

43+50 44+00 44+50 45+00 45+50 46+00 46+50

**GENERAL NOTES**

ASSUMED LIVE LOAD = HS 20 OR ALTERNATE LOADING, EXCEPT THAT THE GIRDERS HAVE BEEN DESIGNED FOR HS-25.

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

THIS BRIDGE HAS BEEN DESIGNED BY STRENGTH DESIGN METHOD AS SPECIFIED IN AASHTO SPECIFICATIONS.

ALL STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50W.

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

THE EXISTING STRUCTURE CONSISTING OF CONTINUOUS COMPOSITE SPANS (1 @ 118'-6" & 1 @ 119'-6") WITH A CLEAR ROADWAY OF 64' AND A REINFORCED CONCRETE FLOOR ON CONTINUOUS STEEL PLATE GIRDERS ON END BENTS OF REINFORCED CONCRETE CAPS W/ PILES AND AN INT. BENT OF REINFORCED CONCRETE CAP ON COLUMNS AND PILE FOOTINGS SHALL BE REMOVED. (BOTH END BENTS WILL BE COMPLETELY REMOVED AND ONLY THE CAP OF THE INTERIOR BENT WILL BE REMOVED.)

THE SUBSTRUCTURE OF THE EXISTING BRIDGE INDICATED ON THE PLANS IS FROM THE BEST INFORMATION AVAILABLE. SINCE 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 THE EXISTING BRIDGE SUBSTRUCTURE SHOWN ON THE PLANS AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

FOR ADDITIONAL GENERAL NOTES, SEE SHEET S-3.

(+) 1.7788% (-) 1.8886%  
 P.V.I. 45+00.00  
 ELEV. 253.850  
 $V_c$  331.00'  
 -VERTICAL CURVE DATA-  
 -L- (MORGANTON RD.)

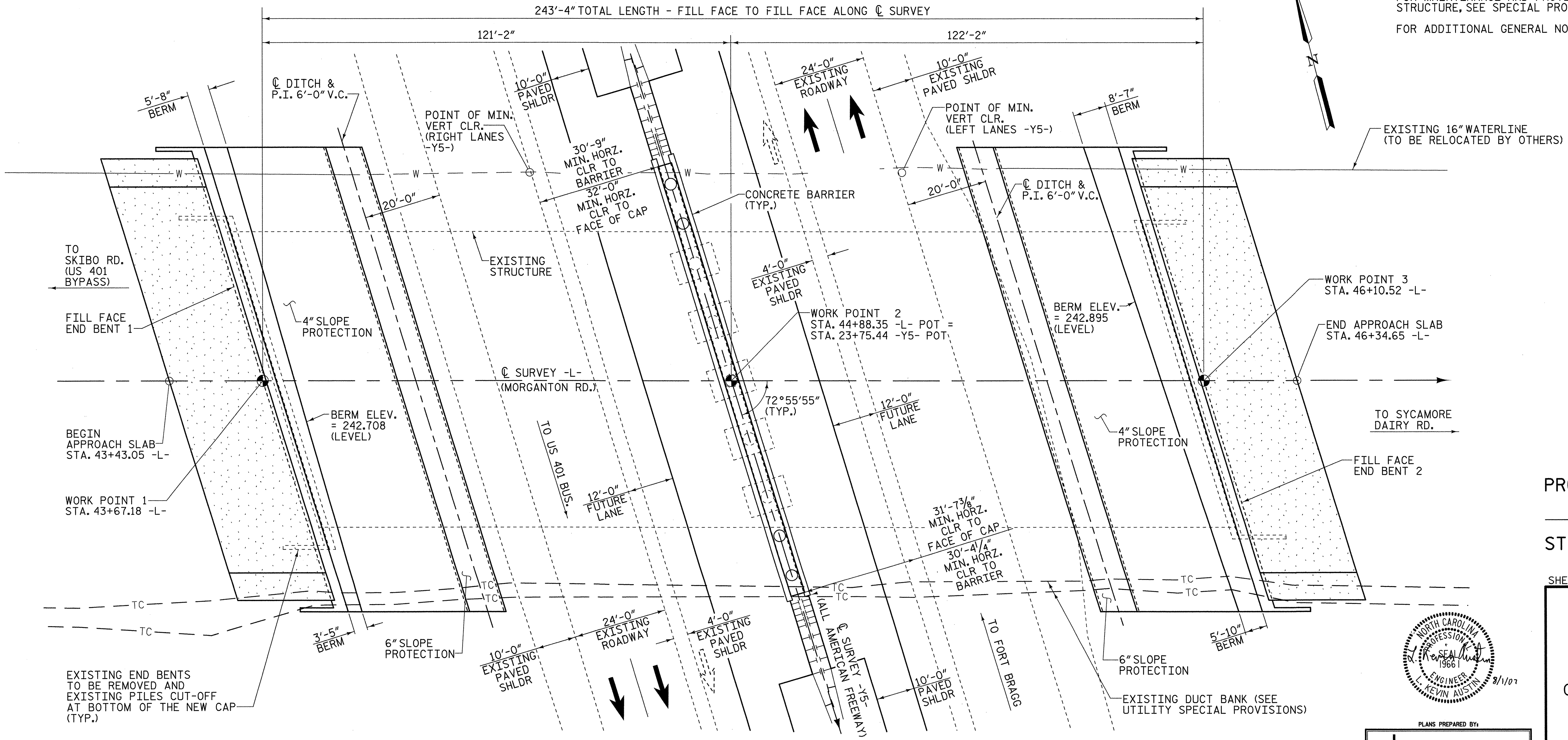
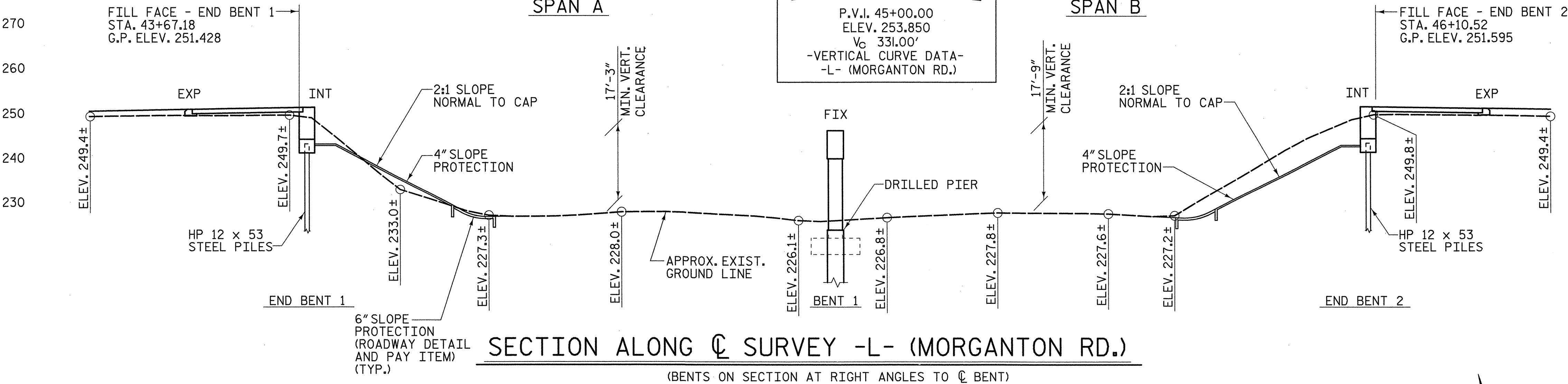
**SPAN A**

**SPAN B**

**SECTION ALONG  $\bar{C}$  SURVEY -L- (MORGANTON RD.)**

(BENTS ON SECTION AT RIGHT ANGLES TO  $\bar{C}$  BENT)

243'-4" TOTAL LENGTH - FILL FACE TO FILL FACE ALONG  $\bar{C}$  SURVEY



**PLAN**

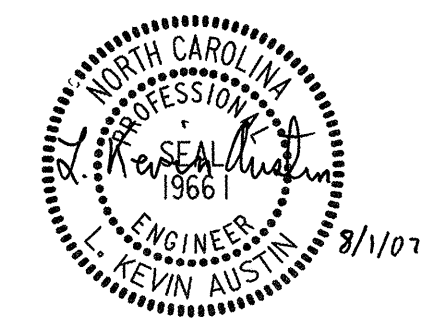
(NOTE: PILES NOT SHOWN FOR CLARITY)

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-  
23+75.44 -Y5-

SHEET 1 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

GENERAL DRAWING FOR  
 BRIDGE ON MORGANTON RD.  
 OVER ALL AMERICAN FREEWAY  
 BETWEEN SKIBO RD. AND  
 SYCAMORE DAIRY RD.

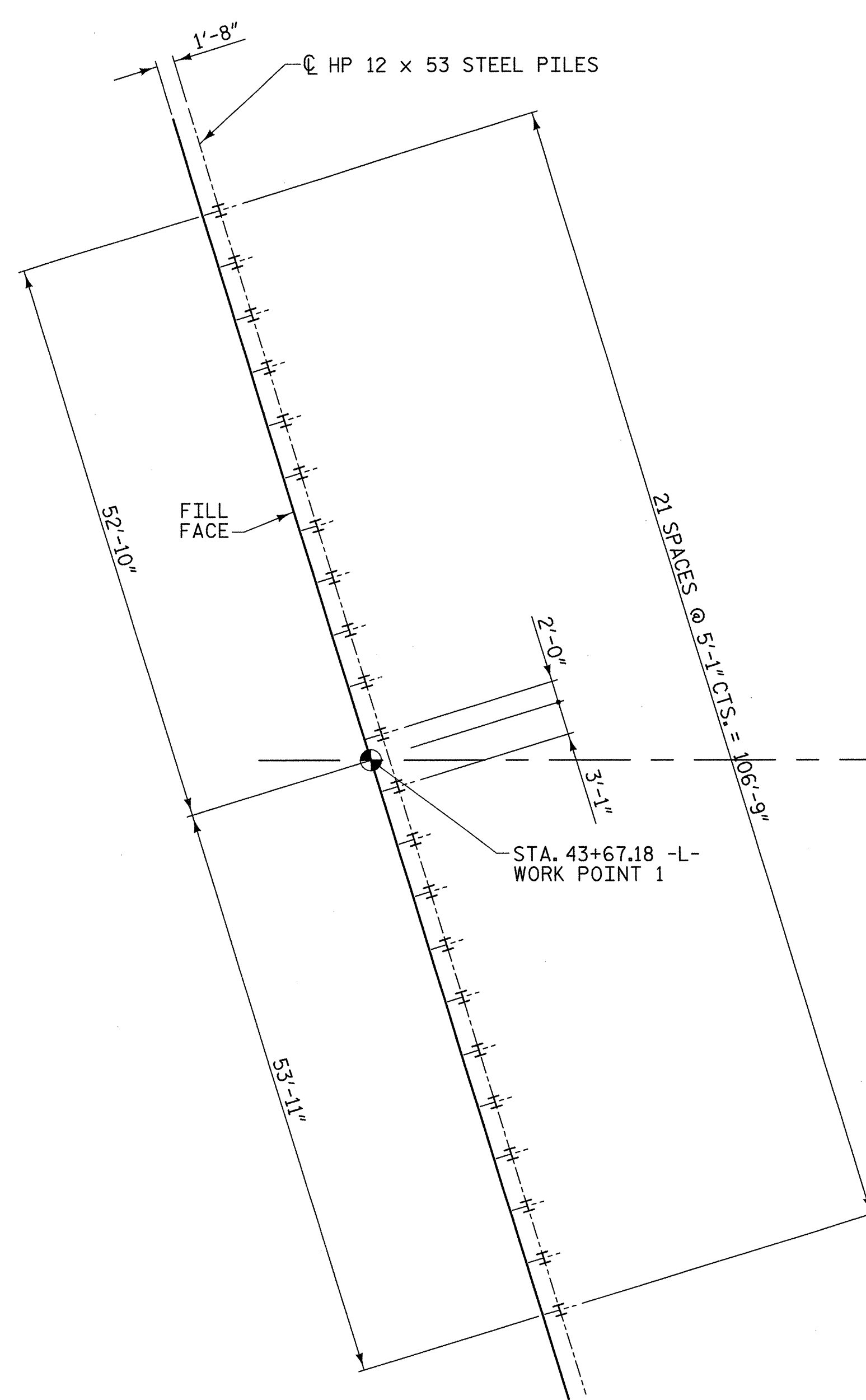


PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 P.O. Box 33127  
 Raleigh, N.C. 27636  
 (919) 851-1111  
 (919) 851-1918 (FAX)  
 WWW.MULKEYINC.COM

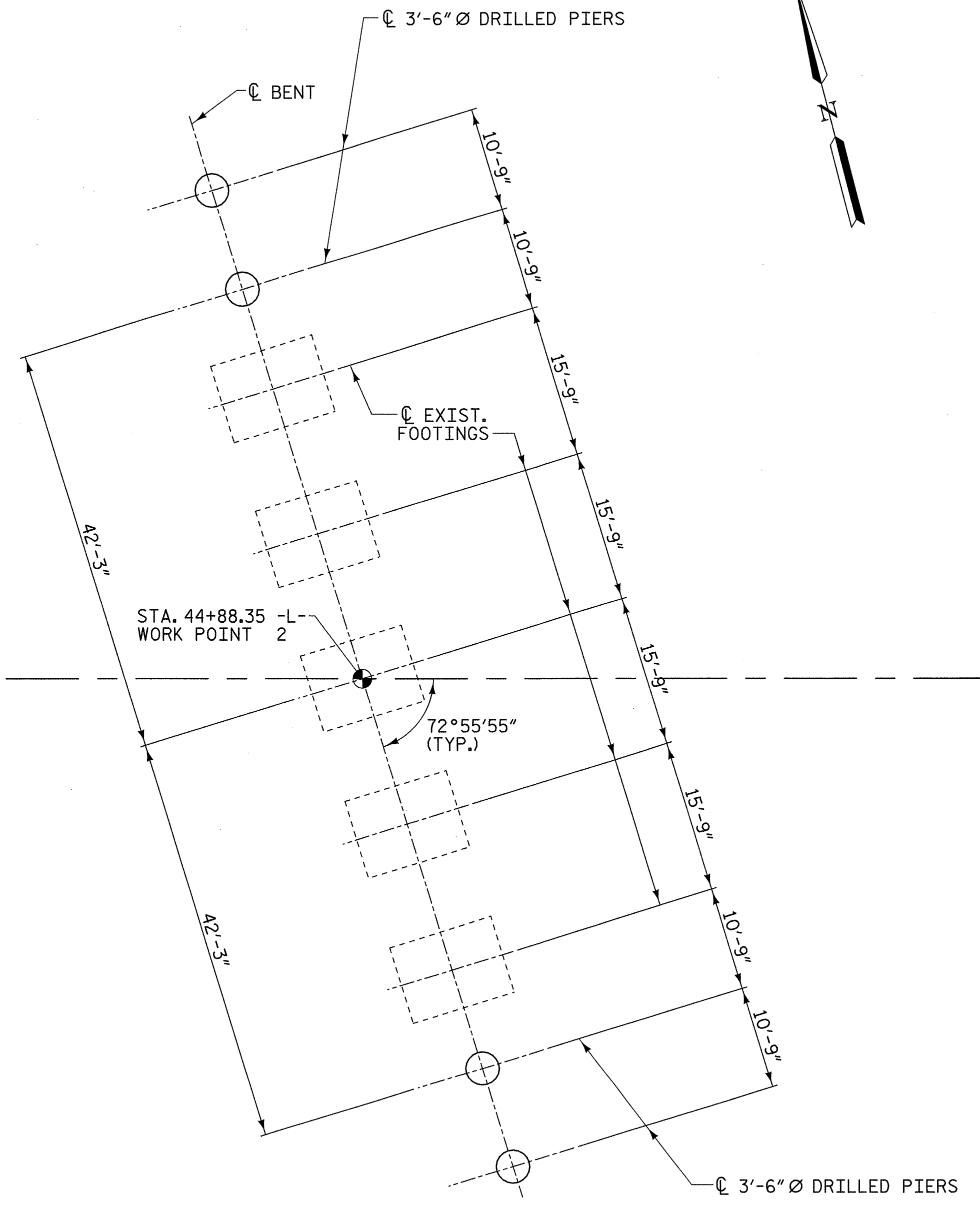
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2			4			

DRAWN BY: W. B. ALLEN DATE: 2/07  
 CHECKED BY: M. A. AVERETTE DATE: 2/07

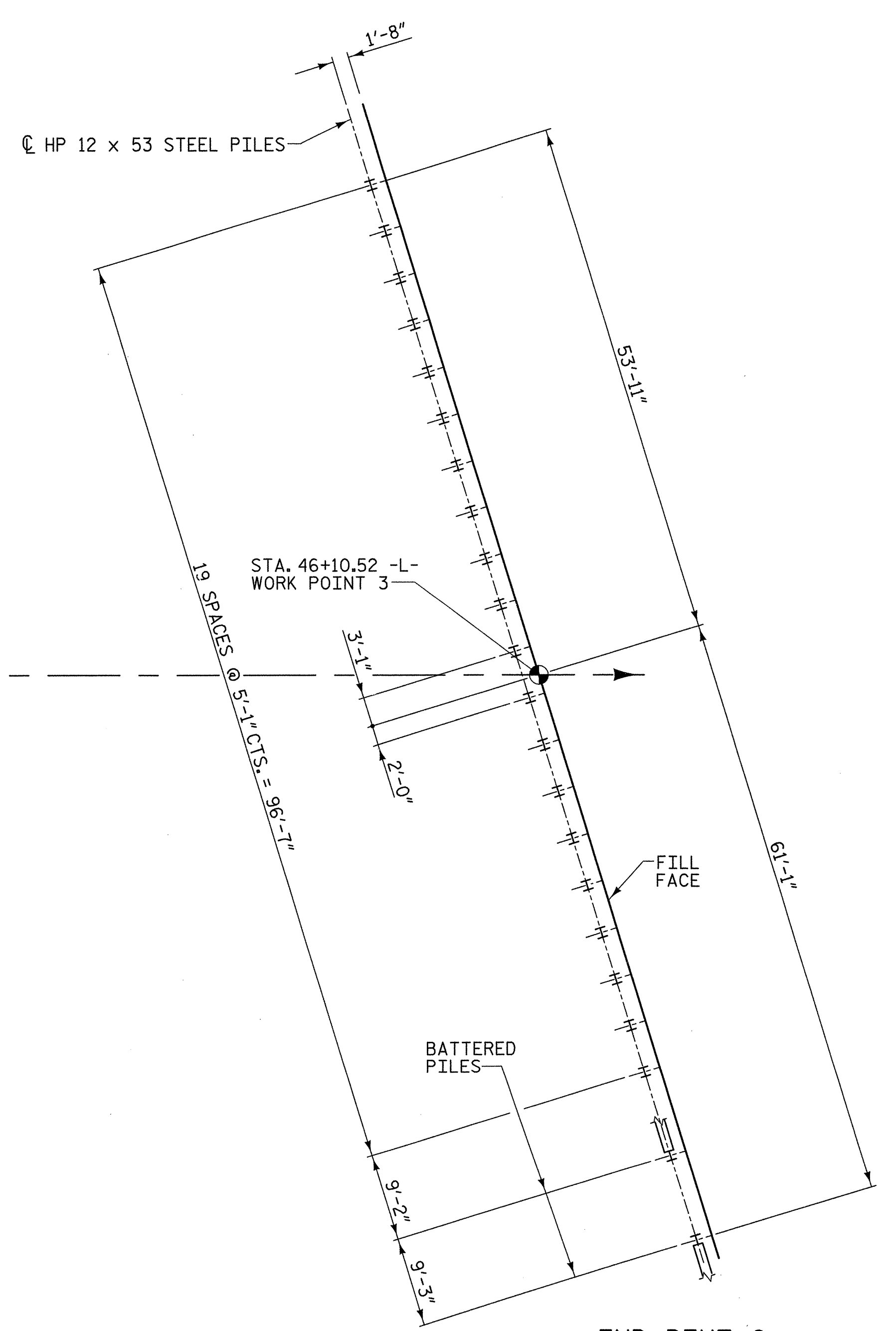
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END BENT 1



BENT 1



END BENT 2

### FOUNDATION LAYOUT

- NOTES:
- ALL PILES ARE HP 12 x 53
  - PILES FOR END BENT NO. 1 AND 2 SHALL BE DRIVEN TO A MINIMUM BEARING CAPACITY OF 90 TONS EACH.
  - WHEN DRIVING PILES, THE MAXIMUM BLOW COUNT SHALL NOT BE EXCEEDED.
  - 1:12 BATTER FOR PILES 21 AND 22 AT END BENT 2.
  - DIMENSIONS LOCATING PILES AND PIERS ARE SHOWN TO THE PILE CENTERLINE.

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 2 OF 3



STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**GENERAL DRAWING  
 FOUNDATION LAYOUT**

DRAWN BY : W. B. ALLEN DATE : 5/07  
 CHECKED BY : M. A. AVERETTE DATE : 5/07

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BM  
-BL- 101  
STA. 42+91.79 -L- 40.16 FT LT.  
ELEV. 248.98

NOTE:  
FOR UTILITY INFORMATION, SEE UTILITY PLANS  
AND SPECIAL PROVISIONS.

### GENERAL NOTES

DRIVE PILES AT END BENTS NO.1 AND 2 TO A REQUIRED BEARING CAPACITY OF 90 TONS PER PILE. THE REQUIRED BEARING CAPACITY IS EQUAL TO THE ALLOWABLE BEARING CAPACITY WITH A MINIMUM FACTOR OF SAFETY OF TWO.

THE ALLOWABLE BEARING CAPACITY FOR PILES AT END BENTS NO.1 AND 2 IS 45 TONS PER PILE.

DRILLED PIERS AT BENT NO.1 ARE DESIGNED FOR BOTH SKIN FRICTION AND END BEARING. CHECK FIELD CONDITIONS FOR REQUIRED END BEARING CAPACITY OF 30 TSF.

DRILLED PIERS AT BENT NO.1 ARE DESIGNED FOR AN APPLIED LOAD OF 265 TONS AT THE TOP OF THE COLUMN.

DRILLED PIERS AT BENT NO.1 SHALL EXTEND TO AN ELEVATION NO HIGHER THAN 151 FT. AND SATISFY THE REQUIRED END BEARING CAPACITY.

SPT TESTING IS REQUIRED TO DETERMINE THE END BEARING CAPACITY OF THE DRILLED PIERS AT BENT NO.1.

SLURRY CONSTRUCTION IS REQUIRED FOR DRILLED PIERS AT BENT NO.1. SEE DRILLED PIERS SPECIAL PROVISION.

DO NOT USE POLYMER SLURRY FOR DRILLED PIERS AT BENT NO.1

SID INSPECTIONS ARE REQUIRED TO INSPECT THE BOTTOM CLEANLINESS OF THE DRILLED PIERS AT BENT NO.1. SEE DRILLED PIERS SPECIAL PROVISION.

CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR THE DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. SEE CROSSHOLE LOGGING SPECIAL PROVISION.

FOR DRILLED PIERS, SEE DRILLED PIERS SPECIAL PROVISION.

THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE "STANDARD SPECIFICATIONS FOR SEISMIC DESIGN OF HIGHWAY BRIDGES" FOR SEISMIC PERFORMANCE CATEGORY A.

FOR SHIPPING STRUCTURAL STEEL, SEE SPECIAL PROVISIONS.

FOR SUBMITTAL OF WORKING DRAWINGS, SEE SPECIAL PROVISIONS.

THE CONCRETE USED IN THE DECK SLAB FOR THIS BRIDGE SHALL BE A SAND-LIGHTWEIGHT CONCRETE HAVING A DRY SPECIFIC WEIGHT OF APPROXIMATELY 115 LBS/CUBIC FOOT AND A 28 DAY CYLINDER STRENGTH OF NOT LESS THAN 4500 PSI.

FOR SAND-LIGHTWEIGHT CONCRETE, SEE SPECIAL PROVISIONS.

THE CONCRETE USED IN THE BRIDGE RAILINGS, APPROACH SLABS, SIDEWALK AND CONC. MEDIAN SHALL BE CLASS AA CONCRETE, NORMAL WEIGHT, AS PER THE STANDARD SPECIFICATIONS.

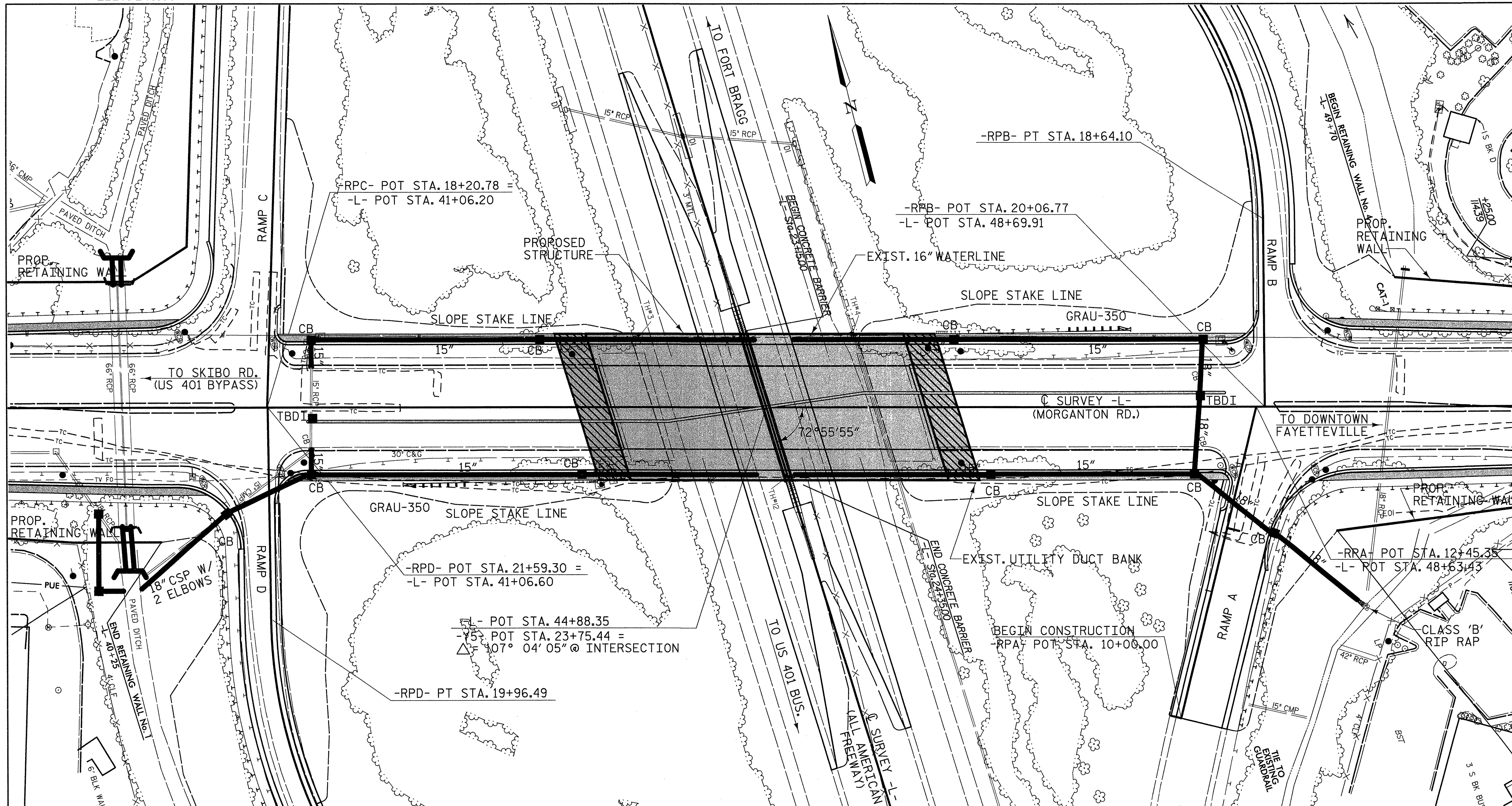
THE CONTRACTOR SHALL PROVIDE INDEPENDENT ASSURANCE SAMPLES OF REINFORCING STEEL AS FOLLOWS: FOR PROJECTS REQUIRING UP TO 400 TONS OF REINFORCING STEEL, ONE 30 INCH SAMPLE OF EACH SIZE BAR USED, AND FOR PROJECTS REQUIRING OVER 400 TONS OF REINFORCING STEEL, TWO 30 INCH SAMPLES OF EACH SIZE BAR USED. THE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

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

FOR FALSEWORK AND FORMWORK, SEE SPECIAL PROVISIONS.

FOR CRANE SAFETY, SEE SPECIAL PROVISIONS.

FOR GROUT FOR STRUCTURES, SEE SPECIAL PROVISIONS.



LOCATION SKETCH

### TOTAL BILL OF MATERIAL

	REMOVAL OF EXIST. STRUCTURE AT STA. 44+88.35 -L-	3'-6" DIA. DRILLED PIERS IN SOIL	3'-6" DIA. DRILLED PIERS NOT IN SOIL	SID INSPECTION	SPT TESTING	CROSSHOLE SONIC LOGGING	REINFORCED CONCRETE DECK SLAB SAND-LIGHTWEIGHT CONCRETE	GROOVING BRIDGE FLOORS	CLASS "A" CONCRETE	BRIDGE APPROACH SLABS	REINFORCING STEEL	SPIRAL COLUMN REINFORCING STEEL	STRUCTURAL STEEL	HP 12 X 53 STEEL PILES	THREE BAR METAL RAIL	4" SLOPE PROTECTION	EVAZOTE JOINT SEALS	STRUCTURE DRAINAGE SYSTEM	
	LUMP SUM	FEET	FEET	EACH	EACH	EACH	SQ. FEET	SQ. FEET	CU.YDS.	LUMP SUM	LBS	LBS	APPROX. LBS	NO.	FEET	FEET	SQ. YARDS	LUMP SUM	LUMP SUM
SUPERSTRUCTURE							27,683	27,005					763,916		567.4				
END BENT 1									63.4		10,888			22	1650	558			
BENT 1		262	30	4	4	4			107.4		34,490	7586							
END BENT 2									62.7		10,868			22	1650	528			
TOTAL	LUMP SUM	262	30	4	4	4	27,683	27,005	233.5	LUMP SUM	56,246	7586	763,916	44	3300	567.4	1086	LUMP SUM	LUMP SUM

PROJECT NO. U-4756  
CUMBERLAND COUNTY

STATION: 44+88.35 -L-  
23+75.44 -Y5-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

GENERAL DRAWING FOR  
BRIDGE ON MORGANTON RD.  
OVER ALL AMERICAN FREWAY  
BETWEEN SKIBO RD. AND  
SYCAMORE DAIRY RD.

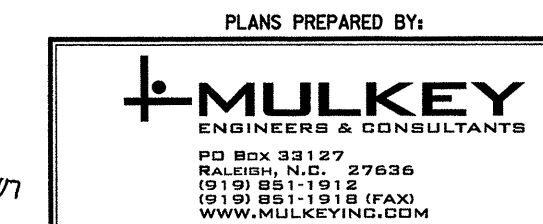
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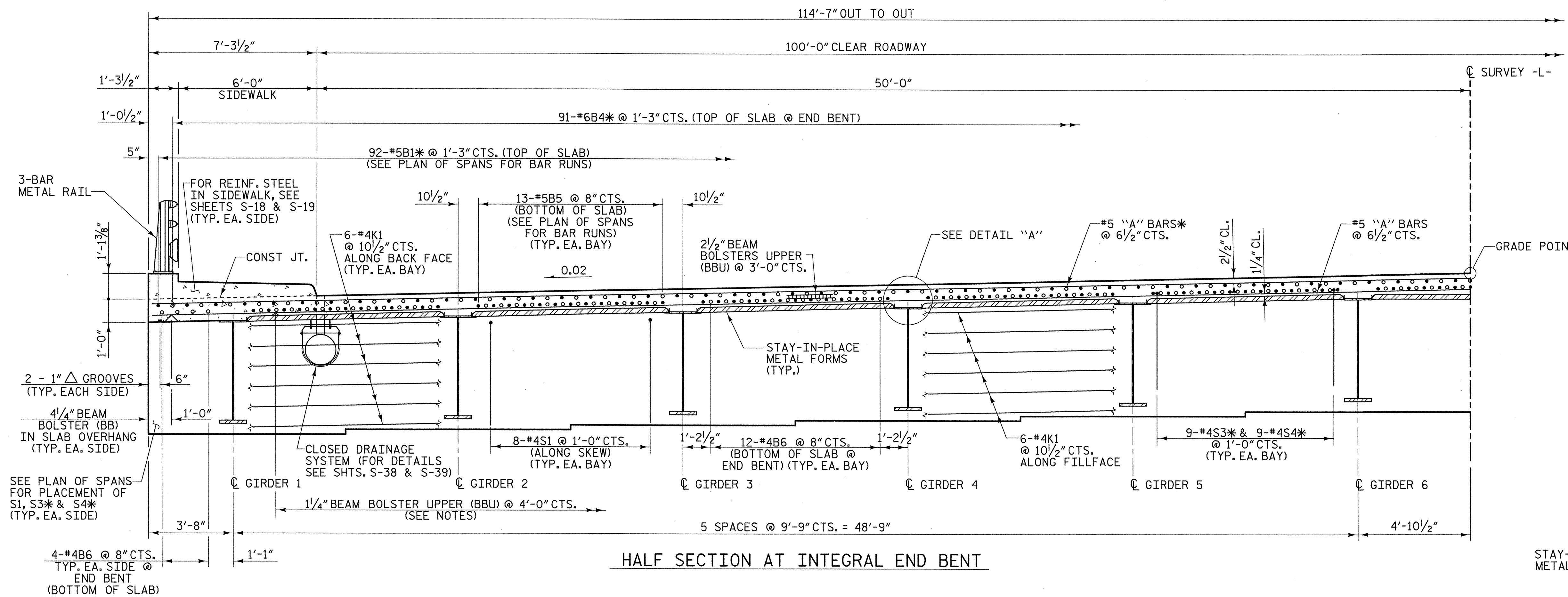
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S-3  
TOTAL SHEETS

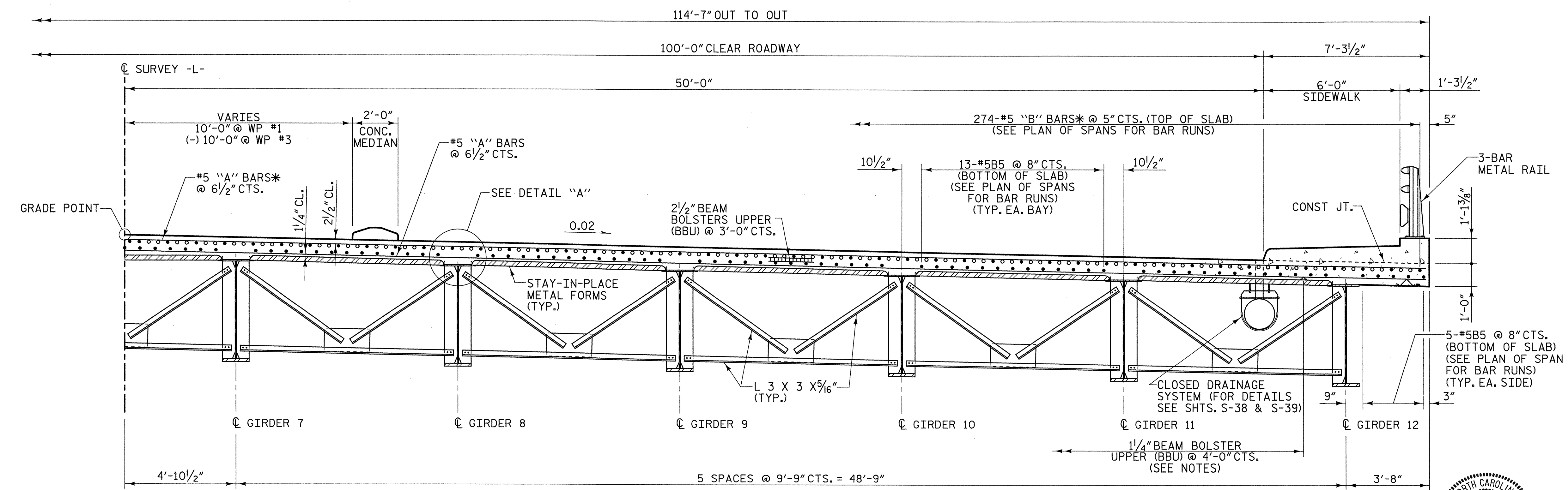
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CHECKED BY: M.A. AVERETTE DATE: 3/07





- \* INDICATES EPOXY COATED REINFORCING STEEL
- DENOTES CONTINUOUS REINFORCEMENT
- DENOTES NON-CONTINUOUS REINFORCEMENT

HALF SECTION AT INTEGRAL END BENT

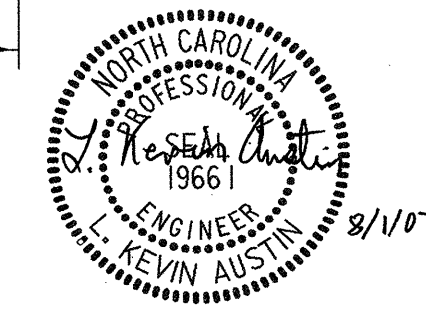


HALF SECTION AT BENT (SHOWING INTERMEDIATE CROSS FRAMES (D1) & BENT DIAPHRAGMS (D2))

TYPICAL SECTION

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

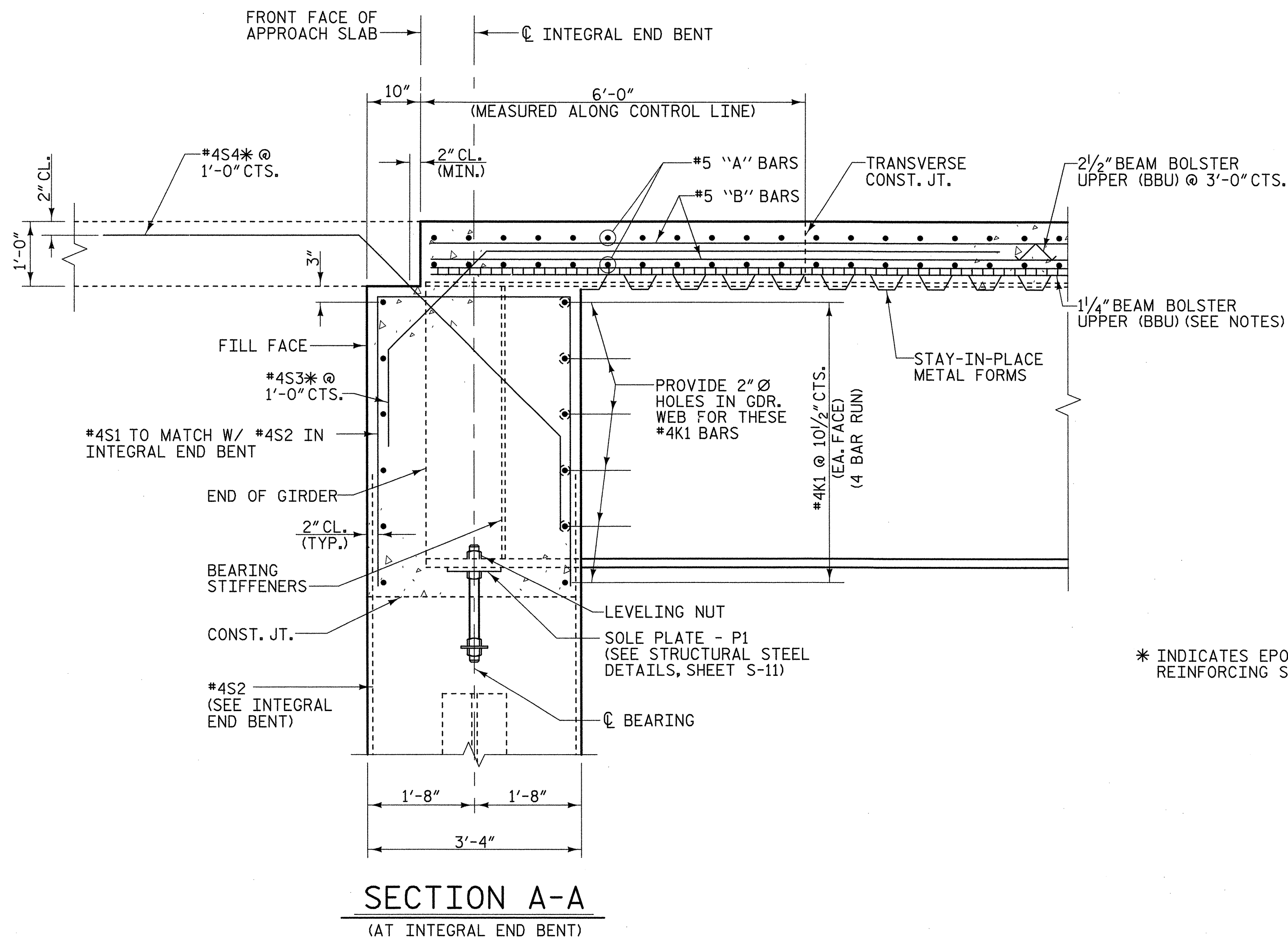
SHEET 1 OF 2  
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
SUPERSTRUCTURE  
TYPICAL SECTION



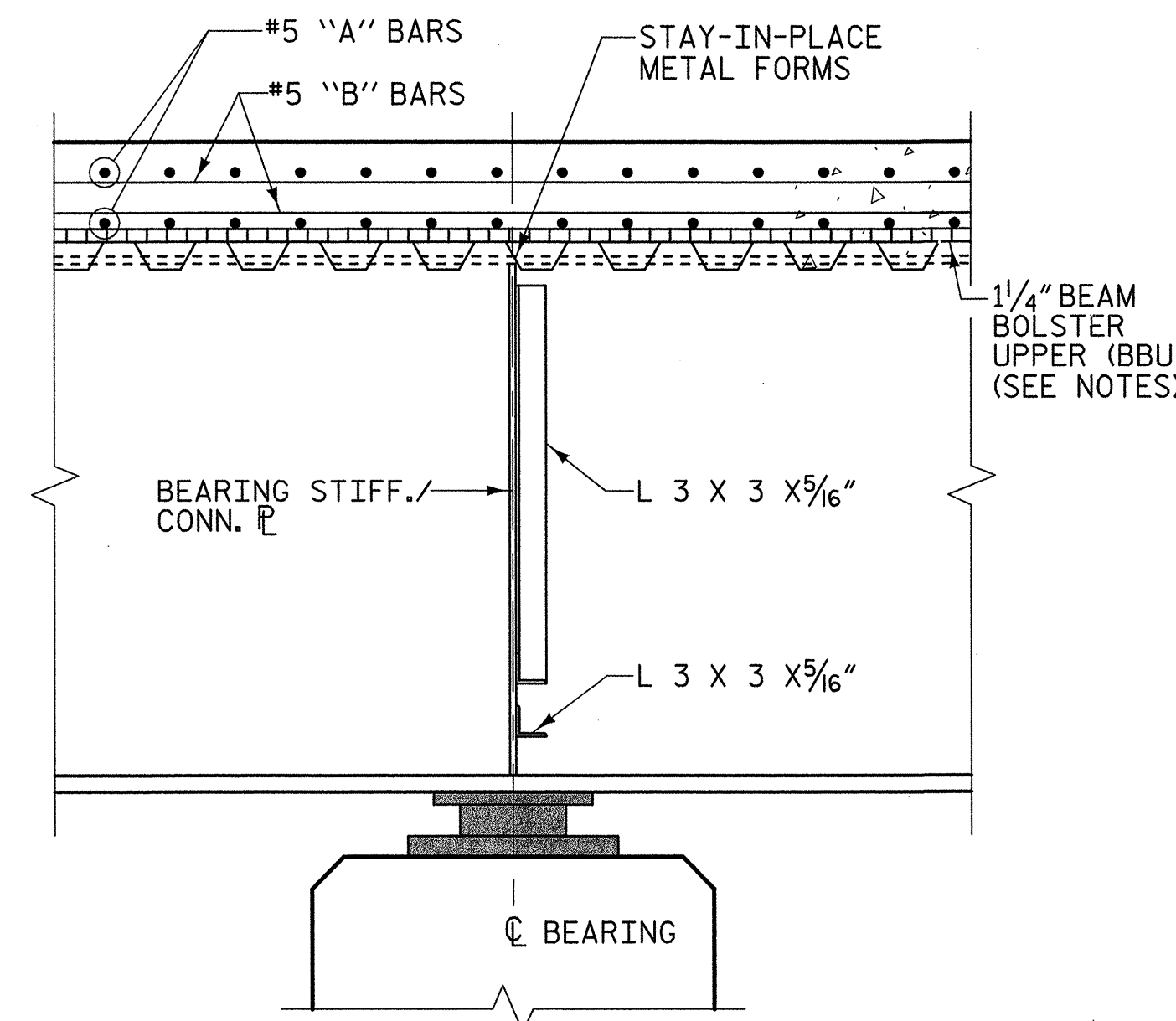
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**SECTION A-A**  
(AT INTEGRAL END BENT)



**SECTION B-B**  
(AT INTERMEDIATE DIAPHRAGM)

\* INDICATES EPOXY COATED REINFORCING STEEL

**NOTES:**

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

PREVIOUSLY CAST CONCRETE IN A CONTINUOUS UNIT SHALL HAVE ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI. BEFORE ADDITIONAL CONCRETE IS CAST IN THE UNIT.

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

THE CONTRACTOR MAY, WHEN NECESSARY, PROPOSE A SCHEME FOR AVOIDING INTERFERENCE BETWEEN METAL STAY-IN-PLACE FORM SUPPORTS OR FORMS AND GIRDER STIFFENER OR CONNECTOR PLATES. THE PROPOSAL SHALL BE INDICATED, AS APPROPRIATE, ON EITHER THE STEEL WORKING DRAWINGS OR THE METAL STAY-IN-PLACE FORM WORKING DRAWINGS.

FOR REINFORCING STEEL BARS INDICATED, BUT NO MARK SHOWN, SEE PLAN OF SPANS.

METAL STAY-IN-PLACE FORMS SHALL NOT BE WELDED TO GIRDER FLANGES IN THE ZONES REQUIRING CHARPY "V" NOTCH TEST. SEE STRUCTURAL STEEL DETAIL SHEETS.

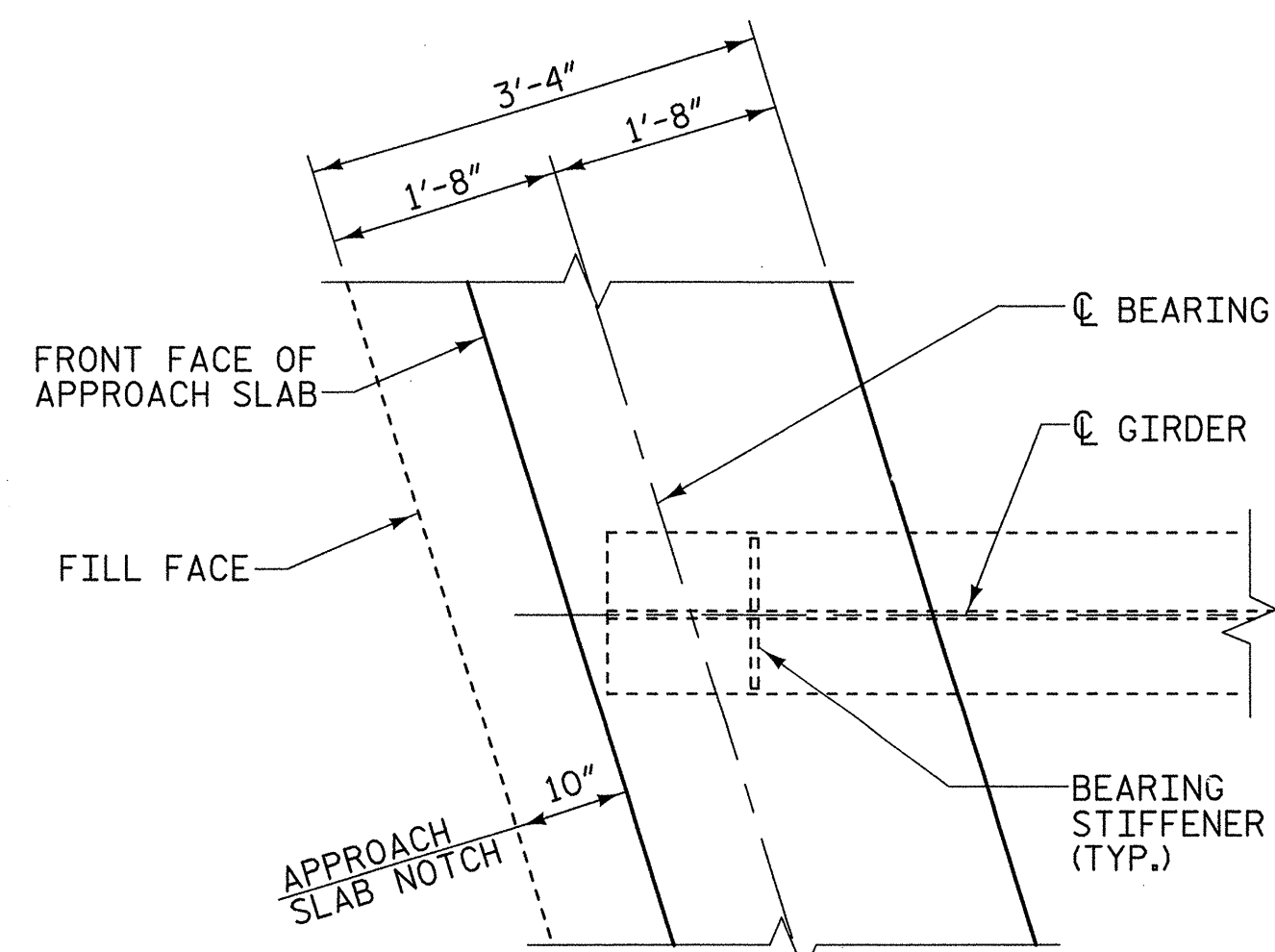
STRUCTURAL STEEL ERECTION IN A CONTINUOUS UNIT SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE UNIT.

FOR STRUCTURE DRAINAGE SYSTEM, SEE SPECIAL PROVISIONS.

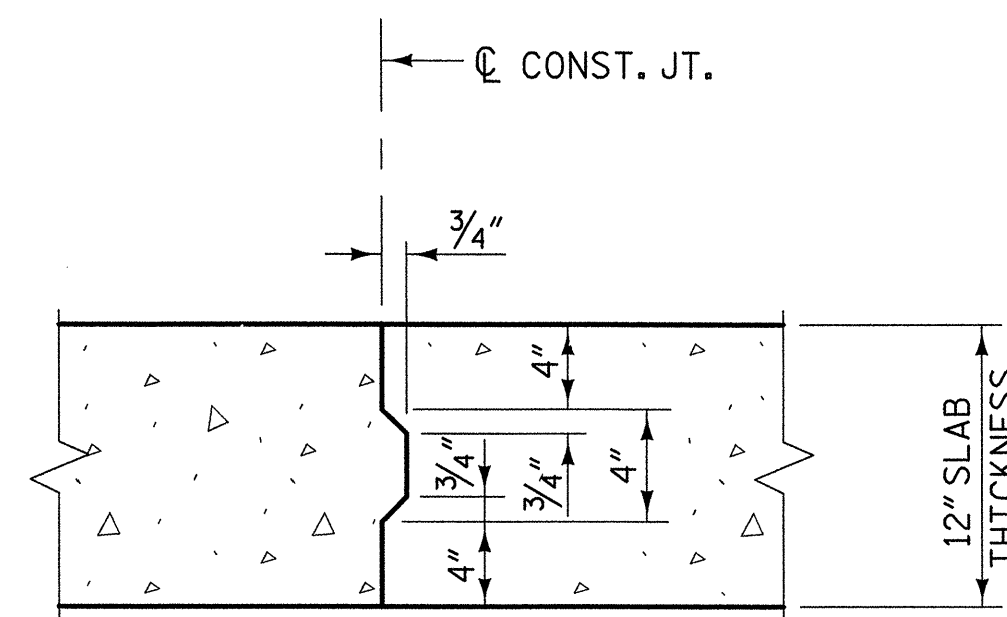
THE CONTRACTOR SHALL SUBMIT A PLAN FOR THE DRAINAGE SYSTEM, INCLUDING, BUT NOT LIMITED TO, ATTACHMENTS TO THE BRIDGE, SCUPPER AND INTEL GRATE DETAILS, SCUPPER SUPPORT SYSTEM, PIPE ALIGNMENT AND PIPE LENGTHS, AND NECESSARY FITTINGS, ELBOWS, WYES, ADAPTERS, GUIDES AND JOINTS.

SHEAR STUDS OR STIRRUPS MAY BE CUT AS APPROVED BY THE ENGINEER TO AVOID INTERFERENCE WITH THE BRIDGE SCUPPER.

SEE ROADWAY PLANS FOR DETAILS AND PAY ITEM FOR JOUCTION BOXES AT APPROXIMATE STATIONS 43+15 -L- AND 46+32 -L-.



**PLAN OF GIRDER AT END BENT**  
(TYPICAL EACH END BENT)



**TRANSVERSE CONSTRUCTION JOINT IN DECK SLAB**

NOTE: REINFORCING STEEL NOT SHOWN FOR CLARITY. LONGITUDINAL REINFORCING STEEL SHALL BE CONTINUOUS THRU JOINT.

	GIRDER	TOP OF SOLE PLATE (P1) ELEV.	GIRDER	TOP OF SOLE PLATE (P1) ELEV.
END BENT #1	1	244.750	7	245.991
	2	244.992	8	245.836
	3	245.232	9	245.681
	4	245.472	10	245.525
	5	245.711	11	245.368
	6	245.949	12	245.210
END BENT #2	1	245.352	7	246.115
	2	245.514	8	245.882
	3	245.675	9	245.647
	4	245.836	10	245.411
	5	245.995	11	245.175
	6	246.153	12	244.937

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

SHEET 2 OF 2

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

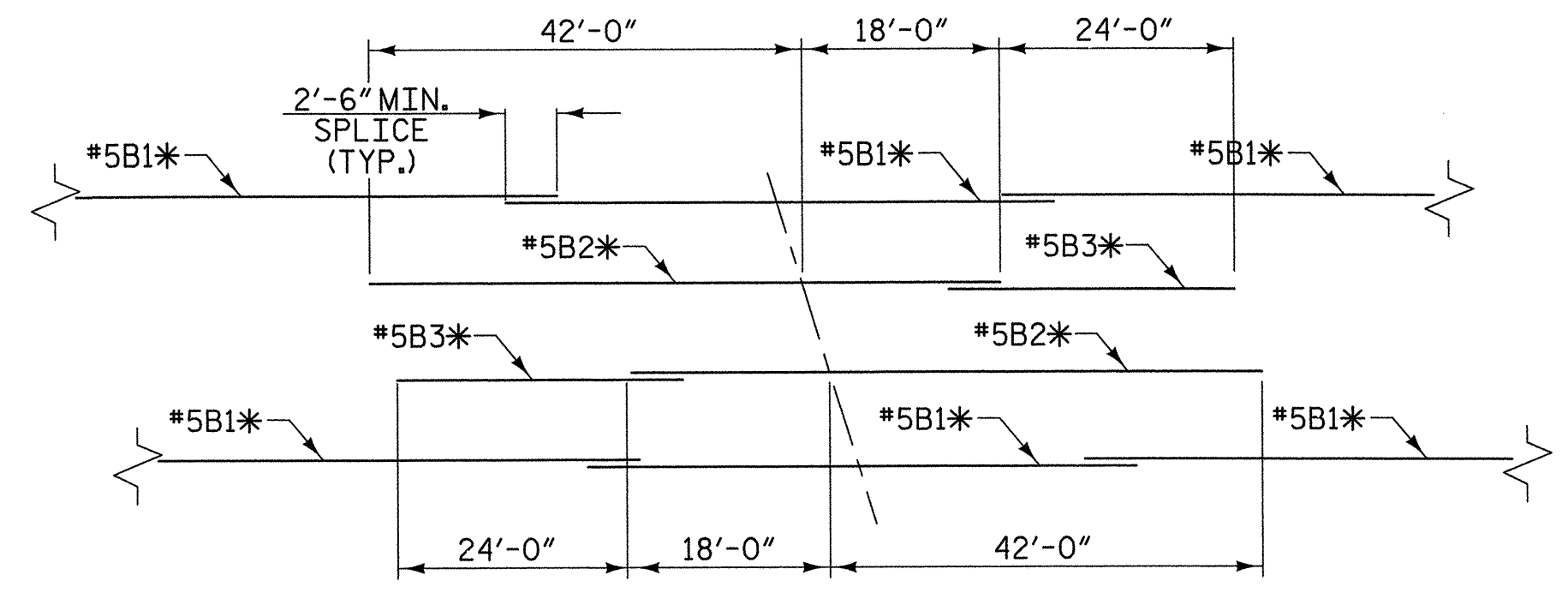
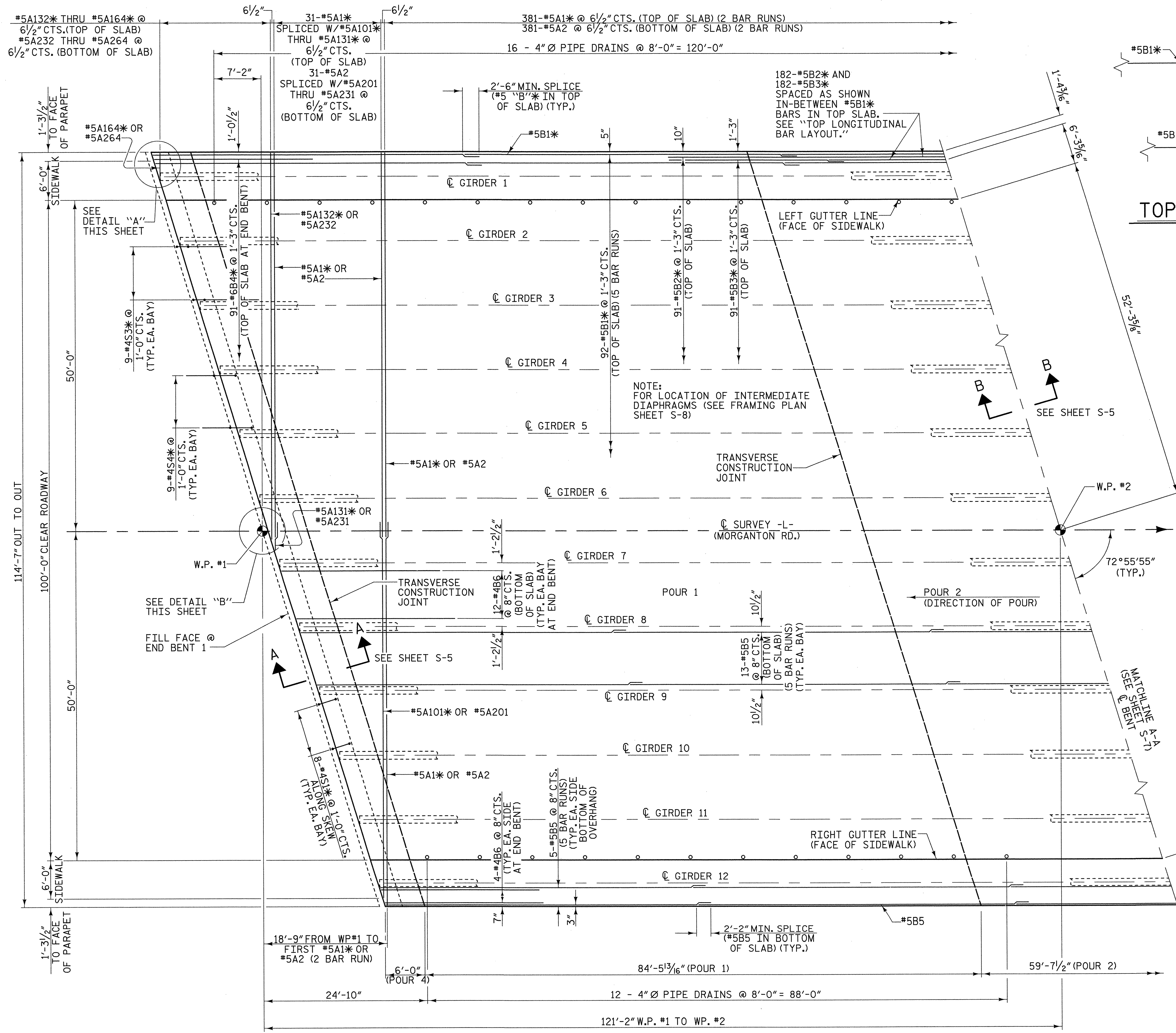
**SUPERSTRUCTURE**  
**TYPICAL SECTION**



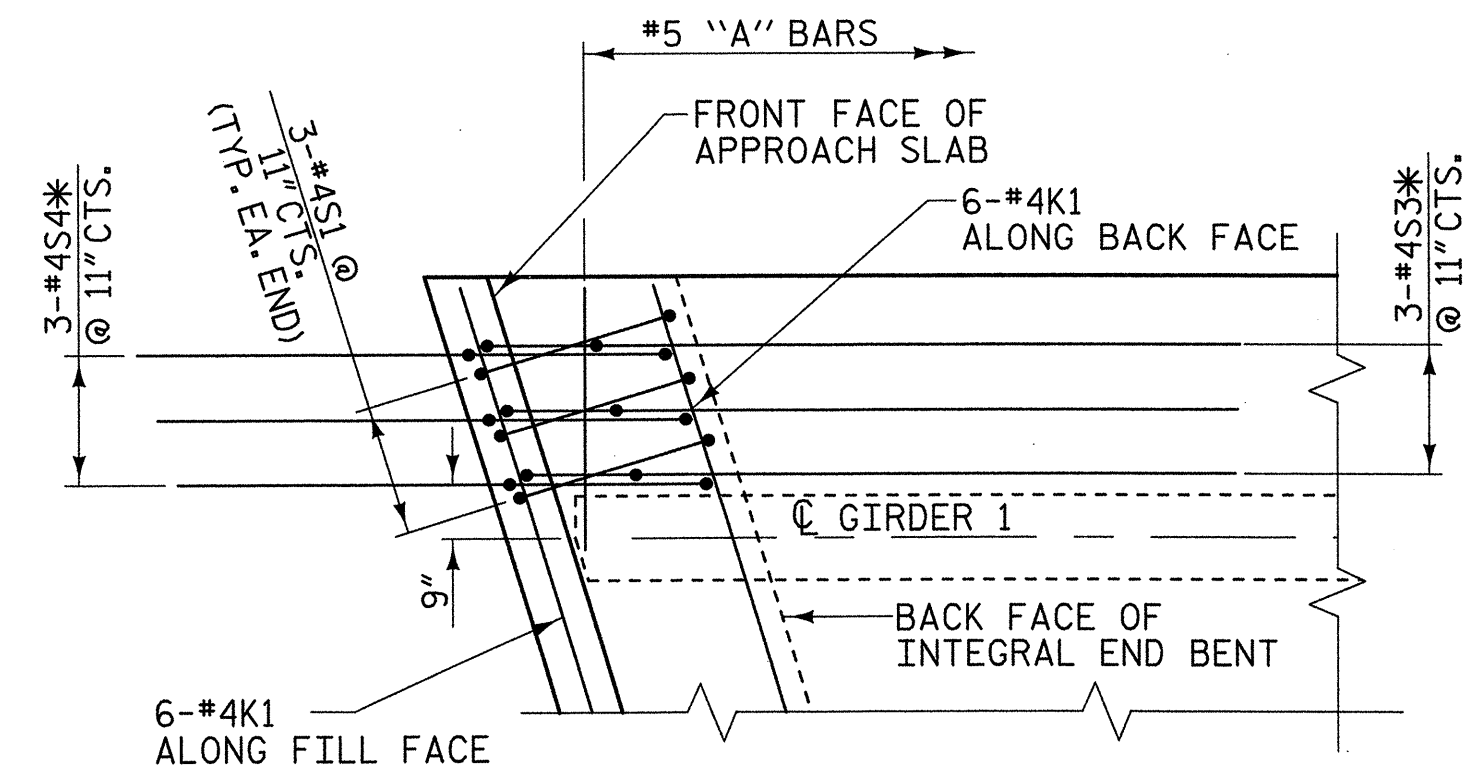
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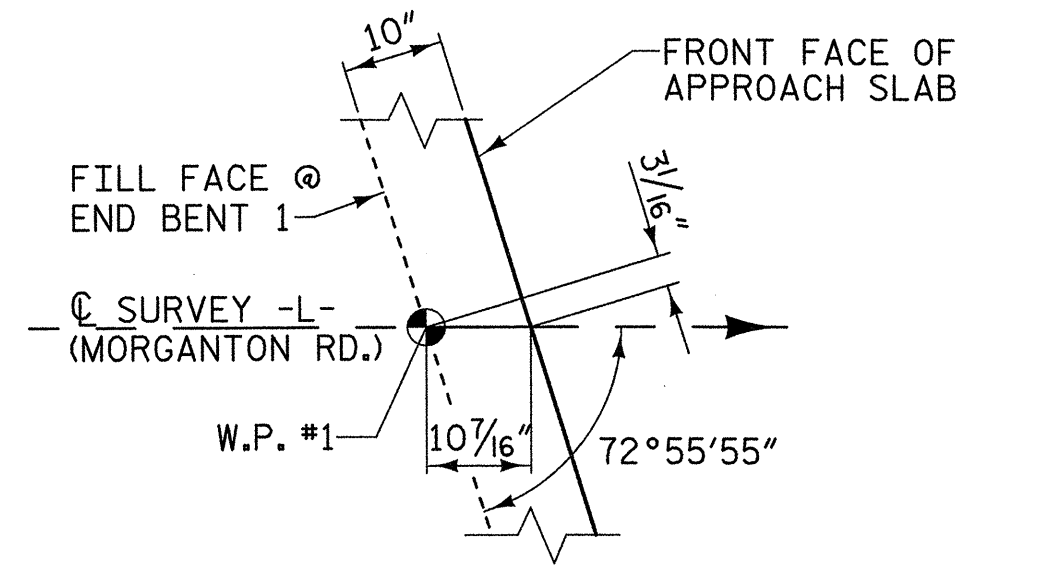
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CHECKED BY : M.A. AVERETTE DATE : 3/07



**TOP LONGITUDINAL BAR LAYOUT @ BENT**

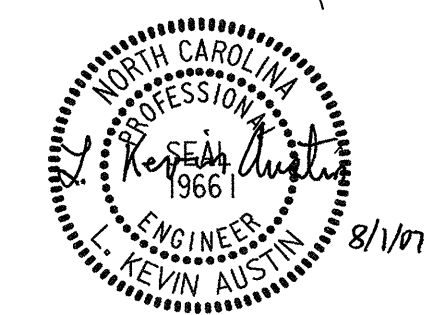


**DETAIL "A"**



**DETAIL "B"**

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-



PLANS PREPARED BY:  
**MULKEY ENGINEERS & CONSULTANTS**  
 PO BOX 32127  
 RALEIGH, NC 27636  
 (919) 851-1918 (FAX)  
 WWW.MULKEYINC.COM

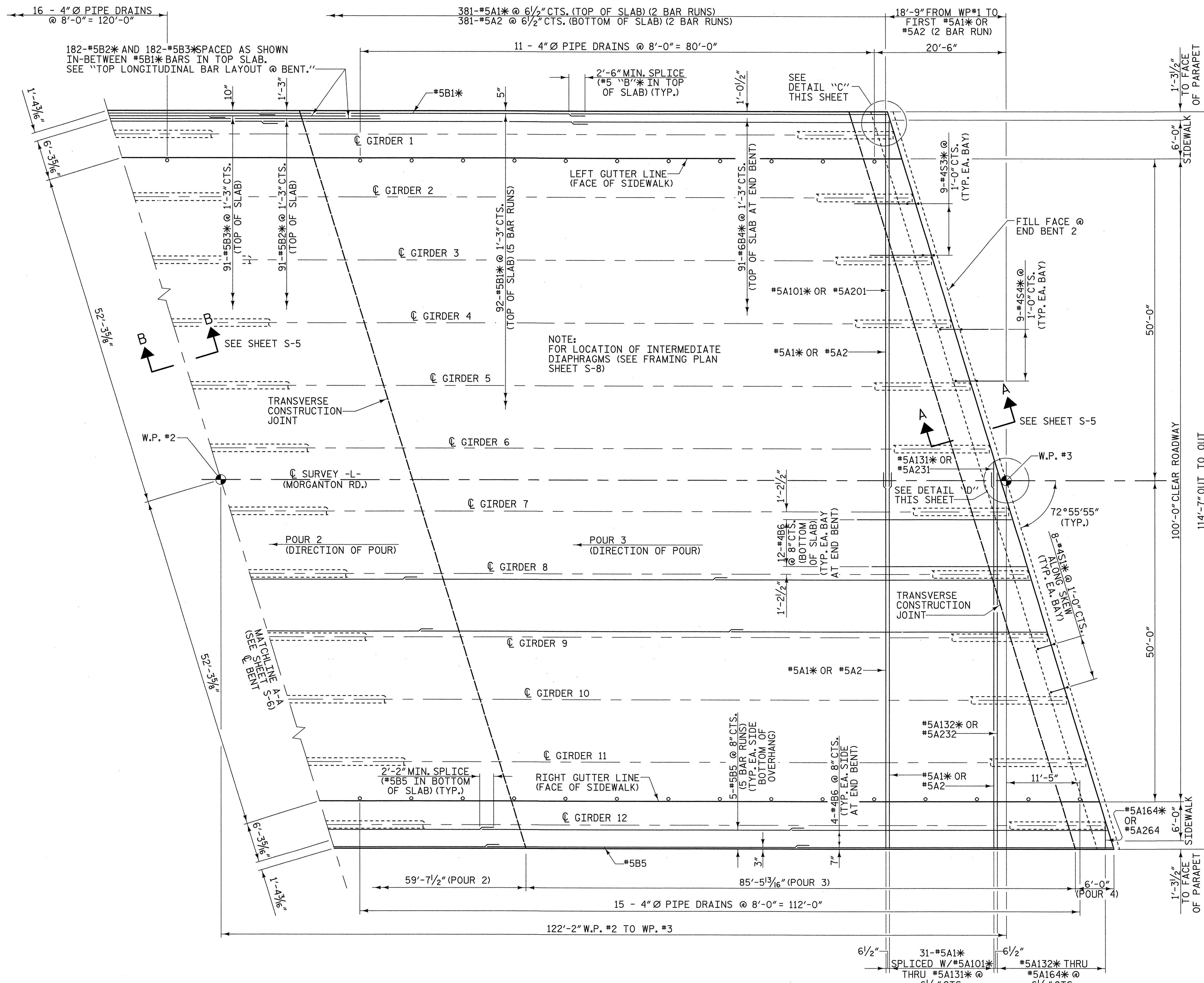
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE SPAN "A"**

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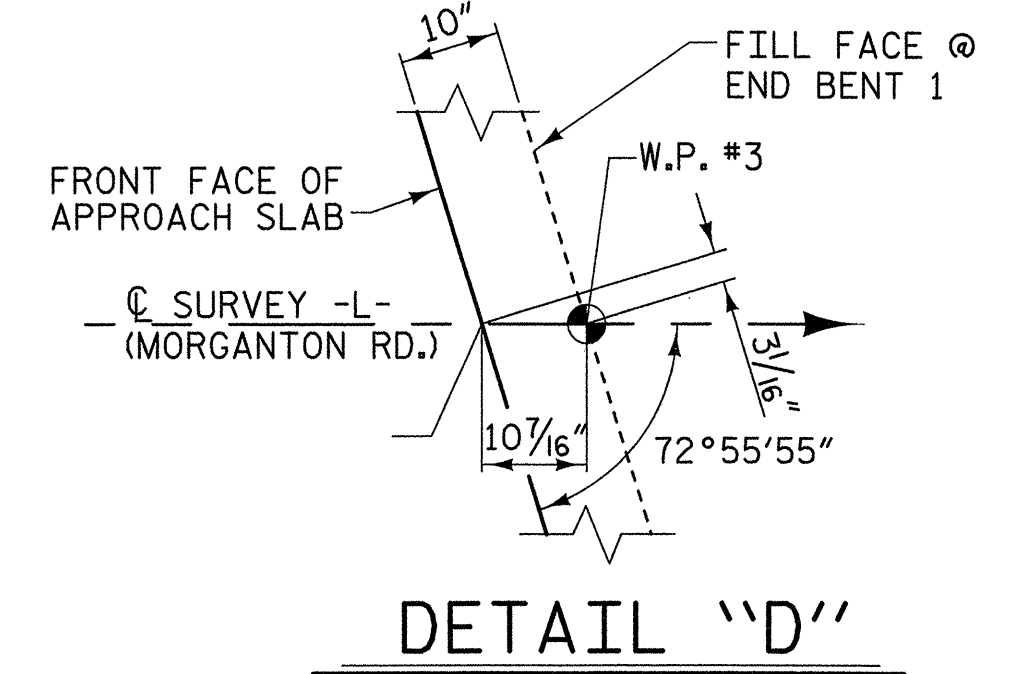
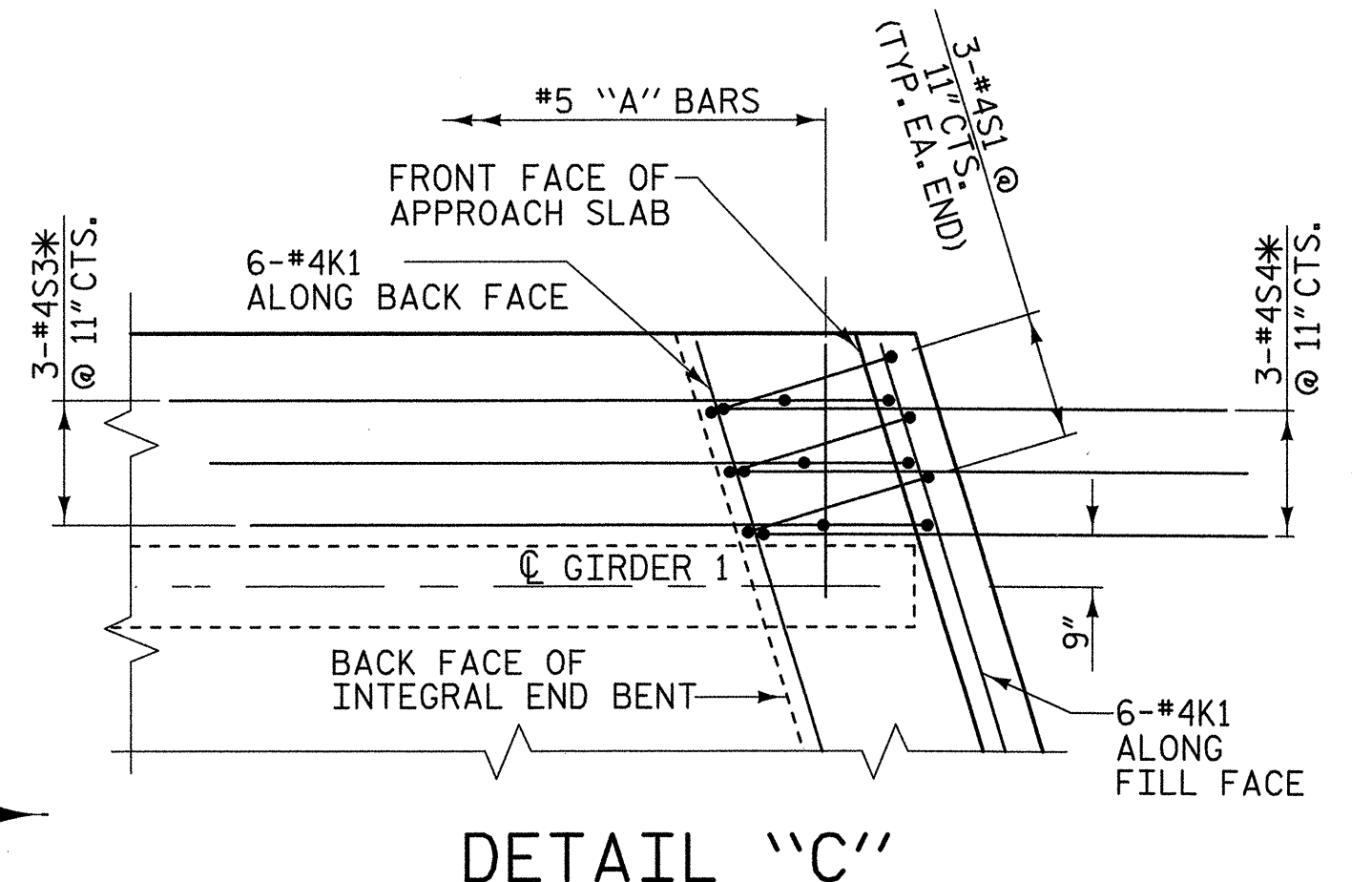
**PLAN OF SPAN A**  
 \* INDICATES EPOXY COATED REINFORCING STEEL

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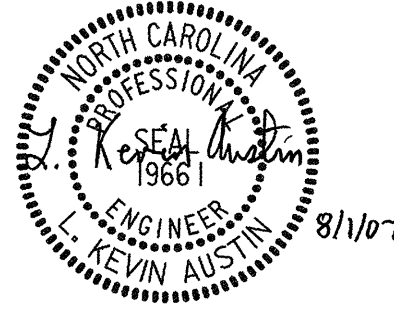
NOTE:  
FOR "TOP LONGITUDINAL BAR LAYOUT @ BENT" DETAIL, SEE SHEET S-6.



PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

### SUPERSTRUCTURE SPAN "B"



PLANS PREPARED BY:  
**MULKEY**  
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 (919) 851-1112  
 (919) 851-1918 (FAX)  
 WWW.MULKEYINC.COM

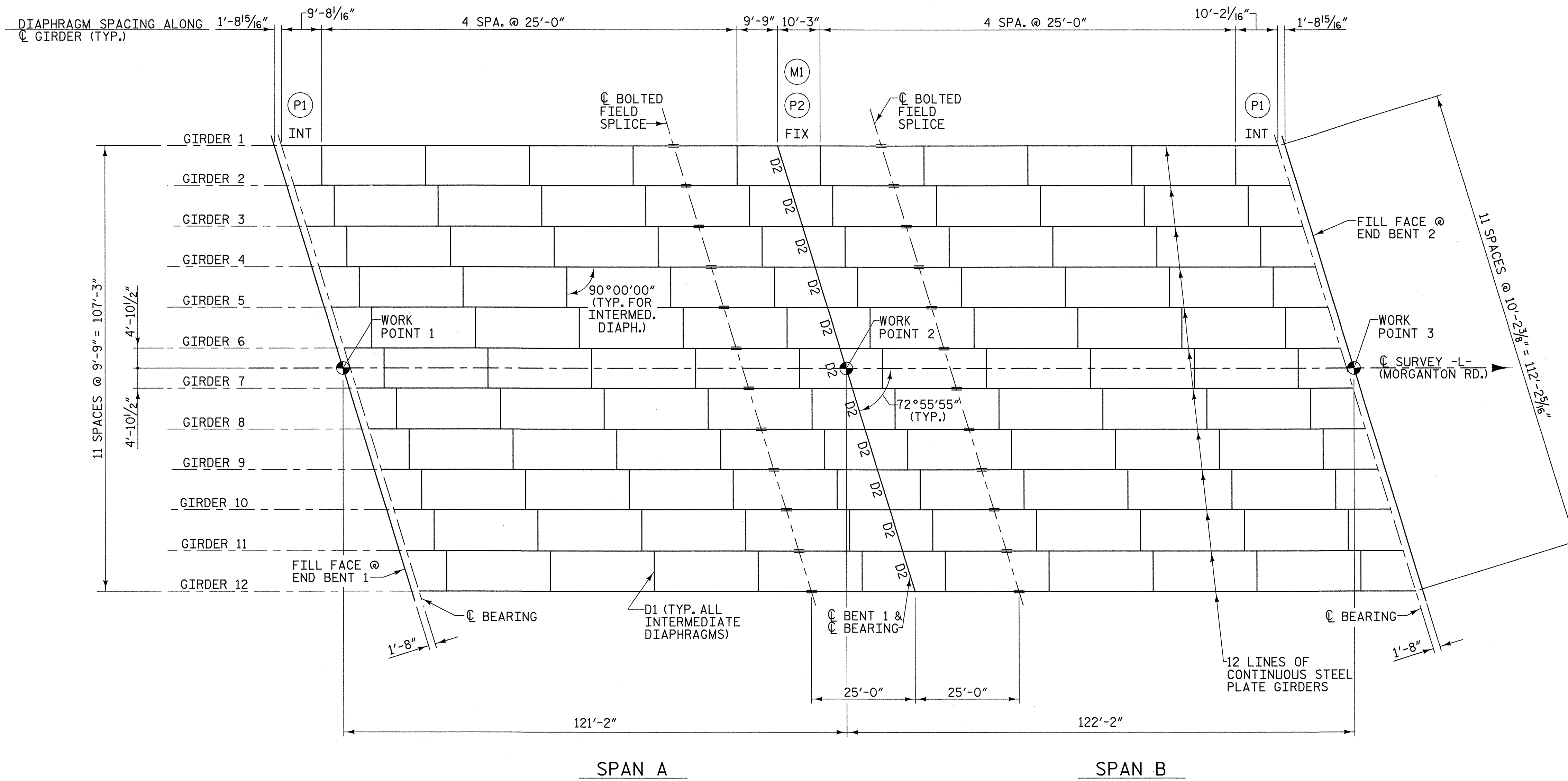
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### PLAN OF SPAN B

\* INDICATES EPOXY COATED REINFORCING STEEL

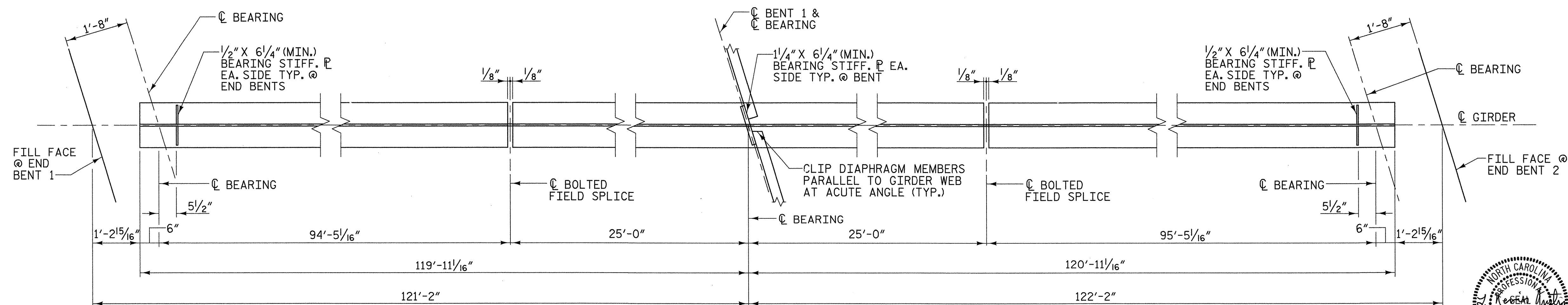
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 CHECKED BY: **M.A. AVERETTE** DATE: 3/07

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- NOTES:**
1. DIAPHRAGM INDICATED THUS: D (NUMBER)
  2. SOLE PLATES INDICATED THUS: (PN) (N=NUMBER)
  3. MASONRY PLATE INDICATED THUS: (MN) (N=NUMBER)

**FRAMING PLAN**



**PLAN OF BOTTOM FLANGE - TYPICAL INTERIOR GIRDER**

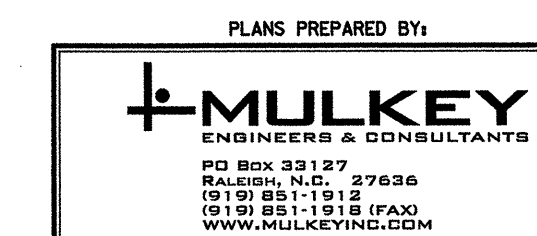
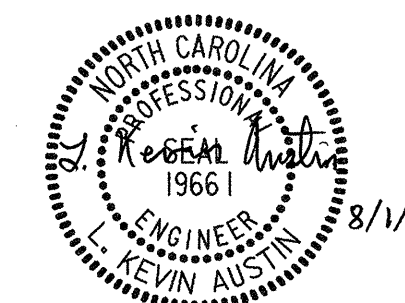
(ALL DIMENSIONS ARE IN HORIZONTAL PLANE) (EXTERIOR GIRDER SIMILAR)

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
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 RALEIGH

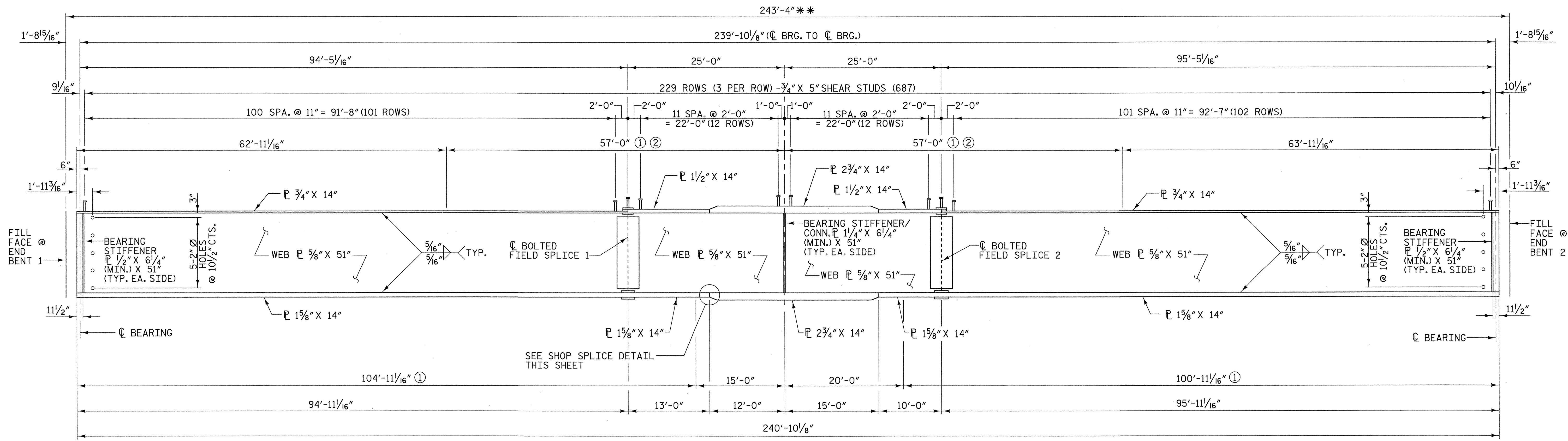
**SUPERSTRUCTURE  
 STRUCTURAL STEEL  
 DETAILS  
 FRAMING PLAN**



DRAWN BY: W.B. ALLEN DATE: 3/07  
 CHECKED BY: M.A. AVERETTE DATE: 3/07

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



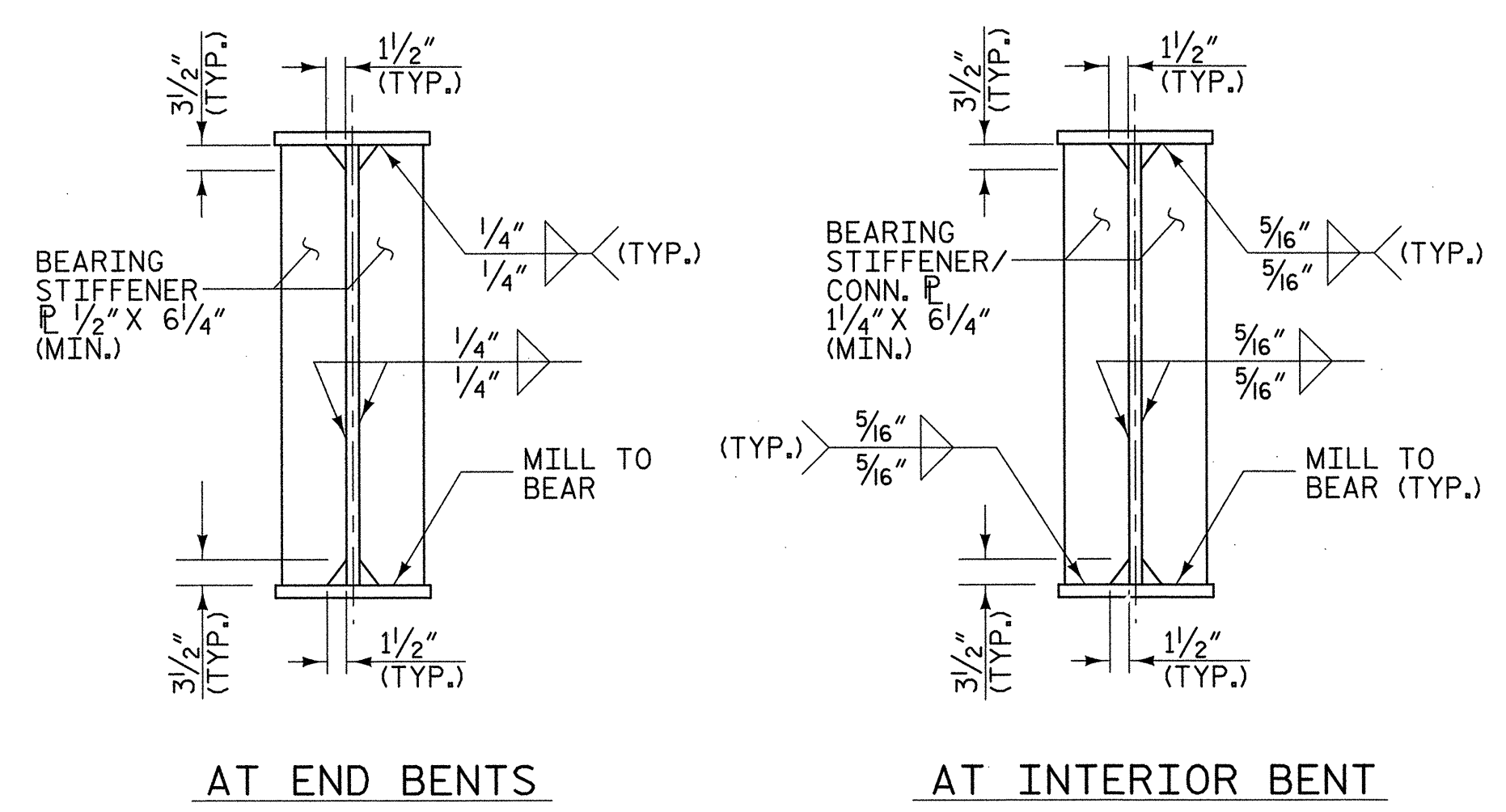


**ELEVATION - GIRDERS 1 THRU 12**

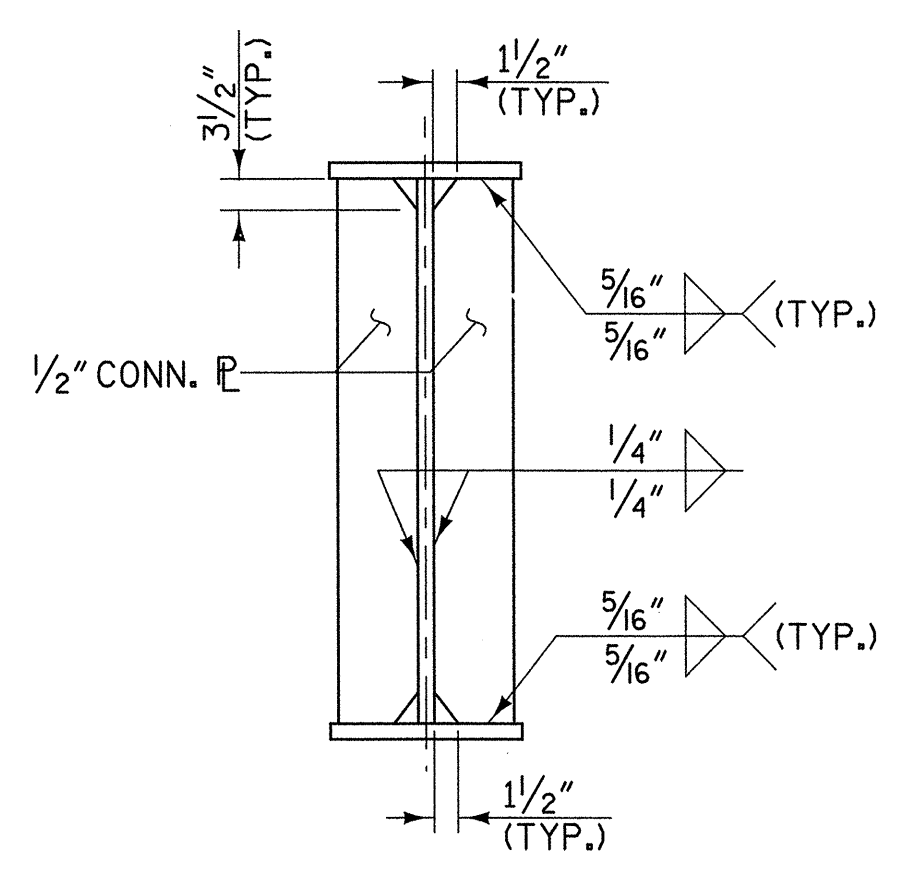
(ALL DIMENSIONS ARE IN HORIZONTAL PLANE)

- ① FOR CHARPY V-NOTCH SEE NOTES ON SHEET S-10.
- ② NO WELDING OF FORMS OR FALSEWORK TO THE TOP FLANGE WILL BE PERMITTED IN THIS REGION.

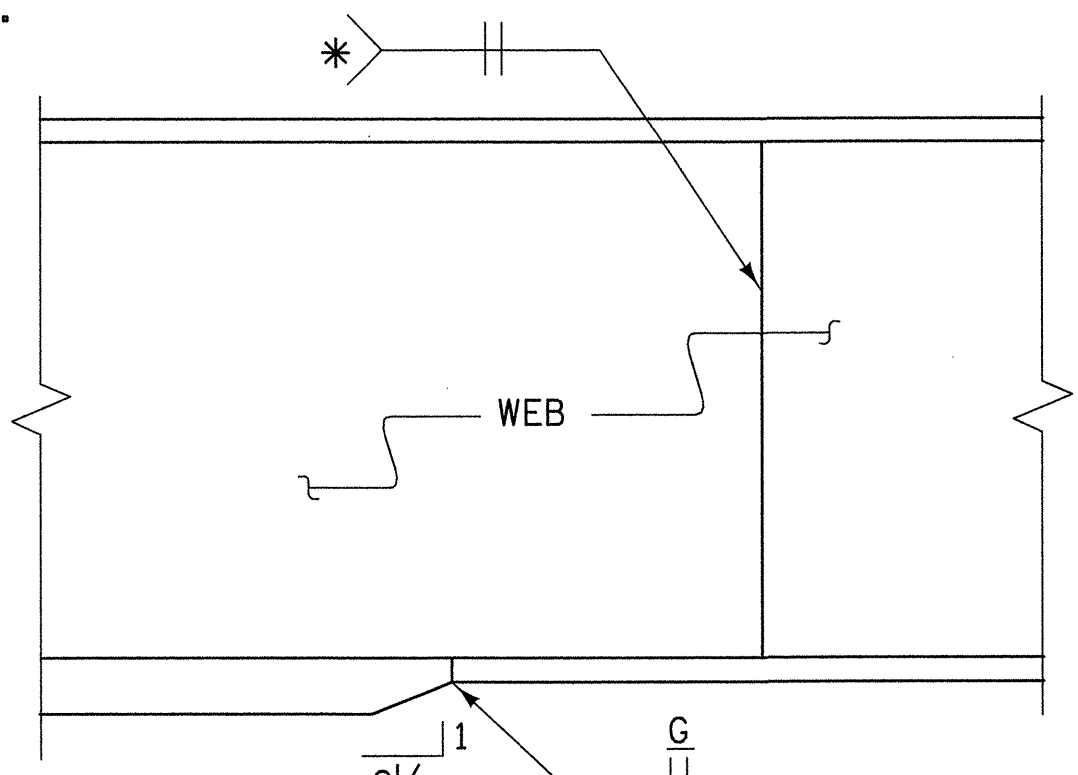
\*\* ALL DIMENSIONS ARE MEASURED ALONG THE C OF THE GIRDER.



**BEARING STIFFENER DETAIL**

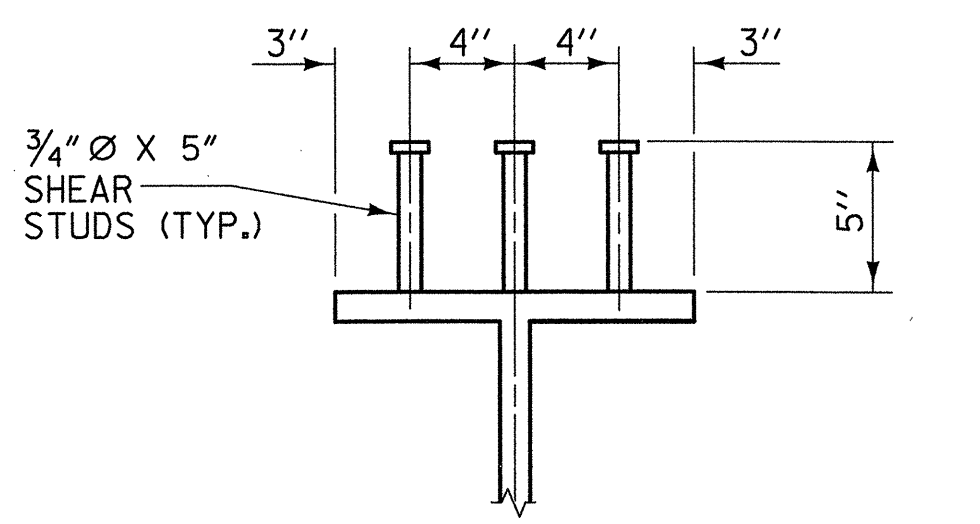


**CONNECTOR PLATE DETAIL**



**SHOP SPLICE DETAIL**

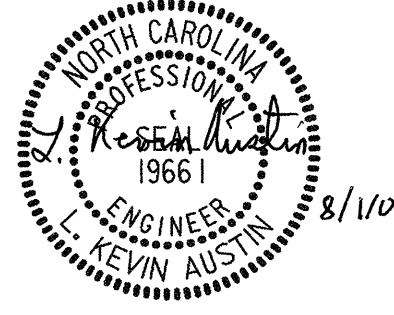
\* GRIND SMOOTH AND FLUSH ON OUTER FACE OF EXTERIOR BEAMS /GIRDERS



**SHEAR STUD DETAILS**

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 2 OF 4  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE  
 STRUCTURAL STEEL  
 DETAILS**

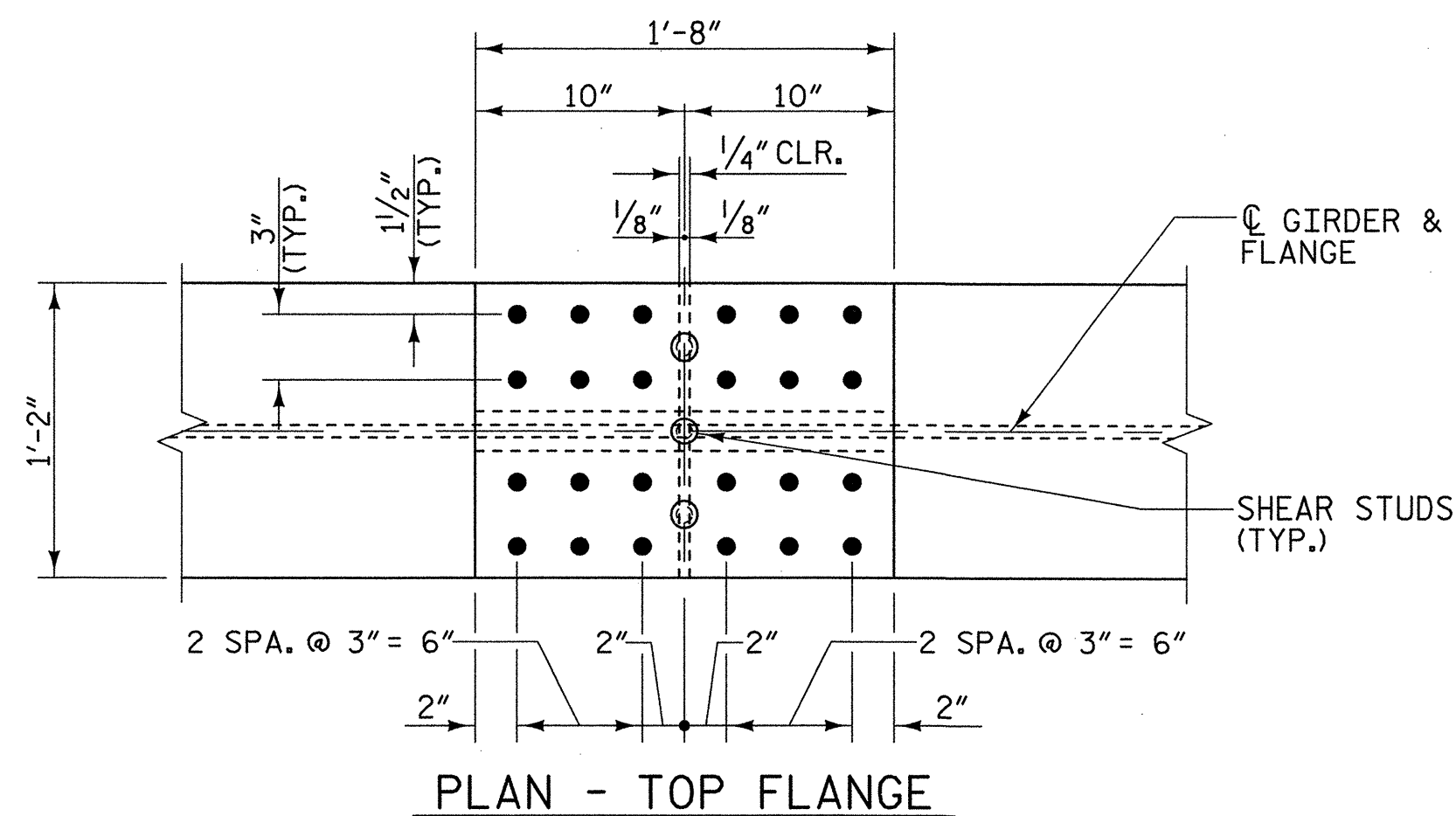


PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO BOX 33127  
 RALEIGH, N.C. 27636  
 (919) 881-1112  
 (919) 881-1918 (FAX)  
 WWW.MULKEYINC.COM

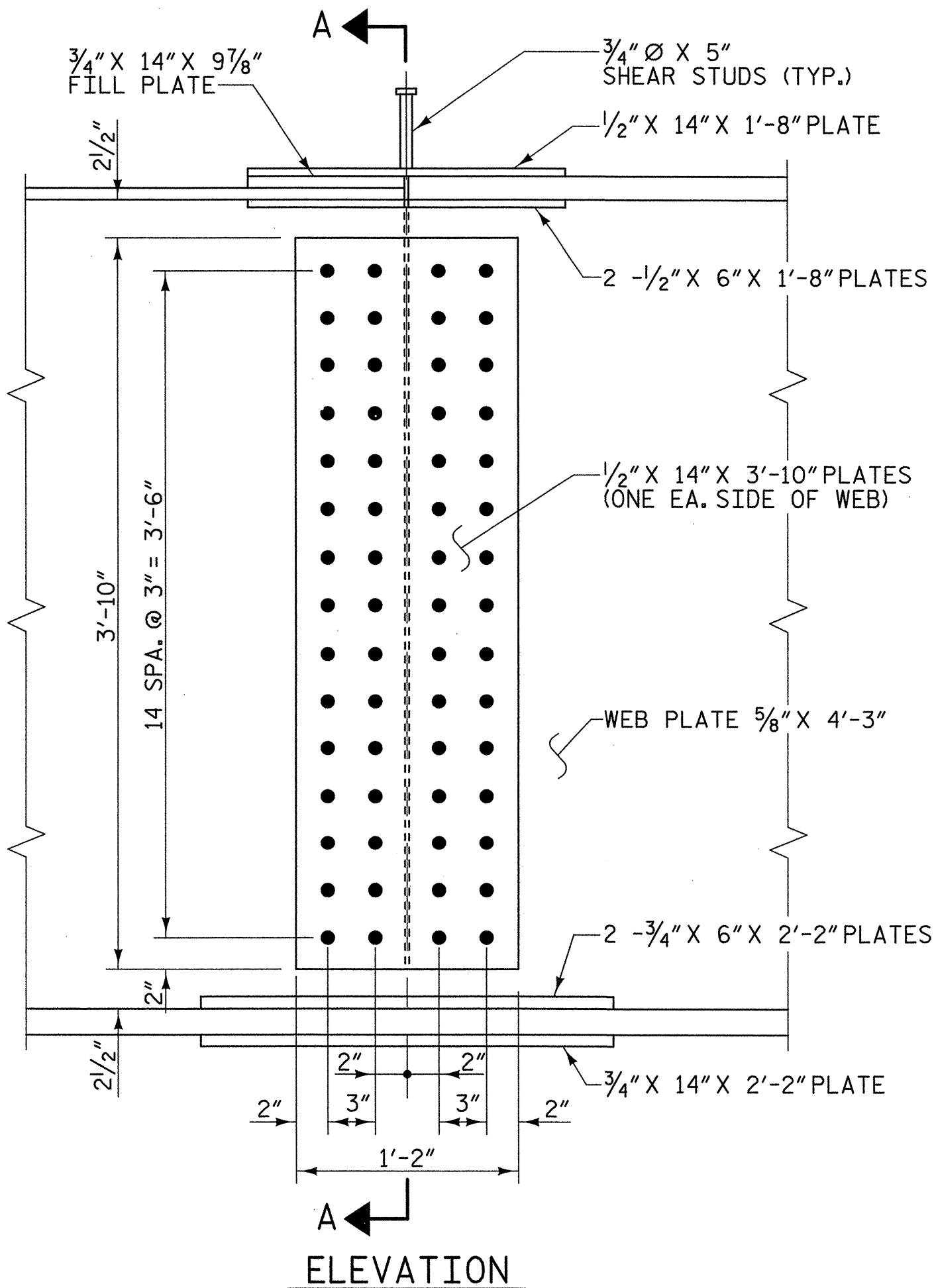
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-9	
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2			4				

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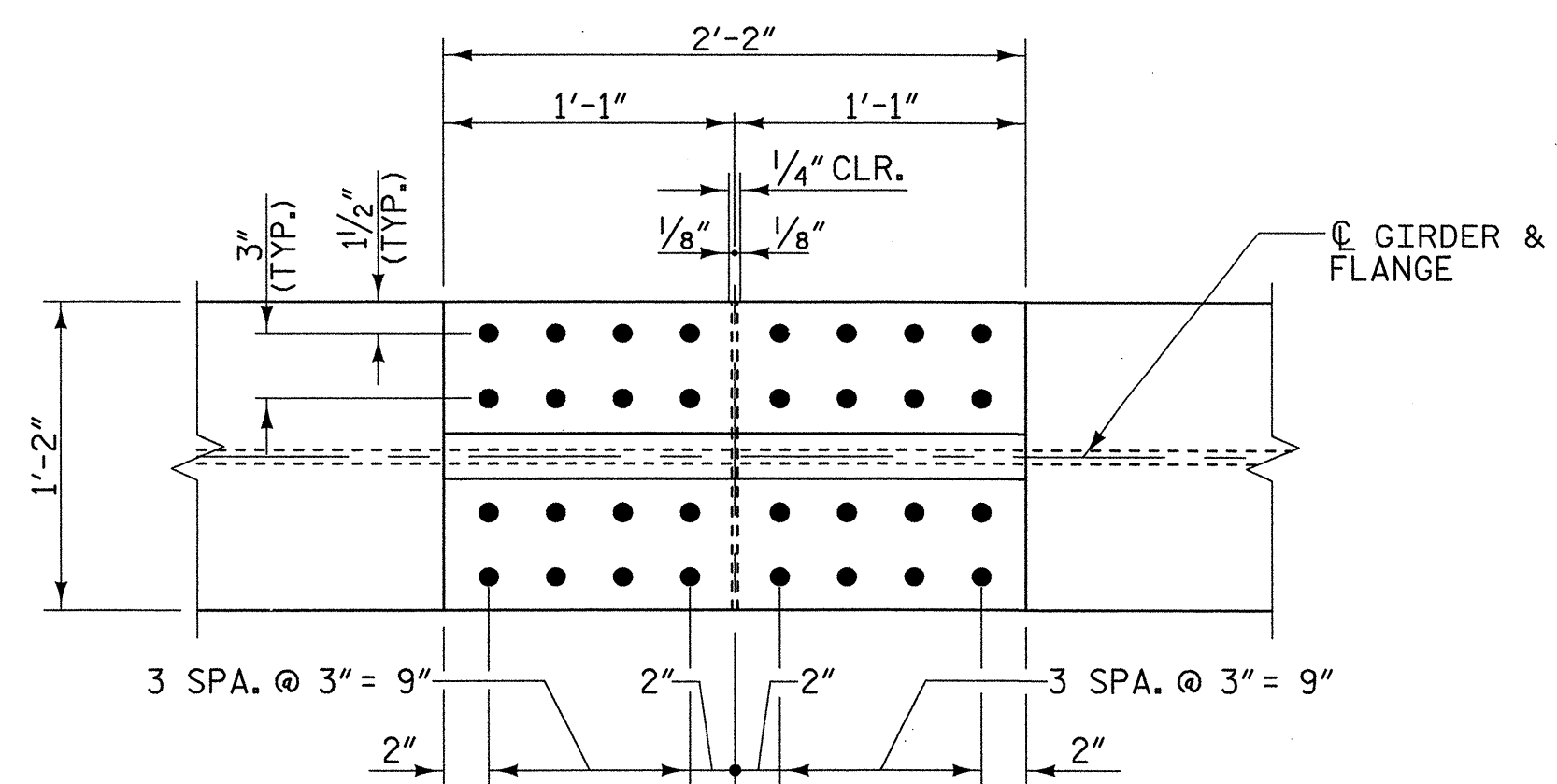
DRAWN BY: W.B. ALLEN DATE: 3/07  
 CHECKED BY: M. A. AVERETTE DATE: 3/07



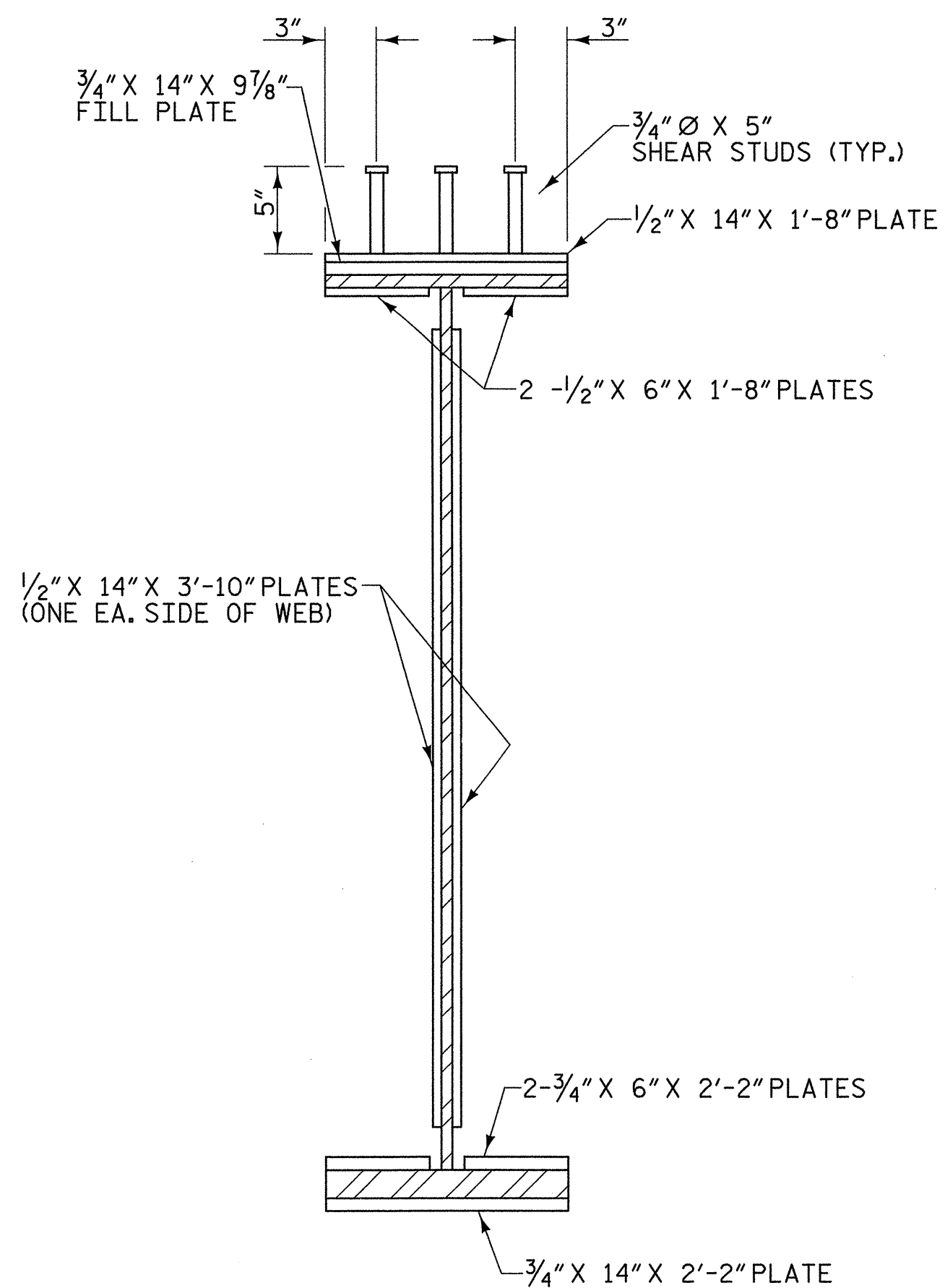
PLAN - TOP FLANGE



ELEVATION



PLAN - BOTTOM FLANGE



SECTION THRU SPLICE  
(SECTION A-A)

FIELD SPILCE DETAILS

STRUCTURAL STEEL NOTES

ALL STRUCTURAL STEEL TO BE AASHTO M270 GRADE 50W.  
ALL DIMENSIONS SHOWN ARE HORIZONTAL OR VERTICAL UNLESS OTHERWISE NOTED.  
ALL FIELD CONNECTIONS TO BE 7/8" DIA. HIGH STRENGTH BOLTS UNLESS OTHERWISE NOTED.

BEARING STIFFENERS SHALL BE PLACED NORMAL TO THE WEB AT END BENTS AND ON SKEW AT THE BENT AND SHALL BE PLUMB.

① CHARPY V-NOTCH TESTS ARE REQUIRED FOR ALL TOP OR BOTTOM FLANGE PLATES WHICH FALL WITHIN THE LIMITS SHOWN ON SHEET S-9, ALL WEB PLATES, AND ALL SPLICE PLATES. IF A PERMITTED SHOP FLANGE SPLICE IS NOT USED CHARPY V-NOTCH TESTS WILL BE REQUIRED FOR THE ENTIRE FLANGE PLATE. FOR CHARPY V-NOTCH TESTS, SEE ARTICLE 1072-9 OF THE STANDARD SPECIFICATIONS.

CAMBERED GIRDER LENGTHS SHALL BE ADJUSTED AND BEARINGS ARE TO BE PLACED ON THE CAMBERED GIRDER SO AS TO BE ALIGNED WITH THE ANCHORS AFTER THE DEAD LOAD DEFLECTION HAS OCCURRED. SHOP PLANS SHALL BE PREPARED ACCORDINGLY.

ALL CONNECTOR PLATES AT CROSSFRAMES SHALL BE PLACED IN PAIRS EXCEPT AT EXTERIOR GIRDERS WHERE THEY WILL BE PLACED ON THE INSIDE FACE ONLY.

ENDS OF THE PLATE GIRDERS SHALL BE IN A PLUMB POSITION AFTER THE TOTAL DEAD LOAD DEFLECTION HAS OCCURRED. SHOP PLANS SHALL BE PREPARED ACCORDINGLY.

INTERMEDIATE DIAPHRAGMS CONNECTOR PLATES SHALL BE NORMAL TO THE GIRDER FLANGES AND WEB.

SHOP SPLICES ARE PERMITTED TO LIMIT THE MAXIMUM REQUIRED FLANGE PIECE LENGTHS TO 60 FEET AND WEB PIECE LENGTHS TO 45 FEET. PERMITTED FLANGE AND WEB SHOP SPLICES SHALL NOT BE LOCATED WITHIN 15 FEET OF MAXIMUM DEAD LOAD DEFLECTION NOR WITHIN 15 FEET OF INTERMEDIATE BEARINGS OF CONTINUOUS UNITS. KEEP 2'-0" MINIMUM BETWEEN WEB AND FLANGE SHOP SPLICES. KEEP 6" MINIMUM BETWEEN CONNECTOR PLATE OR TRANSVERSE STIFFENER WELDS AND WEB OR FLANGE SHOP SPLICES.

THE CONTRACTOR SHALL MAINTAIN STABILITY OF THE PLATE GIRDERS UNTIL ALL FIELD SPLICES AND CROSSFRAME CONNECTIONS HAVE BEEN COMPLETED. ALL STRUCTURAL STEEL ERECTION SHALL BE COMPLETE BEFORE FALSEWORK OR FORMS ARE PLACED ON THE SPAN.

STUDS ON GIRDERS MAY BE SHIFTED UP TO 1" IF NECESSARY TO CLEAR FLANGE SPLICE WELDS.

TENSION ON THE AASHTO M164 BOLTS SHALL BE CALIBRATED USING DIRECT TENSION INDICATOR WASHERS IN ACCORDANCE WITH ARTICLE 440-10 OF THE STANDARD SPECIFICATIONS.

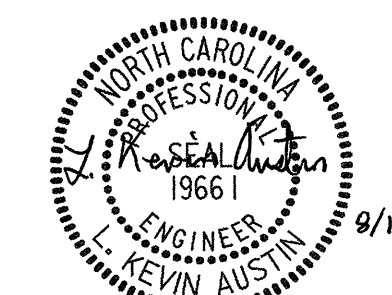
FOR HIGH STRENGTH BOLTS, SEE SPECIAL PROVISIONS.

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

SUPERSTRUCTURE  
STRUCTURAL STEEL  
DETAILS

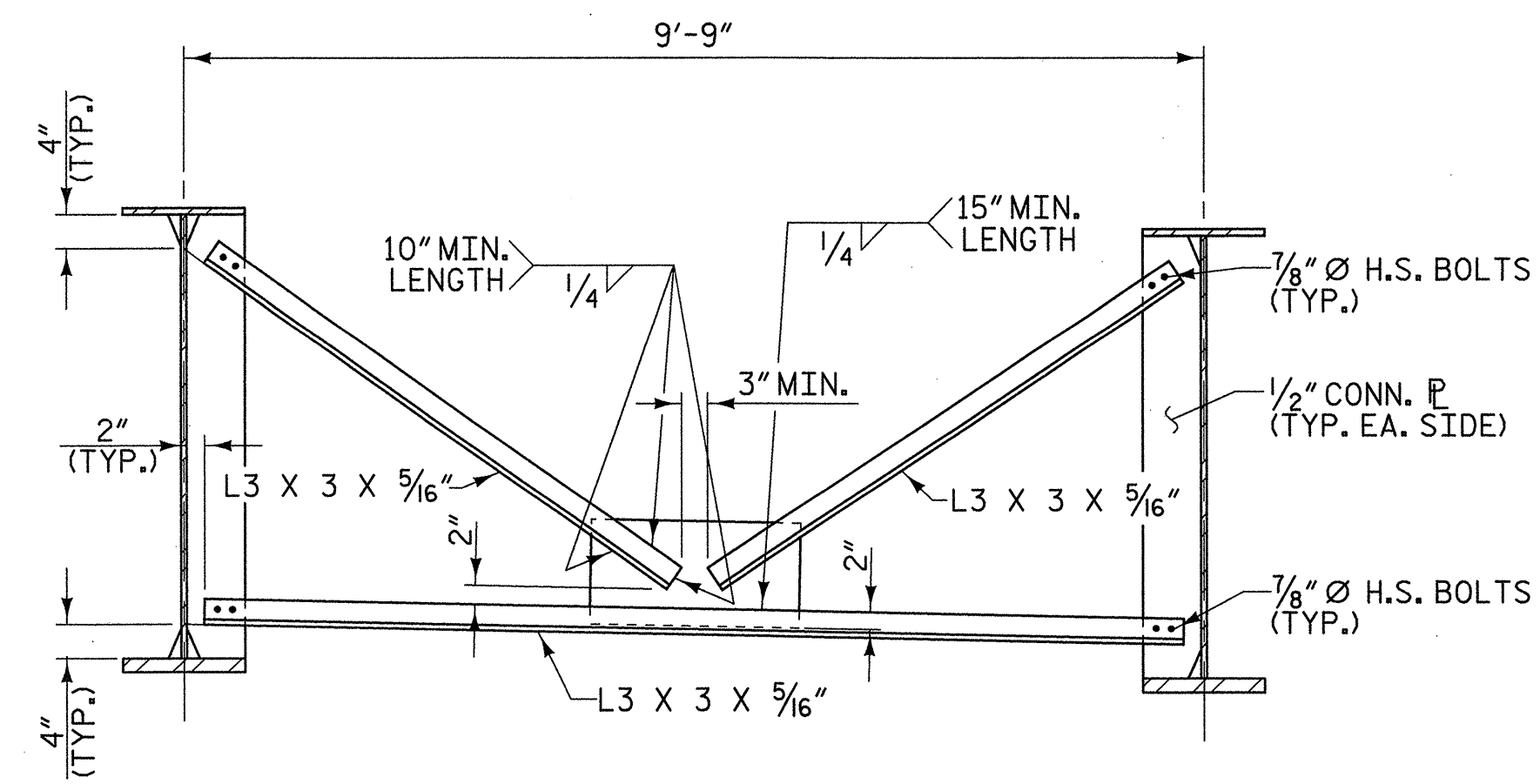


PLANS PREPARED BY:  
**MULKEY**  
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WWW.MULKEYINC.COM

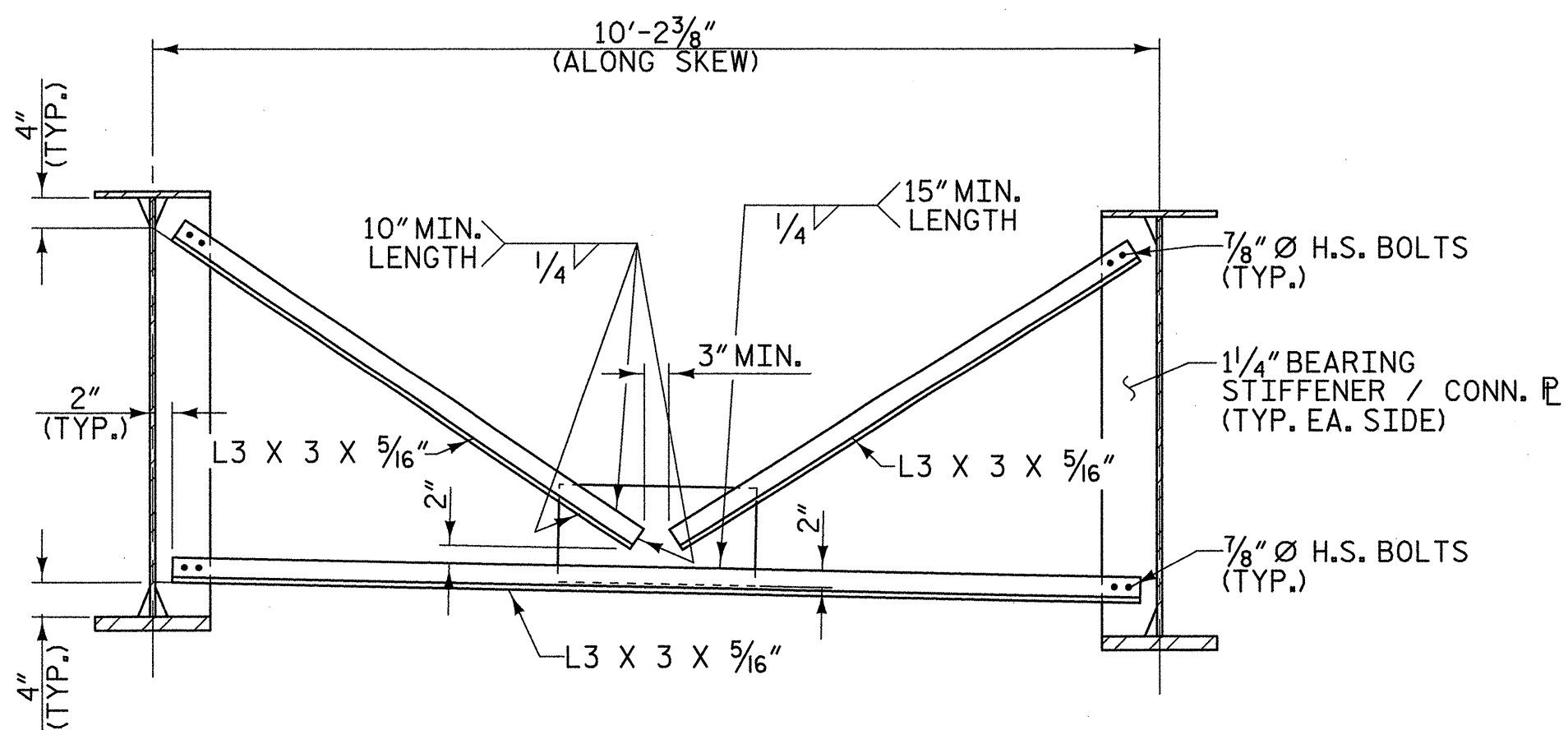
REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-10	
1			3			TOTAL SHEETS	
2			4				

DRAWN BY : W.B. ALLEN DATE : 3/07  
CHECKED BY : M.A. AVERETTE DATE : 3/07

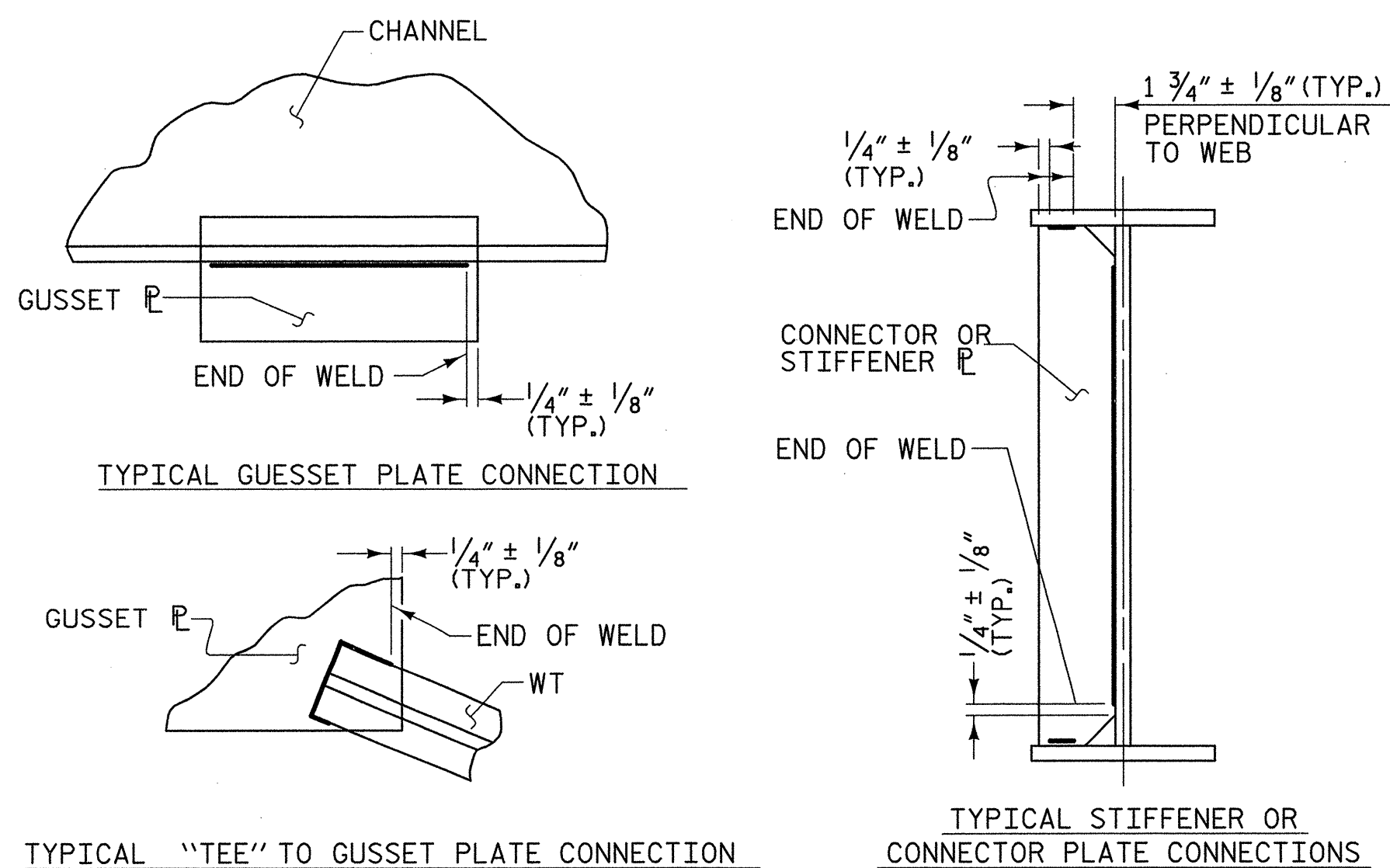
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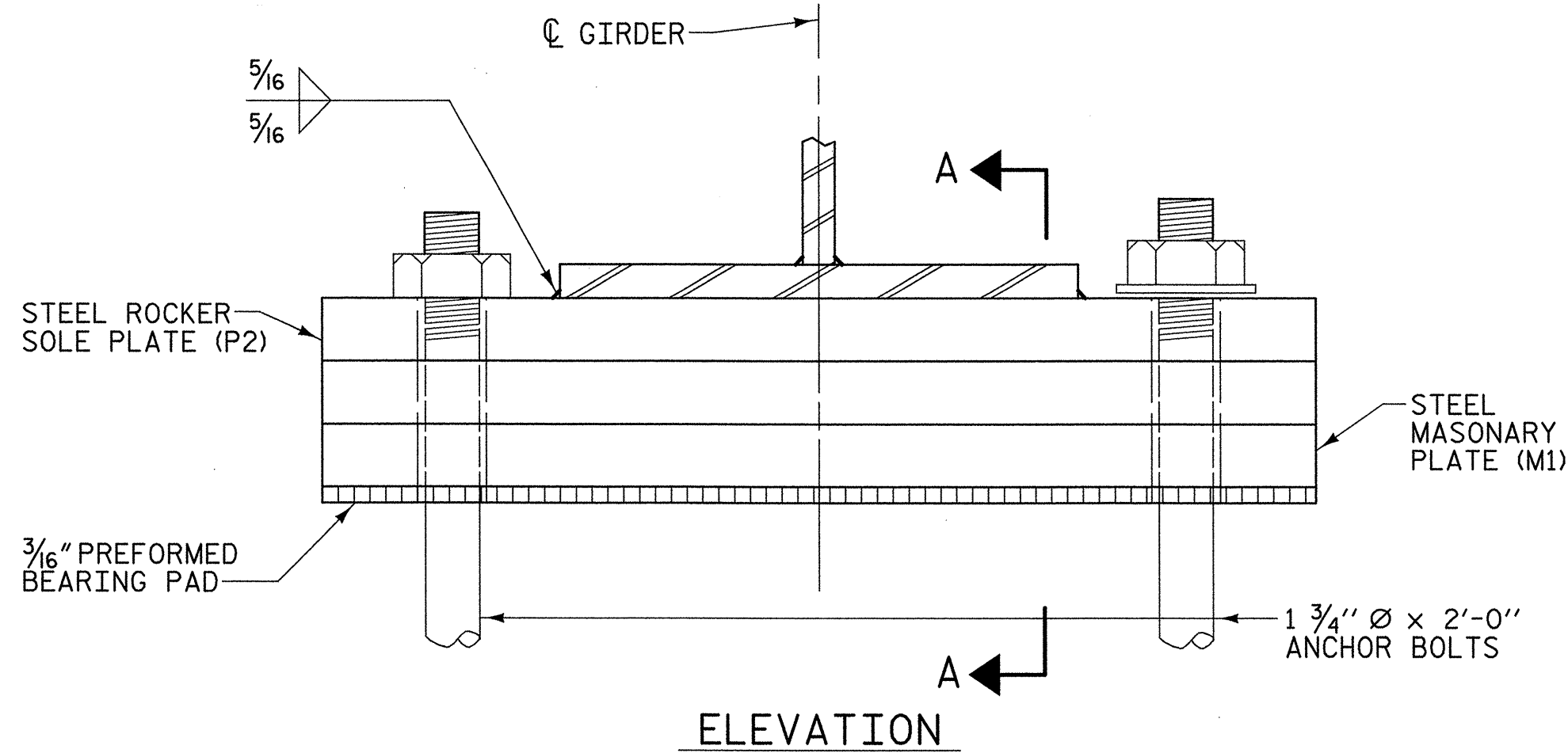
**D1 INTERMEDIATE DIAPHRAGM**



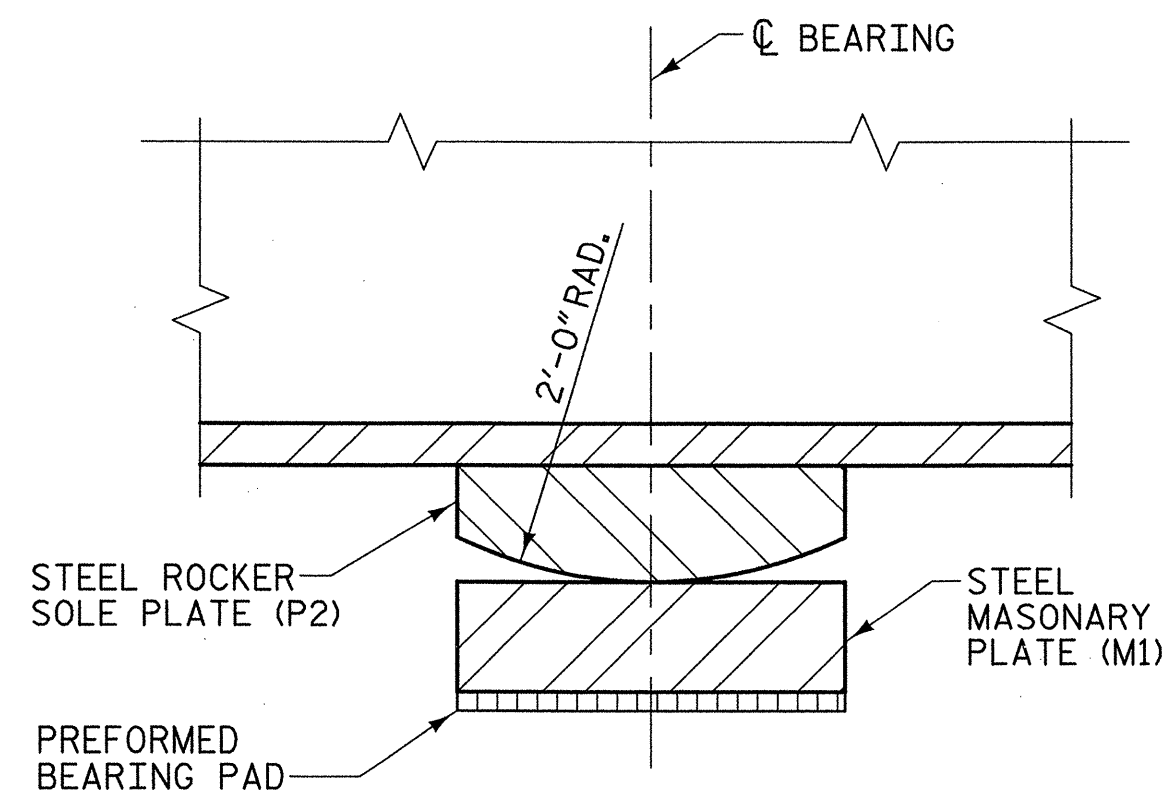
**D2 BENT DIAPHRAGM**



**WELD TERMINATION DETAILS**



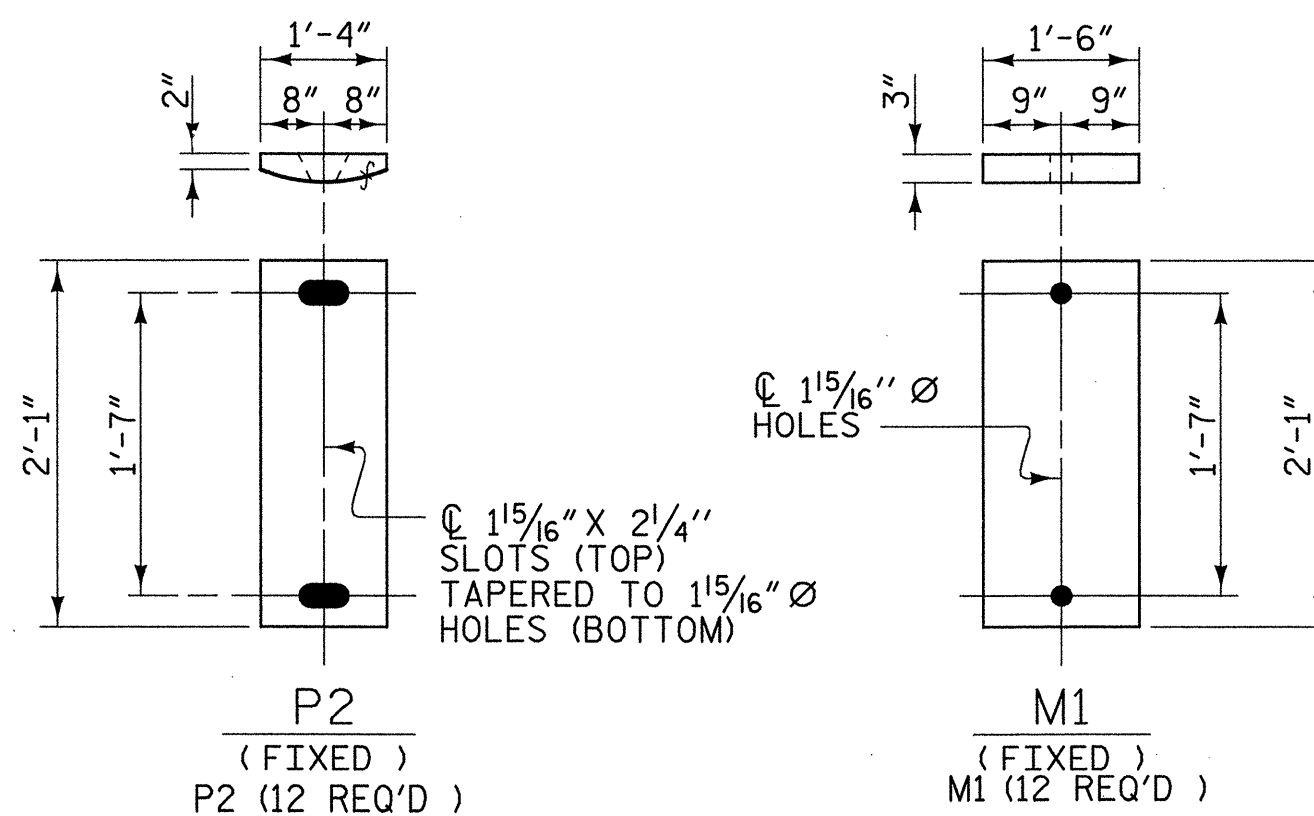
**ELEVATION**



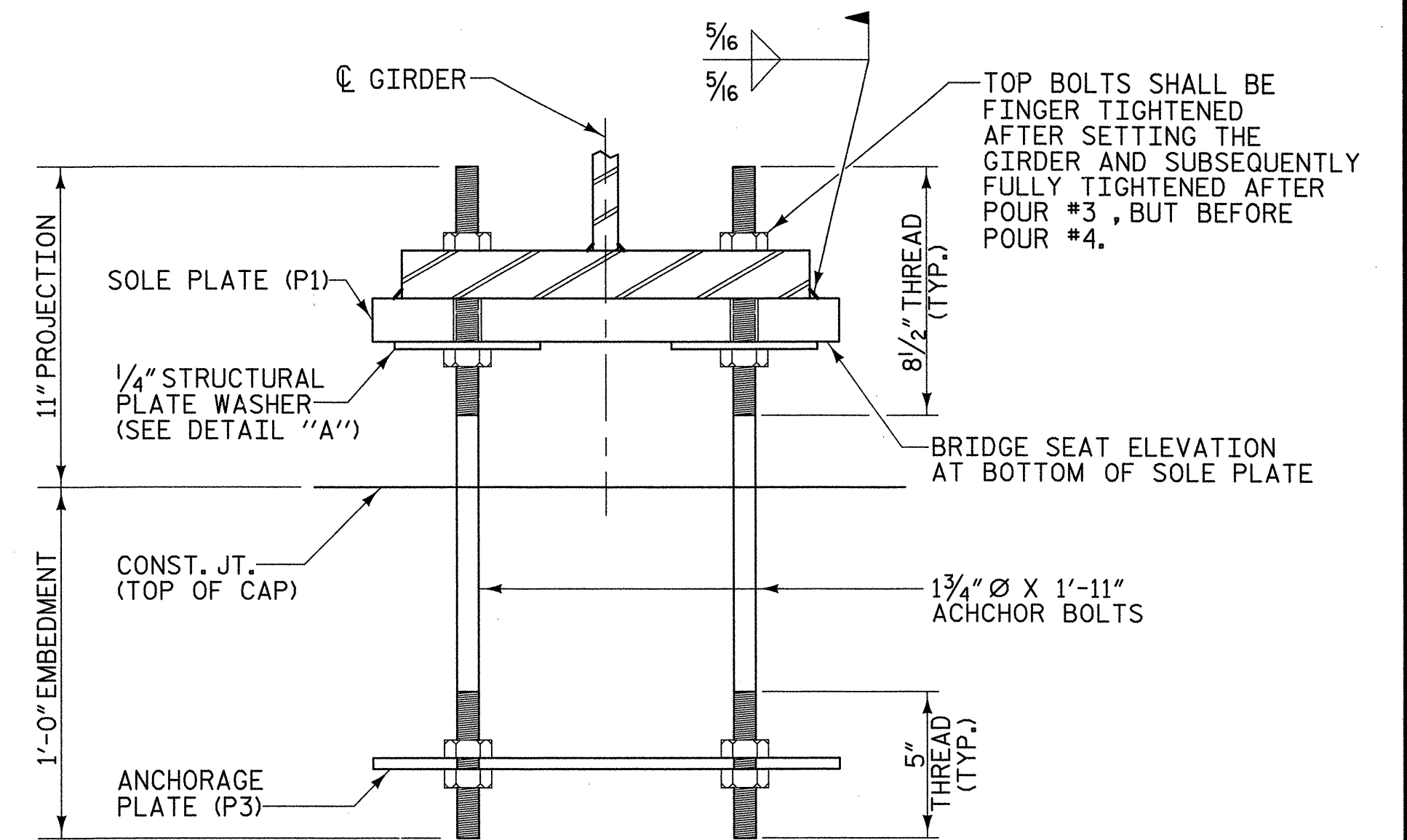
**SECTION A-A**

**FIXED BEARING DETAILS @ BENT**

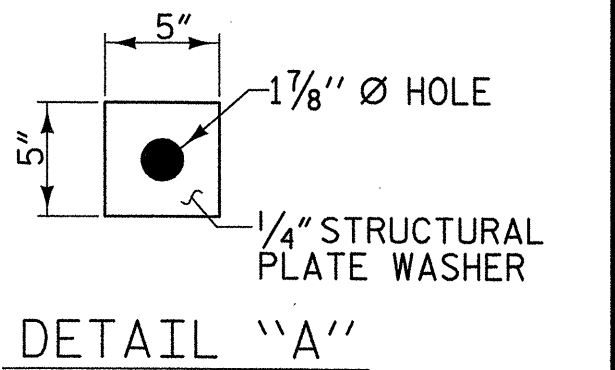
AT ALL FIXED POINTS OF SUPPORT, NUTS FOR ANCHOR BOLTS ARE TO BE TIGHTENED FINGER TIGHT AND THEN BACKED OFF 1/2 TURN. THE THREAD OF THE NUT AND BOLT SHALL THEN BE BURRED WITH A SHARP POINTED TOOL.



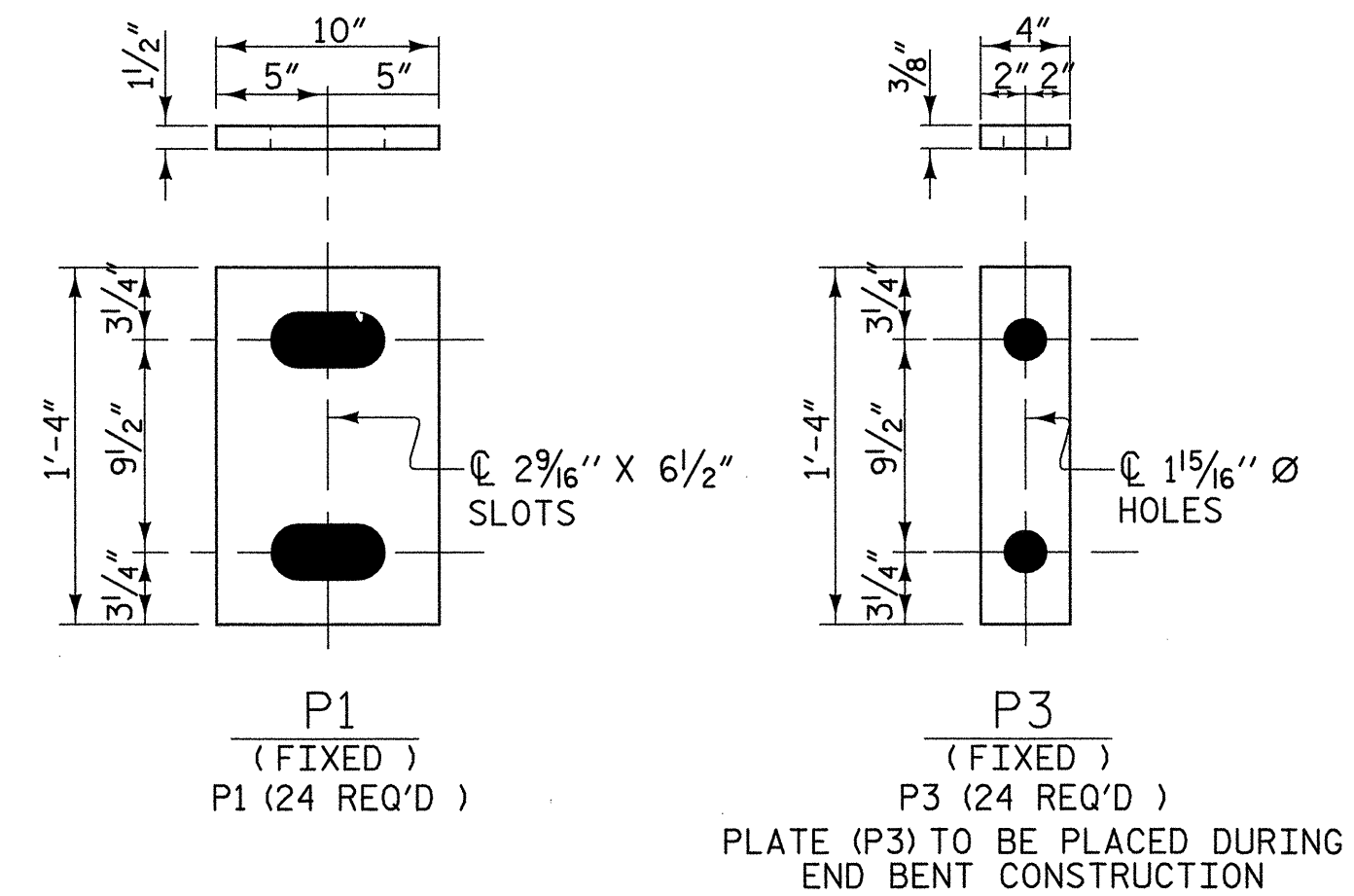
**BEARING PLATE DETAILS FOR FIXED BEARING @ BENT**



**END VIEW (FIXED)**



**DETAIL "A"**



**SOLE PLATE AND ANCHORAGE DETAILS @ INTEGRAL END BENTS**

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE  
 STRUCTURAL STEEL  
 DETAILS**



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

DRAWN BY: W.B. ALLEN DATE: 3/07  
 CHECKED BY: M.A. AVERETTE DATE: 3/07

8/1/2007 5:55:36 AM R:\Structures\U4756.SP.SS.03.dgn



**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.

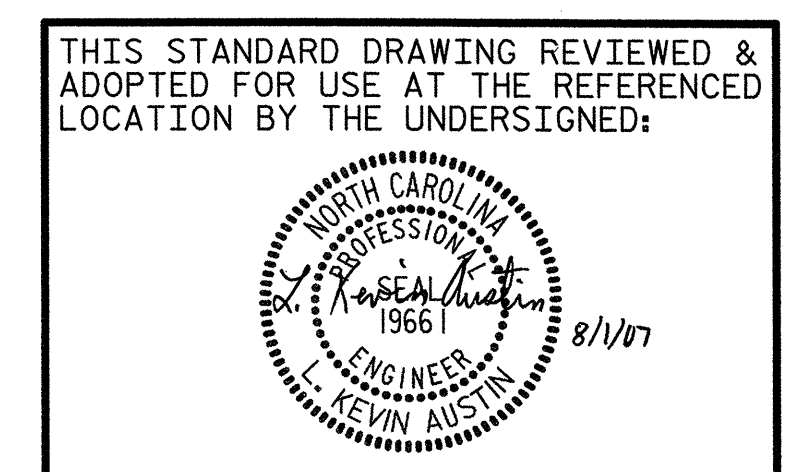
TO INSURE FUTURE IDENTIFICATION OF THE FABRICATOR, A PERMANENT IDENTIFYING MARK SHALL BE PLACED ON EACH POST. THE METHOD OF MARKING AND LOCATION SHALL BE SUCH THAT IT DOES NOT DETRACT FROM THE APPEARANCE OF THE POST, BUT REMAIN VISIBLE AFTER RAIL PLACEMENT.

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 = 567'-4 3/4" LIN. FT.

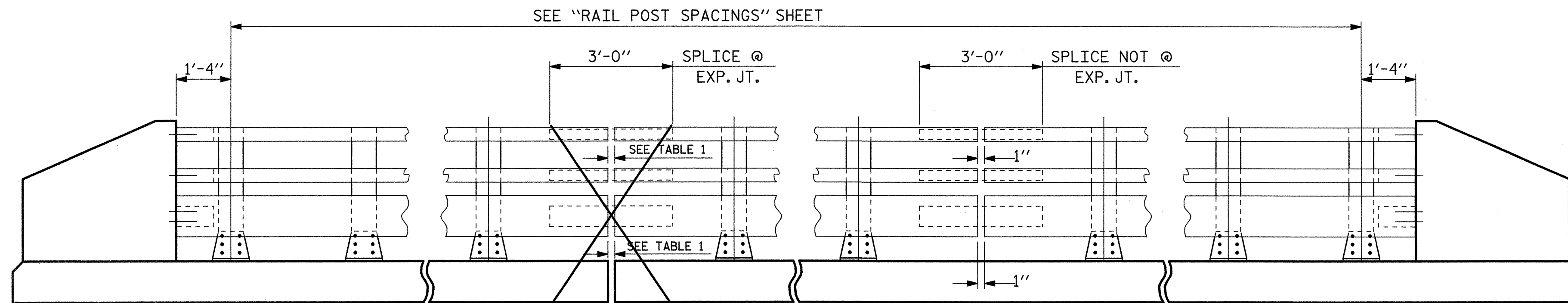


PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 1 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 STANDARD  
**3 BAR METAL RAIL**

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

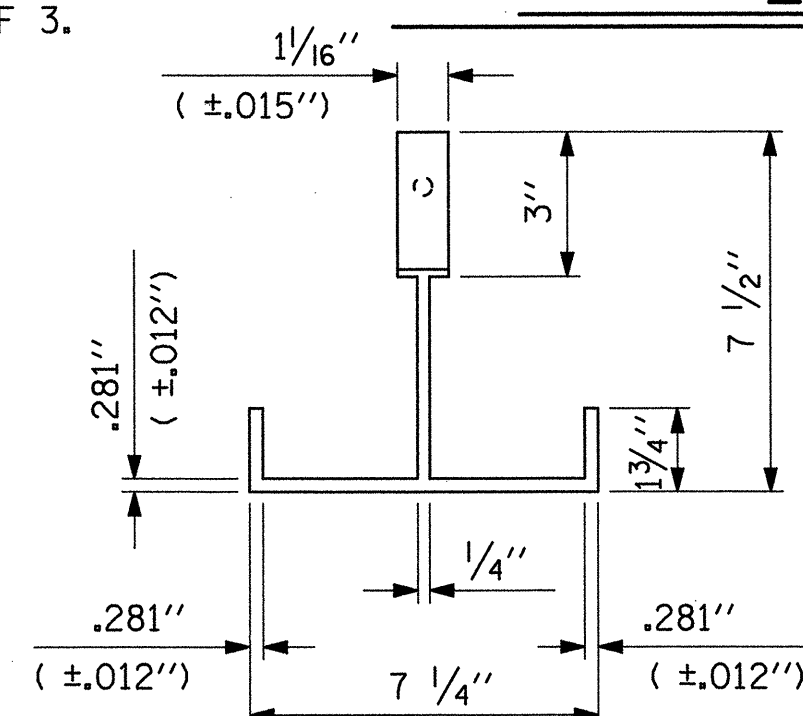
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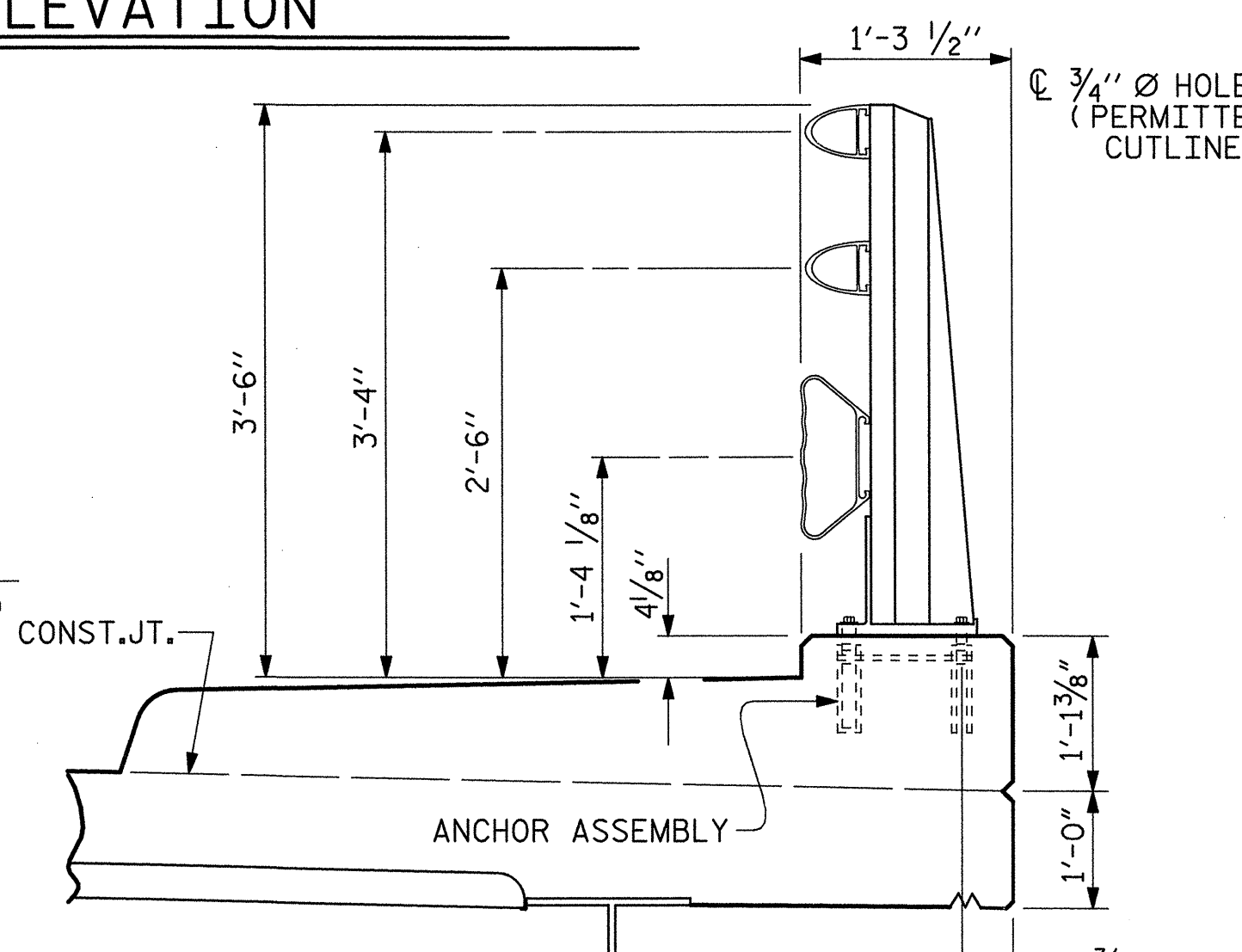
NOTE:  
 FOR ATTACHMENT OF METAL RAIL TO END POST, SEE "3 BAR METAL RAIL", SHT. 3 OF 3.

**ELEVATION**

EXP. JT. @ BENT	RAIL OPENING
BENT No. 1	
BENT No. 2	
BENT No. 3	

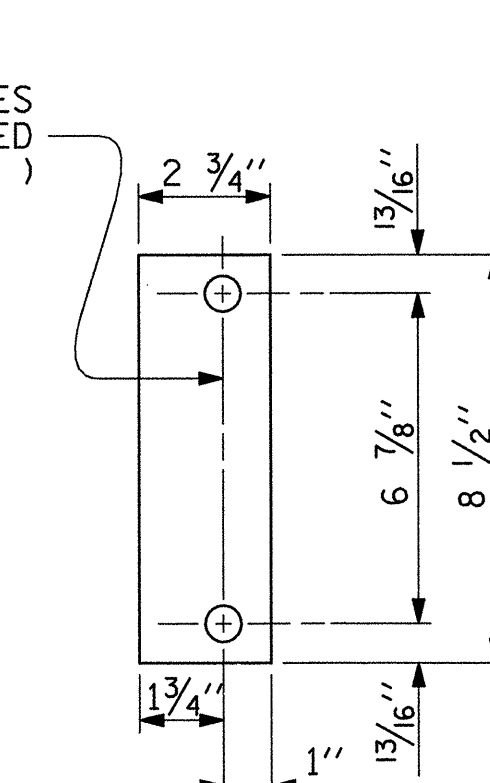


**PLAN**

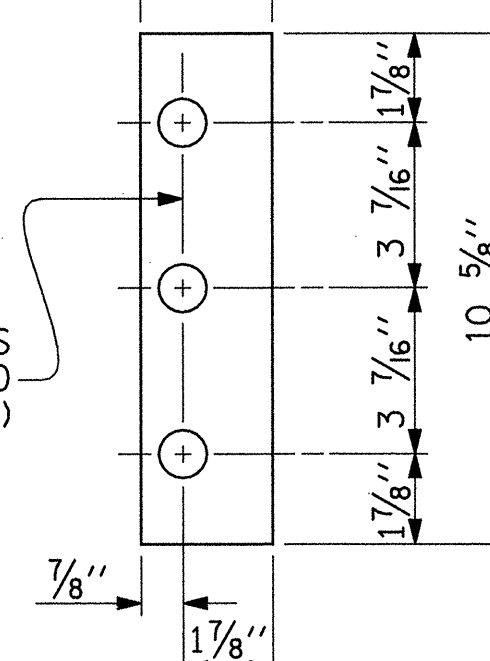


**SECTION THRU RAIL**

FOR ANCHOR ASSEMBLY, SEE "3 BAR METAL RAIL" SHT. 2 OF 3.

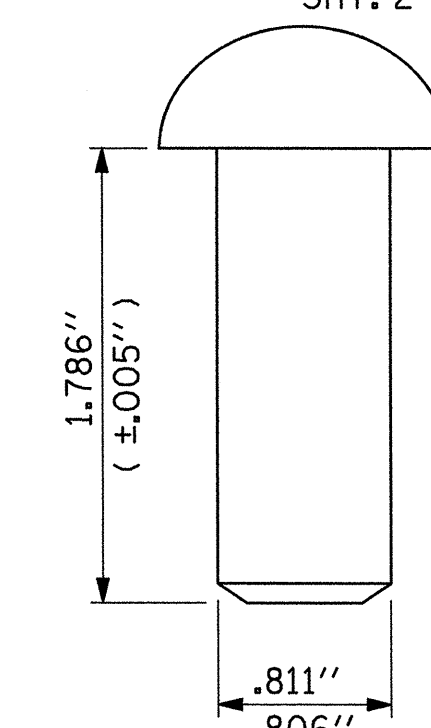


**REAR PLATE**

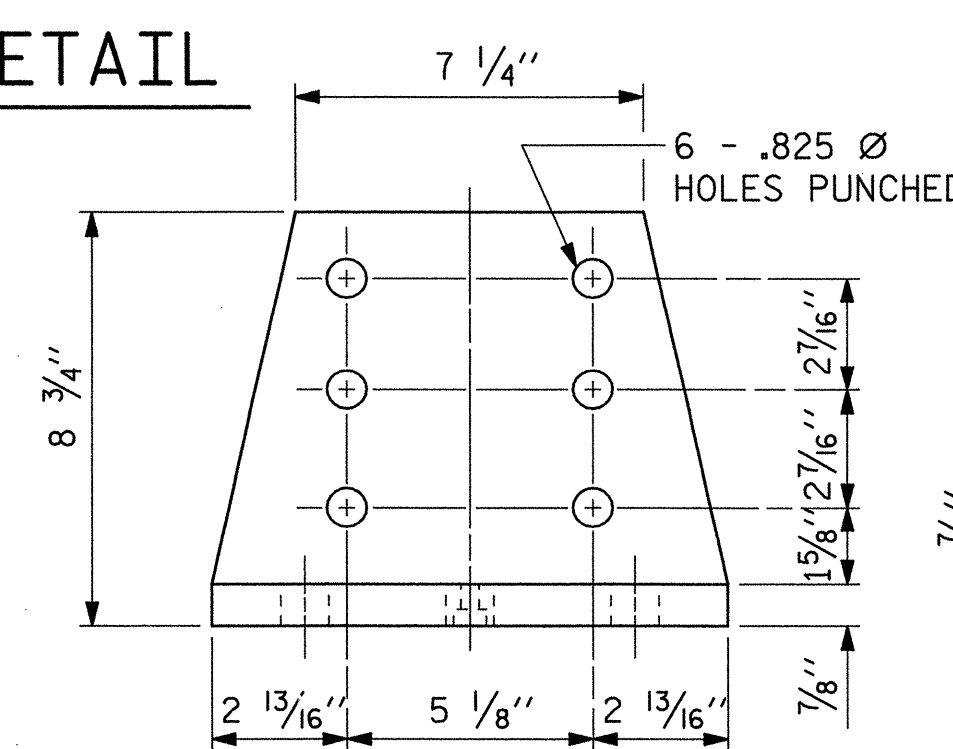


**FRONT PLATE SHIM DETAILS**

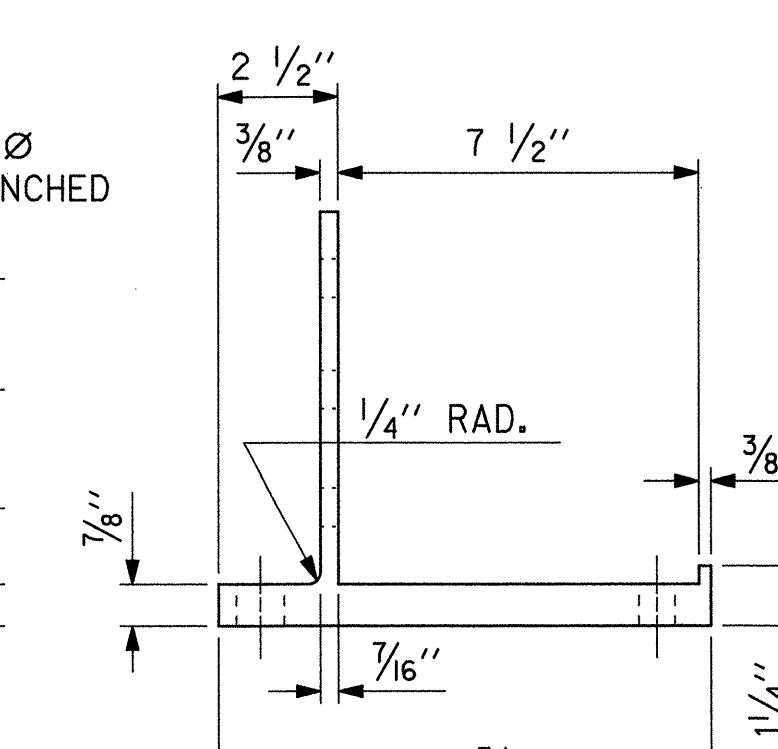
NOTE:  
 SHIMS MAY BE CUT ALONG PERMITTED CUTLINE OR SLOTTED TO EDGE OF PLATE TO FACILITATE PLACEMENT.



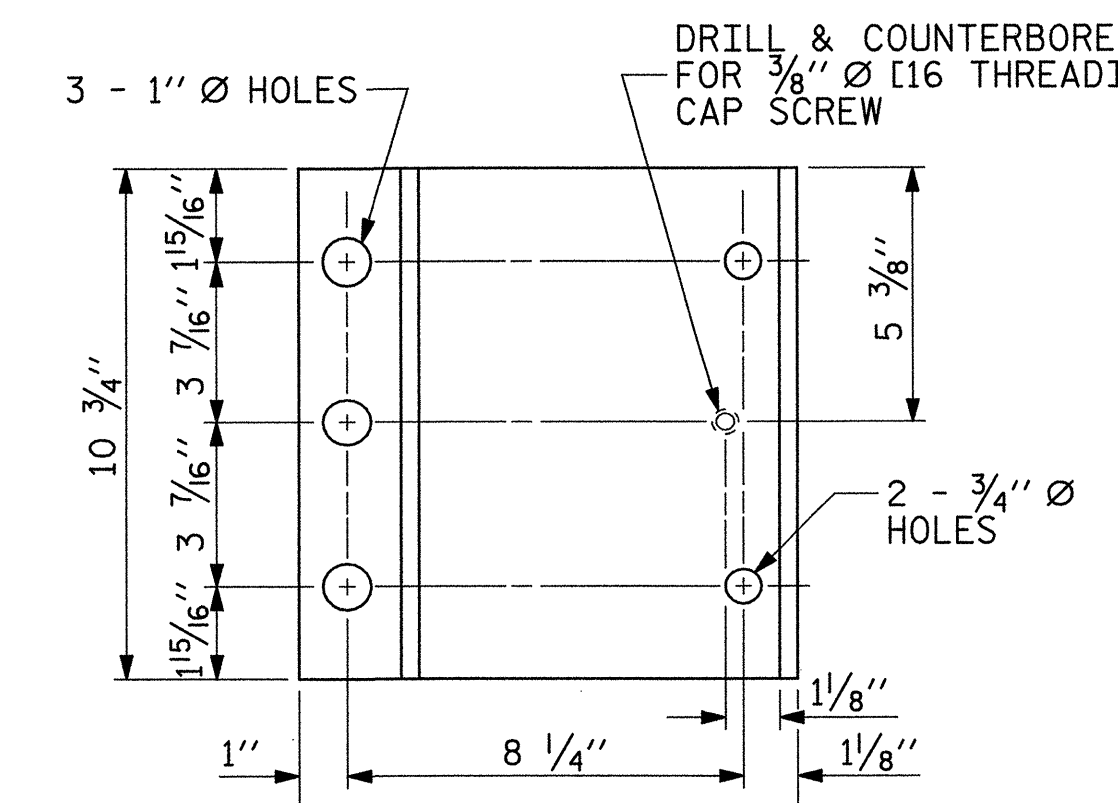
**RIVET DETAIL**



**FRONT ELEVATION**

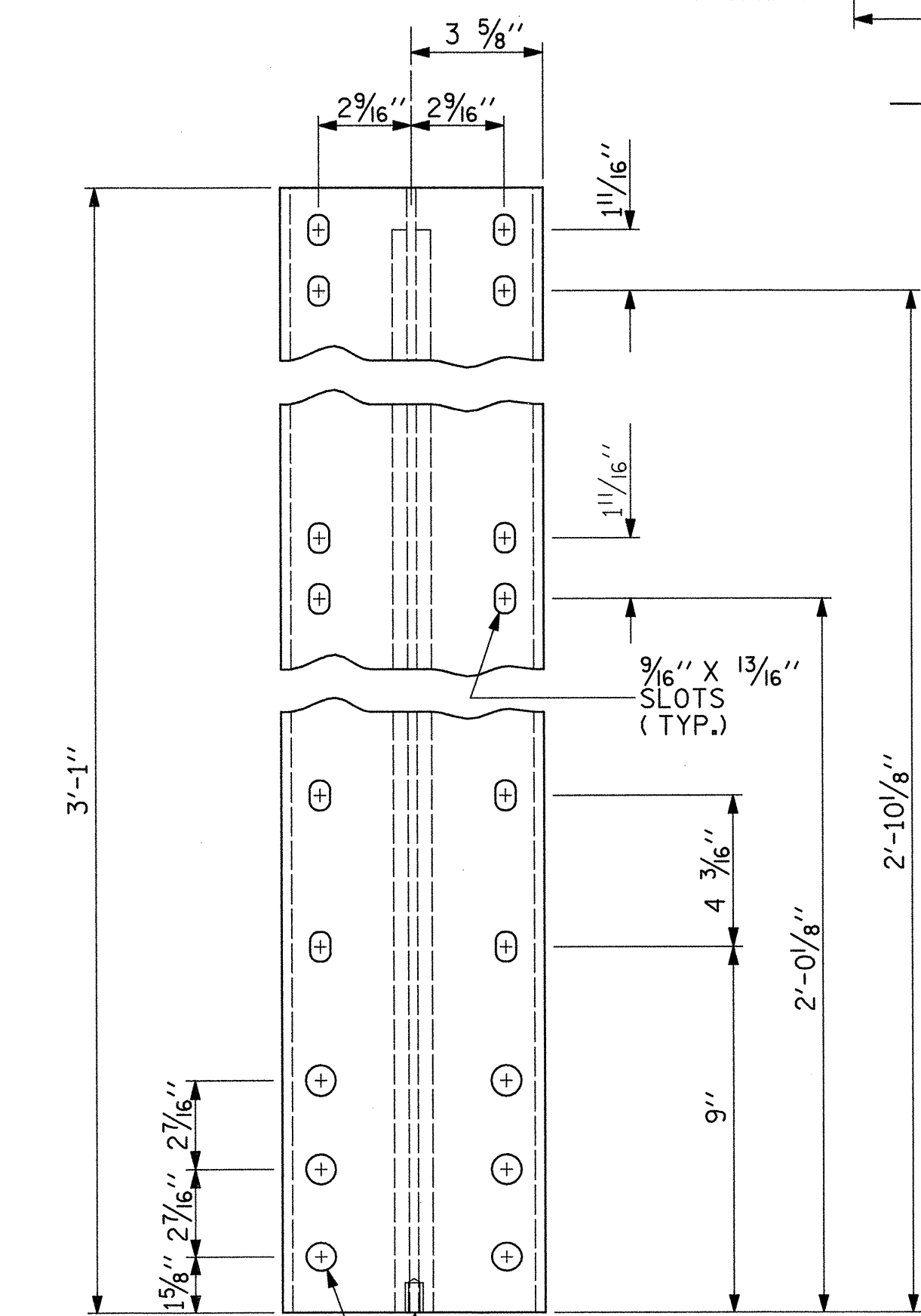


**SIDE ELEVATION**

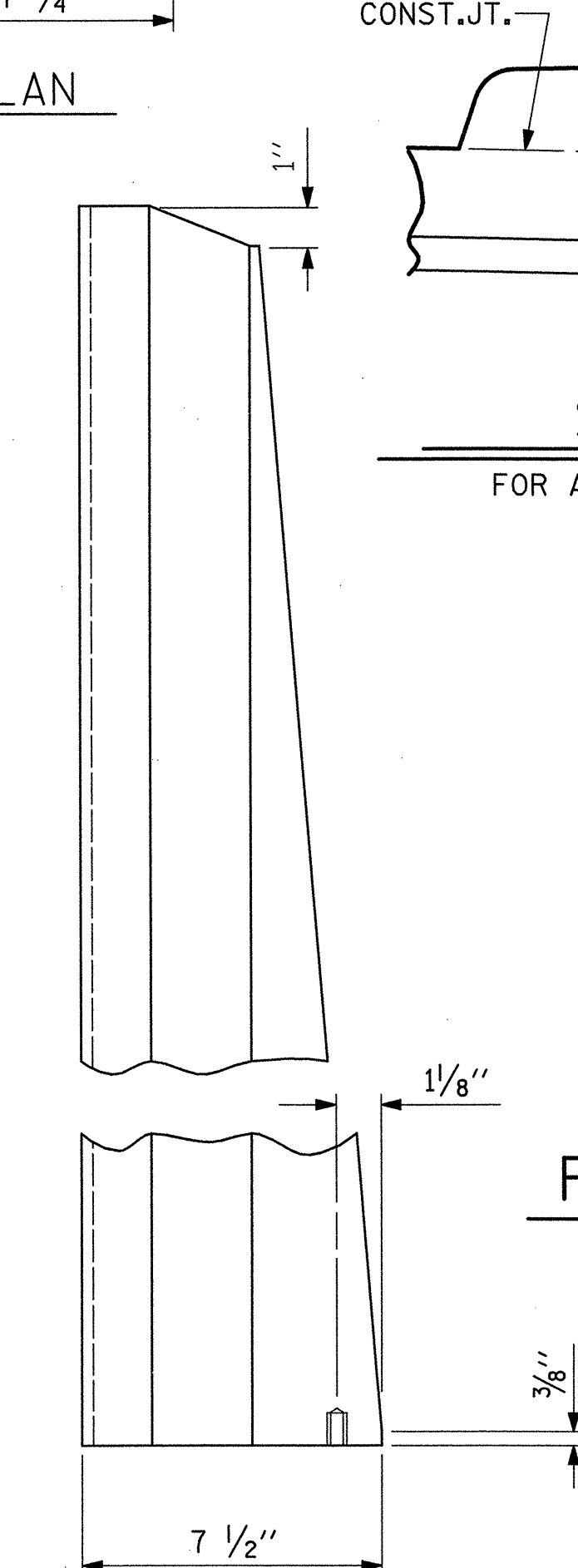


**PLAN**

**POST BASE DETAILS**



**FRONT ELEVATION**



**SIDE ELEVATION**

**DETAILS OF POST**

6 - .825" Ø HOLES PUNCHED FOR RIVETS  
 5/16" Ø DRILL 1" DEEP & 3/8" Ø [16 THREAD] TAP  
 7/8" DEEP FOR 3/8" X 1 1/2" STAINLESS STEEL CAP SCREW

ASSEMBLED BY: W.B. ALLEN	DATE: 3/07
CHECKED BY: M.A. AVERETTE	DATE: 3/07
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

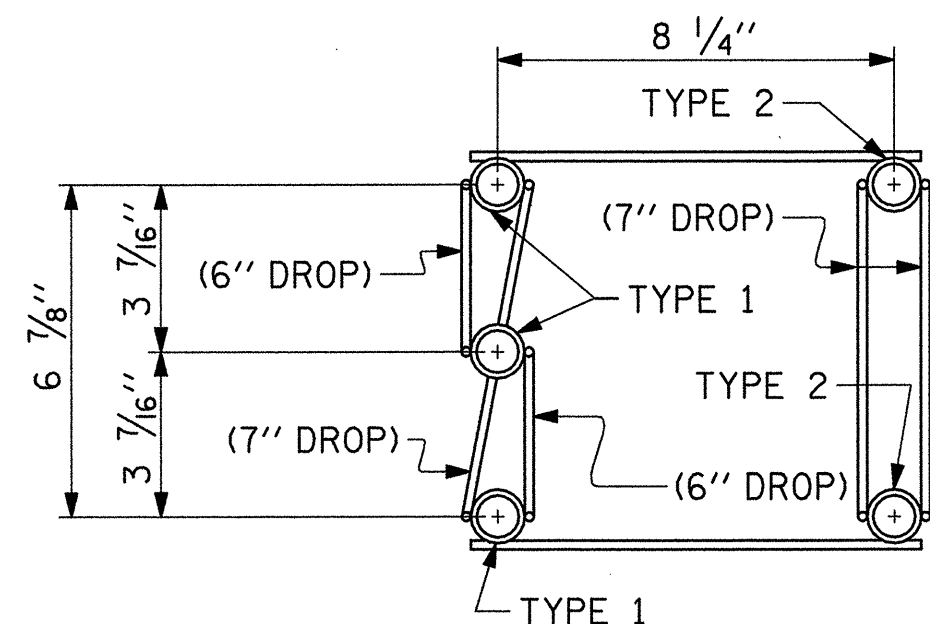
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**NOTES**

**STRUCTURAL CONCRETE ANCHOR ASSEMBLY**

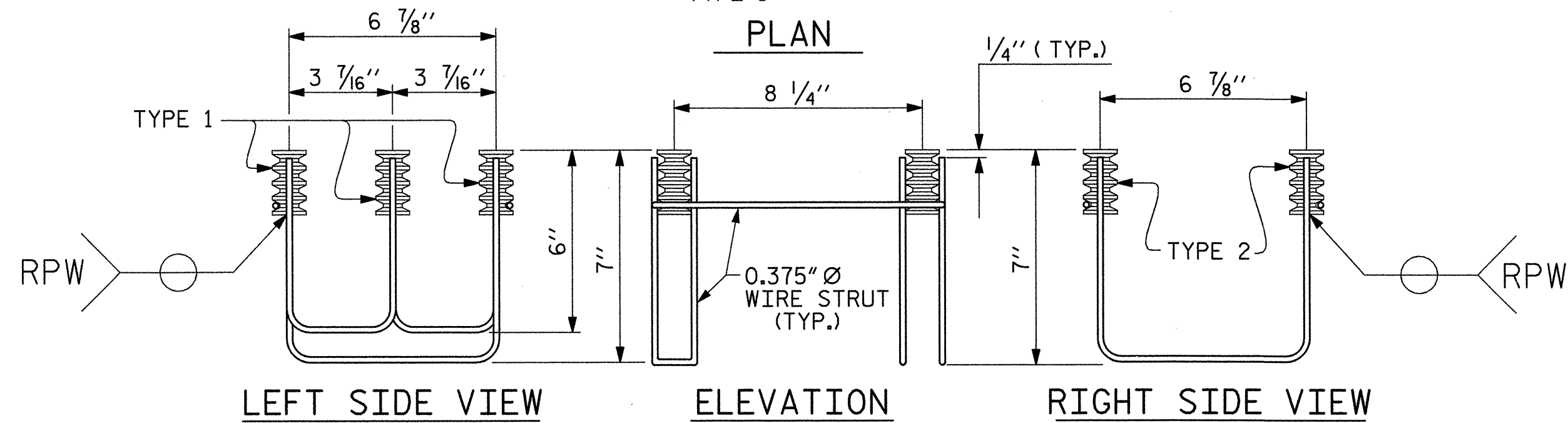
THE STRUCTURAL CONCRETE ANCHOR ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- 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 1/4" 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 1/6" 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.



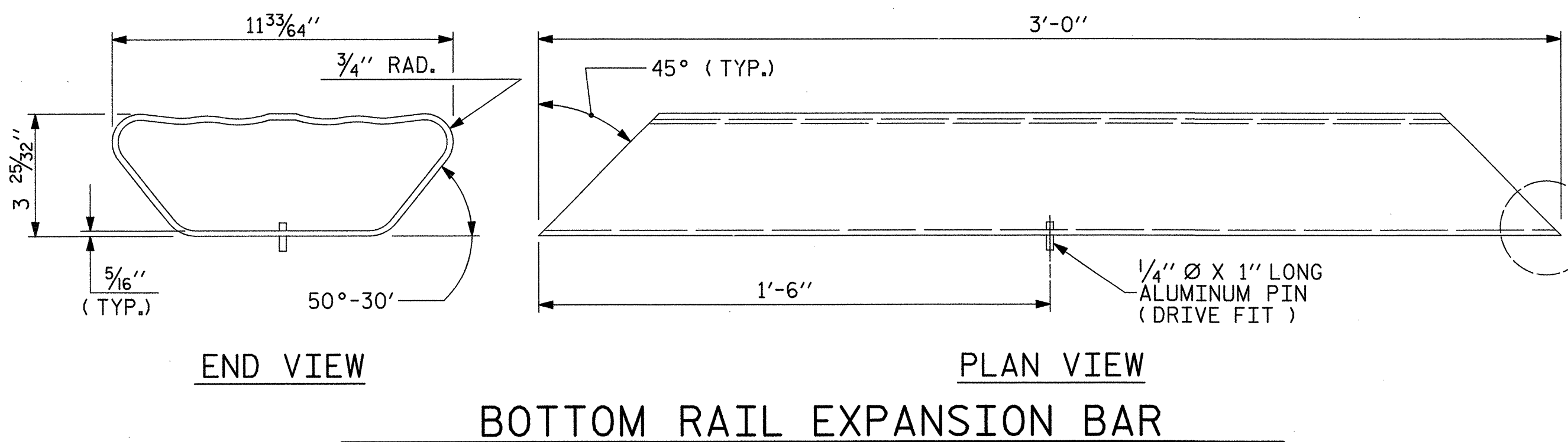
**TYPE 1 FERRULE**  
 THREADED STEEL FERRULES  
 WITH CLOSED BOTTOM TO FIT  
 3/4" Ø BOLT WITH ROUND WASHER.

**TYPE 2 FERRULE**  
 THREADED STEEL FERRULES  
 WITH CLOSED BOTTOM TO FIT  
 5/8" Ø BOLT WITH ROUND WASHER.



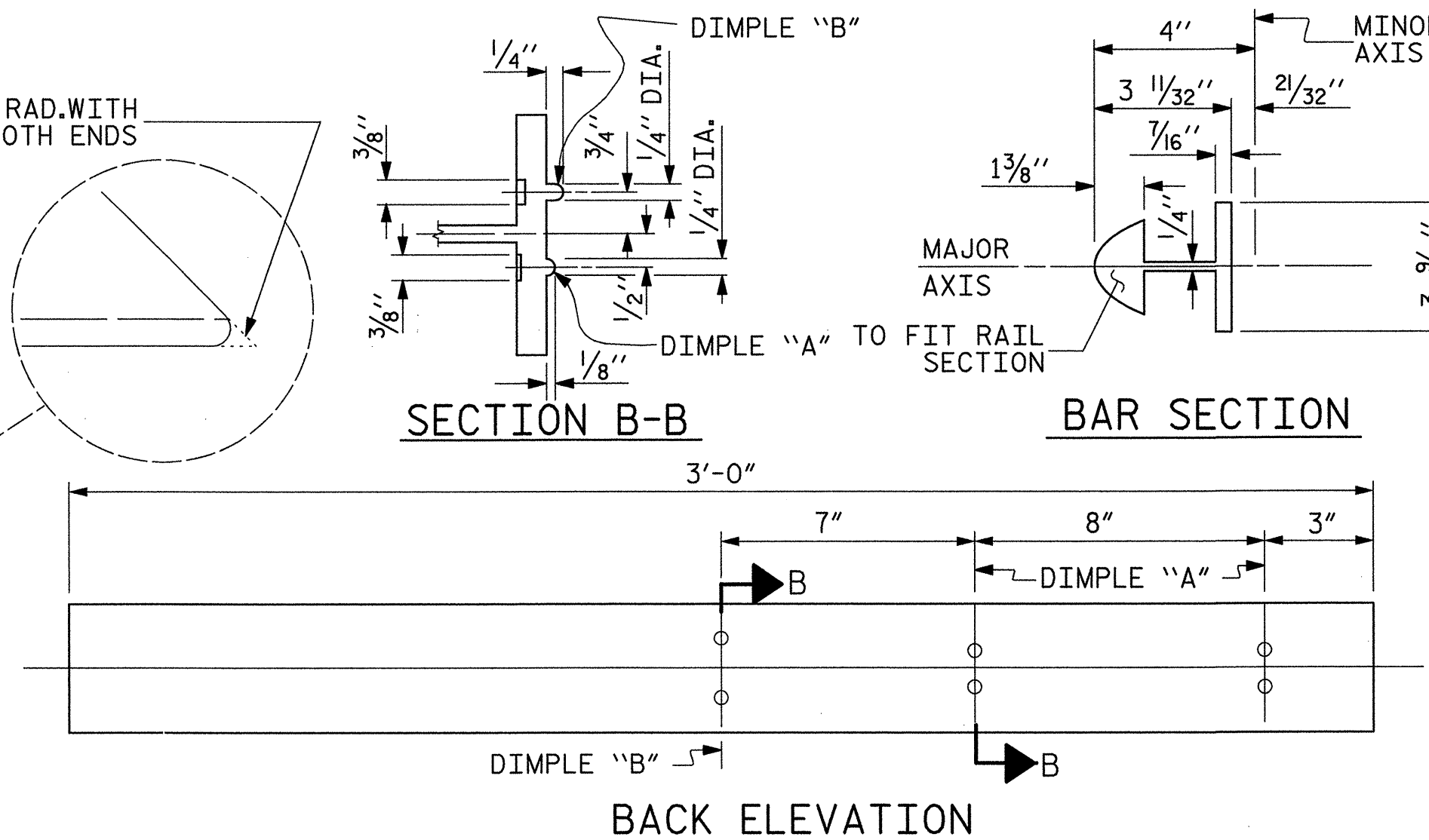
**5-BOLT METAL RAIL ANCHOR ASSEMBLY**

( 94 ASSEMBLIES REQUIRED )

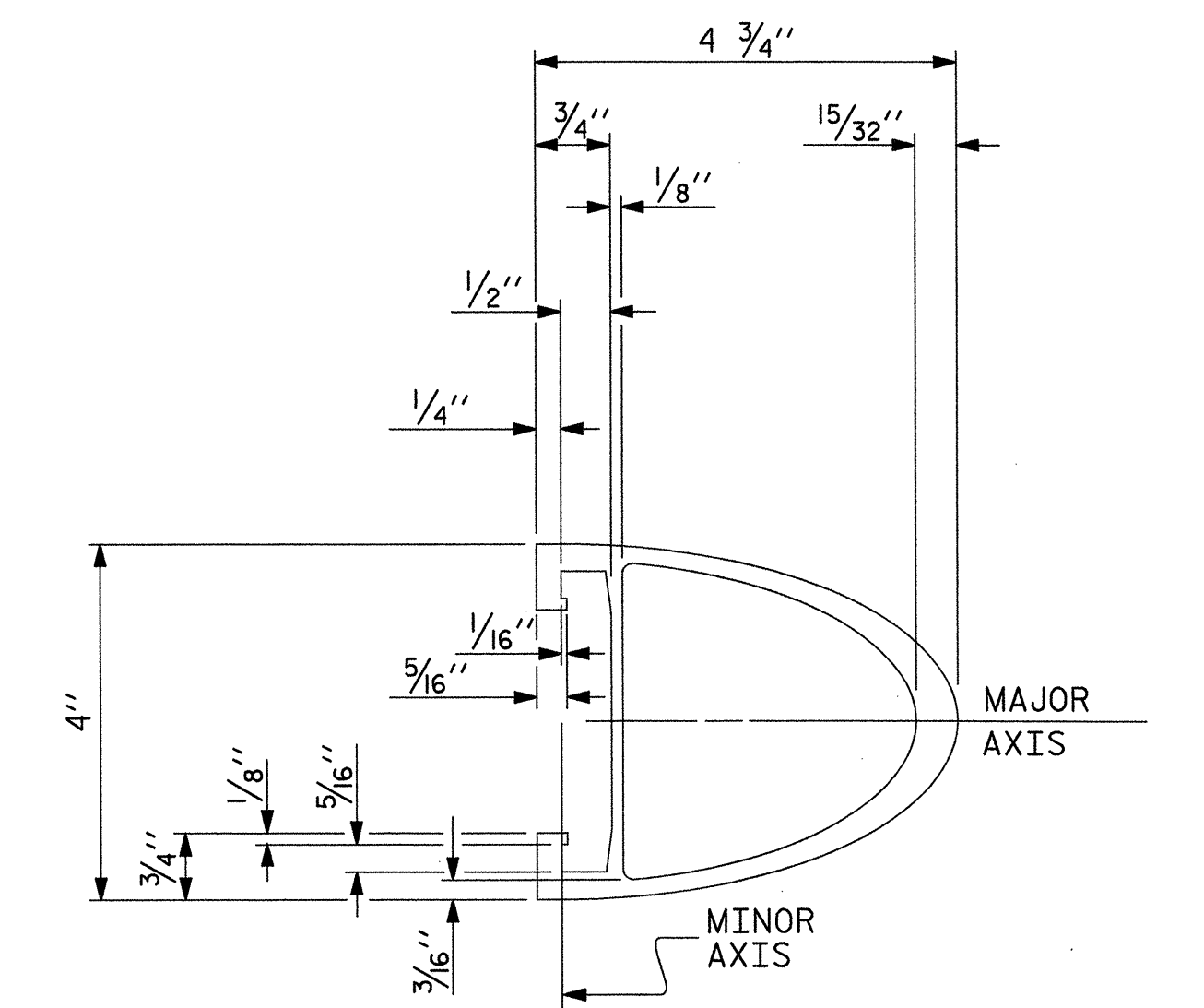


**BOTTOM RAIL EXPANSION BAR**

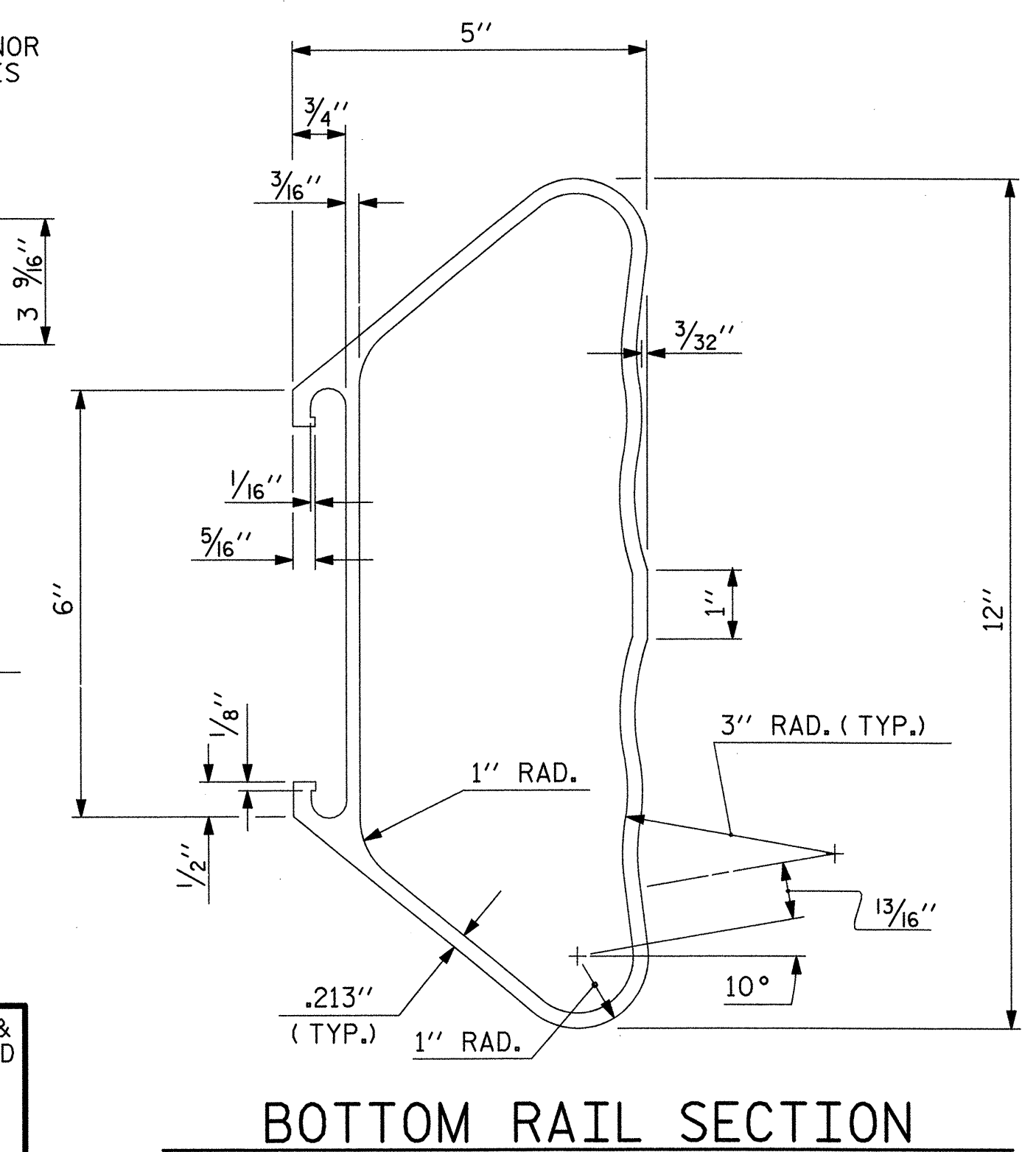
BREAK 1/8" RAD. WITH GRINDER - BOTH ENDS



**TOP & MIDDLE RAIL EXPANSION BAR**

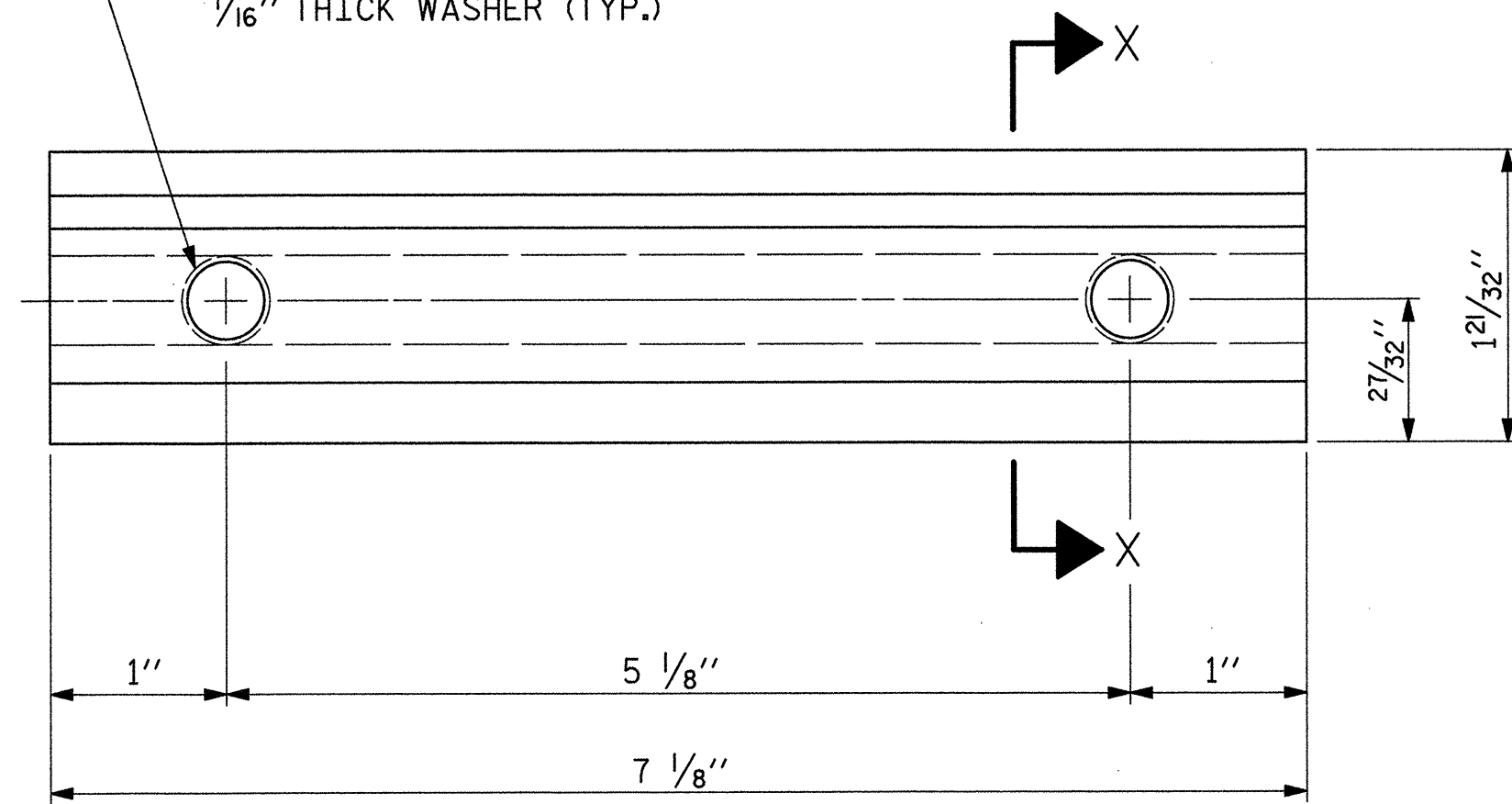


**TOP & MIDDLE RAIL SECTION**



**BOTTOM RAIL SECTION**

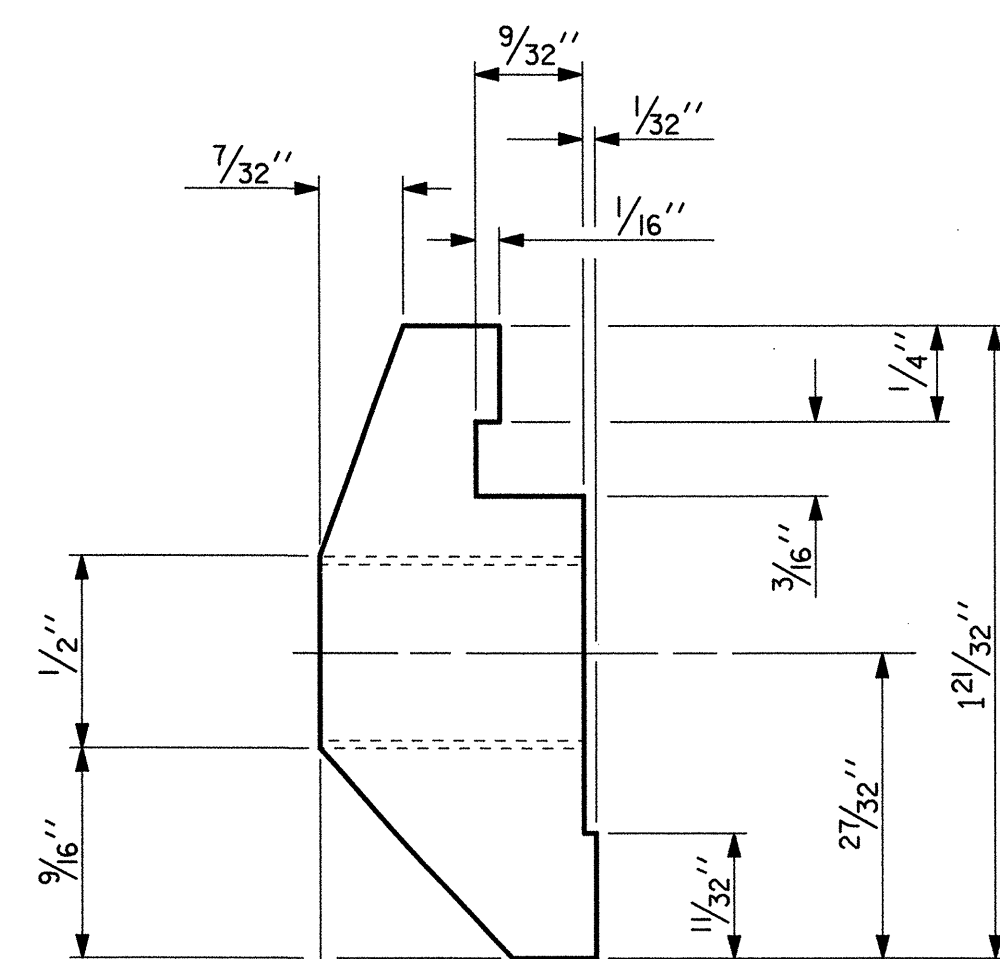
1/2" Ø [13 THREAD] HOLE FOR 1/2" Ø X 1" STAINLESS STEEL  
 HEX HEAD CAP SCREW & 1/16" O.D., 1 1/32" I.D.,  
 1/16" THICK WASHER (TYP.)



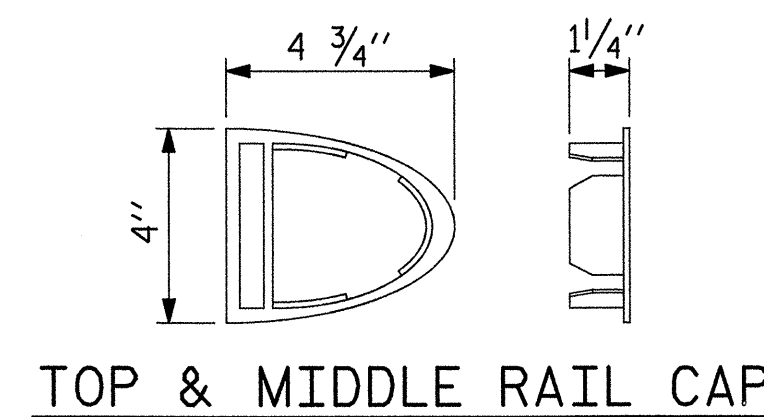
**ELEVATION**

**CLAMP BAR DETAIL**

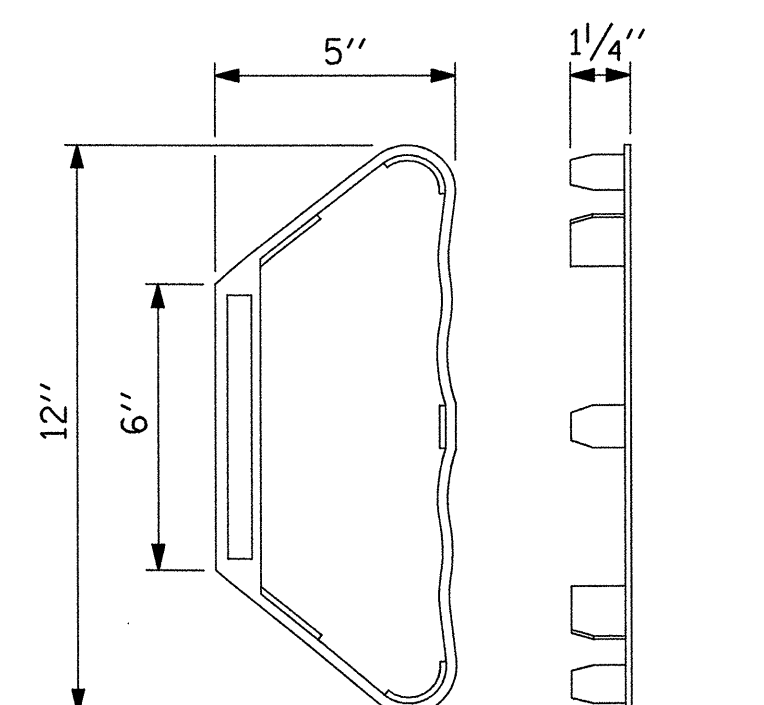
( 6 REQUIRED PER POST )



**SECTION X-X**

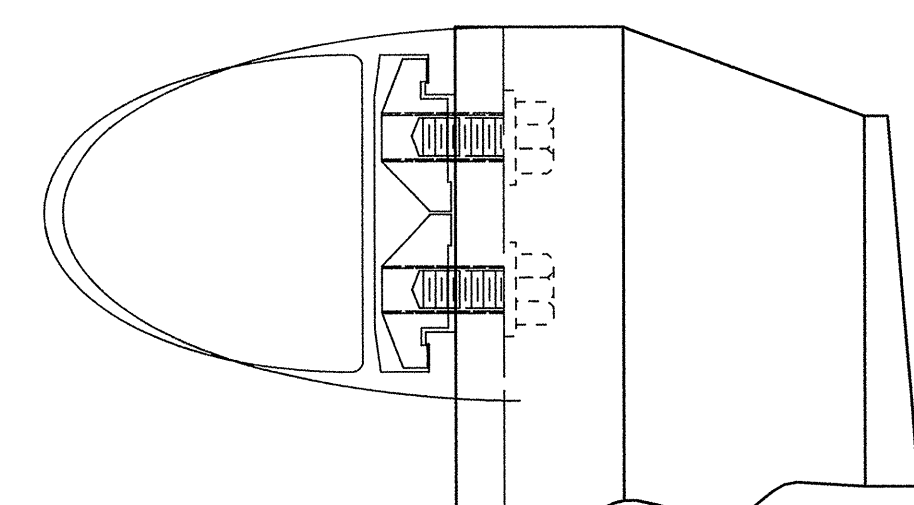


**TOP & MIDDLE RAIL CAP**



**BOTTOM RAIL CAP**

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



**CLAMP ASSEMBLY**

TOP RAIL SHOWN  
 ( MIDDLE & BOTTOM RAIL ARE SIMILAR )

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 2 OF 3

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**STANDARD  
 3 BAR METAL RAIL**

ASSEMBLED BY : W.B. ALLEN DATE : 3/07  
 CHECKED BY : M. A. AVERETTE DATE : 3/07  
 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

PLANS PREPARED BY  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 2700 BIRCHMOUNT RD., SUITE 200  
 RALEIGH, N.C. 27636  
 (919) 881-1318 (FAX)  
 WWW.MULKEYINC.COM

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

NOTES

METAL RAIL TO END POST CONNECTION

THE METAL RAIL TO END POST CONNECTION SHALL CONSIST OF THE FOLLOWING COMPONENTS:

- A. 1/2" PLATES SHALL CONFORM TO AASHTO M270 GRADE 36 AND SHALL BE GALVANIZED AFTER FABRICATION.
- B. 3/4" STRUCTURAL CONCRETE INSERT SHALL HAVE A WORKING LOAD SHEAR CAPACITY OF 4800 LBS. THE FERRULES SHALL ENGAGE A 3/4" Ø X 1 5/8" BOLT WITH 2" O.D. WASHER IN PLACE. THE 3/4" Ø X 1 5/8" BOLT SHALL HAVE N. C. THREADS.
- C. CAP SCREWS FOR RAIL ATTACHMENT TO ANGLE SHALL CONFORM TO THE REQUIREMENTS OF ASTM F593 ALLOY 305 STAINLESS STEEL. CAP SCREWS TO BE CENTERED IN SLOTS AT 60°F. 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.

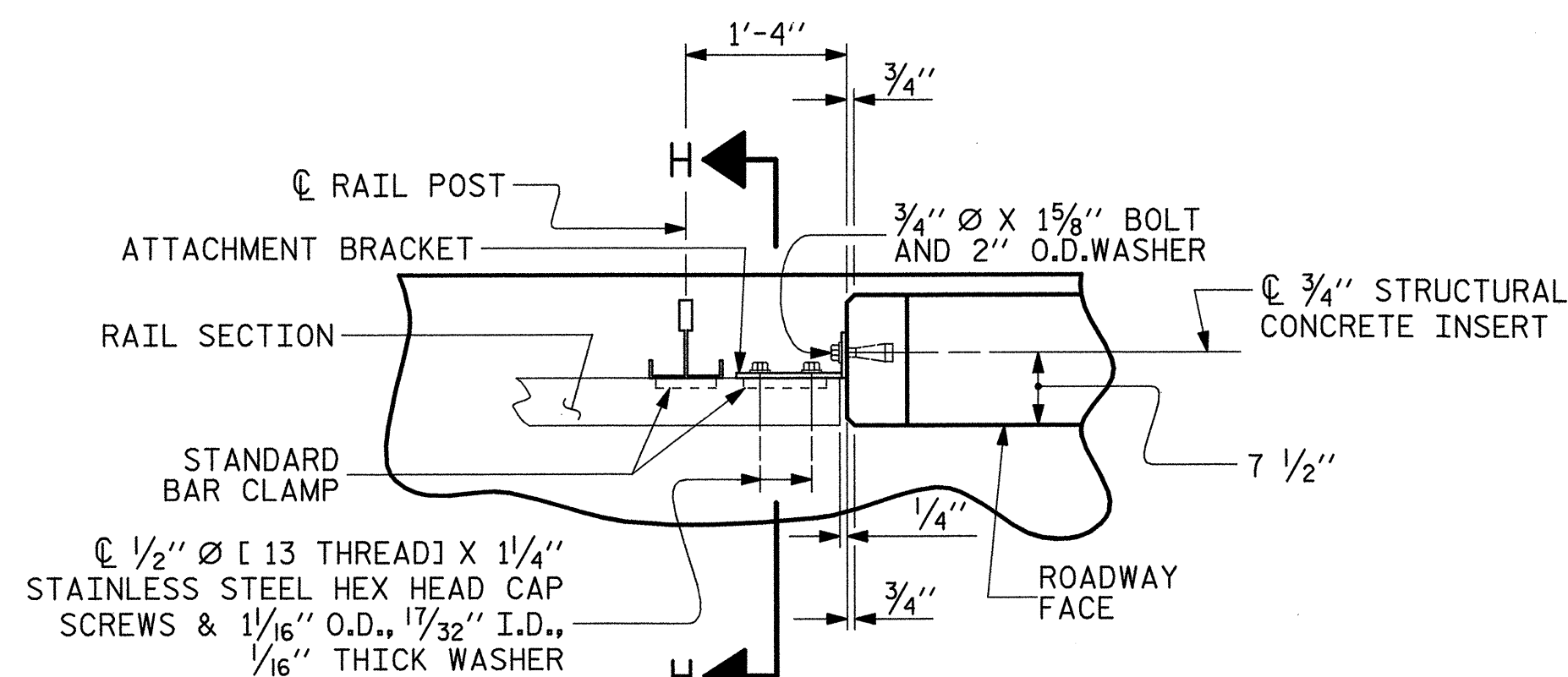
THE CONTRACTOR, AT HIS OPTION, MAY USE AN ADHESIVE BONDING SYSTEM IN LIEU OF THE STRUCTURAL CONCRETE INSERT EMBEDDED IN THE END POST. IF THE ADHESIVE BONDING SYSTEM IS USED, THE 3/4" Ø X 1 5/8" BOLT WITH WASHER SHALL BE REPLACED WITH A 3/4" Ø X 6 1/2" BOLT AND 2" O.D. WASHER. ALL SPECIFICATIONS THAT 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

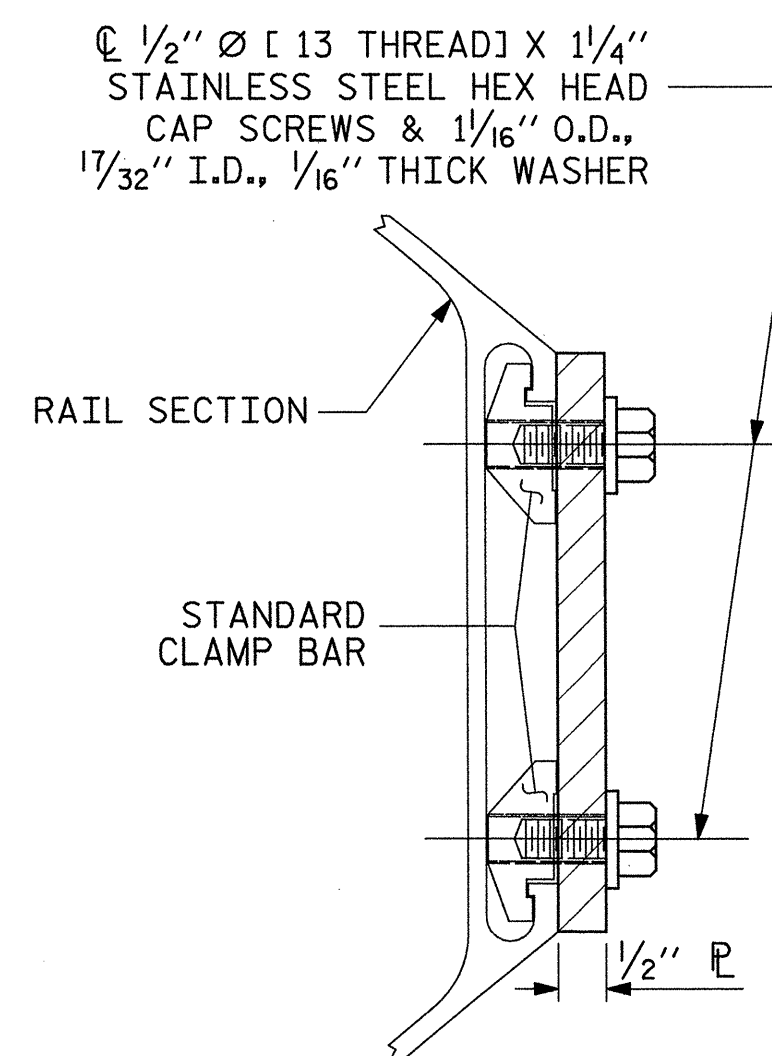
THE STRUCTURAL CONCRETE INSERT ASSEMBLY SHALL CONSIST OF THE FOLLOWING COMPONENTS:

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



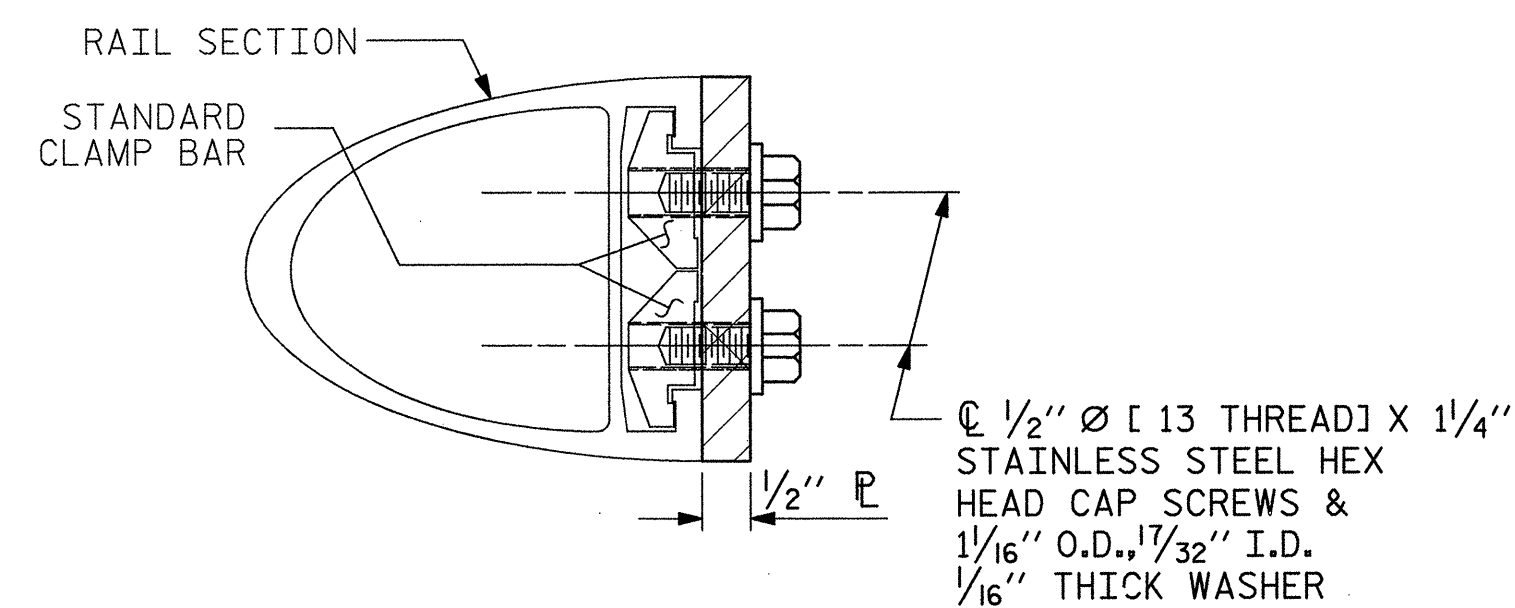
PLAN OF RAIL AND END POST

(STIFFENER ON 1/2" P NOT SHOWN FOR CLARITY)



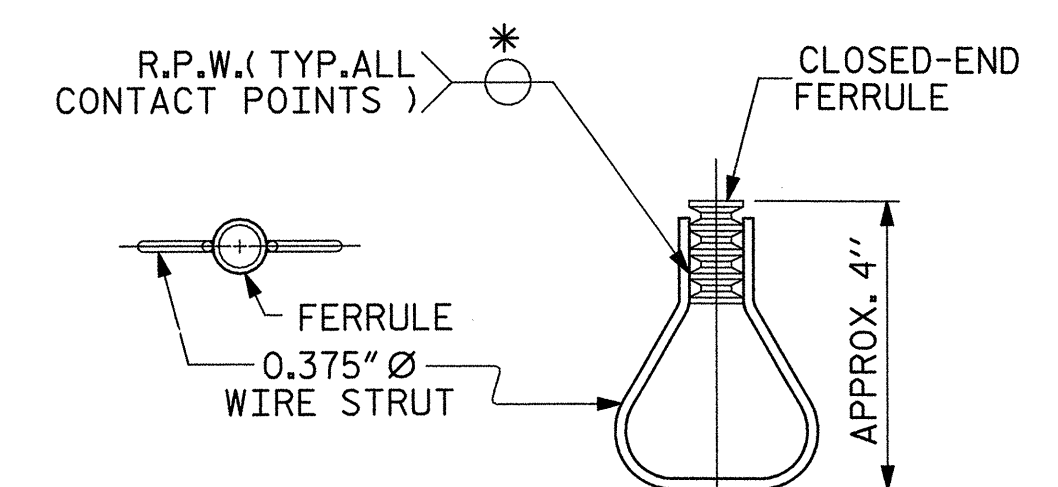
SECTION H-H

(FOR BOTTOM RAIL)



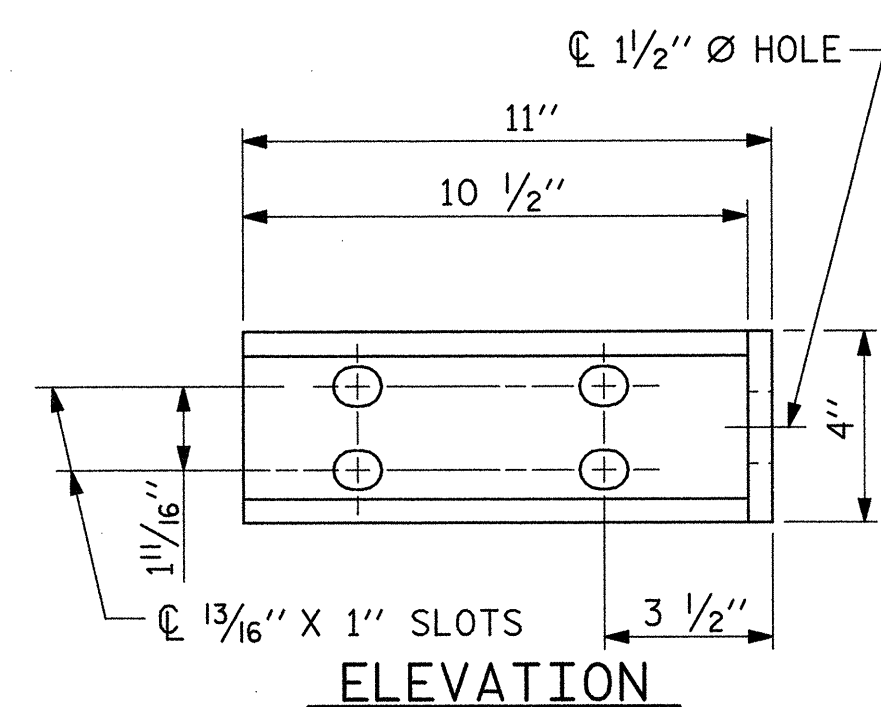
SECTION H-H

(FOR TOP & MIDDLE RAIL)

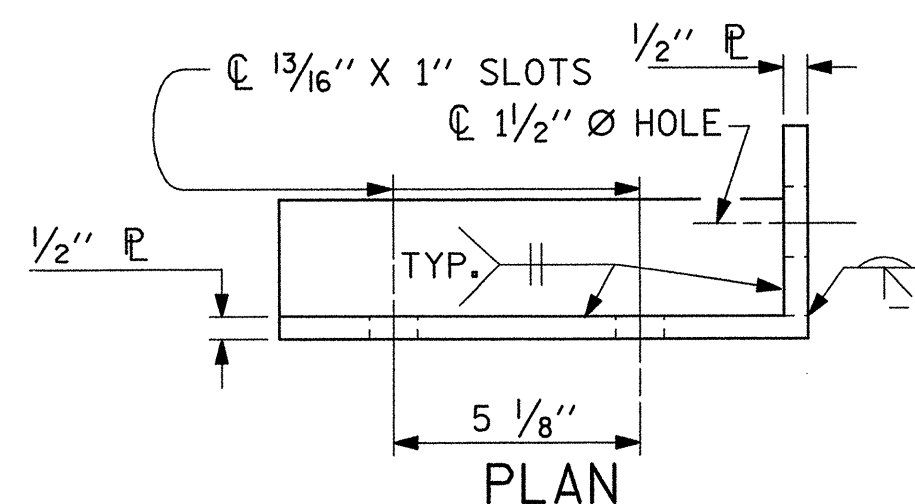


STRUCTURAL CONCRETE INSERT

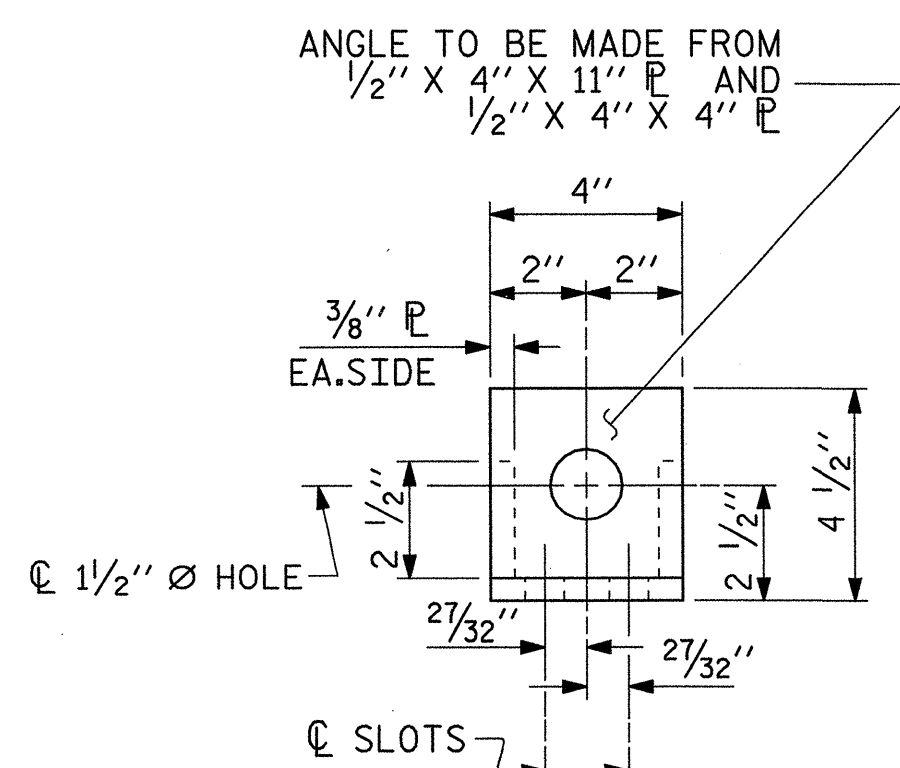
\* EACH WELDED ATTACHMENT OF WIRE TO FERRULE SHALL DEVELOP THE TENSILE STRENGTH OF THE WIRE.



ELEVATION



PLAN

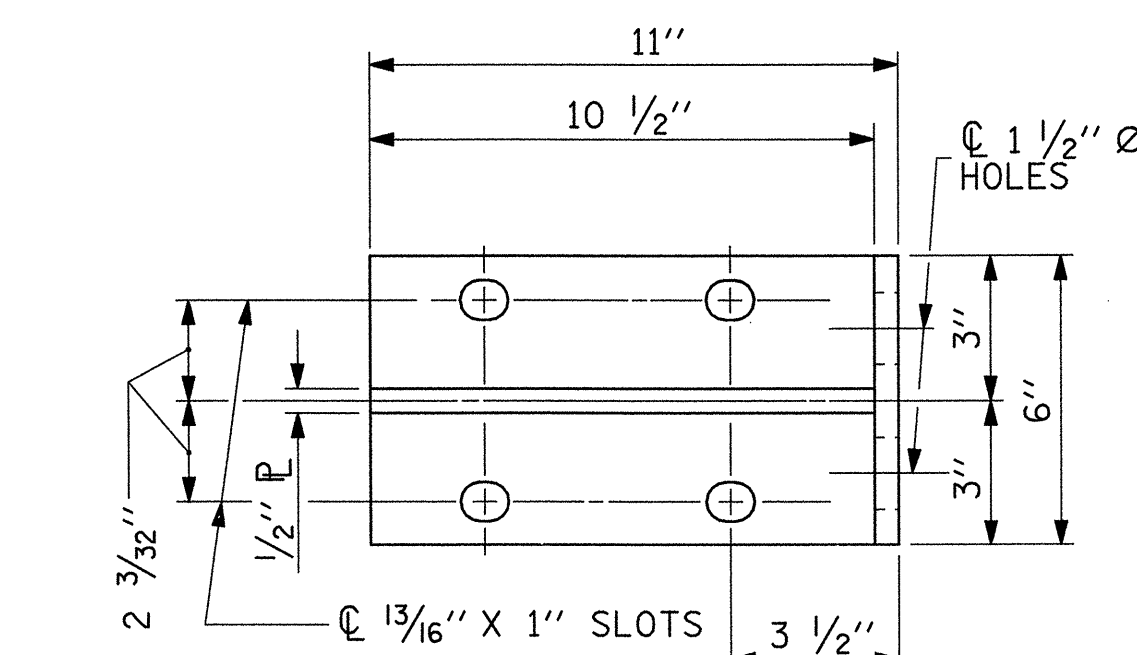


END VIEW

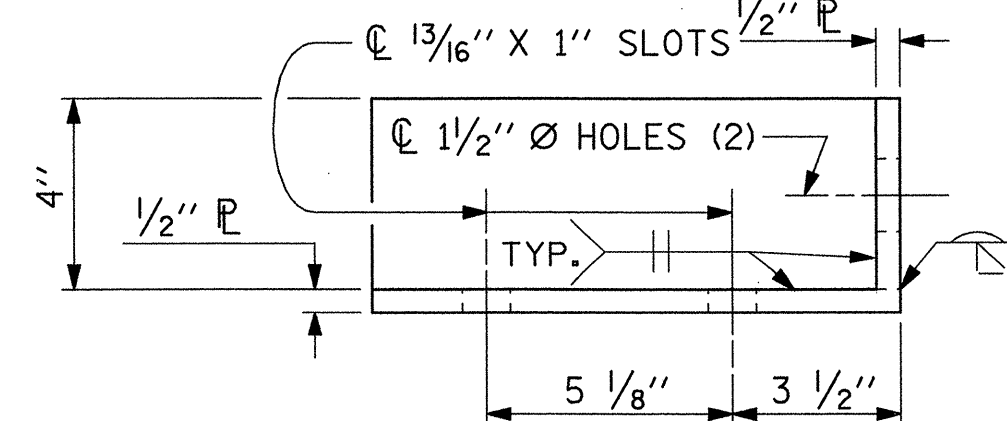
(FIX. AND EXP.)

DETAILS FOR ATTACHMENT BRACKET

(TOP & MIDDLE RAIL ONLY)



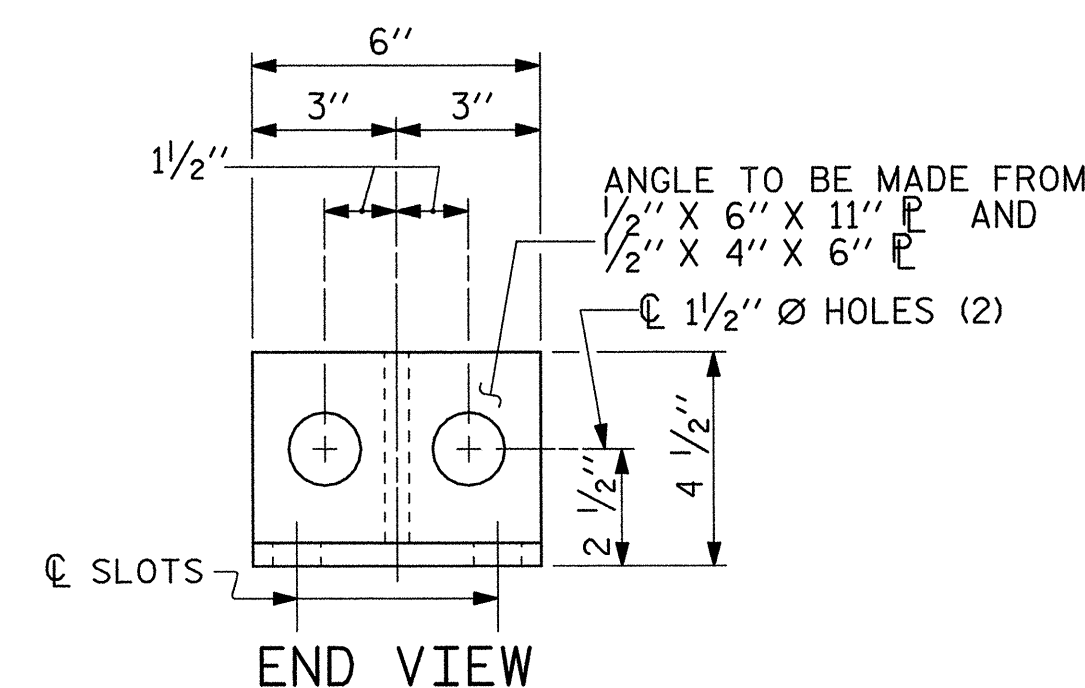
ELEVATION



PLAN

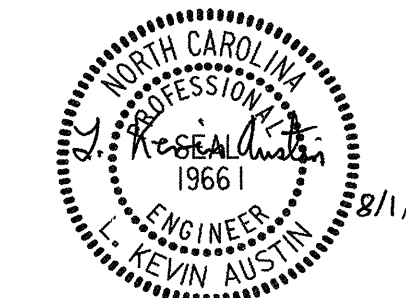
DETAILS FOR ATTACHMENT BRACKET

(BOTTOM RAIL ONLY)



END VIEW

ASSEMBLED BY : W.B. ALLEN	DATE : 3/07
CHECKED BY : M. A. AVERETTE	DATE : 3/07
DRAWN BY : JMB 1/88	REV. 10/17/00 RWW/LES
CHECKED BY : GCH 1/88	REV. 5/7/03 RWW/JTE
	REV. 5/1/06 TLA/GM



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

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

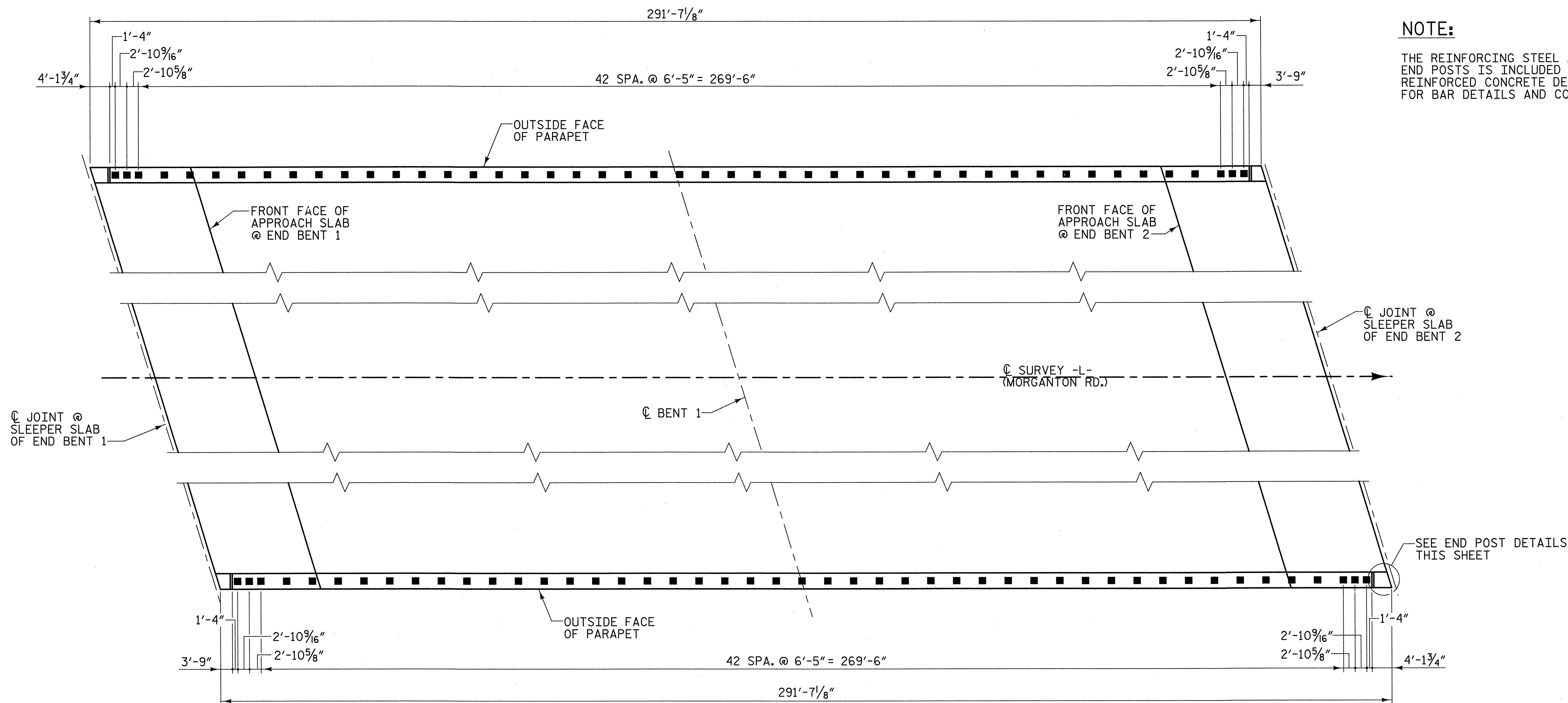
SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

STANDARD  
3 BAR METAL RAIL

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

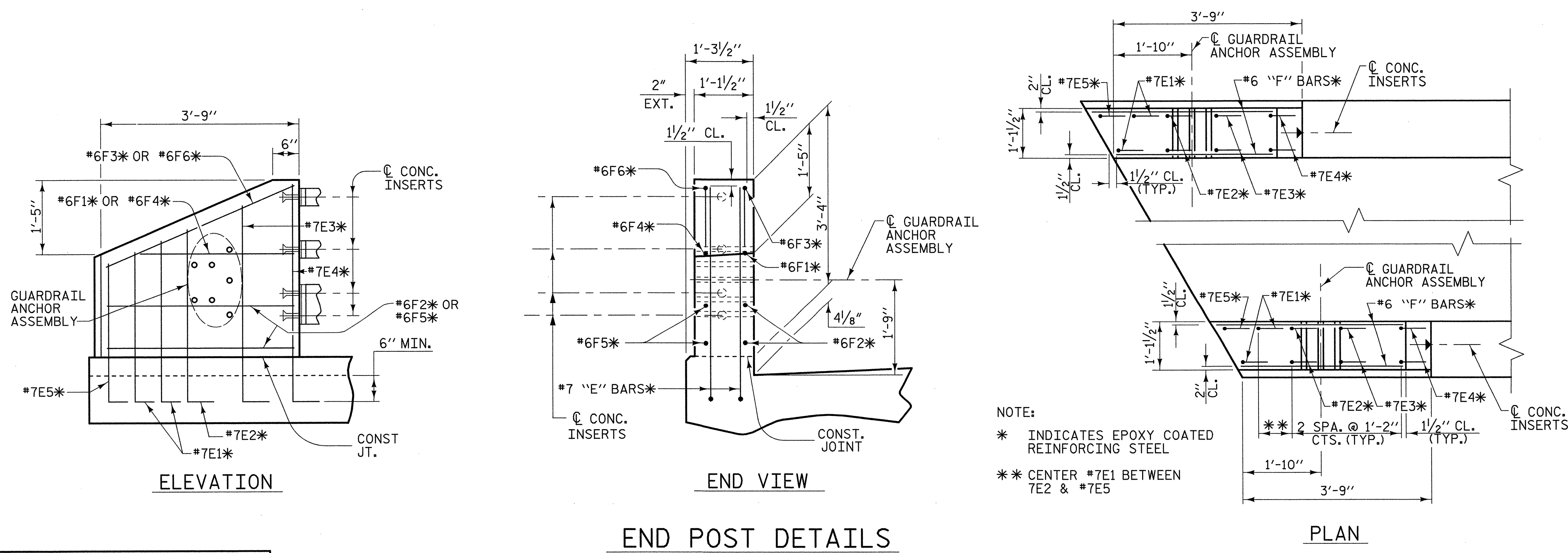
STD. NO. BMR7



**NOTE:**  
THE REINFORCING STEEL AND CONCRETE FOR THE END POSTS IS INCLUDED IN THE UNIT PRICE BID FOR REINFORCED CONCRETE DECK SLAB. SEE SHEET S-20 FOR BAR DETAILS AND CONCRETE QUANTITIES.

### PLAN OF RAIL POST SPACINGS

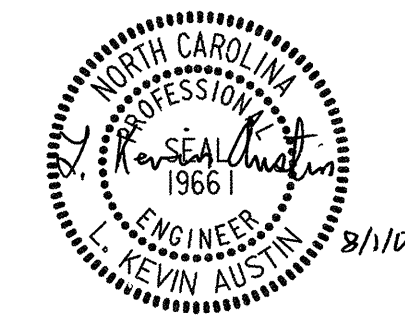
NOTE: ALL DIMENSIONS ARE MEASURED ALONG OUTSIDE EDGE OF SUPERSTRUCTURE



**NOTE:**  
\* INDICATES EPOXY COATED REINFORCING STEEL  
\*\* CENTER #7E1 BETWEEN #7E2 & #7E5

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH  
**SUPERSTRUCTURE  
RAIL POST SPACINGS  
AND  
END POST DETAILS**



PLANS PREPARED BY:  
**MULKEY**  
ENGINEERS & CONSULTANTS  
PO BOX 32127  
RALEIGH, N.C. 27636  
(919) 881-1918 FAX  
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REVISIONS						SHEET NO.
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1			3			S-16
2			4			

DRAWN BY: W. B. ALLEN DATE: 3/07  
CHECKED BY: M. A. AVERETTE DATE: 4/07

8/1/2007 5:00:05 AM RA:\Structures\U4756.SD\_3MR.dwg



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.

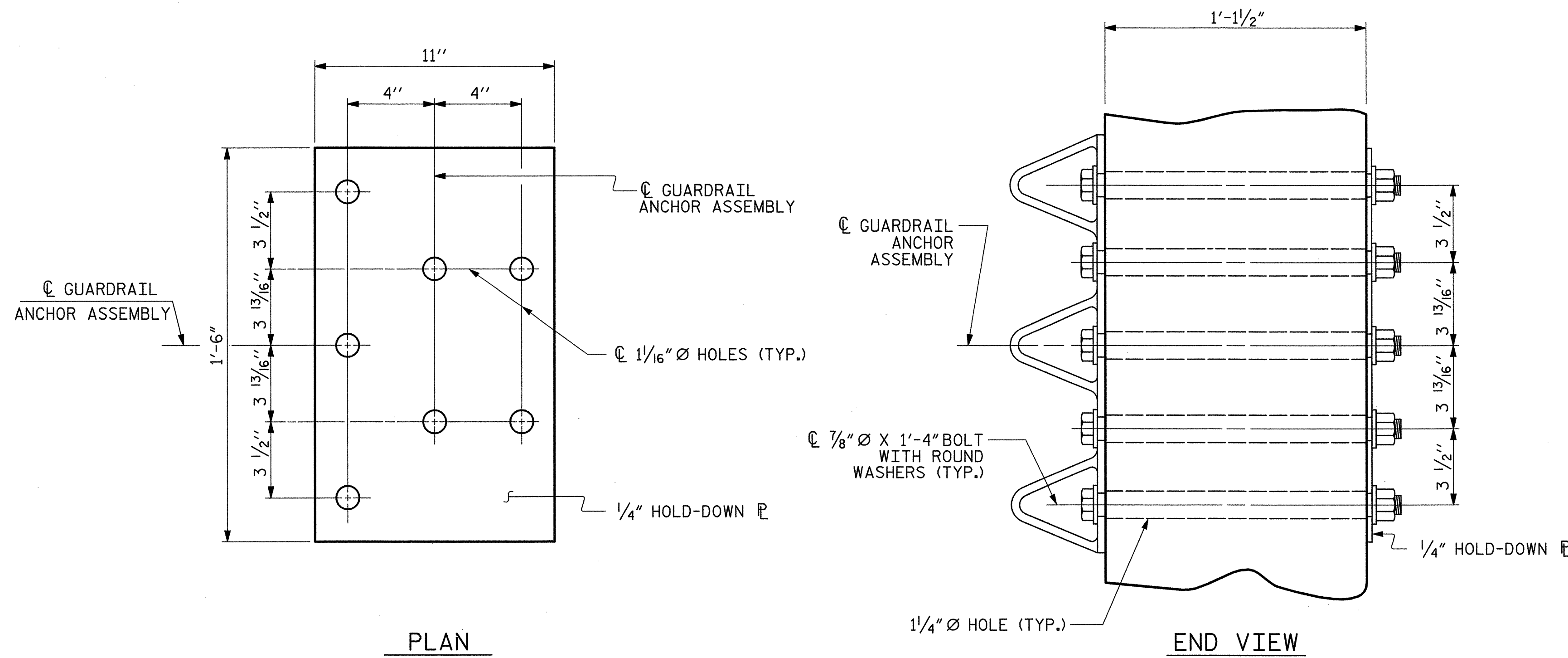
BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307 AND NUTS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M291. BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED. AT THE CONTRACTOR'S OPTION, STAINLESS STEEL BOLTS, NUTS AND WASHERS MAY BE USED AS AN ALTERNATE FOR THE 1/8" Ø GALVANIZED BOLTS, NUTS AND WASHERS. THEY SHALL CONFORM TO OR EXCEED THE MECHANICAL REQUIREMENTS OF ASTM A307. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.

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

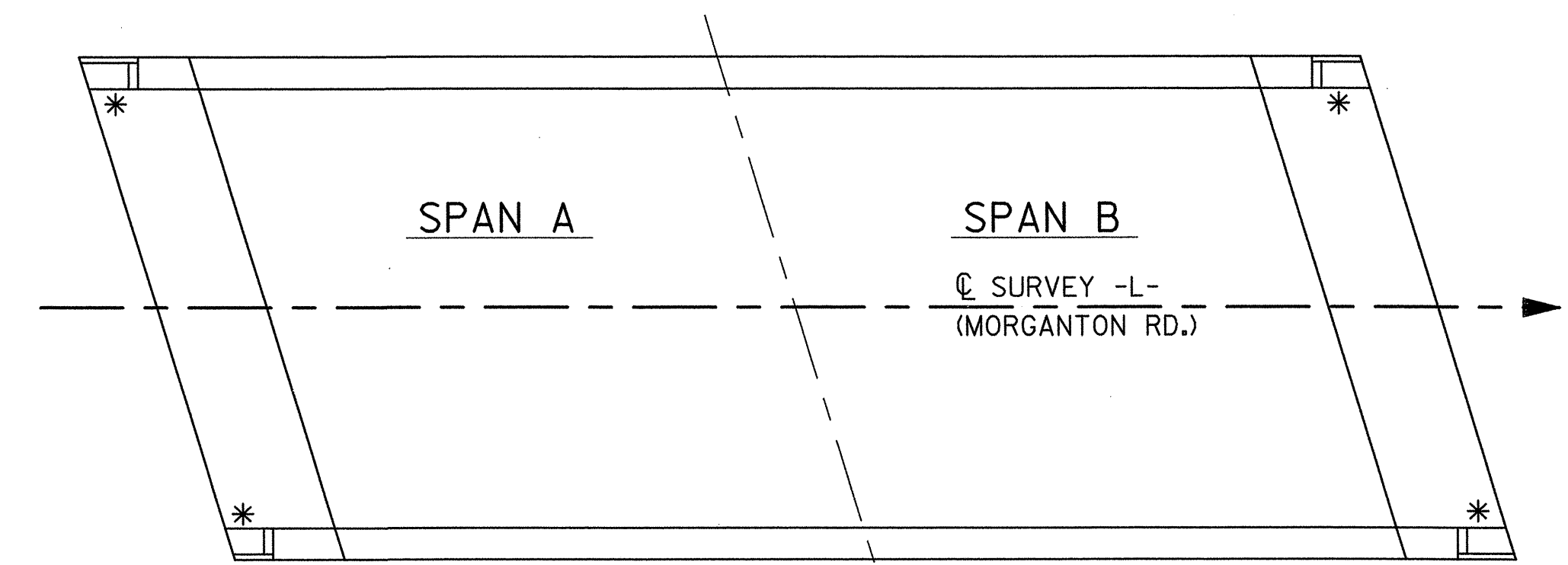
THE COST OF THE GUARDRAIL ANCHOR ASSEMBLIES WITH BOLTS, NUTS AND WASHERS COMPLETE IN PLACE, SHALL BE INCLUDED IN THE VARIOUS PAY ITEMS.

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

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

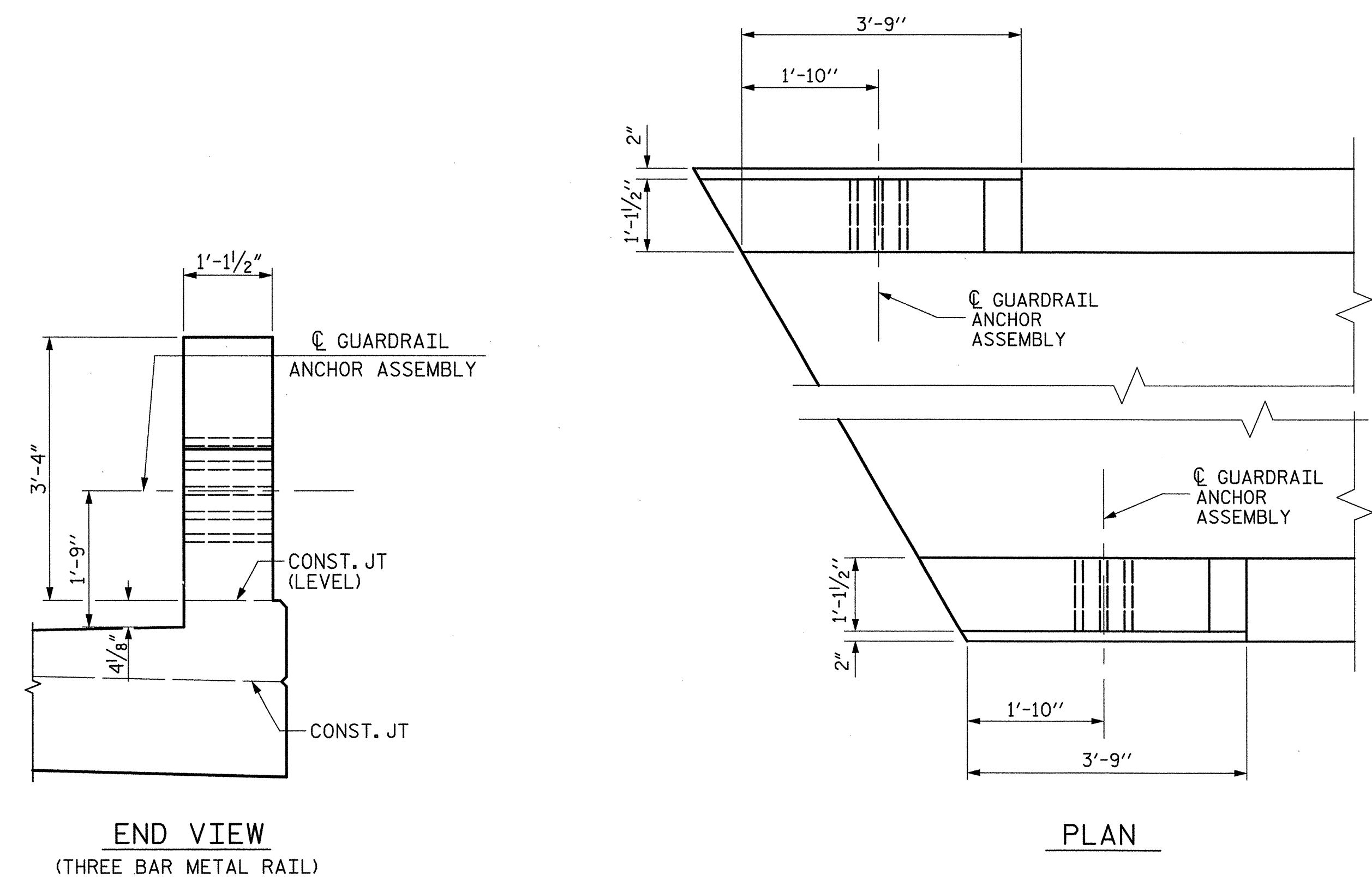


GUARDRAIL ANCHOR ASSEMBLY DETAILS



SKETCH SHOWING POINTS OF ATTACHMENT

\* LOCATION OF GUARDRAIL ATTACHMENT

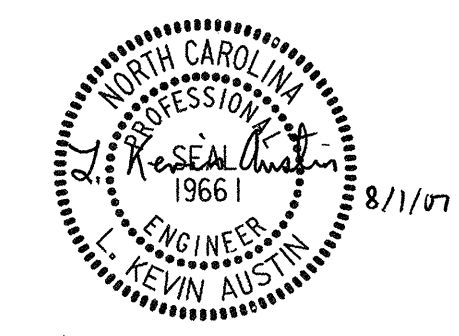


LOCATION OF GUARDRAIL ANCHOR AT END POST

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

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

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



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 P.O. Box 33157  
 Raleigh, N.C. 27636  
 (919) 851-1912  
 (919) 851-1918 (FAX)  
 WWW.MULKEYING.COM

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

ASSEMBLED BY : <b>W.B. ALLEN</b>	DATE : <b>3/07</b>
CHECKED BY : <b>M. A. AVERETTE</b>	DATE : <b>3/07</b>
DRAWN BY : <b>EEM 6/94</b>	REV. 10/17/00 <b>RWW/LES</b>
CHECKED BY : <b>RCW 6/94</b>	REV. 5/17/03 <b>RWW/JTE</b>
	REV. 5/17/06 <b>TLA/GM</b>

**NOTES:**

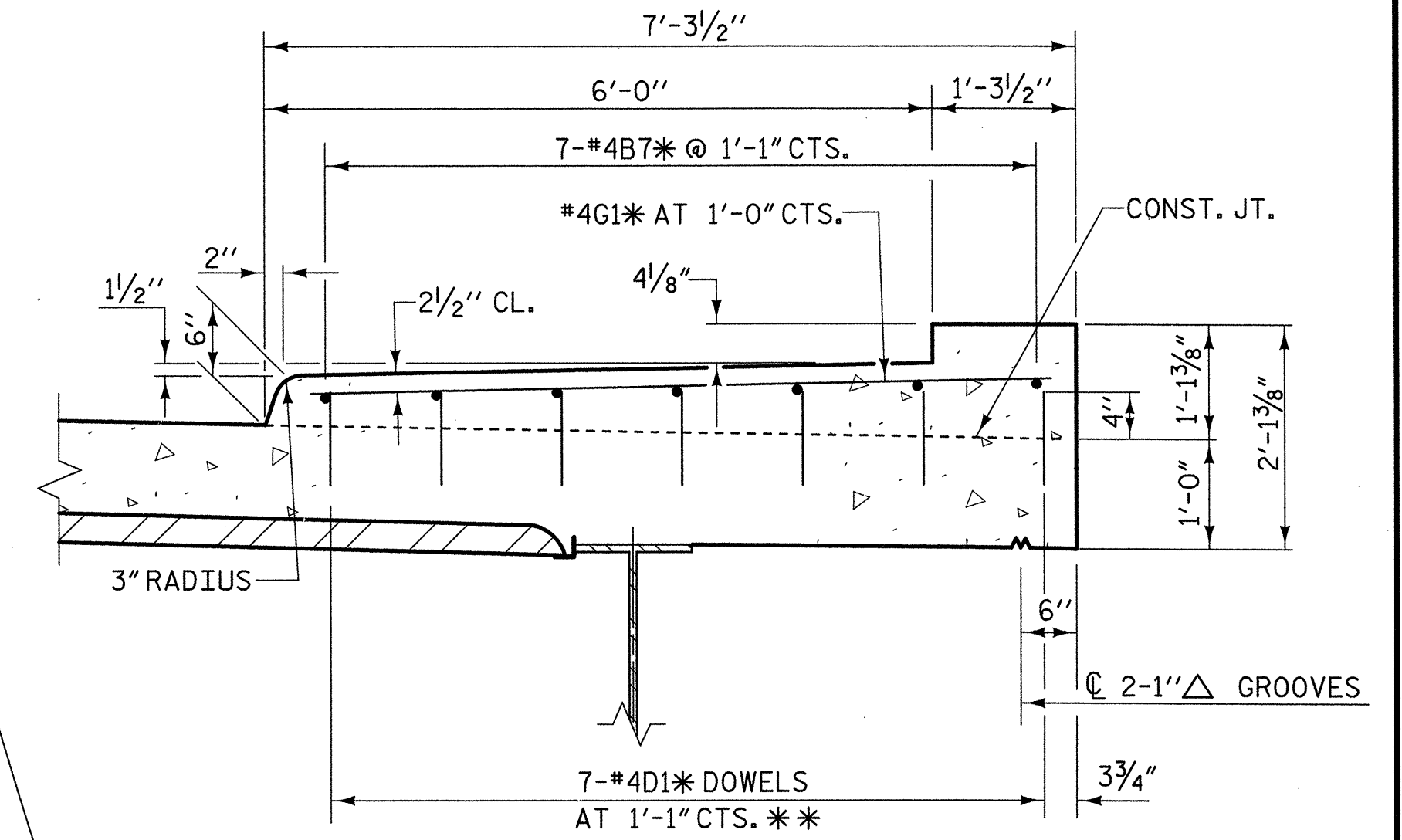
SIDEWALK IN A CONTINUOUS UNIT SHALL NOT BE CAST UNTIL ALL SLAB CONCRETE IN THE UNIT HAS BEEN CAST AND HAS REACHED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

ALL REINFORCING STEEL IN THE SIDEWALK SHALL BE EPOXY COATED.

NO SEPARATE PAYMENT SHALL BE MADE FOR MATERIALS, LABOR AND INCIDENTALS REQUIRED FOR THIS CONSTRUCTION OF CONCRETE SIDEWALK AND CONCRETE MEDIAN AS DETAILED ON BRIDGE SPANS AND APPROACH SLABS. ALL COSTS FOR THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR REINFORCED CONCRETE DECK SLAB.

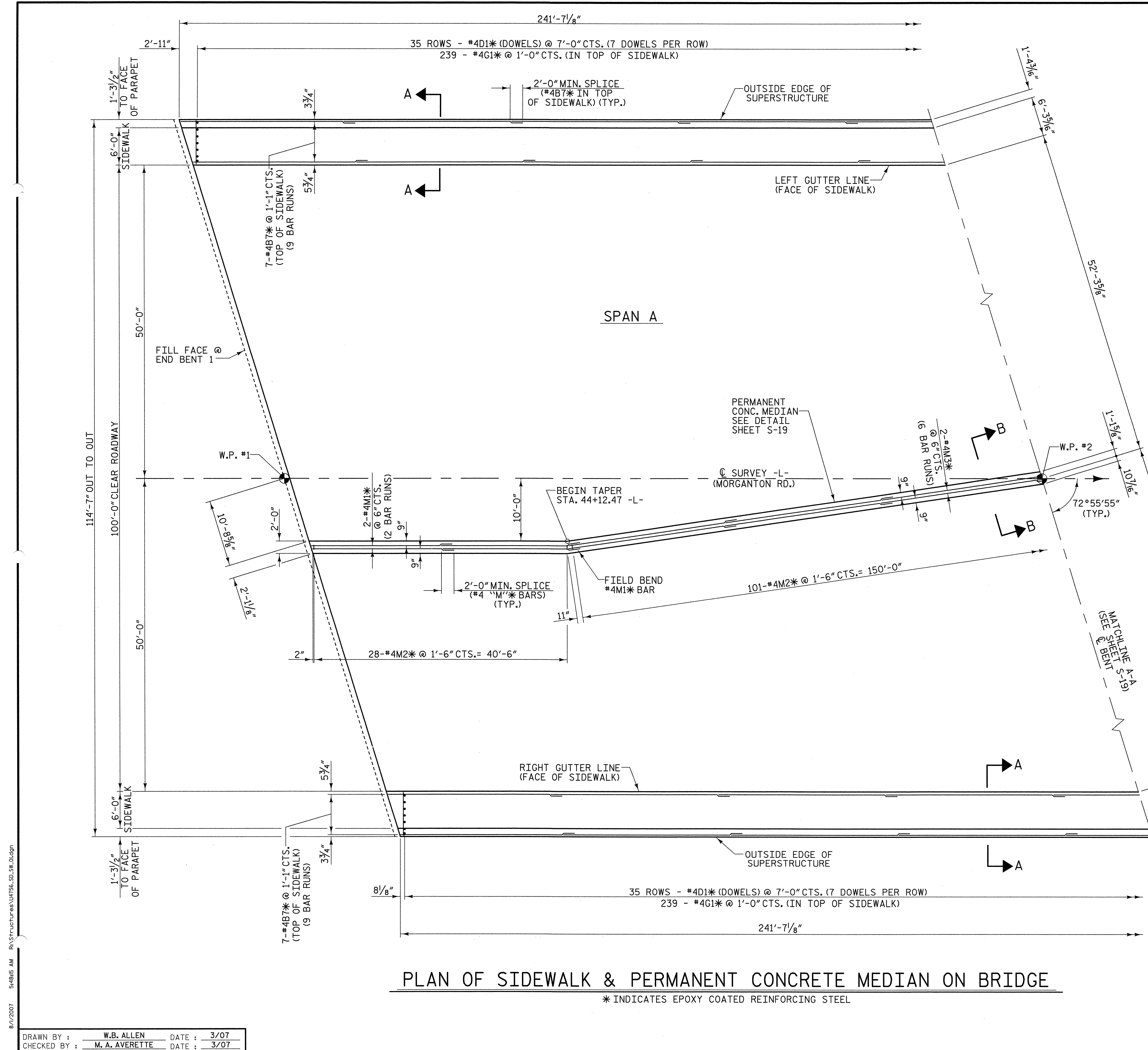
FOR CONCRETE AND REINFORCING STEEL QUANTITIES, SEE "SUPERSTRUCTURE BILL OF MATERIAL", SHEET S-20.

FOR SECTION B-B, SEE SHEET S-19



**SECTION A-A**

\*\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.



**PLAN OF SIDEWALK & PERMANENT CONCRETE MEDIAN ON BRIDGE**

\* INDICATES EPOXY COATED REINFORCING STEEL

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

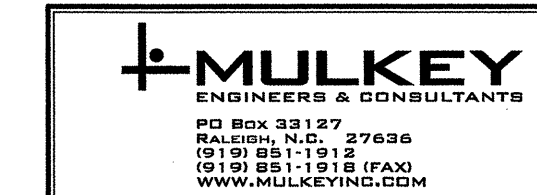
SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUPERSTRUCTURE  
 SIDEWALK &  
 CONCRETE MEDIAN  
 PLAN AND DETAILS**



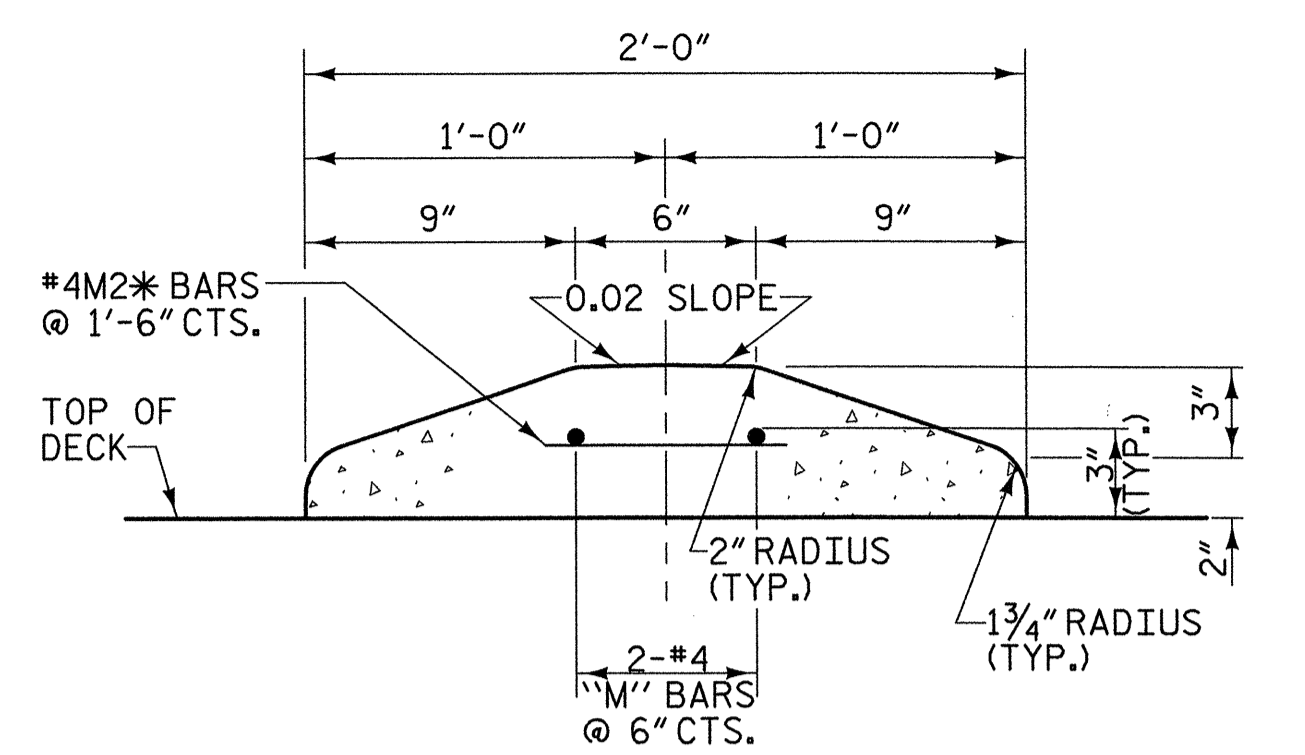
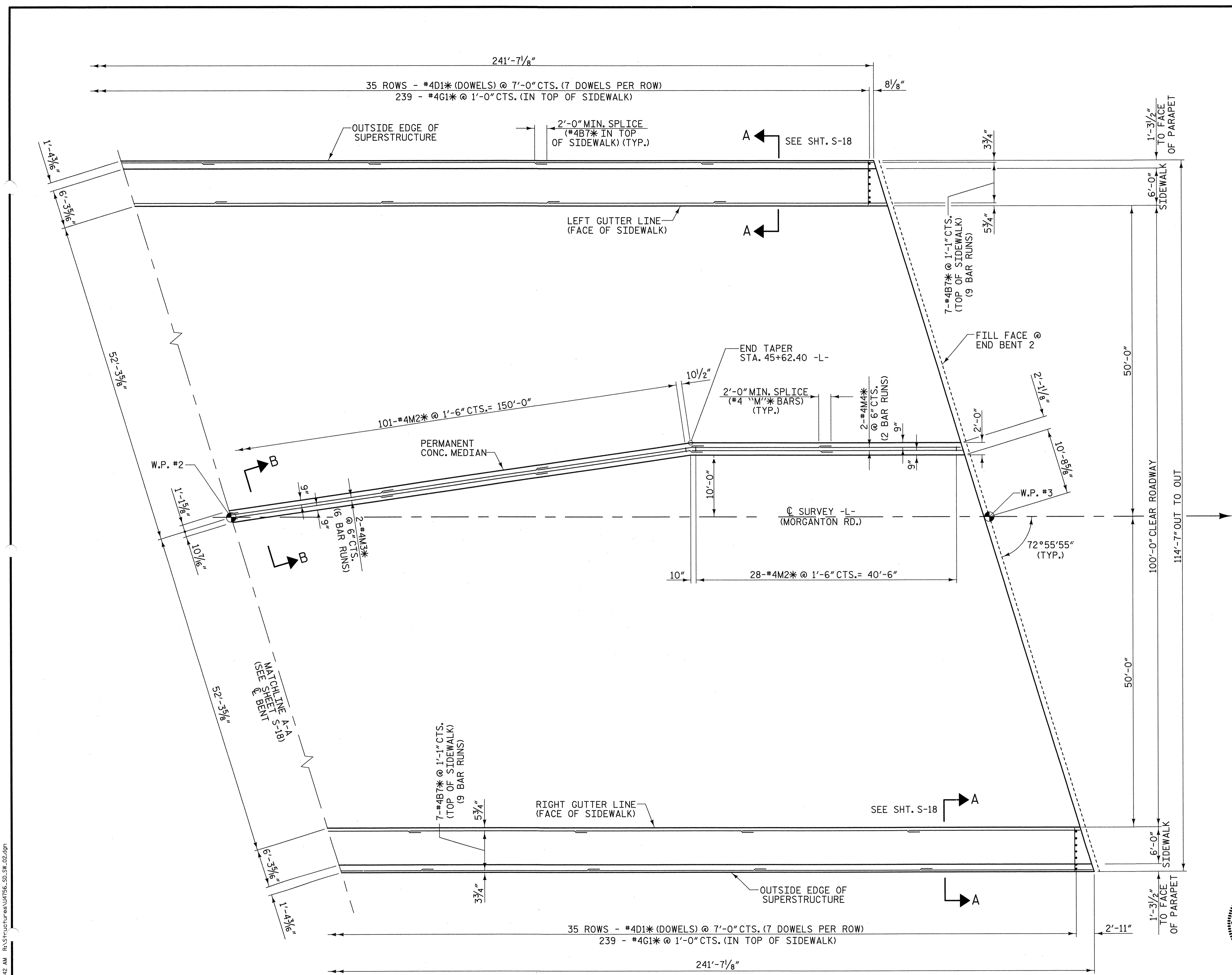
PLANS PREPARED BY:



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1			3			S-18
2			4			

DRAWN BY: W.B. ALLEN DATE: 3/07  
 CHECKED BY: M.A. AVERETTE DATE: 3/07

8/2/2007 5:48:55 AM R:\S\Structures\U4756.SD.SW.01.dgn



**SECTION B-B**  
SECTION THRU PERMANENT CONCRETE MEDIAN

**PLAN OF SIDEWALK & PERMANENT CONCRETE MEDIAN ON BRIDGE**

\* INDICATES EPOXY COATED REINFORCING STEEL

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-  
 SHEET 2 OF 2



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
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 RALEIGH, N.C. 27636  
 (919) 881-1918  
 (919) 881-1918 (FAX)  
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STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE  
 SIDEWALK &  
 CONCRETE MEDIAN  
 PLAN AND DETAILS**

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

DRAWN BY: W.B. ALLEN DATE: 3/07  
 CHECKED BY: M.A. AVERETTE DATE: 3/07

8/17/2007 5:47:42 AM R:\Structures\U4756\_SD\_SIF\_02.dgn



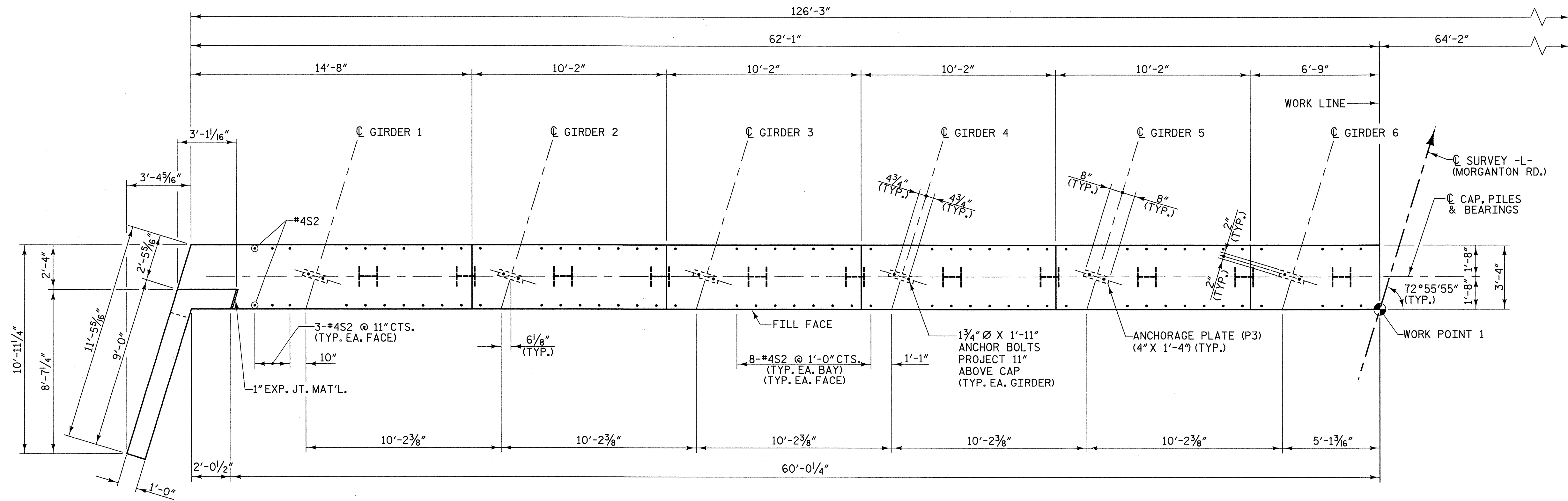
**NOTES:**

FOR PILE SPLICE DETAILS, SEE SHEET S-24.

FOR TEMPORARY DRAINAGE AT END BENT SEE SHEET S-24.

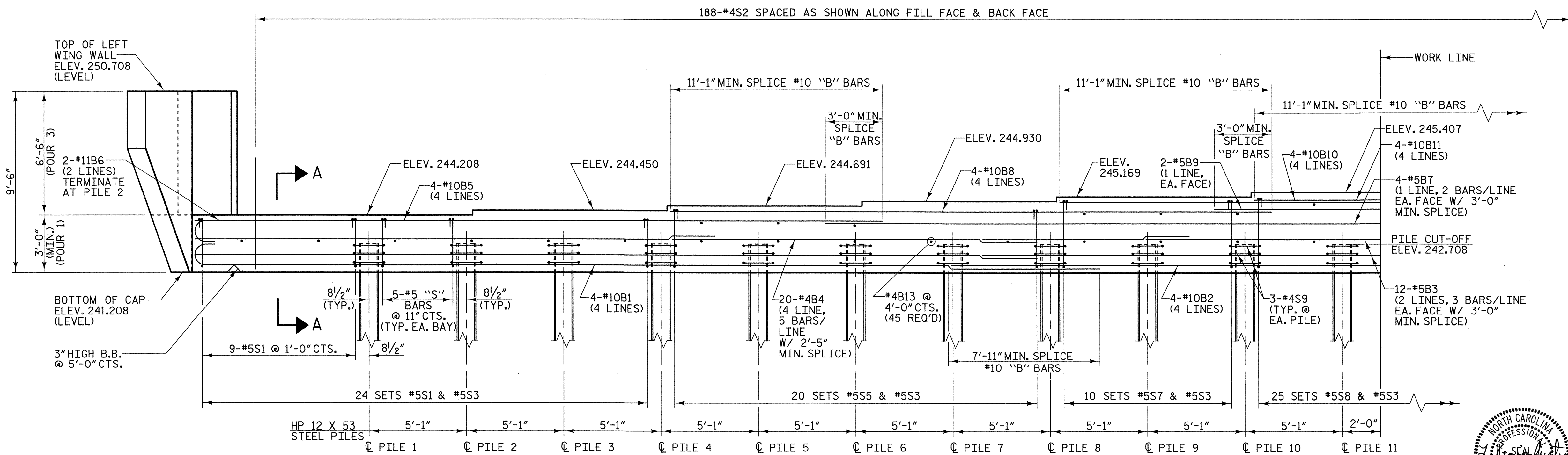
ROUGHEN TOP OF CAP AND WING CONST. JT. TO A FULL AMPLITUDE OF 1/4".

EXISTING END BENT TO BE REMOVED AND EXISTING PILES CUT-OFF AT BOTTOM OF THE NEW CAP.



W1 SEE SHEET S-23

**PLAN**



**ELEVATION**

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

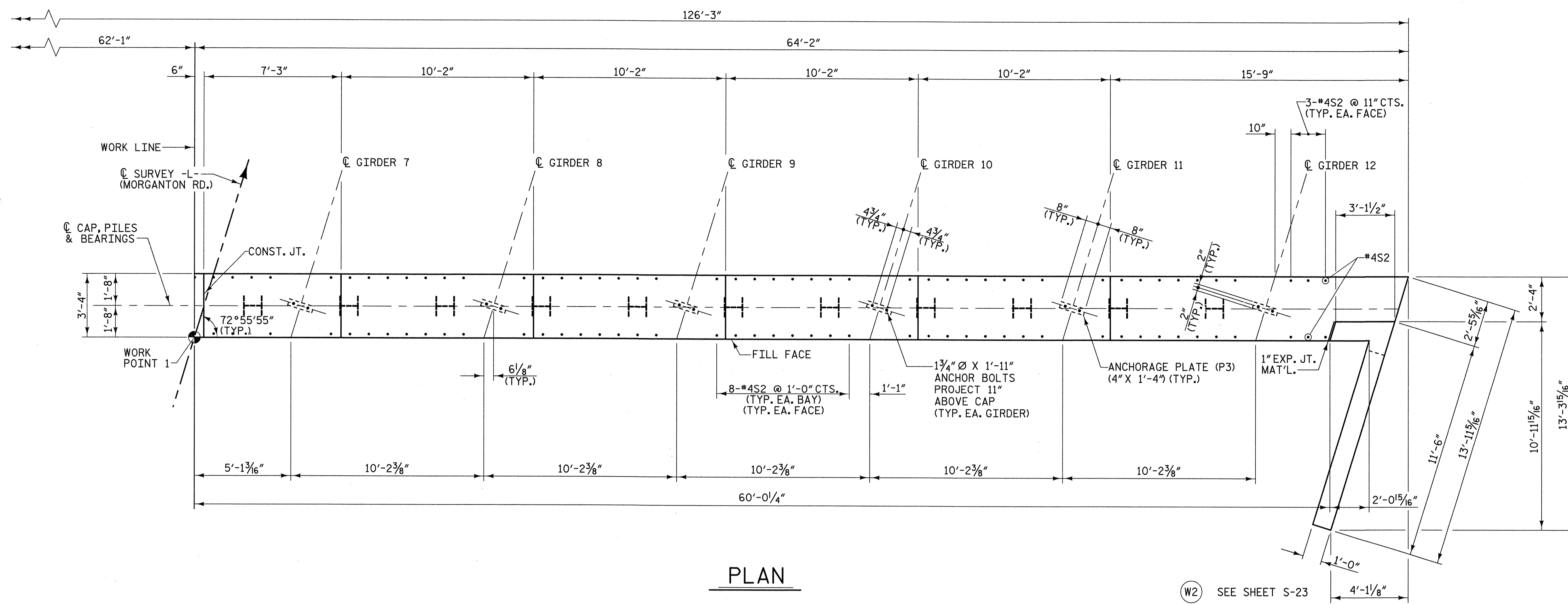
SHEET 1 OF 4  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUBSTRUCTURE  
 END BENT 1**



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO Box 32127  
 RALEIGH, N.C. 27636  
 (919) 881-1121  
 (919) 881-1918 (FAX)  
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DRAWN BY: W. B. ALLEN DATE: 4/07  
 CHECKED BY: M. A. AVERETTE DATE: 4/07

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



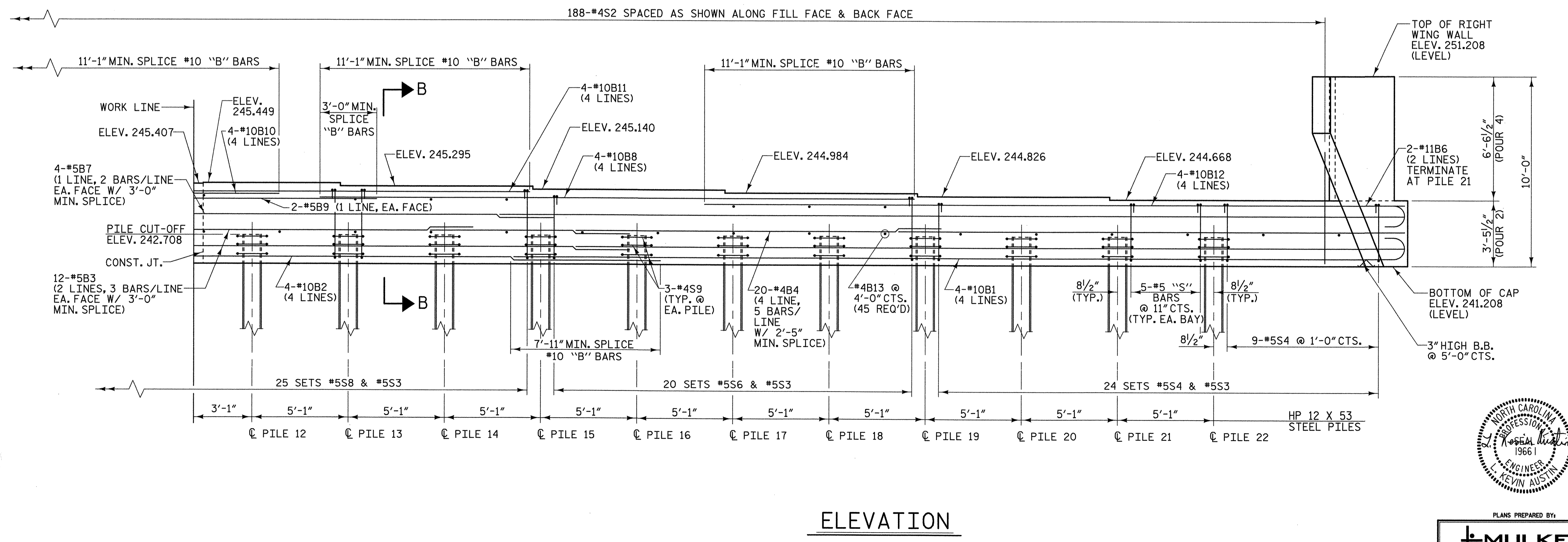
**NOTES:**

FOR PILE SPLICE DETAILS, SEE SHEET S-24.

FOR TEMPORARY DRAINAGE AT END BENT SEE SHEET S-24.

ROUGHEN TOP OF CAP AND WING CONST. JT. TO A FULL AMPLITUDE OF 1/4".

EXISTING END BENT TO BE REMOVED AND EXISTING PILES CUT-OFF AT BOTTOM OF THE NEW CAP.



PROJECT NO. U-4756

CUMBERLAND COUNTY

STATION: 44+88.35 -L-

SHEET 2 OF 4



PLANS PREPARED BY:

**MULKEY**  
ENGINEERS & CONSULTANTS

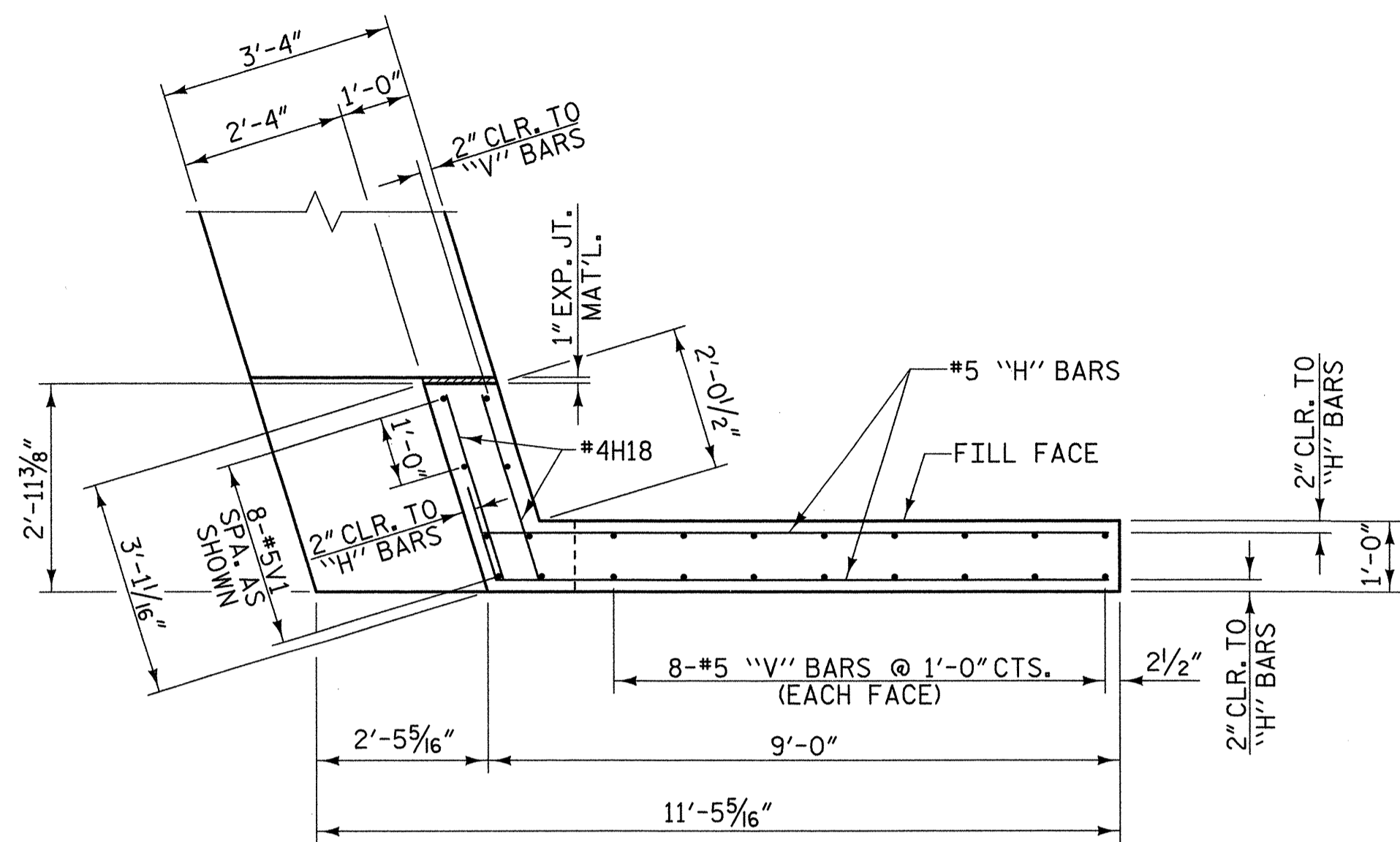
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(919) 851-1912 FAX  
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
<b>SUBSTRUCTURE END BENT 1</b>					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		
					SHEET NO. S-22
					TOTAL SHEETS

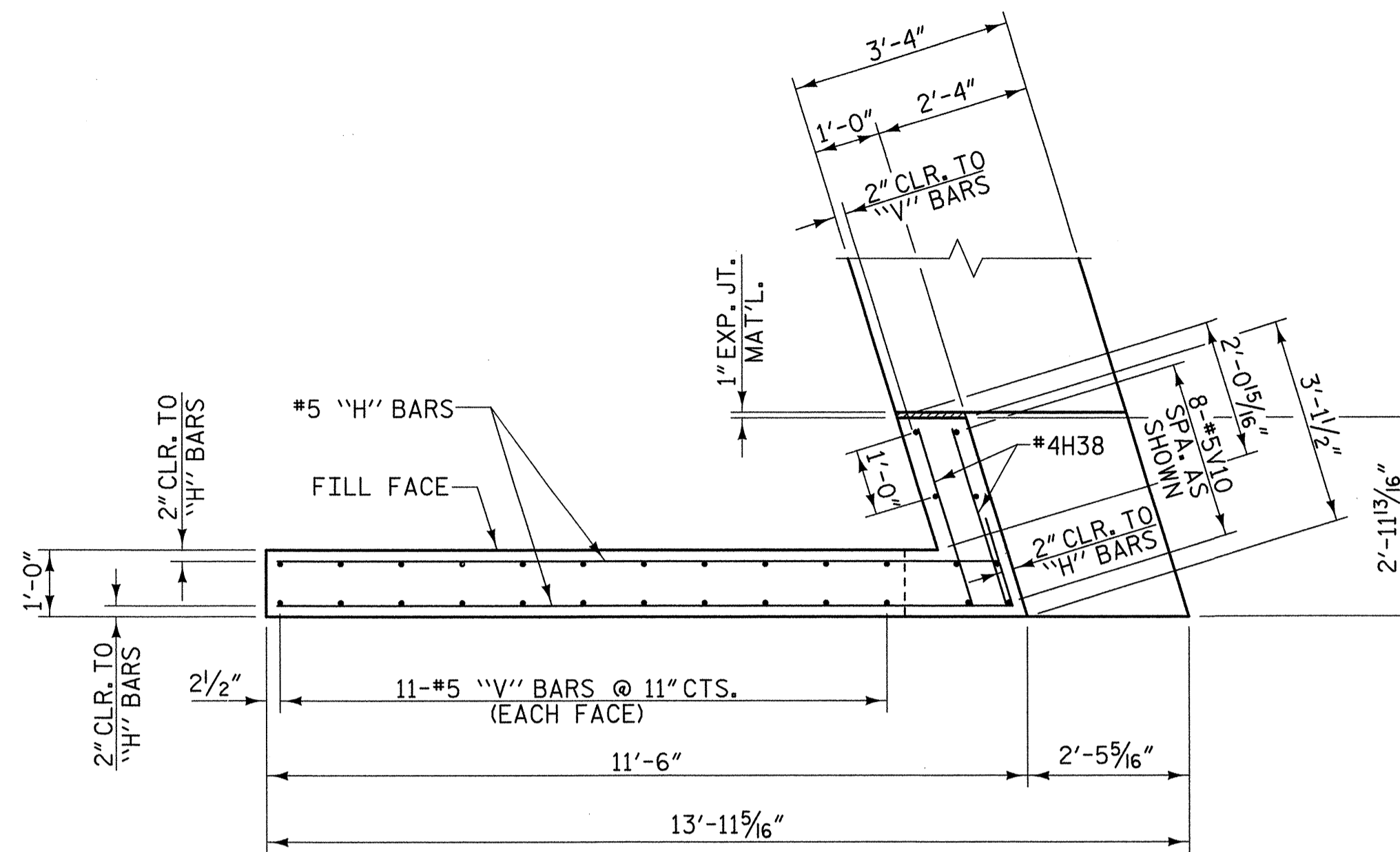
DRAWN BY: W. B. ALLEN DATE: 4/07

CHECKED BY: M. A. AVERETTE DATE: 4/07

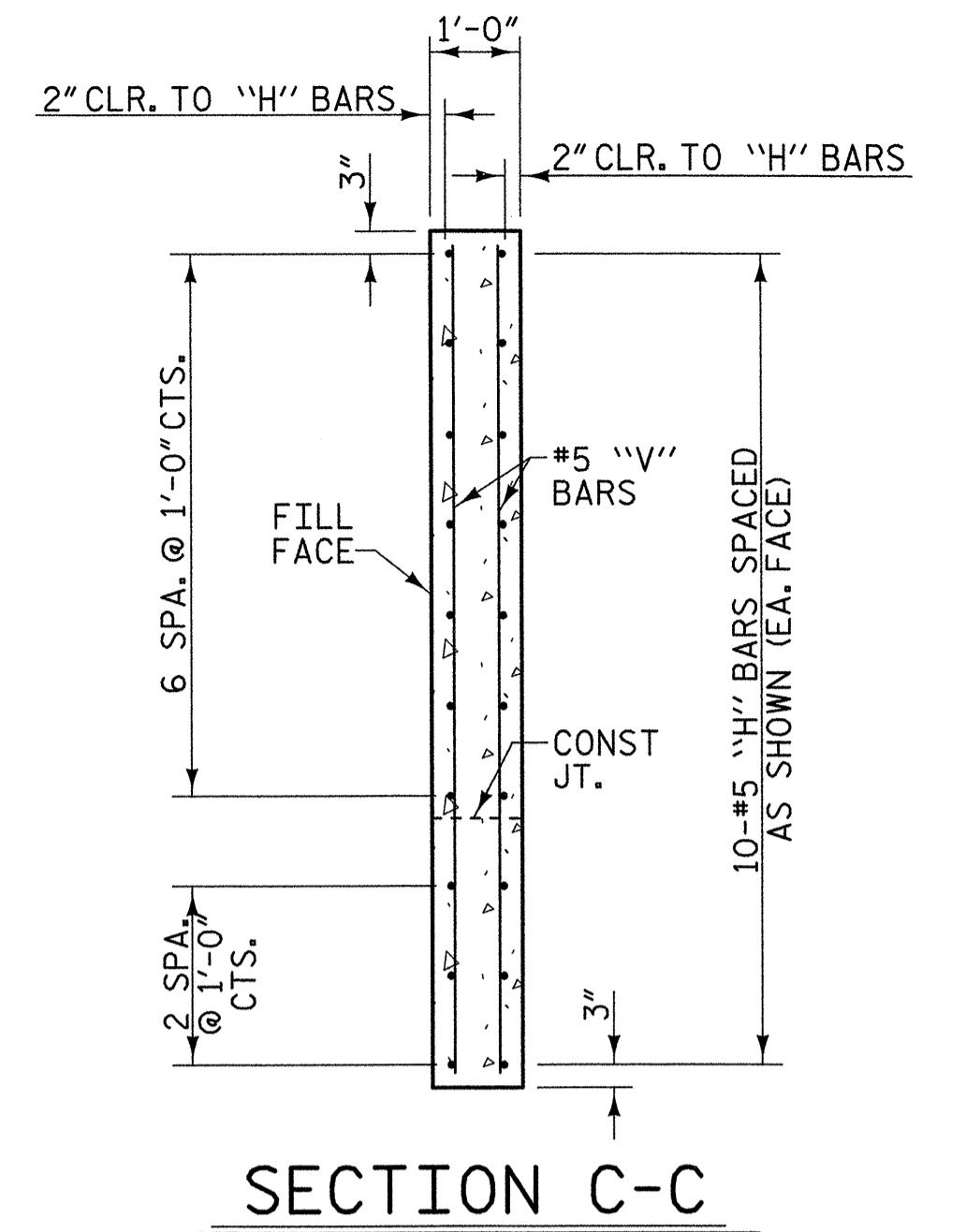
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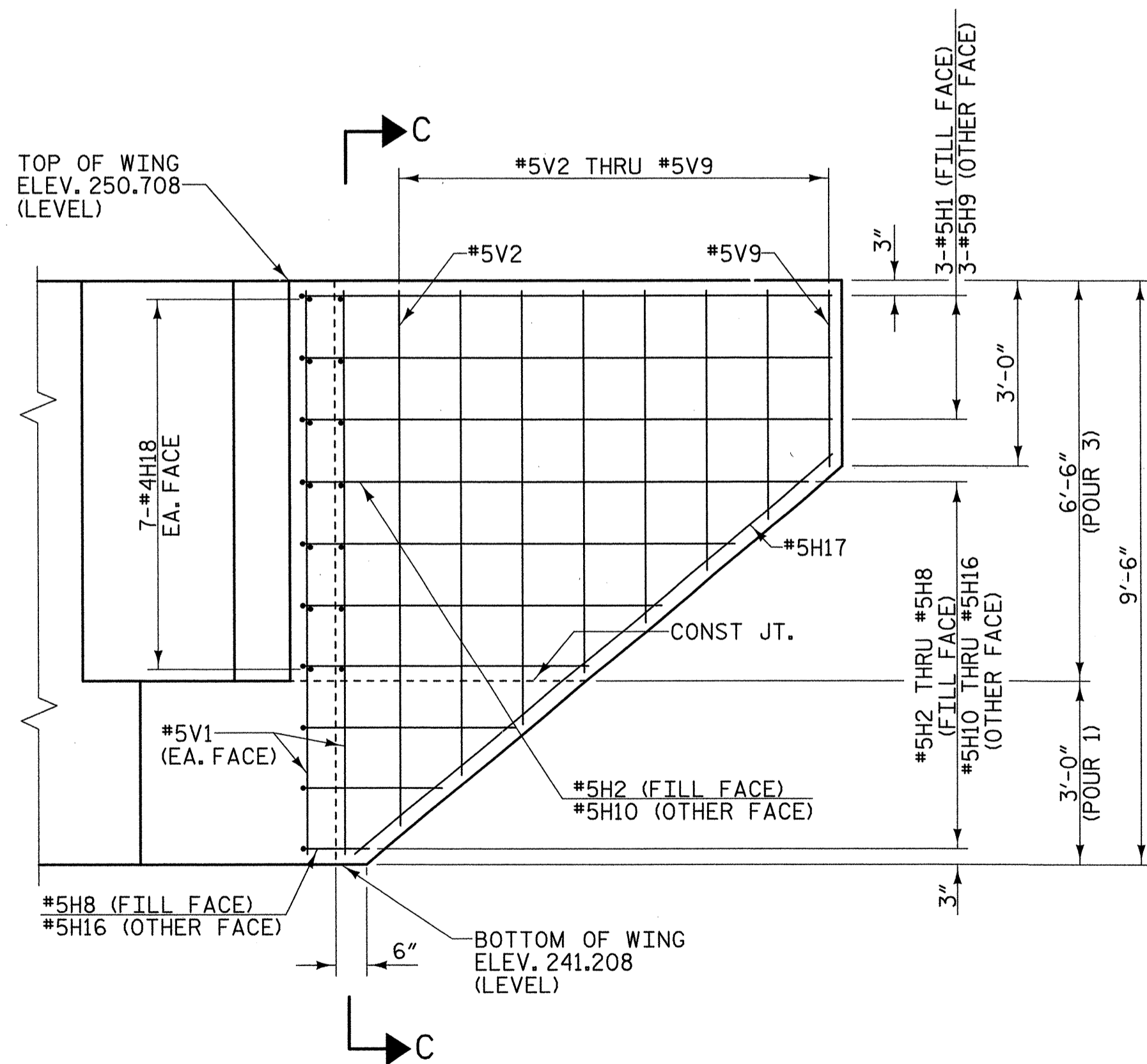
W1 PLAN OF LEFT WING



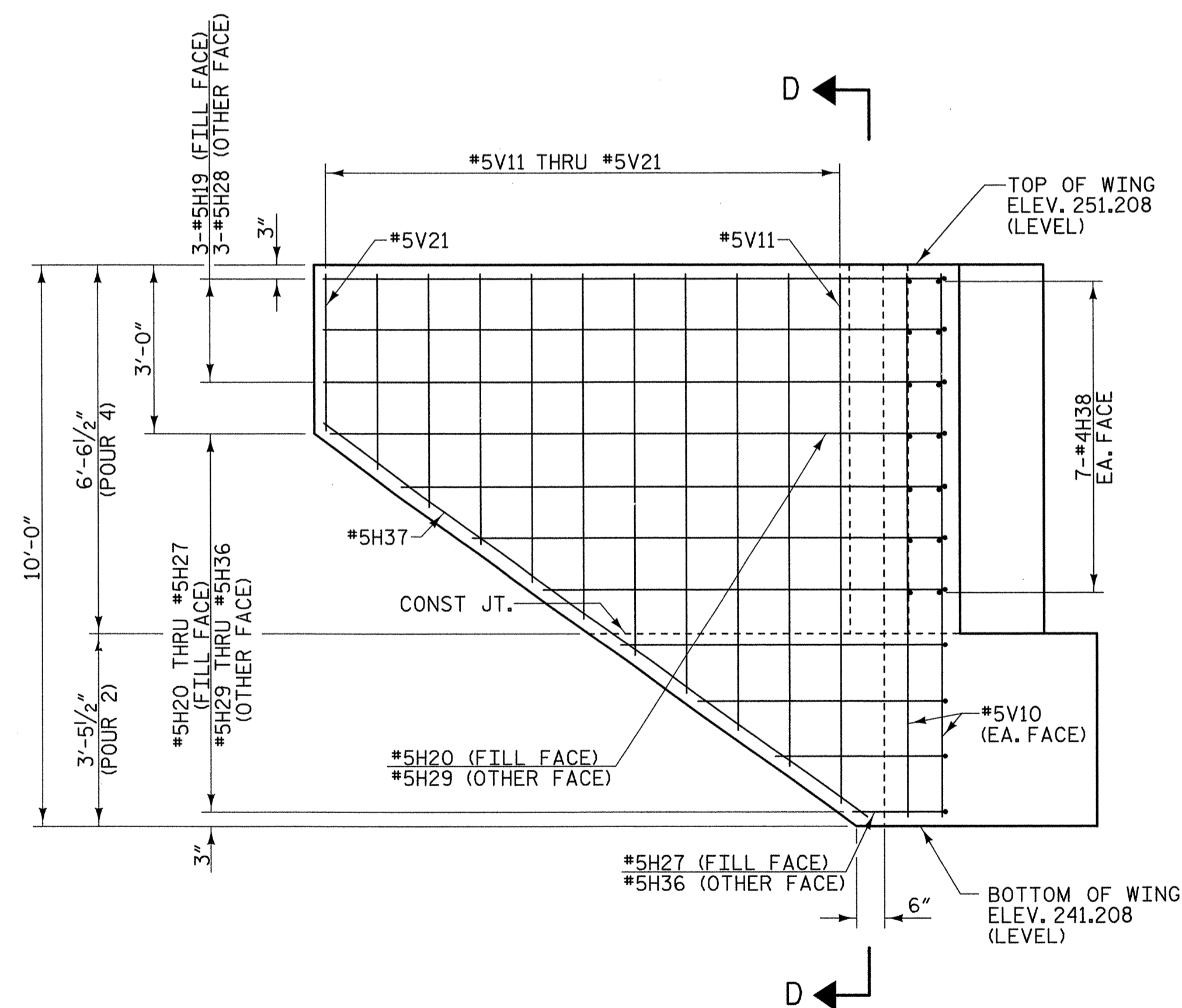
W2 PLAN OF RIGHT WING



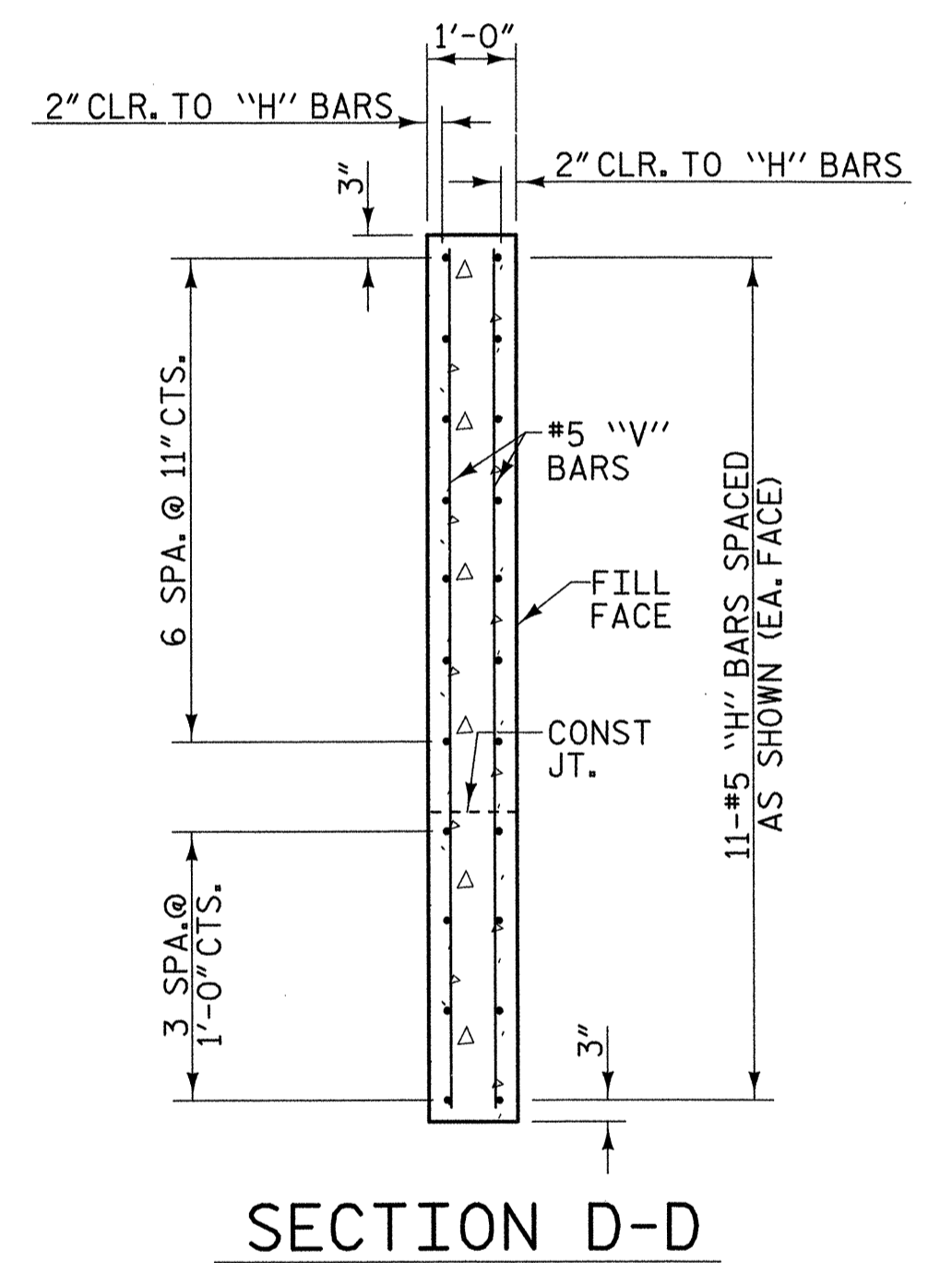
SECTION C-C



W1 ELEVATION OF LEFT WING



W2 ELEVATION OF RIGHT WING



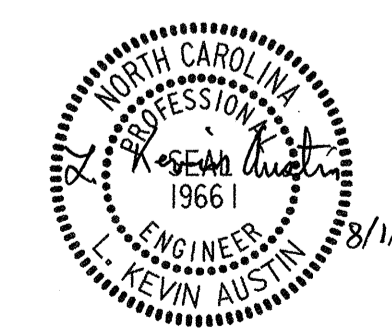
SECTION D-D

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 3 OF 4

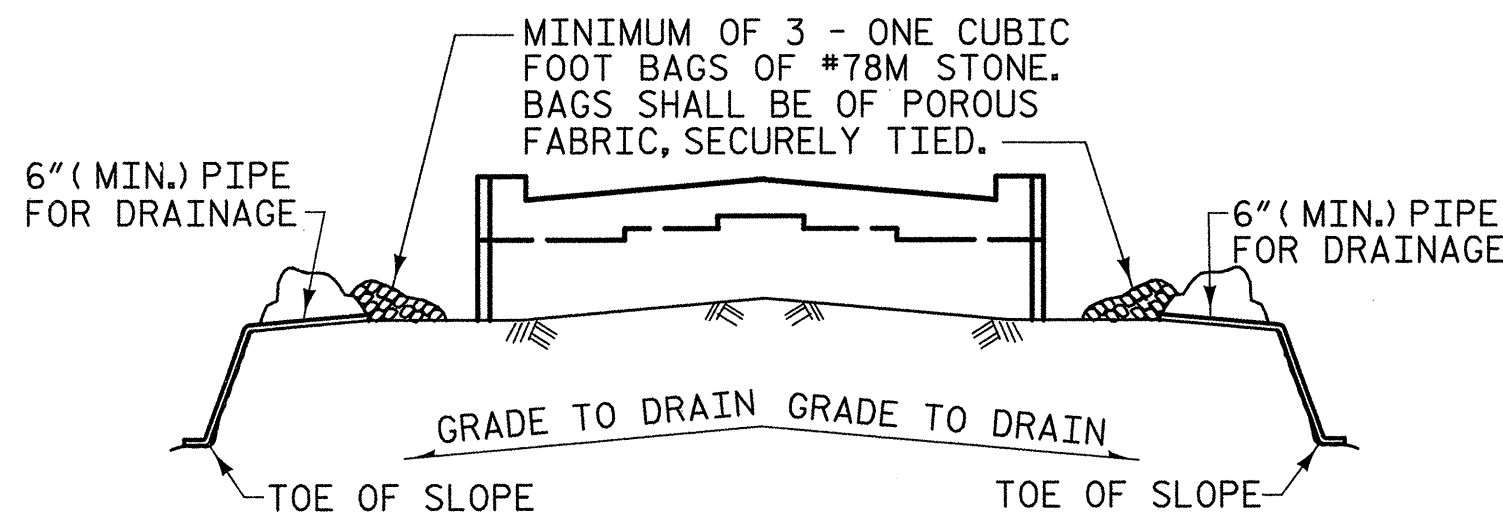
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT 1



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

8/1/2007 5:44:50 AM R:\...uctures\U4756\_SD.EI.03.dgn  
 DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

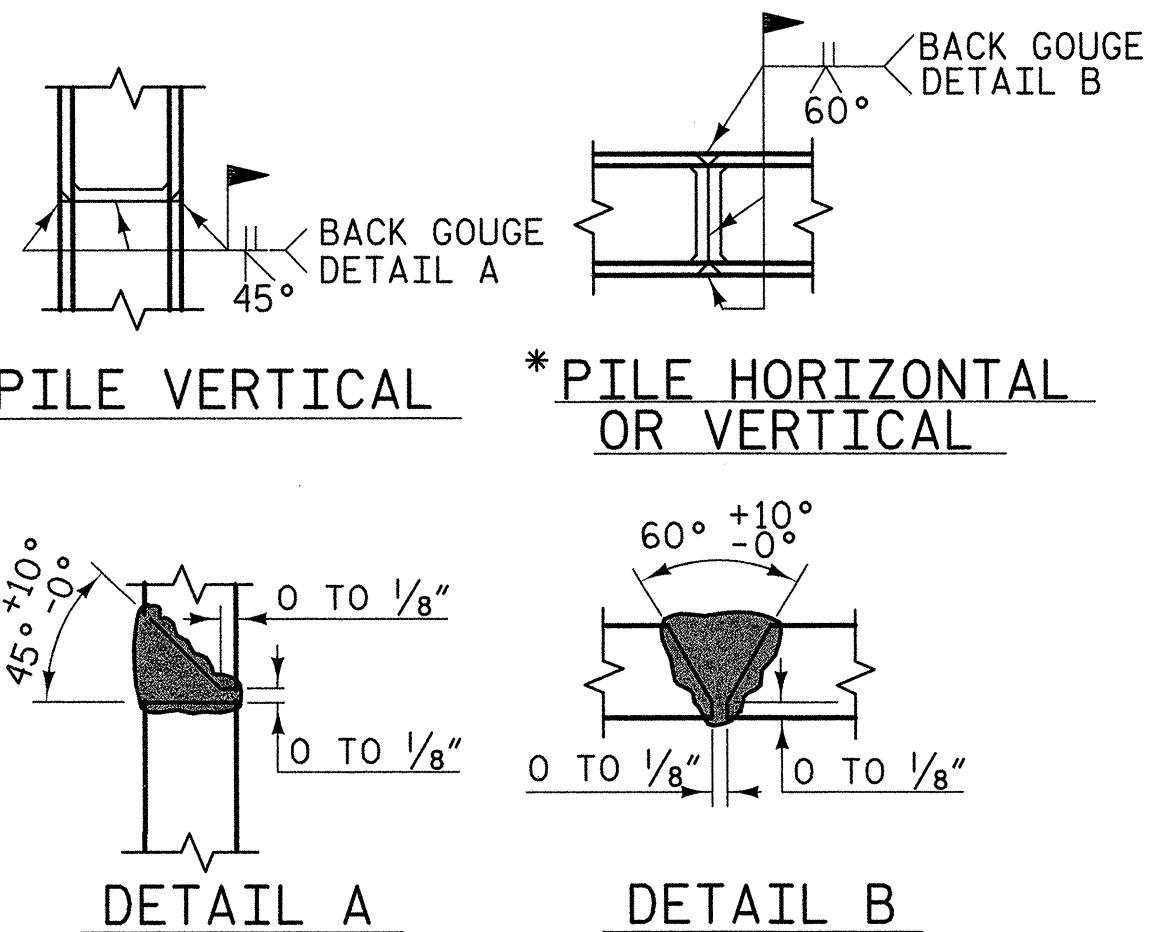


BAGGED STONE AND PIPE SHALL BE PLACED IMMEDIATELY AFTER COMPLETION OF END BENT EXCAVATION. PIPE MAY BE EITHER CONCRETE, CORRUGATED STEEL, CORRUGATED ALUMINUM ALLOY, OR CORRUGATED PLASTIC. PERFORATED PIPE WILL NOT BE ALLOWED.

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.

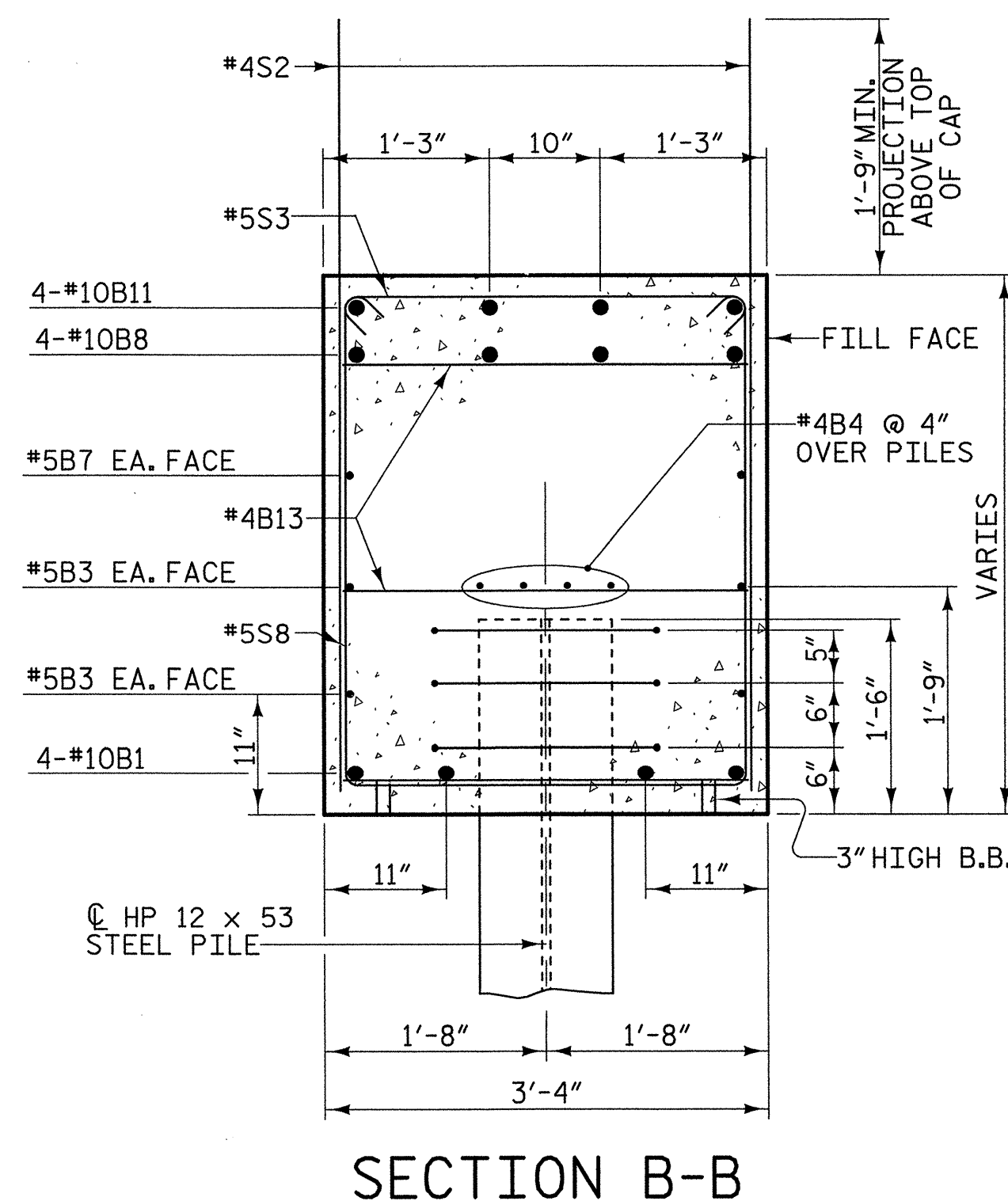
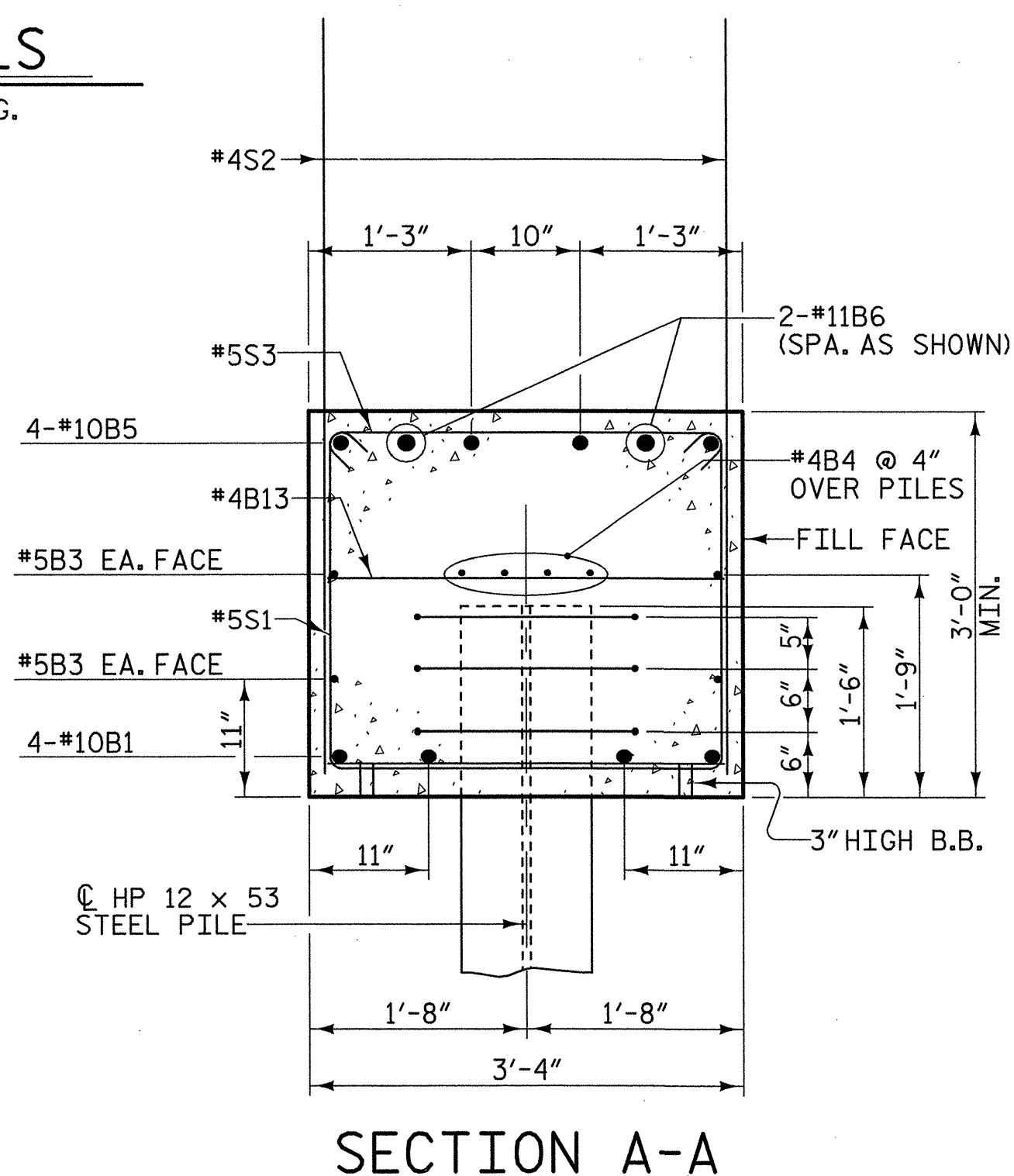
NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK AND THE ENTIRE COST OF THIS WORK SHALL BE INCLUDED IN THE LUMP SUM BID PRICE FOR PLACEMENT OF SUBSTRUCTURE.

### TEMPORARY DRAINAGE AT END BENT

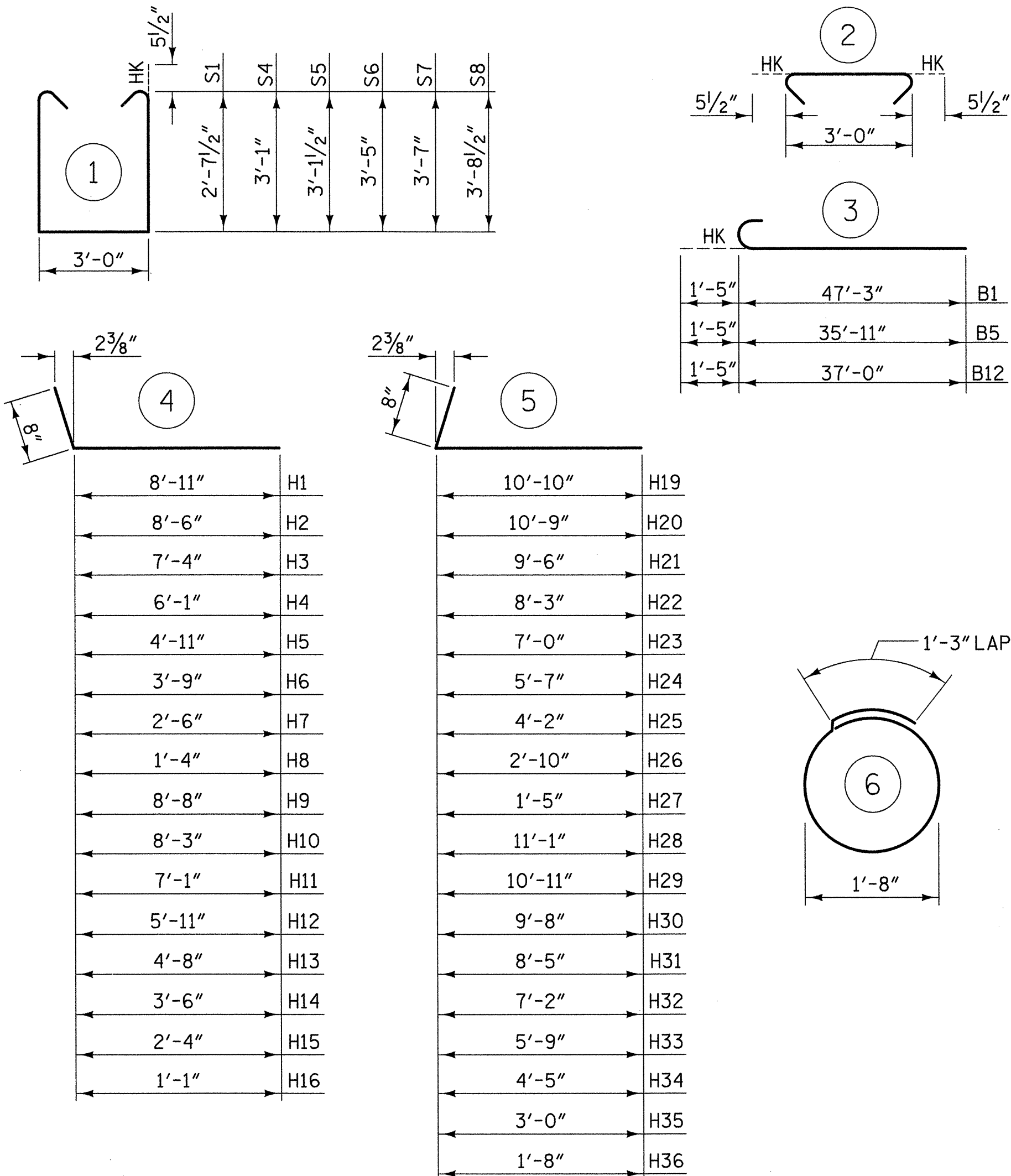


### PILE SPLICE DETAILS

\* POSITION OF PILE DURING WELDING.



### BAR TYPES



ALL BAR DIMENSIONS ARE OUT TO OUT

### BILL OF MATERIAL

FOR END BENT 1											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	3	48'-8"	1675	S1	24	#5	1	9'-2"	229
B2	4	#10	STR	47'-3"	813	S2	188	#4	1	5'-10"	733
B3	12	#5	STR	44'-0"	551	S3	123	#5	2	3'-11"	502
B4	20	#4	STR	27'-2"	363	S4	24	#5	1	10'-1"	252
B5	4	#10	3	37'-4"	643	S5	20	#5	1	10'-2"	212
B6	4	#11	STR	15'-0"	319	S6	20	#5	1	10'-9"	224
B7	4	#5	STR	48'-0"	200	S7	10	#5	1	11'-1"	116
B8	8	#10	STR	31'-5"	1081	S8	25	#5	1	11'-4"	296
B9	2	#5	STR	18'-4"	38	S9	66	#4	6	6'-6"	287
B10	4	#10	STR	21'-3"	366	V1	8	#5	STR	9'-2"	76
B11	4	#10	STR	24'-4"	419	V2	2	#5	STR	8'-8"	18
B12	4	#10	3	38'-5"	661	V3	2	#5	STR	7'-10"	16
B13	45	#4	STR	3'-0"	90	V4	2	#5	STR	7'-0"	15
H1	3	#5	4	9'-7"	30	V5	2	#5	STR	6'-2"	13
H2	1	#5	4	9'-2"	10	V6	2	#5	STR	5'-4"	11
H3	1	#5	4	8'-0"	8	V7	2	#5	STR	4'-6"	9
H4	1	#5	4	6'-9"	7	V8	2	#5	STR	3'-8"	8
H5	1	#5	4	5'-7"	6	V9	2	#5	STR	2'-10"	6
H6	1	#5	4	4'-5"	5	V10	8	#5	STR	9'-8"	81
H7	1	#5	4	3'-2"	3	V11	2	#5	STR	9'-5"	20
H8	1	#5	4	2'-0"	2	V12	2	#5	STR	8'-9"	18
H9	3	#5	4	9'-4"	29	V13	2	#5	STR	8'-1"	17
H10	1	#5	4	8'-11"	9	V14	2	#5	STR	7'-5"	15
H11	1	#5	4	7'-9"	8	V15	2	#5	STR	6'-9"	14
H12	1	#5	4	6'-7"	7	V16	2	#5	STR	6'-1"	13
H13	1	#5	4	5'-4"	6	V17	2	#5	STR	5'-5"	11
H14	1	#5	4	4'-2"	4	V18	2	#5	STR	4'-9"	10
H15	1	#5	4	3'-0"	3	V19	2	#5	STR	4'-1"	9
H16	1	#5	4	1'-9"	2	V20	2	#5	STR	3'-5"	7
H17	2	#5	STR	10'-1"	21	V21	2	#5	STR	2'-9"	6
H18	14	#4	STR	2'-8"	25						
H19	3	#5	4	11'-6"	36						
H20	1	#5	4	11'-5"	12						
H21	1	#5	4	10'-2"	11						
H22	1	#5	4	8'-11"	9						
H23	1	#5	4	7'-8"	8						
H24	1	#5	4	6'-3"	7						
H25	1	#5	4	4'-10"	5						
H26	1	#5	4	3'-6"	4						
H27	1	#5	4	2'-1"	2						
H28	3	#5	4	11'-9"	37						
H29	1	#5	4	11'-7"	12						
H30	1	#5	4	10'-4"	11						
H31	1	#5	4	9'-1"	9						
H32	1	#5	4	7'-10"	8						
H33	1	#5	4	6'-5"	7						
H34	1	#5	4	5'-1"	5						
H35	1	#5	4	3'-8"	4						
H36	1	#5	4	2'-4"	2						
H37	2	#5	STR	11'-11"	25						
H38	14	#4	STR	2'-9"	26						
						TOTAL REINFORCING STEEL =					10888 lbs.
						CLASS "A" CONCRETE - CU. YARDS					
						POUR 1					28.0 cu. yds.
						POUR 2					29.8 cu. yds.
						POUR 3					2.4 cu. yds.
						POUR 4					3.2 cu. yds.
						TOTAL					63.4 cu. yds.
						HP 12 X 53 STEEL PILES					
						22 PILES REQUIRED - LIN. FEET					1650

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 4 OF 4

STATE OF NORTH CAROLINA  
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 RALEIGH

### SUBSTRUCTURE END BENT 1



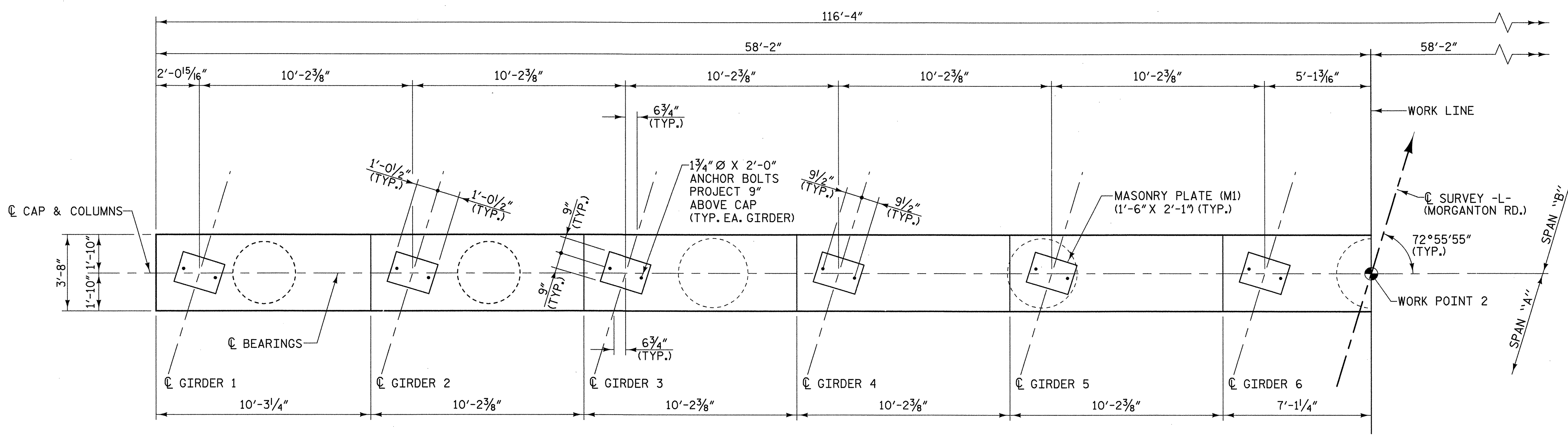
PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO Box 33127  
 Raleigh, NC 27636  
 (919) 851-1111  
 (919) 851-1918 (FAX)  
 WWW.MULKEYINC.COM

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

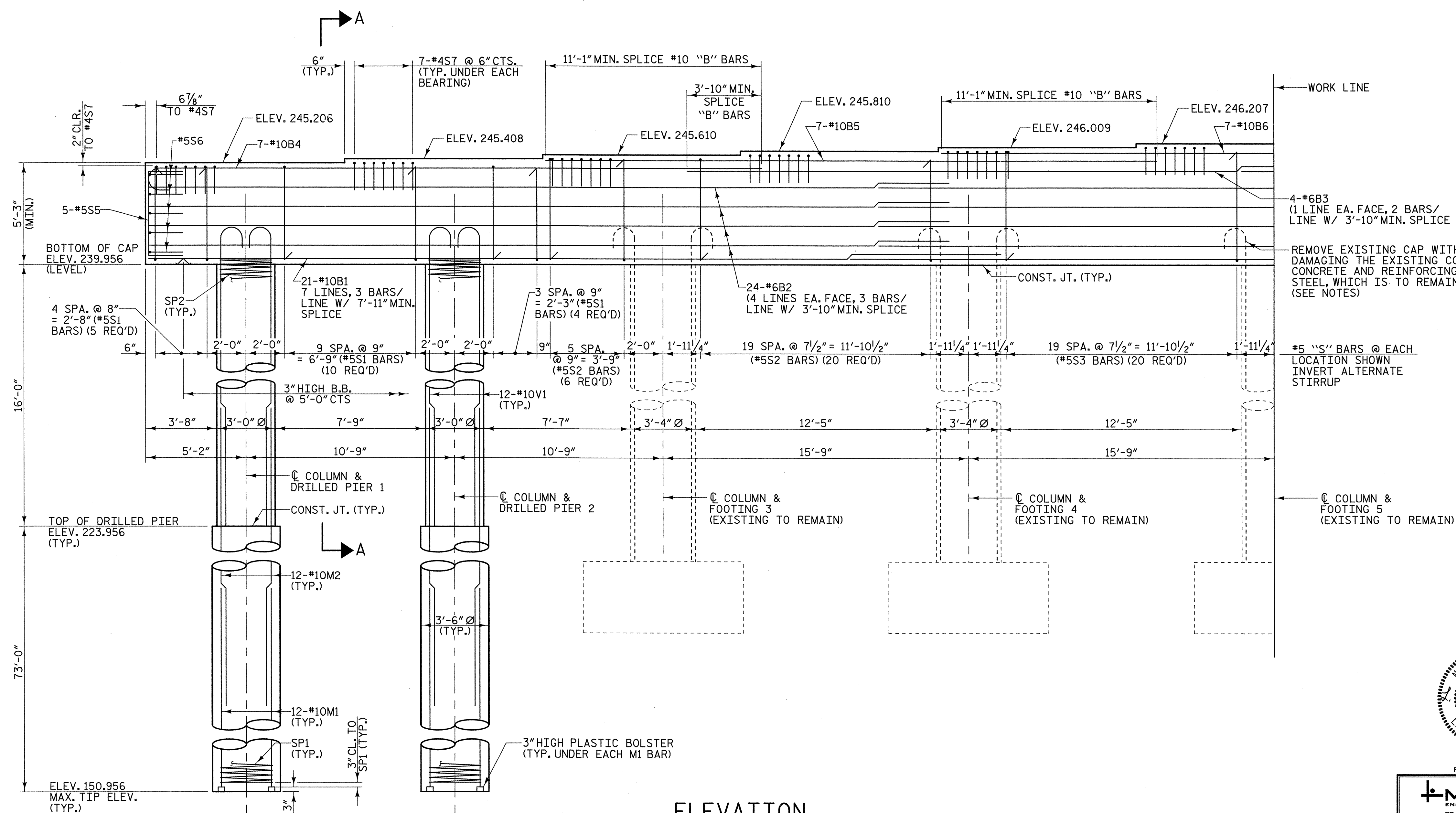
DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

8/1/2007 8:40:09 AM R:\Projects\NUTRIB-SB-EL-04.dgn





PLAN



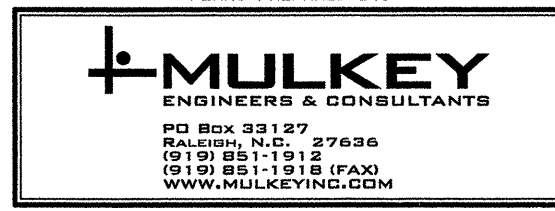
ELEVATION

NOTES:

- STIRRUPS IN THE CAP MAY BE SHIFTED AS NECESSARY TO CLEAR ANCHOR BOLTS.
- HOOKS ON "V" BARS MAY BE TURNED AS NECESSARY FOR PLACING REINFORCING STEEL.
- FOR DRILLED PIERS SEE SPECIAL PROVISIONS.
- THE CONTRACTOR'S ATTENTION IS CALLED TO THE FACT THAT THE LONGITUDINAL REINFORCEMENT FOR THE DRILLED PIERS IS DETAILED WITH 3 FEET OF EXTRA LENGTH.
- ALL STEEL IN THE DRILLED PIERS IS INCLUDED IN THE PAY ITEMS FOR "REINFORCING STEEL" AND "SPIRAL COLUMN REINFORCING STEEL".
- THE LOCATION OF THE CONSTRUCTION JOINT IN THE DRILLED PIERS IS BASED ON AN APPROXIMATE GROUND LINE ELEVATION. IF THE CONSTRUCTION JOINT IS ABOVE THE ACTUAL GROUND ELEVATION, THE CONTRACTOR SHALL PLACE THE CONSTRUCTION JOINT 1 FOOT BELOW THE GROUND LINE.
- THE CONTRACTOR SHALL TAKE ALL STEPS NECESSARY TO PREVENT CUTTING OR OTHERWISE DAMAGING THE EXISTING REINFORCING STEEL TO REMAIN IN PLACE. ANY SUCH BARS DAMAGED (NICKS DEEPER THAN 20% OF THE BAR DIAMETER) BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED OR REPLACED. THE CONTRACTOR SHALL SUBMIT HIS PLAN TO REPAIR OR REPLACE DAMAGED REINFORCING STEEL TO THE ENGINEER FOR APPROVAL.
- THE EXISTING COLUMN REINFORCING SHALL BE CLEANED OF ANY DEBRIS AND RETURNED TO ITS ORIGINAL POSITION, IF NECESSARY, PRIOR TO THE POURING OF THE NEW BENT CAP.

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 1 OF 3



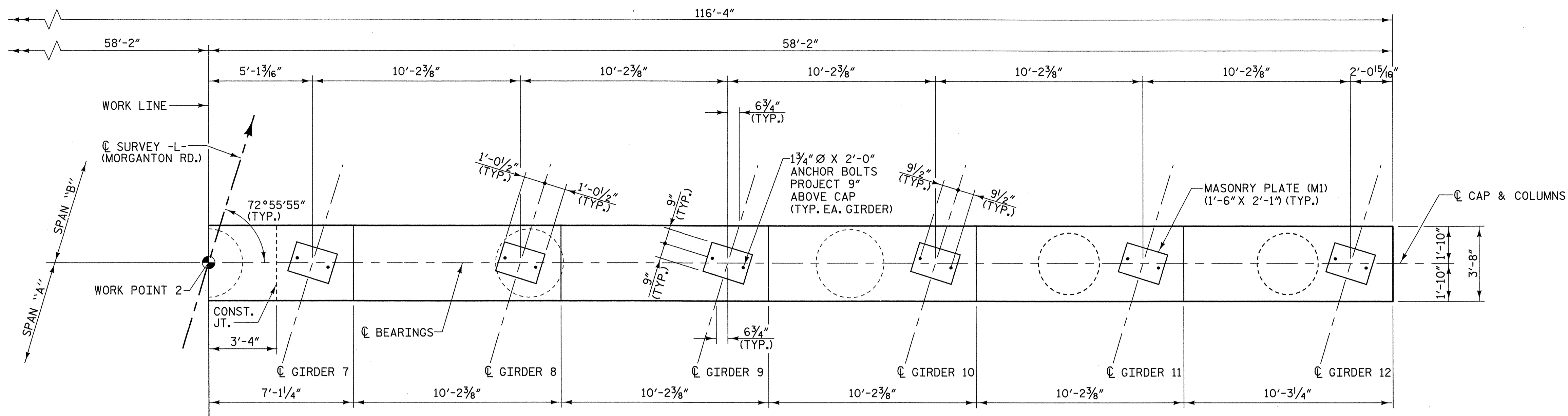
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

## SUBSTRUCTURE BENT 1

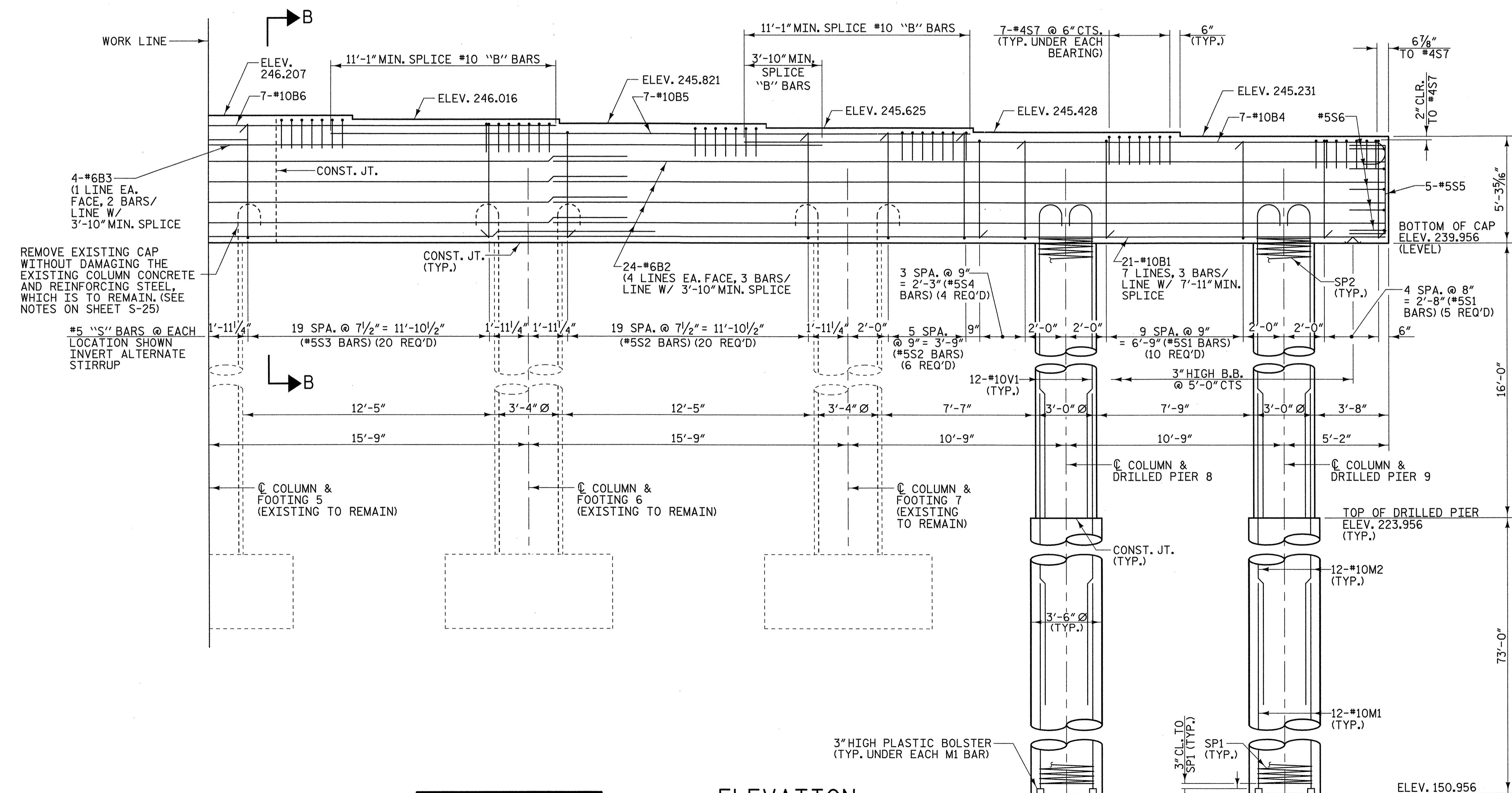
DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

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

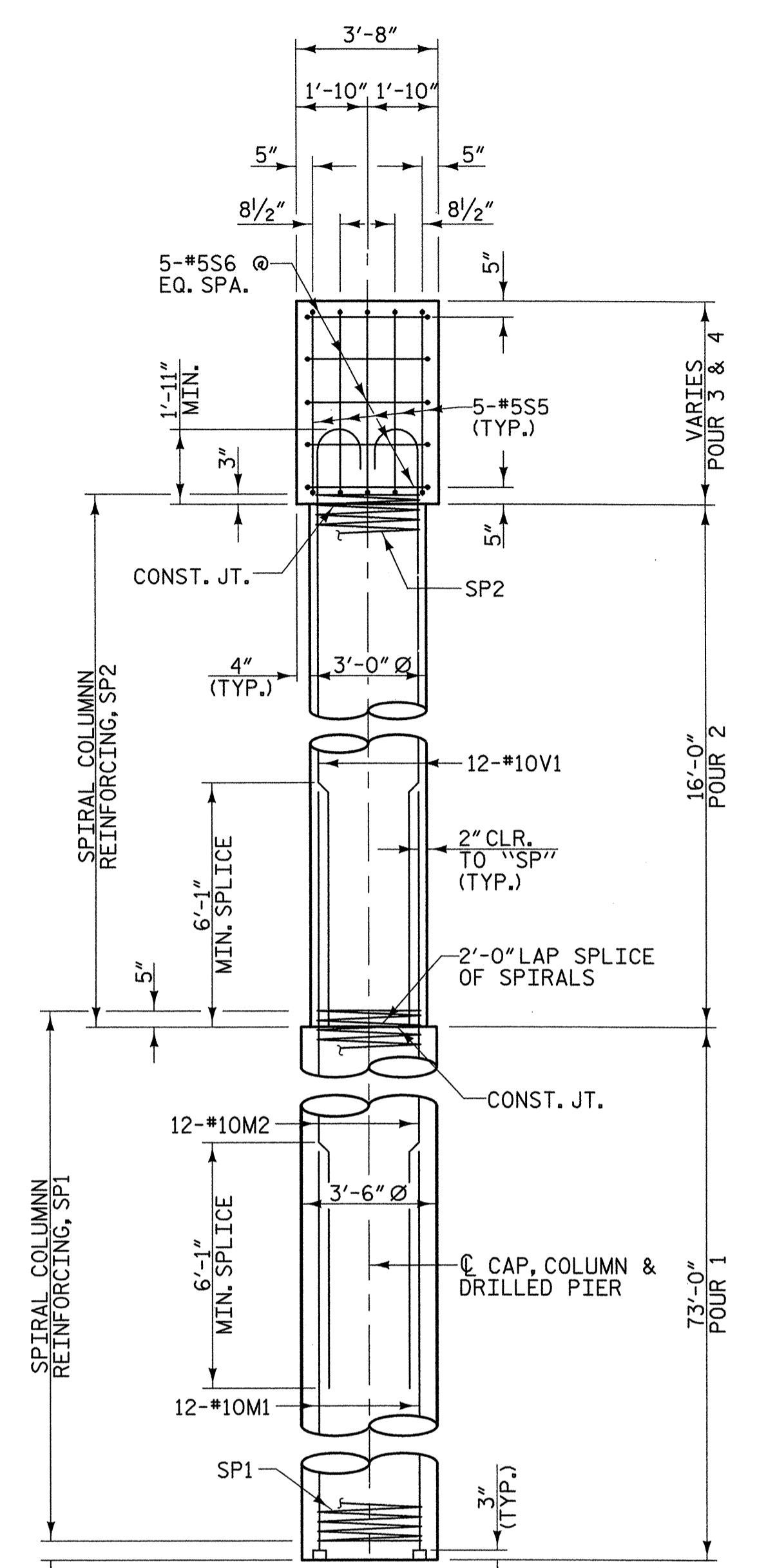
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PLAN



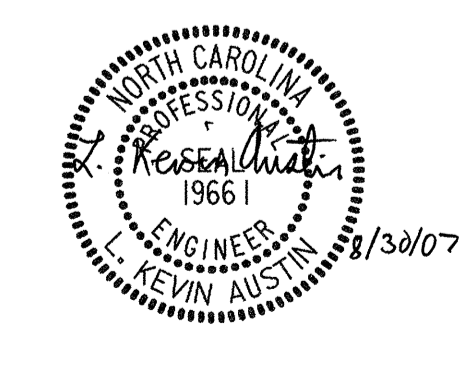
ELEVATION



END ELEVATION

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 2 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE BENT 1



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 P.O. BOX 33127  
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 (919) 881-1313 (FAX)  
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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-26	
1			3			TOTAL SHEETS	
2			4				

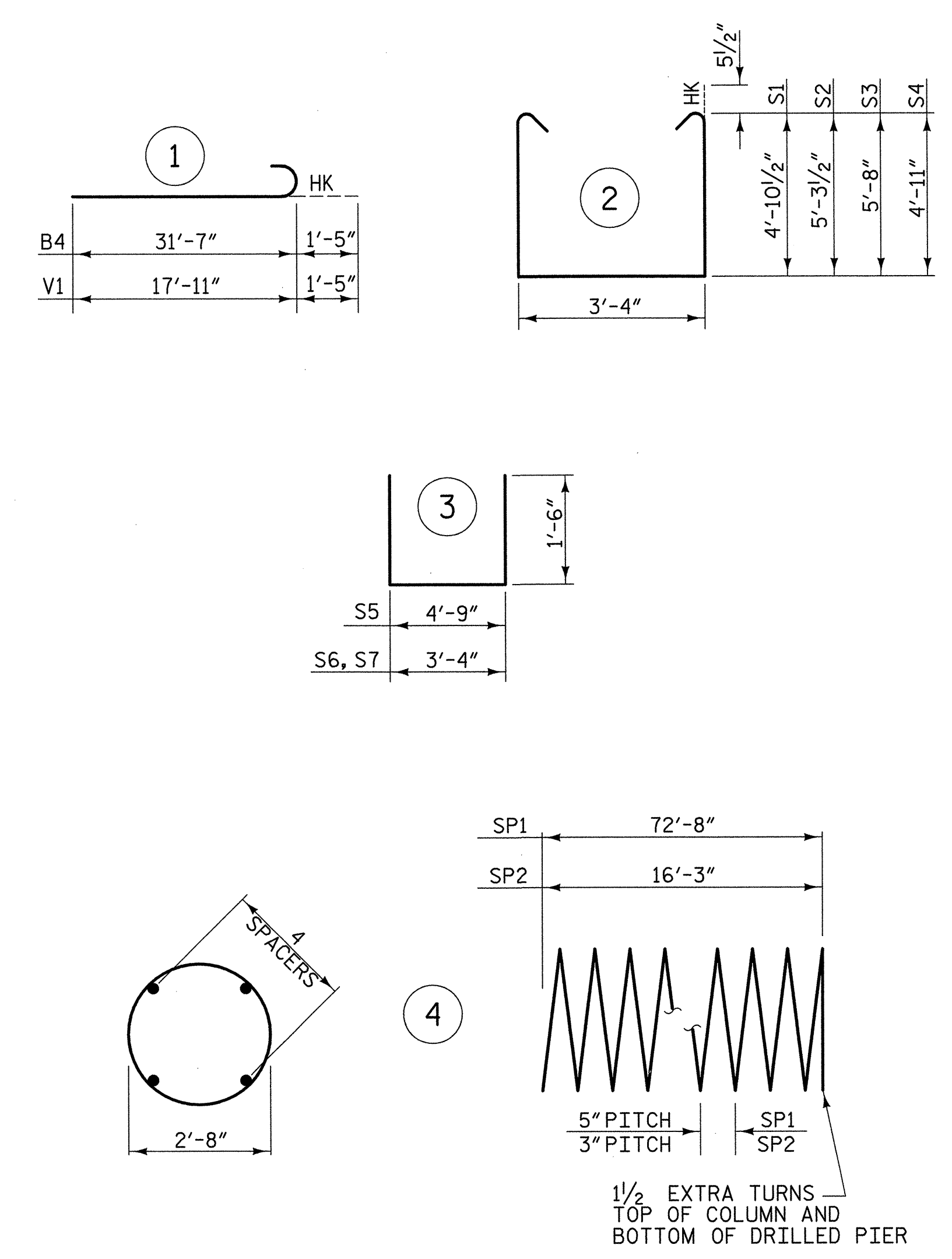
**PROGRESS DRAWING**  
 DO NOT USE FOR CONSTRUCTION

**PROGRESS DRAWING**  
 DO NOT USE FOR CONSTRUCTION

DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

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BAR TYPES

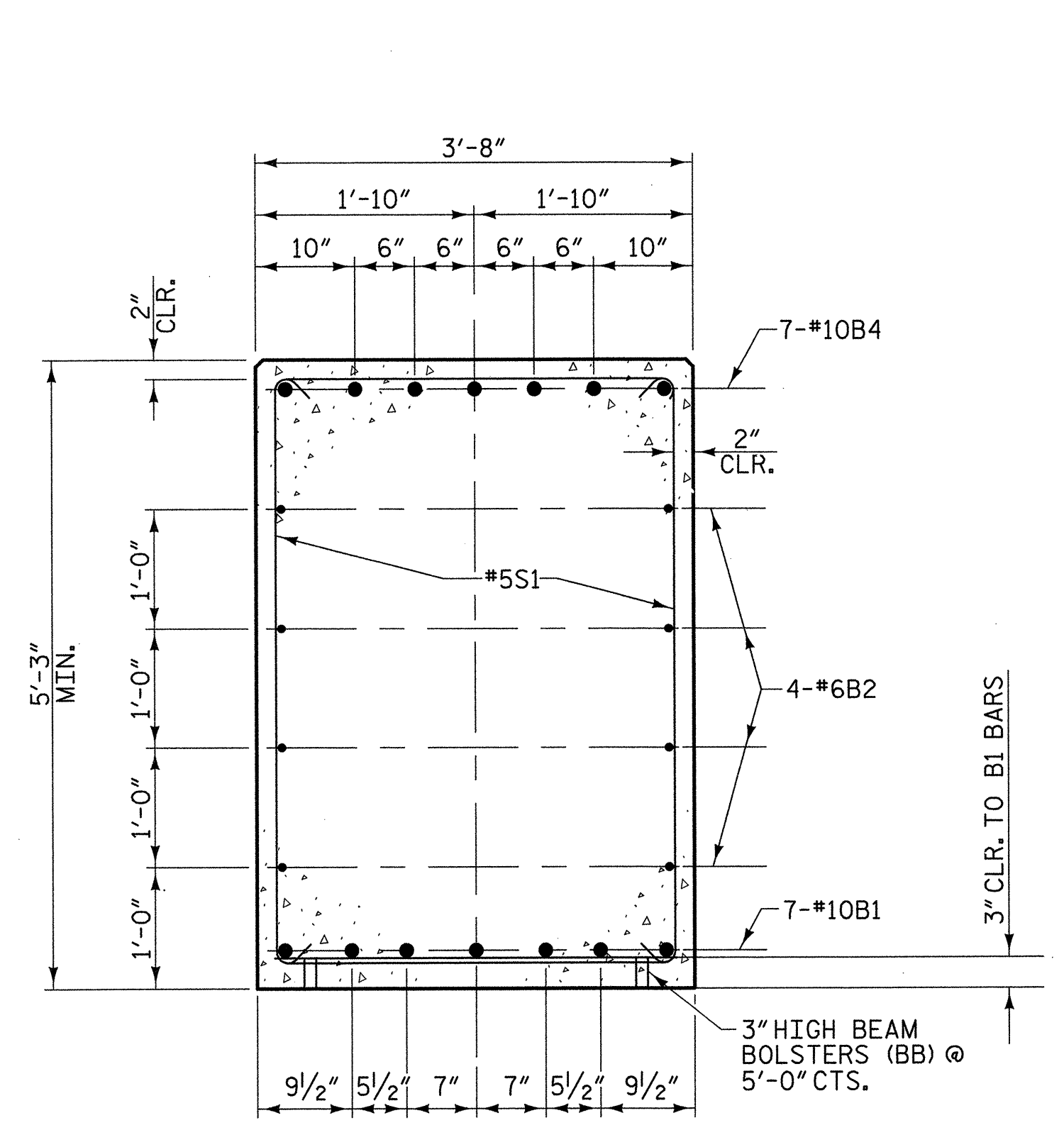


ALL BAR DIMENSIONS ARE OUT TO OUT

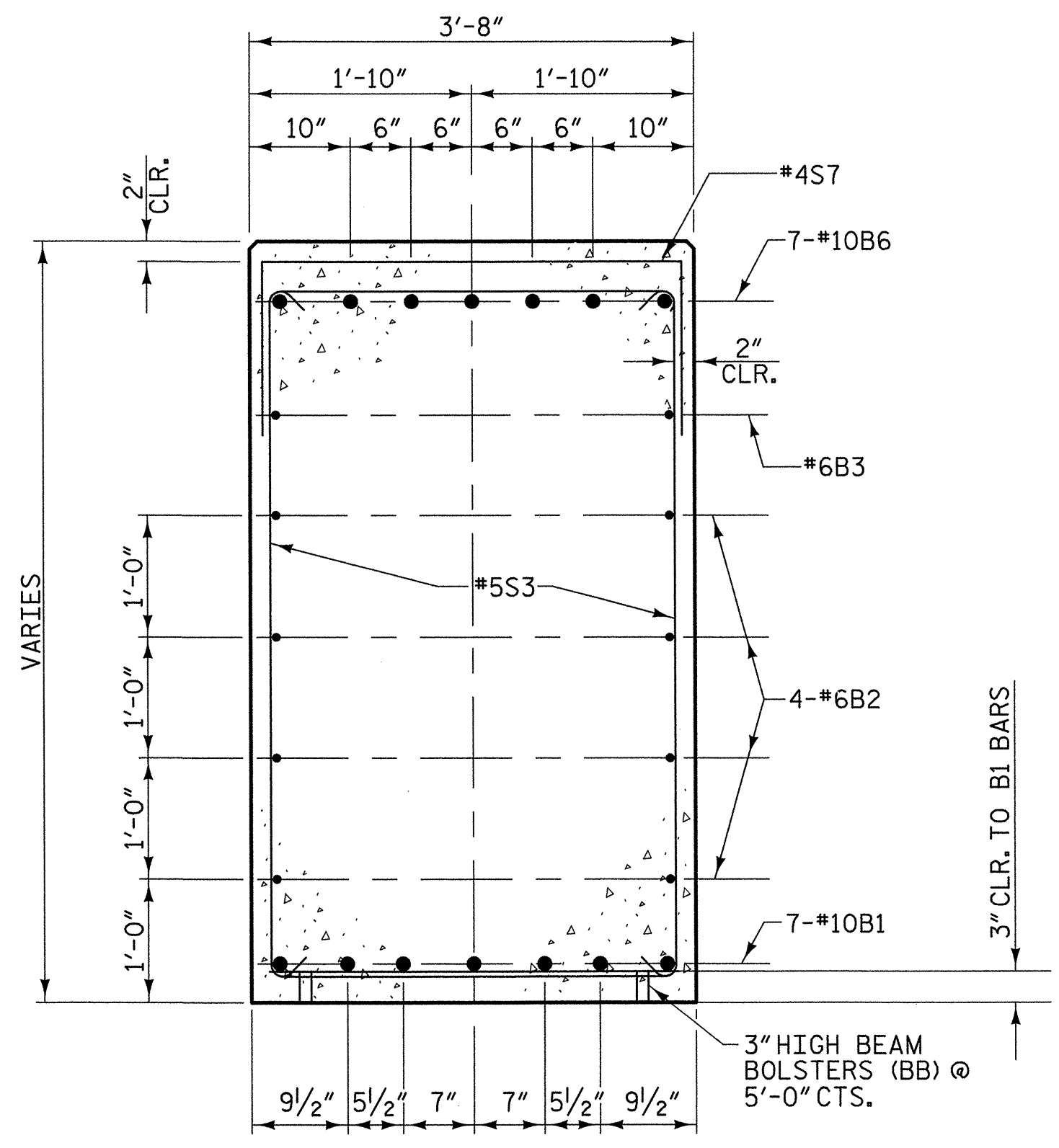
- \*\* THE SP1 SPIRAL REINFORCING STEEL SHALL BE W31 OR D-31 COLD DRAWN WIRE OR #5 PLAIN OR DEFORMED BAR.
- \*\*\* THE SP2 SPIRAL REINFORCING STEEL SHALL BE W20 OR D-20 COLD DRAWN WIRE OR #4 PLAIN OR DEFORMED BAR.

BILL OF MATERIAL

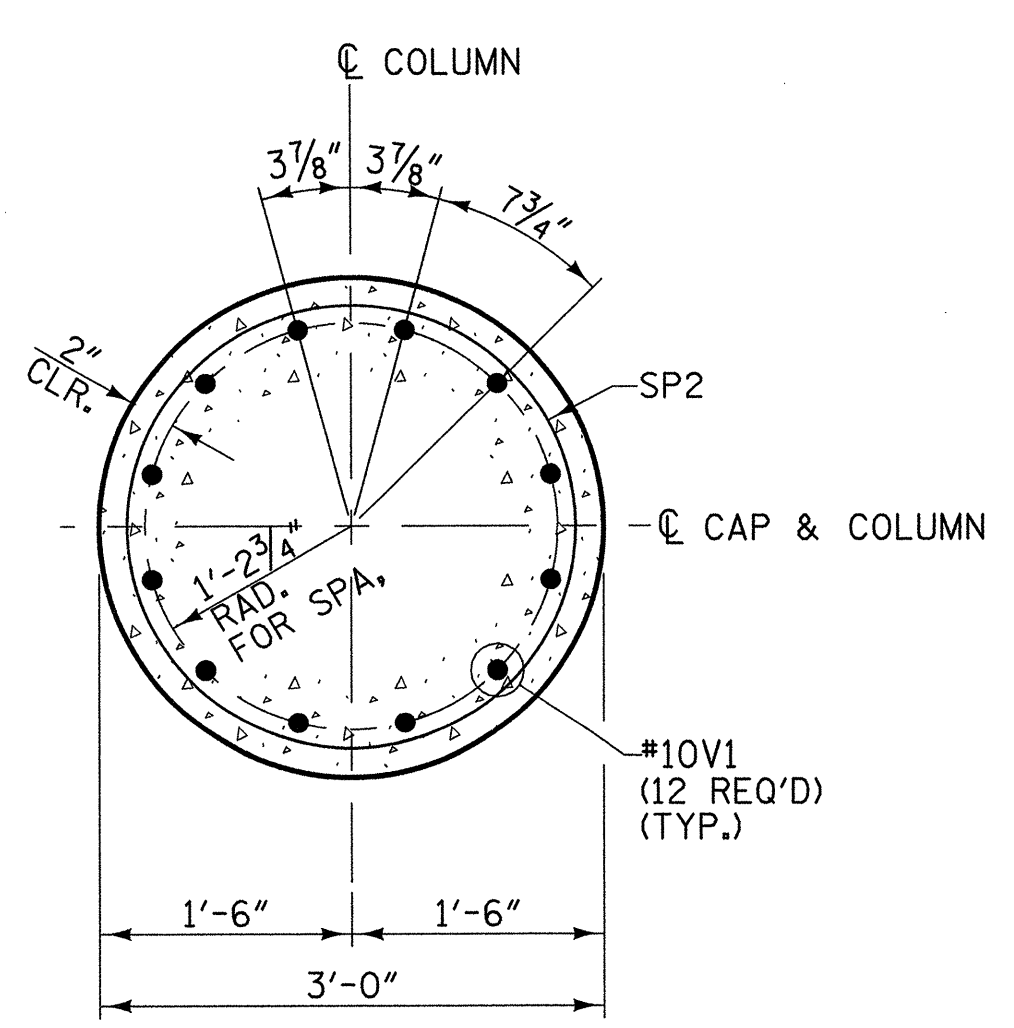
FOR BENT 1					
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	21	#10	STR	44'-0"	3976
B2	24	#6	STR	41'-3"	1487
B3	4	#6	STR	32'-2"	193
B4	14	#10	1	33'-0"	1988
B5	7	#10	STR	31'-6"	949
B6	7	#10	STR	34'-3"	1032
M1	48	#10	STR	28'-2"	5818
M2	48	#10	STR	60'-0"	12393
S1	19	#5	2	14'-0"	277
S2	52	#5	2	14'-10"	805
S3	40	#5	2	15'-7"	650
S4	19	#5	2	14'-1"	279
S5	10	#5	3	7'-9"	81
S6	10	#5	3	6'-4"	66
S7	84	#5	3	6'-4"	555
V1	48	#10	1	19'-4"	3993
TOTAL REINFORCING STEEL =					34542 lbs.
SP1	4	**	4	1464'-0"	6108
SP2	4	***	4	561'-1"	1499
SPIRAL COLUMN REINFORCING STEEL =					7607 lbs.
CLASS "A" CONCRETE - CU. YARDS					
POUR 2 (COLUMNS)					16.8 cu. yds.
POUR 3 (CAP)					48.1 cu. yds.
POUR 4 (CAP)					42.5 cu. yds.
TOTAL					107.4 cu. yds.
DRILLED PIERS @ BENT 1					
3'-6" Ø DRILLED PIERS IN SOIL					262 LIN. FT.
3'-6" Ø DRILLED PIERS NOT IN SOIL					30 LIN. FT.
SPT TESTING					4 EA.
SID INSPECTION					4 EA.
CROSSHOLE SONIC LOGGING					4 EA.
CSL TUBES					1208 LIN. FT.
DRILLED PIER CONC. (FOR INFORMATION ONLY)					104.1 cu. yds.



SECTION A-A

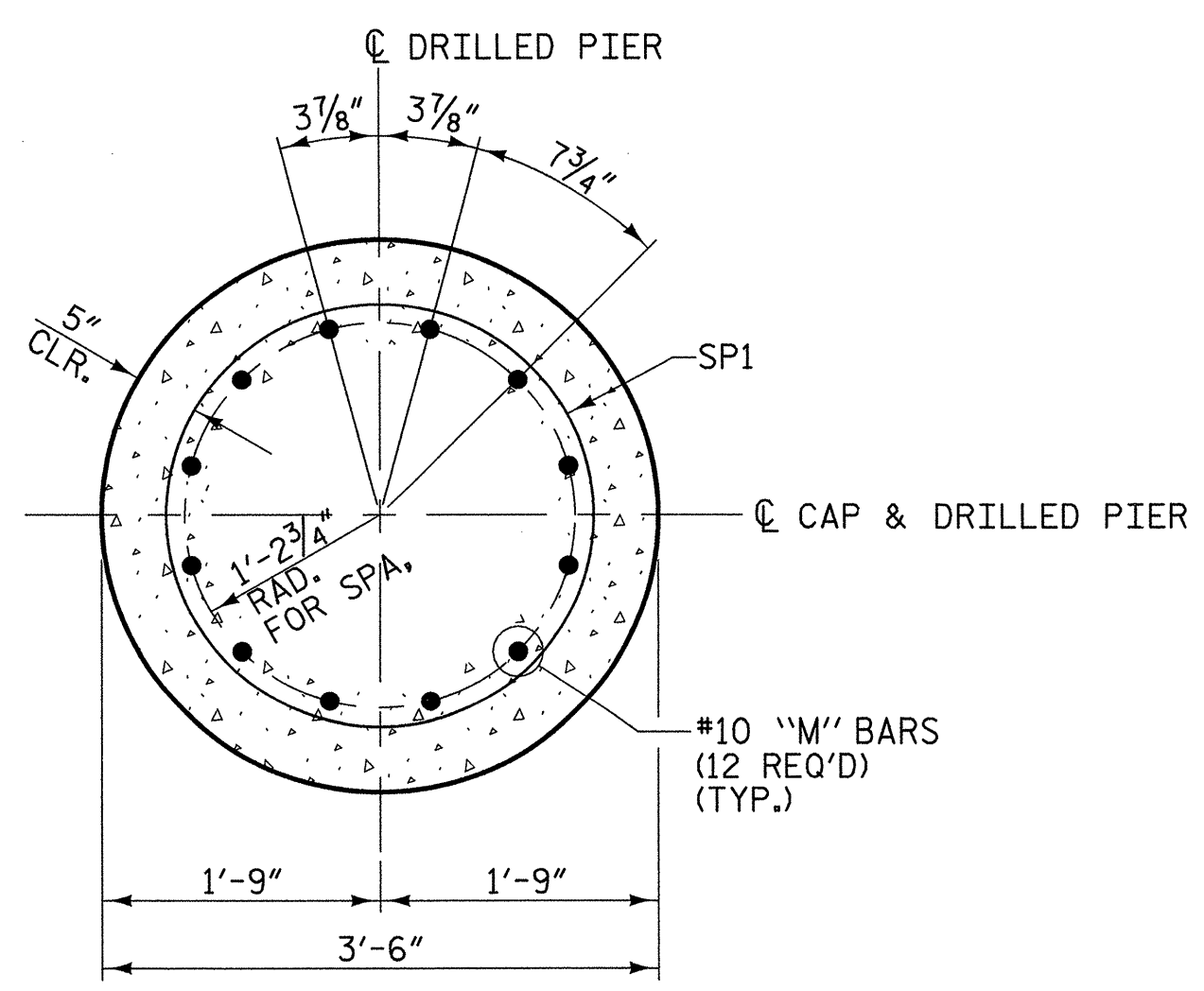


SECTION B-B



SECTION THRU COLUMN

(ALL COLUMNS SIMILAR)  
(SEE ELEVATION FOR BAR MARKS)



SECTION THRU DRILLED PIER

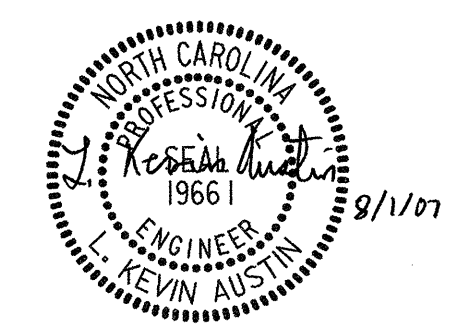
(ALL DRILLED PIERS SIMILAR)  
(SEE ELEVATION FOR BAR MARKS)

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

SHEET 3 OF 3

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH

**SUBSTRUCTURE BENT 1**

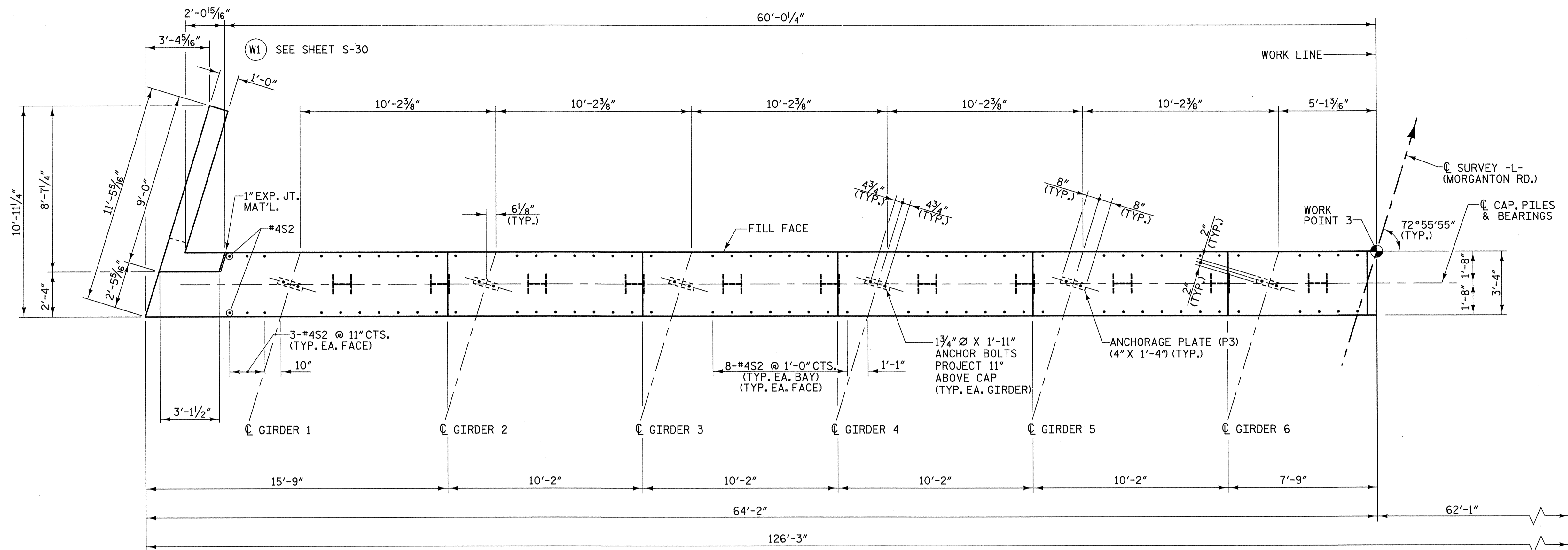


PLANS PREPARED BY:  
**MULKEY ENGINEERS & CONSULTANTS**  
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RALEIGH, NC 27626  
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(919) 851-1818 (FAX)  
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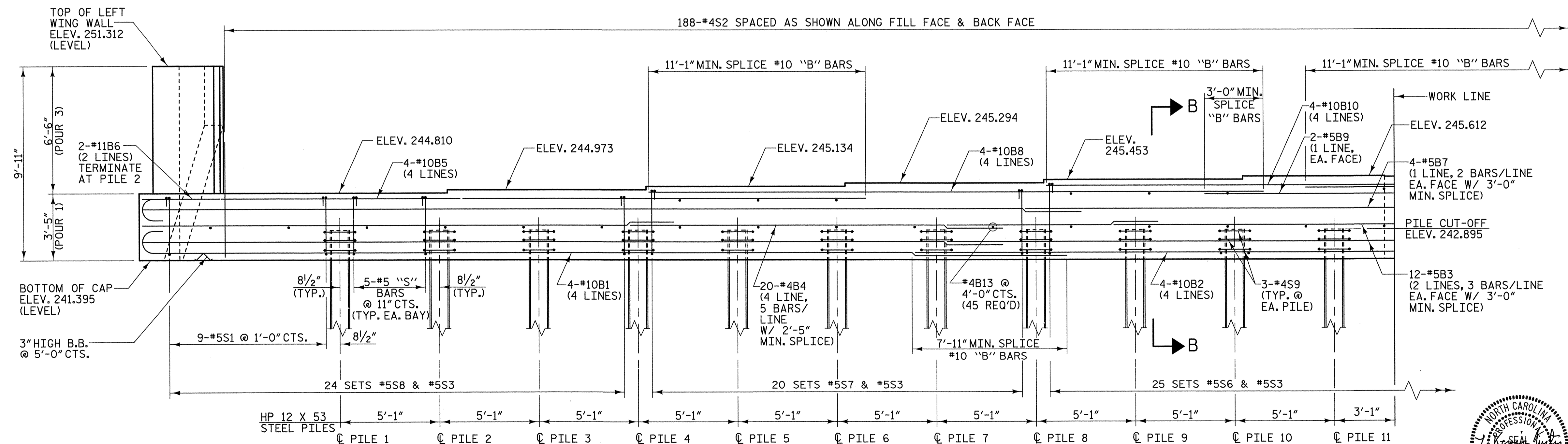
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	S-27
1			3			TOTAL SHEETS
2			4			

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DRAWN BY: W. B. ALLEN DATE: 5/07  
CHECKED BY: M. A. AVERETTE DATE: 5/07



PLAN



ELEVATION

NOTES:

FOR PILE SPLICE DETAILS, SEE SHEET S-24.

FOR TEMPORARY DRAINAGE AT END BENT SEE SHEET S-24.

ROUGHEN TOP OF CAP AND WING CONST. JT. TO A FULL AMPLITUDE OF 1/4".

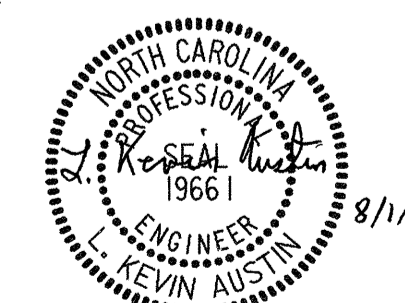
EXISTING END BENT TO BE REMOVED AND EXISTING PILES CUT-OFF AT BOTTOM OF THE NEW CAP.

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 1 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

SUBSTRUCTURE  
 END BENT 2



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

DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

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**NOTES:**

FOR PILE SPLICE DETAILS, SEE SHEET S-24.

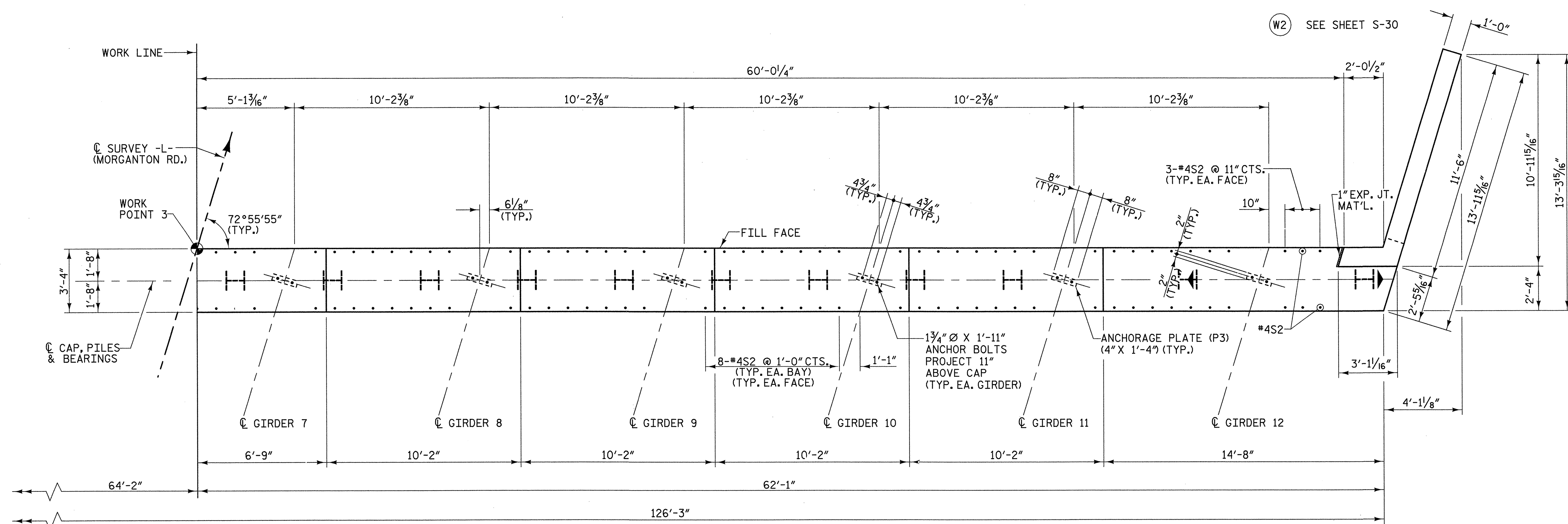
FOR TEMPORARY DRAINAGE AT END BENT SEE SHEET S-24.

ROUGHEN TOP OF CAP AND WING CONST. JT. TO A FULL AMPLITUDE OF 1/4".

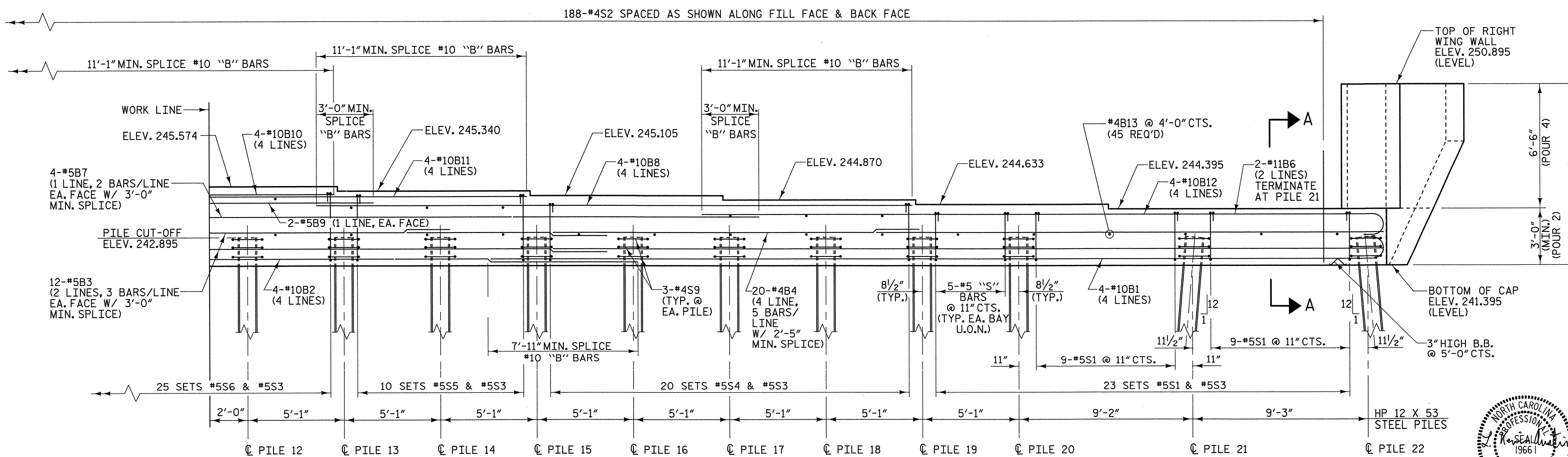
EXISTING END BENT TO BE REMOVED AND EXISTING PILES CUT-OFF AT BOTTOM OF THE NEW CAP.

U.O.N. - UNLESS OTHERWISE NOTED

▲ DENOTES BATTER PILES 1:12 IN DIRECTION OF ARROW.



**PLAN**



**ELEVATION**

PROJECT NO. **U-4756**  
 CUMBERLAND COUNTY  
 STATION: **44+88.35 -L-**

SHEET 2 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**SUBSTRUCTURE  
 END BENT 2**

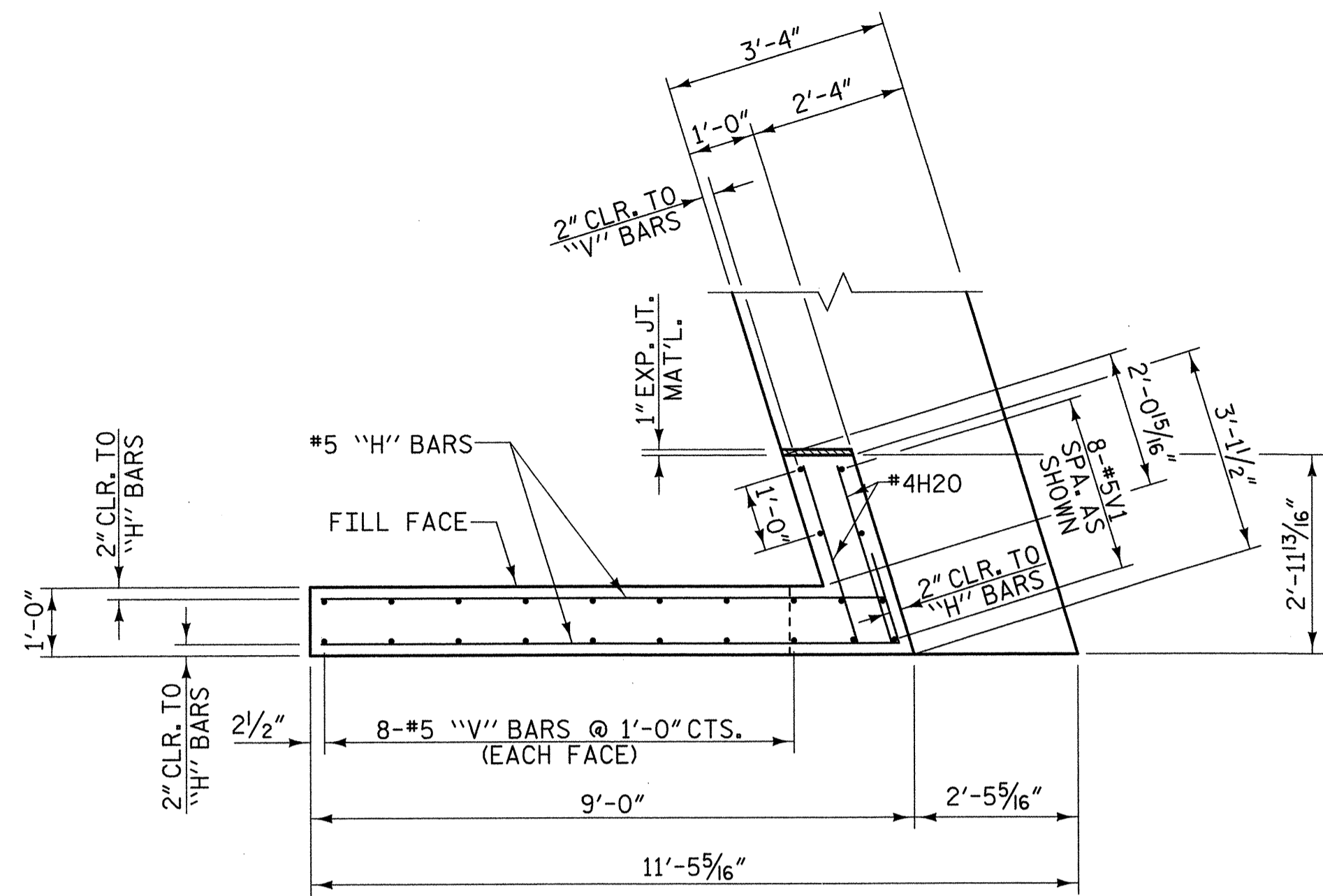


PLANS PREPARED BY:  
**MULKEY ENGINEERS & CONSULTANTS**  
 1915 BEECH ST. SUITE 200  
 RALEIGH, N.C. 27606  
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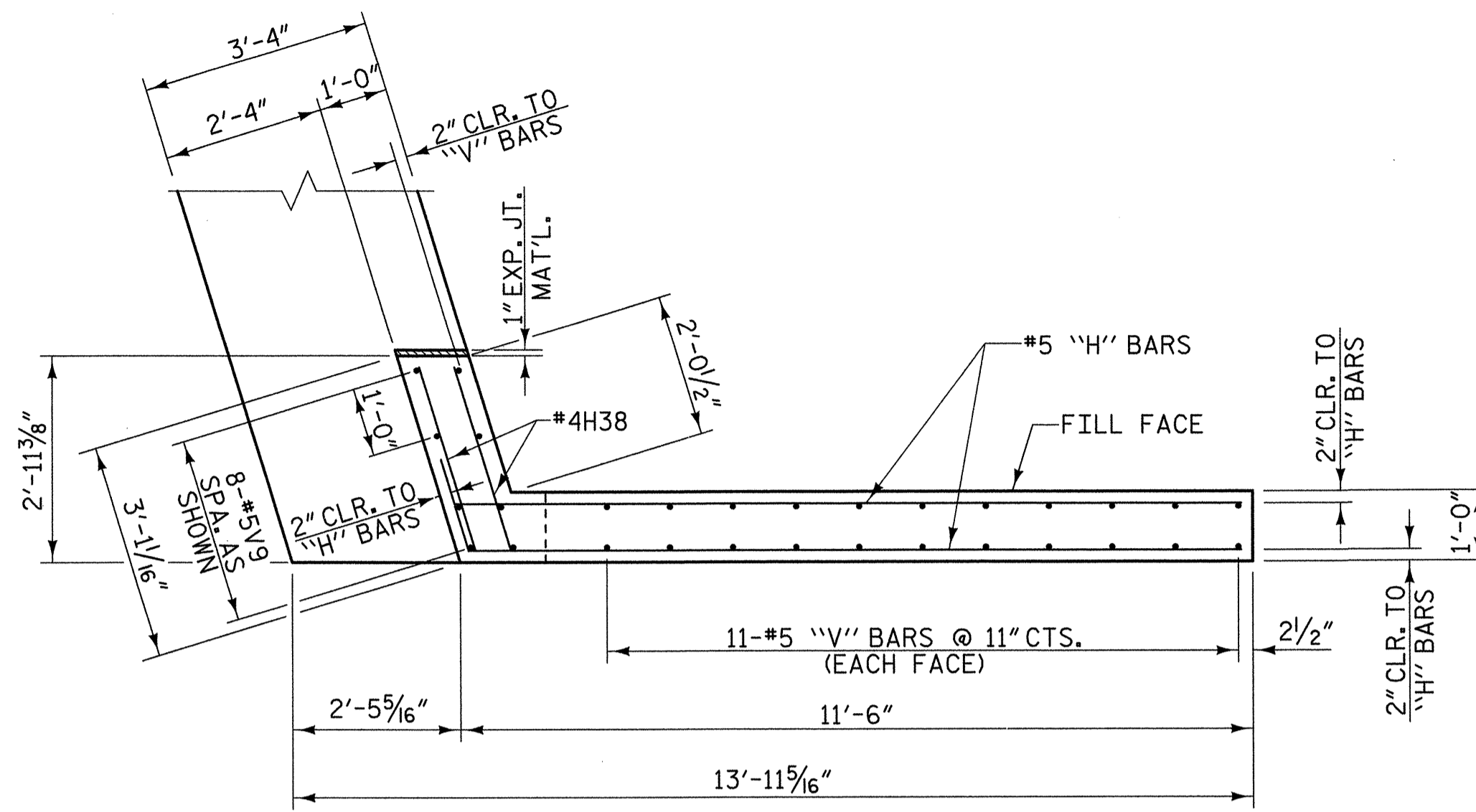
REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	TOTAL SHEETS
1			3			S-29
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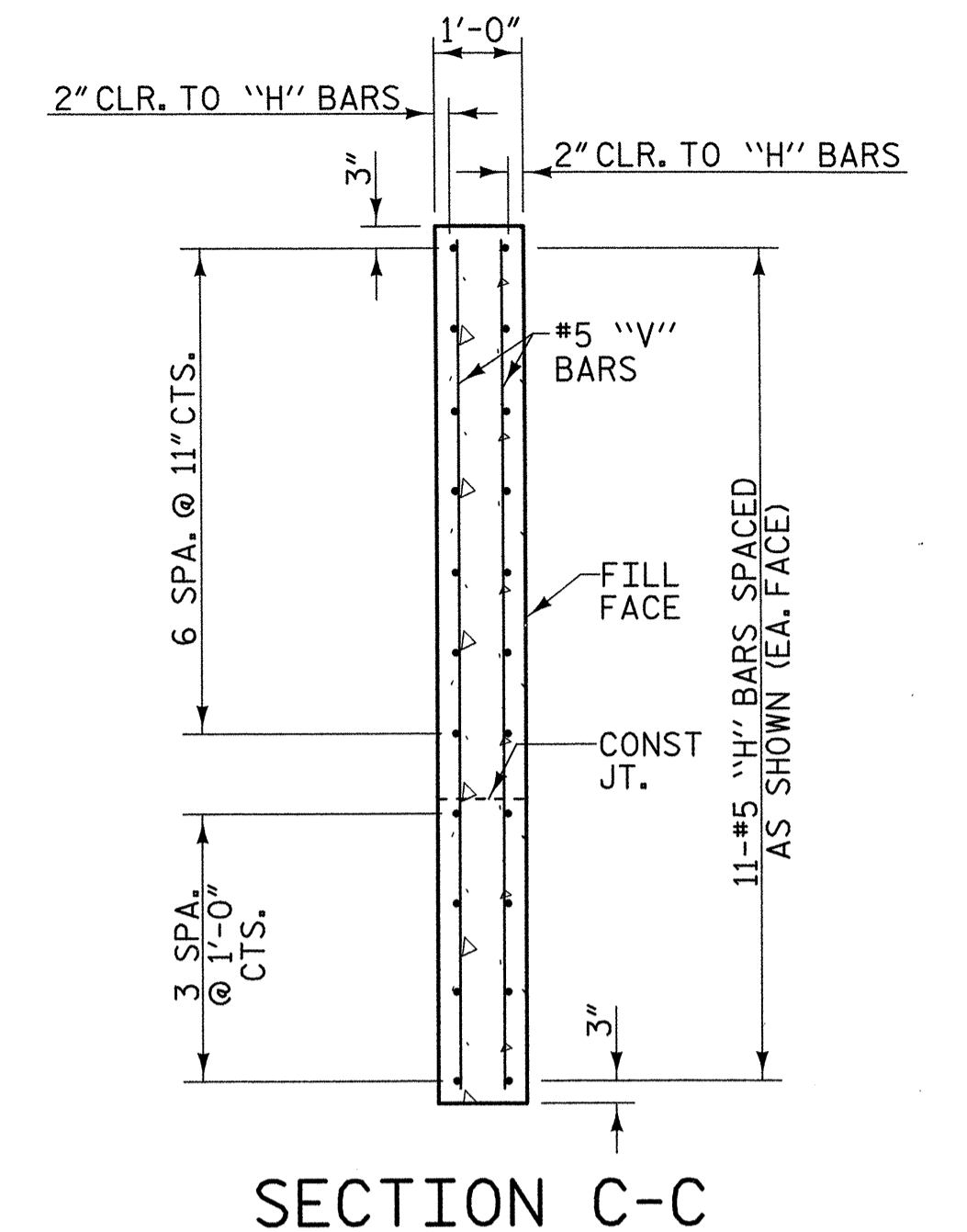
DRAWN BY: **W. B. ALLEN** DATE: **5/07**  
 CHECKED BY: **M. A. AVERETTE** DATE: **5/07**



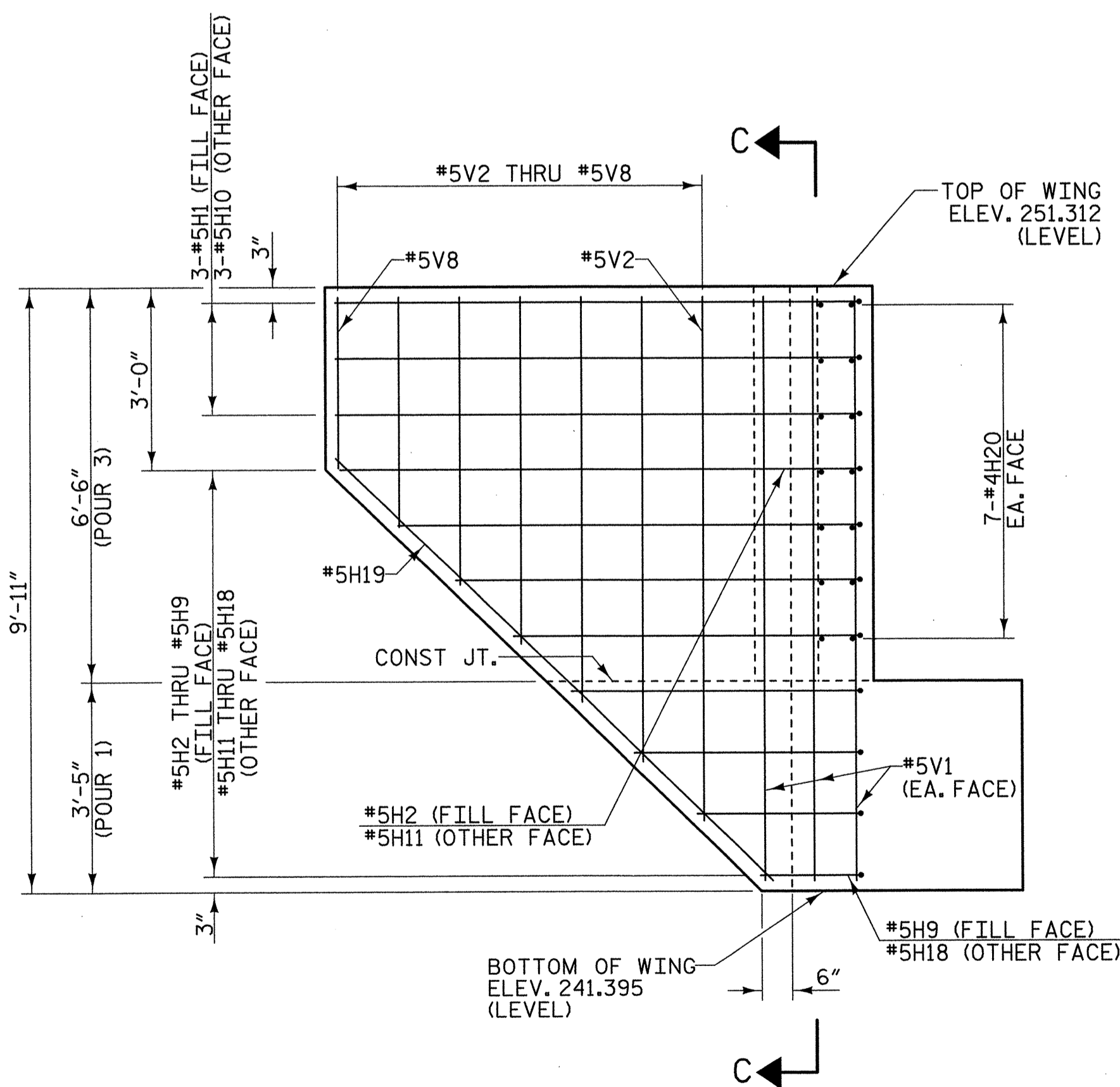
W1 PLAN OF LEFT WING



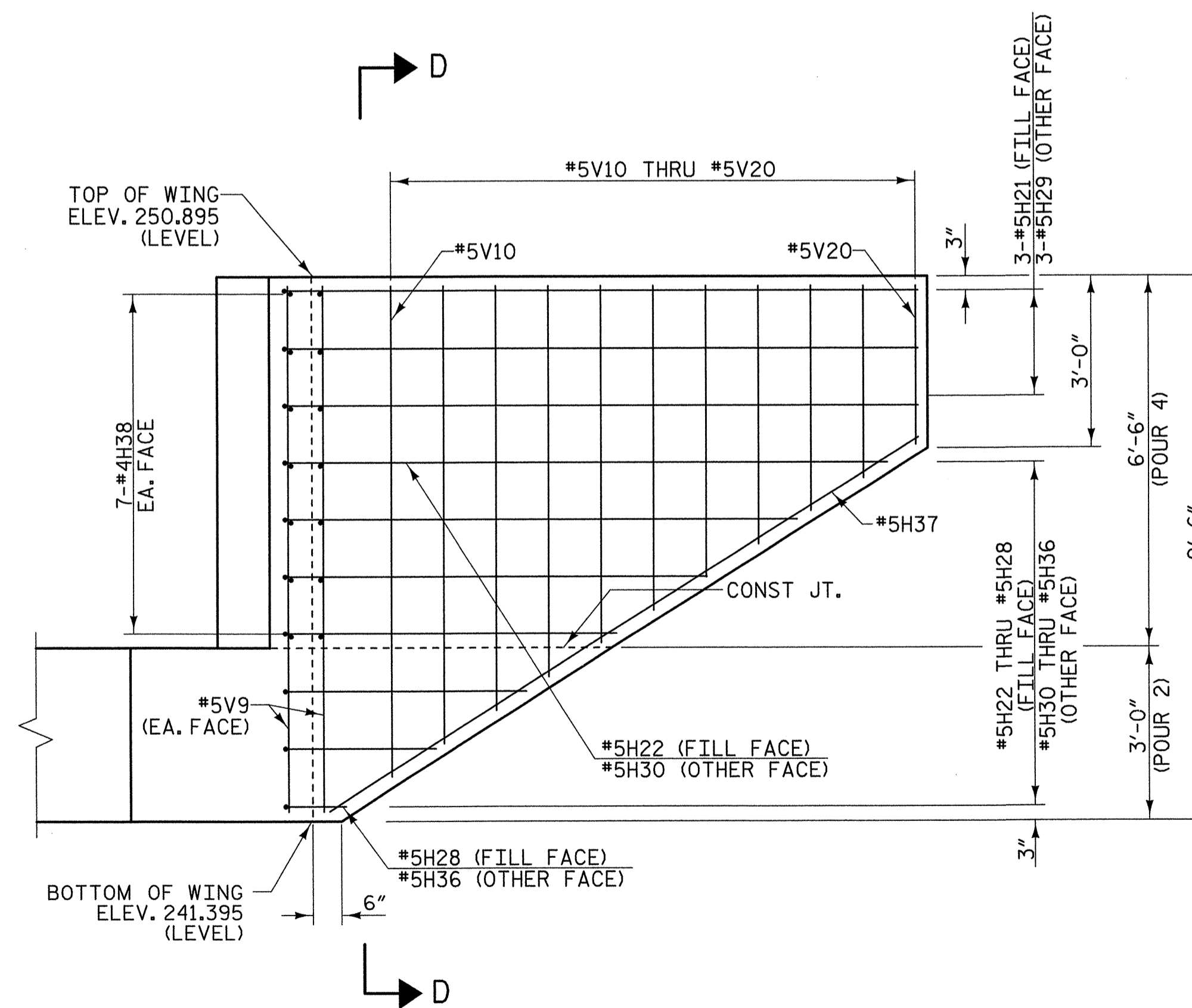
W2 PLAN OF RIGHT WING



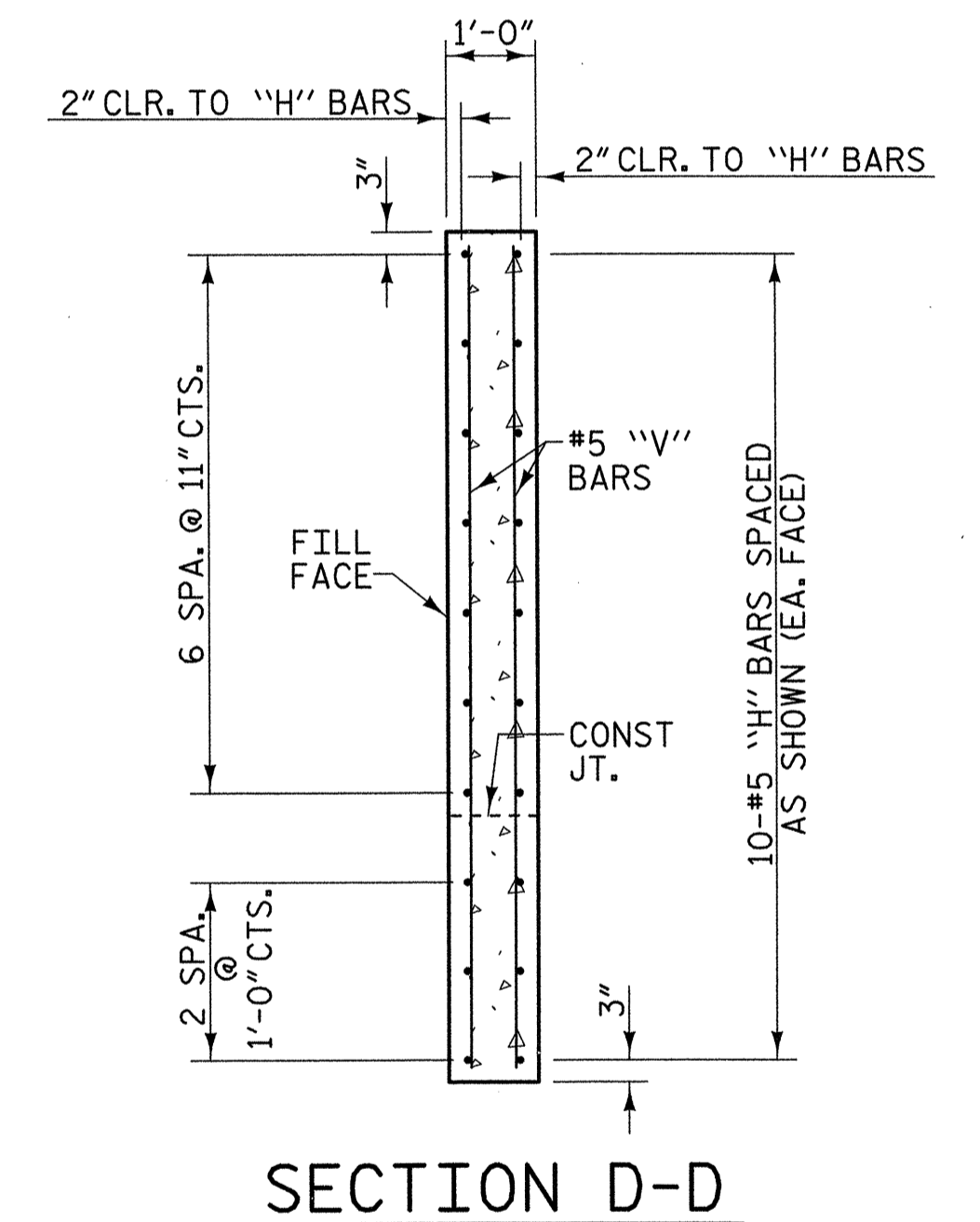
SECTION C-C



W1 ELEVATION OF LEFT WING



W2 ELEVATION OF RIGHT WING



SECTION D-D

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 3 OF 4

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

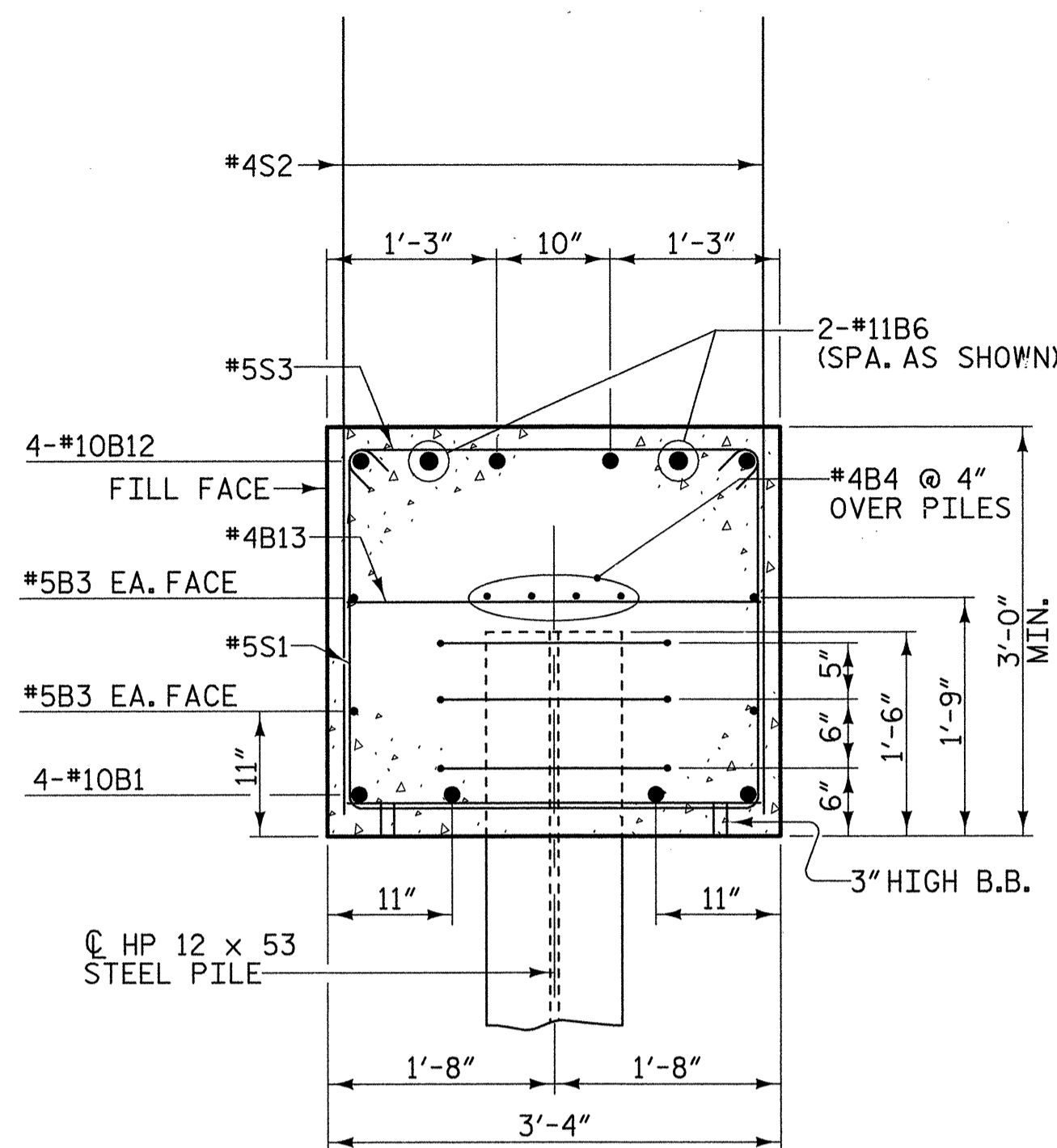
SUBSTRUCTURE  
 END BENT 2



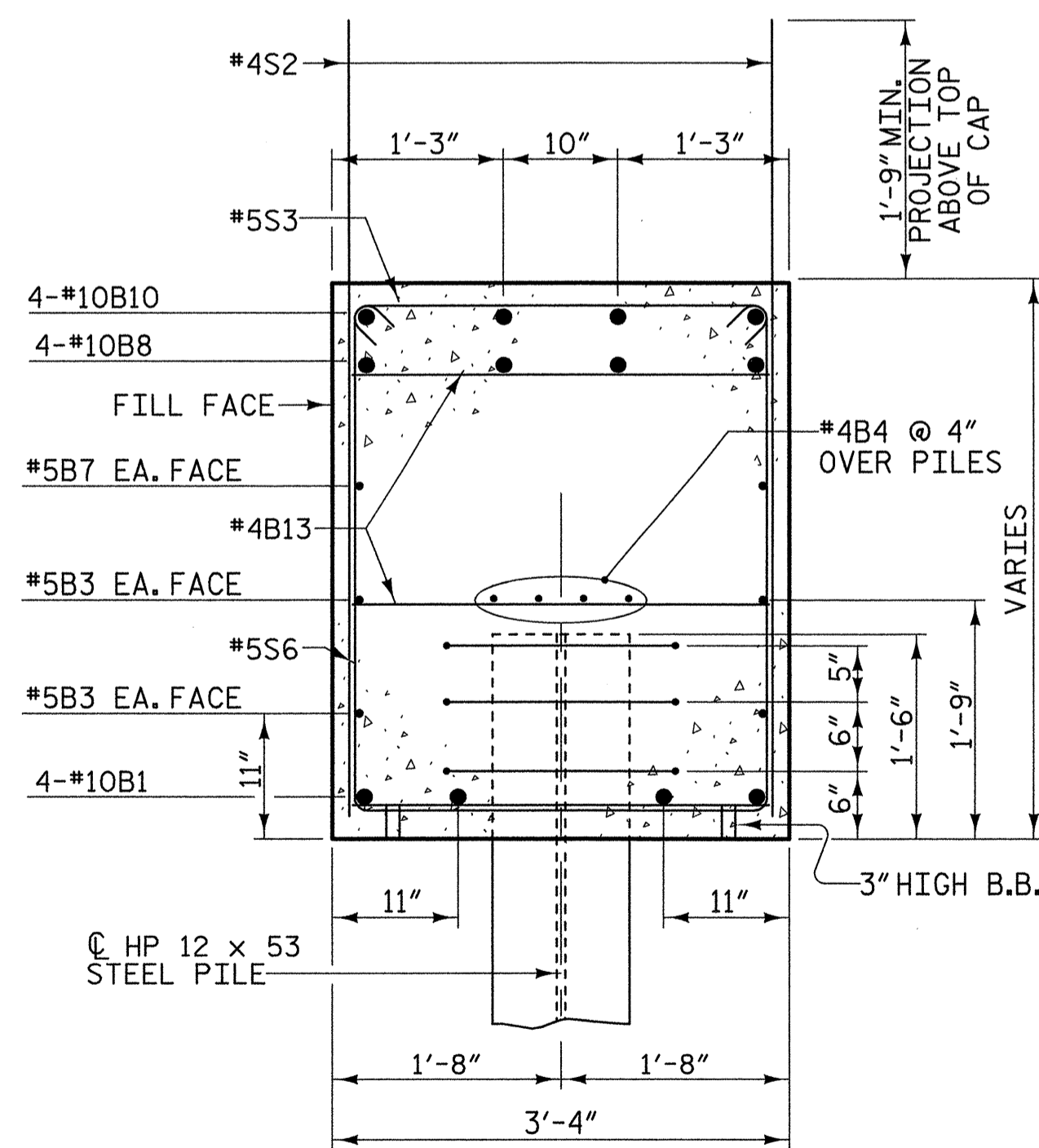
PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO BOX 22127  
 RALEIGH, N.C. 27626  
 (919) 851-1012  
 (919) 851-1918 (FAX)  
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REVISIONS						TOTAL SHEETS
NO.	BY:	DATE:	NO.	BY:	DATE:	S-30
1			3			3
2			4			4

8/1/2007 5:00:02 AM R:\Projects\UT165-SD\LEZ\_03.dgn  
 DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

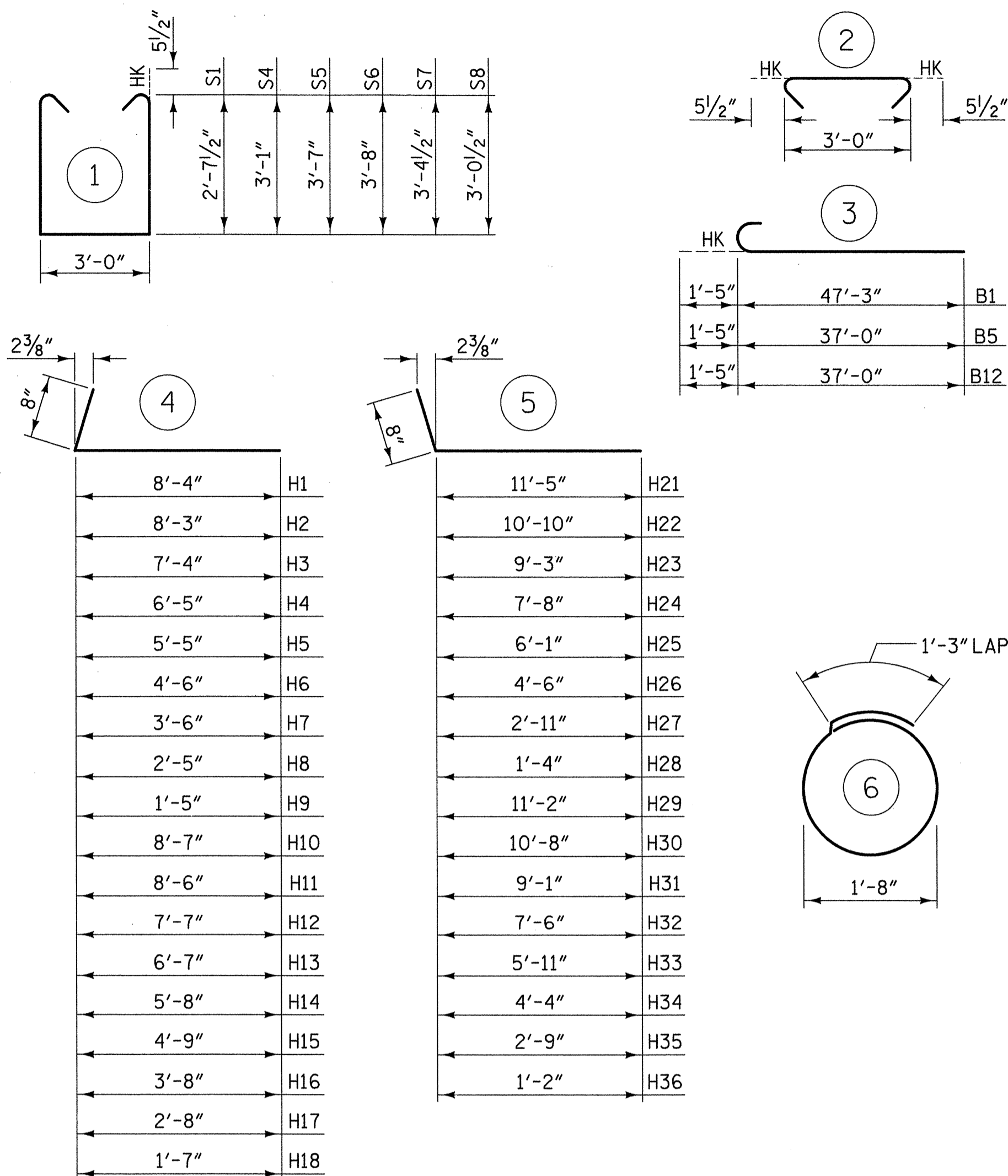


SECTION A-A



SECTION B-B

BAR TYPES



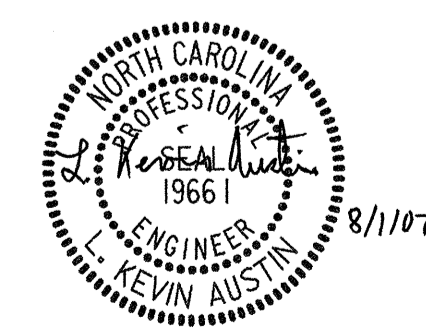
ALL BAR DIMENSIONS ARE OUT TO OUT

BILL OF MATERIAL

FOR END BENT 2											
BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT	BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
B1	8	#10	3	48'-8"	1675	S1	23	#5	1	9'-2"	220
B2	4	#10	STR	47'-3"	813	S2	188	#4	1	5'-10"	733
B3	12	#5	STR	44'-0"	551	S3	122	#5	2	3'-11"	498
B4	20	#4	STR	27'-2"	363	S4	20	#5	1	10'-1"	210
B5	4	#10	3	38'-5"	661	S5	10	#5	1	11'-1"	116
B6	4	#11	STR	15'-0"	319	S6	25	#5	1	11'-3"	293
B7	4	#5	STR	47'-6"	198	S7	20	#5	1	10'-8"	223
B8	8	#10	STR	31'-5"	1081	S8	24	#5	1	10'-0"	250
B9	2	#5	STR	18'-4"	38	S9	66	#4	6	6'-6"	287
B10	4	#10	STR	24'-4"	419						
B11	4	#10	STR	21'-3"	366	V1	8	#5	STR	9'-7"	80
B12	4	#10	STR	38'-5"	661	V2	2	#5	STR	8'-7"	18
B13	45	#4	STR	3'-0"	90	V3	2	#5	STR	7'-7"	16
						V4	2	#5	STR	6'-8"	14
H1	3	#5	4	9'-0"	28	V5	2	#5	STR	5'-8"	12
H2	1	#5	4	8'-11"	9	V6	2	#5	STR	4'-8"	10
H3	1	#5	4	8'-0"	8	V7	2	#5	STR	3'-9"	8
H4	1	#5	4	7'-1"	7	V8	2	#5	STR	2'-9"	6
H5	1	#5	4	6'-1"	6	V9	8	#5	STR	9'-2"	76
H6	1	#5	4	5'-2"	5	V10	2	#5	STR	8'-6"	18
H7	1	#5	4	4'-2"	4	V11	2	#5	STR	8'-0"	17
H8	1	#5	4	3'-1"	3	V12	2	#5	STR	7'-5"	15
H9	1	#5	4	2'-1"	2	V13	2	#5	STR	6'-10"	14
H10	3	#5	4	9'-3"	29	V14	2	#5	STR	6'-3"	13
H11	1	#5	4	9'-2"	10	V15	2	#5	STR	5'-8"	12
H12	1	#5	4	8'-3"	9	V16	2	#5	STR	5'-1"	11
H13	1	#5	4	7'-3"	8	V17	2	#5	STR	4'-6"	9
H14	1	#5	4	6'-4"	7	V18	2	#5	STR	3'-11"	8
H15	1	#5	4	5'-5"	6	V19	2	#5	STR	3'-4"	7
H16	1	#5	4	4'-4"	5	V20	2	#5	STR	2'-9"	6
H17	1	#5	4	3'-4"	3						
H18	1	#5	4	2'-3"	2						
H19	2	#5	STR	9'-11"	21						
H20	14	#4	STR	2'-8"	25						
H21	3	#5	5	12'-1"	38						
H22	1	#5	5	11'-6"	12						
H23	1	#5	5	9'-11"	10						
H24	1	#5	5	8'-4"	9						
H25	1	#5	5	6'-9"	7						
H26	1	#5	5	5'-2"	5						
H27	1	#5	5	3'-7"	4						
H28	1	#5	5	2'-0"	2						
H29	3	#5	5	11'-10"	37						
H30	1	#5	5	11'-4"	12						
H31	1	#5	5	9'-9"	10						
H32	1	#5	5	8'-2"	9						
H33	1	#5	5	6'-7"	7						
H34	1	#5	5	5'-0"	5						
H35	1	#5	5	3'-5"	4						
H36	1	#5	5	1'-10"	2						
H37	2	#5	STR	12'-2"	25						
H38	14	#4	STR	2'-8"	25						
					TOTAL REINFORCING STEEL =	10855 lbs.					
					CLASS "A" CONCRETE - CU. YARDS						
					POUR 1	29.7 cu. yds.					
					POUR 2	27.7 cu. yds.					
					POUR 3	2.4 cu. yds.					
					POUR 4	2.9 cu. yds.					
					TOTAL	62.7 cu. yds.					
					HP 12 X 53 STEEL PILES						
					22 PILES REQUIRED - LIN. FEET	1650					

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 4 OF 4  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
 SUBSTRUCTURE  
 END BENT 2

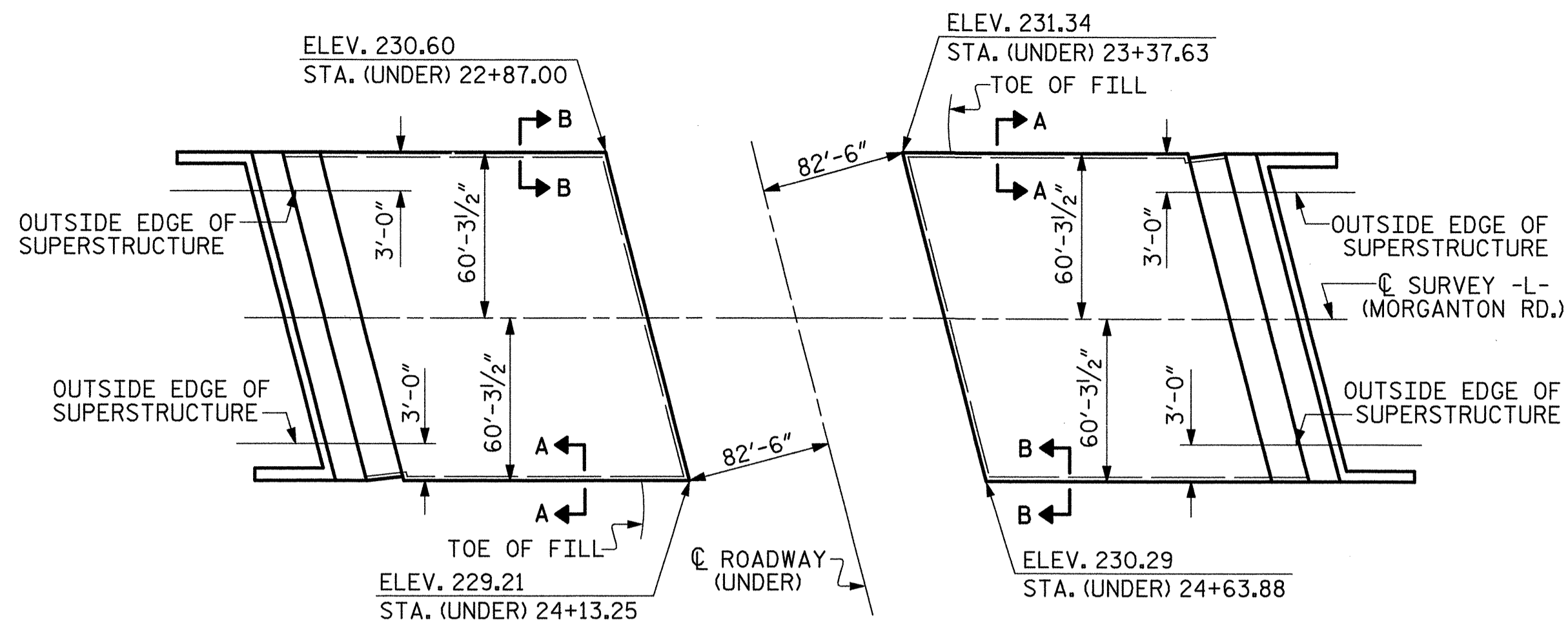


PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO BOX 33127  
 RALEIGH, N.C. 27626  
 (919) 851-1913 FAX  
 (919) 851-1913 (FAX)  
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REVISIONS						SHEET NO.	
NO.	BY:	DATE:	NO.	BY:	DATE:	S-31	
1			3			TOTAL SHEETS	
2			4				

DRAWN BY: W. B. ALLEN DATE: 5/07  
 CHECKED BY: M. A. AVERETTE DATE: 5/07

8/1/2007 8:55:33 AM R:\Structures\U1756-SUB-22.dwg



**GENERAL NOTES**

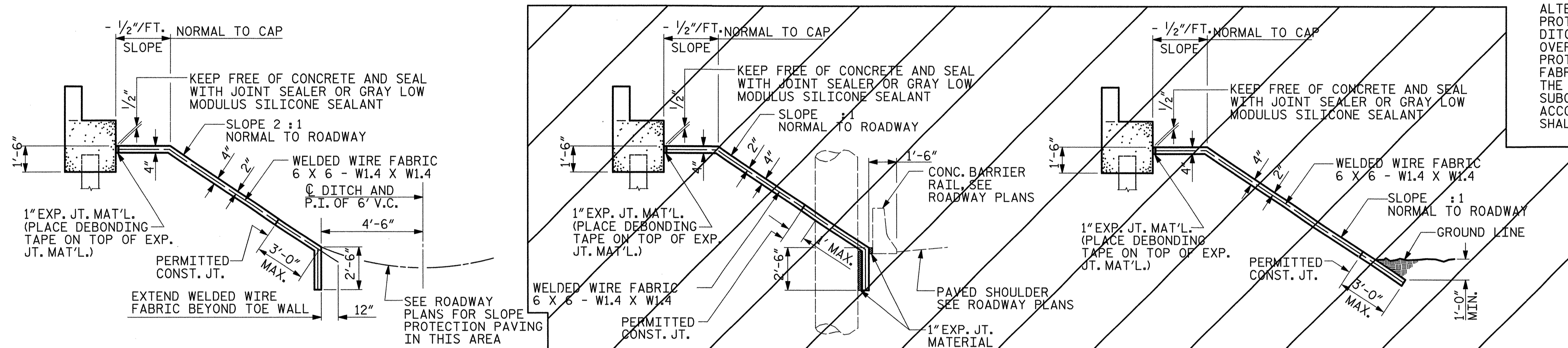
SLOPE PROTECTION SHALL BE PLACED UNDER THE ENDS OF THE BRIDGE AS SHOWN IN THE DETAILS. THE CONTRACTOR, AT HIS OPTION, MAY USE ALTERNATE "B" ONLY FOR HIGHWAY OVER HIGHWAY GRADE SEPARATIONS WITH 2:1 END BENT SLOPE IN RURAL, UNPOPULATED AREAS. STRAIGHT EDGING WILL NOT BE REQUIRED UNLESS, IN THE OPINION OF THE ENGINEER, VISUAL INSPECTION INDICATES A NEED FOR IT. MEASUREMENT AND PAYMENT SHALL BE AS PRESCRIBED IN SECTION 462 OF THE STANDARD SPECIFICATIONS. FOR BERM WIDTH, SEE GENERAL DRAWING.

**ALTERNATE "A"**

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

**ALTERNATE "B"**

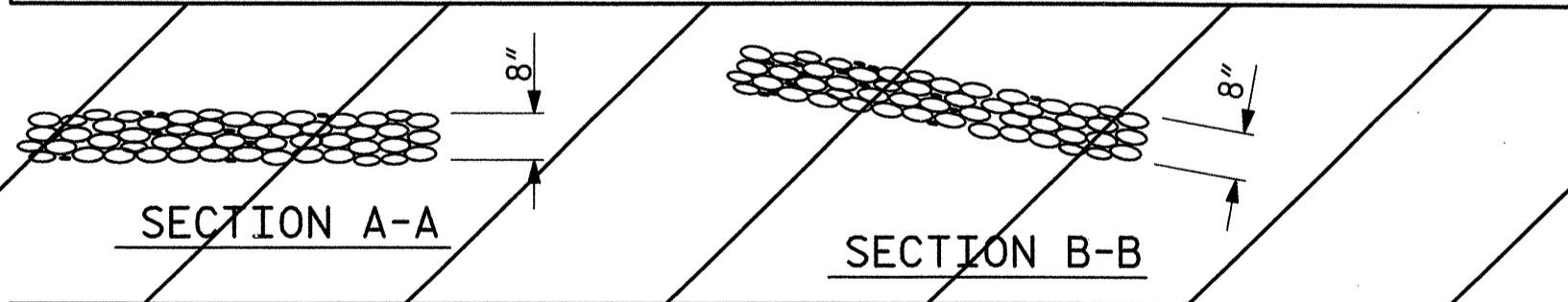
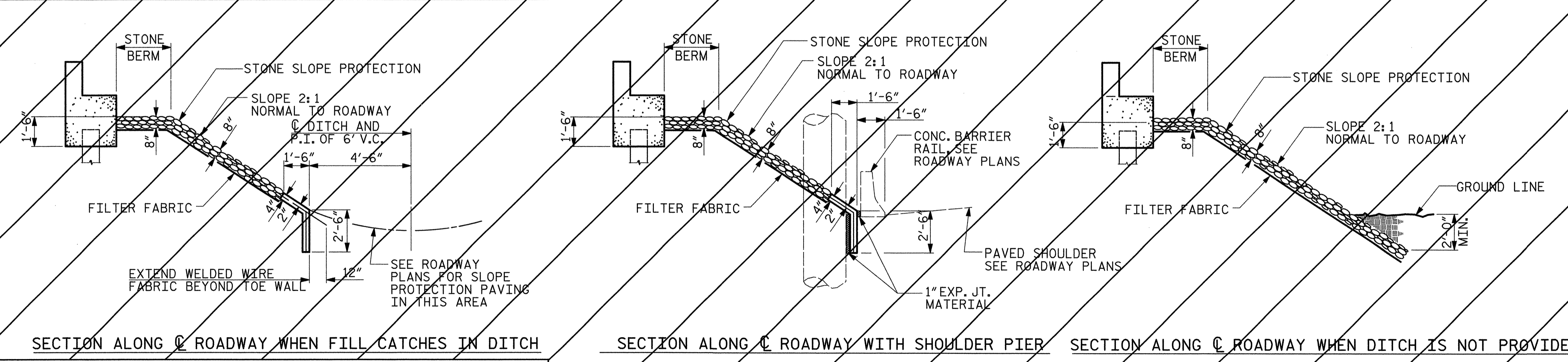
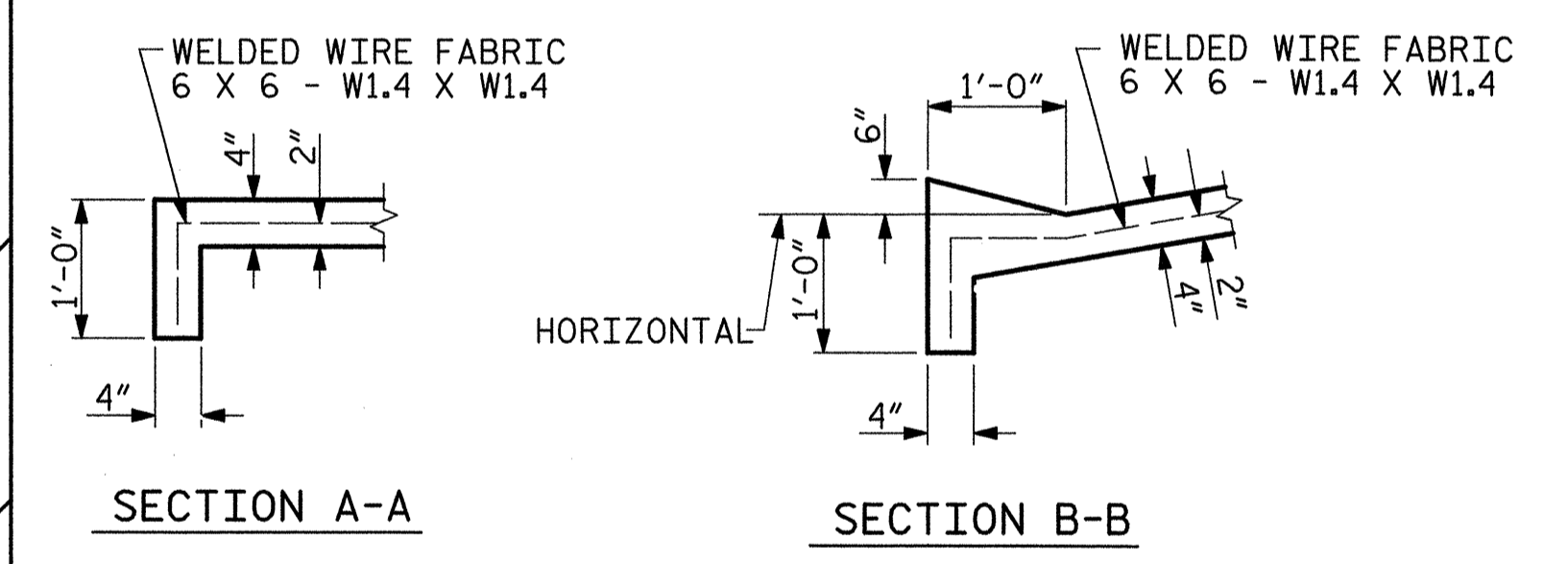
ALTERNATE "B" SHALL CONSIST OF A COMBINATION CONCRETE SLAB AND STONE SLOPE PROTECTION. THE CONCRETE PORTIONS SHALL CONSIST OF PAVED STRIPS ALONG THE DITCH AS SHOWN IN THE DETAILS, FILTER FABRIC AND 8" OF STONE SHALL BE PLACED OVER THE REMAINING AREA SHOWN ON THE PLANS TO BE COVERED WITH SLOPE PROTECTION. CONCRETE SHALL BE CLASS "B". THE COST OF THE CONCRETE, FILTER FABRIC, STONE AND WELDED WIRE FABRIC 6 X 6 - W1.4 X W1.4, SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID PER SQUARE YARD FOR SLOPE PROTECTION. SUBGRADING, STONE TYPE, STONE SIZING, AND HERBICIDE PROTECTION, SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCEPT THE HERBICIDE TYPE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO APPLICATION.



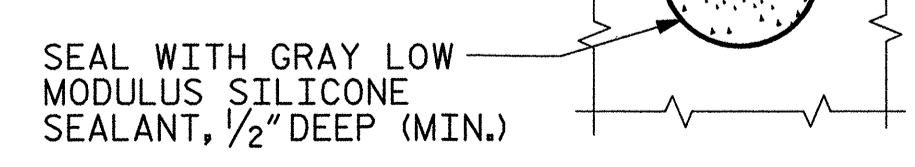
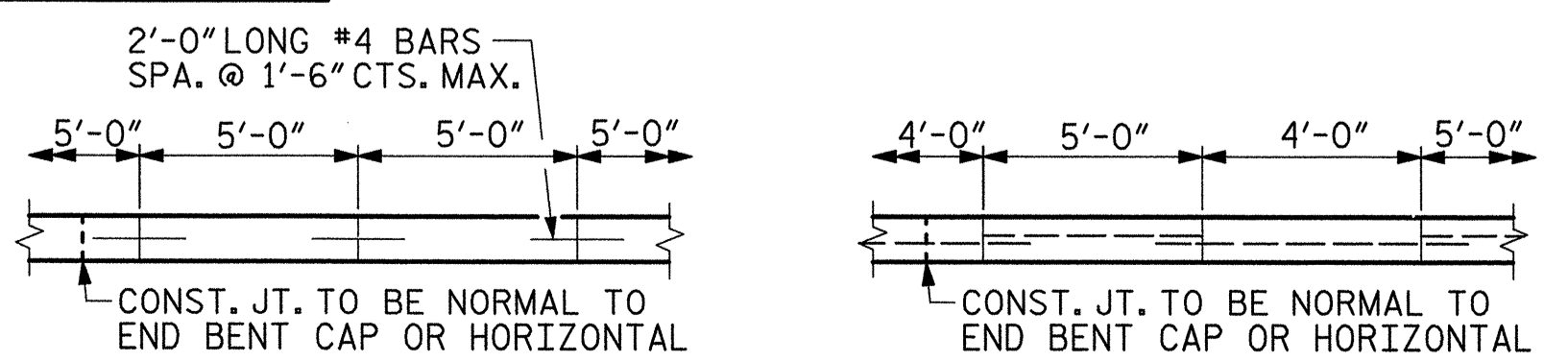
BRIDGE @ STA. 44+88.35	4" INCH SLOPE PROTECTION	WELDED WIRE FABRIC * 60 INCHES WIDE
	SQUARE YARDS	APPROX. L.F.
END BENT 1	558	997.9
END BENT 2	528	944.2

\* QUANTITY SHOWN IS BASED ON 5' POURS.

**DETAILS FOR ALTERNATE "A"**



**DETAILS FOR ALTERNATE "B"**

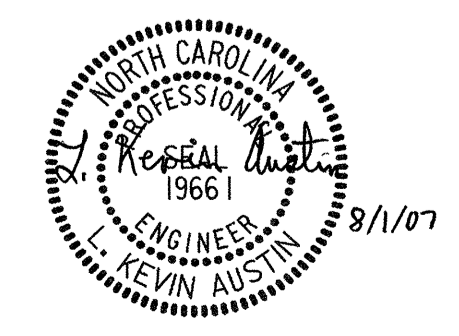


**PLAN WHERE CONCRETE SLOPE PROTECTION MUST BE PLACED AROUND A BENT COLUMN**

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-  
 SHEET 1 OF 2

PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO BOX 23127  
 RALEIGH, N.C. 27626  
 (919) 851-1918 FAX  
 WWW.MULKEYINC.COM

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



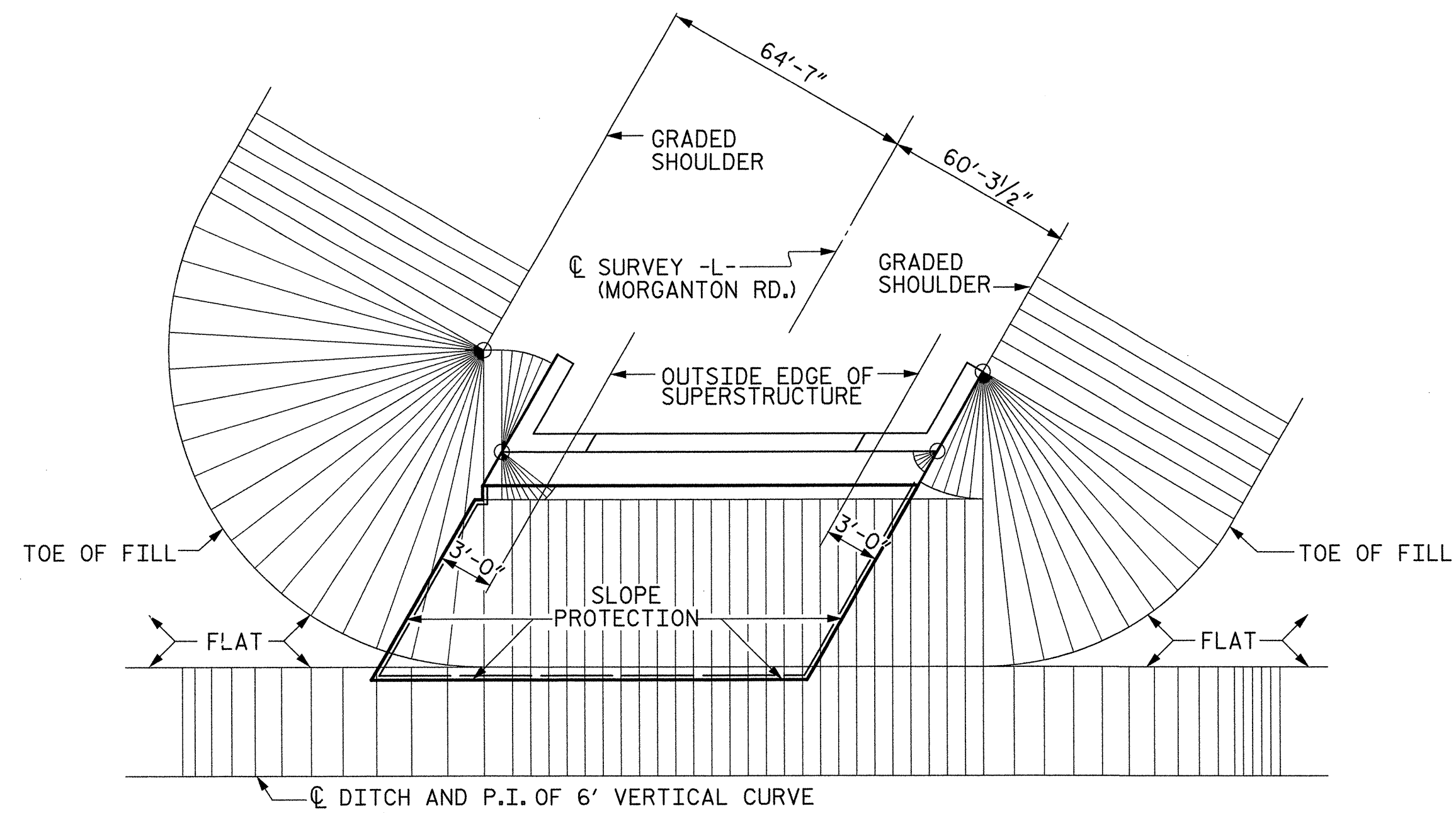
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**STANDARD SLOPE PROTECTION DETAILS**

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

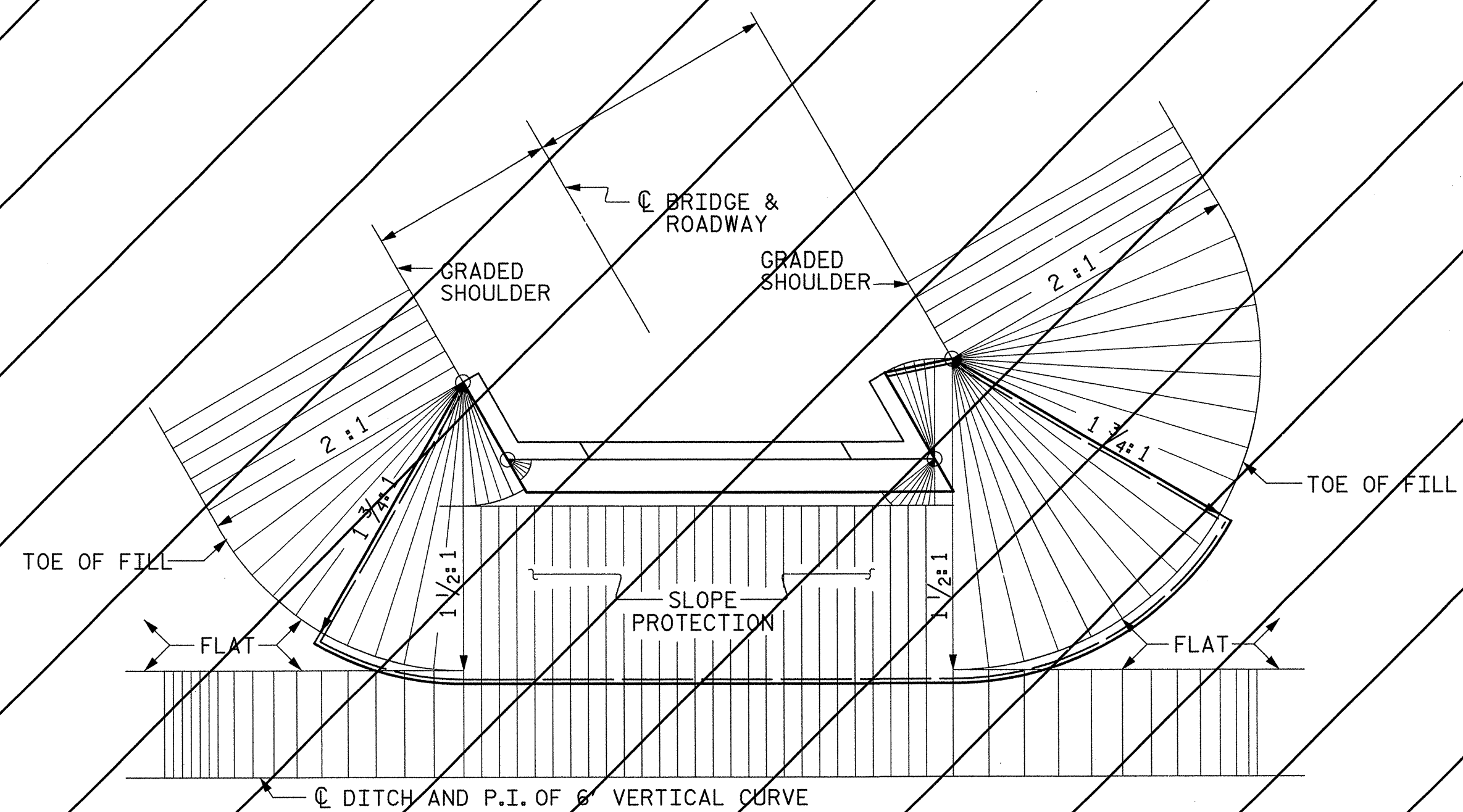
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ASSEMBLED BY: W. B. ALLEN DATE: 4/07  
 CHECKED BY: M. A. AVERETTE DATE: 4/07  
 DRAWN BY: ELR 5/92  
 CHECKED BY: GRP 6/92  
 REV. 7/10/01 LES/RDR  
 REV. 5/7/03 RWW/JTE  
 REV. 5/1/06 TLA/GM

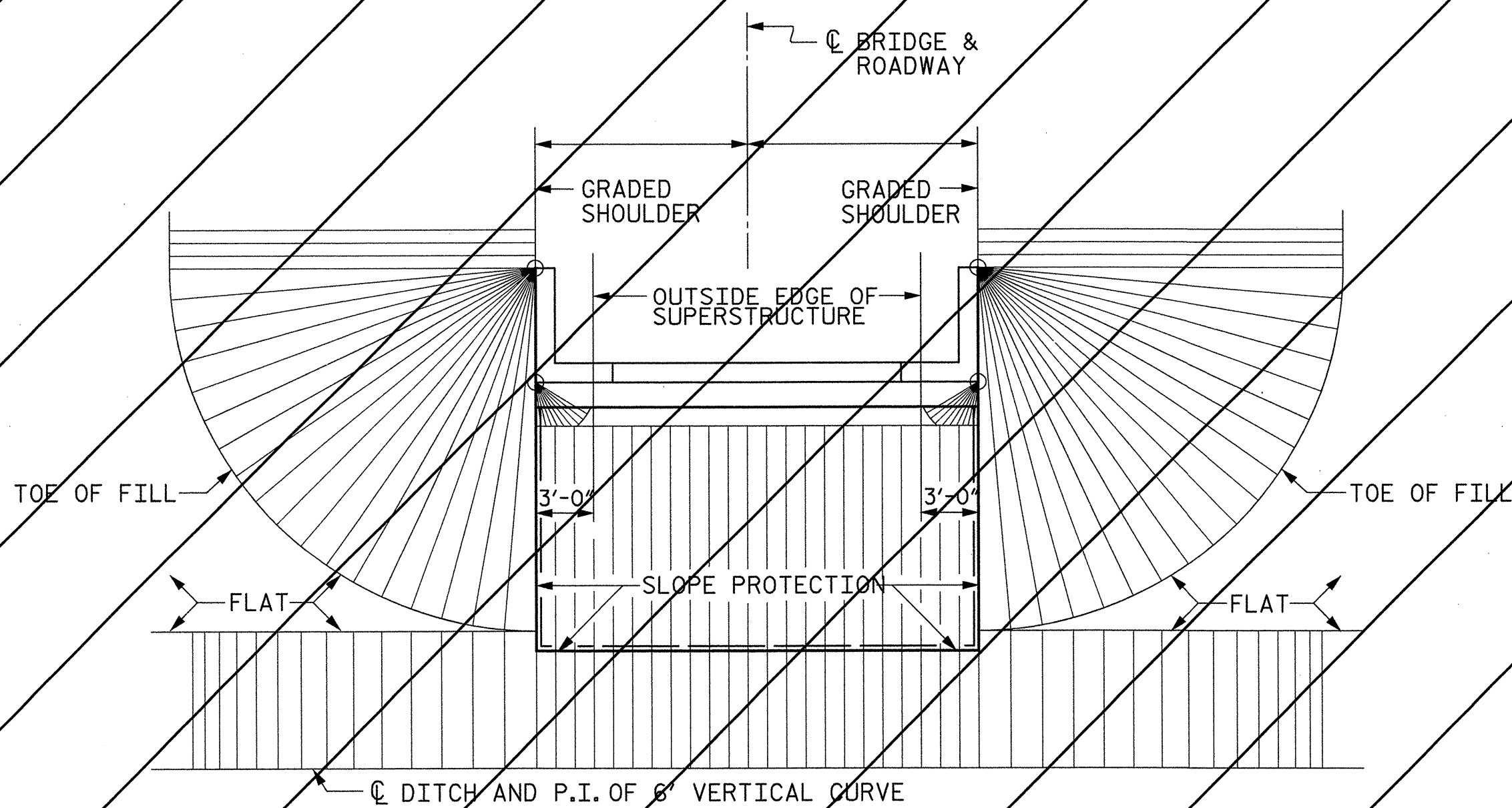




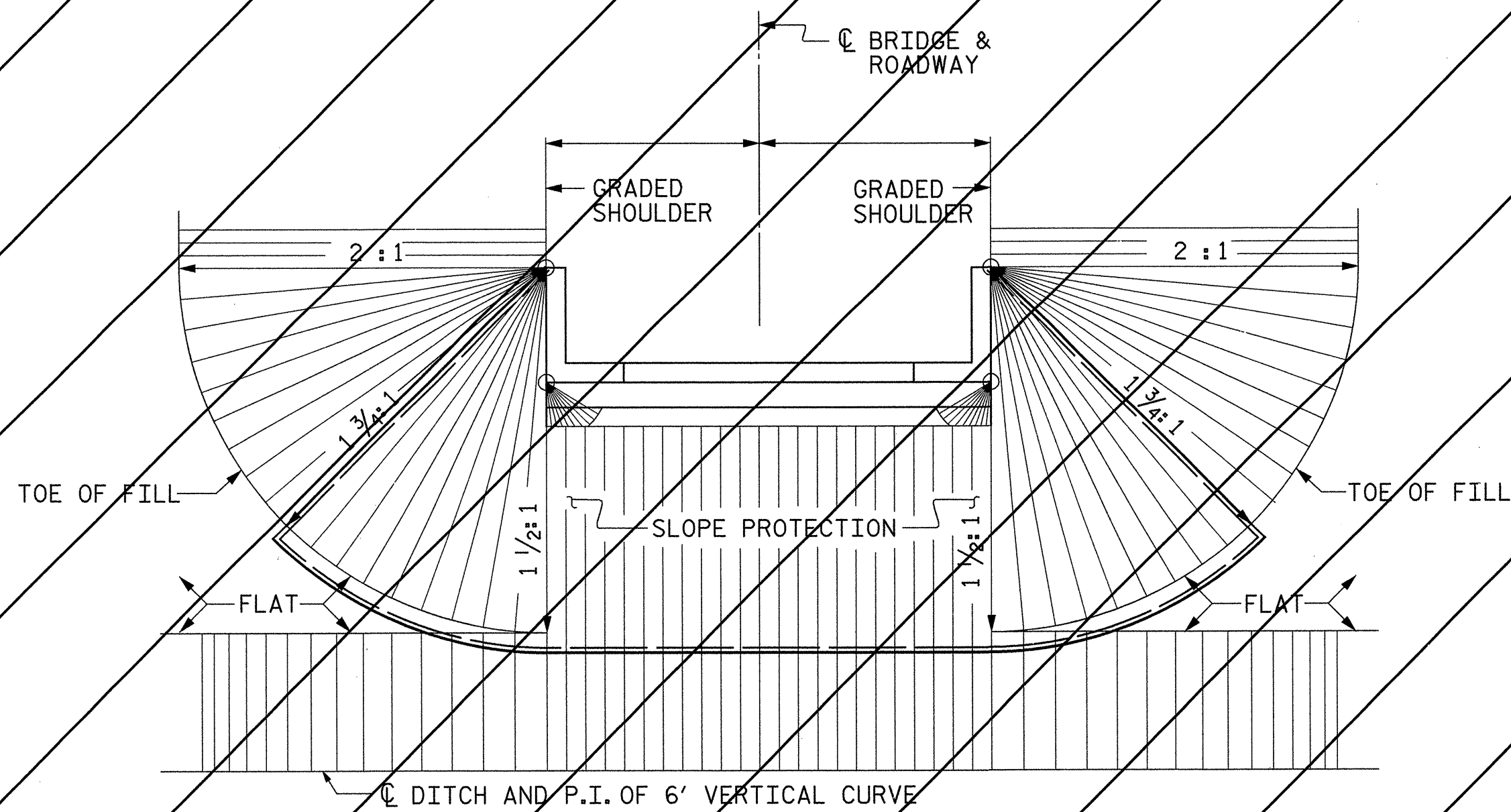
PLAN - END BENT WITH SWEEP BACK WINGS - SKEWED  
( 2:1 SLOPE )



PLAN - END BENT WITH SWEEP BACK WINGS - SKEWED  
( 1 1/2:1 SLOPE )



PLAN - END BENT WITH SWEEP BACK WINGS - 90°  
( 2:1 SLOPE )



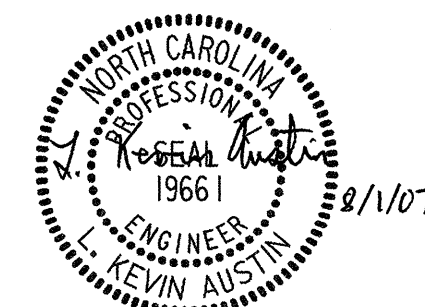
PLAN - END BENT WITH SWEEP BACK WINGS - 90°  
( 1 1/2:1 SLOPE )

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

SHEET 2 OF 2

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

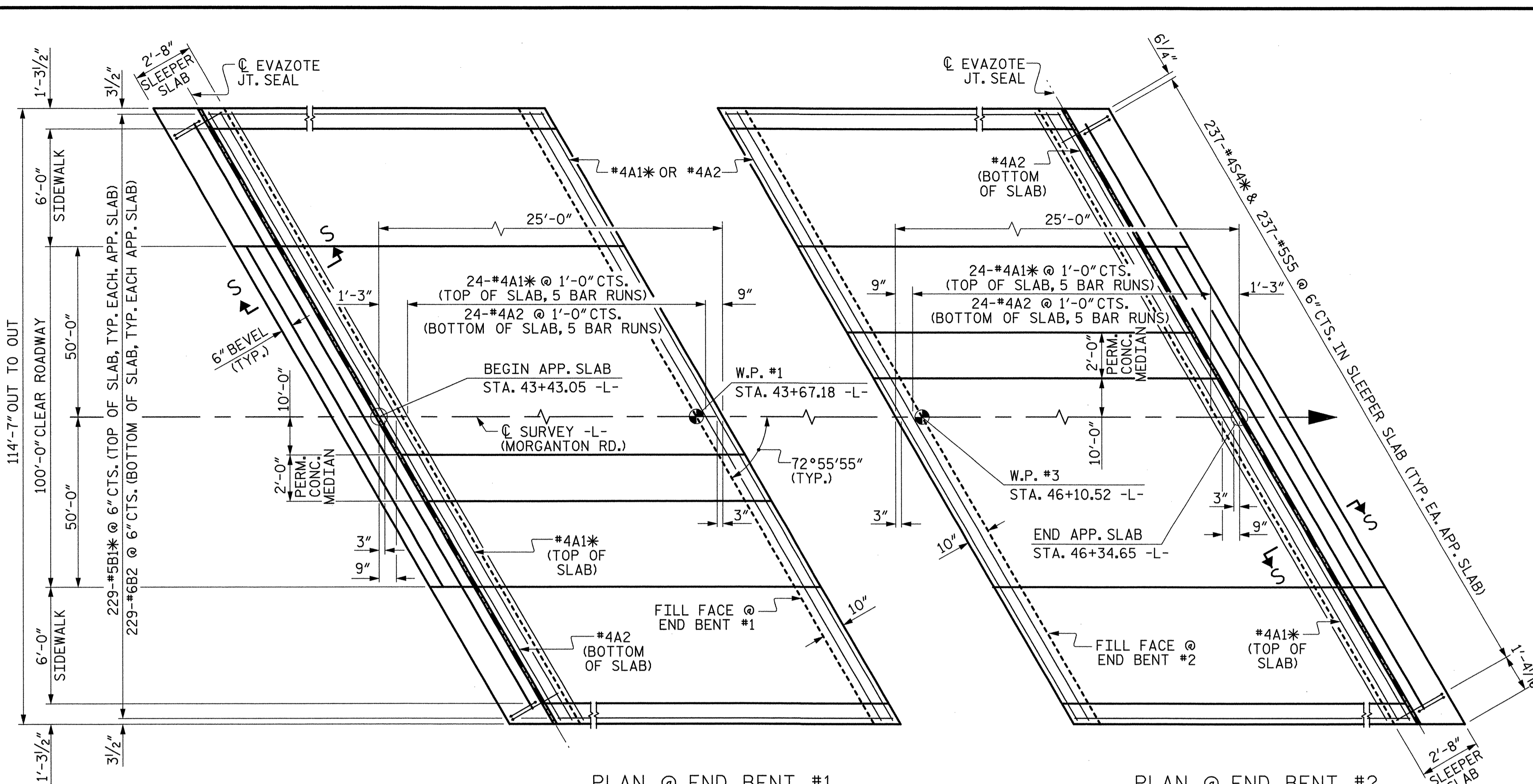
THIS STANDARD DRAWING REVIEWED & ADOPTED FOR USE AT THE REFERENCED LOCATION BY THE UNDERSIGNED:



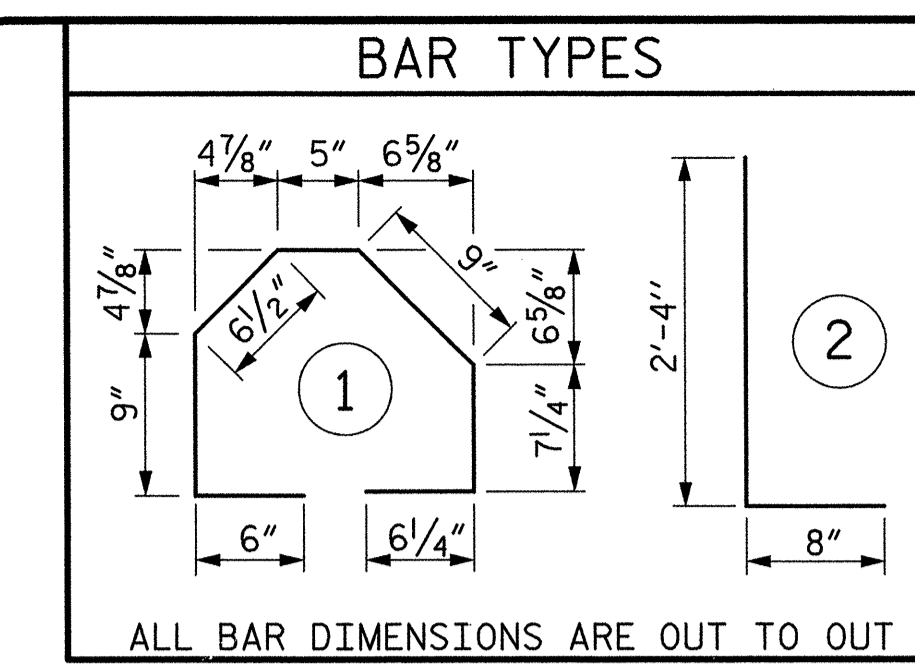
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ASSEMBLED BY : W. B. ALLEN	DATE : 4/07
CHECKED BY : M. A. AVERETTE	DATE : 4/07
DRAWN BY : WJH 10/88	REV. 2/6/97 EEM/RCW
CHECKED BY : FCJ 10/88	REV. 7/17/98 REK/RWW
	REV. 5/1/06 TLA/CM

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



PLAN @ END BENT #1  
 PLAN @ END BENT #2  
 DIMENSIONS SHOWN ARE TYPICAL FOR BOTH APPROACH SLABS. #4A1 BARS IN SLEEPER SLAB NOT SHOWN FOR CLARITY.  
 FOR REINFORCING STEEL IN THE SIDEWALK & THE PERMANENT CONCRETE MEDIAN SEE SHT. S-20  
 \* INDICATES EPOXY COATED REINFORCING STEEL.



**BILL OF MATERIAL**

**APPROACH SLAB AT EB #1**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	160	#4	STR	25'-6"	2725
A2	130	#4	STR	25'-4"	2200
* B1	229	#5	STR	24'-1"	5752
B2	229	#6	STR	24'-7"	8456
* B3	14	#4	STR	24'-7"	230

* D1	64	#4	STR	8"	29
* G1	44	#4	STR	6'-11"	203
* G2	4	#4	STR	7'-2"	19
* M2	17	#4	STR	7"	7
* M5	2	#4	STR	24'-7"	33
* S4	237	#4	1	4'-1"	646
* S5	237	#5	2	3'-0"	742

REINFORCING STEEL LBS. 10386  
 \* EPOXY COATED REINFORCING STEEL LBS. 10656

CLASS AA CONCRETE			
APPROACH SLAB		C. Y.	118.3
SIDEWALK		C. Y.	9.4
MEDIAN		C. Y.	0.6
<b>TOTAL</b>		<b>C. Y.</b>	<b>128.3</b>

**APPROACH SLAB AT EB #2**

BAR	NO.	SIZE	TYPE	LENGTH	WEIGHT
* A1	160	#4	STR	25'-6"	2725
A2	130	#4	STR	25'-4"	2200
* B1	229	#5	STR	24'-1"	5752
B2	229	#6	STR	24'-7"	8456
* B3	14	#4	STR	24'-7"	230

* D1	64	#4	STR	8"	29
* G1	44	#4	STR	6'-11"	203
* G2	4	#4	STR	7'-2"	19
* M2	17	#4	STR	7"	7
* M5	2	#4	STR	24'-7"	33
* S4	237	#4	1	4'-1"	646
* S5	237	#5	2	3'-0"	742

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CLASS AA CONCRETE			
APPROACH SLAB		C. Y.	118.3
SIDEWALK		C. Y.	9.4
MEDIAN		C. Y.	0.6
<b>TOTAL</b>		<b>C. Y.</b>	<b>128.3</b>

**NOTES**

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

FOR REINFORCED BRIDGE APPROACH FILL INCLUDING FABRIC, 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.

THE 6" COMP. A.B.C. SHALL EXTEND 10'-0" BEYOND THE END OF THE APPROACH SLAB AND 1'-0" OUTSIDE OF EACH EDGE OF SLAB.

THE CONTRACTOR MAY USE 4" TYPE B-25.0B ASPHALT CONCRETE BASE COURSE IN LIEU OF 6" COMP. A.B.C. IF THIS OPTION IS USED, THE BASE COURSE SHALL EXTEND 1'-0" BEYOND THE END OF THE SLEEPER SLAB AND THE WIDTH SHALL BE THE SAME AS THAT OF THE APPROACH SLAB.

THE CONTRACTOR MAY USE 5" CLASS "A" CONCRETE BASE IN LIEU OF 6" COMP. A.B.C. IF THIS OPTION IS USED, THE CONCRETE BASE SHALL EXTEND 1'-0" BEYOND THE END OF THE SLEEPER SLAB AND THE WIDTH SHALL BE THE SAME AS THAT OF THE APPROACH SLAB. THE CONCRETE SHALL BE FINISHED TO A SMOOTH SURFACE AND A LAYER OF 30 LB ROOFING FELT SHALL BE PLACED BETWEEN THE CONCRETE BASE AND THE APPROACH SLAB TO PREVENT BOND. THE APPROACH SLAB SHALL NOT BE CAST UNTIL THE CONCRETE BASE HAS REACHED AN AGE OF THREE CURING DAYS.

THE VERTICAL JOINT ON THE RIGHT AND LEFT SIDE OF THE APPROACH SLAB AT THE ENDS OF THE EVAZOTE JOINT SHALL BE FILLED WITH SILICONE OR OTHER APPROVED MATERIAL IN ORDER TO PREVENT BACKFILL FROM ENTERING THE JOINT OPENING.

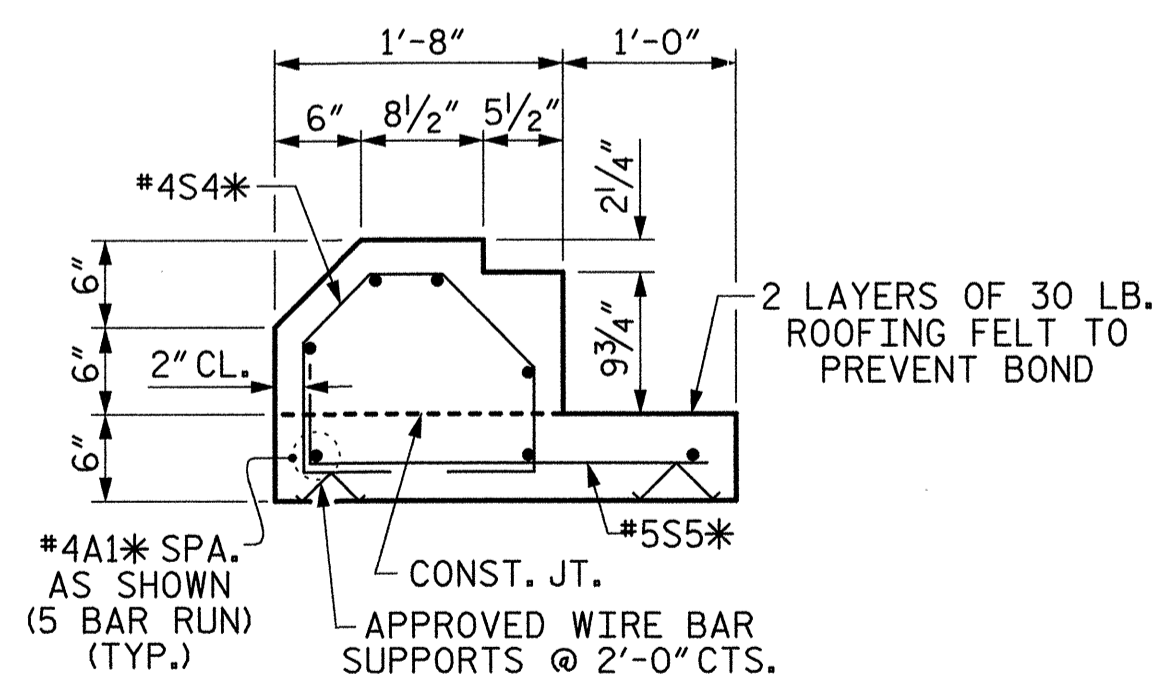
THE JOINT OPENING AT THE APPROACH SLAB/DECK INTERFACE SHALL BE SAWS NO MORE THAN 12 HOURS AFTER THE APPROACH SLAB IS CAST. THE JOINT SHALL BE CLEANED OF ALL DEBRIS BEFORE THE SEALANT IS APPLIED. THE JOINT SEALER MATERIAL SHALL CONFORM TO THE REQUIREMENTS OF TYPE SL LOW MODULUS SILICONE SEALANT.

**WITH EVAZOTE JOINT SEAL**

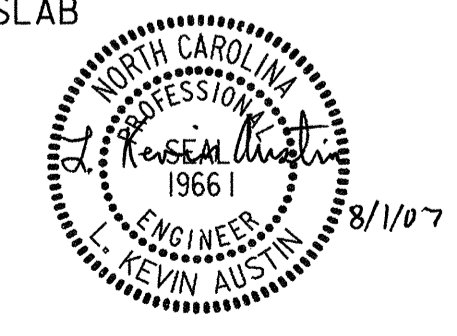
FOR EVAZOTE JOINT SEALS, SEE SPECIAL PROVISIONS.

THE NOMINAL UNCOMPRESSED SEAL WIDTH OF THE EVAZOTE JOINT SEAL SHALL BE 3/16".

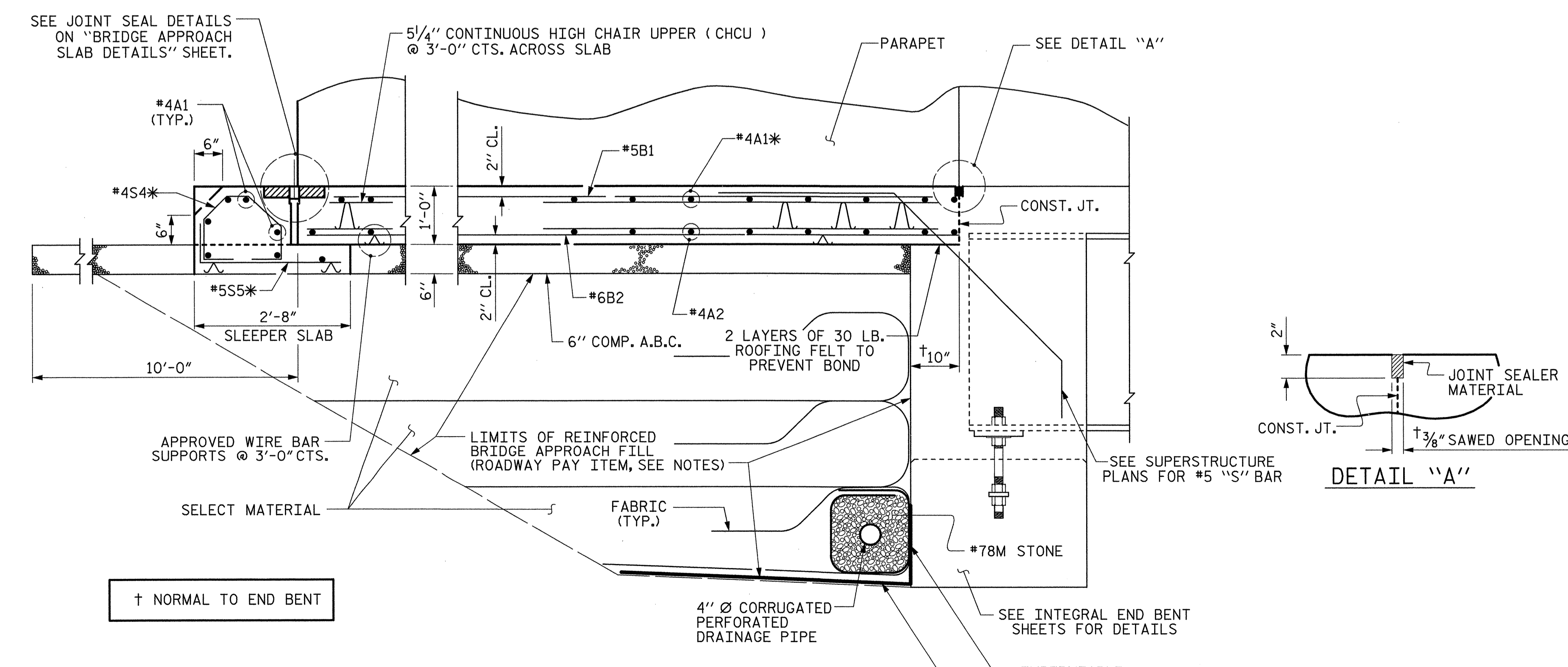
FOR ELASTOMERIC CONCRETE, SEE SPECIAL PROVISIONS.



SECTION S-S  
 SHOWING SLEEPER SLAB



PLANS PREPARED BY:  
**MULKEY ENGINEERS & CONSULTANTS**  
 PO BOX 881 27  
 RALEIGH, N.C. 27606  
 (919) 881-1912  
 (919) 881-1816 (FAX)  
 WWW.MULKEYINC.COM



SECTION THRU SLAB

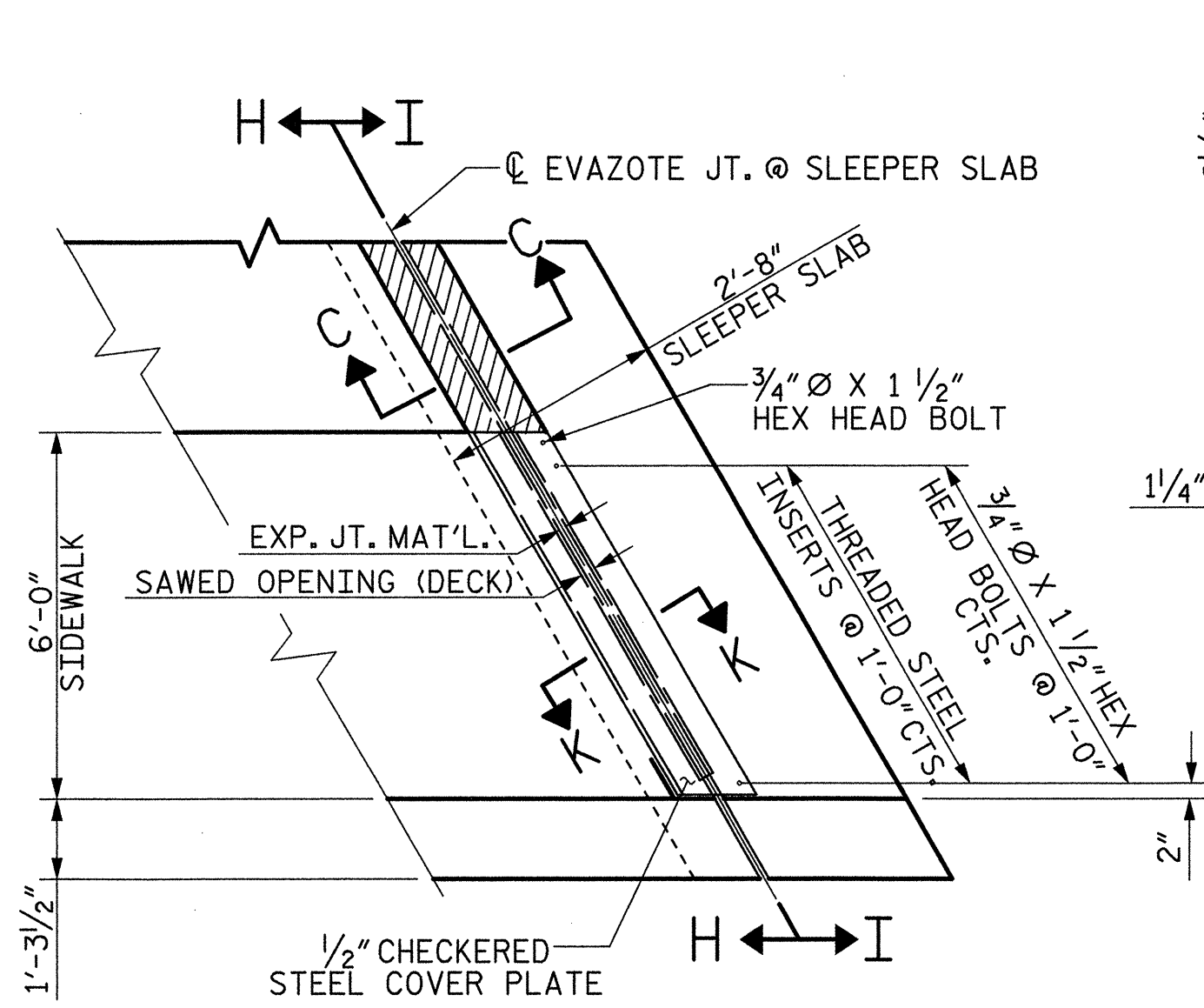
DRAWN BY: W.B. ALLEN DATE: 4/07  
 CHECKED BY: M.A. AVERETTE DATE: 4/07

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

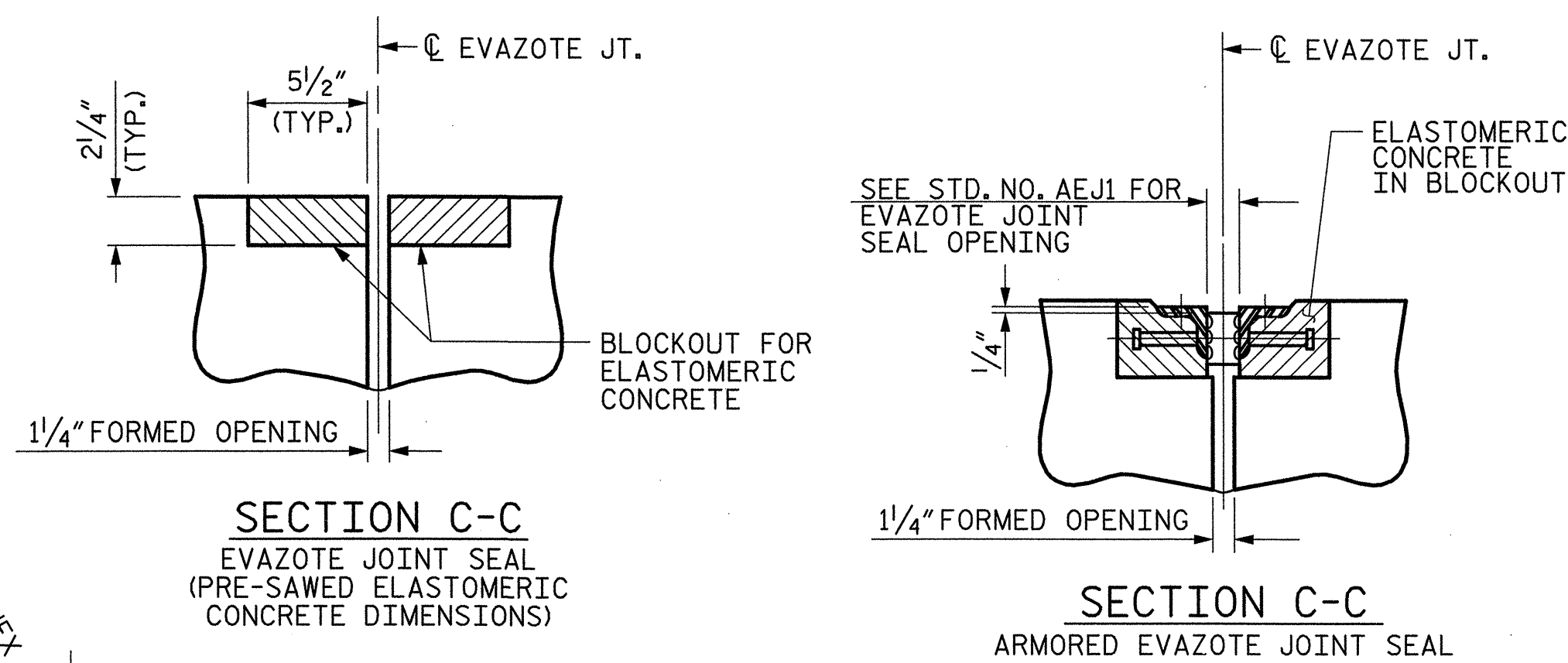
SHEET 1 OF 3

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH					
BRIDGE APPROACH SLAB FOR INTEGRAL ABUTMENT					
REVISIONS					
NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO. S-34  
 TOTAL SHEETS

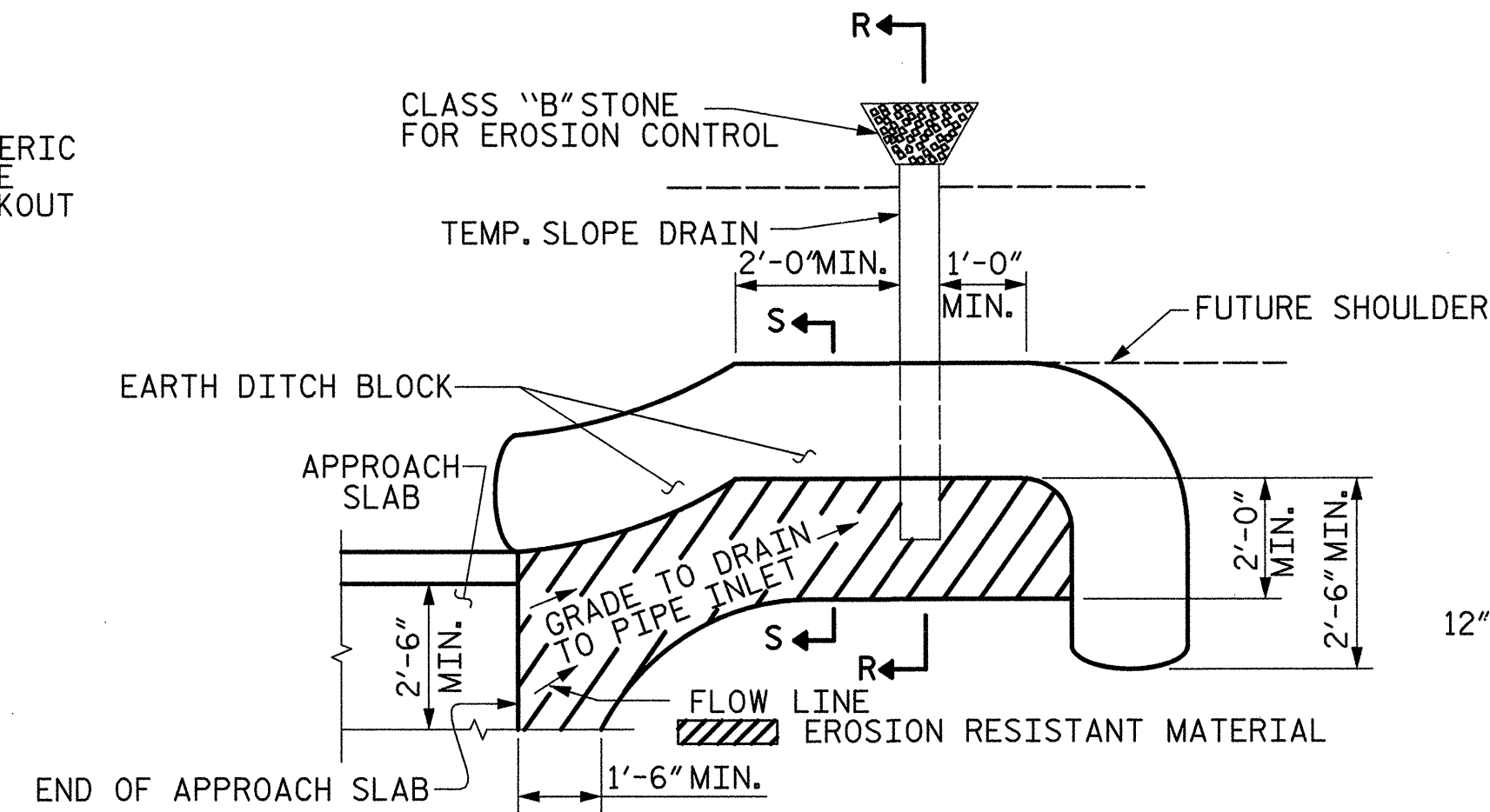


PLAN VIEW OF EVAZOTE JOINT SEAL @ SLEEPER SLAB FOR SIDEWALK



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

SECTION C-C ARMORED EVAZOTE JOINT SEAL

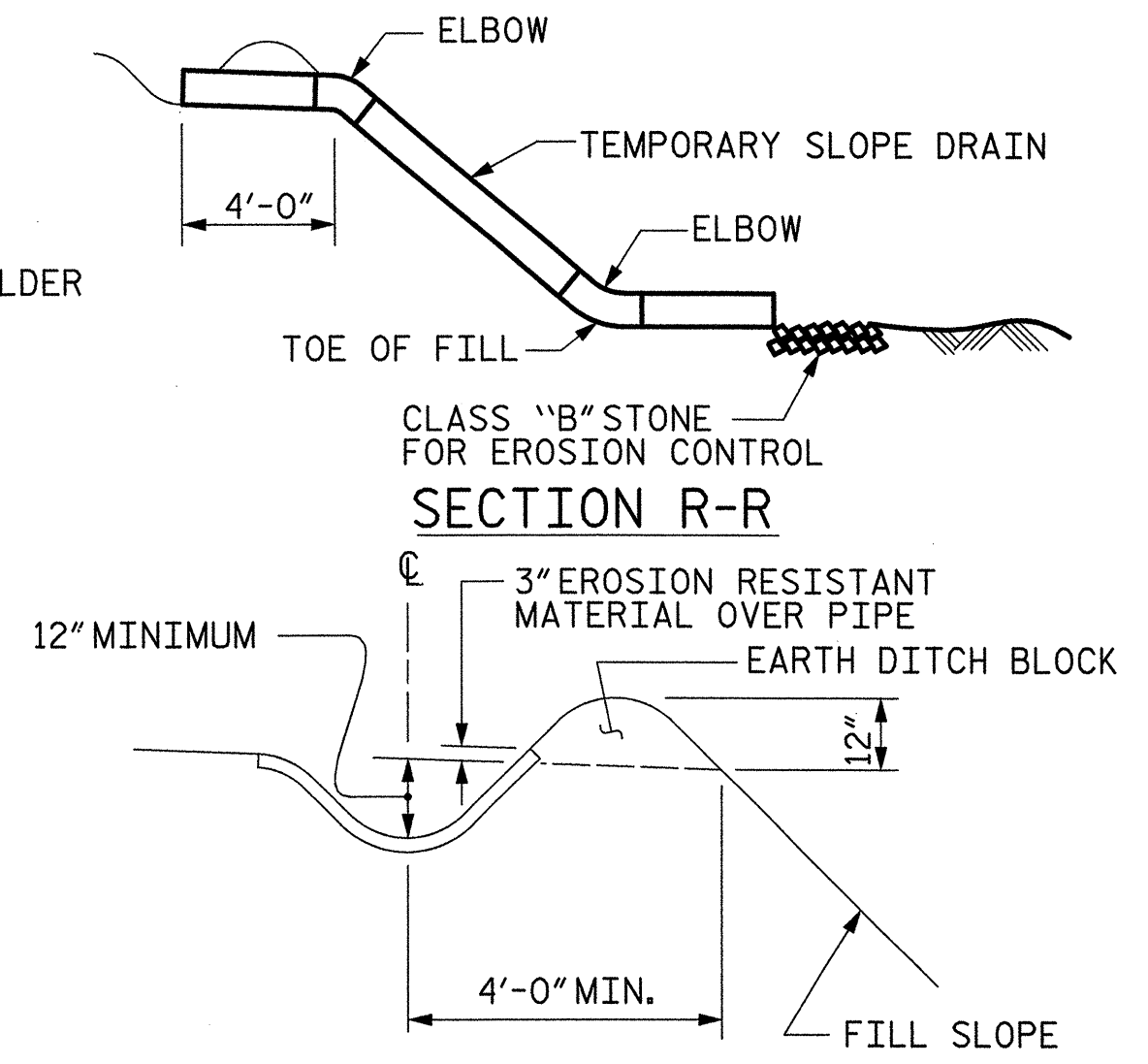


NOTE: IMMEDIATELY AFTER THE CONSTRUCTION OF THE APPROACH SLAB, THE CONTRACTOR SHALL PROVIDE TEMPORARY BERM AND SLOPE DRAIN. CONTRACTOR SHALL GRADE TO PIPE INLET AND PROVIDE EROSION RESISTANT MATERIAL AS SHOWN. THE EROSION RESISTANT MATERIAL SHALL BE EITHER 1) ASPHALT PLANT MIX, TYPE 1 OR TYPE 2, MIN.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

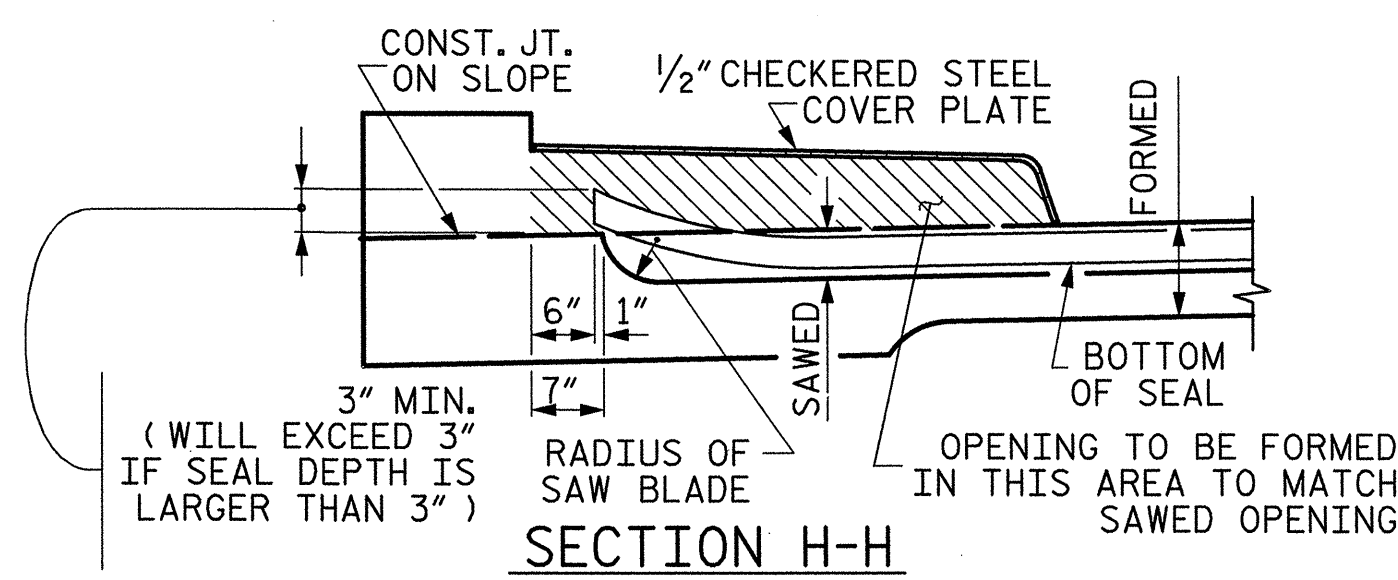
PLAN VIEW

TEMPORARY BERM AND SLOPE DRAIN DETAILS

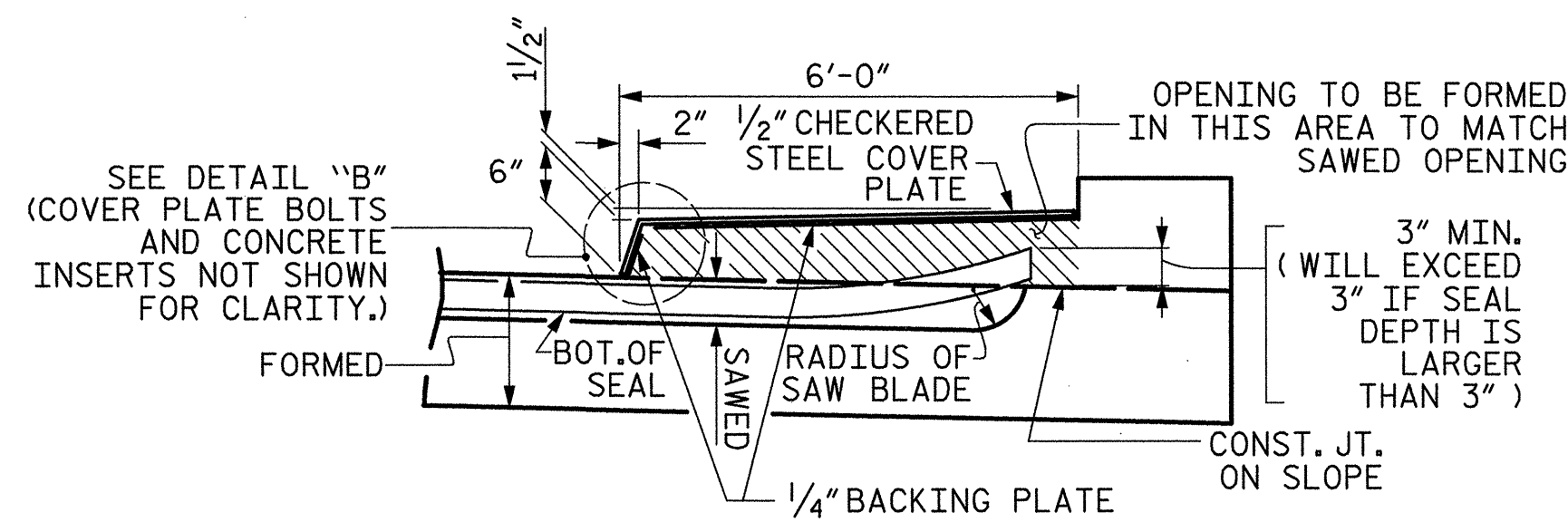
(TO BE USED WHEN SHOULDER BERM GUTTER IS REQUIRED)



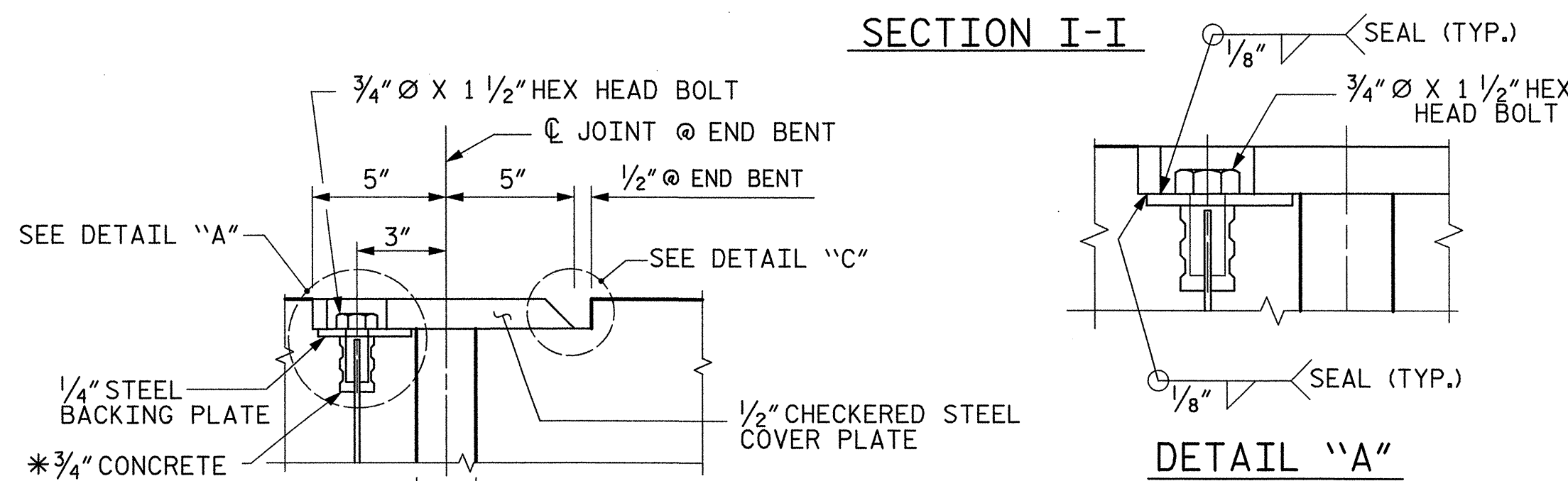
SECTION S-S



SECTION H-H

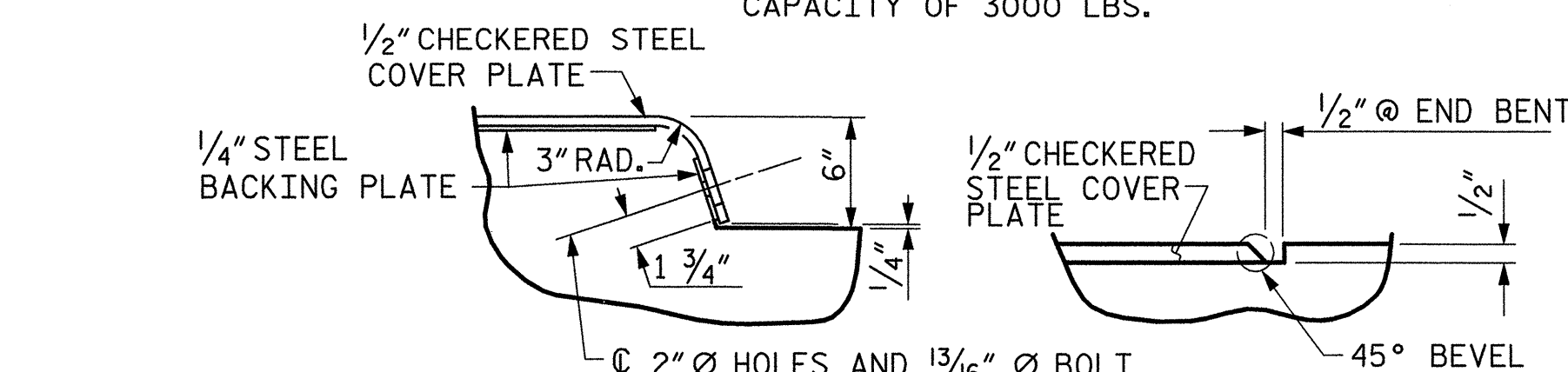


SECTION I-I



DETAIL "A"

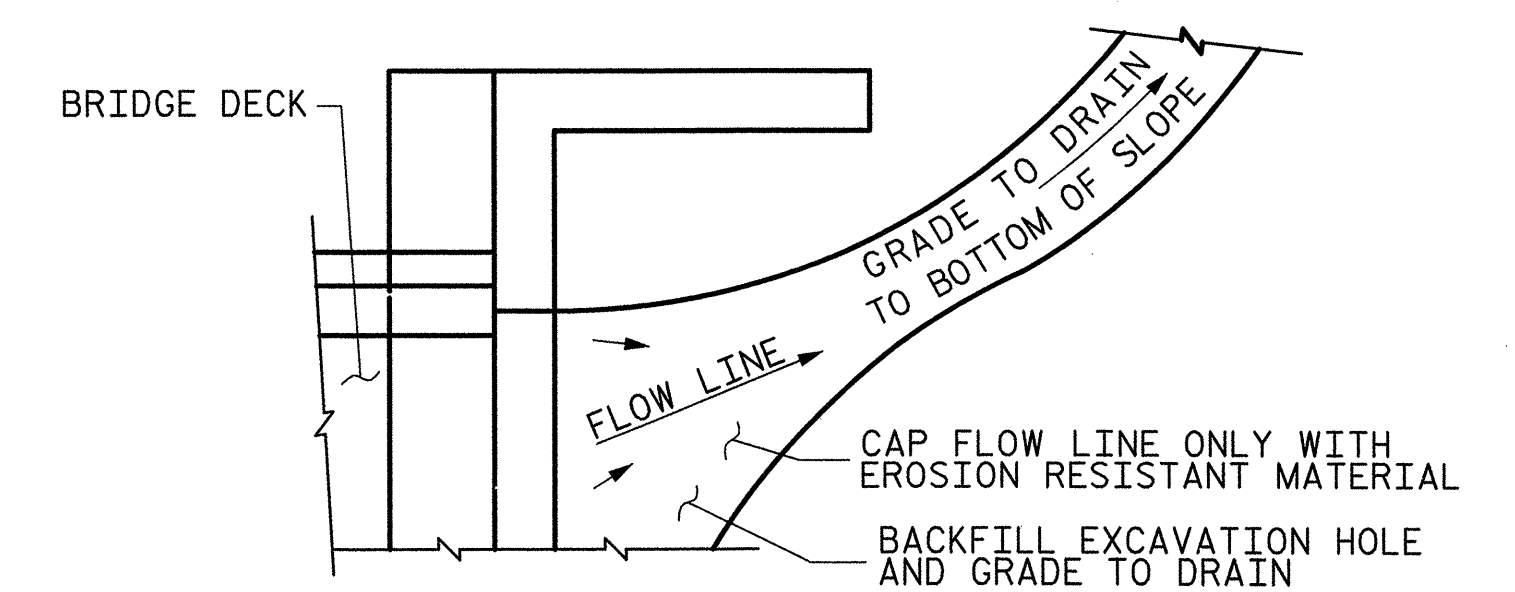
\*THE 3/4" CONCRETE INSERTS SHALL BE CLOSED-END FERRULES WITH LOOPED WIRE STRUTS ATTACHED TO THEM. THE INSERTS SHALL CONFORM TO AASHTO M169, GRADE 12L14 AND SHALL HAVE A TENSILE WORKING LOAD CAPACITY OF 3000 LBS.



DETAIL "B"

DETAIL "C"

JOINT SEAL DETAILS @ SLEEPER SLAB



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. U-4756  
CUMBERLAND COUNTY  
STATION: 44+88.35 -L-

SHEET 2 OF 3

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

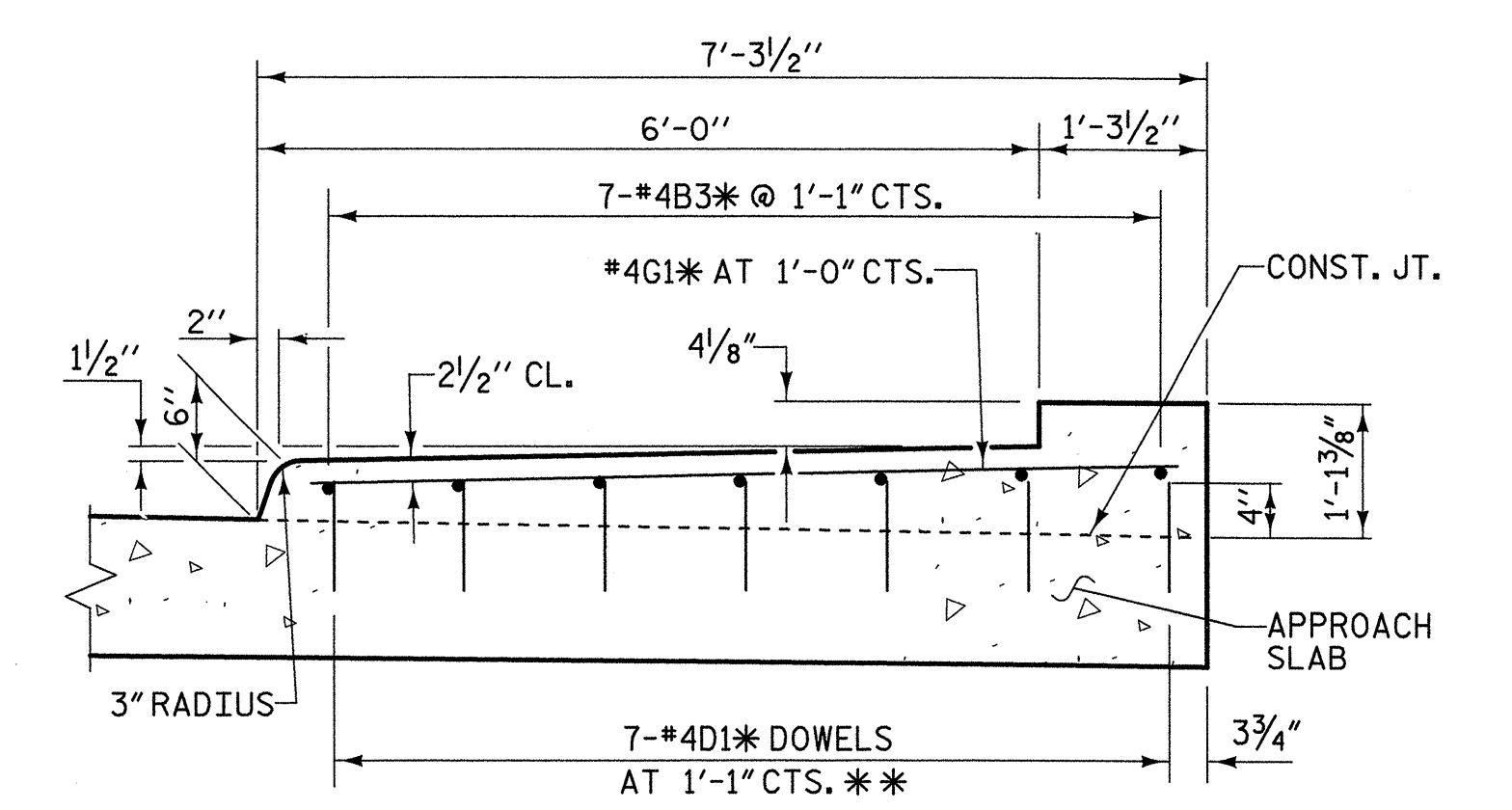
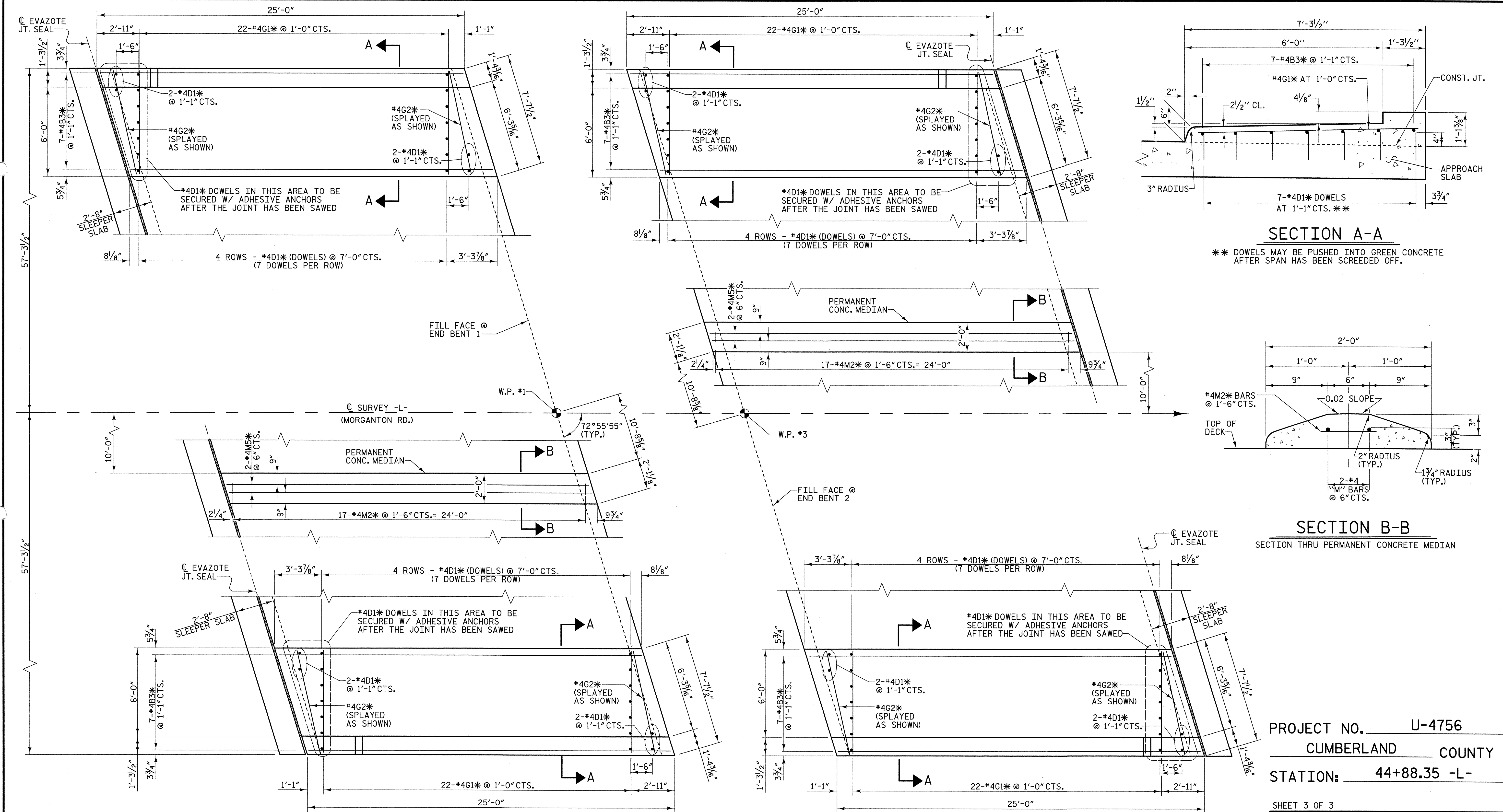
1988  
SHEET NO.  
S-35  
TOTAL SHEETS

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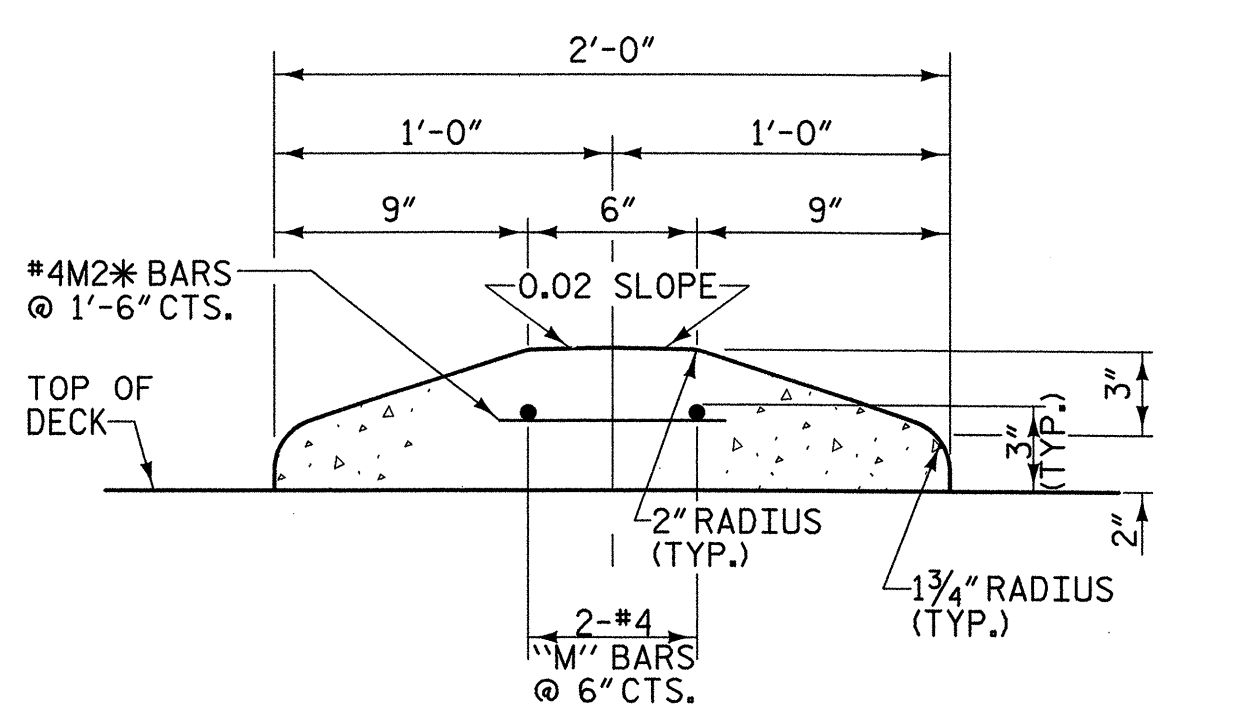


ASSEMBLED BY : W. B. ALLEN	DATE : 4/07
CHECKED BY : M. A. AVERETTE	DATE : 4/07
DRAWN BY : FCJ 11/88	REV. 10/17/00 RWW/LES
CHECKED BY : ARB 11/88	REV. 5/1/03 RWW/JTE
	REV. 5/1/06 TLA/GM

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**SECTION A-A**  
 \*\* DOWELS MAY BE PUSHED INTO GREEN CONCRETE AFTER SPAN HAS BEEN SCREEDED OFF.



**SECTION B-B**  
 SECTION THRU PERMANENT CONCRETE MEDIAN

**PLAN OF SIDEWALK & PERMANENT CONCRETE MEDIAN ON APPROACH SLABS**

\* INDICATES EPOXY COATED REINFORCING STEEL



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 PO BOX 38127  
 RALEIGH, N.C. 27636  
 (919) 871-1918 (FAX)  
 WWW.MULKEYINC.COM

PROJECT NO. **U-4756**  
 CUMBERLAND COUNTY  
 STATION: **44+88.35 -L-**

SHEET 3 OF 3  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**SUPERSTRUCTURE  
 BRIDGE APPROACH SLAB  
 SIDEWALK &  
 CONCRETE MEDIAN  
 PLAN AND DETAILS**

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

DRAWN BY: **W.B. ALLEN** DATE: **3/07**  
 CHECKED BY: **M.A. AVERETTE** DATE: **4/07**

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NOTES

ANGLES SHALL CONFORM TO AASHTO M270 GRADE 36 STEEL OR APPROVED EQUAL. ALL STUD ANCHORS SHALL CONFORM TO AASHTO M169 GRADES 1010 THRU 1020 OR APPROVED EQUAL.

STUD ANCHORS SHALL BE SHOP WELDED AND ALL HOLES SHALL BE SHOP DRILLED AS SHOWN ON THE PLANS. STUD ANCHORS SHALL BE ELECTRIC ARC END WELDED WITH COMPLETE FUSION.

UPON COMPLETION OF SHOP FABRICATION, THE ENTIRE ANCHOR ASSEMBLY SHALL BE METALLIZED. THE 1/2" Ø STUD ANCHORS AND ANCHOR TABS NEED NOT BE METALLIZED. SEE SPECIAL PROVISION FOR THERMAL SPRAYED COATINGS (METALLIZATION).

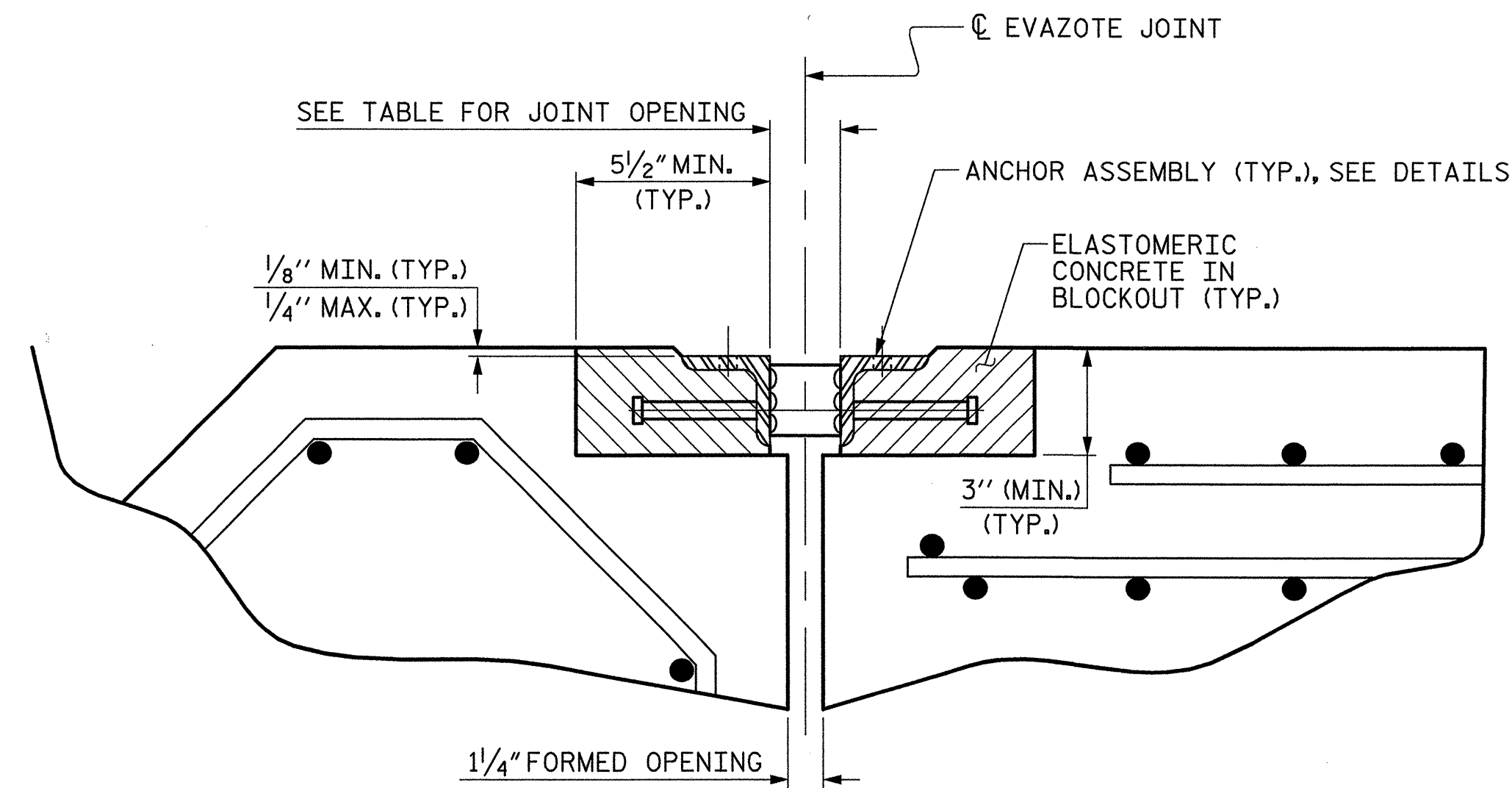
ANCHOR ASSEMBLY SHALL BE MADE CONTINUOUS THE LENGTH OF THE JOINT FROM GUTTER TO GUTTER. FOR FIELD SPLICES AT ALL CROWN BREAK POINTS, THE ENDS OF THE STEEL ANGLES SHALL BE CUT PARALLEL TO THE BRIDGE CENTERLINE. FINISHED FIELD WELDS SHALL BE GROUND SMOOTH AND COATED WITH A MINIMUM THICKNESS OF 4 DRY MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

ANCHOR ASSEMBLY SEGMENTS SHALL NOT BE LESS THAN 12 FEET NOR MORE THAN 20 FEET IN LENGTH. SHORTER SEGMENTS MAY BE USED AT THE EDGE OF ROADWAY OR AT POINTS OF STAGED CONSTRUCTION.

AFTER THE ELASTOMERIC CONCRETE HAS BEEN CAST ON BOTH SIDES OF THE JOINT, REMOVE ANY EXCESS CONCRETE THAT COMES THROUGH THE WEEP HOLES AND THOROUGHLY CLEAN THE ANGLES. ANY DAMAGED STEEL SHALL BE COATED WITH A MINIMUM OF 4 MILS OF ZINC-RICH PAINT IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.

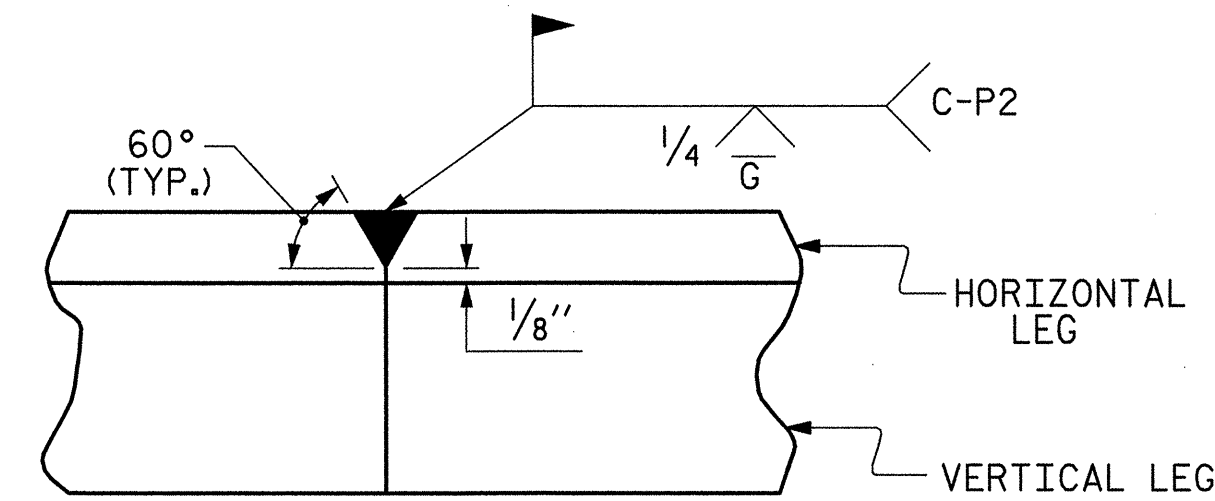
SEE SPECIAL PROVISIONS FOR EVAZOTE JOINT SEALS.

SEE SPECIAL PROVISIONS FOR ELASTOMERIC CONCRETE.



ARMORED JOINT DETAILS

SECTION NORMAL TO JOINT AT BENT



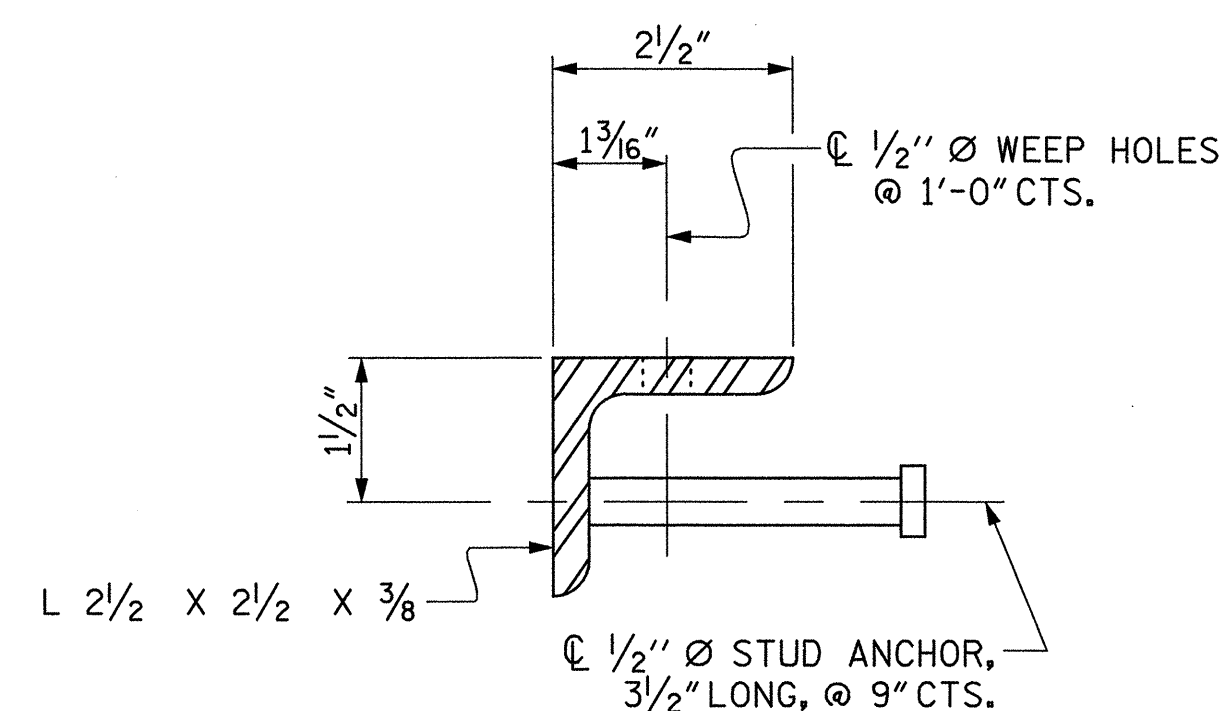
DETAIL- FIELD WELD SPLICE OF ANGLE

MOVEMENT AND SETTING AT EVAZOTE JOINT						
APPROACH SLAB @ END BENT NO.	SKEW ANGLE	NOMINAL UNCOMPRESSED SEAL WIDTH	TOTAL MOVEMENT (ALONG C RDWY)	PERPENDICULAR JOINT OPENING AT 45° F	PERPENDICULAR JOINT OPENING AT 60° F	PERPENDICULAR JOINT OPENING AT 90° F
1	72°55'55"	2 <sup>3</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "	2 <sup>5</sup> / <sub>16</sub> "	2 <sup>7</sup> / <sub>8</sub> "	1 <sup>11</sup> / <sub>16</sub> "
2	72°55'55"	2 <sup>3</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "	2 <sup>5</sup> / <sub>16</sub> "	2 <sup>7</sup> / <sub>8</sub> "	1 <sup>11</sup> / <sub>16</sub> "

TOTAL MOVEMENT IS CALCULATED ALONG THE CENTERLINE OF ROADWAY. JOINT OPENINGS ARE MEASURED PERPENDICULAR TO THE JOINT.

BILL OF MATERIAL		
APPROACH SLAB @ END BENT NO.	ELASTOMERIC CONCRETE * (CU. FT.)	TOTAL LENGTH OF ANGLE (FT)
1	18.0	209'-2 <sup>5</sup> / <sub>8</sub> "
2	18.0	209'-2 <sup>5</sup> / <sub>8</sub> "

\* BASED ON THE MINIMUM BLOCKOUT SHOWN.



SECTION VIEW OF STUD

ARMORED JOINT ANCHOR ASSEMBLY DETAILS

PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 1 OF 1

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

STANDARD  
 ARMORED EVAZOTE  
 JOINT DETAILS

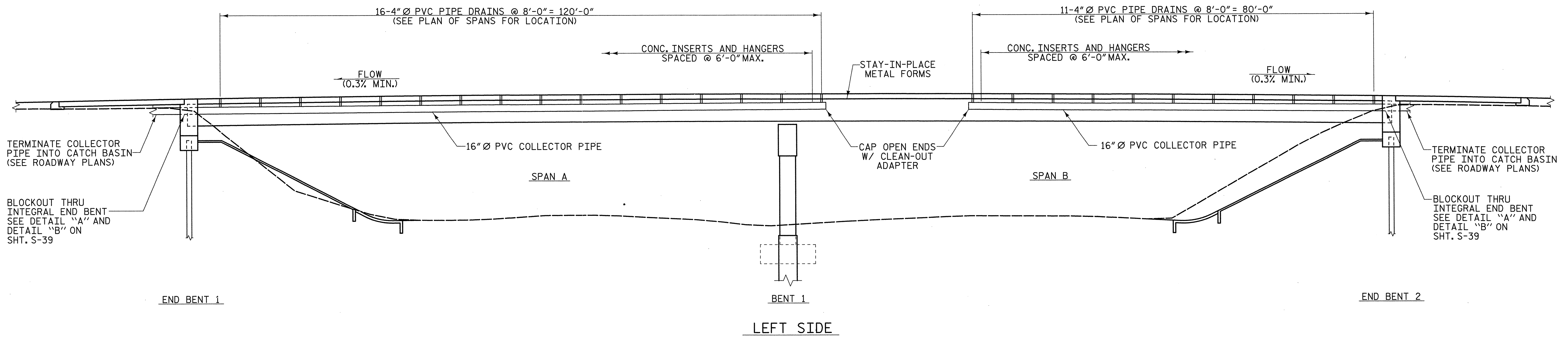
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NO.	BY:	DATE:	NO.	BY:	DATE:	S-37
1			3			TOTAL SHEETS
2			4			

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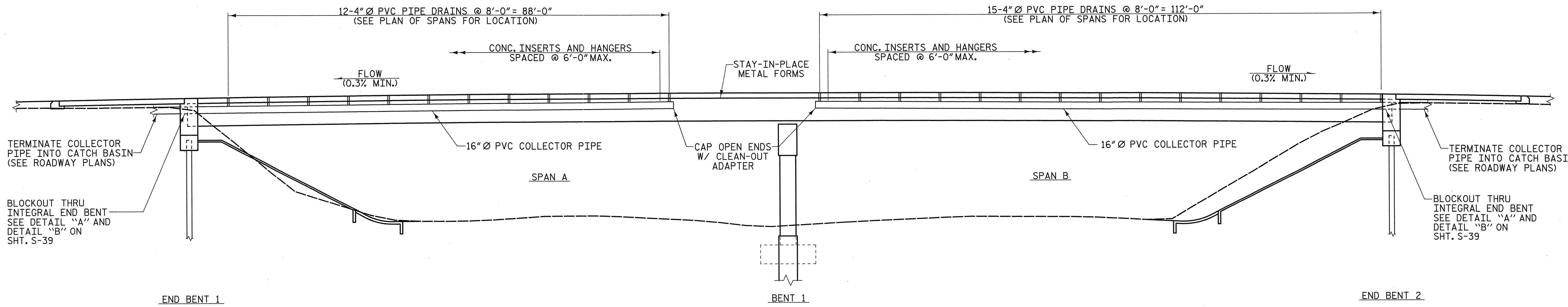


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ASSEMBLED BY : W. B. ALLEN	DATE : 4/07
CHECKED BY : M. A. AVERETTE	DATE : 4/07
DRAWN BY : EEM 1/96	REV. 7/10/01 LES/RDR
CHECKED BY : RGW 1/96	REV. 5/1/03RR RWW/JTE
	REV. 5/1/06 TLA/GM

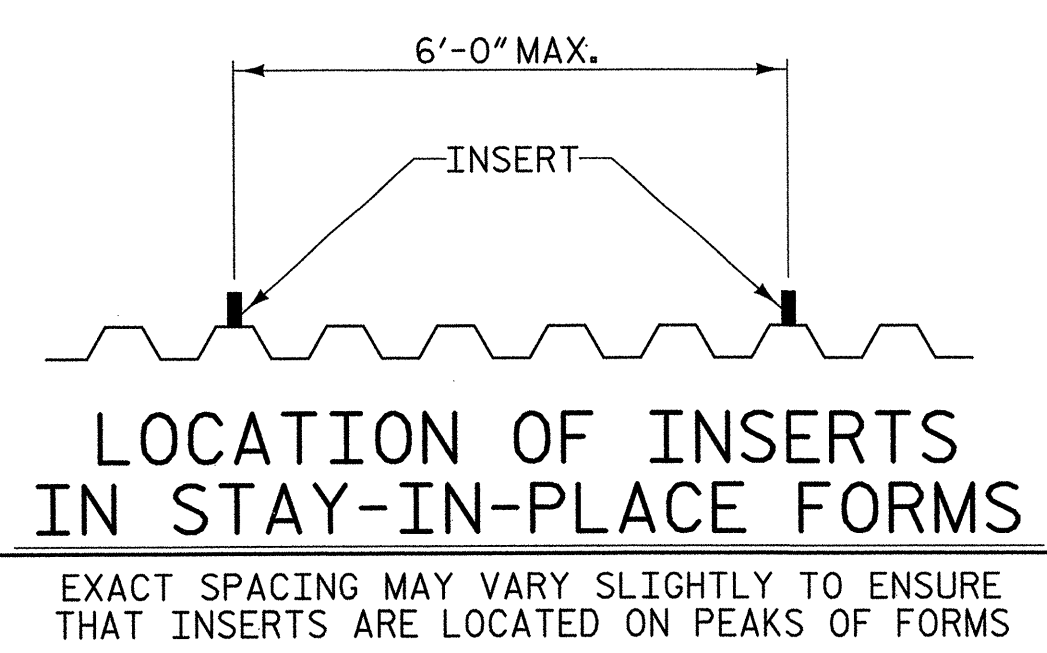


LEFT SIDE



RIGHT SIDE

ELEVATION



PROJECT NO. U-4756  
 CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-  
 23+75.44 -Y5-

SHEET 1 OF 2

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

CLOSED  
 STRUCTURE DRAINAGE  
 SYSTEM

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



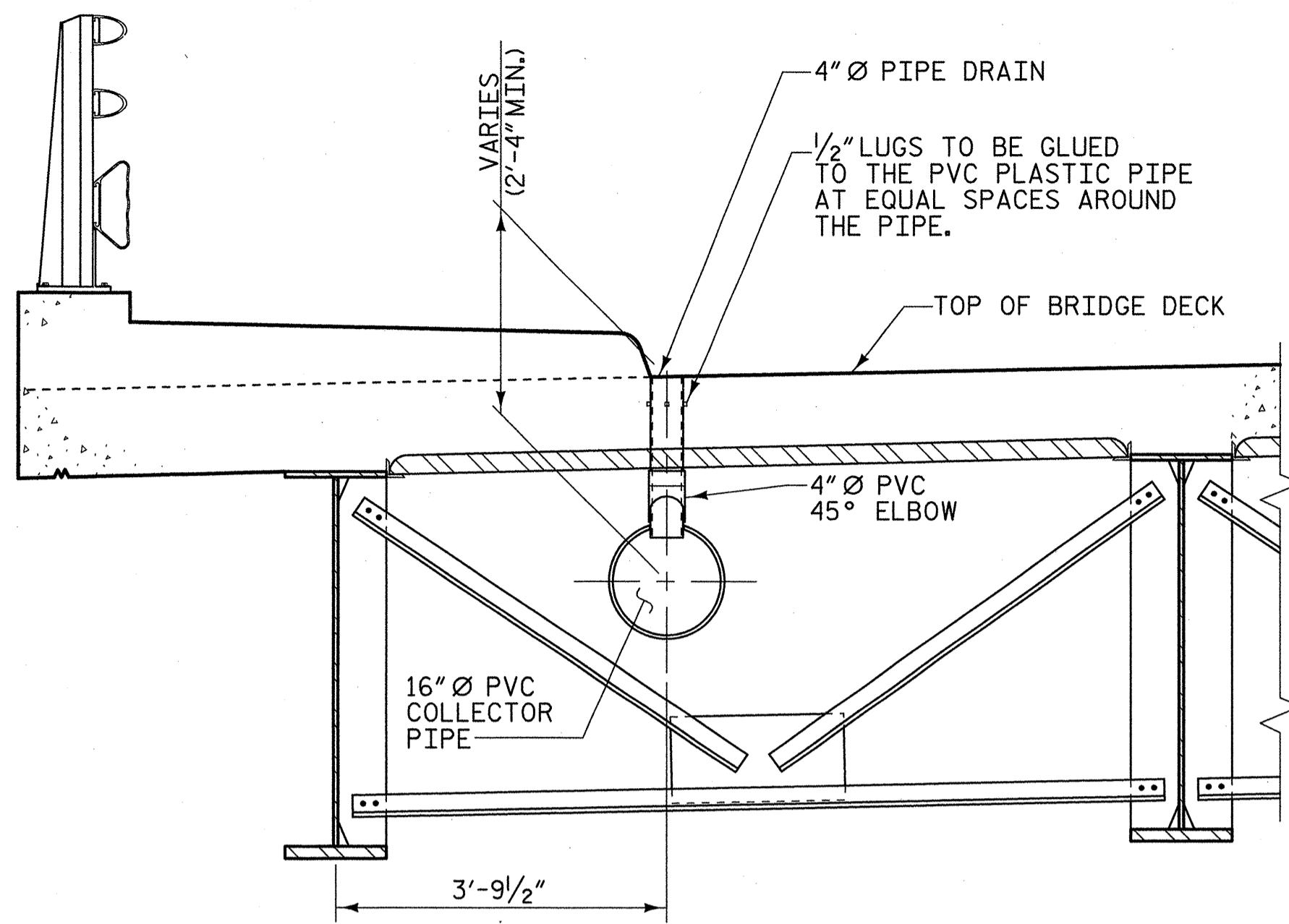
PLANS PREPARED BY:

**MULKEY**  
 ENGINEERS & CONSULTANTS

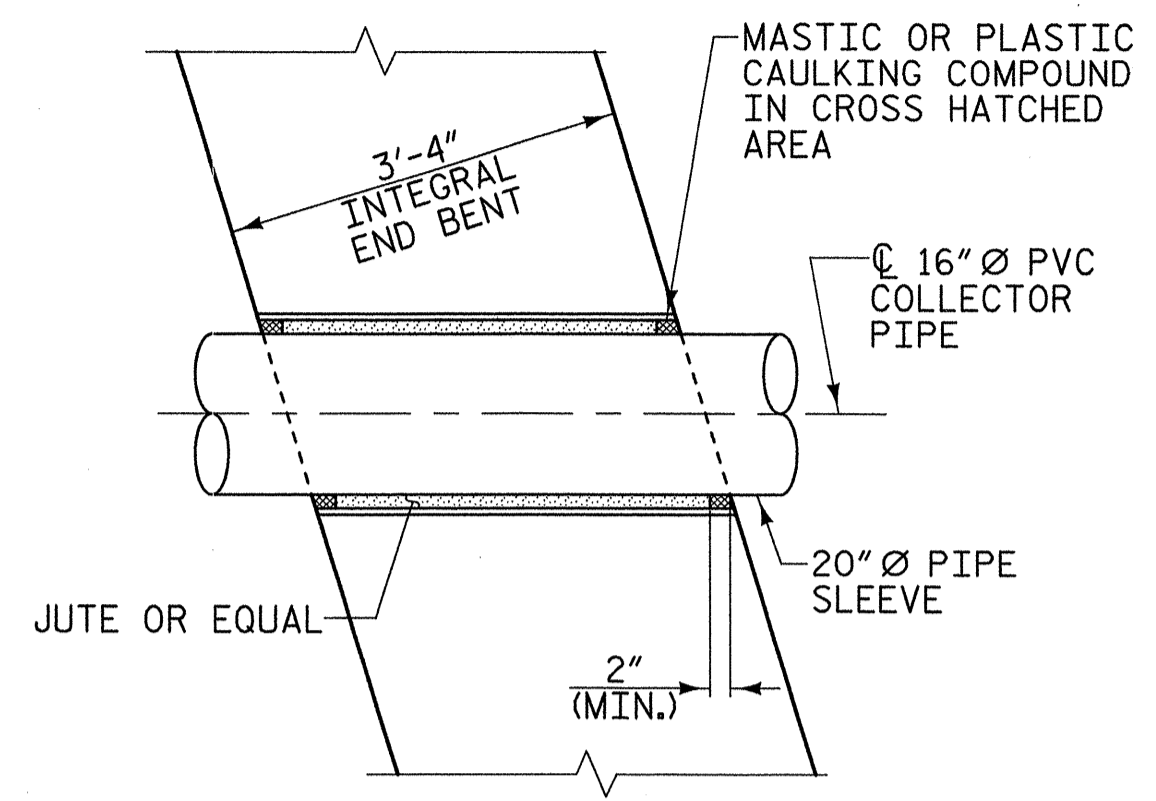
PO BOX 33127  
 RALEIGH, N.C. 27626  
 (919) 881-1912 (FAX)  
 WWW.MULKEYINC.COM

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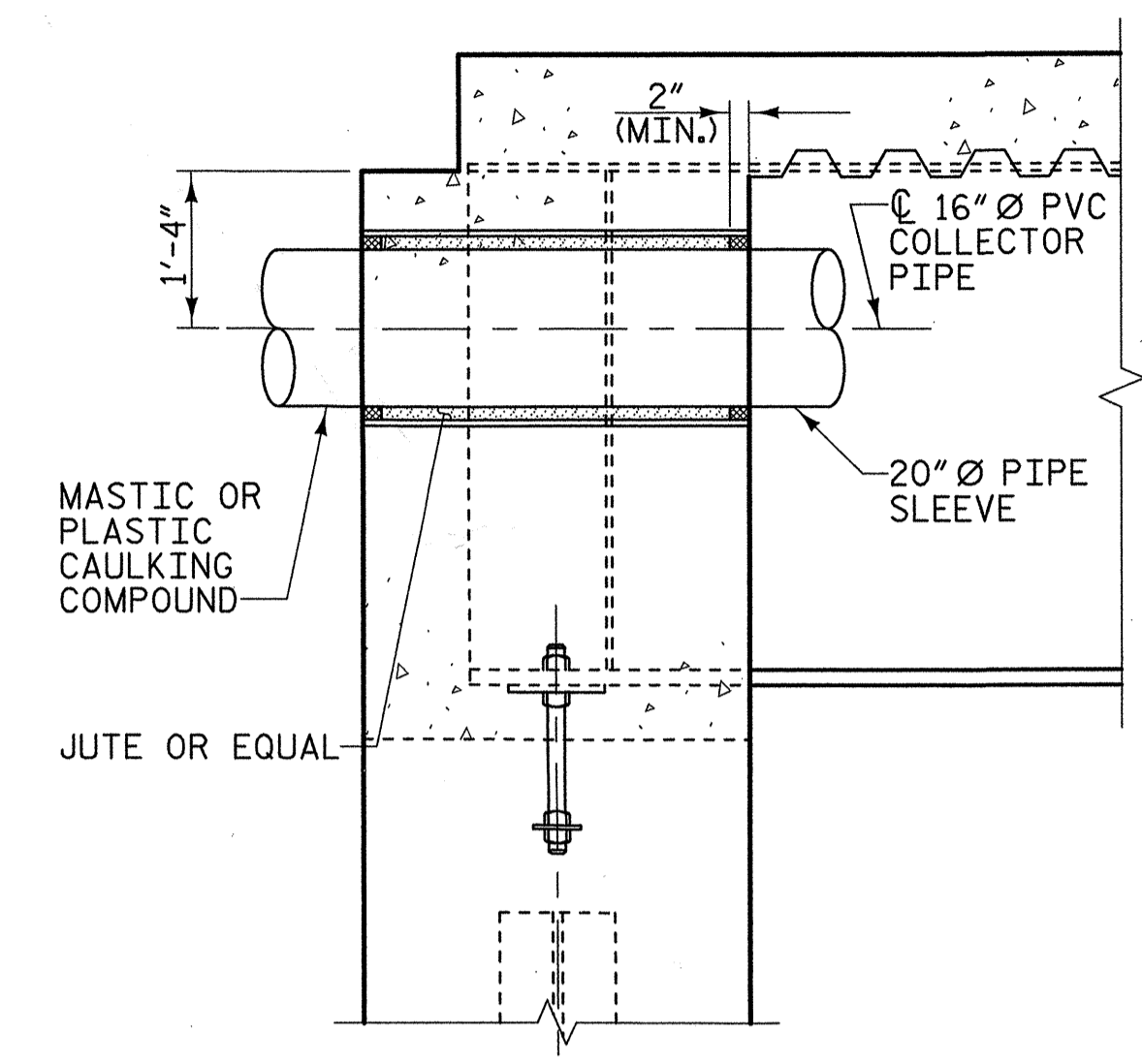
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 CHECKED BY: M. A. AVERETTE DATE: 6/07



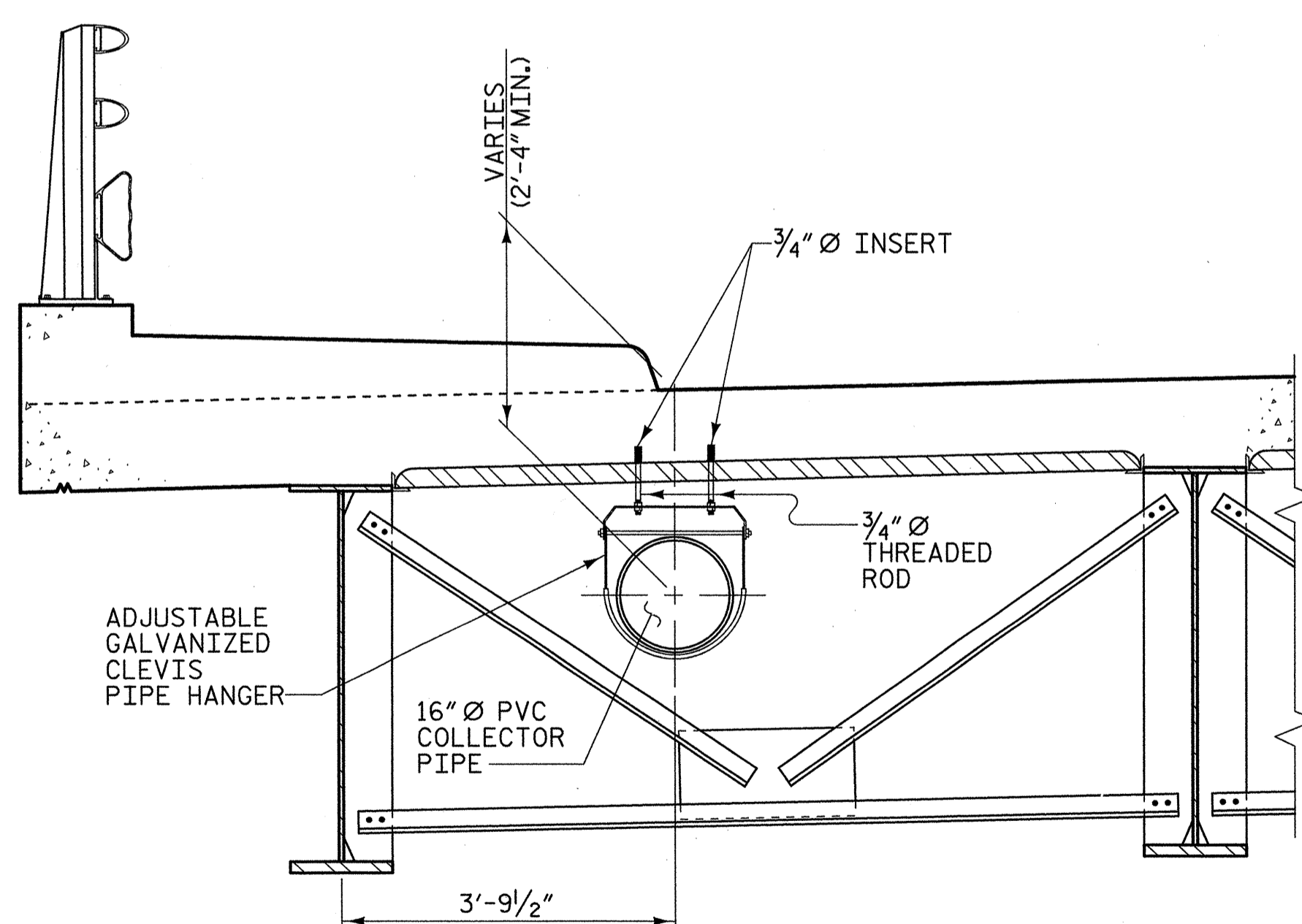
**PART SECTION @ PIPE DRAIN**  
(LOOKING UPSTATION-LEFT SIDE SHOWN, RIGHT SIDE SIMILAR)



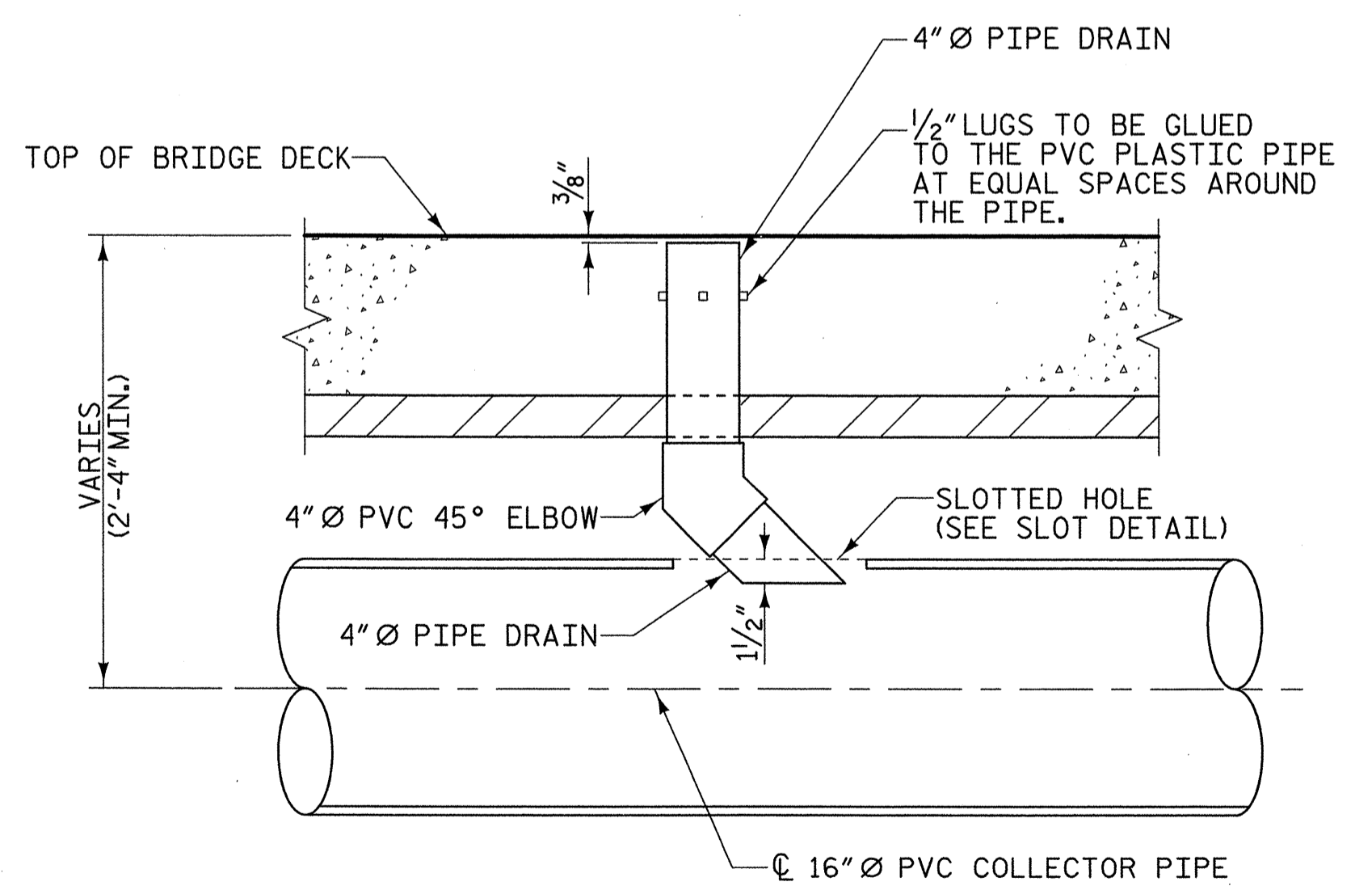
**DETAIL "A"**  
@ END BENTS



**DETAIL "B"**  
@ END BENTS



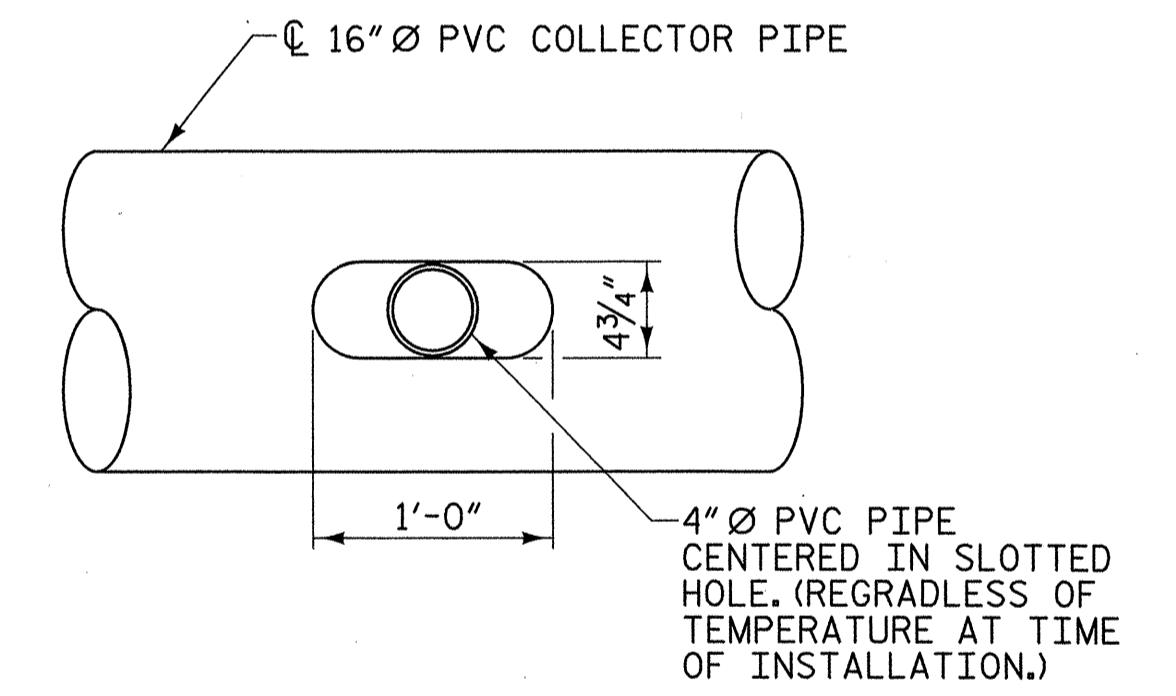
**PART SECTION SHOWING PIPE HANGER**  
(LOOKING UPSTATION-LEFT SIDE SHOWN, RIGHT SIDE SIMILAR)



**PIPE DRAIN & PVC COLLECTOR PIPE CONNECTION**

**NOTES:**

1. ALL STRUCTURAL STEEL SHALL BE AASHTO GRADE 345.
2. ALL FABRICATION SHALL CONFORM TO THE APPLICABLE SECTION OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
3. THE ENTIRE COST FOR THE LABOR AND MATERIALS NECESSARY TO FABRICATE AND INSTALL PIPE SUPPORT AND PIPE ANCHOR ASSEMBLIES SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE "STRUCTURE DRAINAGE SYSTEM." SEE SPECIAL PROVISIONS FOR STRUCTURE DRAINAGE SYSTEM.
4. ALL STRUCTURAL MEMBERS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION PER STANDARD SPECIFICATIONS AND SHALL BE PAINTED WITH A TOP COAT OF ACRYLIC PAINT 2 - 4 MILS (DFT) AS PER STANDARD SPECIFICATION 1080-13.
5. THE GALVANIZED SURFACE SHALL BE CLEANED TO (SSPC SP-1) PRIOR TO COATING.
6. PIPE HANGERS SHALL BE SPACED AT 6'-0" CENTERS (MAXIMUM), AND THEY SHALL NOT BE LOCATED MORE THAN 2'-0" FROM ANY COUPLING.
7. EACH PIPE SECTION SHALL HAVE A MINIMUM OF TWO PIPE HANGERS.
8. COLLECTOR PIPE SHALL BE SUPPORTED FROM THE CONCRETE DECK SLAB. NO ATTACHMENT TO THE GIRDERS WILL BE PERMITTED.
9. ALL HARDWARE SHALL BE GALVANIZED.
10. DRAINS, COLLECTOR PIPE AND FITTINGS SHALL BE SCHEDULE 40 PVC AND CONFORM TO ASTM D1785.
11. FOR LAYOUT OF 4" Ø PVC PIPE DRAINS. SEE "PLAN OF SPANS" SHEETS.
12. THE CONTRACTOR SHALL PROVIDE PVC COUPLINGS CAPABLE OF HANDLING THE ANTICIPATED MOVEMENTS.
13. FOR STRUCTURE DRAINAGE SYSTEM, SEE SPECIAL PROVISIONS.
14. DRAINAGE SYSTEM SUPPORT SHALL BE DESIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA AND SUBMITTED FOR APPROVAL PRIOR TO ORDERING MATERIALS.
15. TOP OF FLOOR DRAIN TO BE SET 3/8" BELOW SURFACE OF SLAB.



**SLOT DETAIL**

PROJECT NO. U-4756  
CUMBERLAND COUNTY  
 STATION: 44+88.35 -L-

SHEET 2 OF 2  
 STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH  
**CLOSED  
 STRUCTURE DRAINAGE  
 SYSTEM**



PLANS PREPARED BY:  
**MULKEY**  
 ENGINEERS & CONSULTANTS  
 P.O. BOX 32127  
 RALEIGH, N.C. 27632  
 (919) 881-1111  
 (919) 881-1918 (FAX)  
 WWW.MULKEYINC.COM

REVISIONS						SHEET NO.
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2			4			

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 CHECKED BY: M. A. AVERETTE DATE: 6/07