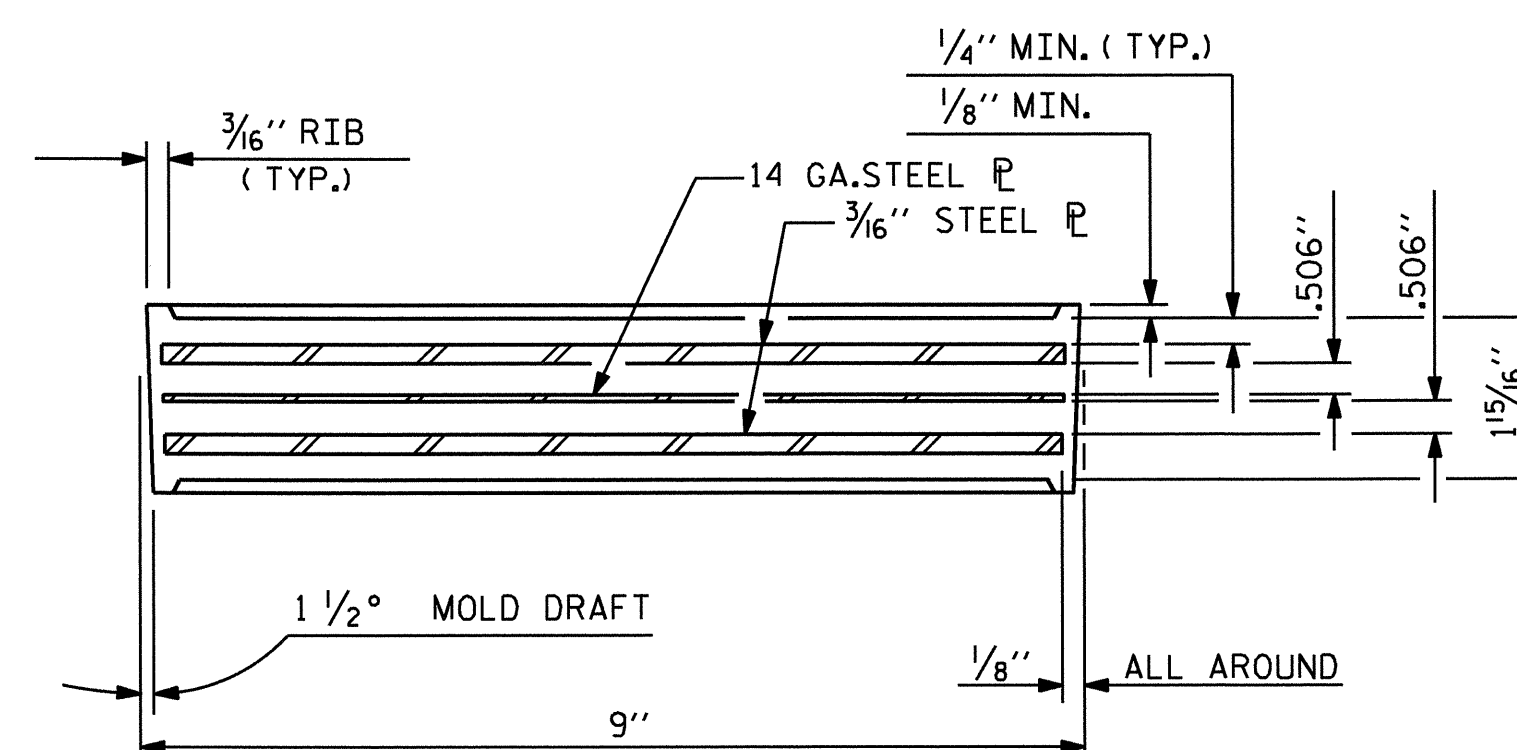
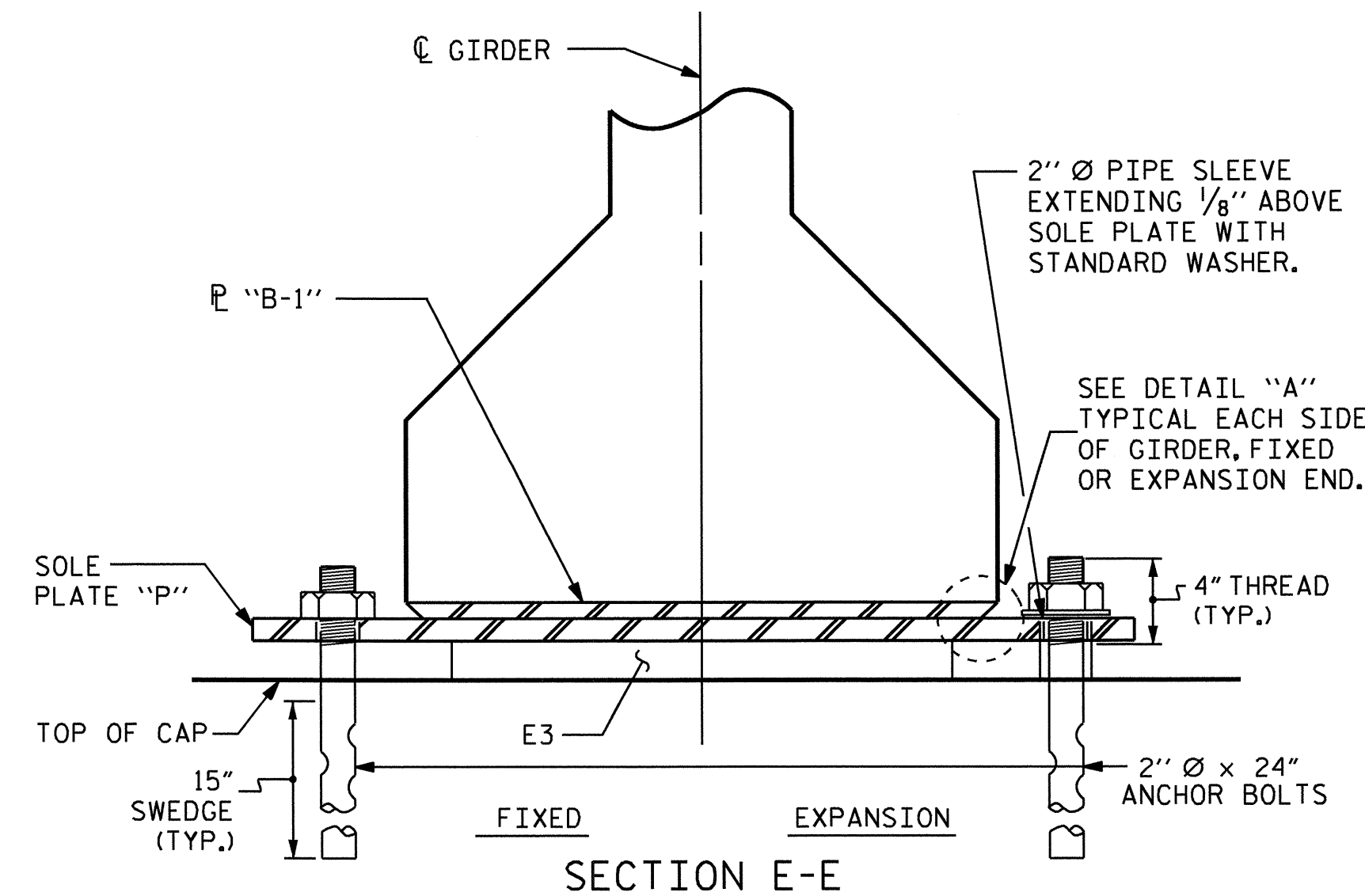
WHEN WELDING THE SOLE PLATE TO THE EMBEDDED PLATE IN THE GIRDER, USE TEMPERATURE INDICATING WAX PENS, OR OTHER SUITABLE MEANS, TO ENSURE THAT THE TEMPERATURE OF THE SOLE PLATE DOES NOT EXCEED 300°F. TEMPERATURES ABOVE THIS MAY DAMAGE THE ELASTOMER.

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

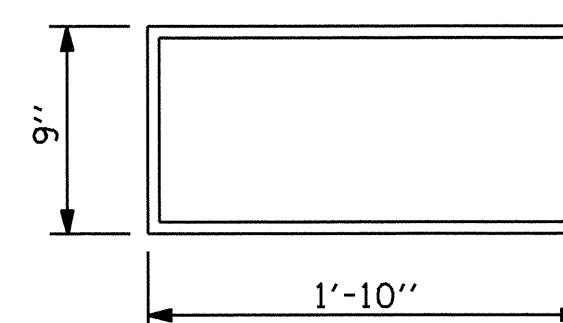
ANCHOR BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A449. NUTS SHALL MEET THE REQUIREMENTS OF AASHTO M291-DH OR AASHTO M292-2H. WASHERS SHALL MEET THE REQUIREMENTS OF AASHTO M293. SHOP DRAWINGS ARE NOT REQUIRED FOR ANCHOR BOLT, NUTS AND WASHERS. SHOP INSPECTION IS REQUIRED.

ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.



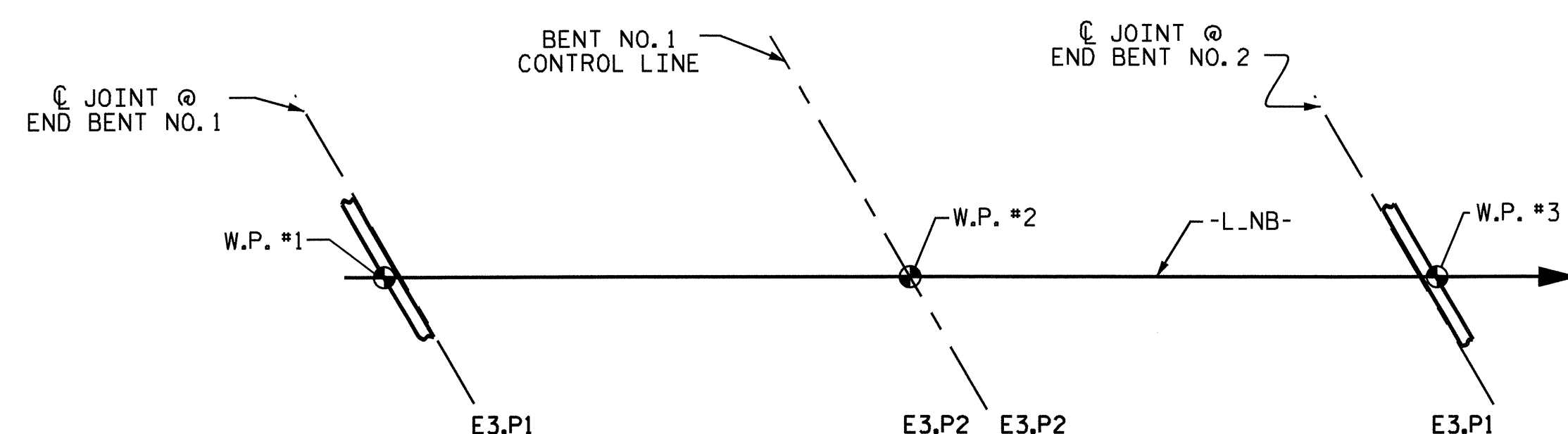
TYPICAL SECTION OF ELASTOMERIC BEARINGS



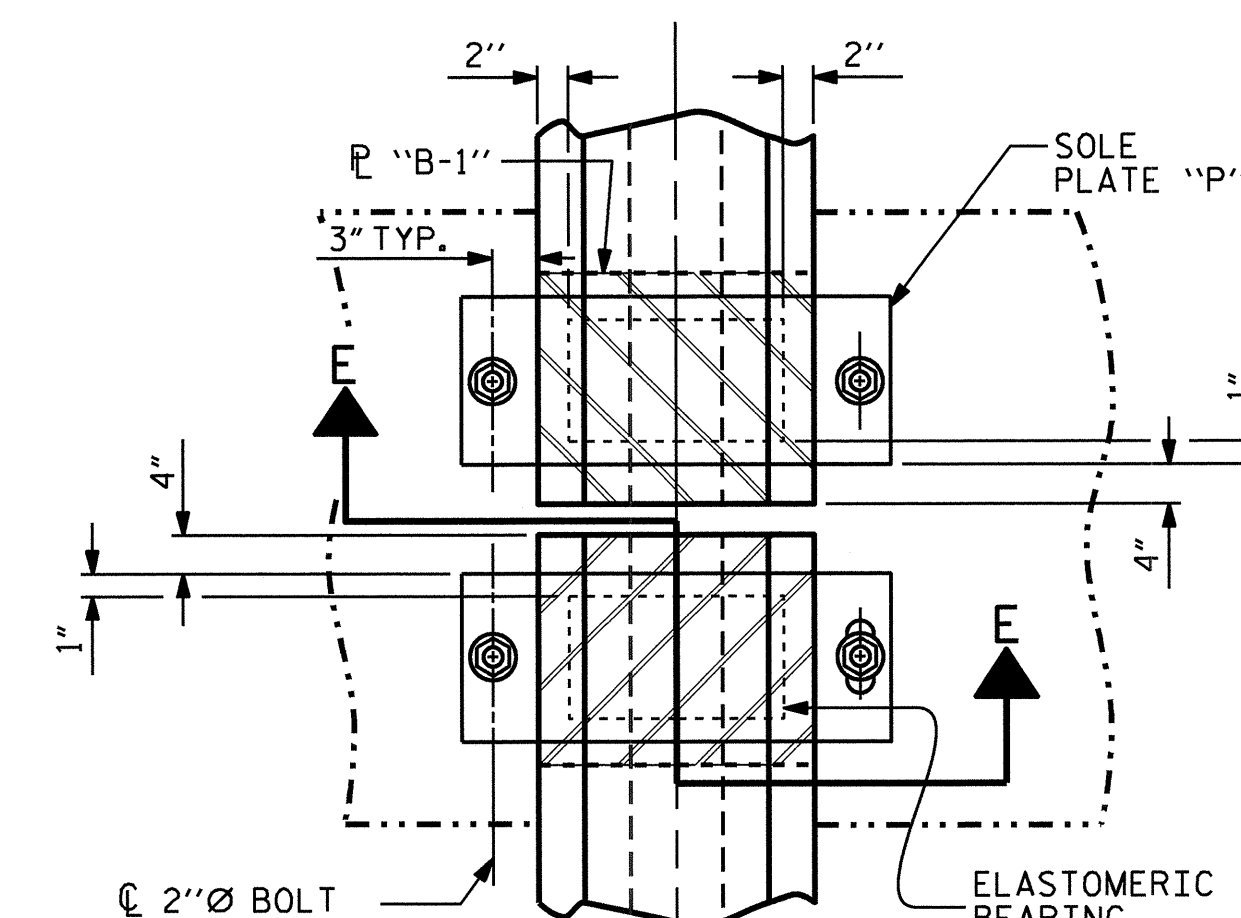
E3 (24 REQ'D)

PLAN VIEW OF ELASTOMERIC BEARING

TYPE IV

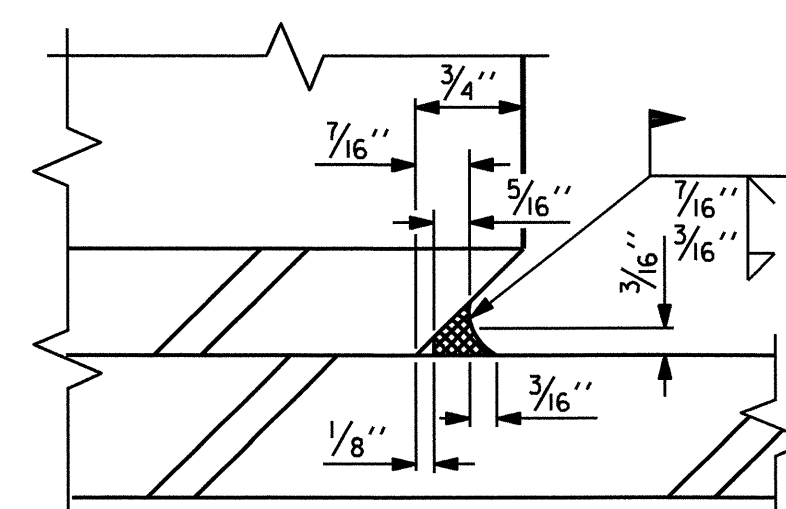


SOLE PLATE LOCATIONS

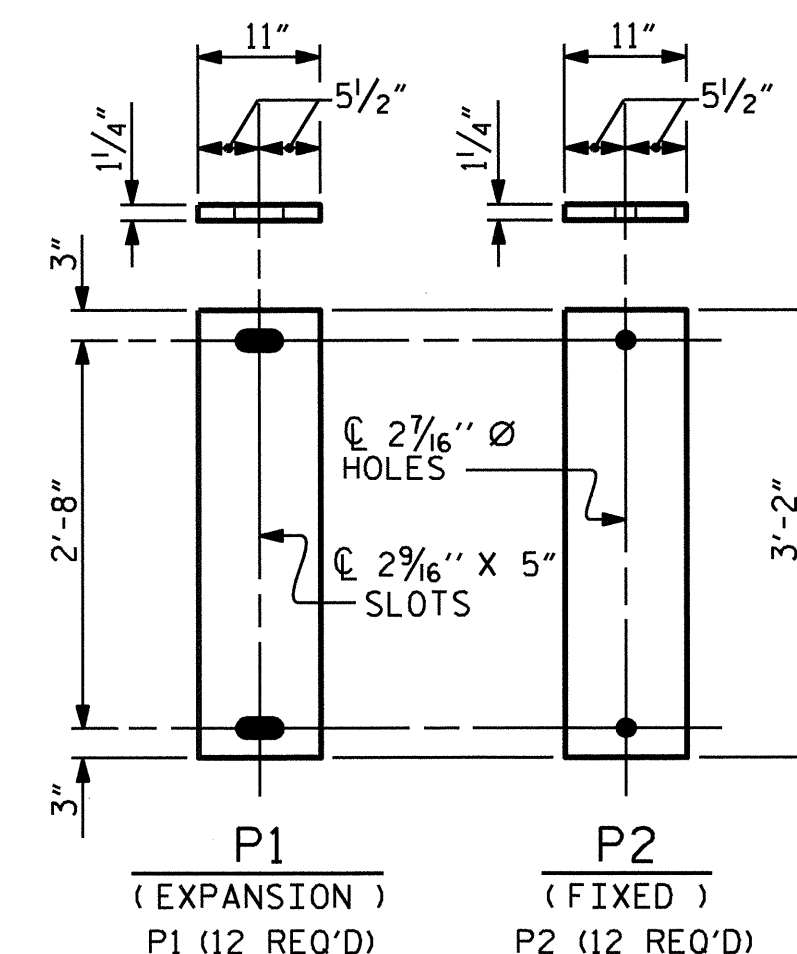


TYPICAL HALF-PLAN (SHOWING CONTINUOUS BENT)

TYPICAL HALF-PLAN (SHOWING SIMPLE SPAN BENT)



DETAIL "A"



SOLE PLATE DETAILS ("P")

- LOAD RATINGS -	
	MAX.D.L.+L.L.
54" PCG -TYPE IV	181 K

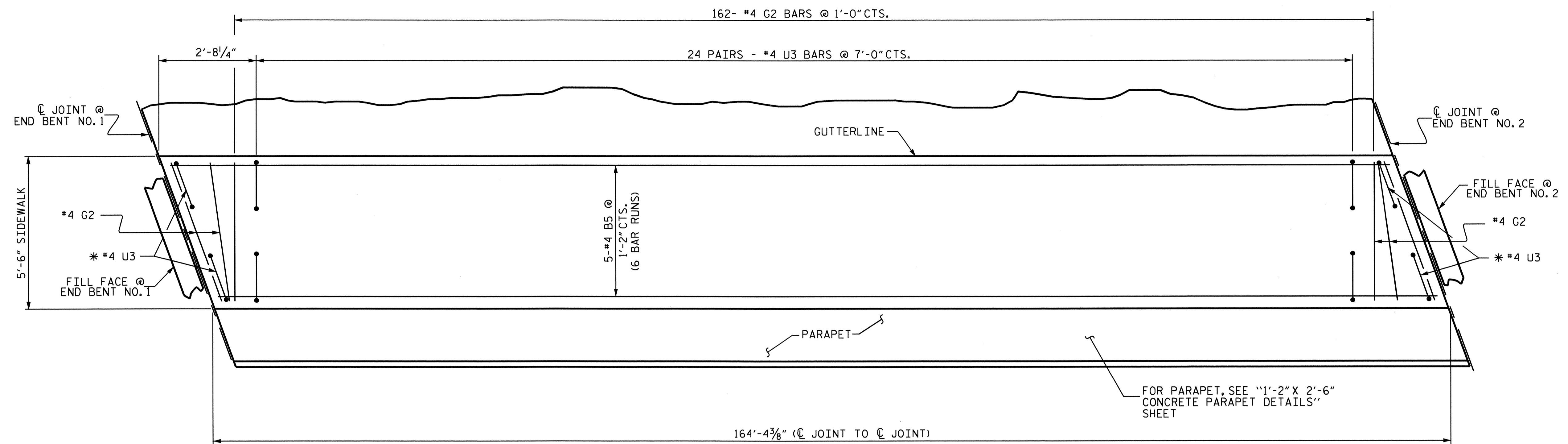


PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

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

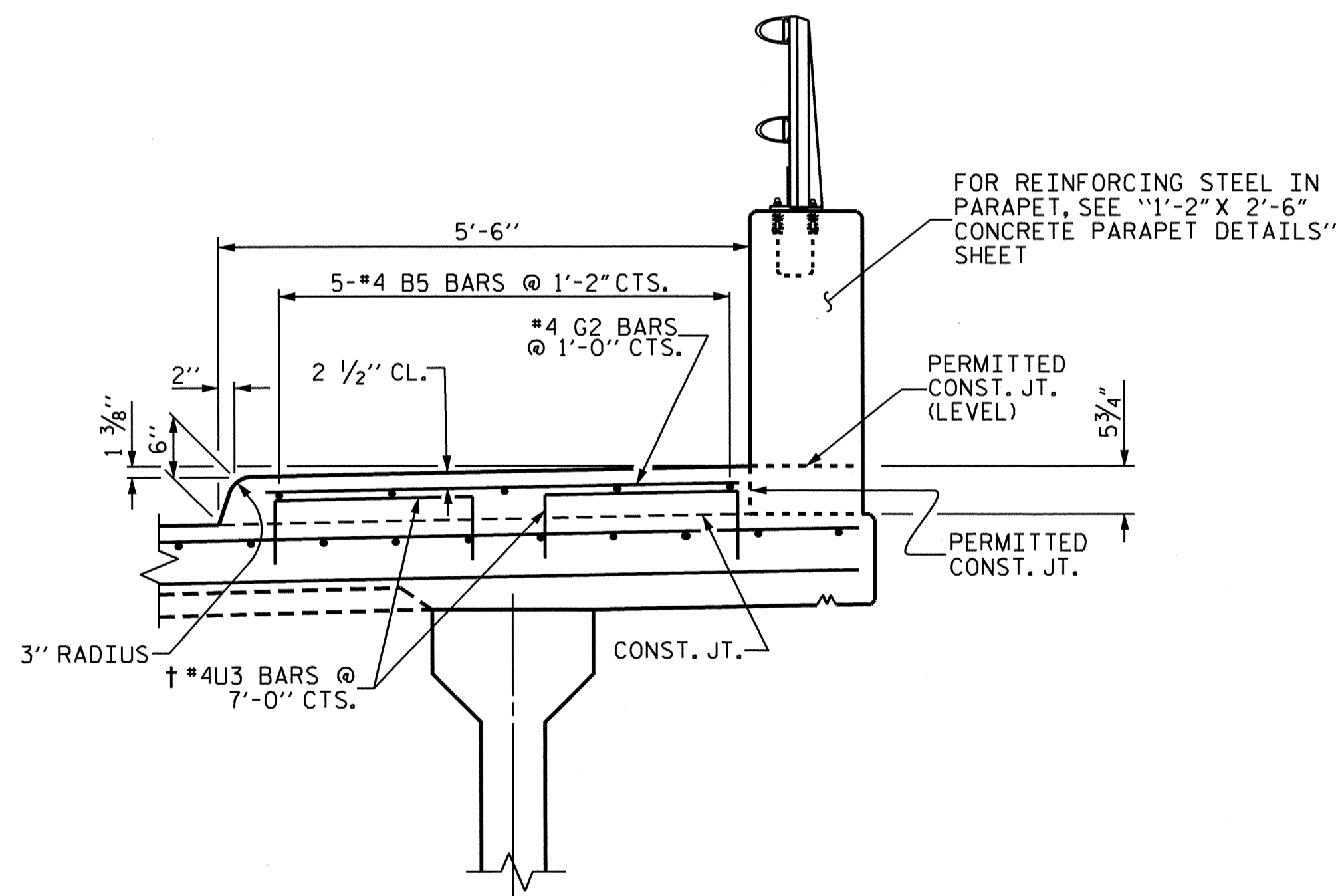
REVISIONS						SHEET NO. S-12
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 36
2			4			

ASSEMBLED BY : W.D. CRUTCHER	DATE : 3-16-11
CHECKED BY : M.G. CHEEK	DATE : 5-11
DRAWN BY : WJH 8/89	REV. 10/17/00 RWW/LES
CHECKED BY : CRK 8/89	REV. 7/10/01 RWW/LES
	REV. 5/1/06 TLA/GM



**PLAN**

\* THESE BARS ARE TO BE PLACED AFTER THE SAWING OF THE JOINT. THE HOLES SHALL BE DRILLED AND THE U3 BARS GROUTED INTO PLACE.



**SECTION THRU SIDEWALK**

† U3 BARS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.

**NOTES**

THE JOINTS IN THE DECK AT THE END BENTS SHALL BE SAWED PRIOR TO THE CASTING OF THE SIDEWALK.

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

ALL REINFORCING STEEL IN SIDEWALK SHALL BE EPOXY COATED.

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

PAYMENT FOR CLASS AA CONCRETE AND REINFORCING STEEL USED IN SIDEWALK ON THE BRIDGE DECK SHALL BE INCLUDED IN SO. FT. COST OF REINFORCED CONCRETE DECK SLAB.

SIDEWALK BILL OF MATERIAL						BAR TYPE
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
* B5	30	#4	STR	29'-9"	596	
* G2	166	#4	STR	5'-0"	554	
* U3	52	#4	1	3'-2"	110	
* EPOXY COATED REINF. STEEL =					1260 LBS.	
CLASS AA CONCRETE =					19.9 C.Y.	ALL BAR DIMENSIONS ARE OUT TO OUT

\* THESE BARS ARE EPOXY COATED

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

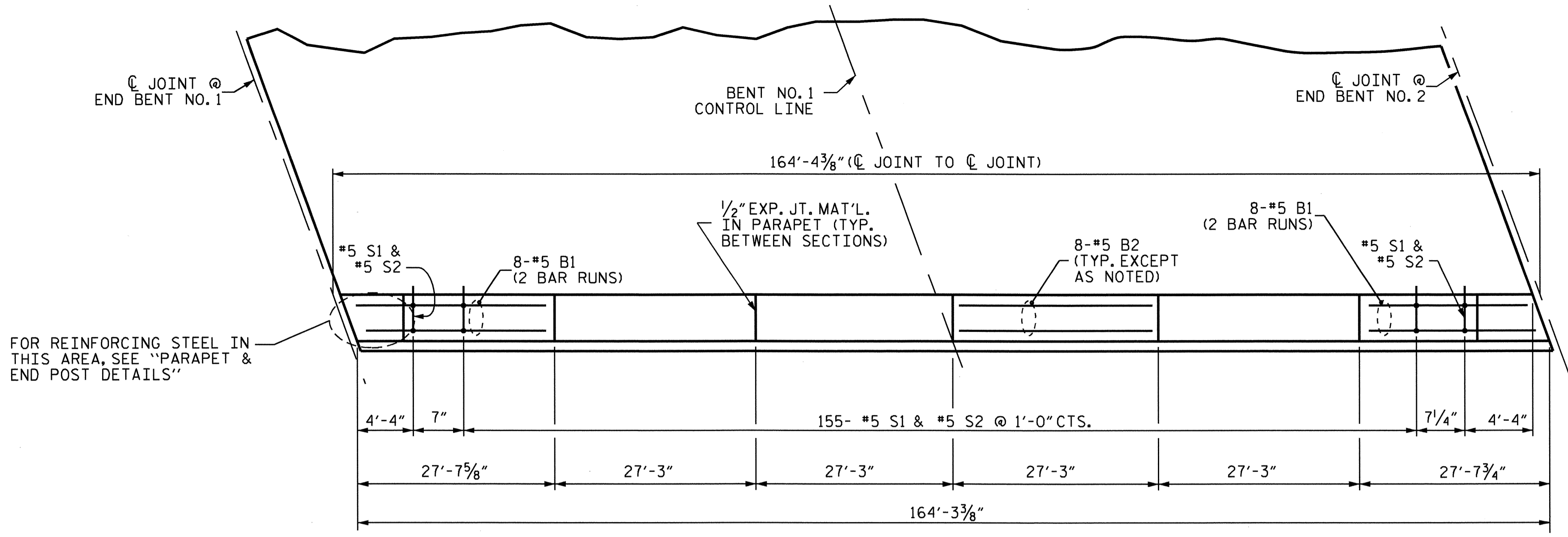
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 SIDEWALK DETAILS

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

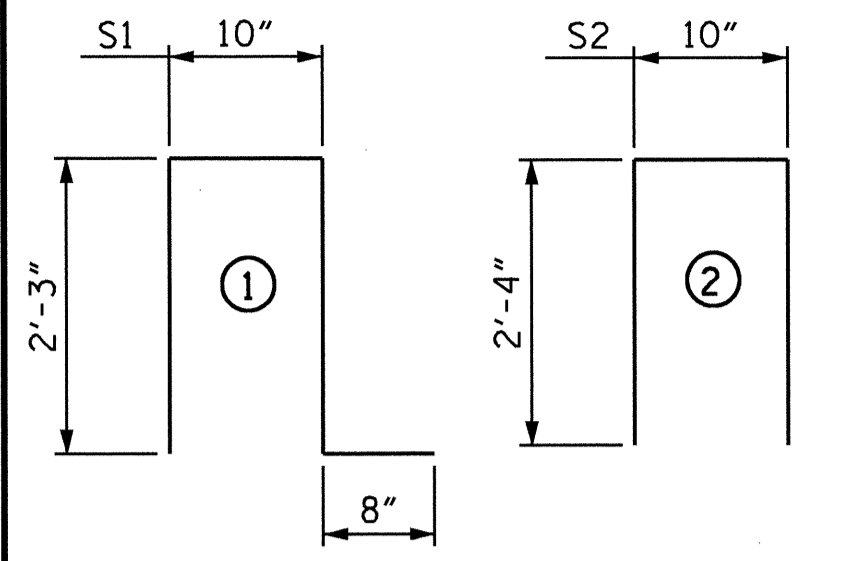


DRAWN BY : W.D. CRUTCHER DATE : 3-21-11  
 CHECKED BY : M.G. CHEEK DATE : 5-11

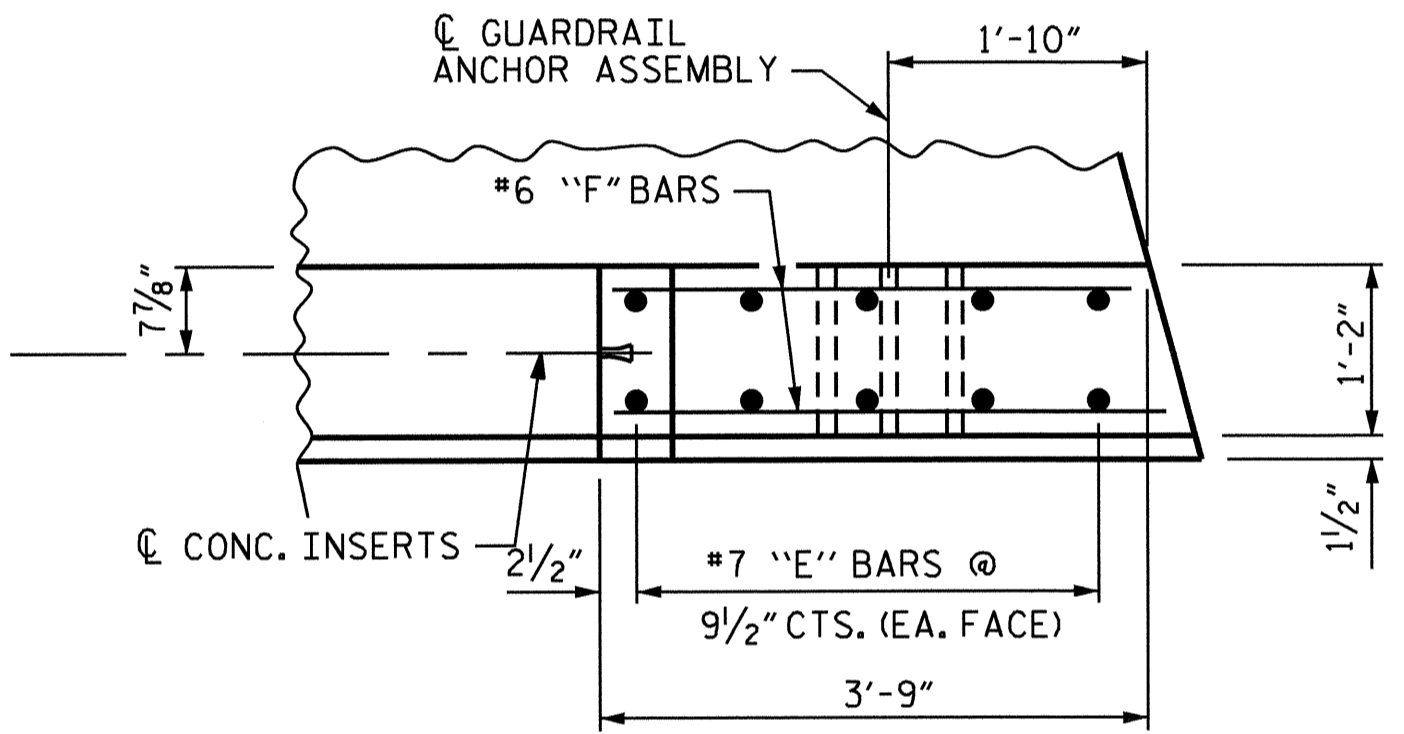


PLAN OF PARAPET

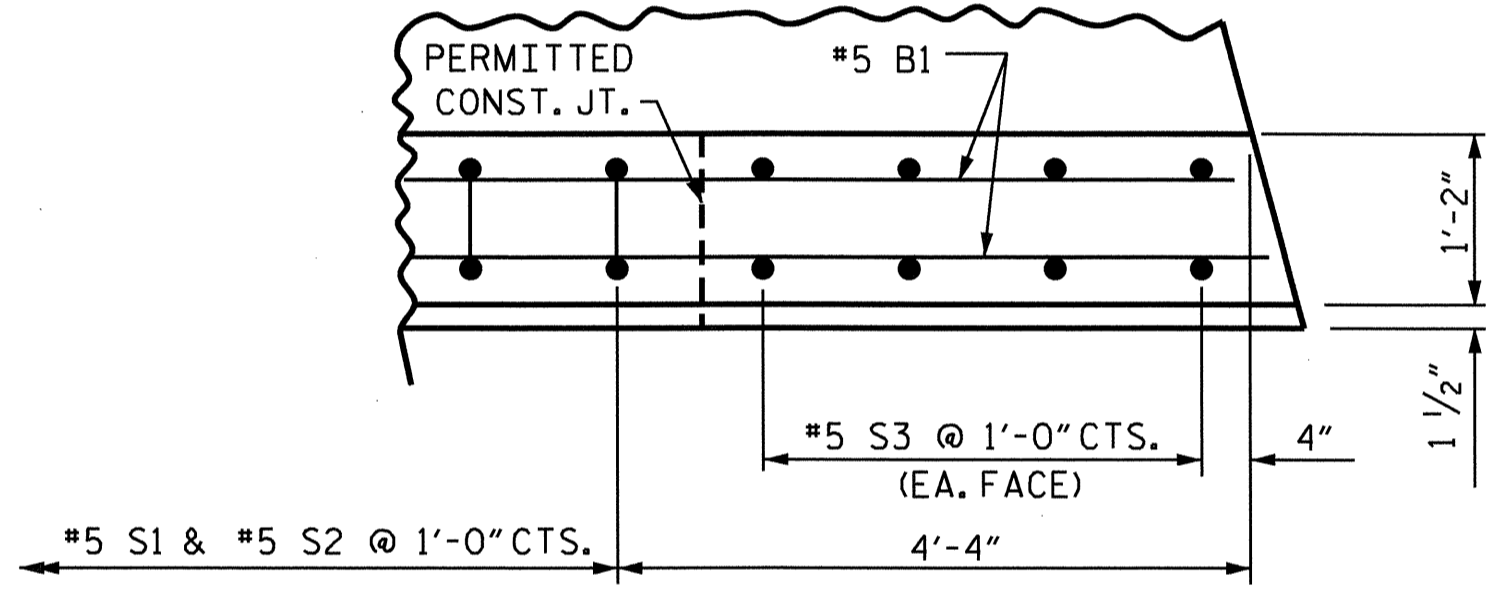
BILL OF MATERIAL					
BAR TYPES		1'-2" X 2'-6" PARAPET AND 2 END POSTS			
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B1	32	#5	STR	15'-6"	517
*B2	32	#5	STR	26'-10"	896
*E1	4	#7	STR	2'-6"	20
*E2	4	#7	STR	3'-0"	25
*E3	4	#7	STR	3'-6"	29
*E4	4	#7	STR	4'-0"	33
*E5	4	#7	STR	4'-4"	35
*F1	4	#6	STR	1'-10"	11
*F2	2	#6	STR	3'-0"	9
*F3	2	#6	STR	3'-4"	10
*F4	2	#6	STR	2'-7"	8
*F5	2	#6	STR	3'-1"	9
*S1	157	#5	1	6'-0"	983
*S2	157	#5	2	5'-6"	901
*S3	16	#5	STR	3'-6"	58
* EPOXY COATED REINFORCING STEEL					= 3544 LBS.
CLASS AA CONCRETE					= 18.2 C.Y.
1'-2" X 2'-6" CONCRETE PARAPET					= 164.36 LIN. FT.



\* THESE BARS ARE EPOXY COATED

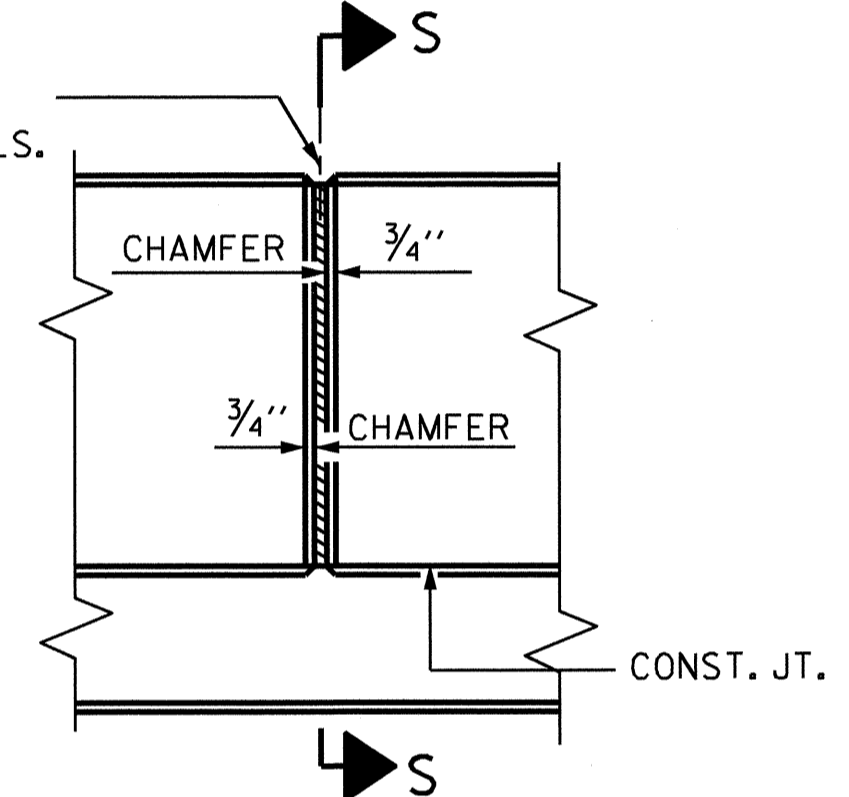


PLAN OF END POST DETAIL

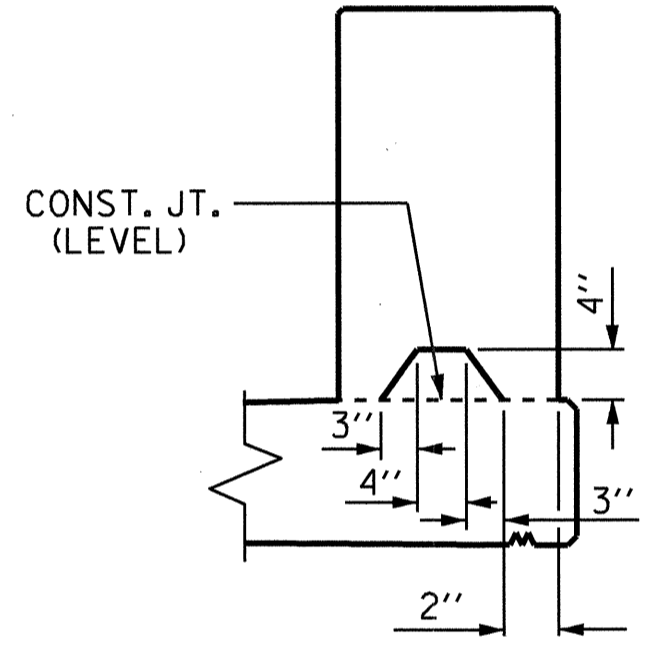


PLAN OF PARAPET DETAIL

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



ELEVATION AT JOINTS IN PARAPET



SECTION S-S

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

**NOTES**

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

THE JOINT IN THE DECK SHALL BE SAWS PRIOR TO THE CASTING OF THE PARAPET.

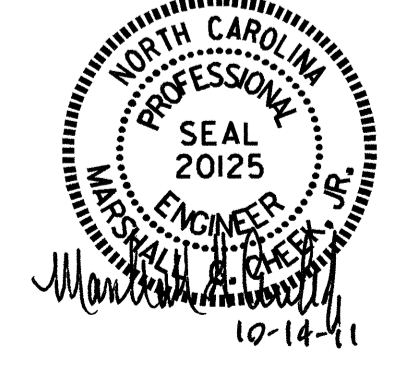
ALL REINFORCING STEEL IN THE PARAPET SHALL BE EPOXY COATED.

THE #5 S3 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWSING THE JOINT. THE YIELD LOAD FOR THE #5 S3 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 PARAPET AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT EACH THIRD POINT BETWEEN PARAPET EXPANSION JOINTS. ONLY ONE CONTRACTION JOINT IS REQUIRED AT MIDPOINT OF PARAPET SEGMENTS LESS THAN 20 FEET IN LENGTH AND NO CONTRACTION JOINTS ARE REQUIRED FOR THOSE SEGMENTS LESS THAN 10 FEET IN LENGTH.

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-  
 SHEET 1 OF 4

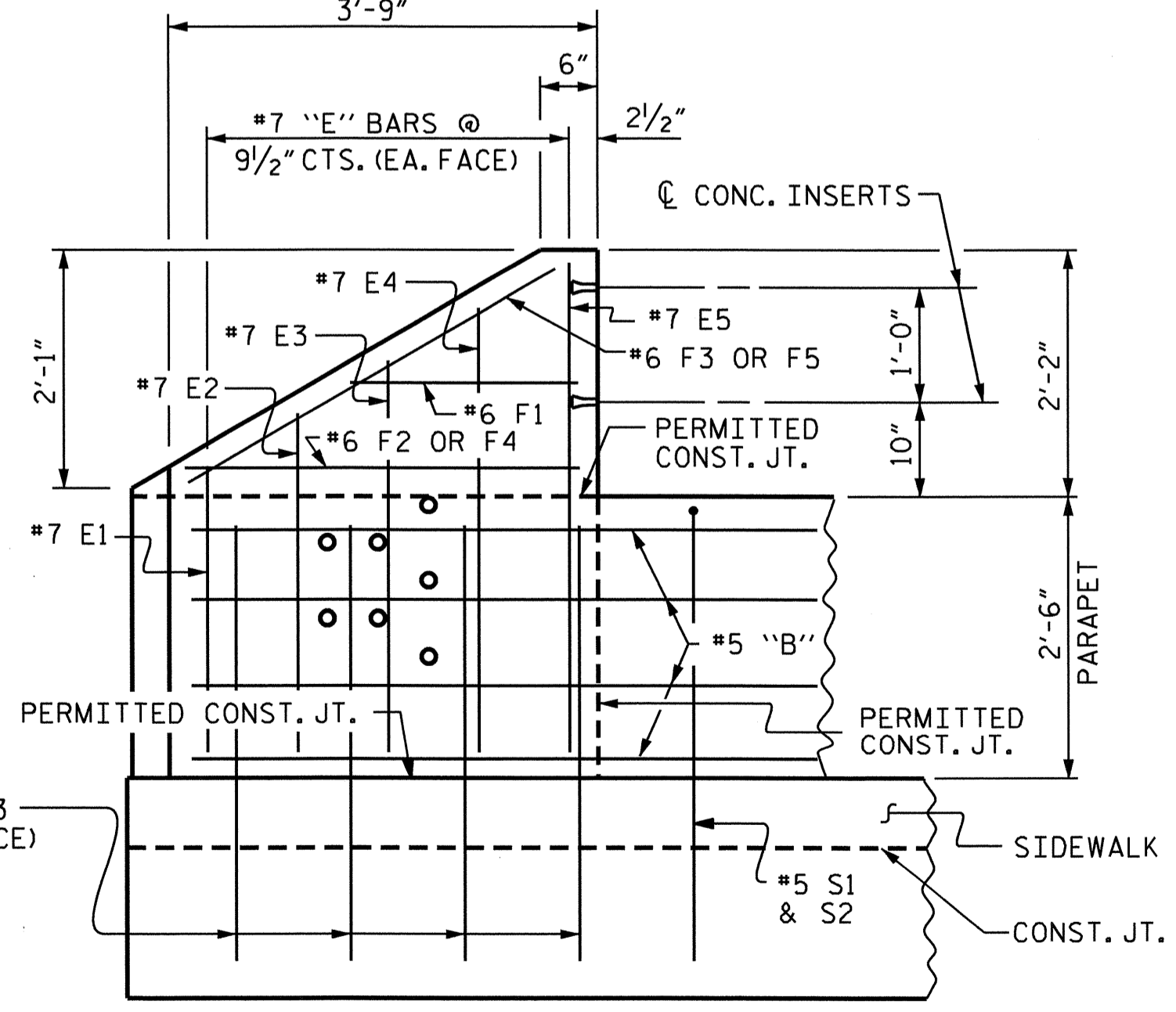
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 1'-2" X 2'-6"  
 CONCRETE PARAPET  
 DETAILS



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

DRAWN BY: W.D. CRUTCHER DATE: 04-11  
 CHECKED BY: M.G. CHEEK DATE: 5-11

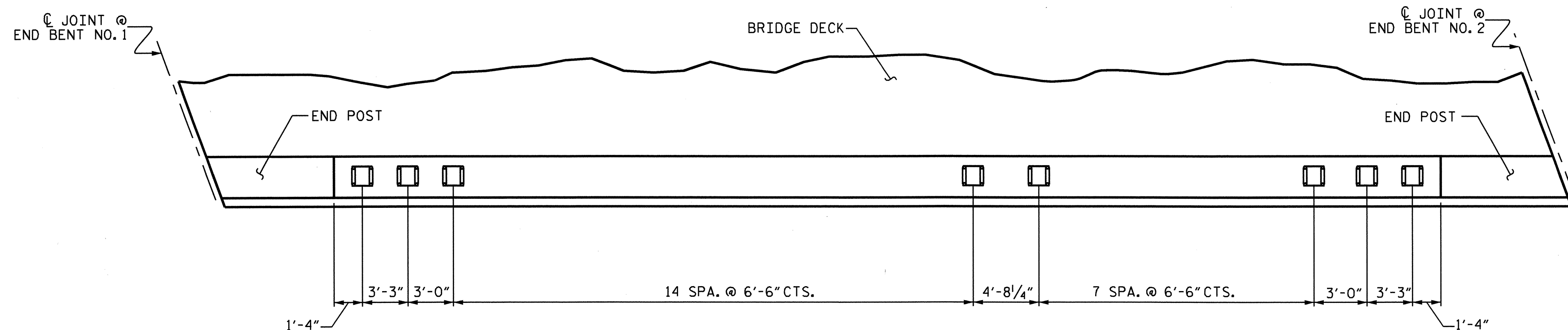
PARAPET AND END POST FOR TWO BAR RAIL



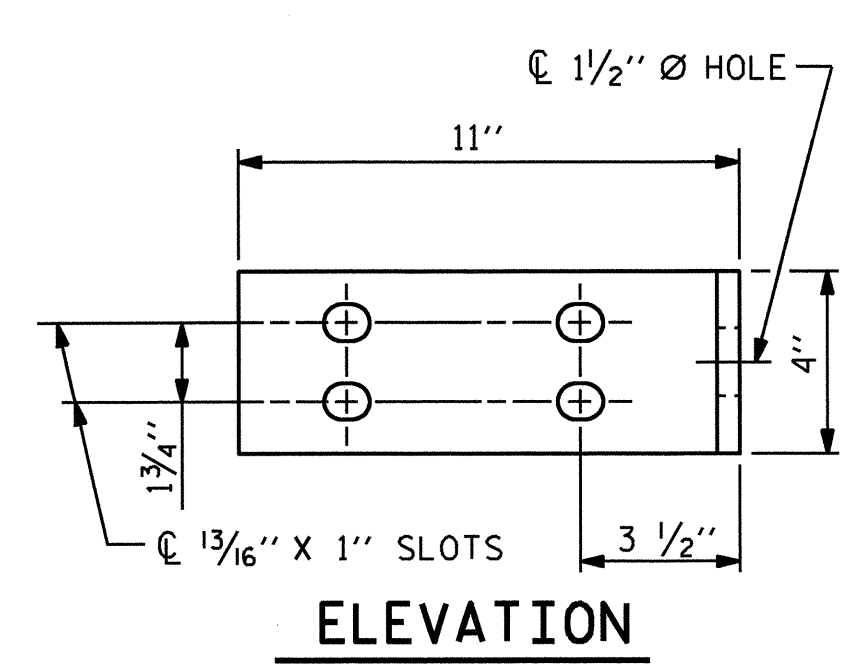
ELEVATION

END VIEW

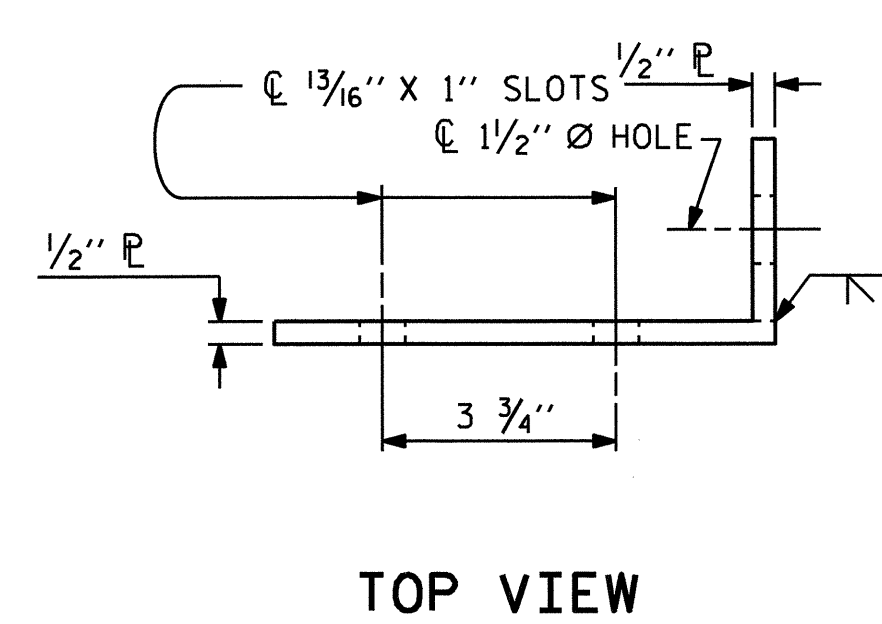




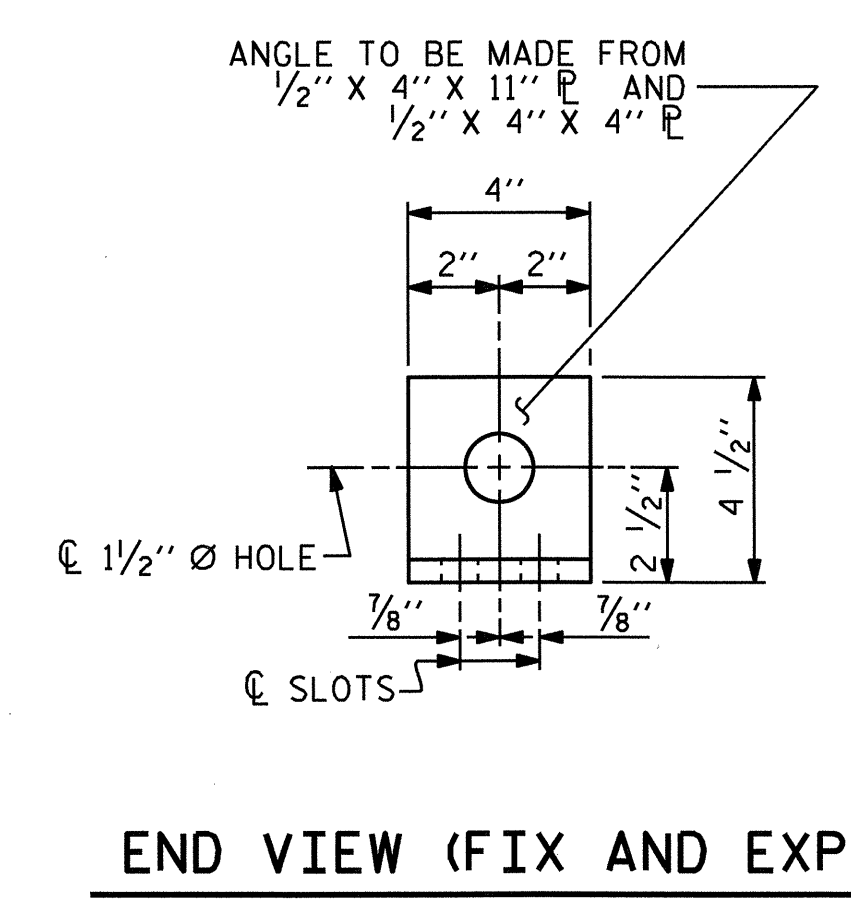
**PLAN OF RAIL POST SPACINGS**



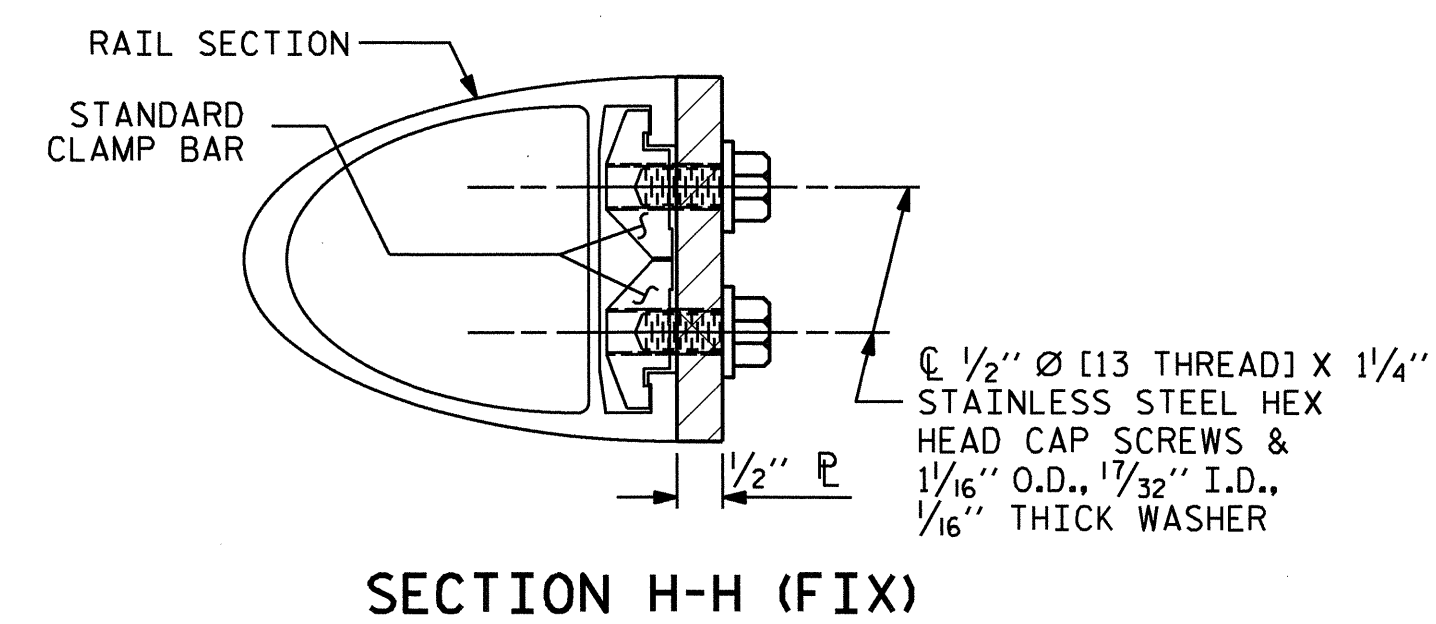
**ELEVATION**



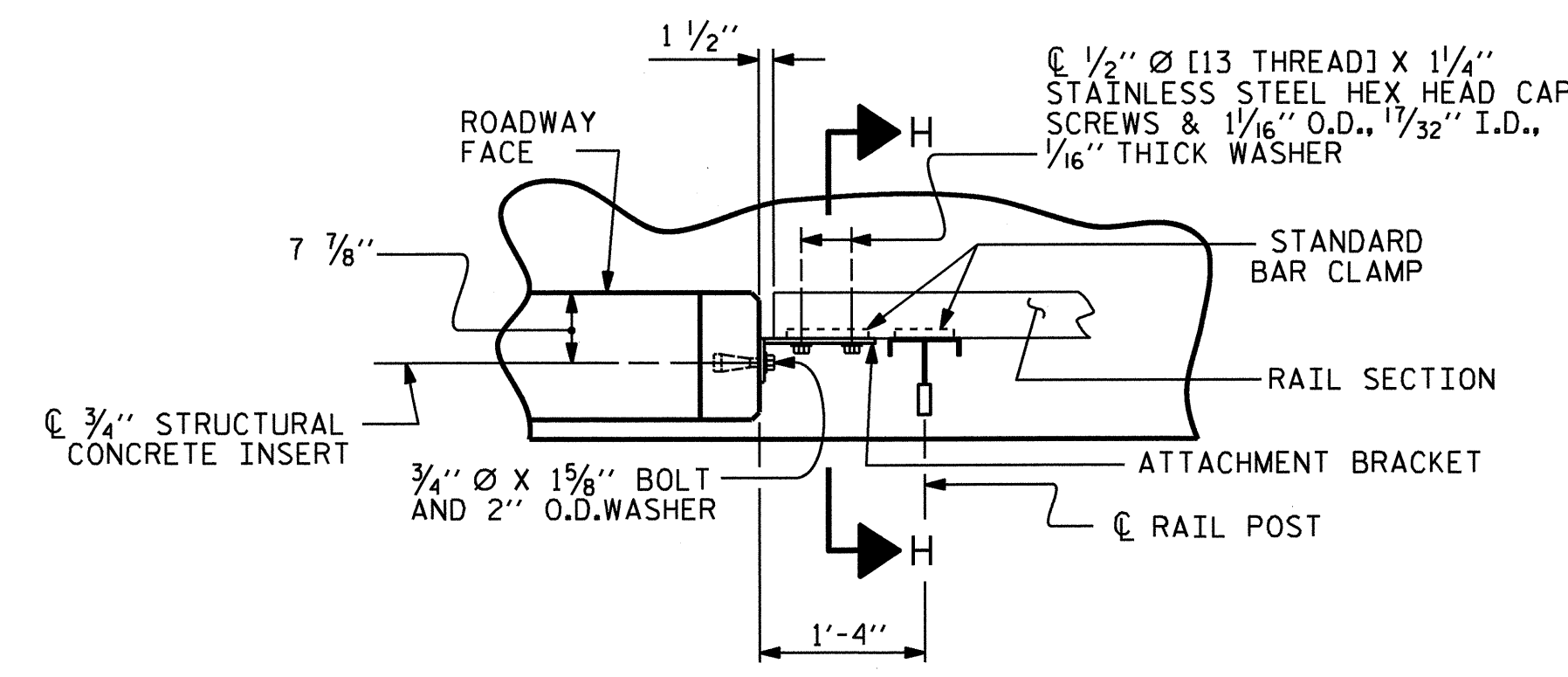
**TOP VIEW**



**END VIEW (FIX AND EXP.)**



**SECTION H-H (FIX)**



**PLAN - RAIL AND END POST**

**DETAILS FOR ATTACHING METAL RAIL TO END POST**

**NOTES**

**STRUCTURAL CONCRETE INSERT**

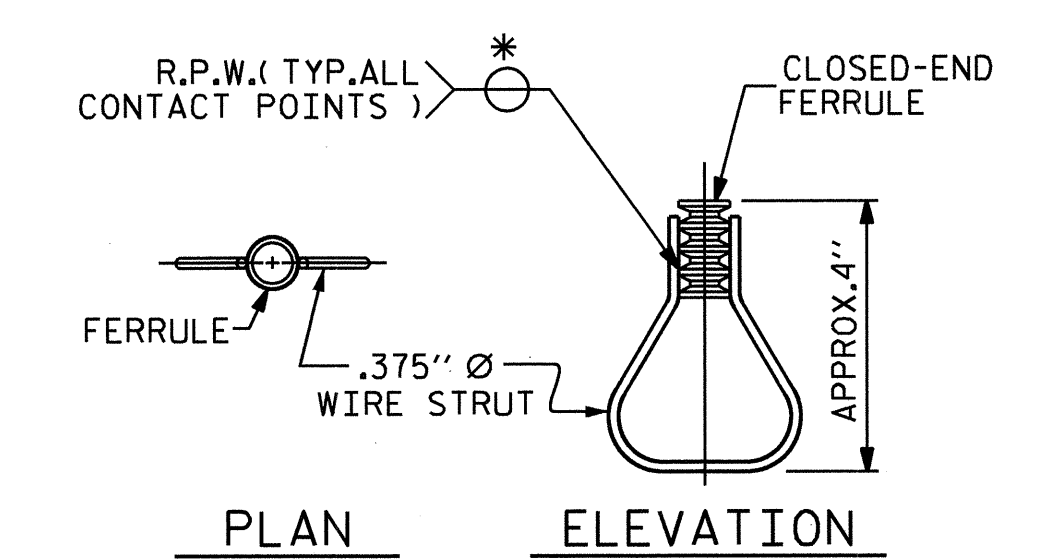
- THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 1 1/2".
  - B. 1 - 3/4" Ø X 1 5/8" BOLT WITH WASHER. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLT AND WASHER SHALL BE GALVANIZED. (AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLT AND WASHER MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 1 5/8" GALVANIZED BOLT AND WASHER. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)
  - C. WIRE STRUT SHOWN IN THE CONCRETE INSERT ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

**NOTES**

**METAL RAIL TO END POST CONNECTION**

- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
  - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.
  - C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F.
  - D. STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
  - E. 1/2" Ø PIPE SLEEVES (IF REQUIRED) TO BE GALVANIZED.
- THE COST OF THE STANDARD CLAMP BARS AND CAP SCREWS USED IN THE METAL RAIL TO END POST CONNECTION SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR LINEAR FEET OF 2 BAR METAL RAILS.
- THE 3/4" STRUCTURAL CONCRETE INSERT WITH BOLT SHALL BE ASSEMBLED IN THE SHOP.
- THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4" Ø X 6/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT APPLY TO THE 3/4" Ø X 1 5/8" BOLT SHALL APPLY TO THE 3/4" Ø X 6 1/2" BOLT. FIELD TESTING OF THE ADHESIVE BONDING SYSTEM IS NOT REQUIRED.



**PLAN ELEVATION  
STRUCTURAL CONCRETE INSERT**

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

PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 RAIL POST SPACINGS  
 AND  
 END OF RAIL DETAILS  
 TWO BAR METAL RAILS

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



ASSEMBLED BY : W.D. CRUTCHER	DATE : 3-28-11
CHECKED BY : M.G. CHEEK	DATE : 5-11
DRAWN BY : FCJ 1/88	REV. 10/17/00 LES/RDR
CHECKED BY : CRK 3/89	REV. 5/7/03 RWW/JTE
	REV. 5/1/06 TLA/GM

**NOTES**

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

**ALUMINUM RAILS**

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B-221 ALLOY 6061-T6. MATERIAL FOR RIVETS SHALL BE ASTM B316 ALLOY 6061-T6. RIVETS SHALL BE STANDARD BUTTON HEAD AND CONE POINT COLD DRIVEN AS PER DRAWING.

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

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

**GALVANIZED STEEL RAILS**

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

**GENERAL NOTES**

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

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

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

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

METAL RAIL POSTS SHALL BE SET NORMAL TO CURB GRADE.

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

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

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

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

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

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

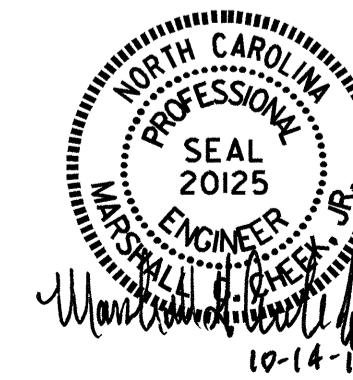
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR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

PAY LENGTH = 156.35 LIN. FT.

PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

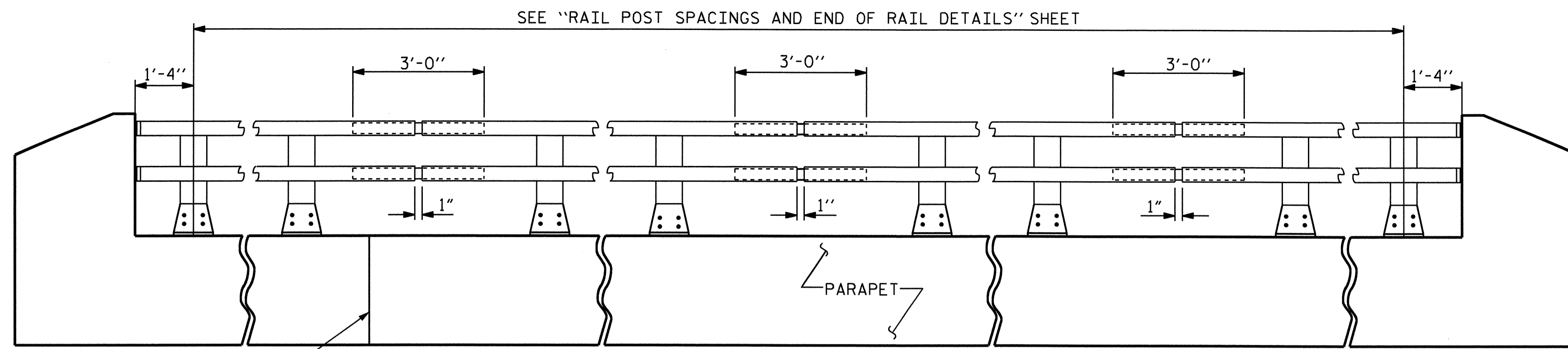
SHEET 3 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 2 BAR METAL RAIL



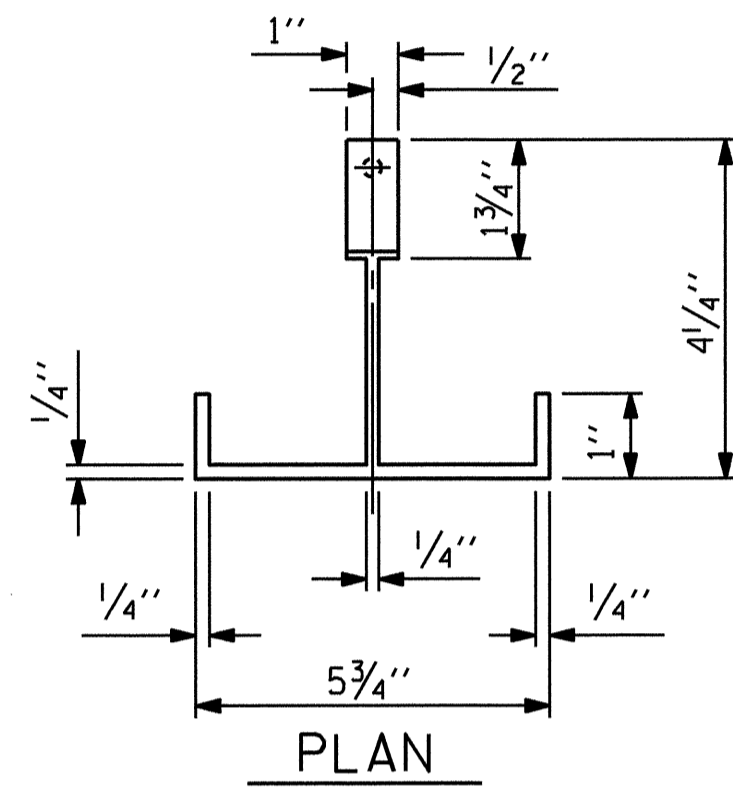
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			36

STD. NO. BMR3

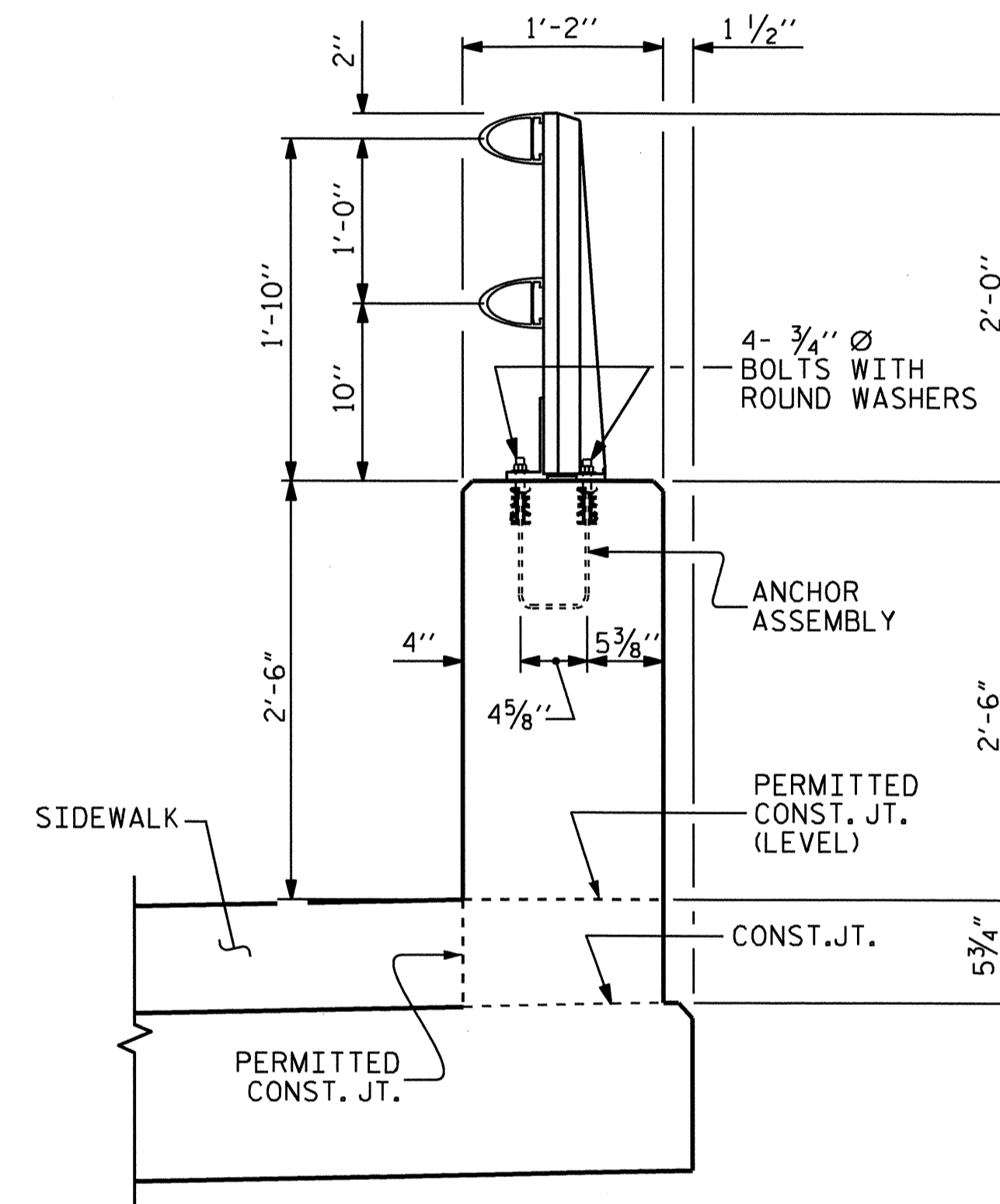


**ELEVATION**

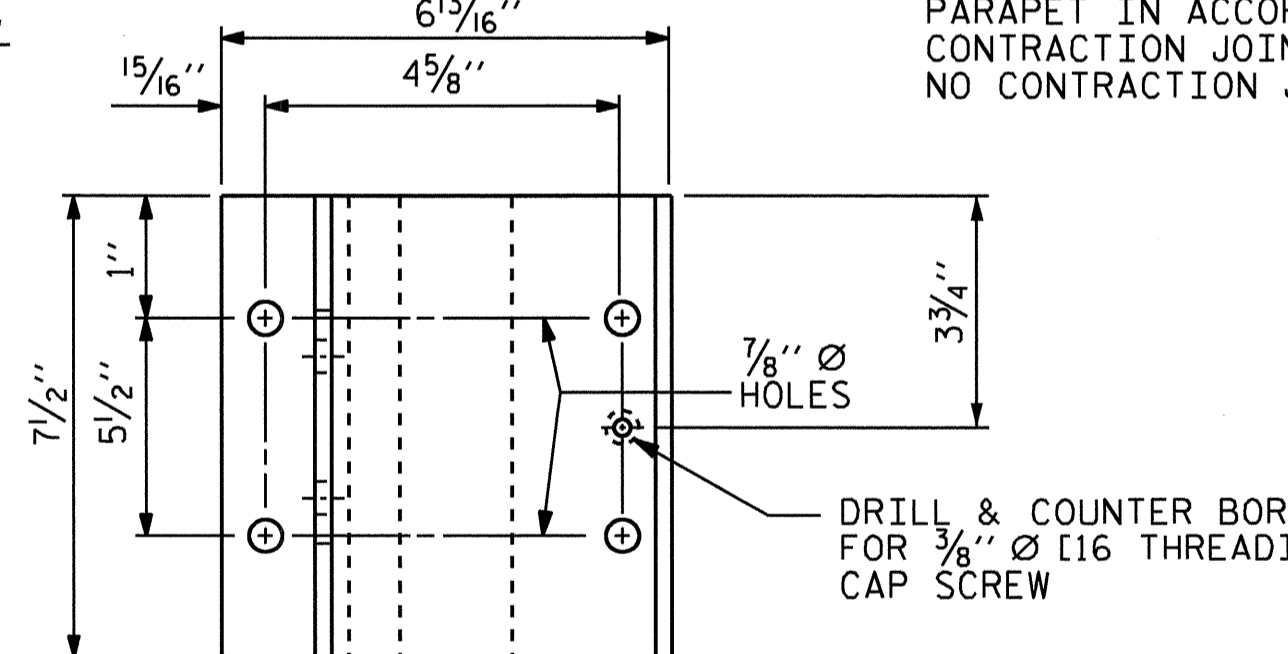
NOTE: FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET 2 OF 4.



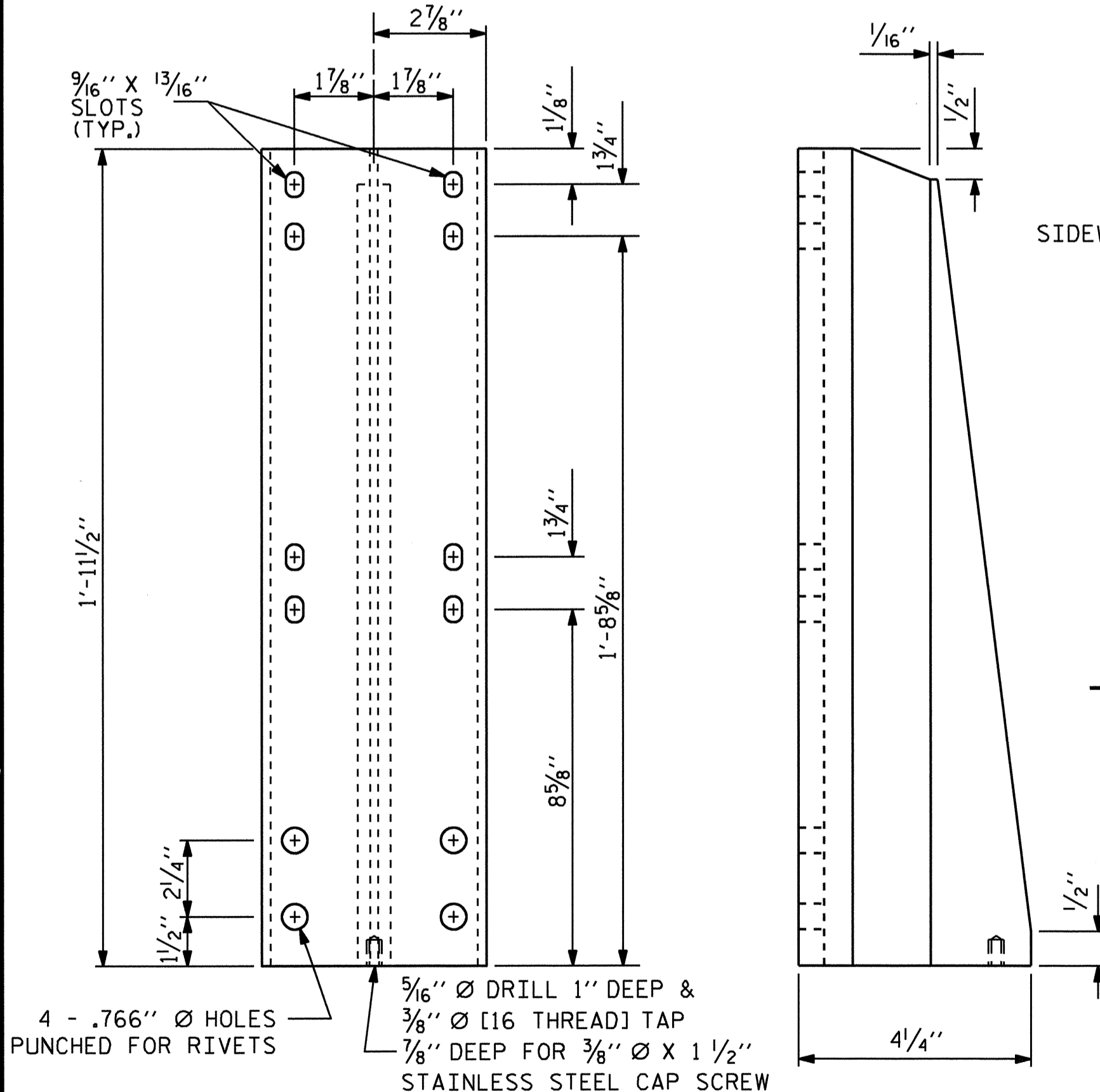
**PLAN**



**SECTION THRU PARAPET AND RAIL**



**PLAN**

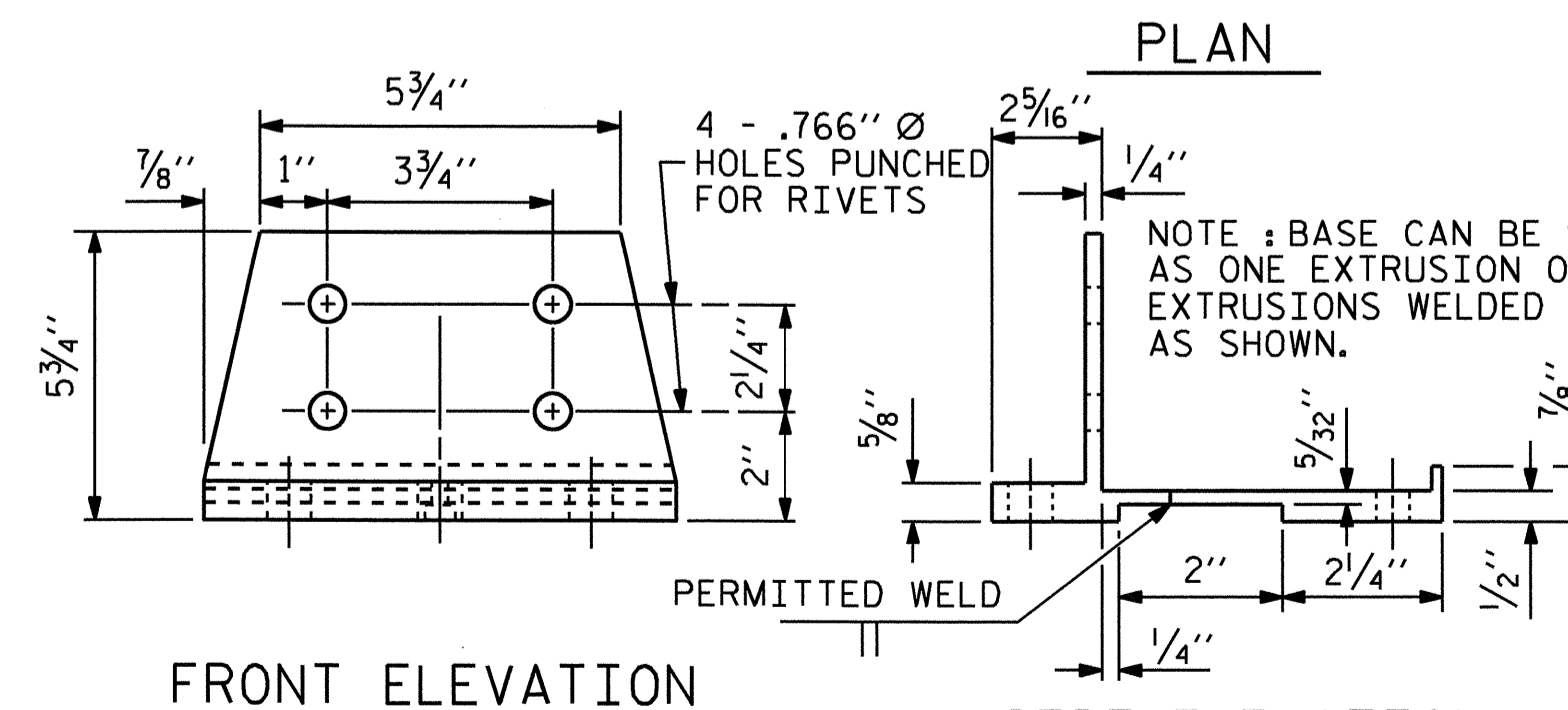


**FRONT ELEVATION**

**SIDE ELEVATION**

**DETAILS OF POST**

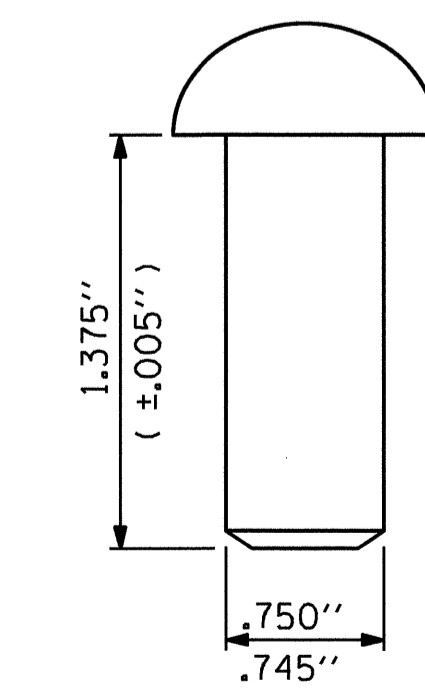
ASSEMBLED BY: W.D. CRUTCHER	DATE: 3-16-11
CHECKED BY: M.G. CHEEK	DATE: 5-11
DRAWN BY: EEM 6/94	REV. 10/17/00 LES/RDR
CHECKED BY: RGW 6/94	REV. 5/7/03R RWW/JTE
	REV. 5/1/06 TLA/GM



**FRONT ELEVATION**

**SIDE ELEVATION**

**POST BASE DETAILS**



**RIVET DETAIL**

NOTES

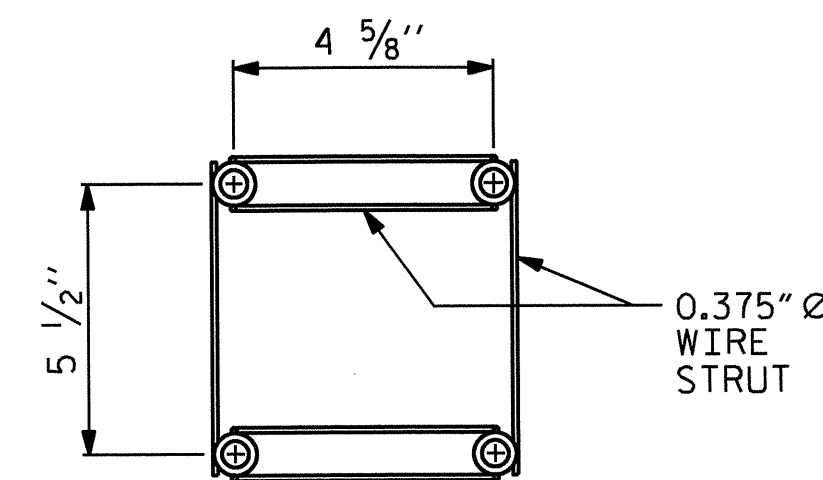
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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

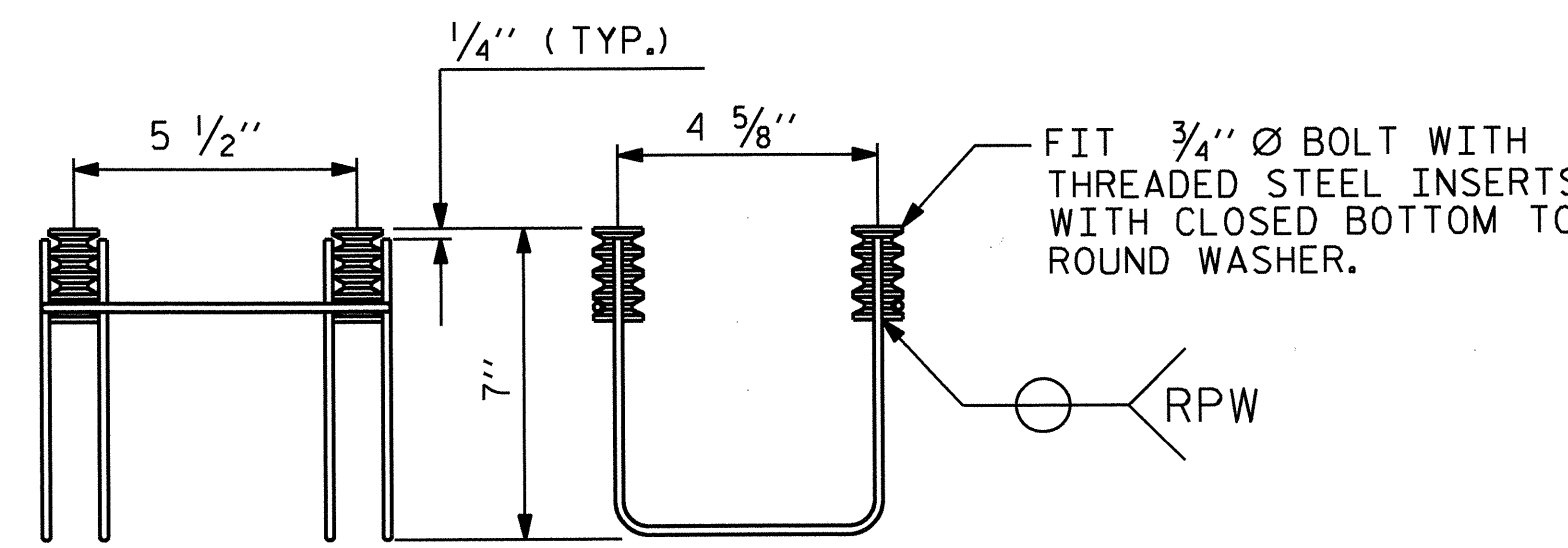
- A. FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF THREADS OF 2" FOR 3/4" FERRULES.
- B. 4 - 3/4" Ø X 2 1/2" BOLTS WITH WASHERS. BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307. BOLTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 3/4" Ø X 2 1/2" GALVANIZED BOLTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
- C. WIRE STRUT SHOWN IN THE CONCRETE ANCHOR ASSEMBLY DETAIL IS THE MINIMUM ALLOWABLE SIZE AND SHALL HAVE A MINIMUM TENSILE STRENGTH OF 100,000 PSI. AS AN OPTION, A 7/16" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.
- D. THE METAL RAIL ANCHOR ASSEMBLIES TO BE HOT DIPPED GALVANIZED TO CONFORM TO REQUIREMENTS OF AASHTO M111.
- E. THE COST OF THE METAL RAIL ANCHOR ASSEMBLY WITH BOLTS AND WASHERS COMPLETE IN PLACE SHALL BE INCLUDED IN THE PRICE BID FOR LINEAR FEET OF METAL RAIL.
- F. BOLTS TO BE TIGHTENED ONE-HALF TURN WITH A WRENCH FROM A FINGER-TIGHT POSITION.

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

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



PLAN

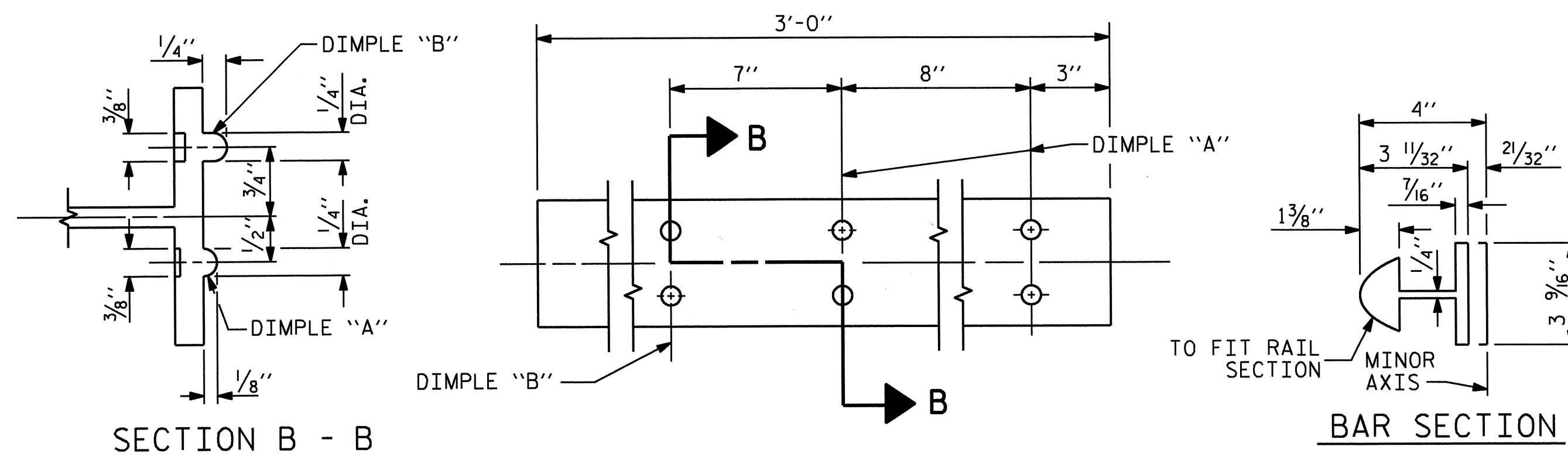


SIDE VIEW

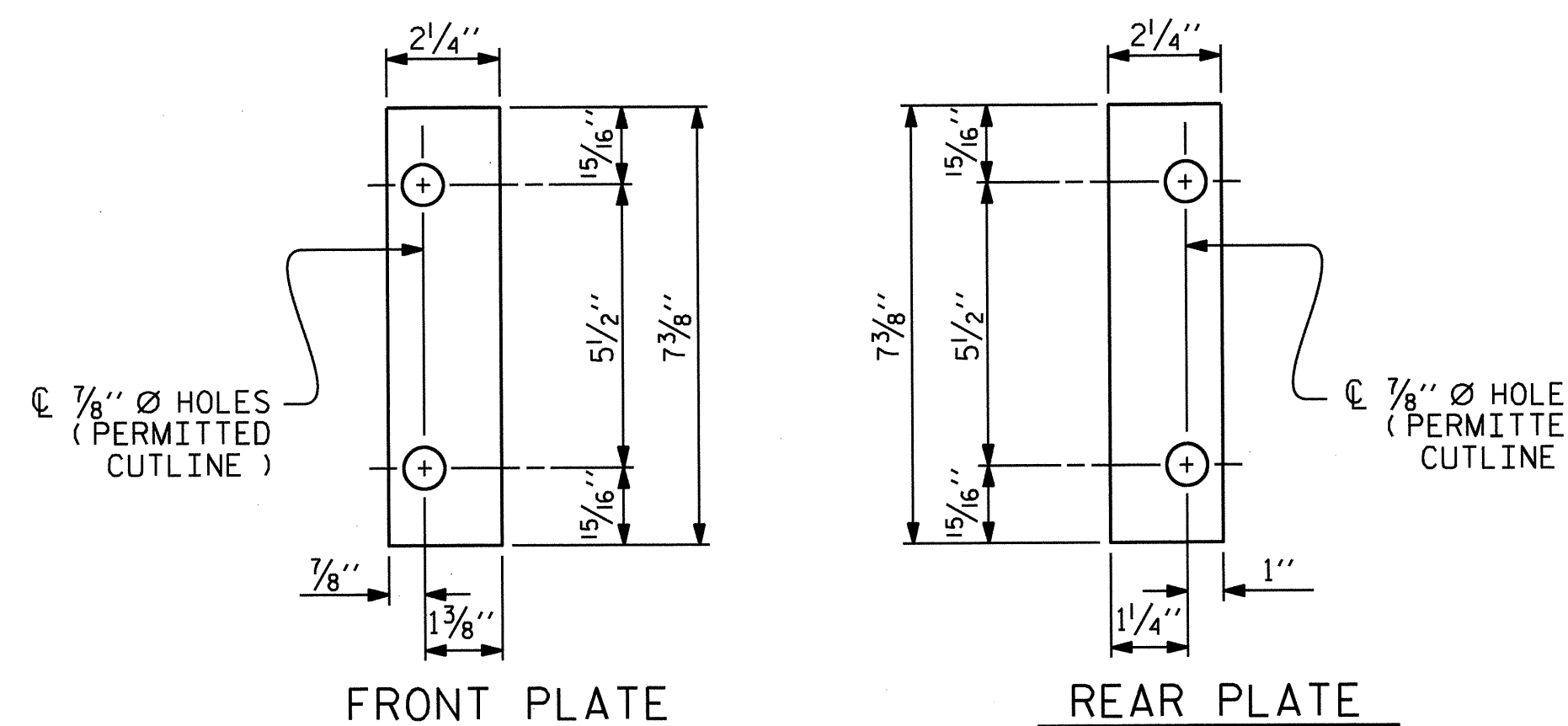
ELEVATION

4-BOLT METAL RAIL ANCHOR ASSEMBLY

( 27 ASSEMBLIES REQUIRED )



EXPANSION BAR DETAILS

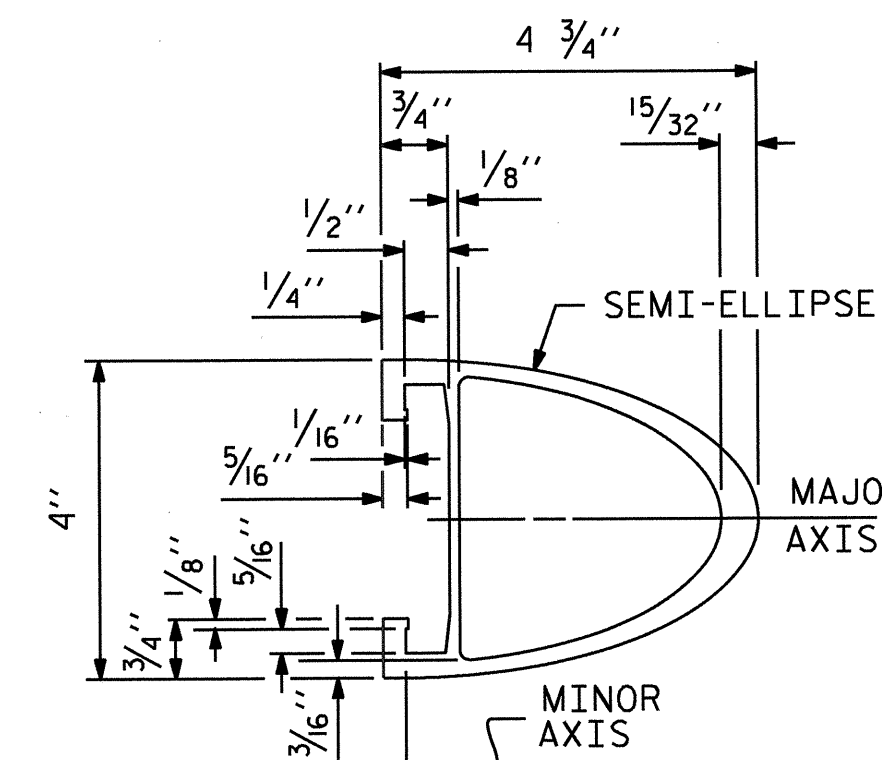


FRONT PLATE

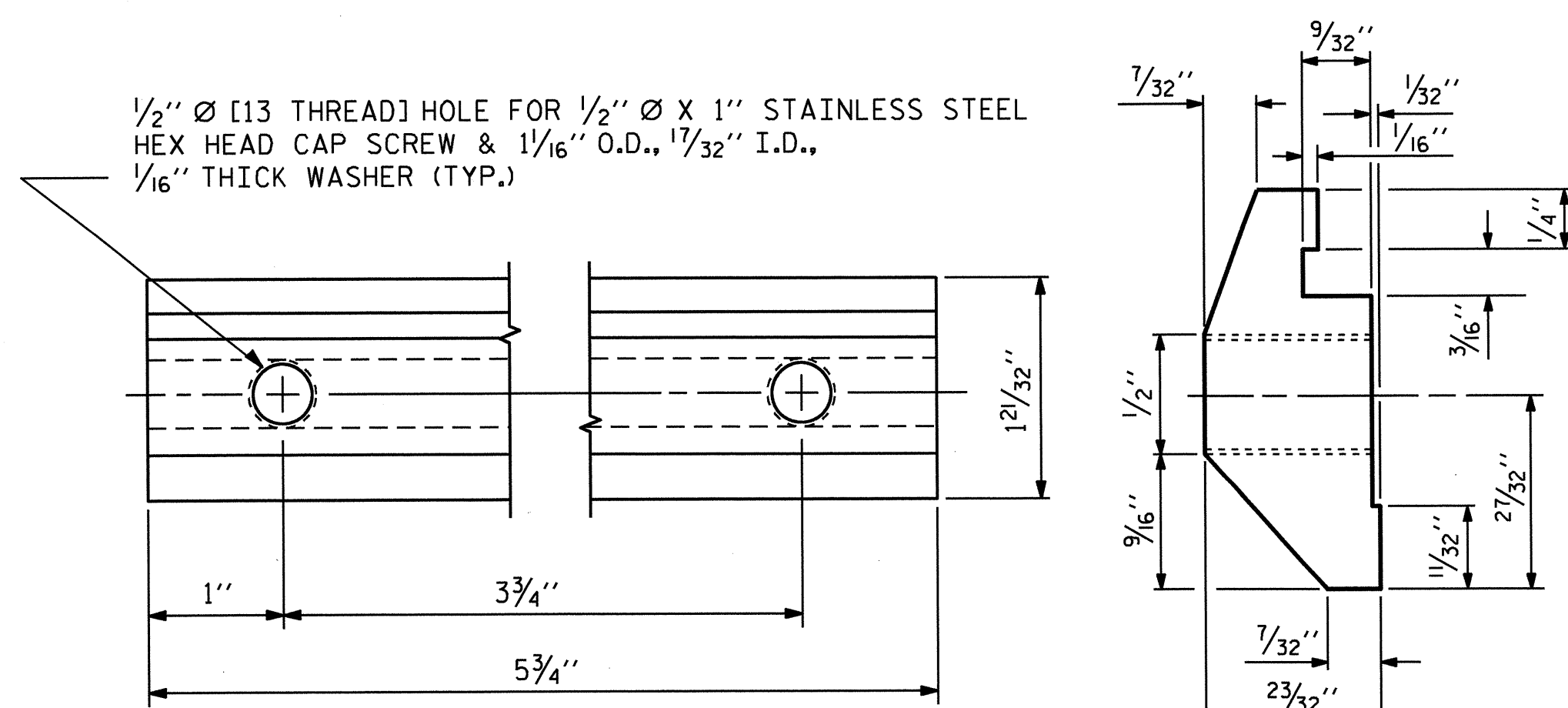
REAR PLATE

SHIM DETAILS

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

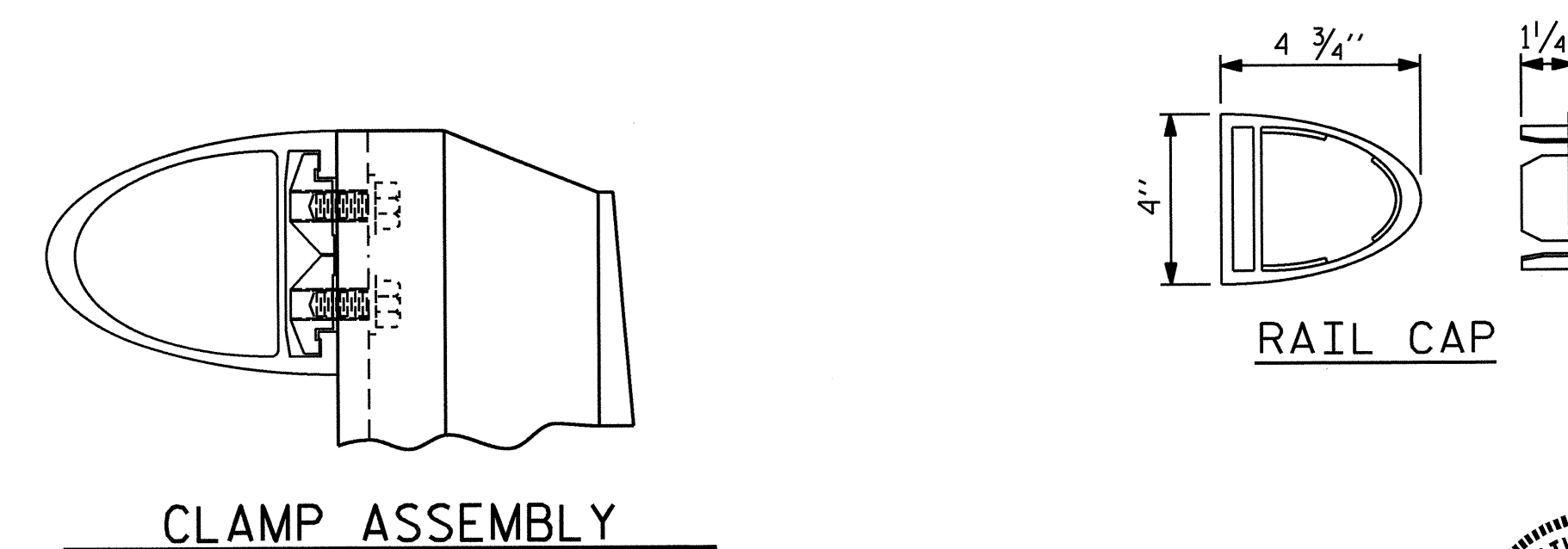


RAIL SECTION



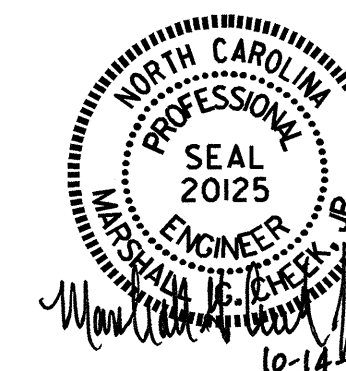
CLAMP BAR DETAIL

( 4 REQUIRED PER POST )



CLAMP ASSEMBLY

RAIL CAP



PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 2 BAR METAL RAIL

ASSEMBLED BY : W.D. CRUTCHER	DATE : 3-16-11
CHECKED BY : M.G. CHECK	DATE : 5-11
DRAWN BY : EEM 6/94	REV. 2/6/97 EEM/RGW
CHECKED BY : RGW 6/94	REV. 8/16/99 MAB/LES
	REV. 5/1/06R KMM/GM

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

**NOTES**

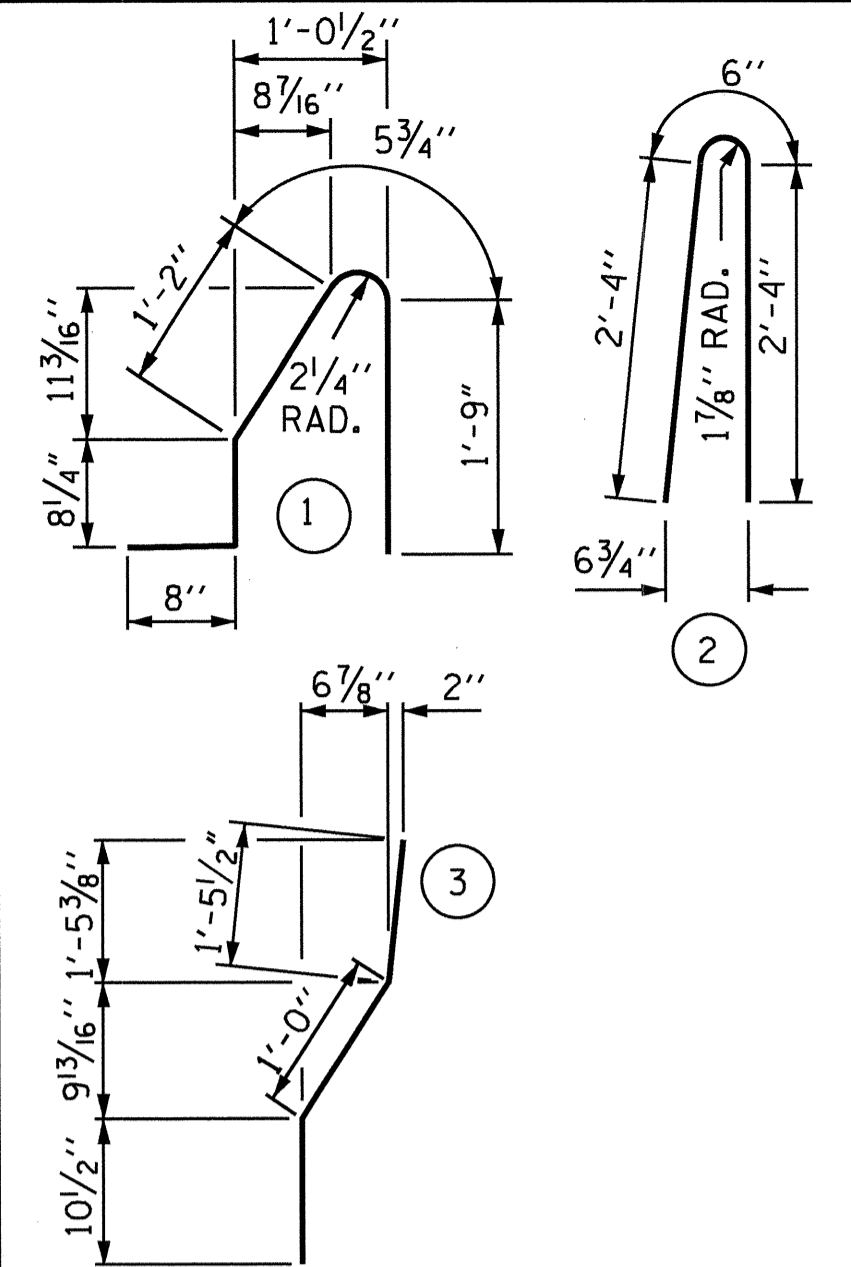
THE BARRIER RAIL IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THAT UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI.

THE JOINT IN THE DECK SHALL BE SAWED PRIOR TO THE CASTING OF BARRIER RAIL. ALL REINFORCING STEEL IN BARRIER RAIL SHALL BE EPOXY COATED.

THE #5 S3 AND #5 S4 BARS SHALL BE INSTALLED, USING AN ADHESIVE ANCHORING SYSTEM, AFTER SAWING THE JOINT. THE YIELD LOAD FOR THE #5 S3 AND #5 S4 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.

**BAR TYPES**



ALL BAR DIMENSIONS ARE OUT TO OUT

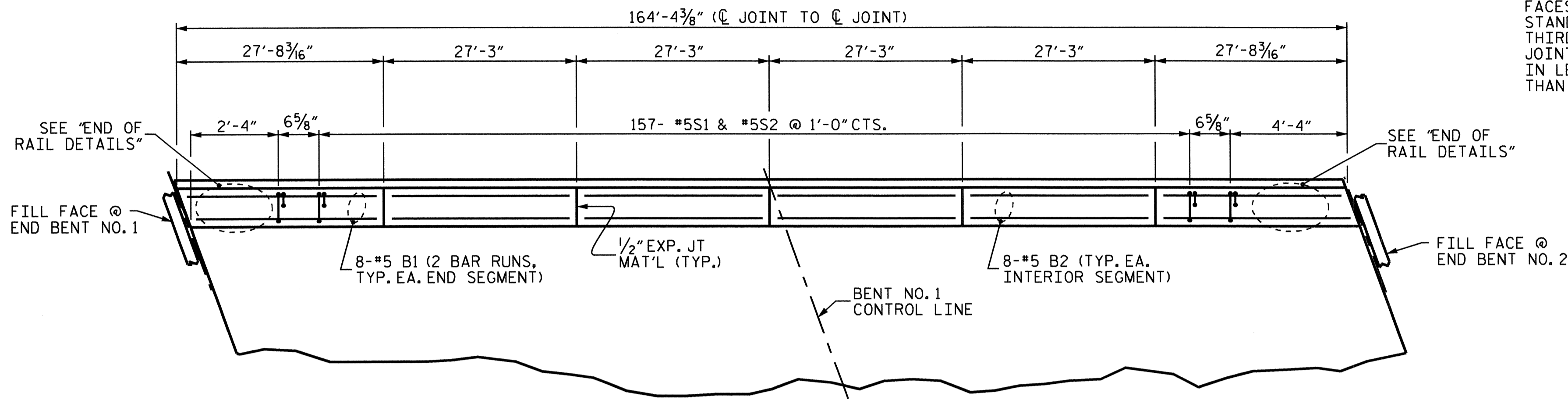
**BILL OF MATERIAL**

FOR CONCRETE BARRIER RAIL ONLY

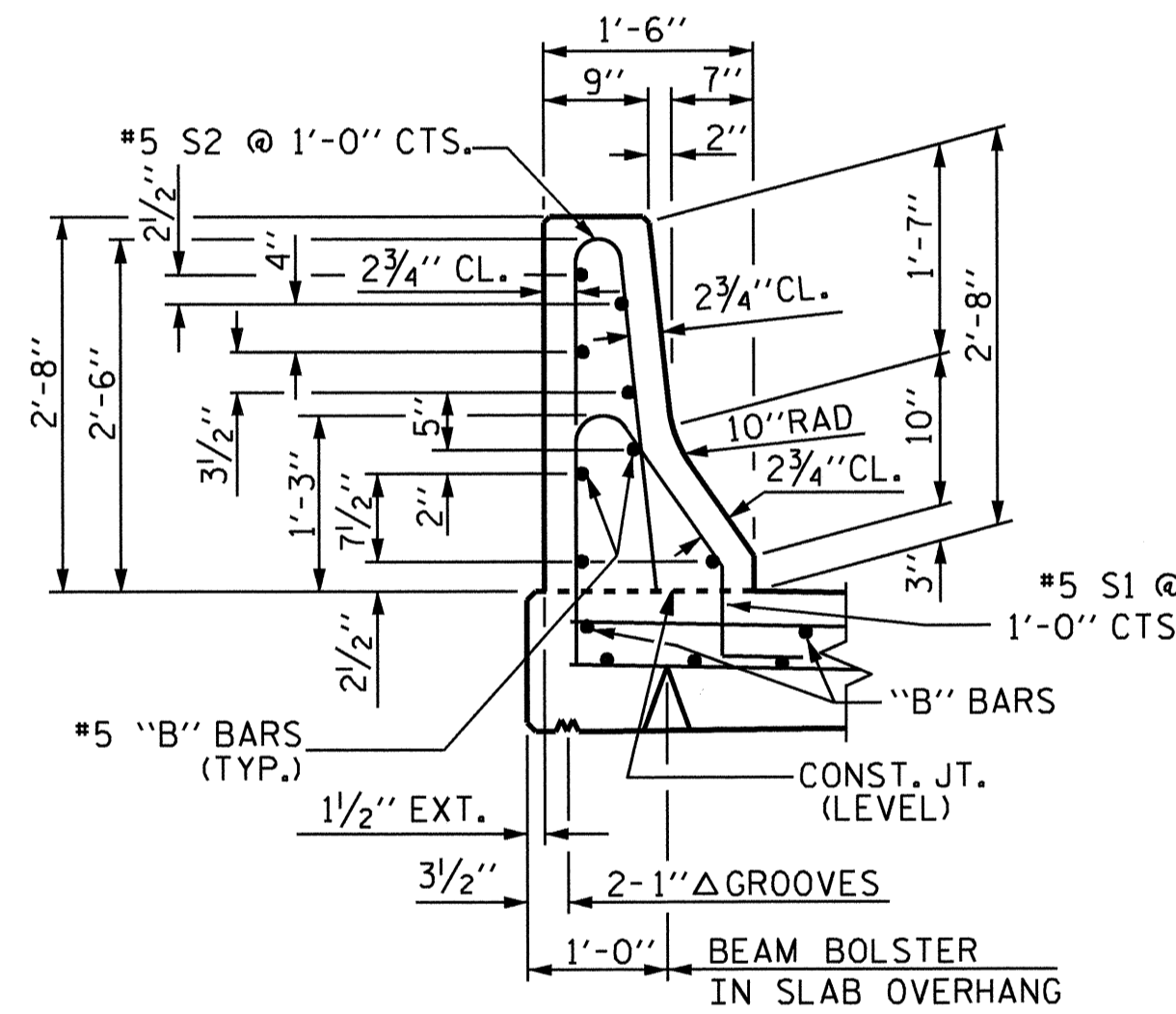
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* S1	159	#5	1	4'-9"	788
* S2	159	#5	2	5'-2"	857
* S3	6	#5	3	3'-4"	21
* S4	6	#5	STR	3'-2"	20
* B1	32	#5	STR	15'-5"	515
* B2	32	#5	STR	26'-10"	896

\* EPOXY COATED REINFORCING STEEL 3097 LBS.  
 CLASS AA CONCRETE 16.5 CU. YDS.  
 CONCRETE BARRIER RAIL 164.36 LIN. FT.

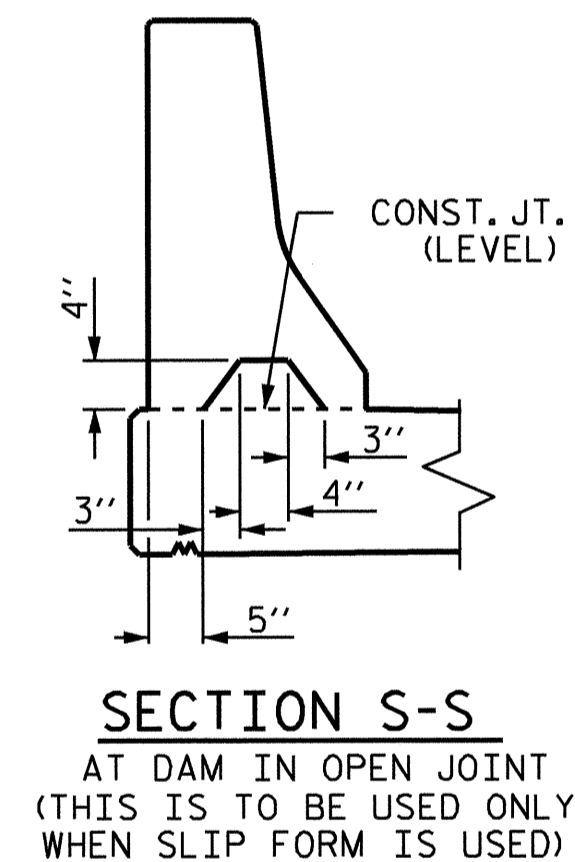
\* THESE BARS ARE EPOXY COATED



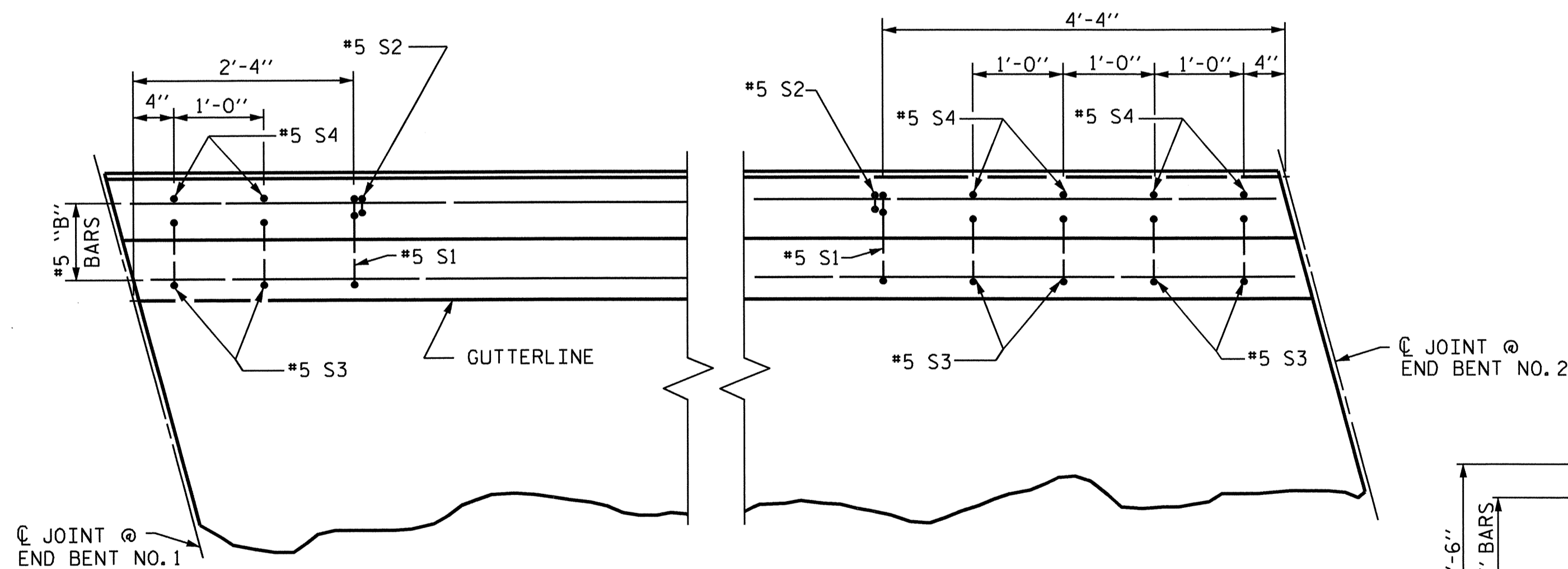
**PLAN OF BARRIER RAIL**



**SECTION THRU RAIL**

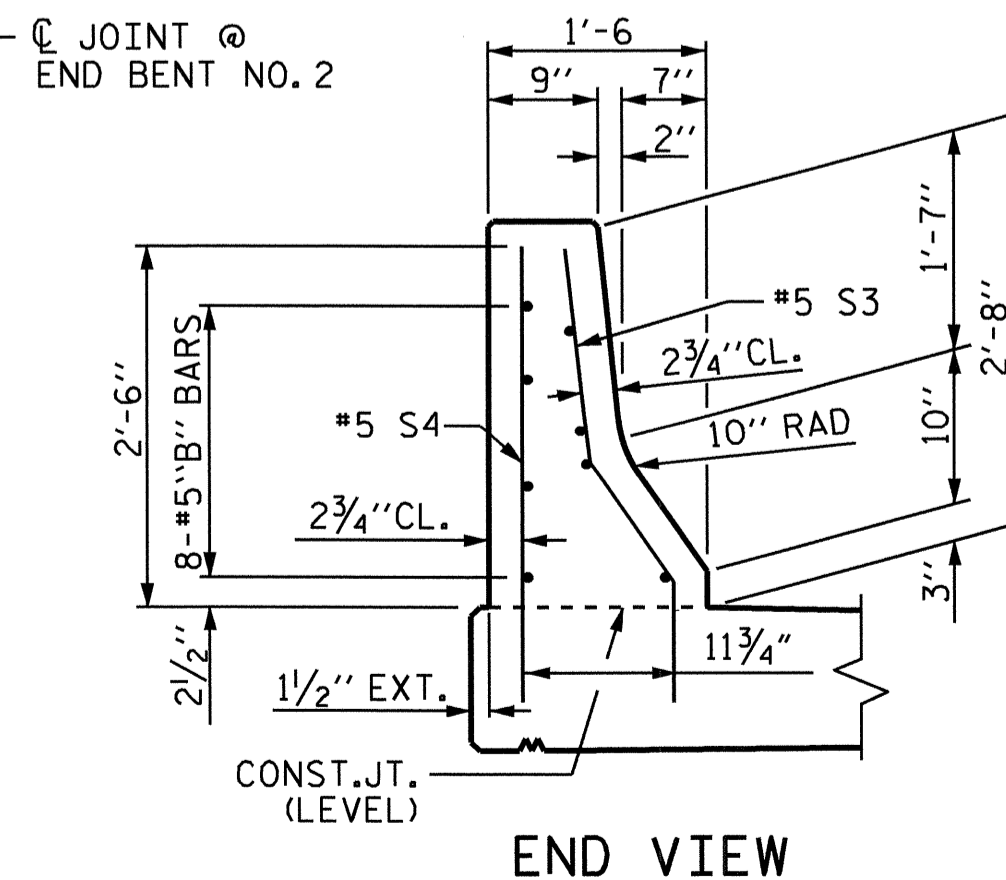


**SECTION S-S**  
 AT DAM IN OPEN JOINT (THIS IS TO BE USED ONLY WHEN SLIP FORM IS USED)



**PLAN**

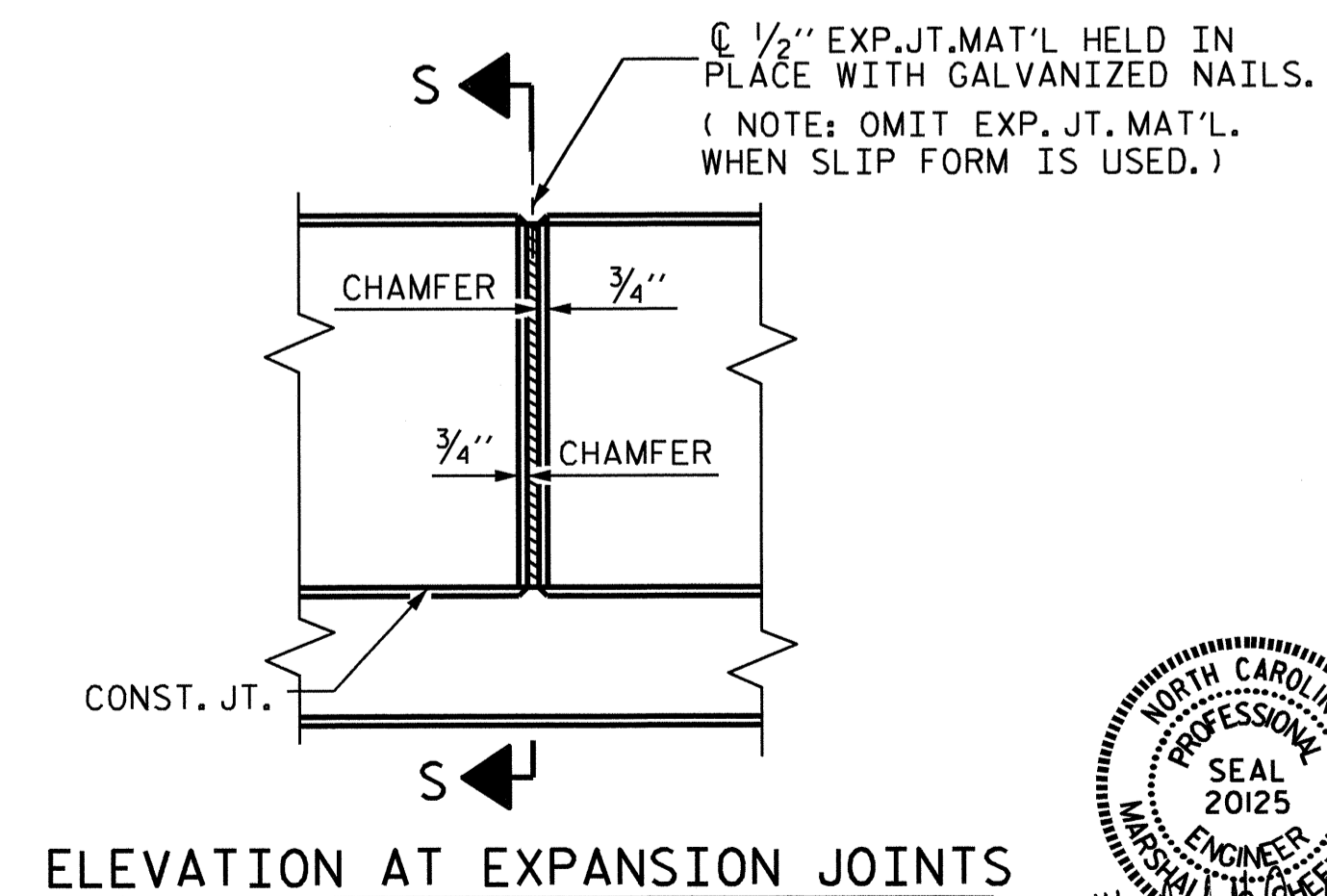
© JOINT @ END BENT NO. 1



**END VIEW**

**END OF RAIL DETAILS**

FOR ADHESIVE ANCHORING AT SAWED JOINTS

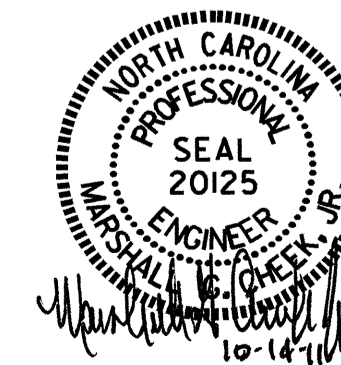


**ELEVATION AT EXPANSION JOINTS**

**BARRIER RAIL DETAILS**

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 CONCRETE  
 BARRIER RAIL



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

STD. NO. CBR1

ASSEMBLED BY : W.D. CRUTCHER DATE : 4-20-11  
 CHECKED BY : M.G. CHECK DATE : 5-11  
 DRAWN BY : ARB 5/87 REV. 10/17/00 RWW/LES  
 CHECKED BY : SJD 9/87 REV. 5/7/03R RWW/JTE  
 REV. 5/1/06R TLA/GM

NOTES

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

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

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

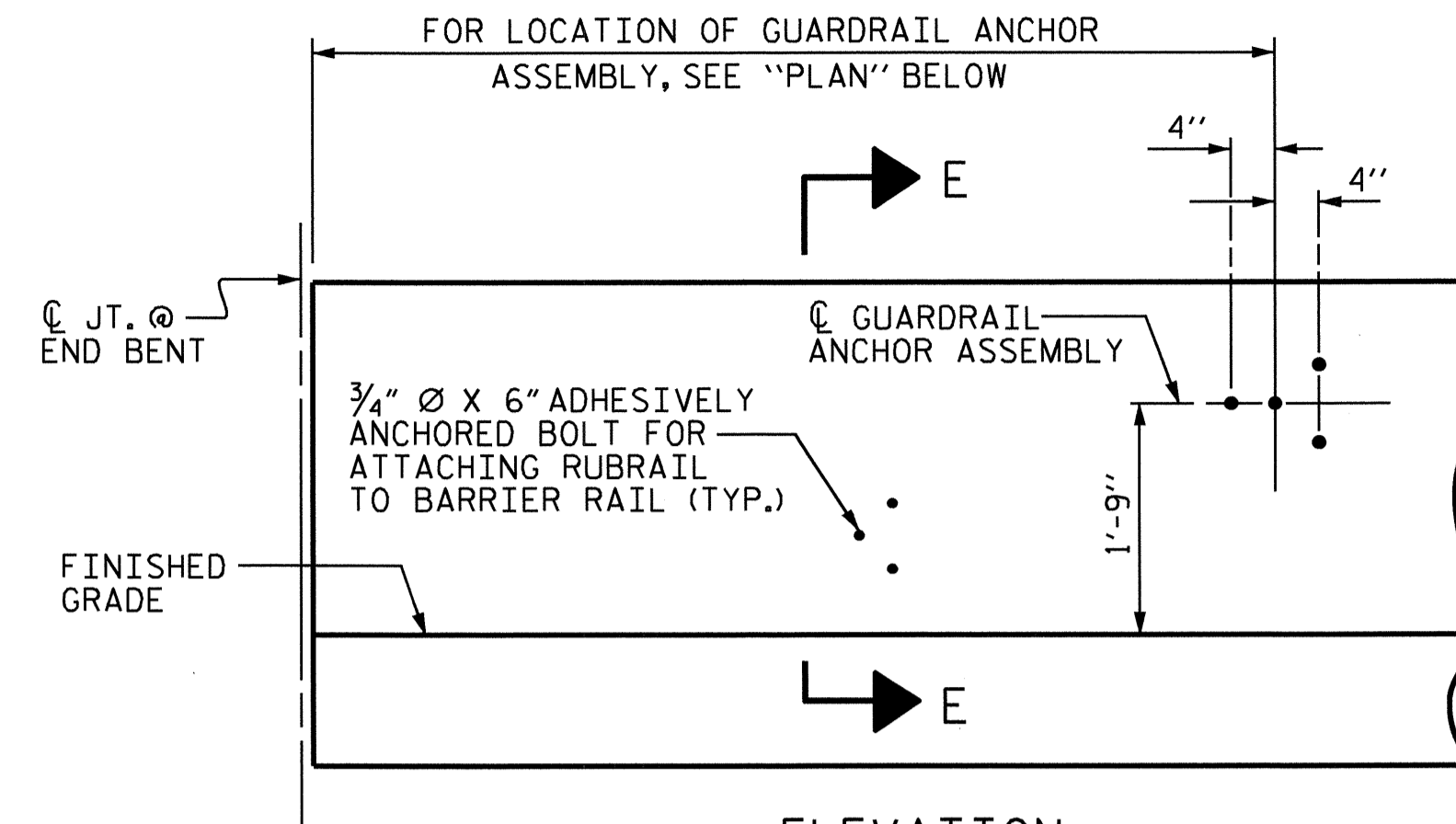
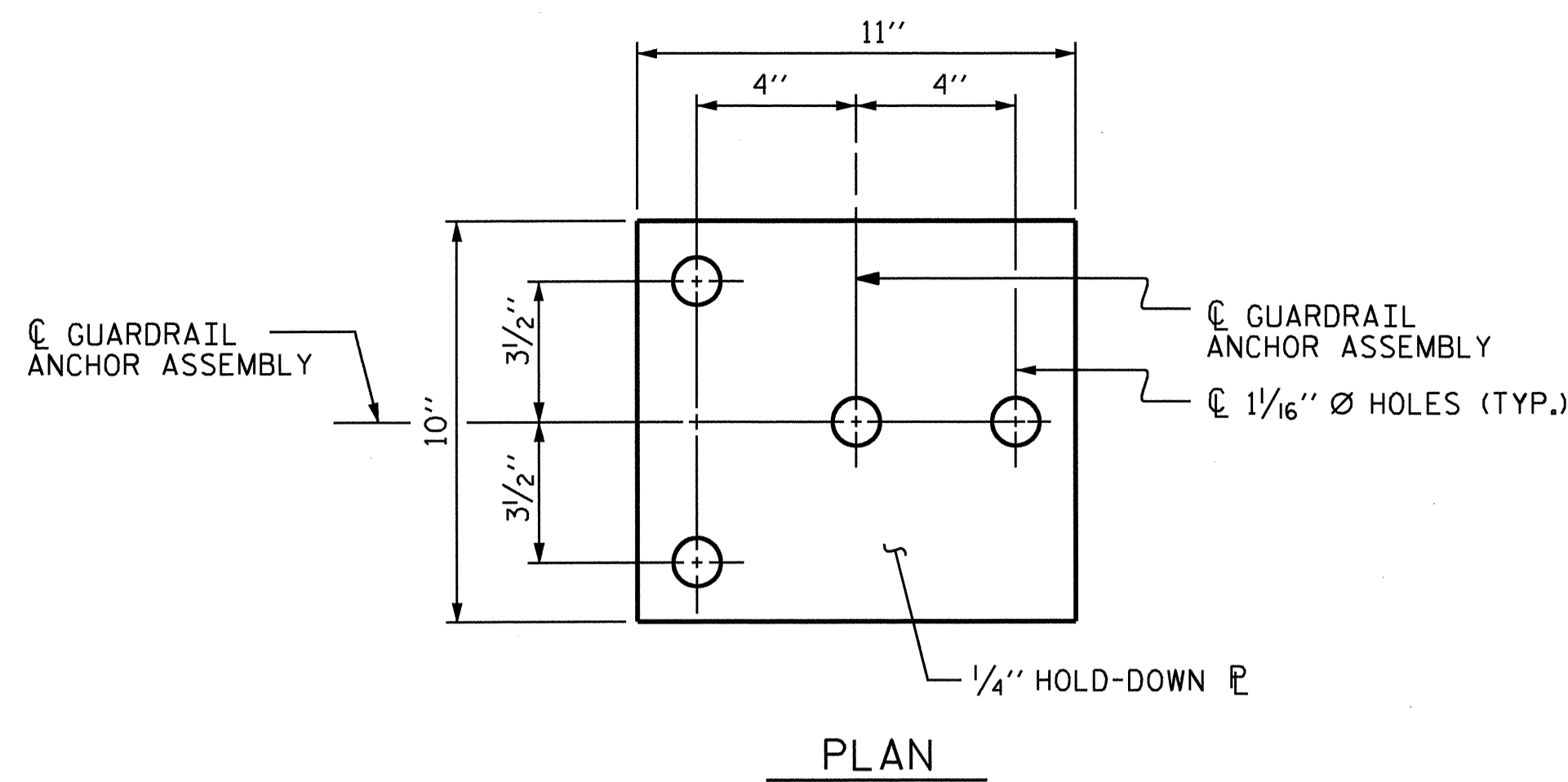
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

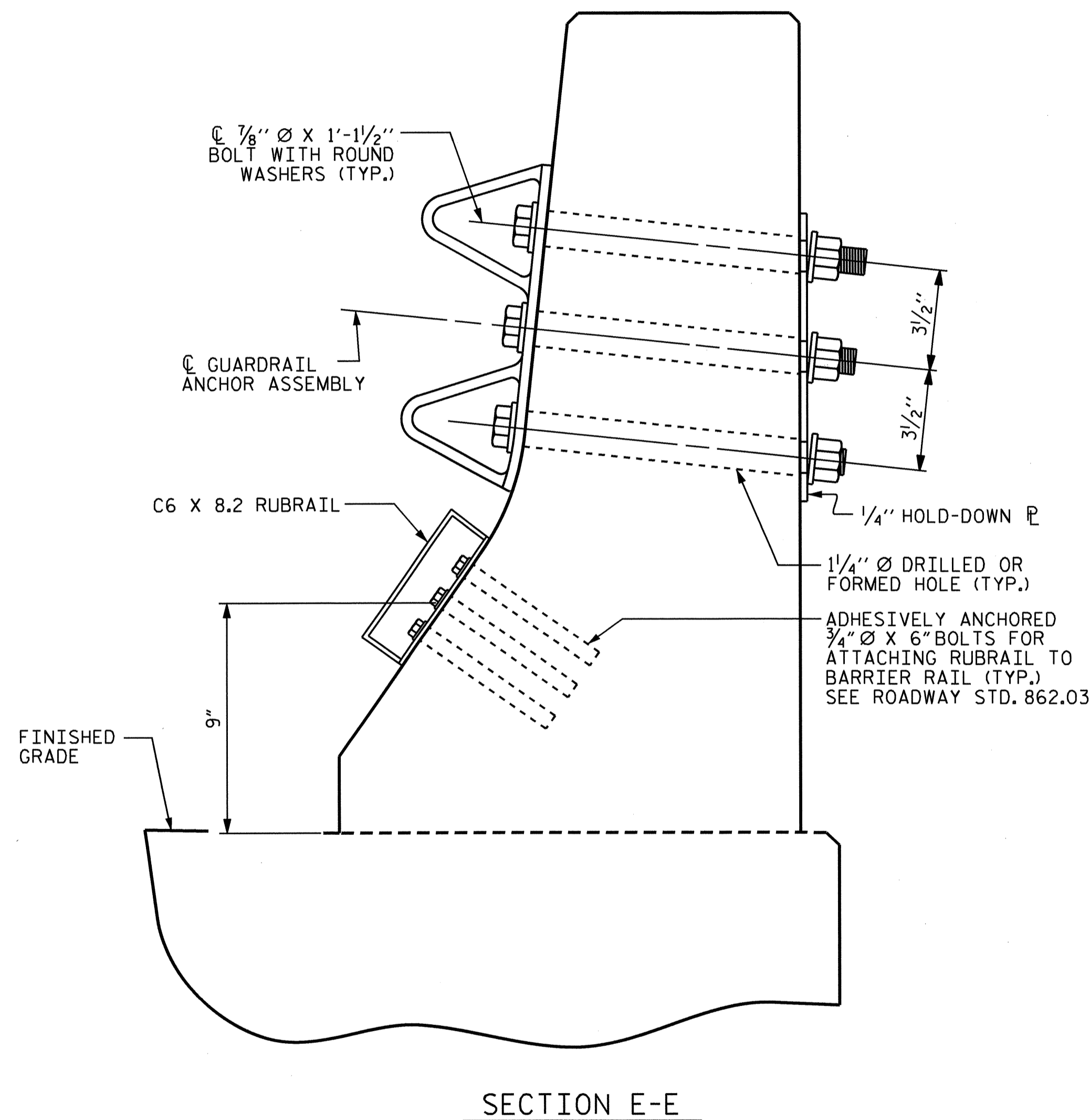
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR CONCRETE BARRIER RAIL.

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

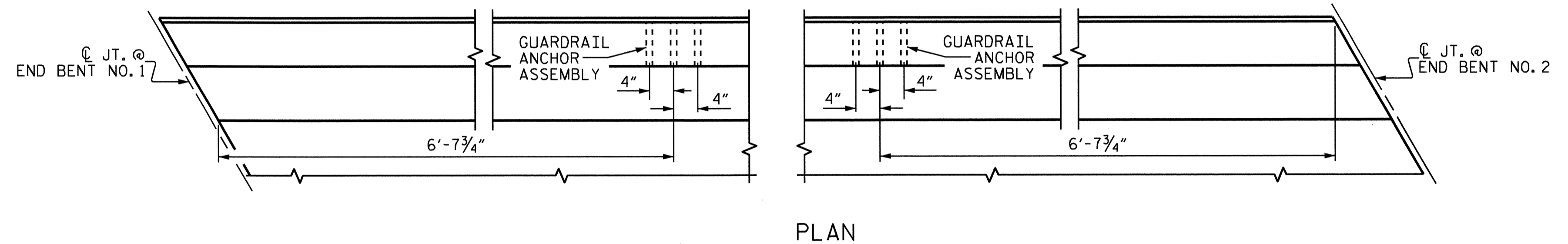
THE C6 X 8.2 RUBRAIL IS TO BE ADHESIVELY ANCHORED TO THE RAIL USING THREE 3/4" Ø X 6" BOLTS WITH WASHERS. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 12 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE SPECIAL PROVISIONS. SEE ROADWAY STANDARD 862.03 FOR DETAILS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



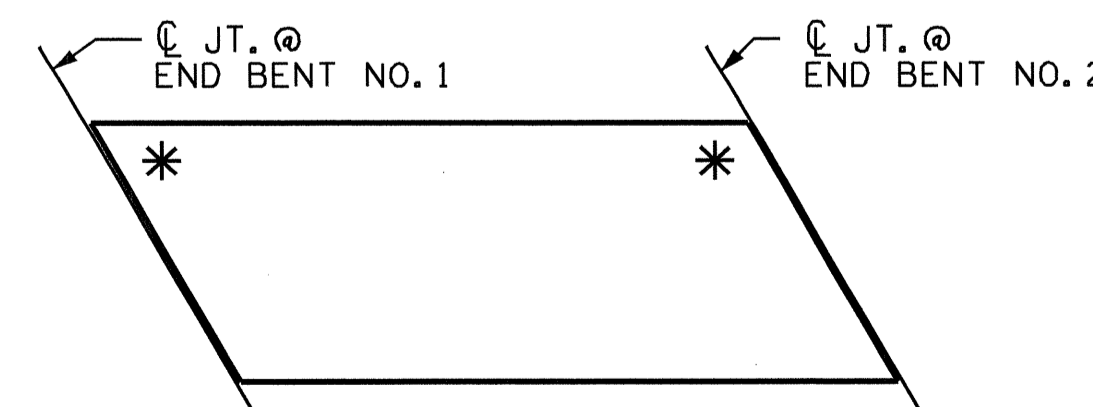
FOR LOCATION OF RUBRAIL, SEE ROADWAY STD. 862.03



GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL



\* DENOTES GUARDRAIL ANCHOR ASSEMBLY

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

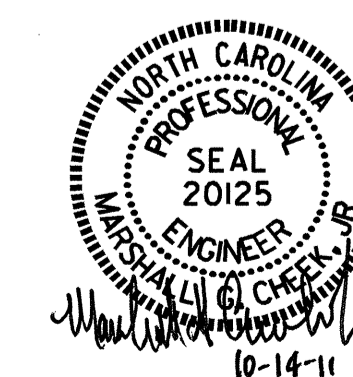
SHEET 1 OF 2

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

ASSEMBLED BY : W.D. CRUTCHER DATE : 3-17-11  
 CHECKED BY : M.G. CHEEK DATE : 5-11  
 DRAWN BY : TLA 5/06  
 CHECKED BY : GM 5/06

ADDED 5/1/06R KMM/GM

21-SEP-2011 09:26  
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 dahodge



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

STD. NO. GRA2

NOTES

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

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

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

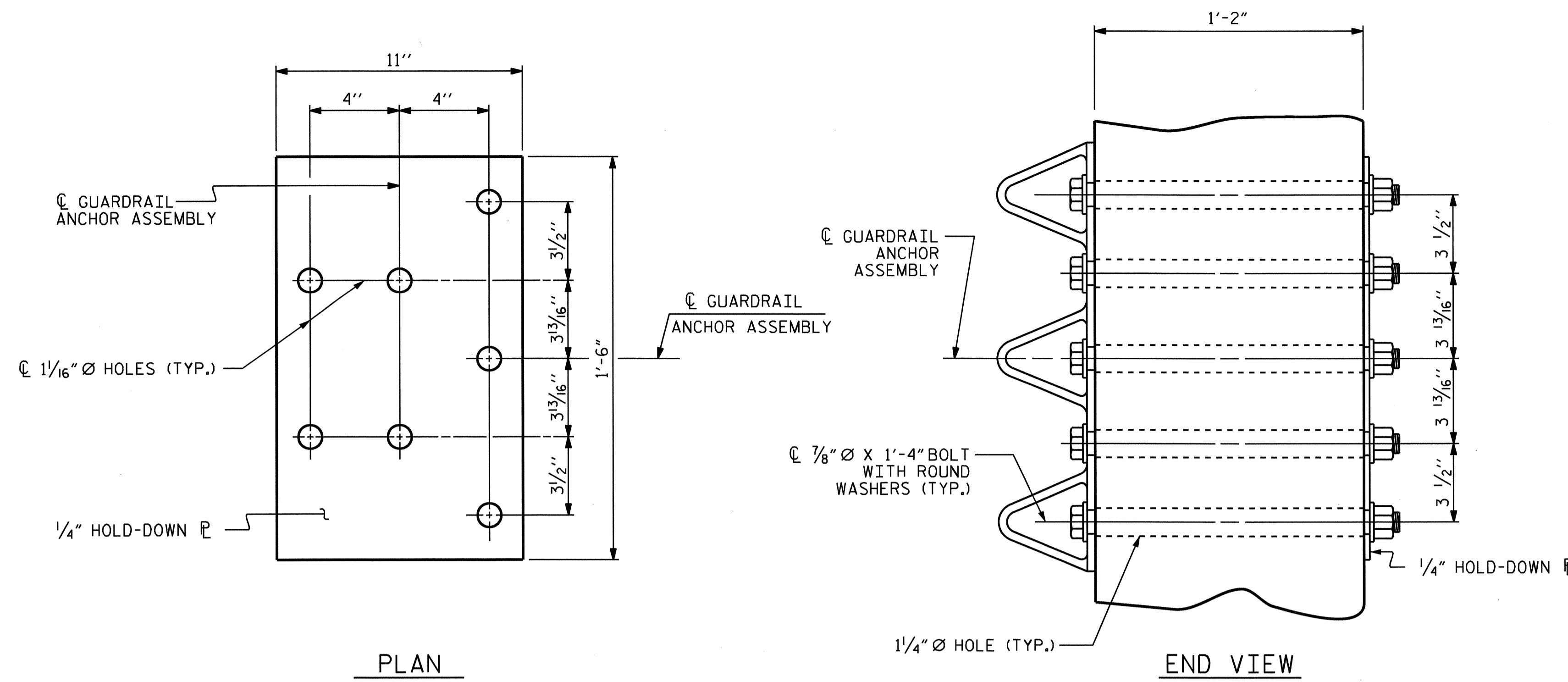
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

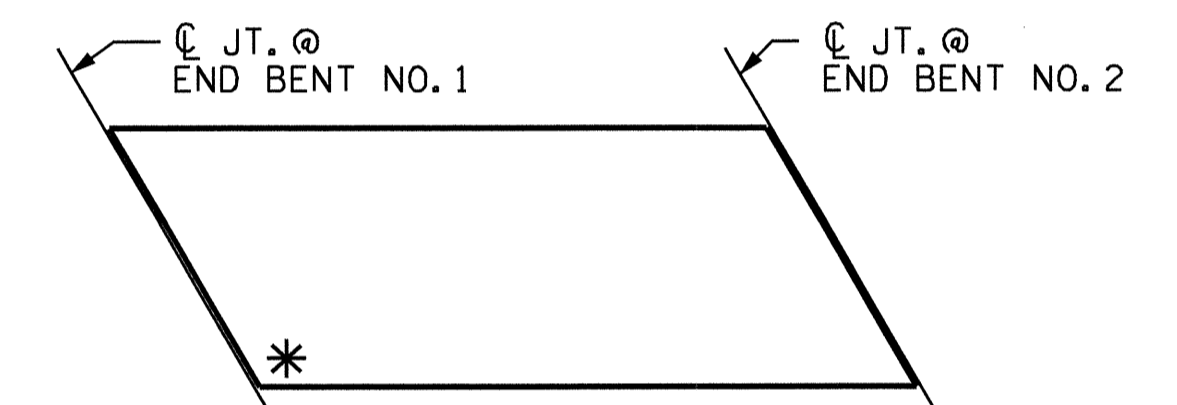
THE 1 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



PLAN

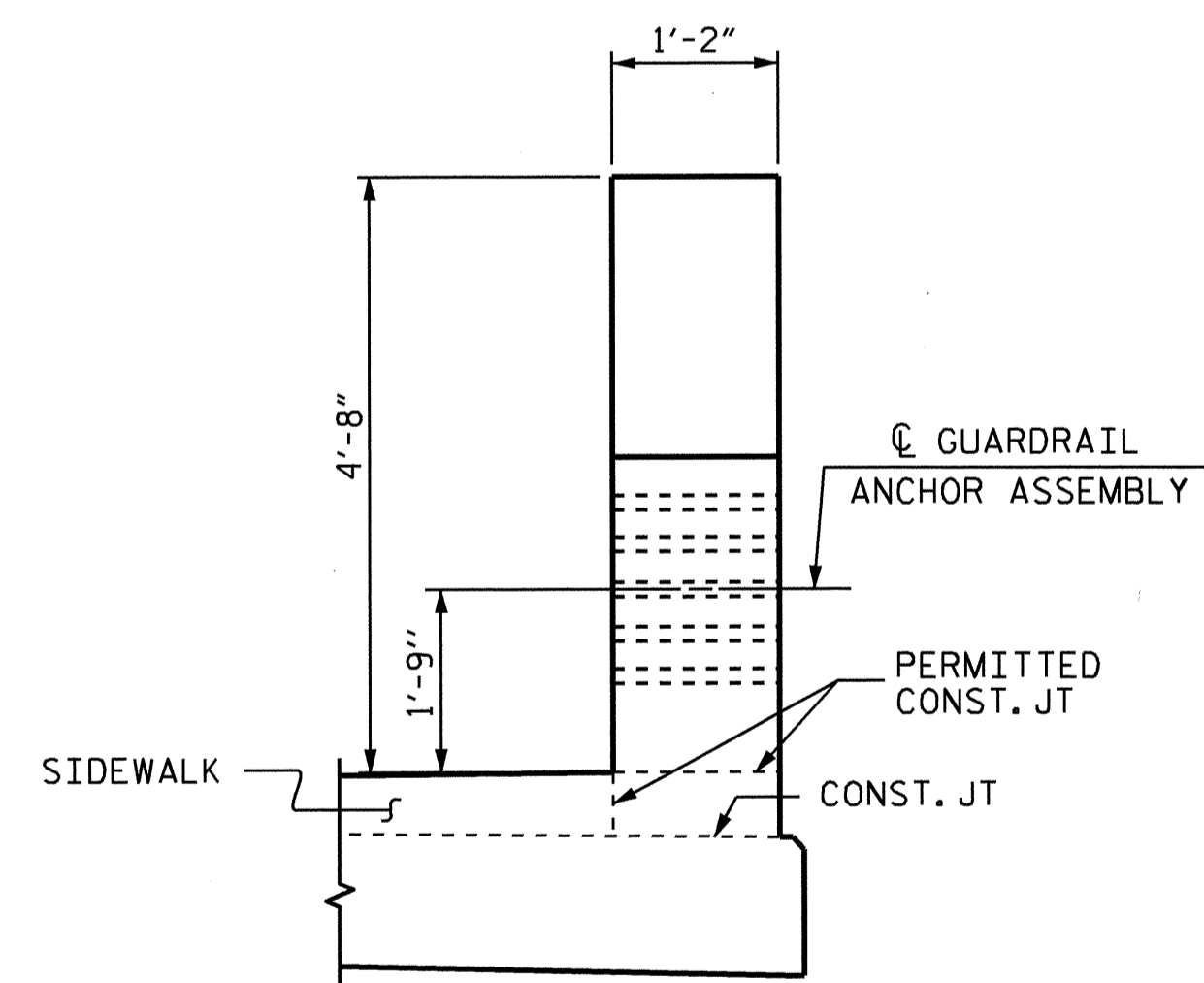
END VIEW

GUARDRAIL ANCHOR ASSEMBLY DETAILS

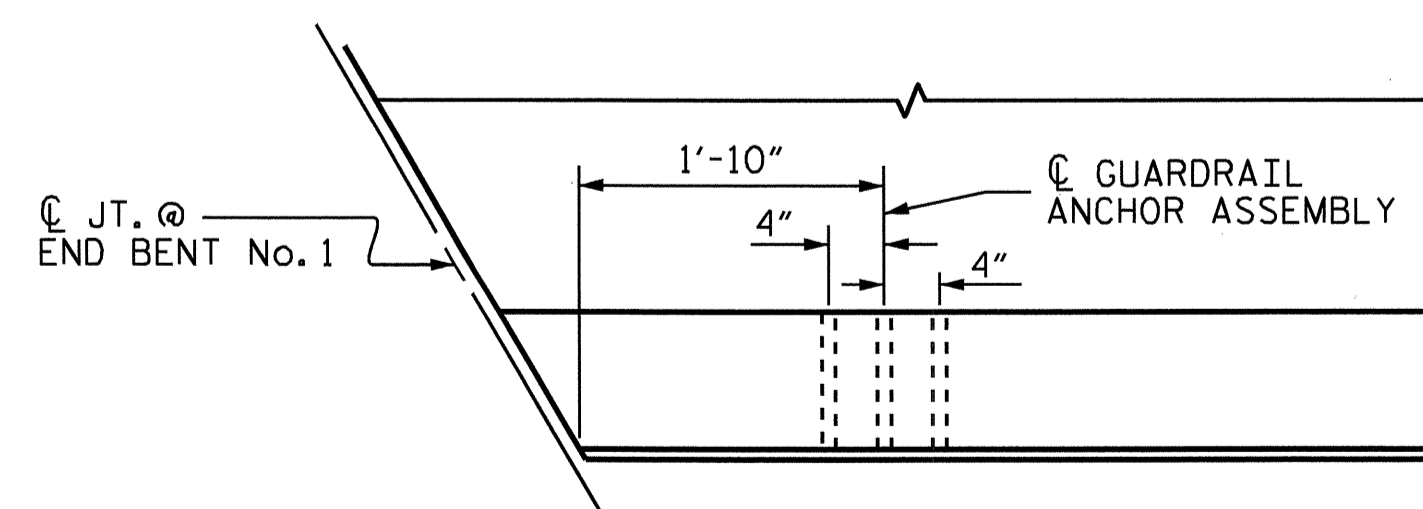


SKETCH SHOWING POINTS OF ATTACHMENT

\* LOCATION OF GUARDRAIL ATTACHMENT



END VIEW  
(TWO BAR METAL RAIL)



PLAN

LOCATION OF GUARDRAIL ANCHOR AT END POST

ASSEMBLED BY : D. HODGE	DATE : 9/11
CHECKED BY : M.G. CHEEK	DATE : 9/11
DRAWN BY : MAA 5/10	ADDED 5/6/10
CHECKED BY : GM 5/10	

21-SEP-2011 09:26  
R:\Structures\FINAL\U-4909.sd.01.GA.dgn  
djhodge



PROJECT NO. U-4909  
FORSYTH COUNTY  
STATION: 158+24.63 -L-NB-

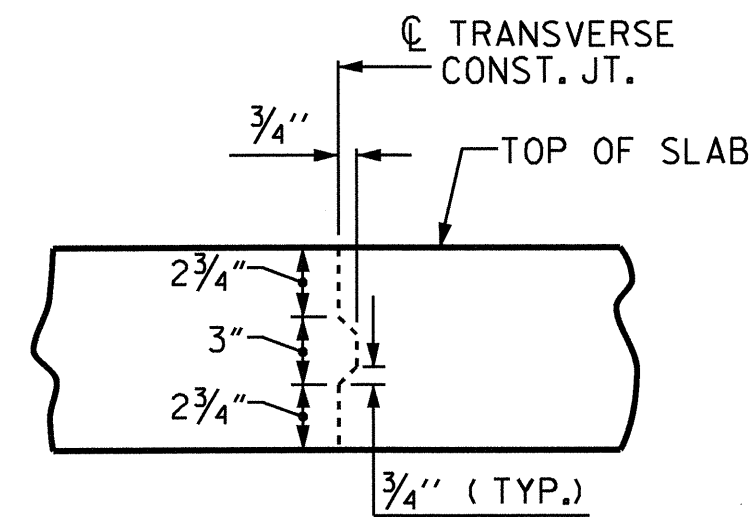
SHEET 2 OF 2

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO. S-20
STANDARD GUARDRAIL ANCHORAGE DETAILS FOR METAL RAILS						
REVISIONS						TOTAL SHEETS 36
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

STD. NO. GRA3

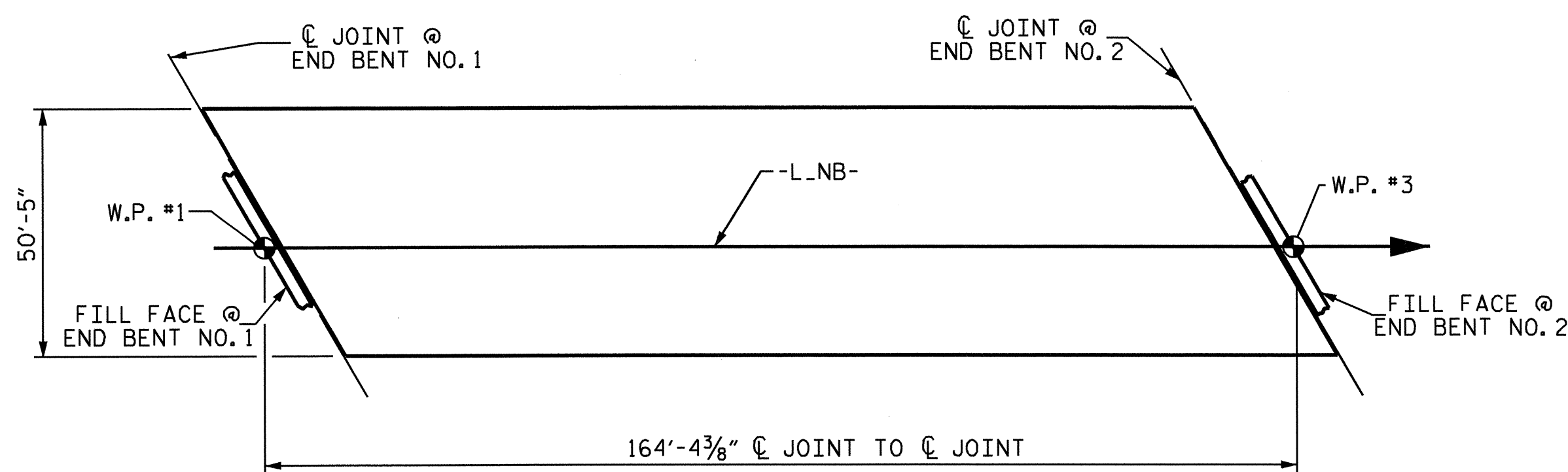
SUPERSTRUCTURE REINFORCING STEEL LENGTHS ARE BASED ON THE FOLLOWING MINIMUM SPLICE LENGTHS

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"			

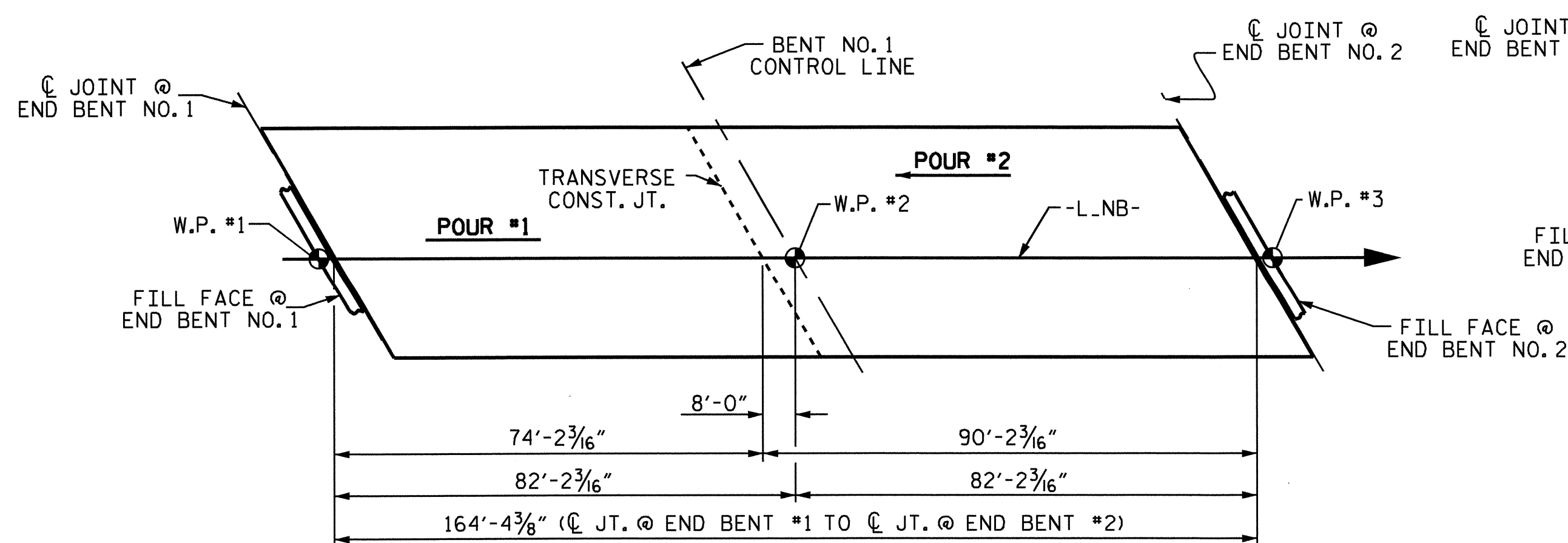


**TRANSVERSE CONSTRUCTION JOINT DETAIL**

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



LAYOUT FOR COMPUTING AREA REINFORCED CONCRETE DECK SLAB (SQ. FT. = 8,287)



**POURING SEQUENCE**

ASSEMBLED BY :	W.D. CRUTCHER	DATE :	3-15-11
CHECKED BY :	M.G. CHEEK	DATE :	5-11
DRAWN BY :	JMB 5/87	REV. 6/1/94	EEM/GRP
CHECKED BY :	SJD 9/87	REV. 8/16/99	RWW/LES
		REV. 5/1/06	TLA/GM

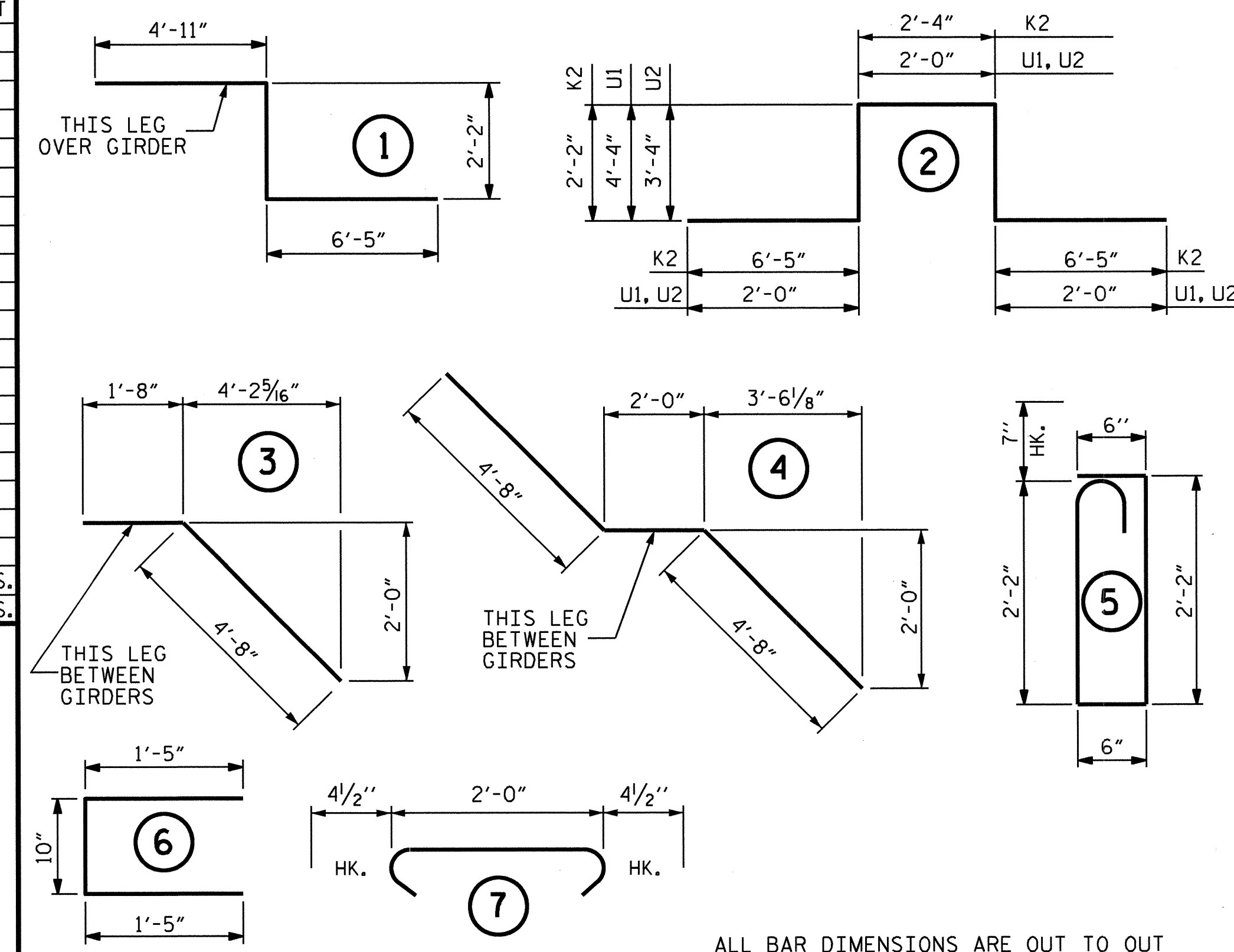
**REINFORCING BAR SCHEDULE SPAN A AND B**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	268	#5	STR	50'-1"	13,999	*G1	2	#5	STR	53'-3"	111
A2	268	#5	STR	50'-1"	13,999						
*A101	6	#5	STR	46'-1"	288	*K1	8	#8	1	13'-6"	288
*A102	6	#5	STR	41'-7"	260	*K2	16	#8	2	19'-6"	833
*A103	6	#5	STR	37'-2"	233	*K3	20	#6	STR	6'-10"	205
*A104	6	#5	STR	32'-8"	204	K4	20	#4	STR	7'-0"	94
*A105	6	#5	STR	28'-3"	177	K5	20	#4	STR	8'-0"	107
*A106	6	#5	STR	23'-9"	149	K6	10	#4	STR	6'-5"	43
*A107	6	#5	STR	19'-4"	121	K7	10	#4	3	6'-4"	42
*A108	6	#5	STR	14'-11	93	K8	20	#4	4	11'-4"	151
*A109	6	#5	STR	10'-5"	65	*S1	70	#4	6	3'-8"	171
*A110	6	#5	STR	6'-0"	38	*S2	70	#5	5	5'-11"	432
						S3	130	#4	7	2'-9"	239
A201	6	#5	STR	46'-1"	288						
A202	6	#5	STR	41'-7"	260						
A203	6	#5	STR	37'-2"	233						
A204	6	#5	STR	32'-8"	204						
A205	6	#5	STR	28'-3"	177						
A206	6	#5	STR	23'-9"	149						
A207	6	#5	STR	19'-4"	121						
A208	6	#5	STR	14'-11	93						
A209	6	#5	STR	10'-5"	65						
A210	6	#5	STR	6'-0"	38						
*B1	140	#4	STR	28'-2"	2634						
*B2	35	#7	STR	60'-0"	4292						
*B3	32	#7	STR	25'-0"	1635						
B4	159	#5	STR	56'-3"	9328						

\* THESE BARS ARE EPOXY COATED

REINFORCING STEEL = 25,961 LBS.  
\* EPOXY COATED REINF. STEEL = 26,228 LBS.

**BAR TYPES**



ALL BAR DIMENSIONS ARE OUT TO OUT

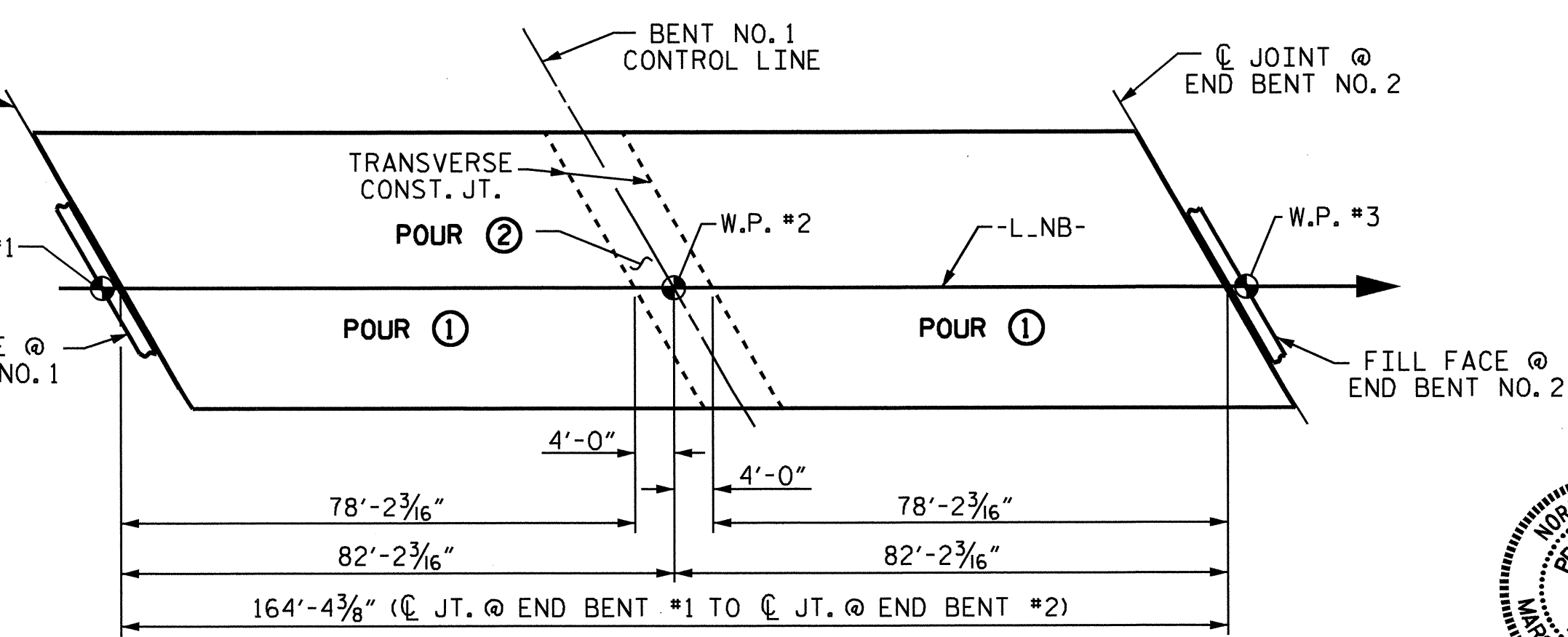
**GROOVING BRIDGE FLOORS**

APPROACH SLABS	1843 SQ.FT.
BRIDGE DECK	6355 SQ.FT.
TOTAL	8198 SQ.FT.

**SUPERSTRUCTURE BILL OF MATERIAL**

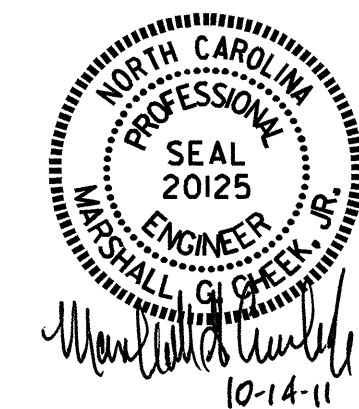
SPAN A AND B	CLASS AA CONCRETE	REINFORCING STEEL	EPOXY COATED REINFORCING STEEL
	(CU. YDS.)	(LBS.)	(LBS.)
POUR #1	125.2		
POUR #2	168.0		
TOTALS **	293.2	25,961	26,228

\*\* QUANTITIES FOR BARRIER RAIL, PARAPET & SIDEWALK ARE NOT INCLUDED



**OPTIONAL POURING SEQUENCE**

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



PROJECT NO. U-4909  
FORSYTH COUNTY  
STATION: 158+24.63 -L\_NB-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**SUPERSTRUCTURE BILL OF MATERIAL**

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

STD. NO. BOM2

**NOTES**

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

BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.

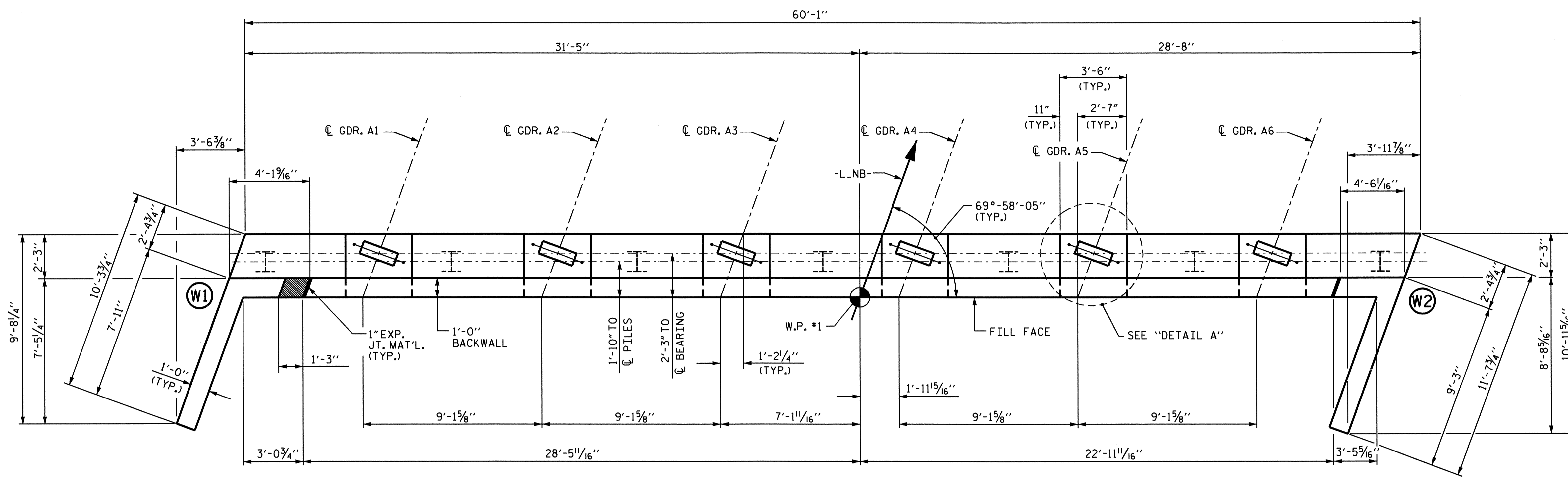
THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.

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

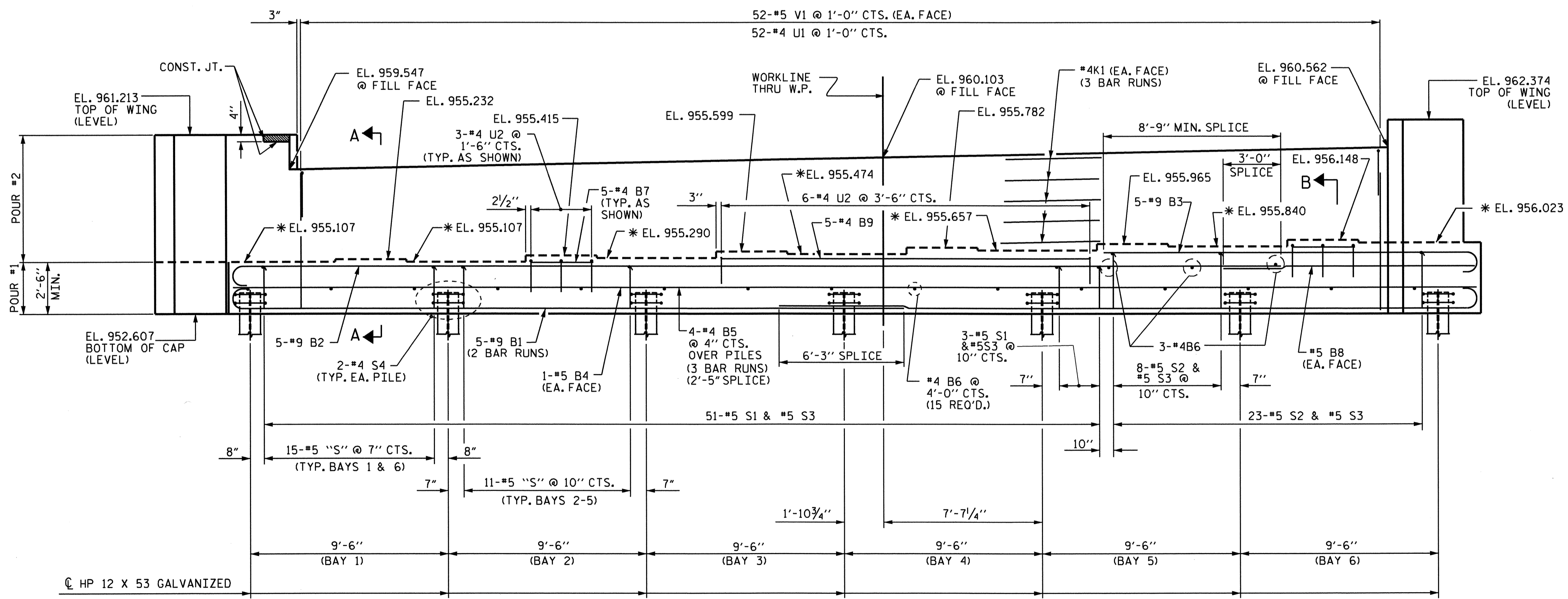
THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.

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

HP STEEL PILES SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.

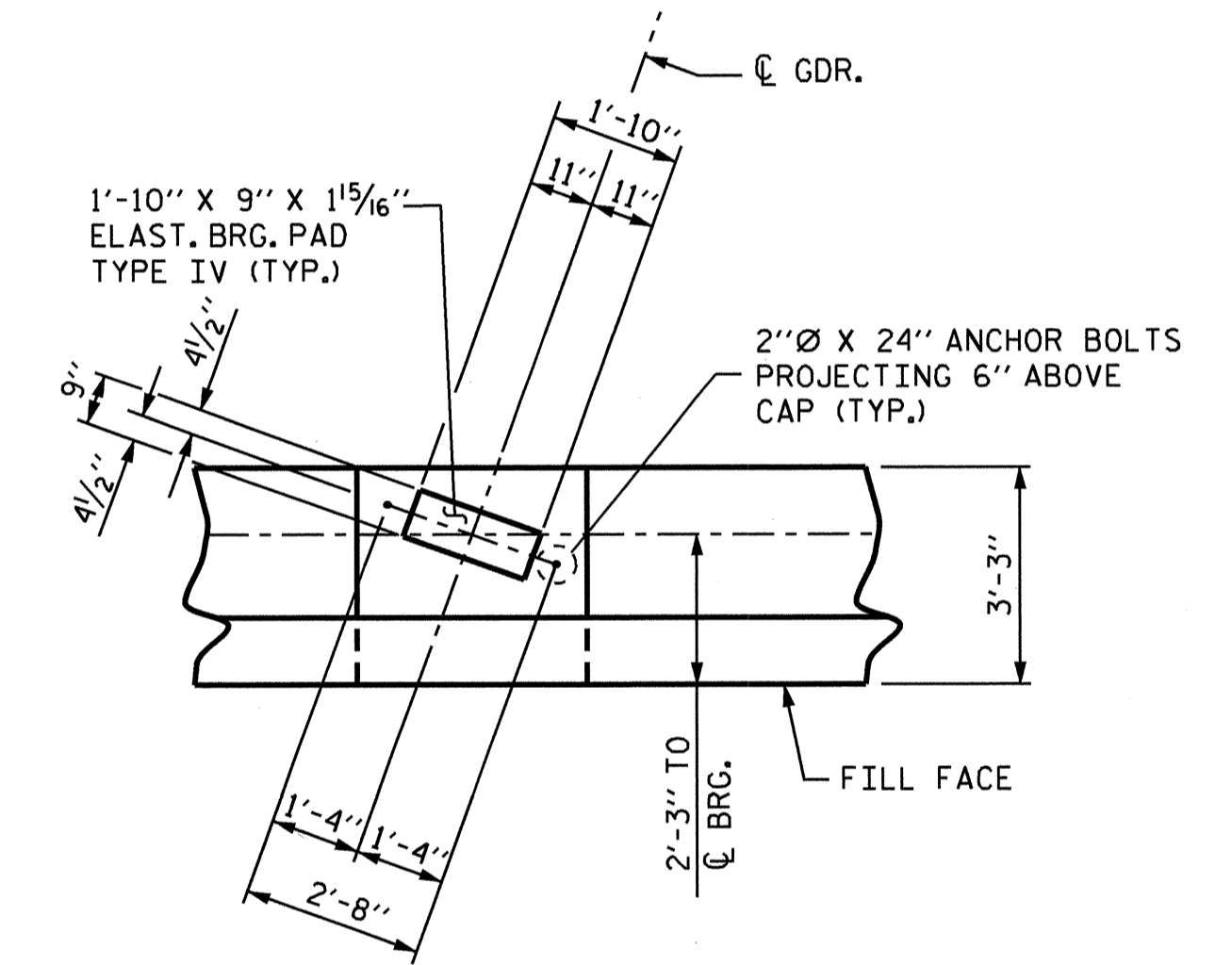


**PLAN**



**ELEVATION**

\* DENOTES ELEVATION BETWEEN BRIDGE SEATS. SEE SECTION A-A, SHEET 3 OF 3 FOR LOCATION.



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

PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L\_NB-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE  
 END BENT NO. 1**

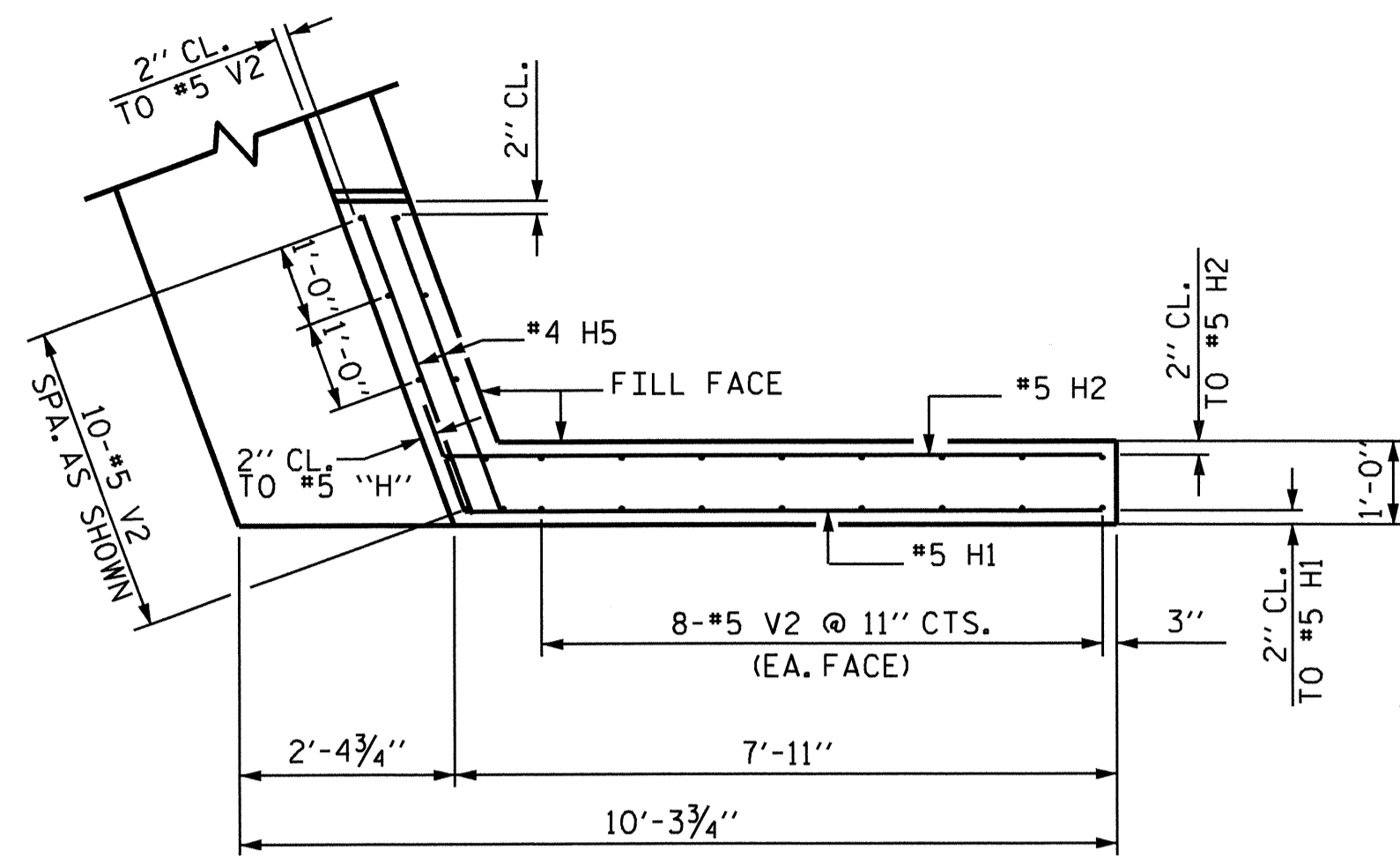


REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-22
1			3			TOTAL SHEETS 36
2			4			

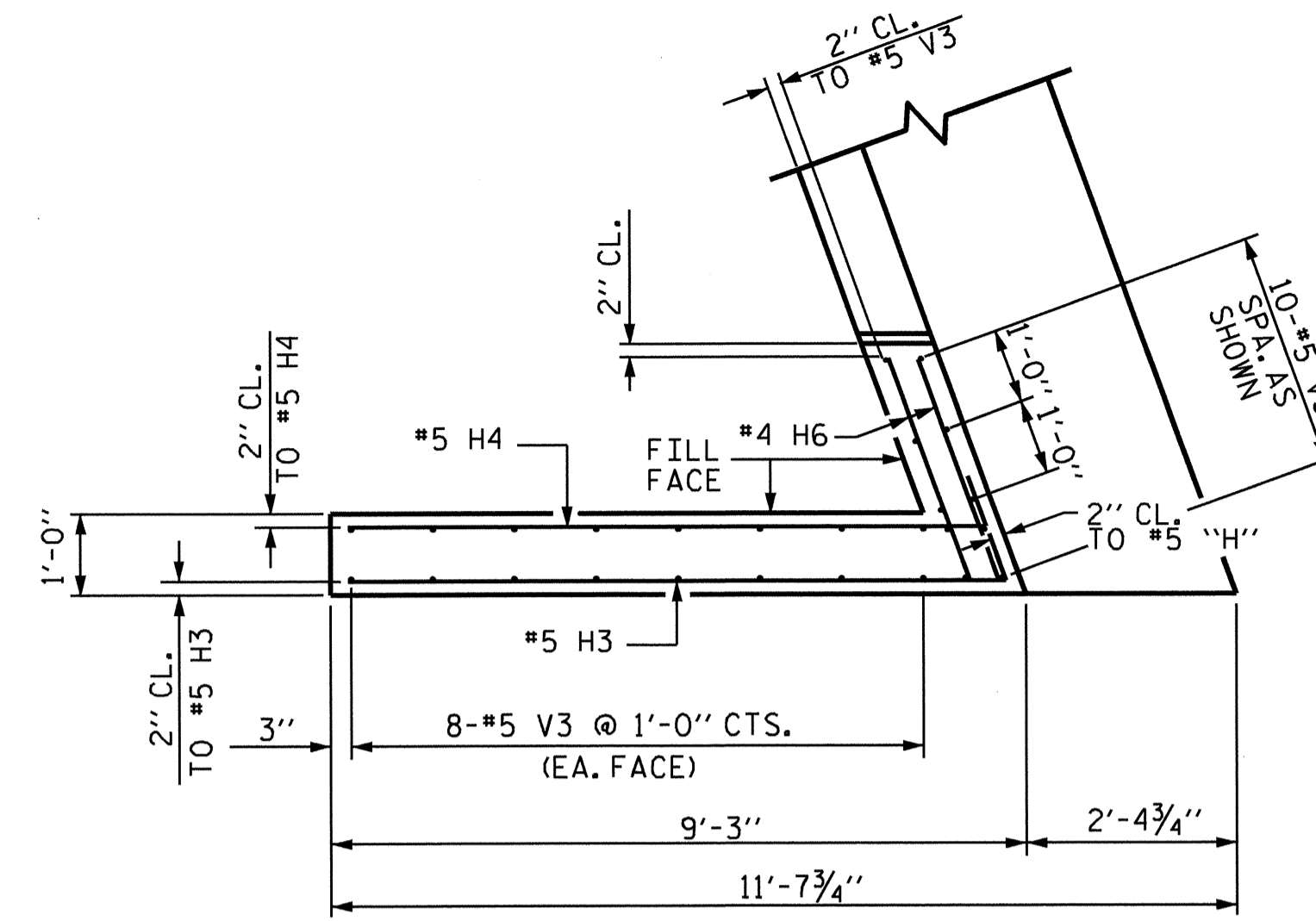
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 CHECKED BY: D. HODGE DATE: 6-11

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 vnguyen

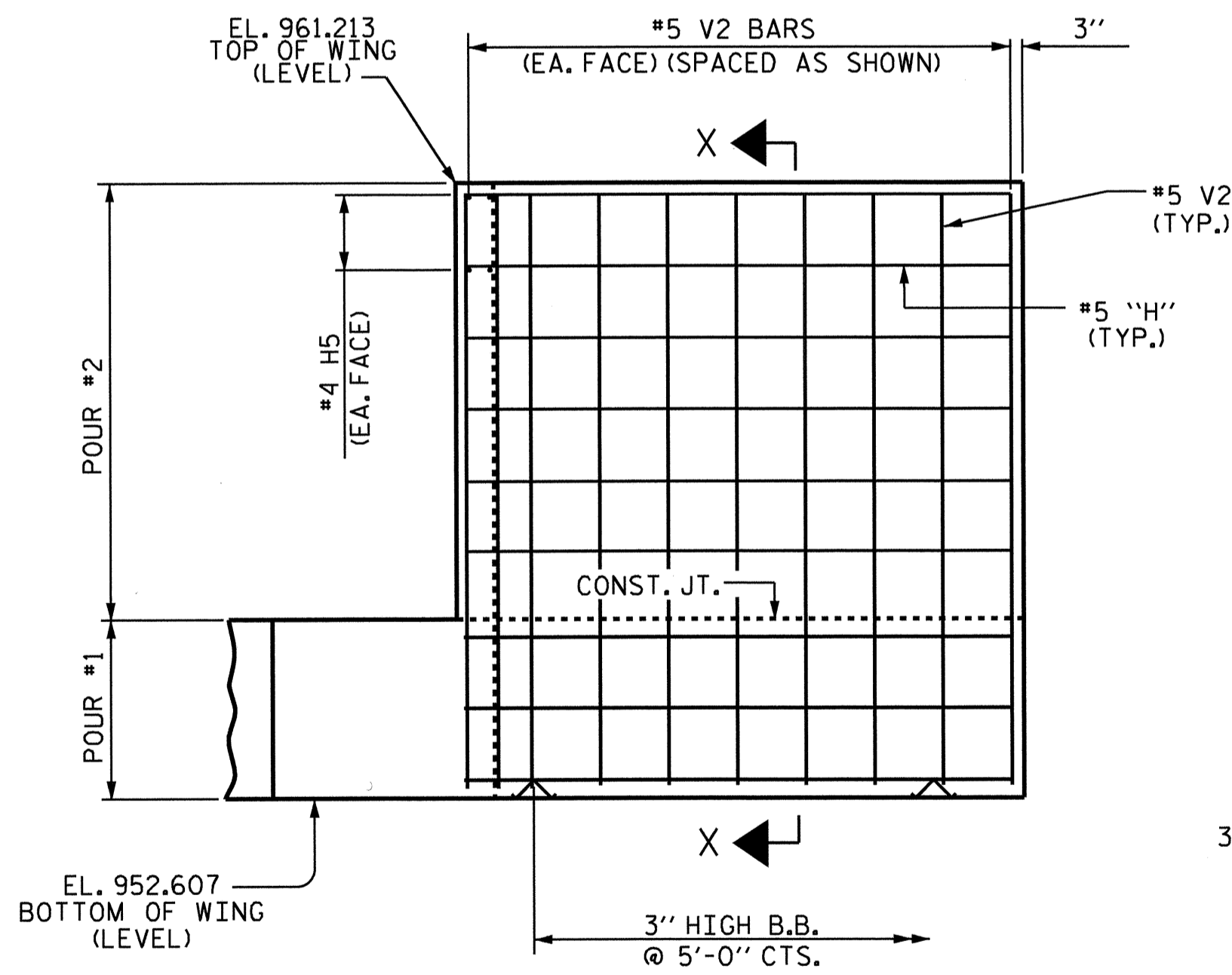




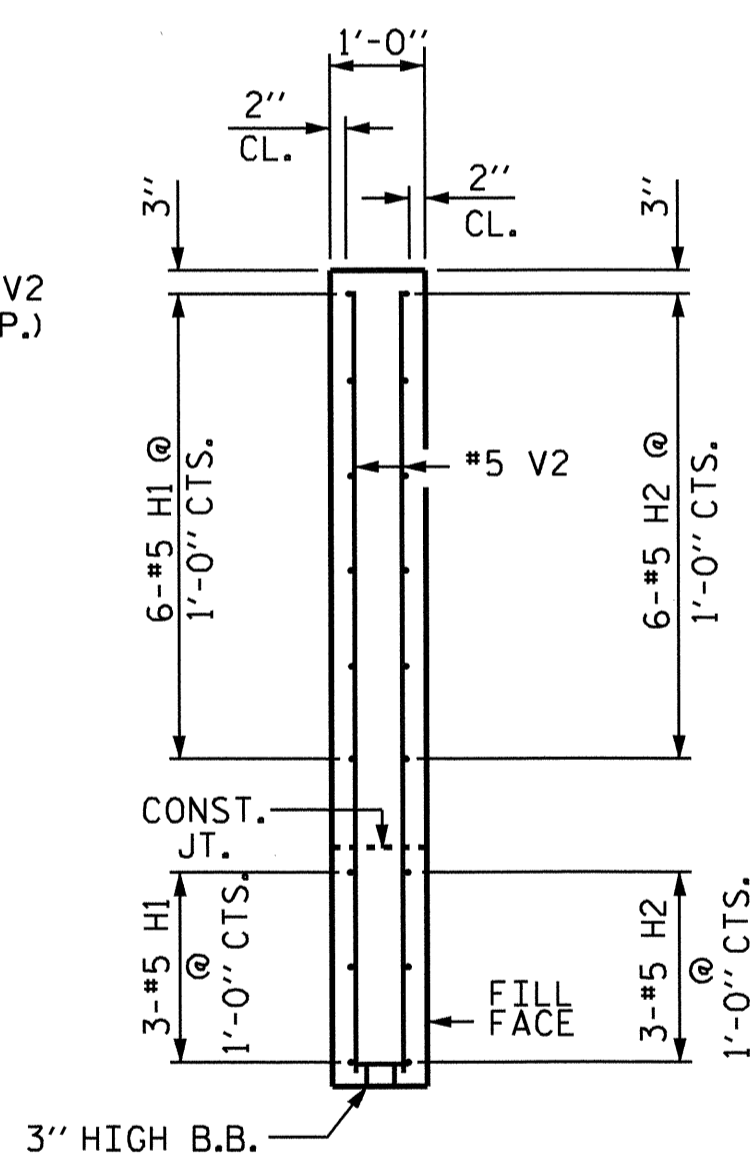
PLAN OF WING - W1



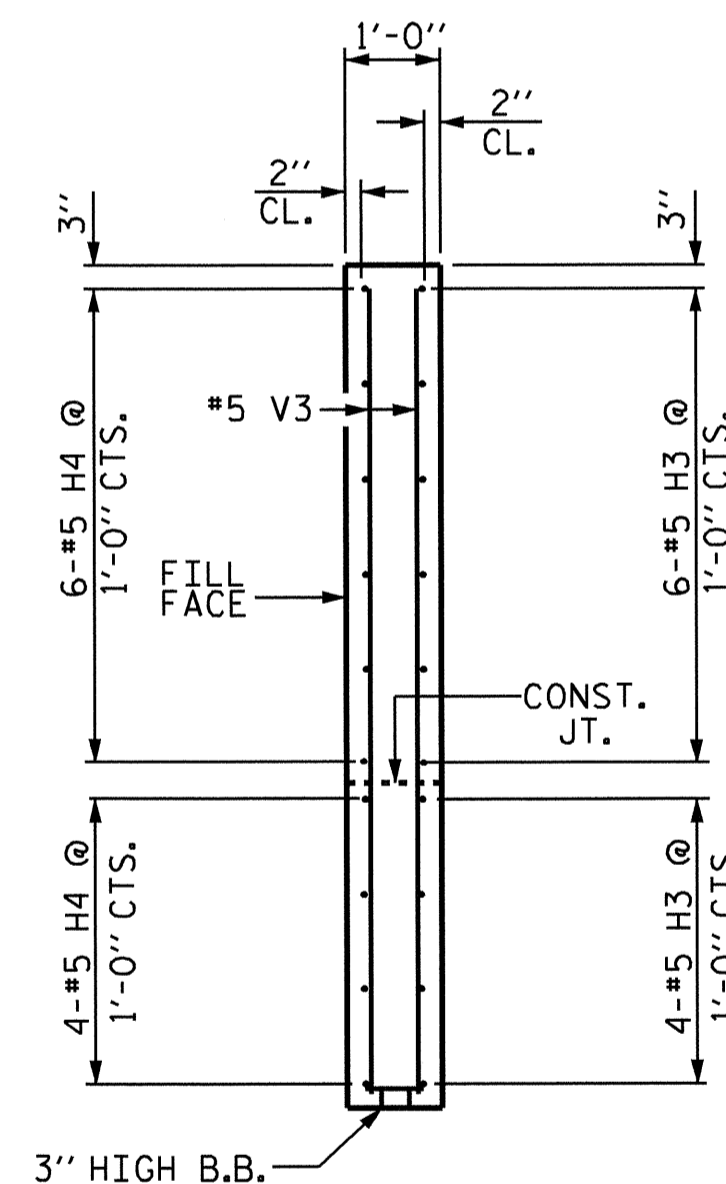
PLAN OF WING - W2



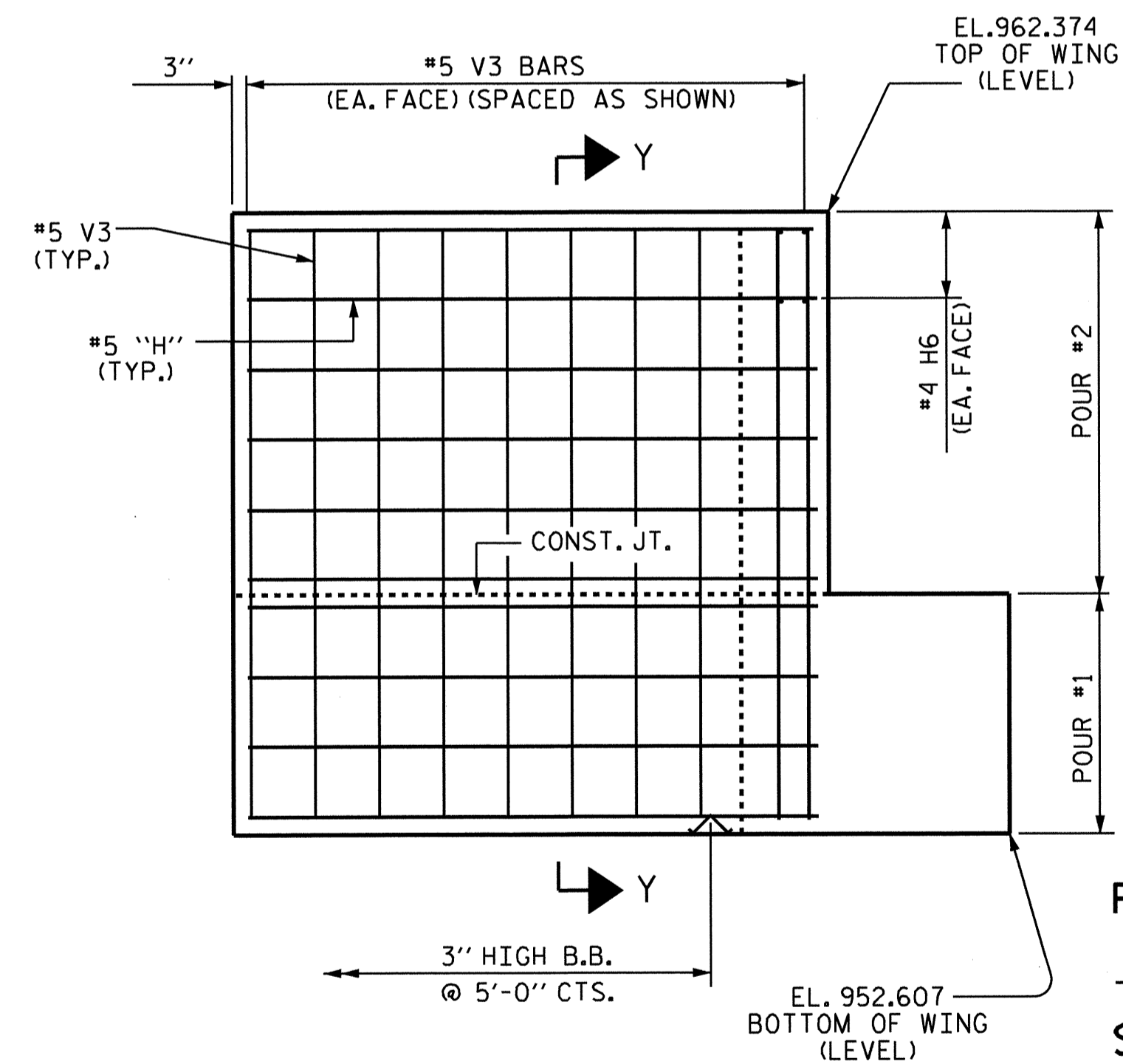
ELEVATION OF WING - W1



SECTION X-X



SECTION Y-Y



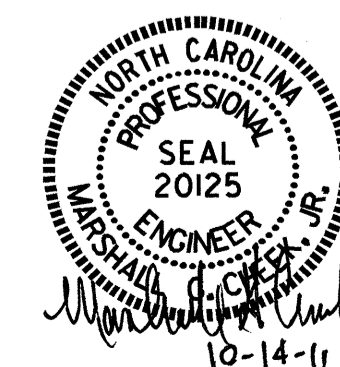
ELEVATION OF WING - W2

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

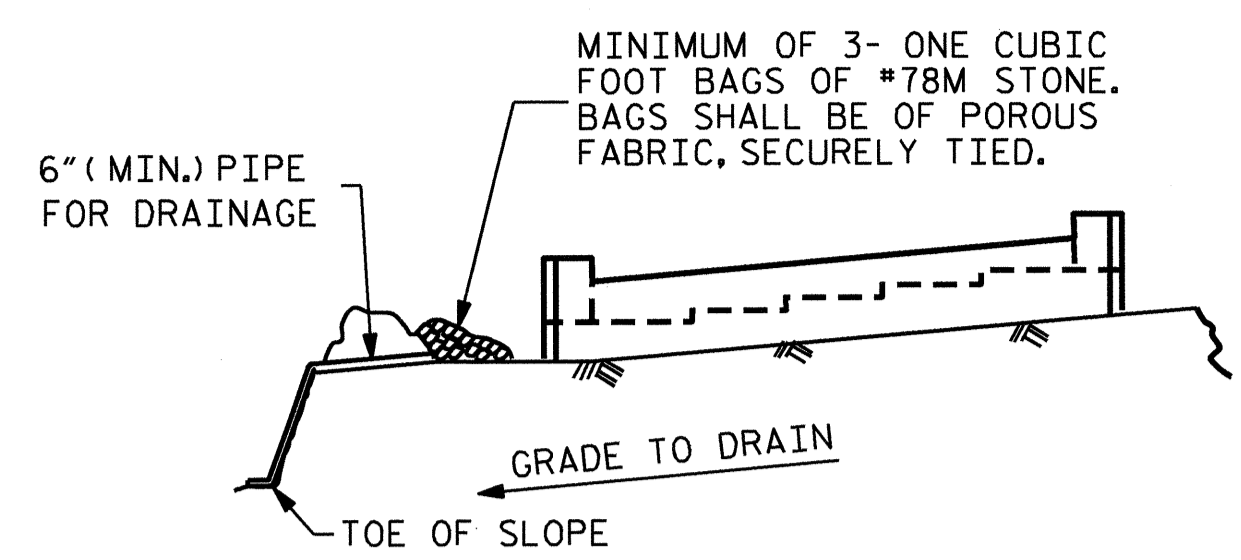
SUBSTRUCTURE  
 END BENT NO. 1



DRAWN BY: V.X. NGUYEN DATE: 5-24-11  
 CHECKED BY: D. HODGE DATE: 8-11

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 vnguyen

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

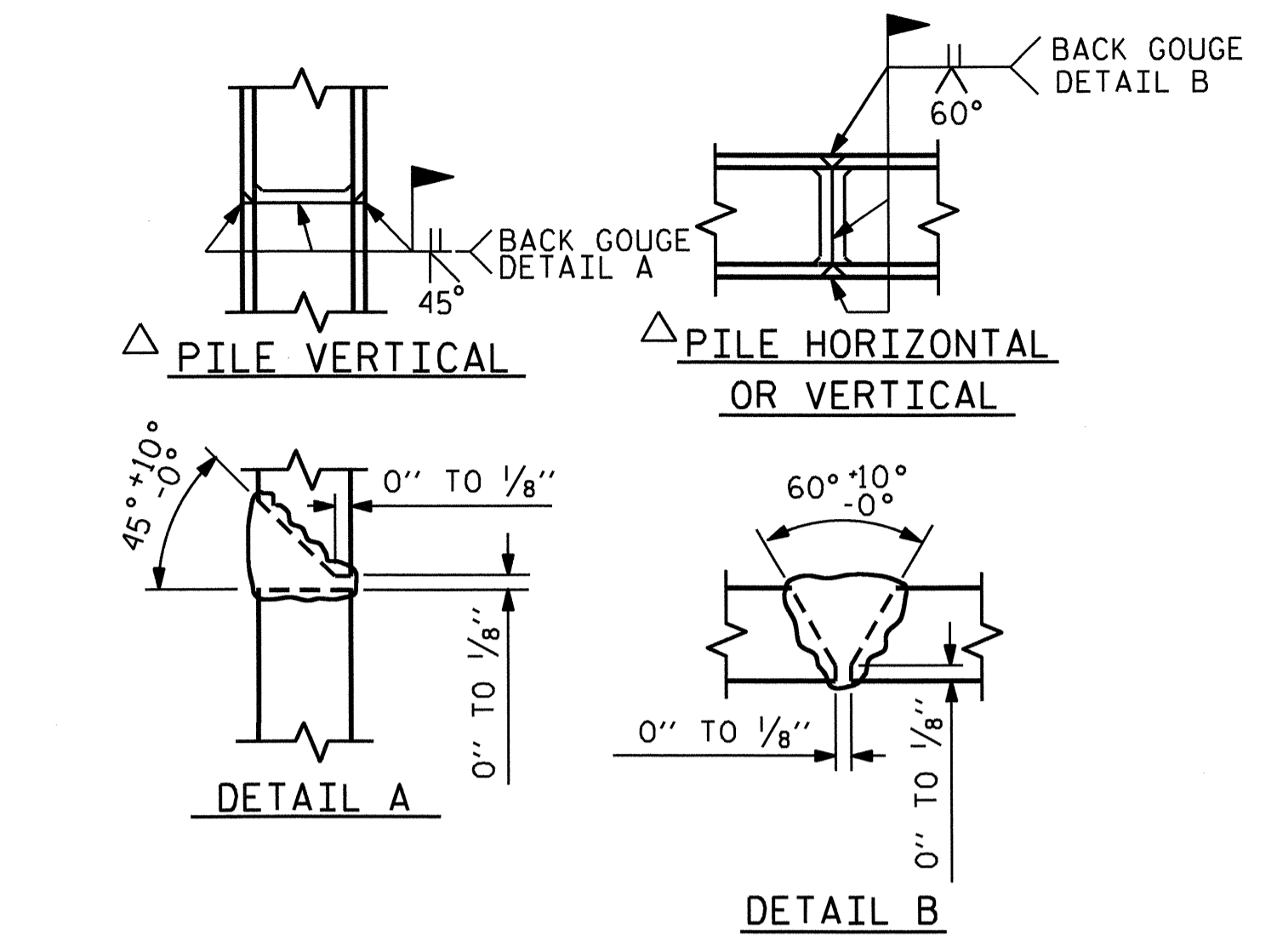


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

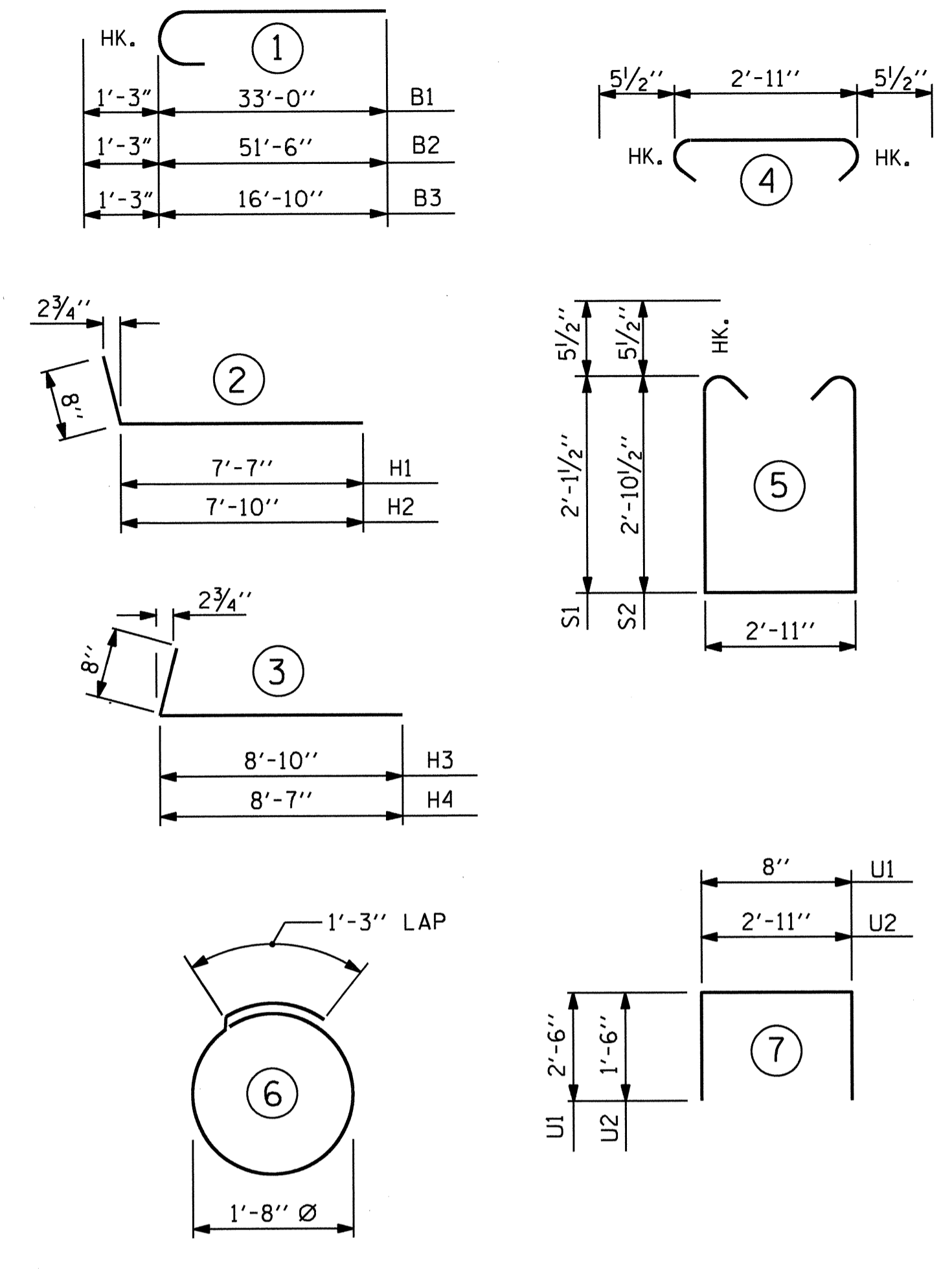
**TEMPORARY DRAINAGE AT END BENT**



△ POSITION OF PILE DURING WELDING.

**PILE SPLICE DETAILS**

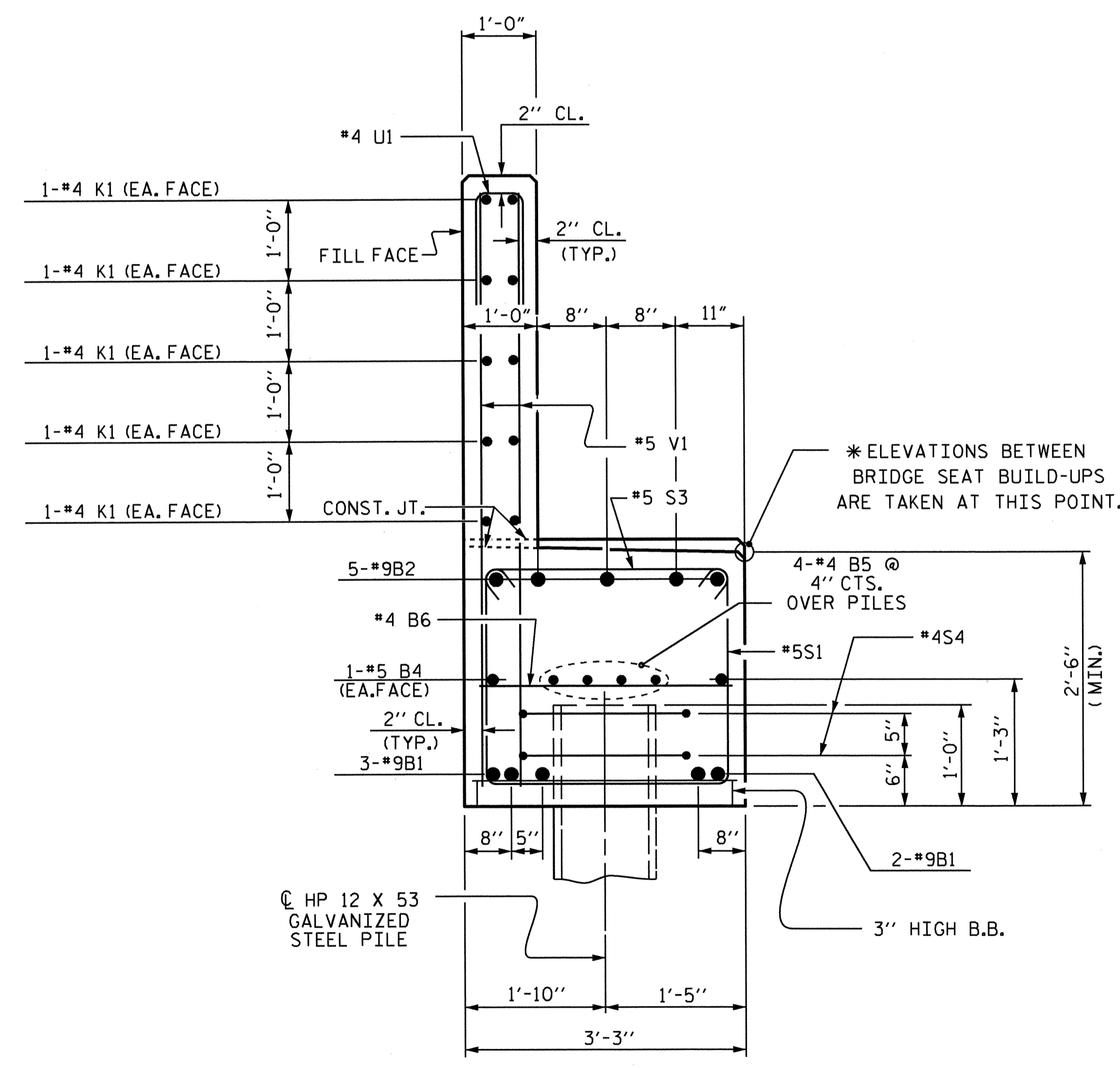
**BAR TYPES**



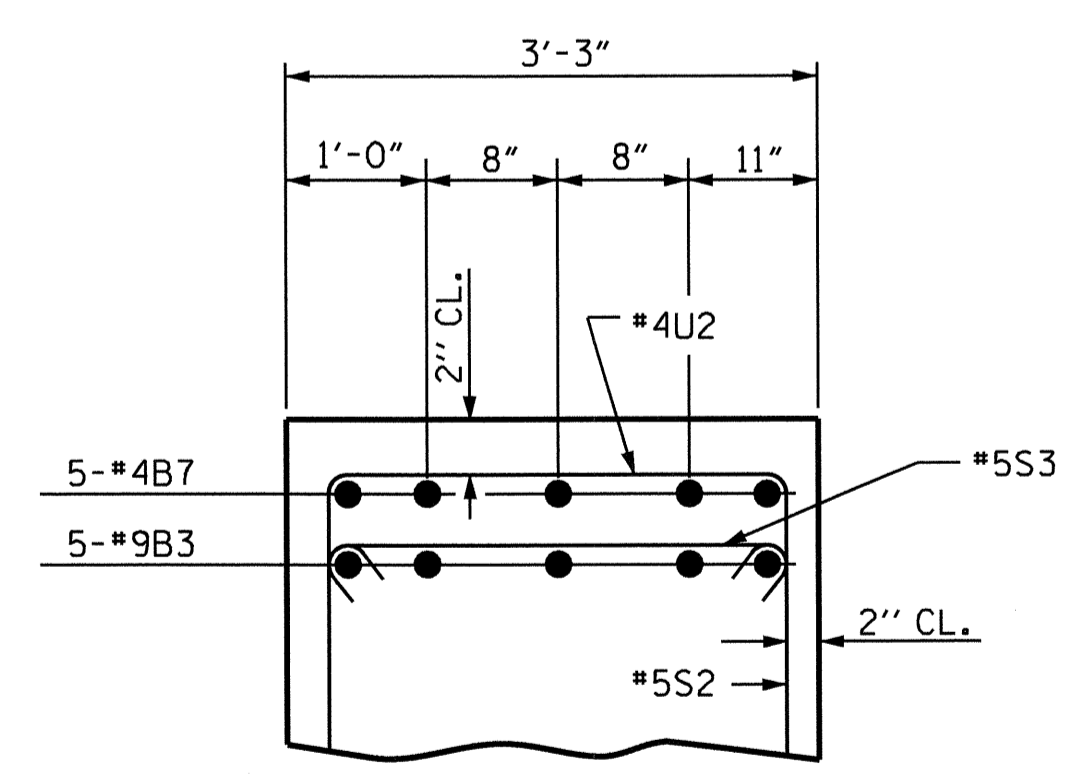
ALL BAR DIMENSIONS ARE OUT TO OUT.

**BILL OF MATERIAL**

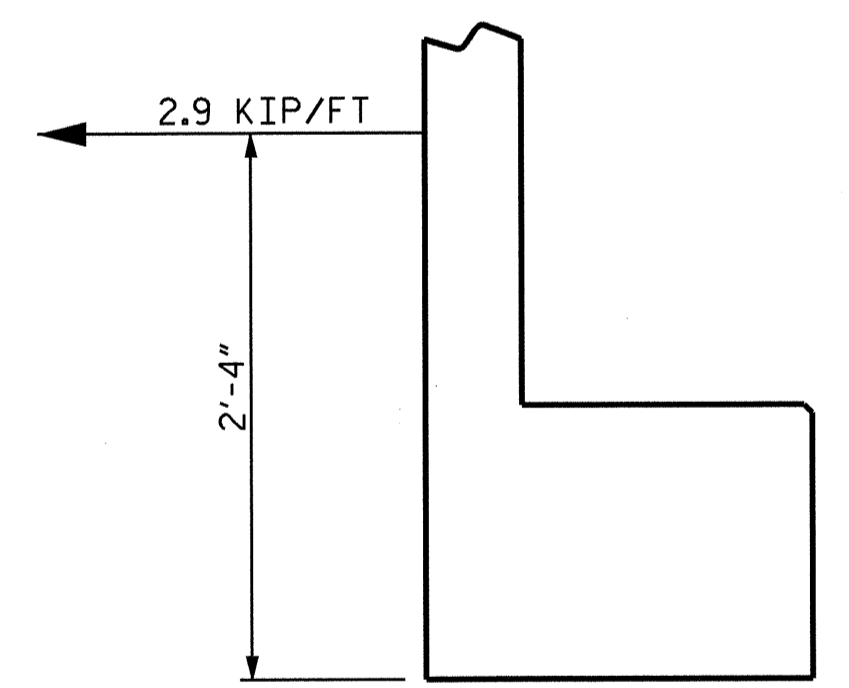
END BENT NO. 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	34'-3"	1165
B2	5	#9	1	52'-9"	897
B3	5	#9	1	18'-1"	307
B4	2	#5	STR	59'-9"	125
B5	12	#4	STR	21'-7"	173
B6	18	#4	STR	2'-11"	35
B7	10	#4	STR	3'-2"	21
B8	2	#5	STR	11'-2"	23
B9	5	#4	STR	18'-2"	61
H1	9	#5	2	8'-3"	77
H2	9	#5	2	8'-6"	80
H3	10	#5	3	9'-6"	99
H4	10	#5	3	9'-3"	96
H5	4	#4	STR	3'-9"	10
H6	4	#4	STR	4'-1"	11
K1	30	#4	STR	21'-7"	433
S1	51	#5	5	8'-1"	430
S2	23	#5	5	9'-7"	230
S3	74	#5	4	3'-10"	296
S4	14	#4	6	6'-6"	61
U1	52	#4	7	5'-8"	197
U2	12	#4	7	5'-11"	47
V1	104	#5	STR	6'-7"	714
V2	26	#5	STR	8'-3"	224
V3	26	#5	STR	9'-5"	255
REINFORCING STEEL					= 6067 LBS.
CLASS A CONCRETE					
POUR #1 : CAP & LOWER WINGS					= 23.1 CU. YDS.
POUR #2 : BACKWALL & UPPER WINGS					= 14.1 CU. YDS.
TOTAL CLASS A CONCRETE					= 37.2 CU. YDS.
HP 12 X 53 GALVANIZED STEEL PILES					
NO. 7					390 LIN. FT.



**SECTION A-A**



**PARTIAL SECTION B**



**MSE REINFORCING STRAP LOAD DETAIL**

**MSE REINFORCING STRAP NOTES**

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR THE LOADING SHOWN AND CAST THE REINFORCEMENT CONNECTION HARDWARE INTO THE END BENT BACKWALL. MAINTAIN A MINIMUM CLEARANCE OF 3" BETWEEN THE HARDWARE AND REINFORCING STEEL IN THE BACKWALL.

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT NO. 1

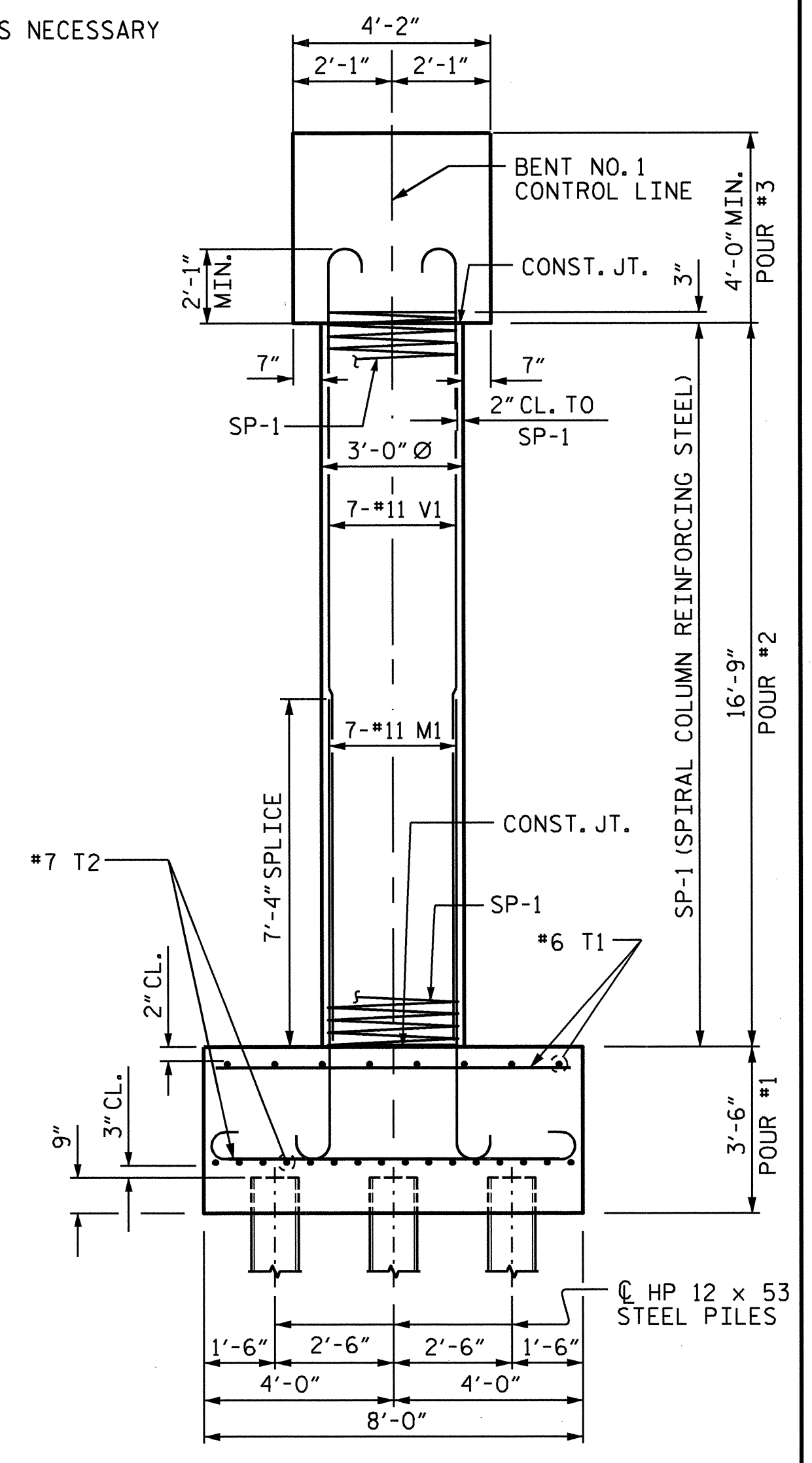
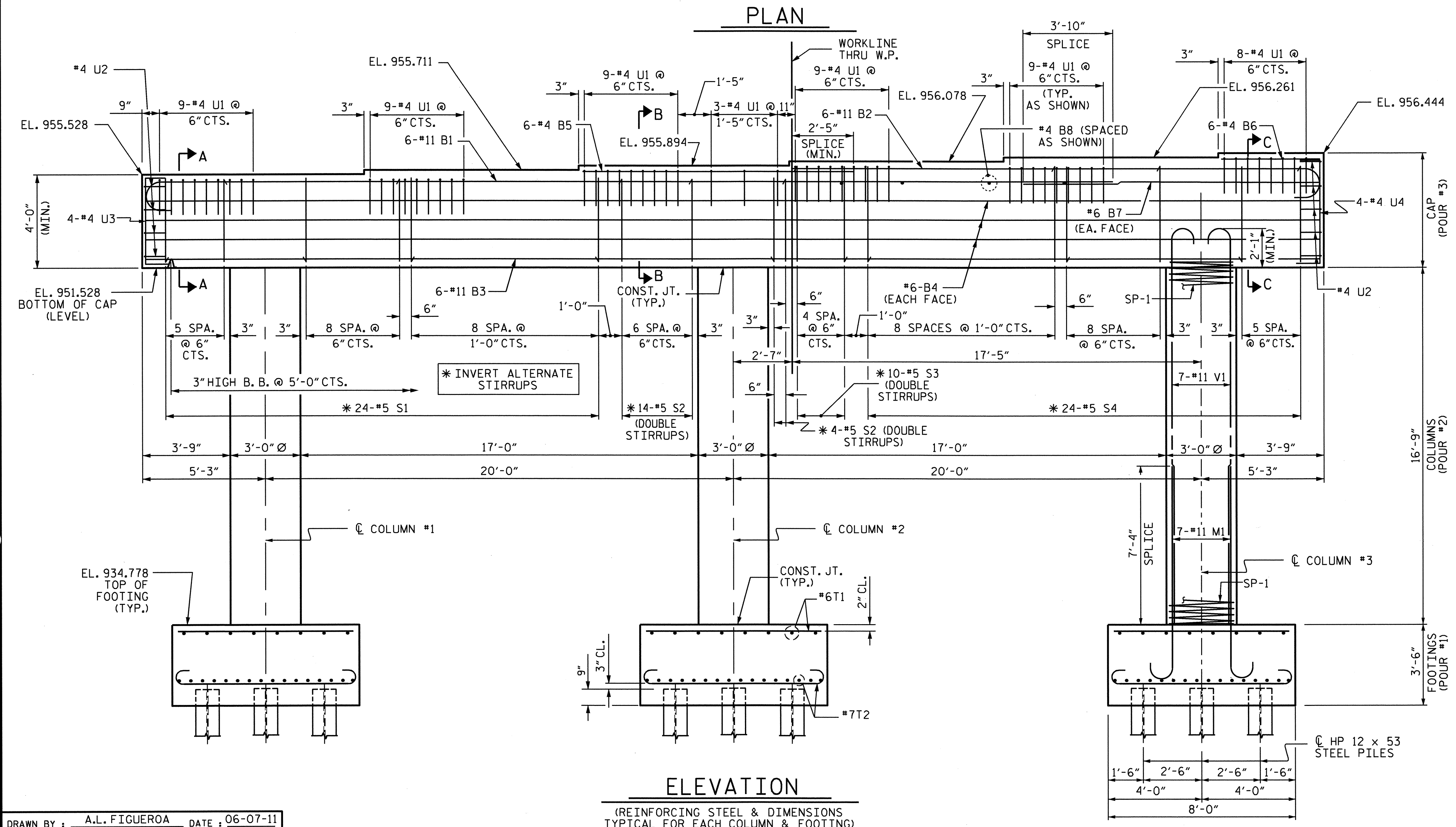
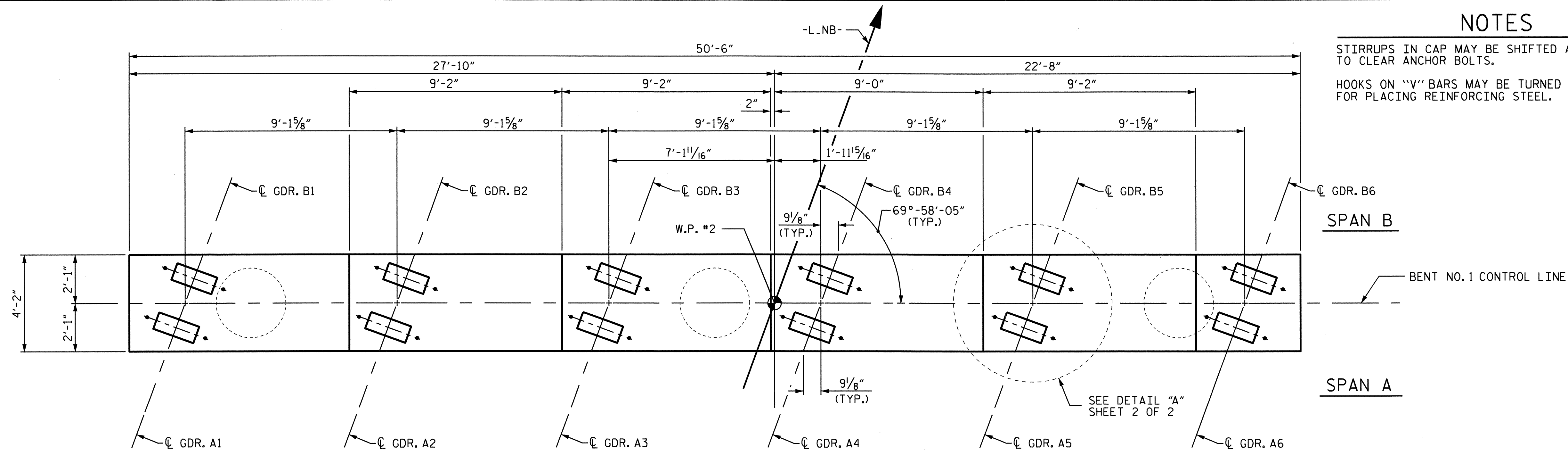


DRAWN BY : V.X. NGUYEN DATE : 5-23-11  
 CHECKED BY : D. HODGE DATE : 8-11

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

# NOTES

STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.



PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

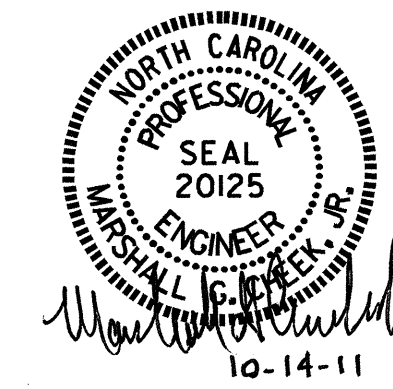
SHEET 1 OF 2

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE BENT NO. 1					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

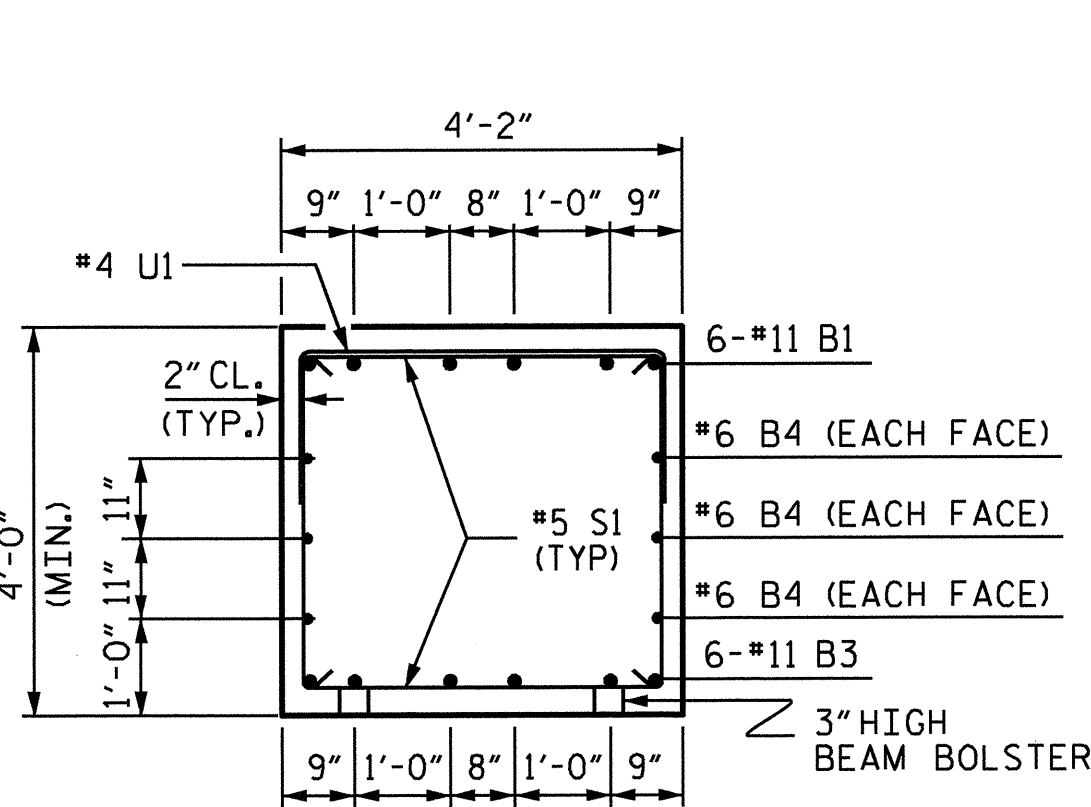
SHEET NO. S-25  
 TOTAL SHEETS 36

DRAWN BY: A.L. FIGUEROA DATE: 06-07-11  
 CHECKED BY: M.G. CHEEK DATE: 07-11

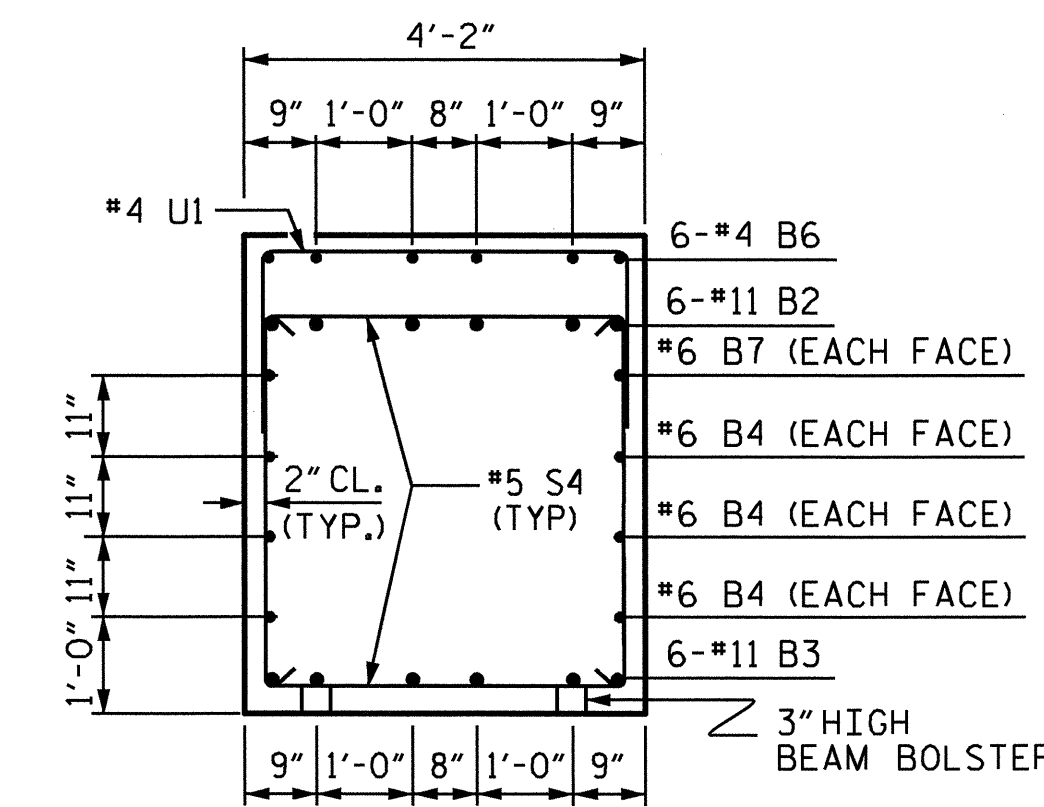
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 RA\Structures\FINAL\U-4909.ad.STR\*1.13.Bent 1.dgn  
 dahodge



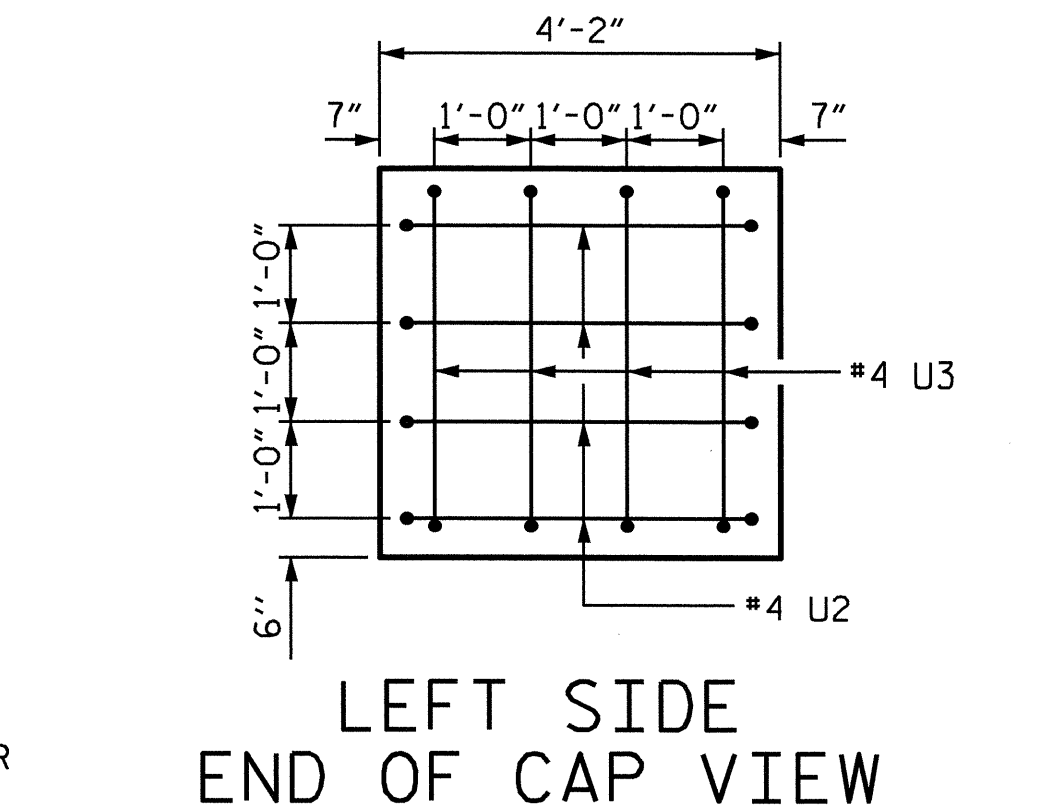
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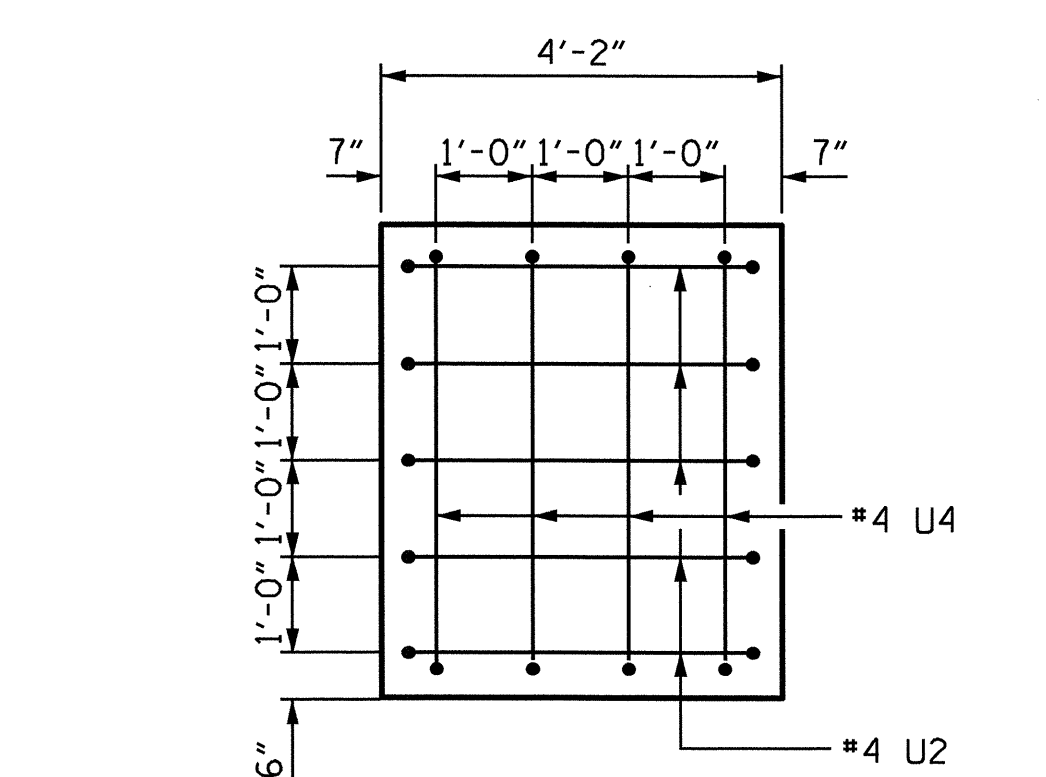
SECTION A-A



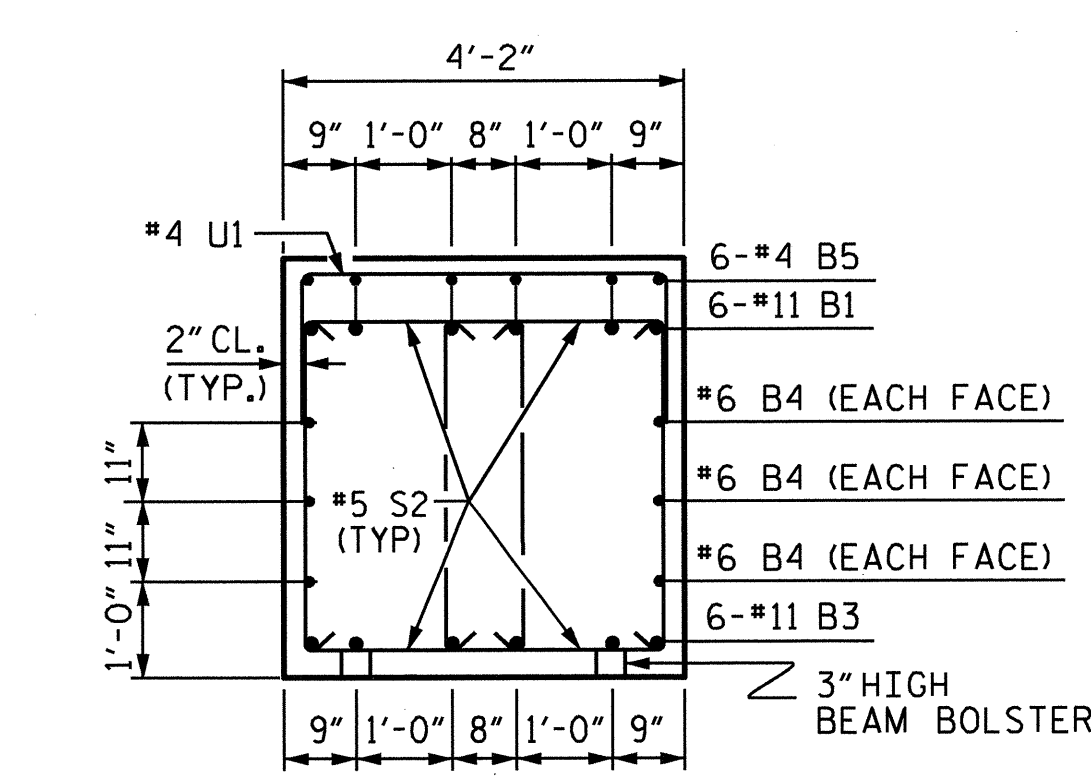
SECTION C-C



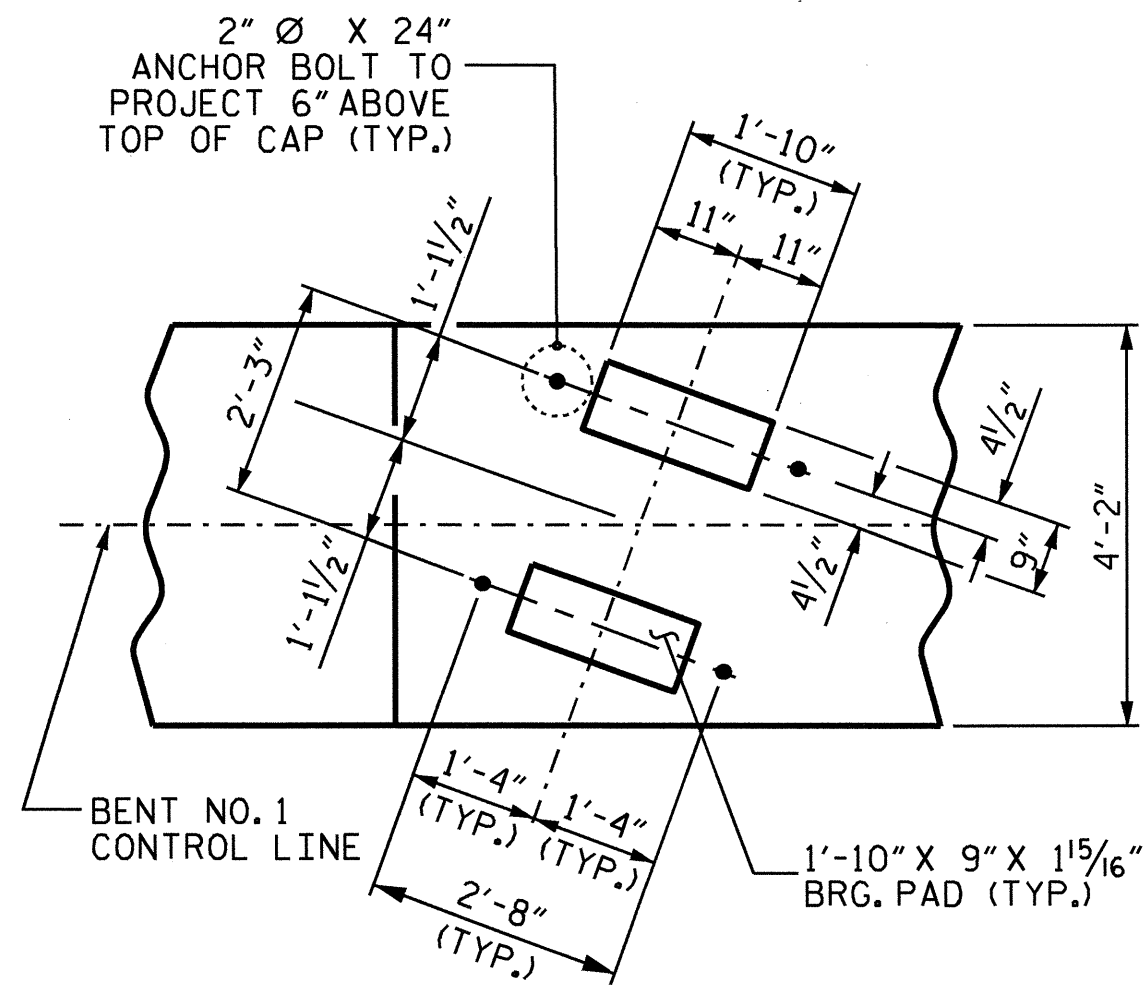
LEFT SIDE END OF CAP VIEW



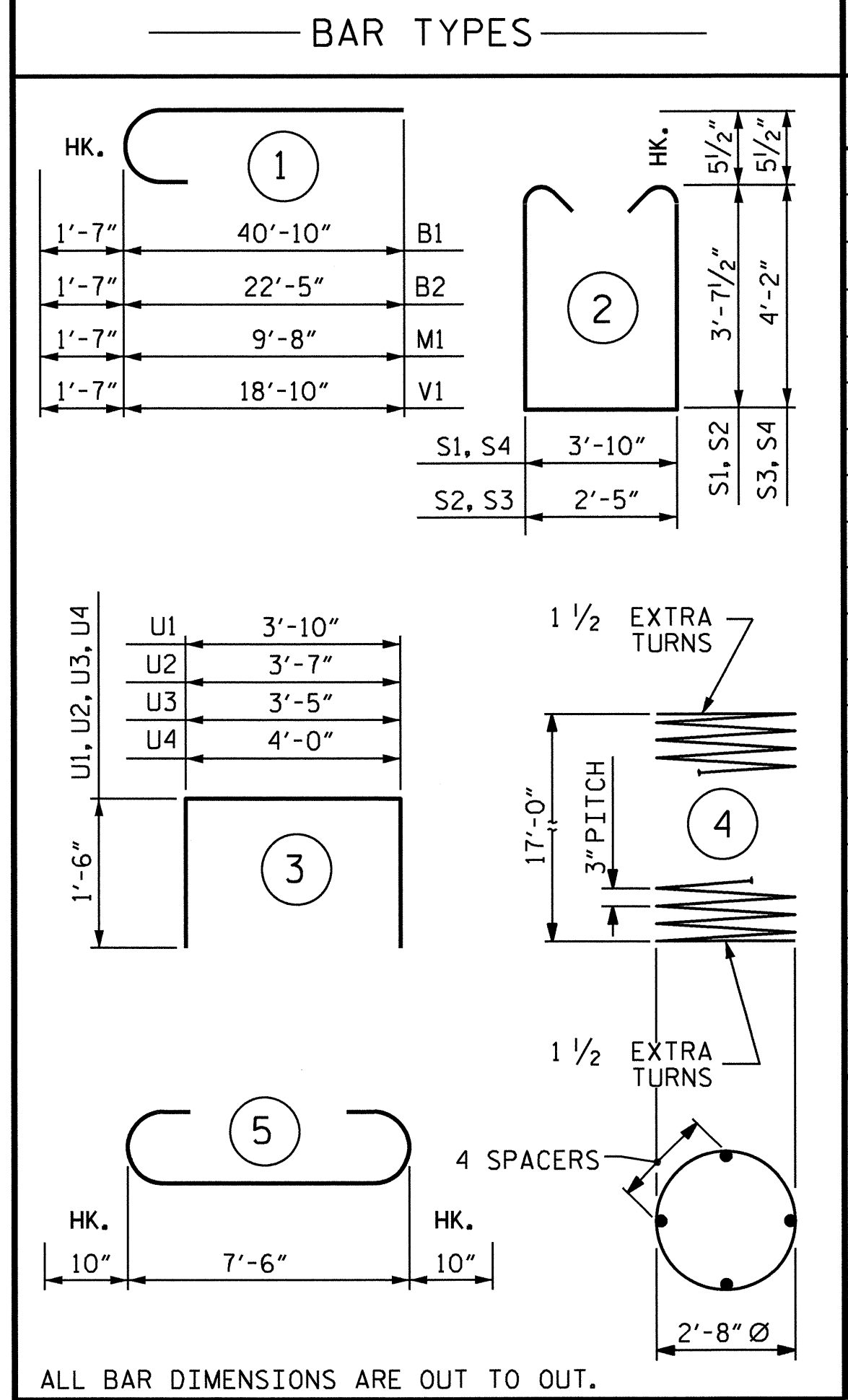
RIGHT SIDE END OF CAP VIEW



SECTION B-B



DETAIL "A"

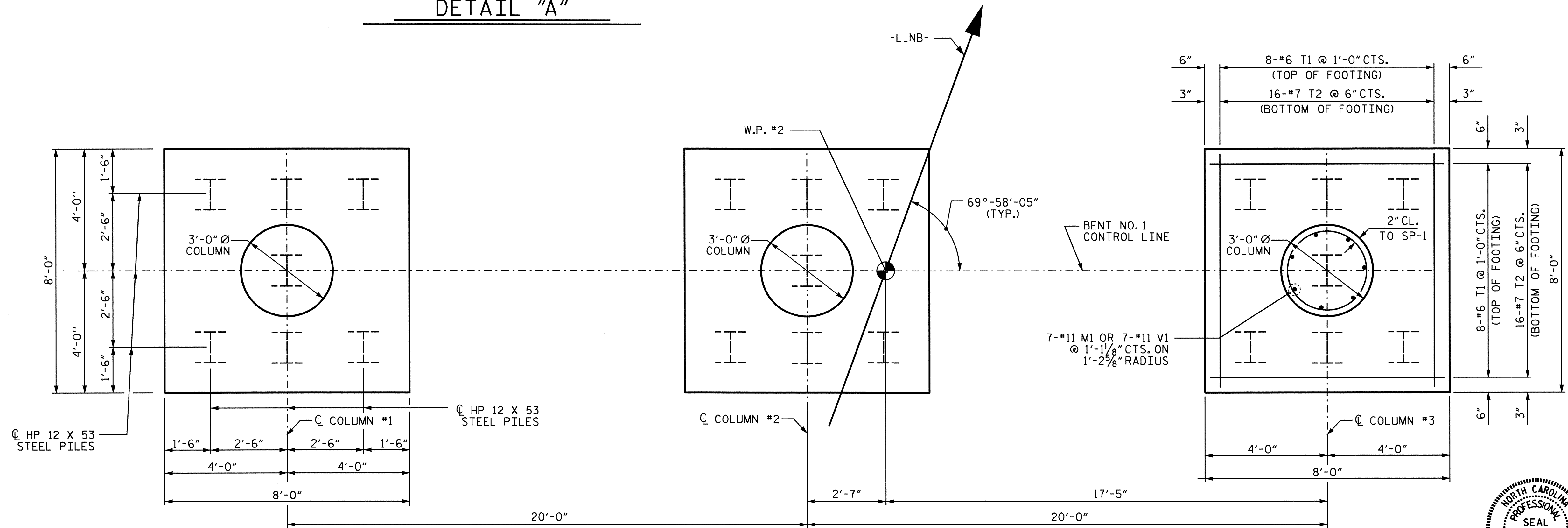


ALL BAR DIMENSIONS ARE OUT TO OUT.  
 \* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

BENT NO. 1

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	#11	1	42'-5"	1352	U1	#4	3	6'-10"	256	
B2	#11	1	24'-0"	765	U2	#4	3	6'-7"	40	
B3	#11	STR	50'-2"	1599	U3	#4	3	6'-5"	17	
B4	#6	STR	50'-2"	452	U4	#4	3	7'-0"	19	
B5	#4	STR	11'-7"	46						
B6	#4	STR	4'-2"	17	V1	#11	1	20'-5"	2278	
B7	#6	STR	13'-1"	39						
B8	#4	STR	3'-10"	10						
									REINFORCING STEEL 11,446 LBS.	
					SP-1	#3	*	4	584'-8"	1172
M1	#11	1	11'-3"	1255	SPIRAL COLUMN REINFORCING STEEL 1,172 LBS.					
									CLASS A CONCRETE BREAKDOWN	
S1	#5	2	12'-0"	300	POUR #1 (FOOTINGS) 24.9 CU.YD.					
S2	#5	2	10'-7"	199	POUR #2 (COLUMNS) 13.2 CU.YD.					
S3	#5	2	11'-8"	122	POUR #3 (CAP) 34.4 CU.YD.					
S4	#5	2	13'-1"	328	TOTAL 72.5 CU.YD.					
									HP 12 X 53 STEEL PILES	
T1	#6	STR	7'-8"	553	NO. 21 735 LIN.FT.					
T2	#7	5	9'-2"	1799	FOUNDATION EXCAVATION LUMP SUM					



PLAN OF FOOTINGS

(REINFORCING STEEL & DIMENSIONS TYPICAL FOR EACH COLUMN & FOOTING)

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L\_NB-

SHEET 2 OF 2

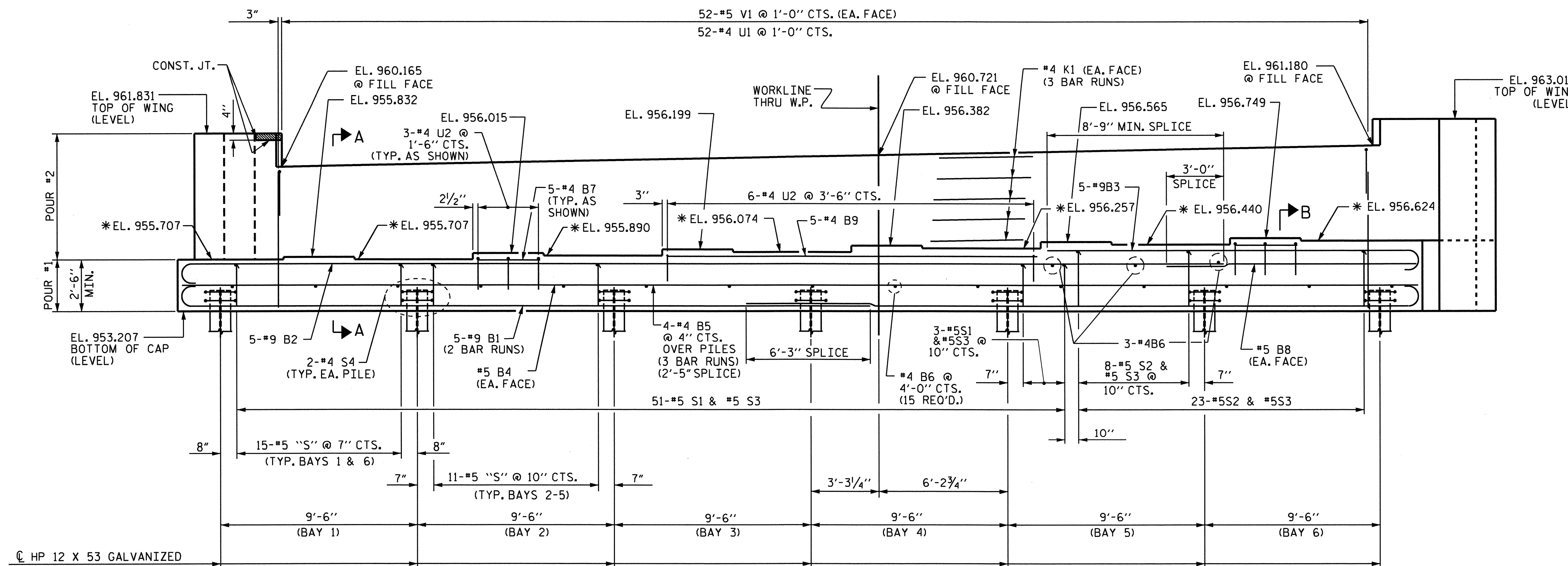
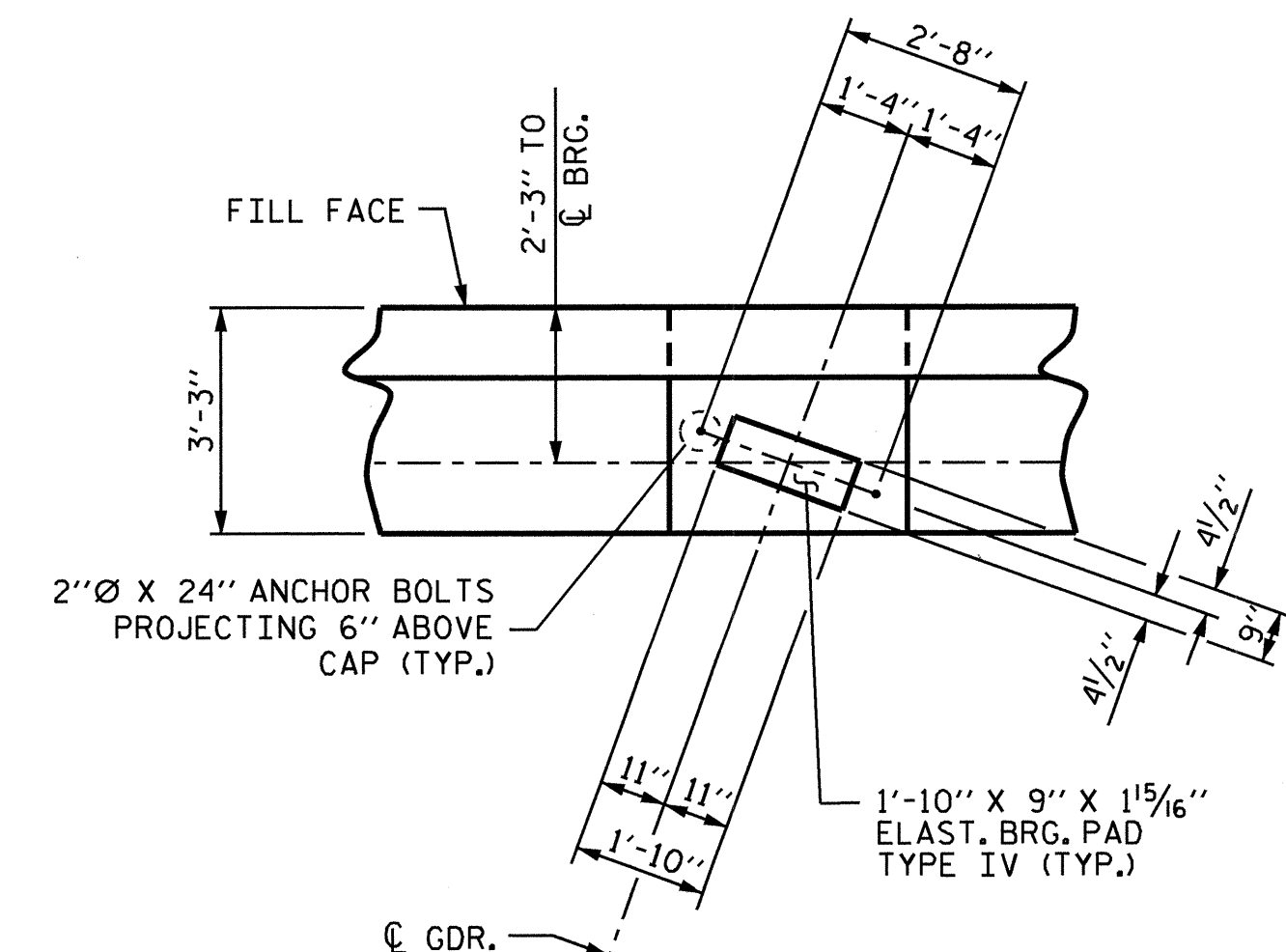
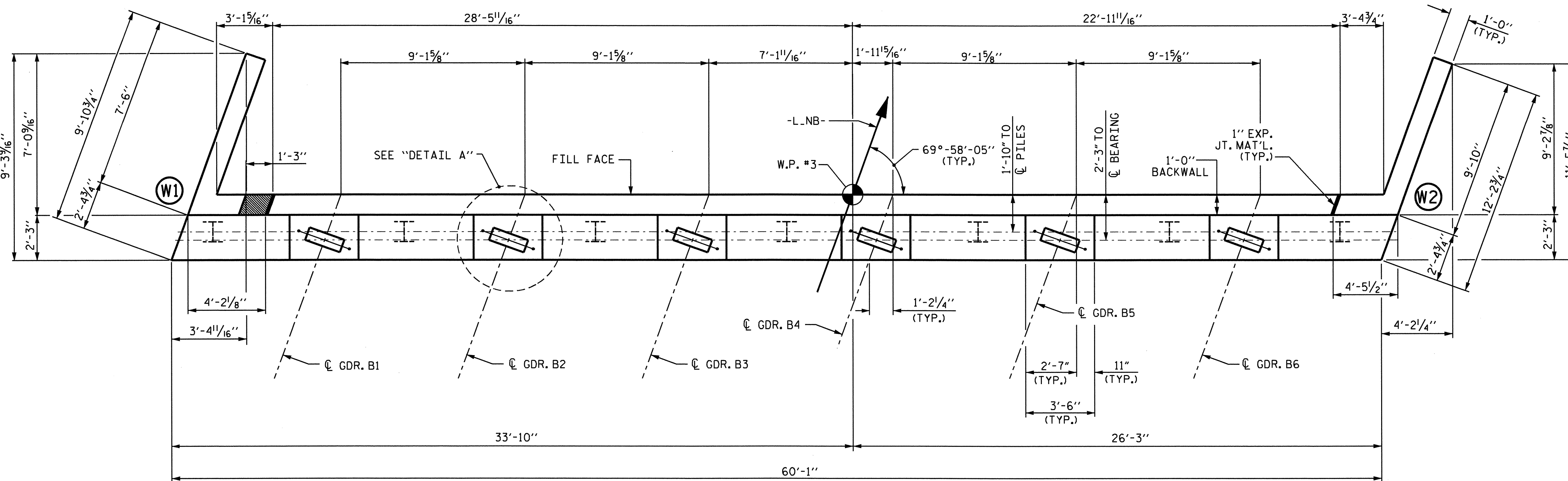
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26	
1			3			TOTAL SHEETS	36
2			4				



DRAWN BY: A.L. FIGUEROA DATE: 06-07-11  
 CHECKED BY: M.G. CHEEK DATE: 07-11

**NOTES**

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- BACKWALL SHALL BE PLACED BEFORE APPLYING THE EPOXY PROTECTIVE COATING.
- THE TOP SURFACE AREAS OF THE END BENT CAPS SHALL BE CURED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE MEMBRANE CURING COMPOUND METHOD SHALL NOT BE USED.
- THE TOP SURFACE OF THE CAP EXCEPT THE BRIDGE SEAT BUILDUPS SHALL BE SLOPED TRANSVERSELY FROM THE FILL FACE TO THE BACK FACE AT THE RATE OF 2%.
- THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE JOINT BETWEEN THE DECK AND THE APPROACH SLAB HAS BEEN SAWED AND THE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.
- THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4" DIAMETER DRAIN PIPE THROUGH THE WING WALL AS REQUIRED FOR REINFORCED BRIDGE APPROACH FILLS. SEE THE ROADWAY PLANS, REINFORCING STEEL IN THE WING WALL MAY BE SHIFTED AS NECESSARY TO CLEAR THE DRAIN PIPE.
- HP STEEL PILES SHALL BE GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS.



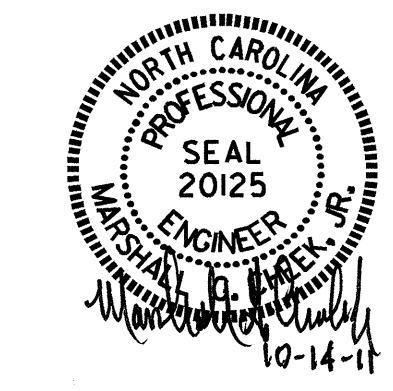
\* DENOTES ELEVATION BETWEEN BRIDGE SEATS.  
SEE SECTION A-A, SHEET 3 OF 3 FOR LOCATION.

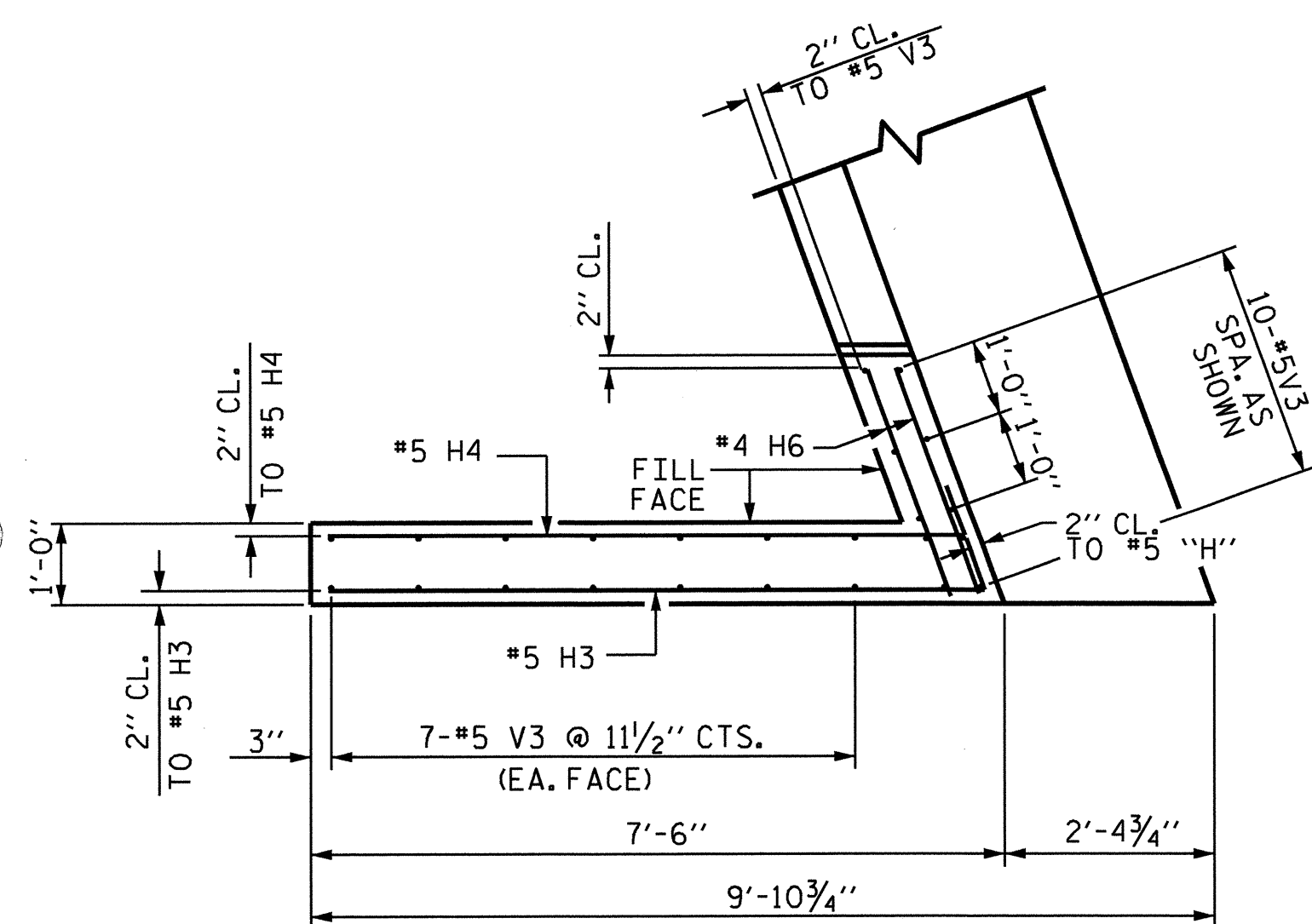
PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 1 OF 3

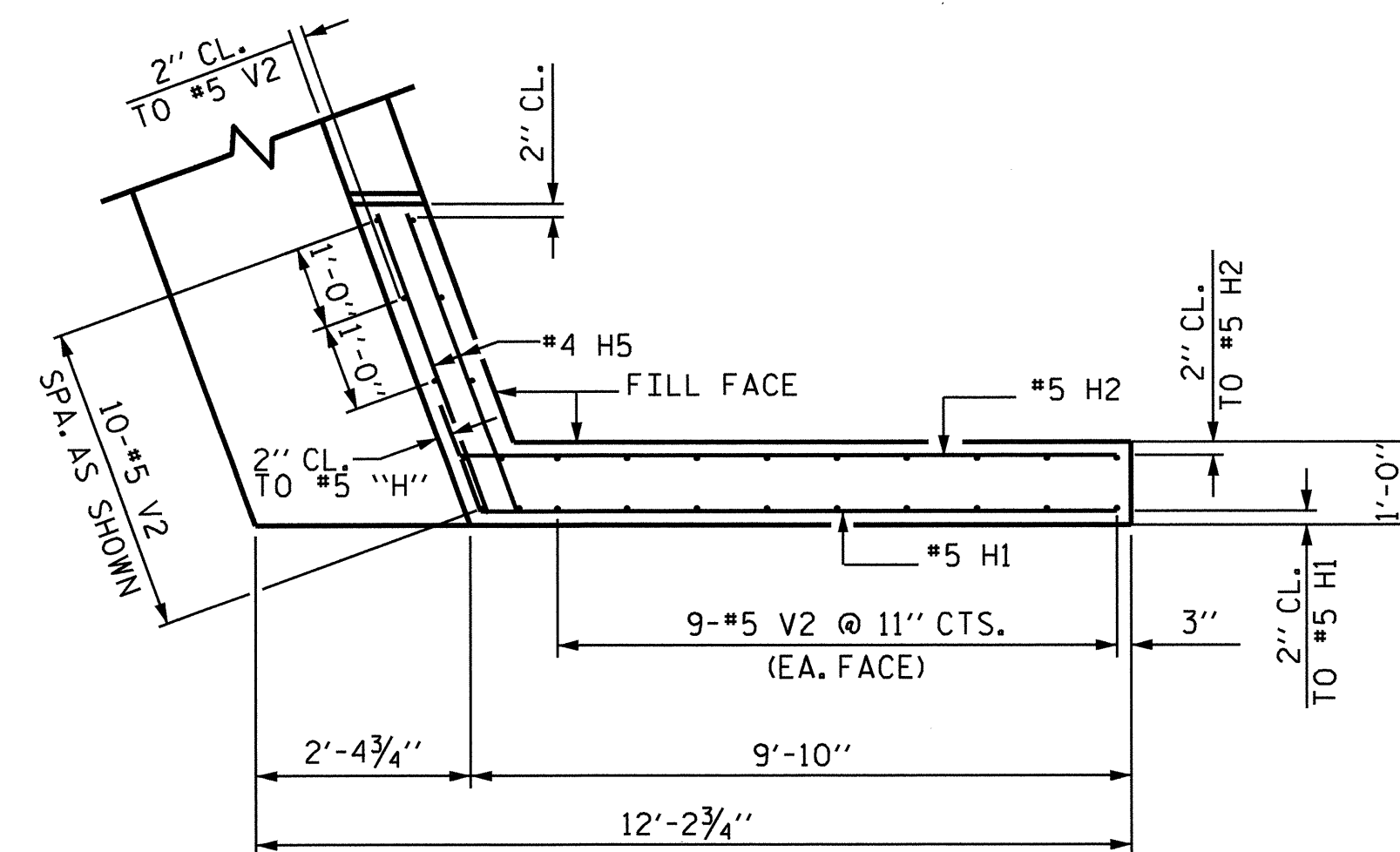
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE END BENT NO. 2					
SHEET NO. S-27					
TOTAL SHEETS 36					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

DRAWN BY: V.X. NGUYEN DATE: 5-31-11  
 CHECKED BY: D. HODGE DATE: 6-11

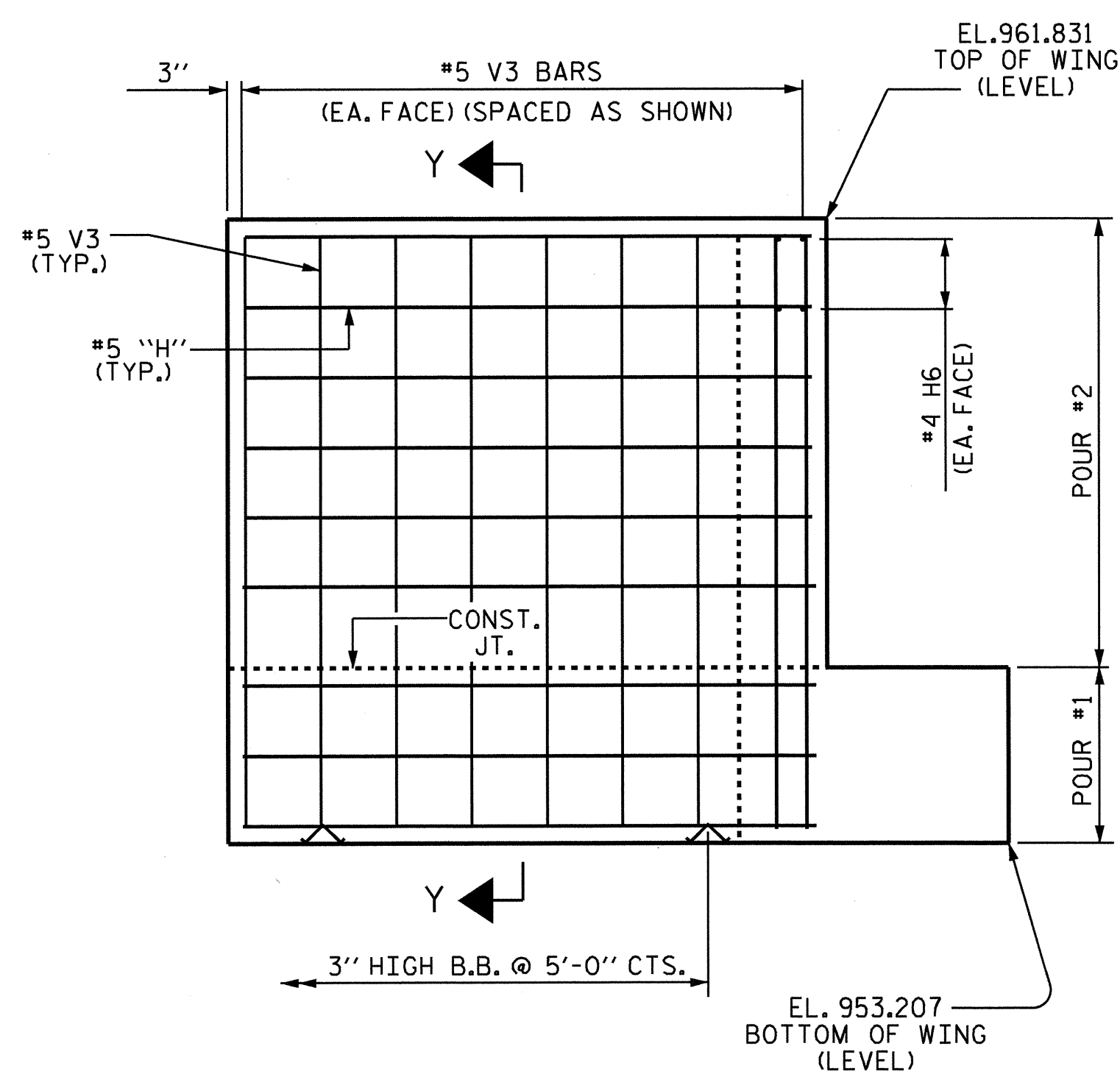




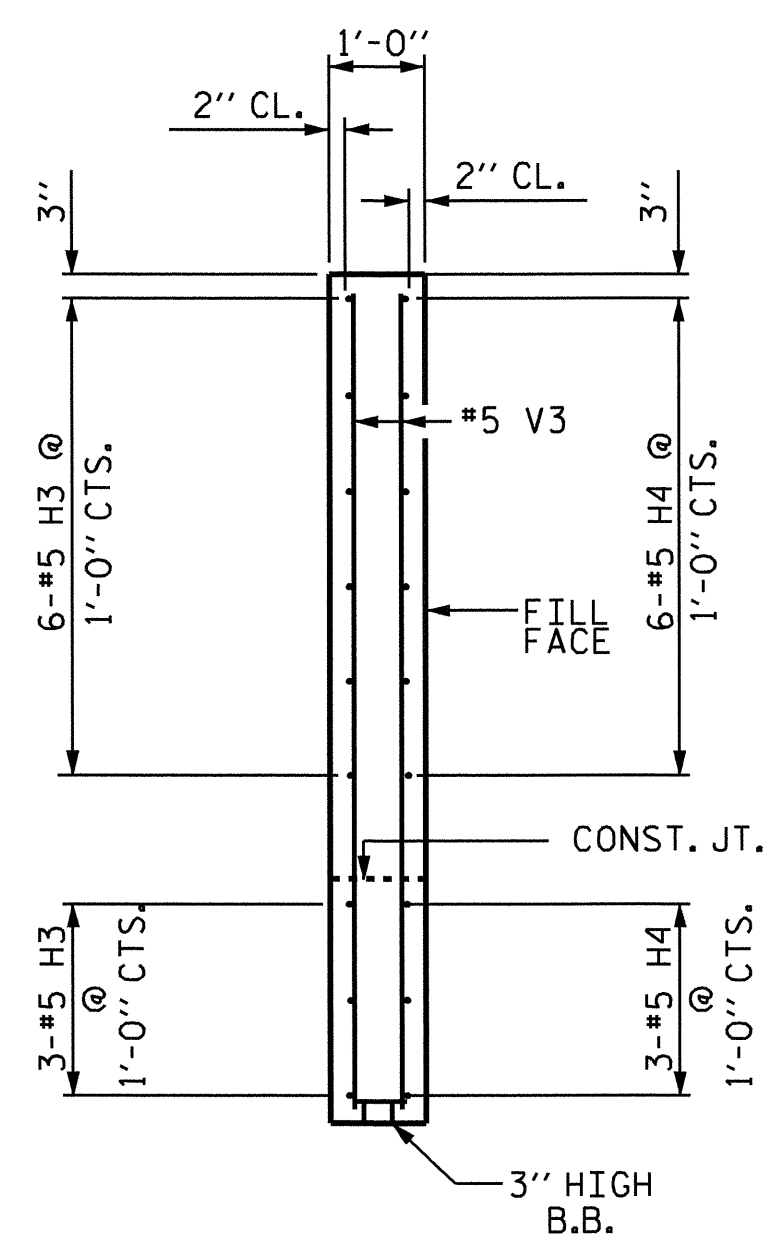
PLAN OF WING - W1



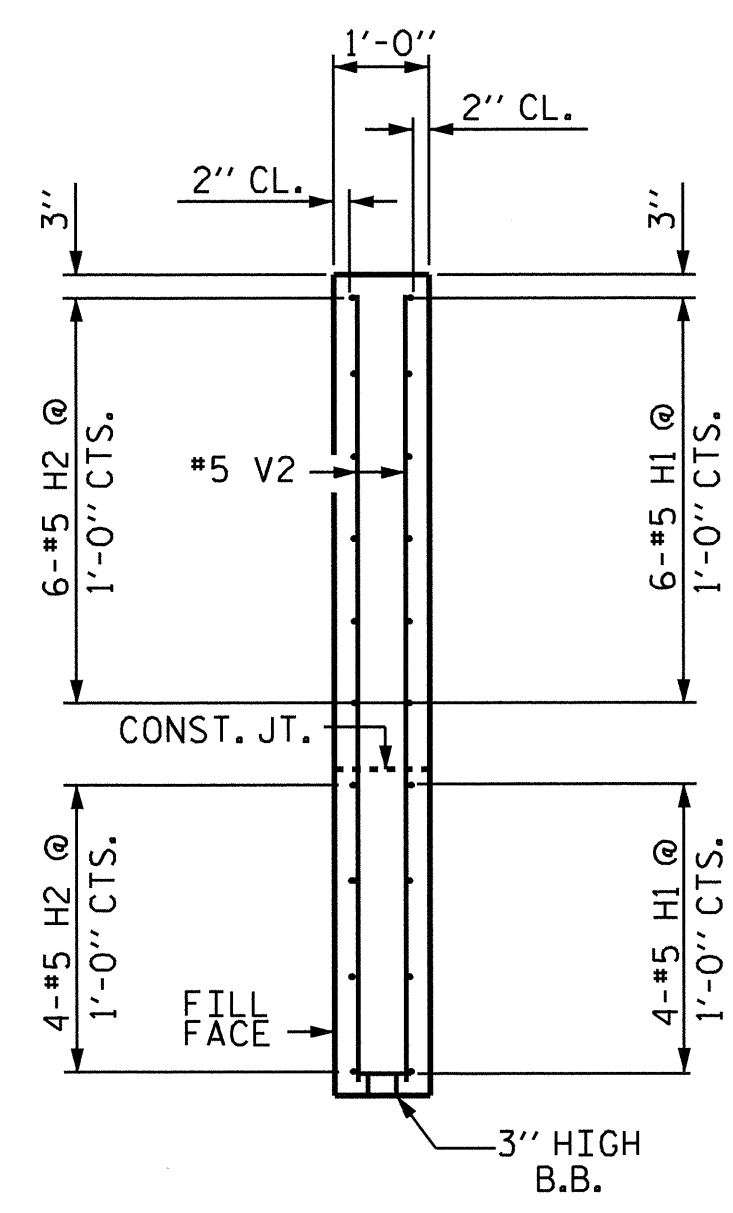
PLAN OF WING - W2



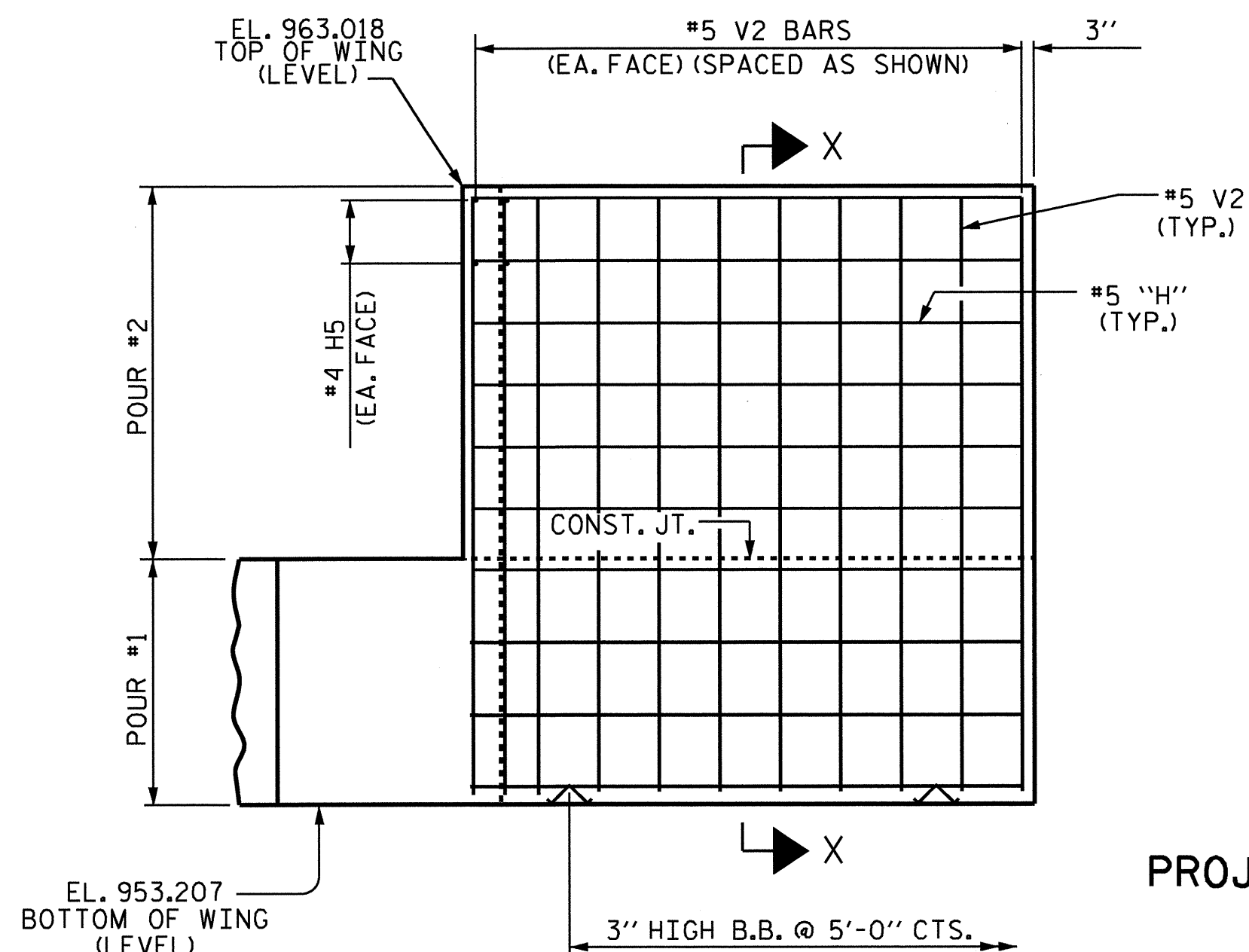
ELEVATION OF WING - W1



SECTION Y-Y



SECTION X-X



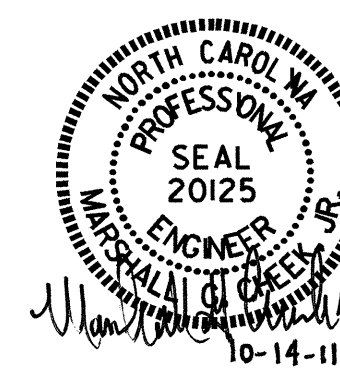
ELEVATION OF WING - W2

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

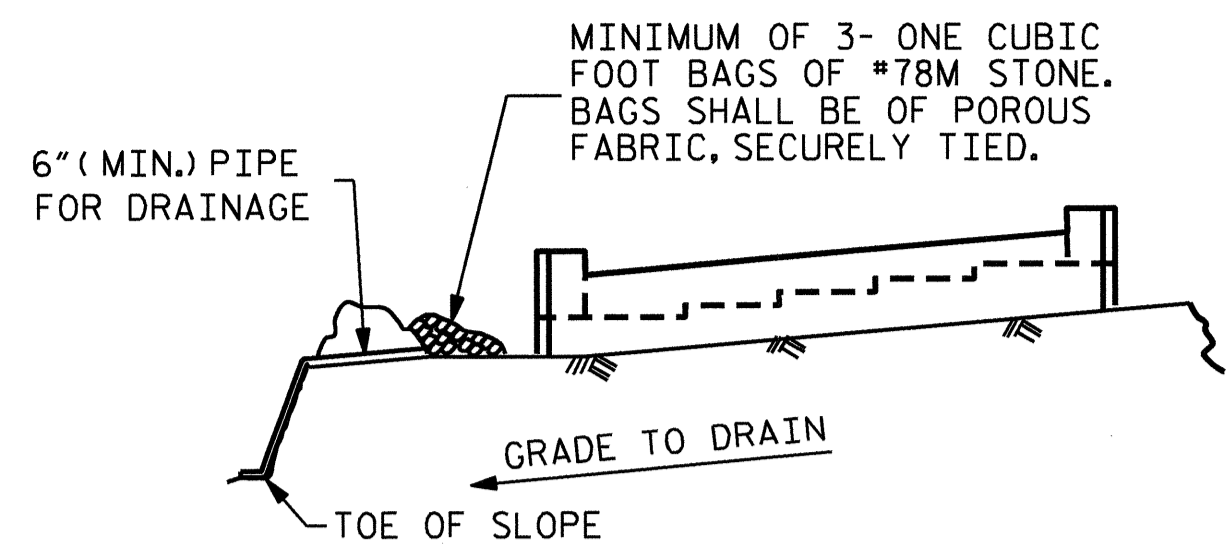
SUBSTRUCTURE  
 END BENT NO. 2



DRAWN BY: V.X. NGUYEN DATE: 6-1-11  
 CHECKED BY: D. HODGE DATE: 8-11

14-OCT-2011 10:43  
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 vnguyen

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

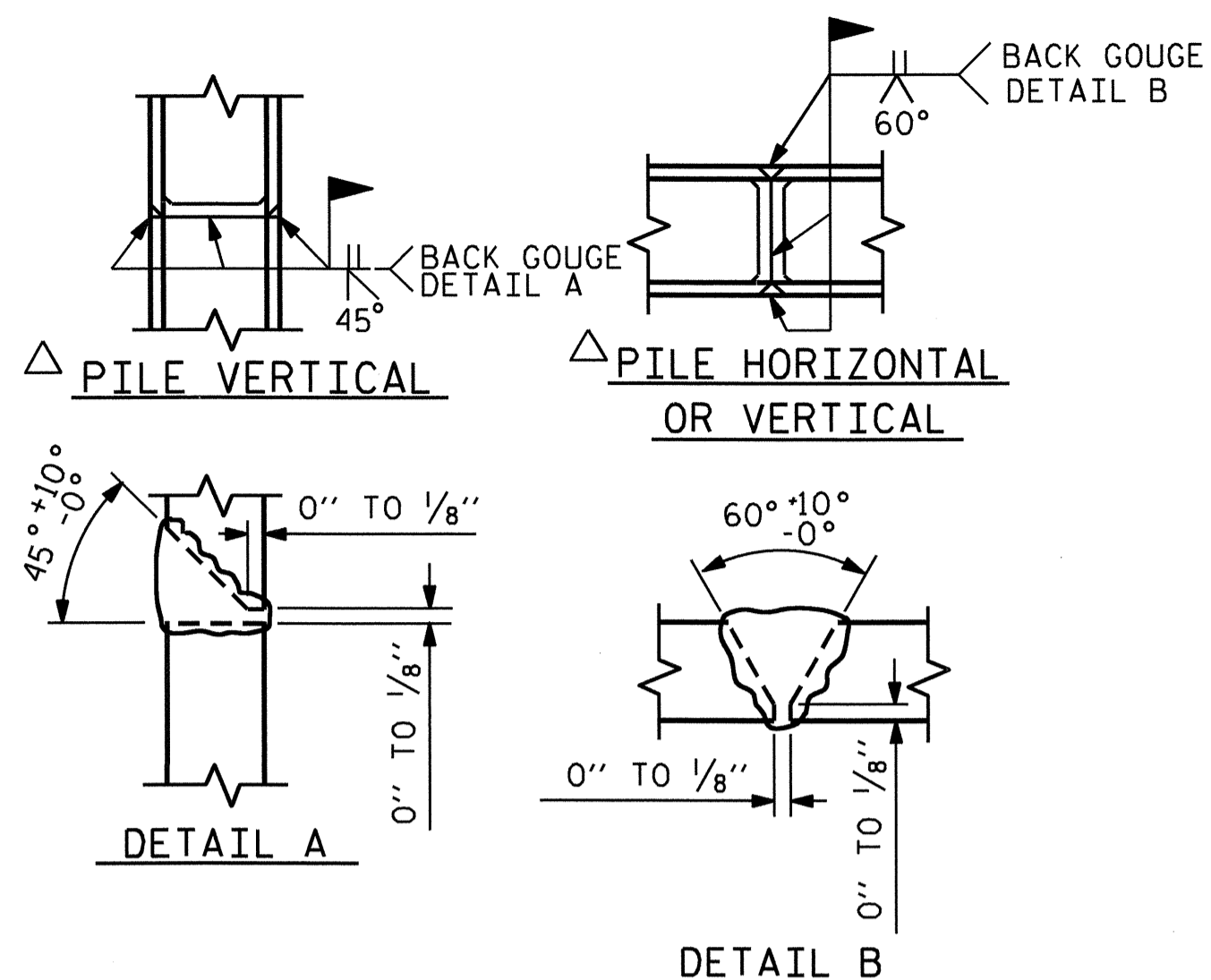


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

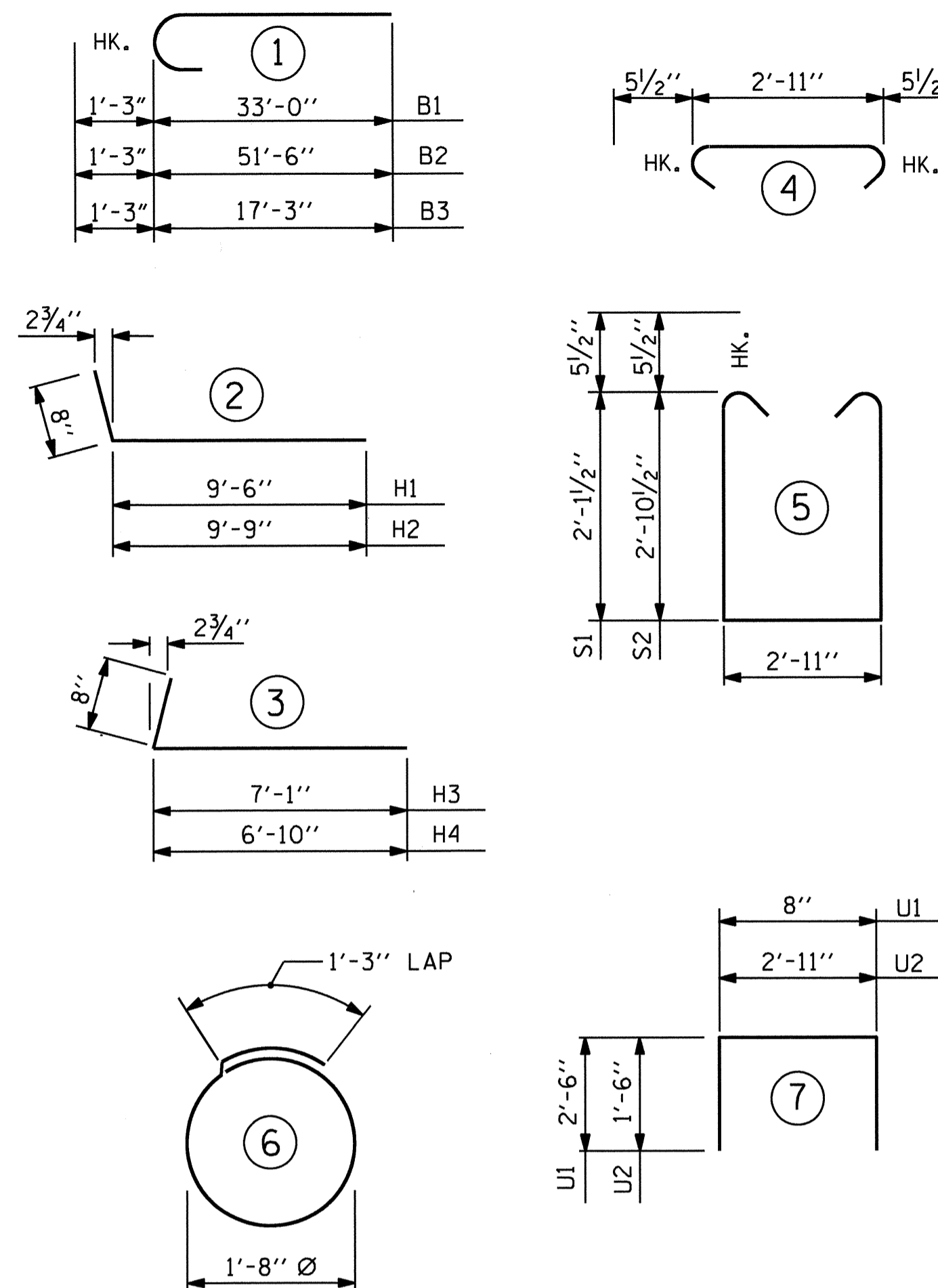
### TEMPORARY DRAINAGE AT END BENT



△ POSITION OF PILE DURING WELDING.

### PILE SPLICE DETAILS

### BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT.

### BILL OF MATERIAL

#### END BENT NO. 2

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	10	#9	1	34'-3"	1165
B2	5	#9	1	52'-9"	897
B3	5	#9	1	18'-6"	315
B4	2	#5	STR	59'-9"	125
B5	12	#4	STR	21'-7"	173
B6	18	#4	STR	2'-11"	35
B7	10	#4	STR	3'-2"	21
B8	2	#5	STR	11'-9"	25
B9	5	#4	STR	18'-2"	61
H1	10	#5	2	10'-2"	106
H2	10	#5	2	10'-5"	109
H3	9	#5	3	7'-9"	73
H4	9	#5	3	7'-6"	70
H5	4	#4	STR	4'-1"	11
H6	4	#4	STR	3'-9"	10
K1	30	#4	STR	21'-7"	433
S1	51	#5	5	8'-1"	430
S2	23	#5	5	9'-7"	230
S3	74	#5	4	3'-10"	296
S4	14	#4	6	6'-6"	61
U1	52	#4	7	5'-8"	197
U2	12	#4	7	5'-11"	47
V1	104	#5	STR	6'-7"	714
V2	28	#5	STR	9'-5"	275
V3	24	#5	STR	8'-3"	207

REINFORCING STEEL = 6086 LBS.

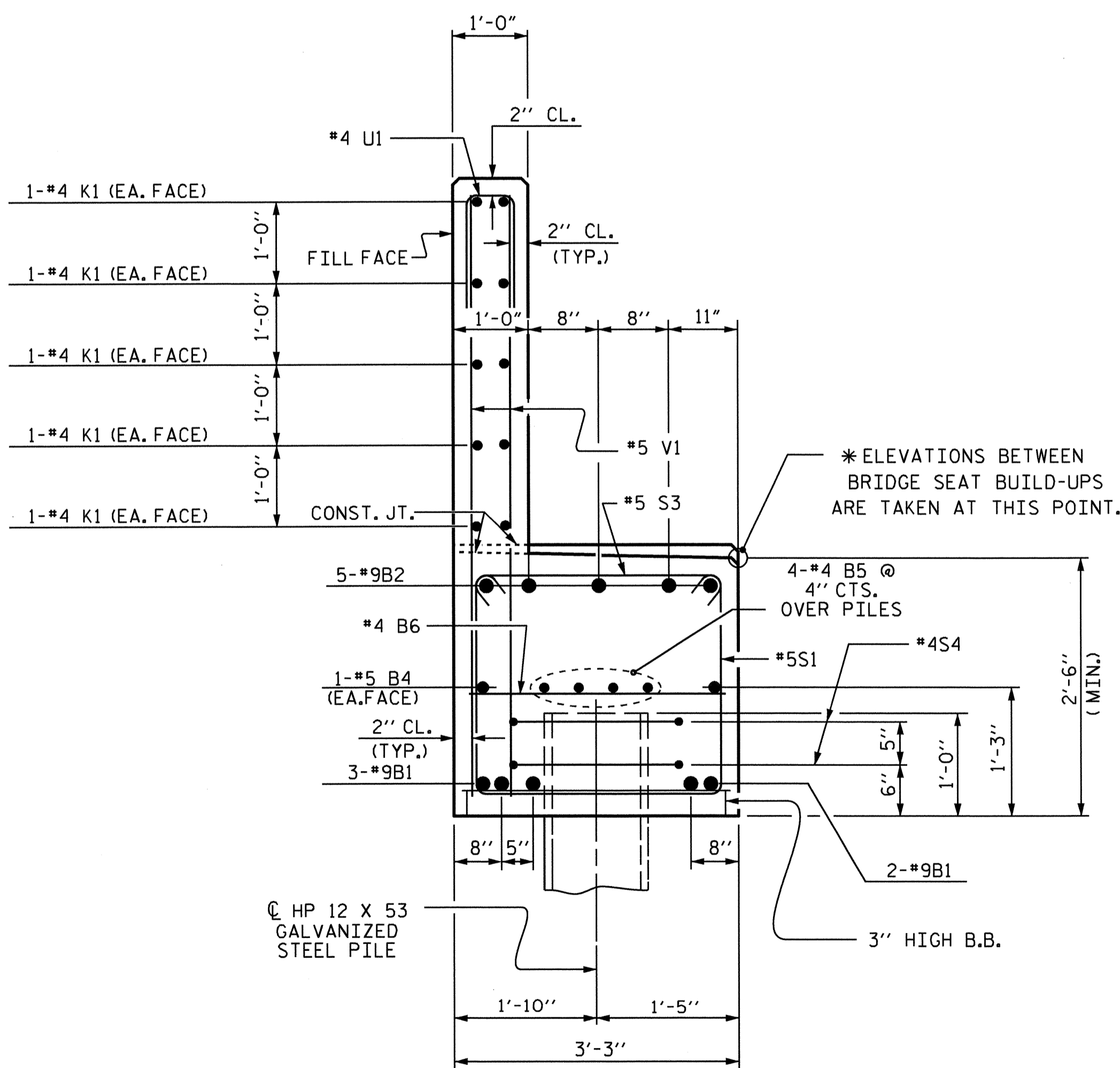
CLASS A CONCRETE

POUR #1 : CAP & LOWER WINGS = 23.1 CU. YDS.

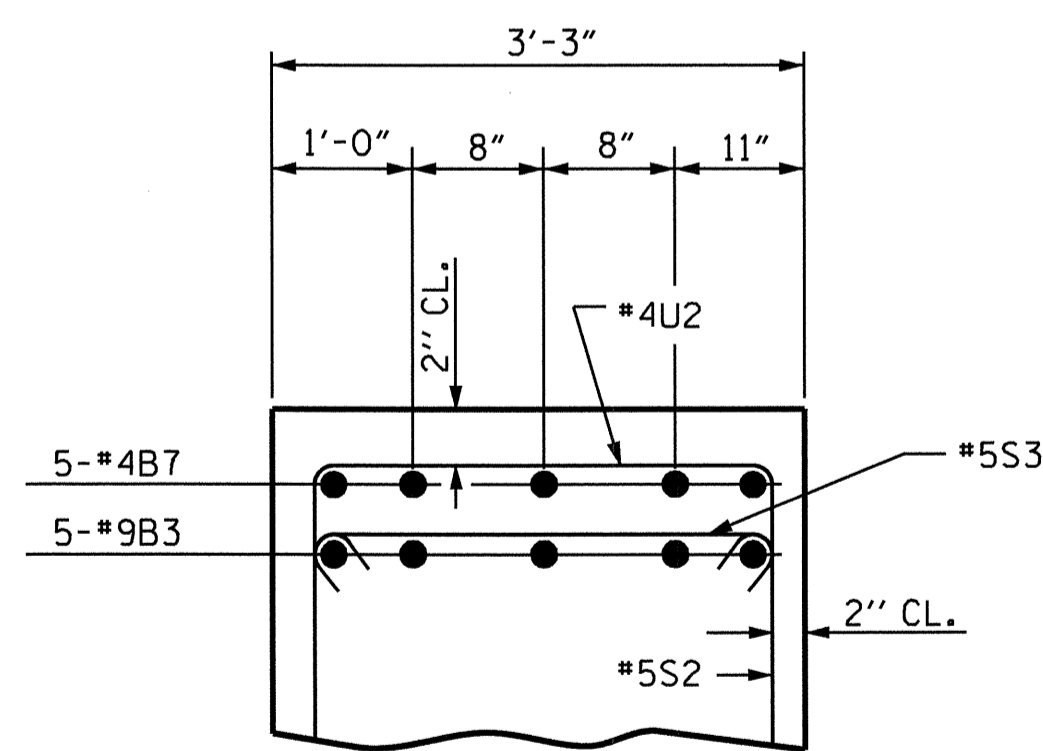
POUR #2 : BACKWALL & UPPER WINGS = 14.2 CU. YDS.

TOTAL CLASS A CONCRETE = 37.3 CU. YDS.

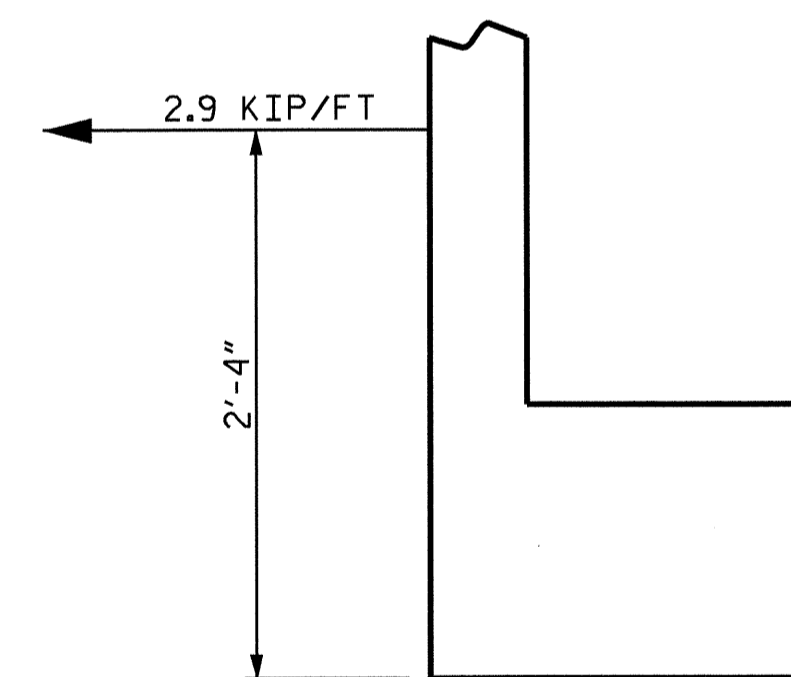
HP 12 X 53 GALVANIZED STEEL PILES NO. 7 = 475 LIN. FT.



### SECTION A-A



### PARTIAL SECTION B



### MSE REINFORCING STRAP LOAD DETAIL

#### MSE REINFORCING STRAP NOTES

DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR THE LOADING SHOWN AND CAST THE REINFORCEMENT CONNECTION HARDWARE INTO THE END BENT BACKWALL. MAINTAIN A MINIMUM CLEARANCE OF 3" BETWEEN THE HARDWARE AND REINFORCING STEEL IN THE BACKWALL.

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 3 OF 3

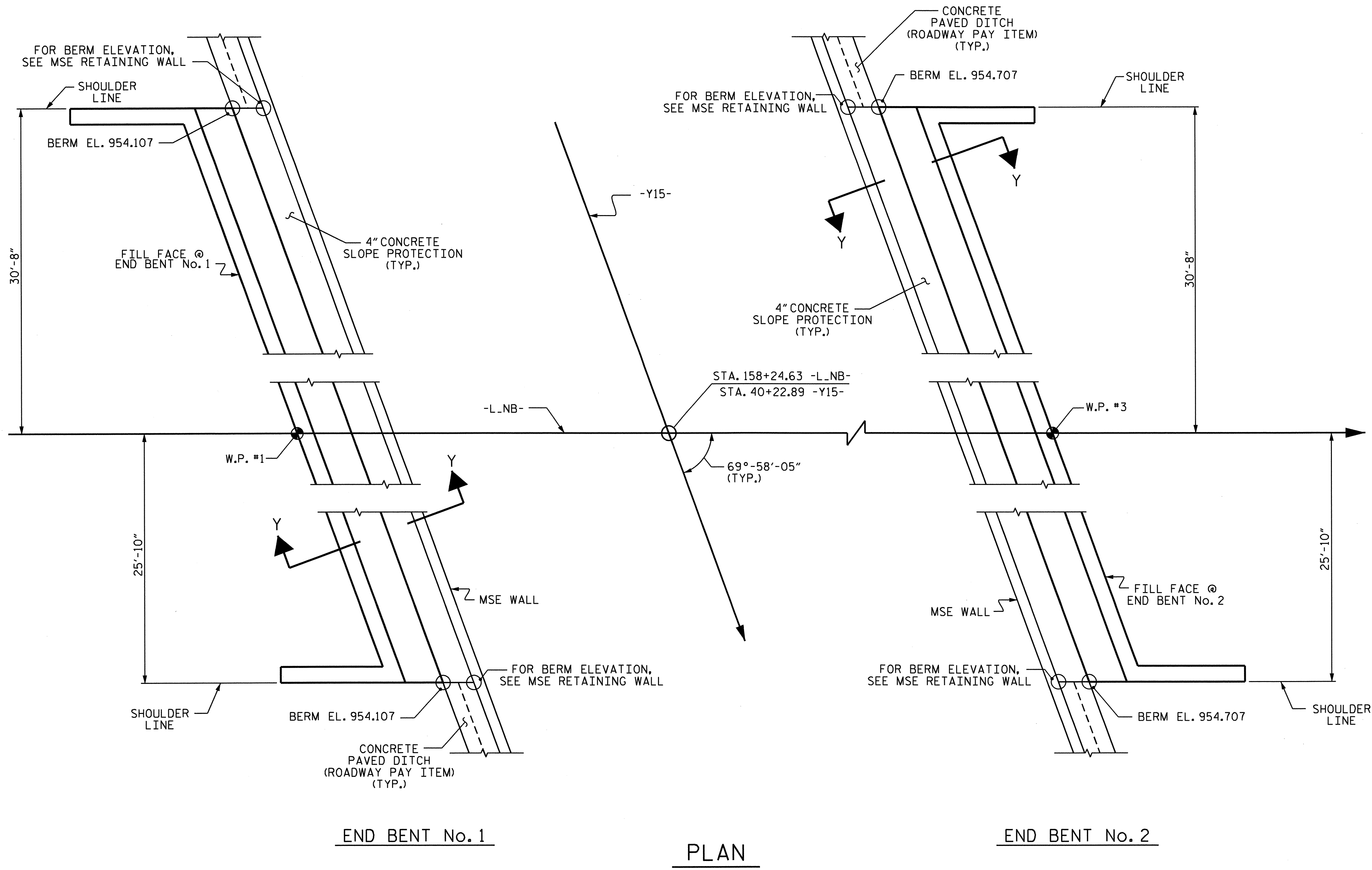
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

### SUBSTRUCTURE END BENT NO. 2

DRAWN BY: V.X. NGUYEN DATE: 6-2-11  
 CHECKED BY: D. HODGE DATE: 8-11



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



**GENERAL NOTES**

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

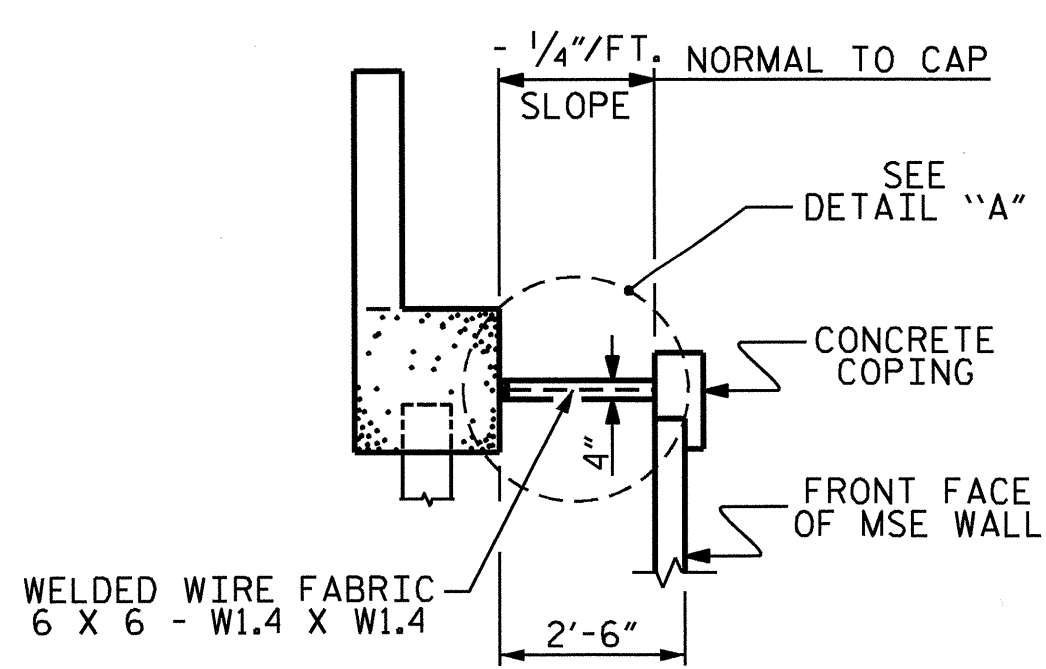
BRIDGE @ STATION 158+24.63 -L-NB-	4" CONCRETE SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT No. 1	14	28
END BENT No. 2	14	28

\* QUANTITY SHOWN IS BASED ON 5' POURS.

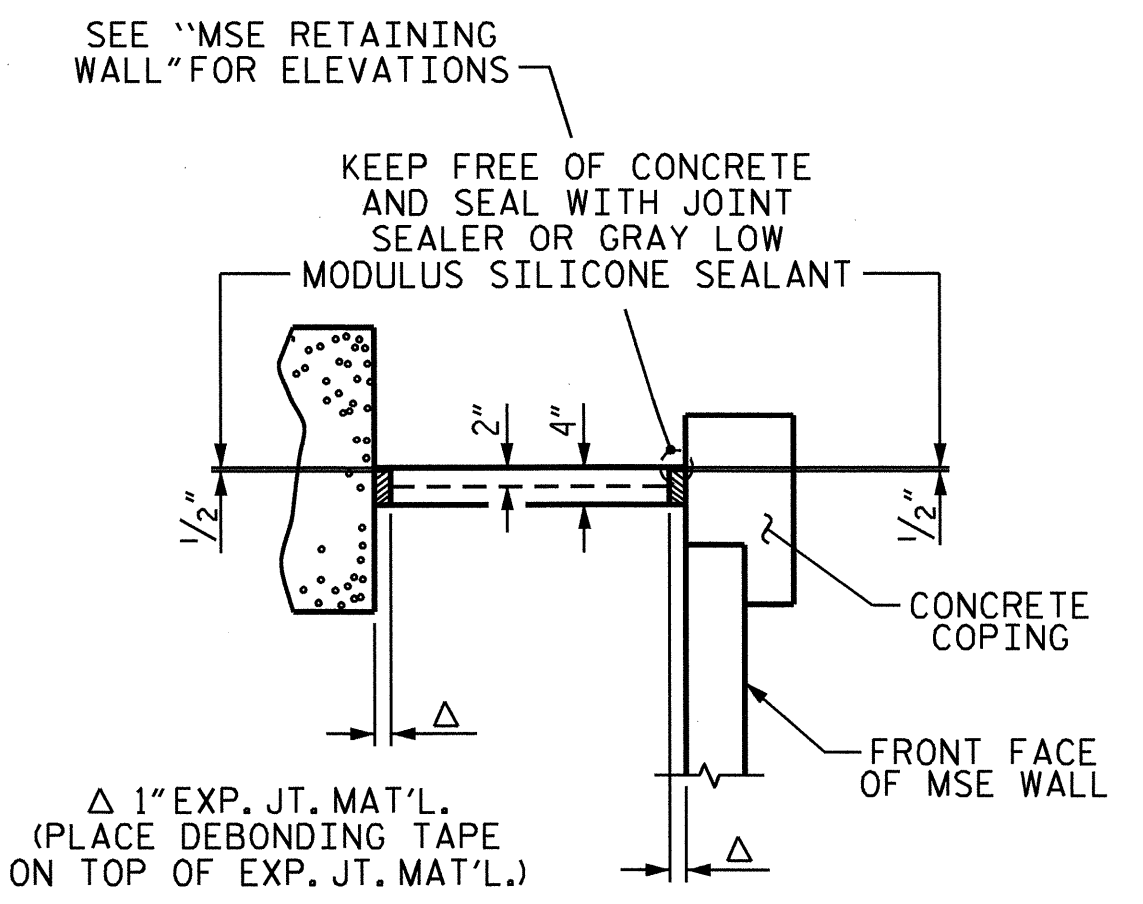
END BENT No. 1

PLAN

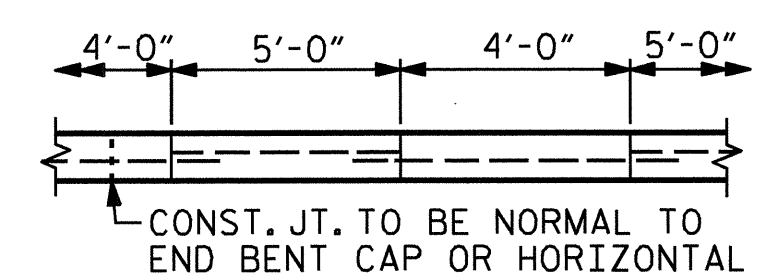
END BENT No. 2



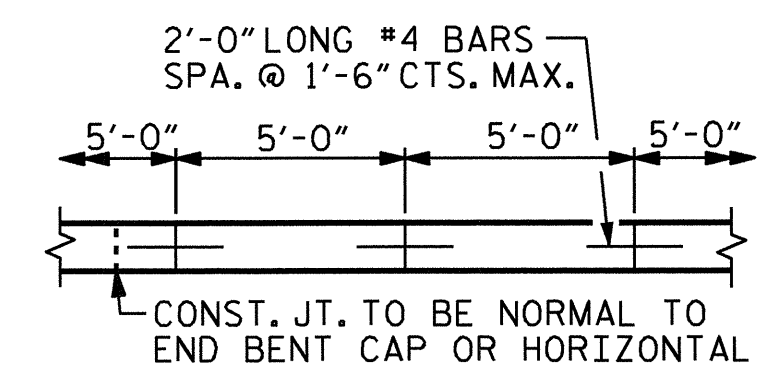
SECTION Y-Y



DETAIL A



OPTIONAL POURING DETAIL



POURING DETAIL

PROJECT NO. U-4909  
FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

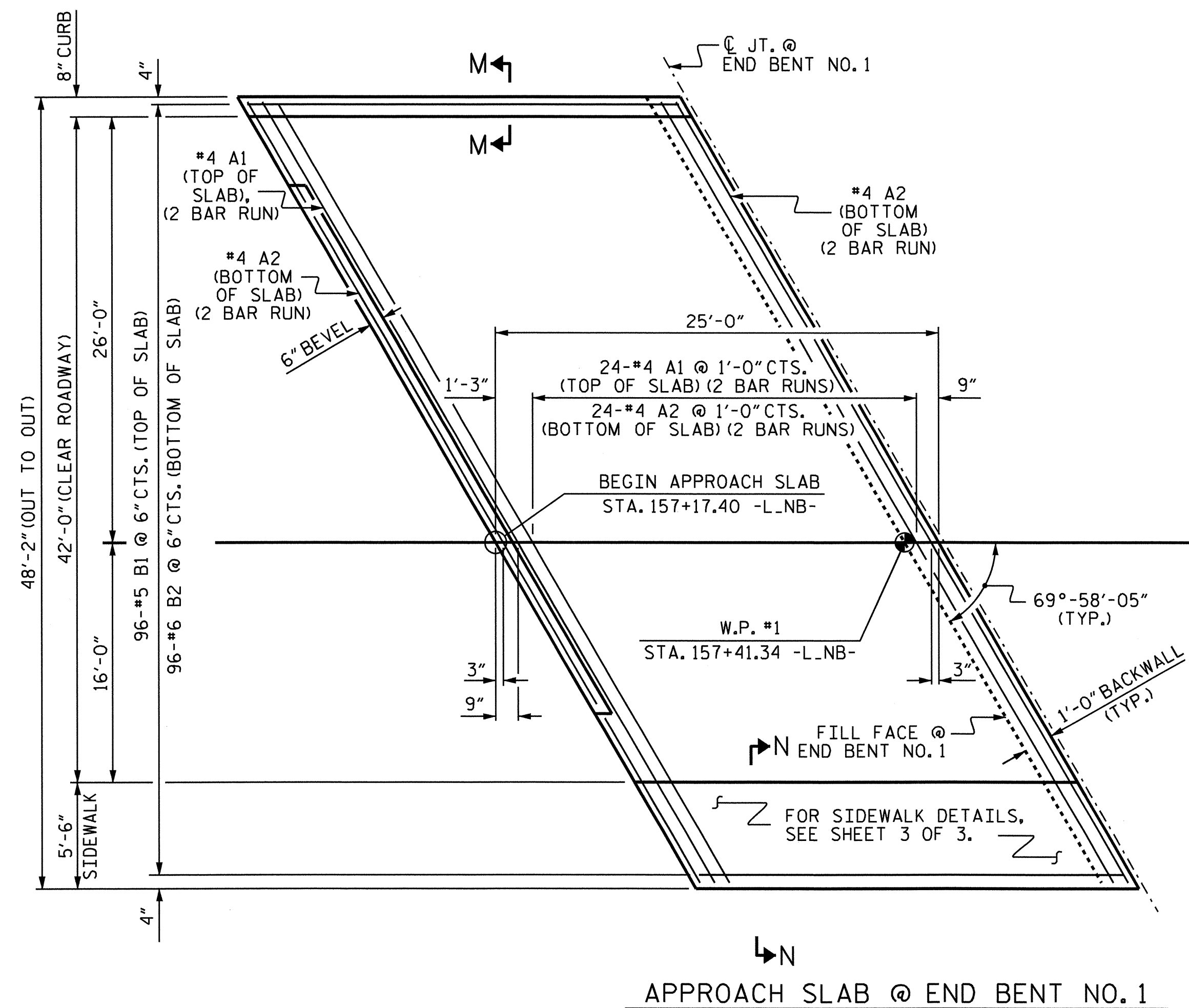
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SLOPE PROTECTION  
 DETAILS



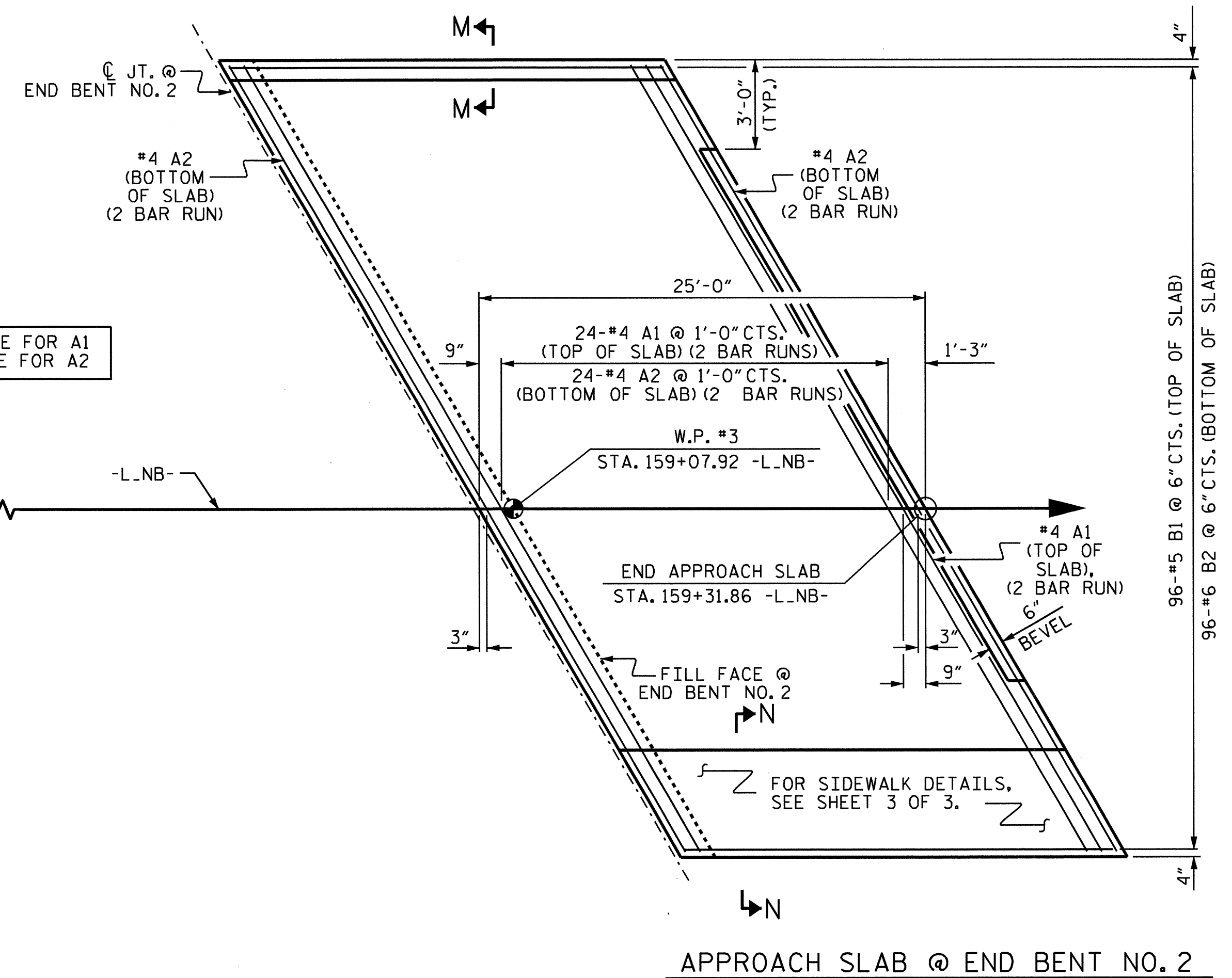
ASSEMBLED BY : D. HODGE	DATE : 8/11
CHECKED BY : M.G. CHECK	DATE : 8/11
DRAWN BY : ELR 5/92	REV. 7/10/01 LES/RDR
CHECKED BY : GRP 6/92	REV. 5/7/03 RWW/JTE
	REV. 5/1/06 TLA/GM

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



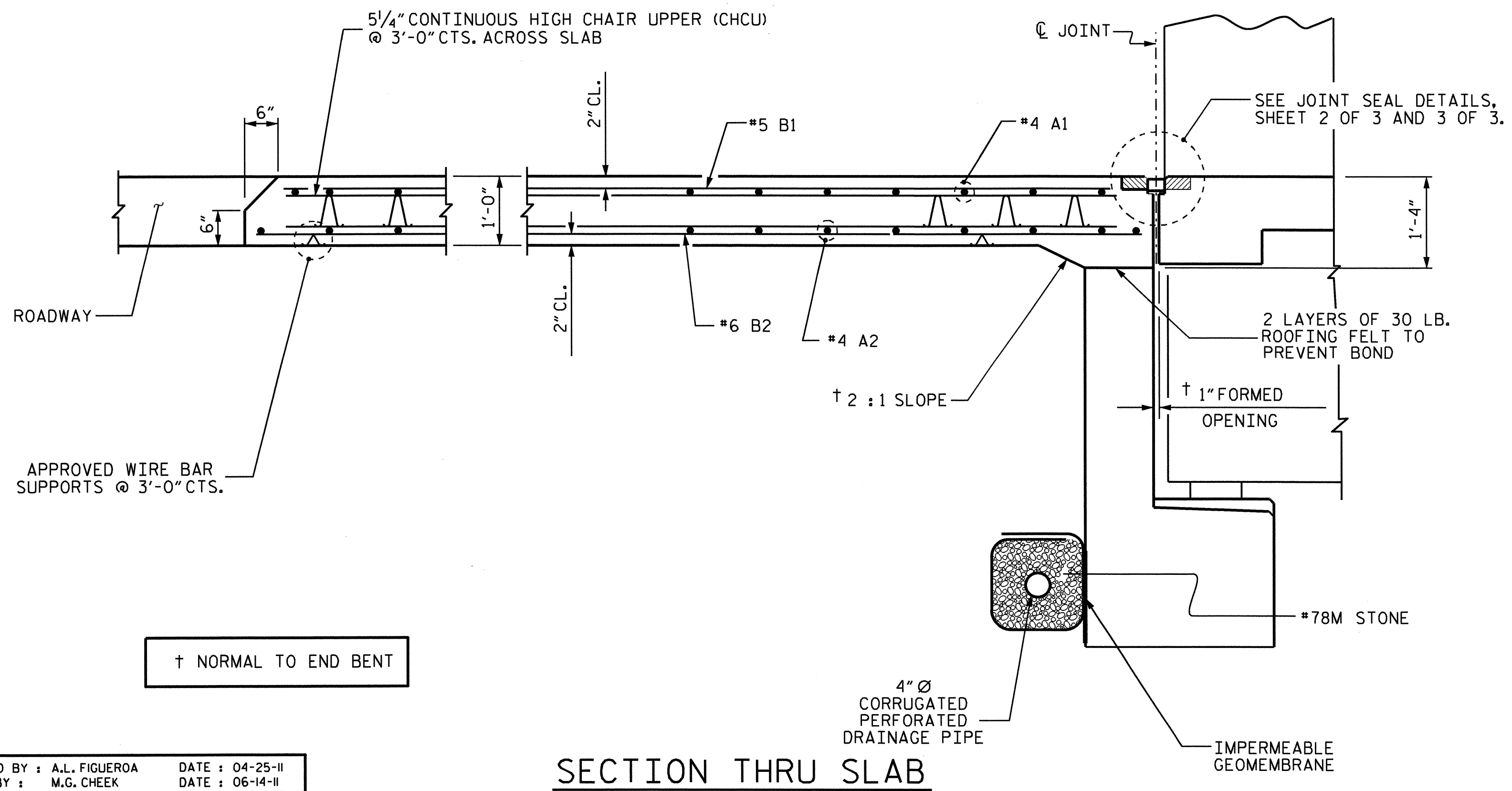


APPROACH SLAB @ END BENT NO. 1

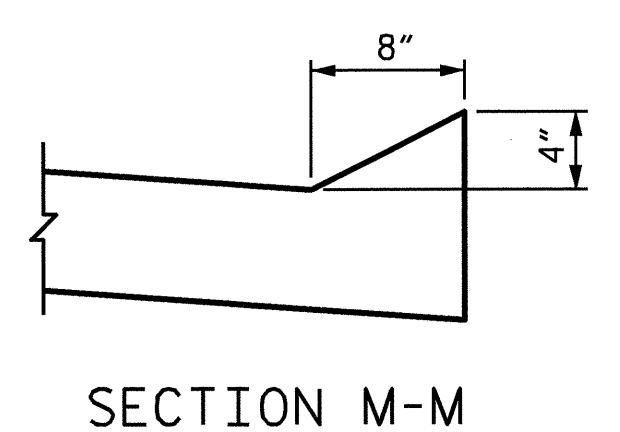


APPROACH SLAB @ END BENT NO. 2

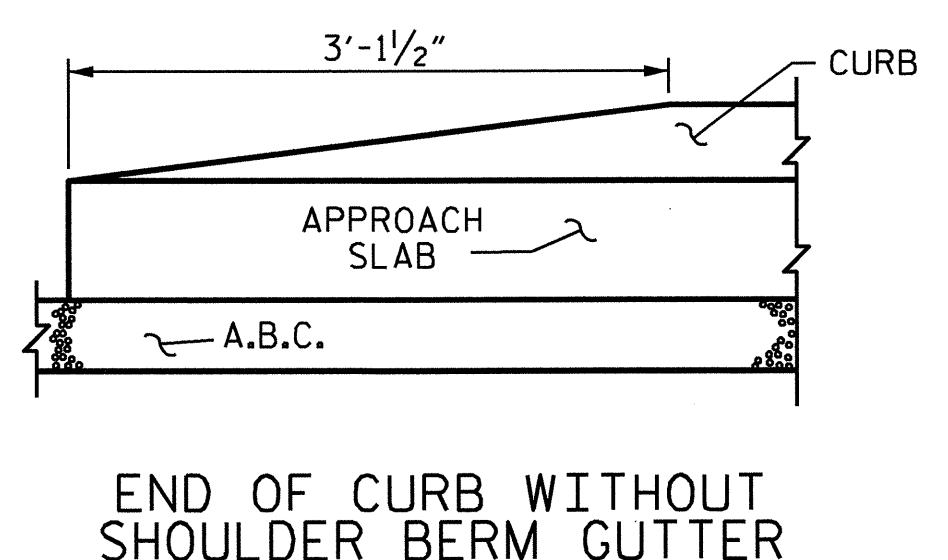
PLAN  
FOR SECTION N-N, SEE SHEET 3 OF 3.



SECTION THRU SLAB



SECTION M-M

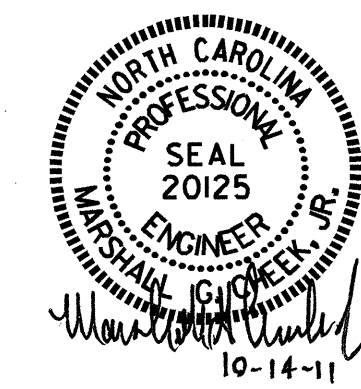


END OF CURB WITHOUT SHOULDER BERM GUTTER

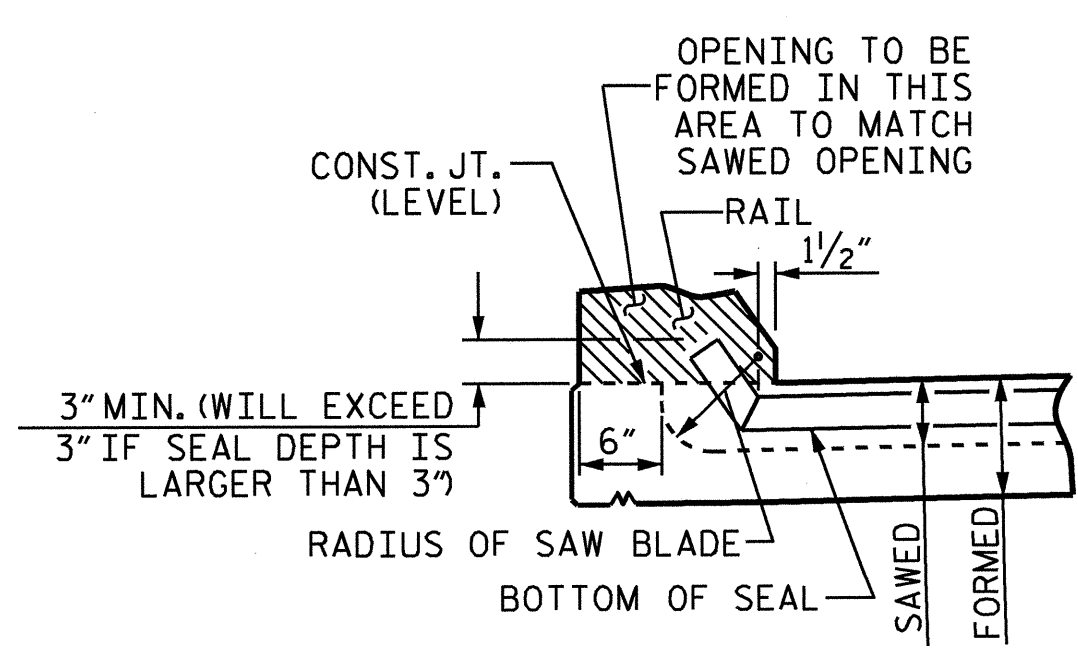
PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 1 OF 3

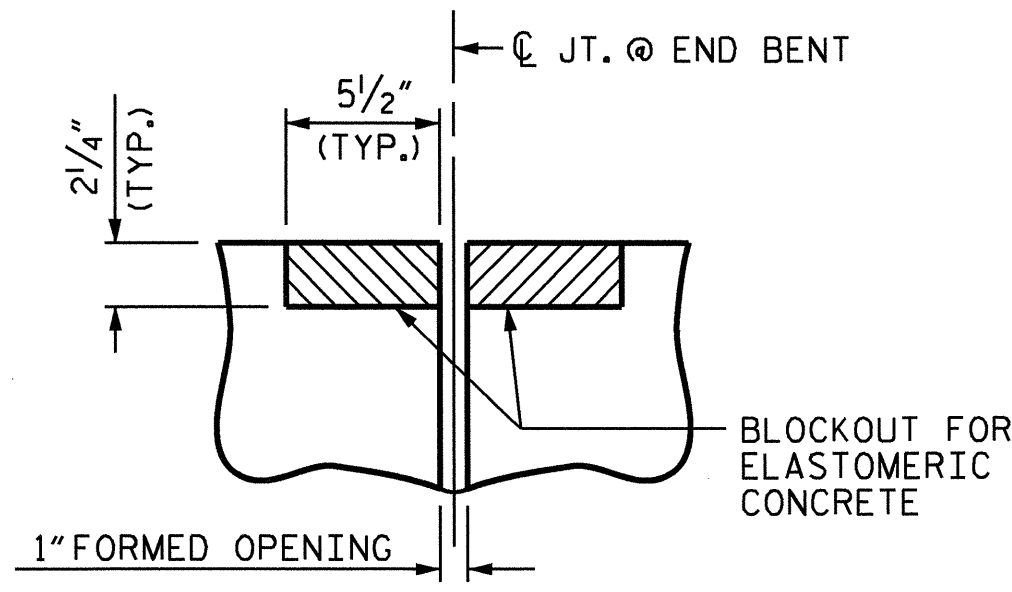
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD BRIDGE APPROACH SLAB FOR FLEXIBLE PAVEMENT					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-31
					TOTAL SHEETS 36



ASSEMBLED BY : A.L. FIGUEROA	DATE : 04-25-11
CHECKED BY : M.G. CHEEK	DATE : 06-14-11
DRAWN BY : EEM 3/95	REV. 7/10/01 LES/RDR
CHECKED BY : VAP 3/95	REV. 5/7/03R RWW/JTE
	REV. 5/1/06R KMM/GM



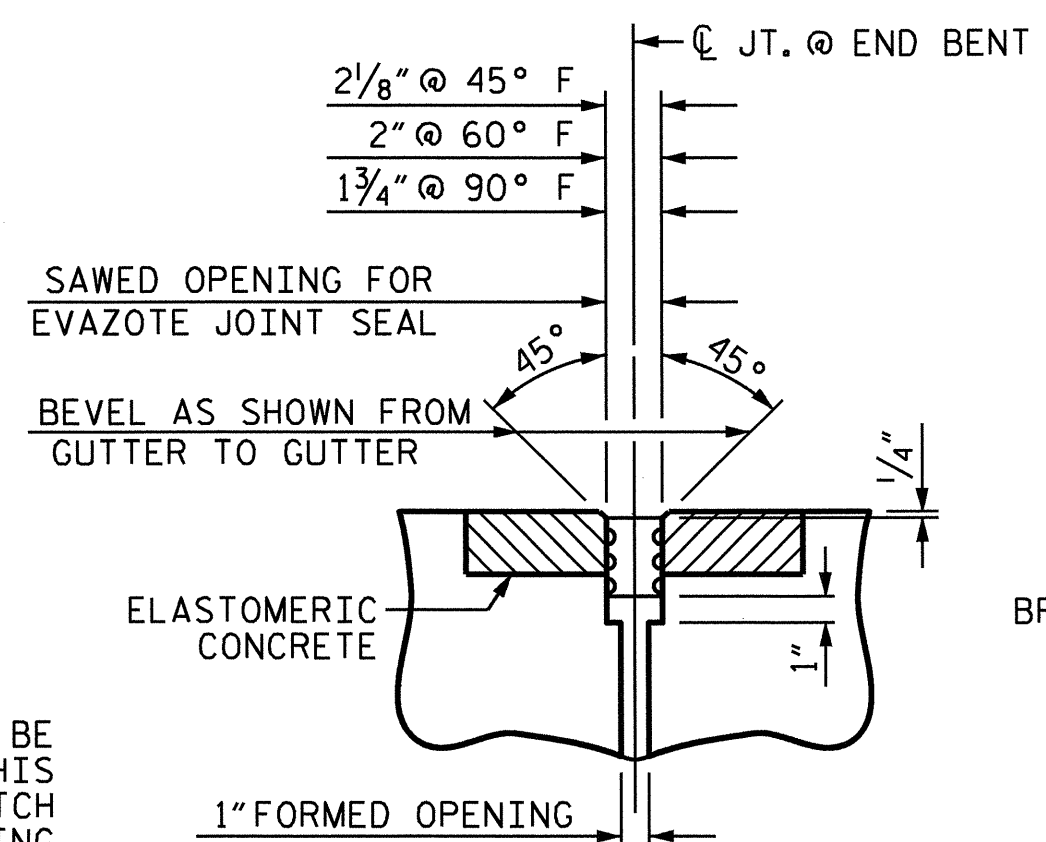
SECTION A-A



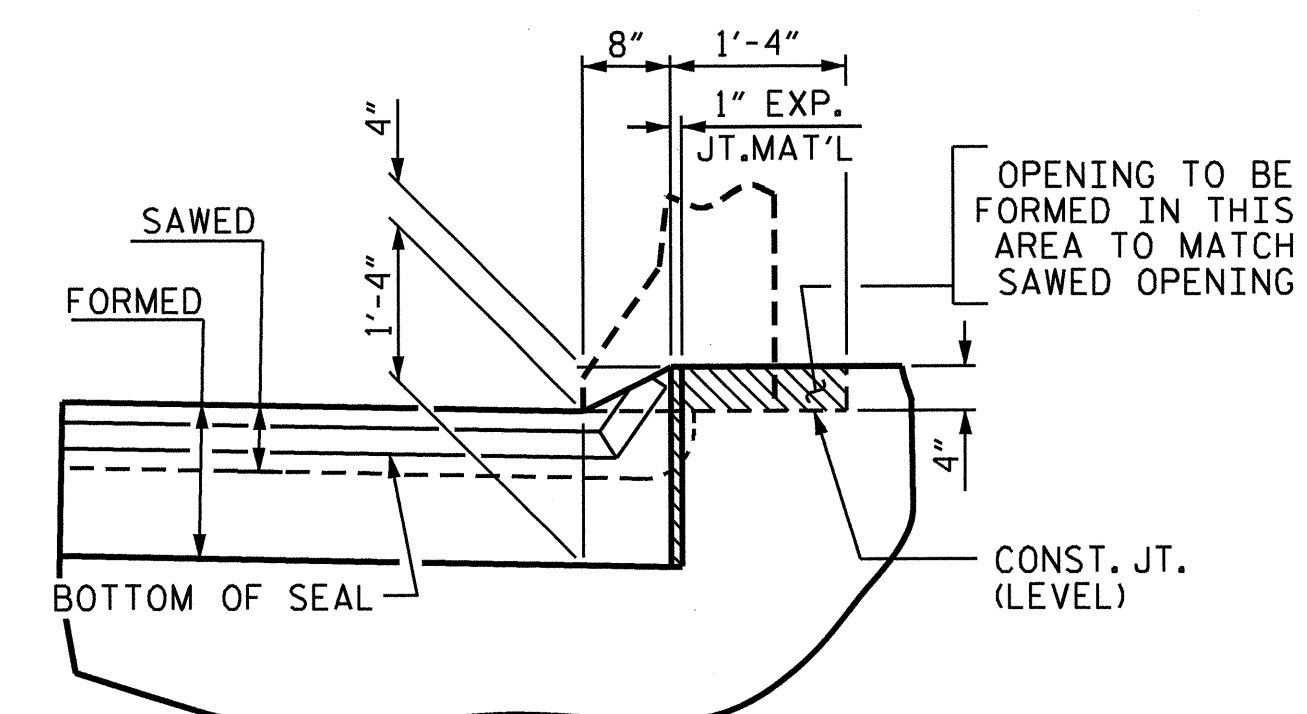
SECTION C-C  
EVAZOTE JOINT SEAL  
(PRE-SAWED ELASTOMERIC  
CONCRETE DIMENSIONS)

ELASTOMERIC CONCRETE	
END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)
1	7.68
2	7.68
TOTAL	15.36

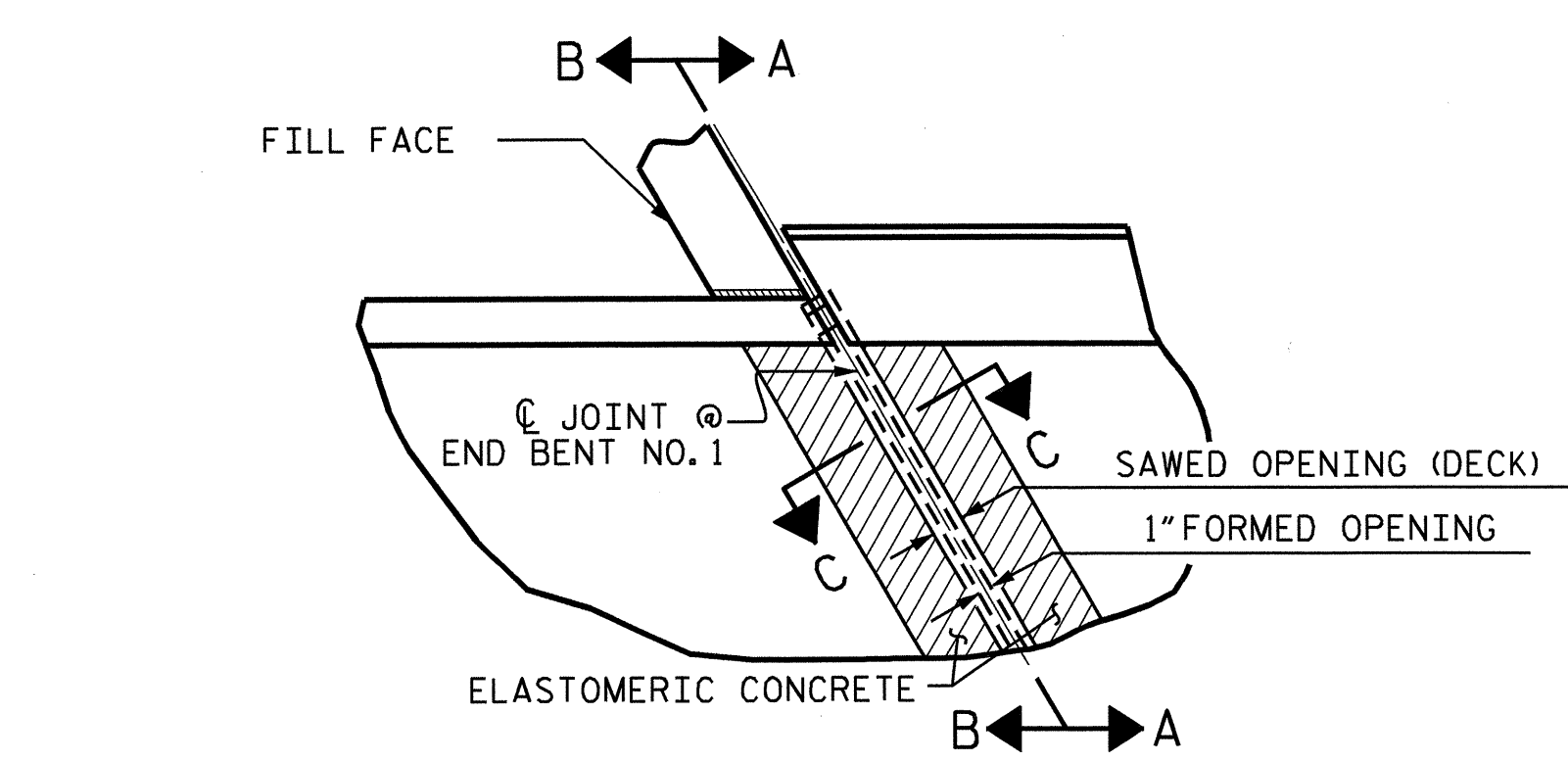
\* BASED ON THE MINIMUM BLOCKOUT SHOWN.



SECTION C-C  
EVAZOTE JOINT SEAL



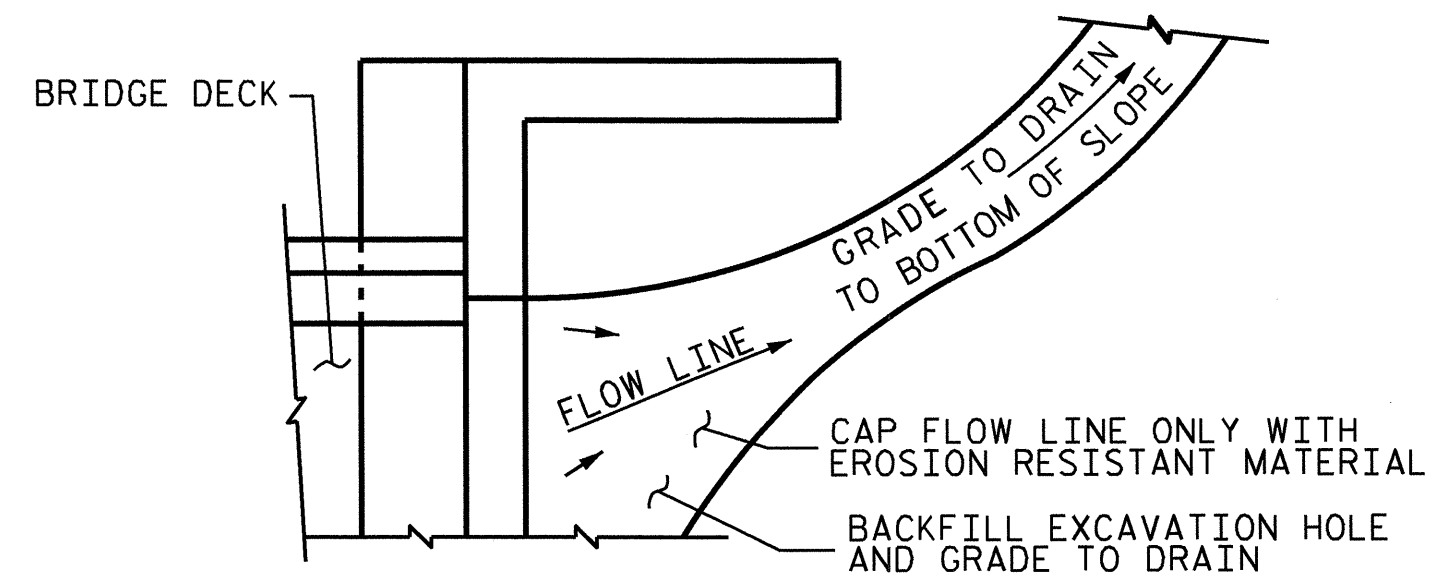
SECTION B-B



PLAN VIEW OF EVAZOTE JOINT

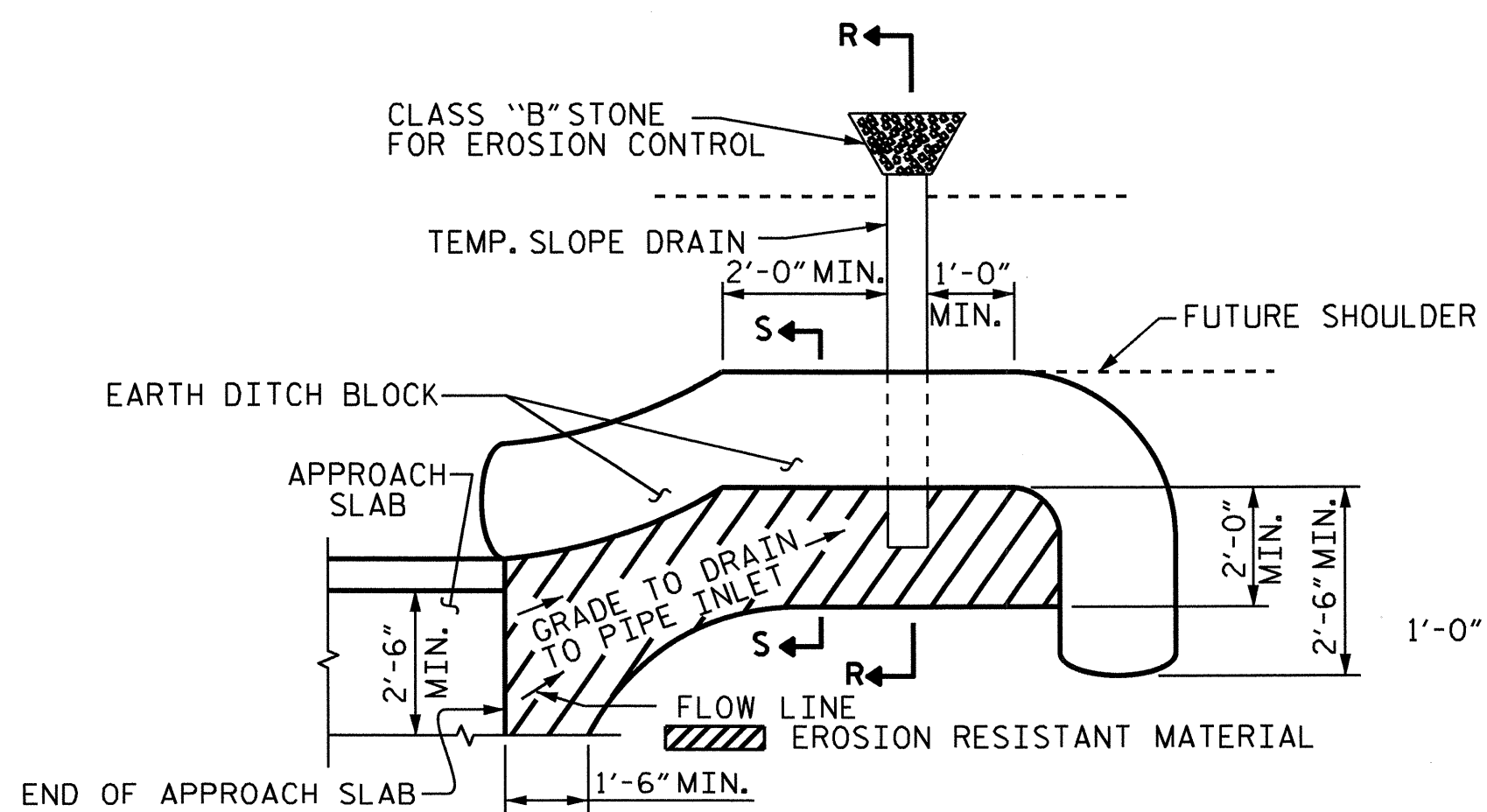
**JOINT SEAL DETAILS @ BARRIER RAIL**

EVAZOTE JOINT SEAL TO BE CUT, HEAT WELDED AND TURNED UP PARALLEL TO SLOPED FACE OF THE BARRIER RAIL.



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

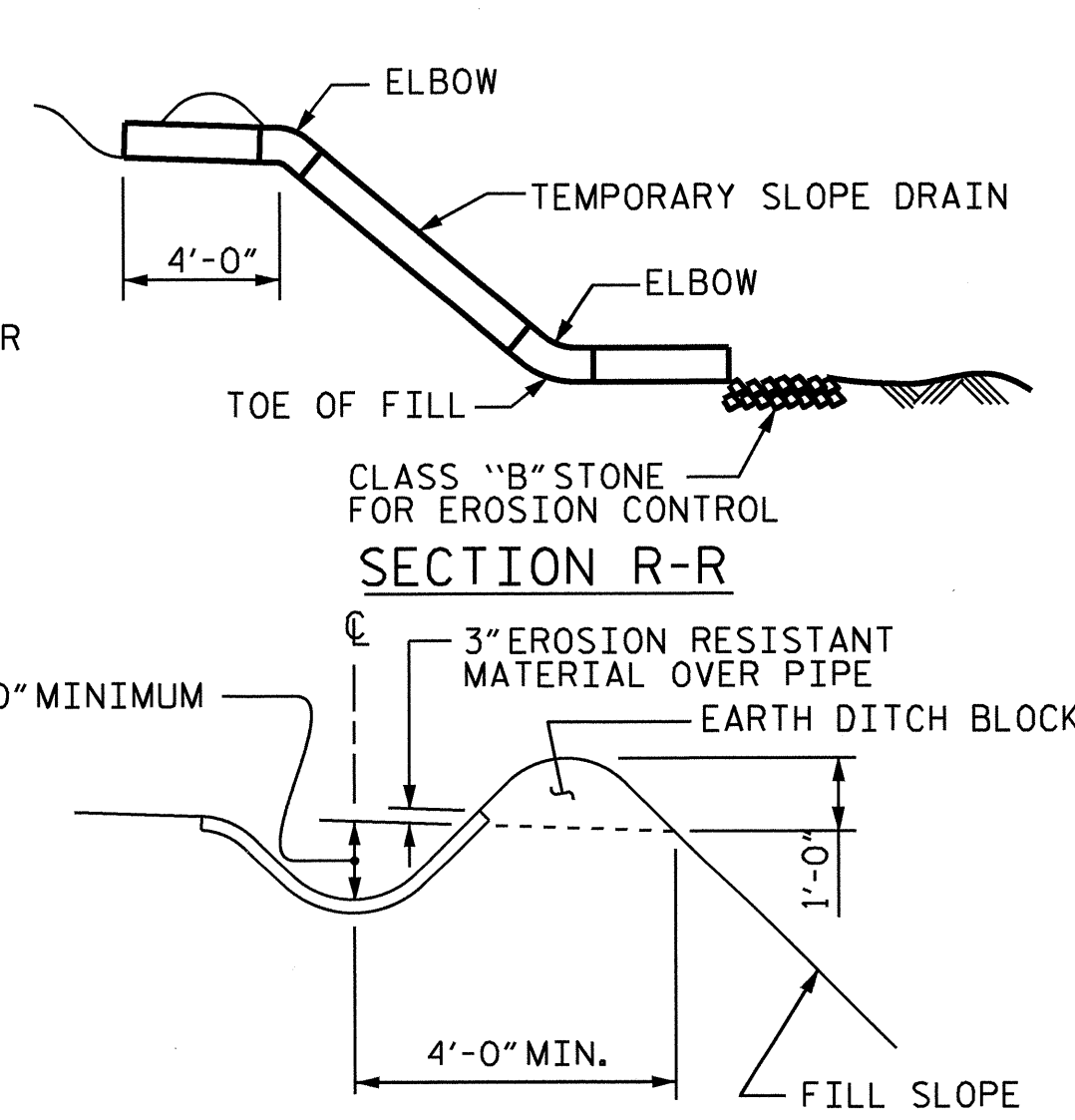
**TEMPORARY DRAINAGE DETAIL**



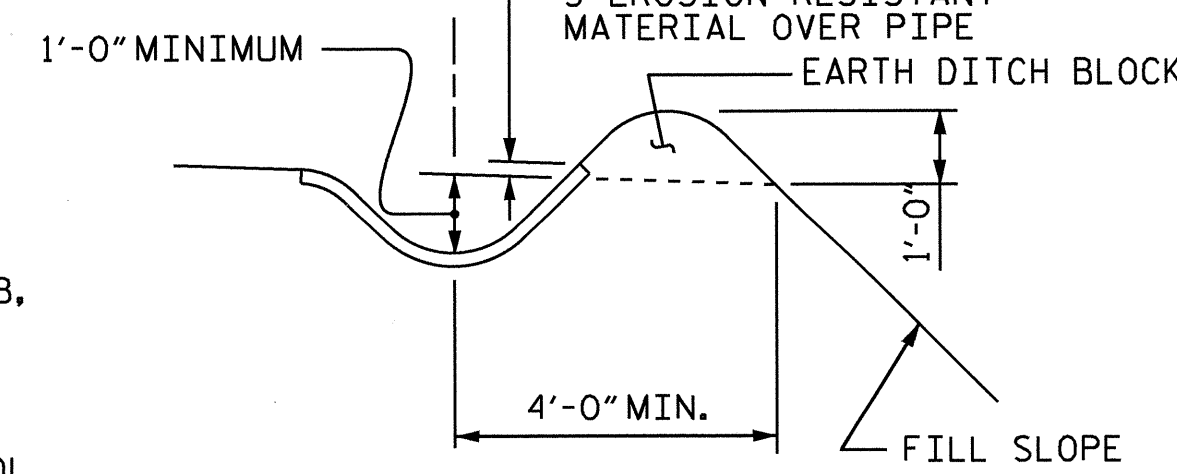
PLAN VIEW

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\"/>

**TEMPORARY BERM AND SLOPE DRAIN DETAILS**



SECTION R-R



SECTION S-S

**NOTES**

APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.  
 AREA BETWEEN THE WINGWALL AND APPROACH SLAB SHALL BE GRADED TO DRAIN THE WATER AWAY FROM THE FILL FACE OF THE BRIDGE AND SHALL BE PAVED. SEE ROADWAY PLANS.  
 THE JOINT SHALL BE SAWED PRIOR TO THE CASTING OF THE PARAPET AND BARRIER RAIL.  
 FOR EVAZOTE JOINT SEALS, SEE SPECIAL PROVISIONS.  
 THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE EVAZOTE JOINT SEAL SHALL BE 2 1/2\"/>

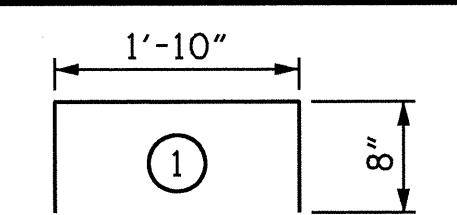
**BILL OF MATERIAL**

APPROACH SLAB AT EB NO.1					
BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	50	#4	STR	26'-6"	885
A2	52	#4	STR	26'-4"	915
*B1	96	#5	STR	23'-10"	2386
B2	96	#6	STR	24'-8"	3557
*B3	5	#4	STR	24'-7"	82
*G1	27	#4	STR	5'-0"	90
*U1	12	#4	1	3'-2"	25
REINFORCING STEEL					4,472 LBS.
* EPOXY COATED REINFORCING STEEL					3,468 LBS.
CLASS AA CONCRETE					
POUR NO. 1 APPROACH SLAB					46.4 C.Y.
POUR NO. 2 SIDEWALK					3.0 C.Y.
TOTAL					49.4 C.Y.

**APPROACH SLAB AT EB NO.2**

BAR NO.	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	50	#4	STR	26'-6"	885
A2	52	#4	STR	26'-4"	915
*B1	96	#5	STR	23'-10"	2386
B2	96	#6	STR	24'-8"	3557
*B3	5	#4	STR	24'-7"	82
*G1	27	#4	STR	5'-0"	90
*U1	12	#4	1	3'-2"	25
REINFORCING STEEL					4,472 LBS.
* EPOXY COATED REINFORCING STEEL					3,468 LBS.
CLASS AA CONCRETE					
POUR NO. 1 APPROACH SLAB					46.4 C.Y.
POUR NO. 2 SIDEWALK					3.0 C.Y.
TOTAL					49.4 C.Y.

**BAR TYPE**



\* THESE BARS ARE EPOXY COATED

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 2 OF 3

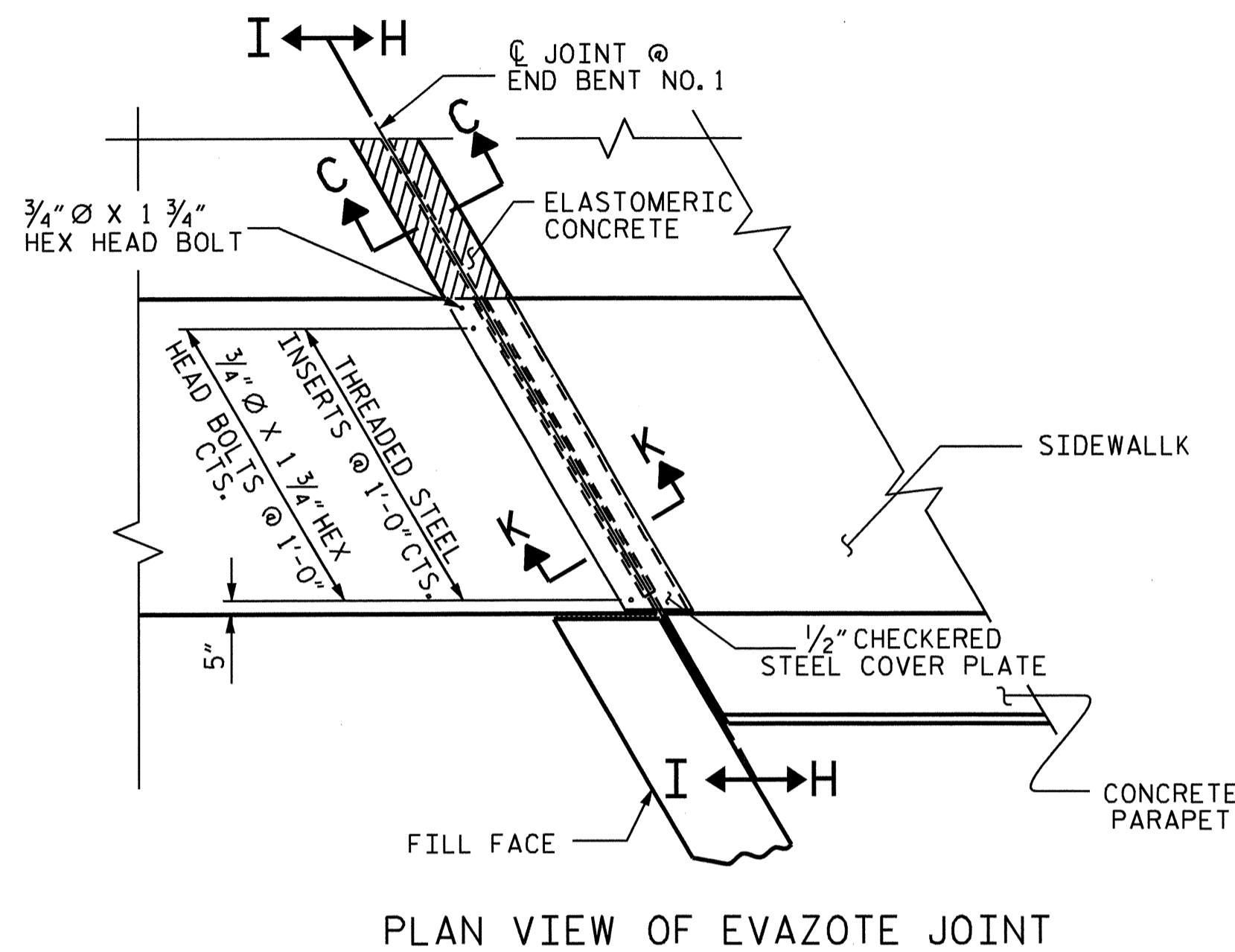
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**BRIDGE APPROACH  
 SLAB DETAILS  
 BARRIER RAIL SIDE**

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

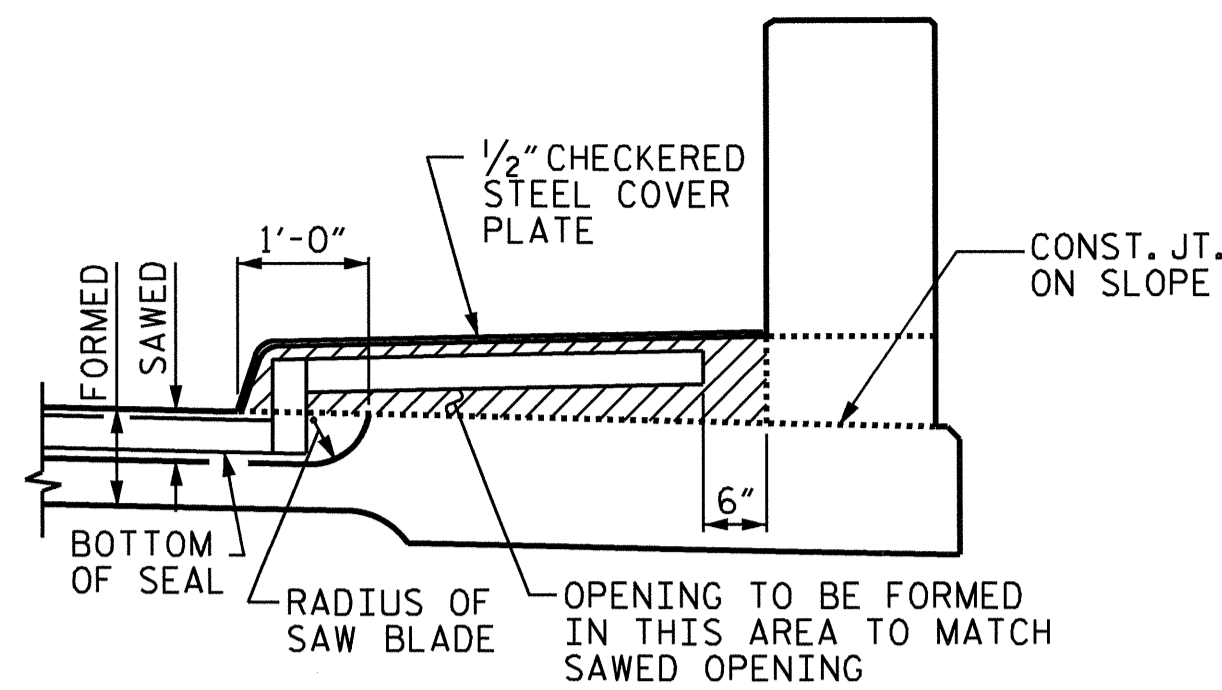


ASSEMBLED BY :	A.L. FIGUEROA	DATE :	4-25-11
CHECKED BY :	M.G. CHEEK	DATE :	6-14-11
DRAWN BY :	FCJ 11/88	REV. 10/17/00	RWW/LES
CHECKED BY :	ARB 11/88	REV. 5/1/03	RWW/JTE
		REV. 5/1/06	TLA/GM

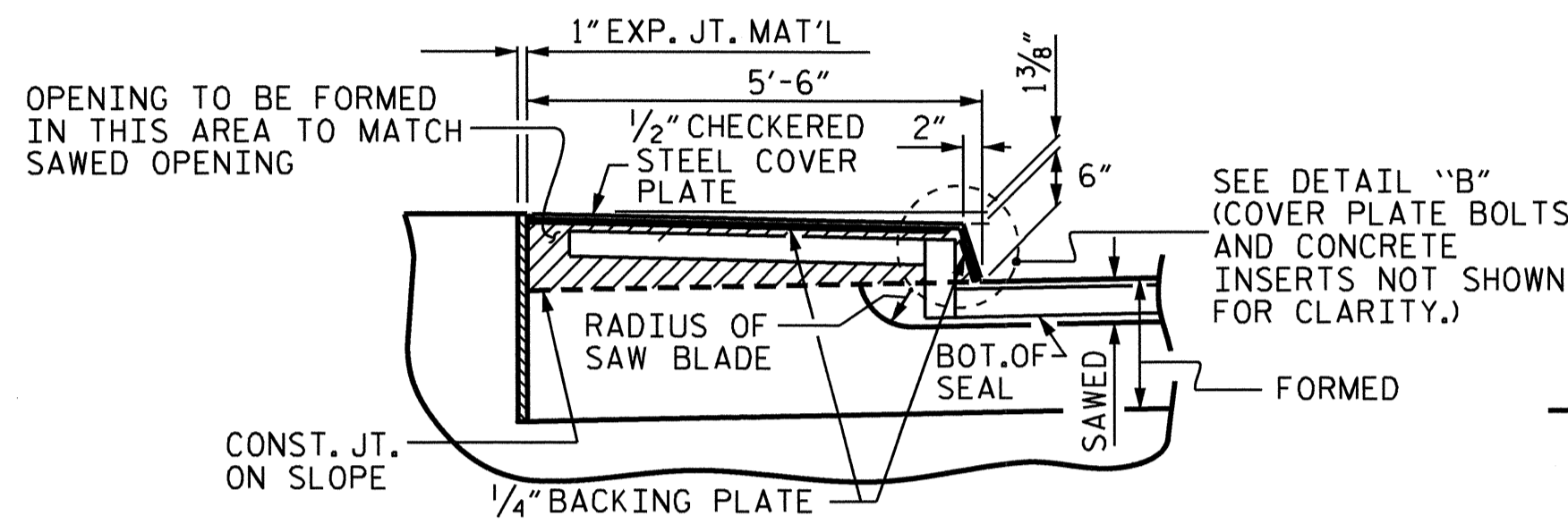


**JOINT SEAL DETAILS @ SIDEWALK & PARAPET**

FOR SECTION C-C, SEE SHEET 2 OF 3



SECTION H-H

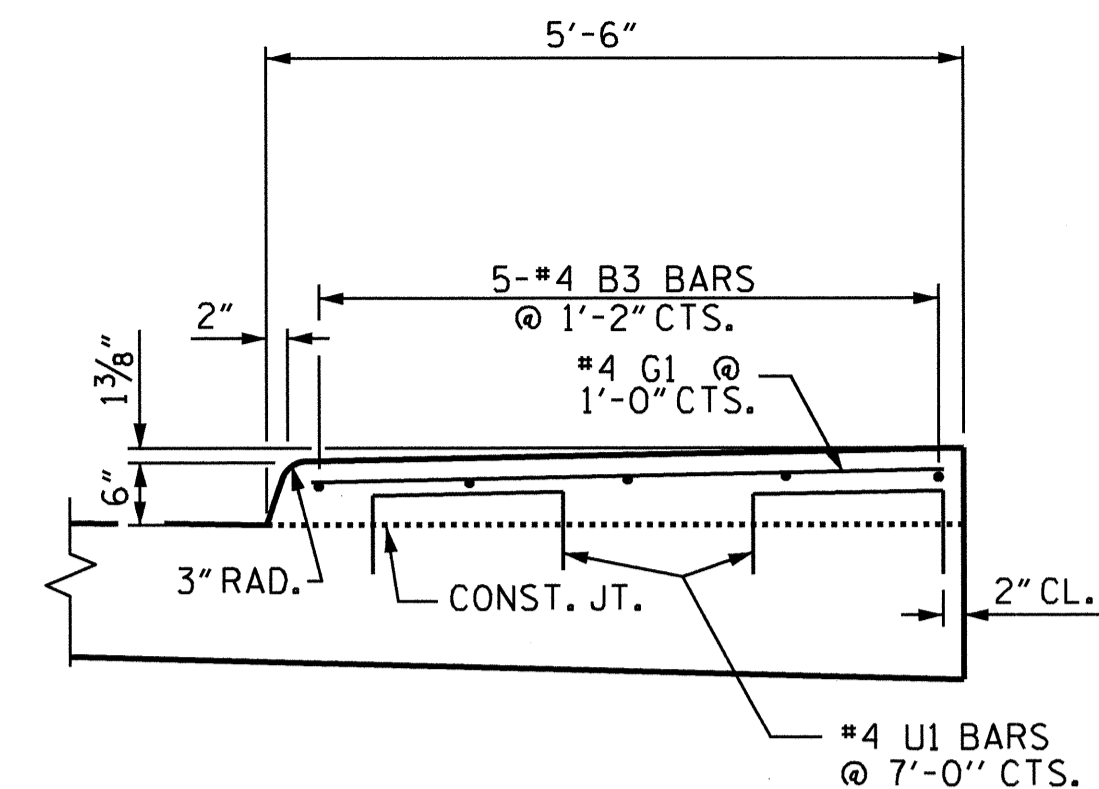


SECTION I-I

THE STEEL PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 OR APPROVED EQUAL. AFTER FABRICATION, THE PLATES SHALL BE COMMERCIALY BLAST CLEANED AND EITHER COATED WITH A MINIMUM THICKNESS OF 4 MILS (DRY) OF ZINC-RICH PAINT, GALVANIZED OR METALLIZED TO A MINIMUM THICKNESS OF 6 MILS IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. FOR THERMAL SPRAYED COATINGS (METALLIZATION), SEE SPECIAL PROVISIONS.

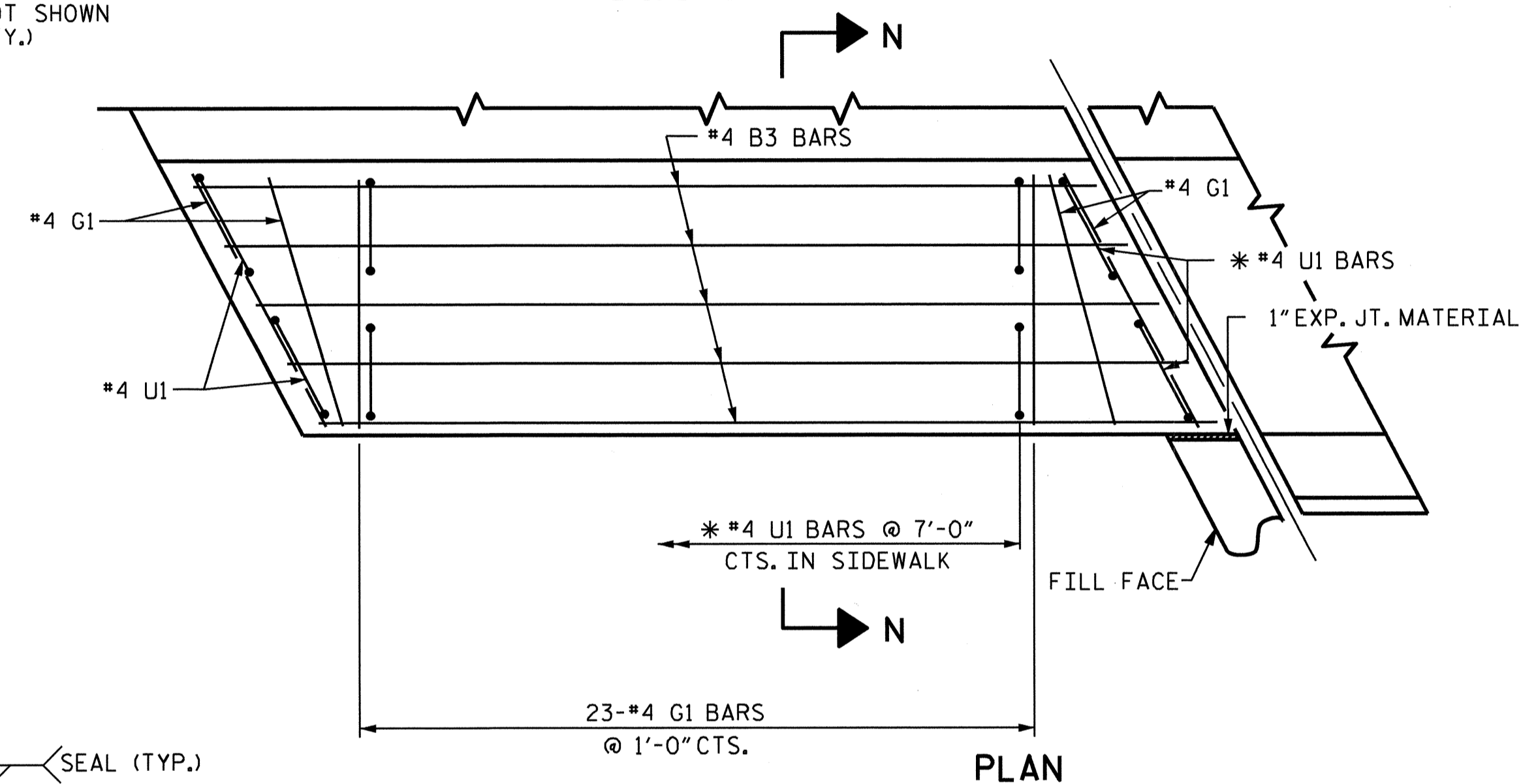
THE 3/4" DIAMETER HEX HEAD BOLTS SHALL CONFORM TO ASTM F593 ALLOY 304 STAINLESS STEEL.

NO SEPARATE PAYMENT WILL BE MADE FOR FURNISHING AND INSTALLING THE COVER PLATE. THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR "EVAZOTE JOINT SEALS".



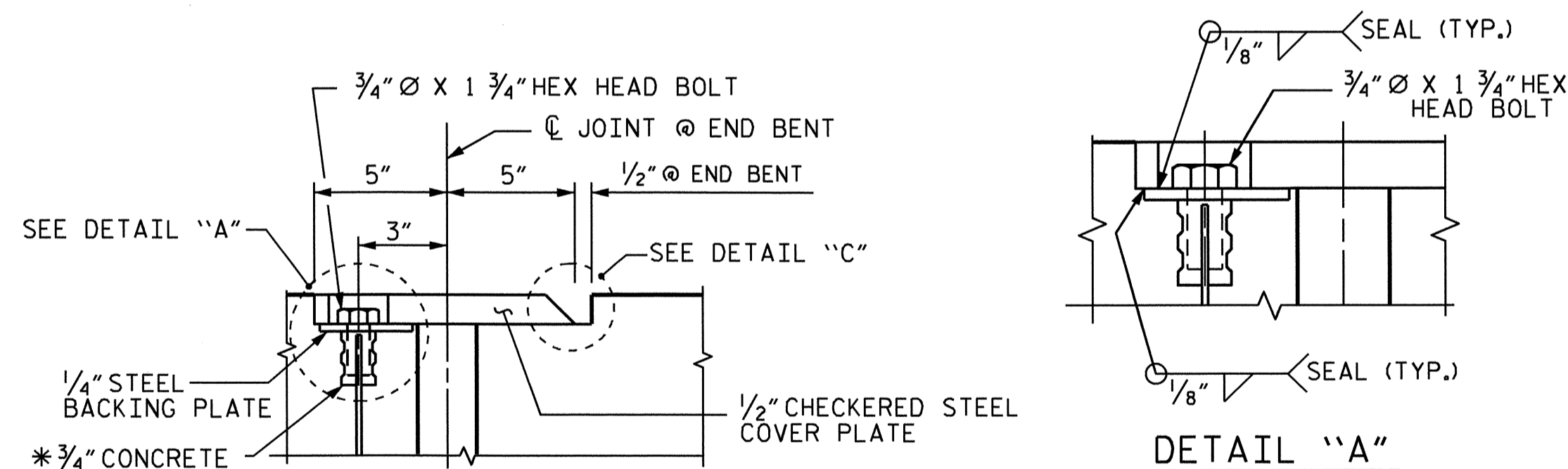
SECTION N-N

\* THESE BARS ARE TO BE PLACED AFTER THE SAWING OF THE JOINT. THE HOLES SHALL BE DRILLED AND THE UI BARS GROUTED INTO PLACE.



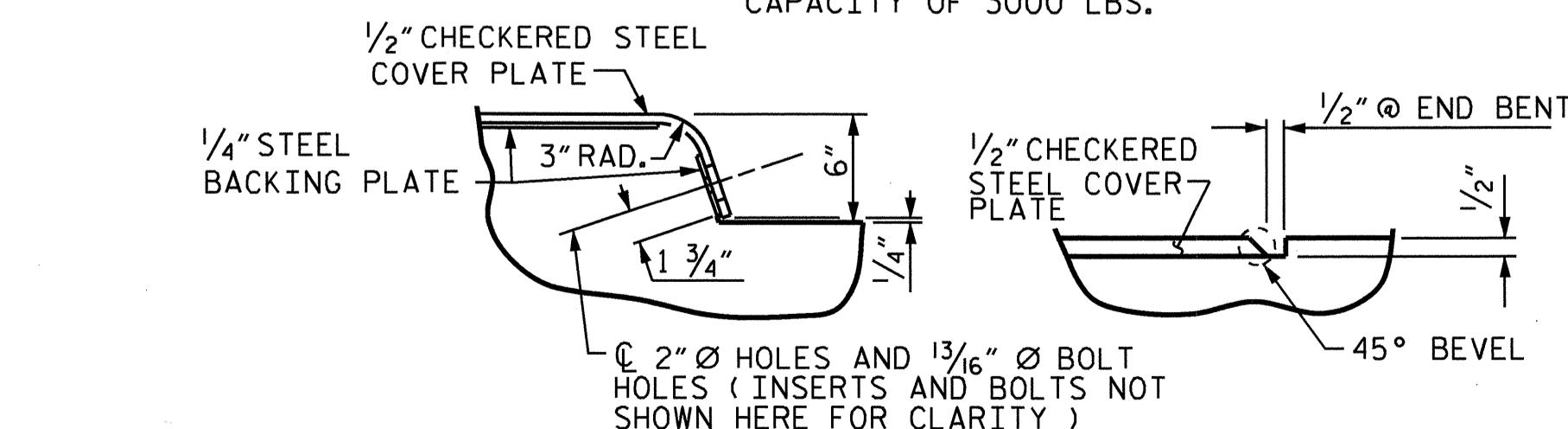
PLAN

**SIDEWALK DETAILS**



DETAIL "A"

\* THE 3/4" CONCRETE INSERTS SHALL BE CLOSED-END FERRULES WITH LOOPED WIRE STRUTS ATTACHED TO THEM. THE INSERTS SHALL CONFORM TO AASHTO M169, GRADE 12L14 AND SHALL HAVE A TENSILE WORKING LOAD CAPACITY OF 3000 LBS.



DETAIL "B"

DETAIL "C"

PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

BRIDGE APPROACH  
 SLAB DETAILS  
 SIDEWALK SIDE



ASSEMBLED BY :	A.L. FIGUEROA	DATE :	4-25-11
CHECKED BY :	M.G. CHEEK	DATE :	6-14-11
DRAWN BY :	FCJ 11/88	REV. 10/17/00	RWW/LES
CHECKED BY :	ARB 11/88	REV. 5/7/03	RWW/JTE
		REV. 5/1/06	TLA/GM

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

OVERHANG BRACKET CALCULATION INSTRUCTIONS

AASHTO SHAPES - TYPES III, IV, V, AND VI

- RECORD KNOWN INFORMATION ON "BRIDGE OVERHANG BRACKET SUMMARY" ON SHEET 2
- CALCULATE THE MAXIMUM SCREED LOAD PER BRACKET (SLPB) WITH AN ESTIMATED R = 1.5. SLPB = R X W. ROUND VALUE UP TO NEAREST SLPB VALUE INDICATED ON APPROPRIATE TABLE 1-1, 1-2, 1-3, OR 1-4.
- WITH THE ESTIMATED SLPB, OVERHANG SLAB THICKNESS, "K" VALUE, AND 45° HANGER SAFE WORKING LOAD (SWL), ENTER THE APPROPRIATE TABLE 1-1, 1-2, 1-3, OR 1-4 (BASED ON OVERHANG DIMENSION) AND DETERMINE THE BRACKET SPACING, S.
- CALCULATE S/D1 AND S/D2, ROUNDING UP TO NEAREST VALUE IN TABLE 2. ENTER TABLE 2 AND DETERMINE R VALUE.
- CALCULATE REVISED SLPB, ROUND VALUE UP TO NEAREST SLPB VALUE INDICATED ON APPROPRIATE TABLE 1-1, 1-2, 1-3, OR 1-4.
- WITH THE REVISED SLPB, OVERHANG SLAB THICKNESS, "K" VALUE AND 45° HANGER SAFE WORKING LOAD (SWL), ENTER THE APPROPRIATE TABLE 1-1, 1-2, 1-3 OR 1-4 (BASED ON OVERHANG DIMENSION) AND DETERMINE REVISED BRACKET SPACING, S.
- CONTINUE ITERATIONS OF STEPS 4-6 UNTIL THE REVISED BRACKET SPACING, S, IS THE SAME AS THE PREVIOUS S VALUE.
- CHECK LUMBER JOIST SPACING: WITH BRACKET SPACING VALUE, S, ROUND THIS VALUE UP TO THE NEAREST VALUE OF ALLOWABLE SPAN LENGTH OF JOIST OF TABLE 3. USING THIS VALUE, ALONG WITH THE AVERAGE OVERHANG SLAB THICKNESS AND THE LUMBER JOIST SIZE, DETERMINE JOIST SPACING FROM TABLE 3. IF NECESSARY, ADJUST LUMBER JOIST SIZE AND/OR JOIST SPACING TO MEET ALLOWABLE SPAN LENGTH OF JOIST.
- CONVERSELY, IF THE DESIRED JOIST SPACING IS KNOWN, USE THIS ALONG WITH THE AVERAGE OVERHANG SLAB THICKNESS AND THE LUMBER JOIST SIZE TO DETERMINE IF ALLOWABLE SPAN LENGTH OF JOIST IS GREATER THAN THE BRACKET SPACING, S. IF NECESSARY, ADJUST LUMBER JOIST SIZE TO MEET REQUIREMENTS OF ALLOWABLE SPAN LENGTH OF JOIST AND JOIST SPACING.
- RECORD REMAINING INFORMATION ON "BRIDGE OVERHANG BRACKET SUMMARY" FORM.
- SUBMIT FORM AND CALCULATIONS FOR REVIEW AND APPROVAL.

TABLE 1-1 (FOR USE ON UP TO 2'-0" OVERHANG (L) & 54" HORIZONTAL LEG LENGTH OF THE OVERHANG BRACKET)

AVG. SLAB THICKNESS (t) (in)	BRACKET DIMENSION (in)	SCREED LOAD PER BRACKET									45° HANGER SWL (lbs)
		2500 lbs.	2250 lbs.	2000 lbs.	1750 lbs.	1500 lbs.	1250 lbs.	1000 lbs.	750 lbs.	0 lbs.	
10	30	3'-6"	4'-0"	4'-5"	2'-1"	2'-7"	3'-2"	3'-8"	4'-2"	5'-9"	4000
	40	3'-6"	4'-0"	4'-5"	2'-1"	2'-7"	3'-2"	3'-8"	4'-2"	5'-9"	4000
	50	3'-6"	4'-0"	4'-5"	2'-1"	2'-7"	3'-2"	3'-8"	4'-2"	5'-9"	4000
12	30	3'-2"	3'-7"	4'-1"	2'-4"	2'-10"	3'-4"	3'-9"	5'-2"	4000	
	40	3'-2"	3'-7"	4'-1"	2'-4"	2'-10"	3'-4"	3'-9"	5'-2"	4000	
	50	3'-2"	3'-7"	4'-1"	2'-4"	2'-10"	3'-4"	3'-9"	5'-2"	4000	
14	30	2'-10"	3'-4"	3'-9"	2'-2"	2'-7"	3'-0"	3'-5"	4'-9"	4000	
	40	2'-10"	3'-4"	3'-9"	2'-2"	2'-7"	3'-0"	3'-5"	4'-9"	4000	
	50	2'-10"	3'-4"	3'-9"	2'-2"	2'-7"	3'-0"	3'-5"	4'-9"	4000	
16	30	2'-8"	3'-0"	3'-5"	2'-0"	2'-4"	2'-9"	3'-2"	4'-4"	4000	
	40	2'-8"	3'-0"	3'-5"	2'-0"	2'-4"	2'-9"	3'-2"	4'-4"	4000	
	50	2'-8"	3'-0"	3'-5"	2'-0"	2'-4"	2'-9"	3'-2"	4'-4"	4000	

TABLE 1-2 (FOR USE ON OVER 2'-0" TO 2'-6" OVERHANG (L) & 54" HORIZONTAL LEG LENGTH OF THE OVERHANG BRACKET)

AVG. SLAB THICKNESS (t) (in)	BRACKET DIMENSION (in)	SCREED LOAD PER BRACKET									45° HANGER SWL (lbs)
		2500 lbs.	2250 lbs.	2000 lbs.	1750 lbs.	1500 lbs.	1250 lbs.	1000 lbs.	750 lbs.	0 lbs.	
10	30	3'-1"	3'-6"	4'-0"	2'-4"	2'-9"	3'-3"	3'-8"	5'-1"	4000	
	40	3'-1"	3'-6"	4'-0"	2'-4"	2'-9"	3'-3"	3'-8"	5'-1"	4000	
	50	3'-1"	3'-6"	4'-0"	2'-4"	2'-9"	3'-3"	3'-8"	5'-1"	4000	
12	30	2'-9"	3'-2"	3'-7"	2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000	
	40	2'-9"	3'-2"	3'-7"	2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000	
	50	2'-9"	3'-2"	3'-7"	2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000	
14	30	2'-6"	2'-10"	3'-3"	2'-3"	2'-7"	3'-0"	4'-1"	4000		
	40	2'-6"	2'-10"	3'-3"	2'-3"	2'-7"	3'-0"	4'-1"	4000		
	50	2'-6"	2'-10"	3'-3"	2'-3"	2'-7"	3'-0"	4'-1"	4000		
16	30	2'-3"	2'-7"	2'-11"	2'-5"	2'-9"	3'-9"	4000			
	40	2'-3"	2'-7"	2'-11"	2'-5"	2'-9"	3'-9"	4000			
	50	2'-3"	2'-7"	2'-11"	2'-5"	2'-9"	3'-9"	4000			

TABLE 1-3 (FOR USE ON OVER 2'-6" TO 3'-0" OVERHANG (L) & 54" HORIZONTAL LEG LENGTH OF THE OVERHANG BRACKET)

AVG. SLAB THICKNESS (t) (in)	BRACKET DIMENSION (in)	SCREED LOAD PER BRACKET									45° HANGER SWL (lbs)	
		2500 lbs.	2250 lbs.	2000 lbs.	1750 lbs.	1500 lbs.	1250 lbs.	1000 lbs.	750 lbs.	0 lbs.		
10	30						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	40						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	50	2'-9"	3'-2"	3'-7"	4'-0"	4'-5"	4'-10"	5'-3"	5'-7"	6'-7"	6000	
12	30						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	40						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	50	2'-9"	3'-2"	3'-7"	4'-0"	4'-5"	4'-10"	5'-3"	5'-7"	6'-7"	6000	
14	30						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	40						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	50	2'-9"	3'-2"	3'-7"	4'-0"	4'-5"	4'-10"	5'-3"	5'-7"	6'-7"	6000	
16	30						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	40						2'-1"	2'-6"	2'-11"	3'-4"	4'-6"	4000
	50	2'-9"	3'-2"	3'-7"	4'-0"	4'-5"	4'-10"	5'-3"	5'-7"	6'-7"	6000	

TABLE 1-4 (FOR USE ON OVER 3'-0" TO 3'-6" OVERHANG (L) & 54" HORIZONTAL LEG LENGTH OF THE OVERHANG BRACKET)

AVG. SLAB THICKNESS (t) (in)	BRACKET DIMENSION (in)	SCREED LOAD PER BRACKET									45° HANGER SWL (lbs)	
		2500 lbs.	2250 lbs.	2000 lbs.	1750 lbs.	1500 lbs.	1250 lbs.	1000 lbs.	750 lbs.	0 lbs.		
10	30						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	40						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	50	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-1"	4'-5"	4'-9"	5'-9"	6000	
12	30						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	40						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	50	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-1"	4'-5"	4'-9"	5'-9"	6000	
14	30						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	40						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	50	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-1"	4'-5"	4'-9"	5'-9"	6000	
16	30						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	40						2'-3"	2'-11"	3'-7"	4'-3"	5'-9"	4000
	50	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-1"	4'-5"	4'-9"	5'-9"	6000	

DEFINITIONS

- SLPB = SCREED LOAD PER BRACKET (R x W)
- R = SCREED LOAD FACTOR, OBTAINED FROM TABLE 2
- W = WHEEL LOAD
- S = BRACKET SPACING
- T = AVERAGE SLAB THICKNESS
- SWL = SAFE WORKING LOAD
- K = DIMENSION DEFINED ON "BRIDGE OVERHANG BRACKET SUMMARY" ON SHEET 2
- L = OVERHANG MEASURED FROM EDGE OF TOP FLANGE TO EDGE OF SUPERSTRUCTURE

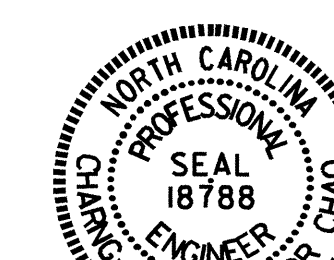
PROJECT NO. U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63-L-NB-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD OVERHANG  
 FALSEWORK

AASHTO TYPES  
 III, IV, V AND VI



Chuan Victor Chao  
 5-12-2011

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

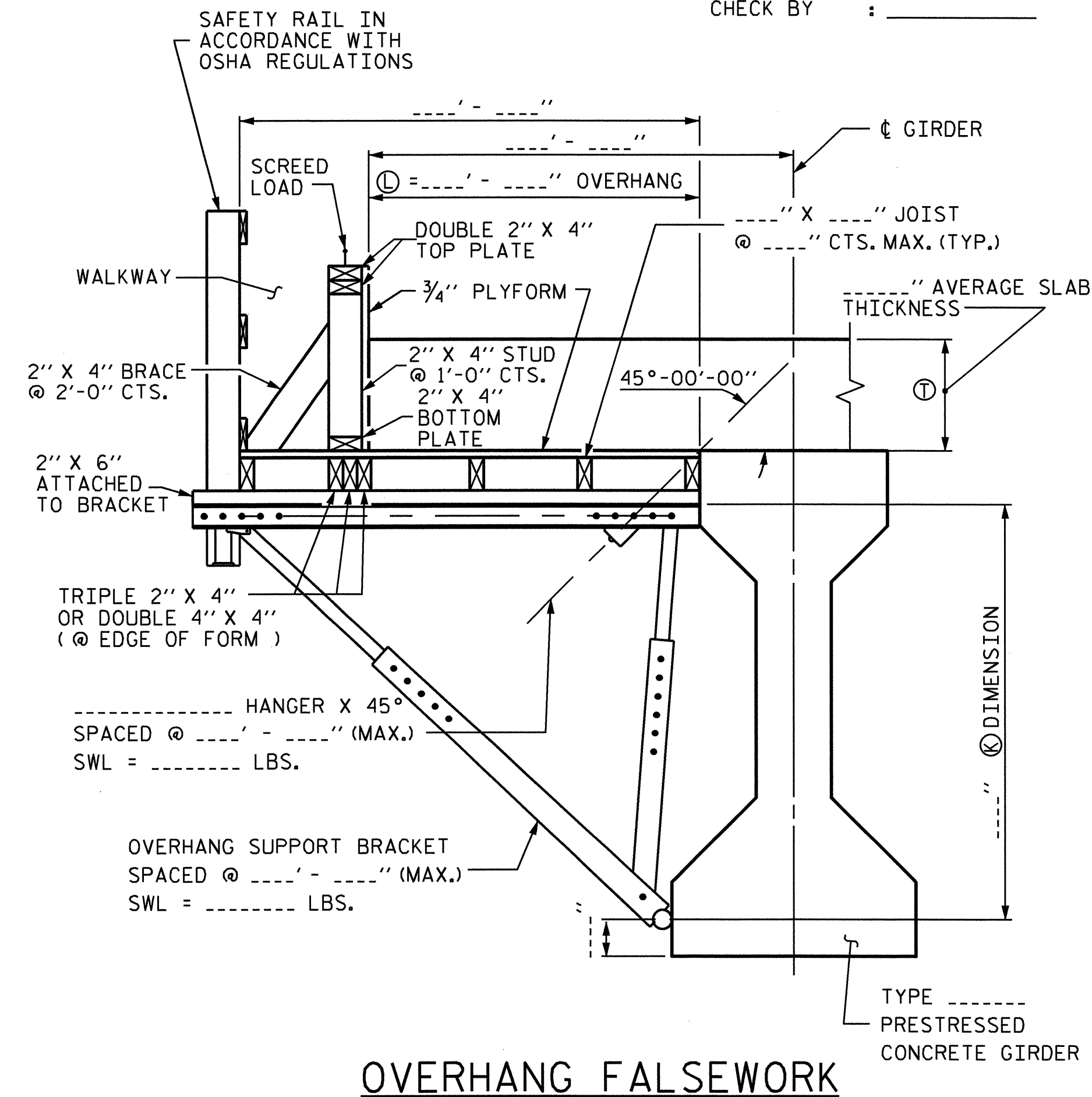
ASSEMBLED BY:	DATE:
CHECKED BY:	DATE:
DRAWN BY: R. WRIGHT 06/04	REV.
CHECKED BY: C. V. CHAO 06/04	

BRIDGE OVERHANG BRACKET SUMMARY

TOTAL SCREED WEIGHT = \_\_\_\_\_ LBS.  
 NUMBER OF SCREED WHEELS = \_\_\_\_\_  
 SCREED WHEEL LOAD (W) = \_\_\_\_\_ LBS.  
 SCREED LOAD PER BRACKET = \_\_\_\_\_ LBS.

PROJECT No. : \_\_\_\_\_  
 COUNTY : \_\_\_\_\_  
 STATION : \_\_\_\_\_  
 DESCRIPTION : \_\_\_\_\_

DATE : \_\_\_\_\_  
 DESIGN BY : \_\_\_\_\_  
 CHECK BY : \_\_\_\_\_



NOTES

DESIGN INCLUDES CONSTRUCTION LIVE LOAD 20 PSF ON THE AREA SUPPORTED AND 75 PLF AT THE OUTSIDE DECK OF OVERHANGS.

REQUIRED MINIMUM DIAGONAL LEG CAPACITY: 3600 LB WORKING LOAD

THE CONTRACTOR HAS THE OPTION OF SUBMITTING HIS OWN DESIGN FOR OVERHANG FALSEWORK IN ACCORDANCE WITH THE SPECIAL PROVISIONS.

SUBMITTALS UTILIZING THE INSTRUCTIONS AND PROCEDURES DESCRIBED ON SHEET 1 OF 3 SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF THE SPECIFICATIONS AND SPECIAL PROVISIONS, EXCEPT THAT CALCULATIONS FOR OVERHANG FALSEWORK NEED NOT BE SEALED BY A REGISTERED ENGINEER.

FOR OVERHANG FALSEWORK BRACING DESIGN, SEE SHEET 3 OF 3.

ASSEMBLED BY:	DATE:
CHECKED BY:	DATE:
DRAWN BY: R. WRIGHT 06/04	REV.
CHECKED BY: C. V. CHAO 06/04	

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 C:\OLD\FILES\dw\vector\overhangfalsework\1IEBAR&STRUT\U-4909\_TYPE\_IV\U4909verHangSheets.dgn  
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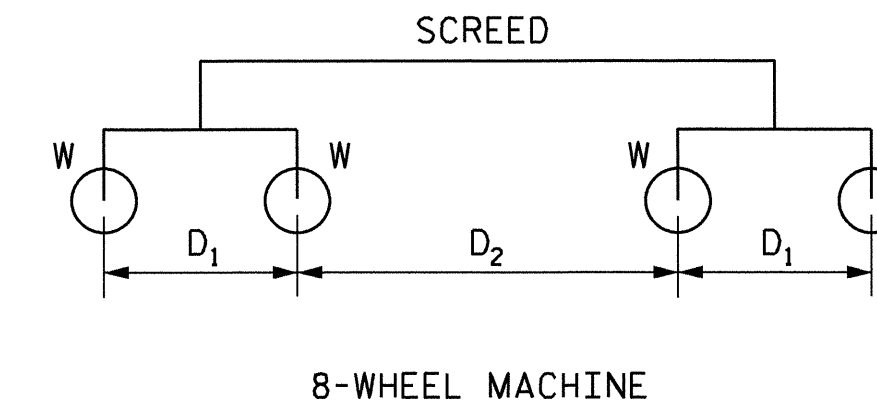
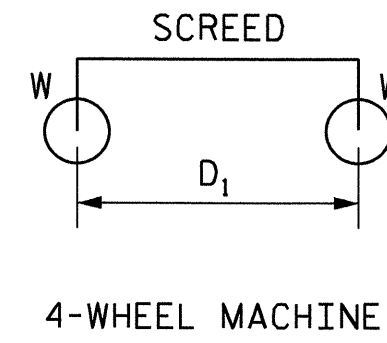


TABLE 2: SCREED LOAD FACTOR "R"

4 WHEEL MACHINE	
S/D1	R
<= 1.0	1.00
1.1	1.09
1.2	1.17
1.3	1.23
1.4	1.29
1.5	1.33
1.6	1.38
1.7	1.41
1.8	1.44
1.9	1.47
2.0	1.50
2.2	1.55
2.4	1.58
2.6	1.62
2.8	1.64
3.0	1.67
3.5	1.71
4.0	1.75

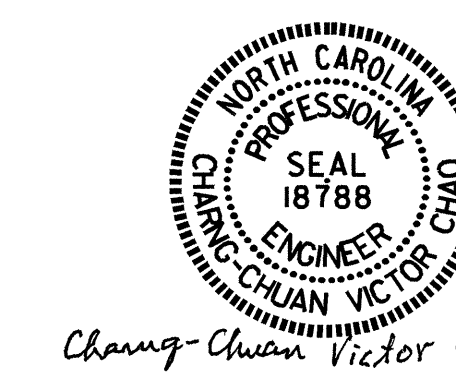
		THE SCREED LOAD FACTOR R (FOR 8 WHEEL MACHINE)																	
		S/D <sub>2</sub>																	
		<= 1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.4	2.6	2.8	3.0	3.5	4.0
S/D <sub>1</sub>	<= 1.0	1.00	1.09	1.17	1.23	1.29	1.33	1.38	1.41	1.44	1.47	1.50	1.55	1.58	1.62	1.64	1.67	1.71	1.75
	1.1	1.09	1.18	1.26	1.32	1.38	1.42	1.47	1.50	1.54	1.56	1.59	1.64	1.67	1.71	1.73	1.76	1.81	1.84
	1.2	1.17	1.26	1.33	1.40	1.45	1.50	1.54	1.58	1.61	1.64	1.67	1.71	1.75	1.78	1.81	1.83	1.88	1.92
	1.3	1.23	1.32	1.40	1.46	1.52	1.56	1.61	1.64	1.68	1.70	1.73	1.78	1.81	1.85	1.87	1.90	1.95	1.98
	1.4	1.29	1.38	1.45	1.52	1.57	1.62	1.66	1.70	1.73	1.76	1.79	1.83	1.87	1.90	1.93	1.95	2.00	2.07
	1.5	1.33	1.42	1.50	1.56	1.62	1.67	1.71	1.75	1.78	1.81	1.83	1.88	1.92	1.95	1.98	2.00	2.10	2.17
	1.6	1.38	1.47	1.54	1.61	1.66	1.71	1.75	1.79	1.82	1.85	1.88	1.92	1.96	1.99	2.04	2.08	2.18	2.25
	1.7	1.41	1.50	1.58	1.64	1.70	1.75	1.79	1.82	1.86	1.89	1.91	1.96	2.00	2.05	2.11	2.16	2.25	2.32
	1.8	1.44	1.54	1.61	1.68	1.73	1.78	1.82	1.86	1.89	1.92	1.94	1.99	2.06	2.12	2.17	2.22	2.32	2.39
	1.9	1.47	1.56	1.64	1.70	1.76	1.81	1.85	1.89	1.92	1.95	1.97	2.04	2.11	2.18	2.23	2.28	2.38	2.45
	2.0	1.50	1.59	1.67	1.73	1.79	1.83	1.88	1.91	1.94	1.97	2.00	2.09	2.17	2.23	2.29	2.33	2.43	2.50
	2.2	1.55	1.64	1.71	1.78	1.83	1.88	1.92	1.96	1.99	2.04	2.09	2.18	2.26	2.32	2.38	2.42	2.52	2.59
	2.4	1.58	1.67	1.75	1.81	1.87	1.92	1.96	2.00	2.06	2.11	2.17	2.26	2.33	2.40	2.45	2.50	2.60	2.67
2.6	1.62	1.71	1.78	1.85	1.90	1.95	1.99	2.05	2.12	2.18	2.23	2.32	2.40	2.46	2.52	2.56	2.66	2.73	
2.8	1.64	1.73	1.81	1.87	1.93	1.98	2.04	2.11	2.17	2.23	2.29	2.38	2.45	2.52	2.57	2.62	2.71	2.79	
3.0	1.67	1.76	1.83	1.90	1.95	2.00	2.08	2.16	2.22	2.28	2.33	2.42	2.50	2.56	2.62	2.67	2.76	2.83	
3.5	1.71	1.81	1.88	1.95	2.00	2.10	2.18	2.25	2.32	2.38	2.43	2.52	2.60	2.66	2.71	2.76	2.86	2.93	
4.0	1.75	1.84	1.92	1.98	2.07	2.17	2.25	2.32	2.39	2.45	2.50	2.59	2.67	2.73	2.79	2.83	2.93	3.00	

TABLE 3: ALLOWABLE SPAN LENGTH OF JOISTS AND JOIST SPACINGS

AVG. SLAB THICKNESS (IN)	LUMBER JOIST SIZE (IN X IN)	JOIST SPACINGS			
		15 IN	12 IN	10 IN	8 IN
		THE ALLOWABLE SPAN LENGTH OF JOISTS			
10	2 X 4	—	4' - 6"	4' - 9"	5' - 0"
	4 X 4	5' - 9"	6' - 3"	6' - 6"	6' - 7"
12	2 X 4	—	4' - 3"	4' - 9"	5' - 0"
	4 X 4	5' - 3"	6' - 0"	6' - 3"	6' - 5"
14	2 X 4	—	4' - 0"	4' - 6"	5' - 0"
	4 X 4	—	5' - 6"	6' - 0"	6' - 4"
16	2 X 4	—	4' - 0"	4' - 3"	4' - 9"
	4 X 4	—	5' - 3"	5' - 9"	6' - 3"

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SHEET 2 OF 3

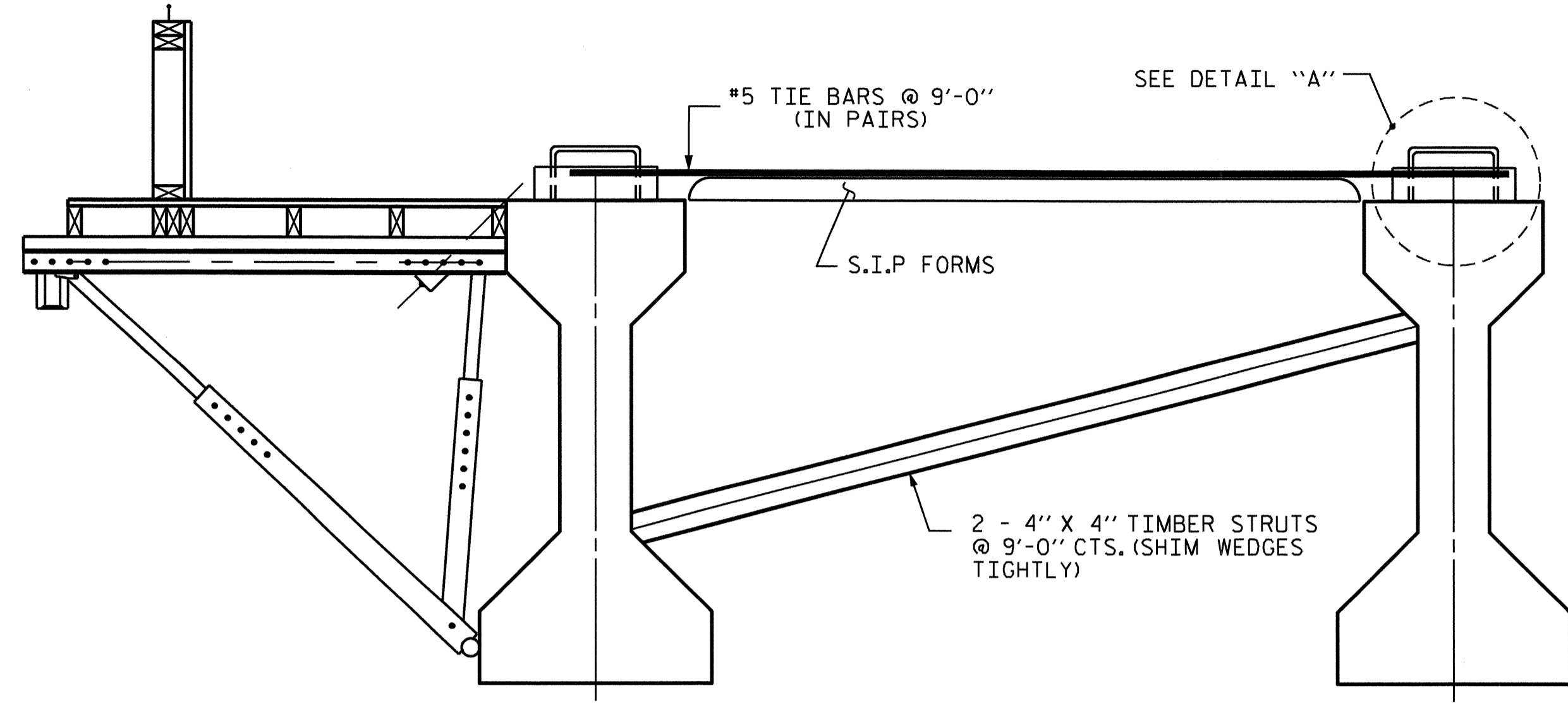


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD OVERHANG FALSEWORK

AASHTO TYPES III, IV, V AND VI

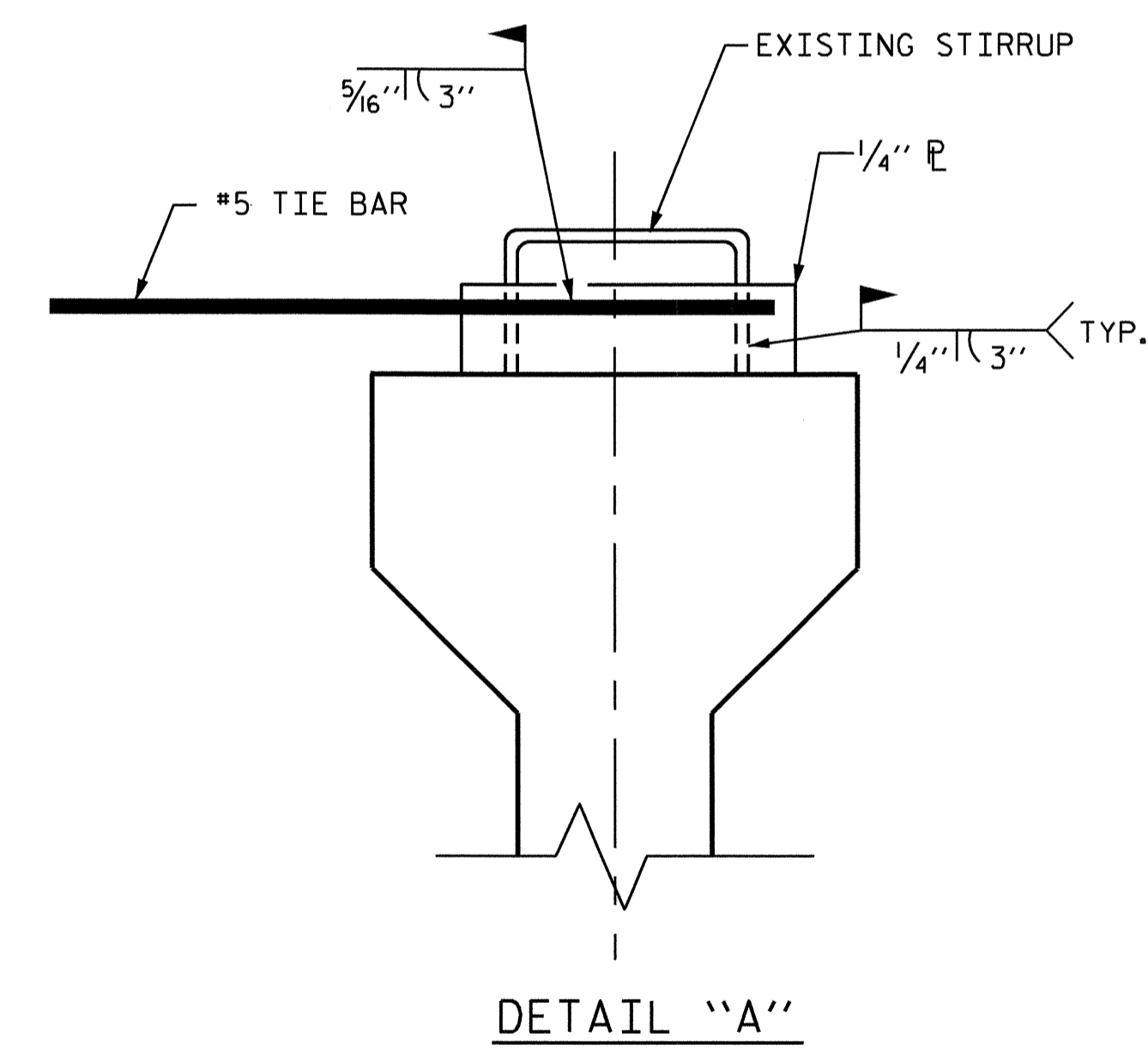
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-35
1			3			TOTAL SHEETS 36
2			4			



EXTERIOR GIRDER

INTERIOR GIRDER

DETAIL OF REQUIRED OVERHANG FALSEWORK BRACING SYSTEM



DETAIL "A"

NOTES:

EACH #5 TIE BAR SHALL BE WELDED TO ONE STIRRUP LOOP AS SHOWN IN DETAIL "A". #5 TIE BARS SHALL BE WELDED TO TWO ADJACENT STIRRUPS OF THE EXTERIOR GIRDER AND THE ADJACENT INTERIOR GIRDER BETWEEN PERMANENT DIAPHRAGMS. WELD STEEL PLATES IN BETWEEN THE TIE BARS AND THE STIRRUP LOOP. WELDING TWO TIE BARS TO THE SAME STIRRUP LOOP SHALL NOT BE PERMITTED.

MAXIMUM SPACING BETWEEN THE BRACING (TIE BARS-TIMBER STRUT) IS 9'-0" CTS. #5 TIE BARS SHALL BE LOCATED OVER A TIMBER STRUT.

INSTALL TIE BARS AND TIMBER STRUTS PRIOR TO PLACEMENT OF CONCRETE OR SCREED WEIGHT ONTO THE OVERHANG FALSEWORK.

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SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD OVERHANG  
 FALSEWORK**

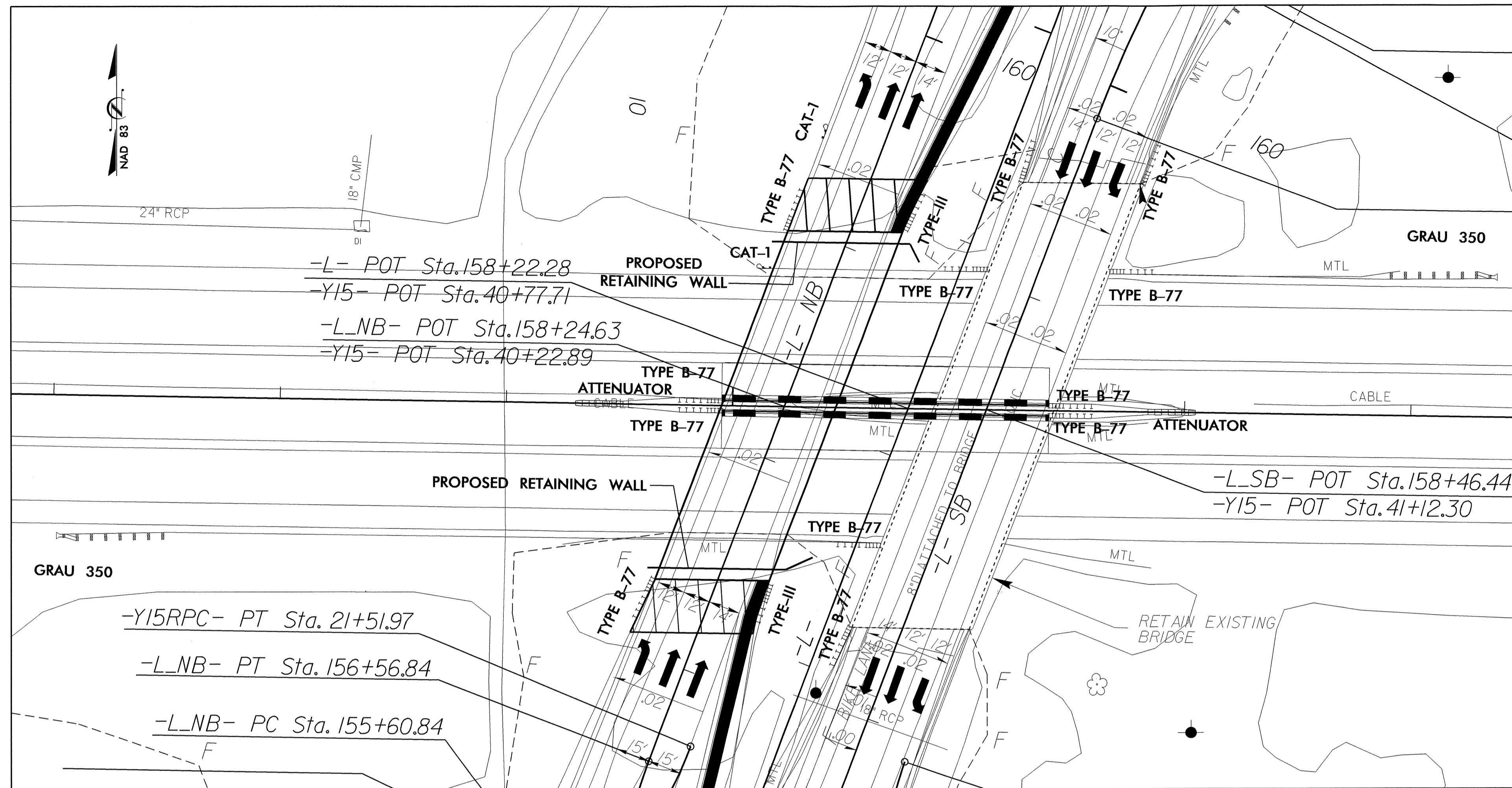
AASHTO TYPES  
 III, IV, V AND VI



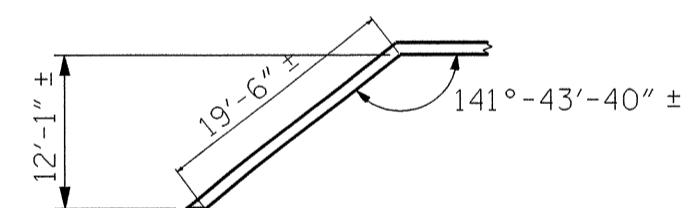
*Chang-Chuan Victor Chao*  
 5-12-2011

DRAWN BY: R. WRIGHT 06/04 DATE : \_\_\_\_\_  
 CHECKED BY: C. V. CHAO 06/04 DATE : \_\_\_\_\_

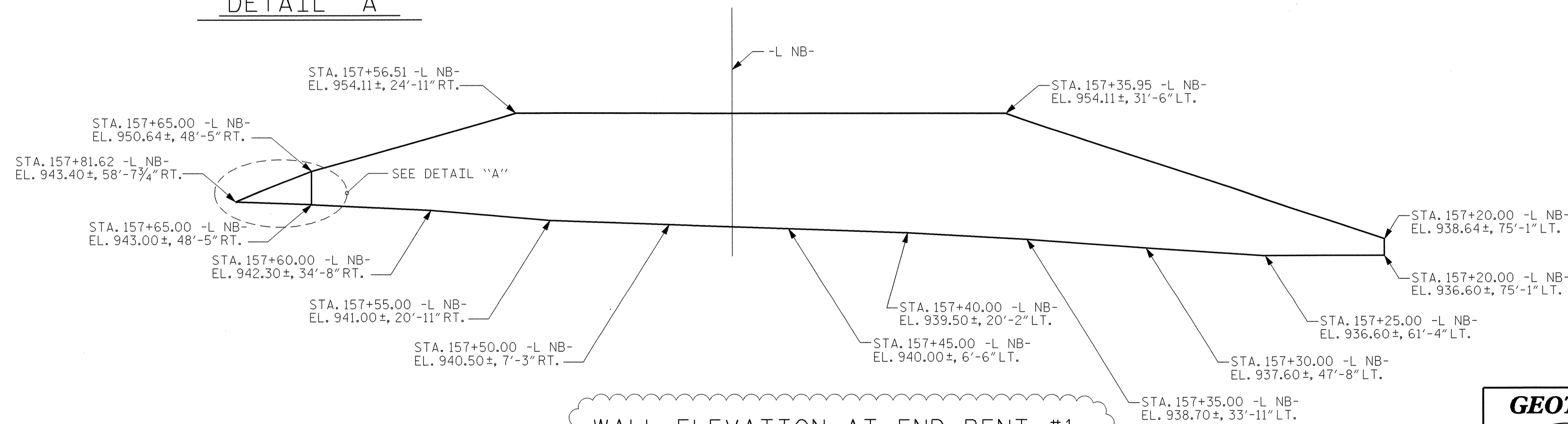
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-36
1			3			TOTAL SHEETS
2			4			36



LOCATION SKETCH



DETAIL "A"



WALL ELEVATION AT END BENT #1

(MSE RETAINING WALL #1)

LOOKING AT FRONT FACE RETAINING WALL

NOTE: THE WALL ENVELOPE IS STATIONED ALONG THE -L- ALIGNMENT; HOWEVER THE WALL IS LOCATED ALONG THE -Y- ALIGNMENT

WALL STATION	TOP ELEV.	EXISTING GROUND	DESIGN HEIGHT
-L-NB			
157+20.00	938.64	936.60	2.04
157+25.00	943.52	936.60	6.92
157+30.00	948.39	937.60	10.79
157+35.00	953.26	938.70	14.56
157+35.95	954.11	938.84	15.27
157+40.00	954.11	939.50	14.61
157+45.00	954.11	940.00	14.11
157+50.00	954.11	940.50	13.61
157+55.00	954.11	941.00	13.11
157+56.51	954.11	941.38	12.73
157+60.00	952.67	942.30	10.37
157+65.00	950.64	943.00	7.64
157+81.62	943.40	943.40	0.00

END BENT 1

TOTAL STRUCTURE QUANTITIES

MSE RETAINING WALLS	
END BENT 1	SO. FT. 1375
END BENT 2	SO. FT. 1170

PROJECT NO.: U-4909  
 FORSYTH COUNTY  
 STATION: 158+24.63 -L-NB = 40+22.89-Y15-  
 SHEET 1 OF 4

**GEOTECHNICAL ENGINEERING UNIT**  
 EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE  
**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**RALEIGH**

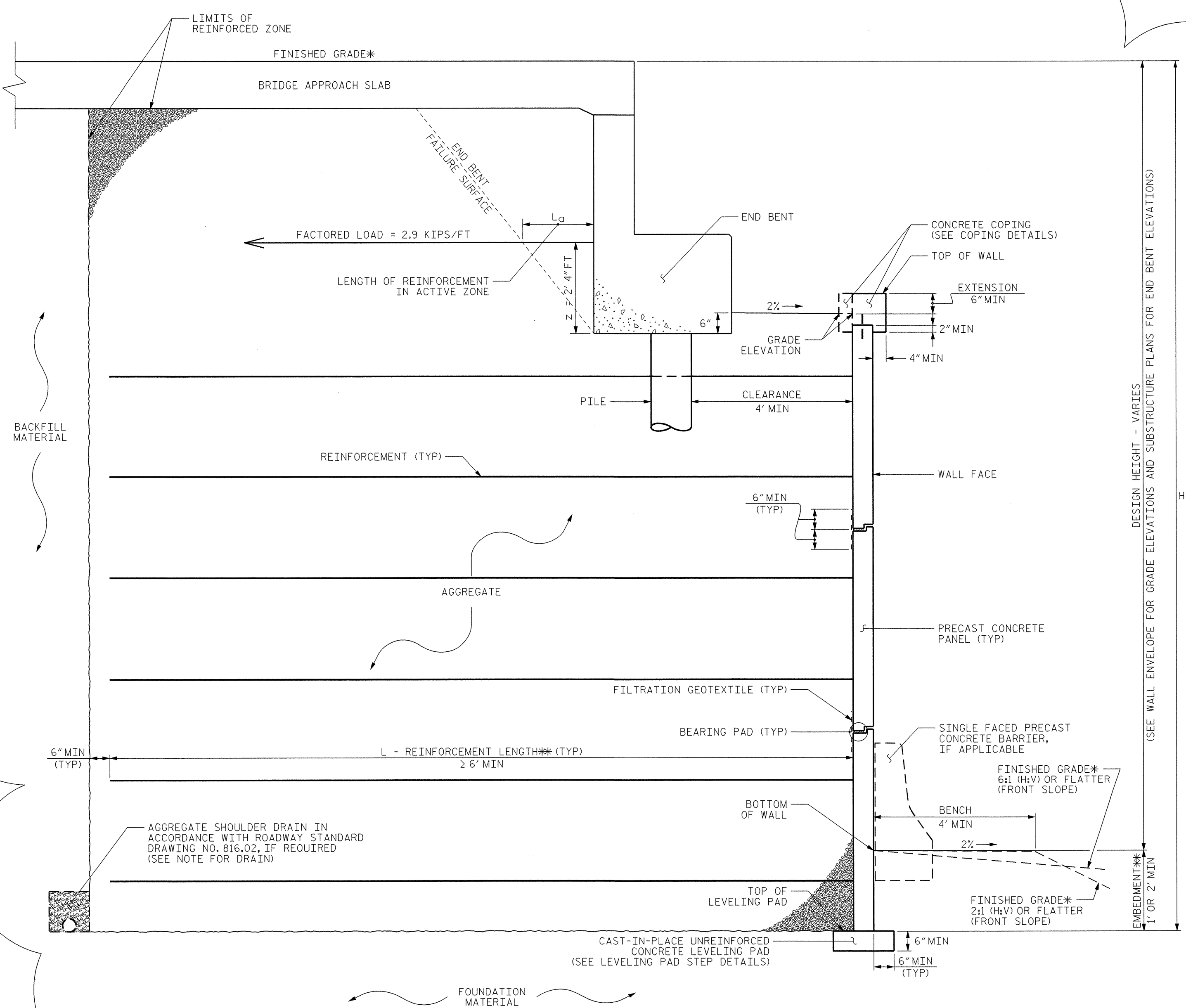
MSE RETAINING WALLS

REVISIONS

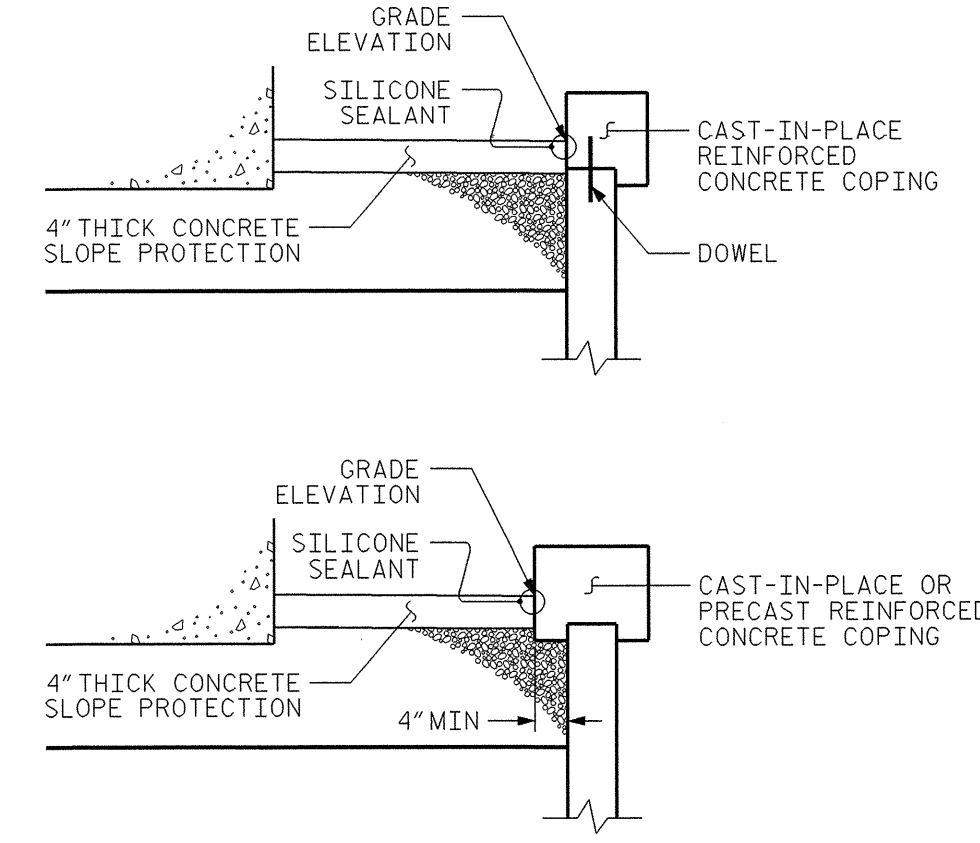
NO.	BY	DATE	NO.	BY	DATE	SHEET NO.
1	SCC	12/5/2011	3			W-1
2			4			8



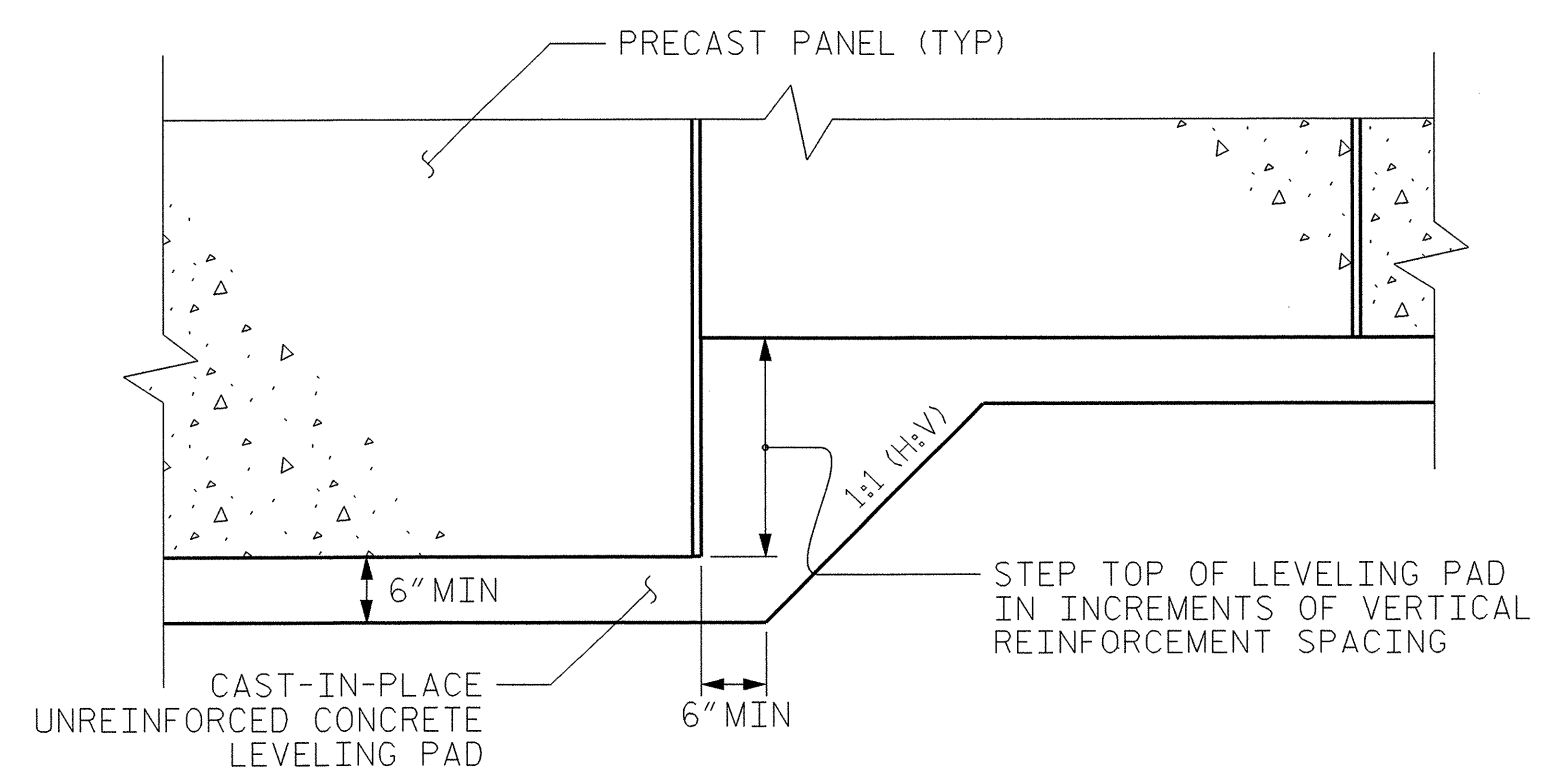




**MSE ABUTMENT WALL WITH PRECAST PANELS - TYPICAL SECTION AT END BENT**  
 \*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
 \*\*SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



**COPING DETAILS**  
 AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.



**PRECAST CONCRETE PANELS**  
**LEVELING PAD STEP DETAILS**

1

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**STATION:** 158+24.63-L- = 40+22.89-Y15-  
 SHEET 3 OF 4

**GEOTECHNICAL ENGINEERING UNIT**  
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**RALEIGH**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1	SCC	12/5/2011	3			W-3
2			4			8

PREPARED BY: EJS	DATE: 5/2011
REVIEWED BY: SCC	DATE: 10/2011

**NOTES:**

FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.

FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

USE AN MSE WALL SYSTEM WITH PRECAST CONCRETE PANELS FOR RETAINING WALLS AT END BENT 1 AND 2.

CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALLS AT END BENT 1 AND 2.

AN ASHLAR ARCHITECTURAL FINISH IS REQUIRED FOR FRONT FACES OF PRECAST CONCRETE PANELS FOR RETAINING WALLS AT END BENT 1 AND 2.

A DRAIN IS NOT REQUIRED FOR RETAINING WALLS AT END BENT 1 AND 2.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS AT END BENTS 1 AND 2, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALLS AT END BENTS 1 AND 2 FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 5250 LB/SF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = THE GREATER OF 0.85 \* H OR 6 FT
- 5) MINIMUM EMBEDMENT ELEVATION = 2 FT
- 6) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (gamma) LB/CF	FRICTION ANGLE (phi) DEGREES (C)	COHESION LB/SF
COARSE	110	38	0
FINE	125	34	0

\*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (gamma) LB/CF	FRICTION ANGLE (phi) DEGREES (C)	COHESION LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

DESIGN RETAINING WALLS AT END BENTS 1 AND 2 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

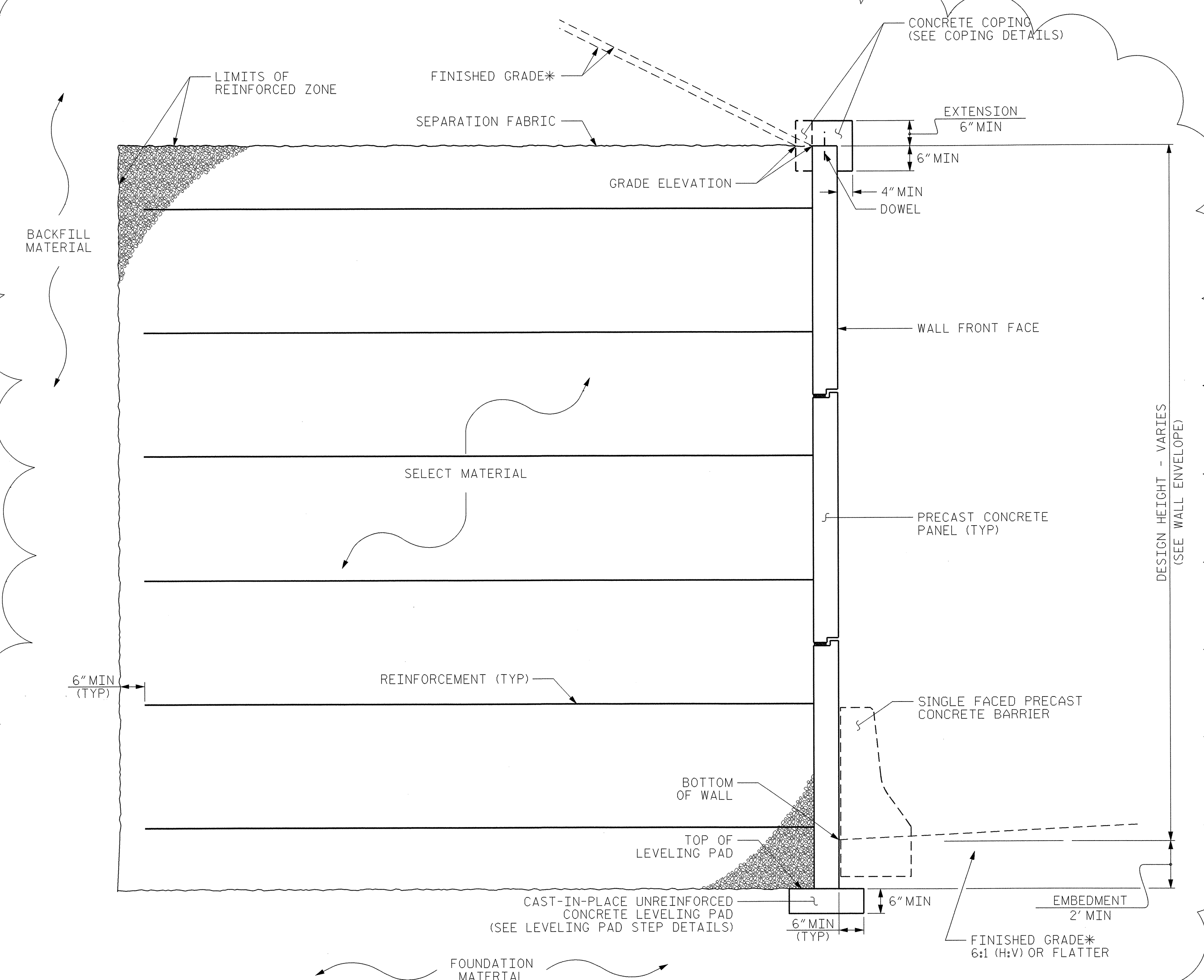
DESIGN REINFORCEMENT CONNECTED TO END BENT CAPS FOR FACTORED LOAD AND LENGTH OF REINFORCEMENT IN ACTIVE (L<sub>a</sub>) SHOWN. CAST REINFORCEMENT CONNECTORS INTO CAP BACKWALL FOR END BENT NO. 1 AND 2. MAINTAIN A CLEARANCE OF AT LEAST 3" BETWEEN CONNECTORS AND REINFORCING STEEL IN CAP.

FOUNDATIONS FOR END BENT NO. 1 AND 2 WILL INTERFERE WITH REINFORCEMENT FOR RETAINING WALLS AT END BENTS 1 AND 2. SEE "FOUNDATION LAYOUT" SHEET FOR FOUNDATION LOCATIONS.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALLS AT END BENTS 1 AND 2 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

\*TEMPORARY SHORING\* (IS OR MAY BE) REQUIRED FOR RETAINING WALLS AT END BENT 1 AND 2 IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE (ROADWAY, STRUCTURE OR TRAFFIC CONTROL) PLANS.

AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT RETAINING WALLS AT END BENT 1 AND 2. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.



**MSE WALL WITH PRECAST PANELS - TYPICAL SECTION BEYOND END BENT**

\*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
\*SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT REQUIREMENTS.

**PROJECT NO.:** U-4909  
**FORSYTH COUNTY**  
**STATION:** 158+24.63-L- = 40+22.89-Y15-  
 SHEET 4 OF 4

PREPARED BY: EJS DATE: 5/2011  
 REVIEWED BY: SCC DATE: 10/2011

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**DEPARTMENT OF TRANSPORTATION**  
**RALEIGH**

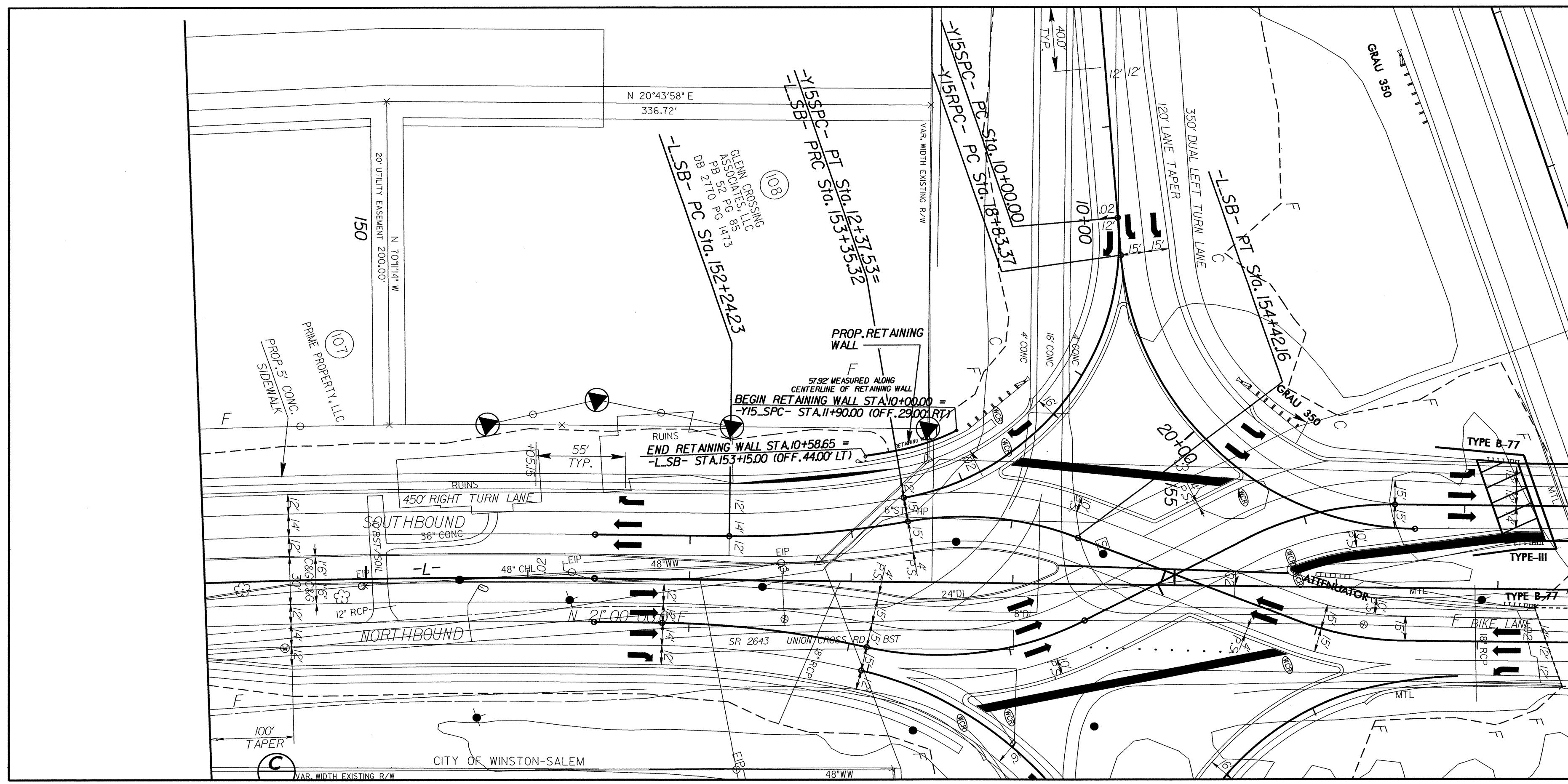
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NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1	SCC	12/5/2011	3			W-4
2			4			B

GEOTECHNICAL ENGINEER

ENGINEER

**NORTH CAROLINA PROFESSIONAL SEAL**  
 SEAL 029889  
 ENGINEER  
 SHANE C. CLARE

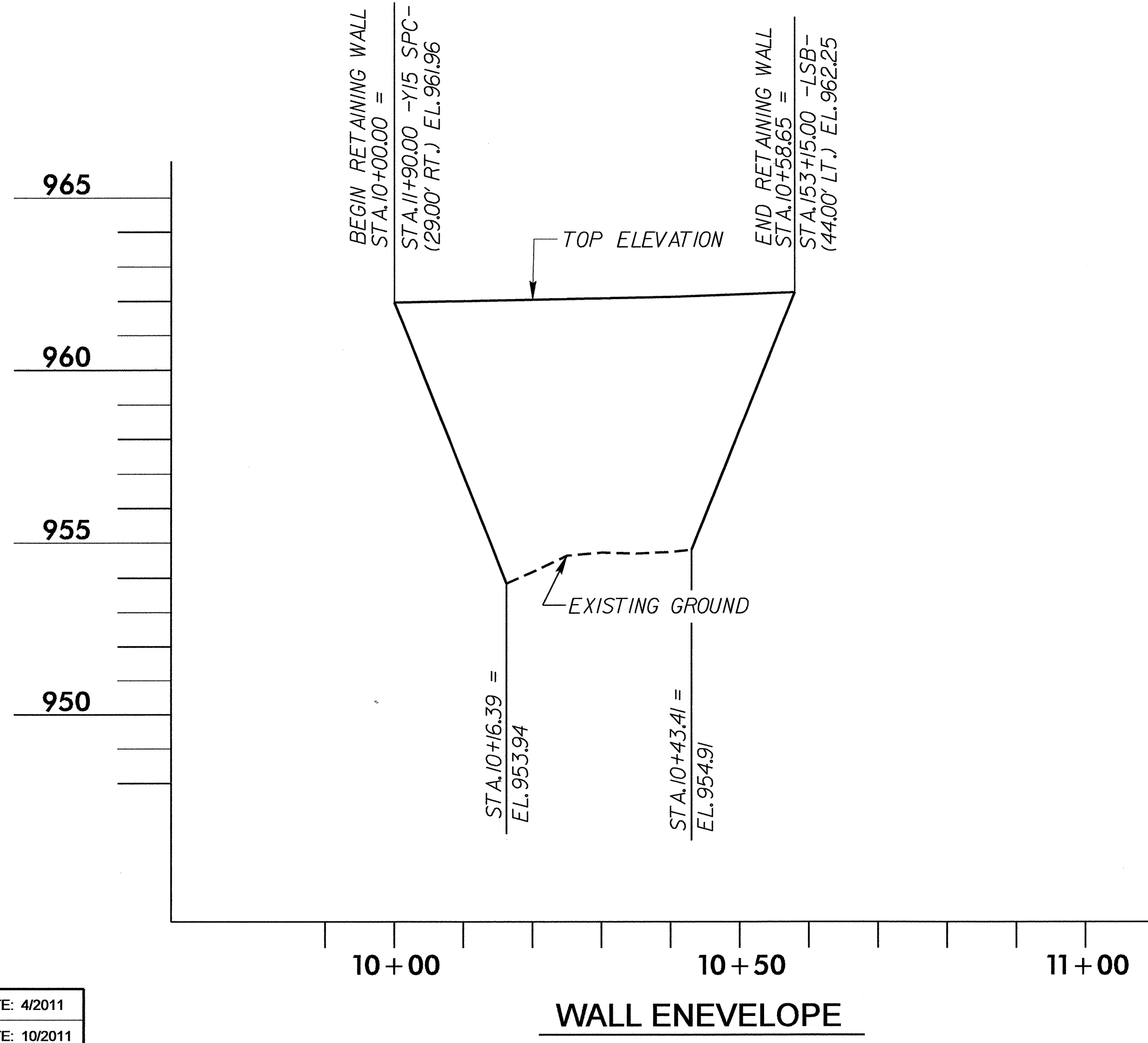
Signature: *Shane C. Clare* DATE: 10/20/11



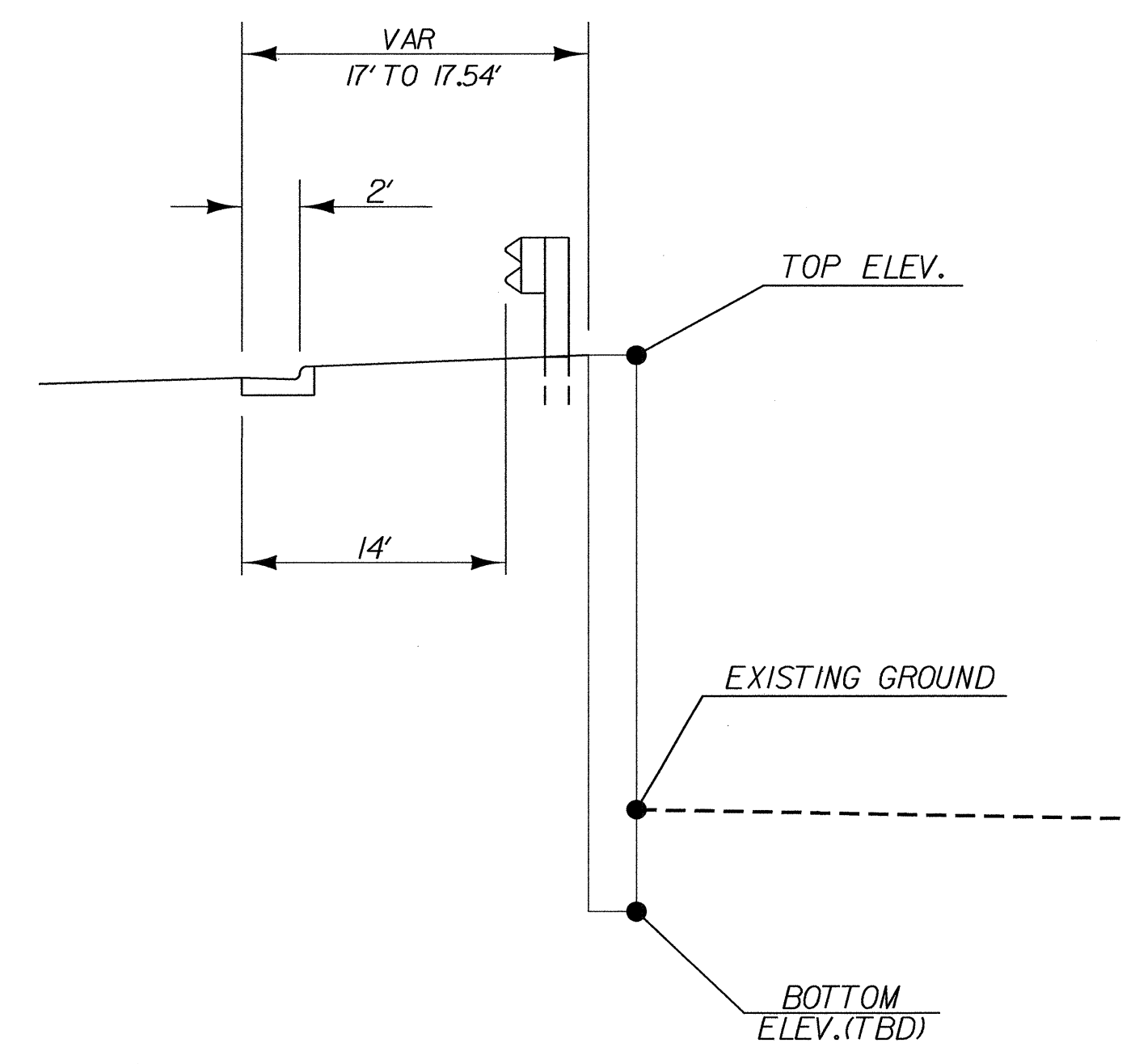
**TOTAL STRUCTURE QUANTITIES**

MSE RETAINING WALL	SQ.FT. 332
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**LOCATION SKETCH**



WALL STATION	TOP ELEV.	EXISTING GROUND	DESIGN HEIGHT
10+00	961.96	952.40	9.56
10+10	962.00	953.33	8.67
10+16.39	962.13	953.94	8.19
10+20	962.04	954.17	7.87
10+30	962.08	954.73	7.35
10+40	962.12	954.74	7.38
10+43.41	962.25	954.91	7.34
10+50	962.19	954.94	7.25
10+58.65	962.25	954.73	7.52



**PROJECT NO.: U-4909**  
**FORSYTH COUNTY**  
**STATION: 11+90.00 -Y15- SPC TO 153+15.00 -L- SB**  
 SHEET 1 OF 4

**GEOTECHNICAL ENGINEERING UNIT**

EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE

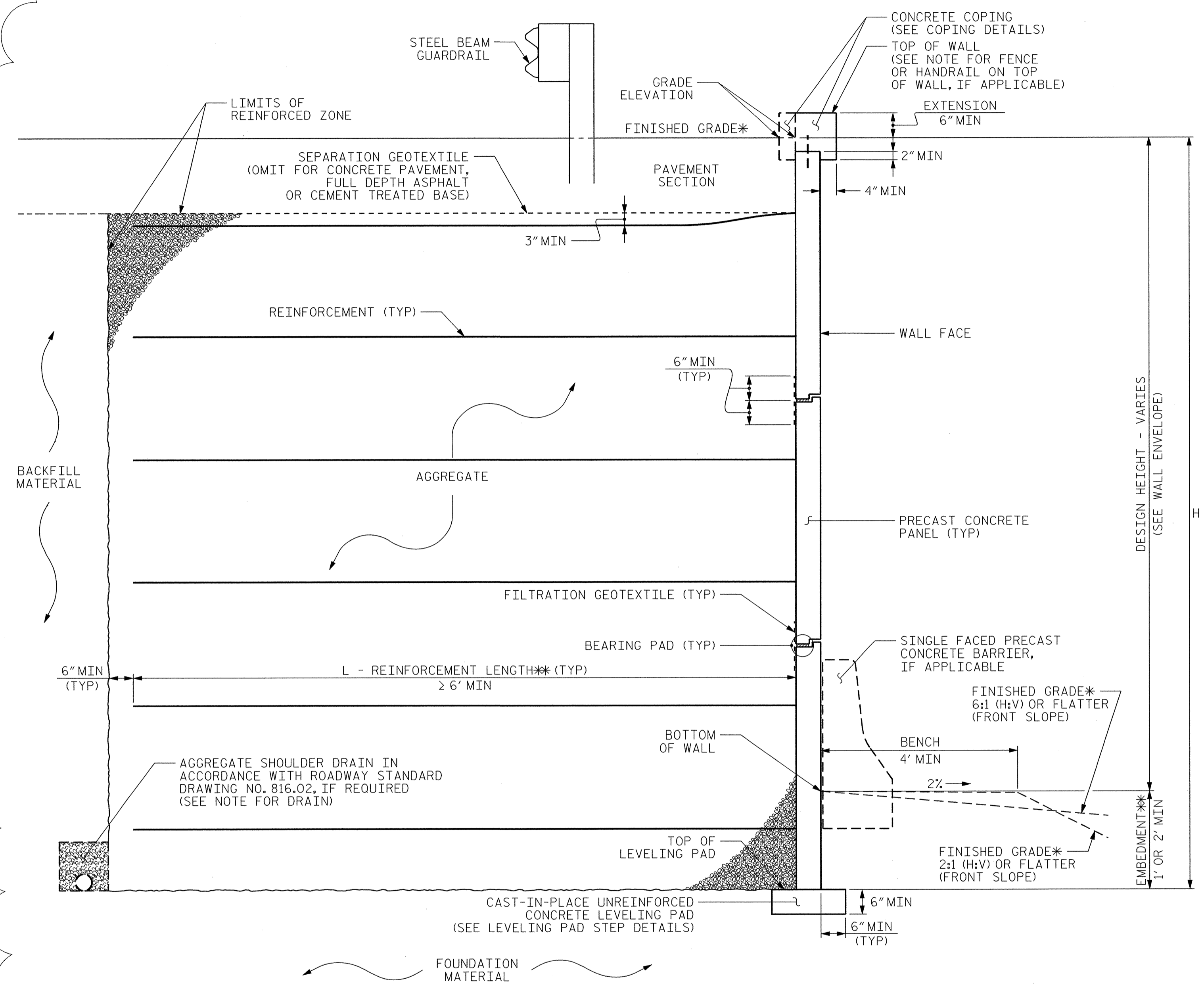
**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**RALEIGH**

**MSE RETAINING WALL ALONG INTERCHANGE RAMP**

REVISIONS						SHEET NO. W-5
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS 8
2			4			

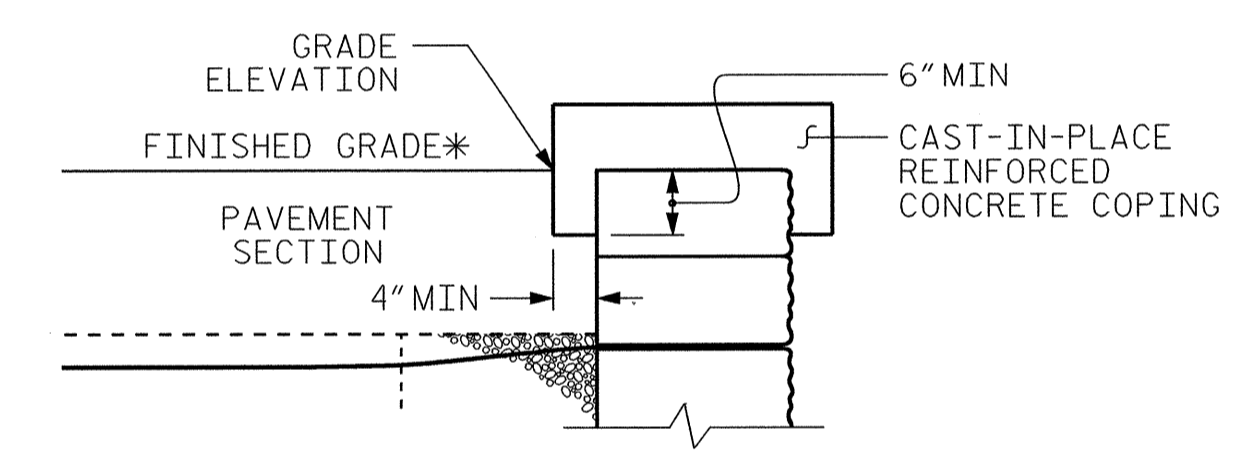
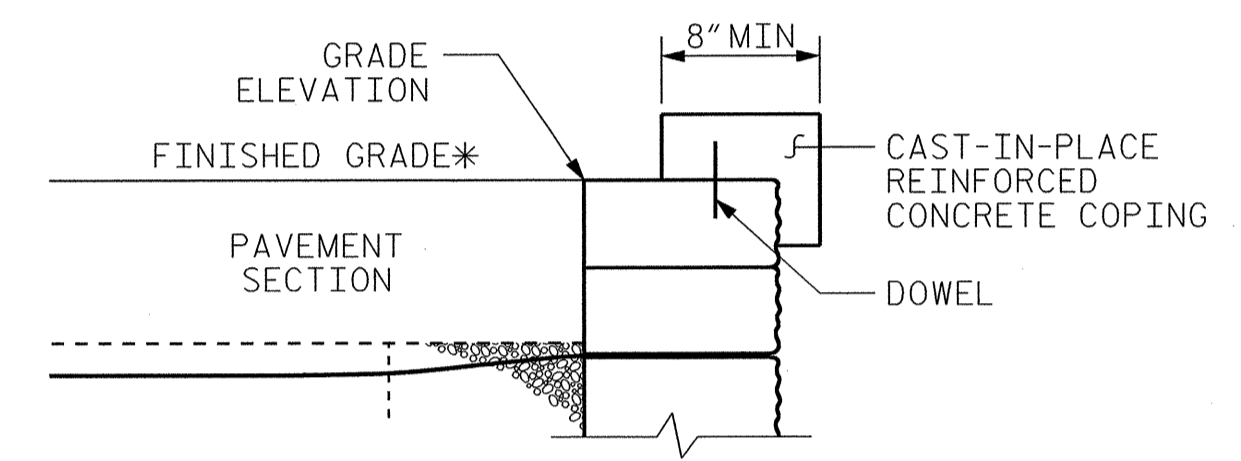
PREPARED BY: EJS DATE: 4/2011  
 REVIEWED BY: SCC DATE: 10/2011





**MSE WALL WITH PRECAST PANELS - TYPICAL SECTION**

\*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.  
 \*\*SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



**COPING DETAILS**

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO SRW UNITS WITH DOWELS OR EXTEND COPING DOWN BACK OF SRW UNITS.  
 \*SEE ROADWAY PLANS FOR FINISHED GRADE DETAILS.

1

**PROJECT NO.:** U-4909  
**FORSYTH COUNTY**  
**STATION:** 11+90.00 -Y15- SPC TO 153+15.00 -L- SB  
 SHEET 3 OF 4 12+20.85 -Y15- SPD TO 10+90.99 -L- SB

**GEOTECHNICAL ENGINEERING UNIT**  
 EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE  
**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**RALEIGH**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1	SCC	12/13/11	3			W-7
2			4			B

GEOTECHNICAL  
ENGINEER

ENGINEER



SCC  
SIGNATURE

11/11/2011  
DATE

SIGNATURE DATE

**NOTES:**

FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.

FOR STEEL BEAM GUARDRAIL, SEE ROADWAY PLANS AND SECTION 862 OF THE STANDARD SPECIFICATIONS.

FOR SINGLE FACED PRECAST CONCRETE BARRIER, SEE ROADWAY PLANS AND SECTION 857 OF THE STANDARD SPECIFICATIONS.

USE AN MSE WALL SYSTEM WITH PRECAST CONCRETE PANELS FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP.

CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP.

AN ASHLAR ARCHITECTURAL FINISH IS REQUIRED FOR FRONT FACES OF PRECAST CONCRETE PANELS FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP.

A DRAIN IS NOT REQUIRED FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP.

BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALLS AT END BENTS 1 AND 2, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.

DESIGN RETAINING WALLS ALONG THE INTERCHANGE RAMP FOR THE FOLLOWING:

- 1) H = DESIGN HEIGHT + EMBEDMENT
- 2) DESIGN LIFE = 100 YEARS
- 3) MAXIMUM FACTORED VERTICAL STRESS ON FOUNDATION MATERIAL = 2800 LB/SF
- 4) MINIMUM REINFORCEMENT LENGTH (L) = THE GREATER OF 0.85 \* H OR 6 FT
- 5) MINIMUM EMBEDMENT ELEVATION = 2 FT
- 6) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (gamma) LB/CF	FRICTION ANGLE (phi) DEGREES	COHESION (C) LB/SF
COARSE	110	38	0
FINE	125	34	0

\*SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

7) IN-SITU ASSUMED MATERIAL PARAMETERS:

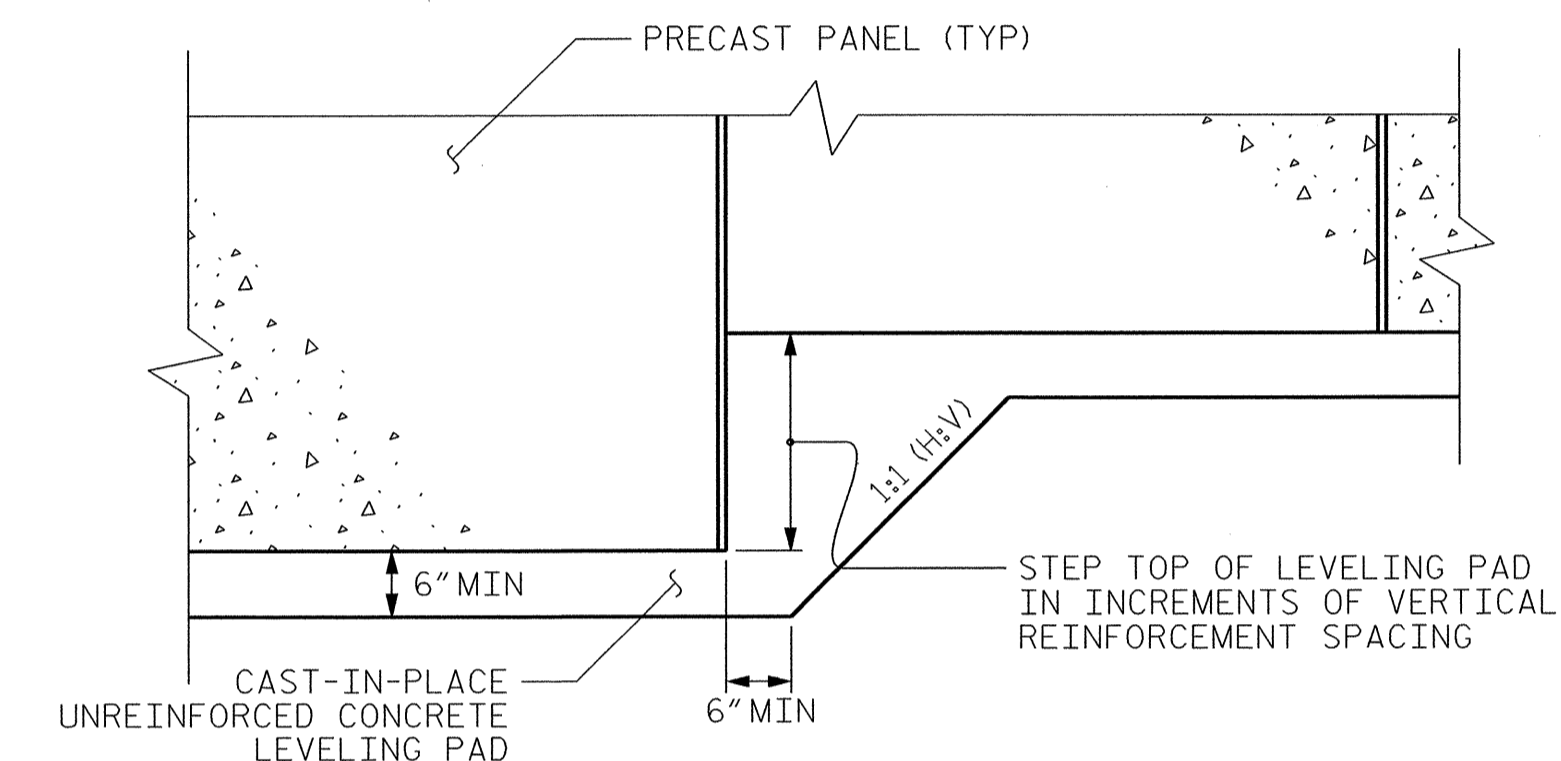
MATERIAL TYPE	UNIT WEIGHT (gamma) LB/CF	FRICTION ANGLE (phi) DEGREES	COHESION (C) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

DESIGN RETAINING WALLS ALONG THE INTERCHANGE RAMP FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

"TEMPORARY SHORING" MAY BE REQUIRED FOR RETAINING WALLS ALONG THE INTERCHANGE RAMP IN ACCORDANCE WITH THE TEMPORARY SHORING PROVISION. SEE (ROADWAY, STRUCTURE or TRAFFIC CONTROL) PLANS.

AT THE CONTRACTOR'S OPTION, "TEMPORARY SHORING FOR WALL CONSTRUCTION" MAY BE USED TO CONSTRUCT RETAINING WALLS ALONG THE INTERCHANGE RAMP. SEE MSE RETAINING WALLS PROVISION FOR TEMPORARY SHORING FOR WALL CONSTRUCTION.



PRECAST CONCRETE PANELS

LEVELING PAD STEP DETAILS

1

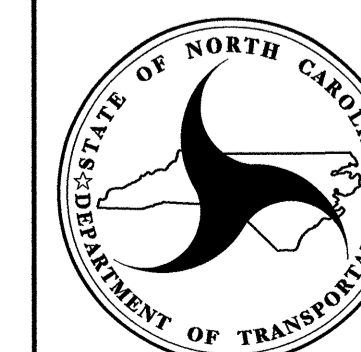
PROJECT NO.: U-4909

FORSYTH COUNTY

STATION: 11+90.00 -Y15- SPC TO 153+15.00 -L- SB

SHEET 4 OF 4 12+20.85 -Y15- SPD TO 10+90.99 -L- SB

**GEOTECHNICAL ENGINEERING UNIT**



- EASTERN REGIONAL OFFICE
- WESTERN REGIONAL OFFICE
- CONTRACT OFFICE

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**MSE RETAINING WALL  
ALONG INTERCHANGE RAMP**

REVISIONS

NO.	BY	DATE	NO.	BY	DATE
1	SCC	12/13/11	3	-	-
2	-	-	4	-	-

SHEET NO.

W-8

TOTAL SHEETS

8

PREPARED BY: EJS	DATE: 4/2011
REVIEWED BY: SCC	DATE: 10/2011

## STANDARD NOTES

### DESIGN DATA:

SPECIFICATIONS	-----	A.A.S.H.T.O. (CURRENT)
LIVE LOAD	-----	SEE PLANS
IMPACT ALLOWANCE	-----	SEE A.A.S.H.T.O.
STRESS IN EXTREME FIBER OF		
STRUCTURAL STEEL - AASHTO M270 GRADE 36	-	20,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50W	-	27,000 LBS. PER SQ. IN.
- AASHTO M270 GRADE 50	-	27,000 LBS. PER SQ. IN.
REINFORCING STEEL IN TENSION		
GRADE 60	--	24,000 LBS. PER SQ. IN.
CONCRETE IN COMPRESSION	-----	1,200 LBS. PER SQ. IN.
CONCRETE IN SHEAR	-----	SEE A.A.S.H.T.O.
STRUCTURAL TIMBER - TREATED OR		
UNTREATED - EXTREME FIBER STRESS	-----	1,800 LBS. PER SQ. IN.
COMPRESSION PERPENDICULAR TO GRAIN	-----	375 LBS. PER SQ. IN.
OF TIMBER	-----	
EQUIVALENT FLUID PRESSURE OF EARTH	-----	30 LBS. PER CU. FT.
		(MINIMUM)

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2006 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N. C. DEPARTMENT OF TRANSPORTATION.

STEEL SHEET PILING FOR PERMANENT OR TEMPORARY APPLICATIONS SHALL BE HOT ROLLED.

### CONCRETE:

UNLESS OTHERWISE REQUIRED ON PLANS, CLASS A CONCRETE SHALL BE USED FOR ALL PORTIONS OF ALL STRUCTURES WITH THE EXCEPTION THAT: CLASS AA CONCRETE SHALL BE USED IN BRIDGE SUPERSTRUCTURES, ABUTMENT BACKWALLS, AND APPROACH SLABS; AND CLASS B CONCRETE SHALL BE USED FOR SLOPE PROTECTION AND RIP RAP.

### CONCRETE CHAMFERS:

UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED CORNERS ON STRUCTURES SHALL BE CHAMFERED 3/4" WITH THE FOLLOWING EXCEPTIONS: TOP CORNERS OF CURBS MAY BE ROUNDED TO 1-1/2" RADIUS WHICH IS BUILT INTO CURB FORMS; CORNERS OF TRANSVERSE FLOOR EXPANSION JOINTS SHALL BE ROUNDED WITH A 1/4" FINISHING TOOL UNLESS OTHERWISE REQUIRED ON PLANS; AND CORNERS OF EXPANSION JOINTS IN THE ROADWAY FACES AND TOPS OF CURBS AND SIDEWALKS SHALL BE ROUNDED TO A 1/4" RADIUS WITH A FINISHING STONE OR TOOL UNLESS OTHERWISE REQUIRED ON PLANS.

### DOWELS:

DOWELS WHEN INDICATED ON PLANS AS FOR CULVERT EXTENSIONS, SHALL BE EMBEDDED AT LEAST 12" INTO THE OLD CONCRETE AND GROUTED INTO PLACE WITH 1:2 CEMENT MORTAR.

### ALLOWANCE FOR DEAD LOAD DEFLECTION, SETTLEMENT, ETC. IN CASTING SUPERSTRUCTURES:

BRIDGES SHALL BE BUILT ON THE GRADE OR VERTICAL CURVE SHOWN ON PLANS. SLABS, CURBS AND PARAPETS SHALL CONFORM TO THE GRADE OR CURVE. ALL DIMENSIONS WHICH ARE GIVEN IN SECTION AND ARE AFFECTED BY DEAD LOAD DEFLECTIONS ARE DIMENSIONS AT CENTER LINE OF BEARING UNLESS OTHERWISE NOTED ON PLANS. IN SETTING FORMS FOR STEEL BEAM BRIDGES AND PRESTRESSED CONCRETE GIRDER BRIDGES, ADJUSTMENTS SHALL BE MADE DUE TO THE DEAD LOAD DEFLECTIONS FOR THE ELEVATIONS SHOWN. WHERE BLOCKS ARE SHOWN OVER BEAMS FOR BUILDING UP TO THE SLAB, THE VERTICAL DIMENSIONS OF THE BLOCKS SHALL BE ADJUSTED BETWEEN BEARINGS TO COMPENSATE FOR DEAD LOAD DEFLECTIONS, VERTICAL CURVE ORDNATE, AND ACTUAL BEAM CAMBER. WHERE BOTTOM OF SLAB IS IN LINE WITH BOTTOM OF TOP FLANGES, DEPTH OF SLAB BETWEEN BEARINGS SHALL BE ADJUSTED TO COMPENSATE FOR DEAD LOAD DEFLECTION, VERTICAL CURVE ORDNATE, AND ACTUAL BEAM CAMBER.

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER. DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

ALL REINFORCING STEEL SHALL BE DEFORMED. DIMENSIONS RELATIVE TO PLACEMENT OF REINFORCING ARE TO CENTERS OF BARS UNLESS OTHERWISE INDICATED IN THE PLANS. DIMENSIONS ON BAR DETAILS ARE TO CENTERS OF BARS OR ARE OUT TO OUT AS INDICATED ON PLANS.

WIRE BAR SUPPORTS SHALL BE PROVIDED FOR REINFORCING STEEL WHERE INDICATED ON THE PLANS. WHEN BAR SUPPORT PIECES ARE PLACED IN CONTINUOUS LINES, THEY SHALL BE SO PLACED THAT THE ENDS OF THE SUPPORTING WIRES SHALL BE LAPPED TO LOCK LEGS ON ADJOINING PIECES.

### STRUCTURAL STEEL:

AT THE CONTRACTOR'S OPTION, HE MAY SUBSTITUTE 7/8" Ø SHEAR STUDS FOR THE 3/4" Ø STUDS SPECIFIED ON THE PLANS. THIS SUBSTITUTION SHALL BE MADE AT THE RATE OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS, AND STUD SPACING CHANGES SHALL BE MADE AS NECESSARY TO PROVIDE THE SAME EQUIVALENT NUMBER OF 7/8" Ø STUDS ALONG THE BEAM AS SHOWN FOR 3/4" Ø STUDS BASED ON THE RATIO OF 3 - 7/8" Ø STUDS FOR 4 - 3/4" Ø STUDS. STUDS OF THE LENGTH SPECIFIED ON THE PLANS MUST BE PROVIDED. THE MAXIMUM SPACING SHALL BE 2'-0".

EXCEPT AT THE INTERIOR SUPPORTS OF CONTINUOUS BEAMS WHERE THE COVER PLATE IS IN CONTACT WITH BEARING PLATE, THE CONTRACTOR MAY, AT HIS OPTION, SUBSTITUTE FOR THE COVER PLATES DESIGNATED ON THE PLANS COVER PLATES OF THE EQUIVALENT AREA PROVIDED THESE PLATES ARE AT LEAST 5/16" IN THICKNESS AND DO NOT EXCEED A WIDTH EQUAL TO THE FLANGE WIDTH LESS 2" OR A THICKNESS EQUAL TO 2 TIMES THE FLANGE THICKNESS. THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT ANSI/AASHTO/AWS "BRIDGE WELDING CODE". ELECTROSLAG WELDING WILL NOT BE PERMITTED.

WITH THE SOLE EXCEPTION OF EDGES AT SURFACES WHICH BEAR ON OTHER SURFACES, ALL SHARP EDGES AND ENDS OF SHAPES AND PLATES SHALL BE SLIGHTLY ROUNDED BY SUITABLE MEANS TO A RADIUS OF APPROXIMATELY 1/16 INCH OR EQUIVALENT FLAT SURFACE AT A SUITABLE ANGLE PRIOR TO PAINTING, GALVANIZING, OR METALLIZING.

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB. METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINISHES AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

GENERALLY, IN CASE OF DISCREPANCY, THIS STANDARD SHEET OF NOTES SHALL GOVERN OVER THE SPECIFICATIONS, BUT THE REMAINDER OF THE PLANS SHALL GOVERN OVER NOTES HEREON, AND SPECIAL PROVISIONS SHALL GOVERN OVER ALL. SEE SPECIFICATIONS ARTICLE 105-4.

ENGLISH

JANUARY, 1990

STD. NO. SN