

# METROLINK (S.C.R.R.A.) ENGINEERING STANDARDS NO. 8 DOUBLE SLIP CROSSING

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 EACH	SOLID MANGANESE CENTER FROG
4 EACH	"D" STRAPS WITH BOLTS
4 EACH	27'-8 <sup>7</sup> / <sub>8</sub> " EXTENDED FIELD WELDED TYPE SWITCH POINTS
4 EACH	27'-2 <sup>3</sup> / <sub>8</sub> " STRAIGHT STOCK RAIL
4 EACH	31'-2 <sup>7</sup> / <sub>16</sub> " CURVED STOCK RAIL
4 EACH	23'-3 <sup>7</sup> / <sub>16</sub> " SWITCH POINTS
1 EACH	No. 1A SMJ TYPE SWITCH ROD W/BASKET (INSULATED)
1 EACH	No. 1B SMJ TYPE SWITCH ROD W/BASKET (INSULATED)
2 EACH	No. 2 SMJ TYPE SWITCH ROD W/BASKET (INSULATED)
2 EACH	No. 3 SMJ TYPE SWITCH ROD W/BASKET (INSULATED)
28 EACH	SLIDE PLATE S-5P
20 EACH	SLIDE PLATE S-8P
2 EACH	INSULATED GAGE PLATE No. DS-GP-1
1 EACH	GAGE PLATE No. DS-GP-2 AND DS-GP3
2 EACH	SWITCH PLATE DS-1R, DS-1L, DS-2R, DS-2L, DS-3R & DS-3L
4 EACH	SWITCH PLATE DS-4P
8 EACH	SWITCH PLATE DS-5P
2 EACH	SWITCH PLATES DS-6P THRU DS-15P
2 EACH	SWITCH PLATE DS-18P AND DS-19P
2 EACH	FROG PLATES F-1 THRU F-14
2 EACH	FROG GAGE PLATES DS-FGP-1 THRU DS-FGP-3
2 EACH	No. 8 R.B.M. FROG ~ 18'-0"
1 EACH	FROG PLATES No. FP-23-R THRU FP-26-R
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FGP-1 THRU FGP-3
4 EACH	13'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
6 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
8 EACH	D.I. RAIL HOLD DOWN CLIPS E-3709
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3710
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
20 PCS.	SCRRA ES1406 "PANDROL", OR EQUAL "E" - CLIP 6" TIE PLATE
224 PCS.	CLIP TYPE E-2055 (GALVANIZED)
24 PCS.	CLIP TYPE E-2063 (GALVANIZED)
720 PCS.	SCREW SPIKES <sup>1</sup> / <sub>8</sub> " DIA. X 6" No. 5760
4 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT KITS

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136 lb. - GUARD RAIL WITH PLATES	No. 2901-04
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INSULATED SPREAD RODS No. 2 & 3 FOR END POINTS	No. 2901-14

### NOTES:

1. ENTIRE DOUBLE SLIP CROSSING TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL.
2. LOCATIONS OF INSULATED JOINTS ARE AS SHOWN ON ES2901-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF THE INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED INSULATED JOINTS UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE S.C.R.R.A. DIRECTOR OF ENGINEERING AND CONSTRUCTION.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "TRACKWORK PLANS AND SPECIFICATIONS" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE S.C.R.R.A. DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN THE PURCHASE OF A "DOUBLE SLIP CROSSING COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS, TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL AND CLOSURE RAIL IDENTIFIED ON SUBSEQUENT SHEETS MUST ALSO BE SUPPLIED.
10. TIE PLATES SHALL CONFORM TO S.C.R.R.A. STANDARD ES2454.
11. SCREW SPIKES ( 15/16 " X 6-2 TPI) SHALL CONFORM TO S.C.R.R.A. STANDARD ES2357. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/8 " DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 27'-8 7/8 " SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2901-07 IS TO BE FURNISHED WITH SWITCH RODS NO. 1A AND 1B PER ES2901-13 AND ES2901-14.
14. FOR CROSSING DATA FOR A NO. 8 DOUBLE SLIP CROSSOVER 136 LB. R.E. RAIL SEE CHART ON SHEET 2.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. OR L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRA NEUTRAL RAIL TEMPERATURE.
17. ENTIRE CROSSOVER TO BE FULLY FLOOR ASSEMBLED INCLUDING END FROGS AND HF GUARD RAILS.
18. ALL E-CLIPS TO BE GALVANIZED.

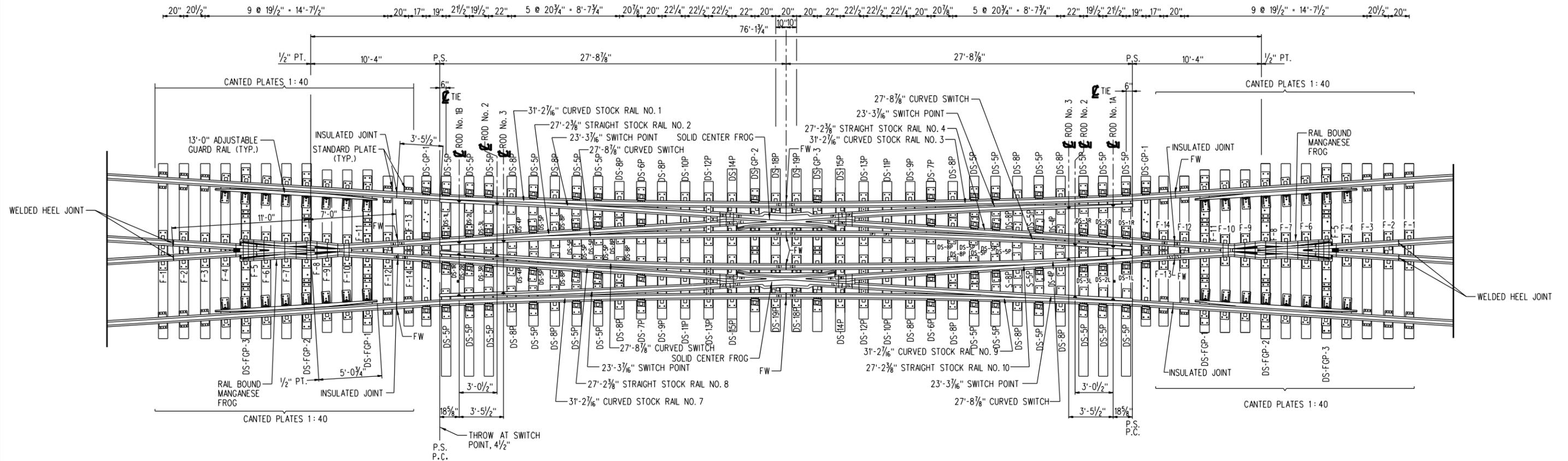
BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
10	7" x 9"	11'-0"	577.50
16	7" x 9"	12'-0"	1008.00
12	7" x 9"	13'-0"	819.00
16	7" x 9"	14'-0"	1176.00
0	7" x 9"	15'-0"	0
6	7" x 9"	16'-0"	504.00
TOTAL		TOTAL	
60			4084.50

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	DRAWN BY: A. CARLOS	DATE: 03/31/2011	SCRRA ENGINEERING STANDARDS ARE INTENDED FOR SCRRA APPROVED USES ONLY. FOR NON-SCRRA APPROVED USES SCRRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRRA. ALL RIGHTS RESERVED.	<p style="margin: 0;"><b>METROLINK</b><sup>®</sup></p> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012	ENGINEERING STANDARDS  NO. 8, 136 LB. DOUBLE SLIP CROSSING WITH SOLID MANGANESE FROG BILL OF MATERIAL AND GENERAL NOTES	STANDARD 2901 SCALE: NONE REVISION SHEET 1 OF 14 CADD FILE: ES2901-01
X XX-XX-XX REVISION XX XX REV. DATE DESCRIPTION DES. ENG.	 ASSISTANT DIRECTOR, STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION			

**NOTE:**

1. SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND DRAWING INDEX.



**NO. 8 DOUBLE SLIP CROSSING**

CROSSING DATA			
BETWEEN THEORETICAL POINTS OF END FROGS	75'-5 3/4"	ANGLE OF CROSSING	7° -09'-10"
BETWEEN THEORETICAL POINT OF END FROG & CENTER FROG	37'-9 3/4"	DEGREE OF CURVATURE	8° -26'-53"
FROM INSIDE SWITCH POINTS TO THEORETICAL POINT END FROG	10'-0 1/4"	GAGE LINE RADIUS	678.8314'
FROM THEORETICAL POINT OF CENTER FROG TO HEEL JOINT	7'-6 1/8"	THROW AT END PT.	4" MIN. 4 1/2" MAX.
LENGTH OF INSIDE SAMSON STOCK RAILS	SEE ABOVE	GAGE ON STRAIGHT TRACK	4'-8 1/2"
LENGTH OF OUTSIDE SAMSON STOCK RAILS	31'-2 1/8"	GAGE ON CURVED TRACK	4'-8 3/8"
LENGTH OF FROG FROM THEORETICAL POINT TO TOE	6'-8"	GAGE ON SWITCH PT.	4'-8 1/2"
LENGTH OF FROG FROM THEORETICAL POINT TO HEEL	11'-4"	SWITCH ANGLE	1° -14'-04"
LENGTH OF OUTSIDE SAMSON END SWITCH POINTS (0" SAMSON)	23'-3 1/8"	HEEL SPREAD OUTSIDE SWITCH POINTS 6 1/2" B.C. 10 1/8" A.C.	
LENGTH OF INSIDE SAMSON END SWITCH POINTS (0" SAMSON)	27'-8 1/8"	HEEL SPREAD INSIDE SWITCH POINTS 7 1/8" B.C. 14" A.C.	

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Narek D. Pape*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Davan*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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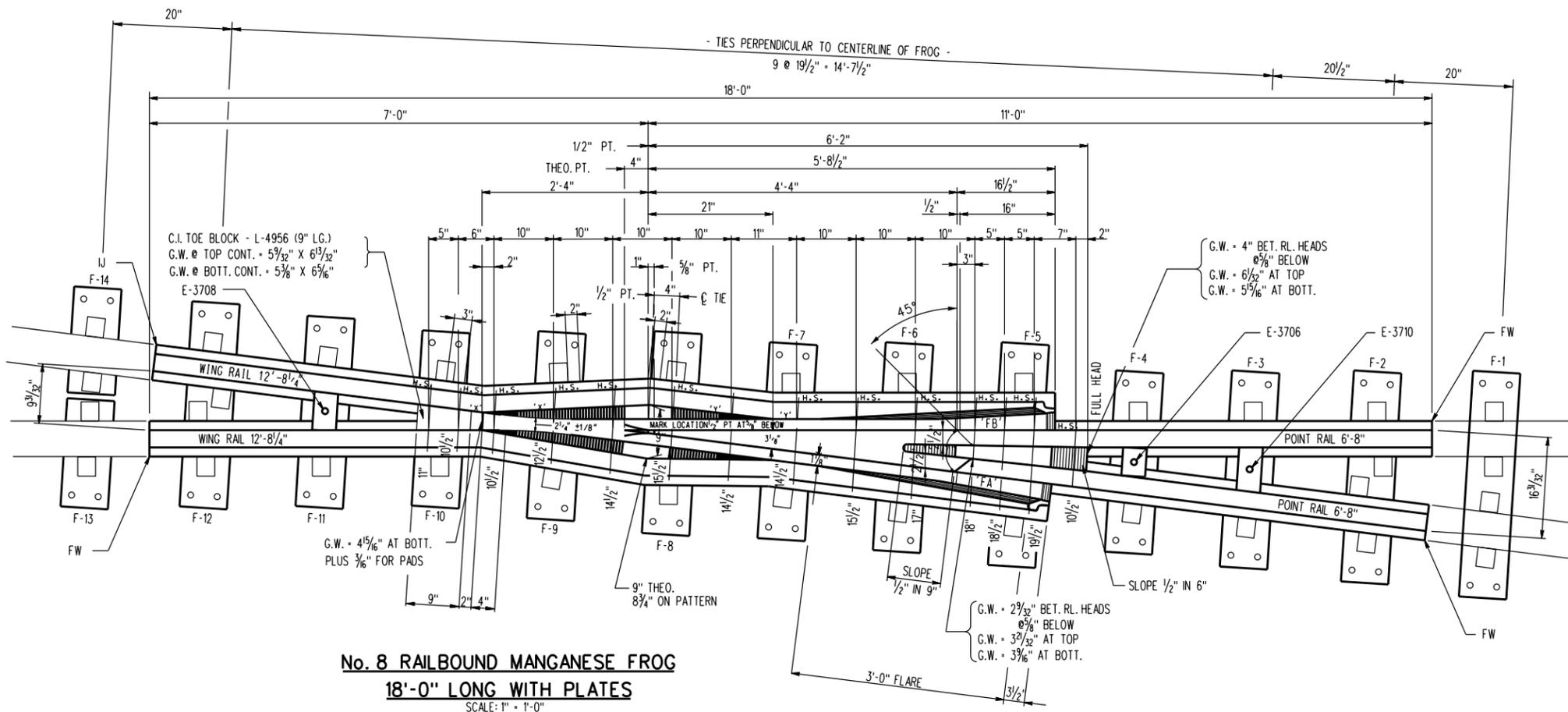


SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 8, 136 LB. DOUBLE SLIP CROSSING WITH SOLID MANGANESE FROG LAYOUT AND CROSSING DATA

STANDARD	2901
SCALE:	1/4" = 1'-0"
REVISION SHEET	- 2 OF 14
CADD FILE:	ES2901-02



**No. 8 RAILBOUND MANGANESE FROG**  
**18'-0" LONG WITH PLATES**  
 SCALE: 1" = 1'-0"

**NOTES:**

1. FROG ANGLE 7°-09'-10".
2. RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
3. RAIL BOUND MANGANESE FROG PER CURRENT A.R.E.M.A. PLAN NO. 775, 1012 AN M2.7 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH "PANDROL" FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE F.G., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG GAGE PLATES SEE SHEET ES2901-11. FOR DETAILS OF FROG PLATES F-1 THRU F-4 SEE SHEET ES2901-12.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. "SPECIFICATIONS FOR SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS, 1 3/8" DIA., H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
11. PLATES TO BE MADE OF MILD ROLLED STEEL.
12. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8, DOUBLE SLIP CROSSING.
13. THE "PANDROL" TYPE, OR APPROVED EQUAL, WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
14. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES F-1, F-2 AND F-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
15. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
16. IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.

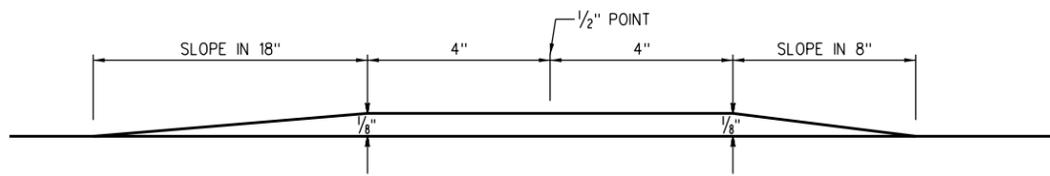
**WELDING OF GAGE PLATE & GUARD RAIL:**

1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" + FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, 3/32 INCH, NR203, 1% NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY S.C.R.R.A. DIRECTOR OF ENGINEERING.

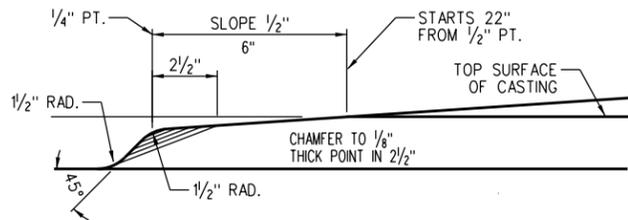
**REFERENCE DWGS.**

LAYOUT - No.8 DOUBLE SLIP CROSSING - 136 lb. ----- No. 2901-02  
 U-69 GUARD RAIL - 136 lb. ----- No. 2901-04

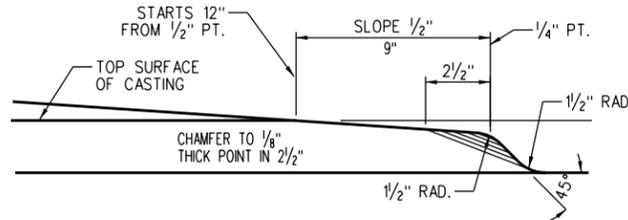
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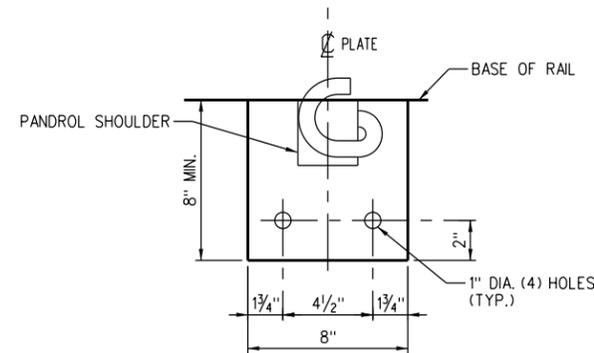
**DETAIL OF WING WHEEL RISER**  
 (NOT TO SCALE)



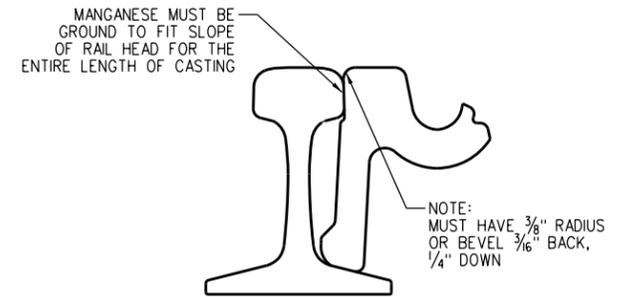
**SLOPE ON MANGANESE @ SECTION "X" - "X"**  
 SCALE: NONE



**SLOPE ON MANGANESE @ SECTION "Y" - "Y"**  
 SCALE: NONE



**TYPICAL PLATE PUNCHING DETAIL**  
 SCALE: NONE



**DETAIL OF FROG CASTING / RAIL FIT**  
 SCALE: NONE

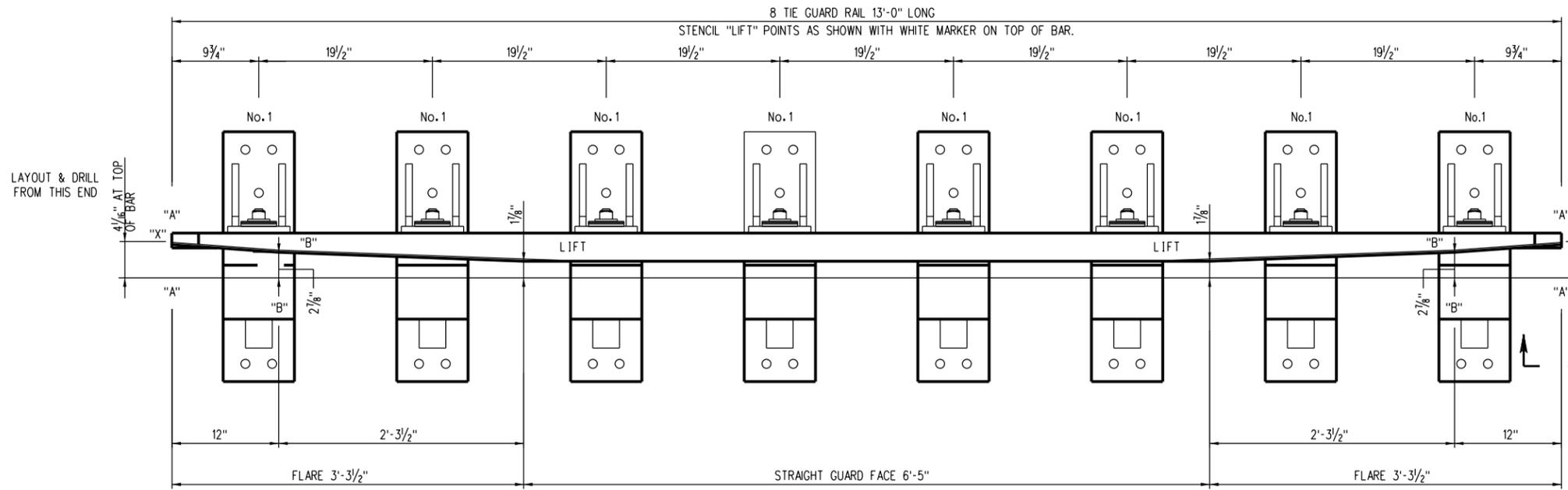
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Assistant Director: Standards & Design Director of Engineering and Construction				

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

**ENGINEERING STANDARDS**  
 NO. 8 RAILBOUND MANGANESE STEEL FROG WITH PANDROLIZED PLATES FOR A 136 LB. DOUBLE SLIP CROSSING

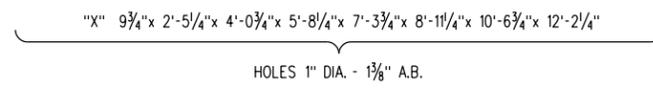
STANDARD	2901
SCALE:	AS NOTED
REVISION	SHEET
-	3 OF 14
CADD FILE:	ES2901-03



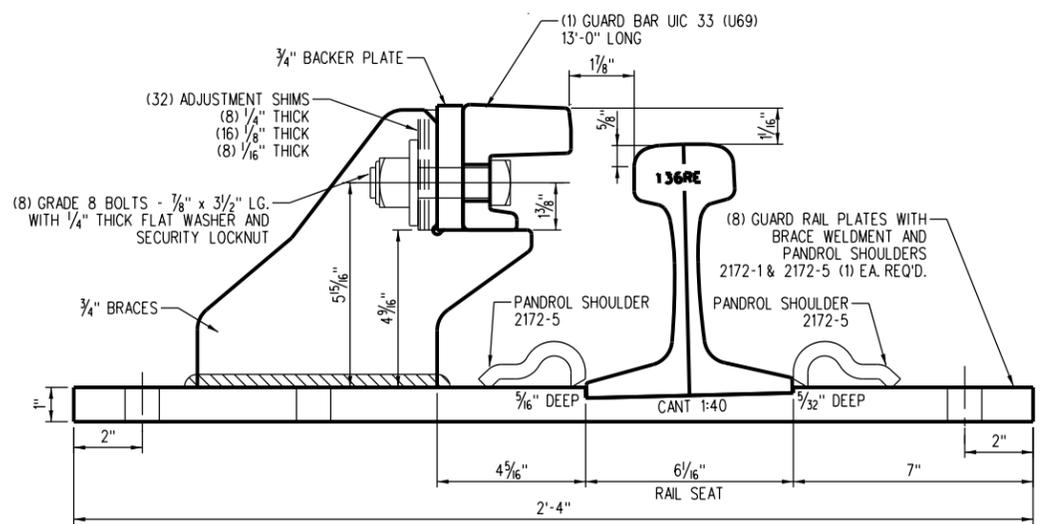
- NOTES:**
1. GUARD RAIL SECTION U.I.C. 33, (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.).
  2. BASE PLATE, BRACKET AND SHIMS MADE FROM MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
  3. GUARD RAIL BOLT AND NUT PER A.R.E.M.A. SPECIFICATION M11 EXCEPT BOLT TO BE GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
  4. WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. "SPECIFICATIONS FOR SPECIAL TRACKWORK".
  5. WELDING PER ANSI \ AWS D1.1-92 OR LATEST REVISION.

COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"

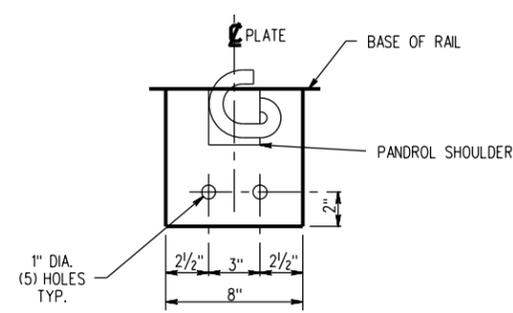
ASSEMBLED 13'-0" GUARD RAIL



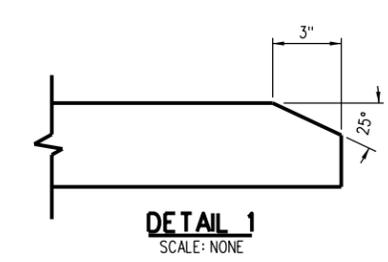
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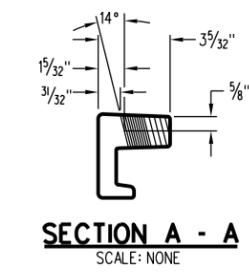
TYPICAL PLATE DETAIL  
SCALE: NONE



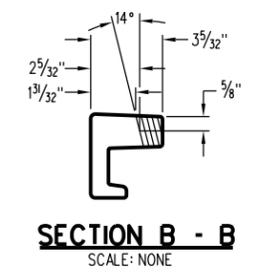
TYPICAL PLATE PUNCHING DETAIL  
SCALE: NONE



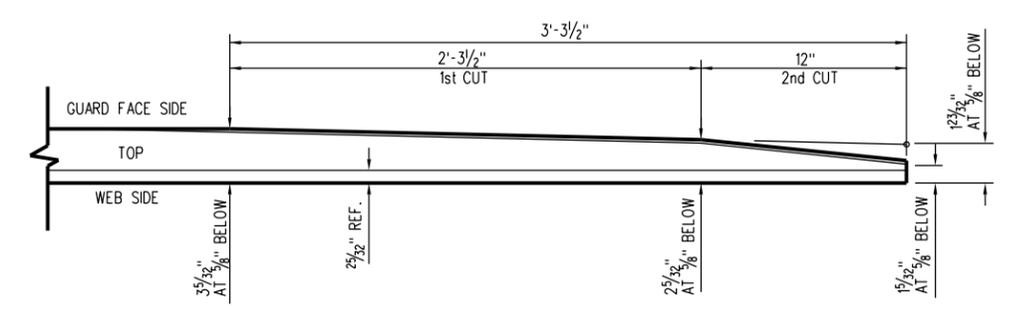
DETAIL 1  
SCALE: NONE



SECTION A - A  
SCALE: NONE



SECTION B - B  
SCALE: NONE



FLARE DETAIL  
BREAK SHARP CORNERS OF ALL MACHINED SURFACES  
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Assistant Director: Standards & Design Director of Engineering and Construction				

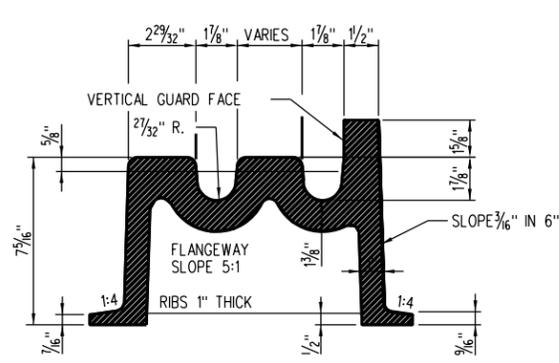
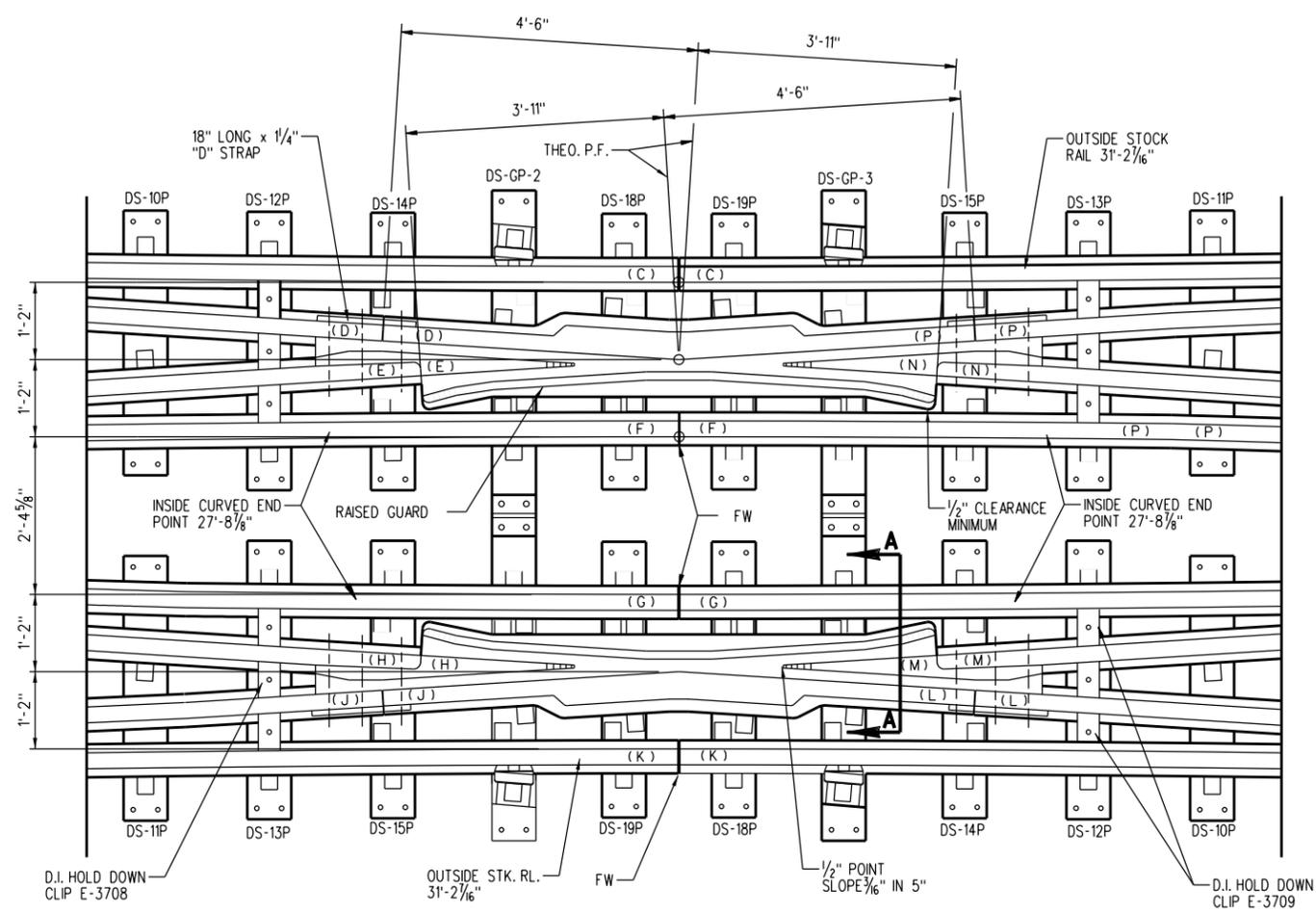
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ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
GUARD RAIL DETAILS 13'-0" LONG		2901
SCALE:	AS NOTED	
REVISION	SHEET	
-	4 OF 14	
CADD FILE:		ES2901-04

**NOTES:**

1. D.I. HOLD DOWN CLIPS TO BE INSTALLED IN THE FIELD.
2. SOLID CAST MANGANESE STEEL CENTER FROGS PER CURRENT A.R.E.M.A. SPECIFICATIONS MODIFIED FOR USE WITH "PANDROL" TYPE FASTENERS AND IN ACCORDANCE WITH PLANS 775, 1012 AND M2.7.

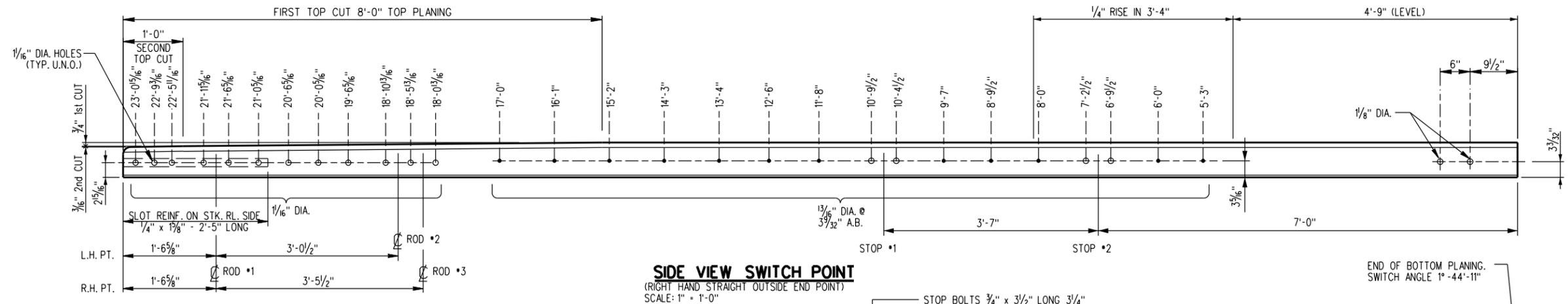


**SECTION A-A**  
SCALE: 3" = 1'-0"

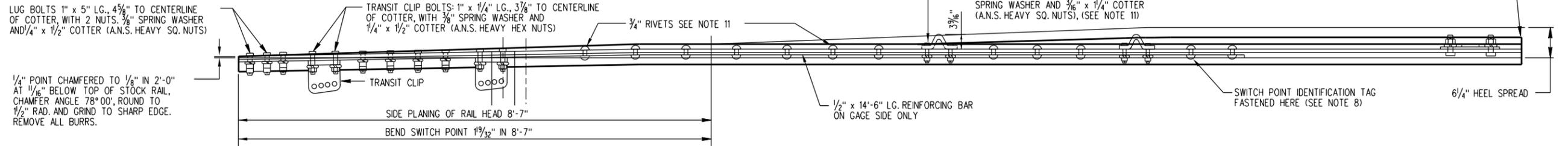
**NO. 8 DOUBLE SLIP CROSSING**  
**CENTER SECTION LAYOUT**  
FROG ANGLE 7° - 09' - 10"  
FLANGEWAY 1 7/8" WIDE, 1 1/8" DEEP

**FOR MAINTENANCE ONLY**

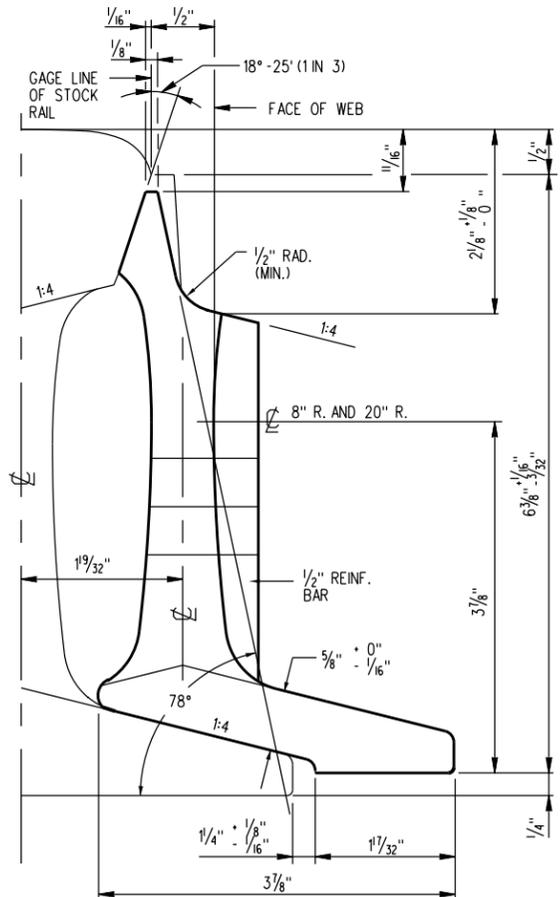
DRAWN BY: A. CARLOS    DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES: SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.	 <p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>	ENGINEERING STANDARDS		STANDARD 2901
ASSISTANT DIRECTOR: STANDARDS & DESIGN <i>Nareh D. Pappas</i>				NO. 8 DOUBLE SLIP CROSSING CENTER SECTION LAYOUT 136 LB. R.E. RAIL		SCALE: 3/4" = 1'-0" REVISION SHEET 5 OF 14 CADD FILE: ES2901-05
DES.    ENG.	DIRECTOR OF ENGINEERING AND CONSTRUCTION <i>William D. Davis</i>					



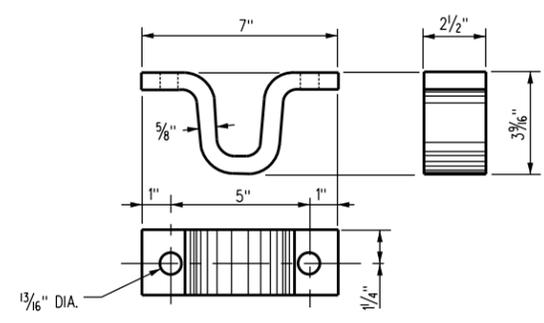
**SIDE VIEW SWITCH POINT**  
(RIGHT HAND STRAIGHT OUTSIDE END POINT)  
SCALE: 1" = 1'-0"



**TOP VIEW SWITCH POINT**  
SCALE: 1" = 1'-0"



**END VIEW OF POINT**  
SCALE: NONE



**STOP**  
SCALE: NONE

**FOR MAINTENANCE ONLY**

**NOTES:**

- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
- METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR LEFT HAND SWITCH POINTS.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIAL AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF THE SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT. USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. AND SHALL RUN OUT AT THE END OF THE TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 16'-6" 940'-0" NO. 8. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
- UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-24G FOR 3/4" RIVETS, AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.
- TURNOUTS ARE TO BE FINISHED WITH MANGANESE STEEL INSERT ON THE REVERSE POINT (TURNOUT SIDE) AND A PLAIN SWITCH POINT ON THE NORMAL POINT (STRAIGHT SIDE). REPLACEMENT POINTS MUST SPECIFY WHETHER PLAIN POINT OR MANGANESE STEEL INSERT ARE TO BE FURNISHED.

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

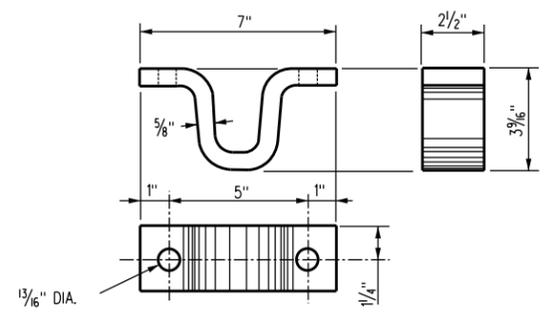
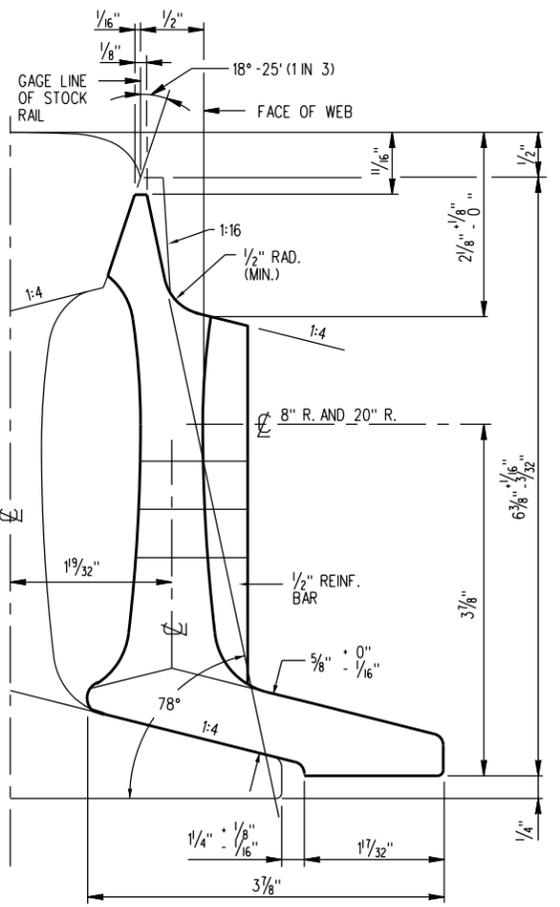
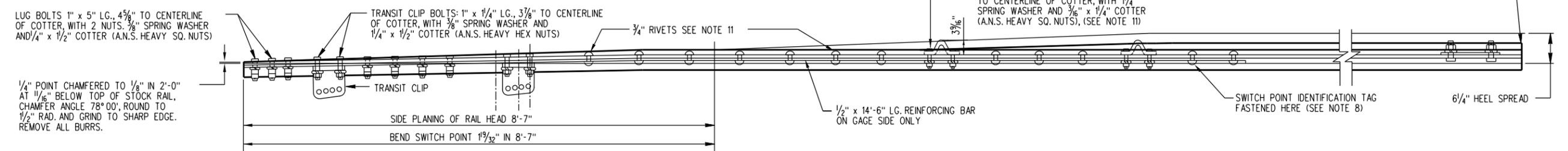
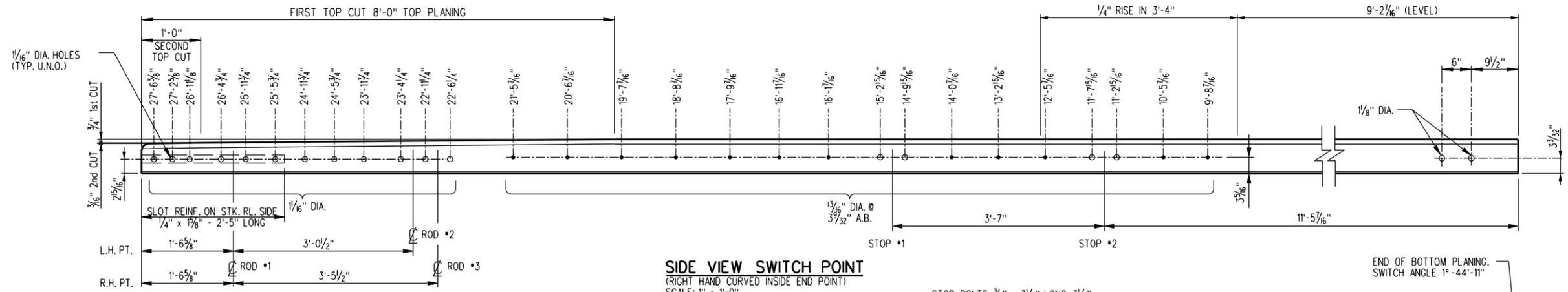
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 136 LB. 23'-3 3/16" STRAIGHT SWITCH POINT  
 MADE FROM 40'-0" LONG RAIL  
 NO. 8 DOUBLE SLIP CROSSING

STANDARD	2901
SCALE:	AS NOTED
REVISION SHEET	6 OF 14
CADD FILE:	ES2901-06



- NOTES:**
- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
  - METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
  - RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR LEFT HAND SWITCH POINTS.
  - SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
  - MATERIAL AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
  - IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF THE SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
  - THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. AND SHALL RUN OUT AT THE END OF THE TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
  - METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 16'-6" 940'-0" NO. 8. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN.
  - AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
  - NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
  - UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-24G FOR 3/4" RIVETS, AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.
  - TURNOUTS ARE TO BE FINISHED WITH MANGANESE STEEL INSERT ON THE REVERSE POINT (TURNOUT SIDE) AND A PLAIN SWITCH POINT ON THE NORMAL POINT (STRAIGHT SIDE). REPLACEMENT POINTS MUST SPECIFY WHETHER PLAIN POINT OR MANGANESE STEEL INSERT ARE TO BE FURNISHED.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR- STANDARDS & DESIGN

*William Davan*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

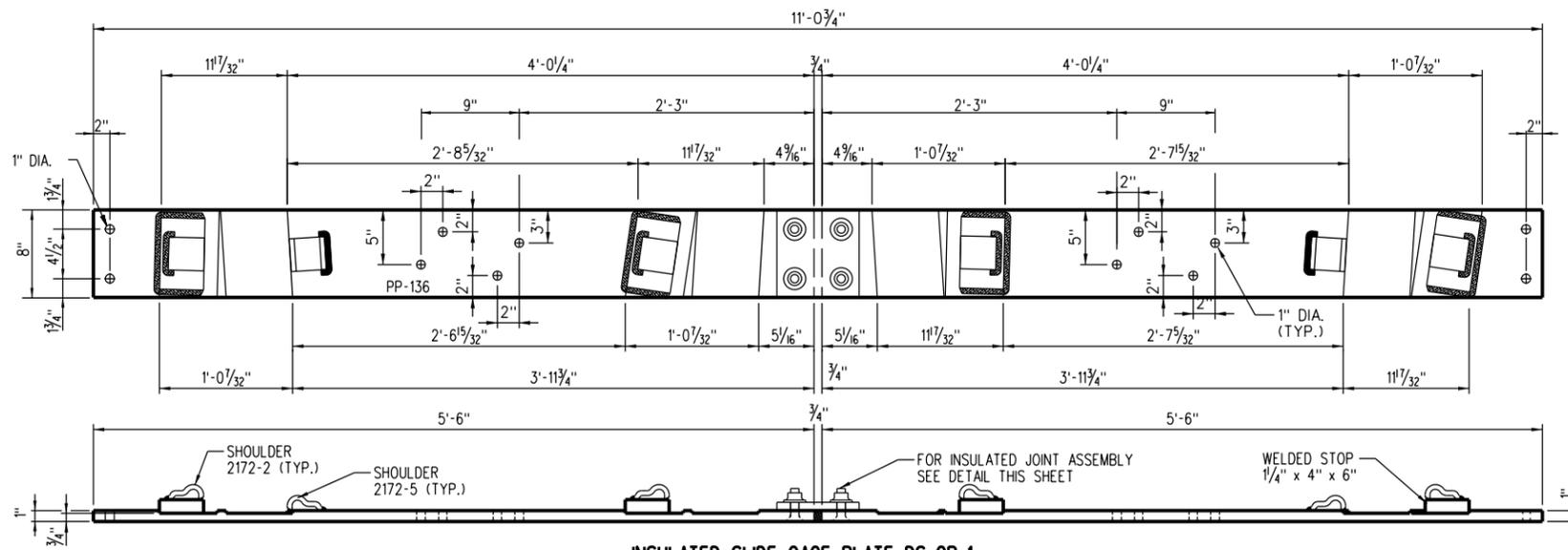
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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

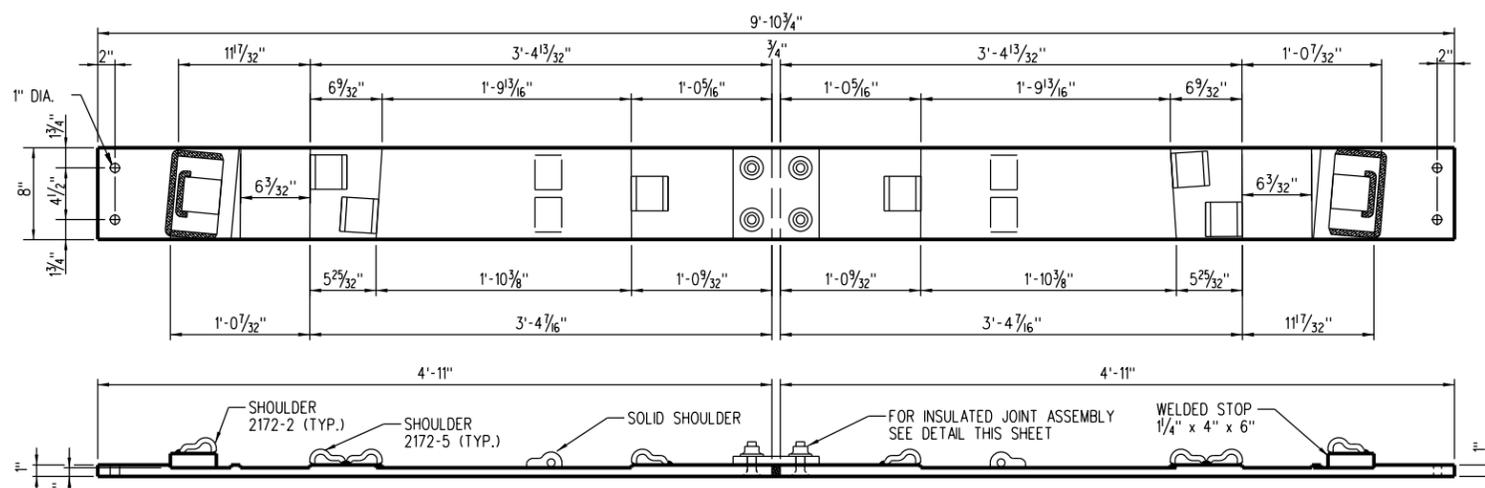
**ENGINEERING STANDARDS**

136 LB. 27'-8 7/8" CURVED SWITCH POINT  
MADE FROM 40'-0" LONG RAIL  
NO. 8 DOUBLE SLIP CROSSING

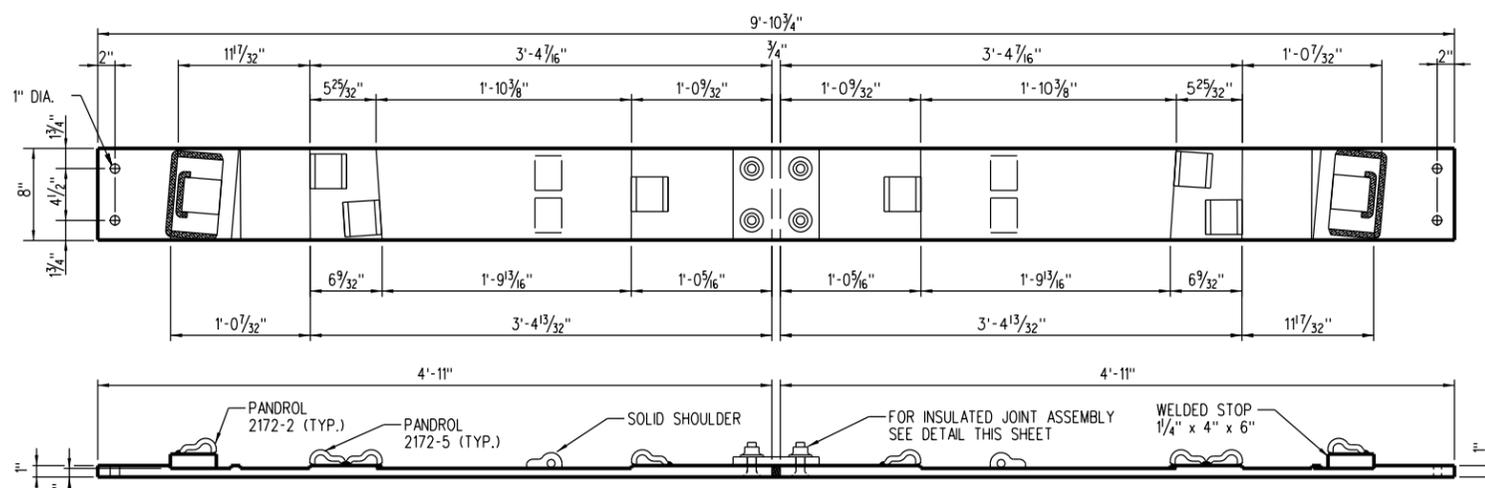
STANDARD	2901
SCALE:	AS NOTED
REVISION	SHEET
-	7 OF 14
CADD FILE:	ES2901-07



**INSULATED SLIDE GAGE PLATE DS-GP-1**  
1" x 8" - MILLED - (1 PC. REQ'D AS SHOWN)



**INSULATED SLIDE GAGE PLATE DS-GP-2**  
1" x 8" - MILLED - (1 PC. REQ'D AS SHOWN)

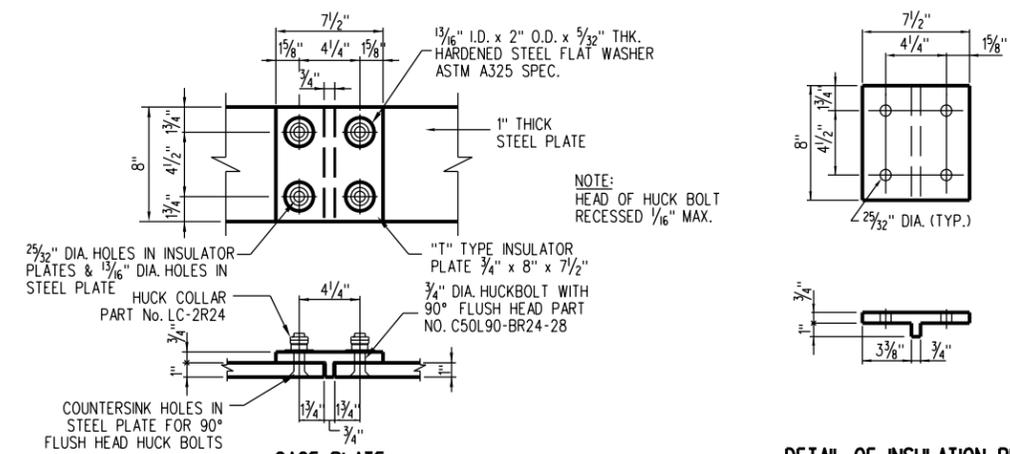


**INSULATED SLIDE GAGE PLATE DS-GP-3**  
1" x 8" - MILLED - (1 PC. REQ'D AS SHOWN)

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 8 DOUBLE SLIP CROSSING.
3. THE "PANDROL" TYPE, OR APPROVED EQUAL, WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD ROLLED STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.

**FOR MAINTENANCE ONLY**



**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**

**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC •127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GPI52P05

**DETAIL "A"**  
**INSULATION AT GAGE PLATES**  
(SCALE: NONE)

**REFERENCE DRAWINGS**

LAYOUT - No.8, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2901-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Narek D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William D. Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

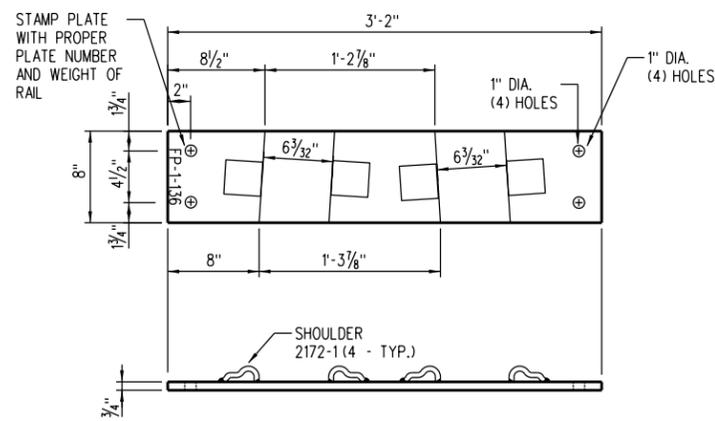
**ENGINEERING STANDARDS**  
 INSULATED GAGE PLATE DETAILS  
 DS-GP-1, DS-GP-2 AND DS-GP-3  
 136 LB. NO. 8 DOUBLE SLIP CROSSING

STANDARD	2901
SCALE	1 1/2" = 1'-0"
REVISION	SHEET
-	8 OF 14
CADD FILE:	ES2901-08

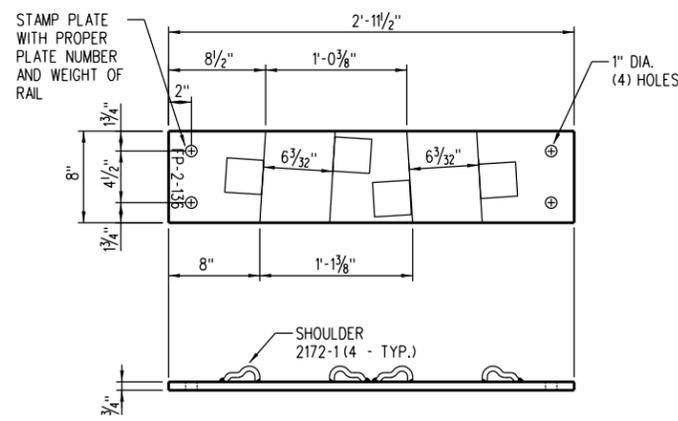




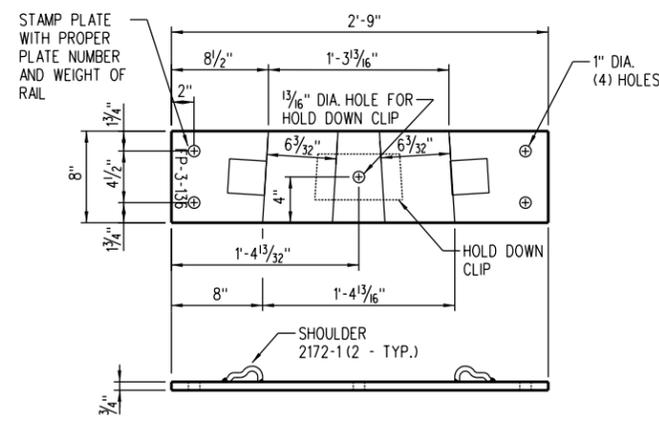




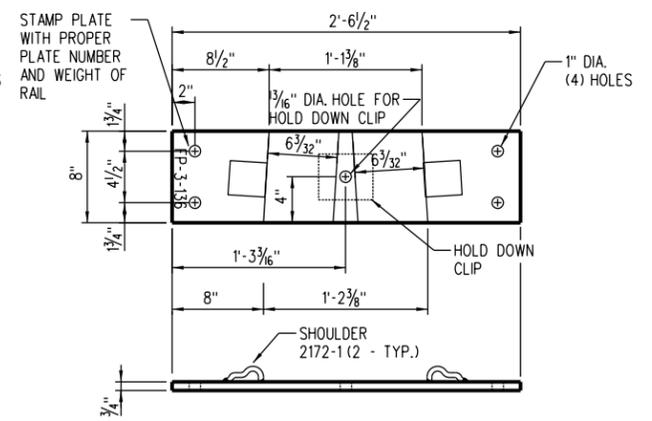
**FROG PLATE - F-1**  
3/4" x 8" x 3'-2" LG. - FLAT



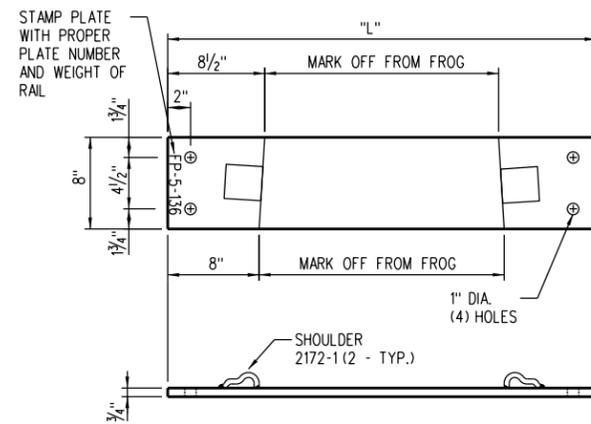
**FROG PLATE - F-2**  
3/4" x 8" x 2'-11 1/2" LG. - FLAT



**FROG PLATE - F-3**  
3/4" x 8" x 2'-9" LG. - FLAT

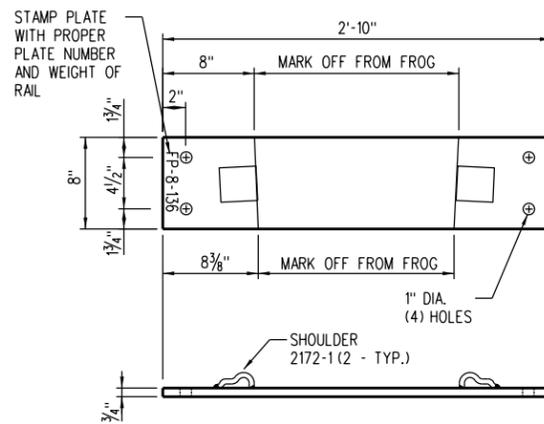


**FROG PLATE - F-4**  
3/4" x 8" x 2'-6 1/2" LG. - FLAT

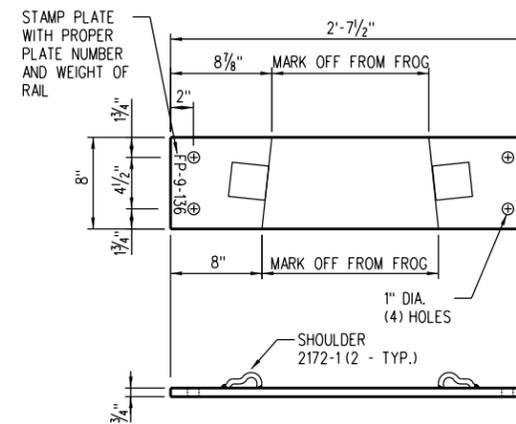


**FROG PLATE - F-5, F-6 AND F-7**  
3/4" x 8" - FLAT (SEE TABLE FOR LENGTHS)

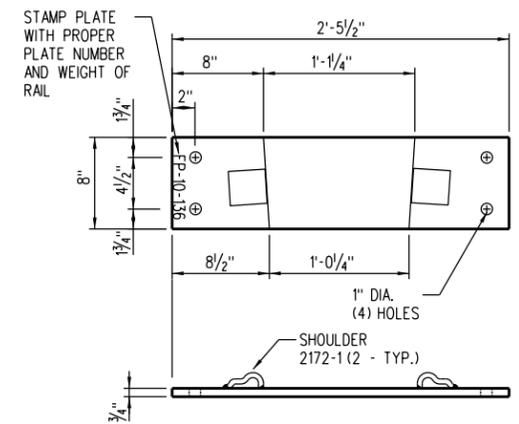
DIMENSION TABLE		
PLATE	"L"	NO. REQ'D
F-5	3'-1 1/2"	1
F-6	2'-11"	1
F-7	2'-9"	1



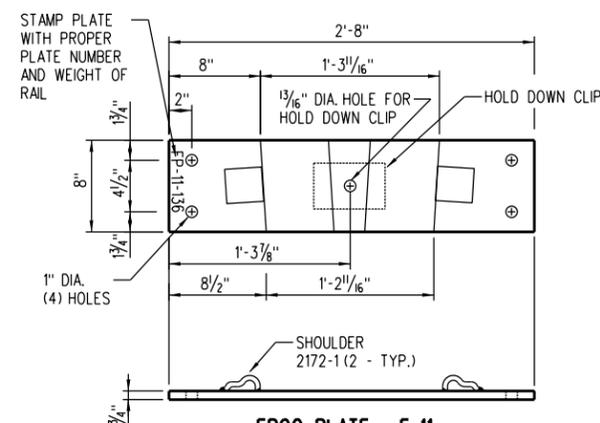
**FROG PLATE - F-8**  
3/4" x 8" x 2'-10" - FLAT



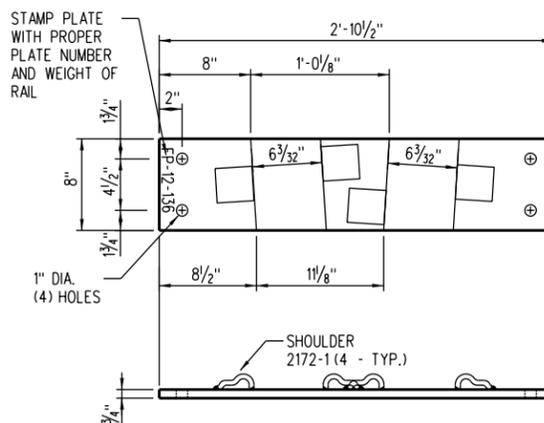
**FROG PLATE - F-9**  
3/4" x 8" x 2'-7 1/2" - FLAT



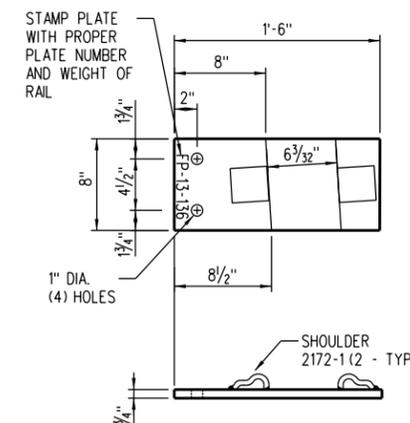
**FROG PLATE - F-10**  
3/4" x 8" x 2'-5 1/2" - FLAT



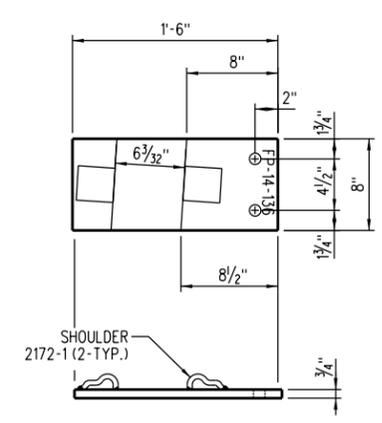
**FROG PLATE - F-11**  
3/4" x 8" x 2'-8" - FLAT



**FROG PLATE - F-12**  
3/4" x 8" x 2'-10 1/2" LG. - FLAT



**FROG PLATE - F-13**  
3/4" x 8" x 1'-6" LG. - FLAT



**FROG PLATE - F-14**  
3/4" x 8" x 1'-6" LG. - FLAT

# FOR MAINTENANCE ONLY

REFERENCE DWGS.

LAYOUT - No.8, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2901-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

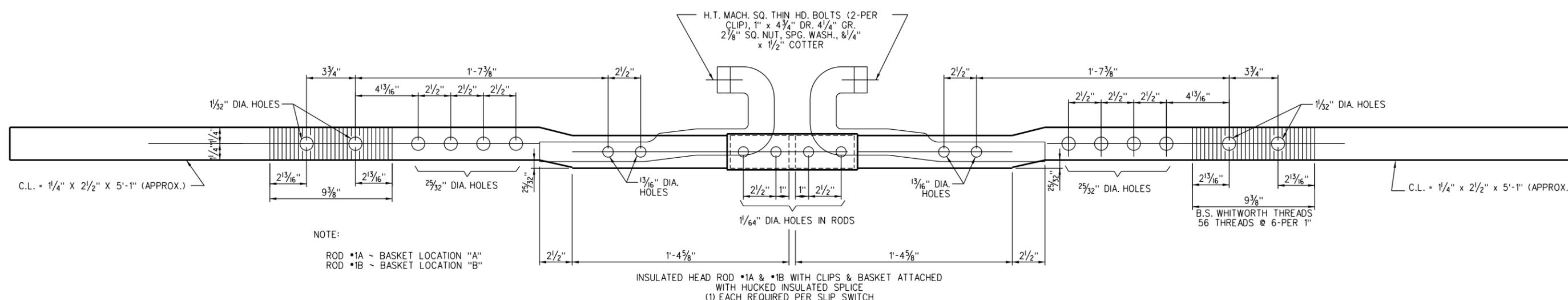
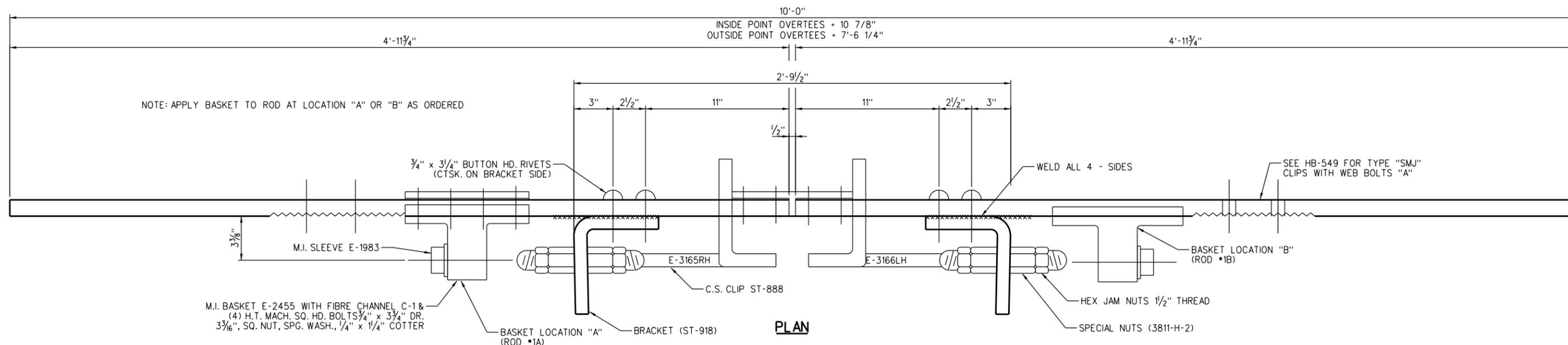
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Narek D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 FROG PLATE DETAILS  
 NO. 8, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2901
SCALE:	1 1/2" = 1'-0"
REVISION SHEET	12 OF 14
CADD FILE:	ES2901-12



**INSULATION MATERIAL CONSISTS OF:**

- (1) FIBRE CHANNEL C-1
- (2) FIBRE ANGLE PLATE AP-34
- (4) FIBRE BUSHINGS B-11
- (1) STEEL SPLICE PLATE ST-684
- (1) STEEL CHANNEL ST-568
- (4) 3/4" HUCK BOLTS C50LR-BR24-36
- (4) HUCK COLLARS LC2R-24G

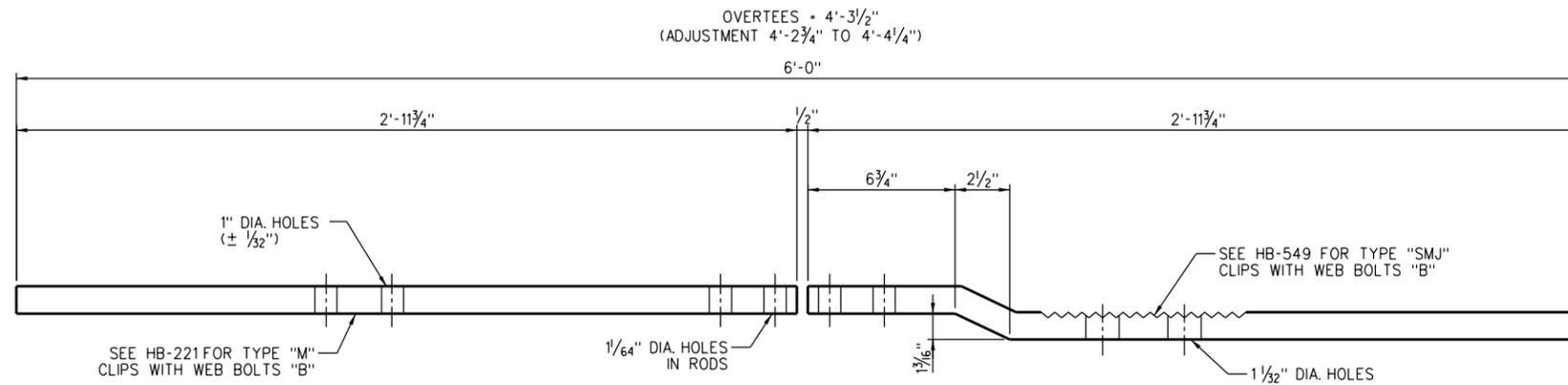
**SWITCH INFORMATION**

GAGE = 4'-8 5/8"  
 THROW AT POINT = 4" MIN. ~ 4 1/2" MAX.  
 "E" DIST. = 1 9/32"  
 PT. = 0" SAMSON.  
 REINF. = 1/2" "D" BOTH SIDES (SLOT 1/4" STK. SIDE).  
 ROD SPACING = 18 3/8"  
 BREAK ALL SHARP CORNERS.  
 DEBURR ALL HOLES.

**FOR MAINTENANCE ONLY**

STAMP RODS WITH "RESP. ROD. #, 136RE, #8 DSS"

DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<b>METROLINK</b>		ENGINEERING STANDARDS		STANDARD 2901	
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY		ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012		INSULATED HEAD ROD NO.1 FOR END POINTS		NO. 8, 136 LB. DOUBLE SLIP CROSSING	
REVISION		XX XX		SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.				SCALE: 3" = 1'-0"		REVISION SHEET	
REV. DATE DESCRIPTION		DES. ENG.						- 13 OF 14		CADD FILE: ES2901-13	



**PLAN**

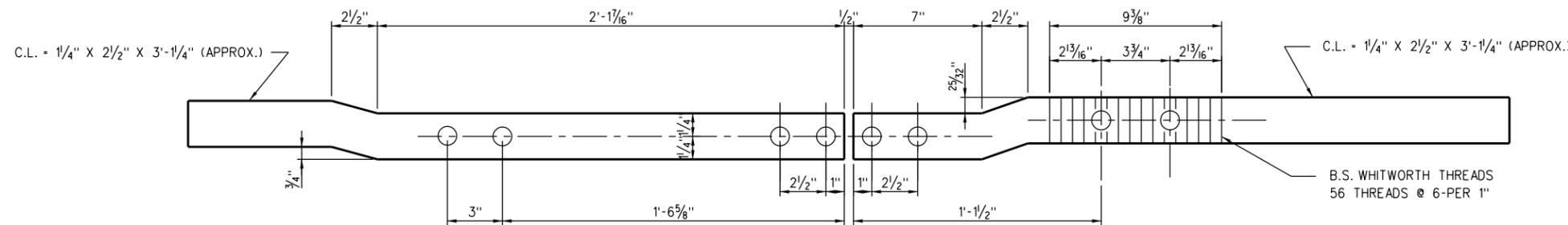
**INSULATION MATERIAL CONSISTS OF:**

- (1) FIBRE CHANNEL C-1.
- (2) FIBRE ANGLE PLATE AP-34.
- (4) FIBRE BUSHINGS B-11.
- (1) STEEL SPLICE PLATE ST-684.
- (1) STEEL CHANNEL ST-568.
- (4) 3/4" HUCK BOLTS C50LR-BR24-36.
- (4) HUCK COLLARS LC2R-24G.

**SWITCH INFORMATION**

- GAGE = 4'-8 5/8"
- THROW AT POINT = 4" MIN. ~ 4 1/2" MAX.
- "E" DIST. = 1'9 1/2"
- PT. = 0" SAMSON
- REINF. = 1/2" "D" BOTH SIDES (SLOT 1/4" STK. SIDE)
- ROD SPACING = 18 5/8" x 3'-0 1/2" (\*2 ROD)
- ROD SPACING = 18 5/8" x 3'-5 1/2" (\*3 ROD)

NOTE: TYPE "M" CLIP MUST BE WELDED TO ROD ALONG BOTH SIDES OF BOTTOM OF CLIPS



**ELEVATION**

INSULATED SPREAD RODS NO. 2 OR 3 WITH CLIPS AND BOLTS ATTACHED WITH HUCKED INSULATED SPLICE, (2) EACH REQUIRED PER SLIP SWITCH

STAMP ROD WITH "RESP. NO., 136RE, \*8 DSS"

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: STANDARDS & DESIGN  
*Wilson Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
INSULATED SPREAD RODS NO. 2 & 3 FOR END POINTS NO. 8, 136 LB. DOUBLE SLIP CROSSING		2901
SCALE: 3" = 1'-0"		SHEET
-		14 OF 14
CADD FILE:		ES2901-14

# METROLINK (S.C.R.R.A.) ENGINEERING STANDARDS NO. 10 DOUBLE SLIP CROSSING

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 EACH	SOLID MANGANESE CENTER FROG
4 EACH	"D" STRAPS WITH BOLTS
4 PAIR	34'-7 <sup>1</sup> / <sub>16</sub> " EXTENDED FIELD WELDED TYPE SWITCH POINT
2 EACH	No. 1A & 1B HEAD ROD FOR END POINTS
2 EACH	No. 2 & 3 SPREAD RODS FOR END POINTS
2 EACH	No. 4 & 5 HEAD RODS FOR MOVEABLE CENTER POINTS
4 EACH	SLIDE PLATE S-5P
28 EACH	SLIDE PLATE S-8P
2 EACH	BRACE SLIDE PLATES 1A & 1B THRU 4A & 4B
2 EACH	BRACE SLIDE PLATES 5C
8 EACH	BRACE SLIDE PLATES 6A & 7A
2 EACH	GAGE PLATE No. GP-1 THRU GP-6
2 EACH	SWITCH PLATE 14-L & 14-R THRU 19-L & 19-R
2 EACH	FROG PLATES F-1 THRU F-15A & 15B
2 EACH	INSULATED FROG GAGE PLATES FGP-1 THRU FGP-3
2 EACH	No.10 RAIL BOUND MANGANESE FROG ~ 21'-2 <sup>1</sup> / <sub>2</sub> "
4 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3709
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
20 PCS.	SCRRA ES1406 "PANDROL", OR EQUAL "E" - CLIP 6" TIE PLATE
356 PCS.	E-CLIP TYPE E-2055 (GALVANIZED)
24 PCS.	E-CLIP TYPE E-2063 (GALVANIZED)
924 PCS.	SCREW SPIKES 1 <sup>9</sup> / <sub>16</sub> " DIA. X 6" No. 5760
2 EACH	STRAIGHT STOCK RAIL 25'-0 <sup>1</sup> / <sub>16</sub> " LONG
4 EACH	BRACE RAIL - 5'-11 <sup>1</sup> / <sub>4</sub> " LONG
4 EACH	M MOVEABLE POINT RAIL - 13'-1 <sup>1</sup> / <sub>4</sub> " LONG
2 EACH	OUTER SLIP RAIL - 20'-7 <sup>7</sup> / <sub>8</sub> " LONG
4 EACH	SWITCH POINT RAIL - 22'-8 <sup>1</sup> / <sub>2</sub> " LONG
2 EACH	KNUCKLE RAIL - 23'-11" LONG
2 EACH	STRAIGHT STOCK RAIL - 25'-0 <sup>1</sup> / <sub>16</sub> " LONG
4 EACH	CURVED STOCK RAIL - 28'-2 <sup>3</sup> / <sub>4</sub> " LONG
4 EACH	CURVED SWITCH POINT RAIL - 34'-7 <sup>3</sup> / <sub>4</sub> " LONG
4 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT KITS

### DRAWING INDEX

BILL OF MATERIAL & GENERAL NOTES	No. 2902-01
136 lb. - NO. 10 - DOUBLE SLIP CROSSING	No. 2902-02
CROSSING GEOMETRY NO. 10 DOUBLE SLIP CROSSING	No. 2902-03
136 LB. - NO. 10 - SOLID MANGANESE FROG WITH PLATES	No. 2902-04
136 lb. - U-69 GUARD RAIL WITH PLATES	No. 2902-05
NO. 10 DOUBLE SLIP CROSSING - CENTER SECTION LAYOUT	No. 2902-06
22'-8 <sup>1</sup> / <sub>2</sub> " SWITCH POINT DETAILS	No. 2902-07
34'-7 <sup>3</sup> / <sub>4</sub> " SWITCH POINT DETAILS	No. 2902-08
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INSULATED GAGE PLATE & BRACE PLATE DETAILS	No. 2902-12
BRACE PLATE & SLIDE PLATE DETAILS	No. 2902-13
BRACE SLIDE PLATE & INSULATED SLIDE PLATE DETAILS	No. 2902-14
INSULATED FROG GAGE PLATE DETAILS	No. 2902-15
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INSULATED HEAD ROD NO. 1 FOR END POINTS	No. 2902-17
INSULATED SPREAD ROD NO. 2 & 3 FOR END POINTS	No. 2902-18
INSULATED HEAD ROD NO. 4 FOR MOVEABLE CENTER POINTS	No. 2902-19
INSULATED HEAD ROD NO. 5 FOR MOVEABLE CENTER POINTS	No. 2902-20

### NOTES:

1. ENTIRE DOUBLE SLIP CROSSING TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL.
2. LOCATIONS OF INSULATED JOINTS ARE AS SHOWN ON ES2902-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF THE INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED INSULATED JOINTS UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE S.C.R.R.A. DIRECTOR OF ENGINEERING AND CONSTRUCTION.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "TRACKWORK PLANS AND SPECIFICATIONS" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE S.C.R.R.A. DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN THE PURCHASE OF A "DOUBLE SLIP CROSSING COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL AND CLOSURE RAIL IDENTIFIED ON SUBSEQUENT SHEETS MUST ALSO BE SUPPLIED.
10. TIE PLATES SHALL CONFORM TO S.C.R.R.A. STANDARD ES2454.
11. SCREW SPIKES (1<sup>9</sup>/<sub>16</sub>" X 6-2 TPI) SHALL CONFORM TO S.C.R.R.A. STANDARD ES2357. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/8" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 34'-7 3/4" SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2902-08 IS TO BE FURNISHED WITH SWITCH RODS NO. 1A, 1B, AND 2 THRU 5 PER ES2902-17 THRU ES2902-20
14. FOR CROSSING DATA FOR A NO. 10 DOUBLE SLIP Crossover 136 LB. R.E. RAIL SEE CHART ON SHEET 3.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES 14 THRU 19 ARE DESIGNED TO BE PERPENDICULAR TO THE CENTRAL AXIS OF THE SWITCH
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO S.C.R.R.A. NEUTRAL RAIL TEMPERATURE.
17. ENTIRE CROSSOVER TO BE FULLY FLOOR ASSEMBLED INCLUDING END FROGS AND HF GUARD RAILS.
18. ALL E-CLIPS TO BE GALVANIZED.

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
24	7" x 9"	11'-0"	1386.00
18	7" x 9"	12'-0"	1134.00
12	7" x 9"	13'-0"	819.00
12	7" x 9"	14'-0"	882.00
4	7" x 9"	15'-0"	294.00
4	7" x 9"	16'-0"	336.00
TOTAL			TOTAL
74			4851.00

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		DRAWN BY: A. CARLOS	DATE: 03/31/2011	SCRRA ENGINEERING STANDARDS ARE INTENDED FOR SCRRA APPROVED USES ONLY. FOR NON-SCRRA APPROVED USES, SCRRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRRA. ALL RIGHTS RESERVED.	<p style="margin: 0;"><b>METROLINK</b><sup>®</sup></p> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012	ENGINEERING STANDARDS  NO. 10, 136 LB. DOUBLE SLIP CROSSING WITH MOVEABLE POINT FROG BILL OF MATERIAL AND GENERAL NOTES	STANDARD 2902 SCALE: NONE REVISION SHEET - 1 OF 20 CADD FILE: ES2902-01
X XX-XX-XX REV. DATE DESCRIPTION DES. ENG.	REVISION XX XX DIRECTOR OF ENGINEERING AND CONSTRUCTION	 ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION					



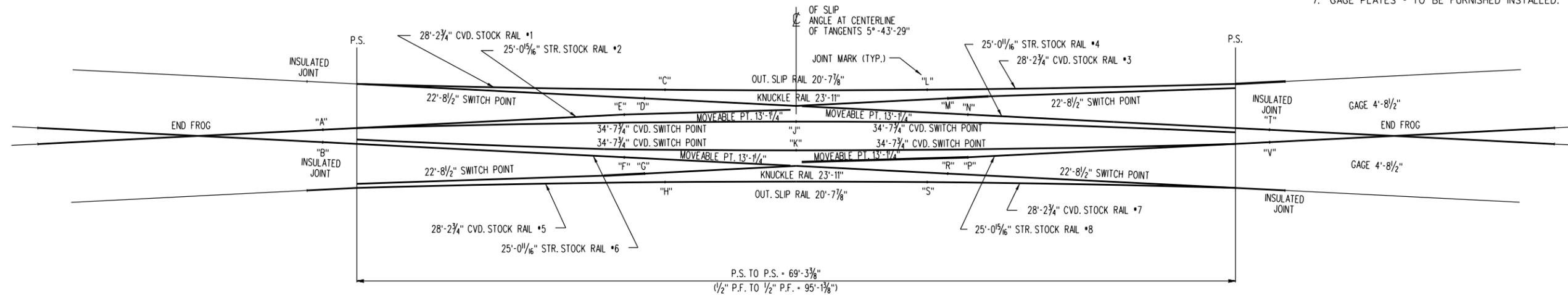
**NOTES:**

1. ALL MEASUREMENTS GIVEN AT 5/8" BELOW TOP OF RAIL AND TO 1/2" POINT OF END OF FROG.
2. ALL RAILS TO BE FULLY HEAT TREATED - BRINELL 341-388.
3. JOINT GAPS: 1/8" STANDARD; 3/8" INSULATED.
4. JOINT DRILLING: ALL FIELD WELDED RAILS: 9 1/2" - 6" @ 3 3/32" A.B., 1/8" DIA. HOLES.
5. ALL INSULATED JOINT RAILS: 3 1/2" - 6" @ 3 3/32" A.B., 1/4" DIA. HOLES.
6. PROPER LOCATION OF EDGE OF PLATES TO BE MARKED WITH WHITE PAINT ON OUTER FLANGE OF RAIL.
7. MATCH MARK ALL RAIL ENDS AS SHOWN.
8. ENTIRE CROSSOVER TO BE FULLY FLOOR ASSEMBLED INCLUDING END FROGS AND HF GUARD RAILS.

**SPECIFICATIONS:**

1. CROSSING TYPE - #10 DOUBLE SLIP, GENERALLY PER A.R.E.M.A. PLAN NO. 814. RAIL: 136RE HEAT TREATED.
2. FROG - #10 RAIL BOUND MANGANESE FROG, 136RE, 22'-6" LONG WITH PANDROL PLATES - MANGANESE CASTING TO BE EXPLOSIVE HARDENED.
3. SWITCH POINTS - 22'-8 1/2" & 34'-7 3/4" LONG, CURVED AND STRAIGHT, SAMSON PLANING A.R.E.M.A. DETAIL 5100. CURVED POINTS TO BE EQUIPPED WITH REPLACEABLE MANGANESE INSERTS.
4. CLIPS AND RODS - VERTICAL RODS WITH "SMJ" CLIPS.
5. ADJUSTABLE BRACES - BOLTLESS WITH SPRING CLIPS.
6. GUARD RAILS - U-69 SECTION 16'-0" RAISED GUARD RAIL WITH BRACES AND PLATES.
7. GAGE PLATES - TO BE FURNISHED INSTALLED.

CROSSING DATA			
BETWEEN THEO. PTS. OF END FROGS	94'-3 3/8"	ANGLE OF CROSSING	5°-43'-29"
BETWEEN THEO. PT. OF END FROG & CENTER FROG	47'-2 7/16"	DEGREE OF CURVATURE	4°-48'-09"
FROM INSIDE SW. PTS. TO THEO. PT. END FROG	12'-6 3/16"	GAGE LINE RADIUS	1193.4206'
FROM THEO. PT. OF CTR. FROG TO HEEL JT.	10'-4 1/8"	THROW AT END PT.	4"
LENGTH OF INSIDE SAMSON STOCK RAIL	23'-9 1/16" 23'-9 3/16"	GAGE ON STRAIGHT TRACK	4'-8 1/2"
LENGTH OF OUTSIDE SAMSON STOCK RAIL	28'-2 3/4"	GAGE ON CURVED TRACK	4'-8 3/16"
LENGTH OF FROG FROM THEO. PT. TO TOE	8'-1 1/2"	SWITCH ANGLE @ END POINTS	1°-11'-56"
LENGTH OF FROG FROM THEO. PT. TO HEEL	12'-3"	HEEL SPREAD OUTSIDE SW. PTS. 5 11/16" B.C. 8 9/32" A.C.	
LENGTH OF OUTSIDE SAM. END SW. PTS. (0" SAMSON)	22'-8 1/2"	HEEL SPREAD INSIDE SW. PTS. 6 1/32" B.C. 14 3/4" A.C.	
LENGTH OF INSIDE SAM. END SW. PTS. (0" SAMSON)	34'-7 3/4"		



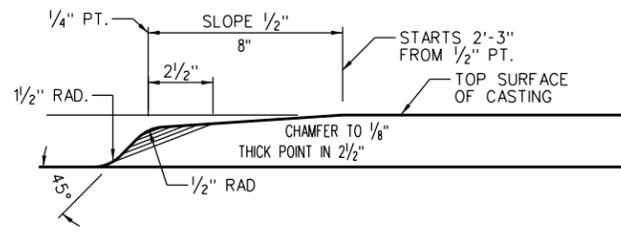
**CROSSING DATA**

**REFERENCE DRAWING**

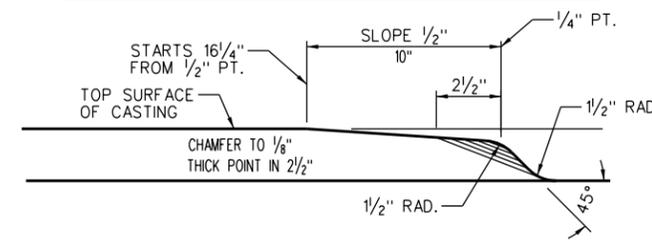
136 lb. - NO. 10 - DOUBLE SLIP CROSSING SHEET No. 2902-02

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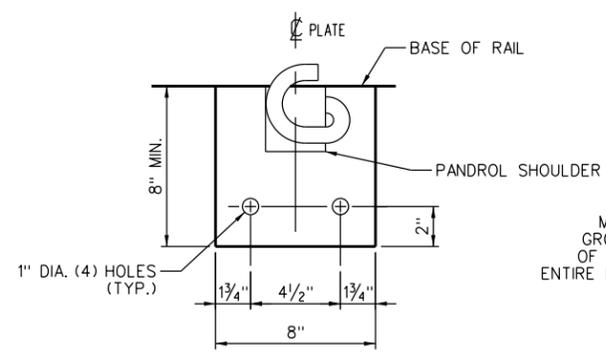
DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<p>SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>	ENGINEERING STANDARDS		STANDARD 2902
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		CROSSING GEOMETRY AND CROSSING DATA NO. 10, 136 LB. DOUBLE SLIP CROSSING		SCALE: NONE	REVISION SHEET 3 OF 20	CADD FILE: ES2902-03
REV.	DATE	DESCRIPTION	DES.	ENG.				



**SLOPE ON MANGANESE @ SECTION "X" - "X"**

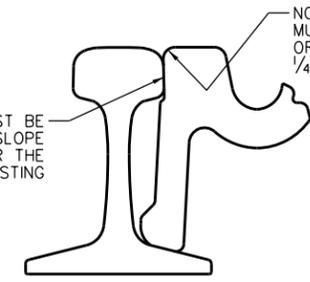


**SLOPE ON MANGANESE @ SECTION "Y" - "Y"**  
SCALE: NONE



**TYPICAL PLATE PUNCHING DETAIL**  
SCALE: NONE

MANGANESE MUST BE GROUND TO FIT SLOPE OF RAIL HEAD FOR THE ENTIRE LENGTH OF CASTING



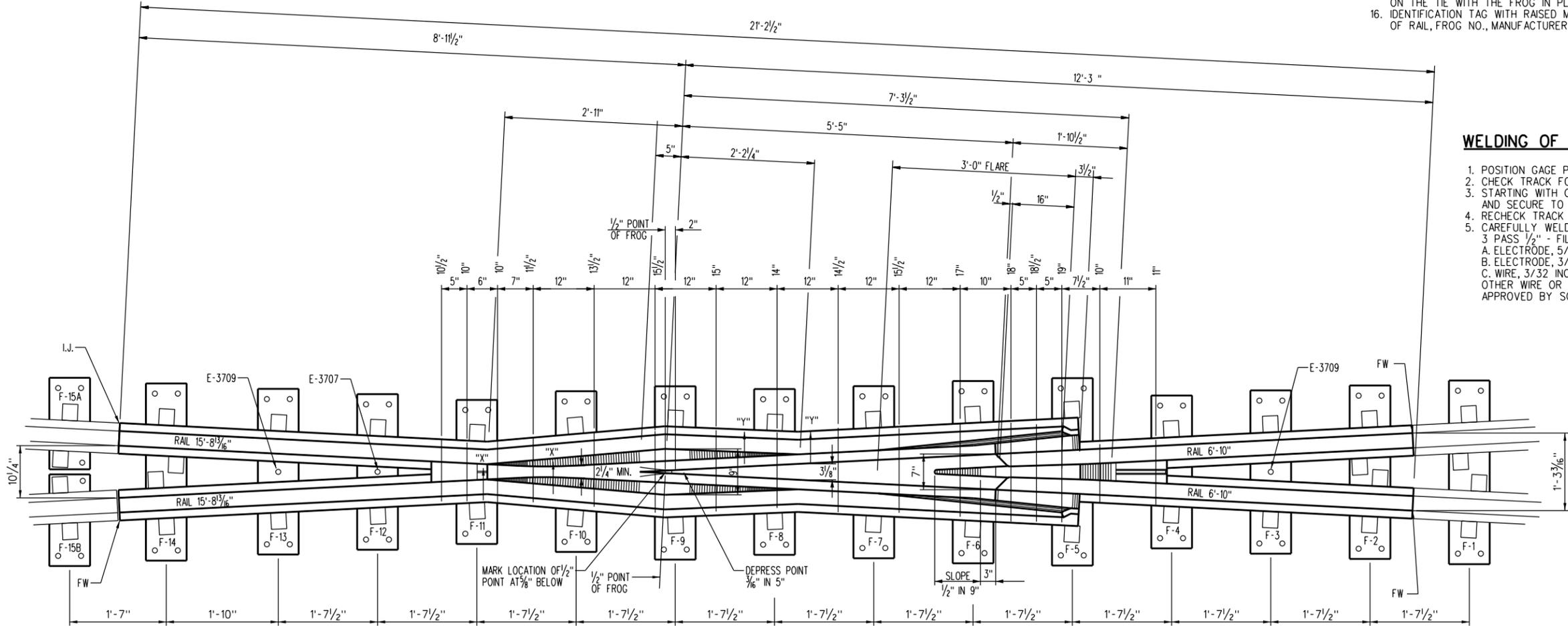
**DETAIL OF FROG CASTING / RAIL FIT**  
SCALE: NONE

**NOTES:**

1. FROG ANGLE 5°-43'-29"
2. RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
3. RAIL BOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH "PANDROL" FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES FP-1 THRU FP-15, SEE SHEET ES2902-16.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS 1 3/8" DIAMETER, H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
11. PLATES TO BE MADE OF MILD ROLLED STEEL.
12. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, DOUBLE SLIP CROSSING, MACHINE OPERATED TURNOUT.
13. THE "PANDROL" TYPE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM "PANDROL INTERNATIONAL", OR APPROVED ALTERNATE MEETING "PANDROL'S" DESIGN SPECIFICATIONS. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
14. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2 AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
15. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
16. IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.

**WELDING OF GAGE PLATE & GUARD RAIL:**

1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" - FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, 3/32 INCH, NR203, 1% NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY SCRRR DIRECTOR OF ENGINEERING MAY BE USED.



**No. 10 RAILBOUND MANGANESE FROG**  
**21'-2 1/2" LONG WITH PLATES**  
SCALE: 1" = 1'-0"

**FOR MAINTENANCE ONLY**

**REFERENCE DWGS.**

LAYOUT - No. 10 DOUBLE SLIP CROSSING - 136 lb. ----- No. 2902-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

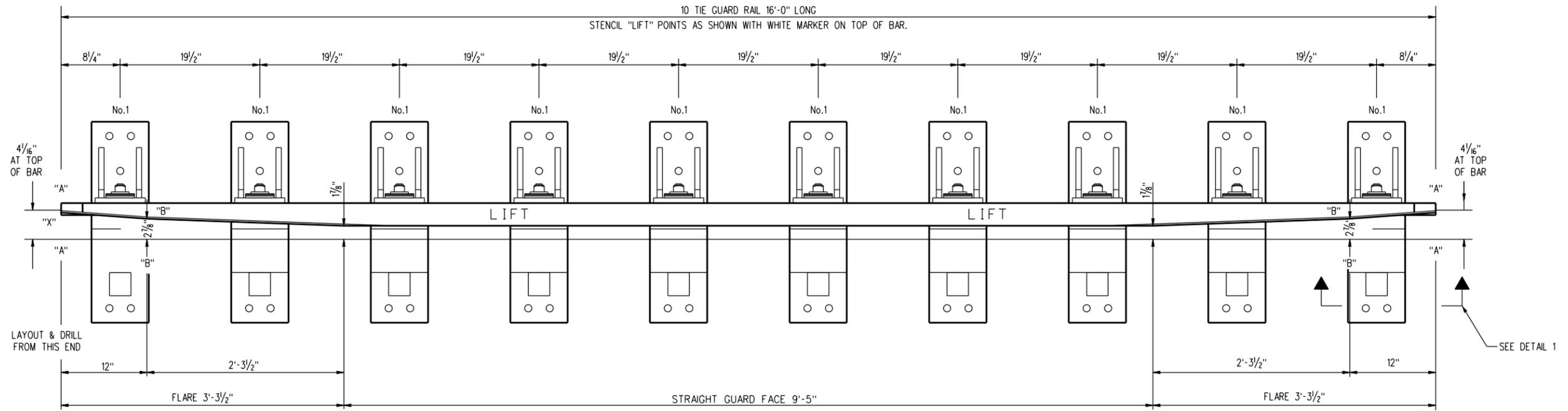
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR- STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

**ENGINEERING STANDARDS**  
 NO. 10 RAILBOUND MANGANESE STEEL FROG WITH PANDROLIZED PLATES FOR A NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	AS NOTED
REVISION SHEET	4 OF 20
CADD FILE:	ES2902-04



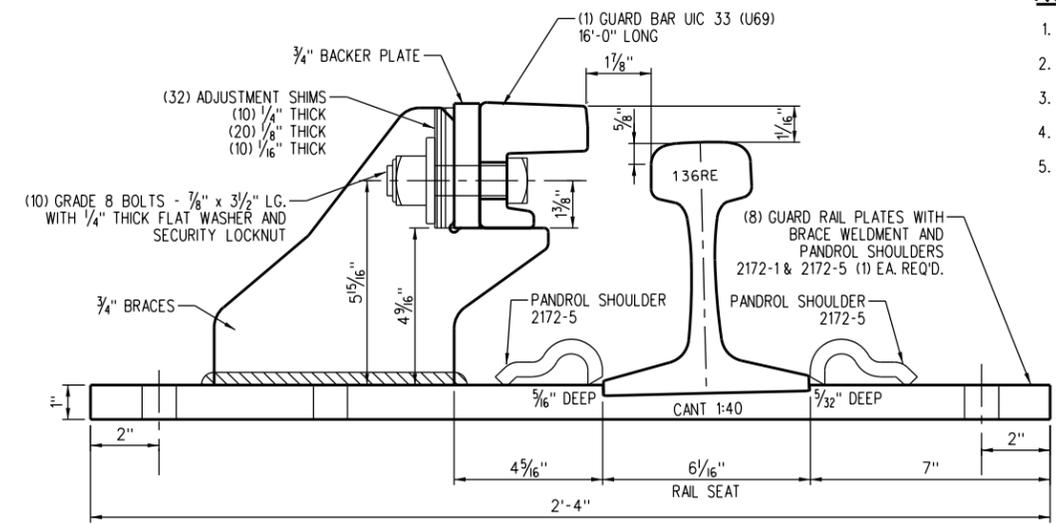
COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"

ASSEMBLED 16'-0" GUARD RAIL  
SCALE: 1/2" = 1'-0"

"X" 8 1/4" x 2'-3 3/4" x 3'-11 1/4" x 5'-6 3/4" x 7'-2 1/4" x 8'-9 3/4" x 10'-5 1/4" x 12'-0 3/4" x 13'-8 1/4" x 15'-3 3/4"

HOLES 1" DIA. - 1 3/8" A.B.

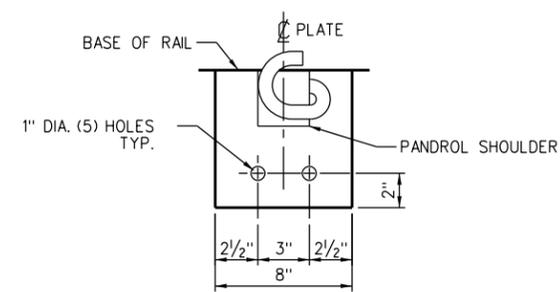
**FOR MAINTENANCE ONLY**



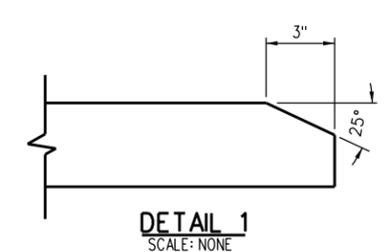
TYPICAL PLATE DETAIL  
SCALE: NONE

**NOTES:**

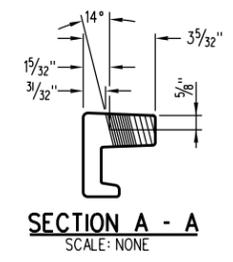
1. GUARD RAIL SECTION U.I.C. 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
2. BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
3. GUARD RAIL BOLT AND NUT PER A.R.E.M.A. SPECIFICATION M11. EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
4. WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
5. WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.



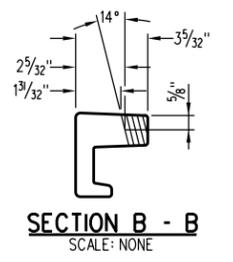
TYPICAL PLATE PUNCHING DETAIL  
SCALE: NONE



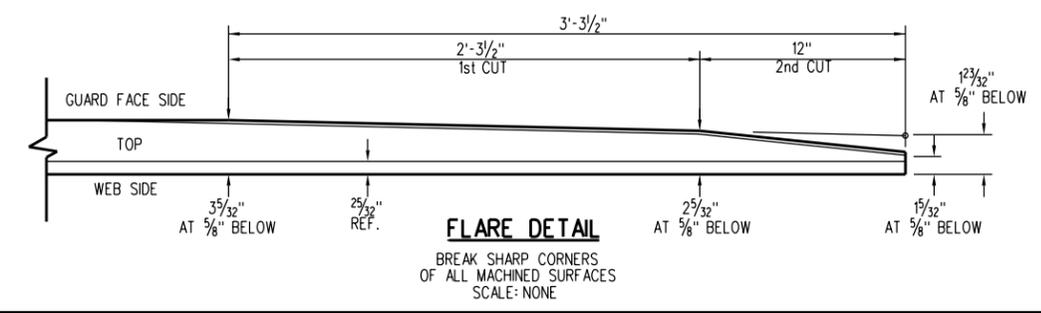
DETAIL 1  
SCALE: NONE



SECTION A - A  
SCALE: NONE



SECTION B - B  
SCALE: NONE



FLARE DETAIL  
BREAK SHARP CORNERS OF ALL MACHINED SURFACES  
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011  ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION				

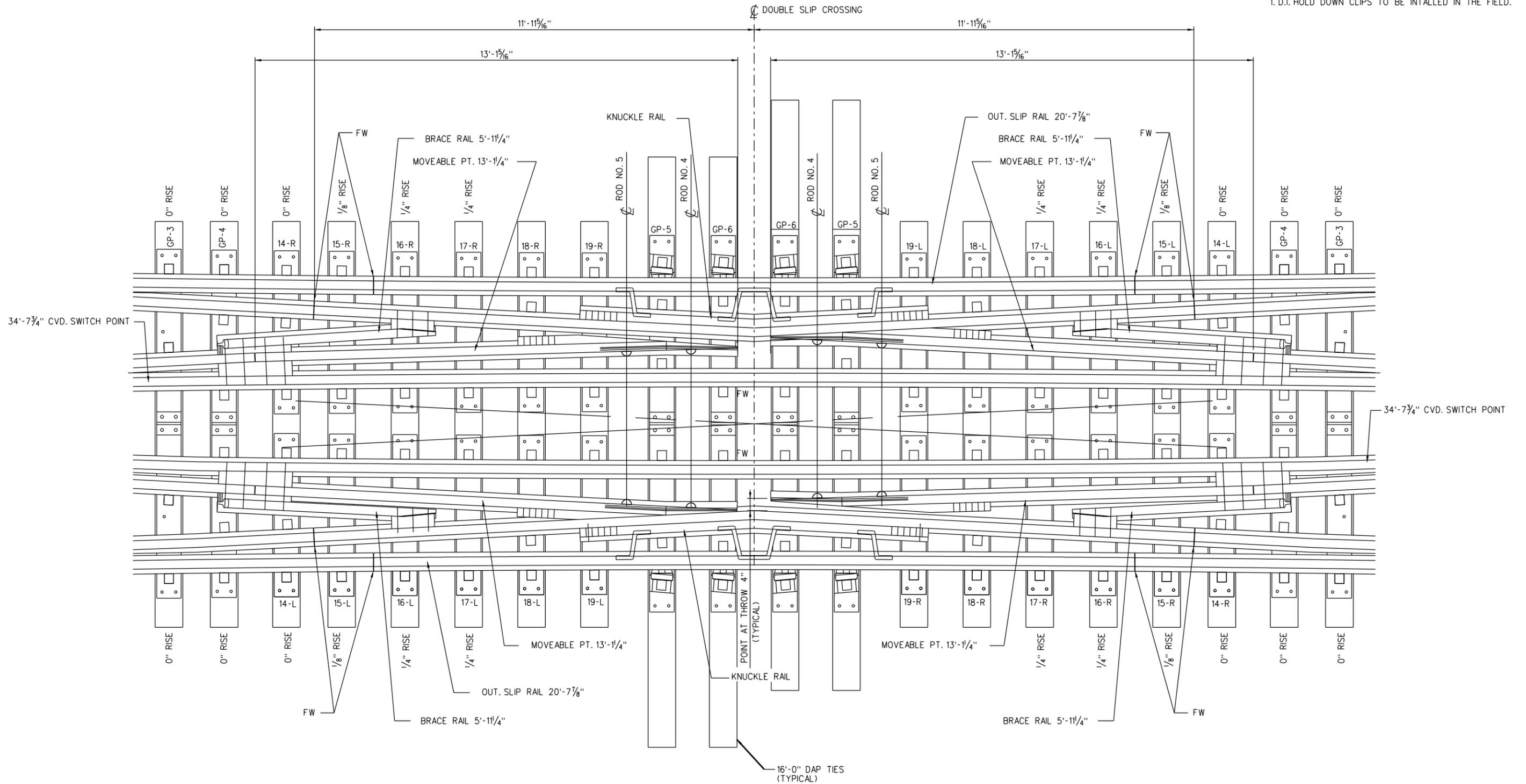
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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
GUARD RAIL DETAILS 16'-0" LONG FOR NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	AS NOTED
REVISION	SHEET
-	5 OF 20
CADD FILE:	ES2902-05

**NOTES:**  
1. D.I. HOLD DOWN CLIPS TO BE INTALLED IN THE FIELD.



**#10 DOUBLE SLIP CROSSING**

**FOR MAINTENANCE ONLY**

REFERENCE DRAWING:

LAYOUT - NO. 10 DOUBLE SLIP CROSSING - 136 LB \_\_\_\_\_ ES2902-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Narek D. Pape*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

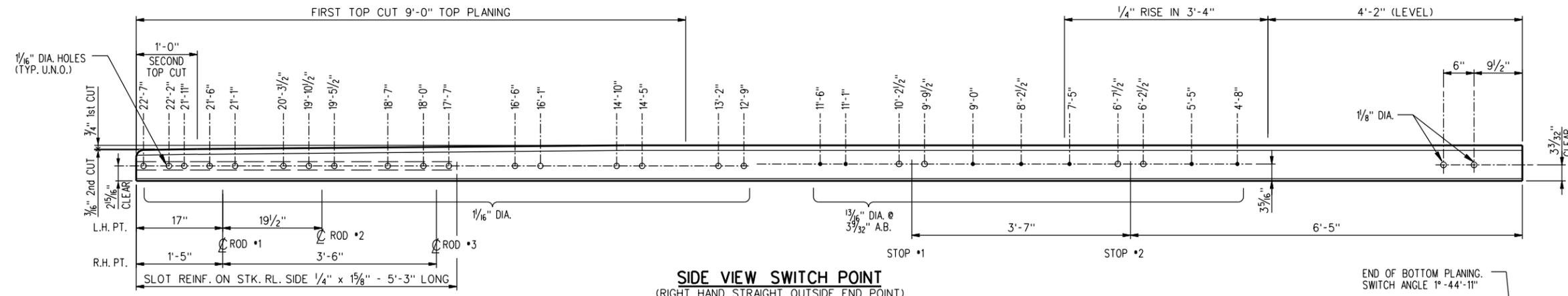
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ENGINEERING STANDARDS

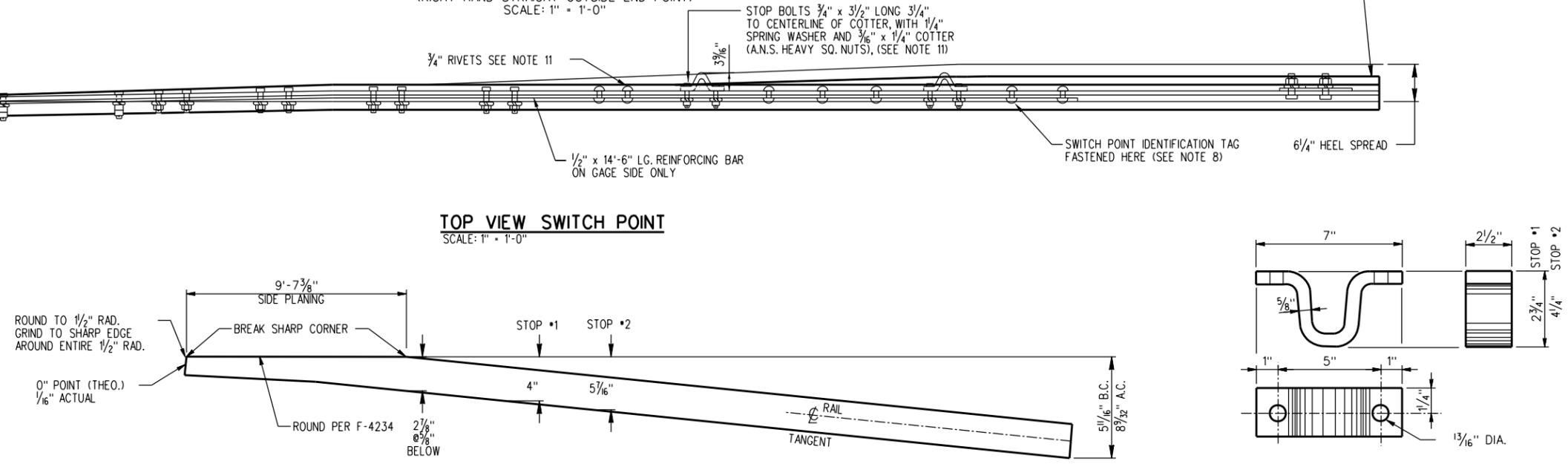
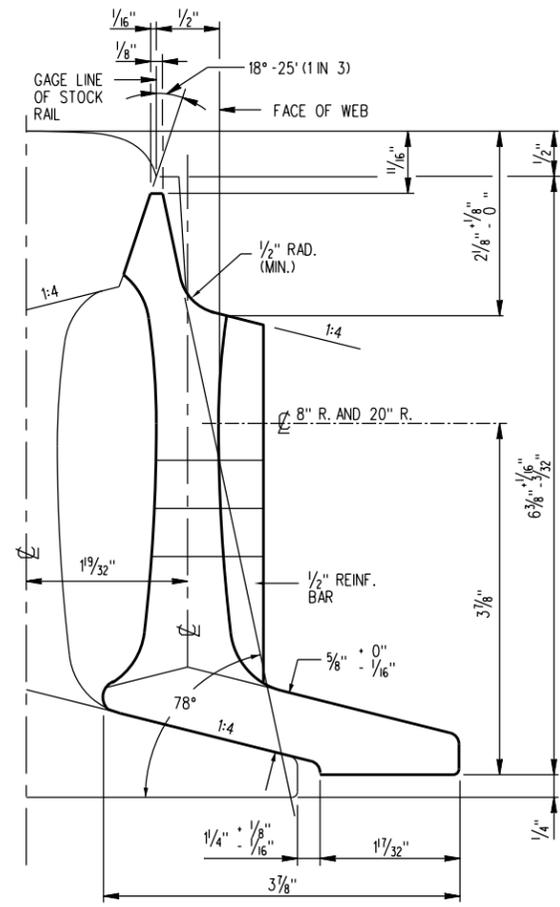
CENTER SECTION LAYOUT  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	3/4" = 1'-0"
REVISION SHEET	6 OF 20
CADD FILE:	ES2902-06



LUG BOLTS 1" x 5" LG., 4 5/8" TO CENTERLINE OF COTTER, WITH 2 NUTS, 3/8" SPRING WASHER AND 1/4" x 1/2" COTTER (A.N.S. HEAVY SQ. NUTS)

1/4" POINT CHAMFERED TO 1/8" IN 2'-0" AT 1/16" BELOW TOP OF STOCK RAIL, CHAMFER ANGLE 78° 00', ROUND TO 1/2" RAD. AND GRIND TO SHARP EDGE. REMOVE ALL BURRS.



**LEFT HAND STRAIGHT OUTSIDE END SWITCH POINT (RIGHT HAND OPPOSITE)**  
SCALE: NONE

**NOTES:**

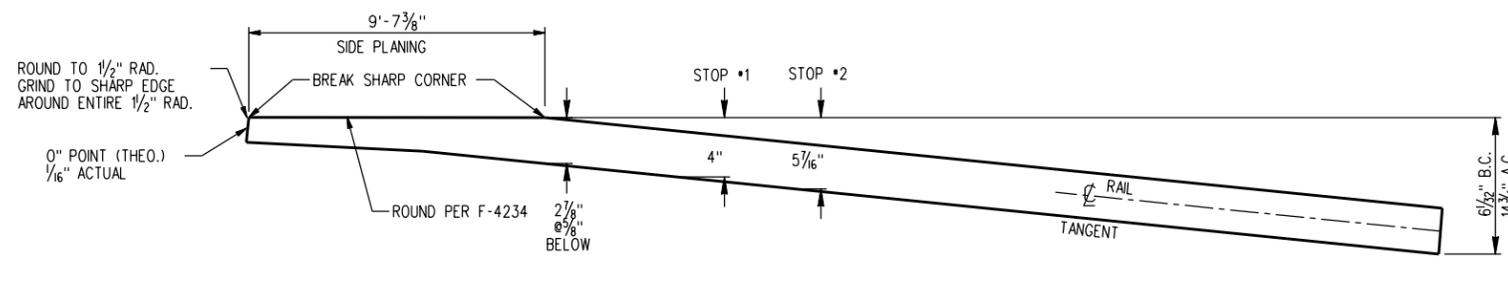
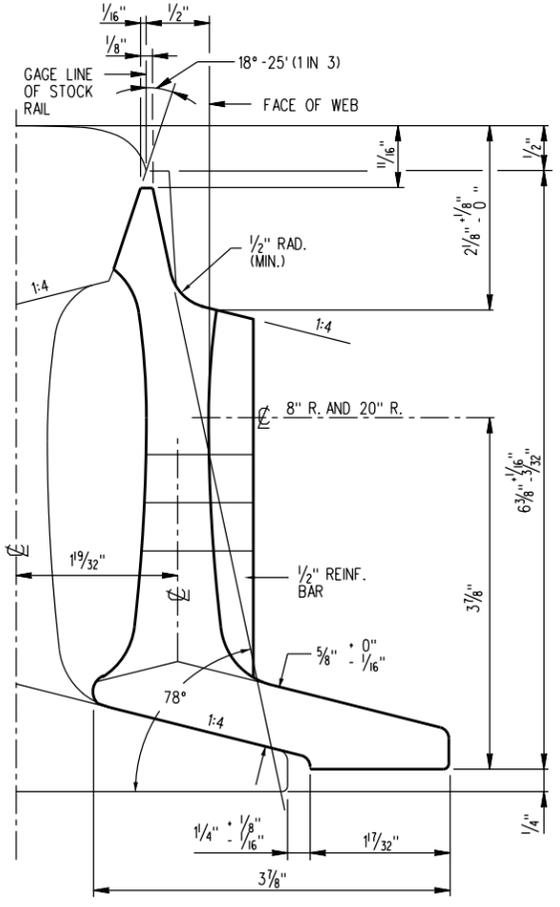
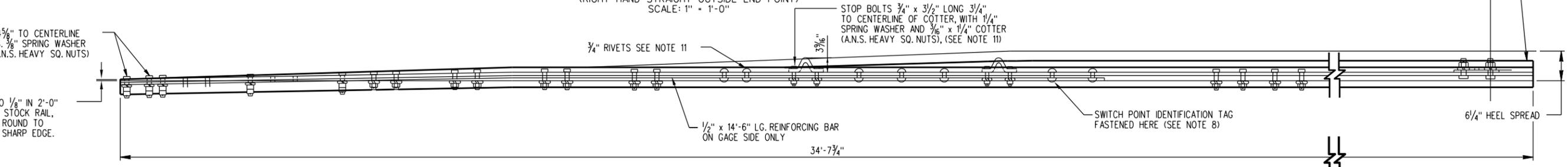
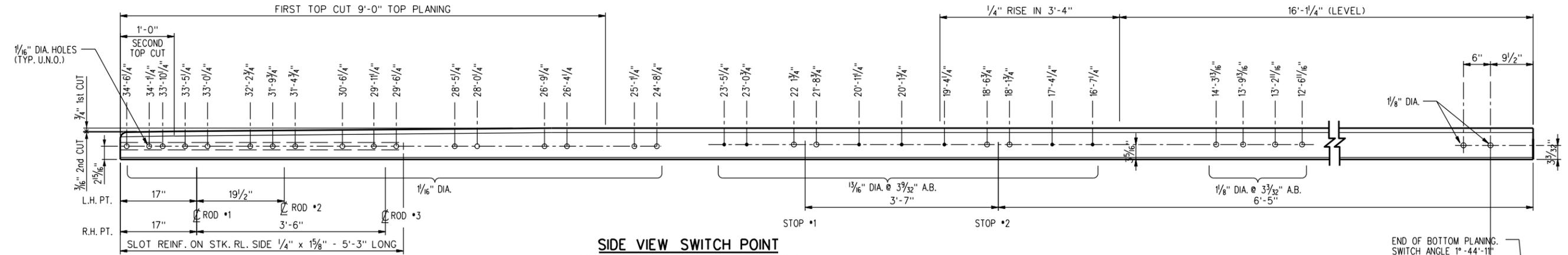
- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
- METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, H.S., MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- LEFT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT HAND SWITCH POINT.
- SIDE PLANING FIGURED ON GAGE LINE 3/8" BELOW TO OF RAIL.
- MATERIAL AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "TRACKWORK PLANS AND SPECIFICATIONS", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF THE SWITCH POINT AND AT HEEL END OF THE SWITCH POINT RAIL. USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF THE TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) TEH TURNOUT NUMBER. MARK TAG THUS: 22'-8 1/2" NO. 10. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
- UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HACK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS. AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.	
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		

**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD 2902
136 LB. 22'-8 1/2" STRAIGHT SWITCH POINT FOR NO. 10, 136 LB. DOUBLE SLIP CROSSING		SCALE: AS NOTED
REVISION	SHEET	7 OF 20
CADD FILE:		ES2902-07



- NOTES:**
1. SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
  2. METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, H.S., MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
  3. LEFT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT HAND SWITCH POINT.
  4. SIDE PLANING FIGURED ON GAGE LINE 3/8" BELOW TO OF RAIL.
  5. MATERIAL AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "TRACKWORK PLANS AND SPECIFICATIONS", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
  6. IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF THE SWITCH POINT AND AT HEEL END OF THE SWITCH POINT RAIL USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
  7. THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF THE TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
  8. METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 22'-8 1/2" NO. 10. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN.
  9. AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
  10. NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
  11. UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HACK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS, AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.
  12. SWITCH POINT MANUFACTURER MUST SUPPLY SHOP DRAWINGS OF MANGANESE STEEL INSERT FOR APPROVAL BY S.C.R.R.A. DIRECTOR OF ENGINEERING PRIOR TO MANUFACTURING OF INSERT.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

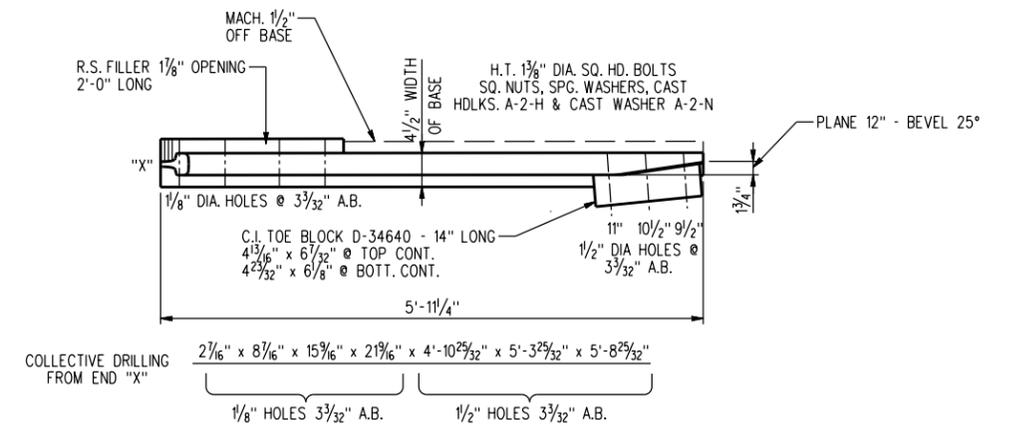
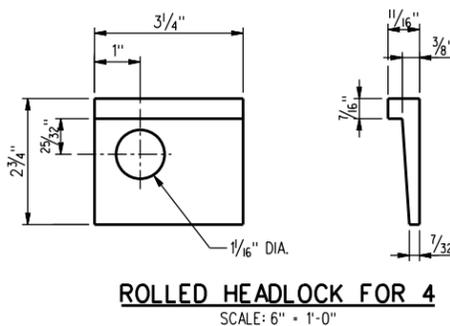
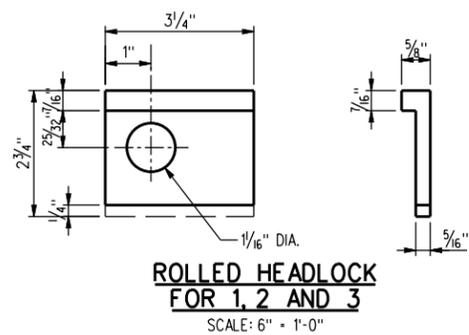
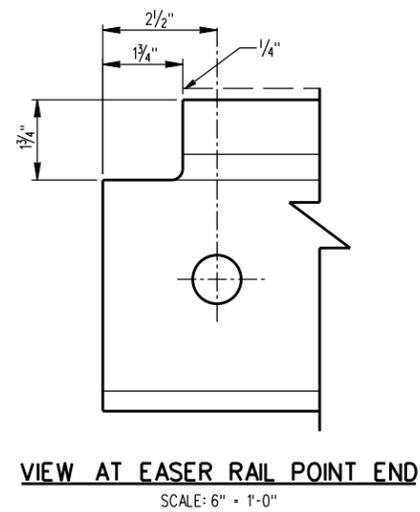
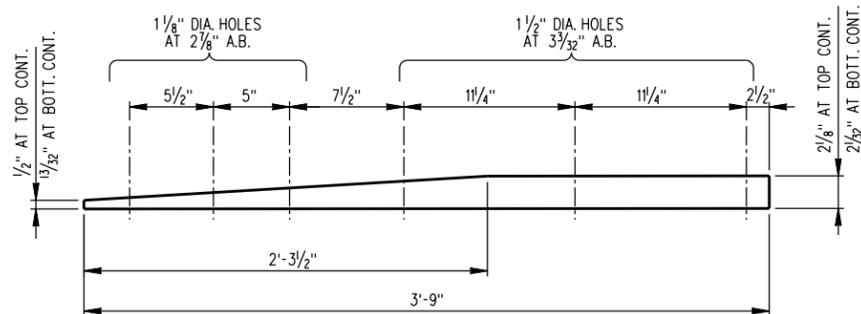
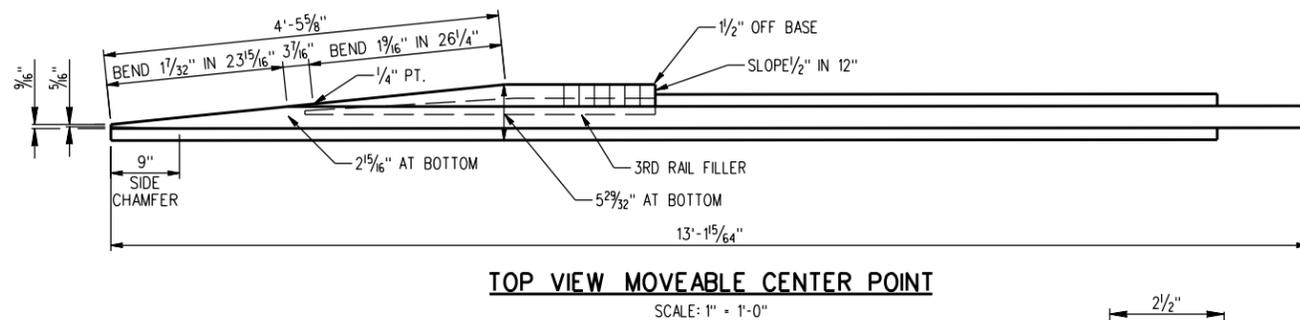
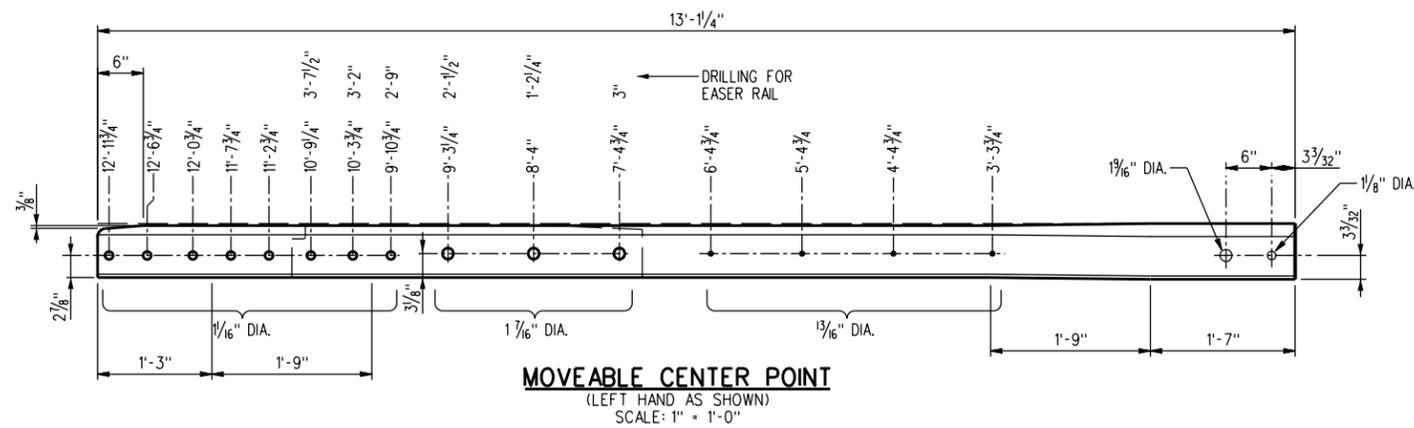
DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
 Director of Engineering and Construction

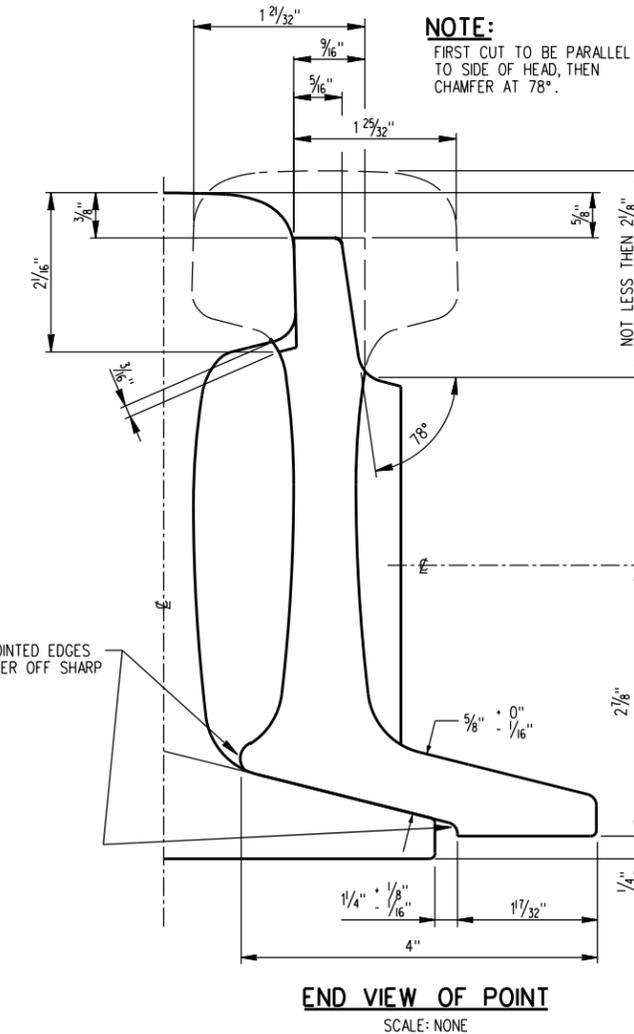
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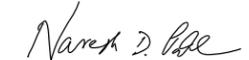
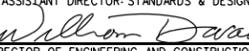
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS	STANDARD 2902
136 LB. 34'-7 3/4" CURVED SWITCH POINT NO. 10, 136 LB. DOUBLE SLIP CROSSING	SCALE: AS NOTED
	REVISION SHEET 8 OF 20
	ADD FILE: ES2902-08



**FOR MAINTENANCE ONLY**



REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

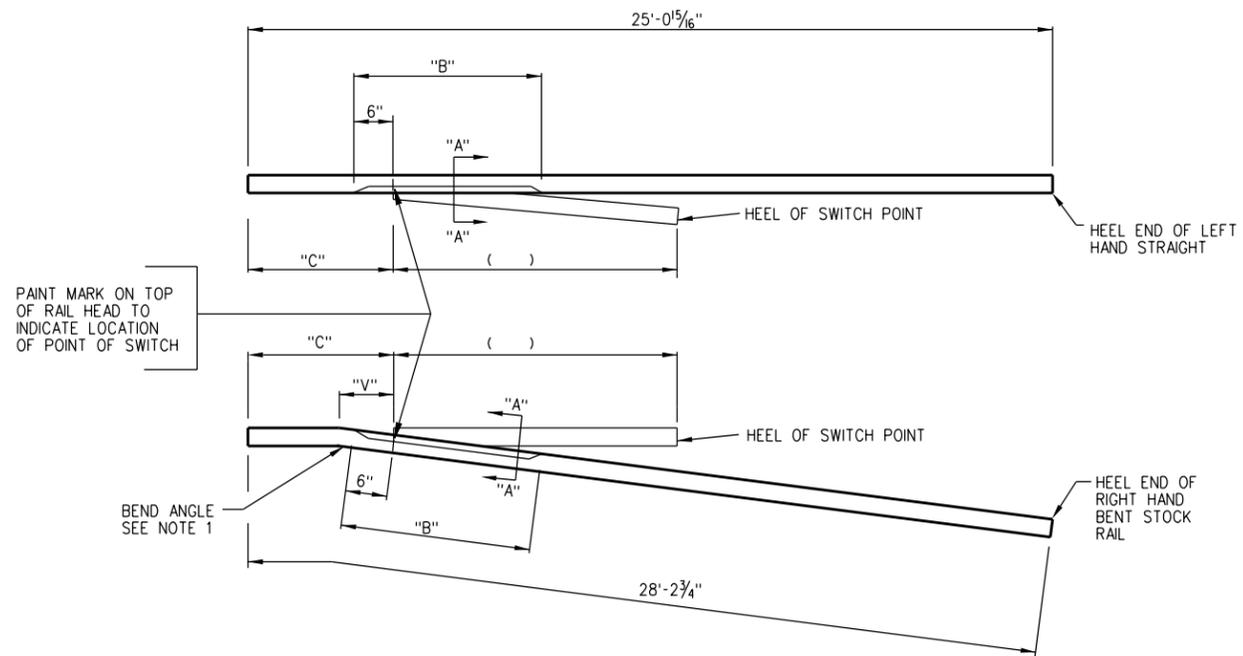
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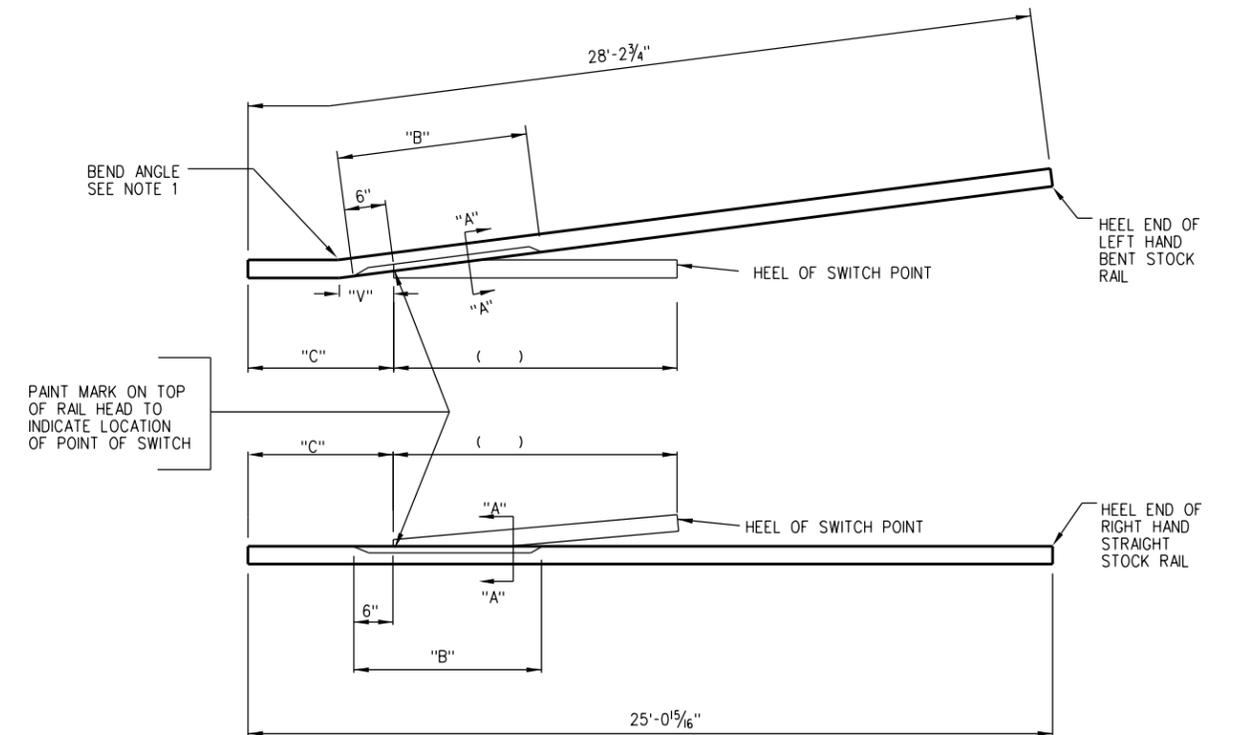
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
136 LB. MOVEABLE CENTER POINT,  
3RD RAIL FILLER AND BRACE RAIL DETAILS  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

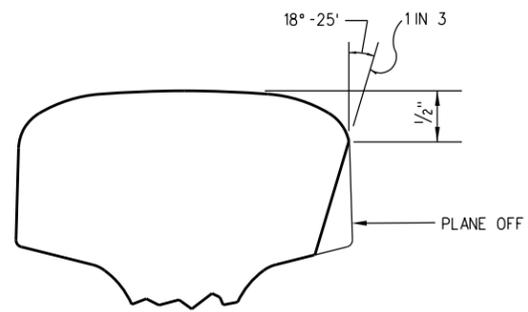
STANDARD	2902
SCALE:	AS NOTED
REVISION SHEET	9 OF 20
CADD FILE:	ES2902-09



STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"



STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"



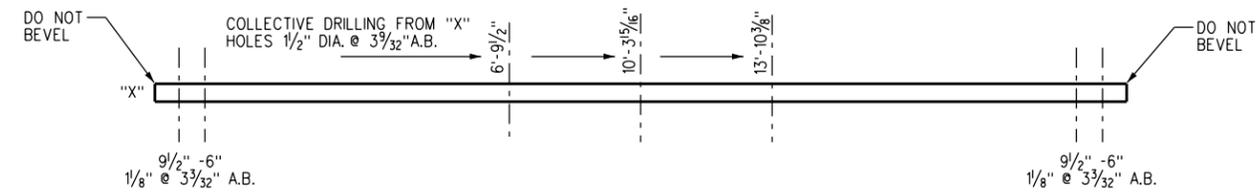
SECTION "A-A"

LENGTHS B, C, & D FOR 136 LB. RAIL						
Sw. Pt. LENGTH	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.		
				C	D	END DRILL. SEE NO. 10
22'-8 1/2"	10	STR.	11'-0"	3'-11"	25'-0 5/16"	NONE
22'-8 1/2"	10	BENT	11'-0"	3'-11"	28'-2 3/4"	HEEL END ONLY

**NOTE:**

1. Bend angle in bent stock rail to be as follows:

Sw. Length	BEND ANGLE	V (Vertex Dist.)
22'-8 1/2"	1° - 44' - 11" or 1" in 2'-9"	10 5/16"



OUTSIDE SLIP RAIL - 20'-7 7/8" LONG  
SCALE: NONE (TWO REQUIRED)

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
Director of Engineering and Construction

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

UNDERCUT STOCK RAILS FOR  
22'-8 1/2" SWITCH POINTS FOR  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	AS NOTED
REVISION SHEET	10 OF 20
CADD FILE:	ES2902-10

**FOR MAINTENANCE ONLY**

**REFERENCE DRAWINGS**

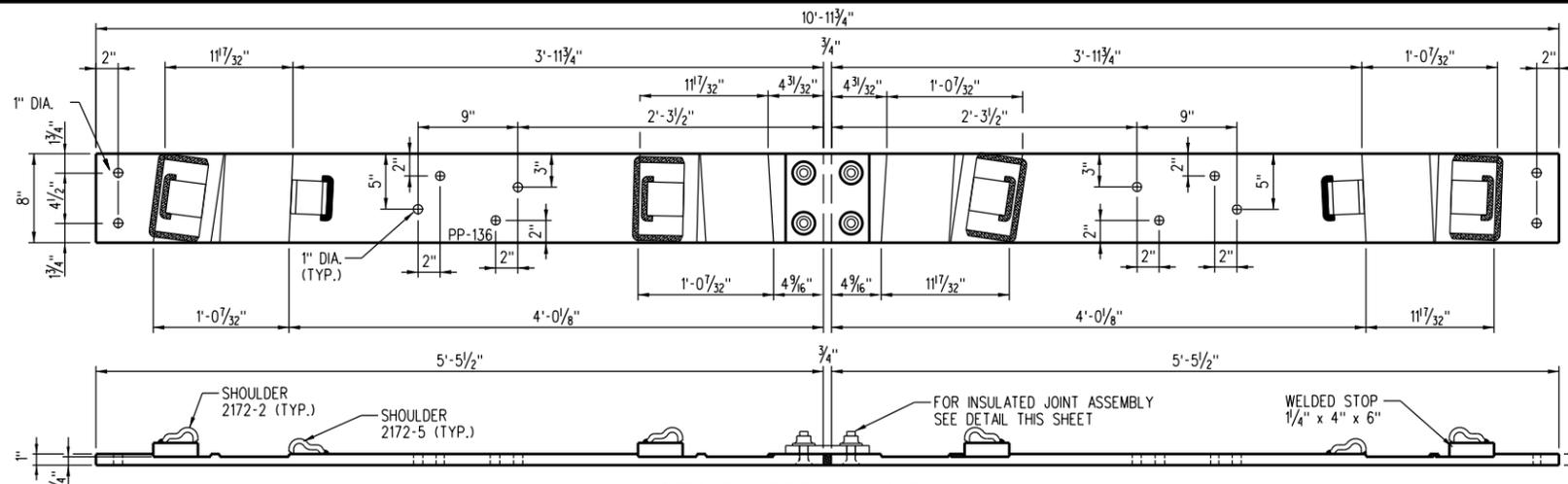
LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

**NOTES:** (For Frog Gage Plates)

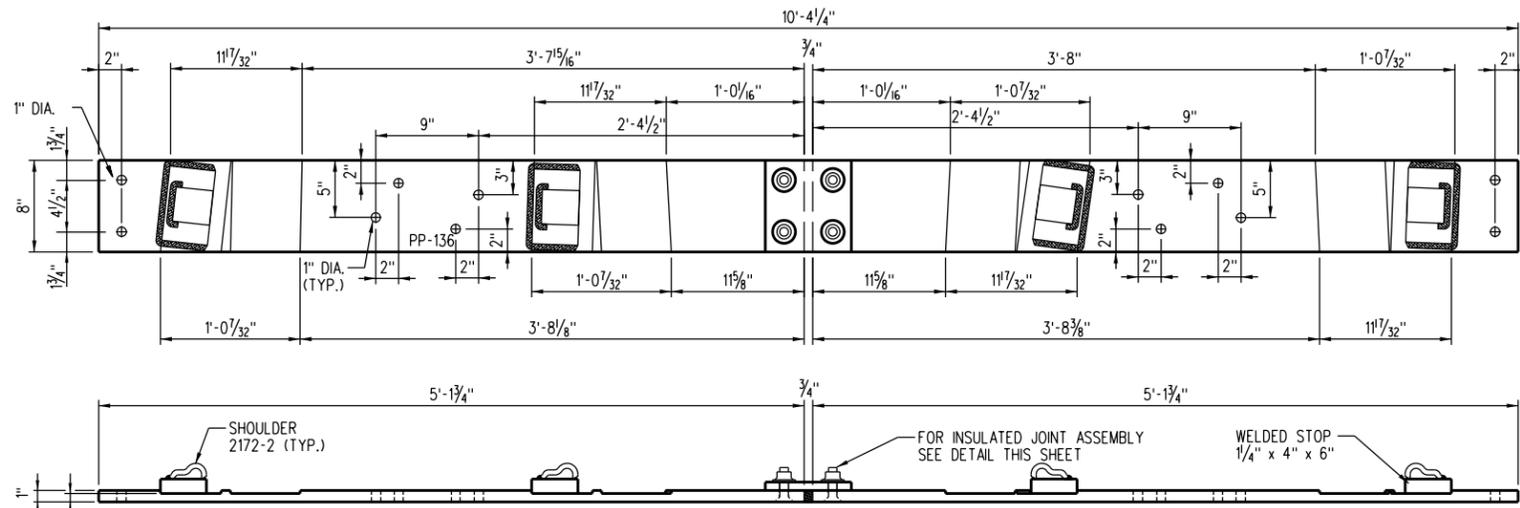
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 DOUBLE SLIP CROSSING.
3. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

**NOTES:** (For Switch Gage Plates)

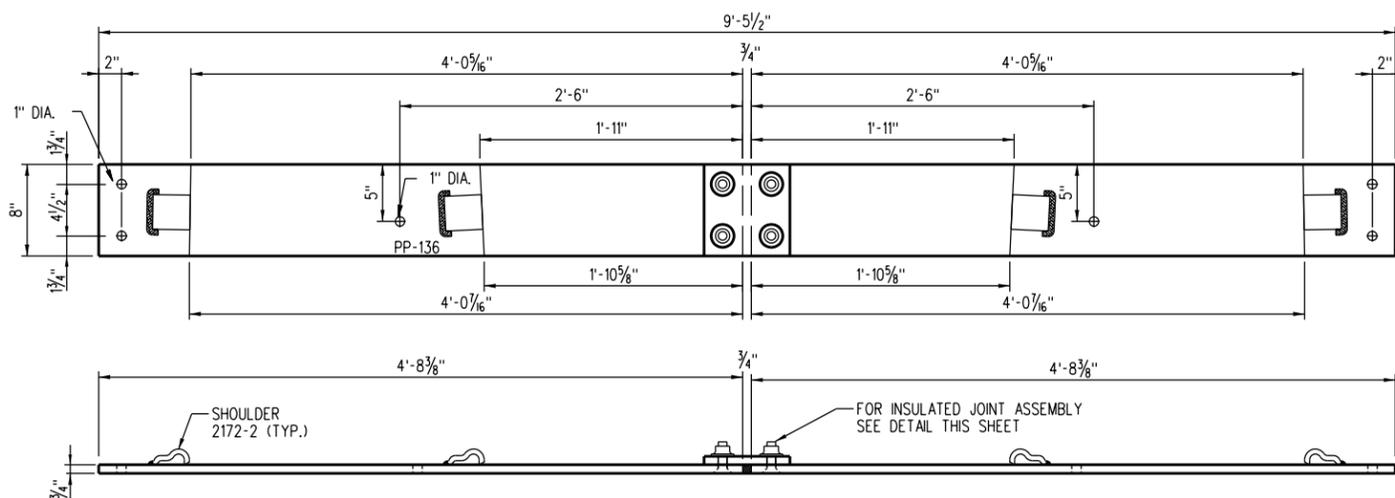
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE WELD - ON PRESSED STEEL SHOULDER, PURCHASED FROM "PANDROL INTERNATIONAL", TO BE MILD STEEL, OTHER APPROVED WELD - ON PRESSED STEEL SHOULDERS MEETING "PANDROL'S" DESIGN SPECIFICATIONS MAY BE USED.
3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAILS SEAT DIMENSION AS CALLED FOR.
4. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 DOUBLE SLIP CROSSING.



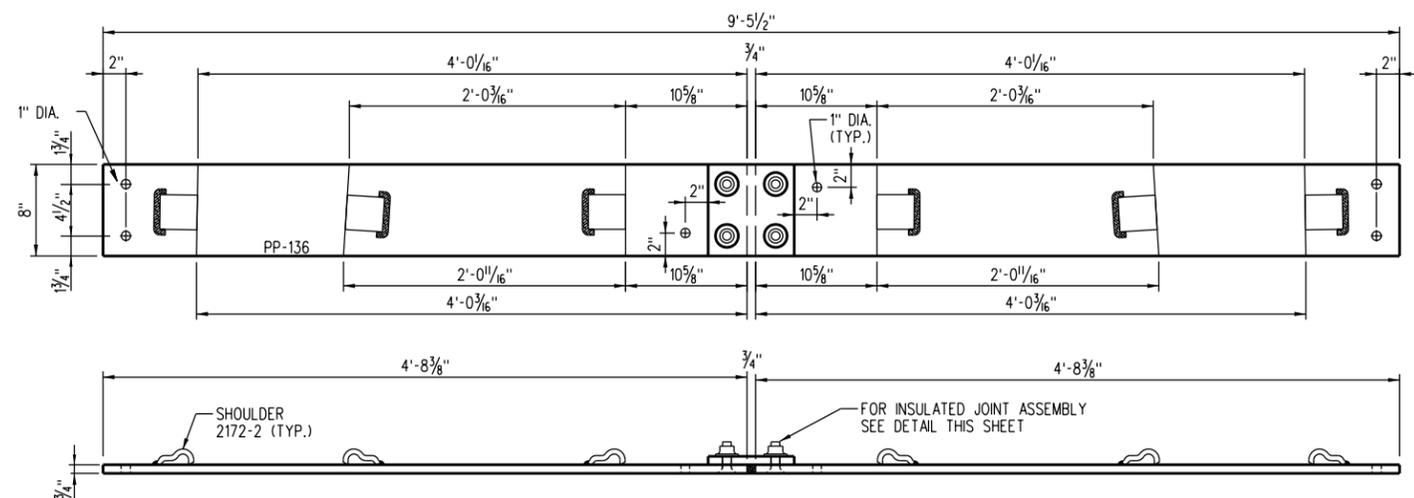
**INSULATED SLIDE GAGE PLATE GP-1**  
1" x 8" - MILLED - (2 EACH REQ'D AS SHOWN)



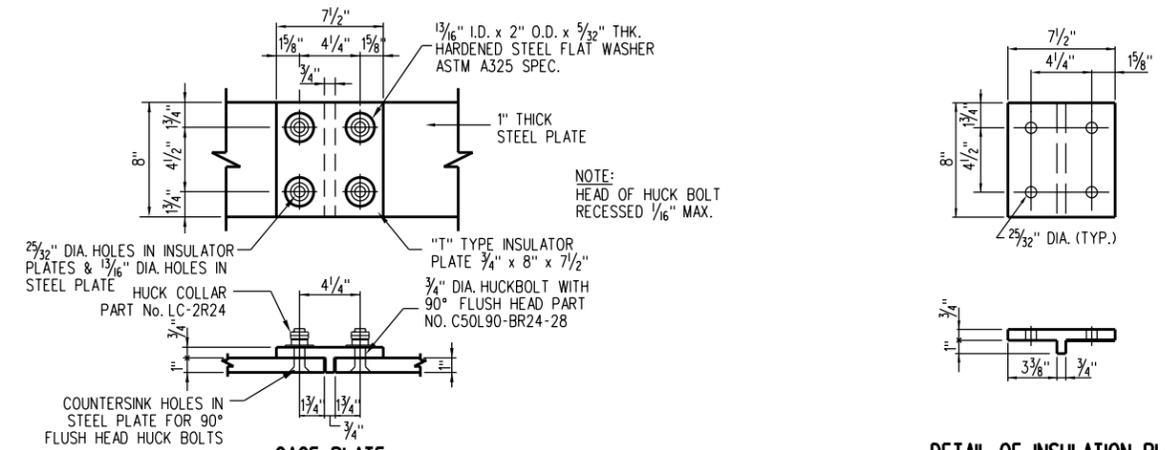
**INSULATED SLIDE GAGE PLATE GP-2**  
1" x 8" - MILLED - (2 EACH REQ'D AS SHOWN)



**INSULATED SLIDE GAGE PLATE GP-3**  
3/4" x 8" - FLAT - (2 EACH REQ'D AS SHOWN)



**INSULATED SLIDE GAGE PLATE GP-4**  
3/4" x 8" - FLAT - (2 EACH REQ'D AS SHOWN)



**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**

**DETAIL "A" INSULATION AT GAGE PLATES**  
(SCALE: NONE)

**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC •127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GPI52P05

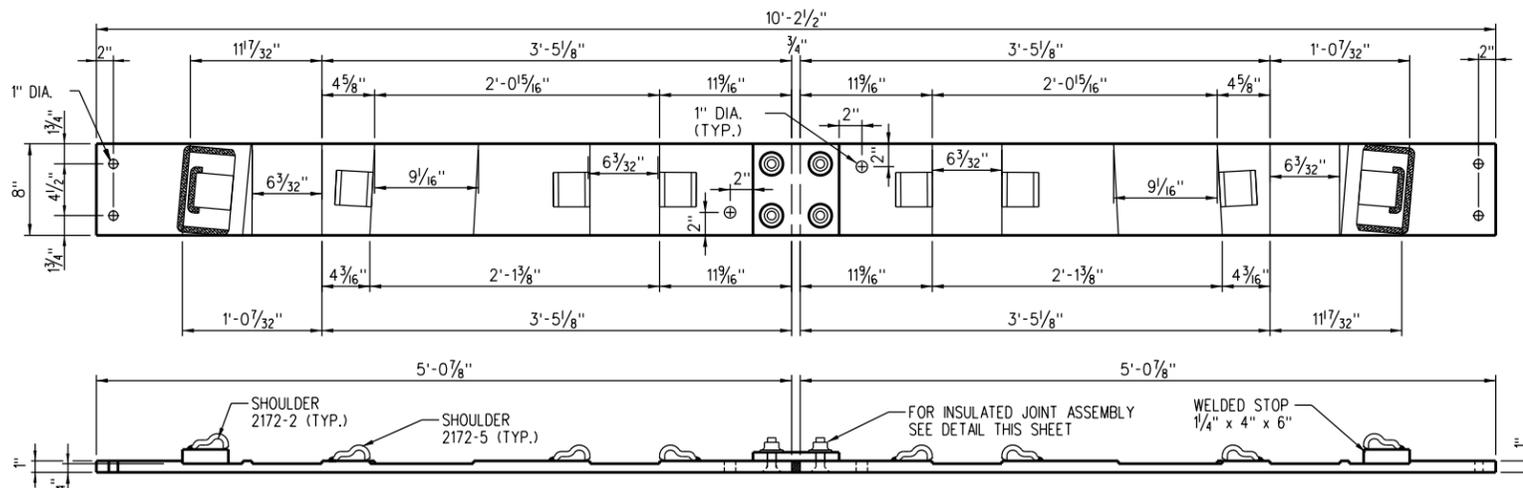
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Narex D. Pae ASSISTANT DIRECTOR- STANDARDS & DESIGN Wilson Davan DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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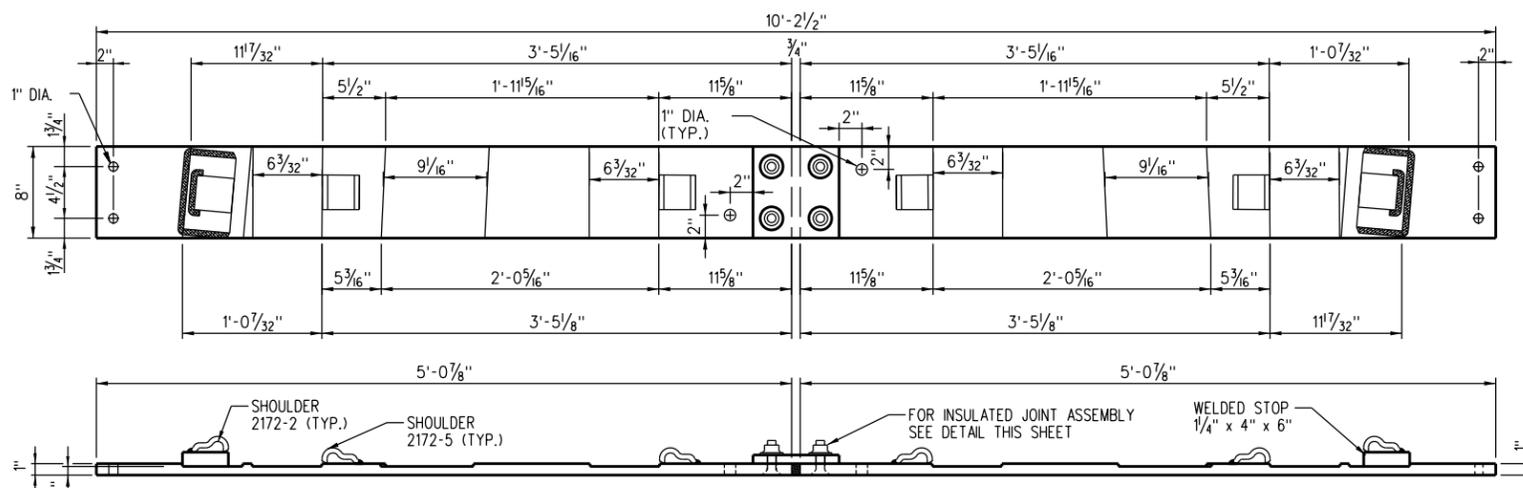
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

**ENGINEERING STANDARDS**  
INSULATED GAGE PLATE DETAILS  
DS-GP-1, DS-GP-2, DS-GP-3 AND DS-GP-4  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	1/2" = 1'-0"
REVISION	SHEET
-	11 OF 20
ADD FILE:	ES2902-11



**INSULATED SLIDE GAGE PLATE GP-5**  
1" x 8" - MILLED - (2 EACH REQ'D AS SHOWN)



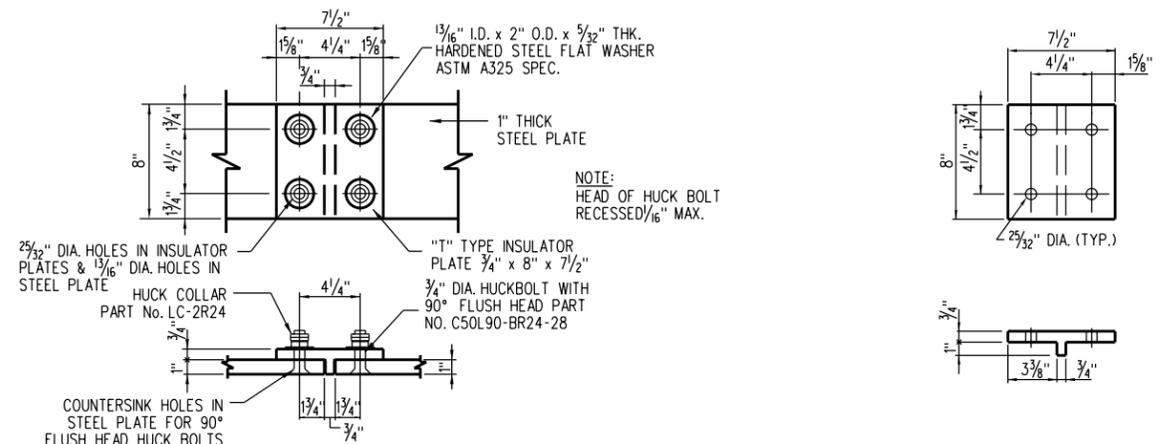
**INSULATED SLIDE GAGE PLATE GP-6**  
1" x 8" - MILLED - (2 EACH REQ'D AS SHOWN)

**REFERENCE DRAWINGS**

LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

**NOTES:**

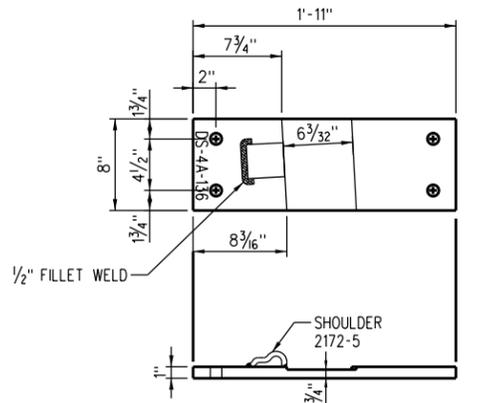
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) & HAND OF TURNOUT (R.H. OR L.H.)
3. THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 DOUBLE SLIP SWITCH.



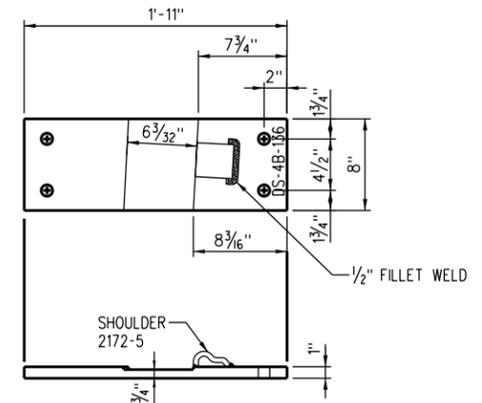
**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**

**DETAIL "A" INSULATION AT GAGE PLATES**  
(SCALE: NONE)

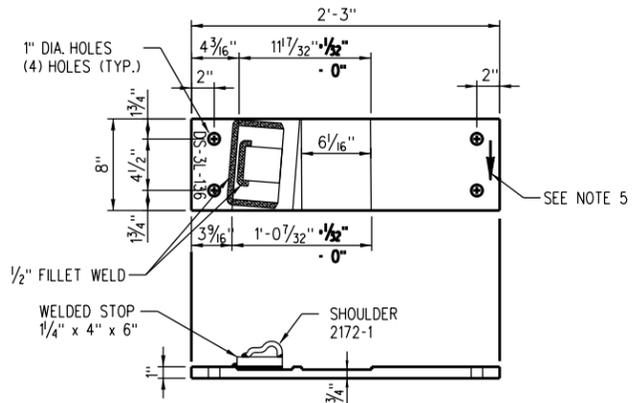
**FOR MAINTENANCE ONLY**



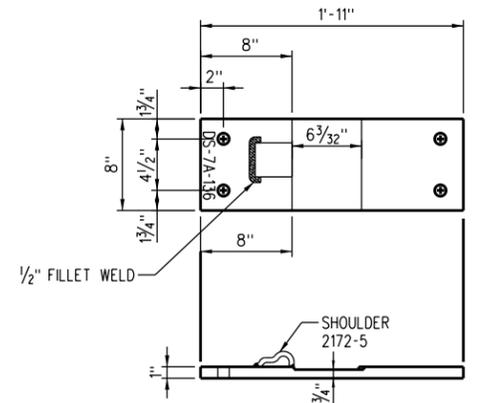
**BRACE PLATE - 4A**  
1" x 8" x 1'-11" LG. - MILLED - W/ADJ. RAIL BRACE (2 REQUIRED)



**BRACE PLATE - 4B**  
1" x 8" x 1'-11" LG. - MILLED - W/ADJ. RAIL BRACE (2 REQUIRED)

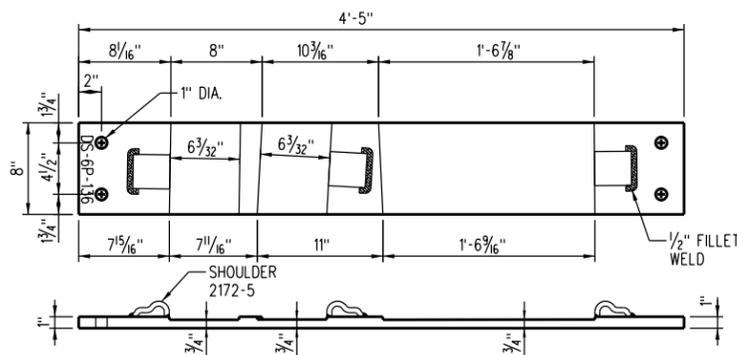


**BRACE PLATE - 6A**  
1" x 8" x 2'-3" LG. - MILLED - W/ADJ. RAIL BRACE



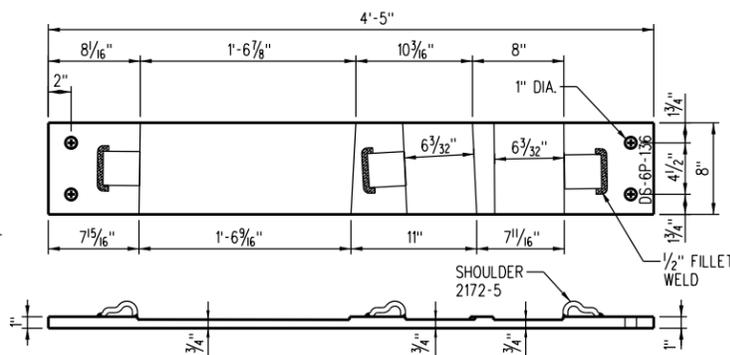
**BRACE PLATE - 7A**  
1" x 8" x 1'-10 1/2" LG. - MILLED - W/ADJ. RAIL BRACE (8 REQUIRED)

DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>		ENGINEERING STANDARDS		STANDARD	
REVISION		XX XX		INSULATED GAGE PLATE DETAILS DS-GP-5 AND DS-GP-6 NO. 10, 136 LB. DOUBLE SLIP CROSSING				2902			
REV.	DATE	DESCRIPTION	DES.	ENG.			SCALE: 1/2" = 1'-0"	REVISION SHEET	12 OF 20	CADD FILE:	ES2902-12



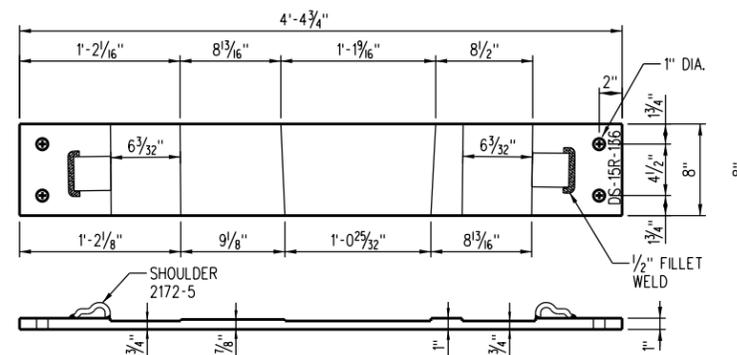
**BRACE PLATE - 14R**

1" x 8" x 4'-5" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



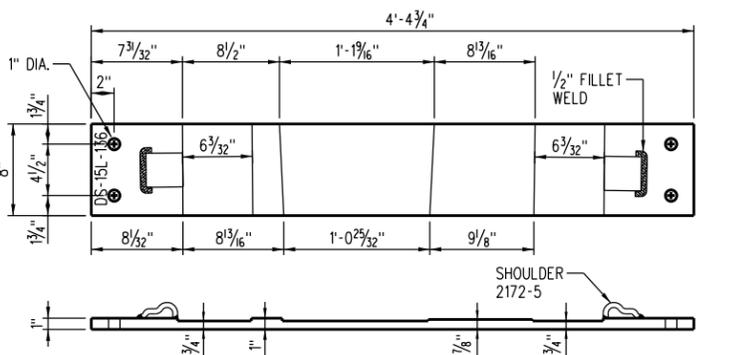
**BRACE PLATE - 14L**

1" x 8" x 4'-5" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



**BRACE PLATE - 15R**

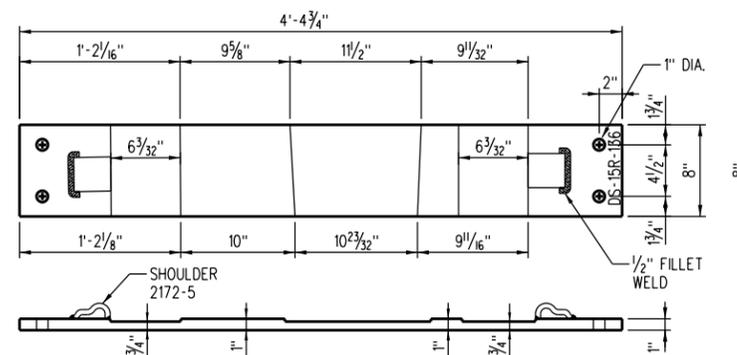
1" x 8" x 4'-4 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



**BRACE PLATE - 15L**

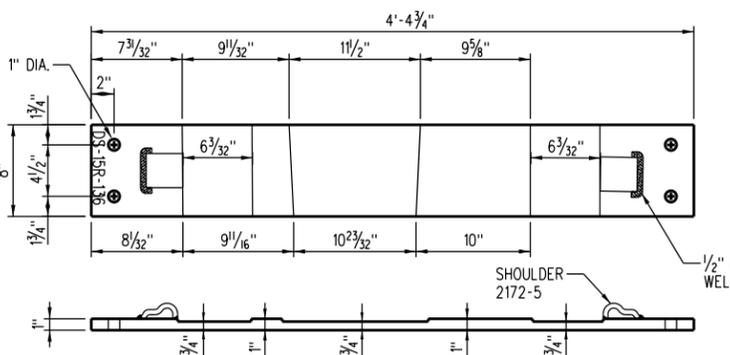
1" x 8" x 4'-4 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)

**FOR MAINTENANCE ONLY**



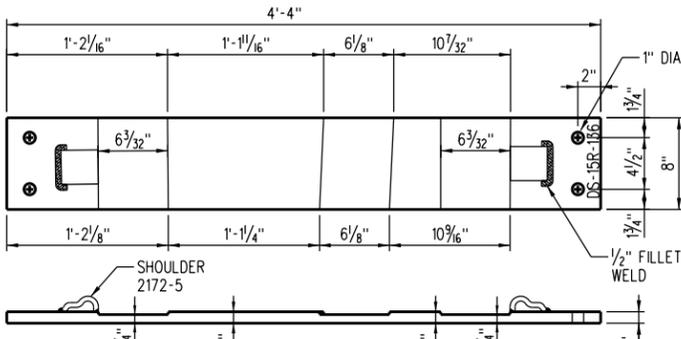
**BRACE PLATE - 16R**

1" x 8" x 4'-4 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



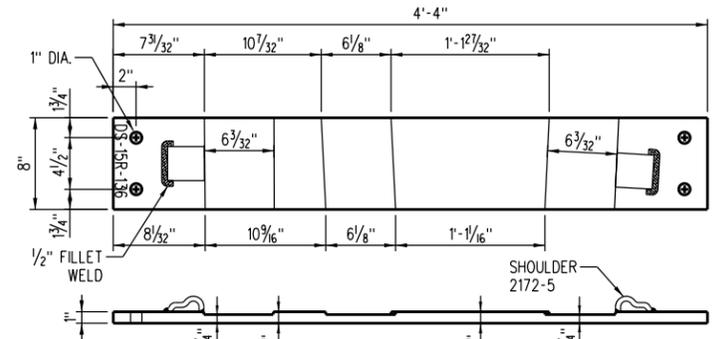
**BRACE PLATE - 16L**

1" x 8" x 4'-4 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



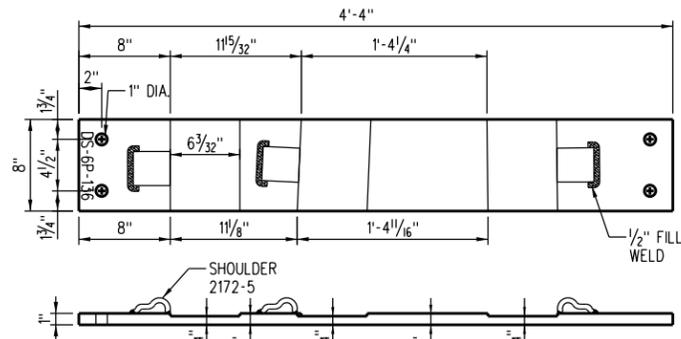
**BRACE PLATE - 17R**

1" x 8" x 4'-4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



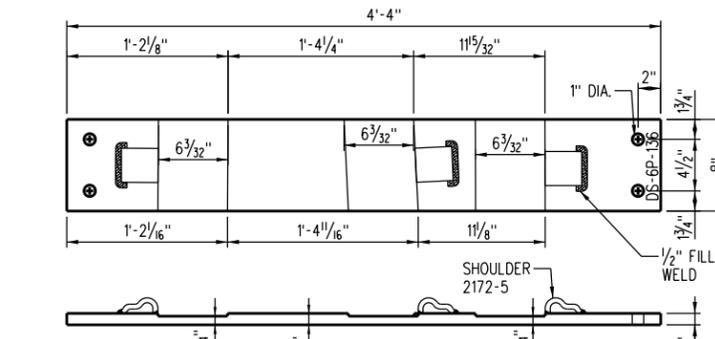
**BRACE PLATE - 17L**

1" x 8" x 4'-4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



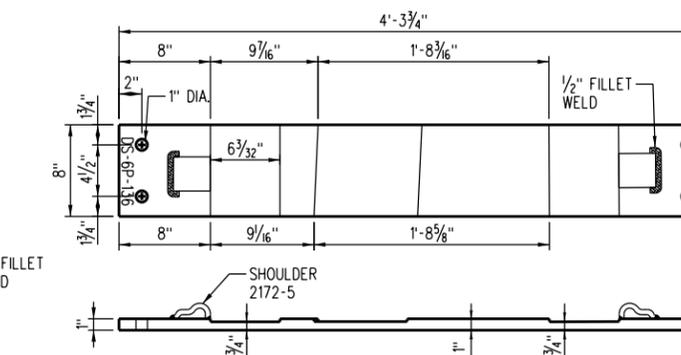
**BRACE PLATE - 18R**

1" x 8" x 4'-4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



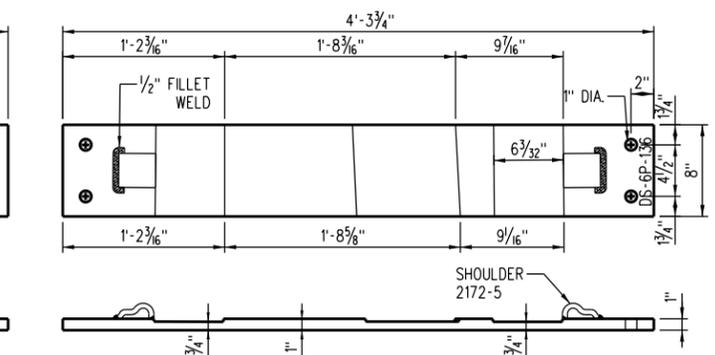
**BRACE PLATE - 18L**

1" x 8" x 4'-4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)



**BRACE PLATE - 19R**

1" x 8" x 4'-3 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)

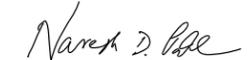
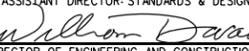


**BRACE PLATE - 19L**

1" x 8" x 4'-3 3/4" LG. - MILLED - W/ADJ. RAIL BRACE  
(2 REQUIRED PER SLIP SWITCH)

**REFERENCE DWGS.**  
LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
  2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL & HAND OF TURNOUT (R.H. OR L.H.))
  3. THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
  4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 DOUBLE SLIP CROSSING.

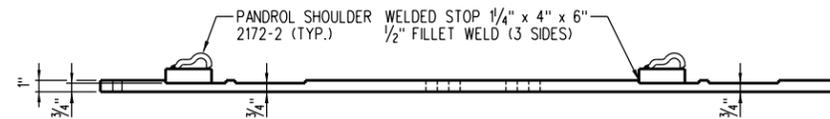
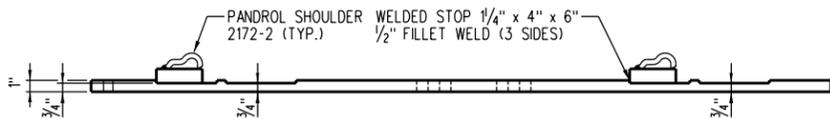
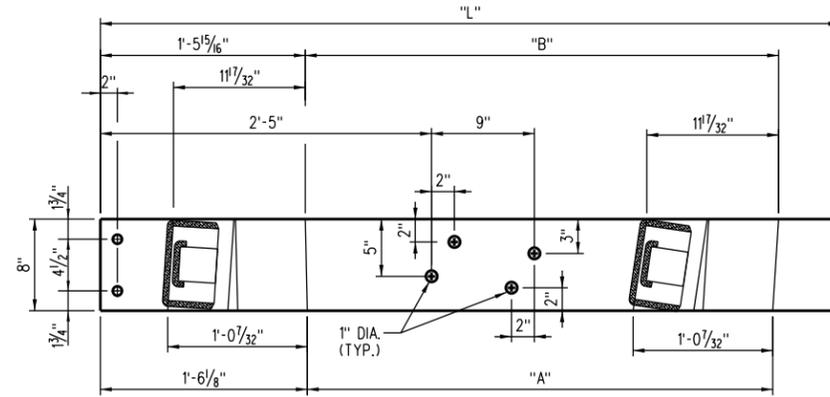
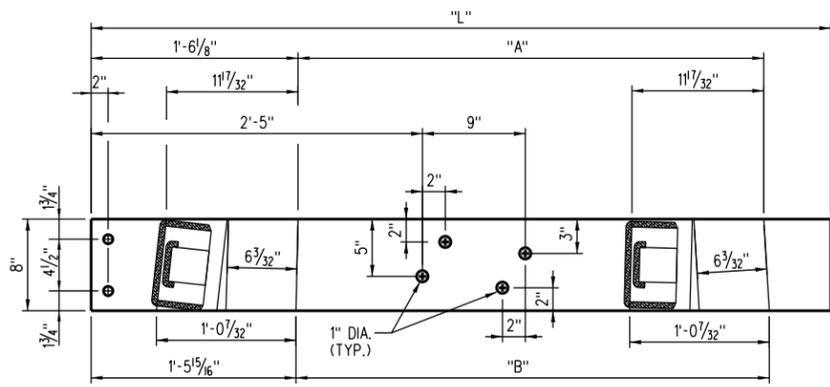
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
BRACE PLATE AND SLIDE PLATE DETAILS NO. 10, 136 LB. DOUBLE SLIP CROSSING		2902
SCALE: 1/2" = 1'-0"		SHEET
REVISION		13 OF 20
CADD FILE:		ES2902-13



**BRACE SLIDE PLATE**  
1" x 8" x "L" - (MILLED)

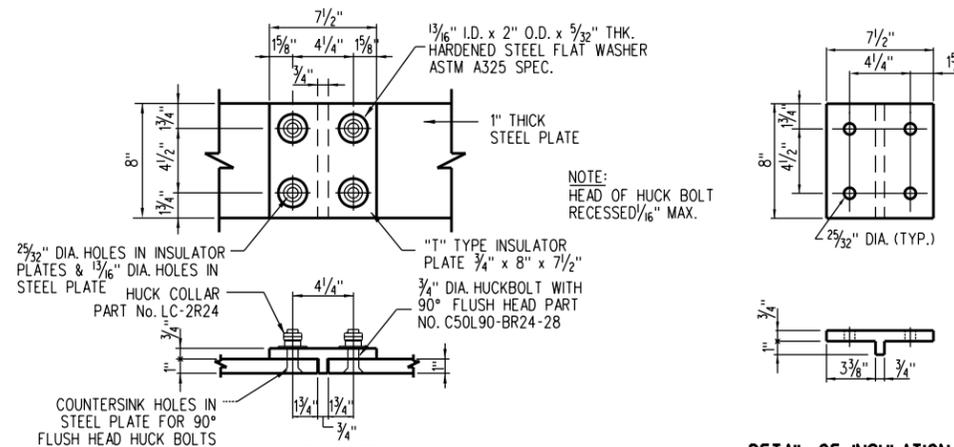
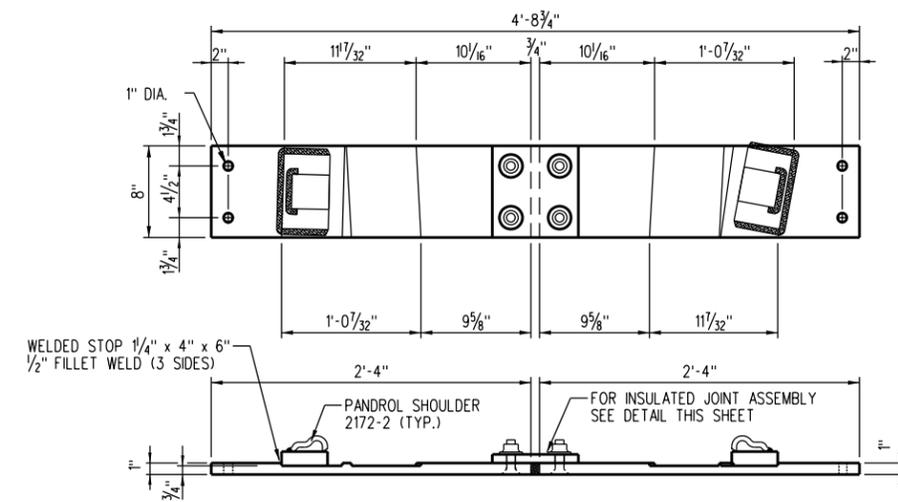
**BRACE SLIDE PLATE**  
1" x 8" x "L" - (MILLED)

DIMENSION TABLE				
PLATE	"A"	"B"	"L"	NUMBER REQUIRED
1-A	3'-4 3/4"	3'-5 7/16"	5'-4 3/4"	2
2-A	3'-3 3/8"	3'-3 3/4"	5'-4 1/4"	2
3-A	3'-1 1/4"	3'-2 1/4"	5'-3 3/4"	2

DIMENSION TABLE				
PLATE	"A"	"B"	"L"	NUMBER REQUIRED
1-B	3'-4 3/4"	3'-5 7/16"	5'-4 3/4"	2
2-B	3'-3 3/8"	3'-3 3/4"	5'-4 1/4"	2
3-B	3'-1 1/4"	3'-2 1/4"	5'-3 3/4"	2

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL & HAND OF TURNOUT (R.H. OR L.H.))
3. THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 DOUBLE SLIP CROSSING.



**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC #127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GPI52P05

**DETAIL "A"**  
**INSULATION AT GAGE PLATES**  
(SCALE: NONE)

**INSULATED SLIDE PLATE 5-C**  
1" x 8" - MILLED - (2 EACH REQ'D AS SHOWN)

**FOR MAINTENANCE ONLY**

**REFERENCE DRAWINGS**

LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

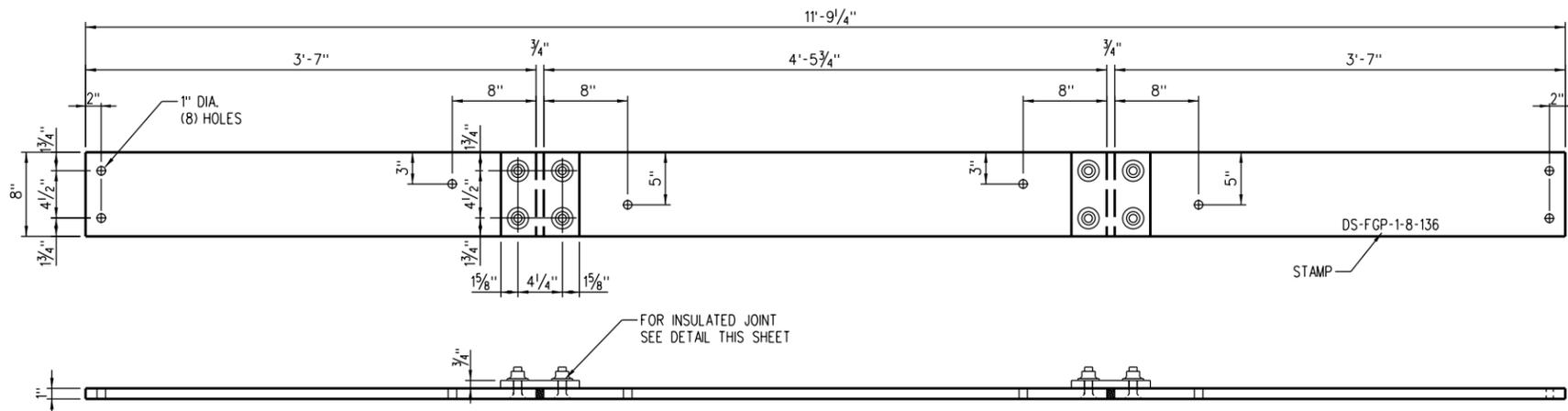
DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: STANDARDS & DESIGN  
*William D. Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

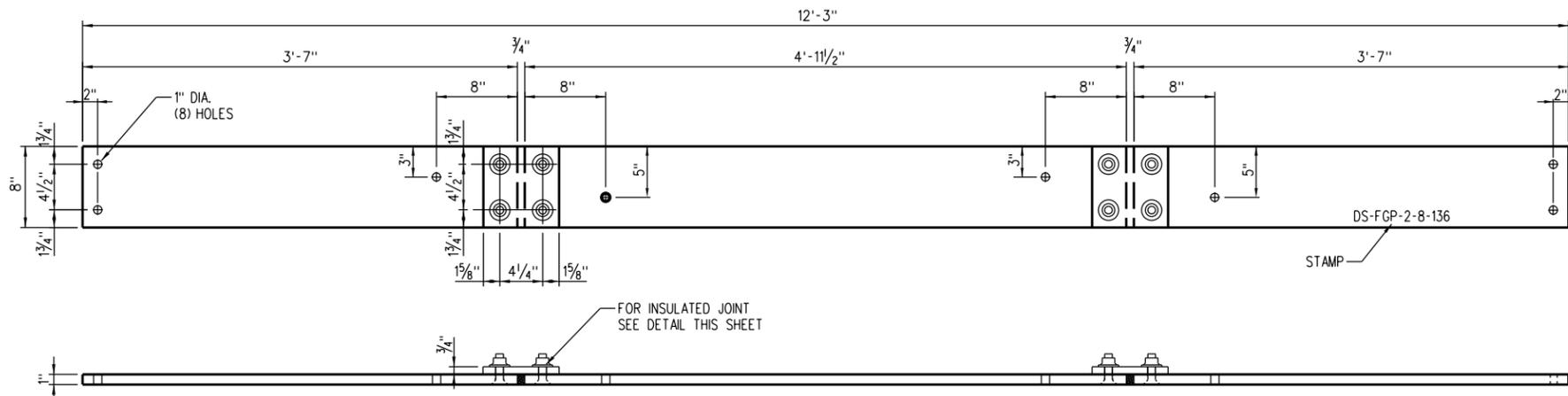
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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

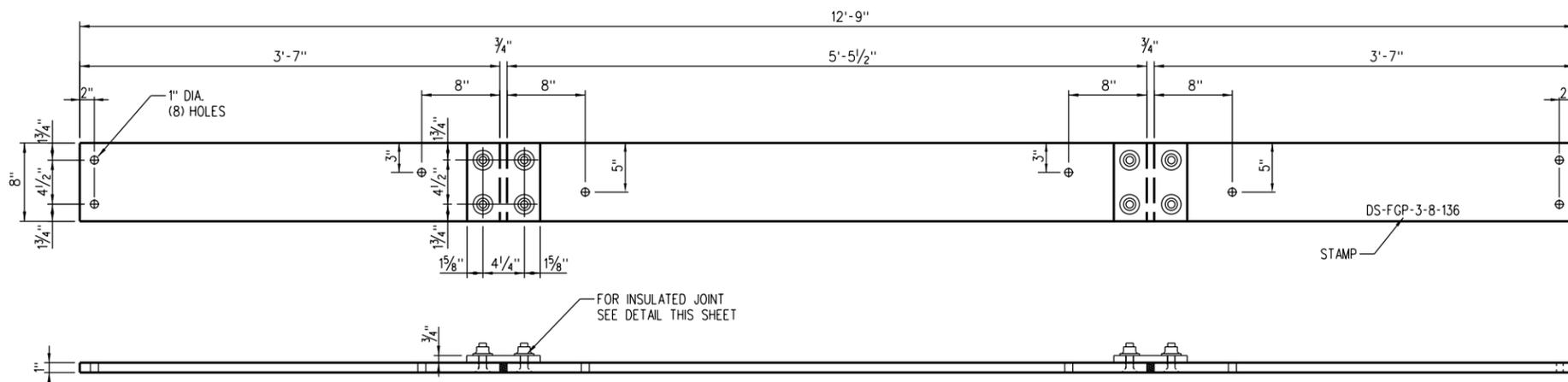
ENGINEERING STANDARDS		STANDARD	2902
BRACE SLIDE PLATES AND INSULATED SLIDE PLATE DETAILS NO. 10, 136 LB. DOUBLE SLIP CROSSING		SCALE:	1 1/2" = 1'-0"
		REVISION	SHEET 14 OF 20
		CADD FILE:	ES2902-14



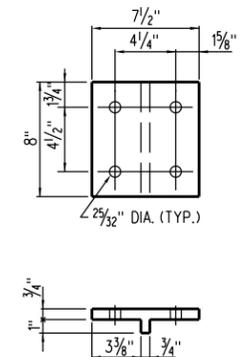
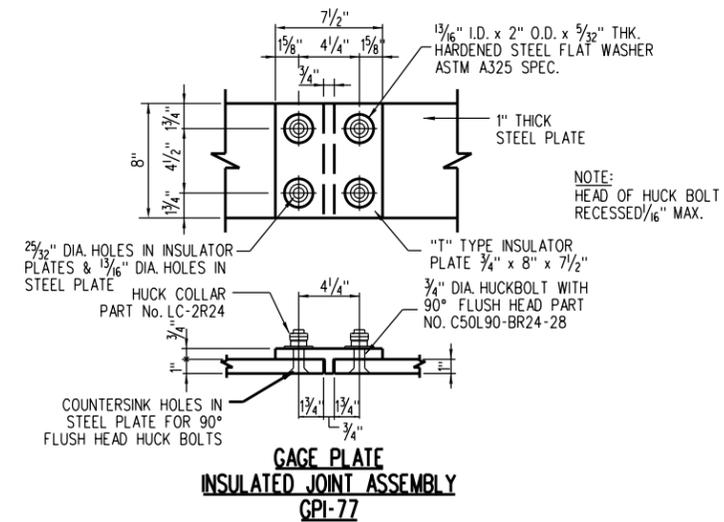
**INSULATED FROG GAGE PLATE FGP-1**  
1' x 8" - FLAT



**INSULATED FROG GAGE PLATE FGP-2**  
1' x 8" - FLAT



**INSULATED FROG GAGE PLATE FGP-3**  
1' x 8" - FLAT



**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC •127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GPI52P05

**DETAIL "A"**  
**INSULATION AT GAGE PLATES**  
(SCALE: NONE)

**FOR MAINTENANCE ONLY**

REFERENCE DWGS.  
LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

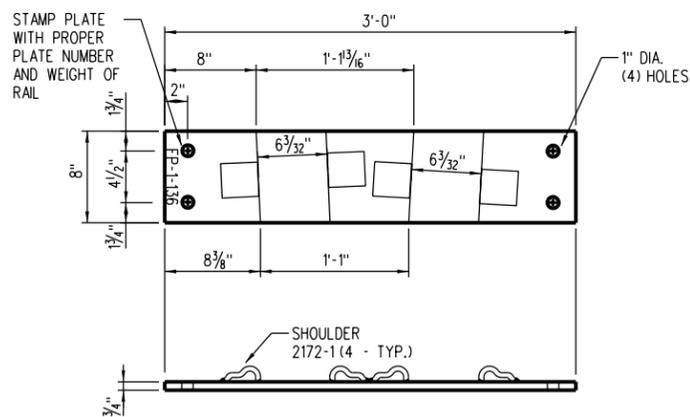
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Assistant Director: Standards & Design Director of Engineering and Construction				

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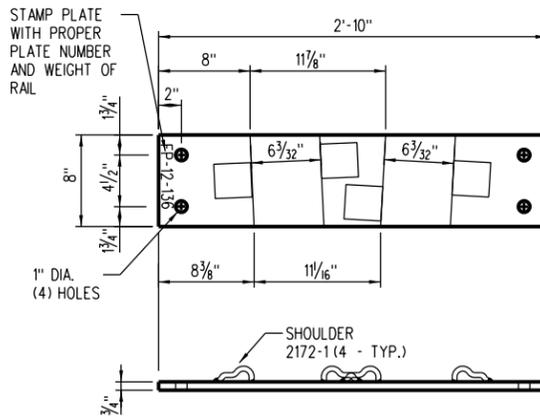
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
INSULATED FROG GAGE PLATE DETAILS  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

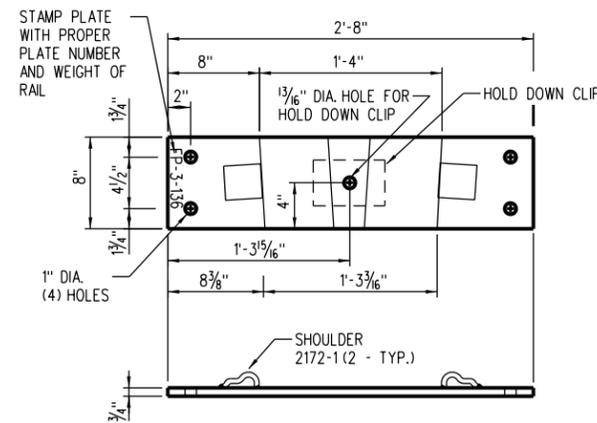
STANDARD	2902
SCALE:	1/2" = 1'-0"
REVISION	SHEET
-	15 OF 20
CADD FILE:	ES2902-15



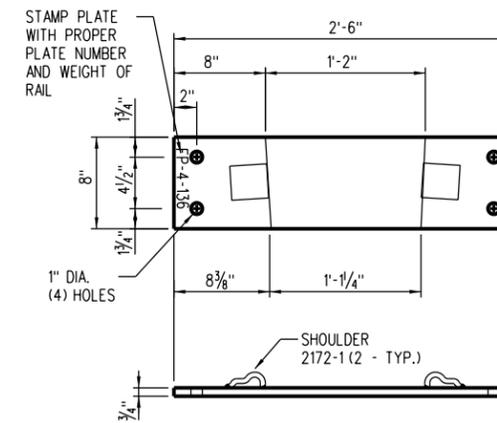
**FROG PLATE - F-1**  
 3/4" x 8" x 3'-0" LG. - FLAT  
 (2 REQUIRED)



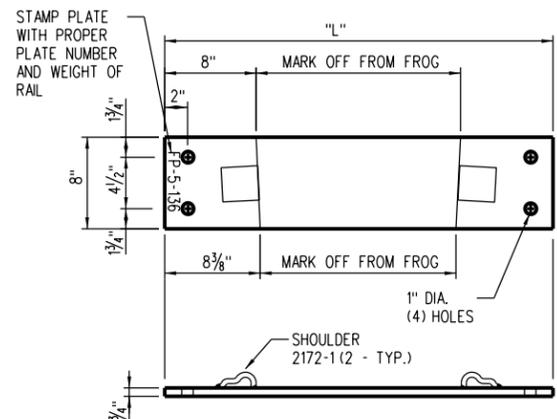
**FROG PLATE - F-2**  
 3/4" x 8" x 2'-10" LG. - FLAT  
 (2 REQUIRED)



**FROG PLATE - F-3**  
 3/4" x 8" x 2'-8" LG. - FLAT  
 (2 REQUIRED)

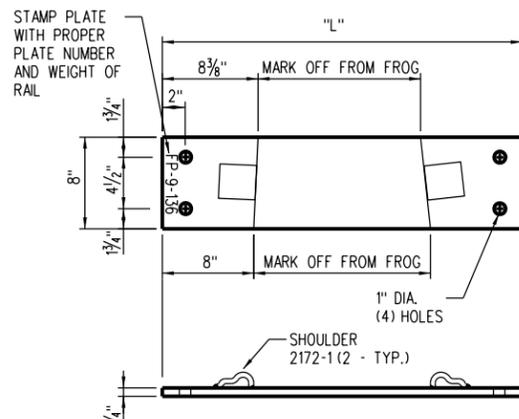


**FROG PLATE - F-4**  
 3/4" x 8" x 2'-6" LG. - FLAT  
 (2 REQUIRED)



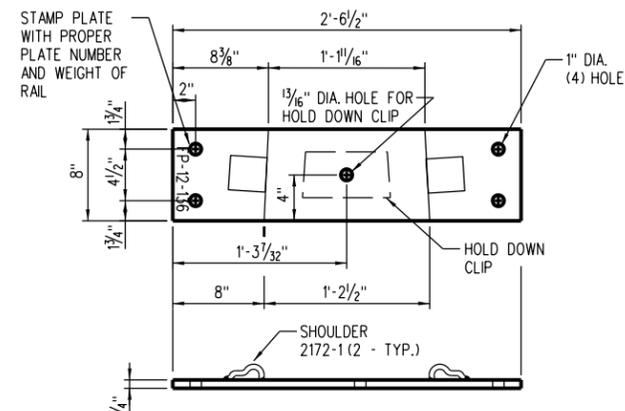
**FROG PLATE - F-5 THRU F-7 AND F-10**  
 3/4" x 8" - FLAT (SEE TABLE FOR LENGTHS)

DIMENSION TABLE		
PLATE	"L"	NO. REQ'D
F-5	3'-0 3/4"	2
F-6	2'-11 3/4"	2
F-7	2'-9 3/4"	2
F-10	2'-7 1/2"	2

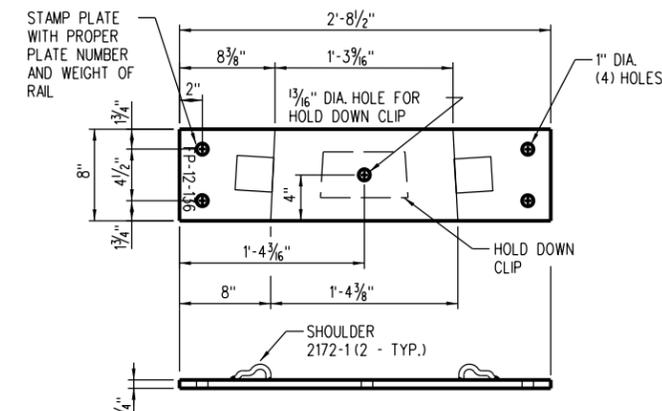


**FROG PLATE - F-8, F-9 AND F-11**  
 3/4" x 8" - FLAT (SEE TABLE FOR LENGTHS)

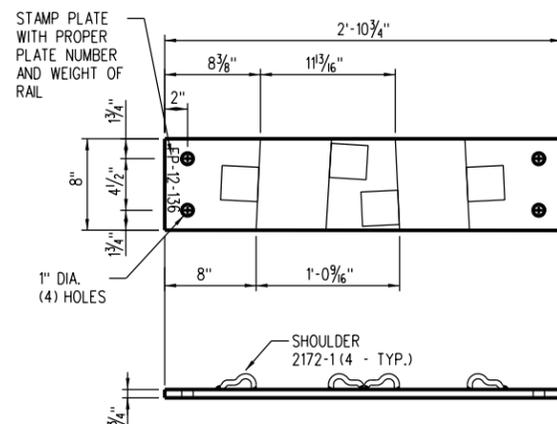
DIMENSION TABLE		
PLATE	"L"	NO. REQ'D
F-8	2'-8 1/2"	2
F-9	2'-10"	2
F-11	2'-4 1/4"	2



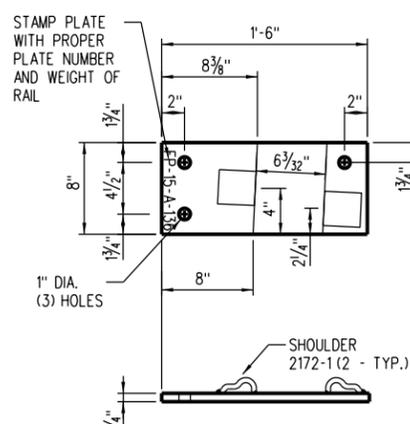
**FROG PLATE - F-12**  
 3/4" x 8" x 2'-6 1/2" - FLAT  
 (2 REQUIRED)



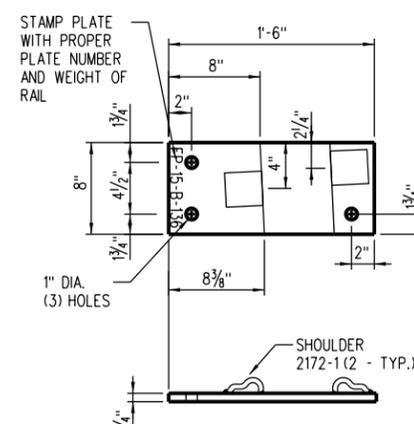
**FROG PLATE - F-13**  
 3/4" x 8" x 2'-8 1/2" - FLAT  
 (2 REQUIRED)



**FROG PLATE - F-14**  
 3/4" x 8" x 2'-10 3/4" LG. - FLAT  
 (2 REQUIRED)



**FROG PLATE - F-15-A**  
 3/4" x 8" x 1'-6" LG. - FLAT  
 (2 REQUIRED)



**FROG PLATE - F-15-B**  
 3/4" x 8" x 1'-6" LG. - FLAT  
 (2 REQUIRED)

**FOR MAINTENANCE ONLY**

REFERENCE DWGS.

LAYOUT - No.10, DOUBLE SLIP CROSSING - 136 lb. ----- SHEET No. 2902-02

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

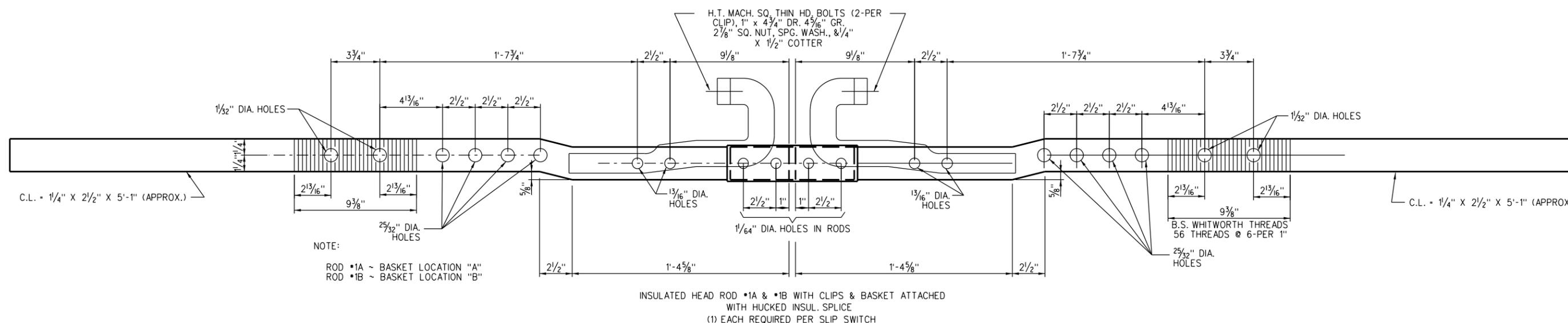
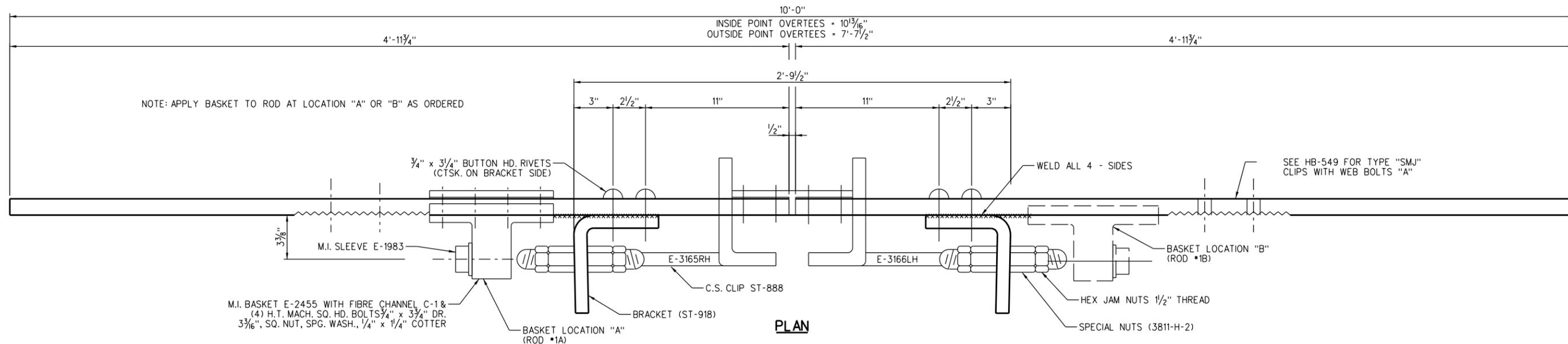
DRAWN BY: A. CARLOS DATE: 03/31/2011  
 Assistant Director: STANDARDS & DESIGN  
 Director of Engineering and Construction

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 FROG PLATE DETAILS  
 NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD 2902  
 SCALE: 1/2" = 1'-0"  
 REVISION SHEET 16 OF 20  
 CADD FILE: ES2902-16



**INSULATION MATERIAL CONSISTS OF:**

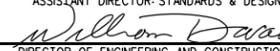
- (1) FIBRE CHANNEL C-1
- (2) FIBRE ANGLE PLATE AP-34
- (4) FIBRE BUSHINGS B-11
- (1) STEEL SPLICE PLATE ST-684
- (1) STEEL CHANNEL ST-568
- (4) 3/4" HUCK BOLTS C50LR-BR24-36
- (4) HUCK COLLARS LC2R-24G

**SWITCH INFORMATION**

GAGE = 4'-8 5/8"  
 THROW AT POINT = 4" MIN. ~ 4 1/2" MAX.  
 "E" DIST. = 1 9/32"  
 PT. = 0" SAMSON.  
 REINF. = 1/2" "D" BOTH SIDES (SLOT 1/4" STK. SIDE).  
 ROD SPACING = 17".  
 BREAK ALL SHARP CORNERS.  
 DEBURR ALL HOLES.

**FOR MAINTENANCE ONLY**

STAMP RODS WITH "RESP. ROD. #, 136RE, #8 DSS"

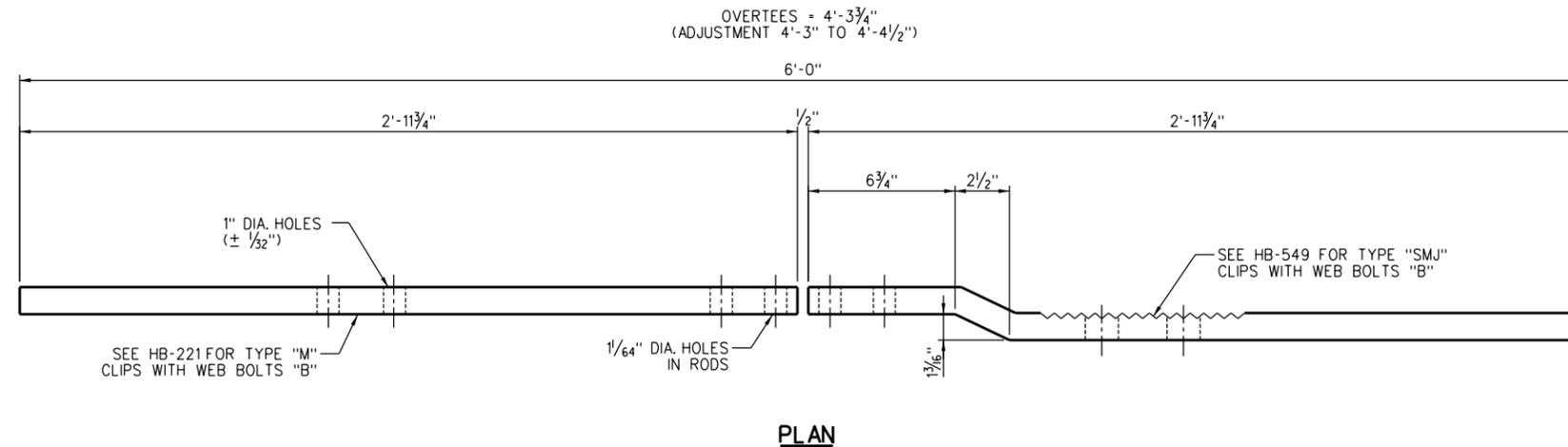
DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<b>METROLINK</b>		ENGINEERING STANDARDS		STANDARD 2902	
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY		ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012		INSULATED HEAD ROD NO.1 FOR END POINTS NO. 10, 136 LB. DOUBLE SLIP CROSSING		SCALE: 3" = 1'-0"	
REVISION		XX XX		REVISION		SHEET		-		17 OF 20	
REV. DATE DESCRIPTION DES. ENG.										CADD FILE: ES2902-17	

**INSULATION MATERIAL CONSISTS OF:**

- (1) FIBRE CHANNEL C-1.
- (2) FIBRE ANGLE PLATE AP-34.
- (4) FIBRE BUSHINGS B-11.
- (1) STEEL SPLICE PLATE ST-684.
- (1) STEEL CHANNEL ST-568.
- (4) 3/4" HUCK BOLTS C50LR-BR24-36.
- (4) HUCK COLLARS LC2R-24G.

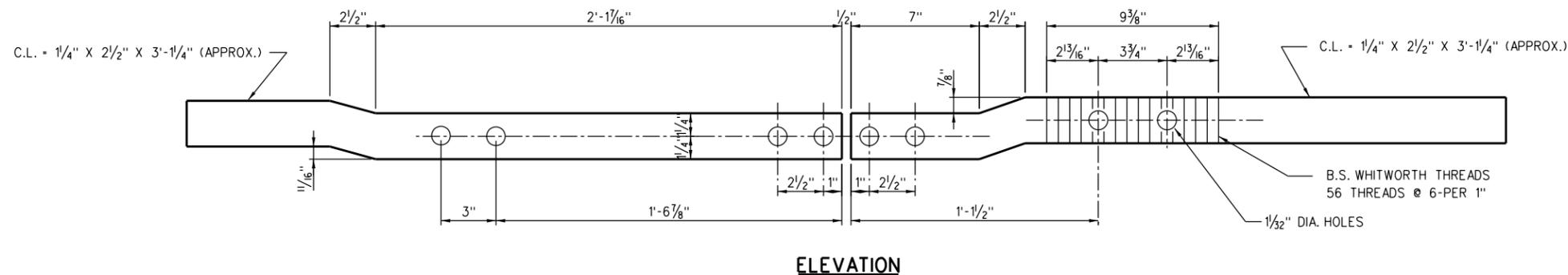
**SWITCH INFORMATION**

- GAGE = 4'-8 5/8"
- THROW AT POINT = 4" MIN. ~ 4 1/2" MAX.
- "E" DIST. = 1 9/32"
- PT. = 0" SAMSON
- REINF. = 1/2" "D" BOTH SIDES (SLOT 1/4" STK. SIDE NO. 2 ROD ONLY)
- ROD SPACING = 17" x 19 1/2" (\*2 ROD ONLY)
- ROD SPACING = 17" x 3'-6" (\*3 ROD ONLY)



**NOTE:**

TYPE "M" CLIP MUST BE WELDED TO ROD ALONG BOTH SIDES OF BOTTOM CLIPS



INSULATED SPREA RODS NO. 2 OR 3 WITH CLIPS AND BOLTS ATTACHED WITH HUCKED INSULATED SPLICE, (2) EACH REQUIRED PER SLIP SWITCH  
STAMP ROD WITH "RESP. NO., 136RE, \*10 DSS"

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
*Nareh D. Papp*

Director of Engineering and Construction  
*William Dava*

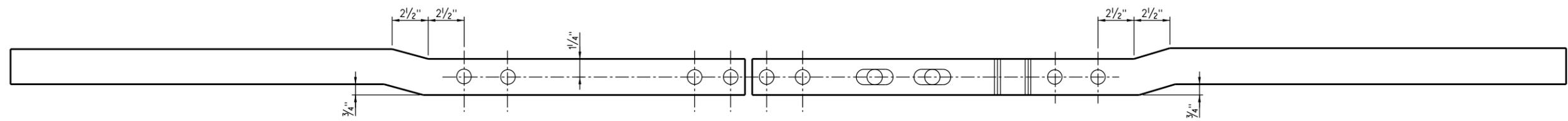
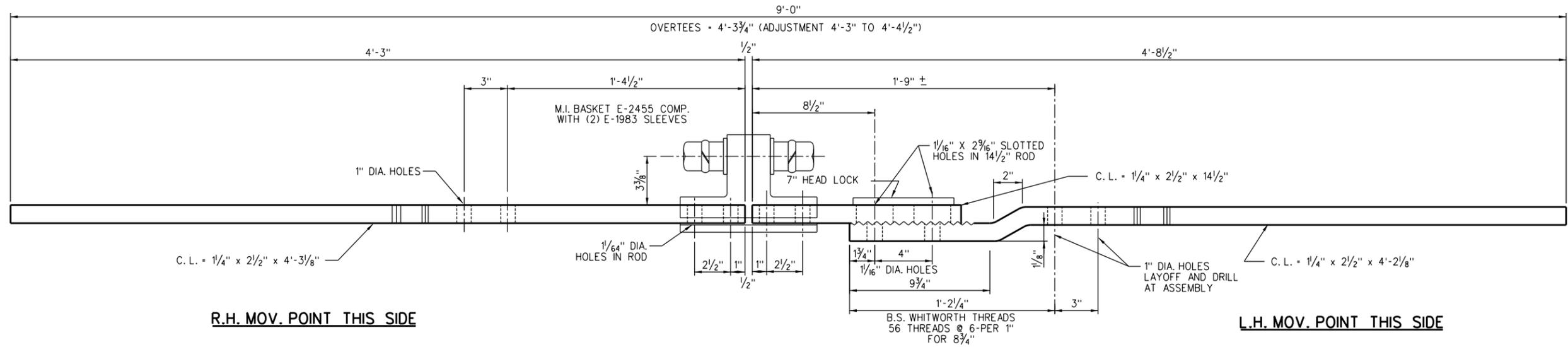
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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

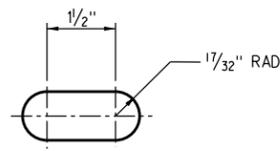
ENGINEERING STANDARDS

INSULATED SPREAD RODS  
NO. 2 & 3 FOR END POINTS  
NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	3" = 1'-0"
REVISION SHEET	18 OF 20
CADD FILE:	ES2902-18

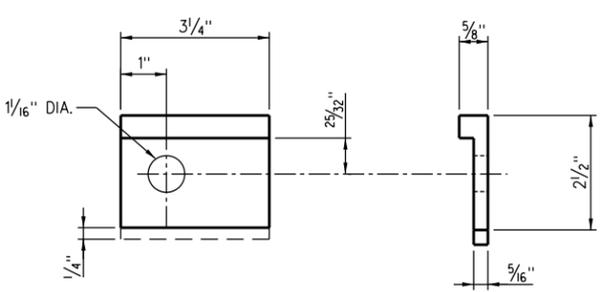


**NO. 4 HEAD ROD**  
(TWO REQUIRED PER CROSSING)  
(SCALE: 3" = 1'-0")

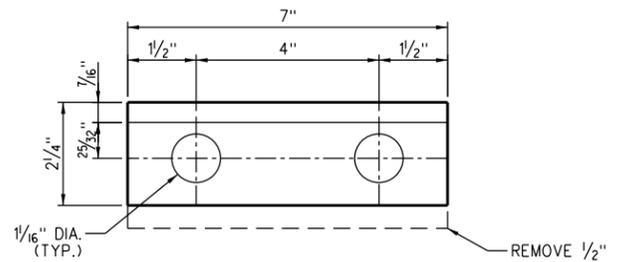


**SLOTTED HOLE DETAIL**  
(1/16" x 2 9/16")  
(SCALE: NONE)

**FOR MAINTENANCE ONLY**

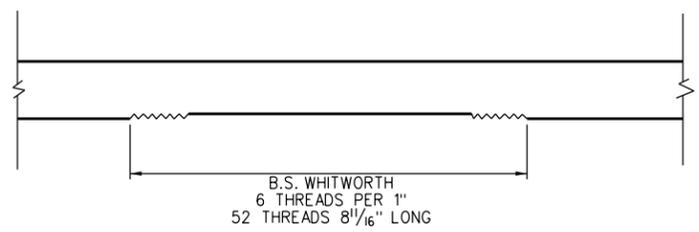


**ROLLED HEADLOCK DETAIL**  
3/4" LG. (BETH. STL. PT. NO. 834-0306)  
(2) PCS. AS SHOWN FOR CLIP, L.H. MOV. POINT  
(2) PCS. OPP. HAND FOR CLIP, R.H. MOV. POINT  
(SCALE: NONE)



**ROLLED HEADLOCK 7" LONG**  
(BETH. STEEL PT. NO. 834-0306)  
(1) PIECE PER ROD.  
(SCALE: NONE)

FURNISH: (2) H.T. MACH. SQ. HD. BOLTS, 1" X 4 1/2"  
DR. 4 1/16" GR. 2 9/16", EA. WITH SLOTTED HEX NUT  
PER BP-10003-BN, SPRING WASHER (N.C.G.)  
& 1/4" X 1 3/4" COTTER



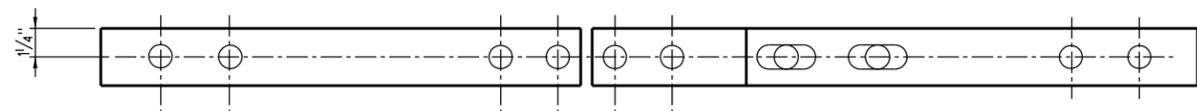
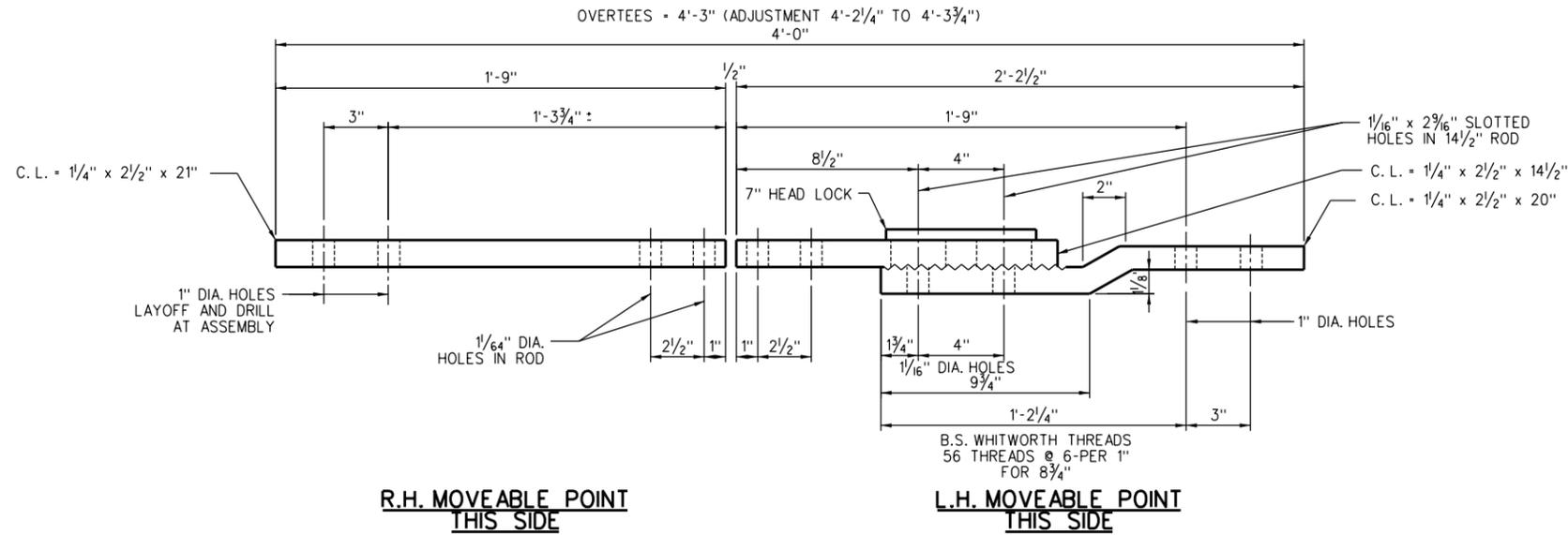
**DETAIL OF SERRATIONS**  
(FOR 1 1/2" LONG STRAIGHT &  
4'-2 1/8" LONG BENT PIECE)  
(SCALE: NONE)

**NOTE:**  
STAMP RODS WITH "RESP. ROD. • 136RE. • 10 DSS"

**INSULATION MATERIAL**  
PER SRI-30 WITH COTTER, SLEEVE NUT  
W/O 1/4" SPACING WASHERS & 1/4" HEX NUTS.  
TYPE "M" CLIP MUST BE WELDED TO ROD ALONG  
BOTH SIDES OF BOTTOM OF CLIPS.  
DEBURR ALL HOLES.

**SWITCH INFORMATION**  
GAGE = 4'-8 3/16"  
THROW AT POINT = 4"  
"E" DIST. = 1 7/32"  
POINT = 3/16"  
REINF. = 1/2" "D" GAGE SIDE  
ROD SPACING = 15"  
HEEL SPREAD = 7 1/2"

DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>		ENGINEERING STANDARDS		STANDARD					
				INSULATED HEAD ROD NO. 4 FOR MOVEABLE CENTER POINTS NO. 10, 136 LB. DOUBLE SLIP CROSSING				2902							
<p>ASSISTANT DIRECTOR: STANDARDS &amp; DESIGN</p>		<p>DIRECTOR OF ENGINEERING AND CONSTRUCTION</p>				SCALE:	AS NOTED								
<table border="1"> <tr> <td>X</td> <td>XX-XX-XX</td> <td>REVISION</td> <td>XX</td> <td>XX</td> </tr> <tr> <td>REV.</td> <td>DATE</td> <td>DESCRIPTION</td> <td>DES.</td> <td>ENG.</td> </tr> </table>		X	XX-XX-XX	REVISION	XX	XX	REV.	DATE	DESCRIPTION	DES.	ENG.			REVISION SHEET	19 OF 20
X	XX-XX-XX	REVISION	XX	XX											
REV.	DATE	DESCRIPTION	DES.	ENG.											
				CADD FILE:	ES2902-19										



**INSULATED SPREAD ROD NO. 5**  
 (2) REQUIRED PER SLIP SWITCH  
 WITH HUCKED INSULATED SPLICE  
 (SCALE: 3" = 1'-0")

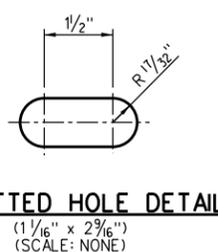
**NOTE:**  
 STAMP RODS WITH "RESP. ROD. • 136RE. •10 DSS"

- INSULATION MATERIAL**
- (1) FIBRE CHANNEL C-1.
  - (2) FIBRE ANGLE PLATE AP-34.
  - (4) FIBRE BUSHINGS B-11.
  - (1) STEEL SPLICE PLATE ST-684.
  - (1) STEEL CHANNEL ST-568.
  - (4) 3/4" HUCK BOLTS C50LR-BR24-36.
  - (4) HUCK COLLARS LC2R-24C.

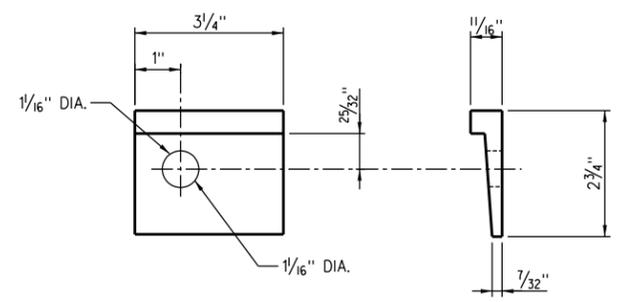
- SWITCH INFORMATION**
- GAGE = 4'-8 5/16"
  - THROW AT POINT = 4"
  - "E" DIST. = 1' 2 1/32"
  - POINT = 3/16"
  - REINF. = 1/2" "D" GAGE SIDE
  - ROD SPACING = 15" x 21"
  - HEEL SPREAD = 7 1/2"

TYPE "M" CLIP MUST BE WELDED TO ROD ALONG BOTH SIDES OF BOTTOM OF CLIPS. DEBURR ALL HOLES.

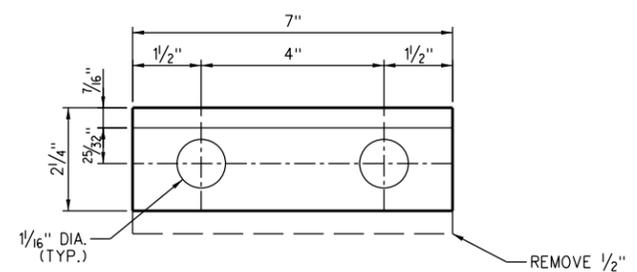
**FOR MAINTENANCE ONLY**



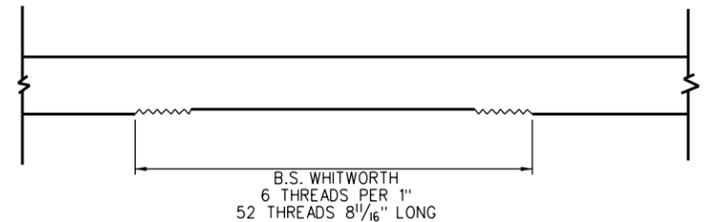
**SLOTTED HOLE DETAIL**  
 (1 1/16" x 2 5/16")  
 (SCALE: NONE)



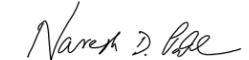
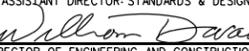
**ROLLED HEADLOCK DETAIL**  
 3/4" LG. (BETH. STL. PT. NO. 834-0305)  
 (2) PCS. AS SHOWN FOR CLIP, R.H. MOV. POINT  
 (2) PCS. OPP. HAND FOR CLIP, L.H. MOV. POINT  
 (SCALE: NONE)



**ROLLED HEADLOCK 7" LONG**  
 (BETH. STEEL PT. NO. 834-0306)  
 (1) PC. PER ROD  
 (SCALE: NONE)  
 FURNISH: (2) H.T. MACH. SQ. HD. BOLTS, 1" x 4 1/2"  
 DR. 4 1/16" GR. 2 5/8", EA. WITH SLOTTED HEX NUT  
 PER BP-10003-BN, SPRING WASHER (N.C.G.)  
 & 1/4" x 1 3/4" COTTER



**DETAIL OF SERRATIONS**  
 (FOR 1 1/2" LONG STRAIGHT & 20" LONG BENT PIECE)  
 (SCALE: NONE)

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

INSULATED HEAD ROD NO. 5  
 FOR MOVEABLE CENTER POINTS  
 NO. 10, 136 LB. DOUBLE SLIP CROSSING

STANDARD	2902
SCALE:	AS NOTED
REVISION SHEET	20 OF 20
CADD FILE:	ES2902-20

EQUIVALENT CURVE DATA	
CURVE	9.5077'
RADIUS	602.62'
DELTA	7.152'
TANGENT (T)	37.66'
LENGTH (L)	75.22'
EXTERNAL	1.17'

CROSSOVER DATA	
LEAD	68.000'
PC TO PS	7.66'
PS TO PI	30.00'
PI TO 1/2" PF	38.00'
LENGTH OF TURNOUT	97.43'
PS TO PT	67.57'

FROG DATA	
FROG NUMBER	8
FROG ANGLE	7° -09' -10"

SWITCH DATA	
SWITCH LENGTH	16'-6"
HEEL SPREAD	6 1/4"
HEEL ANGLE	N/A
SWITCH ANGLE	1° -44' -11"
RADIUS OF CENTER LINE - SWITCH	N/A
TANGENT LENGTH SWITCH	N/A
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	N/A
DEGREE OF CURVE - SWITCH	N/A

TURNOUT DATA	
RADIUS OF CENTER LINE - TURNOUT	487.28'
TANGENT LENGTH - TURNOUT	23.0'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	5° -24' -46"
DEGREE OF CURVE - TURNOUT	11° -46' -44"

CROSSOVER DATA TABLE									
A	B	C	X	Y	2L+X	2L+X-2(PC-PS)	PS TO PS	U	V
13	104.42	103.60	29.10	178.92	179.54	164.23	163.61	27.61	28.42
14	112.45	111.57	37.13	186.89	187.57	172.26	171.58	35.58	36.45
15	120.48	119.54	45.16	194.86	195.61	180.29	179.55	43.55	44.48
16	128.51	127.51	53.19	202.83	203.64	188.32	187.52	51.52	52.51
17	136.54	135.48	61.22	210.80	211.67	196.35	195.49	59.49	60.54
18	144.58	143.45	69.26	218.77	219.70	204.39	203.46	67.46	68.58
19	152.61	151.42	77.29	226.74	227.73	212.42	211.43	75.43	76.61
20	160.64	159.39	85.32	234.71	235.77	220.45	219.40	83.40	84.64
21	168.67	167.36	93.35	242.68	243.80	228.48	227.36	91.36	92.67
22	176.70	175.33	101.38	250.65	251.83	236.51	235.33	99.33	100.70
23	184.74	183.30	109.41	258.62	259.86	244.55	243.30	107.30	108.74
24	192.77	191.27	117.45	266.59	267.93	252.58	251.27	115.27	116.77
25	200.80	199.24	125.48	274.56	275.93	260.61	259.24	123.24	124.80
26	208.83	207.21	133.51	282.53	283.96	268.64	267.21	131.21	132.83
27	216.86	215.18	141.54	290.50	291.99	276.67	275.18	139.18	140.86
28	224.90	223.15	149.57	298.47	300.02	284.71	283.15	147.15	148.90
29	232.93	231.12	157.61	306.44	308.05	292.74	291.12	155.12	156.93
30	240.96	239.09	165.64	314.41	316.09	300.77	299.09	163.09	164.96
31	248.99	247.05	173.67	322.38	324.12	308.80	307.06	171.06	172.99
32	257.02	255.02	181.70	330.35	332.15	316.83	315.03	179.03	181.02

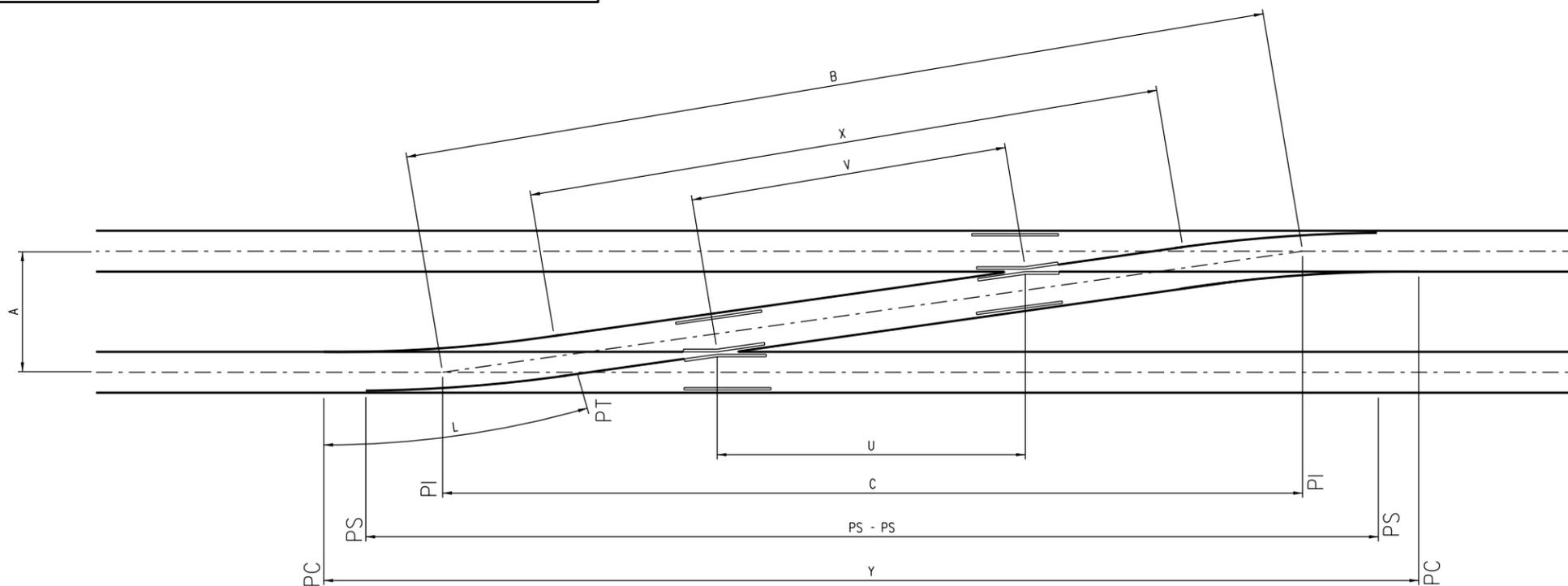
**DRAWING INDEX**

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**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2911-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4"-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2911-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2911-05.
- TIE PLATES SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2454.
- SCREW SPIKES (5/16" X 6-2 TPI) SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2357. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 3/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2911-10 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ES2911-11 AND ES2911-12.
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 8 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2911-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRRA NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND DRAWING ES2911-09.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).

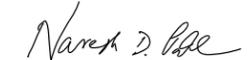
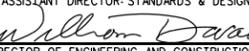
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**CROSSOVER LAYOUT**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY:	A. CARLOS	DATE:	03/31/2011
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION	

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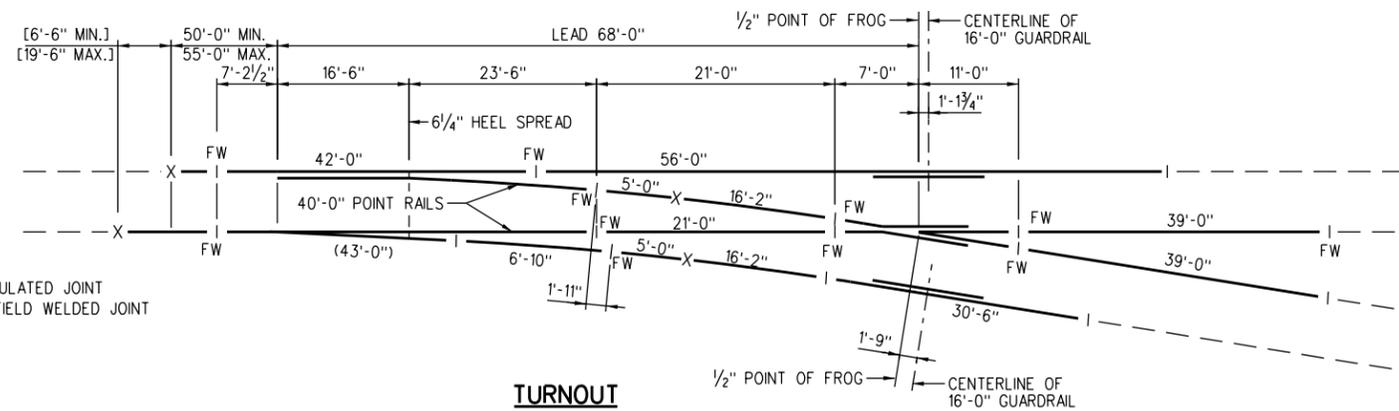
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 8 136 LB. R.H. RBM FROG  
 TURNOUT AND CROSSOVER  
 GENERAL NOTES AND DATA

STANDARD	2911
SCALE:	NONE
REVISION SHEET	- 1 OF 16
CADD FILE:	ES2911-01

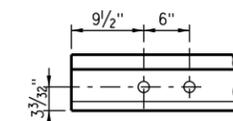
**NOTES:**

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL, STRESS - FREE CONDITION OF 110° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD - ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT RAIL LENGTH.
2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DISCRPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS; AT LOCATION "A" THE 20'-5" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 12'-5" OF THE LIGHTER RAIL. AT LOCATION "B" THE 18'-0" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 11'-0" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING: (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD. (B.) ALL OTHER RAILS SHALL BE 39'-0" AND SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A".
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HIGH STRENGTH" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSABLE, WITH (+ OR -).
7. ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
8. INSULATED JOINT MUST BE INTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
9. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT.
10. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS [0'-0"].
11. WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.



X - INSULATED JOINT  
FW - FIELD WELDED JOINT

**TURNOUT**



**DETAIL "A"**

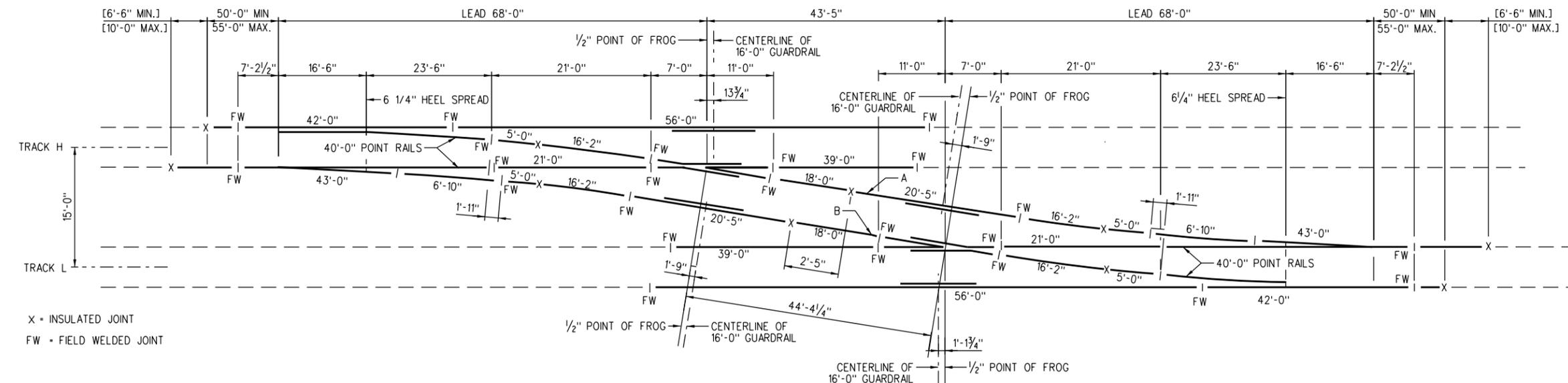
SEE NOTE 4 (b)  
(DRILLED HOLES NOT NECESSARY IF TEMPORARY BOLTED JOINTS ARE NOT REQUIRED)

**21'-2" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD

**38'-5" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



X - INSULATED JOINT  
FW - FIELD WELDED JOINT

**CROSSOVER**  
15'-0" TRACK CENTERS

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 08X30X20M  
*Nareh D. Pae*  
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*William Davan*  
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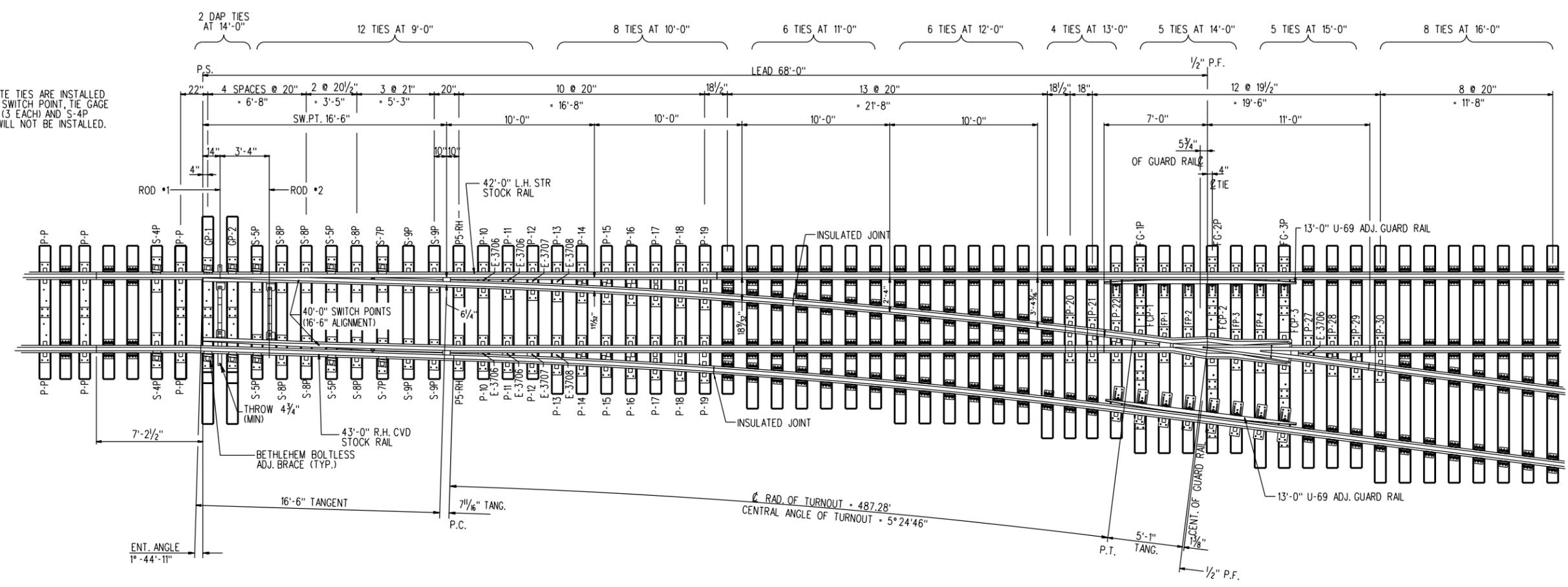
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 8 136 LB. R.H. RBM FROG  
TURNOUT AND CROSSOVER  
JOINTS LOCATIONS

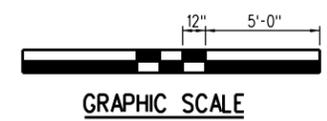
STANDARD	2911
SCALE:	NONE
REVISION SHEET	- 2 OF 16
CADD FILE:	ES2911-02

- NOTES:**
1. SEE SHEET NO. 1 FOR NOTES AND TURNOUT DATA
  2. SEE SHEET NO. 4 FOR BILL OF MATERIALS
  3. SEE SHEET NO. 5 FOR CROSSOVER

**NOTE:**  
IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, TIE GAGE PLATE PP (3 EACH) AND S-4P (2 EACH) WILL NOT BE INSTALLED.



**NO. 8 RIGHT HAND TURNOUT**



**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

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*William Dava*  
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ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 8 136 LB. R.H. RBM FROG TURNOUT LAYOUT

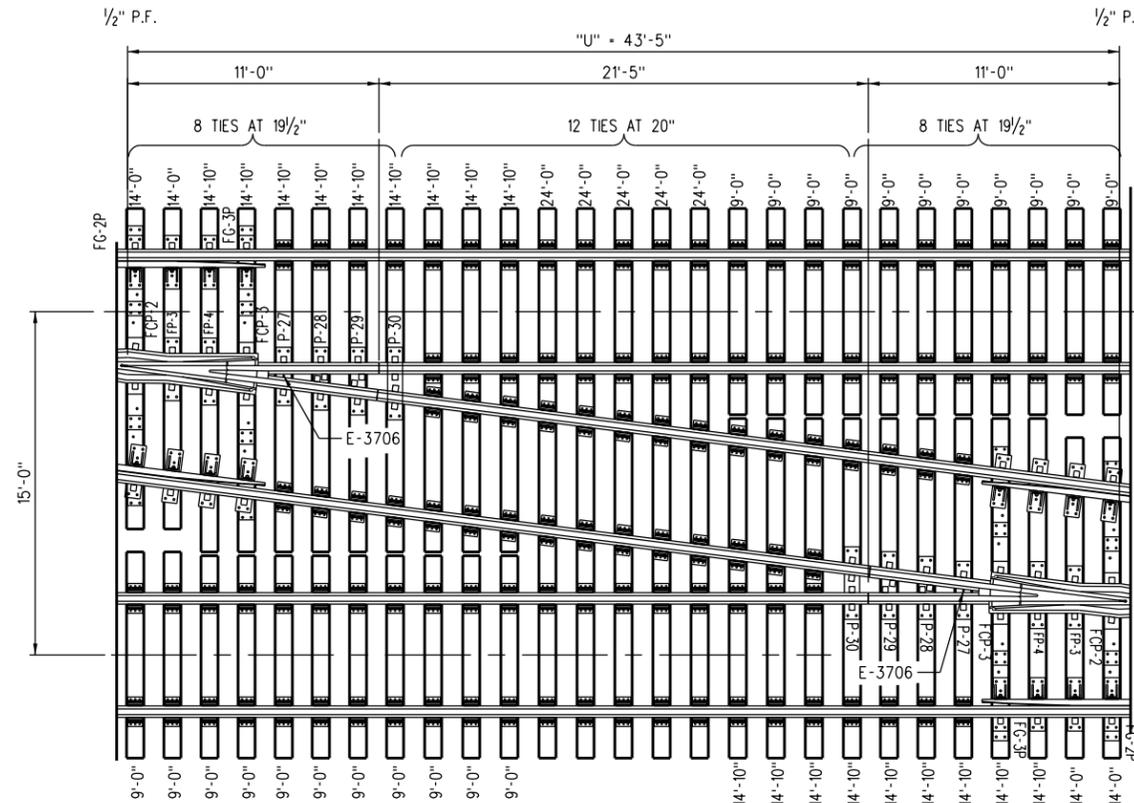
STANDARD	2911
SCALE	1/4" = 1'-0"
REVISION SHEET	- 3 OF 16
CADD FILE	ES2911-03



**NOTES:**

- SEE SHEET 2911-01 FOR NOTES.
- SEE SHEET 2911-03 FOR NO. 8 R. H. RAIL BOUND MANGANESE FROG TURNOUT.
- CROSSOVER FOR 15'-0" TRACK CENTERS IS SHOWN. FOR 16'-0" OR GREATER TRACK CENTERS, USE TWO TURNOUTS PER ES2911-03. FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS DETAILING RAIL AND TIE LAYOUT AND DIMENSIONS THAT FOLLOW THESE EXAMPLES.

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
2 EACH	R.H. CURVED SAMSON STOCK RAILS 43'-0"
2 EACH	L.H. STRAIGHT SAMSON STOCK RAILS 42'-0"
2 EACH	21'-0" RAIL (STRAIGHT)
2 EACH	56'-0" RAIL (STRAIGHT)
2 EACH	6'-10" RAIL (CURVED)
2 EACH	39'-0" RAIL (STRAIGHT)
2 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. GP-1 AND GP-2
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P5-RH
4 EACH	TURNOUT PLATES P-10-R THRU P-19-R
2 EACH	PLATES P-20-R THRU P-22-R & P-27-R THRU P-30-R
2 EACH	No. 8 R.B.M. FROG ~ 18'-0"
2 EACH	FROG PLATES No. FP-1-R THRU FP-4-R
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FGP-1 THRU FGP-3
4 EACH	13'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
384 PCS.	PANDROL SCREW SPIKES 15/16" DIA. X 6" No. 5760
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
192 PCS.	"PANDROL", OR EQUAL, CLIP TYPE E-2055 (GALVANIZED)
24 PCS.	"PANDROL", OR EQUAL, CLIP TYPE E-2063 (GALVANIZED)
96 PCS.	SCRRA ES1406 "PANDROL", OR EQUAL, "E"- CLIP 6" TIE PLATE
4 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (21'-2")
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (38'-5")



**NO. 8 RIGHT HAND CROSSOVER**

CROSSOVER DATA	
FROG NUMBER	8
FROG ANGLE	7° -09'-10"
FROG LENGTH	18'-0"
FROG TOE LENGTH	7'-0"
FROG HEEL LENGTH	11'-0"
SWITCH POINT LENGTH 40'-0"	16'-6" AL.
HEEL SPREAD OF SWITCH	6/4"
SWITCH ANGLE	1° -44'-11"
LEAD	68'-0"
RADIUS OF TURNOUT CURVE C/L	487.28'
DEGREE OF TURNOUT CURVE C/L	11° -46'-44"
CENTRAL ANGLE OF TURNOUT CURVE	5° -24'-46"
STRAIGHT CLOSURE LENGTH	44'-6"
CURVED CLOSURE LENGTH	44'-8 1/8"

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
46	7" x 9"	9'-0"	2173.50
16	7" x 9"	10'-0"	840.00
12	7" x 9"	11'-0"	693.00
12	7" x 9"	12'-0"	756.00
8	7" x 9"	13'-0"	546.00
10	7" x 9"	14'-0"	735.00
4	10" x 9"	14'-0"	294.00
16	7" x 9"	14'-10"	1260.00
5	7" x 9"	24'-0"	630.00
TOTAL			TOTAL
129			7927.50

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Pappas*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

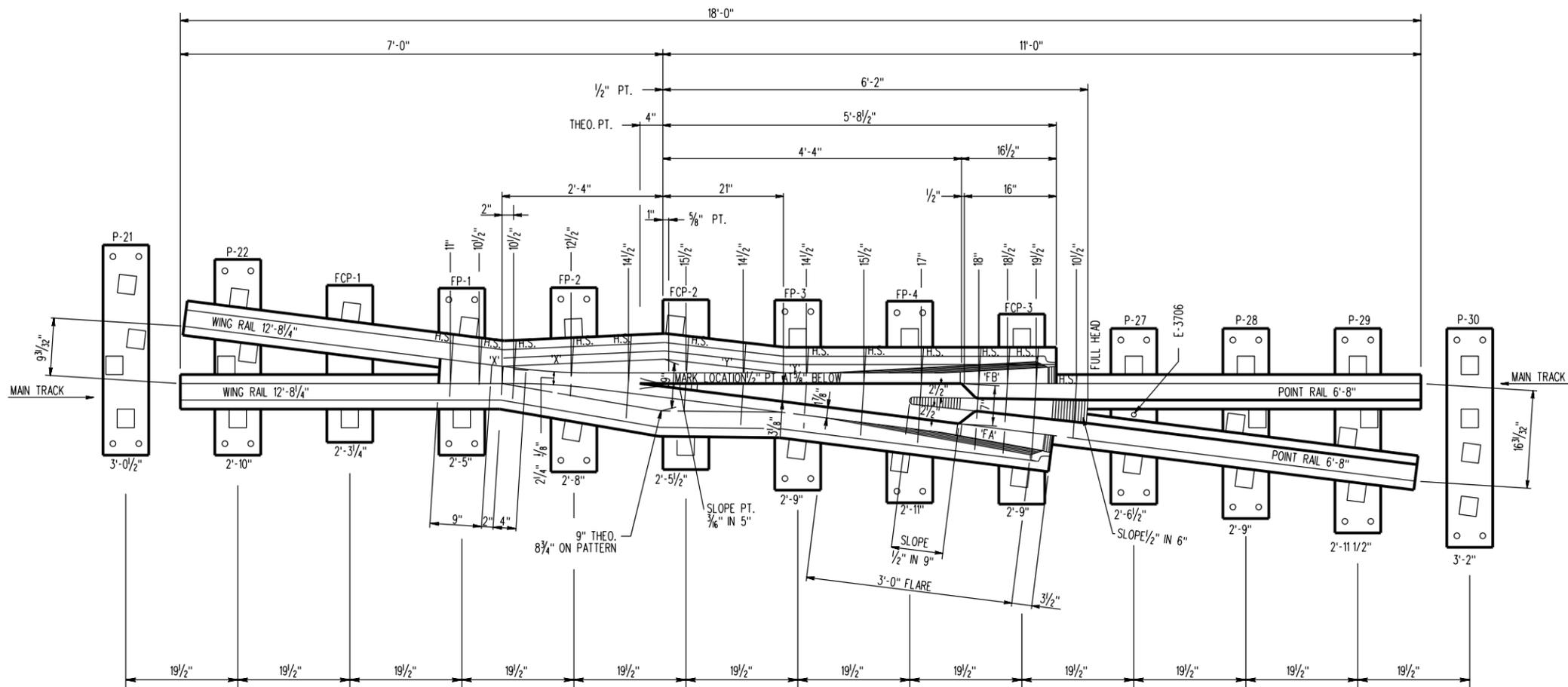
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ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 8 136 LB. R.H. RBM FROG CROSSOVER  
LAYOUT AND BILL OF MATERIALS

STANDARD	2911
SCALE:	1/4" = 1'-0"
REVISION SHEET	5 OF 15
CADD FILE:	ES2911-05



**No. 8 RAILBOUND MANGANESE STEEL FROG  
WITH PANDROLIZED PLATES  
R.H. TURNOUT SHOWN - LH OPPOSITE PLATE ORIENTATION**

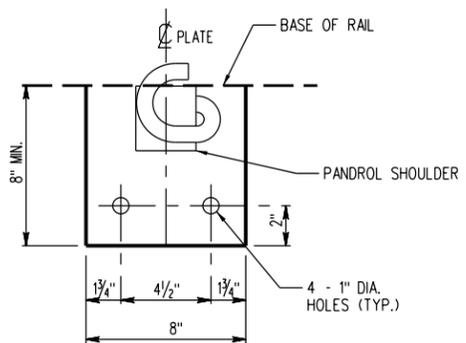
**NOTES:**

1. FROG ANGLE 7°-09'-10".
2. RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
3. RAIL BOUND MANGANESE STEEL FROG PER CURRENT AREMA PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT AREMA SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH "PANDROL" FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES FP-1 THRU FP-4 AND PCP-1 THRU FCP-3 SEE SHEET ES2911-07. FOR PLATES P-21, P-22 AND P-27 THRU P-30 SEE SHEET ES2911-16.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK, EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT AREMA RECOMMENDED PRACTICES.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS 1 1/8" DIA., H.T.C.S. - PER AREMA SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER AREMA SPECIFICATIONS.
11. PLATES TO BE MADE OF MILD ROLLED STEEL.
12. THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 8, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
13. THE "PANDROL" TYPE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD ROLLED STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING "PANDROL'S" DESIGN SPECIFICATIONS. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" x FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
14. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FCP-1, FCP-2 AND FCP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" x FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
15. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" x FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
16. IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
17. RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.

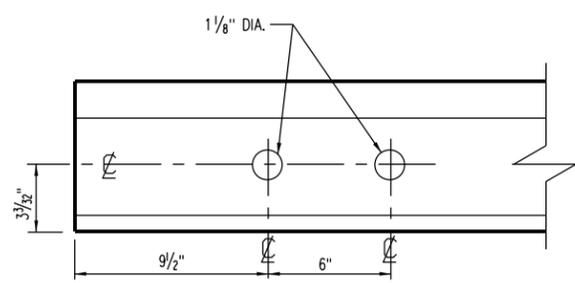
**WELDING OF GAGE PLATE & GUARD RAIL:**

1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" x FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE, 5/32" INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE, 3/16" INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, 3/32" INCH, NR203, 1/2 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY DIRECTOR OF ENGINEERING MAY BE USED.

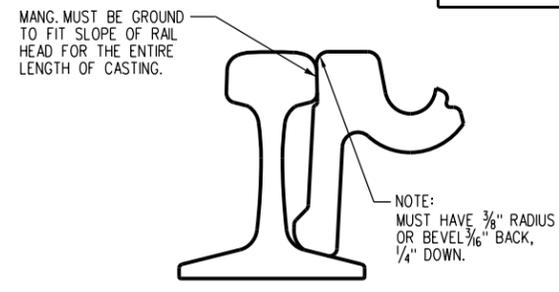
**FOR MAINTENANCE ONLY**



**TYPICAL PLATE PUNCHING DETAIL**



**RAIL END DRILLING**



**DETAIL OF FROG CASTING / RAIL FIT**

SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Narek D. Pape*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**

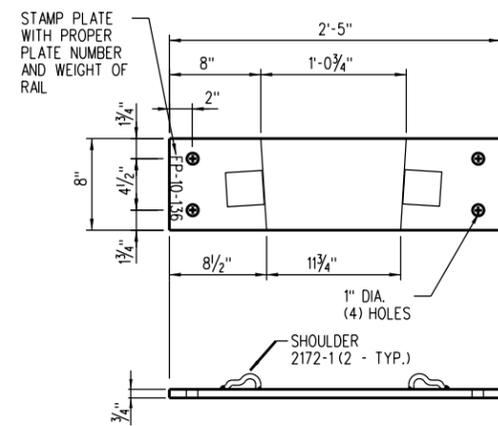
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

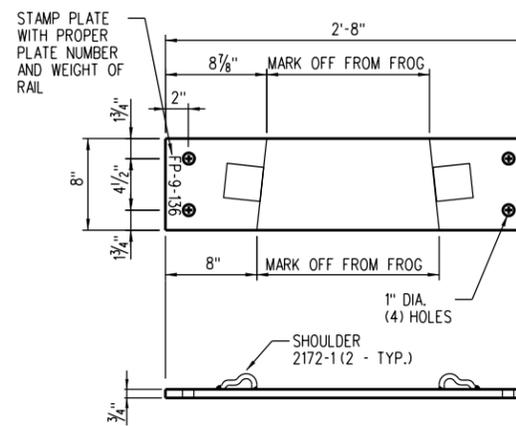
NO. 8 136 LB. R.H. RBM FROG LAYOUT

STANDARD	2911
SCALE:	1" = 1'-0"
REVISION	SHEET
-	6 OF 16
CADD FILE:	ES2911-06

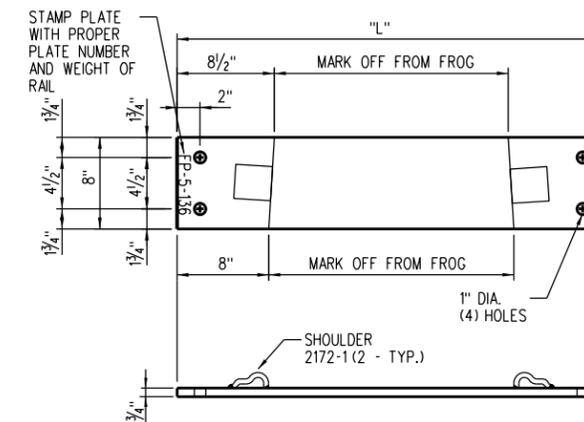
**NOTE:**  
FOR NO. 8 FROG AND PLATE LOCATIONS SEE SHEET 6.



**FROG PLATE - FP-1**  
3/4" x 8" x 2'-5" - FLAT

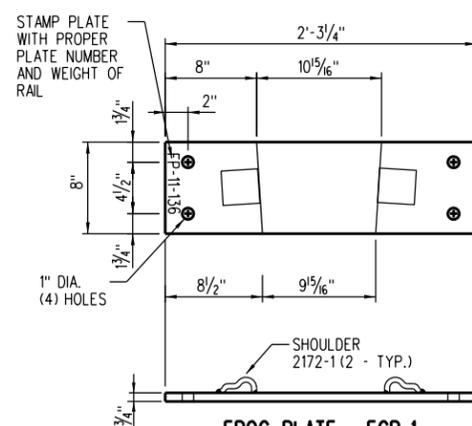


**FROG PLATE - FP-2**  
3/4" x 8" x 2'-8" - FLAT

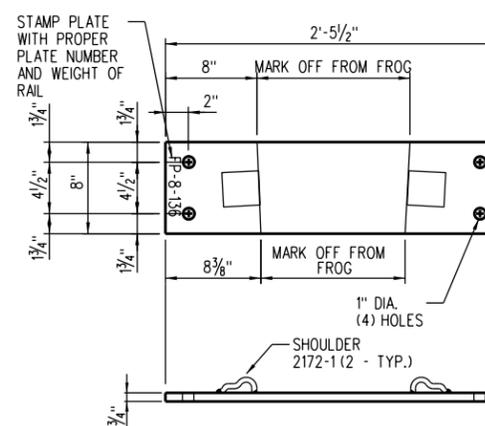


**FROG PLATE - FCP-3, FP-3 AND FP-4**  
3/4" x 8" - FLAT (SEE TABLE FOR LENGTHS)

DIMENSION TABLE		
PLATE	"L"	NO. REQ'D
FCP-3	2'-9"	1
FP-4	2'-11"	1
FP-3	2'-9"	1



**FROG PLATE - FCP-1**  
3/4" x 8" x 2'-3 1/4" - FLAT



**FROG PLATE - FCP-2**  
3/4" x 8" x 2'-5 1/2" - FLAT

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

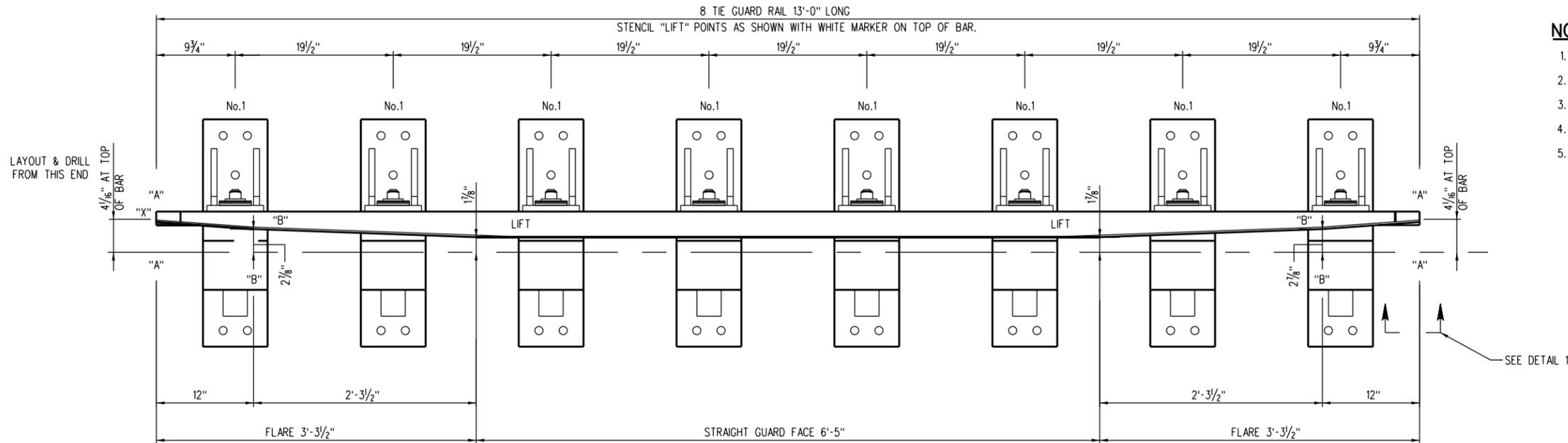
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ENGINEERING STANDARDS	
NO. 8 136 LB. R.H. RBM FROG PLATE DETAILS	

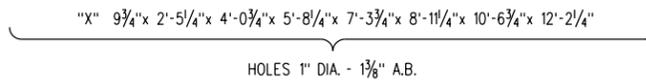
STANDARD	2911
SCALE	1/2" = 1'-0"
REVISION SHEET	7 OF 16
CADD FILE	ES2911-07



**NOTES:**

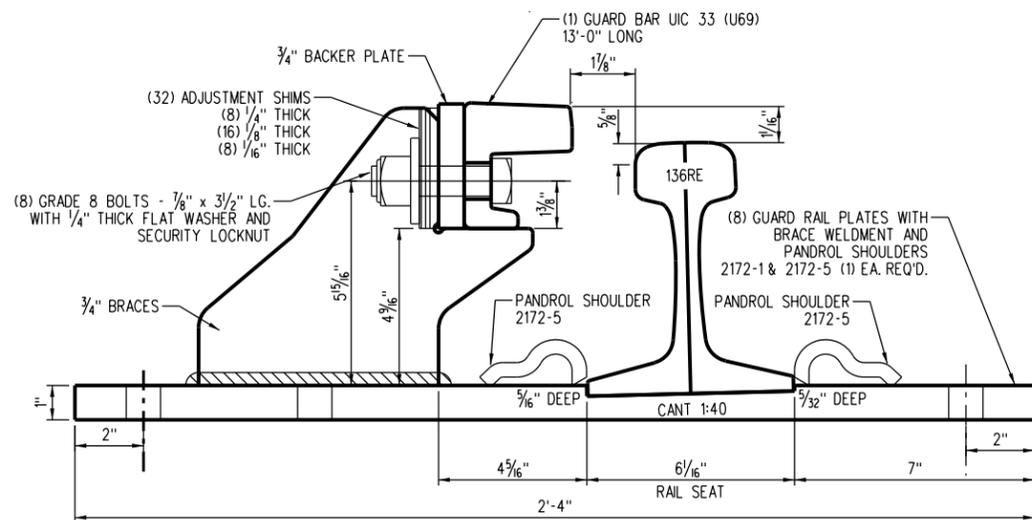
1. GUARD RAIL SECTION UIC 33, (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
2. BASE PLATE, BRACKET & SHIMS - MILD STEEL PER AREMA SPECIFICATION M7.
3. GUARD RAIL BOLT AND NUT PER AREMA SPECIFICATION M11, EXCEPT BOLT TO BE GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
4. WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR "SPECIAL TRACKWORK".
5. WELDING PER ANSI \ AWS D1.1-92 OR LATEST REVISION.

**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

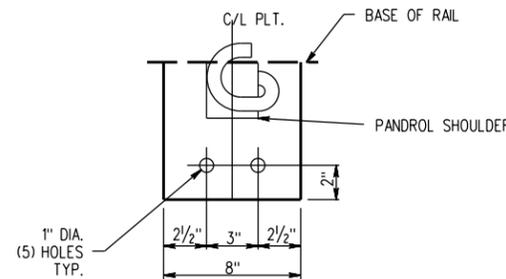


**ASSEMBLED 13'-0" GUARD RAIL**

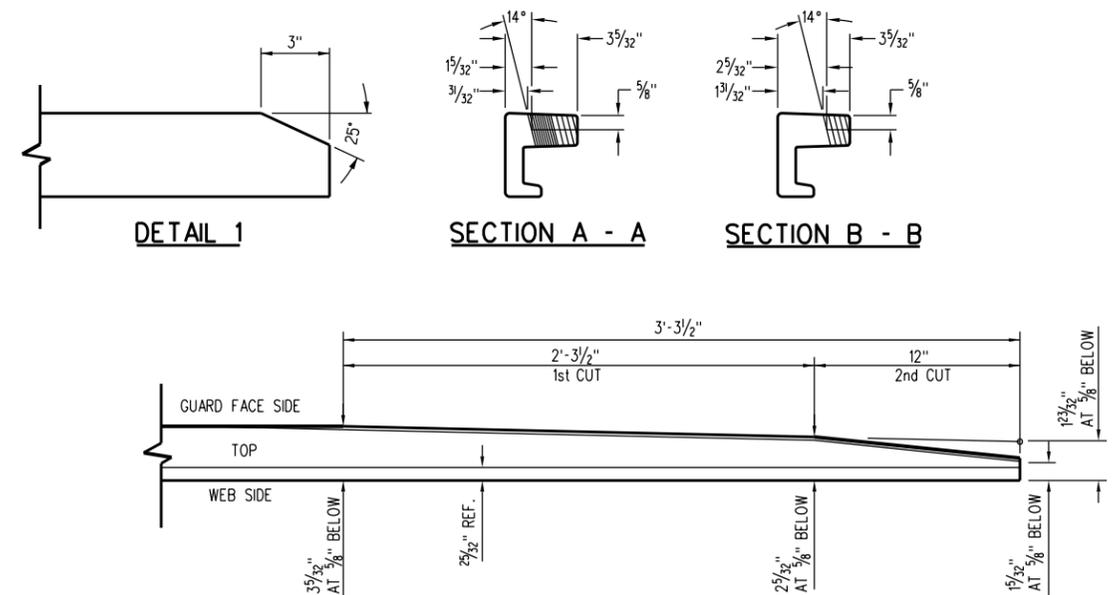
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**TYPICAL PLATE DETAIL**



**TYPICAL PLATE PUNCHING DETAIL**



**FLARE DETAIL**

BREAK SHARP CORNERS OF ALL MACHINED SURFACES

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Assistant Director: STANDARDS & DESIGN Director of Engineering and Construction				

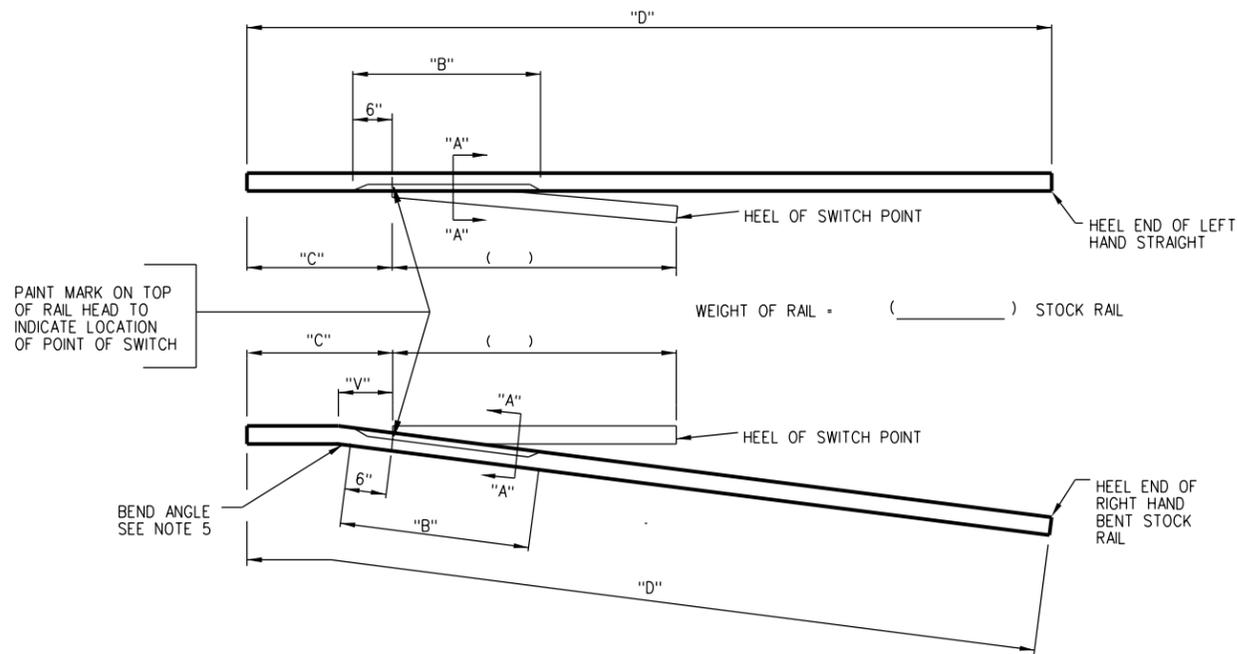
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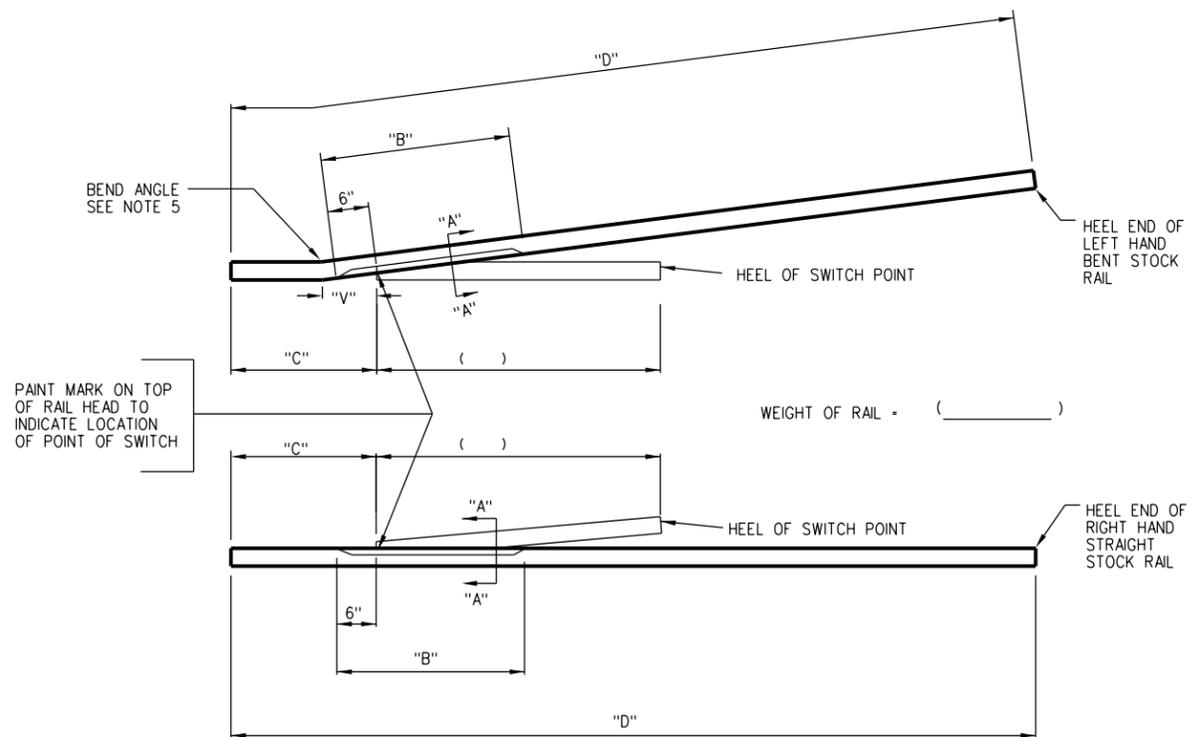
ENGINEERING STANDARDS  
 NO. 8 136 LB. R.H. RBM FROG GUARD RAIL DETAILS

STANDARD	2911
SCALE	1/2" = 1'-0"
REVISION SHEET	8 OF 16
CADD FILE	ES2911-08





STOCK RAILS ARE SHOWN FOR "RIGHT HAND TURNOUT"



STOCK RAILS ARE SHOWN FOR "LEFT HAND TURNOUT"

**NOTES:**

1. INFORMATION OR DIMENSIONS NOTED THUS ( ), TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. LENGTH OF SWITCH POINT.
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.REMA PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.

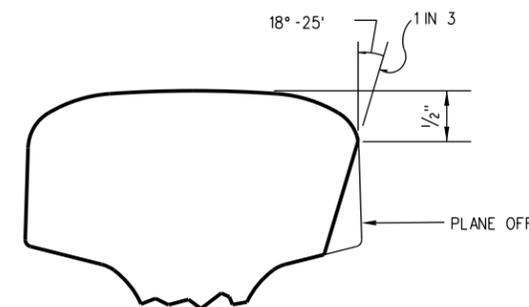
**LENGTHS B,C & D FOR 136 LB. RAIL**

Sw. Pt. LENGTH	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
16'-6"	8	STR.	9'-6"	7'-2 1/2"	40'-0"	NONE	10'-0"	50'-0"	NONE
16'-6"	8	BENT	9'-6"	7'-2 1/2"	40'-0"	HEEL END ONLY	9'-6"	46'-0"	HEEL END ONLY

5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOW:

Sw. Length	BEND ANGLE	V (Vertex Dist.)
16'-6"	1° -44'-11" or 1" in 2'-9"	10 5/16"

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SECTION "A - A"

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
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*William D. Daman*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

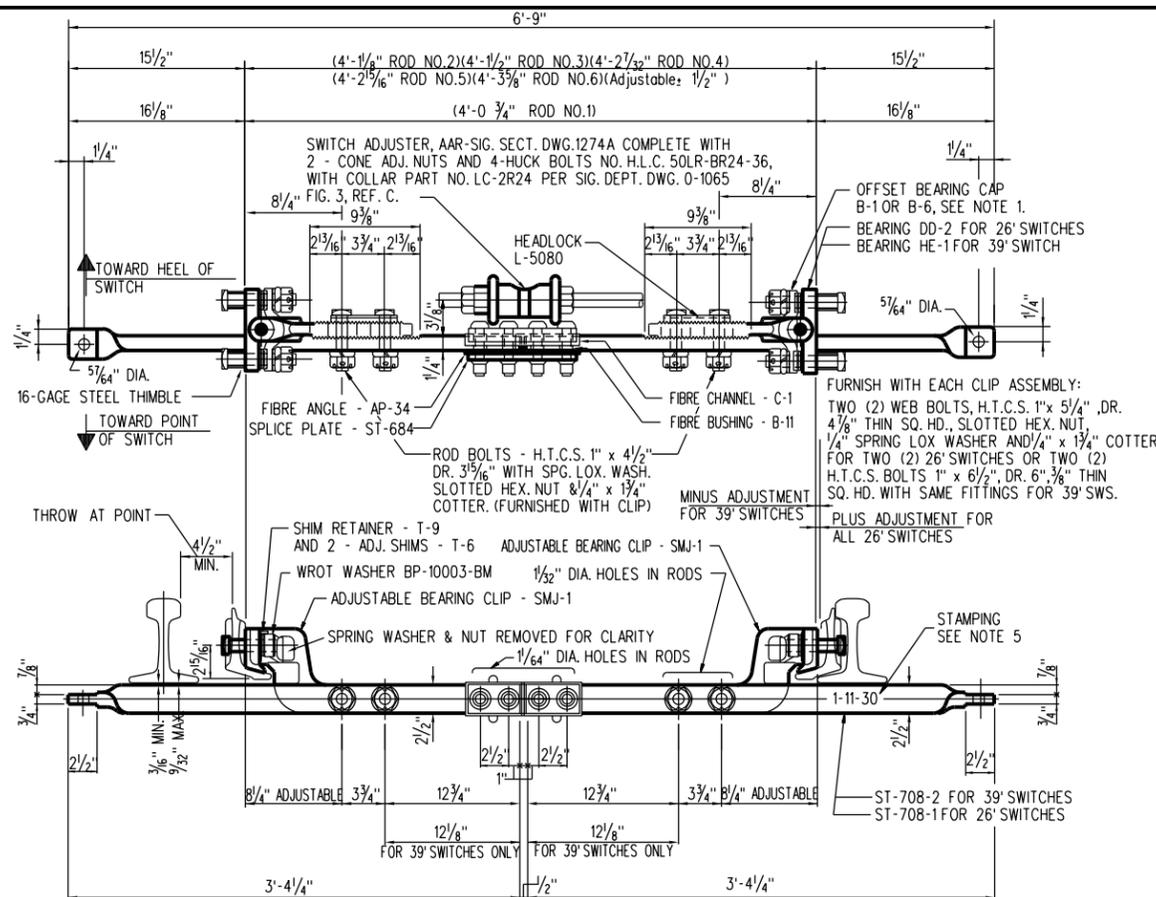
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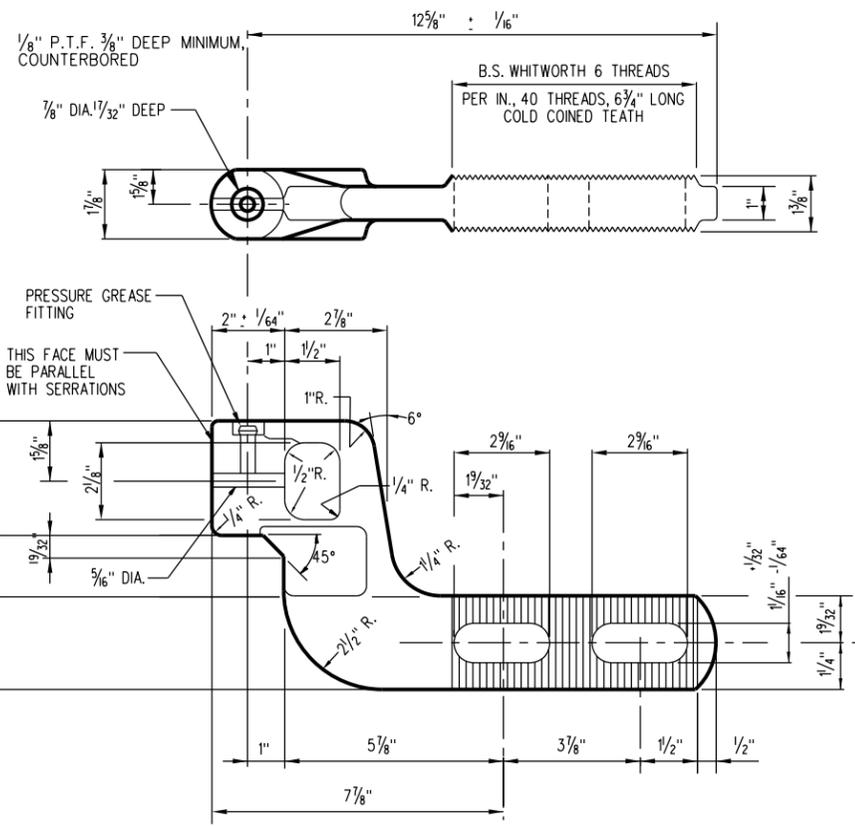
ENGINEERING STANDARDS

NO. 8 STRAIGHT OR CURVED UNDERCUT STOCK RAILS

STANDARD	2911
SCALE:	NONE
REVISION SHEET	10 OF 16
CADD FILE:	ES2911-10



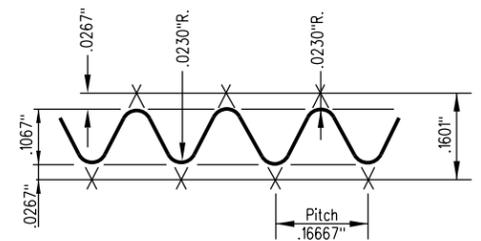
**NO. 1 SWITCH ROD ASSEMBLY**  
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



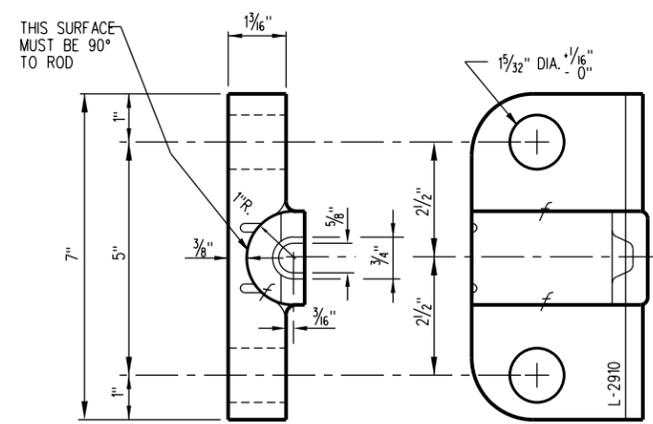
**ADJUSTABLE BEARING CLIP - SMJ - 1**  
SCALE: 3" = 1'-0"

BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E.1020-For.Stl.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	Web Bolt	SEE NOTE
26'	2	DD-2	Malleable Iron	Bearing	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	Malleable Iron	Bearing	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
All	4	T-9	S.A.E.1020	Shim Retainer	1/8" x 1 3/4" x 2 1/4"
All	12	T-6	Stainless Steel	Adjustment Shim	1/8" x 2" x 1 1/8"
All	4	BP-10003-BM	Wrot Iron	Wrot Washer	1/16" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	Rod Bolt	1" x 4 1/2" DR. 3 3/16" REG. SQ. HD. SLOTTED HEX NUT
All	4		Steel	Spg. Lox Washer	For 1" Rod Bolts
All	4		Steel	Cotter	1/4" x 1 3/4" FOR ROD BOLTS
All	2		Steel	Grease Fitting	PRESSURE - FOR BEARING CLIP
All	2	L-5080	Malleable Iron	Headlock	FOR ROD BOLTS
26'	2		16-Gage Steel	Thimble	1 1/2" LONG - FOR SHIPPING
39'	2		16-Gage Steel	Thimble	2 1/2" LONG - FOR SHIPPING
Material for Vertical Rod					
16'-6"	1			Vertical Rod	Use one-ST-708-1
					Use one-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			Vertical Rod	Use one-ST-708-2
					Use one-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
All	4		High Strength Steel	Conn. & Insul. Bolt	HIGH FASTENER NO. HLC-50LR-BR24-36
All	4		Low Carbon Steel	Collar	HUCK FASTENER NO. LC-2R24
All	1	ST-684	H.R. Mild Steel	Splice Plate	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
All	2	AP-34	AAR-Sig.Sec.13-52	Angle	1/2" x 2 1/2" x 4 1/8" HARD FIBRE - PARAFIN COATED
All	4	B-11	AAR-Sig.Sec.13-52	Bushing	1" O.D. HARD FIBRE - PARAFIN COATED
All	1	C-1	AAR-Sig.Sec.13-52	Channel	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
All	1		Malleable Iron	Switch Adjuster	
All	2		Malleable Iron	Cone Adj. Nut	FOR 1/4" THROW RODS

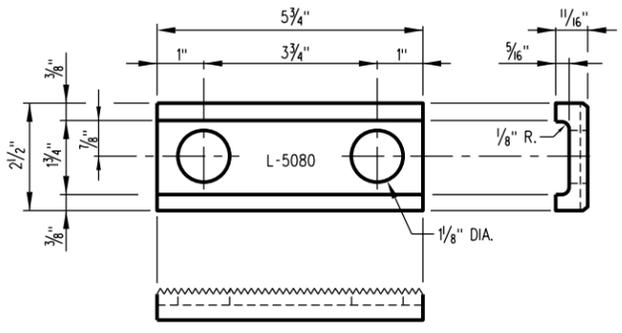
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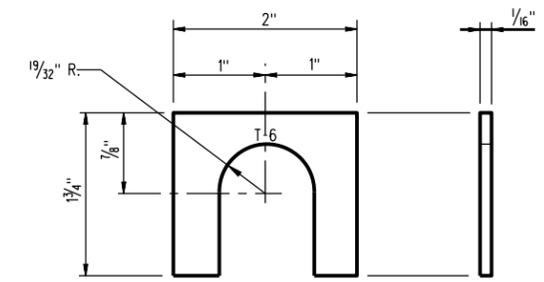
**ENLARGED PROFILE OF SERRATIONS**  
SCALE: NONE



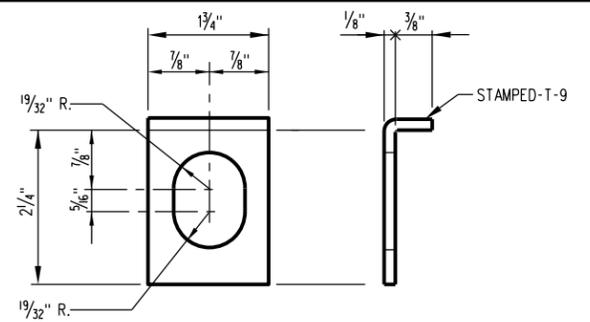
**BEARING - DD - 2**  
SCALE: 6" = 1'-0"



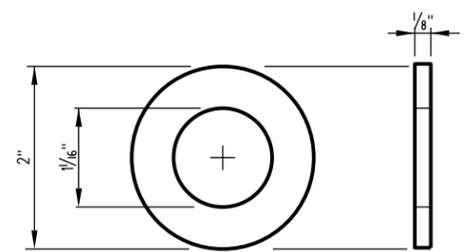
**HEADLOCK L-5080**  
SCALE: 6" = 1'-0"



**ADJUSTABLE SHIM - T - 6**  
SCALE: FULL



**SHIM RETAINER - T - 9**  
SCALE: FULL



**WROT WASHER - BP - 10003 - BM**  
SCALE: FULL

**NOTES:**

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN THE BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.
- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/2" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:  
1-39 FOR USE ON 11'-0" SWITCHES, 132 LB. AND 136 LB. RAIL SECTIONS.  
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB., AND 136 LB. R.E. RAIL SECTIONS.

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

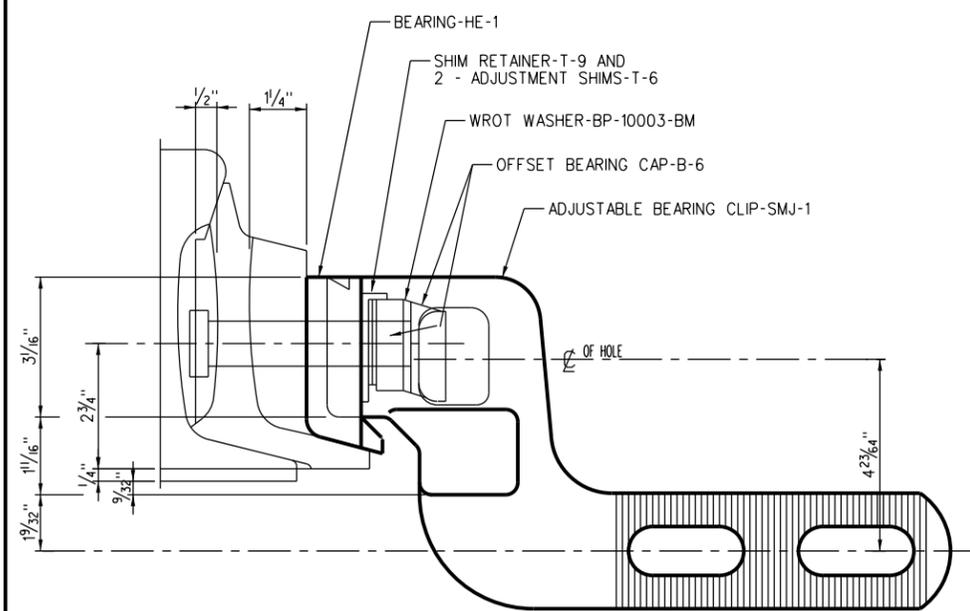
DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
Director of Engineering and Construction

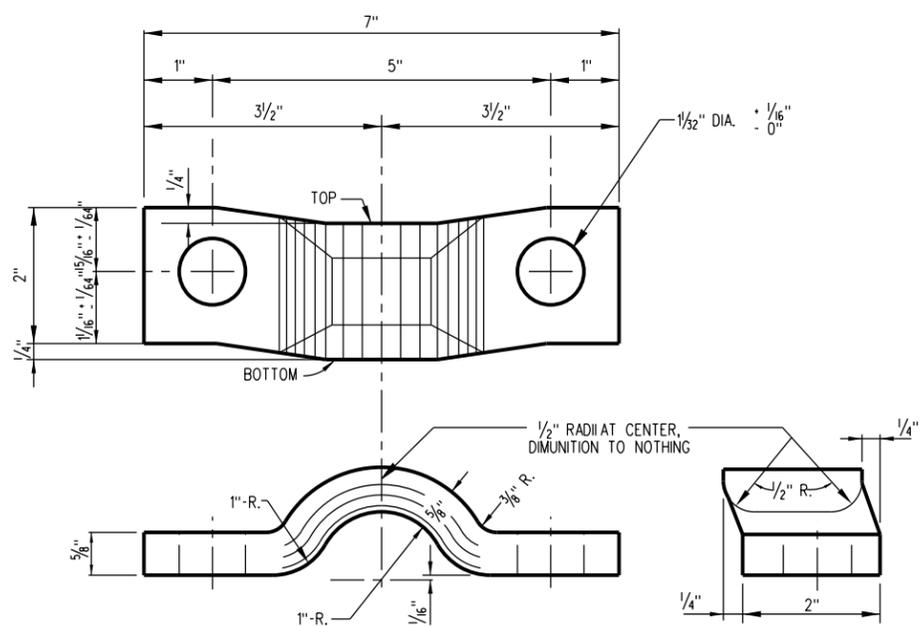
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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

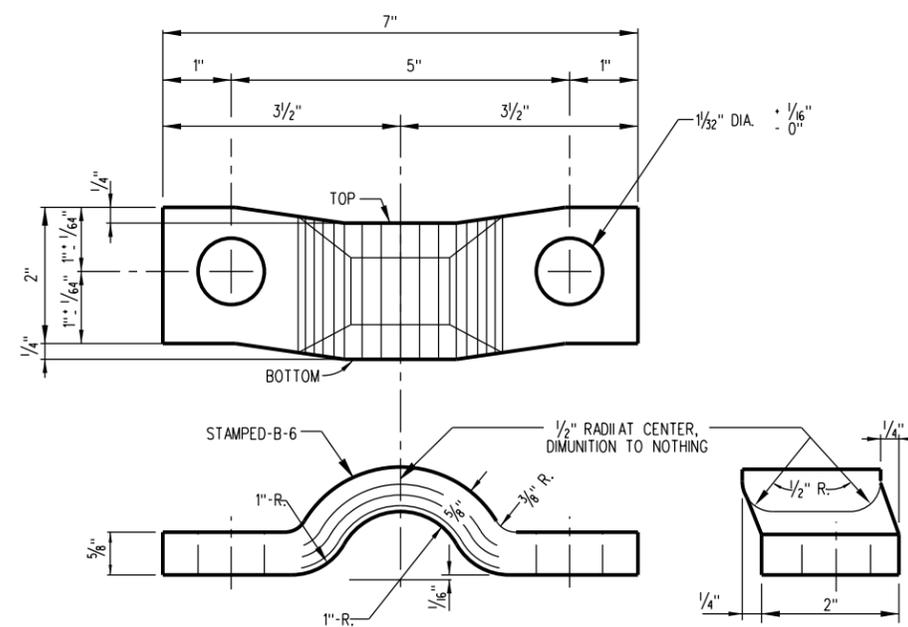
ENGINEERING STANDARDS		STANDARD
		2911
NO. 8 SWITCH ROD DETAILS		SCALE: AS NOTED
		REVISION SHEET
		11 OF 16
		CADD FILE: ES2911-11



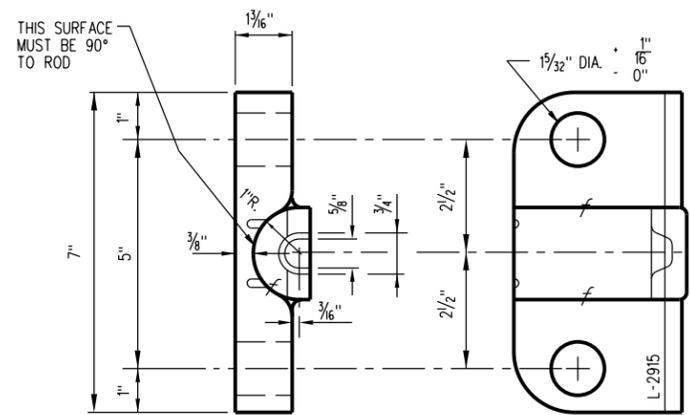
**ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



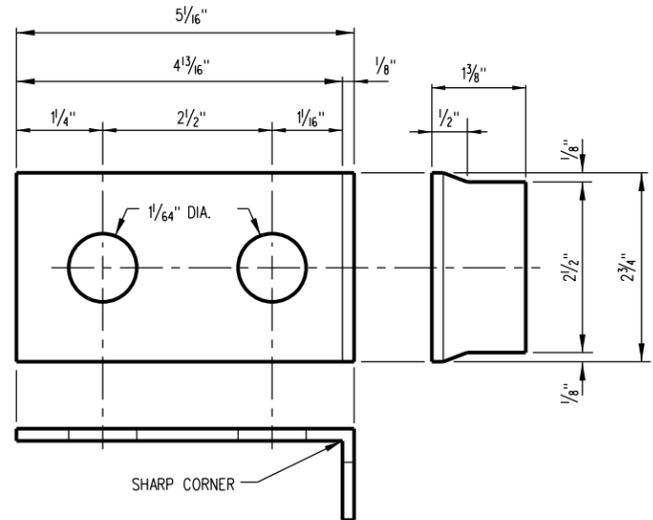
**OFFSET BEARING CAP-B-1**



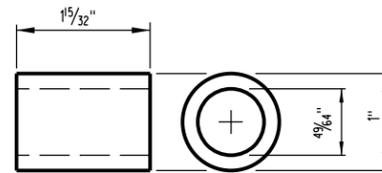
**OFFSET BEARING CAP-B-6**



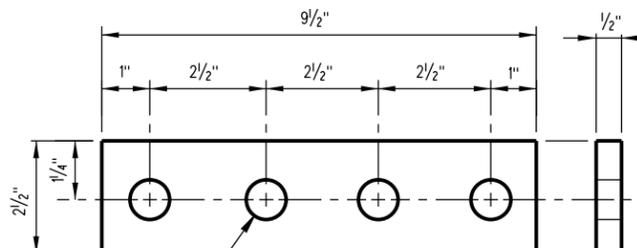
**BEARING-HE-1**



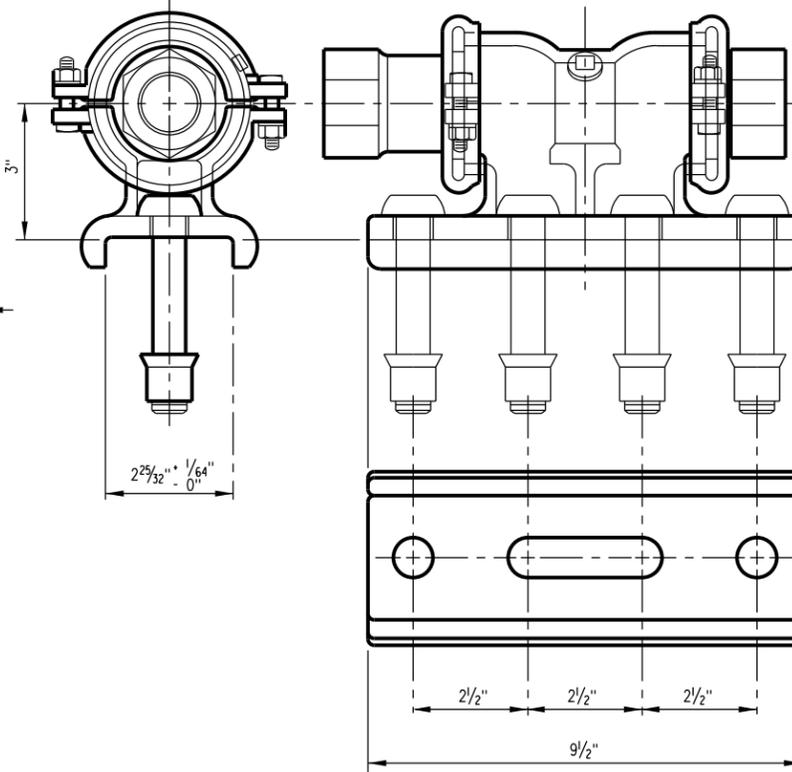
**FIBRE ANGLE-AP-34**



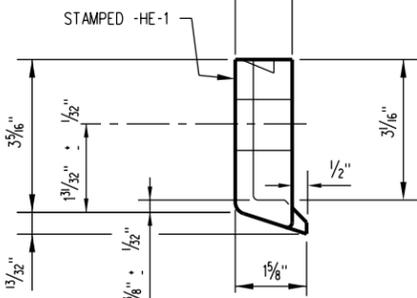
**FIBRE BUSHING-B-11**



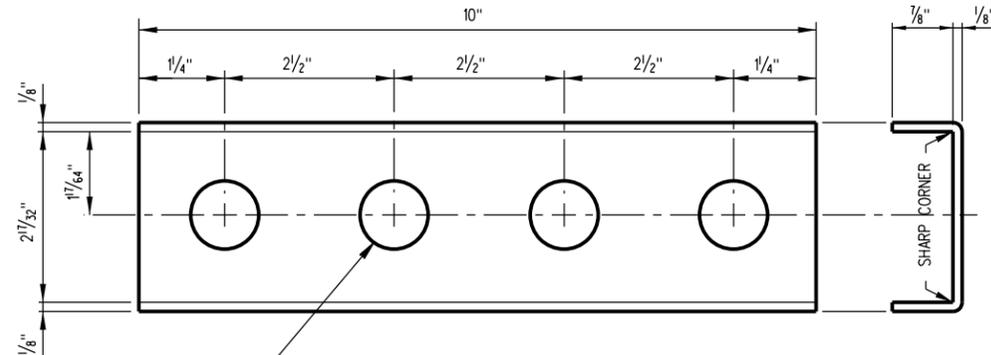
**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**STAMPED-HE-1**



**FIBRE CHANNEL-C-1**

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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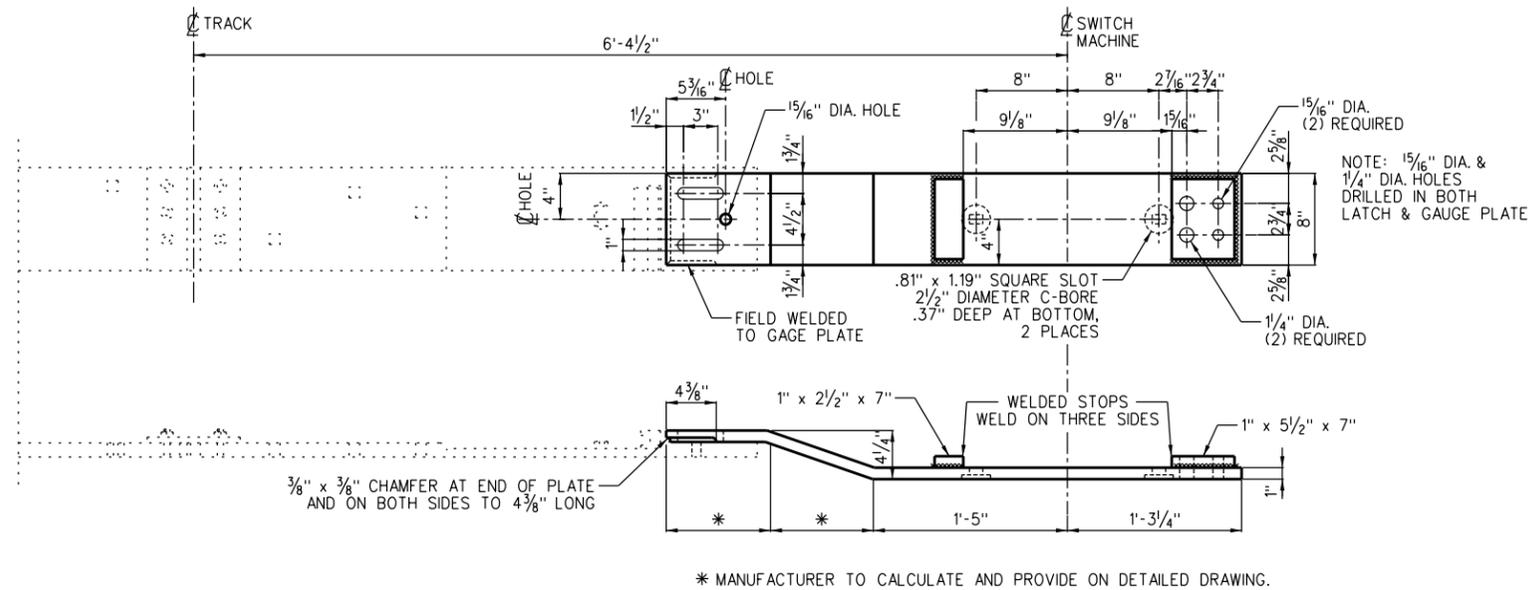
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

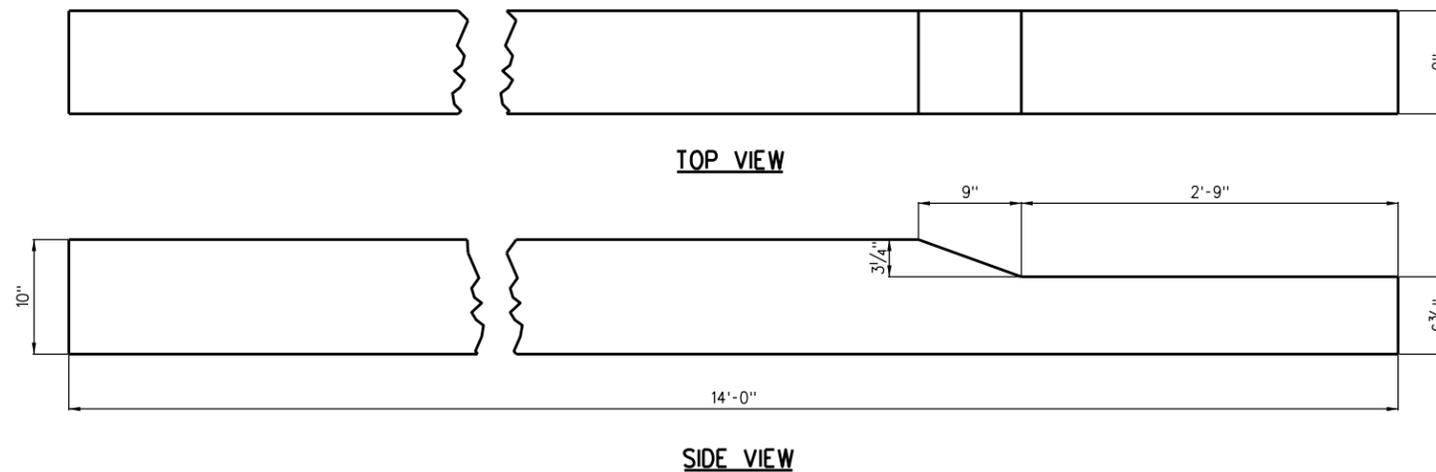
NO. 8 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	2911
SCALE	6" = 1'-0"
REVISION SHEET	- 12 OF 16
CADD FILE	ES2911-12

**NOTE:**  
SEE SHEET NO. 15 FOR NOTES.



**EXTENSION PLATE**  
(2 PCS. REQ'D. AS SHOWN)



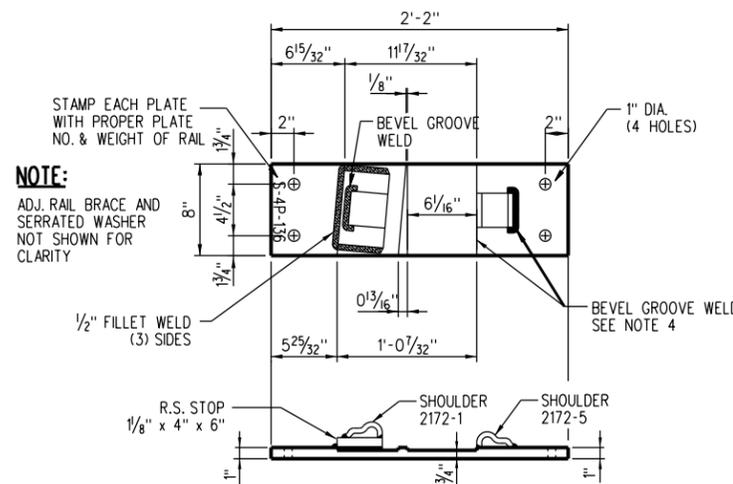
**DAP TIE**  
(2 PCS. REQ'D. AS SHOWN)

TIES SHALL BE MADE OF DOUGLAS FIR OR GUM AND TREATED AFTER FRAMING.

**US&S M23-A SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS.**

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DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		ENGINEERING STANDARDS NO. 8 EXTENSION PLATE AND DAP TIE DETAILS FOR M-23A SWITCH MACHINE	STANDARD 2911
ASSISTANT DIRECTOR: STANDARDS & DESIGN <i>Nareh D. Pappas</i>		DIRECTOR OF ENGINEERING AND CONSTRUCTION <i>William D. Davis</i>				SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012
REV.	DATE	DESCRIPTION	DES.	ENG.		

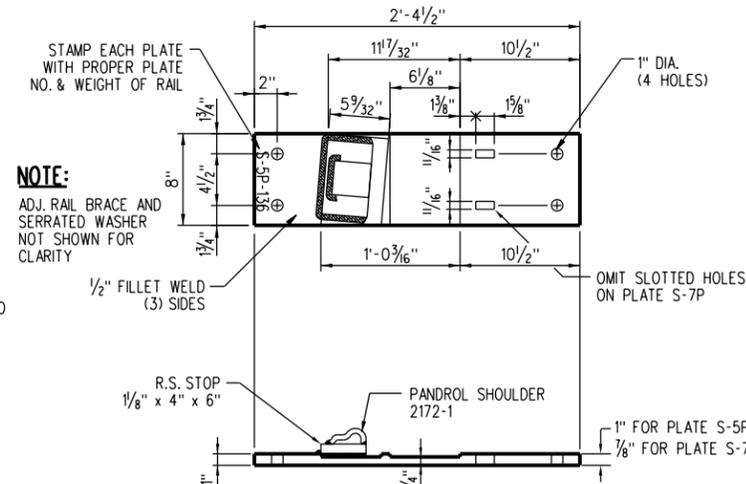


**BRACE PLATE - S-4P**

1" x 8" x 2'-2" LG. - MILLED - W/ADJ. RAIL BRACE  
2 - S-4P PLATES REQUIRED AS SHOWN

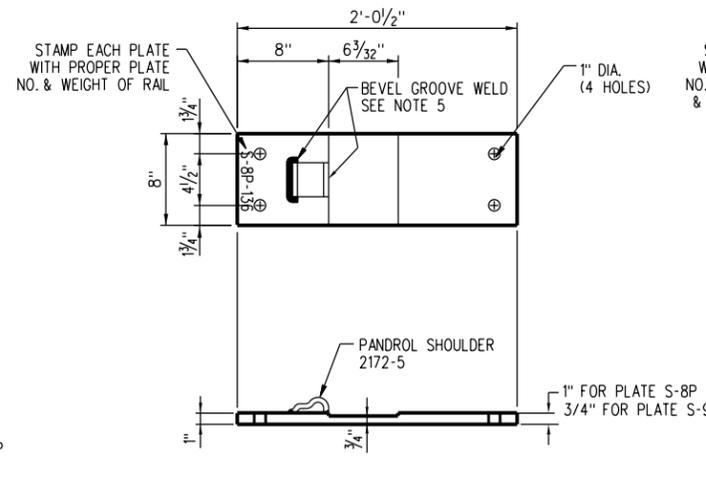
**REFERENCE DWGS.**

LAYOUT - No.8, R.H., H.O. TURNOUT - 136 lb. ----- SHEET No. 2911-02



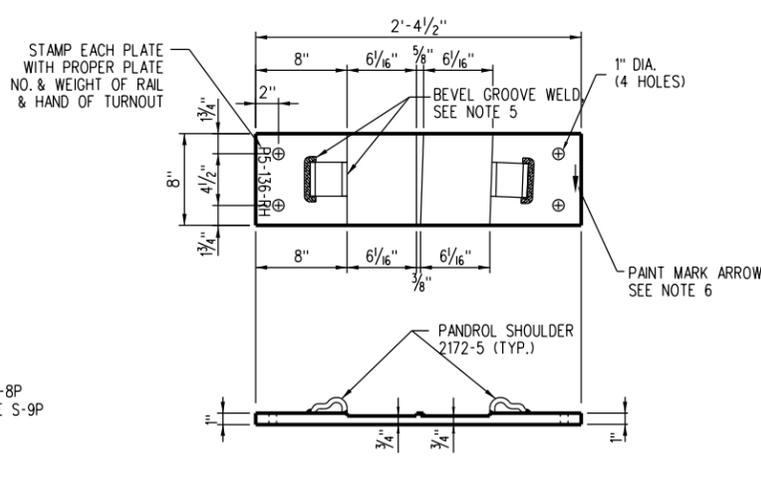
**BRACE SLIDE PLATE - S-5P & S-7P**

1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE  
4 - S-5P PLATES REQUIRED AS SHOWN  
2 - S-7P PLATES REQUIRED AS SHOWN



**SLIDE PLATE - S-8P & S-9P**

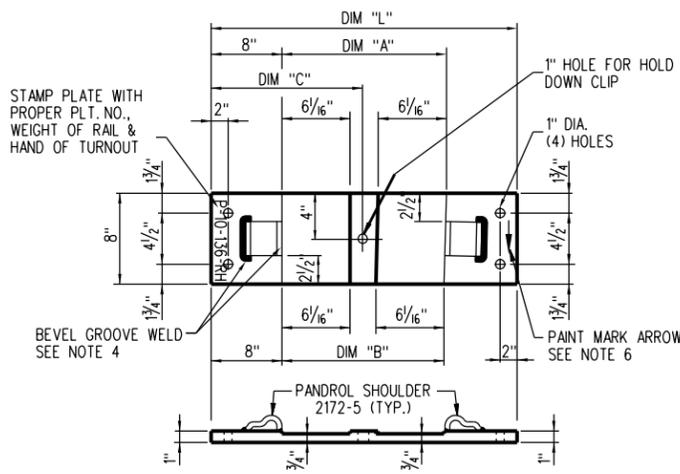
1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP  
6 - S-8P PLATES REQUIRED AS SHOWN (1/4" RISER)  
4 - S-9P PLATES REQUIRED AS SHOWN (0" RISER)



**HEEL PLATE - P5 - RH**

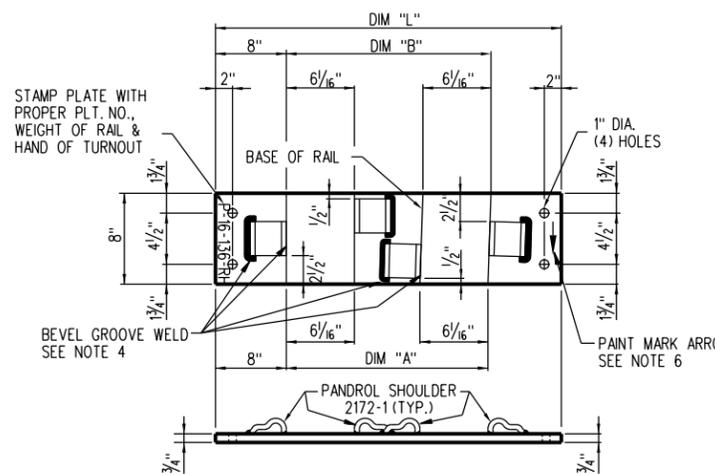
1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS  
2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

**SWITCH PLATES**



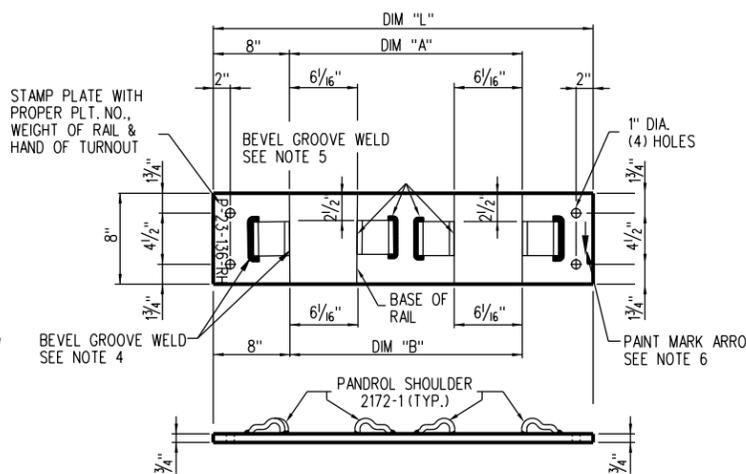
**TURNOUT PLATES - P-10 THRU P-13 & P-27**

1" x 8" x DIM "L" - MILLED - W/ PANDROLS



**TURNOUT PLATES - P-14 THRU P-16, P-21, P-22, P-28 AND P-29**

3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS



**TURNOUT PLATES - P-17 THRU P-20 & P-30**

3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS

**NOTES:**

- PLATES TO BE MADE OF MILD ROLLED STEEL.
- EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) & HAND OF TURNOUT (R.H. OR L.H.)
- THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
- THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-10 THRU P-29 INCLUSIVE AND FROG PLATES AND GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.
- DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET NO. 2911-03 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

**WELDING SPECIFICATIONS:**

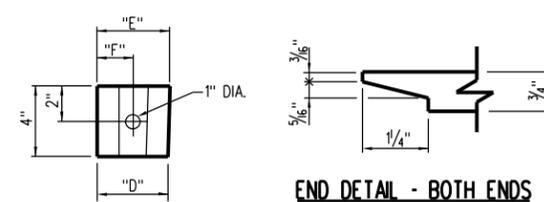
- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" WELD.
- STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" FILLET WELD.
- SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
- FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS FOR ADJUSTABLE USE THE FOLLOWING:  
A. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.  
B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.  
C. WIRE, WELDING 3/32 INCH, NR203, 1% NICKEL FLUX CORE.  
OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY DIRECTOR OF ENGINEERING, MAY BE USED.

**FOR MAINTENANCE ONLY**

DIMENSION TABLE						
PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	PITS REQ'D.	CLIPS REQ'D.
P-10	13 1/16"	13 5/32"	14 5/8"	2'-5"	2 EA.	2 EA.
P-11	14 3/16"	13 1/16"	15"	2'-6"	2 EA.	2 EA.
P-12	15"	14 11/16"	15 3/8"	2'-7"	2 EA.	2 EA.
P-13	15 29/32"	15 1/32"	15 3/16"	2'-8"	2 EA.	2 EA.
P-27	14 1/2"	13 1/4"	14 3/32"	2'-6 1/2"	1 EA.	1 EA.

DIMENSION TABLE						
PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.	CLIPS REQ'D.	
P-14	16 5/32"	16 27/32"	2'-9"	2 EA.	2 EA.	
P-15	17 15/32"	17 7/8"	2'-10"	2 EA.	2 EA.	
P-16	18 1/32"	18 3/32"	2'-11"	2 EA.	2 EA.	
P-21	19 5/8"	20 9/32"	3'-0 1/2"	1 EA.	1 EA.	
P-22	17 1/4"	18 1/4"	2'-10"	1 EA.	1 EA.	
P-28	15 5/16"	16 5/16"	2'-9"	1 EA.	1 EA.	
P-29	18 3/8"	19 3/8"	2'-11 1/2"	1 EA.	1 EA.	

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
P-17	20 1/8"	19 2/32"	3'-0"	2 EA.
P-18	21 1/8"	20 1/16"	3'-1"	2 EA.
P-19	22 2/32"	20 1/32"	3'-2 1/2"	2 EA.
P-20	22 11/16"	21 29/32"	3'-2 1/2"	1 EA.
P-30	21 2/32"	20 2/32"	3'-2"	1 EA.



**END DETAIL - BOTH ENDS**  
HOLD DOWN CLIP FOR PLATES P-10 THRU P-15  
HOLD DOWN CLIP FOR PLATES P-24 THRU P-26

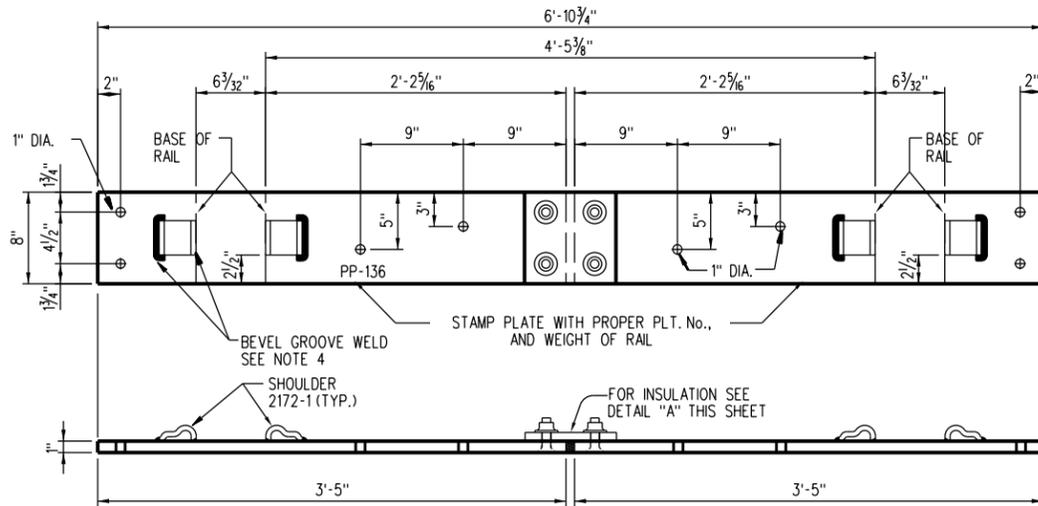
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

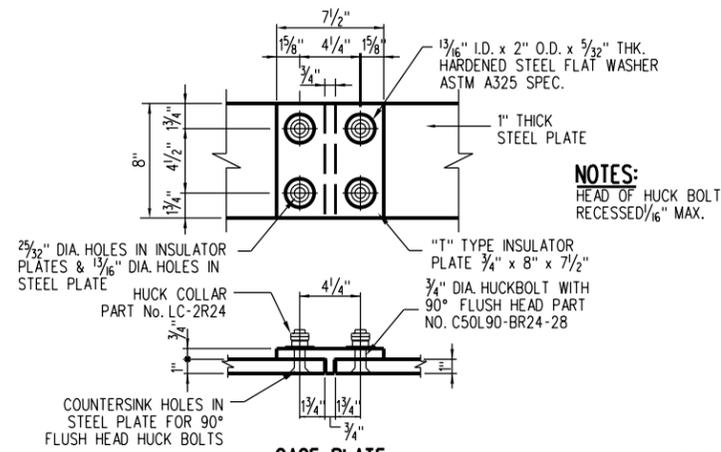
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 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

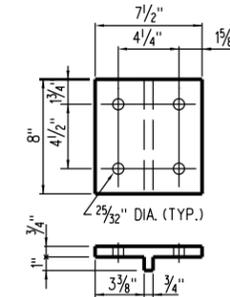
ENGINEERING STANDARDS  
 NO. 8 TURNOUT AND SWITCH PLATE DETAILS  
 STANDARD 2911  
 SCALE: 1/2" = 1'-0"  
 REVISION SHEET 14 OF 16  
 CADD FILE: ES2911-14



**INSULATED GAGE PLATE P-P**  
1" x 8" - FLAT - W/ INSULATION  
13 PC. REQ'D AS SHOWN

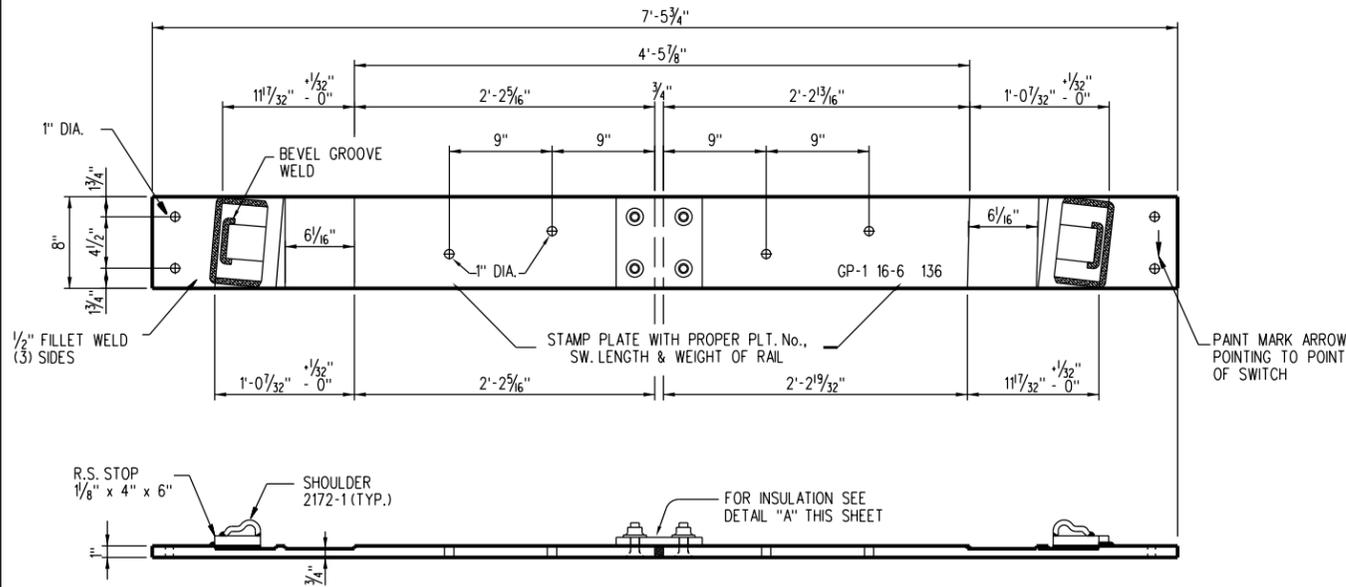


**GAGE PLATE  
INSULATED JOINT ASSEMBLY  
GPI-77**

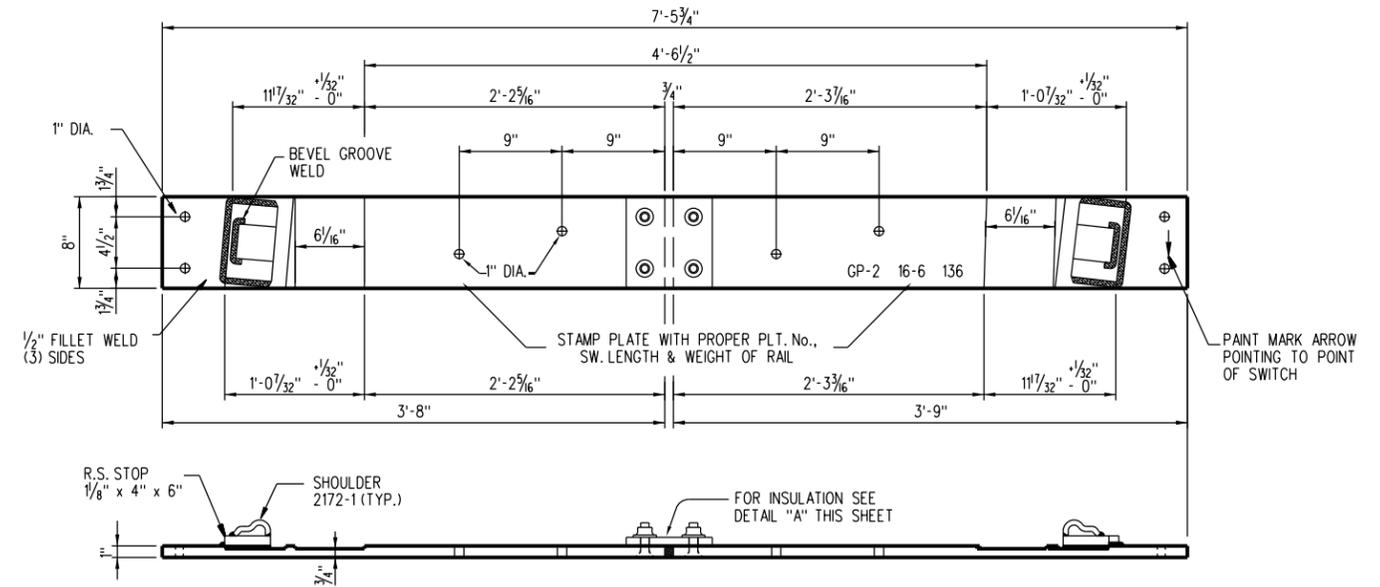


**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC #127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GP152P05

**DETAIL "A"  
INSULATION AT GAGE PLATES**  
(SCALE: NONE)



**INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH**  
1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D AS SHOWN)



**INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH**  
1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D AS SHOWN)

**NOTE:**  
SERRATED WASHER AND BRACE PLATE  
NOT SHOWN FOR CLARITY.

**NOTE:**  
SERRATED WASHER AND BRACE PLATE  
NOT SHOWN FOR CLARITY.

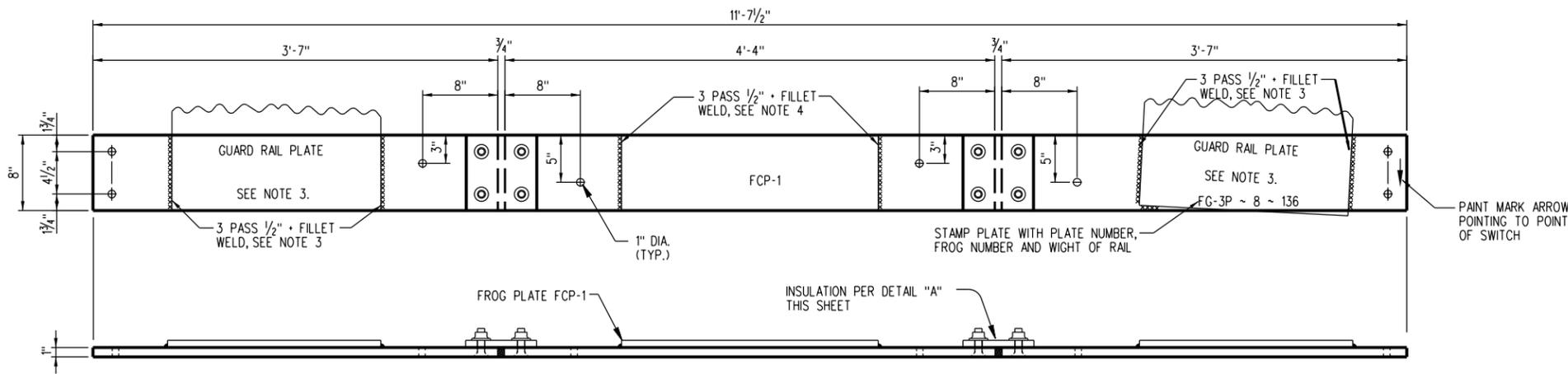
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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION				

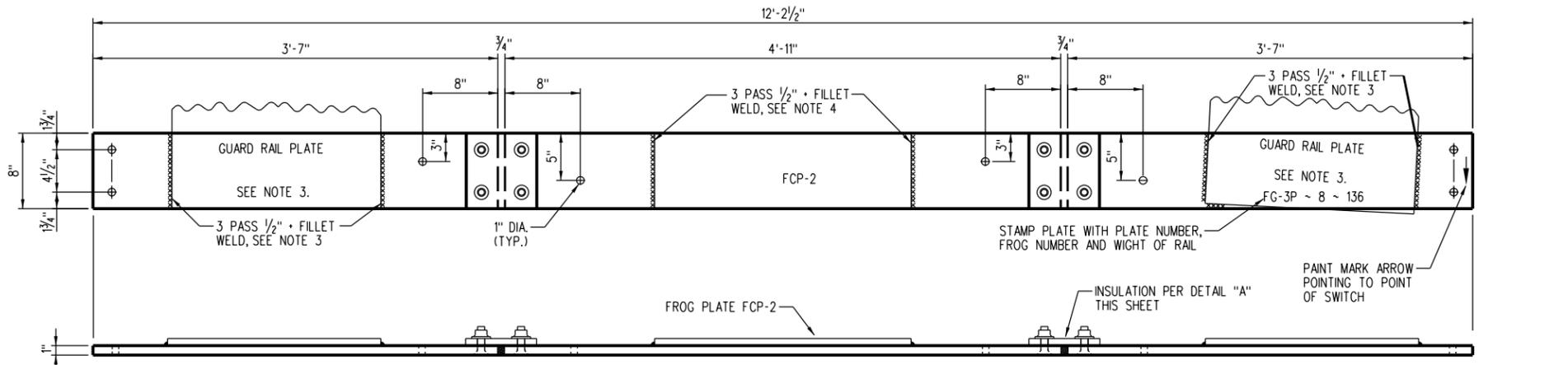
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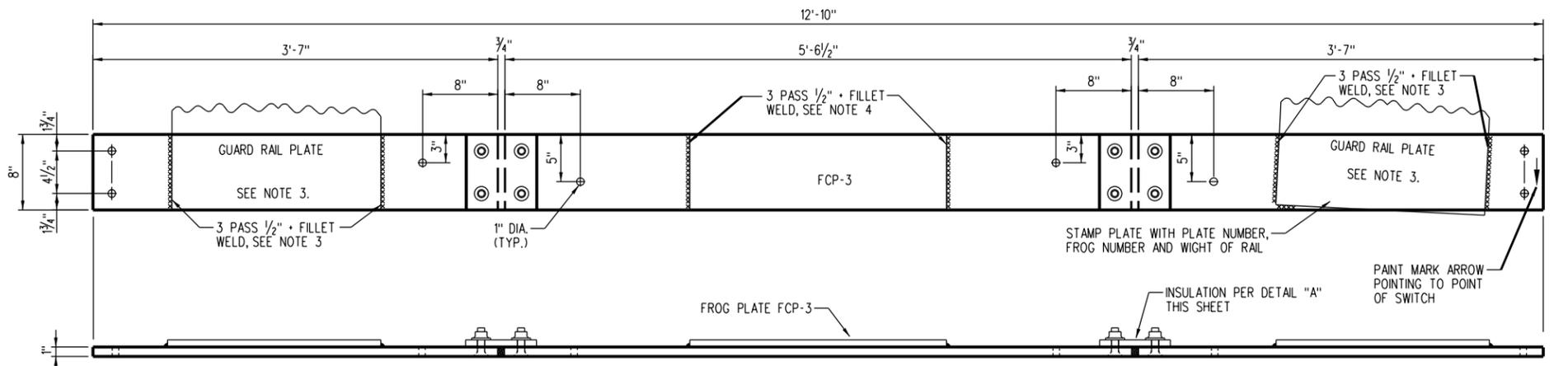
ENGINEERING STANDARDS		STANDARD	2911
NO. 8 SWITCH PLATE DETAILS		SCALE:	1 <sup>1</sup> / <sub>2</sub> " = 1'-0"
		REVISION	SHEET
		-	15 OF 16
		CADD FILE:	ES2911-15



**INSULATED FROG GAGE PLATE - FG-1P**  
 3/4" x 8" - FLAT - W/ INSULATION (1PC. REQ'D AS SHOWN)



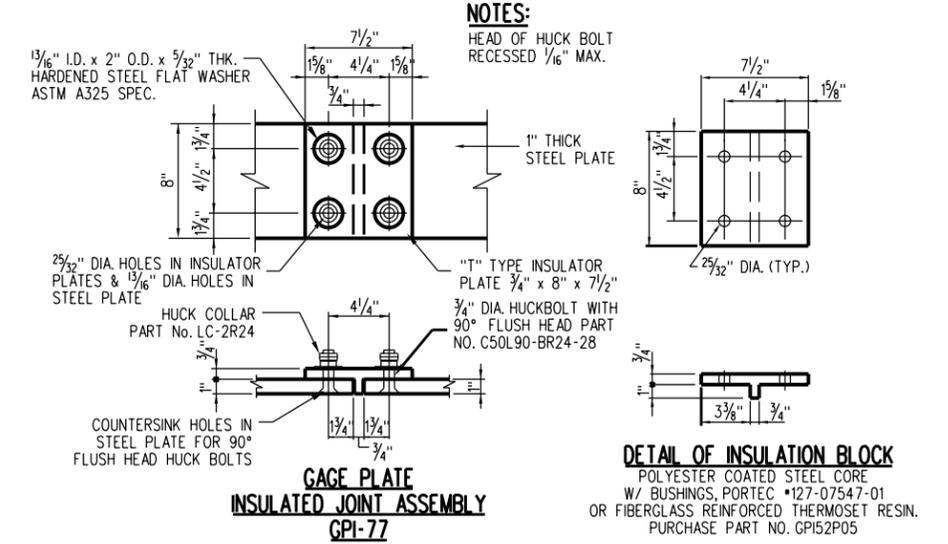
**INSULATED FROG GAGE PLATE - FG-2P**  
 3/4" x 8" - FLAT - W/ INSULATION (1PC. REQ'D AS SHOWN)  
 (THIS DETAIL NOT TO SCALE)



**INSULATED FROG GAGE PLATE - FG-3P**  
 3/4" x 8" - FLAT - W/ INSULATION (1PC. REQ'D AS SHOWN)  
 (THIS DETAIL NOT TO SCALE)

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES SHALL BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.



**DETAIL "A"**  
**INSULATION AT GAGE PLATES**  
 (SCALE: NONE)

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

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*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS	STANDARD	2911
NO. 8 INSULATED GAGE PLATE DETAILS	SCALE:	1/2" = 1'-0"
	REVISION	SHEET
	-	16 OF 16
	CADD FILE:	ES2911-16

**EQUIVALENT CURVE DATA**

CURVE	6.0850'
RADIUS	941.60'
DELTA	5.724'
TANGENT (T)	47.07'
LENGTH (L)	94.07'
EXTERNAL	1.17'
<b>CROSSOVER DATA</b>	
LEAD	80.500'
PC TO PS	14.07'
PS TO PI	33.00'
PI TO 1/2" PF	47.50'
LENGTH OF TURNOUT	117.28'
PS TO PT	80.00'

**FROG DATA**

FROG NUMBER	10
FROG ANGLE	5° -43' -29"

**SWITCH DATA**

SWITCH LENGTH	16'-6"
HEEL SPREAD	6 1/4"
HEEL ANGLE	N/A
SWITCH ANGLE	1° -44' -11"
RADIUS OF CENTER LINE - SWITCH	N/A
TANGENT LENGTH SWITCH	N/A
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	N/A
DEGREE OF CURVE - SWITCH	N/A

**TURNOUT DATA**

RADIUS OF CENTER LINE - TURNOUT	742.29'
TANGENT LENGTH - TURNOUT	25.84'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	3° -59' -18"
DEGREE OF CURVE - TURNOUT	7° -43' -29"

**CROSSOVER DATA TABLE**

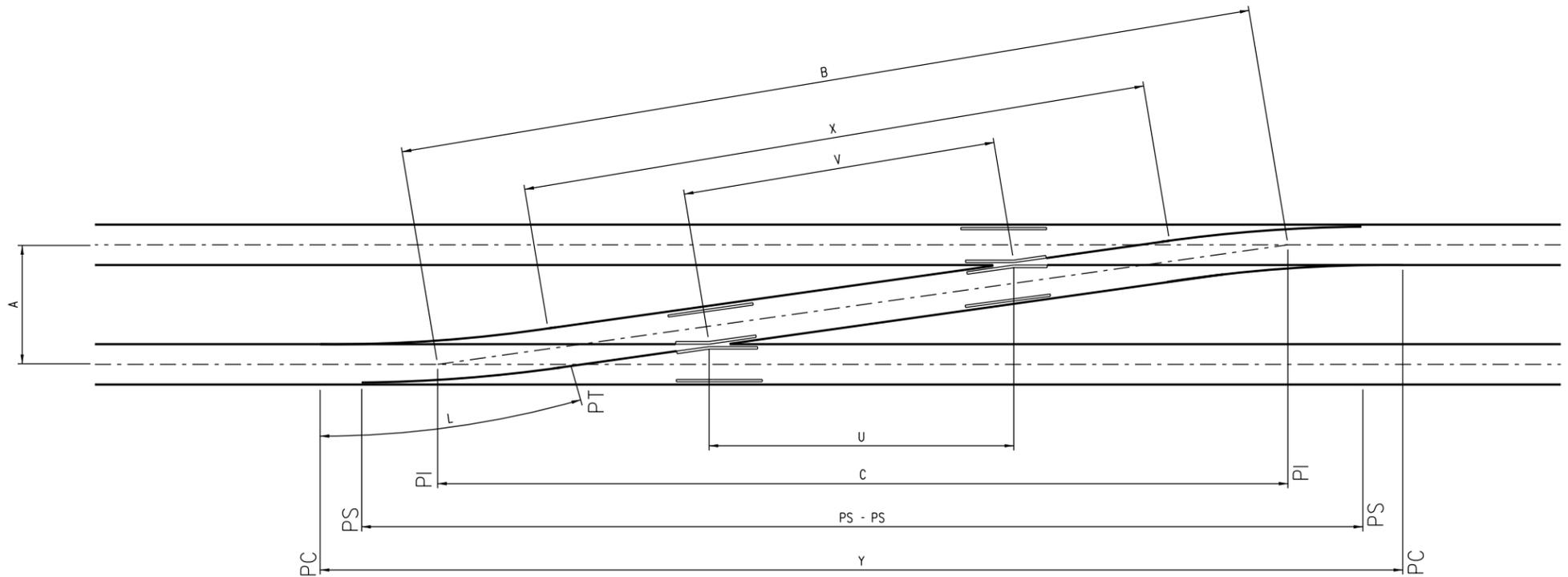
A	B	C	X	Y	2L·X	2L·X-2(PC-PS)	PS TO PS	U	V
13	130.34	129.69	36.20	223.84	224.33	196.19	195.70	34.70	35.35
14	140.37	139.67	46.22	233.82	234.36	206.22	205.68	44.68	45.37
15	150.40	149.65	56.25	243.79	244.39	216.25	215.65	54.65	55.40
16	160.42	159.62	66.28	253.77	254.41	226.27	225.63	64.63	65.43
17	170.45	169.60	76.30	263.75	264.44	236.60	235.61	74.61	75.45
18	180.48	179.58	86.33	273.72	274.47	246.33	245.58	84.58	85.48
19	190.50	189.55	96.36	283.70	284.49	256.65	255.56	94.56	95.50
20	200.53	199.53	106.38	293.68	294.52	266.38	265.54	104.54	105.53
21	210.55	209.50	116.41	303.65	304.54	276.40	275.51	114.51	115.56
22	220.58	219.48	126.43	313.63	314.57	286.43	285.49	124.49	125.58
23	230.61	229.46	136.46	323.60	324.60	296.46	295.46	134.46	135.61
24	240.63	239.43	146.49	333.58	334.62	306.48	305.44	144.44	145.64
25	250.66	249.41	156.51	343.56	344.65	316.51	315.42	154.42	155.66
26	260.69	259.39	166.54	353.53	354.68	326.54	325.39	164.39	165.69
27	270.71	269.36	176.57	363.51	364.70	336.56	335.37	174.37	175.72
28	280.77	279.34	186.59	373.49	374.73	346.59	345.35	184.35	185.74
29	290.77	289.32	196.62	383.46	384.76	356.62	355.32	194.32	195.77
30	300.79	299.29	206.65	393.44	394.78	366.64	365.30	204.30	205.79
31	310.82	309.27	216.67	403.42	404.81	376.67	375.28	214.28	215.82
32	320.85	319.25	226.70	413.39	414.84	386.70	385.25	224.25	225.85

**DRAWING INDEX**

TURNOUT AND CROSSOVER GENERAL NOTES AND DATA	ES2921-01
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TURNOUT LAYOUT	ES2921-03
TURNOUT BILL OF MATERIALS	ES2921-04
CROSSOVER LAYOUT AND BILL OF MATERIALS	ES2921-05
FROG LAYOUT	ES2921-06
GAGE PLATE DETAILS AND DIMENSION TABLE	ES2921-07
GUARD RAIL DETAILS	ES2921-08
SPLIT SWITCH POINT DETAILS	ES2921-09
STRAIGHT UNDERCUT STOCK RAILS	ES2921-10
SWITCH ROD DETAILS	ES2921-11
SWITCH ROD MISCELLANEOUS DETAILS	ES2921-12
EXTENSION PLATE AND DAP TIE DETAILS FOR M-23A SWITCH MACHINE	ES2921-13
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SWITCH PLATE DETAILS	ES2921-15
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**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2921-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2921-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2921-05.
- TIE PLATES SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2454.
- SCREW SPIKES (5/8" X 6-2 TPI) SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2357.
- PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2921-10 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ES2921-11 AND ES2921-12.
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 10 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2921-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRRA NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ES2921-09.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).



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CROSSOVER LAYOUT

REV.	DATE	DESCRIPTION	DES.	ENG.

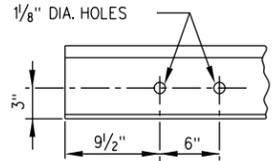
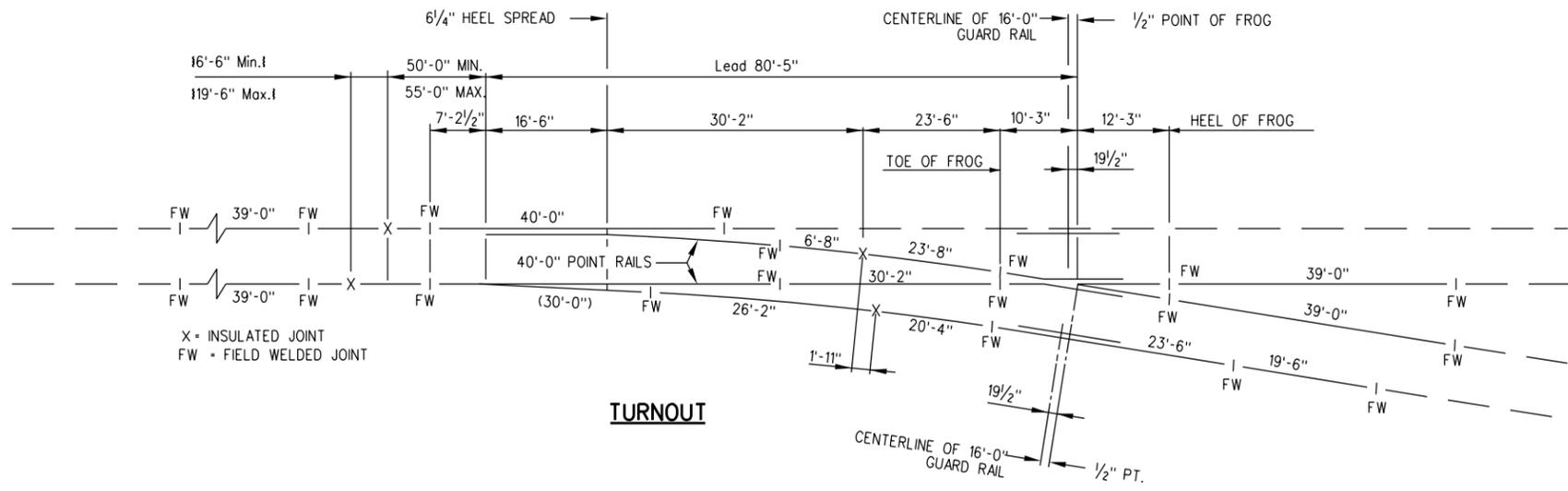
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 10 136 LB. R.H. RBM FROG  
 TURNOUT AND CROSSOVER  
 GENERAL NOTES AND DATA

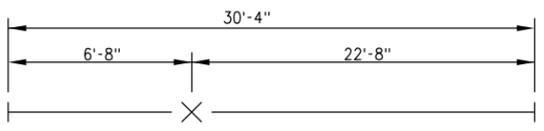
STANDARD	2921
SCALE	NONE
REVISION SHEET	1 OF 15
CADD FILE	ES2921-01



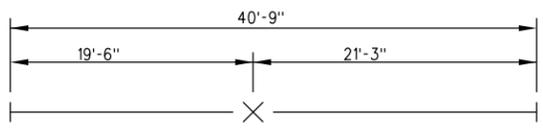
**DETAIL "A"**  
SEE NOTE 4 (b)  
(DRILLED HOLES NOT NECESSARY  
IF TEMPORARY BOLTED JOINTS  
ARE NOT REQUIRED)

**NOTES:**

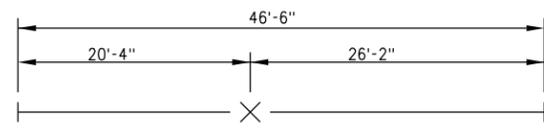
1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS. NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL, STRESS - FREE CONDITION OF 110° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD - ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT RAIL LENGTH.
2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DISCRPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION "A" THE 19'-6" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 11'-6" OF THE LIGHTER RAIL. AT LOCATION "B" THE 21'-3" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 14'-3" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1. NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:
  - (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.
  - (B.) ALL OTHER RAILS SHALL BE 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A".
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSABLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT. INSULATED JOINT MUST BE INTALLED TO BE CENTERED BETWEEN TWO (2) TIES. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0"). WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.



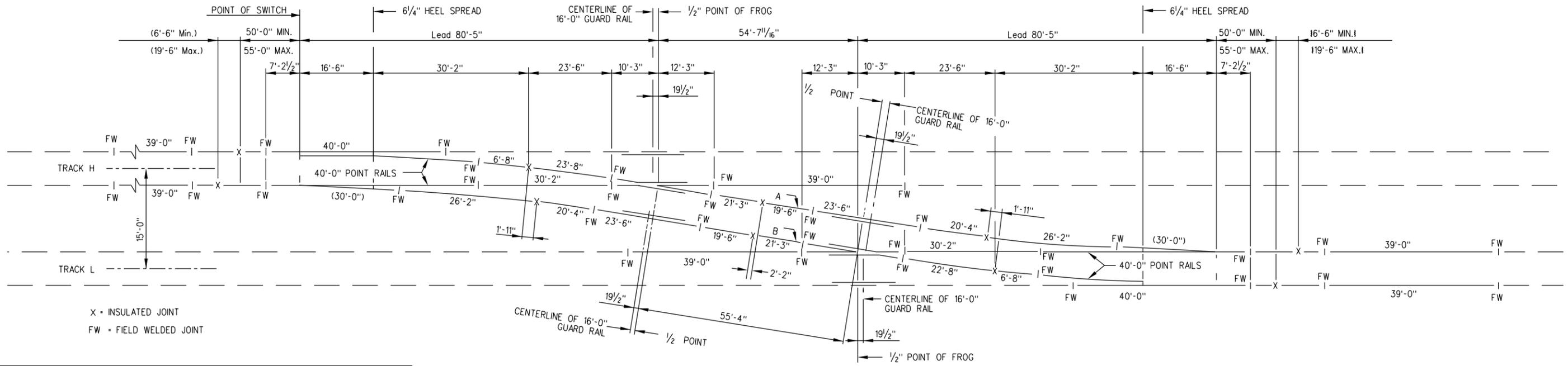
**30'-4" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**  
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



**40'-9" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**  
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



**46'-6" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**  
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



**CROSSOVER**  
15'-0" TRACK CENTERS

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
 Assistant Director: Standards & Design  
 Director of Engineering and Construction

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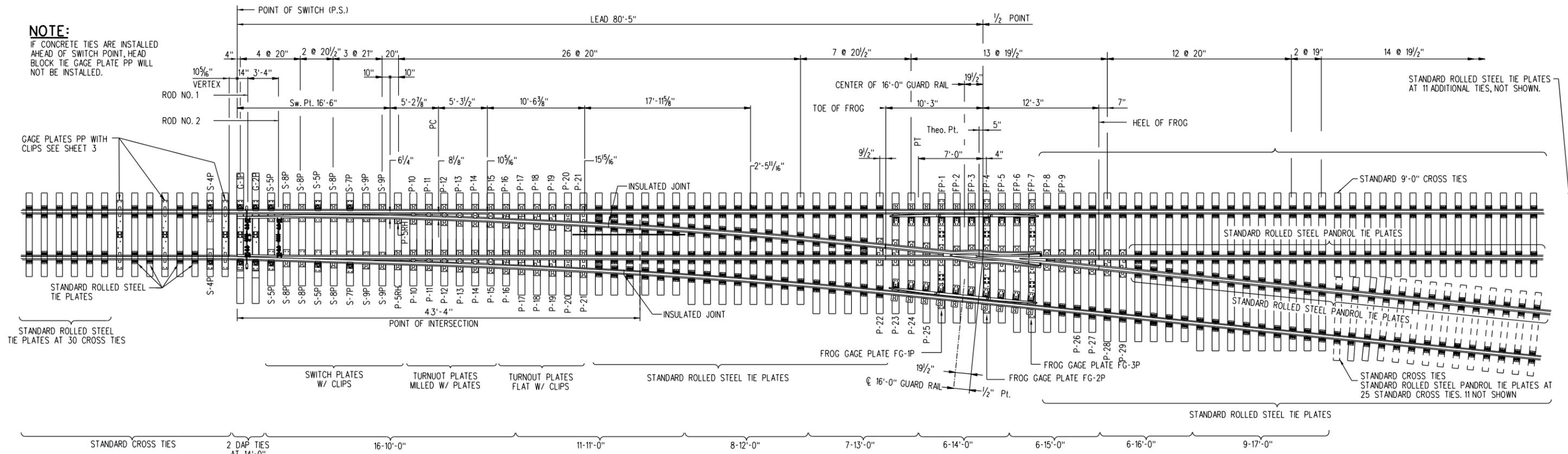


ENGINEERING STANDARDS  
 NO. 10 136 LB. R.H. RBM FROG  
 TURNOUT AND CROSSOVER  
 JOINTS AND LOCATIONS

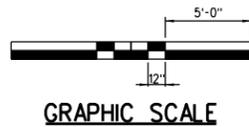
STANDARD	2921
SCALE	NONE
REVISION SHEET	2 OF 15
CADD FILE	ES2921-02

**NOTE:**

IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED.



**\*10 RIGHT HAND TURNOUT**



BILL OF MATERIAL FOR LATERAL TURNOUT	
QTY.	DESCRIPTION
1 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. SAMSON STOCK RAILS (30'-0")
1 EACH	L.H. SAMSON STOCK RAILS (40'-0")
1 EACH	NO. 1 SMJ TYPE SWITCH ROD W/BASKET
1 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
3 EACH	GAGE PLATE NO. P-P
1 EACH	GAGE PLATE NO. G-1P
1 EACH	GAGE PLATE NO. G-2P
6 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	BRACE SLIDE PLATE S-5P
2 EACH	BRACE SLIDE PLATE S-7P
2 EACH	BRACE SLIDE PLATE S-4P
2 EACH	HEEL PLATE P-5RH
2 EACH	TURNOUT PLATES P-10 THRU P-21
1 EACH	PLATES P-22 THRU P-29
1 EACH	NO. 10 SPRING RAIL FROG - 22'-6"
1 EACH	FROG PLATES No. FP-1 THRU FP-9
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
2 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
5 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
138 PCS.	TIE PLATES
552 PCS.	"PANDROL", OR EQUAL, SCREW SPIKES 15*16" DIA. X 6" NO. 5760
276 PCS.	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2055 (GALVANIZED)
8 PCS.	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2063 (GALVANIZED)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
1 EACH	19'-6" RAIL
1 EACH	23'-6" RAIL
1 EACH	30'-2" RAIL
4 EACH	39'-0" RAIL
1 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (30'-4")
1 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (46'-6")

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
16	7" x 9"	10'-0"	840.00
11	7" x 9"	11'-0"	635.25
8	7" x 9"	12'-0"	504.00
7	7" x 9"	13'-0"	477.75
6	7" x 9"	14'-0"	441.00
2	10" x 9"	14'-0" DAP TIES	147.00
6	7" x 9"	15'-0"	472.50
6	7" x 9"	16'-0"	504.00
9	7" x 9"	17'-0"	803.25
TOTAL		TOTAL	
71			4824.75

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR, STANDARDS & DESIGN

*William D. Davis*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

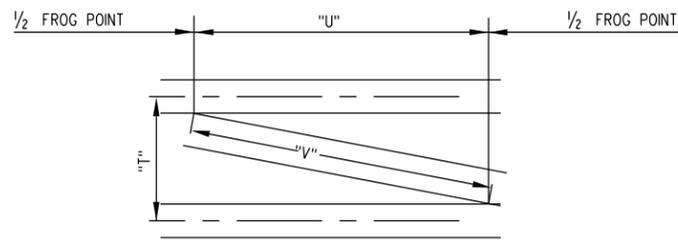
ENGINEERING STANDARDS

NO. 10 136 LB. R.H. RBM FROG TURNOUT LAYOUT

STANDARD	2921
SCALE:	3/16" = 1'-0"
REVISION	SHEET
-	3 OF 15
CADD FILE:	ES2921-03

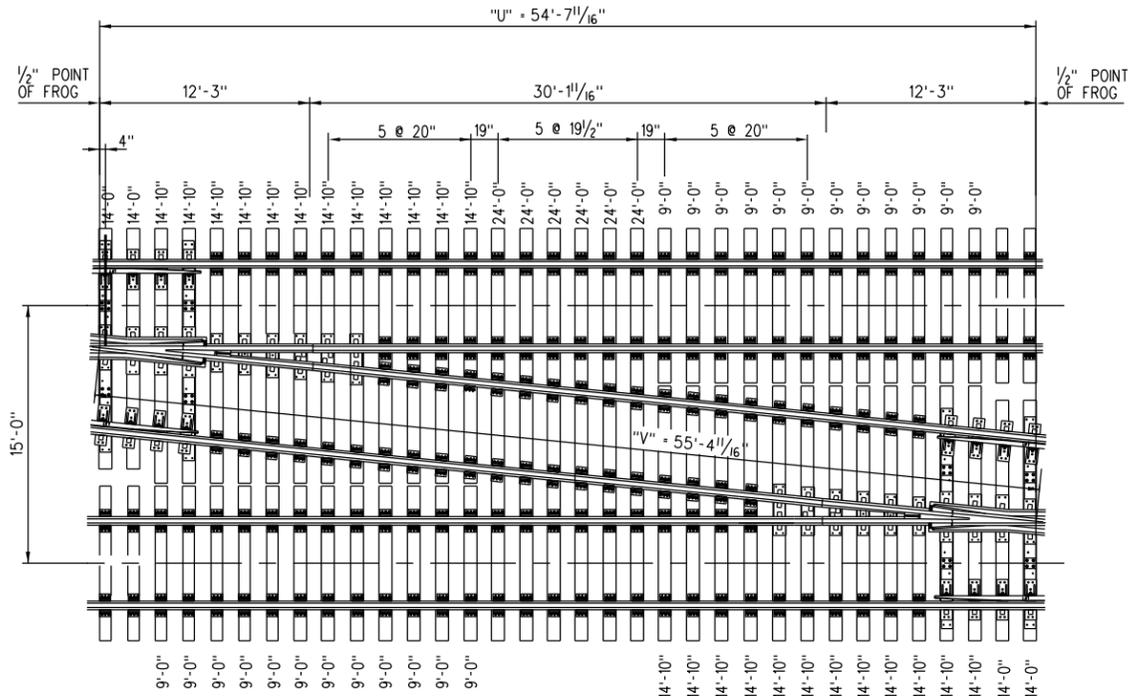
**NOTES:**

1. SEE SHEET ES2921-01 FOR TURNOUT DATA AND NOTES
2. SEE SHEET ES2921-04 FOR BILL OF MATERIALS
3. SEE SHEET ES2921-03 FOR TURNOUT



**CROSSOVER DIAGRAM**

CROSSOVER DATA		
MAIN TRACKS - TANGENT AND PARALLEL		
CROSSOVER - TANGENT BETWEEN FROGS		
TRACK CENTERS "T"	DISTANCE BETWEEN 1/2" FROG PTS.	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
15'-0"	54'-7 1/16"	55'-4 1/16"
EACH 1"	0.831'	0.835'



**NO. 10 CROSSOVER**

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
24	7" x 9"	9'-0"	1134.00
32	7" x 9"	10'-0"	1680.00
22	7" x 9"	11'-0"	1270.50
16	7" x 9"	12'-0"	1008.00
14	7" x 9"	13'-0"	955.50
16	7" x 9"	14'-0"	1176.00
4	10" x 9"	14'-0" DAP TIES	336.00
24	7" x 9"	14'-10"	1890.00
6	7" x 9"	24'-0"	756.00
TOTAL			TOTAL
158			10206.00

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 PAIR	R.H. SAMSON STOCK RAILS (30'-0")
1 PAIR	L.H. SAMSON STOCK RAILS (40'-0")
2 EACH	NO. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. G-1P
2 EACH	GAGE PLATE No. G-2P
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P-5RH
4 EACH	TURNOUT PLATES P-10 THRU P-21
2 EACH	PLATES P-22 THRU P-29
2 EACH	No.10 R.B.M. FROG - 22'-6"
2 EACH	FROG PLATES No. FP-1 THRU FP-9
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
4 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
228 PCS.	TIE PLATES
912 PCS.	"PANDROL", OR EQUAL, SCREW SPIKES 15/16" DIA. X 6" No. 5760
456 PCS.	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2055 (GALVANIZED)
24 PCS.	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2063 (GALVANIZED)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
2 EACH	23'-6" RAIL
2 EACH	30'-2" RAIL
6 EACH	39'-0" RAIL
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (30'-4")
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (40'-9")
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (46'-6")

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

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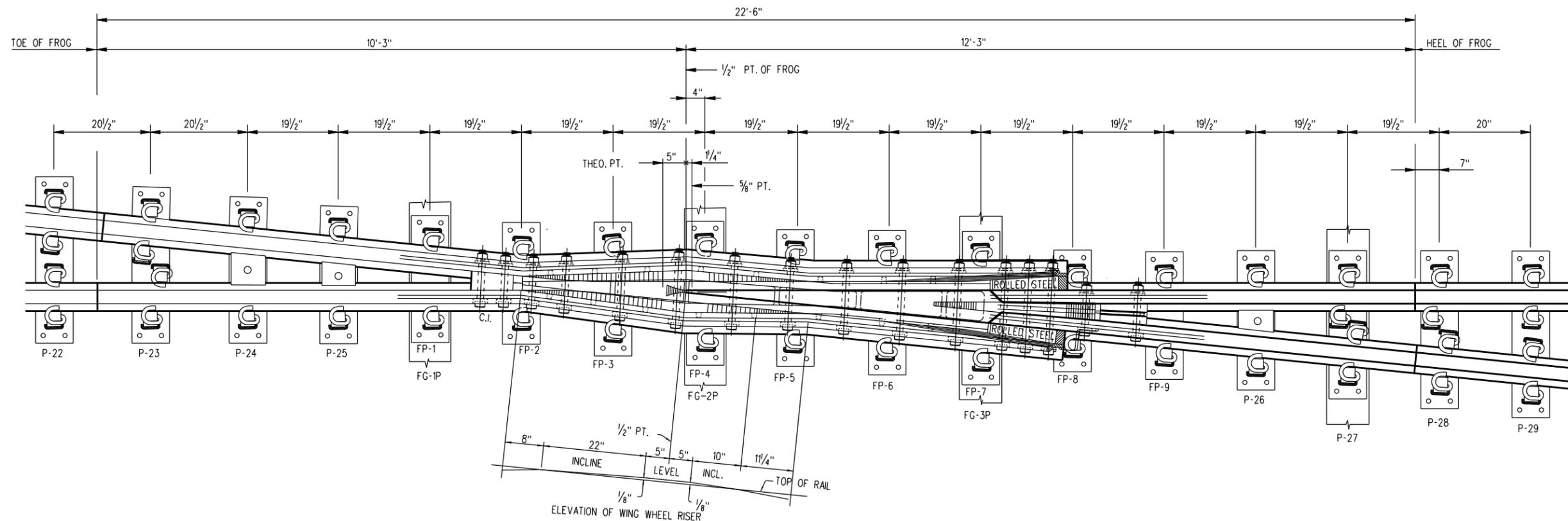
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 10 136 LB. R.H. RBM FROG CROSSOVER  
LAYOUT AND BILL OF MATERIALS

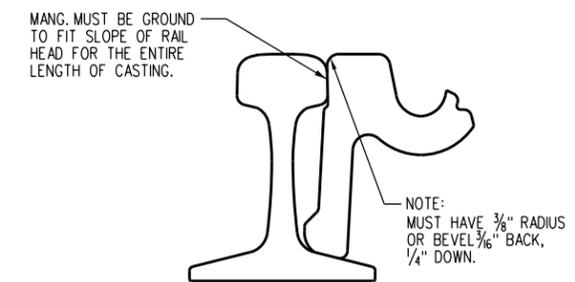
STANDARD	2921
SCALE	3/16" = 1'-0"
REVISION	SHEET
-	4 OF 15
CADD FILE	ES2921-04

**NOTES:**

1. FROG ANGLE 5°-43'-29".
2. RAIL USED IN FABRICATION OF FROG TO BE 136 LB. "HIGH STRENGTH".
3. RAILBOUND MANGANESE STEEL FROG PER CURRENT AREMA. PLAN NUMBERS 621 AND 623 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT AREMA. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH PANDROL TYPE FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MANUFACTURER, FROG NUMBER, HAND OF TURNOUT, RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES SEE ES2921-07.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT AREMA. SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT AREMA. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS TO BE 1 3/8" DIA. H.T.C.S. PER AREMA. SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER AREMA. SPECIFICATIONS.
11. RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.



**NO. 10 RAILBOUND MANGANESE STEEL FROG**  
ANGLE 5°-43'-29"



**DETAIL OF FROG CASTING / RAIL FIT**

SCALE: NONE

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

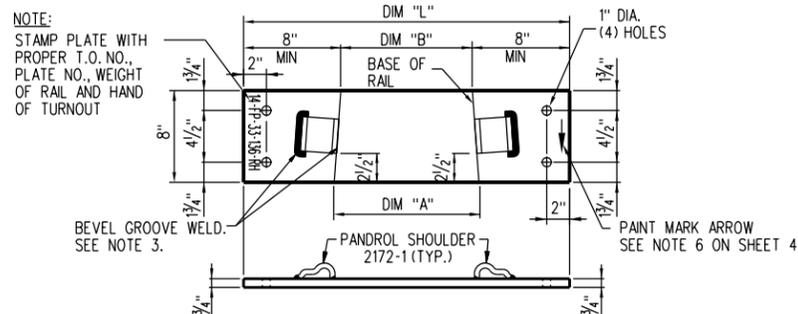
DRAWN BY: A. CARLOS DATE: 03/31/2011

ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*Wilson Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

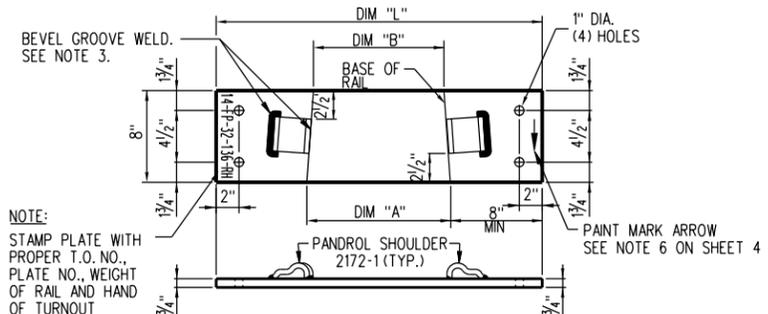
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ENGINEERING STANDARDS	STANDARD 2921
NO. 10 136 LB. R.H. RBM FROG LAYOUT	SCALE: 1" = 1'-0"
	REVISION SHEET 5 OF 15
	CADD FILE: ES2921-05



**FROG PLATE - FP-1**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

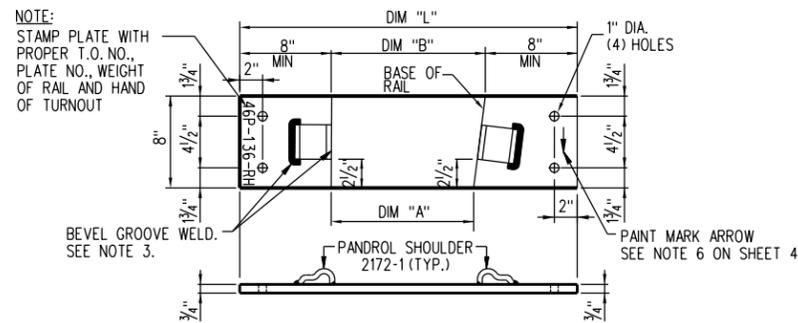


**FROG PLATE - FP-4**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

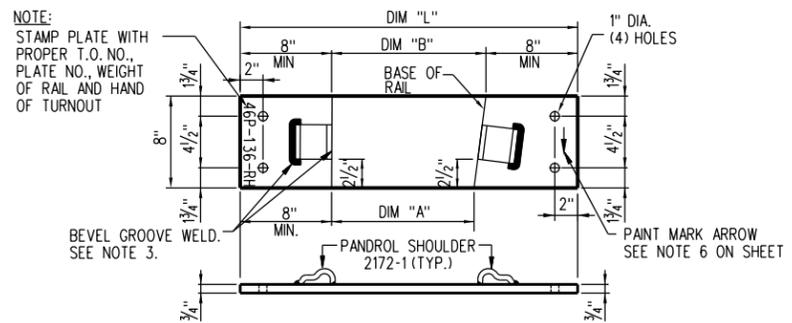
**NOTE:**  
1. FOR FROG DETAILS AND NOTES SEE SHEET 8.

**NOTE "A"**  
PLATES FP-1 THRU FP-9 ARE TO BE LAYED OUT AND PROPERLY SPACED AND MARKED OFF FROM UNDER FROG TO INSURE LOCATION OF PANDROL SHOULDERS

**NOTE "B"**  
SPECIAL FROG PLATES FP-1, FP-4 AND FP-7 ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE DWG. NO. 2921-16



**FROG PLATE - FP-2 & FP-3**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**FROG PLATE - FP-5 THRU FP-9**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
FP-1	SEE NOTE "A"	2'-6 1/2"	2'-6 1/2"	1 EA.
FP-2	SEE NOTE "A"	2'-4 1/2"	2'-4 1/2"	1 EA.
FP-3	SEE NOTE "A"	2'-8"	2'-8"	1 EA.
FP-4	SEE NOTE "A"	2'-9 1/2"	2'-9 1/2"	1 EA.
FP-5	SEE NOTE "A"	2'-8"	2'-8"	1 EA.
FP-6	SEE NOTE "A"	2'-10"	2'-10"	1 EA.
FP-7	SEE NOTE "A"	3'-0"	3'-0"	1 EA.
FP-8	SEE NOTE "A"	2'-4 1/2"	2'-4 1/2"	1 EA.
FP-9	SEE NOTE "A"	2'-6 1/2"	2'-6 1/2"	1 EA.

\*NOTES: DIMENSIONS FOR LOCATION OF PRESSED STEEL SHOULDERS TO BE VERIFIED USING FINISHED FROG AS A TEMPLATE BEFORE WELDING SHOULDERS IN PLACE.

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

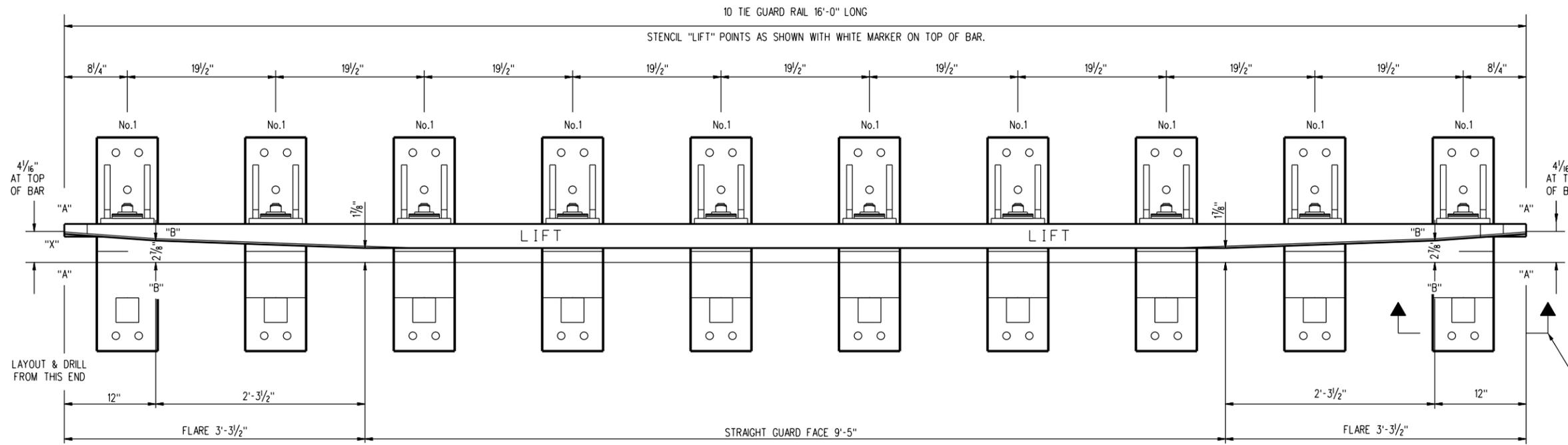
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 10 136 LB. R.H. RBM FROG  
 GAGE PLATE DETAILS AND DIMENSION TABLE

STANDARD	2921
SCALE:	1/2" = 1'-0"
REVISION SHEET	6 OF 15
CADD FILE:	ES2921-06



- NOTES:**
1. GUARD RAIL SECTION UIC 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
  2. BASE PLATE, BRACKET AND SHIMS MILD STEEL PER AREMA SPECIFICATION M7.
  3. GUARD RAIL BOLT AND NUT PER AREMA SPECIFICATION M11. EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
  4. WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK.
  5. WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.

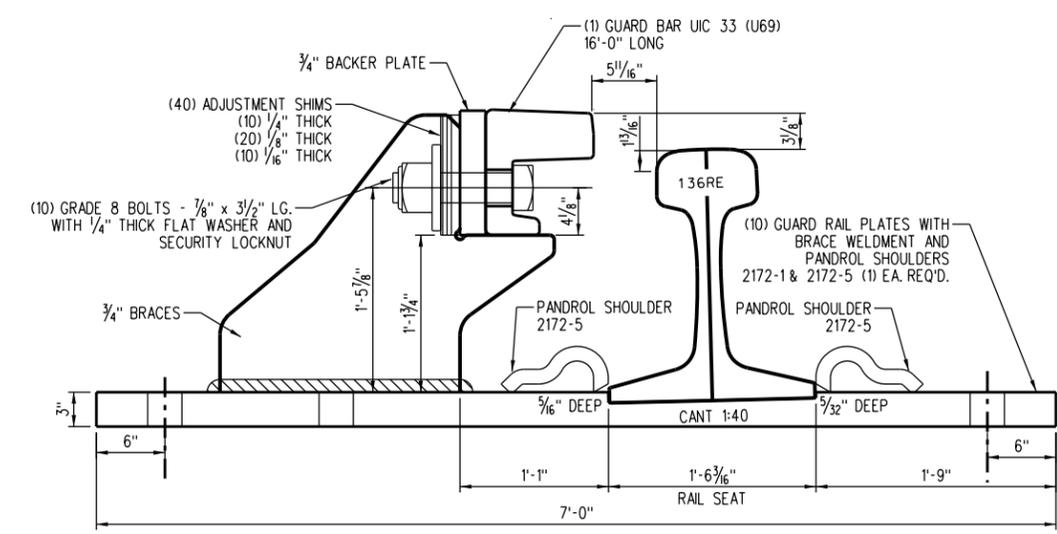
**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

**ASSEMBLED 16'-0" GUARD RAIL**  
SCALE: 1/2" = 1'-0"

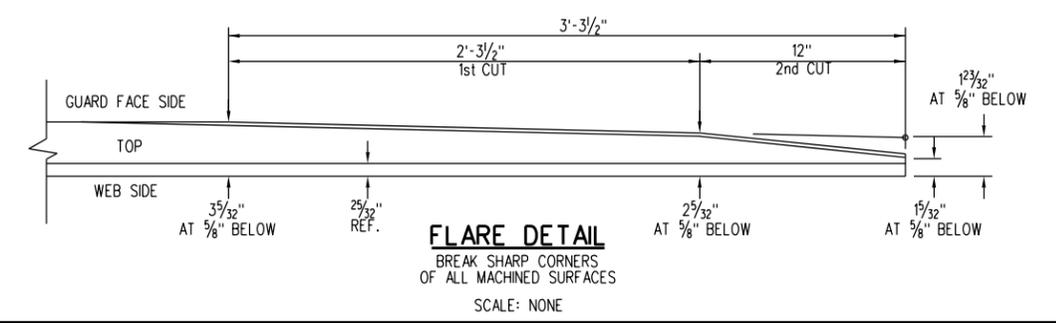
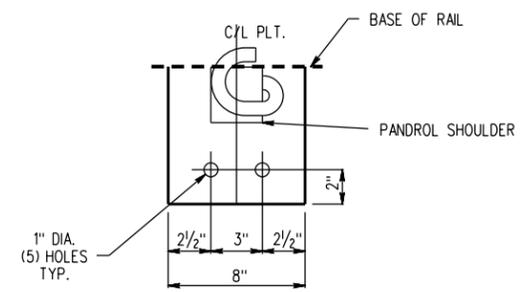
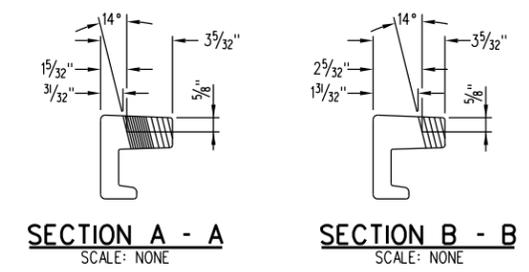
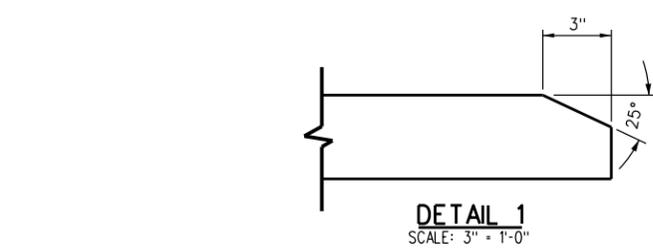
"X" 8 1/4" x 2'-3 3/4" x 3'-11 1/4" x 5'-6 3/4" x 7'-2 1/4" x 8'-9 3/4" x 10'-5 1/4" x 12'-0 3/4" x 13'-8 1/4" x 15'-3 3/4"

HOLES 1" DIA. - 1 3/8" A.B.

**FOR MAINTENANCE ONLY**



**TYPICAL PLATE DETAIL**



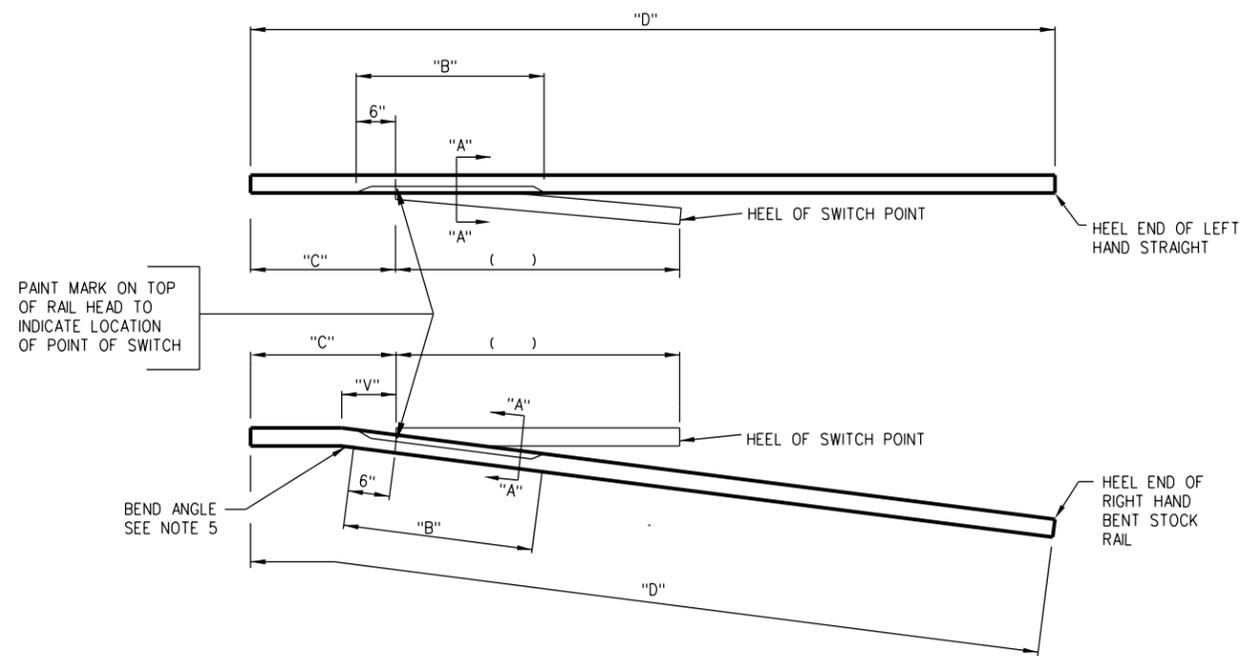
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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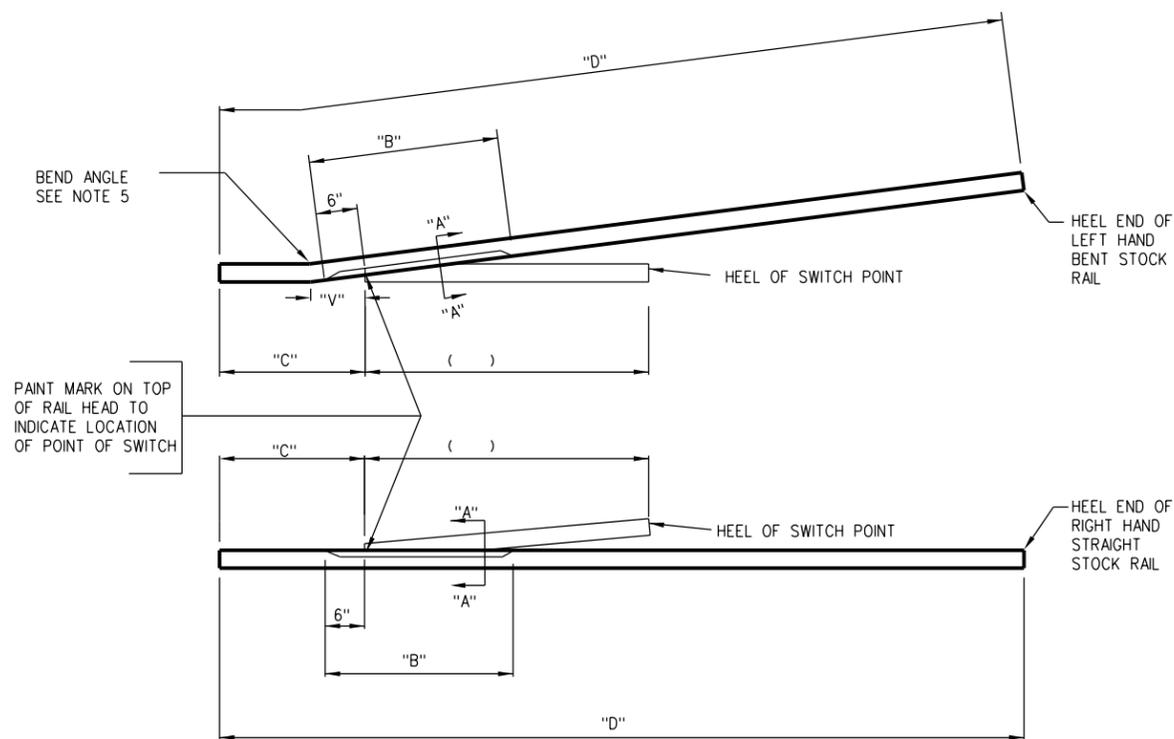
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
NO. 10 136 LB. R.H. RBM FROG GUARD RAIL DETAILS		2921
SCALE: 1/2" = 1'-0"		SHEET
REV. -		7 OF 15
CADD FILE:		ES2921-07





STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"



STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"

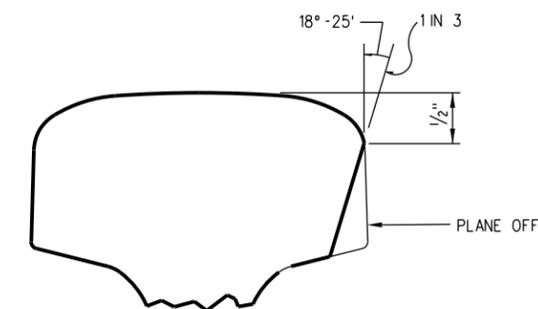
**NOTES:**

1. INFORMATION OR DIMENSIONS NOTED THUS, ( ) TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT AREMA PLAN NO. 1005.
3. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW

LENGTHS B, C, & D FOR 136 LB. RAIL									
Sw. Pt. LENGTH	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
16'-6"	10	STR.	9'-6"	10'-0"	40'-0"	NONE	10'-0"	52'-0"	NONE
16'-6"	10	BENT	9'-6"	10'-0"	40'-0"	HEEL END ONLY	10'-0"	52'-0"	HEEL END ONLY

4. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

Sw. Length	BEND ANGLE	V (Vertex Dist.)
16'-6"	1° -44'-11" or 1" in 2'-9"	10 <sup>9</sup> / <sub>16</sub> "



SECTION "A-A"

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

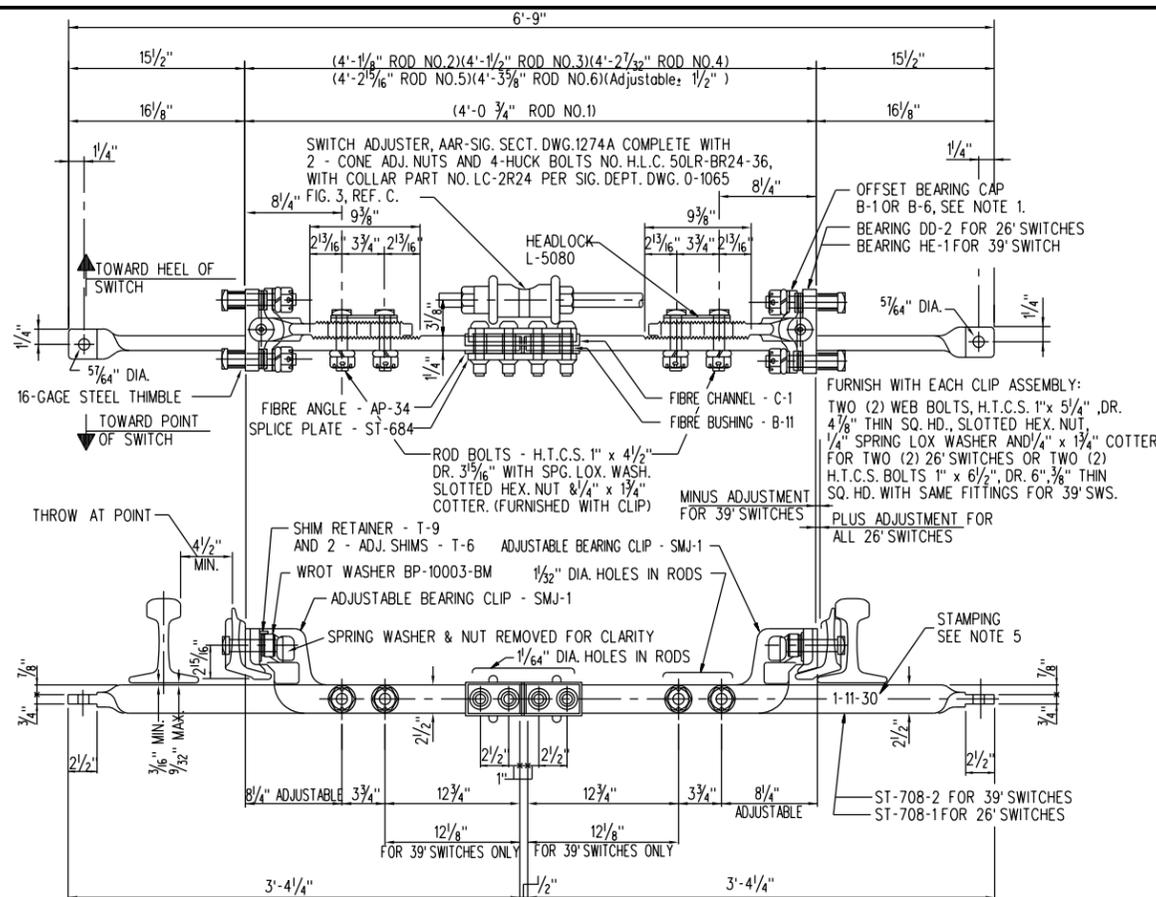
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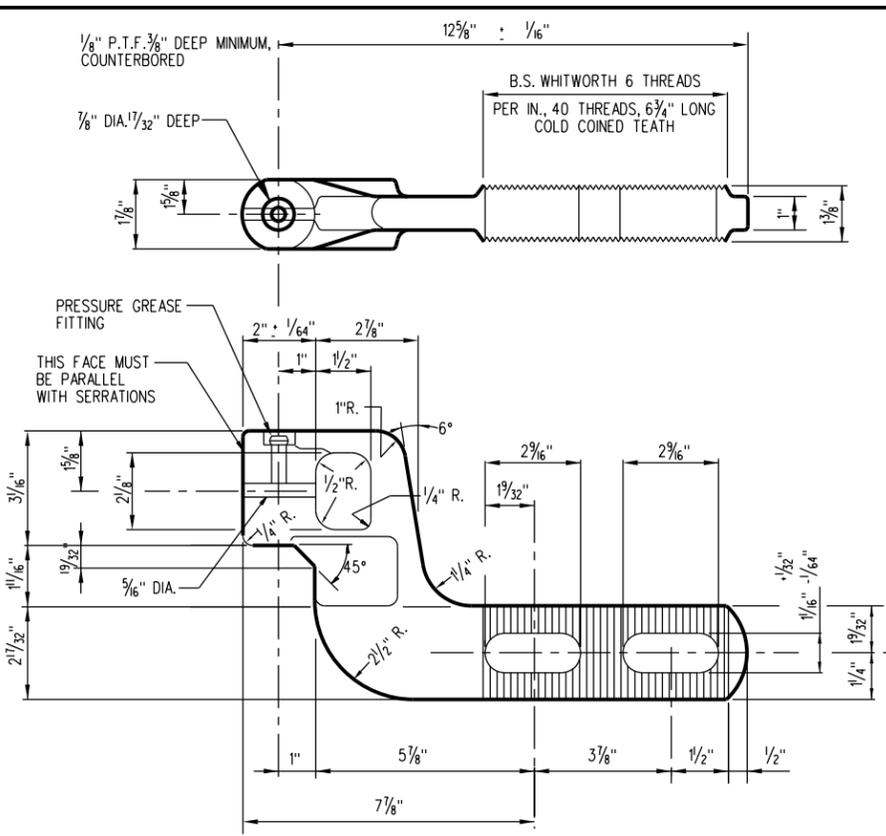
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 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 10 STRAIGHT OR CURVED UNDERCUT STOCK RAILS

STANDARD	2921
SCALE	NONE
REVISION SHEET	9 OF 15
CADD FILE	ES2921-09

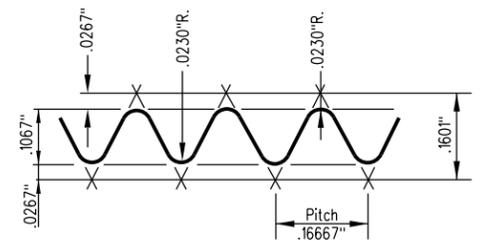


**NO. 1 SWITCH ROD ASSEMBLY**  
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2

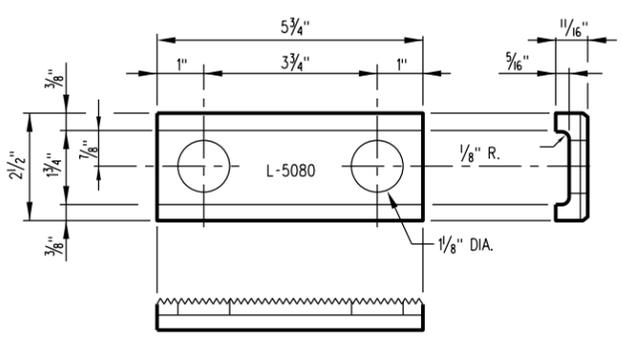


**ADJUSTABLE BEARING CLIP - SMJ - 1**  
SCALE: 3\"/>

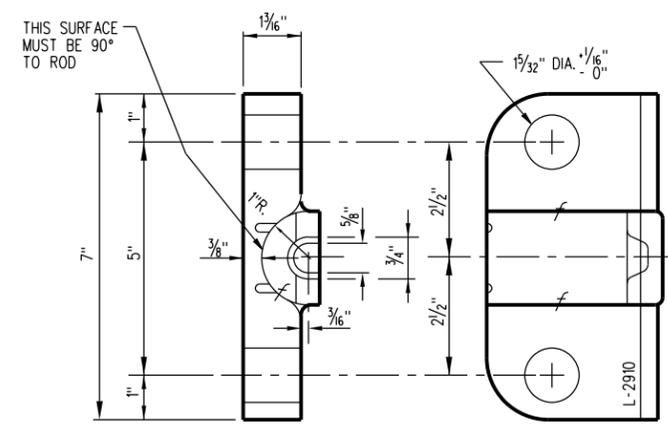
BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E.1020-For.Stl.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	Web Bolt	SEE NOTE
26'	2	DD-2	Malleable Iron	Bearing	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	Malleable Iron	Bearing	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
All	4	T-9	S.A.E.1020	Shim Retainer	1/8" x 1 3/4" x 2 1/4"
All	12	T-6	Stainless Steel	Adjustment Shim	1/6" x 2" x 1 1/8"
All	4	BP-10003-BM	Wrot Iron	Wrot Washer	1/16" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	Rod Bolt	1" x 4 1/2" DR. 3 3/16" REG. SQ. HD. SLOTTED HEX NUT
All	4		Steel	Spg. Lox Washer	For 1" Rod Bolts
All	4		Steel	Cotter	1/4" x 1 3/4" FOR ROD BOLTS
All	2		Steel	Grease Fitting	PRESSURE - FOR BEARING CLIP
All	2	L-5080	Malleable Iron	Headlock	FOR ROD BOLTS
26'	2		16-Gage Steel	Thimble	1 1/2" LONG - FOR SHIPPING
39'	2		16-Gage Steel	Thimble	2 1/2" LONG - FOR SHIPPING
Material for Vertical Rod					
16'-6"	1			Vertical Rod	Use one-ST-708-1
					Use one-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			Vertical Rod	Use one-ST-708-2
					Use one-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
All	4		High Strength Steel	Conn. & Insul. Bolt	HIGH FASTENER NO. H.L.C. 50LR-BR24-36
All	4		Low Carbon Steel	Collar	HUCK FASTENER NO. LC-2R24
All	1	ST-684	H.R. Mild Steel	Splice Plate	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
All	2	AP-34	AAR-Sig. Sec. 13-52	Angle	1/2" x 2 1/2" x 4 1/8" HARD FIBRE - PARAFIN COATED
All	4	B-11	AAR-Sig. Sec. 13-52	Bushing	1" O.D. HARD FIBRE - PARAFIN COATED
All	1	C-1	AAR-Sig. Sec. 13-52	Channel	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
All	1		Malleable Iron	Switch Adjuster	
All	2		Malleable Iron	Cone Adj. Nut	FOR 1/4" THROW RODS



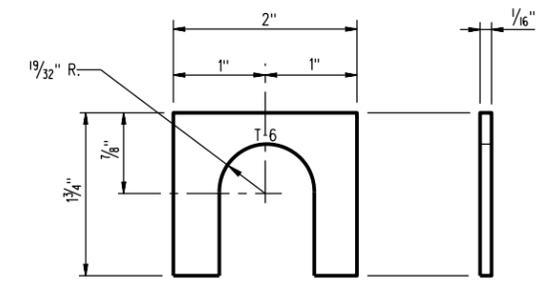
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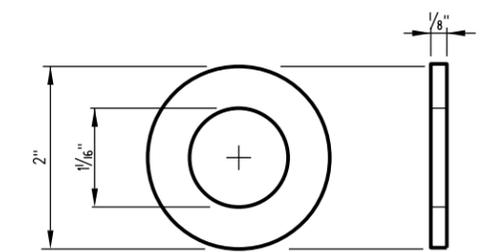
**HEADLOCK L-5080**  
SCALE: 6\"/>



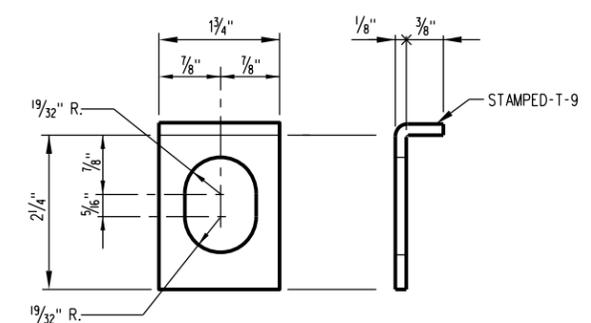
**BEARING - DD - 2**  
SCALE: 6\"/>



**ADJUSTABLE SHIM - T - 6**  
SCALE: FULL



**WROT WASHER - BP - 10003 - BM**  
SCALE: FULL



**SHIM RETAINER - T - 9**  
SCALE: FULL

**NOTES:**

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OF LEFT) SHOULD ALSO BE SPECIFIED.
- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:  
1-39 FOR USE ON 39'-0" SWITCHES, 132 LB. AND 136 LB. RE RAIL SECTIONS.  
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.

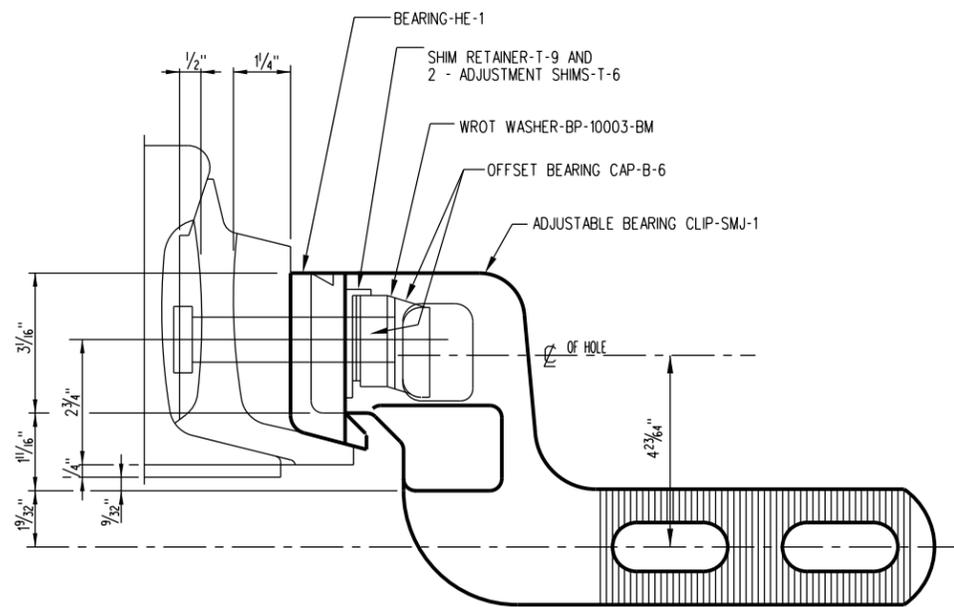
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ENGINEERING STANDARDS	STANDARD 2921
NO. 10 SWITCH ROD DETAILS	SCALE: AS NOTED
	REVISION SHEET 10 OF 15
	CADD FILE: ES2921-10

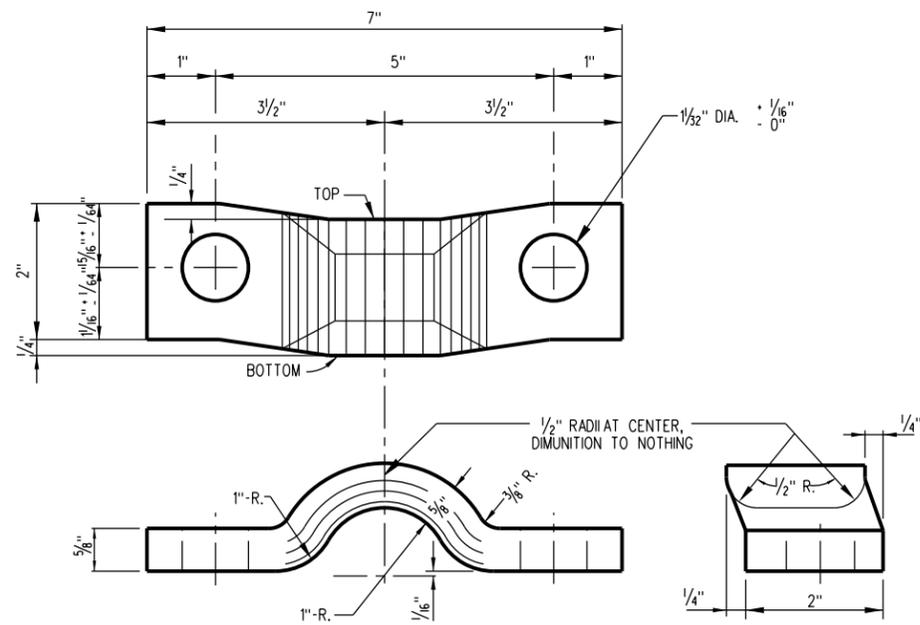
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
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*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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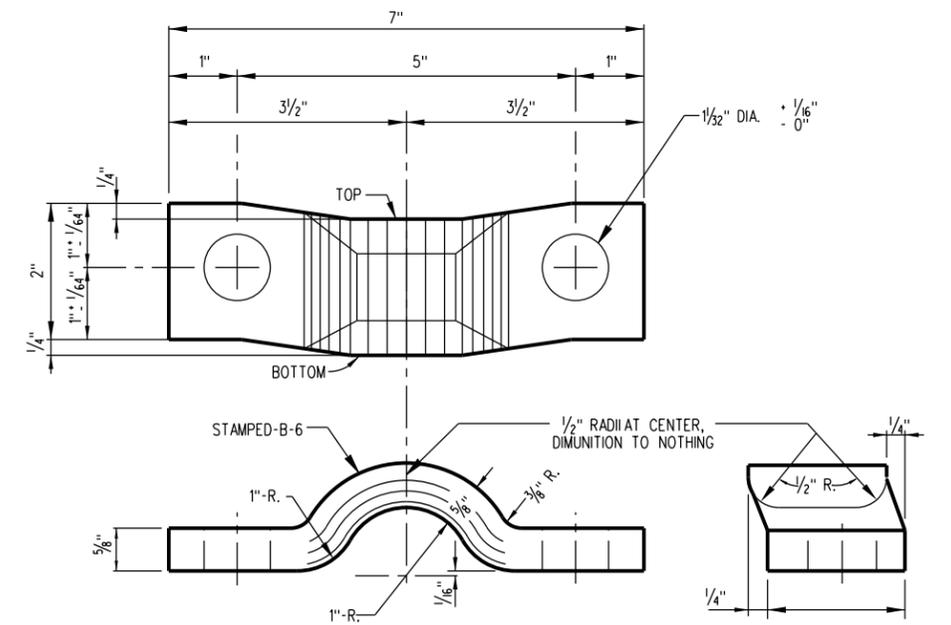
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012



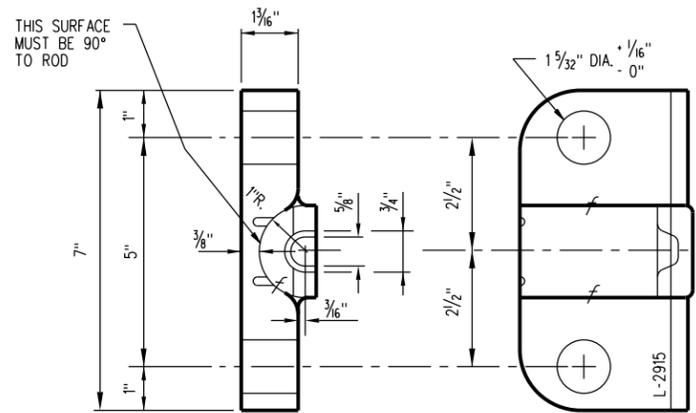
**ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39 SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



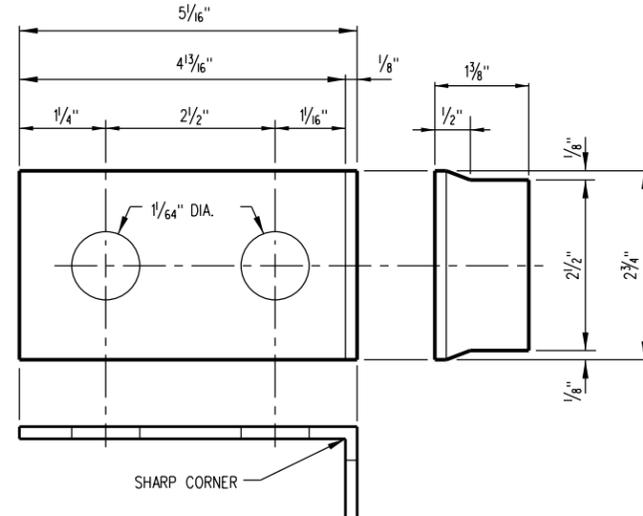
**OFFSET BEARING CAP-B-1**



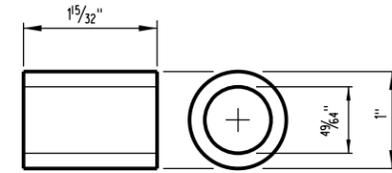
**OFFSET BEARING CAP-B-6**



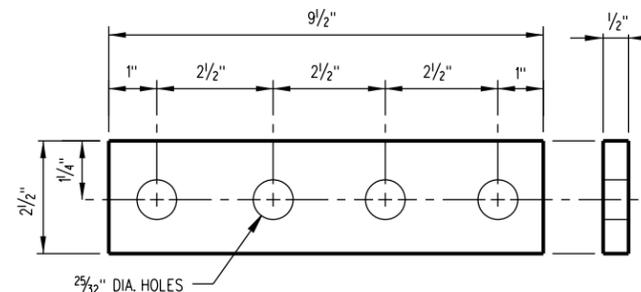
**BEARING-HE-1**



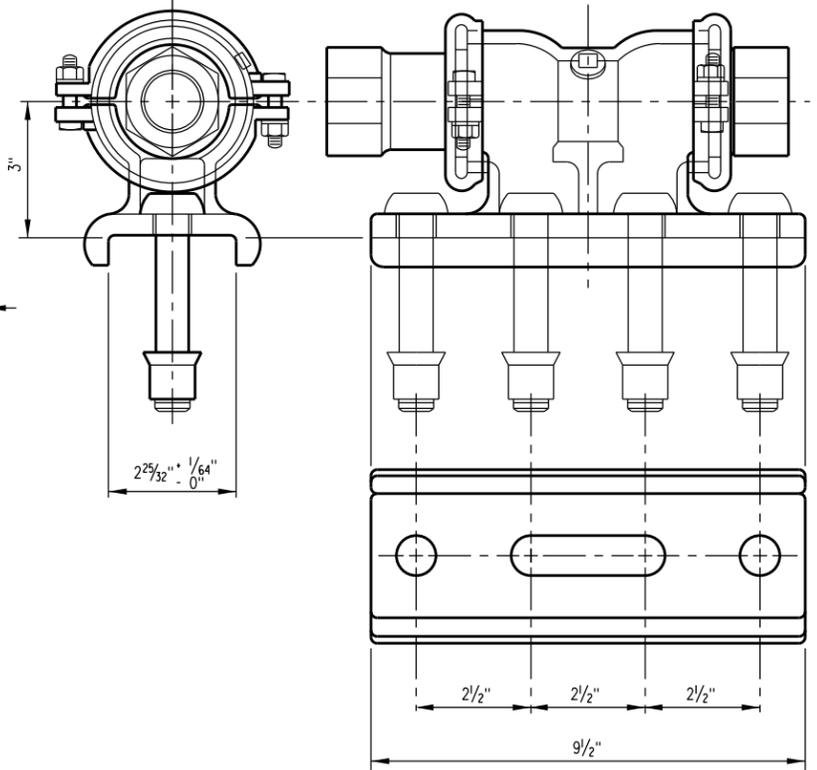
**FIBRE ANGLE-AP-34**



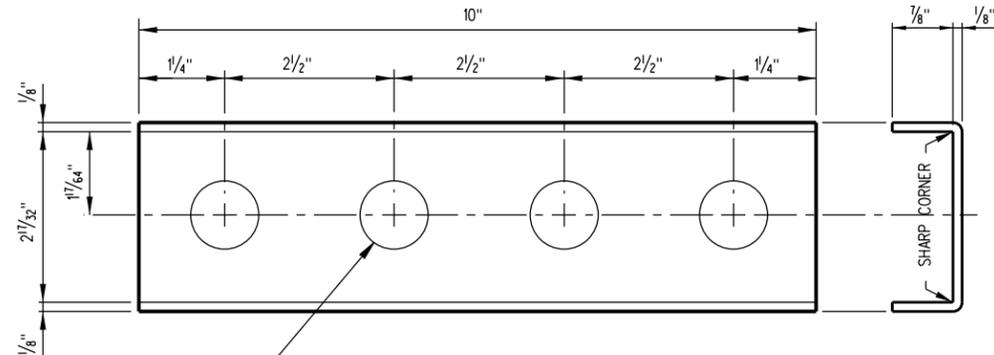
**FIBRE BUSHING-B-11**



**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**FIBRE CHANNEL-C-1**

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

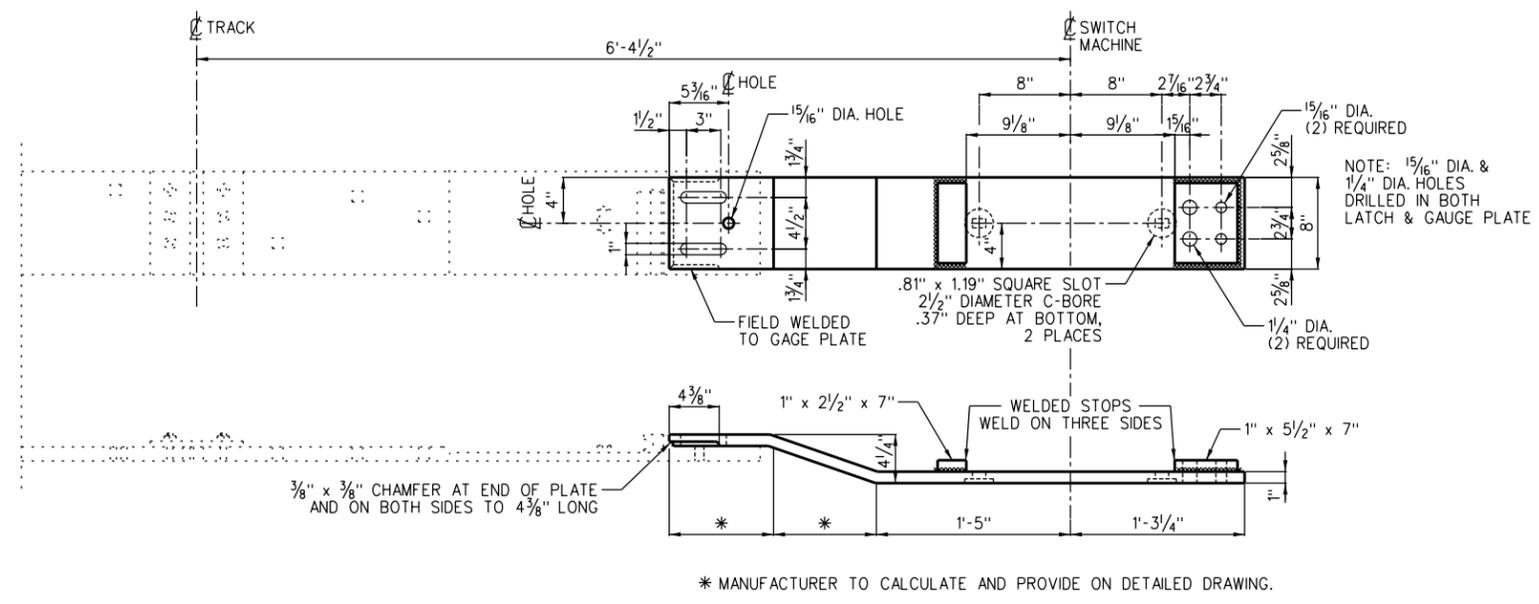
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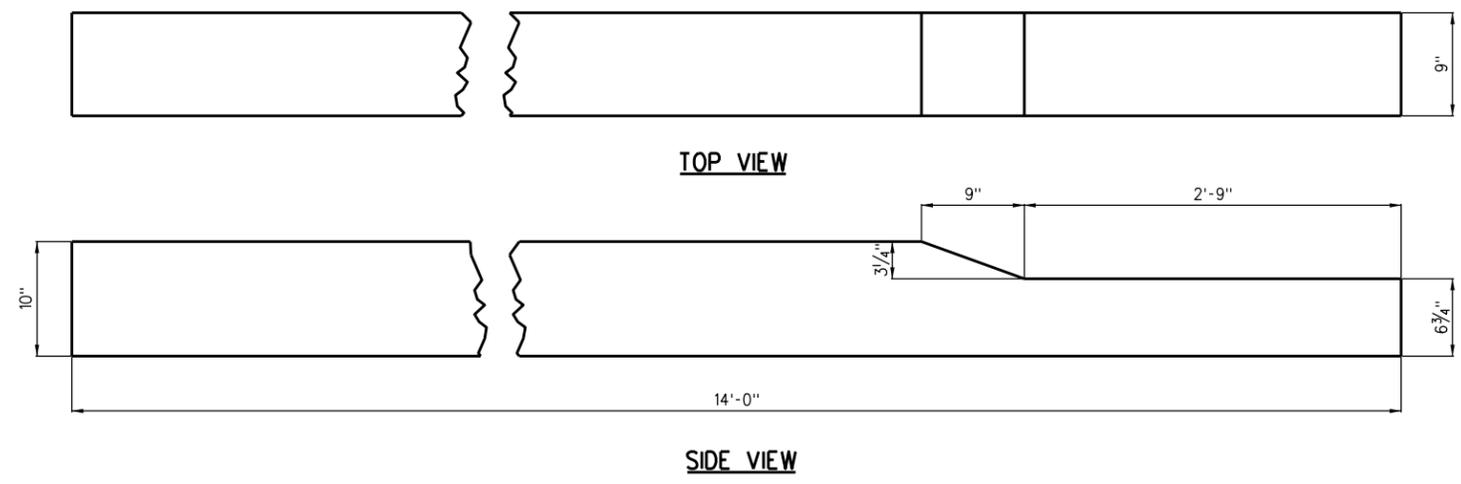
ENGINEERING STANDARDS  
 NO. 10 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	SCALE	REVISION	SHEET	CADD FILE
2921	6" = 1'-0"	-	11 OF 15	ES2921-11

**NOTE:**  
SEE SHEET 15 FOR NOTES.



**EXTENSION PLATE**  
(2 PCS. REQ'D. AS SHOWN)



TIES SHALL BE MADE OF DOUGLAS FIR OR GUM AND TREATED AFTER FRAMING.

**DAP TIE**  
(2 PCS. REQ'D. AS SHOWN)

**US&S M23-A SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS.**

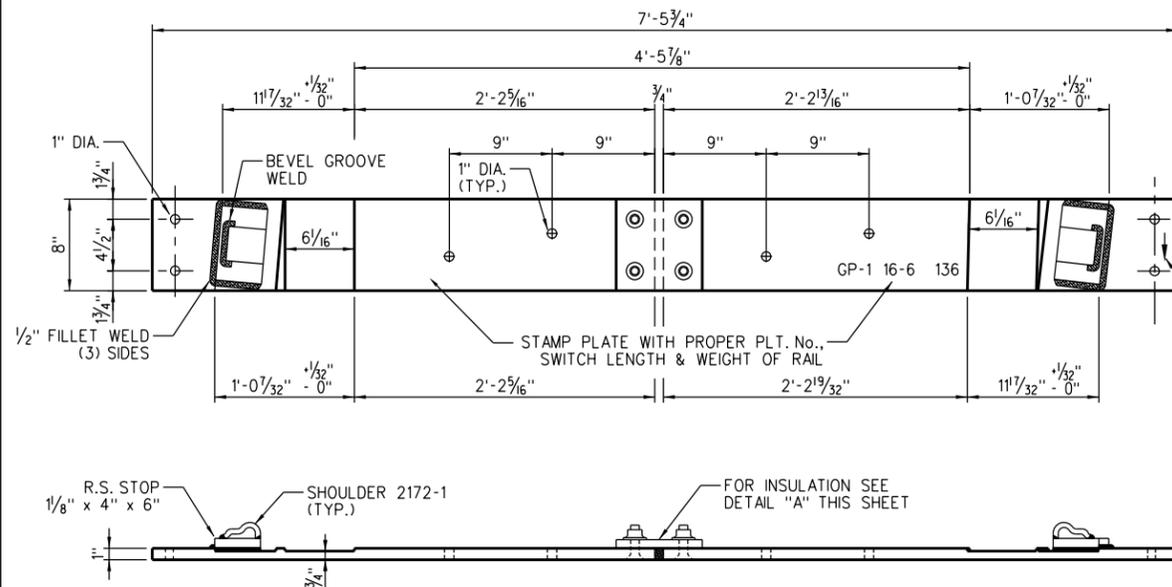
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DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCRRRA ENGINEERING STANDARDS ARE INTENDED FOR SCRRRA APPROVED USES ONLY. FOR NON-SCRRRA APPROVED USES, SCRRRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRRRA. ALL RIGHTS RESERVED.	<p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>	ENGINEERING STANDARDS NO. 10 EXTENSION PLATE AND DAP TIE DETAILS FOR M-23A SWITCH MACHINE	STANDARD 2921
ASSISTANT DIRECTOR: STANDARDS & DESIGN <i>Nareh D. Papp</i>		DIRECTOR OF ENGINEERING AND CONSTRUCTION <i>William Dava</i>				SCALE: 1/2" = 1'-0" REVISION SHEET - 12 OF 15 CADD FILE: ES2921-12
REV.	DATE	DESCRIPTION	DES.	ENG.		



**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PANDROL TYPE WELD - ON, PRESSED STEEL SHOULDER, MADE OF MILD STEEL TO BE PURCHASED FROM APPROVED SUPPLIER MEETING DESIGN SPECIFICATIONS.
3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. THE PLATES AS SHOWN FOR A 136 LB., NO. 10 RIGHT HAND HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
5. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET 2921-13.

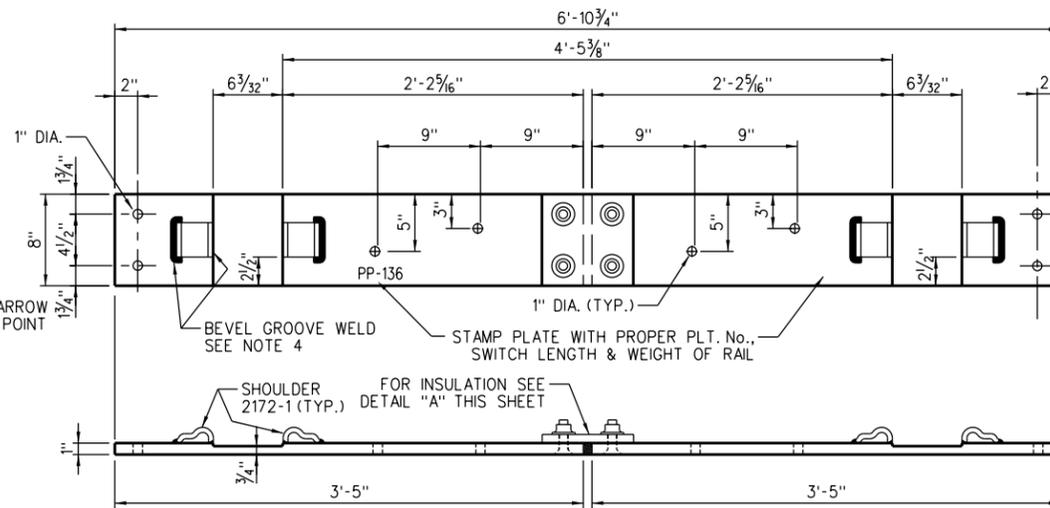


**INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH**

1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D AS SHOWN) (SCALE: 1/2" = 1'-0")

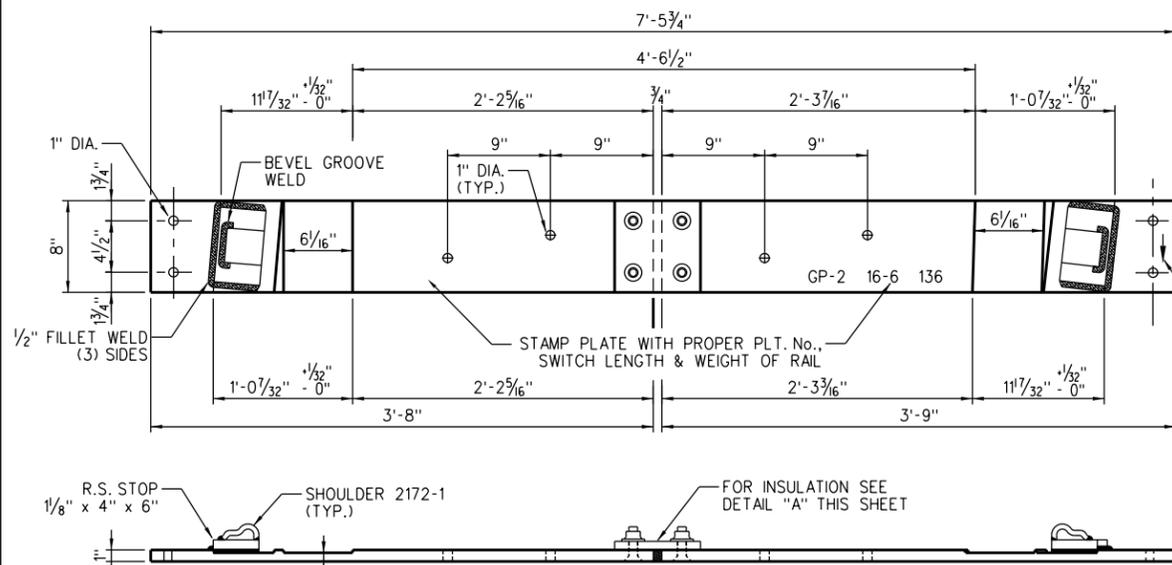
**NOTE:**

SERRATED WASHER AND BRACE PLATE NOT SHOWN FOR CLARITY.



**PANDROLIZED INSULATED GAGE PLATE PP**

1" x 8" - FLAT - W/ INSULATION (3 PC. REQ'D AS SHOWN)  
(SCALE: 1/2" = 1'-0")

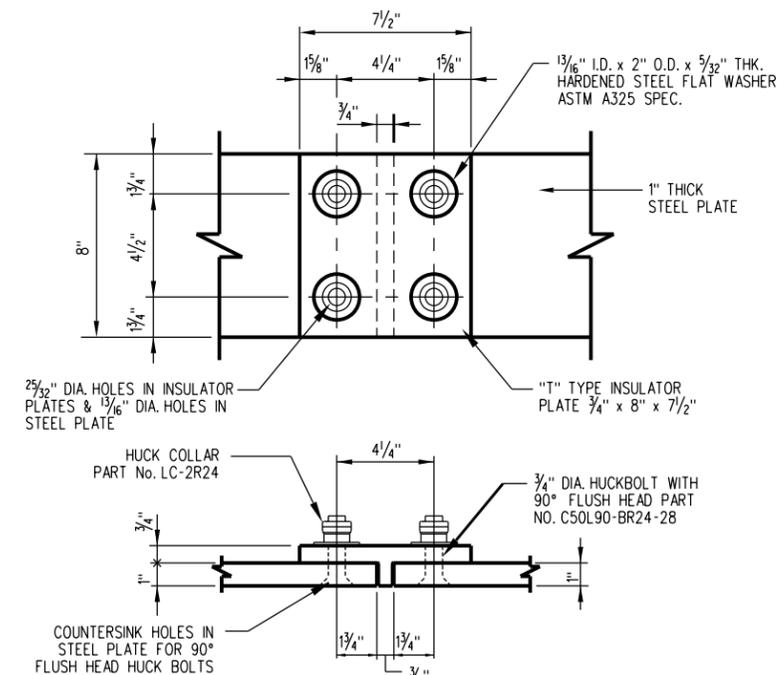


**INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH**

1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D AS SHOWN) (SCALE: 1/2" = 1'-0")

**NOTE:**

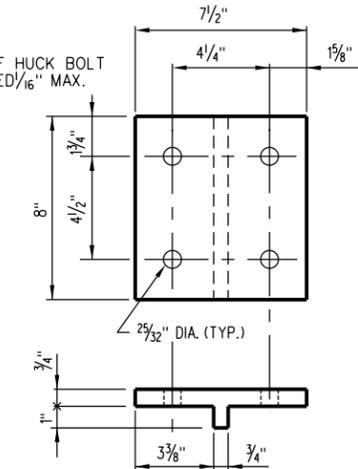
SERRATED WASHER AND BRACE PLATE NOT SHOWN FOR CLARITY.



**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**

**NOTE:**

HEAD OF HUCK BOLT RECESSED 1/16" MAX.

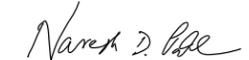
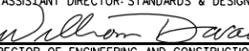


**DETAIL OF INSULATION BLOCK**

POLYESTER COATED STEEL CORE W/ BUSHINGS, PORTEC •127-07547-01 OR FIBERGLASS REINFORCED THERMOSET RESIN. PURCHASE PART NO. GPI52P05

**DETAIL "A" INSULATION AT PLATES**  
(SCALE: 3" = 1'-0")

**FOR MAINTENANCE ONLY**

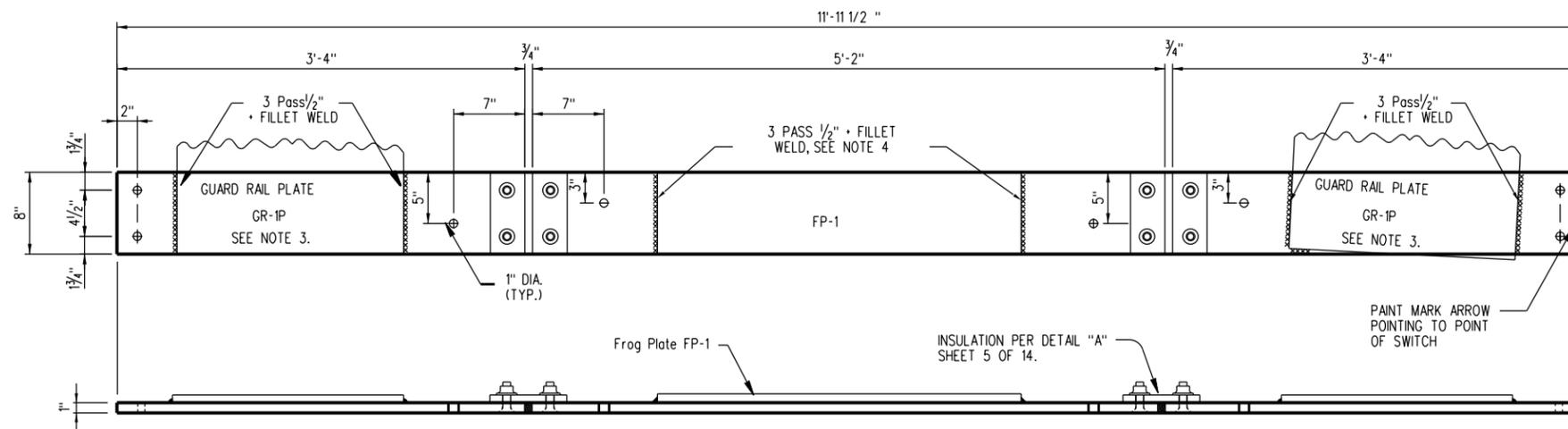
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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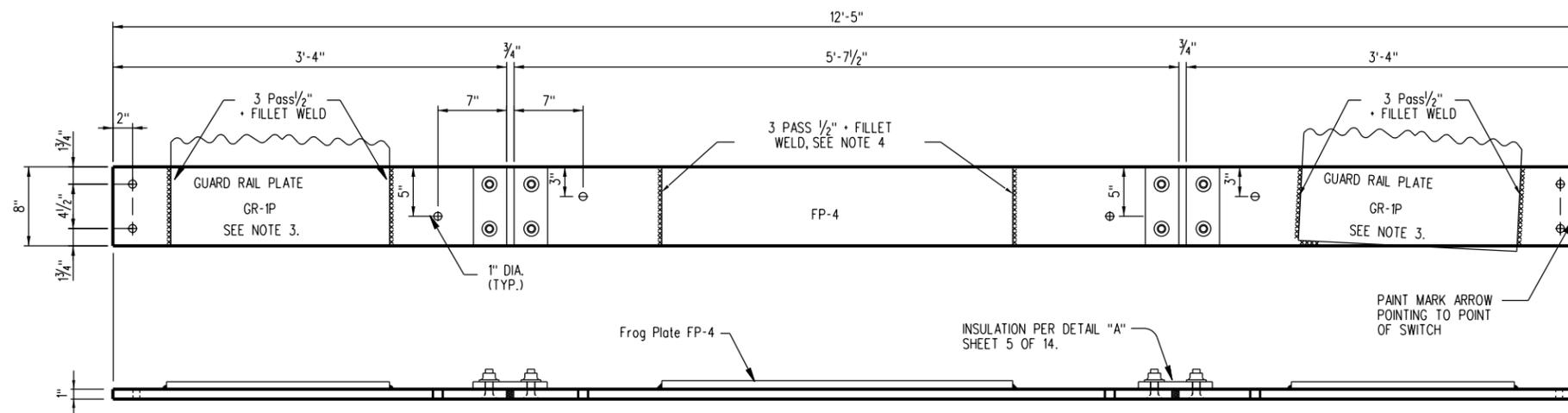


SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
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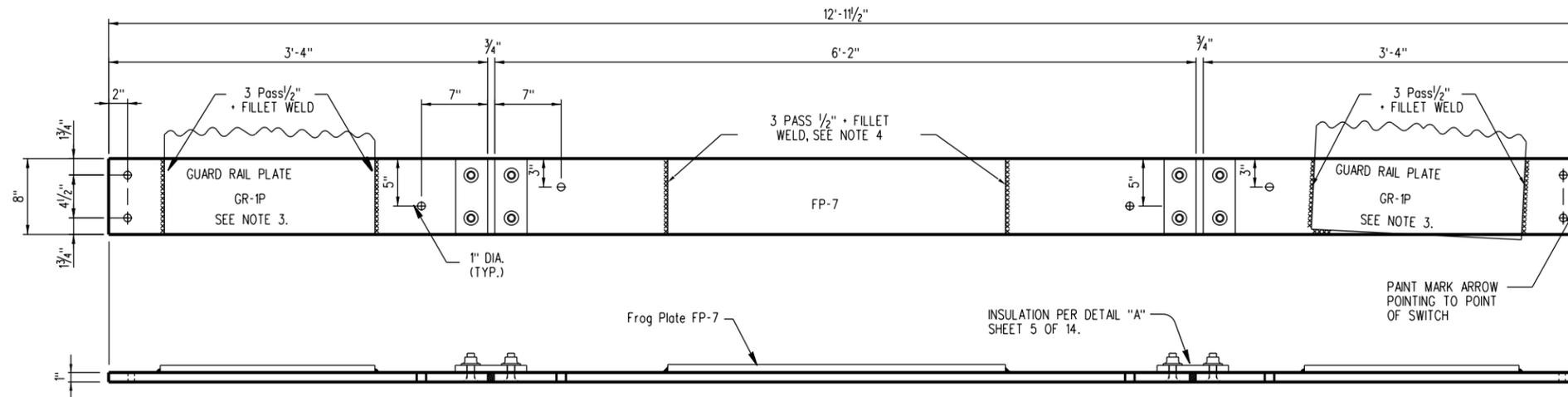
ENGINEERING STANDARDS		STANDARD
NO. 10 SWITCH PLATE DETAILS		2921
SCALE:		AS NOTED
REVISION SHEET		14 OF 15
CADD FILE:		ES2921-14



**INSULATED FROG GAGE PLATE - FG-1P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-2P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



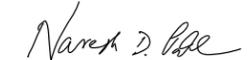
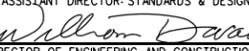
**INSULATED FROG GAGE PLATE - FG-3P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 10 INSULATED GAGE PLATE DETAILS

STANDARD	2921
SCALE:	1/2" = 1'-0"
REVISION SHEET	15 OF 15
CADD FILE:	ES2921-15

**EQUIVALENT CURVE DATA**

CURVE	6.0850'
RADIUS	941.60'
DELTA	5.724'
TANGENT (T)	47.07'
LENGTH (L)	94.07'
EXTERNAL	1.17'

**CROSSOVER DATA**

LEAD	80.500'
PC TO PS	14.07'
PS TO PI	33.00'
PI TO 1/2" PF	47.50'
LENGTH OF TURNOUT	117.28'
PS TO PT	80.00'

**FROG DATA**

FROG NUMBER	10
FROG ANGLE	5° -43'-29"

**SWITCH DATA**

SWITCH LENGTH	16'-6"
HEEL SPREAD	6 1/4"
HEEL ANGLE	N/A
SWITCH ANGLE	1° -44'-11"
RADIUS OF CENTER LINE - SWITCH	N/A
TANGENT LENGTH SWITCH	N/A
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	N/A
DEGREE OF CURVE - SWITCH	N/A

**TURNOUT DATA**

RADIUS OF CENTER LINE - TURNOUT	736.76'
TANGENT LENGTH - TURNOUT	25.65'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	3° -59'-18"
DEGREE OF CURVE - TURNOUT	7° -46'-58"

**CROSSOVER DATA TABLE**

A	B	C	X	Y	2L·X	2L·X-2(PC-PS)	PS TO PS	U	V
13	130.34	129.69	36.20	223.84	224.33	196.19	195.70	34.70	35.35
14	140.37	139.67	46.22	233.82	234.36	206.22	205.68	44.68	45.37
15	150.40	149.65	56.25	243.79	244.39	216.25	215.65	54.65	55.40
16	160.42	159.62	66.28	253.77	254.41	226.27	225.63	64.63	65.43
17	170.45	169.60	76.30	263.75	264.44	236.60	235.61	74.61	75.45
18	180.48	179.58	86.33	273.72	274.47	246.33	245.58	84.58	85.48
19	190.50	189.55	96.36	283.70	284.49	256.65	255.56	94.56	95.50
20	200.53	199.53	106.38	293.68	294.52	266.38	265.54	104.54	105.53
21	210.55	209.50	116.41	303.65	304.54	276.40	275.51	114.51	115.56
22	220.58	219.48	126.43	313.63	314.57	286.43	285.49	124.49	125.58
23	230.61	229.46	136.46	323.60	324.60	296.46	295.46	134.46	135.61
24	240.63	239.43	146.49	333.58	334.62	306.48	305.44	144.44	145.64
25	250.66	249.41	156.51	343.56	344.65	316.51	315.42	154.42	155.66
26	260.69	259.39	166.54	353.53	354.68	326.54	325.39	164.39	165.69
27	270.71	269.36	176.57	363.51	364.70	336.56	335.37	174.37	175.72
28	280.77	279.34	186.59	373.49	374.73	346.59	345.35	184.35	185.74
29	290.77	289.32	196.62	383.46	384.76	356.62	355.32	194.32	195.77
30	300.79	299.29	206.65	393.44	394.78	366.64	365.30	204.30	205.79
31	310.82	309.27	216.67	403.42	404.81	376.67	375.28	214.28	215.82
32	320.85	319.25	226.70	413.39	414.84	386.70	385.25	224.25	225.85

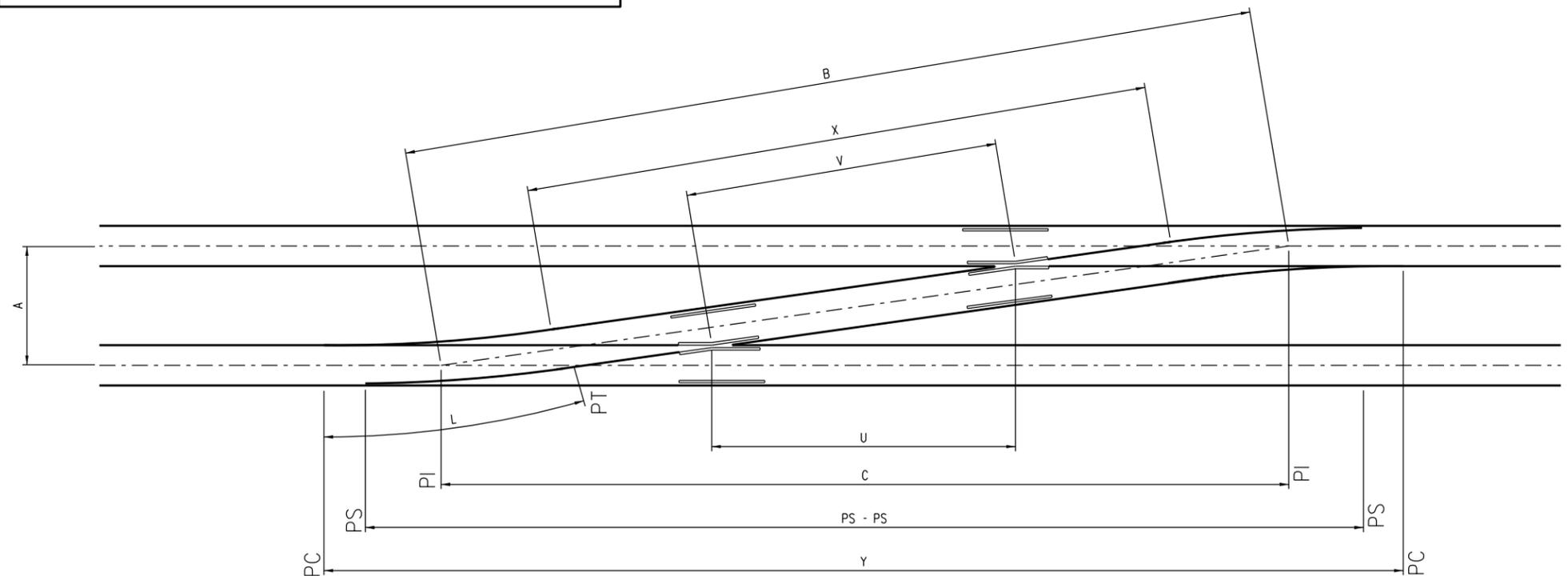
**DRAWING INDEX**

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TURNOUT BILL OF MATERIALS	ES2922-04
CROSSOVER LAYOUT AND BILL OF MATERIALS LAYOUT	ES2922-05
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SWITCH PLATE DETAILS	ES2922-15
INSULATED GAGE PLATE DETAILS	ES2922-16

**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2922-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2922-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2922-05.
- TIE PLATES SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2454.
- SCREW SPIKES (1 5/16" X 6-2 TPI) SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2357. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 3/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2922-09 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ES2922-11 AND ES2922-04.
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 8 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2922-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRRA NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND PER ES2922-09.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).

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**CROSSOVER LAYOUT**

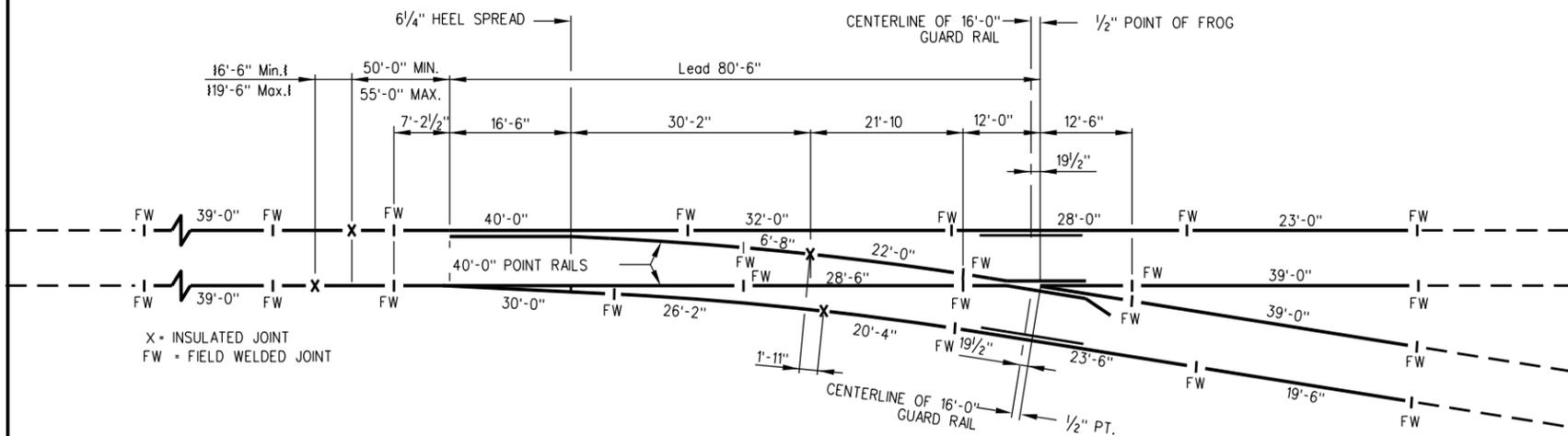
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DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
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 DIRECTOR OF ENGINEERING AND CONSTRUCTION

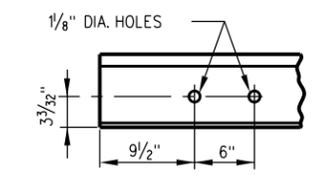
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 10 136 LB. R.H. SR FROG  
 TURNOUT AND CROSSOVER  
 GENERAL NOTES AND DATA  
 STANDARD 2922  
 SCALE: NONE  
 REVISION SHEET 1 OF 15  
 CADD FILE: ES2922-01



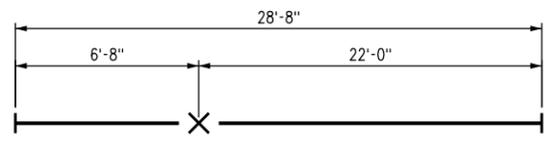
**TURNOUT**



**DETAIL "A"**  
SEE NOTE (b)  
(DRILLED HOLES NOT NECESSARY  
IF TEMPORARY BOLTED JOINTS  
ARE NOT REQUIRED)

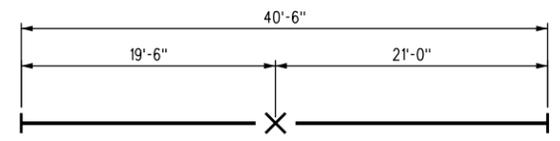
**NOTES:**

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL STRESS - FREE CONDITION OF 110° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD - ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT
2. RAIL LENGTH. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION "A" THE 19'-6" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 11'-6" OF THE LIGHTER RAIL. AT LOCATION "B" THE 21'-3" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 14'-3" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1. NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING: (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD. (B.) ALL OTHER RAILS SHALL BE 39'-0" OF SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A". ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HIGH STRENGTH" EXCEPT GUARD RAILS. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT. INSULATED JOINT MUST BE INTALLED TO BE CENTERED BETWEEN TWO (2) TIES. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0"). WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT. ORDER POINT END AND HEEL END OF STOCK RAIL DRILLED AND PEENED.



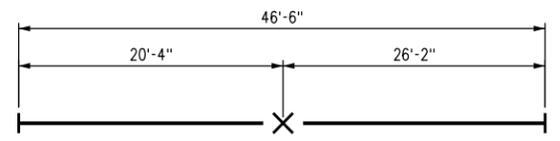
**28'-8" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



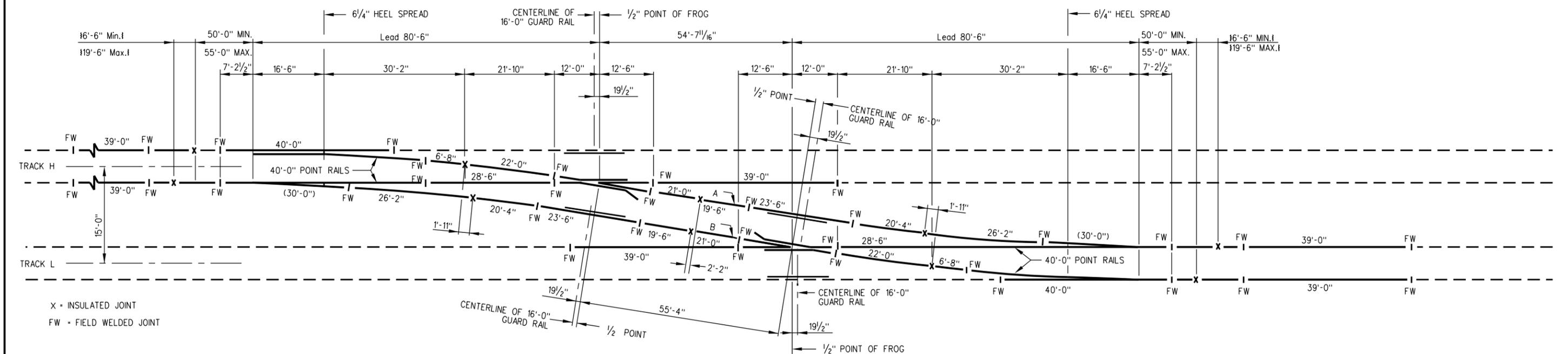
**40'-6" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



**46'-6" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



**CROSSOVER**  
15'-0" TRACK CENTERS

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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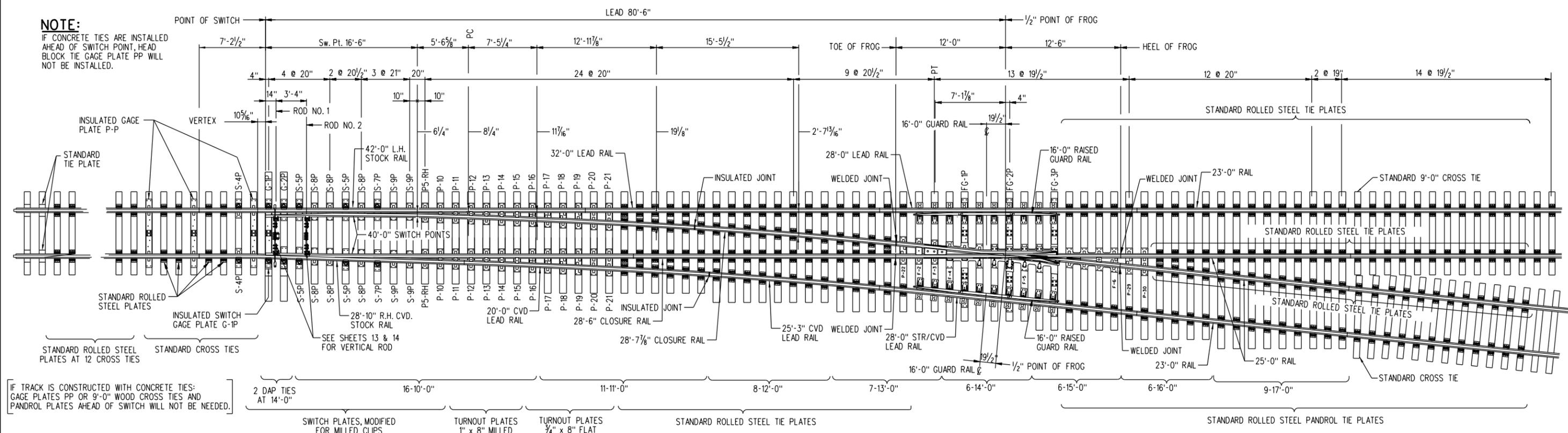
**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 10 136 LB. R.H. SR FROG  
 TURNOUT AND CROSSOVER  
 JOINTS LOCATIONS

STANDARD	2922
SCALE	NONE
REVISION SHEET	2 OF 15
CADD FILE	ES2922-02

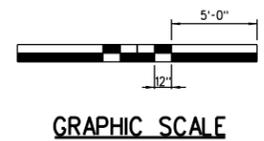
**NOTE:**  
IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED.



IF TRACK IS CONSTRUCTED WITH CONCRETE TIES: GAGE PLATES PP OR 9'-0" WOOD CROSS TIES AND PANDROL PLATES AHEAD OF SWITCH WILL NOT BE NEEDED.

BILL OF MATERIAL FOR LATERAL TURNOUT	
QTY.	DESCRIPTION
1 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. SAMSON STOCK RAILS 30'-0"
1 EACH	L.H. SAMSON STOCK RAILS 40'-0"
1 EACH	NO.1 SMJ TYPE SWITCH ROD W/BASKET
1 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
3 EACH	GAGE PLATE NO. P-P
1 EACH	GAGE PLATE NO. G-1P
1 EACH	GAGE PLATE NO. G-2P
6 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	BRACE SLIDE PLATE S-5P
2 EACH	BRACE SLIDE PLATE S-7P
2 EACH	BRACE SLIDE PLATE S-4P
2 EACH	HEEL PLATE P-5RH
2 EACH	TURNOUT PLATES P-10 THRU P-21
1 EACH	PLATES P-22 THRU P-29
1 EACH	NO.10 SPRING RAIL FROG - 22'-6"
1 EACH	FROG PLATES No. FP-1 THRU FP-9
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
2 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
5 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
138 PCS.	TIE PLATES
552 PCS.	"PANDROL", OR EQUAL SCREW SPIKES 1/8" DIA. X 6" No. 5760
276 PCS.	"PANDROL", OR EQUAL E-CLIP TYPE E-2055 (GALVANIZED)
8 PCS.	"PANDROL", OR EQUAL E-CLIP TYPE E-2063 (GALVANIZED)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
1 EACH	19'-6" RAIL
1 EACH	23'-6" RAIL
1 EACH	28'-6" RAIL
1 EACH	23'-0" RAIL
1 EACH	28'-0" RAIL
1 EACH	32'-0" RAIL
4 EACH	39'-0" RAIL
1 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (28'-8")
1 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (46'-6")

**•10 RIGHT HAND TURNOUT**



BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
16	7" x 9"	10'-0"	840.00
11	7" x 9"	11'-0"	635.25
8	7" x 9"	12'-0"	504.00
7	7" x 9"	13'-0"	477.75
6	7" x 9"	14'-0"	441.00
2	10" x 9"	14'-0" DAP TIES	147.00
6	7" x 9"	15'-0"	472.50
6	7" x 9"	16'-0"	504.00
9	7" x 9"	17'-0"	803.25
TOTAL			TOTAL
71			4824.75

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX		XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
Director of Engineering and Construction

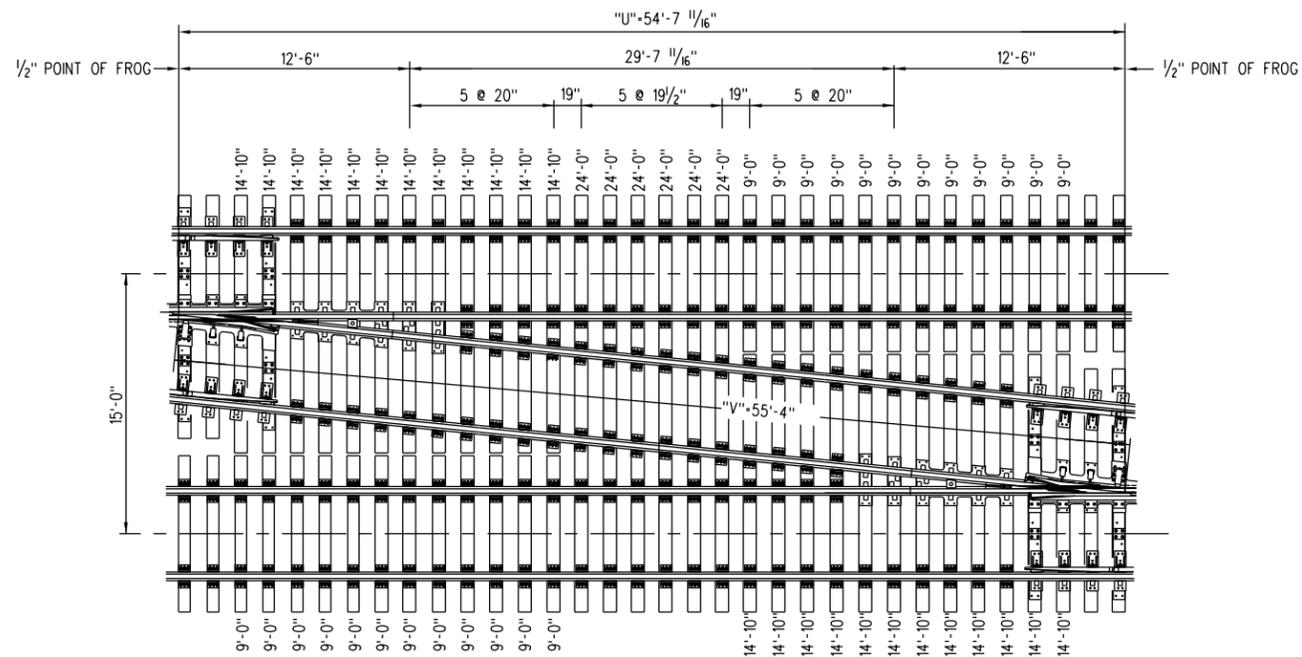
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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 10 136 LB. R.H. SR FROG TURNOUT  
LAYOUT & BILL OF MATERIALS

STANDARD	2922
SCALE:	1/16" = 1'-0"
REVISION	SHEET
-	3 OF 15
CADD FILE:	ES2922-03

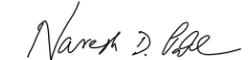
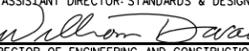
BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
24	7" x 9"	9'-0"	1134.00
32	7" x 9"	10'-0"	1680.00
22	7" x 9"	11'-0"	1270.50
16	7" x 9"	12'-0"	1008.00
14	7" x 9"	13'-0"	955.50
16	7" x 9"	14'-0"	1176.00
4	10" x 9"	14'-0" DAP TIES	294.00
24	7" x 9"	14'-10"	1890.00
6	7" x 9"	24'-0"	756.00
TOTAL		TOTAL	
158		10164.00	



RIGHT HAND CROSSOVER

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 PAIR	R.H. SAMSON STOCK RAILS (30'-0")
1 PAIR	L.H. SAMSON STOCK RAILS (40'-0")
2 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. G-1P
2 EACH	GAGE PLATE No. G-2P
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P-5RH
4 EACH	TURNOUT PLATES P-10 THRU P-21
2 EACH	PLATES P-22 THRU P-29
2 EACH	No.10 SPRING RAIL FROG - 24'-6"
2 EACH	FROG PLATES No. FP-1 THRU FP-9
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
4 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
228 PCS.	TIE PLATES
912 PCS.	"PANDROL", OR EQUAL, SCREW SPIKES 15/16 " DIA. X 6" No. 5760
456 PCS.	"PANDROL", OR EQUAL, E-CLIPS TYPE E-2055 (GALVANIZED)
24 PCS.	"PANDROL", OR EQUAL, E-CLIPS TYPE E-2063 (GALVANIZED)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
2 EACH	23'-6" RAIL
2 EACH	28'-6" RAIL
6 EACH	39'-0" RAIL
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (28'-6")
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (40'-6")
2 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT (46'-6")

# FOR MAINTENANCE ONLY

DRAWN BY:	A. CARLOS	DATE:	03/31/2011
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION	
REV.	DATE	DESCRIPTION	DES. ENG.
X	XX-XX-XX	REVISION	XX XX

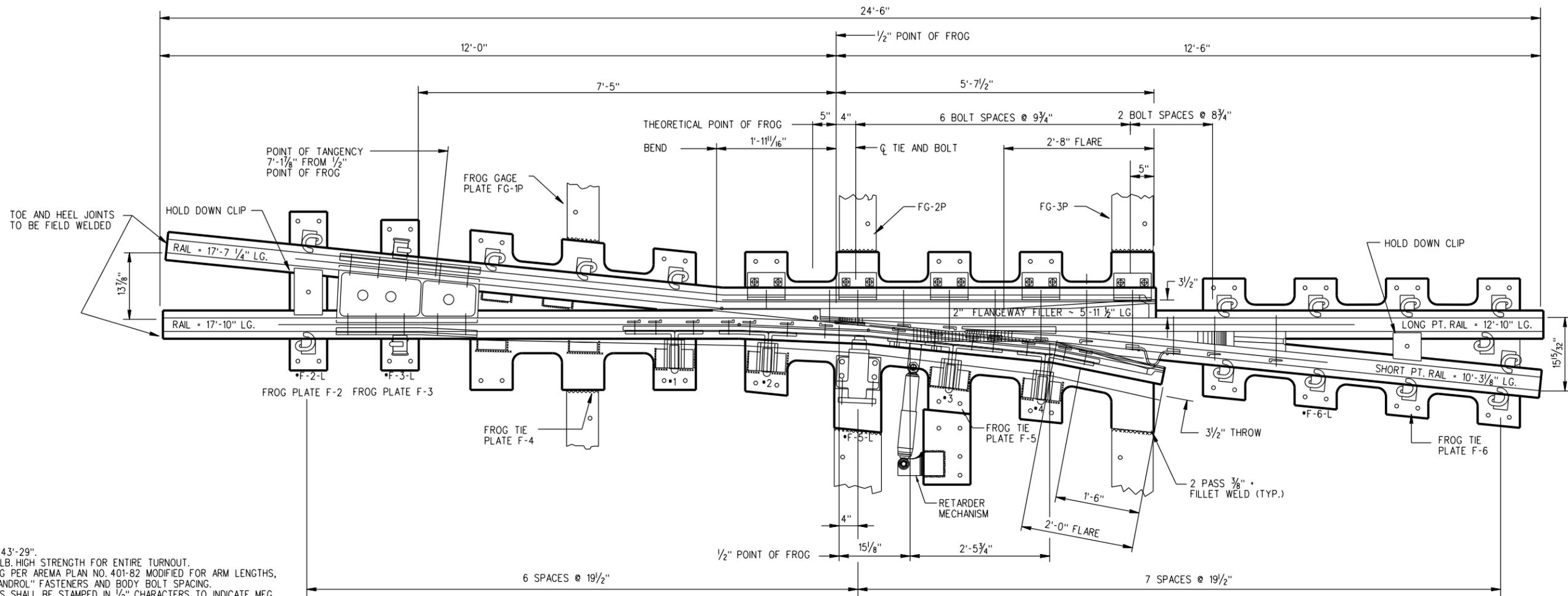
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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 10 136 LB. R.H. SR FROG CROSSOVER LAYOUT  
BILL OF MATERIALS

STANDARD	2922
SCALE:	3/16" = 1'-0"
REVISION	SHEET
-	4 OF 15
CADD FILE:	ES2922-04



**NO. 10 SPRING RAIL STEEL FROG**  
(SHOWN WITH RETARDER MECHANISM)

- NOTES:**
1. FROG ANGLE 5°-43'-29".
  2. RAIL TO BE 136 LB. HIGH STRENGTH FOR ENTIRE TURNOUT.
  3. SPRING RAIL FROG PER AREMA PLAN NO. 401-82 MODIFIED FOR ARM LENGTHS, PLATES WITH "PANDROL" FASTENERS AND BODY BOLT SPACING.
  4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
  5. A MARKER PLATE SHALL BE PLACED ON THE RIGID WING RAIL NEAR THE 1/2 POINT OF FROG IN RAISED OR DEEPLY CUT CHARACTERS TO INDICATE MFG., FROG NO. 10, R.H., SPRING, RAILS SECTION, DATE MADE AND MFG'S SERIAL NO. IF ANY.
  6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT AREMA SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
  7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT AREMA RECOMMENDED PRACTICE.
  8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
  9. SHOULDERS MUST MEET APPROVED DESIGN SPECIFICATIONS.
  10. HOLES IN PLATES FOR SCREW SPIKES ARE DRILLED 1" DIA.
  11. BODY BOLTS TO BE 1 1/8" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8, WITH 3/8" SPRING WASHER AND BEVELED HEAD LOCK.
  12. HORN AND CAST STEEL TOE BLOCK BOLTS TO BE 1" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8 WITH SQUARE NUTS, 3/8" SPRING WASHER AND BEVELED HEADLOCK.
  13. SPRING BOX BOLTS TO BE 3/4" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8, COUNTERSUNK, SQUARE NECK WITH SPRING WASHERS.
  14. DURING MANUFACTURING OF FROG PLATES, SET STOPS, HOLD DOWN HORNS AND SPRING BOX FOR SPRING WING RAIL TO OPEN 2" AT BEND. LOCATE ITEMS PERPENDICULAR TO FULLY OPENED SPRING WING RAIL. HOLD DOWN HOUSING TO BE CENTERED ON HORN WITH SPRING WING RAIL AT HALF OPEN POSITION. OTHER ITEMS TO BE APPROXIMATELY CENTERED ON CENTERLINE OF SWITCH TIE.
  15. SPRING ASSEMBLY WITH BOLT THROUGH RIGID AND SPRING WING RAILS AT THEORETICAL POINT OF FROG MAY BE USED IN PLACE OF AREMA SPRING BOX. SUBSTITUTE HOLD DOWN HORN FOR SPRING BOX.
  16. THE NUMBER OF BOLTS AND BOLT SPACING FOR HOLD DOWN HORNS TO BE ADJUSTED AS REQUIRED TO ALLOW CLEARANCE FOR BODY BOLTS AND OTHER FROG COMPONENTS DURING MOVEMENT OF SPRING WING RAIL.
  17. THE TOE BLOCK TO BE CAST STEEL PER AREMA PLAN NO. 401-82. JOINT BAR NEXT TO SPRING WING RAIL TO BE BENT TO ALIGNMENT OF FULLY OPEN SPRING WING RAIL (2" OPENING). REGULAR BOLT WITH THIMBLE TO BE USED INSTEAD OF SHOULDER BOLT. MANUFACTURER MAY SUBMIT ALTERNATE DESIGN FOR TOE BLOCK FOR APPROVAL PRIOR TO MANUFACTURING.
  18. FROG SHOWN IS PER NOTE 3 ABOVE, IF ANOTHER SPRING RAIL FROG IS USED, SHOP DRAWINGS MUST BE APPROVED BY SCRRRA DIRECTOR OF ENGINEERING.
  19. RAIL END TO BE DRILLED OUTSIDE TWO HOLES OF SCRRRA RAIL JOINT PER ES2502.

**NOTE:**  
ON SPRING RAIL FROGS, BONDS TO BE INSTALLED ON RIGID WING RAIL SIDE. DISTANCE BETWEEN TERMINALS IS SHOWN AS 1". THIS DIMENSION MAY DECREASE, WHEN NECESSARY, DUE TO LIMITED DISTANCE FROM BOLT TO END OF RAIL.  
WHEN A PLATE CLIP ON SPRING RAIL FROGS INTERFERES WITH APPLICATION OF BONDS AS SHOWN HEREON, THE PLATE CLIP SHOULD BE ALTERED TO PERMIT PROPER INSTALLATION OF THE BONDS.  
USE A 12" BOND OF WELDED OR PLUG - IN TYPE.

**INSTALLATION OF FROG FIELD WELDS:**  
FROG TO BE INSTALLED WITH FIELD WELDS ON MAIN TRACK (STRAIGHT) SIDE IN ALL CASES.  
FIELD WELDS ARE USED ON TURNOUT (CURVED) SIDE IF USED BY THROUGH TRAFFIC OR MORE THAN ONCE PER DAY.  
BOLTED JOINTS PER ES1202 ARE TO BE USED ON TURNOUT SIDE IF TURNOUT USE DOES NOT EXCEED ABOVE LIMITS.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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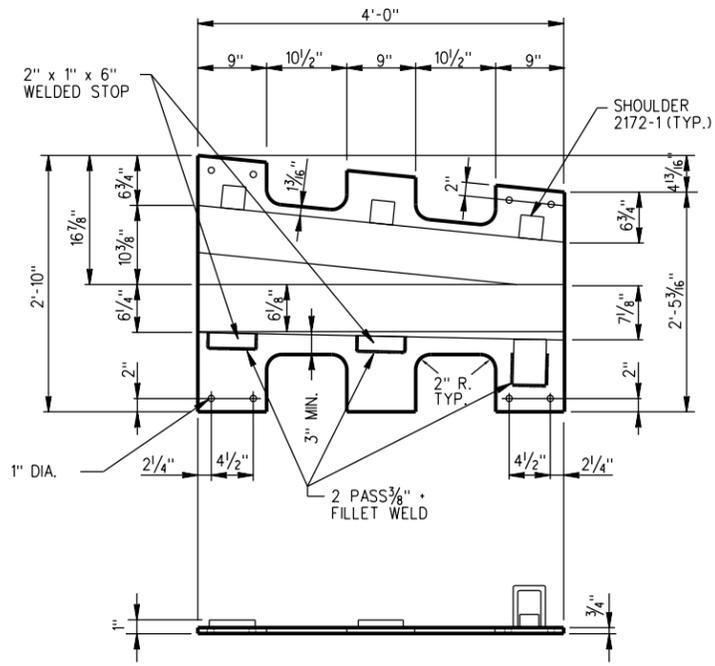
**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

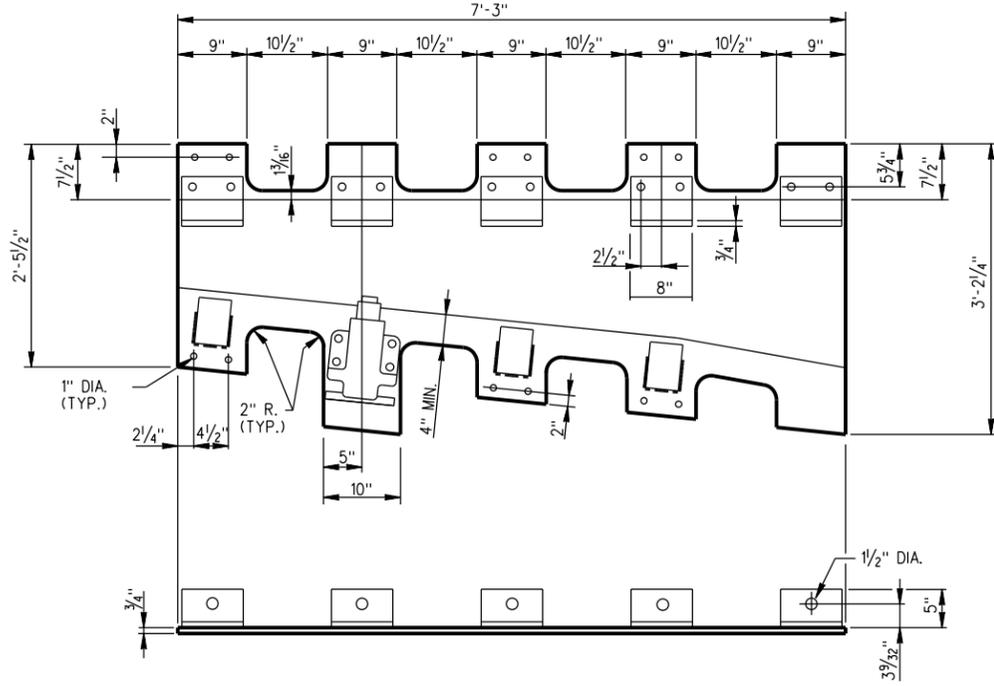
ENGINEERING STANDARDS  
 NO. 10 136 LB. R.H. SR FROG LAYOUT

STANDARD	2922
SCALE	1" = 1'-0"
REVISION	SHEET
-	5 OF 15
CADD FILE	ES2922-05

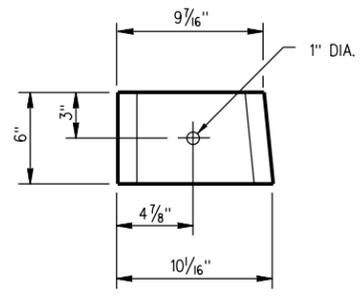
**NOTE:**  
FOR NOTES AND FROG LAYOUT SEE DRAWING ES2922-06.



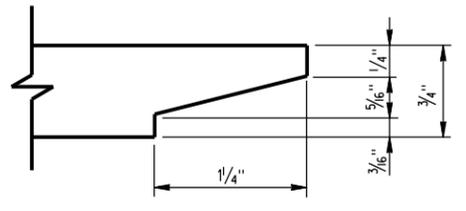
**FROG PLATE - F-4**



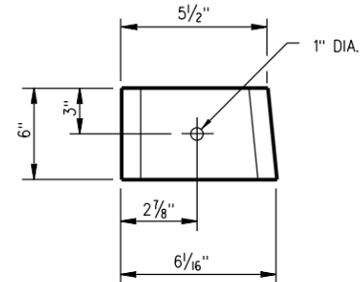
**FROG PLATE - F-5**



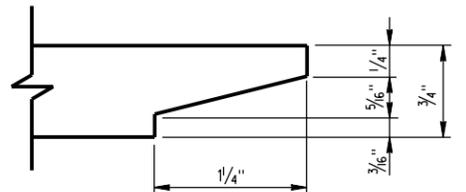
**HOLD DOWN CLIP FOR PLATE - F-2**  
SCALE: NONE



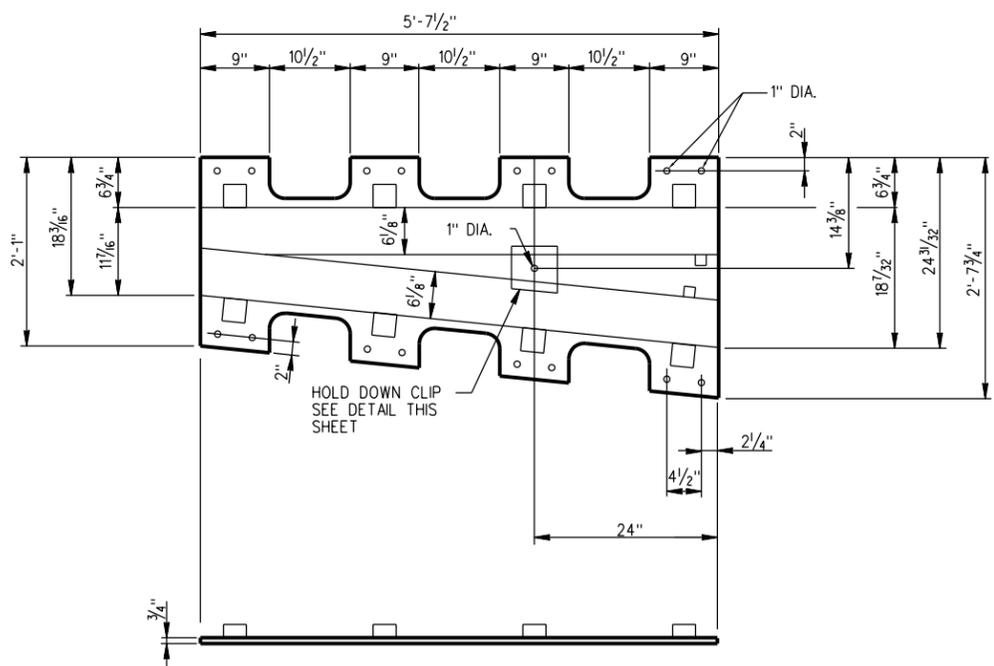
**END DETAIL - BOTH ENDS**  
SCALE: NONE



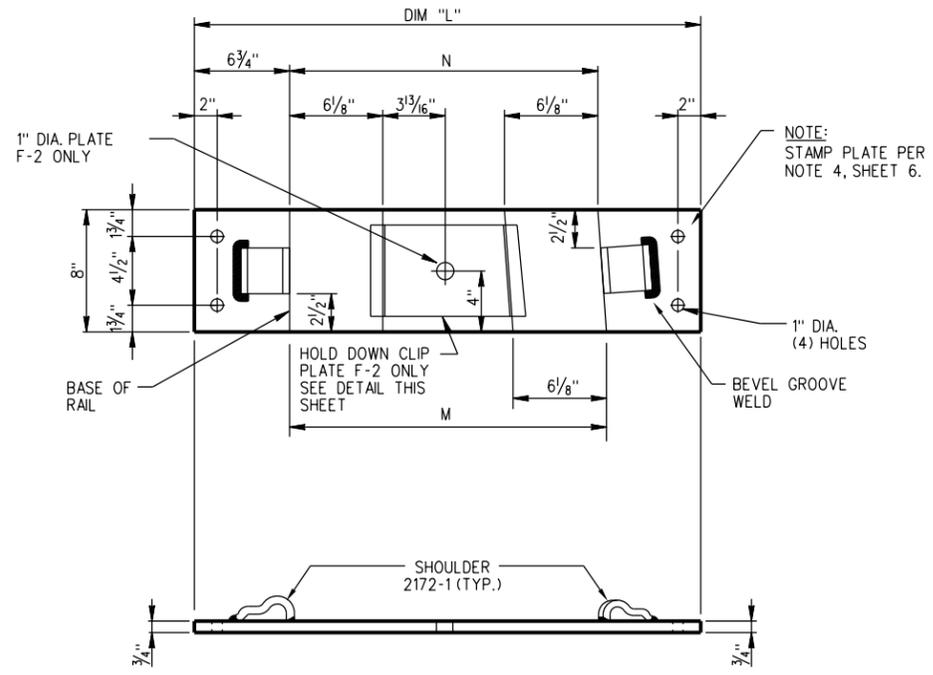
**HOLD DOWN CLIP FOR PLATE - F-6**  
SCALE: NONE



**END DETAIL - BOTH ENDS**  
SCALE: NONE



**FROG PLATE - F-6**



**FROG PLATE - F-2 AND F-3**  
3/4" x 8" x DIM "L" - FLAT - W/ CLIPS  
(SCALE: NONE)

NOTE:  
STAMP PLATE PER  
NOTE 4, SHEET 6.

DIMENSION TABLE				
PLATE	DIM "L"	DIM "M"	DIM "N"	PITS REQ'D.
F-2	2'-9 3/4"	20 1/4"	19 1/2"	1 EA.
F-3	2'-8"	18 3/8"	17 5/8"	1 EA.

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
Director of Engineering and Construction

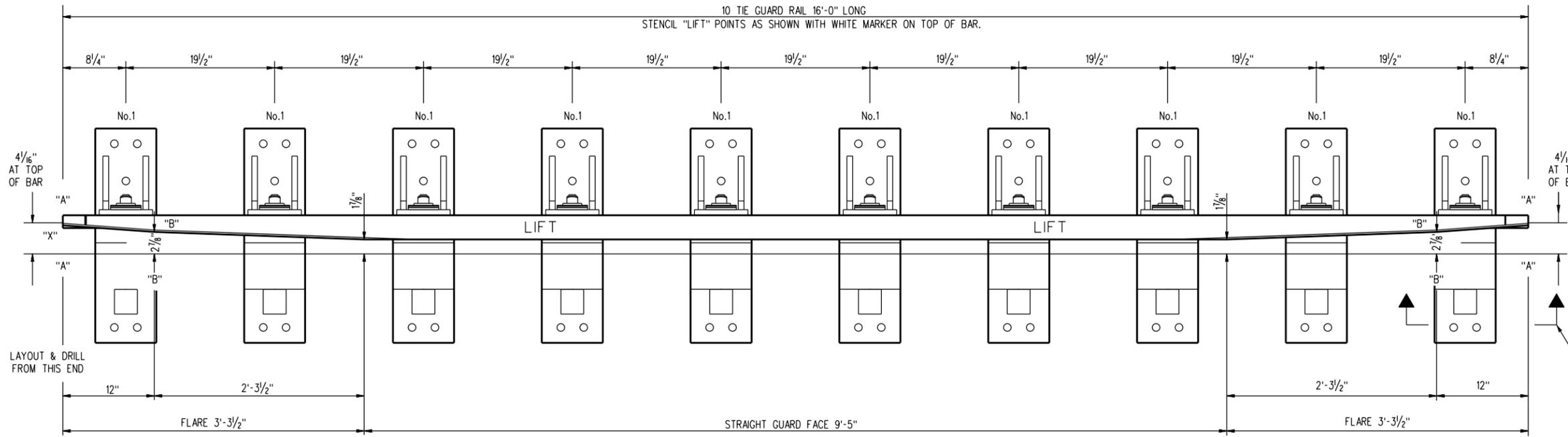
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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 10 136 LB. R.H. SR FROG PLATE  
DETAILS AND DIMENSION TABLE

STANDARD	2922
SCALE:	1" = 1'-0"
REVISION	SHEET
-	6 OF 15
CADD FILE:	ES2922-06



- NOTES:**
1. GUARD RAIL SECTION UIC 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
  2. BASE PLATE, BRACKET AND SHIMS MILD STEEL PER AREMA SPECIFICATION M7.
  3. GUARD RAIL BOLT AND NUT PER AREMA SPECIFICATION M11. EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY
  4. LOCKNUT, WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK.
  5. WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.

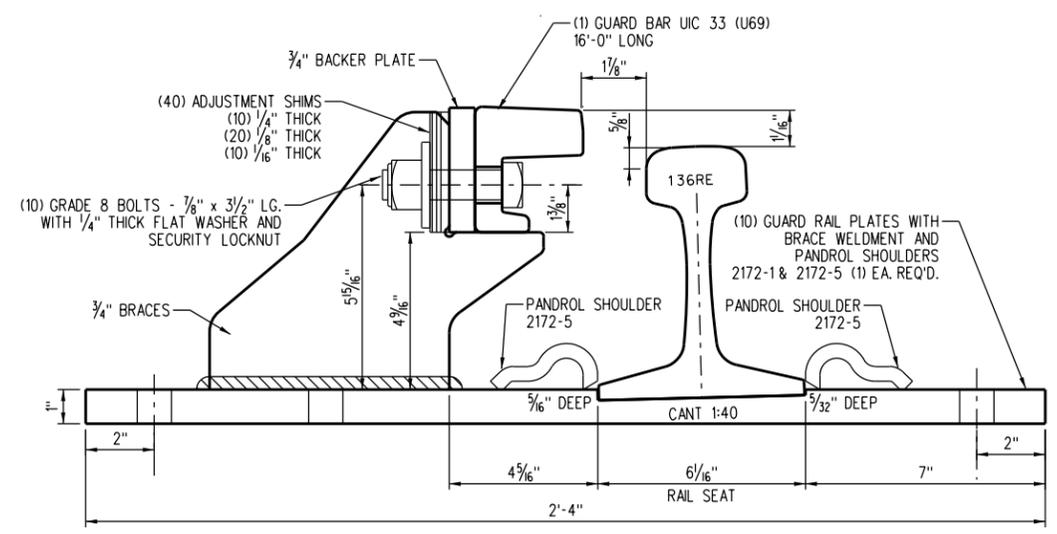
**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

"X" 8 1/4" x 2'-3 3/2" x 3'-11 1/4" x 5'-6 3/4" x 7'-2 1/4" x 8'-9 3/4" x 10'-5 1/4" x 12'-0 3/4" x 13'-8 1/4" x 15'-3 3/4"

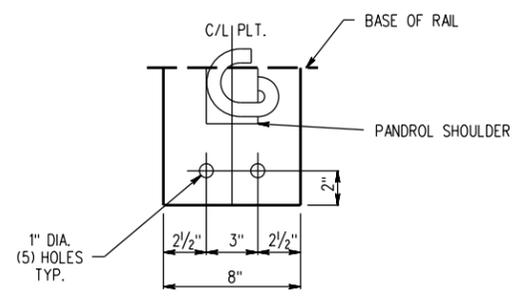
HOLES 1" DIA. - 1 3/8" A.B.

**ASSEMBLED 16'-0" GUARD RAIL**

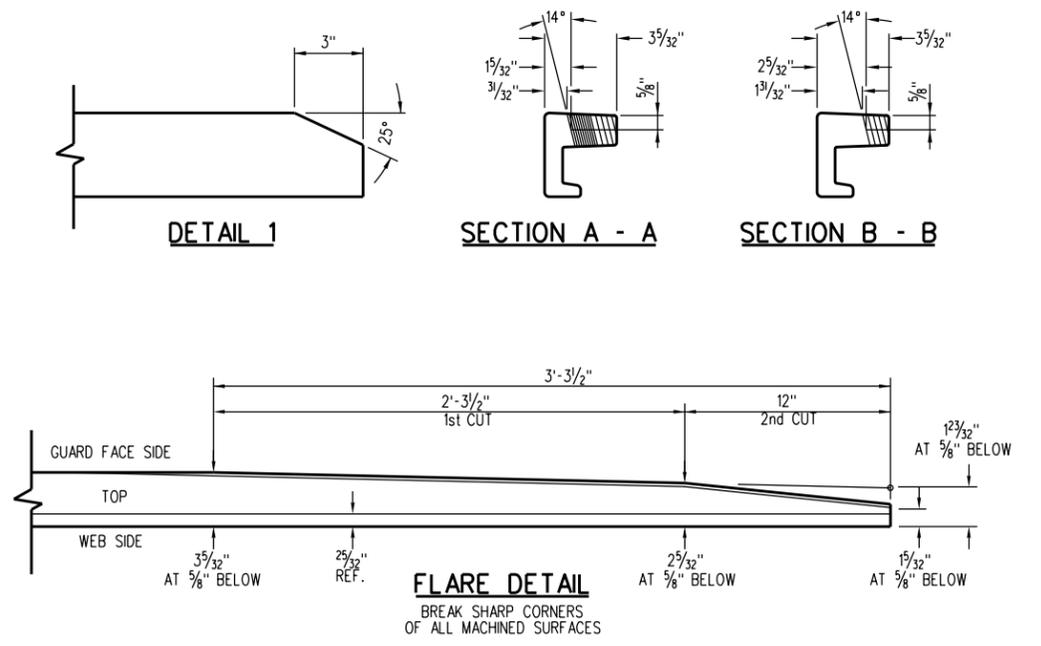
**FOR MAINTENANCE ONLY**



**TYPICAL PLATE DETAIL**  
SCALE: NONE



**TYPICAL PLATE PUNCHING DETAIL**



**FLARE DETAIL**  
BREAK SHARP CORNERS OF ALL MACHINED SURFACES

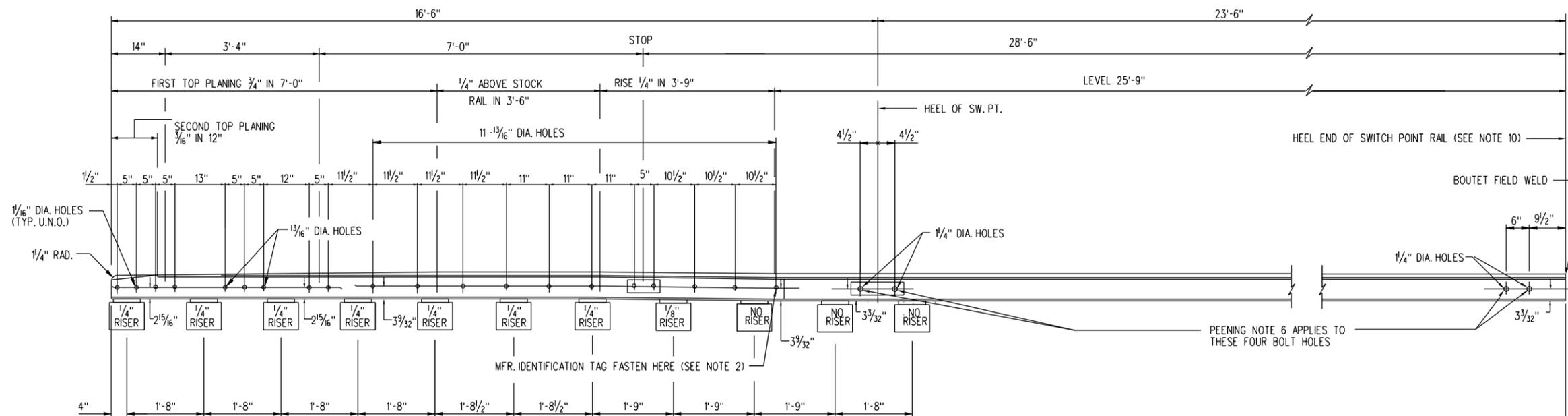
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: <i>Nareh D. Papp</i> DRAFTER DATE: 03/31/2011 ASSISTANT DIRECTOR: STANDARDS & DESIGN DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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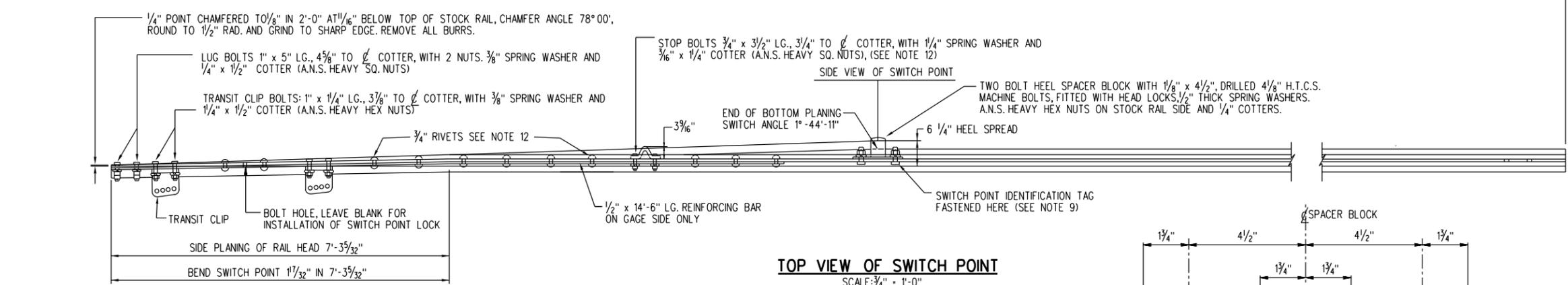
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 10 136 LB. R.H. SR FROG  
GUARD RAIL DETAILS

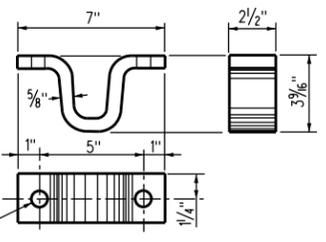
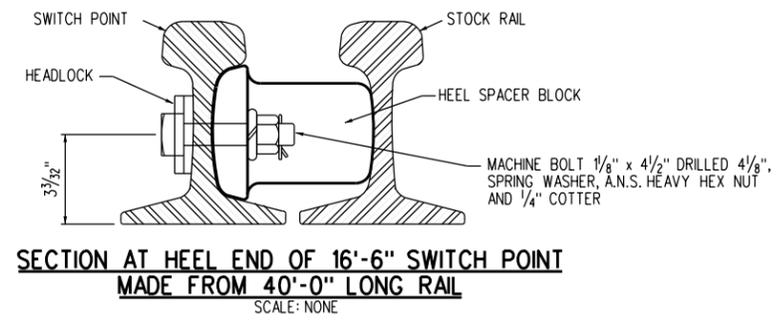
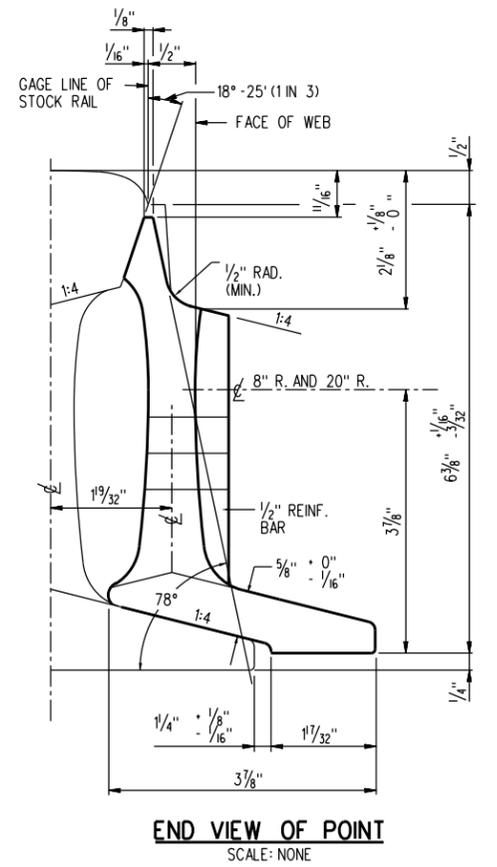
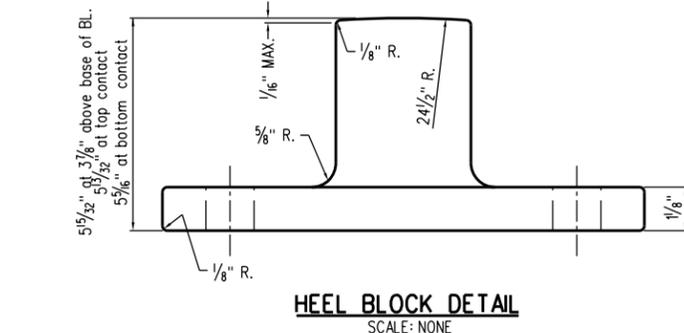
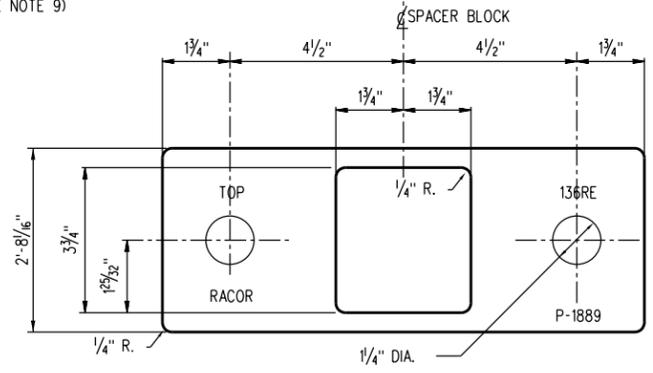
STANDARD	2922
SCALE:	1 1/2" = 1'-0"
REVISION	SHEET
-	7 OF 15
CADD FILE:	ES2922-07



- NOTES:**
- SWITCH POINTS TO BE MADE FROM HIGH STRENGTH RAIL, PAINT MARKED ORANGE.
  - METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
  - RIGHT HAND TURNOUT SHOWN, MAKE OPPOSITE HAND FOR LEFT HAND SWITCH POINTS.
  - SIDE PLANING FIGURED ON GAGE LINE 5/16" BELOW TOP OF RAIL. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "TRACKWORK PLANS AND SPECIFICATIONS", UNLESS OTHERWISE SPECIFIED ON THIS PLAN. IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
  - ALL SWITCH POINTS WILL BE FURNISHED WITHOUT ALLOY STEEL TIP.
  - THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136-LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
  - METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER, MARK TAG THUS: 16'-6" (40'-0") NO. 10. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL END OF SWITCH POINT IN LOCATION SHOWN.
  - AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END. NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
  - UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS, AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.



**TOP VIEW OF SWITCH POINT**  
SCALE: 3/4" = 1'-0"



**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 08X30X20M

*Nareh D. Papp*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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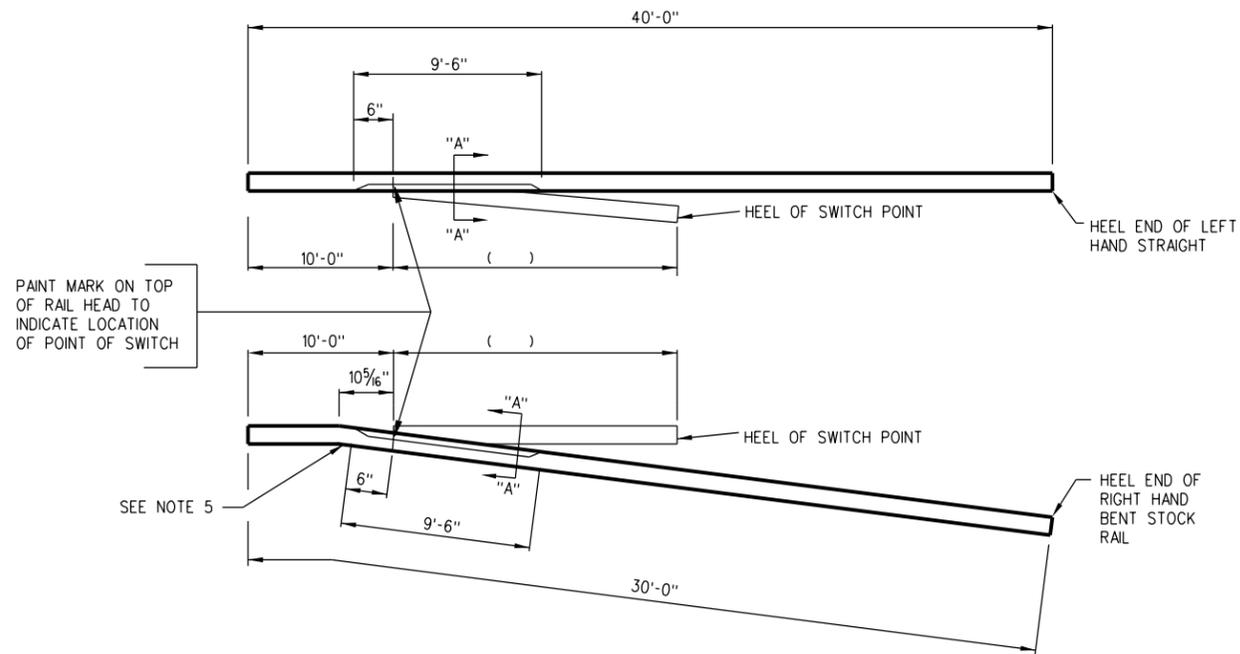
**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

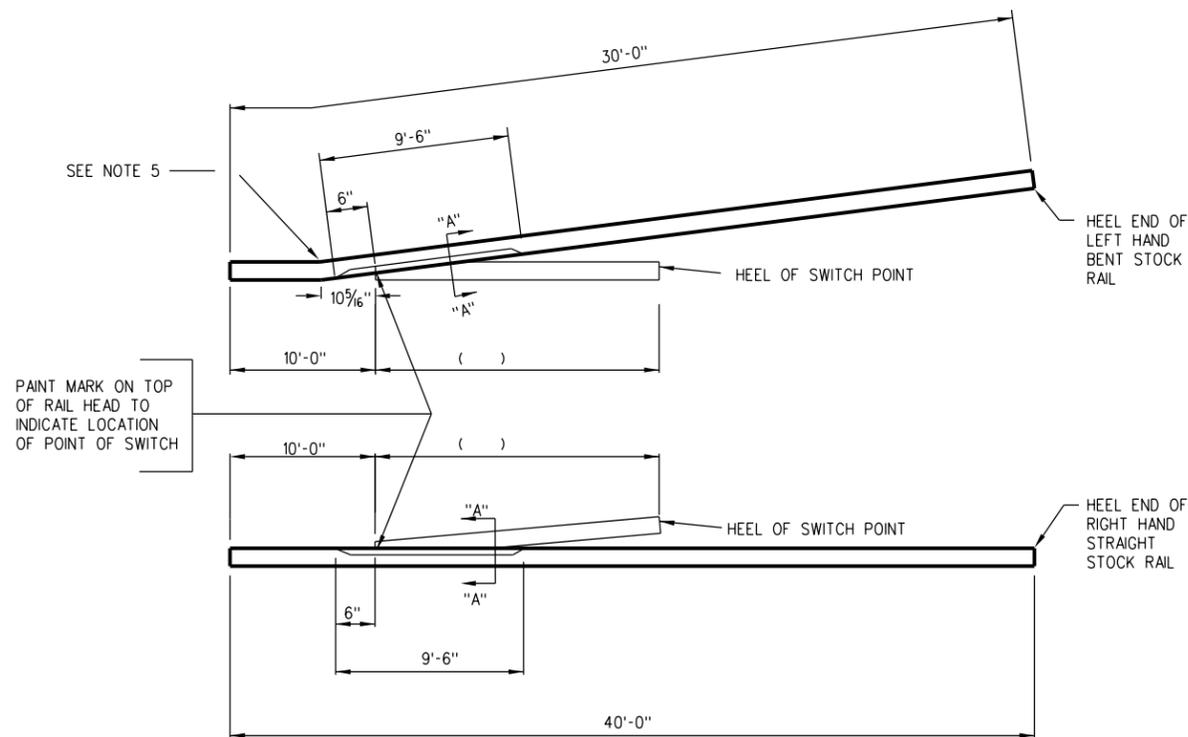
ENGINEERING STANDARDS

NO. 10 SPLIT SWITCH POINT DETAILS

STANDARD	2922
SCALE:	AS NOTED
REVISION	SHEET
-	8 OF 15
CADD FILE:	ES2922-08



STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"



STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"

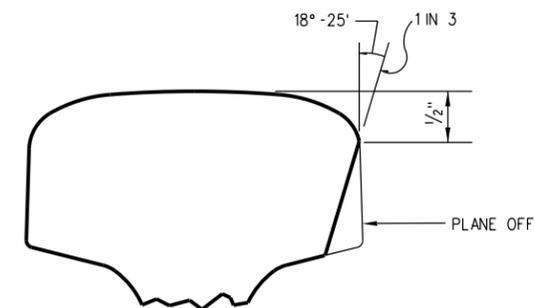
**NOTES:**

1. INFORMATION OR DIMENSIONS NOTED THUS, ( ) TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT AREMA PLAN NO. 1005.
3. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.

LENGTHS B, C, & D FOR 136 LB. RAIL									
Sw. Pt. Length	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
16'-6"	10	STR.	9'-6"	10'-0"	40'-0"	NONE	10'-0"	52'-0"	NONE
16'-6"	10	BENT	9'-6"	10'-0"	30'-0"	HEEL END ONLY	10'-0"	52'-0"	HEEL END ONLY

4. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

Sw. Length	BEND ANGLE	V (Vertex Dist.)
16'-6"	1°-44'-11" or 1" in 2'-9"	10 <sup>5</sup> / <sub>16</sub> "



SECTION "A-A"

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

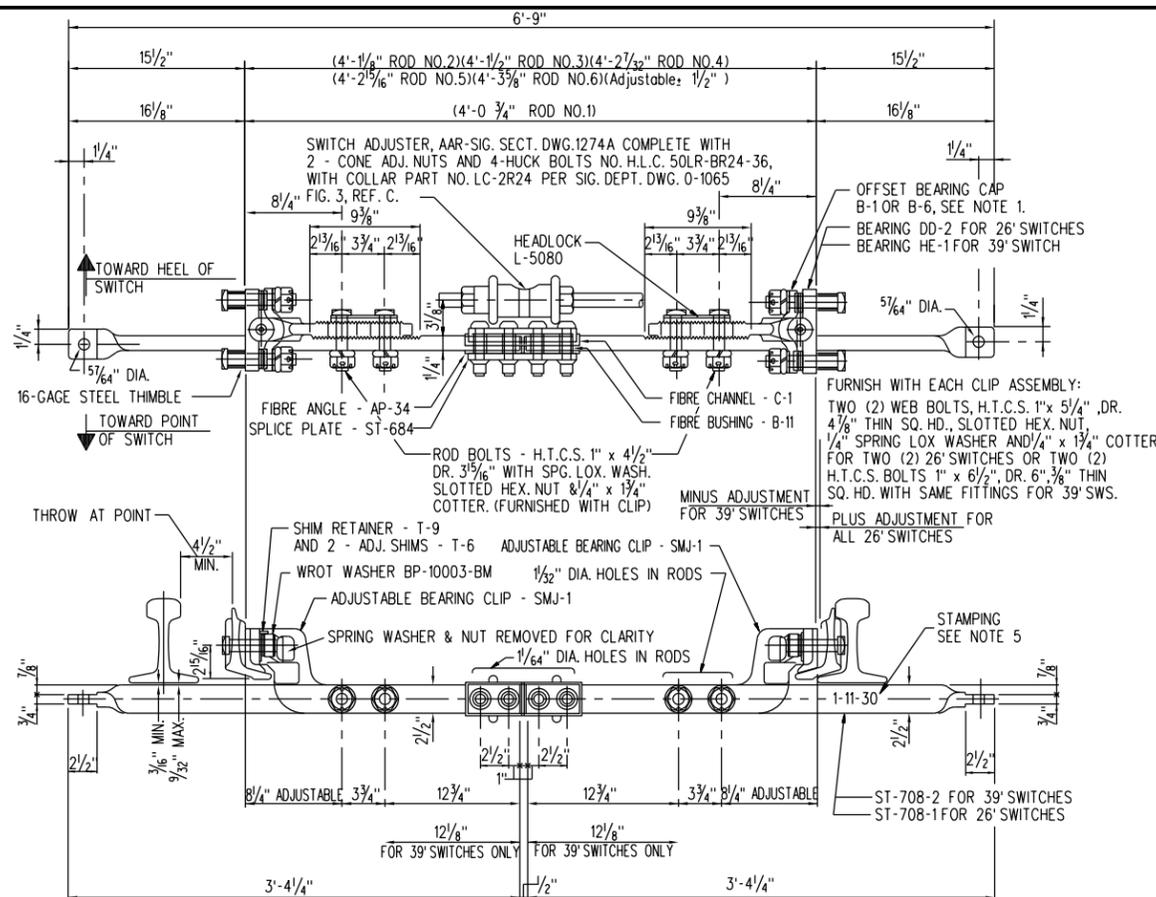
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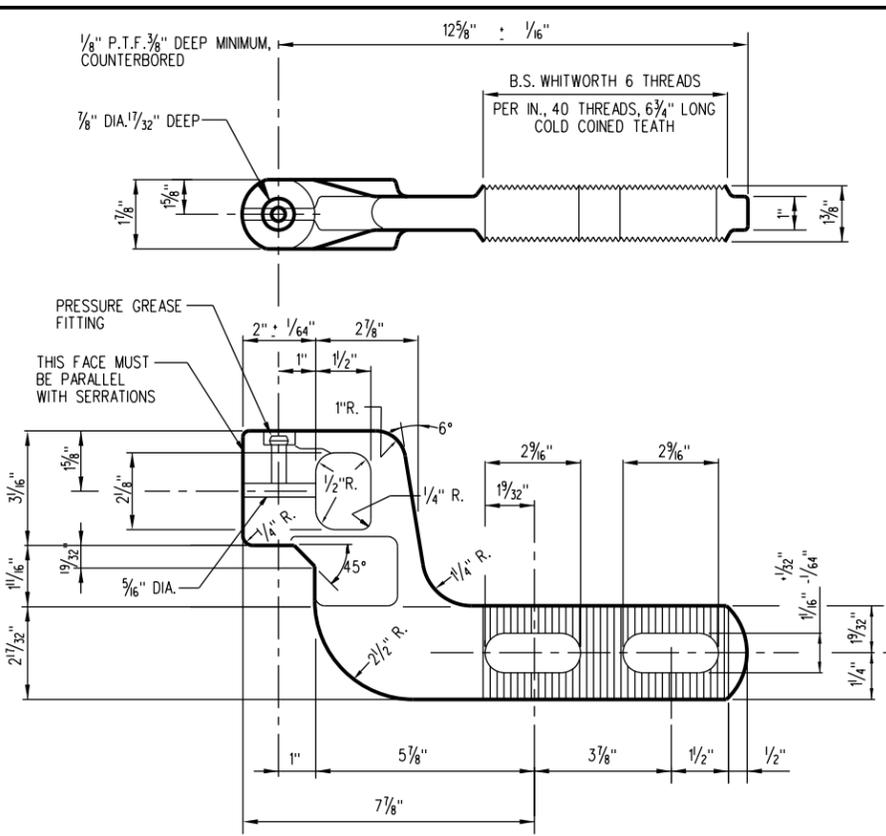
ENGINEERING STANDARDS

NO. 10 STRAIGHT OR CURVED UNDERCUT STOCK RAILS

STANDARD	2922
SCALE	NONE
REVISION SHEET	9 OF 15
CADD FILE	ES2922-09



**NO. 1 SWITCH ROD ASSEMBLY**  
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2

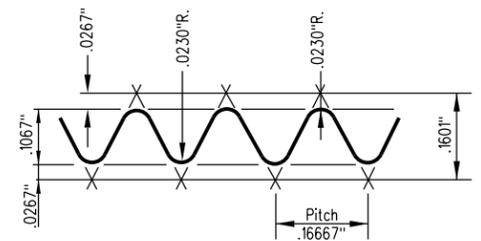


**ADJUSTABLE BEARING CLIP - SMJ - 1**  
SCALE: 3" = 1'-0"

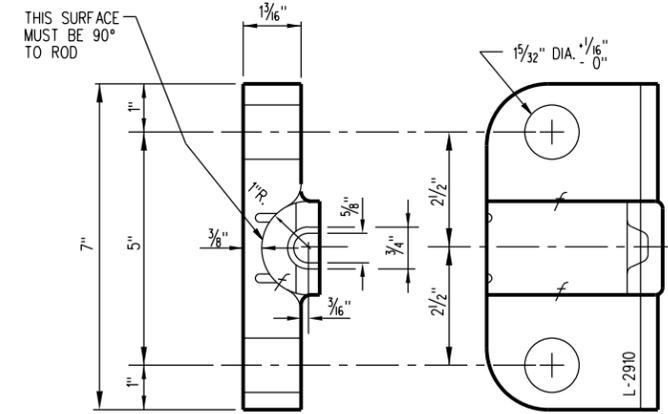
BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E.1020-For.Stl.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	Web Bolt	SEE NOTE
26'	2	DD-2	Malleable Iron	Bearing	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	Malleable Iron	Bearing	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
All	4	T-9	S.A.E.1020	Shim Retainer	1/8" x 1 3/4" x 2 1/4"
All	12	T-6	Stainless Steel	Adjustment Shim	1/16" x 2" x 1 1/8"
All	4	BP-10003-BM	Wrot Iron	Wrot Washer	1/16" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	Rod Bolt	1" x 4 1/2" DR. 3 3/8" REG. SQ. HD. SLOTTED HEX NUT
All	4		Steel	Spg. Lox Washer	For 1" Rod Bolts
All	4		Steel	Cotter	1/4" x 1 3/4" FOR ROD BOLTS
All	2		Steel	Grease Fitting	PRESSURE - FOR BEARING CLIP
All	2	L-5080	Malleable Iron	Headlock	FOR ROD BOLTS
26'	2		16-Gage Steel	Thimble	1 1/2" LONG - FOR SHIPPING
39'	2		16-Gage Steel	Thimble	2 1/2" LONG - FOR SHIPPING

**Material for Vertical Rod**

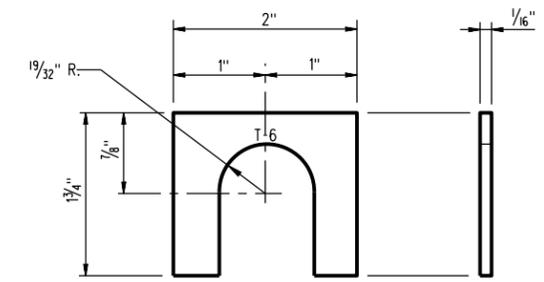
16'-6"	1		Vertical Rod	Use one-ST-708-1
				Use one-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1		Vertical Rod	Use one-ST-708-2
				Use one-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
All	4		High Strength Steel	Conn. & Insul. Bolt
				HIGH FASTENER NO. HLC-50LR-BR24-36
All	4		Low Carbon Steel	Collar
				HUCK FASTENER NO. LC-2R24
All	1	ST-684	H.R. Mild Steel	Splice Plate
				1/2" x 2 1/2" x 9 1/2" FOR INSULATION
All	2	AP-34	AAR-Sig. Sec. 13-52	Angle
				1/2" x 2 1/2" x 4 1/8" HARD FIBRE - PARAFIN COATED
All	4	B-11	AAR-Sig. Sec. 13-52	Bushing
				1" O.D. HARD FIBRE - PARAFIN COATED
All	1	C-1	AAR-Sig. Sec. 13-52	Channel
				1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
All	1		Malleable Iron	Switch Adjuster
All	2		Malleable Iron	Cone Adj. Nut
				FOR 1/4" THROW RODS



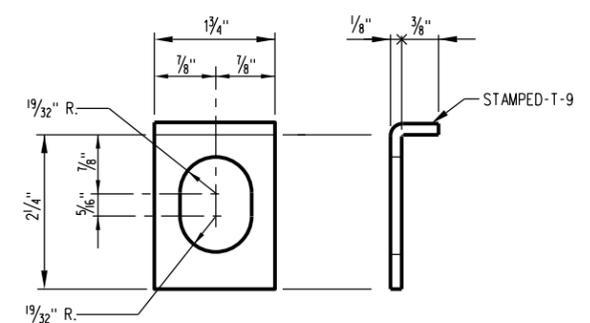
**ENLARGED PROFILE OF SERRATIONS**  
SCALE: NONE



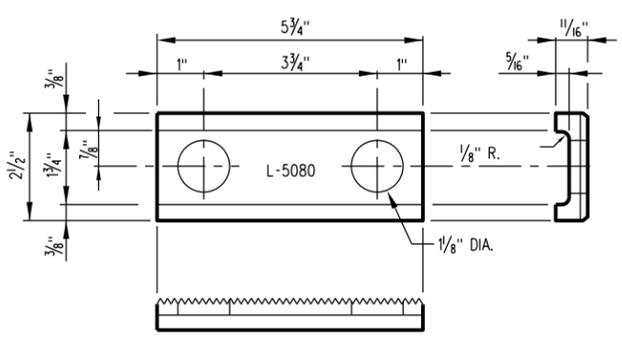
**BEARING - DD - 2**  
SCALE: 6" = 1'-0"



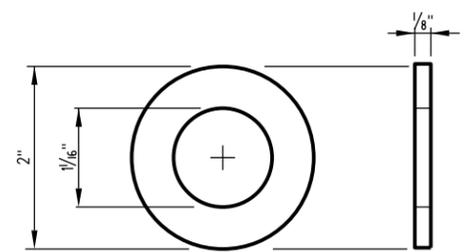
**ADJUSTABLE SHIM - T - 6**  
SCALE: FULL



**SHIM RETAINER - T - 9**  
SCALE: FULL



**HEADLOCK L-5080**  
SCALE: 6" = 1'-0"



**WROT WASHER - BP - 10003 - BM**  
SCALE: FULL

**NOTES:**

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED, IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.
- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:  
1-39 FOR USE ON 39'-0" SWITCHES, 132 LB., AND 136 LB. RE RAIL SECTIONS.  
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.

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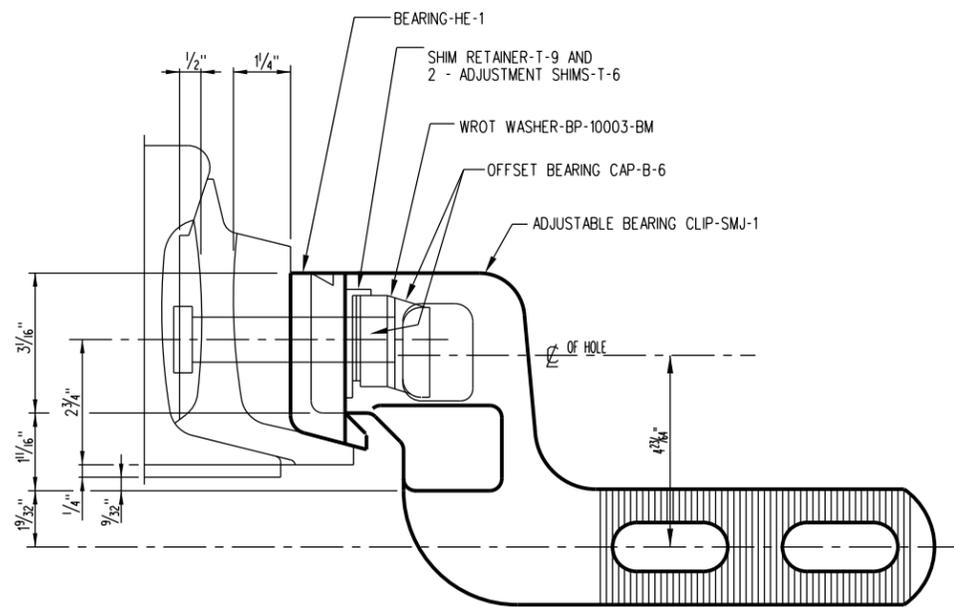
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

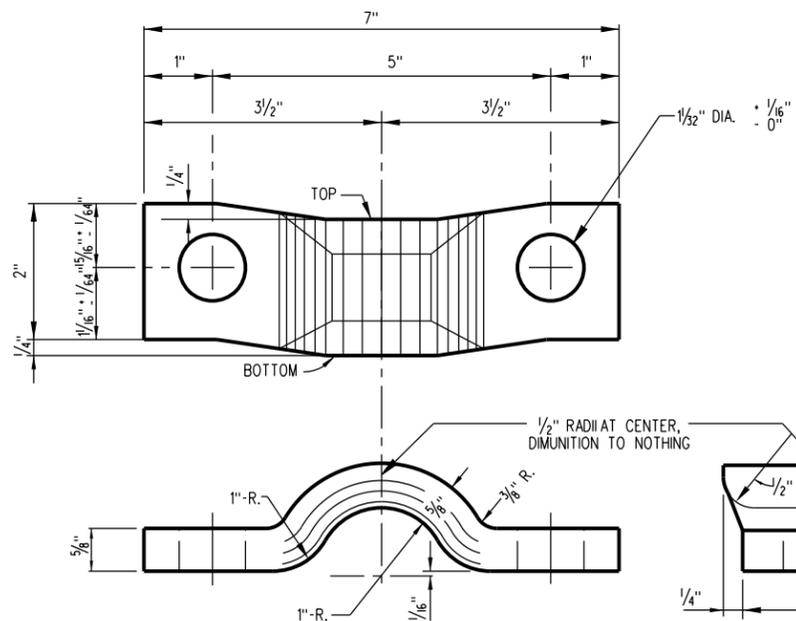
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

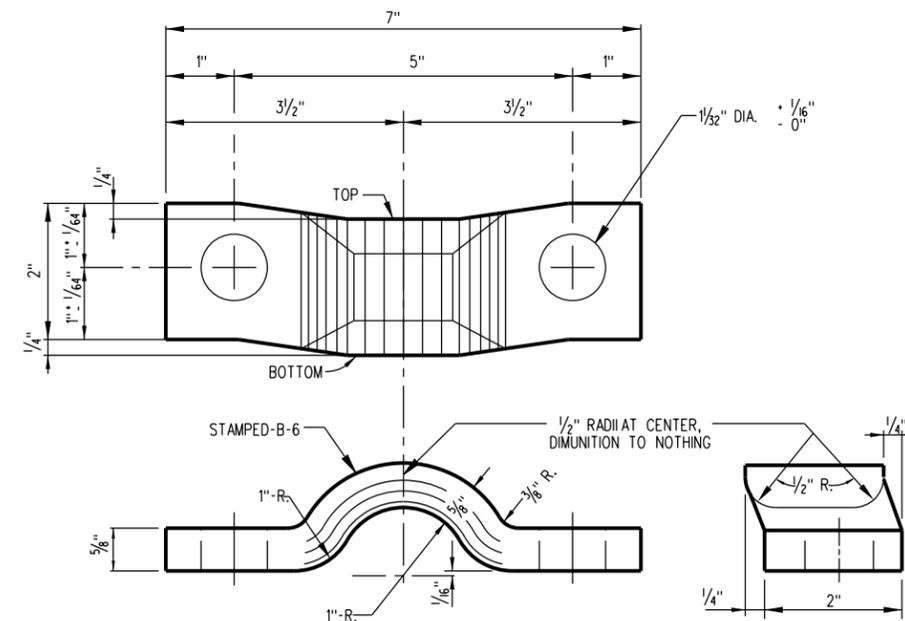
ENGINEERING STANDARDS		STANDARD
		2922
NO. 10 SWITCH ROD DETAILS		SCALE: AS NOTED
		REVISION SHEET
		10 OF 15
		CADD FILE: ES2922-10



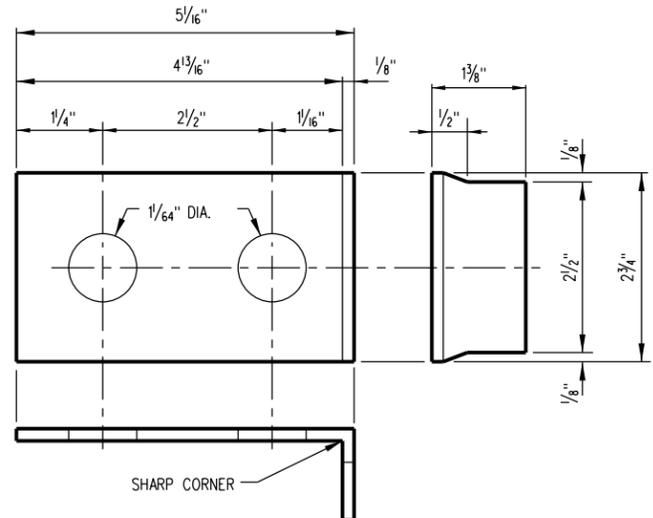
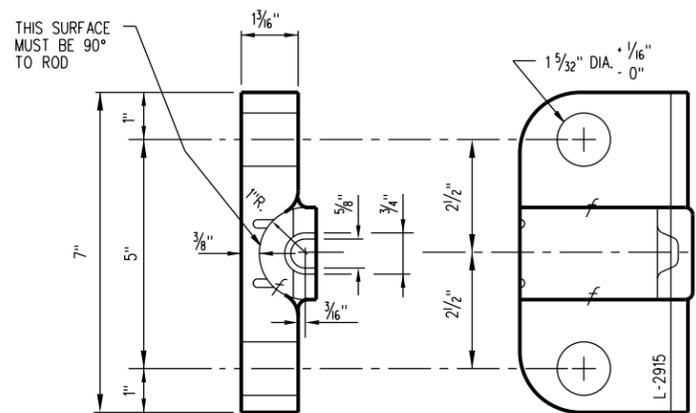
**ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39 SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



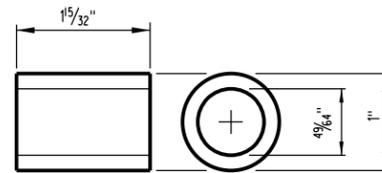
**OFFSET BEARING CAP-B-1**



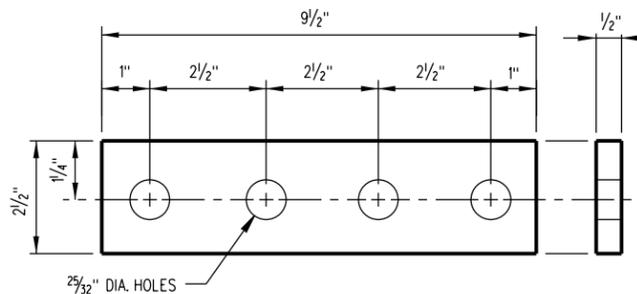
**OFFSET BEARING CAP-B-6**



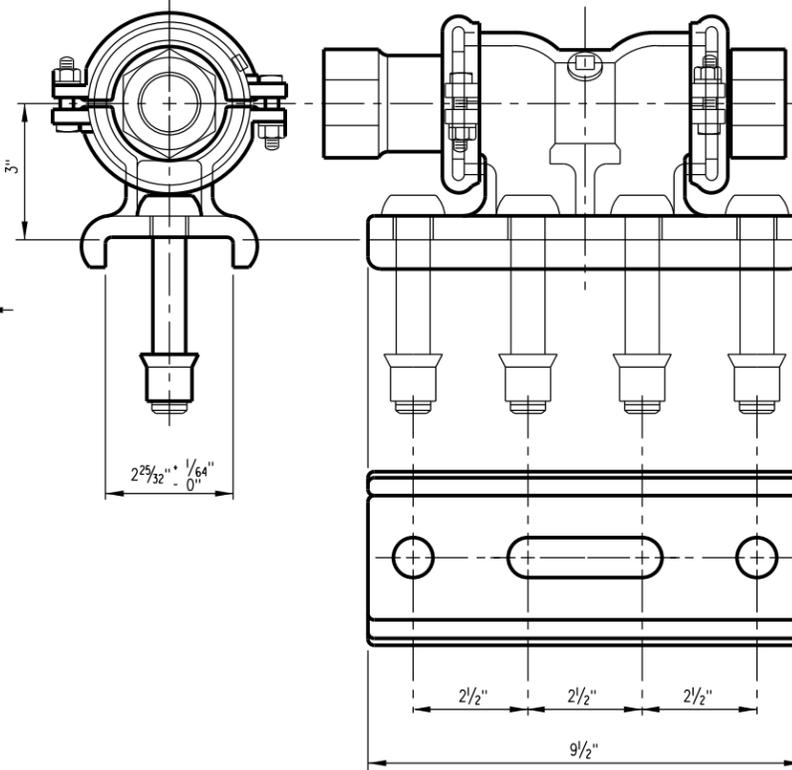
**FIBRE ANGLE-AP-34**



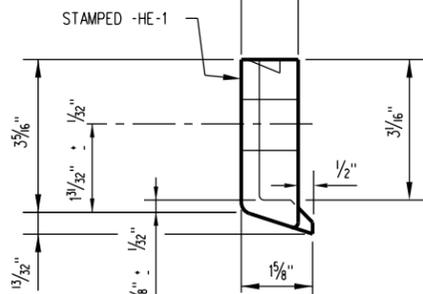
**FIBRE BUSHING-B-11**



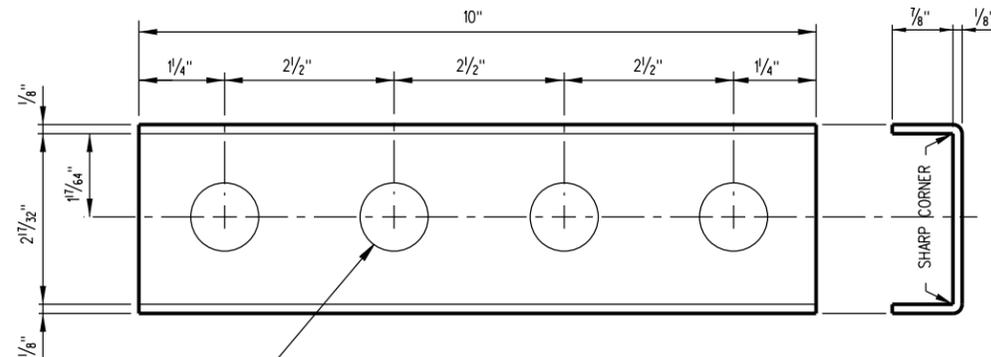
**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**BEARING-HE-1**



**FIBRE CHANNEL-C-1**

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Narek D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**

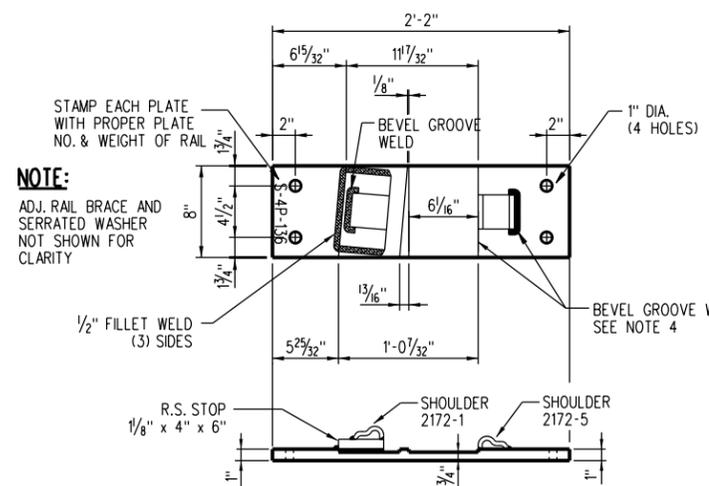
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

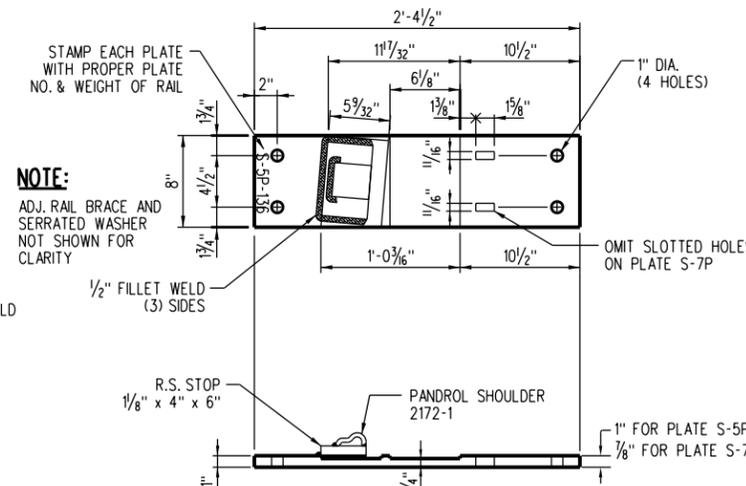
NO. 10 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	2922
SCALE	6" = 1'-0"
REVISION SHEET	11 OF 15
CADD FILE	ES2922-11

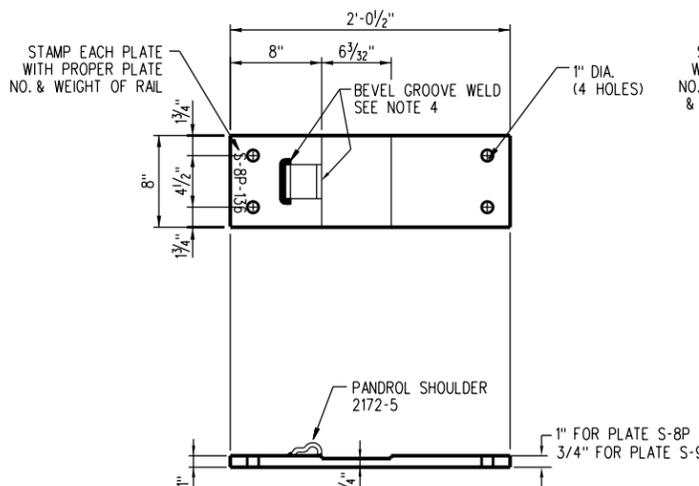




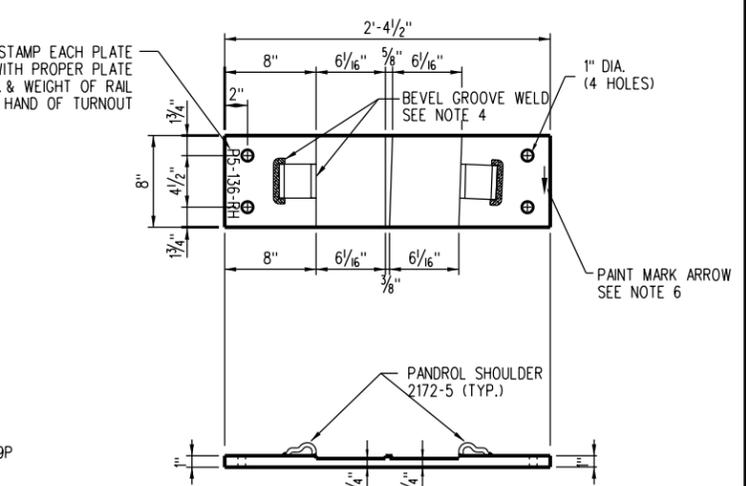
**BRACE PLATE - S-4P**  
 1" x 8" x 2'-2" LG. - MILLED - W/ADJ. RAIL BRACE  
 2 - S-4P PLATES REQUIRED AS SHOWN



**BRACE SLIDE PLATE - S-5P & S-7P**  
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE  
 4 - S-5P PLATES REQUIRED AS SHOWN  
 2 - S-7P PLATES REQUIRED AS SHOWN

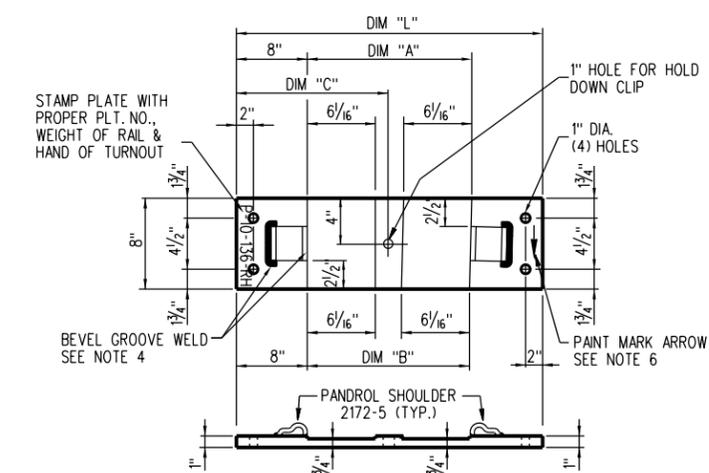


**SLIDE PLATE - S-8P & S-9P**  
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP  
 6 - S-8P PLATES REQUIRED AS SHOWN (1/4" RISER)  
 4 - S-9P PLATES REQUIRED AS SHOWN (0" RISER)

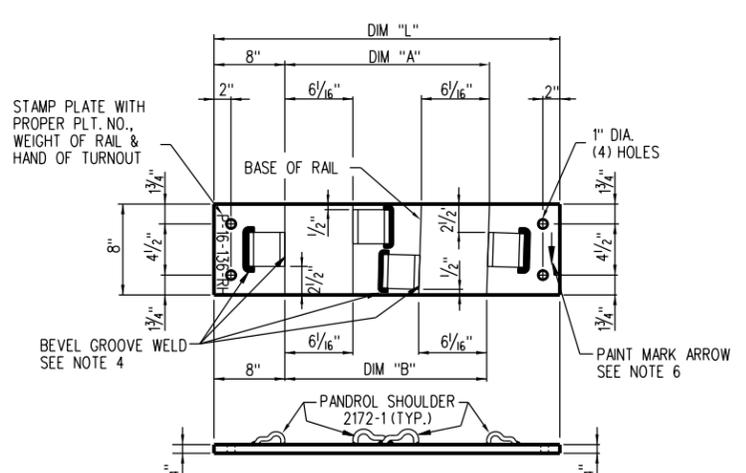


**HEEL PLATE - P5 - RH**  
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS  
 2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

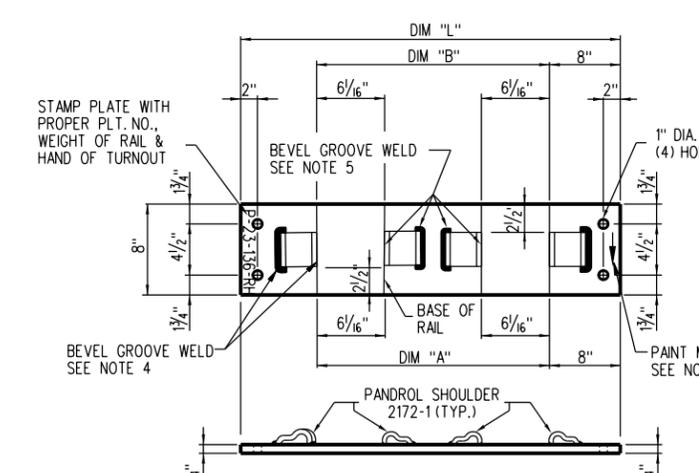
**SWITCH PLATES**



**TURNOUT PLATES - P-10 THRU P-15**  
 1" x 8" x DIM "L" - MILLED - W/ PANDROLS



**TURNOUT PLATES - P-16 THRU P-18 & P-29**  
 3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS



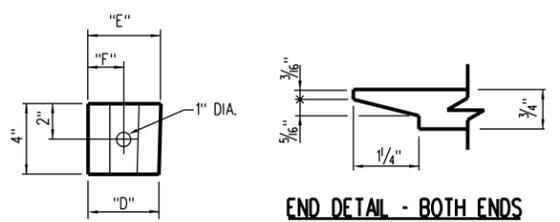
**TURNOUT PLATES - P-19 THRU P-22 & P-30**  
 3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) & HAND OF TURNOUT (R.H. OR L.H.)
3. THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 10 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-10 THRU P-29 INCLUSIVE AND FROG PLATES AND GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.
6. DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET NO. 2922-03 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

**WELDING SPECIFICATIONS**

1. SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" WELD.
2. STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" FILLET WELD.
3. SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
4. FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS USE THE FOLLOWING:
  - A. ELECTRODE 1/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, WELDING 3/32 INCH, NR203, 1/2 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY DIRECTOR OF ENGINEERING, MAY BE USED.



**END DETAIL - BOTH ENDS**  
 HOLD DOWN CLIP FOR PLATES P-10 THRU P-15

PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	PITS REQ'D.	DIM "D"	DIM "E"	DIM "F"	CLIPS REQ'D.
P-10	13 1/8"	13 3/8"	14 19/32"	2'-5"	2 EA.	3 1/8"	3 3/8"	1 5/8"	2 EA.
P-11	13 23/32"	13 5/16"	14 1/8"	2'-6"	2 EA.	3 23/32"	3 3/32"	1 5/16"	2 EA.
P-12	14 11/32"	14 19/32"	15 3/16"	2'-6 1/2"	2 EA.	4 11/32"	4 9/16"	2 1/4"	2 EA.
P-13	15"	15 1/4"	15 1/2"	2'-7 1/2"	2 EA.	4 3/32"	5 7/32"	2 3/16"	2 EA.
P-14	15 1/16"	15 3/32"	15 23/32"	2'-8"	2 EA.	5 29/32"	5 5/16"	2 29/32"	2 EA.
P-15	16 13/32"	16 7/32"	16 1/32"	2'-8 1/2"	2 EA.	6 3/8"	6 1/16"	3 3/32"	2 EA.

PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
P-16	17 1/8"	17 1/16"	2'-9 1/2"	2 EA.
P-17	17 5/16"	18 1/4"	2'-10"	2 EA.
P-18	18 29/32"	19 3/32"	2'-11"	2 EA.
P-29	19 11/32"	20 1/8"	3'-0"	1 EA.

PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
P-19	20 5/32"	19 29/32"	3'-0"	2 EA.
P-20	21 1/8"	20 3/4"	3'-1"	2 EA.
P-21	22 7/32"	21 3/4"	3'-2"	2 EA.
P-22	22 3/16"	21 1/16"	3'-2 1/2"	1 EA.
P-30	22 5/32"	21 1/32"	3'-2"	1 EA.

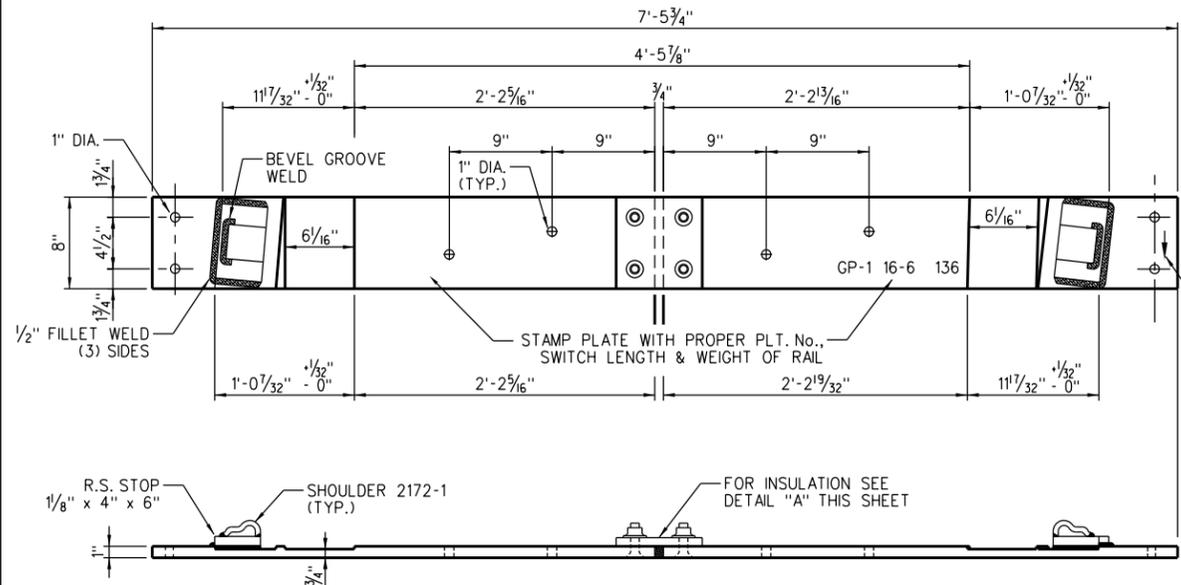
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DRAWN BY:	A. CARLOS	DATE:	03/31/2011
REVISION	XX	XX	XX
REV.	DATE	DESCRIPTION	DES.

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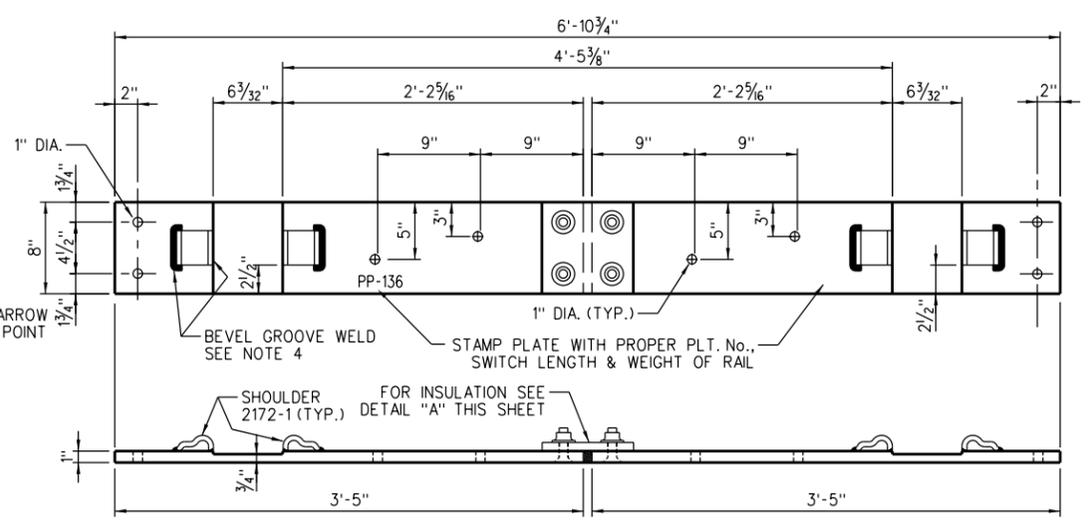
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS	STANDARD	2922
NO. 10 TURNOUT AND SWITCH PLATE DETAILS	SCALE:	1/2" = 1'-0"
	REVISION	SHEET
		13 OF 15
	CADD FILE:	ES2922-13



**INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH**  
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
 (1 PC. REQ'D AS SHOWN) (SCALE: 1/2" = 1'-0")

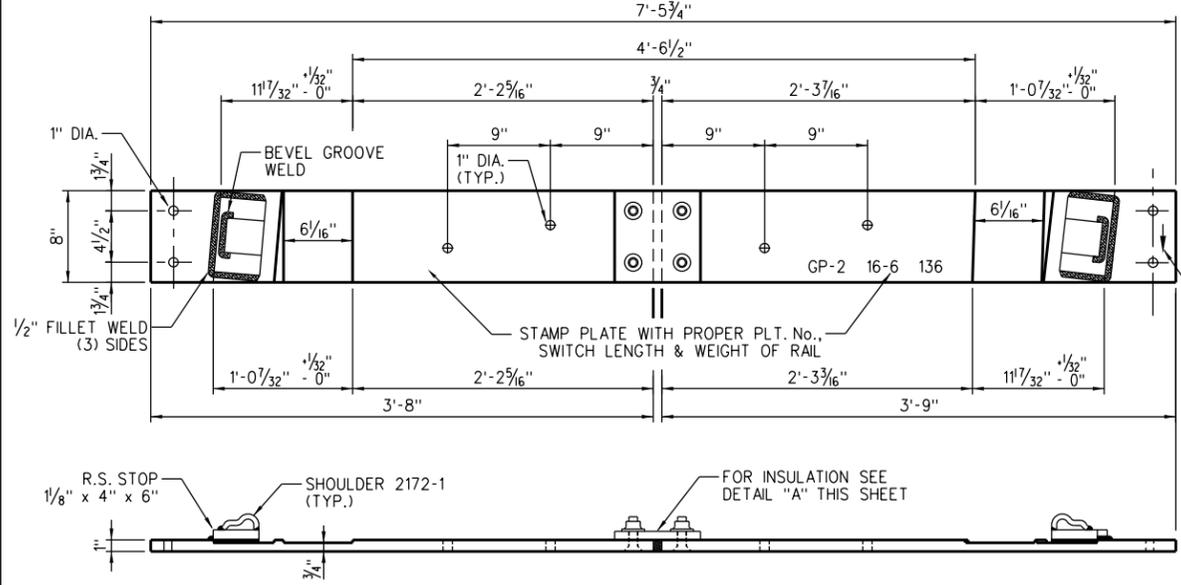
**NOTE:**  
 SERRATED WASHER AND BRACE PLATE  
 NOT SHOWN FOR CLARITY.



**PANDROLIZED INSULATED GAGE PLATE PP**  
 1" x 8" - FLAT - W/ INSULATION (3 PC. REQ'D AS SHOWN)  
 (SCALE: 1/2" = 1'-0")

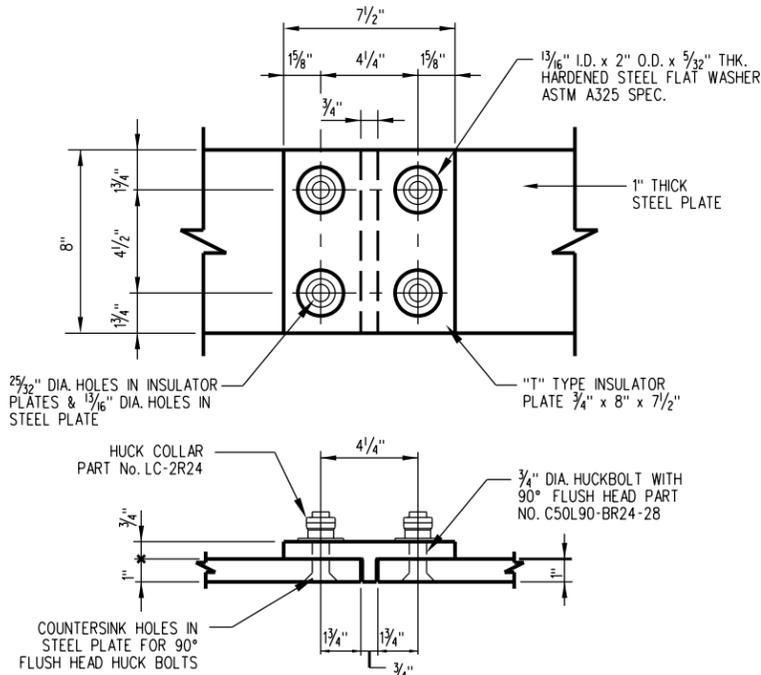
**NOTE:**  
 SERRATED WASHER AND BRACE PLATE  
 NOT SHOWN FOR CLARITY.

- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
  2. THE PANDROL TYPE WELD - ON, PRESSED STEEL SHOULDER, MADE OF MILD STEEL TO BE PURCHASED FROM APPROVED SUPPLIER MEETING DESIGN SPECIFICATIONS.
  3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  4. THE PLATES AS SHOWN FOR A 136 LB., NO. 10 RIGHT HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
  5. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET 2922-13.

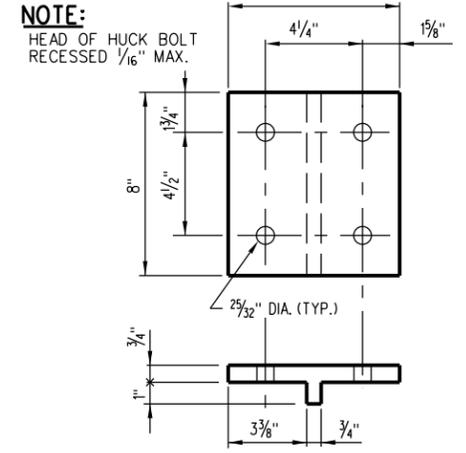


**INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH**  
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES  
 (1 PC. REQ'D AS SHOWN) (SCALE: 1/2" = 1'-0")

**NOTE:**  
 SERRATED WASHER AND BRACE PLATE  
 NOT SHOWN FOR CLARITY.



**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**



**DETAIL "A" INSULATION AT PLATES**  
 (SCALE: 3" = 1'-0")

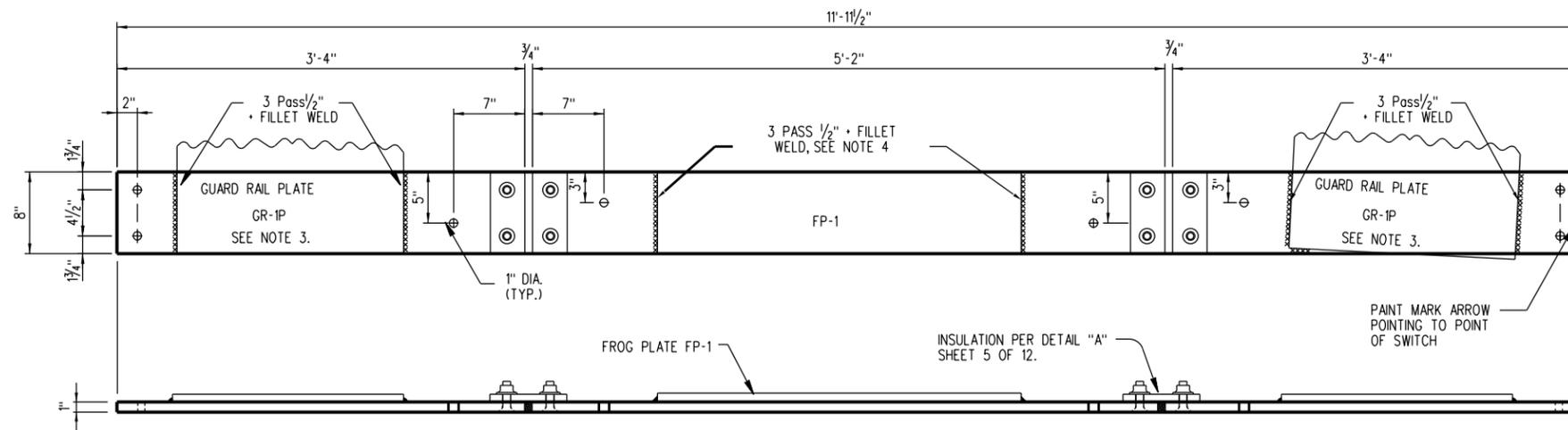
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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

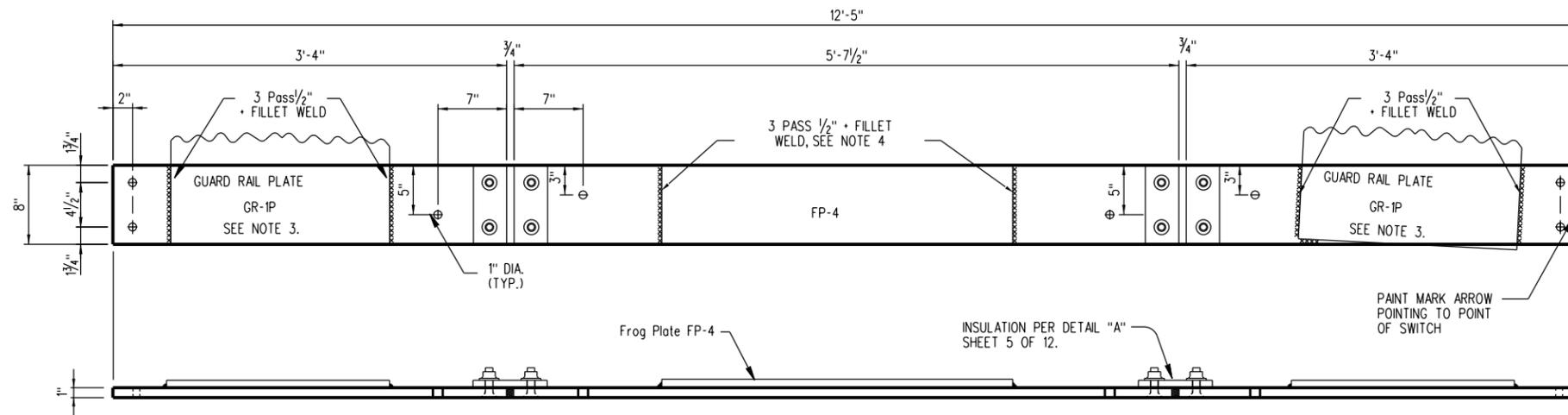
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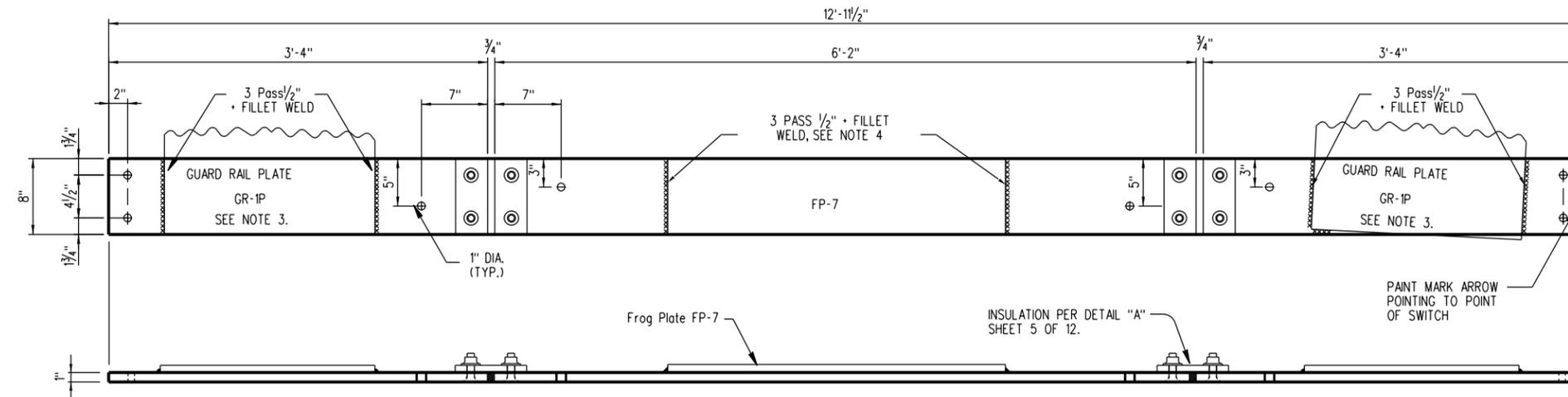
ENGINEERING STANDARDS	STANDARD 2922
NO. 10 SWITCH PLATE DETAILS	SCALE: AS NOTED
	REVISION SHEET 14 OF 15
	CADD FILE: ES2922-14



**INSULATED FROG GAGE PLATE - FG-1P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-2P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



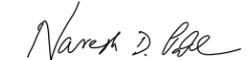
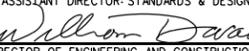
**INSULATED FROG GAGE PLATE - FG-3P**  
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG PLATE IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
  
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ENGINEERING STANDARDS  
 NO. 10 INSULATED GAGE PLATE DETAILS

STANDARD	2922
SCALE	1/2" = 1'-0"
REVISION SHEET	15 OF 15
CADD FILE	ES2922-15

EQUIVALENT CURVE DATA	
CURVE	3.1046'
RADIUS	1845.54'
DELTA	4.091'
TANGENT (T)	65.91'
LENGTH (L)	131.77'
EXTERNAL	1.18'
CROSSOVER DATA	
LEAD	108.625'
PC TO PS	23.78'
PS TO PI	42.13'
PI TO 1/2" PF	66.50'
LENGTH OF TURNOUT	160.12'
PS TO PT	107.99'

FROG DATA	
FROG NUMBER	14
FROG ANGLE	4°-05'-27"
SWITCH DATA	
SWITCH LENGTH	26'-0"
HEEL SPREAD	6 1/4"
HEEL ANGLE	1°-27'-00"
SWITCH ANGLE	0°-50'-44"
RADIUS OF CENTER LINE - SWITCH	2,462.20'
TANGENT LENGTH SWITCH	12.98'
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	0°-36'-16"
DEGREE OF CURVE - SWITCH	2°-38'-45"
TURNOUT DATA	
RADIUS OF CENTER LINE - TURNOUT	1,576.40'
TANGENT LENGTH - TURNOUT	44.51'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	3°-14'-07"
DEGREE OF CURVE - TURNOUT	3°-38'-07"

CROSSOVER DATA TABLE									
A	B	C	X	Y	2L+X	2L+X-2(PC-PS)	PS TO PS	U	V
13	182.23	181.77	50.41	313.59	313.94	266.38	266.03	48.78	49.24
14	196.25	195.75	64.42	327.57	327.96	280.40	280.01	62.76	63.26
15	210.27	209.73	78.44	341.56	341.98	294.41	293.99	76.74	77.27
16	224.28	223.71	92.46	355.54	355.00	308.43	307.97	90.72	91.29
17	238.30	237.70	106.48	369.52	370.01	322.45	321.95	104.70	105.31
18	252.32	251.68	120.50	383.50	384.03	336.47	335.94	118.69	119.33
19	266.34	265.55	134.51	397.48	398.05	350.49	349.92	132.67	133.34
20	280.36	279.64	148.53	411.47	412.07	364.50	363.90	146.65	147.36
21	294.37	293.62	162.55	425.45	426.09	378.52	377.88	160.63	161.38
22	308.39	307.61	176.57	439.43	440.10	392.54	391.87	174.62	175.40
23	322.41	321.59	190.58	453.41	454.12	406.56	405.85	188.60	189.42
24	336.43	335.57	204.60	467.39	468.14	420.57	419.83	202.58	203.43
25	350.45	349.55	218.32	481.38	482.16	434.59	433.81	216.56	217.45
26	364.46	363.53	232.64	495.36	496.18	448.61	447.78	230.54	231.47
27	378.48	377.52	246.66	509.34	510.19	462.63	461.78	244.53	245.49
28	392.50	391.50	260.67	523.32	524.21	476.65	475.76	258.51	259.50
29	406.52	405.48	274.69	537.31	538.23	490.66	489.74	272.49	273.52
30	420.53	419.46	288.71	551.29	552.25	504.68	503.72	286.47	287.54
31	434.55	433.44	302.73	565.27	566.26	518.70	517.70	300.45	301.56
32	448.57	447.43	316.75	579.25	580.28	532.72	531.69	314.44	315.58

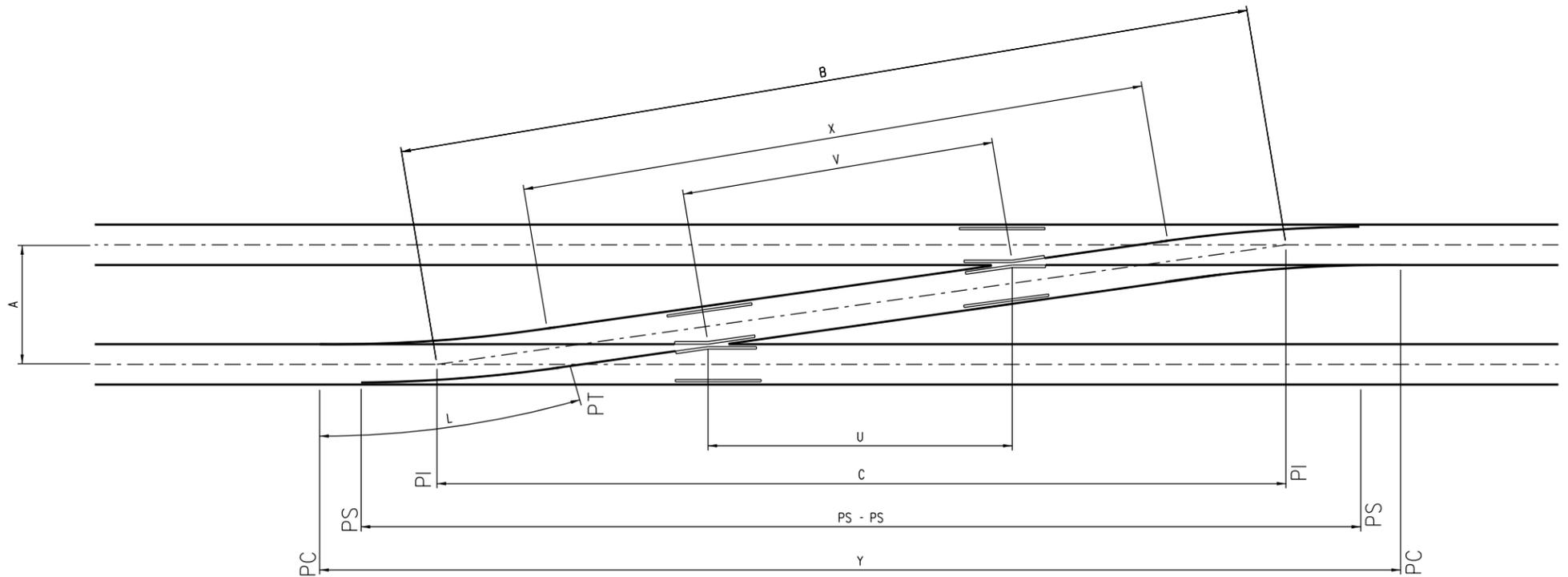
**DRAWING INDEX**

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**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2931-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2931-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2931-05.
- TIE PLATES SHALL CONFORM TO SCRRA ENGINEERING STANDARD ES2454.
- SCREW SPIKES (5/16" X 6-2 TPI) SHALL CONFORM TO SCRRA ENGINEERING STANDARD ES2357. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 3/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 26'-0" SWITCH POINT, MADE FROM 40'-0" RAIL PER ES2931-09 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ES2931-11 AND ES2931-12.
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 14 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2931-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-45 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRA NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWICH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ES2931-09.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM POINT OF SWITCH (PS).

**FOR MAINTENANCE ONLY**



**CROSSOVER LAYOUT**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

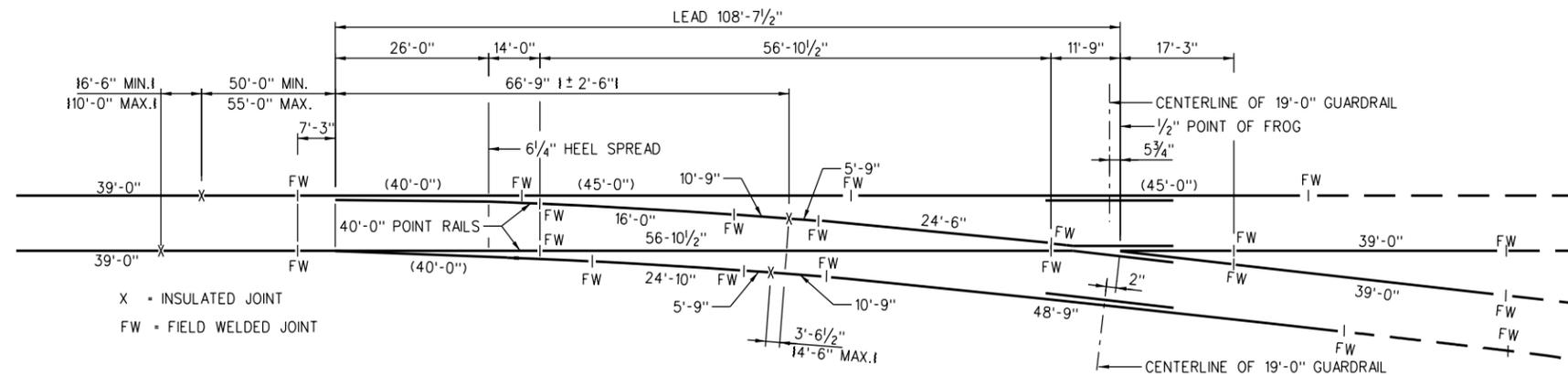
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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

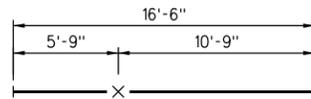
ENGINEERING STANDARDS		STANDARD
NO. 14 136 LB. R.H. RBM FROG TURNOUT AND CROSSOVER GENERAL NOTES AND DATA		2931
SCALE:	NONE	
REVISION	SHEET	1 OF 16
CADD FILE:	ES2931-01	

**NOTES:**

1. SINCE THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
2. RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW:  
THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH HEAVIER RAIL THAN TRACK L. CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 65'-6" RAIL SHALL BE REPLACED WITH 5'-0" OF THE HEAVIER RAIL AND 60'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 16'-11 3/4" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 6'-11 3/4" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:  
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.  
(B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH END DRILLED PER DETAIL "A", IF SO REQUIRED.
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HIGH STRENGTH" RAIL.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
7. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
8. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT.
9. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS 10'-0".
10. WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.

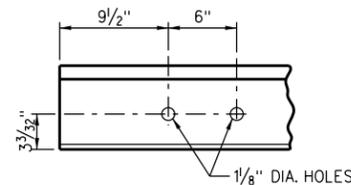


**TURNOUT**

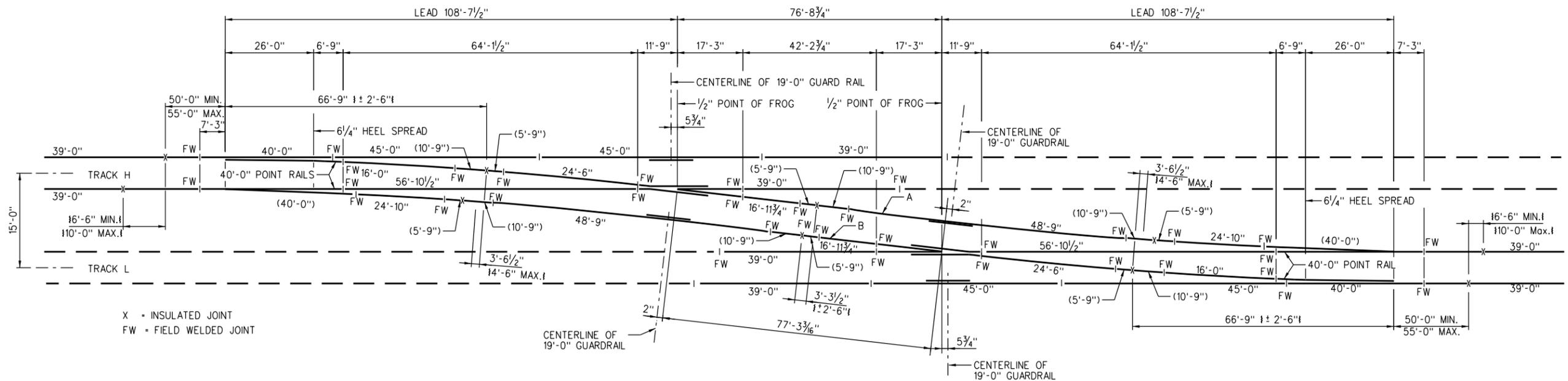


**16'-6" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD.



**DETAIL "A"**  
SEE NOTE 4 (b)



**CROSSOVER**  
(15'-0" TRACK CENTERS)

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William D. Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 14 136 LB. R.H. RBM FROG  
 TURNOUT AND CROSSOVER  
 JOINTS LOCATIONS

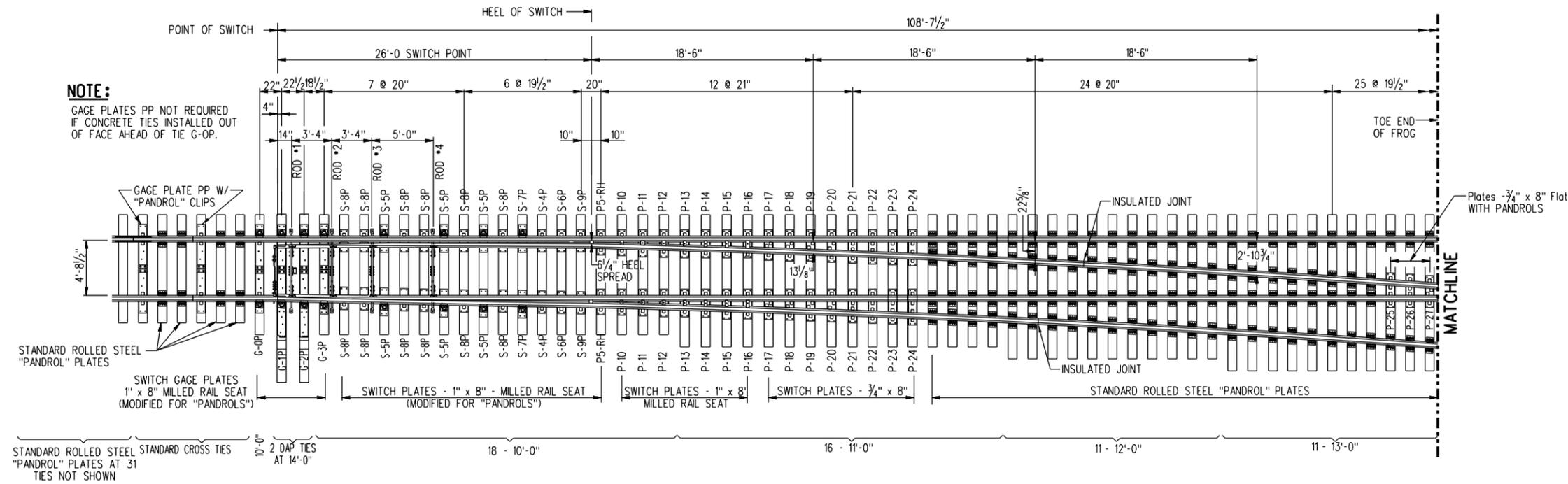
STANDARD	2931
SCALE:	NONE
REVISION SHEET	2 OF 16
CADD FILE:	ES2931-02

**NOTES:**

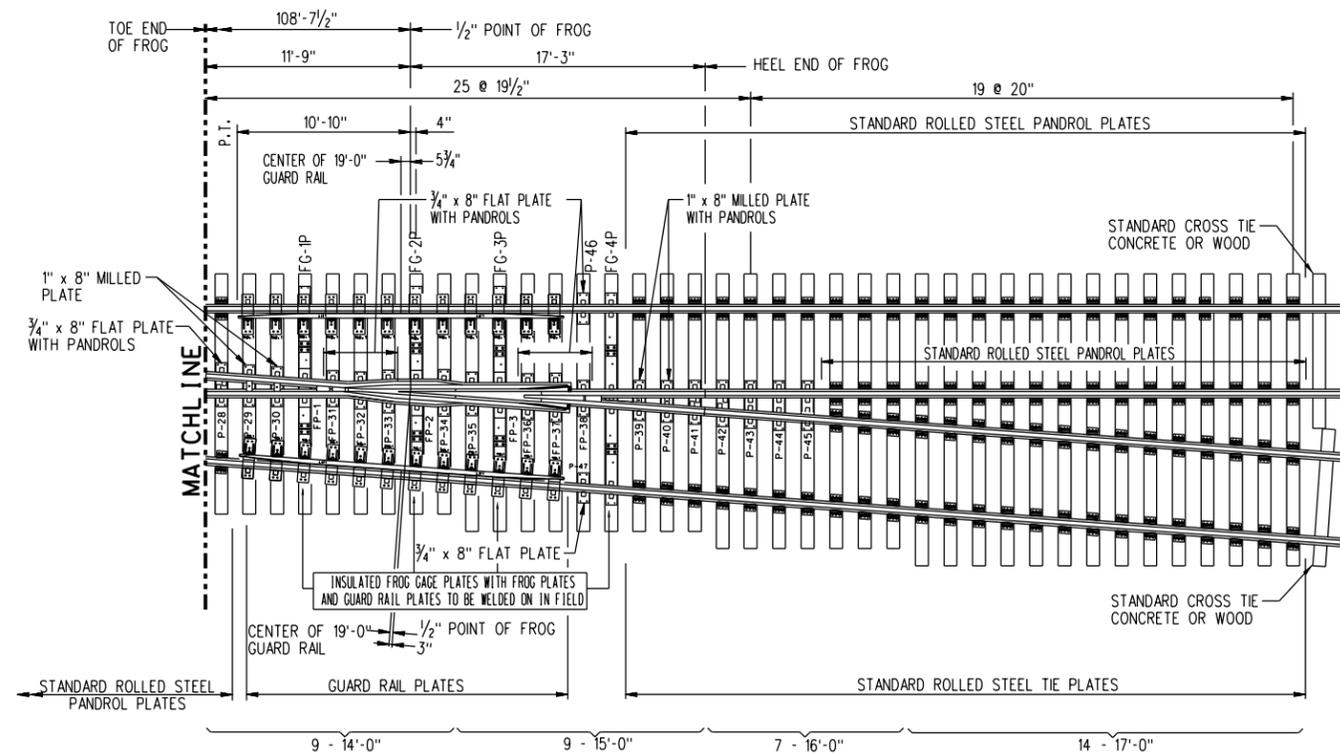
1. SEE SHEET NO. ES2931-01 FOR NOTES AND TURNOUT DATA
2. SEE SHEET NO. ES2931-04 FOR TURNOUT BILL OF MATERIALS
3. SEE SHEET NO. ES2931-05 FOR CROSSOVER LAYOUT

**NOTE:**

GAGE PLATES PP NOT REQUIRED IF CONCRETE TIES INSTALLED OUT OF FACE AHEAD OF THE G-OP.



**NO. 14 RIGHT HAND TURNOUT**



**NO. 14 RIGHT HAND TURNOUT (CONT.)**

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR- STANDARDS & DESIGN

*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 14 136 LB. R.H. RBM FROG TURNOUT LAYOUT

STANDARD	2931
SCALE	3/16" = 1'-0"
REVISION	SHEET
-	3 OF 16
CADD FILE:	ES2931-03

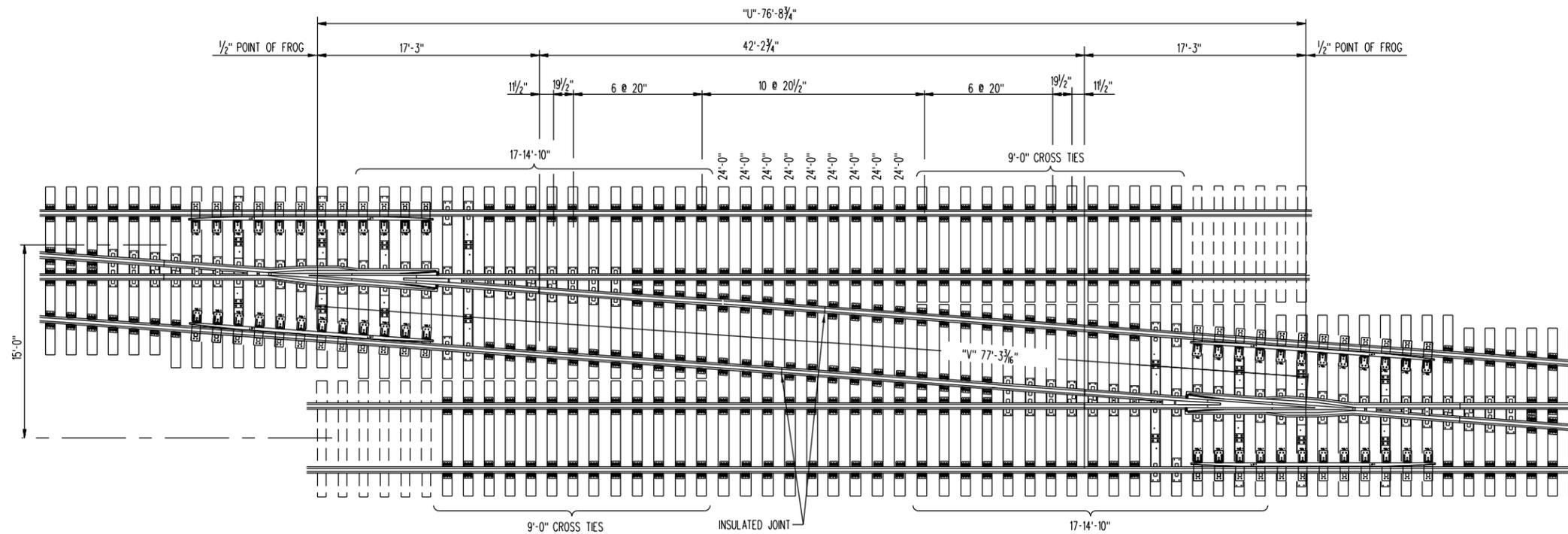
BILL OF MATERIAL FOR LATERAL TURNOUT	
QTY.	DESCRIPTION
1	NO. 14 RAIL BOUND MANGANESE FROG
2	19'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
1 PAIR	26'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. & L.H. SAMSON STOCK RAILS (40'-0")
1	"MF" TYPE FRONT ROD W/ "MF" CLIPS
1	NO. 1 SMJ TYPE SWITCH ROD W/ BASKET
1 EACH	NO. 2 THRU NO. 4 SMJ TYPE SWITCH ROD W/ BASKET
1	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
2	SWITCH GAGE PLATE P-P
1 EACH	SWITCH GAGE PLATES G-OP THRU G-3P
2 EACH	TURNOUT PLATES P-10 THRU P-24
1 EACH	TURNOUT PLATES P-25 THRU P-30
1 EACH	TURNOUT PLATES P-39 THRU P-45
1 EACH	SINGLE RAIL PLATES P-46 AND P-47
1 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
1 EACH	FROG PLATES FP-31 THRU FP-38
1 EACH	FROG CLAMP PLATES FCP-1 THRU FCP-3
2	SLIDE PLATE S-4P
6	SLIDE PLATE S-5P
2	SLIDE PLATE S-6P
2	SLIDE PLATE S-7P
12	SLIDE PLATE S-8P
2	SLIDE PLATES S-9P
2	HEEL PLATE P5-RH
4	D.I. RAIL HOLD DOWN CLIPS E-3706
6	D.I. RAIL HOLD DOWN CLIPS E-3708
2	D.I. RAIL HOLD DOWN CLIPS E-3709
4	D.I. RAIL HOLD DOWN CLIPS E-3710
16	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
144	"PANDROL", OR EQUAL, TYPE PLATES
288	"PANDROL", OR EQUAL, CLIP TYPE E-2055
8	"PANDROL", OR EQUAL, CLIP TYPE E-2063
576	"PANDROL", OR EQUAL, 15/16" DIA. No. 5760 SCREW SPIKES
1 EACH	16'-0" RAIL
1 EACH	24'-6" RAIL
1 EACH	24'-10" RAIL
4 EACH	39'-0" RAIL
2 EACH	45'-0" RAIL
1 EACH	48'-9" RAIL
1 EACH	56'-10 1/2" RAIL
2 EA.	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT 16'-6"

BILL OF SWITCH TIES FOR TURNOUT			
PIECES	SIZE	LENGTH	BOARD FEET
1	7" x 9"	10'-0"	52.50
2	7" x 9"	15'-0"	136.50
18	7" x 9"	10'-0"	945.00
16	7" x 9"	11'-0"	924.00
11	7" x 9"	12'-0"	693.00
11	7" x 9"	13'-0"	750.75
9	7" x 9"	14'-0"	661.50
2	10" x 9"	14'-0" DAP TIES	147.00
7	7" x 9"	15'-0"	551.25
7	7" x 9"	16'-0"	588.00
14	7" x 9"	17'-0"	1249.50
TOTAL			TOTAL
98			6699.00

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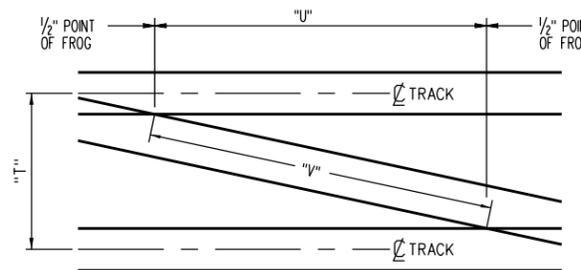
	DRAWN BY: A. CARLOS	DATE: 03/31/2011	SCRRRA ENGINEERING STANDARDS ARE INTENDED FOR SCRRRA APPROVED USES ONLY. FOR NON-SCRRRA APPROVED USES, SCRRRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRRRA. ALL RIGHTS RESERVED.	 <b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012	<b>ENGINEERING STANDARDS</b>  NO. 14 136 LB. R.H. RBM FROG TURNOUT BILL OF MATERIALS	STANDARD 2931 SCALE: NONE REVISION SHEET - 4 OF 16 CADD FILE: ES2931-04
X XX-XX-XX REV. DATE DESCRIPTION DES. ENG.	 ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION					

- NOTES:**
1. SEE SHEET NO. ES2931-01 FOR TURNOUT NOTES AND DATA
  2. SEE SHEET NO. ES2931-04 FOR BILL OF MATERIALS
  3. SEE SHEET NO. ES2931-03



BILL OF MATERIAL	
QTY.	DESCRIPTION
2	NO. 14 RAIL BOUND MANGANESE FROG
4	19'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
2	"MF" TYPE FRONT ROD W/ "MF" CLIPS
2	NO. 1 SMJ TYPE SWITCH ROD W/ BASKET
2 EACH	NO. 2 THRU NO. 4 SMJ TYPE SWITCH ROD W/ BASKET
2	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
4	SWITCH GAGE PLATE P-P
2 EACH	SWITCH GAGE PLATES G-OP THRU G-3P
4 EACH	TURNOUT PLATES P-10 THRU P-24
2 EACH	TURNOUT PLATES P-25 THRU P-30
2 EACH	TURNOUT PLATES P-39 THRU P-45
2 EACH	SINGLE RAIL PLATES P-46 AND P-47
2 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
2 EACH	FROG PLATES FP-31 THRU FP-38
2 EACH	FROG CLAMP PLATES FCP-1 THRU FCP-3
4	SLIDE PLATE S-4P
12	SLIDE PLATE S-5P
4	SLIDE PLATE S-6P
4	SLIDE PLATE S-7P
24	SLIDE PLATE S-8P
4	SLIDE PLATES S-9P
4	HEEL PLATE P5-RH
8	D.I. RAIL HOLD DOWN CLIPS E-3706
12	D.I. RAIL HOLD DOWN CLIPS E-3708
4	D.I. RAIL HOLD DOWN CLIPS E-3709
8	D.I. RAIL HOLD DOWN CLIPS E-3710
32	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
186	"PANDROL", OR EQUAL, TYPE PLATES
372	"PANDROL", OR EQUAL, CLIP TYPE E-2055
24	"PANDROL", OR EQUAL, CLIP TYPE E-2063
744	"PANDROL", OR EQUAL, 1/16" DIA. No. 5760 SCREW SPIKES

**CROSSOVER**



**CROSSOVER DATA DETAIL**

CROSSOVER DATA		
Track Centers "U"	DISTANCE BETWEEN 1/2" FROG POINTS	
	ON MAIN TRACK	ON CROSSOVER
14'-0"	62'-9"	63'-3"
15'-0"	76'-8 3/4"	77'-3 3/8"
16'-0"	90'-8 1/2"	91'-3 3/8"
17'-0"	104'-8 3/8"	105'-3 1/2"
Each 1"	1.165'	1.168'

BILL OF MATERIAL (CONT.)	
QTY.	DESCRIPTION
2 EACH	16'-0" RAIL
2 EACH	16'-11 3/4" RAIL
2 EACH	24'-6" RAIL
2 EACH	24'-10" RAIL
2 EACH	39'-0" RAIL
2 EACH	45'-0" RAIL
2 EACH	48'-9" RAIL
2 EACH	56'-10 1/2" RAIL
6 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINTS (16'-6")
2 PAIR	26'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
2 PAIR	R.H. & L.H. SAMSON STOCK RAILS (40'-0" RAIL)

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
34	7" x 9"	9'-0"	1606.50
38	7" x 9"	10'-0"	1995.00
32	7" x 9"	11'-0"	1848.00
22	7" x 9"	12'-0"	1386.00
20	7" x 9"	13'-0"	1365.00
18	7" x 9"	14'-0"	1323.00
4	10" x 9"	14'-0" DAP TIES	294.00
34	7" x 9"	14'-10"	2677.50
9	7" x 9"	24'-0"	1134.00
TOTAL			TOTAL
207			13629.00

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
*William D. Davis*  
 Director of Engineering and Construction

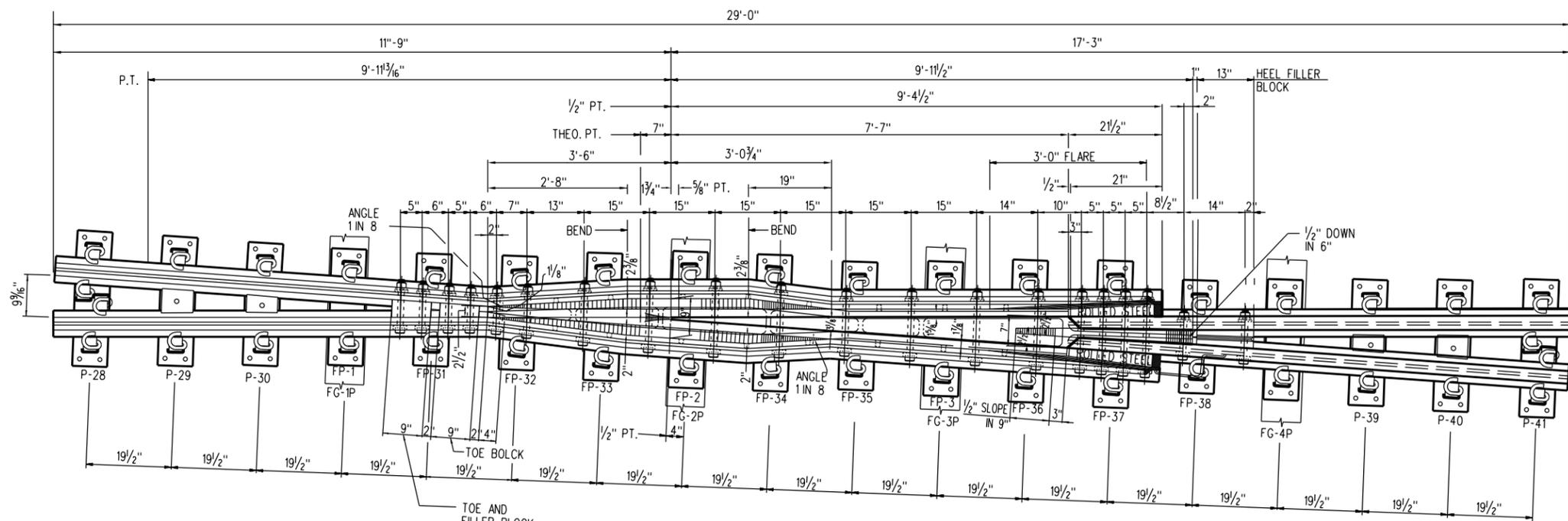
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 14 136 LB. R.H. RBM FROG CROSSOVER LAYOUT AND BILL OF MATERIALS

STANDARD 2931  
 SCALE: 3/16" = 1'-0"  
 REVISION SHEET 5 OF 16  
 CADD FILE: ES2931-05



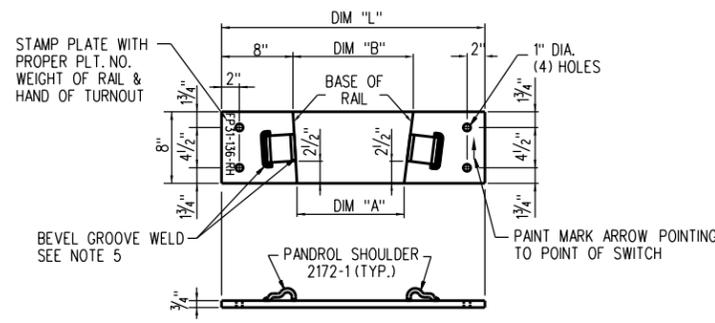
**NO. 14 RAIL BOUND MANGANESE STEEL FROG**

**NOTES:**

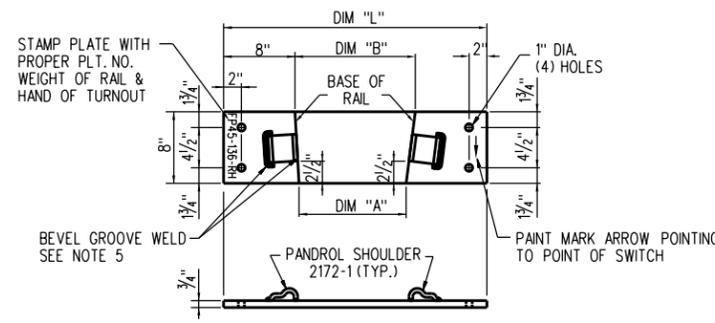
- FROG ANGLE 4°-05'-27"
- RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
- RAIL BOUND MANGANESE STEEL FROG PER CURRENT AREMA PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT AREMA SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH FASTENERS.
- ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
- WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO", EXCEPT AS OTHERWISE SPECIFIED.
- ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT AREMA RECOMMENDED PRACTICE.
- FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
- BODY BOLTS 1 3/8" DIA. H.T.C.S. - PER AREMA SPECIFICATIONS.
- TOE AND HEEL BLOCKS AND BOLTS PER AREMA SPECIFICATIONS.
- PLATES TO BE MADE OF MILD ROLLED STEEL.
- THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES TO BE OPPOSITE.
- THE "PANDROL", OR APPROVED EQUAL, TYPE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2 AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
- IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
- RAILS ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.

**WELDING OF GAGE PLATE & GUARD RAIL PLATES:**

- POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
- CHECK TRACK FOR CORRECT GAGE.
- STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ELASTIC CLIPS AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
- RECHECK TRACK GAGE IF NECESSARY.
- CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, 3/32 INCH, NR203, 1/2 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY SCRRRA DIRECTOR OF ENGINEERING MAY BE USED.



**FROG PLATE - FP-31**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**FROG PLATES - FP-32 & FP-33**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-31	SEE NOTE "A"	2'-4 1/2"	1 EA.	
FP-32	SEE NOTE "A"	2'-5 1/2"	1 EA.	
FP-33	SEE NOTE "A"	2'-9"	1 EA.	
FP-34	SEE NOTE "A"	2'-11"	1 EA.	
FP-35	SEE NOTE "A"	2'-8 1/2"	1 EA.	
FP-36	SEE NOTE "A"	2'-11 1/2"	1 EA.	
FP-37	SEE NOTE "A"	3'-1"	1 EA.	
FP-38	SEE NOTE "A"	2'-4 1/2"	1 EA.	

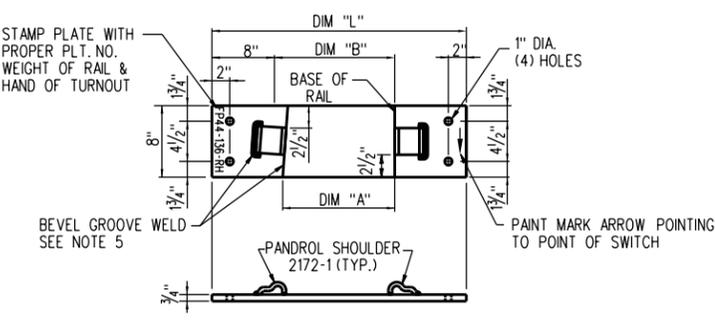
**NOTE "A"**

PLATES FP-31 THRU FP-38 ARE TO BE LAYED OUT AND MARKED OFF FROM UNDER FROG TO INSURE PROPER LOCATION OF PANDROL SHOULDERS.

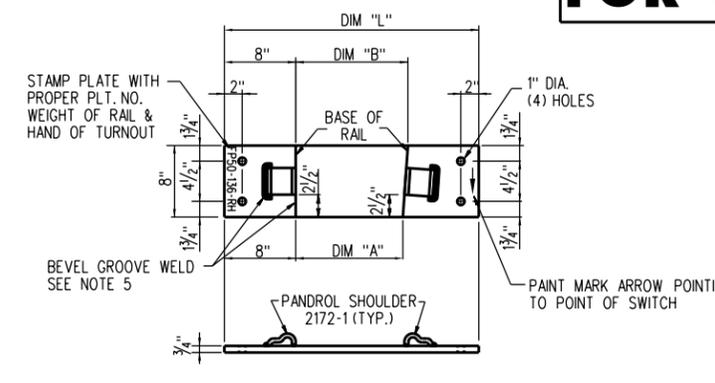
**NOTE "B"**

SPECIAL FROG PLATES FP-1, FP-2, AND FP-3 WITH STEEL SHOULDERS, SHOWN IN POSITION ON SHEET 7, ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE DWG. NO. 2931-07.

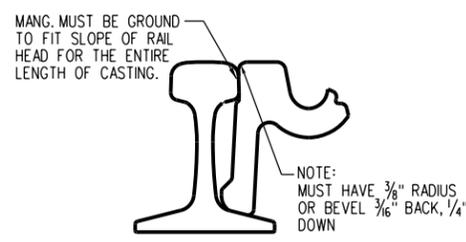
**FOR MAINTENANCE ONLY**



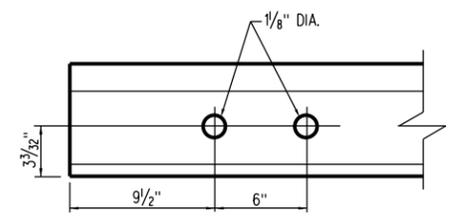
**FROG PLATE - FP-34**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**FROG PLATES - FP-35 THRU FP-38**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

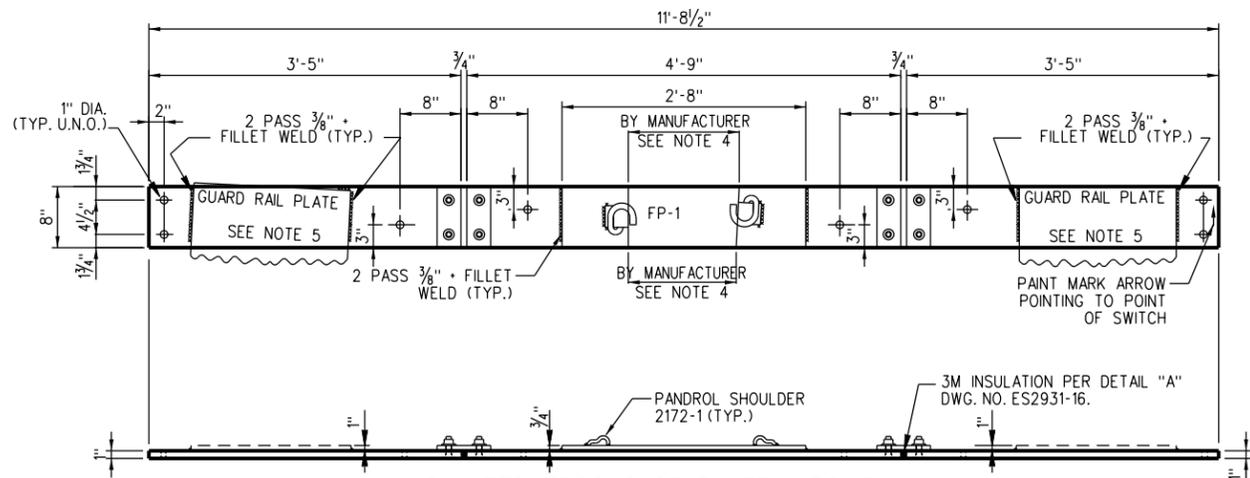


**DETAIL OF FROG CASTING / RAIL FIT**  
SCALE: NONE

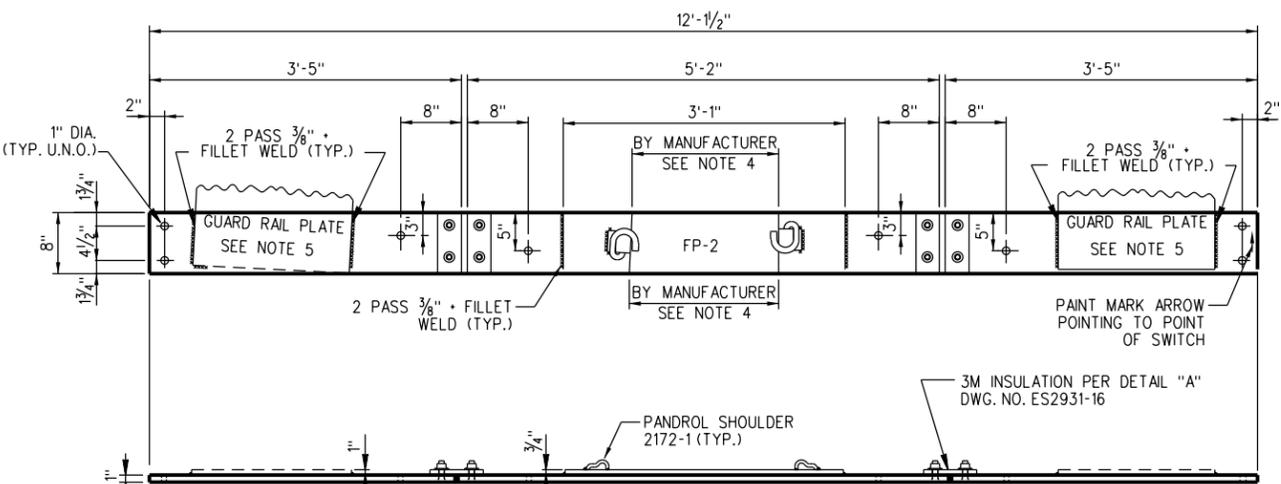


**RAIL END DRILLING**

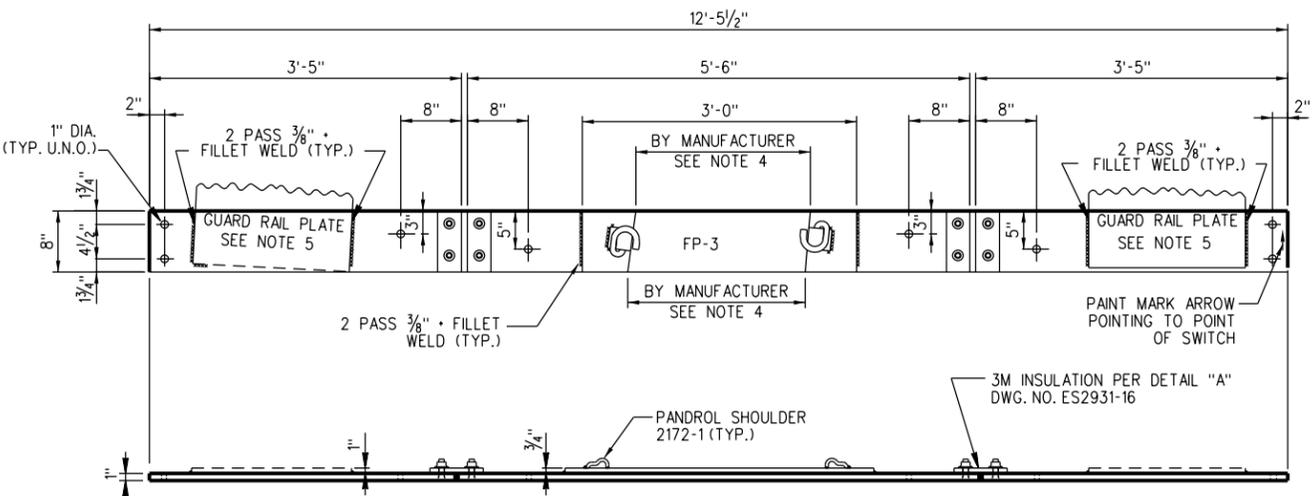
	DRAWN BY: A. CARLOS	DATE: 03/31/2011	SCRRRA ENGINEERING STANDARDS ARE INTENDED FOR SCRRRA APPROVED USES ONLY. FOR NON-SCRRRA APPROVED USES, SCRRRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRRRA. ALL RIGHTS RESERVED.	<b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012	<b>ENGINEERING STANDARDS</b>  NO. 14 136 LB. R.H. RBM FROG LAYOUT	STANDARD 2931 SCALE: 3/4" = 1'-0" REVISION SHEET 6 OF 16 CADD FILE: ES2931-06
X XX-XX-XX REV. DATE DESCRIPTION DES. ENG.	 ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION					



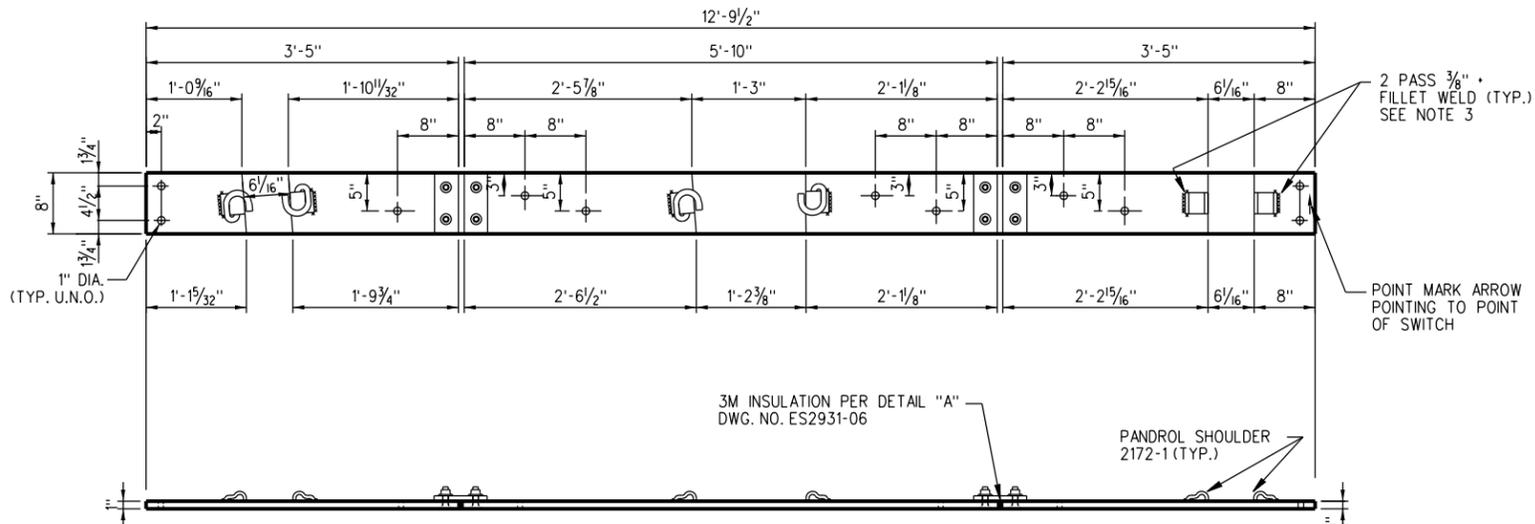
**INSULATED FROG GAGE PLATE - FG-1P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-2P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-3P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-4P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

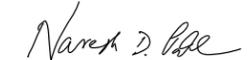
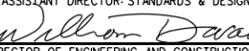
**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND TURNOUT, FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE "PANDROL" TYPE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM "PANDROL INTERNATIONAL" OR APPROVED ALTERNATE MEETING "PANDROL'S" DESIGN SPECIFICATIONS, THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF SHOULDERS ON FROG PLATES FP-1, FP-2 AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
5. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

**INSTRUCTIONS FOR WELDING GUARD RAIL PLATES TO GAGE PLATES:**

1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE, 3/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE, 1/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, 3/32 INCH, NR203, 1/2 NICKEL FLUX CORE.
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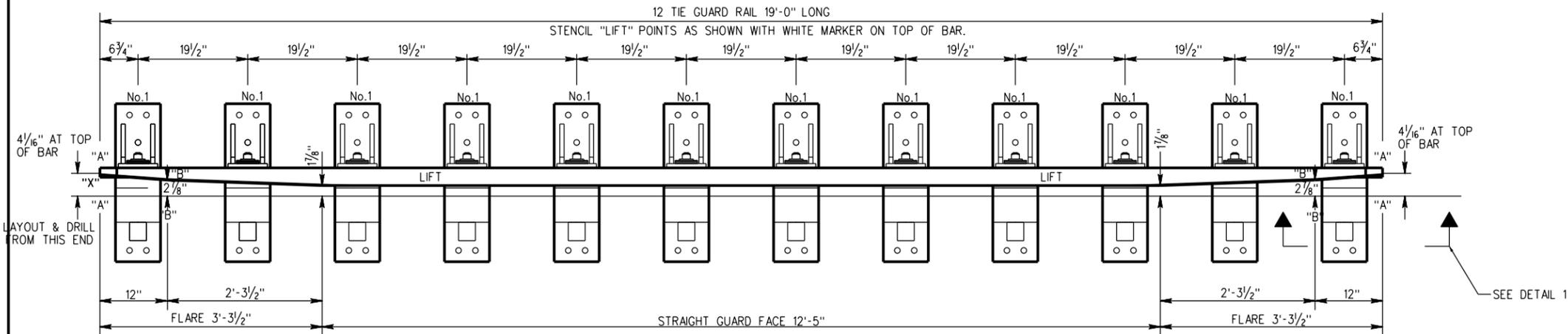
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011  ASSISTANT DIRECTOR: STANDARDS & DESIGN  DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 14 136 LB. R.H. RBM FROG GAGE PLATE DETAILS

STANDARD	2931
SCALE	1" = 1'-0"
REVISION	SHEET
-	7 OF 16
CADD FILE	ES2931-07



**NOTES:**

1. GUARD RAIL SECTION UIC 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
2. BASE PLATE, BRACKET AND SHIMS MILD STEEL PER AREMA SPECIFICATION M7.
3. GUARD RAIL BOLT AND NUT PER AREMA SPECIFICATION M11. EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
4. WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK.
5. WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.

**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

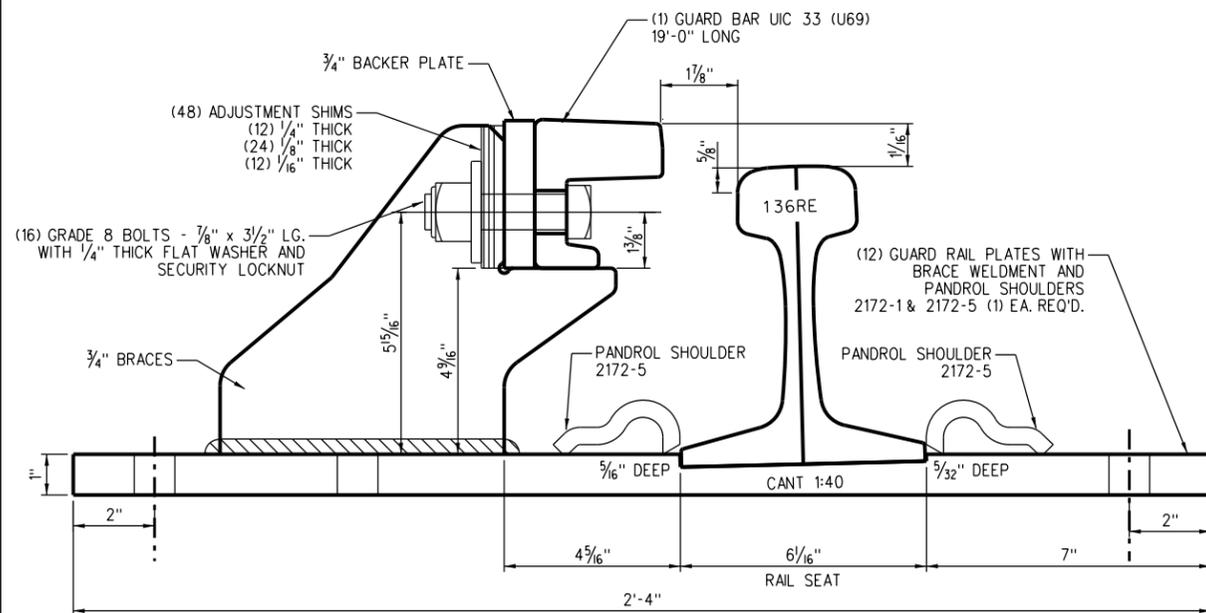
"X" 6 3/4"x 2'-2 1/4"x 3'-9 3/4"x 5'-5 1/4"x 7'-0 3/4"x 8'-8 1/4"x 10'-3 3/4"x 11'-11 1/4"x 13'-6 3/4"x 15'-2 1/4"x 16'-9 3/4"x 18'-5 1/4"

HOLES 1" DIA. - 1 3/8" A.B.

**ASSEMBLED 19'-0" GUARD RAIL**

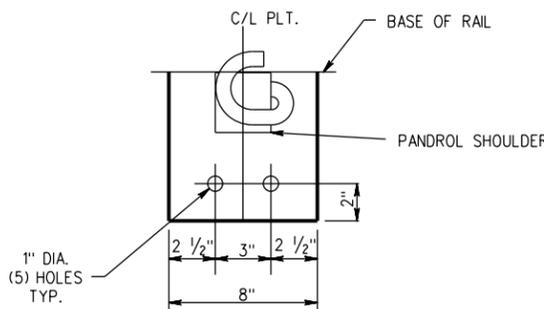
SCALE: 1" = 1'-0"

**FOR MAINTENANCE ONLY**

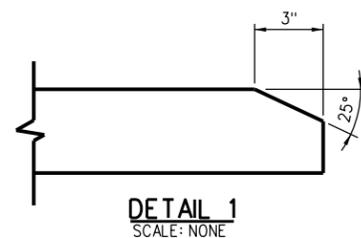


**TYPICAL PLATE DETAIL**

SCALE: NONE

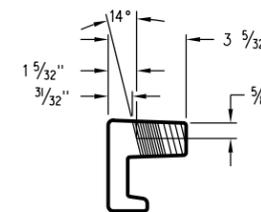


**TYPICAL PLATE PUNCHING DETAIL**



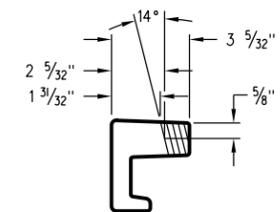
**DETAIL 1**

SCALE: NONE



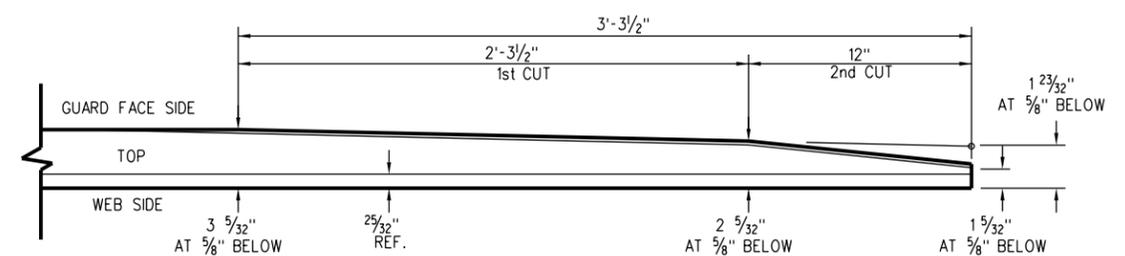
**SECTION A-A**

SCALE: NONE



**SECTION B-B**

SCALE: NONE



**FLARE DETAIL**

BREAK SHARP CORNERS OF ALL MACHINED SURFACES  
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Narek D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

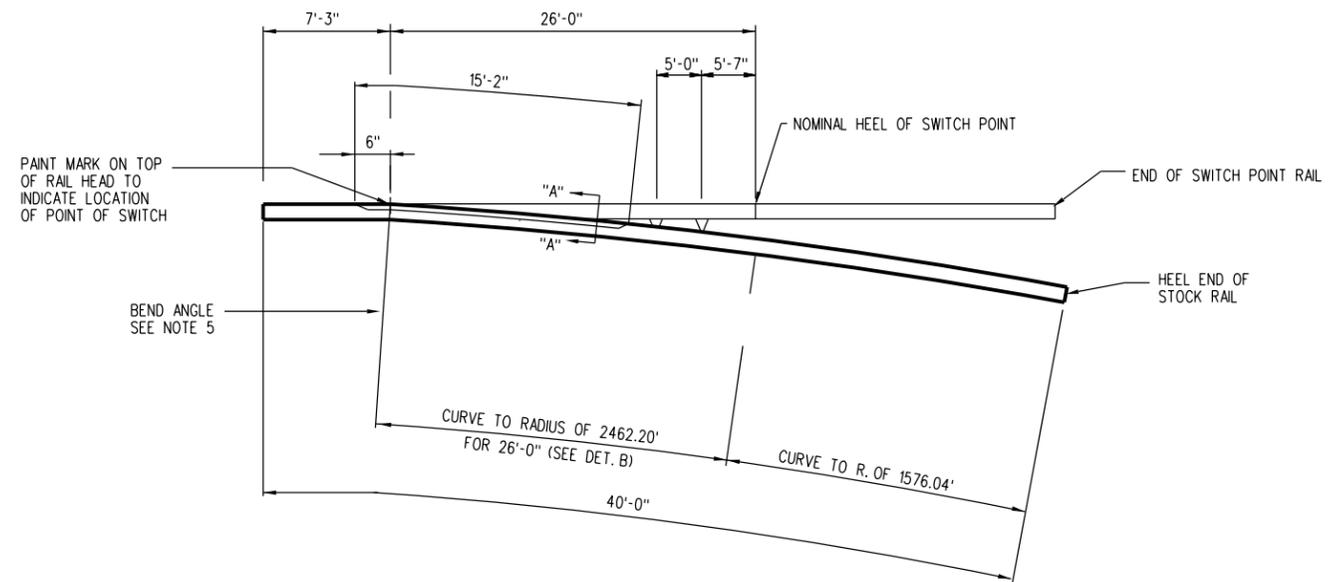
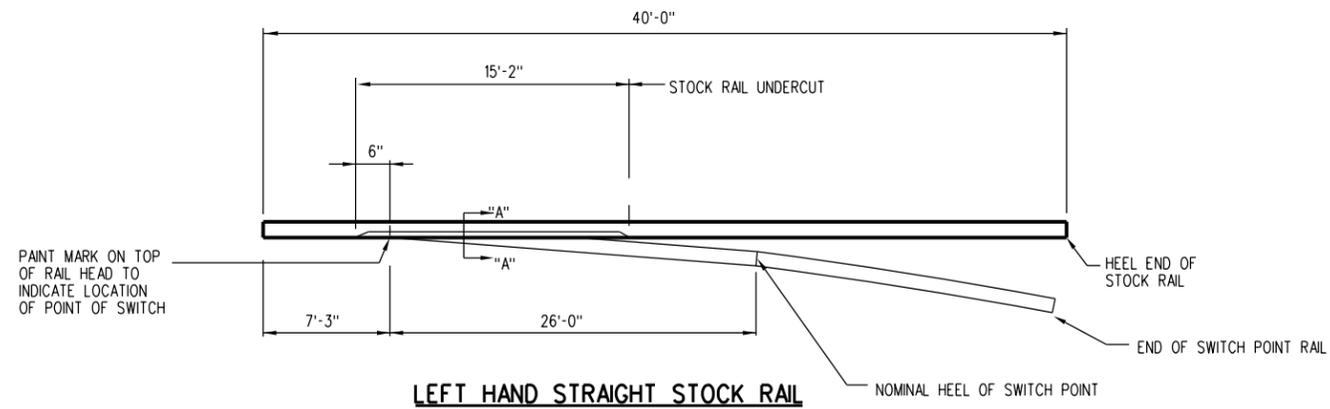
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

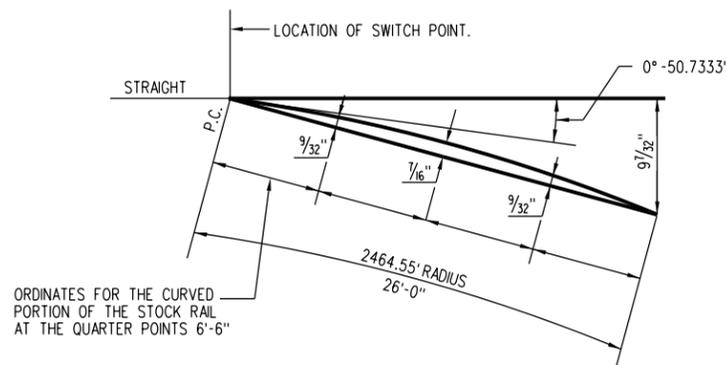
ENGINEERING STANDARDS  
 NO. 14 136 LB. R.H. RBM FROG  
 GUARD RAIL DETAILS

STANDARD	2931
SCALE:	1" = 1'-0"
REVISION	SHEET
-	8 OF 16
CADD FILE:	ES2931-08





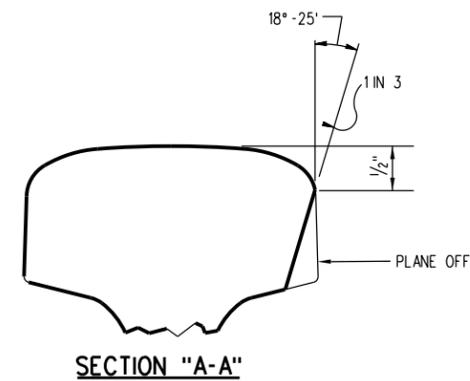
STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT".  
FOR LEFT HAND TURNOUT, STOCK RAILS ARE OPPOSITE HAND,  
BEING LEFT HAND CURVED STOCK RAIL AND  
RIGHT HAND STRAIGHT STOCK RAIL



**NOTES:**

1. INFORMATION OR DIMENSIONS NOTED THUS, ( ) TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. LENGTH OF SWITCH POINT (26'-0").
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT AREMA PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.
5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS: 0°-50.7333' OR 1" IN 5'-7 3/4".
6. THE CURVED PORTION OF THE CURVED STOCK RAIL SHALL BE CURVED PER DETAIL "B".

LENGTHS B, C, & D FOR 136 LB. RAIL									
SW. PT. LENGTH	T.O. NO.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR FIRST (NEW) INSTALL.		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
26'-0"	14	STR.	15'-2"	7'-3"	40'-0"	NONE	10'-0"	43'-0"	NONE
26'-0"	14	CURVED	15'-2"	7'-3"	40'-0"	NONE	12'-0"	43'-0"	NONE



**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
Director of Engineering and Construction

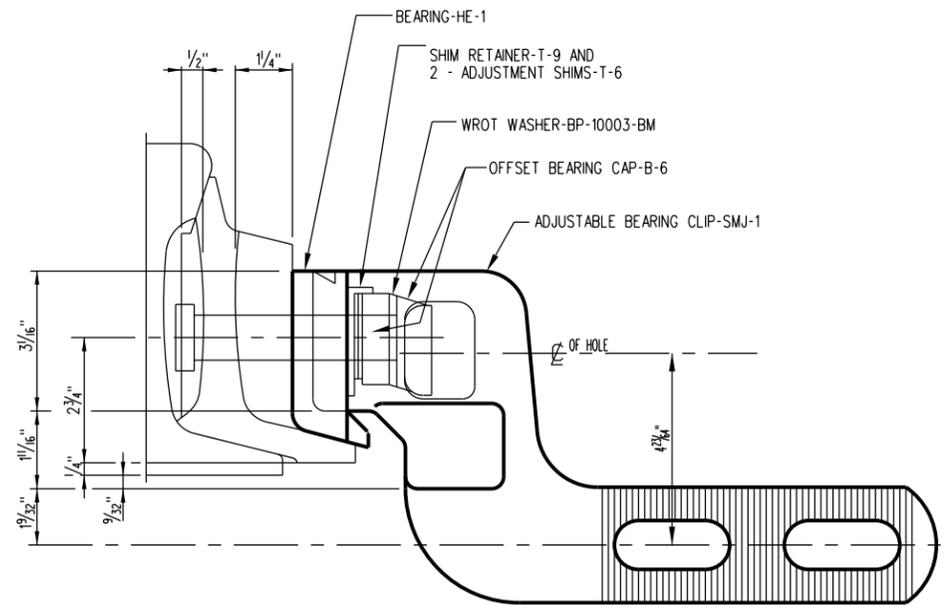
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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

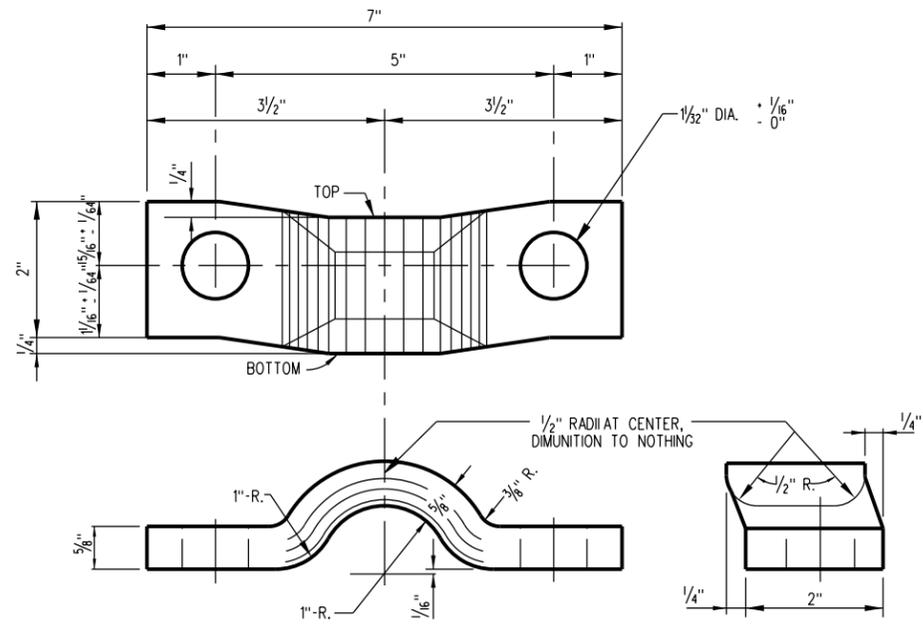
ENGINEERING STANDARDS  
NO. 14 STRAIGHT OR CURVED UNDERCUT STOCK RAILS

STANDARD	2931
SCALE:	NONE
REVISION SHEET	10 OF 16
CADD FILE:	ES2931-10

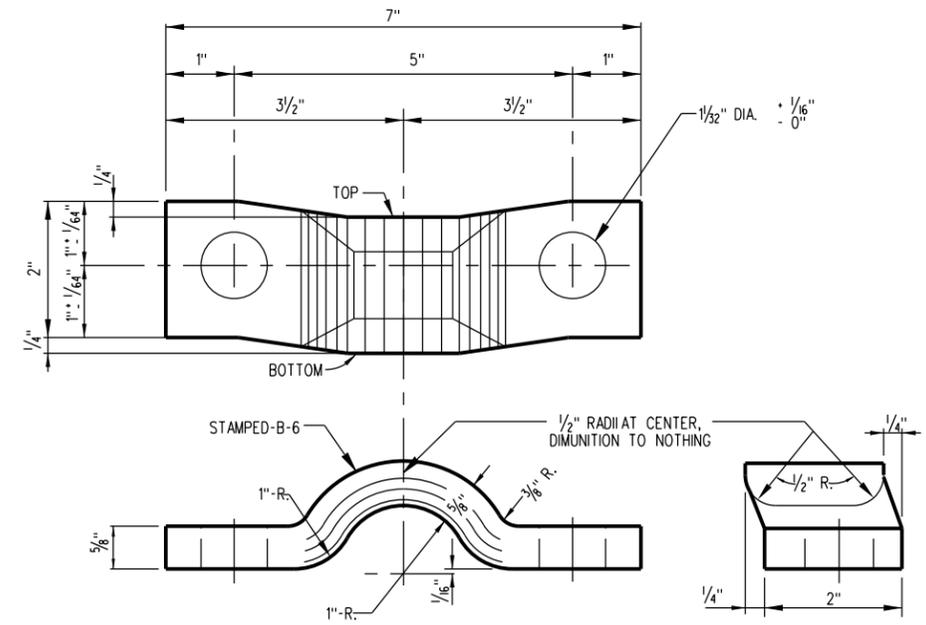




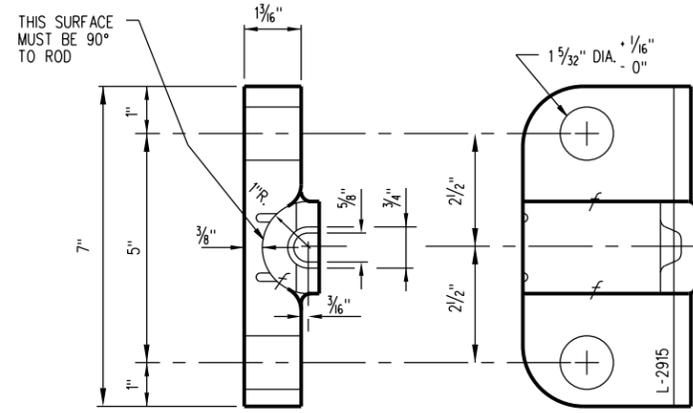
**ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



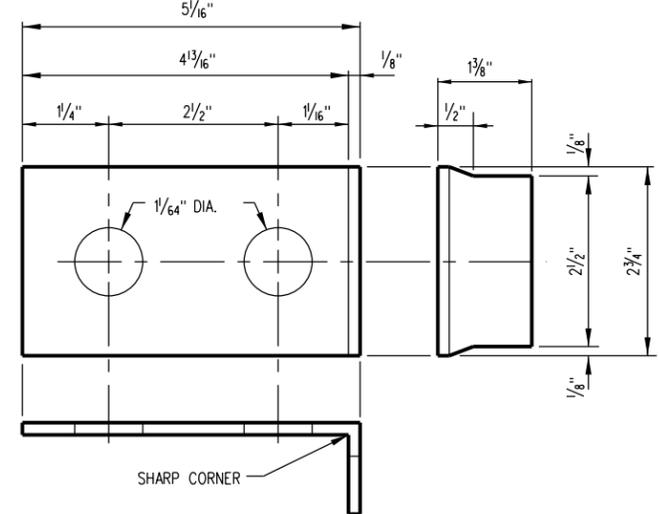
**OFFSET BEARING CAP-B-1**



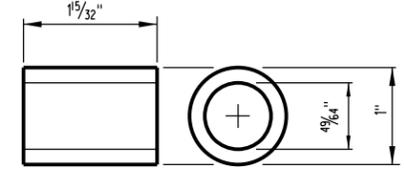
**OFFSET BEARING CAP-B-6**



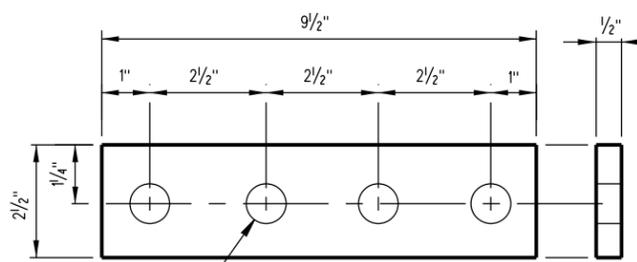
**BEARING-HE-1**



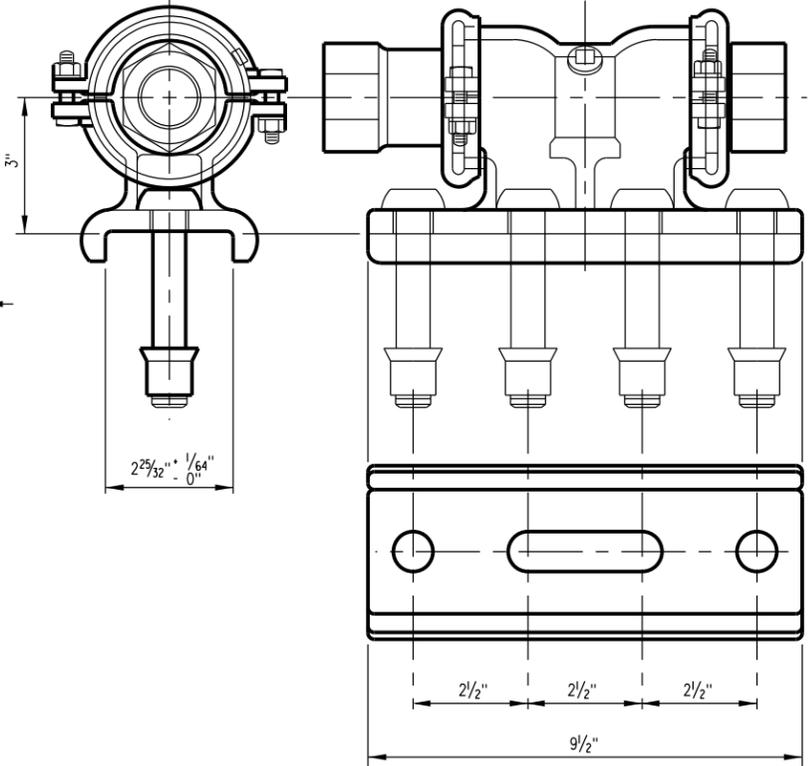
**FIBRE ANGLE-AP-34**



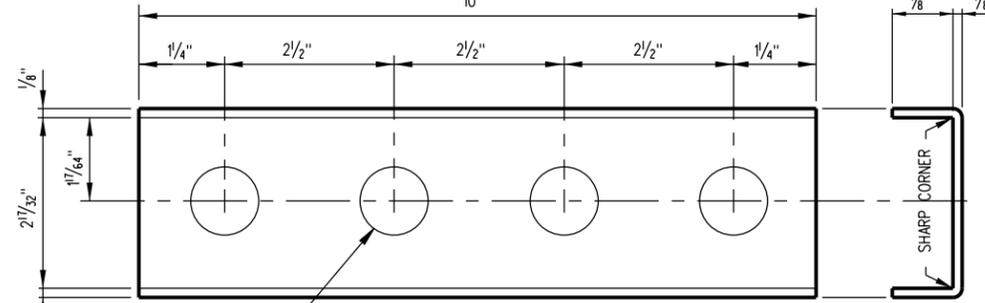
**FIBRE BUSHING-B-11**



**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**FIBRE CHANNEL-C-1**

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

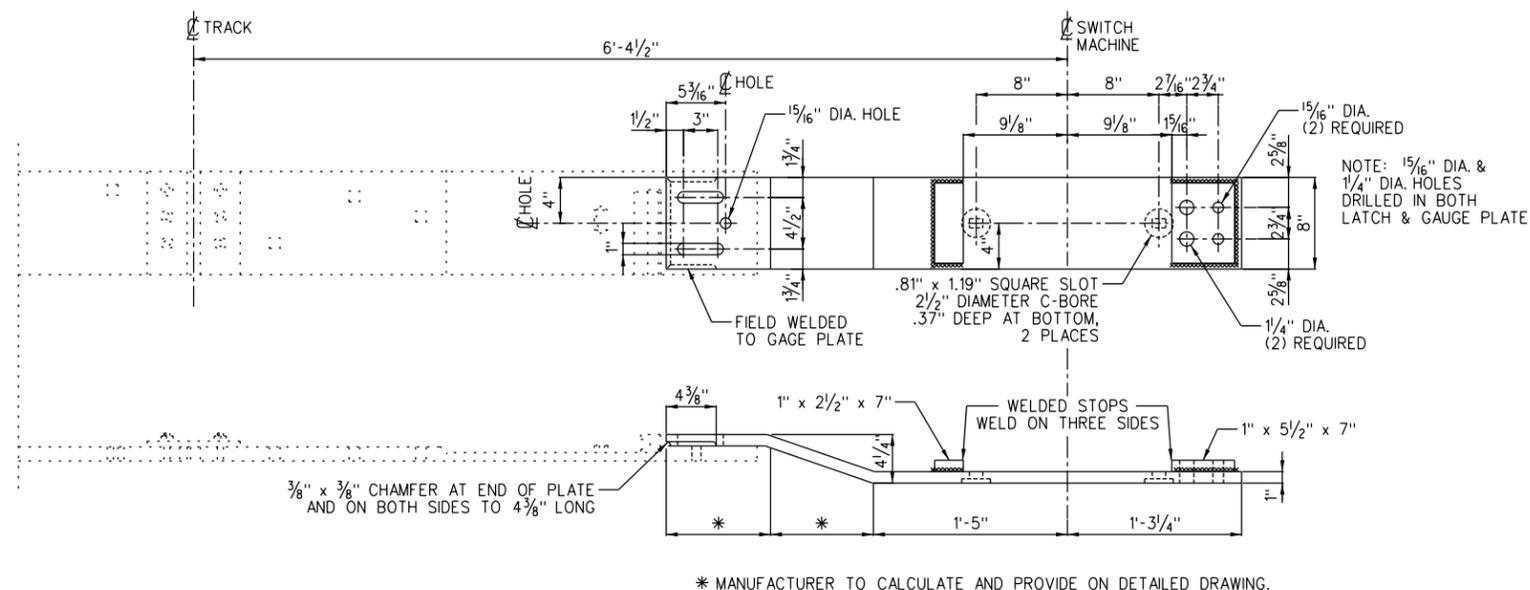
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William D. Dacan*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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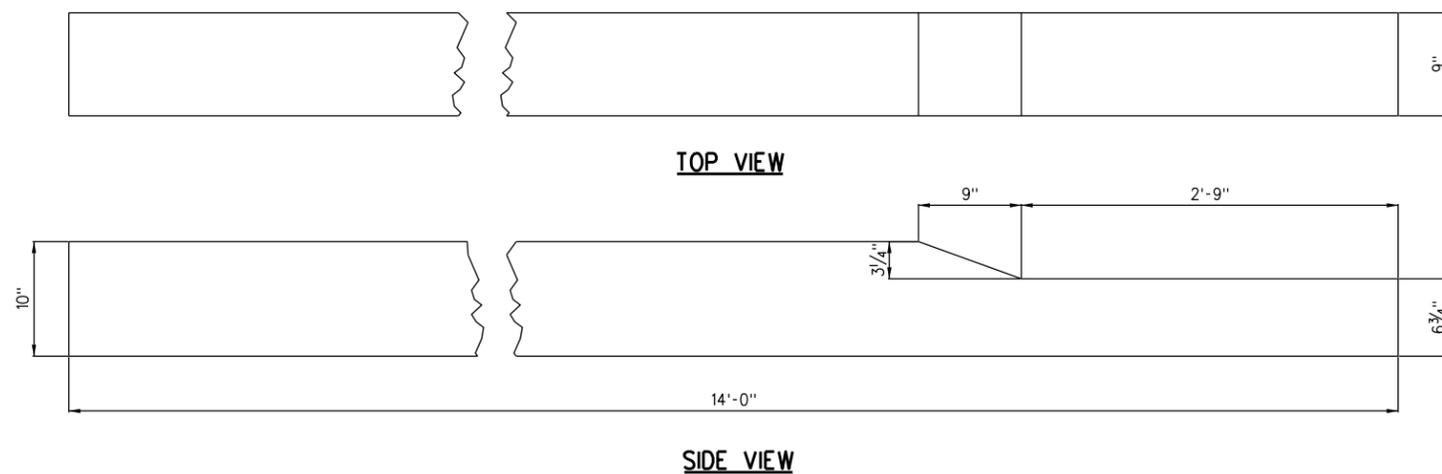
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 14 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	2931
SCALE	6" = 1'-0"
REVISION SHEET	12 OF 16
CADD FILE	ES2931-12



**EXTENSION PLATE**  
(2 PCS. REQ'D. AS SHOWN)



**DAP TIE**  
(2 PCS. REQ'D. AS SHOWN)

TIES SHALL BE MADE OF DOUGLAS FIR OR GUM AND TREATED AFTER FRAMING.

**US&S M23-A SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS.**

# FOR MAINTENANCE ONLY

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

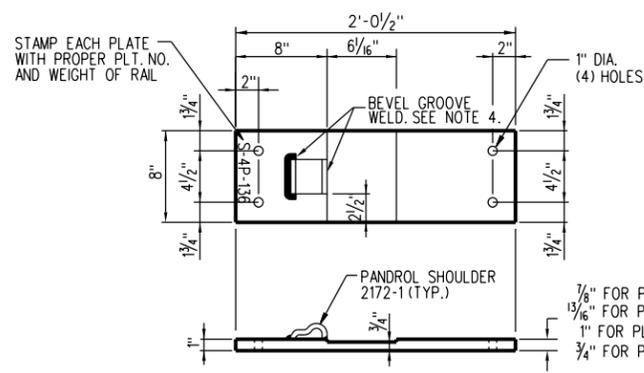
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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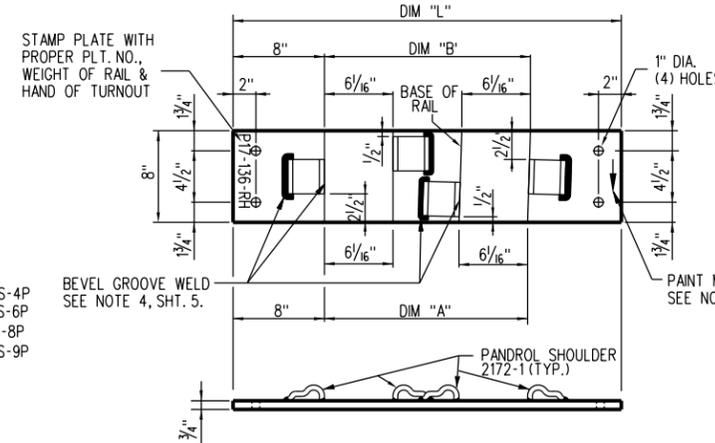
**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 14 EXTENSION PLATE AND DAP TIE DETAILS  
 FOR M-23A SWITCH MACHINE

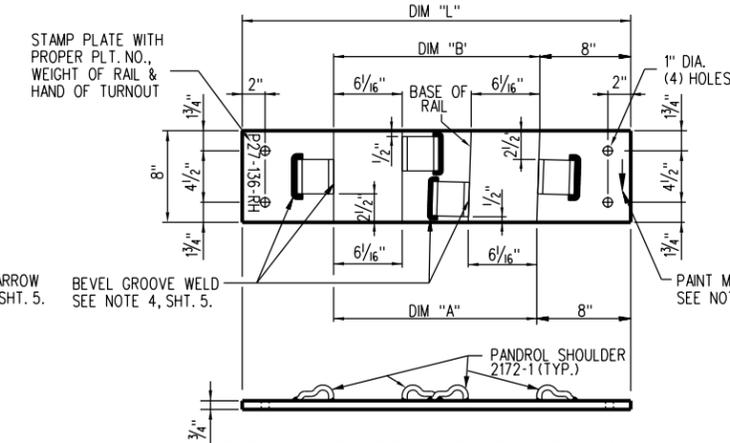
STANDARD	2931
SCALE:	1/2" = 1'-0"
REVISION SHEET	- 13 OF 16
CADD FILE:	ES2931-13



**SLIDE PLATE - S-4P, S-6P, S-8P, S-9P**  
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP  
 2 - S-4P PLATES REQUIRED AS SHOWN  
 2 - S-6P PLATES REQUIRED AS SHOWN  
 2 - S-8P PLATES REQUIRED AS SHOWN  
 2 - S-9P PLATES REQUIRED AS SHOWN

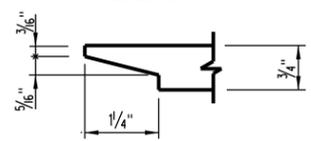
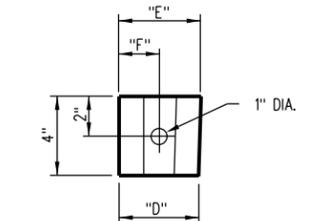


**TURNOUT PLATES - P-17 THRU P-20 & TURNOUT PLATES - P-41 THRU P-42**  
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

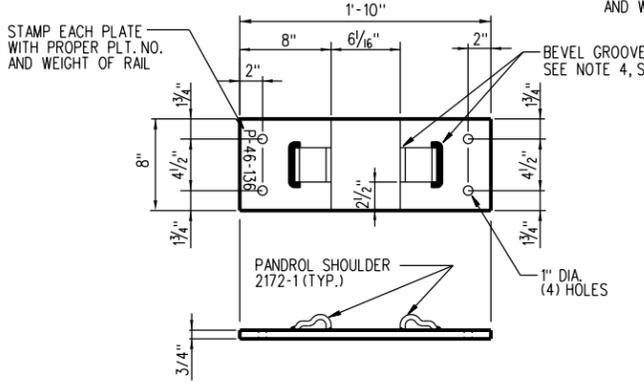


**TURNOUT PLATES - P-27 AND P-28**  
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

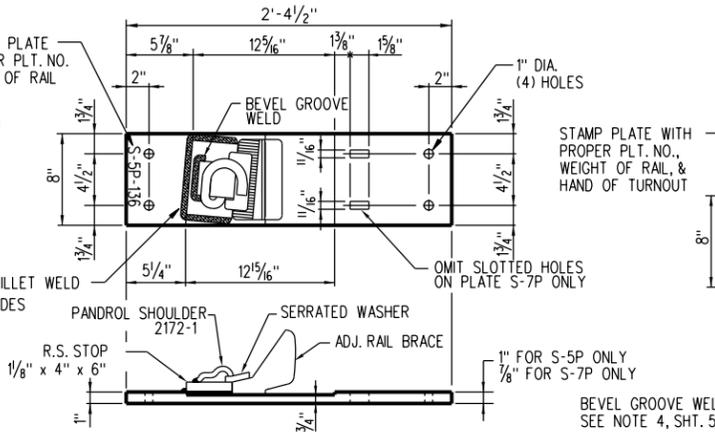
**NOTES:**  
 1. SEE SHEET NO. ES2931-15 FOR DIMENSION TABLE AND NOTES



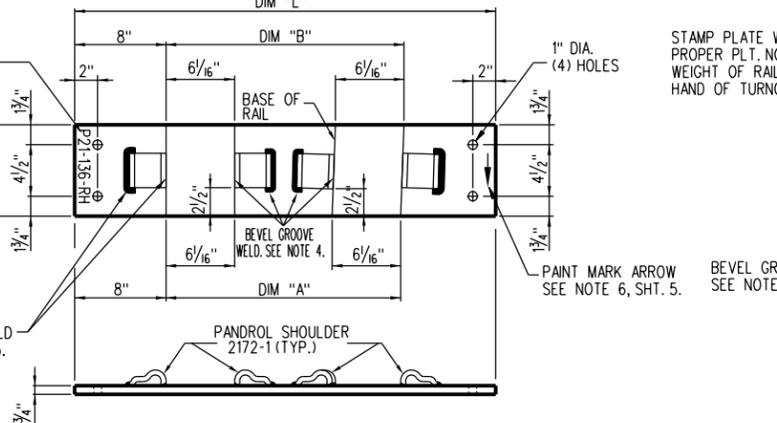
**FOR MAINTENANCE ONLY**



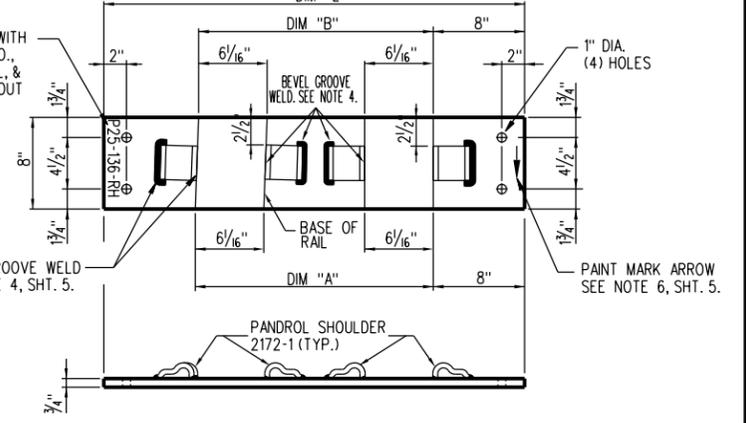
**TURNOUT PLATES - P-46**  
 1 EA. 3/4" x 8" x 22" LG. - FLAT - W/PANDROL CLIPS



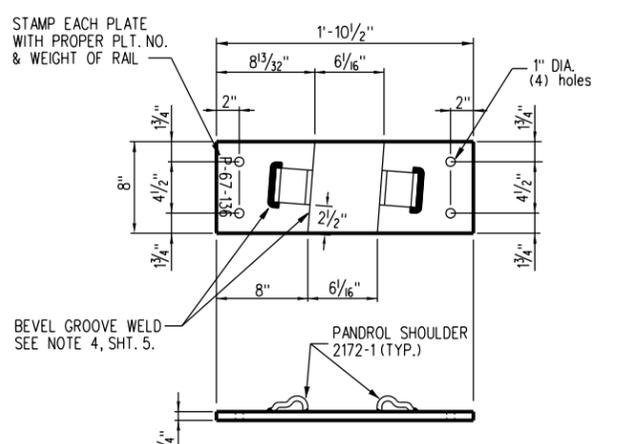
**BRACE SLIDE PLATE - S-5P & S-7P**  
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE  
 12 - S-5P PLATES REQUIRED AS SHOWN  
 2 - S-7P PLATES REQUIRED AS SHOWN



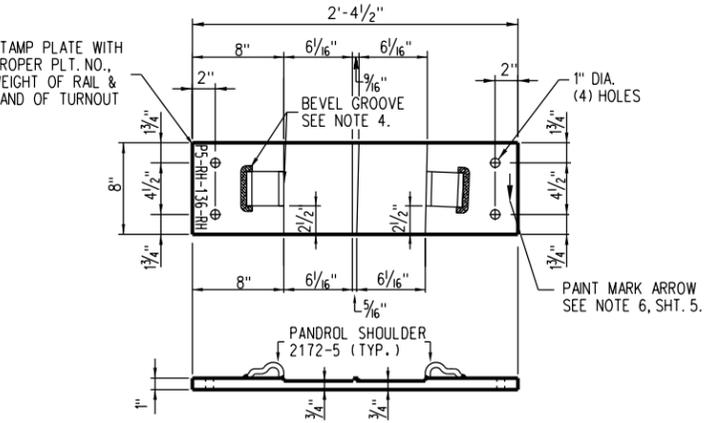
**TURNOUT PLATES - P-21 THRU P-24, P-43 THRU P-45**  
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**TURNOUT PLATES - P-25 AND P-26**  
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**TURNOUT PLATES - P-47**  
 1 EA. 3/4" x 8" x 22 1/2" LG. - FLAT - W/PANDROL CLIPS

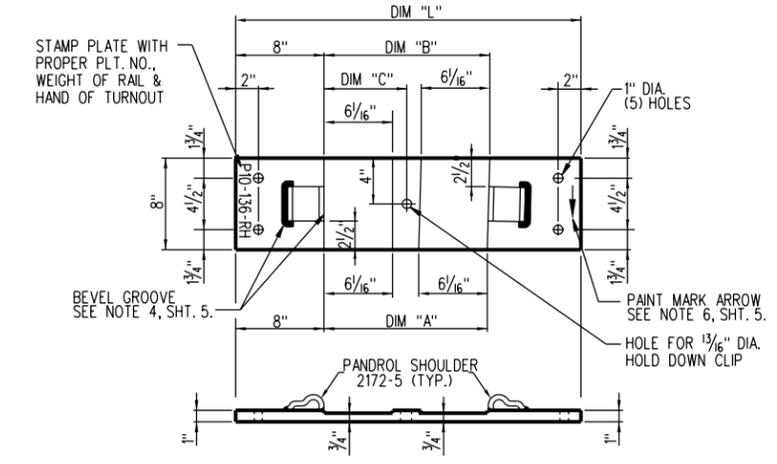


**HEEL PLATE - P5-RH**

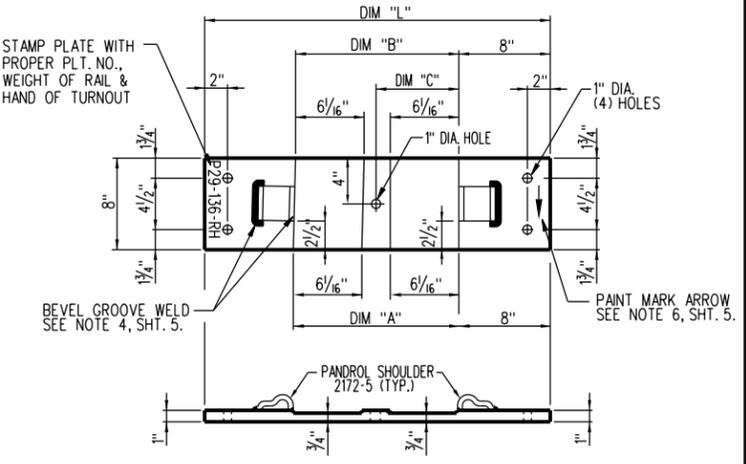
1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS  
 2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

**HEEL PLATE - P6-LH**

1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS  
 2 - P6-LH PLATES REQUIRED AS SHOWN, EXCEPT OPPOSITE FOR L.H. T.O.



**TURNOUT PLATES - P-10 THRU P-16 & P-40**  
 1" x 8" x DIM "L" - MILLED - W/PANDROLS



**FROG PLATES - P-29, P-30 AND P-39**  
 1" x 8" x DIM "L" - MILLED - W/PANDROLS

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Pape*  
 ASSISTANT DIRECTOR STANDARDS & DESIGN

*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

NO. 14 TURNOUT AND FROG PLATE DETAILS

STANDARD	2931
SCALE:	1/2" = 1'-0"
REVISION	SHEET
	14 OF 16
CADD FILE:	ES2931-14

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H.)
3. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS. MINIMUM  $\frac{3}{8}$ " WELD ALONG BEVELED GROOVE OF THE SHOULDER. SEE WELD SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-13 THRU P-65 INCLUSIVE AND FROG GAGE PLATES FG-1P THRU FG-4P ARE TO BE OPPOSITE.
6. ARROW SHOWN ON DETAIL IS FOR EXAMPLE ONLY. USING DWG. NO. 2931-03 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARDS SWITCH POINT.

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
P-17	17 <sup>11</sup> / <sub>32</sub> "	17 <sup>3</sup> / <sub>16</sub> "	2'-10"	2 EA.
P-18	18 <sup>9</sup> / <sub>32</sub> "	18 <sup>9</sup> / <sub>16</sub> "	2'-10 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-19	19 <sup>5</sup> / <sub>32</sub> "	19 <sup>5</sup> / <sub>16</sub> "	2'-11 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-20	19 <sup>27</sup> / <sub>32</sub> "	20 <sup>5</sup> / <sub>32</sub> "	3'-0"	1 EA.
P-21	20 <sup>2</sup> / <sub>32</sub> "	20 <sup>3</sup> / <sub>32</sub> "	3'-1"	2 EA.
P-22	20 <sup>7</sup> / <sub>16</sub> "	21 <sup>3</sup> / <sub>4</sub> "	3'-2"	2 EA.
P-23	22 <sup>1</sup> / <sub>4</sub> "	22 <sup>9</sup> / <sub>32</sub> "	3'-2 <sup>1</sup> / <sub>2</sub> "	2 EA.
P-24	23 <sup>3</sup> / <sub>32</sub> "	23 <sup>3</sup> / <sub>16</sub> "	3'-3 <sup>1</sup> / <sub>2</sub> "	2 EA.
P-25	22 <sup>19</sup> / <sub>32</sub> "	22 <sup>7</sup> / <sub>32</sub> "	3'-3"	2 EA.
P-26	20 <sup>27</sup> / <sub>32</sub> "	20 <sup>5</sup> / <sub>16</sub> "	3'-1"	2 EA.
P-27	19 <sup>9</sup> / <sub>16</sub> "	19 <sup>5</sup> / <sub>32</sub> "	2'-11 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-28	18 <sup>1</sup> / <sub>4</sub> "	17 <sup>11</sup> / <sub>16</sub> "	2'-10 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-41	17 <sup>19</sup> / <sub>32</sub> "	18 <sup>9</sup> / <sub>32</sub> "	2'-10 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-42	18 <sup>3</sup> / <sub>32</sub> "	19 <sup>9</sup> / <sub>16</sub> "	2'-11 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-43	20 <sup>3</sup> / <sub>16</sub> "	20 <sup>5</sup> / <sub>16</sub> "	3'-1"	1 EA.
P-44	21 <sup>3</sup> / <sub>16</sub> "	23 <sup>3</sup> / <sub>8</sub> "	3'-2 <sup>1</sup> / <sub>2</sub> "	1 EA.
P-45	23 <sup>1</sup> / <sub>4</sub> "	23 <sup>3</sup> / <sub>16</sub> "	3'-3 <sup>1</sup> / <sub>2</sub> "	1 EA.

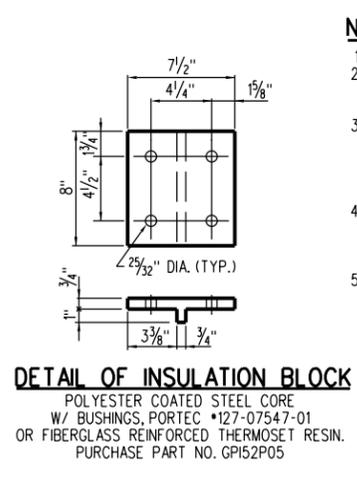
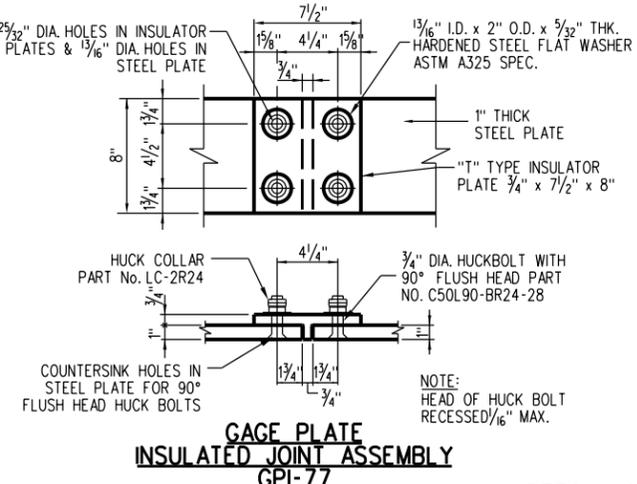
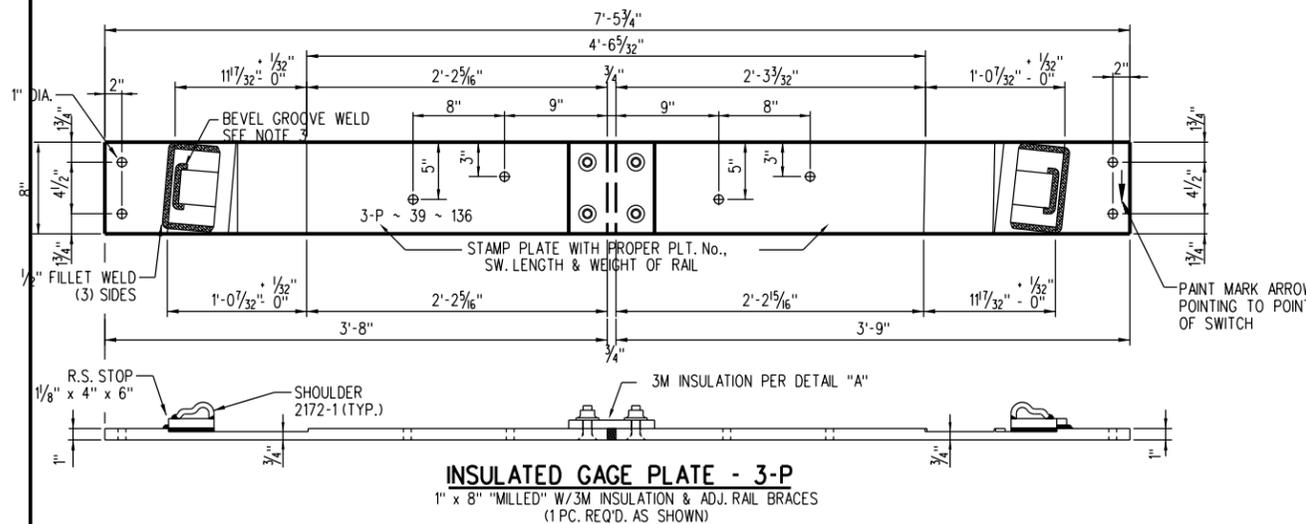
**WELDING SPECIFICATIONS:**

1. WHEN FIELD WELDING SHOULDERS OR STOPS TO GAGE PLATES, THE GAGE PLATES MUST BE PROPERLY POSITIONED AND SECURED IN PLACE BEFORE WELDING.
2. CHECK TRACK FOR CORRECT GAGE.
3. START WITH ONE GAGE PLATE. PLACE PANDROL SHOULDERS TIGHT AGAINST BASE OF RAIL AND WELD IN PLACE WHILE SIMULTANEOUSLY CONTROLLING CORRECT GAGE.
  - A. THE PRESSED STEEL SHOULDERS MUST BE CAREFULLY WELDED TO THE PLATE WITH 2 PASS  $\frac{3}{8}$ " • FILLET OR BEVEL GROOVE WELD. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  - B. THE  $\frac{1}{8}$ " X 6" STOPS MUST BE SET FLUSH AGAINST SHOULDER OF MILLED PLATE AND CENTERED FOR WELDING. THE PLATES SHALL BE WELDED ON THREE SIDES ONLY WITH 3 PASS  $\frac{1}{2}$ " • FILLET WELD AND NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE.
4. WHEN WELDING PRESSED STEEL SHOULDERS, STOPS OR PLATES TO GAGE PLATES USE ONE OF THE FOLLOWING:
  - A. ELECTRODES,  $\frac{5}{32}$  INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODES,  $\frac{3}{16}$  INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, WELDING  $\frac{5}{32}$  INCH, NR-203, 1/2 NICKEL FLUX CORE.
 OTHER ELECTRODES OR WIRE MEETING SPECIFICATIONS CALLED FOR MAY BE USED UPON APPROVAL BY THE DIRECTOR OF ENGINEERING.

PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	Pits REQ'D.	DIM "D"	DIM "E"	DIM "F"	Clips REQ'D.
P-10	13 <sup>1</sup> / <sub>32</sub> "	13 <sup>1</sup> / <sub>4</sub> "	6 <sup>9</sup> / <sub>32</sub> "	2'-5 <sup>1</sup> / <sub>2</sub> "	2 EA.	3 <sup>1</sup> / <sub>32</sub> "	3 <sup>1</sup> / <sub>4</sub> "	1 <sup>9</sup> / <sub>16</sub> "	2
P-11	13 <sup>9</sup> / <sub>32</sub> "	13 <sup>2</sup> / <sub>32</sub> "	6 <sup>1</sup> / <sub>8</sub> "	2'-6"	2 EA.	3 <sup>9</sup> / <sub>32</sub> "	3 <sup>2</sup> / <sub>32</sub> "	1 <sup>3</sup> / <sub>8</sub> "	2
P-12	14 <sup>7</sup> / <sub>32</sub> "	14 <sup>1</sup> / <sub>16</sub> "	7 <sup>3</sup> / <sub>32</sub> "	2'-6 <sup>1</sup> / <sub>2</sub> "	2 EA.	4 <sup>7</sup> / <sub>32</sub> "	4 <sup>1</sup> / <sub>32</sub> "	2 <sup>3</sup> / <sub>32</sub> "	2
P-13	14 <sup>13</sup> / <sub>16</sub> "	15 <sup>1</sup> / <sub>16</sub> "	7 <sup>15</sup> / <sub>32</sub> "	2'-7"	2 EA.	4 <sup>13</sup> / <sub>16</sub> "	4 <sup>3</sup> / <sub>32</sub> "	2 <sup>15</sup> / <sub>32</sub> "	2
P-14	15 <sup>1</sup> / <sub>32</sub> "	15 <sup>2</sup> / <sub>32</sub> "	7 <sup>1</sup> / <sub>16</sub> "	2'-8"	2 EA.	5 <sup>1</sup> / <sub>32</sub> "	5 <sup>2</sup> / <sub>32</sub> "	2 <sup>1</sup> / <sub>16</sub> "	2
P-15	16 <sup>1</sup> / <sub>8</sub> "	16 <sup>5</sup> / <sub>16</sub> "	8 <sup>1</sup> / <sub>8</sub> "	2'-8 <sup>1</sup> / <sub>2</sub> "	2 EA.	6 <sup>1</sup> / <sub>8</sub> "	6 <sup>3</sup> / <sub>8</sub> "	3 <sup>1</sup> / <sub>8</sub> "	2
P-16	16 <sup>1</sup> / <sub>16</sub> "	17 <sup>3</sup> / <sub>32</sub> "	8 <sup>1</sup> / <sub>2</sub> "	2'-9"	2 EA.	6 <sup>1</sup> / <sub>16</sub> "	7 <sup>3</sup> / <sub>32</sub> "	3 <sup>1</sup> / <sub>2</sub> "	2
P-29	16 <sup>1</sup> / <sub>8</sub> "	16 <sup>5</sup> / <sub>16</sub> "	8 <sup>9</sup> / <sub>16</sub> "	2'-9"	1 EA.	6 <sup>2</sup> / <sub>32</sub> "	6 <sup>9</sup> / <sub>32</sub> "	3 <sup>9</sup> / <sub>32</sub> "	1
P-30	15 <sup>1</sup> / <sub>2</sub> "	14 <sup>29</sup> / <sub>32</sub> "	7 <sup>9</sup> / <sub>8</sub> "	2'-7 <sup>1</sup> / <sub>2</sub> "	1 EA.	5 <sup>1</sup> / <sub>32</sub> "	4 <sup>1</sup> / <sub>8</sub> "	2 <sup>19</sup> / <sub>32</sub> "	1
P-39	14 <sup>13</sup> / <sub>16</sub> "	15 <sup>3</sup> / <sub>8</sub> "	7 <sup>1</sup> / <sub>16</sub> "	2'-7 <sup>1</sup> / <sub>2</sub> "	1 EA.	4 <sup>2</sup> / <sub>32</sub> "	5 <sup>1</sup> / <sub>32</sub> "	2 <sup>9</sup> / <sub>16</sub> "	1
P-40	16 <sup>3</sup> / <sub>16</sub> "	16 <sup>3</sup> / <sub>4</sub> "	8 <sup>1</sup> / <sub>4</sub> "	2'-9"	1 EA.	6 <sup>3</sup> / <sub>32</sub> "	6 <sup>2</sup> / <sub>32</sub> "	3 <sup>1</sup> / <sub>4</sub> "	1

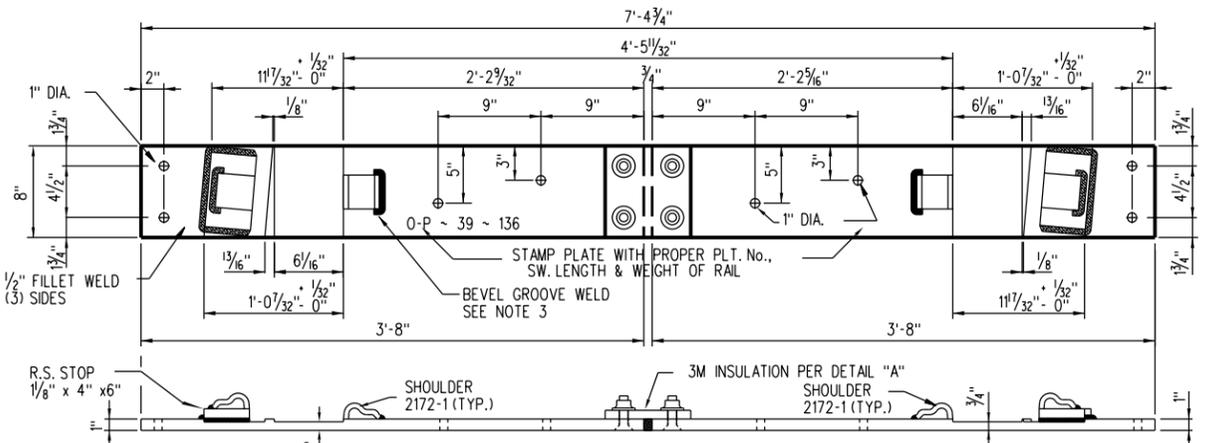
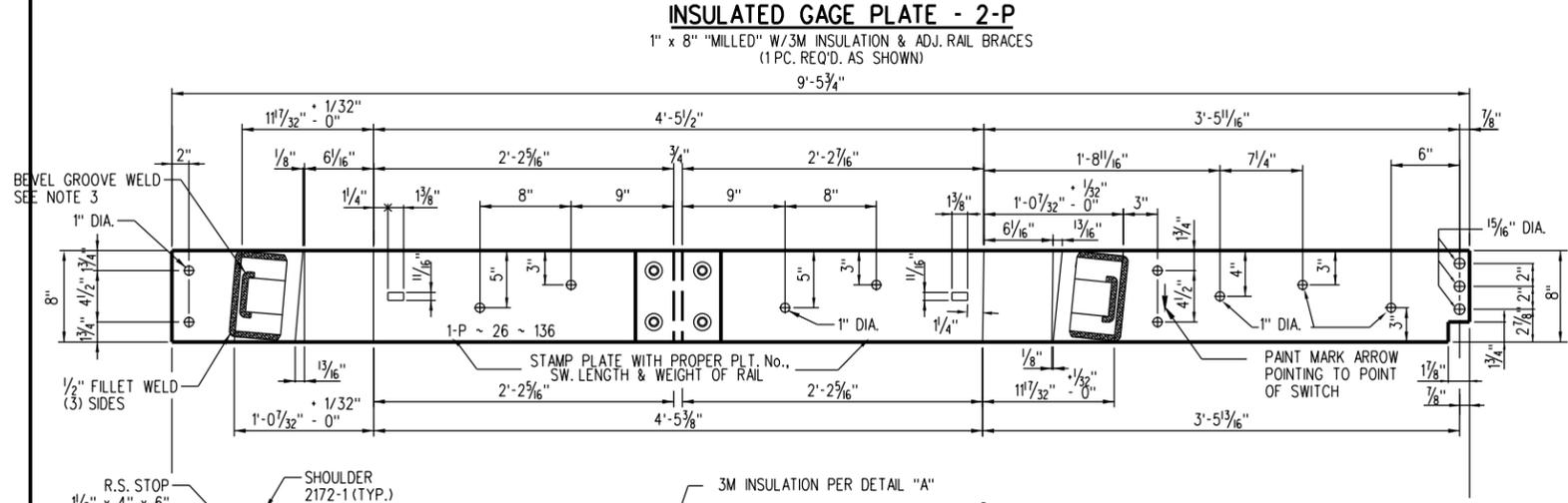
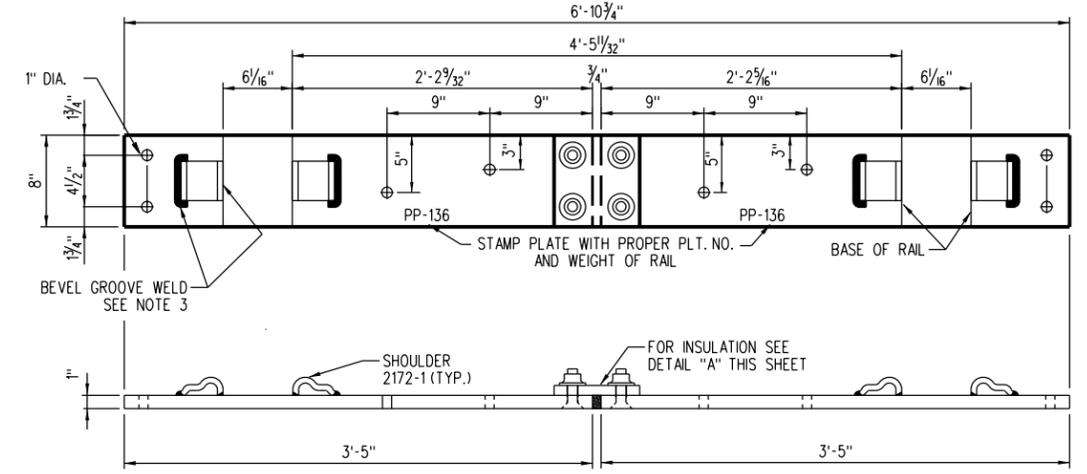
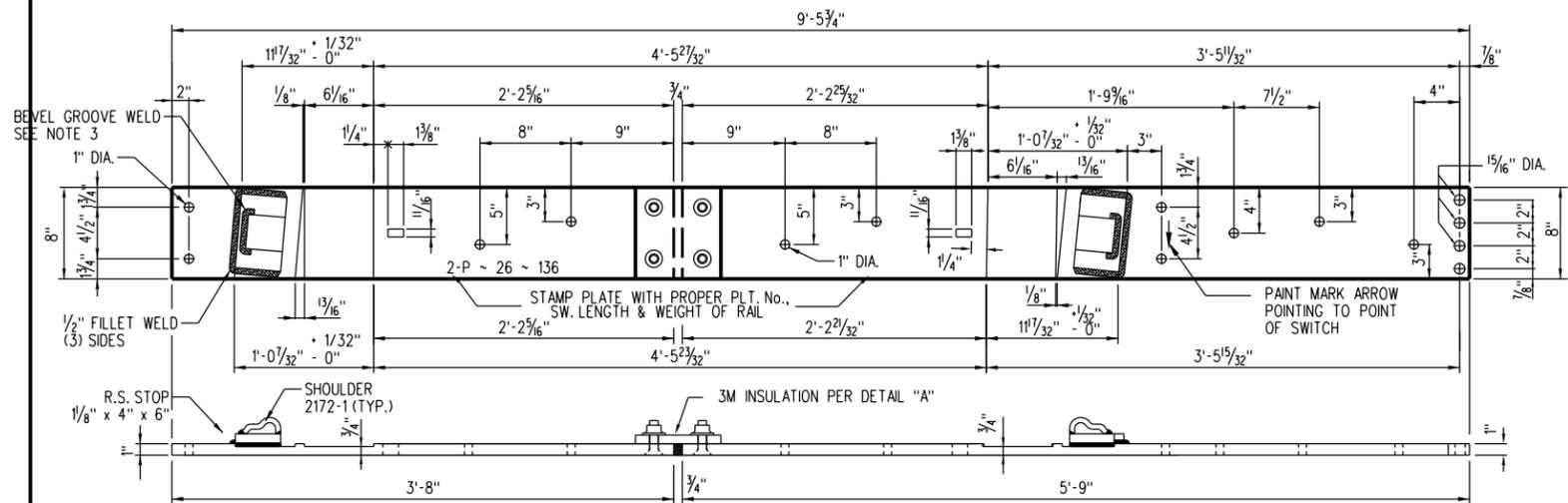
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DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		 <p>SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>		ENGINEERING STANDARDS		STANDARD 2931	
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		NO. 14 136 LB. RBM FROG DIMENSION TABLE AND NOTES				SCALE: NONE			
X	XX-XX-XX	REVISION	XX	XX				REVISION SHEET	15 OF 16	CADD FILE:	ES2931-15
REV.	DATE	DESCRIPTION	DES.	ENG.							



- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
  2. THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
  3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH A MINIMUM 3/8" WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  4. SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MACHINE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES 1-P AND 2-P MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.
  5. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET 2931-13.

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
 Assistant Director: STANDARDS & DESIGN  
 Director of Engineering and Construction

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 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS	STANDARD 2931
NO. 14 INSULATED GAGE PLATE DETAILS	SCALE: 1/2" = 1'-0"
	REVISION SHEET 16 OF 16
	CADD FILE: ES2931-16

EQUIVALENT CURVE DATA	
CURVE	1.5213'
RADIUS	3766.40'
DELTA	2.864'
TANGENT (T)	94.16'
LENGTH (L)	188.27'
EXTERNAL	1.18'
CROSSOVER DATA	
LEAD	156.008'
PC TO PS	33.14'
PS TO PI	61.01'
PI TO 1/2" PF	94.99'
LENGTH OF TURNOUT	229.57'
PS TO PT	155.13'

FROG DATA	
FROG NUMBER	20
FROG ANGLE	2° 51' 51"
SWITCH DATA	
SWITCH LENGTH	39'-0"
HEEL SPREAD	6 1/4 "
HEEL ANGLE	1° -04'-30"
SWITCH ANGLE	0° -27'-19"
RADIUS OF CENTER LINE - SWITCH	3,605.70'
TANGENT LENGTH SWITCH	19.48'
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	0° -37'-11"
DEGREE OF CURVE - SWITCH	1° -35'-20"
TURNOUT DATA	
RADIUS OF CENTER LINE - TURNOUT	3,329.91'
TANGENT LENGTH - TURNOUT	69.98'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	2° -24'-32"
DEGREE OF CURVE - TURNOUT	1° -43'-15"

CROSSOVER DATA TABLE									
A	B	C	X	Y	2L·X	2L·X-2(PC-PS)	PS TO PS	U	V
13	260.17	259.85	71.86	448.16	448.41	382.12	381.88	69.86	70.18
14	280.18	279.83	91.87	468.15	468.42	402.14	401.86	89.85	90.20
15	300.20	299.82	111.88	488.14	488.43	422.15	421.85	109.84	110.21
16	320.21	319.81	131.90	508.12	508.45	442.16	441.84	129.82	130.22
17	340.22	339.80	151.91	528.11	528.46	462.17	461.83	149.81	150.23
18	360.24	359.79	171.92	548.10	548.47	482.19	481.82	169.80	170.25
19	380.24	379.77	191.94	568.09	568.48	502.20	501.80	189.79	190.26
20	400.26	399.76	211.95	599.08	598.50	522.21	521.79	209.78	210.27
21	420.28	419.75	231.96	608.06	608.51	542.23	541.78	229.76	230.29
22	440.29	439.74	251.98	628.05	628.52	562.24	561.77	249.75	250.30
23	460.30	459.76	271.99	648.04	648.54	582.25	581.76	269.74	270.31
24	480.32	479.72	292.00	668.03	668.55	602.27	601.75	289.73	290.33
25	500.33	499.70	312.03	688.02	688.56	622.28	621.73	309.72	310.34
26	520.34	519.69	332.03	708.01	708.58	642.29	641.72	329.71	330.35
27	540.35	539.68	352.04	727.99	728.59	662.31	661.71	349.69	350.37
28	560.37	559.67	372.05	747.98	748.60	682.32	681.70	369.68	370.38
29	580.38	579.66	392.07	767.97	768.62	702.33	701.69	389.67	390.39
30	600.39	599.64	412.08	787.96	788.63	722.35	721.67	409.66	410.41
31	620.41	619.63	432.09	807.95	808.64	742.36	741.66	429.65	430.42
32	640.42	639.62	452.11	827.93	828.66	762.37	761.65	449.63	450.43

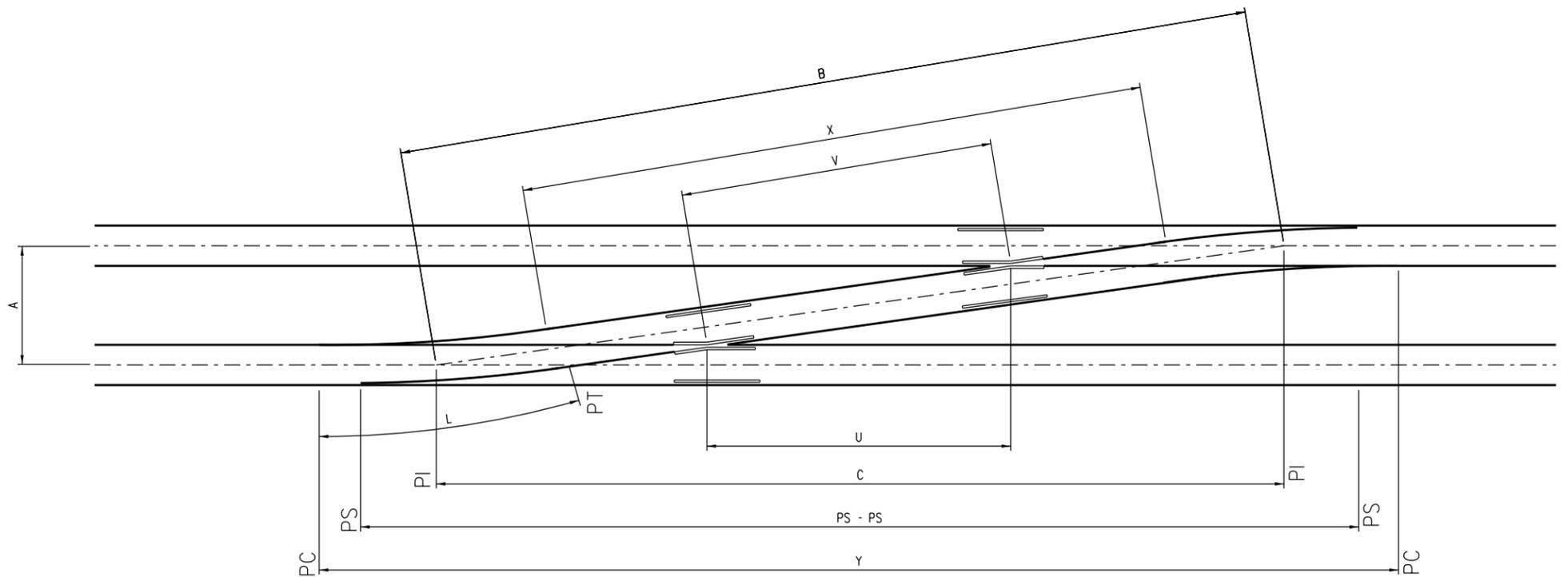
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CROSSOVER LAYOUT AND BILL OF MATERIALS	ES2941-05
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**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2941-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2941-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2941-05.
- TIE PLATES SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2454.
- SCREW SPIKES (15/16" X 6-2 TPI) SHALL CONFORM TO SCRRRA ENGINEERING STANDARD ES2357.
- PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 39'-0" SWITCH POINT PER ES2941-09 IS TO BE FURNISHED WITH A "SMJ" NO. 1 & 5 SWITCH ROD PER DRAWINGS ES2941-11 AND ES2941-12. SWITCH RODS NO. 2, 3, 4 & 6 SHALL BE SIMILAR TO NO. 1 SWITCH ROD AND WILL BE FURNISHED WITHOUT BASKET ADJUSTMENT
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 20 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2941-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-13 THRU P-66 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS, WITH THE EXCEPTION OF PLATE P-67 TO BE PERPENDICULAR TO TURNOUT SIDE OF TRACK.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRRA NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ES2941-09.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
- SWITCH POINT ROLLER BEARINGS AND SWITCH PLATES WITH POINT ROLLER RISERS SHALL BE AS APPROVED BY THE SCRRRA DIRECTOR OF ENGINEERING AND CONSTRUCTION, SUBMITTED AS SHOP DRAWINGS PER NOTE 8 ABOVE.
- SWITCH POINT ROLLER BEARINGS WILL BE MOUNTED ABOVE PLATE AND WILL NOT BE LOCATED BETWEEN SWITCH TIES.
- HELPER THROW ROD ASSEMBLIES SHALL CONFORM TO ES2941-11.

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**CROSSOVER LAYOUT**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design

Director of Engineering and Construction

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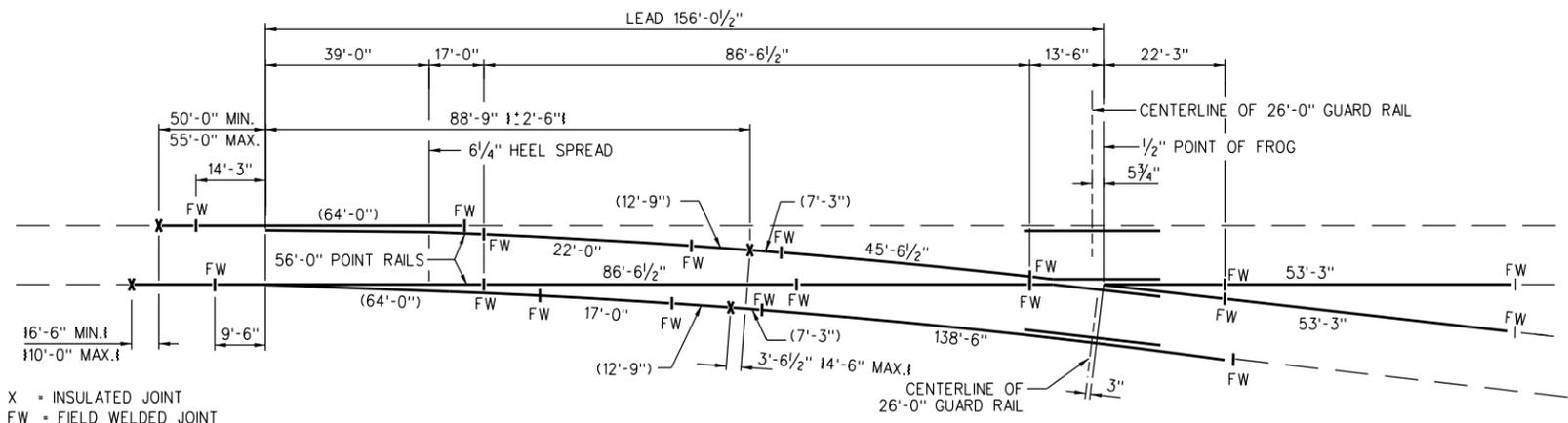
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**ENGINEERING STANDARDS**

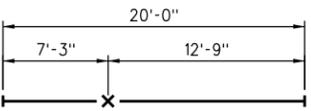
NO. 20 136 LB. RH RBM FROG  
TURNOUT AND CROSSOVER  
GENERAL NOTES AND DATA

STANDARD	2941
SCALE	NONE
REVISION SHEET	1 OF 15
CADD FILE	ES2941-01



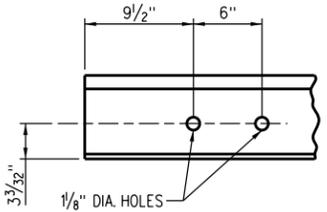
X = INSULATED JOINT  
FW = FIELD WELDED JOINT

**TURNOUT**  
SCALE: NONE



**20'-0" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**

(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD. (SCALE: NONE)

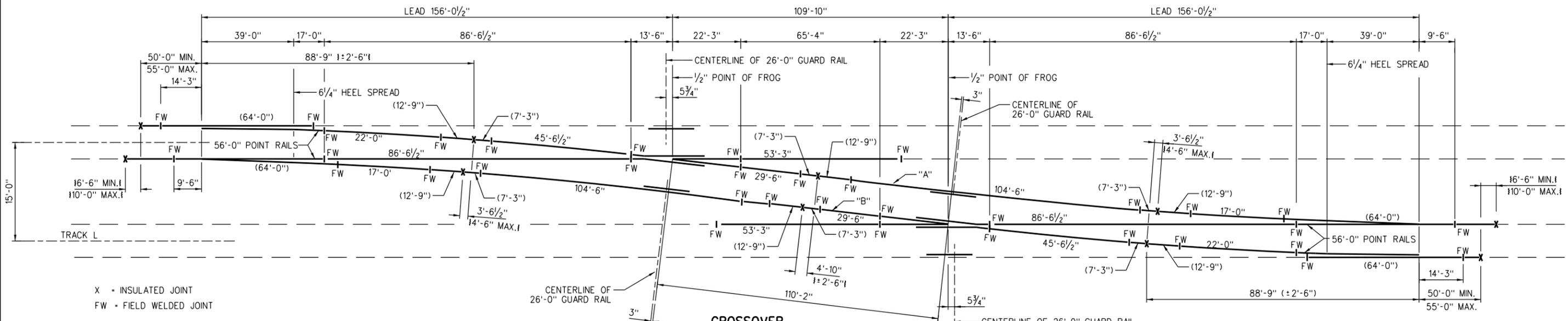


**DETAIL "A"**  
SEE NOTE 4 (b)  
SCALE: 1/2" = 1'-0"

**NOTES:**

- SINCE THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
- RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW:  
THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH THE HEAVIER RAIL THAN TRACK L.
- CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 104'-6" RAIL SHALL BE REPLACED WITH 16'-6" OF THE HEAVIER RAIL AND 88'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 29'-6" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 19'-6" OF THE LIGHTER RAIL.
- IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN THE RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
- FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:  
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.  
(B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A", IF SO REQUIRED.
- ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HIGH STRENGTH" EXCEPT GUARD RAILS.
- LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
- INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
- FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LARGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS 10'-0".
- WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
- INSULATED JOINTS SHALL HAVE 45° MITRE CUT RAIL ENDS.

**FOR MAINTENANCE ONLY**



X = INSULATED JOINT  
FW = FIELD WELDED JOINT

**CROSSOVER**  
15'-0" TRACK CENTERS  
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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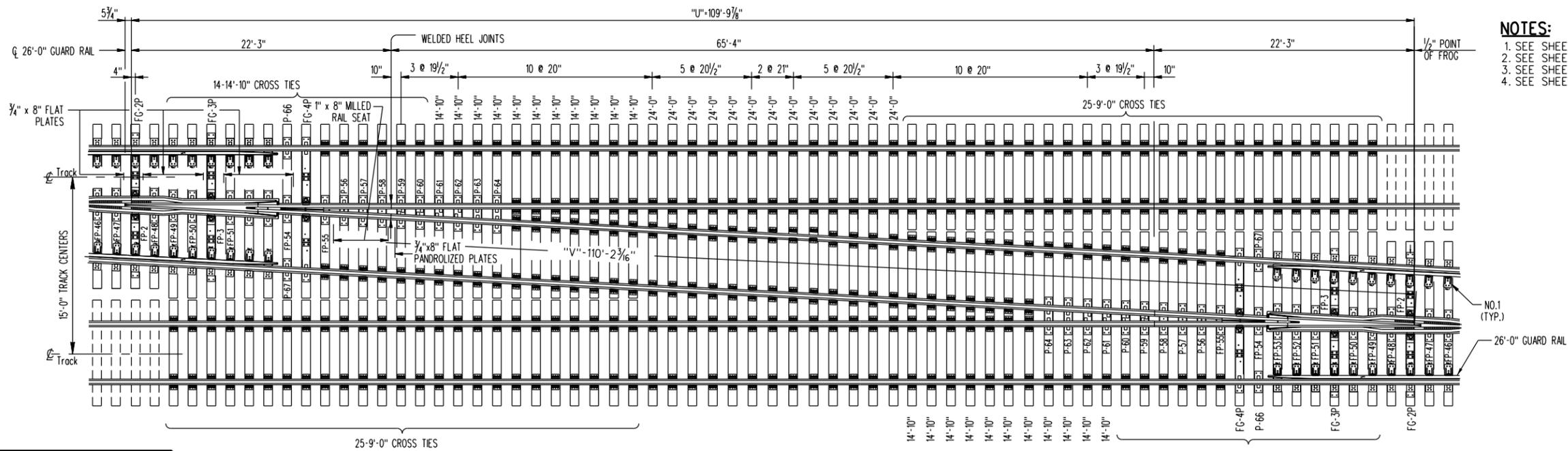
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ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 20 136 LB. R.H. RBM FROG  
TURNOUT AND CROSSOVER  
JOINTS LOCATIONS

STANDARD	2941
SCALE:	NONE
REVISION SHEET	- 2 OF 15
CADD FILE:	ES2941-02



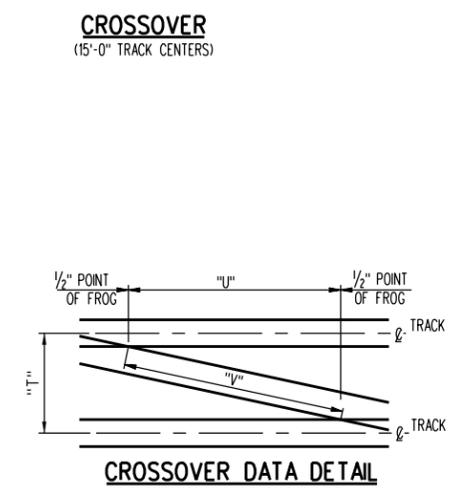




- NOTES:**
- SEE SHEET 1 FOR NO. 20 TURNOUT DATA AND NOTES
  - SEE SHEET 4 FOR BILL OF MATERIALS
  - SEE SHEET 3 FOR LAYOUT OF NO. 20 TURNOUT
  - SEE SHEET 14 FOR SWITCH AND TURNOUT PLATES

BILL OF MATERIAL FOR CROSSOVER	
QTY.	DESCRIPTION
2	No. 20 RAIL BOUND MANGANESE FROG
4	26'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
2 PAIR	39'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (56'-0" RAIL)
2 EACH	R.H. & L.H. SAMSON STOCK RAILS (64'-0")
2 EACH	17'-0" RAILS
2 EACH	22'-0" RAILS
2 EACH	29'-6" RAILS
2 EACH	45'-6 1/2" RAILS
2 EACH	53'-3" RAILS
2 EACH	86'-6 1/2" RAILS
2 EACH	104'-6" RAILS
2	"MF" TYPE FRONT ROD W/ "MF" CLIPS
2	No. 1 SMJ TYPE SWITCH ROD W/ BASKET
2 EACH	No. 2 THRU No. 6 SMJ TYPE SWITCH ROD W/ BASKET
2	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
4 EACH	TURNOUT PLATES P-13 THRU P-33
2 EACH	TURNOUT PLATES P-34 THRU P-43
2 EACH	TURNOUT PLATES P-56 THRU P-65
2 EACH	SINGLE RAIL PLATES P-66 AND P-67
2	SWITCH GAGE PLATE P-P
2 EACH	SWITCH GAGE PLATES G-OP THRU G-3P
2 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
2 EACH	FROG PLATES FP-44 THRU FP-55
24	SLIDE PLATE S-5P
4	SLIDE PLATE S-7P
36	SLIDE PLATE S-8P
4	SLIDE PLATES S-9P THRU S-12P
4	HEEL PLATE P5-RH
4	ROLLER RISER PLATES RBP-1 AND RBP-2
8 PIECES	SWITCH POINT ROLLER ASSEMBLIES
14	D.I. RAIL HOLD DOWN CLIPS E-3706
10	D.I. RAIL HOLD DOWN CLIPS E-3707
12	D.I. RAIL HOLD DOWN CLIPS E-3708
4	D.I. RAIL HOLD DOWN CLIPS E-3709
8	D.I. RAIL HOLD DOWN CLIPS E-3710
44	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
282	"PANDROL", OR EQUAL, TIE PLATES
564	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2055
24	"PANDROL", OR EQUAL, "E"-CLIP TYPE E-2063
1128	"PANDROL", OR EQUAL 1/16" DIA. No. 5760 SCREW SPIKES
6 EA.	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINT 20'-0"

BILL OF MATERIAL FOR HELPER ASSEMBLY (TWO REQUIRED)	
QTY.	DESCRIPTION
11	COTTER PIN, 3/16 X 1 3/4 LG
4	PIPE COUPLER
1	JAW PIN
9	COTTER PIN, 3/16 X 1 1/2
4	BOLT, 3/4-10 X 3" LG, HVY HEX
8	PIN, PIPE CARRIER ROLLER
11	FLAT WASHER, 3/4, USS
11	LOCK WASHER, 3/4, HVY
6	NUT, 3/4-10, HEAVY SQUARE
11	NUT, 3/4-10, HEAVY HEX
6	RETAINER, BOLT
6	STUD, 3/4 X 14 W 3" 3/4-10 THREAD BOTH ENDS
1	ROD OPERATING - *5 HELPER
2	ASSY - SWITCH POINT ADJUSTER
8	ROLLER, PIPE CARRIER
8	STAND, PIPE CARRIER
8	3/4 X 5 LG LAG BOLT
16	1/2 X 4 LG LAG BOLT
7	RIVET, 1/4" X 1 1/2, ROUND, STEEL
2	CONE NUT, SWITCH POINT ADJUSTER
4	LOCK WASHER, 1 1/4" HEAVY
6	NUT, 1 1/4-7, HEAVY HEX, JAMB
2	PIPE - SCHEDULE 80 X 212 7/8 LG
1	CLEVIS
4	SCREW JAW ROD
2	SOLID JAW
9	JAW PIN
4	SCREW JAW, 1 1/4-7 X 6 1/2 LG
2	CRANK STAND PIN
1	ADJUSTABLE LINK
1	CRANK, 3 ARM, STAGE 3
1	CRANK, 3 ARM, STAGE 2
1	CRANK, 3 ARM, STAGE 1
2	CRANK STAND
1	CRANK PLATE, STAGE 2
1	CRANK PLATE, STAGE 1



CROSSOVER DATA		
MAIN TRACKS - TANGENT AND PARALLEL CROSSOVER - TANGENT BETWEEN FROGS		
TRACK CENTERS "T"	DISTANCE BETWEEN 1/2 FROG POINTS	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
14'-0"	89'-9 7/8"	90'-2 1/8"
15'-0"	109'-9 7/8"	110'-2 3/16"
16'-0"	129'-9 3/16"	130'-2 3/8"
17'-0"	149'-9 1/2"	150'-2 1/2"
EACH 1"	1.666'	1.668'

BILL OF SWITCH TIES FOR CROSSOVER			
PIECES	SIZE	LENGTH	BOARD FEET
50	7" x 9"	9'-0"	2362.50
60	7" x 9"	10'-0"	3150.00
40	7" x 9"	11'-0"	2310.00
32	7" x 9"	12'-0"	2016.00
26	7" x 9"	13'-0"	1774.50
24	7" x 9"	14'-0"	1764.00
4	10" x 9"	14'-0" DAP TIES	294.00
58	7" x 9"	14'-10"	4567.50
13	7" x 9"	24'-0"	1638.00
TOTAL			19876.50

BILL OF TURNOUT PLATES AND DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
P-23	17 7/32"	17 13/32"	2'-9 1/2"	2 EA.
P-24	17 1/16"	17 29/32"	2'-10"	2 EA.
P-25	18 7/32"	18 13/32"	2'-11"	2 EA.
P-26	18 23/32"	18 5/16"	2'-11"	2 EA.
P-27	19 1/4"	19 13/32"	2'-11 7/8"	2 EA.
P-28	19 23/32"	20"	3'-0"	2 EA.
P-29	20 3/16"	20 17/32"	3'-0 1/2"	2 EA.
P-30	20 27/32"	21 1/32"	3'-1"	2 EA.
P-31	21 1/16"	21 13/32"	3'-1 1/2"	2 EA.
P-32	22"	22 1/8"	3'-2 1/2"	2 EA.
P-33	22 9/32"	22 27/32"	3'-3"	2 EA.
P-34	23 3/32"	22 23/32"	3'-3"	1 EA.
P-35	22 5/32"	21 29/32"	3'-2"	1 EA.
P-36	21 1/16"	20 25/32"	3'-1"	1 EA.
P-37	20 3/16"	19 13/16"	3'-0"	1 EA.
P-38	19 1/32"	18 3/16"	2'-10"	1 EA.
P-39	18 1/4"	17 7/8"	2'-10"	1 EA.
P-40	17 9/32"	16 29/32"	2'-9"	1 EA.
P-59	17 1/32"	17 23/32"	2'-10"	1 EA.
P-60	18 5/16"	18 23/32"	2'-11"	1 EA.
P-61	19 9/32"	19 1/16"	3'-0"	1 EA.
P-62	20 1/4"	20 27/32"	3'-1"	1 EA.
P-63	21 1/4"	21 27/32"	3'-2"	1 EA.
P-64	22 1/4"	22 29/32"	3'-3"	1 EA.
P-65	23 1/4"	23 3/32"	3'-4"	1 EA.
P-66	SEE DRAWING 2941-04 FOR DETAILS			1 EA.
P-67	SEE DRAWING 2941-04 FOR DETAILS			1 EA.

BILL OF TURNOUT PLATES AND DIMENSION TABLE						
PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	Pits REQ'D.	Clips REQ'D.
P-13	12 1/16"	12 3/32"	6 1/16"	2'-5"	2 EA.	2
P-14	13 1/32"	13 3/8"	6 29/32"	2'-5 1/2"	2 EA.	2
P-15	13 5/16"	13 29/32"	6 1/8"	2'-6"	2 EA.	2
P-16	14 1/32"	14 1/32"	7 1/16"	2'-6"	2 EA.	2
P-17	14 5/32"	14 3/8"	7 9/32"	2'-6 1/2"	2 EA.	2
P-18	14 9/32"	15 1/16"	7 1/2"	2'-7"	2 EA.	2
P-19	15 1/32"	15 17/32"	7 23/32"	2'-7 1/2"	2 EA.	2
P-20	15 25/32"	15 3/32"	7 5/16"	2'-8"	2 EA.	2
P-21	16 1/4"	16 1/16"	8 3/16"	2'-8 1/2"	2 EA.	2
P-22	16 23/32"	16 5/16"	8 1/8"	2'-9"	2 EA.	2
P-41	16 3/16"	15 29/32"	8 1/16"	2'-8 1/2"	1 EA.	1
P-42	15 1/32"	14 5/16"	7 9/32"	2'-7 1/2"	1 EA.	1
P-43	14 3/8"	13 39/32"	7 3/32"	2'-6 1/2"	1 EA.	1
P-56	14 1/32"	14 29/32"	7 1/16"	2'-7"	1 EA.	1
P-57	15 3/8"	15 25/32"	7 3/16"	2'-8"	1 EA.	1
P-58	16 1/32"	16 3/4"	8 9/32"	2'-9"	1 EA.	1

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design

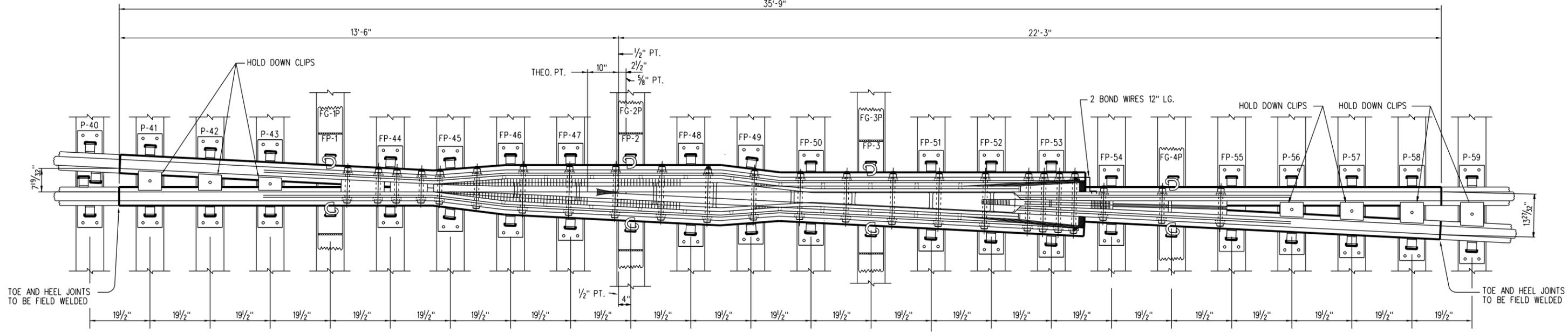
Director of Engineering and Construction

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**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD 2941
NO. 20 136 LB. R.H. RBM FROG CROSSOVER LAYOUT AND BILL OF MATERIALS		SCALE: 3/16" = 1'-0"
		REVISION SHEET 5 OF 15
		CADD FILE: ES2941-05



**No.20 RAILBOUND MANGANESE STEEL FROG WITH PLATES**

**DIMENSION TABLE**

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-45	SEE NOTE "A"		2'-5 1/2"	1
FP-49	" " "		2'-10 1/2"	1

**NOTE "A"**

SPECIAL FROG PLATES FP-44 THRU FP-55 ARE TO BE LAYED OUT AND MARKED OFF FROM UNDER FROG TO INSURE PROPER LOCATION OF SHOULDERS.

**NOTE "B"**

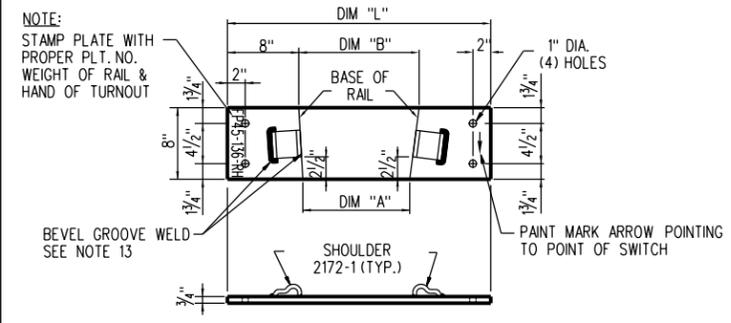
SPECIAL FROG PLATES FP-1, FP-2, AND FP-3 WITH ADJUSTABLE CLAMPS, SHOWN IN POSITION ON THIS SHEET, ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE DWG. No. 2941-07

**DIMENSION TABLE**

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-46	SEE NOTE "A"		2'-8 1/2"	1 EA.
FP-47	" " "		2'-9 1/2"	1 EA.
FP-48	" " "		2'-11 1/2"	1 EA.
FP-50	" " "		2'-8 1/2"	1 EA.
FP-51	" " "		2'-10 1/2"	1 EA.
FP-52	" " "		2'-11 1/2"	1 EA.
FP-53	" " "		3'-0 1/2"	1 EA.
FP-54	" " "		2'-4"	1 EA.
FP-55	" " "		2'-6"	1 EA.
SPECIAL FROG PLATES WITH ADJUSTABLE CLAMPS				
FP-1	SEE NOTE "B"		2'-8"	1 EA.
FP-2	" " "		3'-1"	1 EA.
FP-3	" " "		3'-0"	1 EA.

**NOTES:**

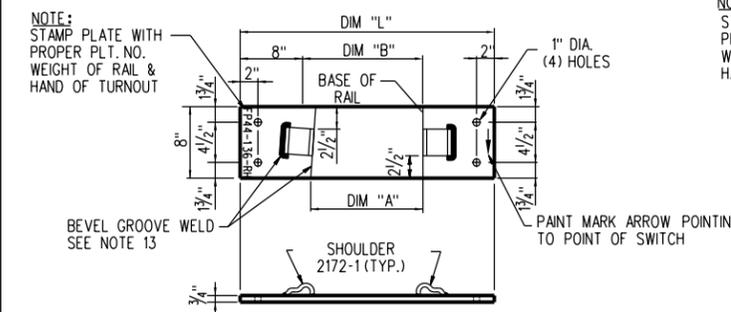
- FROG ANGLE 2°-51'-51".
- RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
- RAIL BOUND MANGANESE STEEL FROG PER CURRENT AREMA PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT AREMA SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH PANDROL FASTENERS.
- ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
- FOR DETAILS OF FROG PLATES FP-1 THRU FP-3, SEE SHEET 7 FOR DETAILS OF FROG PLATES FP-44 THRU FP-55 SEE THIS SHEET.
- WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT "AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
- ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT AREMA RECOMMENDED PRACTICE.
- FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
- BODY BOLTS 1 3/8" DIA., H.T.C.S. - PER AREMA SPECIFICATIONS.
- TOE AND HEEL BLOCKS AND BOLTS PER AREMA SPECIFICATIONS.
- PLATES TO BE MADE OF MILD ROLLED STEEL.
- THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 20, RIGHT HAND, TURNOUT.
- FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
- THE PANDROL TYPE, OR APPROVED EQUAL, WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROL'S DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2, AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATE IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
- IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
- RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.



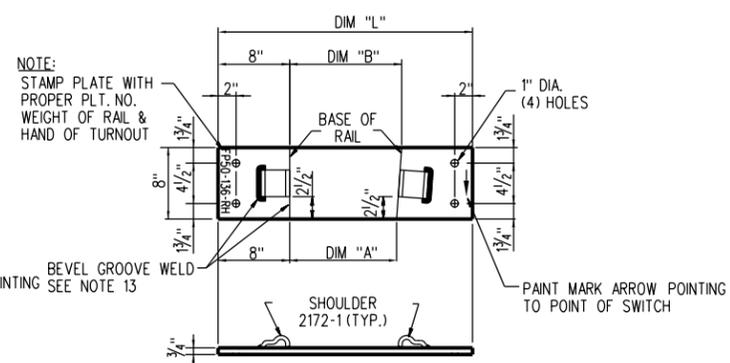
**FROG PLATES - FP-45 & FP-49**  
3/4" x 8" x DIM "L" - FLAT - W/ CLIPS

**DIMENSION TABLE**

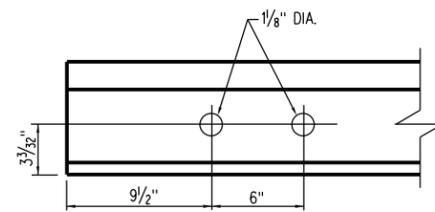
PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-44	SEE NOTE "A"		2'-4 1/2"	1 EA.



**FROG PLATE - FP-44**  
3/4" x 8" x DIM "L" - FLAT - W/ CLIPS

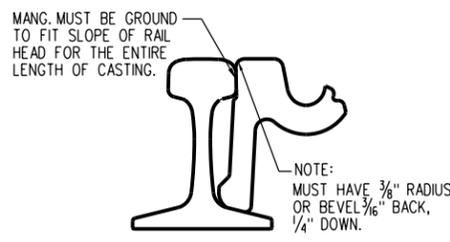


**FROG PLATES ~ FP-46 THRU FP-48 & FP-50 THRU FP-55**  
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



**RAIL END DRILLING**

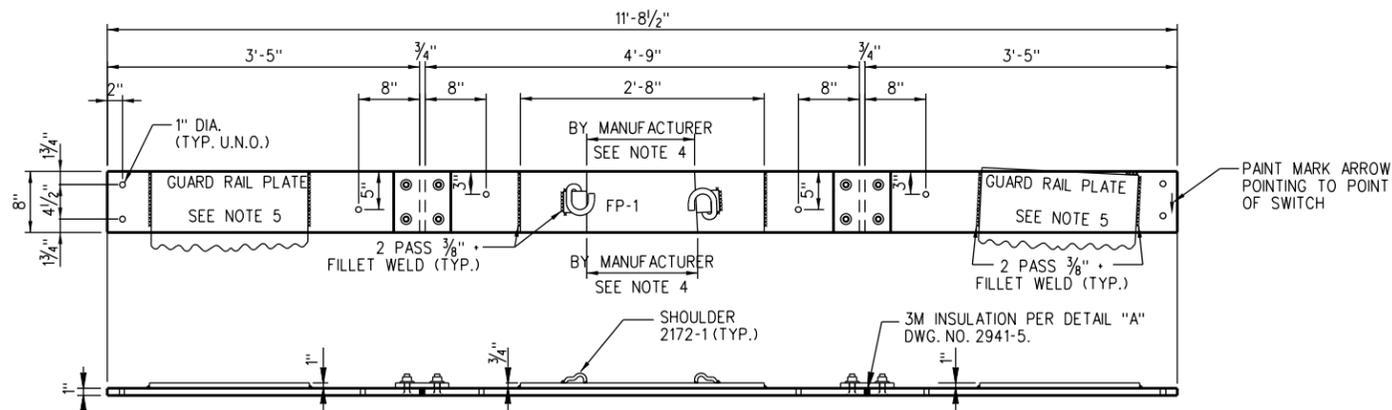
NOTE: RAIL END DRILLING CAN BE ELIMINATED IF NO TEMPORARY BOLTED JOINTS ARE TO BE USED.



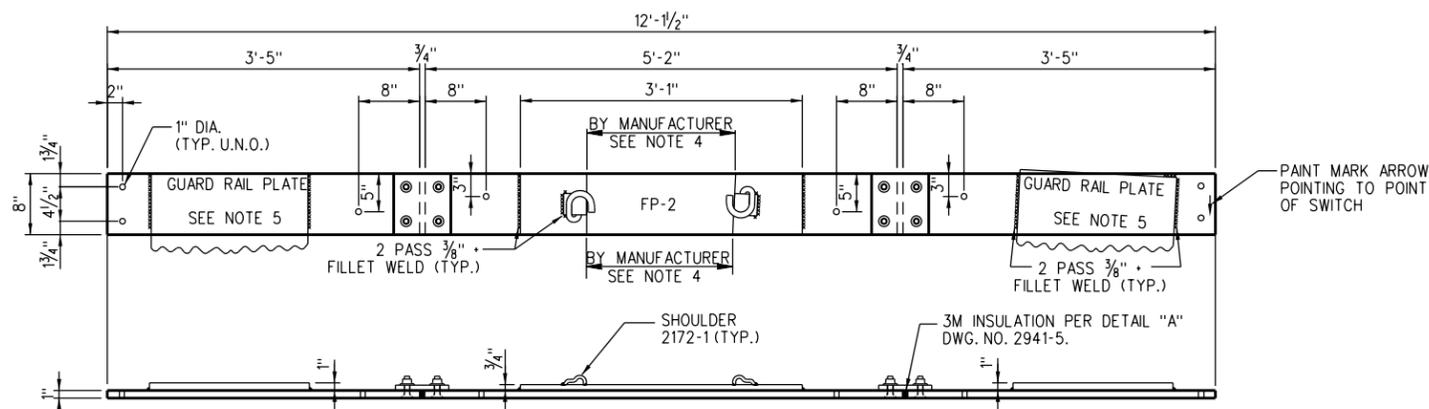
**DETAIL OF FROG CASTING / RAIL FIT**  
SCALE: NONE

**FOR MAINTENANCE ONLY**

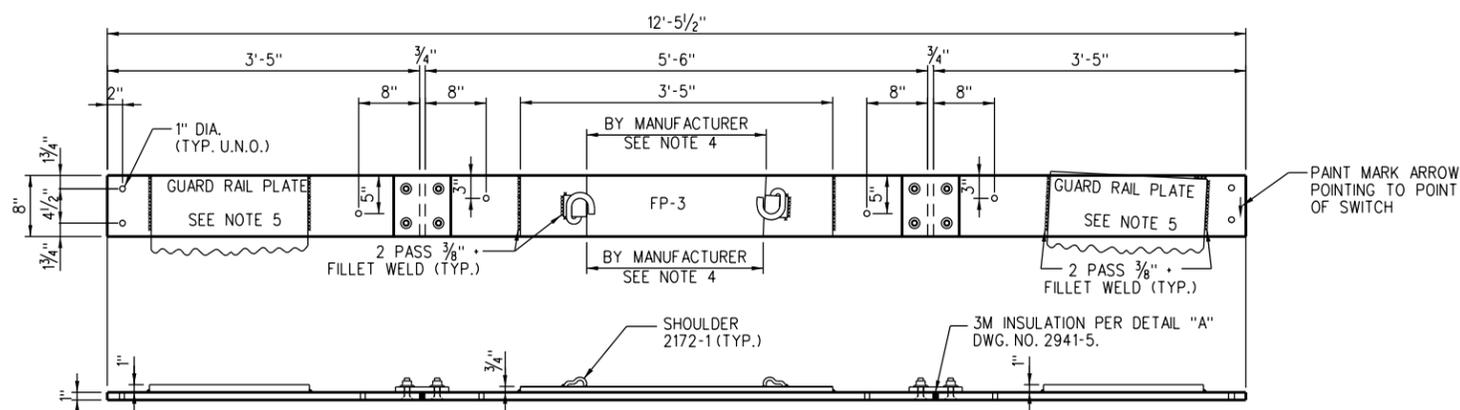
DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.	<p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>	ENGINEERING STANDARDS	STANDARD 2941
<p>Assistant Director: Standards &amp; Design</p> <p>Director of Engineering and Construction</p>			NO. 20 136 LB. R.H. RBM FROG LAYOUT & PLATE DETAILS		SCALE: 3/4" = 1'-0"	
REV.	DATE	DESCRIPTION	DES.	ENG.	REVISION SHEET 6 OF 15	
<p>UserName: carlos Date Plotted: 10/5/2011 2:39:32 PM Plot Driver: S:\Plot Drivers\pdf.plt FileName: s:\V8EngStds\2000\Turnouts\Maintenance Only Standards\ES2941-06.dgn</p>					CADD FILE: ES2941-06	



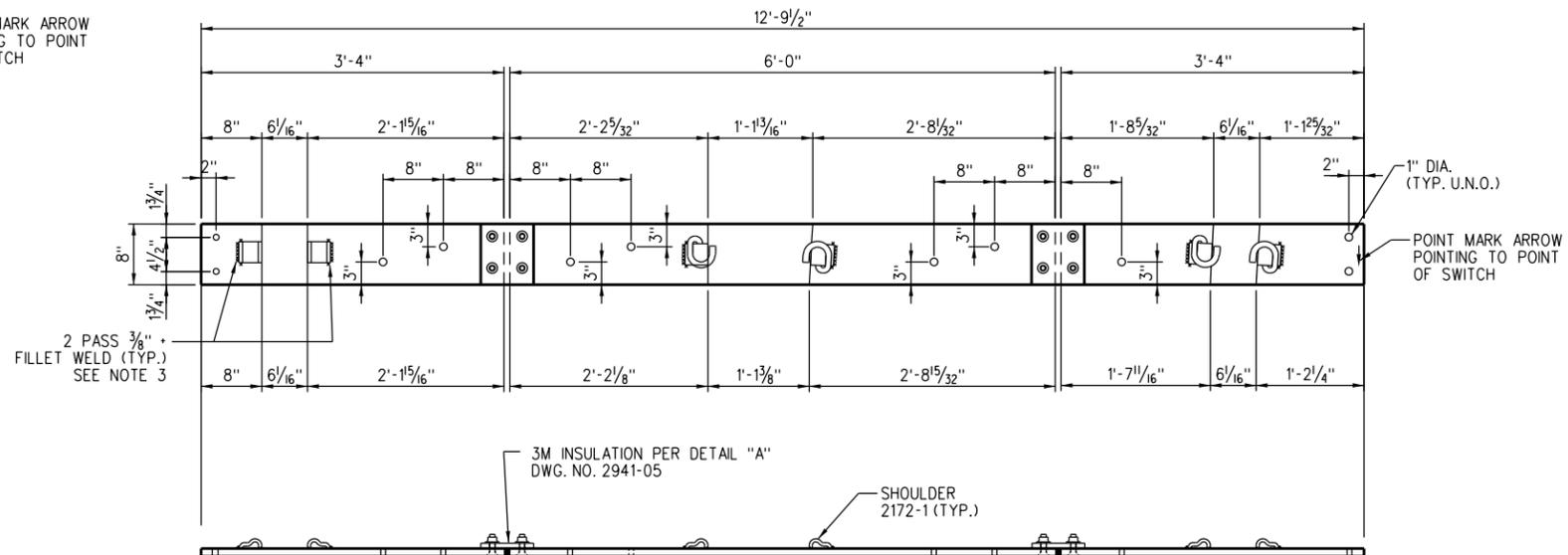
**INSULATED FROG GAGE PLATE - FG-1P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-2P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-3P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FG-4P**  
1' x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

**NOTES:**

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 20, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE PANDROL TYPE OR APPROVED EQUAL WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROL'S DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" \* FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2, AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" \* FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
5. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" \* FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

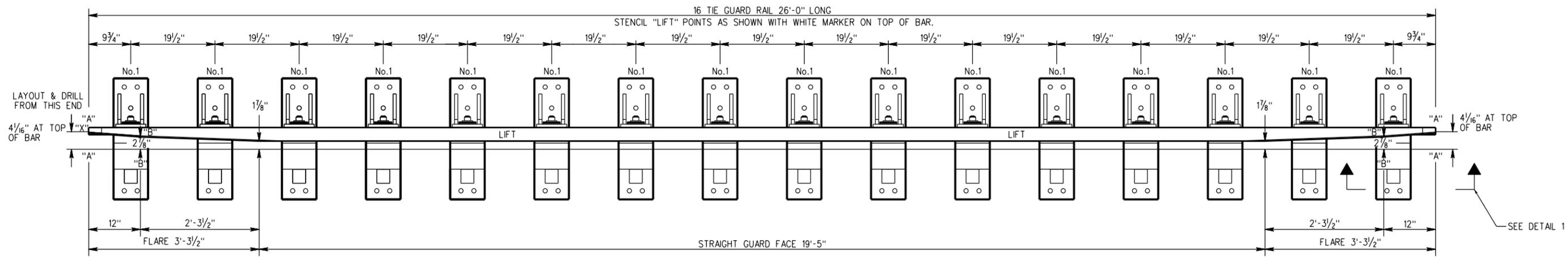
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William D. Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 20 136 LB. R.H. RBM FROG  
 GAGE PLATE DETAILS

STANDARD	2941
SCALE	1" = 1'-0"
REVISION SHEET	7 OF 15
CADD FILE	ES2941-07



**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

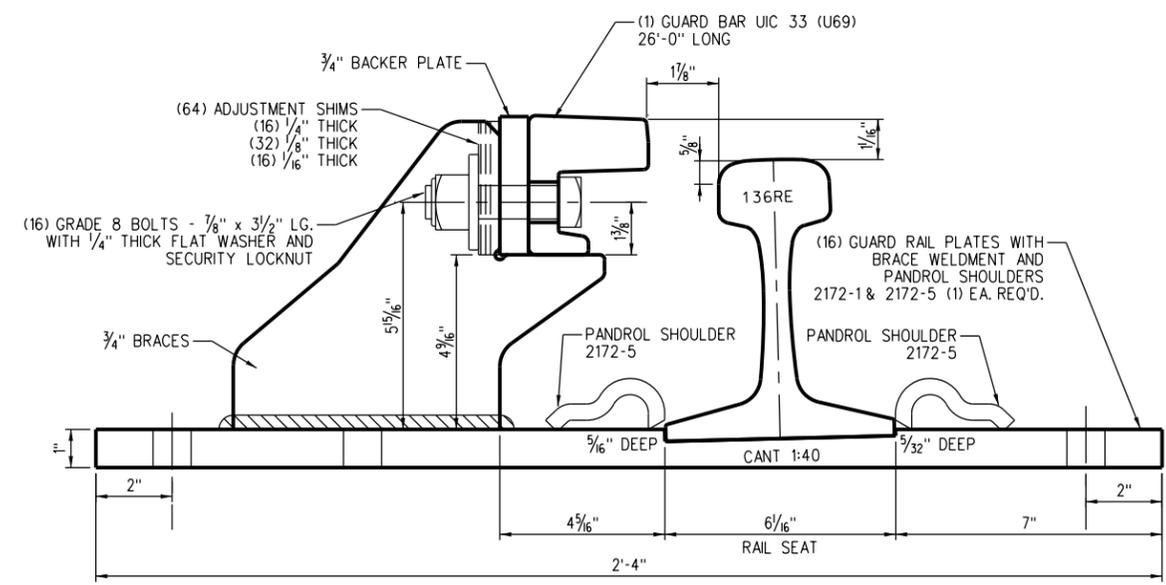
"X" 9 3/4" 2'-5 1/4" 4'-0 3/4" 5'-8 1/4" 7'-3 3/4" 8'-11 1/4" 10'-6 3/4" 12'-2 1/4" 13'-9 3/4" 15'-5 1/4" 17'-0 3/4" 18'-8 1/4" 20'-3 3/4" 21'-11 1/4" 23'-6 3/4" 25'-2 1/4"

HOLES 1" DIA. ~ 1 3/8" A.B.

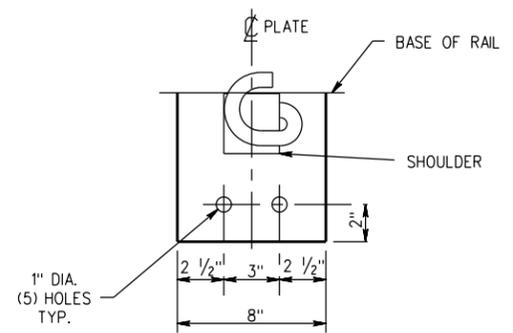
**ASSEMBLED 26'-0" GUARD RAIL**  
SCALE: 1" = 1'-0"

- NOTES:**
1. GUARD RAIL SECTION U.I.C. 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
  2. BASE PLATE, BRACKET AND SHIMS MILD STEEL PER AREMA SPECIFICATION M7.
  3. GUARD RAIL BOLT AND NUT PER AREMA SPECIFICATION M11, EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
  4. WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK.
  5. WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.

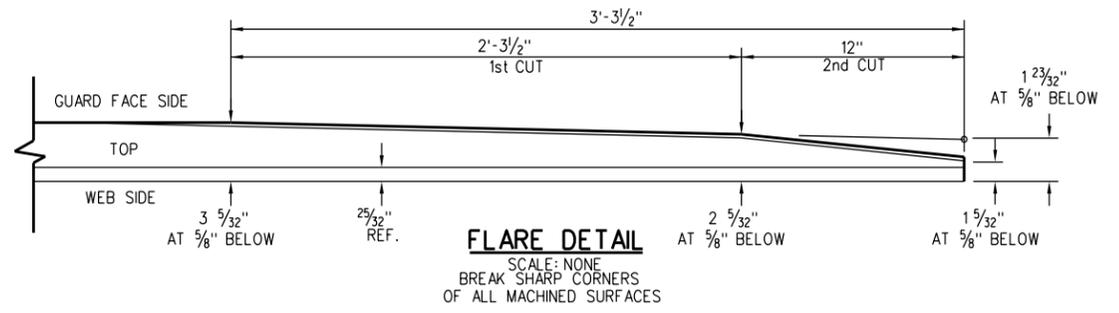
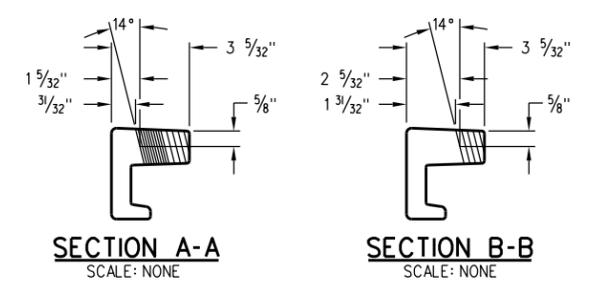
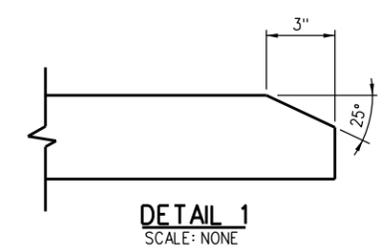
**FOR MAINTENANCE ONLY**



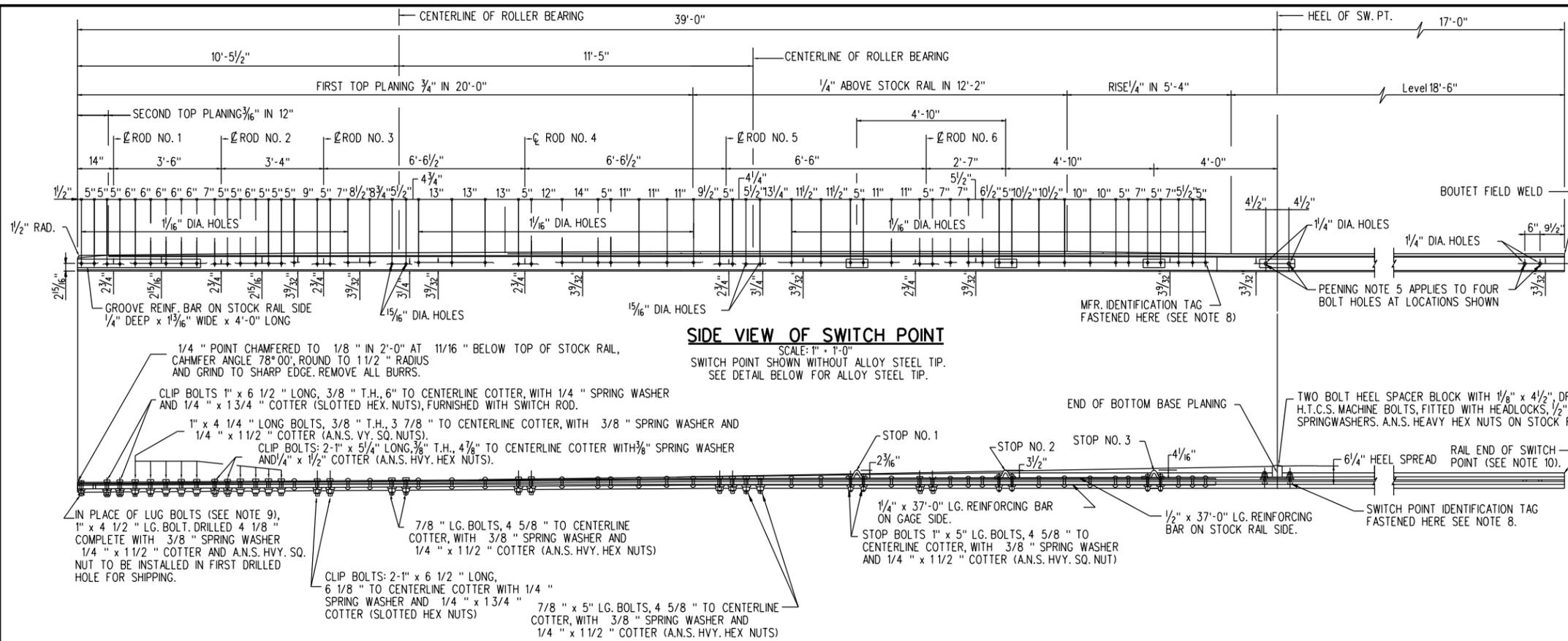
**TYPICAL PLATE DETAIL**  
SCALE: NONE



**TYPICAL PLATE PUNCHING DETAIL**  
SCALE: NONE

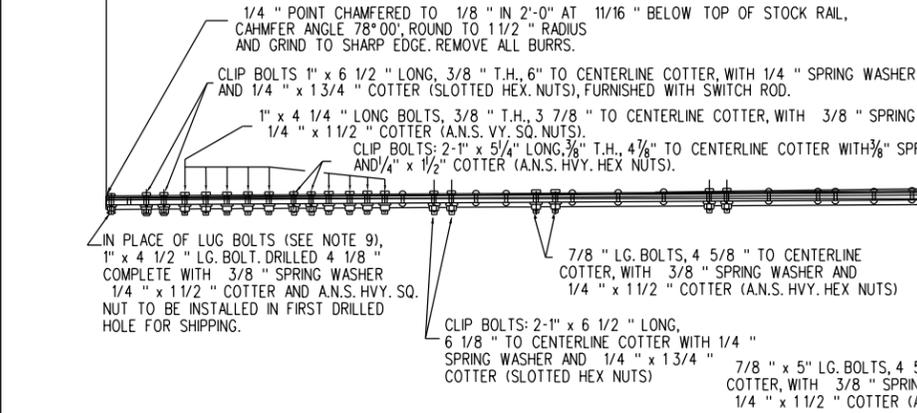


DRAWN BY: A. CARLOS		DATE: 03/31/2011		SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES, SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.		<p><b>METROLINK</b> SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012</p>		ENGINEERING STANDARDS		STANDARD	
 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		NO. 20 136 LB. R.H. RBM FROG GUARD RAIL DETAILS				2941			
REVISION	XX XX	DESCRIPTION	DES.	ENG.	XX XX	SCALE:	AS NOTED	REVISION SHEET	8 OF 15	CADD FILE:	ES2941-08



**SIDE VIEW OF SWITCH POINT**

SCALE: 1" = 1'-0"  
SWITCH POINT SHOWN WITHOUT ALLOY STEEL TIP.  
SEE DETAIL BELOW FOR ALLOY STEEL TIP.

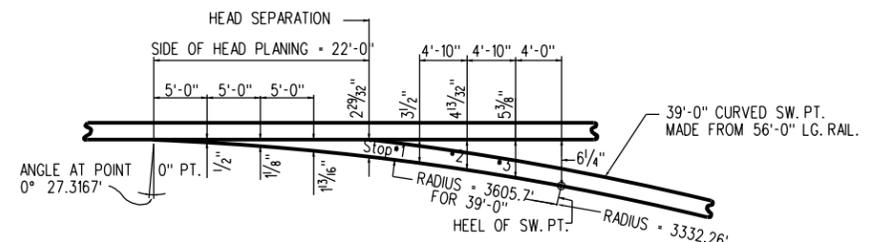


**TOP VIEW OF SWITCH POINT**

**NOTES:**

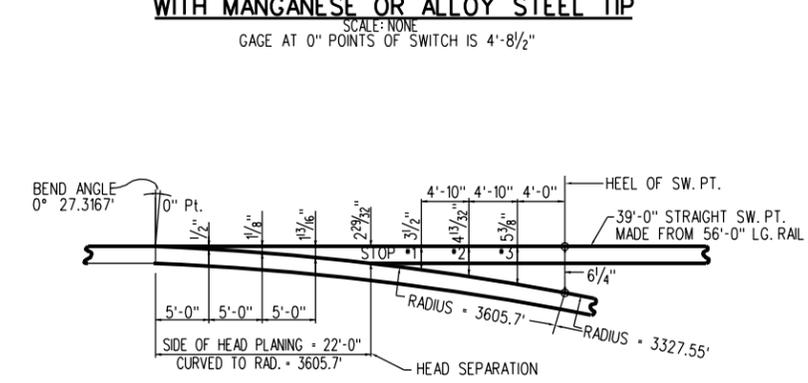
- SWITCH POINTS TO BE MADE FROM HIGH STRENGTH RAIL.
- CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE TURNOUT SWITCH POINT (LEFT HAND POINT FOR RIGHT HAND TURNOUT) MAY BE FURNISHED WITH ALLOY STEEL TIP. THE MAIN LINE SWITCH POINT (RIGHT HAND POINT FOR RIGHT HAND TURNOUT) TO BE FURNISHED WITHOUT ALLOY STEEL TIP.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PERENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 39'-0" (56'-0") NO. 20. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.

**FOR MAINTENANCE ONLY**



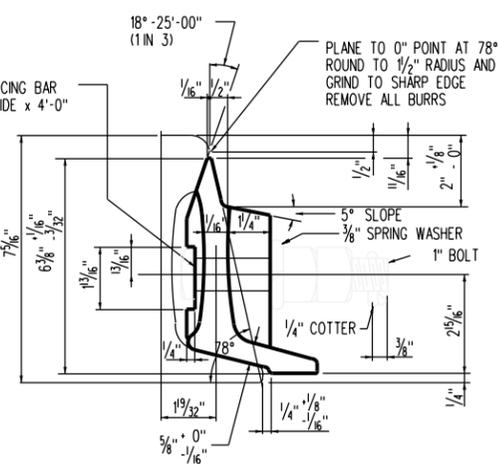
**CURVED SWITCH POINT MAY BE EQUIPPED WITH MANGANESE OR ALLOY STEEL TIP**

SCALE: NONE  
GAGE AT 0" POINTS OF SWITCH IS 4'-8 1/2"



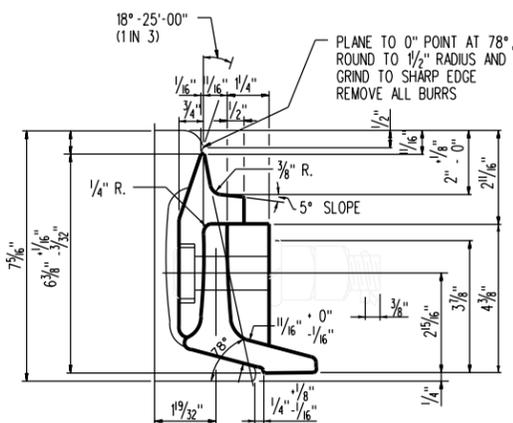
**STRAIGHT SWITCH POINT WITHOUT MANGANESE OR ALLOY STEEL TIP**

SCALE: NONE  
DIMENSIONS SHOWN ARE ON SWITCH POINTS 5/8" BELOW TOP OF RAIL. RIGHT HAND SWITCH SHOWN. LEFT HAND SWITCH OPPOSITE HAND.



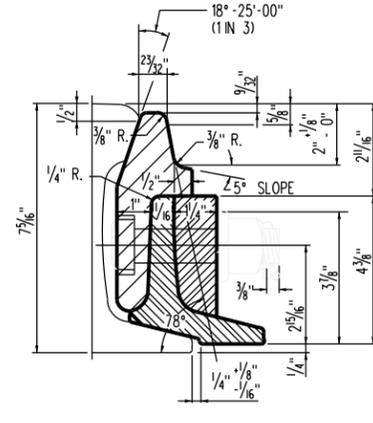
**END VIEW AT POINT**

SCALE: NONE  
(WITHOUT MANG. OR ALLOY STEEL TIP)



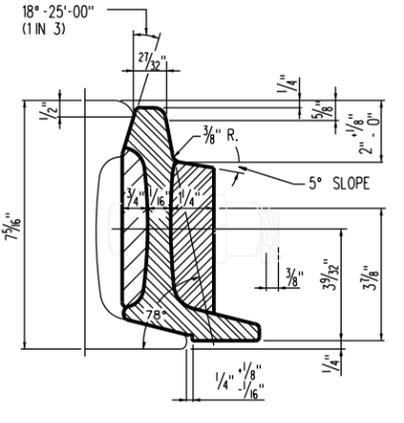
**END VIEW AT "A-A"**

SCALE: NONE



**SECTION "B-B"**

SCALE: NONE



**SECTION "C-C"**

SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: <i>Nareh D. Papp</i> DRAFTER: <i>William Dava</i> DATE: 03/31/2011 ASSISTANT DIRECTOR- STANDARDS & DESIGN DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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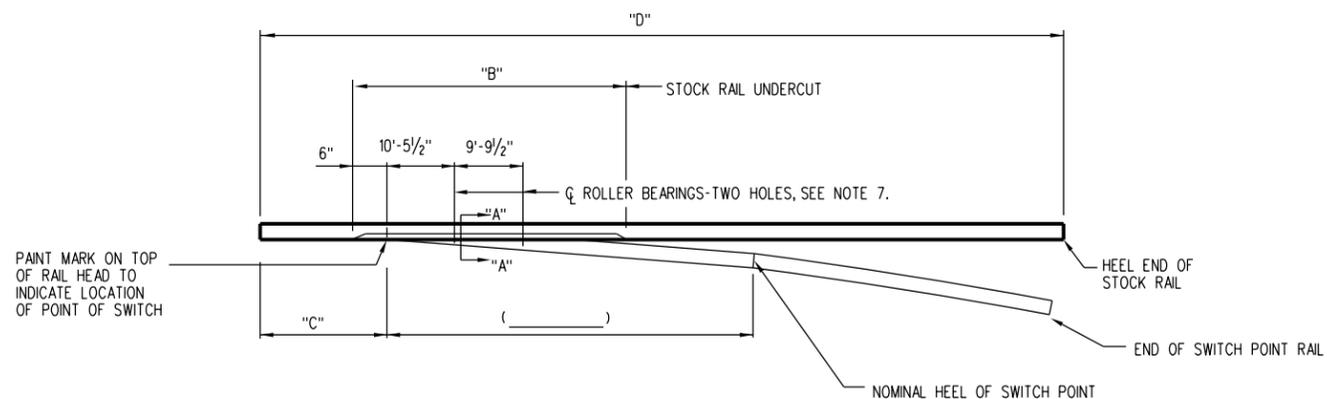
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
NO. 20 SPLIT SWITCH POINT DETAILS

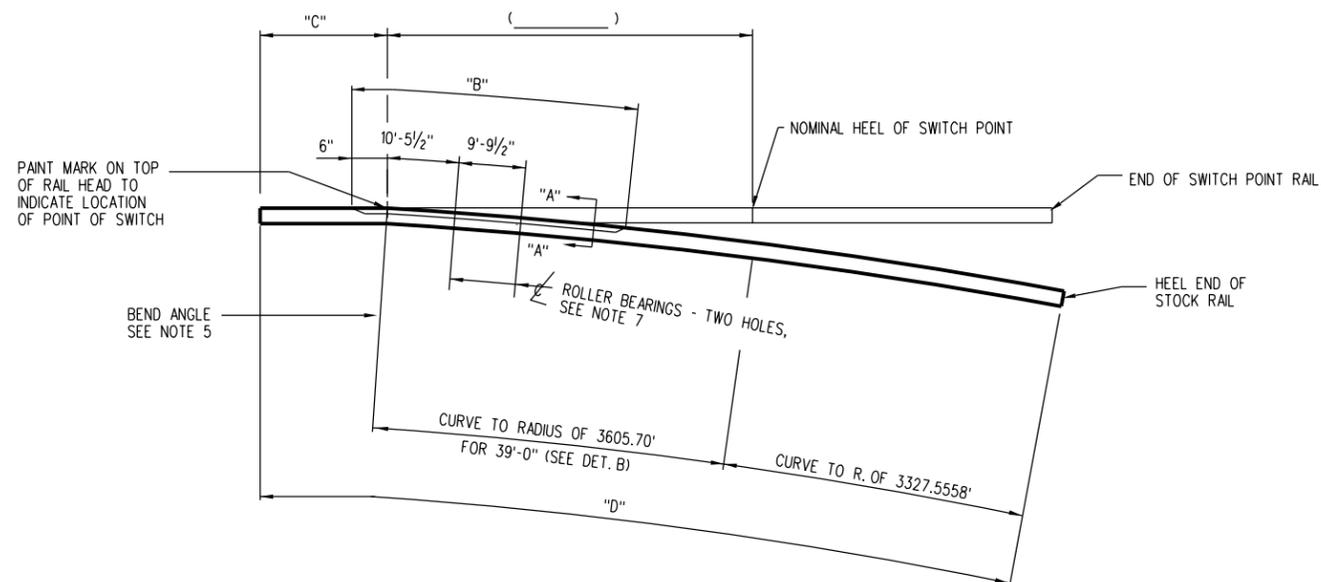
STANDARD	2941
SCALE:	AS NOTED
REVISION	SHEET
-	9 OF 15
CADD FILE:	ES2941-09

**NOTES:**

1. INFORMATION OR DIMENSIONS SHOWN THUS ( ) TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. CROSS OUT ONE - FOR JOINTED RAIL TURNOUT.
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT AREMA PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.
5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS: 0° -27.3167' OR 1" IN 10'-5 7/32".
6. THE CURVED PORTION OF THE CURVED STOCK RAIL SHALL BE CURVED PER DETAIL "B".
7. FOR ROLLER BEARINGS: DRILL TWO HOLES, 15/16" DIA. 3/4" ABOVE BASE OF RAIL. PERMISSIBLE VARIATIONS: DIA. 0" UNDER, 9/32" OVER. LOCATION 9/32" OVER OR UNDER.



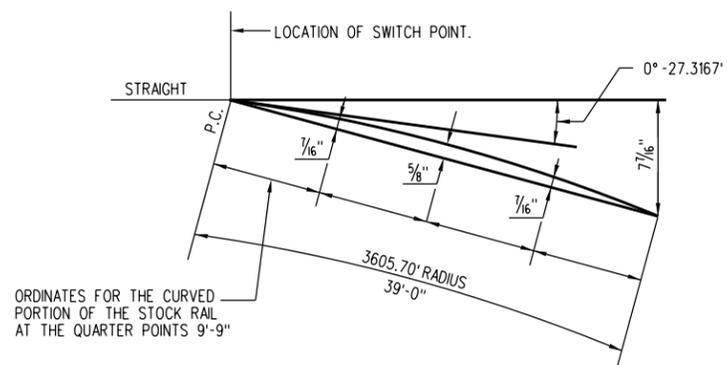
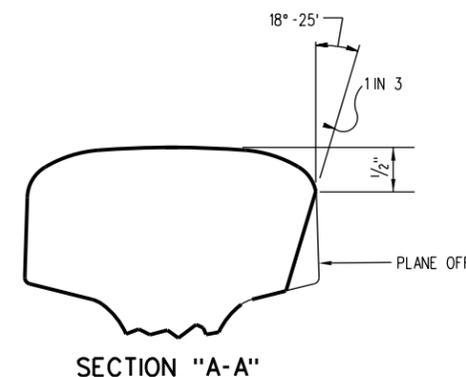
**LEFT HAND STRAIGHT STOCK RAIL**



**RIGHT HAND CURVED STOCK RAIL**

STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT". FOR LEFT HAND TURNOUT, STOCK RAILS ARE OPPOSITE HAND, BEING LEFT HAND CURVED STOCK RAIL AND RIGHT HAND STRAIGHT STOCK RAIL.

LENGTHS B, C, & D FOR 136 LB. RAIL									
Sw. Pt. LENGTH	T.O. NO.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL SEE NO. 10	C	D	END DRILL SEE NO. 10
39'-0'	20	STR.	23'-6"	10'-0"	67'-0"	NONE	10'-0"	70'-0"	NONE
39'-0"	20	CURVED	23'-6"	12'-0"	67'-0"	NONE	12'-0"	70'-0"	NONE



**DETAIL "B"**

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

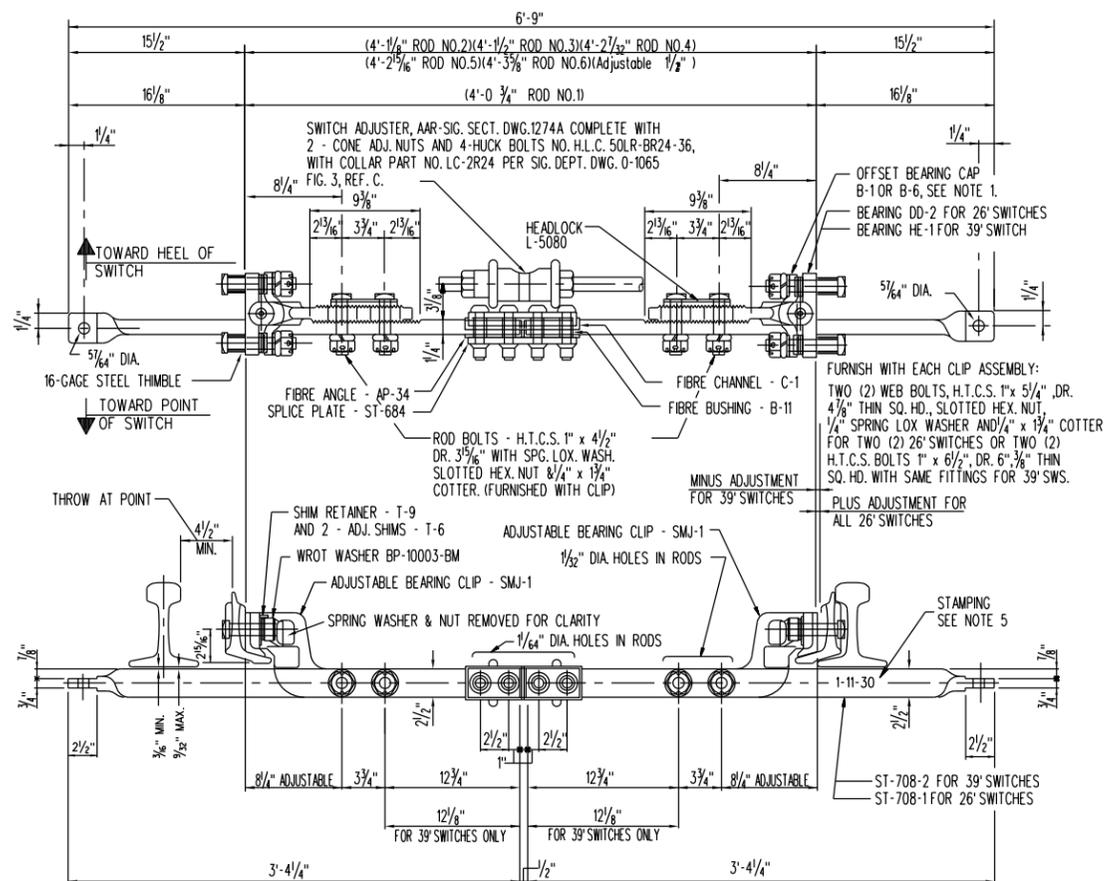
Assistant Director: Standards & Design  
*Wilson Dacan*  
 Director of Engineering and Construction

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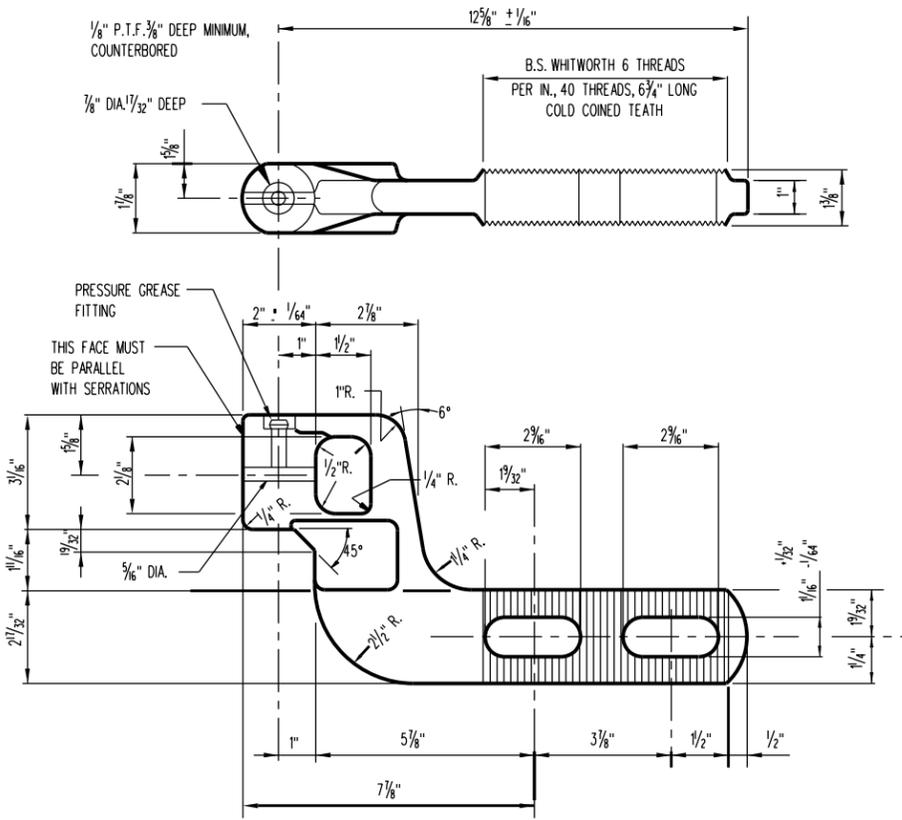
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 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS	
NO. 20 STRAIGHT OR CURVED UNDERCUT STOCK RAILS	

STANDARD	2941
SCALE:	NONE
REVISION SHEET	10 OF 15
CADD FILE:	ES2941-10



**NO. 1 SWITCH ROD ASSEMBLY**  
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



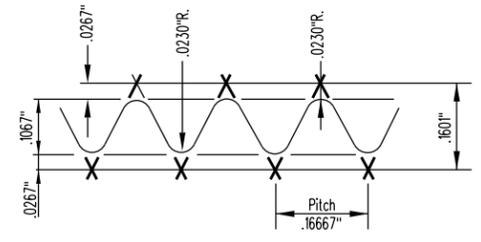
**ADJUSTABLE BEARING CLIP - SMJ - 1**  
SCALE: 3" = 1'-0"

BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E.1020-For.Stl.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	Web Bolt	SEE NOTE
26'	2	DD-2	Malleable Iron	Bearing	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	Malleable Iron	Bearing	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
All	4	T-9	S.A.E.1020	Shim Retainer	1/8" x 1 3/4" x 2 1/4"
All	12	T-6	Stainless Steel	Adjustment Shim	1/16" x 2" x 1 1/8"
All	4	BP-10003-BM	Wrot Iron	Wrot Washer	1/16" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	Rod Bolt	1" x 4 1/2" DR. 3 1/2" REG. SQ. HD. SLOTTED HEX NUT
All	4		Steel	Spg. Lox Washer	For 1" Rod Bolts
All	4		Steel	Cotter	1/4" x 1 3/4" FOR ROD BOLTS
All	2		Steel	Grease Fitting	PRESSURE - FOR BEARING CLIP
All	2	L-5080	Malleable Iron	Headlock	FOR ROD BOLTS
26'	2		16-Gage Steel	Thimble	1 1/2" LONG - FOR SHIPPING
39'	2		16-Gage Steel	Thimble	2 1/2" LONG - FOR SHIPPING

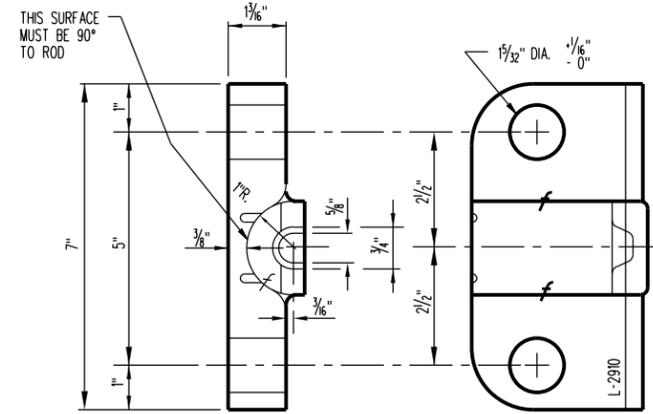
**Material for Vertical Rod**

16'-6"	1		Vertical Rod	Use one-ST-708-1
				Use one-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1		Vertical Rod	Use one-ST-708-2
				Use one-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
All	4		High Strength Steel	Conn. & Insul. Bolt
All	4		Low Carbon Steel	Collar
All	1	ST-684	H.R. Mild Steel	Splice Plate
All	2	AP-34	AAR-Sig.Sec.13-52	Angle
All	4	B-11	AAR-Sig.Sec.13-52	Bushing
All	1	C-1	AAR-Sig.Sec.13-52	Channel
All	1		Malleable Iron	Switch Adjuster
All	2		Malleable Iron	Cone Adj. Nut

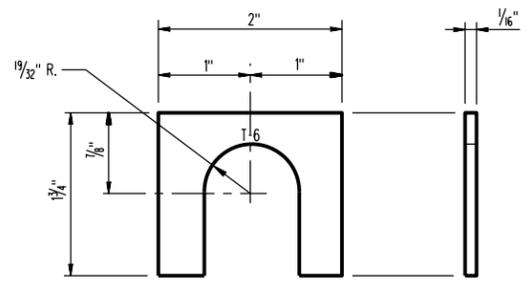
FOR 1/4" THROW RODS



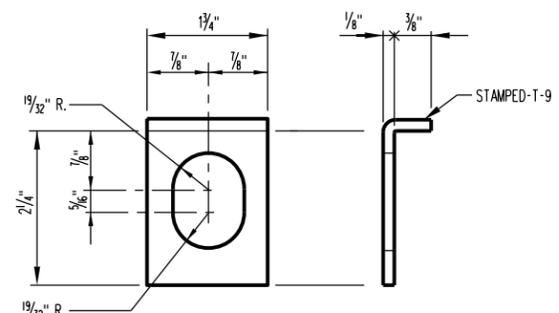
**ENLARGED PROFILE OF SERRATIONS**  
SCALE: NONE



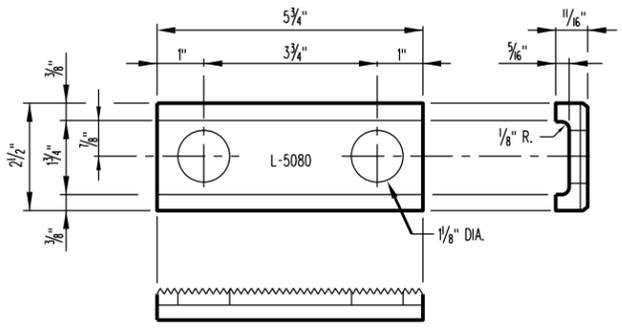
**BEARING - DD - 2**  
SCALE: 6" = 1'-0"



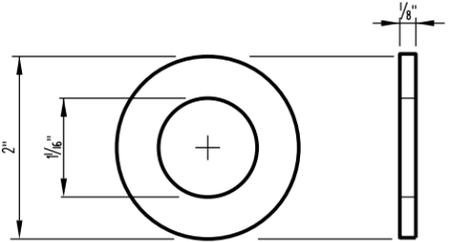
**ADJUSTABLE SHIM - T - 6**  
SCALE: FULL



**SHIM RETAINER - T - 9**  
SCALE: FULL



**HEADLOCK L-5080**  
SCALE: 6" = 1'-0"



**WROT WASHER - BP - 10003 - BM**  
SCALE: FULL

- NOTES:**
- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
  - WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.
  - TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/2" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
  - MATERIALS AND WORKMANSHIP SHALL MEET CURRENT AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
  - VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON IDENTIFICATION MARKING WILL BE AS FOLLOWS:  
1-39 FOR USE ON 39'-0" SWITCHES, 132-LB. AND 136-LB. R.E. RAIL SECTIONS.  
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115-LB., 119-LB., 131-LB., 132-LB. AND 136-LB. R.E. RAIL SECTIONS

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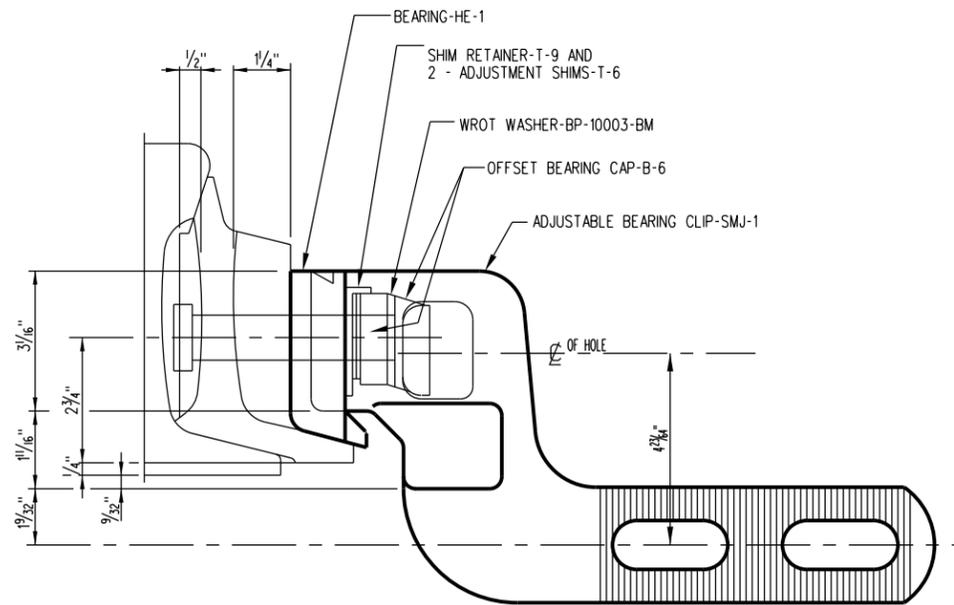
REV.	DATE	DESCRIPTION	DES.	ENG.
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DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
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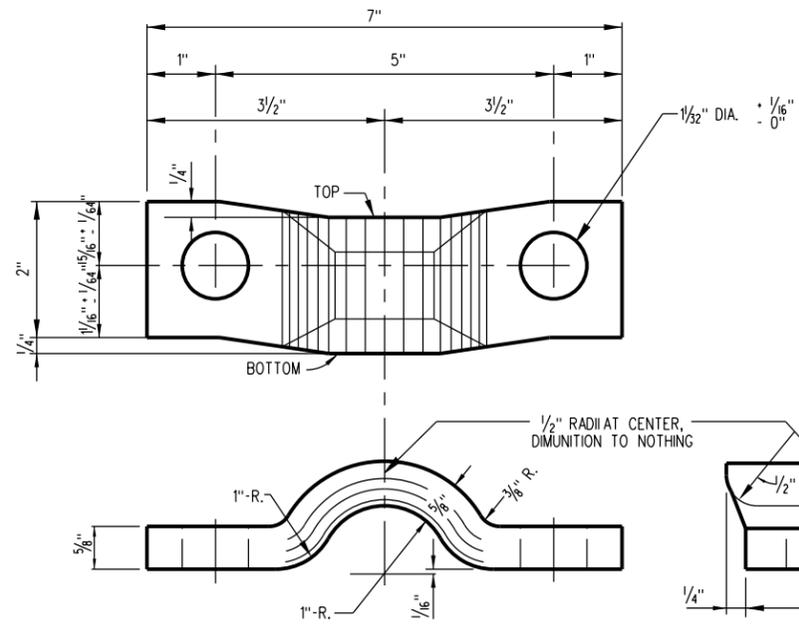
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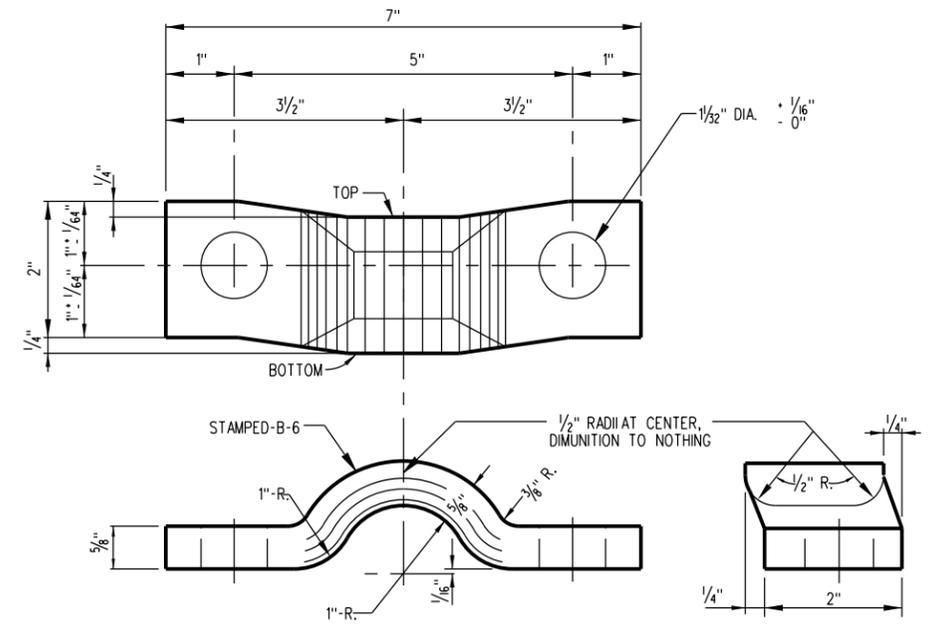
ENGINEERING STANDARDS		STANDARD
		2941
NO. 20 SWITCH ROD DETAILS		SCALE: AS NOTED
		REVISION SHEET 11 OF 15
		CADD FILE: ES2941-11



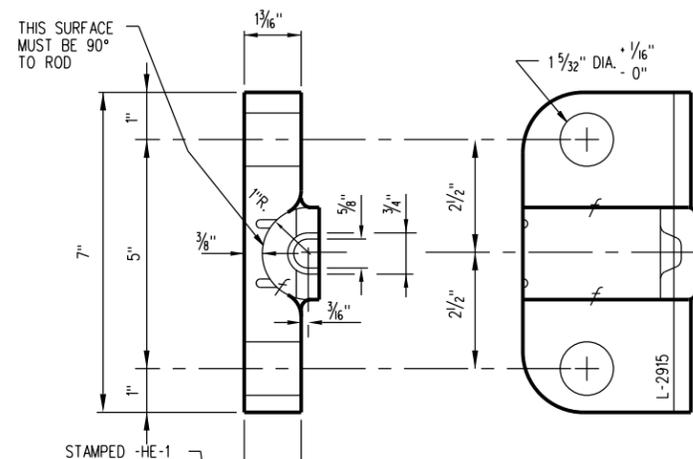
**ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39 SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



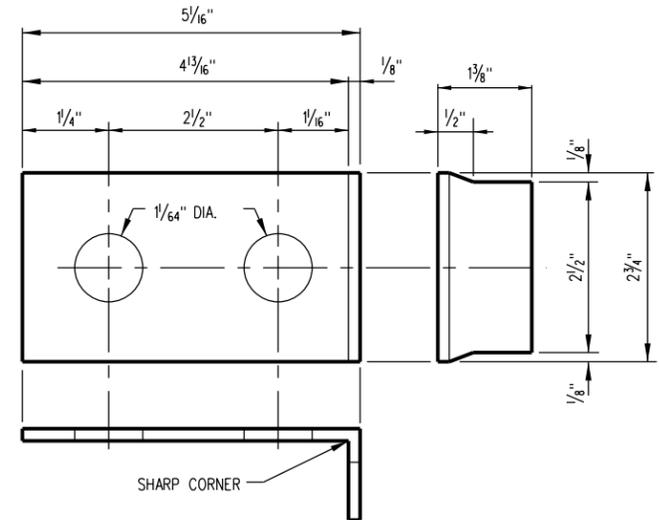
**OFFSET BEARING CAP-B-1**



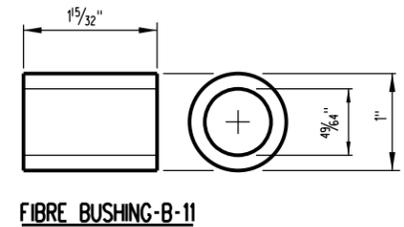
**OFFSET BEARING CAP-B-6**



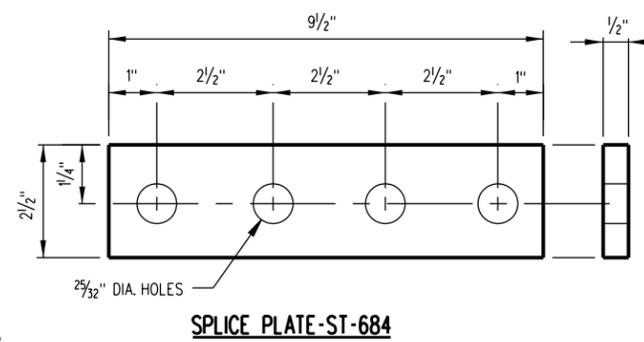
**BEARING-HE-1**



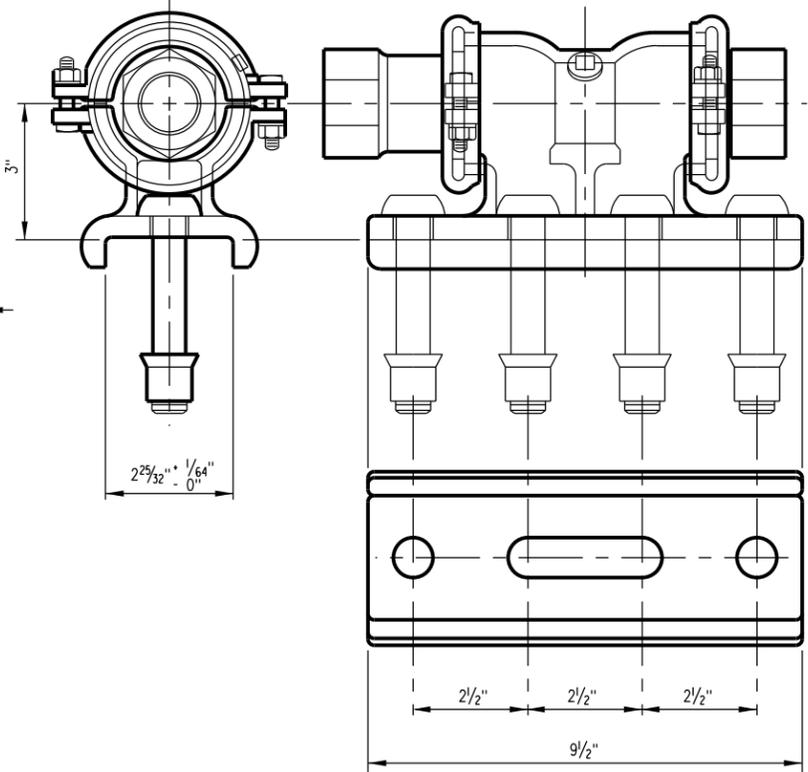
**FIBRE ANGLE-AP-34**



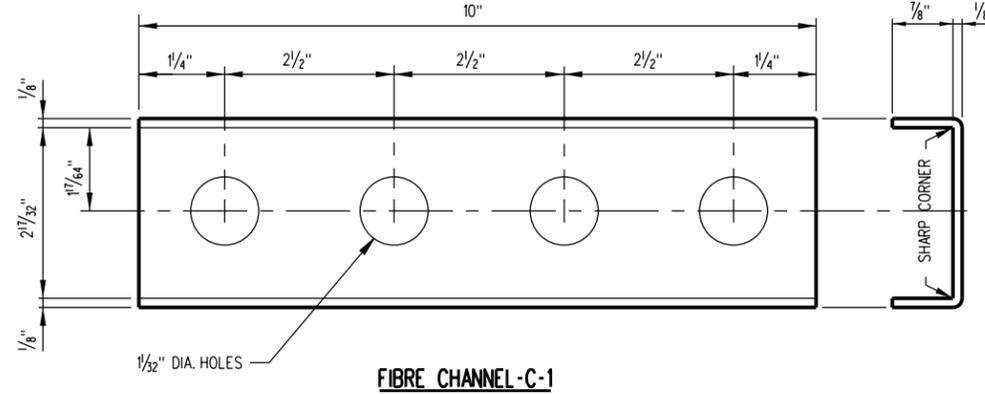
**FIBRE BUSHING-B-11**



**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**FIBRE CHANNEL-C-1**

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

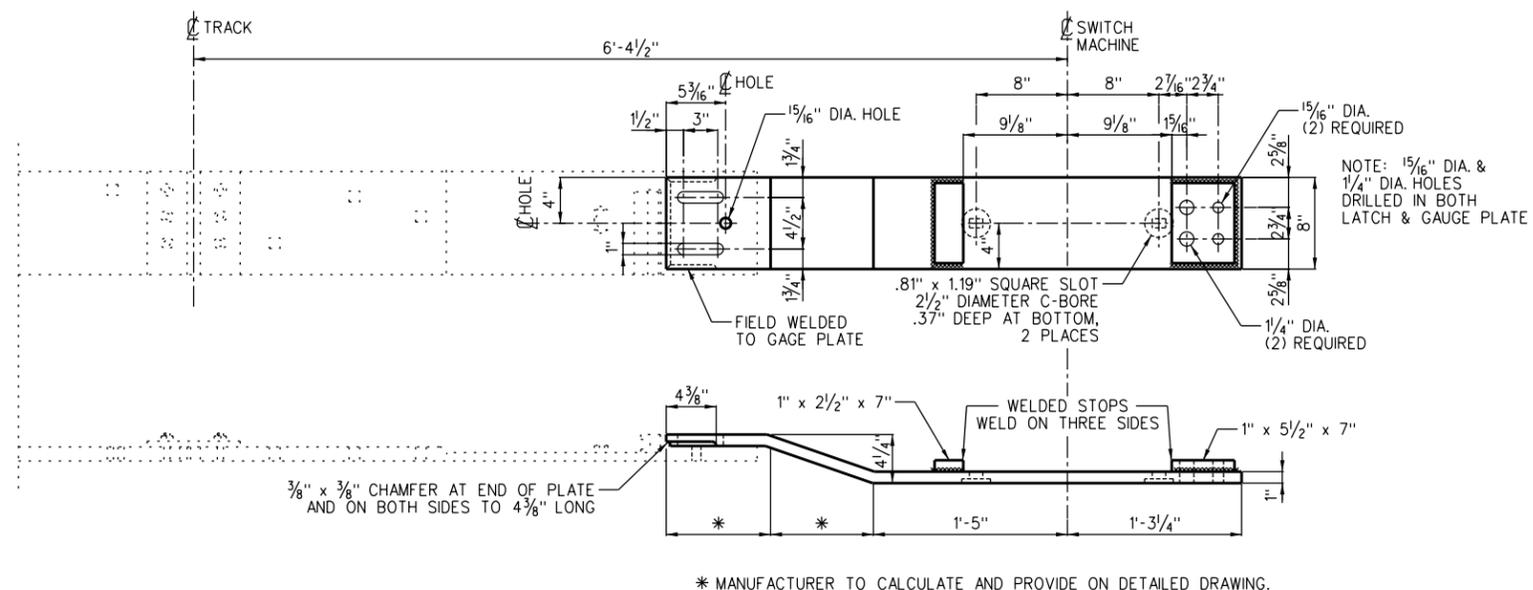
DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Narek D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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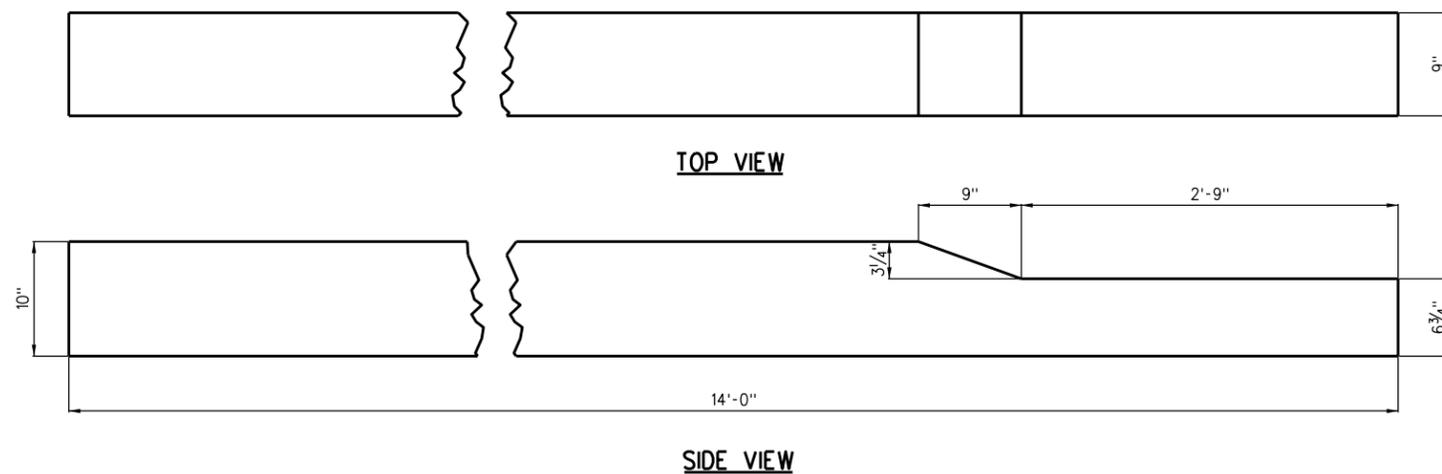
**METROLINK**  
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ENGINEERING STANDARDS  
 NO. 20 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	2941
SCALE	AS NOTED
REVISION SHEET	12 OF 15
CADD FILE	ES2941-12



**EXTENSION PLATE**  
(2 PCS. REQ'D. AS SHOWN)



TIES SHALL BE MADE OF DOUGLAS FIR OR GUM AND TREATED AFTER FRAMING.

**DAP TIE**  
(2 PCS. REQ'D. AS SHOWN)

**US&S M23-A SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS.**

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

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ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William Dava*  
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**METROLINK**

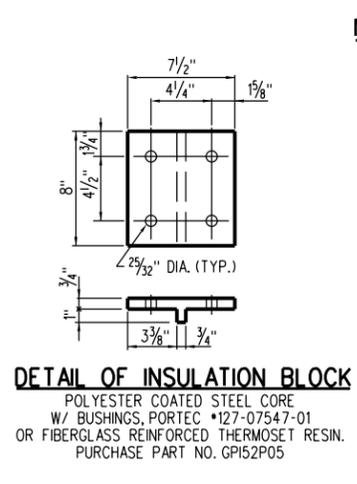
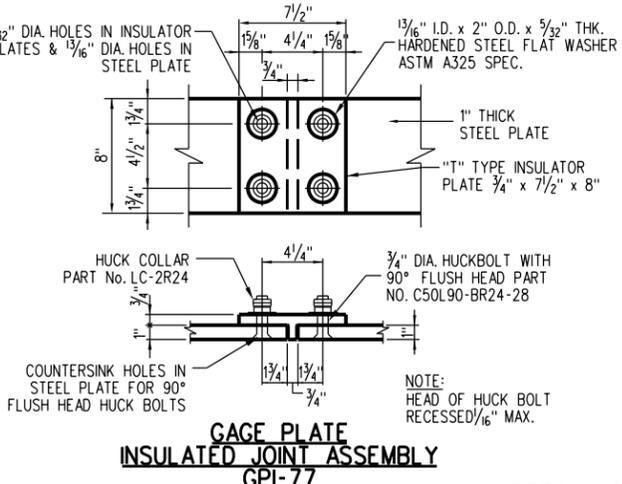
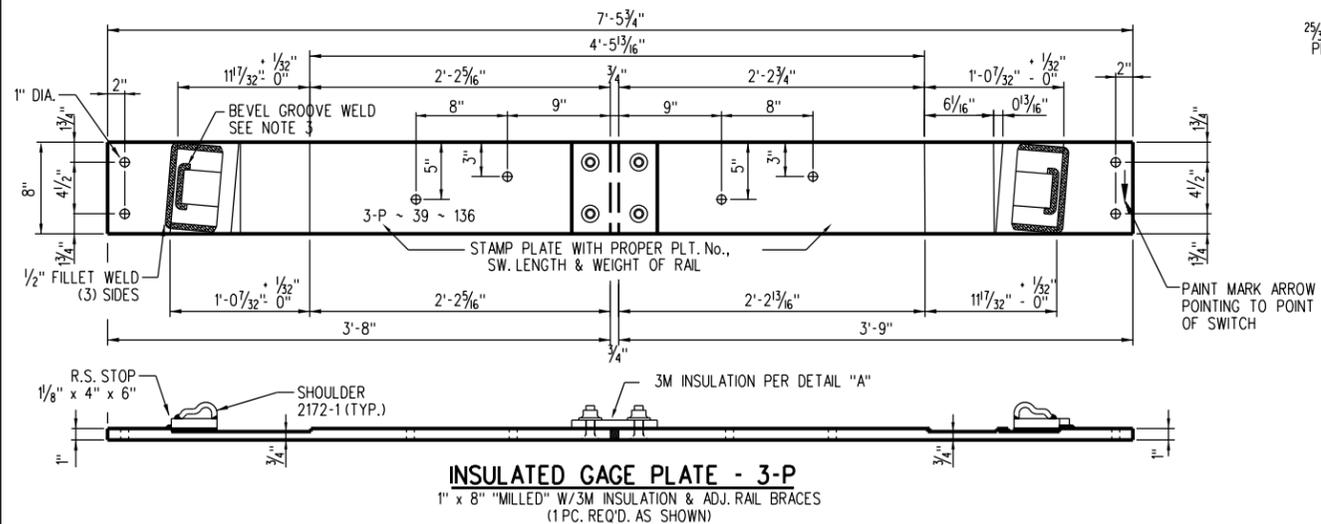
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS

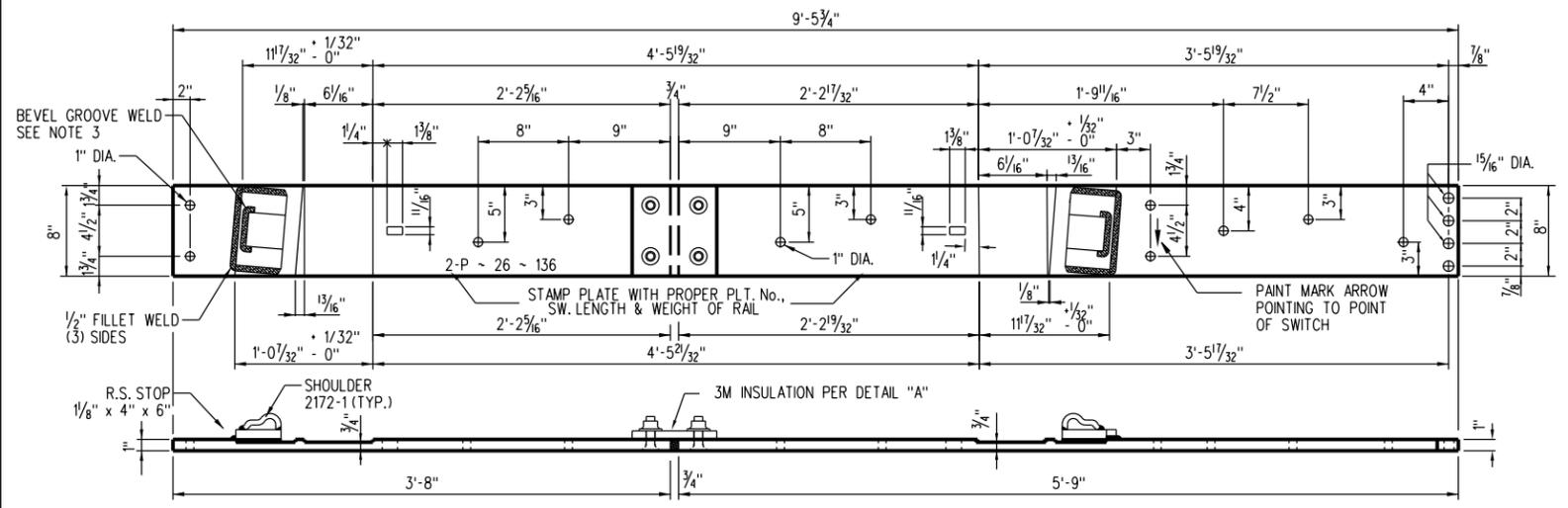
NO. 20 EXTENSIONS PLATE AND DAP TIE DETAILS

STANDARD	2941
SCALE:	1/2" = 1'-0"
REVISION SHEET	- 13 OF 15
CADD FILE:	ES2941-13

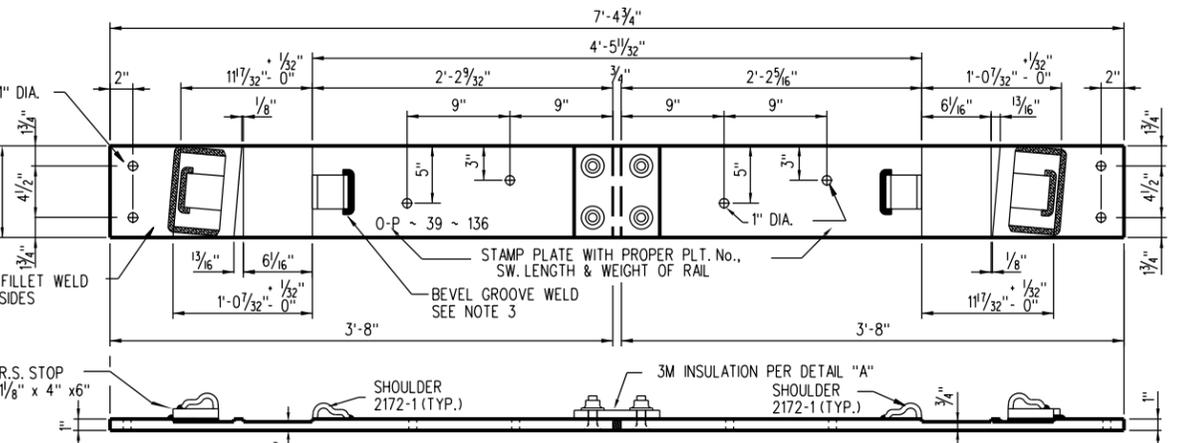
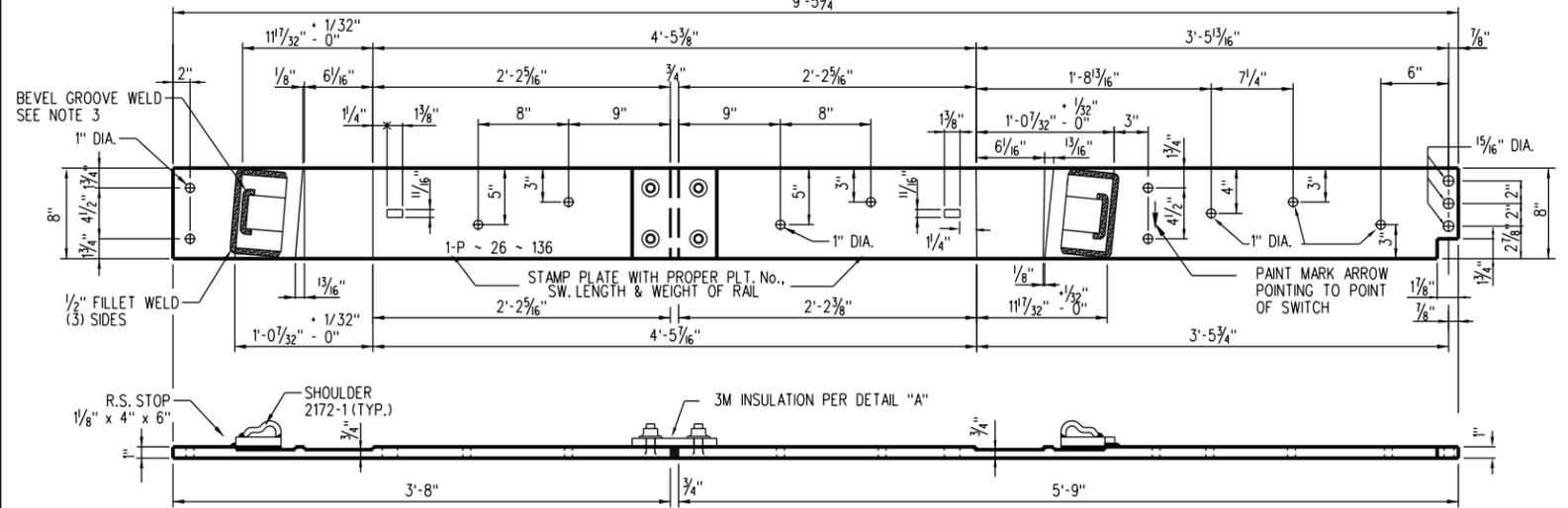
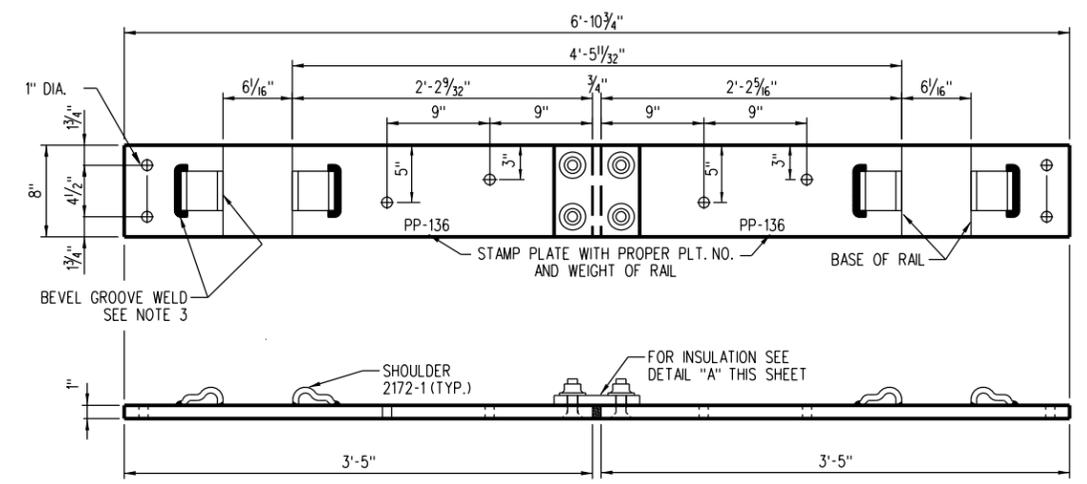




- NOTES:**
- PLATES TO BE MADE OF MILD ROLLED STEEL.
  - THE PANDROL TYPE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
  - THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH A MINIMUM 3/8" WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  - SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MCHNE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES 1-P AND 2-P MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.



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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS		DATE: 03/31/2011	SCERRA ENGINEERING STANDARDS ARE INTENDED FOR SCERRA APPROVED USES ONLY. FOR NON-SCERRA APPROVED USES, SCERRA SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCERRA. ALL RIGHTS RESERVED.	
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WILLIAM DAVAN		DIRECTOR OF ENGINEERING AND CONSTRUCTION		

**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
NO. 20 INSULATED GAGE PLATE DETAILS		2941
SCALE: 1/2" = 1'-0"		SHEET
REVISION		15 OF 15
CADD FILE:		ES2941-15

EQUIVALENT CURVE DATA	
CURVE	1.0564'
RADIUS	5423.62'
DELTA	2.386'
TANGENT (T)	112.95'
LENGTH (L)	225.86'
EXTERNAL	1.18'
CROSSOVER DATA	
LEAD	205.000'
PC TO PS	21.94'
PS TO PI	91.01'
PI TO 1/2" PF	113.99'
LENGTH OF TURNOUT	293.28'
PS TO PT	203.92'

FROG DATA	
FROG NUMBER	24
FROG ANGLE	2° -23' -13"
SWITCH DATA	
SWITCH LENGTH	61'-8"
HEEL SPREAD	6 1/4"
HEEL ANGLE	0° -59' -02"
SWITCH ANGLE	0° -08' -00"
RADIUS OF CENTER LINE - SWITCH	4817.35'
TANGENT LENGTH SWITCH	77.36'
CENTRAL ANGLE OF CLOSURE CURVE-SWITCH	1° -50' -27"
DEGREE OF CURVE - SWITCH	1° -11' -22"
TURNOUT DATA	
RADIUS OF CENTER LINE - TURNOUT	4815.00'
TANGENT LENGTH - TURNOUT	101.20'
CENTRAL ANGLE OF CLOSURE CURVE - TURNOUT	1° -50' -27"
DEGREE OF CURVE - TURNOUT	1° -11' -24"

CROSSOVER DATA TABLE									
A	B	C	X	Y	2L·X	2L·X- 2(PC-PS)	PS TO PS	U	V
13	312.26	311.99	86.37	537.88	538.09	494.21	494.01	84.01	84.28
14	336.28	335.99	110.39	561.88	562.11	518.23	518.01	108.01	108.30
15	360.30	359.99	134.41	585.88	586.13	542.25	542.01	132.01	132.32
16	384.32	383.99	158.43	609.88	610.15	566.27	566.01	156.01	156.34
17	408.34	407.99	182.45	633.88	634.17	590.29	590.01	180.01	180.36
18	432.36	431.99	206.47	657.88	658.19	614.32	614.01	204.01	204.38
19	456.38	455.99	230.49	681.88	682.21	638.34	638.01	228.01	228.40
20	480.41	479.99	254.51	705.88	706.23	662.36	662.00	252.00	252.42
21	504.43	503.99	278.53	729.88	730.25	686.38	686.00	276.00	276.44
22	528.45	527.99	302.55	753.88	754.27	710.40	710.00	300.00	300.46
23	552.47	551.99	326.57	777.88	778.29	734.42	734.00	324.00	324.48
24	576.49	575.99	350.59	801.88	802.31	758.44	758.00	348.00	348.50
25	600.51	599.99	374.62	825.88	826.33	782.46	782.00	372.00	372.52
26	624.53	623.99	398.64	849.88	850.35	806.48	806.00	396.00	396.54
27	648.55	647.98	422.66	873.88	874.37	830.50	830.00	420.00	420.56
28	672.57	671.98	446.68	897.88	898.39	854.52	854.00	444.00	444.58
29	696.59	695.98	470.70	921.87	922.41	878.54	878.00	468.00	468.60
30	720.61	719.98	494.72	945.87	946.43	902.56	902.00	492.00	492.62
31	744.63	743.98	518.74	969.87	970.45	926.58	926.00	516.00	516.64
32	768.65	767.98	542.76	993.87	994.47	950.60	950.00	540.00	540.66

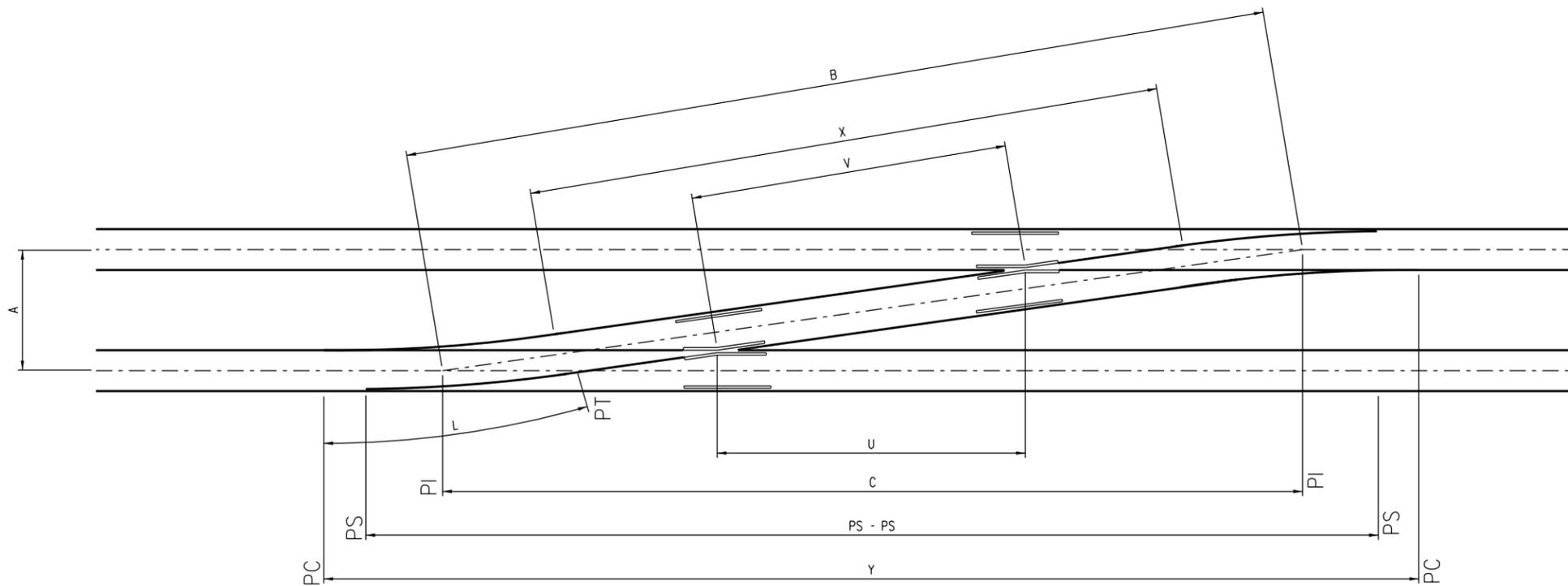
**DRAWING INDEX**

TURNOUT AND CROSSOVER GENERAL NOTES AND DATA	ES2951-01
TURNOUT AND CROSSOVER JOINTS	ES2951-02
TURNOUT LAYOUT	ES2951-03
TURNOUT BILL OF MATERIALS	ES2951-04
CROSSOVER LAYOUT AND BILL OF MATERIALS LAYOUT	ES2951-05
FROG LAYOUT	ES2951-06
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GUARD RAIL DETAILS	ES2951-08
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**NOTES:**

- TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
- LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ES2951-02. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
- ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED JOINTS PER ES2504 UNLESS OTHERWISE SPECIFIED.
- ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE SCRRR DIRECTOR OF ENGINEERING AND CONSTRUCTION.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
- WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
- GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
- MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE SCRRR DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
- THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ES2951-02 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ES2951-05.
- TIE PLATES SHALL CONFORM TO SCRRR ENGINEERING STANDARD ES2454.
- SCREW SPIKES (5/16" X 6-2 TPI) SHALL CONFORM TO SCRRR ENGINEERING STANDARD ES2357.
- PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
- MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT AREMA PLAN NO. 1005.
- THE 61'-8" SWITCH POINT, PER ES2951-09 & ES2951-10 SHALL BE FURNISHED WITH "MF" FRONT ROD PER SCRRR SIGNALS DEPARTMENT. "SMJ" NO. 1, 5 & 7 SWITCH RODS PER ES2951-11 & ES2951-12 AND SWITCH RODS NO. 2, 3, 4 AND 6 SHALL BE SIMILAR TO NO. 1 SWITCH ROD AND WILL BE FURNISHED WITHOUT BASKET ADJUSTMENT.
- FOR LOCATION OF INSULATED AND COMPROMISE JOINTS FOR NO. 24 TURNOUT AND CROSSOVER, SEE DRAWING NO. ES2951-02.
- GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-13 THRU P-37 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
- UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO SCRRR NEUTRAL RAIL TEMPERATURE.
- ALL E-CLIPS SHALL BE GALVANIZED.
- SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ES2951-09 & ES2951-10.
- THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
- SWITCH POINT ROLLER BEARINGS AND SWITCH PLATES WITH POINT ROLLER RISERS SHALL BE AS APPROVED BY THE SCRRR DIRECTOR OF ENGINEERING AND CONSTRUCTION, SUBMITTED AS SHOP DRAWINGS PER NOTE 8 ABOVE.
- SWITCH POINT ROLLER BEARINGS WILL BE MOUNTED ABOVE PLATE AND WILL NOT BE LOCATED BETWEEN SWITCH TIES.
- HELPER THROW ROD ASSEMBLIES SHALL CONFORM TO ES2951-11.

**FOR MAINTENANCE ONLY**



**CROSSOVER LAYOUT**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Narek D. Pape*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

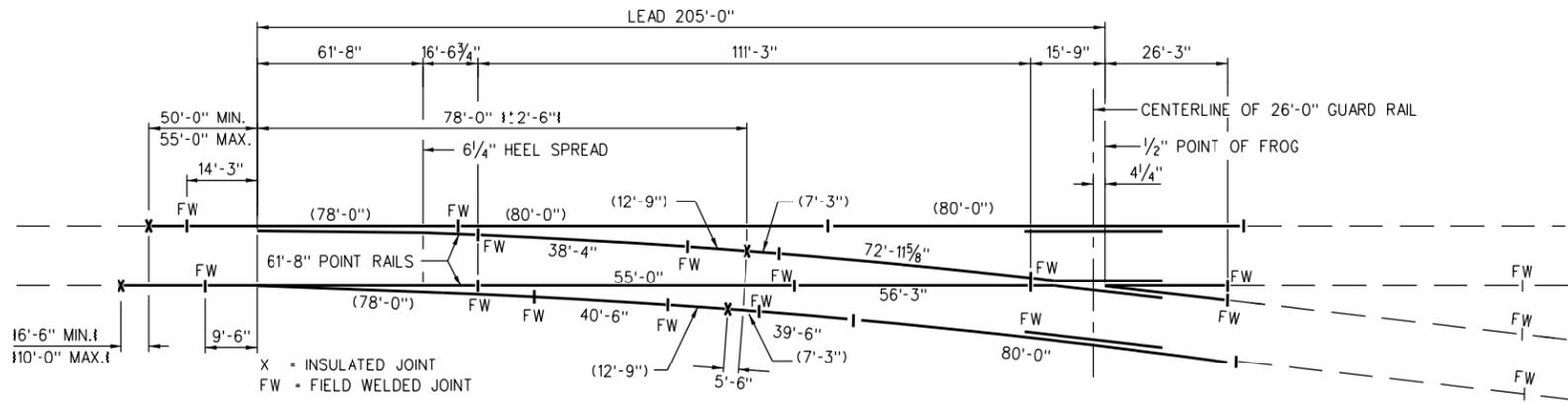
*William Dava*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

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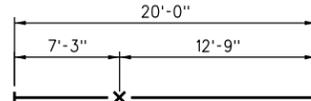
**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

**ENGINEERING STANDARDS**  
NO. 24, 136 LB. R.H. RBM FROG  
TURNOUT AND CROSSOVER  
GENERAL NOTES AND DATA

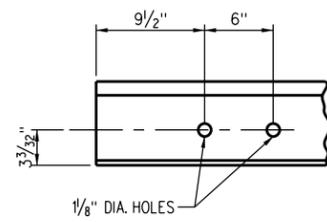
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SCALE	NONE
REVISION SHEET	1 OF 16
CADD FILE	ES2951-01



**TURNOUT**  
SCALE: NONE



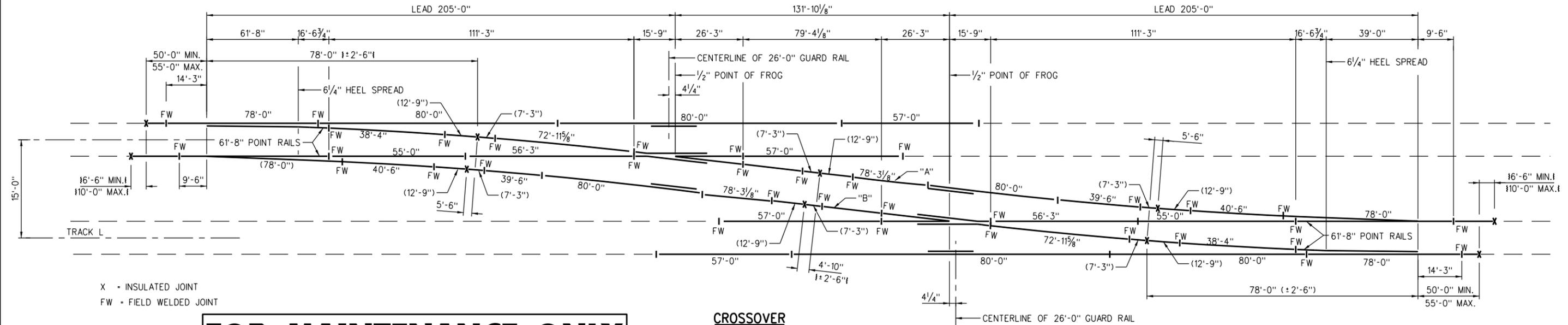
**20'-0" LONG ADHESIVE BONDED PREFABRICATED MITRE CUT INSULATED RAIL JOINT ASSEMBLY**  
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD. (SCALE: NONE)



**DETAIL "A"**  
SEE NOTE 4 (b)  
SCALE: 1/2" = 1'-0"

**NOTES:**

- SINCE THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
- RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW:  
THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH THE HEAVIER RAIL THAN TRACK L.  
CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 80'-0" RAIL SHALL BE REPLACED WITH 16'-6" OF THE HEAVIER RAIL AND 63'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 78'-3 3/8" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 68'-3 3/8" OF THE LIGHTER RAIL.
- IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN THE RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAILS ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
- FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:  
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.  
(B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A", IF SO REQUIRED.
- ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HIGH STRENGTH" EXCEPT GUARD RAILS.
- LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
- INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
- FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LARGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS 10'-0".
- WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
- INSULATED JOINTS SHALL HAVE 45° MITRE CUT RAIL ENDS.



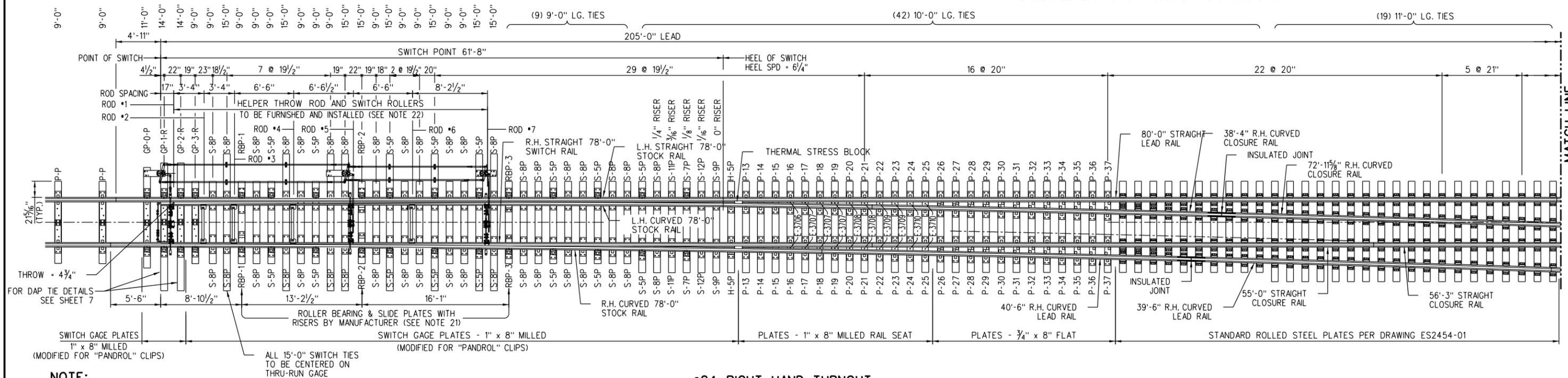
**CROSSOVER**  
15'-0" TRACK CENTERS  
(SCALE: NONE)

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 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012				NO. 24 136 LB. RH. RBM FROG TURNOUT AND CROSSOVER JOINTS LOCATIONS		2951
X	XX-XX-XX	REVISION	XX	XX					SCALE:	AS NOTED
REV.	DATE	DESCRIPTION	DES.	ENG.					REVISION SHEET	2 OF 16
								CADD FILE:		ES2951-02

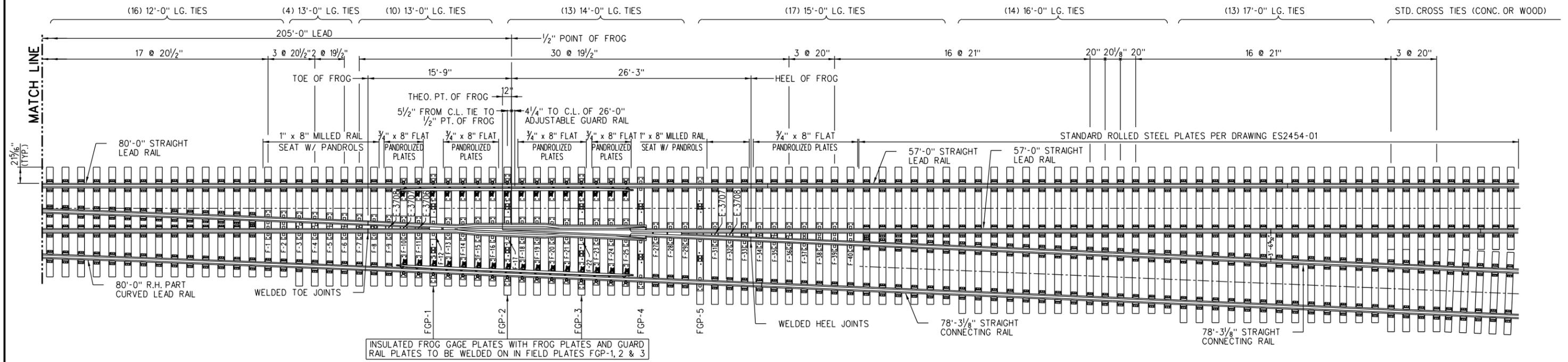
**NOTE:**

1. SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
2. SEE SHEET 2951-05 FOR CROSSOVER AND CROSSOVER DATA.



**•24 RIGHT HAND TURNOUT**

**NOTE:**  
IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED

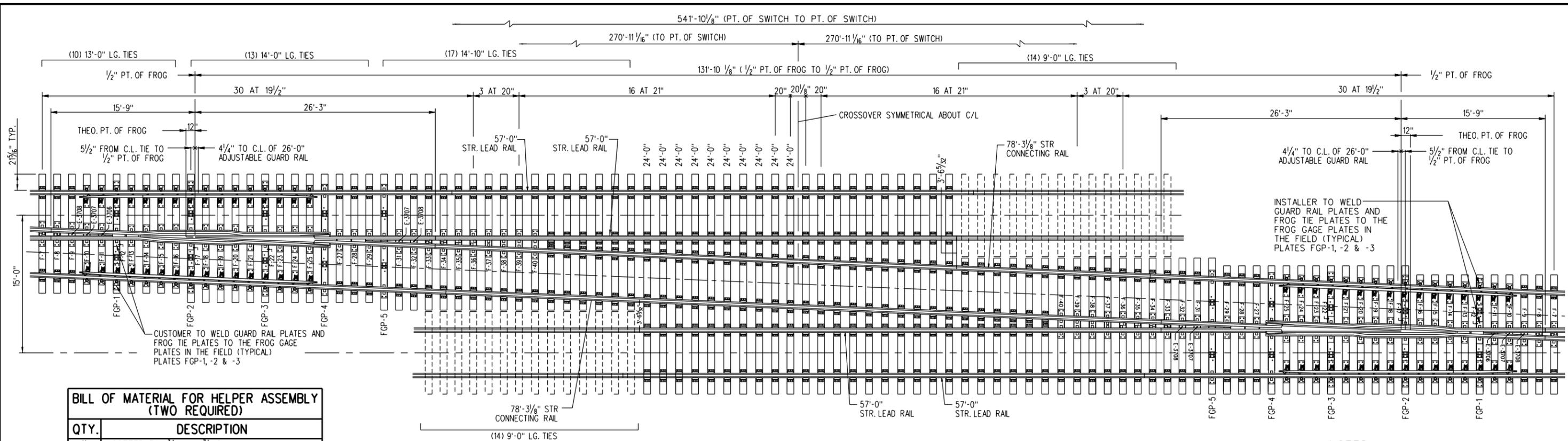


**•24 RIGHT HAND TURNOUT (CONT.)  
(LEFT HAND TURNOUT OPPOSITE HAND)**

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 ASSISTANT DIRECTOR: STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		NO. 24, 136 LB. R.H. RBM FROG TURNOUT LAYOUT				SCALE: 3/16" = 1'-0"		
REV.	DATE	DESCRIPTION	DES.	ENG.			REVISION SHEET	3 OF 16		CADD FILE: ES2951-03





No. 24 CROSSOVER

**FOR MAINTENANCE ONLY**

**BILL OF MATERIAL FOR HELPER ASSEMBLY (TWO REQUIRED)**

QTY.	DESCRIPTION
11	COTTER PIN, 3/16" x 1 3/4 LG
4	PIPE COUPLER
1	JAW PIN
9	COTTER PIN, 3/16" x 1 1/2
6	BOLT, 3/4" - 10 X 3" LG, HVY HEX
8	PIN, PIPE CARRIER ROLLER
12	FLAT WASHER, 3/4", USS
12	LOCK WASHER, 3/4", HVY
6	NUT, 3/4" - 10, HEAVY SQUARE
12	NUT, 3/4" - 10, HEAVY HEX
6	RETAINER BOLT
6	STUD, 3/4 X 14 W 3" 3/4- 10 THREAD BOTH ENDS
1	ROD OPERATING - No. 7 HELPER
1	ROD OPERATING - No. 5 HELPER
2	ASSY - SWITCH POINT ADJUSTER
8	ROLLER, PIPE CARRIER
8	STAND, PIPE CARRIER
8	3/4" x 5" LG LAG BOLT
16	1/2" x 4" LG LAG BOLT
8	RIVET, 1/4" x 1 1/2", ROUND, STEEL
4	CONE NUT, SWITCH POINT ADJUSTER
4	LOCK WASHER, 1 1/4" HEAVY
8	NUT, 1 1/4" - 7, HEAVY HEX, JAMB
2	PIPE - SCHEDULE 80 x 148 7/8" LG
2	PIPE - SCHEDULE 80 x 212 7/8" LG
1	CLEVIS
4	SCREW JAW ROD
4	SOLID JAW
11	JAW PIN
4	SCREW JAW, 1 1/4" - 7 x 6 1/2 LG
3	CRANK STAND PIN
1	ADJUSTABLE LINK
1	CRANK, 3 ARM, STAGE 3
1	CRANK, 3 ARM, STAGE 2
1	CRANK, 3 ARM, STAGE 1
3	CRANK STAND
1	CRANK PLATE, STAGE 3
1	CRANK PLATE, STAGE 2
1	CRANK PLATE, STAGE 1

**BILL OF MATERIAL FOR CROSSOVER**

QTY.	DESCRIPTION
2 SETS	PORTEC "POLY" TRANSIT INSULATED JOINT KITS (PART #400205503)
3610 PCS.	"PANDROL", OR EQUAL, SCREW SPIKES, 1 5/16" D. X 6" LONG
600 PCS.	"PANDROL", OR EQUAL, STANDARD TIE PLATES
2 PAIR	61"-8" EXTENDED FIELD WELDED TYPE SWITCH POINTS (78'-0" RAIL)
4 EACH	THERMAL STRESS BLOCK ASSEMBLY
2 EACH	R.H. & L.H. SAMSON STOCK RAILS
2 EACH	No. 1,5 & 7 SMJ TYPE SWITCH ROD
2 EACH	SWITCH RODS No. 2, 3, 4 & 6 SMJ TYPE
4 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. GP-0-P
2 EACH	GAGE PLATE No. GP-1-R OR GP-1-L
2 EACH	GAGE PLATE No. GP-2-R OR GP-2-L
2 EACH	GAGE PLATE No. GP-3-R OR GP-3-L
80 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	SLIDE PLATE S-11P
4 EACH	SLIDE PLATE S-12P
32 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	ROLLER BEARING BRACE PLATES RBP-1, RBP-2, & RBP-3
4 EACH	HEEL PLATE HP-5 & TURNOUT PLATES P-13 THRU P-37
6 EACH	EPOXY BONDED PREFABRICATED MITRE CUT INSULATED JOINTS 20'-0"

**BILL OF MATERIAL FOR CROSSOVER**

QTY.	DESCRIPTION
2 EACH	No. 24 RAILBOUND MANGANESE FROG - 42'-0" LONG
2 EACH	FROG PLATES No. F-1 THRU F-40
2 EACH	FROG GAGE PLATES FGP-1 THRU FGP-5
4 EACH	26'-0" U-69 ADJUSTABLE GUARD RAIL W/ PLATES
2 EACH	L.H. & R.H. STRAIGHT STOCK RAILS - 78'-0"
2 EACH	L.H. & R.H. CURVED STOCK RAILS - 78'-0"
4 EACH	STRAIGHT LEAD RAILS - 80'-0"
2 EACH	R.H. CURVED LEAD RAILS - 39'-6" & 40'-6"
2 EACH	R.H. CURVED CLOSURE RAILS - 38'-4" & 72'-11 1/2"
2 EACH	STRAIGHT CLOSURE RAILS - 55'-0" & 56'-3"
2 EACH	R.H. PART CURVED RAIL - 80'-0"
4 EACH	STRAIGHT LEAD RAILS - 57'-0"
2 EACH	STRAIGHT CONNECTING RAILS - 78'-3 7/8"
12 PCS.	RACOR SWITCH POINT ROLLER ASSEMBLIES
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3706
5 EACH	D.I. RAIL HOLD DOWN CLIP - E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIP - E-3708
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3709
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3710
64 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLIES
2100 PCS.	"PANDROL", OR EQUAL, CLIP TYPE E-2055
24 PCS.	"PANDROL", OR EQUAL, CLIP TYPE E-2063 (USE AT INSUL. JTS.)
16 PCS.	"PANDROL", OR EQUAL, SHOULDER PR-2172-1 (USE ON FGP-4 & FGP-5)

**NOTES:**

- FOR NOTES SEE DRAWING 2951-01
- SEE DRAWING 2951-03 FOR NO. 24 TURNOUT.
- CROSSOVER FOR 15'-0" TRACK CENTERS IS SHOWN. FOR 16'-0" OR GREATER TRACK CENTERS, USE TWO TURNOUTS PER DRAWING 2951-03. FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS DETAILING RAIL AND TIE LAYOUT AND DIMENSIONS THAT FOLLOW THESE EXAMPLES.
- CROSSOVER TO BE PRE-PLATED ON TIES. PREBORE TIES 3/8" X 5 1/2" DEEP. MANGANESE CASTINGS TO BE EXPLOSION HARDENED BRINELL 352 MINIMUM.

**BILL OF SWITCH TIES FOR CROSSOVER**

PIECES	SIZE	LENGTH	BOARD FEET
76	7" x 9"	9'-0"	3591.00
84	7" x 9"	10'-0"	4410.00
38	7" x 9"	11'-0"	2194.50
32	7" x 9"	12'-0"	2016.00
28	7" x 9"	13'-0"	1911.00
26	7" x 9"	14'-0"	1911.00
4	10" x 9"	14'-0" DAP TIES	294.00
52	7" x 9"	14'-10"	4095.00
20	7" x 9"	24'-0"	2520.00
TOTAL			TOTAL
360			22942.50

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR- STANDARDS & DESIGN  
*William D. Davis*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS  
 NO. 24, 136 LB. R.H. RBM FROG CROSSOVER  
 LAYOUT AND BILL OF MATERIALS

STANDARD 2951  
 SCALE: 3/16" = 1'-0"  
 REVISION SHEET 5 OF 16  
 CADD FILE: ES2951-05

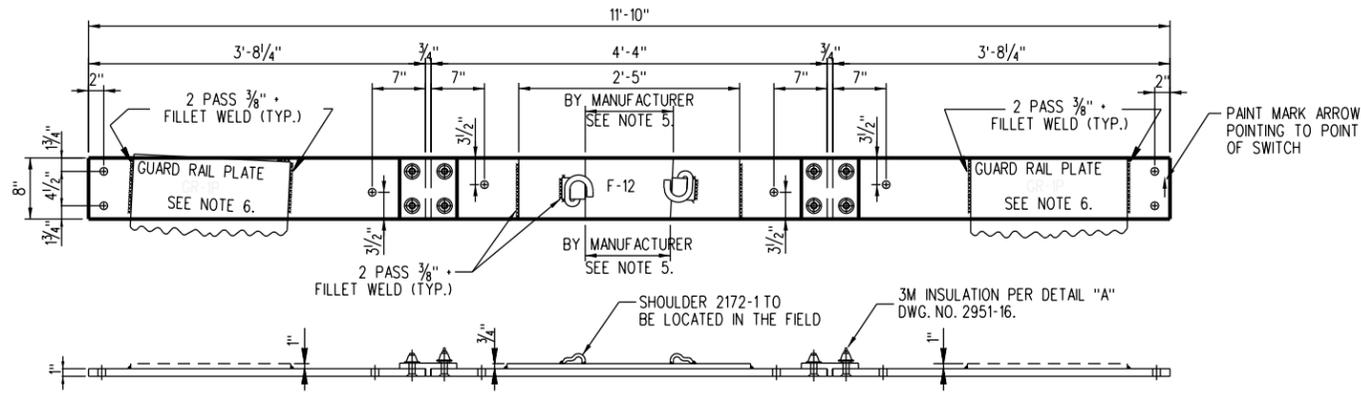


**NOTES:**

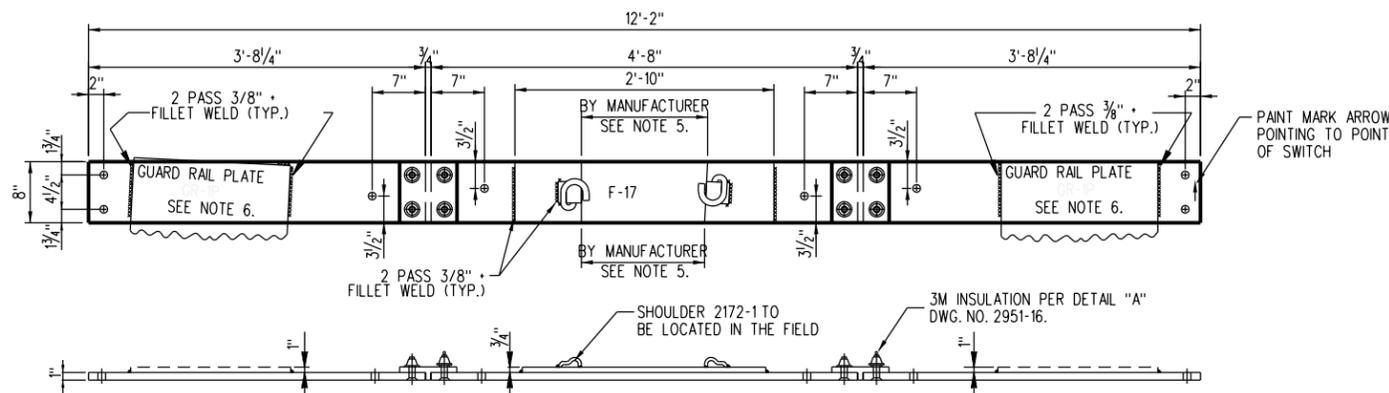
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 24, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE PANDROL TYPE, OR APPROVED EQUAL WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROLS DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS  $\frac{3}{8}$ " FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF SHOULDERS ON FROG PLATES FGP-1, FGP-2, AND FGP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS  $\frac{1}{2}$ " FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
6. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS  $\frac{1}{2}$ " FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

**INSTRUCTIONS FOR WELDING GUARD RAILS TO GAGE PLATES:**

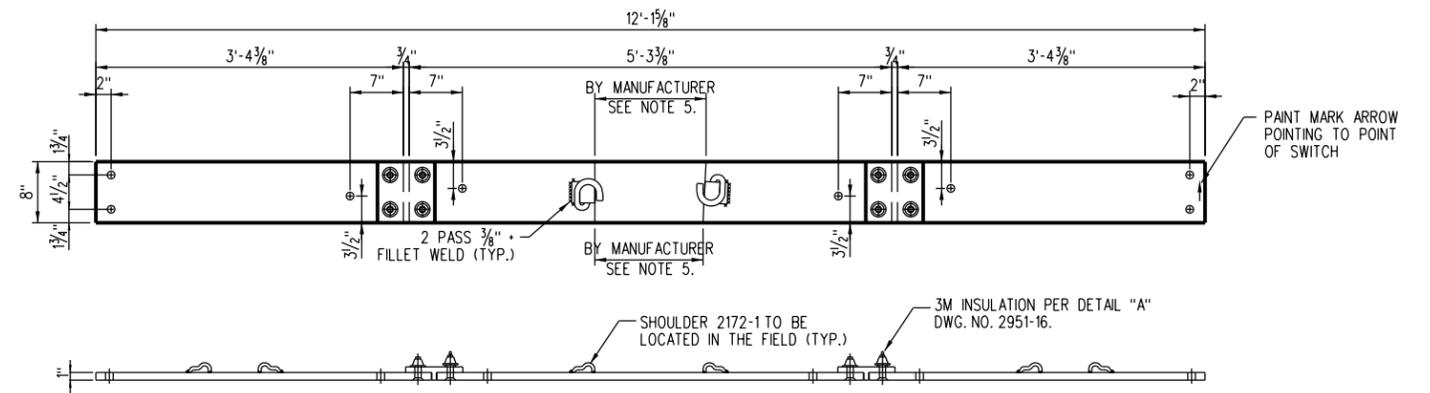
1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH PANDROL CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS  $\frac{1}{2}$ " FILLET WELD. FOR WELDING USE THE FOLLOWING:
  - A. ELECTRODE,  $\frac{5}{32}$  INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE,  $\frac{3}{16}$  INCH, WELDING SPEC. 7018XLM.
  - C. WIRE,  $\frac{3}{32}$  INCH, NR203, 1/2 NICKEL FLUX CORE
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY SCRRRA DIRECTOR OF ENGINEERING MAY BE USED.



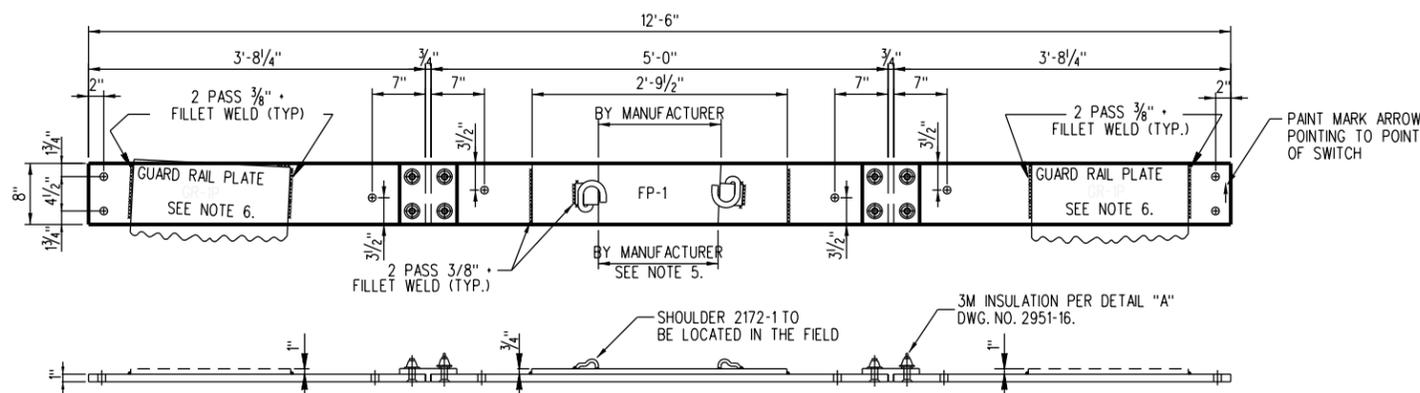
**INSULATED FROG GAGE PLATE - FGP-1**  
1" x 8" - FLAT - W/3M INSULATION (1PC. REQ'D. AS SHOWN)



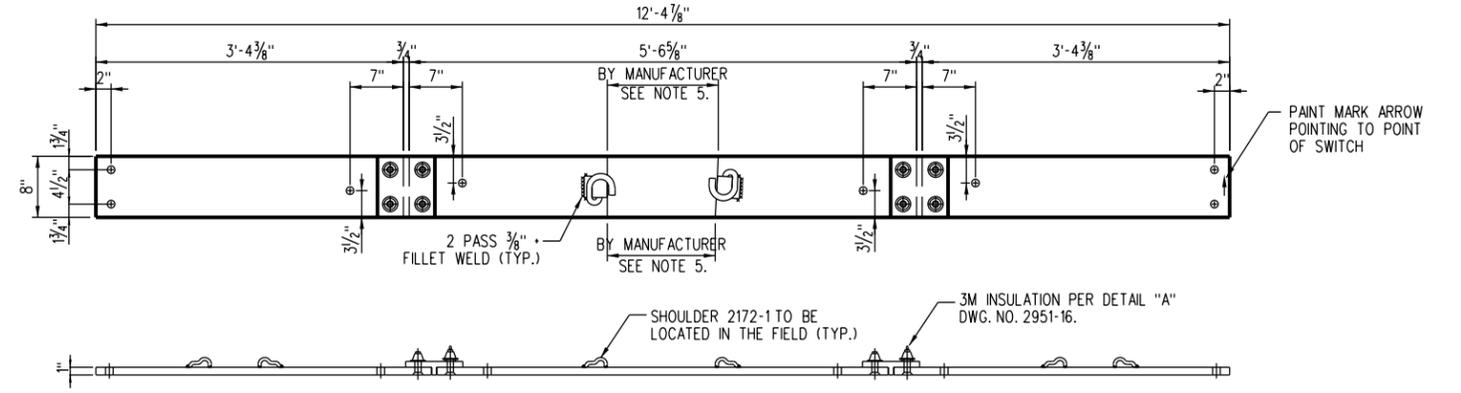
**INSULATED FROG GAGE PLATE - FGP-2**  
1" x 8" - FLAT - W/3M INSULATION (1PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FGP-4**  
1" x 8" - FLAT - W/3M INSULATION (1PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FGP-3**  
1" x 8" - FLAT - W/3M INSULATION (1PC. REQ'D. AS SHOWN)



**INSULATED FROG GAGE PLATE - FGP-5**  
1" x 8" - FLAT - W/3M INSULATION (1PC. REQ'D. AS SHOWN)

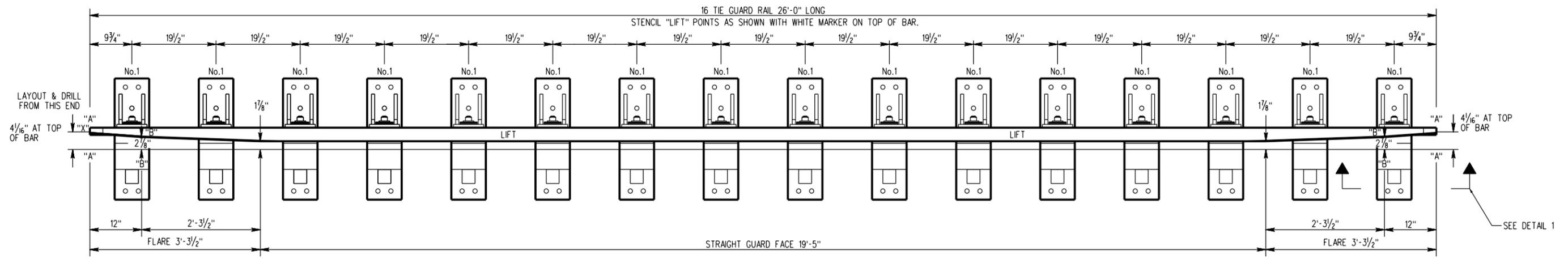
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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011 Assistant Director: STANDARDS & DESIGN Director of Engineering and Construction				

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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

ENGINEERING STANDARDS		STANDARD
NO. 24 136 LB. R.H. RBM FROG GAGE PLATE DETAILS		2951
SCALE:	1" = 1'-0"	
REVISION	SHEET	
-	7 OF 16	
CADD FILE:		ES2951-07



**COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"**

- "X" 9 3/4" x 2'-5 1/4" x 4'-0 3/4" x 5'-8 1/4" x 7'-3 3/4" x 8'-11 1/4" x 10'-6 3/4" x 12'-2 1/4" x 13'-9 3/4" x 15'-5 1/4" x 17'-0 3/4" x 18'-8 1/4" x 20'-3 3/4" x 21'-11 1/4" x 23'-6 3/4" x 25'-2 1/4"

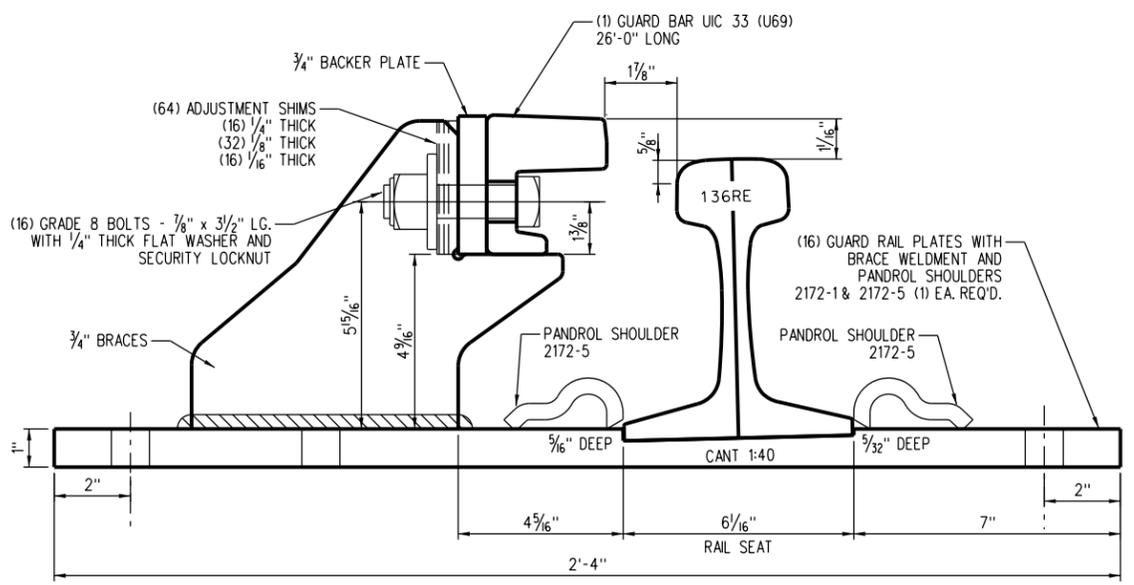
HOLES 1" DIA. ~ 1 3/8" A.B.

**ASSEMBLED 26'-0" GUARD RAIL**  
SCALE: 1" = 1'-0"

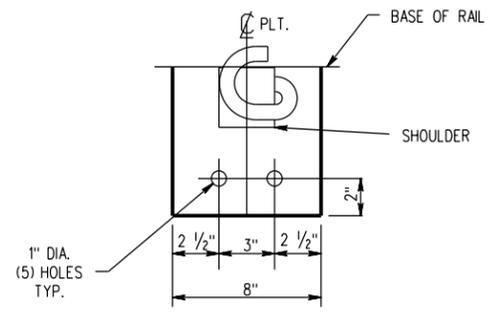
**NOTES:**

- GUARD RAIL SECTION UIC 33; (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
- BASE PLATE, BRACKET AND SHIMS MILD STEEL PER AREMA SPECIFICATION M7.
- GUARD RAIL BOLT AND NUT PER A.R.E.M.A SPECIFICATION M11. EXCEPT BOLT TO GRADE 8 AND NUT TO BE SECURITY LOCKNUT.
- WORKMANSHIP AND TOLERANCES PER AREMA SPECIFICATIONS FOR SPECIAL TRACKWORK.
- WELDING PER ANSI-AWS D1.1-92 OR LATEST REVISION.

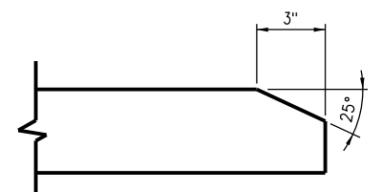
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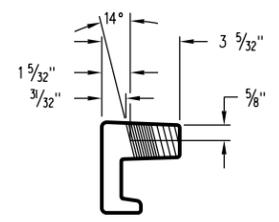
**TYPICAL PLATE DETAIL**  
SCALE: NONE



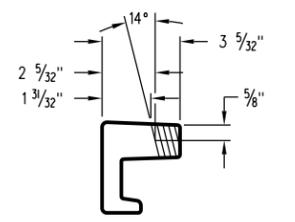
**TYPICAL PLATE PUNCHING DETAIL**  
SCALE: NONE



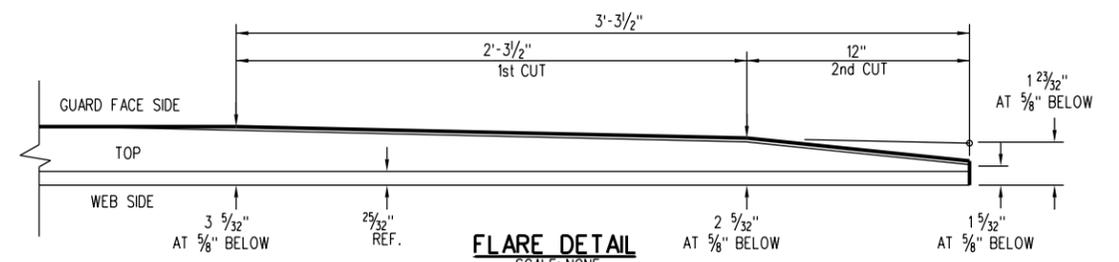
**DETAIL 1**  
SCALE: NONE



**SECTION A-A**  
SCALE: NONE



**SECTION B-B**  
SCALE: NONE



**FLARE DETAIL**  
SCALE: NONE  
BREAK SHARP CORNERS OF ALL MACHINED SURFACES

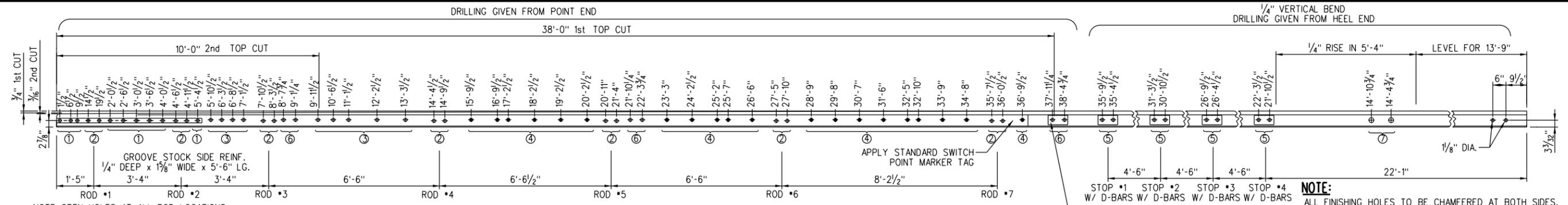
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS DATE: 03/31/2011				
 ASSISTANT DIRECTOR: STANDARDS & DESIGN				
 DIRECTOR OF ENGINEERING AND CONSTRUCTION				

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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

**ENGINEERING STANDARDS**  
NO. 24 136 LB. R.H. RBM FROG  
GUARD RAIL DETAILS

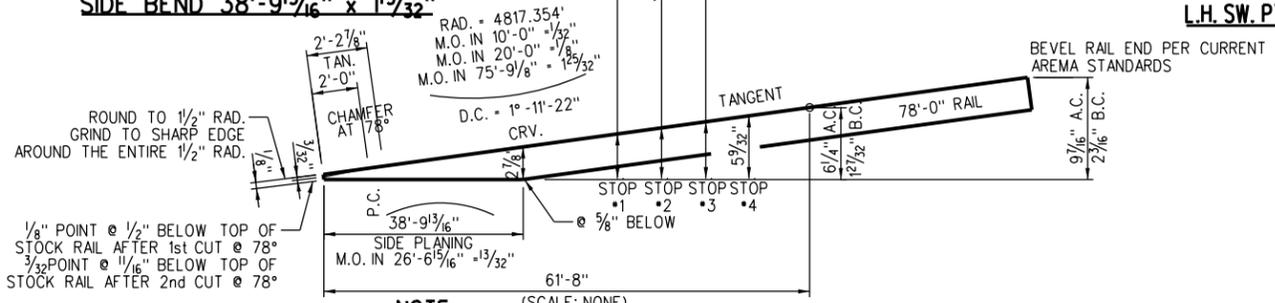
STANDARD	2951
SCALE:	1" = 1'-0"
REVISION	SHEET
-	8 OF 16
CADD FILE:	ES2951-08



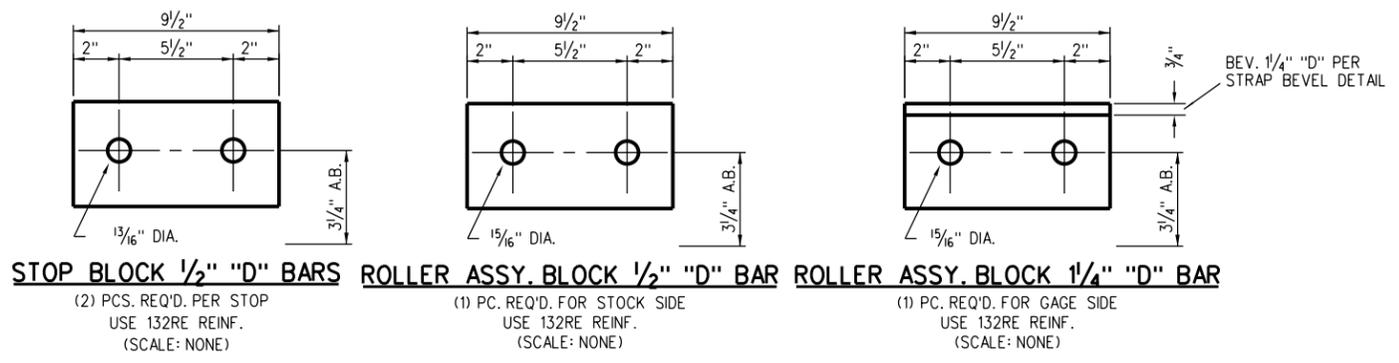
NOTE: OPEN HOLES AT ALL ROD LOCATIONS  
**SWITCH ANGLE = 0°-08'-00"**  
**SIDE BEND 38'-9 1/16" x 1 1/32"**

**R.H. SW. PT. (FOR LH TURNOUT) SHOWN**  
**L.H. SW. PT. (FOR RH TURNOUT) OPP. HAND**  
 (SCALE: 1/2" = 1'-0")

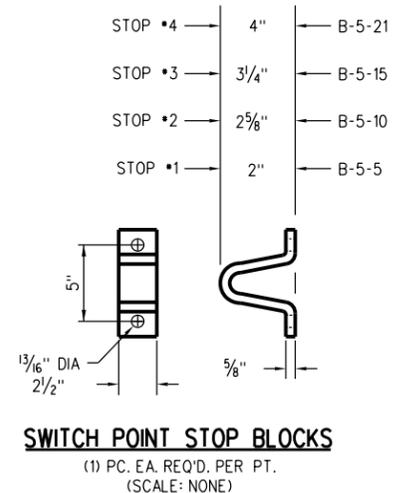
**NOTE:**  
 ALL FINISHING HOLES TO BE CHAMFERED AT BOTH SIDES.  
 BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY  
 REMOVED BY GRINDING, BEFORE CHAMFERING.



**NOTE:**  
 PLANE SIDE BEND TO FIT CURVED STOCK RAIL.  
 POINT SIDE BEND MUST HAVE CURVED WEB TO  
 CONFORM WITH CURVED WEB OF STOCK RAIL

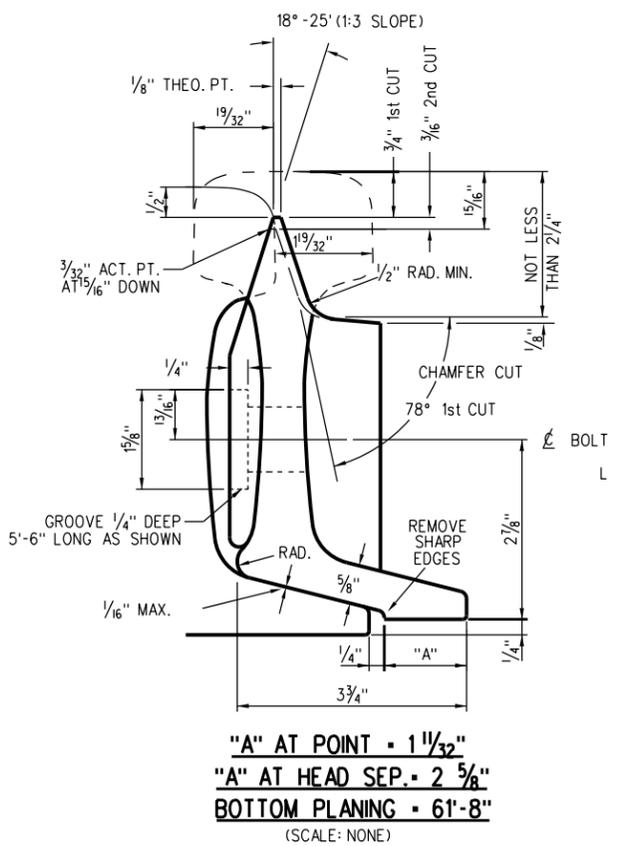


QUANTITIES SHOWN FOR (1) SWITCH POINT		
<b>REIN. BARS</b>	GAGE SIDE STOCK RAIL SIDE	1/4" "D" x 37'-0" LG. 1/2" "D" x 37'-0" LG. } USE 132RE REINF.
<b>CLIPS</b>	HEAD ROD BACK RODS	TYPE "MJS" (FURNISHED WITH ROD) TYPE "MJS" (FURNISHED WITH ROD)
<b>WEB BOLTS</b>	HEAD ROD BACK ROD	1" DIA. (FURNISHED WITH ROD) 1" DIA. (FURNISHED WITH ROD)
<b>ROD BOLTS</b>	HEAD ROD BACK ROD	1" DIA. (FURNISHED WITH ROD) 1" DIA. (FURNISHED WITH ROD)
<b>STOP BOLTS</b>	SEE BOLT TABLE	
<b>REIN BAR</b>	HUCKS - SEE BOLT TABLE BOLTS - SEE BOLT TABLE	
<b>INSTRUCTIONS</b>	RAIL TO BE 136RE HEAD HARDENED	

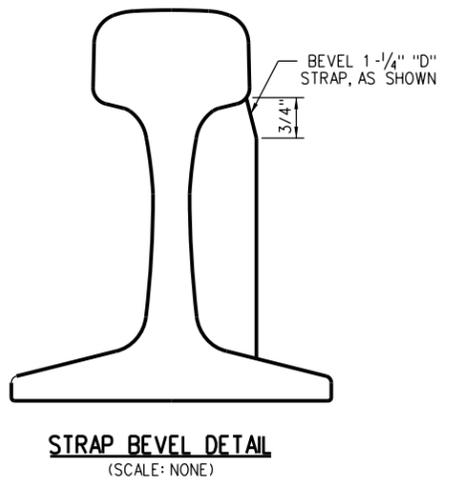


• HUCKS  
 ○ BOLTS

BOLT TABLE				
BOLT #	BOLT DESCRIPTION	QTY.	HOLE DIA.	A.B.
1	H.T. MACH., TH. SQ. HD., 1" x 4 1/2", DR. 4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1/16"	2 7/8"
2	NONE - OPEN TYPE "MJS" CLIP HOLES	—	1/16"	2 7/8"
3	H.T. MACH., TH. SQ. HD., 1" x 4 3/4", DR. 4 1/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1/16"	3 1/4"
4	HUCK PIN C50LR-BR-24-36 WITH COLLAR LC-2R-24	20	13/16"	3 1/4"
5	H.T. MACH., SQ. HD., 3/4" x 4 1/4", DR. 3 3/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	8	13/16"	3 1/4"
6	NONE - OPEN ROLLER HOLES	—	15/16"	3 1/4"
7	NONE - OPEN THERMAL STRESS BLOCK HOLES	—	1/2"	3 1/4"

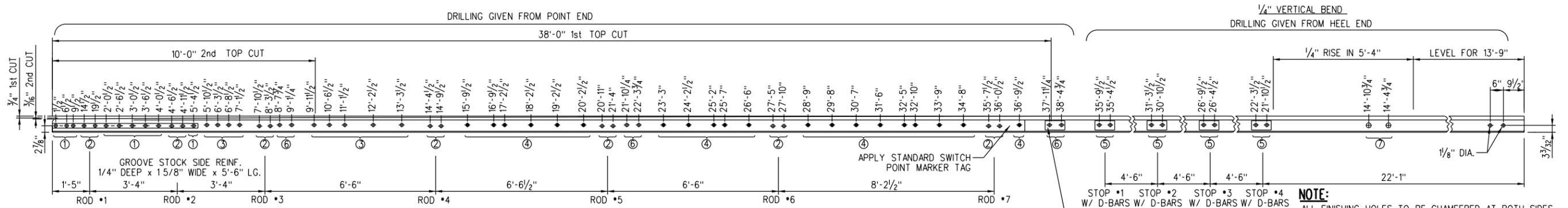


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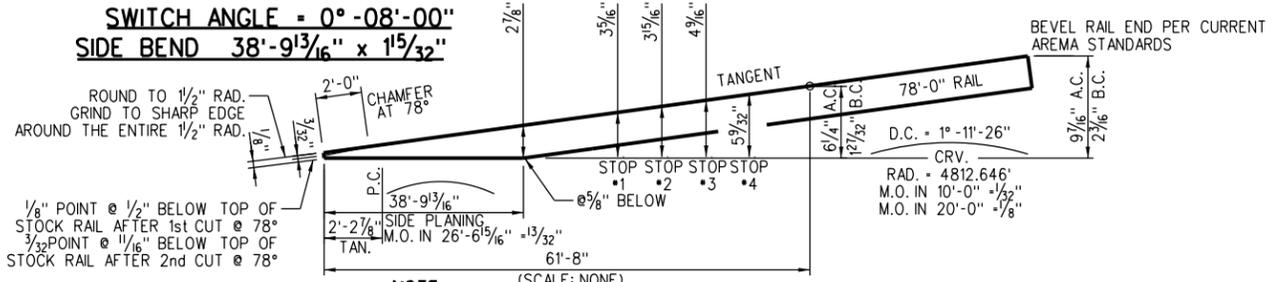


- NOTES:**
- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
  - CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
  - SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
  - MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
  - IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
  - THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
  - METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PERENTHESIS, THE ACTUAL LENGTH OF SWITCHPOINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 61'-8" (78'-0") NO. 24. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
  - UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
  - AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
  - MANGANESE TIP SHALL BE USED ON DIVERGING POINTS.

DRAWN BY: A. CARLOS DATE: 03/31/2011  ASSISTANT DIRECTOR- STANDARDS & DESIGN	SCRR ENGINEERING STANDARDS ARE INTENDED FOR SCRR APPROVED USES ONLY. FOR NON-SCRR APPROVED USES. SCRR SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SCRR. ALL RIGHTS RESERVED.	 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012	ENGINEERING STANDARDS NO. 24 CURVED SPLIT SWITCH POINT DETAILS	STANDARD 2951 SCALE: AS NOTED REVISION SHEET 9 OF 16 CADD FILE: ES2951-09
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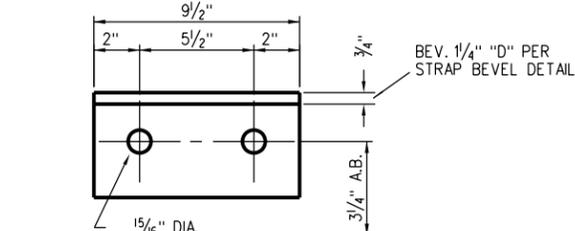
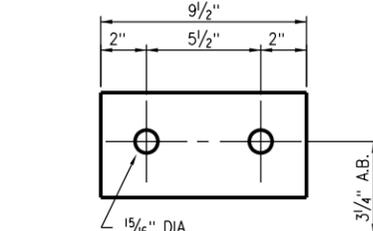
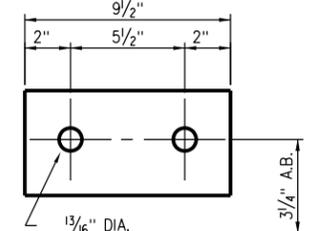


**NOTE:**  
ALL FINISHING HOLES TO BE CHAMFERED AT BOTH SIDES. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING, BEFORE CHAMFERING.

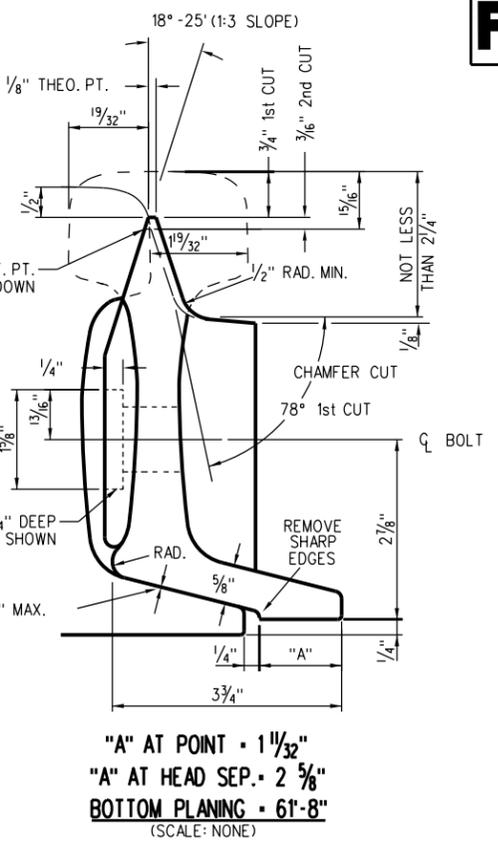
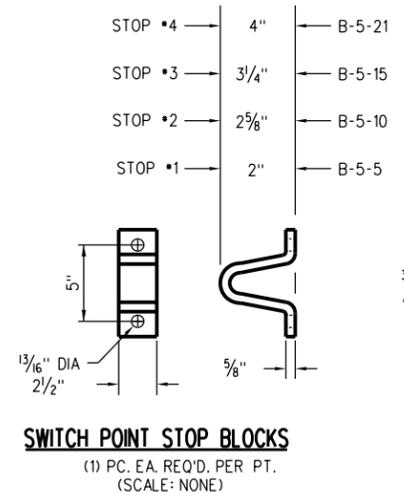


**NOTE:**  
PLANE SIDE BEND TO FIT CURVED STOCK RAIL. POINT SIDE BEND MUST HAVE CURVED WEB TO CONFORM WITH CURVED WEB OF STOCK RAIL

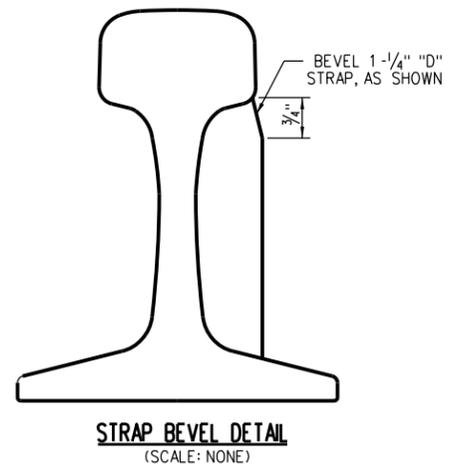
**R.H. SW. PT. (FOR RH TURNOUT) SHOWN**  
**L.H. SW. PT. (FOR LH TURNOUT) OPP. HAND**  
(SCALE: 1/2" = 1'-0")



QUANTITIES SHOWN FOR (1) SWITCH POINT	
<b>REIN. BARS</b>	GAGE SIDE 1/4" "D" x 37'-0" LG. } USE 132RE REINF. STOCK RAIL SIDE 1/2" "D" x 37'-0" LG.
<b>CLIPS</b>	HEAD ROD TYPE "MJS" (FURNISHED WITH ROD) BACK RODS TYPE "MJS" (FURNISHED WITH ROD)
<b>WEB BOLTS</b>	HEAD ROD 1" DIA. (FURNISHED WITH ROD) BACK ROD 1" DIA. (FURNISHED WITH ROD)
<b>ROD BOLTS</b>	HEAD ROD 1" DIA. (FURNISHED WITH ROD) BACK ROD 1" DIA. (FURNISHED WITH ROD)
<b>STOP BOLTS</b>	SEE BOLT TABLE
<b>REIN BAR</b>	HUCKS - SEE BOLT TABLE BOLTS - SEE BOLT TABLE
<b>INSTRUCTIONS</b>	RAIL TO BE 136RE HEAD HARDENED



# FOR MAINTENANCE ONLY

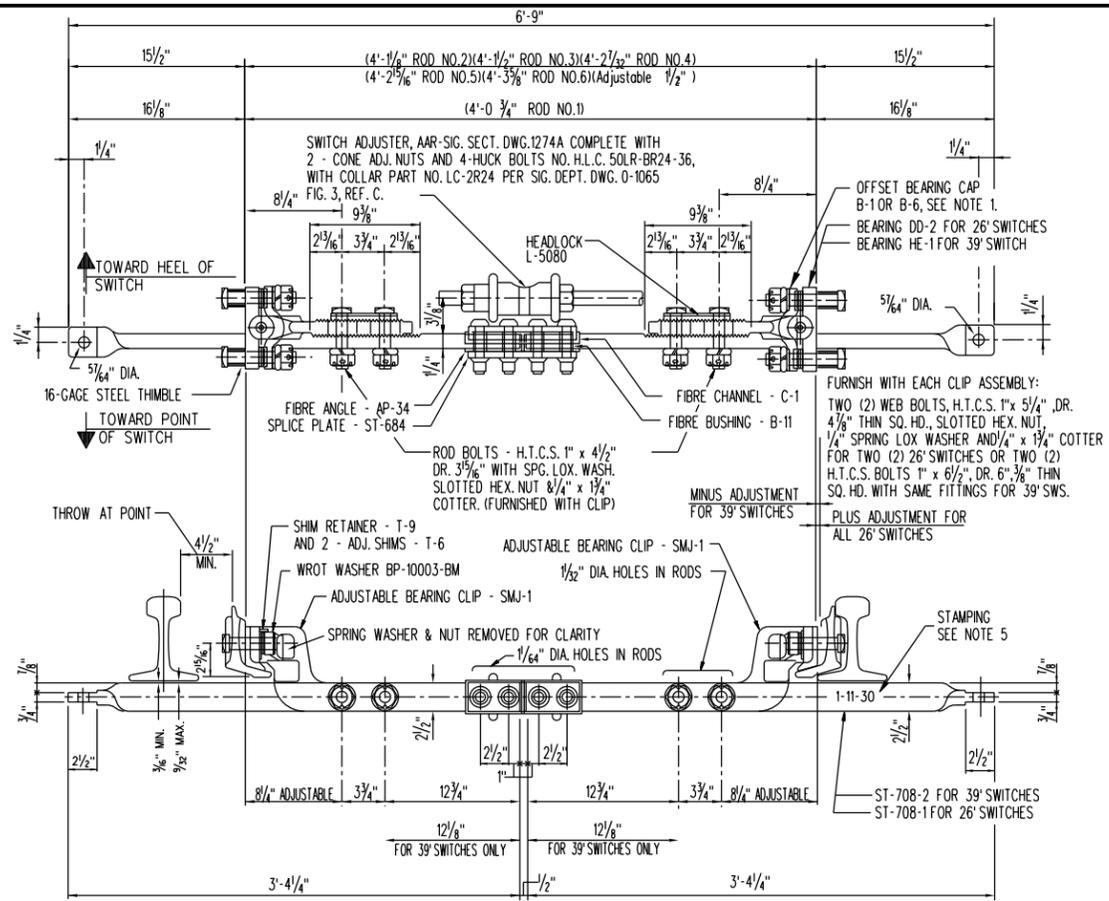


- NOTES:**
- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
  - CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
  - SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
  - MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
  - IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
  - THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
  - METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PERENTHESIS, THE ACTUAL LENGTH OF SWITCHPOINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 61'-8" (78'-0") NO. 24. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
  - UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
  - AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
  - MANGANESE TIP SHALL BE USED ON DIVERGING POINTS.

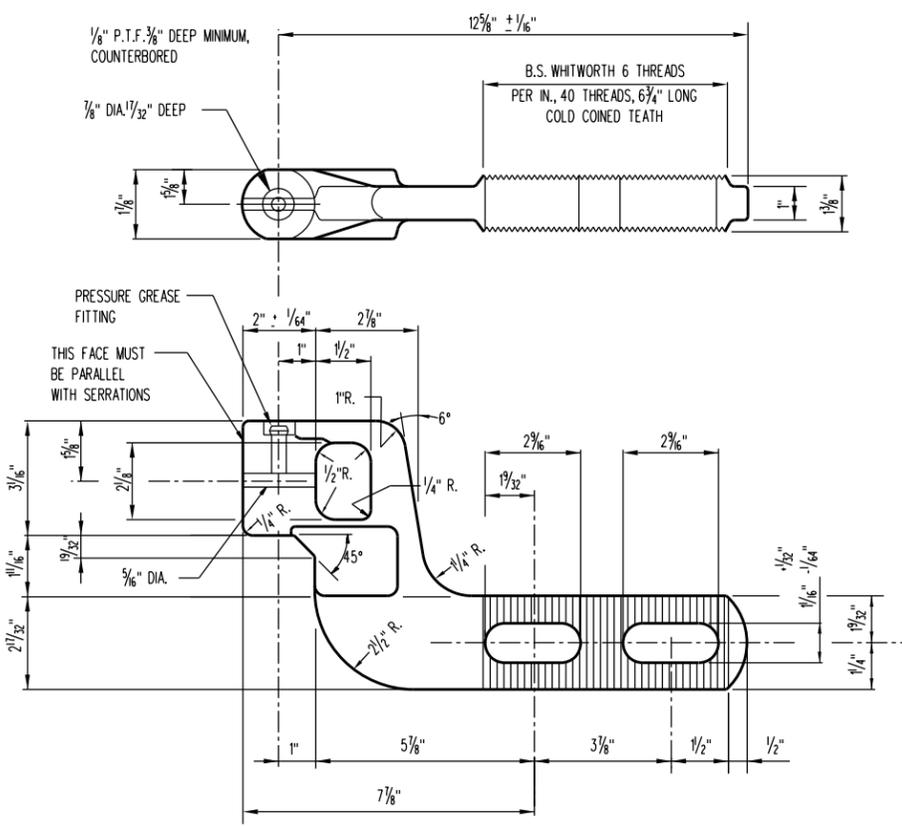
**BOLT TABLE**

BOLT #	BOLT DESCRIPTION	QTY.	HOLE DIA.	A.B.
1	H.T. MACH., TH. SQ. HD., 1" x 4 1/2", DR. 4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	2 7/8"
2	NONE - OPEN TYPE "MJS" CLIP HOLES	—	1 1/16"	2 7/8"
3	H.T. MACH., TH. SQ. HD., 1" x 4 3/4", DR. 4 1/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	3 1/4"
4	HUCK PIN C50LR-BR-24-36 WITH COLLAR LC-2R-24	20	1 3/16"	3 1/4"
5	H.T. MACH., SQ. HD., 3/4" x 4 1/4", DR. 3 3/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	8	1 3/16"	3 1/4"
6	NONE - OPEN ROLLER HOLES	—	15/16"	3 1/4"
7	NONE - OPEN THERMAL STRESS BLOCK HOLES	—	1/2"	3 1/4"

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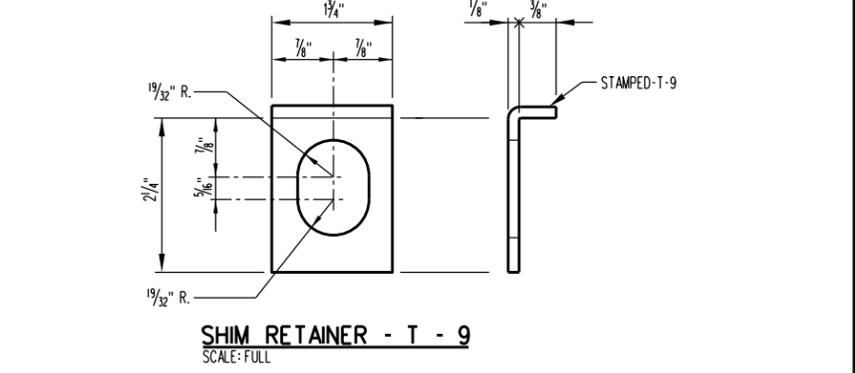
**NO. 1 SWITCH ROD ASSEMBLY**  
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



**ADJUSTABLE BEARING CLIP - SMJ - 1**  
SCALE: 3\"/>

BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E.1020-For.Stl.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	Web Bolt	SEE NOTE
26'	2	DD-2	Malleable Iron	Bearing	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	Malleable Iron	Bearing	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-For.Stl.	Offset Bearing Cap	HEAT TREATED - BRINELL -.225 to .250
All	4	T-9	S.A.E.1020	Shim Retainer	1/8" x 1 3/4" x 2 1/4"
All	12	T-6	Stainless Steel	Adjustment Shim	1/16" x 2" x 1 1/8"
All	4	BP-10003-BM	Wrot Iron	Wrot Washer	1/16" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	Rod Bolt	1" x 4 1/2" DR. 3 1/2" REG. SQ. HD. SLOTTED HEX NUT
All	4		Steel	Spg. Lox Washer	For 1" Rod Bolts
All	4		Steel	Cotter	1/4" x 1 3/4" FOR ROD BOLTS
All	2		Steel	Grease Fitting	PRESSURE - FOR BEARING CLIP
All	2	L-5080	Malleable Iron	Headlock	FOR ROD BOLTS
26'	2		16-Gage Steel	Thimble	1 1/2" LONG - FOR SHIPPING
39'	2		16-Gage Steel	Thimble	2 1/2" LONG - FOR SHIPPING

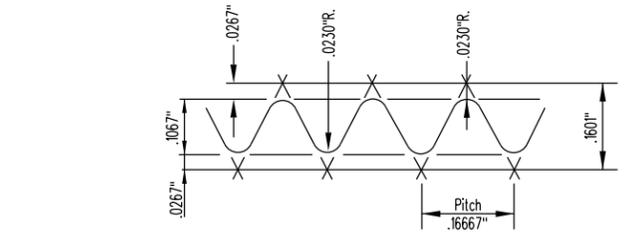
Material for Vertical Rod				
16'-6"	1		Vertical Rod	Use one-ST-708-1
				Use one-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1		Vertical Rod	Use one-ST-708-2
				Use one-ST-708-2 TWIST, MACHINE AND DRILL END HOLE



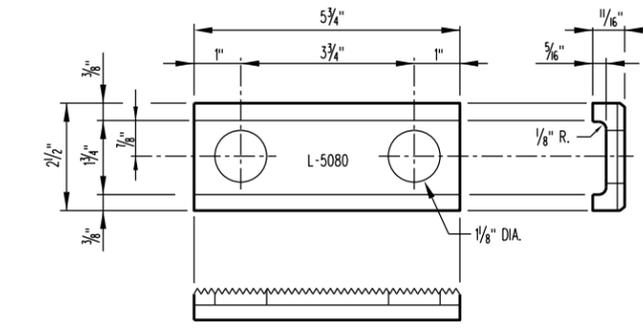
**SHIM RETAINER - T - 9**  
SCALE: FULL

- NOTES:**
- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
  - WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.
  - TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
  - MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
  - VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:  
1-39 FOR USE ON 39'-0" SWITCHES, 132-LB. AND 136-LB. R.E. RAIL SECTIONS.  
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115-LB., 119-LB., 131-LB., 132-LB. AND 136-LB. R.E. RAIL SECTIONS

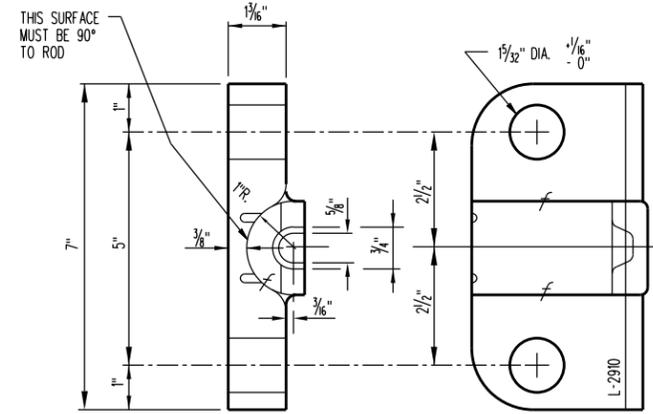
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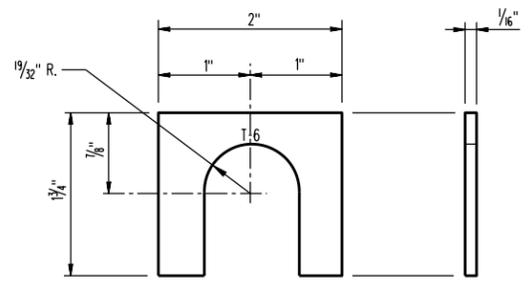
**ENLARGED PROFILE OF SERRATIONS**  
SCALE: NONE



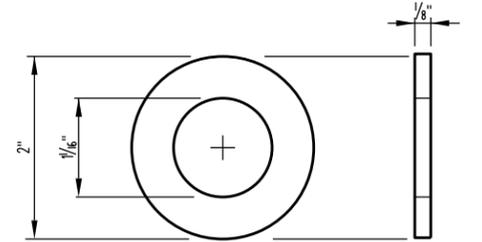
**HEADLOCK L-5080**  
SCALE: 6\"/>



**BEARING - DD - 2**  
SCALE: 6\"/>



**ADJUSTABLE SHIM - T - 6**  
SCALE: FULL



**WROT WASHER - BP - 10003 - BM**  
SCALE: FULL

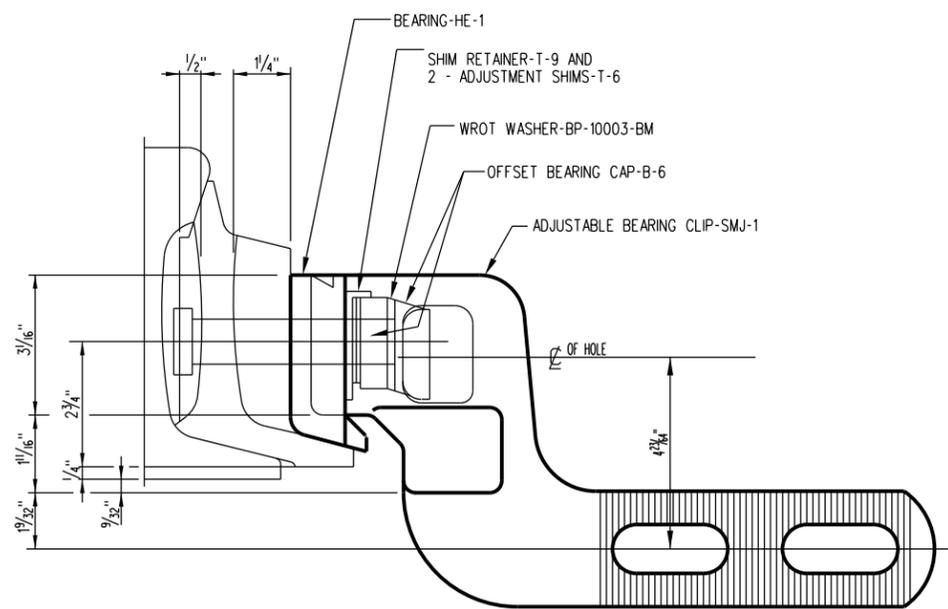
REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Papp*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

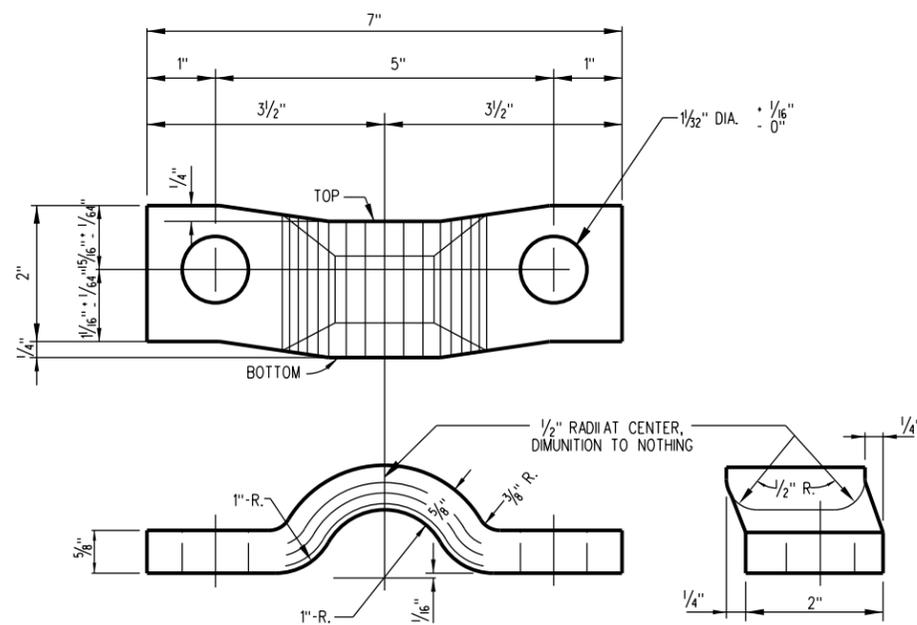
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**METROLINK**  
 SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

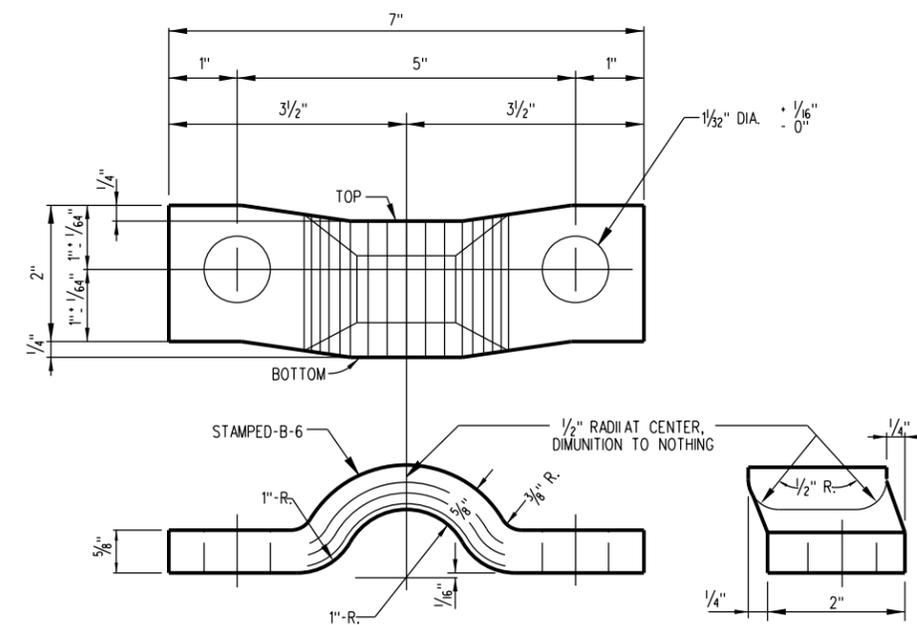
ENGINEERING STANDARDS		STANDARD
		2951
SCALE:		AS NOTED
REVISION	SHEET	11 OF 16
CADD FILE:	ES2951-11	



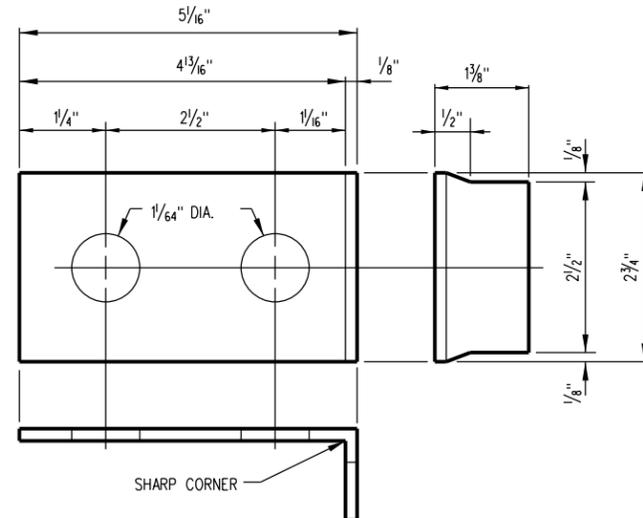
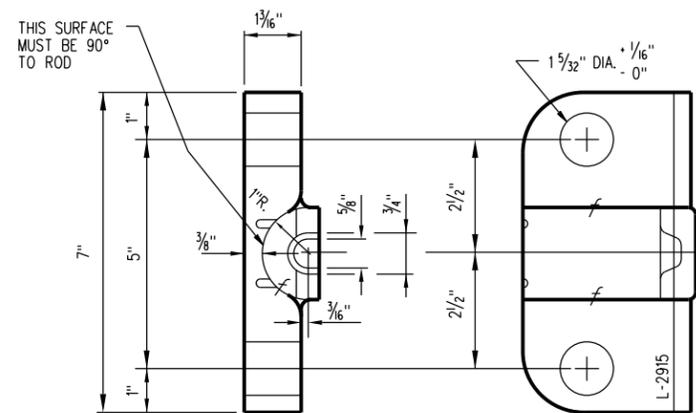
**ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES**  
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



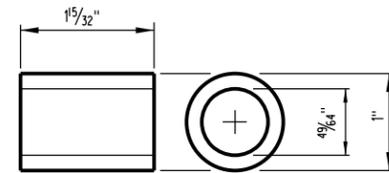
**OFFSET BEARING CAP-B-1**



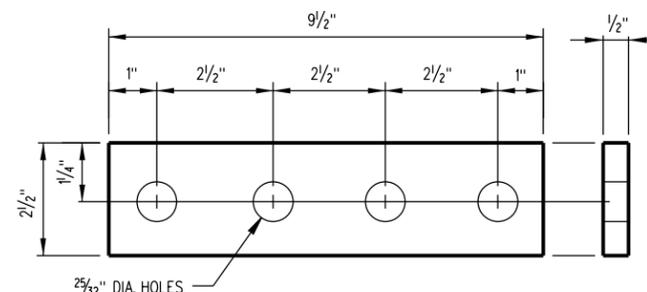
**OFFSET BEARING CAP-B-6**



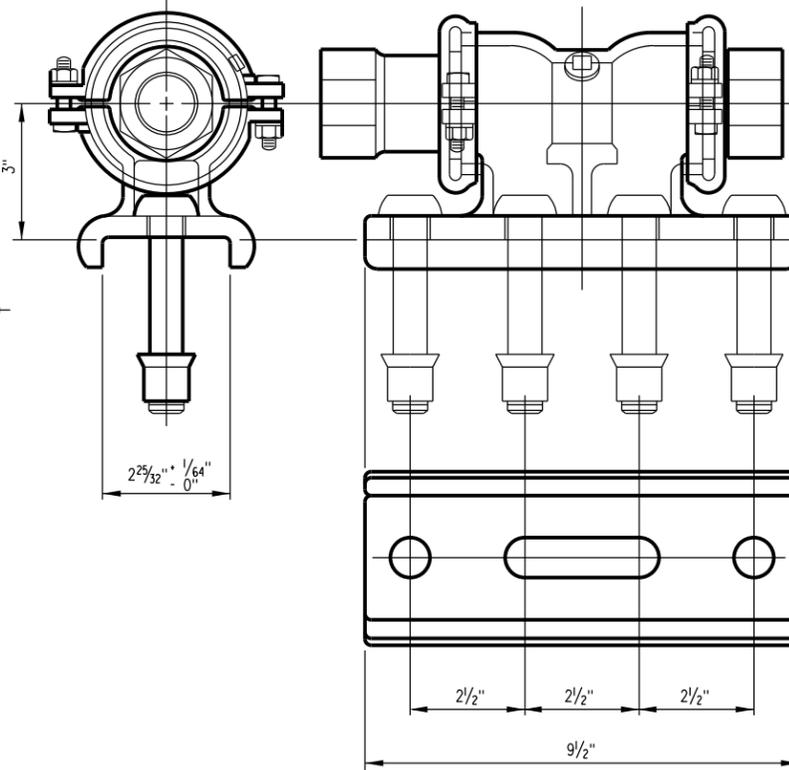
**FIBRE ANGLE-AP-34**



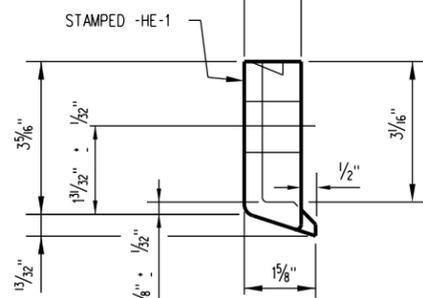
**FIBRE BUSHING-B-11**



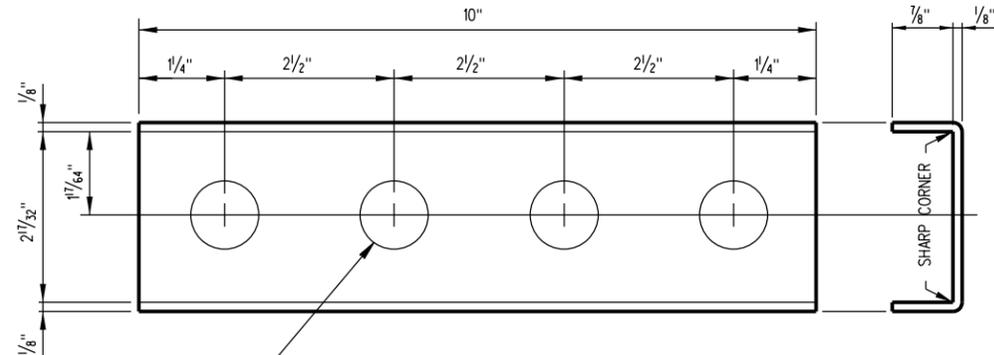
**SPLICE PLATE-ST-684**



**SWITCH ADJUSTER**



**BEARING-HE-1**



**FIBRE CHANNEL-C-1**

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REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011  
*Nareh D. Pape*  
 ASSISTANT DIRECTOR: STANDARDS & DESIGN  
*William Dava*  
 DIRECTOR OF ENGINEERING AND CONSTRUCTION

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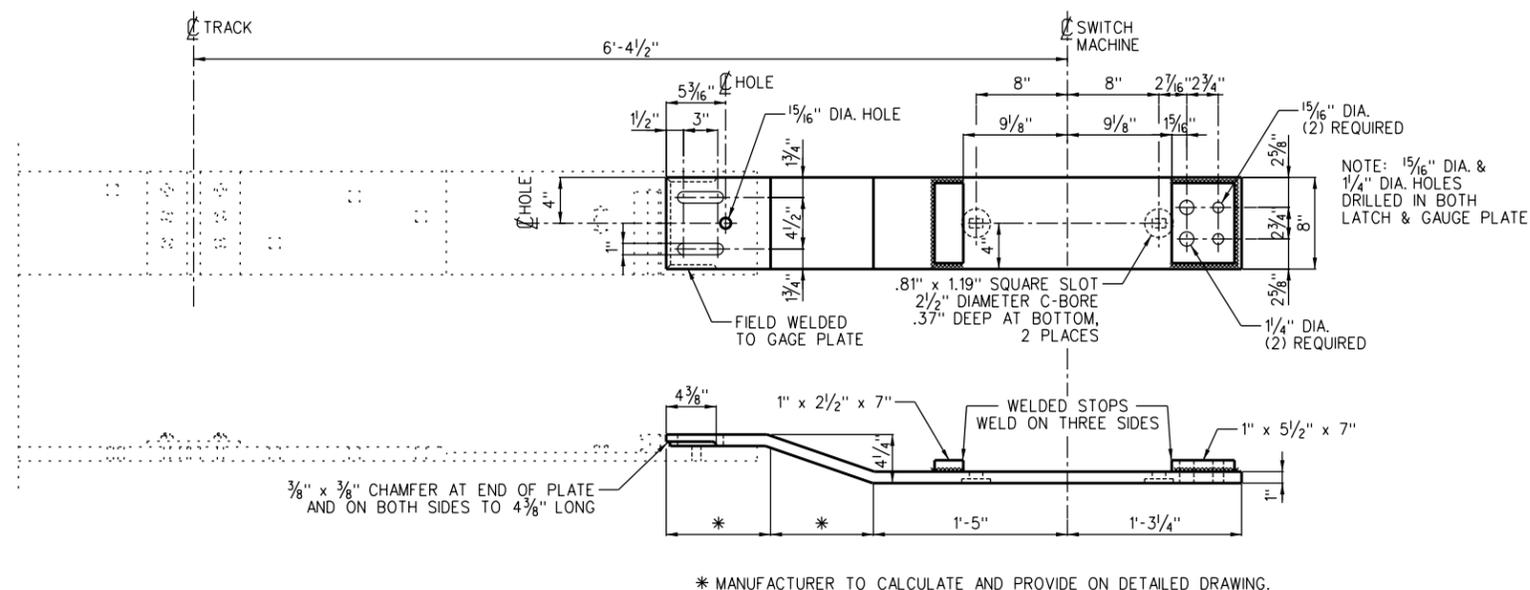
**METROLINK**

SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
 ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

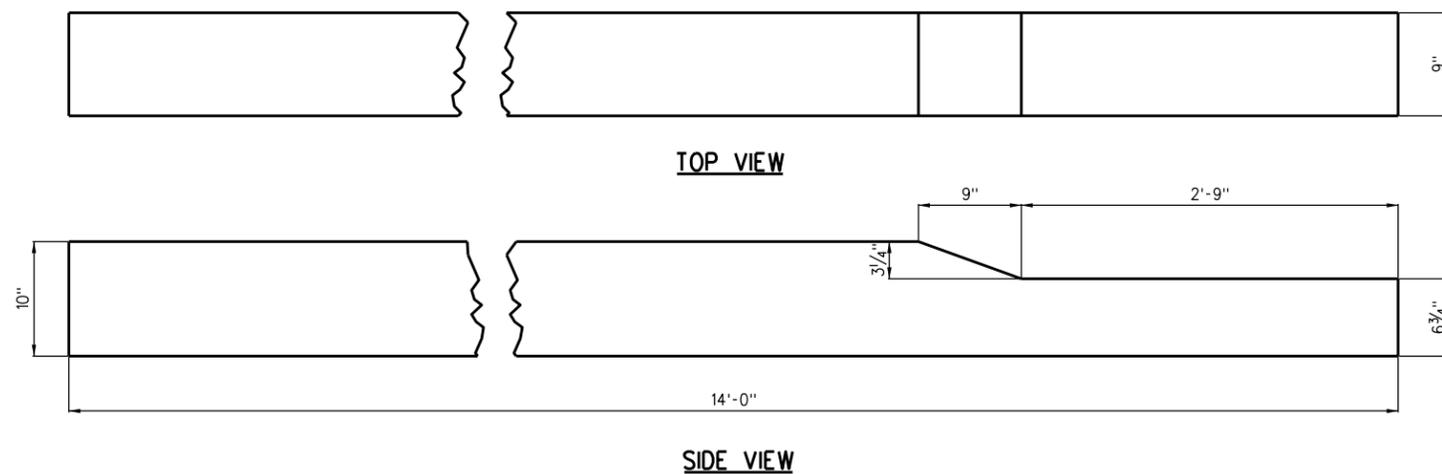
ENGINEERING STANDARDS

NO. 24 SWITCH ROD MISCELLANEOUS DETAILS

STANDARD	2951
SCALE	AS NOTED
REVISION SHEET	12 OF 16
CADD FILE	ES2951-12



**EXTENSION PLATE**  
(2 PCS. REQ'D. AS SHOWN)



TIES SHALL BE MADE OF DOUGLAS FIR OR GUM AND TREATED AFTER FRAMING.

**DAP TIE**  
(2 PCS. REQ'D. AS SHOWN)

**US&S M23-A SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS.**

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

DRAWN BY: A. CARLOS DATE: 03/31/2011

*Nareh D. Papp*  
ASSISTANT DIRECTOR: STANDARDS & DESIGN

*William D. Davis*  
DIRECTOR OF ENGINEERING AND CONSTRUCTION

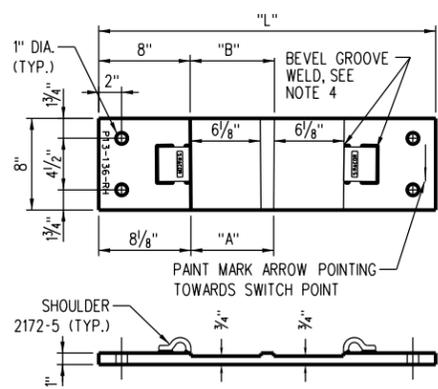
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ENGINEERING STANDARDS

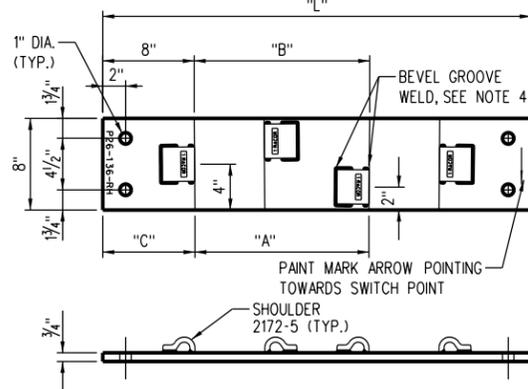
NO. 24 EXTENSIONS PLATE AND DAP TIE DETAILS FOR M-23A SWITCH MACHINE

STANDARD	2951
SCALE:	1/2" = 1'-0"
REVISION SHEET	- 13 OF 16
CADD FILE:	ES2951-13



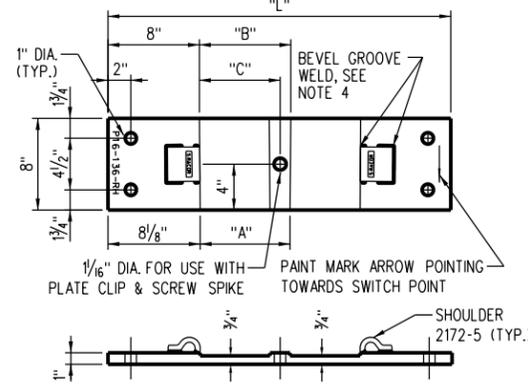
HEEL PLATE H-5P  
TURNOUT PLATES P-13 THRU P-15  
1" x 8" x "L" LONG

PLATE	"A"	"B"	"L"	QTY.
*H-5P	6 11/32"	6 15/32"	2'-5"	2
*P-13	6 5/8"	6 3/4"	2'-5"	2
*P-14	6 15/16"	7 1/16"	2'-5"	2
*P-15	7 1/4"	7 3/8"	2'-5 1/2"	2



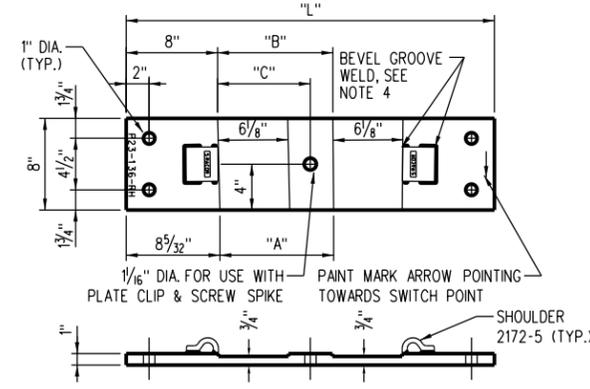
TURNOUT PLATES P-26 THRU P-37  
1" x 8" x "L" LONG

PLATE	"A"	"B"	"C"	"L"	QTY.
*P-26	11 1/16"	11 7/32"	8 5/32"	2'-9 1/2"	2
*P-27	11 15/32"	11 5/8"	8 5/32"	2'-9 1/2"	2
*P-28	11 7/8"	12 1/32"	8 5/32"	2'-10"	2
*P-29	12 9/32"	12 7/16"	8 5/32"	2'-10 1/2"	2
*P-30	12 11/16"	12 27/32"	8 5/32"	2'-11"	2
*P-31	13 1/8"	13 9/32"	8 5/32"	2'-11 1/2"	2
*P-32	13 17/32"	13 23/32"	8 3/16"	3'-0"	2
*P-33	13 31/32"	14 5/32"	8 3/16"	3'-0"	2
*P-34	14 13/32"	14 19/32"	8 3/16"	3'-1"	2
*P-35	14 7/8"	15 1/16"	8 3/16"	3'-1"	2
*P-36	15 5/16"	15 1/2"	8 3/16"	3'-1 1/2"	2
*P-37	15 25/32"	15 31/32"	8 3/16"	3'-2"	2

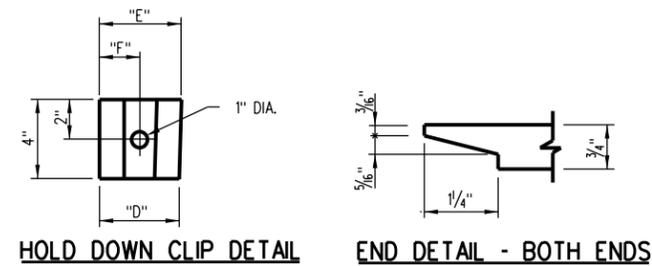


TURNOUT PLATES ~ P-16 THRU P-22  
1" x 8" x "L" LONG

PLATE	"A"	"B"	"C"	"L"	QTY.
*P-16	7 17/32"	7 21/32"	6 7/8"	2'-6"	2
*P-17	7 7/8"	8"	7 1/16"	2'-6"	2
*P-18	8 3/16"	8 5/16"	7 7/32"	2'-7"	2
*P-19	8 17/32"	8 21/32"	7 13/32"	2'-7"	2
*P-20	8 7/8"	9"	7 9/16"	2'-7"	2
*P-21	9 7/32"	9 11/32"	7 3/4"	2'-8"	2
*P-22	9 9/16"	9 11/16"	7 29/32"	2'-8"	2
*P-23	9 15/16"	10 3/32"	8 3/32"	2'-8"	2
*P-24	10 5/16"	10 15/32"	8 9/32"	2'-8 1/2"	2
*P-25	10 11/16"	10 27/32"	8 15/32"	2'-9"	2

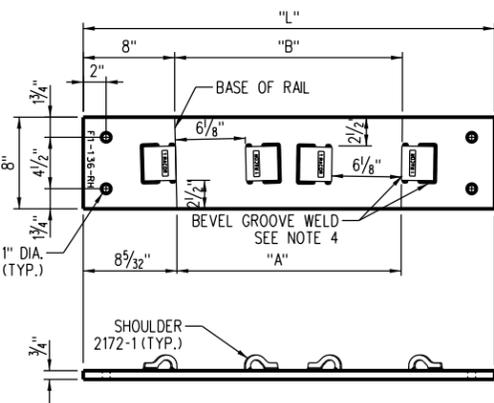


TURNOUT PLATES ~ P-23 THRU P-25  
1" x 8" x "L" LONG



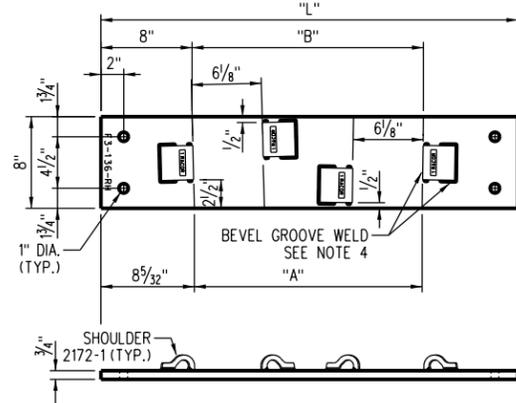
- NOTES:**
- PLATES TO BE MADE OF MILD ROLLED STEEL.
  - EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NUMBER AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H.)
  - THE "PANDROL" TYPE OR APPROVED EQUAL WELD ON PRESSED SHOULDER, MADE OF MILD STEEL, AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
  - THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" FILLET WELD ALONG THE BEVELLED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  - THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 24 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT PLATES P-13 THRU P-37 INCLUSIVE AND FROG PLATE F-1 THRU F-36 ARE TO OPPOSITE. DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET 2951-03 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

- WELDING SPECIFICATIONS:**
- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" WELD.
  - STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" FILLET WELD.
  - SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
  - FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS FOR ADJUSTABLE USE THE FOLLOWING:
    - ELECTRODE 1/32" INCH, WELDING SPEC. 7018XLM.
    - ELECTRODE 3/64" INCH, WELDING SPEC. 7018XLM.
    - WIRE, WELDING 3/32" INCH, NR203, 1% NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY DIRECTOR OF ENGINEERING, MAY BE USED.



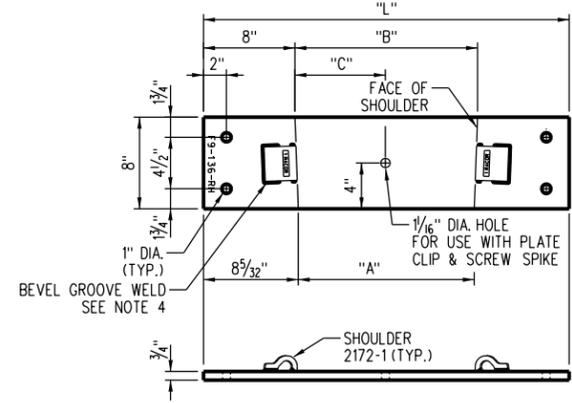
FROG PLATES ~ F-1 AND F-2 AND F-37 THRU F-40  
3/4" x 8" x "L" LONG

PLATE	"A"	"B"	"L"	QTY.
*F-1	21 1/32"	21 2/32"	3'-2"	1
*F-2	20 2/32"	21 1/32"	3'-1"	1
*F-37	19 5/8"	19 5/16"	3'-0"	1
*F-38	20 1/16"	20 3/4"	3'-1"	1
*F-39	21 9/32"	21 9/32"	3'-1 1/2"	1
*F-40	22 1/8"	9 11/32"	3'-2"	1



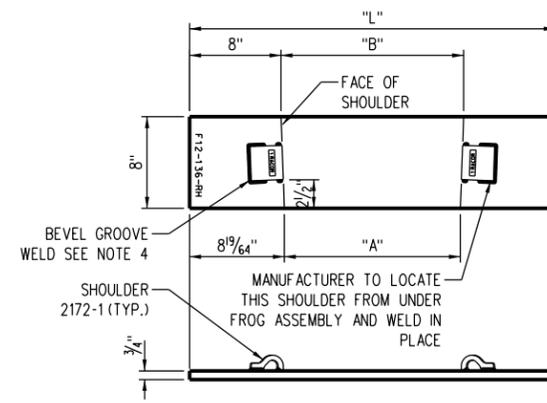
FROG PLATES ~ F-3 THRU F-8 AND F-33 THRU F-36  
3/4" x 8" x "L" LONG

PLATE	"A"	"B"	"L"	QTY.
*F-3	19 29/32"	20 1/32"	3'-0 1/2"	1
*F-4	19 3/32"	19 13/32"	2'-11 1/2"	1
*F-5	18 5/8"	18 5/8"	2'-10 1/2"	1
*F-6	17 1/2"	17 13/16"	2'-10"	1
*F-7	16 23/32"	17 1/32"	2'-9"	1
*F-8	15 29/32"	16 1/32"	2'-8 1/2"	1
*F-33	16 1/32"	16 2/32"	2'-9"	1
*F-34	17 5/32"	17 19/32"	2'-9 1/2"	1
*F-35	17 3/32"	18 7/32"	2'-10 1/2"	1
*F-36	18 29/32"	19 3/32"	2'-11"	1



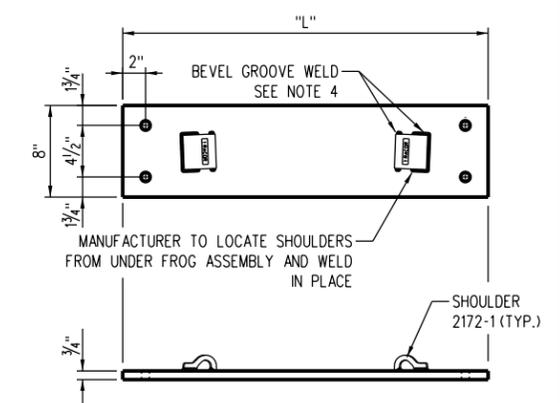
FROG PLATES ~ F-9 THRU F-11, F-13, F-27 THRU F-29, F-31 AND F-32  
3/4" x 8" x "L" LONG

PLATE	"A"	"B"	"C"	"L"	QTY.
*F-9	15 3/32"	15 13/32"	7 23/32"	2'-7 1/2"	1
*F-10	14 9/32"	14 19/32"	7 5/16"	2'-6 1/2"	1
*F-11	13 15/32"	13 25/32"	6 29/32"	2'-6"	1
*F-13	11 27/32"	12 5/32"		2'-4"	1
*F-27	11 15/32"	11 29/32"		2'-4"	1
*F-28	12 9/32"	12 19/32"		2'-4 1/2"	1
*F-29	13 3/32"	13 13/32"		2'-5 1/2"	1
*F-31	14 23/32"	15 1/32"	7 11/32"	2'-7"	1
*F-32	15 11/32"	15 23/32"	7 15/16"	2'-8"	1



FROG PLATES ~ F-12, F-17 AND F-22  
3/4" x 8" x "L" LONG

PLATE	"A"	"B"	"L"	QTY.
*F-12	12 29/32"	12 31/32"	2'-5"	2
*F-17	--	--	2'-10"	2
*F-22	--	--	2'-9 1/2"	2



FROG PLATES ~ F-14 THRU F-16, F-18 THRU F-21 AND F-23 THRU F-25  
3/4" x 8" x "L" LONG

PLATE	"L"
F-14	2'-6"
F-15	2'-8 1/2"
F-16	2'-9"
F-18	2'-11"
F-19	2'-11 1/2"
F-20	2'-11"
F-21	2'-8 1/2"
F-23	2'-10"
F-24	2'-11"
F-25	2'-11 1/2"

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

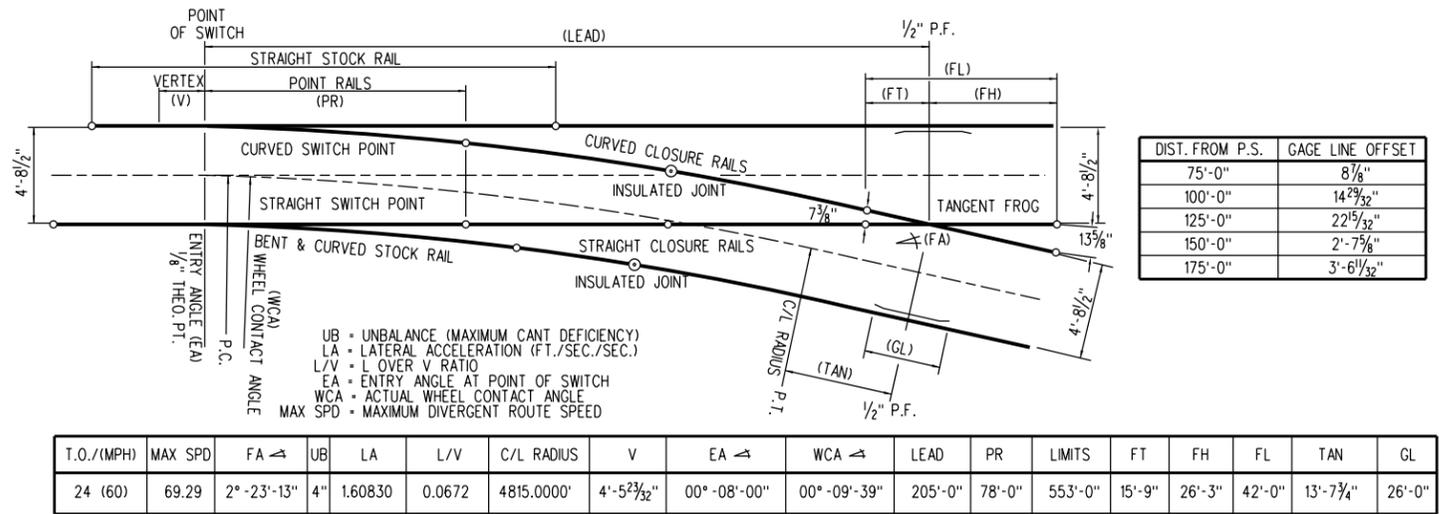
DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director-Standards & Design  
Director of Engineering and Construction

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**METROLINK**  
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY  
ONE GATEWAY PLAZA, 12TH FLOOR, L. A., CA. 90012

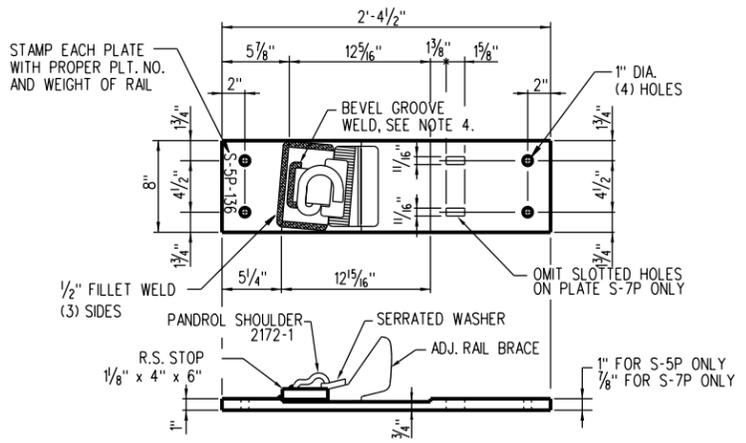
ENGINEERING STANDARDS	STANDARD 2951
NO. 24 TURNOUT AND FROG PLATE DETAILS	SCALE: 1/2" = 1'-0"
	REVISION SHEET 14 OF 16
	CADD FILE: ES2951-14



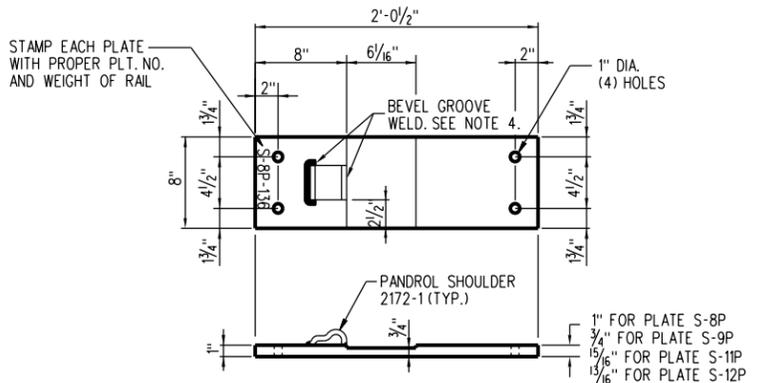
**SPECIFICATIONS:**

TURNOUT & FROG ANGLE : STD. No.24 - 2°-23'-13"  
 RAIL: 136RE HEAD HARDENED  
 FLANGEWAYS: 1 1/8" WIDE x 1 1/8" DEEP (MIN. DEPTH)  
 JOINT DRILLING: 9 1/2" x 6" - 3/8" DIA. - 3 3/32" A.B.  
 EXCEPT INSULATED JOINTS: 3 1/2" x 6" x 6" - 1/8" DIA. - 3 3/32" A.B.  
 JOINT GAPS: 0" STD. - 3/16" INSUL.  
 SWITCH POINTS: 61'-8" LONG TANGENTIAL ALIGNMENT (78'-0" LONG RAIL), POINT DETAIL PER A.R.E.M.A. 5100  
 STOCK RAILS: 78'-0" SAMSON UNDERCUT  
 SWITCH RODS: VERTICAL TYPE WITH "SMJ" CLIPS - 1/4" x 2 1/2"  
 SWITCH PLATES: INSUL. GAGE PLATES - 1" x 8" MILLED WITH BOLTLESS ADJUSTABLE BRACE  
 SLIDE PLATES - 1" x 8" MILLED WITH PANDROL CLIPS  
 BRACE PLATES - 1" x 8" MILLED WITH BOLTLESS ADJUSTABLE BRACE  
 ROLLER ASSY. PLATES - 1" x 8" MILLED WITH PANDROL CLIPS & ROLLER ASSY.  
 TURNOUT PLATES \*HP-5 & \*P-25 - 1" x 8" FLAT WITH PANDROL CLIPS & PLATE CLIPS (WHERE SHOWN)  
 TURNOUT PLATES \*P-26 TO P-37 - 3/4" x 8" FLAT WITH PANDROL CLIPS  
 GUARD RAILS: H.T. UIC-33 (U-69) - 26'-0" LONG ADJUSTABLE GUARD RAIL - 1/2" RAISED  
 STANDARD TIE PLATES: PANDROL ROLLED SHOULDER  
 FROG: NO. 24 RACOR RAILBOUND MANG. FROG - 42'-0" LG. - HI-INTEGRITY - MITERED HEEL - EXPLOSION HARDENED  
 FROG PLATES: TIE PLATES - 3/4" x 8" FLAT WITH PANDROL CLIPS  
 INSUL GAGE PLATES - 1" x 8" FLAT WITH PANDROL CLIPS

**NO. 24 TANGENTIAL TURNOUT GEOMETRY**  
(SCALE: NONE)



**BRACE SLIDE PLATE - S-5P & S-7P**  
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE  
 16 - S-5P PLATES REQUIRED AS SHOWN  
 2 - S-7P PLATES REQUIRED AS SHOWN  
 (SCALE: NONE)



**SLIDE PLATE - S-8P, S-9P, S-11P & S-12P**  
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP  
 40 - S-8P PLATES REQUIRED AS SHOWN  
 2 - S-9P PLATES REQUIRED AS SHOWN  
 2 - S-11P PLATES REQUIRED AS SHOWN  
 2 - S-12P PLATES REQUIRED AS SHOWN  
 (SCALE: NONE)

**NOTES:**

- PLATES TO BE MADE OF MILD ROLLED STEEL.
- EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NUMBER AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H)
- THE "PANDROL" TYPE OR APPROVED EQUAL WELD ON PRESSED SHOULDER, MADE OF MILD STEEL, AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
- THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 24 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT PLATES P-13 THRU P-37 INCLUSIVE AND FROG PLATE F-1 THRU F-36 ARE TO BE OPPOSITE.
- DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET 2951-03 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

**WELDING SPECIFICATIONS:**

- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
- STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
- SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
- FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS USE THE FOLLOWING:
  - A. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.
  - B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
  - C. WIRE, WELDING 3/32 INCH, NR203, 1/2 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY DIRECTOR OF ENGINEERING, MAY BE USED.

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX

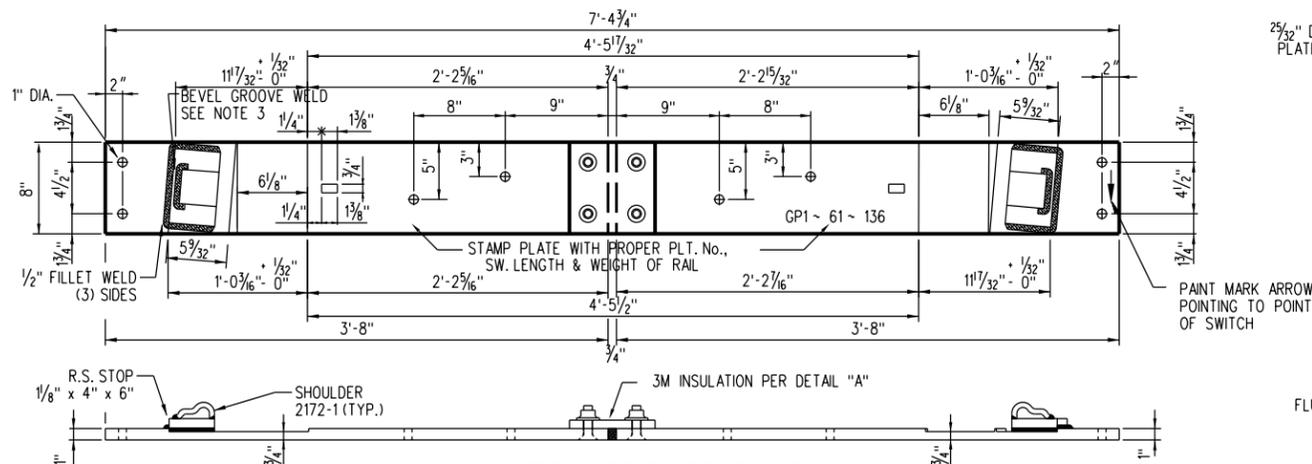
DRAWN BY: A. CARLOS DATE: 03/31/2011

Assistant Director: Standards & Design  
 Director of Engineering and Construction

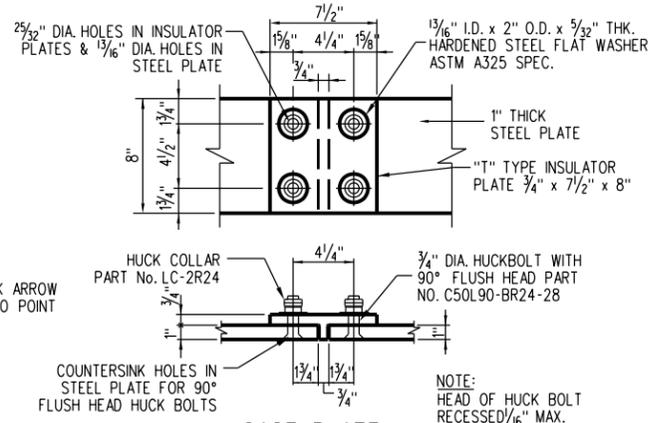
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ENGINEERING STANDARDS	STANDARD	2951
NO. 24 SWITCH PLATE DETAILS & TRACK GEOMETRY	SCALE:	NONE
	REVISION SHEET	15 OF 16
	CADD FILE:	ES2951-15



**INSULATED GAGE PLATE GP-1-R**  
1" x 8" "MILLED" W/3M INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D. AS SHOWN)

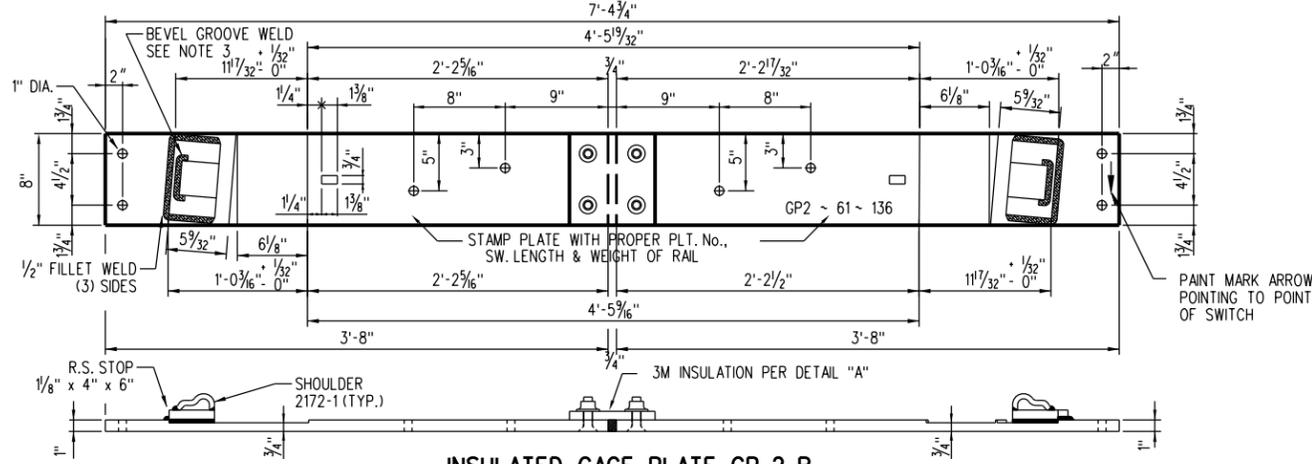


**GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77**

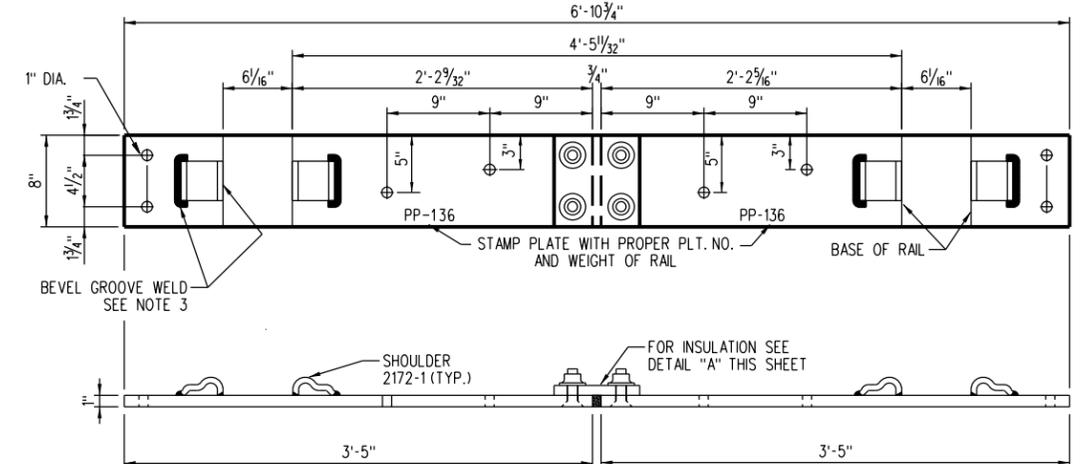
**DETAIL OF INSULATION BLOCK**  
POLYESTER COATED STEEL CORE  
W/ BUSHINGS, PORTEC #127-07547-01  
OR FIBERGLASS REINFORCED THERMOSET RESIN.  
PURCHASE PART NO. GPI52P05

- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
  2. THE PANDROL TYPE, OR APPROVED EQUAL, WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROLS DESIGN SPECIFICATIONS SHALL BE USED.
  3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH A MINIMUM 3/8" WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
  4. SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MACHINE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES GP-1-R AND GP-2-R MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.

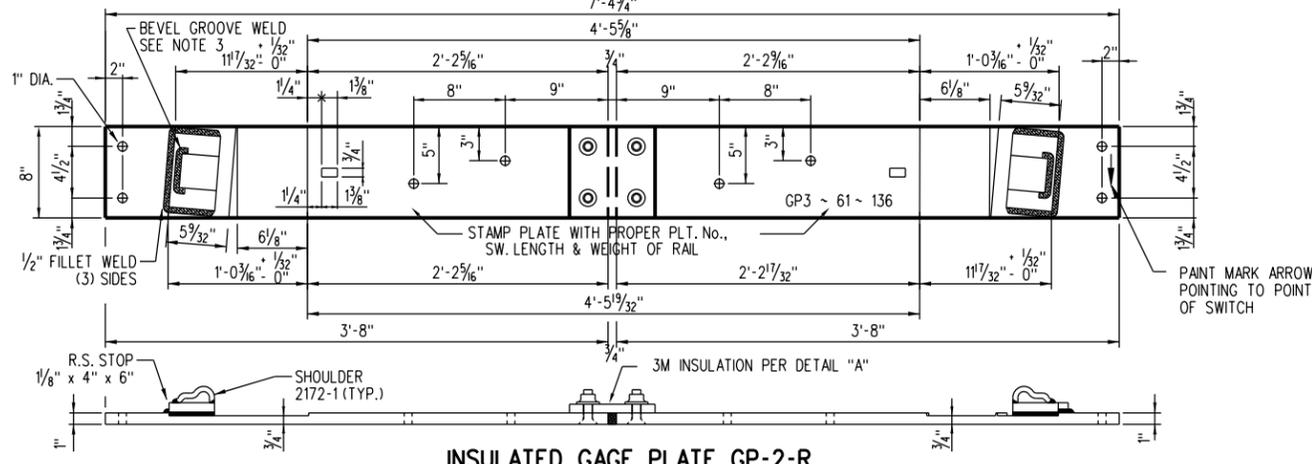
**DETAIL "A" INSULATION AT GAGE PLATES**  
(SCALE: NONE)



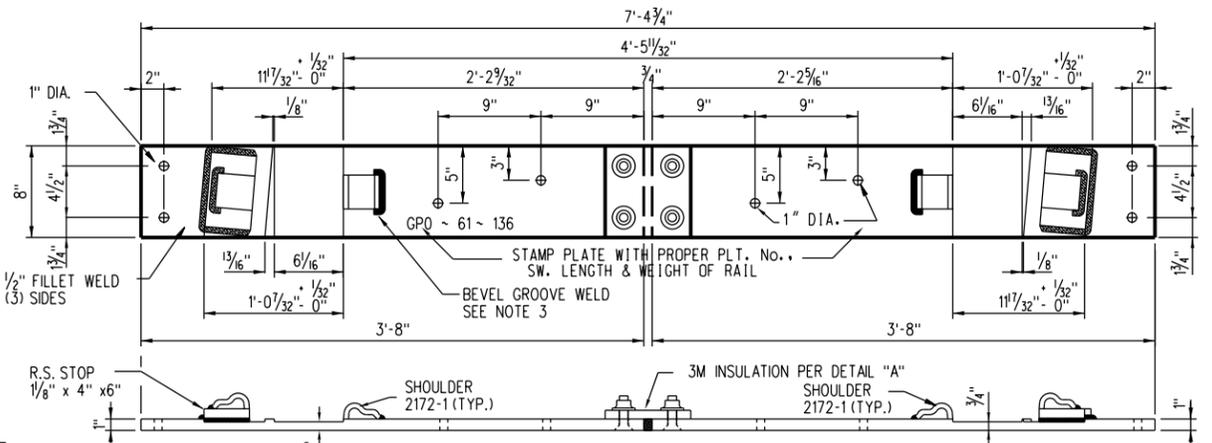
**INSULATED GAGE PLATE GP-2-R**  
1" x 8" "MILLED" W/3M INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D. AS SHOWN)



**INSULATED GAGE PLATE PP WITH PANDROL CLIPS**  
1" x 8" "FLAT" W/3M INSULATION  
(2 PC. REQ'D. AS SHOWN)



**INSULATED GAGE PLATE GP-2-R**  
1" x 8" "MILLED" W/3M INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D. AS SHOWN)



**INSULATED GAGE PLATE GP-O-P**  
1" x 8" "MILLED" W/3M INSULATION & ADJ. RAIL BRACES  
(1 PC. REQ'D. AS SHOWN)

**FOR MAINTENANCE ONLY**

REV.	DATE	DESCRIPTION	DES.	ENG.
X	XX-XX-XX	REVISION	XX	XX
DRAWN BY: A. CARLOS		DATE: 03/31/2011		
 ASSISTANT DIRECTOR- STANDARDS & DESIGN		 DIRECTOR OF ENGINEERING AND CONSTRUCTION		

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ENGINEERING STANDARDS		STANDARD	2951
NO. 24 INSULATED GAGE PLATE DETAILS		SCALE:	1/2" = 1'-0"
		REVISION	SHEET
		-	16 OF 16
		CADD FILE:	ES2951-16