

09/08/13

TIP PROJECT: B-4651

CONTRACT: C203426



VICINITY MAP

--- DENOTES OFF-SITE DETOUR

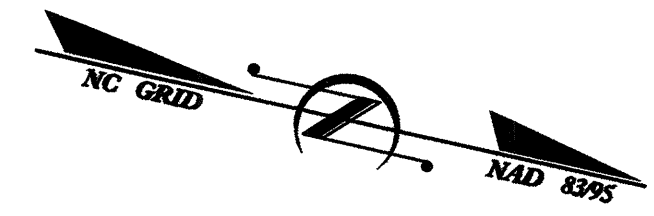
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

UNION COUNTY

LOCATION: BRIDGE NO. 251 OVER SOUTH FORK CROOKED CREEK
ON SR 1508

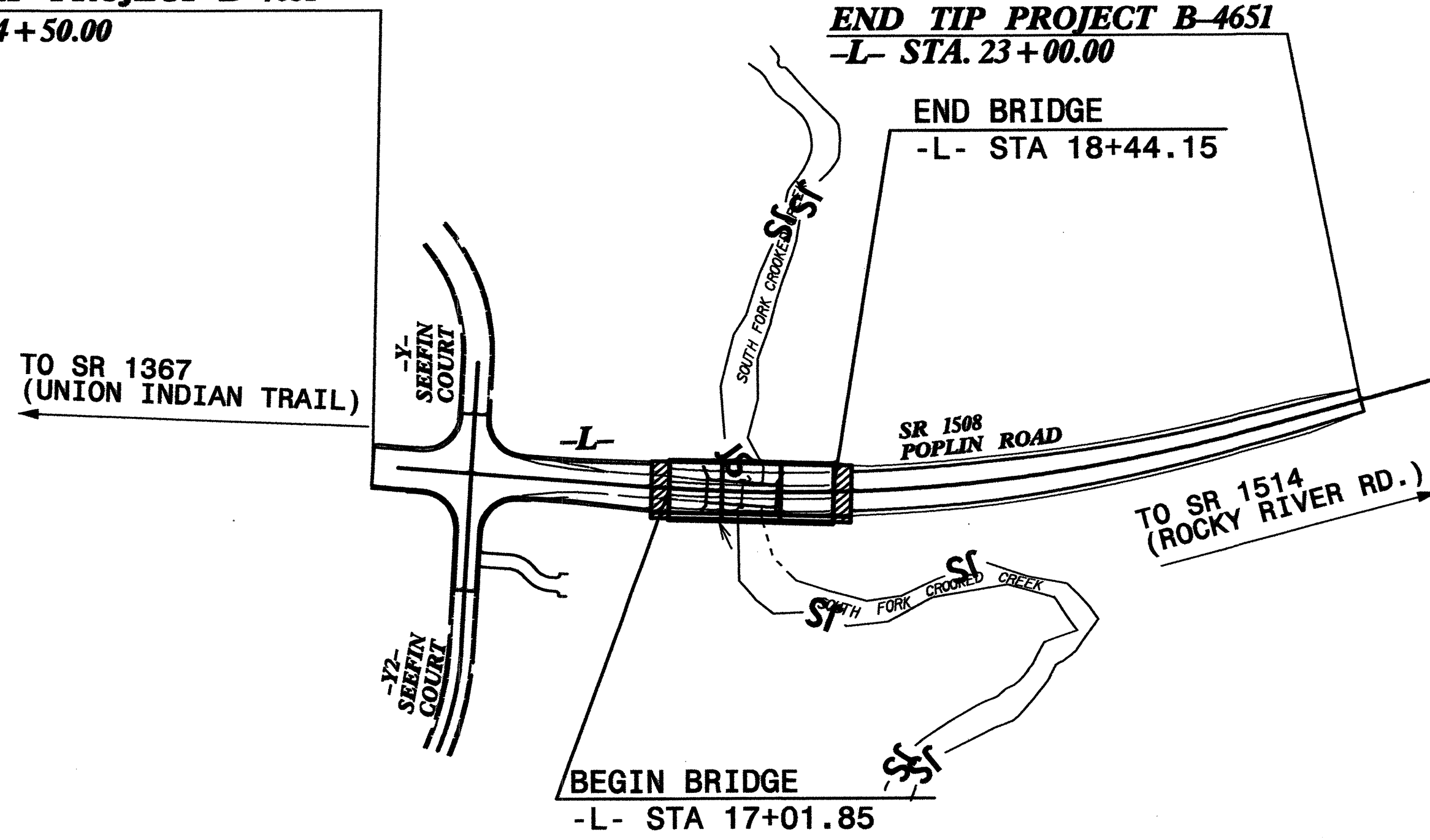
TYPE OF WORK: GRADING, DRAINAGE, PAVING, & STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4651	1	32
WB NO.	F.A. PROJ. NO.	DESCRIPTION	
33817.1.1	BRZ-1508(5)	P.E.	
33817.2.1	BRZ-1508(5)	R/W	
33817.3.FD1	BRZ-1508(5)	UTIL/CONST	

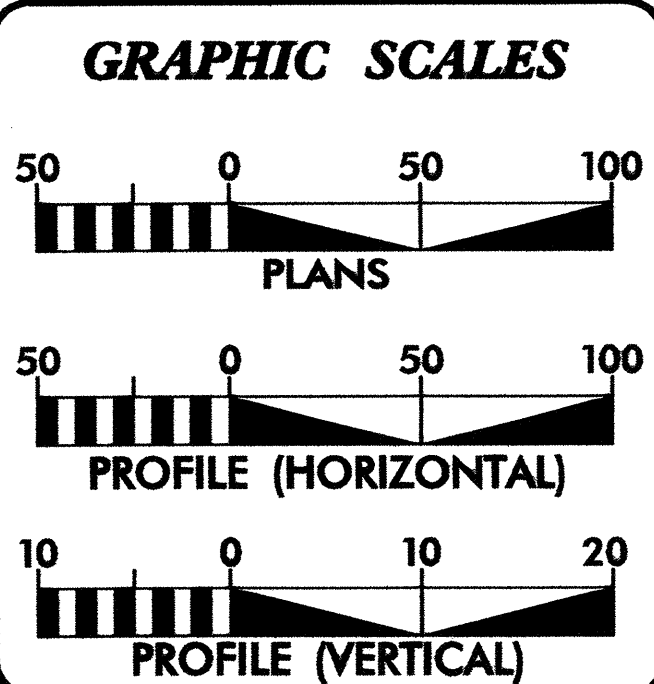
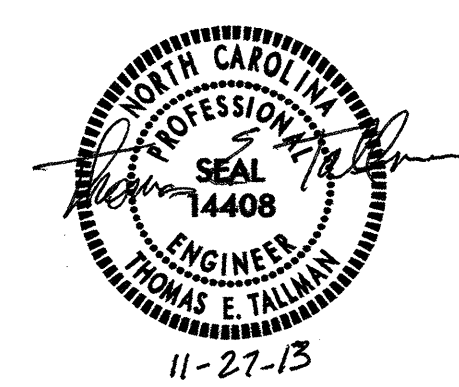


BEGIN TIP PROJECT B-4651
-L- STA. 14+50.00

END TIP PROJECT B-4651
-L- STA. 23+00.00



STRUCTURES



DESIGN DATA (RURAL LOCAL)

ADT (2008) = 3,535
ADT (2028) = 6,435
DHV = 13 %
D = 60 %
T = 3 %
V = 60 MPH
(TTST=1% + DUALS=2%)
SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4651	=	0.134 MI.
LENGTH STRUCTURES TIP PROJECT B-4651	=	0.027 MI.
TOTAL LENGTH OF TIP PROJECT B-4651	=	0.161 MI.

Prepared in the Office of:

ICA Engineering
574/a Florence & Hutcherson, Inc.
 5121 S. Kingsley Way, Suite 100 Raleigh, NC 27607
 NC License No. 1P-0258

For the
DIVISION OF HIGHWAYS

2012 STANDARD SPECIFICATIONS

LETTING DATE: MARCH 18, 2014

THOMAS E. TALLMAN, P.E.
 PROJECT ENGINEER

DIVISION OF HIGHWAYS
 STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER

11/27/2013 10:00 AM
 ICA Engineering, Inc.
 574/a Florence & Hutcherson, Inc.

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

LOAD FACTORS:

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

	YEAR	ADTT
CURRENT		
FUTURE		

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:

- ALL DISTANCES ARE MEASURED FROM THE CENTERLINE OF BEARING.
- SERVICE III LIMIT STATE NOT APPLICABLE AT OPERATING LEVEL.
-
-

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING (#)	MINIMUM RATING FACTORS (RF)	TONS = W x RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						LIVE-LOAD FACTORS (γ_{LL})	MOMENT					SHEAR					LIVE-LOAD FACTORS (γ_{LL})	MOMENT						
							DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)		DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93 (INVENTORY)	N/A	①	1.29	--	1.75	0.280	1.29	2	I	24.50	0.60	1.34	1	I	4.00	0.80	0.280	1.95	2	I	24.50	1	
	HL-93 (OPERATING)	N/A		1.67	--	1.35	0.280	1.67	2	I	24.50	0.60	1.73	1	I	4.00	N/A	--	--	--	--	--	1,2	
	HS-20 (INVENTORY)	36.000	②	1.34	48.2	1.75	0.280	1.59	2	I	24.50	0.60	1.34	1	I	4.00	0.80	0.280	2.41	2	I	24.50	1	
	HS-20 (OPERATING)	36.000		2.22	79.9	1.35	0.280	2.07	2	I	24.50	0.60	2.22	1	I	4.00	N/A	--	--	--	--	--	1,2	
LEGAL LOAD RATING	SINGLE VEHICLE (SV)	SNSH	13.500		4.05	54.7	1.40	0.280	4.05	2	I	24.50	0.60	5.29	1	I	4.00	0.80	0.280	4.08	1	I	22.00	1
		SNGARBS2	20.000		3.20	64.0	1.40	0.280	3.20	2	I	24.50	0.60	3.86	1	I	40.00	0.80	0.280	3.87	1	I	22.00	1
		SNAGRIS2	22.000		3.11	68.4	1.40	0.280	3.11	2	I	24.50	0.60	3.64	1	I	40.00	0.80	0.280	3.77	1	I	17.00	1
		SNCOTTS3	27.250		2.02	55.0	1.40	0.280	2.02	2	I	24.50	0.60	2.45	1	I	4.00	0.80	0.280	2.40	1	I	22.00	1
		SNAGGRS4	34.925		1.76	61.5	1.40	0.280	1.76	2	I	24.50	0.60	1.98	1	I	4.00	0.80	0.280	2.11	1	I	22.00	1
		SNS5A	35.550		1.71	60.8	1.40	0.280	1.71	2	I	24.50	0.60	2.10	1	I	40.00	0.80	0.280	2.06	1	I	22.00	1
		SNS6A	39.950		1.60	63.9	1.40	0.280	1.60	2	I	24.50	0.60	1.88	1	I	40.00	0.80	0.280	1.94	1	I	22.00	1
		SNS7B	42.000		1.53	64.3	1.40	0.280	1.53	2	I	24.50	0.60	1.91	1	I	4.00	0.80	0.280	1.85	1	I	22.00	1
	TRUCK TRACTOR SEMI-TRAILER (TTST)	TNAGRIT3	33.000		1.96	64.7	1.40	0.280	1.96	2	I	24.50	0.60	2.35	1	I	4.00	0.80	0.280	2.38	2	I	24.50	1
		TNT4A	33.075		1.98	65.5	1.40	0.280	1.98	2	I	24.50	0.60	2.24	1	I	4.00	0.80	0.280	2.40	2	I	24.50	1
		TNT6A	41.600		1.65	68.6	1.40	0.280	1.65	2	I	24.50	0.60	2.16	1	I	40.00	0.80	0.280	2.00	2	I	24.50	1
		TNT7A	42.000		1.68	70.6	1.40	0.280	1.68	2	I	24.50	0.60	1.87	1	I	4.00	0.80	0.280	2.03	2	I	24.50	1
		TNT7B	42.000		1.75	73.5	1.40	0.280	1.75	2	I	24.50	0.60	1.78	1	I	4.00	0.80	0.280	2.12	2	I	24.50	1
		TNAGRIT4	43.000		1.66	71.4	1.40	0.280	1.66	2	I	24.50	0.60	1.68	1	I	4.00	0.80	0.280	2.01	2	I	24.50	1
TNAGT5A	45.000		1.55	69.8	1.40	0.280	1.55	2	I	24.50	0.60	1.73	1	I	4.00	0.80	0.280	1.88	2	I	24.50	1		
TNAGT5B	45.000		③	1.52	68.4	1.40	0.280	1.52	2	I	24.50	0.60	1.55	1	I	4.00	0.80	0.280	1.84	2	I	24.50	1	

CONTROLLING LOAD RATING

① DESIGN LOAD RATING (HL-93)

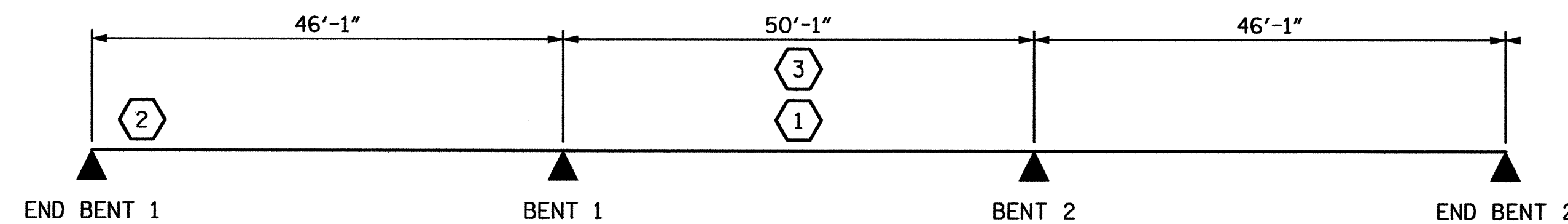
② DESIGN LOAD RATING (HS-20)

③ LEGAL LOAD RATING **

** SEE CHART FOR VEHICLE TYPE

GIRDER LOCATION

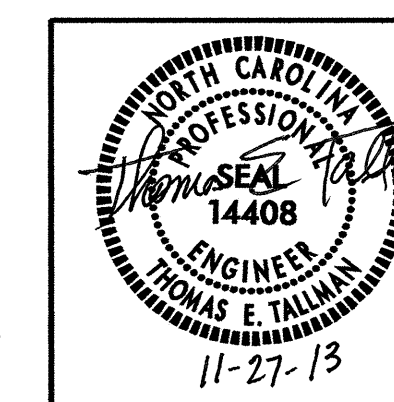
I - INTERIOR GIRDER
 EL - EXTERIOR LEFT GIRDER
 ER - EXTERIOR RIGHT GIRDER



LRFR SUMMARY

PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

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



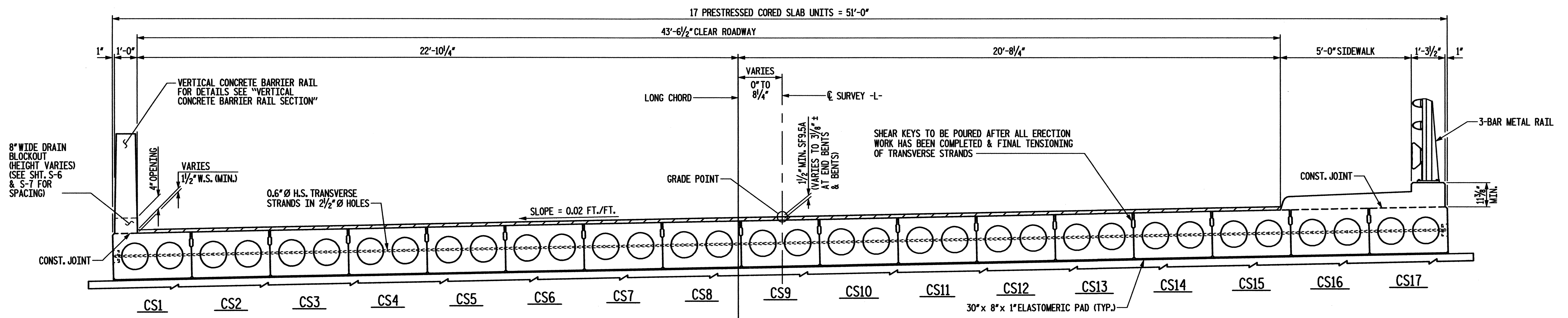
ICA
Engineering
 f/k/a Florence & Hutcheson, Inc.
 5121 Kingdom Way, Suite 100 Raleigh, NC 27607
 NC License No: F-0288

REVISIONS						HEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-4
1			3			TOTAL SHEETS 30
2			4			

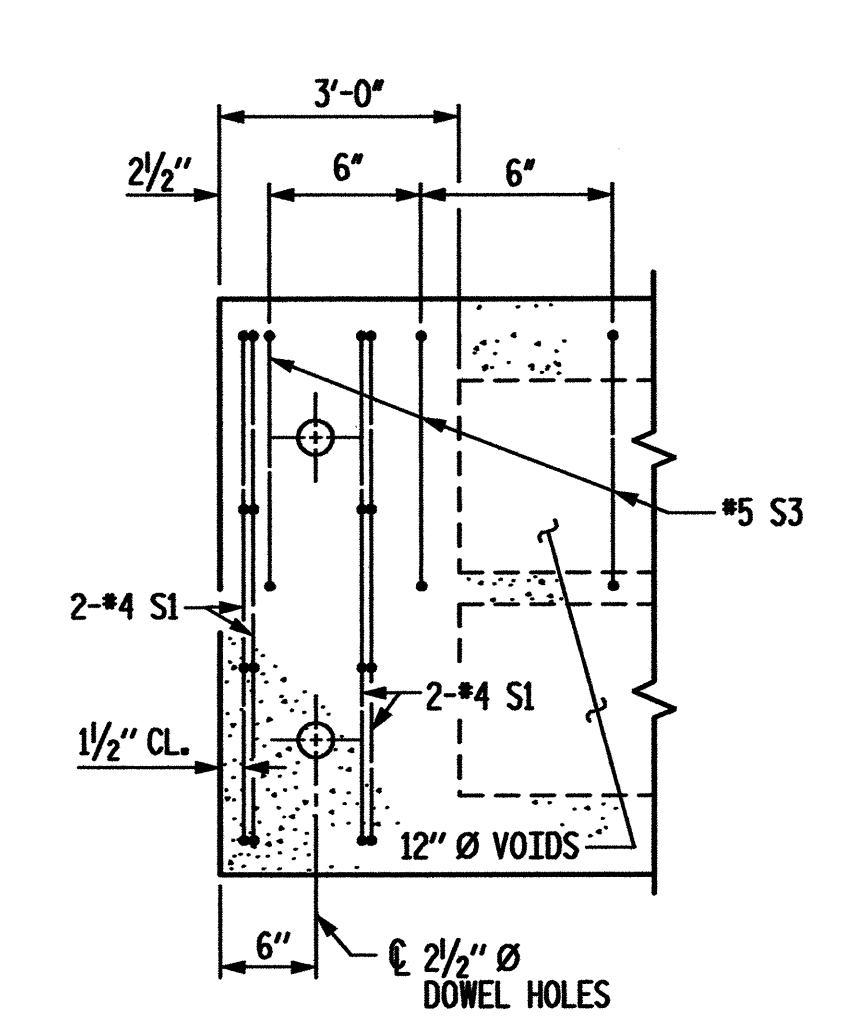
STD. NO. LRFR1

11/27/2013
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 PCA Engineering / T&E / Florence & Hutcheson, Inc.

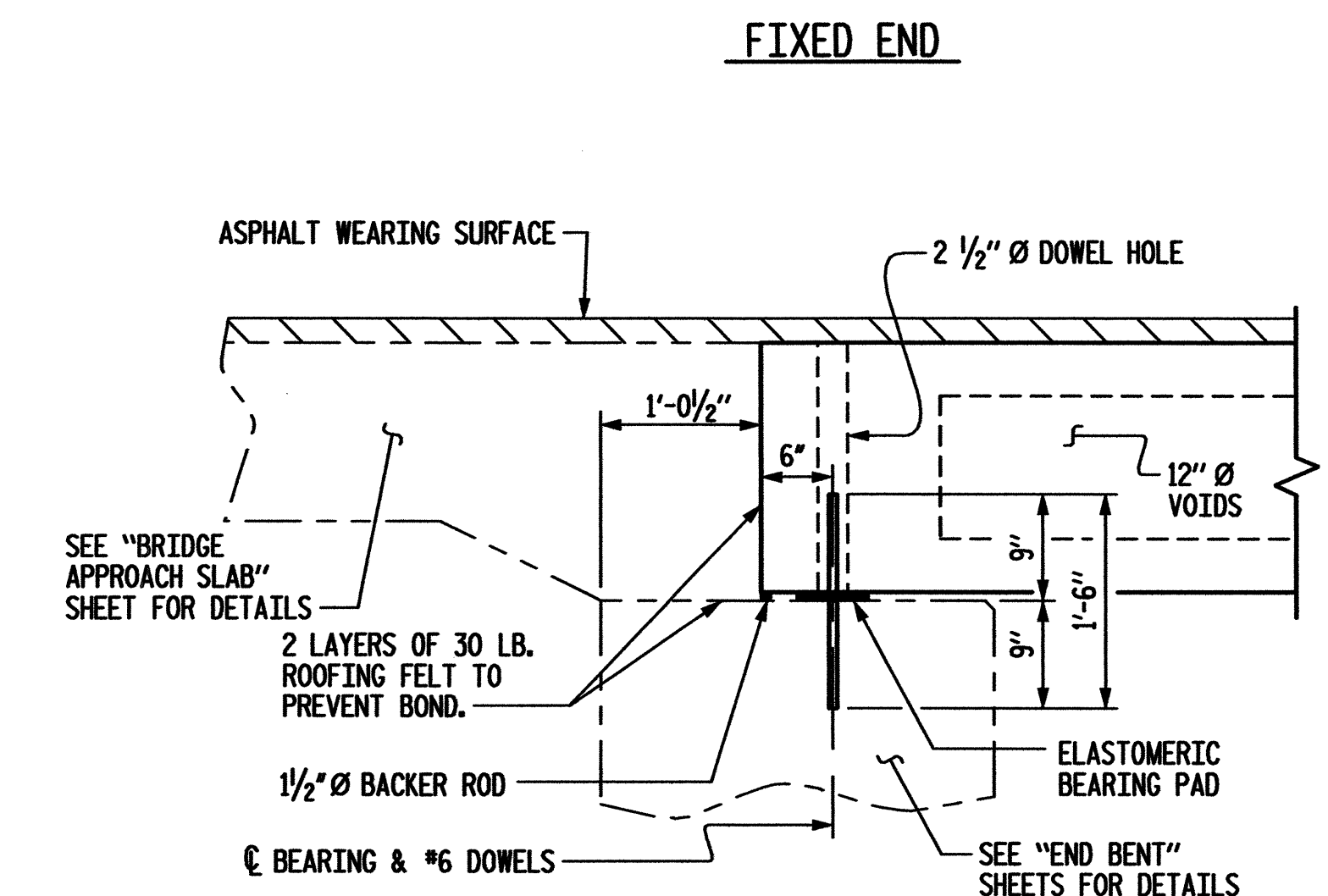
DRAWN BY : D. H. CARTER DATE : AUG 2010
 CHECKED BY : J. E. MONDOLFI DATE : AUG 2010
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



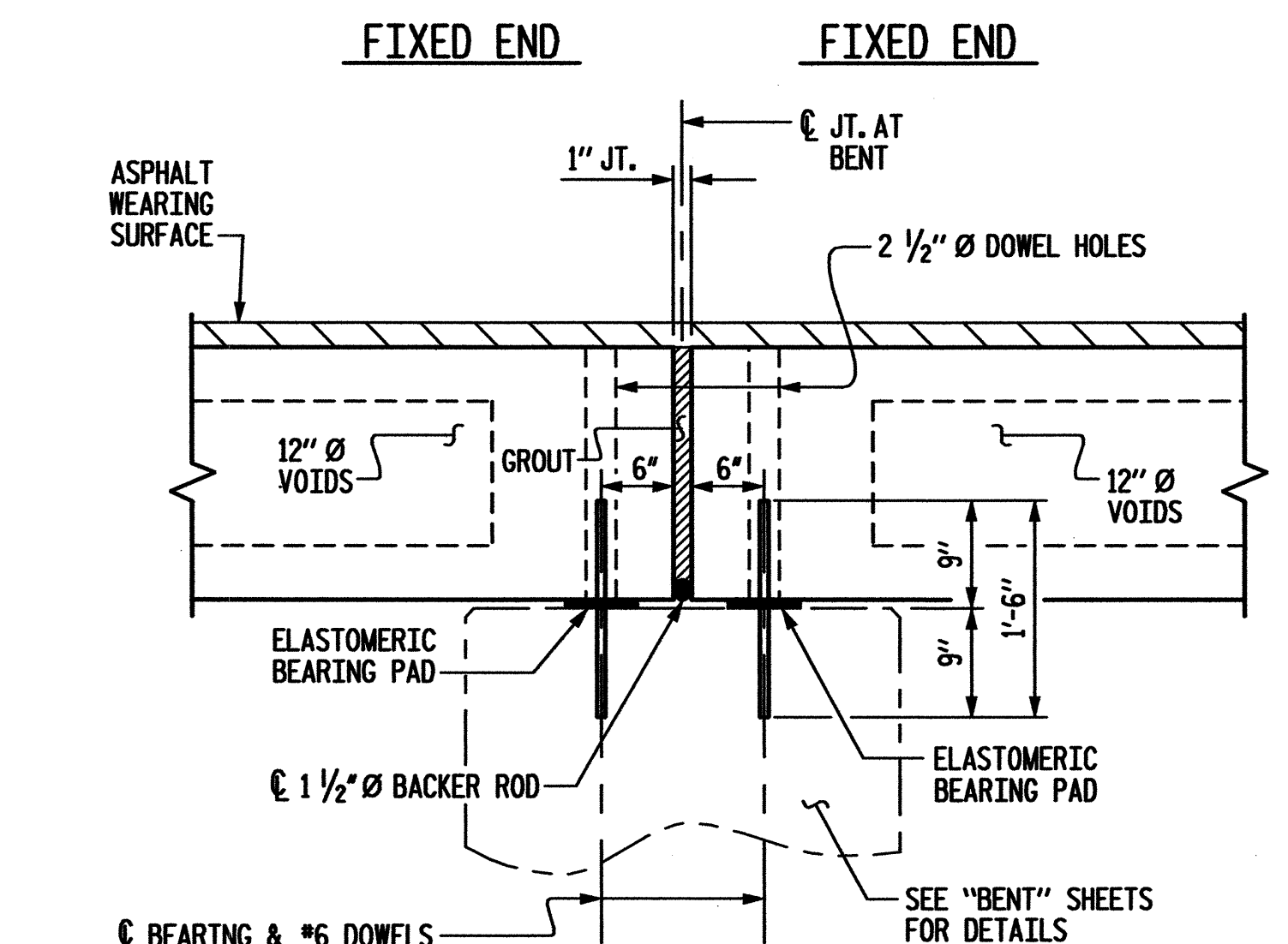
TYPICAL SECTION



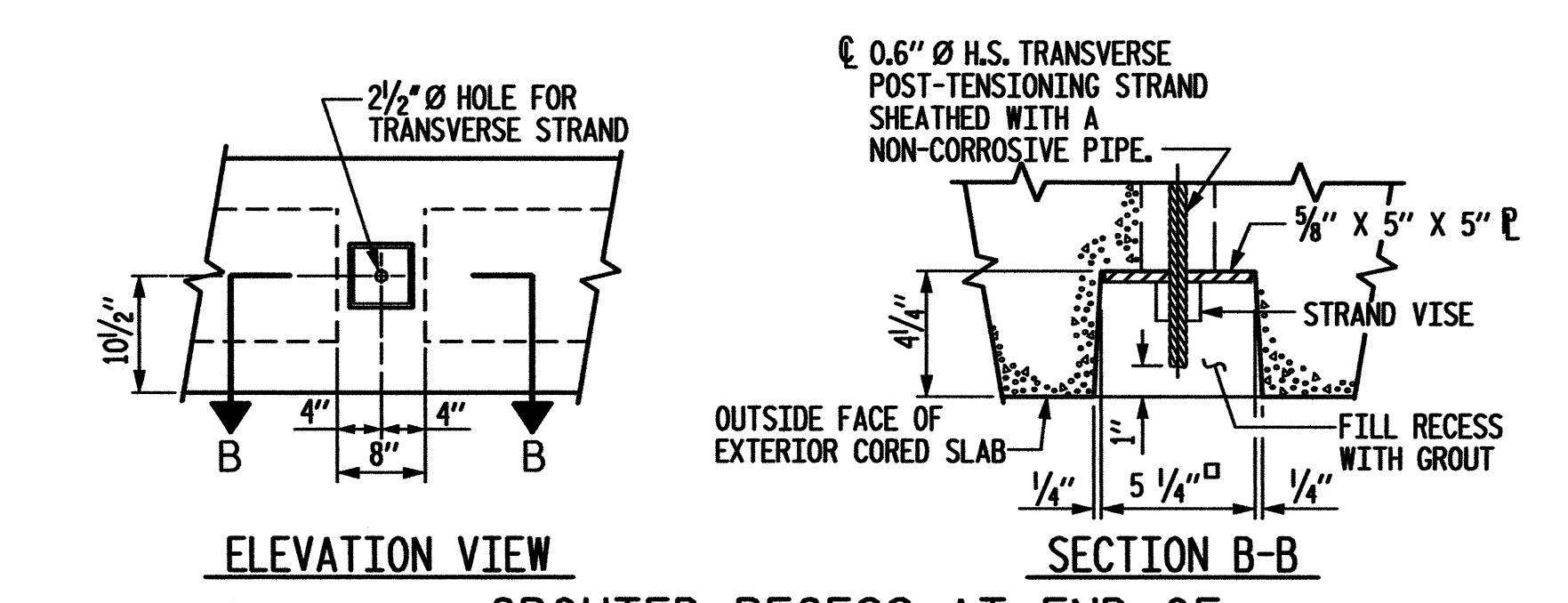
PART PLAN - CS1
NOTE: ALL UNITS SIMILAR EXCEPT OMIT S3 BARS.



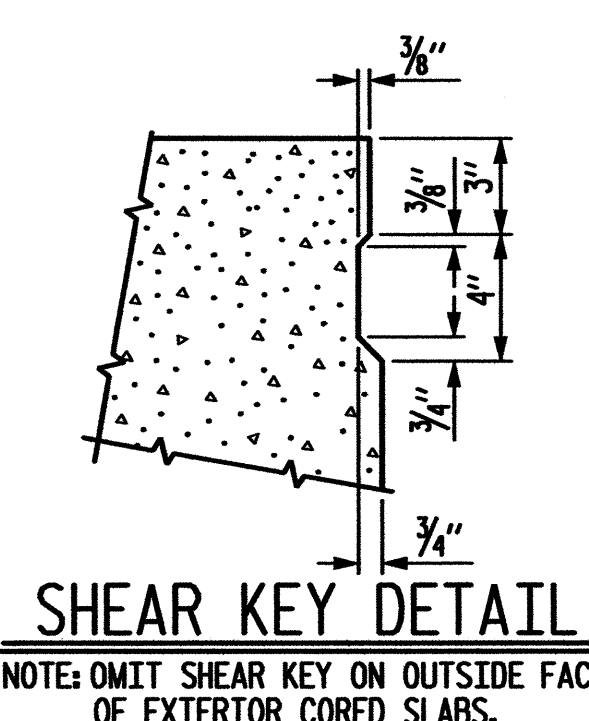
SECTION AT END BENT



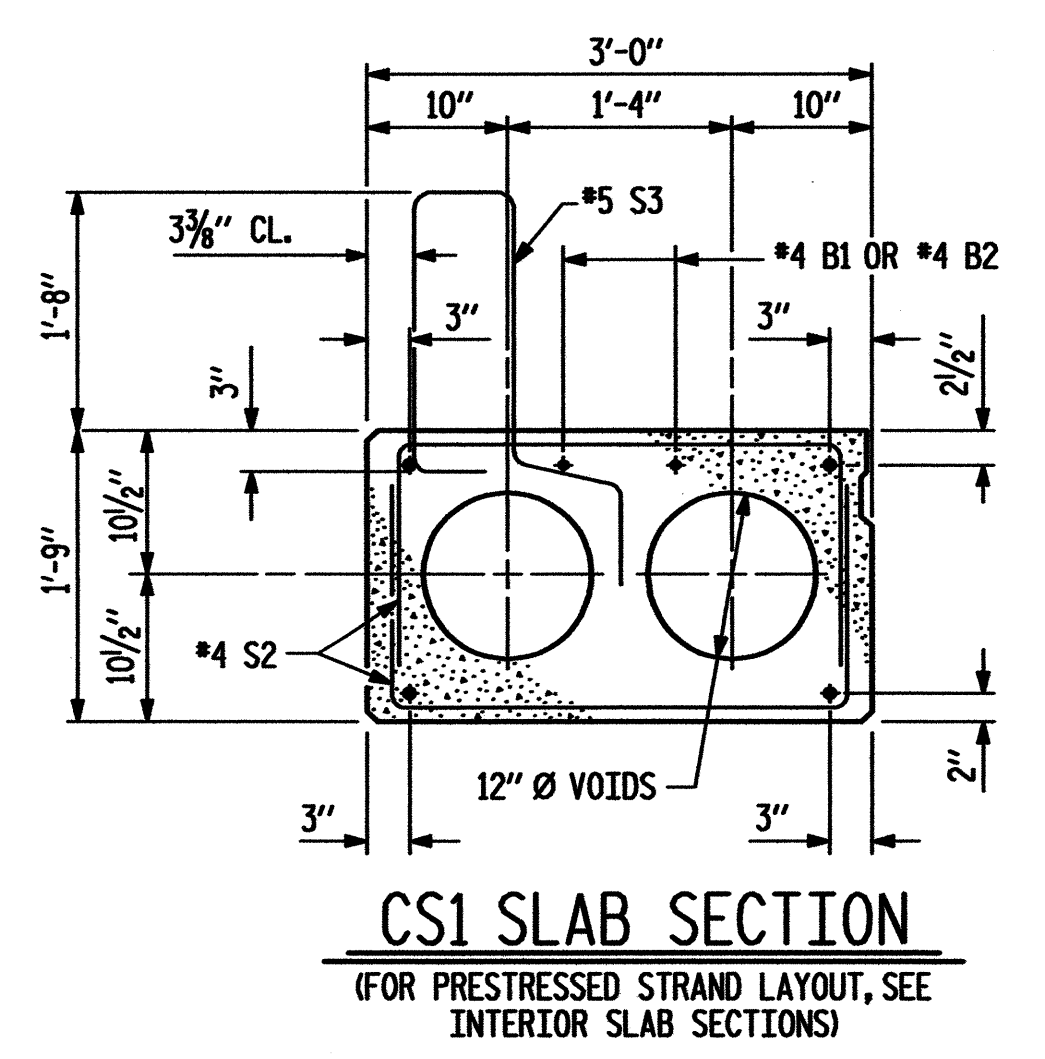
SECTION AT BENT



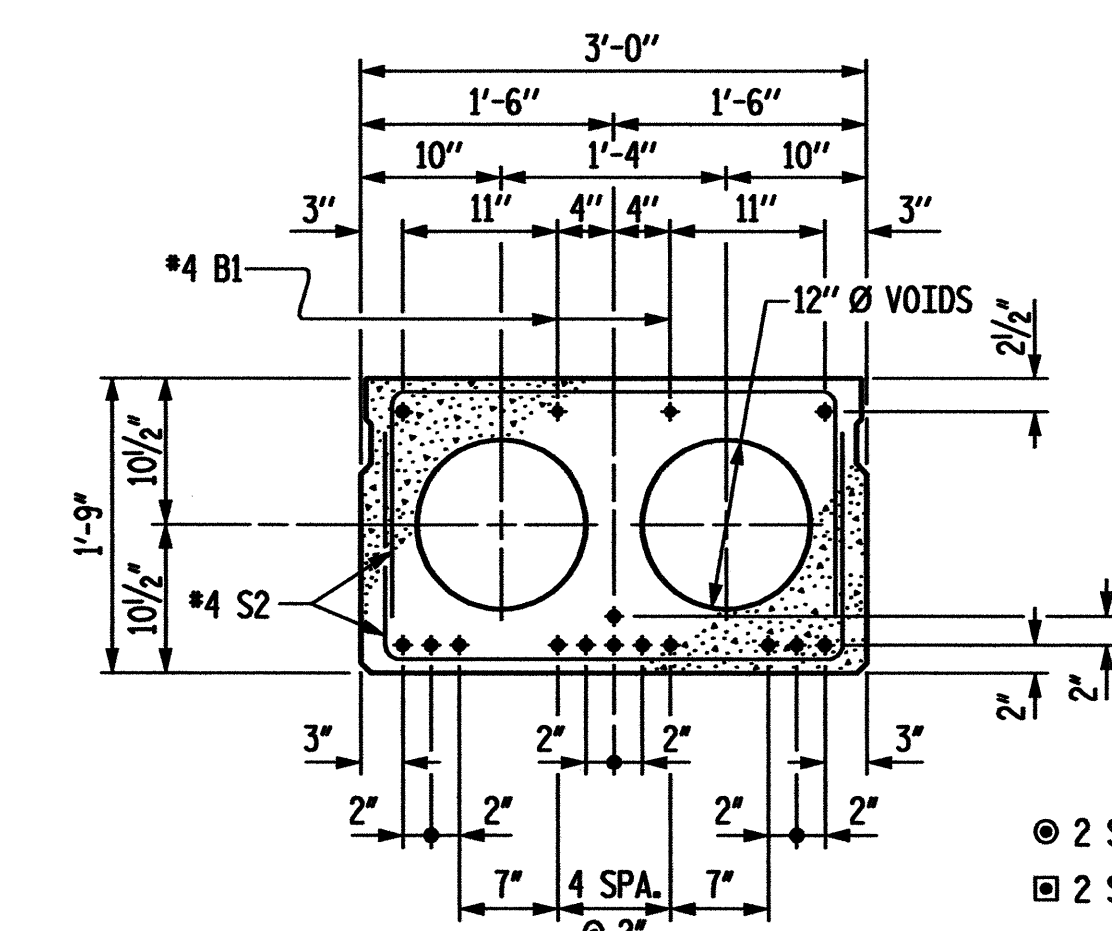
ELEVATION VIEW
SECTION B-B
GROUTED RECESS AT END OF POST-TENSIONED STRAND - CORED SLABS



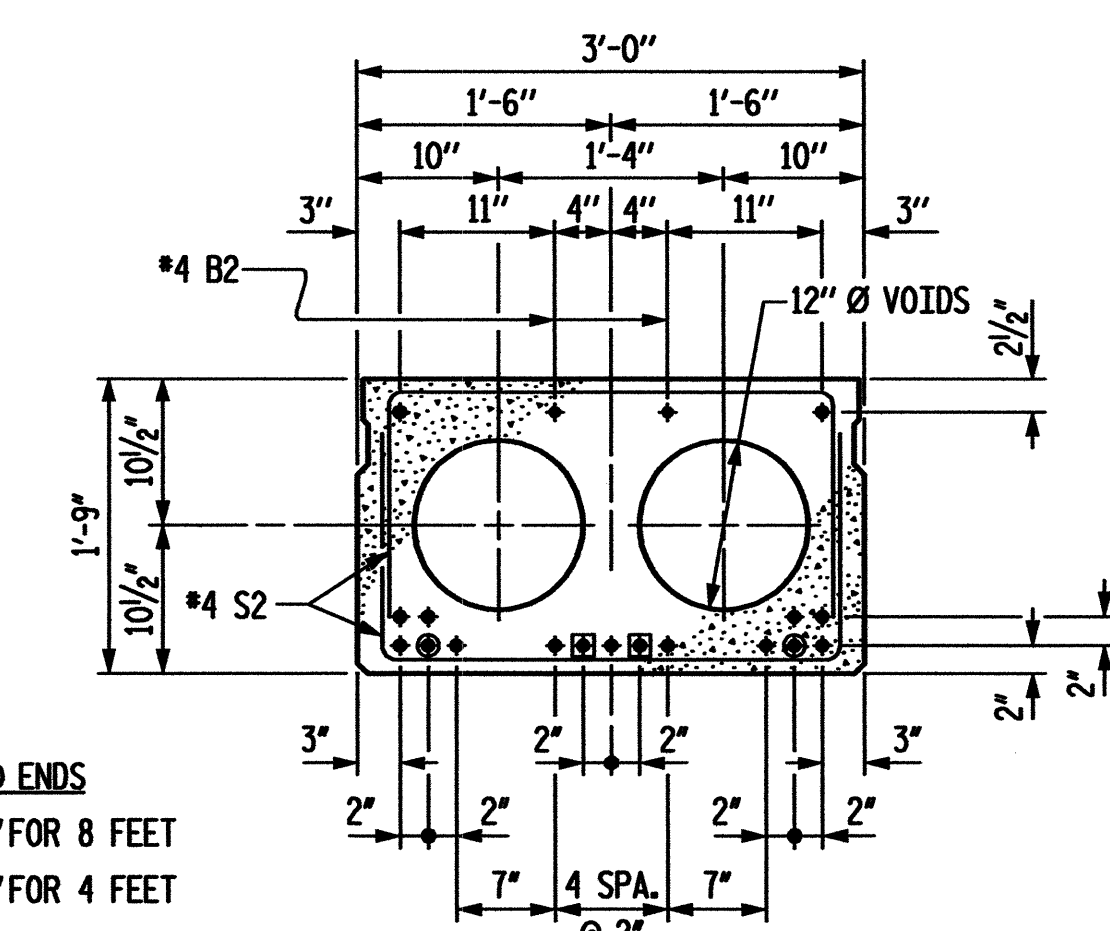
SHEAR KEY DETAIL
NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR CORED SLABS.



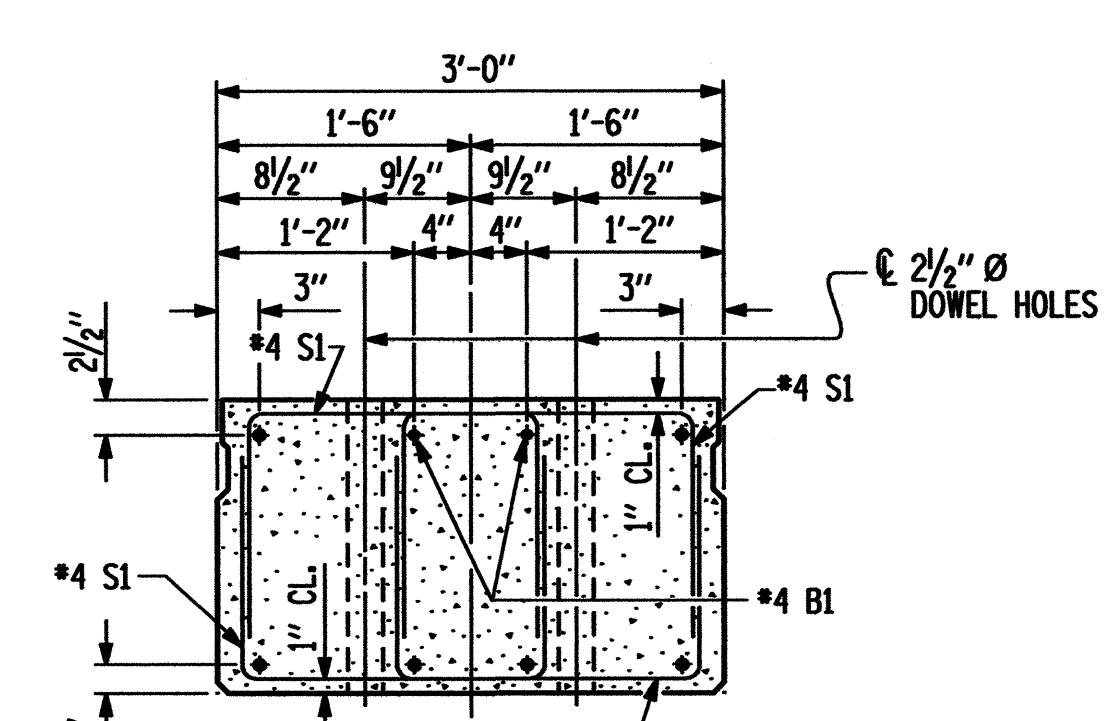
CS1 SLAB SECTION
(FOR PRESTRESSED STRAND LAYOUT, SEE INTERIOR SLAB SECTIONS)



45' SPAN-INTERIOR SLAB SECTION
14 - 0.60" Ø LOW RELAXATION STRANDS



50' SPAN-INTERIOR SLAB SECTION
17 - 0.60" Ø LOW RELAXATION STRANDS

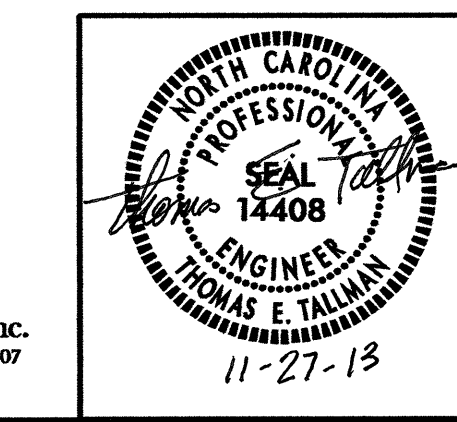


END ELEVATION
SHOWING PLACEMENT OF DOUBLE STIRRUPS AND LOCATION OF DOWL HOLES. (STRAND LAYOUT NOT SHOWN.) INTERIOR SLAB SECTION SHOWN, EXTERIOR SLAB SECTION SIMILAR EXCEPT SHEAR KEY LOCATION.

PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 1'-9"
PRESTRESSED CORED SLAB UNIT
43'-0 1/2" CLEAR ROADWAY - 90° SKEW



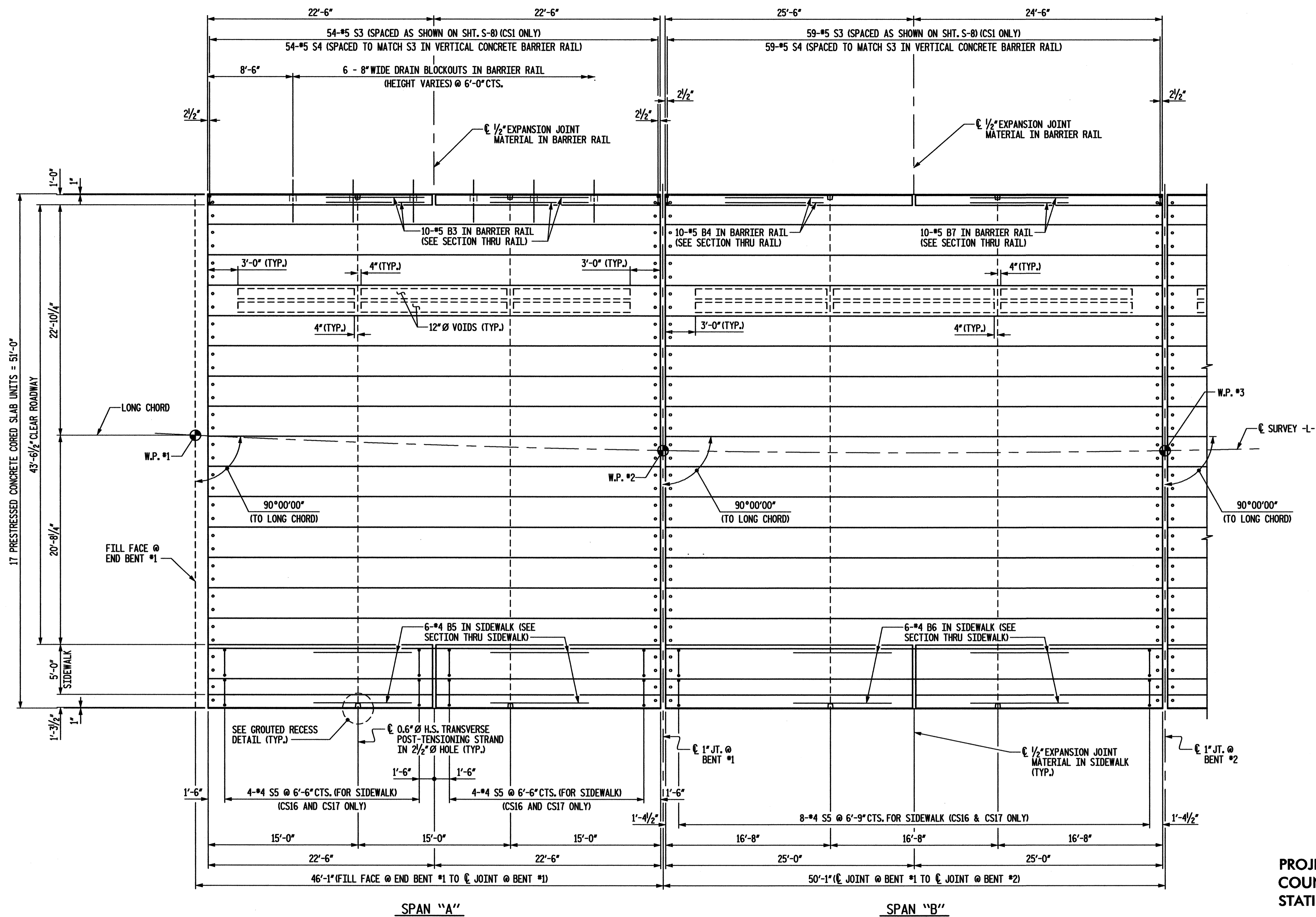
ICA Engineering
11/21/2013

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

TOTAL QUANTITY: 30

11/27/2013
 D:\Projects\33817\Structures\05_b4651.ecd\slab.dgn
 ICA Engineering 1747 G. Florence & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: MAY 2013
 CHECKED BY: K. M. MOBLEY DATE: NOV 2013
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013



PLAN OF SPANS

PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

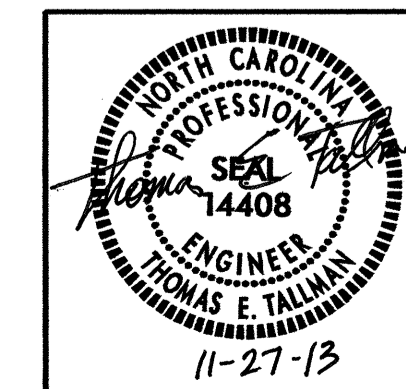
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PLAN OF SPANS
CORED SLAB DETAILS
SPANS "A" & "B"

REVISIONS						QUERY NO.
NO.	BY	DATE	NO.	BY	DATE	S-6
1			3			TOTAL QUERIES
2			4			30

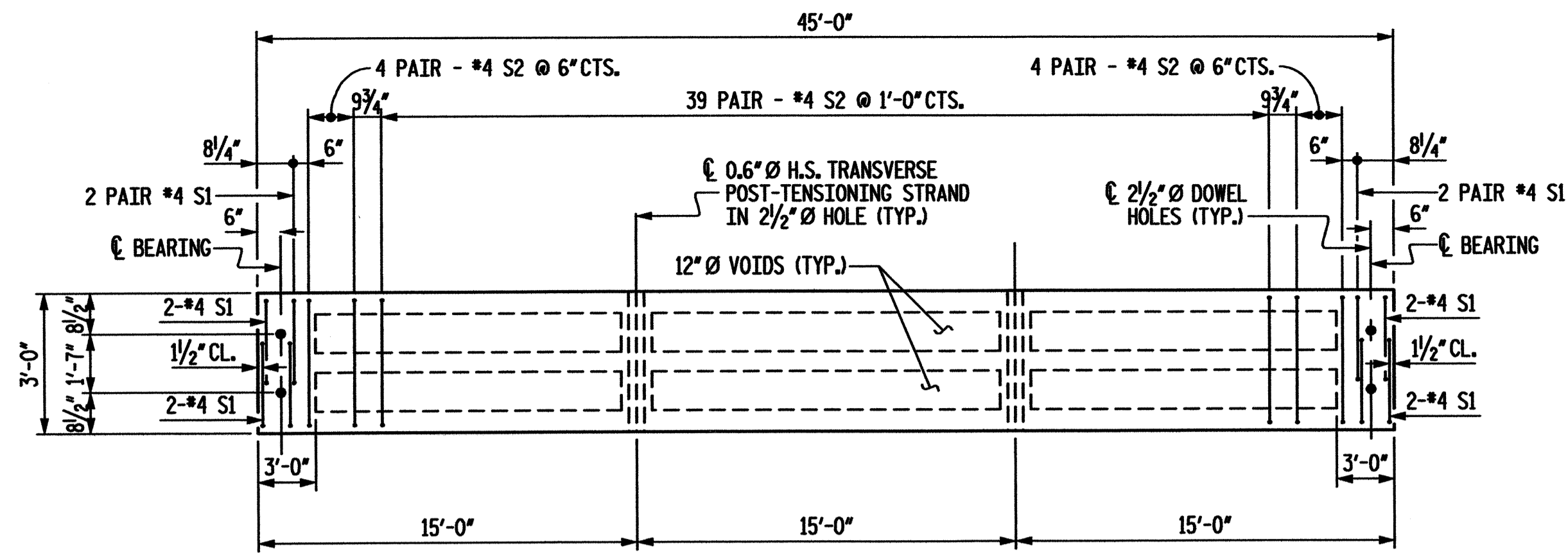
ICK
Engineering

f/k/a Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No: F-0288



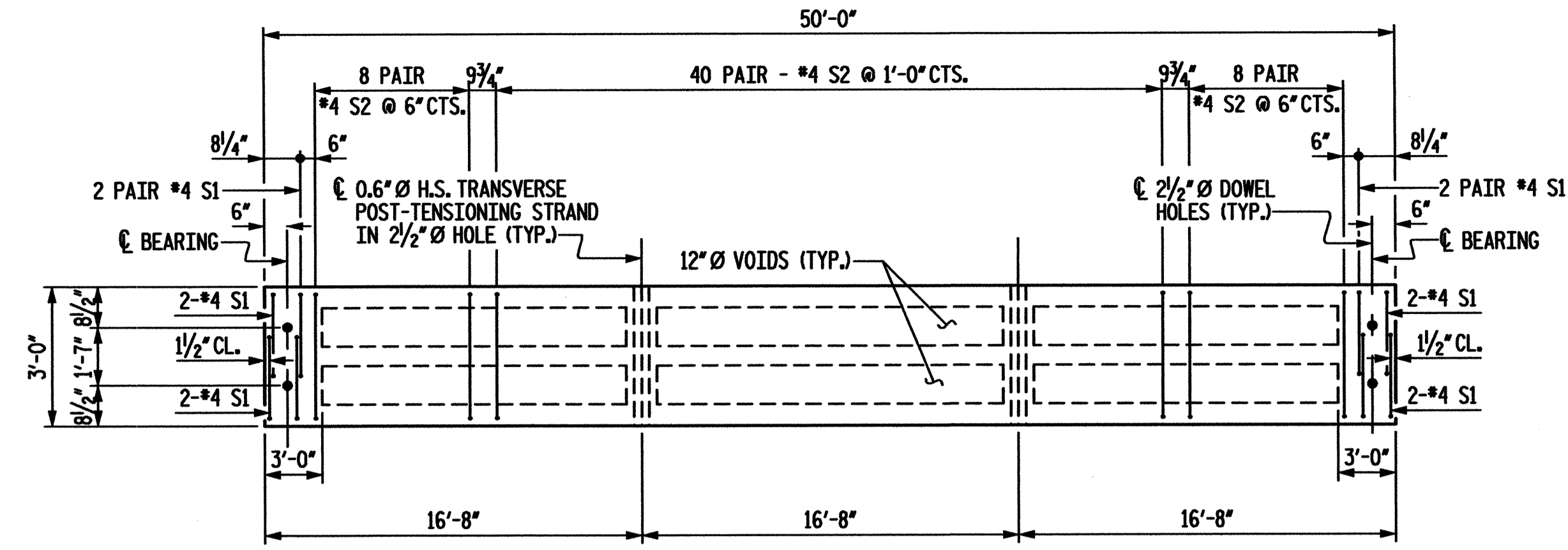
11/27/2013
C:\p\4651_ko\4651\structures\4651\4651.ed\cas2.dgn
PCA Engineering 17/K/a Florence & Hutcheson, Inc.

DRAWN BY : D. H. CARTER DATE : DEC 2008
CHECKED BY : K. M. MOBLEY DATE : NOV 2013
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



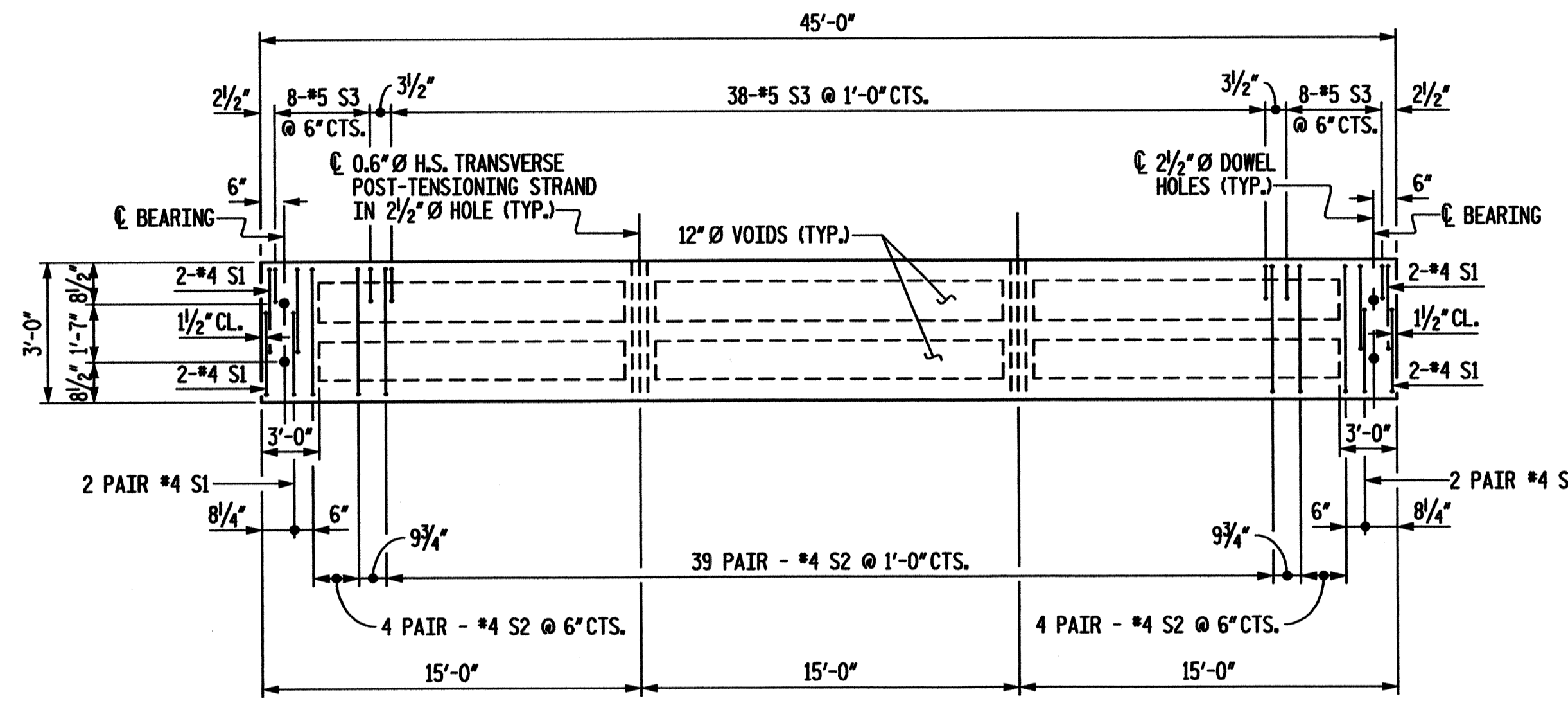
45' SPAN - PLAN OF INTERIOR CORED SLAB UNIT

FOR UNITS CS2-CS15



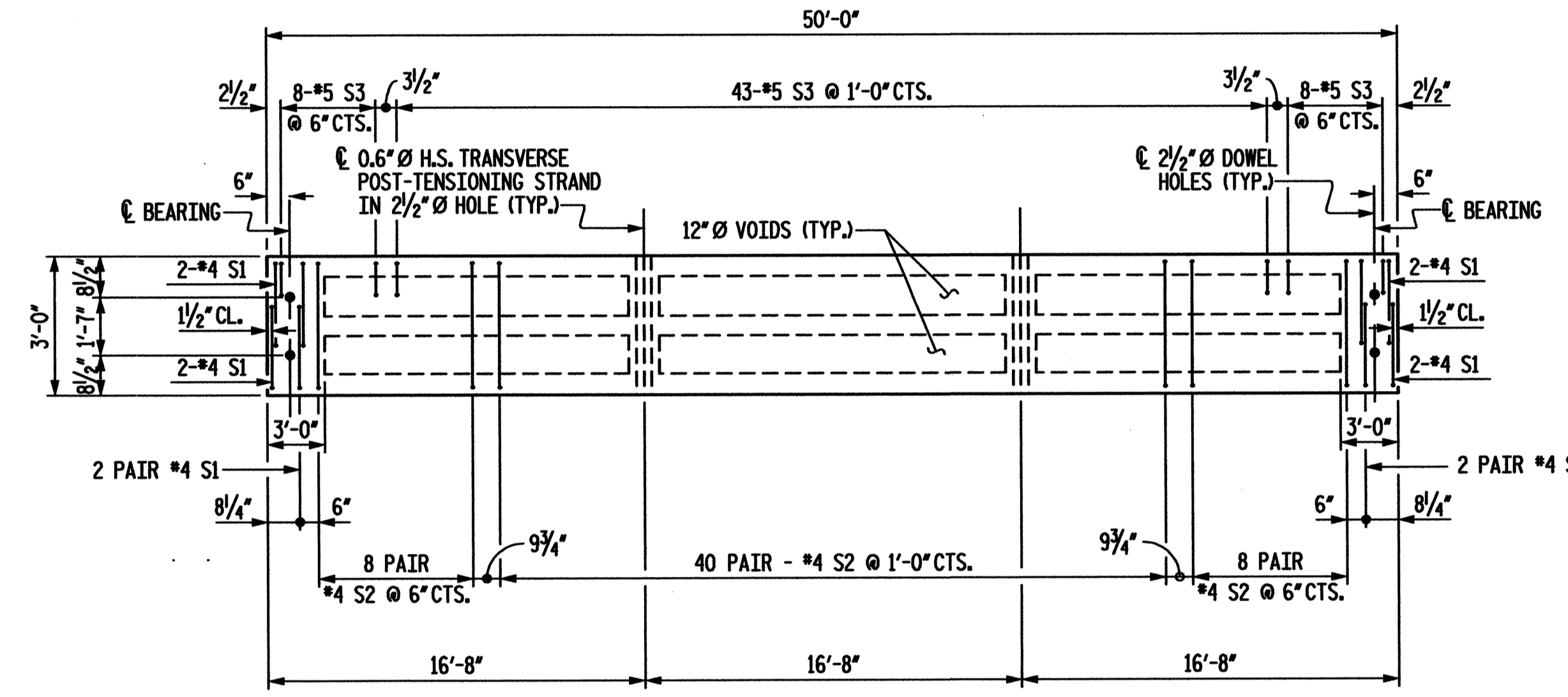
50' SPAN - PLAN OF INTERIOR CORED SLAB UNIT

FOR UNITS CS2-CS15



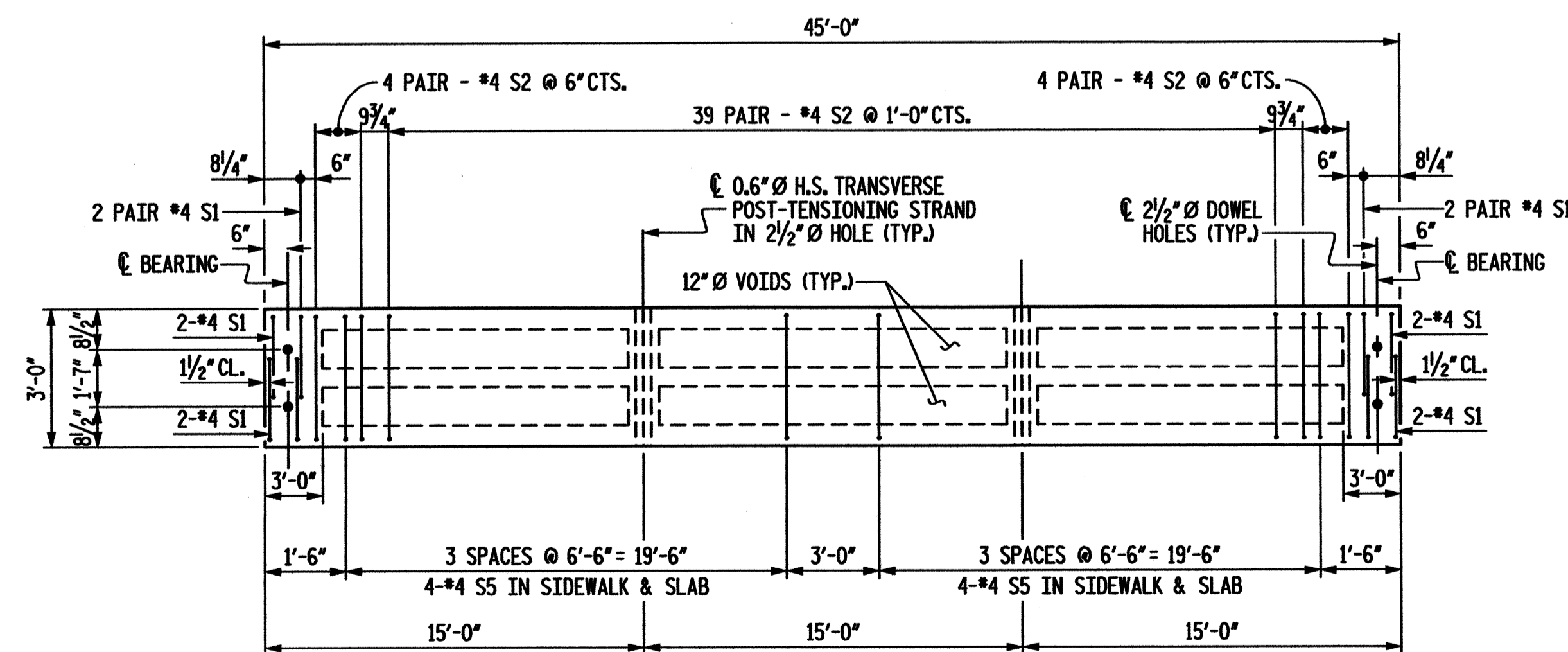
45' SPAN - PLAN OF EXTERIOR CORED SLAB UNIT

FOR UNIT CS1

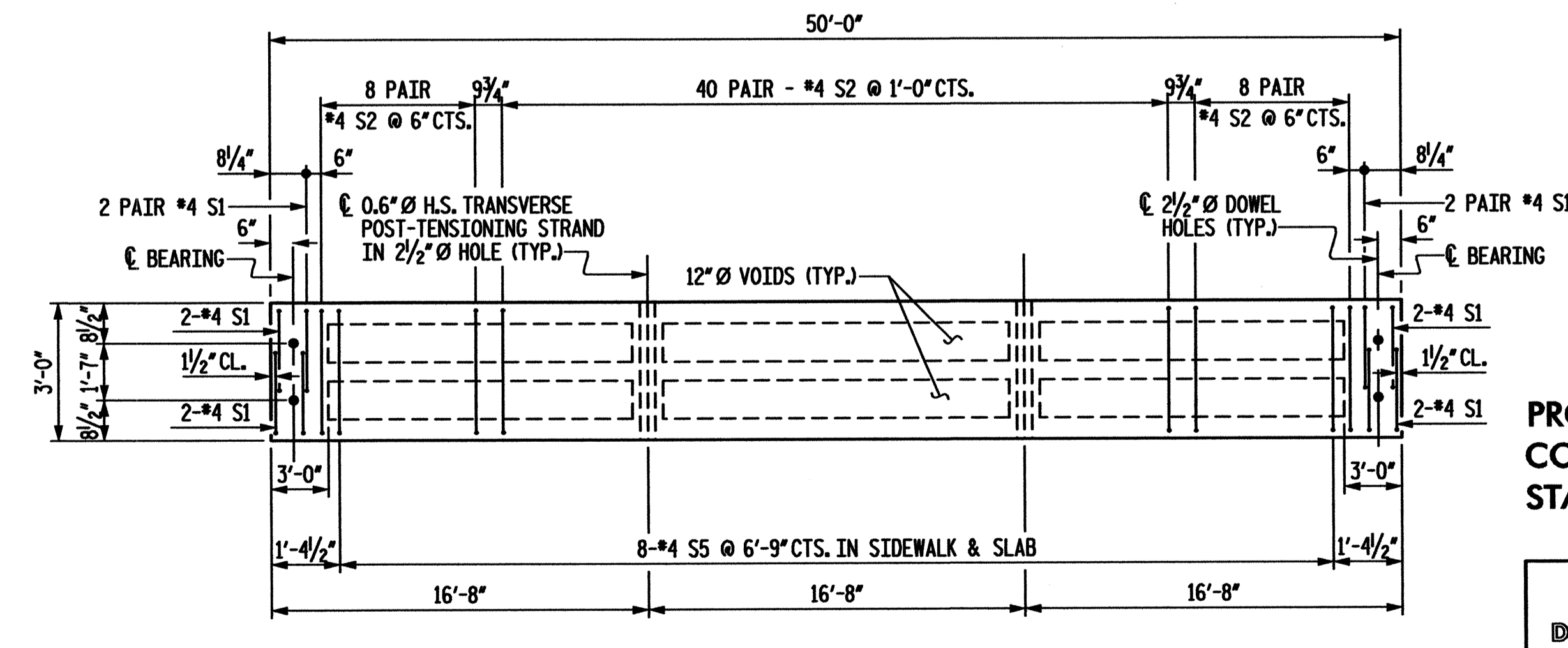


50' SPAN - PLAN OF EXTERIOR CORED SLAB UNIT

FOR UNIT CS1



45' SPAN - PLAN OF CORED SLAB UNIT CS16 & CS17



50' SPAN - PLAN OF CORED SLAB UNIT CS16 & CS17

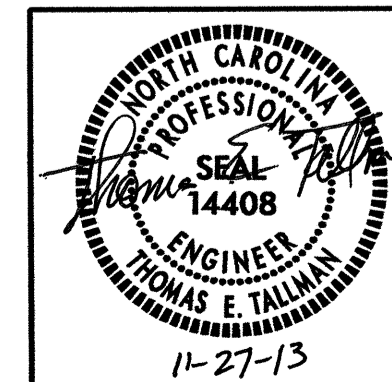
PROJECT NO. 33817
COUNTY: UNION
STATION: 17 + 73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

3'-0" X 1'-9"
PRESTRESSED CORED SLAB UNIT
SPANS "A", "B" AND "C"

ICA
Engineering

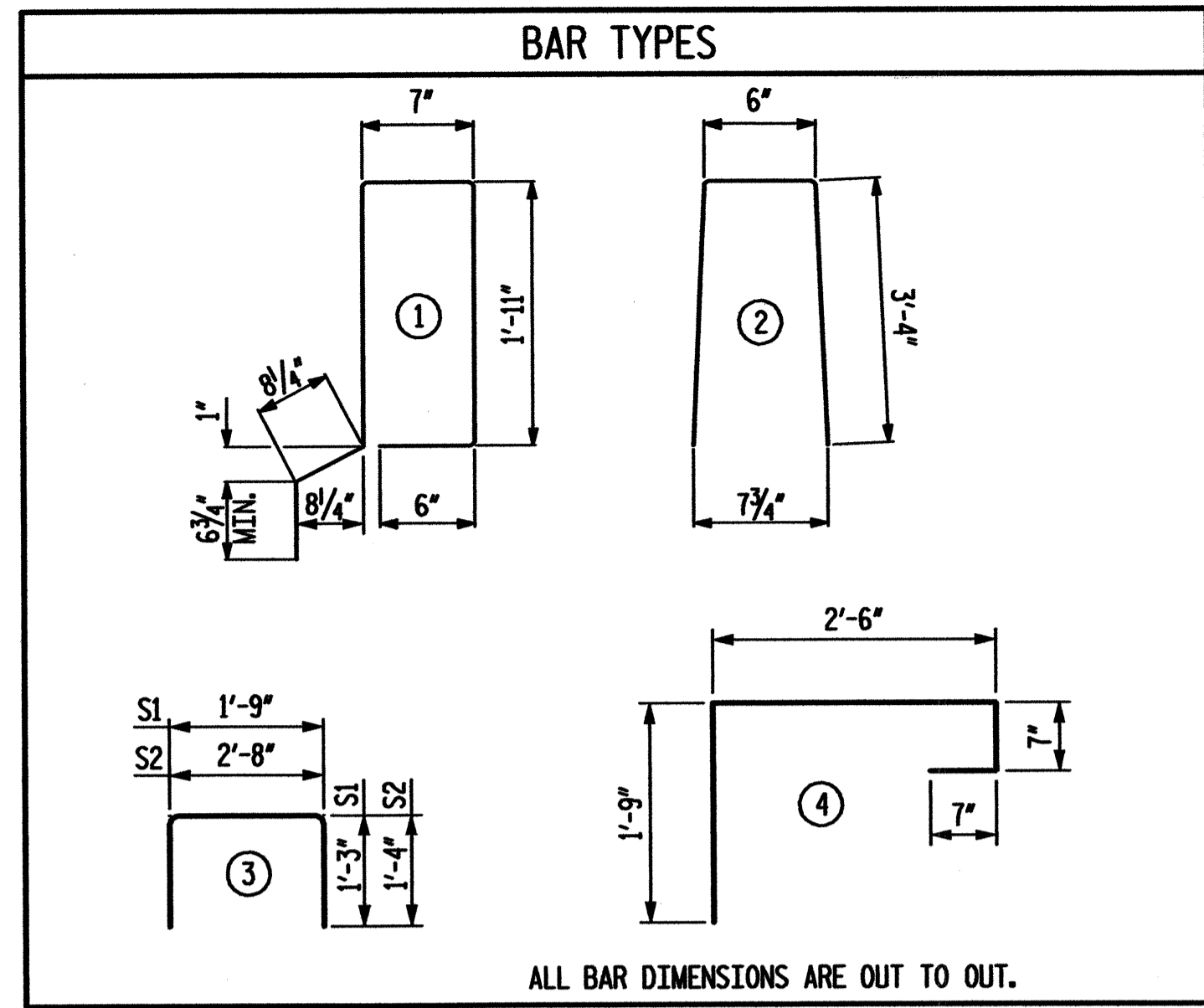
1/k/a Florence & Hutcheson, Inc.
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NC License No. P-0288



REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-8
1			3			TOTAL SHEETS 30
2			4			

11/27/2013
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P:\CA Engineering\T/E/Tallman & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: DEC 2008
CHECKED BY: K. M. MOBLEY DATE: NOV 2013
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013



BILL OF MATERIAL FOR ONE 45'-0" CORED SLAB SECTION CS2-CS15

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#4	STR	23'-3"	62
S1	16	#4	3	4'-3"	45
S2	98	#4	3	5'-4"	349
REINFORCING STEEL					LBS. 456
5100 P.S.I. CONCRETE					C. Y. 6.0
0.6" Ø L.R. STRANDS					NO. 14

BILL OF MATERIAL FOR ONE 50'-0" CORED SLAB SECTION CS2-CS15

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B2	4	#4	STR	25'-9"	69
S1	16	#4	3	4'-3"	45
S2	112	#4	3	5'-4"	399
REINFORCING STEEL					LBS. 513
5100 P.S.I. CONCRETE					C. Y. 6.7
0.6" Ø L.R. STRANDS					NO. 17

BILL OF MATERIAL FOR ONE 45'-0" CORED SLAB SECTION CS16 OR CS17

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#4	STR	23'-3"	62
S1	16	#4	3	4'-3"	45
S2	98	#4	3	5'-4"	349
*S5	8	#4	4	5'-5"	29
REINFORCING STEEL					LBS. 456
*EPOXY COATED REINFORCING STEEL					LBS. 29
5100 P.S.I. CONCRETE (CS16)					C. Y. 6.0
5100 P.S.I. CONCRETE (CS17)					C. Y. 6.1
0.6" Ø L.R. STRANDS					NO. 14

BILL OF MATERIAL FOR ONE 45'-0" EXTERIOR CORED SLAB SECTION CS1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	4	#4	STR	23'-3"	62
S1	16	#4	3	4'-3"	45
S2	98	#4	3	5'-4"	349
*S3	54	#5	1	6'-2"	347
REINFORCING STEEL					LBS. 456
*EPOXY COATED REINFORCING STEEL					LBS. 347
5100 P.S.I. CONCRETE					C. Y. 6.1
0.6" Ø L.R. STRANDS					NO. 14

BILL OF MATERIAL FOR ONE 50'-0" EXTERIOR CORED SLAB SECTION CS1

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B2	4	#4	STR	25'-9"	69
S1	16	#4	3	4'-3"	45
S2	112	#4	3	5'-4"	399
*S3	59	#5	1	6'-2"	379
REINFORCING STEEL					LBS. 513
*EPOXY COATED REINFORCING STEEL					LBS. 379
5100 P.S.I. CONCRETE					C. Y. 6.8
0.6" Ø L.R. STRANDS					NO. 17

BILL OF MATERIAL FOR ONE 50'-0" CORED SLAB SECTION CS16 OR CS17

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B2	4	#4	STR	25'-9"	69
S1	16	#4	3	4'-3"	45
S2	112	#4	3	5'-4"	399
*S5	8	#4	4	5'-5"	29
REINFORCING STEEL					LBS. 513
*EPOXY COATED REINFORCING STEEL					LBS. 29
5100 P.S.I. CONCRETE (CS16)					C. Y. 6.7
5100 P.S.I. CONCRETE (CS17)					C. Y. 6.8
0.6" Ø L.R. STRANDS					NO. 17

CORED SLABS REQUIRED

	NUMBER			LENGTH			TOTAL LENGTH
	SPAN A	SPAN B	SPAN C	SPAN A	SPAN B	SPAN C	
EXTERIOR C.S.	2	2	2	45'-0"	50'-0"	45'-0"	280'-0"
INTERIOR C.S.	15	15	15	45'-0"	50'-0"	45'-0"	2100'-0"

SUMMARY FOR EXTERIOR CORED SLAB SECTIONS

	LBS.	SPAN			TOTAL
		"A"	"B"	"C"	
REINFORCING STEEL	912	1026	912	2850	
*EPOXY COATED REINFORCING STEEL	376	408	376	1160	
5100 P.S.I. CONCRETE	12.2	13.6	12.2	38.0	
0.6" Ø L.R. STRANDS	NO. 28	34	28	90	

SUMMARY FOR INTERIOR CORED SLAB SECTIONS

	LBS.	SPAN			TOTAL
		"A"	"B"	"C"	
REINFORCING STEEL	6840	7695	6840	21375	
*EPOXY COATED REINFORCING STEEL	29	29	29	87	
5100 P.S.I. CONCRETE	90.0	100.5	90.0	280.5	
0.6" Ø L.R. STRANDS	NO. 210	255	210	675	

BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B3	40	#5	STR	22'-1"	921
*B4	10	#5	STR	25'-1"	262
*B7	10	#5	STR	24'-1"	251
*S4	167	#5	2	7'-2"	1248
*EPOXY COATED REINFORCING STEEL					LBS. 2682
CLASS AA CONCRETE					C. Y. 18.4
TOTAL LIN. FT. OF CONCRETE BARRIER RAIL					140.2

BILL OF MATERIAL FOR CONCRETE SIDEWALK

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B5	24	#4	STR	22'-1"	354
*B6	12	#4	STR	24'-7"	197
*EPOXY COATED REINFORCING STEEL					LBS. 551
CLASS AA CONCRETE					C. Y. 29.3
TOTAL LIN. FT. OF CONCRETE SIDEWALK					170.3

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 CAST WITH THE CORED SLAB SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE CORED SLABS.

RECESSES FOR TRANSVERSE STRANDS SHALL BE GROUTED AFTER THE TENSIONING OF THE STRANDS.

THE 2 1/2" Ø DOWEL HOLES AT FIXED ENDS OF SLAB SECTIONS SHALL BE FILLED WITH NON-SHRINK GROUT.

THE 1 1/2" Ø BACKER ROD SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER, SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

WHEN CORED SLABS ARE CAST, AN INTERNAL HOLD-DOWN SYSTEM SHALL BE EMPLOYED TO PREVENT VOIDS FORM RISING OR MOVING SIDEWAYS. AT LEAST SIX WEEKS PRIOR TO CASTING CORED SLABS, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW AND COMMENT, DETAILED DRAWINGS OF THE PROPOSED HOLD-DOWN SYSTEM. IN ADDITION TO STRUCTURAL DETAILS, LOCATION AND SPACING OF THE HOLD-DOWNS SHALL BE INDICATED.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE CORED SLAB UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 4100 PSI.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE CORED SLAB UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO CORED SLAB UNIT ENDS.

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

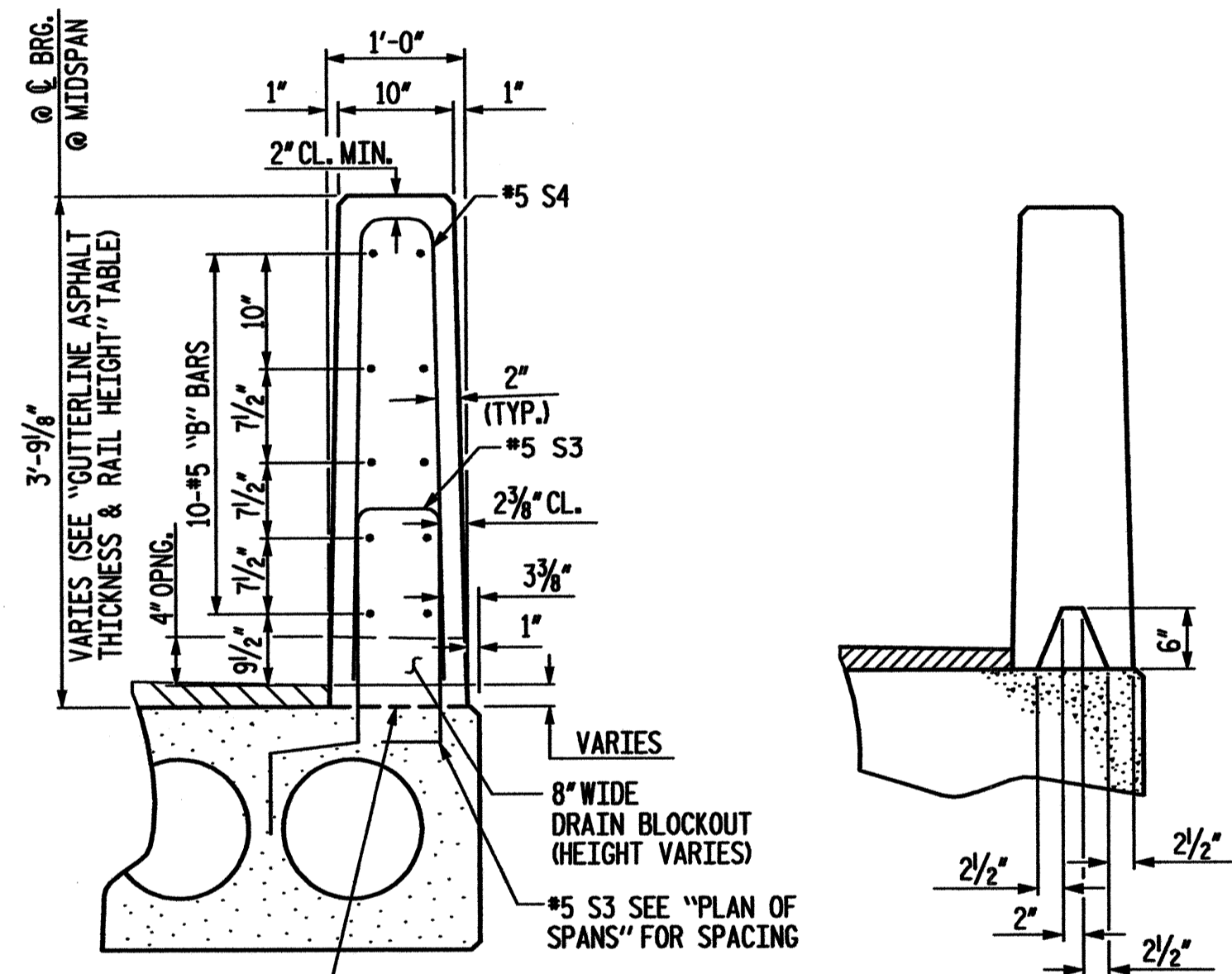
TRANSVERSE POST TENSIONING OF THE CORED SLAB UNITS SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAIL AND SIDEWALK SHALL BE EPOXY COATED.

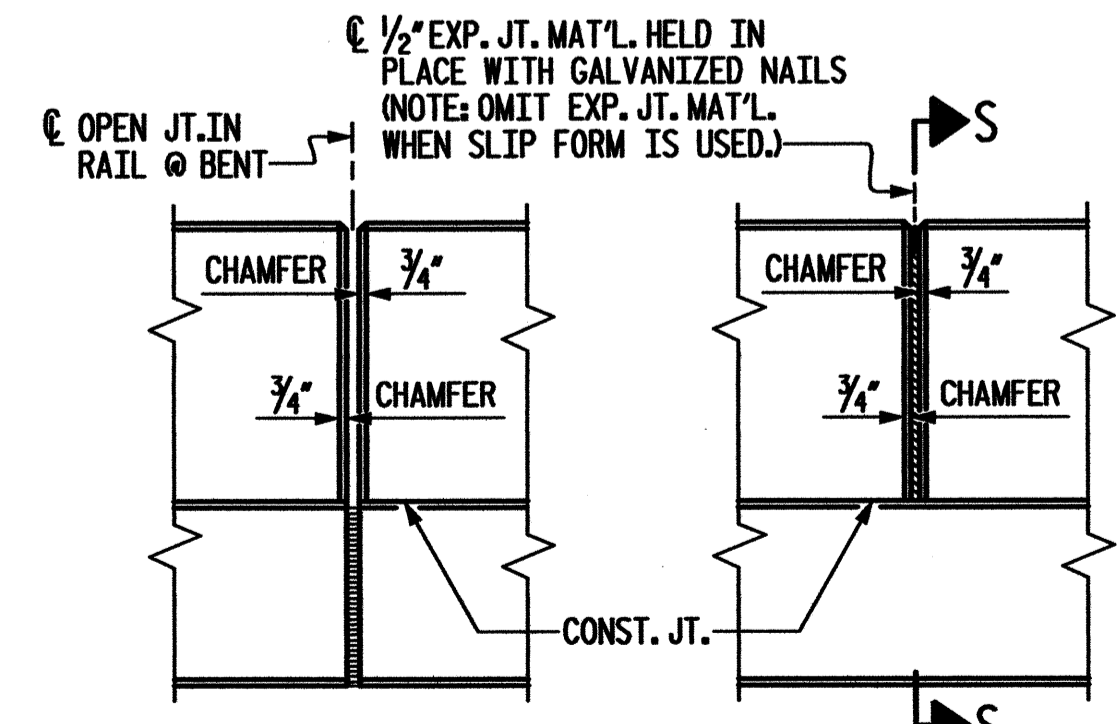
THE DRAIN OPENING AT THE GUTTERLINE SHALL BE 4" X 8". THE HEIGHT OF THE BLOCKOUT IN THE VERTICAL CONCRETE BARRIER RAIL SHALL EXTEND FROM THE TOP OF THE CORED SLAB UNIT TO THE TOP OF THE DRAIN OPENING.

APPLY EPOXY PROTECTIVE COATING TO EXTERIOR FACE OF THE EXTERIOR CORED SLAB UNITS THAT REQUIRE DRAINS IN BARRIER RAIL.

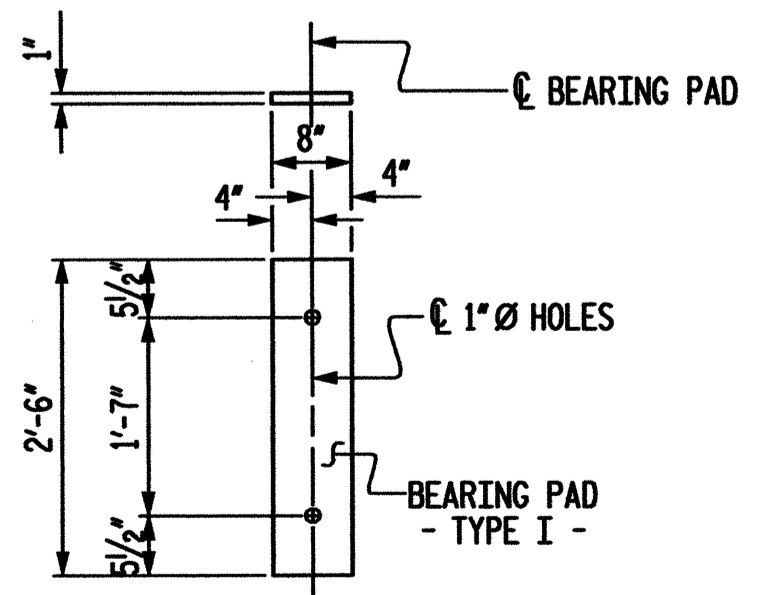


SECTION THRU RAIL and **SECTION SS**

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



ELEVATION AT EXPANSION JOINTS



FIXED END (TYPE I - 102 REQ'D)

ELASTOMERIC BEARING DETAILS

GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT

ROADWAY	ASPHALT OVERLAY THICKNESS		RAIL HEIGHT
	@ MID-SPAN		@ MID-SPAN
43'-6 1/2" CLEAR ROADWAY	SUPERED SECTION		
	SPANS A AND C		2" / 3'-8"
SPAN B	1/2"		3'-7 1/2"

GRADE 270 STRANDS

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

DEAD LOAD DEFLECTION AND CAMBER

	SPANS "A" & "C"		SPAN "B"
	3'-0" x 1'-9"		3'-0" x 1'-9"
CAMBER (SLAB ALONE IN PLACE)	1.340"		1.880"
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD **	0.163"		0.240"
FINAL CAMBER	1.177"		1.640"

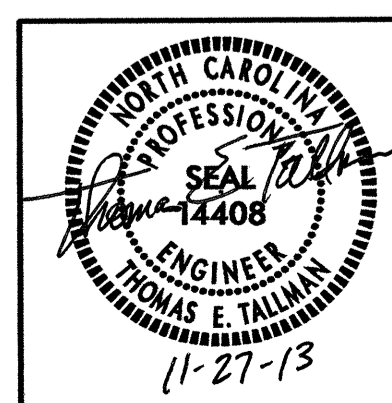
** INCLUDES FUTURE WEARING SURFACE

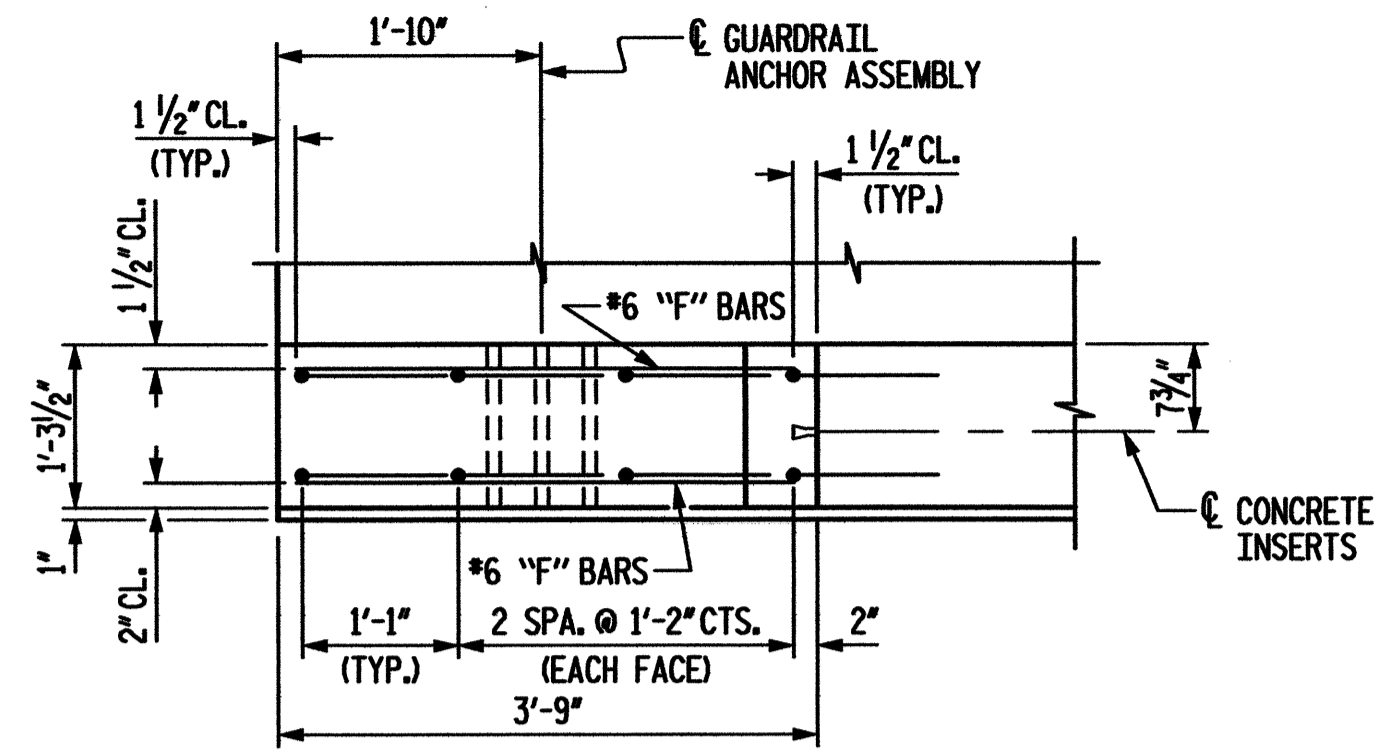
PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

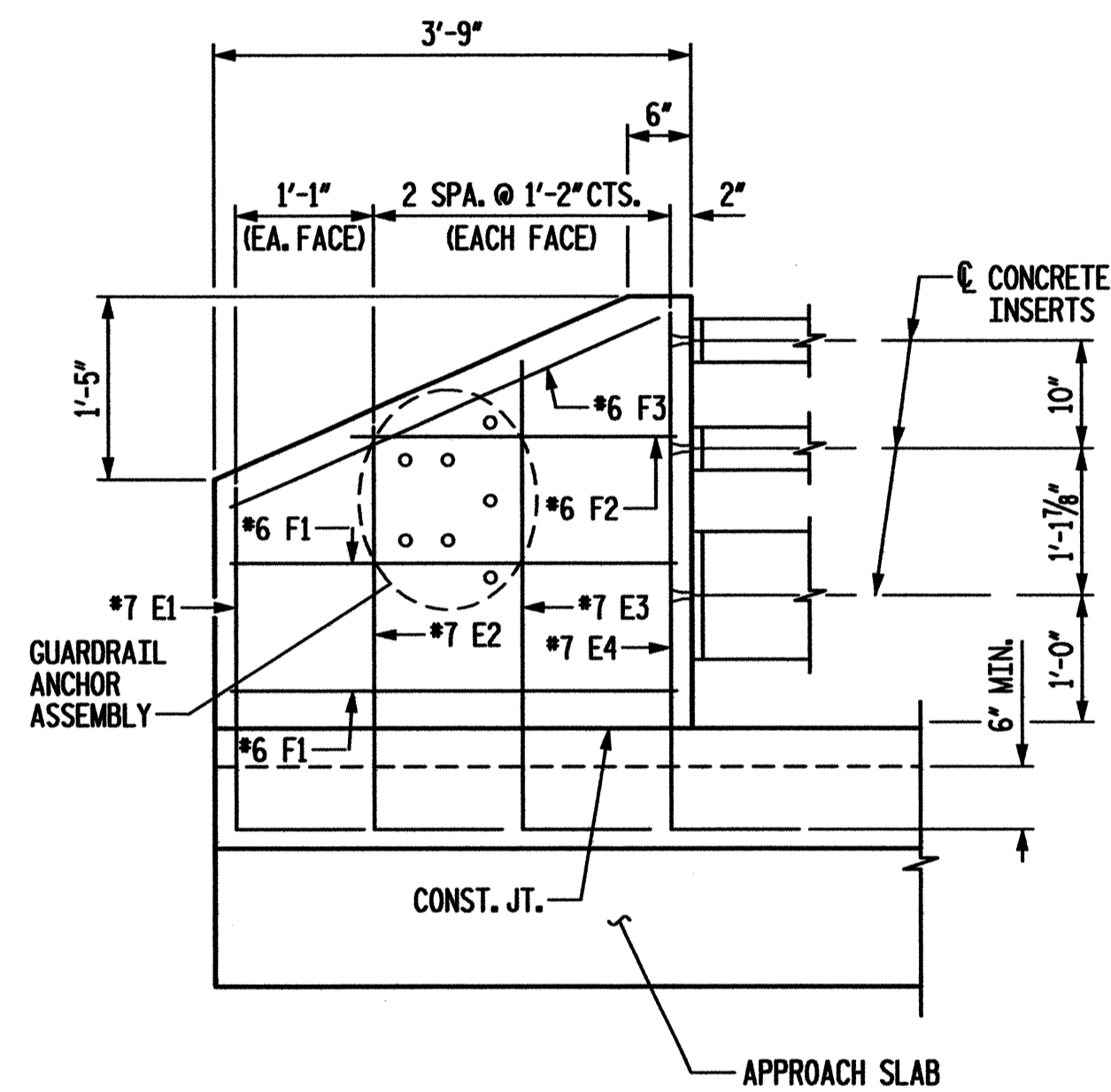
BILL OF MATERIALS

REVISIONS						SHEET NO. S-9
NO.	BY	DATE	NO.	BY	DATE	
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2			4			

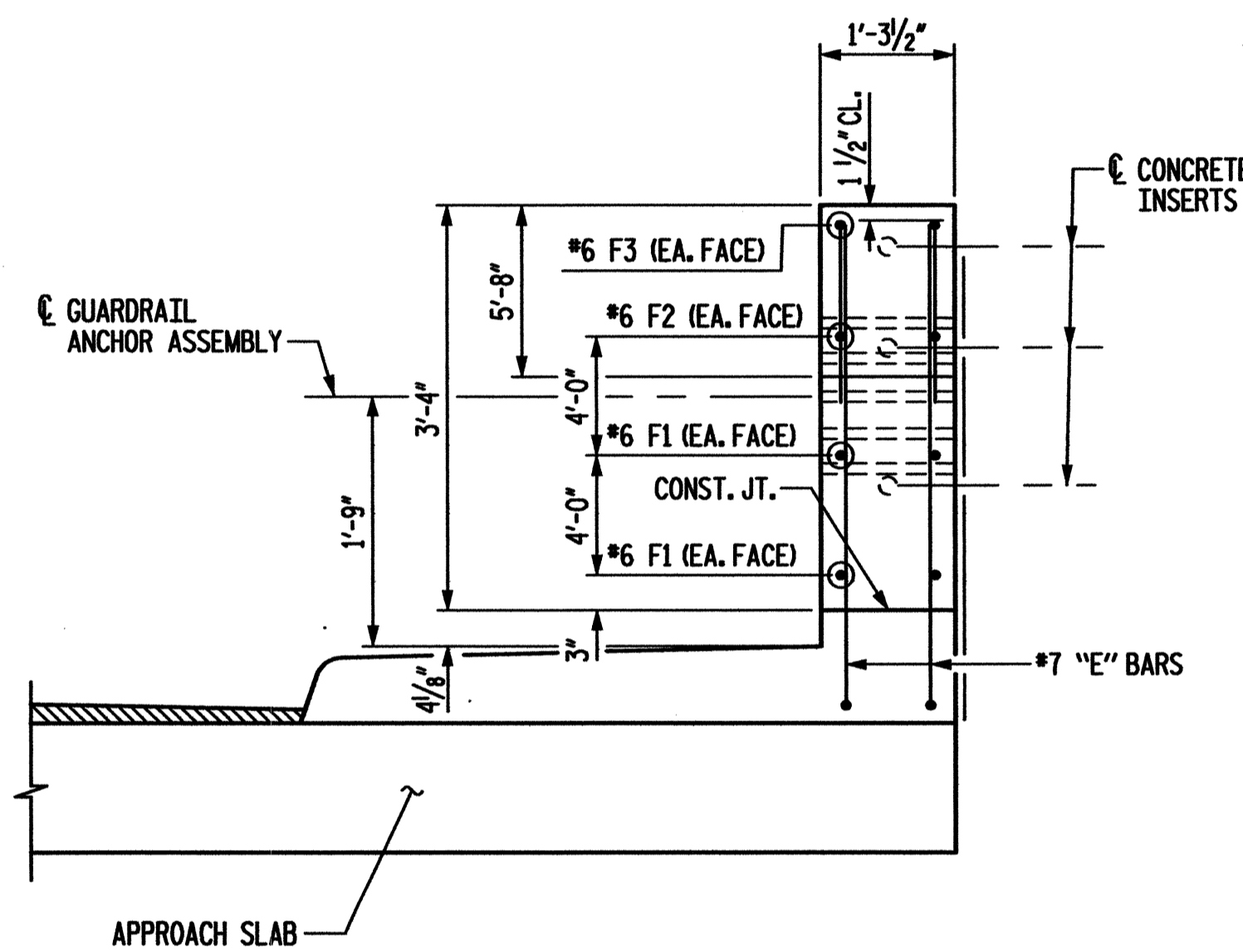




PLAN OF END POST



ELEVATION



END VIEW

END POST FOR THREE BAR RAIL

BAR TYPE		BILL OF MATERIAL FOR TWO END POSTS AT THREE BAR RAIL				
E1	E2	E3	E4			
2'-7"	3'-2"	3'-8"	4'-0"	1'-0"		
BAR DIMENSIONS ARE OUT TO OUT.						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
E1	4	7	1	3'-7"	29	
E2	4	7	1	4'-2"	34	
E3	4	7	1	4'-8"	38	
E4	4	7	1	5'-0"	41	
F1	8	6	STR	3'-6"	42	
F2	4	6	STR	2'-6"	15	
F3	4	6	STR	3'-9"	23	
EPOXY COATED REINFORCING STEEL 222 LBS.						
CLASS "AA" CONCRETE 1.1 CU. YDS.						

NOTE: FOR GUARDRAIL ANCHORAGE DETAILS, SEE DWG. NO. S-15.

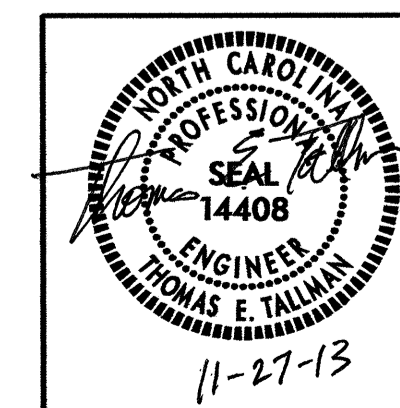
PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE
 END POST DETAILS FOR
 THREE BAR METAL RAIL



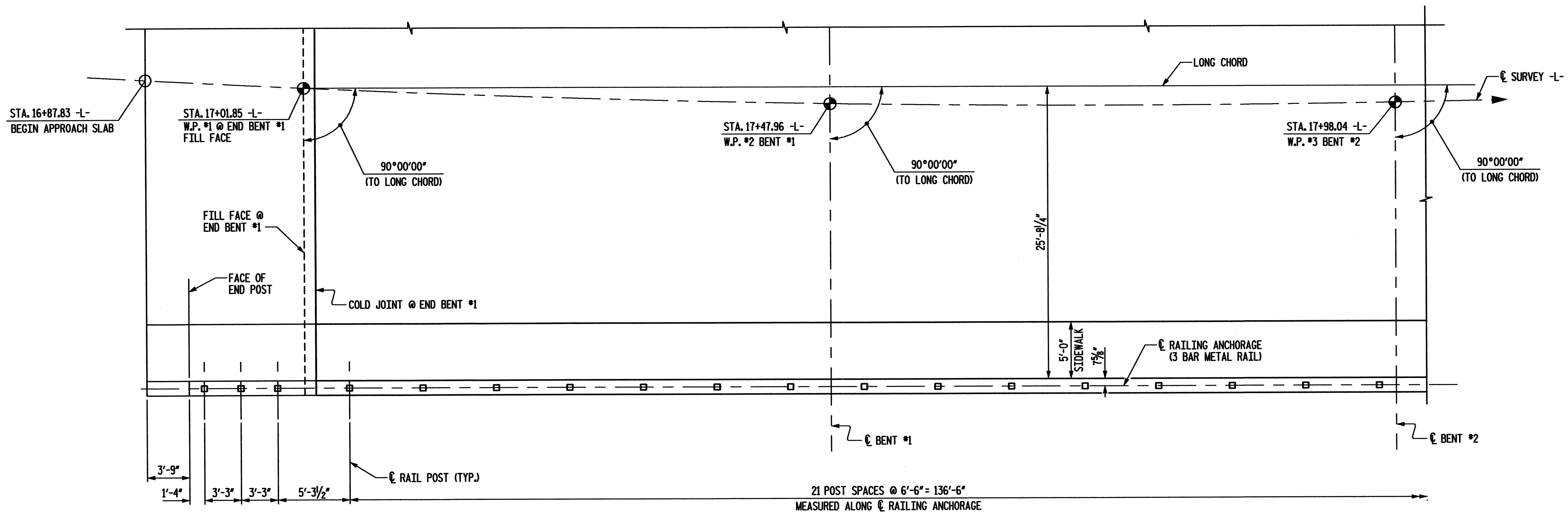
f/k/a Florence & Hutcheson, Inc.
 5121 Kingston Way, Suite 100 Raleigh, NC 27607
 NC License No: F-0288



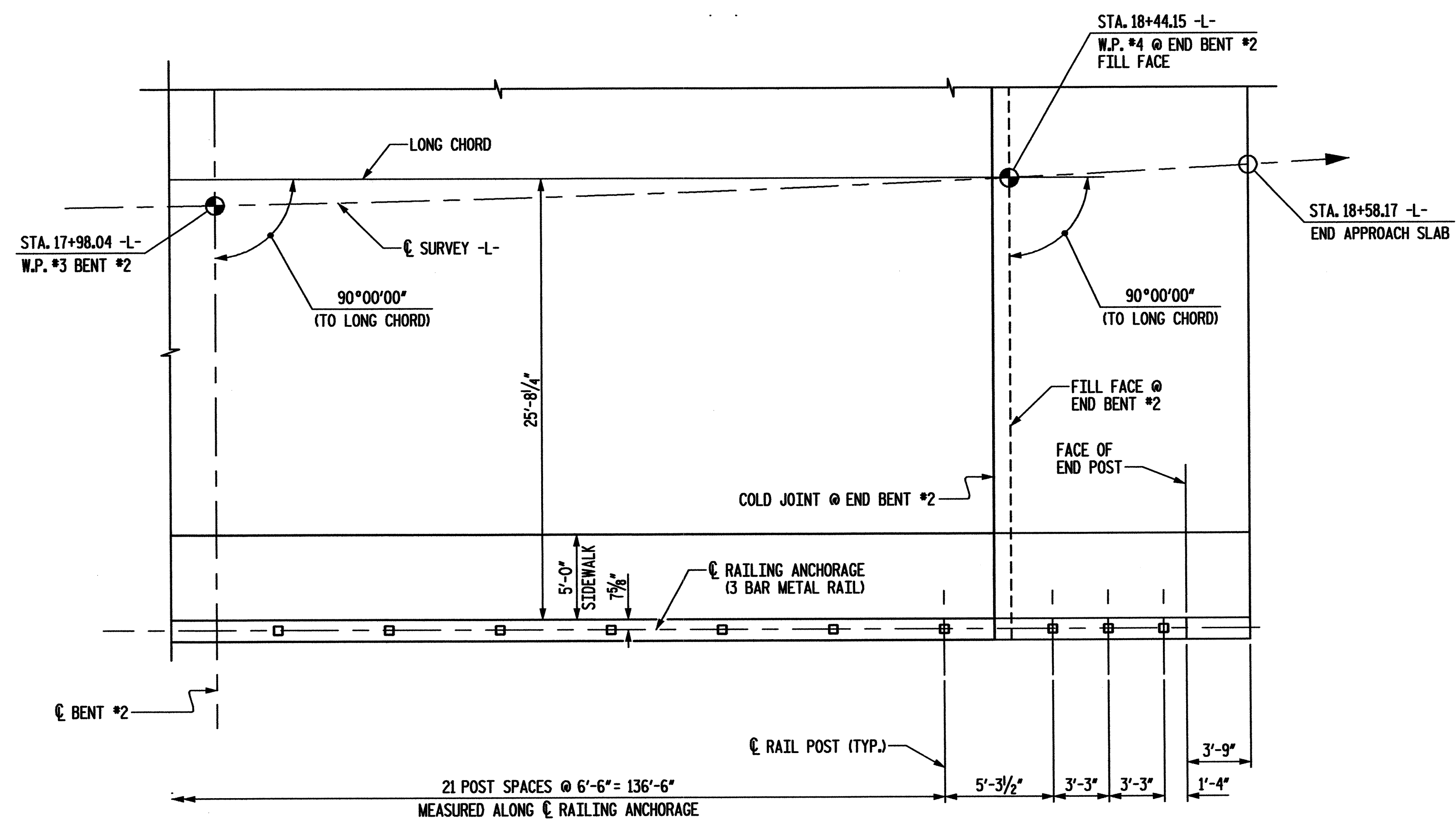
REVISIONS						HEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-10
1			3			TOTAL SHEETS
2			4			30

11/27/2013
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 ICA Engineering 7/7/20 Florence & Hutcheson, Inc.

DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



PLAN OF RAIL POST SPACINGS

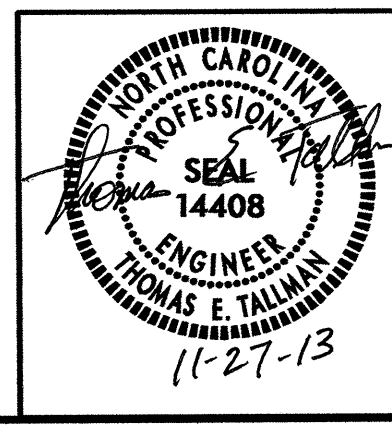


PLAN OF RAIL POST SPACINGS

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUPERSTRUCTURE
 RAIL POST SPACINGS FOR
 THREE BAR METAL RAIL



REVISIONS						QUERY NO.
NO.	BY	DATE	NO.	BY	DATE	S-11
1			3			TOTAL QUERIES
2			4			30

11/27/2013
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 ICA Engineering 17727a Florence & Hutcheson, Inc.

DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013

NOTES

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

ALUMINUM RAILS

MATERIAL FOR POSTS, BASES AND RAILS, EXPANSION BARS AND CLAMP BARS SHALL BE ASTM B221 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. PLACE ONE JOINT SPLICE JUST BEYOND THE 3RD RAIL POST FROM EACH END, TYPICALLY 14' FROM THE END. PLACE OTHER JOINTS AS NEEDED.

FOR END OF RAIL TO CLEAR FACE OF CONCRETE END POST DIMENSION, SEE STANDARD NO. BMR7.

CAP SCREWS SHALL BE ASTM F593 ALLOY 305 STAINLESS STEEL. WASHERS FOR RAIL ATTACHMENT 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.

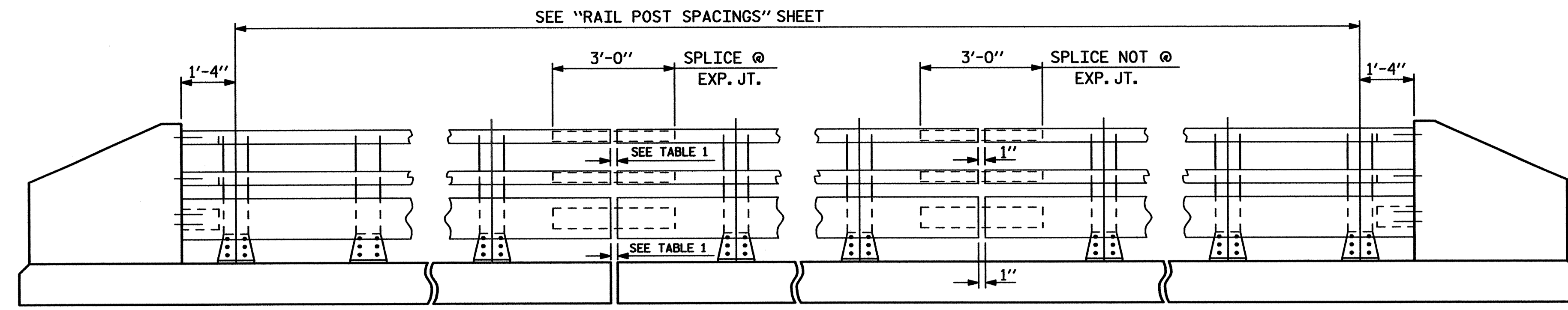
TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAIN VISIBLE AFTER RAIL PLACEMENT.

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.

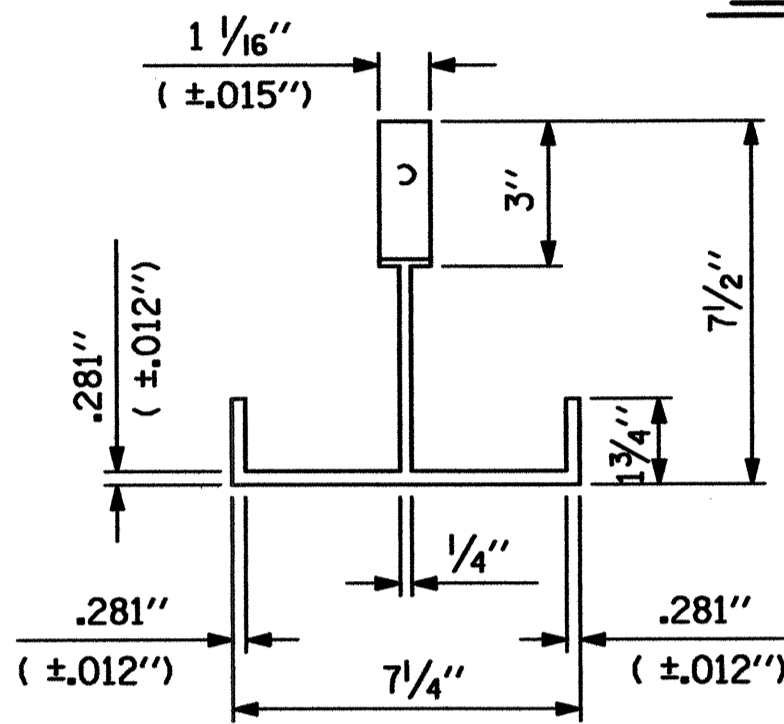
PAY LENGTH = 162.8 LIN. FT.



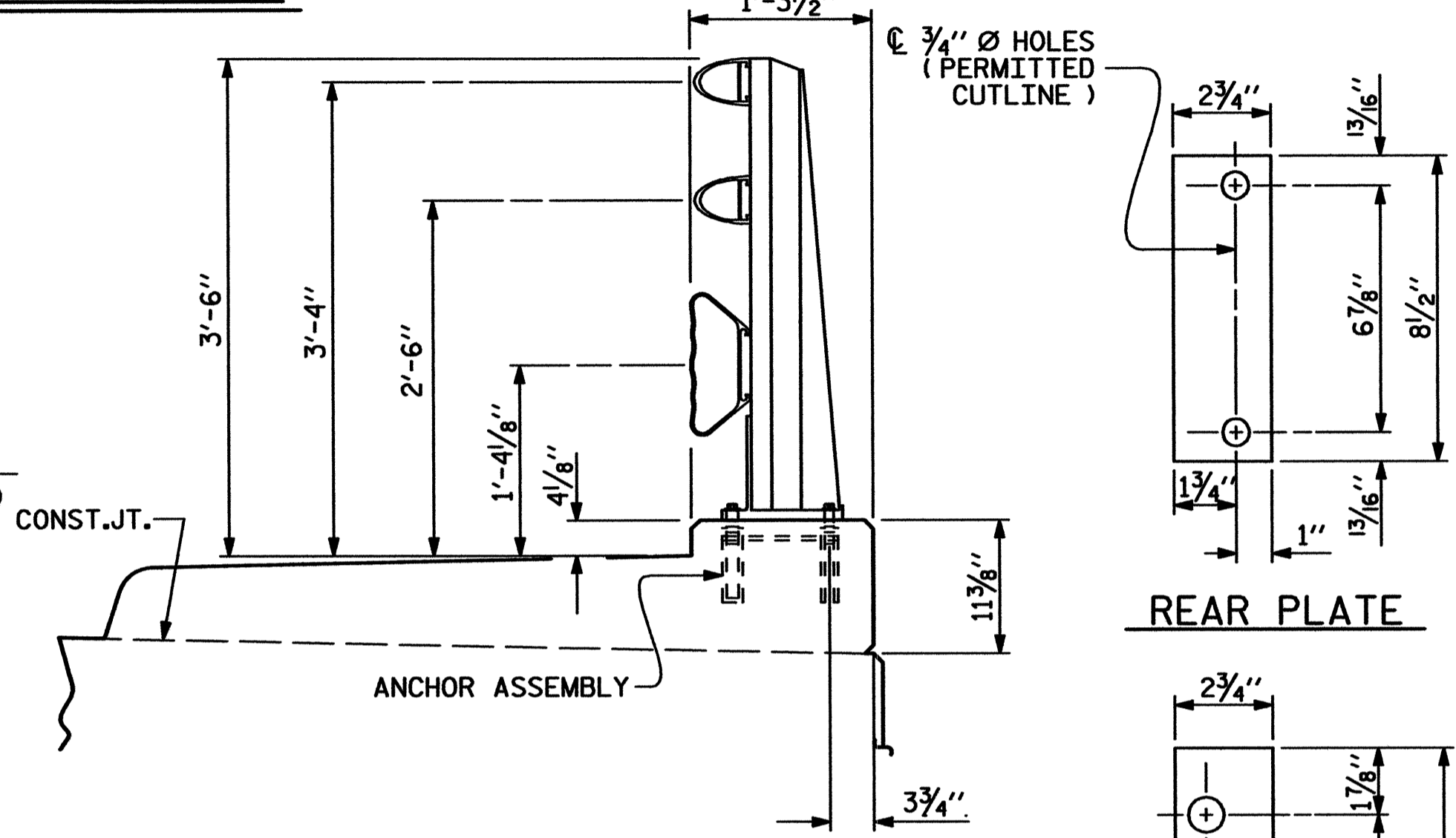
ELEVATION

NOTE:
FOR ATTACHMENT OF METAL RAIL TO END POST, SEE SHEET S-15.

CL. JT. @ BENT	RAIL OPENING
BENT No. 1	1"
BENT No. 2	1"



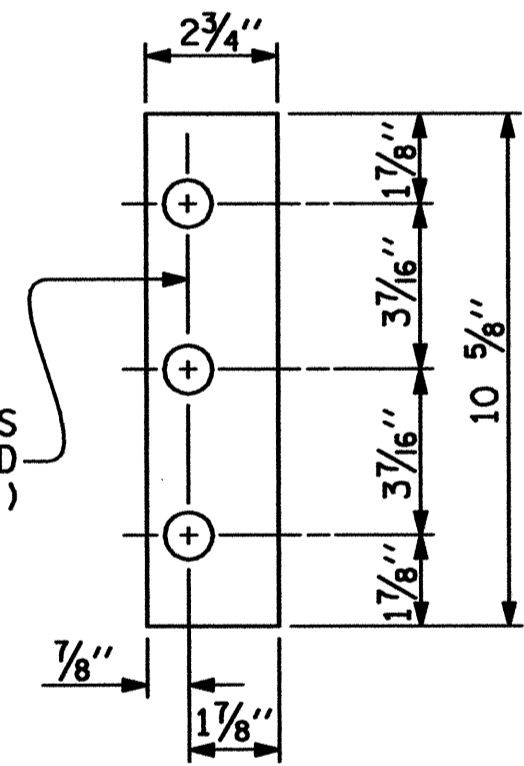
PLAN



SECTION THRU RAIL

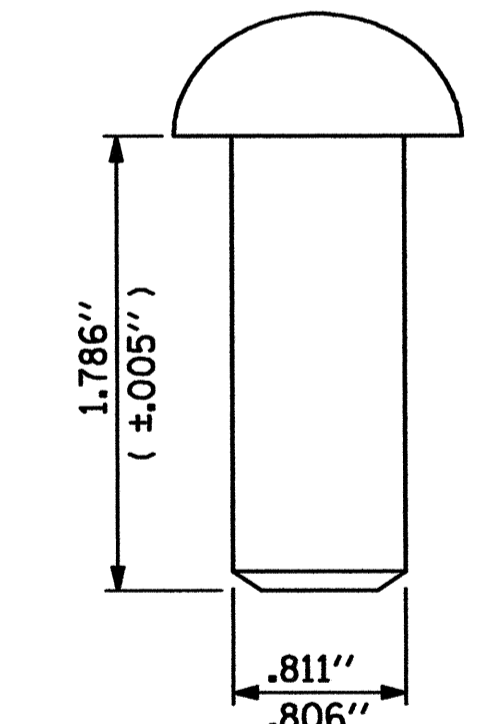
FOR ANCHOR ASSEMBLY, SEE "3 BAR METAL RAIL" STD. NO. BMR6

REAR PLATE

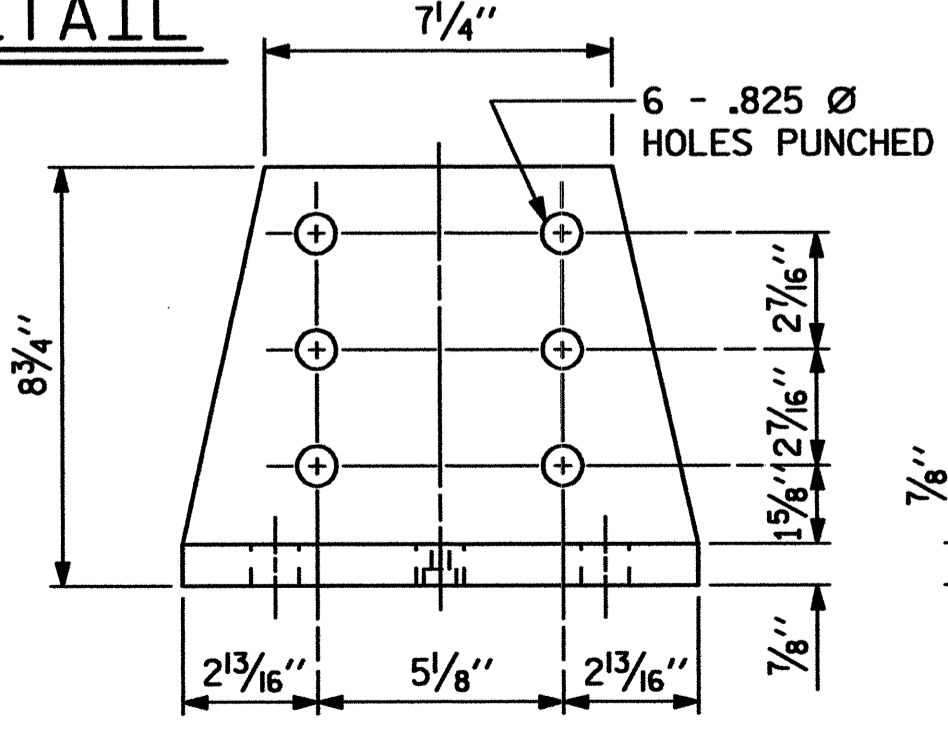


FRONT PLATE SHIM DETAILS

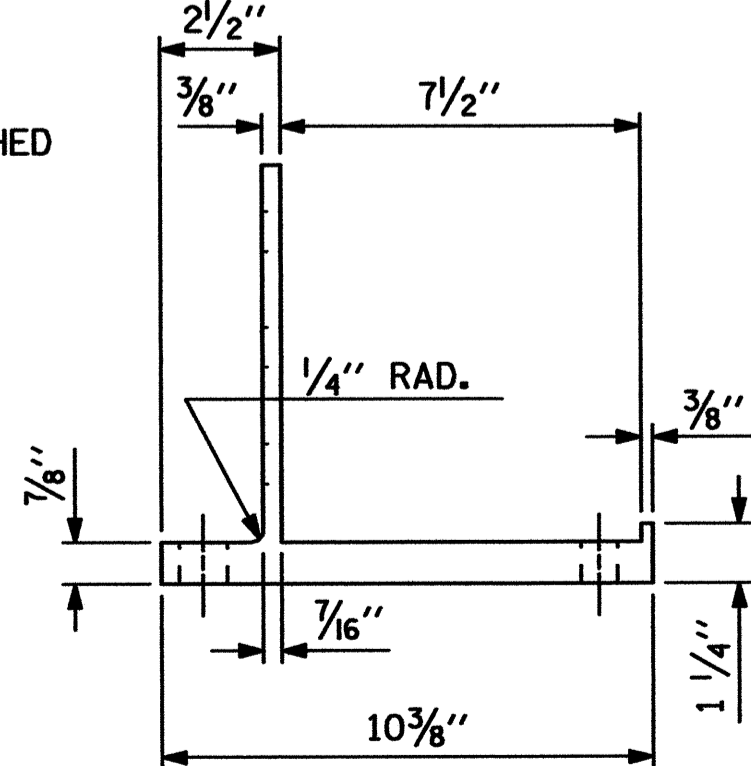
NOTE: SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



RIVET DETAIL

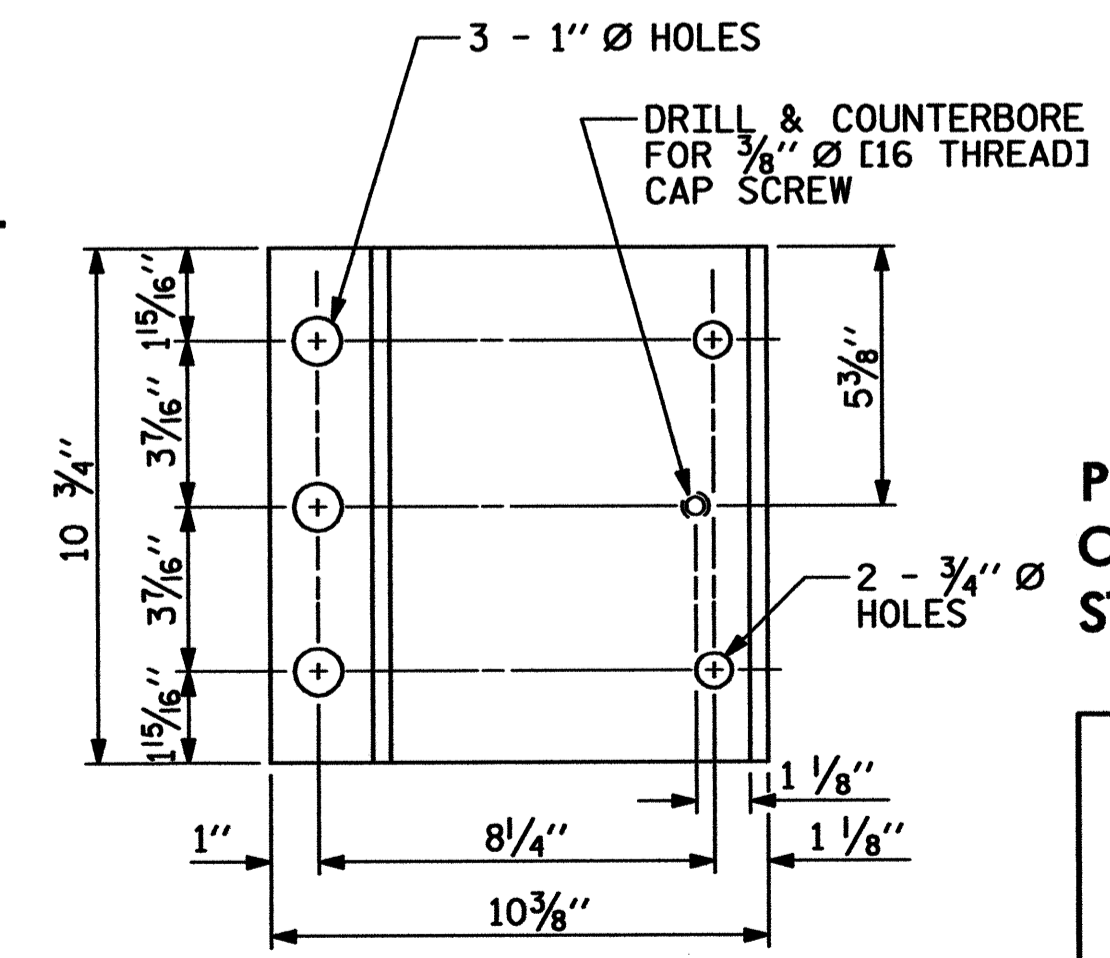


FRONT ELEVATION



SIDE ELEVATION

POST BASE DETAILS

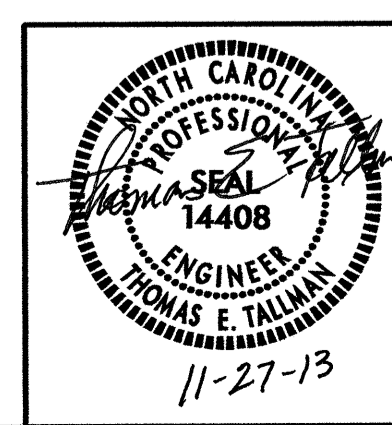


PLAN

PROJECT NO. 33817
COUNTY: UNION
STATION: 17 + 73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3 BAR METAL RAIL
(SHEET 1 OF 3)

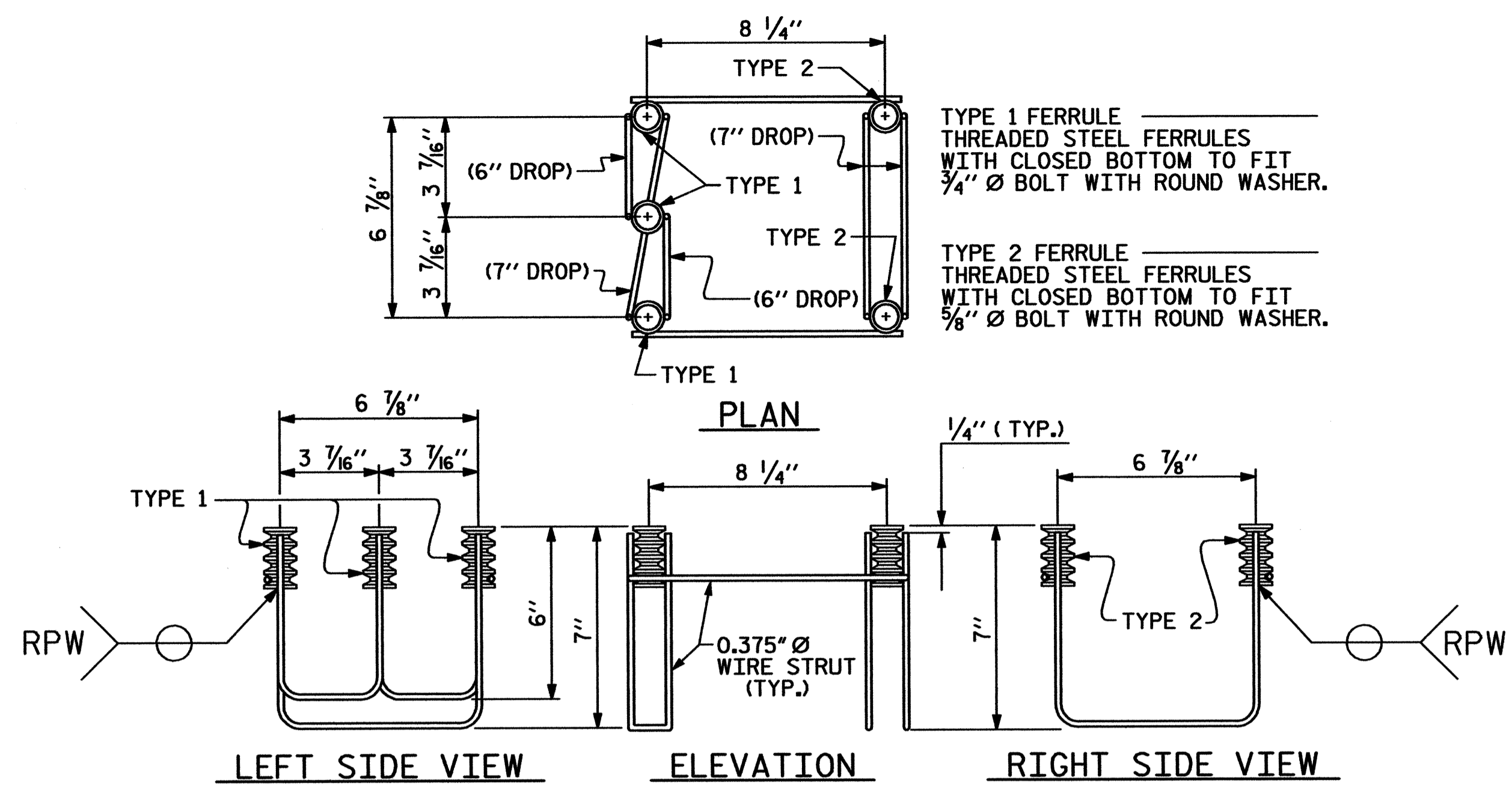


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3121 Kington Way, Suite 100 Raleigh, NC 27607
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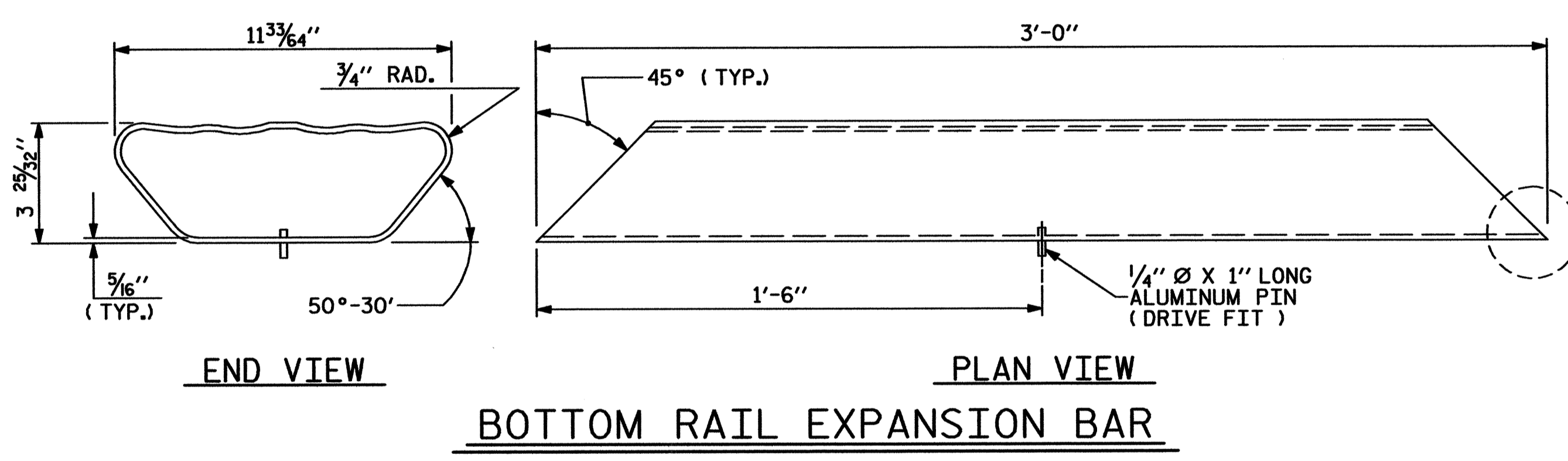
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-12
1			3			TOTAL SHEETS
2			4			30

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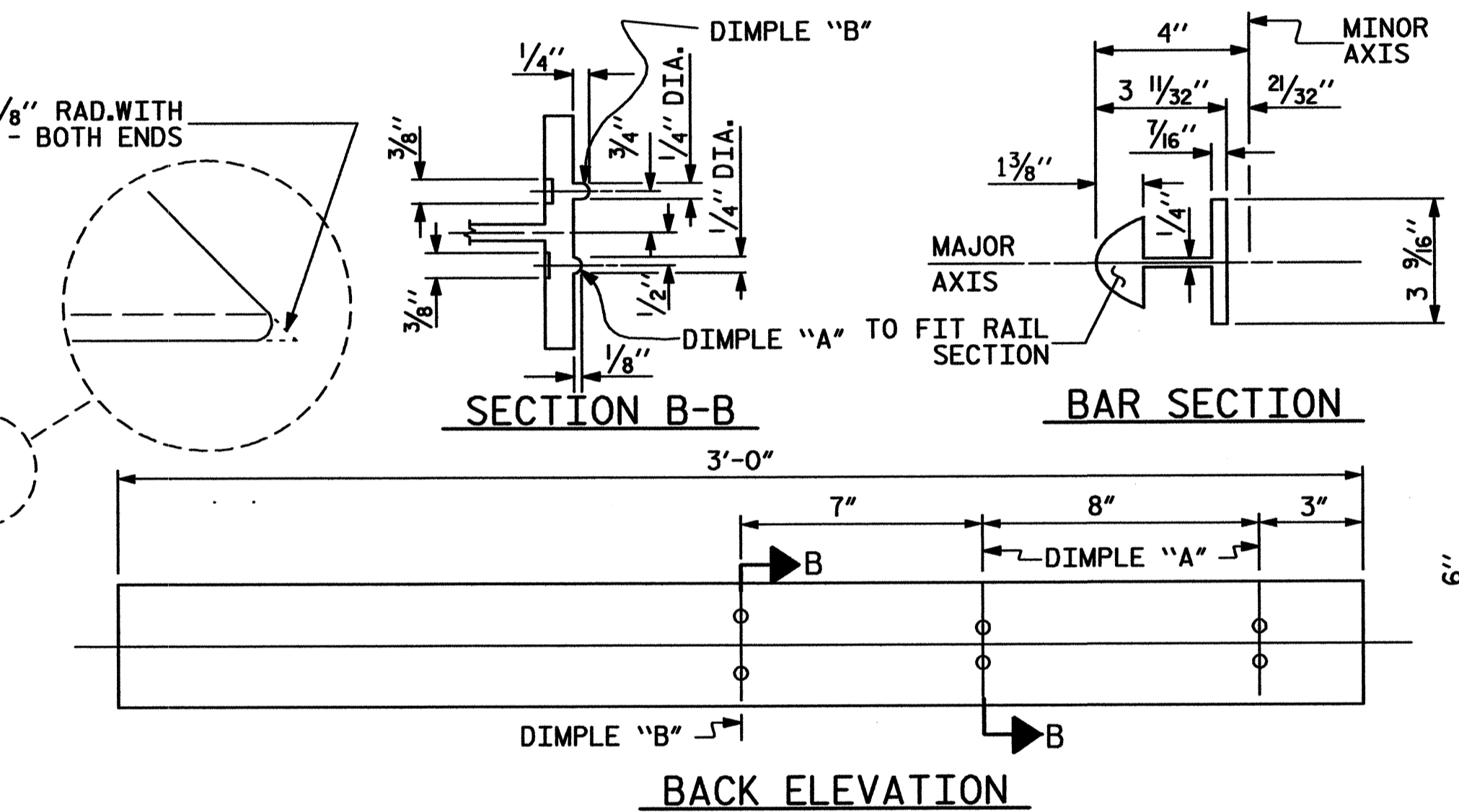
ASSEMBLED BY: B.E. LANNING DATE: DEC. 2008
CHECKED BY: J.E. MONDOLFI DATE: DEC. 2008
DRAWN BY: JMB 1/88 REV. 10/17/00 RWW/LES
CHECKED BY: GGH 1/88 REV. 5/7/03 RWW/JTE
REV. 5/1/06 TLA/GM



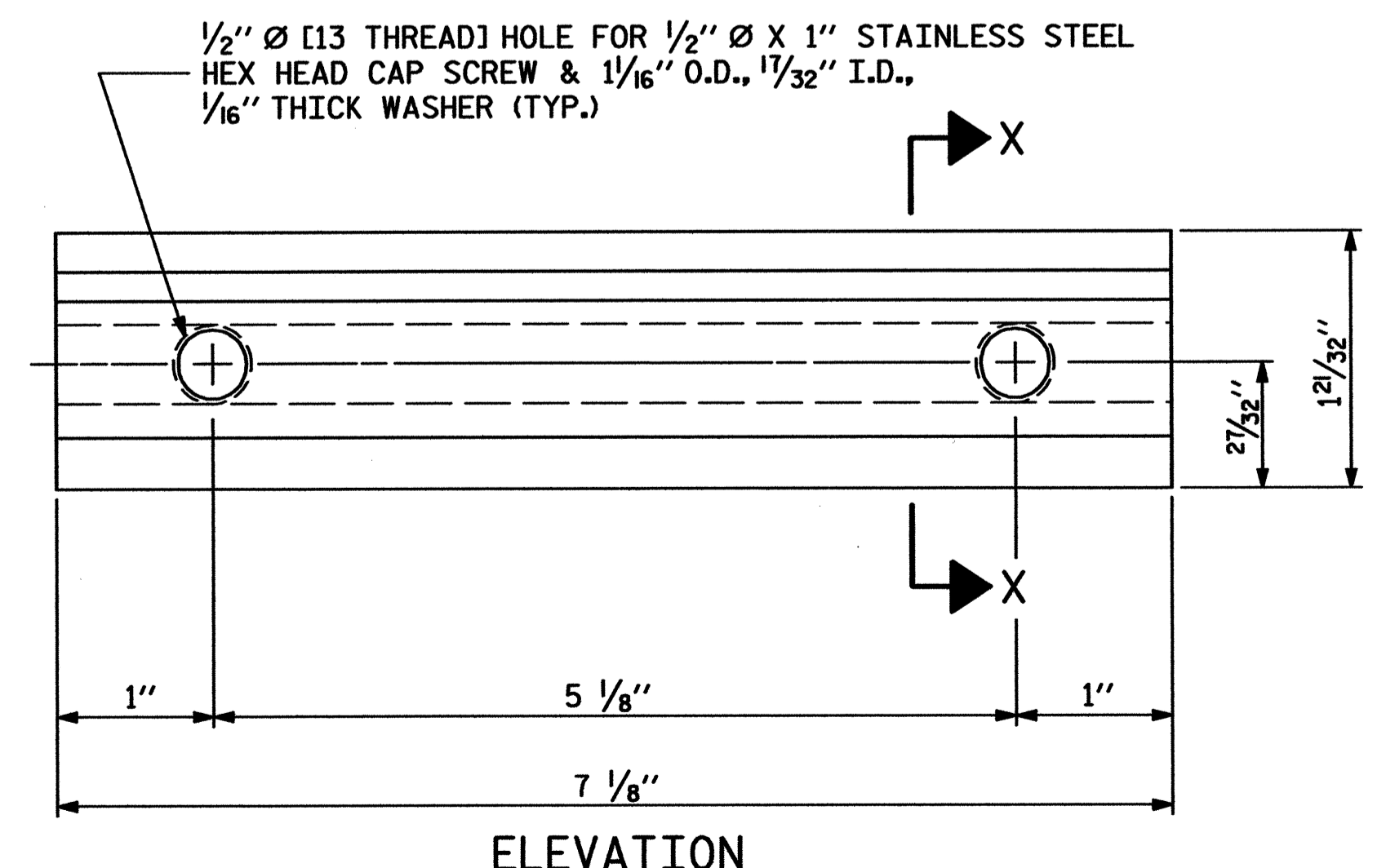
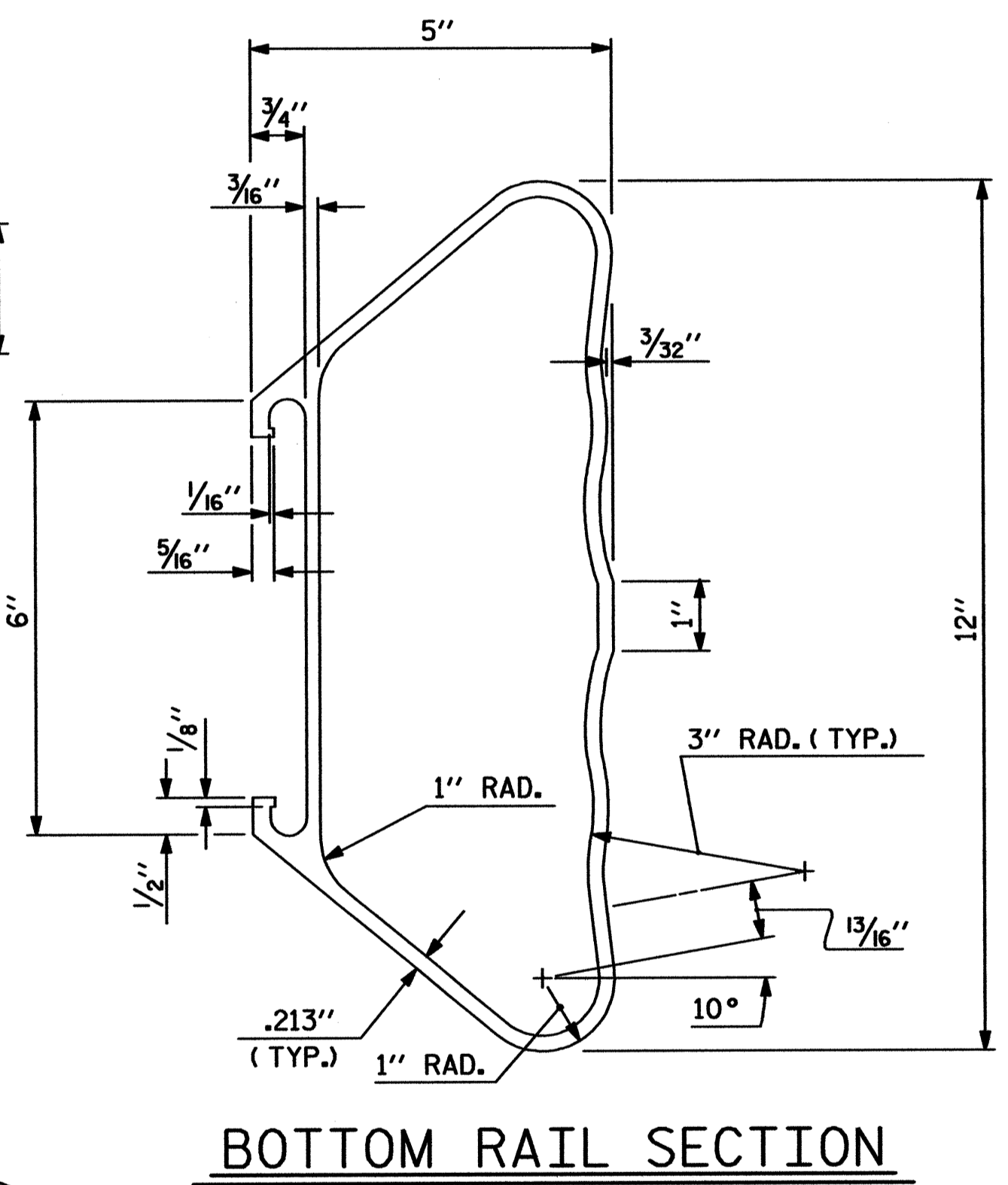
5-BOLT METAL RAIL ANCHOR ASSEMBLY
(28 ASSEMBLIES REQUIRED)



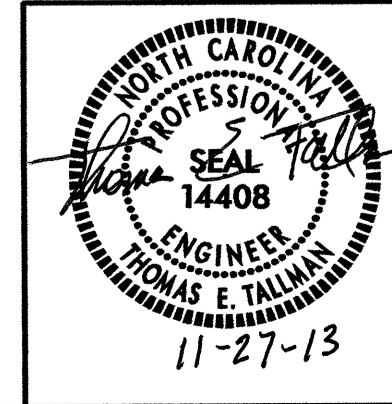
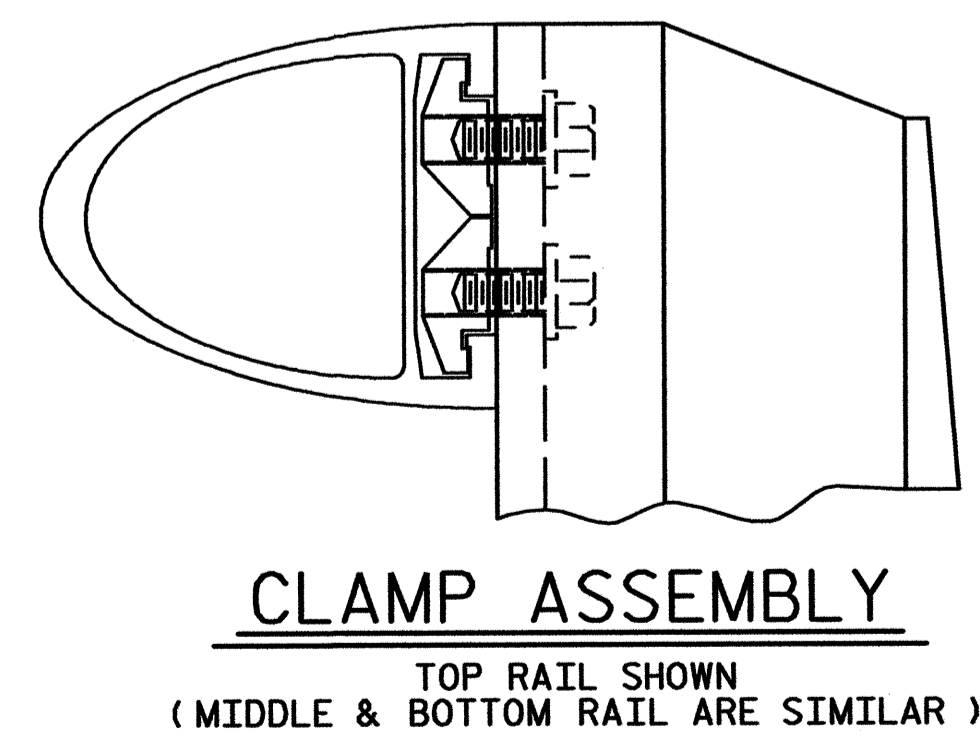
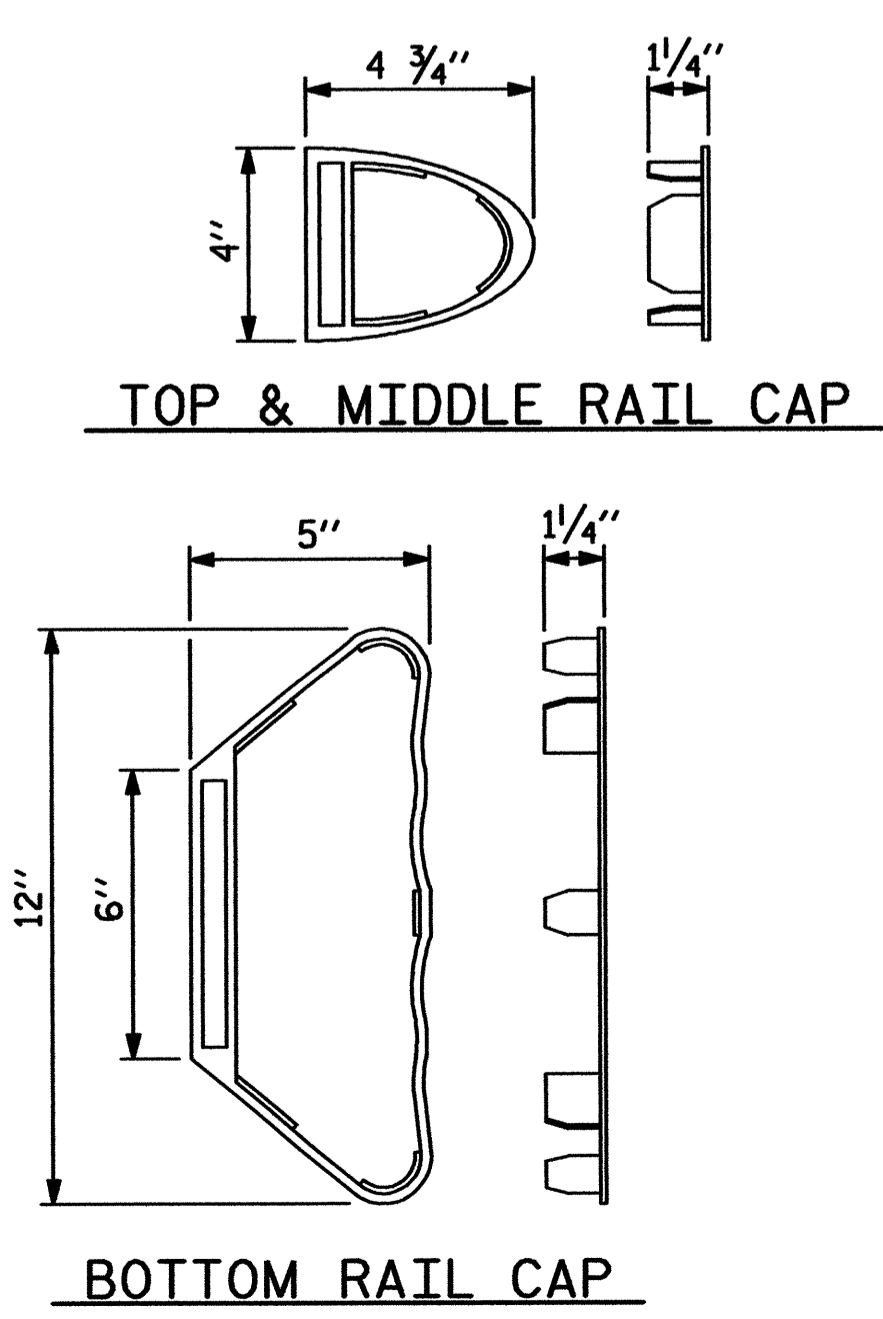
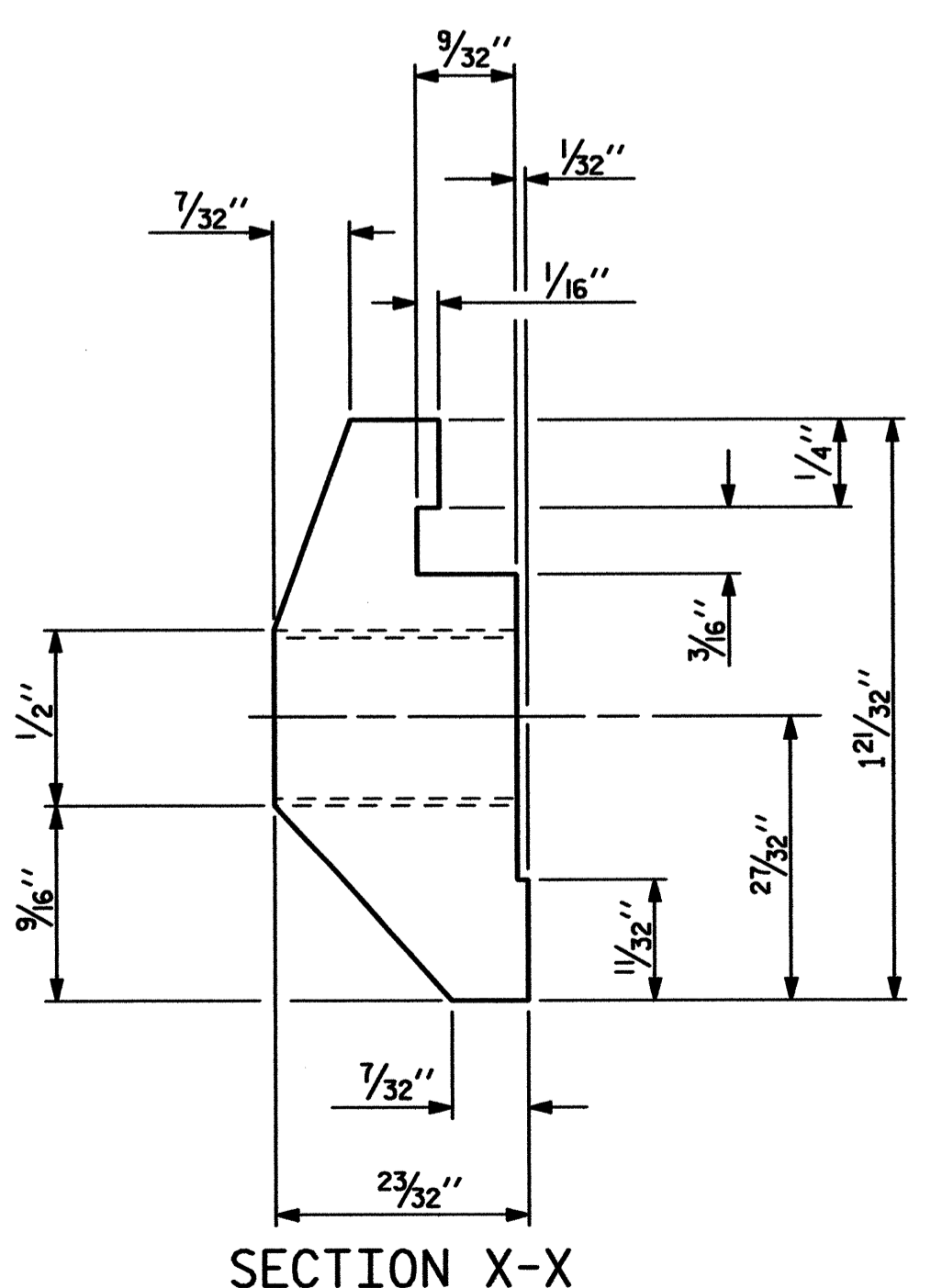
BOTTOM RAIL EXPANSION BAR



TOP & MIDDLE RAIL EXPANSION BAR



CLAMP BAR DETAIL
(6 REQUIRED PER POST)



PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
STANDARD 3 BAR METAL RAIL (SHEET 2 OF 3)					
REVISIONS					SHEET NO.
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		
					TOTAL SHEETS
					30

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 AND 1 3/4" FOR 5/8" FERRULES.

B. 3 - 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. 2 - 5/8" Ø X 2 1/4" 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 5/8" Ø X 2 1/4" 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.

D. 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 1/8" Ø WIRE STRUT WITH A MINIMUM TENSILE STRENGTH OF 90,000 PSI IS ACCEPTABLE.

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

F. 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.

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

11/27/2013
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ICA Engineering 7/27/09 Florence & Hutcheson, Inc.

ASSEMBLED BY : B.E. LANNING	DATE : DEC. 2008		
CHECKED BY : J.E. MONDOLFI	DATE : DEC. 2008		
DRAWN BY : JMB 1/88	REV. 7/10/01 RWW/LES		
CHECKED BY : GGH 1/88	REV. 5/1/03 RWW/JTE		
	REV. 5/1/06 TLA/GM		

NOTES

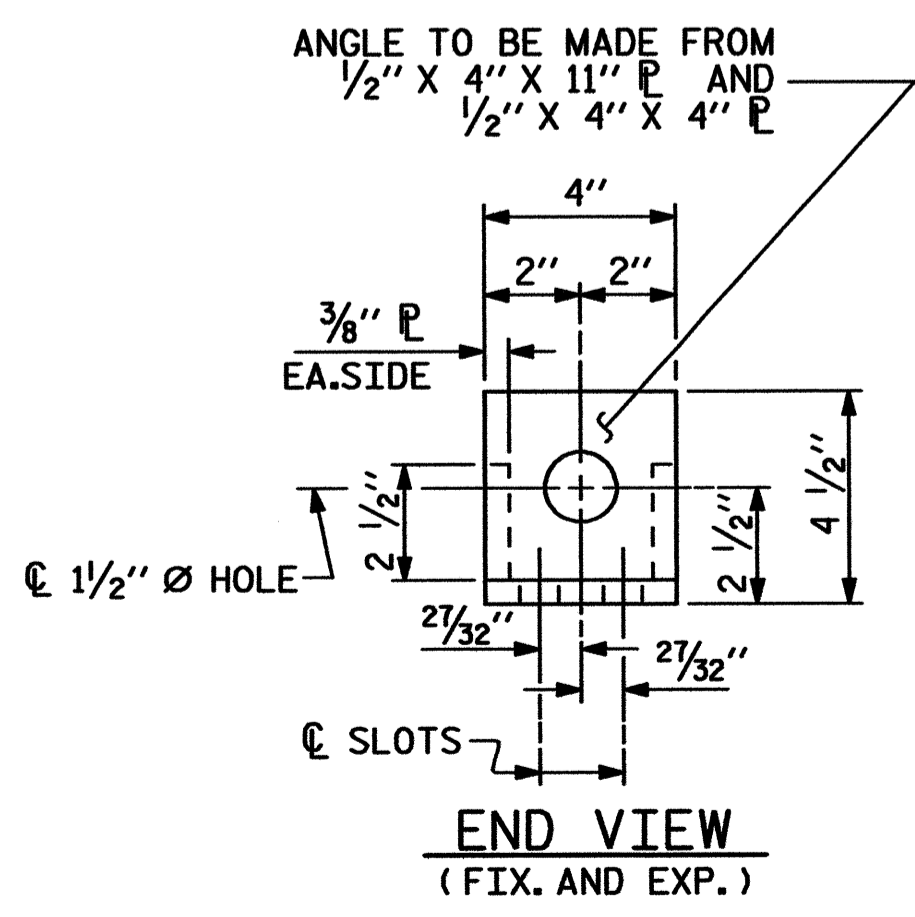
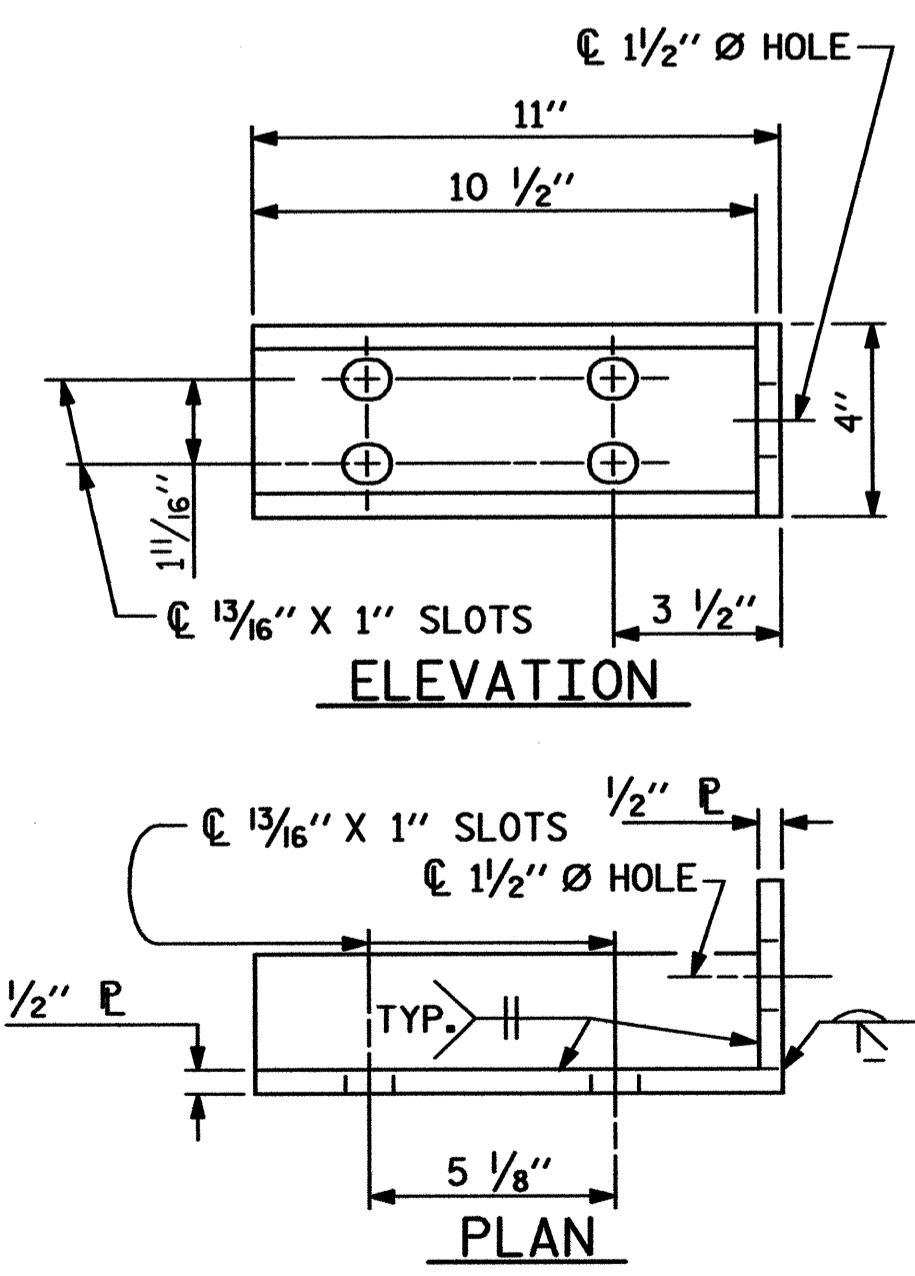
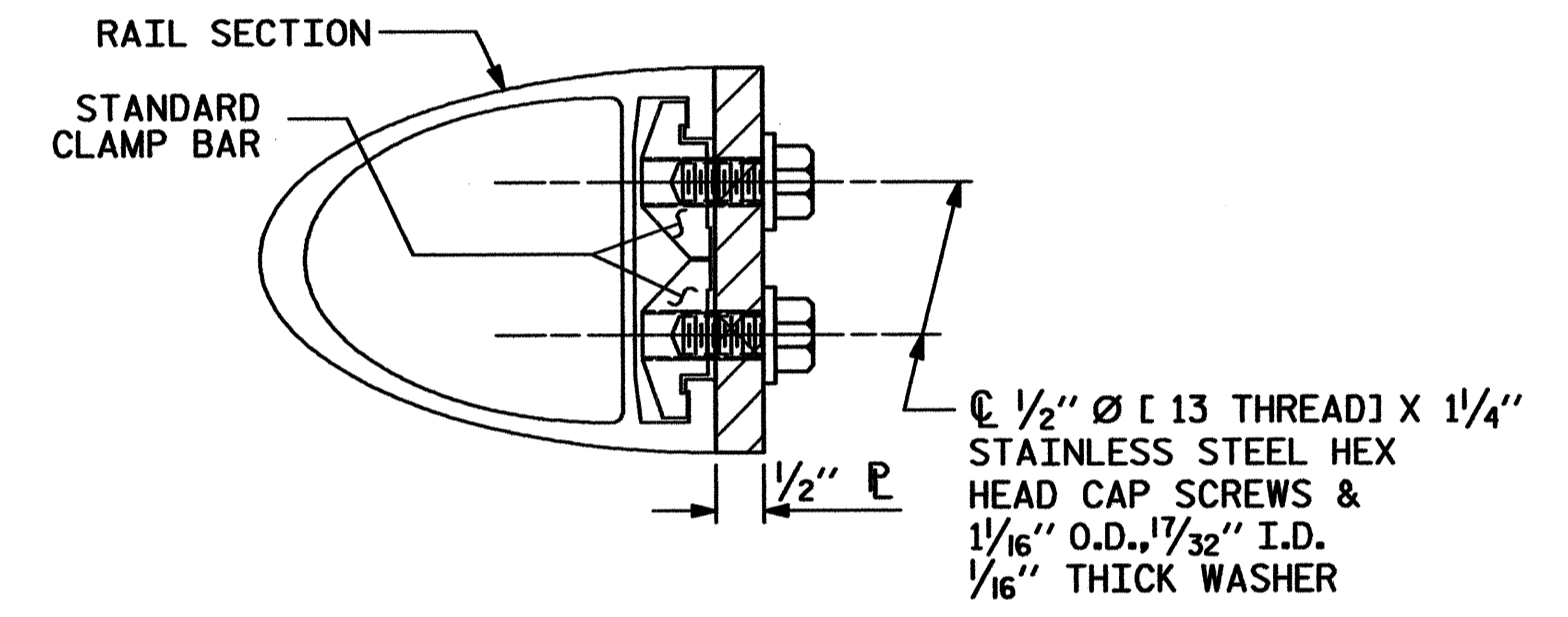
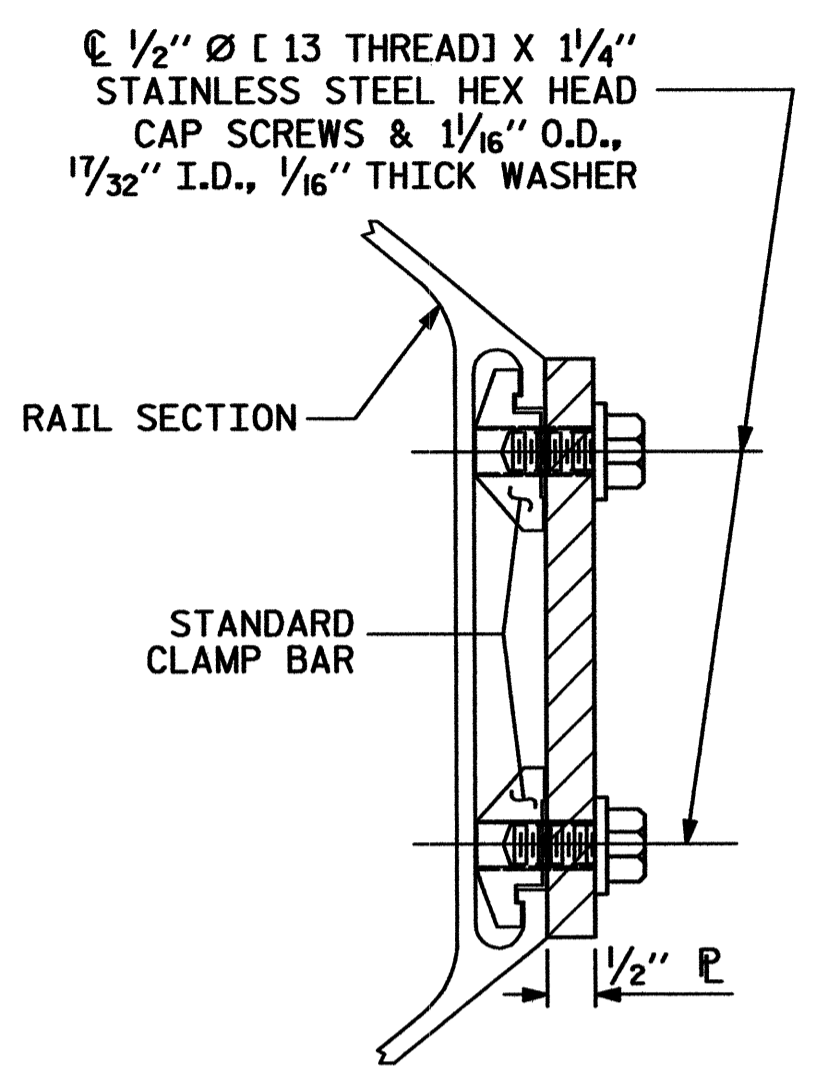
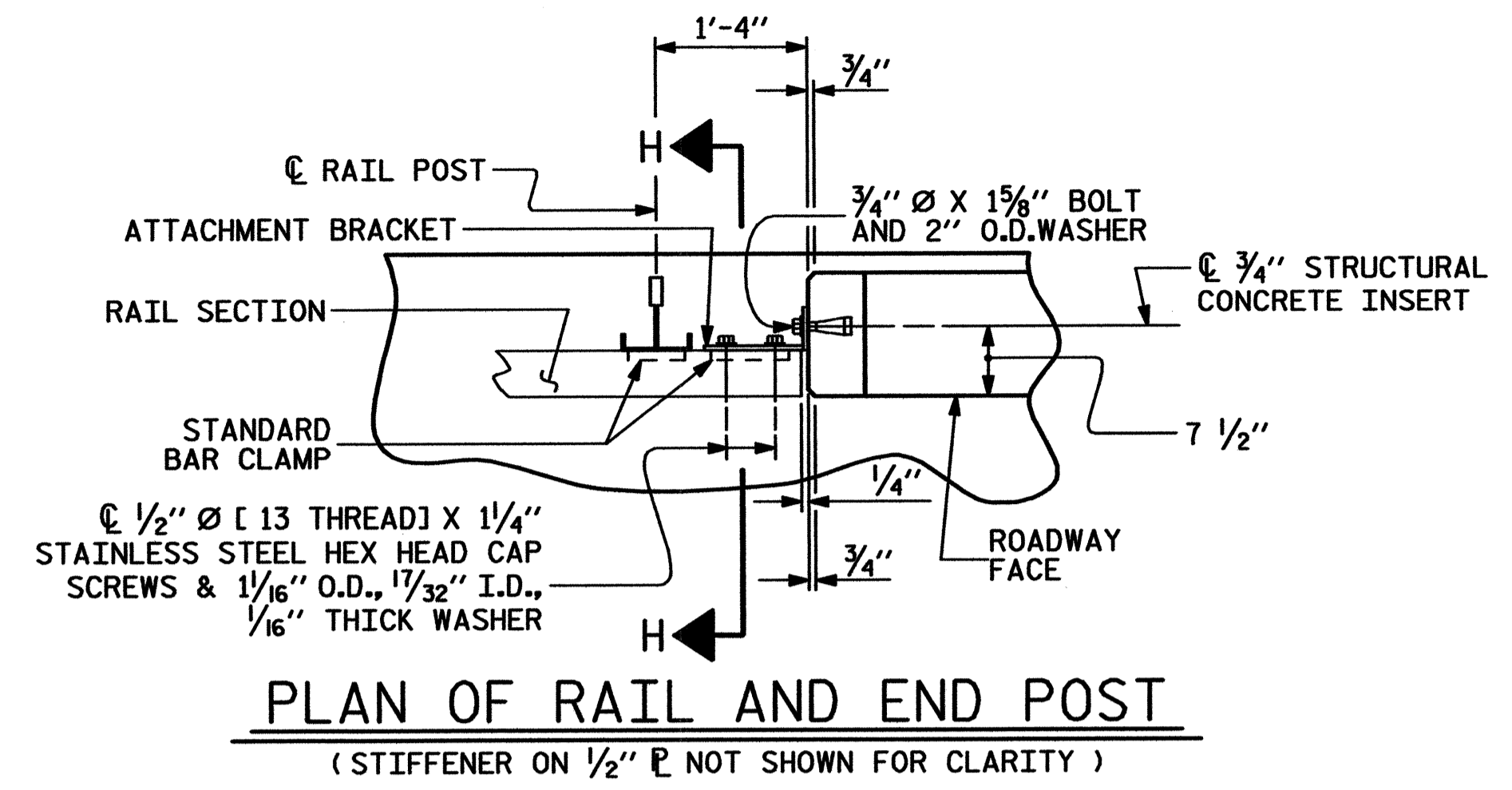
METAL RAIL TO END POST CONNECTION

- THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:
- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
 - B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS, THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N.C. THREADS.
 - C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°. WASHERS FOR RAIL ATTACHMENT SHALL MEET THE REQUIREMENTS OF ASTM F844 EXCEPT THEY SHALL BE MADE FROM ALLOY 304 STAINLESS STEEL.
 - D. STANDARD CLAMP BARS (STD. No. BMR6).
- 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 3 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.

NOTES

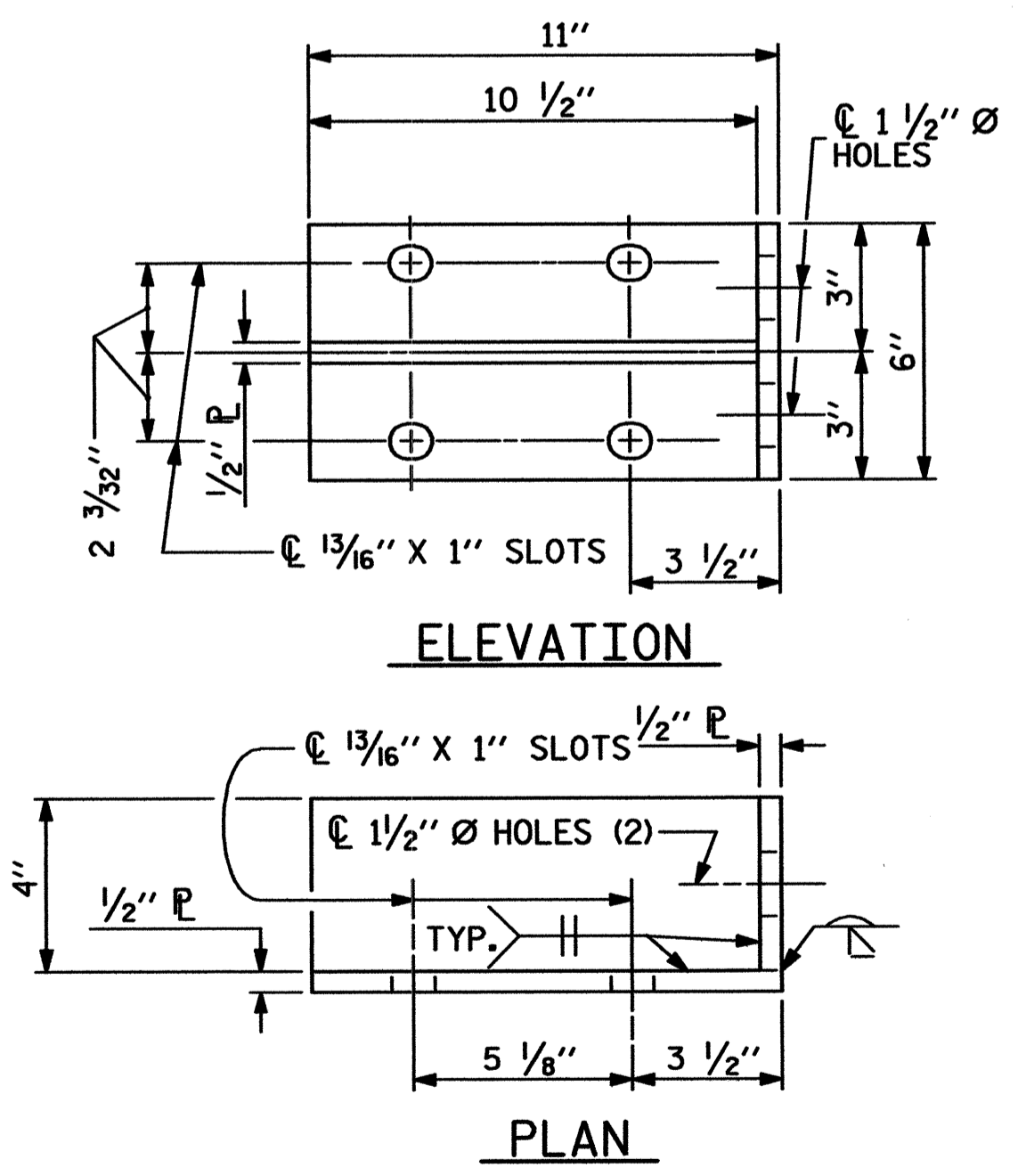
STRUCTURAL CONCRETE INSERT

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

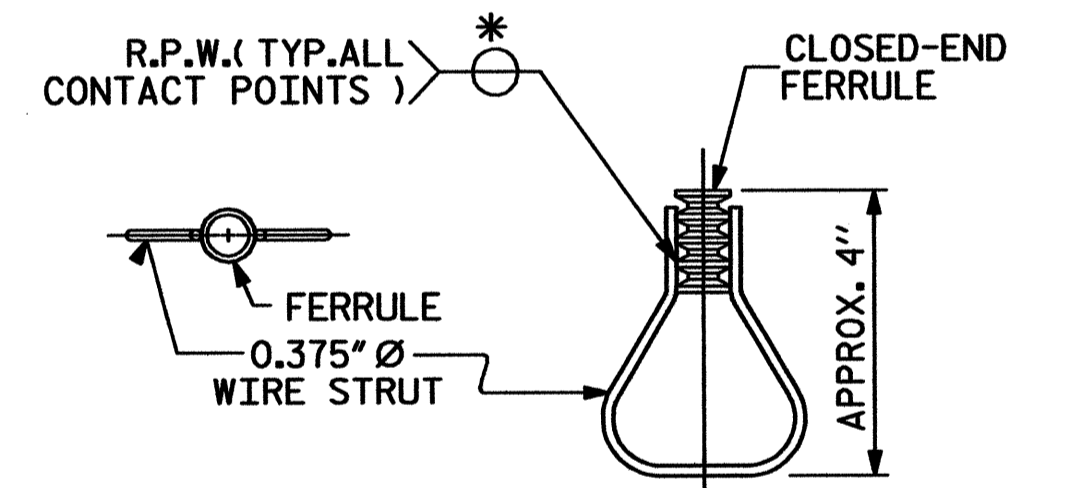


DETAILS FOR ATTACHMENT BRACKET
(TOP & MIDDLE RAIL ONLY)

SECTION H-H
(FOR BOTTOM RAIL)



DETAILS FOR ATTACHMENT BRACKET
(BOTTOM RAIL ONLY)



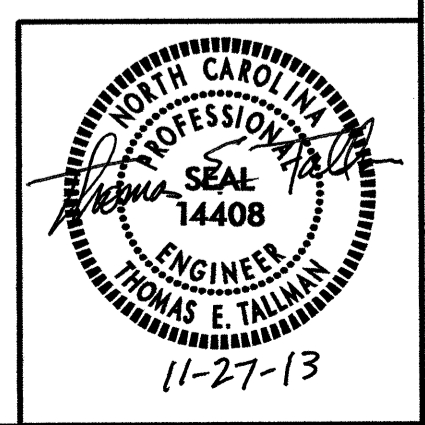
STRUCTURAL CONCRETE INSERT

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

PROJECT NO. 33817
COUNTY: UNION
STATION: 17 + 73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

STANDARD
3 BAR METAL RAIL
(SHEET 3 OF 3)



REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-14
1			3			TOTAL SHEETS
2			4			30

11/27/2013 10:46:51 AM \\p04651\structures\414_b4651.ed\m4.dgn ICA Engineering 7/27/03 Florence & Hutcheson, Inc.

ASSEMBLED BY : B.E. LANNING	DATE : DEC. 2008
CHECKED BY : J.E. MONDOLFI	DATE : DEC. 2008
DRAWN BY : JMB 1/88	REV. 7/10/01 RWW/LES
CHECKED BY : GGH 1/88	REV. 5/7/03 RWW/JTE
	REV. 5/1/06 TLA/GM

NOTES

THE GUARDRAIL ANCHOR ASSEMBLY SHALL CONSIST OF A 1/4" HOLD DOWN PLATE AND 7 - 1/8" 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 1/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.)

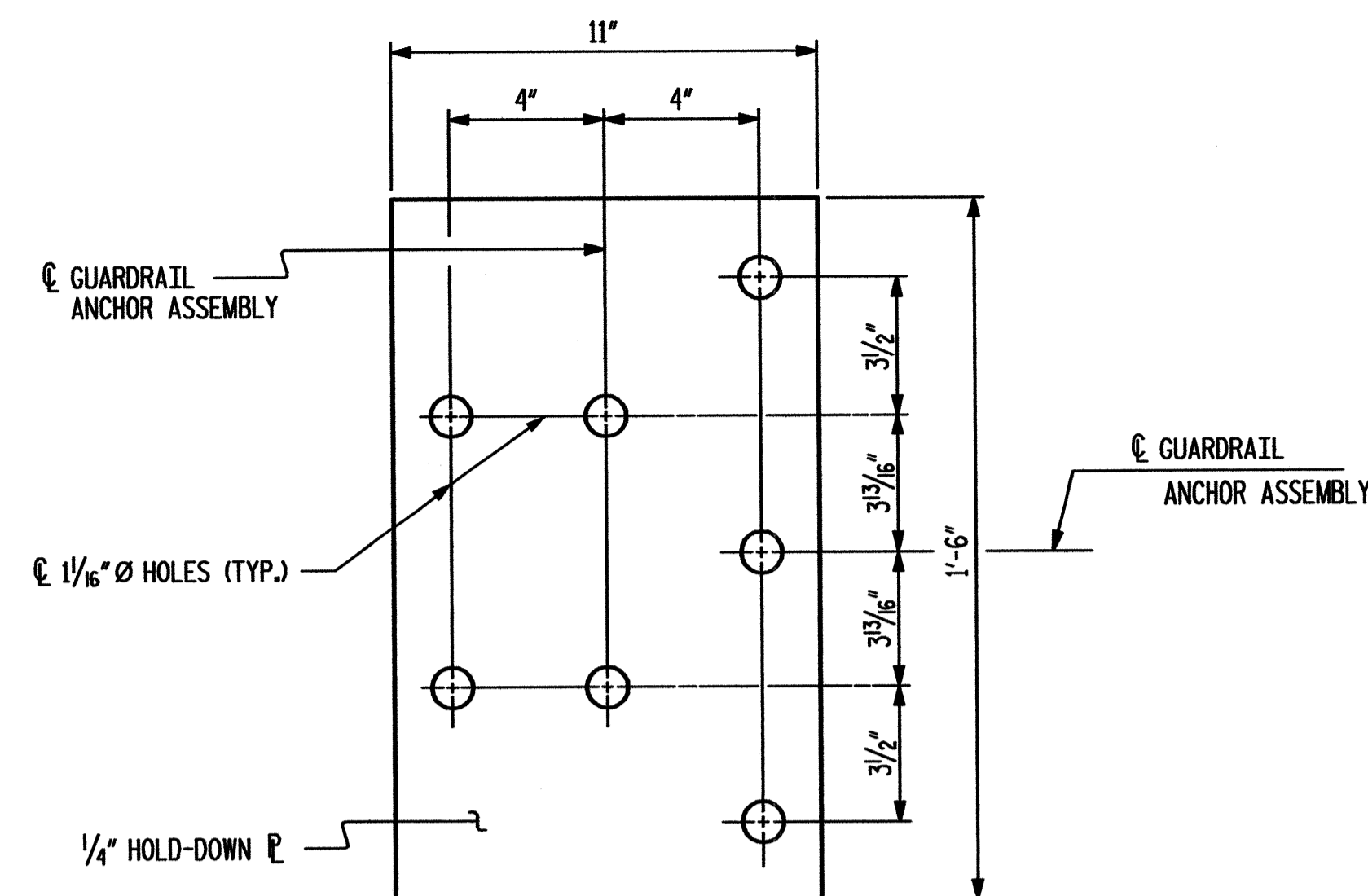
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

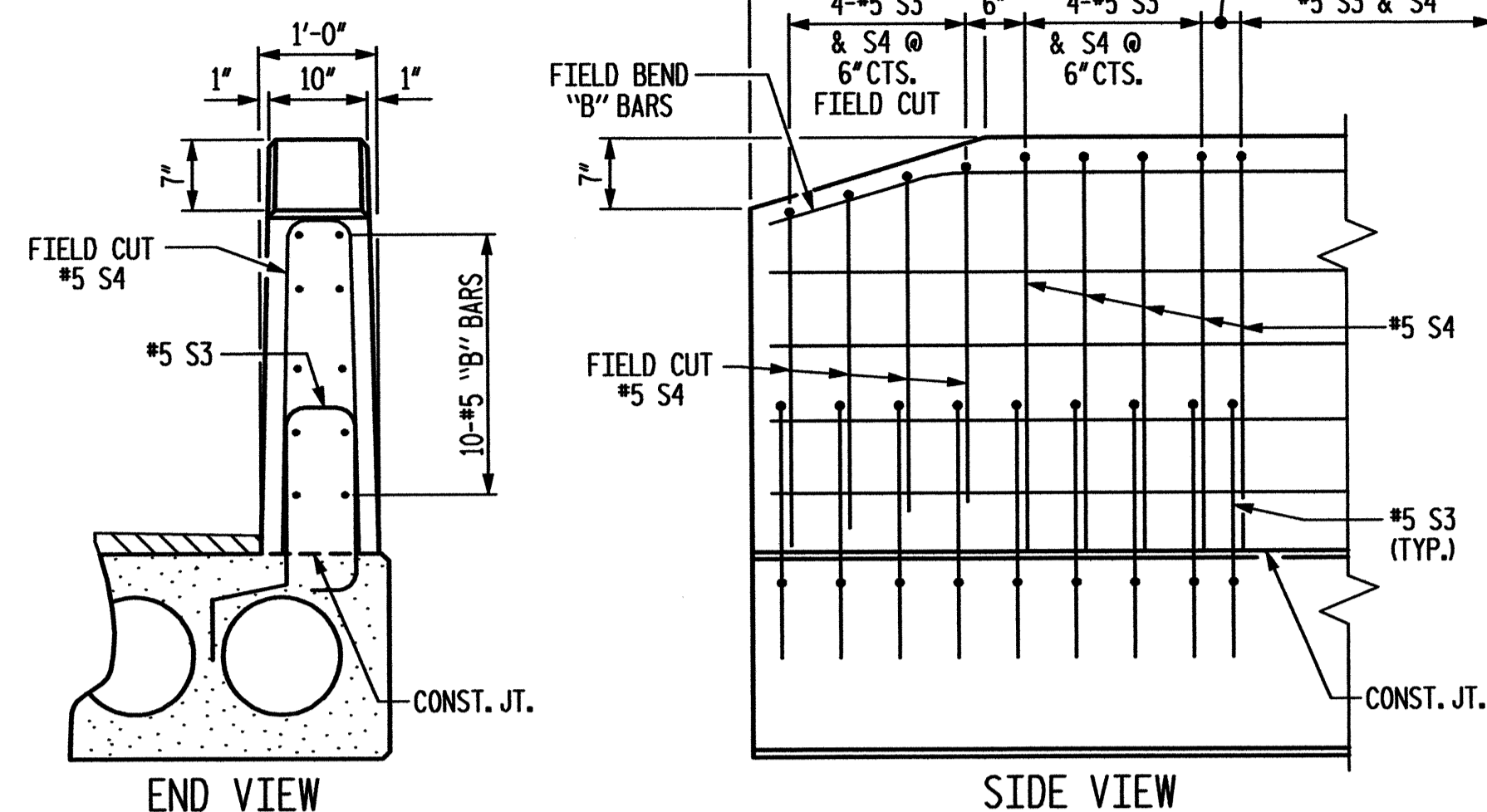
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLY SHALL BE INCLUDED IN THE UNIT CONTRACT PRICE BID FOR VERTICAL CONCRETE BARRIER RAIL.

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

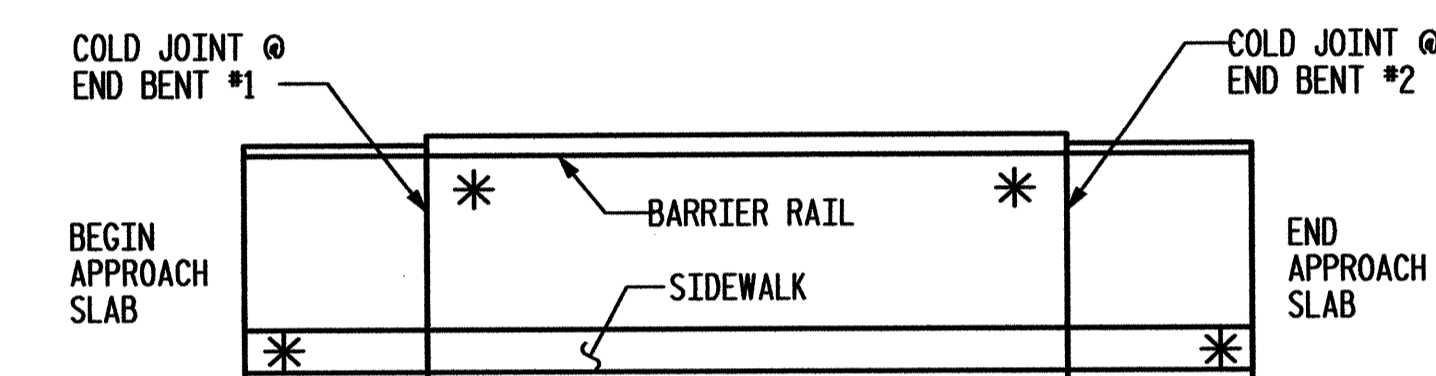
THE 1/4" Ø HOLES SHALL BE FORMED OR DRILLED WITH A CORE BIT. IMPACT TOOLS WILL NOT BE PERMITTED. ANY CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.



PLAN

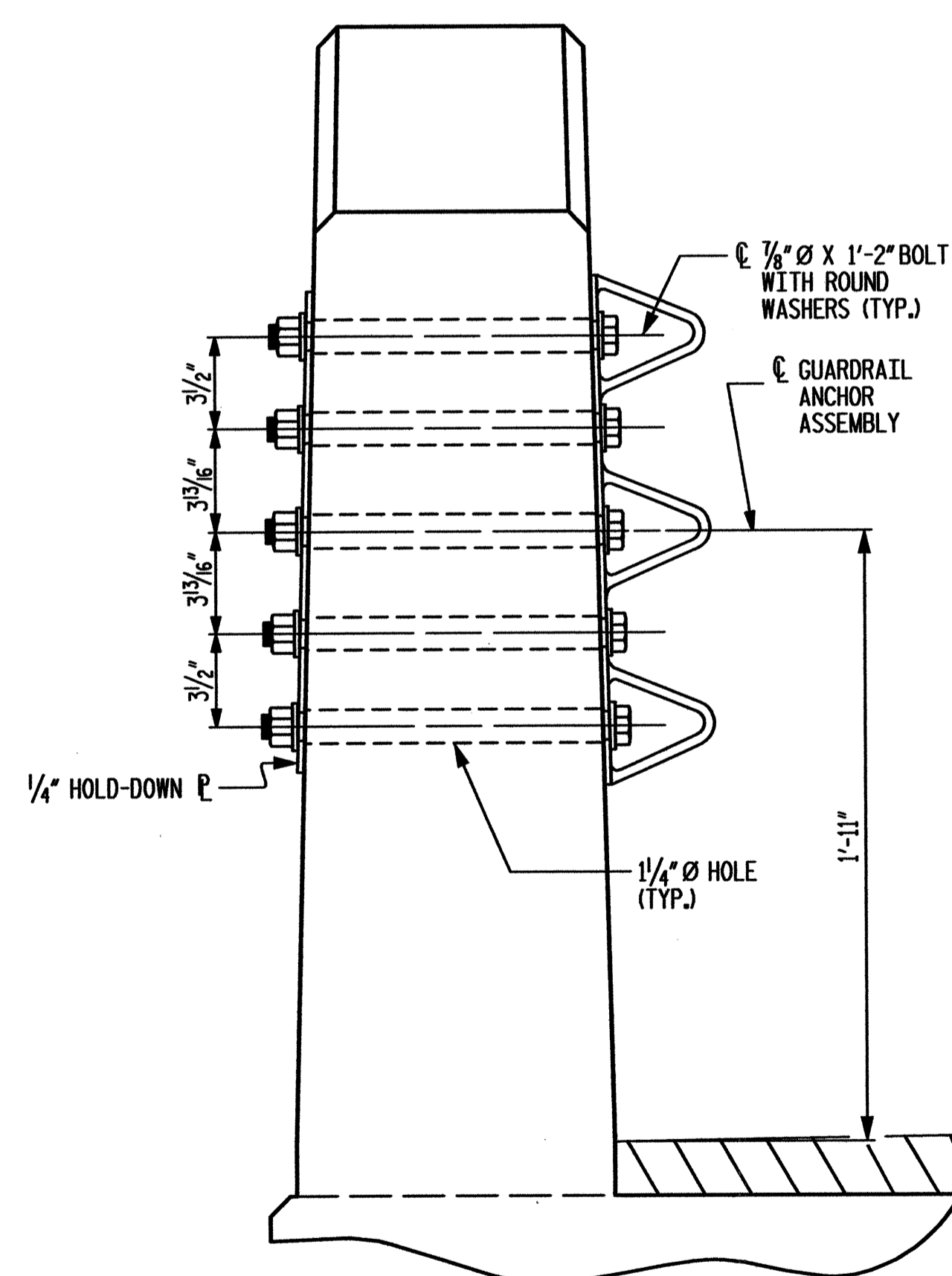


END OF BARRIER RAIL DETAILS

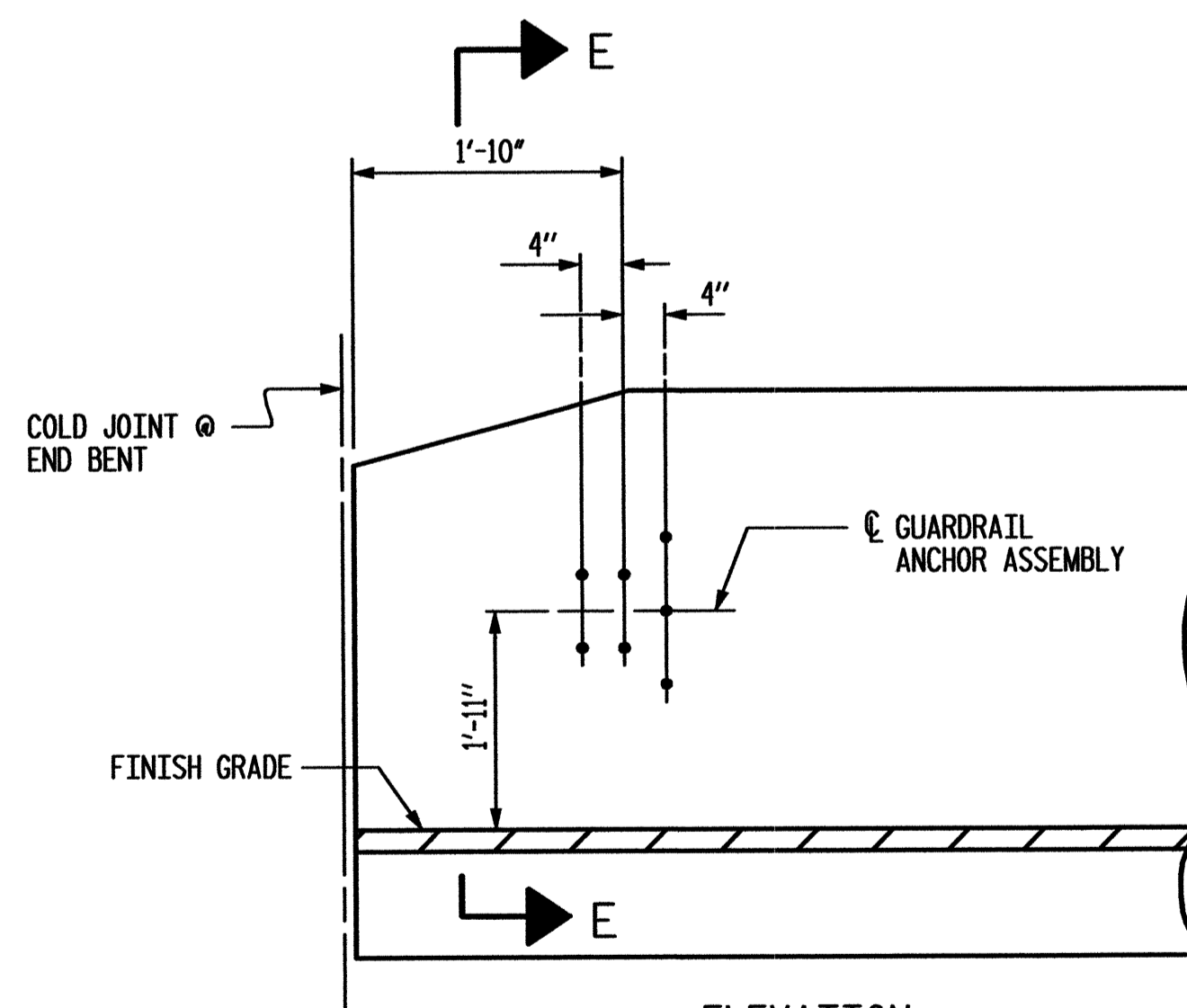


SKETCH SHOWING POINTS OF ATTACHMENTS

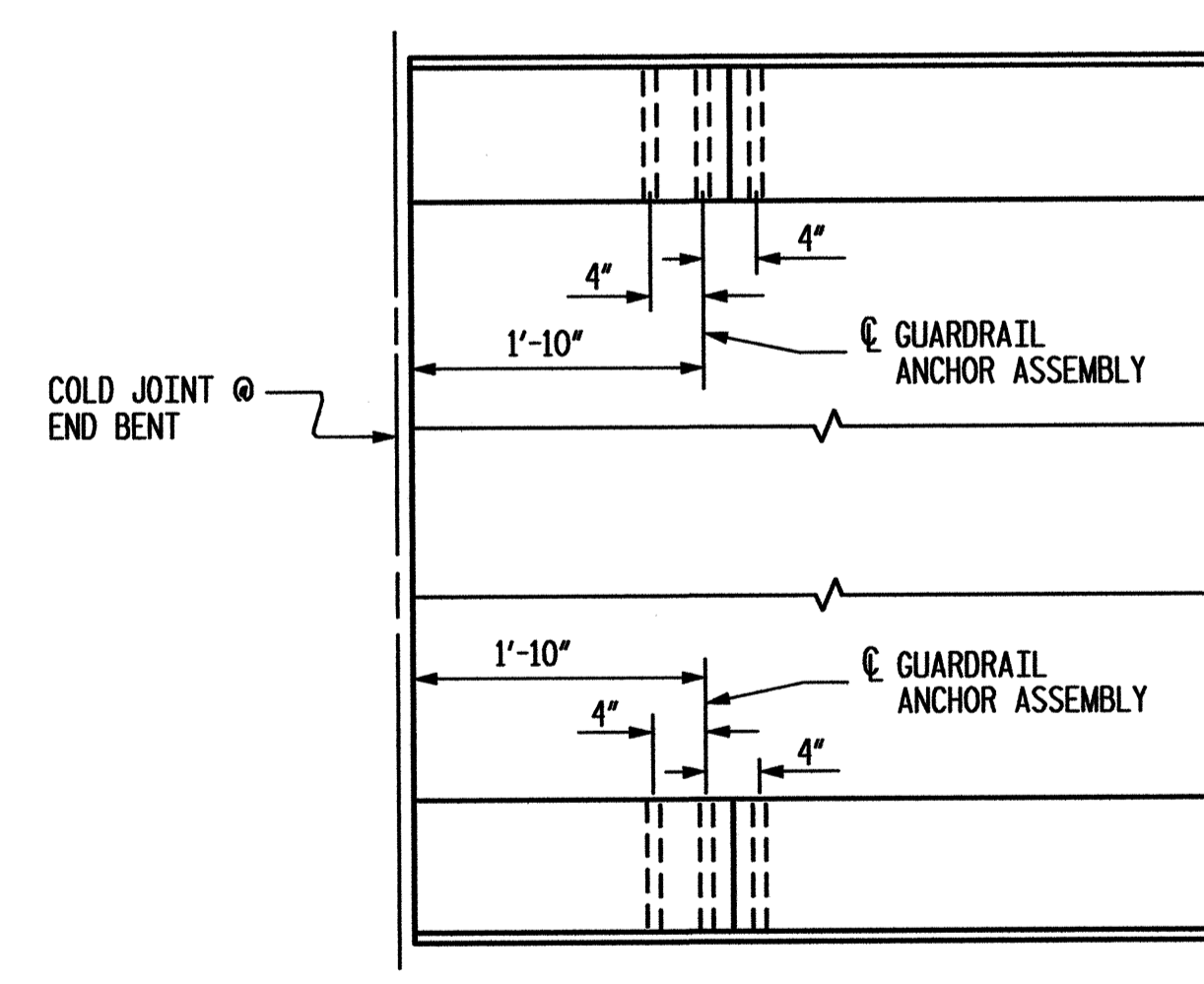
* DENOTES GUARDRAIL ANCHOR ASSEMBLY



SECTION E-E
GUARDRAIL ANCHOR ASSEMBLY DETAILS



ELEVATION



PLAN

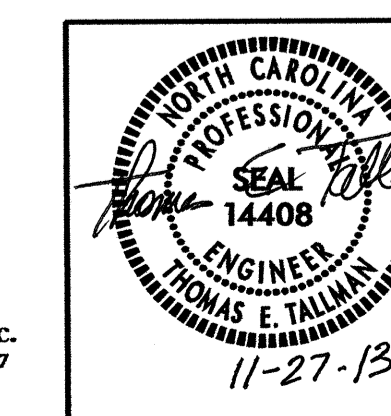
LOCATION OF ANCHORS FOR GUARDRAIL

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

PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUPERSTRUCTURE
GUARDRAIL ANCHORAGE DETAILS

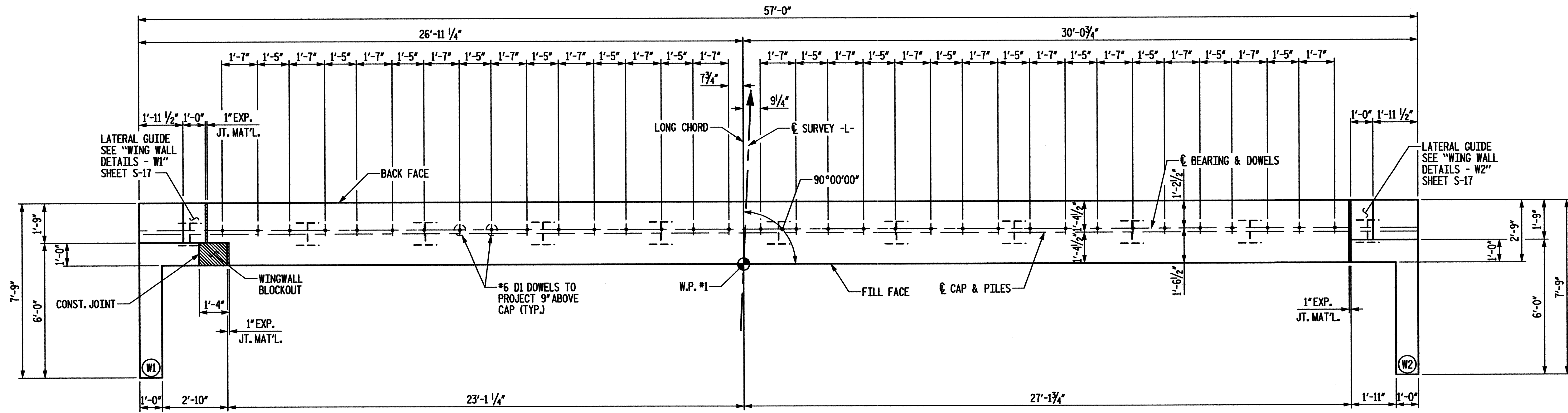


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Engineering
f/k/a Florence & Hutcheson, Inc.
5121 Kingsdown Way, Suite 100 Raleigh, NC 27607
NC License No. F-0988

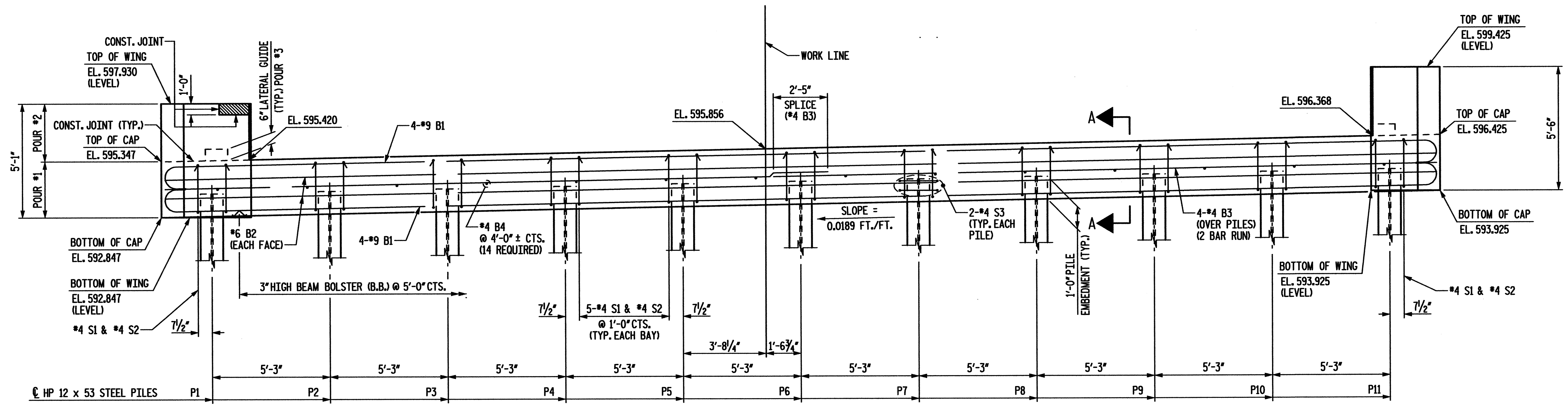
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NO.	BY	DATE	NO.	BY	DATE	S-15
1			3			TOTAL SHEETS 30
2			4			

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PCA Engineering 7/27/13 a Florence & Hutcheson, Inc.

DRAWN BY : D. H. CARTER DATE : DEC 2008
CHECKED BY : K. M. MOBLEY DATE : NOV 2013
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	593.899
P2	593.998
P3	594.098
P4	594.197
P5	594.296
P6	594.395
P7	594.495
P8	594.594
P9	594.693
P10	594.793
P11	594.892

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR DOWELS.

THE TOP SURFACE AREA OF THE CAP SHALL BE SLOPED TRANSVERSELY FROM FILL FACE TO BACK FACE AT A RATE OF 2.28%. SEE SECTION A-A FOR LOCATION OF ELEVATIONS AND CAP DEPTHS.

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

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

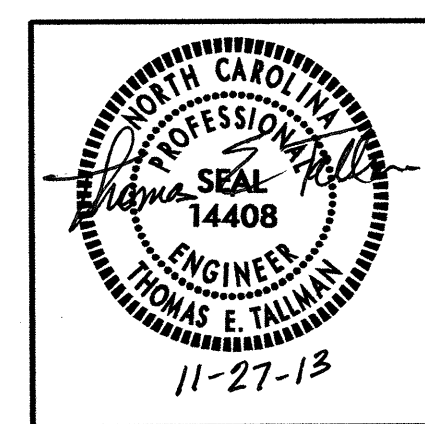
FOR SECTION A-A, PILE SPLICE DETAILS AND TEMPORARY DRAINAGE DETAILS, SEE SHEET S-20.

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

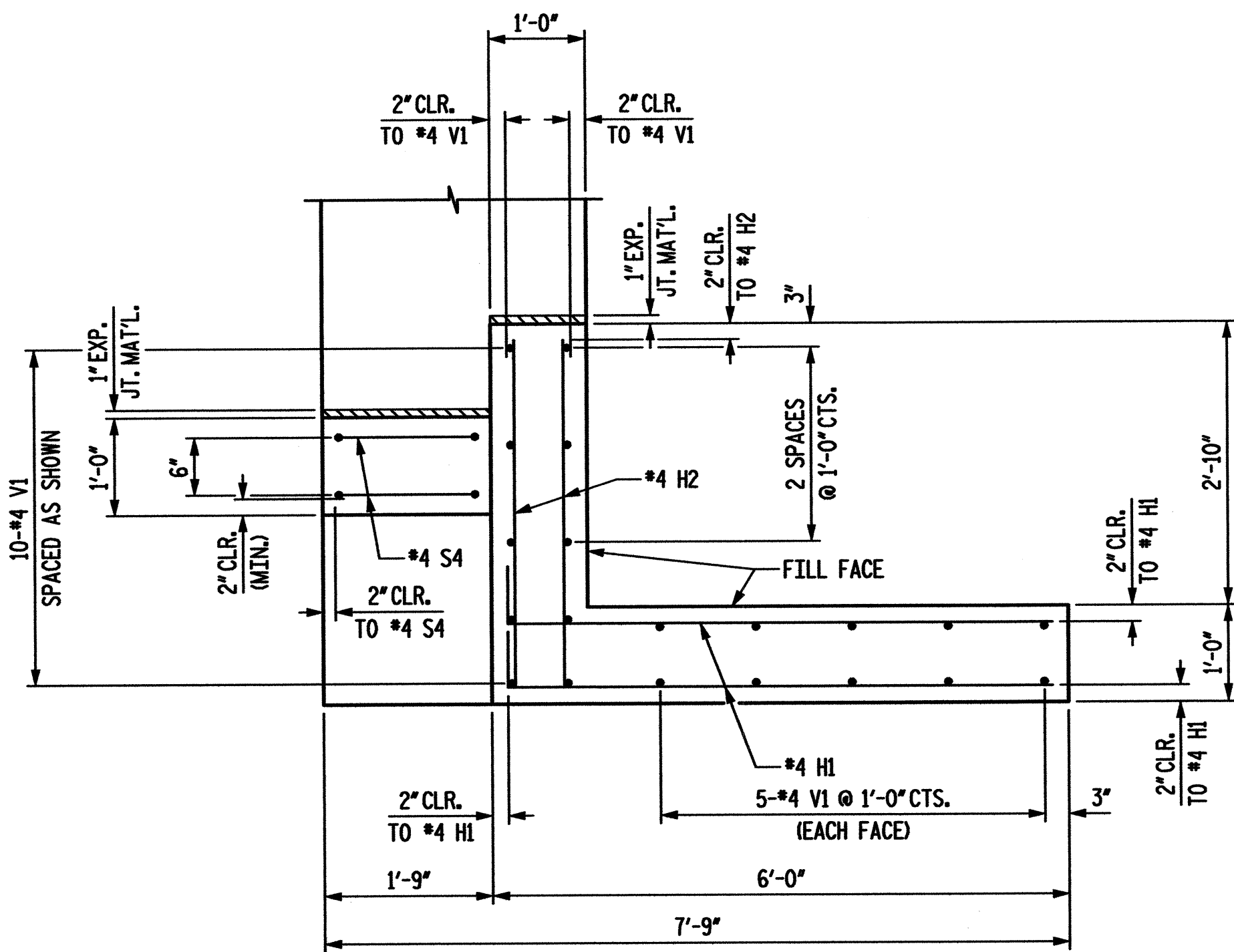
SUBSTRUCTURE
 END BENT 1
 (SHEET 1 OF 2)

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NO.	BY	DATE	NO.	BY	DATE	
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2			4			

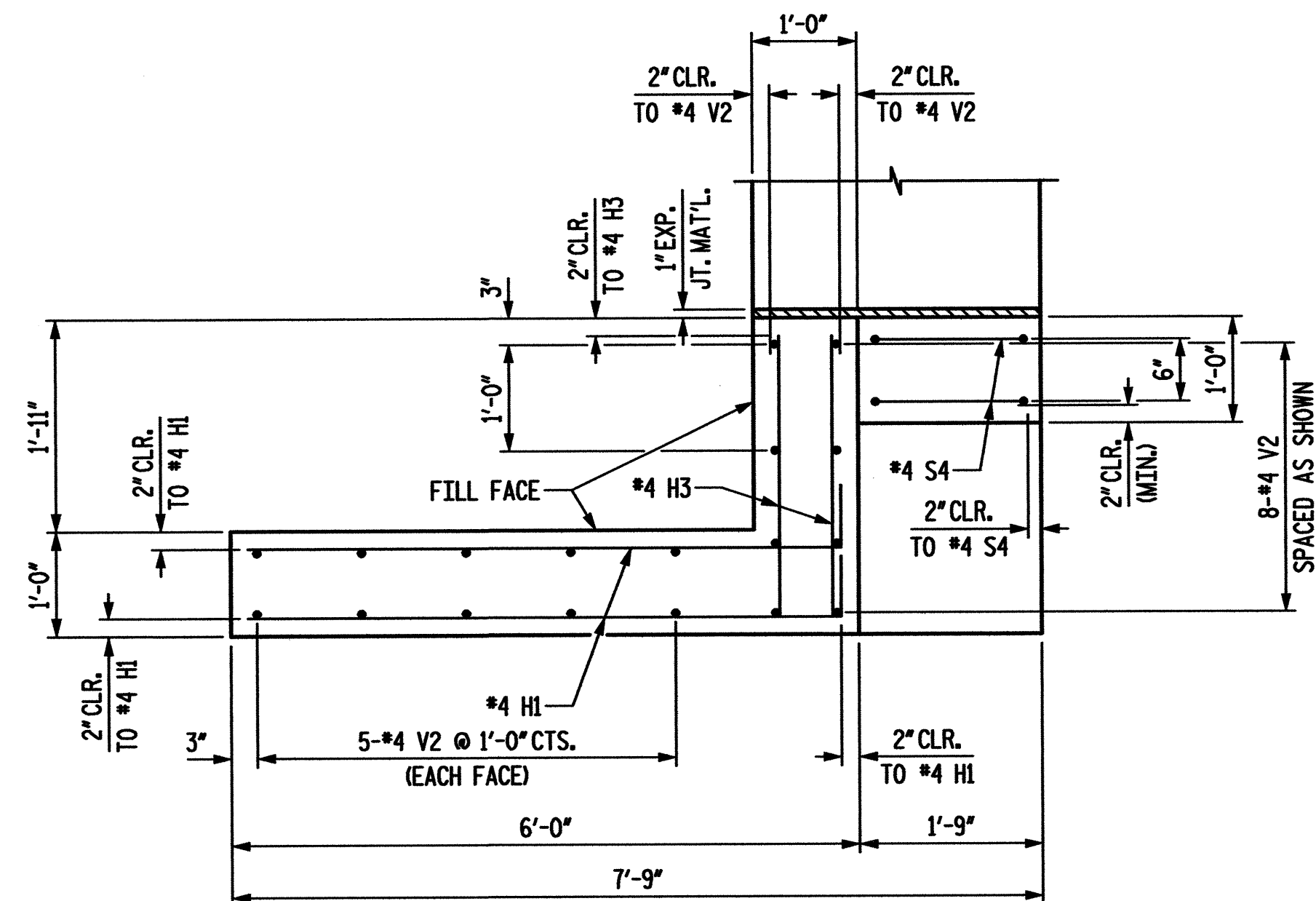


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 ICA Engineering / k/a Florence & Hutcheson, Inc.

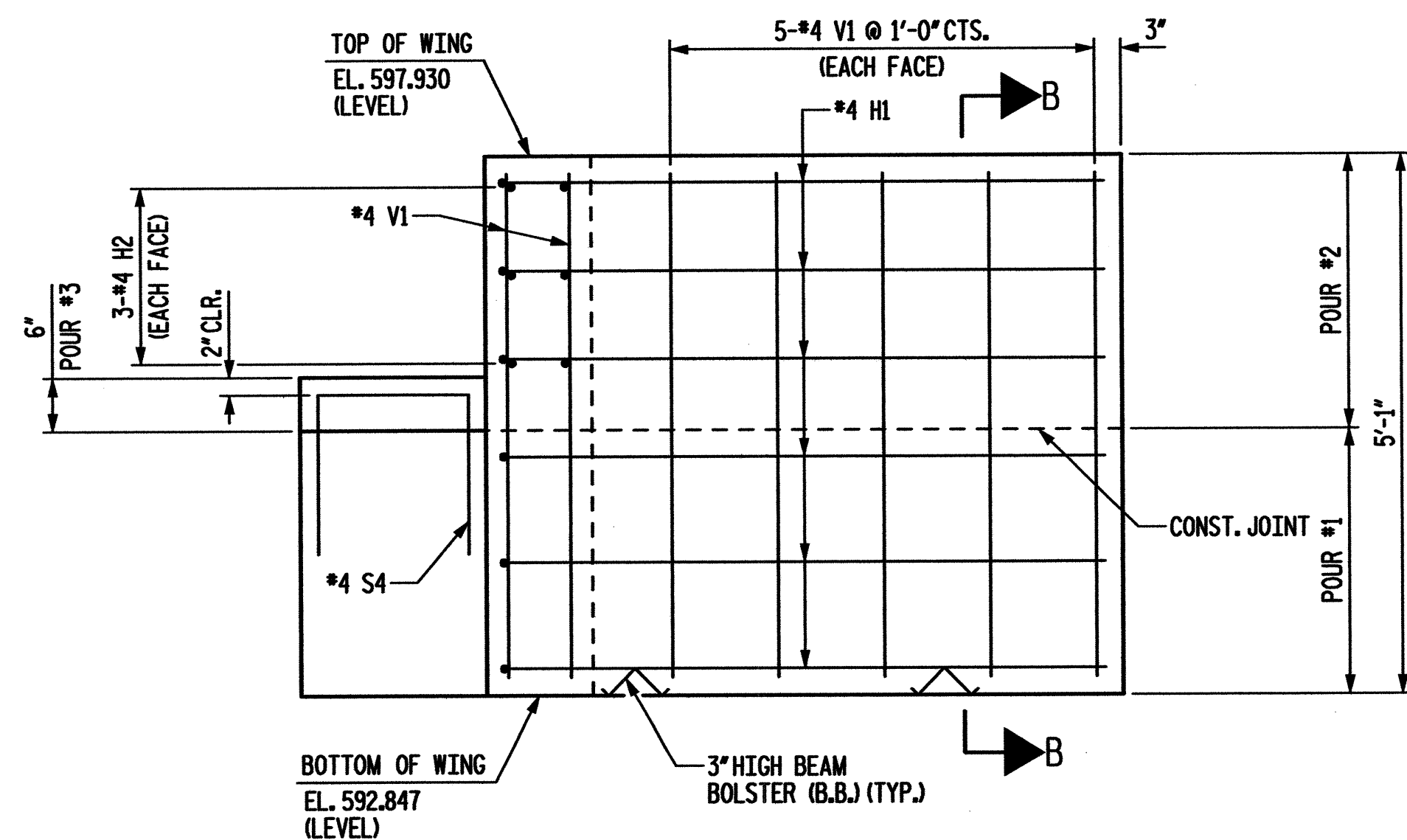
DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : K. M. MOBLEY DATE : NOV 2013
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



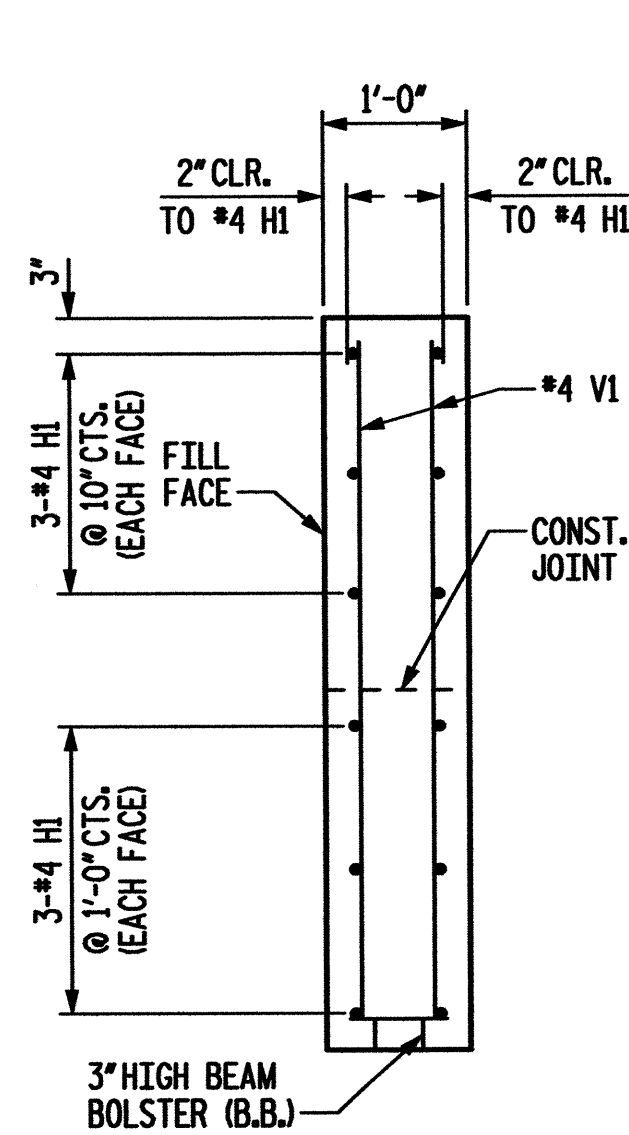
PLAN OF LEFT WING - W1



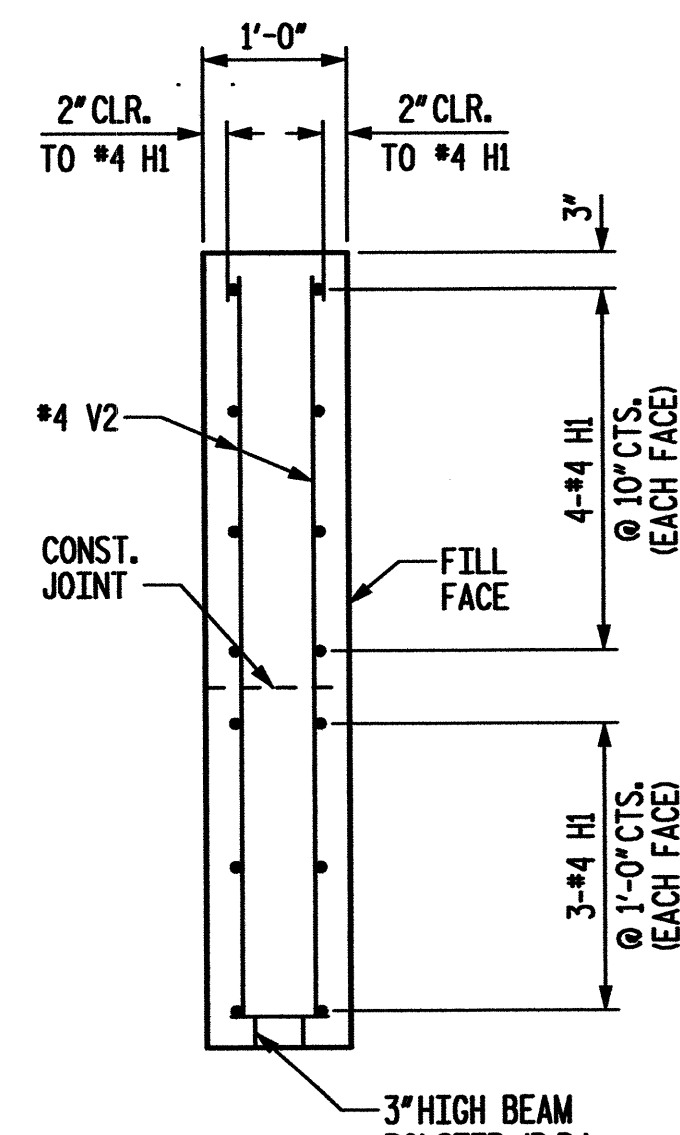
PLAN OF RIGHT WING - W2



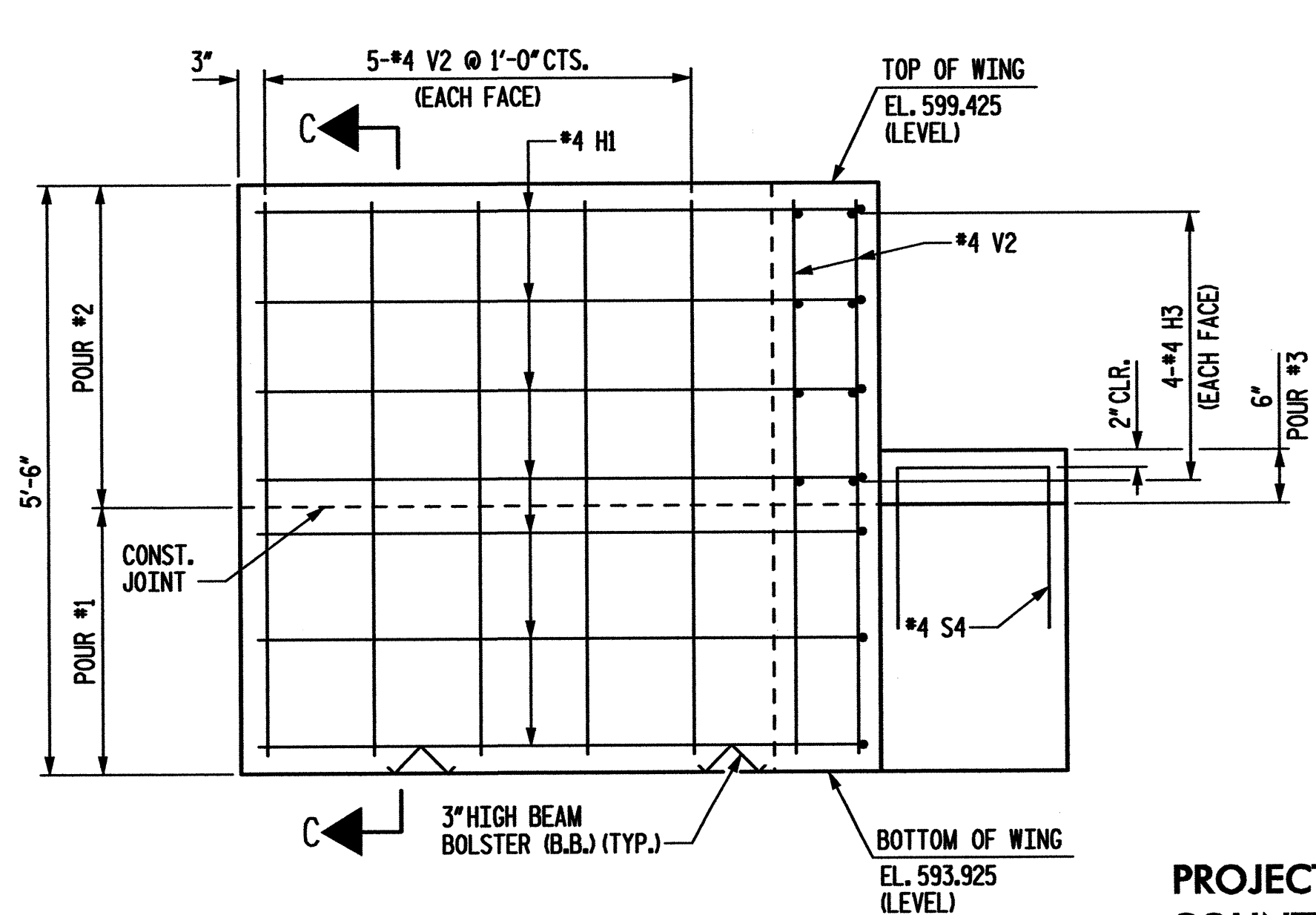
ELEVATION OF LEFT WING - W1



SECTION B-B



SECTION C-C



ELEVATION OF RIGHT WING - W2

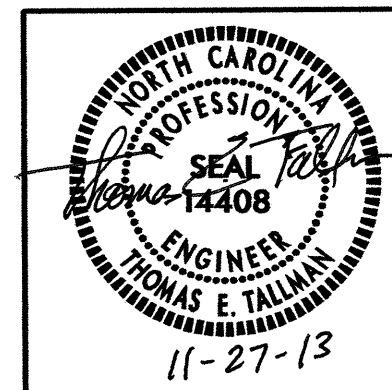
PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
 END BENT #1
 (SHEET 2 OF 2)



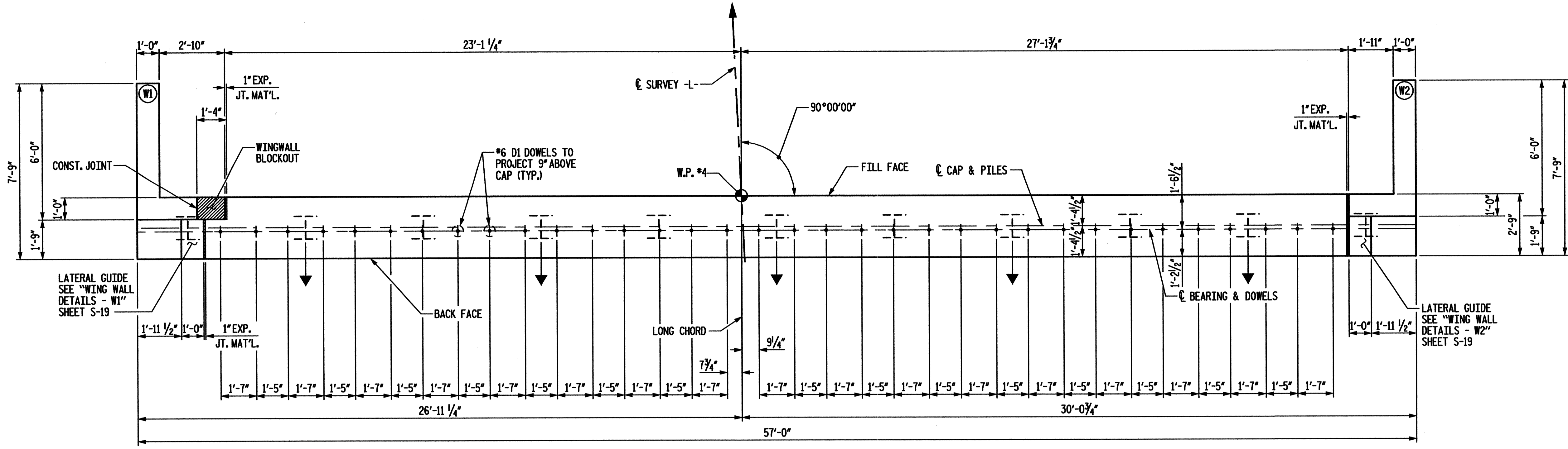
f/k/a Florence & Hutcheson, Inc.
 5121 Kingdom Way, Suite 100 Raleigh, NC 27607
 NC License No: P-0288



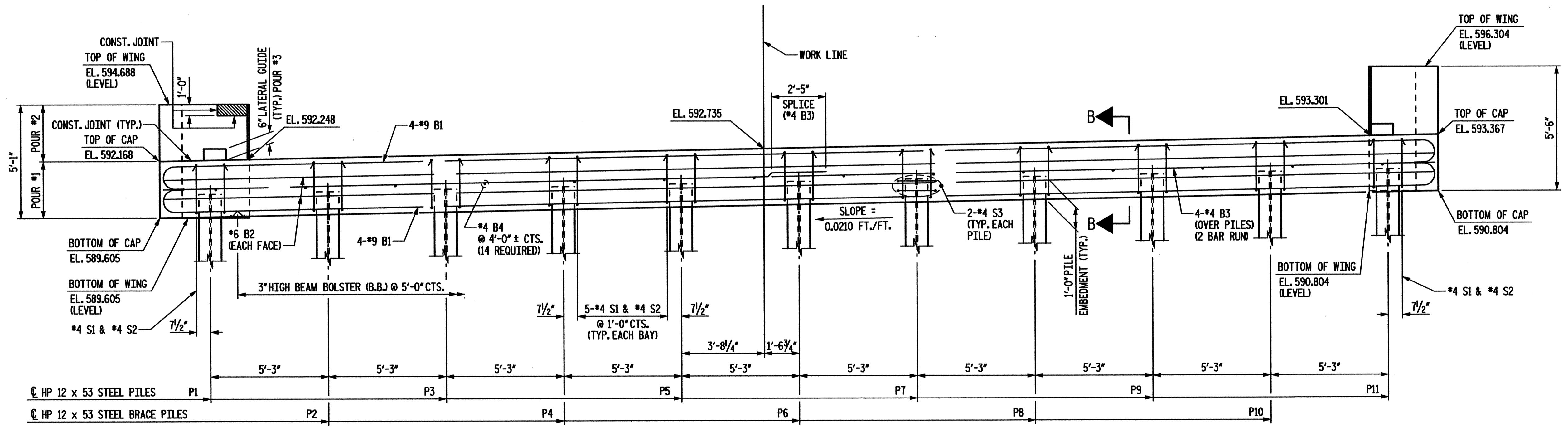
REVISIONS						SHEET NO. S-17
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS 30
2			4			

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 TCA Engineering 7/7/2 Florence & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: DEC 2008
 CHECKED BY: J. E. MONDOLFI DATE: DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013



PLAN



ELEVATION

TOP OF PILE ELEVATIONS	
PILE	ELEVATION
P1	590.663
P2	590.773
P3	590.884
P4	590.994
P5	591.105
P6	591.215
P7	591.325
P8	591.436
P9	591.546
P10	591.657
P11	591.767

NOTES:

STIRRUPS IN CAP MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR DOWELS.

THE TOP SURFACE AREA OF THE CAP SHALL BE SLOPED TRANSVERSELY FROM BACK FACE TO FILL FACE AT A RATE OF 2.28%. SEE SECTION B-B FOR LOCATION OF ELEVATIONS AND CAP DEPTHS.

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

THE CONTRACTOR SHALL PROVIDE FOR INSTALLATION OF THE 4\"/>

FOR SECTION B-B, PILE SPLICE DETAILS AND TEMPORARY DRAINAGE DETAILS, SEE SHEET S-20.

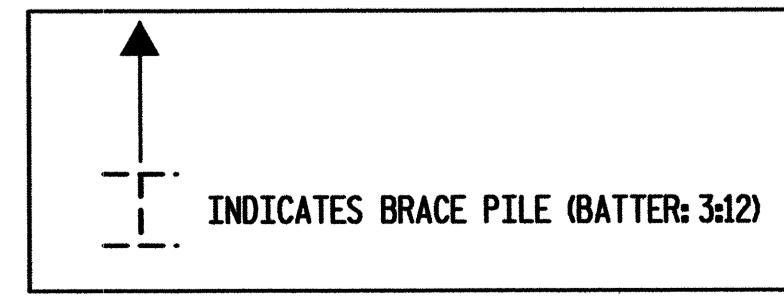
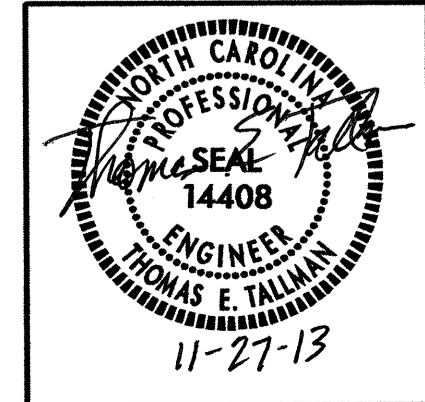
PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
 END BENT 2
 (SHEET 1 OF 2)

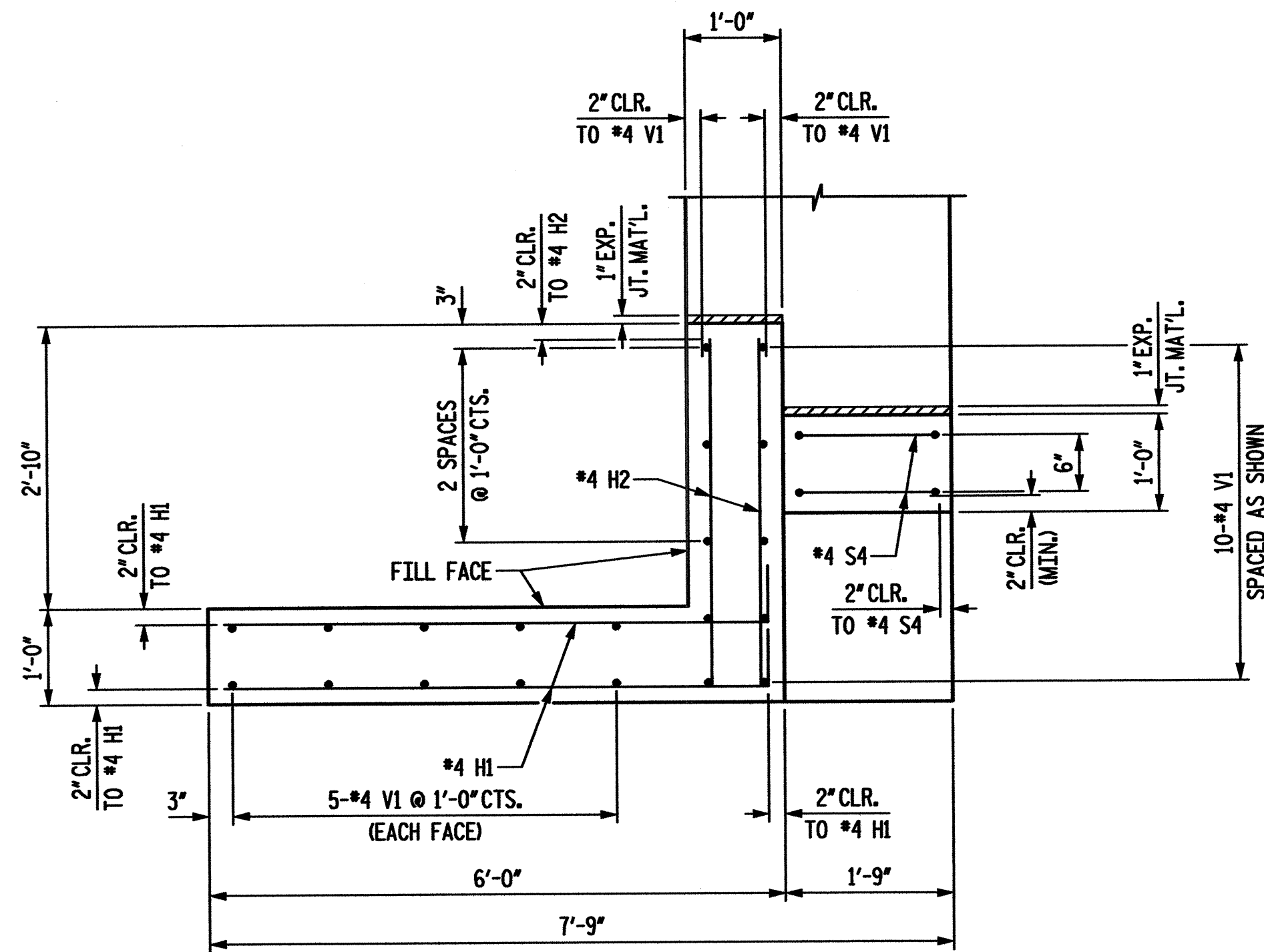
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

SHIRT NO. S-18
 TOTAL SHEETS 30

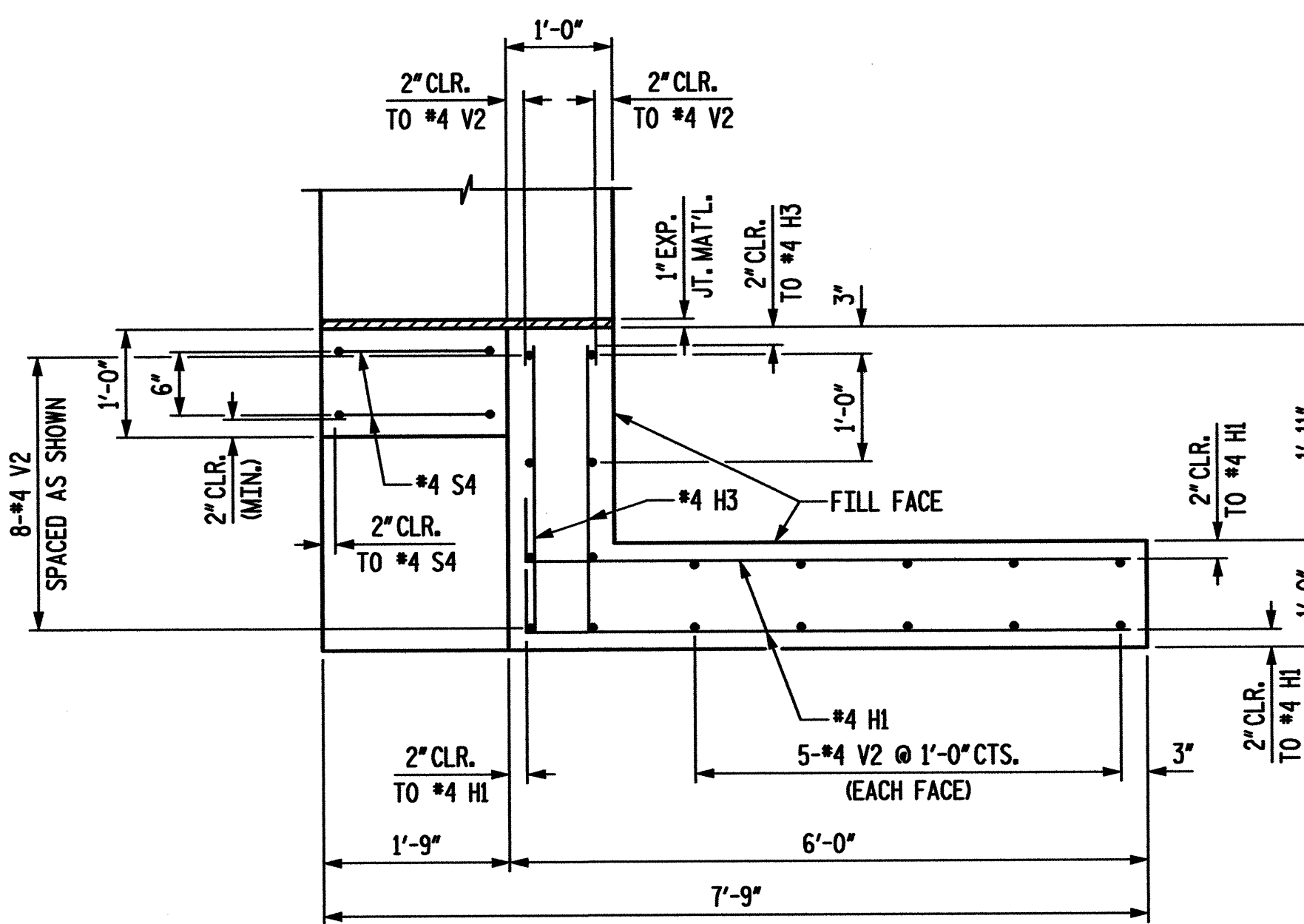


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 K. M. Mobley
 K. M. Mobley
 T. E. Tallman

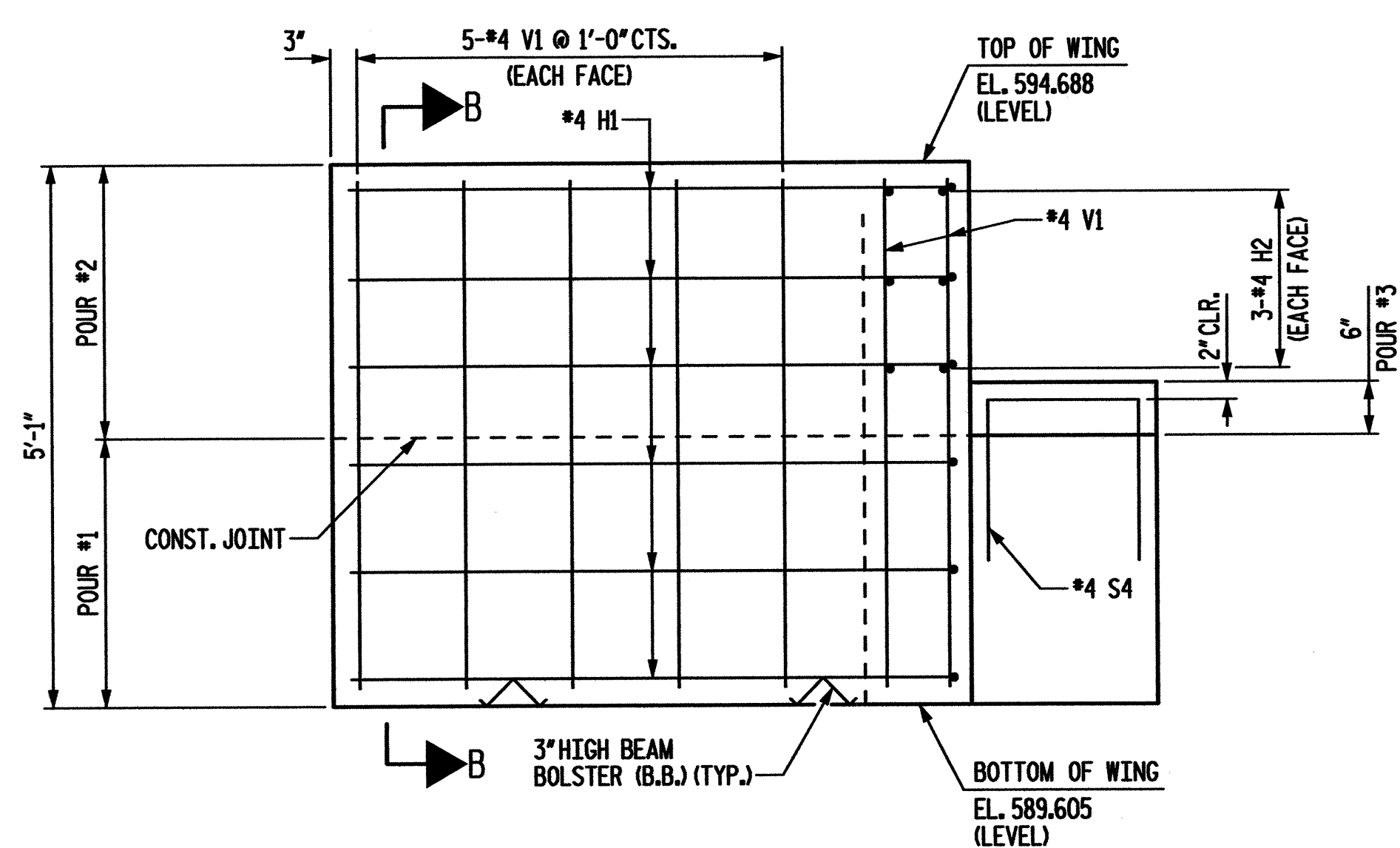
DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : K. M. MOBLEY DATE : NOV 2013
 DESIGN ENGINEER OF RECORD : T. E. TALLMAN DATE : NOV 2013



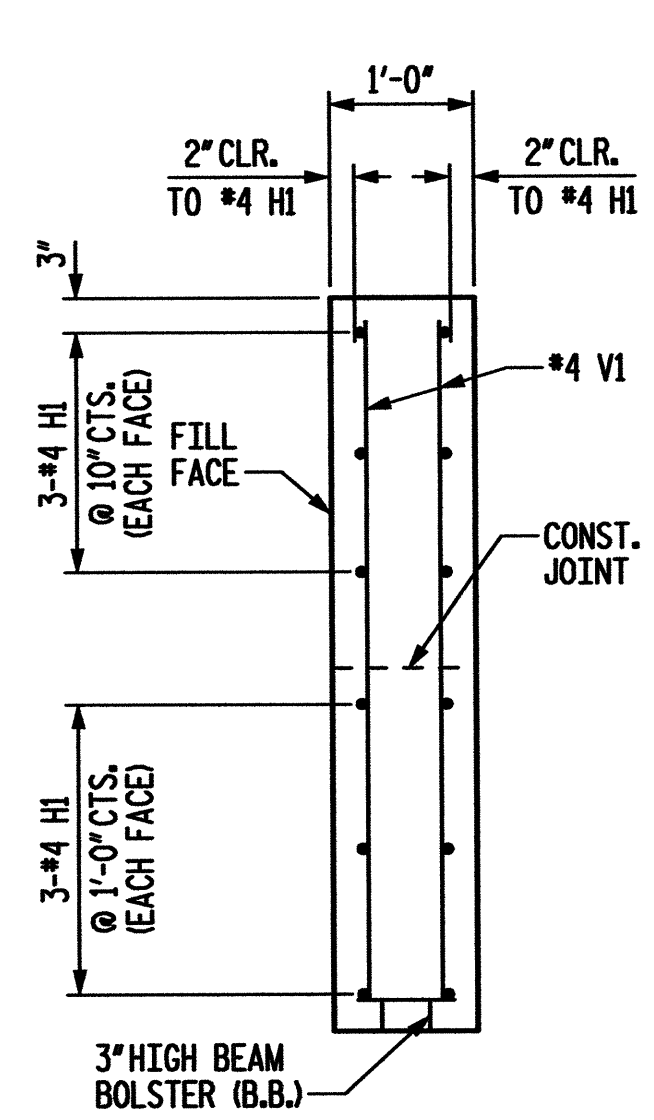
PLAN OF LEFT WING - W1



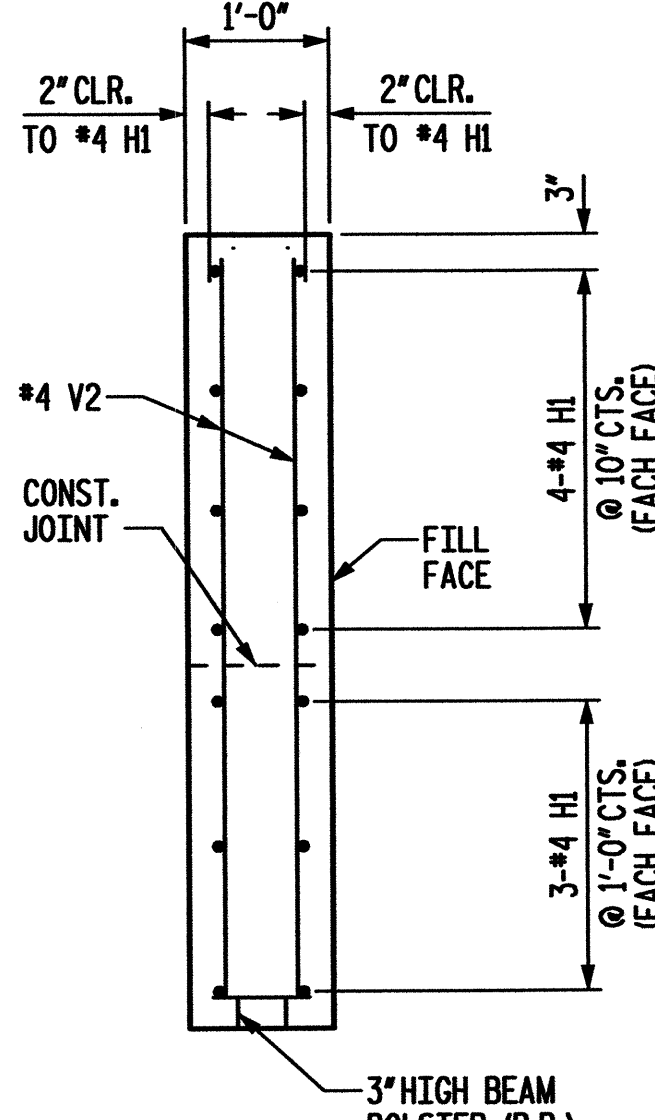
PLAN OF RIGHT WING - W2



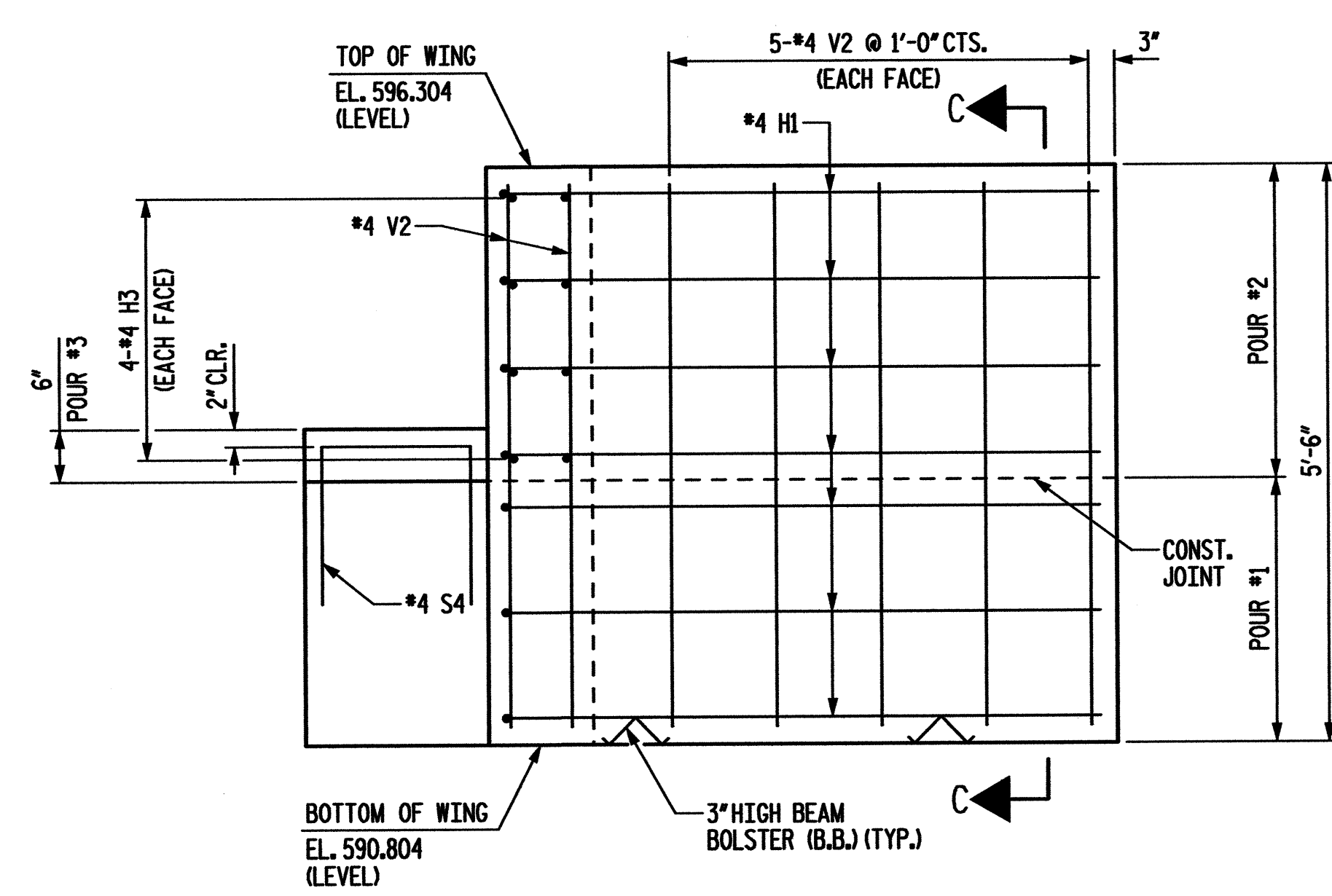
ELEVATION OF LEFT WING - W1



SECTION B-B



SECTION C-C

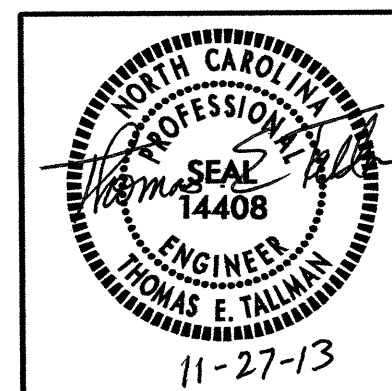


ELEVATION OF RIGHT WING - W2

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

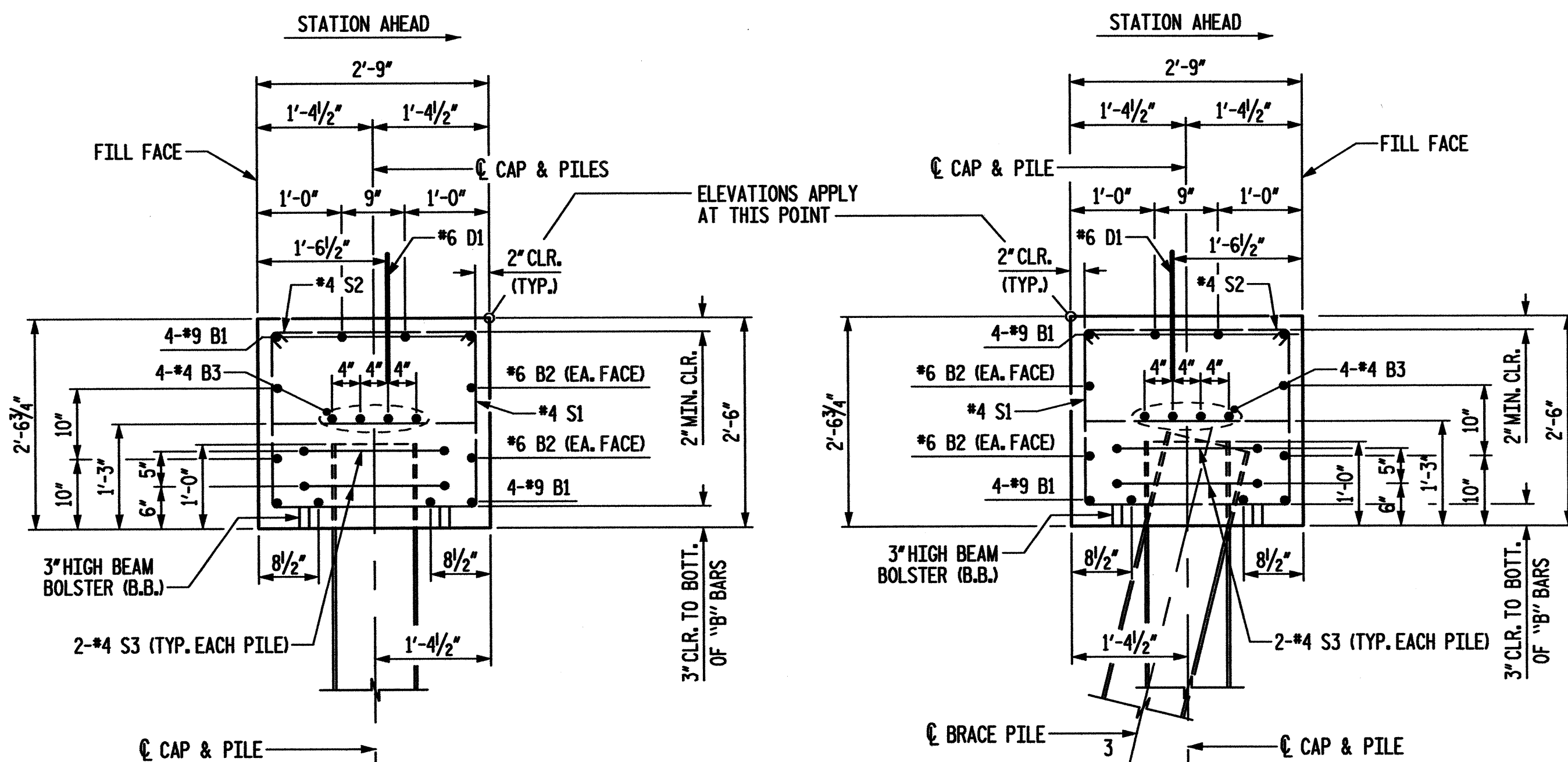
SUBSTRUCTURE
 END BENT #2
 (SHEET 2 OF 2)



REVISIONS						SHEET NO. S-19
NO.	BY	DATE	NO.	BY	DATE	
1			3			TOTAL SHEETS 30
2			4			

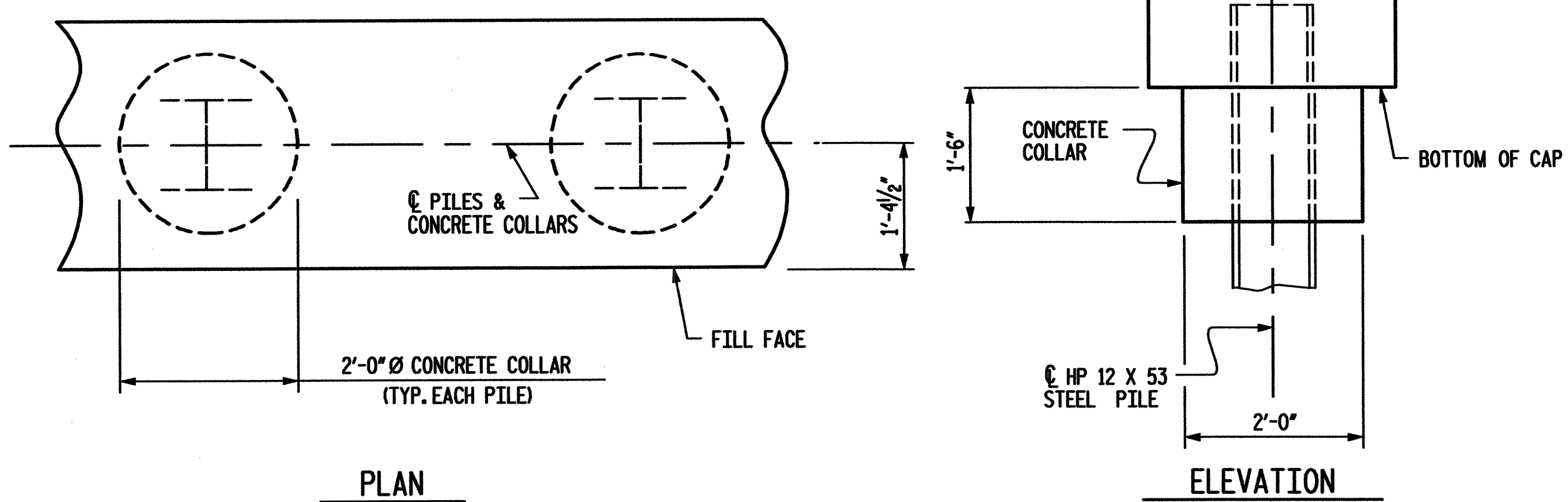
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 PCA Engineering 7/27/13 Florence & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: DEC 2008
 CHECKED BY: J. E. MONDOLFI DATE: DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013



SECTION A-A

SECTION B-B

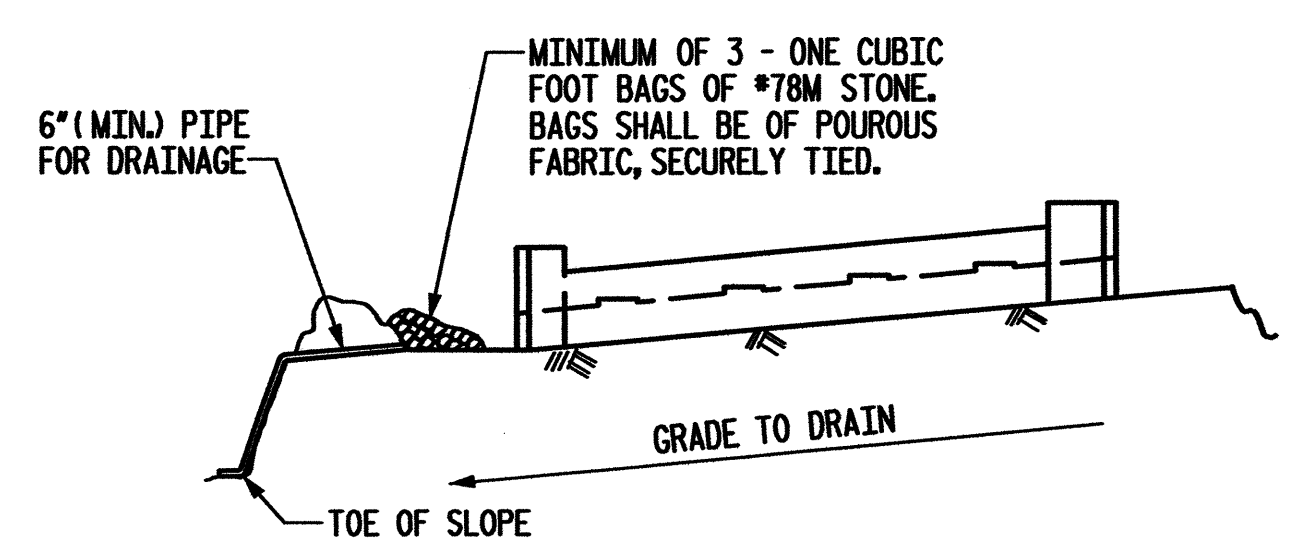


PLAN

ELEVATION

CORROSION PROTECTION FOR STEEL PILES DETAIL

(END BENT No. 1 SHOWN, END BENT No. 2 SIMILAR BY ROTATION)

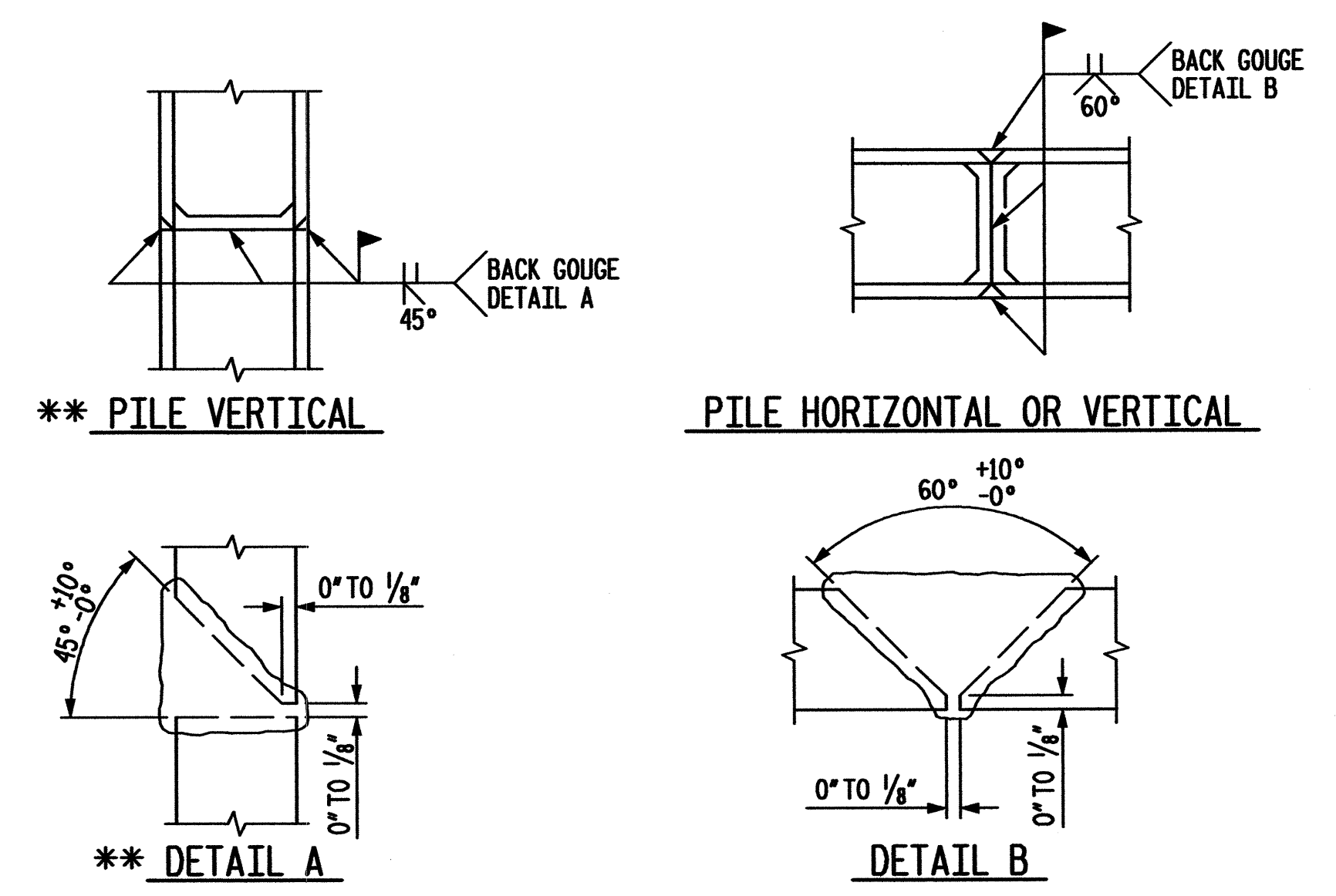


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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

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

TEMPORARY DRAINAGE AT END BENT



** PILE VERTICAL

PILE HORIZONTAL OR VERTICAL

** DETAIL A

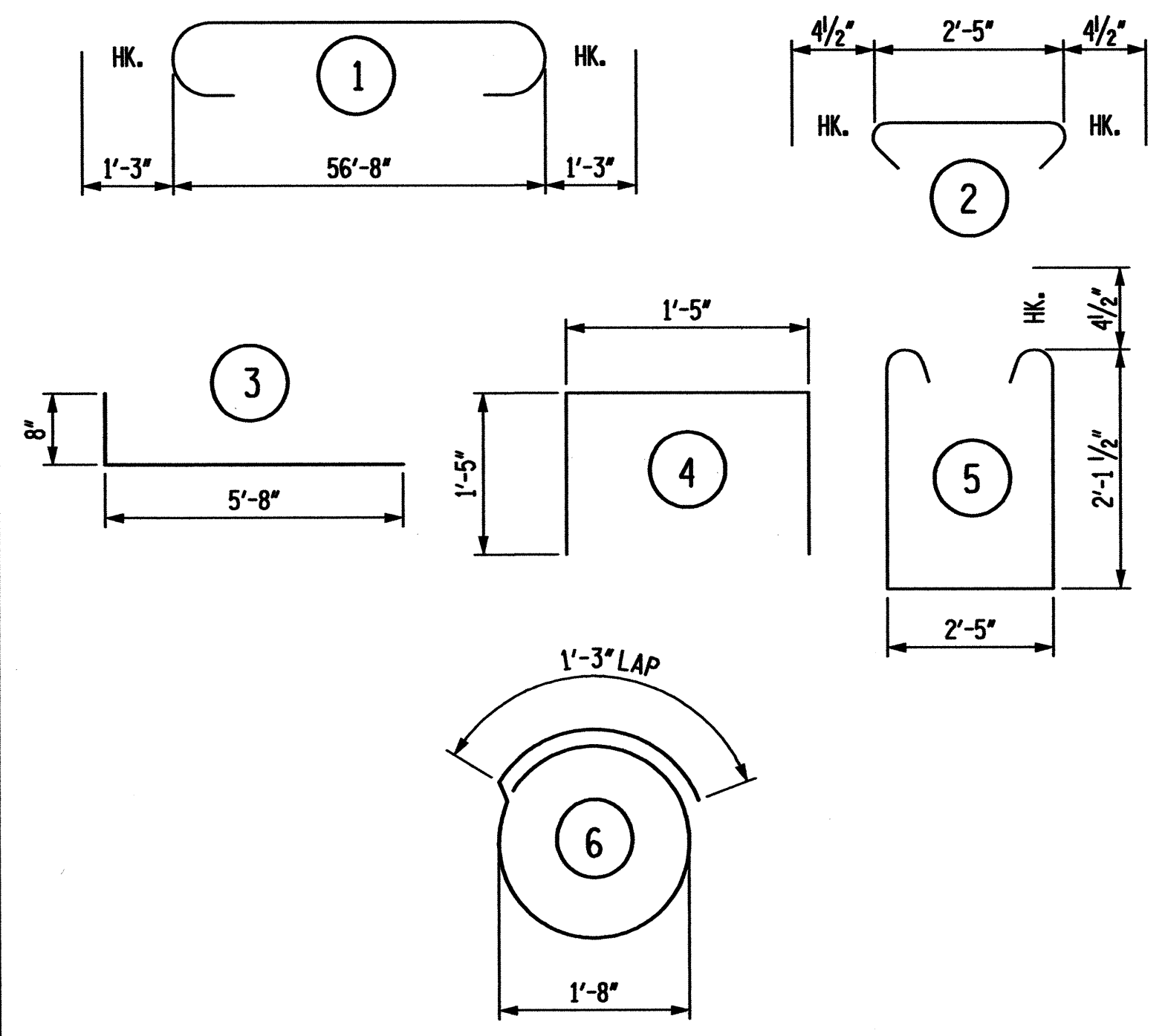
DETAIL B

** POSITION OF PILE DURING WELDING

PILE SPLICE DETAILS

BAR TYPES

ALL BAR DIMENSIONS ARE OUT TO OUT.



BILL OF MATERIAL

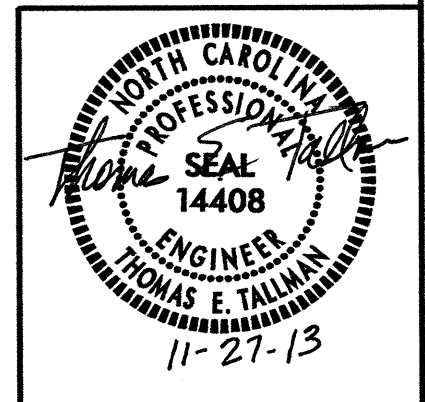
FOR ONE END BENT (2 REQUIRED)						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
B1	8	#9	1	59'-2"	1609	
B2	4	#6	STR	56'-8"	340	
B3	8	#4	STR	29'-7"	158	
B4	14	#4	STR	2'-5"	23	
D1	34	#6	STR	1'-6"	77	
H1	26	#4	3	6'-4"	110	
H2	6	#4	STR	3'-6"	14	
H3	8	#4	STR	2'-7"	14	
S1	52	#4	5	7'-5"	258	
S2	52	#4	2	3'-2"	110	
S3	22	#4	6	6'-6"	96	
S4	4	#4	4	4'-3"	11	
V1	20	#4	STR	4'-9"	63	
V2	18	#4	STR	5'-2"	62	
REINFORCING STEEL TOTAL					LBS.	2945
POUR #1 CAP & LOWER PART OF WINGS & COLLARS					17.3	CY
POUR #2 UPPER PART OF WINGS					1.5	CY
POUR #3 LATERAL GUIDES					0.1	CY
TOTAL CLASS A CONCRETE					18.9	CY

END BENT No. 1 HP 12 X 53 STEEL PILES		END BENT No. 2 HP 12 X 53 STEEL PILES	
NO: 11	LIN. FT.= 165	NO: 11	LIN. FT.= 110
PILE EXCAVATION IN SOIL = 129 FT.		STEEL PILE POINTS: 11 EACH	
PILE EXCAVATION NOT IN SOIL = 36 FT.			

PROJECT NO. 33817
COUNTY: UNION
STATION: 17+73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

**SUBSTRUCTURE
END BENT DETAILS**



ICA Engineering
f/k/a Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100 Raleigh, NC 27607
NC License No. P-00356

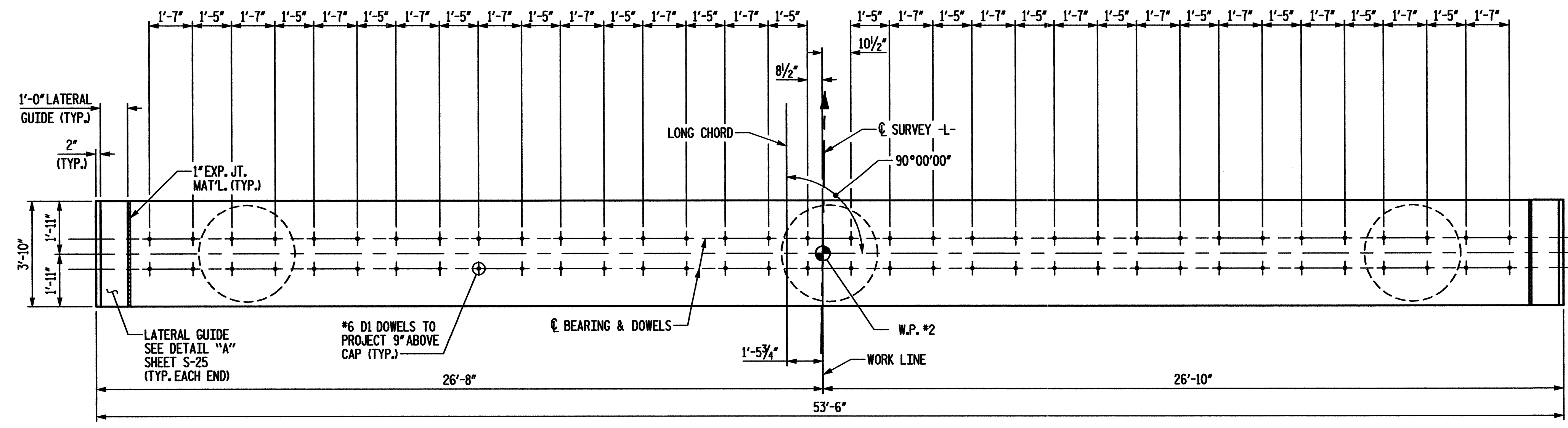
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NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

30

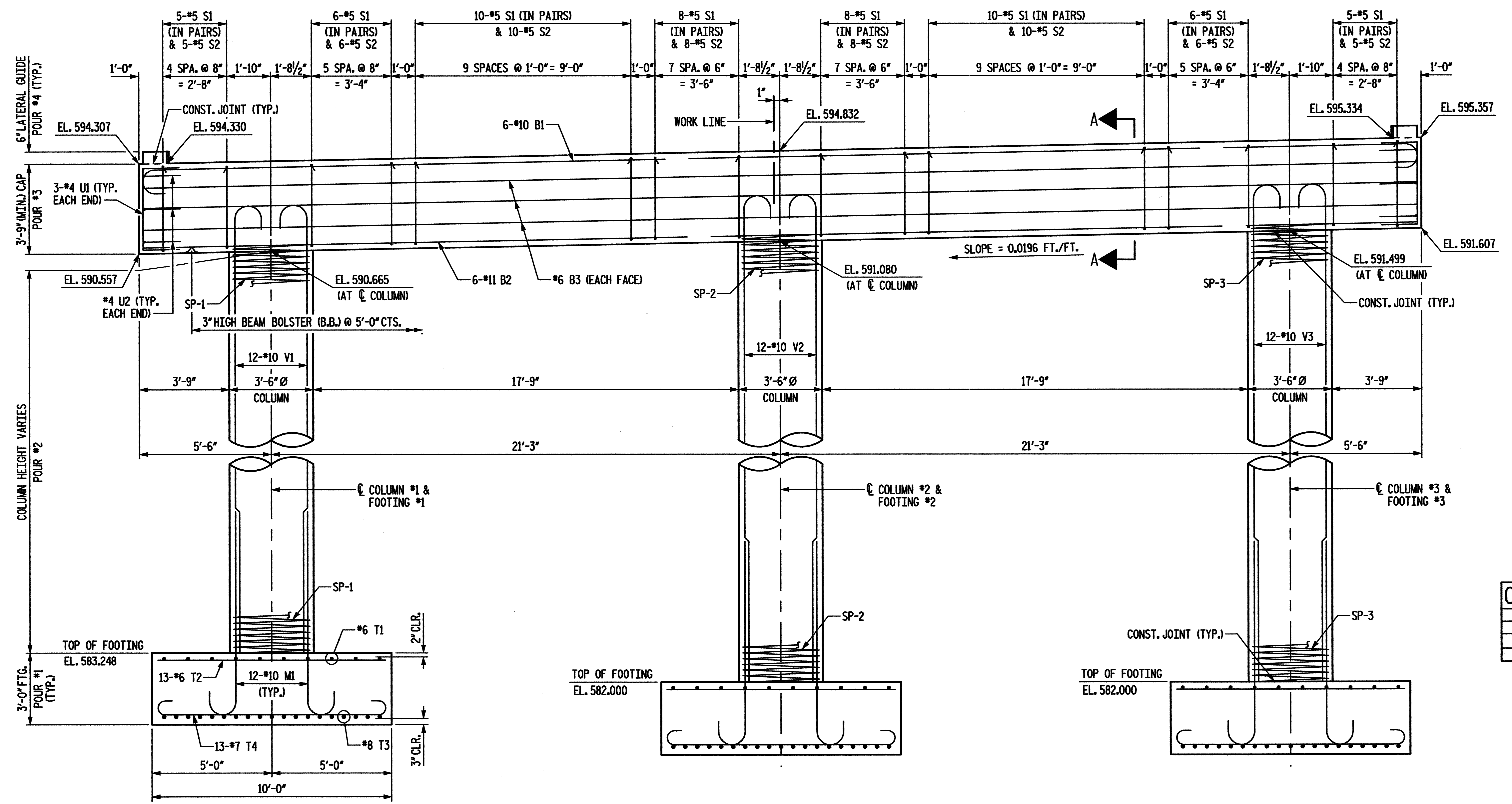
11/27/2013 P:\Projects\4651\Structure\20-4651.ed.eco.dgn PCA Engineering /K/G Florence & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: DEC 2008
CHECKED BY: J. E. MONDOLFI DATE: DEC 2008
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013

NOTES:
 STIRRUPS MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR DOWELS.
 HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
 THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE COLUMNS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.
 FOR SECTION A-A, SEE SHEET S-22.
 THE TOP SURFACE OF THE CAP SHALL BE SLOPED TRANSVERSELY AT A RATE OF -2.28% (LOOKING AHEAD STATIONS). SEE SECTION A-A FOR LOCATION OF ELEVATIONS AND CAP DEPTHS.

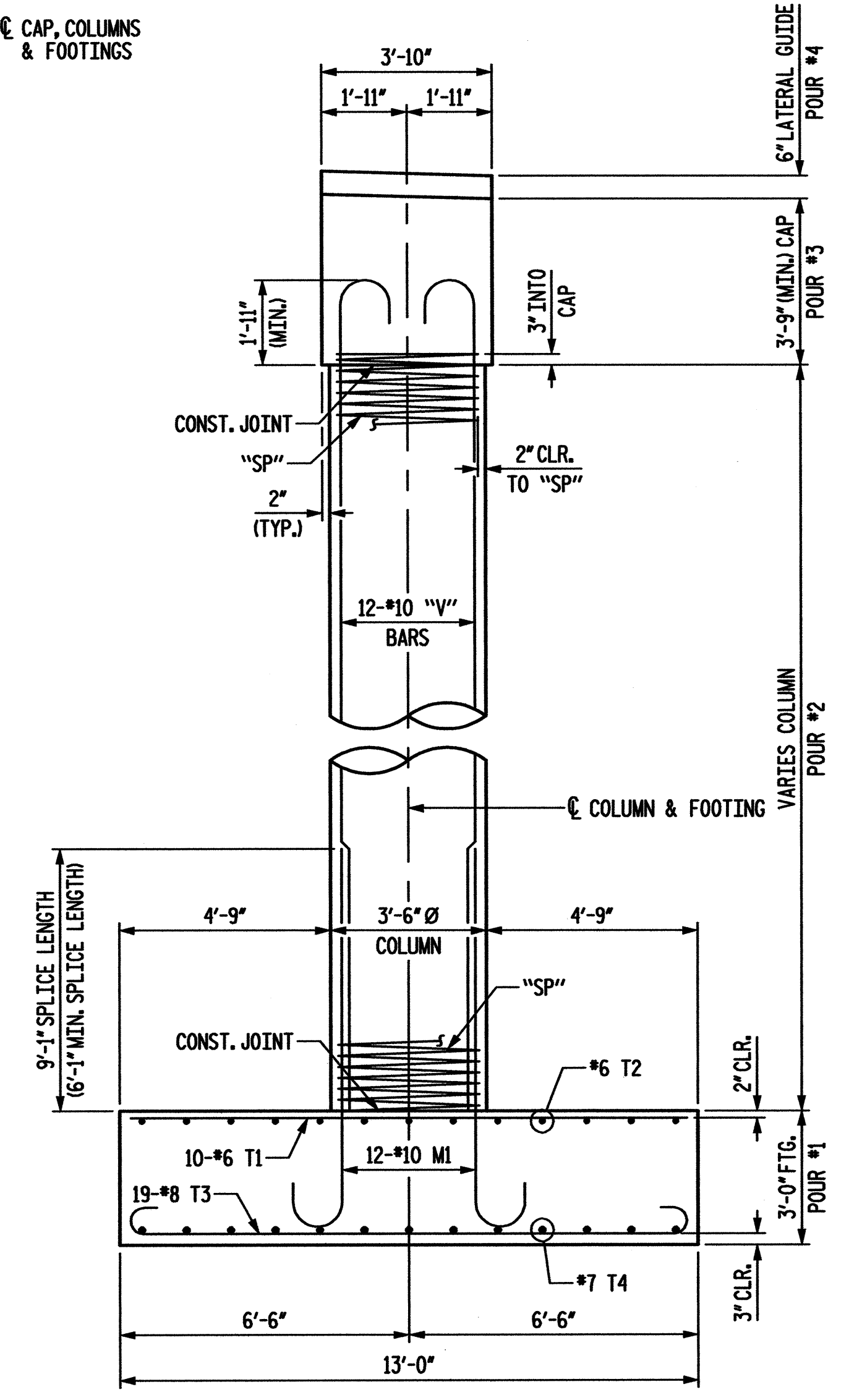


PLAN



ELEVATION

DETAILS SHOWN FOR FOOTINGS ARE TYPICAL.



END ELEVATION

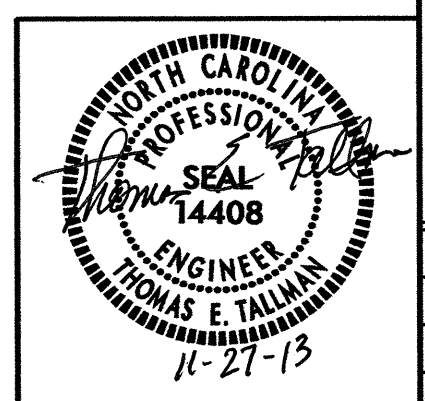
COLUMN TABLE	
COLUMN	HEIGHT
COLUMN #1	7'-5"
COLUMN #2	9'-1"
COLUMN #3	9'-6"

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

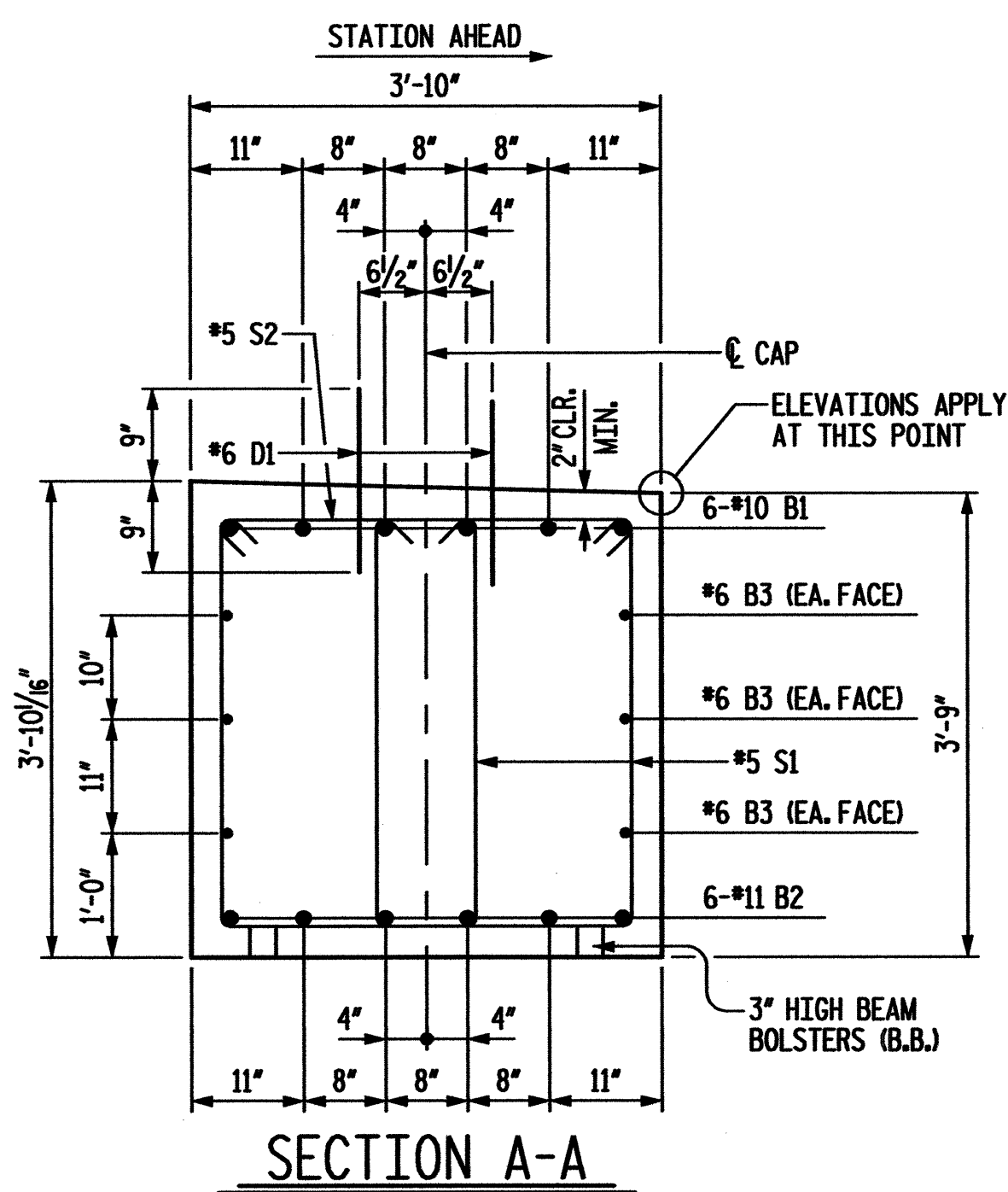
SUBSTRUCTURE
 BENT #1
 (SHEET 1 OF 2)

REVISIONS					SHEET NO. S-21
NO.	BY	DATE	NO.	DATE	
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2			4		

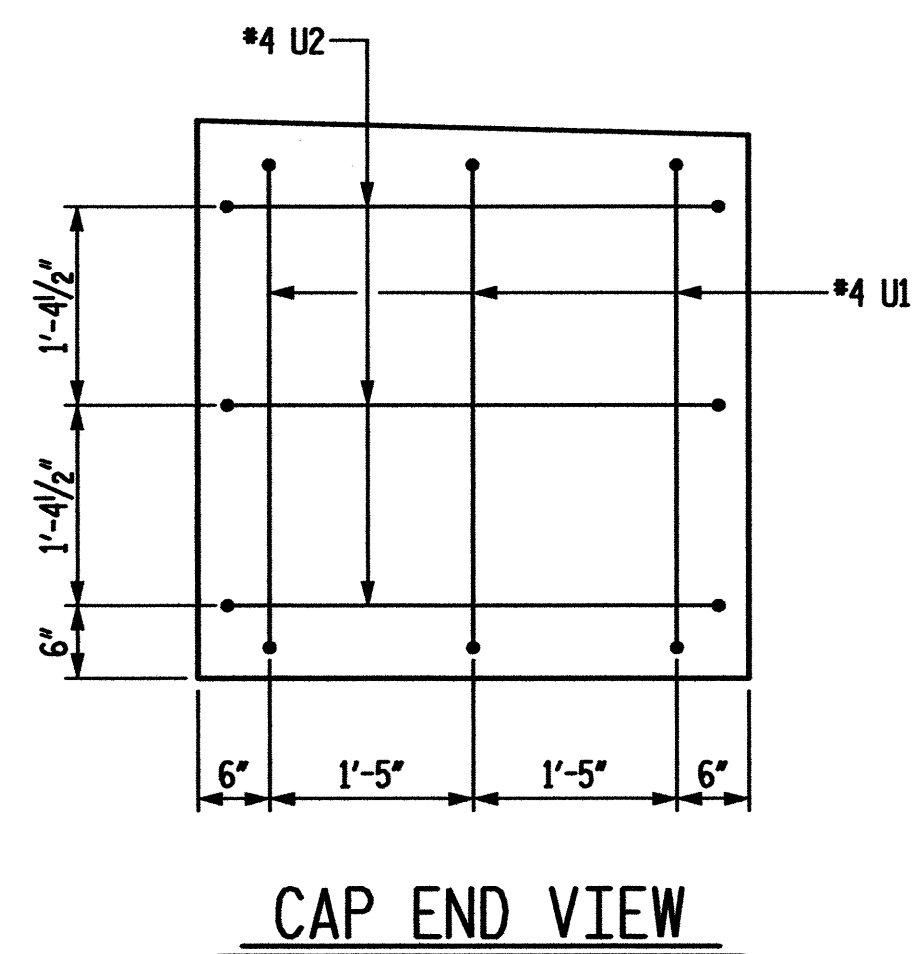


11/27/2013
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 ICAK Engineering 7/27/08 Florence & Hutcheson, Inc.

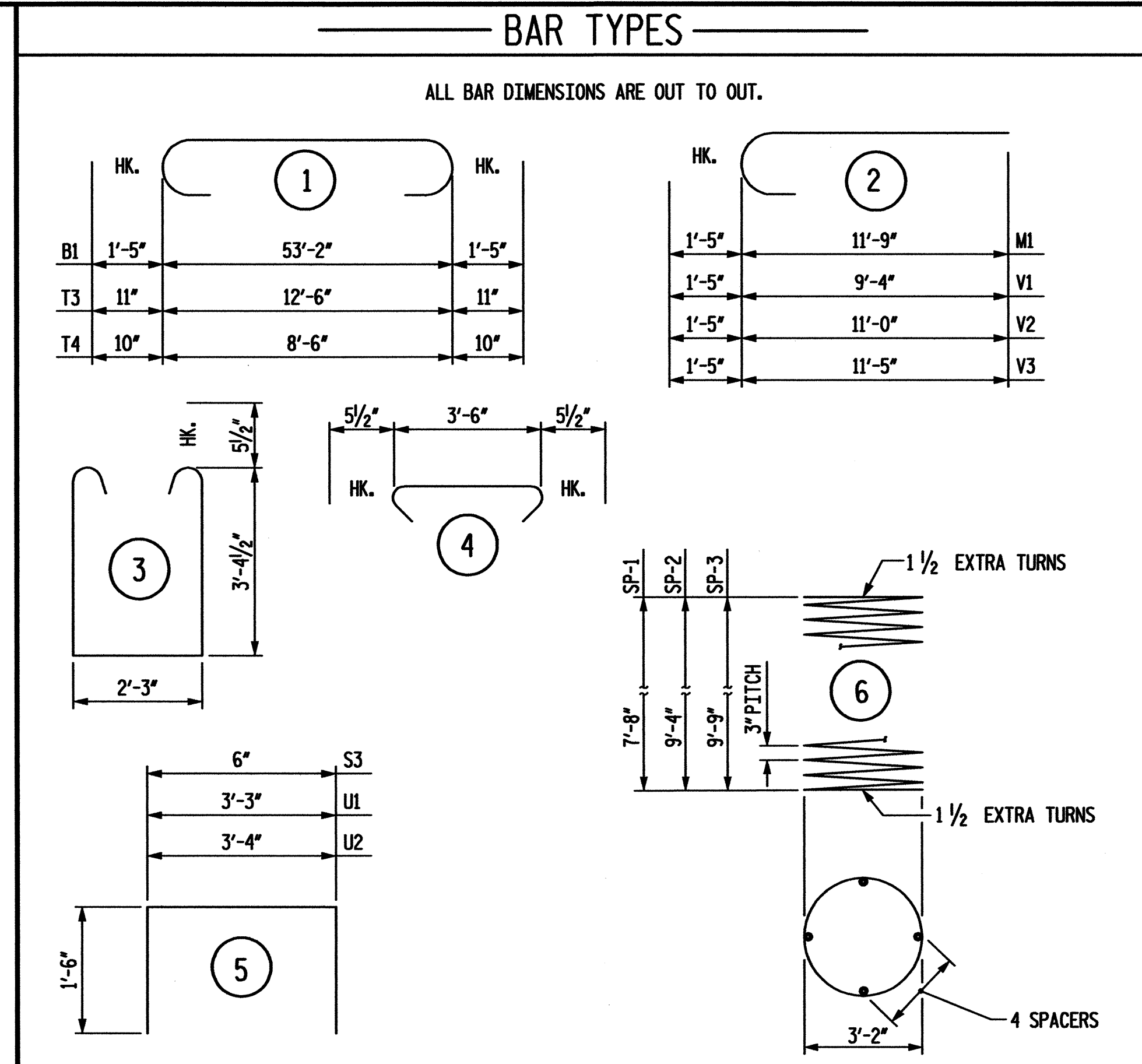
DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



SECTION A-A

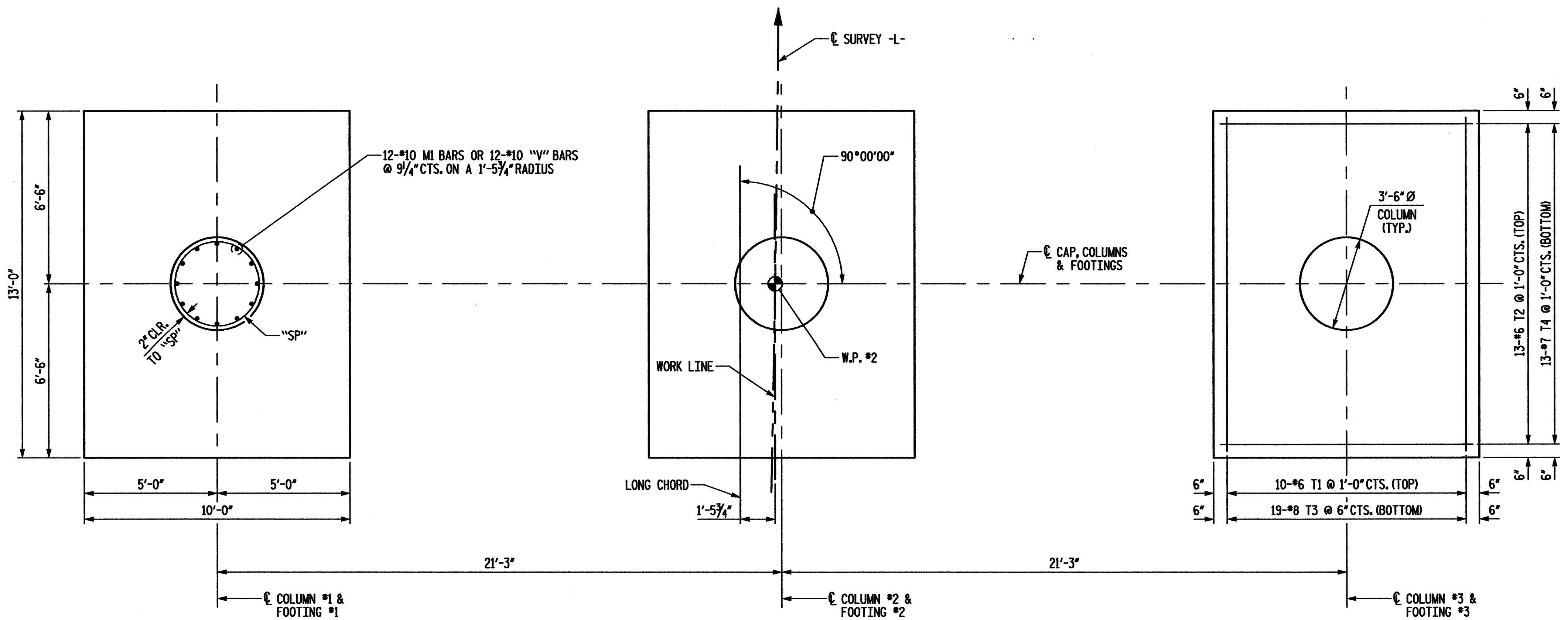


CAP END VIEW



BILL OF MATERIAL					
BENT #1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	56'-0"	1446
B2	6	#11	STR	53'-2"	1695
B3	6	#6	STR	53'-2"	479
B4	4	#4	STR	3'-6"	9
D1	68	#6	STR	1'-6"	153
M1	36	#10	2	13'-2"	2040
S1	116	#5	3	9'-11"	1200
S2	58	#5	4	4'-5"	267
S3	8	#4	5	3'-6"	19
T1	30	#6	STR	12'-6"	563
T2	39	#6	STR	8'-6"	498
T3	57	#8	1	14'-4"	2181
T4	39	#7	1	10'-2"	810
U1	6	#4	5	6'-3"	25
U2	6	#4	5	6'-4"	25
V1	12	#10	2	10'-9"	555
V2	12	#10	2	12'-5"	641
V3	12	#10	2	12'-10"	663
REINFORCING STEEL TOTAL				LBS.	13269
SPIRAL COLUMN REINFORCING STEEL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	1	**	6	331'-0"	221
SP-2	1	**	6	395'-10"	264
SP-3	1	**	6	412'-6"	276
SPIRAL COLUMN REINFORCING STEEL TOTAL				LBS.	761
POUR #1 FOOTINGS					43.3 CY
POUR #2 COLUMNS					9.3 CY
POUR #3 CAP					28.9 CY
POUR #4 LATERAL GUIDES					0.1 CY
TOTAL					81.6 CY

*Spiral reinforcing steel shall be W20 or D-20 cold drawn wire or #4 plain or deformed bar



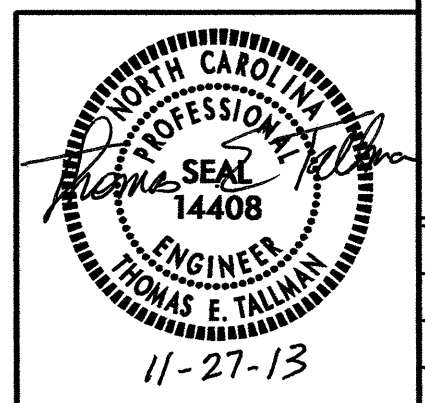
PLAN OF FOOTINGS

DETAILS SHOWN FOR FOOTINGS AND COLUMNS ARE TYPICAL

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

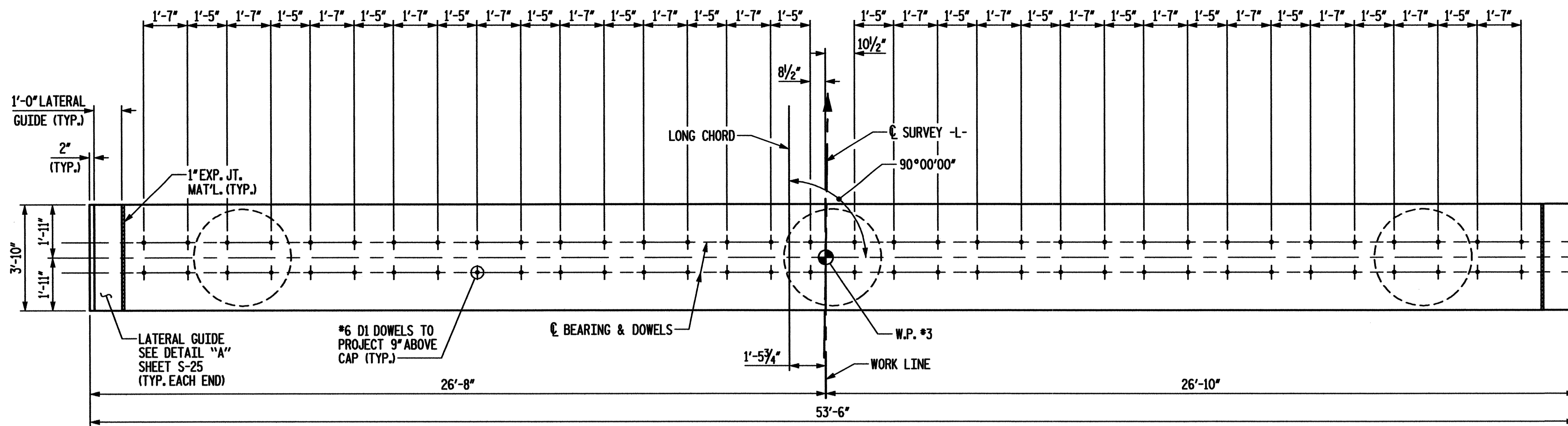
SUBSTRUCTURE
 BENT #1
 (SHEET 2 OF 2)



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

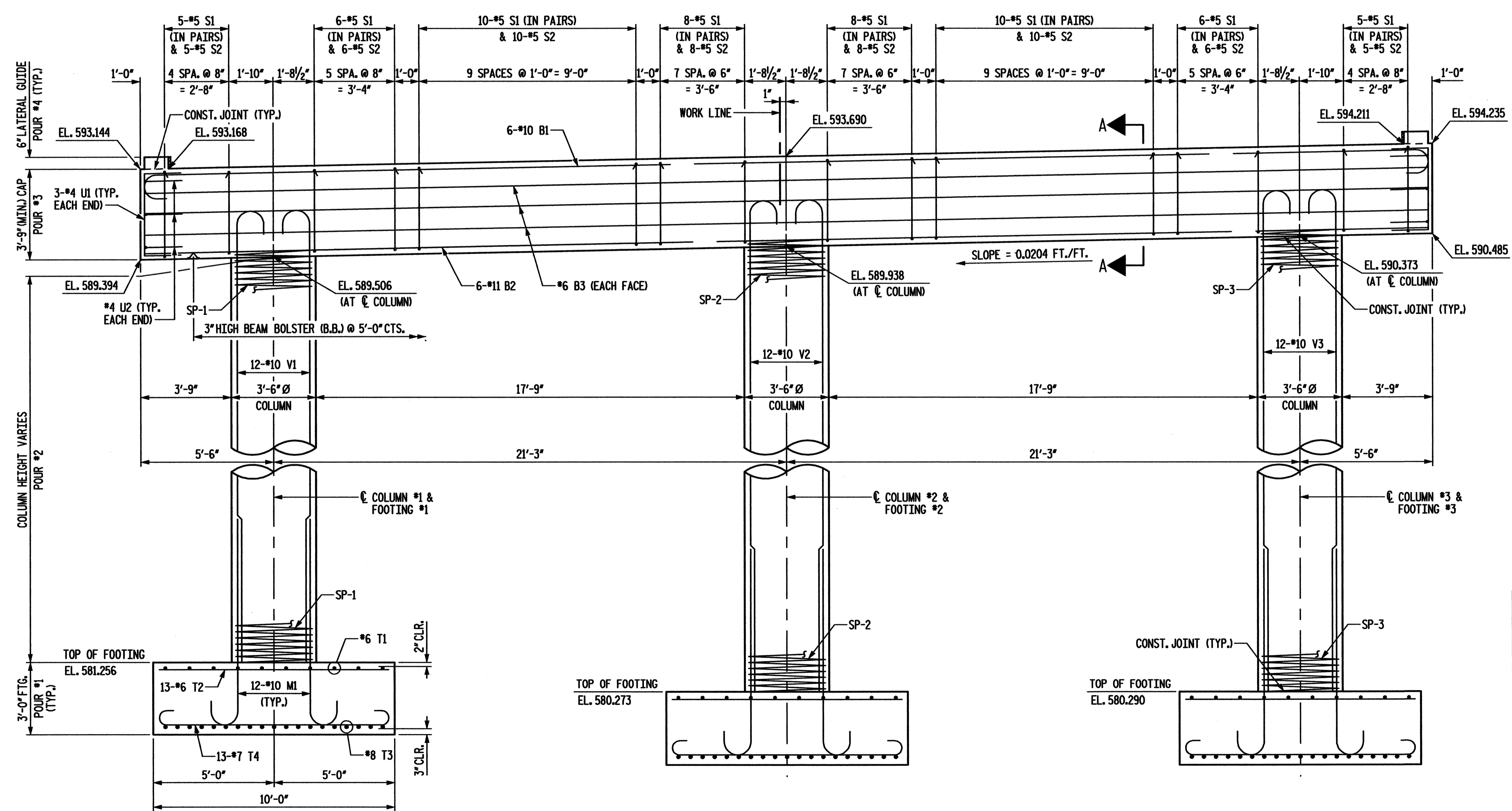
SHEET NO. S-22
 TOTAL SHEETS 30

11/27/2013
 C:\Users\jcarter\Documents\Projects\33817\Substructure\22.dwg
 J. E. Mondolfi
 Design Engineer of Record
 T. E. Tallman
 Date: DEC 2008
 Date: DEC 2008
 Date: NOV 2013



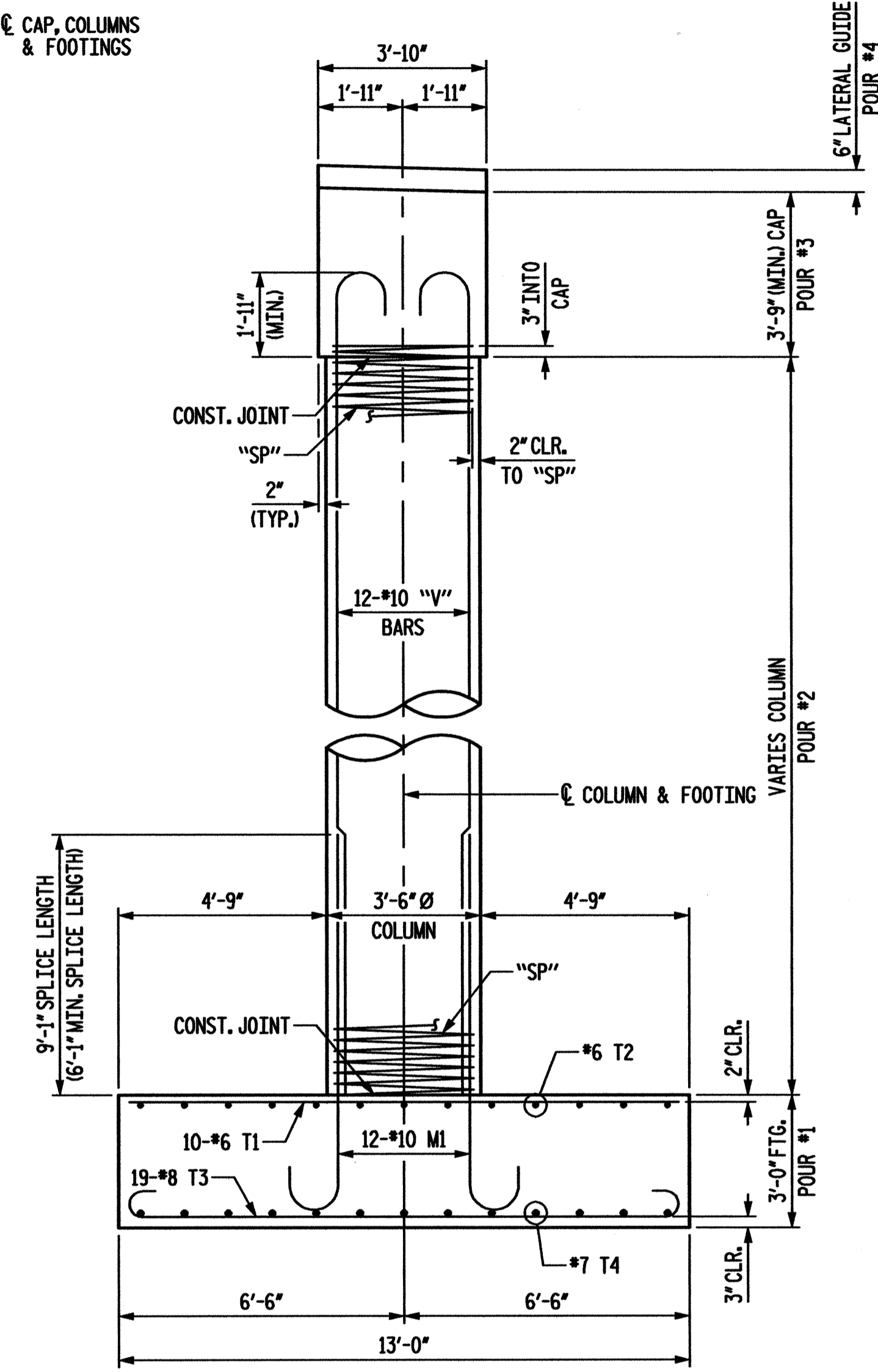
PLAN

NOTES:
 STIRRUPS MAY BE SHIFTED SLIGHTLY AS NECESSARY TO CLEAR DOWELS.
 HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
 THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE COLUMNS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.
 FOR SECTION A-A, SEE SHEET S-24.
 THE TOP SURFACE OF THE CAP SHALL BE SLOPED TRANSVERSELY AT A RATE OF -2.28% (LOOKING AHEAD STATIONS). SEE SECTION A-A FOR LOCATION OF ELEVATIONS AND CAP DEPTHS.



ELEVATION

DETAILS SHOWN FOR FOOTINGS ARE TYPICAL.



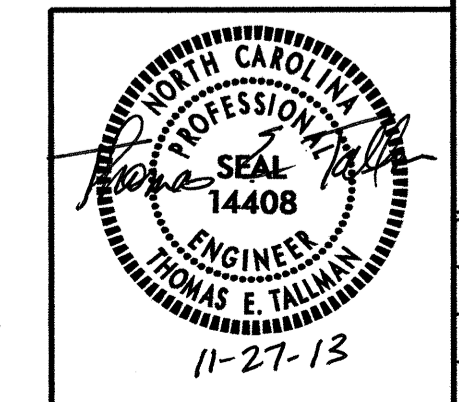
END ELEVATION

COLUMN TABLE	
COLUMN #	HEIGHT
COLUMN #1	8'-3"
COLUMN #2	9'-8"
COLUMN #3	10'-1"

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

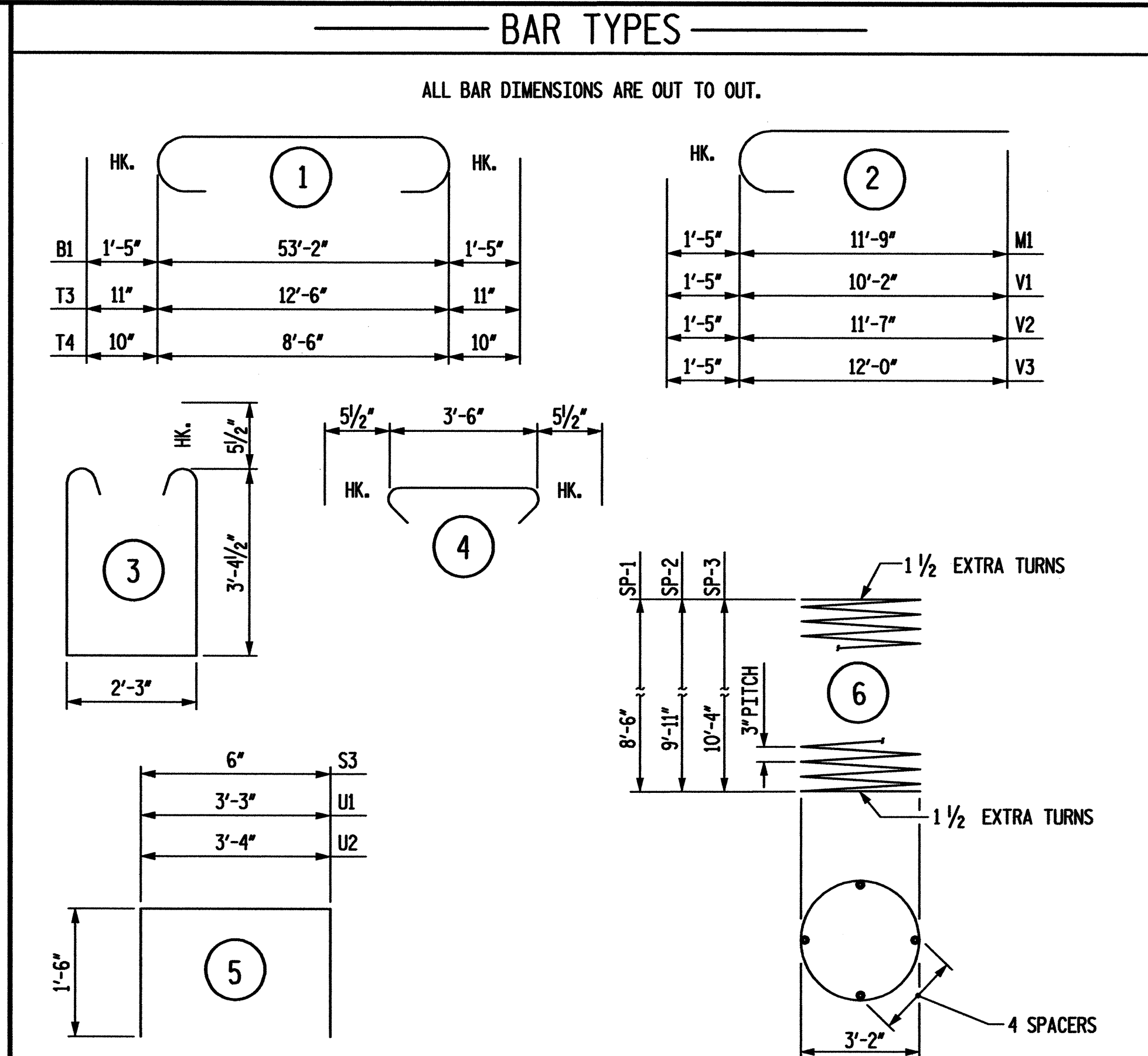
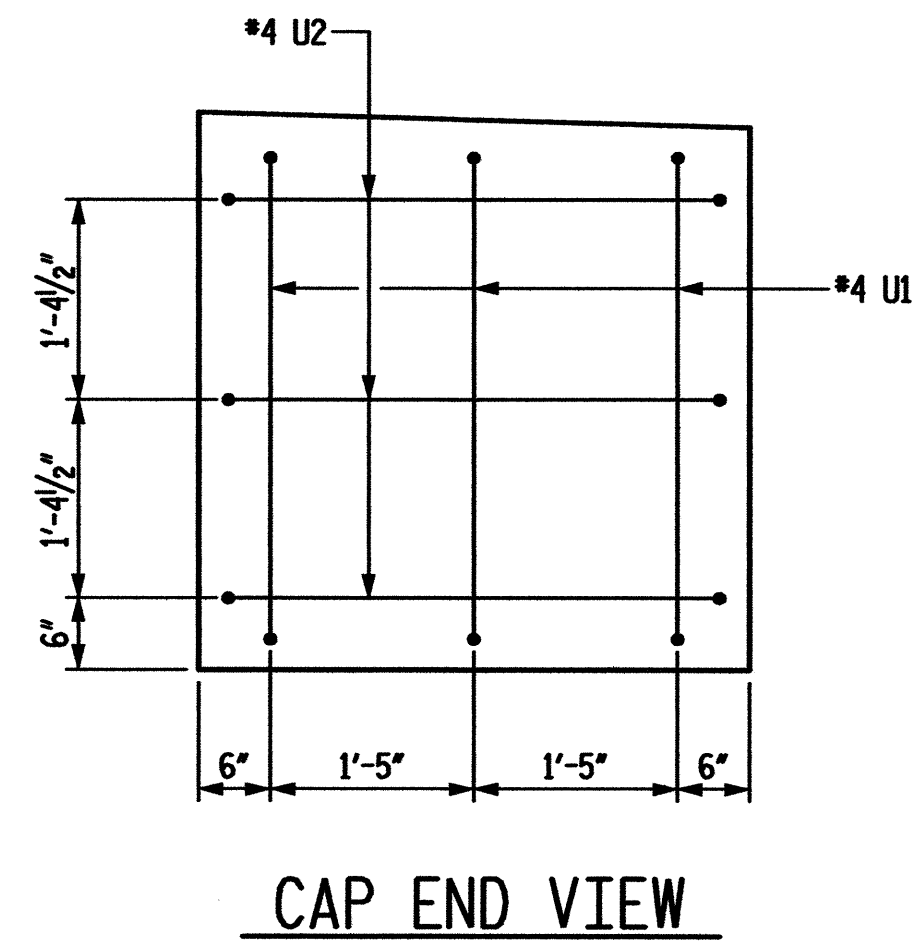
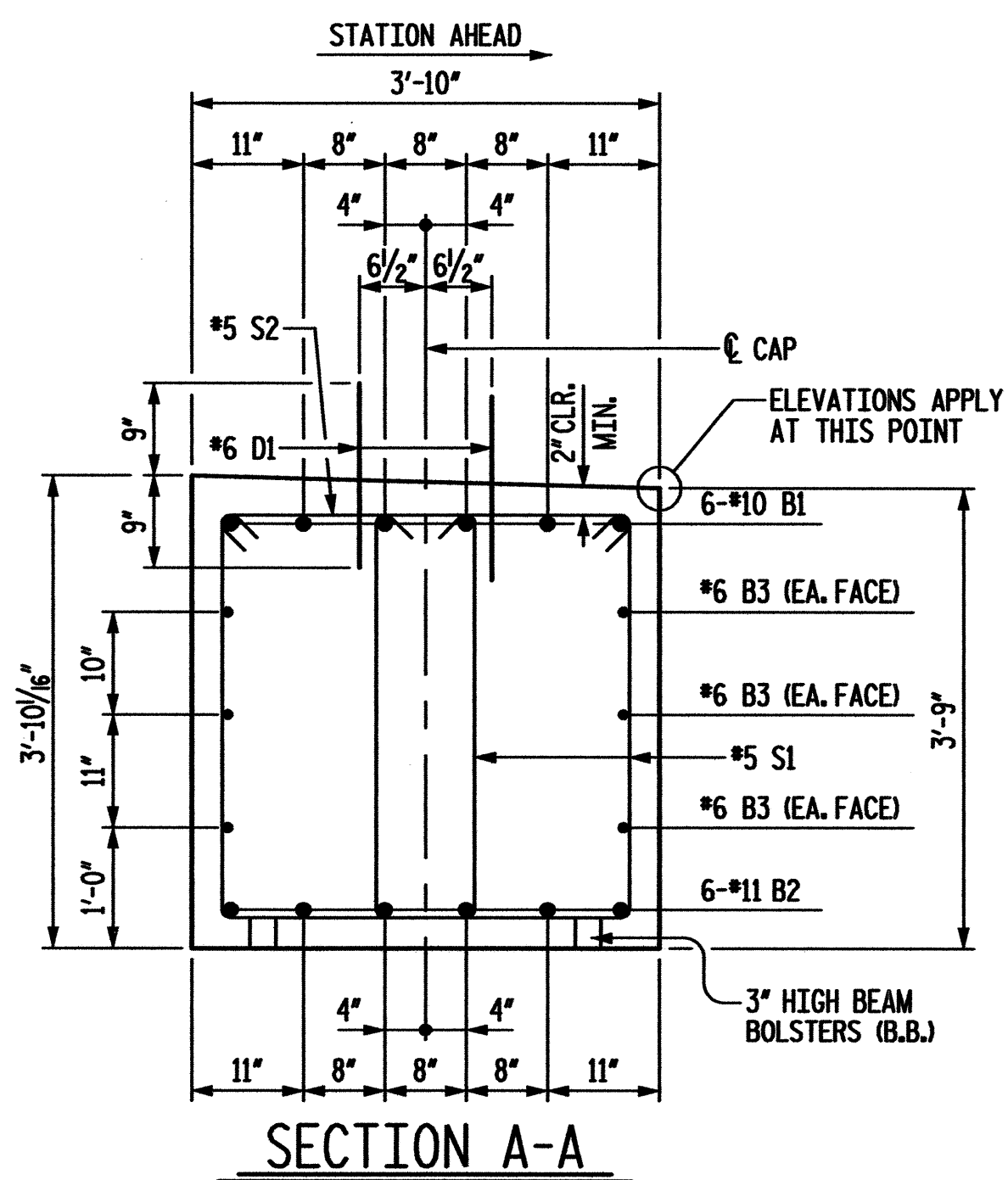
SUBSTRUCTURE
 BENT #2
 (SHEET 1 OF 2)



REVISIONS						HEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-23
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2			4			30

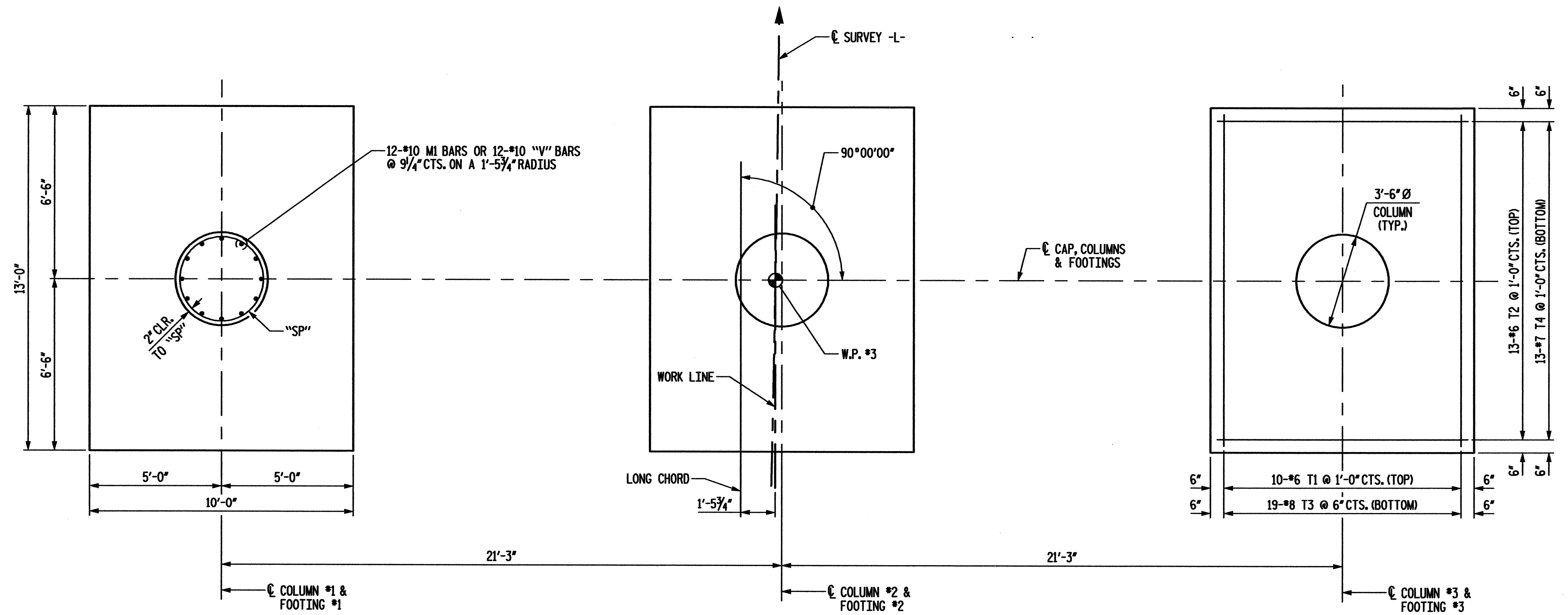
11/27/2013
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 ICA Engineering 17K/D Florence & Hutcheson, Inc.

DRAWN BY: D. H. CARTER DATE: DEC 2008
 CHECKED BY: J. E. MONDOLFI DATE: DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013



BILL OF MATERIAL					
BENT #2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	6	#10	1	56'-0"	1446
B2	6	#11	STR	53'-2"	1695
B3	6	#6	STR	53'-2"	479
B4	4	#4	STR	3'-6"	9
D1	68	#6	STR	1'-6"	153
M1	36	#10	2	13'-2"	2040
S1	116	#5	3	9'-11"	1200
S2	58	#5	4	4'-5"	267
S3	8	#4	5	3'-6"	19
T1	30	#6	STR	12'-6"	563
T2	39	#6	STR	8'-6"	498
T3	57	#8	1	14'-4"	2181
T4	39	#7	1	10'-2"	810
U1	6	#4	5	6'-3"	25
U2	6	#4	5	6'-4"	25
V1	12	#10	2	11'-7"	598
V2	12	#10	2	13'-0"	671
V3	12	#10	2	13'-5"	693
REINFORCING STEEL TOTAL				LBS.	13372
SPIRAL COLUMN REINFORCING STEEL					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
SP-1	1	**	6	363'-5"	243
SP-2	1	**	6	419'-5"	280
SP-3	1	**	6	435'-1"	291
SPIRAL COLUMN REINF. STEEL TOTAL				LBS.	814
POUR #1 FOOTINGS				43.3	CY
POUR #2 COLUMNS				10.0	CY
POUR #3 CAP				28.9	CY
POUR #4 LATERAL GUIDES				0.1	CY
TOTAL				82.3	CY

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

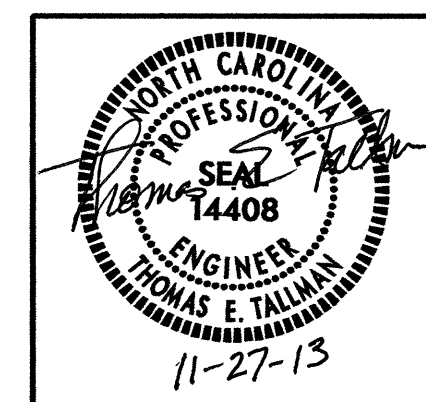


PLAN OF FOOTINGS
DETAILS SHOWN FOR FOOTINGS AND COLUMNS ARE TYPICAL

PROJECT NO. 33817
COUNTY: UNION
STATION: 17 + 73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SUBSTRUCTURE
BENT #2
(SHEET 2 OF 2)

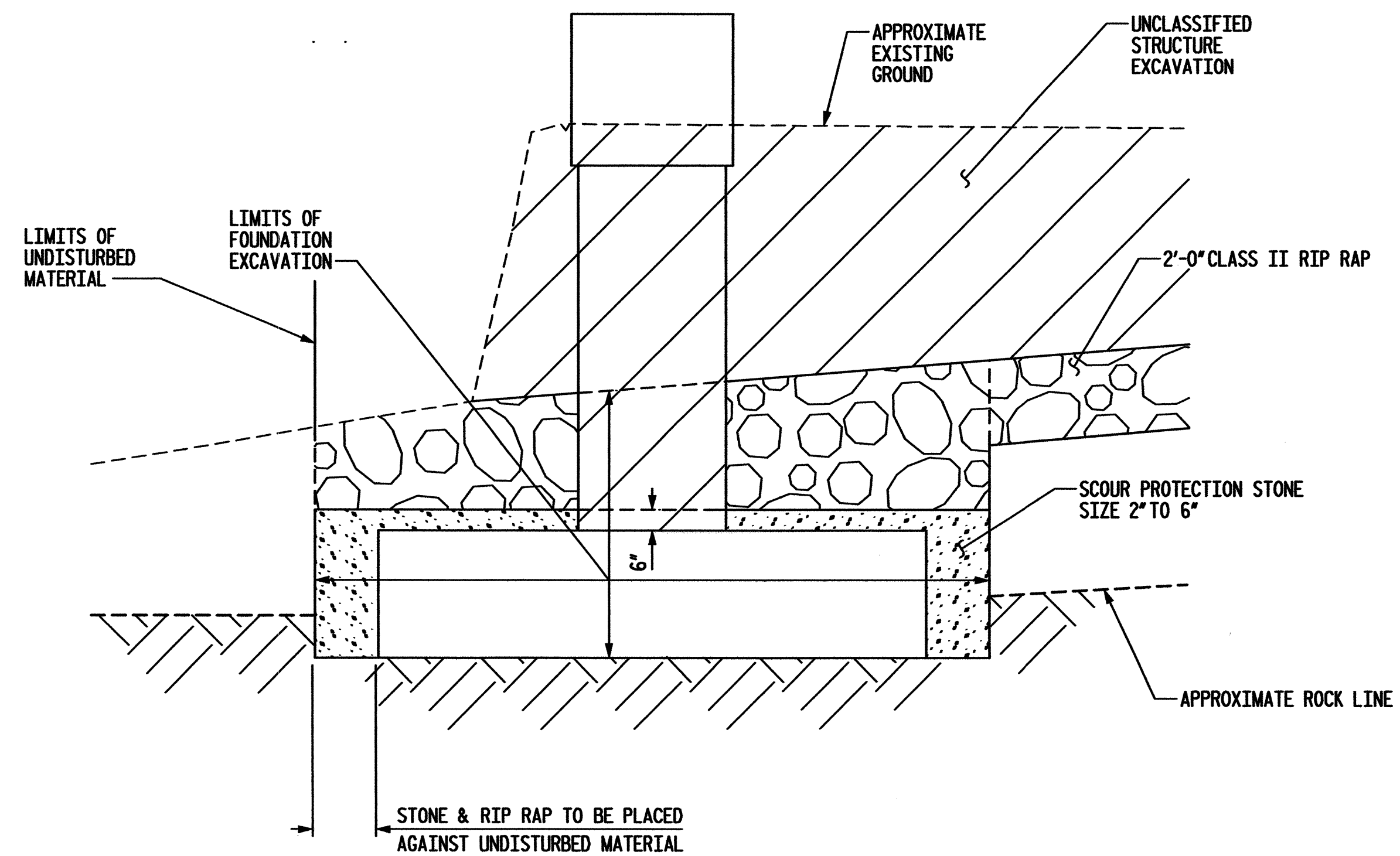
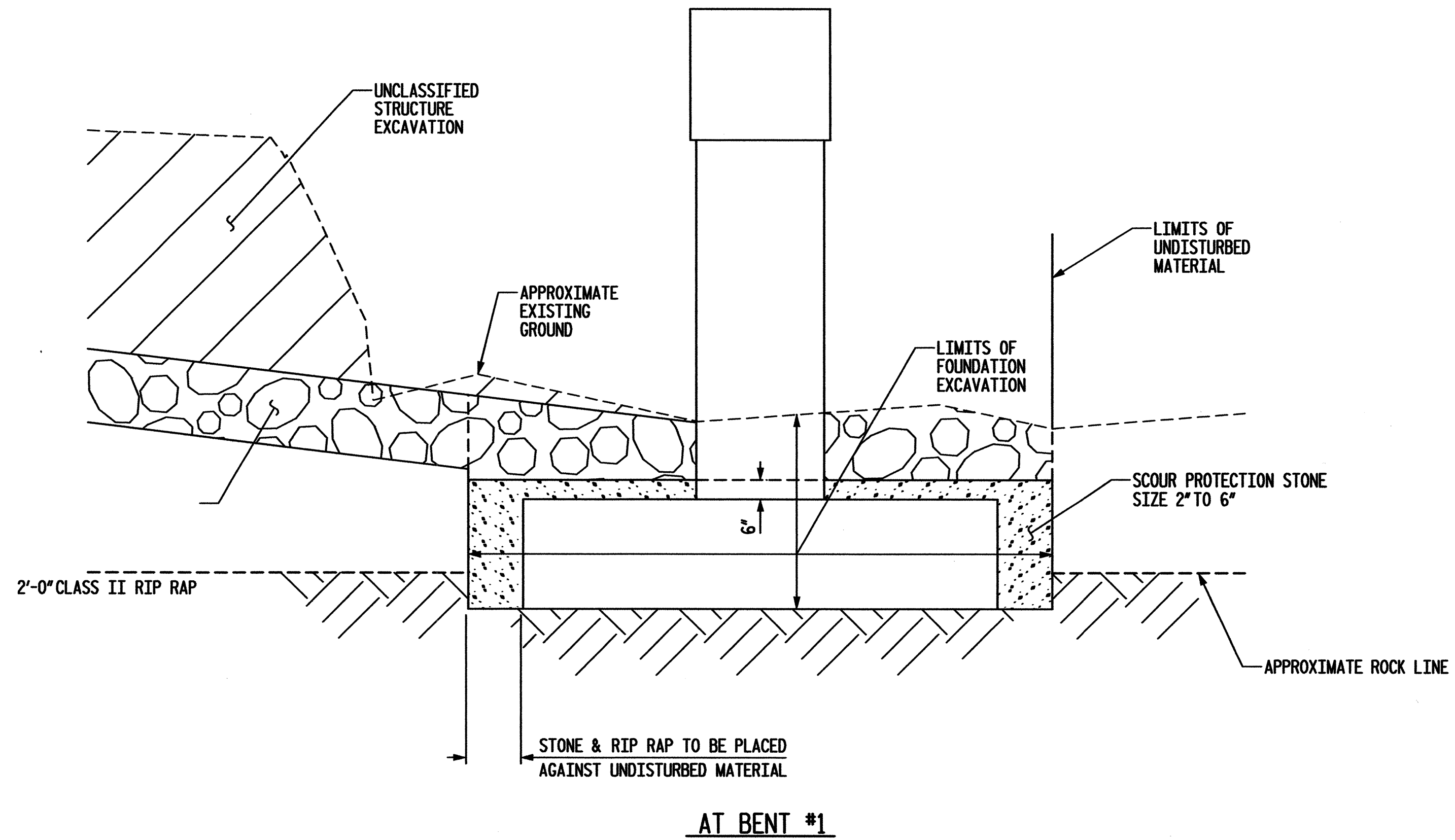
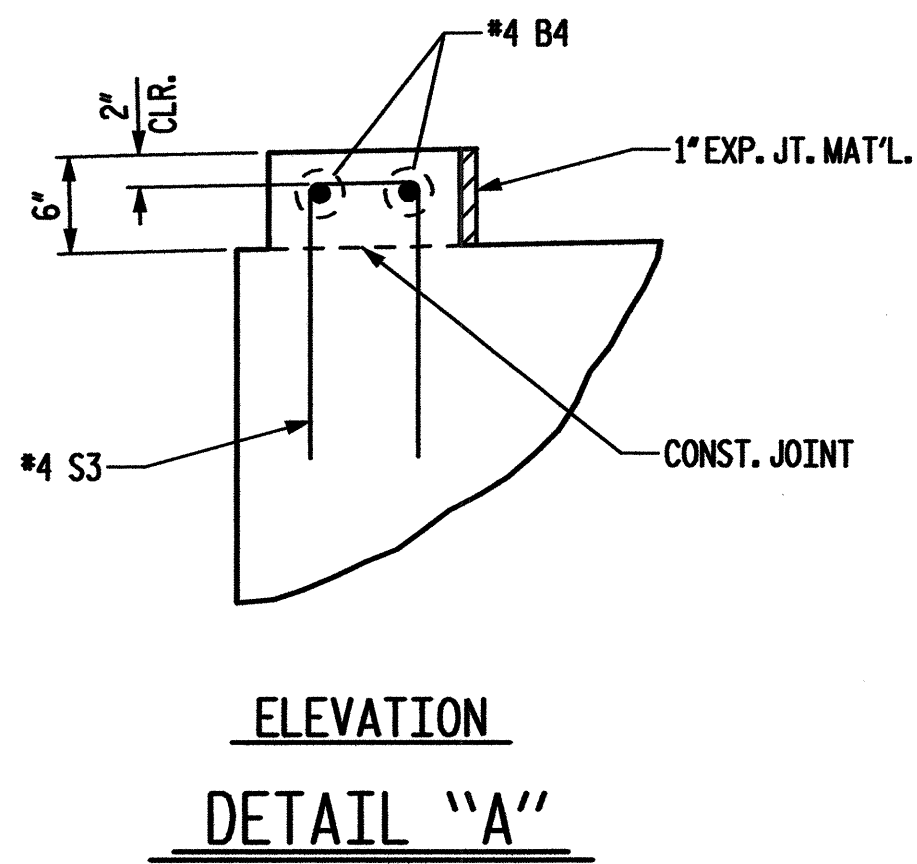
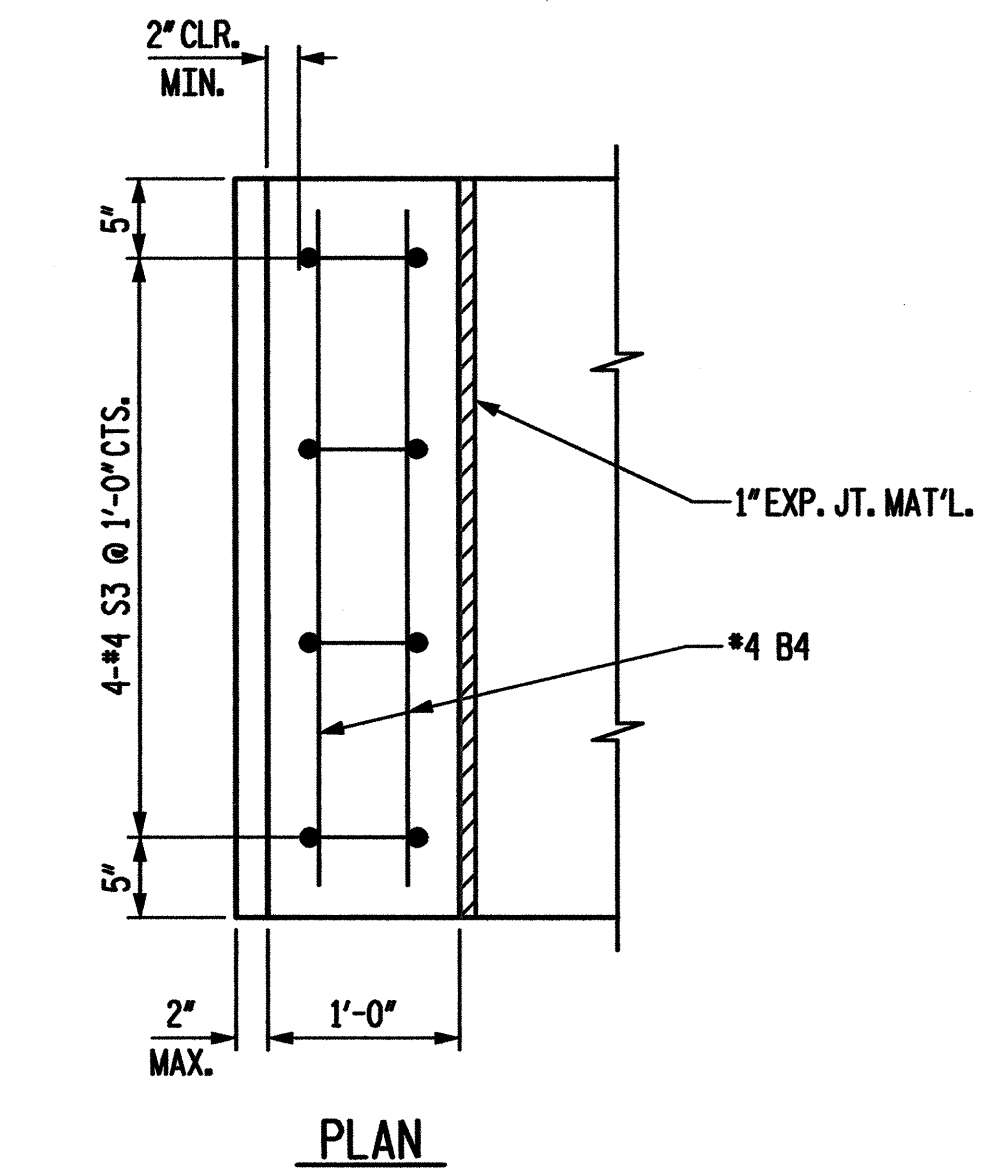


REVISIONS					REVISION NO.
NO.	BY	DATE	NO.	BY	DATE
1			3		
2			4		

11/27/2013 D:\1104651\structures\24_b4651_led.b2b.dgn ICA Engineering f/k/a Florence & Hutcheson, Inc.

DRAWN BY : D. H. CARTER DATE : DEC 2008
CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013

NOTE:
 NO SEPARATE PAYMENT WILL BE MADE FOR PIER SCOUR PROTECTION. THE ENTIRE COST OF PIER SCOUR PROTECTION SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR 'FOUNDATION EXCAVATION'.



PIER SCOUR PROTECTION DETAIL

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

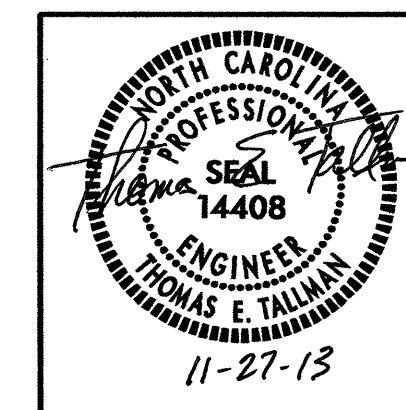
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

SUBSTRUCTURE
 BENT DETAILS

REVISIONS						HEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-25
1			3			TOTAL SHEETS
2			4			30

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 Engineering

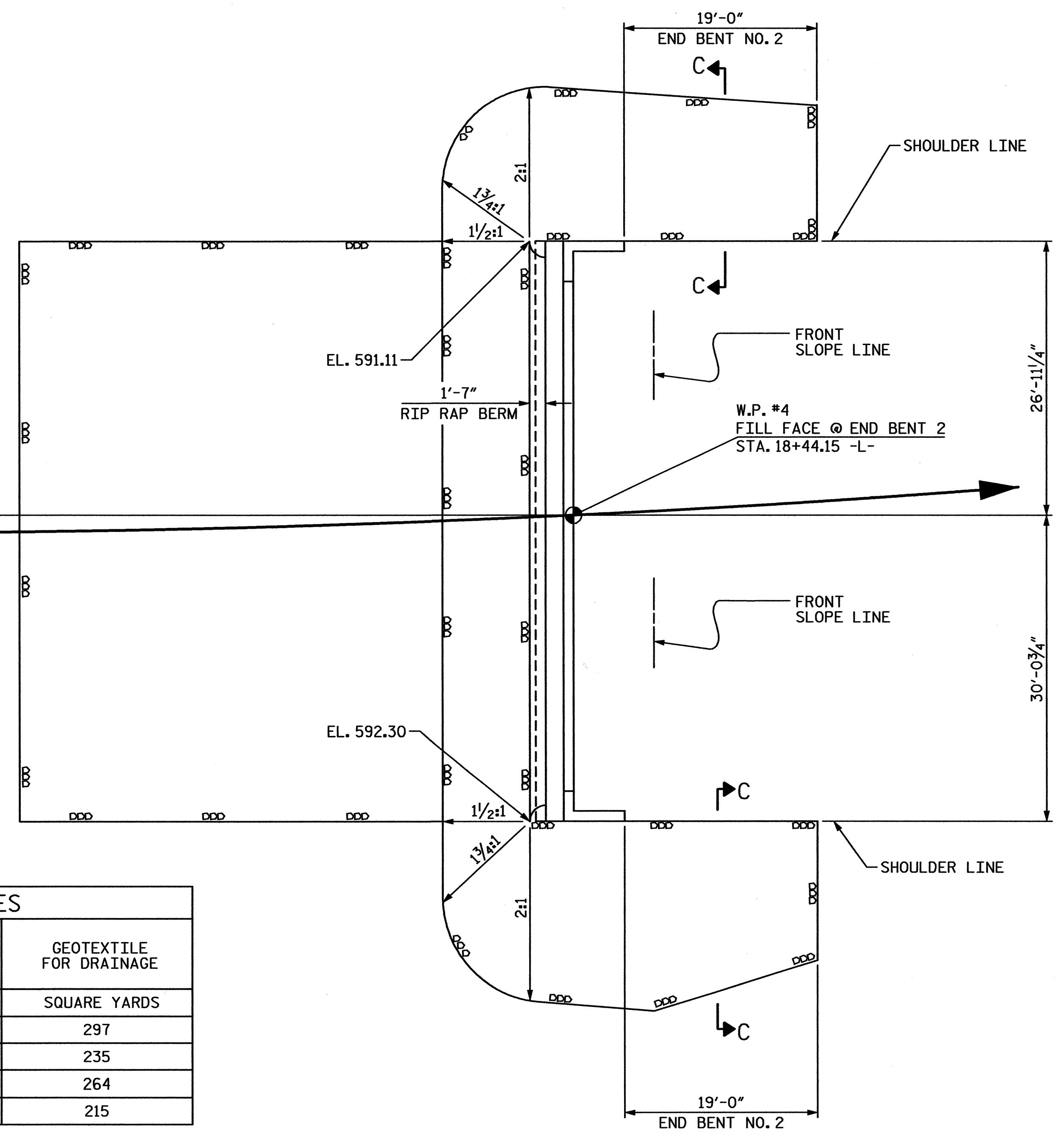
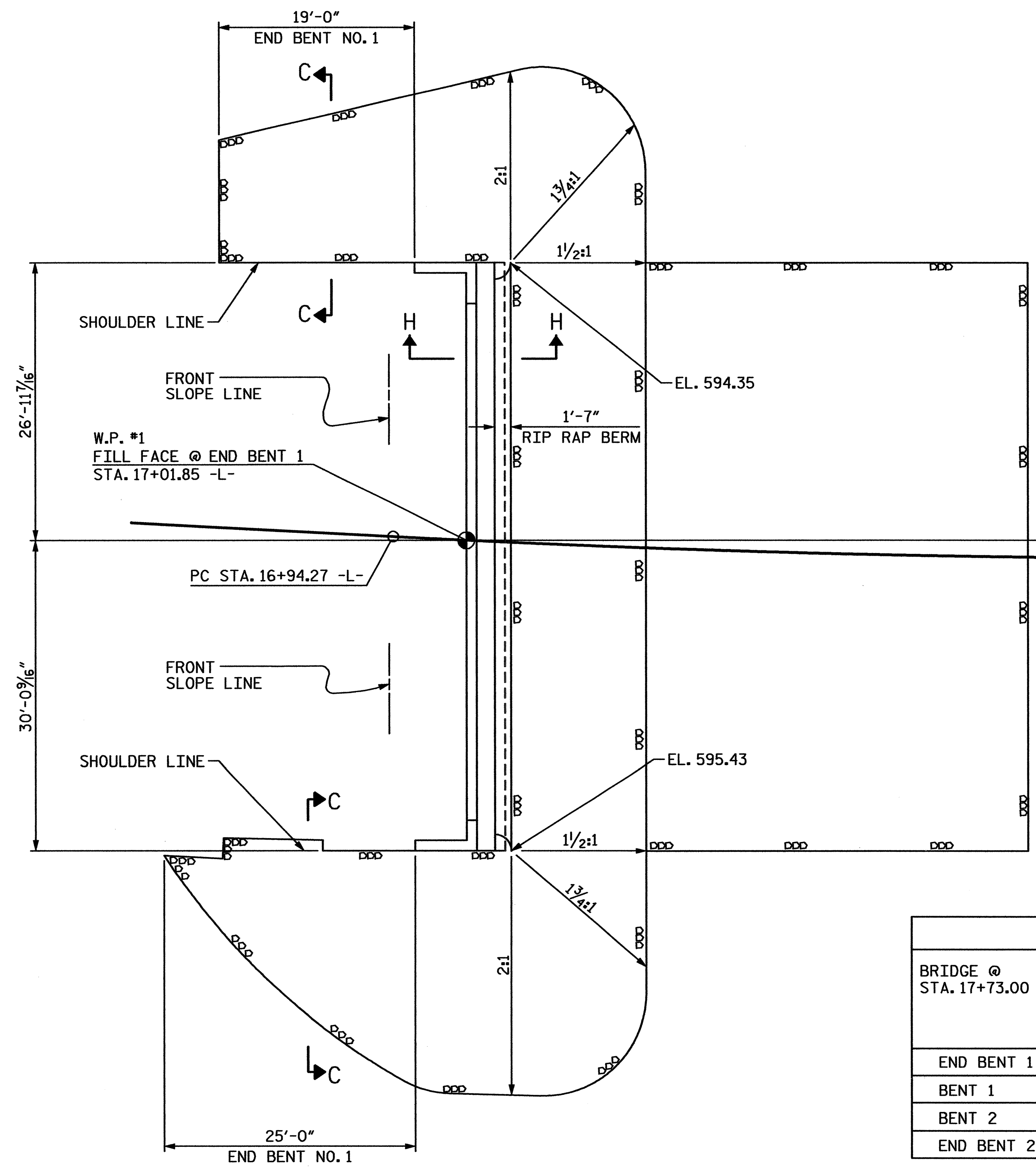
5/k/a Florence & Hutcheson, Inc.
 5121 Kingston Way, Suite 100 Raleigh, NC 27607
 NC License No: F-0268



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 J. E. Mondolfi

DRAWN BY : D. H. CARTER DATE DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE NOV 2013

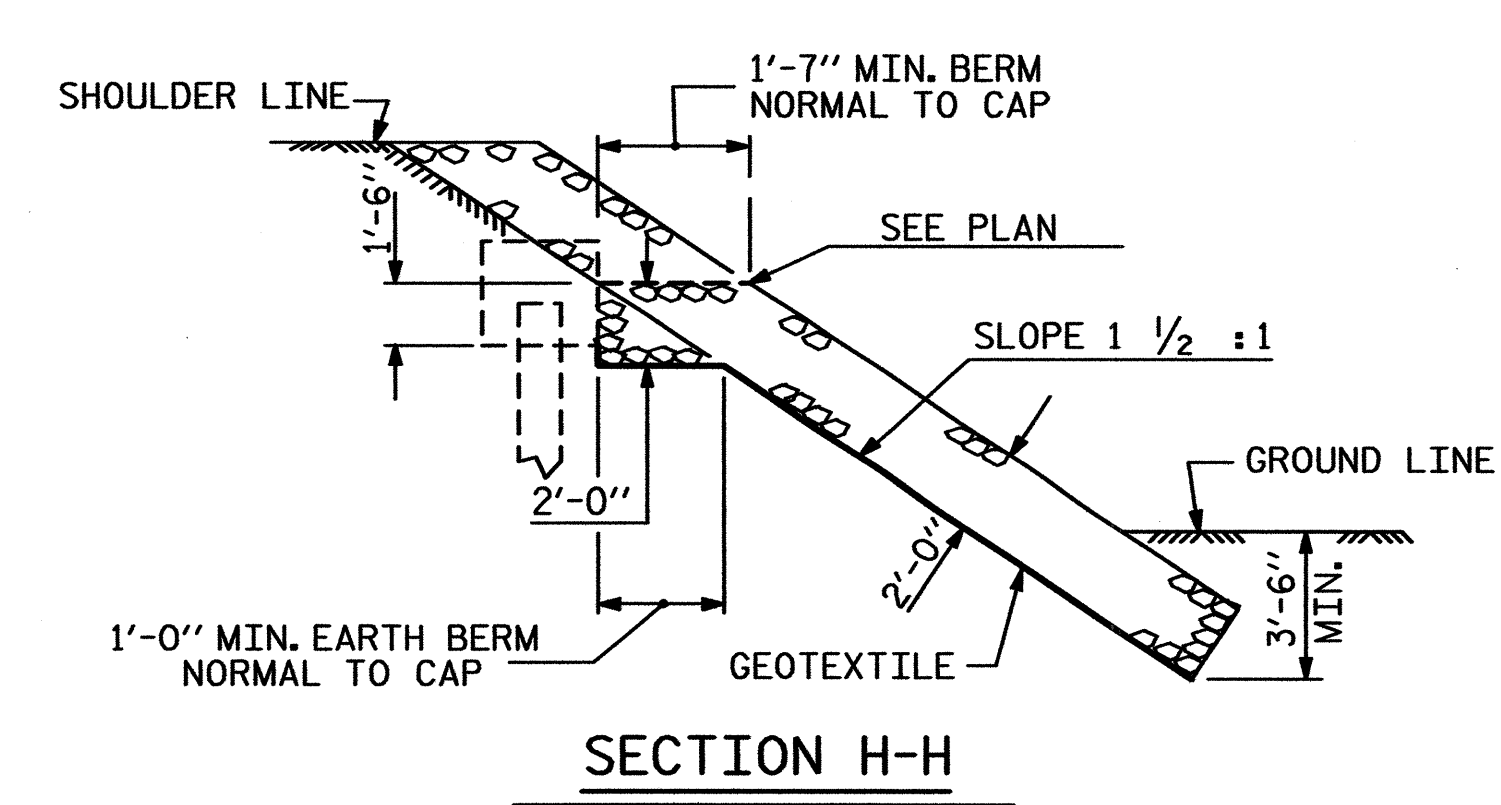
NOTES :
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.



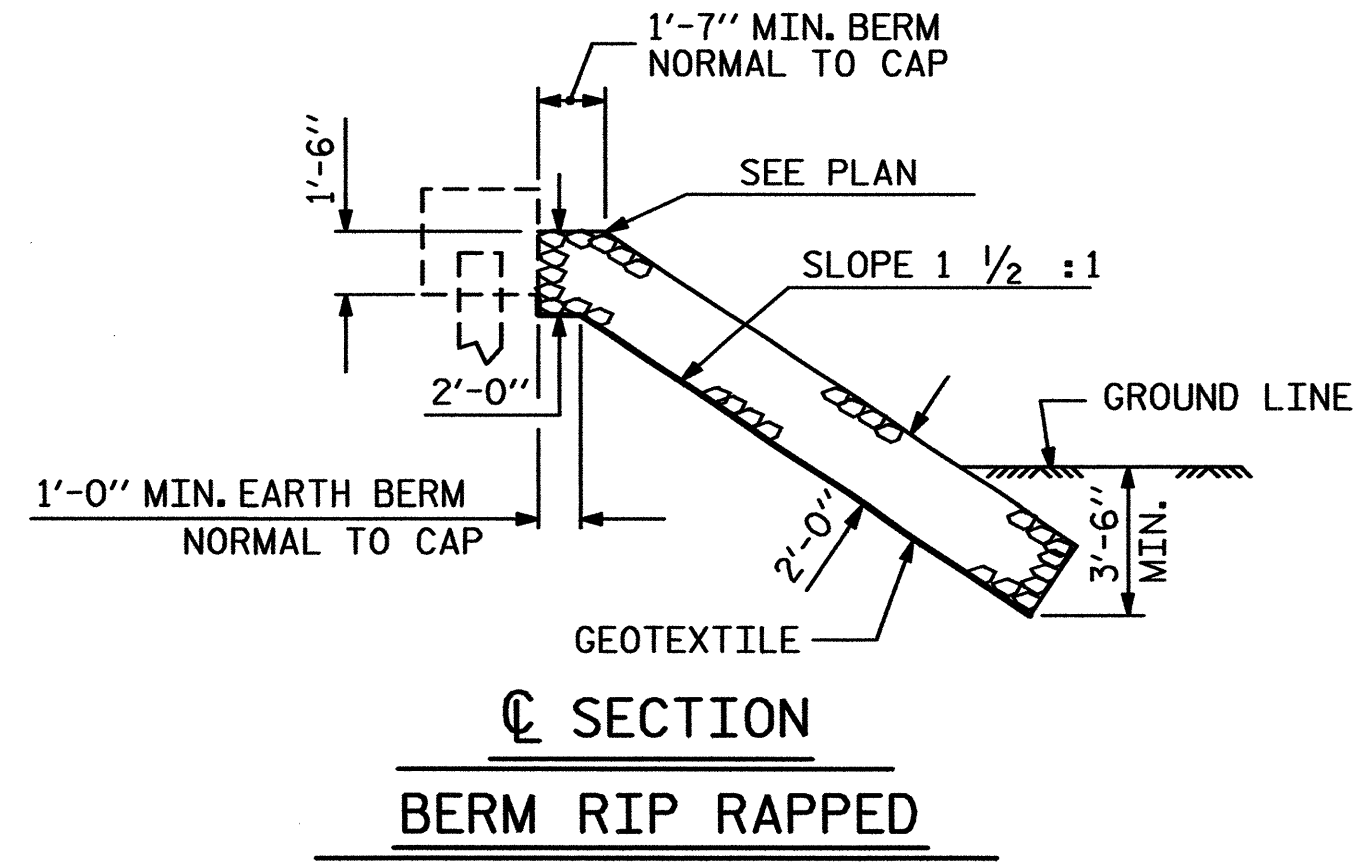
ESTIMATED QUANTITIES		
BRIDGE @ STA. 17+73.00 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	268	297
BENT 1	212	235
BENT 2	237	264
END BENT 2	194	215

END BENT 1

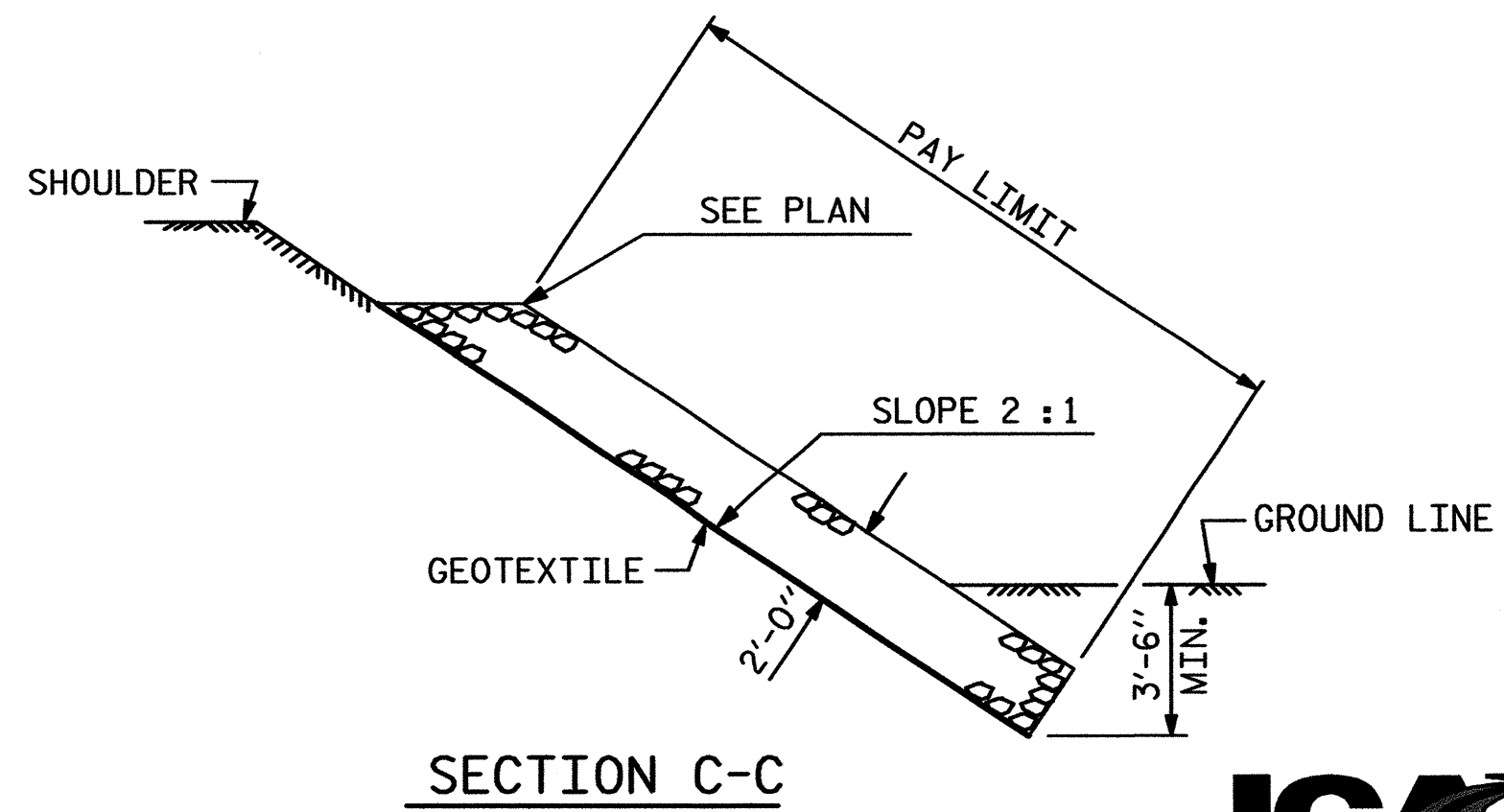
END BENT 2



SECTION H-H



SECTION BERM RIP RAPPED

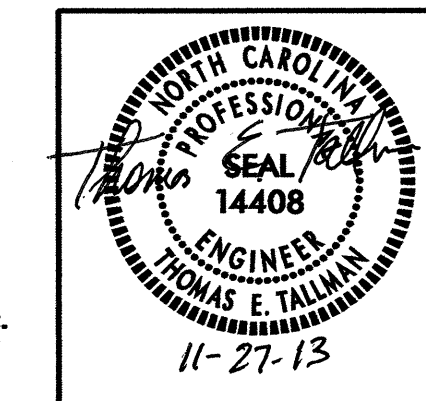


SECTION C-C

PROJECT NO. 33817
COUNTY: UNION
STATION: 17 + 73.00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RIP RAP DETAILS



REVISIONS					SHEET NO. S-26
NO.	BY	DATE	NO.	BY	
1			3		
2			4		



DRAWN BY : D. H. CARTER DATE : MAY 2013
CHECKED BY : J. E. MONDOLFI DATE : MAY 2013
DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013

11/27/2013 14:15:30 ICA Engineering 7/3/2013 Florence & Hutcheson, Inc.

BILL OF MATERIAL

APPROACH SLAB AT END BENT #1						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	32	#4	STR	25'-10"	552	
A2	32	#4	STR	25'-9"	550	
*B1	100	#5	STR	14'-3"	1486	
B2	100	#6	STR	14'-8"	2203	
*B3	6	#4	STR	14'-8"	59	
*D1	12	#4	STR.	0'-8"	5	
*G1	15	#4	STR.	5'-9"	58	
REINFORCING STEEL					LBS.	2753
* EPOXY COATED REINFORCING STEEL					LBS.	2160
CLASS AA CONCRETE					C. Y.	32.6
AT END BENT #1						
APPROACH SLAB AT END BENT #2						
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	
*A1	32	#4	STR	25'-10"	552	
A2	32	#4	STR	25'-9"	550	
*B1	100	#5	STR	14'-3"	1486	
B2	100	#6	STR	14'-8"	2203	
*B3	6	#4	STR	14'-8"	59	
*D1	12	#4	STR.	0'-8"	5	
*G1	15	#4	STR.	5'-9"	58	
REINFORCING STEEL					LBS.	2753
* EPOXY COATED REINFORCING STEEL					LBS.	2160
CLASS AA CONCRETE					C. Y.	32.6
AT END BENT #2						

NOTES

FOR BRIDGE APPROACH FILL INCLUDING GEOTEXTILE, 4" Ø DRAINAGE PIPE, AND #78M STONE BACKFILL, SEE ROADWAY PLANS.

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

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

*78M STONE BACKFILL (CLASS V SELECT MATERIAL) SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS SECTION 1016.

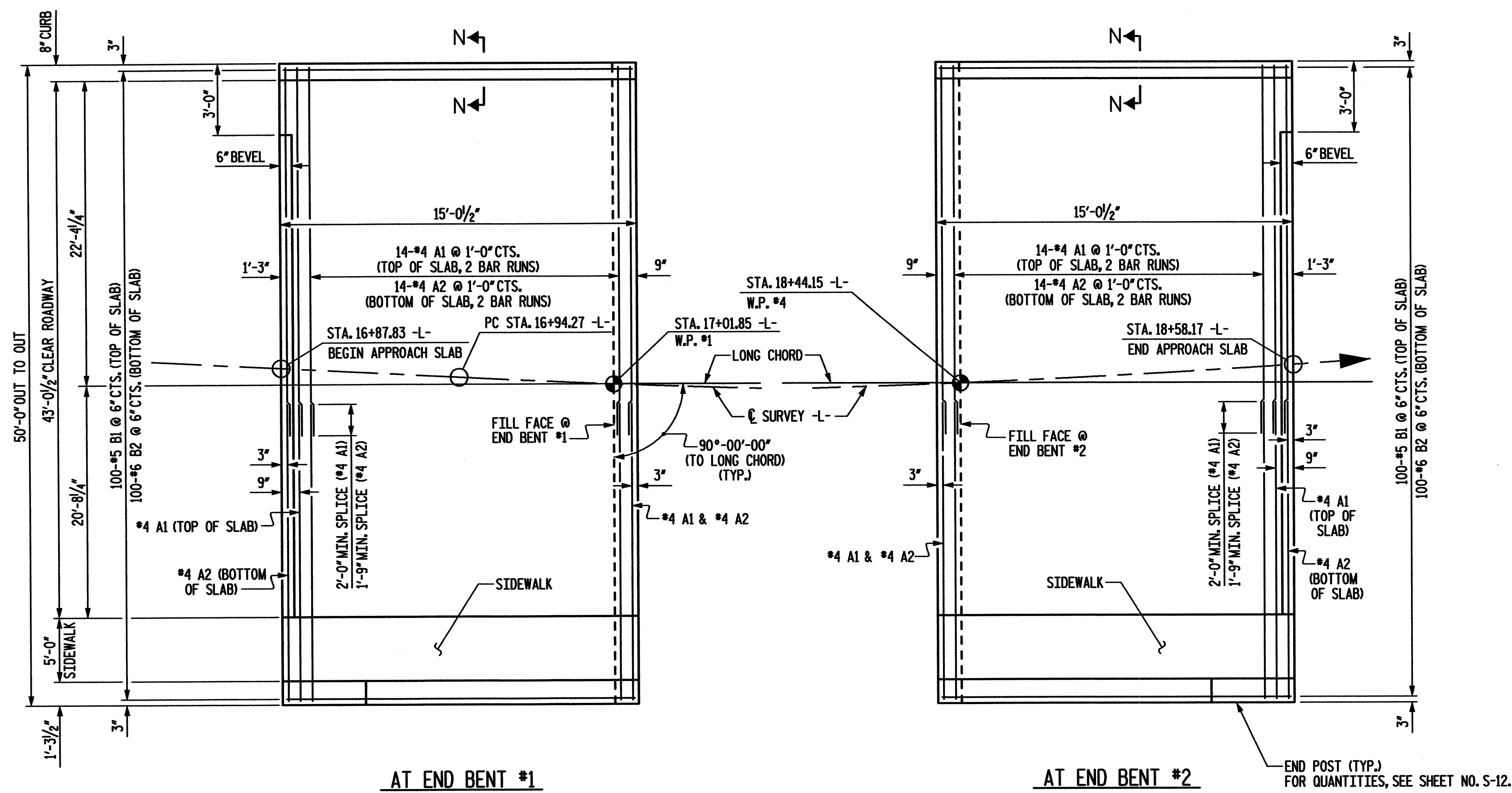
*78M STONE BACKFILL IS TO BE CONTINUOUS ALONG FILL FACE OF BACKWALL FROM OUTSIDE EDGE TO OUTSIDE EDGE OF APPROACH SLAB.

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.

APPROACH SLAB GROOVING IS NOT REQUIRED.

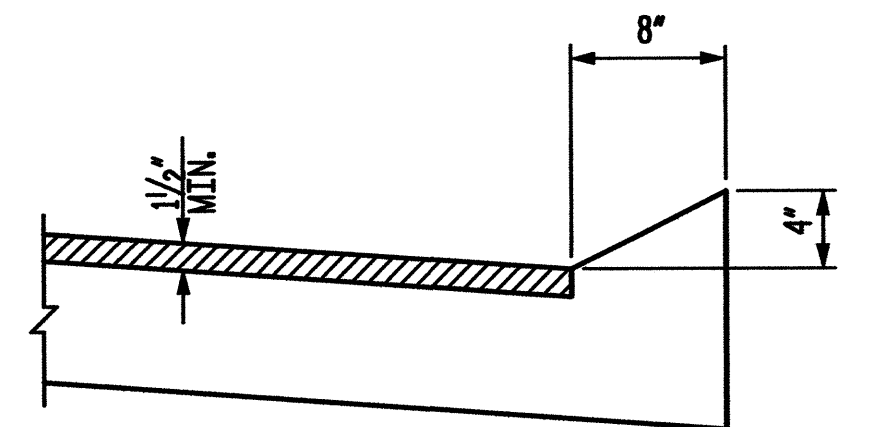
FOR REINFORCING STEEL IN SIDEWALK, SEE SHEET S-28.

FOR THE 4" Ø DRAINAGE PIPE OUTLET(S), SEE ROADWAY STANDARD DRAWINGS.

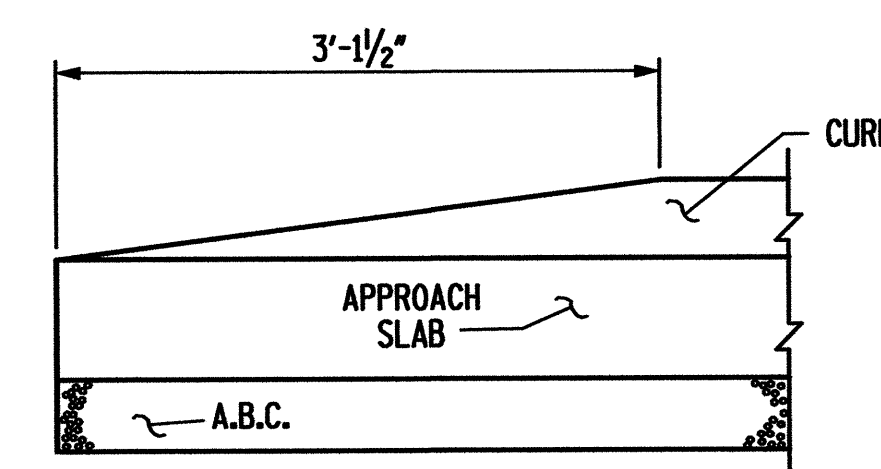


PLAN OF APPROACH SLABS

DIMENSIONS ARE TYPICAL FOR BOTH APPROACH SLABS



SECTION N-N



END OF CURB WITHOUT SHOULDER BERM GUTTER

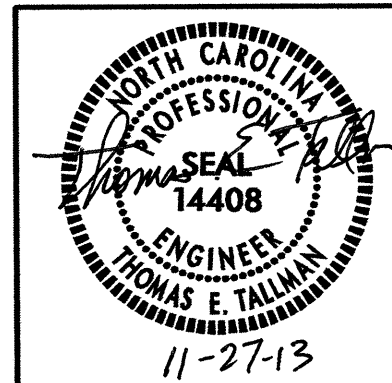
CURB DETAILS

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

BRIDGE APPROACH SLAB
 FOR PRESTRESSED CONCRETE
 CORED SLAB

REVISIONS						QUERY NO.
NO.	BY	DATE	NO.	BY	DATE	S-27
1			3			TOTAL SHEETS
2			4			30



11/27/2013
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DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD : T. E. TALLMAN DATE : NOV 2013

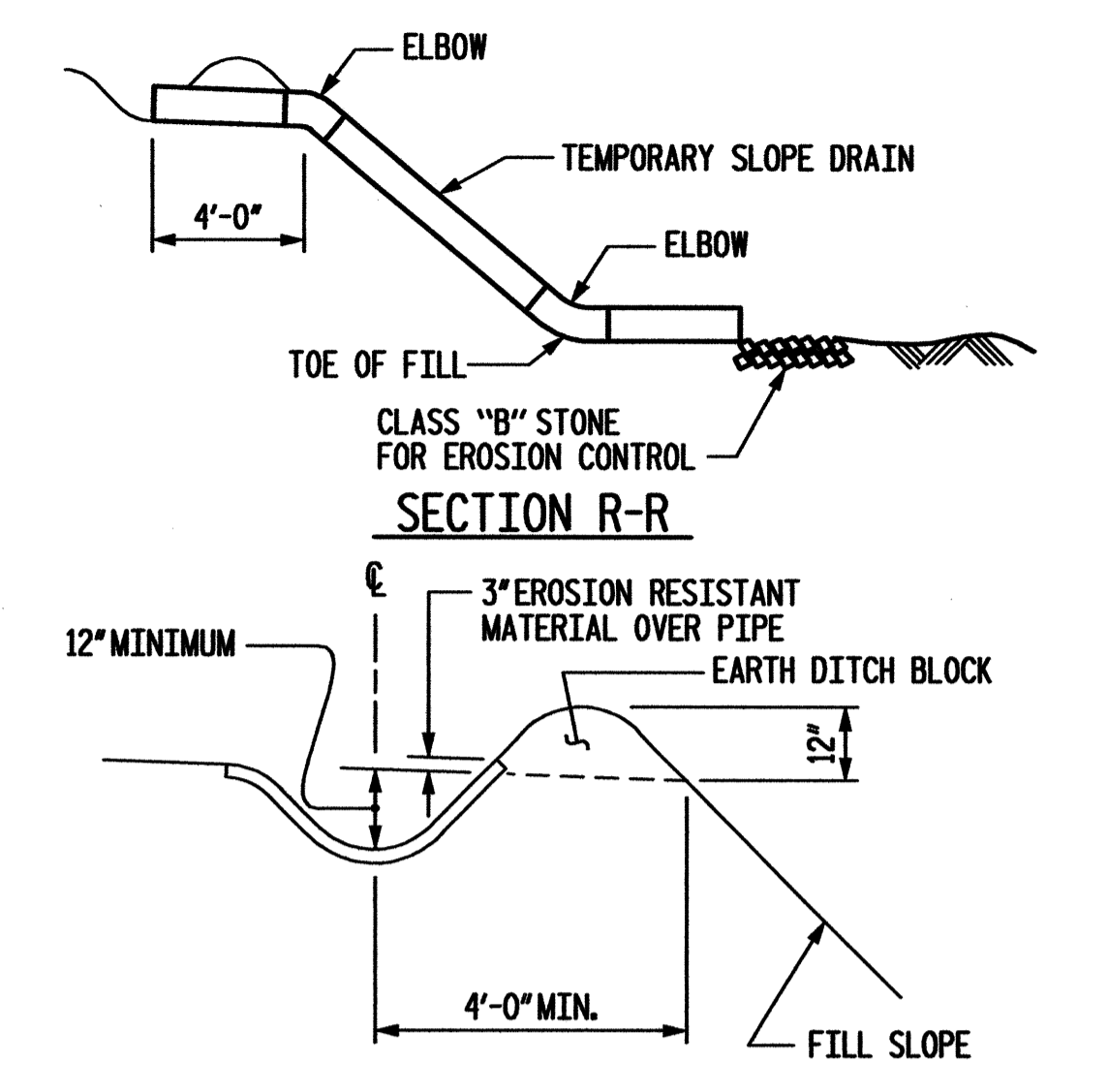


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

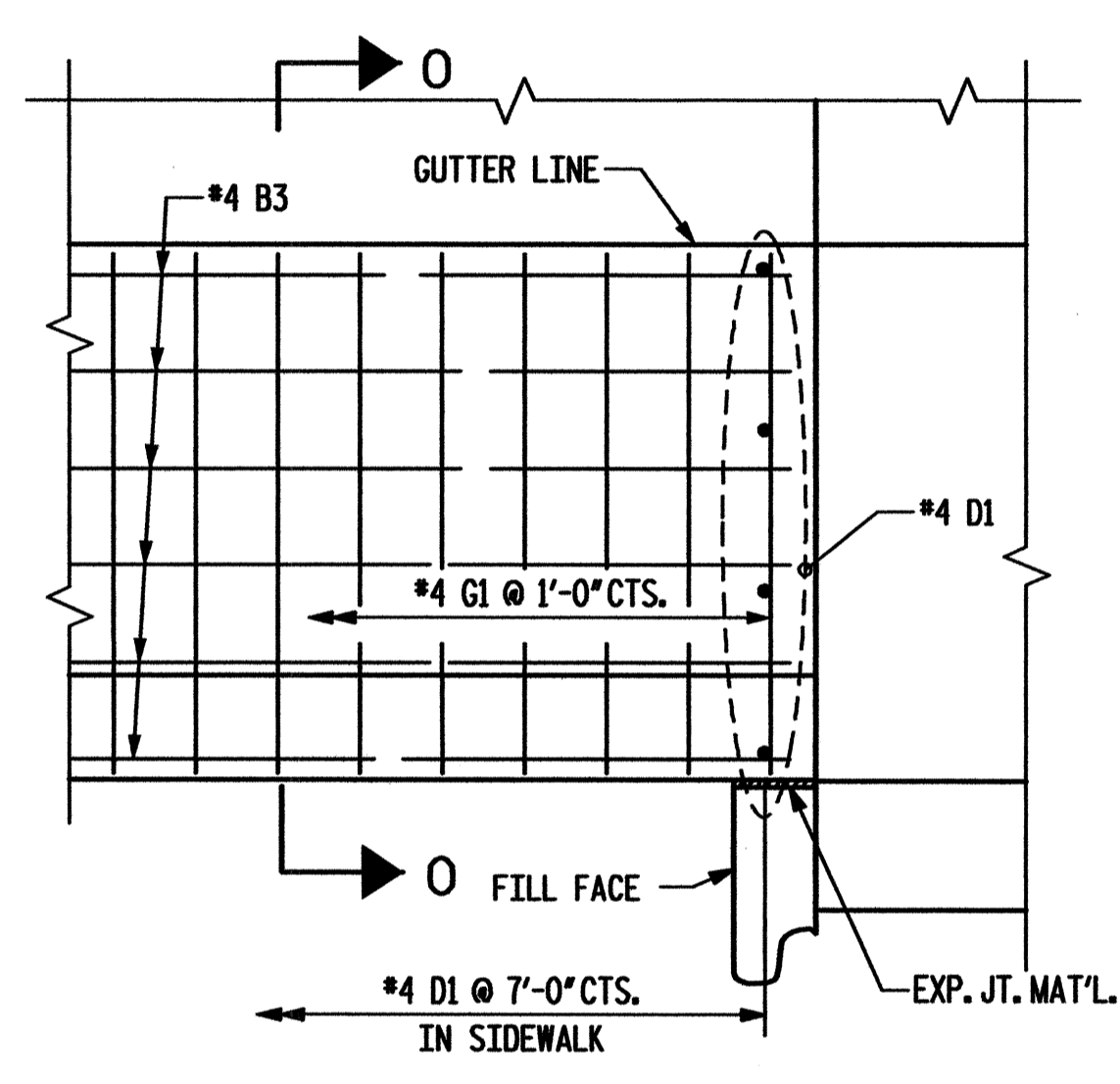
PLAN VIEW

TEMPORARY BERM AND SLOPE DRAIN DETAILS

(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)

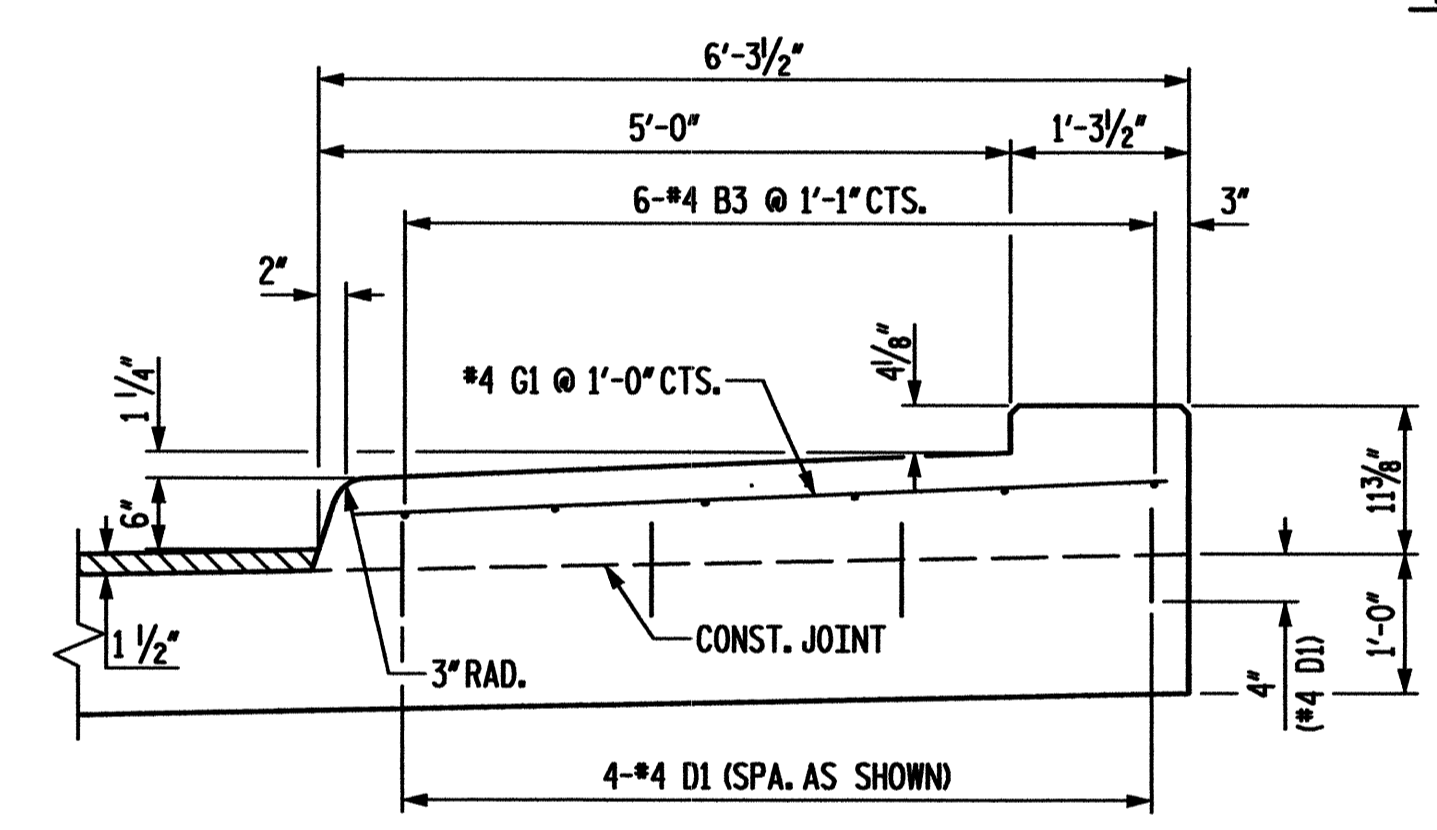


SECTION S-S

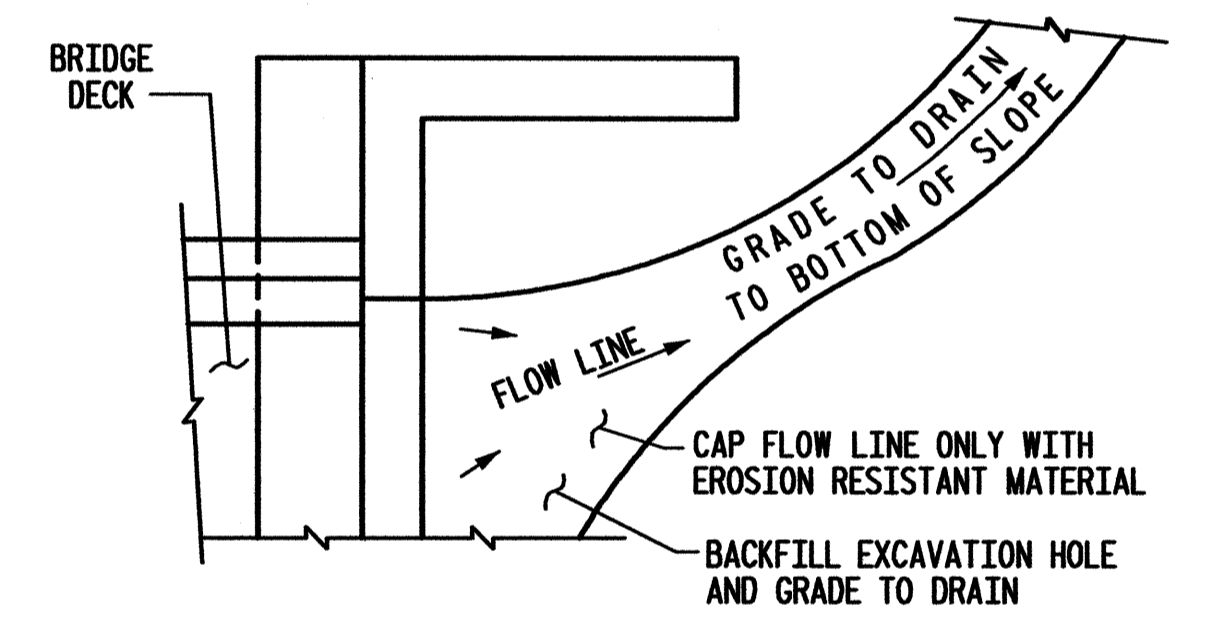


PLAN

DETAILS OF SIDEWALK ON APPROACH SLAB



SECTION O-O



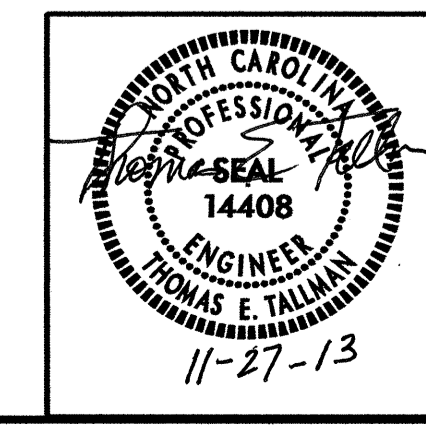
NOTE: IF THE APPROACH SLAB IS NOT CONSTRUCTED IMMEDIATELY AFTER THE BACKFILLING OF THE END BENT EXCAVATION, GRADE TO DRAIN TO THE BOTTOM OF THE SLOPE AND PROVIDE EROSION RESISTANT MATERIAL, SUCH AS FIBERGLASS ROVING OR AS DIRECTED BY THE ENGINEER TO PREVENT SOIL EROSION AND TO PROTECT THE AREA ADJACENT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

TEMPORARY DRAINAGE DETAIL

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

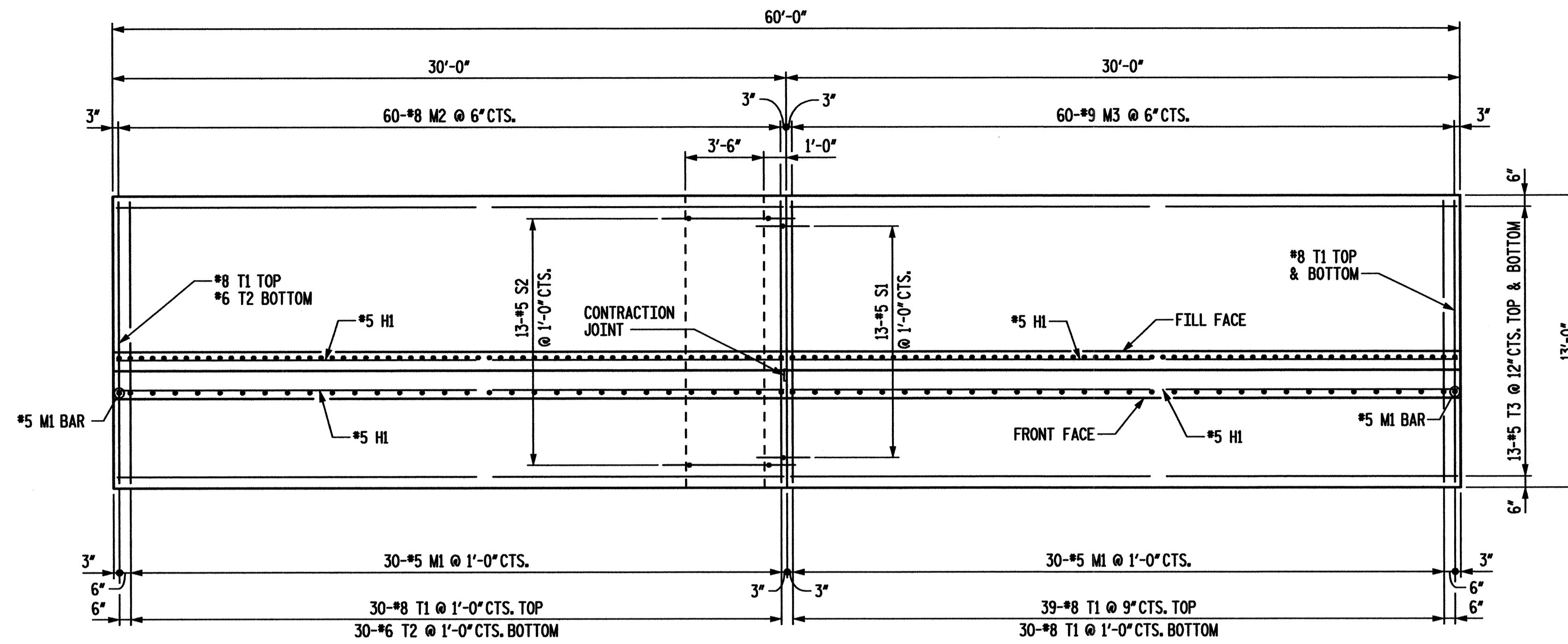
BRIDGE APPROACH
 SLAB DETAILS



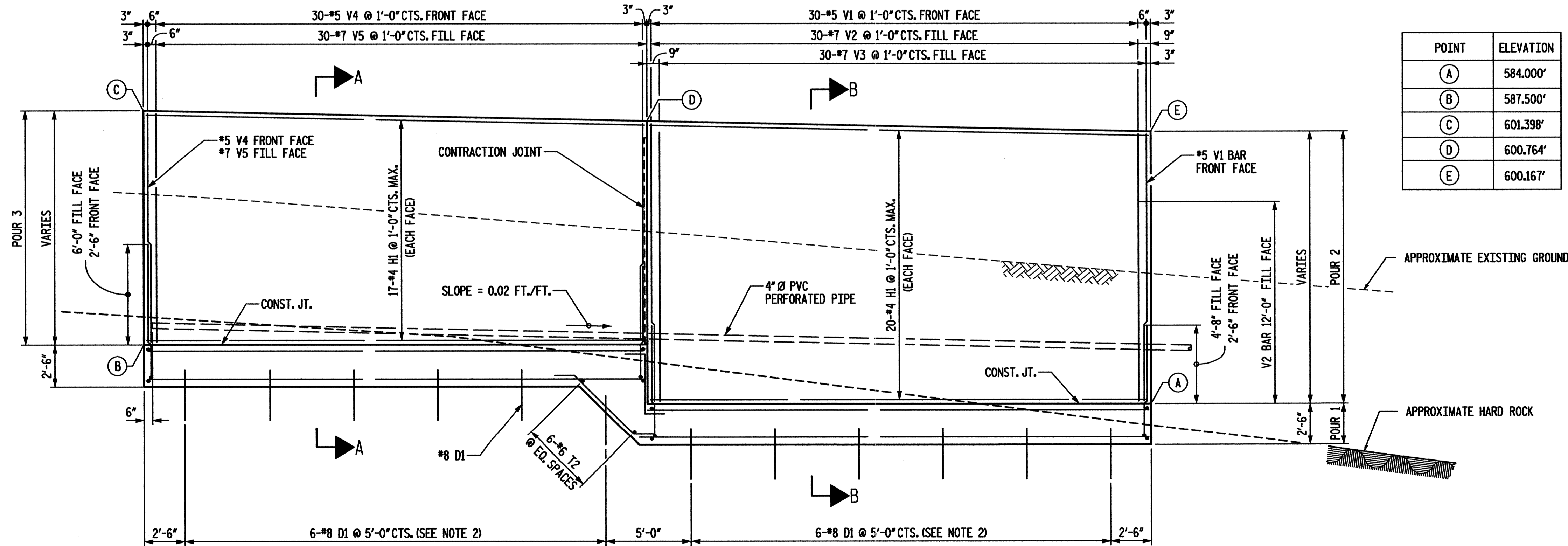
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1			3			TOTAL SHEETS
2			4			30

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 User: carter
 Plot: 11/27/2013 10:46:51 AM
 Plot Device: HP DesignJet 5000 Series

DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD : T. E. TALLMAN DATE : NOV 2013



PLAN OF WALL



ELEVATION OF WALL

NOTES:

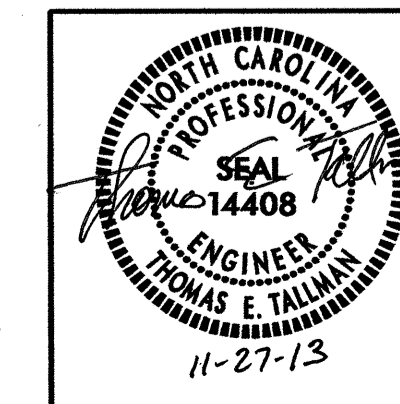
1. FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEETS S-1 & S-3.
2. CONTRACTOR SHALL HAVE THE OPTION NOT TO KEY THE FOOTING INTO ROCK (MINIMUM KEY DEPTH AT 1'-0". IN THIS CASE CONTRACTOR MUST FOUND BOTTOM OF FOOTING ON ROCK AND SHALL PLACE VERTICAL DOWELS WITH #8 STEEL BARS AT 5' SPACES TO BE EMBEDDED 24" INTO ROCK AND 12" INTO THE BOTTOM OF FOOTINGS. PAYMENT FOR THE DOWELS SHALL BE INCLUDED IN THE LUMP SUM BID FOR EXCAVATION AND EMBANKMENT. THE COST OF KEYING FOOTING INTO ROCK SHALL BE INCLUDED IN THE LUMP SUM PAYMENT FOR EXCAVATION AND EMBANKMENT.
3. THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE VERTICAL REINFORCEMENT FOR THE RETAINING WALL IS DETAILED WITH 3 FEET OF EXTRA LENGTH. FIELD CUT "V" BARS AS NEEDED.

POINT	ELEVATION
(A)	584.000'
(B)	587.500'
(C)	601.398'
(D)	600.764'
(E)	600.167'

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17+73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

RETAINING WALL
 (SHEET 1 OF 2)



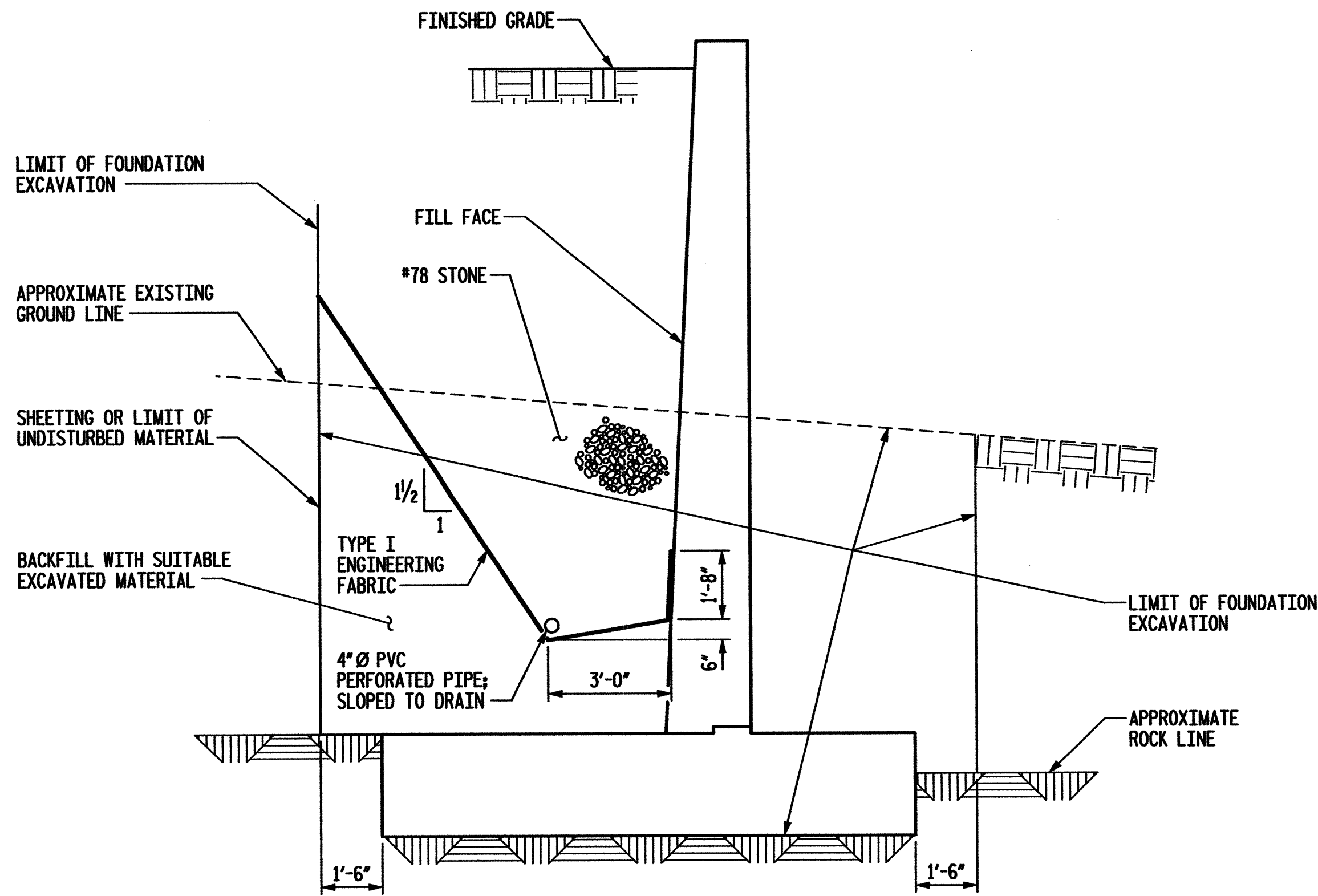
ICK
 Engineering

f/k/a Florence & Hutcheson, Inc.
 5121 Kingston Way, Suite 100 Raleigh, NC 27607
 NC License No: P-0288

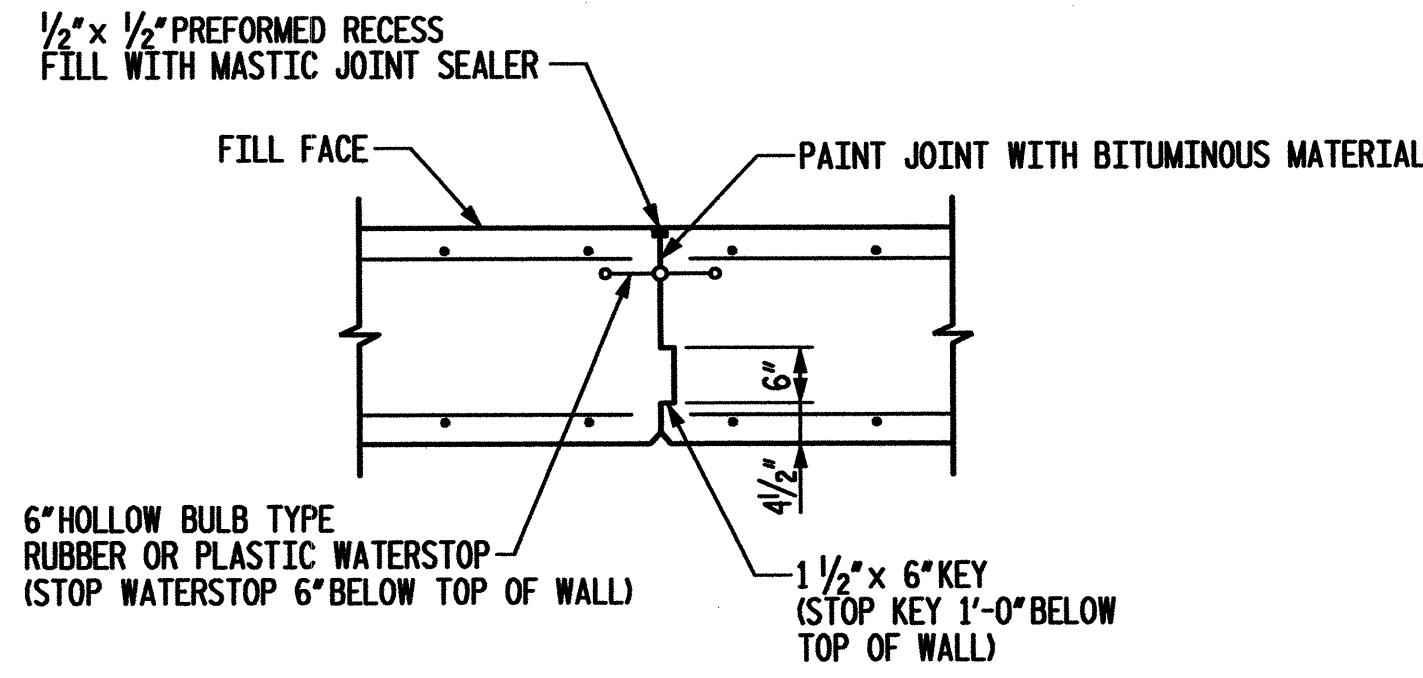
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NO.	BY	DATE	NO.	BY	DATE	S-29
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2			4			30

11/27/2013
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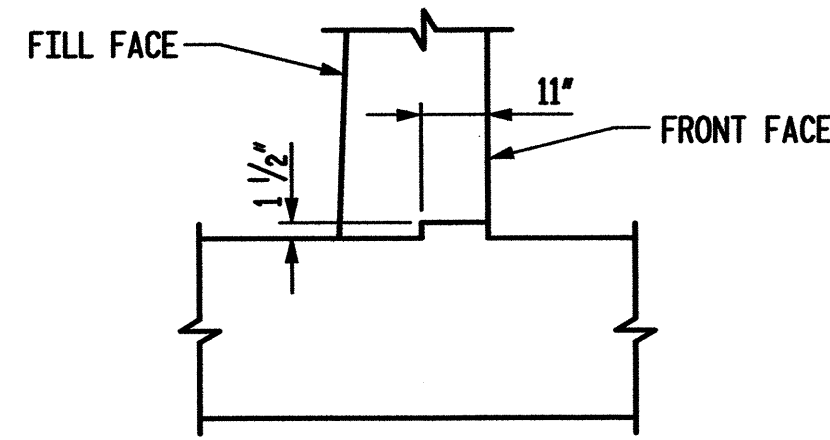
DRAWN BY : D. H. CARTER DATE : DEC 2008
 CHECKED BY : J. E. MONDOLFI DATE : DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE : NOV 2013



EXCAVATION AND EMBANKMENT AT RETAINING WALL

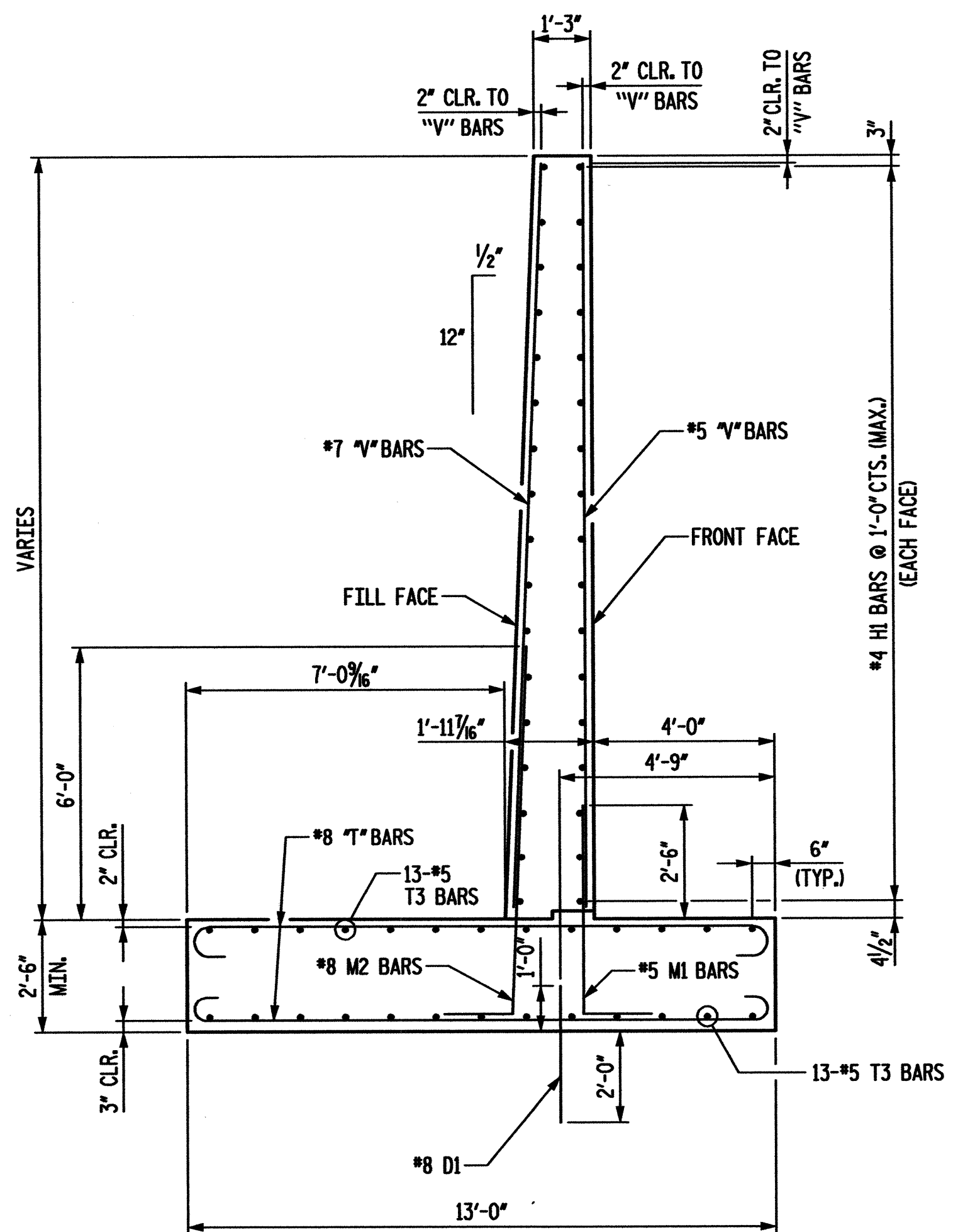


CONTRACTION JOINT DETAIL

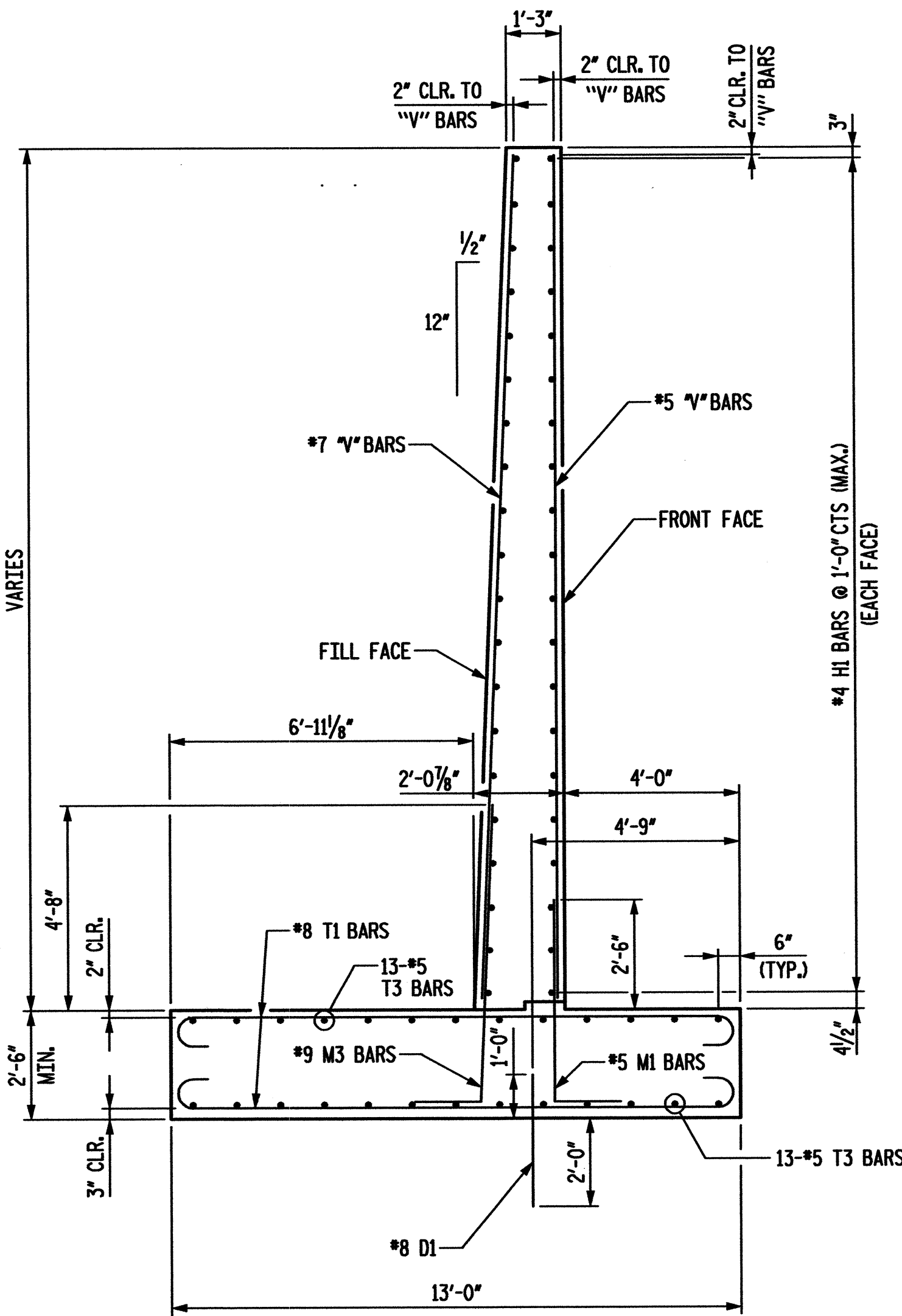


SHEAR KEY DETAIL AT BOTTOM OF WALL

BAR TYPES				BILL OF MATERIAL			
RETAINING WALL							
BAR NO.	SIZE	TYPE	LENGTH	WEIGHT			
D1	12	8	STR	3'-0"	96		
H1	74	5	STR	29'-8"	2290		
S1	13	5	2	7'-8"	104		
S2	13	5	3	7'-4"	99		
T1	102	8	4	14'-6"	3949		
T2	37	6	4	14'-0"	778		
T3	52	5	4	29'-8"	1609		
M1	62	5	1	6'-2"	399		
M2	60	8	1	9'-8"	1549		
M3	60	9	1	8'-4"	1700		
V1	31	5	STR	19'-6"	630		
V2	30	7	STR	12'-0"	736		
V3	30	7	STR	19'-6"	1196		
V4	31	5	STR	16'-8"	539		
V5	31	7	STR	16'-8"	1056		
REINFORCING STEEL TOTAL				10873	LB		
CLASS "A" CONCRETE BREAKDOWN							
POUR #1 - FOOTING				76.9	CY		
POUR #2 - WALL				30.4	CY		
POUR #3 - WALL				25.1	CY		
TOTAL				132.4	CY		



SECTION A-A

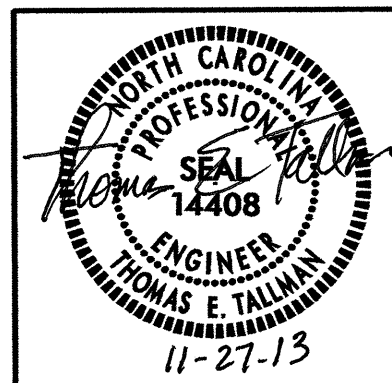


SECTION B-B

PROJECT NO. 33817
 COUNTY: UNION
 STATION: 17 + 73.00

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

RETAINING WALL
 (SHEET 2 OF 2)



REVISIONS						SHIRT NO.
NO.	BY	DATE	NO.	BY	DATE	S-30
1			3			TOTAL SHEETS
2			4			30

11/27/2013
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DRAWN BY: D. H. CARTER DATE: DEC 2008
 CHECKED BY: J. E. MONDOLFI DATE: DEC 2008
 DESIGN ENGINEER OF RECORD: T. E. TALLMAN DATE: NOV 2013

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

SPECIAL NOTES:

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

ENGLISH

JANUARY, 1990

STD. NO. SN