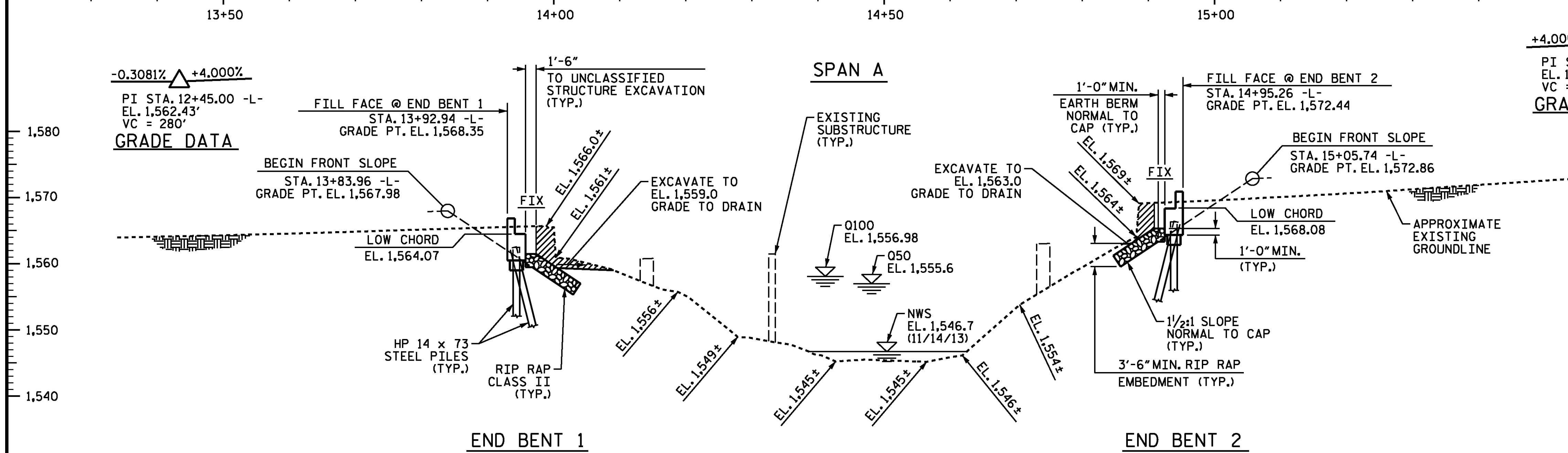


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numbers appear on each page, on the dates appearing  
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**This file or an individual page  
shall not be considered a certified document.**



**GRADE DATA**  
 +4.000%  $\Delta$  +6.000%  
 PI STA. 16+00.00 -L-  
 EL. 1,576.63'  
 VC = 200'

**UNCLASSIFIED STRUCTURE EXCAVATION**

**HORIZONTAL CURVE DATA -L-**

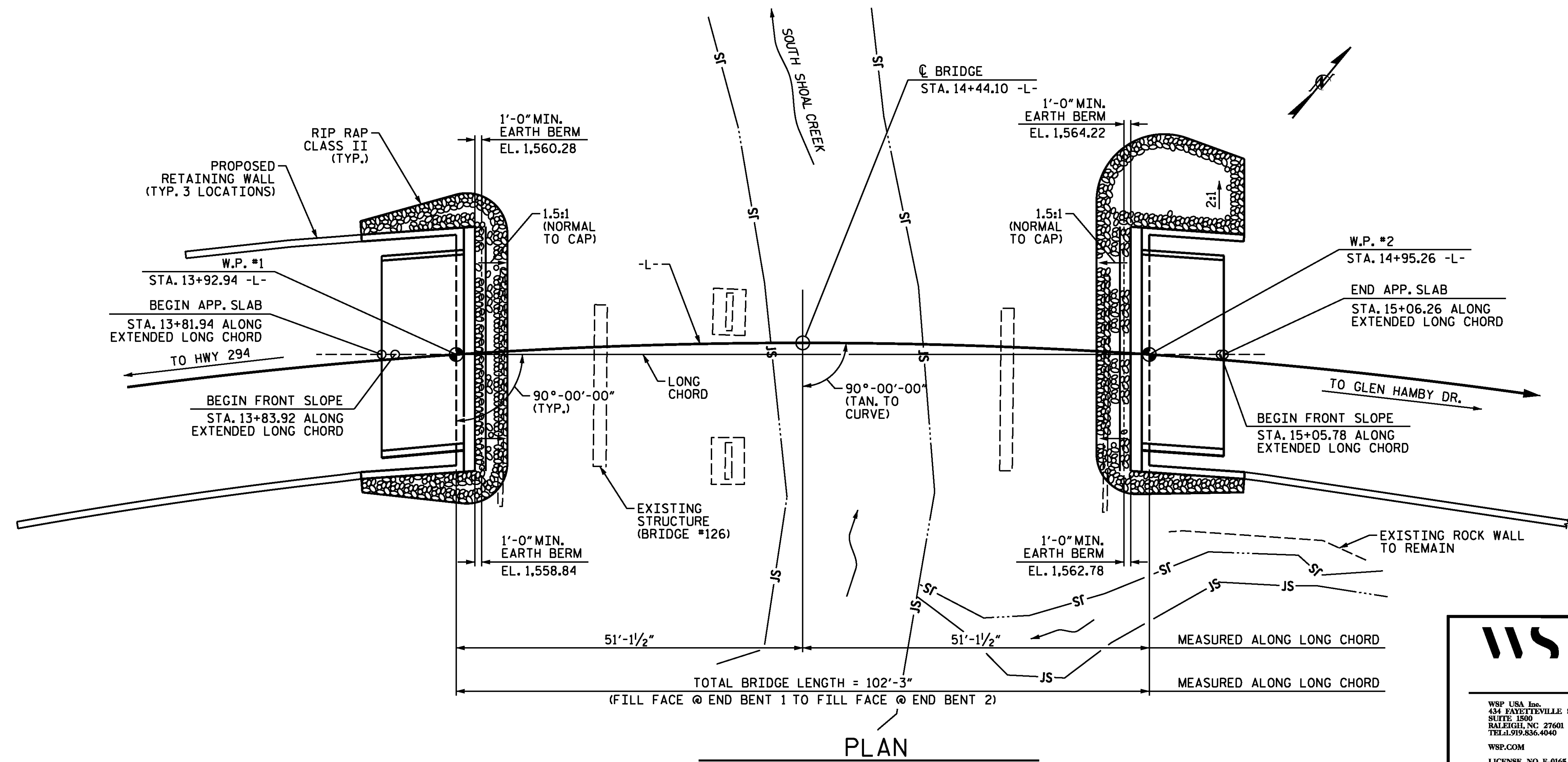
PI STA 11+71.20	PI STA 14+83.43	PI STA 16+98.62
$\Delta = 13^{\circ}-15'-27.8''$ (RT)	$\Delta = 24^{\circ}-16'-39.6''$ (RT)	$\Delta = 4^{\circ}-47'-41.6''$ (RT)
D = 4^{\circ}-27'-41.0"	D = 7^{\circ}-30'-00.0"	D = 4^{\circ}-17'-57.4"
L = 297.17'	L = 323.70'	L = 111.53'
T = 149.25'	T = 164.32'	T = 55.80'
R = 1,284.26'	R = 763.94'	R = 1,332.68'

**HYDRAULIC DATA**

DESIGN DISCHARGE	=2,600 CFS
FREQUENCY OF DESIGN FLOOD	=25 YEARS
DESIGN HIGH WATER ELEVATION	=1,554.9
DRAINAGE AREA	=13.3 SQ. MI.
BASE DISCHARGE (Q100)	=3,760 CFS
BASE HIGH WATER ELEVATION	=1,556.98

**OVERTOPPING FLOOD DATA**

OVERTOPPING DISCHARGE	=12,000 CFS
FREQUENCY OF OVERTOPPING FLOOD	=500+ YEARS
OVERTOPPING FLOOD ELEVATION	=1,564.1

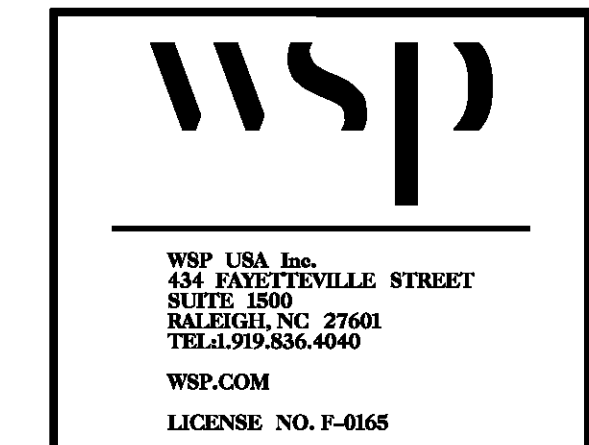


I HEREBY CERTIFY THESE PLANS ARE THE AS-BUILT PLANS



PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-  
 SHEET 1 OF 4 REPLACES BRIDGE #126

DESIGN-ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 11/3/2017



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 GENERAL DRAWING  
 FOR BRIDGE ON HIWASSEE DAM  
 ACCESS RD. OVER  
 SOUTH SHOAL CREEK  
 BETWEEN HWY 294 AND SR 1312

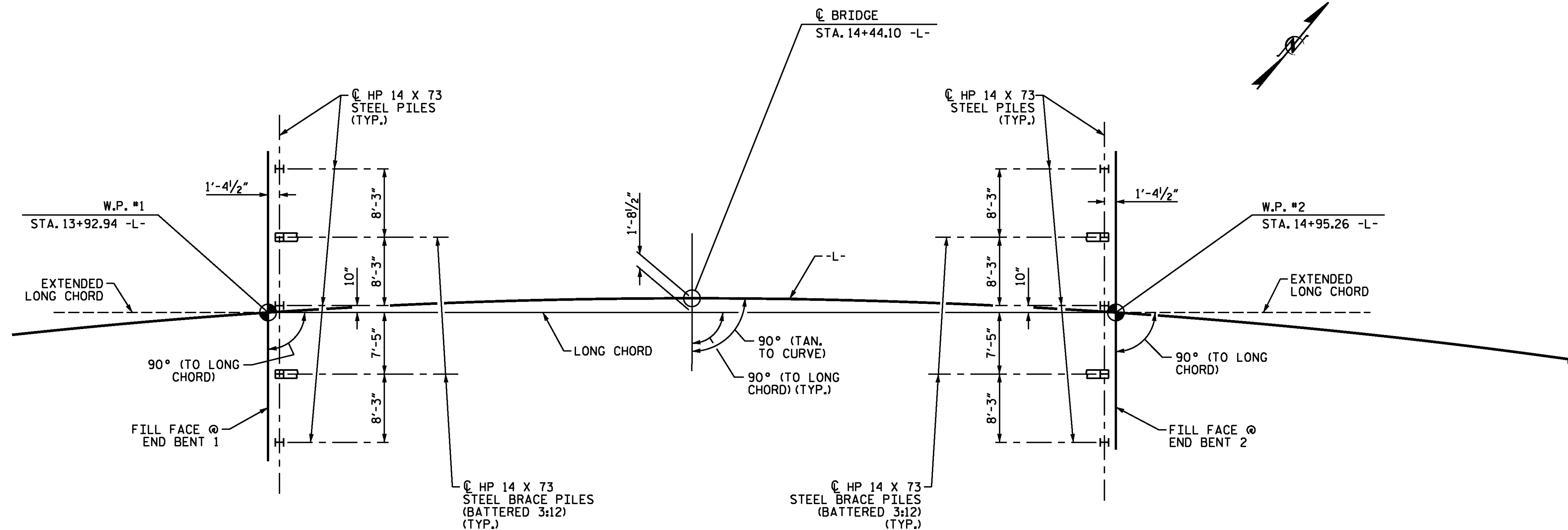
**REVISIONS**

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

SHEET NO. S-1  
TOTAL SHEETS 18

DRAWN BY: M. HOBBS DATE: 08/14  
 CHECKED BY: M. MILLS DATE: 08/14

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



### FOUNDATION LAYOUT

(END BENTS ARE PARALLEL)

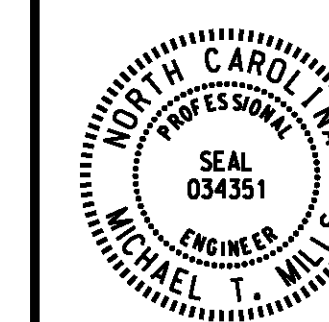
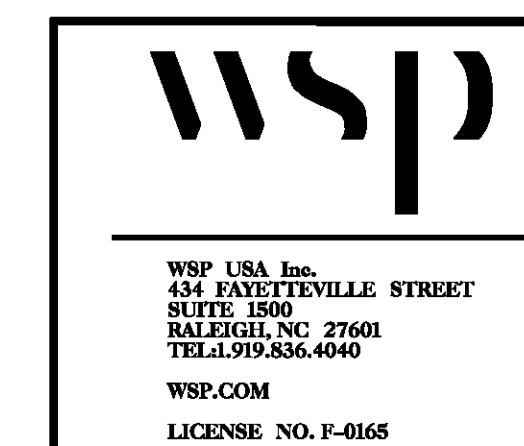
### NOTES

- FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- PILES AT END BENT 1 AND 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 140 TONS PER PILE. DRIVE PILES AT END BENT 1 AND 2 TO A REQUIRED DRIVING RESISTANCE OF 235 TONS PER PILE. INSTALL PILES AT END BENT 1 TO A TIP ELEVATION NO HIGHER THAN 1545FT.
- STEEL H-PILE POINTS ARE REQUIRED FOR STEEL AT END BENTS 1 AND 2 FOR STEEL PILE POINTS SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF 30,000 TO 50,000 FT-LBS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT END BENTS 1 AND 2. THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.
- TESTING THE FIRST PRODUCTION PILE WITH THE PDA DURING DRIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS, AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.
- IF NECESSARY, PREDRILL PILE LOCATIONS AT END BENT 1 TO ELEVATION 1545FT WITH EQUIPMENT THAT WILL RESULT IN A MAXIMUM PREDRILLING DIAMETER OF 14IN. FOR PREDRILLING FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 2 OF 4

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017



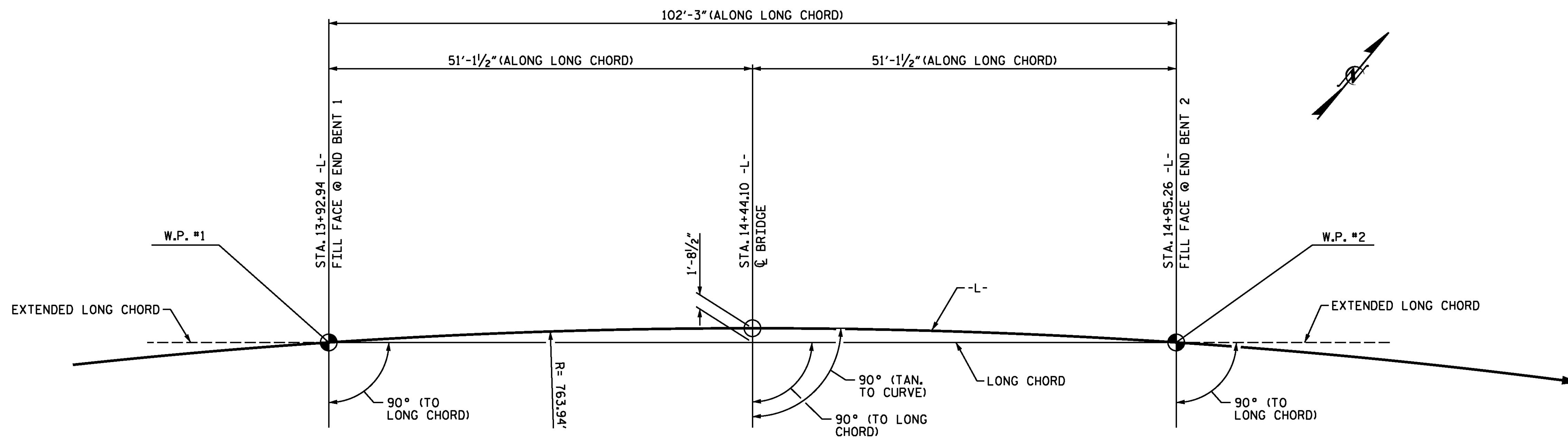
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 FOR BRIDGE ON HIWASSEE DAM  
 ACCESS RD. OVER  
 SOUTH SHOAL CREEK  
 BETWEEN HWY 294 AND SR 1312

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

DRAWN BY : M. HOBBS DATE : 08/14  
 CHECKED BY : N. PIERCE DATE : 08/14





### LONG CHORD LAYOUT

(THE EFFECTS OF THE HORIZONTAL CURVE SHALL BE NEGLECTED IN THE CONSTRUCTION OF THIS BRIDGE. BRIDGE TO BE BUILT ALONG THE LONG CHORD BETWEEN THE WORK POINTS AT THE FILL FACES.)

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 3 OF 4

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING  
 FOR BRIDGE ON HIWASSEE DAM  
 ACCESS RD. OVER  
 SOUTH SHOAL CREEK  
 BETWEEN HWY 294 AND SR 1312

REVISIONS						SHEET NO.
NO.	BYs	DATEs	NO.	BYs	DATEs	S-3
1			3			TOTAL SHEETS
2			4			18

DRAWN BY : M. HOBBS DATE : 08/14  
 CHECKED BY : N. PIERCE DATE : 08/14

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

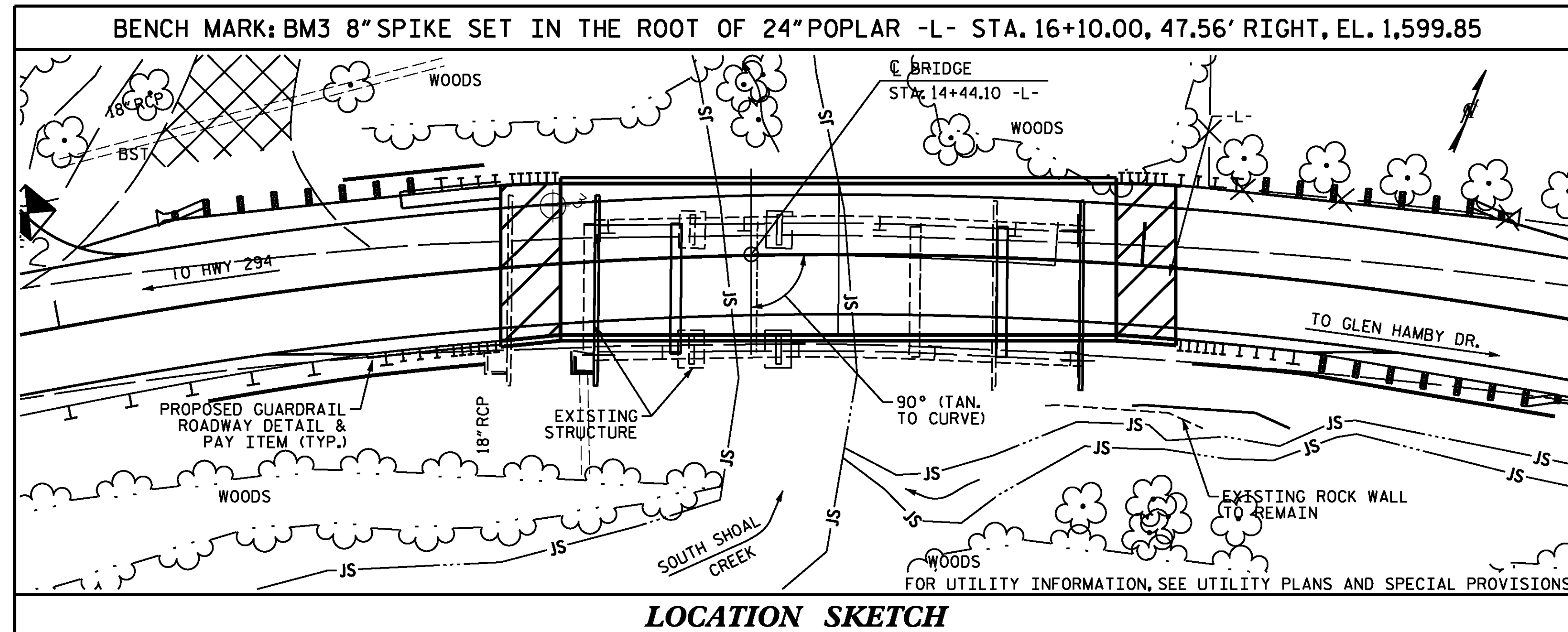
**TOTAL BILL OF MATERIAL**

	REMOVAL OF EXISTING STRUCTURE	PDA TESTING	UNCLASSIFIED STRUCTURE EXCAVATION	CLASS A CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	PILE DRIVING EQUIPMENT SETUP FOR HP 14 x 73 STEEL PILES	HP 14 X 73 STEEL PILES	STEEL PILE POINTS	PREDRILLING FOR PILES	VERTICAL CONCRETE BARRIER RAIL	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE	ELASTOMERIC BEARINGS	3'-0" X 3'-3" PRESTRESSED CONCRETE BOX BEAMS	ASBESTOS ASSESSMENT		
	LUMP SUM	EACH	LUMP SUM	CU. YDS.	LUMP SUM	LBS.	No.	No.	LIN. FT.	EACH	LIN. FT.	LIN. FT.	SO. YDS.	LUMP SUM	No.	LIN. FT.	LUMP SUM	
SUPERSTRUCTURE												224						
END BENT 1			LUMP SUM	27.2		4369	5	5	100	5	100		108	120				
END BENT 2			LUMP SUM	27.2		4369	5	5	95	5			112	124				
TOTAL	LUMP SUM	1	LUMP SUM	54.4	LUMP SUM	8738	10	10	195	10	100	224	220	244	LUMP SUM	10	1000.00	LUMP SUM

**GENERAL DRAWING NOTES**

ASSUMED LIVE LOAD = HL-93 OR ALTERNATE LOADING.  
 THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.  
 THIS BRIDGE IS LOCATED IN SEISMIC ZONE 1.  
 FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.  
 FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.  
 FOR OTHER DESIGN DATA AND GENERAL NOTES, SEE SHEET SN.  
 FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.  
 THE MATERIAL SHOWN IN THE HATCHED AREA ON SHEET S-1 SHALL BE EXCAVATED TO EL. 1,559.0 AT END BENT 1 AND EL. 1,563.0 AT END BENT 2 ON EACH SIDE OF CENTERLINE ROADWAY AS DIRECTED BY THE ENGINEER. THIS WORK WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR UNCLASSIFIED STRUCTURE EXCAVATION. SEE SECTION 412 OF THE STANDARD SPECIFICATIONS.  
 INASMUCH AS THE PAINT SYSTEM ON THE EXISTING STRUCTURAL STEEL CONTAINS LEAD, THE CONTRACTOR'S ATTENTION IS DIRECTED TO ARTICLE 107-1 OF THE STANDARD SPECIFICATIONS. ANY COSTS RESULTING FROM COMPLIANCE WITH APPLICABLE STATE OR FEDERAL REGULATIONS PERTAINING TO HANDLING OF MATERIALS CONTAINING LEAD BASED PAINT SHALL BE INCLUDED IN THE BID PRICE FOR "REMOVAL OF EXISTING STRUCTURE AT STATION 14+44.10 -L-".  
 ASPHALT WEARING SURFACE IS INCLUDED IN ROADWAY QUANTITY ON ROADWAY PLANS.

FOR ASBESTOS ASSESSMENT FOR BRIDGE DEMOLITION AND RENOVATION ACTIVITIES, SEE SPECIAL PROVISIONS.  
 FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.  
 FOR EROSION CONTROL MEASURES SEE EROSION CONTROL PLANS.  
 THIS STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH "HEC 18 - EVALUATING SCOUR AT BRIDGES".  
 THE EXISTING STRUCTURE CONSISTING OF 3 SPANS (1 @ 15'-0", 1 @ 60', 1 @ 15') WITH REINFORCED CONCRETE FLOOR; 19'-2" CLEAR ROADWAY WIDTH WITH BITUMINOUS WEARING SURFACE ON CONCRETE ABUTMENTS AND INTERIOR BENTS AND HELPER BENT; AND LOCATED AT PROPOSED STRUCTURE SHALL BE REMOVED. THE EXISTING BRIDGE IS NOT PRESENTLY POSTED FOR LOAD LIMIT. SHOULD THE STRUCTURAL INTEGRITY OF THE BRIDGE DETERIORATE DURING CONSTRUCTION OF THE PROPOSED BRIDGE, A LOAD LIMIT MAY BE POSTED AND MAY BE REDUCED AS FOUND NECESSARY DURING THE LIFE OF THE PROJECT.  
 THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. THIS INFORMATION IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL HAVE NO CLAIM WHATSOEVER AGAINST THE DEPARTMENT OF TRANSPORTATION FOR ANY DELAYS OR ADDITIONAL COST INCURRED BASED ON DIFFERENCES BETWEEN THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.  
 REMOVAL OF THE EXISTING BRIDGE SHALL BE PERFORMED IN A MANNER THAT PREVENTS DEBRIS FROM FALLING INTO THE WATER. THE CONTRACTOR SHALL SUBMIT DEMOLITION PLANS FOR REVIEW AND REMOVE THE BRIDGE IN ACCORDANCE WITH ARTICLE 402-2 OF THE STANDARD SPECIFICATIONS.

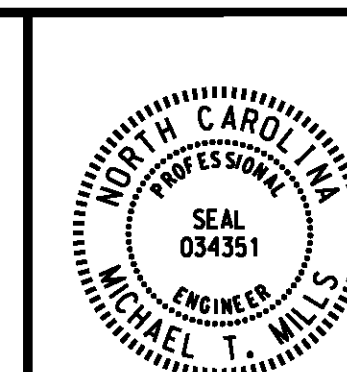
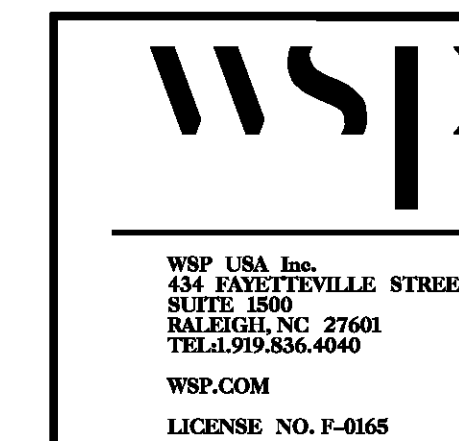


**LOCATION SKETCH**

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 4 OF 4

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**GENERAL DRAWING**  
 FOR BRIDGE ON HIWASSEE DAM  
 ACCESS RD. OVER  
 SOUTH SHOAL CREEK  
 BETWEEN HWY 294 AND SR 1312

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

DRAWN BY : M. HOBBS DATE : 08/14  
 CHECKED BY : N. PIERCE DATE : 08/14

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

LEVEL	VEHICLE	WEIGHT (W) (TONS)	CONTROLLING LOAD RATING	MINIMUM RATING FACTORS (RF)	TONS = W X RF	STRENGTH I LIMIT STATE										SERVICE III LIMIT STATE					COMMENT NUMBER			
						MOMENT					SHEAR					MOMENT								
						LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN	GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	LIVELOAD FACTORS	DISTRIBUTION FACTORS (DF)	RATING FACTOR	SPAN		GIRDER LOCATION	DISTANCE FROM LEFT END OF SPAN (ft)	
DESIGN LOAD RATING	HL-93(Inv)	N/A	1	1.07	--	1.75	0.218	1.62	A	EL	49.3	0.407	1.07	A	EL	0.0	0.80	0.218	1.41	A	EL	49.3		
	HL-93(0pr)	N/A	--	1.39	--	1.35	0.218	2.10	A	EL	49.3	0.407	1.39	A	EL	0.0	N/A	--	--	--	--	--	--	
	HS-20(Inv)	36.000	2	1.46	53	1.75	0.218	2.25	A	EL	49.3	0.407	1.46	A	EL	0.0	0.80	0.218	1.97	A	EL	49.3		
	HS-20(0pr)	36.000	--	1.90	68	1.35	0.218	2.92	A	EL	49.3	0.407	1.90	A	EL	0.0	N/A	--	--	--	--	--	--	
LEGAL LOAD RATING	SV	SNSH	13.500	--	4.54	61	1.40	0.218	6.68	A	EL	49.3	0.407	4.54	A	EL	0.0	0.80	0.218	4.66	A	EL	49.3	
		SNGARBS2	20.000	--	3.17	63	1.40	0.218	4.84	A	EL	49.3	0.407	3.17	A	EL	0.0	0.80	0.218	3.38	A	EL	49.3	
		SNAGRIS2	22.000	--	2.92	64	1.40	0.218	4.52	A	EL	49.3	0.407	2.92	A	EL	0.0	0.80	0.218	3.16	A	EL	49.3	
		SNCOTTS3	27.250	--	2.26	62	1.40	0.218	3.32	A	EL	49.3	0.407	2.26	A	EL	0.0	0.80	0.218	2.32	A	EL	49.3	
		SNAGGRS4	34.925	--	1.83	64	1.40	0.218	2.72	A	EL	49.3	0.407	1.83	A	EL	0.0	0.80	0.218	1.90	A	EL	49.3	
		SNS5A	35.550	--	1.84	65	1.40	0.218	2.66	A	EL	49.3	0.407	1.84	A	EL	0.0	0.80	0.218	1.86	A	EL	49.3	
		SNS6A	39.950	--	1.66	66	1.40	0.218	2.42	A	EL	49.3	0.407	1.66	A	EL	0.0	0.80	0.218	1.69	A	EL	49.3	
	TTST	SNS7B	42.000	--	1.61	68	1.40	0.218	2.31	A	EL	49.3	0.407	1.61	A	EL	0.0	0.80	0.218	1.61	A	EL	49.3	
		TNAGRIT3	33.000	--	1.99	66	1.40	0.218	2.95	A	EL	49.3	0.407	1.99	A	EL	0.0	0.80	0.218	2.06	A	EL	49.3	
		TNT4A	33.075	--	1.96	65	1.40	0.218	2.95	A	EL	49.3	0.407	1.96	A	EL	0.0	0.80	0.218	2.06	A	EL	49.3	
		TNT6A	41.600	--	1.67	69	1.40	0.218	2.39	A	EL	49.3	0.407	1.68	A	EL	0.0	0.80	0.218	1.67	A	EL	49.3	
		TNT7A	42.000	--	1.65	69	1.40	0.218	2.40	A	EL	49.3	0.407	1.65	A	EL	0.0	0.80	0.218	1.67	A	EL	49.3	
		TNT7B	42.000	--	1.59	67	1.40	0.218	2.45	A	EL	49.3	0.407	1.59	A	EL	0.0	0.80	0.218	1.71	A	EL	49.3	
		TNAGRIT4	43.000	--	1.54	66	1.40	0.218	2.35	A	EL	49.3	0.407	1.54	A	EL	0.0	0.80	0.218	1.64	A	EL	49.3	
TNAGT5A	45.000	--	1.51	68	1.40	0.218	2.23	A	EL	49.3	0.407	1.51	A	EL	0.0	0.80	0.218	1.55	A	EL	49.3			
TNAGT5B	45.000	3	1.47	66	1.40	0.218	2.21	A	EL	49.3	0.407	1.47	A	EL	0.0	0.80	0.218	1.54	A	EL	49.3			

**LOAD FACTORS:**

DESIGN LOAD RATING FACTORS	LIMIT STATE	γ <sub>DC</sub>	γ <sub>DW</sub>
	STRENGTH I	1.25	1.50
	SERVICE III	1.00	1.00

**NOTES:**

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

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

**COMMENTS:**

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

**# CONTROLLING LOAD RATING**

1 DESIGN LOAD RATING (HL-93)

2 DESIGN LOAD RATING (HS-20)

3 LEGAL LOAD RATING \*\*

\*\* SEE CHART FOR VEHICLE TYPE

---

**GIRDER LOCATION**

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



LRFR SUMMARY

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017

wsp

WSP USA Inc.  
 434 FAYETTEVILLE STREET  
 SUITE 1500  
 RALEIGH, NC 27601  
 TEL: 919.856.4040  
 WSP.COM  
 LICENSE NO. F-0165

STATE OF NORTH CAROLINA  
 PROFESSIONAL ENGINEER  
 SEAL  
 034351  
 MICHAEL T. MILLS

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

LRFR SUMMARY FOR  
 100' BOX BEAM UNIT  
 90° SKEW  
 (NON-INTERSTATE TRAFFIC)

REVISIONS						SHEET NO.
NO.	BYs	DATEs	NO.	BYs	DATEs	S-5
1			3			TOTAL SHEETS
2			4			18

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : TMG II/II	
CHECKED BY : AAC II/II	



**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 BOX BEAM SECTIONS SHALL BE GRADE 60 AND SHALL BE INCLUDED IN THE UNIT PRICE BID FOR PRESTRESSED CONCRETE BOX BEAMS.

FLAME CUTTING OF THE TRANSVERSE POST-TENSIONING STRAND IS NOT ALLOWED.

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

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

THE BACKER RODS SHALL CONFORM TO THE REQUIREMENTS OF TYPE M BOND BREAKER. SEE SECTION 1028 OF THE STANDARD SPECIFICATIONS.

THE TRANSFER OF LOAD FROM THE ANCHORAGES TO THE BOX BEAM UNIT SHALL BE DONE WHEN THE CONCRETE HAS REACHED A COMPRESSIVE STRENGTH OF NOT LESS THAN 5,500 PSI.

ALL REINFORCING STEEL IN VERTICAL CONCRETE BARRIER RAILS SHALL BE EPOXY COATED.

PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH THE BOX BEAM UNIT ENDS.

APPLY EPOXY PROTECTIVE COATING TO BOX BEAM UNIT ENDS.

VERTICAL GROOVED CONTRACTION JOINTS, 1/2" IN DEPTH, SHALL BE TOOLED IN ALL EXPOSED FACES OF THE BARRIER RAIL AND IN ACCORDANCE WITH ARTICLE 825-10(B) OF THE STANDARD SPECIFICATIONS. A VERTICAL 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.

THE LOCATION OF THE VOID DRAINS MAY BE SHIFTED SLIGHTLY WHERE NECESSARY TO CLEAR PRESTRESSING STRANDS OR TRANSVERSE REINFORCING STEEL.

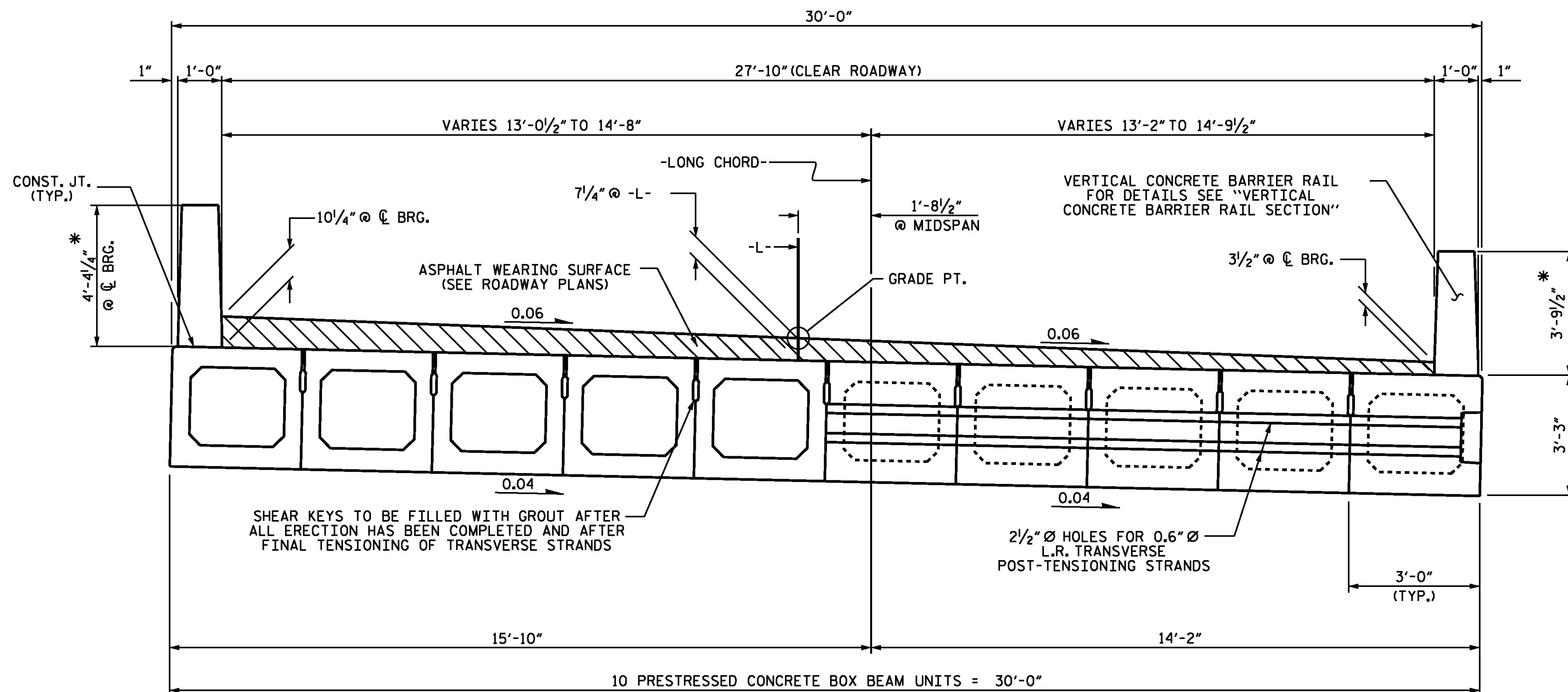
FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.

THE PERMITTED THREADED INSERTS ARE DETAILED AS AN OPTION FOR THE CONTRACTOR TO ATTACH FALSEWORK AND FORMWORK DURING CONSTRUCTION.

THE PERMITTED THREADED INSERTS IN THE EXTERIOR UNITS SHALL BE SIZED BY THE CONTRACTOR, SPACED AT 4'-0" CENTERS AND GALVANIZED IN ACCORDANCE WITH SECTION 1076 OF THE STANDARD SPECIFICATIONS. STAINLESS STEEL THREADED INSERTS MAY BE USED AS AN ALTERNATE.

THE PERMITTED THREADED INSERTS SHALL BE GROUTED BY THE CONTRACTOR IMMEDIATELY FOLLOWING REMOVAL OF THE FALSEWORK.

THE COST OF THE PERMITTED THREADED INSERTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PRECAST UNITS.



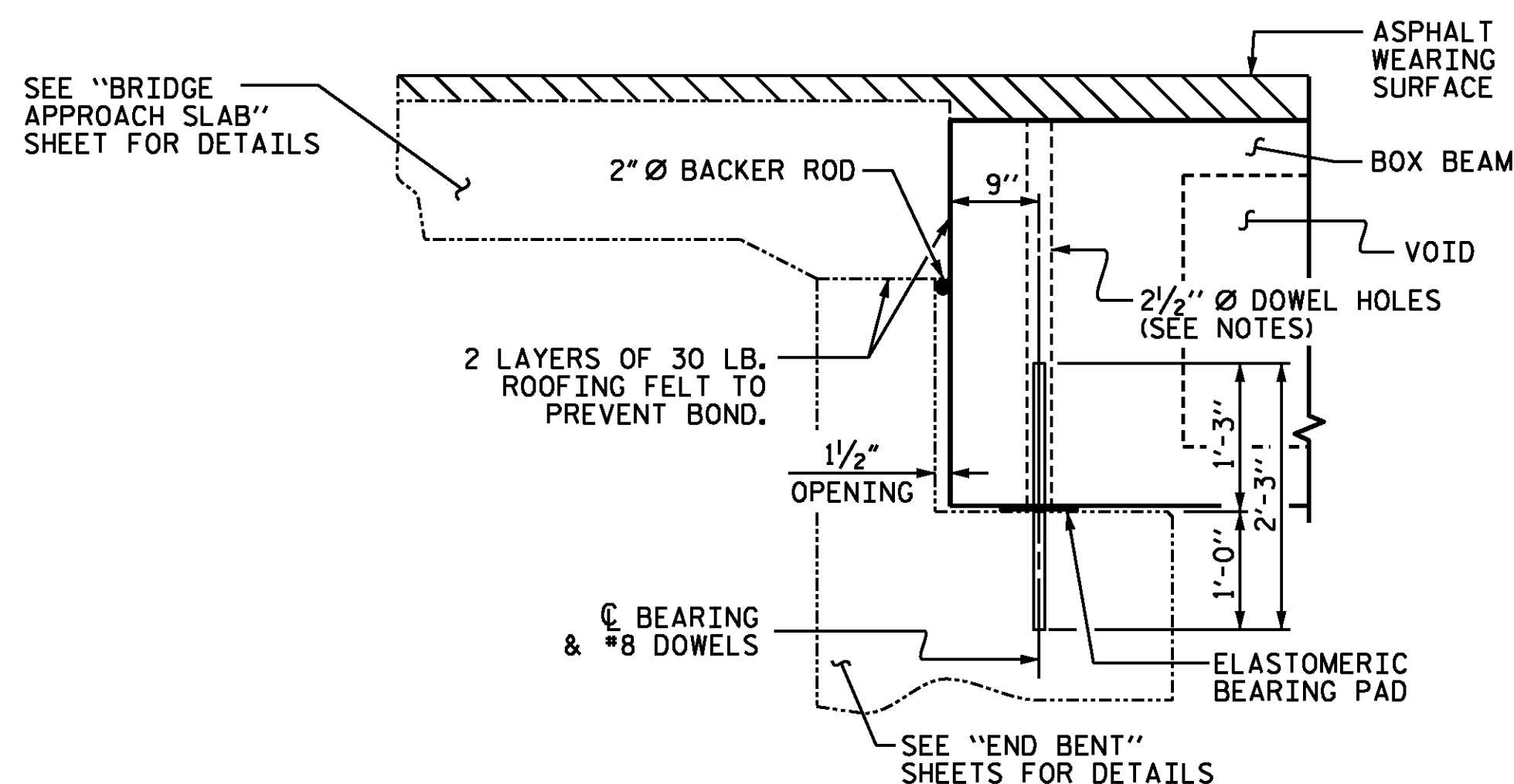
HALF SECTION THROUGH VOIDS

HALF SECTION AT INTERMEDIATE DIAPHRAGMS

**TYPICAL SECTION**

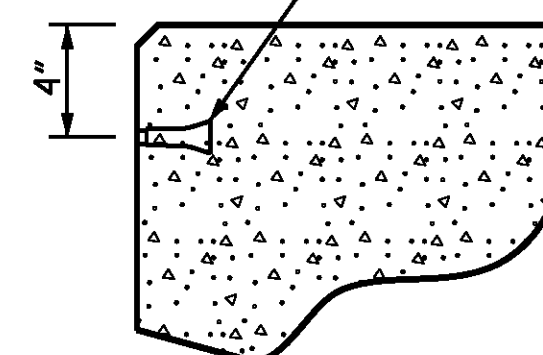
\*THE MAXIMUM BARRIER RAIL HEIGHT AND ASPHALT THICKNESS IS SHOWN. THE HEIGHT OF THE BARRIER RAIL AND ASPHALT THICKNESS VARIES WHILE THE TOP OF THE BARRIER RAIL FOLLOWS THE PROFILE OF THE GUTTERLINE. FOR RAIL HEIGHT DETAILS AND ASPHALT THICKNESS, SEE THE "VERTICAL CONCRETE BARRIER RAIL SECTION" DETAIL.

**FIXED END**



**SECTION AT END BENT**

PERMITTED THREADED INSERT CAST IN OUTSIDE FACE OF EXTERIOR UNIT AND RECESSED 3/8" SIZE TO BE DETERMINED BY CONTRACTOR.

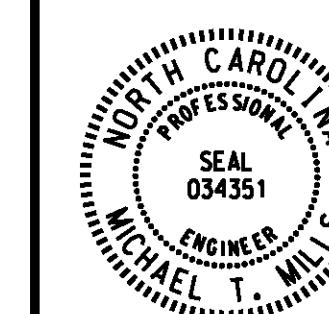
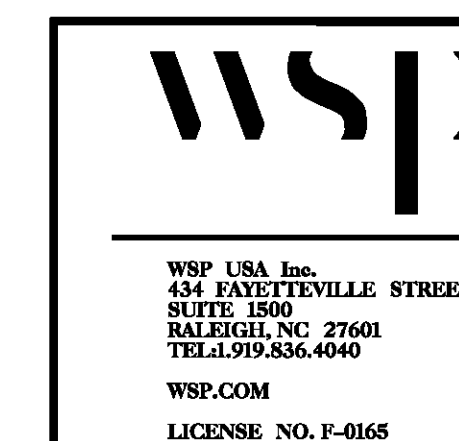


**THREADED INSERT DETAIL**

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 1 OF 5

DESIGN ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 04/25/2017

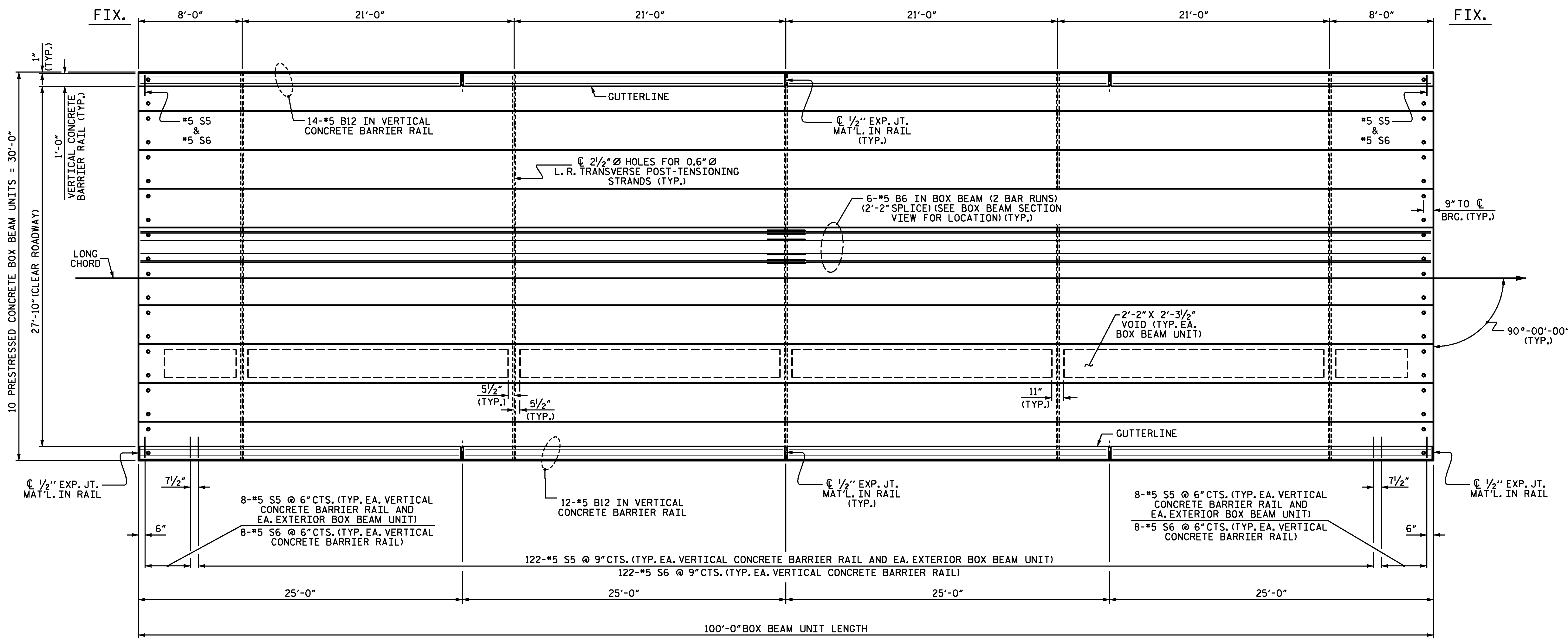


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

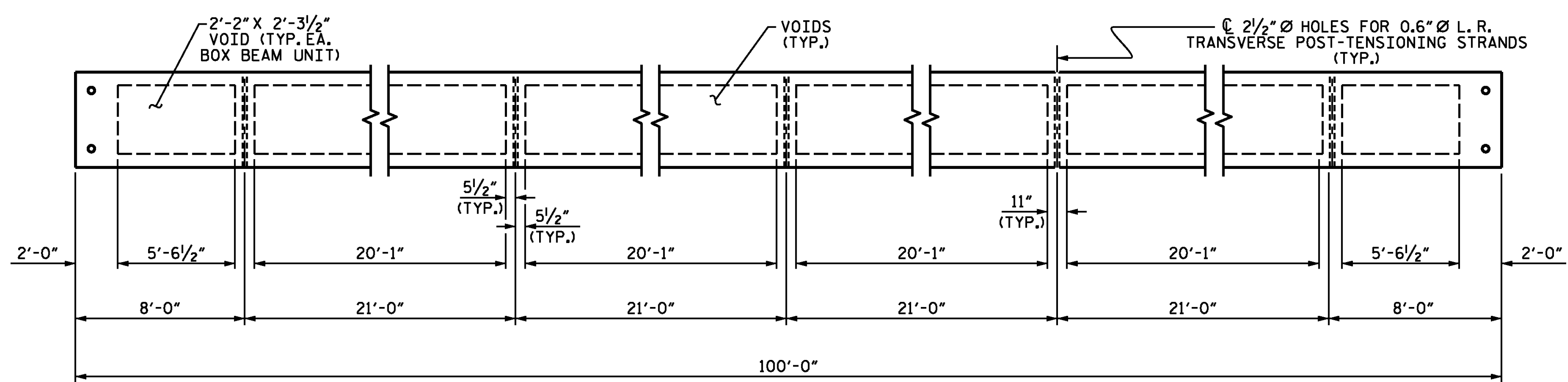
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-6
1			3			TOTAL SHEETS 18
2			4			

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : DGE 8/11	REV. 10/15 MAA/TMG
CHECKED BY : TMG 11/11	

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



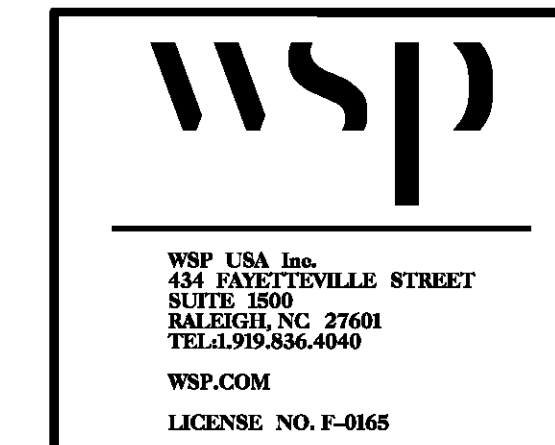
PLAN OF UNIT



DIAPHRAGM AND VOID LAYOUT

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-  
 SHEET 2 OF 5

DESIGN ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 11/2/2017



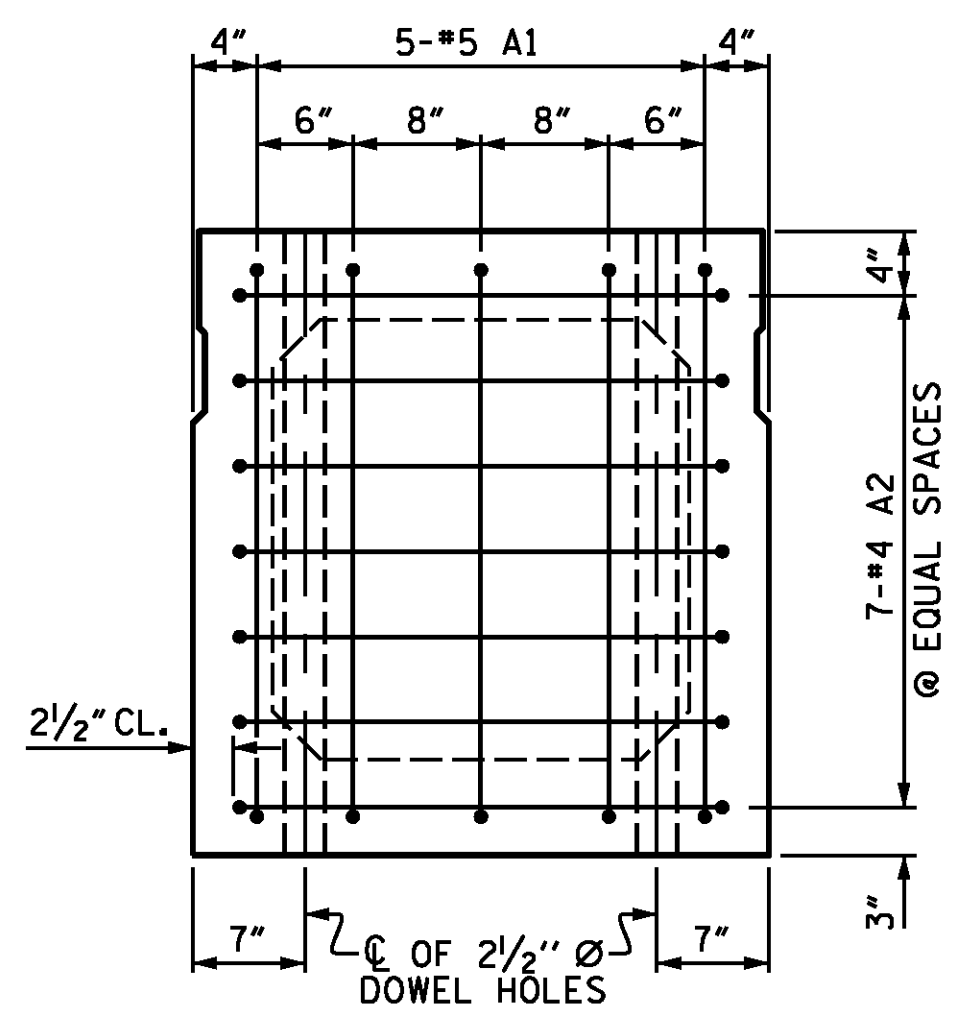
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

PLAN OF 100' UNIT  
 27'-10" CLEAR ROADWAY  
 90° SKEW

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-7
1			3			TOTAL SHEETS
2			4			18

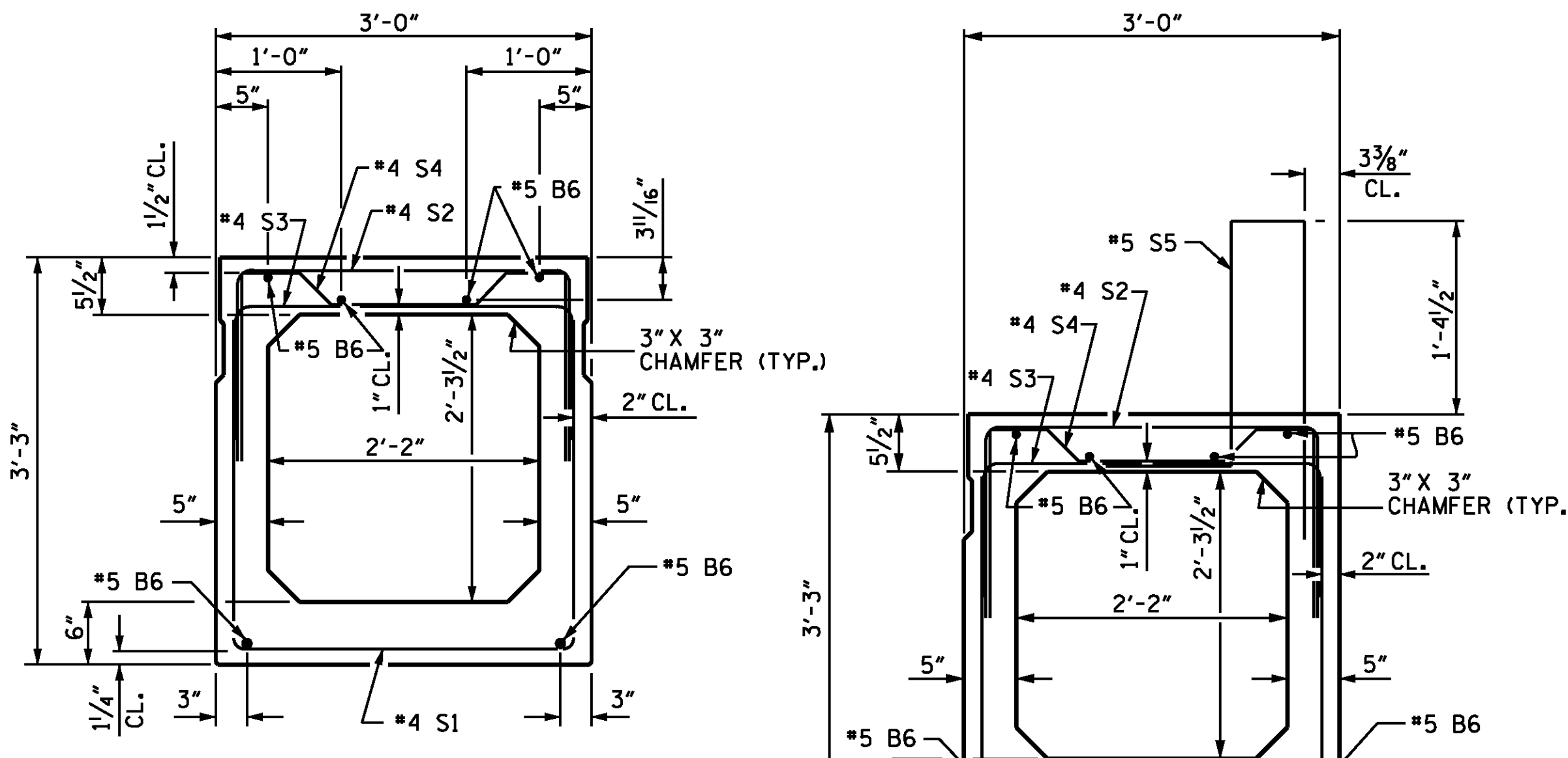
ASSEMBLED BY : C. HOWARD DATE : 8/14  
 CHECKED BY : M. MILLS DATE : 8/14  
 DRAWN BY : DGE 8/10  
 CHECKED BY : TMG 11/11





**END ELEVATION**

SHOWING PLACEMENT OF #5 & #4 "A" BARS AND LOCATION OF DOWEL HOLES. (INTERIOR BOX BEAM SECTION SHOWN-EXTERIOR SECTION SIMILAR EXCEPT SHEAR KEY LOCATION. STRAND LAYOUT NOT SHOWN.)



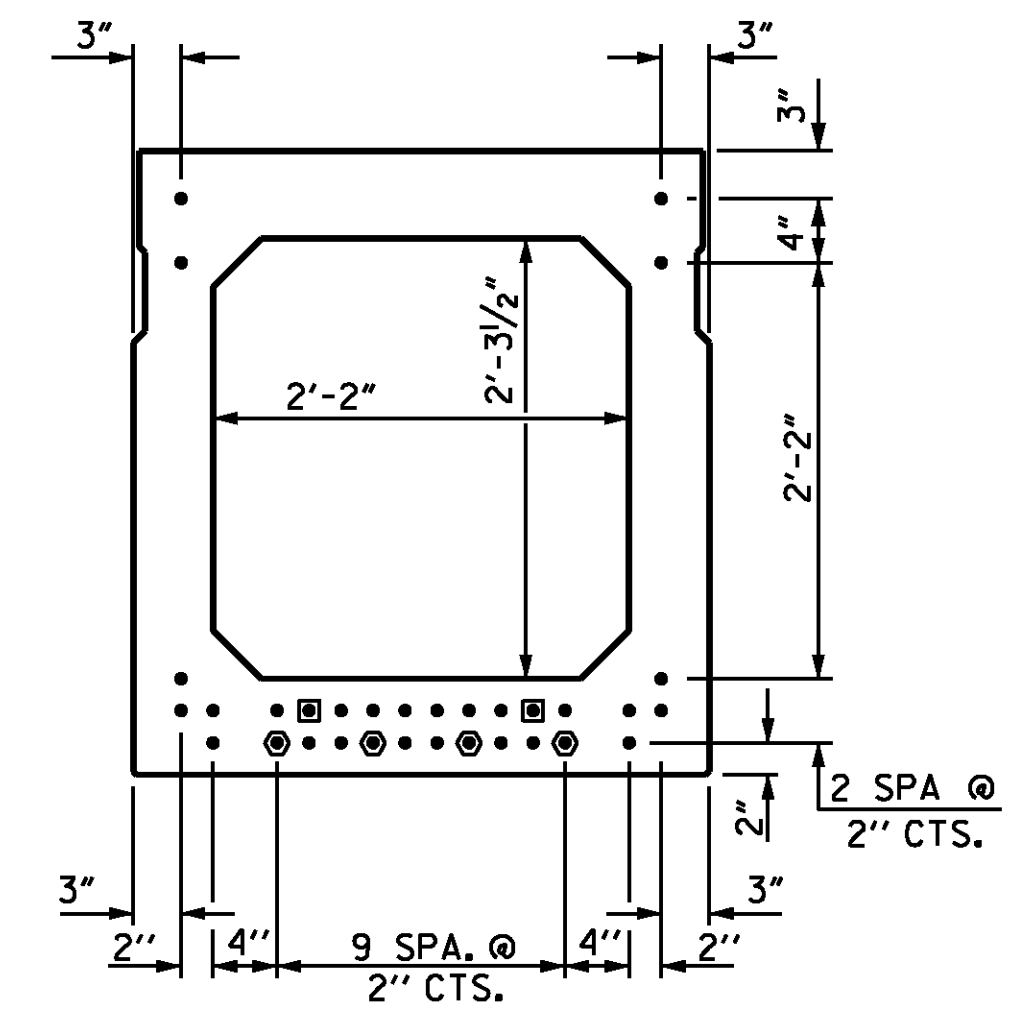
**INTERIOR BOX BEAM SECTION**

(STRAND LAYOUT NOT SHOWN)

**EXTERIOR BOX BEAM SECTION**

(STRAND LAYOUT NOT SHOWN)

**0.6" Ø LOW RELAXATION STRAND LAYOUT**



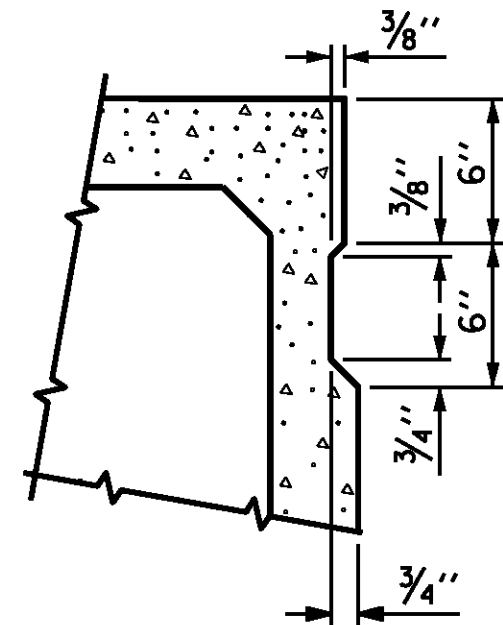
**TYPICAL STRAND LOCATION**

(32 STRANDS REQUIRED)

**DEBONDING LEGEND**

- FULLY BONDED STRANDS
- ◐ STRANDS DEBONDED FOR 4'-0" FROM END OF GIRDER
- ◑ STRANDS DEBONDED FOR 12'-0" FROM END OF GIRDER

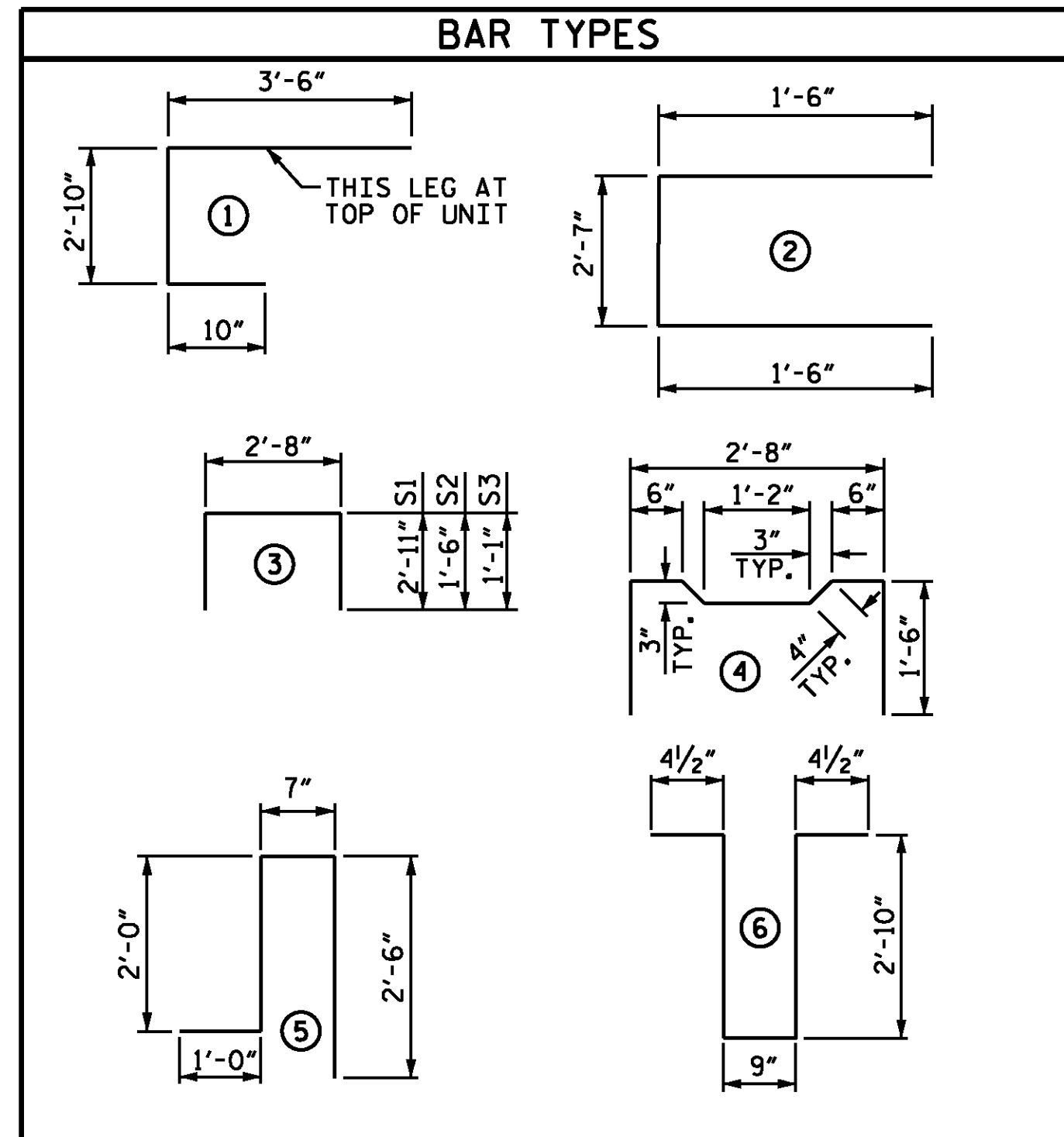
BOND SHALL BE BROKEN ON STRANDS AS SHOWN FOR THE SPECIFIED LENGTH FROM EACH END OF THE BOX BEAM. SEE STANDARD SPECIFICATIONS ARTICLE 1078-7.



**SHEAR KEY DETAIL**

NOTE: OMIT SHEAR KEY ON OUTSIDE FACE OF EXTERIOR BOX BEAMS.

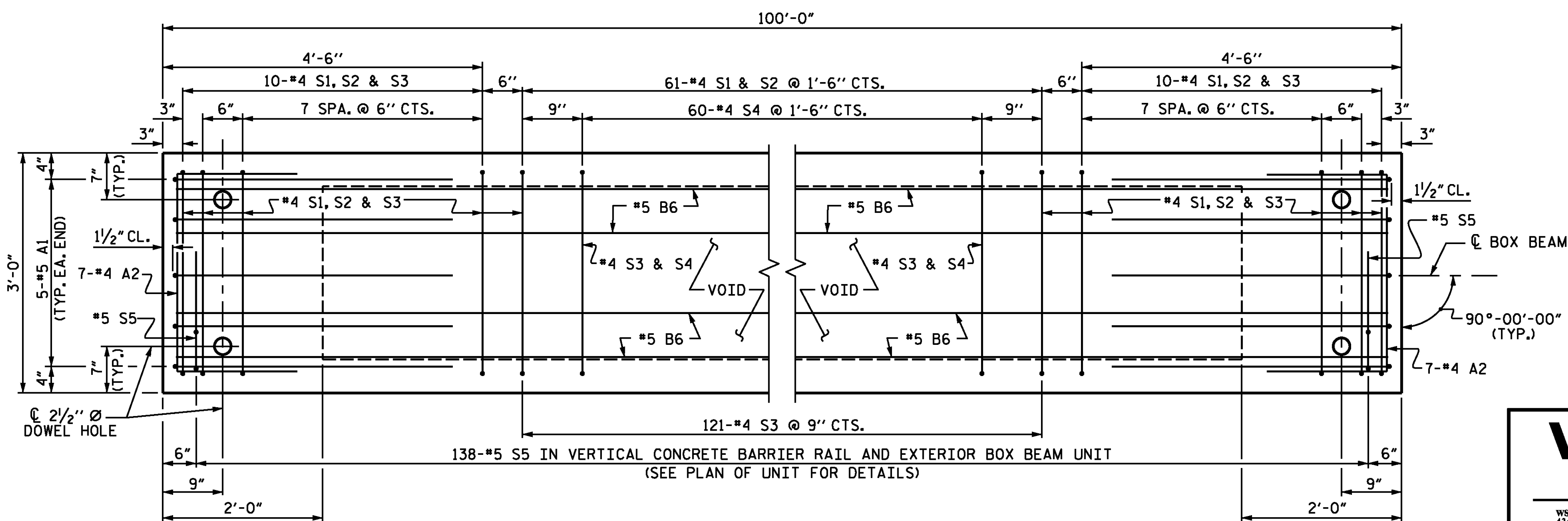
GRADE 270 STRANDS	
	0.6" Ø L.R.
AREA ( SQUARE INCHES )	0.217
ULTIMATE STRENGTH ( LBS. PER STRAND )	58,600
APPLIED PRESTRESS ( LBS. PER STRAND )	43,950



ALL BAR DIMENSIONS ARE OUT TO OUT

**BILL OF MATERIAL FOR ONE BOX BEAM SECTION**

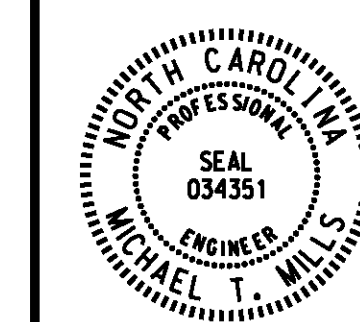
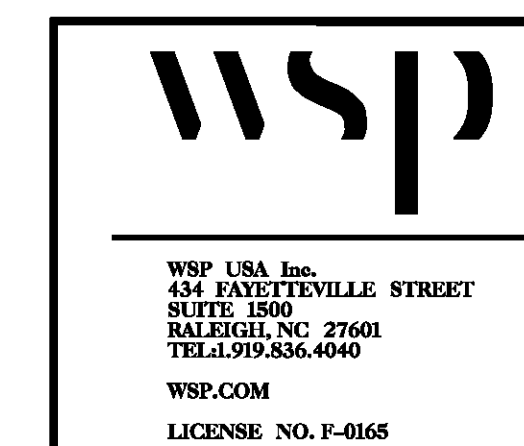
		EXTERIOR UNIT		INTERIOR UNIT			
BAR NUMBER	SIZE	TYPE	LENGTH	WEIGHT	LENGTH	WEIGHT	
A1	10	#5	7'-2"	75	7'-2"	75	
A2	44	#4	5'-7"	164	5'-7"	164	
B6	12	#5	STR	50'-11"	637	50'-11"	637
K1	15	#4	6	72	7'-2"	72	
K2	10	#4	STR	2'-7"	17	2'-7"	17
S1	81	#4	3	460	8'-6"	460	
S2	81	#4	3	307	5'-8"	307	
S3	141	#4	3	455	4'-10"	455	
S4	60	#4	4	234	5'-10"	234	
* S5	138	#5	5	840	--	--	
REINFORCING STEEL			2421	LBS.	2421	LBS.	
* EPOXY COATED REINF. STEEL			840	LBS.			
7500 P.S.I. CONCRETE			19.6	CU. YDS.	19.4	CU. YDS.	
0.6" Ø L.R. STRANDS			No. 32		No. 32		



**PLAN OF BOX BEAM**

EXTERIOR UNIT SHOWN, INTERIOR UNIT SIMILAR EXCEPT OMIT #5 S5 BARS. FOR LOCATION OF DIAPHRAGMS, SEE "PLAN OF UNIT". FOR THREADED INSERTS, SEE "THREADED INSERT DETAIL". FOR REINFORCING STEEL IN DIAPHRAGMS, SEE "DOUBLE DIAPHRAGM DETAILS".

DESIGN-ENGINEER OF RECORD: Michael Mills  
DATE: 11/2/2017



PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
STATION: 14+44.10 -L-

SHEET 3 OF 5

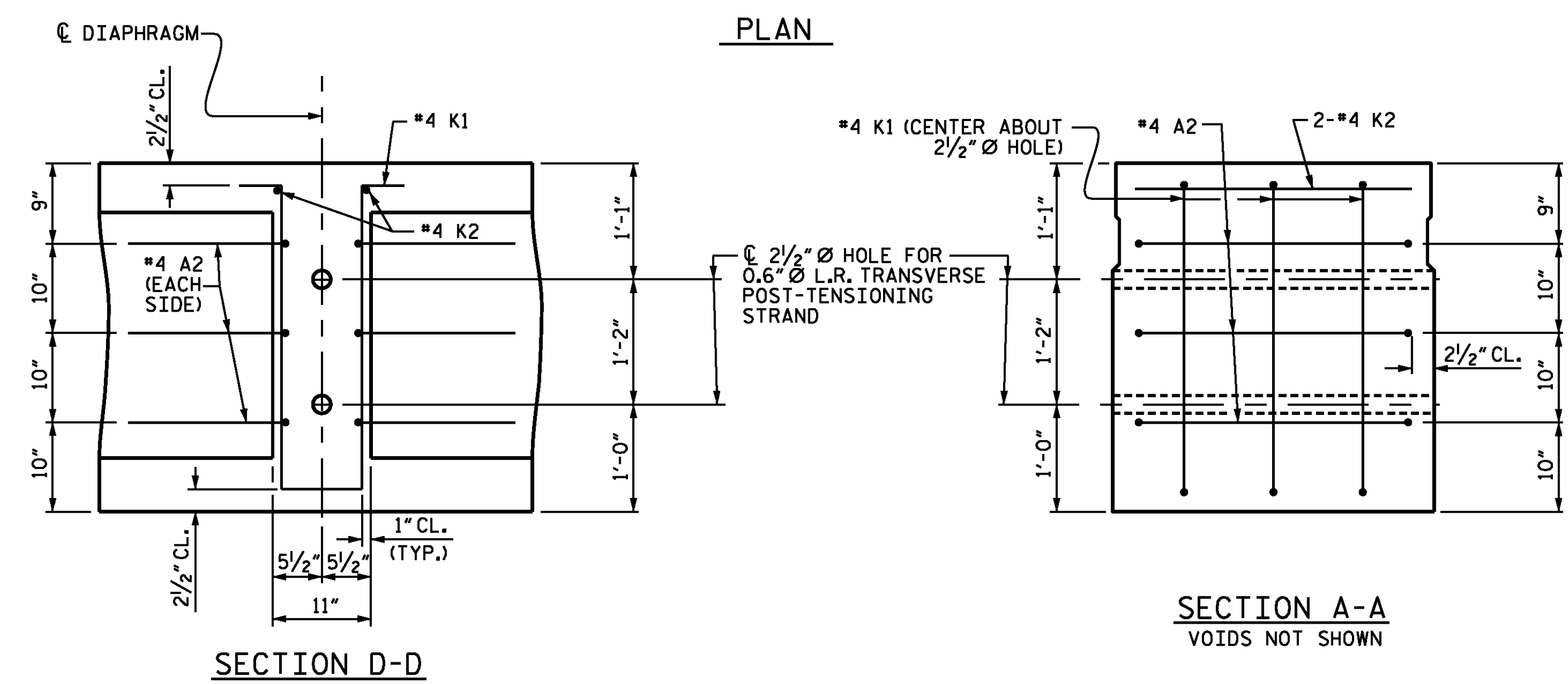
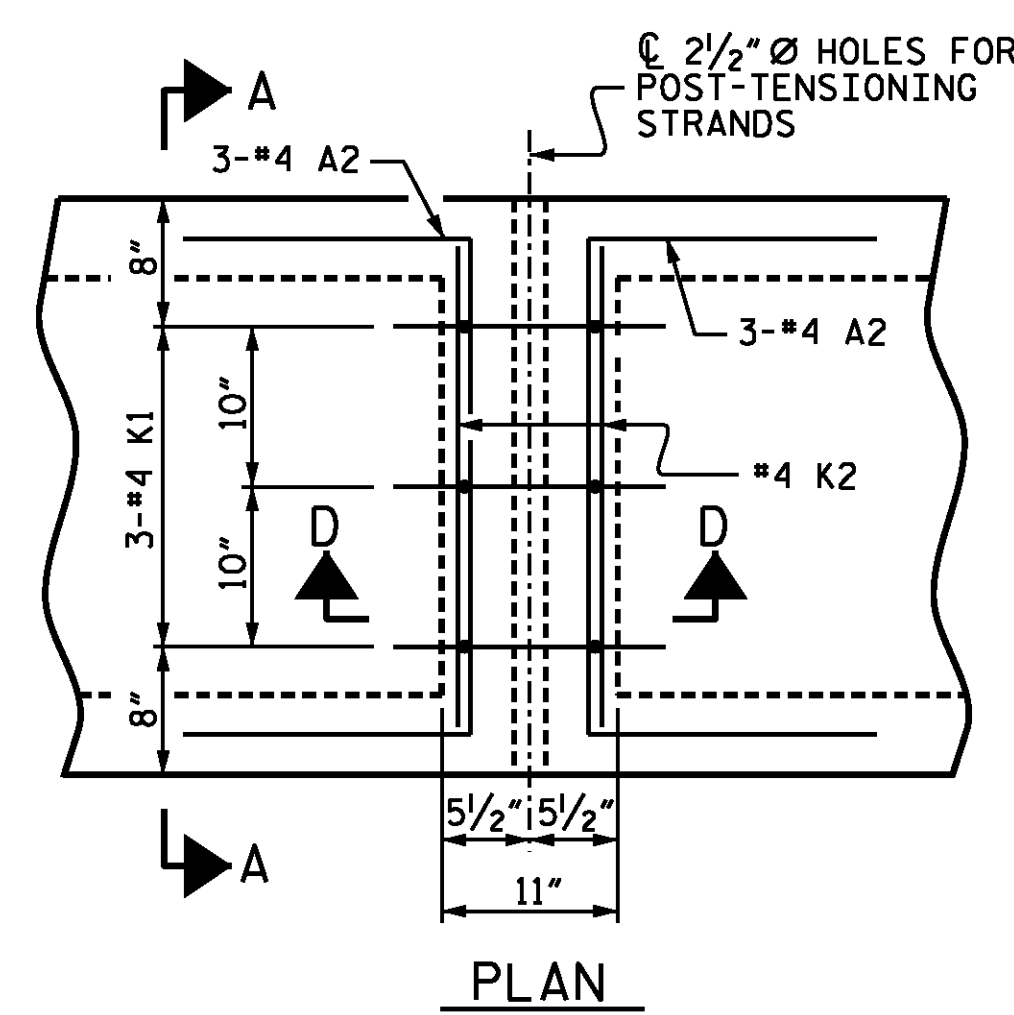
DEPARTMENT OF TRANSPORTATION  
STANDARD

3'-0" X 3'-3"  
PRESTRESSED CONCRETE  
BOX BEAM UNIT

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-8
1			3			TOTAL SHEETS
2			4			18

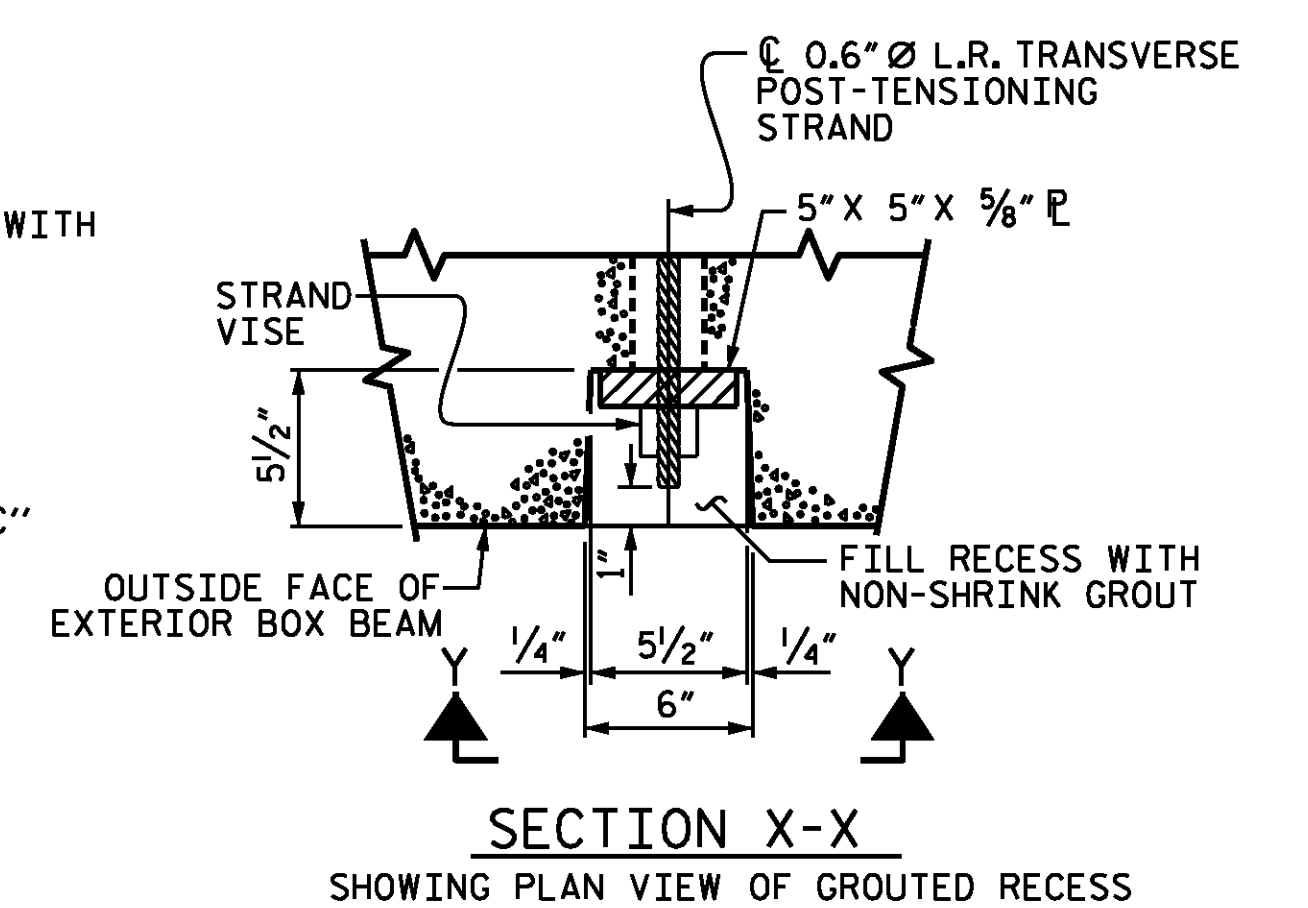
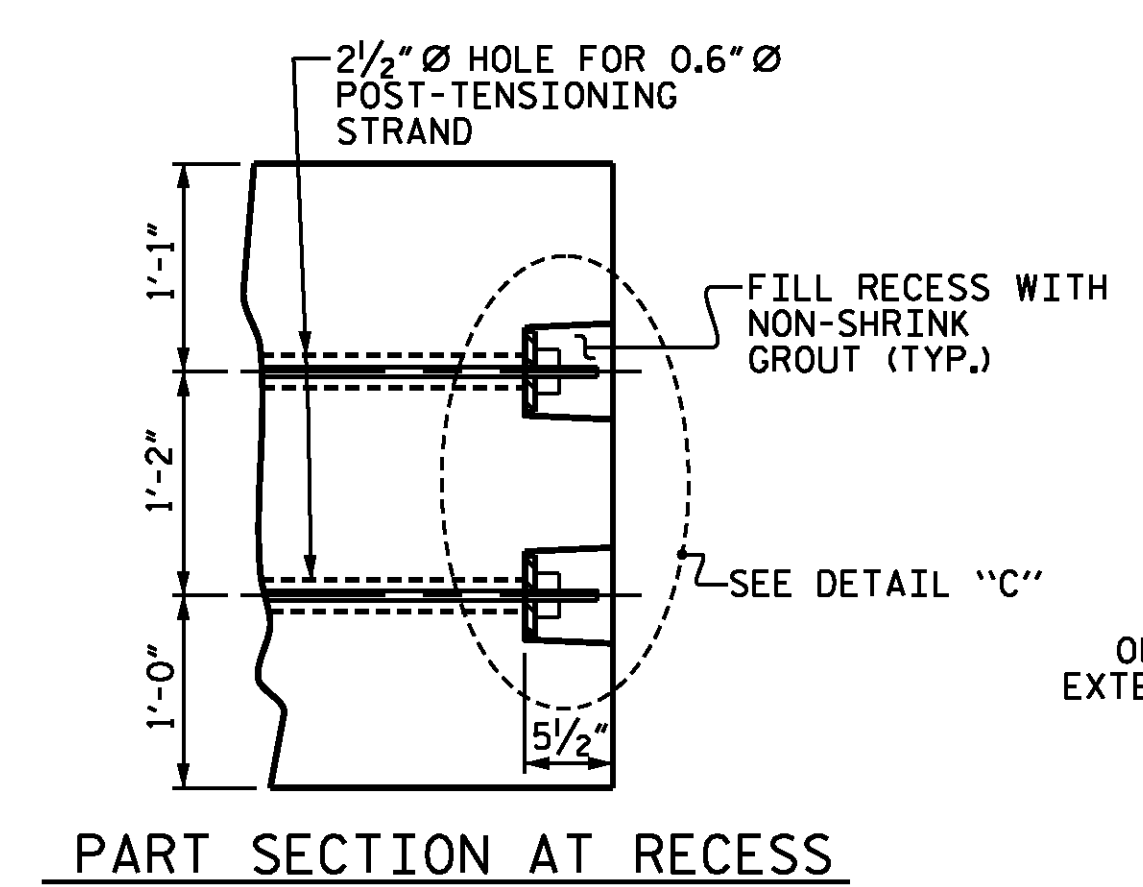
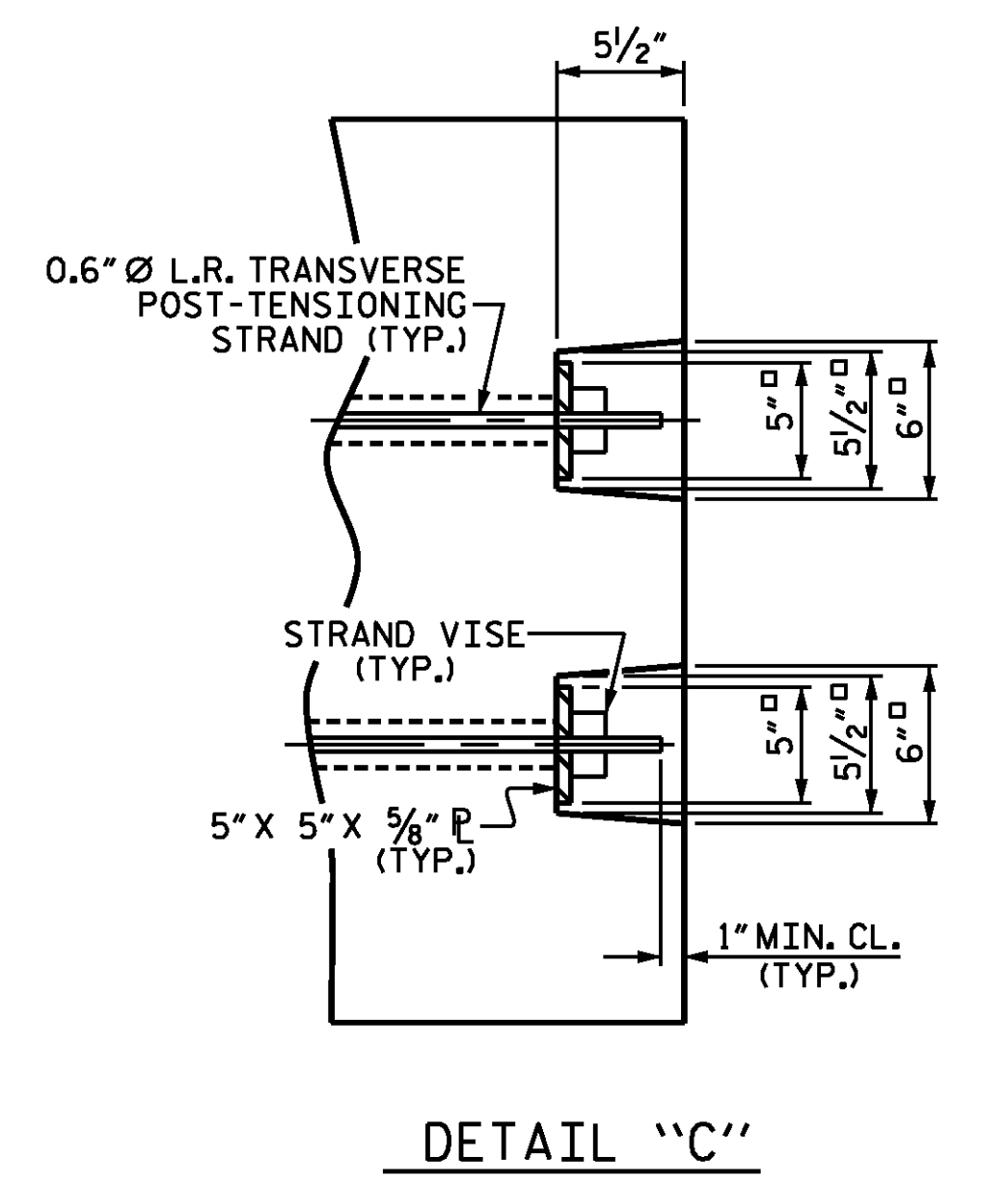
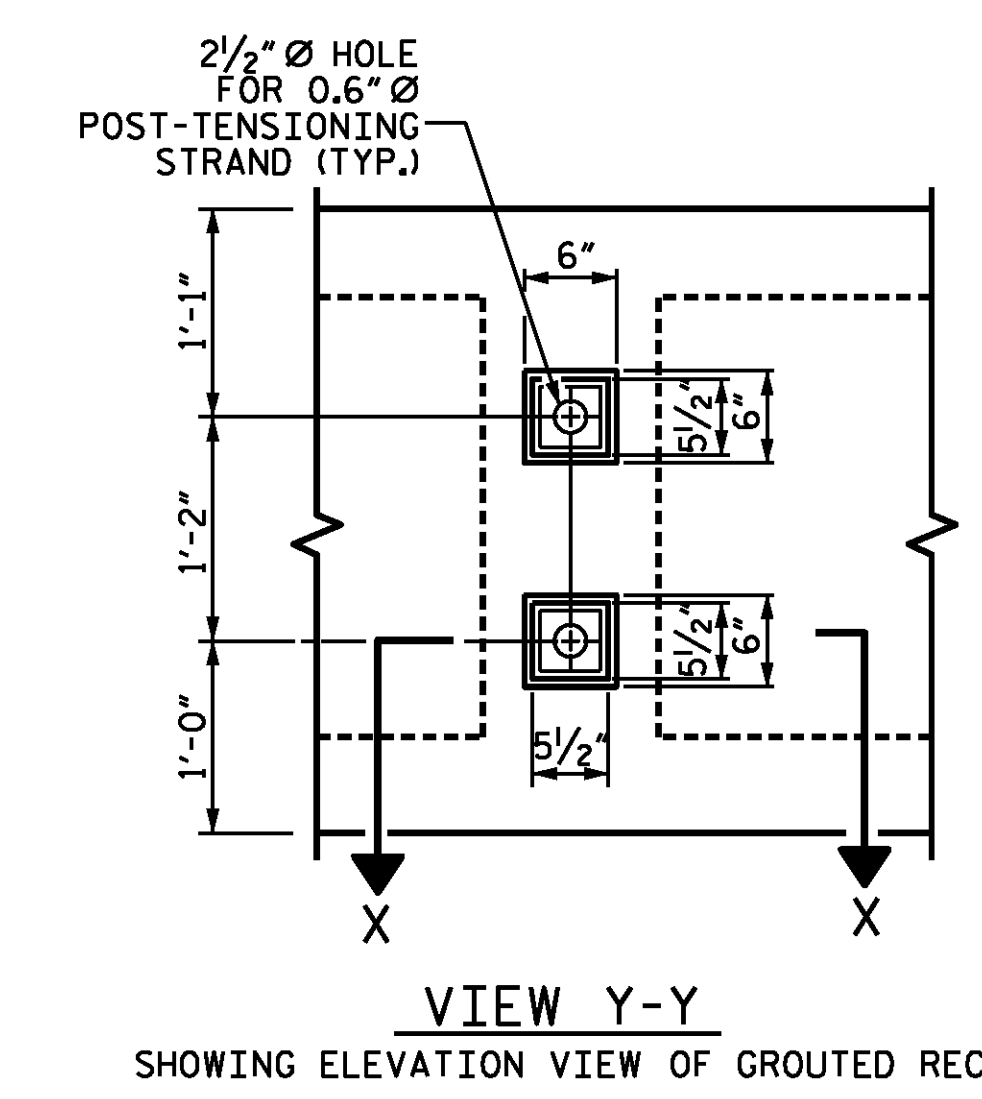
STD. NO. 39PCBB6\_90S\_100L

ASSEMBLED BY : C. HOWARD DATE : 8/14  
CHECKED BY : M. MILLS DATE : 8/14  
DRAWN BY : DGE II/II  
CHECKED BY : TMG II/II

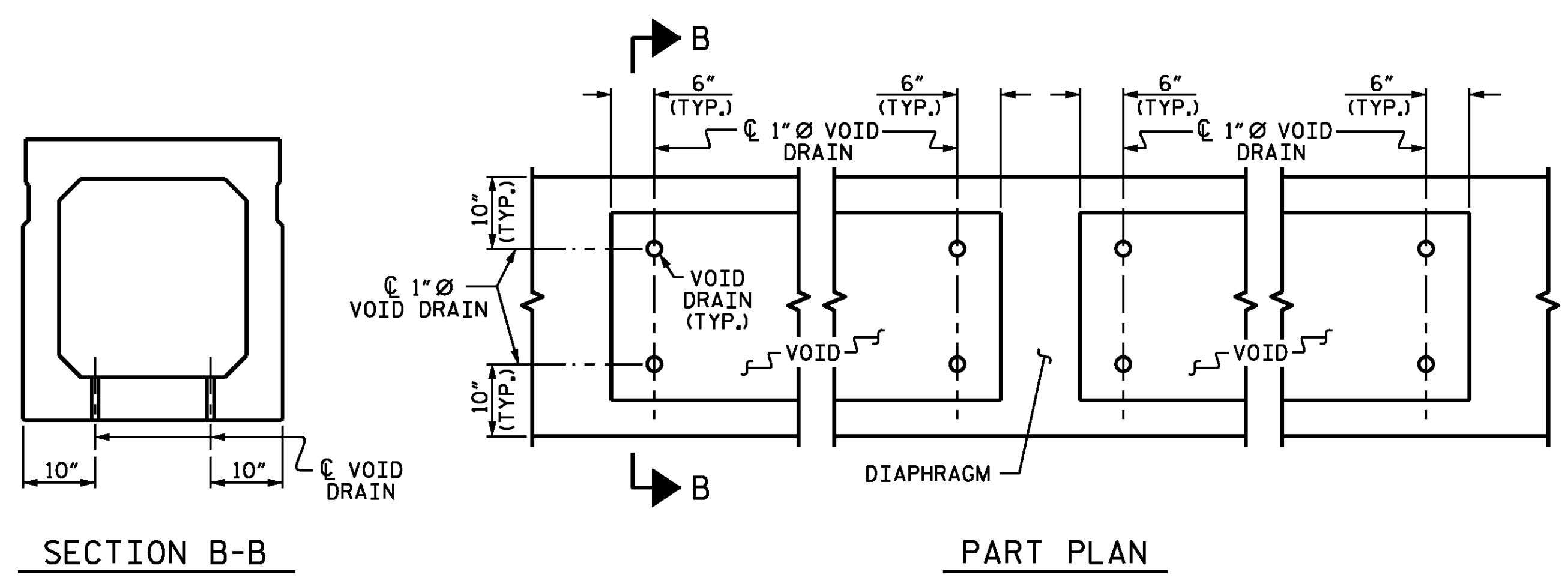


**DOUBLE DIAPHRAGM DETAILS**

\*4 "S" BARS NOT SHOWN. \*4 "S" BARS MAY BE SHIFTED SLIGHTLY TO CLEAR 2 1/2" Ø HOLE.



**GROUTED RECESS DETAIL AT END OF POST-TENSIONED STRANDS OF EXTERIOR BOX BEAM**



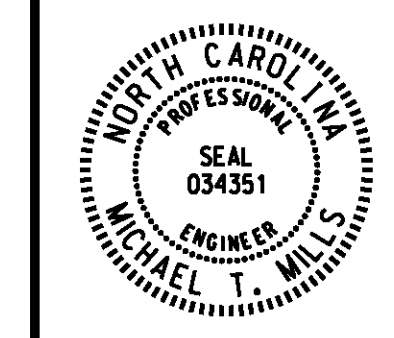
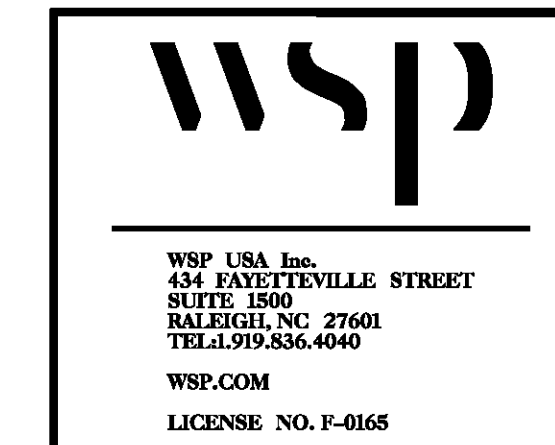
**VOID DRAIN DETAILS**  
(DIMENSIONS SHOWN ARE TYPICAL FOR EACH VOID)

DEAD LOAD DEFLECTION AND CAMBER	
100' BOX BEAM UNIT (NC & SE)	3'-0" x 3'-3"
CAMBER (SLAB ALONE IN PLACE)	0.6" Ø L.R. STRAND
DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD**	2" ↑
FINAL CAMBER	1/8" ↓

\*\* INCLUDES FUTURE WEARING SURFACE

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-  
 SHEET 4 OF 5

DESIGN ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 11/2/2017

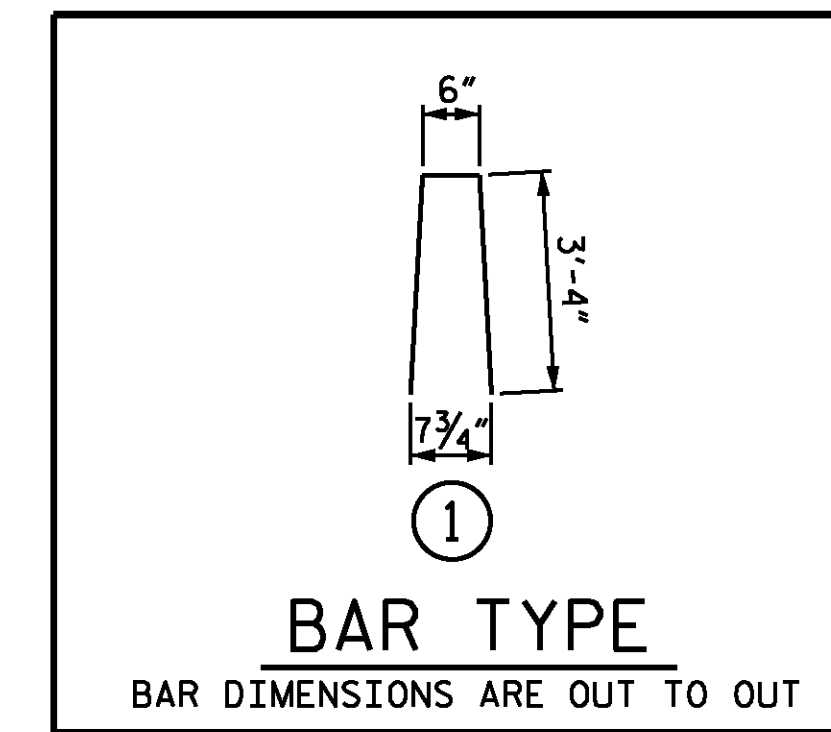
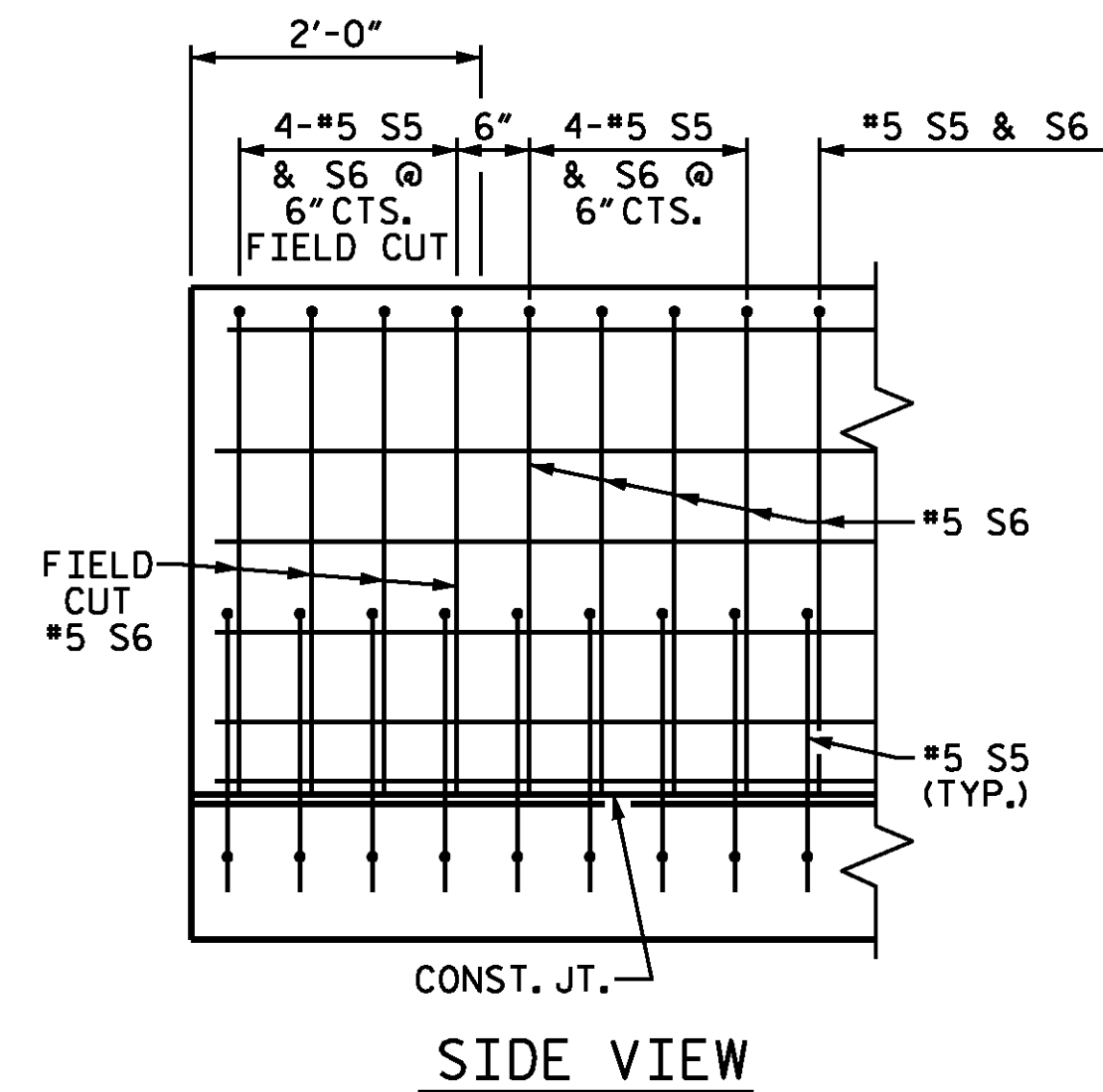
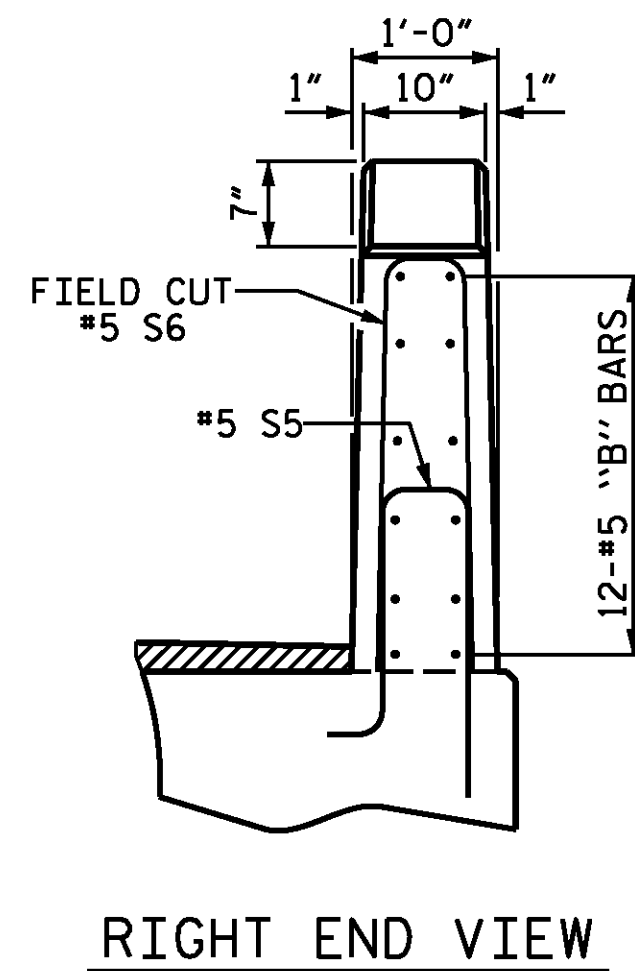
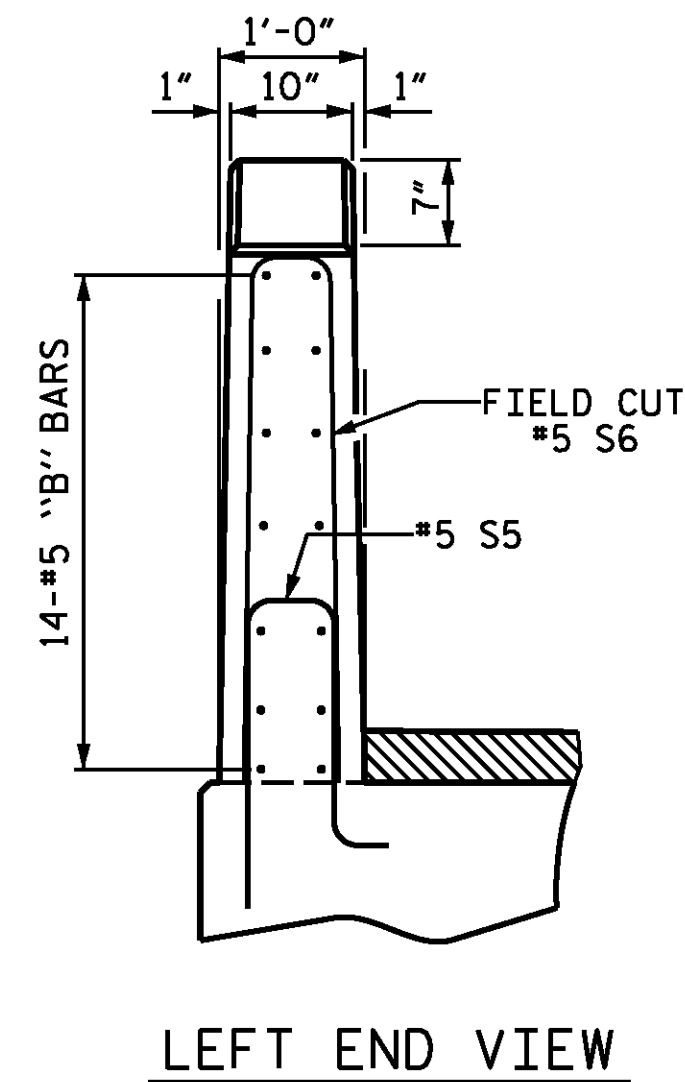
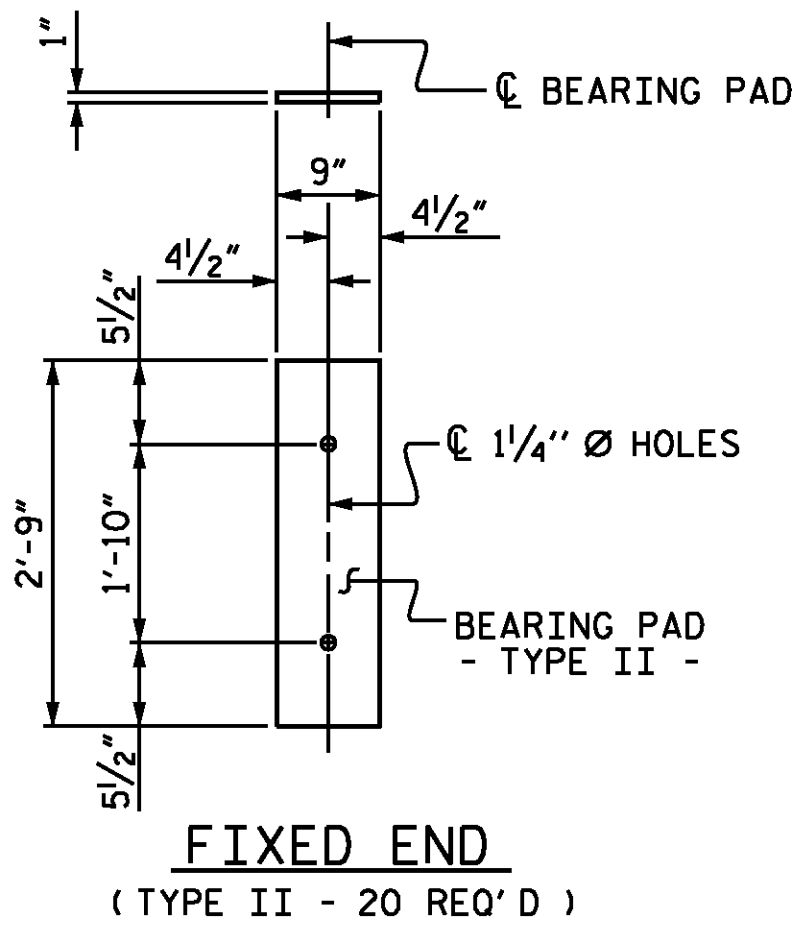


STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : DGE II/II	ADDED 7/11/05
CHECKED BY : TMG II/II	REV. 5/1/06
	REV. 10/1/11
	TLA/GM
	MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9
1			3			TOTAL SHEETS
2			4			18





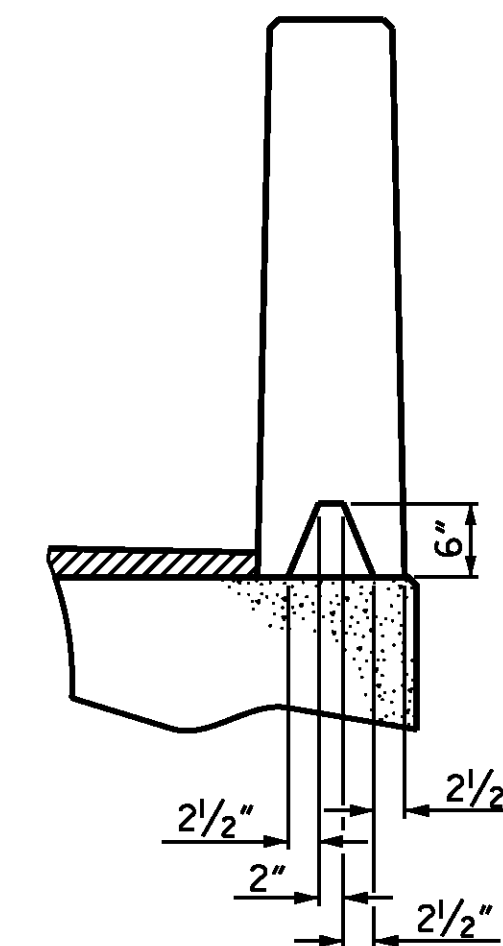
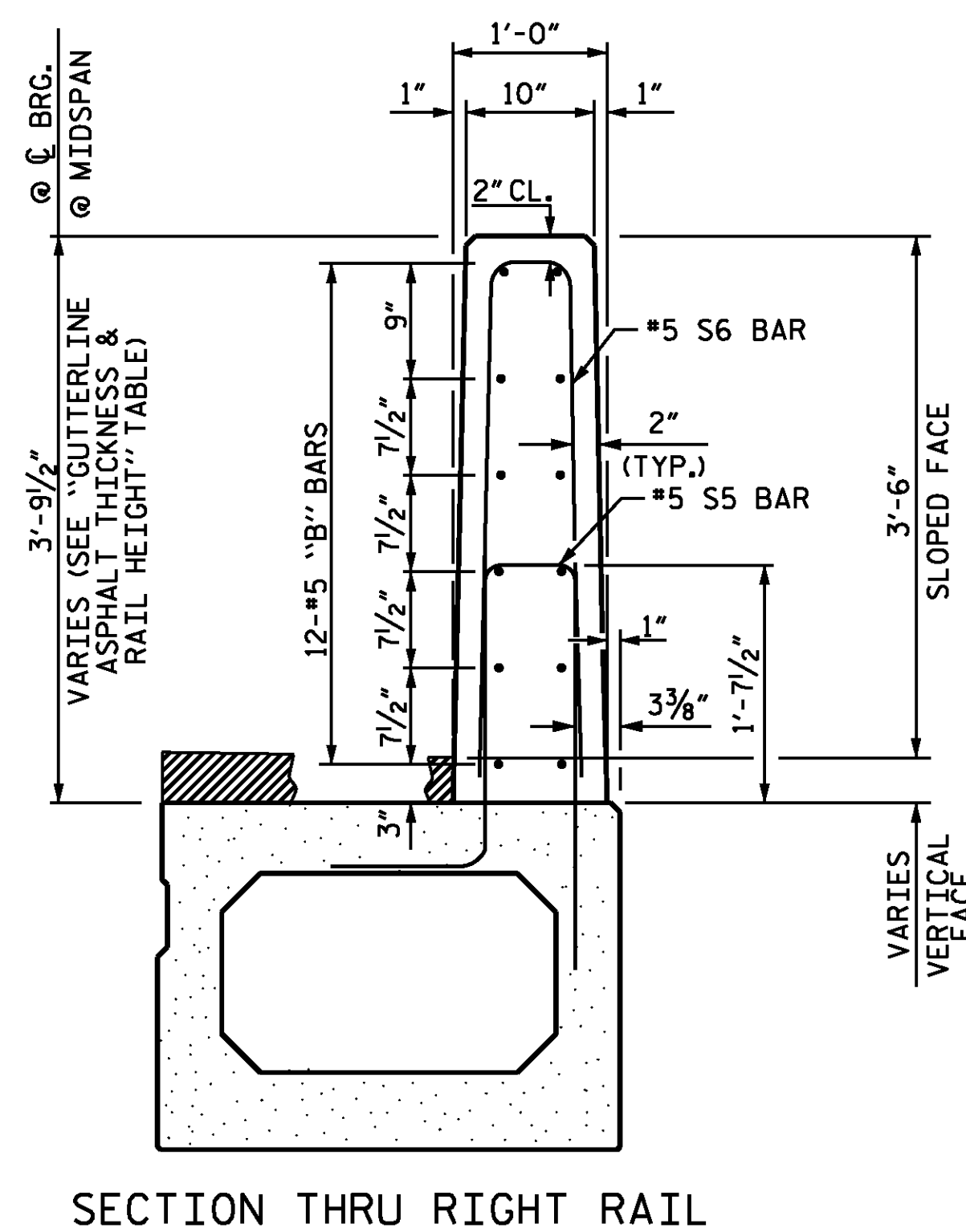
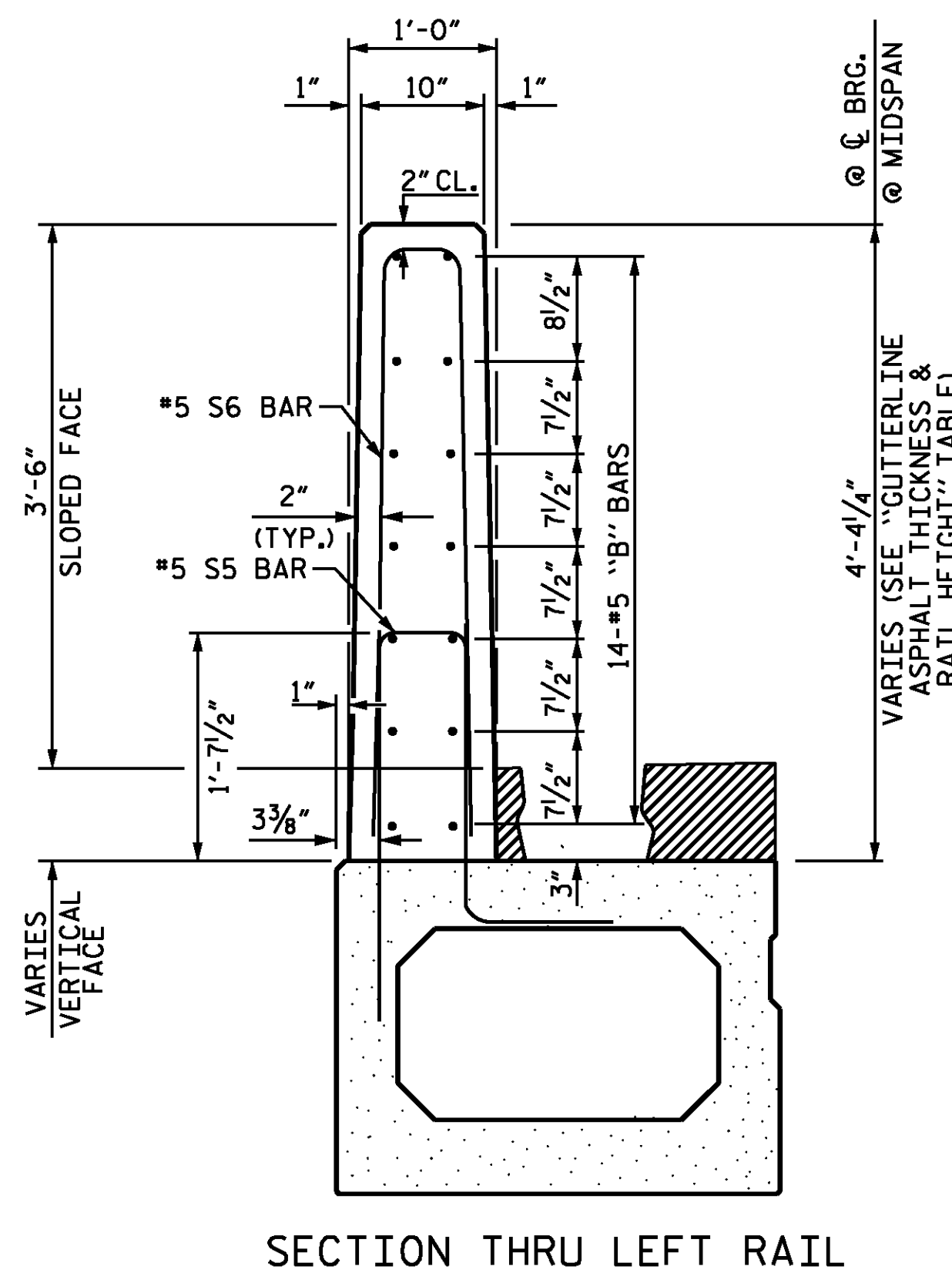
**ELASTOMERIC BEARING DETAILS**

ELASTOMER IN ALL BEARINGS SHALL BE 60 DUROMETER HARDNESS.

**END OF RAIL DETAILS**

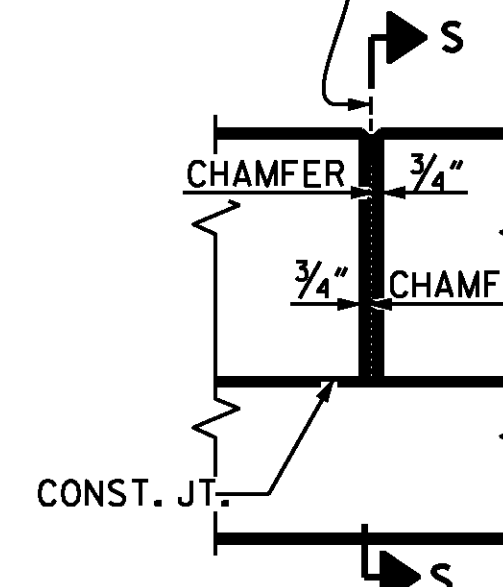
BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL					
BAR	BARS PER PAIR OF EXTERIOR UNITS	SIZE	TYPE	LENGTH	WEIGHT
100' UNIT					
*B12	104	#5	STR	24'-7"	2667
*S6	276	#5	1	7'-2"	2063
* EPOXY COATED REINFORCING STEEL				LBS.	4730
CLASS AA CONCRETE				CU.YDS.	32.2
TOTAL VERTICAL CONCRETE BARRIER RAIL				LN. FT.	224.0

NOTE: CLASS AA CONCRETE AND TOTAL VERTICAL CONCRETE BARRIER RAIL QUANTITIES INCLUDE APPROACH SLAB RAILS. FOR REINFORCING STEEL IN APPROACH SLAB BARRIER RAILS, SEE APPROACH SLAB SHEETS.



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

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



GUTTERLINE ASPHALT THICKNESS & RAIL HEIGHT		
	ASPHALT OVERLAY THICKNESS @ MID-SPAN	RAIL HEIGHT @ MID-SPAN
RIGHT EXTERIOR	2 1/8"	3'-8 1/8"
LEFT EXTERIOR	9 5/8"	4'-3 3/8"

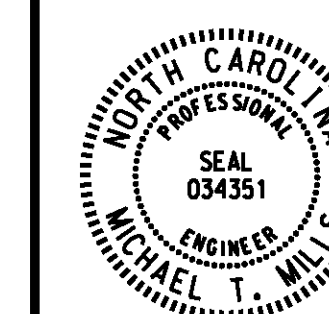
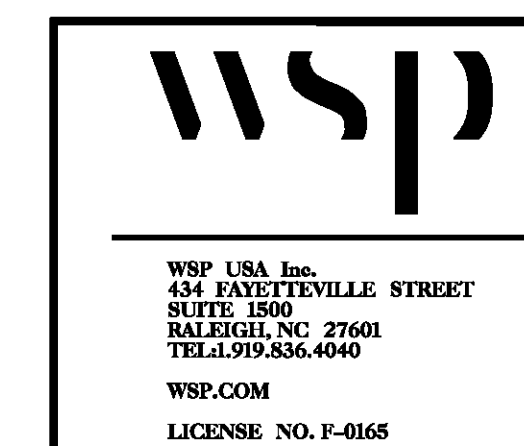
BOX BEAM UNITS REQUIRED			
	NUMBER	LENGTH	TOTAL LENGTH
EXTERIOR B.B.	2	100'-0"	200'-0"
INTERIOR B.B.	8	100'-0"	800'-0"
TOTAL	10		1000'-0"

**VERTICAL CONCRETE BARRIER RAIL DETAILS**

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 5 OF 5

DESIGN-ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 11/2/2017



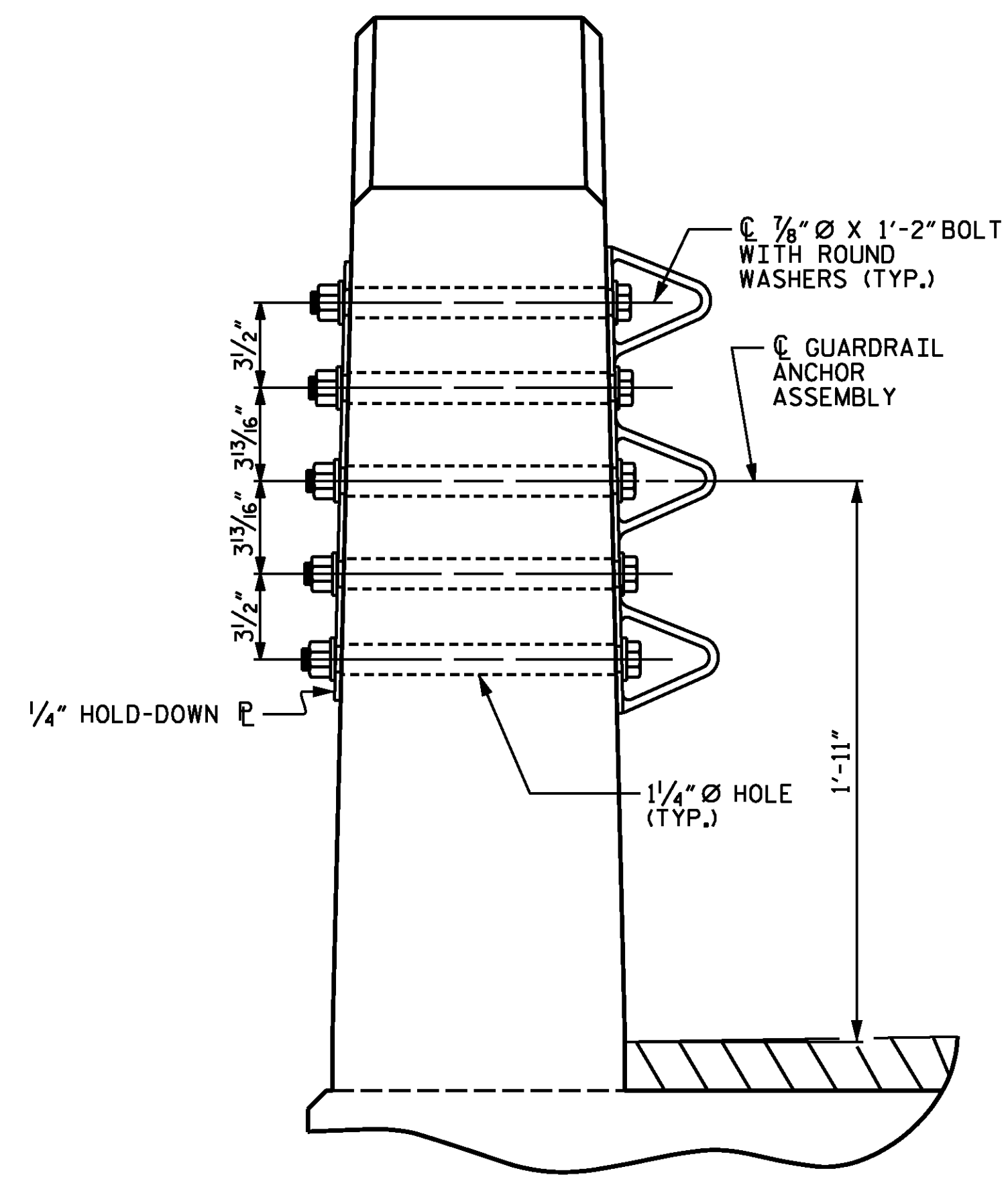
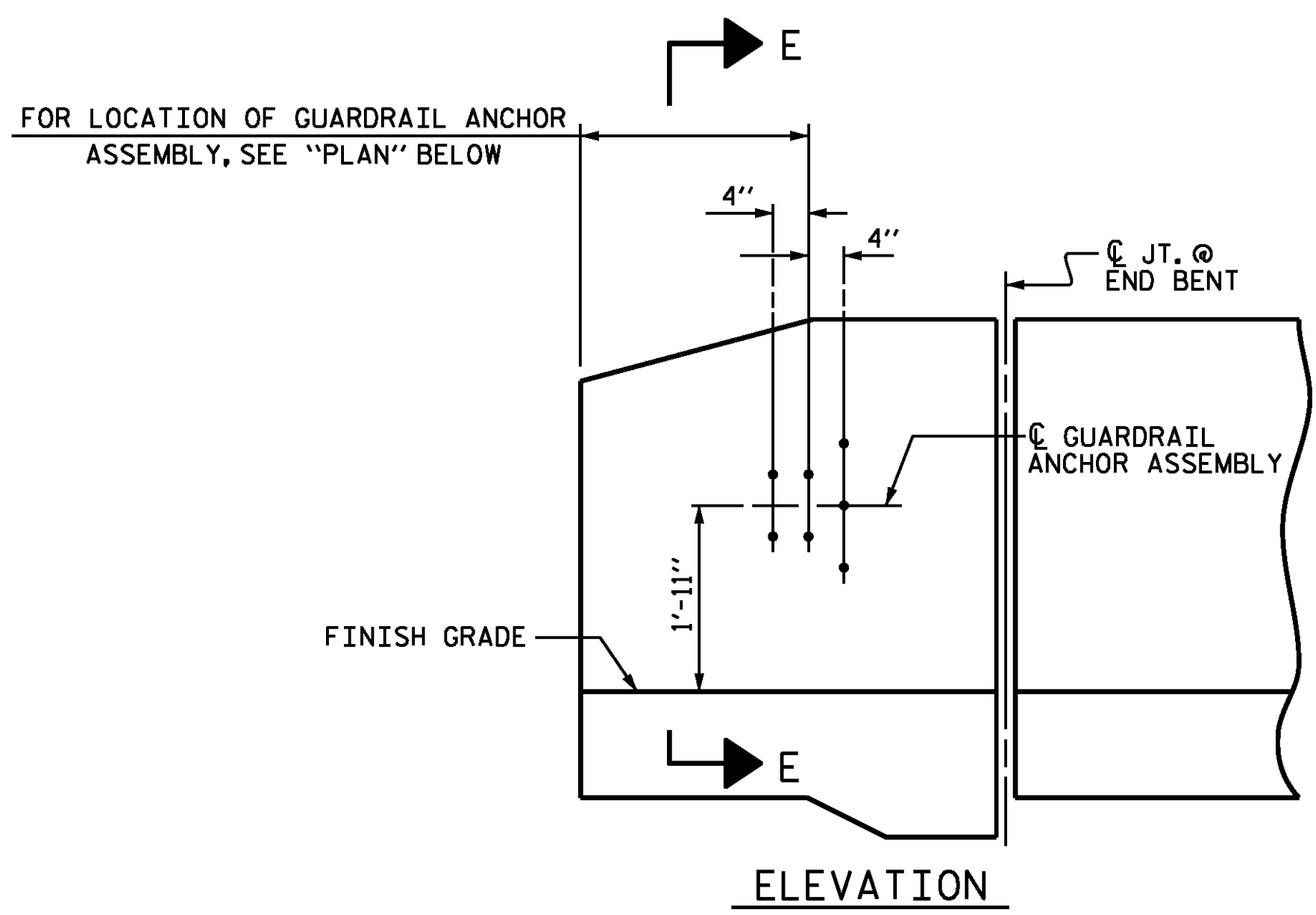
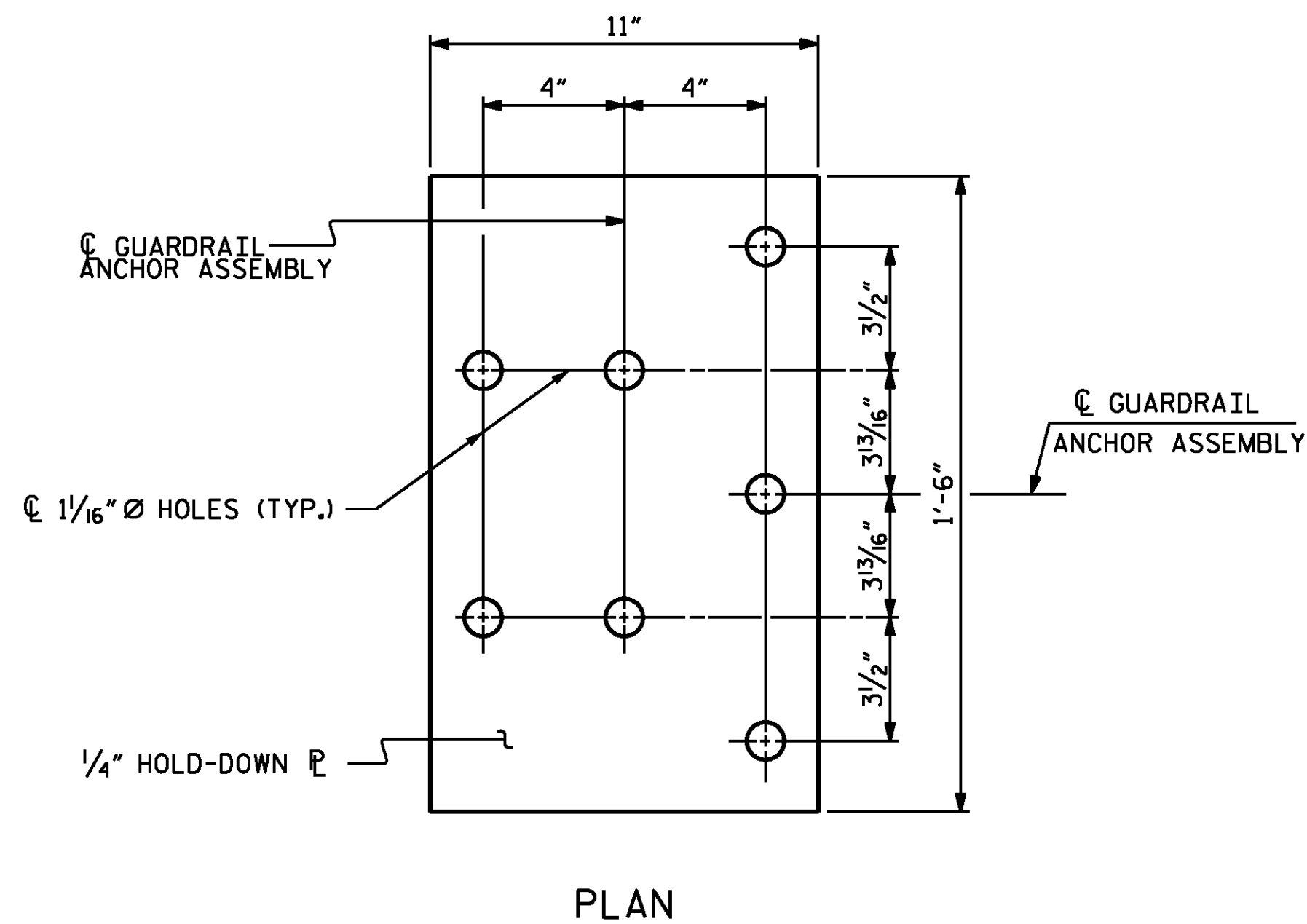
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
 3'-0" X 3'-3"  
 PRESTRESSED CONCRETE  
 BOX BEAM UNIT

ASSEMBLED BY : C. HOWARD DATE : 8/14  
 CHECKED BY : M. MILLS DATE : 8/14  
 DRAWN BY : DGE 10/11  
 CHECKED BY : TMG 11/11

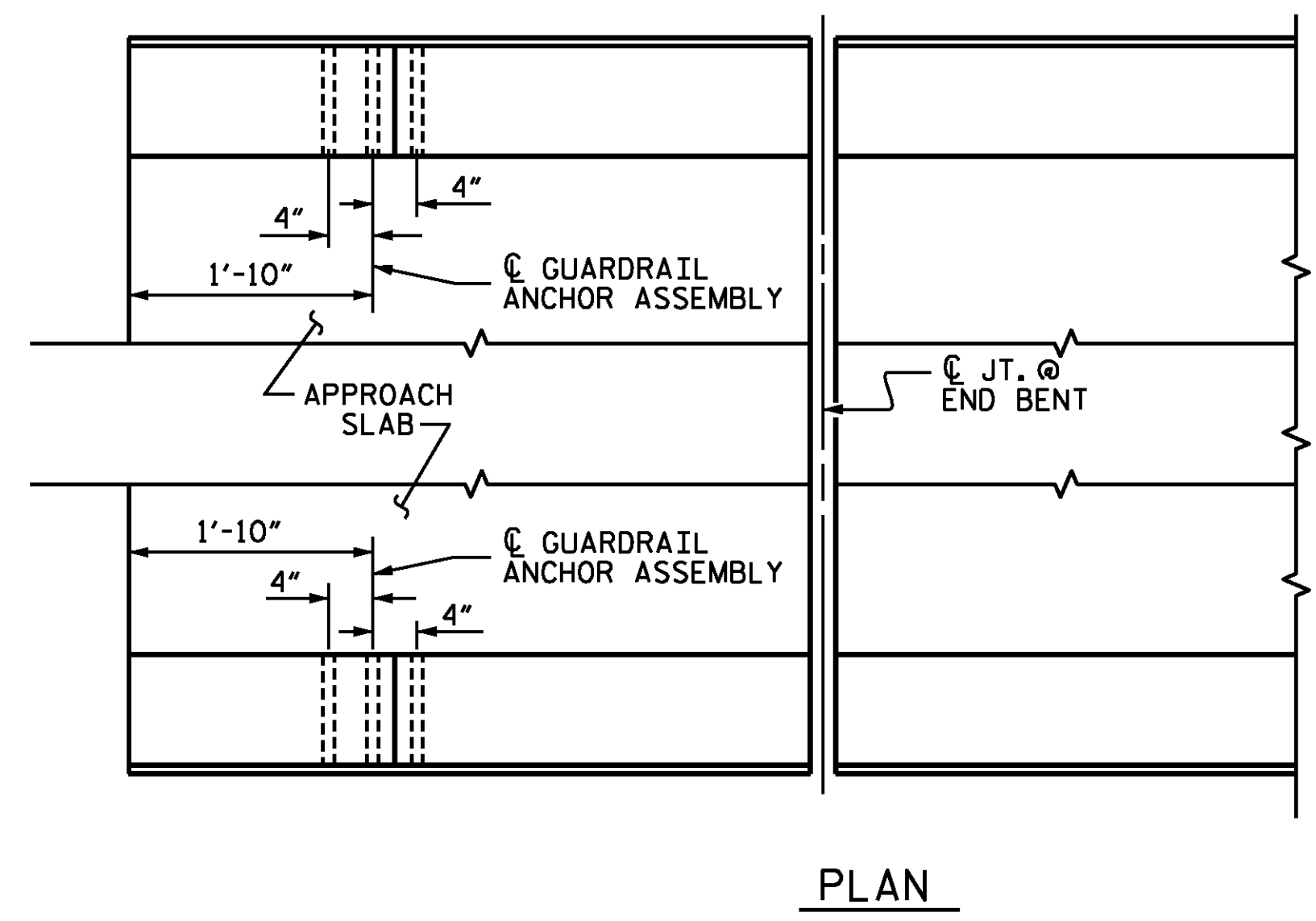
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10
1			3			TOTAL SHEETS 18
2			4			

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





SECTION E-E  
GUARDRAIL ANCHOR ASSEMBLY DETAILS



LOCATION OF ANCHORS FOR GUARDRAIL  
END BENT #1 SHOWN, END BENT #2 SIMILAR.

**NOTES**

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

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

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

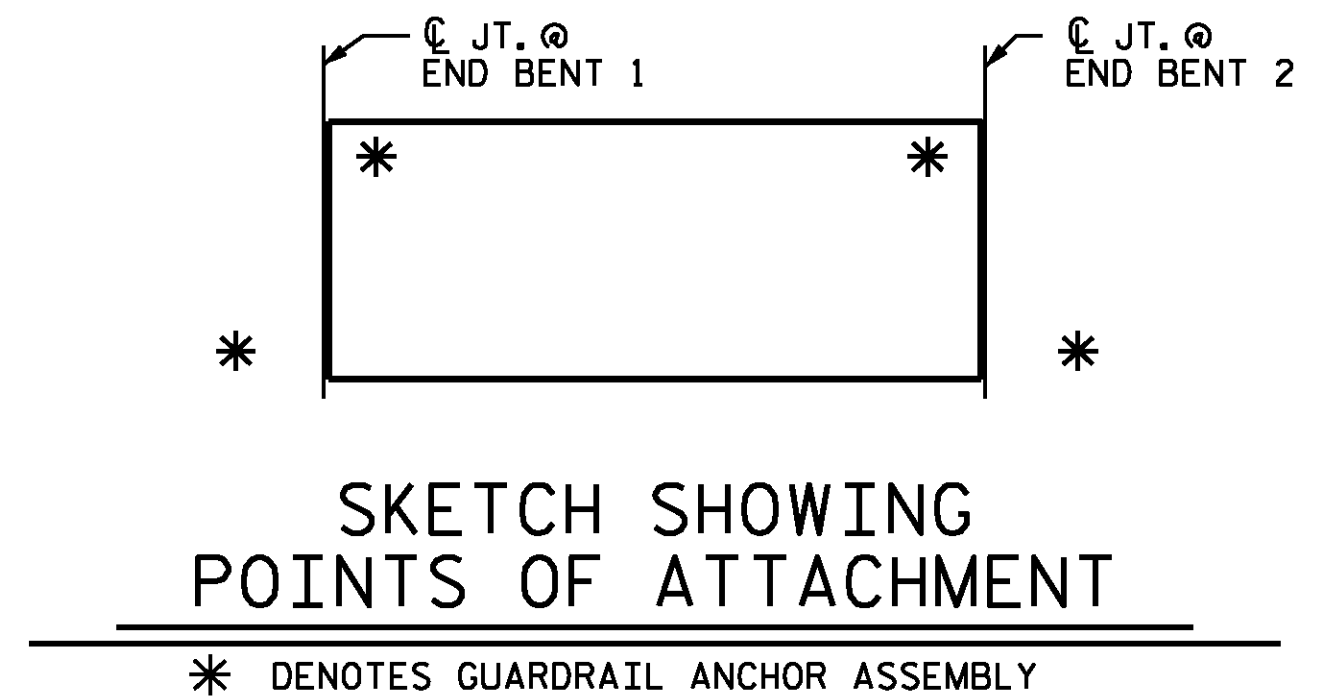
THE GUARDRAIL ANCHOR ASSEMBLY IS REQUIRED AT ALL POINTS WHERE APPROACH GUARDRAIL IS TO BE ATTACHED TO THE END OF BARRIER RAIL. FOR POINTS OF ATTACHMENT, SEE SKETCH.

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

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

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

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



PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
STATION: 14+44.10 -L-

DESIGN ENGINEER OF RECORD:  
*Michael Mills*  
DATE: 11/2/2017

**wsp**

WSP USA Inc.  
434 FAYETTEVILLE STREET  
SUITE 1500  
RALEIGH, NC 27601  
TEL: 919.856.4040  
WSP.COM  
LICENSE NO. F-0165

STATE OF NORTH CAROLINA  
PROFESSIONAL ENGINEER  
SEAL  
034351  
MICHAEL T. MILLS

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD  
GUARDRAIL ANCHORAGE  
FOR VERTICAL CONCRETE  
BARRIER RAIL

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : MAA 5/10	REV. 10/1/11 MAA/GM
CHECKED BY : GM 5/10	REV. 12/5/11 MAA/GM
	REV. 6/13 MAA/GM

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-11
1			3			TOTAL SHEETS
2			4			18

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

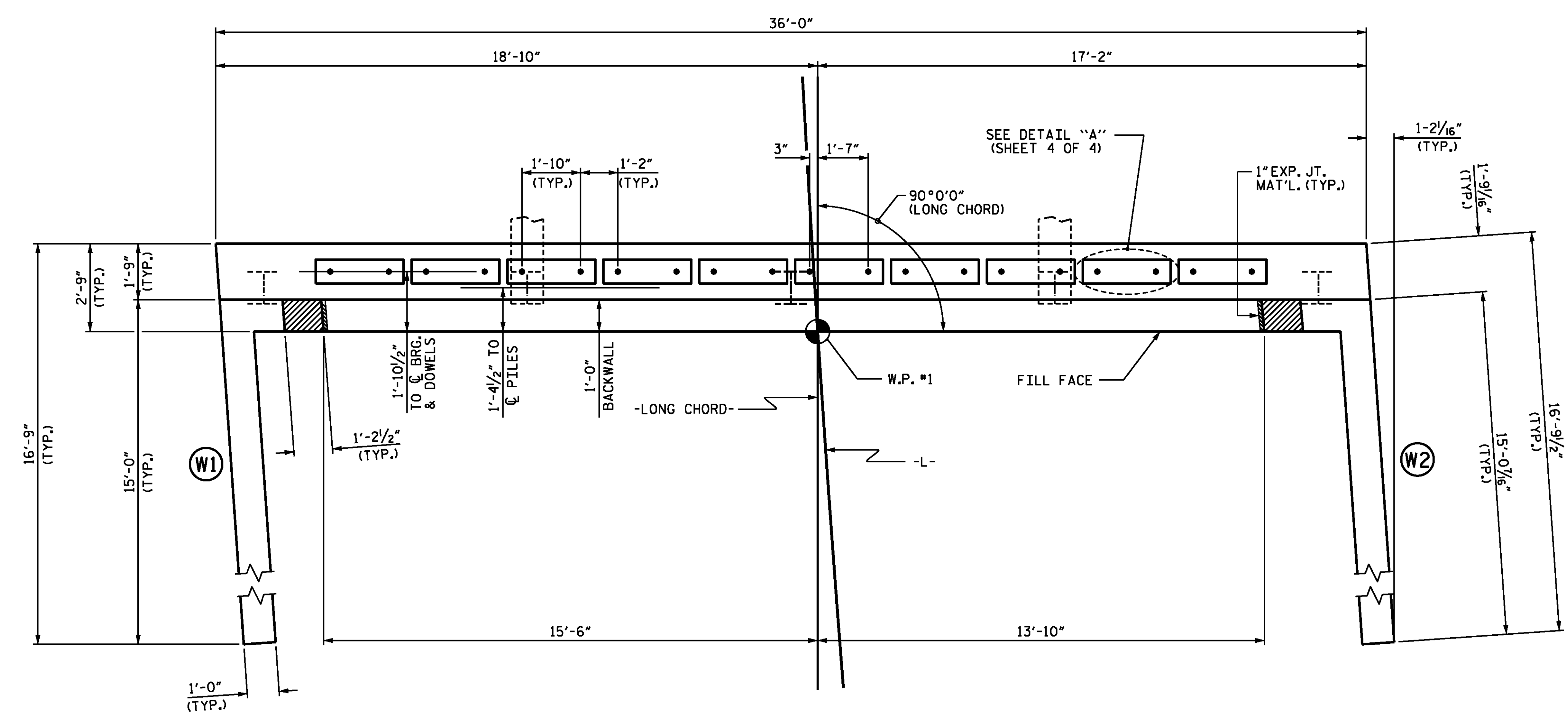
### NOTES

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

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

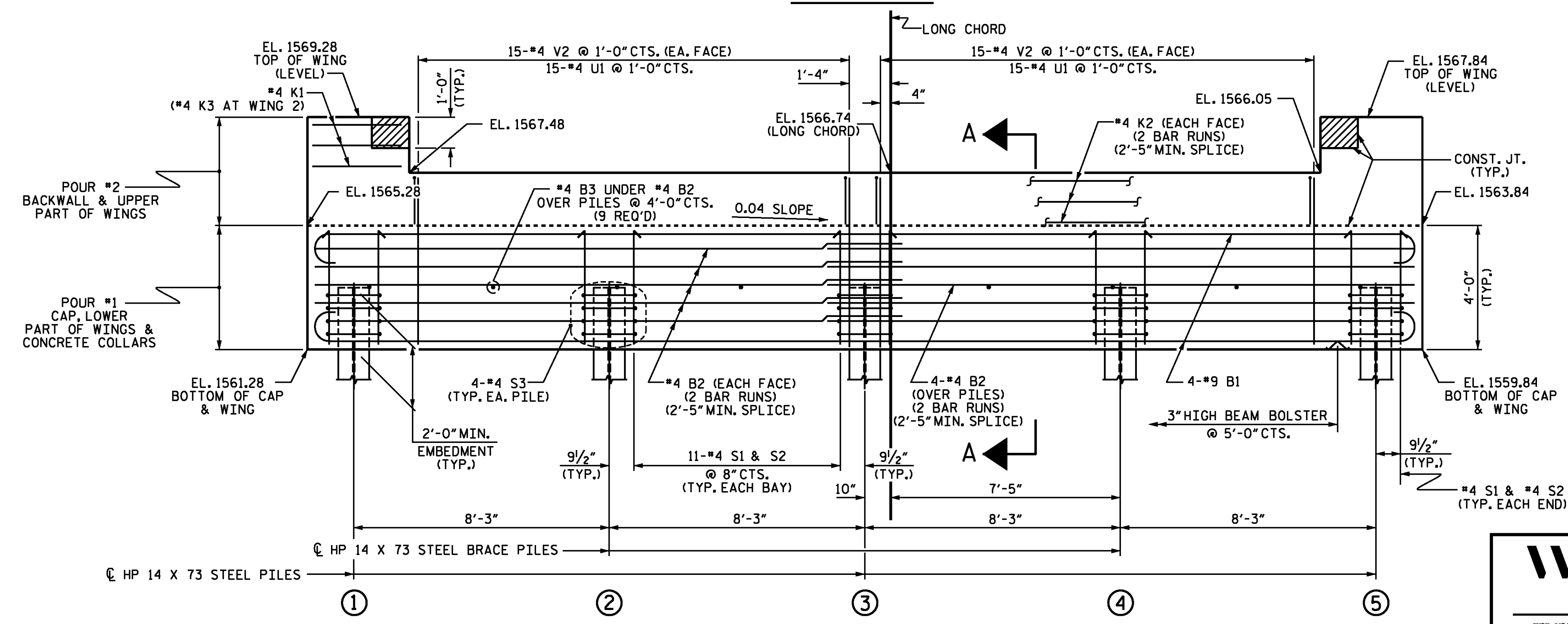
FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.

FOR WING DETAILS, SEE SHEET 3 OF 4.



PLAN

TOP OF PILE ELEVATIONS	
①	1563.22
②	1562.89
③	1562.56
④	1562.23
⑤	1561.90



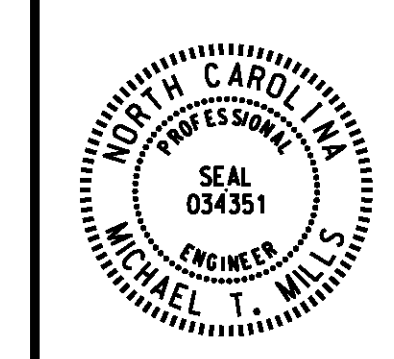
ELEVATION

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
 STATION: 14+44.10 -L-  
 SHEET 1 OF 4

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017

**wsp**

WSP USA Inc.  
 434 FAYETTEVILLE STREET  
 SUITE 1500  
 RALEIGH, NC 27601  
 TEL: 919.856.4040  
 WSP.COM  
 LICENSE NO. F-0165



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT 1

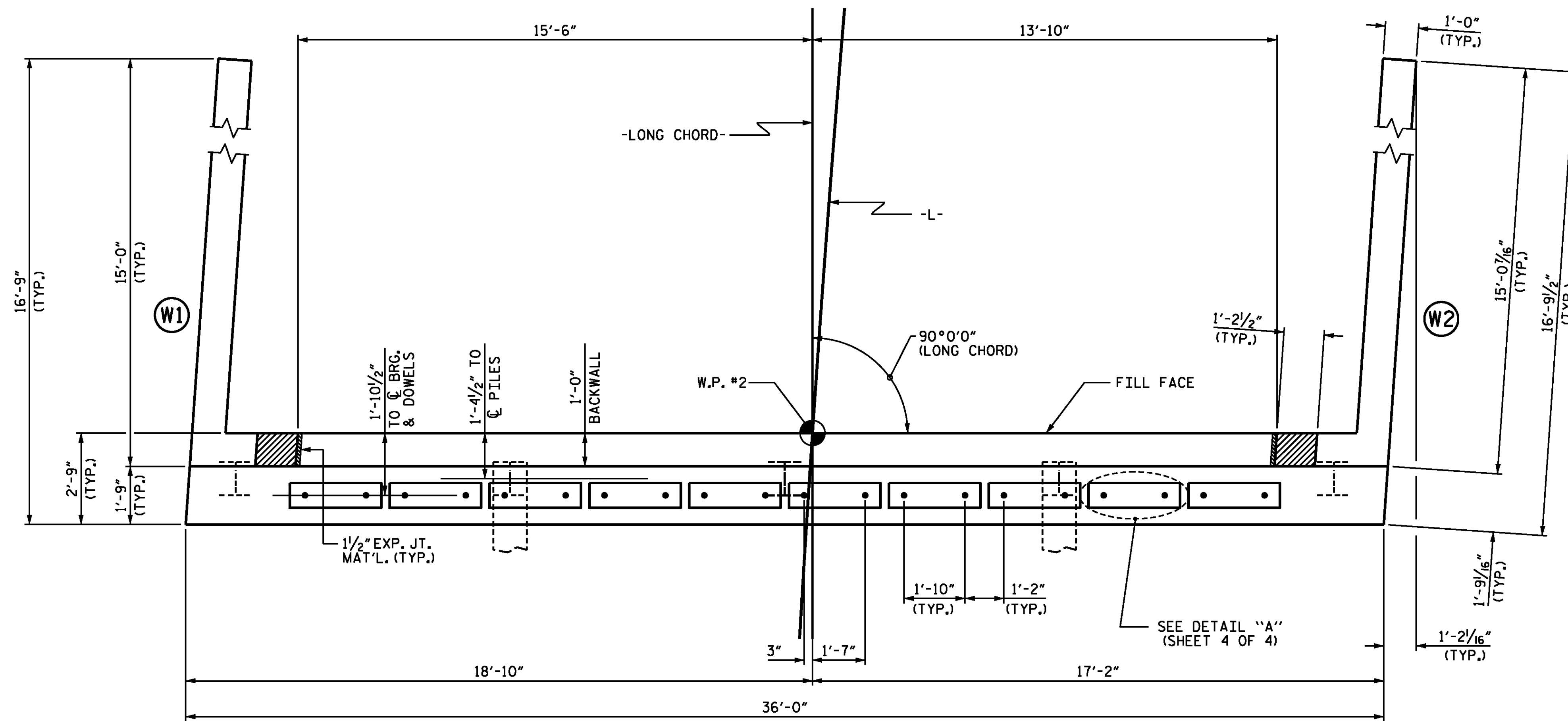
ASSEMBLED BY : C. HOWARD DATE : 8/14  
 CHECKED BY : M. MILLS DATE : 8/14

DRAWN BY : WJH 12/11  
 CHECKED BY : AAC 12/11

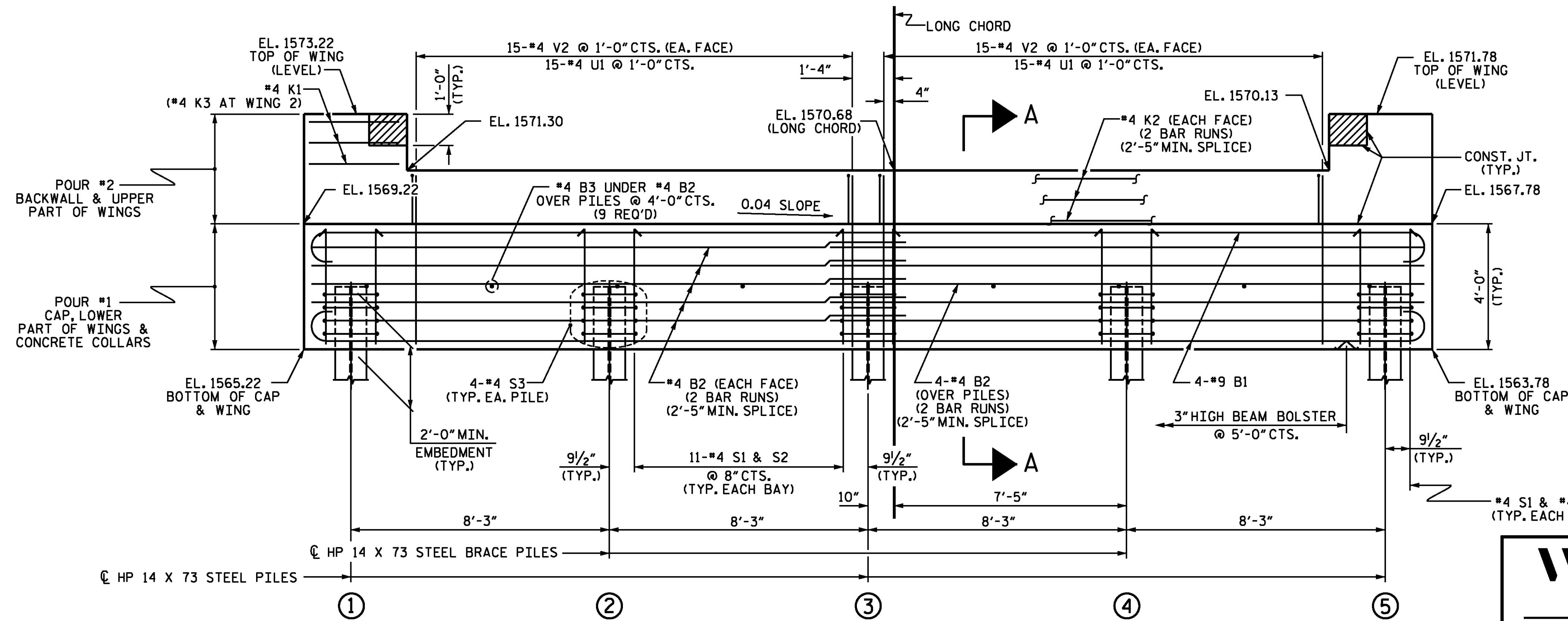
WINGS NOT SHOWN FOR CLARITY.  
 FOR SECTION A-A, SEE SHEET 4 OF 4.  
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
 SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

REVISIONS						SHEET NO. S-12
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 18
2			4			

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



PLAN



ELEVATION

NOTES

- STIRRUPS IN CAP MAY BE SHIFTED AS NECESSARY TO CLEAR DOWELS.
- THE CONCRETE IN THE SHADED AREA OF THE WING SHALL BE POURED AFTER THE VERTICAL CONCRETE BARRIER RAIL IS CAST IF SLIP FORMING IS USED.
- FOR PILE SPLICE DETAILS, SEE SHEET 4 OF 4.
- FOR WING DETAILS, SEE SHEET 3 OF 4.

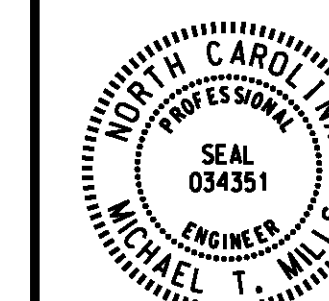
TOP OF PILE ELEVATIONS

①	1567.16
②	1566.83
③	1566.50
④	1566.17
⑤	1565.84

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 2 OF 4

DESIGN-ENGINEER OF RECORD:  
 Michael Mills  
 DATE: 11/2/2017



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT 2

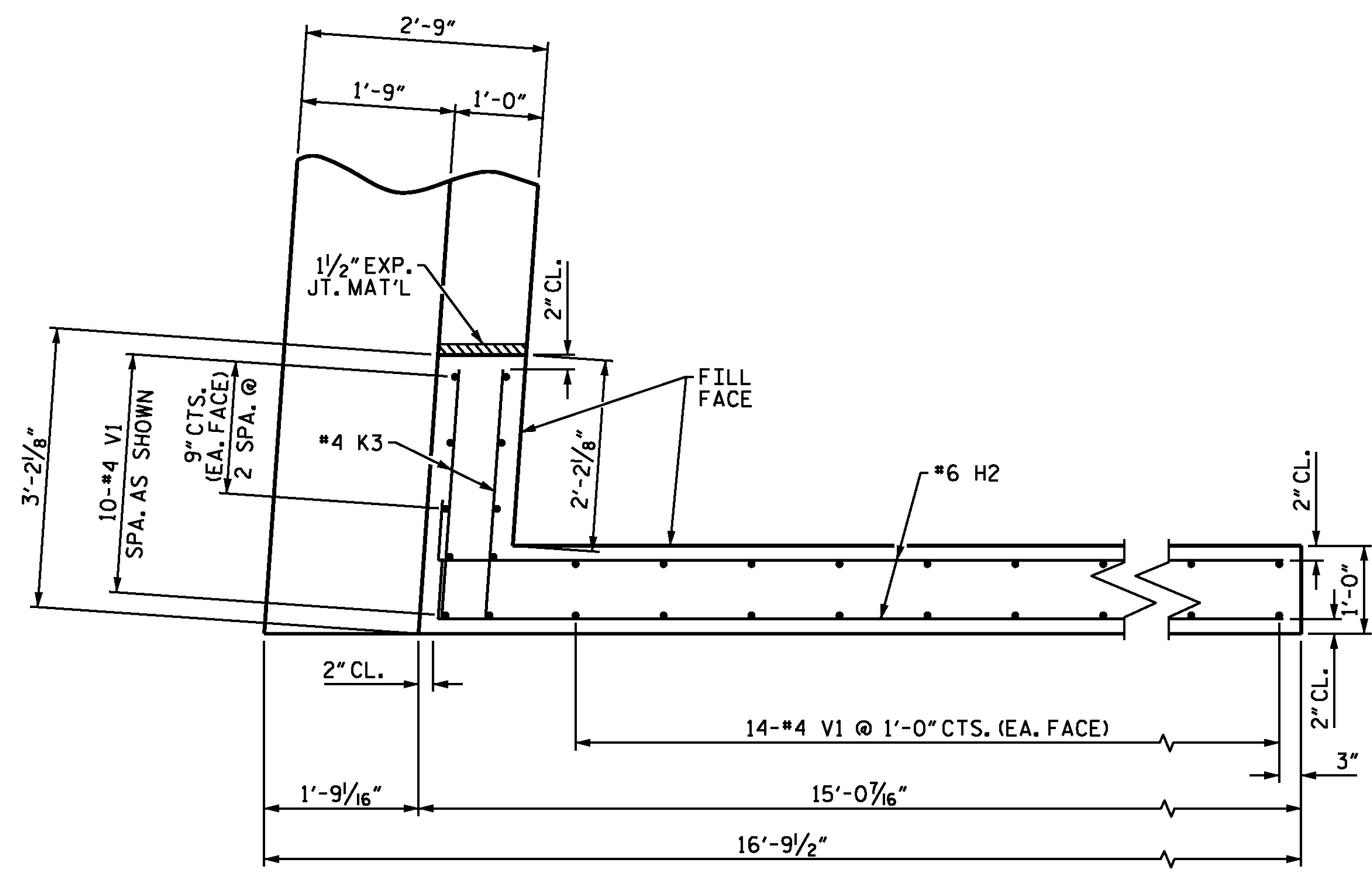
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			18
2			4			

ASSEMBLED BY : C. HOWARD DATE : 8/14  
 CHECKED BY : M. MILLS DATE : 8/14  
 DRAWN BY : WJH 12/11  
 CHECKED BY : AAC 12/11

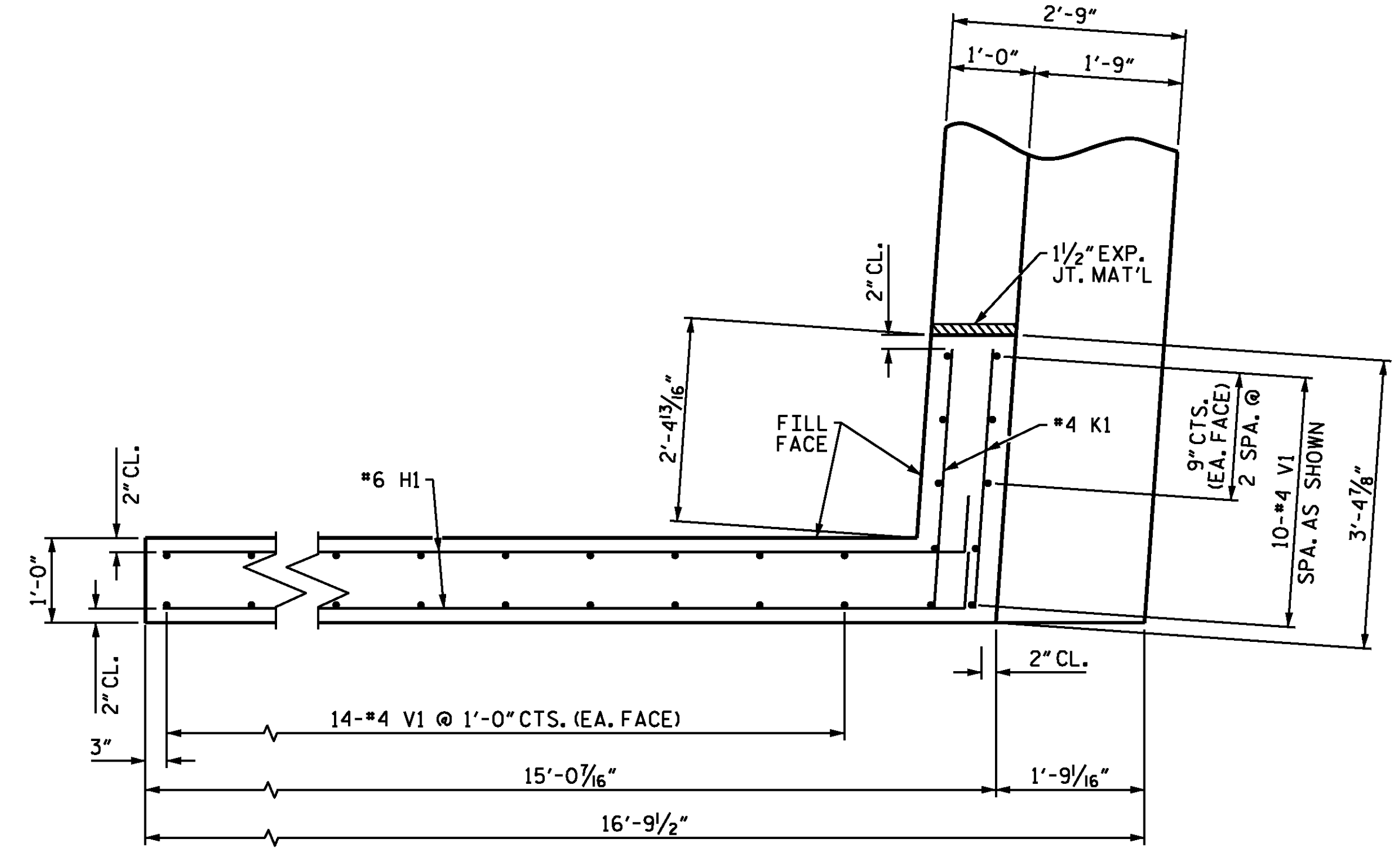
WINGS NOT SHOWN FOR CLARITY.  
 FOR SECTION A-A, SEE SHEET 4 OF 4.  
 CONCRETE COLLARS FOR STEEL PILES NOT SHOWN IN PLAN AND ELEVATION VIEWS FOR CLARITY.  
 SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL", SHEET 4 OF 4.

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

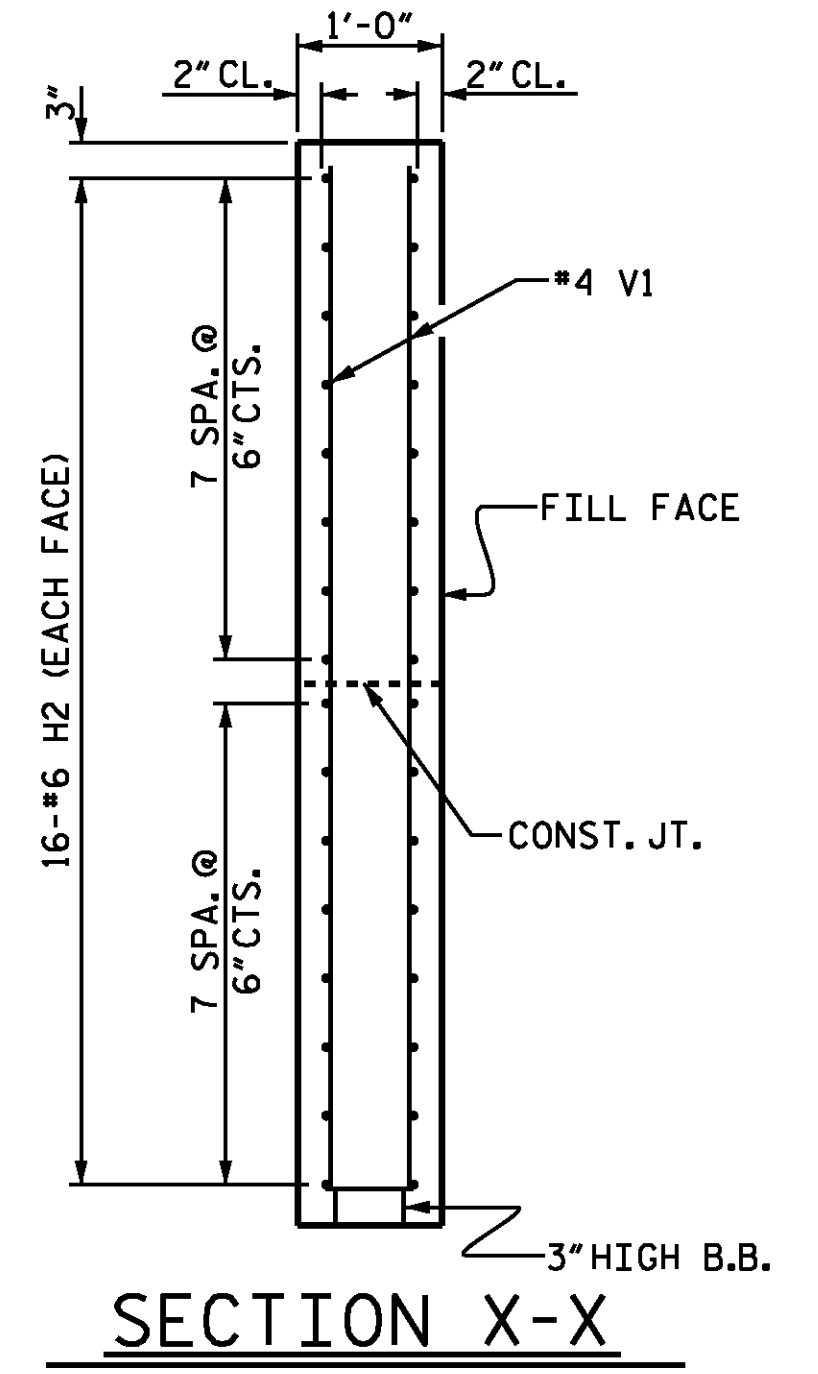




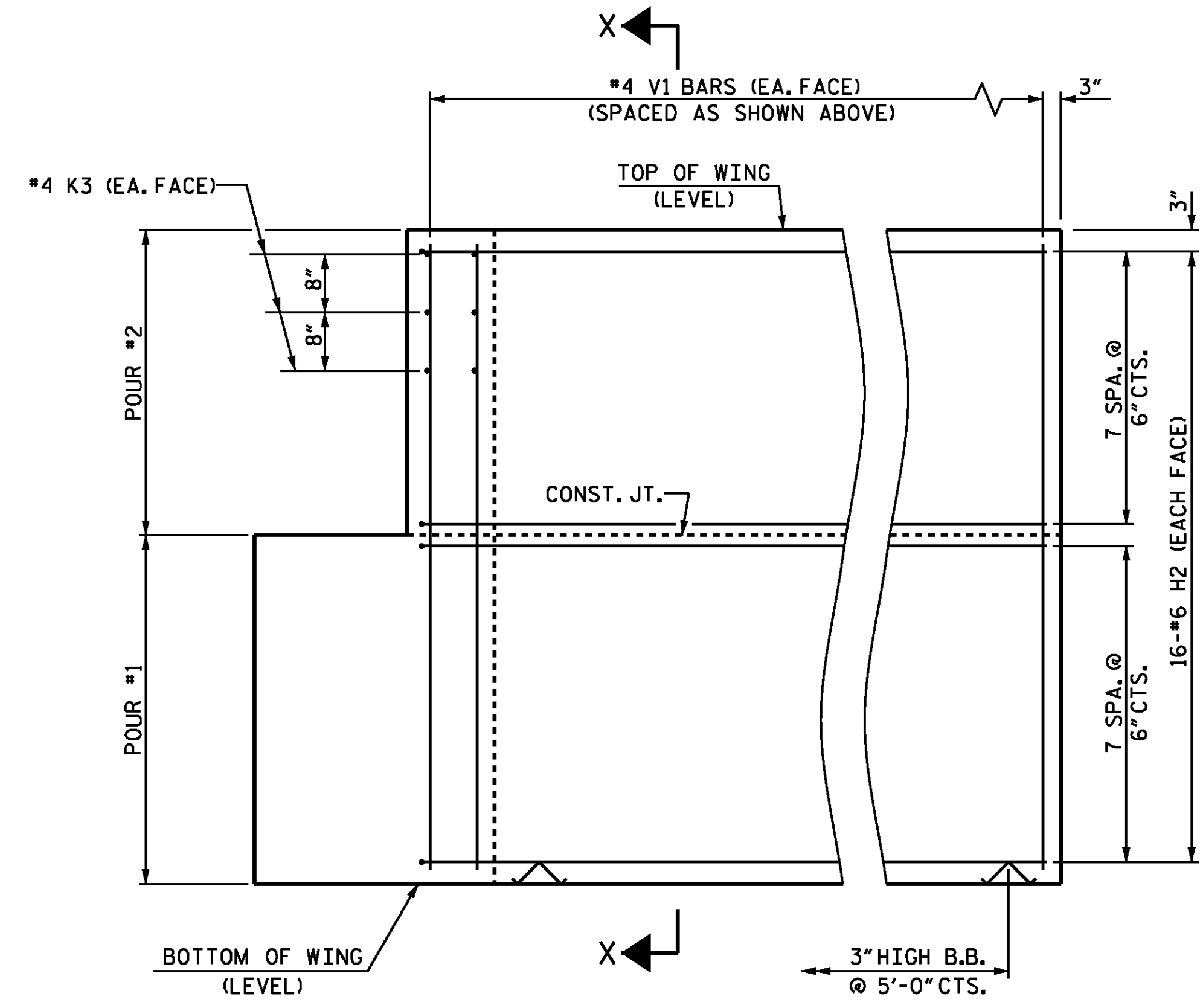
PLAN OF WING (W1)



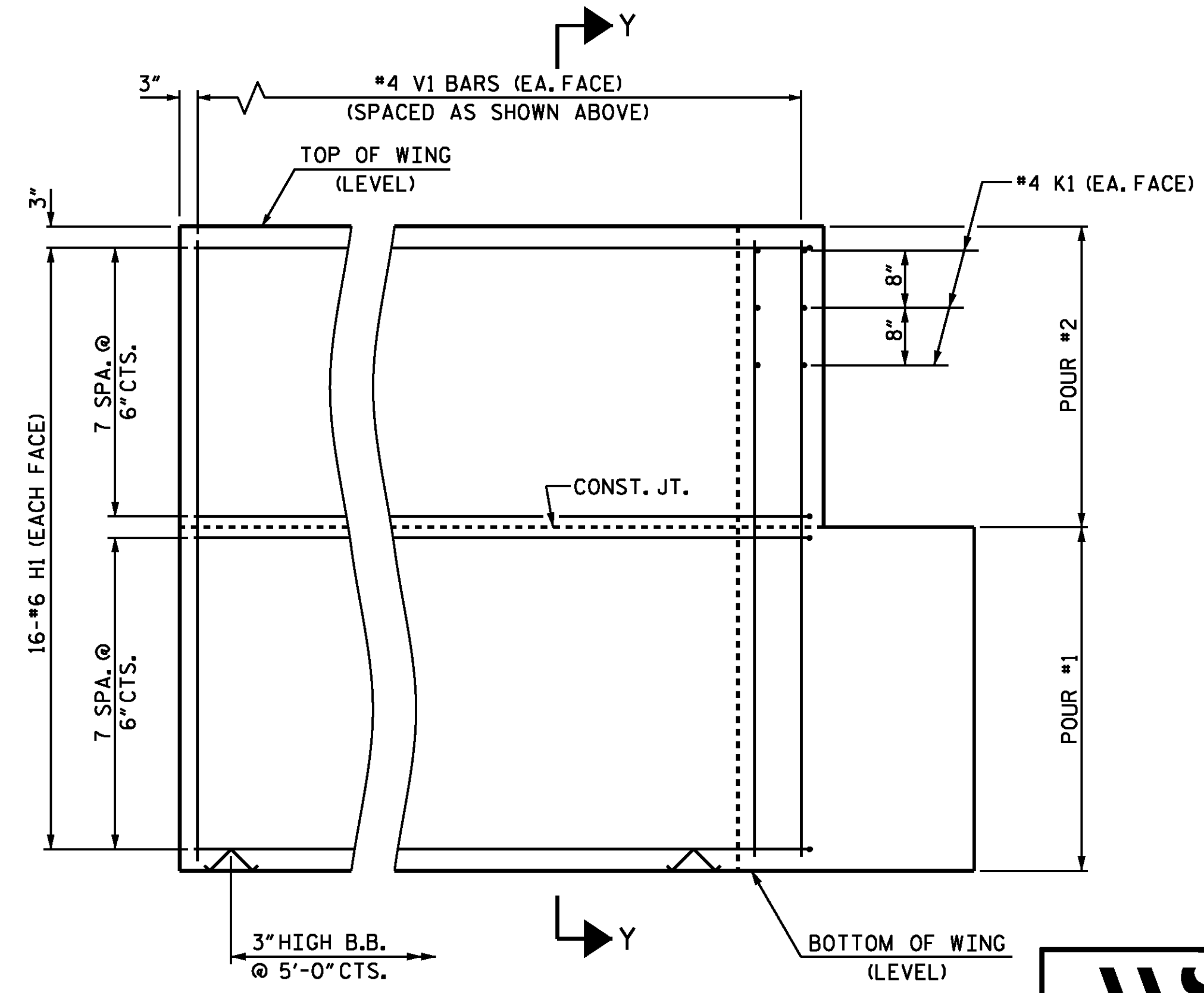
PLAN OF WING (W2)



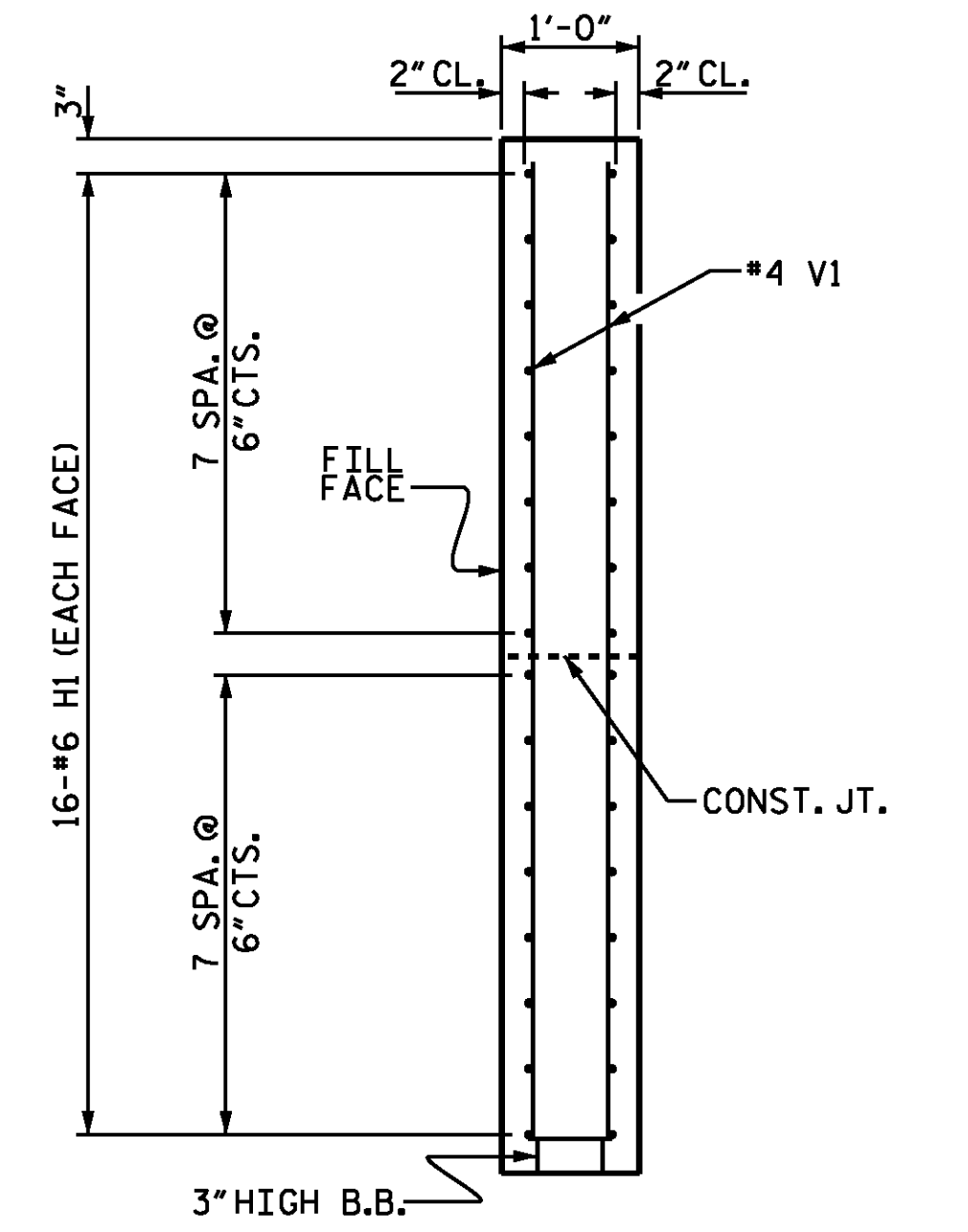
SECTION X-X



ELEVATION OF WING (W1)



ELEVATION OF WING (W2)



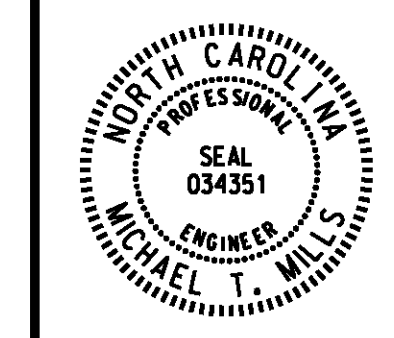
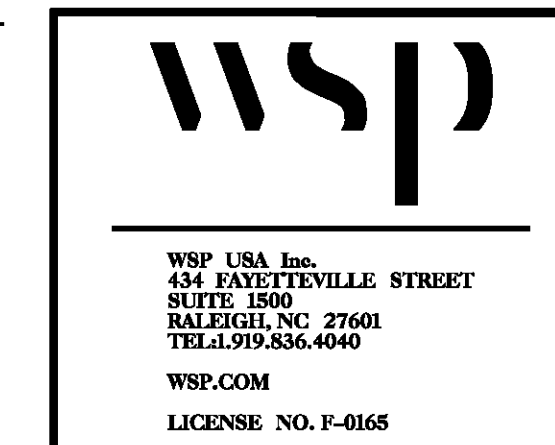
SECTION Y-Y

WING DETAILS

END BENT 1 SHOWN  
END BENT 2 SIMILAR OPPOSITE HAND

PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
STATION: 14+44.10 -L-  
SHEET 3 OF 4

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
DATE: 11/2/2017

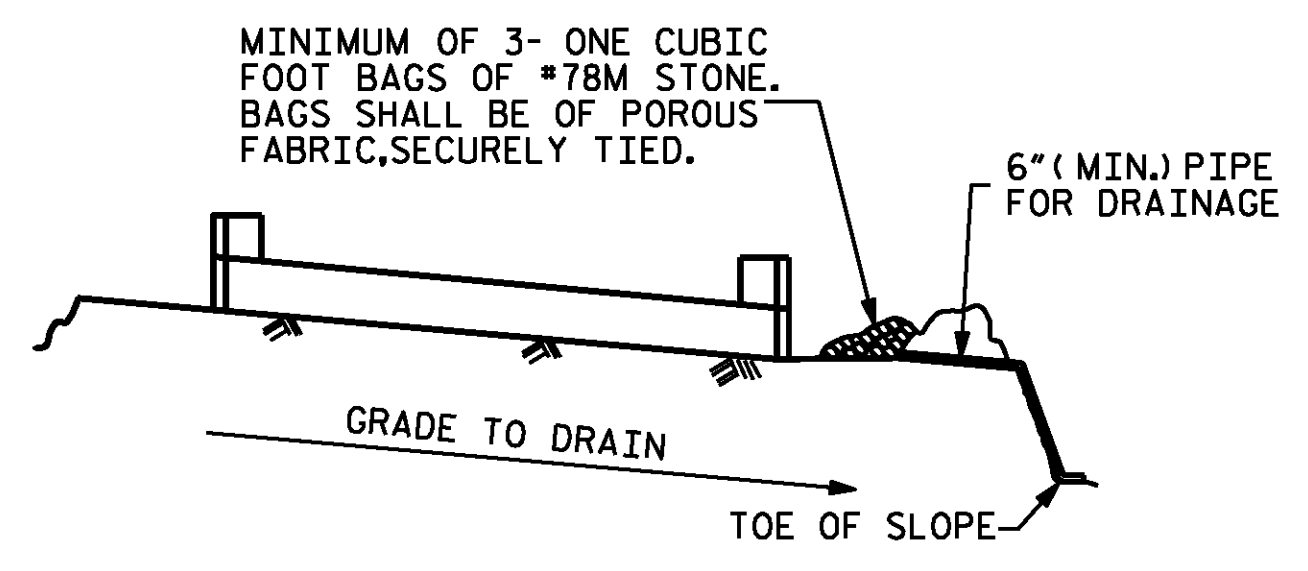


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUBSTRUCTURE  
END BENT  
WING DETAILS

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : WJH 12/11	
CHECKED BY : AAC 12/11	

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-14
1			3			TOTAL SHEETS
2			4			18

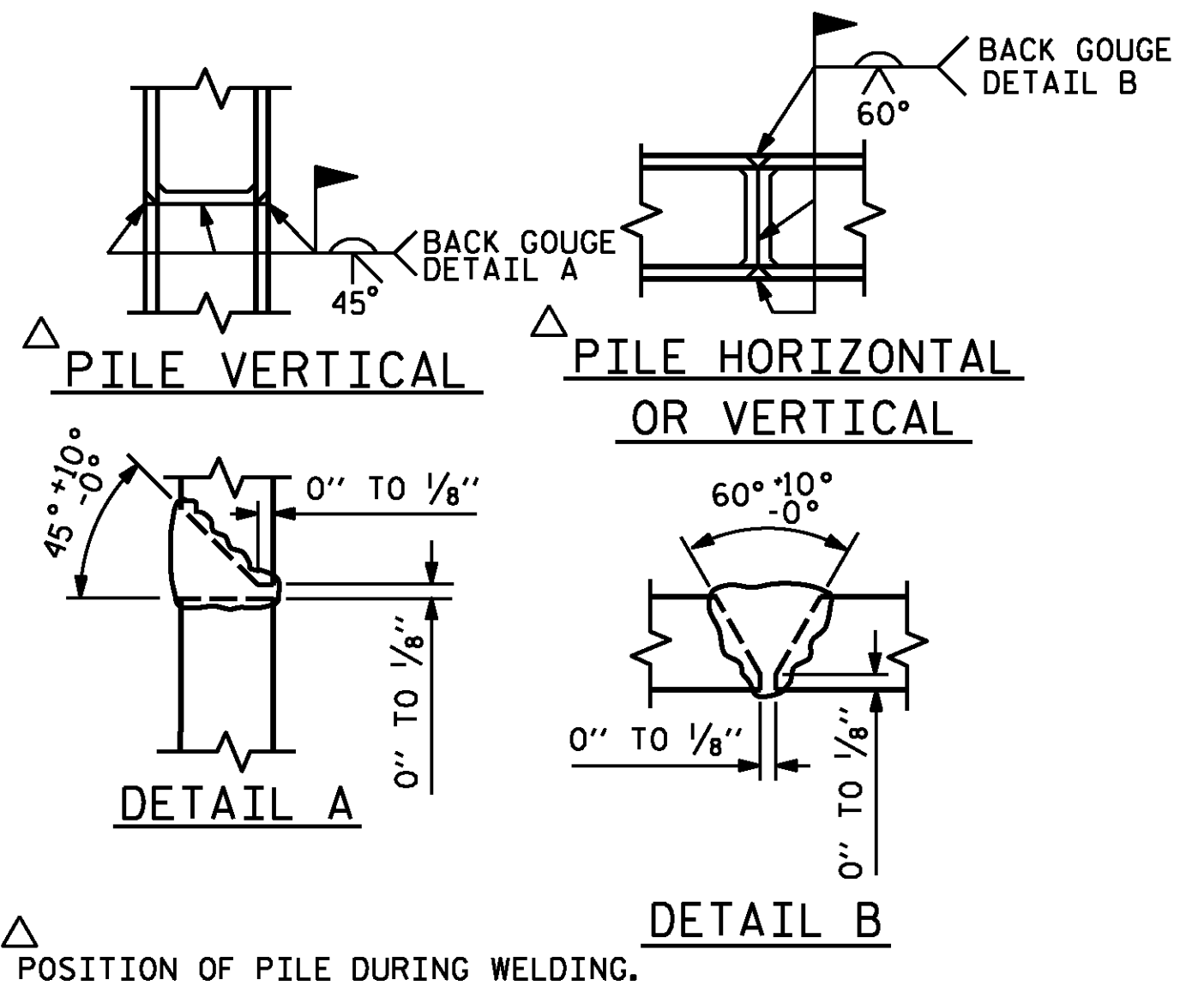


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

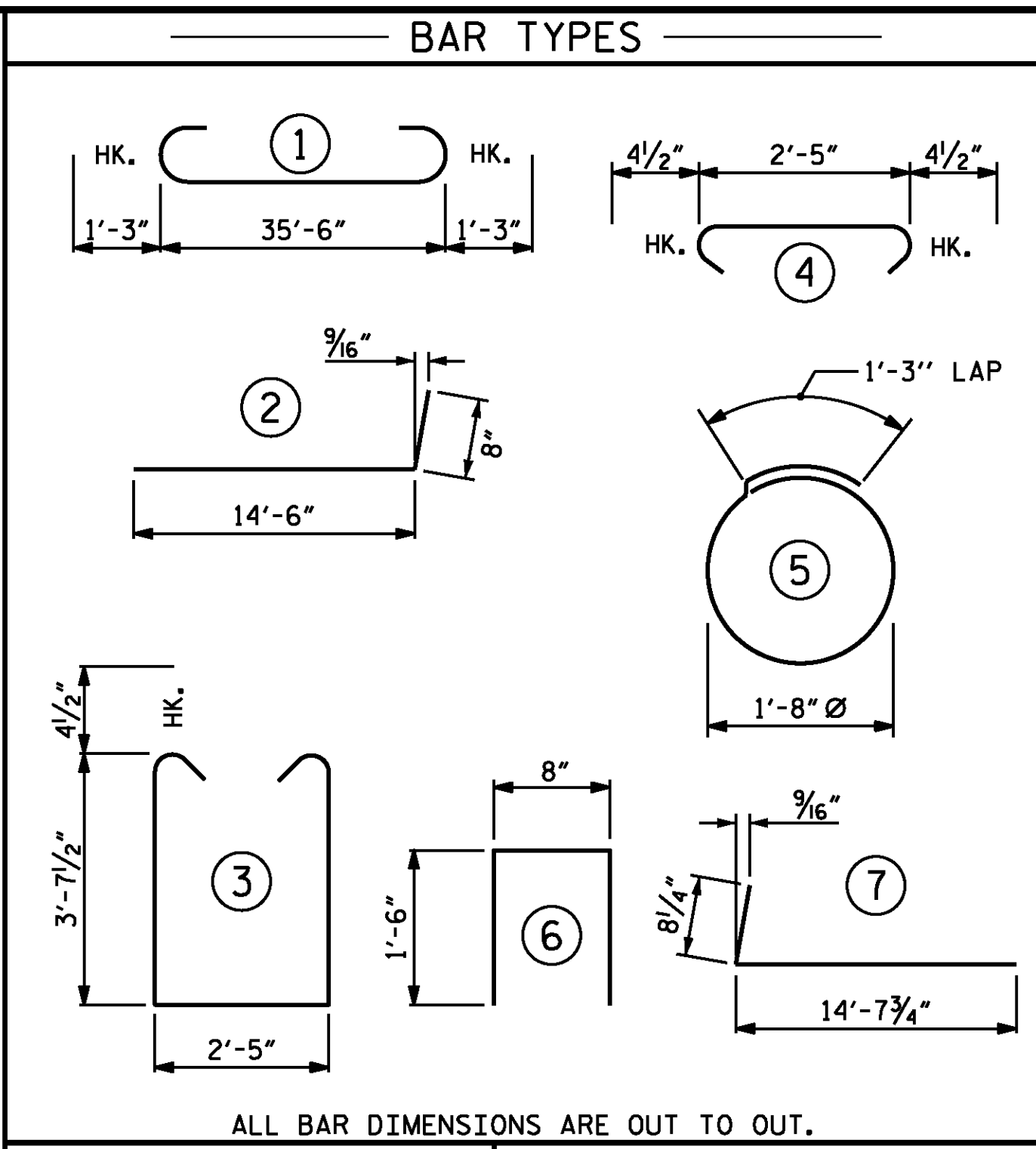
BAGGED STONE SHALL REMAIN IN PLACE UNTIL THE ENGINEER DIRECTS THAT IT BE REMOVED. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF SILT ACCUMULATIONS AT BAGGED STONE WHEN SO DIRECTED BY THE ENGINEER. BAGS SHALL BE REMOVED AND REPLACED WHENEVER THE ENGINEER DETERMINES THAT THEY HAVE DETERIORATED AND LOST THEIR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

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

**TEMPORARY DRAINAGE AT END BENT**



**PILE SPLICE DETAILS**



ALL BAR DIMENSIONS ARE OUT TO OUT.

END BENT 1		END BENT 2	
HP 14 X 73 STEEL PILES	NO: 5	HP 14 X 73 STEEL PILES	NO: 5
LIN. FT. = 100		LIN. FT. = 95	
STEEL PILE POINTS	E.A. = 5	STEEL PILE POINTS	E.A. = 5

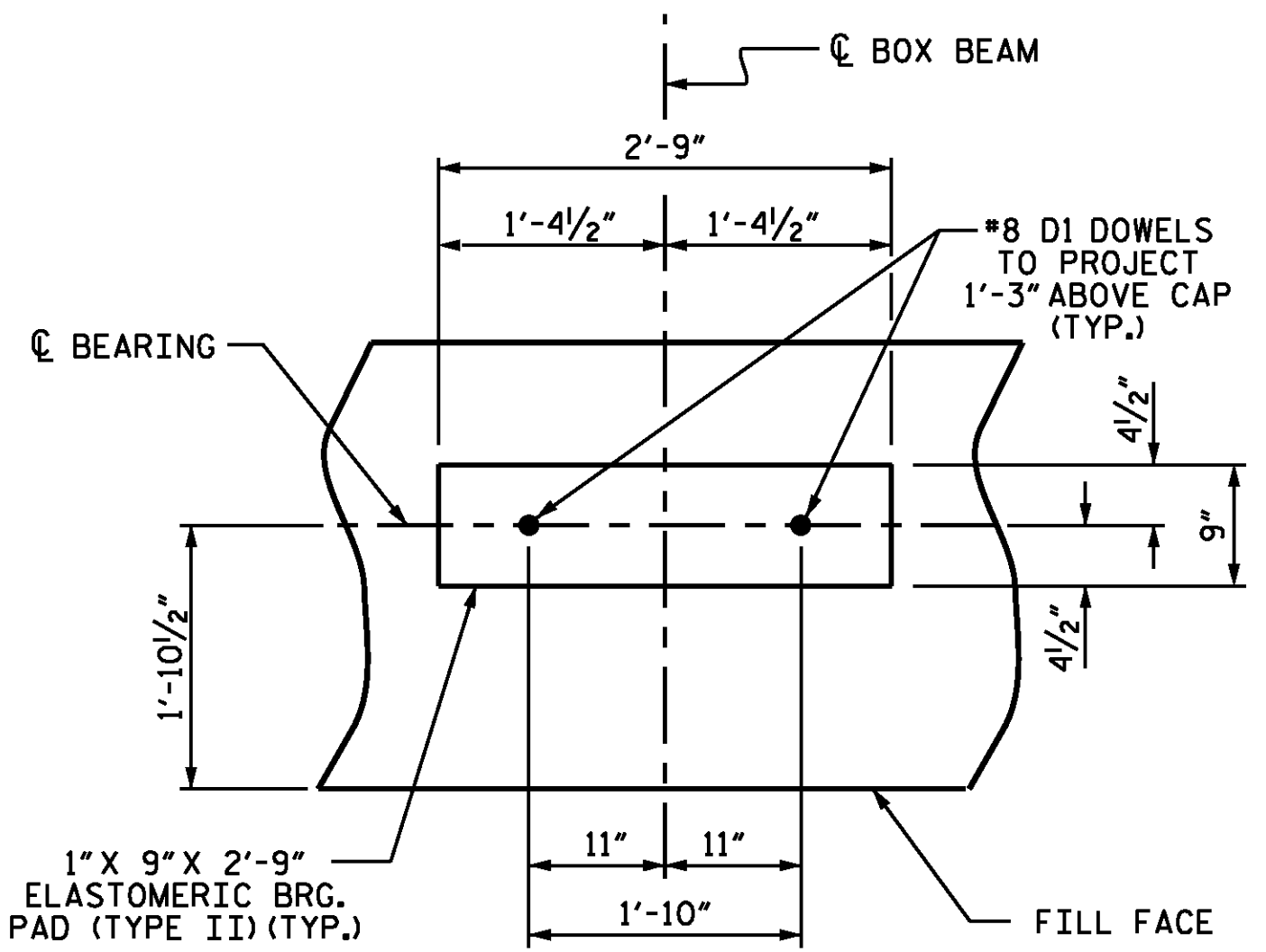
**BILL OF MATERIAL FOR ONE END BENT**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#9		38'-0"	1034
B2	28	#4	STR	19'-1"	357
B3	9	#4	STR	2'-5"	15
D1	20	#8	STR	2'-3"	120
H1	32	#6		15'-2"	729
H2	32	#6		15'-4"	737
K1	6	#4	STR	2'-10"	12
K2	12	#4	STR	19'-1"	153
K3	6	#4	STR	3'-0"	12
S1	46	#4	3	10'-5"	320
S2	46	#4	4	3'-2"	97
S3	20	#4	5	6'-6"	87
U1	30	#4	6	3'-8"	73
V1	76	#4	STR	7'-8"	389
V2	60	#4	STR	5'-10"	234

REINFORCING STEEL (FOR ONE END BENT) 4369 LBS.

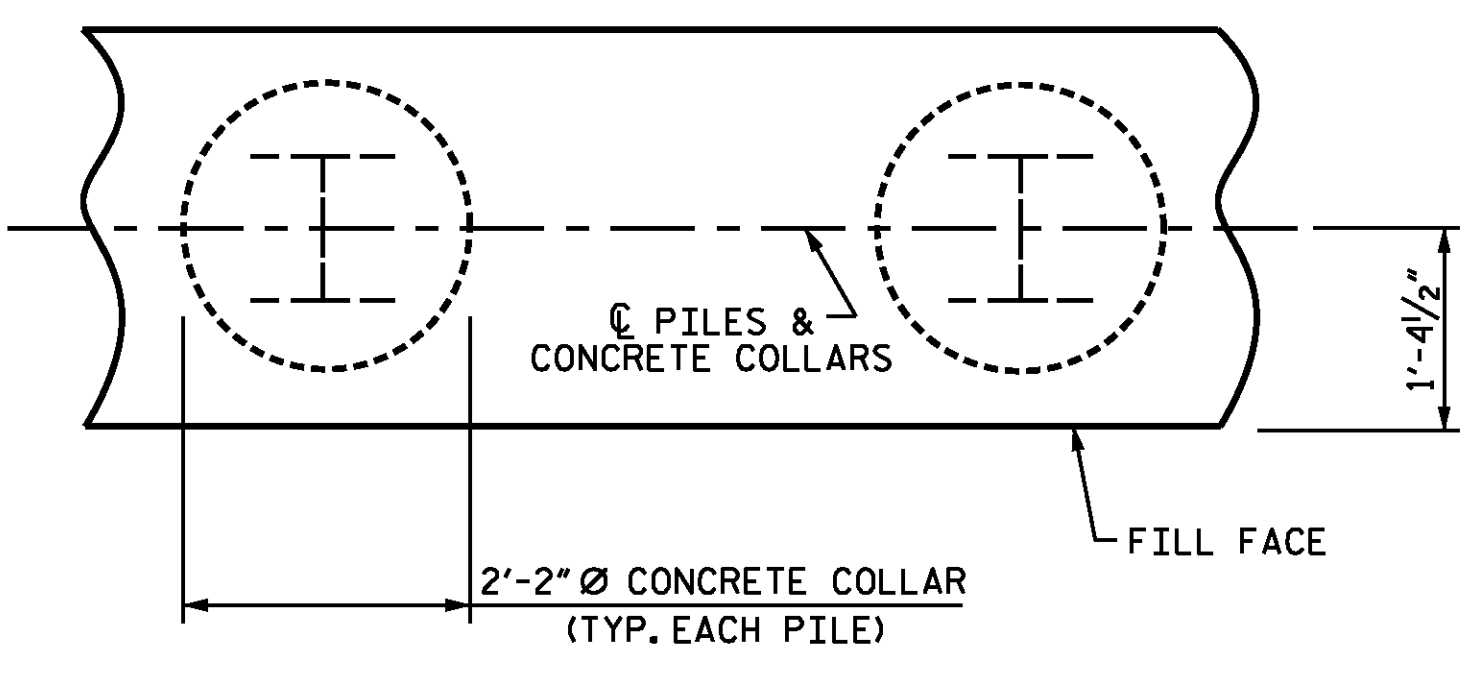
CLASS A CONCRETE BREAKDOWN (FOR ONE END BENT)

POUR #1 CAP, LOWER PART OF WINGS & COLLARS	19.7 C.Y.
POUR #2 BACKWALL & UPPER PART OF WINGS	7.5 C.Y.
<b>TOTAL CLASS A CONCRETE</b>	<b>27.2 C.Y.</b>



**DETAIL "A"**

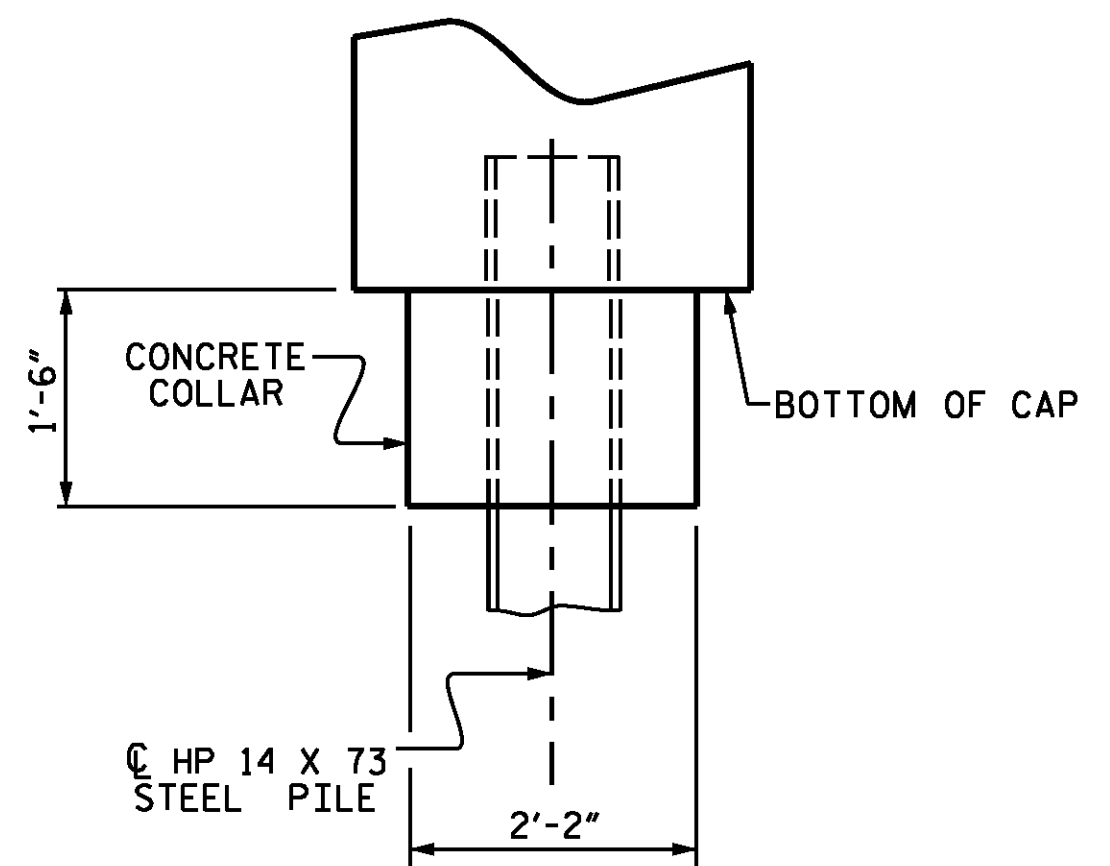
(END BENT 1 SHOWN, END BENT 2 SIMILAR BY ROTATION)



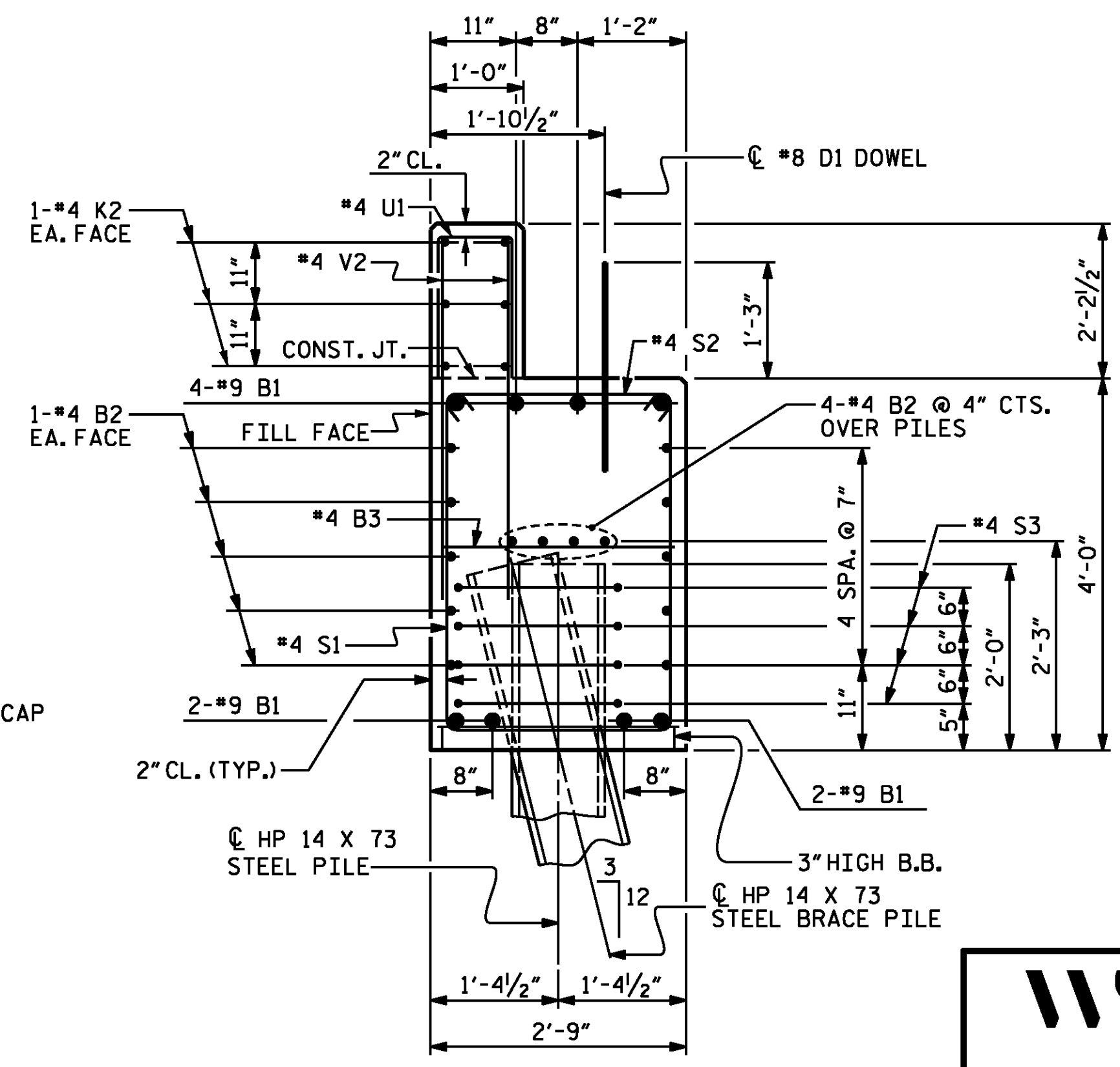
**PLAN**

**CORROSION PROTECTION FOR STEEL PILES DETAIL**

(END BENT 1 SHOWN, END BENT 2 SIMILAR BY ROTATION)



**ELEVATION**



**SECTION A-A**

(CONCRETE COLLAR NOT SHOWN FOR CLARITY. SEE "CORROSION PROTECTION FOR STEEL PILES DETAIL.")

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

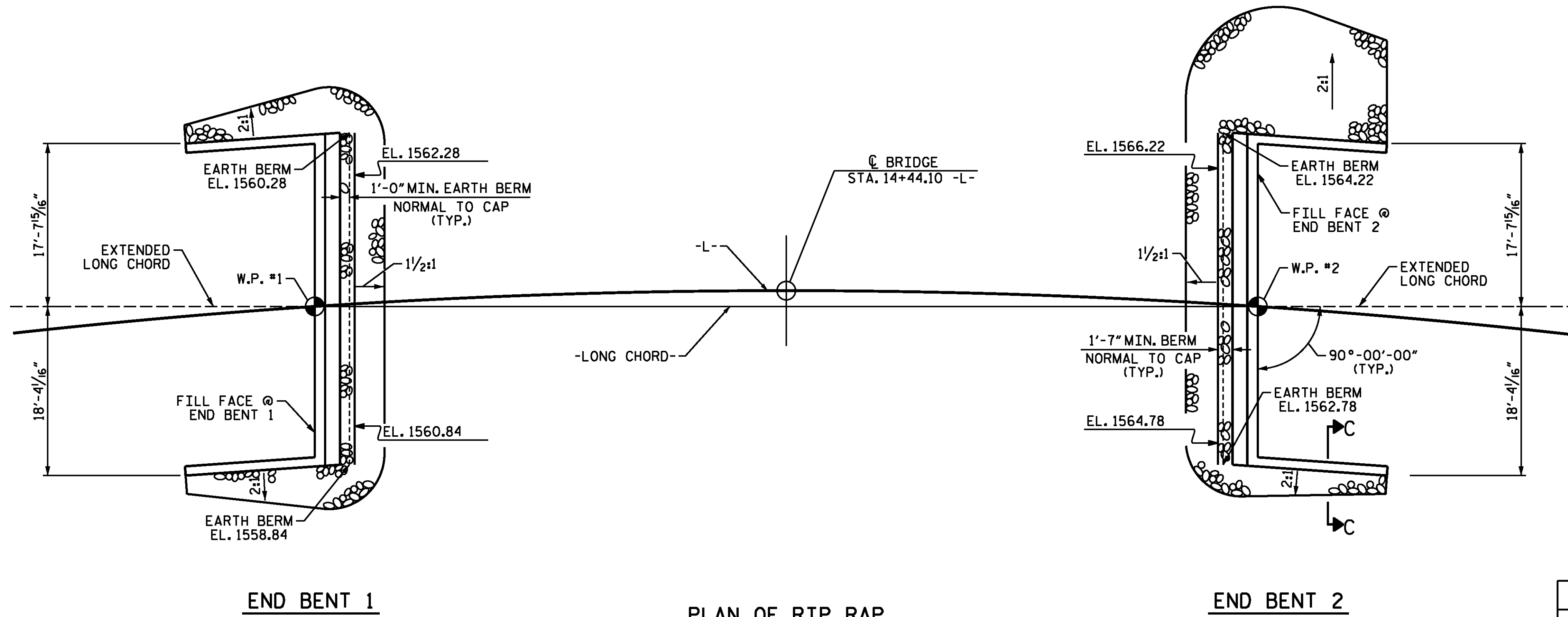
**SUBSTRUCTURE  
 END BENTS 1 & 2  
 DETAILS**

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-15
1			3			TOTAL SHEETS
2			4			18

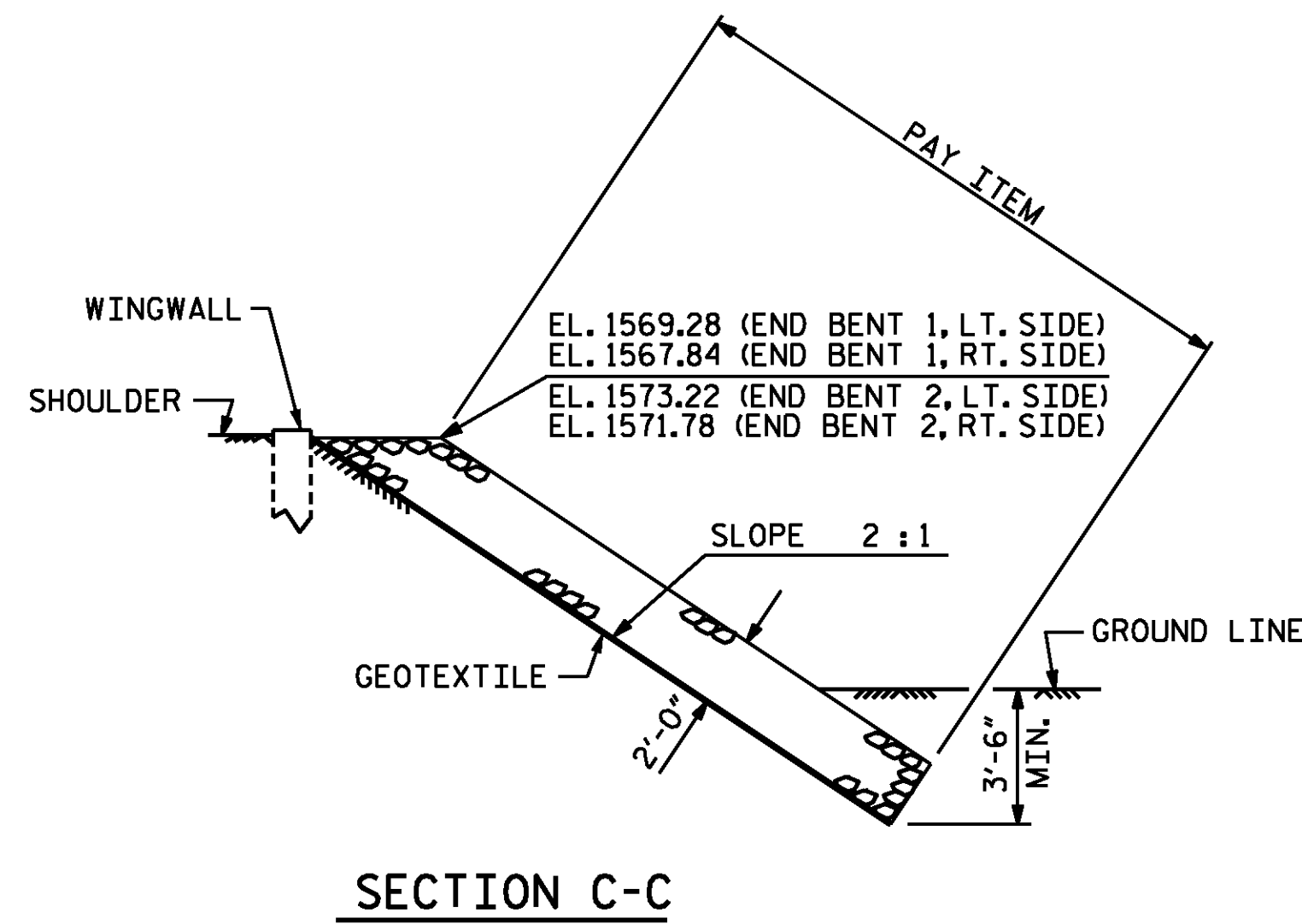
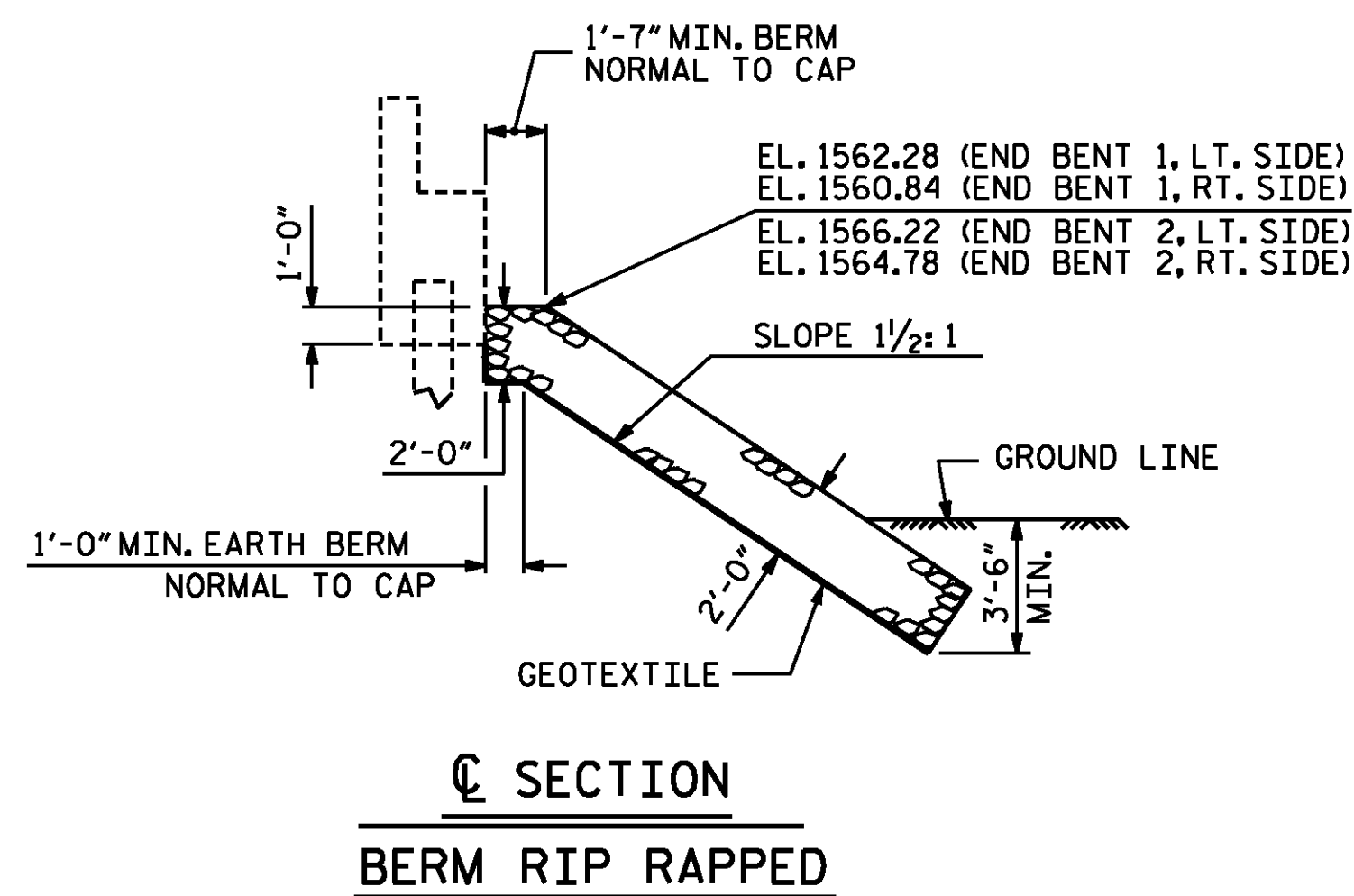
DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
 DATE: 11/2/2017

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : WJH 12/11	
CHECKED BY : AAC 12/11	

NOTES :  
FOR BERM WIDTH DIMENSIONS, SEE GENERAL DRAWING.

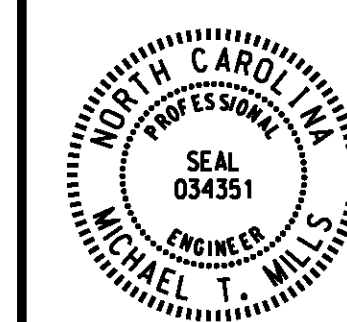
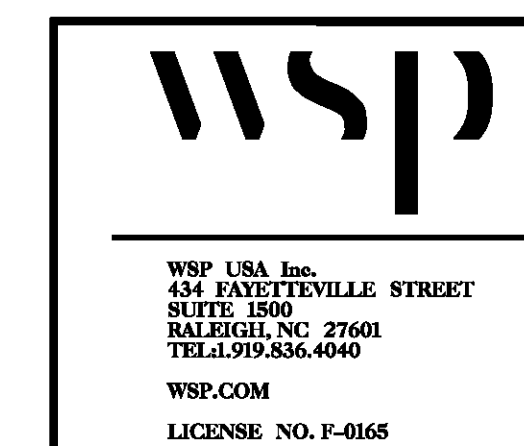


ESTIMATED QUANTITIES		
BRIDGE @ STA. 14+44.10 -L-	RIP RAP CLASS II (2'-0" THICK)	GEOTEXTILE FOR DRAINAGE
	TONS	SQUARE YARDS
END BENT 1	108	120
END BENT 2	112	124



PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
STATION: 14+44.10 -L-

DESIGN-ENGINEER OF RECORD:  
*Michael Mills*  
DATE: 11/2/2017

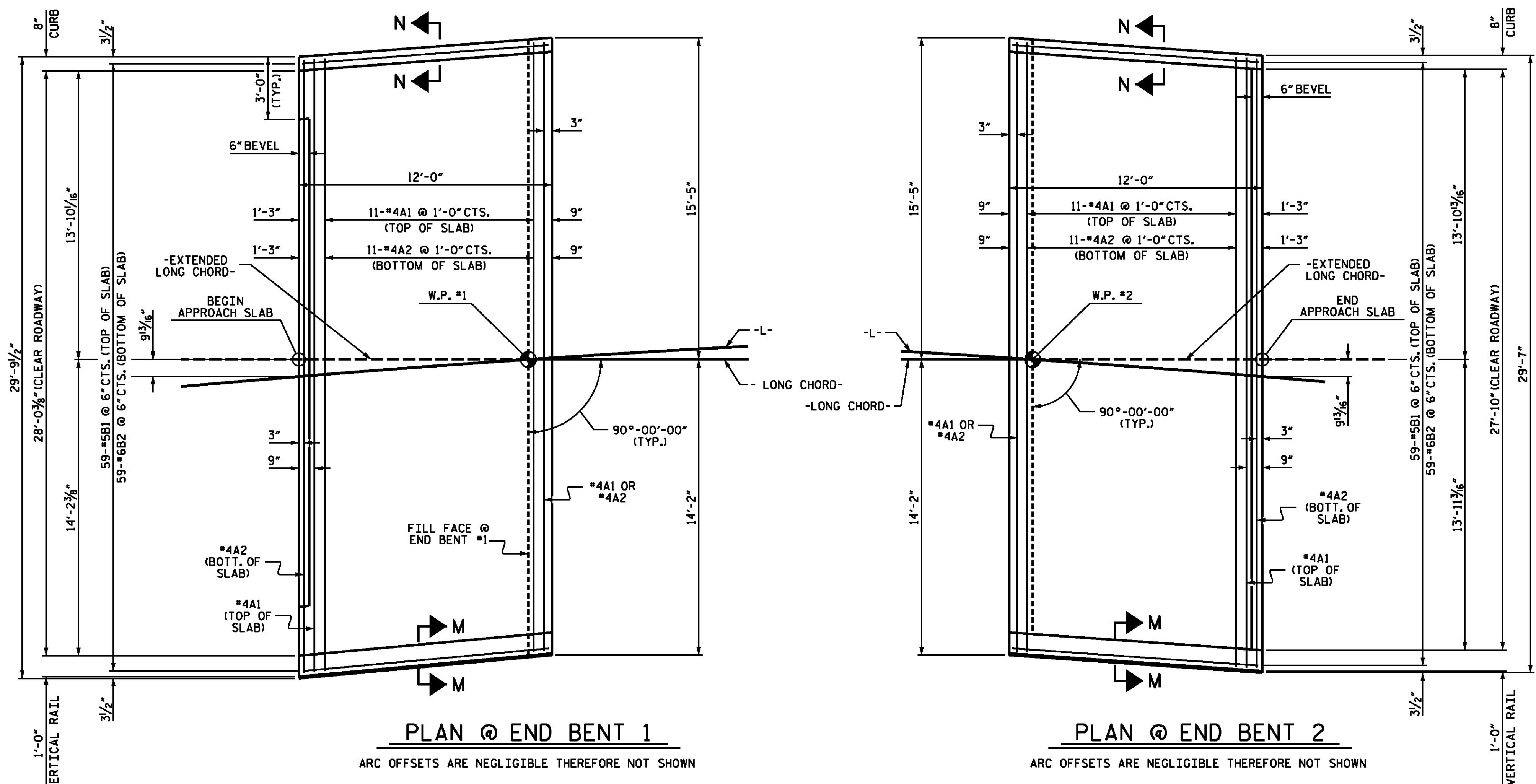


STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
STANDARD  
RIP RAP DETAILS

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-16
1			3			TOTAL SHEETS
2			4			18

ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : REK 1/84	REV. 5/1/06R TLA/GM
CHECKED BY : RDU 1/84	REV. 10/1/11 MAA/GM
	REV. 12/21/11 MAA/GM





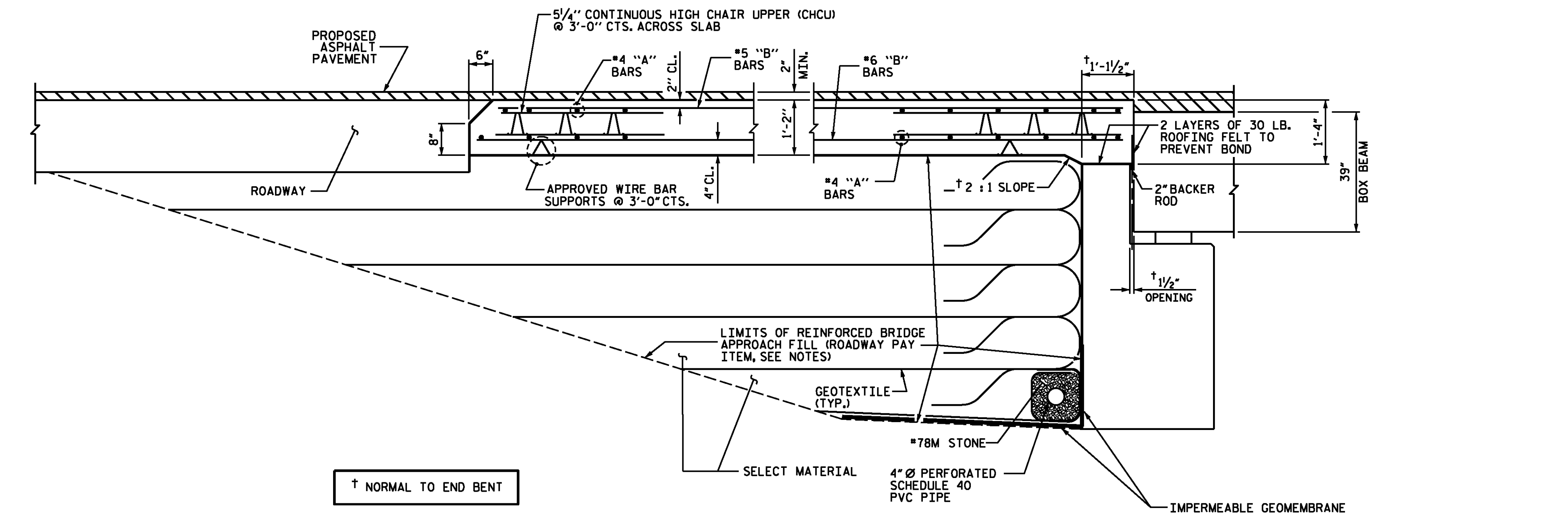
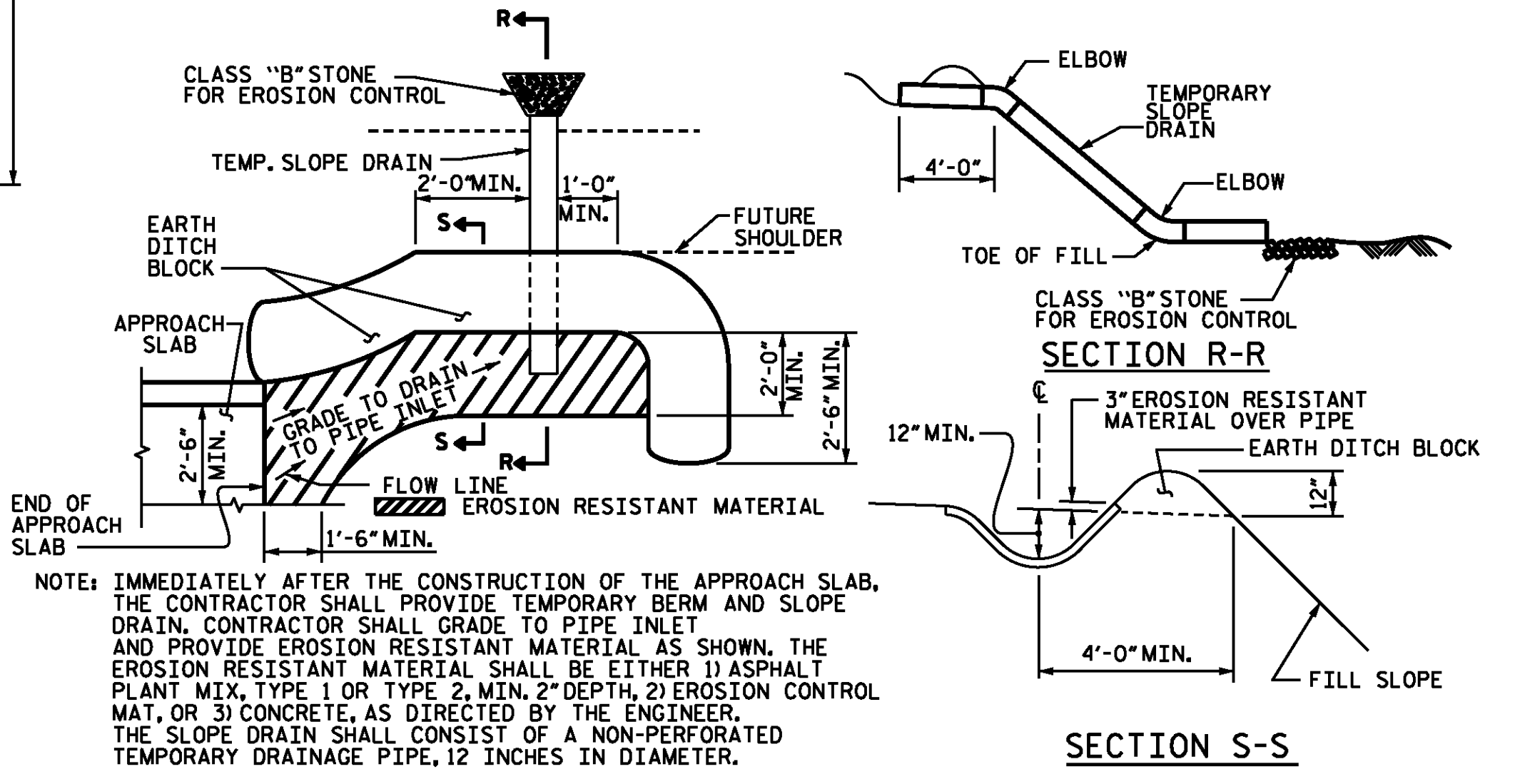
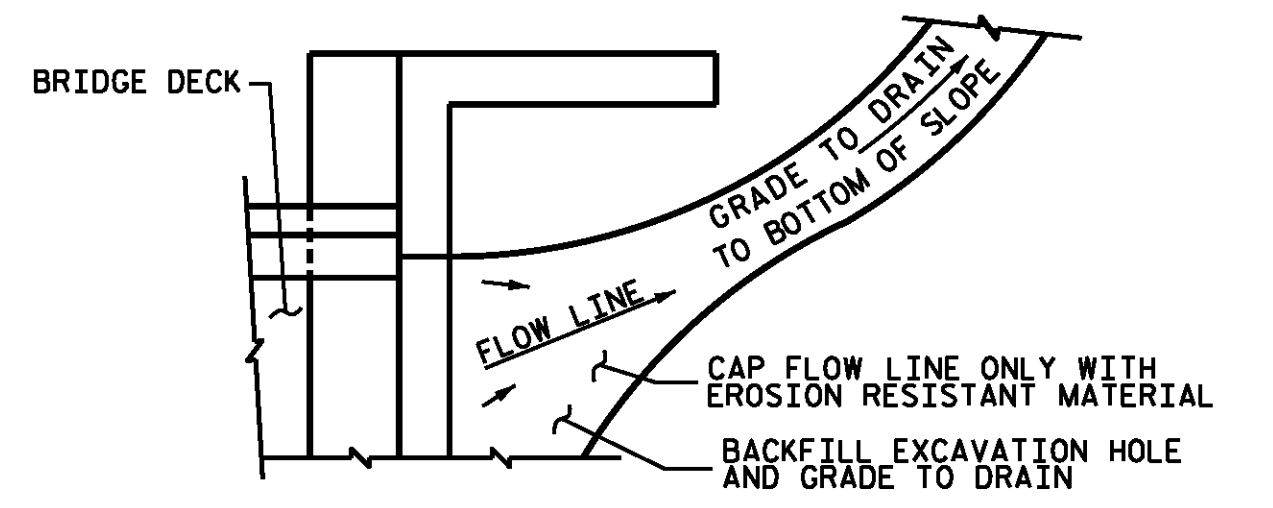
FOR SECTIONS N-N AND M-M, SEE SHEET 2 OF 2.

**NOTES**

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

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

APPROACH SLAB GROOVING IS NOT REQUIRED.



ASSEMBLED BY : C. HOWARD	DATE : 8/14
CHECKED BY : M. MILLS	DATE : 8/14
DRAWN BY : MAA	11/11
CHECKED BY : AAC	11/11

DESIGN ENGINEER OF RECORD:  
*Michael Mills*  
DATE: 11/2/2017

**wsp**  
WSP USA Inc.  
434 PAVETTAVILLE STREET  
SUITE 1500  
RALEIGH, NC 27601  
TEL: 919.836.4040  
WSP.COM  
LICENSE NO. R-0165

STATE OF NORTH CAROLINA  
PROFESSIONAL ENGINEER  
SEAL 034351  
MICHAEL T. MILLS

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

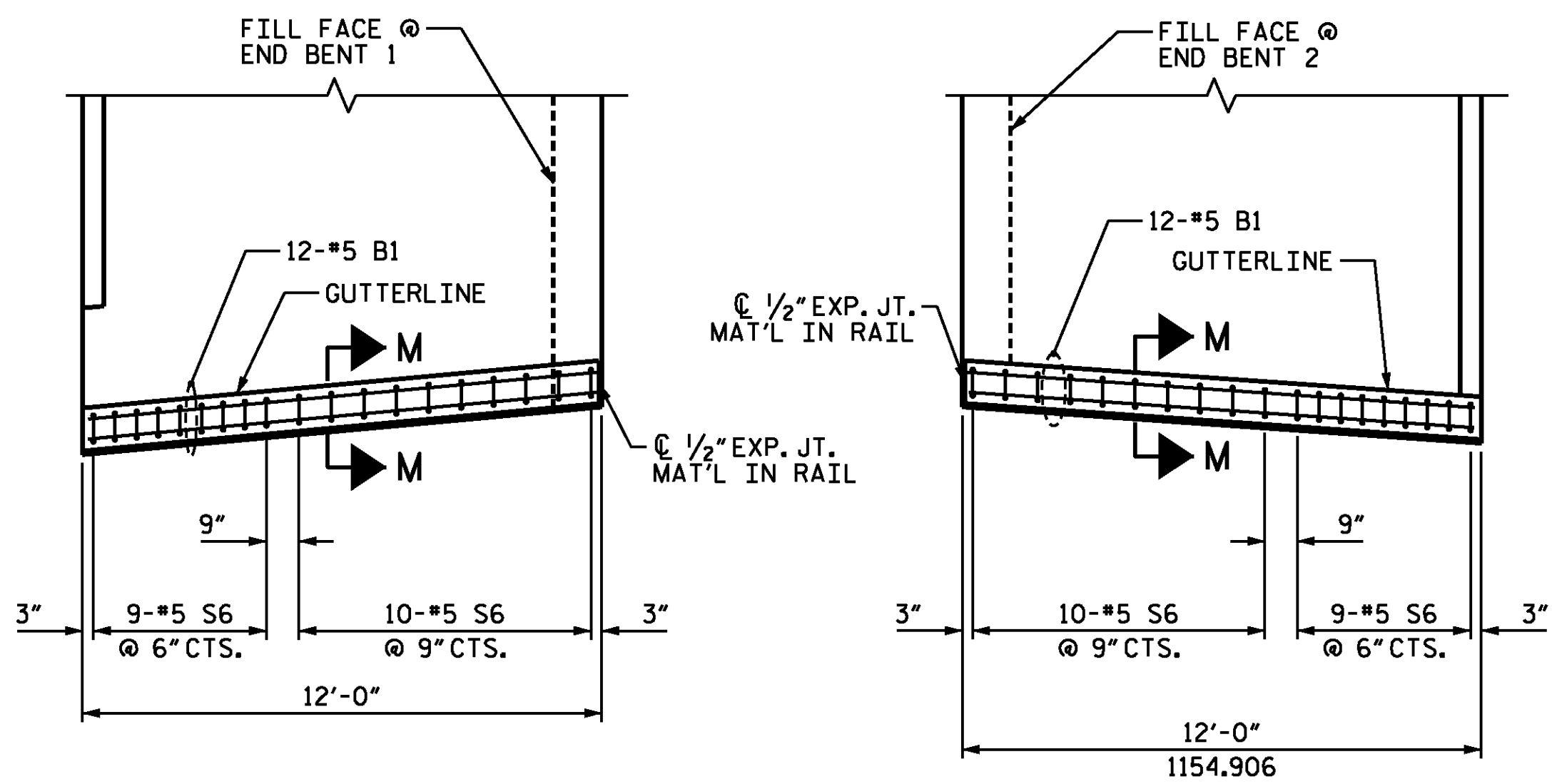
PROJECT NO. 17BP.14.R.87  
CHEROKEE COUNTY  
STATION: 14+44.10 -L-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (SUB-REGIONAL TIER) 90° SKEW

REVISIONS						SHEET NO. S-17
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS 18
2			4			



PLAN @ END BENT 1

PLAN @ END BENT 2

BILL OF MATERIAL					
VERTICAL CONCRETE BARRIER RAIL ON APPROACH SLAB AT EB 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B1	12	#5	STR	11'-2"	140
*S6	19	#5	1	7'-2"	142
S7	19	#5	2	6'-10"	135
REINFORCING STEEL					LBS. 282
* EPOXY COATED REINFORCING STEEL					LBS. 135

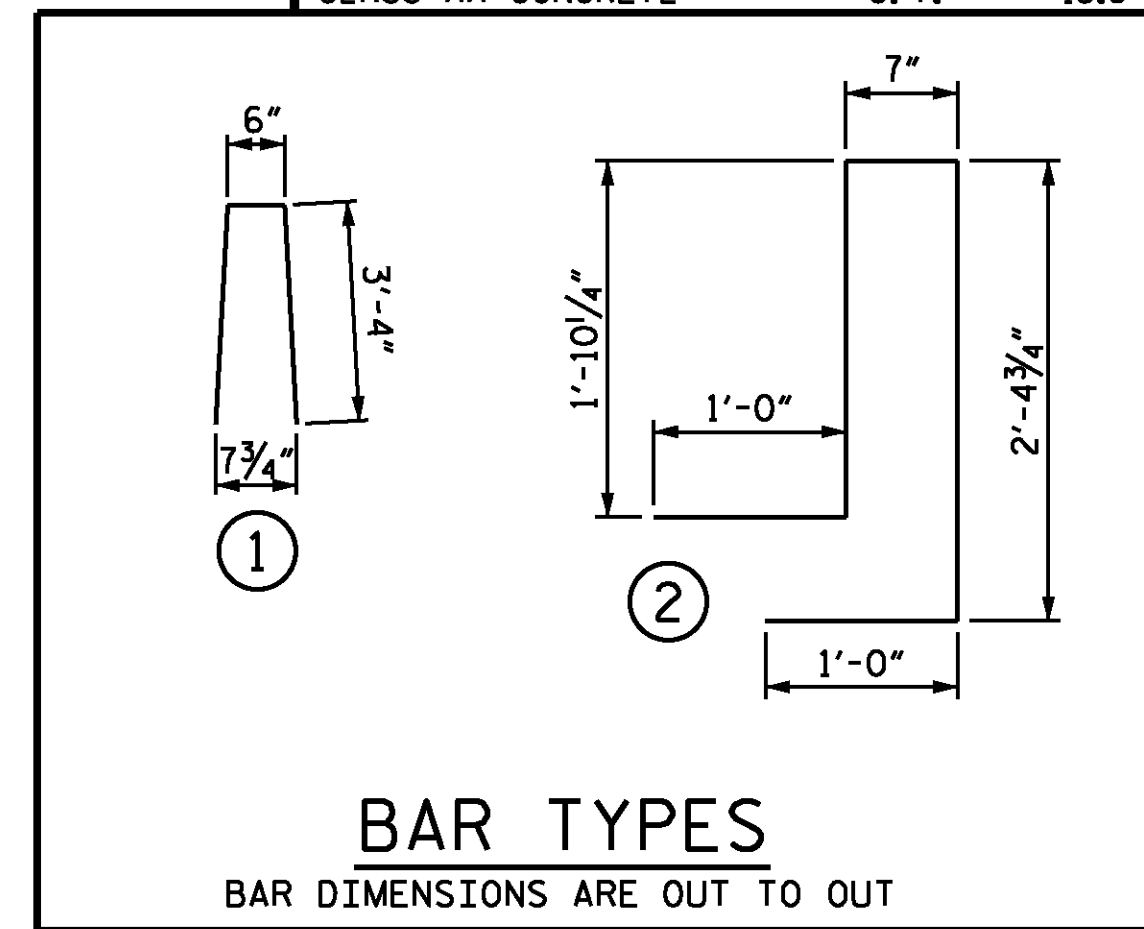
BILL OF MATERIAL					
VERTICAL CONCRETE BARRIER RAIL ON APPROACH SLAB AT EB 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*B1	12	#5	STR	11'-2"	140
*S6	19	#5	1	7'-2"	142
S7	19	#5	2	6'-10"	135
REINFORCING STEEL					LBS. 282
* EPOXY COATED REINFORCING STEEL					LBS. 135

NOTE: APPROACH SLAB BARRIER RAILS TOTAL VERTICAL CONCRETE BARRIER RAIL LENGTH AND CLASS AA CONCRETE CUBIC YARDS ARE INCLUDED IN THE "BILL OF MATERIAL FOR VERTICAL CONCRETE BARRIER RAIL" ON SHEET S-10.

BILL OF MATERIAL					
APPROACH SLAB AT EB 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	13	#4	STR	28'-10"	250
A2	13	#4	STR	28'-10"	250
*B1	59	#5	STR	11'-2"	687
B2	59	#6	STR	11'-8"	1034
REINFORCING STEEL					LBS. 1284
* EPOXY COATED REINFORCING STEEL					LBS. 937
CLASS AA CONCRETE					C. Y. 15.6

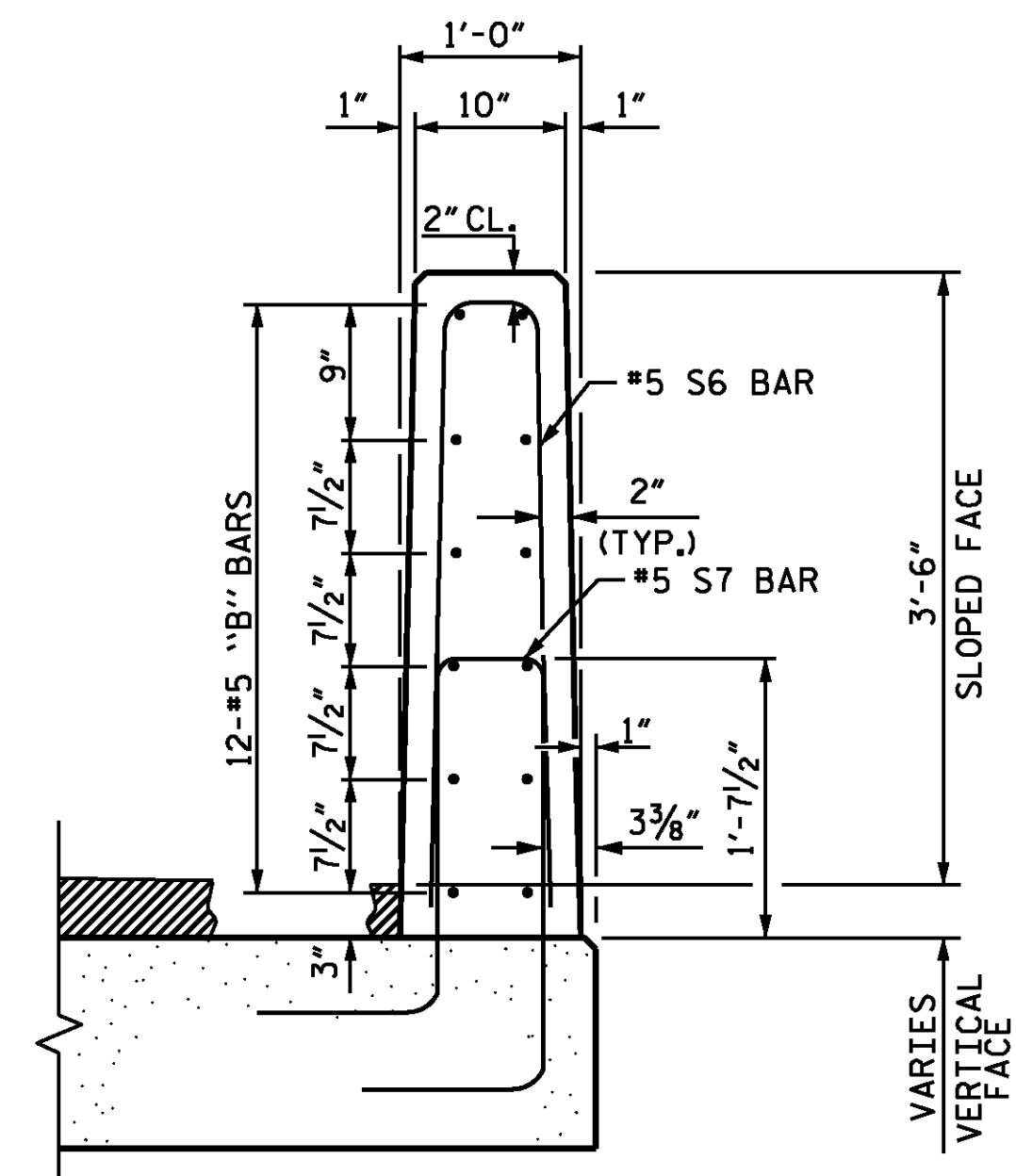
BILL OF MATERIAL					
APPROACH SLAB AT EB 2					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
*A1	13	#4	STR	28'-10"	250
A2	13	#4	STR	28'-10"	250
*B1	59	#5	STR	11'-2"	687
B2	59	#6	STR	11'-8"	1034
REINFORCING STEEL					LBS. 1284
* EPOXY COATED REINFORCING STEEL					LBS. 937
CLASS AA CONCRETE					C. Y. 15.6



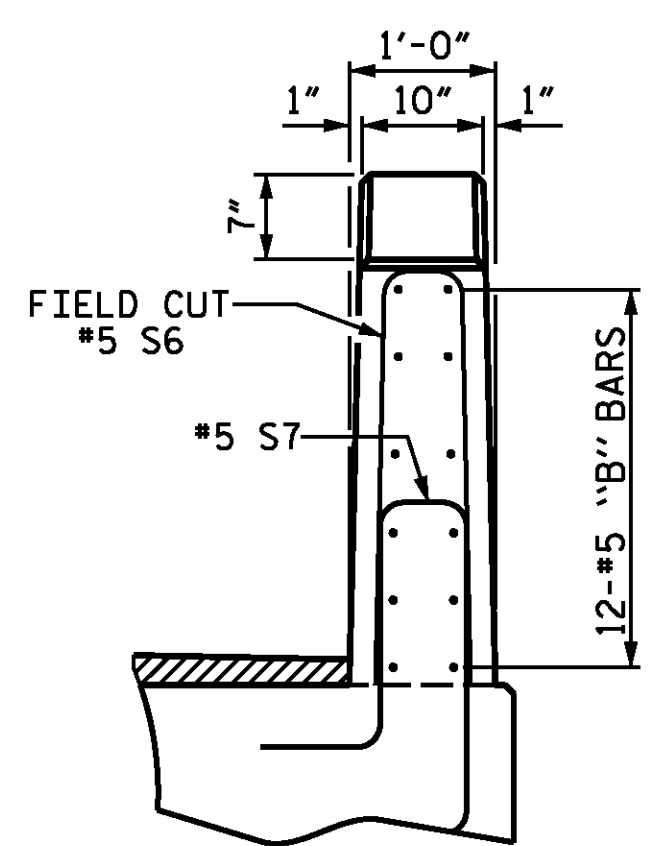
BAR TYPES

BAR DIMENSIONS ARE OUT TO OUT

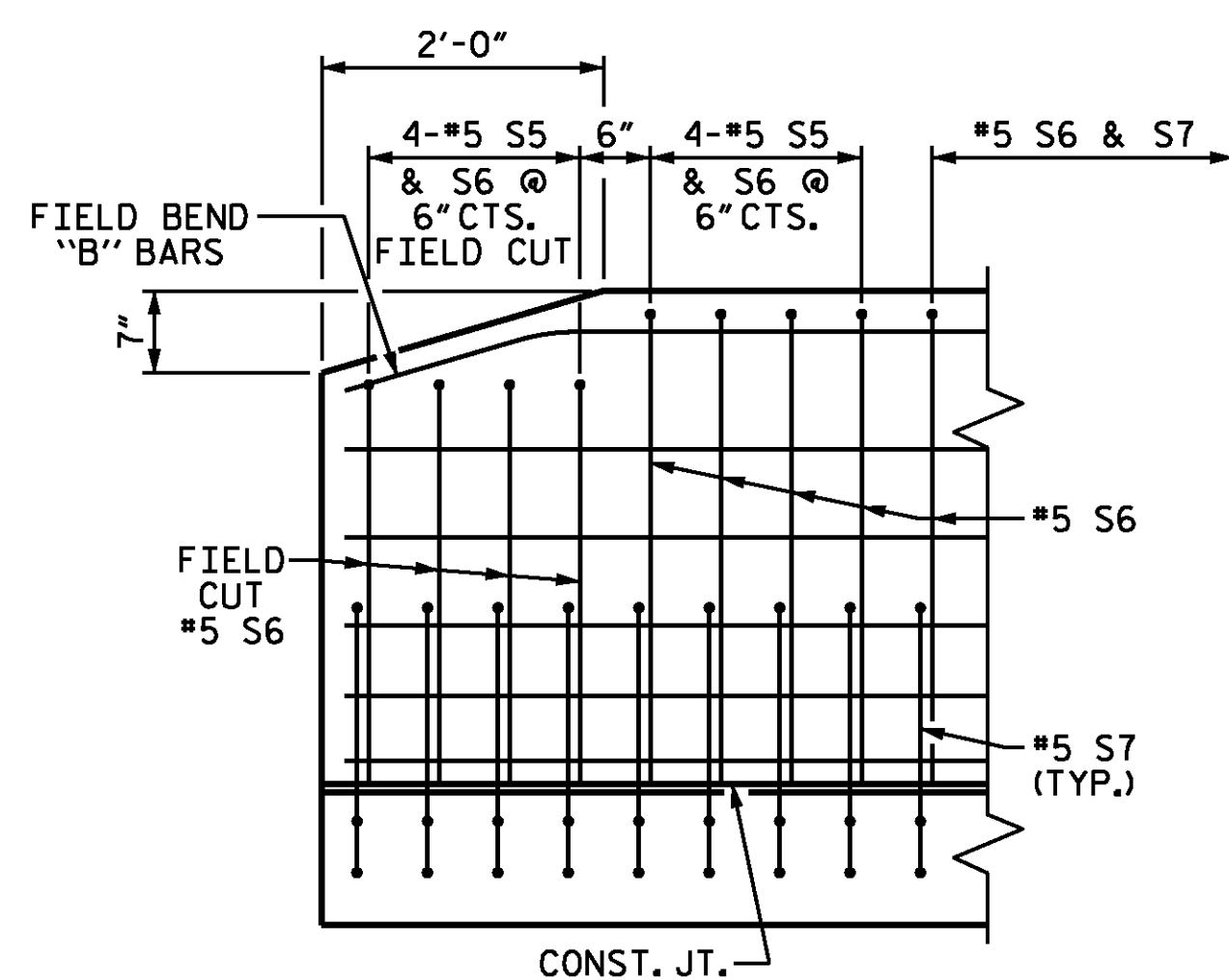
SPLICE LENGTHS		
BAR SIZE	EPOXY COATED	UNCOATED
#4	2'-0"	1'-9"
#5	2'-6"	2'-2"
#6	3'-10"	2'-7"



SECTION M-M

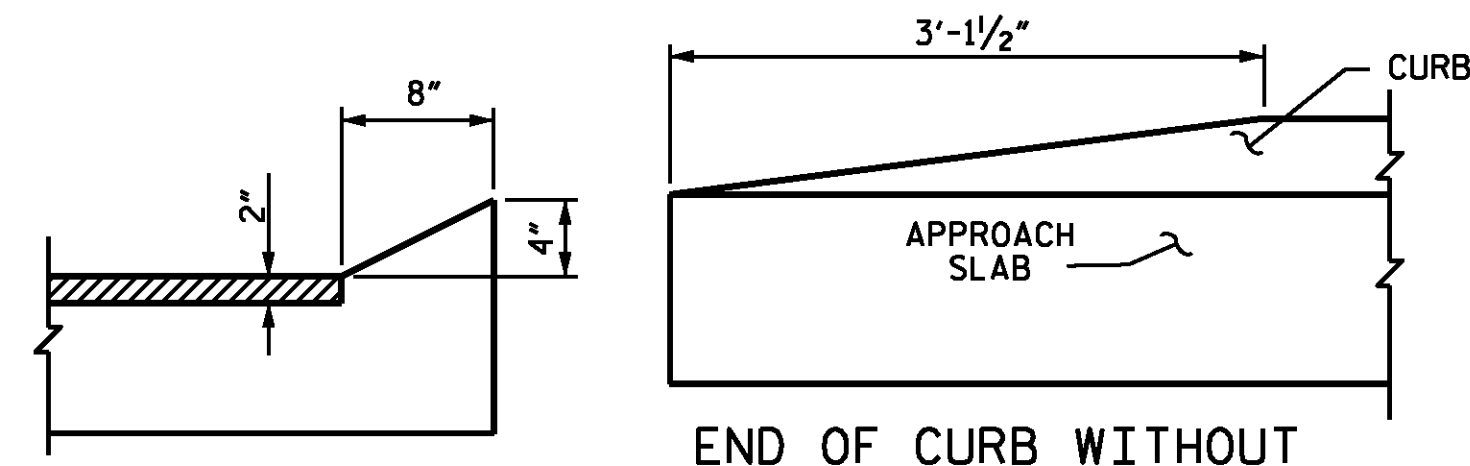


RIGHT END VIEW



SIDE VIEW

END OF RAIL DETAILS



SECTION N-N

END OF CURB WITHOUT SHOULDER BERM GUTTER

CURB DETAILS

VERTICAL CONCRETE BARRIER RAIL DETAILS

PROJECT NO. 17BP.14.R.87  
 CHEROKEE COUNTY  
 STATION: 14+44.10 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 BRIDGE APPROACH SLAB FOR PRESTRESSED CONCRETE BOX BEAM UNIT (SUB-REGIONAL TIER)

DESIGN-ENGINEER OF RECORD:  
 Nicholas Pierce  
 DATE: 11/3/2017

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

DRAWN BY: M.J. OSTRISHKO DATE: 01/2015  
 CHECKED BY: N.A. PIERCE DATE: 01/2015

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



## 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.

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