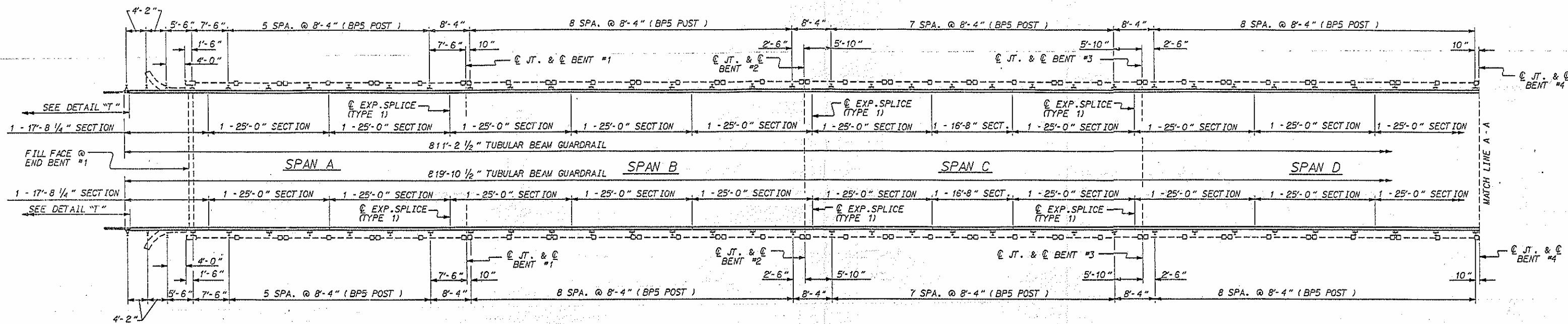
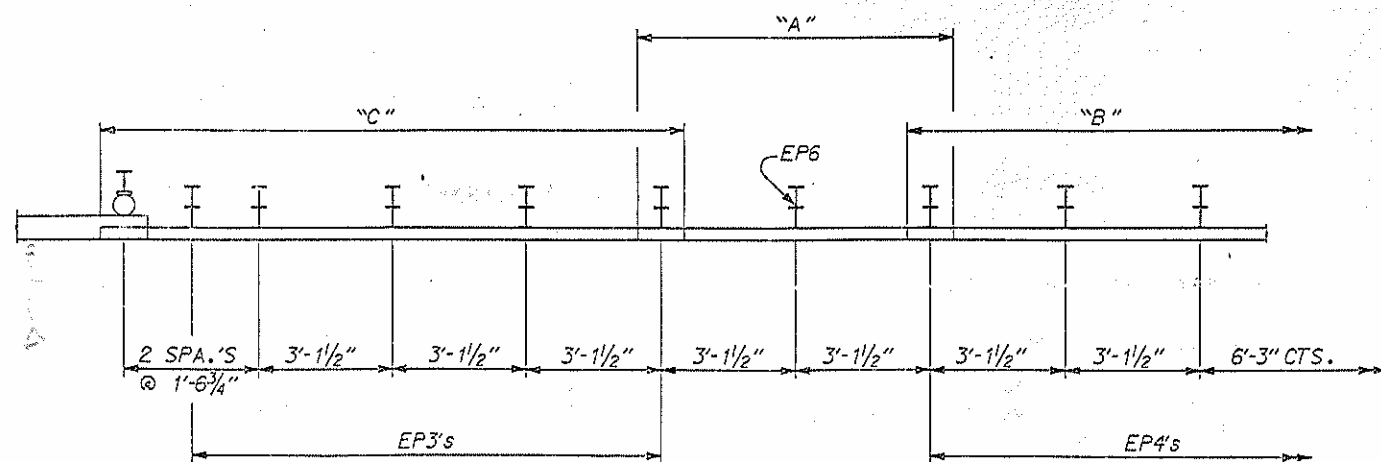




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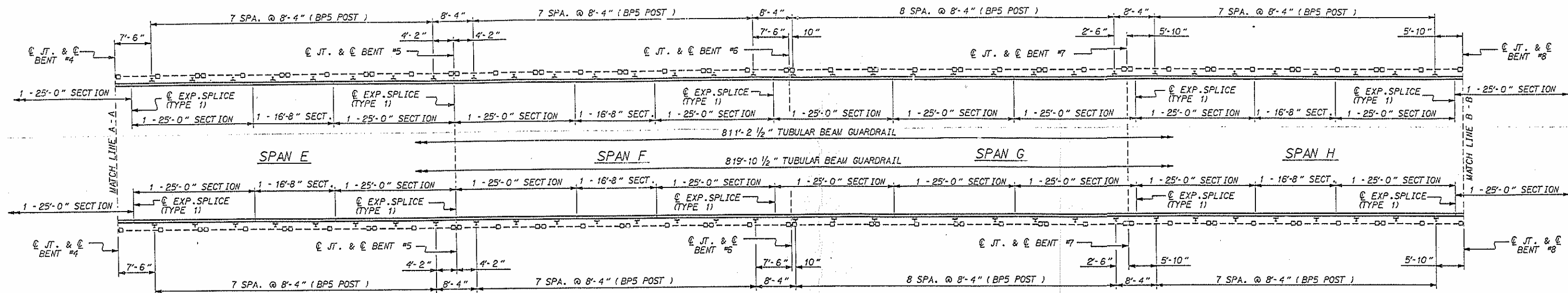
DETAIL "T"

LEGEND	
	USE BP5
	USE EP1
	USE EP2
	USE EP3 (EXCEPT AS NOTED)
	USE EP5
"A" ---	USE W-TR GUARDRAIL TRANSITIONAL SECTION
"B" ---	USE STANDARD GUARDRAIL
"C" ---	USE 20" TRIPLE CORRUGATED STEEL BEAM GUARDRAIL
"D" ---	USE TRIPLE CORRUGATED GUARDRAIL TERMINAL SECTION

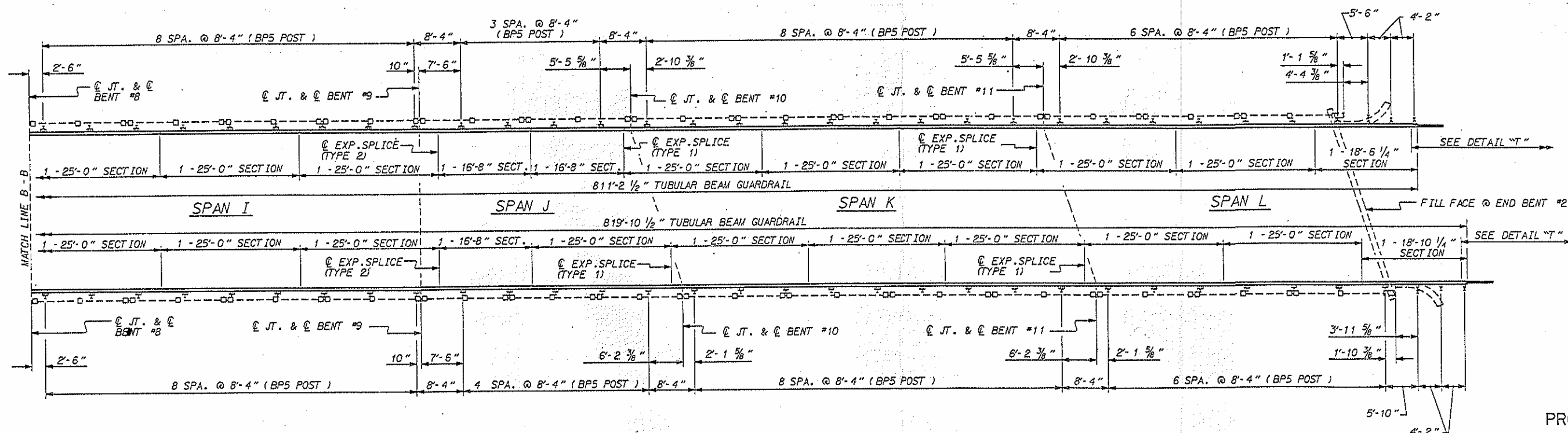
PROJECT NO. 8.1770302
 SURRY COUNTY
 STATION: _____
 SHEET 13 OF 34 BRIDGE #

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

DRAWN BY: R. TUNG DATE: 5-18-92
 CHECKED BY: S. W. PERCE DATE: 6-1-92



PLAN



PLAN

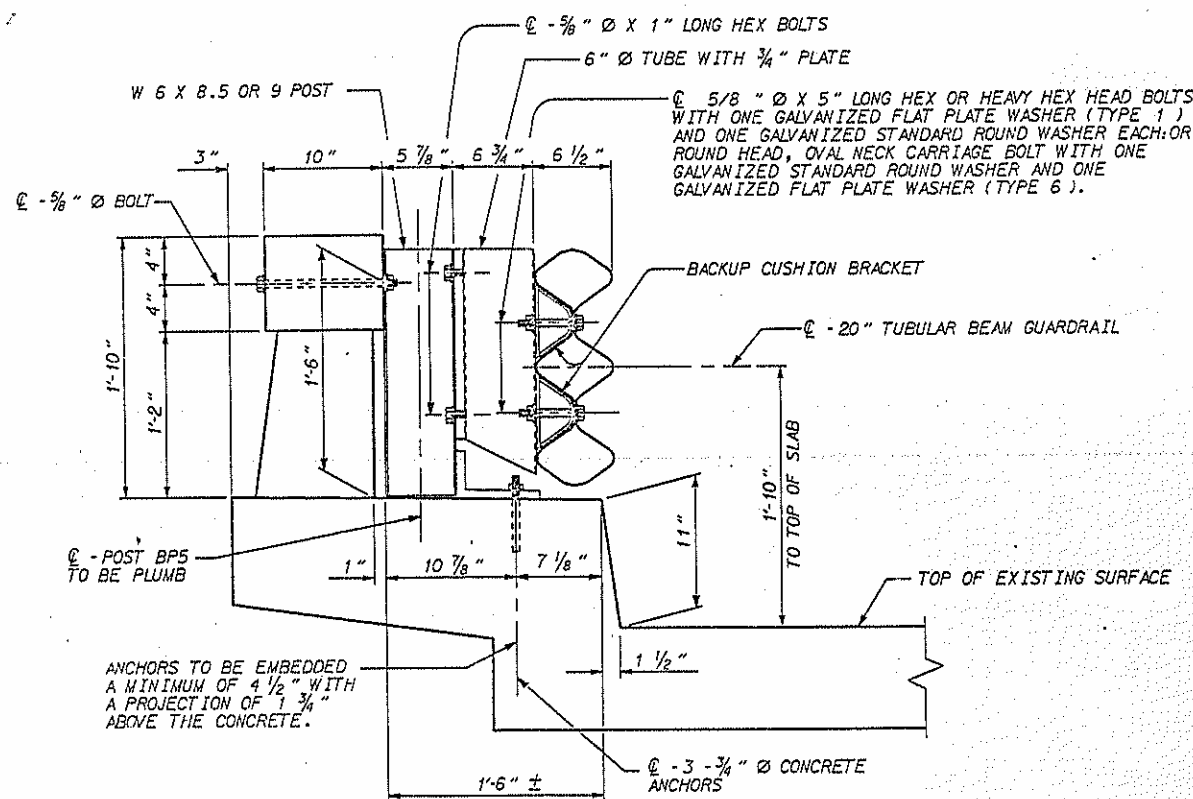
PROJECT NO. 8.1770302
 SURRY COUNTY
 STATION: _____

SHEET 14 OF 34 BRIDGE #5

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH
 RETROFIT OF EXISTING
 BRIDGE RAIL
 WITH TUBULAR BEAM
 GUARDRAIL

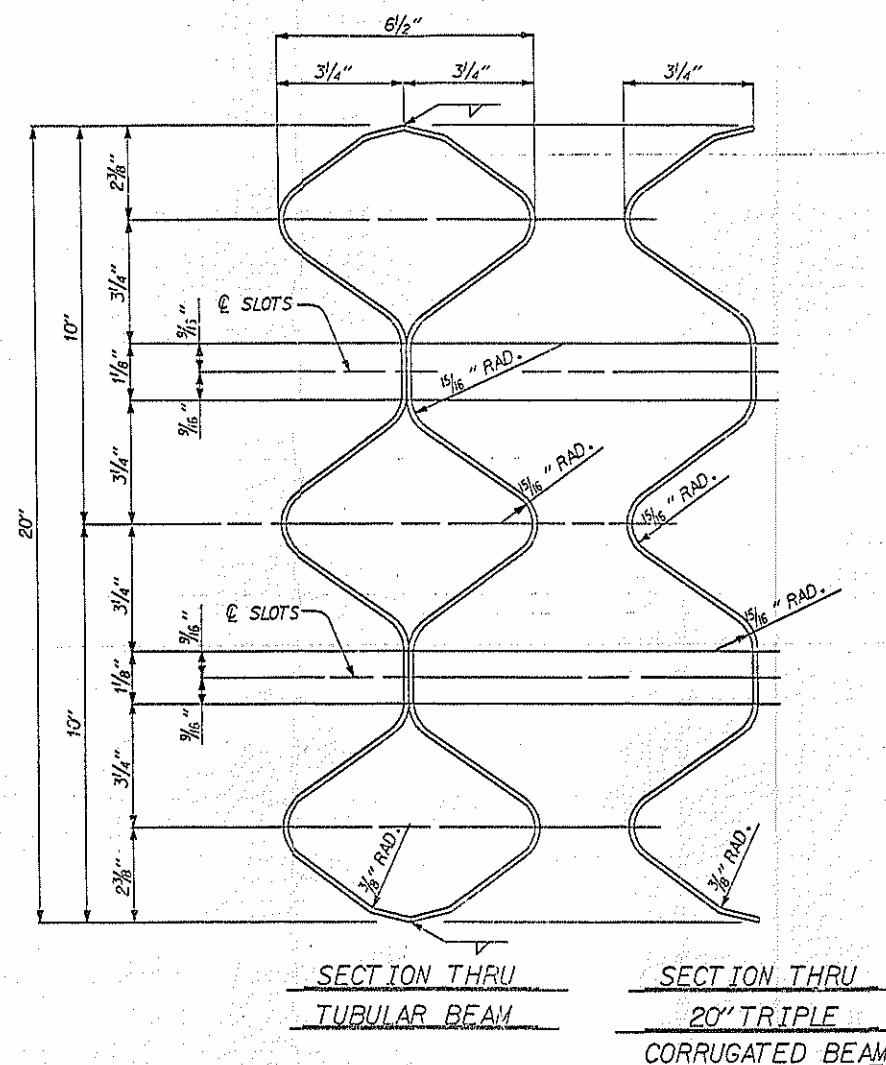
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	
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2			4			15

DRAWN BY: R. TUNG DATE: 5-18-92
 CHECKED BY: S.W. PEARCE DATE: 6-1-92



RETROFIT EXISTING RAIL WITH TUBULAR BEAM GUARDRAIL
(WITHOUT WEARING SURFACE)

BP5



CONCRETE ANCHOR NOTES

- CONCRETE ANCHORS SHALL CONSIST OF A STUD, THREADED ON ONE END, WITH A NUT AND WASHER. THE ANCHORS SHALL BE INSTALLED WITH AN ADHESIVE ANCHORING SYSTEM. SEE ROADWAY SPECIAL PROVISIONS FOR "ADHESIVELY ANCHORED ANCHOR BOLTS/DOWELS." EXPANSION ANCHORS WILL NOT BE ALLOWED.
- THE CONCRETE ANCHORS SHALL BE TESTED AS FOLLOWS:
 - THE SPECIFIED REQUIRED DESIGN STRENGTH OF THE ANCHOR BOLTS SHALL BE 7500 POUNDS PER BOLT.
 - THE ENGINEER SHALL CHOOSE A MINIMUM OF FOUR LOCATIONS ON EACH SPAN IN THE AREA OF THE CURB FOR LOAD TESTS AS DESCRIBED IN THE ROADWAY SPECIAL PROVISIONS.
 - THE SUCCESSFULLY TESTED ANCHOR MAY BE USED IN THE FINAL RAIL ASSEMBLY IF APPROPRIATELY LOCATED. IF NOT SO LOCATED OR IF THE ANCHOR FAILS THE TEST, THE TEST AREA SHALL BE REPAIRED AS DAMAGED CONCRETE. SEE "GENERAL NOTES."
- STUD BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED TO CONFORM TO THE REQUIREMENTS OF ASTM A-153.
- AT THE CONTRACTOR'S OPTION, STAINLESS STEEL CONCRETE ANCHORS MAY BE USED AS AN ALTERNATE FOR THE GALVANIZED ANCHORS. THEY SHALL MEET OR EXCEED THE MECHANICAL REQUIREMENTS FOR THE GALVANIZED ANCHORS. THE USE OF THIS ALTERNATE SHALL BE APPROVED BY THE ENGINEER.
- CONCRETE ANCHORS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
- TUBULAR BEAM POSTS ARE TO BE MOUNTED AGAINST THE EXISTING CONCRETE RAIL.
- HOLES FOR THE 5/8" DIA. BOLTS, THRU THE EXISTING CONCRETE RAIL OR POST, SHALL BE 3/4" DIA.. HOLES SHALL BE HORIZONTAL AND SHALL BE DRILLED WITH A ROTARY OR ROTARY IMPACT DRILL. IMPACT TOOLS WILL NOT BE PERMITTED.
- 5/8" DIA. AND/OR 1" DIA. BOLT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-307 AND SHALL BE GALVANIZED TO CONFORM TO THE REQUIREMENTS OF ASTM A-153.

GENERAL NOTES

- GUARDRAIL SHALL CONFORM TO THE NCDOT STANDARD SPECIFICATIONS EXCEPT AS NOTED AND AS SHOWN ON PLANS.
- 20" TRIPLE TUBULAR CORRUGATED BEAM RAIL SHALL BE 10 GAGE.
- POSTS, BASE ANGLES AND/OR BASE PLATES, 6" DIA. TUBES, AND OFFSET BLOCKS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A-36. SHIMS SHALL MEET THE REQUIREMENTS OF ASTM A-570 GRADE 33 OR A-611 GRADE C.
- POSTS, BASE ANGLES AND/OR BASE PLATES, TUBES, BLOCKS, AND SHIMS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A-123.
- POSTS ARE TO BE PLUMB. SHIMS MAY BE USED BENEATH THE ROADWAY EDGE OF THE BASE ANGLES AND/OR BASE PLATES AS NECESSARY FOR POST ALIGNMENT.
- "BP" POST HEIGHT TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR.
- PROPOSED RAIL POST MAY BE SHIFTED SLIGHTLY TO CLEAR REINFORCING STEEL. STANDARD SLOTS MAY BE USED IN THE RAIL TO ALLOW ADJUSTMENT.
- HOLES SHALL BE DRILLED USING A ROTARY DRILL OR A ROTARY IMPACT DRILL. CARBIDE TIPPED BITS SHALL BE USED UNLESS REINFORCING STEEL IS ENCOUNTERED. AN APPROPRIATE BIT FOR DRILLING THROUGH REINFORCING STEEL SHALL BE USED WHEN NECESSARY. THE CONTRACTOR SHALL BE PREPARED TO DRILL THROUGH REINFORCING STEEL.
- THE CONTRACTOR SHALL VERIFY POST SPACINGS AS SHOWN ON THE PLANS BEFORE HOLES ARE DRILLED IN THE 20" TRIPLE TUBULAR CORRUGATED BEAM RAIL. STANDARD SLOTS WILL BE ALLOWED. FIELD PUNCHING OF THE HOLES OR SLOTS WILL NOT BE PERMITTED.
- CURVED RAIL USAGE: RAILS ARE TO BE USED ON BRIDGES WITH HORIZONTAL AND/OR VERTICAL CURVES. THE CONTRACTOR MAY AT HIS OPTION HAVE THE REQUIRED CURVATURE IN THE RAIL FORMED IN THE SHOP OR IN THE FIELD. THE RAIL SHALL CONFORM WITHOUT BUCKLING OR KINKING TO THE REQUIRED CURVATURE IN A UNIFORM MANNER ACCEPTABLE TO THE ENGINEER.
- A SEALANT WILL BE REQUIRED IN THE AREA OF THE ANCHOR BOLTS AND WILL BE PLACED IN THE FOLLOWING MANNER:
 - BEFORE THE BASE PLATE HAS BEEN SET IN PLACE, IF THE GROUT DOES NOT COMPLETELY FILL THE ANCHOR HOLE, SEAL THE AREA AROUND EACH CONCRETE ANCHOR BOLT TO KEEP MOISTURE FROM ENTERING THE HOLE.
 - AFTER THE BASE PLATE HAS BEEN SET IN PLACE AND BEFORE THE WASHERS AND NUTS HAVE BEEN PLACED ON THE BOLT, SEAL THE HOLE REMAINING AROUND THE ANCHOR BOLT.
 THE SEALANT SHALL BE A ONE-COMPONENT POLYSULFIDE GUN GRADE MEETING FEDERAL SPECIFICATION TT-S-230. SEALANT SHALL BE GRAY IN COLOR AND APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION. THE FOLLOWING SEALANTS MEET THE ABOVE REQUIREMENTS:
 - "SONOLASTIC ONE PART", MANUFACTURED BY SONNEBORN-DESO TO CO., DES PLAINS, ILLINOIS, 60018.
 - "THORSPAN ONE COMPONENT", MANUFACTURED BY STANDARD DRY WALL PRODUCTS, INC., MIAMI, FLORIDA, 33166.
 - "HORNFLX ONE COMPONENT", MANUFACTURED BY W. R. GRACE AND CO., CAMBRIDGE, MASSACHUSETTS, 02140.
- ALL CONCRETE DAMAGED BY THIS WORK SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.
- VERTICAL SLOTS IN THE 6" DIA. TUBE ALLOW FOR SOME VERTICAL ADJUSTMENT OF RAIL HEIGHT IN ORDER TO OBTAIN THE CENTERLINE OF RAIL HEIGHT OF 1'-10" ABOVE RIDING SURFACE.
- THE SIZE OF FILLET WELDS SHALL CONFORM TO THE REQUIREMENTS OF THE CURRENT AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES." ELECTROSLAG WELDING WILL NOT BE PERMITTED.
- LAP BEAM RAIL JOINTS IN DIRECTION OF TRAFFIC.

PROJECT NO. 8.1770302

SURRY COUNTY

STATION: _____

SHEET 15 OF 34

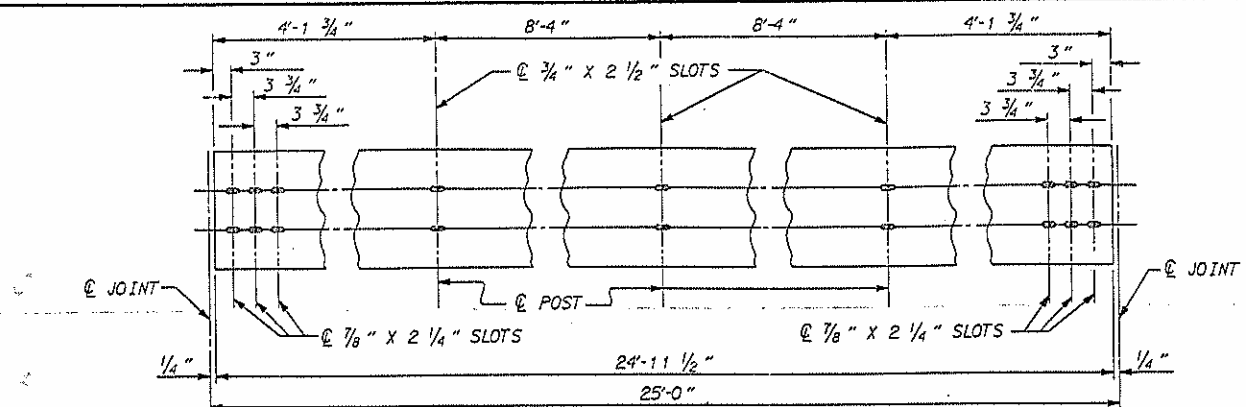
BRIDGE #6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

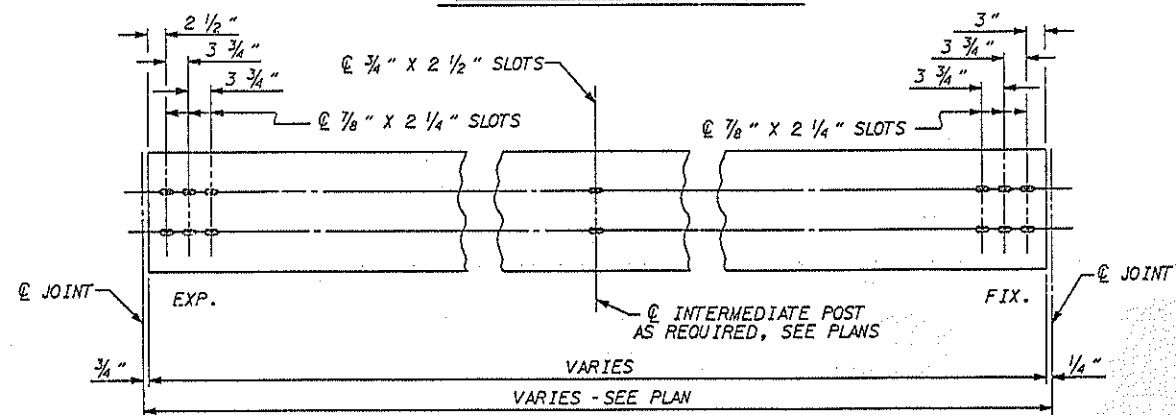
DETAILS FOR RETROFIT
OF EXISTING BRIDGE
RAIL WITH TUBULAR
BEAM GUARDRAIL

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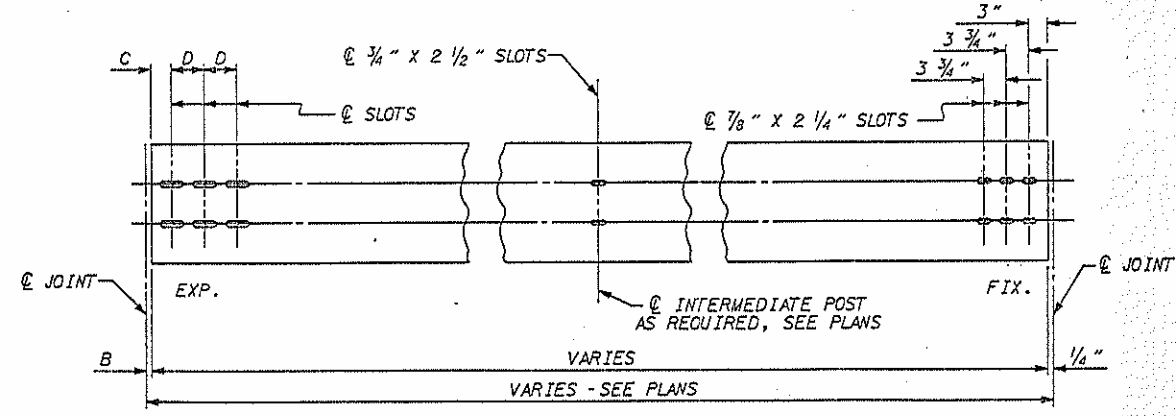
DRAWN BY: R.TUNG DATE: 2-18-92
CHECKED BY: SW.PEARCE DATE: 6-1-92



**ELEVATION TUBULAR BEAM
STANDARD RAIL**

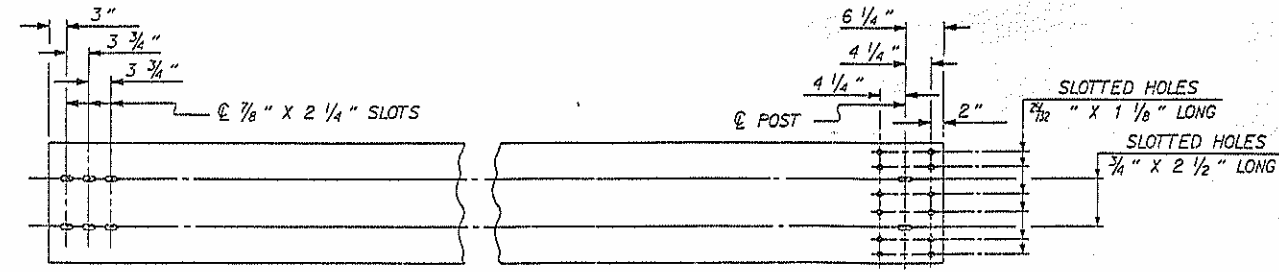


**ELEVATION TUBULAR BEAM
EXPANSION RAIL FOR TYPE 1 SPLICE**

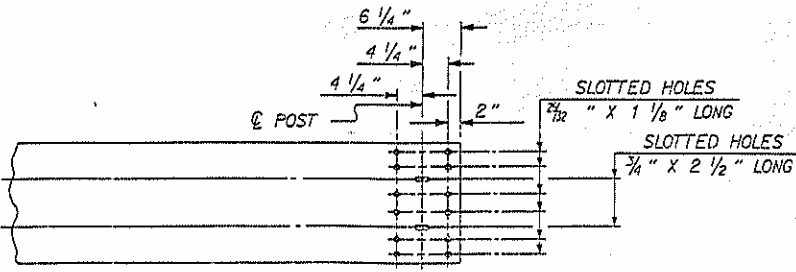


**ELEVATION TUBULAR BEAM
EXPANSION RAIL FOR TYPE 2 THRU 5 SPLICE**

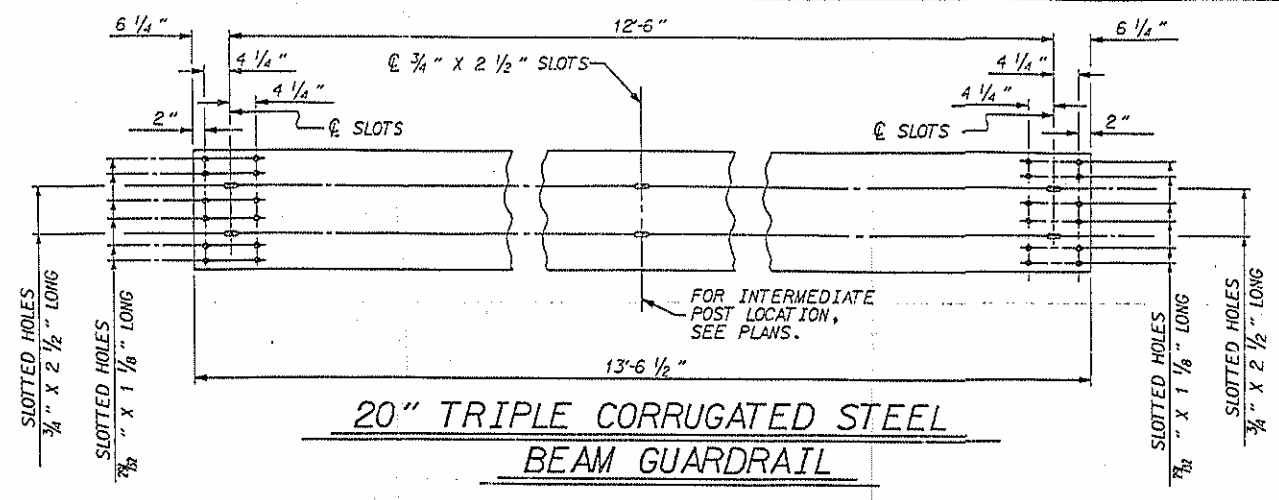
NOTE: FOR DIM'S "B", "C", "D", & "SLOT SIZE", SEE "TABLE 1", SHEET 5 OF 5.



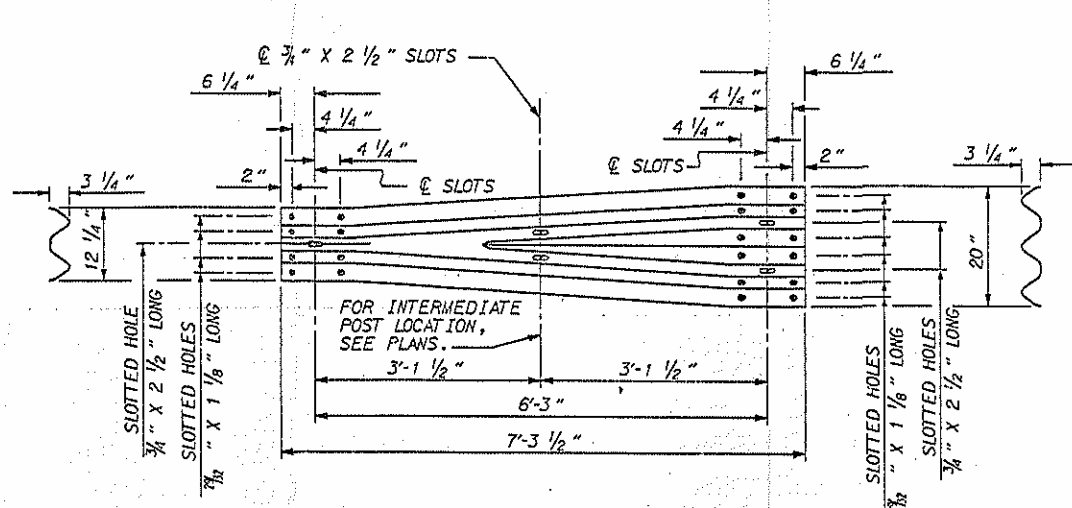
**PART ELEVATION TUBULAR BEAM
SHOWING FIXED SIDE OF TYPE 2 THRU 5, EXP. SPLICE**



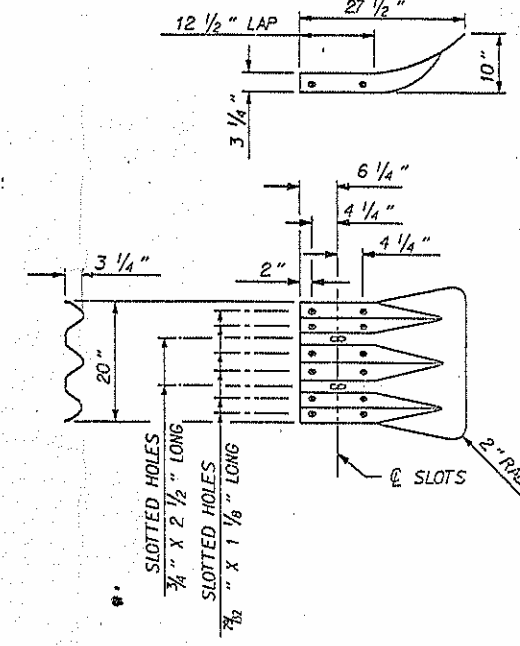
**PART ELEVATION TUBULAR BEAM
SHOWING CONNECTION OF TUBULAR BEAM TO 20" TRIPLE
CORRUGATED BEAM, TRANSITION SECTION, OR TERMINAL
SECTION.**



**20" TRIPLE CORRUGATED STEEL
BEAM GUARDRAIL**



W-TR GUARDRAIL TRANSITIONAL SECTION



**TRIPLE CORRUGATED GUARDRAIL
TERMINAL SECTION**

PROJECT NO. 8.1770302
SURRY COUNTY
STATION: _____
SHEET 17 OF 34 BRIDGE # 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DETAILS FOR RETROFIT OF
EXISTING BRIDGE RAIL WITH
TUBULAR BEAM GUARDRAIL

REVISIONS						SHEET NO. 248
NO.	BY	DATE	NO.	BY	DATE	
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DRAWN BY: R. TUNG DATE: 2-18-92
CHECKED BY: SW. PEARCE DATE: 6-1-92

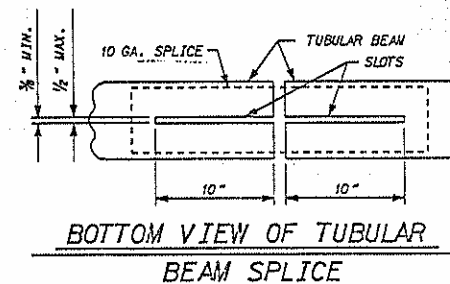
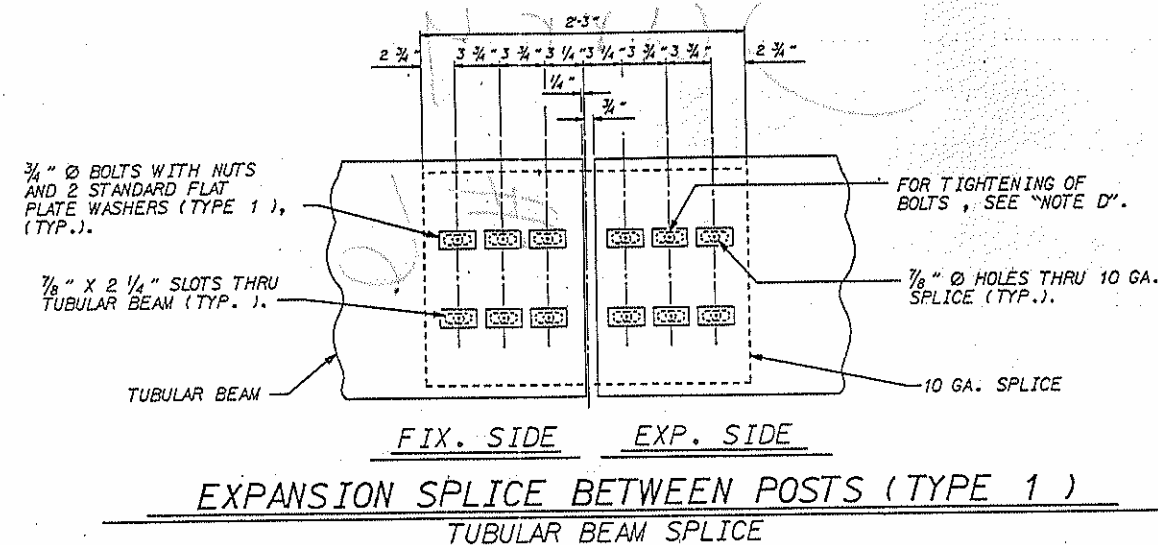
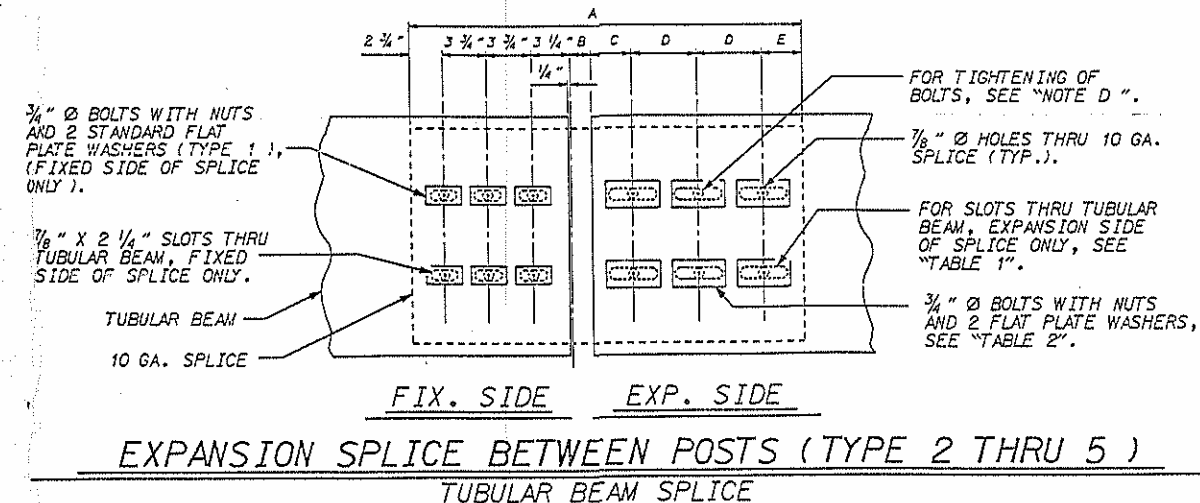
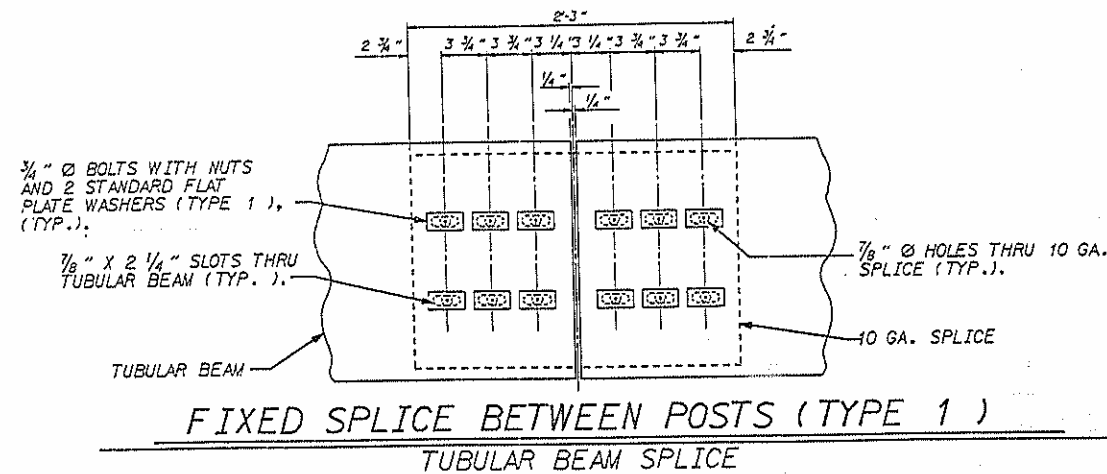
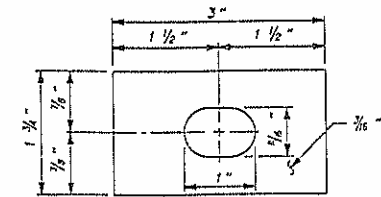
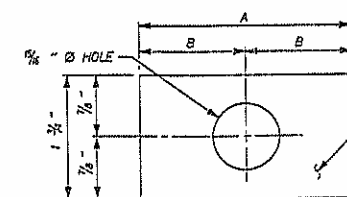


TABLE 1				
DIMENSIONS FOR TYPE 2 THRU 5 EXPANSION SPLICE (TUBULAR BEAM SPLICE BETWEEN POSTS)				
TYPE	2	3	4	5
A	2'-0"	3'-1"	3'-5"	3'-8"
B	1 1/4"	1 1/2"	1 5/8"	2 1/8"
C	2 1/4"	3"	4 1/8"	4 1/2"
D	3 3/8"	4"	4 3/4"	5"
E	5 1/2"	6 1/2"	7 1/2"	8 1/2"
SLOT SIZE	1" X 4"	1" X 5"	1" X 6"	1" X 7"

TABLE 2			
FLAT PLATE WASHER DIMENSIONS			
TYPE	DESCRIPTION	A	B
1	STANDARD WASHER	3"	1 1/2"
TYPE	USE WITH SPLICE	A	B
2	TYPE 2	4 1/2"	2 1/4"
3	TYPE 3	5 1/2"	2 3/4"
4	TYPE 4	6 1/2"	3 1/4"
5	TYPE 5	7 1/4"	3 3/4"

FLAT PLATE WASHER - TYPE 6



"NOTE D": BOLTS ON EXPANSION SIDE OF TUBULAR BEAM SPLICE SHALL BE TIGHTENED FINGER TIGHT. DOUBLE NUTS SHALL BE USED AND TIGHTENED AGAINST EACH OTHER TO PREVENT THE NUTS FROM BECOMING LOOSE ON THE BOLT.

PROJECT NO. 8.1770302
SURRY COUNTY

STATION: _____

SHEET 18 OF 34 BRIDGE # 6

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH
DETAILS FOR RETROFIT OF
EXISTING BRIDGE RAIL WITH
TUBULAR BEAM GUARDRAIL

REVISIONS				SHEET NO.	
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CHECKED BY: S.W. PEECE DATE: 6-1-92