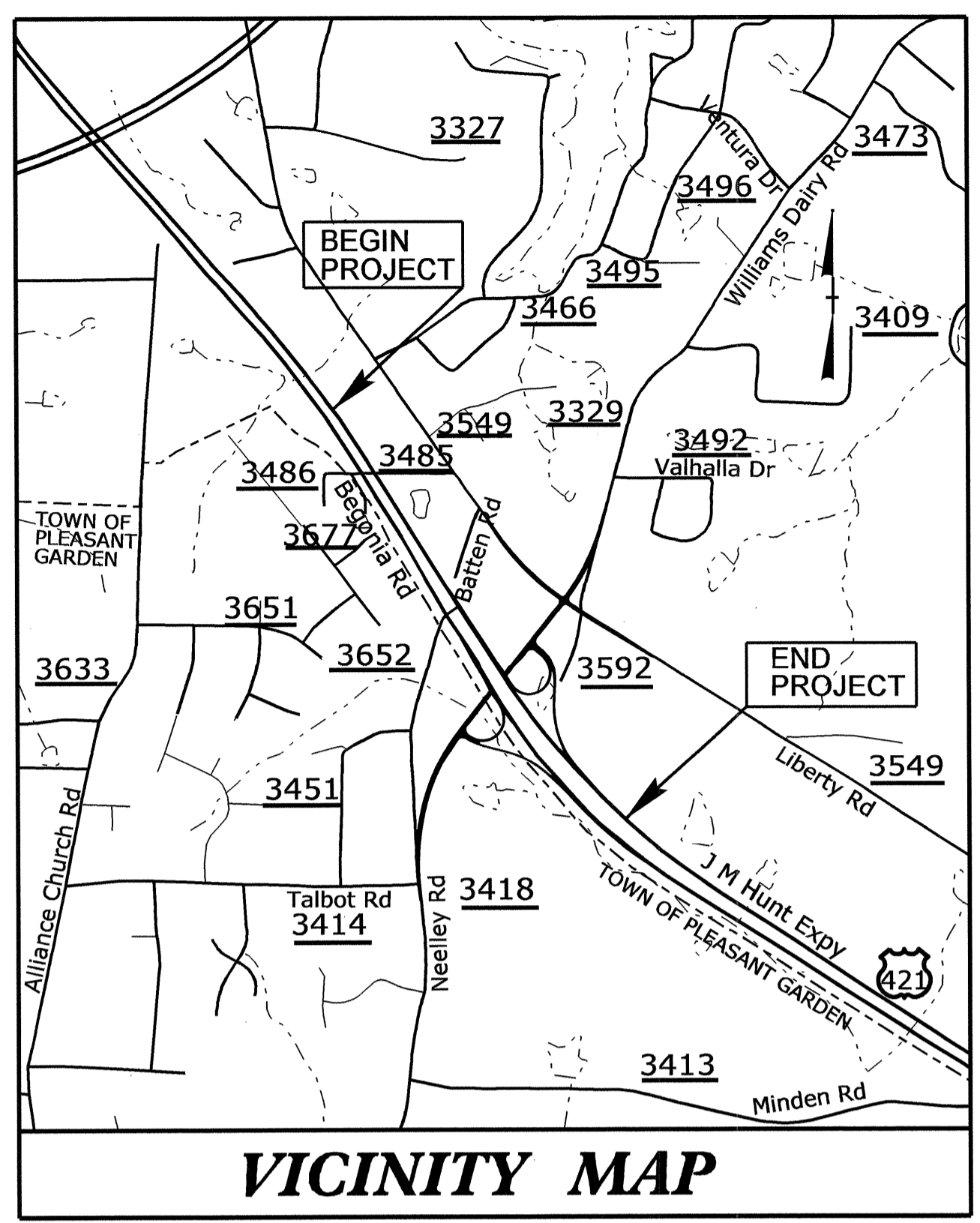


**CONTRACT: C203412 TIP PROJECT: R-2612B**

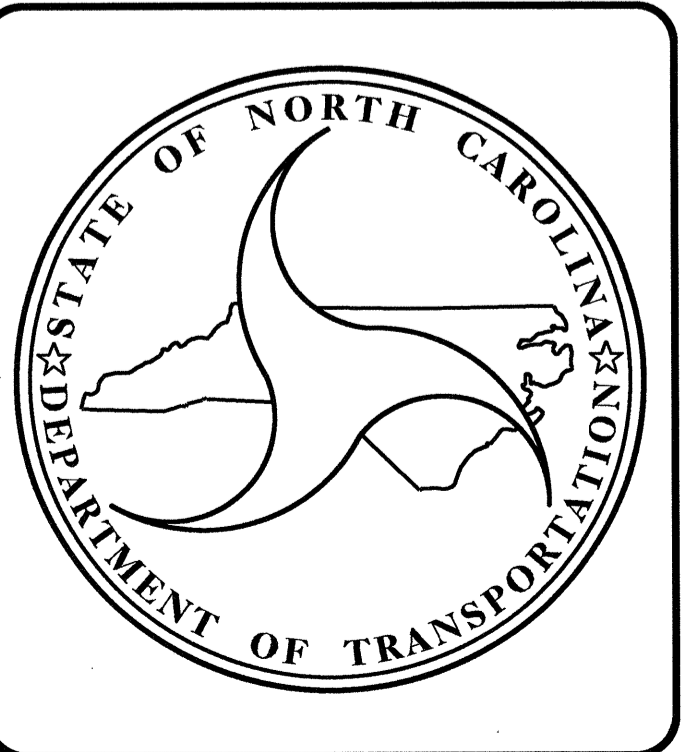
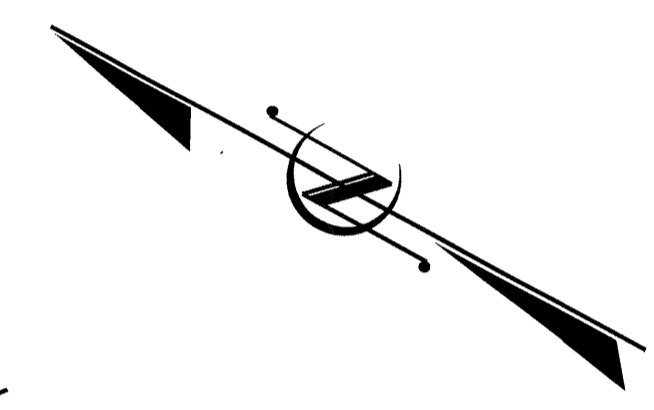
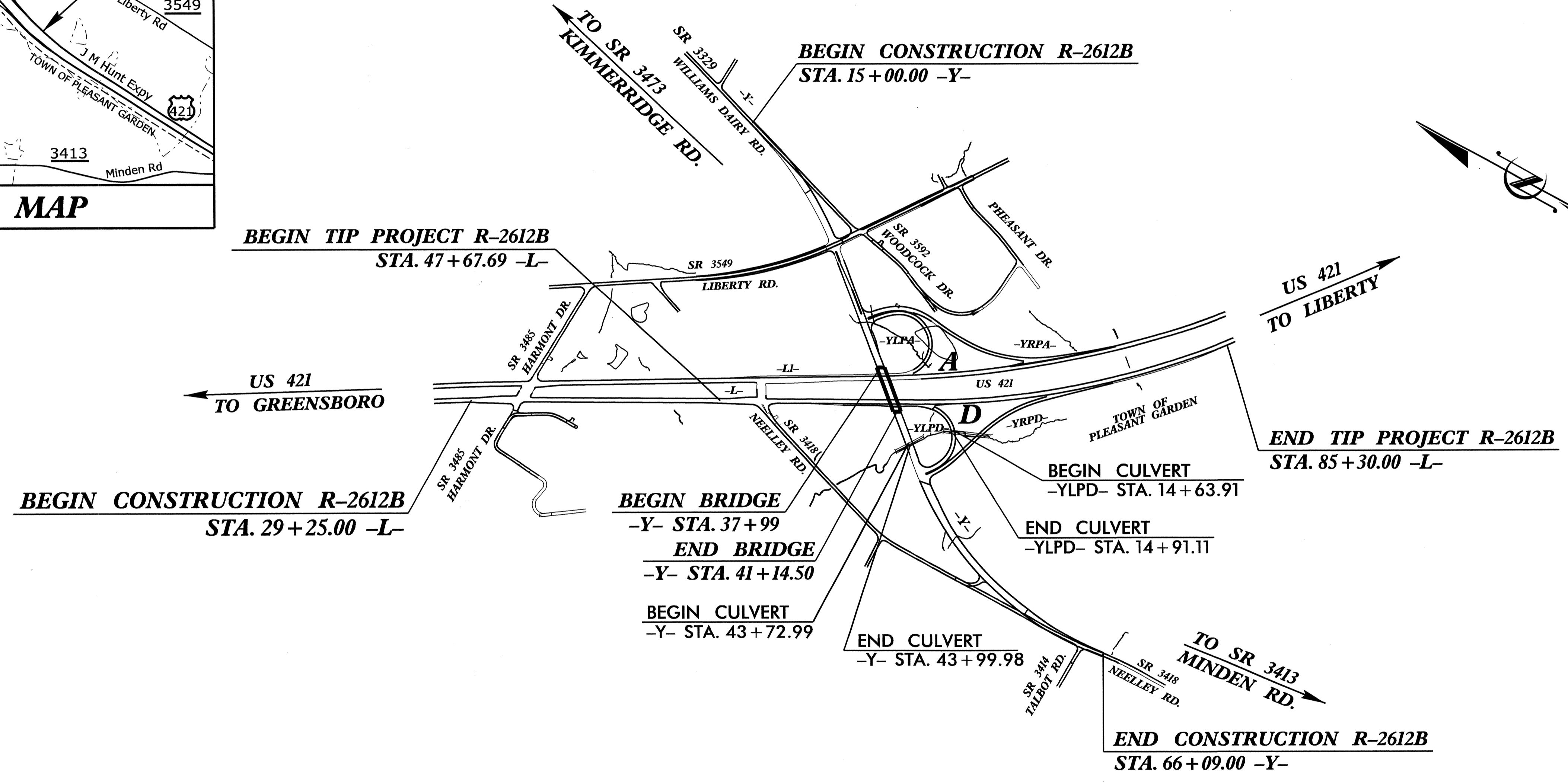
**STRUCTURES**



STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS  
**GUILFORD COUNTY**

**LOCATION: US 421 AT SR 3418 (NEELLEY ROAD) SOUTH OF GREENSBORO**  
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE, AND CULVERTS**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2612B		
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
34483.1.1	CMNHS-0421(52)	PE	
34483.2.3	CMNHS-0421(52)	RW/UTL	
34483.3.FR2	CMNH-0421(52)	CONST.	
	F		



**DESIGN DATA**

ADT 2014	= 34,070
ADT 2034	= 51,740
DHV	= 11 %
D	= 70 %
T	= 17 % *
V	= 70 MPH
* TTST	12% DUAL 5%
FUNC. CLASS	= FREEWAY STATEWIDE TIER

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT R-2612B	= 0.713 MI
TOTAL LENGTH TIP PROJECT R-2612B	= 0.713 MI

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

2012 STANDARD SPECIFICATIONS

LETTING DATE : JUNE 17, 2014

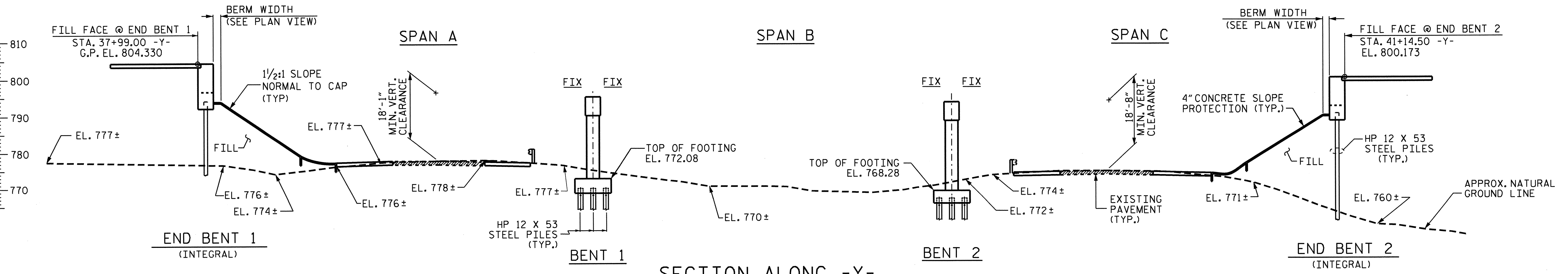
J. M. BAILEY, P.E.  
 PROJECT ENGINEER

T. H. FANG, P.E.  
 PROJECT DESIGN ENGINEER

37+50 38+00 38+50 39+00 39+50 40+00 40+50 41+00

+1.9831%  $\Delta$  -1.3176%  
 PI STA. 31+85.00  
 EL. 812.42  
 VC = 500'

GRADE DATA -Y-



SECTION AT END BENTS AND BENTS ARE TAKEN AT RIGHT ANGLES.

HORIZONTAL CURVE DATA

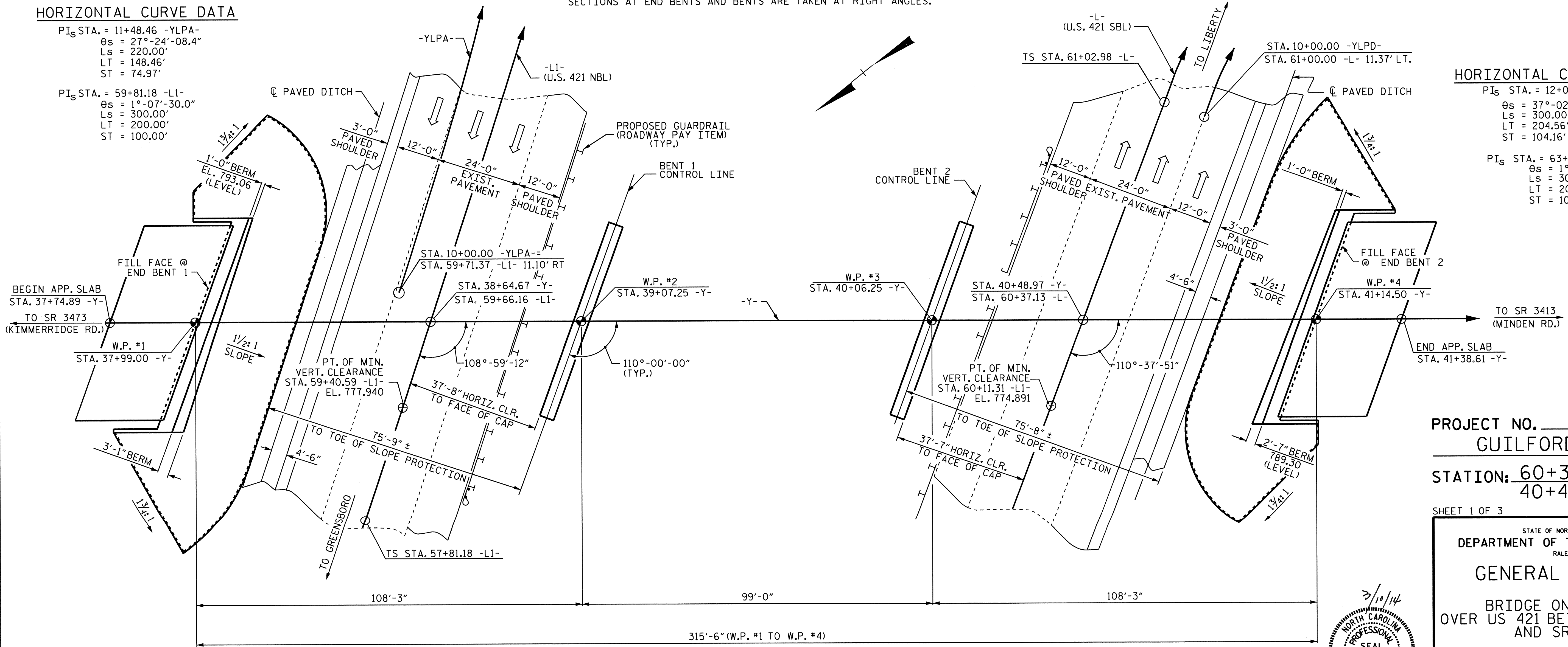
PIs STA. = 11+48.46 -YLPA-  
 $\theta_s = 27^\circ-24'-08.4''$   
 $L_s = 220.00'$   
 $LT = 148.46'$   
 $ST = 74.97'$

PIs STA. = 59+81.18 -L1-  
 $\theta_s = 1^\circ-07'-30.0''$   
 $L_s = 300.00'$   
 $LT = 200.00'$   
 $ST = 100.00'$

HORIZONTAL CURVE DATA

PIs STA. = 12+04.56 -YLPD-  
 $\theta_s = 37^\circ-02'-40.9''$   
 $L_s = 300.00'$   
 $LT = 204.56'$   
 $ST = 104.16'$

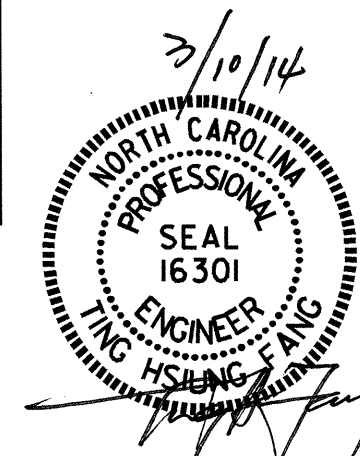
PIs STA. = 63+02.99 -L-  
 $\theta_s = 1^\circ-30'-00.0''$   
 $L_s = 300.00'$   
 $LT = 200.01'$   
 $ST = 100.01'$



PLAN  
 FOUNDATIONS NOT SHOWN FOR CLARITY

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-  
 40+48.97 -Y- =  
 SHEET 1 OF 3 BRIDGE #1121

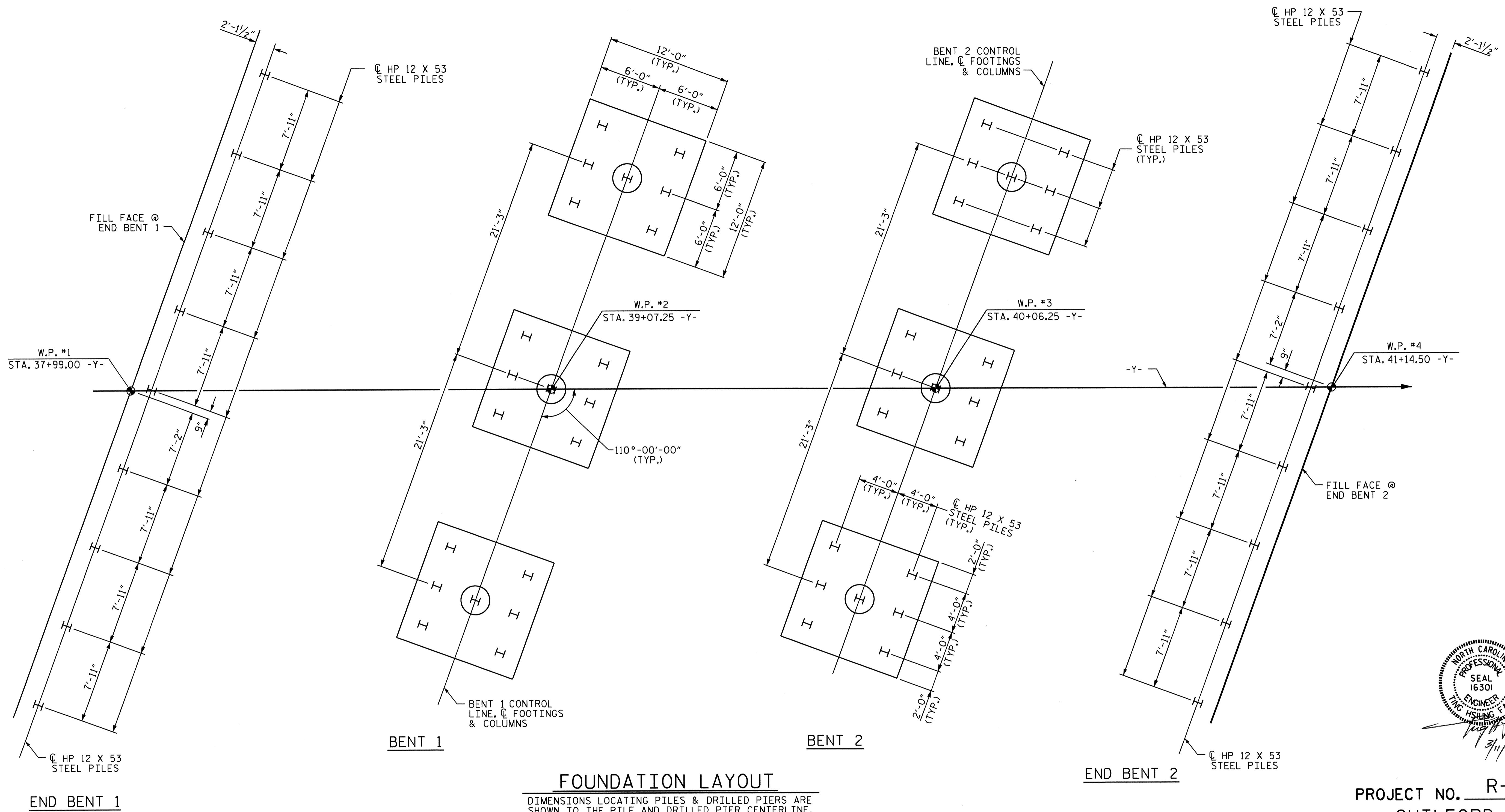
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 GENERAL DRAWING  
 BRIDGE ON SR 3418  
 OVER US 421 BETWEEN SR 3549  
 AND SR 3418



DRAWN BY : S. B. WILLIAMS DATE : 11-29-11  
 CHECKED BY : T. H. FANG DATE : 12-21-11  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 11-11

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

10-MAR-2014 13:28  
 \\dot\dfsroot\Proj\TIP\Projects-R\2612B\Structures\Plans\Final Plans\str \*1\2612b.sd.gdn  
 clyokley



### FOUNDATION LAYOUT

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

### NOTES

FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

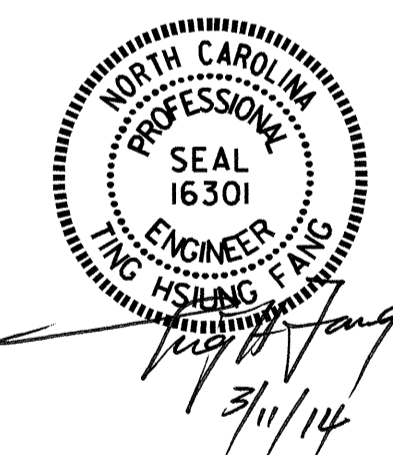
PILES AT END BENTS 1 AND 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 135 TONS PER PILE.

DRIVE PILES AT END BENT 1 AND END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 225 TONS PER PILE.

PILES AT BENT 1 AND BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 115 TONS PER PILE.

DRIVE PILES AT BENT 1 AND BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 195 TONS PER PILE.

STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT BENT 1 AND BENT 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.



PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
GENERAL DRAWING					
BRIDGE ON SR 3418 OVER US 421 BETWEEN SR 3549 AND SR 3418					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-2
					TOTAL SHEETS 38

DRAWN BY : T. KIRSCHBAUM DATE : 4-19-13  
 CHECKED BY : E. J. OMILE DATE : 5-13  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 5-13

TOTAL BILL OF MATERIAL

	FOUNDATION EXCAVATION FOR BENT	REINFORCED CONCRETE DECK SLAB	GROOVING BRIDGE FLOORS	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	72" PRESTRESSED CONCRETE GIRDERS		HP 12 X 53 STEEL PILES		STEEL PILE POINTS	TWO BAR METAL RAIL	1'-2" X 2'-6" CONCRETE PARAPET	4" SLOPE PROTECTION	ELASTOMERIC BEARINGS
								NO.	LIN. FT.	NO.	LIN. FT.					
	LUMP SUM	SQ. FT.	SQ. FT.	CU. YDS.	LUMP SUM	LBS.	LBS.	NO.	LIN. FT.	NO.	LIN. FT.	EACH	LIN. FT.	LIN. FT.	SQ. YDS.	LUMP SUM
SUPERSTRUCTURE		17,694	18,296					15	1,553.64				611.6	626.6		
END BENT 1				53.0		6,721				9	270				490	
BENT 1	LUMP SUM			131.3		14,729	1,454			21	315	21				
BENT 2	LUMP SUM			133.9		15,035	1,650			21	315	21				
END BENT 2				49.1		6,635				9	405				500	
TOTAL	LUMP SUM	17,694	18,296	367.3	LUMP SUM	43,120	3,104	15	1,553.64	60	1,305	42	611.6	626.6	990	LUMP SUM

NOTES

ASSUMED LIVE LOAD = HL 93 OR ALTERNATE LOADING.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.  
 FOR EROSION CONTROL MEASURES, SEE EROSION CONTROL PLANS.  
 THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.  
 THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.  
 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.

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

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

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

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

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

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

FOR PLACING LOAD ON STRUCTURE MEMBERS, SEE SPECIAL PROVISIONS.

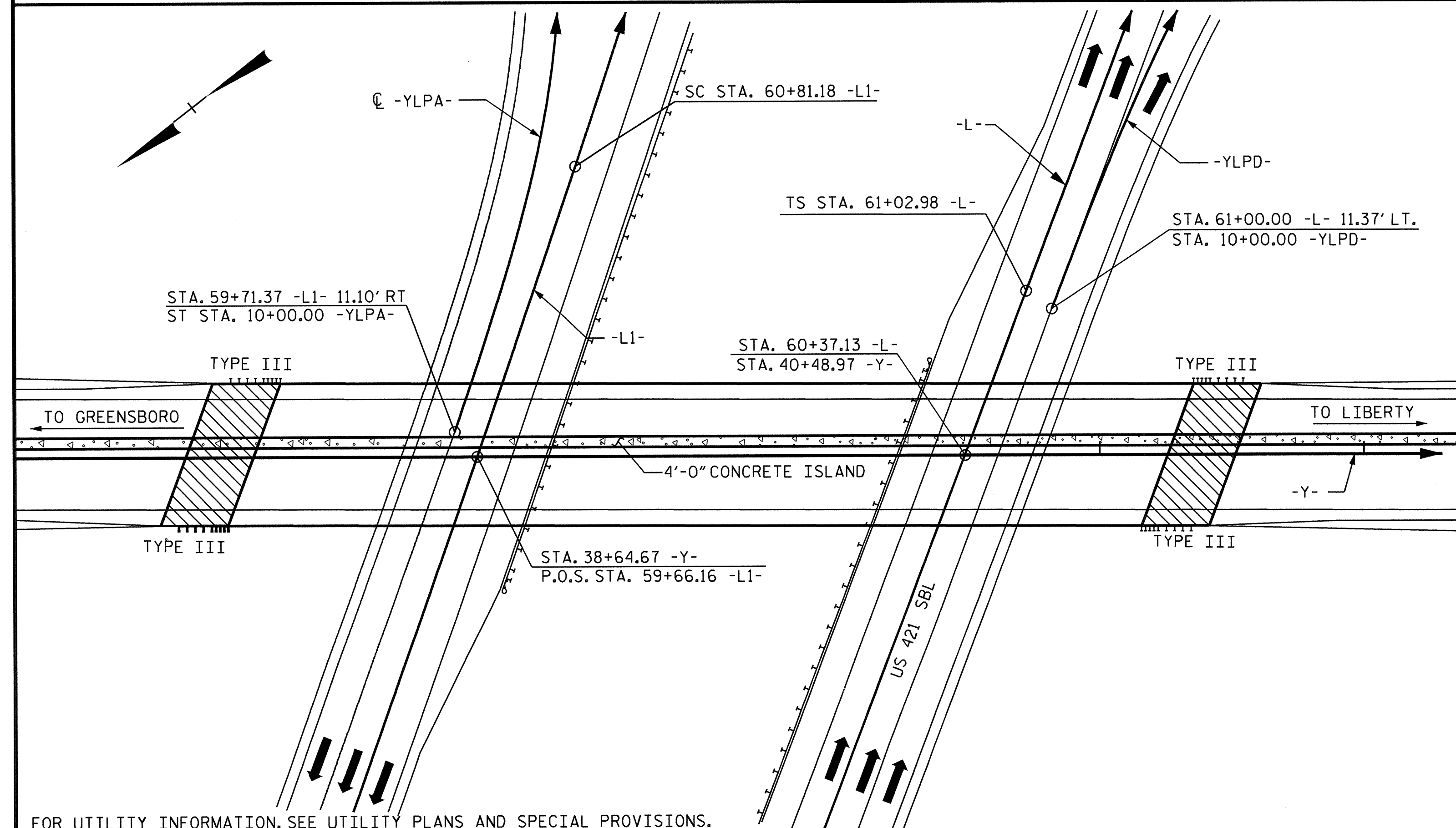
FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

BM #10 GARDEN RESET BRASS DISK IN CONC 23.21' LT. OF -Y- STA. 27+57.05 ELEV. 807.16'



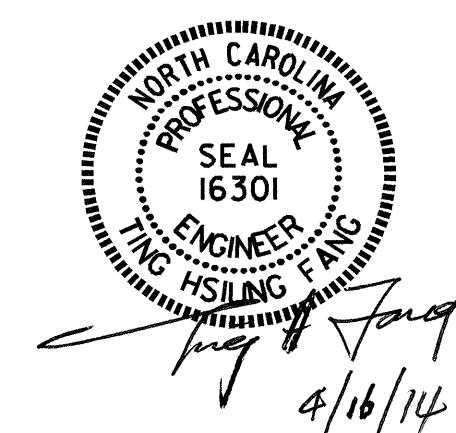
FOR UTILITY INFORMATION, SEE UTILITY PLANS AND SPECIAL PROVISIONS.

LOCATION SKETCH

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 GENERAL DRAWING  
 BRIDGE ON SR 3418  
 OVER US 421 BETWEEN SR 3549  
 AND SR 3418



DRAWN BY : S. B. WILLIAMS DATE : 11-29-11  
 CHECKED BY : T. H. FANG DATE : 12-22-11

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

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 (INVENTORY)	N/A	①	1.01	--	1.75	0.975	1.44	B	ER	48.375	1.138	1.09	B	I	67.725	0.80	1.138	1.01	B	I	48.375		
	HL-93 (OPERATING)	N/A	--	1.42	--	1.35	0.975	1.87	B	ER	48.375	1.138	1.42	B	I	67.725	N/A	--	--	--	--	--		
	HS-20 (INVENTORY)	36.000	②	1.37	49.159	1.75	0.975	1.99	B	ER	48.375	1.138	1.37	B	I	67.725	0.80	0.928	1.41	B	I	48.375		
	HS-20 (OPERATING)	36.000	--	1.77	63.724	1.35	0.975	2.59	B	ER	48.375	1.138	1.77	B	I	67.725	N/A	--	--	--	--	--		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500	--	3.32	44.872	1.40	0.975	5.89	B	ER	48.375	1.138	4.08	B	I	67.725	0.80	0.928	3.32	B	I	48.375	
		SNGARBS2	20.000	--	2.41	48.225	1.40	0.975	4.28	B	ER	48.375	1.138	2.90	B	I	67.725	0.80	0.928	2.41	B	I	48.375	
		SNAGRIS2	22.000	--	2.26	49.652	1.40	0.975	4.00	B	ER	48.375	1.138	2.69	B	I	67.725	0.80	0.928	2.26	B	I	48.375	
		SNCOTTS3	27.250	--	1.65	45.020	1.40	0.975	2.93	B	ER	48.375	1.138	2.04	B	I	67.725	0.80	0.928	1.65	B	I	48.375	
		SNAGGRS4	34.925	--	1.36	47.334	1.40	0.975	2.40	B	ER	48.375	1.138	1.69	B	I	67.725	0.80	0.928	1.36	B	I	48.375	
		SNS5A	35.550	--	1.33	47.176	1.40	0.975	2.35	B	ER	48.375	1.138	1.71	B	I	67.725	0.80	0.928	1.33	B	I	48.375	
		SNS6A	39.950	--	1.21	48.228	1.40	0.975	2.14	B	ER	48.375	1.138	1.55	B	I	67.725	0.80	0.928	1.21	B	I	48.375	
	SNS7B	42.000	--	1.15	48.269	1.40	0.975	2.04	B	ER	48.375	1.138	1.53	B	I	67.725	0.80	0.928	1.15	B	I	48.375		
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000	--	1.47	48.481	1.40	0.975	2.61	B	ER	48.375	1.138	1.85	B	I	67.725	0.80	0.928	1.47	B	I	48.375	
		TNT4A	33.075	--	1.47	48.713	1.40	0.975	2.61	B	ER	48.375	1.138	1.81	B	I	67.725	0.80	0.928	1.47	B	I	48.375	
		TNT6A	41.600	--	1.20	49.693	1.40	0.975	2.12	B	ER	48.375	1.138	1.62	B	I	67.725	0.80	0.928	1.19	B	I	48.375	
		TNT7A	42.000	--	1.20	50.207	1.40	0.975	2.12	B	ER	48.375	1.138	1.59	B	I	67.725	0.80	0.928	1.20	B	I	48.375	
		TNT7B	42.000	--	1.22	51.419	1.40	0.975	2.17	B	ER	48.375	1.138	1.49	B	I	67.725	0.80	0.928	1.22	B	I	48.375	
		TNAGRIT4	43.000	--	1.17	50.475	1.40	0.975	2.08	B	ER	48.375	1.138	1.44	B	I	67.725	0.80	0.928	1.17	B	I	48.375	
TNAGT5A		45.000	--	1.11	50.001	1.40	0.975	1.97	B	ER	48.375	1.138	1.43	B	I	67.725	0.80	0.928	1.11	B	I	48.375		
TNAGT5B	45.000	③	1.10	49.572	1.40	0.975	1.95	B	ER	48.375	1.138	1.37	B	I	67.725	0.80	0.928	1.10	B	I	48.375			

LOAD FACTORS:

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

NOTES:

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

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

COMMENTS:

- 1.
- 2.
- 3.
- 4.

④ CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

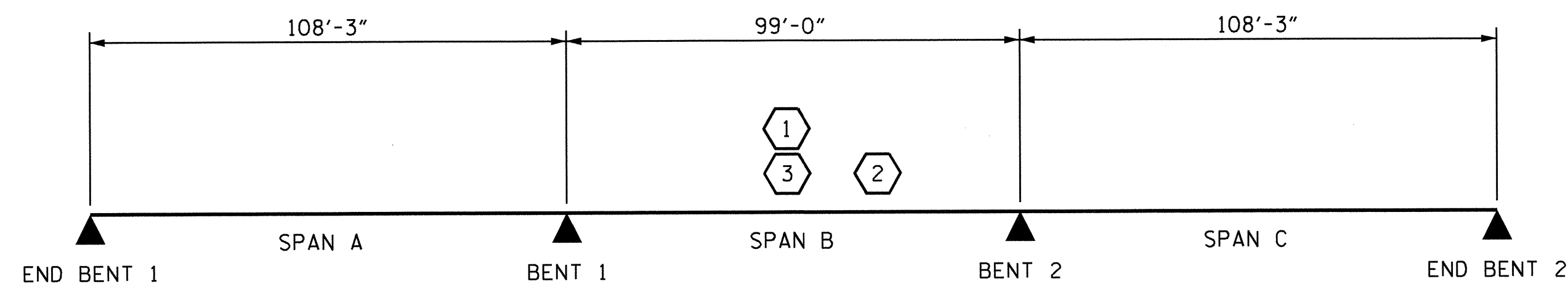
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

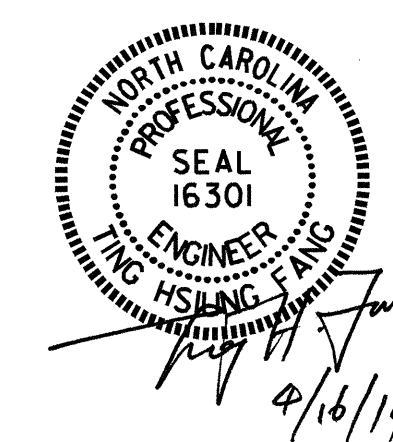
GIRDER LOCATION

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



LRFR SUMMARY

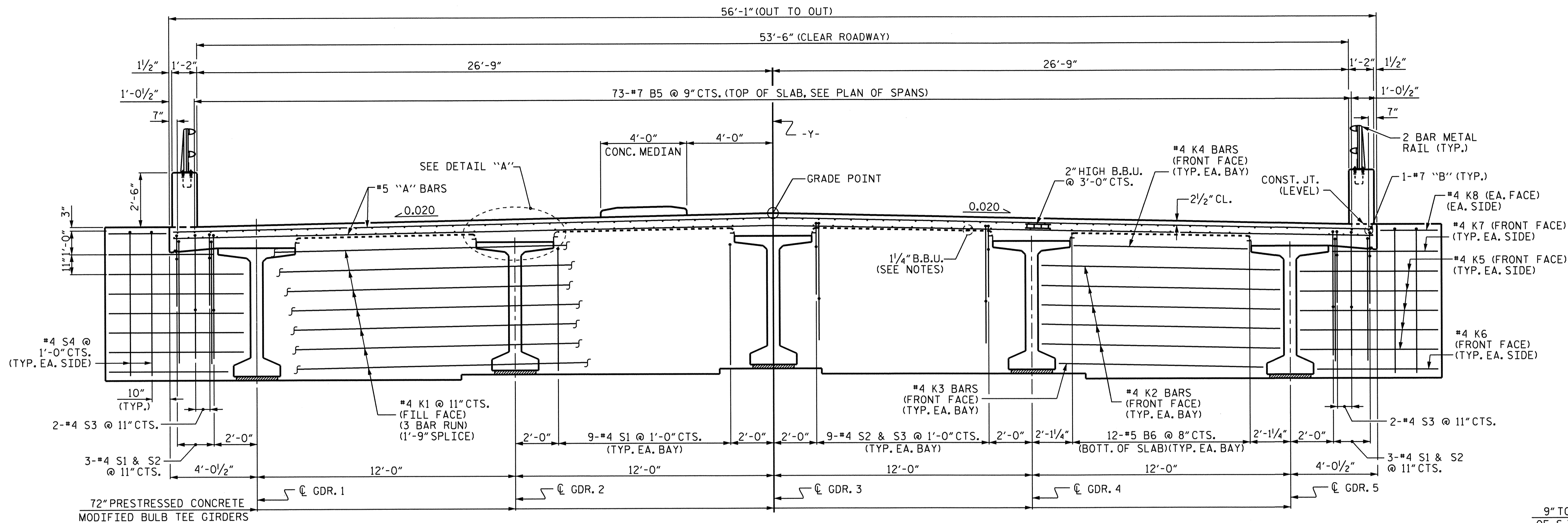
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-



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

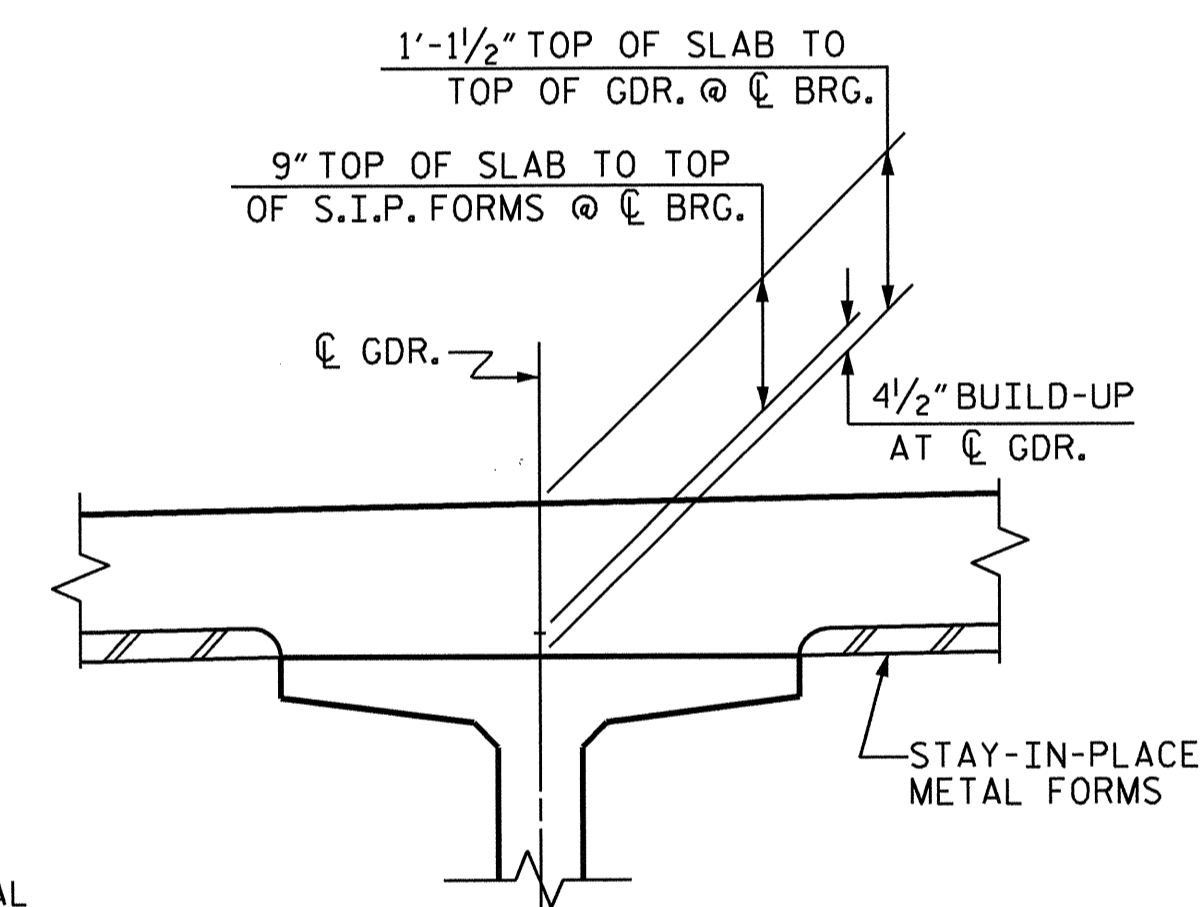
REVISIONS						SHEET NO. S-4
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

ASSEMBLED BY : P. K. NEWTON DATE : 4-2-14  
 CHECKED BY : T. J. KIRSCHBAUM DATE : 4-4-14  
 ENGINEER OF RECORD: P. K. NEWTON DATE : 4-8-14  
 DRAWN BY : MAA 1/08 REV. 11/2/08R MAA/GM  
 CHECKED BY : GM/DI 2/08

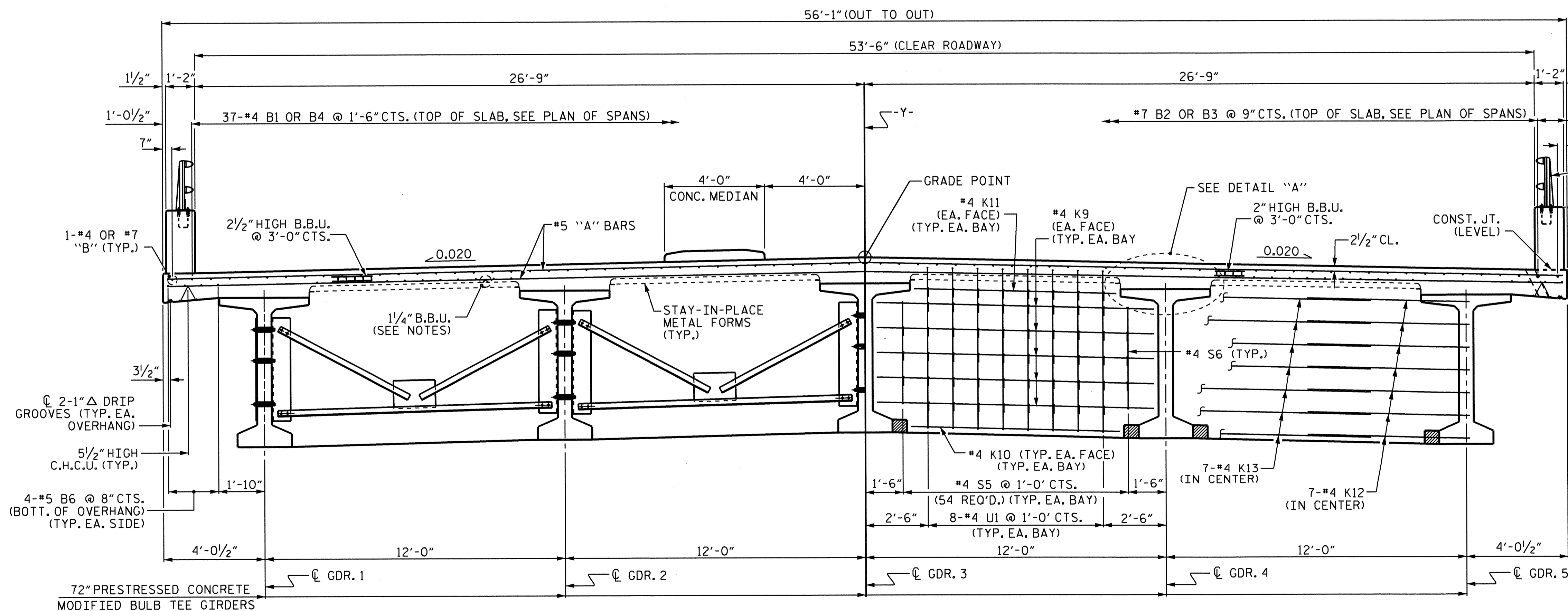


**TYPICAL SECTION**

APPROACH SLAB BLOCKOUT AND WINGS NOT SHOWN FOR CLARITY.  
SHOWING ABUTMENT WALL AT FILL FACE OF END BENTS.



**DETAIL "A"**



**PARTIAL TYPICAL SECTION**

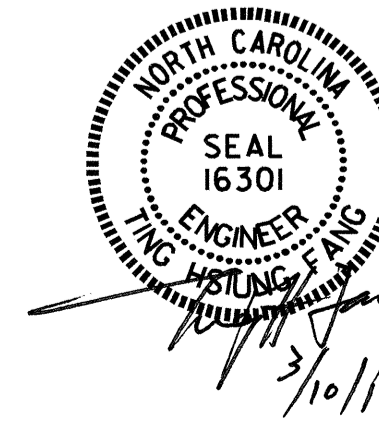
SHOWING INTERMEDIATE DIAPHRAGM

**PARTIAL TYPICAL SECTION**

SHOWING BENT DIAPHRAGM

DRAWN BY : S.B. WILLIAMS DATE : 1-17-12  
 CHECKED BY : E.J. OMILE DATE : 5-12  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 11-11

10-MAR-2014 13:28  
 \\dot\dfsroot\01\Proj\TIPProjects-R\2612B\Structures\Plans\Final Plans\str \*1r2612b.sd.ts.dgn  
 clyokeley



PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 TYPICAL SECTION

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-5
1			3			TOTAL SHEETS
2			4			38

**NOTES**

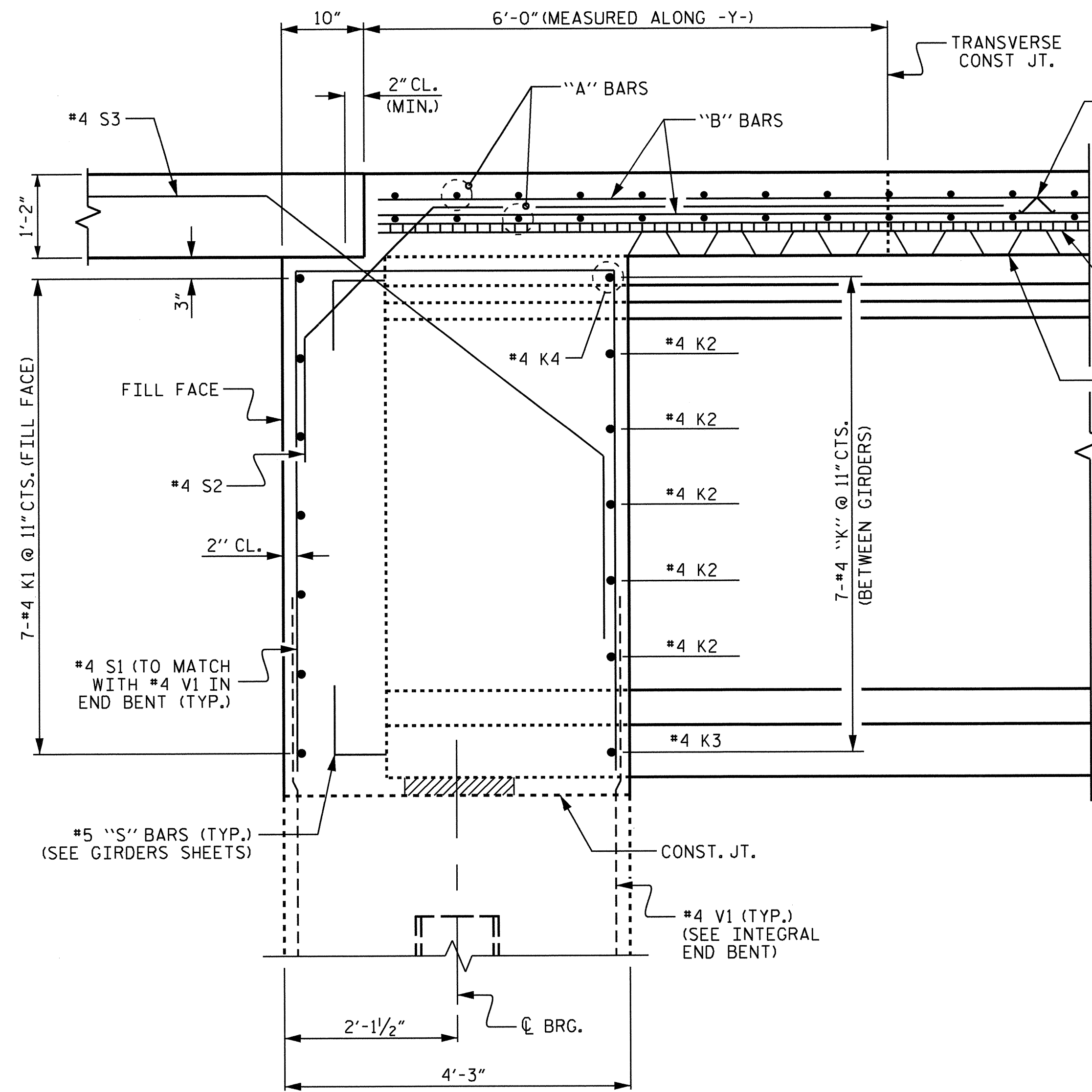
PROVIDE 1/4" HIGH BEAM BOLSTERS UPPER AT 4'-0" CTS. ATOP THE METAL STAY-IN-PLACE FORMS TO SUPPORT THE BOTTOM MAT OF "A" BARS. WHEN USING REMOVABLE FORMS, PROVIDE CONTINUOUS HIGH CHAIRS FOR METAL DECK (C.H.C.M.) @ 4'-0" CTS. WITH A HEIGHT TO SUPPORT THE BOTTOM MAT OF "A" BARS A CLEAR DISTANCE OF 2 1/2"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

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

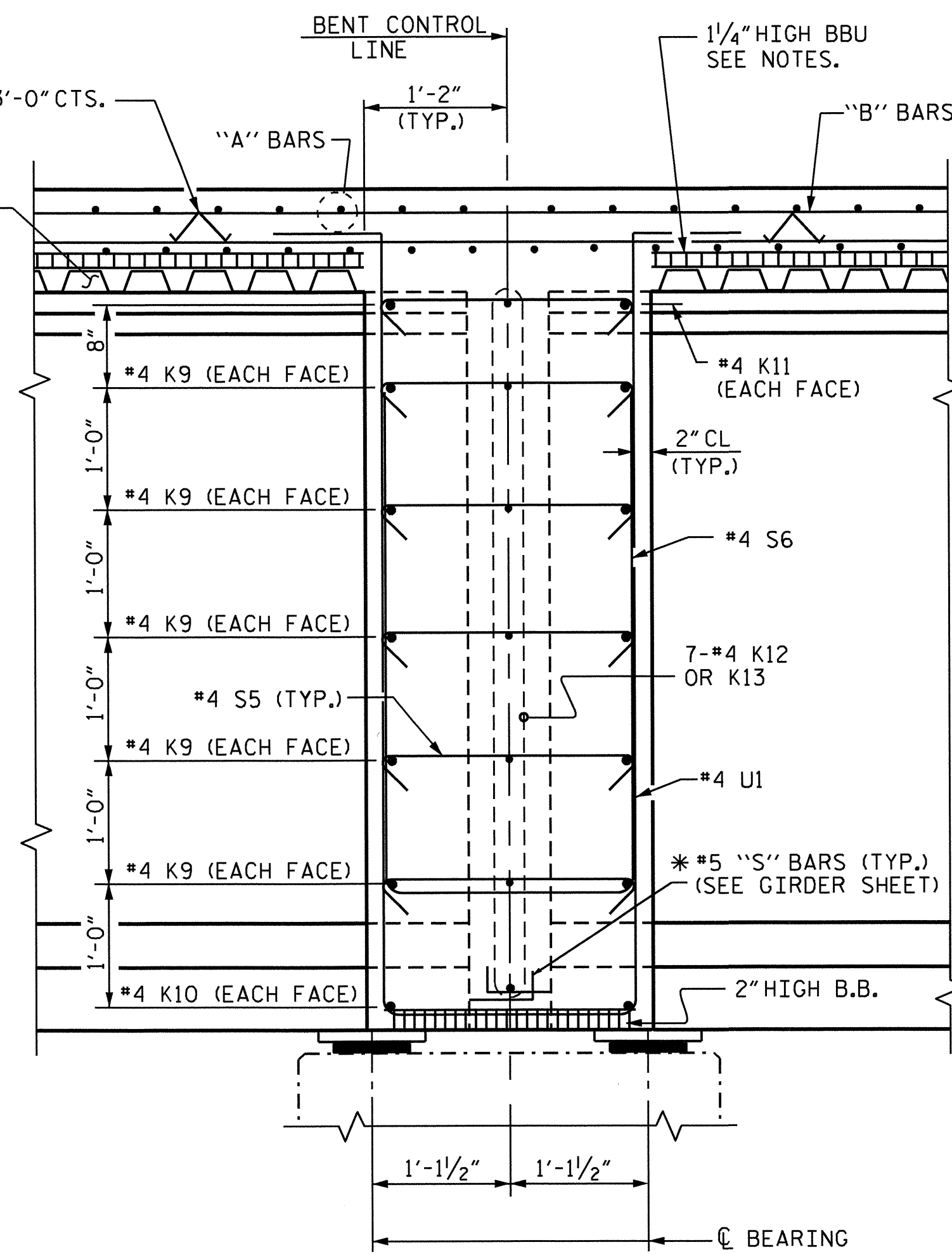
PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

CONCRETE MEDIAN 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.

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

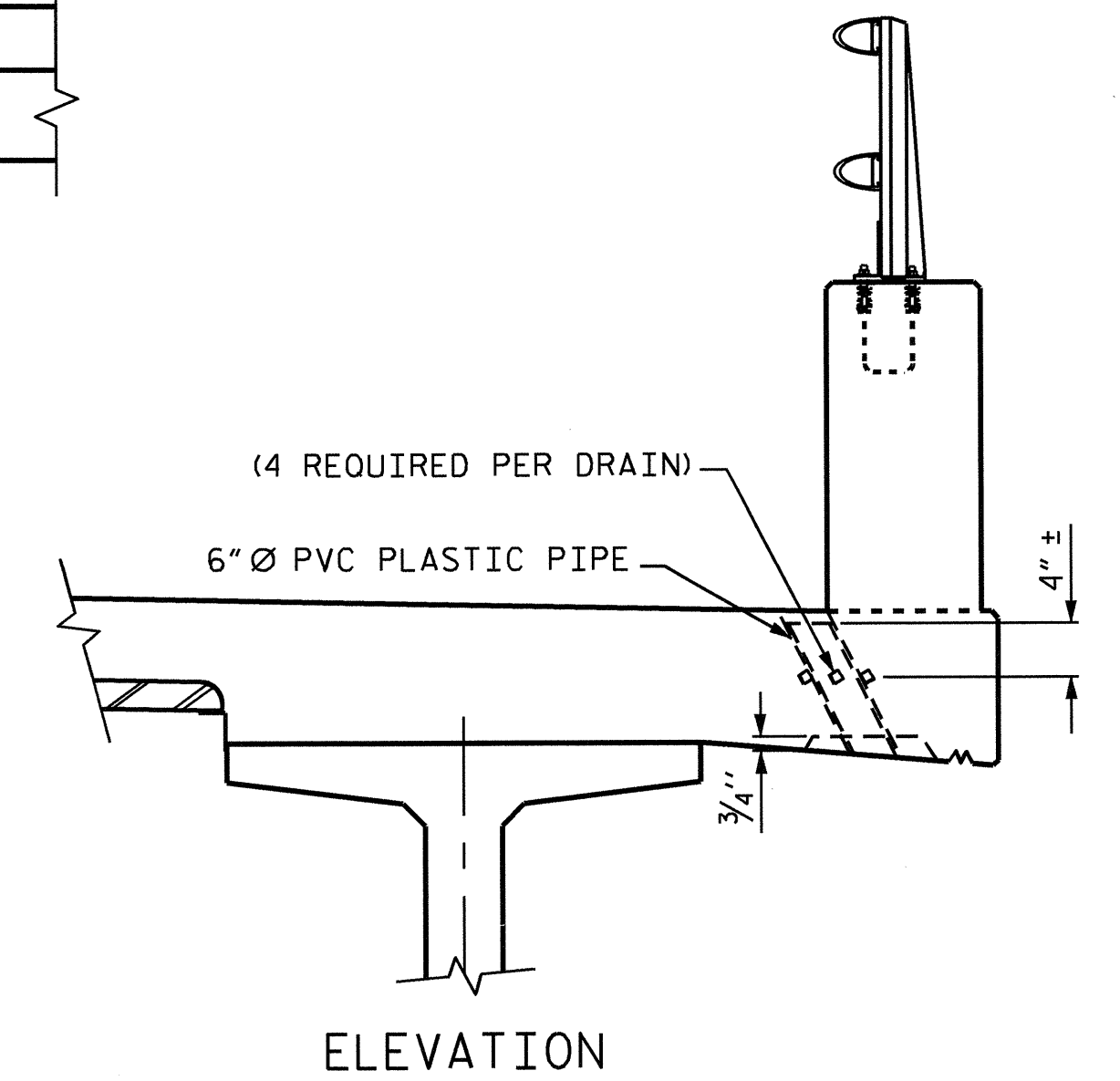


**SECTION THRU ABUTMENT END BENT**

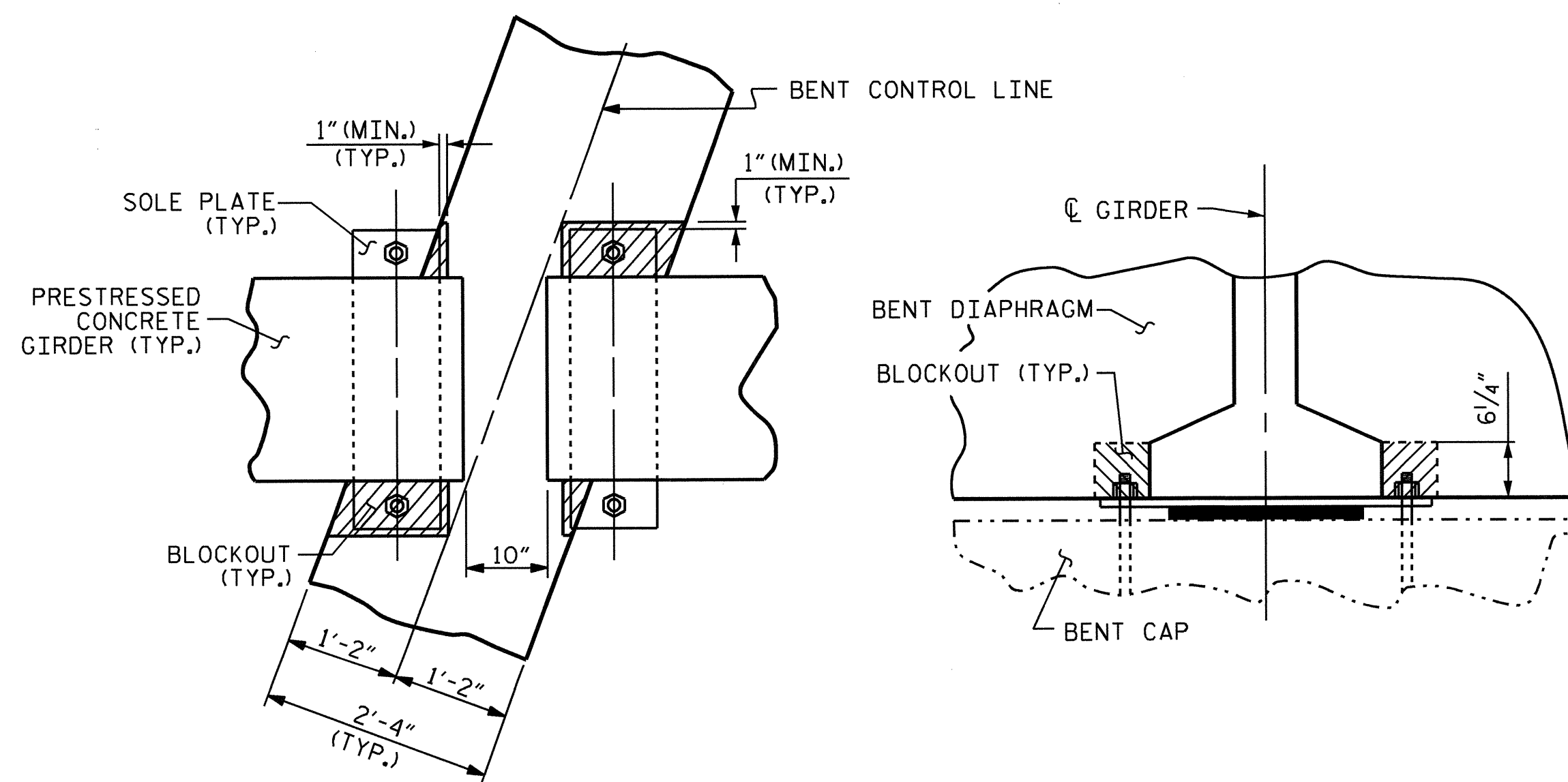


**SECTION THRU BENT**

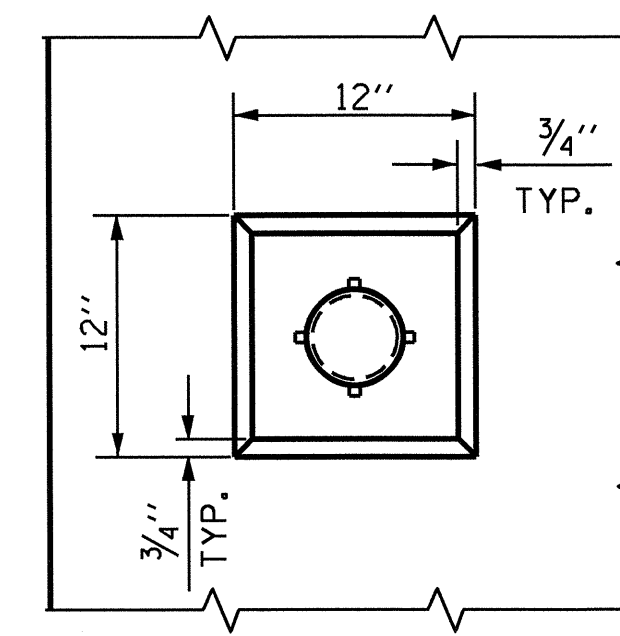
\*FIELD BEND AS NEEDED



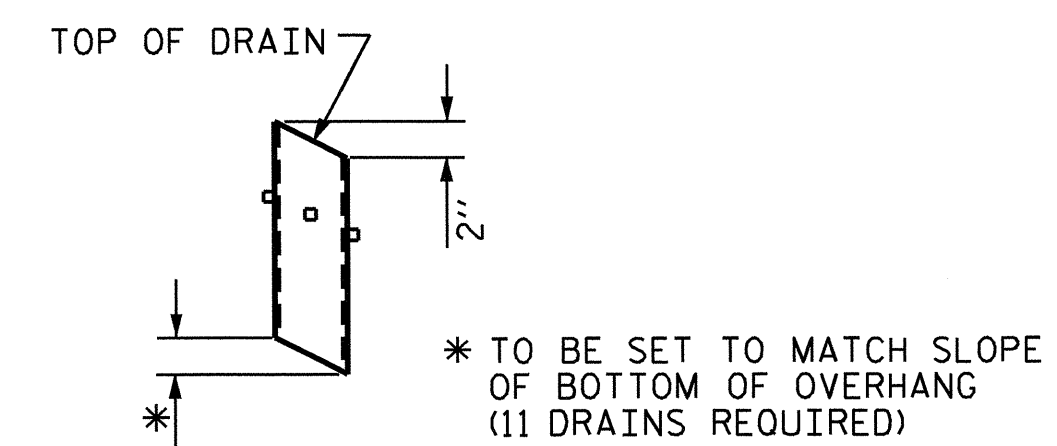
**ELEVATION**



**BENT DIAPHRAGM BLOCKOUT DETAIL**



**PLAN OF RECESS**



**PIPE DETAIL**

TOP OF FLOOR DRAINS TO BE SET 3/8" BELOW SURFACE OF SLAB.

4 - 1/2" SQUARE LUGS TO BE GLUED TO THE P.V.C. PLASTIC PIPE AT EQUAL SPACES AROUND THE PIPE DRAIN APPROXIMATELY 4" FROM THE TOP OF THE PIPE.

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

**DRAIN DETAILS**

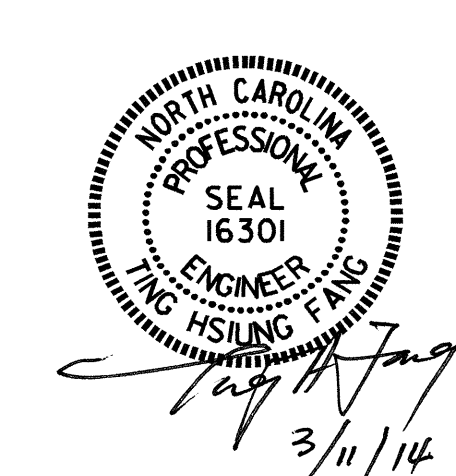
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

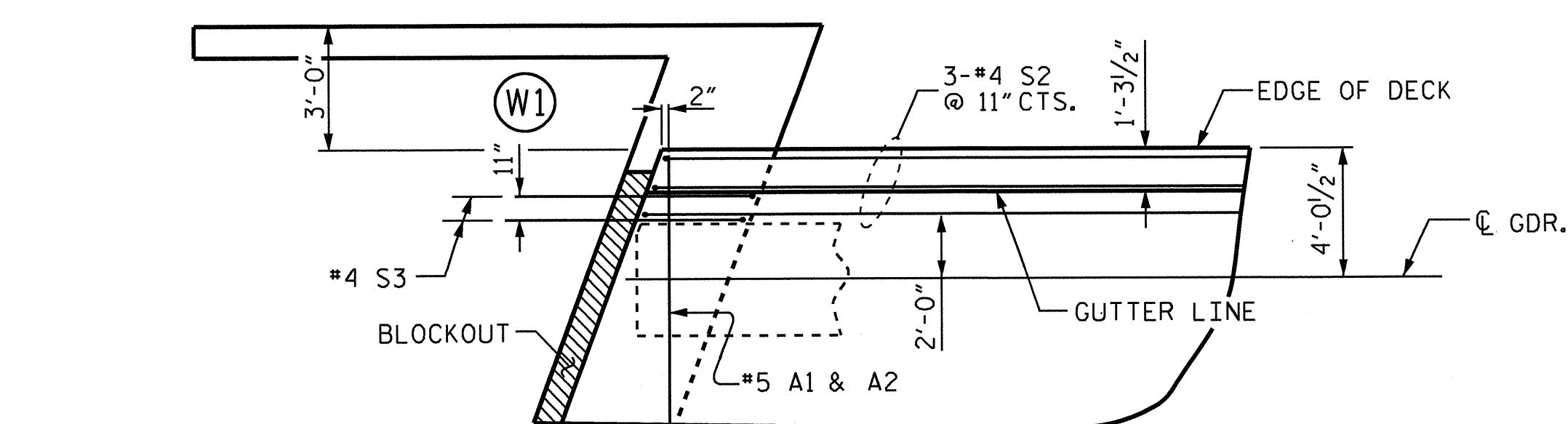
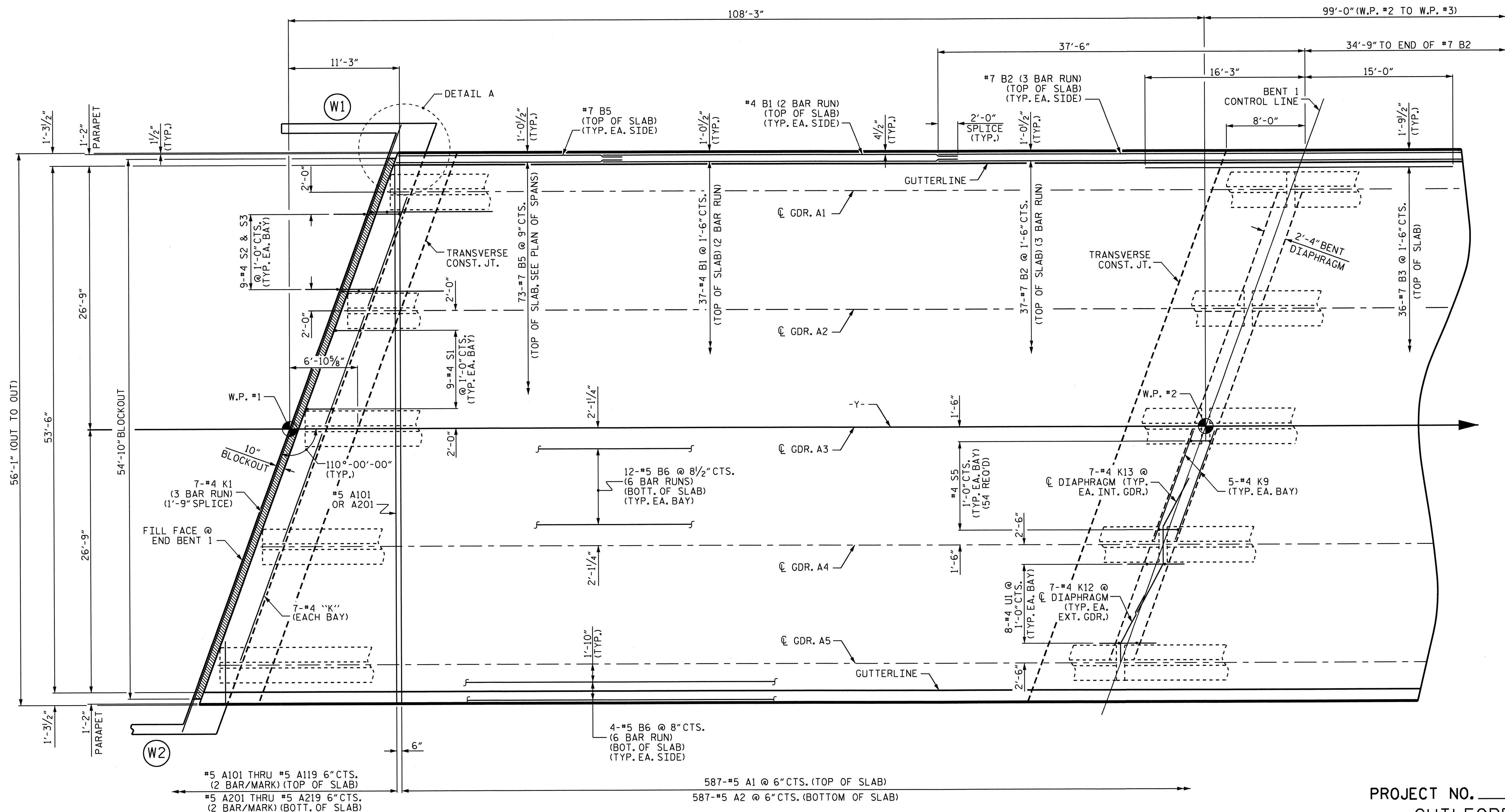
SUPERSTRUCTURE

TYPICAL SECTION  
 DETAILS



DRAWN BY : S.B. WILLIAMS DATE : 1-17-12  
 CHECKED BY : E.I. OMILE DATE : 5-12  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 11-11

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS
2			4			38



PLAN OF SPAN A

DETAIL A

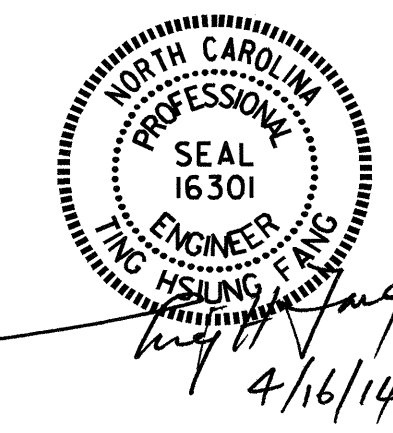
#4 S1 & S4 NOT SHOWN FOR CLARITY.  
W1 SHOWN W2 SIMILAR.

DRAWN BY : S. B. WILLIAMS DATE : 2/12  
 CHECKED BY : E. I. OMILE DATE : 9/13  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 9/13

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

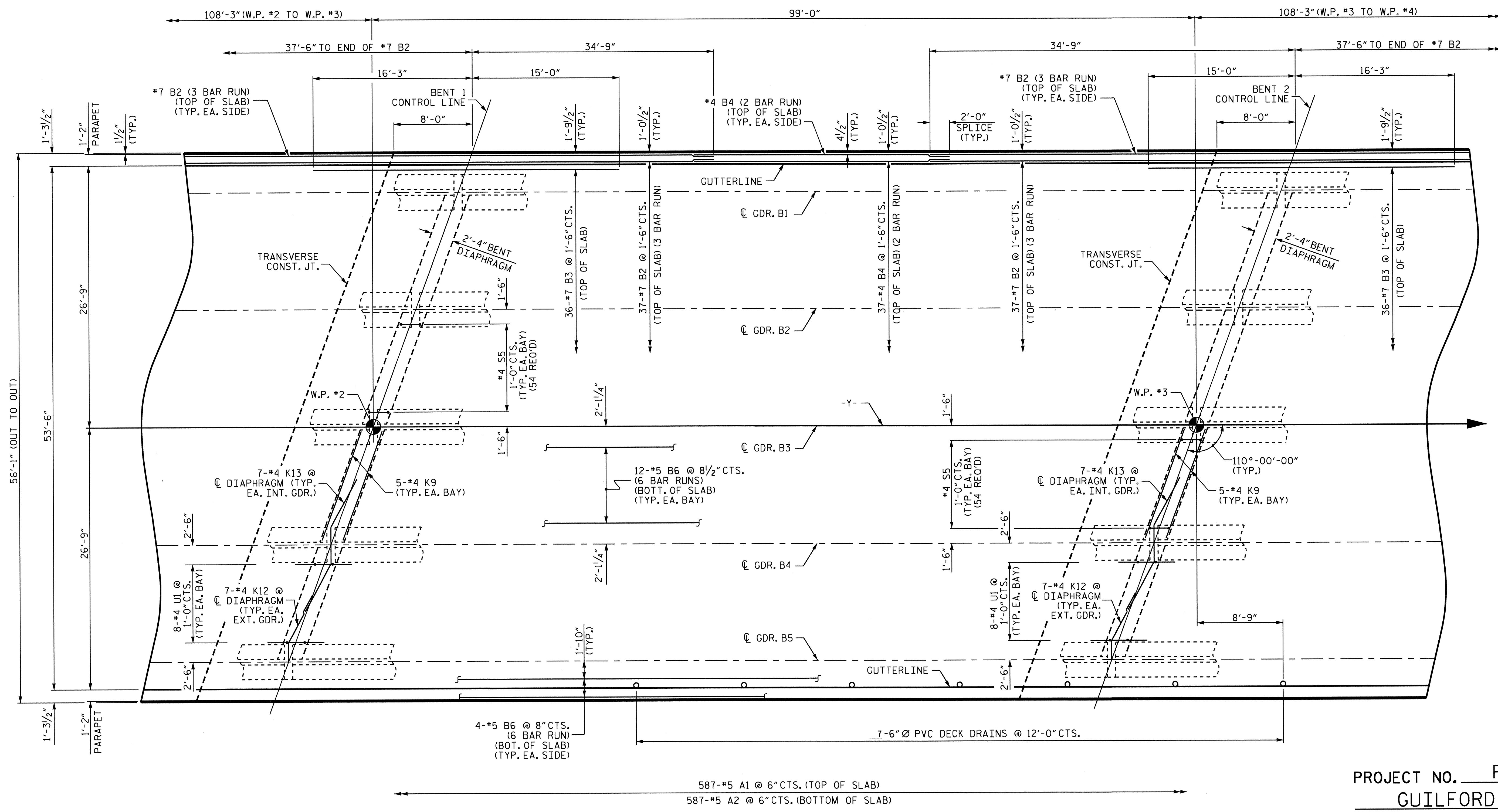
SHEET 1 OF 5

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



REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7	
1			3			TOTAL SHEETS 38	
2			4				





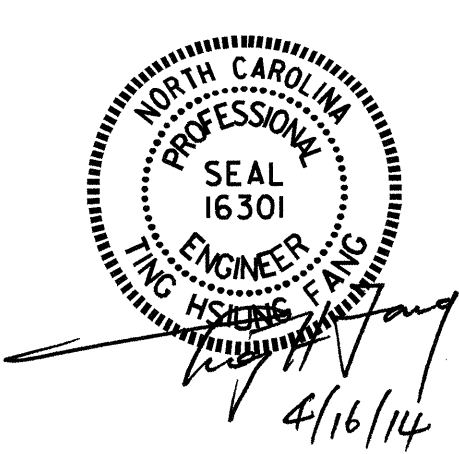
**PLAN OF SPAN B**

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-  
 SHEET 2 OF 5

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

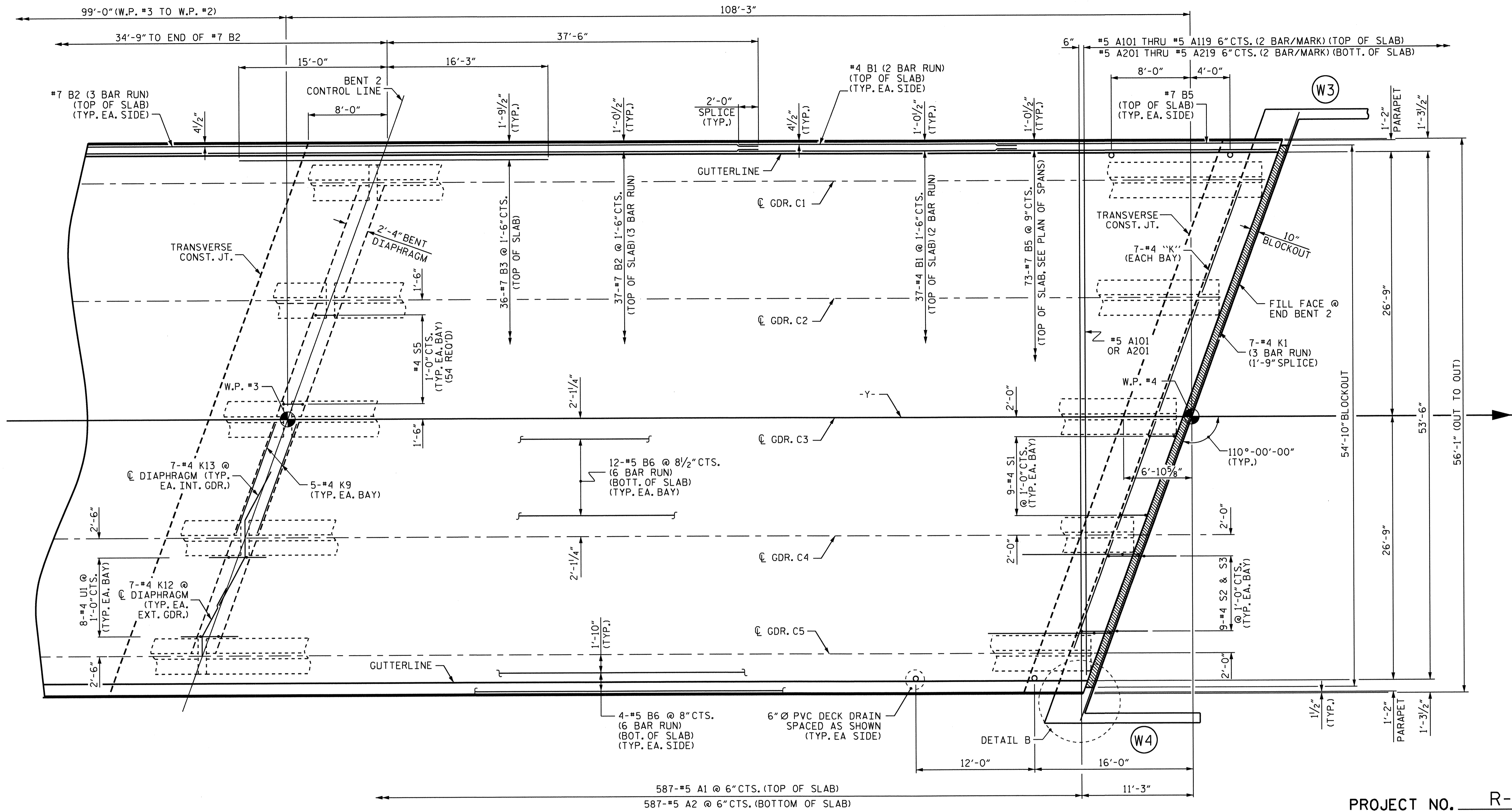
SUPERSTRUCTURE  
 PLAN OF SPANS  
 SPAN B

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			38

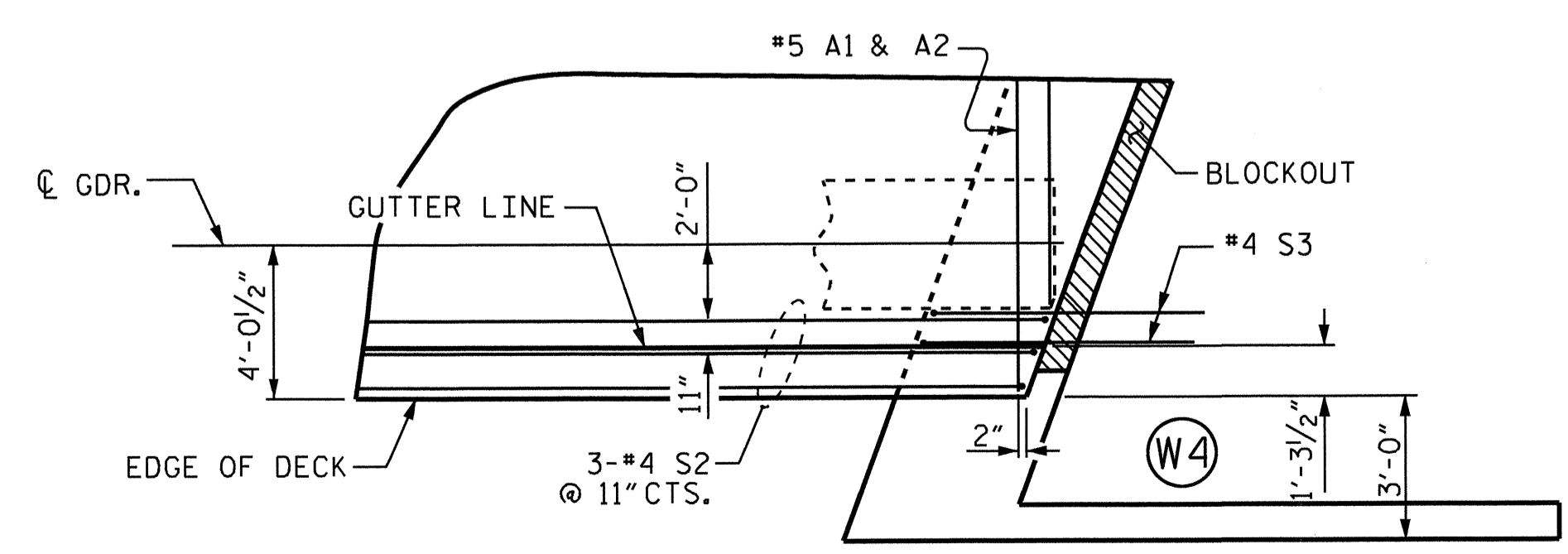


DRAWN BY : S. B. WILLIAMS DATE : 2/12  
 CHECKED BY : E. I. OMILE DATE : 9/13  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 9/13

16-APR-2014 13:41  
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 cyokeley

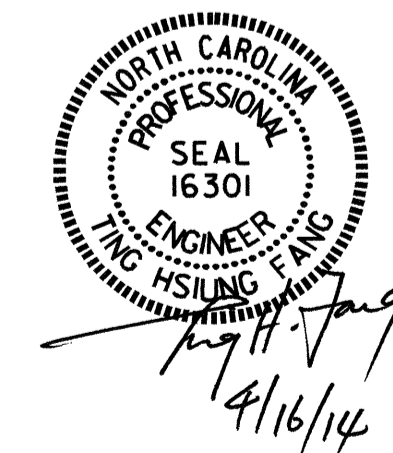


PLAN OF SPAN C



DETAIL B

#4 S1 & S4 NOT SHOWN FOR CLARITY.  
W4 SHOWN W3 SIMILAR.



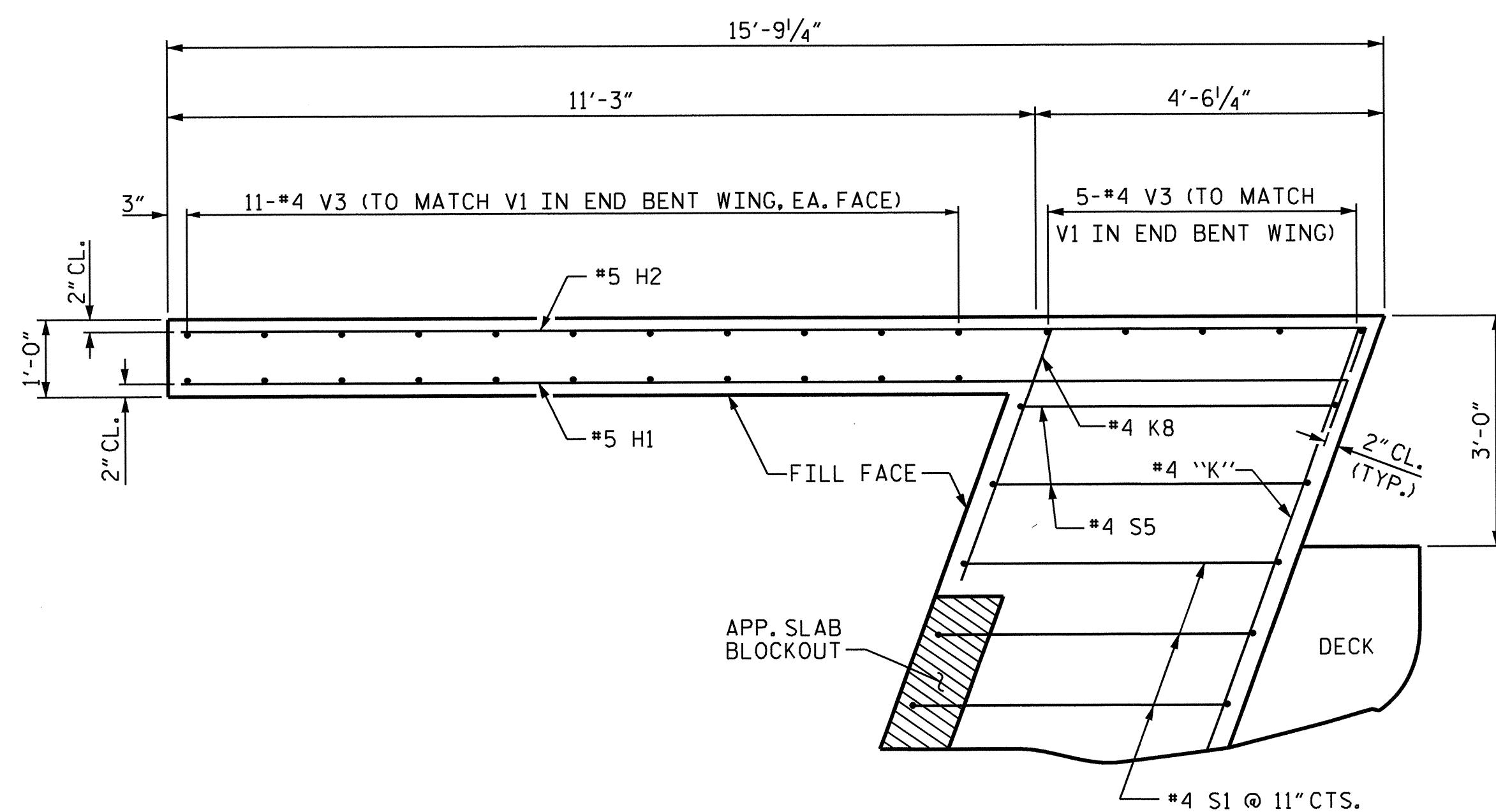
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 3 OF 5

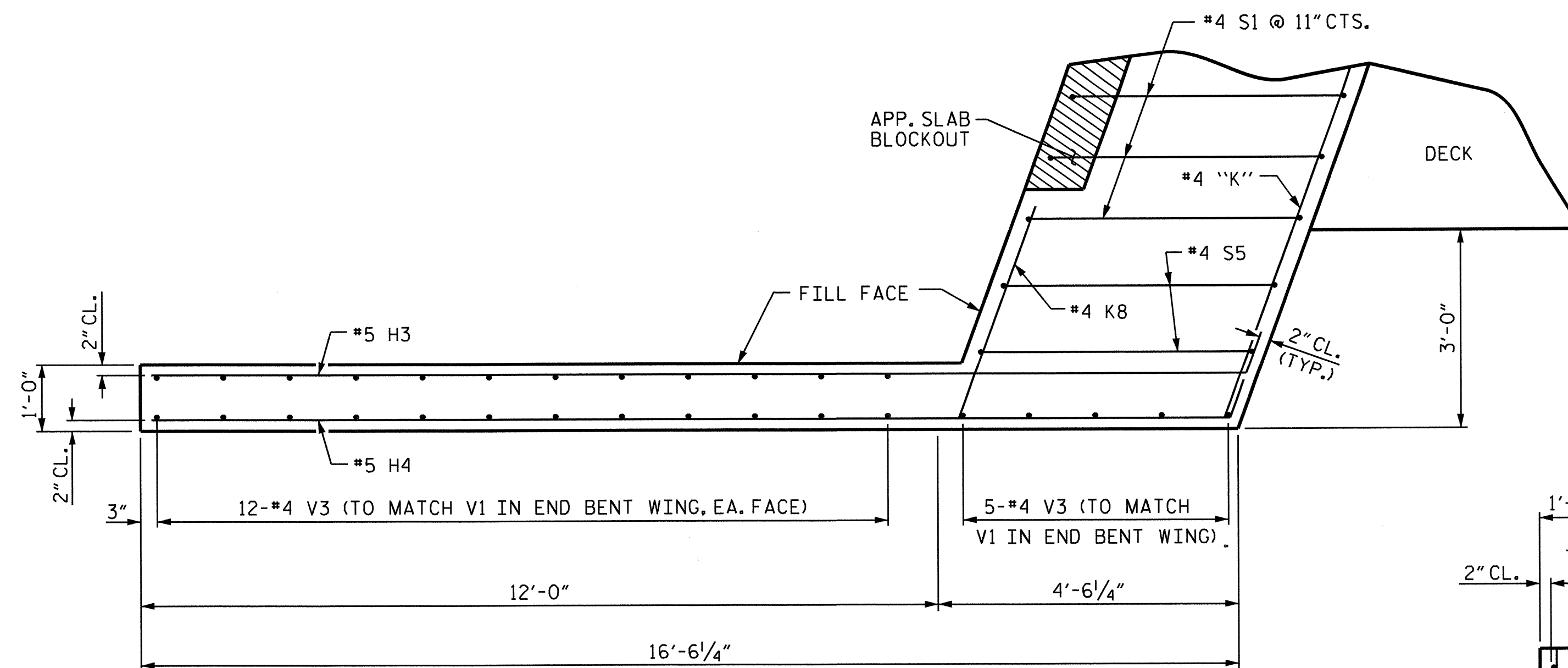
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPANS  
 SPAN C

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			38

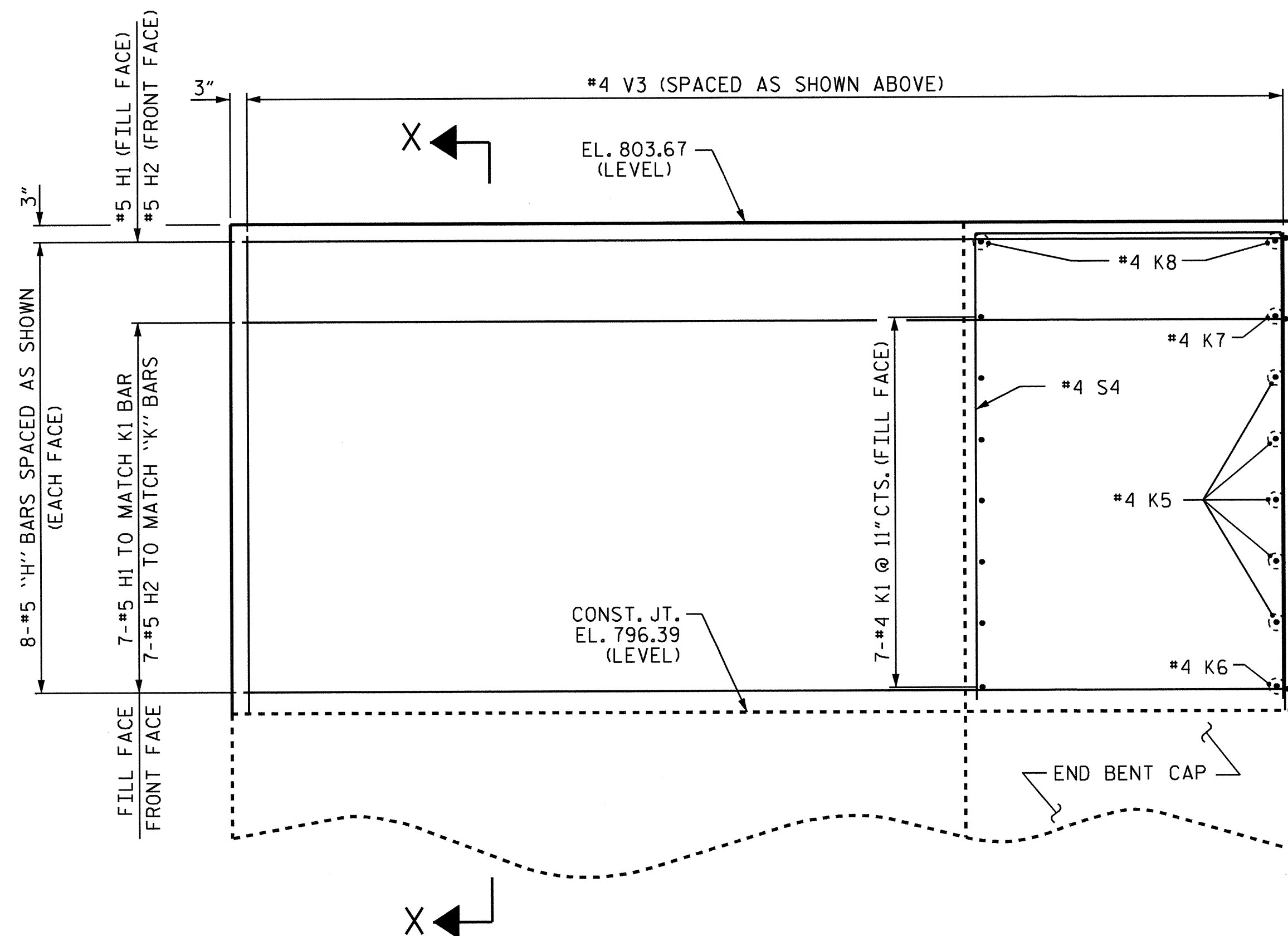
DRAWN BY : S. B. WILLIAMS DATE : 2/12  
 CHECKED BY : E. I. OMILE DATE : 9/13  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 9/13



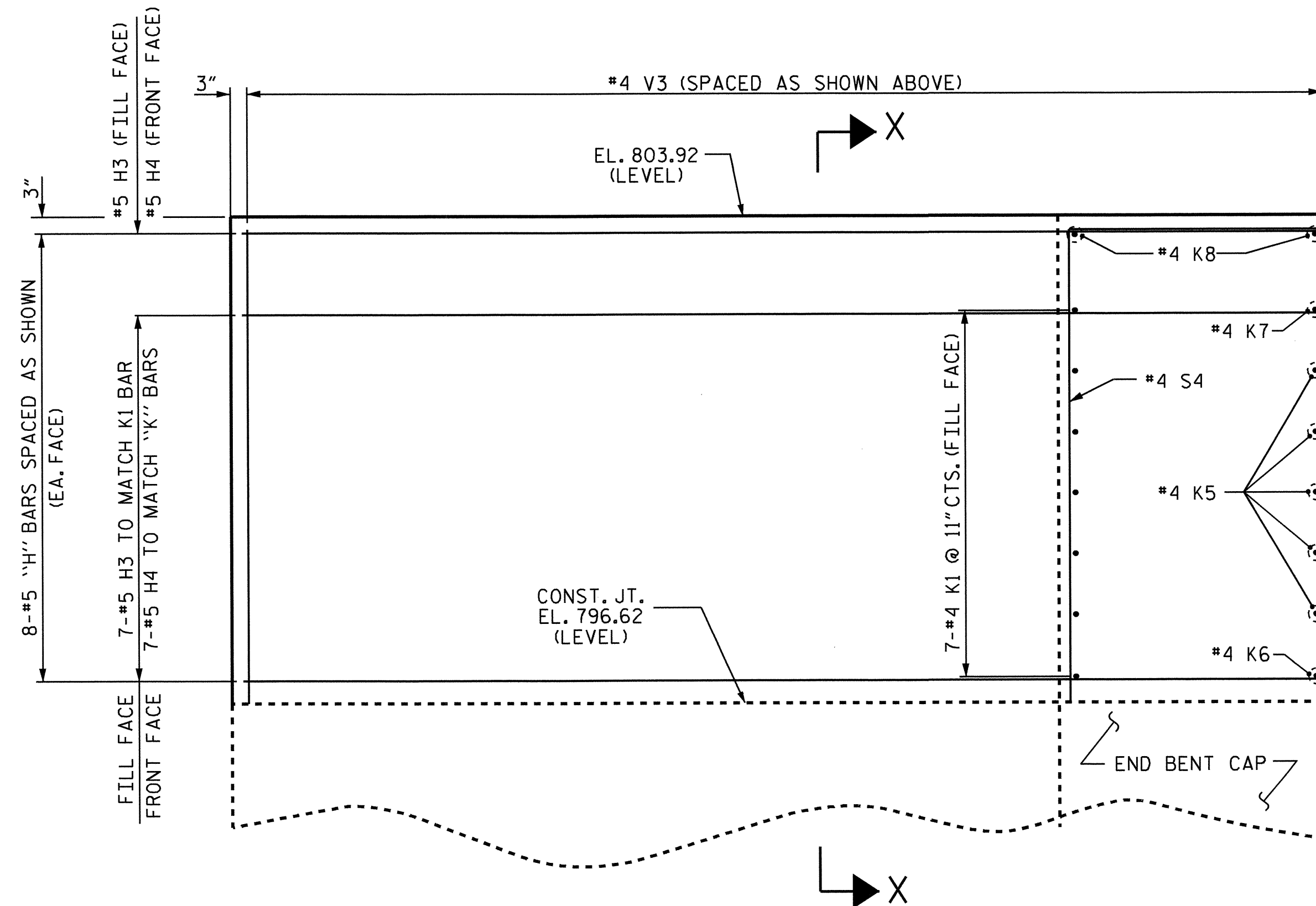
PLAN OF WING (W1)



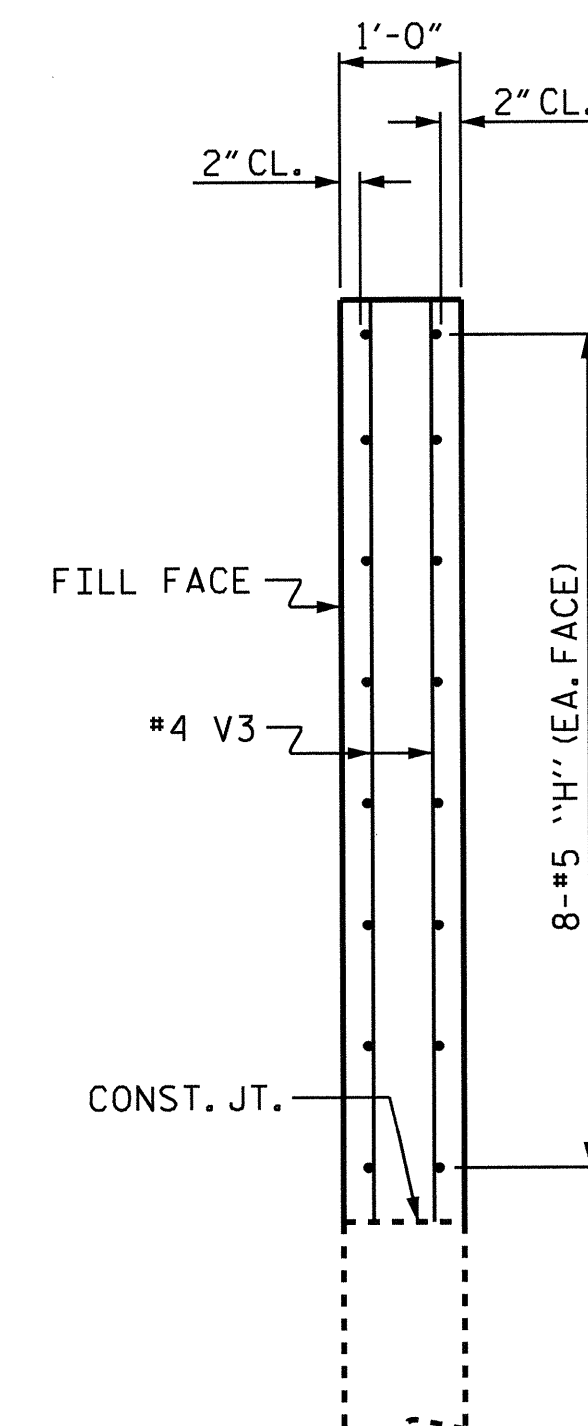
PLAN OF WING (W2)



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)

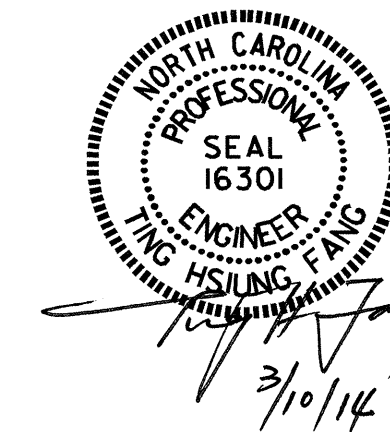


SECTION X-X

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

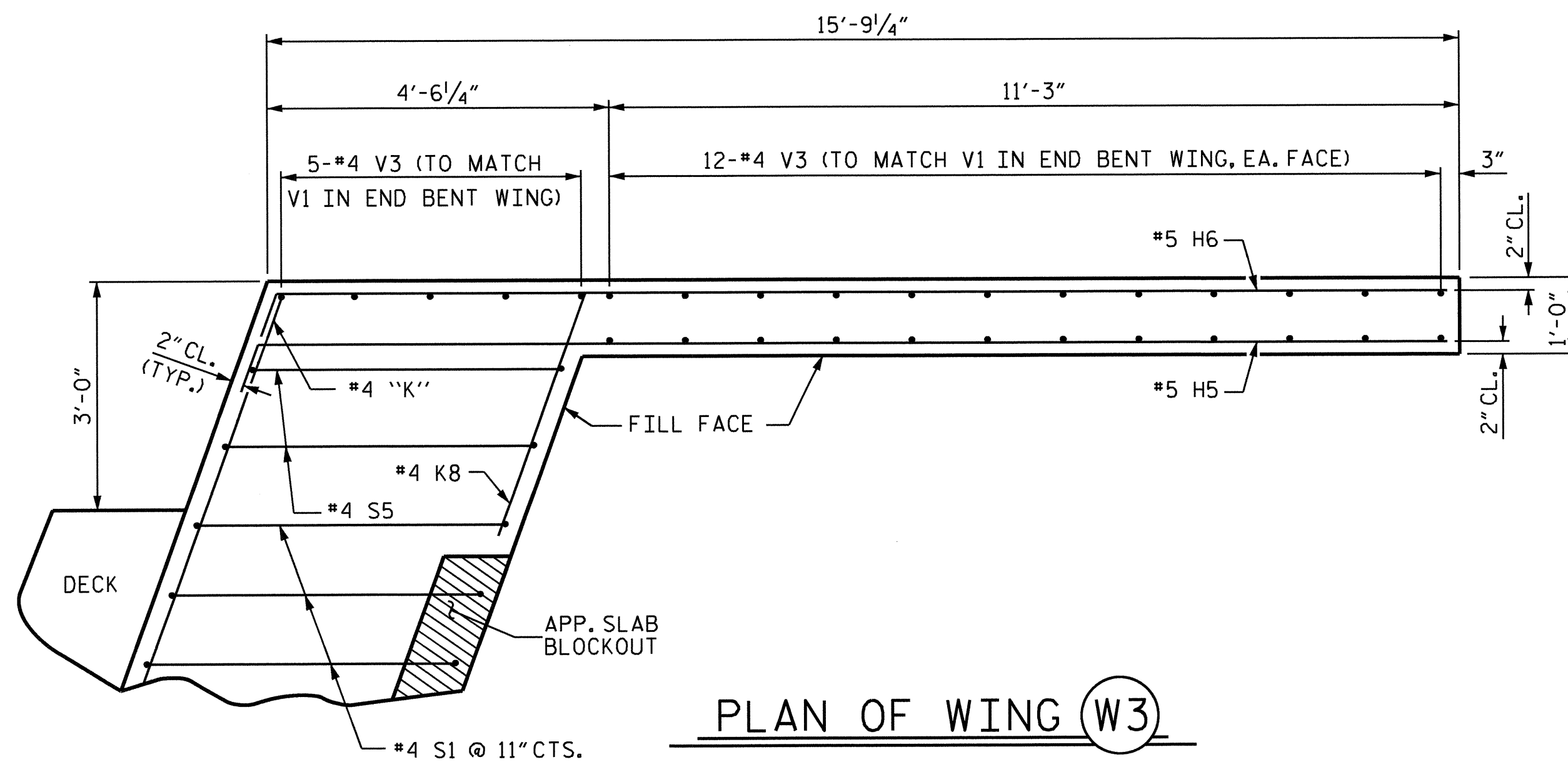
SHEET 4 OF 5

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 PLAN OF SPANS  
 DETAILS

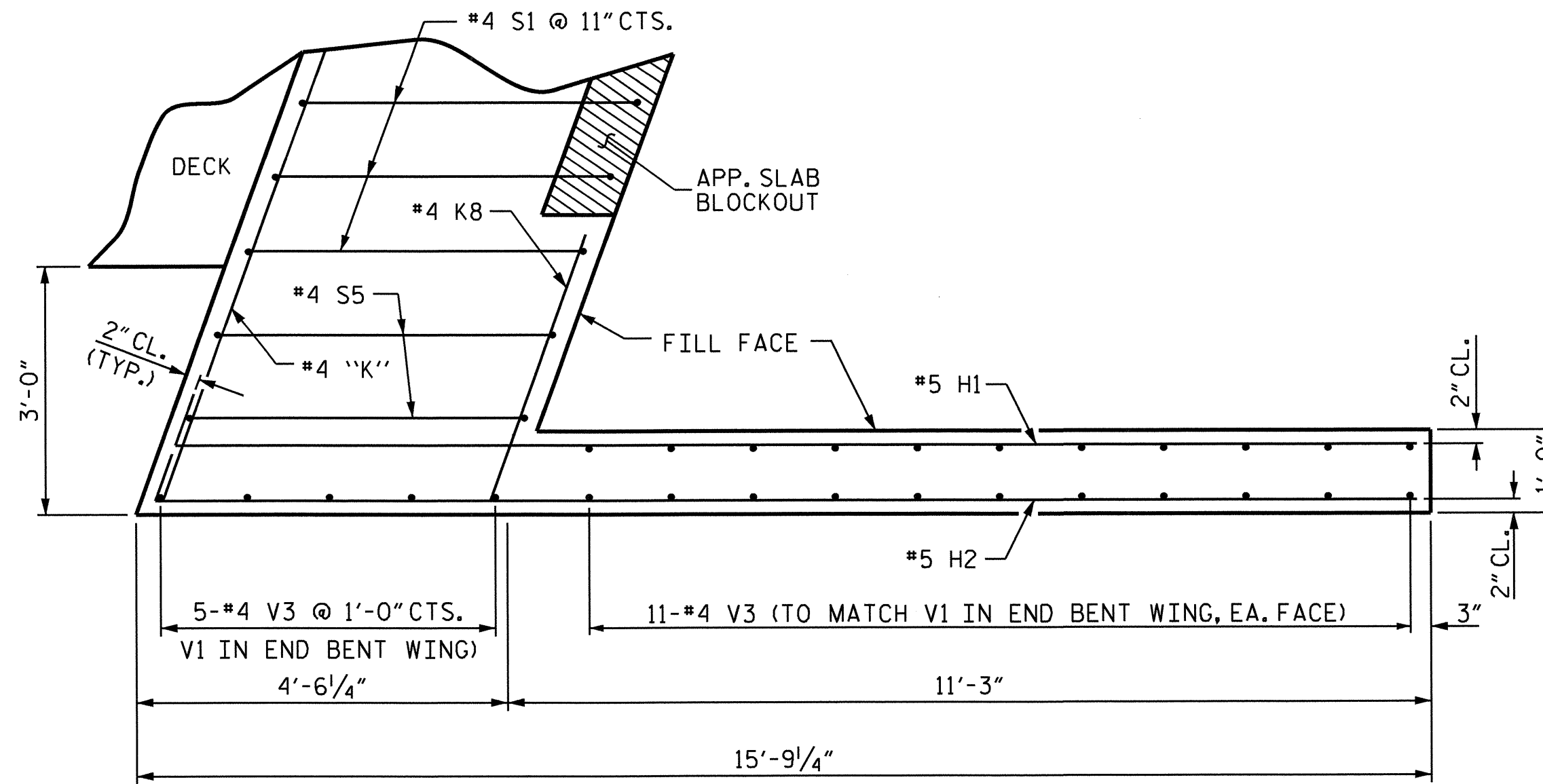


DRAWN BY: R. PATEL DATE: 4-2-12  
 CHECKED BY: E.I. OMILE DATE: 11-8-12  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE: 11-11

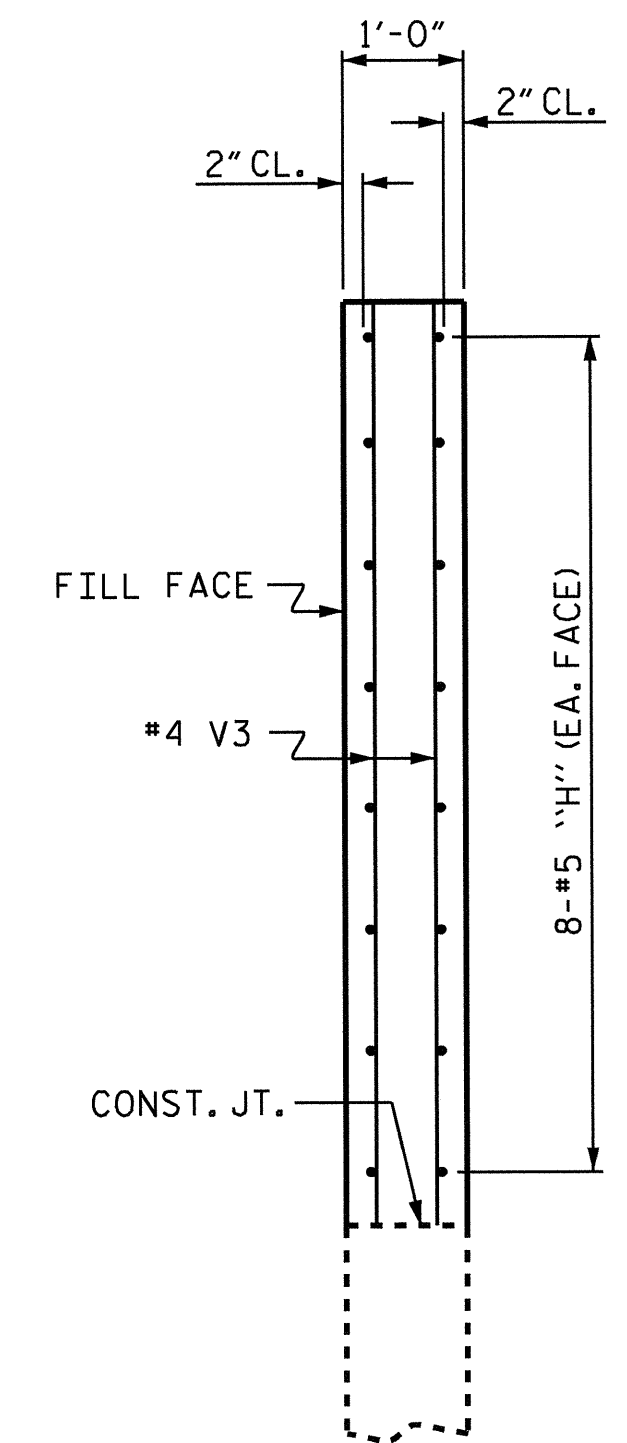
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS
2			4			38



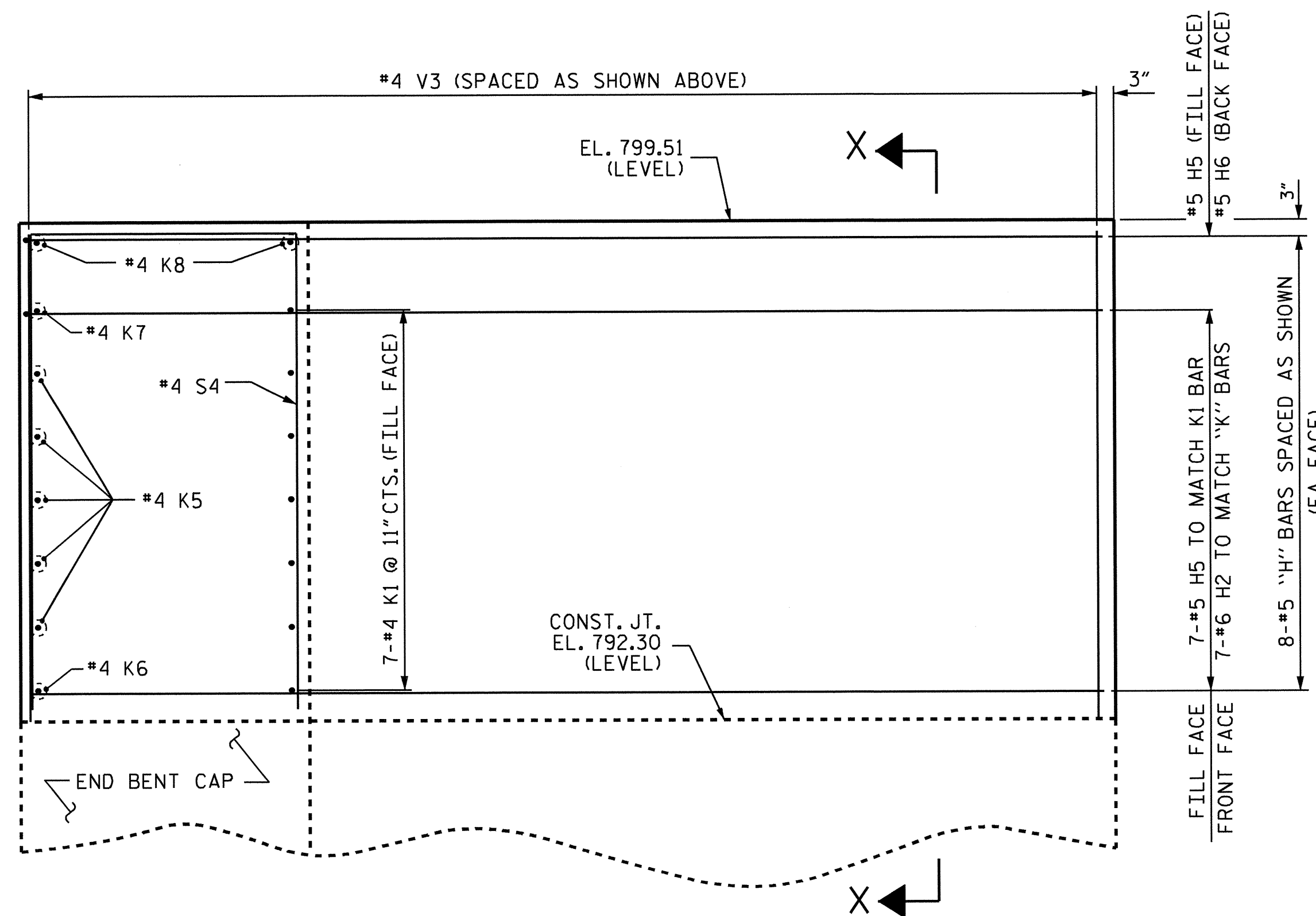
PLAN OF WING (W3)



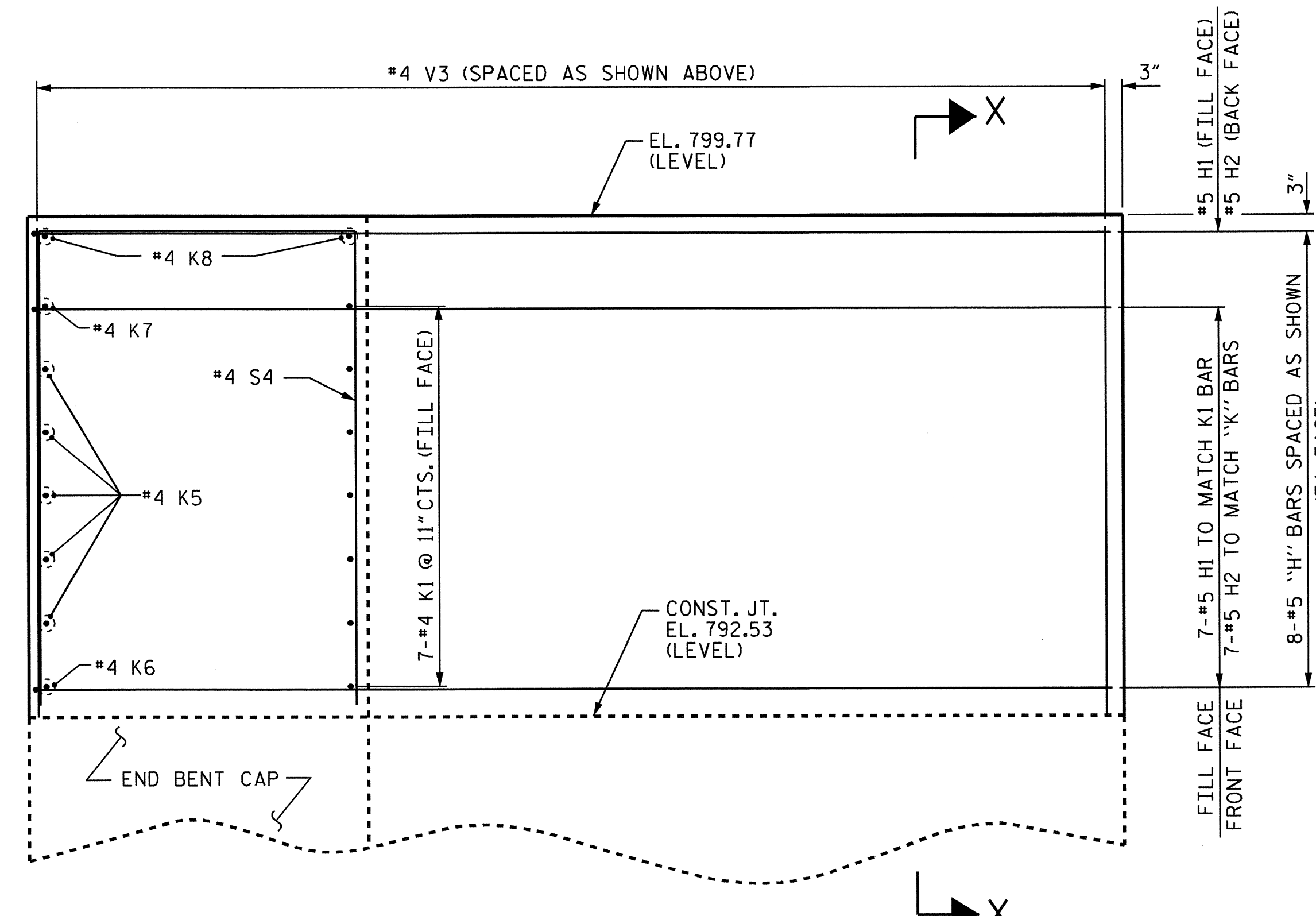
PLAN OF WING (W4)



SECTION X-X



ELEVATION OF WING (W3)



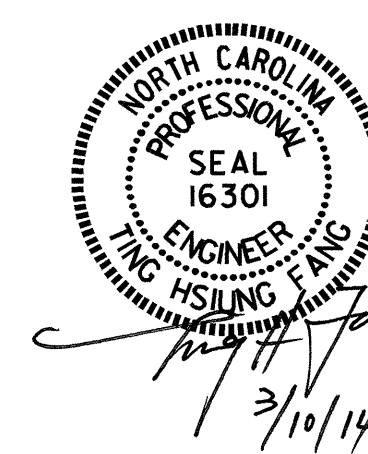
ELEVATION OF WING (W4)

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 5 OF 5

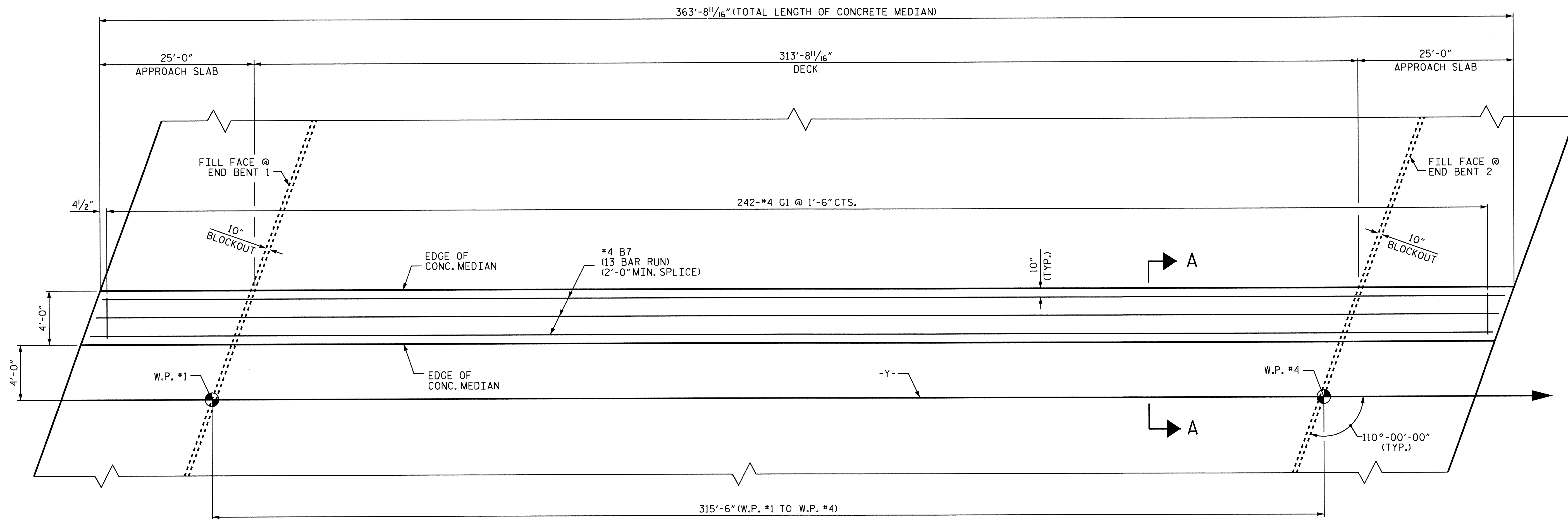
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUPERSTRUCTURE  
 PLAN OF SPANS  
 DETAILS



DRAWN BY: R. PATEL DATE: 4-2-12  
 CHECKED BY: E.I. OMILE DATE: 11-8-12  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE: 11-11

REVISIONS						SHEET NO. S-11
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

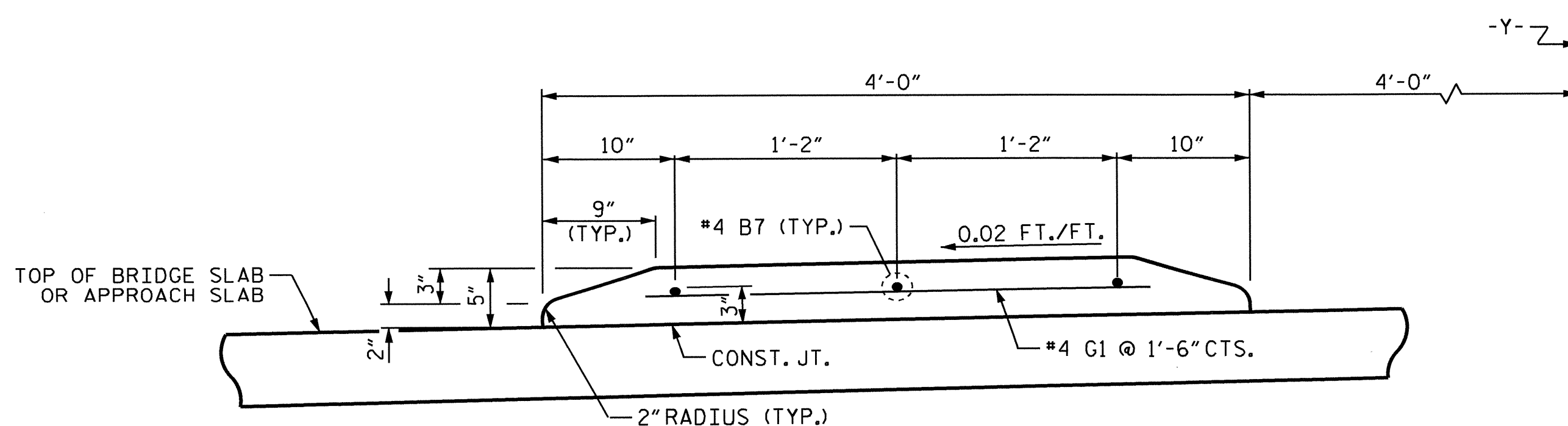


**PLAN**

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

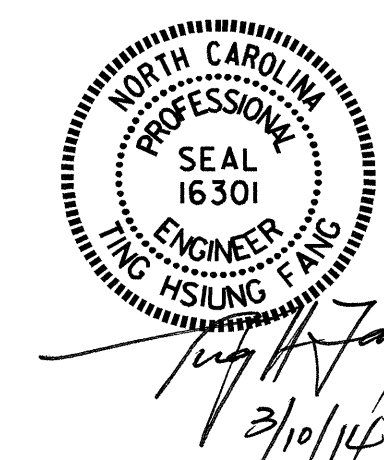
THE CONCRETE MEDIAN ON THE BRIDGE EXTENDING TO THE END OF THE APPROACH SLABS IS INCLUDED IN THE SUPERSTRUCTURE BILL OF MATERIAL AND PAID FOR AS PART OF THE REINFORCED CONCRETE DECK PAY ITEM.

ALL REINFORCING STEEL IN THE CONCRETE MEDIAN SHALL BE EPOXY COATED.



**SECTION A-A**

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-



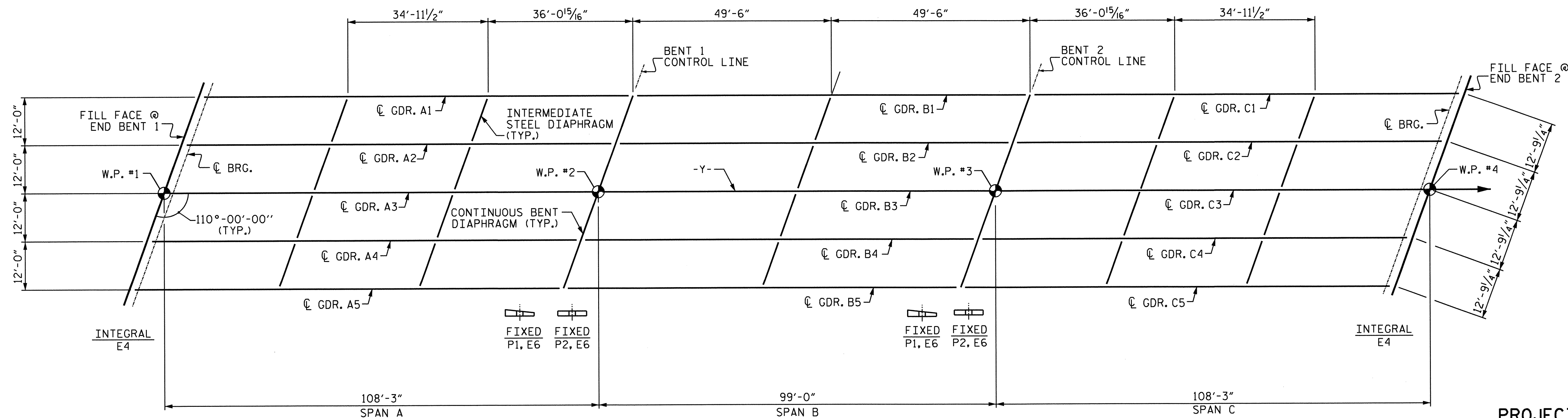
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 CONCRETE MEDIAN  
 DETAILS

DRAWN BY : R. PATEL DATE : 6-27-12  
 CHECKED BY : E.I. OMILE DATE : 7-11-12  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 12-20-12

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-12
1			3			TOTAL SHEETS
2			4			38

DEAD LOAD DEFLECTION TABLE FOR GIRDERS																							
0.6" Ø LOW RELAXATION	SPANS A & C											SPAN B											
	GIRDERS 1 & 5											GIRDERS 1 & 5											
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.	
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.112	0.212	0.290	0.339	0.356	0.339	0.290	0.212	0.112	0	0	0.075	0.142	0.194	0.228	0.239	0.228	0.194	0.142	0.075	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0	0.042	0.080	0.110	0.129	0.135	0.129	0.110	0.080	0.042	0	0	0.031	0.058	0.080	0.093	0.098	0.093	0.080	0.058	0.031	0
FINAL CAMBER	↑	0	13/16"	19/16"	23/16"	2 1/2"	2 5/8"	2 1/2"	2 3/16"	1 1/16"	13/16"	0	0	9/16"	1"	1 3/8"	1 5/8"	1 11/16"	1 5/8"	1 3/8"	1"	9/16"	0
GIRDERS 2 THRU 4											GIRDERS 2 THRU 4												
TENTH POINTS	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.	BRG.	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	BRG.	
CAMBER ( GIRDER ALONE IN PLACE )	↑	0	0.112	0.212	0.290	0.339	0.356	0.339	0.290	0.212	0.112	0	0	0.075	0.142	0.194	0.228	0.239	0.228	0.194	0.142	0.075	0
* DEFLECTION DUE TO SUPERIMPOSED D.L.	↓	0	0.045	0.086	0.118	0.138	0.145	0.138	0.118	0.086	0.045	0	0	0.033	0.062	0.085	0.100	0.105	0.100	0.085	0.062	0.033	0
FINAL CAMBER	↑	0	13/16"	1 1/2"	2 1/16"	2 1/16"	2 3/16"	2 1/16"	2 1/16"	1 1/2"	13/16"	0	0	1/2"	1 5/16"	1 5/16"	1 9/16"	1 5/8"	1 9/16"	1 5/16"	1 5/16"	1 1/2"	0

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



### FRAMING PLAN

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

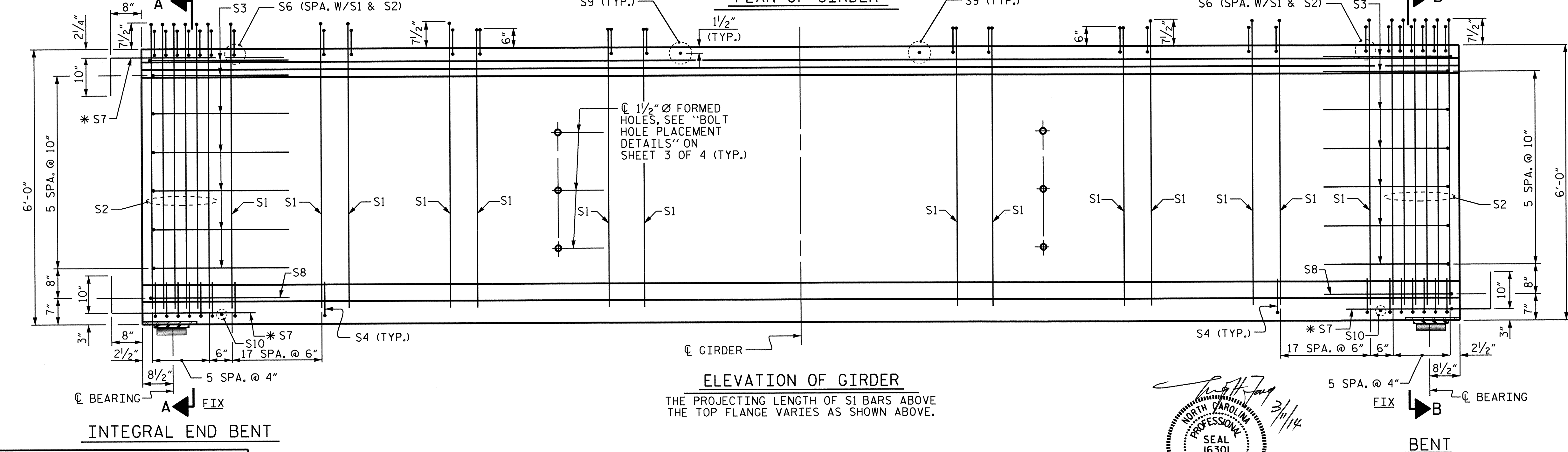
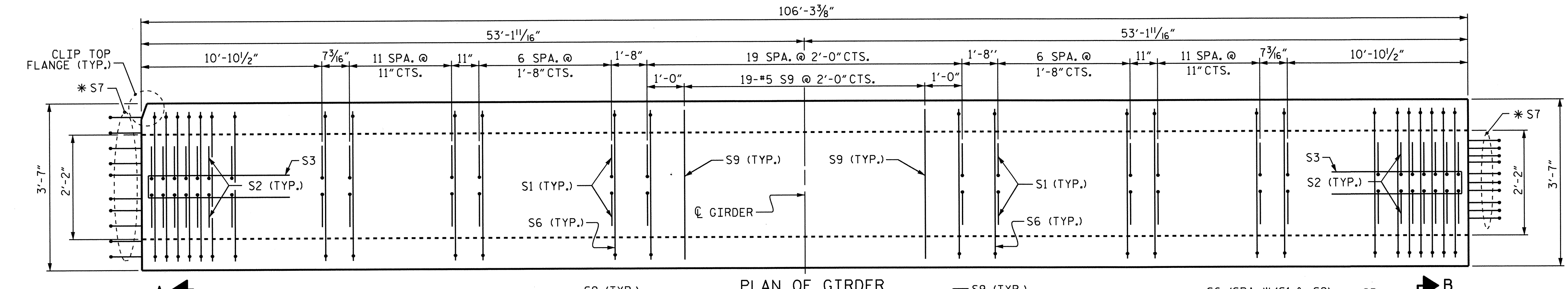
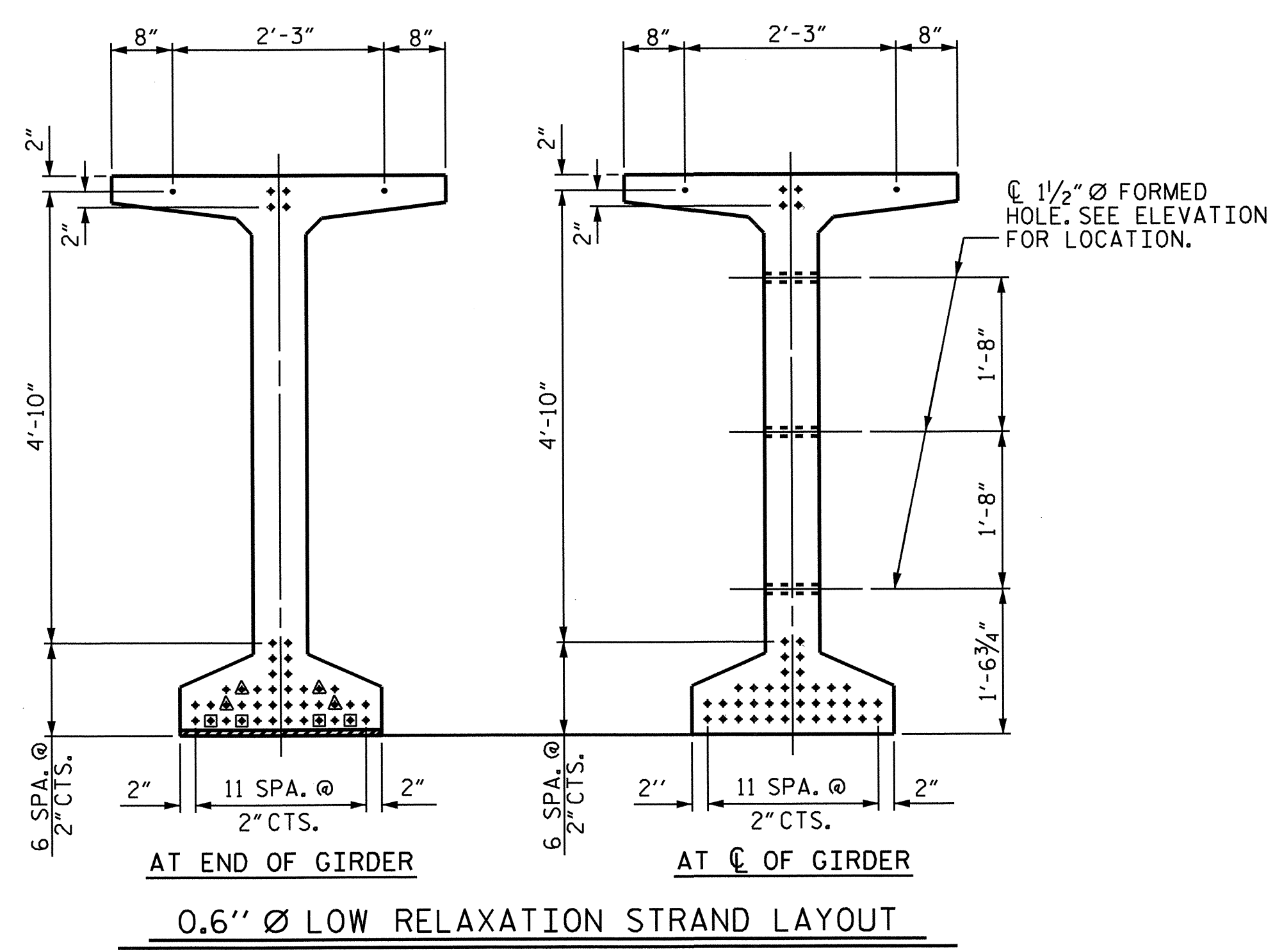
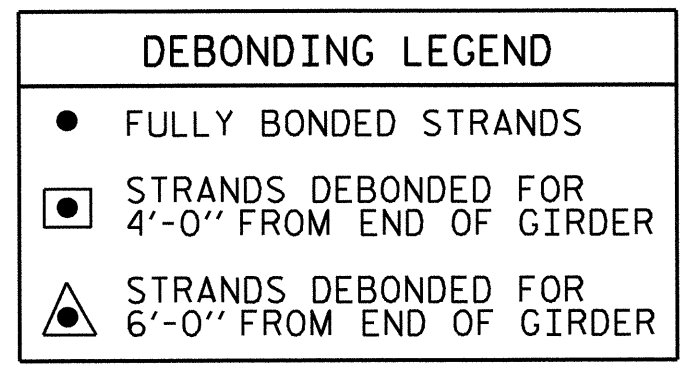
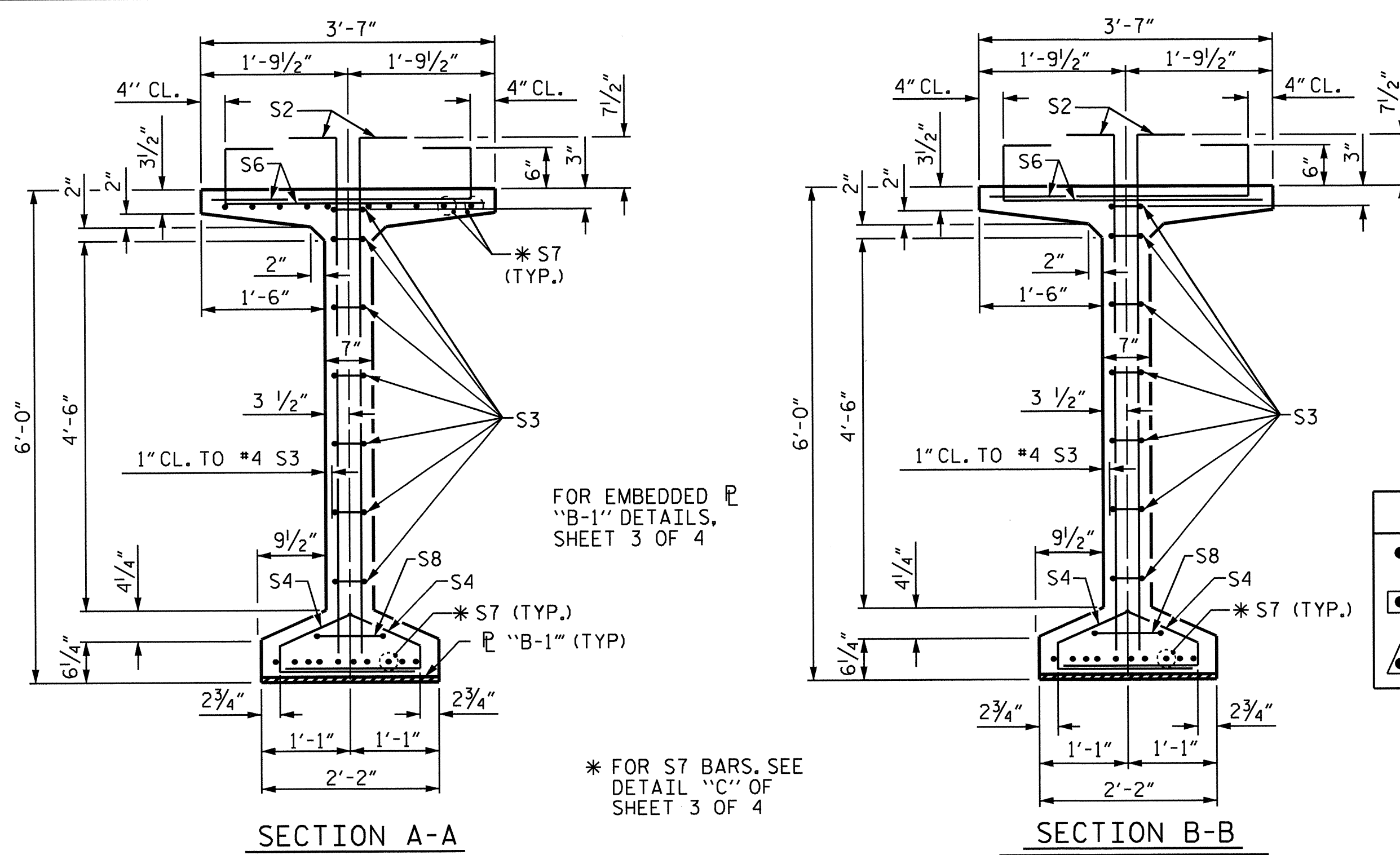
PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 60+37.13 -L-



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
FRAMING PLAN &  
DEAD  
LOAD DEFLECTIONS

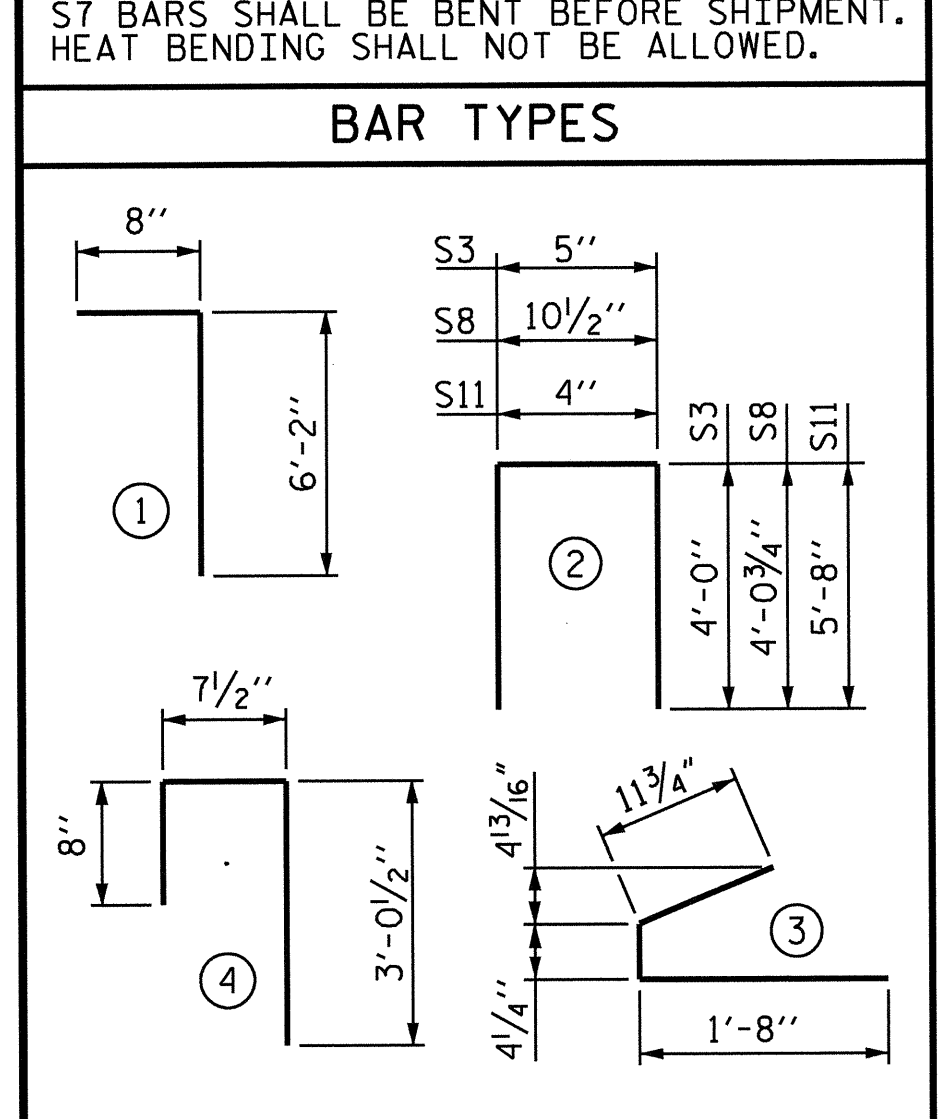
DRAWN BY : RAMAN PATEL DATE : 3-9-12  
CHECKED BY : E.I. OMILE DATE : 11-20-12  
DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-13	
1			3			TOTAL SHEETS	
2			4			38	



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

REINFORCING STEEL FOR ONE GDR						
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT	
S1	188	#4	1	6'-10"	858	
S2	24	#5	1	6'-10"	171	
S3	14	#4	2	8'-5"	79	
S4	96	#4	3	3'-0"	192	
S6	212	#5	4	4'-4"	958	
*S7	30	#5	STR	3'-8"	115	
S8	2	#5	2	9'-0"	19	
S9	19	#5	STR	3'-3"	64	
S10	2	#3	STR	1'-10"	1	
S11	8	#5	2	11'-8"	97	
S12	16	#4	STR	8'-0"	86	



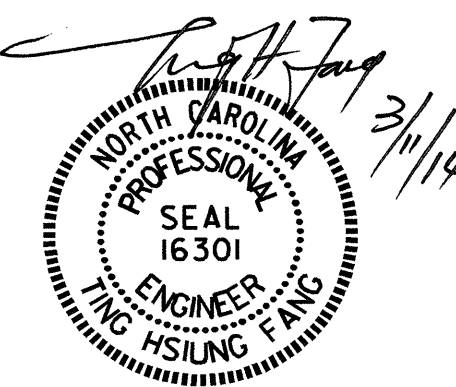
QUANTITIES FOR ONE GIRDER		
REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
LB.	C.Y.	No.
2,640	22.8	44

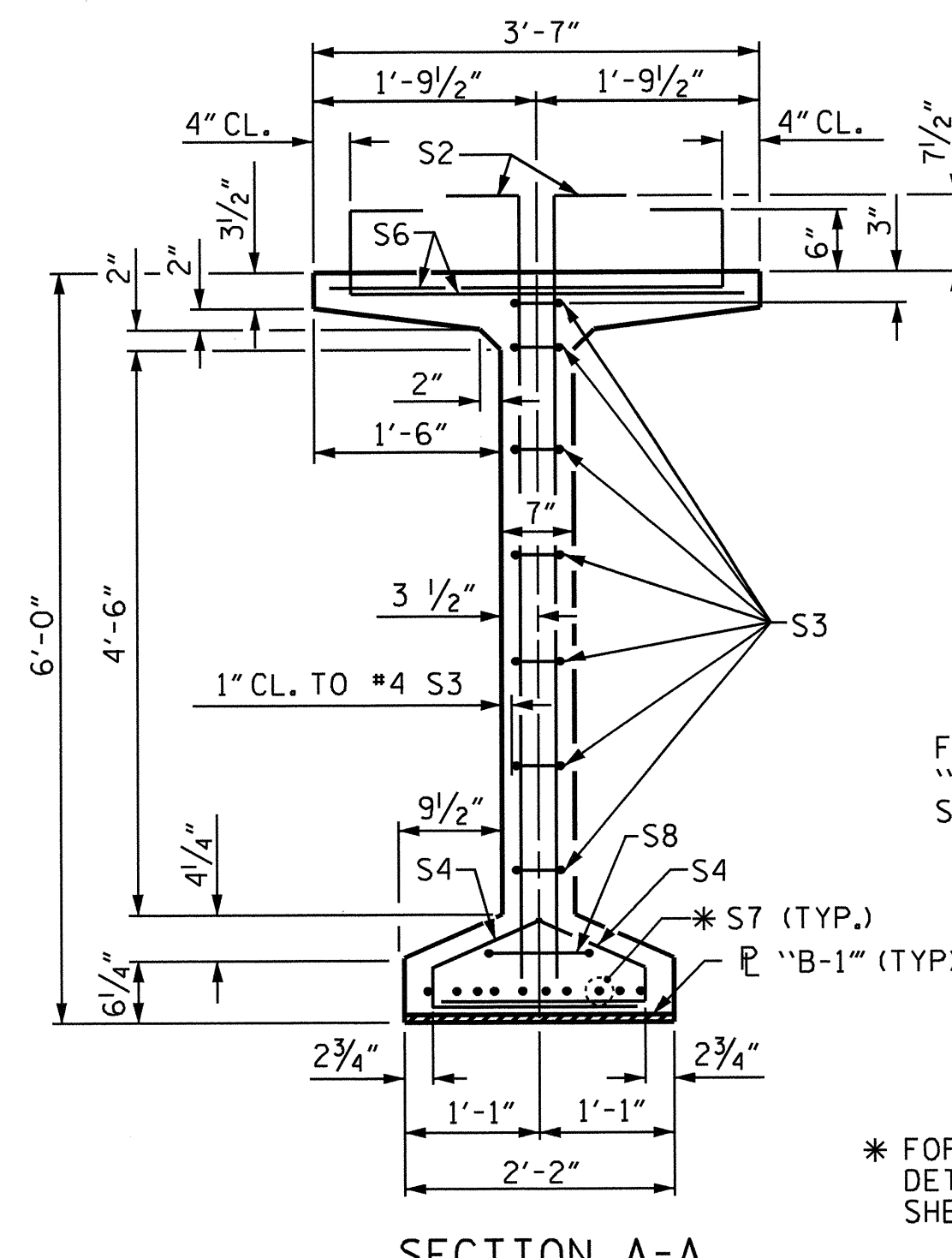
GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
10	106'-3 3/8"	1062.81'

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

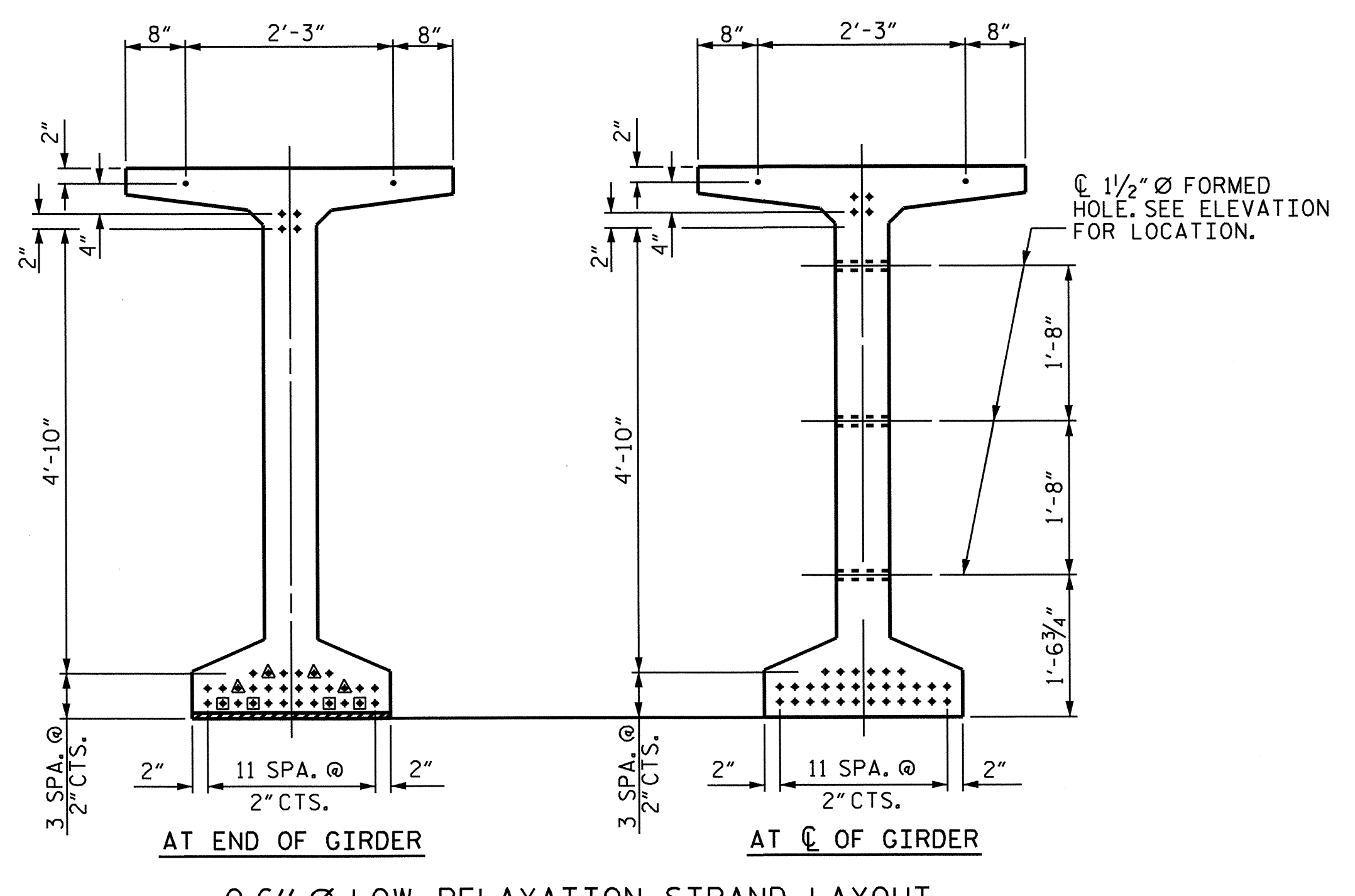
SHEET 1 OF 4  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 72" PRESTRESSED CONCRETE  
 MODIFIED BULB TEE  
 CONTINUOUS FOR LIVE LOAD  
 SPANS A & C

ASSEMBLED BY : RAMAN PATEL DATE : 2-13-12  
 CHECKED BY : E.I. OMILE DATE : 11-14-12  
 DRAWN BY : EEM 2/6/97 REV. 10/17/00 RWW/LES  
 CHECKED BY : VAP 2/6/97 REV. 5/1/06R TLA/GM  
 REV. 10/1/11 MAA/GM





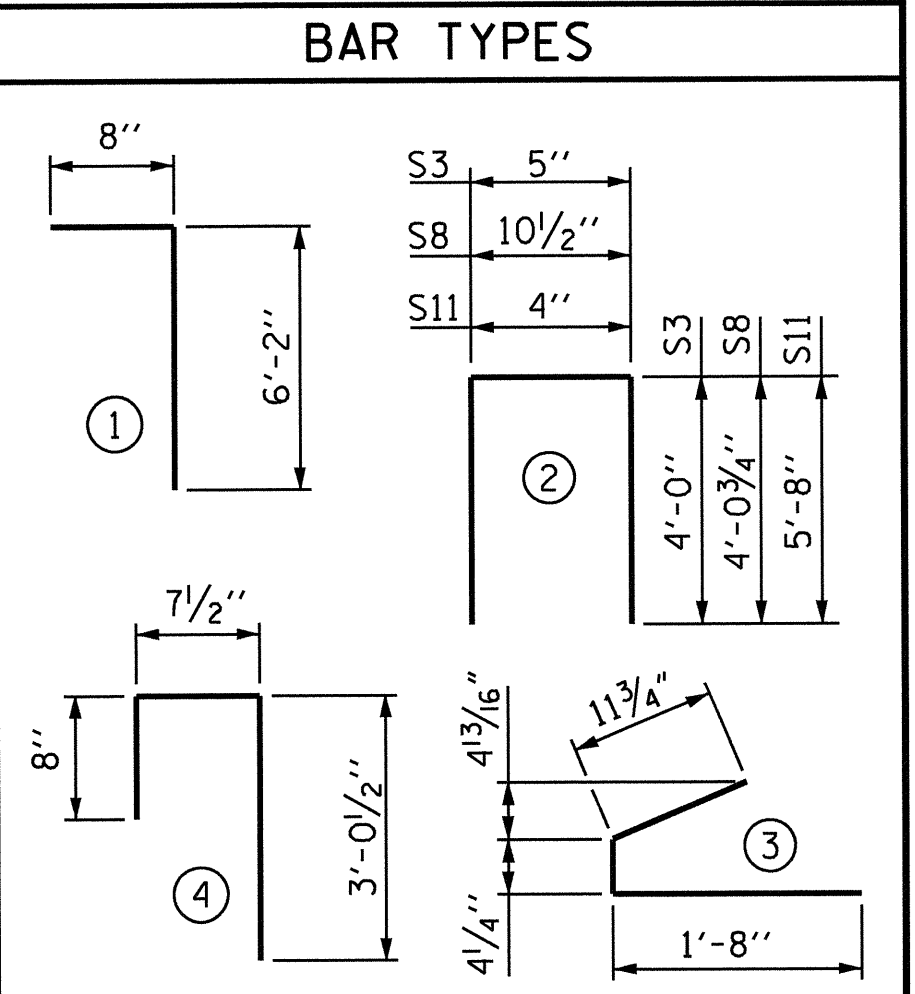
DEBONDING LEGEND	
●	FULLY BONDED STRANDS
□	STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
△	STRANDS DEBONDED FOR 6'-0" FROM END OF GIRDER



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

REINFORCING STEEL FOR ONE GIRDER					
BAR	NUMBER	SIZE	TYPE	LENGTH	WEIGHT
S1	166	#4	1	6'-10"	758
S2	24	#5	1	6'-10"	171
S3	14	#4	2	8'-5"	79
S4	92	#4	3	3'-0"	184
S6	190	#5	4	4'-4"	859
*S7	20	#5	STR	3'-8"	76
S8	2	#5	2	9'-0"	19
S10	2	#3	STR	1'-10"	1
S11	4	#5	2	11'-8"	49
S12	8	#4	STR	8'-0"	43

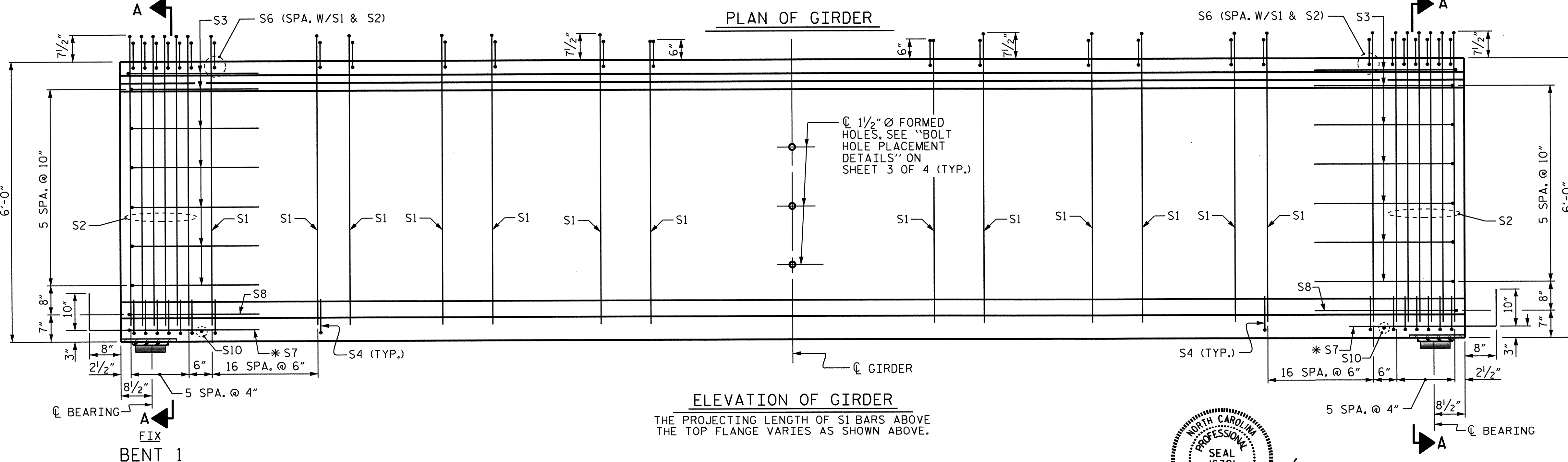
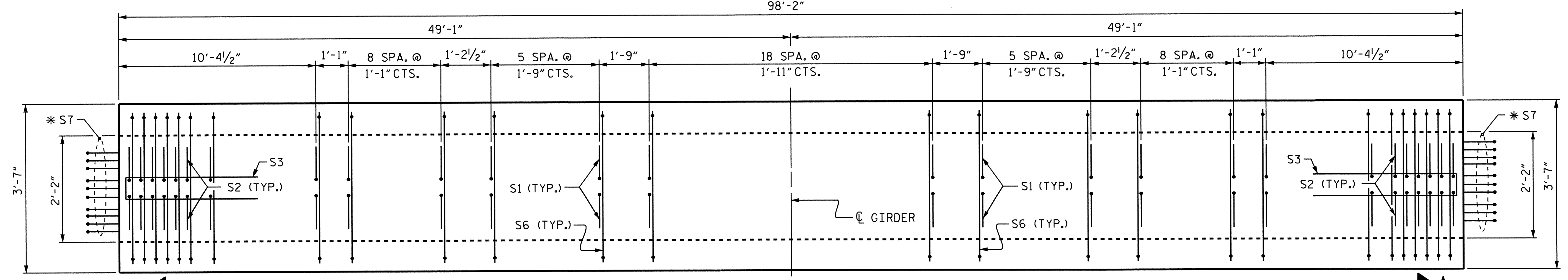
S7 BARS SHALL BE BENT BEFORE SHIPMENT. HEAT BENDING SHALL NOT BE ALLOWED.



ALL BAR DIMENSIONS ARE OUT-TO-OUT.

QUANTITIES FOR ONE GIRDER		
REINFORCING STEEL	8000 PSI CONCRETE	0.6" Ø L.R. STRANDS
LB.	C.Y.	No.
2,239	21.0	36

GIRDERS REQUIRED		
NUMBER	LENGTH	TOTAL LENGTH
5	98'-2"	490.83'



PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 4

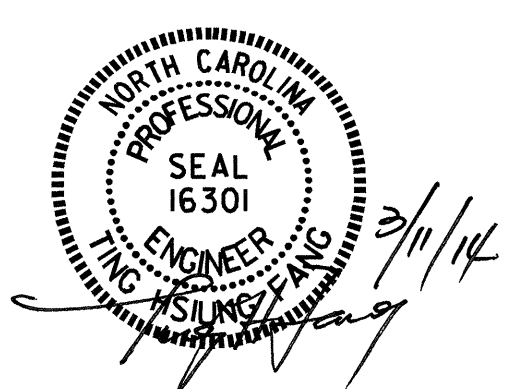
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

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

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

SHEET NO. S-15  
 TOTAL SHEETS 38

ASSEMBLED BY : RAMAN PATEL DATE : 2-13-12  
 CHECKED BY : E.I. OMILE DATE : 11-14-12  
 DRAWN BY : EEM 2/6/97 REV. 10/17/00 RWW/LES  
 CHECKED BY : VAP 2/6/97 REV. 5/1/06R TLA/GM  
 REV. 10/11/11 MAA/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.

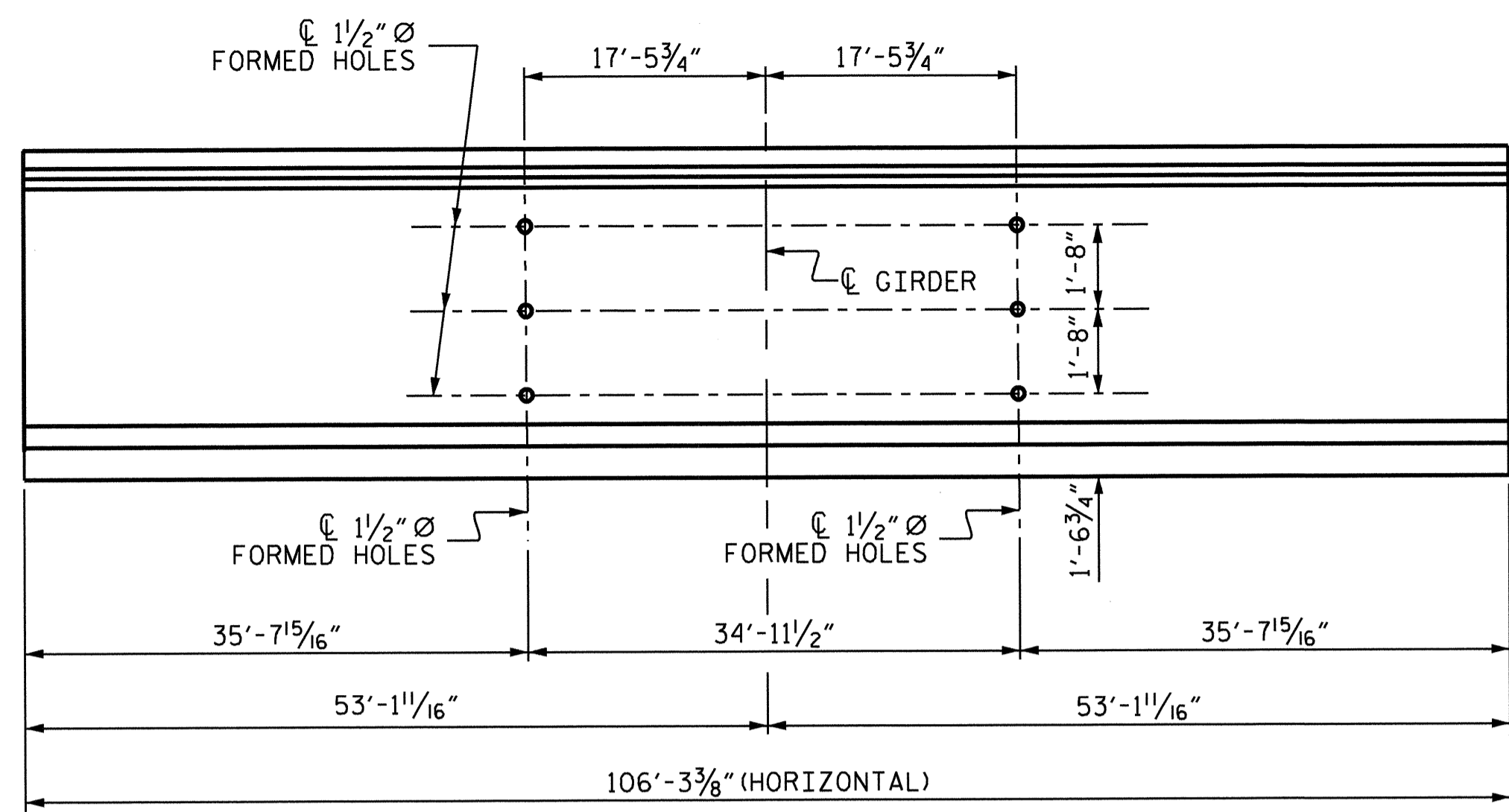
THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE GIRDER SHALL BE DONE WHEN CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 7400 PSI FOR SPAN A OR C AND NOT LESS THAN 6000 PSI FOR SPAN B.

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

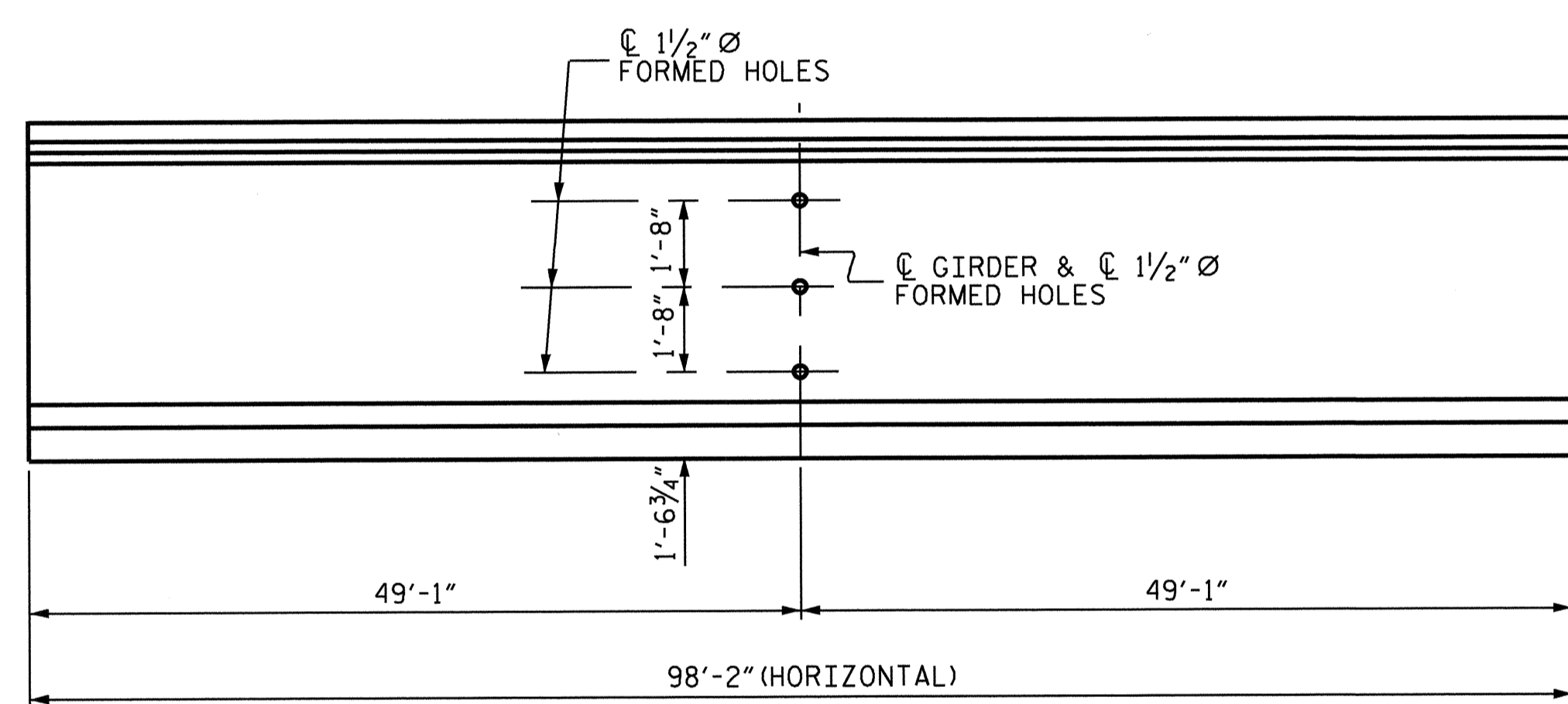
THE TOP SURFACE OF THE GIRDER, EXCLUDING THE OUTSIDE 4", SHALL BE RAKED TO A DEPTH OF 1/4".

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

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

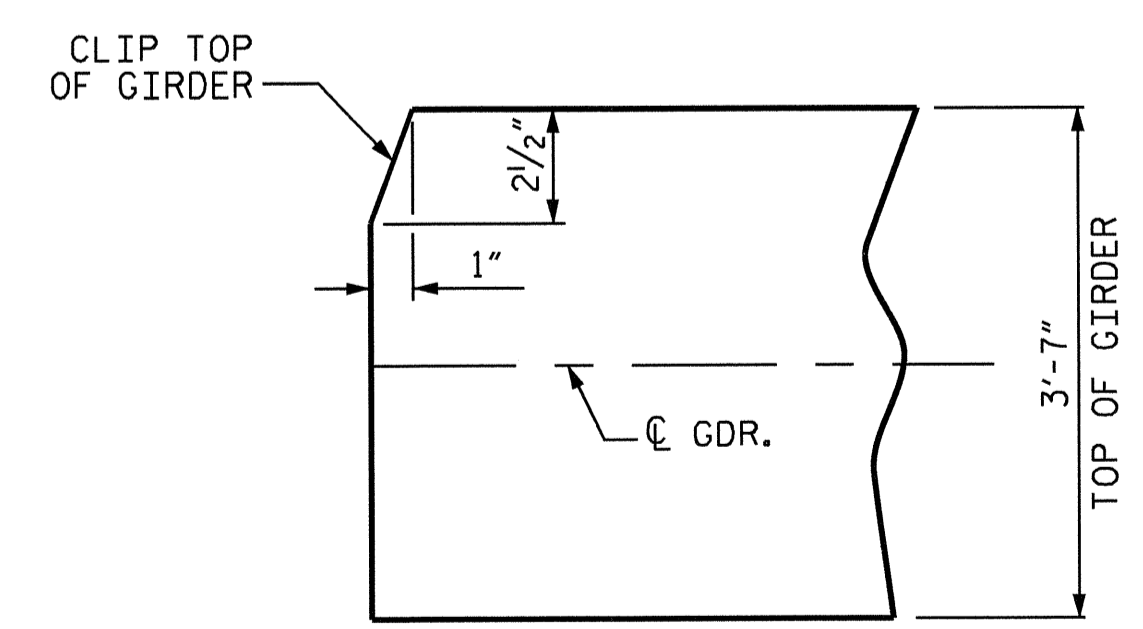


**SPANS A & C**



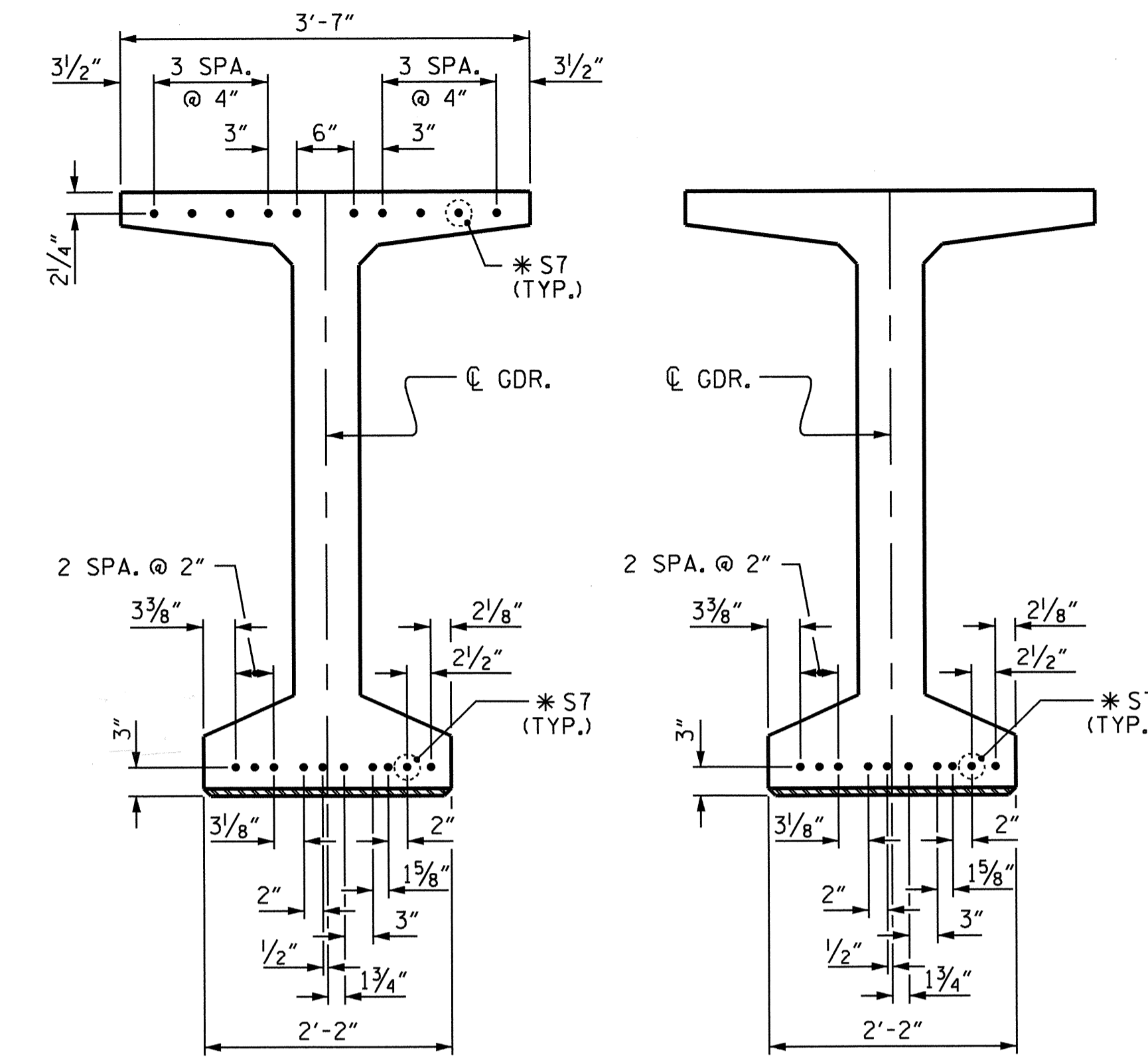
**SPAN B**

**BOLT HOLE PLACEMENT DETAILS**



**TOP FLANGE CLIP DETAILS**

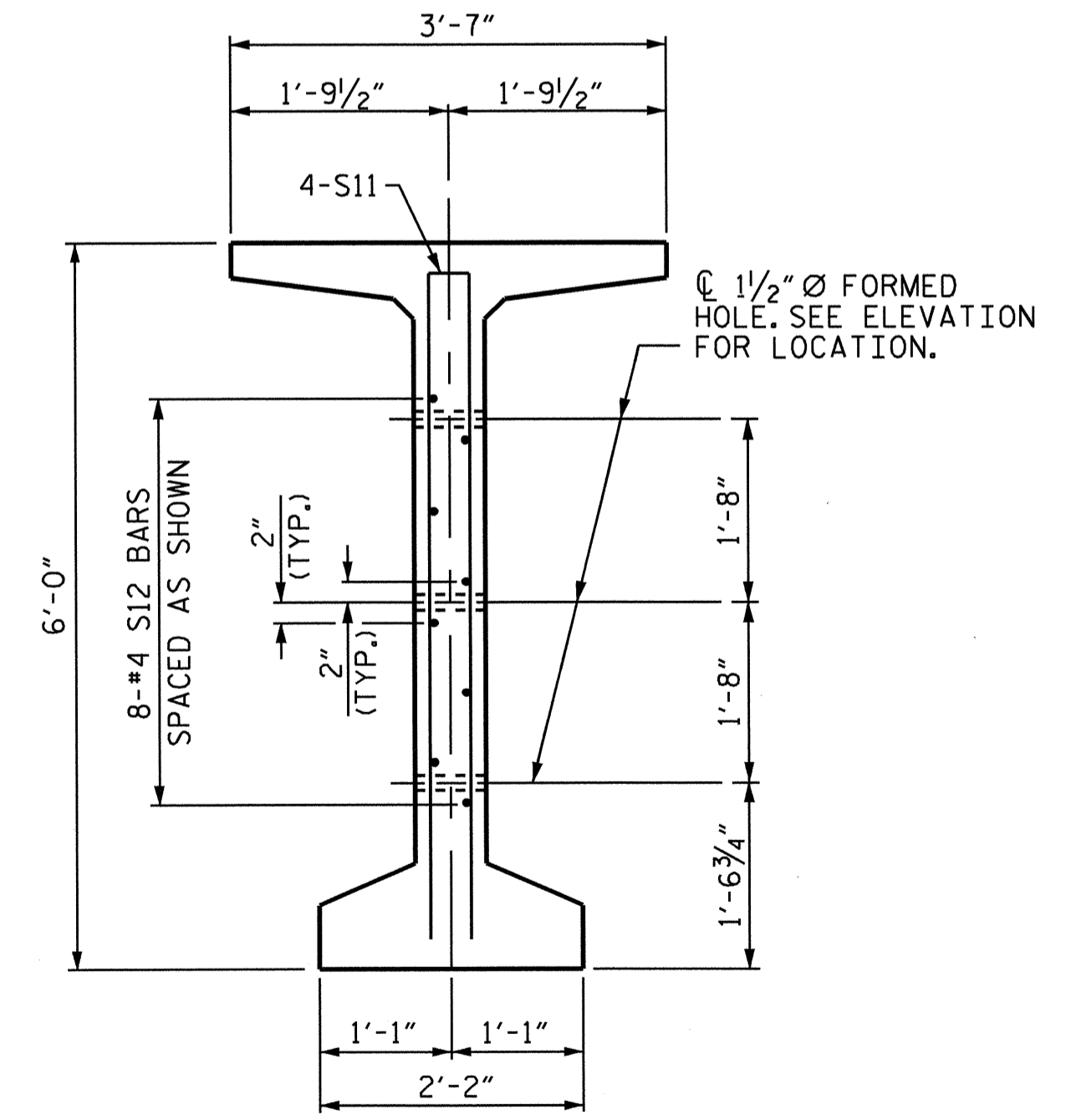
AT END BENT 1 SHOWN, END BENT 2 SIMILAR BY ROTATION



**AT END BENT END**

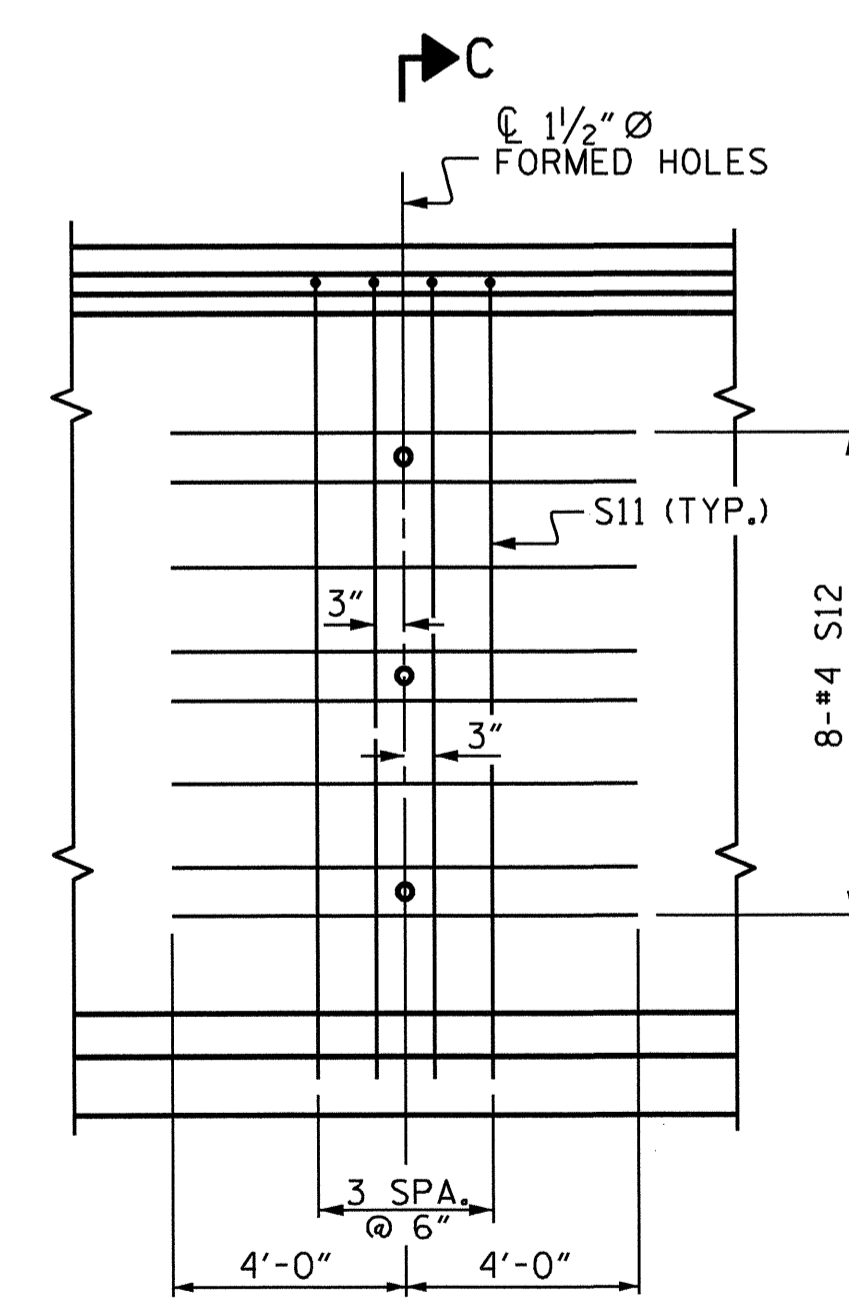
**AT BENT END**

**DETAIL "C"**



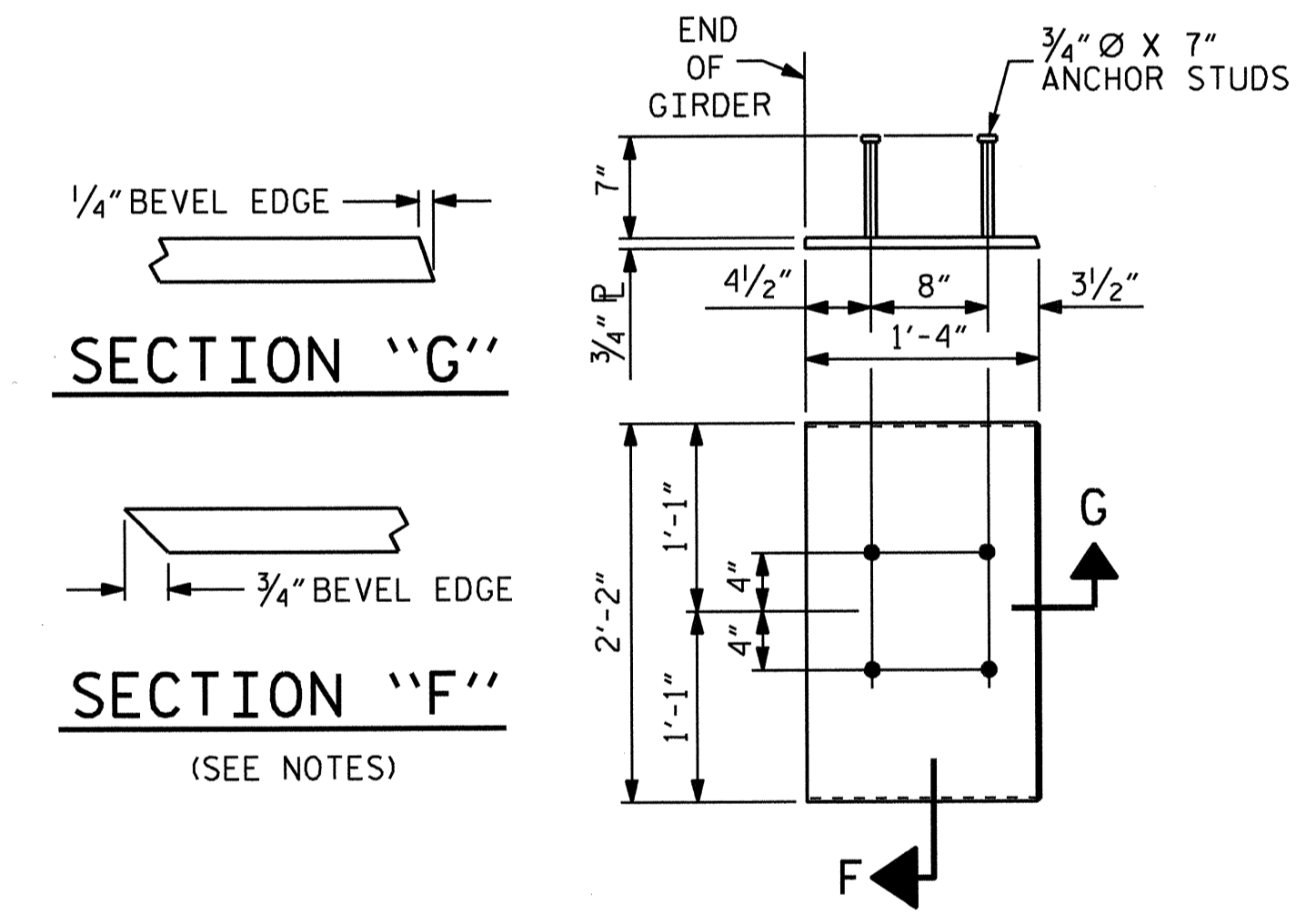
**SECTION C-C**

(S1, S6 AND S9 BARS NOT SHOWN)



**PARTIAL ELEVATION**

SHOWING INTERMEDIATE STEEL DIAPHRAGM REINFORCING STEEL FOR GIRDER



**SECTION "G"**

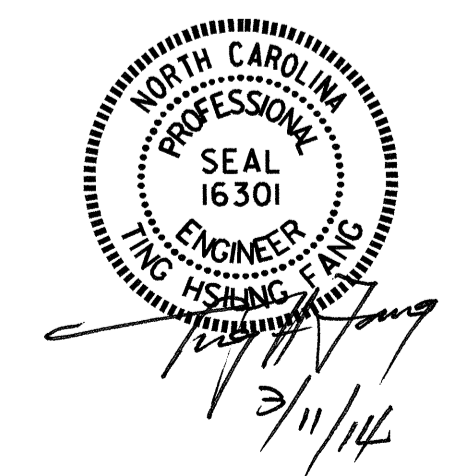
**SECTION "F"**

(SEE NOTES)

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

(2 REQ'D PER GIRDER)

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-  
 SHEET 3 OF 4



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

REVISIONS						SHEET NO. S-16
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

ASSEMBLED BY : RAMAN PATEL	DATE : 2-14-12
CHECKED BY : E.J. OMILE	DATE : 11-15-12
DRAWN BY : ELR 11/91	REV. 7/10/OIRR LES/RDR
CHECKED BY : GRP 11/91	REV. 5/1/06 TLA/GM
	REV. 10/1/11 MAA/GM

STRUCTURAL STEEL NOTES

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

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

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

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

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

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

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

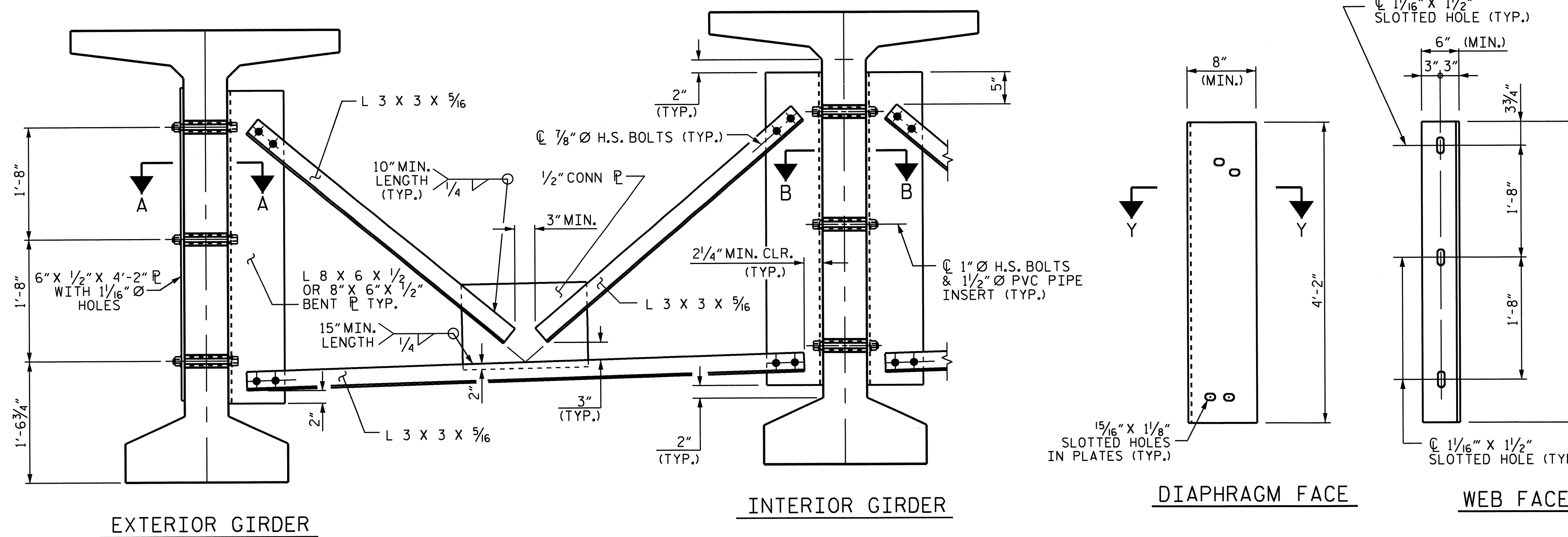
FOR BOLTS THROUGH THE GIRDER WEB, PROVIDE SUFFICIENT LENGTH OF THREADS ON ALL BOLTS TO ACCOMMODATE WASHERS AND THE THICKNESS OF CONNECTING MEMBER PLUS AT LEAST 1/4" PROJECTION BEYOND THE NUT.

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

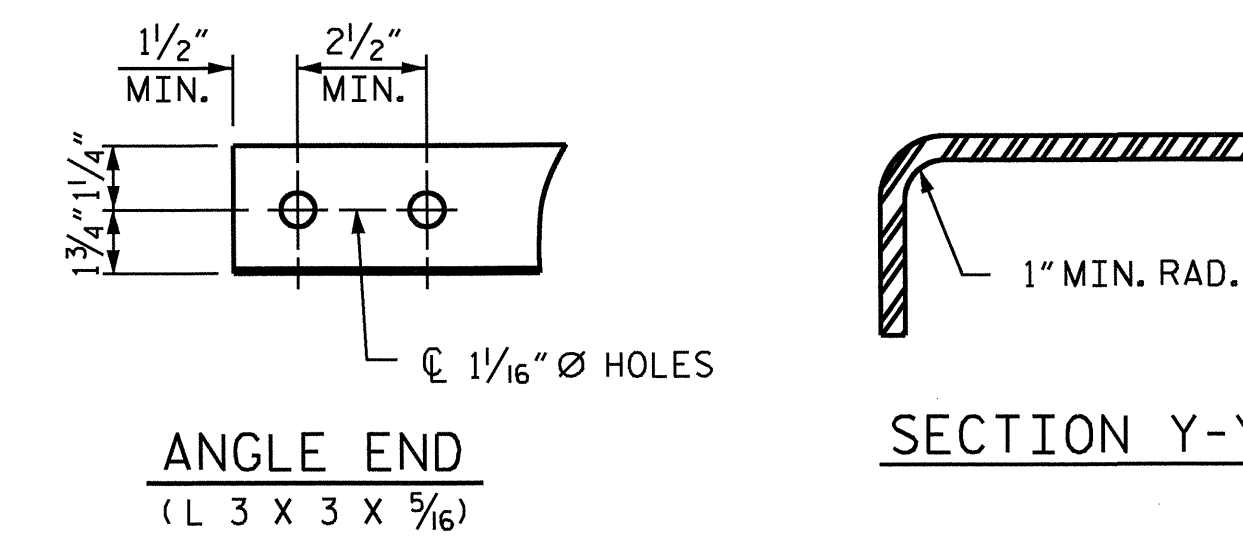
SUBMIT TWO SETS OF WORKING DRAWINGS FOR THE INTERMEDIATE DIAPHRAGM ASSEMBLY FOR REVIEW, COMMENTS AND ACCEPTANCE. AFTER REVIEW, COMMENTS, AND ACCEPTANCE, SUBMIT SEVEN SETS FOR DISTRIBUTION.

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

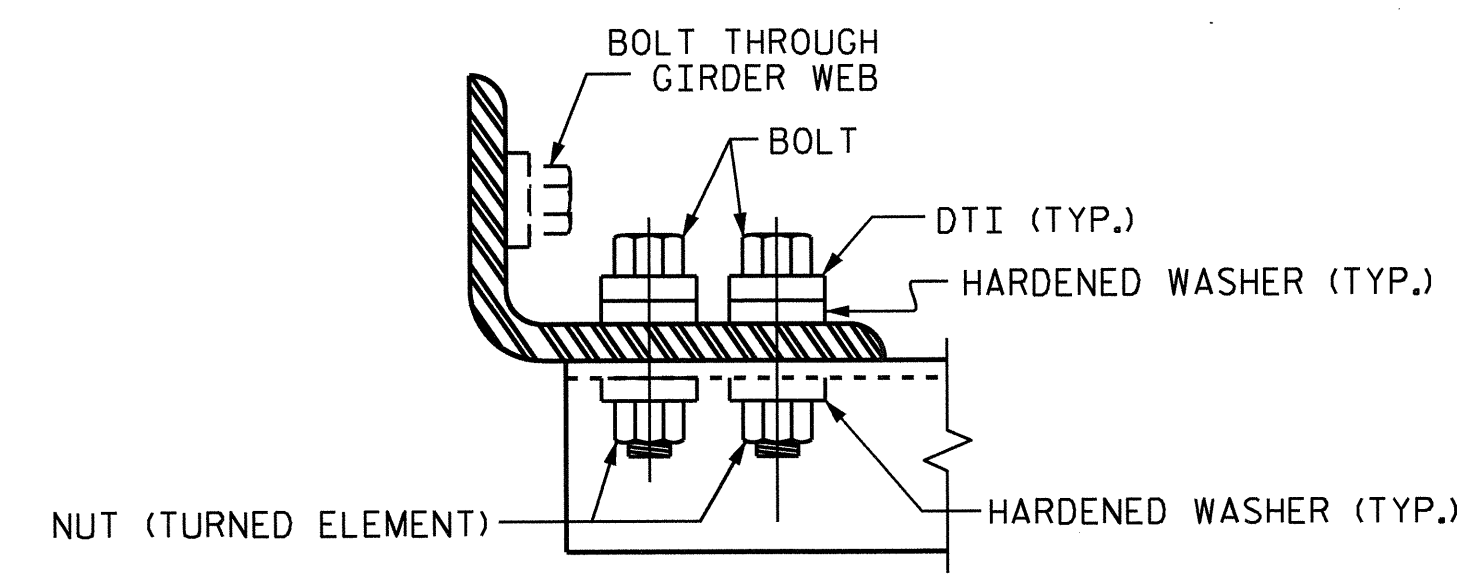
THE COST OF THE STEEL DIAPHRAGMS AND ASSEMBLIES SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE GIRDERS.



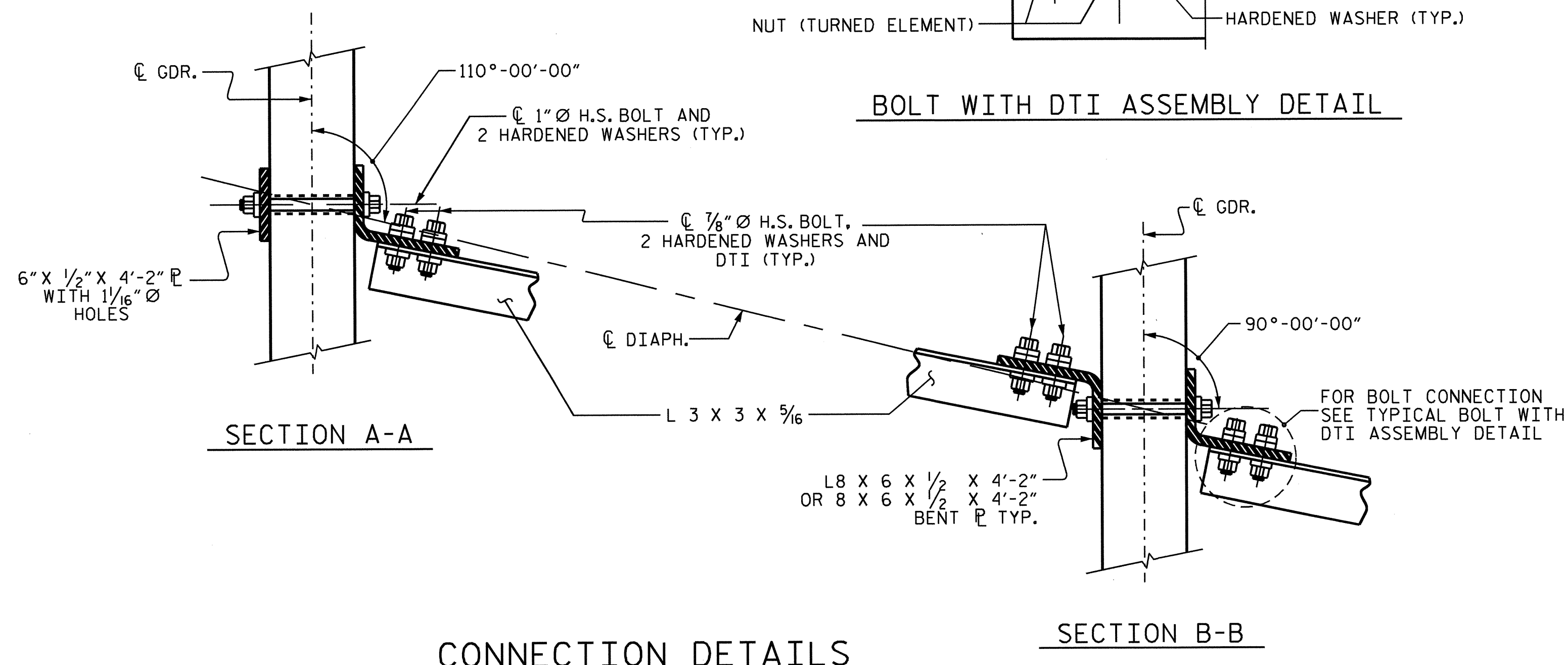
PART SECTION AT INTERMEDIATE DIAPHRAGM



CONNECTOR PLATE DETAIL



BOLT WITH DTI ASSEMBLY DETAIL

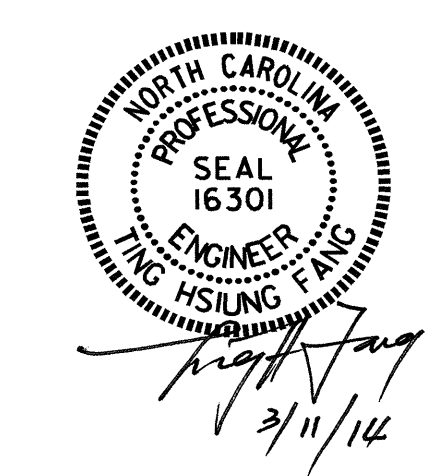


CONNECTION DETAILS

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO. S-17
STANDARD INTERMEDIATE STEEL DIAPHRAGMS FOR 72" MODIFIED BULB TEE PRESTRESSED CONCRETE GIRDERS						
REVISIONS						TOTAL SHEETS 38
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			



ASSEMBLED BY : RAMAN PATEL DATE : 2-14-12  
 CHECKED BY : E.J. OMILE DATE : 11-15-12  
 DRAWN BY : RWW 11/09  
 CHECKED BY : GM 11/09

**NOTES**

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

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

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

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

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

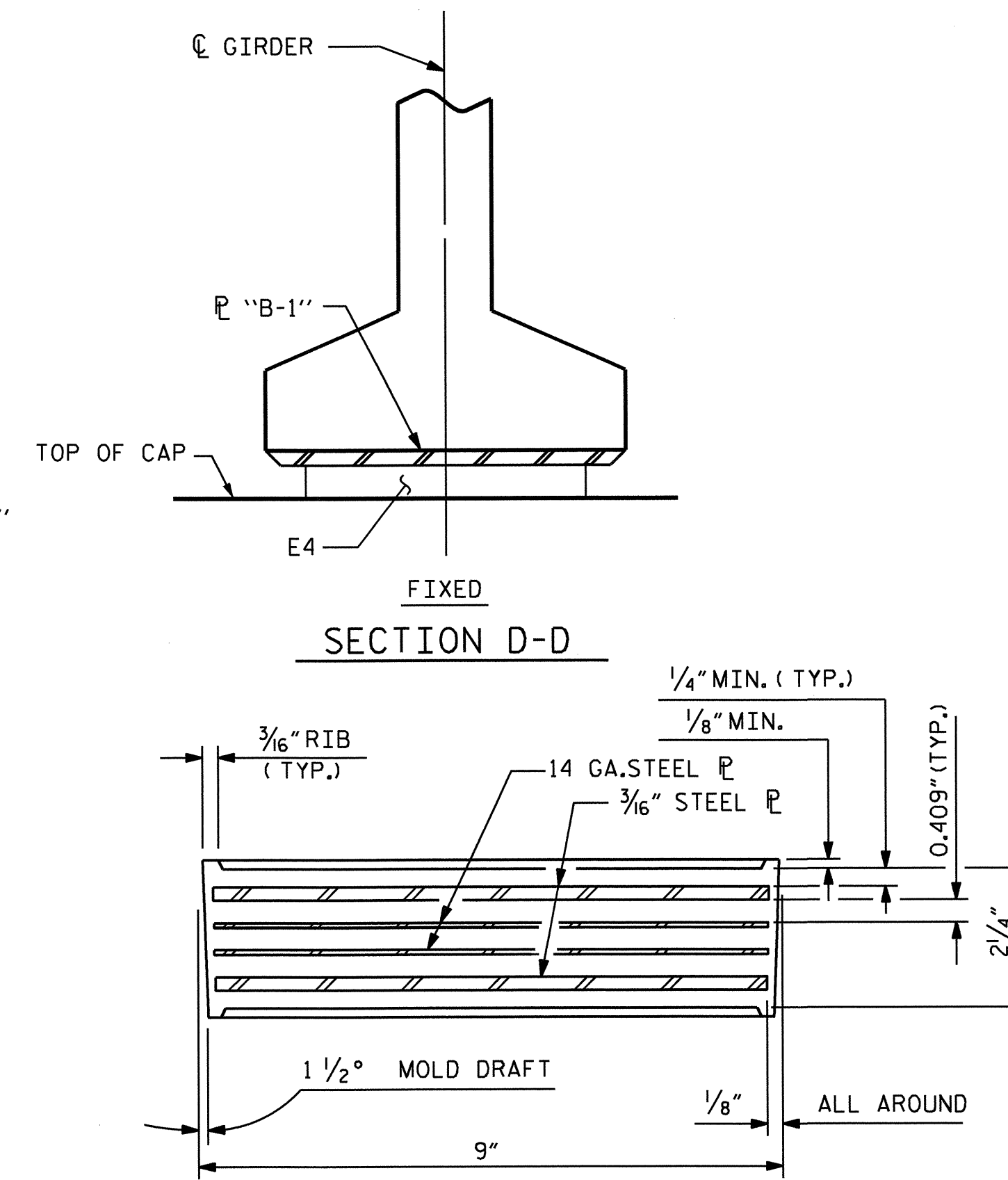
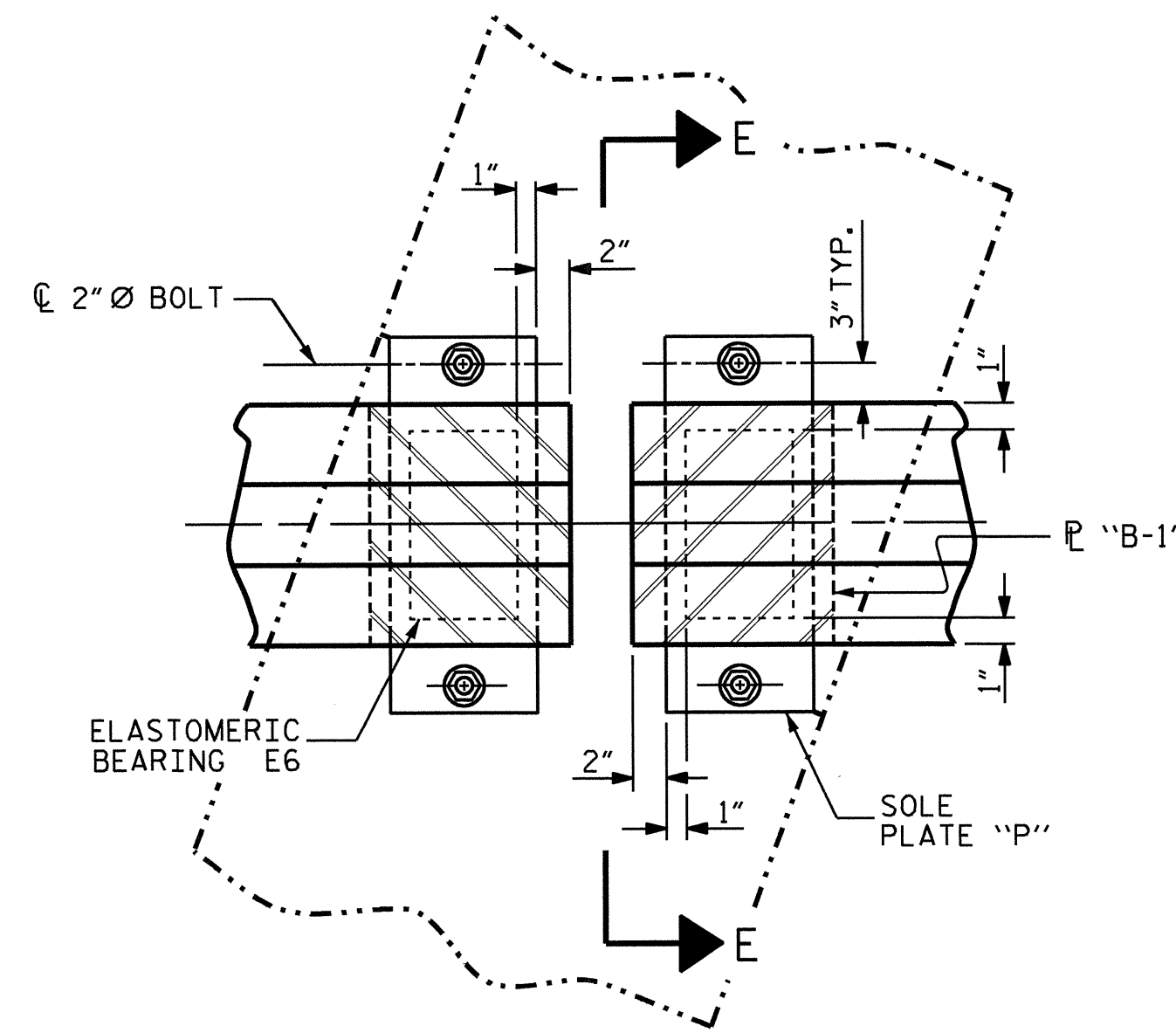
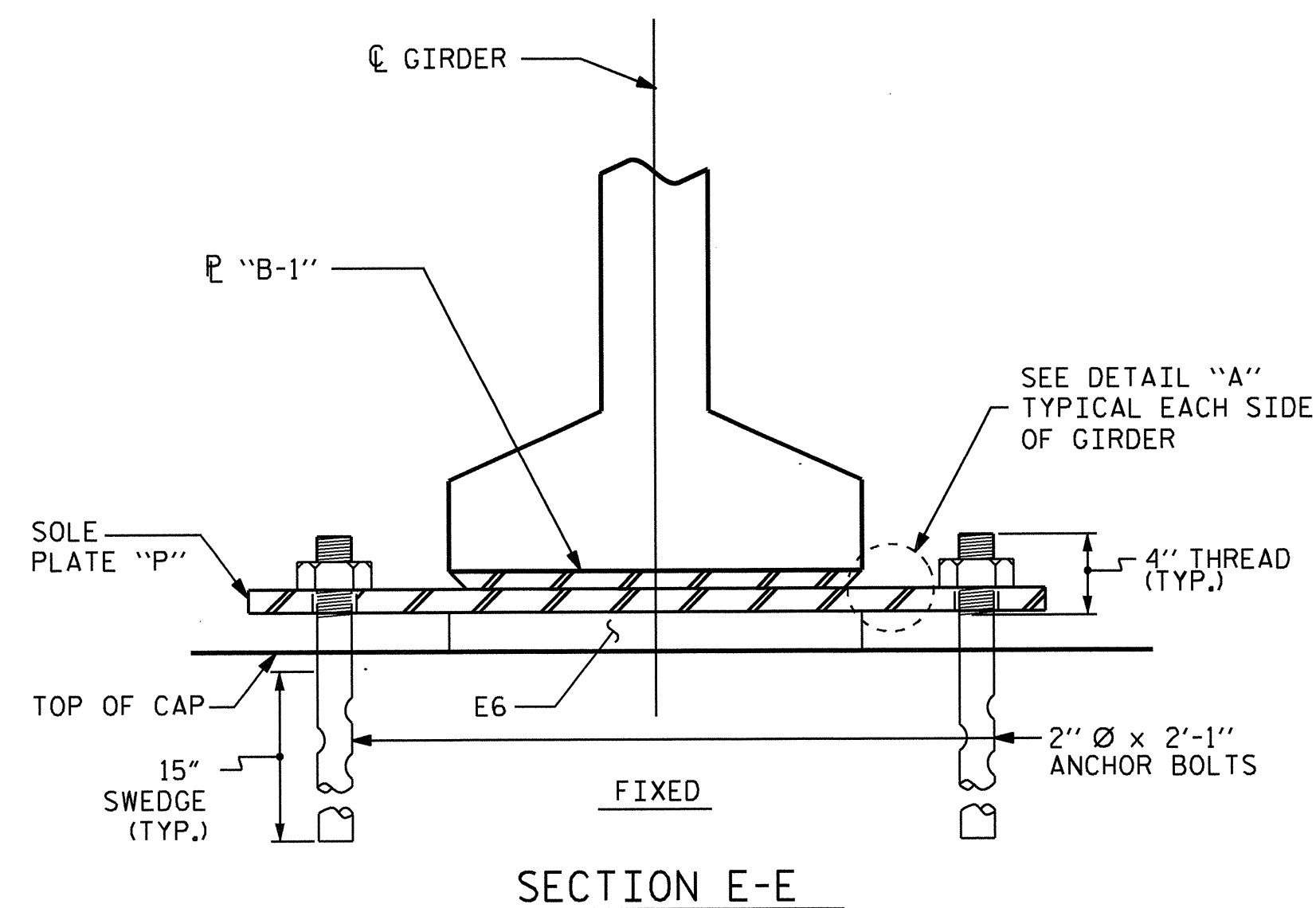
SOLE PLATE "P", BOLTS, NUTS, WASHERS, AND PIPE SLEEVE SHALL BE INCLUDED IN THE PAY ITEM FOR PRESTRESSED CONCRETE GIRDERS.

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

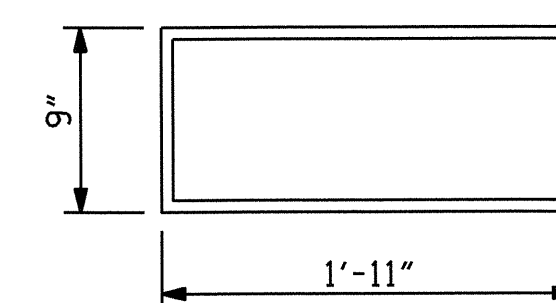
ALL SURFACES OF BEARING PLATES SHALL BE SMOOTH AND STRAIGHT.

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

FOR STEEL REINFORCED ELASTOMERIC BEARINGS, SEE SPECIAL PROVISIONS.



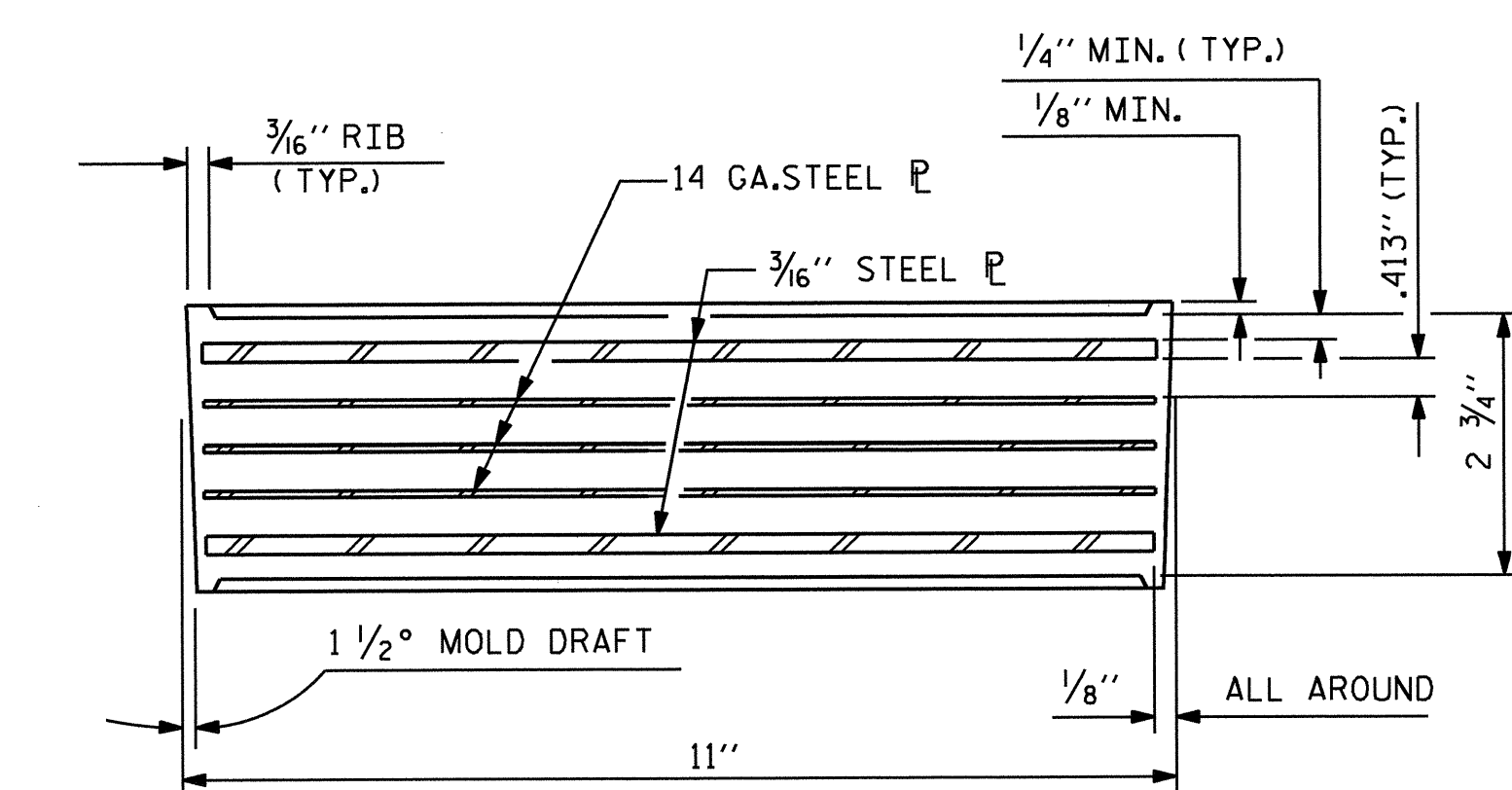
TYPICAL SECTION OF ELASTOMERIC BEARINGS



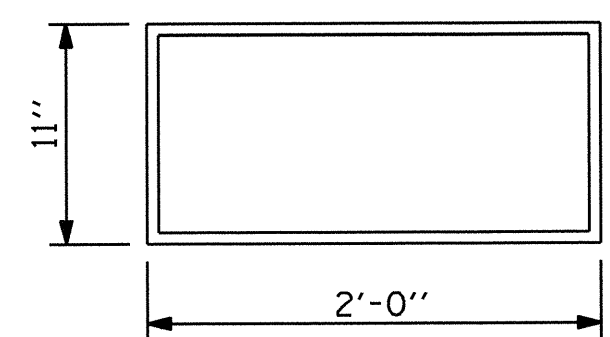
E4 (10 REQ'D)  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE V

PLAN VIEW @ BENT  
(SHOWING INTERIOR BENT)

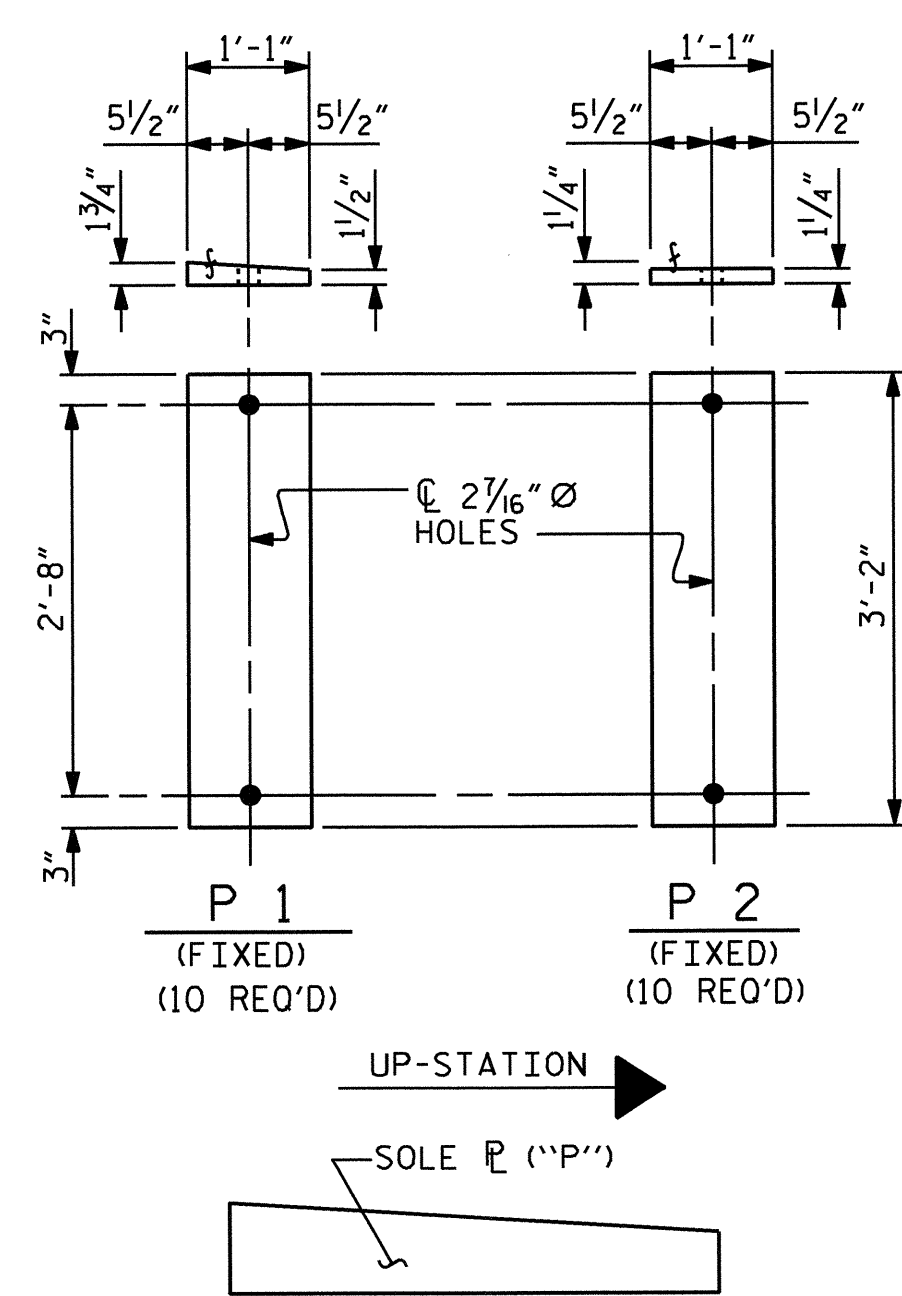
LOAD RATINGS	
	MAX. D.L. + L.L.
TYPE V	335 K
TYPE VII	430 K



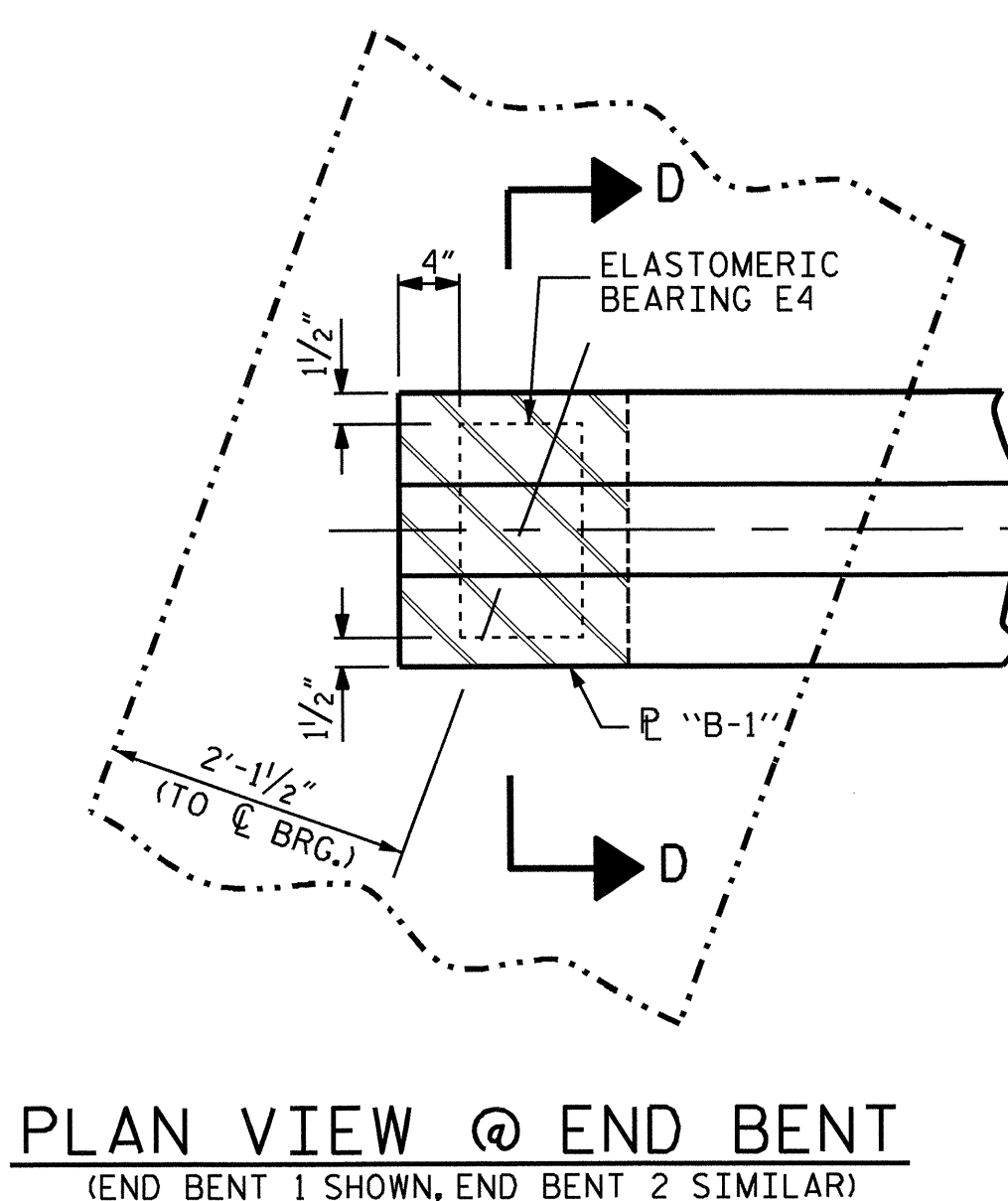
TYPICAL SECTION OF ELASTOMERIC BEARINGS



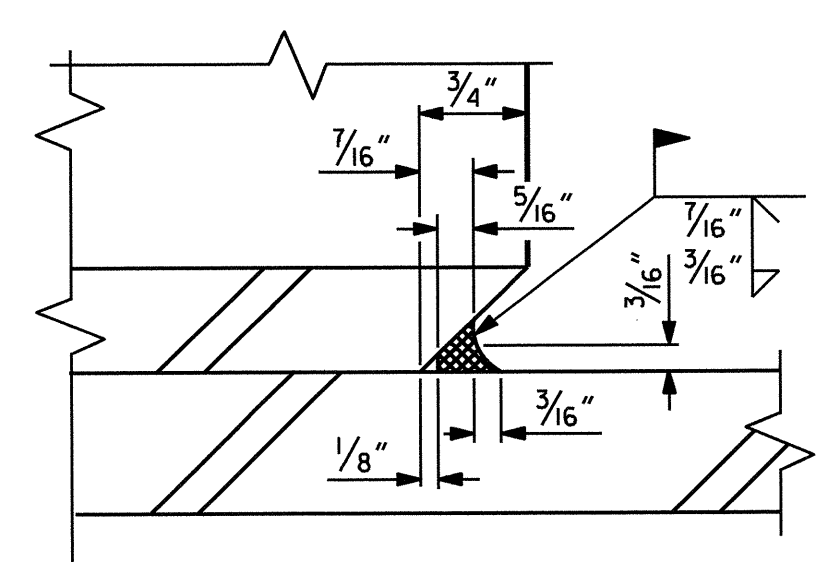
E6 (20 REQ'D)  
PLAN VIEW OF ELASTOMERIC BEARING  
TYPE VII



SOLE PLATE DETAILS

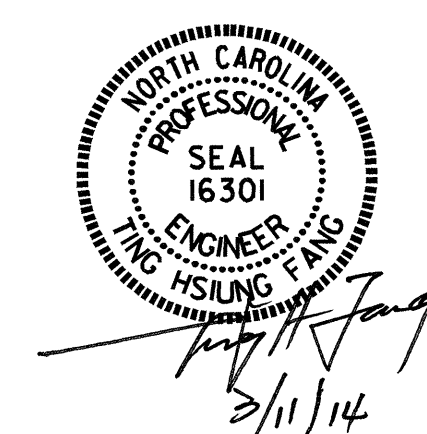


PLAN VIEW @ END BENT  
(END BENT 1 SHOWN, END BENT 2 SIMILAR)



DETAIL "A"

ASSEMBLED BY : RAMAN PATEL	DATE : 2-13-12
CHECKED BY : E.I. OMILE	DATE : 11-15-12
DRAWN BY : EEM 2/97	REV. 10/17/00 RWW/LES
CHECKED BY : VAP 2/97	REV. 5/1/06 TLA/GM
	REV. 10/1/11 MAA/GM



PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 60+37.13 -L-

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

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	5-18
1			3			TOTAL SHEETS
2			4			38

**NOTES**

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

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

**ALUMINUM RAILS**

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

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

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

**GALVANIZED STEEL RAILS**

MATERIAL AND GALVANIZING ARE TO CONFORM TO THE FOLLOWING SPECIFICATIONS:

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

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

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

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

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

**GENERAL NOTES**

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

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE SHEET 3 OF 4.

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.

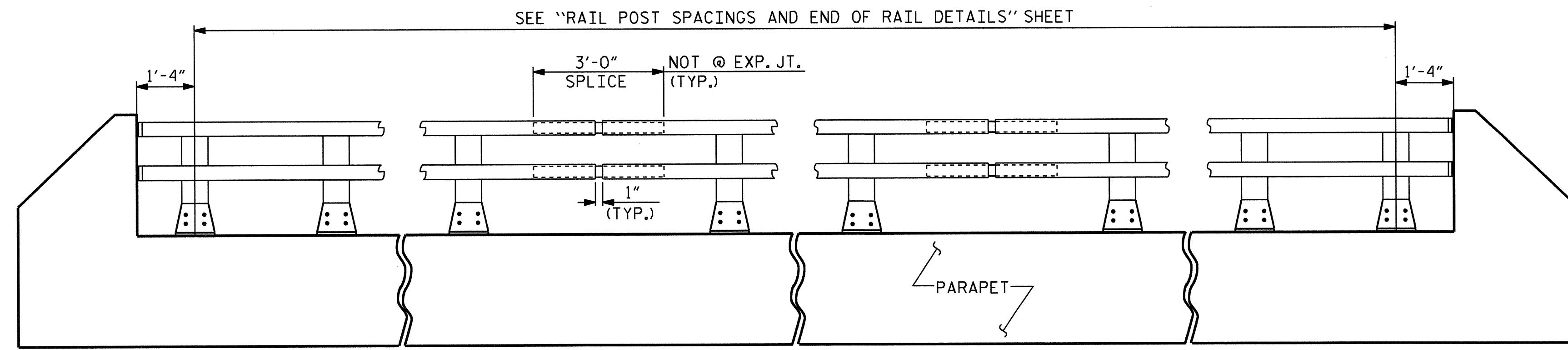
TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAINS VISIBLE AFTER RAIL PLACEMENT.

SHIMS SHALL BE USED AS NECESSARY FOR POST ALIGNMENT.

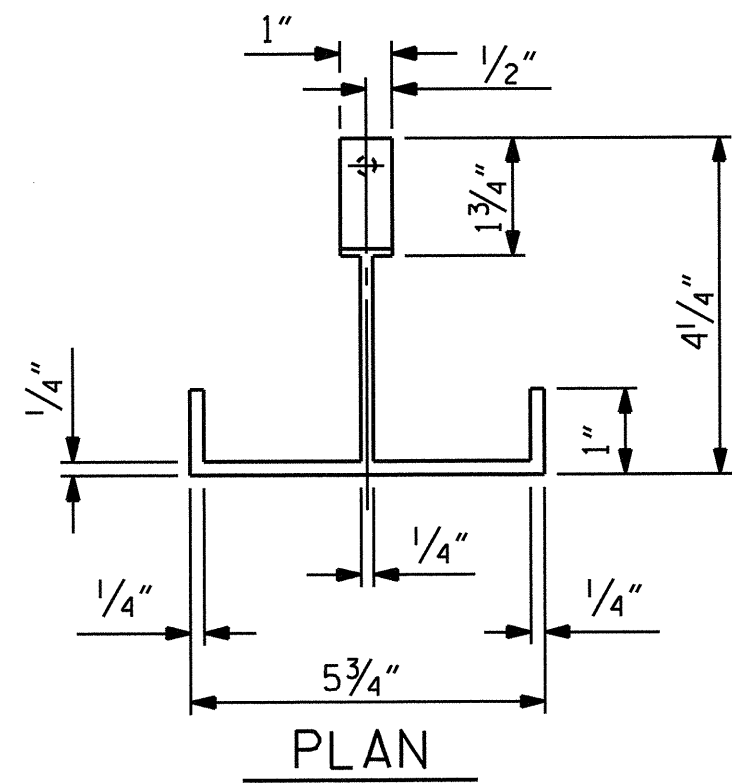
ALLOY 6351-T5 MAY BE SUBSTITUTED FOR ALLOY 6061-T6 WHERE APPLICABLE.

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

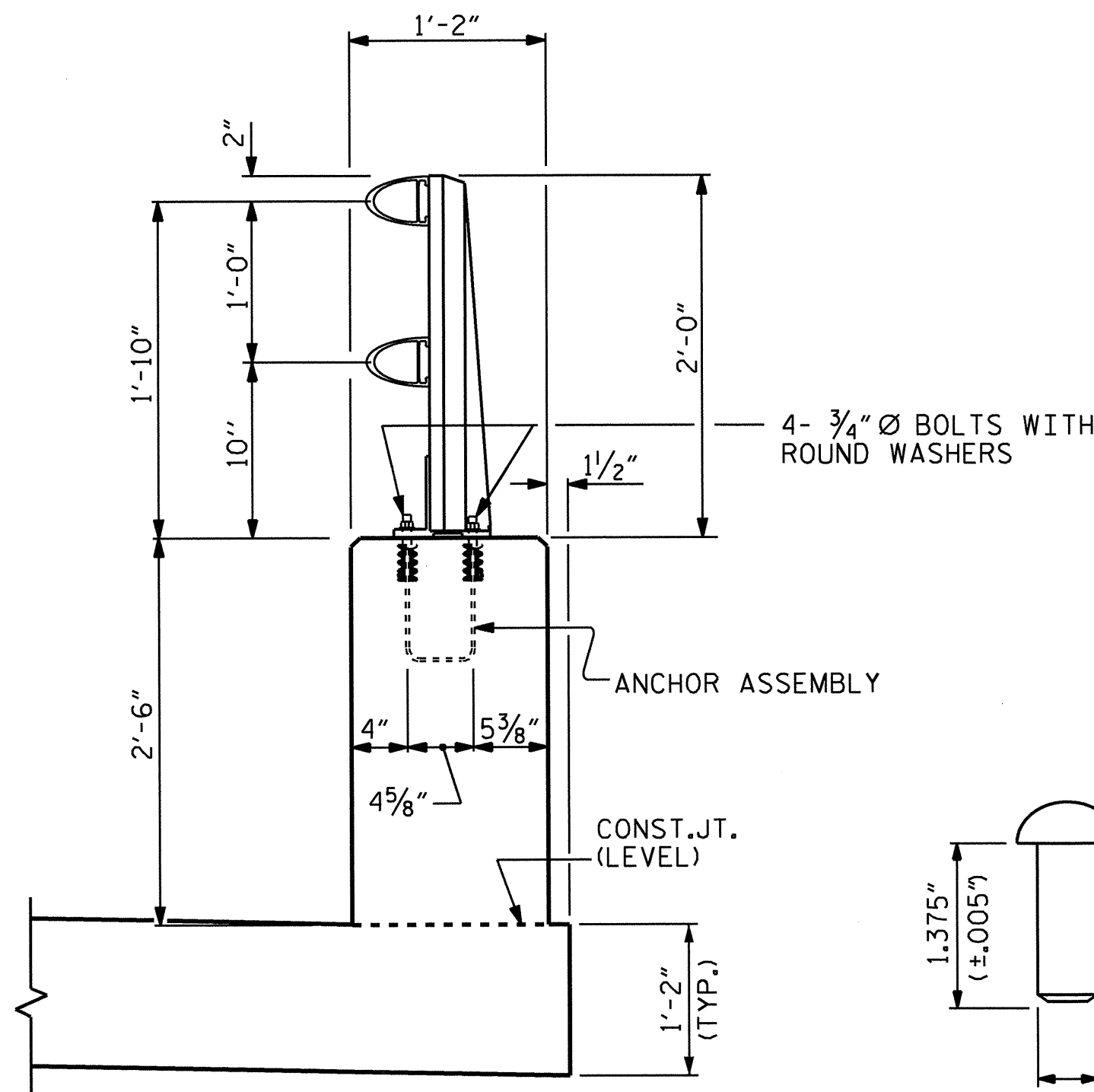
GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE PARAPET IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. THE CONTRACTION JOINT SHALL BE LOCATED AT A SPACING OF 8 FT. TO 10 FT. BETWEEN EXPANSION JOINTS. NO CONTRACTION JOINTS WILL BE REQUIRED FOR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



**ELEVATION**  
FOR ATTACHMENT OF METAL RAIL TO END POST,  
SEE SHEET 3 OF 4

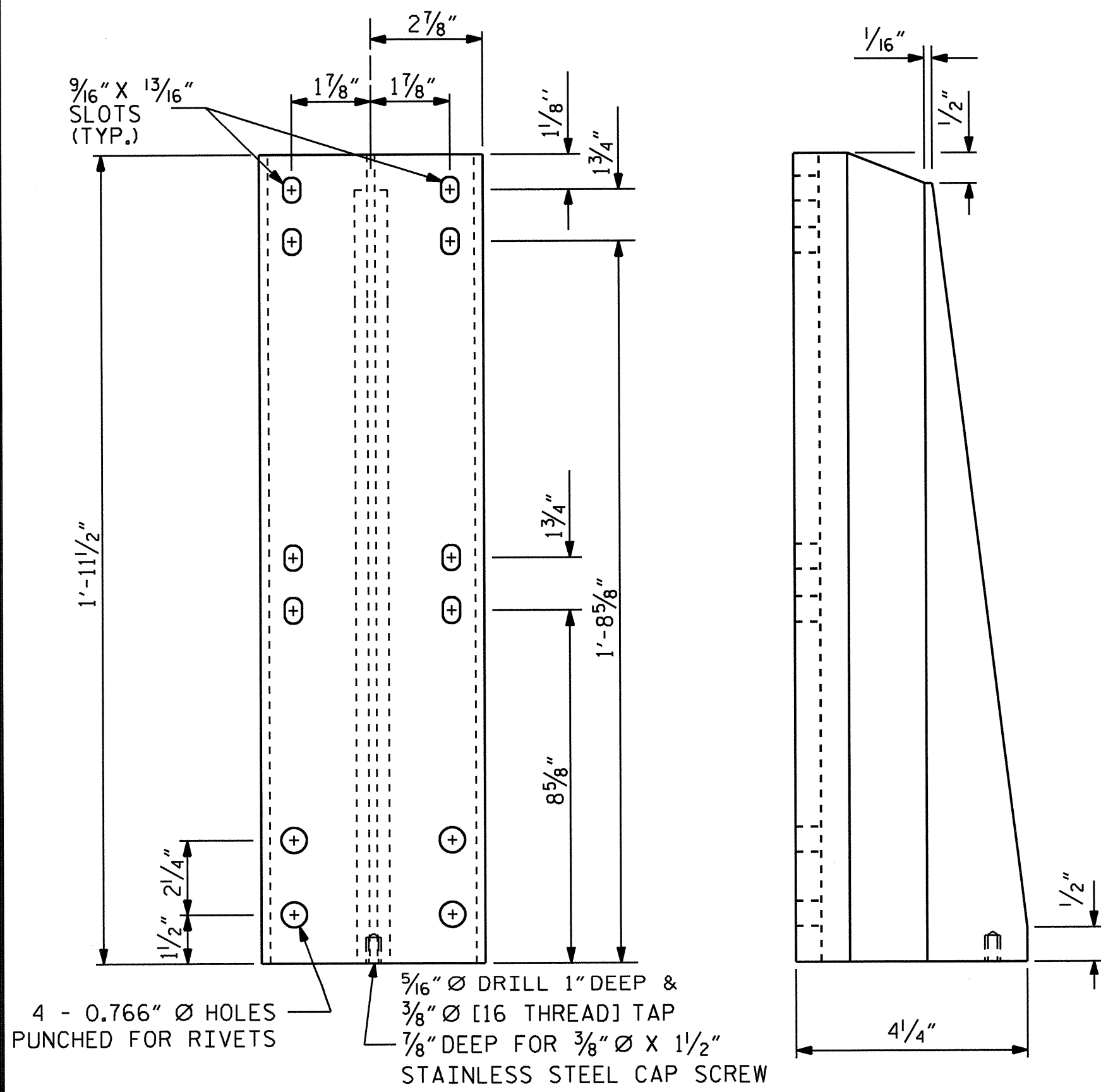


**PLAN**



**SECTION THRU PARAPET**

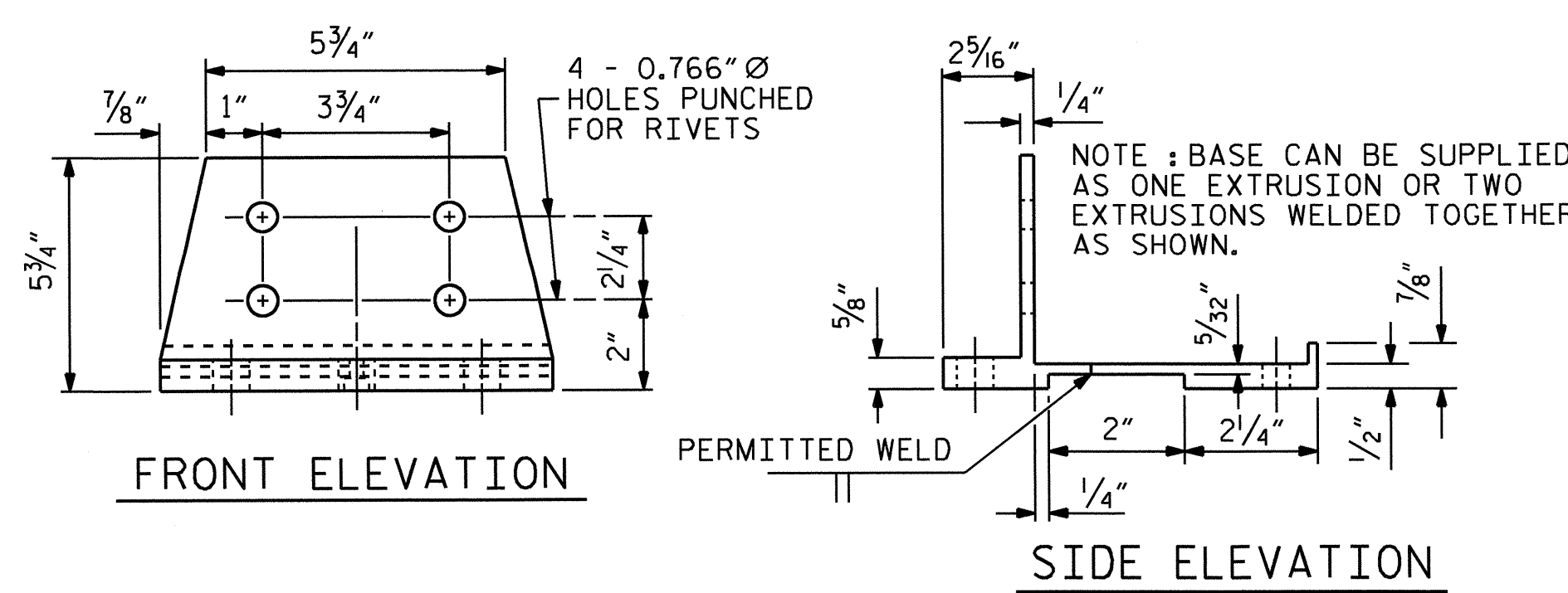
**RIVET DETAIL**



**FRONT ELEVATION**

**SIDE ELEVATION**

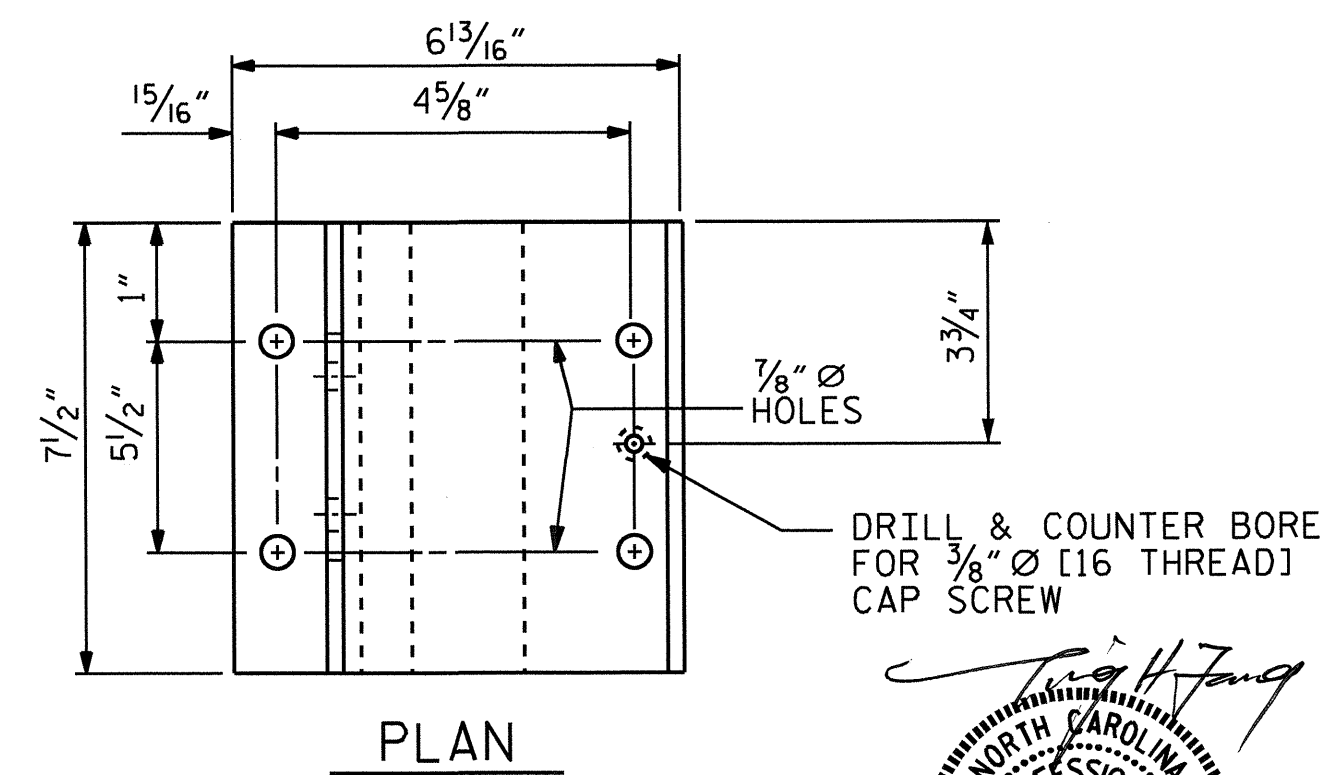
**DETAILS OF POST**



**FRONT ELEVATION**

**SIDE ELEVATION**

**POST BASE DETAILS**



**PLAN**

PAY LENGTH = 611.6 LIN. FT.

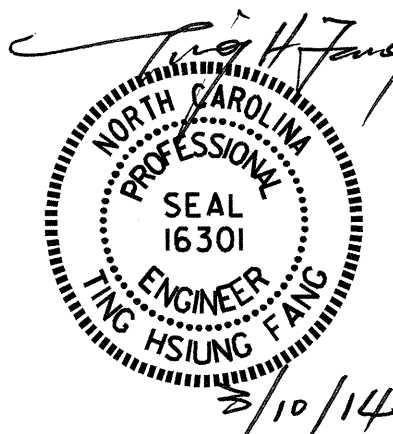
PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 60+37.13 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD

2 BAR METAL RAIL



ASSEMBLED BY : S. B. WILLIAMS DATE : 2-23-12  
CHECKED BY : E. I. OMILE DATE : 11-15-12  
DRAWN BY : EEM 6/94 REV. 5/7/03R RWW/JTE  
CHECKED BY : RCW 6/94 REV. 5/1/06 TL4/GM  
REV. 10/1/11 MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-19
1			3			TOTAL SHEETS 38
2			4			

STD. NO. BMR3

NOTES

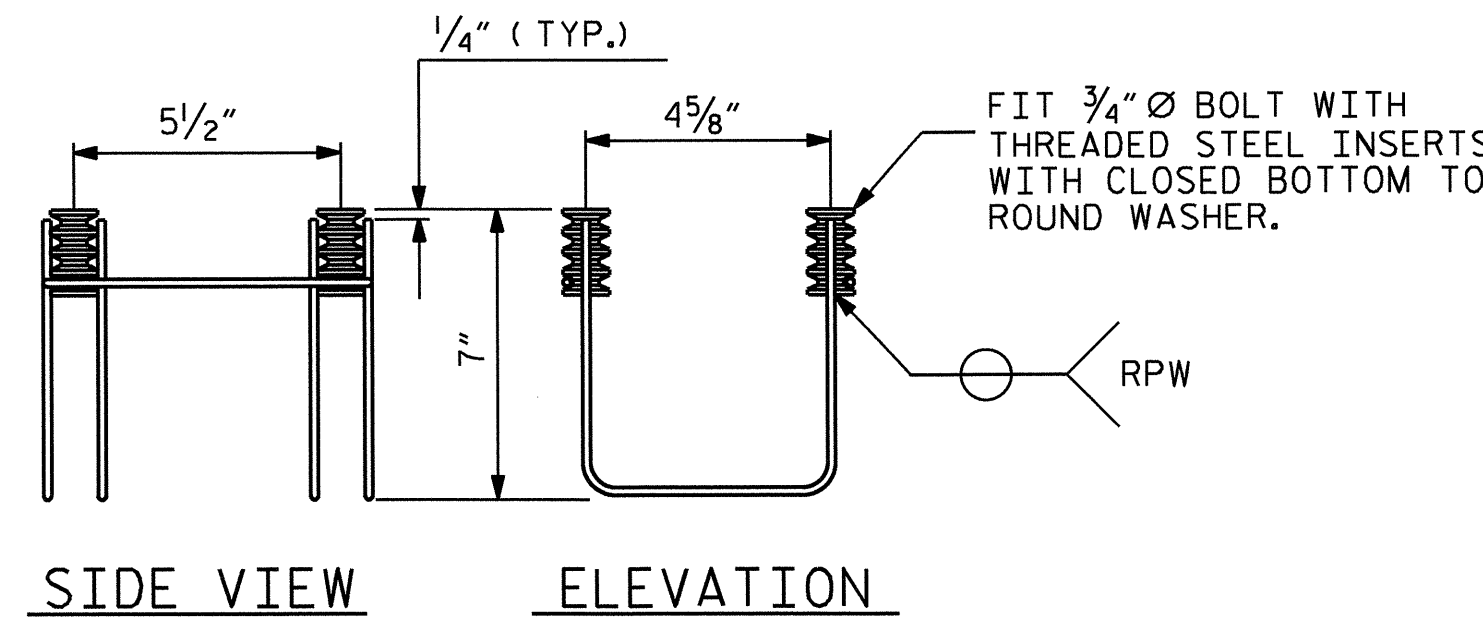
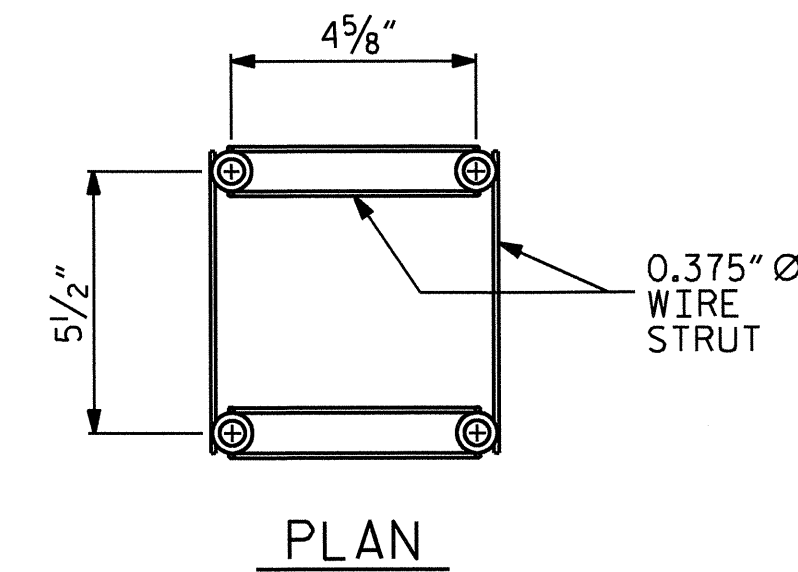
STRUCTURAL CONCRETE ANCHOR ASSEMBLY

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.

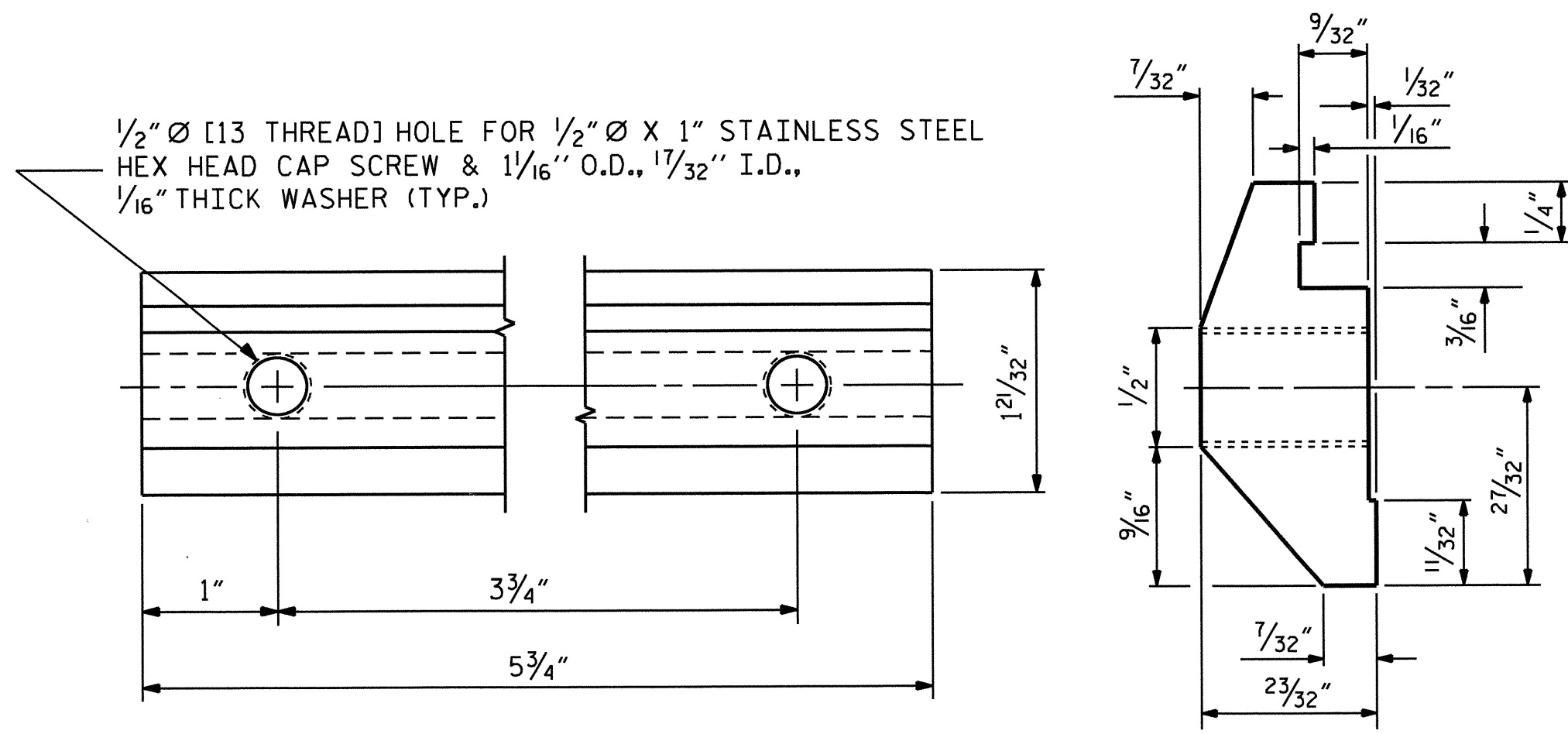
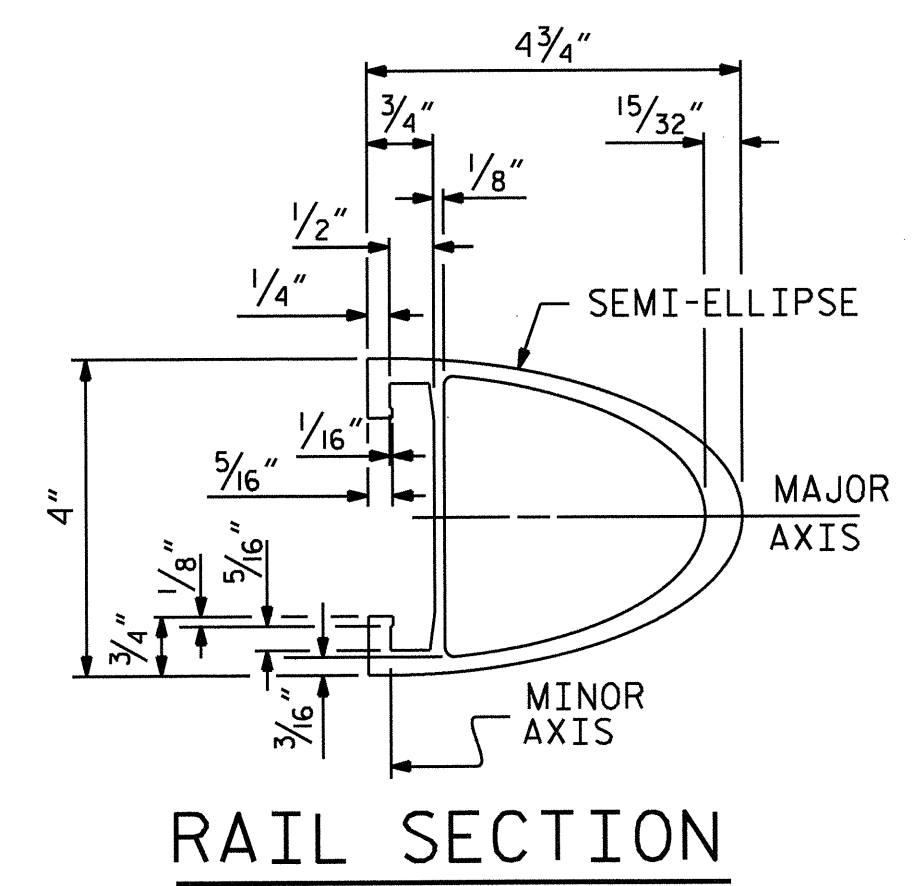
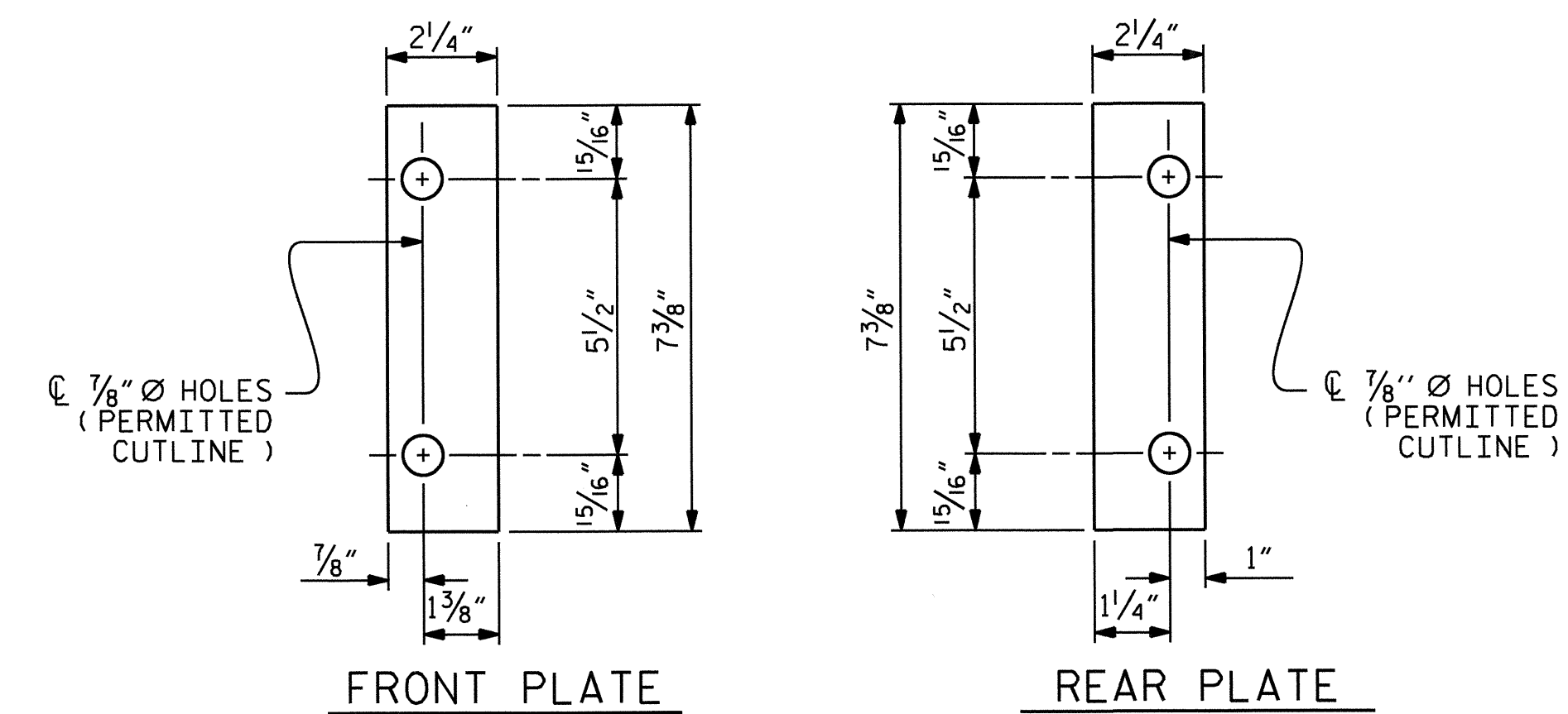
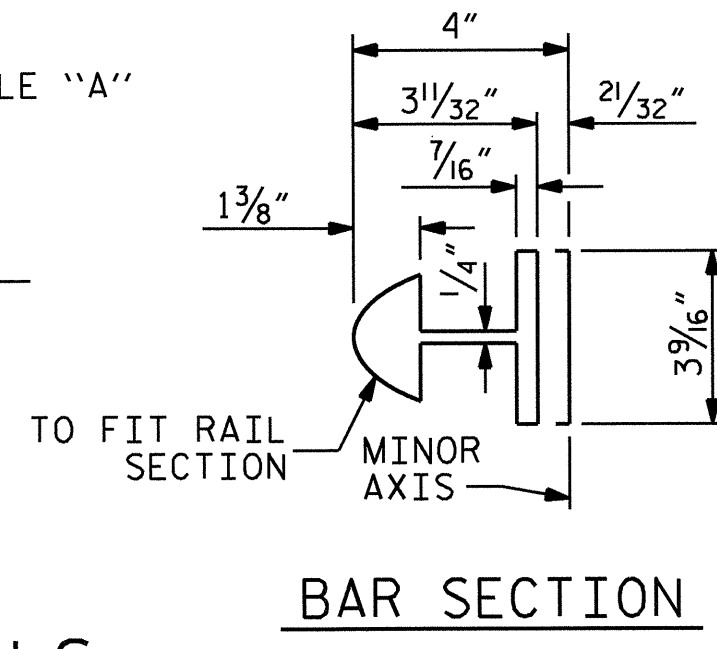
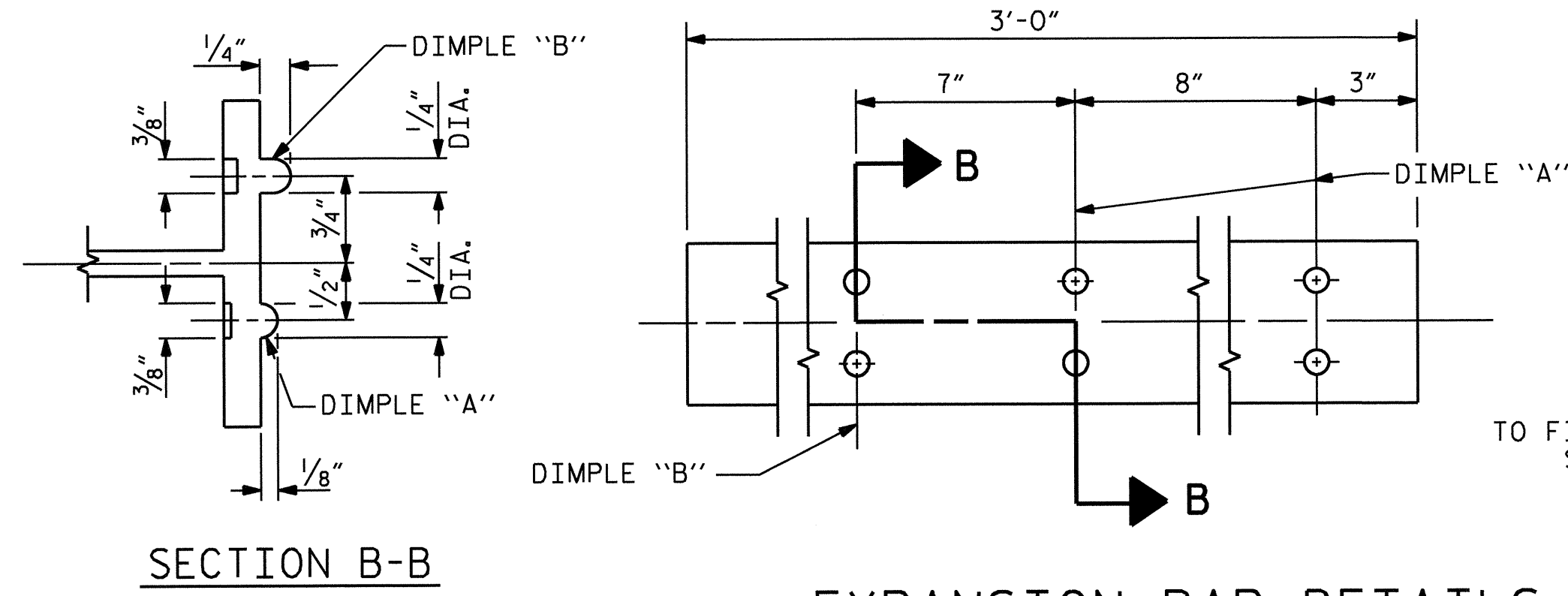
THE CONTRACTOR MAY USE ADHESIVELY ANCHORED ANCHOR BOLTS IN PLACE OF THE METAL RAIL ANCHOR ASSEMBLY. LEVEL ONE FIELD TESTING IS REQUIRED, AND THE YIELD LOAD OF THE 3/4" Ø BOLT IS 10 KIPS. FOR ADHESIVELY ANCHORED ANCHOR BOLTS OR DOWELS, SEE STANDARD SPECIFICATIONS.

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

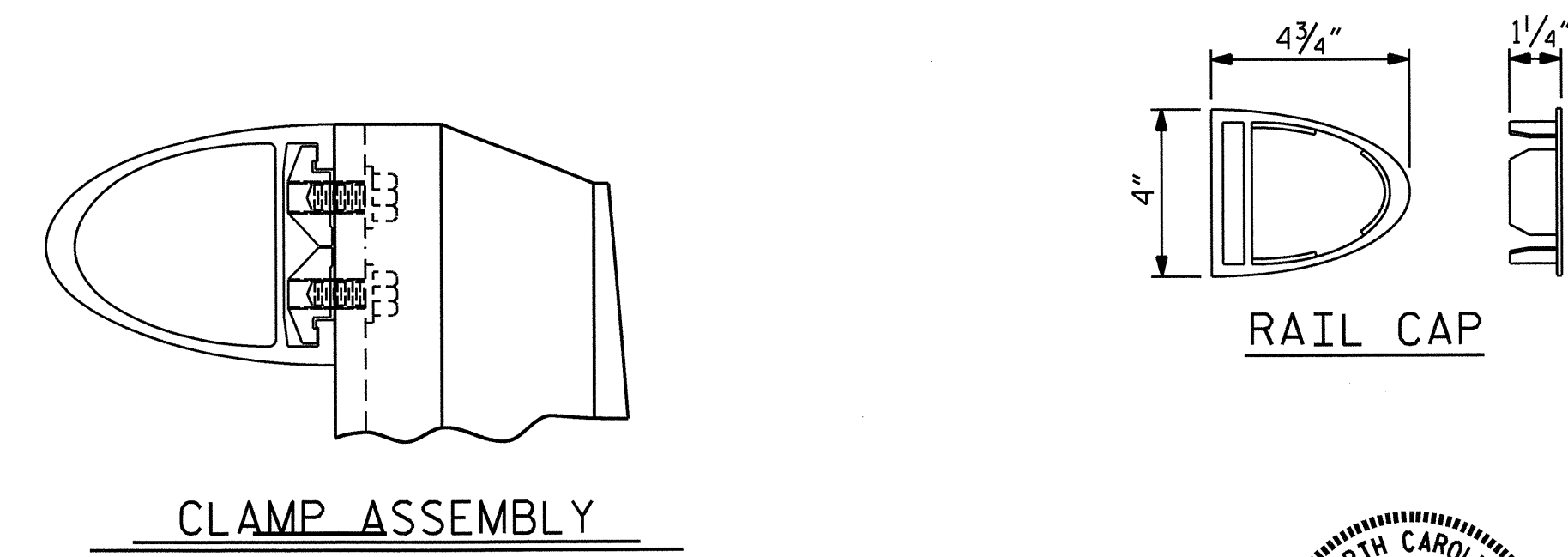


4-BOLT METAL RAIL ANCHOR ASSEMBLY

(100 ASSEMBLIES REQUIRED)



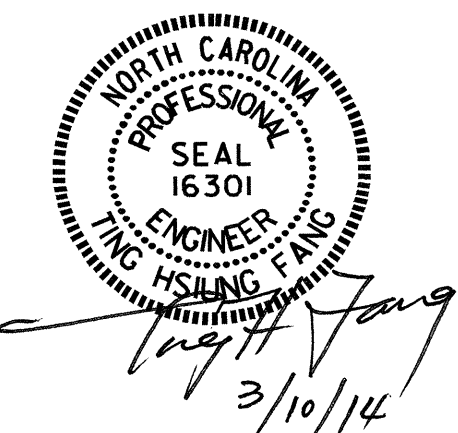
NOTE: SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



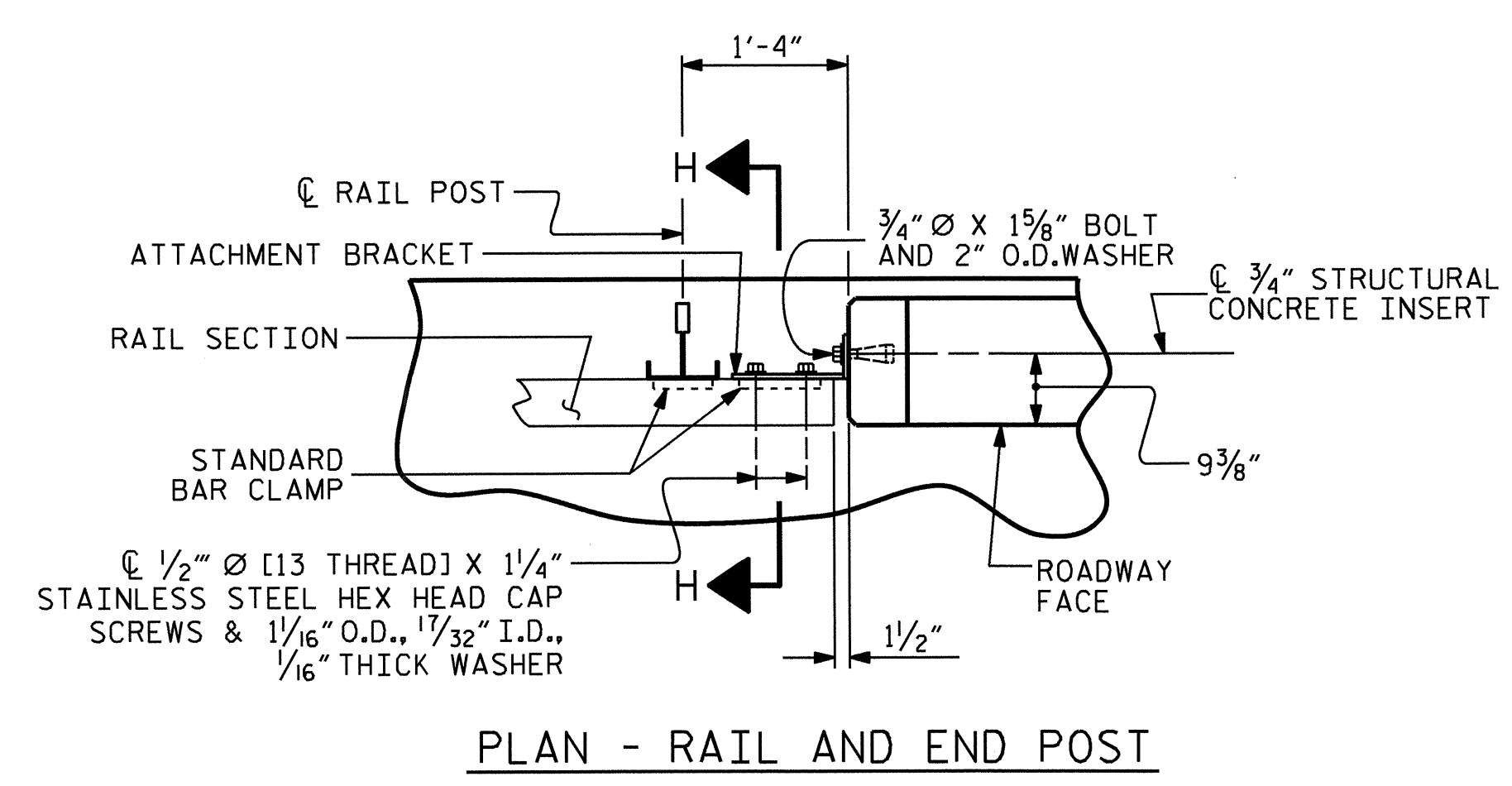
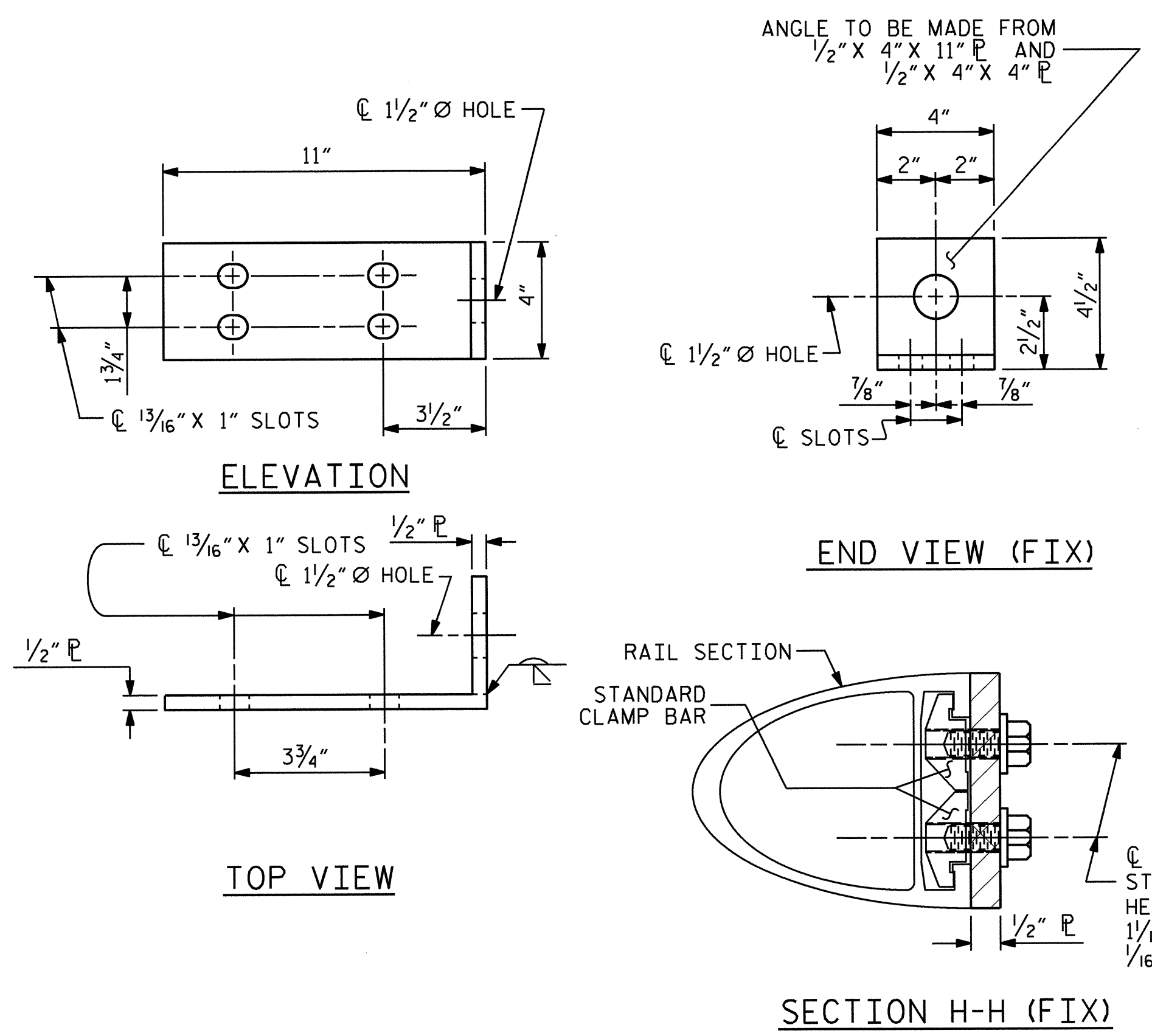
PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 4

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD					
2 BAR METAL RAIL					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					S-20
					TOTAL SHEETS 38



ASSEMBLED BY : S. B. WILLIAMS	DATE : 2-23-12
CHECKED BY : E. I. OMILE	DATE : 11-15-12
DRAWN BY : EEM 6/94	REV. 8/16/99 MAB/LES
CHECKED BY : RCW 6/94	REV. 5/1/06R KMM/GM
	REV. 10/1/11 MAA/GM



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

**NOTES**  
STRUCTURAL CONCRETE INSERT

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

- FERRULES SHALL BE MADE FROM STEEL MEETING THE REQUIREMENTS OF AASHTO M169, GRADE 12L14 AND SHALL HAVE A MINIMUM LENGTH OF 1 1/2".
- 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.)
- 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:

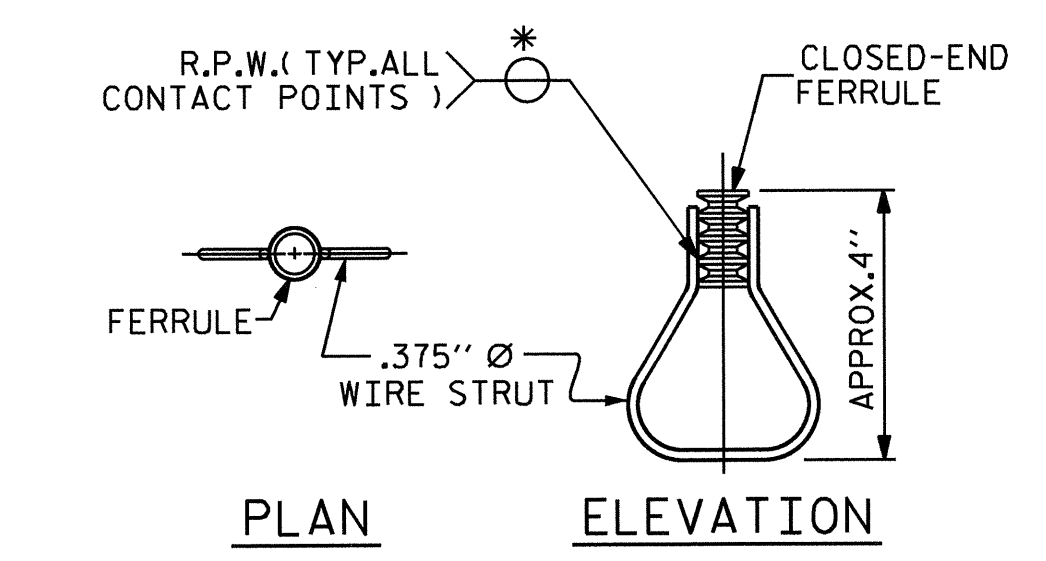
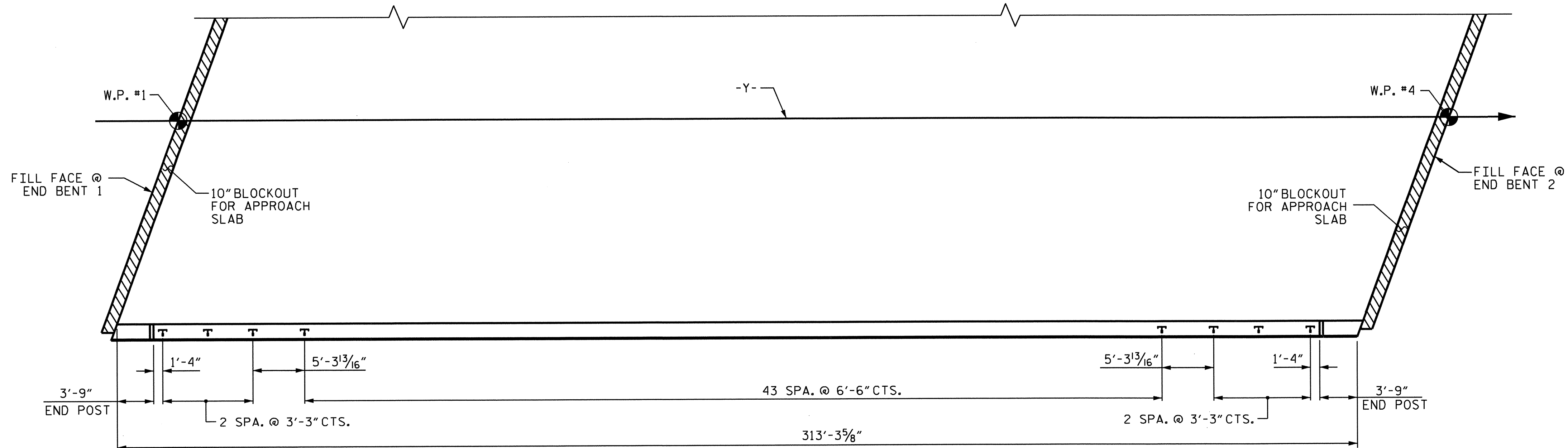
- 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
- 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N.C. THREADS.
- 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.
- STANDARD CLAMP BARS (SEE METAL RAIL SHEET).
- 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 RAIL.

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

THE COST OF THE 3/4" STRUCTURAL CONCRETE INSERT ASSEMBLY, AND THE 1/2" PLATES COMPLETE IN PLACE SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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



**STRUCTURAL CONCRETE INSERT**

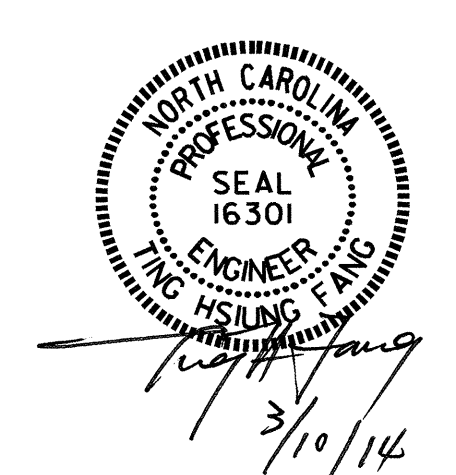
\* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.

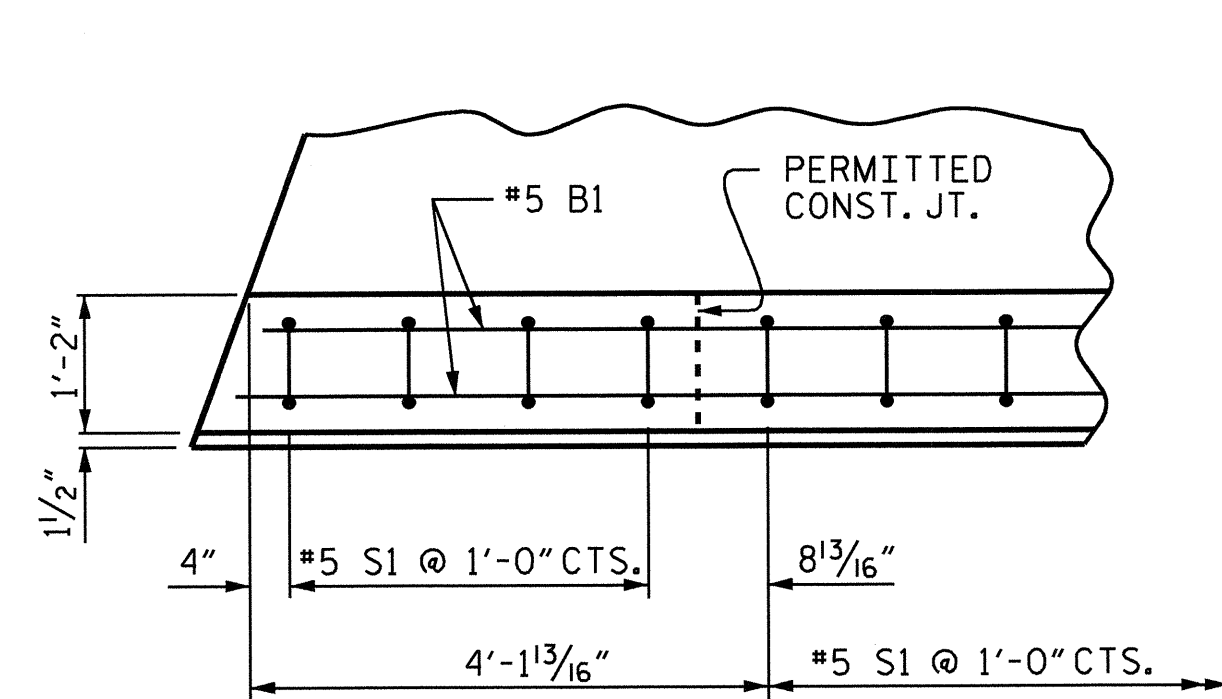
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 3 OF 4

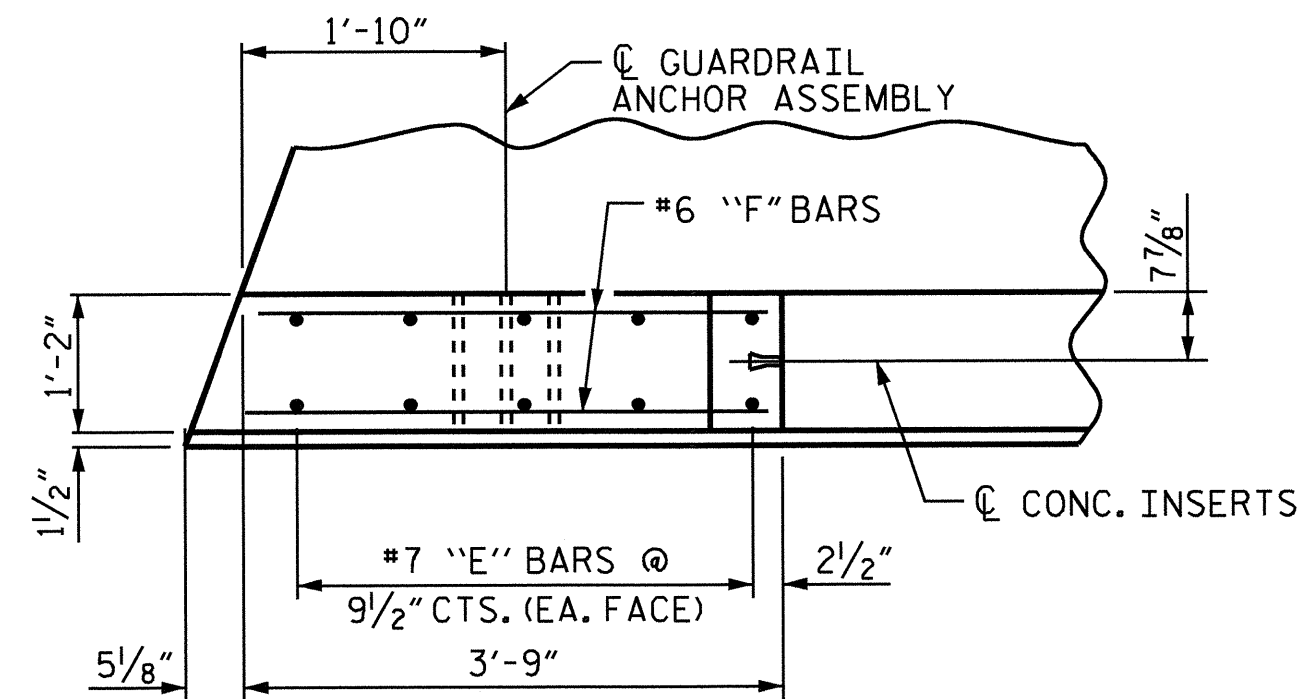
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	5-21
1			3			TOTAL SHEETS
2			4			38

DRAWN BY : RAMAN PATEL DATE : 2-23-12  
 CHECKED BY : E.I. OMILE DATE : 7-10-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

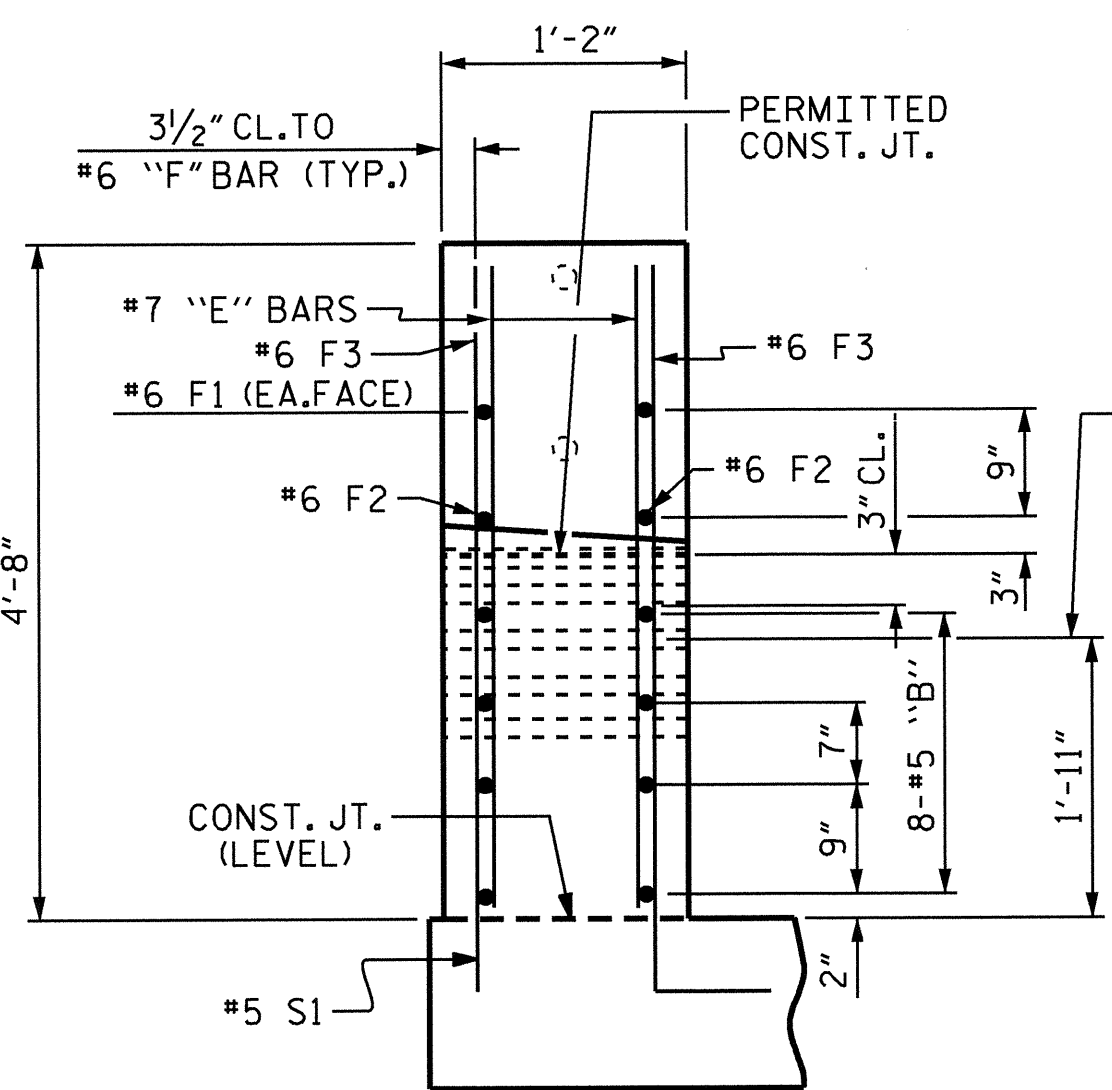




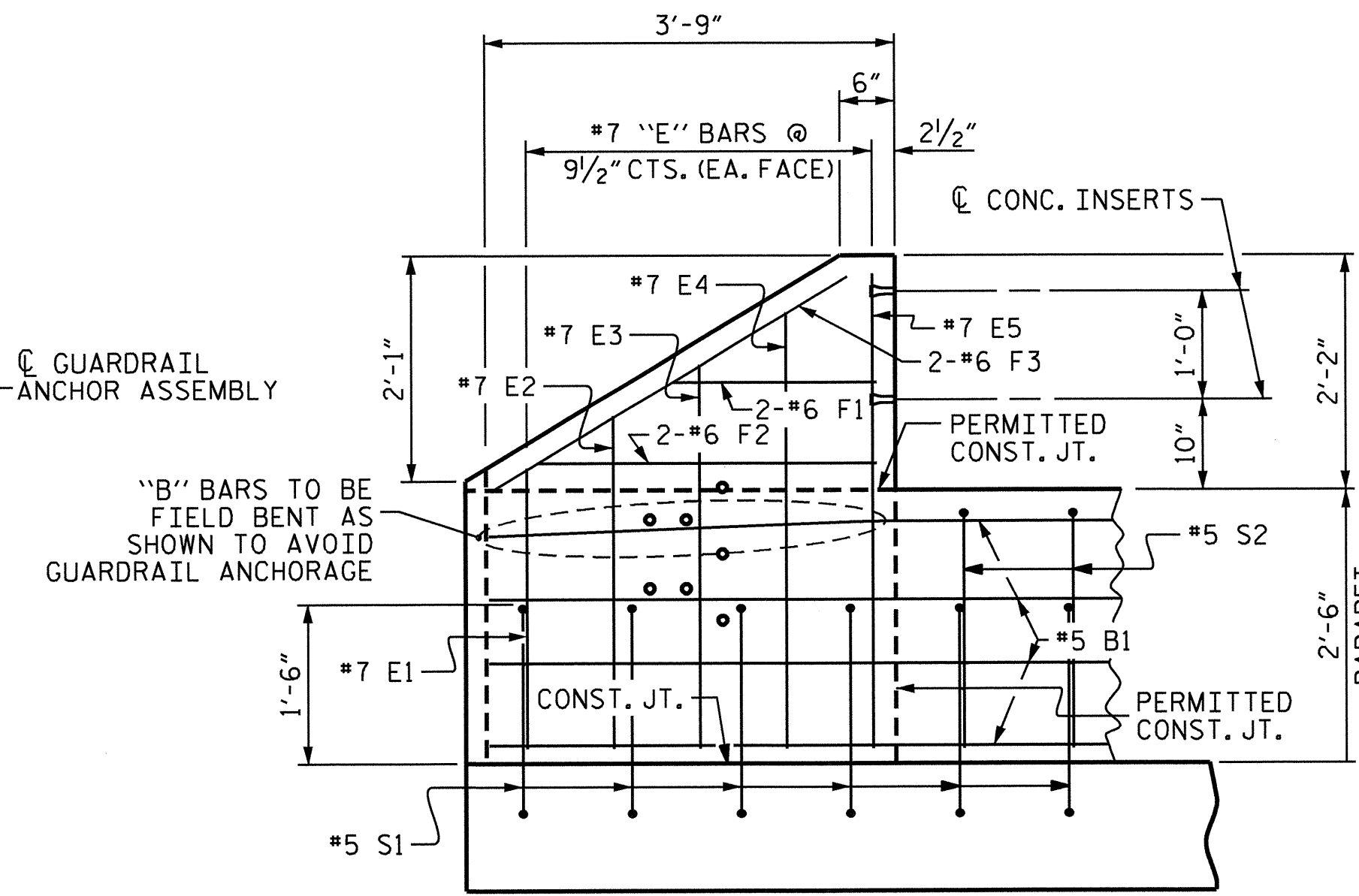
PLAN OF PARAPET



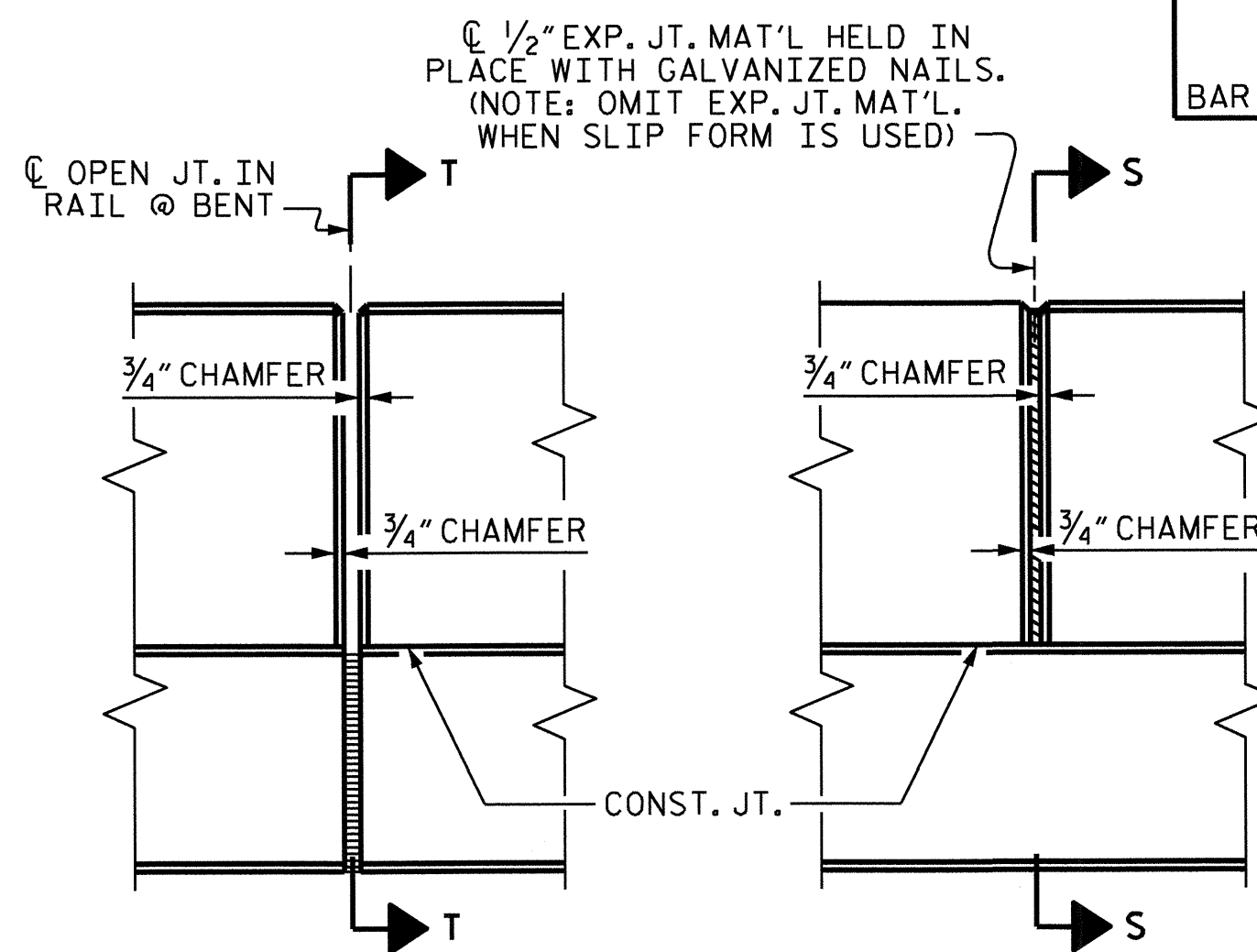
PLAN OF END POST



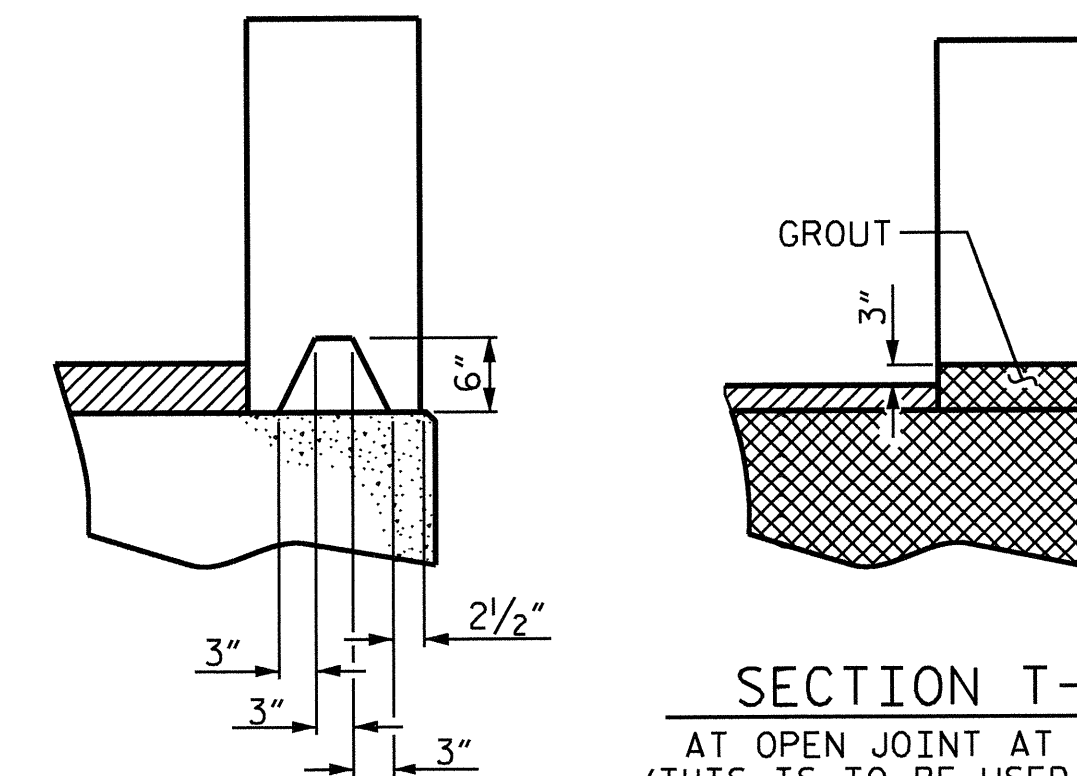
END VIEW



ELEVATION



ELEVATION AT EXPANSION JOINTS



SECTION T-T  
AT OPEN JOINT AT BENT  
(THIS IS TO BE USED WHERE  
FOAM JOINT IS NOT USED)

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

**NOTES**

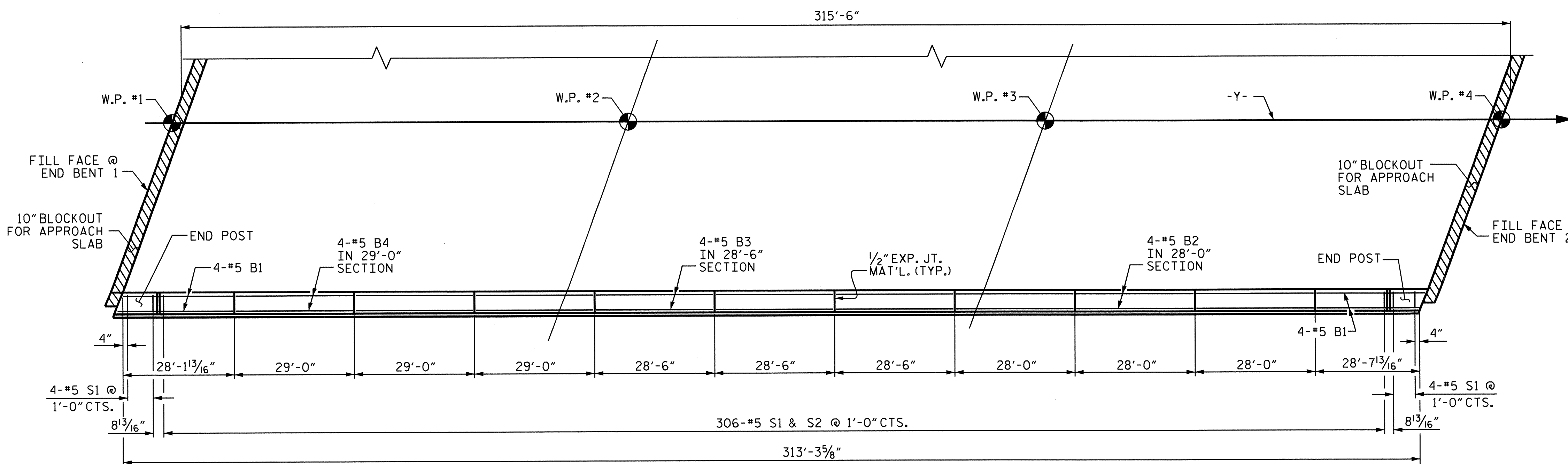
ALL REINFORCING STEEL IN PARAPETS AND END POSTS SHALL BE EPOXY COATED.

FOR DETAIL OF CONCRETE INSERT AND GUARDRAIL ANCHOR ASSEMBLY, SEE "RAIL POST SPACINGS AND END OF RAIL DETAIL" SHEET.

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

BAR TYPE		BILL OF MATERIAL				
FOR 2 PARAPETS AND 4 END POSTS						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
* B1	64	#5	STR	15'-8"	1046	
* B2	48	#5	STR	27'-7"	1381	
* B3	48	#5	STR	28'-1"	1406	
* B4	48	#5	STR	28'-7"	1431	
* E1	8	#7	STR	2'-6"	41	
* E2	8	#7	STR	3'-0"	49	
* E3	8	#7	STR	3'-6"	57	
* E4	8	#7	STR	4'-0"	65	
* E5	8	#7	STR	4'-4"	71	
* F1	8	#6	STR	1'-11"	23	
* F2	8	#6	STR	3'-1"	37	
* F3	8	#6	STR	3'-8"	44	
* S1	628	#5	1	5'-5"	3548	
* S2	612	#5	2	5'-6"	3511	
* EPOXY COATED REINFORCING STEEL					12,711 LBS.	
CLASS AA CONCRETE					68.3 CU. YDS.	
CONCRETE PARAPET					626.6 LIN. FT.	

PARAPET AND END POST FOR TWO BAR RAIL



PLAN OF PARAPET

LEFT SIDE SHOWN, RIGHT SIDE SIMILAR BY ROTATION.

DRAWN BY : RAMAN PATEL DATE : 2-23-12  
 CHECKED BY : E.I. OMILE DATE : 7-10-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUPERSTRUCTURE  
 TWO BAR METAL  
 RAIL POST SPACINGS  
 & END POST DETAILS

REVISIONS						SHEET NO. S-22
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

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.

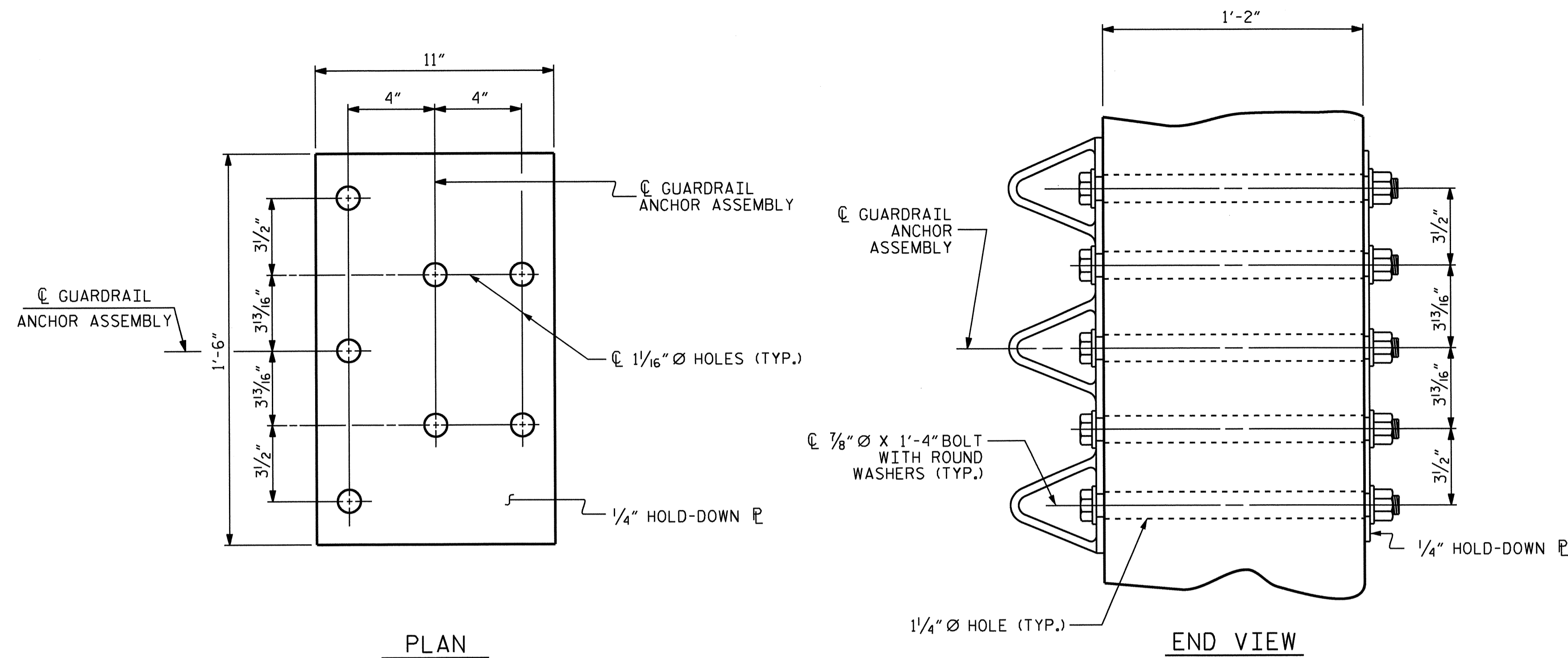
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF THE PARAPET. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

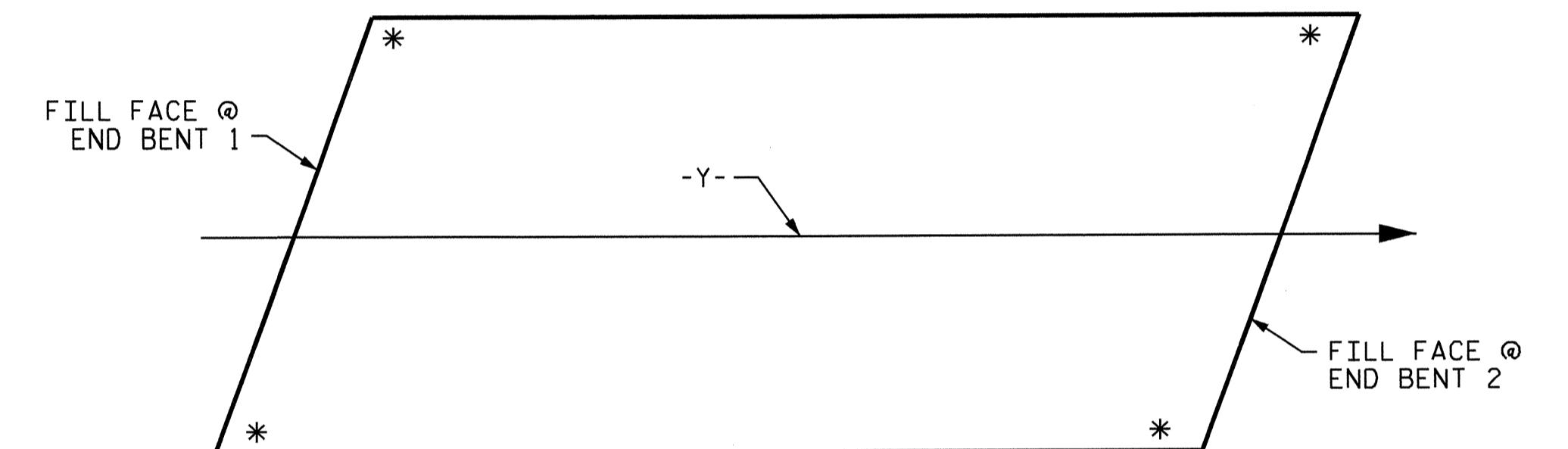
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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.

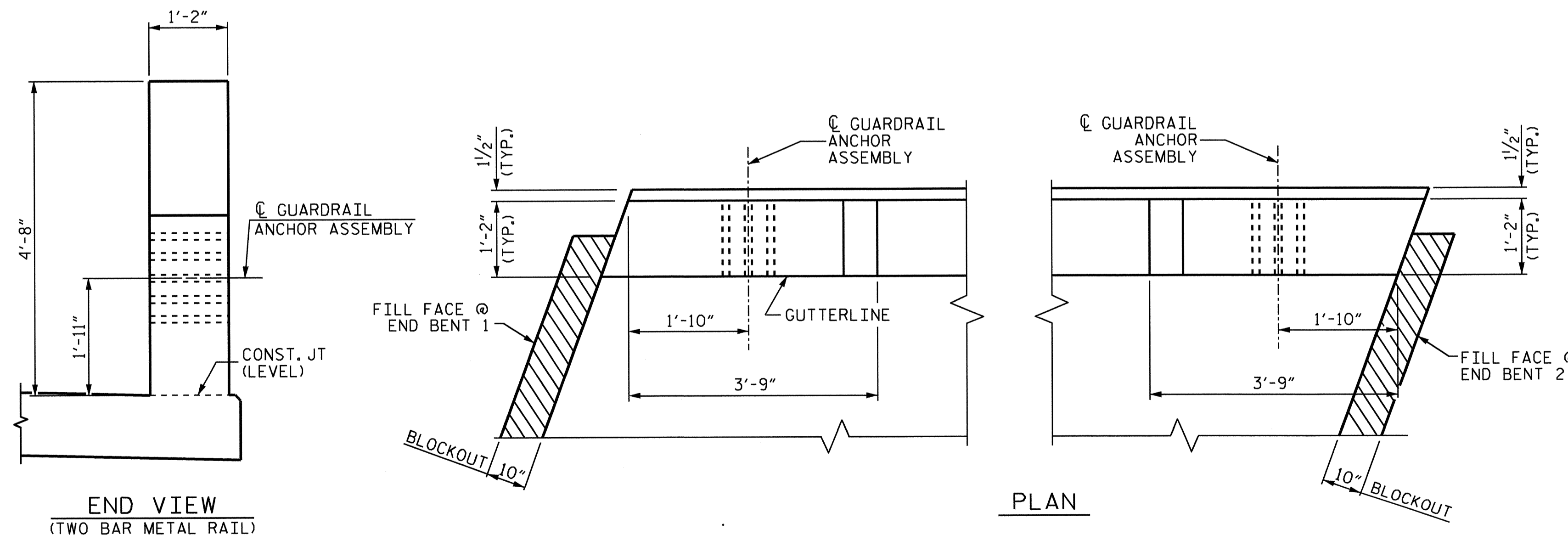


GUARDRAIL ANCHOR ASSEMBLY DETAILS



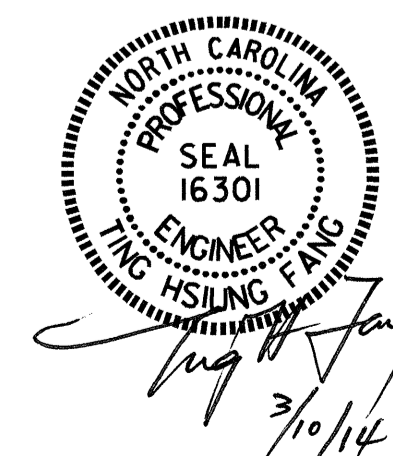
SKETCH SHOWING POINTS OF ATTACHMENT

\* LOCATION OF GUARDRAIL ATTACHMENT



LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

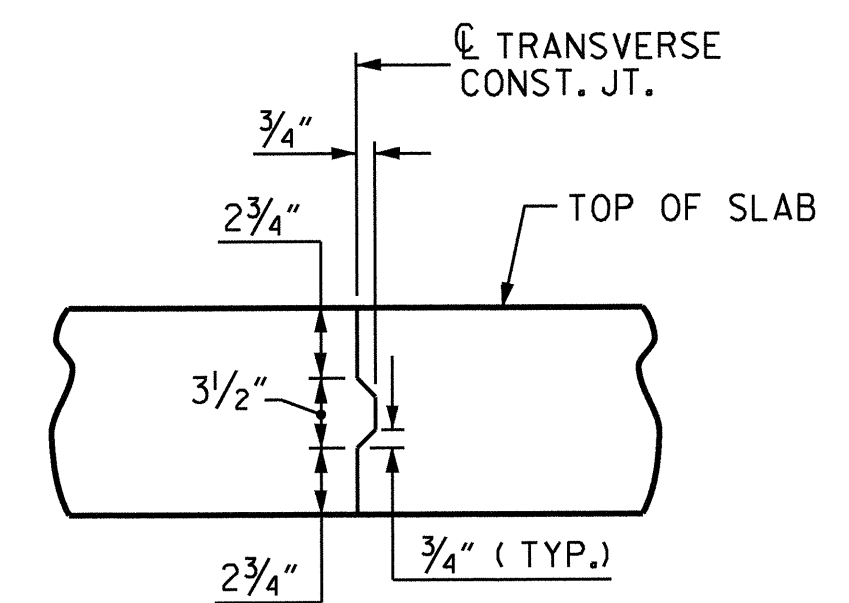
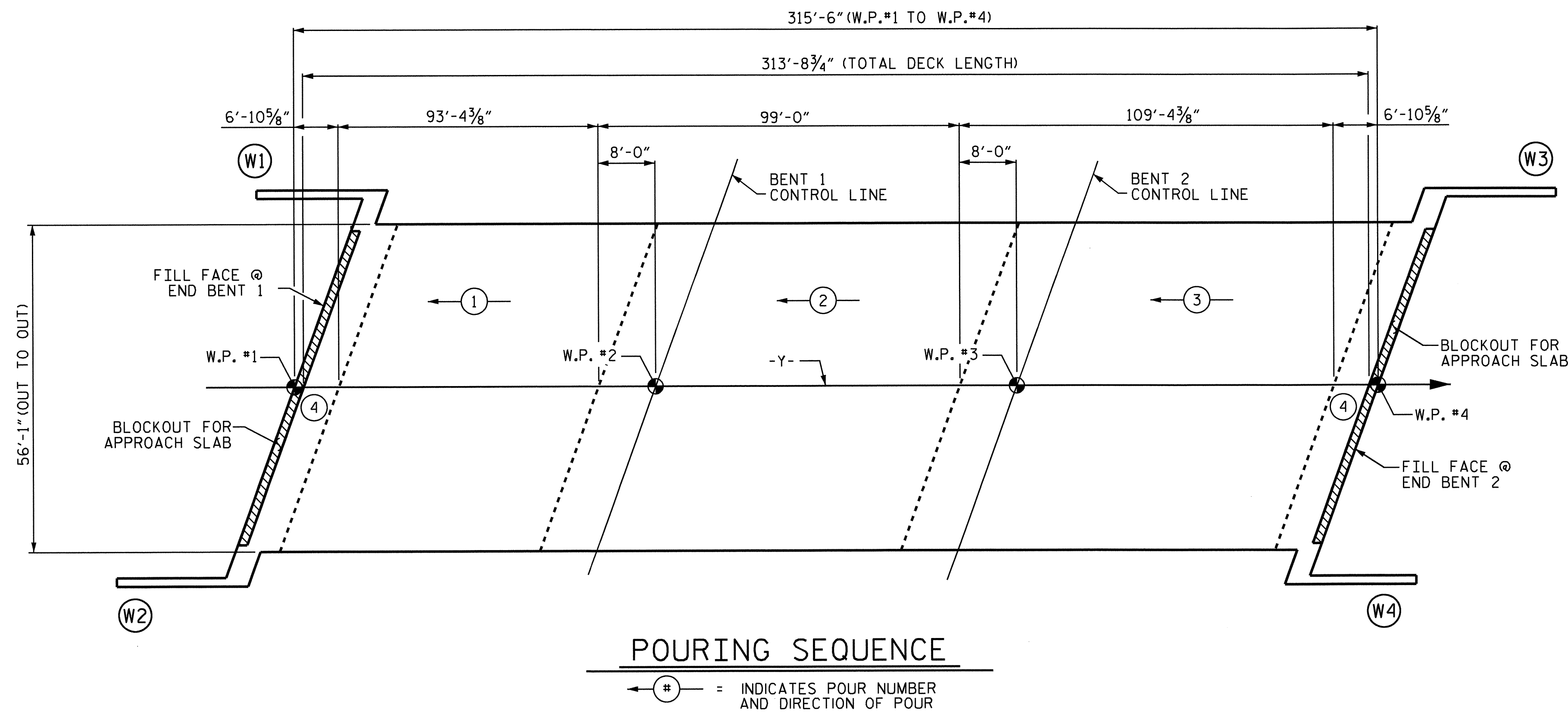


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 GUARDRAIL ANCHORAGE  
 DETAILS  
 FOR METAL RAILS

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

ASSEMBLED BY : S. B. WILLIAMS DATE : 2-23-12  
 CHECKED BY : E. I. OMILE DATE : 12-6-12  
 DRAWN BY : EEM 6/94 REV. 10/17/00 RWW/LES  
 CHECKED BY : RGW 6/94 REV. 5/7/03 RWW/JTE  
 REV. 5/1/06 TLA/GM

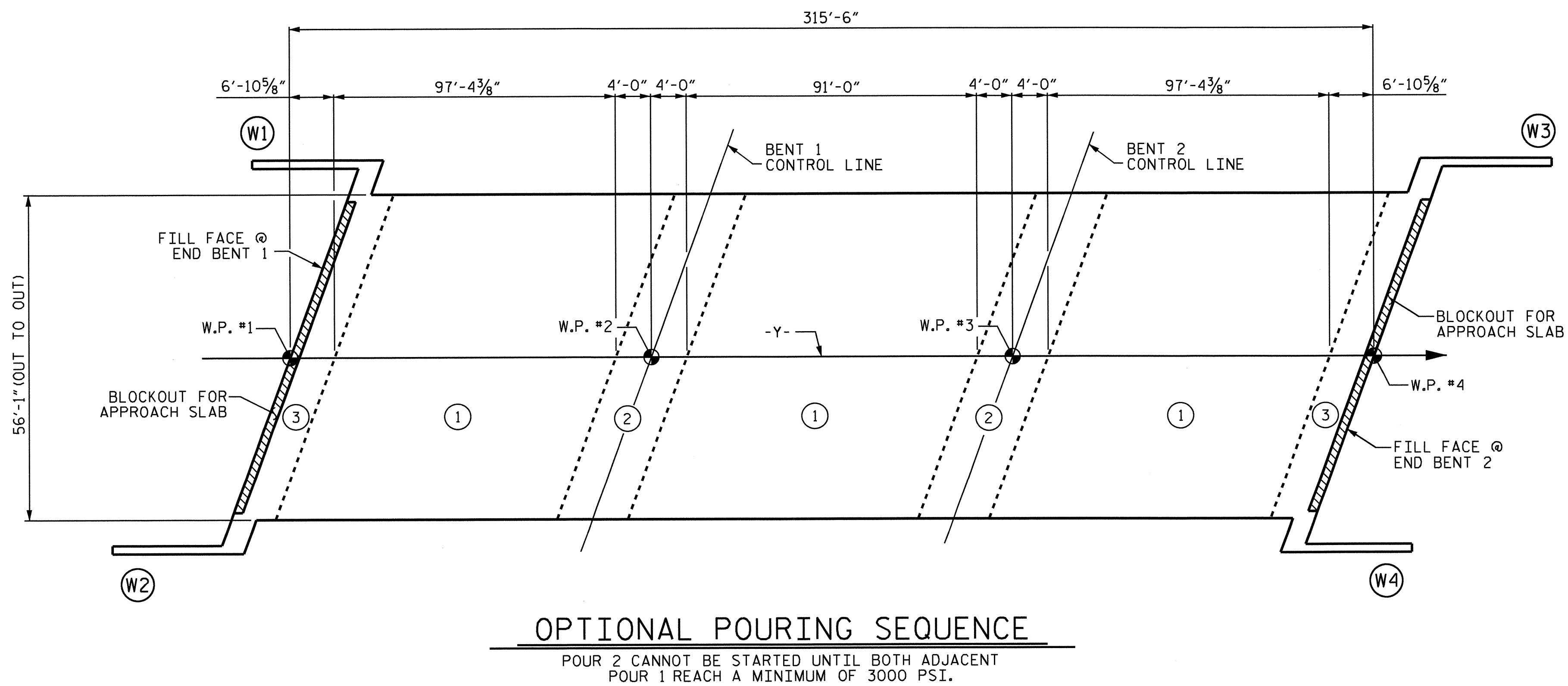




**TRANSVERSE CONSTRUCTION JOINT DETAIL**

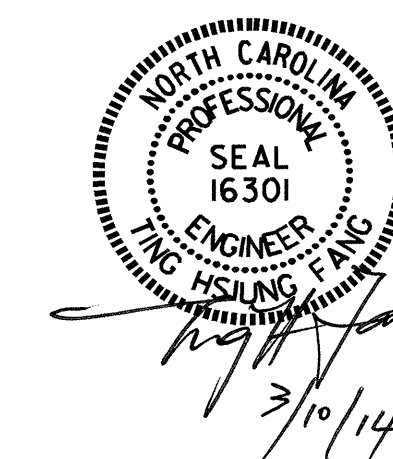
NOTE: REINFORCING STEEL IN SLAB NOT SHOWN. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

NOTE: THE UPPER PORTION OF THE WINGS SHALL BE POURED WITH THE SUPERSTRUCTURE.



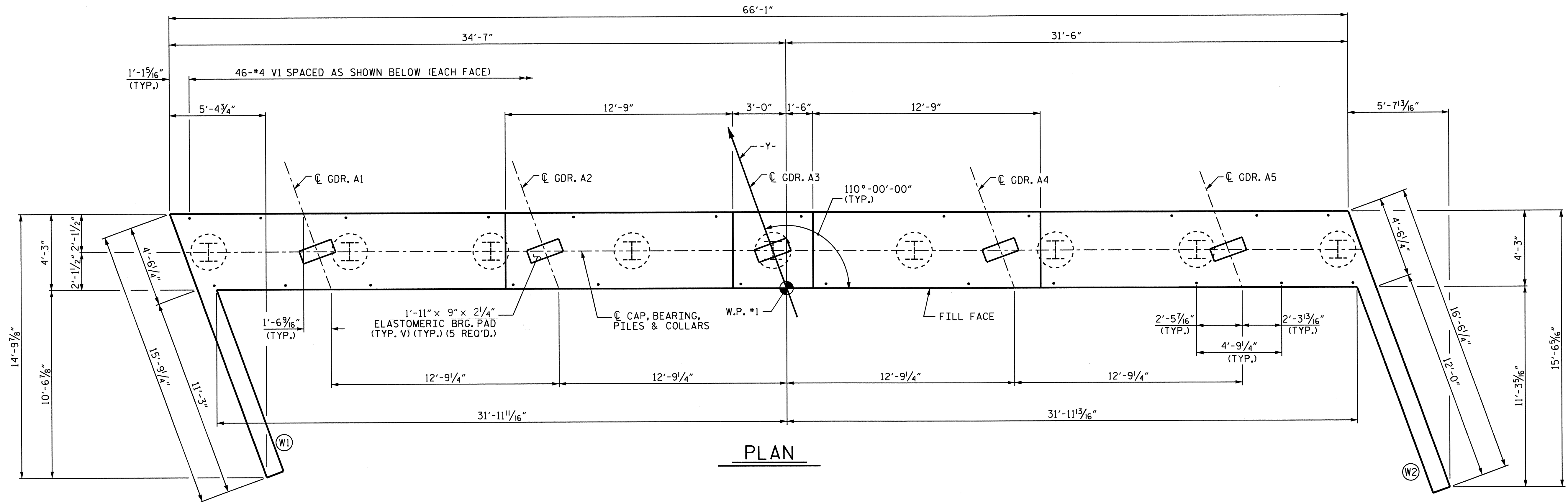
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH						SHEET NO. S-24 TOTAL SHEETS 38
SUPERSTRUCTURE  POUR SEQUENCE						
REVISIONS						
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			
2			4			

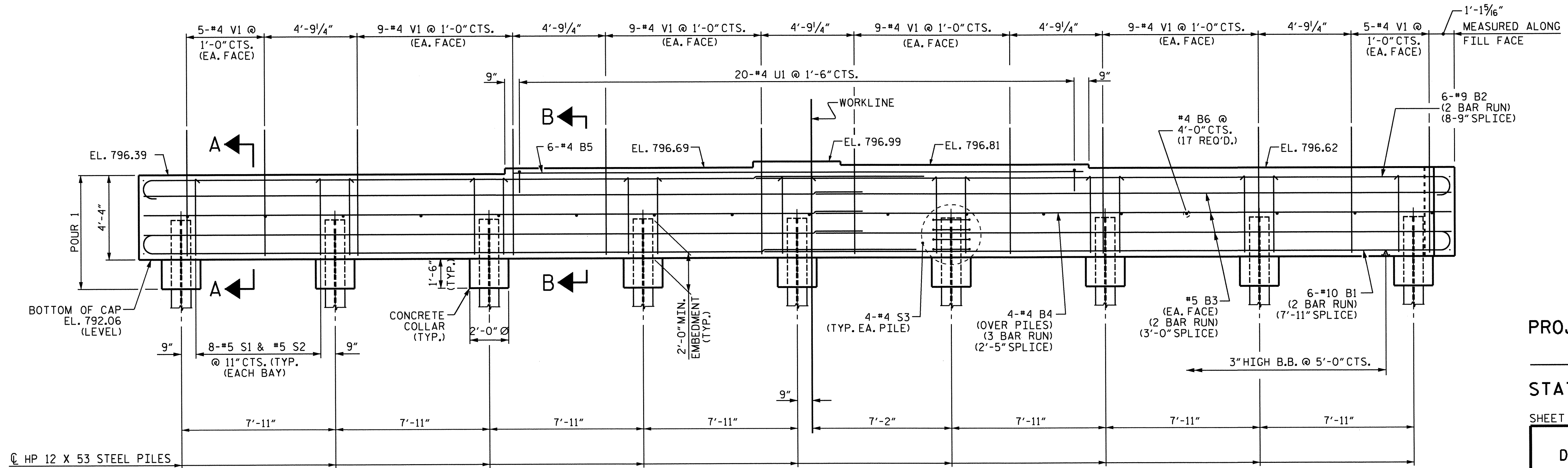


DRAWN BY : S. B. WILLIAMS DATE : 2-11-12  
 CHECKED BY : T. FANG DATE : 1-14  
 DESIGN ENGINEER OF RECORD: R. PATEL DATE : 11-11





PLAN



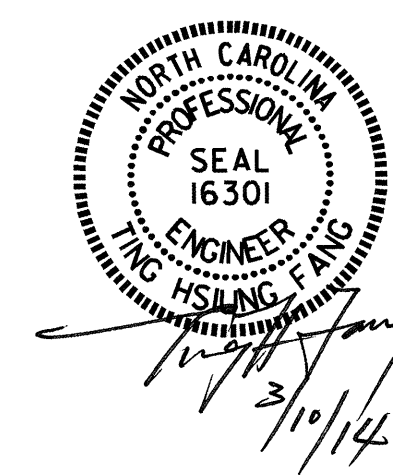
ELEVATION

WINGS DETAILS NOT SHOWN FOR CLARITY

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 1 OF 3

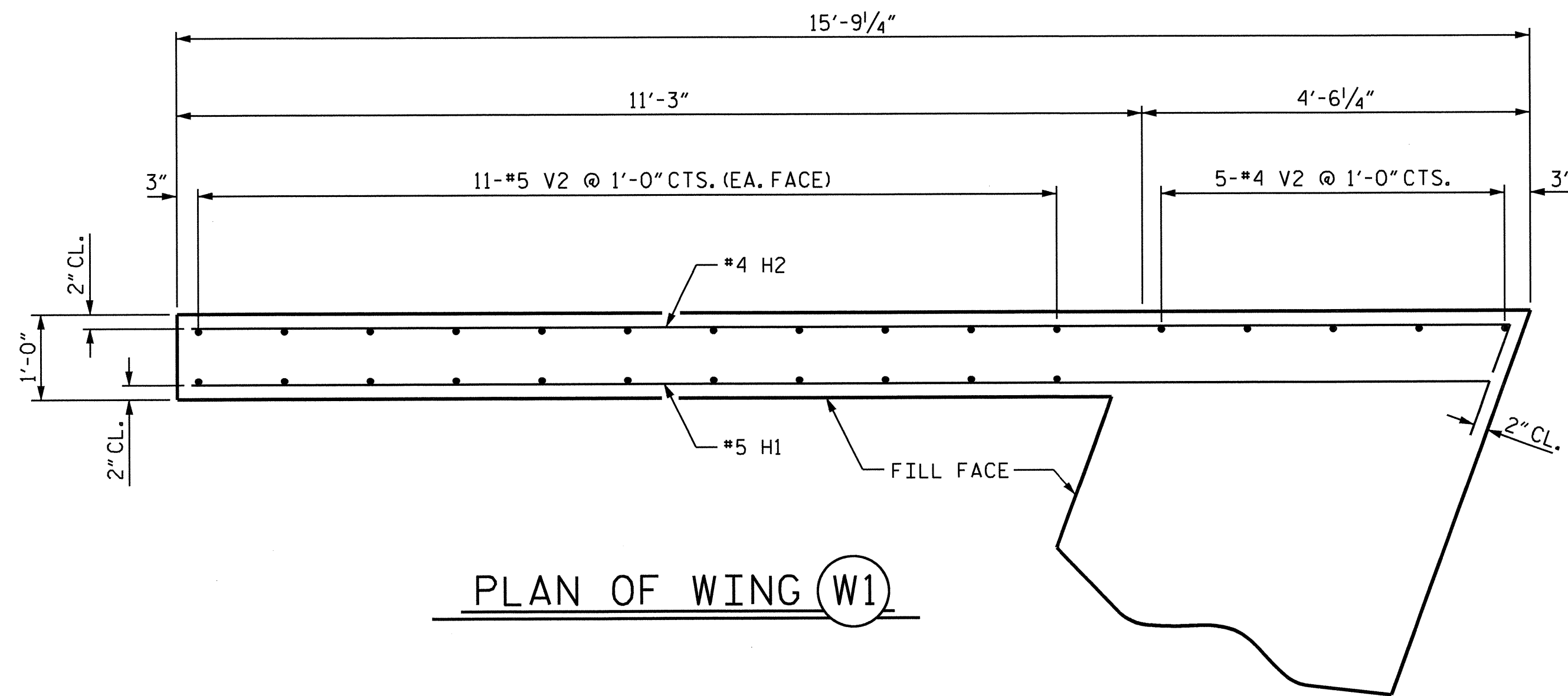
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1  
 (INTEGRAL)



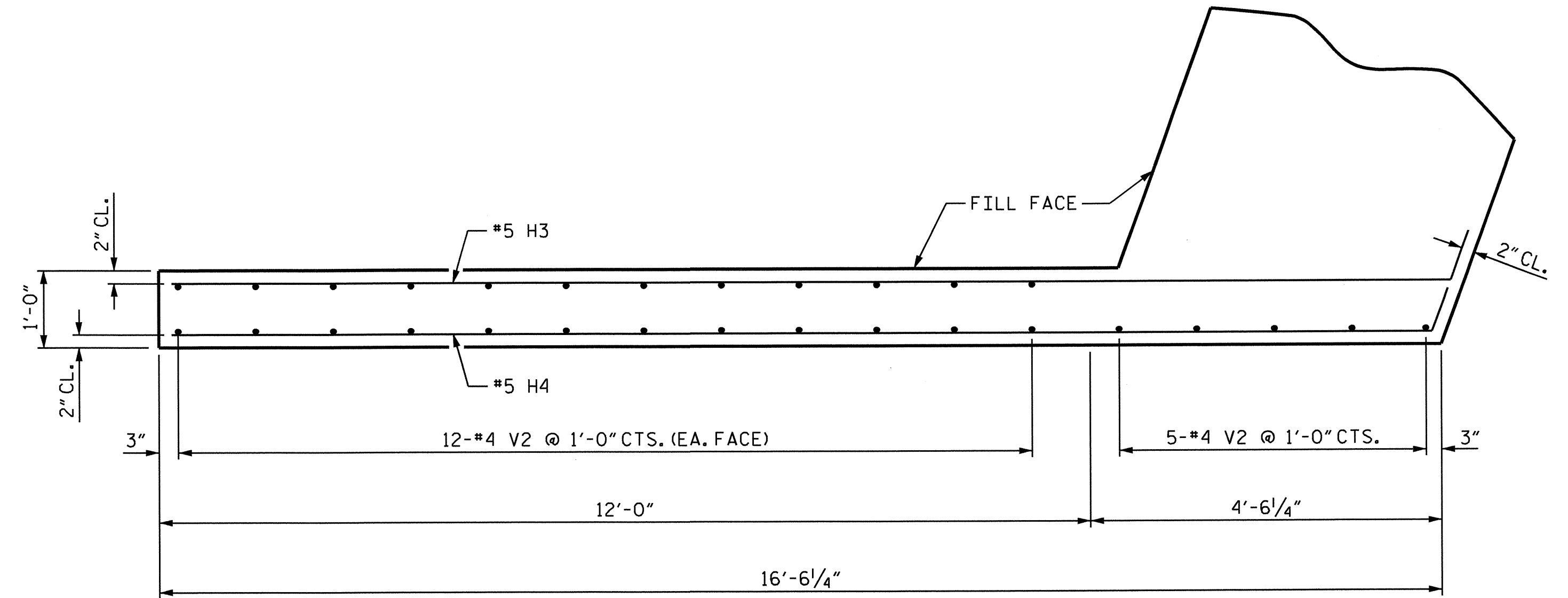
DRAWN BY: RAMAN PATEL DATE: 3-9-12  
 CHECKED BY: E.I. OMILE DATE: 11-20-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

10-MAR-2014 13:29  
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 clyokeley

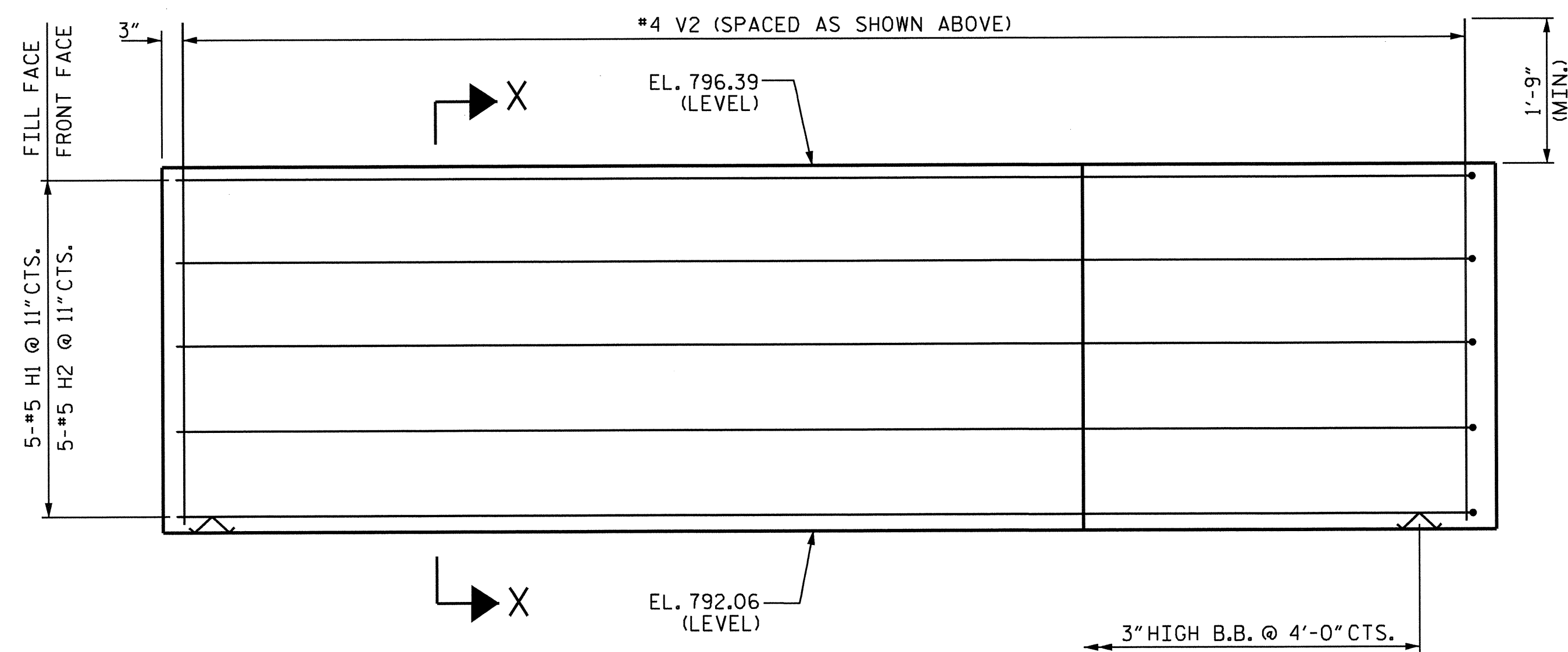
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26
1			3			TOTAL SHEETS
2			4			38



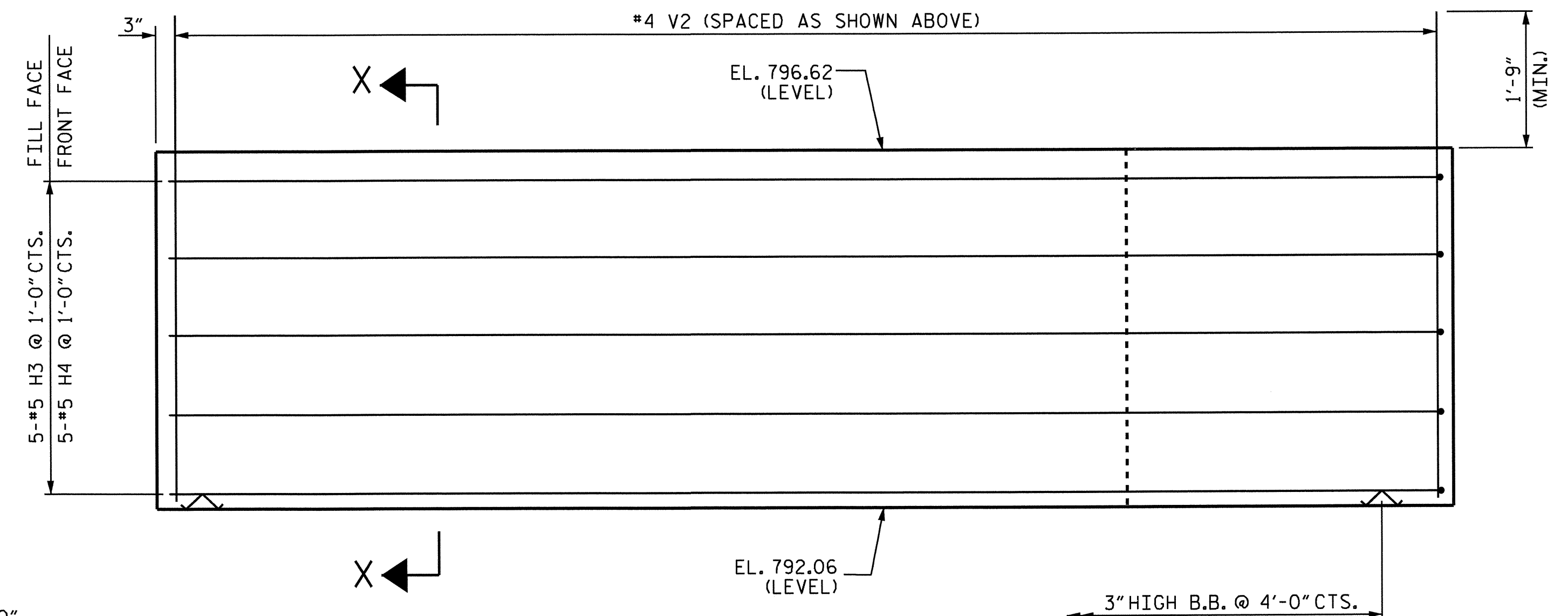
PLAN OF WING (W1)



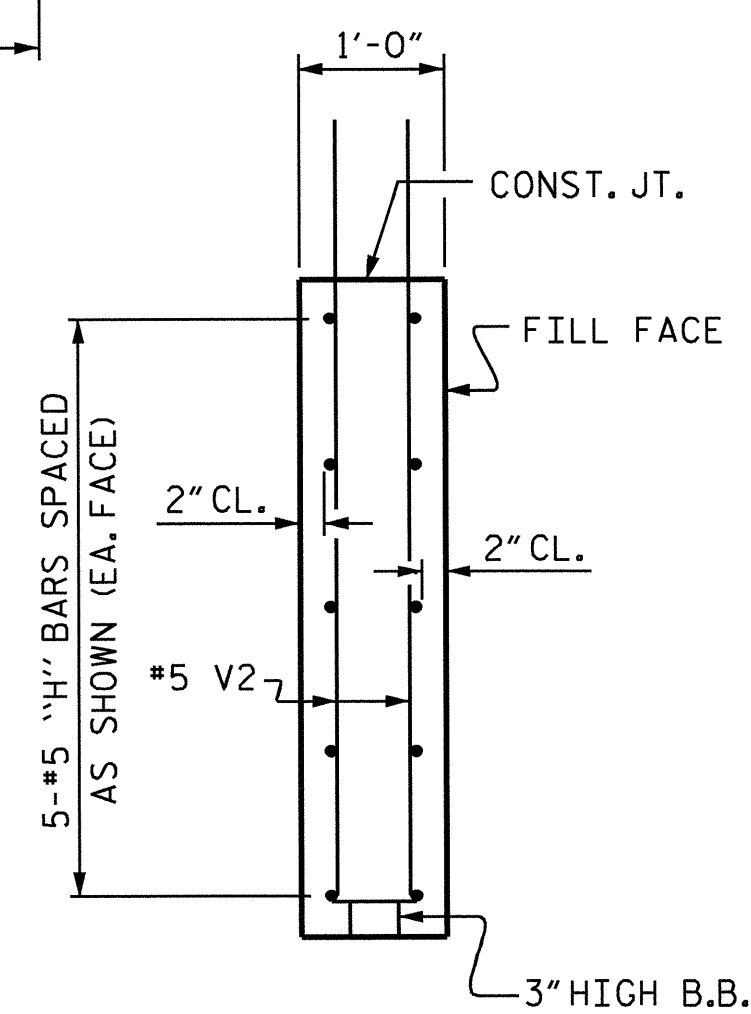
PLAN OF WING (W2)



ELEVATION OF WING (W1)



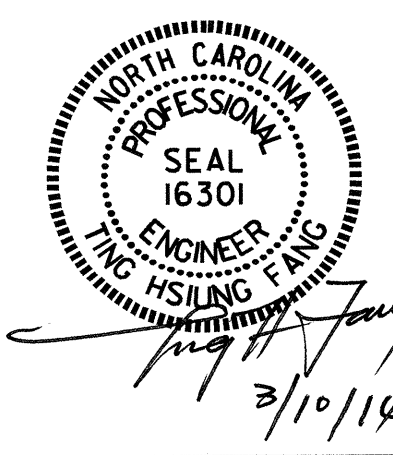
ELEVATION OF WING (W2)



SECTION X-X

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

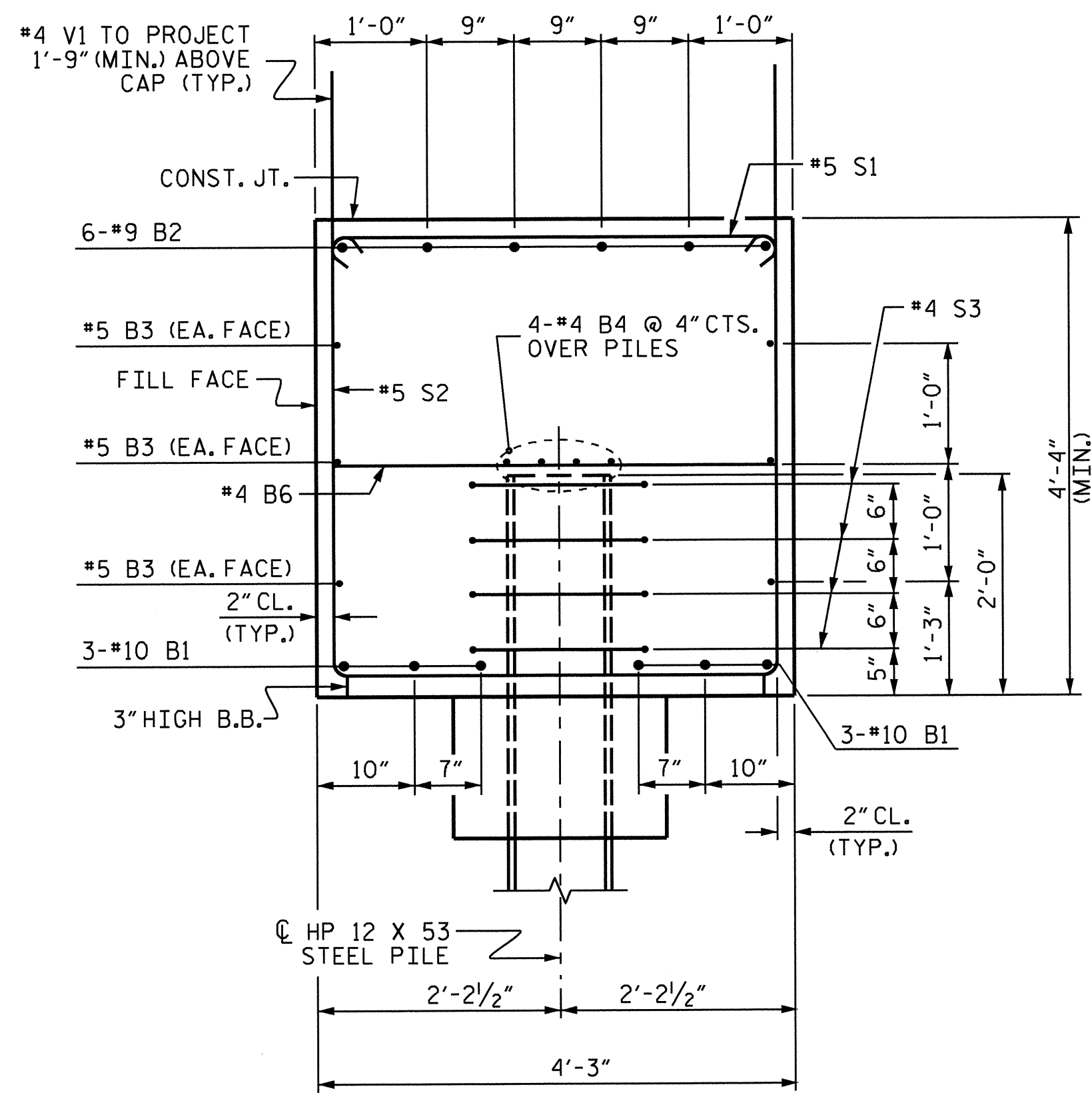
SHEET 2 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 1  
 (INTEGRAL)



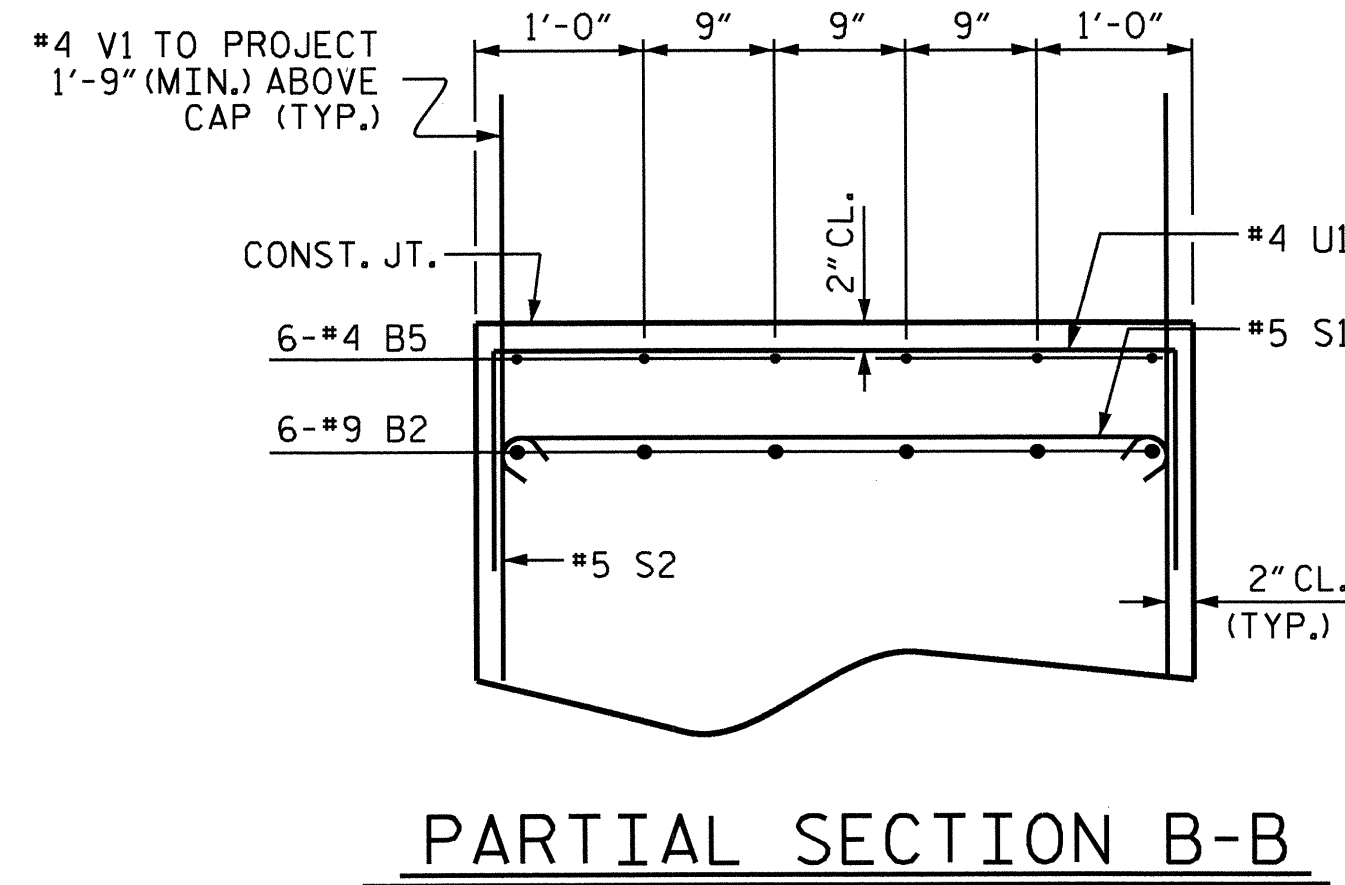
DRAWN BY: RAMAN PATEL DATE: 3-9-12  
 CHECKED BY: E.I. OMILE DATE: 11-20-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27	
1			3			TOTAL SHEETS	
2			4			38	

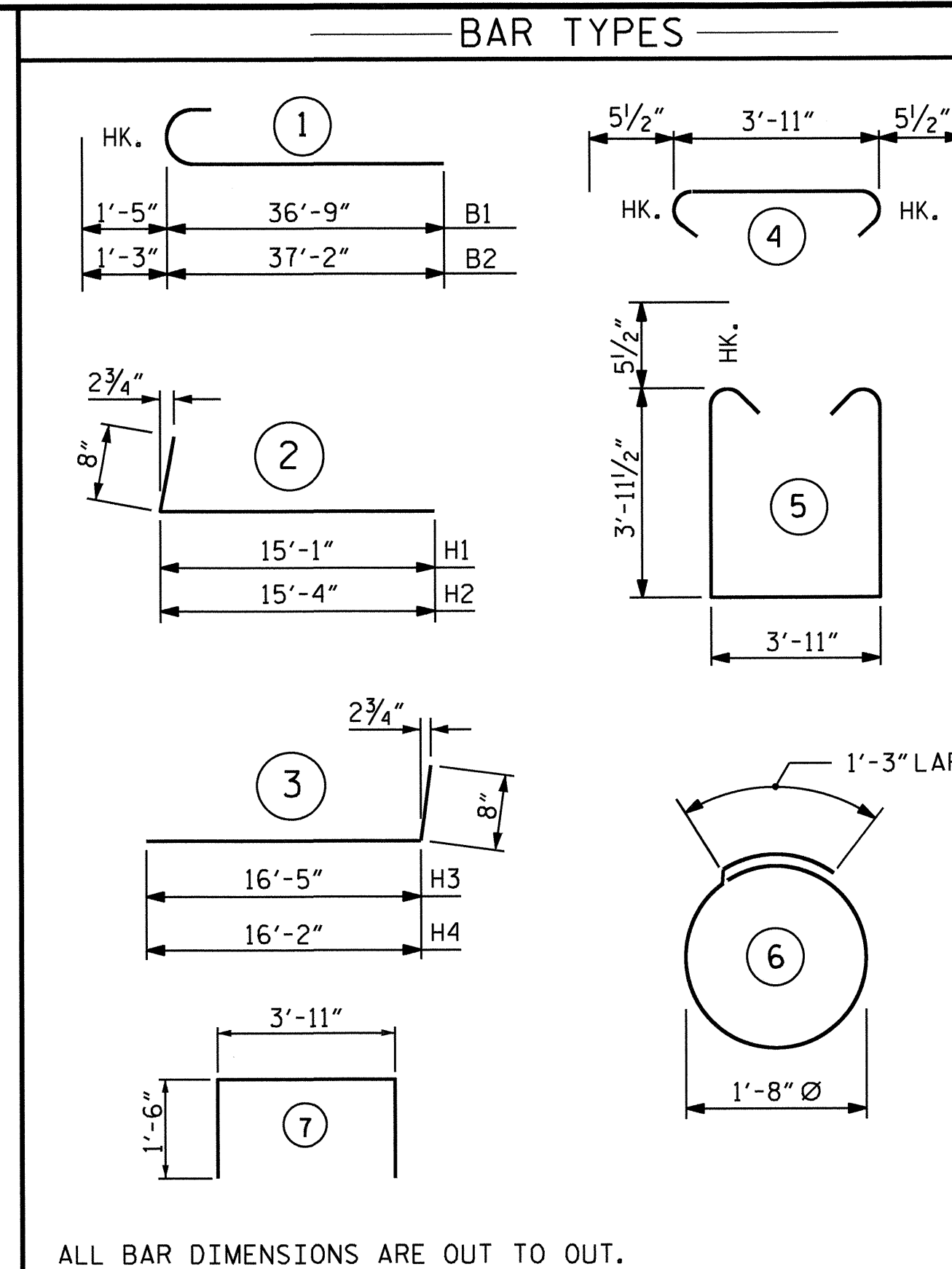
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 clyokeley



SECTION A-A



PARTIAL SECTION B-B



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL

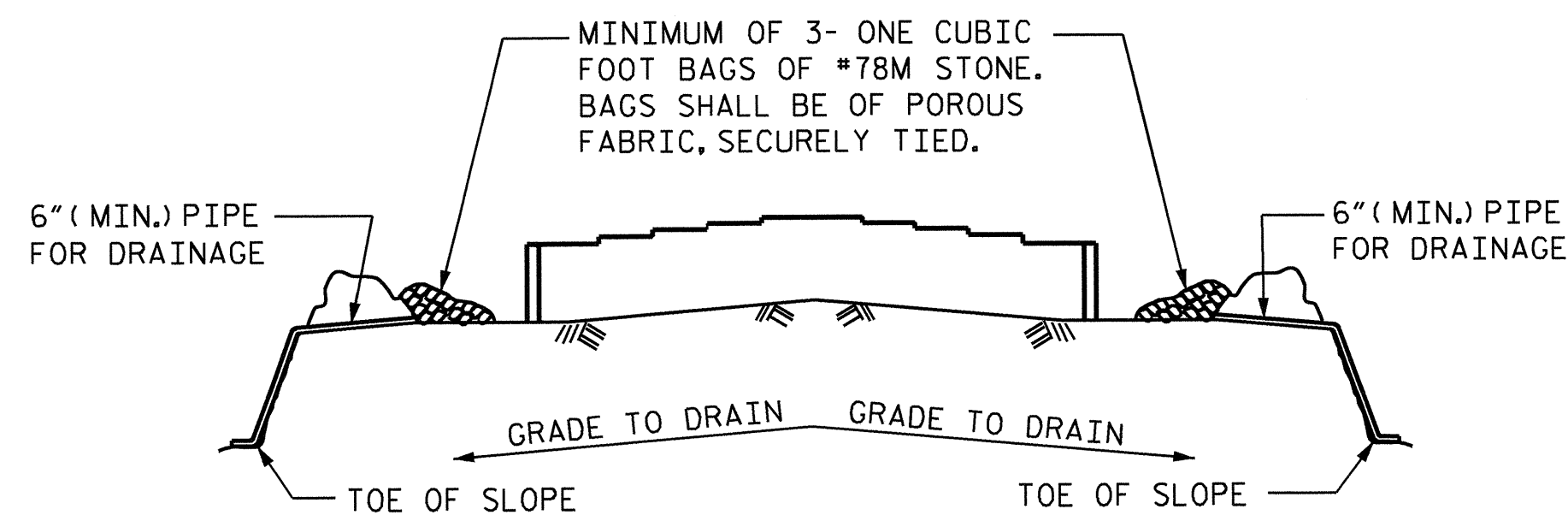
END BENT 1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	1	38'-2"	1971
B2	12	#9	1	38'-5"	1567
B3	12	#5	STR	34'-5"	431
B4	12	#4	STR	23'-7"	189
B5	6	#4	STR	29'-8"	119
B6	17	#4	STR	3'-11"	44
H1	5	#5	2	15'-9"	82
H2	5	#5	2	16'-0"	83
H3	5	#5	3	17'-1"	89
H4	5	#5	3	16'-10"	88
S1	64	#5	4	4'-10"	323
S2	64	#5	5	12'-9"	851
S3	36	#4	6	6'-6"	156
U1	20	#4	7	6'-11"	92
V1	92	#4	STR	6'-7"	405
V2	56	#4	STR	6'-2"	231

REINFORCING STEEL = 6,721 LBS

CLASS A CONCRETE;  
CAP, LOWER WINGS, & COLLARS = 53.0 C.Y.

HP 12 X 53 STEEL PILES  
NO. 9 LIN. FT. 270

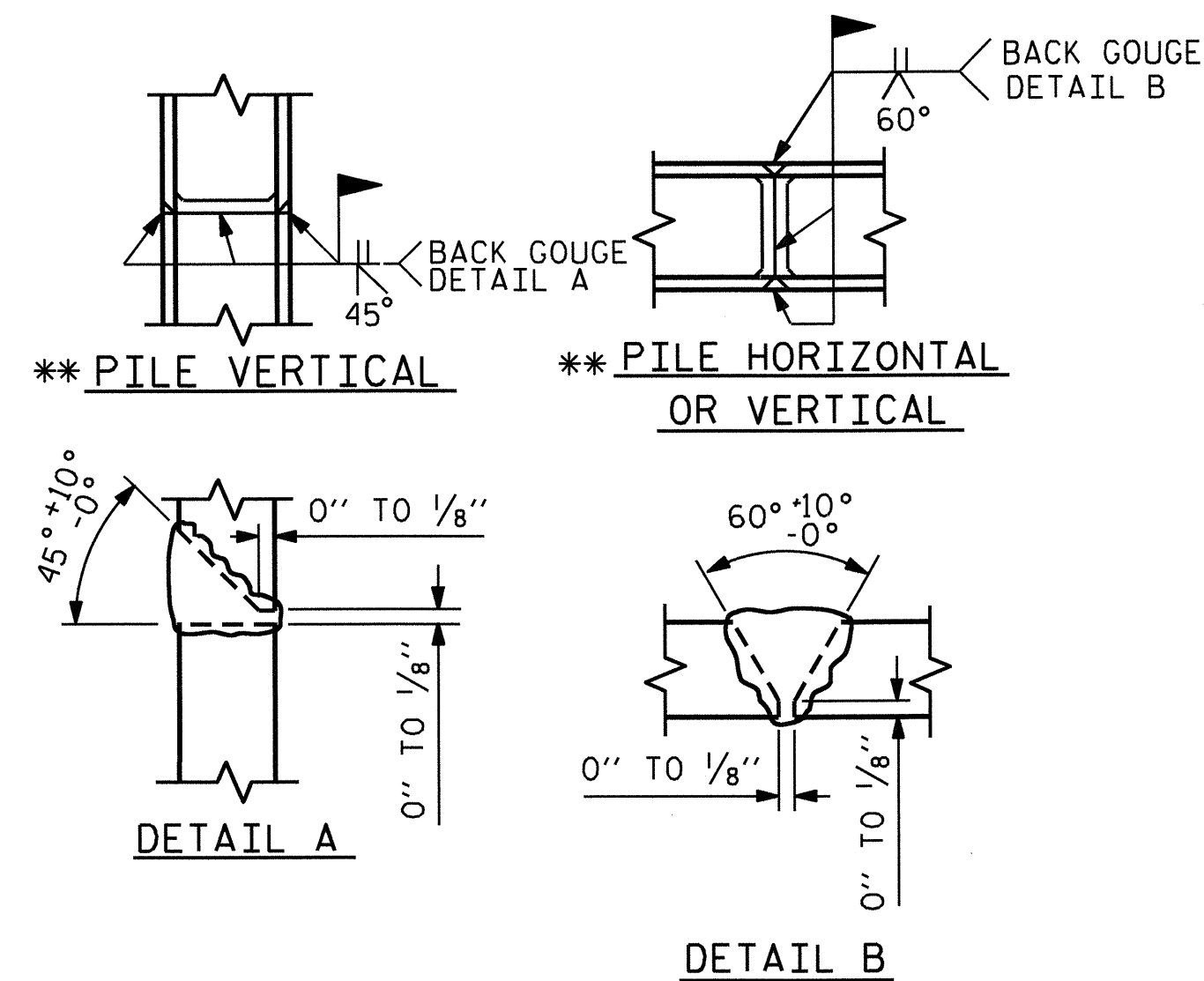


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

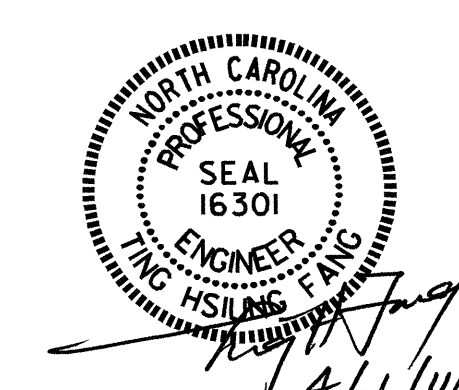
PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 60+37.13 -L-

SHEET 3 OF 3

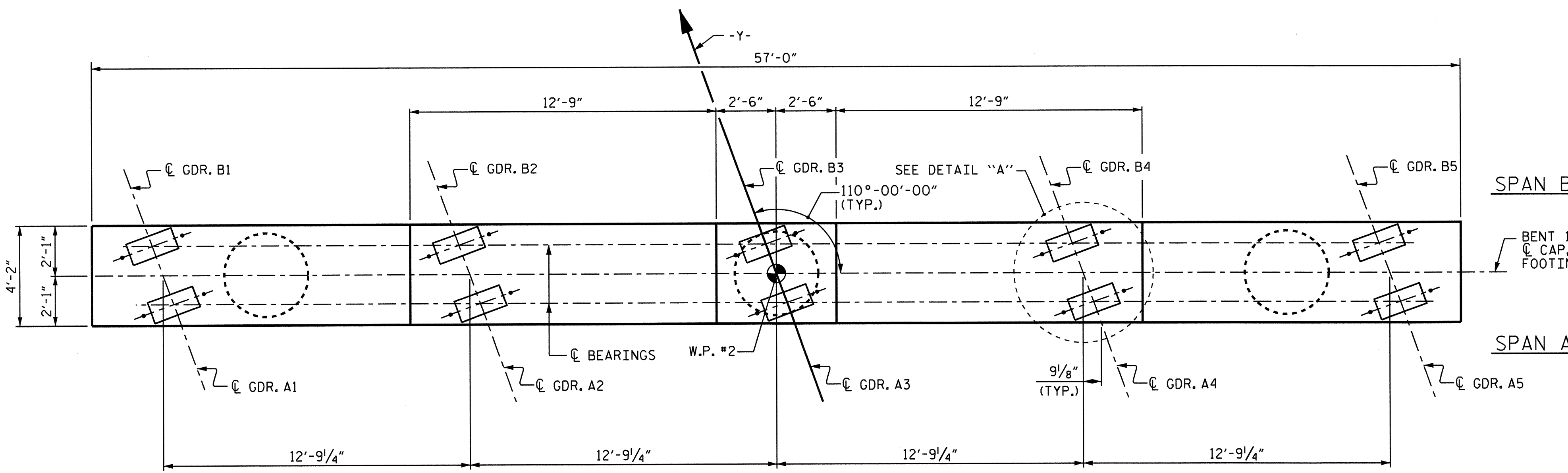
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUBSTRUCTURE

END BENT 1  
(INTEGRAL)

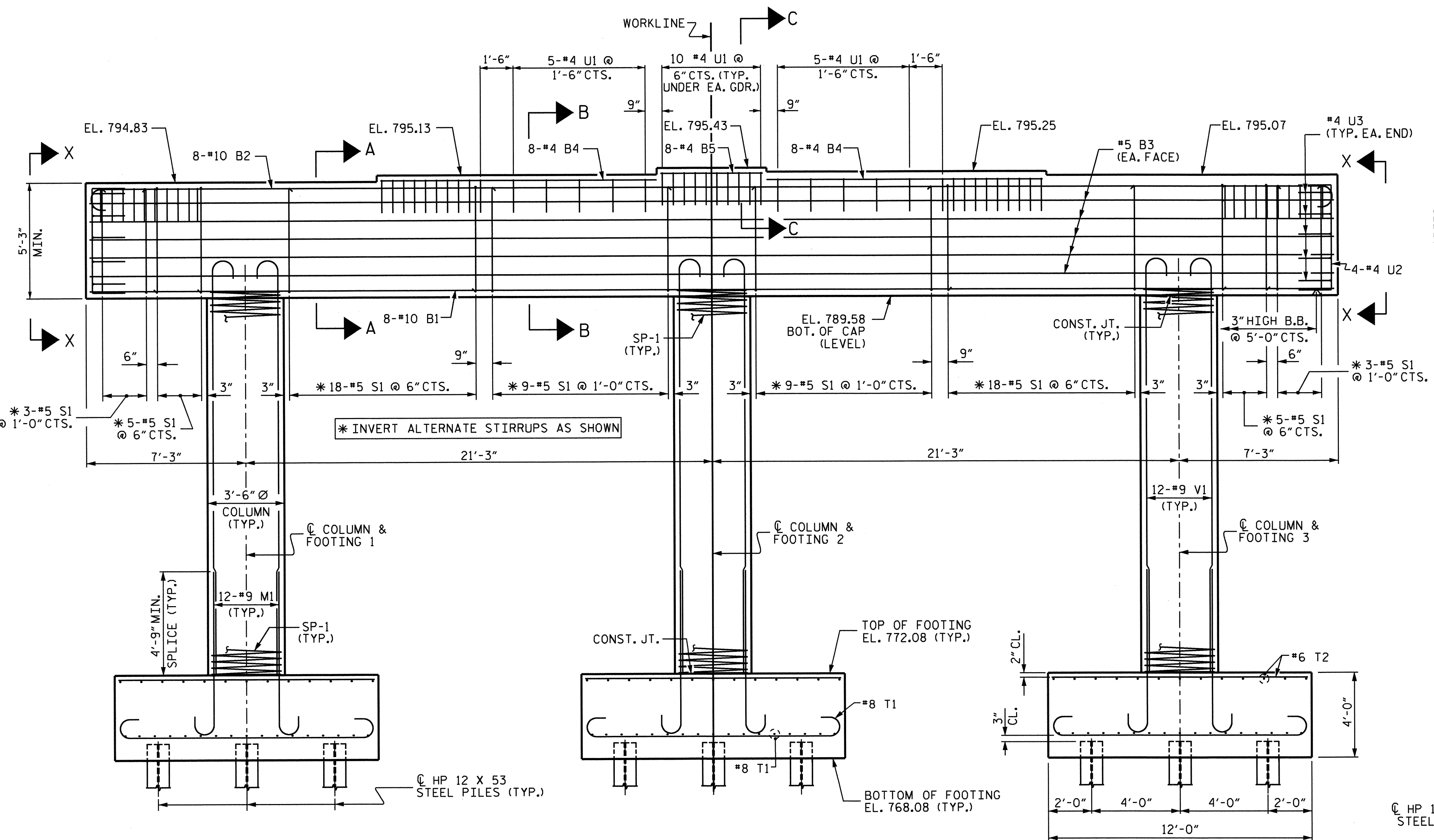
REVISIONS						SHEET NO. S-28
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			



DRAWN BY: RAMAN PATEL DATE: 3-9-12  
CHECKED BY: E.J. OMILE DATE: 11-20-12  
DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

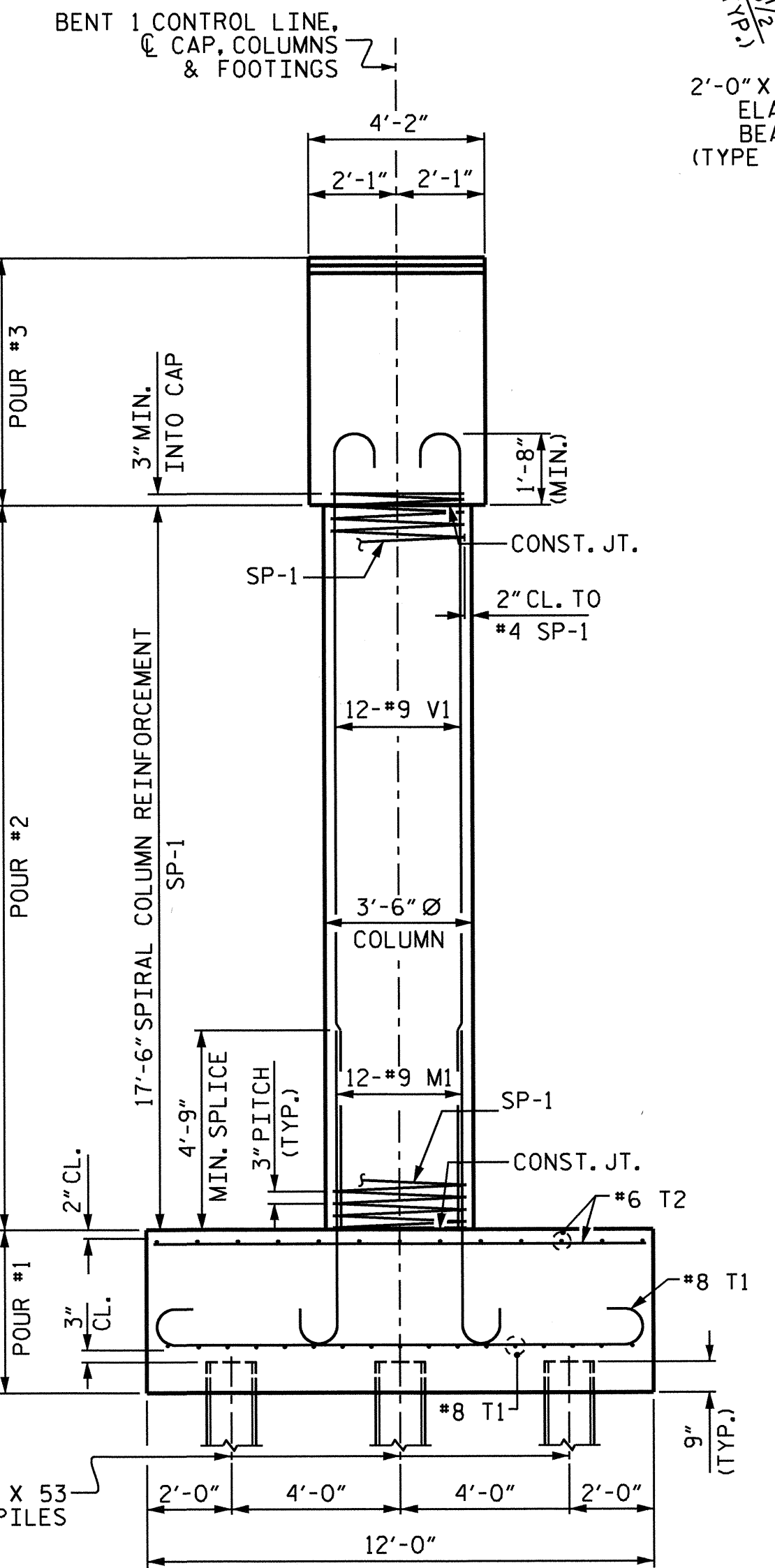


PLAN



ELEVATION

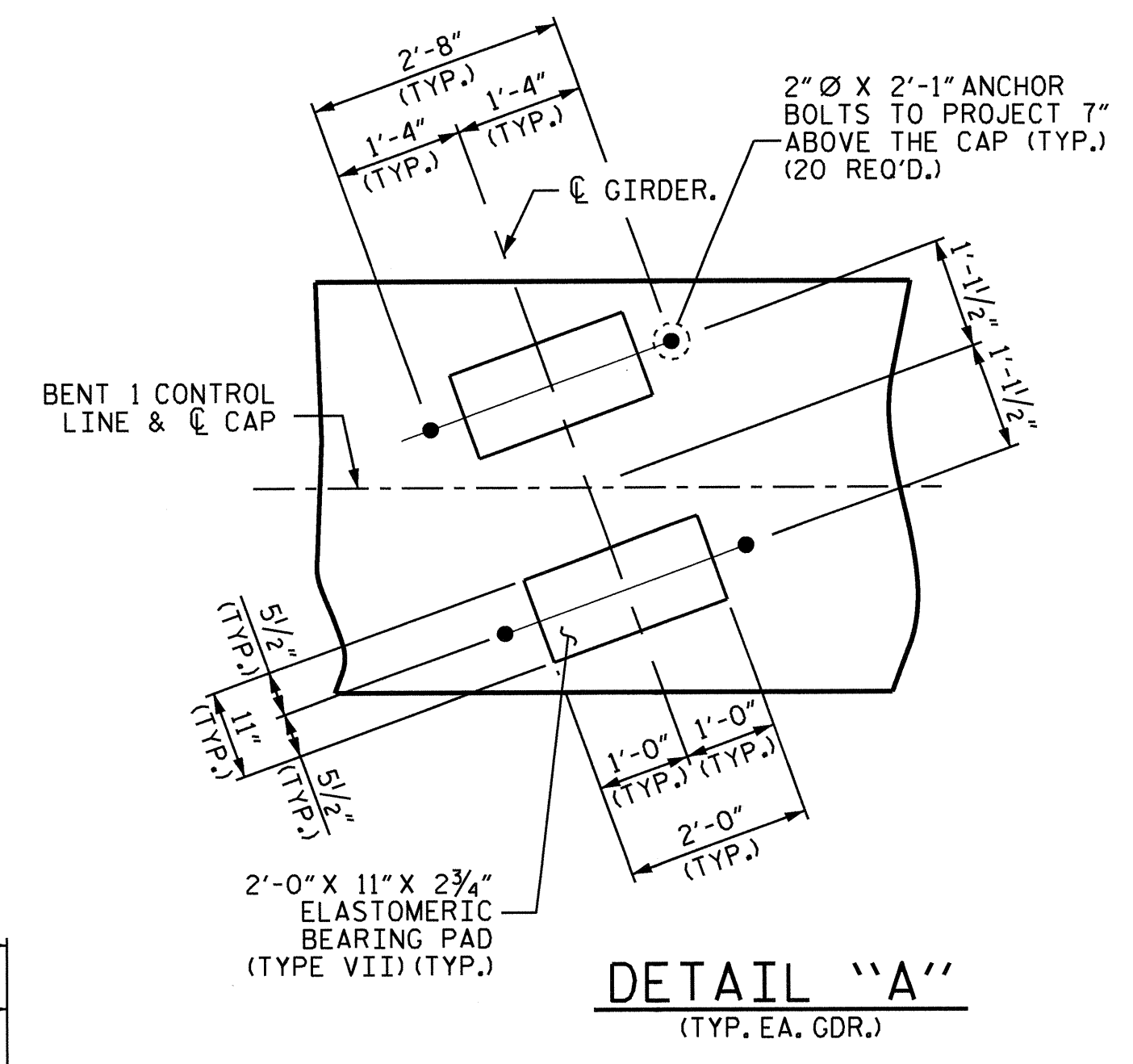
REINFORCING STEEL, DIMENSIONS AND DETAILS ARE TYPICAL FOR EACH COLUMN AND FOOTING



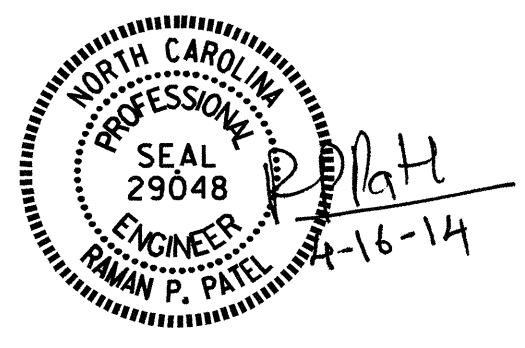
END ELEVATION

NOTES

STIRRUPS AND U1 BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 HOOKS ON M1 & V1 BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.  
 FOR PILE SPLICE DETAIL, SEE SHEET 2 OF 2.



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



PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

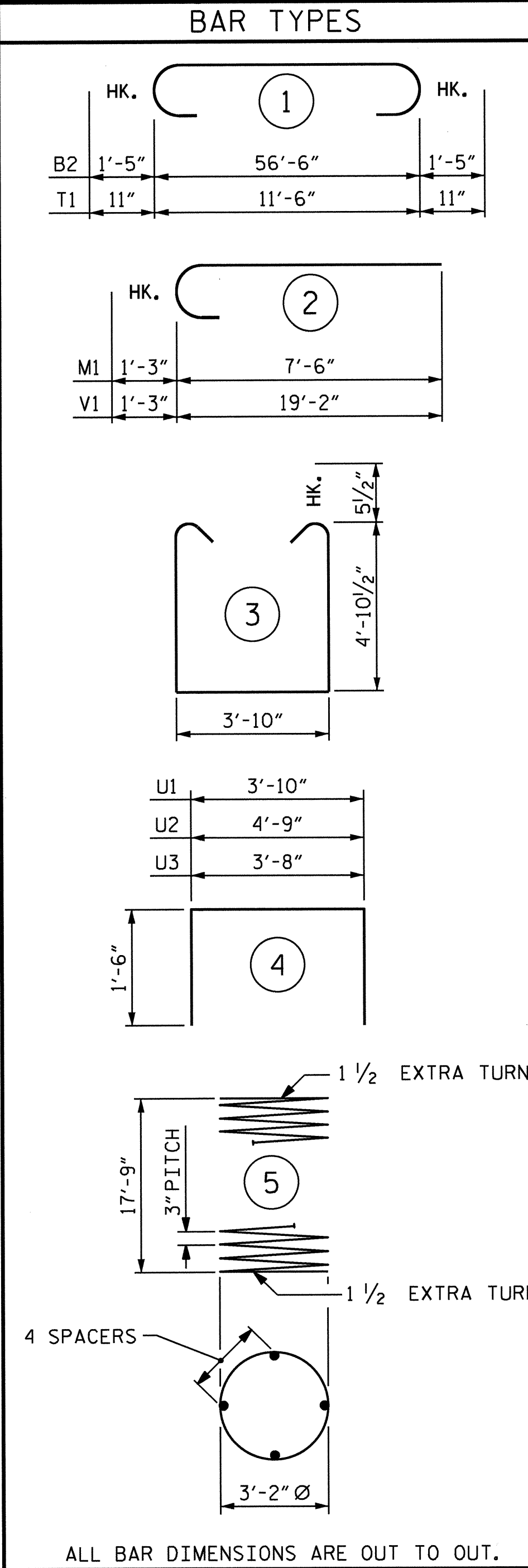
SHEET 1 OF 2

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

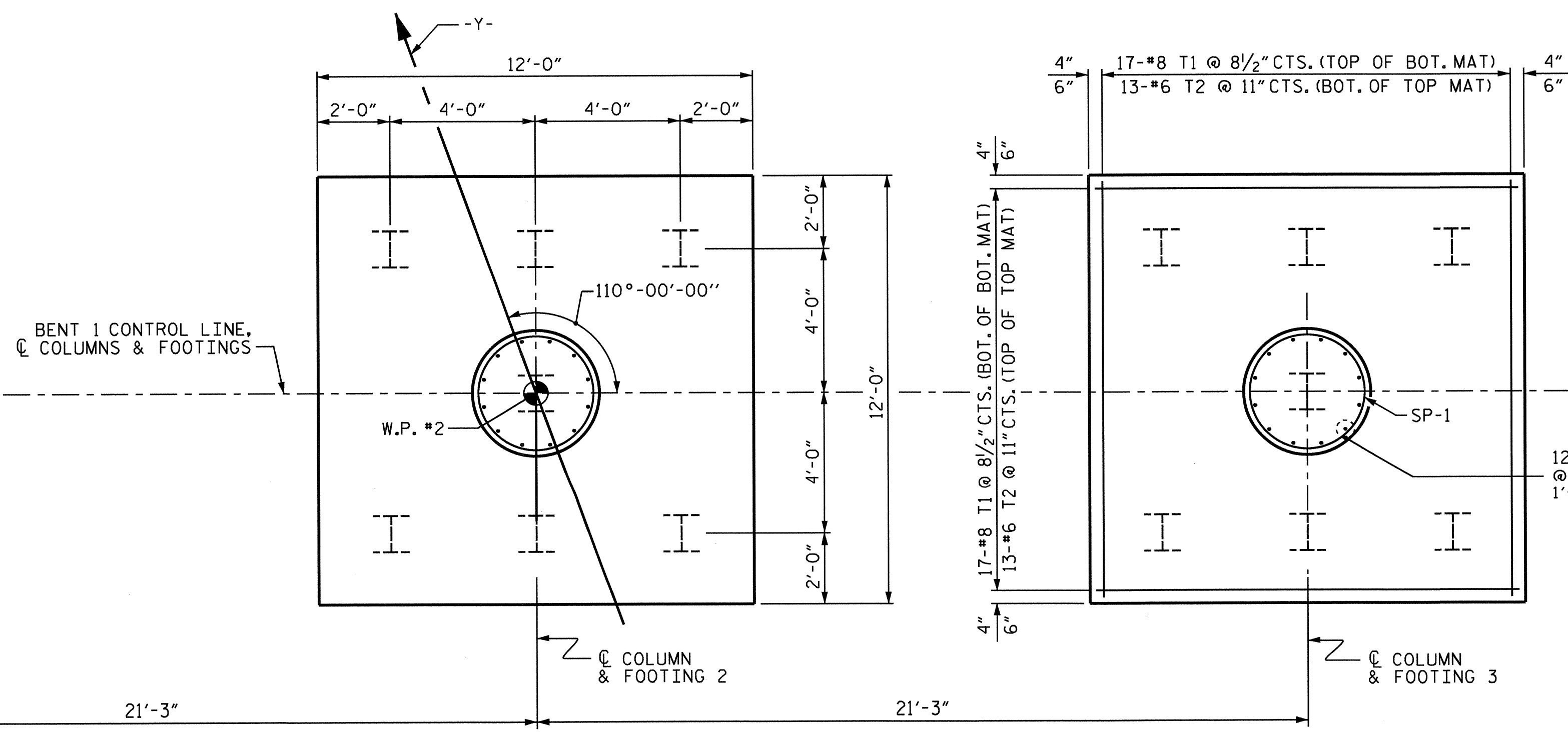
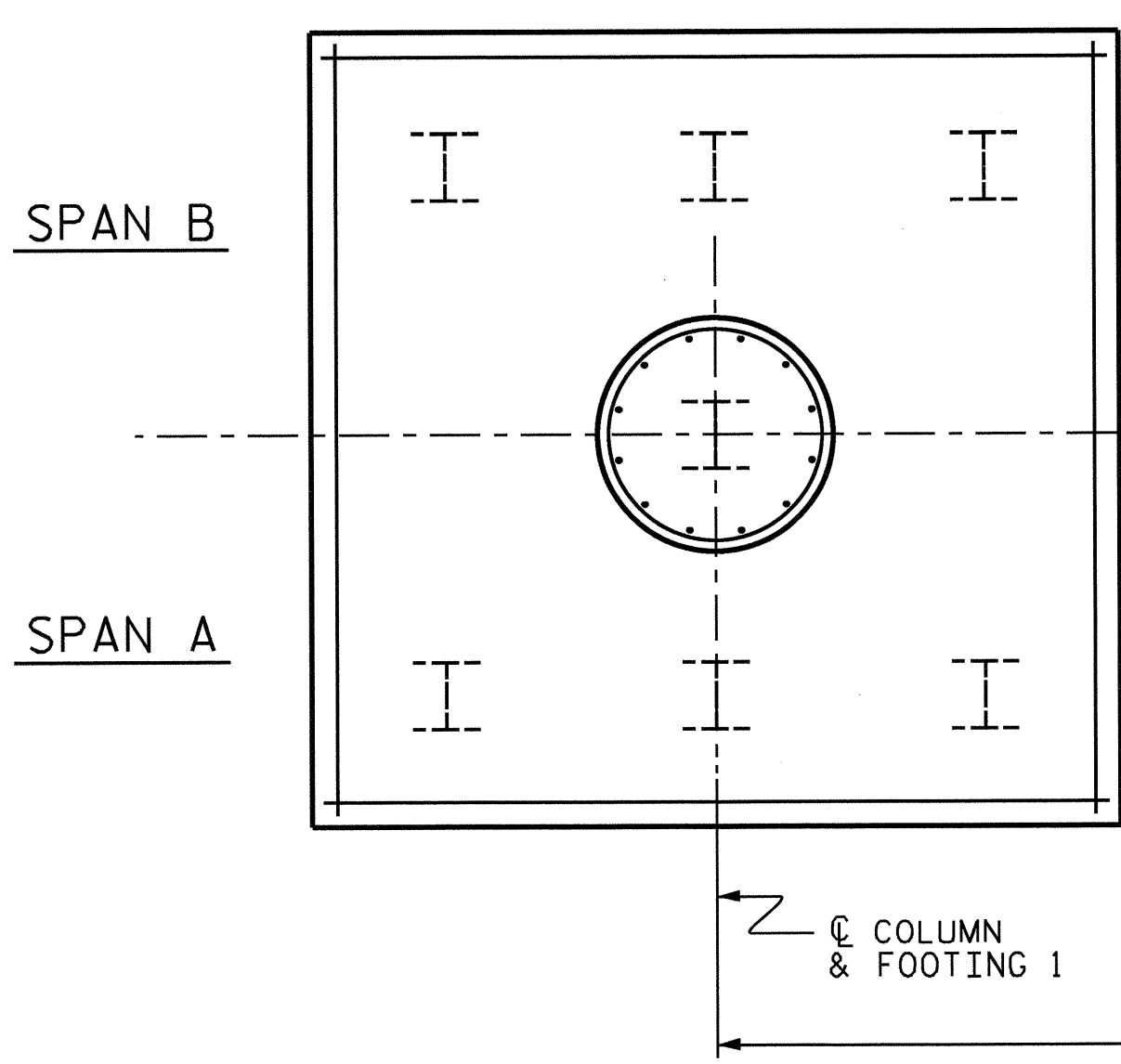
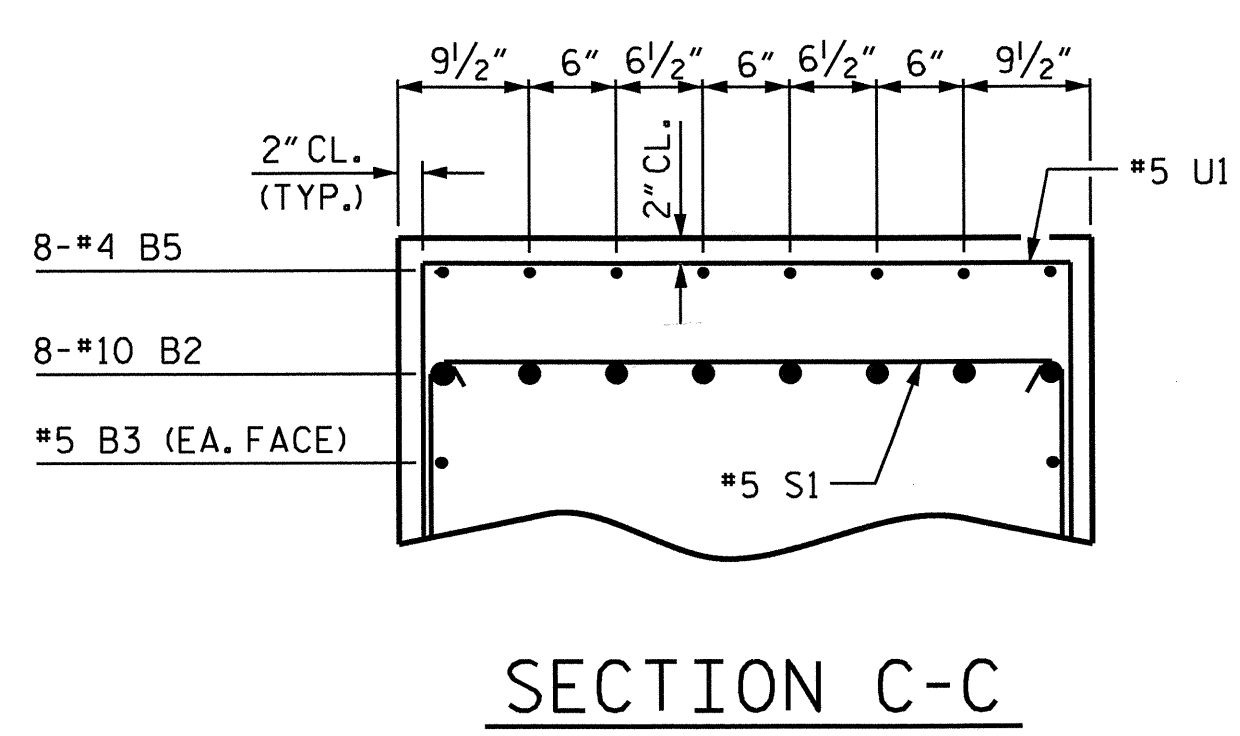
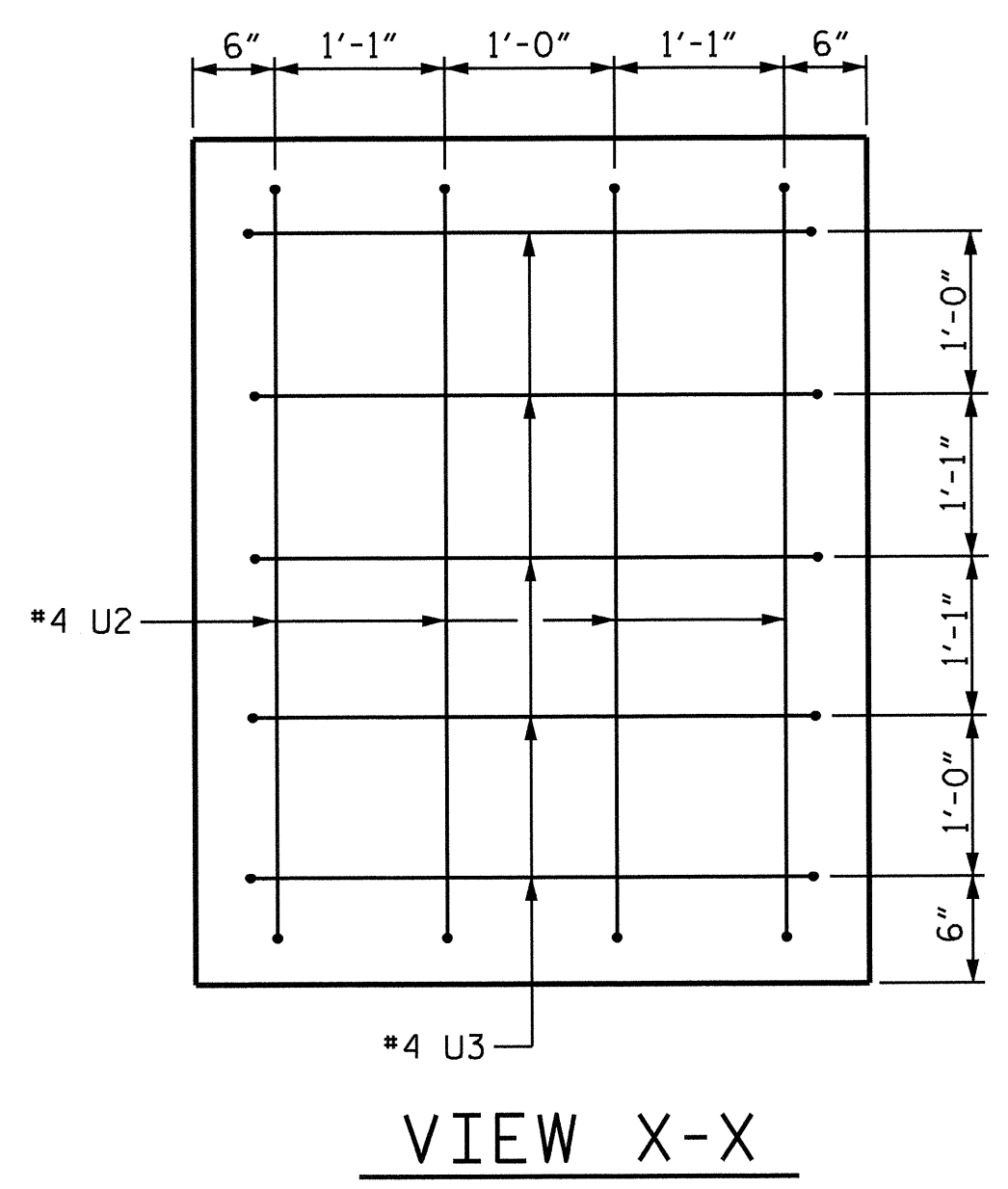
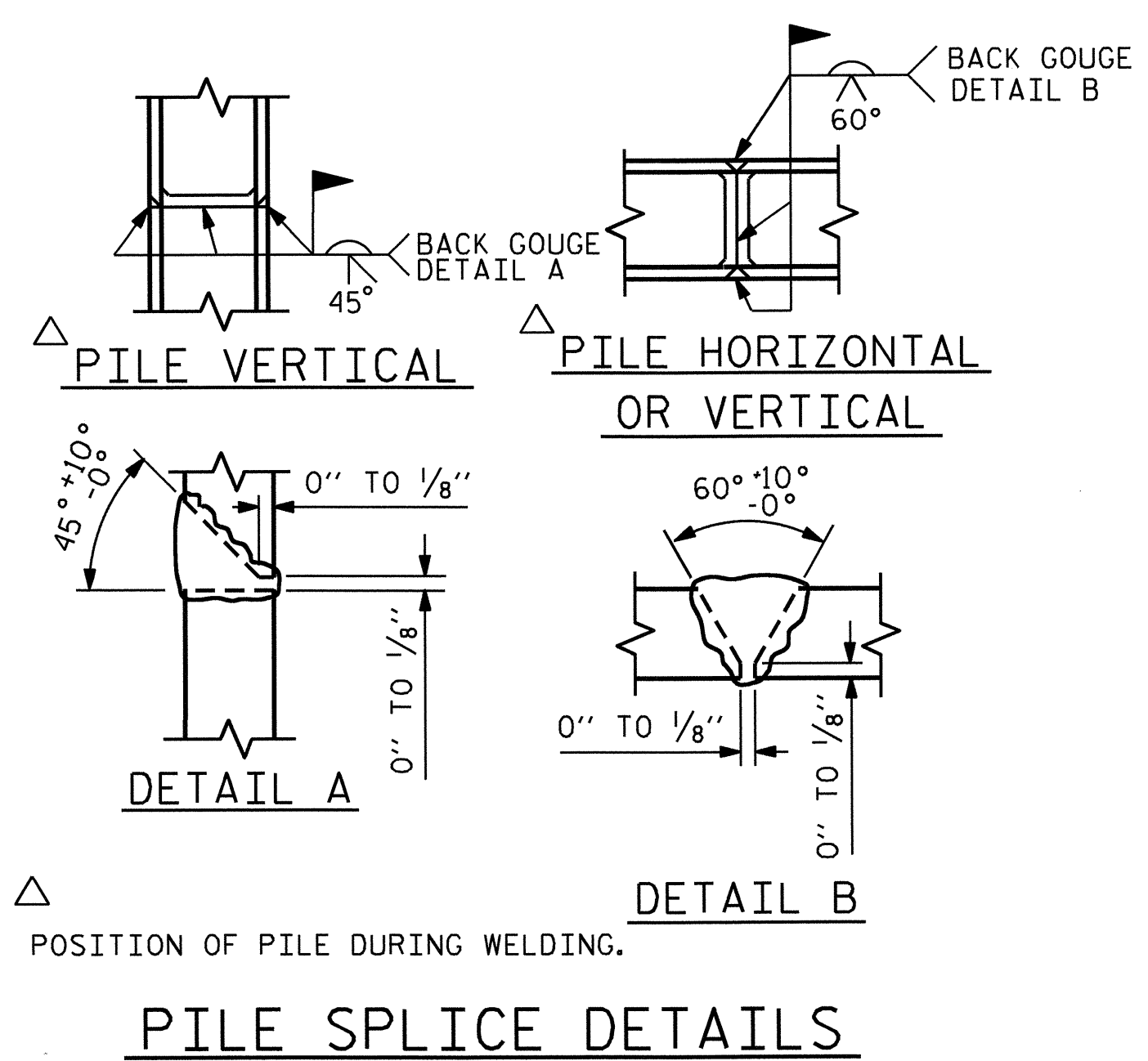
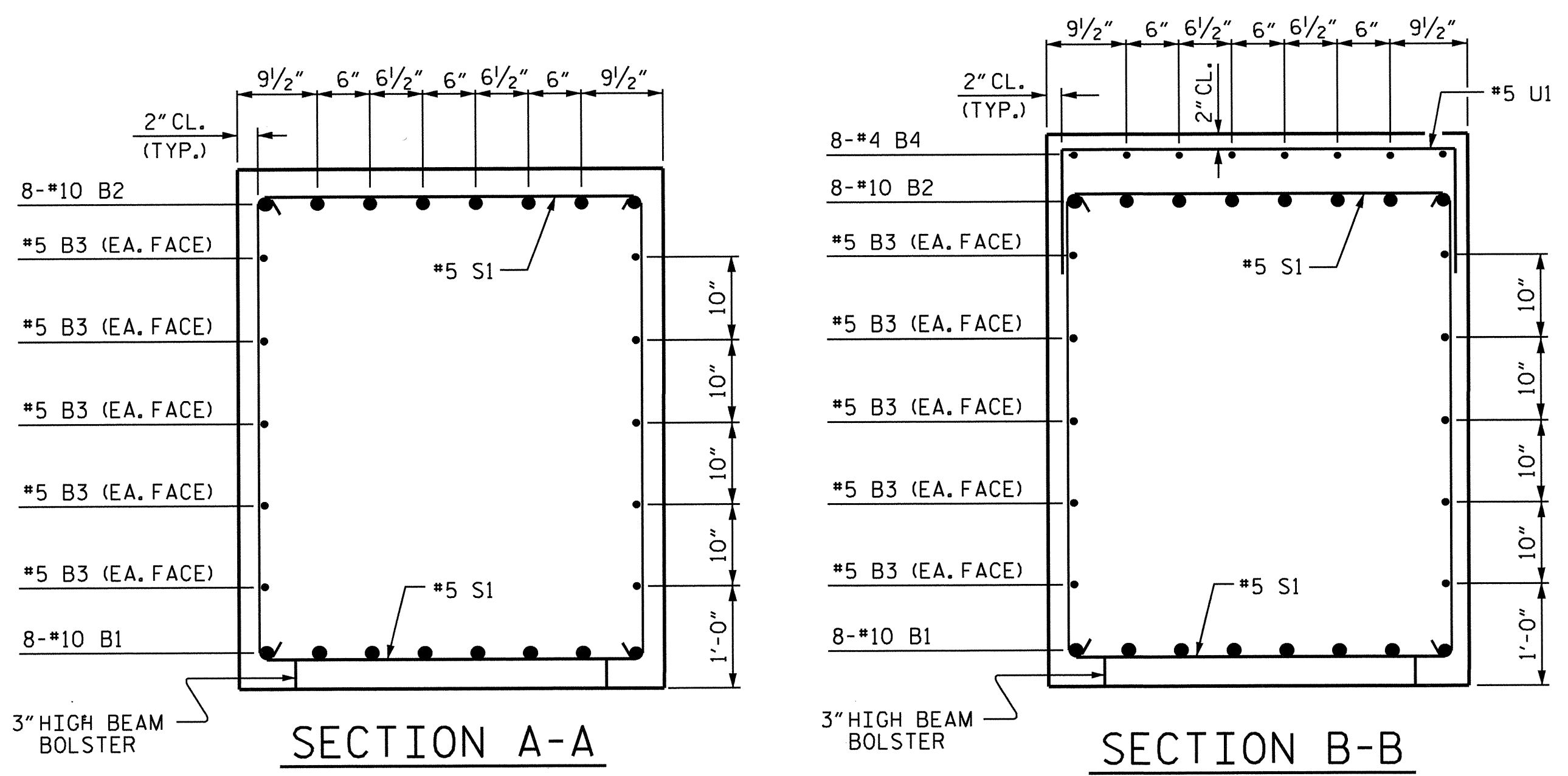
SHEET NO. S-29  
TOTAL SHEETS 38

DRAWN BY: RAMAN PATEL DATE: 7-3-12  
 CHECKED BY: E.I. OMILE DATE: 11-26-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	56'-8"	1951
B2	8	#10	1	59'-4"	2042
B3	10	#5	STR	56'-8"	591
B4	16	#4	STR	12'-5"	133
B5	8	#4	STR	4'-8"	25
M1	36	#9	2	8'-9"	1071
S1	70	#5	3	14'-6"	1059
T1	102	#8	1	13'-4"	3631
T2	78	#6	STR	11'-8"	1367
U1	60	#4	4	6'-10"	274
U2	8	#4	4	7'-9"	41
U3	10	#4	4	6'-8"	45
V1	36	#9	2	20'-5"	2499
REINFORCING STEEL				LBS.	14,729
SP-1	3	*	5	725'-7"	1454
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,454
CLASS A CONCRETE					
POUR #1 - FOOTINGS				CU. YDS.	64.0
POUR #2 - COLUMNS				CU. YDS.	18.7
POUR #3 - CAP				CU. YDS.	48.6
TOTAL				CU. YDS.	131.3
HP 12 X 53 STEEL PILES					
NUMBER = 21				LIN. FT. =	315
STEEL PILE POINTS					21 EA.



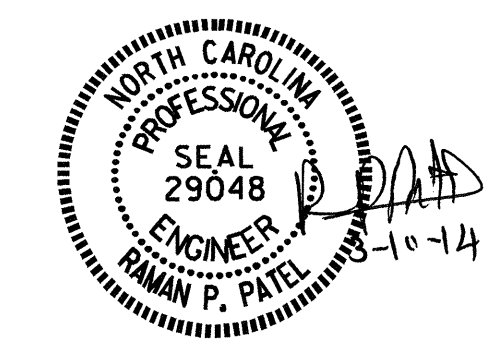
\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



**PLAN OF FOOTINGS AND COLUMNS**

REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING AND COLUMN

DRAWN BY : RAMAN PATEL DATE : 7-3-12  
 CHECKED BY : E.I. OMILE DATE : 11-26-12  
 DESIGN ENGINEER OF RECORD : RAMAN PATEL DATE : 12-20-12

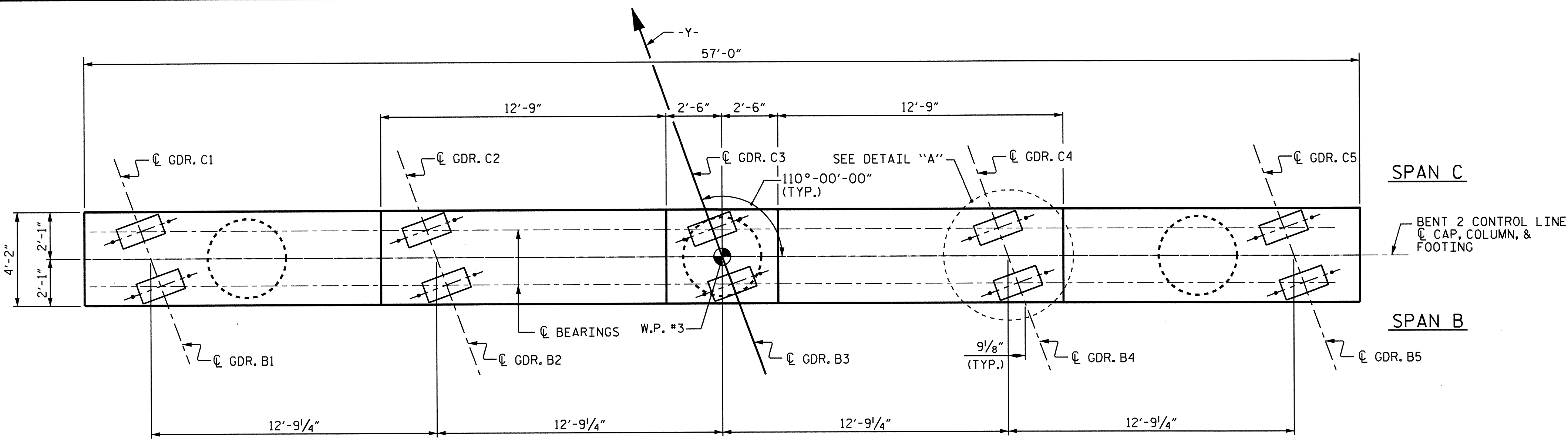


PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-  
 SHEET 2 OF 2

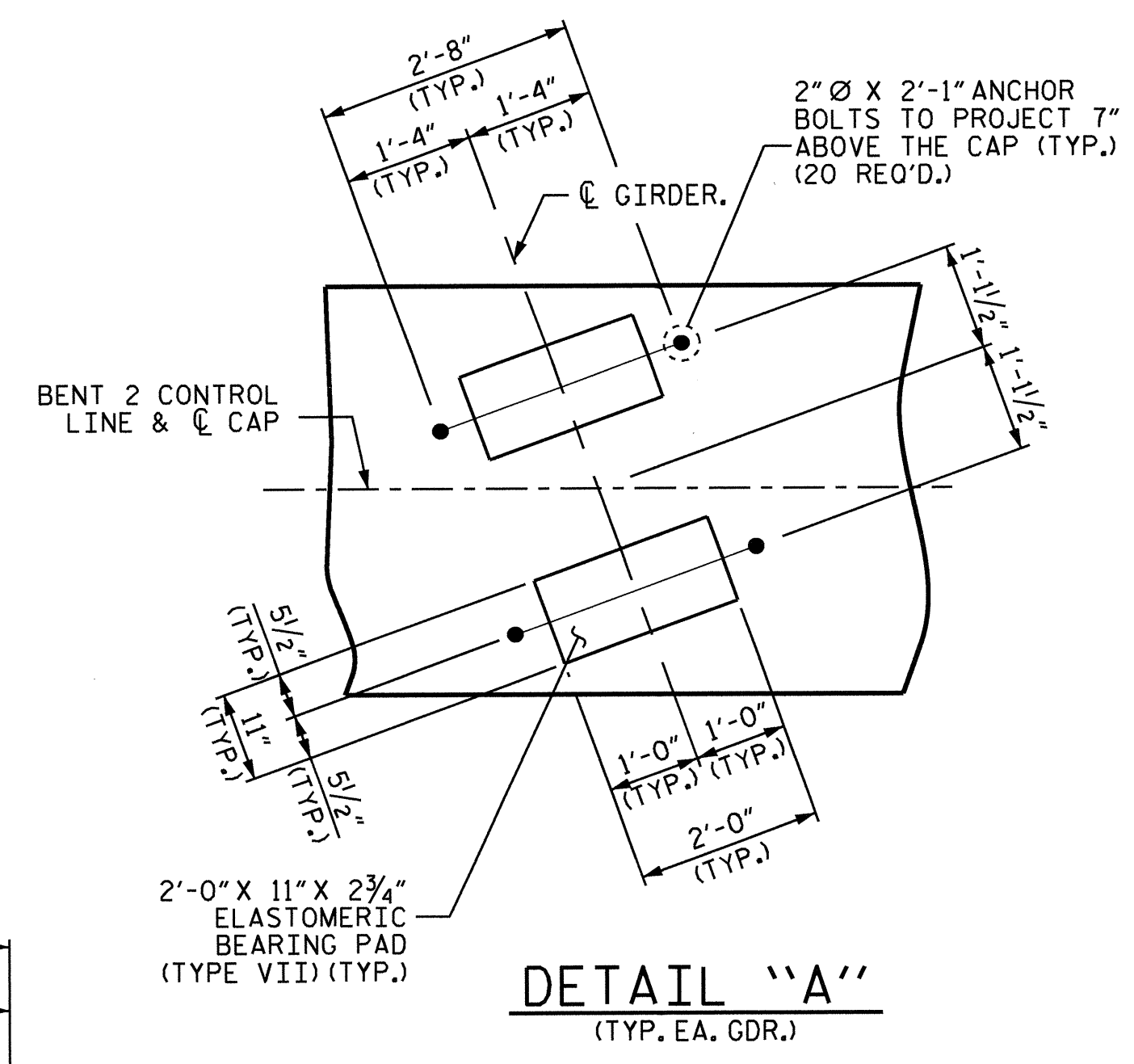
REVISIONS						SHEET NO. S-30
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

**NOTES**

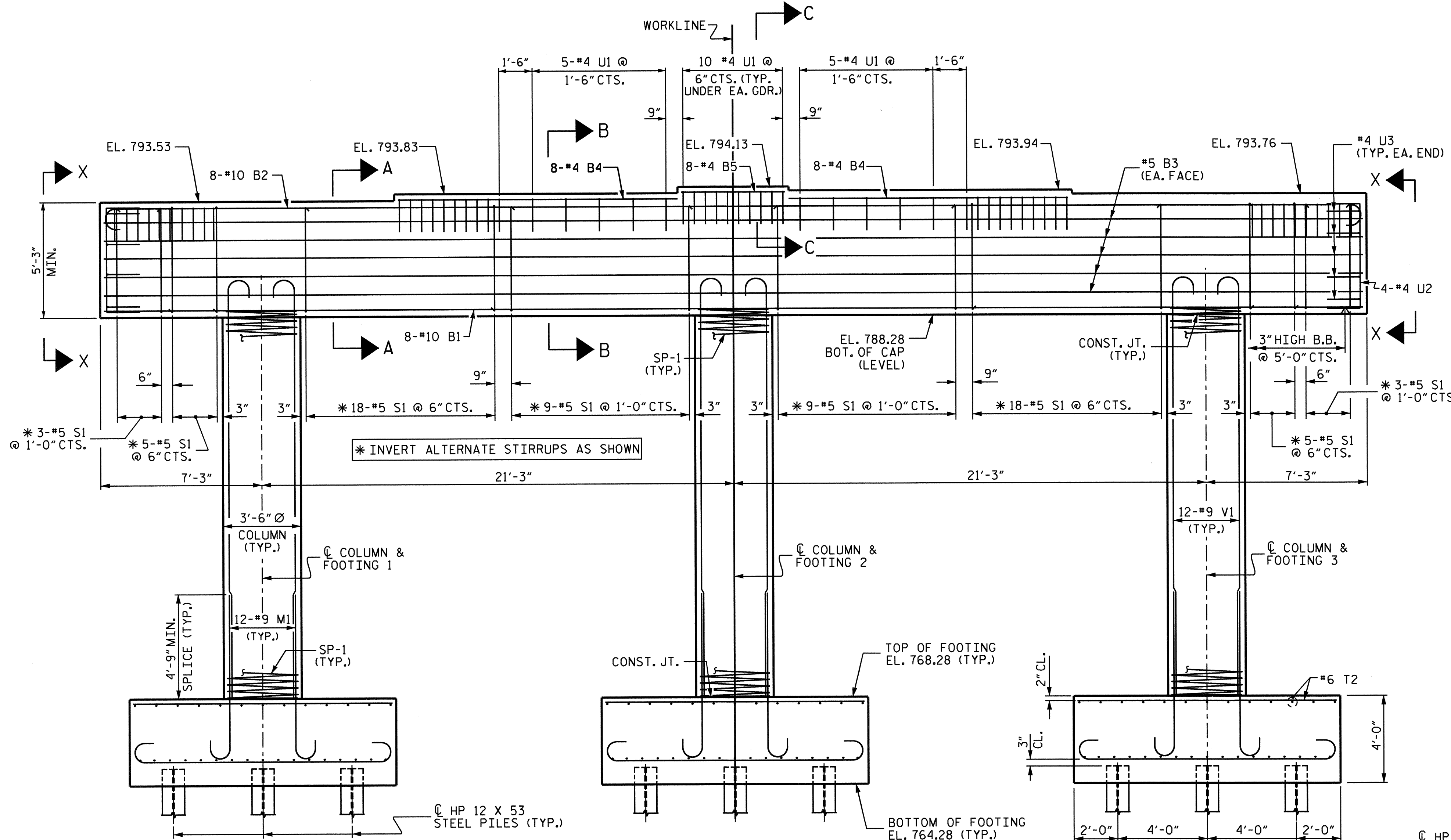
STIRRUPS AND UI BARS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.  
 HOOKS ON M1 & V1 BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.  
 FOR PILE SPLICE DETAIL, SEE SHEET 2 OF 2.



**PLAN**

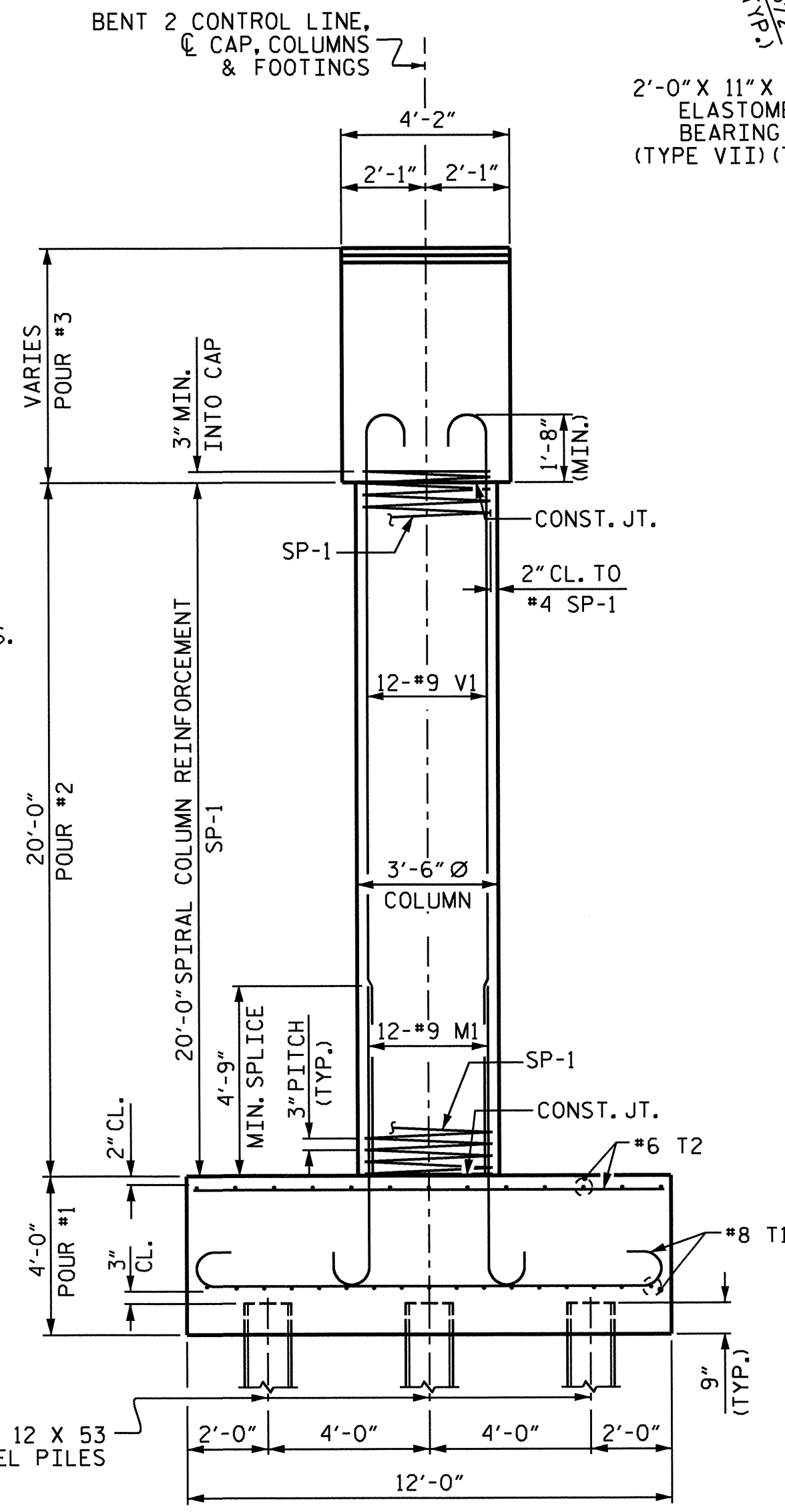


**DETAIL "A"**  
(TYP. EA. GDR.)

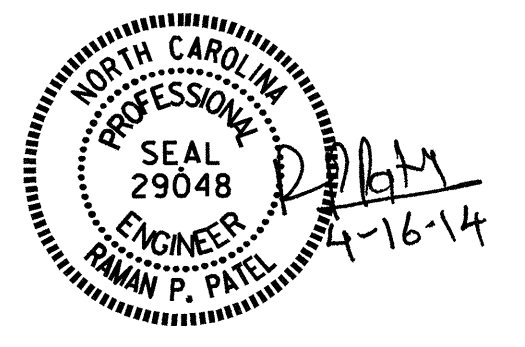


**ELEVATION**

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



**END ELEVATION**



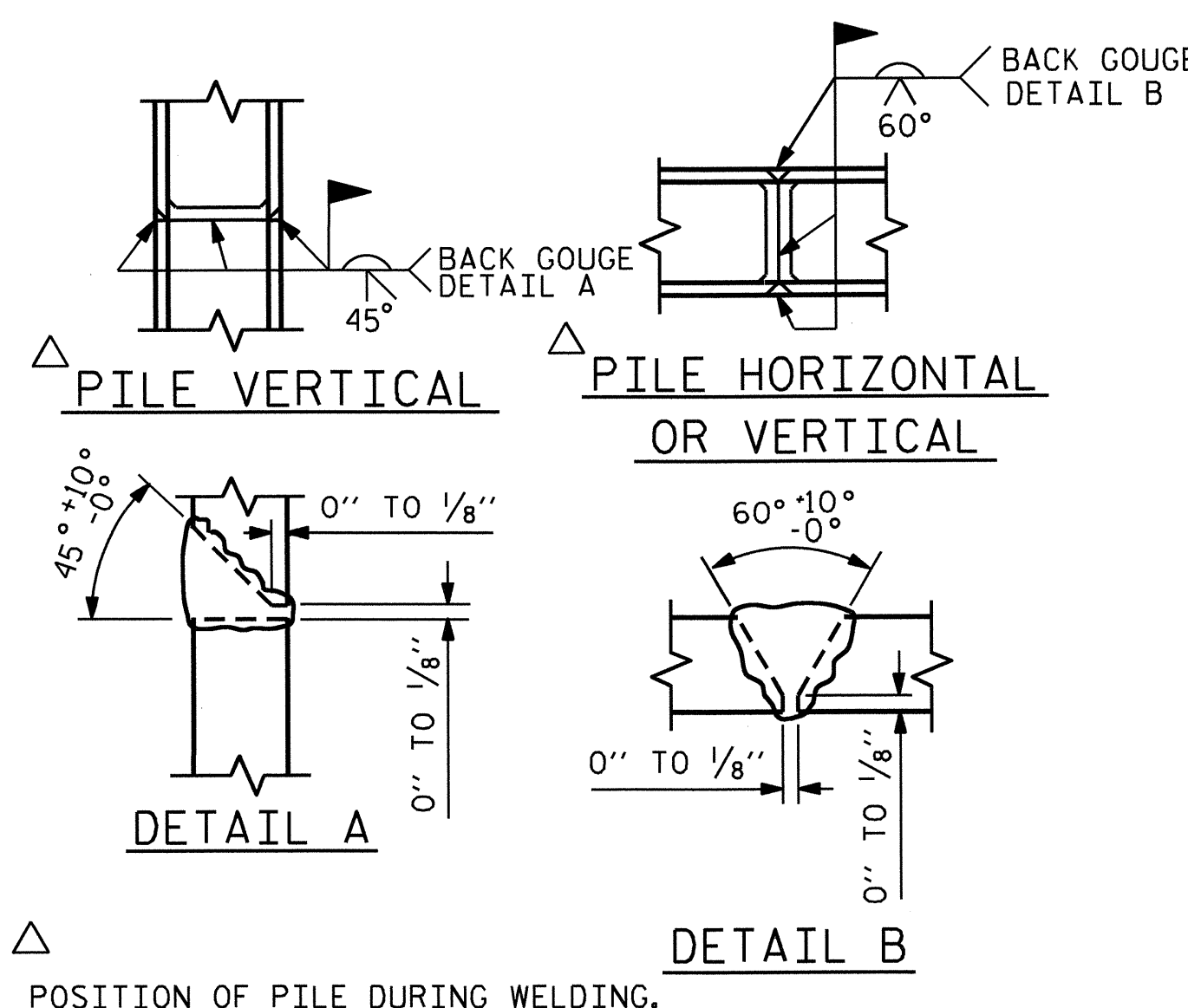
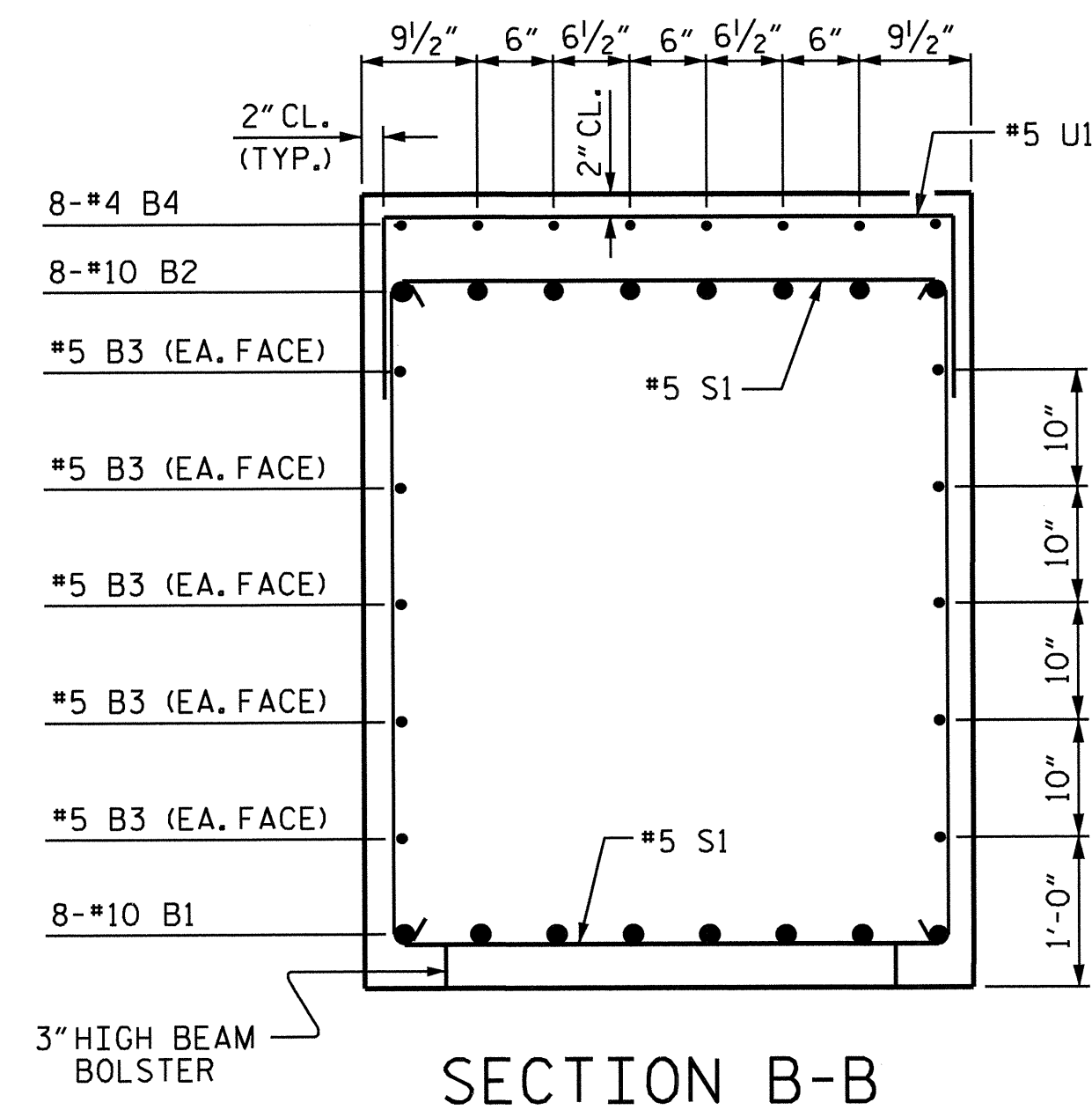
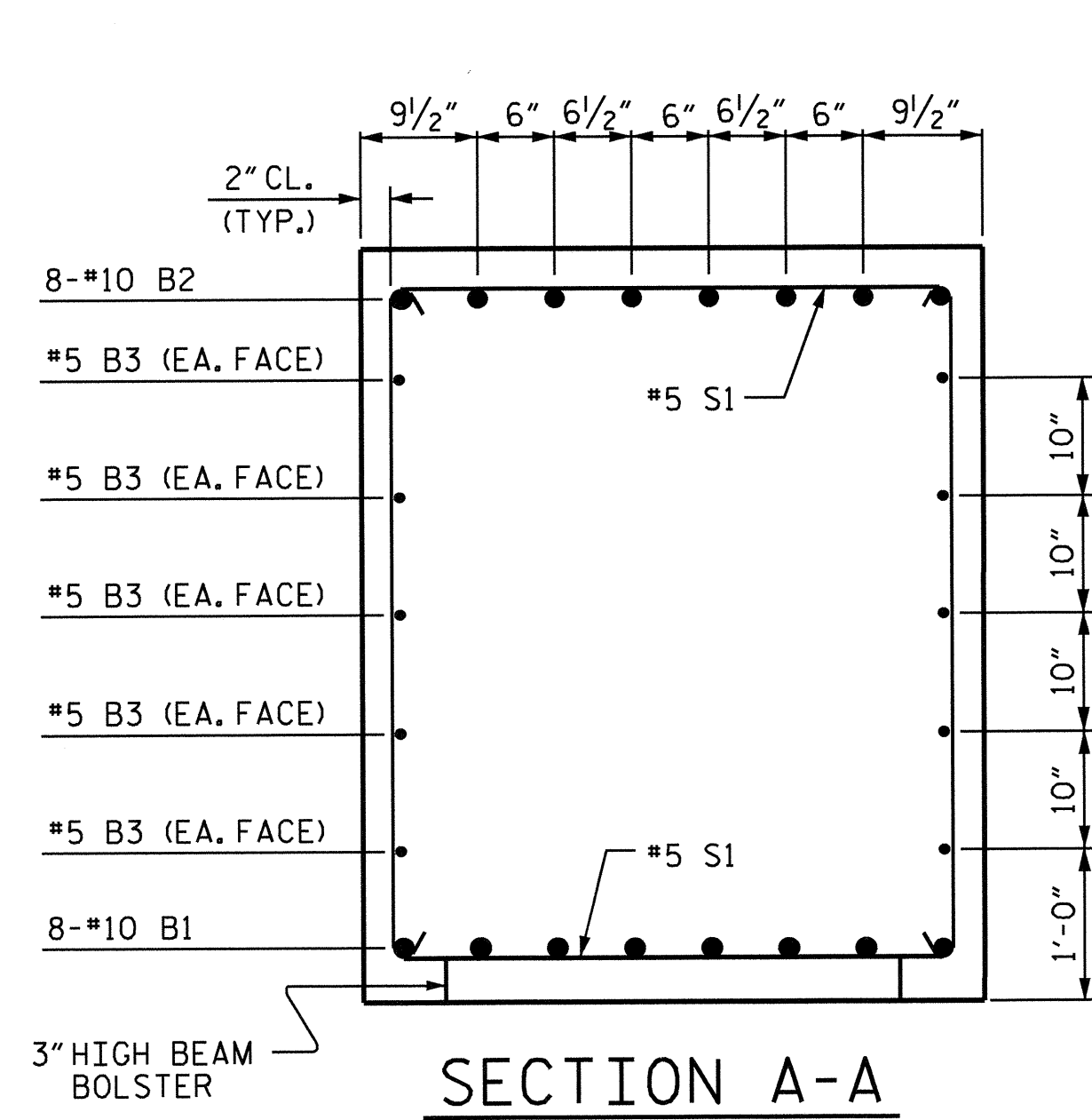
PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 1 OF 2

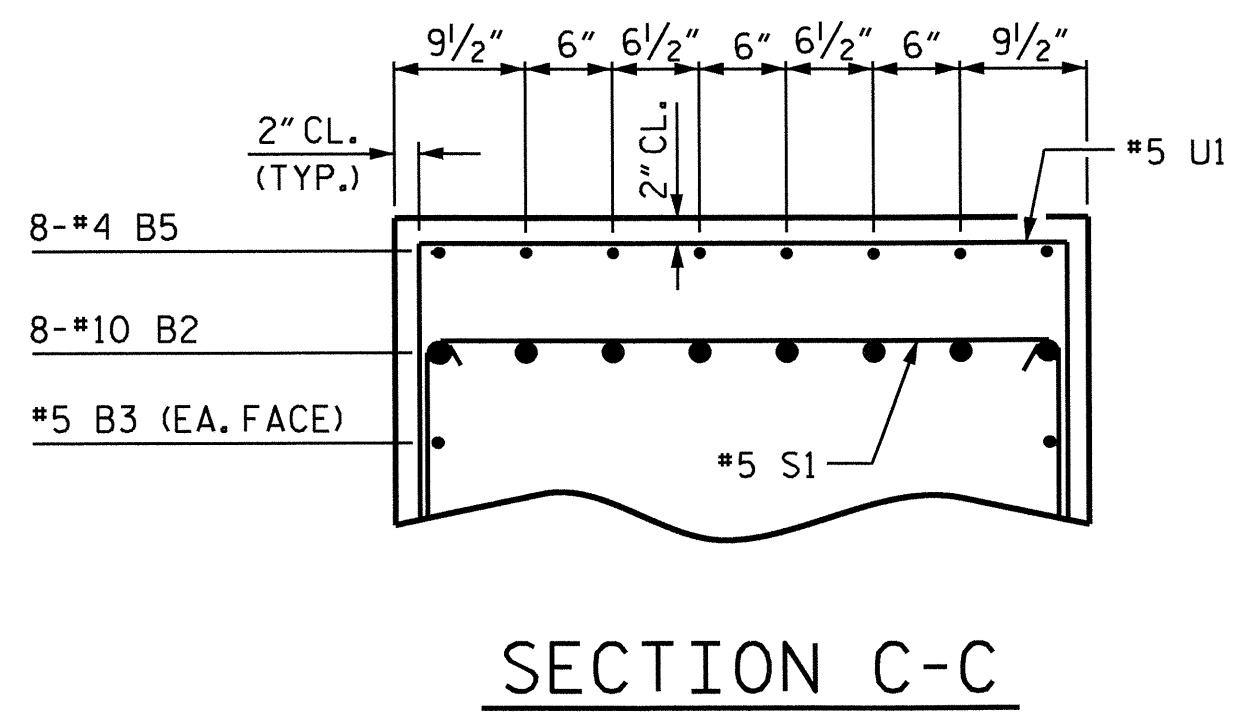
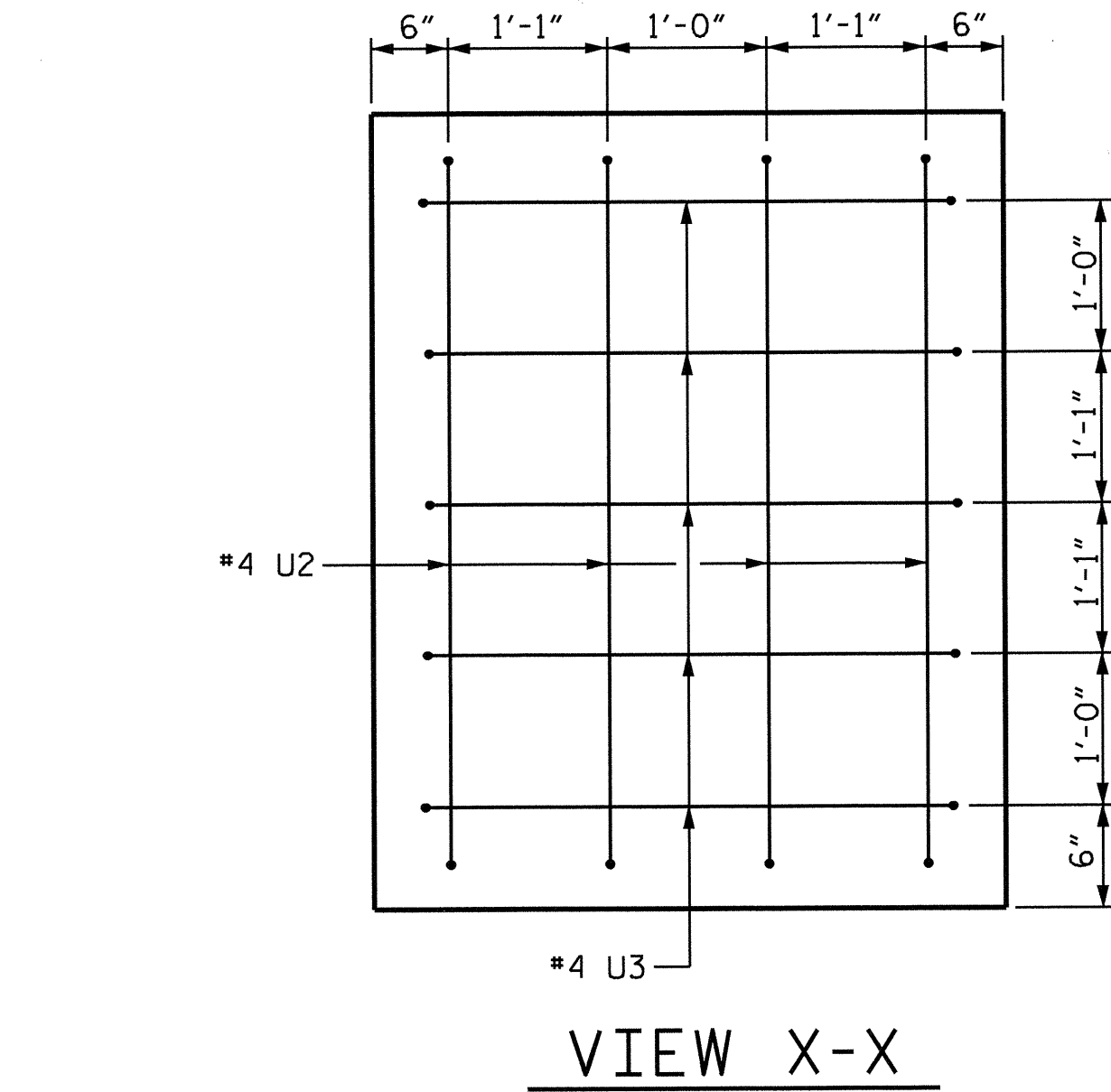
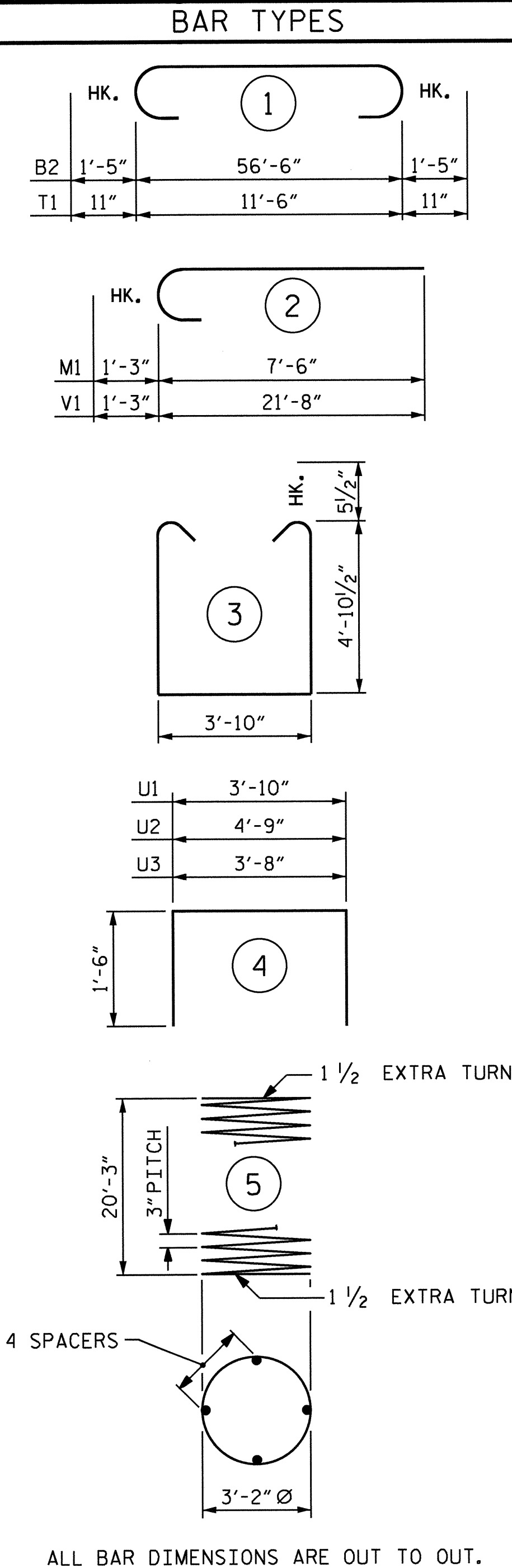
REVISIONS						SHEET NO. S-31
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

DRAWN BY: RAMAN PATEL DATE: 7-3-12  
 CHECKED BY: E.I. OMILE DATE: 11-26-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

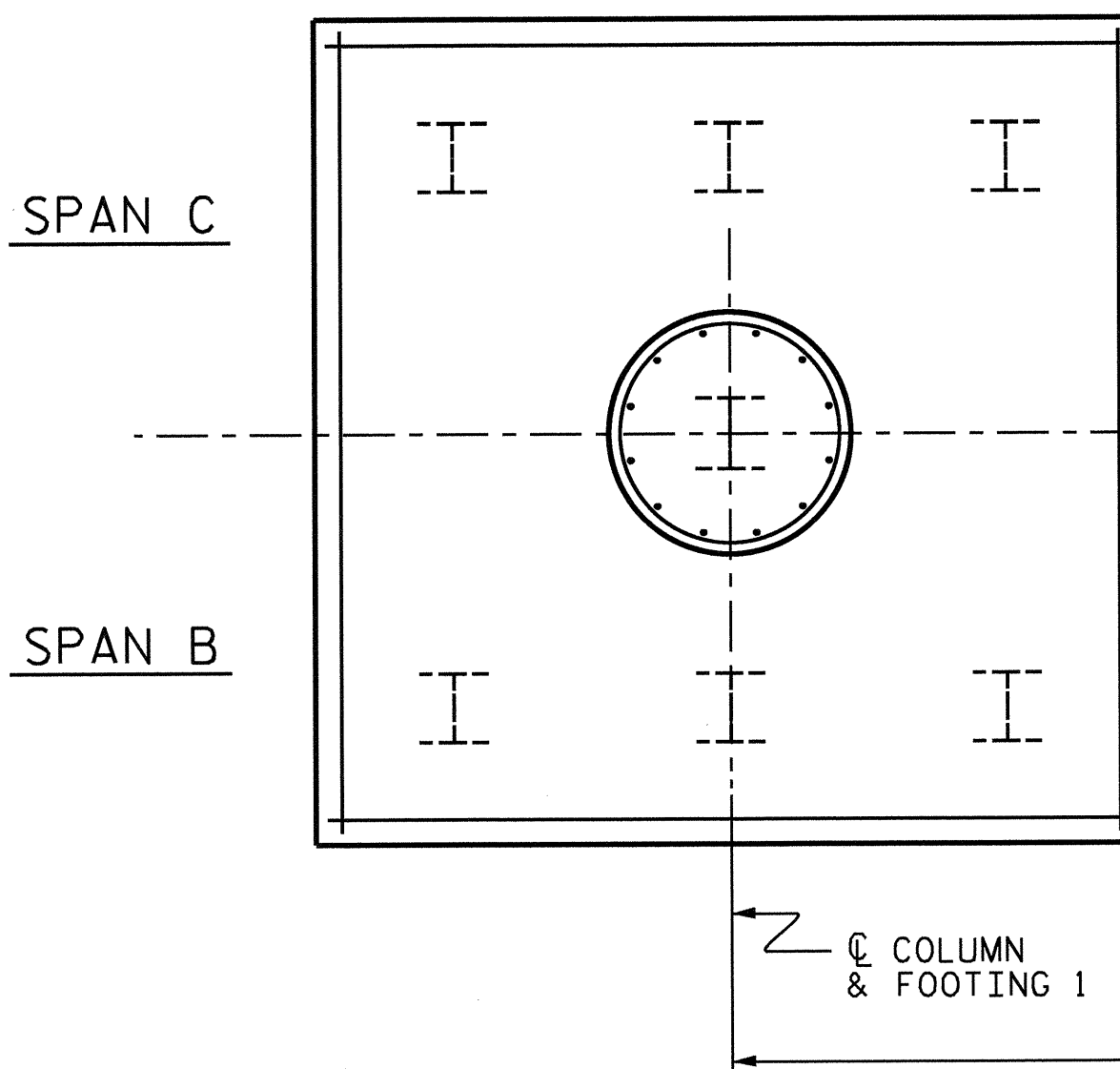
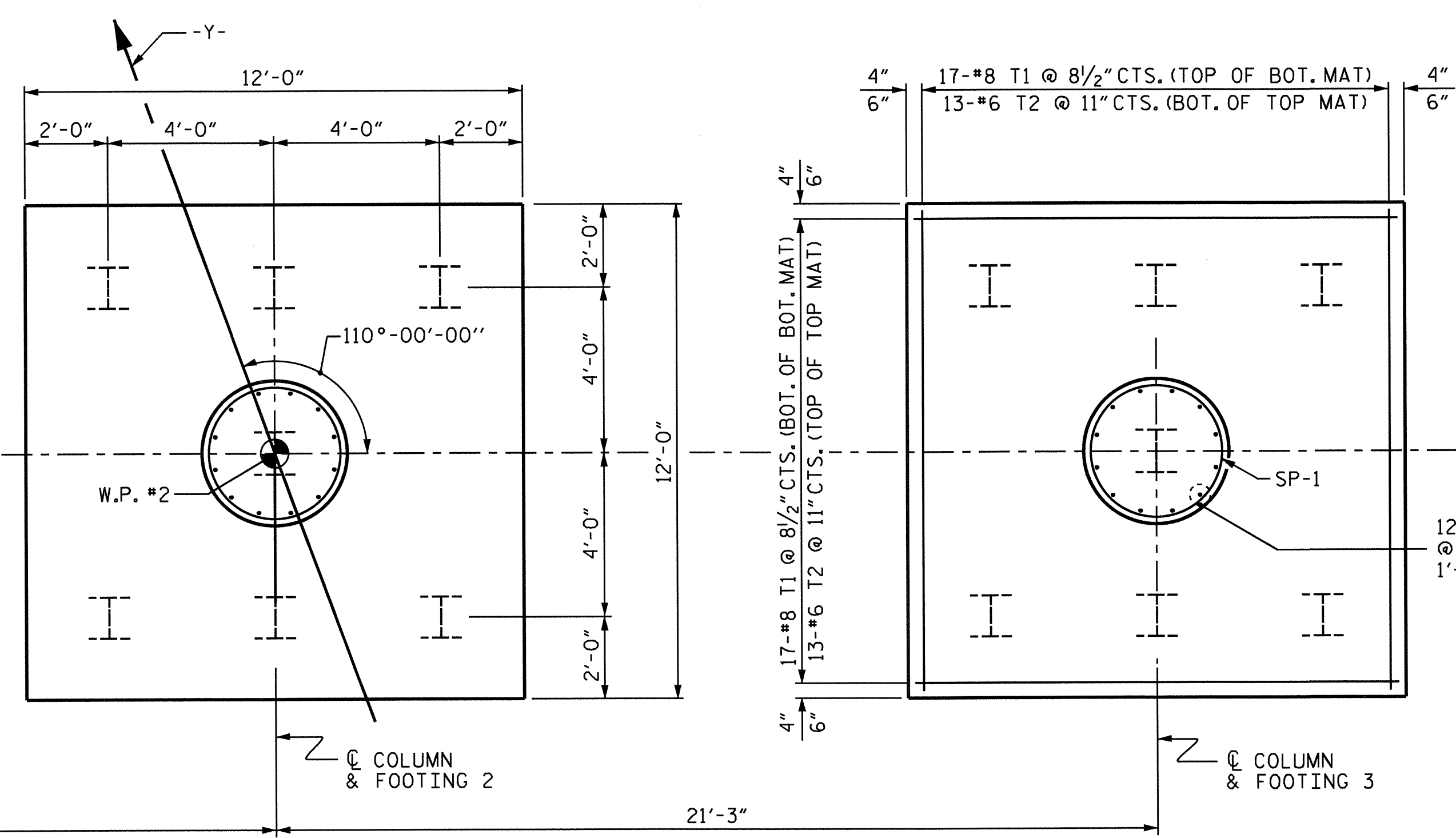




BILL OF MATERIAL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	STR	56'-8"	1951
B2	8	#10	1	59'-4"	2042
B3	10	#5	STR	56'-8"	591
B4	16	#4	STR	12'-5"	133
B5	8	#4	STR	4'-8"	25
M1	36	#9	2	8'-9"	1071
S1	70	#5	3	14'-6"	1059
T1	102	#8	1	13'-4"	3631
T2	78	#6	STR	11'-8"	1367
U1	60	#4	4	6'-10"	274
U2	8	#4	4	7'-9"	41
U3	10	#4	4	6'-8"	45
V1	36	#9	2	22'-11"	2805
REINFORCING STEEL				LBS.	15,035
SPIRAL COLUMN REINFORCING STEEL				LBS.	1,650
CLASS A CONCRETE					
POUR #1 - FOOTINGS				CU. YDS.	64.0
POUR #2 - COLUMNS				CU. YDS.	21.4
POUR #3 - CAP				CU. YDS.	48.5
TOTAL				CU. YDS.	133.9
HP 12 X 53 STEEL PILES					
NUMBER = 21				LIN. FT. =	315
STEEL PILE POINTS					21 EA.

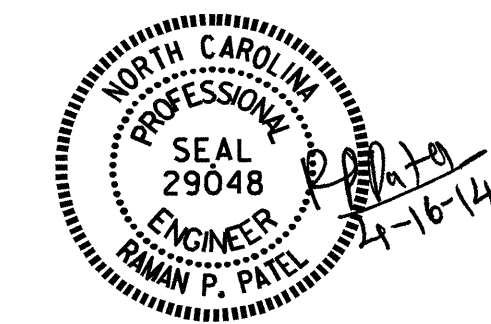


\* THE SP-1 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.



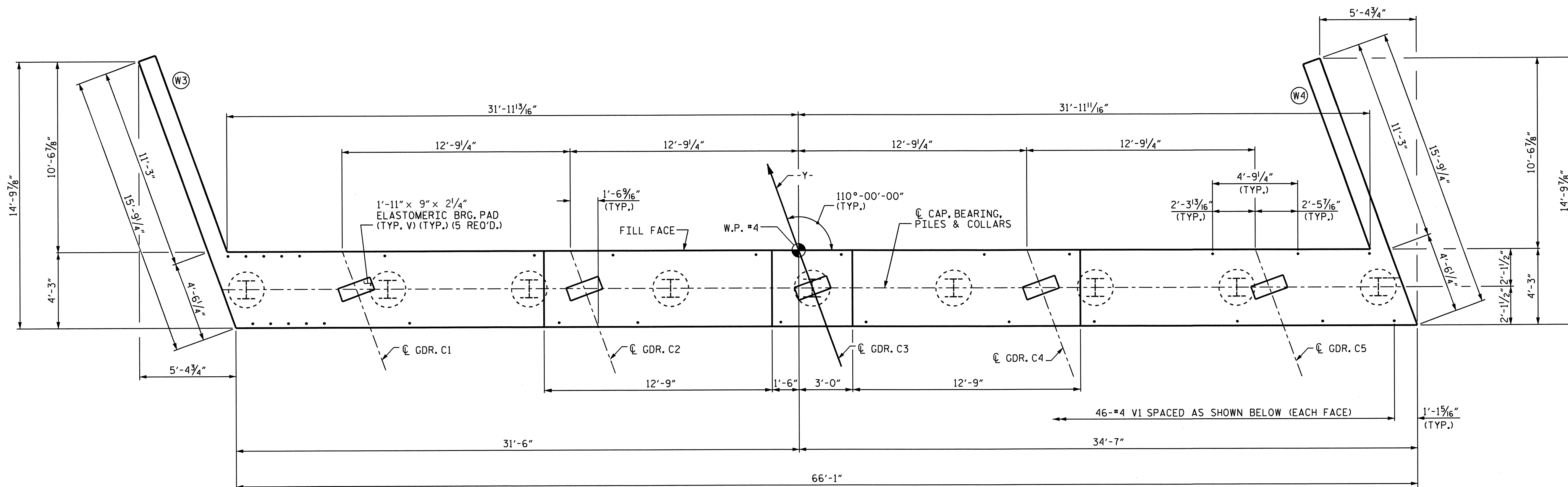
PLAN OF FOOTINGS AND COLUMNS  
REINFORCING STEEL AND DIMENSIONS ARE TYPICAL FOR EACH FOOTING AND COLUMN

DRAWN BY : RAMAN PATEL DATE : 7-3-12  
CHECKED BY : E.I. OMILE DATE : 11-26-12  
DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

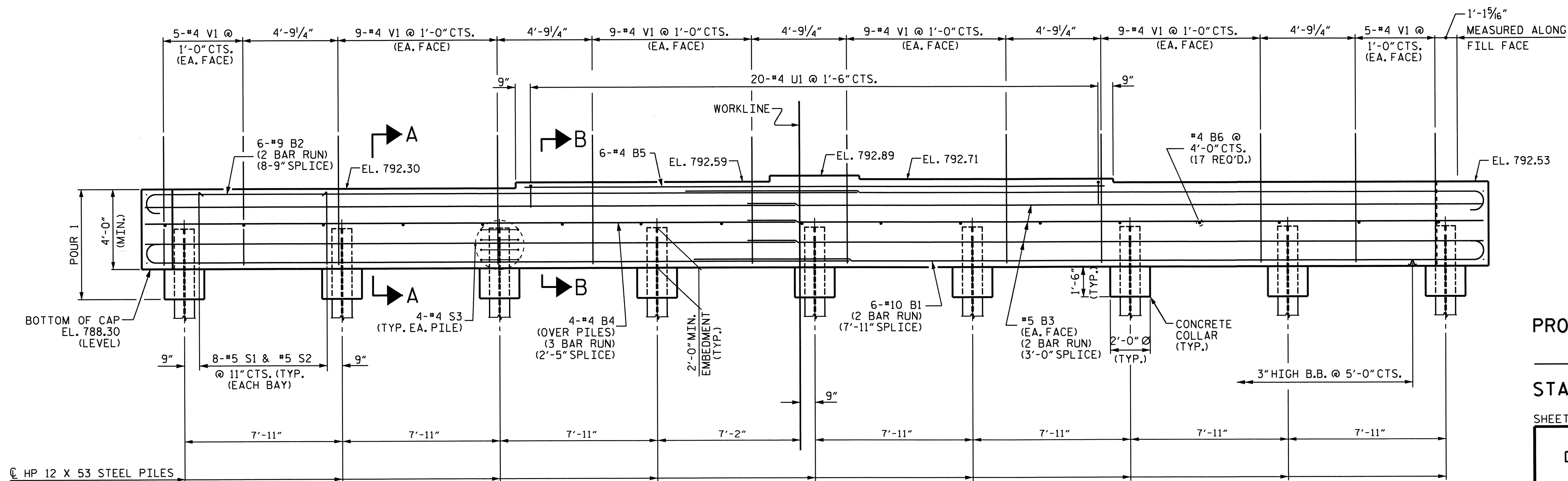


PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 60+37.13 -L-  
SHEET 2 OF 2

REVISIONS						SHEET NO. S-32
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			



PLAN



ELEVATION

WINGS DETAILS NOT SHOWN FOR CLARILITY



*Hsing Hsing Yang*  
3/10/12

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 1 OF 3

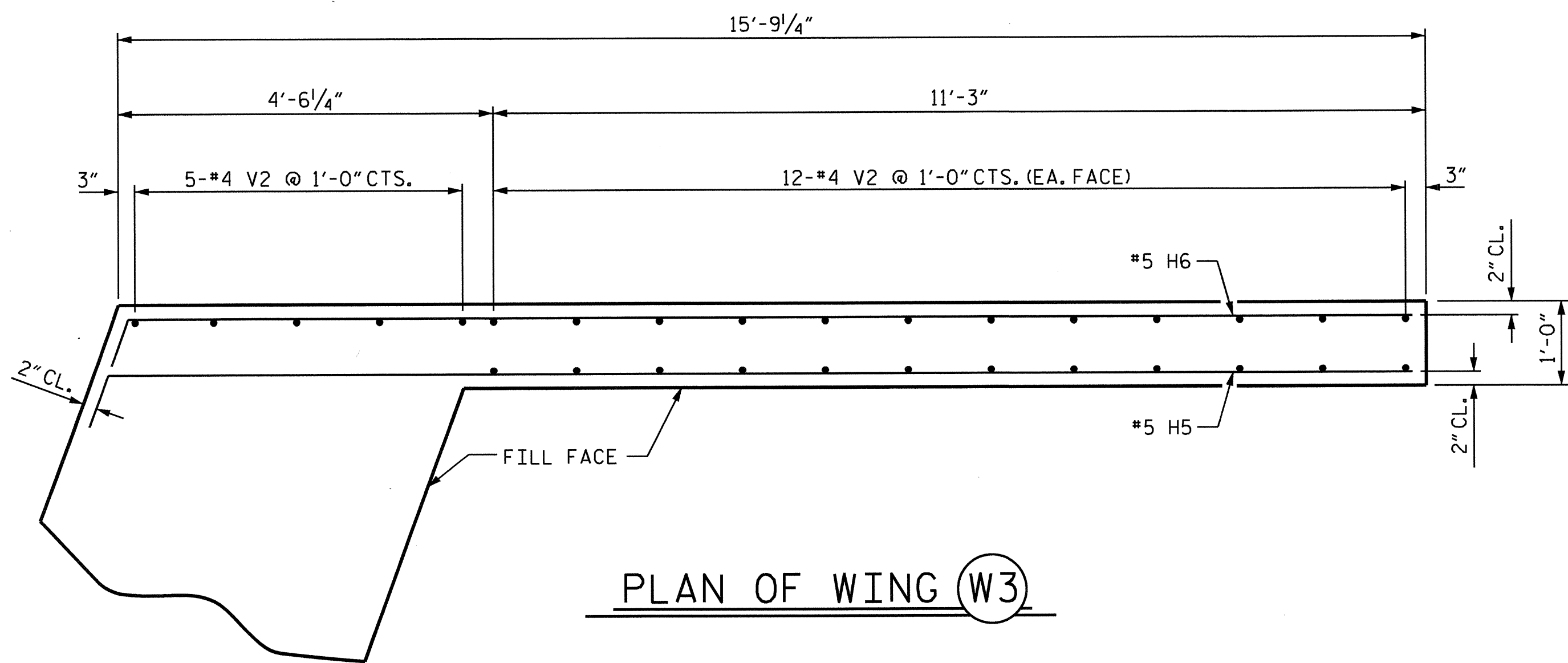
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE

END BENT 2  
 (INTEGRAL)

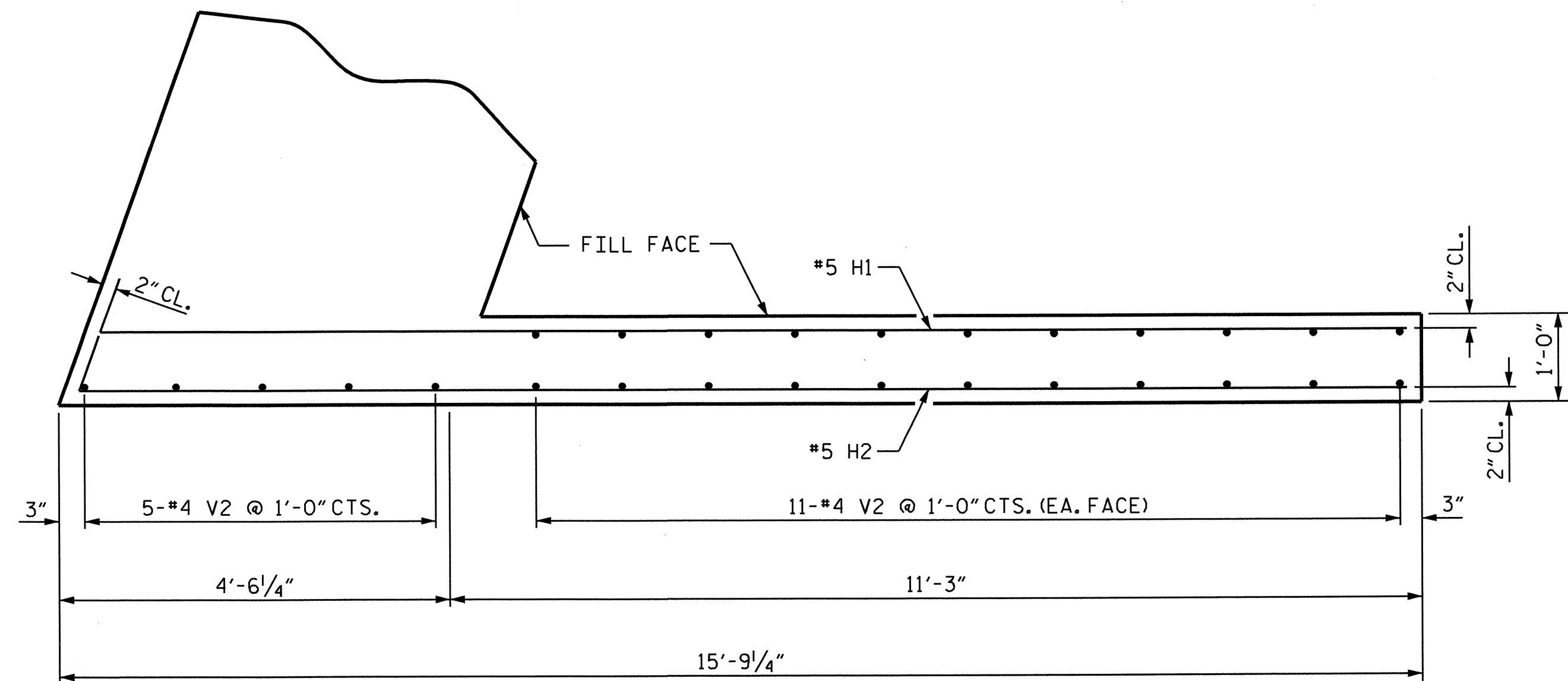
DRAWN BY: RAMAN PATEL DATE: 3-9-12  
 CHECKED BY: E.I. OMILE DATE: 11-20-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE: 12-20-12

10-MAR-2014 13:29  
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 ctyokeley

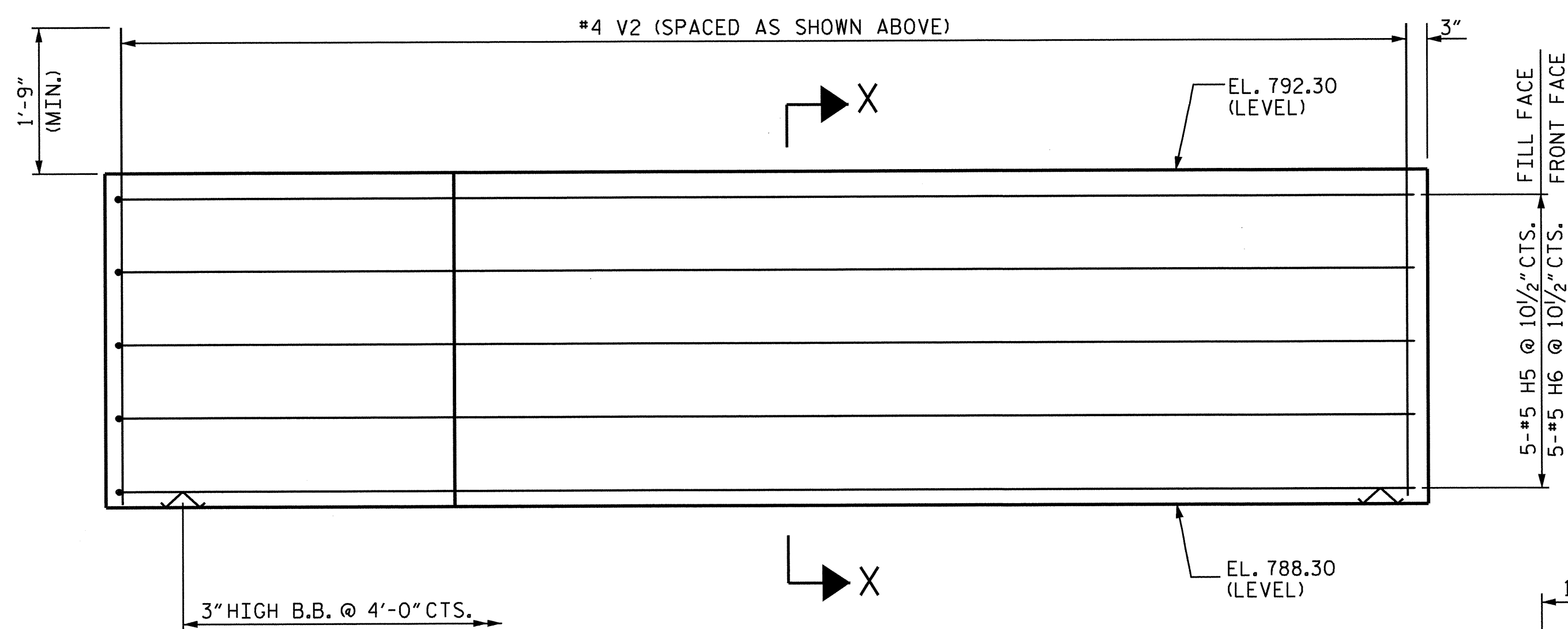
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-33
1			3			TOTAL SHEETS
2			4			38



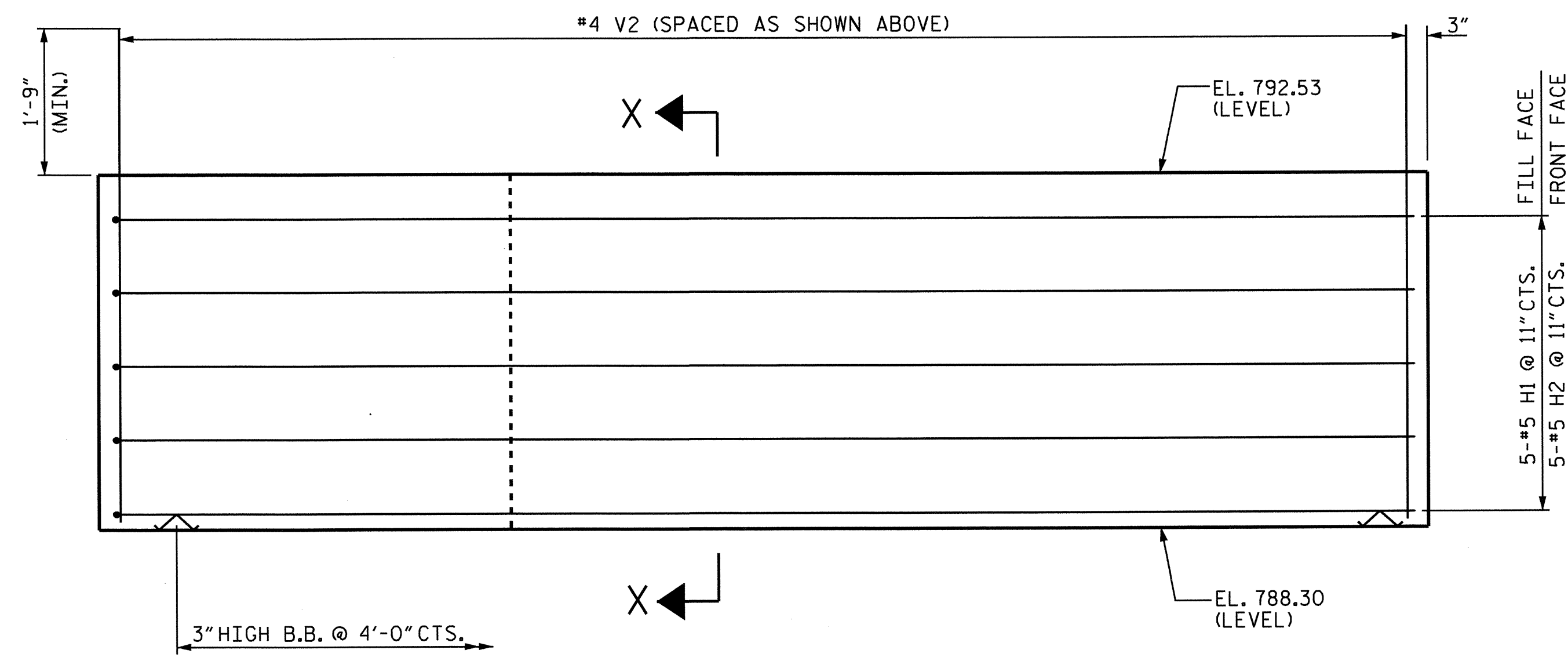
PLAN OF WING (W3)



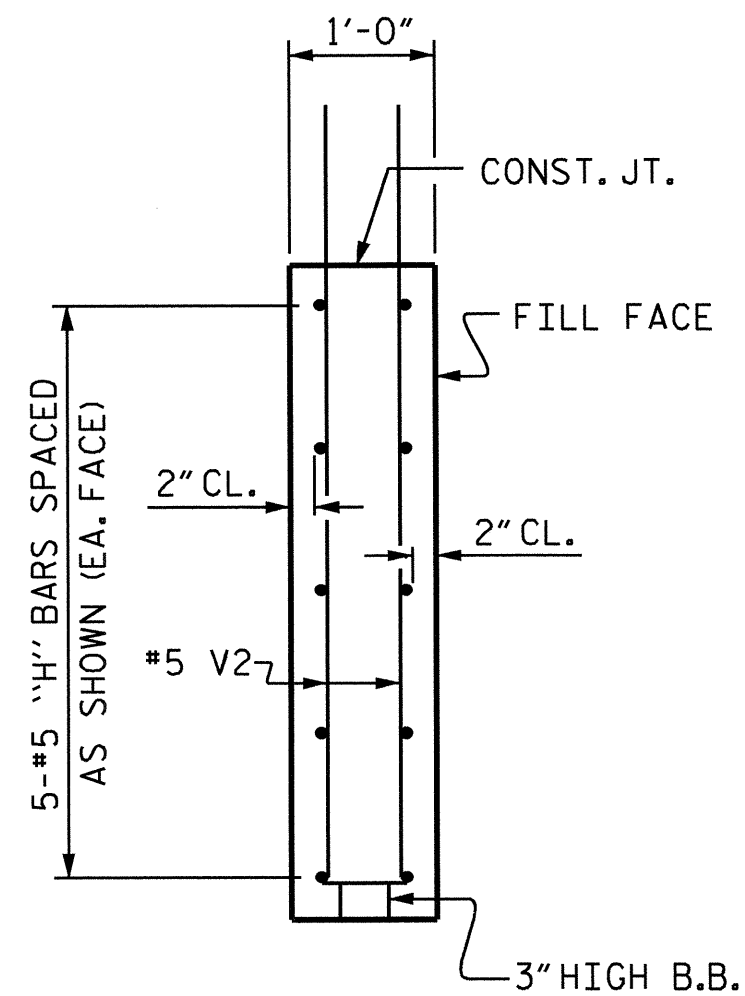
PLAN OF WING (W4)



ELEVATION OF WING (W3)



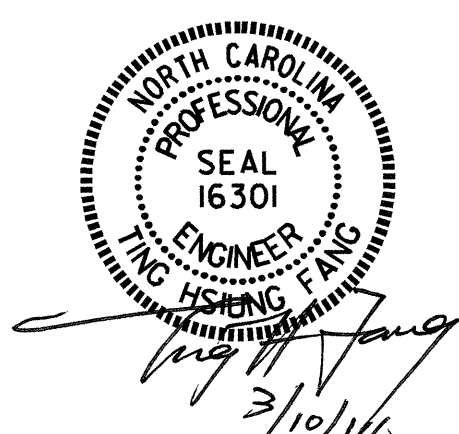
ELEVATION OF WING (W4)



SECTION X-X

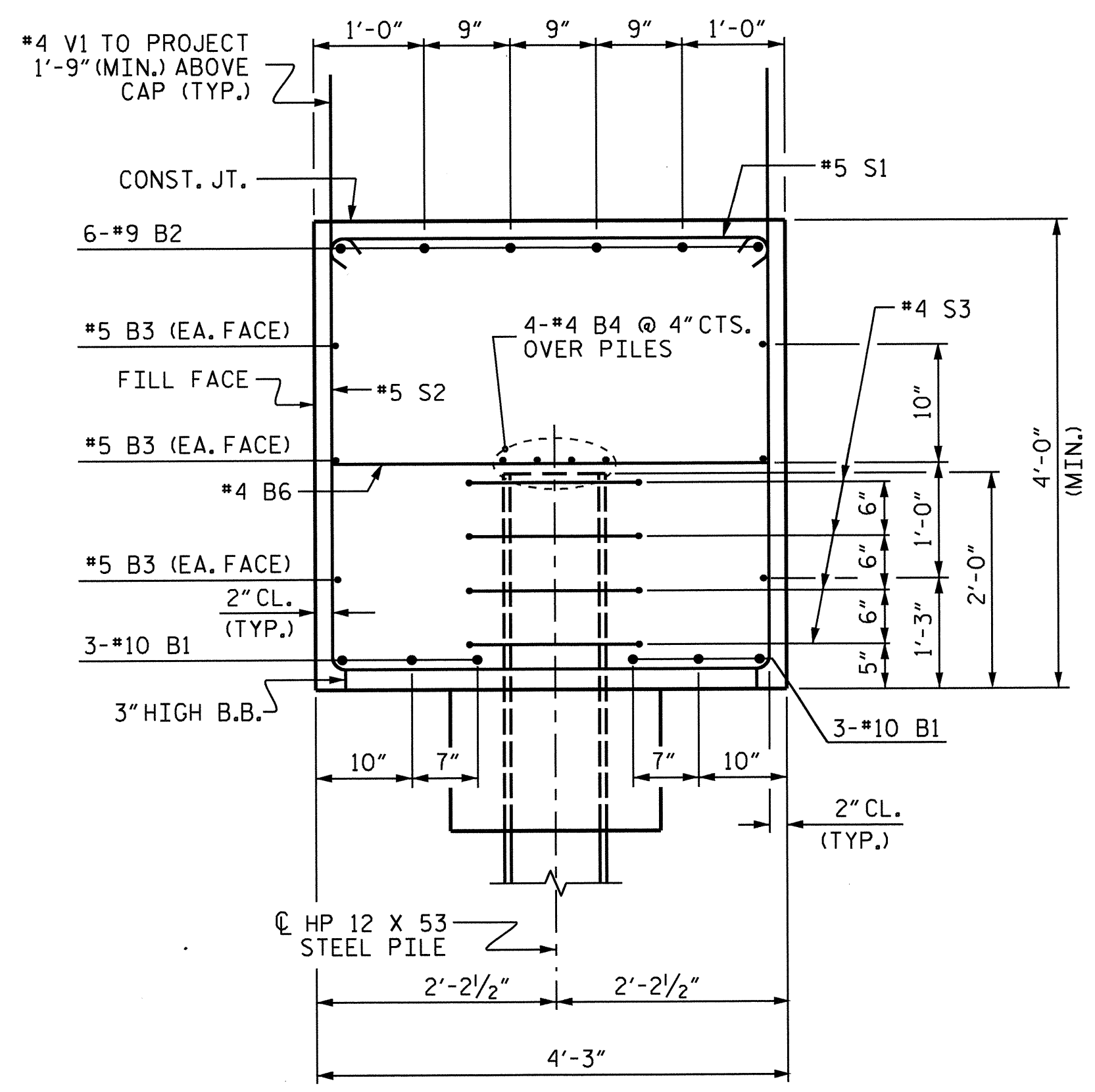
PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2  
 (INTEGRAL)

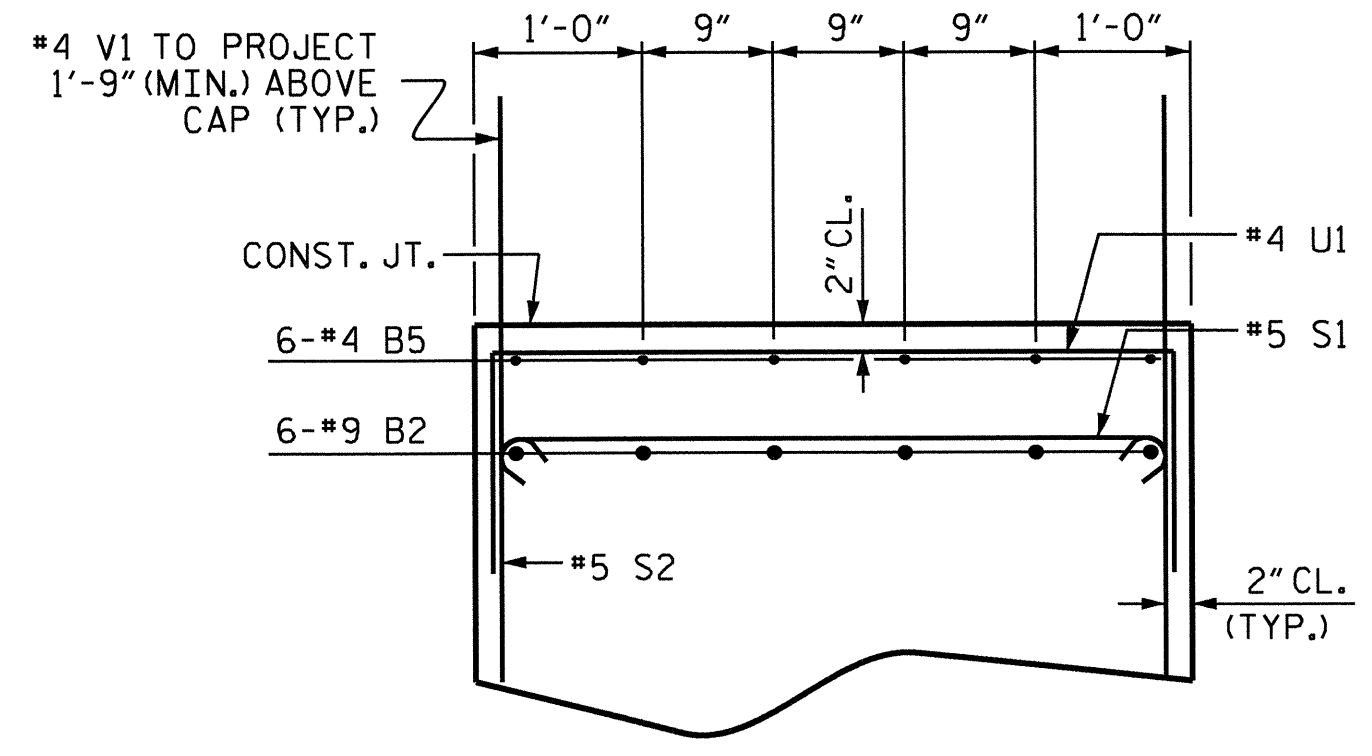


DRAWN BY : RAMAN PATEL DATE : 3-9-12  
 CHECKED BY : E.I. OMILE DATE : 11-20-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

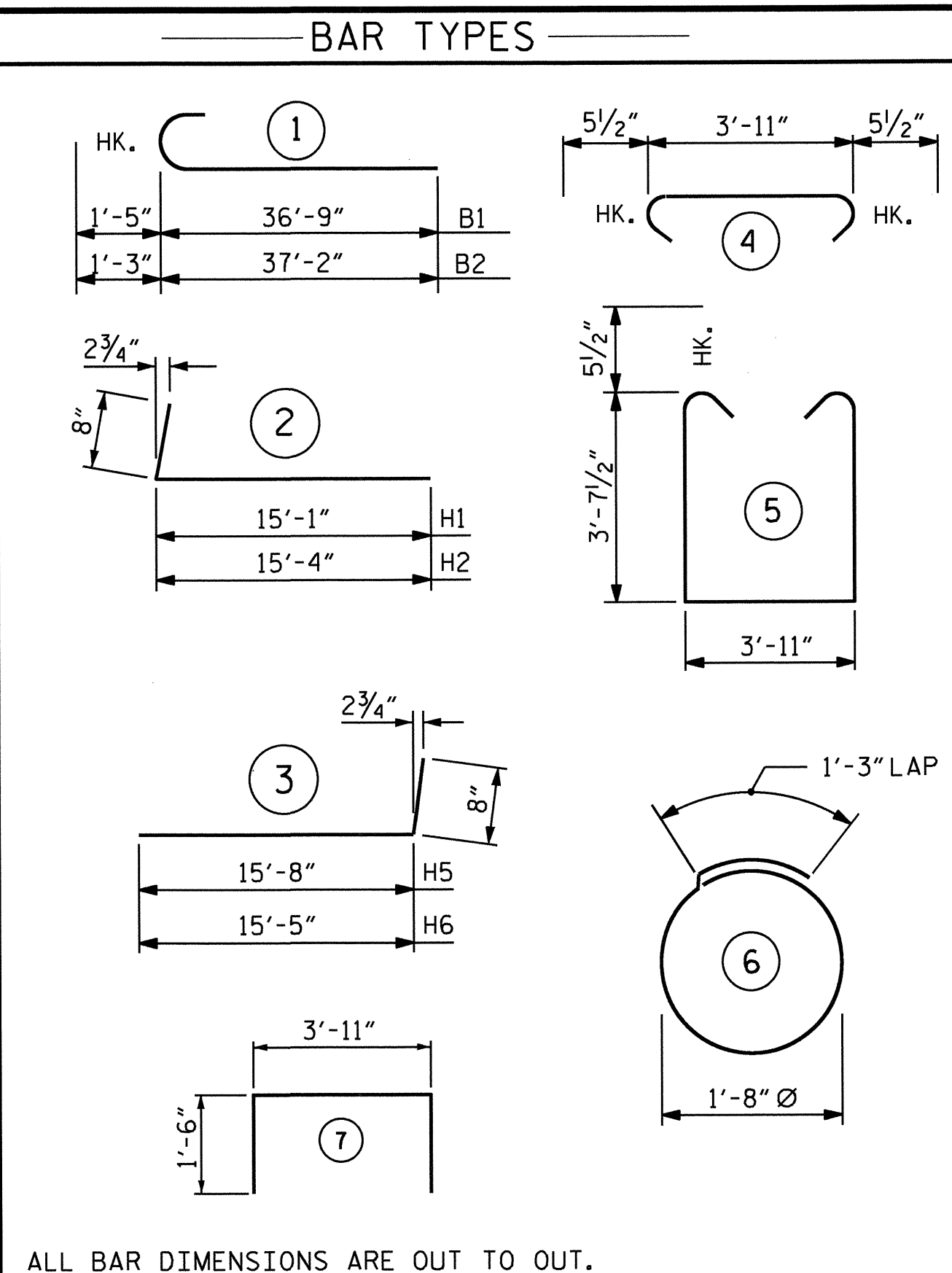
REVISIONS						SHEET NO. S-34
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS 38
2			4			



**SECTION A-A**

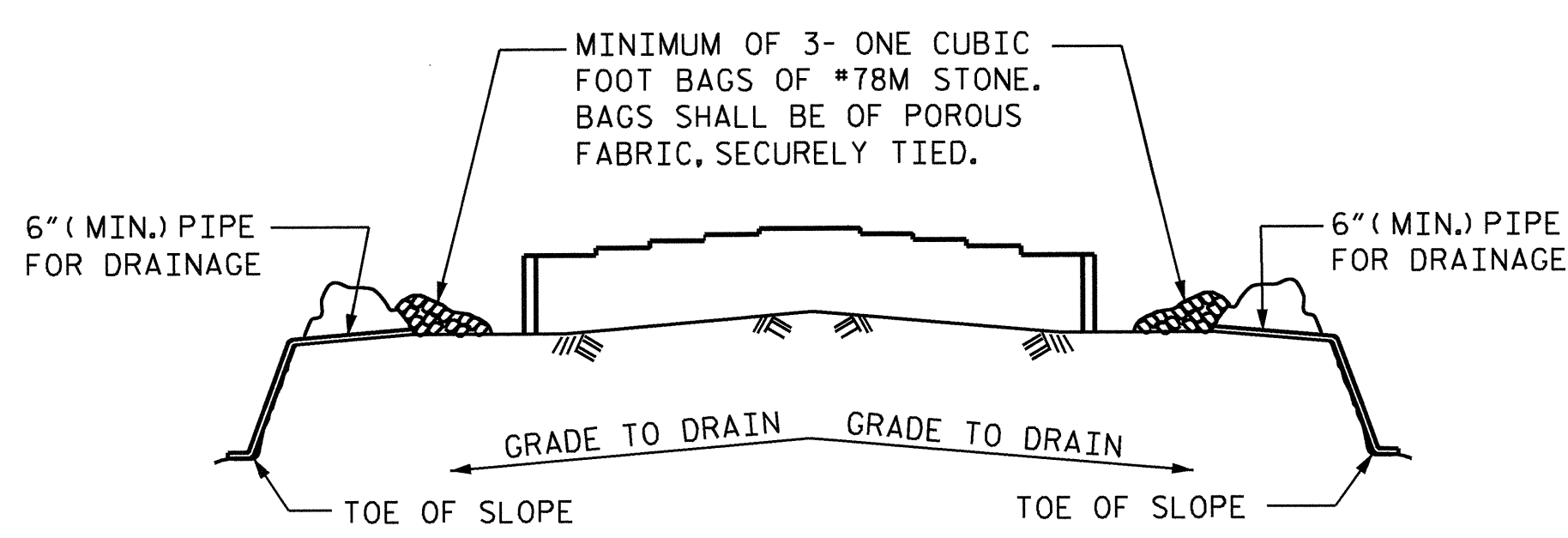


**PARTIAL SECTION B-B**



ALL BAR DIMENSIONS ARE OUT TO OUT.

BILL OF MATERIAL					
END BENT 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	12	#10	1	38'-2"	1971
B2	12	#9	1	38'-5"	1567
B3	12	#5	STR	34'-5"	431
B4	12	#4	STR	23'-7"	189
B5	6	#4	STR	29'-8"	119
B6	17	#4	STR	3'-11"	44
H1	5	#5	2	15'-9"	82
H2	5	#5	2	16'-0"	83
H5	5	#5	3	16'-4"	85
H6	5	#5	3	16'-1"	84
S1	64	#5	4	4'-10"	323
S2	64	#5	5	12'-1"	807
S3	36	#4	6	6'-6"	156
U1	20	#4	7	6'-11"	92
V1	92	#4	STR	6'-3"	384
V2	56	#4	STR	5'-10"	218
REINFORCING STEEL =				6,635 LBS	
CLASS A CONCRETE: CAP, LOWER WINGS, & COLLARS = 49.1 C.Y.					
HP 12 X 53 STEEL PILES NO. 9 LIN. FT. 405					



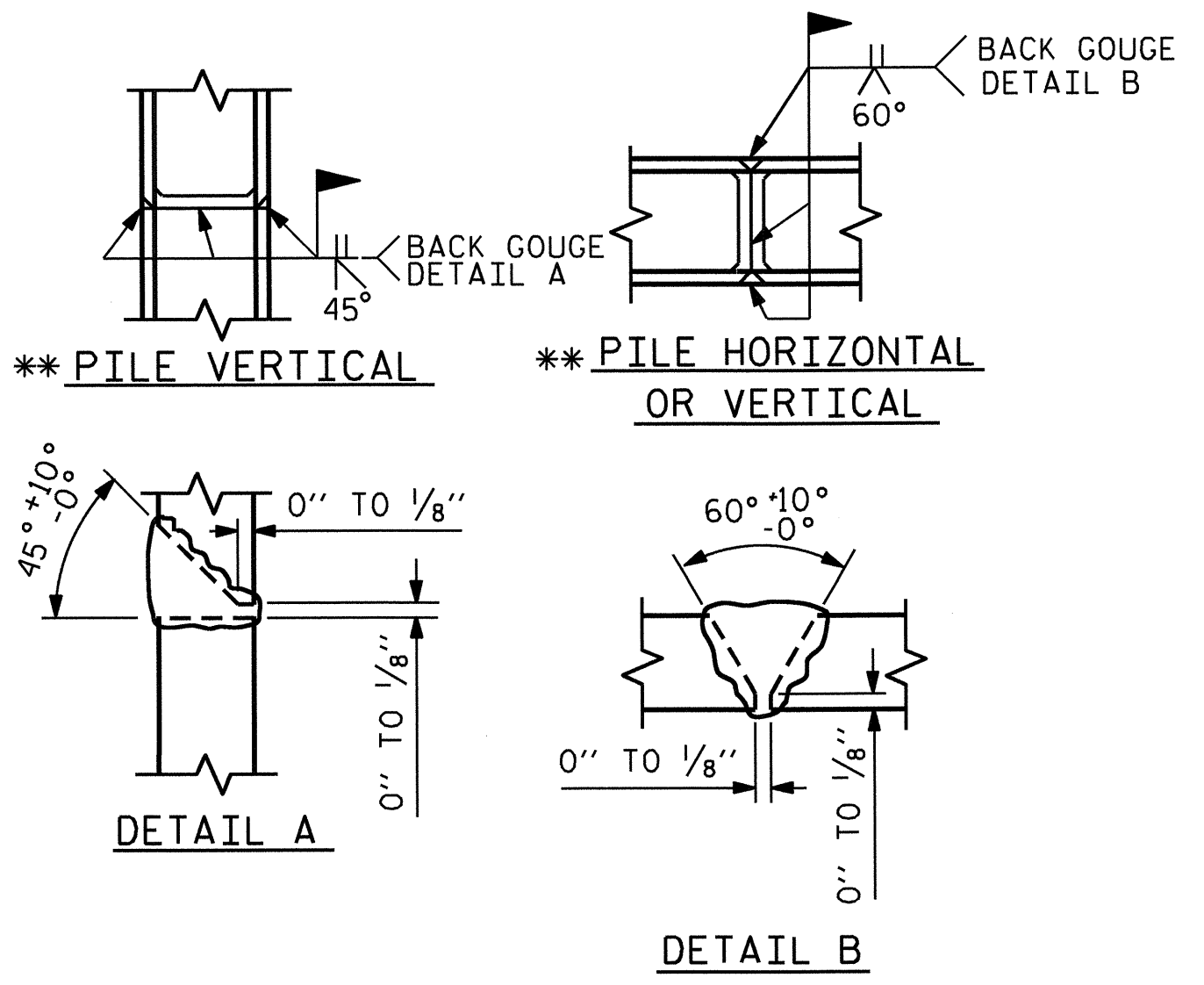
MINIMUM OF 3- ONE CUBIC FOOT BAGS OF #78M STONE. BAGS SHALL BE OF POROUS FABRIC, SECURELY TIED.

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

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

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

**TEMPORARY DRAINAGE AT END BENT**



\*\* POSITION OF PILE DURING WELDING.

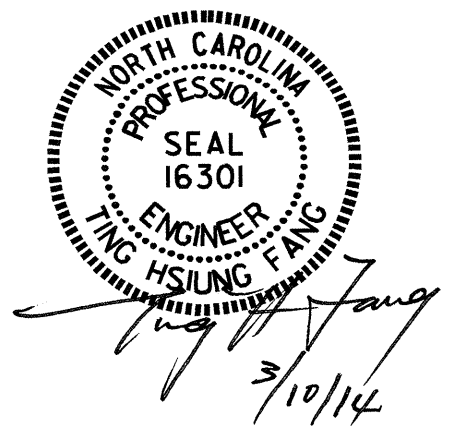
**PILE SPLICE DETAILS**

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
SUBSTRUCTURE					
END BENT 2 (INTEGRAL)					
REVISIONS					SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

S-35  
TOTAL SHEETS 38



DRAWN BY : RAMAN PATEL DATE : 3-9-12  
 CHECKED BY : E.I. OMILE DATE : 11-20-12  
 DESIGN ENGINEER OF RECORD: RAMAN PATEL DATE : 12-20-12

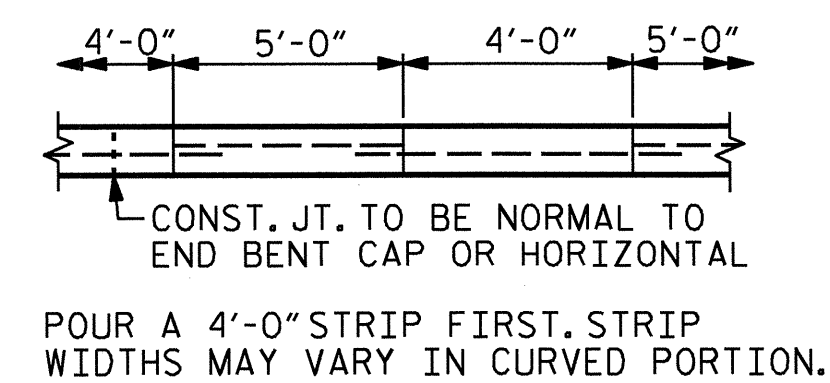
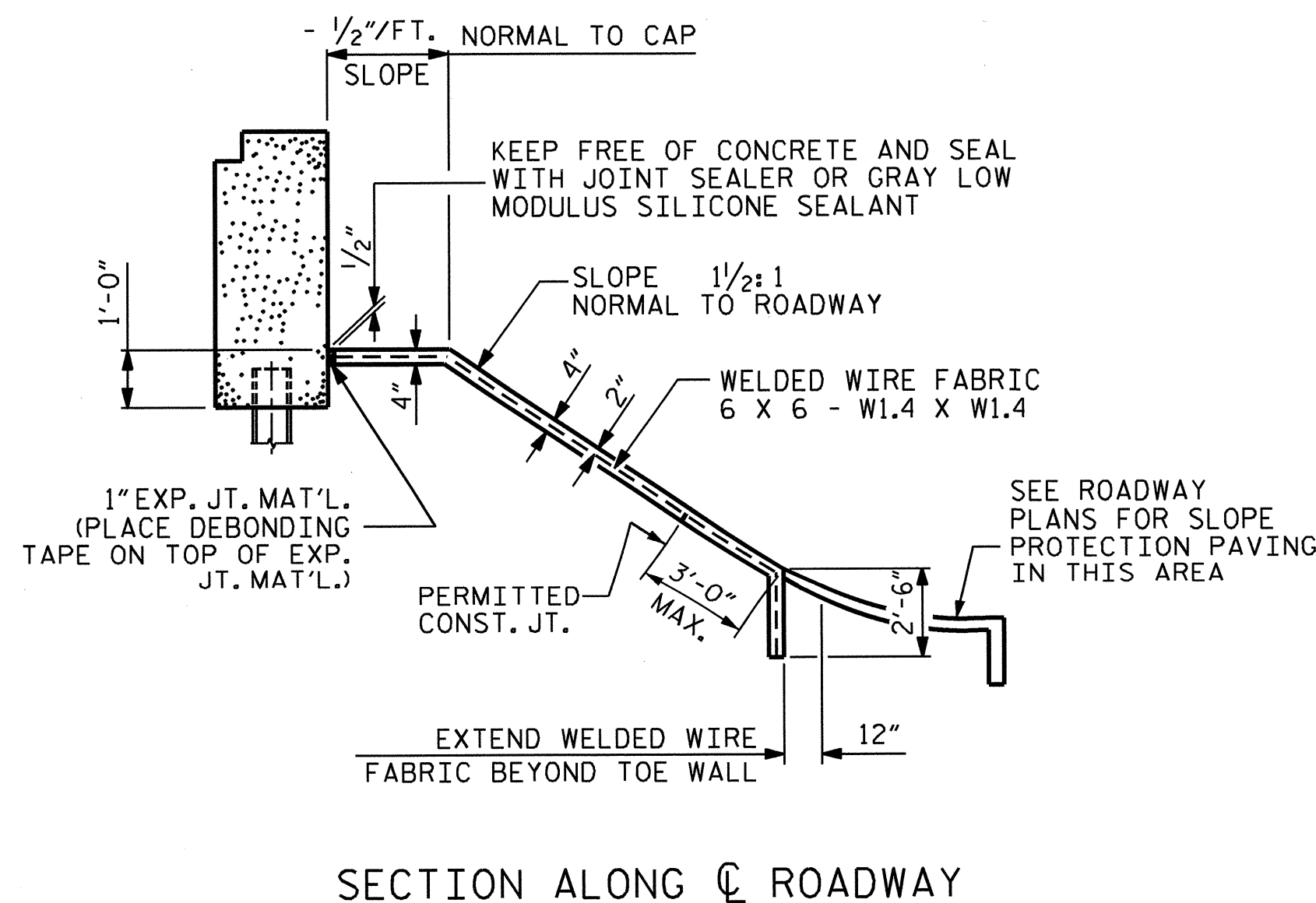
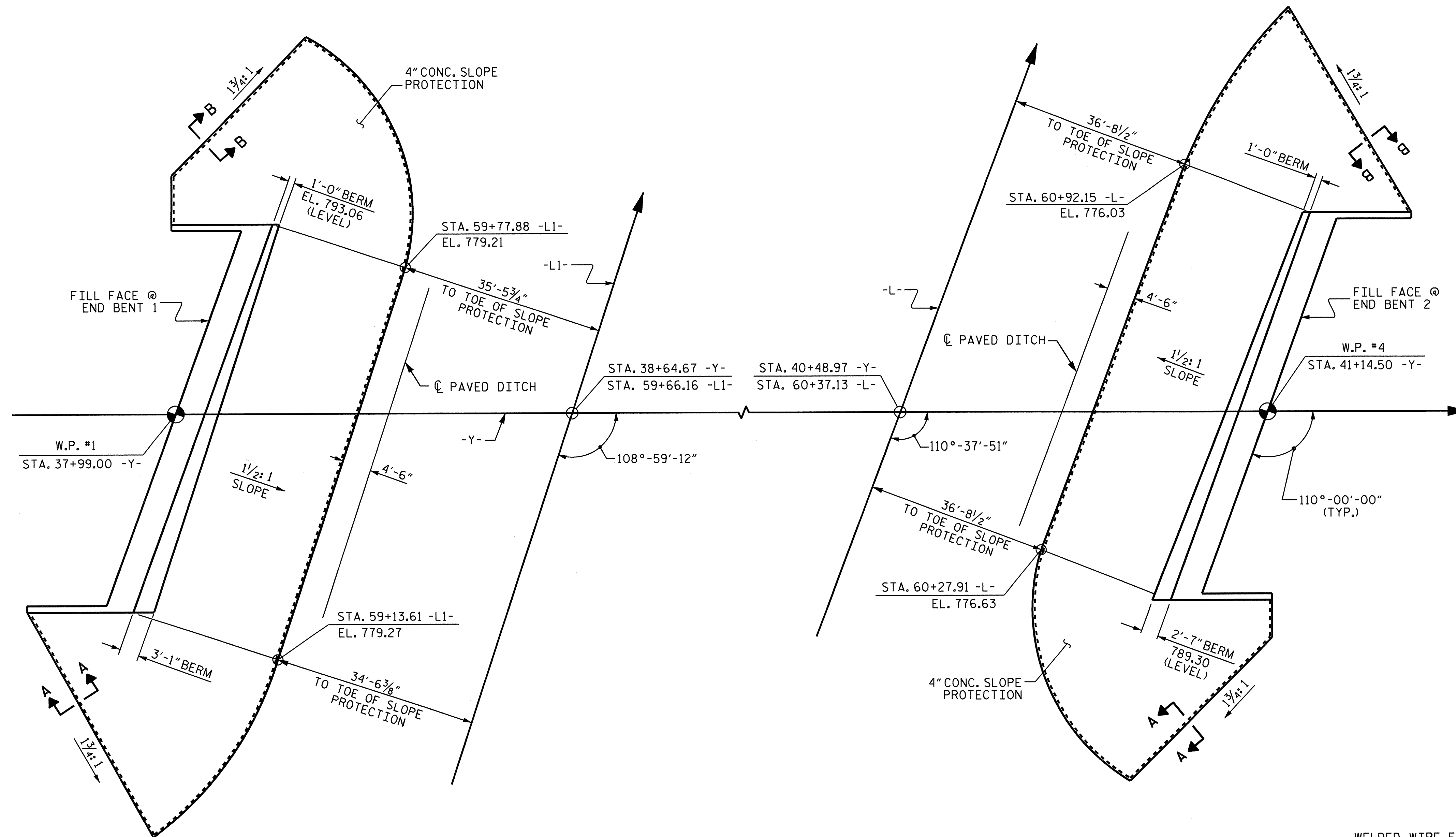
**GENERAL NOTES**

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

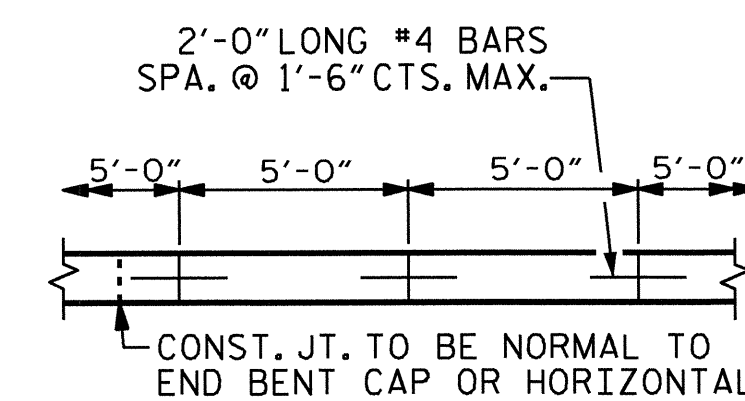
SLOPE PROTECTION SHALL CONSIST OF 4" POURED-IN-PLACE CONCRETE PAVING AS SHOWN IN THE DETAILS ON THIS SHEET. CONCRETE SHALL BE CLASS "B". THE CONCRETE SURFACE SHALL BE FLOATED WITH A WOODEN FLOAT AND FINISHED. WELDED WIRE FABRIC REINFORCING SHALL BE 6 X 6 - W1.4 X W1.4, 60" WIDE. SLOPE PROTECTION SHALL BE POURED IN 5' STRIPS AS SHOWN IN THE "POURING DETAIL" WITH 2'-0" LONG #4 BARS PLACED ALONG THE SLOPE BETWEEN STRIPS AT 1'-6" MAXIMUM SPACING. SLOPE PROTECTION MAY BE POURED IN ALTERNATE 4' AND 5' STRIPS AS SHOWN IN THE "OPTIONAL POURING DETAIL" WITH ADJACENT RUNS OF WELDED WIRE FABRIC LAPPING AT LEAST 6". THE COST OF THE WELDED WIRE FABRIC AND #4 BARS, IF USED, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION.

BRIDGE @ STA. 60+37.13 -L-	4" INCH SLOPE PROTECTION	* WELDED WIRE FABRIC 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	490	980
END BENT 2	500	1000

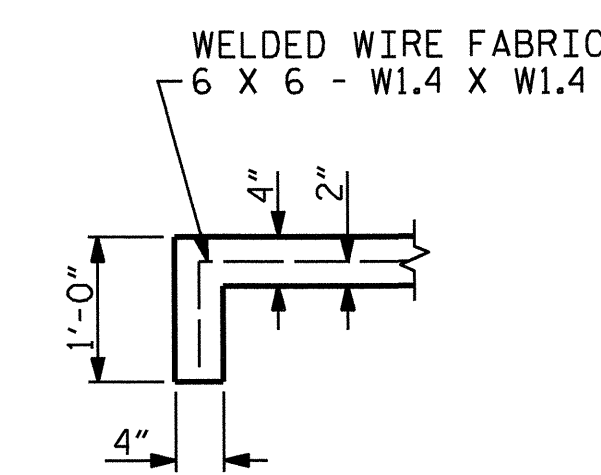
\* QUANTITY SHOWN IS BASED ON 5' POURS.



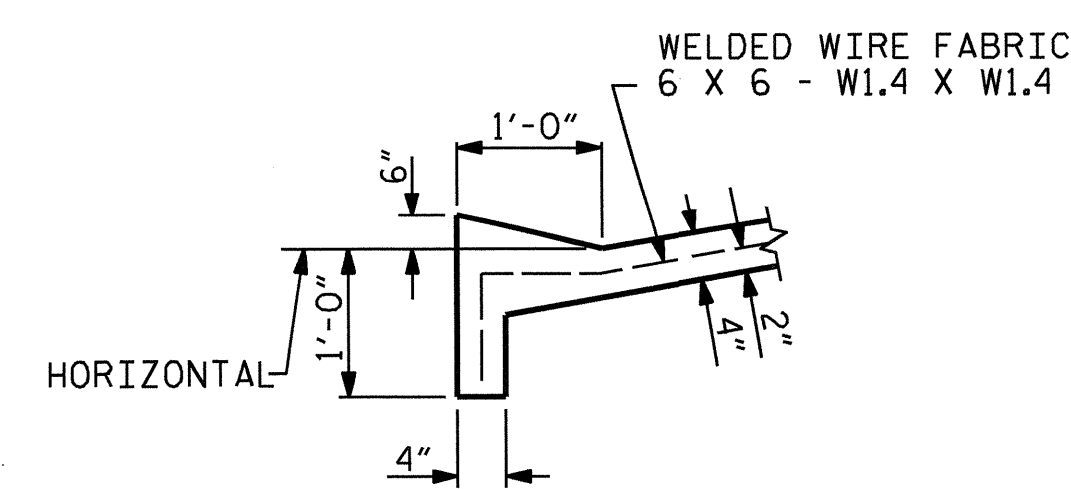
OPTIONAL POURING DETAIL



POURING DETAIL



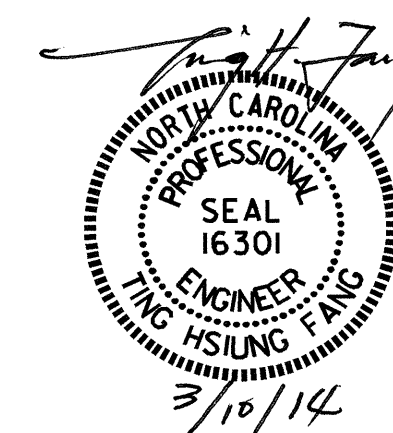
SECTION A-A



SECTION B-B

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 SLOPE PROTECTION  
 DETAILS



REVISIONS						SHEET NO. S-36
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 38
2			4			

ASSEMBLED BY : RAMAN PATEL DATE : 3-27-12  
 CHECKED BY : E.I. OMILE DATE : 11-21-12  
 DRAWN BY : ELR 5/92 REV. 5/1/06 TLA/GM  
 CHECKED BY : GRP 6/92 REV. 10/1/11 MAA/GM  
 REV. 12/2/11 MAA/GM

**BILL OF MATERIAL**

FOR ONE APPROACH SLAB  
(2 REQ'D)

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	52	#4	STR	30'-0"	1042
A2	52	#4	STR	29'-11"	1039
* B1	109	#5	STR	24'-1"	2738
B2	109	#6	STR	24'-7"	4025
REINFORCING STEEL				LBS.	5064
* EPOXY COATED REINFORCING STEEL				LBS.	3780
** CLASS AA CONCRETE				C. Y.	57.1

**SPLICE CHART**

BAR	SIZE	SPLICE
* A1	#4	2'-0"
A2	#4	1'-9"

**NOTES**

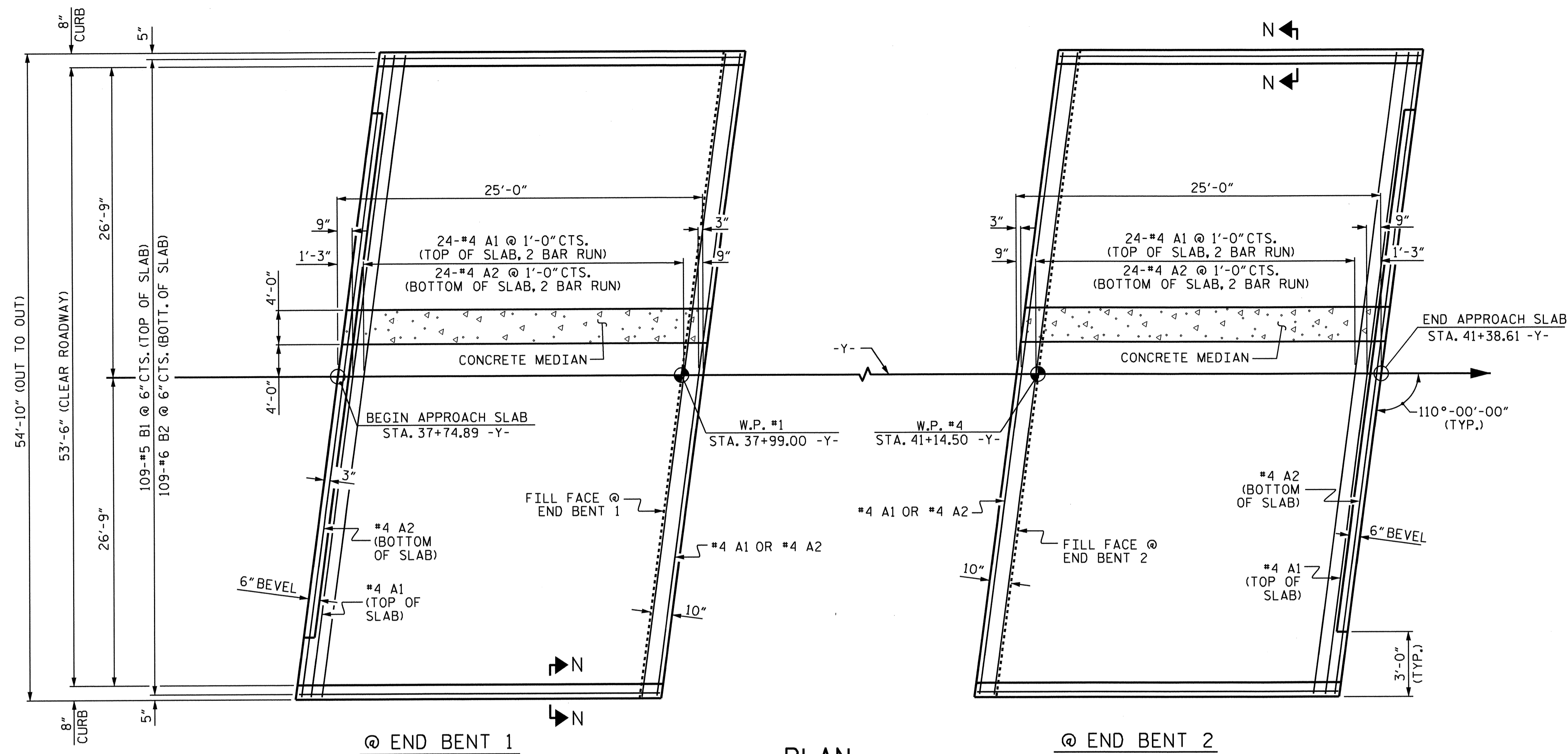
APPROACH SLAB SHALL NOT BE CONSTRUCTED PRIOR TO COMPLETION OF THE BRIDGE DECK.

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

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

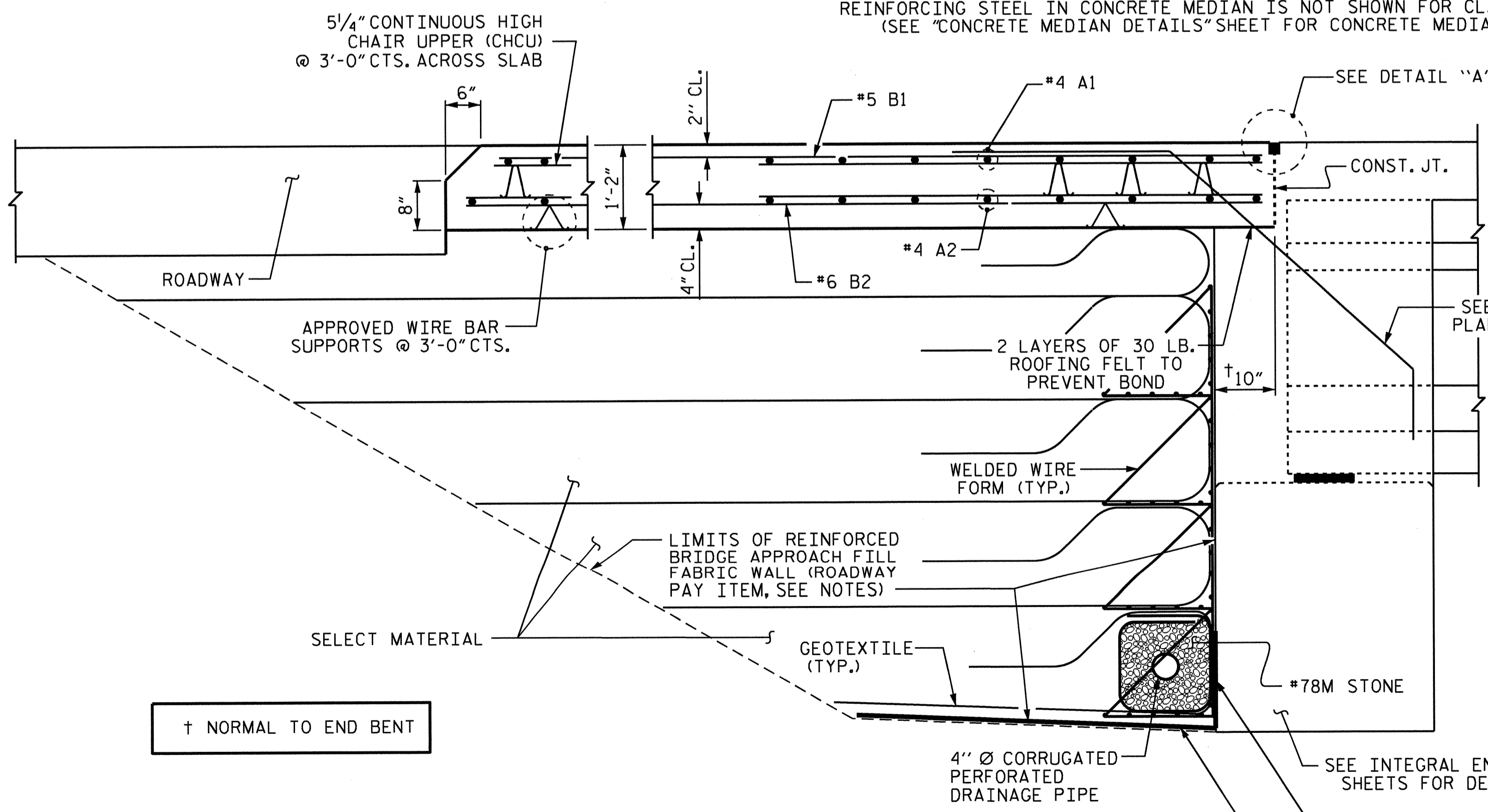
THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWED NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF SECTION 1028-3 OF THE STANDARD SPECIFICATIONS.

\* QUANTITIES FOR CONCRETE MEDIAN ARE INCLUDED IN SUPERSTRUCTURE TOTAL BILL OF MATERIAL AND PAID FOR AS PART OF THE REINFORCED CONCRETE DECK PAY ITEM.

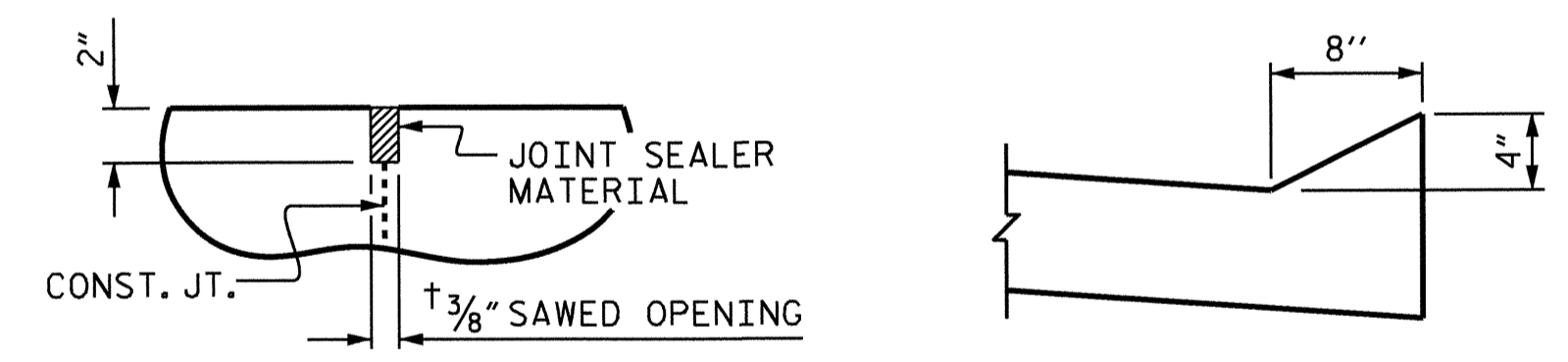


**PLAN**

DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS. REINFORCING STEEL IN CONCRETE MEDIAN IS NOT SHOWN FOR CLARITY. (SEE "CONCRETE MEDIAN DETAILS" SHEET FOR CONCRETE MEDIAN)

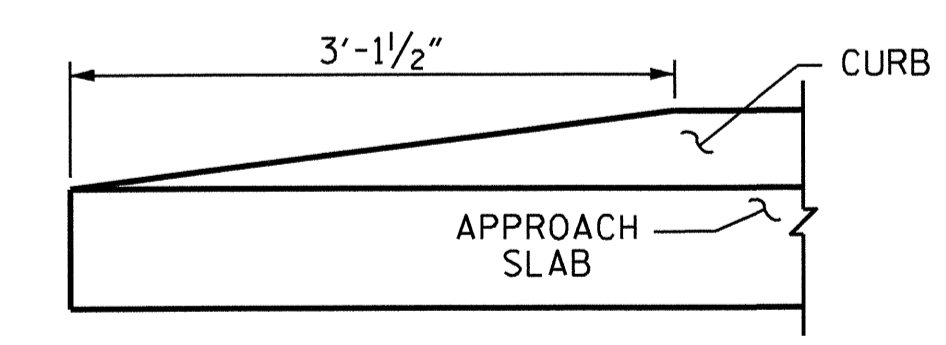


**SECTION THRU SLAB**



**DETAIL "A"**

**SECTION N-N**

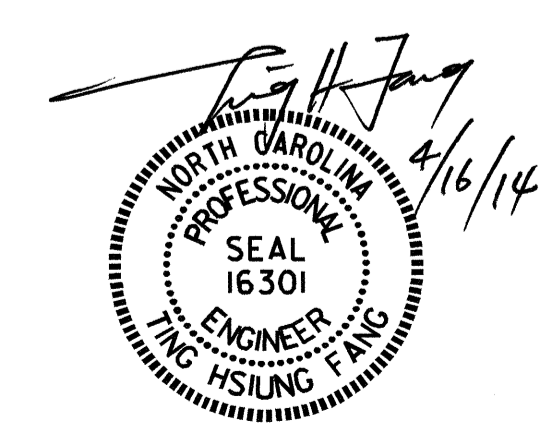


**END OF CURB WITHOUT SHOULDER BERM GUTTER**

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH SLAB  
 FOR INTEGRAL ABUTMENT



ASSEMBLED BY: RAMAN PATEL DATE: 3-26-12  
 CHECKED BY: E.I. OMILE DATE: 11-21-12

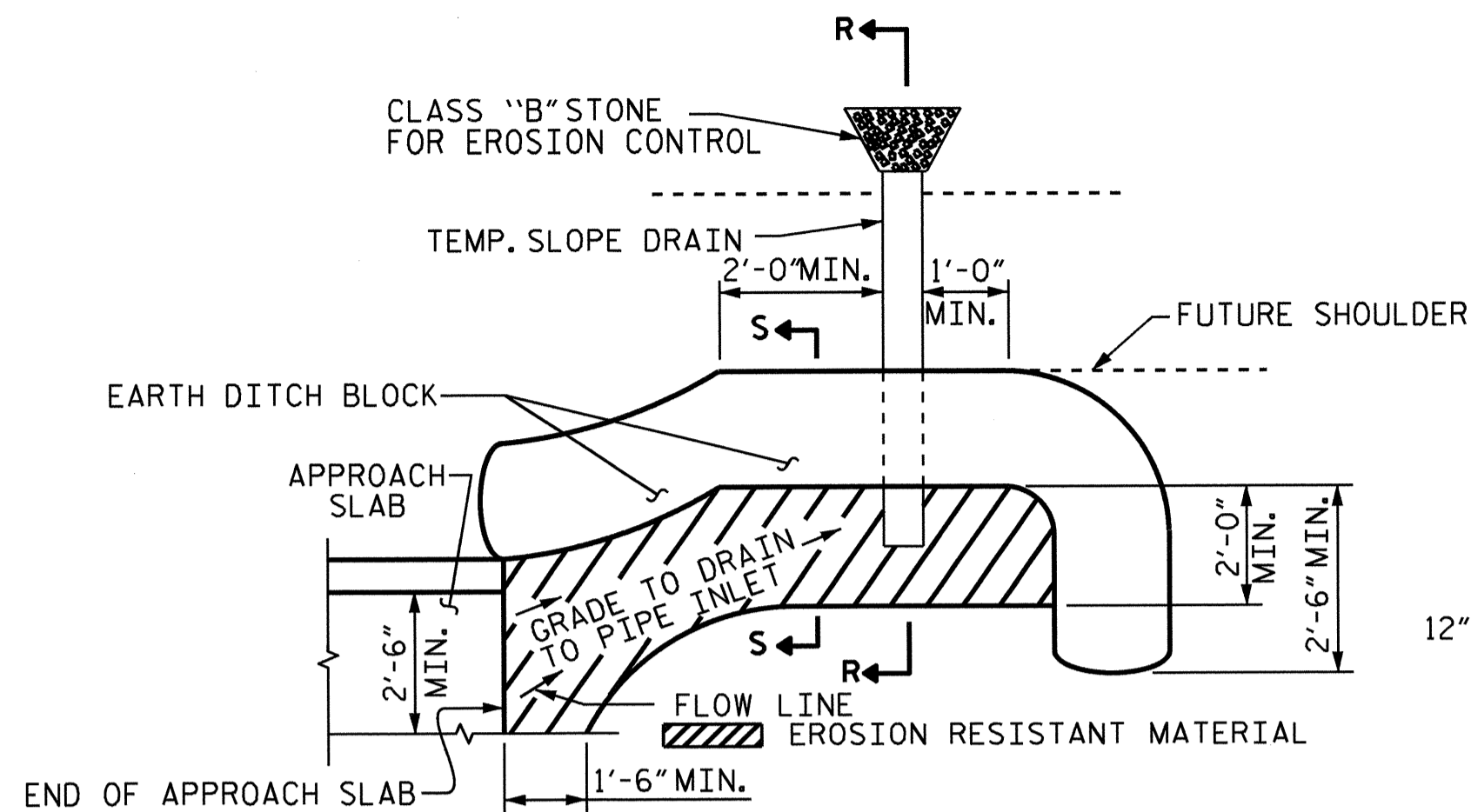
DRAWN BY: TLA 10/05  
 CHECKED BY: GM 5/06

ADDED 5/1/06RR KMM/GM  
 REV. 10/1/11 MAA/GM  
 REV. 12/21/11 MAA/GM

REVISIONS

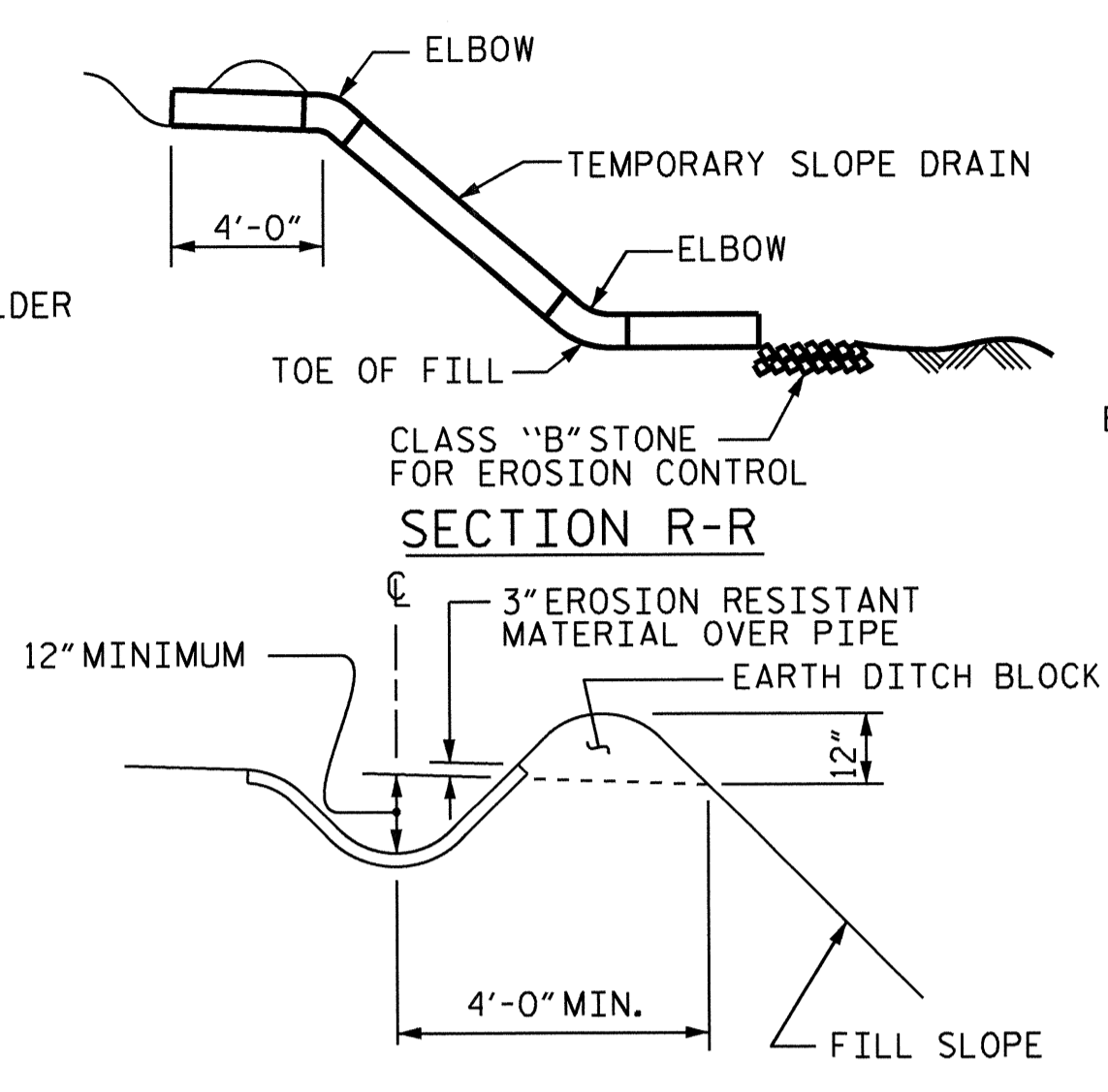
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-37  
 TOTAL SHEETS 38

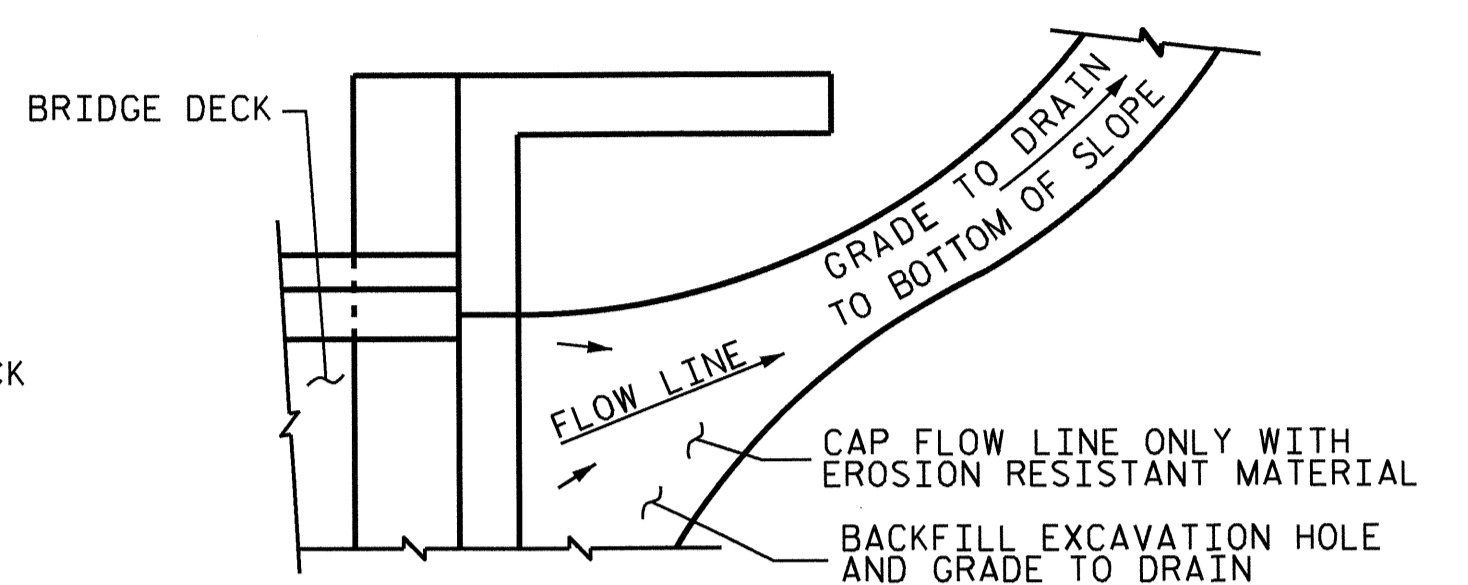


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

PLAN VIEW



SECTION R-R



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

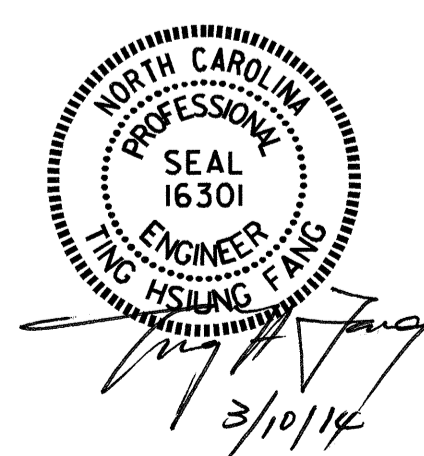
TEMPORARY DRAINAGE DETAIL

**TEMPORARY BERM AND SLOPE DRAIN DETAILS**

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 60+37.13 -L-

SHEET 2 OF 2

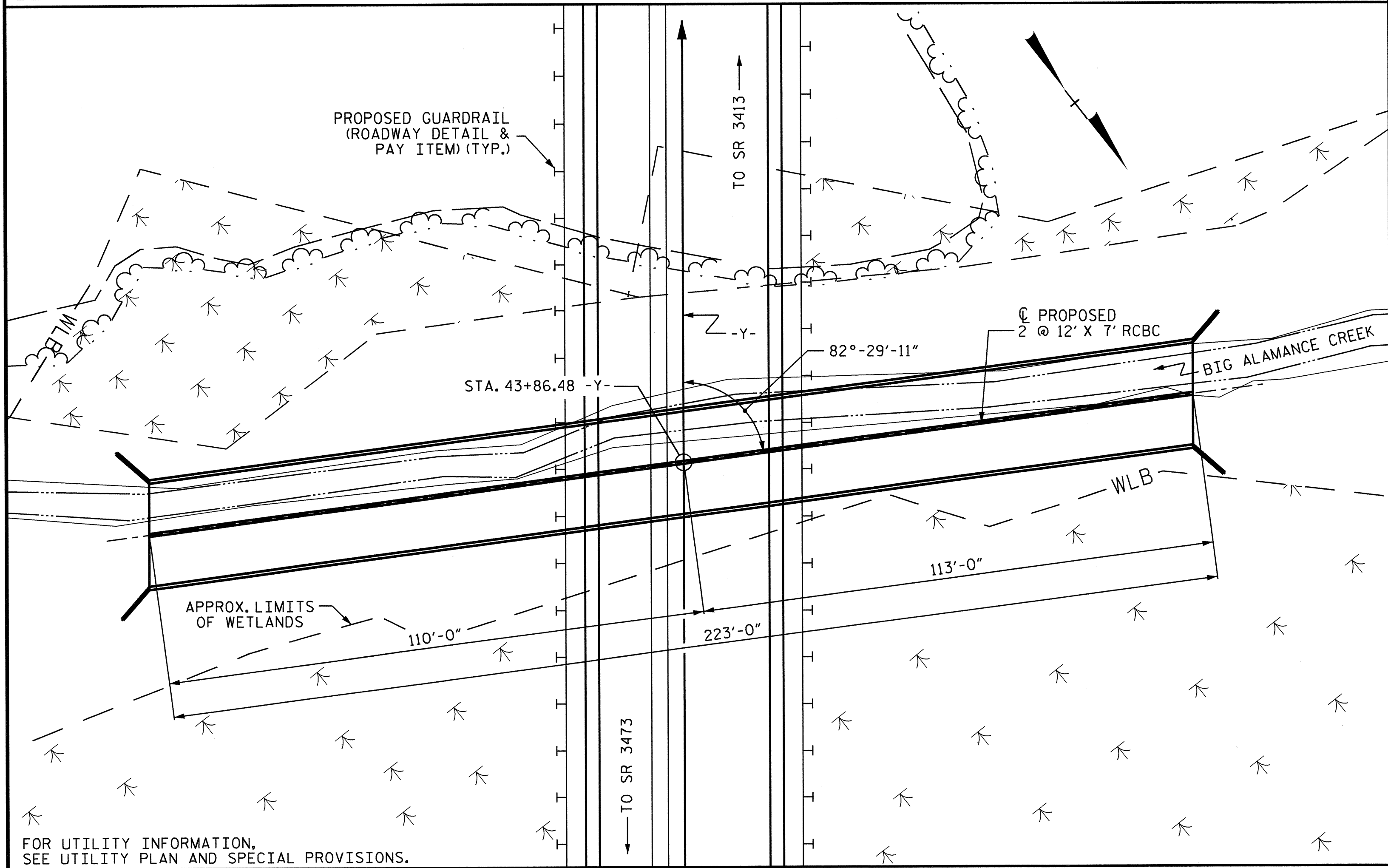


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 BRIDGE APPROACH  
 SLAB DETAILS

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

ASSEMBLED BY : RAMAN PATEL	DATE : 3-26-12
CHECKED BY : E.I. OMILE	DATE : 11-21-12
DRAWN BY : FCJ 11/88	REV. 5/7/03 RWW/JTE
CHECKED BY : ARB 11/88	REV. 5/1/06RRR MAA/KMM
	REV. 10/1/11 MAA/OM

BENCHMARK #7: RR SPIKE IN ROOT OF 15" OAK TREE 219' RT. OF -BY1- STA. 7+81 EL. 791.36



LOCATION SKETCH

FOR UTILITY INFORMATION, SEE UTILITY PLAN AND SPECIAL PROVISIONS.

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

NOTES

- ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
- DESIGN FILL-----42.20'
- FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
  1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
  2. THE REMAINING PORTIONS OF WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY CONTRACTOR.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS
- THE REINFORCED CONCRETE BOX CULVERT SHALL BE CONSTRUCTED WITH 4 INCHES OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.
- DETAILED DRAWINGS FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED. SEE SHEET SN.
- THE STANDEE BARS ARE NOT INCLUDED IN THE BILL OF MATERIAL. STANDEE BARS ARE CONSIDERED INCIDENTAL TO THE CONSTRUCTION OF THE CULVERT AND PAID FOR UNDER THE VARIOUS PAY ITEMS.

**ROADWAY DATA**

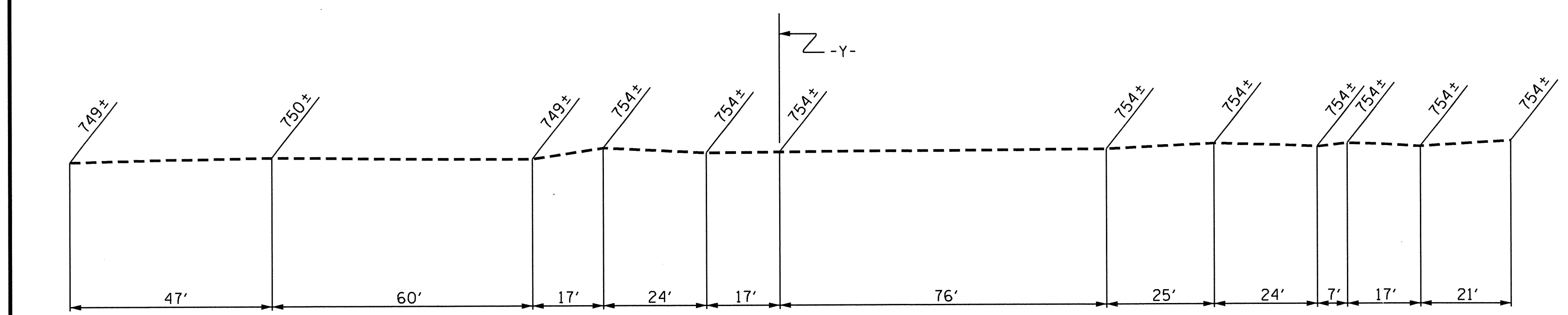
GRADE PT. EL. @ STA. 43+86.48 -Y-	= 796.59'
BED ELEV. @ STA. 43+86.48 -Y-	= 747.61'
ROADWAY SLOPE	= 2 : 1

**HYDRAULIC DATA**

DESIGN DISCHARGE	= 420 CFS
FREQUENCY OF DESIGN FLOOD	= 50 YRS.
DESIGN HIGH WATER ELEVATION	= 754.9'
DRAINAGE AREA	= 286 ACRES
BASE DISCHARGE (Q100)	= 633 CFS
BASE HIGH WATER ELEVATION	= 755.81'

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	= 750+ CFS
FREQUENCY OF OVERTOPPING FLOOD	= 500+ YRS.
OVERTOPPING FLOOD ELEVATION	= 775.00'



PROFILE ALONG CULVERT

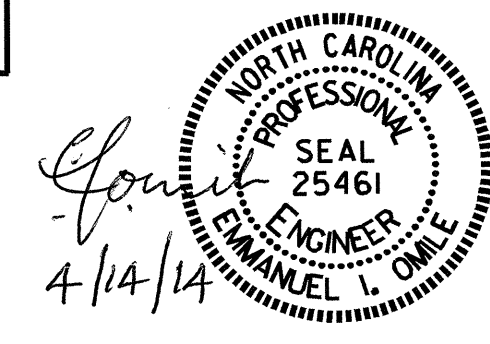
**TOTAL STRUCTURE QUANTITIES**

<b>CLASS A CONCRETE</b>	
BARREL @ 6.046 _____ CY/FT	1,348.4 C.Y.
SILL _____	2.8 C.Y.
WING ETC. _____	26.9 C.Y.
TOTAL _____	1,378.1 C.Y.
<b>REINFORCING STEEL</b>	
BARREL _____	105,285 LBS.
WINGS ETC. _____	1,277 LBS.
TOTAL _____	106,562 LBS.
CULVERT EXCAVATION _____	LUMP SUM
FOUNDATION COND. MAT'L _____	484 TONS

PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 43+86.48 -Y-

SHEET 1 OF 5

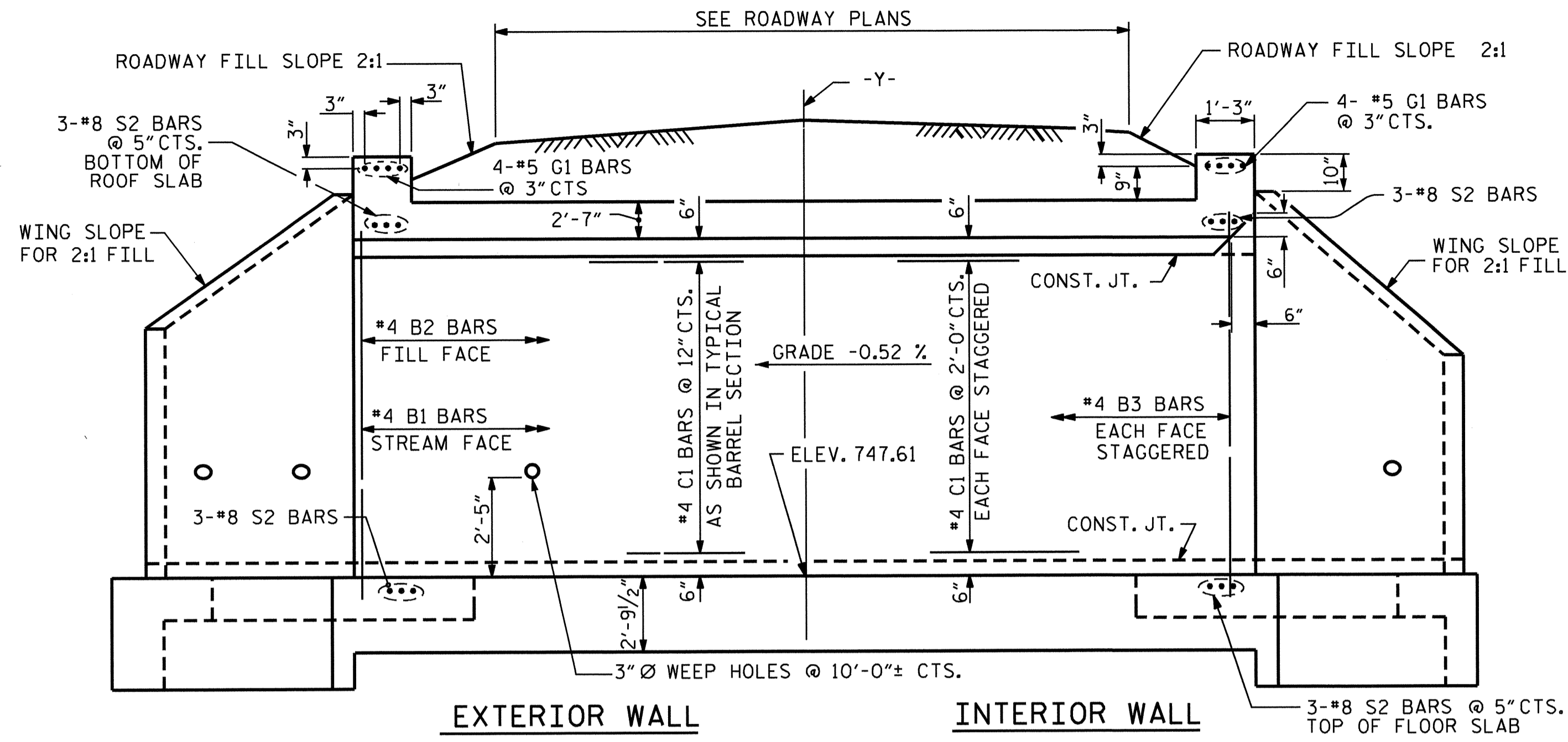
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
BARREL STANDARD  
DOUBLE 12 FT. X 7 FT.  
CONCRETE BOX CULVERT  
80°-29'-11" SKEW



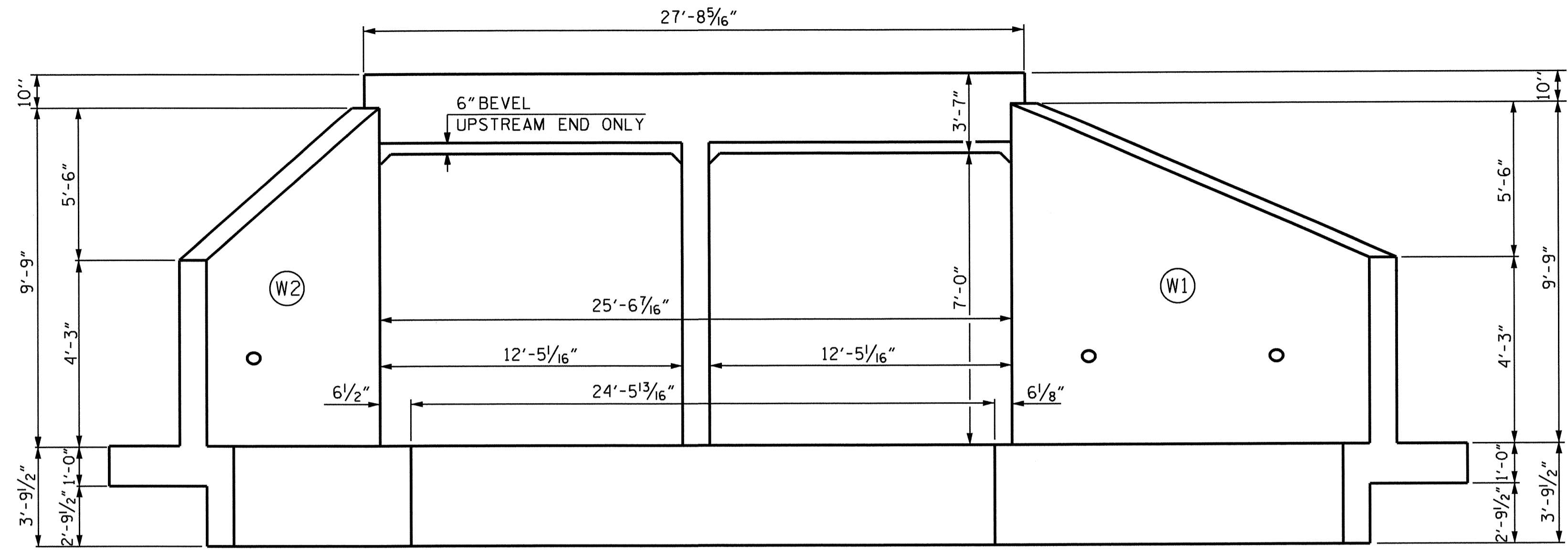
ASSEMBLED BY : <u>E.I. OMILE</u>	DATE : <u>2/13</u>	<b>SPECIAL</b>
CHECKED BY : <u>S.L. WANCE</u>	DATE : <u>3/13</u>	
DRAWN BY : <u>R.W. WRIGHT</u>	DATE : <u>OCT. 1989</u>	<b>STANDARD</b>
CHECKED BY : <u>A.R. BISSETTE</u>	DATE : <u>OCT. 1989</u>	

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



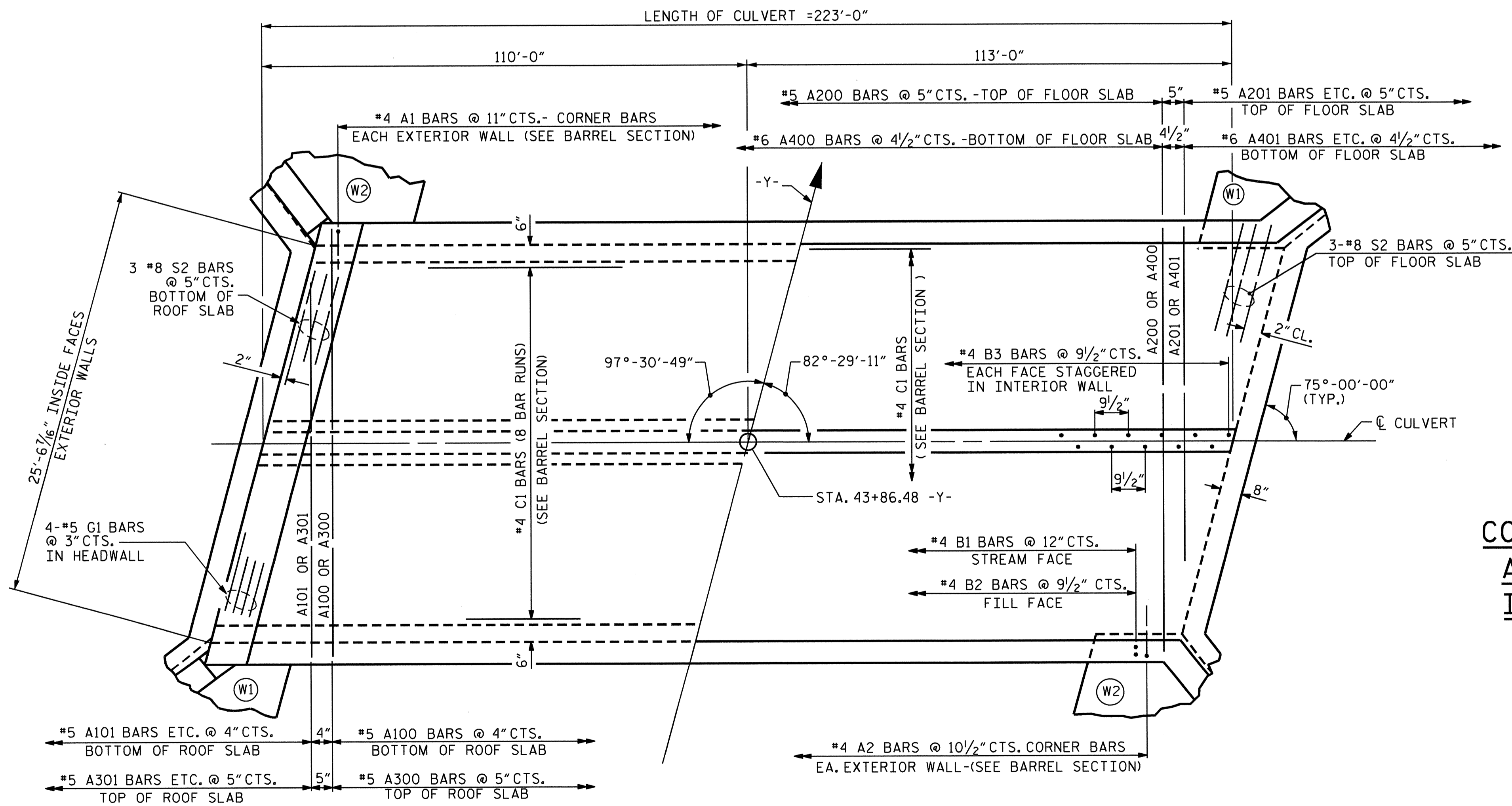


EXTERIOR WALL INTERIOR WALL  
**CULVERT SECTION NORMAL TO ROADWAY**



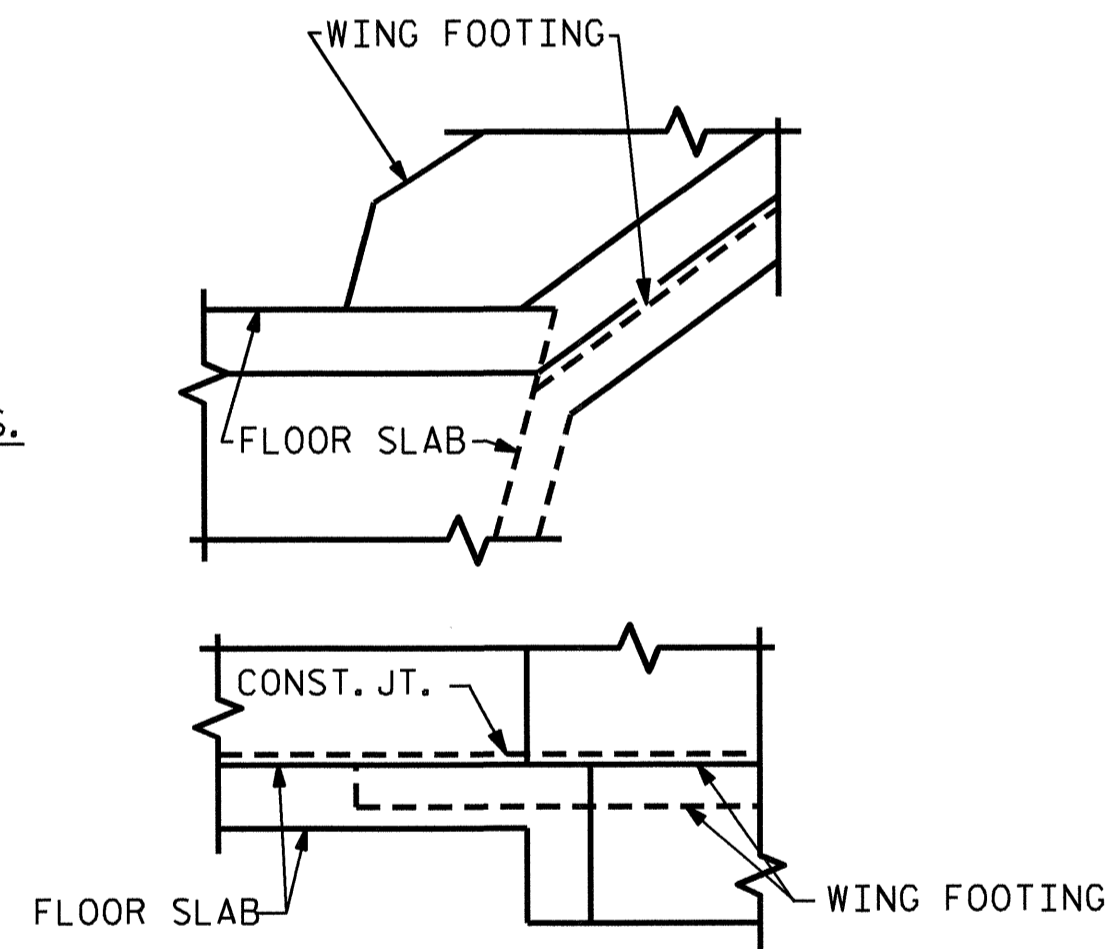
**INLET END ELEVATION**

OUTLET END ELEVATION SIMILAR BY ROTATION  
SILLS NOT SHOWN FOR CLARITY



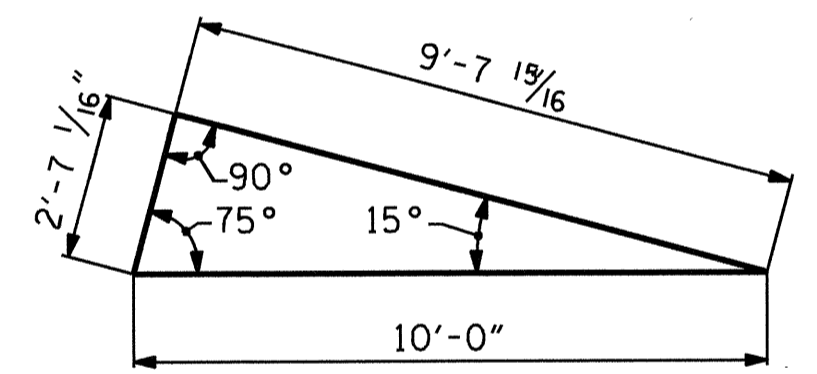
**PART PLAN - ROOF SLAB**

**PART PLAN - FLOOR SLAB**



**DETAIL**

**CONNECTION OF WING FOOTING  
AND FLOOR SLAB WHEN SLAB  
IS THICKER THAN FOOTING**



**SKEW TRIANGLE**

PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 43+86.48 -Y-

SHEET 2 OF 5

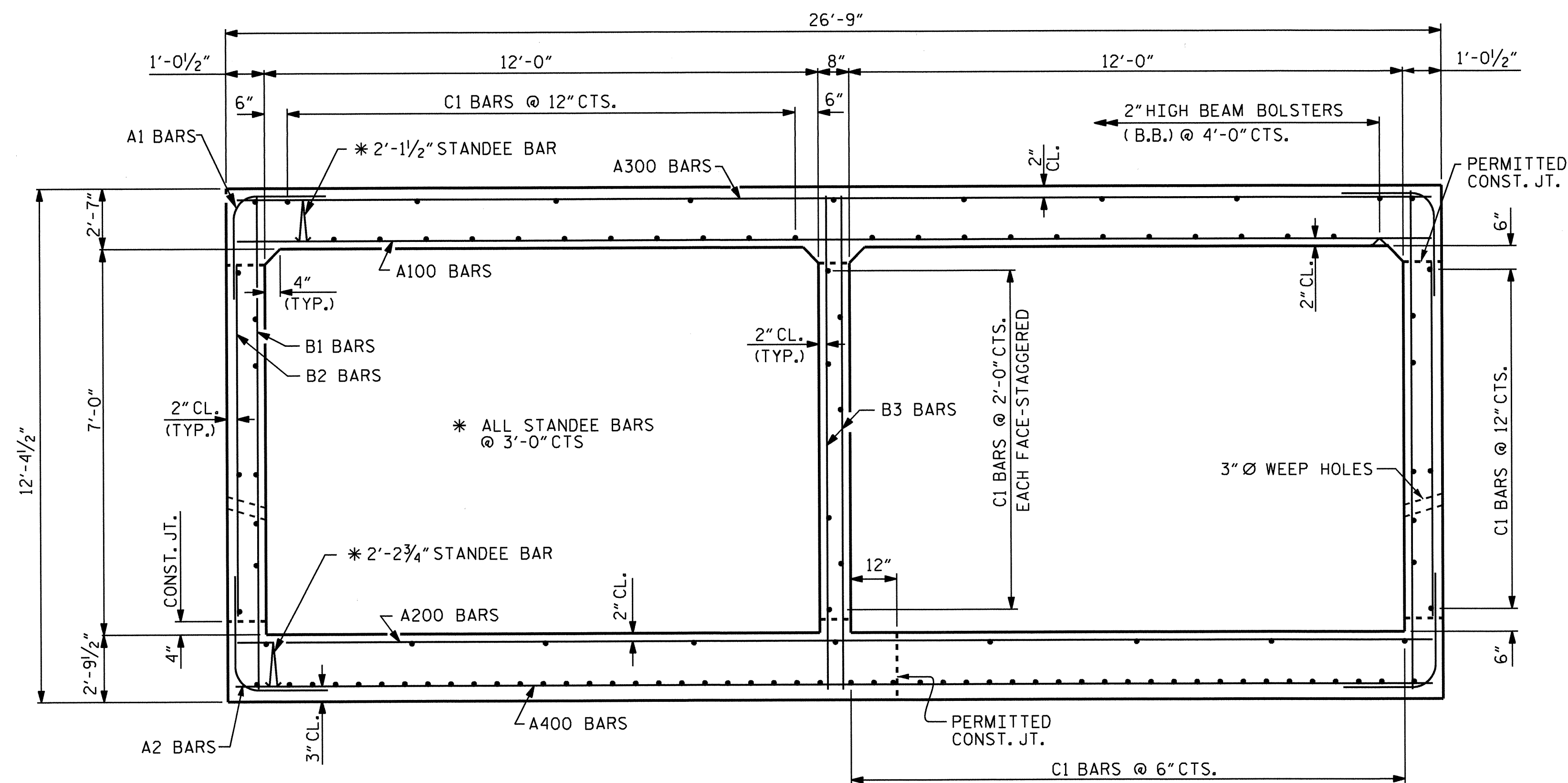
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
BARREL STANDARD  
**DOUBLE 12 FT. X 7 FT.  
CONCRETE BOX CULVERT  
82°-29'-11" SKEW**

*E. I. Omile*  
4/14/14  
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 25461  
EMMANUEL I. OMILE

REVISED 11-19-99 BY MAM. CHECKED BY R.W.W.  
REDRAWN NOV. 1990 BY TSS. CHECKED BY ARB

ASSEMBLED BY: <u>E.I. OMILE</u>	DATE: <u>3-12-13</u>	<b>SPECIAL</b>
CHECKED BY: <u>S.L. WANCE</u>	DATE: <u>3-12-13</u>	
DRAWN BY: <u>W. BRYAN STALEY II</u>	DATE: <u>SEPT. 21, 1971</u>	<b>STANDARD</b>
CHECKED BY: <u>JOEL A. JOHNSON</u>	DATE: <u>NOV. 12, 1971</u>	

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

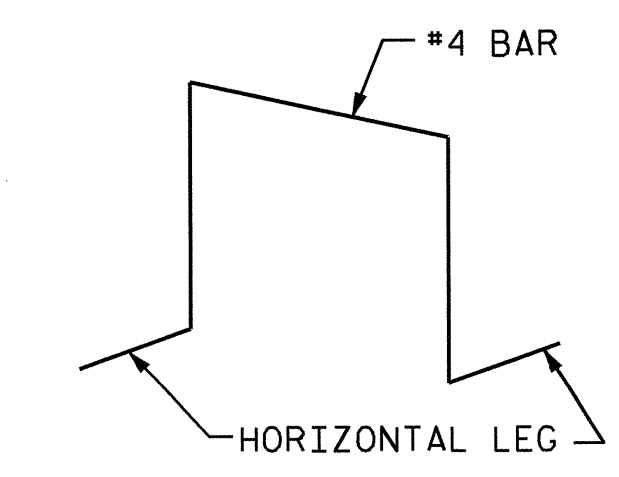


**RIGHT ANGLE SECTION OF BARREL**

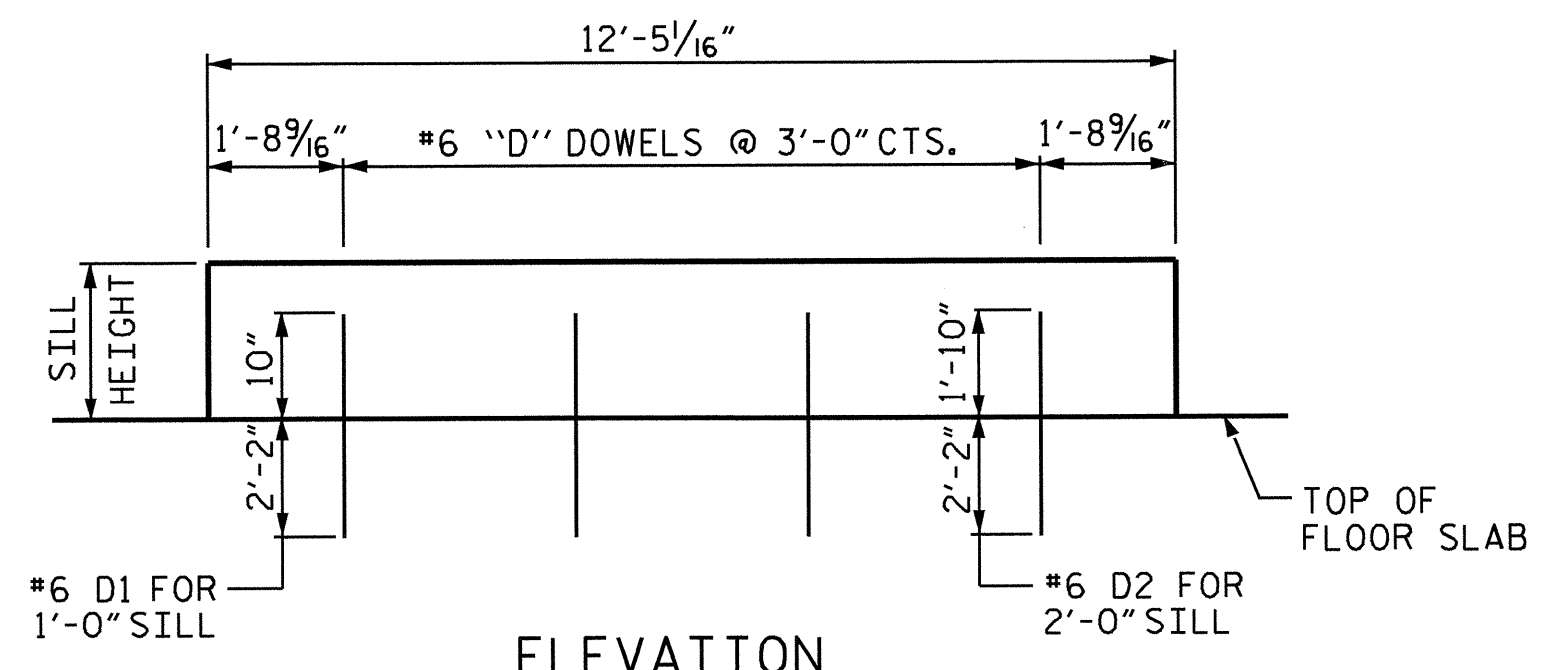
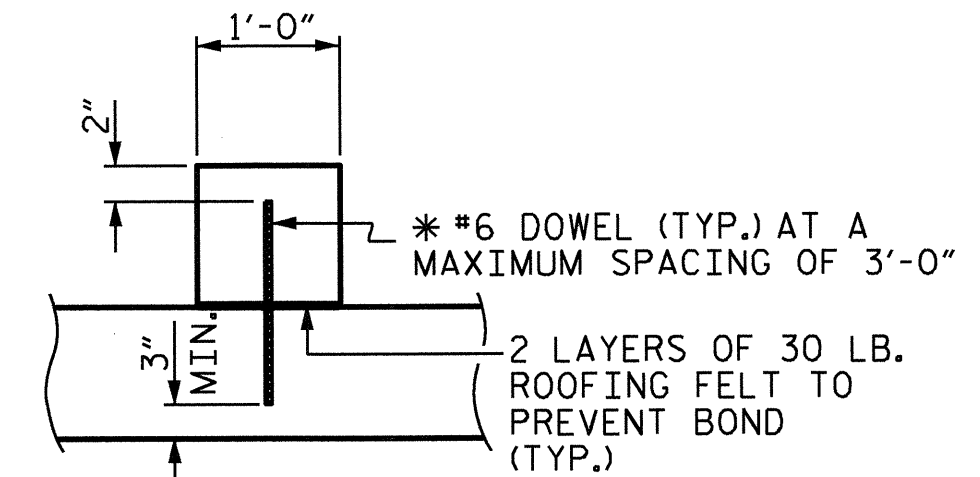
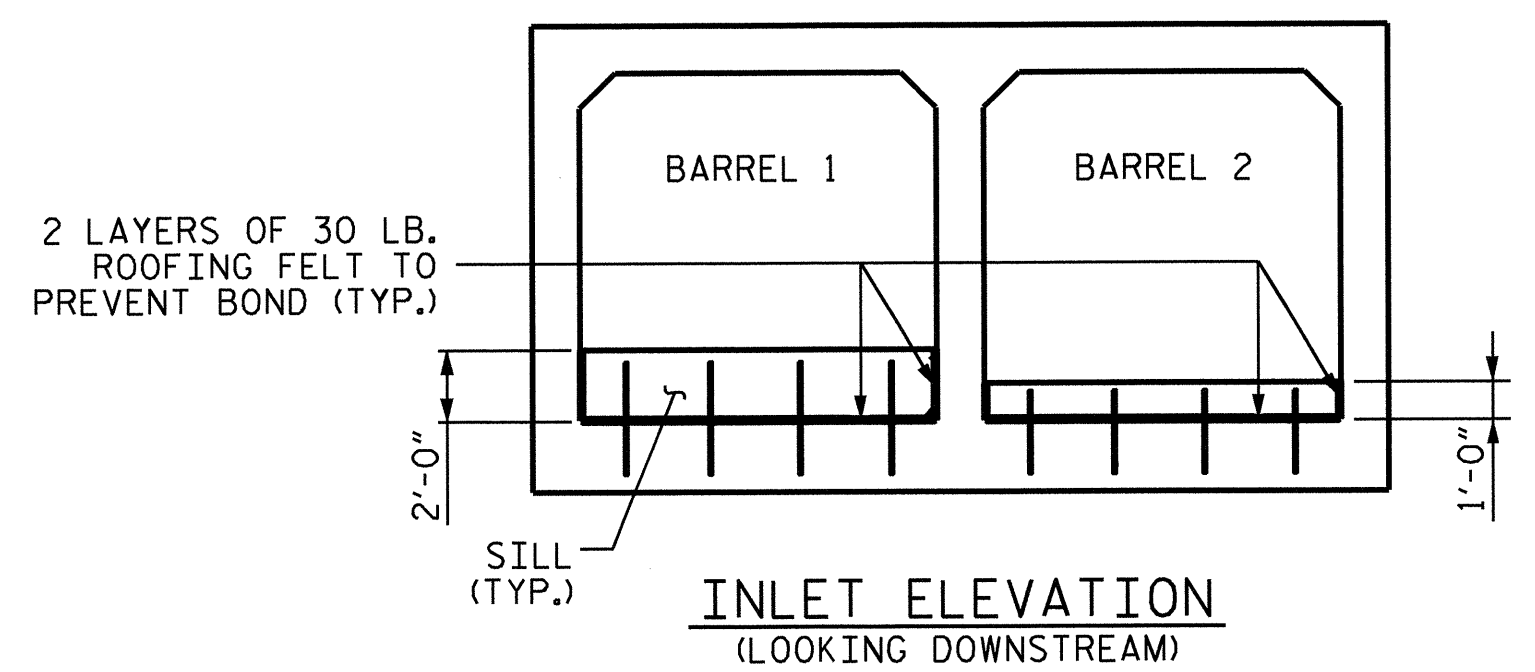
THERE ARE 115 C1 BARS IN SECTION OF BARREL.

BAR TYPE		BILL OF MATERIAL				
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
A1	488	#4	3	7'-4"	2391	
A2	510	#4	3	6'-7"	2243	
B1	446	#4	STR	11'-10"	3526	
B2	564	#4	STR	6'-4"	2386	
B3	564	#4	STR	11'-10"	4458	
A100	648	#5	STR	26'-4"	17798	
A101	6	#5	STR	22'-2"	139	
A102	6	#5	STR	18'-5"	115	
A103	6	#5	STR	14'-8"	92	
A104	6	#5	STR	11'-0"	69	
A105	6	#5	STR	7'-3"	45	
A106	6	#5	STR	3'-6"	22	
A200	518	#5	STR	26'-4"	14227	
A201	6	#5	STR	21'-3"	133	
A202	6	#5	STR	16'-7"	104	
A303	6	#5	STR	11'-11"	75	
A204	6	#5	STR	7'-3"	45	
A205	6	#5	STR	2'-7"	16	
A300	518	#5	STR	26'-4"	14227	
A301	6	#5	STR	21'-3"	133	
A302	6	#5	STR	16'-7"	104	
A303	6	#5	STR	11'-11"	75	
A304	6	#5	STR	7'-3"	45	
A305	6	#5	STR	2'-7"	16	
A400	576	#6	STR	26'-4"	22782	
A401	6	#6	STR	21'-8"	195	
A402	6	#6	STR	17'-6"	158	
A403	6	#6	STR	13'-4"	120	
A404	6	#6	STR	9'-1"	82	
A405	6	#6	STR	4'-11"	44	
C1	920	#4	STR	29'-8"	18232	
D1	8	#6	STR	3'-0"	36	
D2	8	#6	STR	4'-0"	48	
G1	8	#5	STR	27'-4"	228	
S2	12	#8	STR	27'-4"	876	
REINFORCING STEEL					LBS. 105,285	

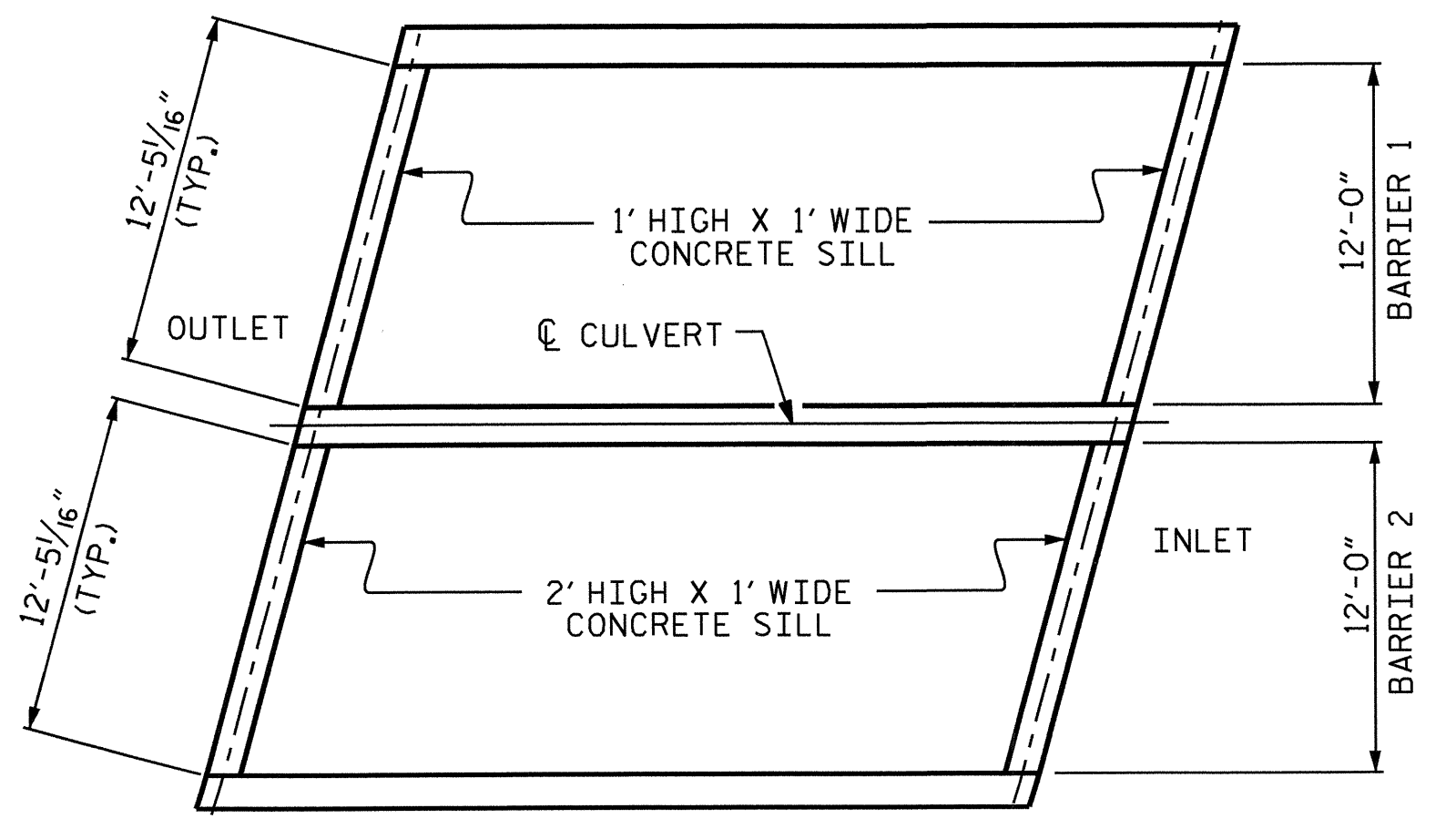
SPLICE LENGTHS CHART		
BAR	SIZE	SPLICE LENGTH
C1	#4	1'-11"
"B"	#4	1'-9"



**SATNDEE BAR DETAIL**  
THE STANDEE BAR SHALL BE IN ACCORDANCE WITH CRSI "MANUAL OF STANDARD PRACTICE".



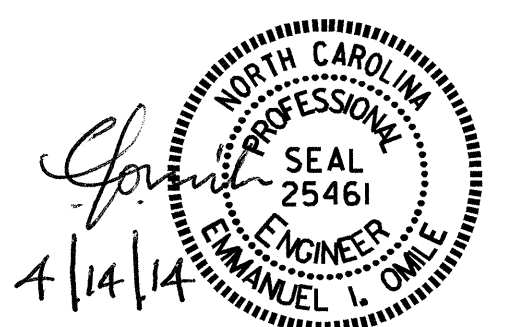
**SILL DETAILS**



**PLAN**

**NOTE**

BED MATERIAL PLACED BETWEEN THE HIGH SILLS BARREL OF THE CULVERT SHALL PROVIDE A CONTINUOUS FLOW CHANNEL BETWEEN THE HIGH SILLS. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS B RIP RAP. THE LOWER SILLS BARREL SHALL BE LEFT TO FILL NATURALLY. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.

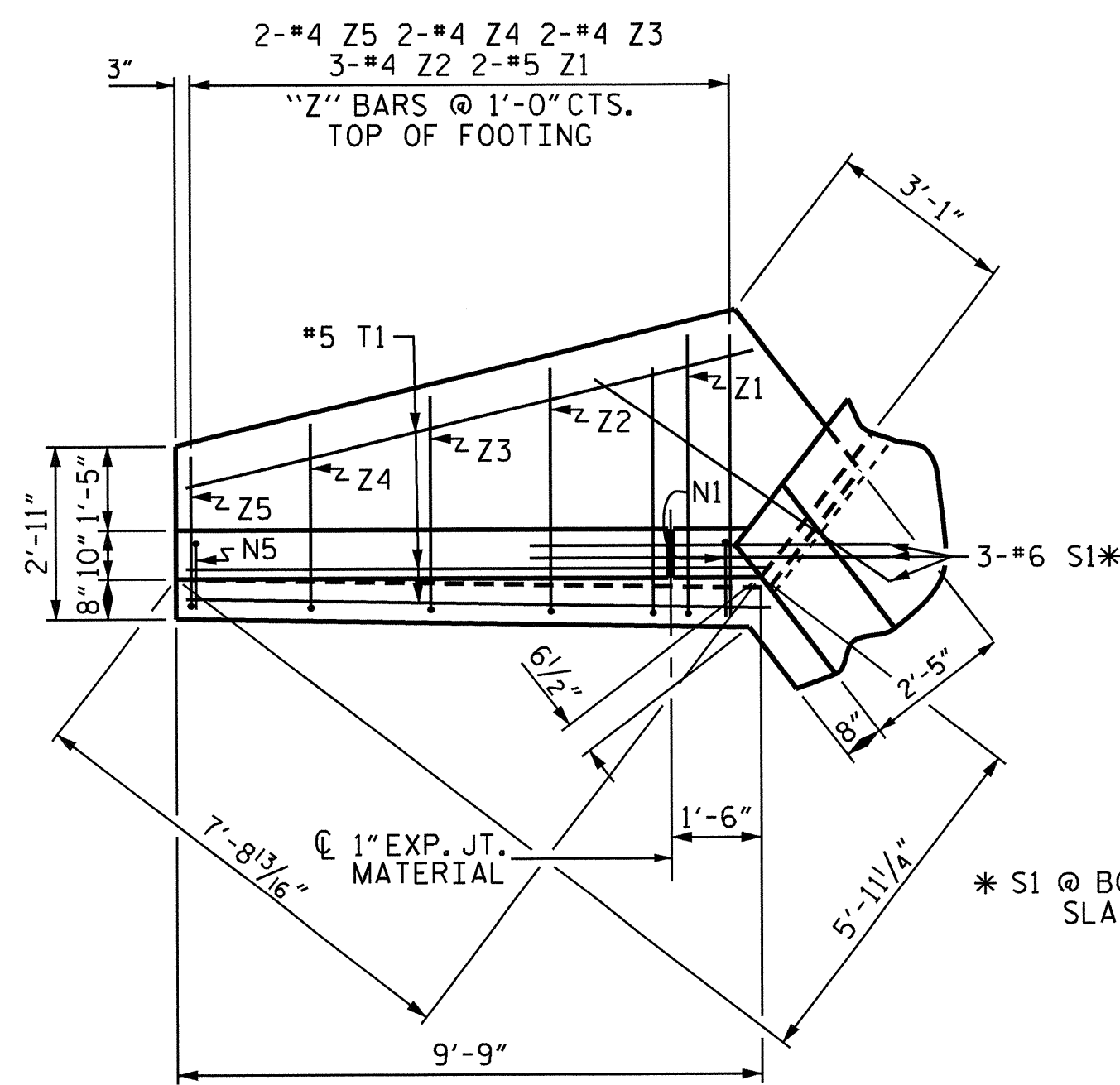


PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 43+86.48 -Y-

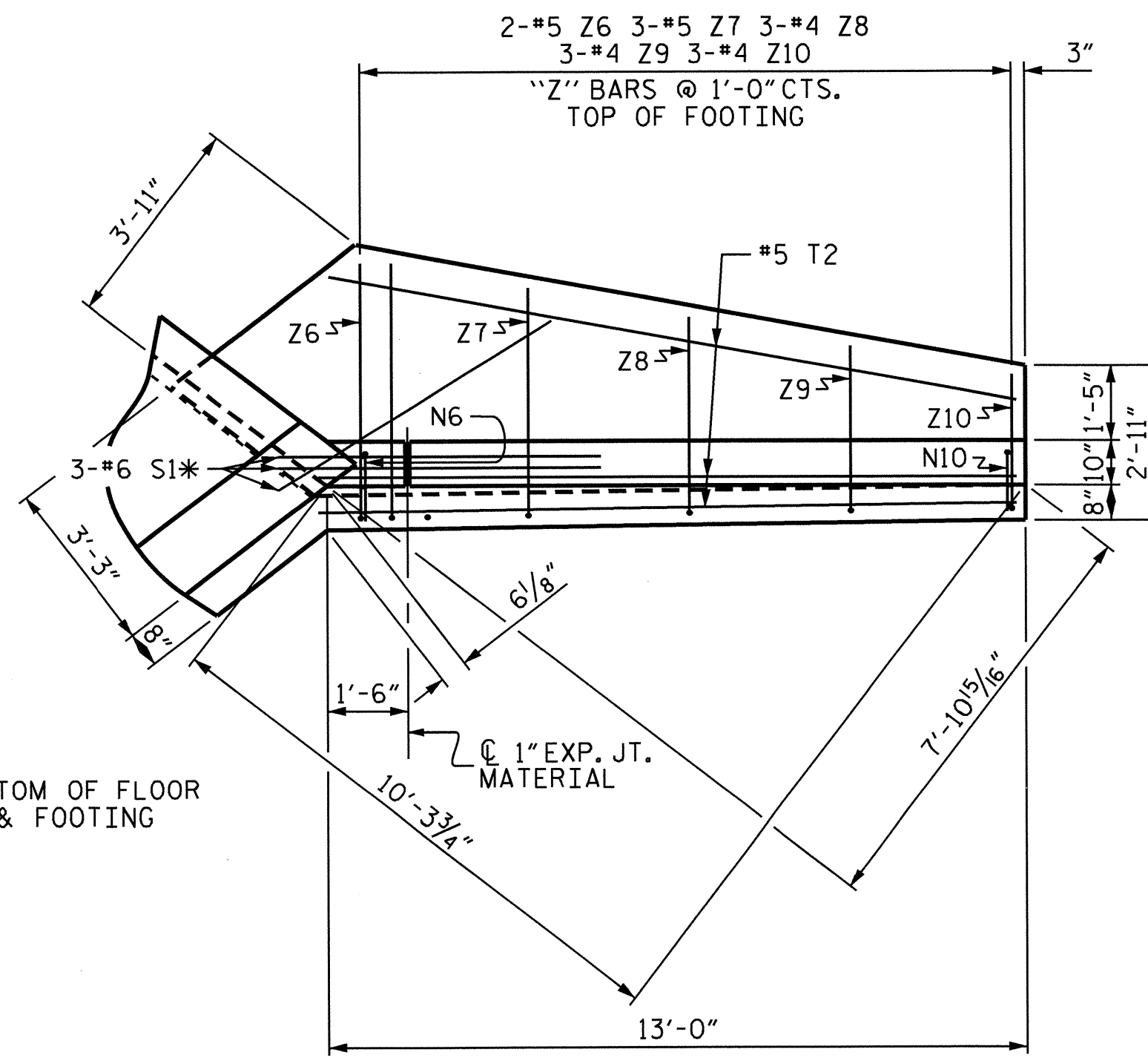
SHEET 3 OF 5

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

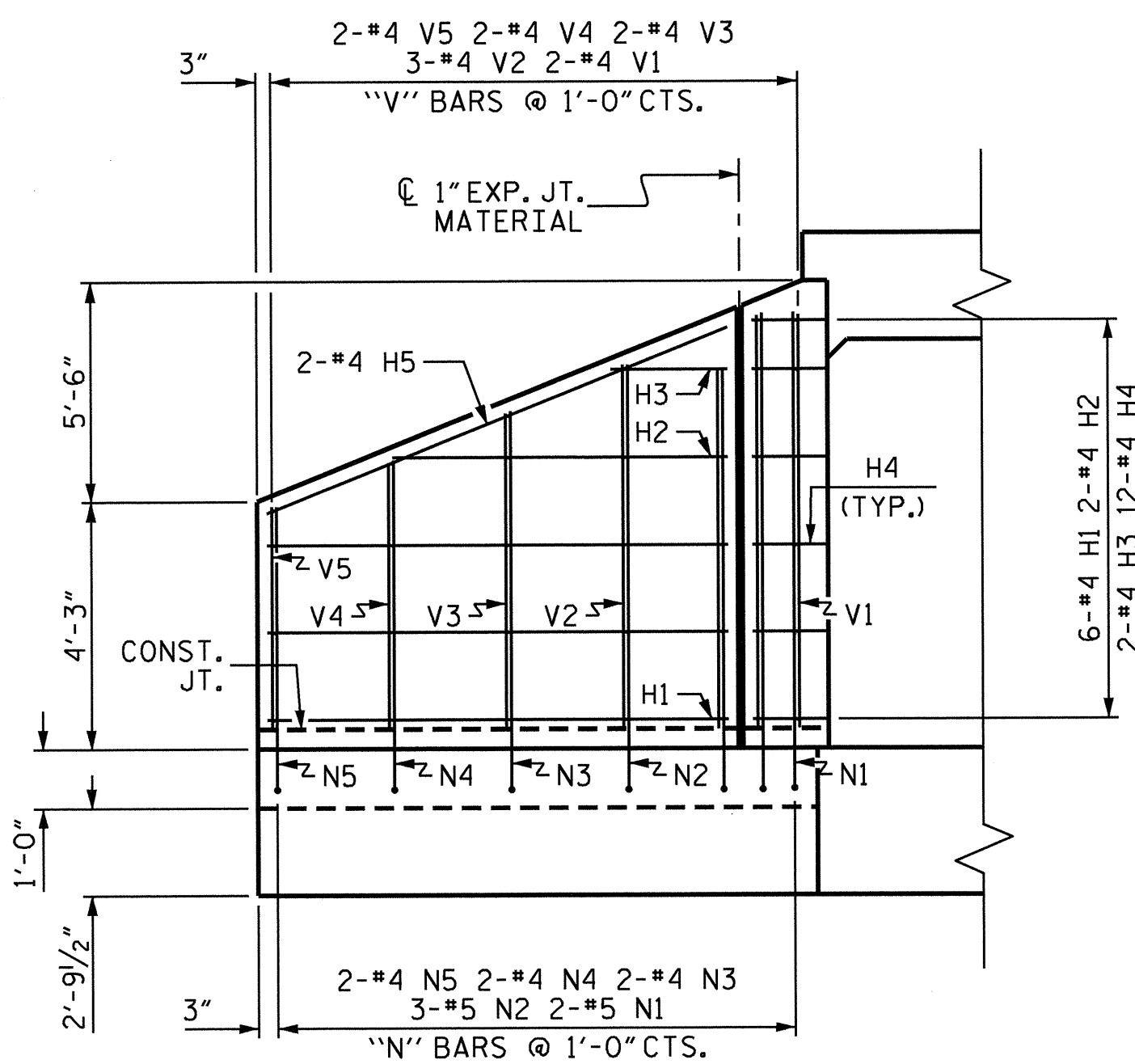
DRAWN BY : E.I. OMILE DATE : 2-28-13  
CHECKED BY : S.L. WANCE DATE : 3-28-13  
DESIGN ENGINEER  
OF RECORD : E.I. OMILE DATE : 1-6-14



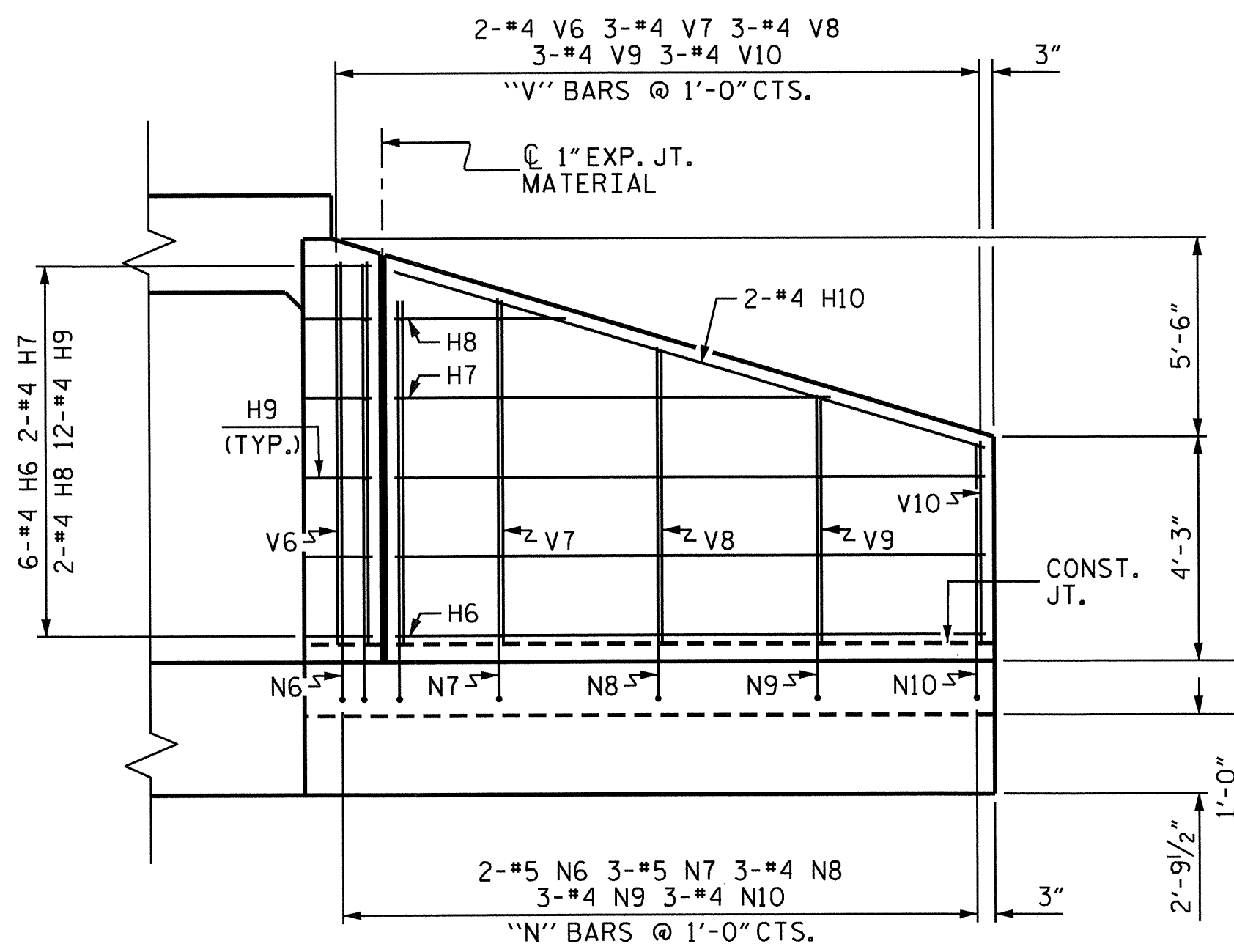
PLAN W2



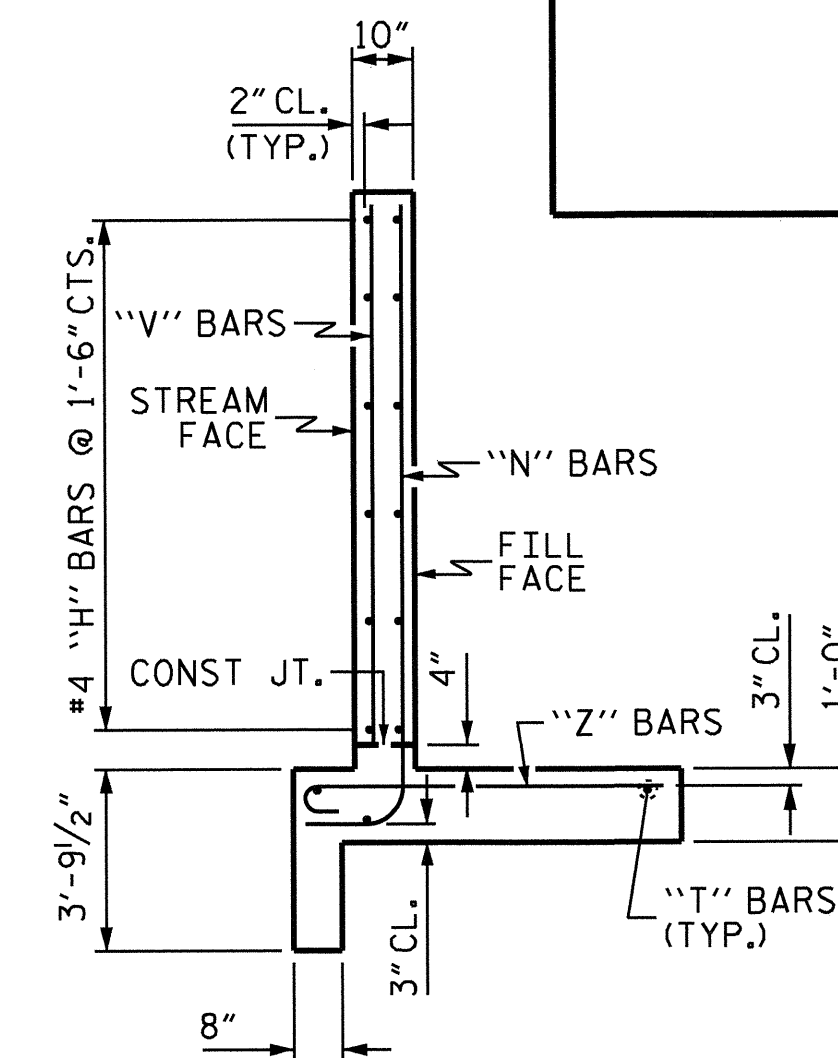
PLAN W1



ELEVATION W2



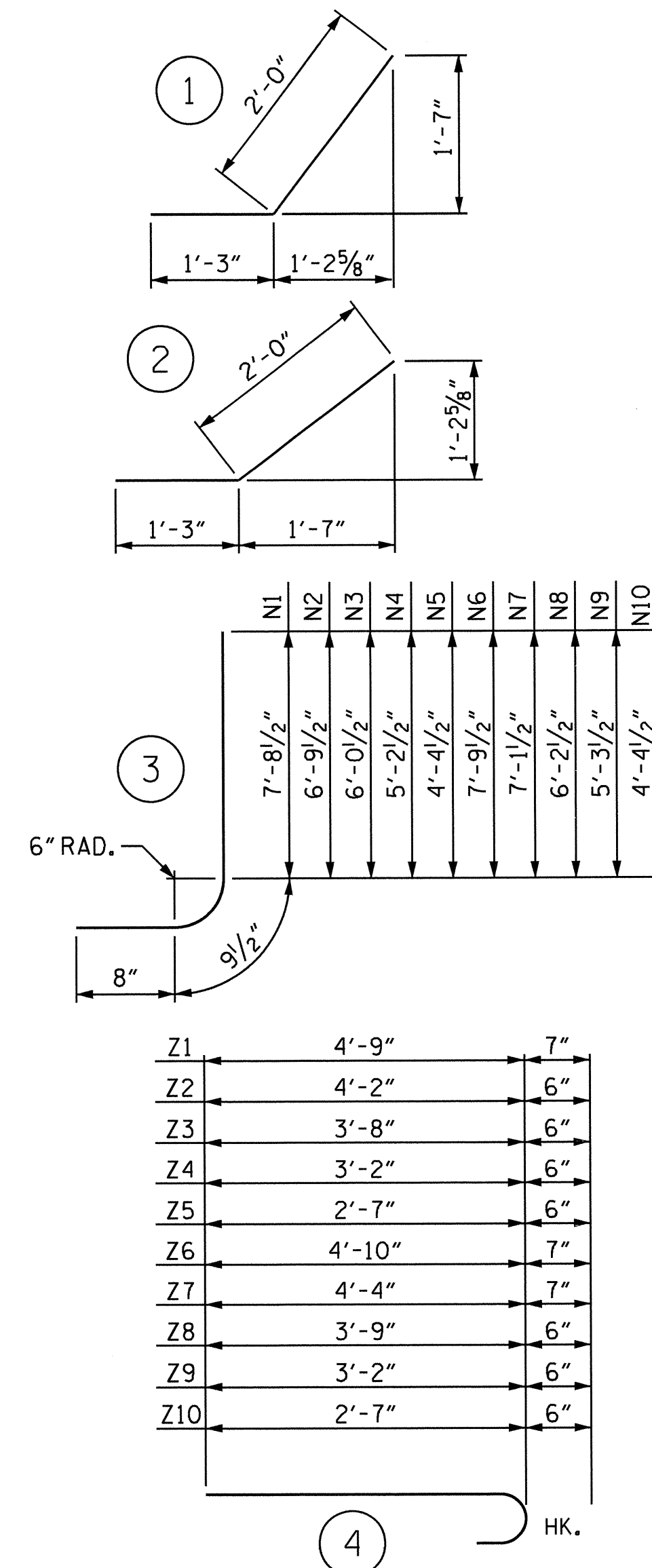
ELEVATION W1



TYPICAL WING SECTION

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	12	#4	STR 7'-10"	63
H2	4	#4	STR 5'-8"	15
H3	4	#4	STR 2'-0"	5
H4	24	#4	1 3'-3"	52
H5	4	#4	STR 8'-5"	22
H6	12	#4	STR 11'-1"	89
H7	4	#4	STR 8'-2"	22
H8	4	#4	STR 3'-3"	9
H9	24	#4	2 3'-3"	52
H10	4	#4	STR 11'-7"	31
N1	4	#5	3 9'-2"	38
N2	6	#5	3 8'-3"	52
N3	4	#4	3 7'-6"	20
N4	4	#4	3 6'-8"	18
N5	4	#4	3 5'-10"	16
N6	4	#5	3 9'-3"	39
N7	6	#5	3 8'-7"	54
N8	6	#4	3 7'-8"	31
N9	6	#4	3 6'-9"	27
N10	6	#4	3 5'-10"	23
S1	12	#6	STR 6'-0"	108
T1	6	#5	STR 9'-9"	61
T2	6	#5	STR 13'-0"	81
V1	4	#4	STR 7'-1"	19
V2	6	#4	STR 6'-3"	25
V3	4	#4	STR 5'-5"	14
V4	4	#4	STR 4'-7"	12
V5	4	#4	STR 3'-10"	10
V6	4	#4	STR 7'-3"	19
V7	6	#4	STR 6'-6"	26
V8	6	#4	STR 5'-7"	22
V9	6	#4	STR 4'-8"	19
V10	6	#4	STR 3'-10"	15
Z1	4	#5	4 5'-4"	22
Z2	6	#4	4 4'-8"	19
Z3	4	#4	4 4'-2"	11
Z4	4	#4	4 3'-8"	10
Z5	4	#4	4 3'-1"	8
Z6	4	#5	4 5'-5"	23
Z7	6	#5	4 4'-11"	31
Z8	6	#4	4 4'-3"	17
Z9	6	#4	4 3'-8"	15
Z10	6	#4	4 3'-1"	12

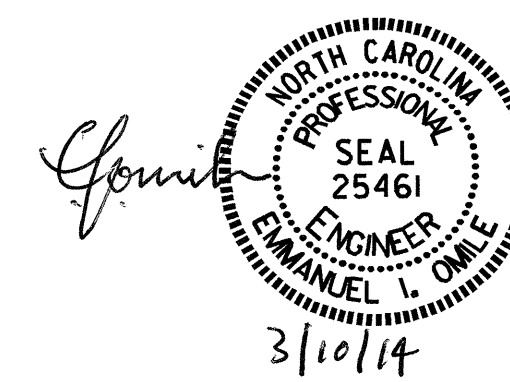
REINFORCING STEEL FOR 4 WINGS	1277 LBS
CLASS A CONCRETE	
4 WINGS	19.7 CY
2 HEADWALLS	2.6 CY
2 END CURTAIN WALLS	4.6 CY
TOTAL	26.9 CY

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 43+86.48 -Y-

SHEET 4 OF 5

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD WINGS  
 FOR  
 CONCRETE BOX CULVERT  
 H = 7'-0" SLOPE = 2:1  
 75° SKEW



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

ASSEMBLED BY: E.I. OMILE DATE: 3-4-13  
 CHECKED BY: S.L. WANCE DATE: 3-4-13  
 DRAWN BY: CCJ 12/99  
 CHECKED BY: RWW 03/00

**LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS**

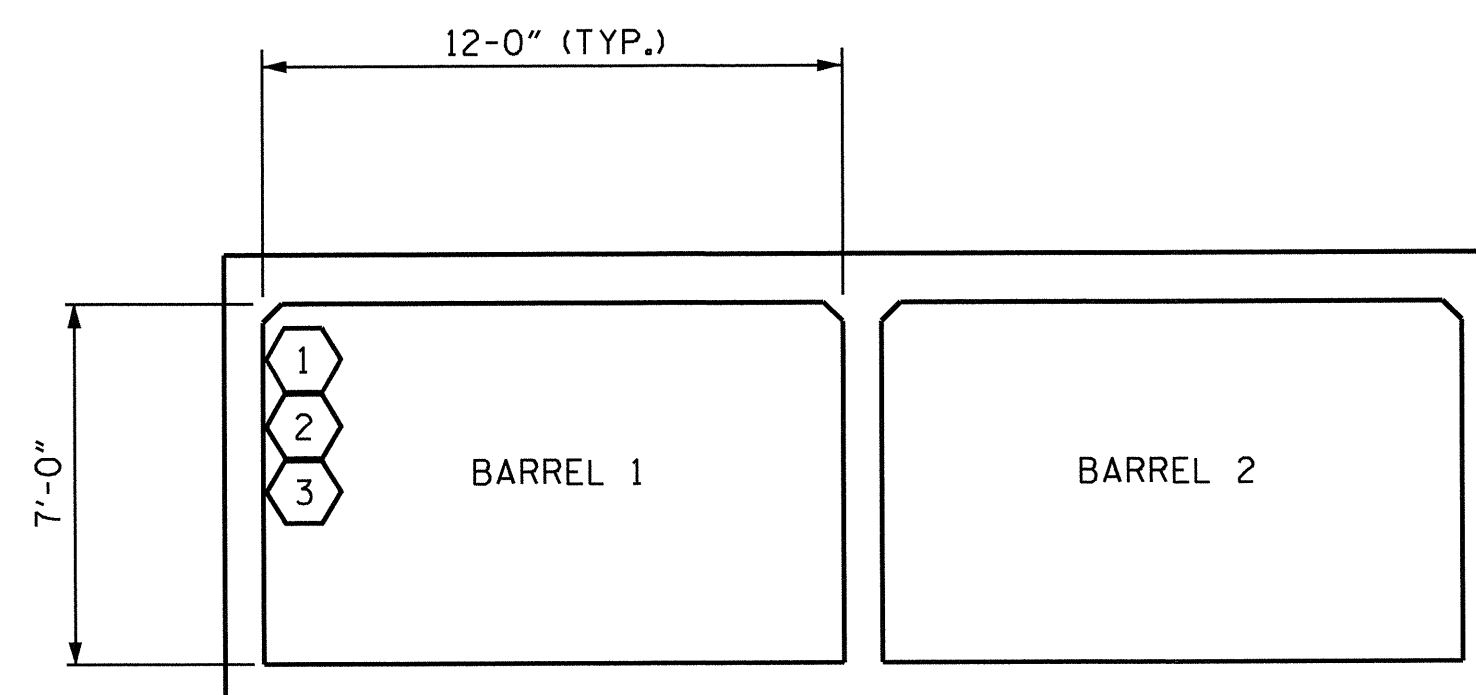
LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER	
						LIVE-LOAD FACTORS (γ <sub>LL</sub> )	MOMENT				SHEAR				
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (ft)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (ft)
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	1	4.21	--	1.75	12.28	1	BOT CNR WALL	8.96	<b>4.21</b>	1	EXTERIOR WALL	<b>2.06</b>	
	HL-93 (OPERATING)	N/A		5.45	--	1.35	15.92	1	BOT CNR WALL	8.96	5.45	1	EXTERIOR WALL	2.06	
	HS-20 (INVENTORY)	36.000	2	4.21	151.49	1.75	12.28	1	BOT CNR WALL	8.96	<b>4.21</b>	1	EXTERIOR WALL	<b>2.06</b>	
	HS-20 (OPERATING)	36.000		5.45	196.36	1.35	15.92	1	BOT CNR WALL	8.96	5.45	1	EXTERIOR WALL	2.06	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	3	5.26	71.01	1.40	15.33	1	BOT CNR WALL	8.96	<b>5.26</b>	1	EXTERIOR WALL	<b>2.06</b>	
		SNGARBS2		5.26	105.20	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNAGRIS2		5.26	115.72	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNCOTTS3		5.26	143.34	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNAGGRS4		5.26	183.71	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNS5A		5.26	187.00	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNS6A		5.26	210.14	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		SNS7B		5.26	220.93	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3		5.26	173.59	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		TNT4A		5.26	173.98	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		TNT6A		5.26	218.82	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		TNT7A		5.26	220.93	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		TNT7B		5.26	220.93	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
		TNAGRIT4		5.26	226.19	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06	
TNAGT5A		5.26	236.71	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06			
TNAGT5B		5.26	236.71	1.40	15.33	1	BOT CNR WALL	8.96	5.26	1	EXTERIOR WALL	2.06			

**LOAD FACTORS:**

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

**NOTE:**  
RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

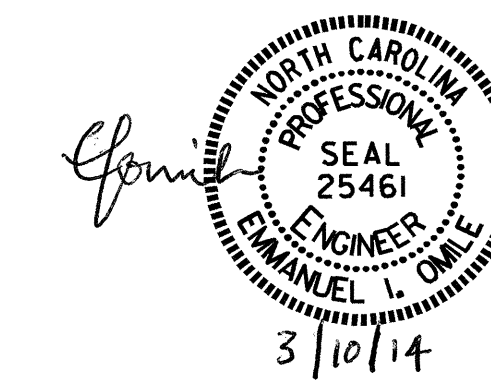
#	CONTROLLING LOAD RATING
1	
2	DESIGN LOAD RATING (HS-20)
3	LEGAL LOAD RATING **
** SEE CHART FOR VEHICLE TYPE	



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

ASSEMBLED BY : E. I. OMILE	DATE : 3-12-13
CHECKED BY : S.L. WANCE	DATE : 3-12-13
DESIGN ENGINEER OF RECORD : E.I. OMILE	DATE : 1-6-14
DRAWN BY : WMC	T/II
CHECKED BY : GM	T/II
REV. 10/17/11	MAA/GM

10-MAR-2014 08:46  
K:\TIP\Projects-R\2612B\Structures\Plans\Final Plans\culverts\vr2612b.sd.cul.dgn  
eomile



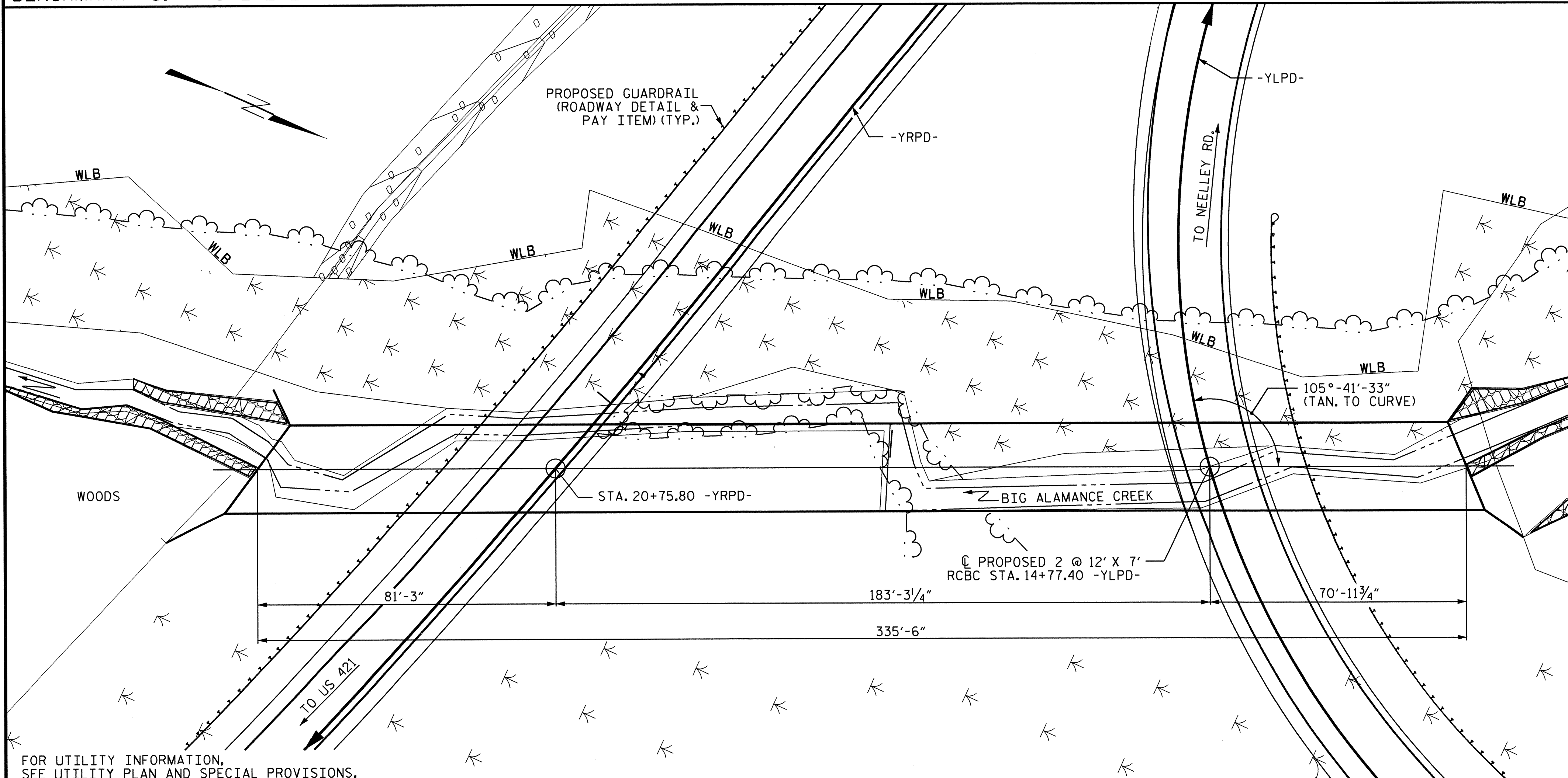
PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 43+86.48 -Y-

SHEET 5 OF 5

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH STANDARD LRFR SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS (NON-INTERSTATE TRAFFIC)					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. C-5					TOTAL SHEETS 14

CULVERT #1      STD. NO. LRFR5

BENCHMARK #3: RR SPIKE IN ROOT OF 14" ELM TREE 81' RT. OF -BL- STA. 55+52 EL. 741.39



LOCATION SKETCH

NOTES

- ASSUMED LIVE LOAD -----HL-93 OR ALTERNATE LOADING.
- DESIGN FILL-----22.56'
- FOR OTHER DESIGN DATA AND NOTES SEE STANDARD NOTE SHEET.
- 3" Ø WEEP HOLES INDICATED TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.
- CONCRETE IN CULVERTS TO BE POURED IN THE FOLLOWING ORDER:
  1. WING FOOTINGS AND FLOOR SLAB INCLUDING 4" OF ALL VERTICAL WALLS.
  2. THE REMAINING PORTIONS OF WALLS AND WINGS FULL HEIGHT FOLLOWED BY ROOF SLAB AND HEADWALLS.
- THE RESIDENT ENGINEER SHALL CHECK THE LENGTH OF CULVERT BEFORE STAKING IT OUT TO MAKE CERTAIN THAT IT WILL PROPERLY TAKE CARE OF THE FILL.
- DIMENSIONS FOR WING LAYOUT AS WELL AS ADDITIONAL REINFORCING STEEL EMBEDDED IN BARREL ARE SHOWN ON WING SHEET.
- TRANSVERSE CONSTRUCTION JOINTS SHALL BE USED IN THE BARREL, SPACED TO LIMIT THE POURS TO A MAXIMUM OF 70 FT. LOCATION OF JOINTS SHALL BE SUBJECT TO APPROVAL OF THE ENGINEER.
- STEEL IN THE BOTTOM SLAB MAY BE SPLICED AT THE PERMITTED CONSTRUCTION JOINT AT THE CONTRACTOR'S OPTION. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY CONTRACTOR.
- AT THE CONTRACTOR'S OPTION, HE MAY SPLICE THE VERTICAL REINFORCING STEEL IN THE INTERIOR FACE OF EXTERIOR WALL AND BOTH FACES OF INTERIOR WALLS ABOVE LOWER WALL CONSTRUCTION JOINT. THE SPLICE LENGTH SHALL BE AS PROVIDED IN THE SPLICE LENGTH CHART SHOWN ON THE PLANS. EXTRA WEIGHT OF STEEL DUE TO THE SPLICES SHALL BE PAID FOR BY THE CONTRACTOR.
- THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE BARS FROM WHICH THE SAMPLES ARE TAKEN MUST THEN BE SPLICED WITH REPLACEMENT BARS OF THE SIZE AND LENGTH OF THE SAMPLE, PLUS A MINIMUM LAP SPLICE OF THIRTY BAR DIAMETERS. PAYMENT FOR THE SAMPLES OF REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO VARIOUS PAY ITEMS.
- A 3 FOOT STRIP OF FILTER FABRIC SHALL BE ATTACHED TO THE FILL FACE OF THE WING COVERING THE ENTIRE LENGTH OF THE EXPANSION JOINT.
- FOR CULVERT DIVERSION DETAILS AND PAY ITEM, SEE EROSION CONTROL PLANS.
- NO PRECAST REINFORCED BOX CULVERT OPTION WILL BE ALLOWED.
- FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.
- FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.
- FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.
- FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.
- DETAILED DRAWING FOR FALSEWORK AND FORMS FOR THIS CULVERT SHALL BE SUBMITTED. SEE SHEET SN.

FOR UTILITY INFORMATION, SEE UTILITY PLAN AND SPECIAL PROVISIONS.

ROADWAY DATA

GRADE PT. EL. @ STA. 14+77.4 -YLPD- = 773.67'  
 BED ELEV. @ STA. 14+77.40 -YLPD- = 745.79'  
 ROADWAY SLOPE = 2 : 1

HYDRAULIC DATA

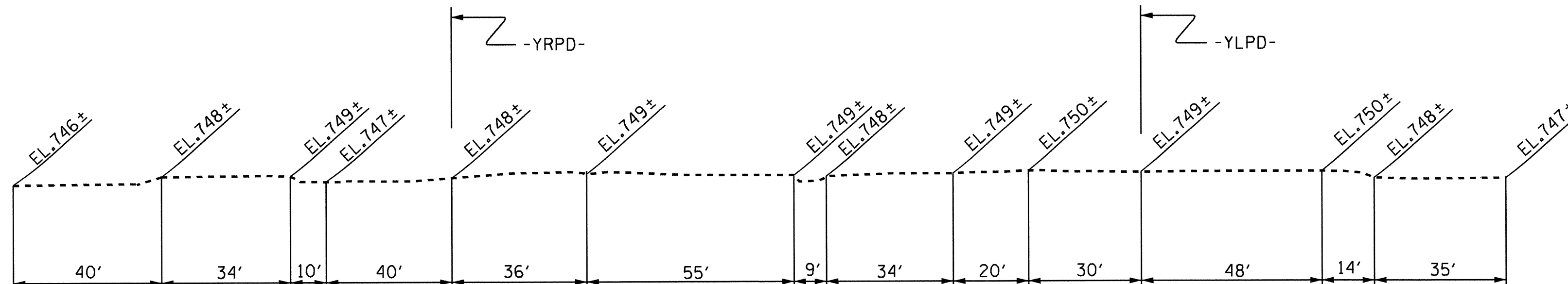
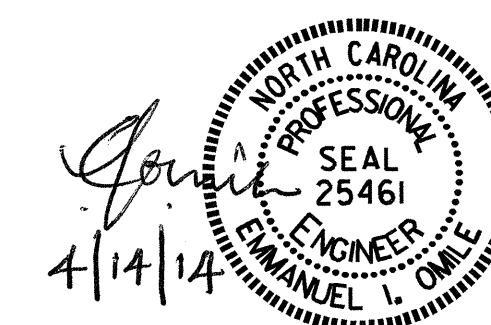
DESIGN DISCHARGE = 400 CFS  
 FREQUENCY OF DESIGN FLOOD = 50 YRS.  
 DESIGN HIGH WATER ELEVATION = 752.40'  
 DRAINAGE AREA = 320 ACRES  
 BASE DISCHARGE (Q100) = 633 CFS  
 BASE HIGH WATER ELEVATION = 753.28'

OVERTOPPING FLOOD DATA

OVERTOPPING DISCHARGE = 850+ CFS  
 FREQUENCY OF OVERTOPPING FLOOD = 500+ YRS.  
 OVERTOPPING FLOOD ELEVATION = 771.00'(SAG)

TOTAL STRUCTURE QUANTITIES

CLASS A CONCRETE	
BARREL @ 4.043	CY/FT 1,356.4 C.Y.
SILL	3.3 C.Y.
WING ETC.	27.5 C.Y.
TOTAL	1,387.2 C.Y.
REINFORCING STEEL	
BARREL	161,545 LBS.
WINGS ETC.	1,387 LBS.
TOTAL	162,932 LBS.
CULVERT EXCAVATION _____ LUMP SUM	
FOUNDATION COND. MAT'L _____ 714 TONS	



PROFILE ALONG CULVERT

I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS

PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-

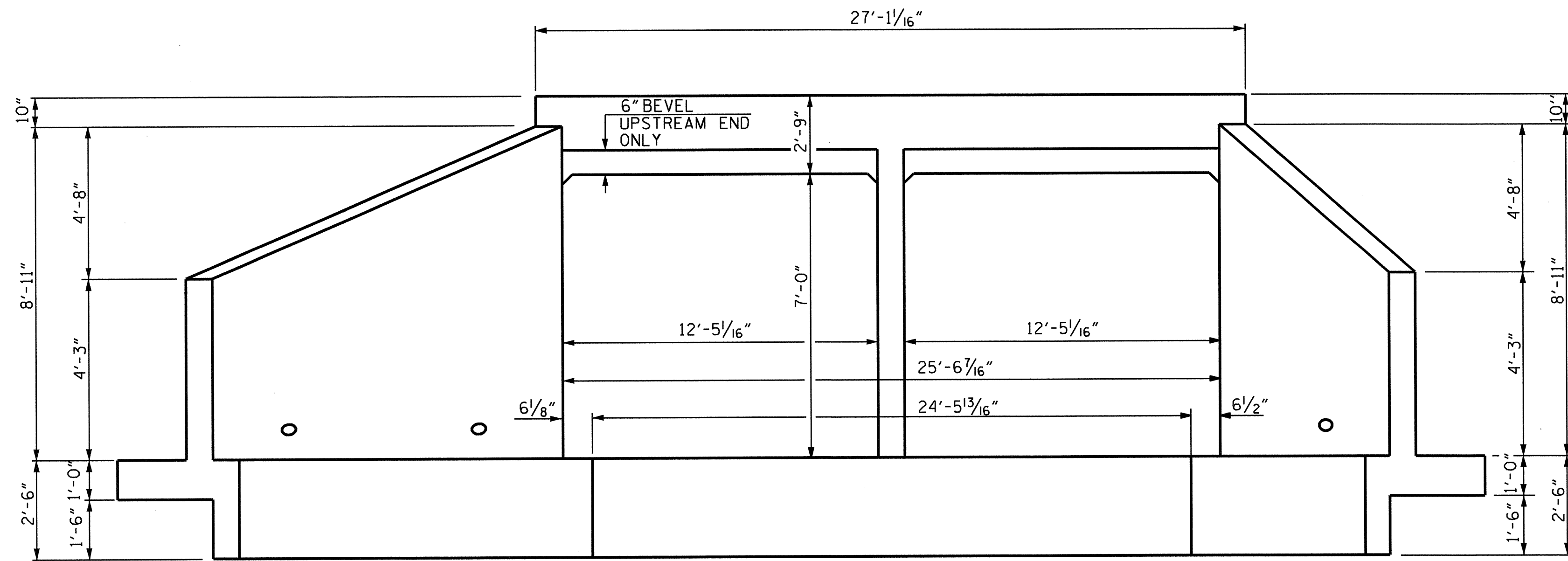
SHEET 1 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 105°-41'-33" SKEW

REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-6	
1			3			TOTAL SHEETS	
2			4			14	

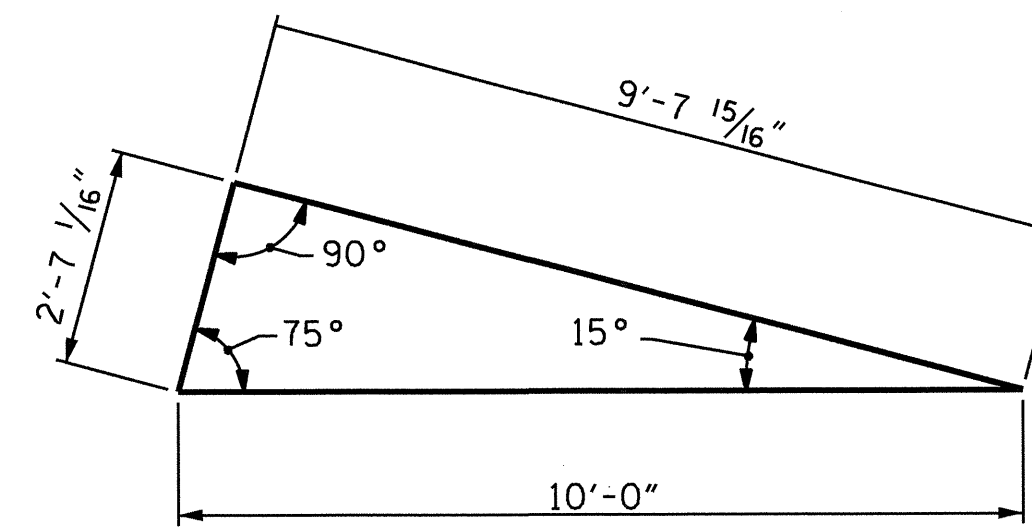
ASSEMBLED BY : E.I. OMILE	DATE : 3-7-12	SPECIAL
CHECKED BY : S.L. WANCE	DATE : 4/13	
DRAWN BY : R.W. WRIGHT	DATE : OCT. 1989	STANDARD
CHECKED BY : A.R. BISSETTE	DATE : OCT. 1989	



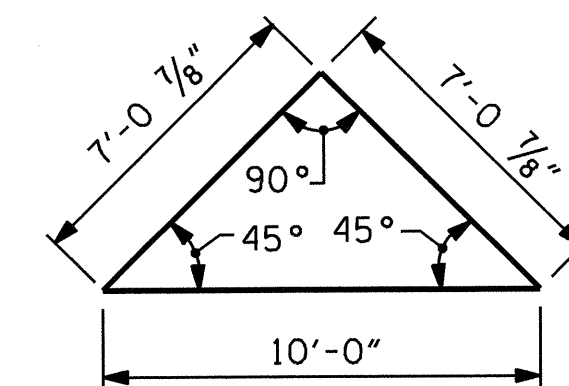


**INLET END ELEVATION**

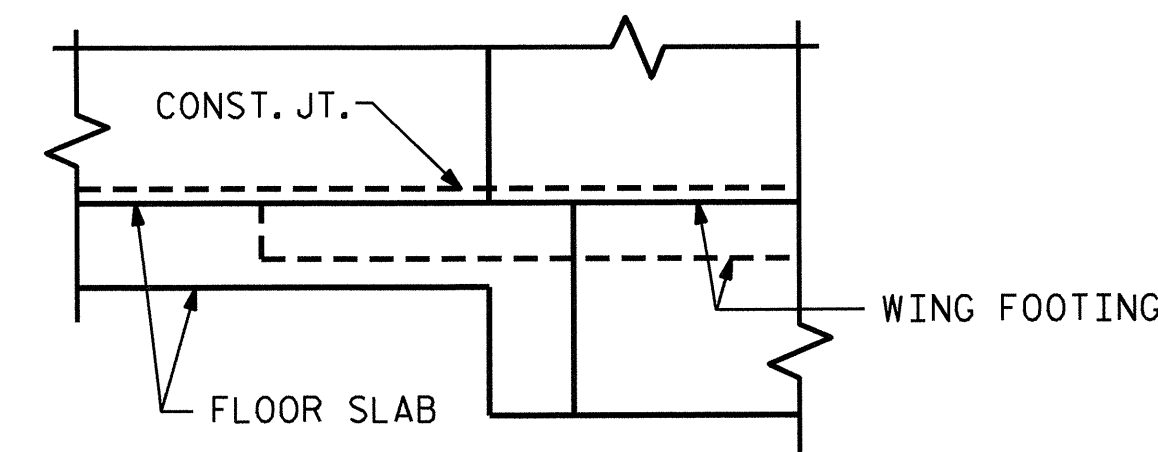
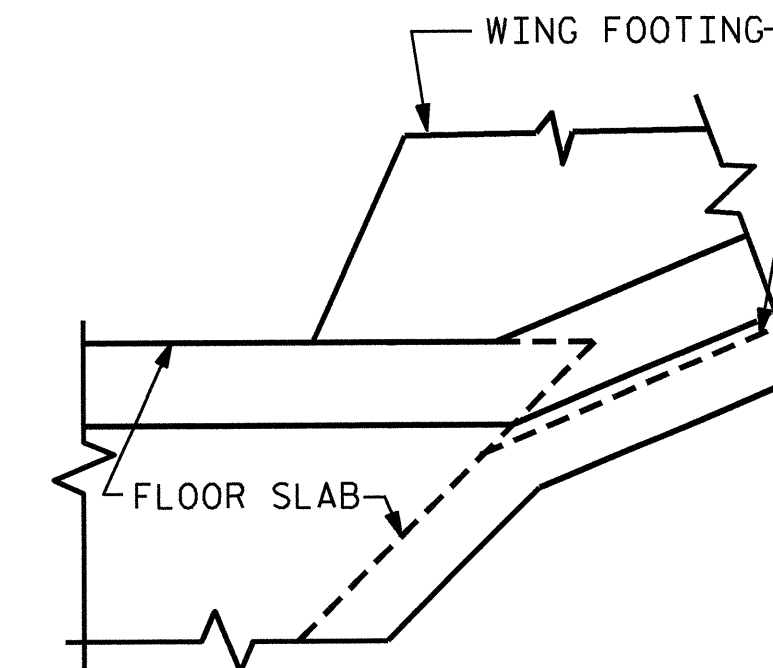
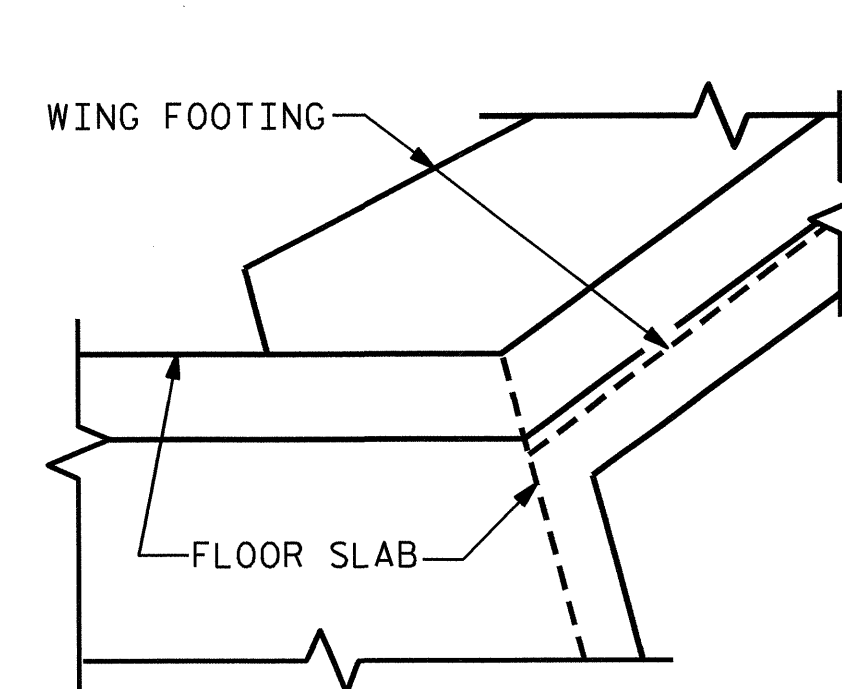
LOOKING DOWNSTREAM AT 105° SKEW  
 SILLS NOT SHOWN FOR CLARITY



**SKEW TRIANGLE**

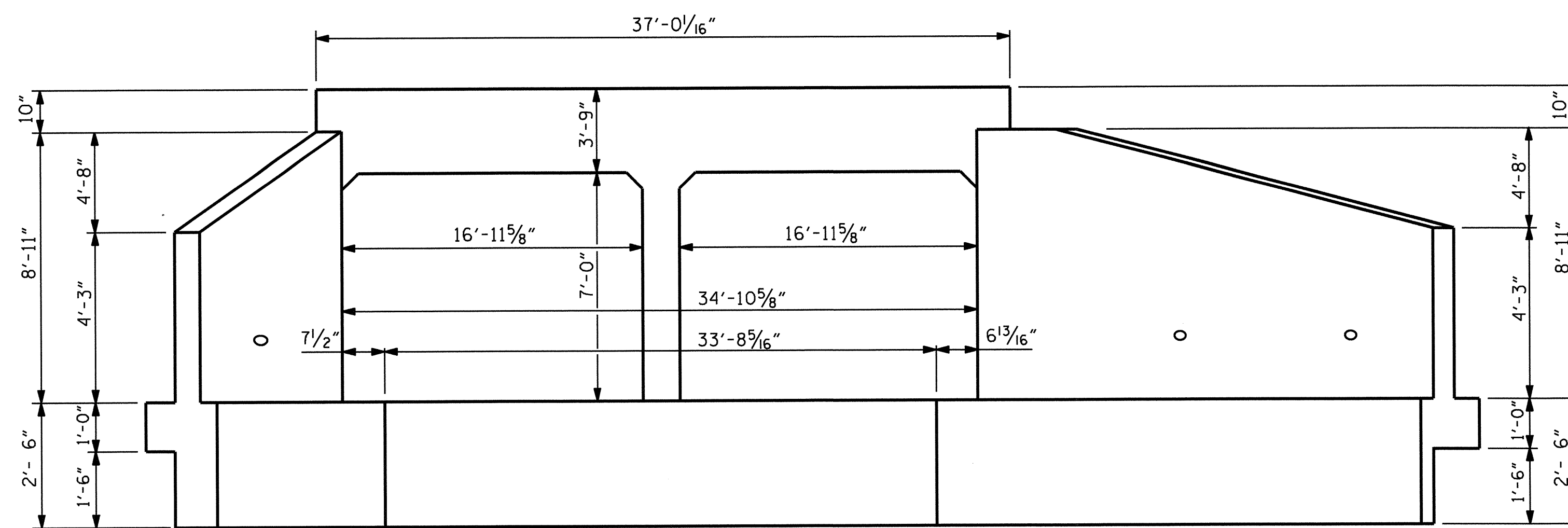


**SKEW TRIANGLE**



**DETAIL**

**CONNECTION OF WING FOOTING  
 AND FLOOR SLAB WHEN SLAB  
 IS THICKER THAN FOOTING**



**OUTLET END ELEVATION**

LOOKING UPSTREAM AT 45° SKEW  
 SILLS NOT SHOWN FOR CLARITY

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-

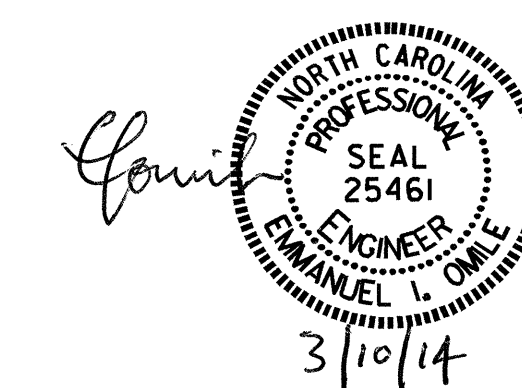
SHEET 3 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**DOUBLE 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT**

**105°-41'-33" SKEW**

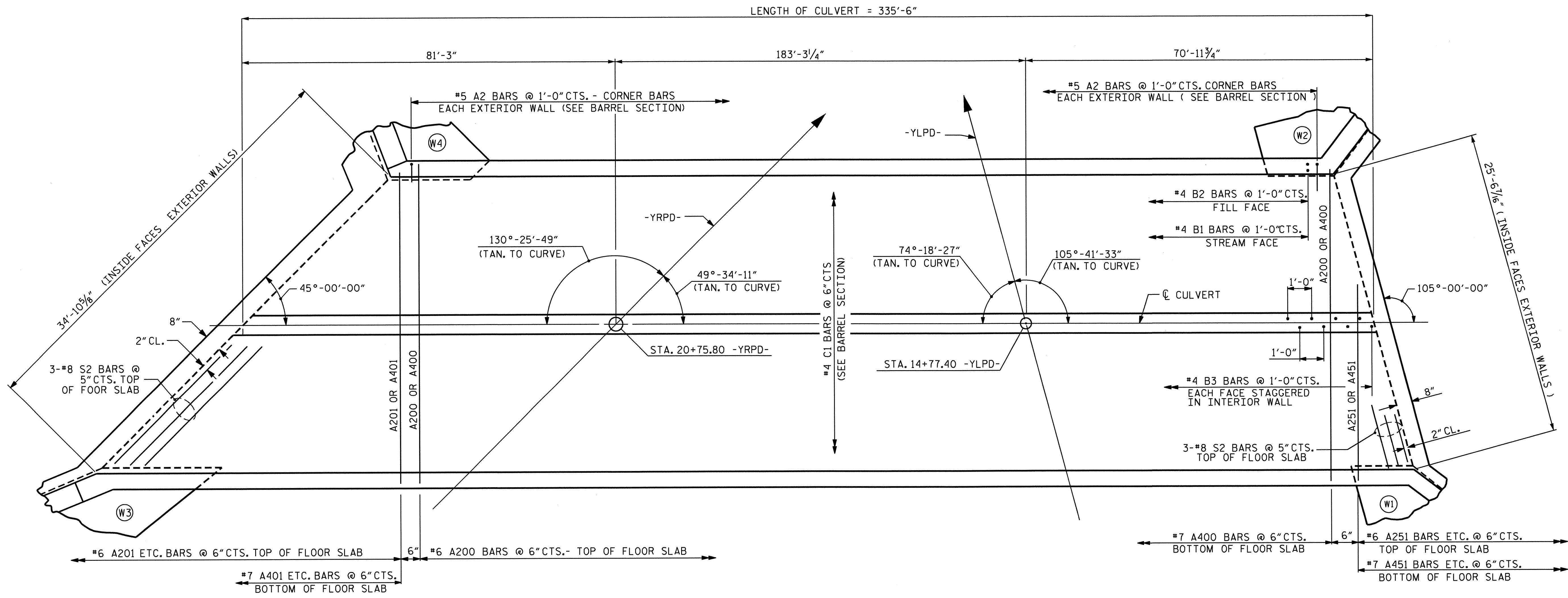
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-8
1			3			TOTAL SHEETS
2			4			15



REVISED 11-19-99 BY M.M. CHECKED BY R.W.W.  
 REDRAWN 11-30 BY C.O.C. CHECKED BY M.A.J.

ASSEMBLED BY: E.I. OMILE DATE: 3-8-13  
 CHECKED BY: S.L. WANCE DATE: 4/13  
 DRAWN BY: DANNY SHERRED DATE: 4-11-72  
 CHECKED BY: HASON A. JUDEH DATE: 4-17-72

**SPECIAL**  
**STANDARD**



PLAN OF CULVERT- FLOOR SLAB

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-

SHEET 4 OF 9  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 DOUBLE 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT  
 105°-41'-33" SKEW

*E. I. Omile*  
 NORTH CAROLINA  
 PROFESSIONAL  
 SEAL  
 25461  
 ENGINEER  
 CHANCELLER I. OMILE  
 3/10/14

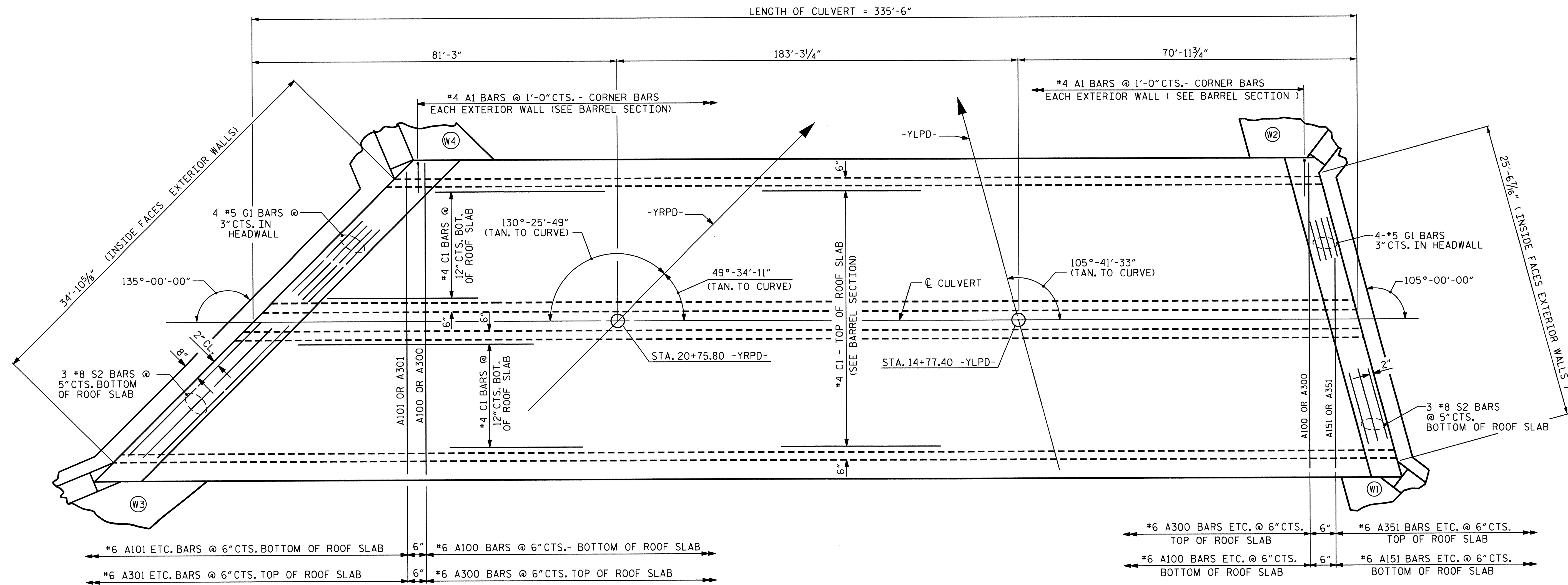
REVISED 11-9-99 BY M.M. CHECKED BY B.W.W.  
 REVISION 8-15-98 BY E.L. CHECKED BY C.R.P.  
 REDRAWN 11-30 BY A.R.B. CHECKED BY C.R.A.

ASSEMBLED BY : E.I. OMILE	DATE : 3-8-13	SPECIAL
CHECKED BY : S.L. WANCE	DATE : 4/13	
DRAWN BY : W. BRYAN STANLEY II	DATE : NOV.1971	STANDARD
CHECKED BY : JOEL A. JOHNSON	DATE : DEC.1971	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-9
1			3			TOTAL SHEETS
2			4			14

CULVERT #2      STD. NO. CB222

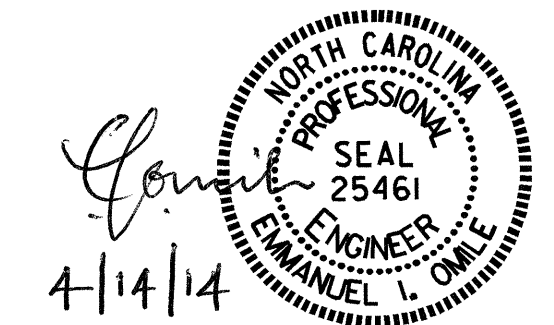




PLAN OF CULVERT - ROOF SLAB

PROJECT NO. R-2612B  
GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-

SHEET 5 OF 9  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DOUBLE 12 FT. X 7 FT.  
 CONCRETE BOX CULVERT**  
**105°-41'-33" SKEW**



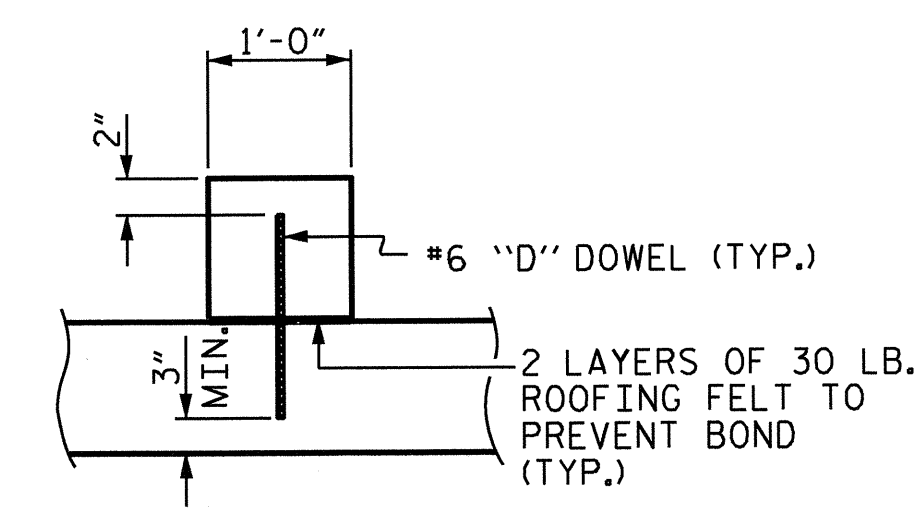
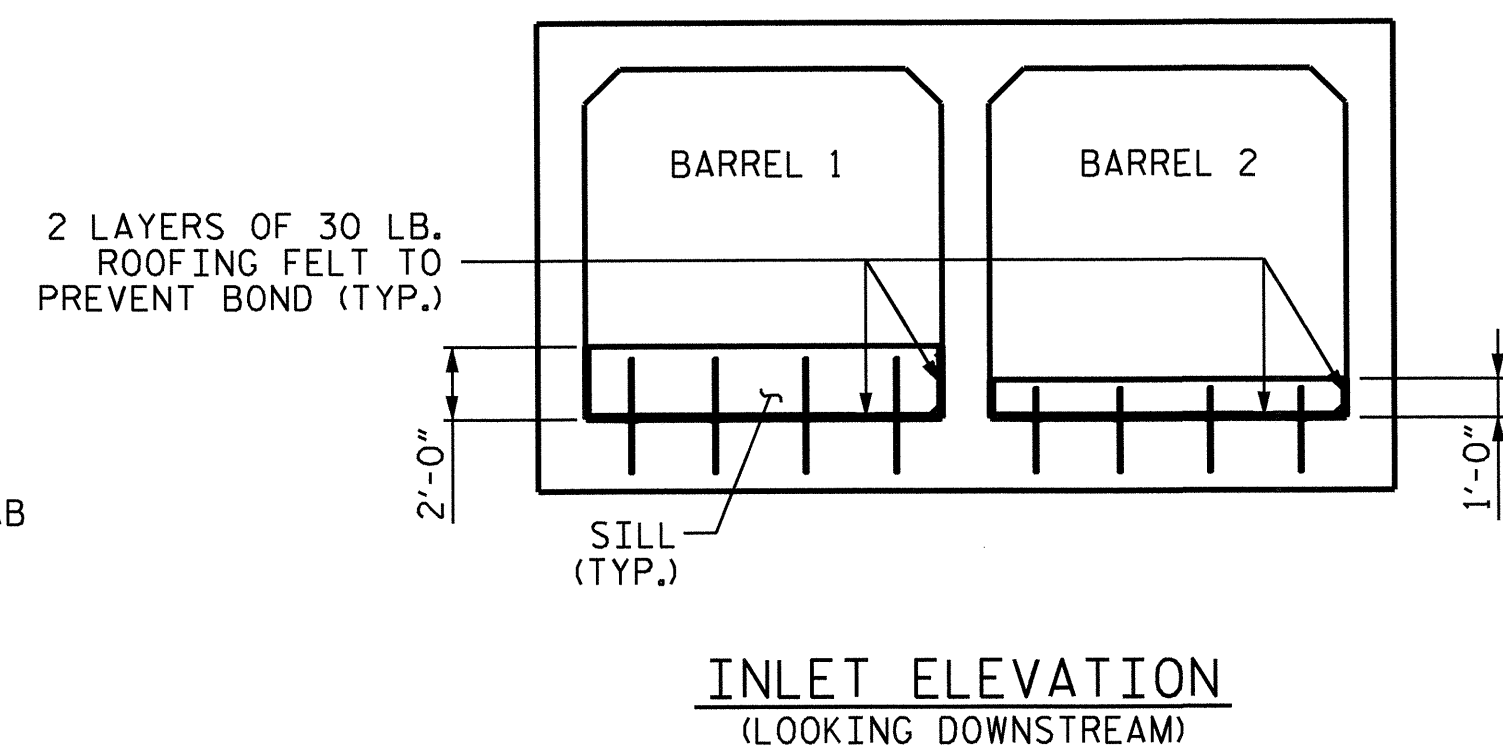
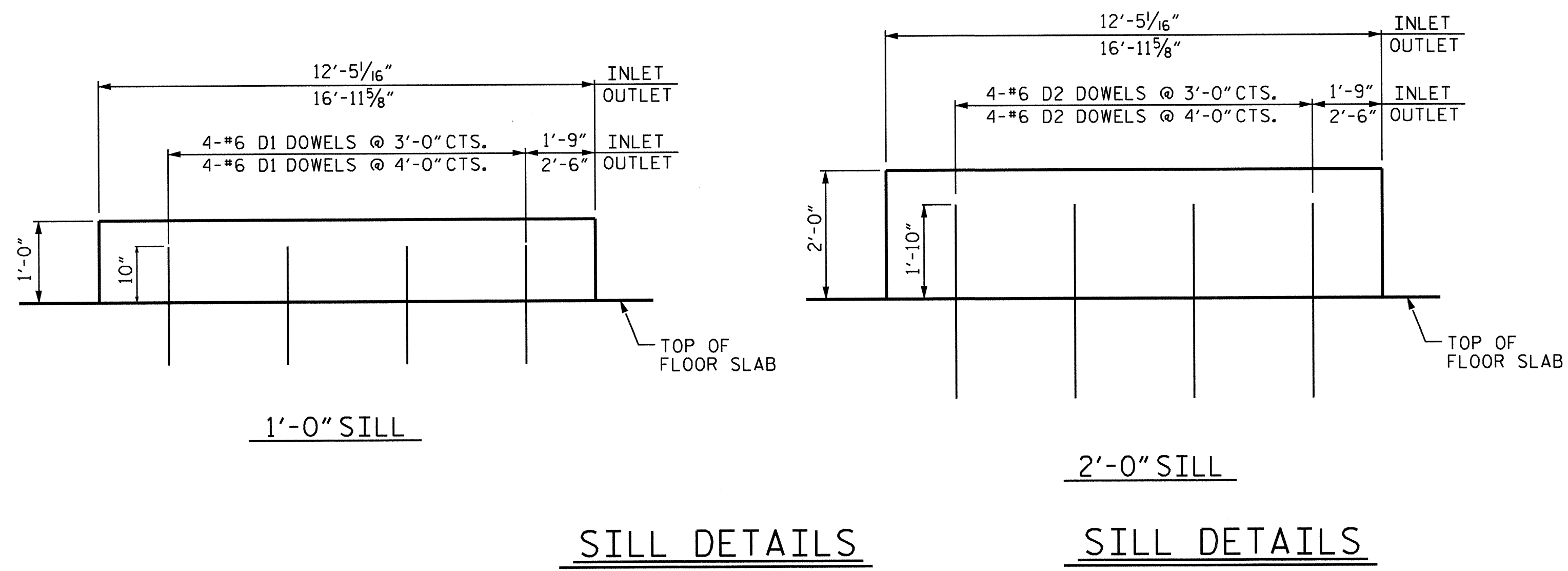
REVISED 11-9-99 BY M.M. CHECKED BY R.W.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.F.P.  
 REDRAWN 11-30-89 BY A.R.B. CHECKED BY C.R.K.

ASSEMBLED BY : <u>E.I. OMILE</u>	DATE : <u>3-8-13</u>	<b>SPECIAL</b>
CHECKED BY : <u>S.L. WANCE</u>	DATE : <u>4/13</u>	
DRAWN BY : <u>W. BRYAN STANLEY II</u>	DATE : <u>NOV.1971</u>	<b>STANDARD</b>
CHECKED BY : <u>JOEL A. JOHNSON</u>	DATE : <u>DEC.1971</u>	

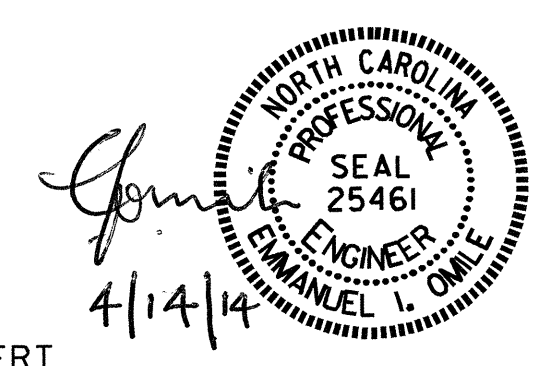
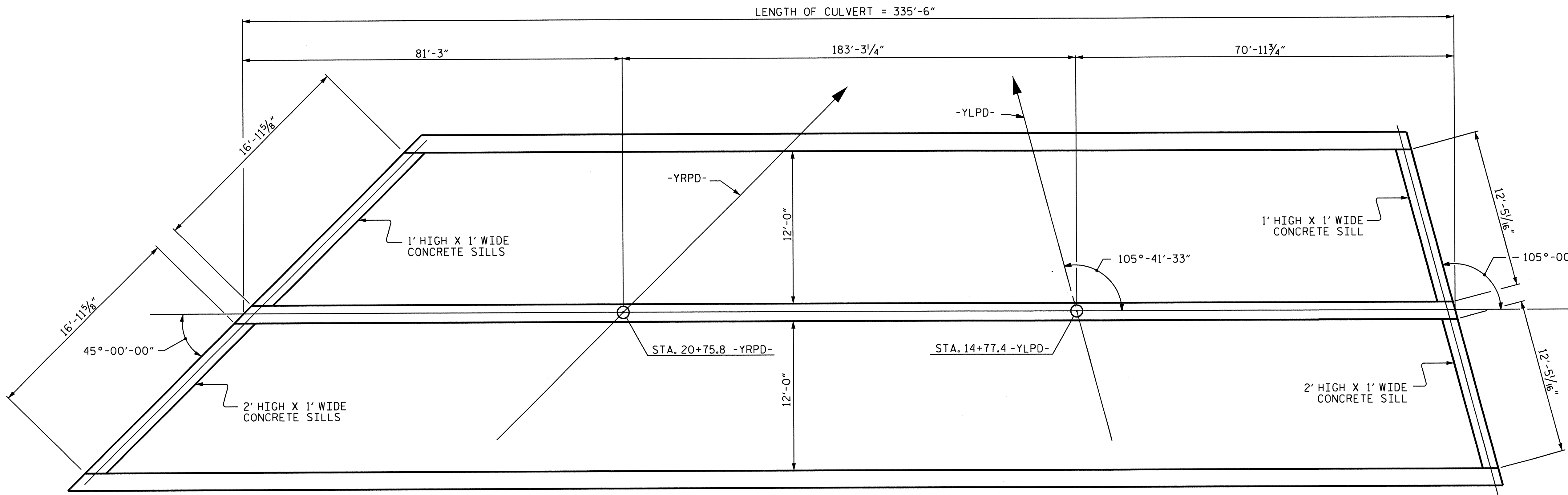
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-10	
1			3			TOTAL	14
2			4				

**NOTE**

BED MATERIAL PLACED BETWEEN THE HIGH SILLS BARREL OF THE CULVERT SHALL PROVIDE A CONTINUOUS FLOW CHANNEL BETWEEN THE HIGH SILLS. THE MATERIAL SHALL BE NATURAL STONE WITH A GRADATION SIZE SIMILAR TO THAT OF CLASS B RIP RAP. THE LOWER SILLS BARREL SHALL BE LEFT TO FILL NATURALLY. BED MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.



DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SLAB HAS BEEN FLOAT FINISHED.



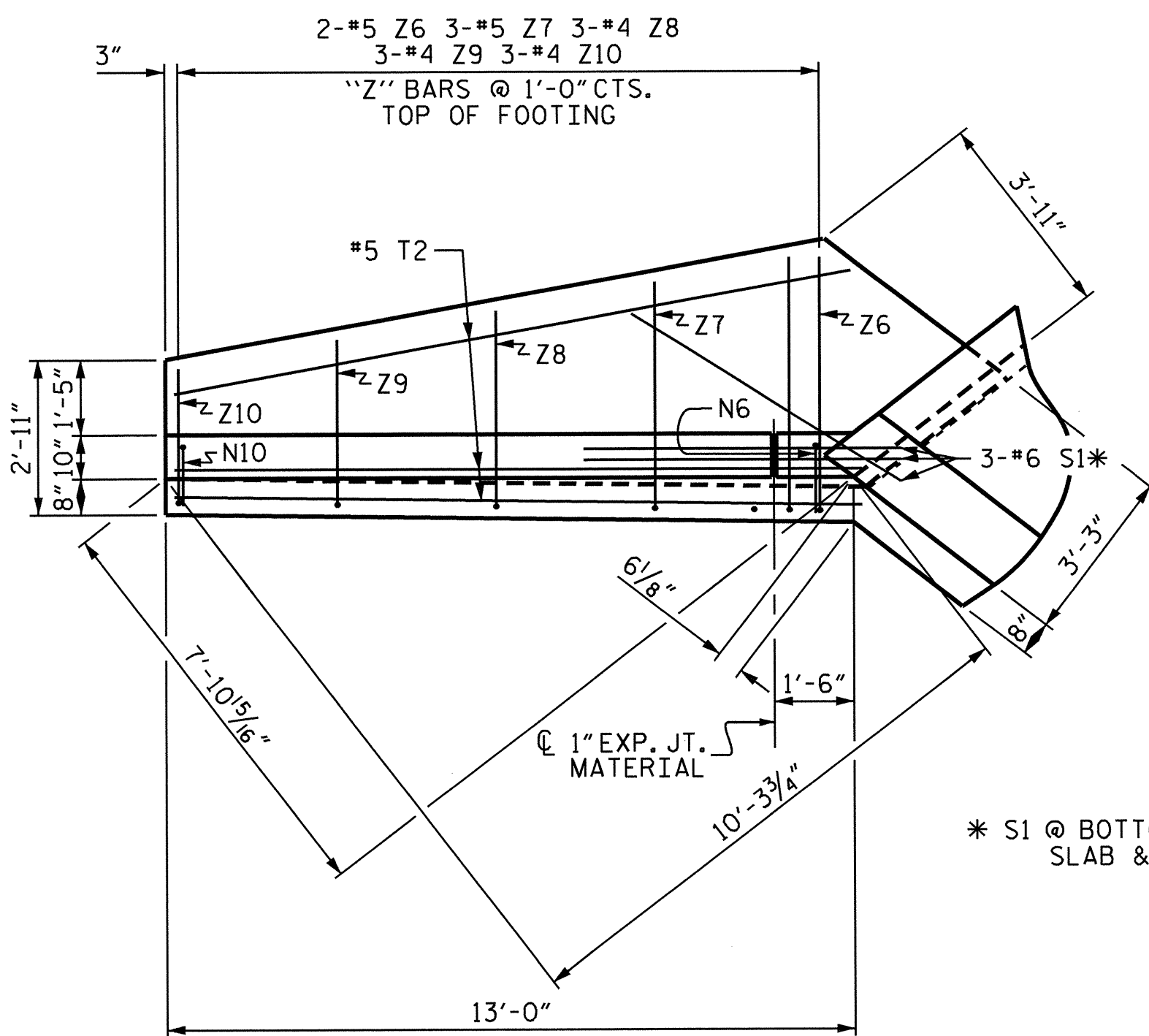
PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-  
 SHEET 6 OF 9

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**DETAILS OF SILLS FOR CONCRETE BOX CULVERT**  
**105°-41'-33" SKEW**

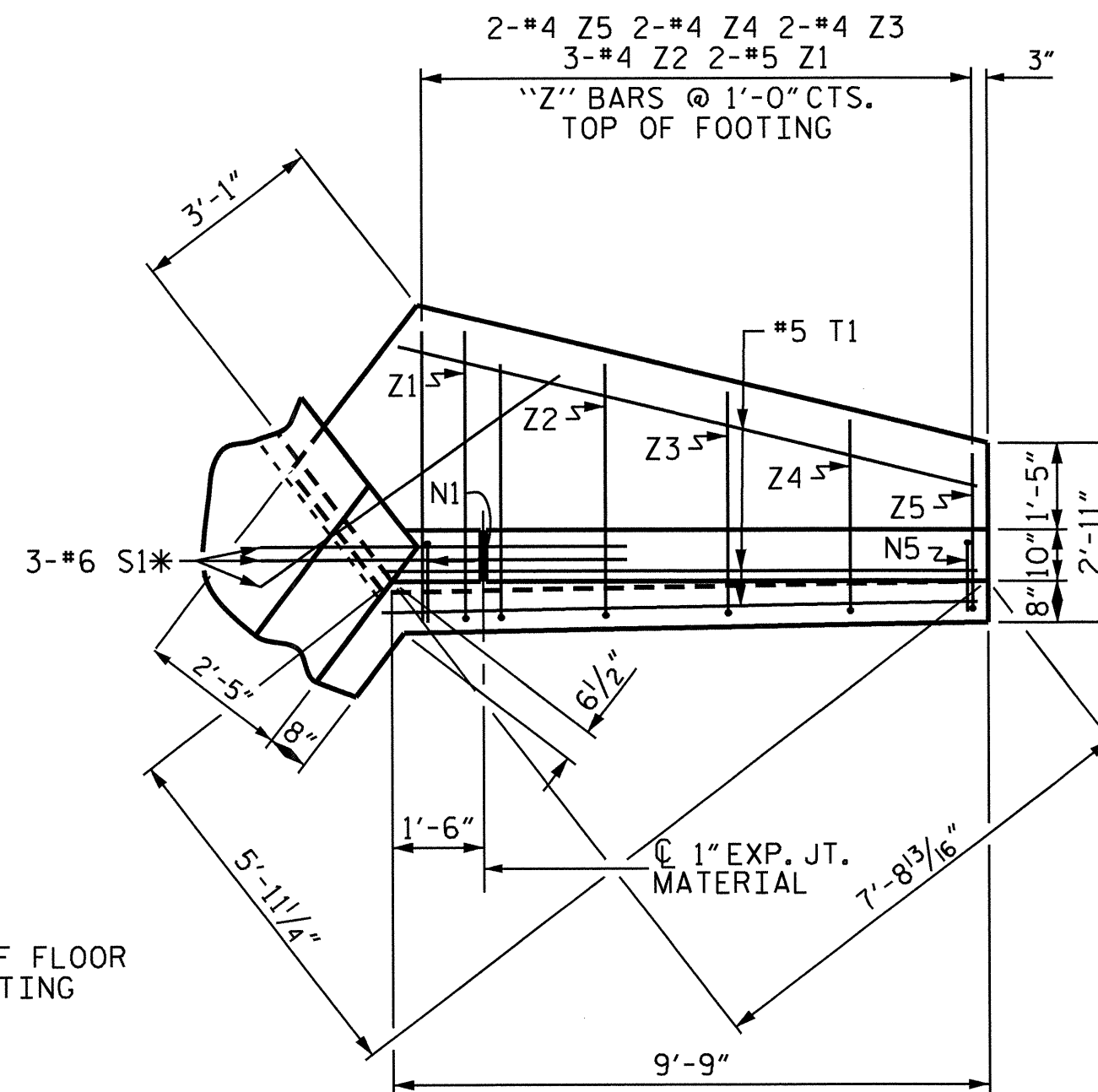
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	C-11	
1			3			TOTAL SHEETS	14
2			4				

REVISED 11-19-99 BY M.M. CHECKED BY R.M.W.  
 REVISED 8-28-92 BY E.L.R. CHECKED BY G.R.P.  
 REDRAWN 8/1990 BY S.A.T., CHECKED BY E.L.R.

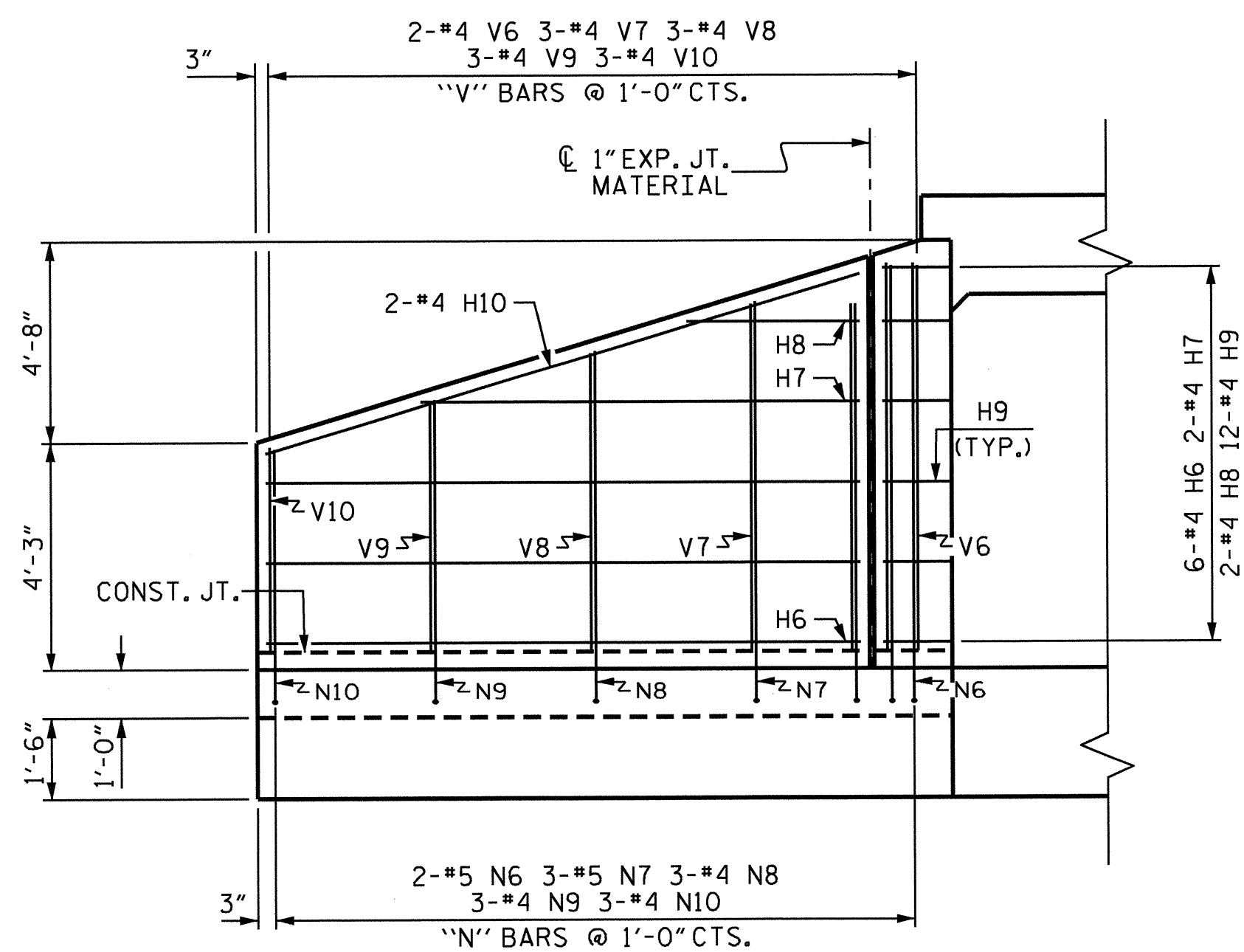
ASSEMBLED BY : <u>E.I. OMILE</u> DATE : <u>2-28-13</u>	<b>SPECIAL</b>
CHECKED BY : <u>S.L. WANCE</u> DATE : <u>4/13</u>	
DRAWN BY : <u>W. BRYAN STALEY II</u> DATE : <u>NOV. 5, 1971</u>	<b>STANDARD</b>
CHECKED BY : <u>JOEL A. JOHNSON</u> DATE : <u>NOV. 13, 1971</u>	



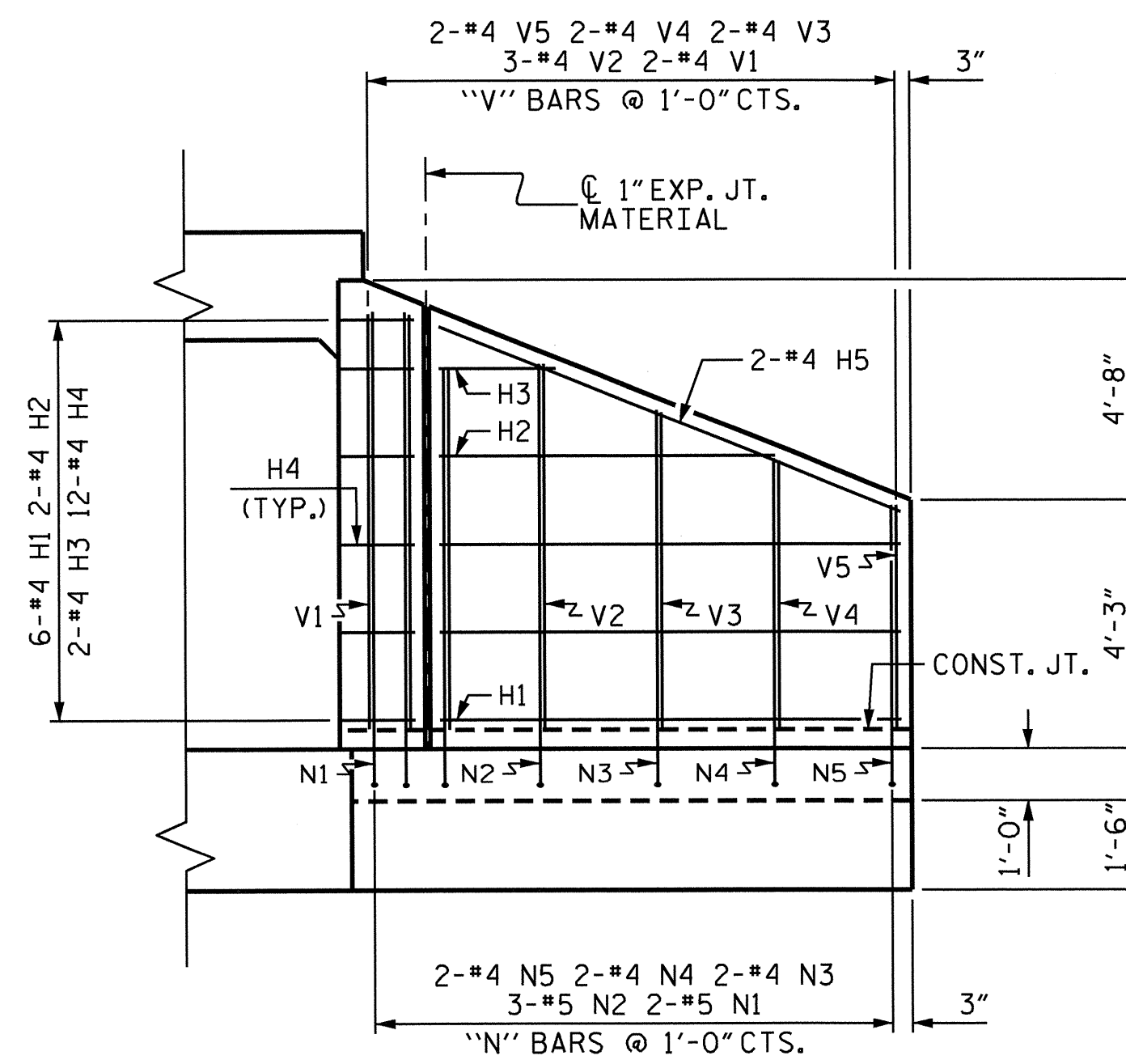
PLAN W1



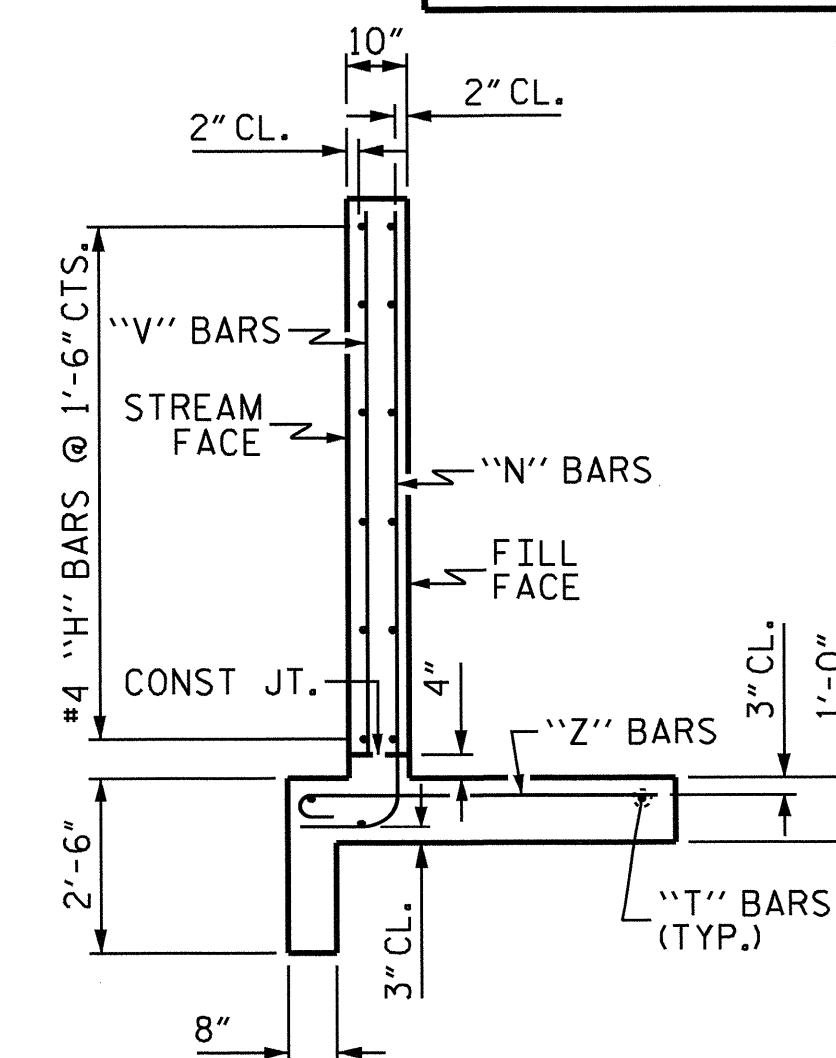
PLAN W2



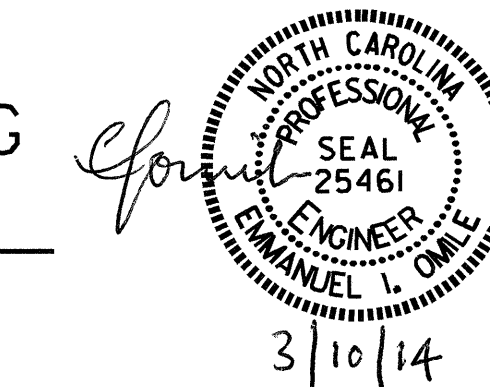
ELEVATION W1



ELEVATION W2



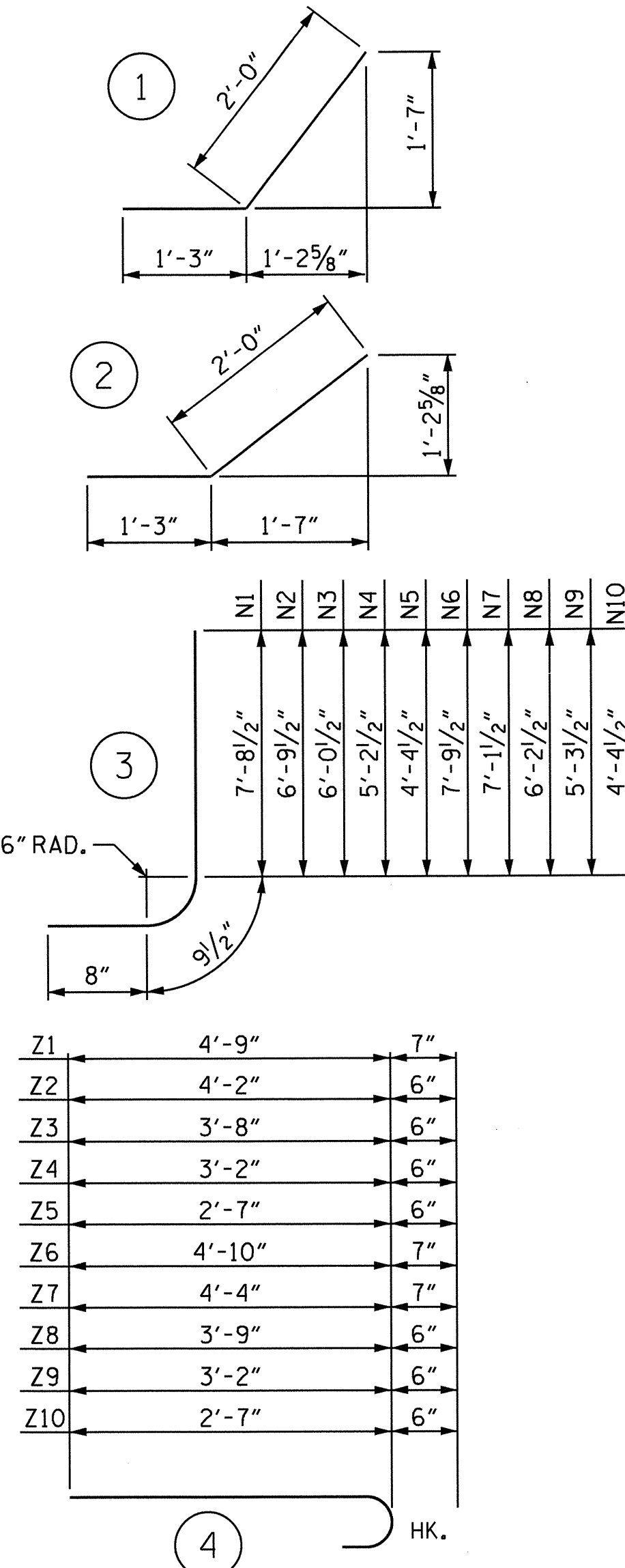
TYPICAL WING SECTION



3/10/14

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

BAR NO.	SIZE	TYPE	LENGTH	WEIGHT
H1	#4	STR	7'-10"	31
H2	#4	STR	5'-8"	8
H3	#4	STR	2'-0"	3
H4	#4	1	3'-3"	26
H5	#4	STR	8'-5"	11
H6	#4	STR	11'-1"	44
H7	#4	STR	8'-2"	11
H8	#4	STR	3'-3"	4
H9	#4	2	3'-3"	26
H10	#4	STR	11'-7"	15
N1	#5	3	9'-2"	19
N2	#5	3	8'-3"	26
N3	#4	3	7'-6"	10
N4	#4	3	6'-8"	9
N5	#4	3	5'-10"	8
N6	#5	3	9'-3"	19
N7	#5	3	8'-7"	27
N8	#4	3	7'-8"	15
N9	#4	3	6'-9"	14
N10	#4	3	5'-10"	12
S1	#6	STR	6'-0"	54
T1	#5	STR	9'-9"	31
T2	#5	STR	13'-0"	41
V1	#4	STR	7'-1"	9
V2	#4	STR	6'-3"	13
V3	#4	STR	5'-5"	7
V4	#4	STR	4'-7"	6
V5	#4	STR	3'-10"	5
V6	#4	STR	7'-3"	10
V7	#4	STR	6'-6"	13
V8	#4	STR	5'-7"	11
V9	#4	STR	4'-8"	9
V10	#4	STR	3'-10"	8
Z1	#5	4	5'-4"	11
Z2	#4	4	4'-8"	9
Z3	#4	4	4'-2"	6
Z4	#4	4	3'-8"	5
Z5	#4	4	3'-1"	4
Z6	#5	4	5'-5"	11
Z7	#5	4	4'-11"	15
Z8	#4	4	4'-3"	9
Z9	#4	4	3'-8"	7
Z10	#4	4	3'-1"	6

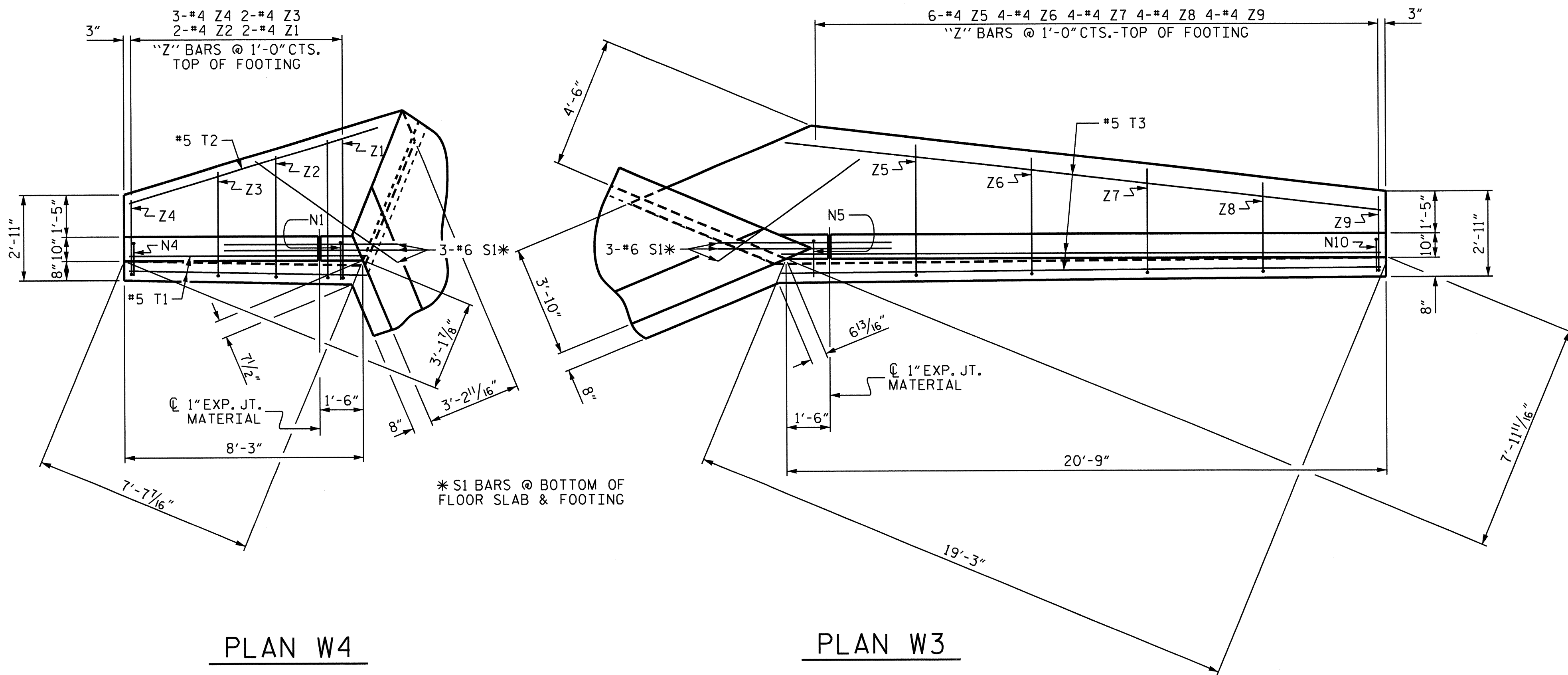
REINFORCING STEEL	WEIGHT
FOR 2 WINGS	638 LBS
CLASS A CONCRETE	
2 WINGS	9.1 CY
1 HEADWALL	1.3 CY
1 END CURTAIN WALL	1.5 CY
TOTAL	11.9 CY

PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 14+77.40 -YLPD-

SHEET 7 OF 9  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD WINGS  
FOR  
CONCRETE BOX CULVERT  
H = 7'-0" SLOPE = 2:1  
105° SKEW

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

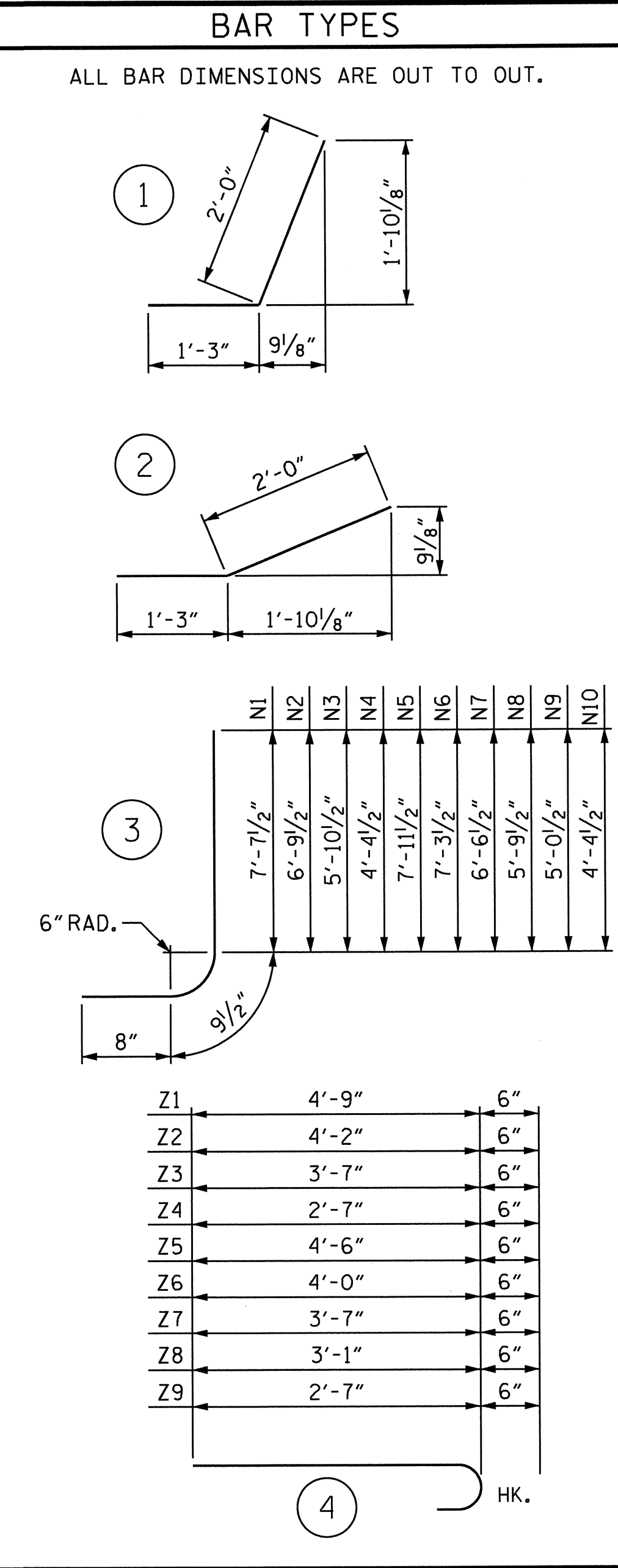
ASSEMBLED BY : E.I. OMILE DATE : 3-9-13  
CHECKED BY : S.L. WANCE DATE : 4/13  
DRAWN BY : CCJ 12/99  
CHECKED BY : RWW 03/00



PLAN W4

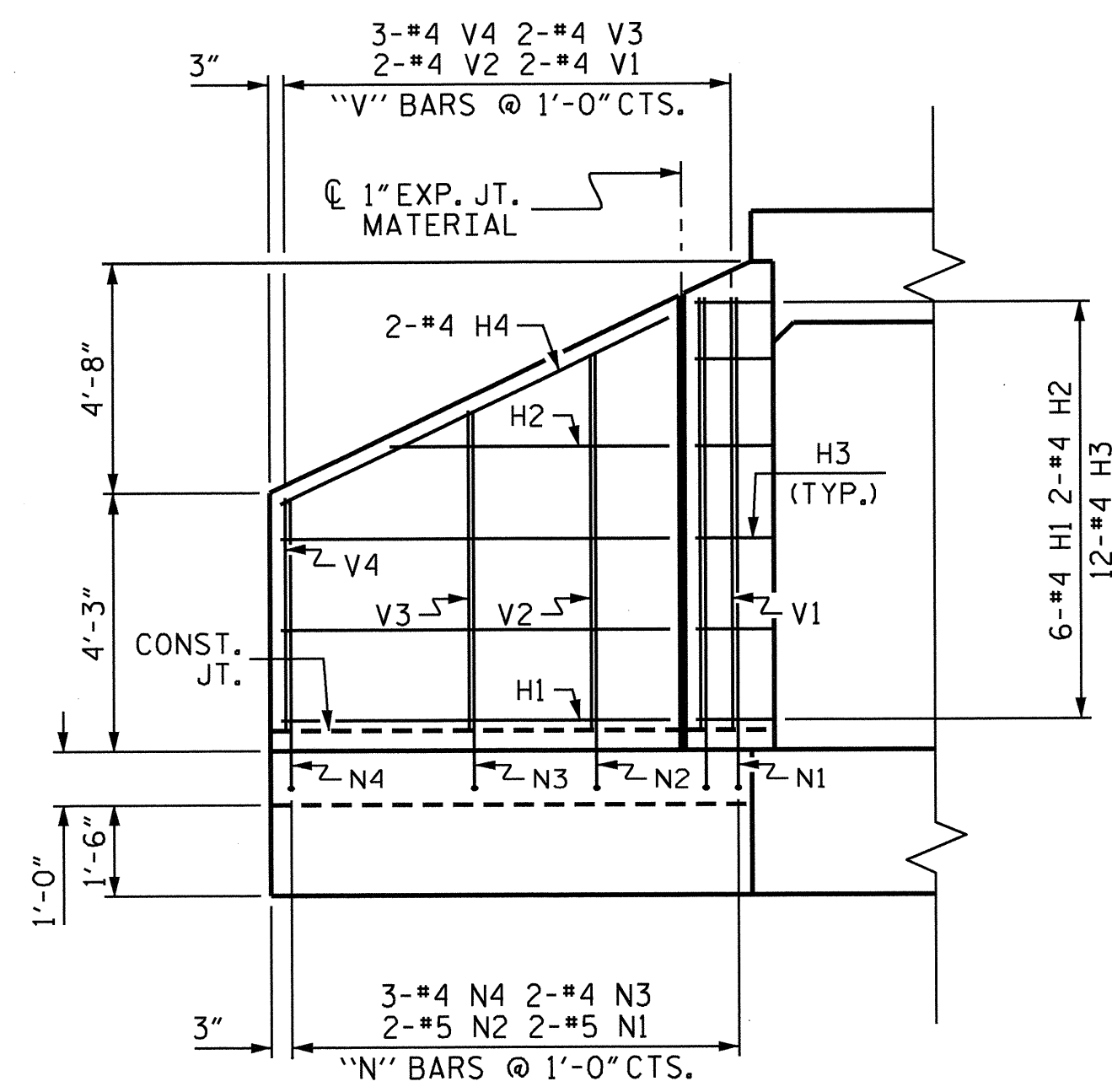
PLAN W3

\* S1 BARS @ BOTTOM OF FLOOR SLAB & FOOTING

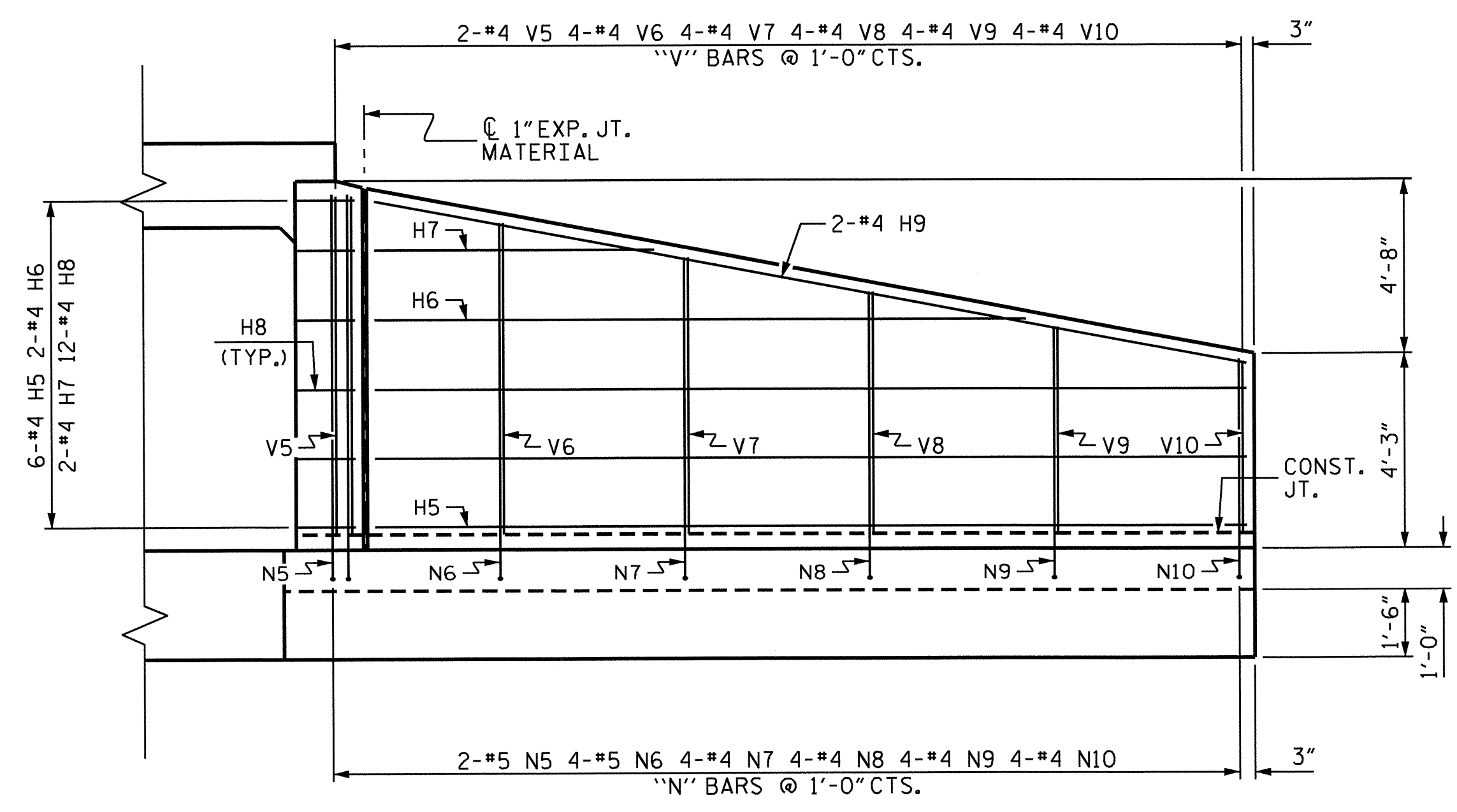


BILL OF MATERIAL					
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT	
H1	6	#4 STR	6'-4"	25	
H2	2	#4 STR	4'-6"	6	
H3	12	#4	3'-3"	26	
H4	2	#4 STR	7'-0"	99	
H5	6	#4 STR	18'-10"	75	
H6	2	#4 STR	14'-1"	19	
H7	2	#4 STR	6'-0"	8	
H8	12	#4	3'-3"	26	
H9	2	#4 STR	19'-2"	2526	
N1	2	#5	3	9'-1"	19
N2	2	#5	3	8'-3"	17
N3	2	#4	3	7'-4"	10
N4	6	#4	3	5'-7"	11
N5	2	#5	3	9'-5"	20
N6	4	#5	3	8'-9"	37
N7	4	#4	3	8'-0"	21
N8	4	#4	3	7'-3"	19
N9	4	#4	3	6'-6"	17
N10	4	#4	3	5'-10"	16
S1	6	#6 STR	6'-0"	54	
T1	2	#5 STR	8'-3"	17	
T2	1	#5 STR	9'-0"	9	
T3	3	#5 STR	20'-9"	65	
V1	2	#4 STR	7'-1"	9	
V2	2	#4 STR	6'-2"	8	
V3	2	#4 STR	5'-3"	7	
V4	3	#4 STR	3'-9"	8	
V5	2	#4 STR	7'-4"	10	
V6	4	#4 STR	6'-9"	18	
V7	4	#4 STR	6'-0"	16	
V8	4	#4 STR	5'-3"	14	
V9	4	#4 STR	4'-6"	12	
V10	4	#4 STR	3'-9"	10	
Z1	2	#4	4	5'-3"	7
Z2	2	#4	4	4'-8"	6
Z3	2	#4	4	4'-1"	5
Z4	3	#4	4	3'-1"	6
Z5	6	#4	4	5'-0"	20
Z6	4	#4	4	4'-6"	12
Z7	4	#4	4	4'-1"	11
Z8	4	#4	4	3'-7"	10
Z9	4	#4	4	3'-1"	8

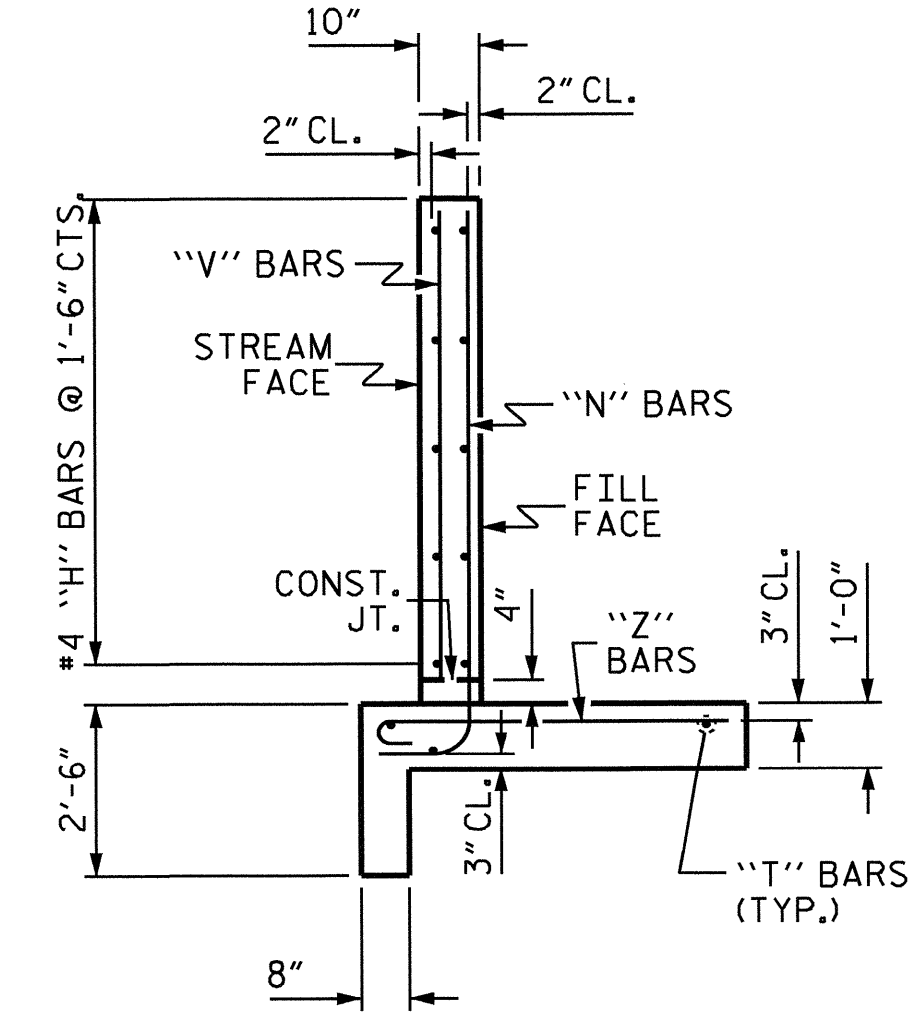
REINFORCING STEEL FOR 2 WINGS		749 LBS
CLASS A CONCRETE		
2 WINGS		11.8 CY
1 HEADWALL		1.7 CY
1 END CURTAIN WALL		2.1 CY
<b>TOTAL</b>		<b>15.6 CY</b>



ELEVATION W4

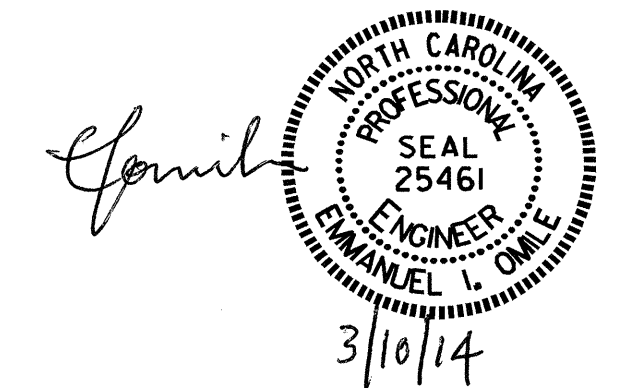


ELEVATION W3



TYPICAL WING SECTION

ASSEMBLED BY : E.I. OMILE DATE : 3-8-13  
 CHECKED BY : S.L. WANCE DATE : 4/13  
 DRAWN BY : CCJ 01/00  
 CHECKED BY : RWW 03/00



PROJECT NO. R-2612B  
 GUILFORD COUNTY  
 STATION: 14+77.40 -YLPD-

SHEET 8 OF 9  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD WINGS FOR CONCRETE BOX CULVERT**  
 H = 7'-0" SLOPE = 2:1  
 45° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	C-13
1			3			TOTAL SHEETS 14
2			4			

**LOAD AND RESISTANCE FACTOR RATING (LRFR)  
SUMMARY FOR REINFORCED CONCRETE BOX CULVERTS**

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING #	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE								COMMENT NUMBER		
						LIVE-LOAD FACTORS (LL)	MOMENT				SHEAR					
							RATING FACTOR	BOX NO.	ELEMENT TYPE	DISTANCE FROM LEFT END OF ELEMENT (FT)	RATING FACTOR	BOX NO.	ELEMENT TYPE		DISTANCE FROM LEFT END OF ELEMENT (FT)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	2.09	--	1.75	7.53	1	EXTERIOR WALL	0.88	<b>2.09</b>	1	TOP SLAB	<b>10.98</b>		
	HL-93 (OPERATING)	N/A		2.71	--	1.35	9.76	1	EXTERIOR WALL	0.88	2.71	1	TOP SLAB	10.98		
	HS-20 (INVENTORY)	36,000	②	2.09	75.17	1.75	7.53	1	EXTERIOR WALL	0.88	<b>2.09</b>	1	TOP SLAB	<b>10.98</b>		
	HS-20 (OPERATING)	36,000		2.71	97.45	1.35	9.76	1	EXTERIOR WALL	0.88	2.71	1	TOP SLAB	10.98		
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH		4.73	63.86	1.40	9.14	1	EXTERIOR WALL	0.88	4.73	1	EXTERIOR WALL	1.42		
		SNGARBS2	20,000		4.22	84.45	1.40	9.20	1	EXTERIOR WALL	0.88	4.22	1	TOP SLAB	10.98	
		SNAGRIS2	22,000		3.78	83.11	1.40	9.21	1	EXTERIOR WALL	0.88	3.78	1	TOP SLAB	10.98	
		SNCOTTS3	27,250		2.97	80.97	1.40	9.30	1	EXTERIOR WALL	0.88	2.97	1	BOTTOM SLAB	10.98	
		SNAGGRS4	34,925		2.43	84.98	1.40	9.32	1	EXTERIOR WALL	0.88	2.43	1	TOP SLAB	10.98	
		SNS5A	35,550		2.48	88.02	1.40	9.37	1	EXTERIOR WALL	0.88	2.48	1	BOTTOM SLAB	10.98	
		SNS6A	39,950		2.31	92.10	1.40	9.38	1	EXTERIOR WALL	0.88	2.31	1	BOTTOM SLAB	10.98	
		SNS7B	42,000		2.28	95.71	1.40	9.37	1	EXTERIOR WALL	0.88	2.28	1	TOP SLAB	10.98	
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33,000		2.71	89.39	1.40	9.27	1	EXTERIOR WALL	0.88	2.71	1	TOP SLAB	10.98	
		TNT4A	33,075		2.97	98.27	1.40	9.29	1	EXTERIOR WALL	0.88	2.97	1	BOTTOM SLAB	10.98	
		TNT6A	41,600		2.52	104.95	1.40	9.32	1	EXTERIOR WALL	0.88	2.52	1	BOTTOM SLAB	10.98	
		TNT7A	42,000		2.48	103.96	1.40	9.32	1	EXTERIOR WALL	0.88	2.48	1	TOP SLAB	10.98	
		TNT7B	42,000		2.73	114.61	1.40	9.33	1	EXTERIOR WALL	0.88	2.73	1	BOTTOM SLAB	10.98	
		TNAGRIT4	43,000		2.39	102.67	1.40	9.36	1	EXTERIOR WALL	0.88	2.39	1	BOTTOM SLAB	10.98	
		TNAGT5A	45,000		2.24	100.94	1.40	9.35	1	EXTERIOR WALL	0.88	2.24	1	TOP SLAB	10.98	
		TNAGT5B	45,000	③	2.05	92.29	1.40	9.39	1	EXTERIOR WALL	0.88	<b>2.05</b>	1	TOP SLAB	<b>10.98</b>	

**LOAD FACTORS:**

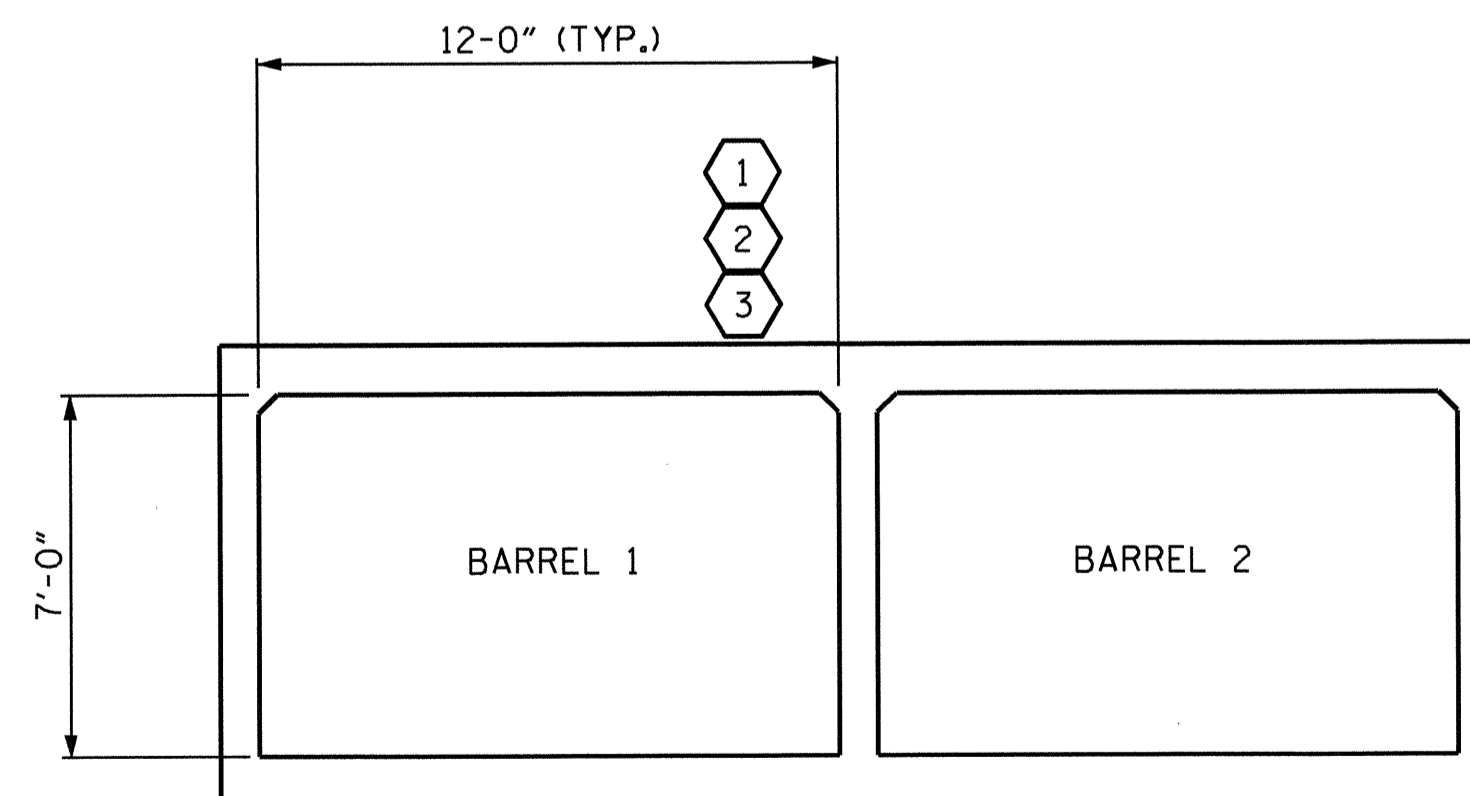
DESIGN LOAD RATING FACTORS

LOAD TYPE	MAX FACTOR	MIN FACTOR
DC	1.25	0.90
DW	1.50	0.65
EV	1.30	0.90
EH	1.35	0.90
ES	1.35	0.90
LS	1.75	--
WA	1.00	--

**NOTE:**

RATING FACTORS ARE BASED ON THE STRENGTH I LIMIT STATE.

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



**LRFR SUMMARY**  
(LOOKING DOWNSTREAM)

ASSEMBLED BY : E.I. OMILE	DATE : 3/11/13
CHECKED BY : S.L. WANCE	DATE : 4/13
DESIGN ENGINEER OF RECORD : E.I. OMILE	DATE : 1/14
DRAWN BY : WMC 7/11	REV. 10/17/11
CHECKED BY : GM 7/11	MAA/GM

PROJECT NO. R-2612B  
GUILFORD COUNTY  
STATION: 14+77.40 -YLPD-

SHEET 9 OF 9

*Gomile*  
  
 3/10/14

STATE OF NORTH CAROLINA					
DEPARTMENT OF TRANSPORTATION					
RALEIGH					
STANDARD					
LRFR SUMMARY FOR					
REINFORCED CONCRETE					
BOX CULVERTS					
(NON-INTERSTATE TRAFFIC)					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
SHEET NO. C-14					TOTAL SHEETS 14
CULVERT #2					STD. NO. LRF5

## STANDARD NOTES

### DESIGN DATA:

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

### MATERIAL AND WORKMANSHIP:

EXCEPT AS MAY OTHERWISE BE SPECIFIED ON PLANS OR IN THE SPECIAL PROVISIONS, ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE 2012 "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" OF THE N.C. DEPARTMENT OF TRANSPORTATION.

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

### CONCRETE:

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

### CONCRETE CHAMFERS:

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

### DOWELS:

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

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

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

IN SETTING FALSEWORK AND FORMS FOR REINFORCED CONCRETE SPANS, AN ALLOWANCE SHALL BE MADE FOR DEAD LOAD DEFLECTIONS, SETTLEMENT OF FALSEWORK, AND PERMANENT CAMBER WHICH SHALL BE PROVIDED FOR IN ADDITION TO THE ELEVATIONS SHOWN. AFTER REMOVAL OF THE FALSEWORK, THE FINISHED STRUCTURES SHALL CONFORM TO THE PROFILE AND ELEVATIONS SHOWN ON THE PLANS AND CONSTRUCTION ELEVATIONS FURNISHED BY THE ENGINEER.

DETAILED DRAWINGS FOR FALSEWORK OR FORMS FOR BRIDGE SUPERSTRUCTURE AND ANY STRUCTURE OR PARTS OF A STRUCTURE AS NOTED ON THE PLANS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE CONSTRUCTION OF THE FALSEWORK OR FORMS IS STARTED.

### REINFORCING STEEL:

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

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

### STRUCTURAL STEEL:

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

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

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

### HANDRAILS AND POSTS:

METAL STANDARDS AND FACES OF THE CONCRETE END POSTS FOR THE METAL RAIL SHALL BE SET NORMAL TO THE GRADE OF THE CURB, UNLESS OTHERWISE SHOWN ON PLANS. THE METAL RAIL AND TOPS OF CONCRETE POSTS USED WITH THE ALUMINUM RAIL SHALL BE BUILT PARALLEL TO THE GRADE OF THE CURB.

METAL HANDRAILS SHALL BE IN ACCORDANCE WITH THE PLANS. RAILS SHALL BE AS MANUFACTURED FOR BRIDGE RAILING. CASTINGS SHALL BE OF A UNIFORM APPEARANCE. FINS AND OTHER DEFORMATIONS RESULTING FROM CASTING OR OTHERWISE SHALL BE REMOVED IN A MANNER SO THAT A UNIFORM COLORING OF THE COMPLETED CASTING SHALL BE OBTAINED. CASTINGS WITH DISCOLORATIONS OR OF NON-UNIFORM COLORING WILL NOT BE ACCEPTED. CERTIFIED MILL REPORTS ARE REQUIRED FOR METAL RAILS AND POSTS.

### SPECIAL NOTES:

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

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