

Index for March 18, 2008 Revision

MBTA – RAILROAD OPERATIONS INDEX – STANDARD PLANS

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1100	Standard Timber Tie	1	10-28-92	1232	Rail Anchoring Details -- Jointed and CWR Track	1	10-28-92
1104	Tie Spacing and Spiking Patterns	2	1-5-96	1236	Bridge Timber Anchoring Detail	2	1-5-96
1106	Anti-Splitting End Plate for Cross Ties & Switch Timber	2	10-28-92	<u>RAIL AND JOINT BARS</u>			
1108	Transition Ties	1	10-28-92	1300	115 LB RE Rail	2	10-28-92
				1302	132 LB RE Rail	2	10-28-92
				1320	115 LB RE Joint Bar	2	10-28-92
				1322	132 LB RE Joint Bar	2	10-28-92
				1328	Compromise Joint Bars for Tee Rail	2	10-28-92
				1332	Standard Track Bolt	1	10-28-92
				1340	132 RE Bonded, Insulated Joint	2	10-28-92

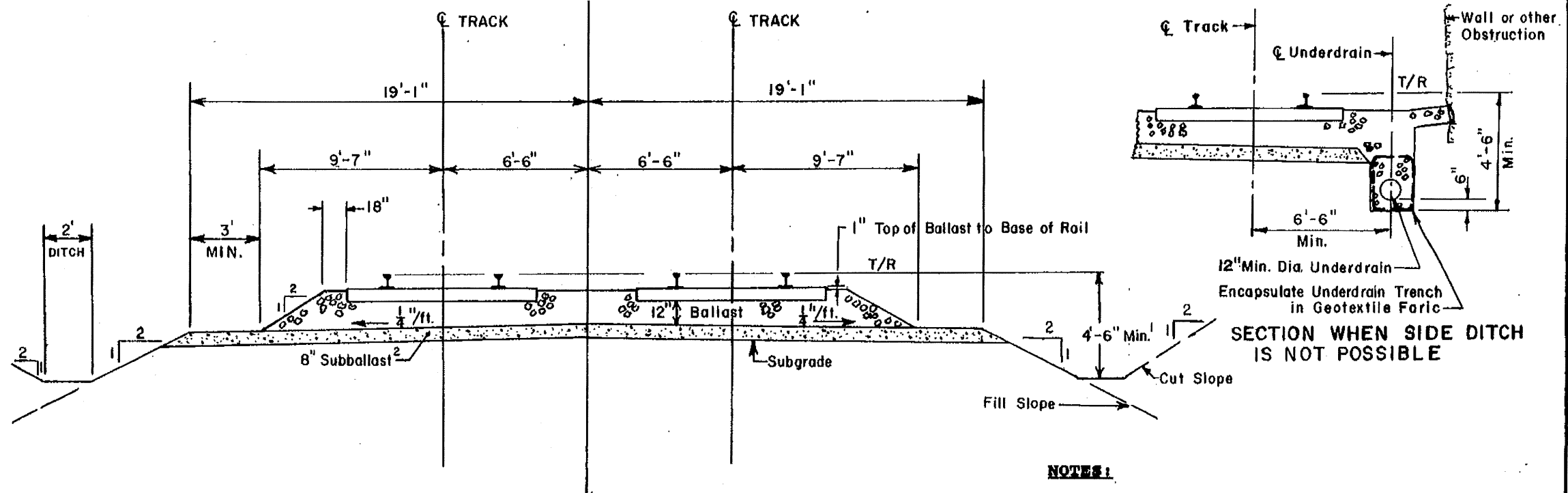
<u>DRAWING NO.</u>	<u>TITLE</u>	<u>ISSUE NO.</u>	<u>ISSUE DATE</u>
<u>TURNOUTS AND CROSSOVERS</u>			
2000	Standard Turnouts – General Layout	2	10-28-92
2002	Standard Crossovers – General Layout	2	10-28-92
2080	<u>No. 8 Turnout</u> – Bill of Material	3	1-5-96
2081	Offsets for No. 8 Turnout	1	10-28-92
2082	No. 8 Welded Turnout – Tie and Rail Layout	3	1-5-96
2083	No. 8 Crossover – Tie and Rail Layout	2	10-28-92
2084	No. 8 Railbound Manganese Steel Frog	3	1-5-96
2100	<u>No. 10 Turnout</u> – Bill of Material	2	10-28-92
2101	Offsets for No. 10 Turnout	1	11-17-86
2102	No. 10 Welded Turnout – Tie and Rail Layout	2	10-28-92
2103	No. 10 Crossover – Tie and Rail Layout	2	10-28-92
2104	16'-6" Straight Split Switch	3	1-5-96
2105	No. 10 Railbound Manganese Steel Frog	3	1-5-96
2106	Switch Plates and Gage Plates – For 16'-6" Switch	2	10-28-92
2107	Vertical Switch Rods and Adjustable Rocker Clips – For 16'-6" Switch	2	10-28-92
2110	<u>No. 10 Turnout with Floating Heel Blocks</u> – Bill of Material	2	1-5-96
2112	No. 10 Turnout with Floating Heel Blocks – Tie & Rail Layout	2	1-5-96
2114	16'-6" Straight Split Switch with Floating Heel Blocks	2	1-5-96
2150	<u>No. 15 Turnout</u> – Bill of Material	2	10-28-92
2151	Offsets for No. 15 Turnout	2	10-28-92
2152	No. 15 Welded Turnout – Tie and Rail Layout	2	10-28-92
2153	No. 15 Equilateral Turnout – Tie and Rail Layout	2	10-28-92
2154	No. 15 Crossover – Tie and Rail Layout	2	10-28-92

<u>DRAWING NO.</u>	<u>TITLE</u>	<u>ISSUE NO.</u>	<u>ISSUE DATE</u>
2155	26'-0" Curved Split Switch	2	10-28-92
2156	No. 15 Railbound Manganese Steel Frog	3	1-5-96
2157	Switch Plates and Gage Plates – For 26'-0" Switch	3	1-5-96
2158	Vertical Switch Rods and Adjustable Rocker Clips – for 26'-0" Switch	2	10-28-92
2160	<u>No. 15 Turnout with Floating Heel Blocks</u> – Bill of Material	2	1-5-96
2162	No. 15 Turnout with Floating Heel Blocks – Tie and Rail Layout	2	1-5-96
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2200	<u>No. 20 Turnout</u> – Bill of Material	3	4-29-96
2201	Offsets for No. 20 Turnout	2	10-28-92
2202	No. 20 Welded Turnout – Tie and Rail Layout	3	4-29-96
2203	No. 20 Equilateral Turnout – Tie and Rail Layout	3	4-29-96
2204	No. 20 Crossover – Tie and Rail Layout	3	4-29-96
2205	39'-0" Curved Split Switch	3	4-29-96
2206	No. 20 Railbound Manganese Steel Frog	3	1-5-96
2207	Switch Plates and Gage Plates – For 39'-0" Switch	2	10-28-92
2208	Vertical Switch Rods and Adjustable Rocker Clips – for 39'-0" Switch	2	10-28-92
2209	Typical Power Switch Layout with Helper	3	4-29-96
2210	<u>No. 20 Turnout with Floating Heel Blocks</u> – Bill of Material	3	4-29-96
2212	No. 20 Turnout with Floating Heel Blocks – Tie and Rail Layout	3	4-29-96
2215	39'-0" Curved Split Switch with Floating Heel Blocks	3	4-29-96
<u>MISCELLANEOUS TURNOUT COMPONENTS</u>			
2300	10'-0" Manganese Steel One Piece Guard Rail	2	10-28-92

<u>DRAWING NO.</u>	<u>TITLE</u>	<u>ISSUE NO.</u>	<u>ISSUE DATE</u>
2302	13'-3" Manganese Steel One Piece Guard Rail	1	10-28-92
2310	Guard Rail Installation and Maintenance	2	10-28-92
2326	Frog Tie Plates – Railbound Manganese Frog	2	10-28-92
2328	Self-Aligning Shoulder Tie Plates	2	1-5-96
2340	Resiliently Fastened Turnout Plates – For Use Behind Heel of Switch with Graduated Risers	2	10-28-92
2341	Table of Dimensions for Resiliently Fastened Turnout Turnout Plates with Graduated Risers	2	10-28-92
2342	Resiliently Fastened Turnout Plates No. 8 & 10 Floating Heel Block Turnouts	2	1-5-96
2343	Resiliently Fastened Turnout Plates No. 15 & 20 Floating Heel Block Turnouts	2	1-5-96
2348	Special Flat and Transition Canted Plates	1	1-5-96
2350	Heel Block and Switch Rail Stop – 13', 16'-6", 26' & 39' Switches	2	10-28-92
2352	Resiliently Fastened Adjustable Rail Brace	2	6-5-87
2356	Switch Point Guard	2	10-28-92
2360	60 Ft. Undercut Stock Rail	1	10-28-92
2370	No. 6 Solid Self-Guarded Manganese Steel Frog	1	10-28-92
2372	No. 8 Solid Self-Guarded Manganese Steel Frog	1	10-28-92
2374	No. 10 Solid Self-Guarded Manganese Steel Frog	1	10-28-92
<u>REPLACEMENT AND MAINTENANCE MATERIAL</u>			
2502	Replacement Bolts for Railbound Manganese Frogs	1	11-17-86
2504	Replacement Bolts for Self-Guarded Frogs	1	11-17-86
2506	B&M No. 6 Railbound Manganese Steel Frog	1	11-17-86
2508	B&M No. 8 Railbound Manganese Steel Frog	1	11-17-86
2510	B&M No. 10 Railbound Manganese Steel Frog	1	11-17-86
2512	B&M No. 12 Railbound Manganese Steel Frog	1	11-17-86
2515	B&M No. 15 Railbound Manganese Steel Frog	1	11-17-86

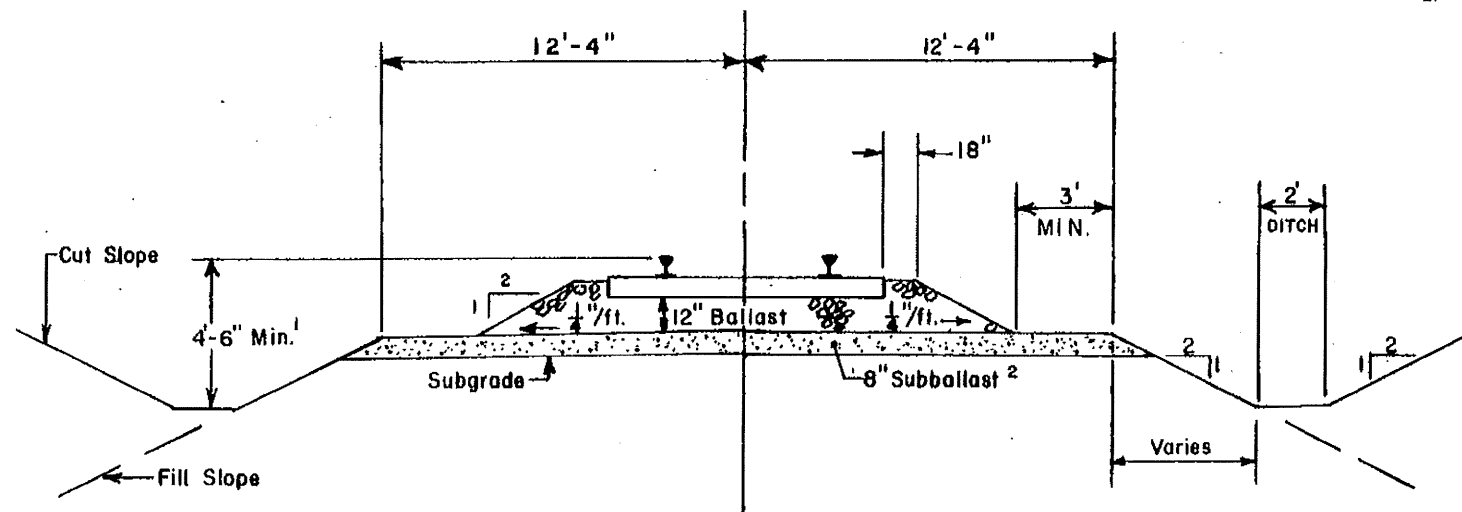
<u>DRAWING NO.</u>	<u>TITLE</u>	<u>ISSUE NO.</u>	<u>ISSUE DATE</u>
2520	B&M No. 20 Railbound Manganese Steel Frog	1	11-17-86
2530	B&M Solid Manganese Steel Self Guarded Frogs	1	11-17-86
2540	B&M Hook Flange Guard Rails	1	11-17-86
<u>DOUBLE SLIP SWITCHES AND RAIL CROSSINGS</u>			
2602	No. 8 Double Slip/Rigid Frog, Tie Layout	1	1-5-96
2604	No. 8 Double Slip/Rigid Frog, General Layout	1	1-5-96
2605	No. 8 Double Slip/Rigid Frog, Solid Manganese Center Frog	1	1-5-96
<u>MISCELLANEOUS TRACK AND APPURTENANCES DETAILS</u>			
3000	Hinged Block Derail	1	10-28-92
3004	Sliding Block Derail	2	1-5-96
3006	Split Switch Derail	1	10-28-92
3007	Operating Rod Support Bracket for Split Switch Derail	1	10-28-92
3010	Steel Bumping Post	1	10-28-92
3020-1	New Century Switch Stand – Intermediate, Model 50-B and Low – Model 50-A	2	10-28-92
3020-2	New Century Switch Stand – Intermediate, Model 50-B and Low – Model 50-A	2	10-28-92
3023	Low Switch Stand – Racor – Style 22	2	10-28-92
3030	Switch Stand Target	2	10-28-92
3040	Typical Snowmelter Layout	2	1-5-96
3060	Guard Rail on Bridges	3	1-5-96
3062	Resiliently Fastened Bridge Guard Rail	2	1-5-96
<u>GRADE CROSSINGS</u>			
3100	Grade Crossing Layout	1	10-28-92
3106	Typical Section Full Depth Rubber Crossing	1	10-28-92
3108	Typical Section Rubber Rail Seal Crossing	1	10-28-92
3120	Temporary Timber Grade Crossing	1	10-28-92

<u>DRAWING NO.</u>	<u>TITLE</u>	<u>ISSUE NO.</u>	<u>ISSUE DATE</u>
<u>FENCING</u>			
3200	Snow Fences	1	10-28-92
3204	Inter Track Fence	1	10-28-92
3206	Chain Link Fencing	2	10-28-92
3208	Chain Link Fence Gates	1	10-28-92
<u>SIGNS</u>			
3302	Mile Posts	1	10-28-92
3304	Speed Restrictions, Yard Limit & Flanger Signs	1	11-17-86
3306	Temporary Slow Boards	2	10-28-92
3307	Table of Slow Board Placement Distances	1	10-28-92
3312	Close Clearance Signs	1	11-17-86
3314	Clearance Warning Sign	1	10-28-92
3344	Do Not Dig -- Buried Cables	1	11-17-86
3352	No Trespassing Sign	2	10-28-92
3388	Public Crossing, No Warning Devices	1	11-17-86
<u>LIGHTING</u>			
3400	Platform Lighting for Enclosed Stations	1	03-18-08
3404	Track Area Lighting Between Tracks for Enclosed Stations	1	03-18-08
3408	Track Area Lighting Under Platforms for Enclosed Stations	1	03-18-08
<u>MISCELLANEOUS</u>			
4056	Steel Beam Guard Rail Detail	1	11-17-86



- NOTES:**

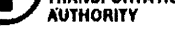
1. At locations where sufficient side ditch is not possible, use perforated pipe underdrain (12" min. dia.).
2. In new construction, when subgrade conditions warrant the use of geotextile fabric, place fabric beneath the subballast.



 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1000
		Oct. 28, 1992 2 ISSUE DATE ISSUE NO

TYPICAL ROADBED SECTION

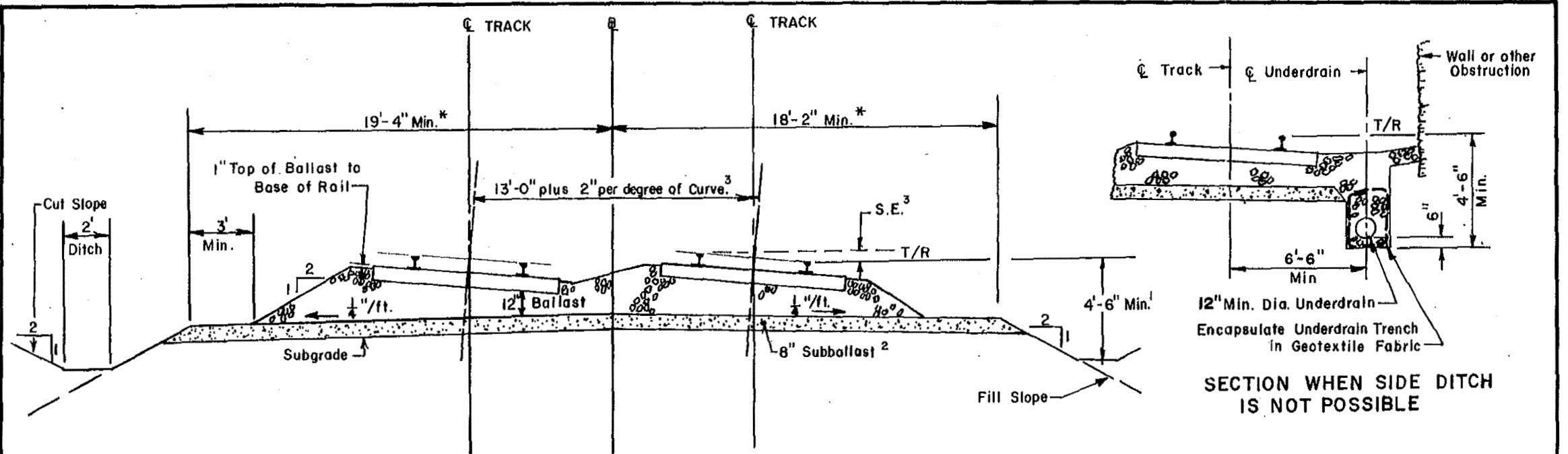
DOUBLE & SINGLE TRACK ON TANGENT



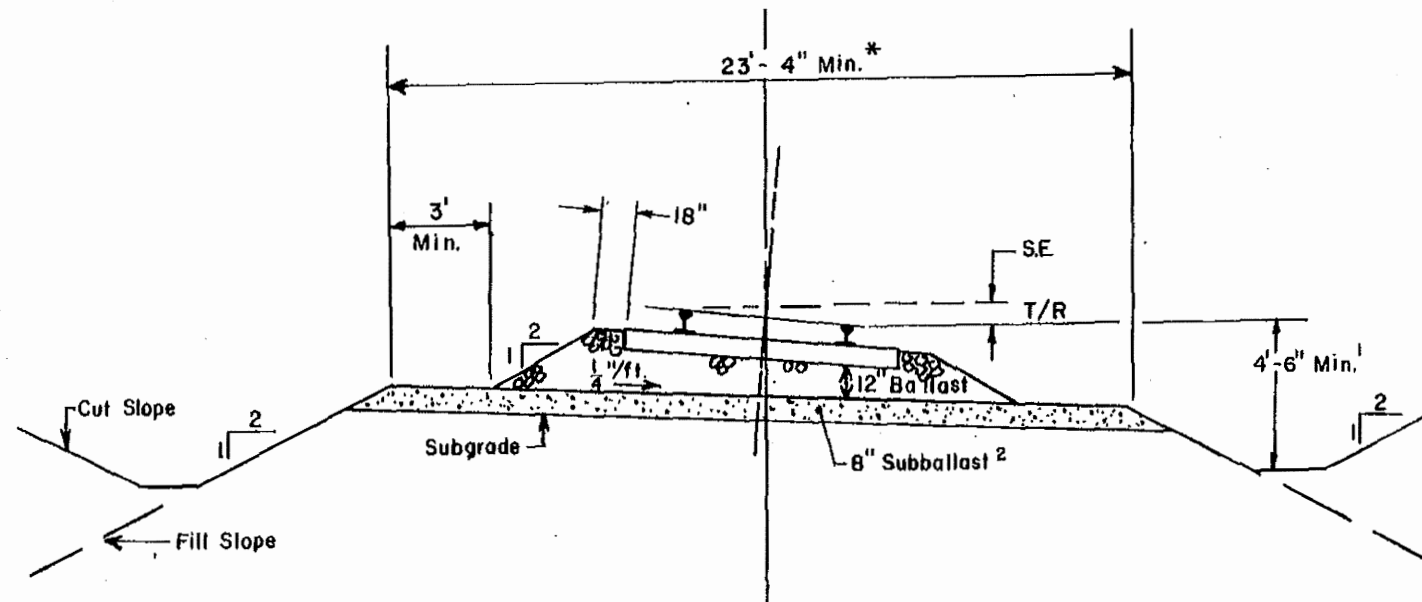
ENGINEERING OFFICER



CHIEF ENGINEERING OFFICER



STANDARD SECTION FOR DOUBLE TRACK ON CURVE



STANDARD SECTION FOR SINGLE TRACK ON CURVE

*Increase these dimensions as necessary to maintain minimum distance of $3'$ between bottom of ballast shoulder and top of $2:1$ Slope.

1. At locations where sufficient side ditch is not possible, use perforated pipe underdrain ($12'' \text{ min. dia.}$).
2. In new construction, when subgrade conditions warrant the use of geotextile fabric, place fabric beneath the subballast.
3. Wherever the outside track has the greater superelevation, increase the track centers $3 \frac{1}{2}''$ per $1'$ of superelevation difference.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1002
			Oct. 28, 1992 ISSUE DATE
TYPICAL ROADBED SECTION DOUBLE & SINGLE TRACK ON CURVE			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

Overhead bridge pier or
abutment, retaining walls,
and other obstructions
including temporary barricades
for construction, etc.

Automatic highway
crossing devices

1'-6" Min.
10'-0"
Maintenance Rd.
(where practical)

8'-6" Min.
12'-0" Preferred

A
15'-0" Preferred
8'-6" Min.

STANDARD CLEARANCES - TANGENT TRACK

A-Low switch stand or Electric lock (less than 3'-0" high) ----- 6'-6"
High switch stand (more than 3'-0" high) ----- 9'-0"

13'-6" Min.

13'-6" Preferred

12'-0" Preferred
8'-6" Min.
20'-0" Max.

7'-0" Min.

Flanger marker, slow
board whistle post, etc.

Mile post



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG.
NO. 1012

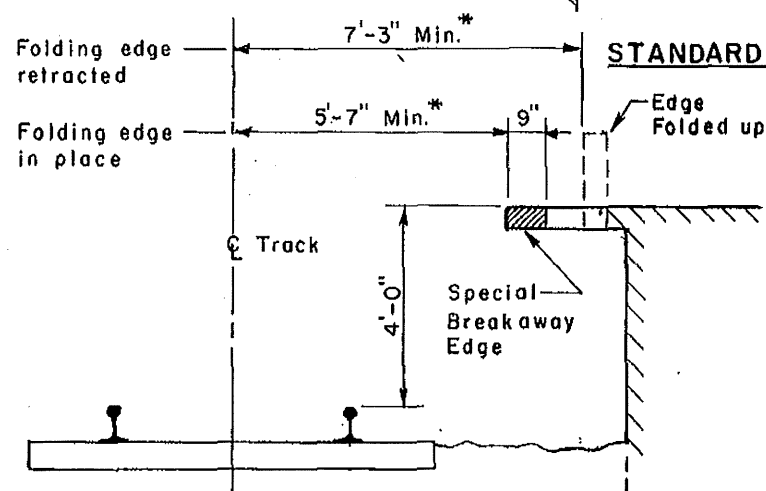
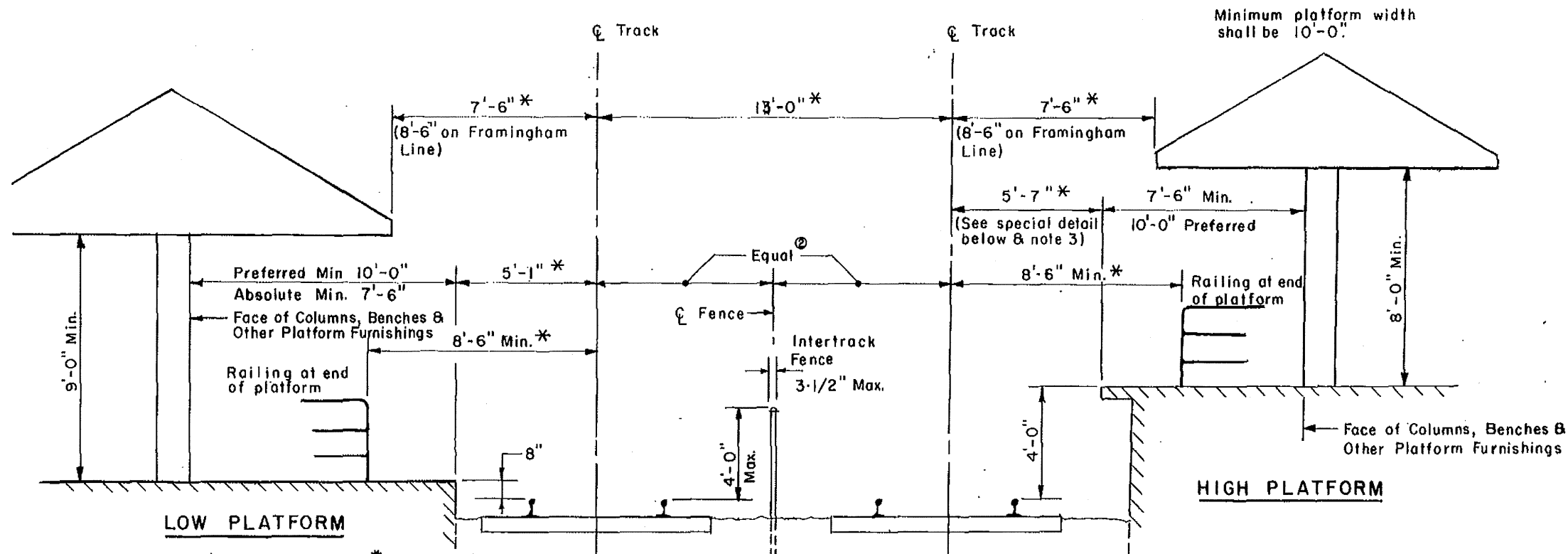
Oct. 28, 1992
ISSUE DATE

2
ISSUE NO.

STANDARD CLEARANCES
GENERAL ROADWAY OBSTRUCTIONS
TANGENT TRACK

John D. Pay
ENGINEERING OFFICER

W. A. ...
CHIEF ENGINEERING OFFICER



SPECIAL HIGH PLATFORM CLEARANCE

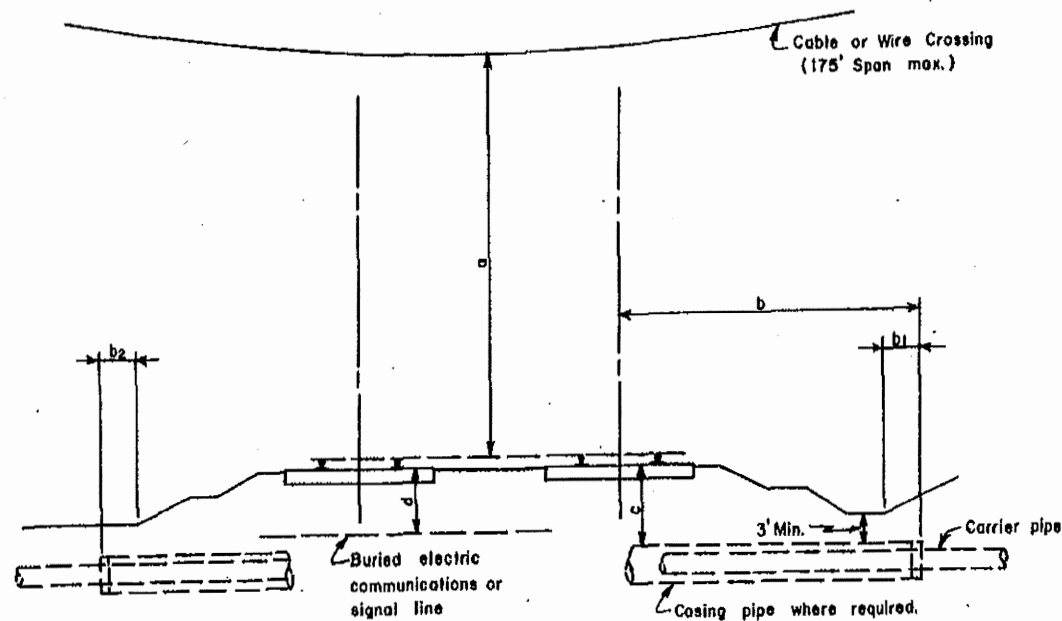
Where required by freight operator

NOTES:

- * Indicates dimensions to be increased for curvature as indicated on Drawings 1018 & 1019.
- When track centers are less than 13'-0", minimum distance from $\mathcal{C}$ of track to face of fence shall be 6'-0".
- At major terminals with direct fixation and no freight operation, use 5'-4" to high platform.

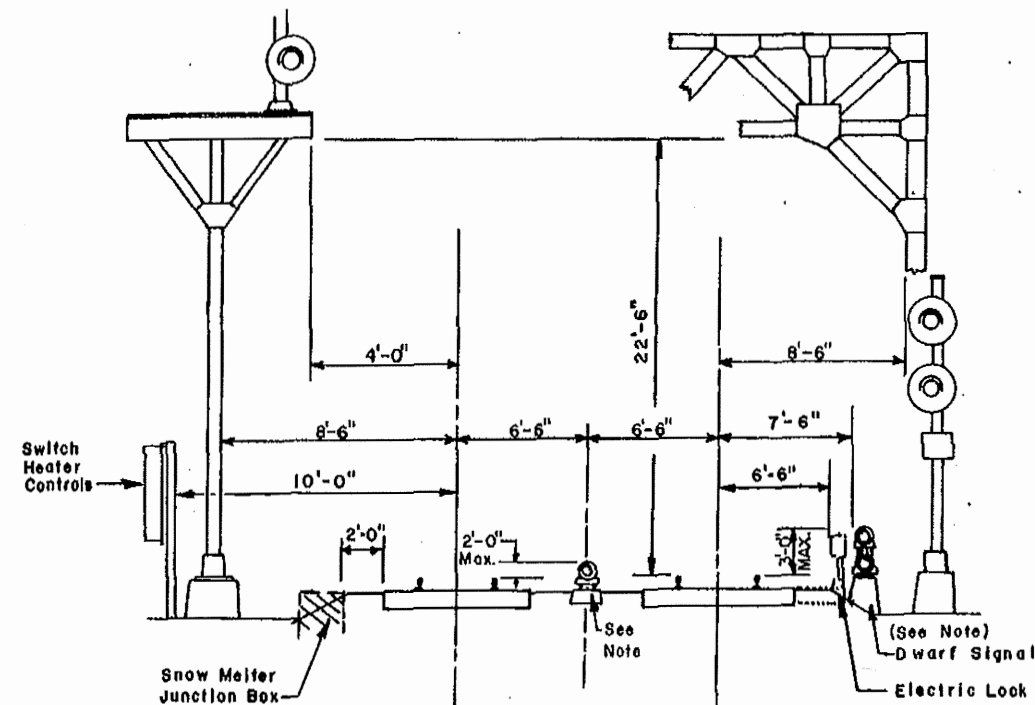
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1013
			Oct. 28, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

STANDARD CLEARANCES AT STATIONS-TANGENT TRACK



Dimension	Description	
a	Power lines 0 to 750V	27'-0"
	Power lines 750 to 15,000V	28'-0"
	Power lines 15 to 50 KV	30'-0"
	Other than power lines	27'-0"
		At 120°F Ambient Temperature
b	Sealed ended casings	25'-0"
	Open ended casings	45'-0"
b1	End casing beyond ditch	2'-0"
b2	End casing beyond slope	3'-0"
c	Casing pipe	4'-6"
	Carrier pipe without casing	4'-0"
d	Buried electric lines	4'-0"
	Railroad signal lines	2'-6"
	Communications lines	3'-6"
	Switch Heater Feeds	4'-0"

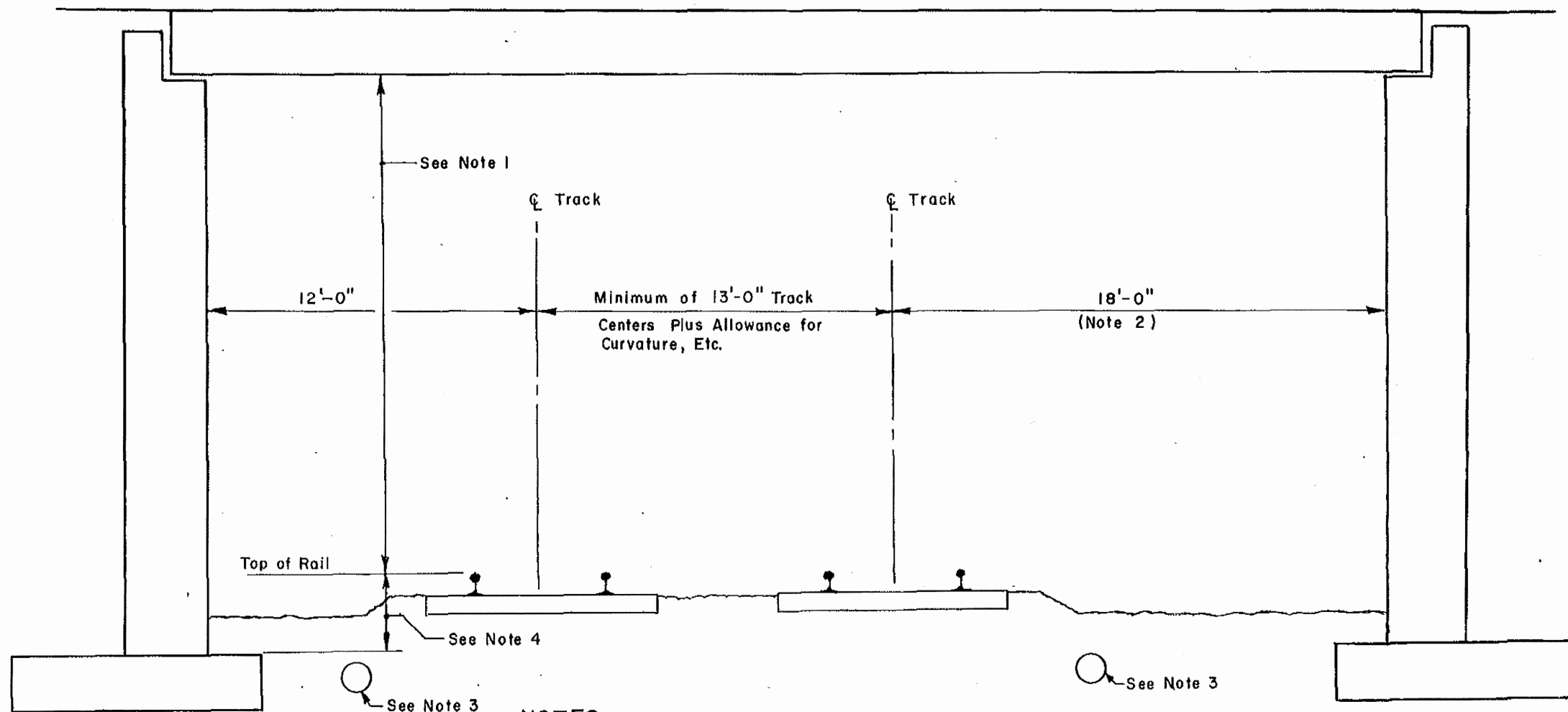
MINIMUM CLEARANCES FOR OVERHEAD & BURIED UTILITY CROSSINGS



NOTE
Signal Foundations Shall Be Level with Top of Rail Except Dwarf Signals Between Tracks - Foundation to be Level with Top of Tiles.

STANDARD CLEARANCE TO SIGNAL EQUIPMENT-TANGENT TRACK

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1014
			Jan. 5, 1996 ISSUE DATE
STANDARD CLEARANCES TANGENT TRACK SIGNAL EQUIPMENT & UTILITY CROSSINGS		SECTION CHIEF <i>John D. Ray</i>	



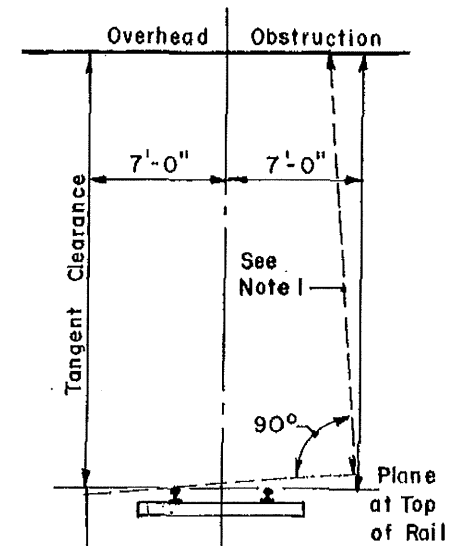
NOTES

1. See Drawing No. 1016 for Vertical Clearances by Route Segment.
2. Provide 18'-0" of Side Clearance on Side Designated for Access/Maintenance Roadway.
3. Provide Storm Drains Sized to have a Flow Capacity Equal To Adjacent R.O.W. Ditches, 12" Dia. Min.
4. Wherever Bridge is Built with Less Than 22'-6" Vertical Clearance, Design Footings to Allow Future Undercutting and Lowering Track To Provide 22'-6".

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1015 Oct. 28, 1992 ISSUE DATE	1 ISSUE NO.
	CLEARANCES FOR NEW OVERHEAD BRIDGES			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER		

MINIMUM ACCEPTABLE VERTICAL CLEARANCES FOR NEW OVERHEAD STRUCTURES

NORTHSIDE			SOUTHSIDE		
LINE	SEGMENT/LOCATION	Min. Clear	LINE	SEGMENT/LOCATION	Min. Clear
East Route Main Line	Boston to Everett Junction	20'-8"	Framingham (B&A) Main Line	Riverside to Framingham	22'-6"
East Route Main Line	Everett Junction to Newburyport	18'-0"	Shore Line (N. E. Corridor)	Boston to Rhode Island State Line	19'-6"
Saugus Branch	Everett Junction to Lynn	20'-0"	Needham Branch	Forest Hills to Newton Upper Falls	18'-0"
Gloucester Branch	Beverly Junction to Rockport	18'-0"	Dedham Secondary	Readville to Dedham	18'-0"
Danvers Branch	Salem to Danvers	18'-0"	Stoughton Branch	Canton Jct. to Whittendon Jct.	18'-0"
West Route Main Line	Boston to Wilmington Junction	18'-0"	Millis Secondary	Needham, Junction to Millis	18'-0"
West Route Main Line	Wilmington Junction to State Line	22'-6"	Franklin Branch	Readville to Franklin	19'-6"
Newburyport Branch	Wakefield to Topsfield	18'-0"	East Junction Secondary	Attleboro to Seekonk	18'-0"
South Middleton Branch	West Peabody to South Middleton	18'-0"	Old Colony Main Line	Boston to Braintree	18'-0"
M & L Branch	Lawrence to State Line	18'-0"	Middleboro Secondary	Braintree to Middleboro	20'-8"
New Hampshire Main Line	Boston to Lowell (Bleachery)	20'-8"	Plymouth Secondary	Braintree to Plymouth	18'-0"
New Hampshire Main Line	Lowell (Bleachery) to State Line	22'-6"	Greenbush Secondary	Braintree to Greenbush	18'-0"
Woburn Branch	Winchester to Woburn	18'-0"			
Stoneham Branch	Montvale to Stoneham	18'-0"			
Wildcat	Wilmington to Wilmington Junction	20'-8"			
Billerica Secondary	North Billerica to Bennett Hall	18'-0"			
Fitchburg Main Line	Boston to Willows (Ayer)	20'-8"			
Fitchburg Main Line	Willows (Ayer) to Fitchburg	22'-6"			
Central Mass. Branch	Clematis Brook to Berlin	18'-0"			
Marlboro Secondary	Hudson to Marlboro	18'-0"			
Greenville Branch	Ayer to N.H. State Line	18'-0"			

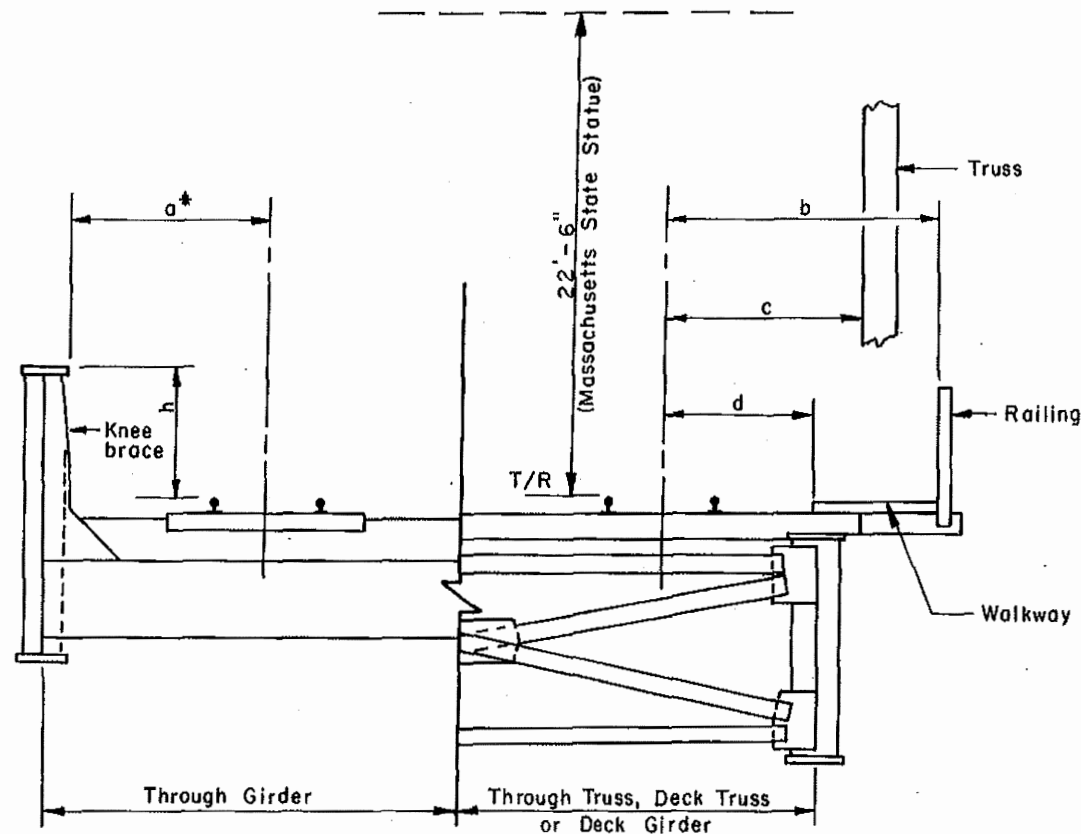


Where there are vertical curves, calculate and compensate for mid ordinate of an 85'-0" long car.

NOTES

1. Superelevated track is to have clearance measurements taken perpendicular to plane of the superelevation as shown in dashed lines.
2. Vertical clearances shall be measured from the lowest projection (rivet, bolt, pipe, etc.) within 7ft. from centerline of track on each side, as shown.
3. Clearances shown are minimums and require MBTA and Mass. DPU approvals under 22'-6".

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1016
			Oct. 28, 1992 ISSUE DATE
MINIMUM VERTICAL CLEARANCES BY ROUTE SEGMENT			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



DIMENSION DESCRIPTION

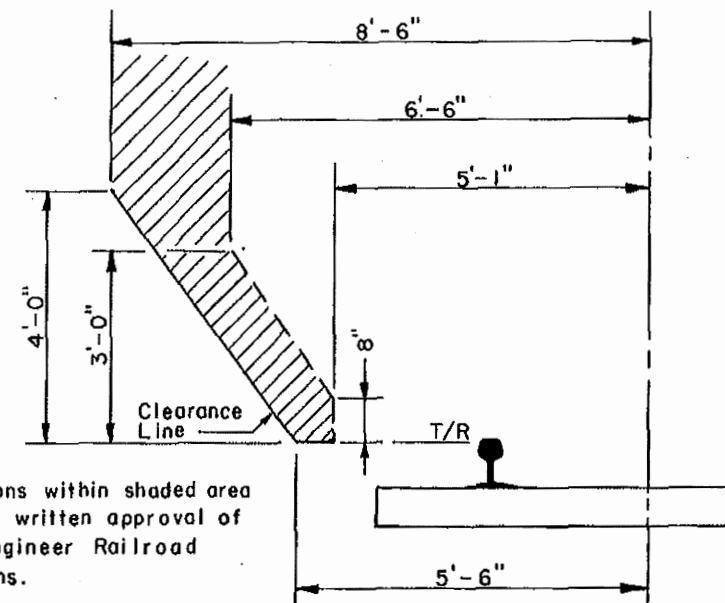
a	Standard side clearance	8'-6" *
b	Clearance to walkway railing	8'-6"
c	Standard side clearance	8'-6"
d	Standard clearance to walkway edge	4'-6" open deck bridge (use 5'-1" on ballasted deck provided that walkway is not more than 8" above top of near rail)

(For Tangent Track)

For additional clearance for curvature, see Plan 1018.

STANDARD TANGENT TRACK BRIDGE SIDE CLEARANCES

(For through girder & truss, deck truss & girder)

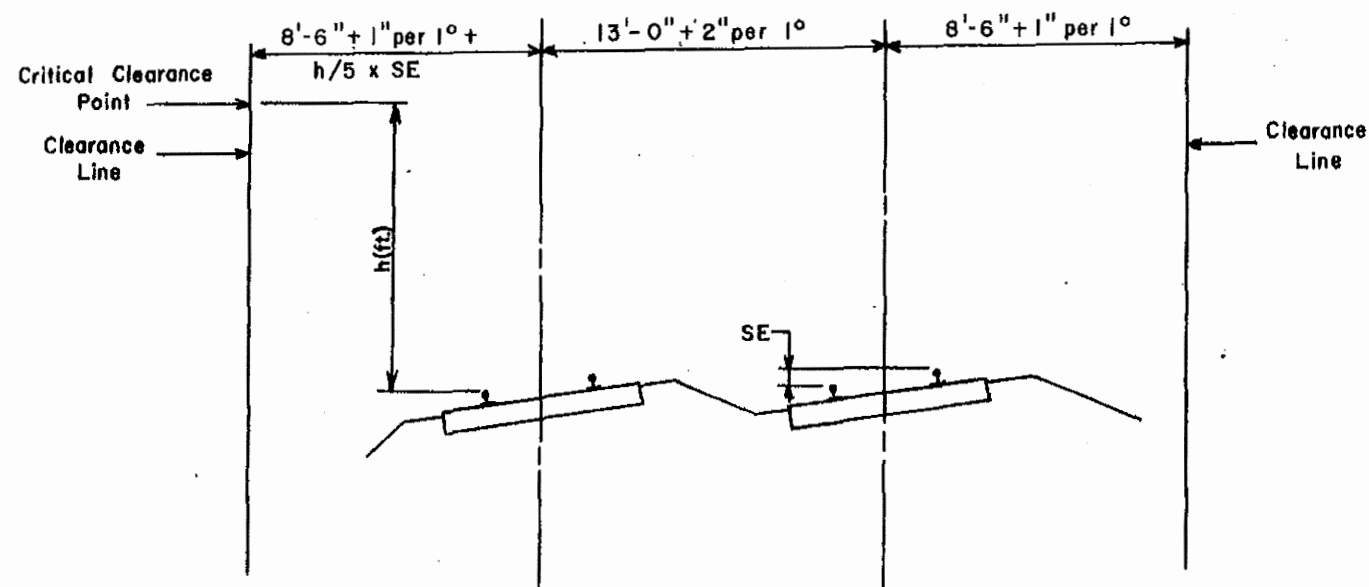


DETAIL AT THROUGH PLATE GIRDER

* If dimension 'h' is 4'-0" or less, then dimension 'a' may be reduced as shown above with the following conditions:

- Bridge is not within yard limits.
- Sign "Will not Clear Man on Side of Car" is posted on both ends of the structure.
- On new bridges, a safety walk outside the girder is provided.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1017 Oct. 28, 1992 ISSUE DATE	① ISSUE NO.
	STANDARD CLEARANCES TANGENT TRACK BRIDGES			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER		



Standard Side Clearance-Tangent Track ----- 8'-6"
 Track centers between :
 Mainline Tracks or Yard Tracks ----- 13'-0"
 Mainline or Passing Track and Ladder Track ----- 17'-0"

Increased side clearance for curvature ----- 1" per 1° *

Increased track centers for curvature ----- 2" per 1°

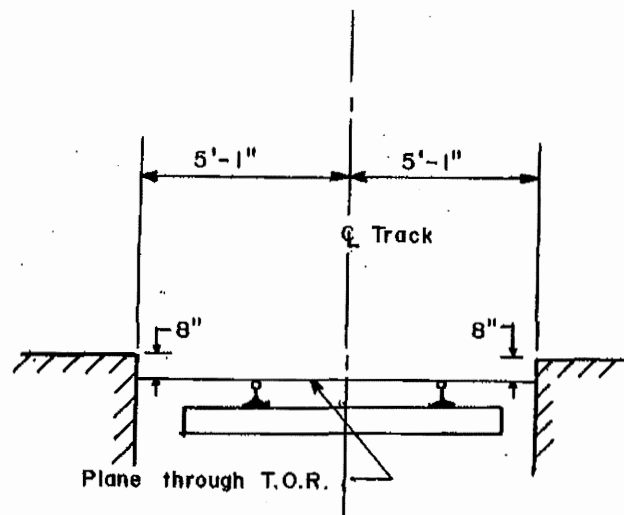
Increased side clearance for superelevation ----- $h/5 \times SE$
 Where SE is Superelevation in Inches
 h is Height to Obstruction in Feet

* For Clearance Adjustments at Passenger Platforms, see Dwg. No. 1019.

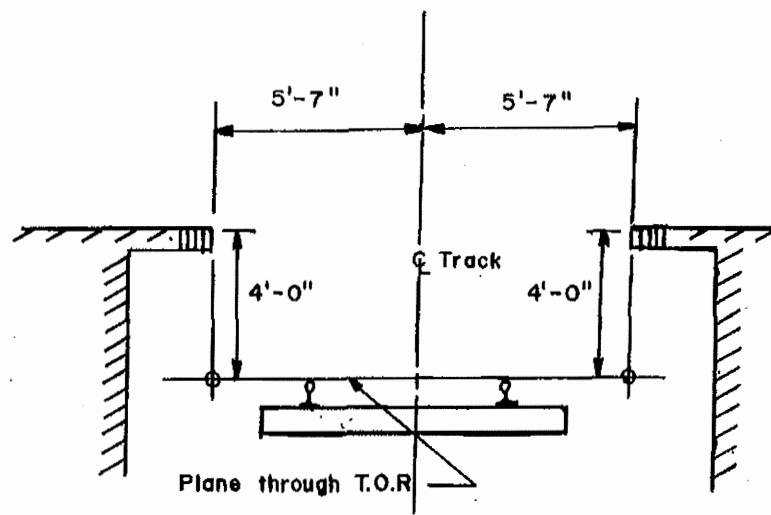
NOTE: Where possible, an 18'-0" side clearance will be provided from the center line of one track for a maintenance roadway.

STANDARD TRACK CENTERS & SIDE CLEARANCE - CURVED TRACK

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1018
			Oct. 28, 1992 (2) ISSUE DATE ISSUE NO.
STANDARD TRACK CENTERS & SIDE CLEARANCE INCREASES FOR CURVED TRACK			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

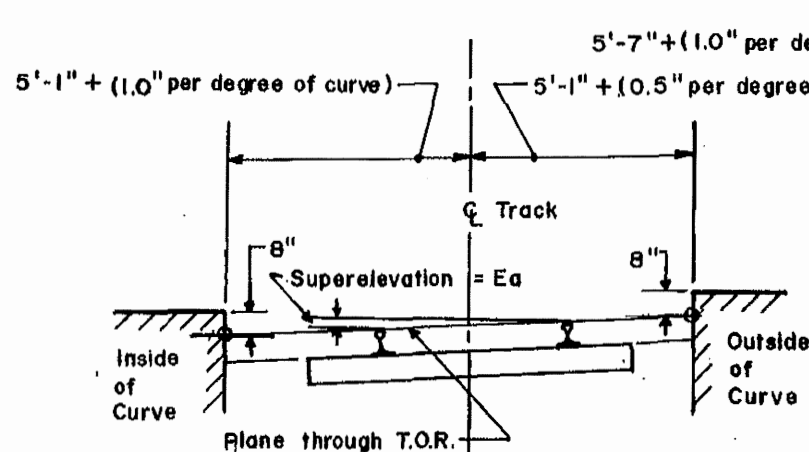


LOW PLATFORM

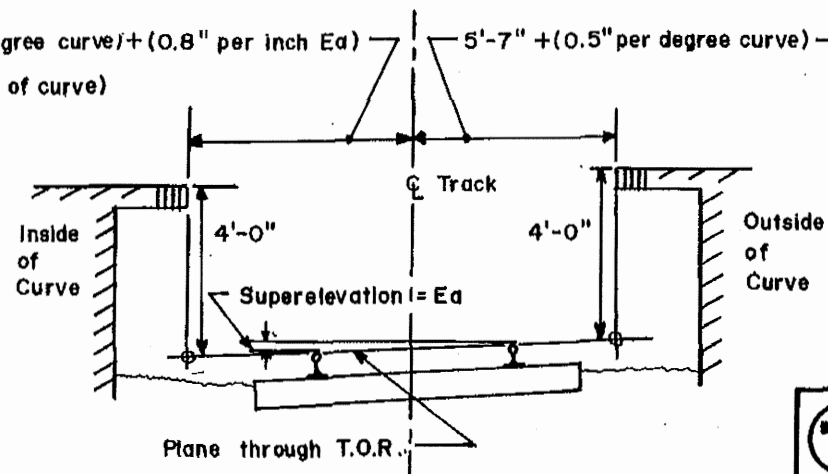


HIGH PLATFORM

TANGENT TRACK



LOW PLATFORM



HIGH PLATFORM

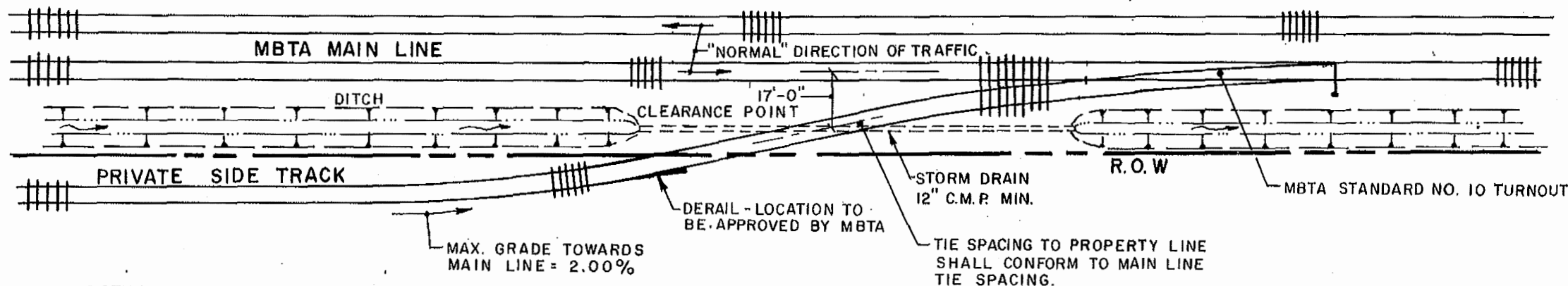
CURVED TRACK

NOTES:

1. Where curvature is in excess of $2^{\circ}-00'$ and/or superelevation is over 1", horizontal clearance to be reviewed by Chief Engineer Railroad Operations.
2. On certain through freight routes, additional side clearance must be provided for by the use of special fold-up platform edges made of material which will shatter or fold back if accidentally struck in a down position.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1019
			Oct. 28, 1992
			ISSUE DATE
John J. Williams ENGINEERING OFFICER		W. A. B. B. B. CHIEF ENGINEERING OFFICER	

CLEARANCE AT
PASSENGER PLATFORMS

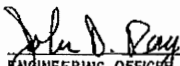
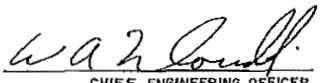


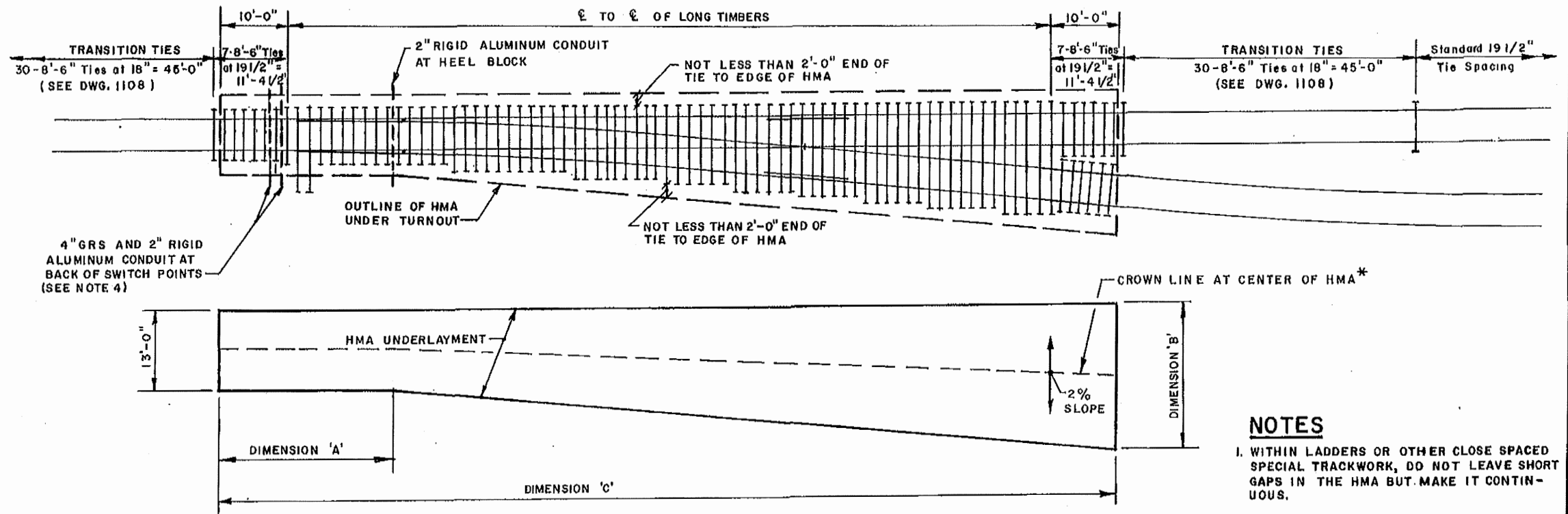
NOTES:

1. Turnout (T.O.) shall be 132 RE, welded, resiliently fastened per MBTA current standard with Hot Mixed Asphalt to be installed under all main line T.O.'s as per plan 1030.
2. No relay rail will be permitted on MBTA property, except with the express written permission of the MBTA and under no circumstances shall the rail differ from the main line rail in weight or section.
3. All T.O.'s shall be trailing point (as depicted) with respect to normal traffic direction unless otherwise permitted with the express written authorization from the MBTA.
4. MBTA forces (or their designee) shall perform all T.O. installation and trackwork on MBTA property to the property line.
5. In territory with concrete ties, those serviced by the sidetrack shall be responsible for the costs of removal of the concrete ties and additional Transition ties to maintain track integrity.
6. Sidetracks which slope down toward the main line shall not exceed a 2% grade (2ft. vertical per 100ft. linear).
7. Any sidetrack sloping toward the main line shall be equipped with a Split Switch Derail with installation and maintenance of the Derail the responsibility of those serviced by the Sidetrack unless otherwise approved. Location of the Derail subject to MBTA approval.
8. Under no circumstances shall railroad cars or other equipment encroach beyond the clearance point and should clearance point be on MBTA property. No car or equipment shall be allowed to stand between the property line and the clearance point without the express written permission of the MBTA.
9. Unattended derails shall be kept locked at all times in the normal position (Derail "on") if the sidetrack is occupied by railroad cars.
10. Additional structures, such as bollards, may be necessary to protect the main line and the cost of these additional structures shall be borne by those serviced by the sidetrack.

11. The maximum curvature (calculated by chord definition) on sidetracks shall be a degree of curve not exceeding $12^{\circ}30'$ unless otherwise allowed by the designated freight railroad servicing the sidetrack but in no case on MBTA property shall the degree of curve exceed $12^{\circ}30'$.

12. Existing drainage patterns shall be maintained (where necessary) by the installation of a pipe (12" min.) to facilitate drainage flow across Sidetrack area. Pipe shall have a flow capacity equal to the ditch and shall be reviewed by the MBTA on a site specific basis. Pipe shall be designed for railroad loadings (E-80) at expected depth below bottom of tie.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG: NO. 1020
		Oct. 28, 1992 ISSUE DATE
SIDE TRACK INSTALLATION		
 ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



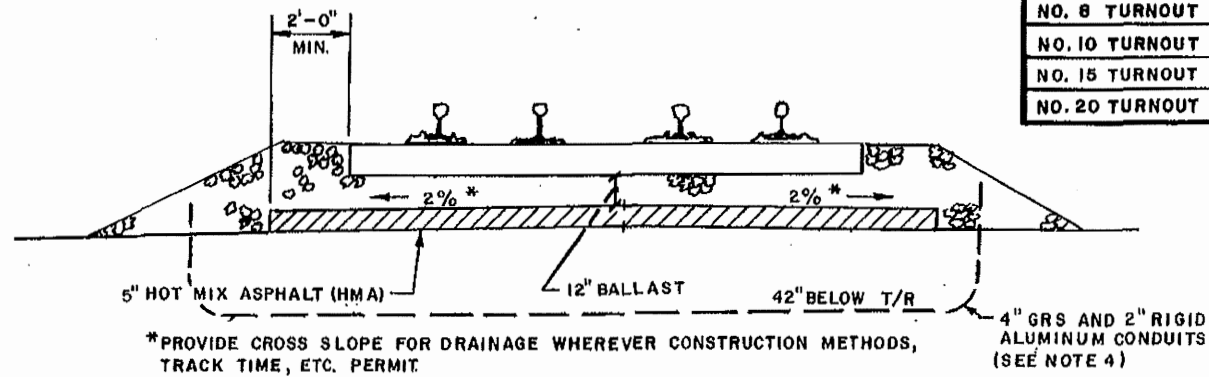
PLAN-TYPICAL TURNOUT INSTALLATION

NOTES

1. WITHIN LADDERS OR OTHER CLOSE SPACED SPECIAL TRACKWORK, DO NOT LEAVE SHORT GAPS IN THE HMA BUT MAKE IT CONTINUOUS.
2. PROVIDE TRANSITION TIES IN MAINLINE TRACK ONLY. FOR ADDITIONAL DETAILS, SEE STANDARD DRAWING NO. 1108.
3. TONS OF HMA CALCULATED AS 0.059 TONS/S.Y./INCH THICKNESS OF HMA.
4. PROVIDE INDICATED CONDUITS AT ALL POWER TURNOUTS AND WHERE ELECTRIC SWITCH HEATERS ARE TO BE INSTALLED. SEE DRAWING NO. 3040 ALSO.

TURNOUT SIZE	DIM. A	DIM. B	DIM. C	TONS OF HMA
NO. 8 TURNOUT	24'-2"	22'-7"	117'-6"	65
NO. 10 TURNOUT	24'-4"	22'-5"	136'-0"	76
NO. 15 TURNOUT	27'-8"	22'-3"	190'-4"	109
NO. 20 TURNOUT	42'-3"	22'-2"	252'-0"	139

(NOTE 3)



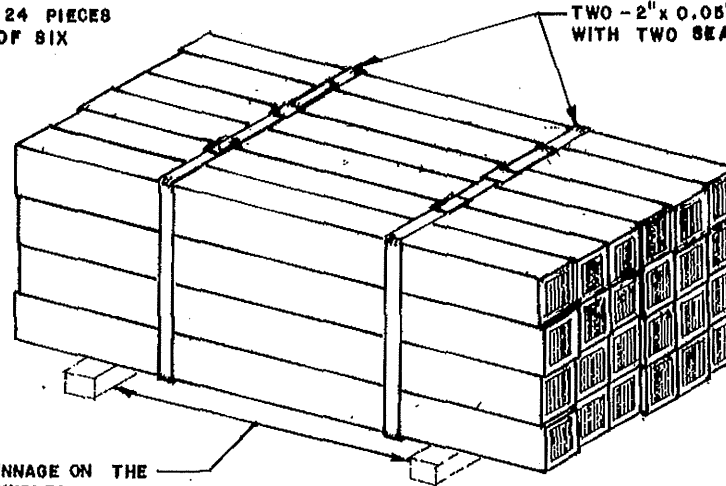
*PROVIDE CROSS SLOPE FOR DRAINAGE WHEREVER CONSTRUCTION METHODS, TRACK TIME, ETC. PERMIT

TYPICAL SECTION

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1030
			Apr. 29, 1996 ISSUE DATE
ASPHALT UNDERLAYMENT AT TURNOUTS			
John D. Poy SECTION CHIEF			

BUNDLE TIES IN GROUPS OF 24 PIECES
CONSISTING OF FOUR ROWS OF SIX
TIES ON EDGE.

TWO - 2" x 0.06" HEAVY DUTY STEEL STRAPS
WITH TWO SEALS PER BAND

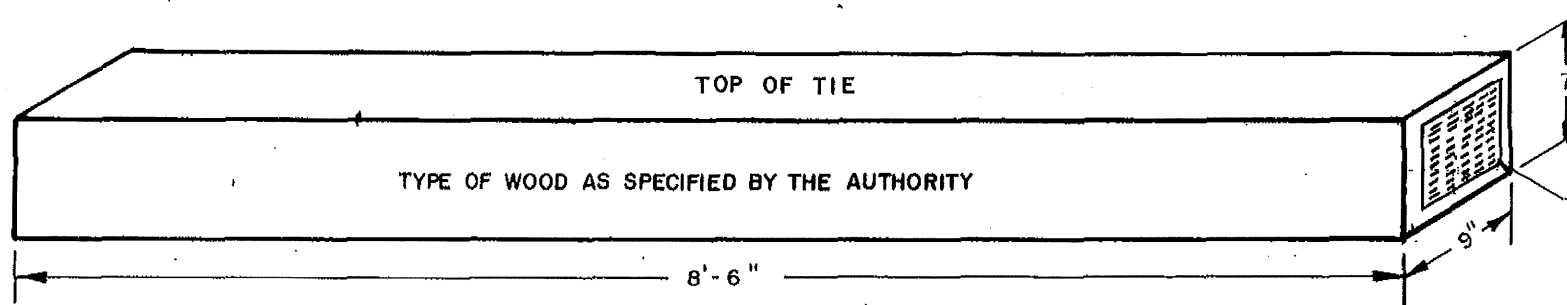


4" x 4" WOOD DUNNAGE ON THE
BOTTOM OF ALL BUNDLES

NOTES:

1. ALL TIES SHALL CONFORM TO MBTA STANDARD
MATERIAL SPECIFICATIONS FOR CROSSTIES -
TREATED.

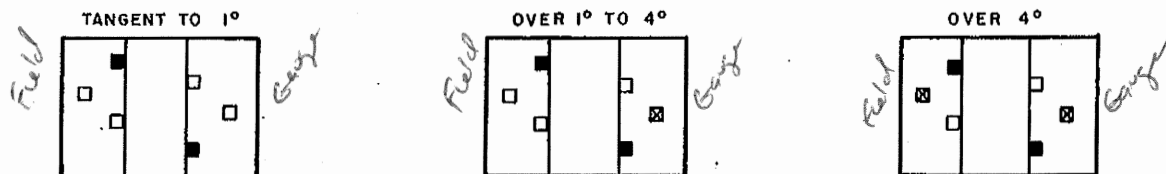
BUNDLES FOR SHIPMENT



ANTI-SPLITTING END PLATE (BOTH ENDS)
SEE PLAN NO. 1106 - APPLY PRIOR TO SEASONING

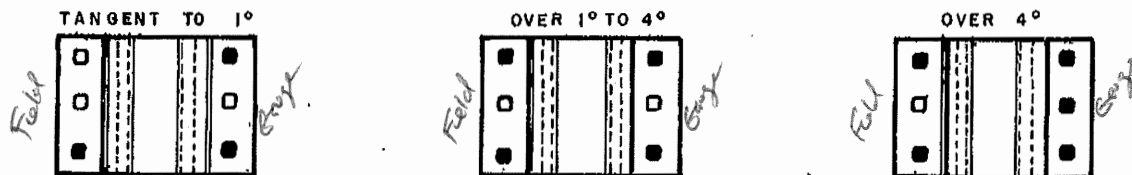
STANDARD TIE

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1100	(1) ISSUE NO.
		Oct. 28, 1992 ISSUE DATE	
STANDARD TIMBER TIE   ENGINEERING OFFICER CHIEF ENGINEERING OFFICER			



STANDARD TIE PLATE (B-6 PUNCHING) WITH CUT SPIKES

■ INDICATES RAIL HOLDING SPIKES ☒ INDICATES ADDITIONAL CUT SPIKES

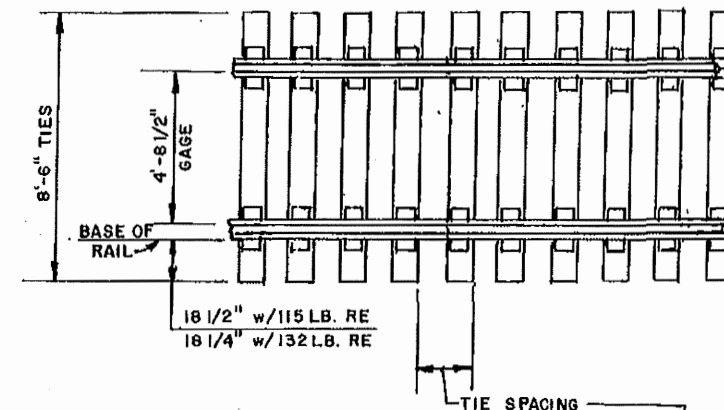


STANDARD RESILIENTLY FASTENED TIE PLATE

■ INDICATES USE OF LOCK SPIKE IN SPIKE HOLE
PREBORE HOLES FOR LOCK SPIKES, 9/16" DIA. X 6" DEEP.
DO NOT BORE HOLES ALL THE WAY THROUGH THE TIE.

NOTES:

1. LEFT SIDE OF ALL DEPICTED PLATES TO BE CONSIDERED THE FIELD SIDE WITH THE GAGE SIDE ON THE RIGHT.
2. SEE SHEET 1216 FOR LOCK SPIKE DETAIL.

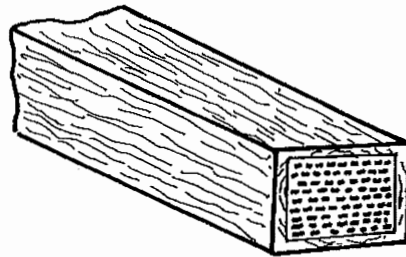


TIMBER TIES	
STANDARD MAIN LINE TRACK-----	19 1/2"
WITHIN GRADE CROSSINGS*-----	18"
SECONDARY & YARD TRACK-----	22"
CONCRETE TIES	
STANDARD MAIN LINE TRACK-----	24"

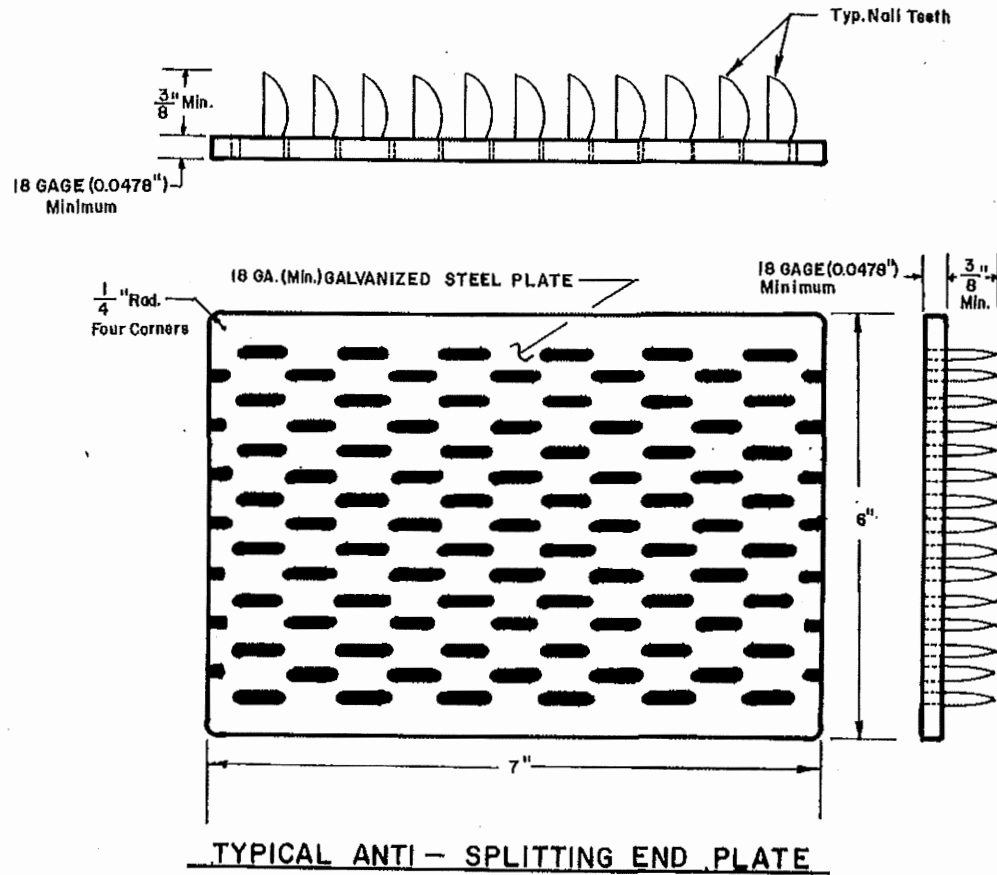
* Ties within full depth rubber crossings shall be 9'-0" long.
Temporary crossings may have 19 1/2" spacing.
Use 18" spacing within transition areas as shown on drawing no. 1108.

STANDARD TIE SPACING

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1104 Jan. 5, 1998 ISSUE DATE	(2) ISSUE NO.
	TIE SPACING AND SPIKING PATTERNS SECTION CHIEF			



TYPICAL TIE END VIEW



NOTES:

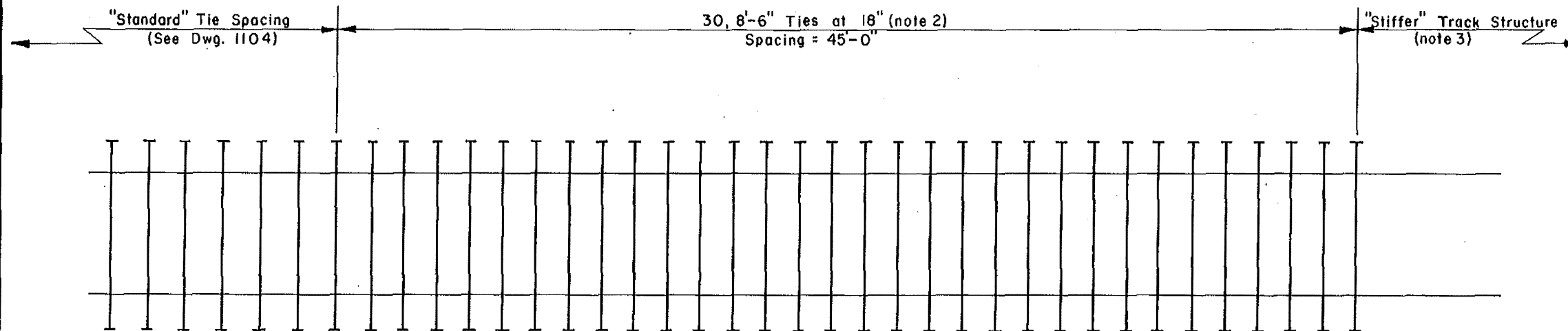
1. The Anti-Splitting End Plate (ASEP) shall be manufactured from a minimum 18 Ga. (0.0478") galvanized steel plate, hot dipped.
2. The ASEP shall have nail teeth not less than 3/8" in length and of sufficient sharpness to fully penetrate hardwood timbers used for cross ties.
3. The ASEP shall be machine applied to the ends of a tie with uniform pressure and minimum teeth bending and shall be applied so that the nail teeth side of the plate is flush with end surface of the tie.
4. The ASEP is to be applied to new ties prior to seasoning.
5. The center of the ASEP is to be applied not more than 1/2" off the horizontal and vertical centerline intersections of the tie end.
6. The ASEP shall be fabricated in such a way that the teeth twist vertically to allow a better grip in the tie.
7. Mark and install plates to indicate location of Heartwood (KERF Marks).

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1106
			Oct. 28, 1992
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

**ANTI-SPLITTING END PLATE FOR
CROSSTIES & SWITCH TIMBER**

John D. Ray

W. A. [Signature]



NOTES :

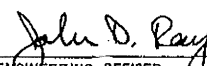
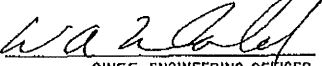
1. Use Transition Ties whenever there is a significant change in track Modulus (Stiffness).
2. Tie spacing dimension is shown for speeds up to 60 mph.
For speeds greater than 60 mph, increase as follows:

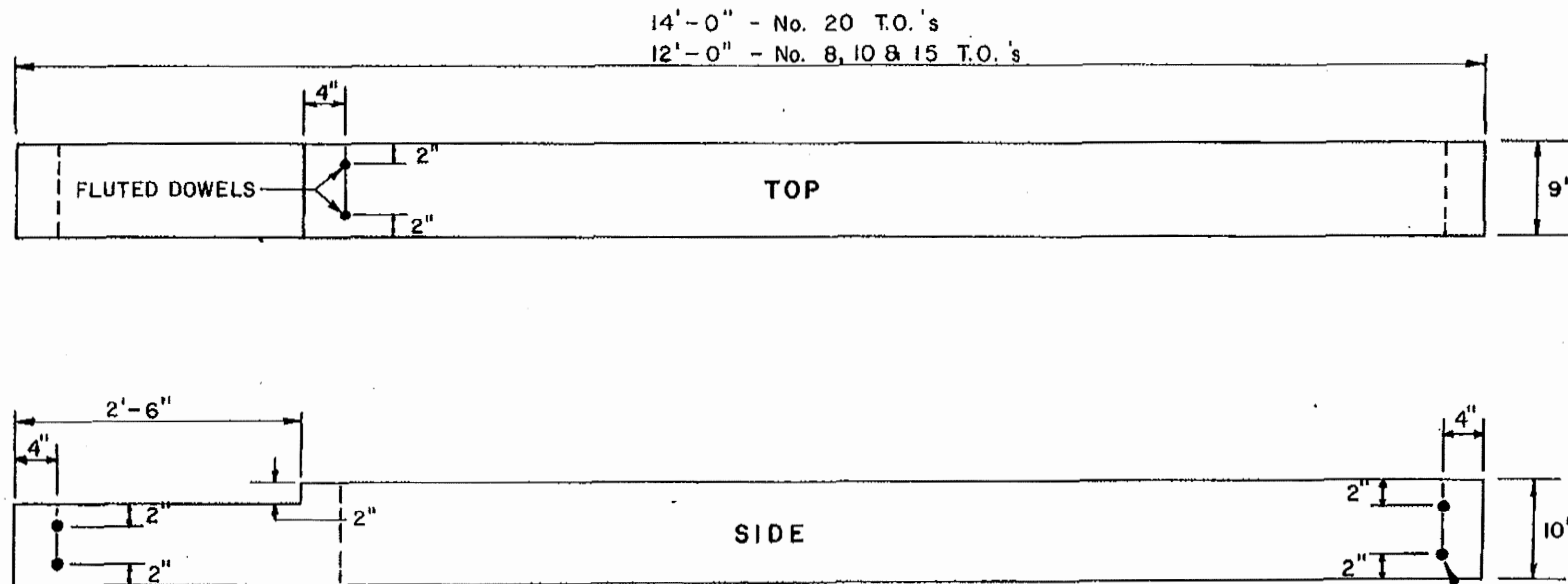
70 mph - 35 Ties at 18" = 52'-6"

80 mph - 40 Ties at 18" = 60'-0"

3. "Stiffer" Track Structure consists of any of the following:

- a. Concrete Ties
- b. Bridge or Approach Slab
- c. Hot Mix Asphalt Underlayment (Grade Crossing or Turnout)
- d. Direct Fixation Track Construction

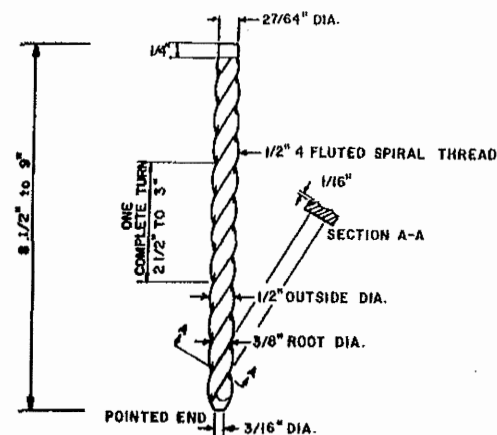
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1108 Oct. 28, 1992 ISSUE DATE	1 ISSUE NO.
	TRANSITION TIES  ENGINEERING OFFICER  CHIEF ENGINEERING OFFICER		



**POWER SWITCH TIMBER FRAMING
(TWO TIMBERS PER MACHINE)**

NOTES:

1. DETAILS ON THIS DRAWING APPLY ONLY TO TURNOUTS TO BE OPERATED BY A SWITCH MACHINE.
2. 14'-0" HEADBLOCKS REQUIRED ON NO. 20 TURNOUTS TO ACCOMMODATE HELPER MECHANISM.

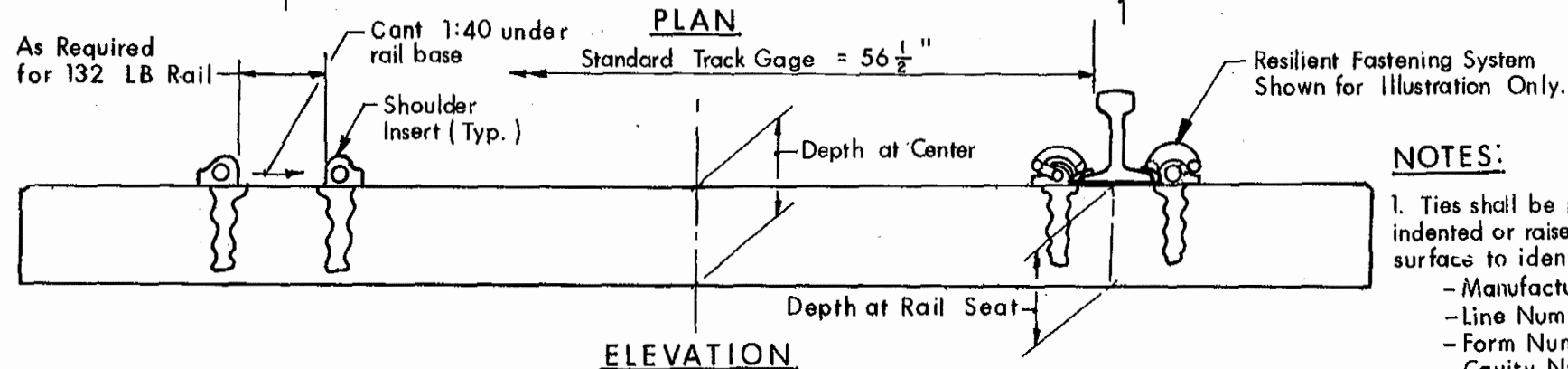
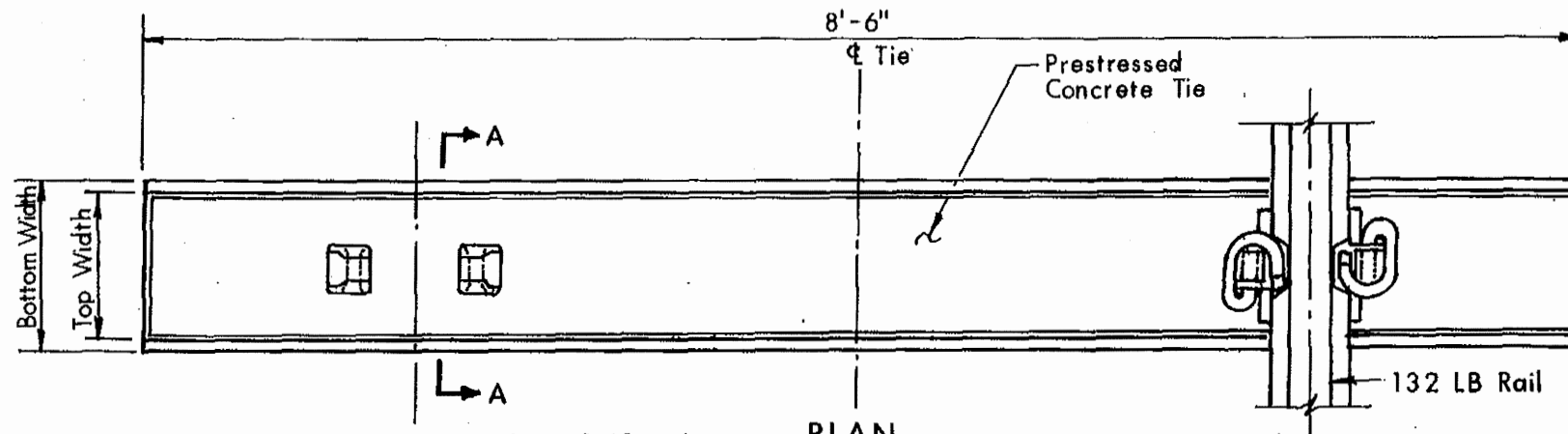


**FLUTED STEEL TIE DOWELS
(6 per Headblock)**

ANTI-SPLIT DOWEL NOTES

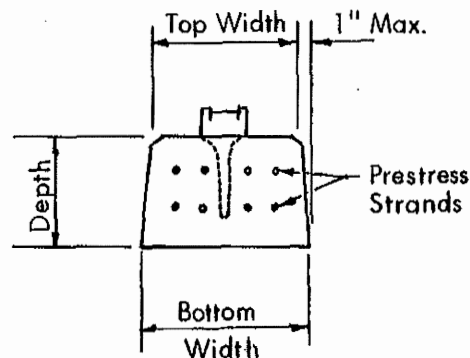
1. USE OF LUBRICANTS TO ASSIST IN DRIVING DOWEL IS PROHIBITED.
2. LOCATION OF DOWELS SHALL BE AS SHOWN.
3. MINIMUM LENGTH OF HOLES TO ACCEPT DOWELS SHALL BE EQUAL TO THE LENGTH OF DOWEL, AND THE SIZE OF THE DRILLED HOLES MUST NOT EXCEED 3/8 INCH IN DIAMETER.
4. DOWELS MUST BE COMPLETELY DRIVEN.
5. DOWELS ARE TO BE MADE OF COPPER BEARING STEEL A.S.T.M. A107.
6. TOLERANCE ON DIAMETERS OF 1/64" PLUS OR MINUS IS PERMITTED.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1110
			Apr. 29, 1996 3 ISSUE DATE ISSUE NO.
HEADBLOCK TIE LAYOUT & DAPPING DETAILS			
John D. Ray SECTION CHIEF			



NOTES:

1. Ties shall be permanently labeled by indented or raised characters on the top surface to identify the following:
 - Manufacturers Identification
 - Line Number
 - Form Number
 - Cavity Number
 - Year of Manufacture
 - Date Code
 - Rail Seat Size
2. Weight of Tie shall not exceed 800 lbs.
3. Conc. Strength (f_c), 7,000 p.s.i. min. at 28 days.



SECTION A-A

Dimension Description	Minimum	Maximum	Tolerance
Top Width	9"	10"	$\pm 1/8"$
Bottom Width	11"	12"	$\pm 1/8"$
Depth at Center	7"	10"	$+1/4"-1/8"$
Depth at Seat	9 1/2"	10 1/2"	$+1/4"-1/8"$



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG.
NO. 1120

Oct. 28, 1992

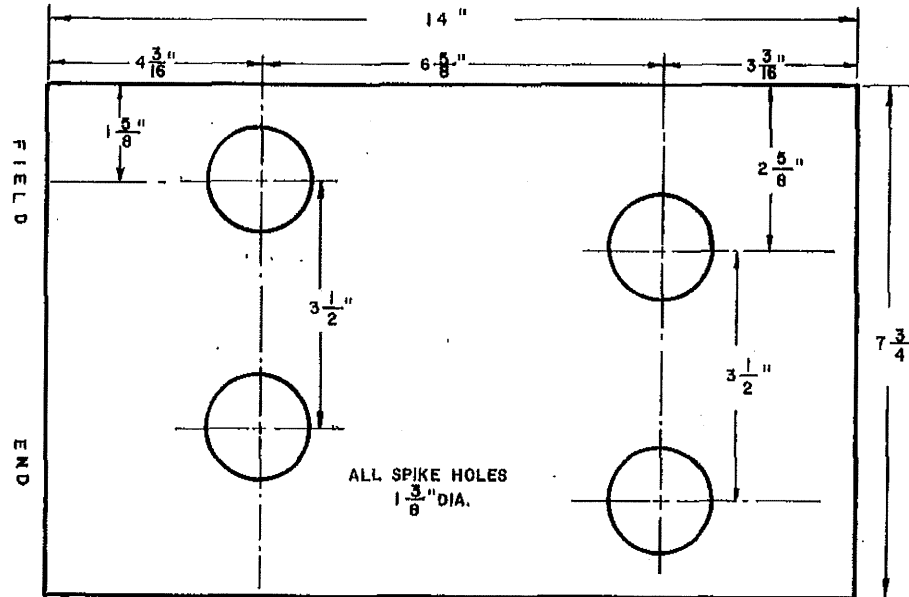
ISSUE DATE

2
ISSUE NO.

CONCRETE TIE

John D. Ray
ENGINEERING OFFICER

W. A. H. H. H.
CHIEF ENGINEERING OFFICER

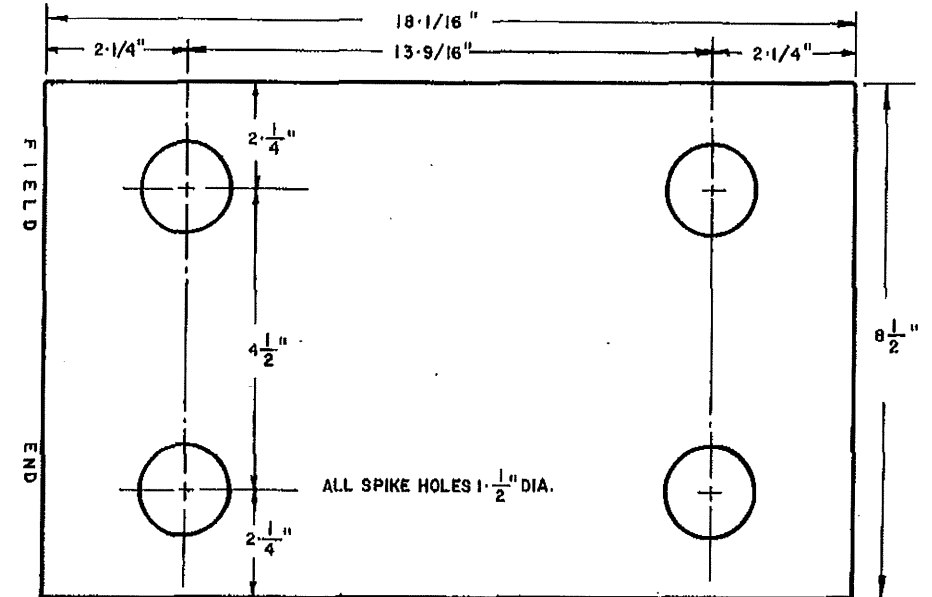


WOOD SHIM FOR TIE PLATES

As Shown Dimensions Will Fit Either 132lb or 115 lb Plate (B-6 Punching Only).

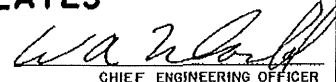
NOTES:

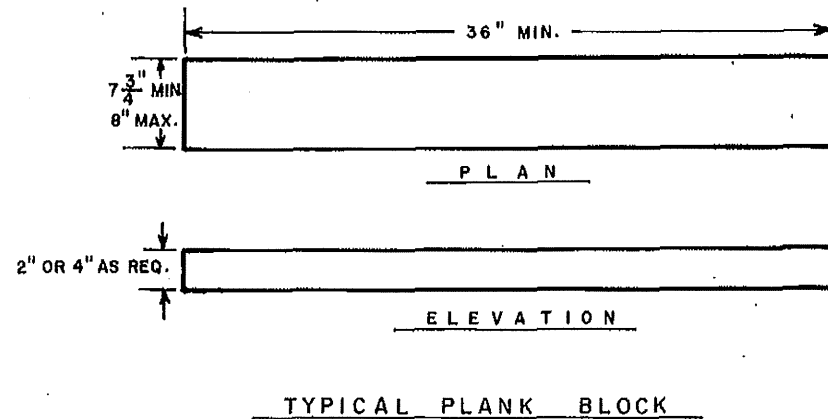
1. Shims shall be made of sawed, sound hardwood or marine plywood - prebored as shown.
2. A variation of 1/4" more or 1/16" less is allowable in length or width with length, width & depth uniform (no wedge shape allowed in any direction).
3. Thickness of shim shall be in 1/4" increments from 1/2" to 1 3/4".
4. Wood shims not exceeding 1" in thickness may be secured using a standard 6" cut spike but shimming exceeding 1" must be secured using special 8" track spikes.
5. For additional data on use and installation, see drawing 1204 and MW-1 Manual, SECTIONS 213.129 and 213.131.



WOOD SHIM FOR RESILIENTLY FASTENED TIE PLATE

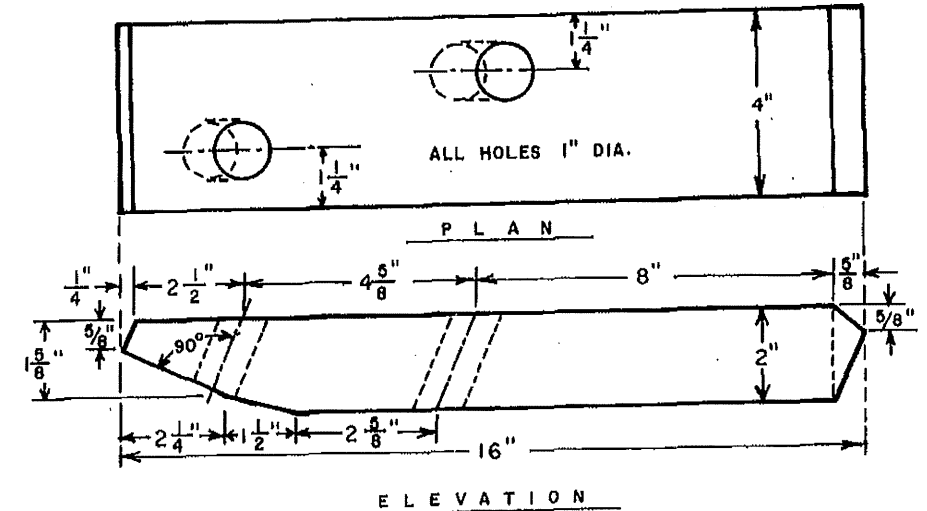
As Shown Dimensions Will Fit Either 132lb or 115lb Plate

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1200
		Oct. 28, 1992 ISSUE DATE
WOOD SHIMS FOR TIE PLATES		
 ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



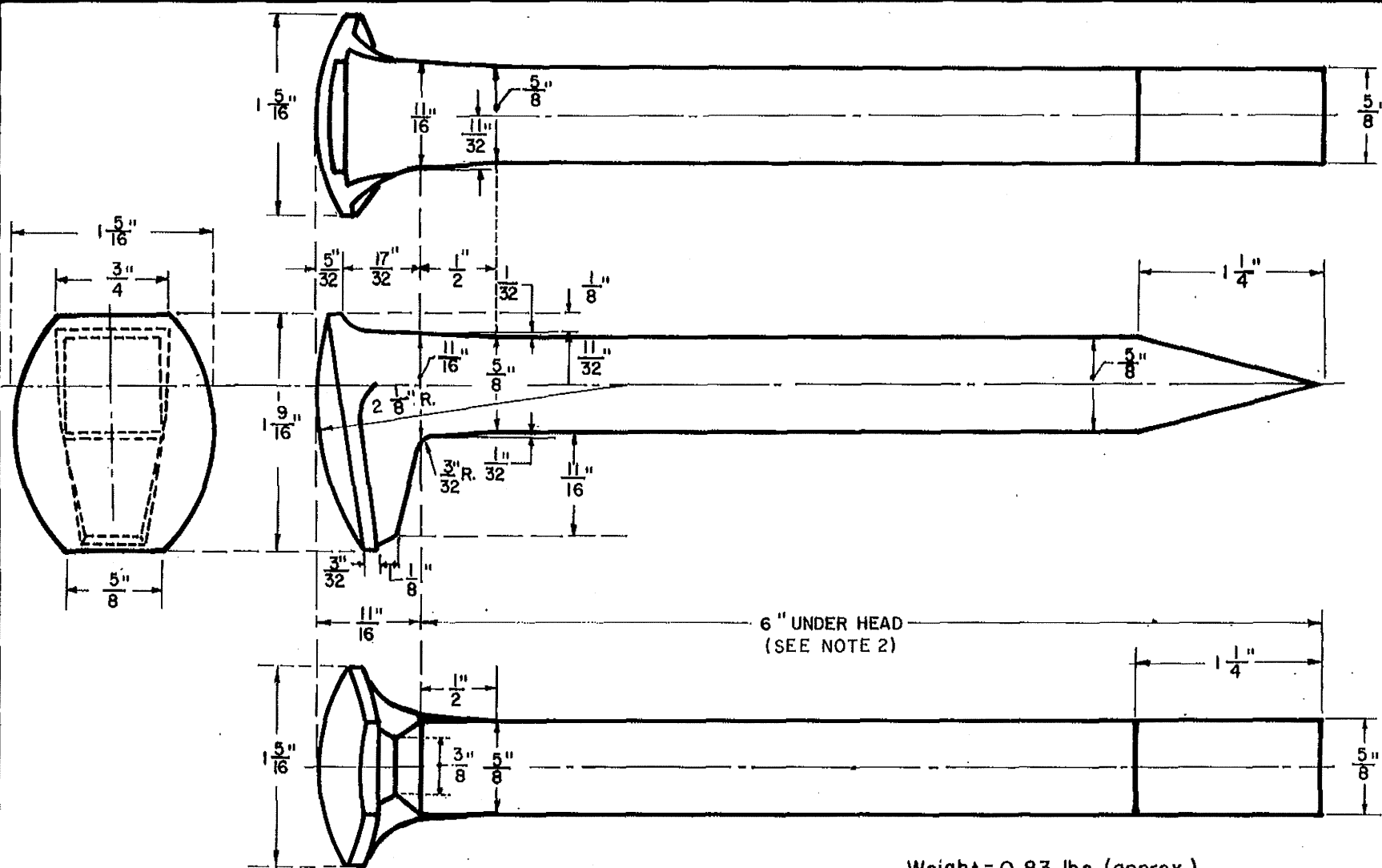
NOTES:

1. Plank blocks are to conform to the dimensional specifications for wood shims (drawing 1200) contained in these standard plans except that plank blocks are to be made from hard wood with additional plate holding spike hole(s) to be bored in the field.
2. Plank blocks are to be applied directly on top of the tie beneath the rail and the tie plate and secured to the tie with spikes as required to penetrate the tie at least 4 inches.
3. When a rail is shimmed 2" or more, a combination of shims and 2" or 4" plank block must be used with the wood shims on top of the plank and secured to it as with 10d or 20d nails depending on thickness of shim.
4. When Plank blocks are used (min. length to be 36"), they are to be applied with one end flush with the end of the tie and spiked to the tie using at least four 8" Boat spikes using 5/8" diameter spike holes bored in the field.
5. If the elevation change permits, full tie length plank blocks shall be used wherever possible.
6. Wood shims not exceeding 1" in thickness may be secured using a standard 6" cut spike but shimming exceeding 1" must be secured using special 8" track spikes.



7. When a rail is shimmed more than 1 1/2" it must be securely braced at least every third tie for the full length of the shimming.
8. Braced and/or shimmed track should be checked frequently for alignment, gage, and cross level as well as to assure that the braces and/or shims are tight.
9. It should be stressed that shimming and blocking should be considered a method of last resort in correcting rail elevation mismatch problems when the track subgrade is frozen and cannot be worked.
10. Record of Shim/Block installations must be maintained in the office of Engineer of Track.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1204
			Oct. 28, 1992 ISSUE DATE
FROST BRACING AND BLOCKING			
ENGINEERING OFFICER			
CHIEF ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	



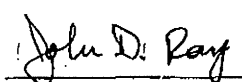
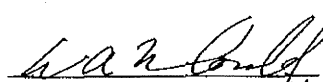
NOTES:

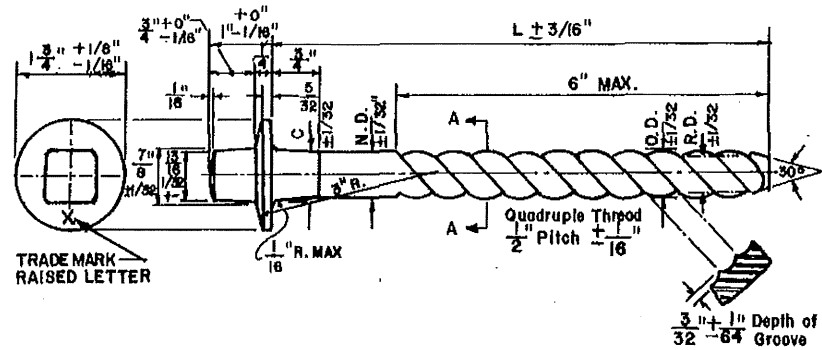
1. See A.R.E.A. Specifications for Soft Steel Track Spikes for Process, Chemical Composition, Tensile Properties, Bending Properties, and other standards.
2. Spikes used for frost shims shall have a length dimension of 8" under the head.
3. Spikes shall be shipped in steel kegs which do not exceed a weight of 200 lbs.

Weight = 0.83 lbs (approx.)

Approx. 240 Spikes per 200 lb. keg

STANDARD CUT TRACK SPIKE

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. No. 1210 Oct. 28, 1992 ISSUE DATE	(2) ISSUE NO.
	CUT SPIKE   ENGINEERING OFFICER CHIEF ENGINEERING OFFICER		



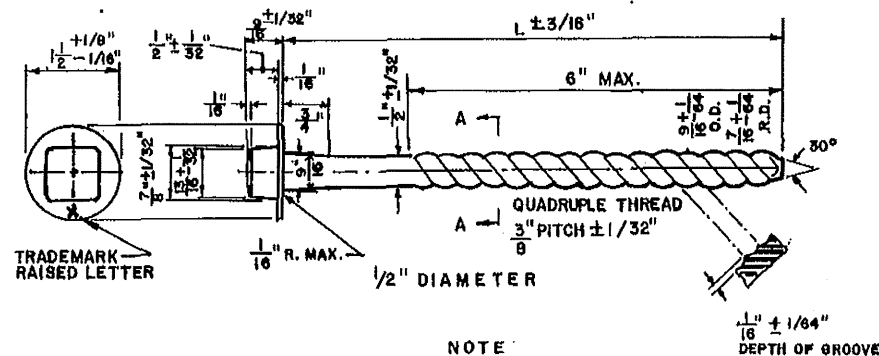
DESCRIPTION	5/8"	1 1/8"	3/4"
O.D. OF THREAD	23/32"	25/32"	27/32"
R.D. ROOT DIAMETER	17/32"	19/32"	21/32"
C-TOP OF CONE NECK	11/16"	25/32"	13/16"

NOTE
* Order By Nominal Diameter
And Length Under Head



A.R.E.A. WASHER-HEAD TIMBER DRIVE SPIKE

Not to Scale

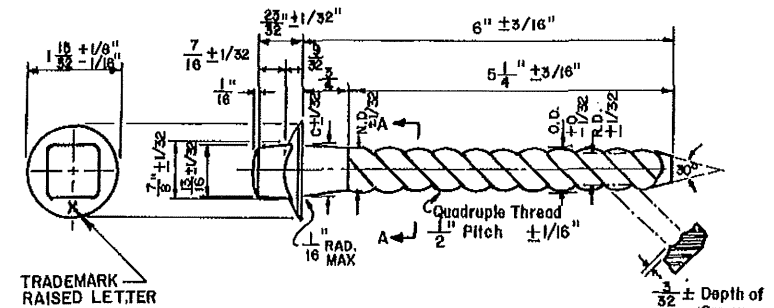


NOTE
Order By Nominal Diameter
And Length Under Head.



A.R.E.A. TIMBER DRIVE SPIKE

Not to Scale



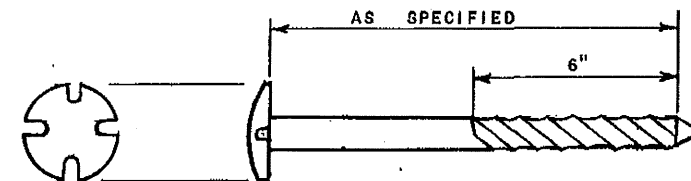
DESCRIPTION	1 1/8"	3/4"
O.D. OF THREAD	23/32 MAX.	25/32 MAX.
R.D. ROOT DIAMETER	17/32"	19/32"
C-TOP OF CONE NECK	25/32"	27/32"

NOTES
Other Lengths Procurable
Order by Nominal Diameter.
Designed to Fit 1 1/16" and 3/4"
Square and Round Holes



A.R.E.A. CONE-NECK DRIVE SPIKE

Not to Scale



SPIKE DIAMETER	HEAD DIAMETER	HEAD THICKNESS	LENGTH
1/2" Nominal Diameter	2"	19/64"	6", 8", 10" or 12"
5/8" "	2 1/2"	11/32"	6" to 14"
3/4" "	2 1/2"	11/32"	6" to 14"

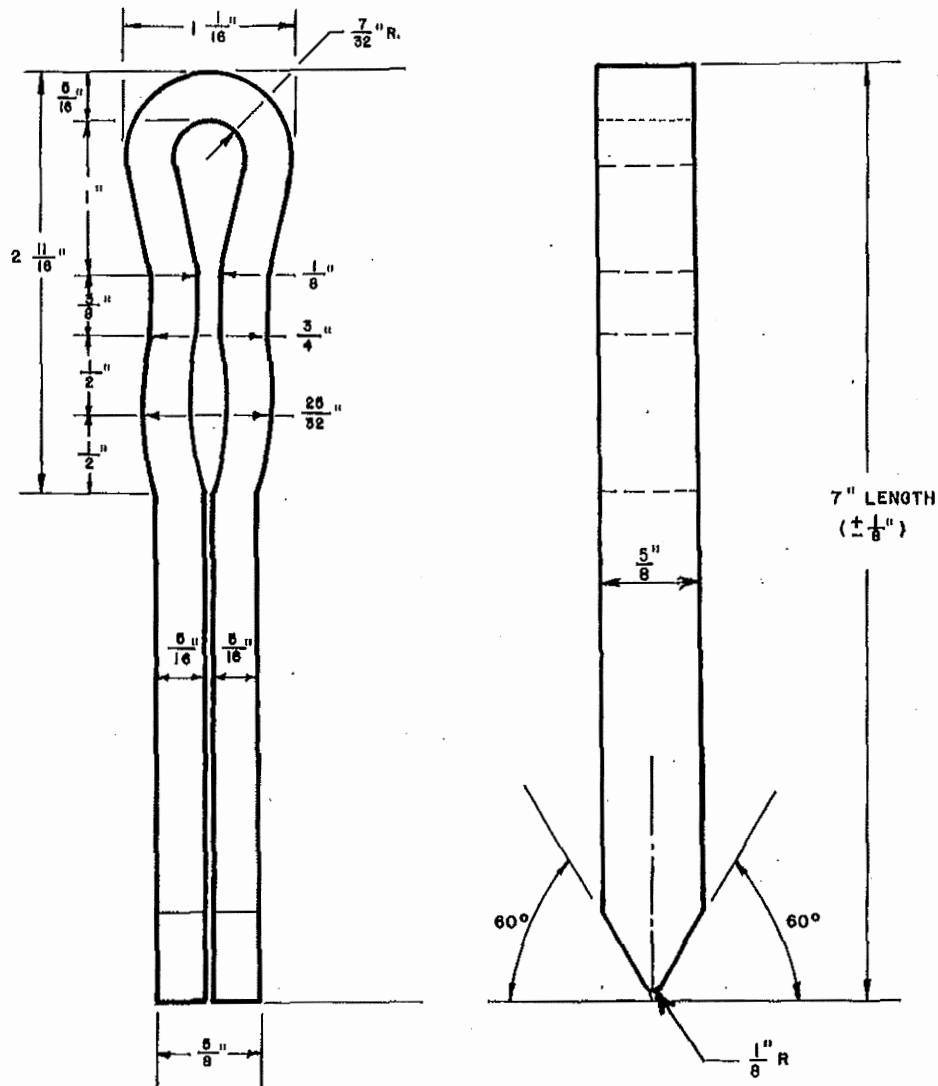
DOME HEAD DRIVE SPIKE

Not to Scale

NOTE:

ALL DRIVE SPIKES TO CONFORM TO CURRENT
A.R.E.A. SPECIFICATIONS FOR STEEL DRIVE
SPIKES, CHAPTER 5, MISCELLANEOUS PART.

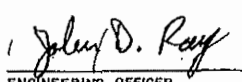
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	TIMBER DRIVE SPIKES 		
	ENGINEERING OFFICER CHIEF ENGINEERING OFFICER		

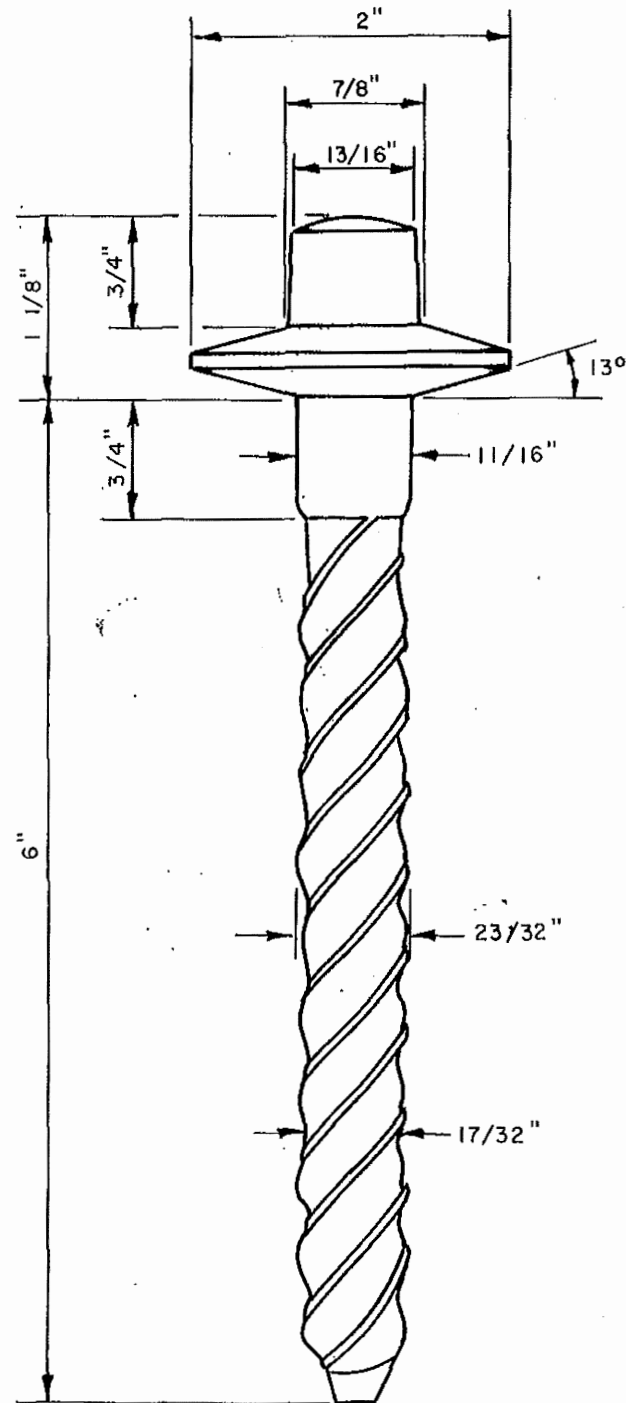


LOCK SPIKE FOR TIE PLATE

NOTE:

1. Lock Spikes shall be manufactured from 5/8" X 5/16" alloy spring steel with a minimal tensile strength of 160,000 p.s.i. and elongation of 25 %.
2. When Lock Spikes are driven into an 11/16" square spike hole (in free air), the legs shall open 1/8" (minimum).
3. For Spiking patterns, see drawing NO. 1104

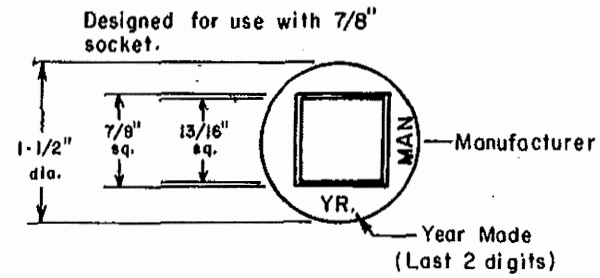
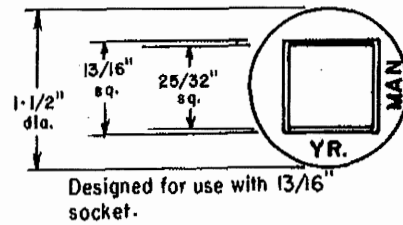
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1216	(2) ISSUE NO.
		Oct. 28, 1992 ISSUE DATE	
LOCK SPIKE FOR TIE PLATES			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



NOTES:

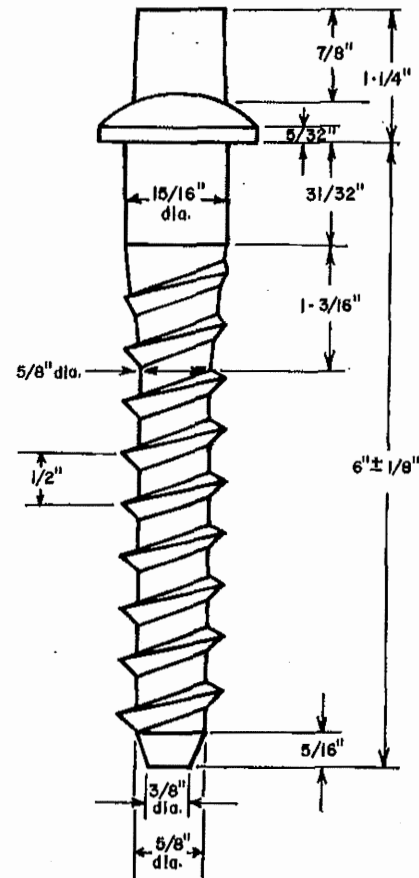
1. Track Drive Spikes shall be hot forged from medium carbon steel conforming with ASTM A-66.
2. Prebore holes either 7/16" or 1/2" in dia. Drive spike with hammering force only.
3. Track Drive Spikes shall be used instead of cut spikes within turnouts at locations where resilient fasteners cannot be applied. This includes frog guard rails and plates just beyond the heel of switch.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1217
		Oct. 28, 1992 ISSUE DATE
TRACK DRIVE SPIKE		
<i>John D. Ray</i> ENGINEERING OFFICER	<i>W. A. Z. Z. Z.</i> CHIEF ENGINEERING OFFICER	

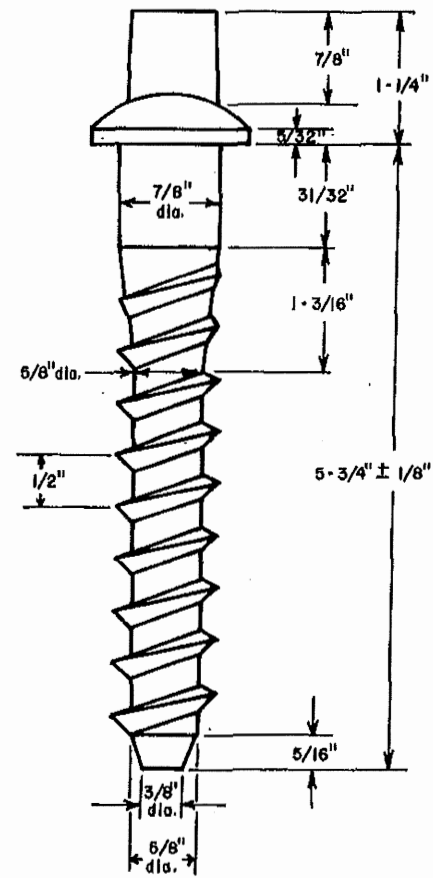


NOTES:

1. SCREW SPIKES SHALL BE FORGED FROM MEDIUM CARBON STEEL CONFORMING WITH ASTM A-66.
2. UNLESS OTHERWISE SPECIFIED, FURNISH 7/8" DIAMETER SCREW SPIKES
3. APPROXIMATE WEIGHT = 1.1 LBS.

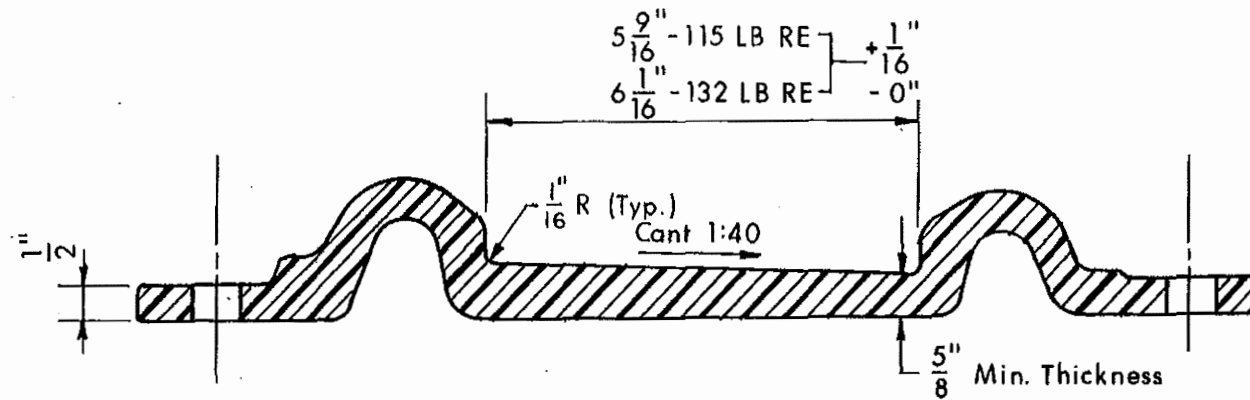


1 5/16" SCREW SPIKE

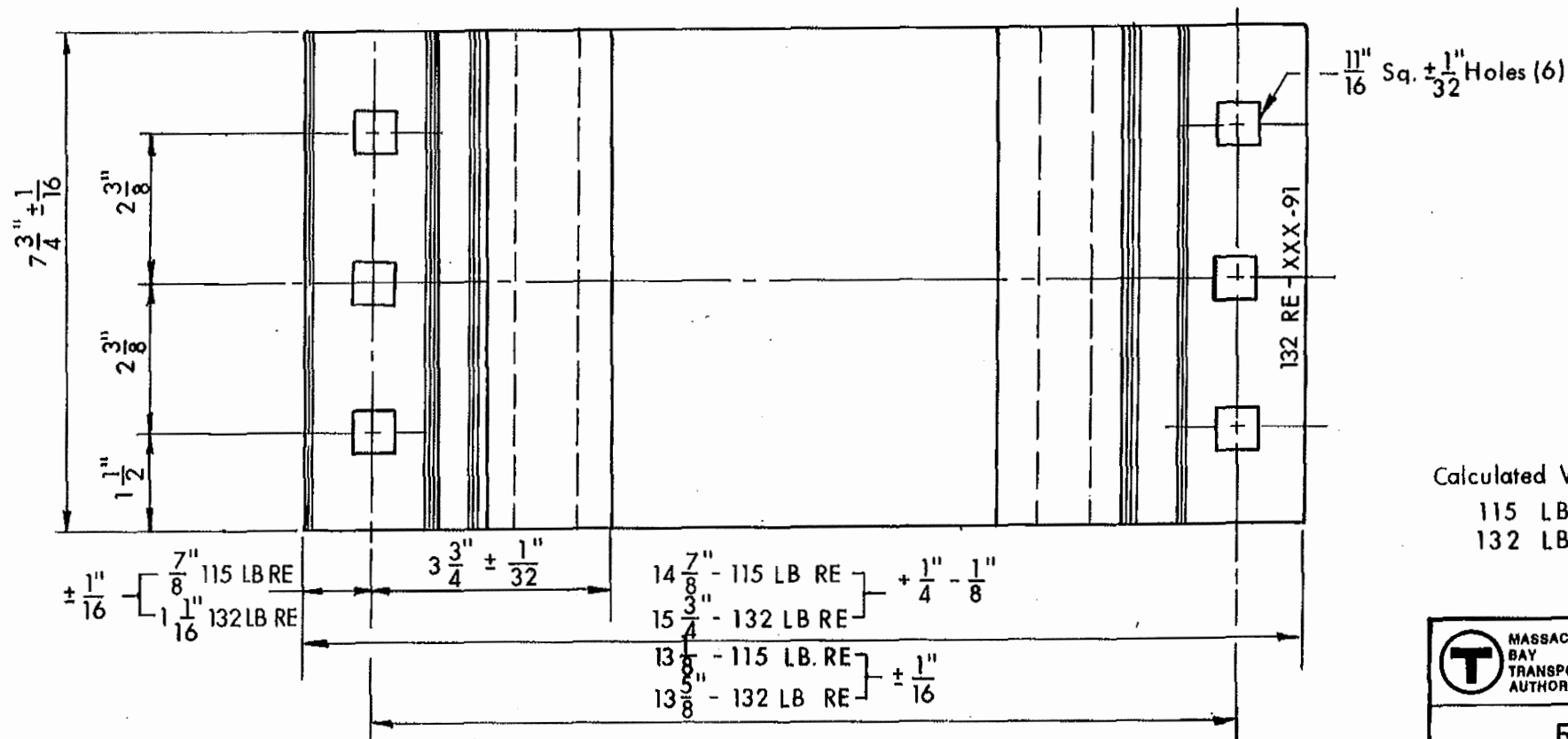


7/8" SCREW SPIKE

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1218
			Oct. 28, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	



SECTION



PLAN

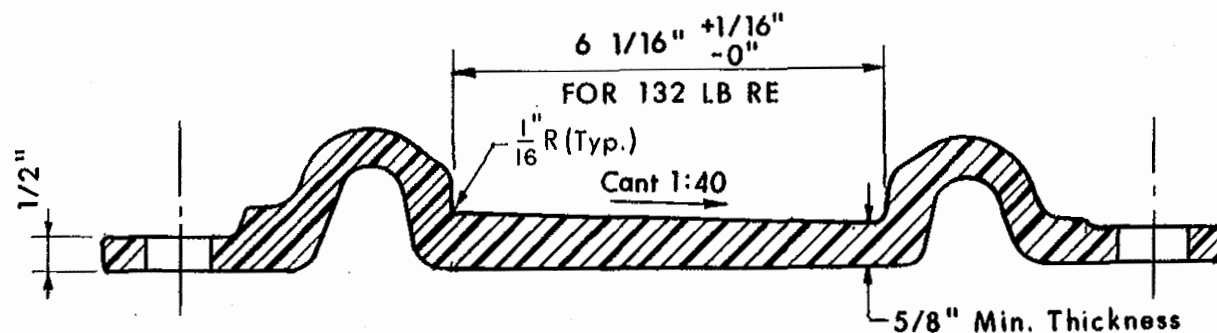
NOTES:

1. Tie Plates shall conform to current A.R.E.A. Specifications.
2. Tie Plates shall be branded either 115 or 132 to designate the section, three letters or a trademark to indicate the producer and two figures being the last two digits of the year rolled. Lettering shall be on the gage side of the plate.
3. Material shall be Low - Carbon Steel.

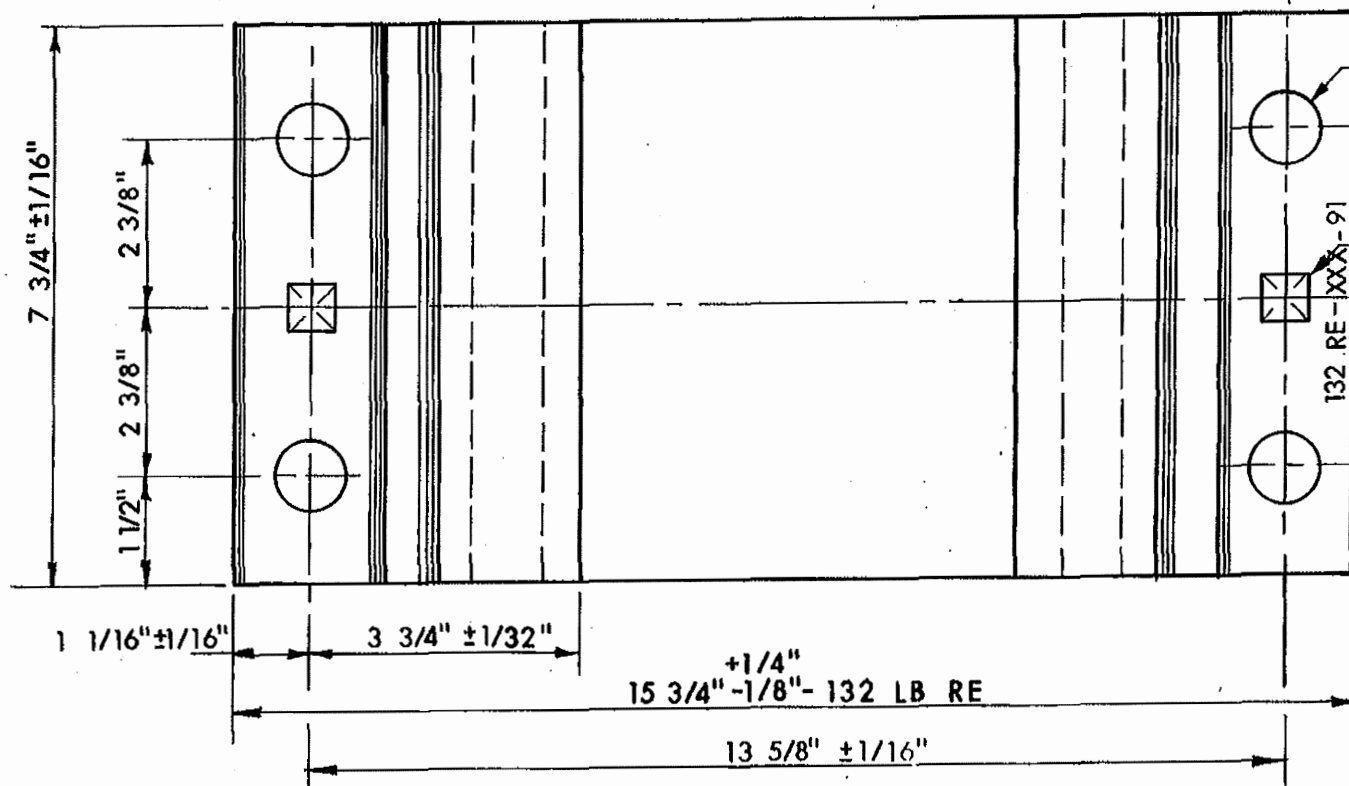
Calculated Weight (Approx.) of Punched Plate

115 LB RE	-----	23.40 lbs.
132 LB RE	-----	24.48 lbs.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1224
			Oct. 28, 1992 (2) ISSUE DATE ISSUE NO.
RESILIENT FASTENER TIE PLATE FOR LOCK SPIKES			
John D. Ray ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



SECTION



PLAN

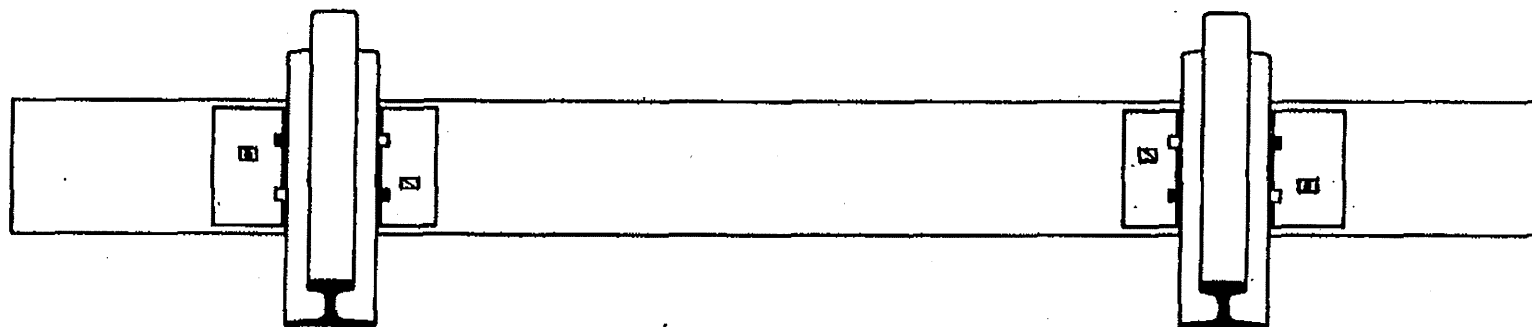
Calculated Weight (Approx.) of Punched Plate
132 LB. R.E. ---- 24.36 lbs.

NOTES:

1. Tie Plates shall conform to current A.R.E.A. Specifications.
2. Tie Plates shall be branded 132 to designate the section, three letters or a trademark to designate the producer and two figures being the last two digits of the year rolled. Lettering shall be on the gage side of the plate.
3. Material shall be Low-Carbon Steel.

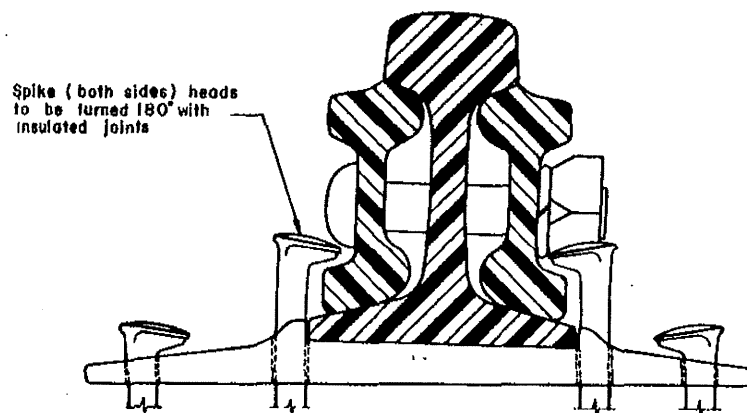
- 4 Outside holes shall be 15/16" dia. round holes to fit 7/8" dia. screw spikes.
- 2 Center holes marked ☒ shall be 11/16" sq. holes ±1/32"

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1225	ISSUE NO. 1
		Oct. 28, 1992 ISSUE DATE	
RESILIENT FASTENER TIE PLATE FOR SCREW SPIKES			
John D. Roy ENGINEERING OFFICER		W. A. Walsh CHIEF ENGINEERING OFFICER	



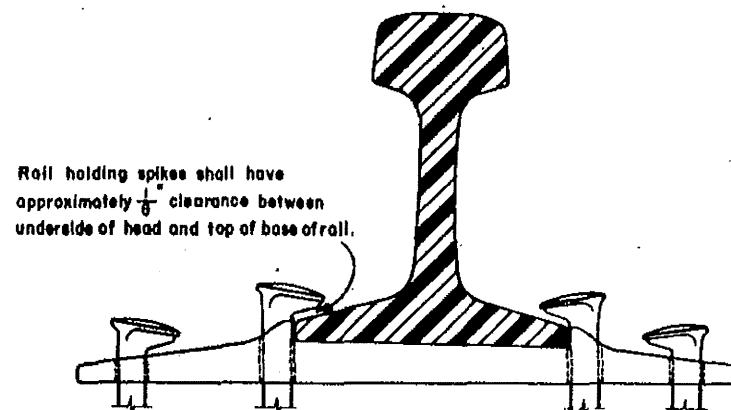
LEGEND

- Indicates Rail Holding Spikes In All Cases
- ▣ " 1st Plate Holding Spike (Where Only One Is Required).
- ⊠ " 2nd Plate Holding Spike (Where Two Are Required).



Spike (both sides) heads
to be turned 180° with
insulated joints

SPIKE APPLICATION WITHIN
JOINT BAR LIMITS



Rail holding spikes shall have
approximately $\frac{1}{8}$ " clearance between
underside of head and top of base of rail.

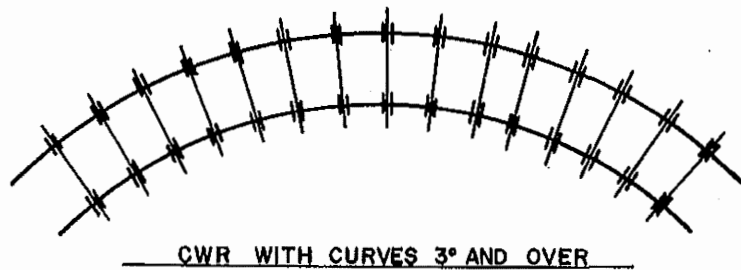
SPIKE APPLICATION OF RAIL
AND PLATE HOLDING SPIKES

(Tangent and Curved Track)

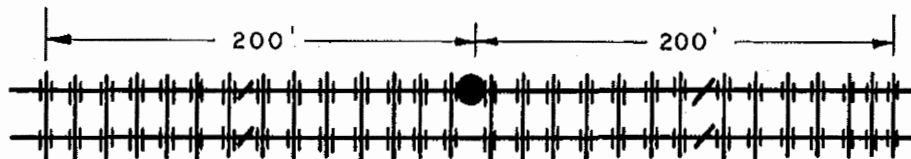
NOTES:

1. Spiking on bridges and trestles shall be the same as for standard ballasted track.
2. For spiking patterns, see drawing NO. 1104

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1230	(2) ISSUE NO.
		Oct. 28, 1992 ISSUE DATE	
SPIKING ARRANGEMENT FOR TIE PLATES			
John D. Ray ENGINEERING OFFICER		W. A. Walsh CHIEF ENGINEERING OFFICER	



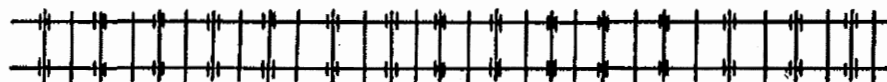
CWR WITH CURVES 3° AND OVER



JOINTED END OF CWR STRING

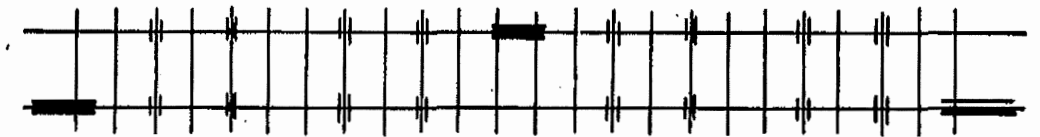
● INDICATES JOINT BARS

AT LOCATIONS WHERE CWR MEETS JOINTED RAIL,
DO NOT APPLY ADDITIONAL ANCHORS TO
JOINTED RAIL.



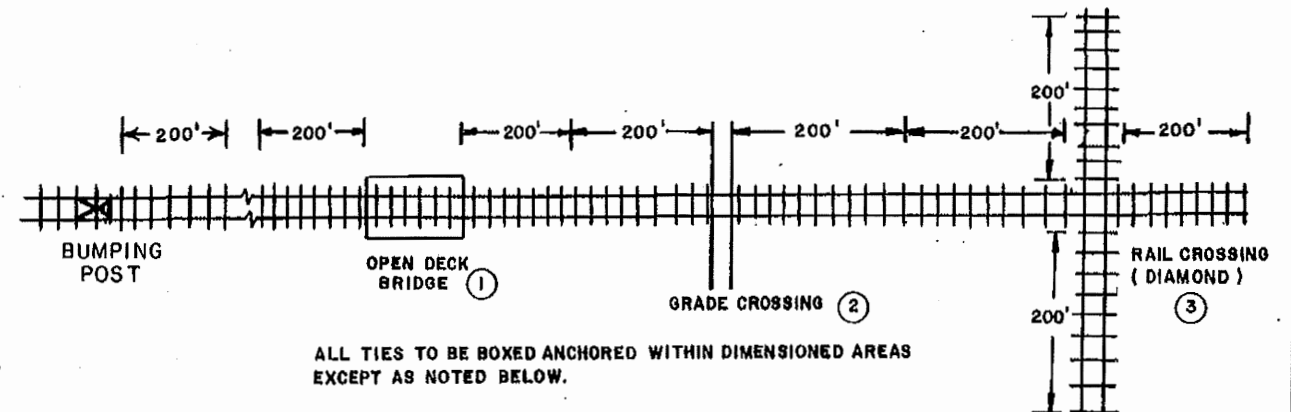
TYPICAL CONTINUOUS WELDED RAIL (CWR) STRING
(TANGENT & CURVATURE UP TO 3°)

RAIL ANCHORING PATTERNS FOR CONTINUOUS WELDED RAIL



RAIL ANCHORING PATTERN FOR JOINTED RAIL IN 39' LENGTHS WITH TRAFFIC
IN BOTH DIRECTIONS

(32 ANCHORS PER 39 FOOT LENGTH OF TRACK) ④ & ⑤



ALL TIES TO BE BOXED ANCHORED WITHIN DIMENSIONED AREAS
EXCEPT AS NOTED BELOW.

RAIL ANCHORING FOR OPEN DECK BRIDGES, GRADE AND RAIL CROSSINGS AND BUMPING POSTS WITH C.W.R. OR JOINTED RAIL

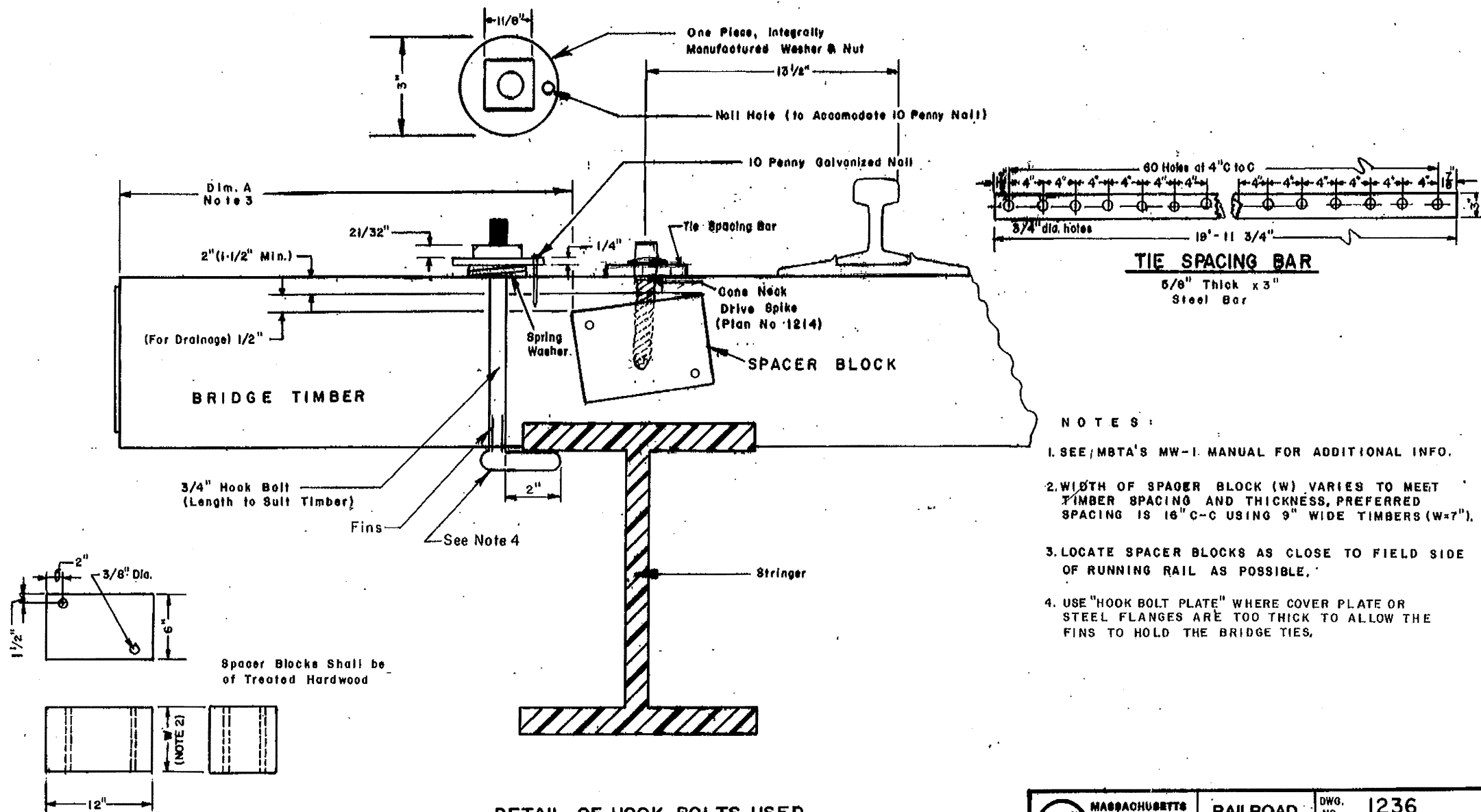
Anchoring Patterns Shown are for Cut-Spike Fastened Track. Rail Fastened with Approved Resilient Fasteners Does Not Need Anchors As Shown on This Drawing.

NOTES

1. OPEN DECK OR THROUGH DECK BRIDGES ARE NOT TO BE ANCHORED ACROSS THE SPAN EXCEPT UNDER THE PROVISIONS OF THE MBTA'S MW-1 OR WITH AUTHORIZATION OF THE CHIEF ENGINEER.
2. GRADE CROSSINGS ARE NOT TO BE ANCHORED WITHIN THE LIMITS OF THE PAVED OR RUBBER AREA.
3. THE DIAMOND FROGS ARE NOT TO BE ANCHORED.
4. JOINTED RAIL ANCHORING PATTERN TO BE ADJUSTED FOR JOINT SPACING WHERE NECESSARY
5. JOINTED RAIL ANCHORING TO BE ADJUSTED FOR DIFFERING RAIL LENGTHS

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1232
			Oct. 28, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

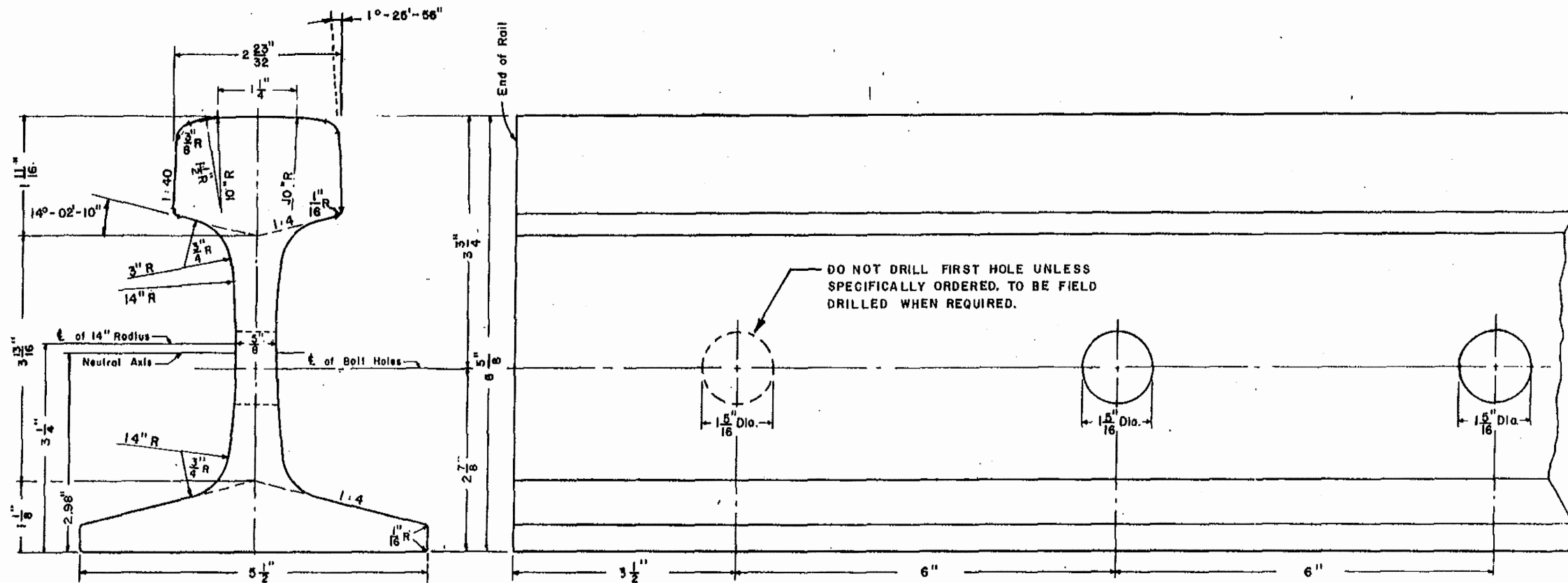
RAIL ANCHORING DETAILS- JOINTED AND CWR TRACK



SPACER BLOCKS

DETAIL OF HOOK BOLTS USED AS BRIDGE TIMBER ANCHOR

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1236
			Jan. 5, 1996 ISSUE DATE
BRIDGE TIMBER ANCHORING DETAIL John D. Ray SECTION CHIEF			



SECTION

DRILLING

Rails shall be in accordance with current A.R.E.A. "Specifications for Steel Rails," except all rails within special trackwork shall be fully heat treated

MINIMUM MATHEMATICAL ATTRIBUTES

Area Sq. In.	Percent	Moment of Inertia	
Head-----3.91	34.8	Sec. Modulus of Head-----	18.0
Web-----3.04	27.1	Sec. Modulus of Base-----	22.0
Base-----4.29	38.1	Ratio M.I. to Area-----	5.83
Total-----11.25	100.0	Ratio Sec. Modulus Head to Area-----	1.60
		Ratio Height to Base-----	1.20
		Weight per Yard-----	114.7
		Net Tons per Mile of Track-----	201.87



RAILROAD
OPERATIONS

DWG.
NO. 1300

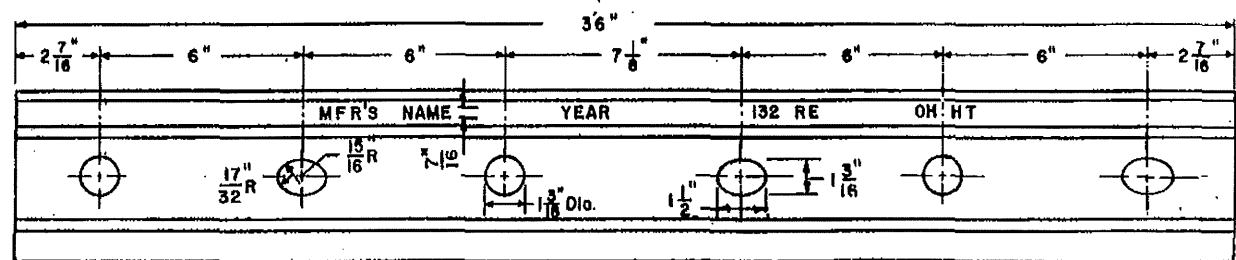
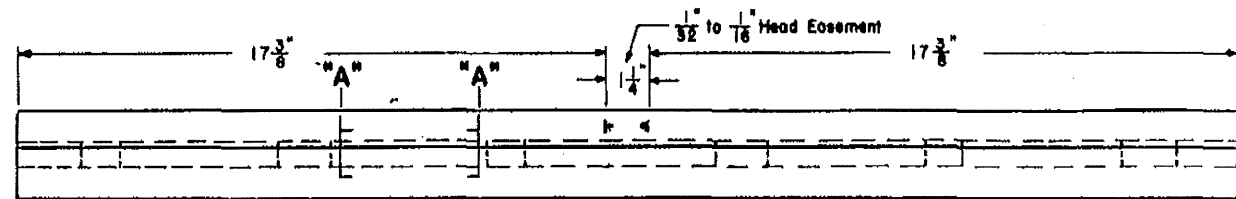
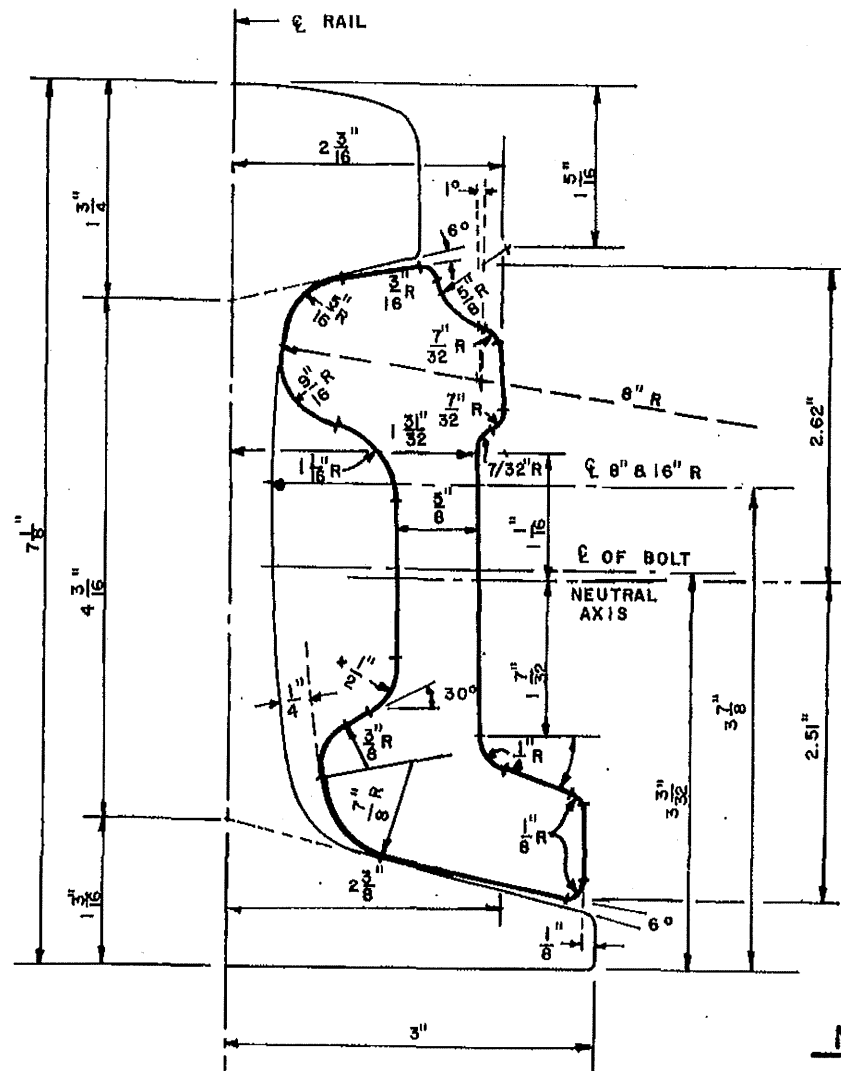
Oct. 28, 1992
ISSUE DATE

(2)
ISSUE NO.

115 LB R E RAIL

John D. Ray
ENGINEERING OFFICER

W. A. H. H.
CHIEF ENGINEERING OFFICER



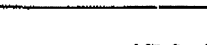
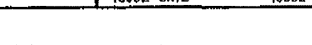
MINIMUM
MATHEMATICAL ATTRIBUTES
TWO BARS

Moment of Inertia-----	31.8
Section Modulus above Neutral Axis-----	13.2
Section Modulus below Neutral Axis-----	12.0
Calculated Weight of 2 Bars-----	117.71 Lbs.
Area in Square Inches (1 Bar)-----	5.52 sq. in.

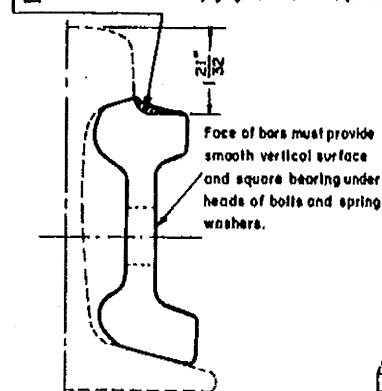
Joint Bars shall be Short Toe and a Headfree Design.

Joint Bars shall be in accordance with the current A.R.E.A.
"Specifications For Quenched Carbon Steel Joint Bars."

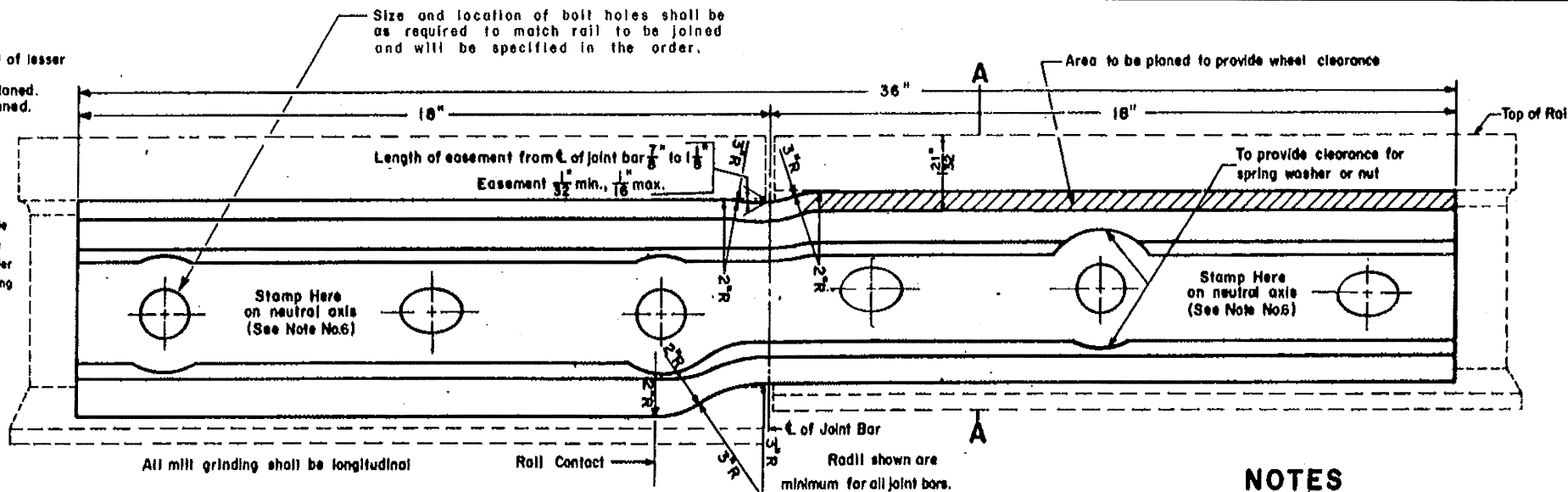
1 $\frac{1}{8}$ " Elliptical Neck Bolts to be used with this bar.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1322 Oct. 28, 1992 ISSUE DATE	(2) ISSUE NO.
	132 LB RE JOINT BAR		
 _____ ENGINEERING OFFICER		 _____ CHIEF ENGINEERING OFFICER	

Planed off to provide wheel clearance on rail of lesser section depth or lighter rail.
Joint with "No Hand" both bars are to be planed.
Joint with "Hand" only gage bar is to be planed.



SECTION A-A

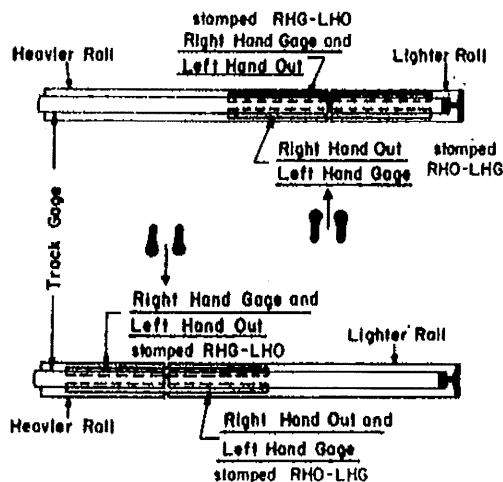


NOTES

1. All joint bars shall conform to current AREA specifications for Quenched Carbon Steel Joint Bars.
2. One joint shall consist of two bars. The joint bars shall be furnished without any provisions for any wear in the rail.
3. Joint bars shall be ordered 36" long without exception unless specifically directed otherwise by the Chief Engineering Officer.
4. Joint bars shall be forged, heat treated and shaped to the configuration of standard joint bars of the respective rail sections to be joined.
5. All bars must be furnished so that the distance between other faces of the bars will be the same as for standard joint bar for the respective rail sections so joint bolts of standard lengths can be used.
6. All bars shall be stamped with depressed characters not less than $\frac{1}{8}$ " in height to show the manufacturer's name or trademark, year manufactured, and connecting rail sections at each end. Bars for joints that have "No Hand" shall be stamped "RHO-LHG" or "RHG-LHO" to indicate interchangeability. Bars for joints "With a Hand" shall be stamped "LHG", "RHG", "LHO", or "RHO", whichever applies, see sketch at left. All stamping shall be placed so as to not be covered by the bolt heads or the nuts.

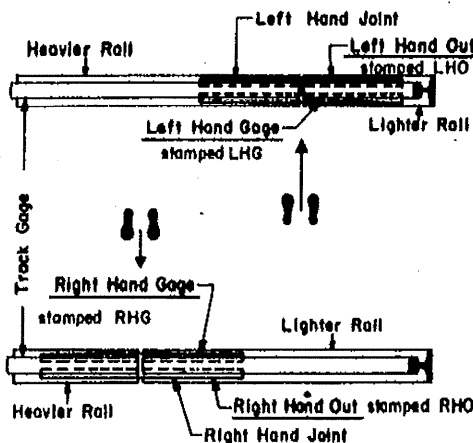
ALLOWABLE COMPROMISES

100-85
107-85
107-100
112-100
112-107
115-100
115-107
115-112
132-115
136-115
136-132



JOINTS - NO HAND

Proper designations for joint bars are shown underlined

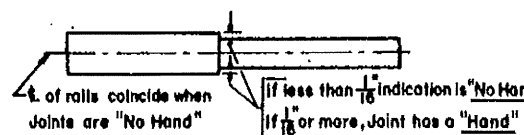


JOINTS - WITH A HAND

TO DETERMINE HAND OF JOINT BAR

Stand between the rails (gage) of a track and face rails to be connected, ORDER -

LEFT HAND JOINT - when the heavier rail is on your left.
RIGHT HAND JOINT - when the heavier rail is on your right.



Even though the width of the rail heads are equal or within the limits specified above, the indication is a "Hand" if one rail is vertical and one rail is coned.



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG. NO. 1328

Oct. 28, 1992

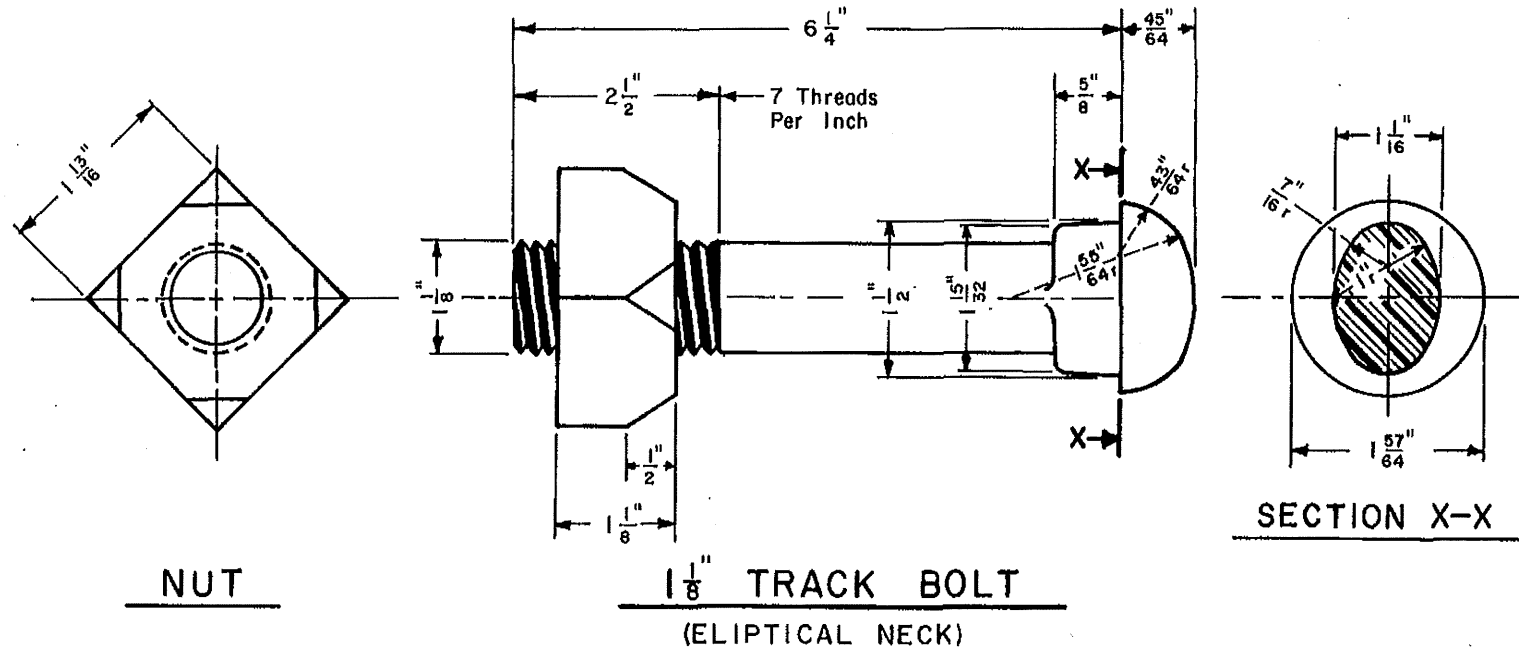
ISSUE DATE

ISSUE NO. 2

COMPROMISE JOINT BARS FOR TEE RAIL

John D. Ray
ENGINEERING OFFICER

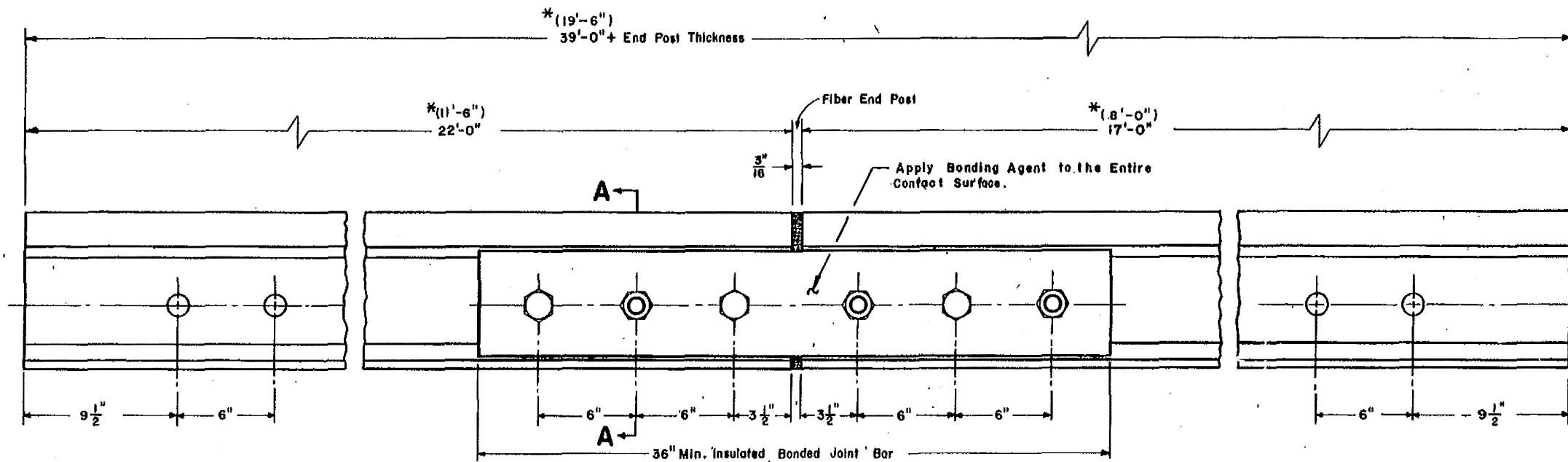
W. A. R. R. R.
CHIEF ENGINEERING OFFICER



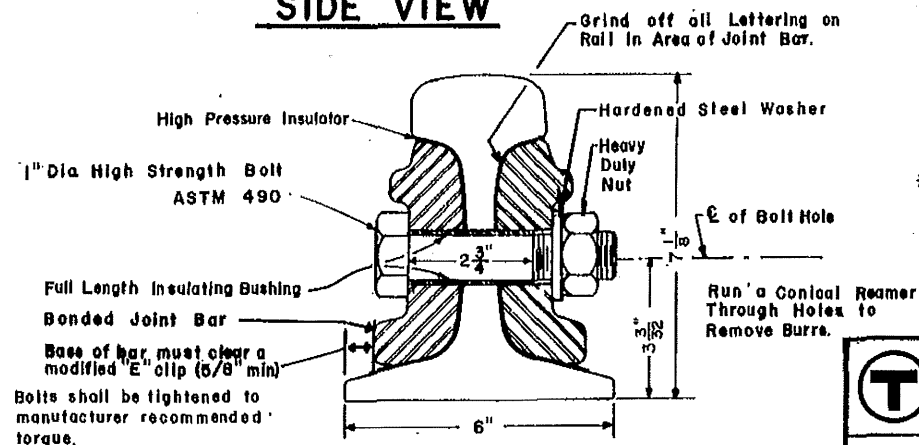
NOTES

- 1-All bolts, nuts and spring washers shall conform with current A.R.E.A. Specifications
- 2-All threads to be rolled threads.
- 3-All nuts to be wrench fit
- 4-All bolts, nuts and spring washers to be thoroughly coated with a metal preservative.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1332 Oct. 28, 1992 ISSUE DATE	① ISSUE NO.
	STANDARD TRACK BOLT <i>John D. Ray</i> ENGINEERING OFFICER		
 <i>W. A. R. R. R.</i> CHIEF ENGINEERING OFFICER			



SIDE VIEW



SECTION A-A

MINIMUM MATHEMATICAL ATTRIBUTES
 Avg. Area ——— 6.40 sq. in.
 Moment of Inertia ——— 12.40
 Section Mod. — Top ——— 4.86
 Section Mod. — Bottom ——— 4.90

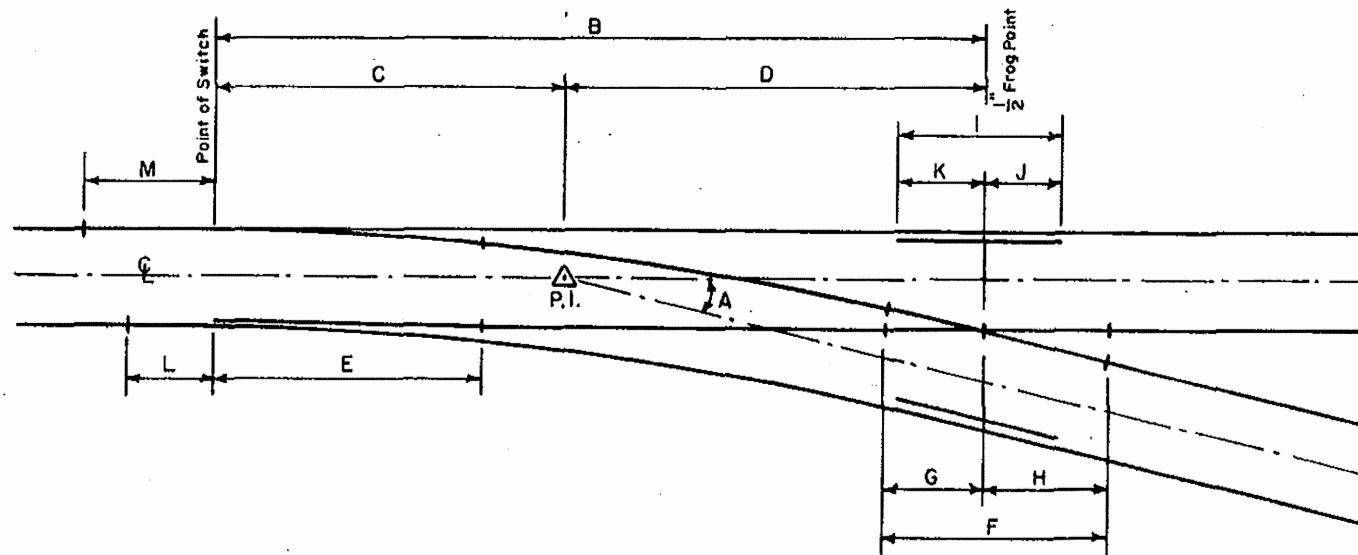
NOTES

- 1- All rails to be Fully Heat Treated
- 2- End bolt holes in the rail shall be $1\frac{5}{16}$ " dia.
- 3- Bolt heads to be installed in bar, in alternate positions.
- * 4- Supply 19'-6" long sections for new installations and 39'-0" long sections for replacements.
- 5- When spiking joint, place head in reverse position.
- 6- With Resilient Fastener Plates, use a Modified 'E' Clip, (2063A) - With Concrete Ties, include a modified 4263 insulator.

Allgheny..... 1050 ft. lbs
 Portec..... 1050 " "

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 1340
			Oct. 28, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

132 R.E. BONDED INSULATED JOINT



- A = Frog angle
 B = Actual lead
 C = Point of intersection to point of switch
 D = Point of intersection to $\frac{1}{2}$ frog point
 E = Length of straight switch point (② curved point)
 F = Length of frog
 G = Toe length
 H = Heel length
 I = Guard rail length
 J = $\frac{1}{2}$ frog point to end of guard rail
 K = $\frac{1}{2}$ frog point to end of guard rail
 L = Point of switch to end of stock rail
 M = Point of switch to end of stock rail
- FROG DIMENSIONS SHOWN
 ARE FOR WELDED, RAIL-
 BOUND MANGANESE STEEL
 FROG.

TURNOUT NUMBER	ANGLE A	DIMENSION													
		B	C	D	E	F	G	H	I	J	K	L	M	L	M
6①	9°-31'-38"	47'-6"	19'-0"	28'-6"	11'-0"	12'-6"	5'-1"	7'-5"	10'-0"	3'-8 $\frac{1}{2}$ "	6'-3 $\frac{1}{2}$ "	4'-6"	6'-2"	-	-
8	7°-09'-10"	68'-0"	30'-0"	38'-0"	16'-6"	18'-0"	7'-0"	11'-0"	10'-0"	3'-8 $\frac{1}{2}$ "	6'-3 $\frac{1}{2}$ "	4'-6"	6'-2"	-	-
10	5°-43'-29"	77'-4 $\frac{5}{8}$ "	29'-10 $\frac{3}{4}$ "	47'-6"	16'-6"	23'-0"	9'-8"	13'-6"	13'-3"	6'-3 $\frac{1}{2}$ "	8'-11 $\frac{1}{2}$ "	4'-6"	6'-2"	14'-7 $\frac{1}{2}$ "	10'-5"
15	3°-49'-06"	111'-2 $\frac{5}{8}$ "	39'-11 $\frac{3}{4}$ "	71'-3"	②26'-0"	26'-8"	10'-4"	16'-4"	13'-3"	6'-4"	7'-11"	4'-6"	8'-0"	5'-0"	8'-9 $\frac{1}{4}$ "
20	2°-51'-51"	154'-6 $\frac{1}{2}$ "	59'-6 $\frac{1}{2}$ "	95'-0"	②39'-0"	34'-2"	13'-1"	21'-1"	13'-3"	6'-4"	7'-11"	6'-4"	6'-4"	5'-7 $\frac{1}{2}$ "	9'-0 $\frac{1}{2}$ "

① Requires special approval

② Curved Switch

STANDARD TURNOUTS

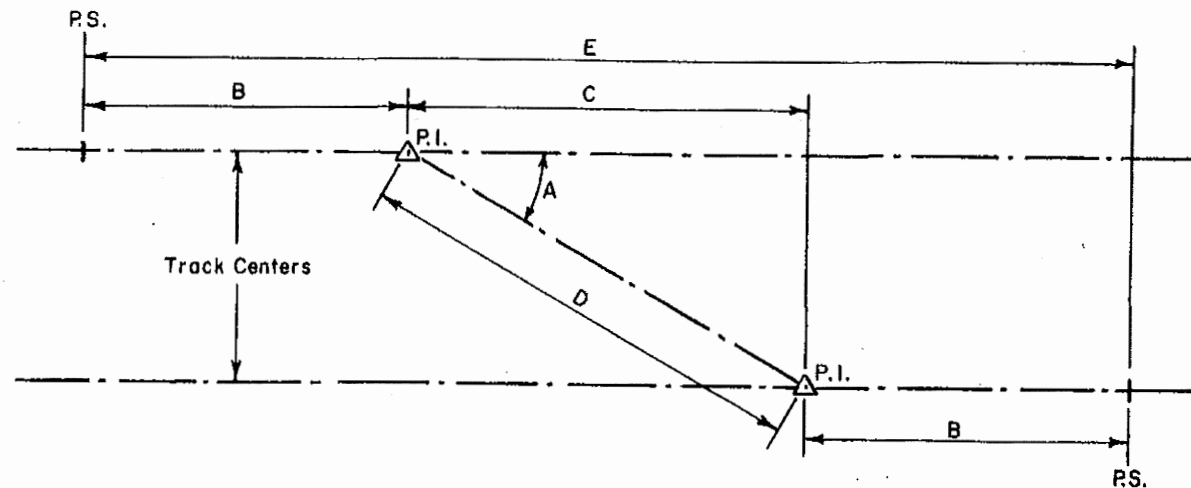
SOLID
HEEL BLOCK
TURNOUTS

FLOATING
HEEL BLOCK
TURNOUTS

	RAILROAD OPERATIONS	DWG. NO. 2000
		Oct. 28, 1992 ISSUE DATE

STANDARD TURNOUTS GENERAL LAYOUT

ENGINEERING OFFICER
 CHIEF ENGINEERING OFFICER



FOR TRACK CENTERS OTHER THAN SHOWN IN TABLE,

$C = \text{Track Centers} \div \text{Tangent Angle } A$

$D = \text{Track Centers} \div \text{Sine Angle } A$

$E = \text{Dimension } C + 2B$

FROG #	TANGENT	SINE
6	0.167831	0.165516
8	0.125492	0.124516
10	0.100254	0.099754
15	0.066741	0.066593
20	0.050031	0.049968

TRACK CENTERS MUST BE IN DECIMALS OF
A FOOT.

TURNOUT NUMBER	ANGLE A	B	C			D			E		
			Track Centers			Track Centers			Track Centers		
			12'-0"	13'-0"	14'-0"	12'-0"	13'-0"	14'-0"	12'-0"	13'-0"	14'-0"
6	9°-31'-38"	19'-0"	71'-6"	77'-5 $\frac{1}{2}$ "	83'-5"	72'-6"	78'-6 $\frac{1}{2}$ "	84'-7"	109'-6"	115'-5 $\frac{1}{2}$ "	121'-5"
8	7°-09'-10"	30'-0"	95'-7 $\frac{1}{2}$ "	103'-7 $\frac{1}{8}$ "	111'-6 $\frac{3}{4}$ "	96'-4 $\frac{1}{2}$ "	104'-4 $\frac{7}{8}$ "	112'-5 $\frac{1}{4}$ "	155'-7 $\frac{1}{2}$ "	163'-7 $\frac{1}{8}$ "	171'-6 $\frac{3}{4}$ "
10	5°-43'-29"	29'-10 $\frac{3}{4}$ "	119'-8 $\frac{7}{16}$ "	129'-8 $\frac{1}{8}$ "	139'-7 $\frac{13}{16}$ "	120'-3 $\frac{5}{8}$ "	130'-3 $\frac{15}{16}$ "	140'-4 $\frac{1}{4}$ "	179'-5 $\frac{15}{16}$ "	189'-5 $\frac{5}{8}$ "	199'-5 $\frac{5}{16}$ "
15	3°-49'-06"	39'-11 $\frac{3}{4}$ "	179'-9 $\frac{9}{16}$ "	194'-9 $\frac{3}{8}$ "	209'-9 $\frac{3}{16}$ "	180'-2 $\frac{3}{8}$ "	195'-2 $\frac{9}{16}$ "	210'-2 $\frac{13}{16}$ "	259'-9 $\frac{1}{16}$ "	274'-8 $\frac{7}{8}$ "	289'-8 $\frac{11}{16}$ "
20	2°-51'-51"	59'-6 $\frac{1}{2}$ "	239'-10 $\frac{1}{16}$ "	259'-10 $\frac{1}{16}$ "	279'-9 $\frac{15}{16}$ "	240'-1 $\frac{13}{16}$ "	260'-2"	280'-2 $\frac{1}{8}$ "	358'-11 $\frac{1}{4}$ "	378'-11 $\frac{1}{16}$ "	398'-10 $\frac{15}{16}$ "

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2002
		Oct. 28, 1992 ISSUE DATE
STANDARD CROSSOVERS GENERAL LAYOUT		
John D. Ray ENGINEERING OFFICER	W. A. K. Kelly CHIEF ENGINEERING OFFICER	

BILL OF MATERIAL FOR A NO. 8 TURNOUT

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 16'-6" SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2104
2	HEEL BLOCK ASSEMBLIES, COMPLETE	2350
2*	39'-0" UNDERCUT STOCK RAILS	2104
1	INSULATED GAGE PLATE (NO. 1G)	2106
2	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 1A ADJUSTABLE BRACE SLIDE PLATES	2106
4	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 2 ADJUSTABLE BRACE SLIDE PLATES	2106
6	NO. 1-P SHOULDER SLIDE PLATES	2106
2	NO. 3 SHOULDER SLIDE PLATES	2106
2	NO. SH HEEL PLATES, 1-RH AND 1-LH	2106
2	SWITCH RAIL STOPS	2350
4	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2107
2	INSULATED VERTICAL SWITCH RODS (NO. 1 & 2)	2107
20	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 8-2 TO 8-11 X 2)	2340
12	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 8 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2084
8	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
10	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. P35 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
2	10'-0" MANGANESE STEEL ONE PIECE GUARD RAILS	2300
2	BOLTED, POLY TYPE INSULATED JOINT ASSEMBLY	-
-	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	"
1 EA.	VARIOUS LENGTHS OF FULLY, HEAT TREATED RAIL AS FOLLOWS: 25'-0", 25'-0" 24'-5½", 23'-5½", 21'-3", 20'-0", 19'-6", 19'-6"	"
920	7" LOCK SPIKES	1216
100	½" x 6" A.R.E.A. SPIKES**	1210
360	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
16	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
124	STANDARD RESILIENT FASTENER TIE PLATES	1224
14	1:80 CANT TRANSITION TIE PLATES	2348
-	PAIRS OF MODIFIED JOINT BAR ASSEMBLIES (HEAD & TOE OF GAGE SIDE BARS REMOVED TO ALLOW SWITCH MOVEMENT AT JOINT NEAR HEEL OF SWITCH-NO. 20 ONLY)	2202
14	STANDARD JOINT BAR ASSEMBLIES	1322 OR 1320
56	STANDARD TRACK BOLTS WITH NUTS AND WASHERS	1332

- ** CUT SPIKES ARE FURNISHED BY THE INSTALLER
• WELD KITS (14) TO BE FURNISHED BY THE INSTALLER

NOTES:

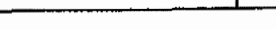
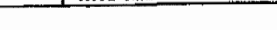
- TURNOUTS SUPPLIED SHALL BE EITHER 115 OR 132 LB. RE AS SPECIFIED IN THE ORDER.
- TURNOUTS SHALL BE RESILIENTLY FASTENED THROUGHOUT, EXCEPT FROG TIE PLATES.
GUARD RAILS AND LOCATIONS WHERE SPRING CLIPS CANNOT BE PHYSICALLY INSTALLED
SUCH AS ON TURNOUT PLATES NEAR HEEL.
- FABRICATOR SHALL SUPPLY ALL MATERIAL REQUIRED FOR THE COMPLETE INSTALLATION
OF THE TURNOUT EXCEPT SWITCH TIMBER UNLESS OTHERWISE SPECIFIED IN THE ORDER.
- FOR SWITCH TIMBER SCHEDULE, SEE PLAN 2082.

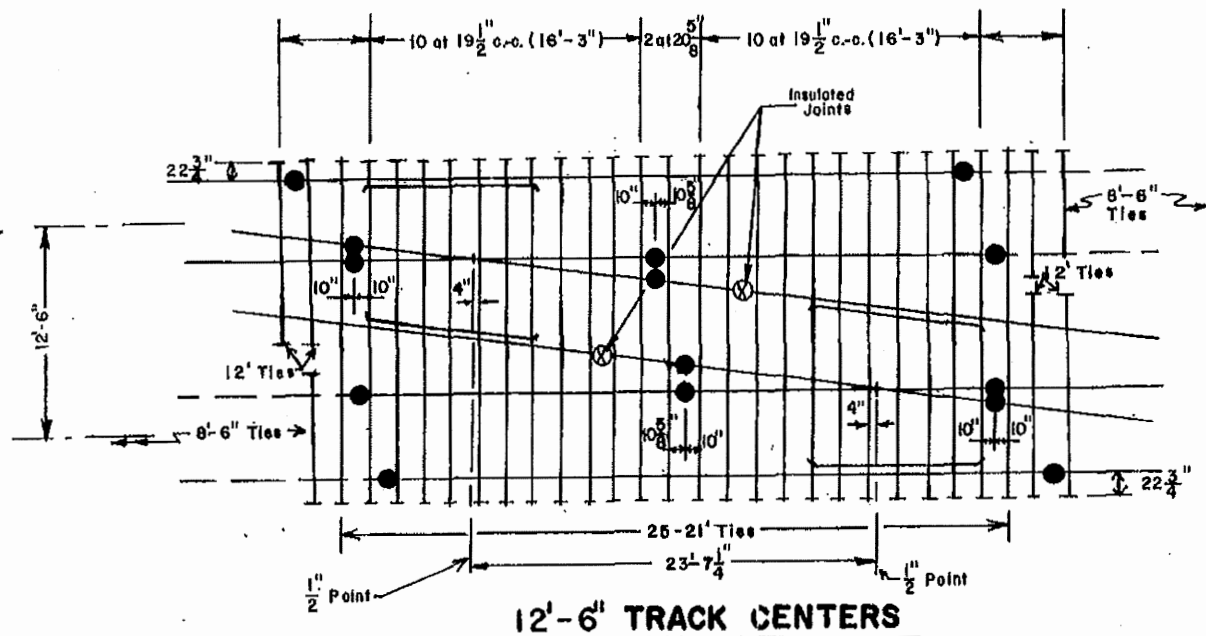
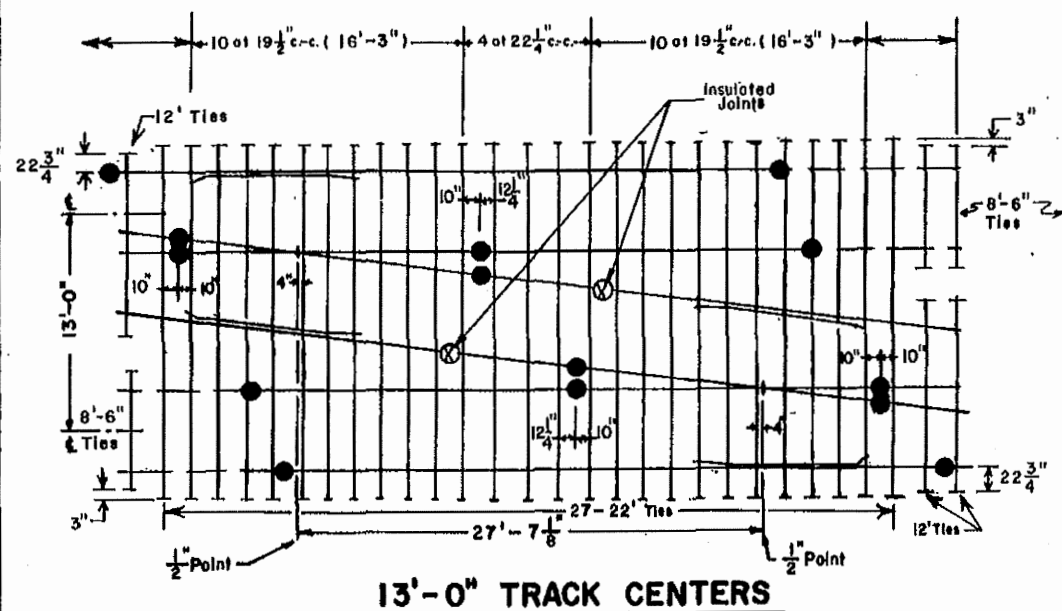
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2080	(3) ISSUE NO.
		JAN. 5, 1996 ISSUE DATE	
NO. 8 TURNOUT BILL OF MATERIAL  SECTION CHIEF			



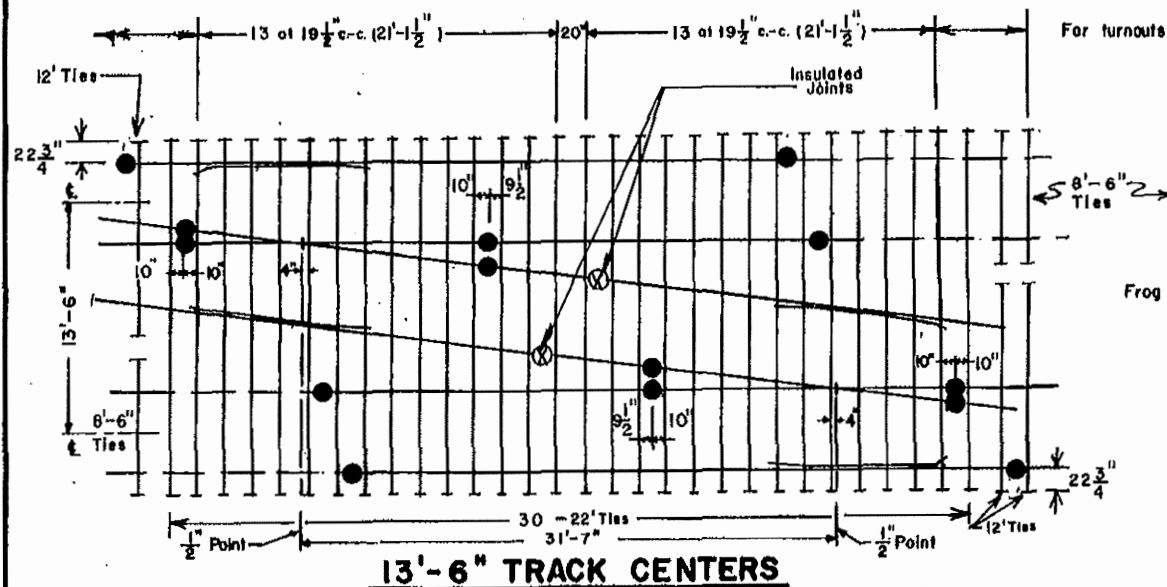
Values for track centers not shown may be determined by interpolation.

RAIL SECTION	FROG TYPE	LENGTH OF CLOSURE RAILS	
		CURVED	STRAIGHT
115, 132	RBM	44'-8 ¹¹ / ₁₆ "	44'-8"
115, 132	S.G.	48'-9 ¹¹ / ₁₆ "	48'-7"

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2081 Nov. 17, 1986 ISSUE DATE	1 ISSUE NO.
	OFFSETS FOR NO. 8 TURNOUT 115 OR 132 R.E. RAIL-UNDERCUT   <u>ENGINEERING OFFICER</u> <u>CHIEF ENGINEERING OFFICER</u>		



For every 1" change in track centers, the horizontal distance between $\frac{1}{2}$ " frog points will change 8" (approx.)



For turnouts see Plan No. 2082.

SWITCH TIMBER FOR A CROSSOVER

TRACK CENTERS	TIMBER LENGTHS						
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	21'-0"	22'-0"
12'-6"	26 *	18	14	12	—	25	—
13'-0"	26 *	18	14	12	—	—	27
13'-6"	26 *	18	14	12	—	—	30

FOR HEADBLOCKS, ADD THE FOLLOWING 9" x 10" TIMBERS:

Handthrown Switch — 4 - 13'-0" with switchstand less than 3' high, 4 - 16'-0" w/3' +
 * Handthrown Switch with Electric Locking — 6 - 16'-0" and delete 2 - 9'-0" from Table.
 Power Operated Switch — 4 - 12'-0"

NOTE: Timber layout shown is for exact track centers indicated. Other track centers require adjusting the timber schedule and timber spacing as required. All timber must extend a minimum of 18" from field side base of roll.

Frog Angle = 7°-09'-10"

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2083 Oct. 28, 1992 ISSUE DATE	(2) ISSUE NO.
	NO. 8 CROSSOVER TIE AND RAIL LAYOUT			
	 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

BILL OF MATERIAL FOR A NO. 10 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 16'-6" Switch Points, complete with reinforcing bars, clips and stops attached	2104
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2104
1	Insulated Gage Plates (Nos. 1 - G)	2106
2	No. 0 Adjustable Brace Slide Plates	2106
2	No. 1A Adjustable Brace Slide Plates	2106
4	No. 1 Adjustable Brace Slide Plates	2106
2	No. 2 Adjustable Brace Slide Plates	2106
6	No. 1-P Shoulder Slide Plates	2106
2	No. 3 Shoulder Slide Plates	2106
2	No. SH Heel Plates, 1-RH and 1-LH	2106
2	Switch Rail Stops	2350
4	Adjustable Rocker Clips for Vertical Switch Rods	2107
2	Insulated Vertical Switch Rods (No. 1 & 2)	2107
22	Turnout Plates for use behind heel of switch (No. 10-2 to 10-12 x 2)	2340
12	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 10 Railbound Manganese Steel Frog, Complete	2105
4	FT20 Hook Twin Tie Plates	2326
6	FT23 " " " "	"
10	FT27 " " " "	"
2	FT29 " " " "	"
-	FT23 Modified Hook Twin Tie Plates	"
2	FT27 " " " " "	"
2	FT29 " " " " "	"
-	FT33 " " " " "	"
-	FTR27 Hook Twin Tie Plates	"
2	FTR29 " " " "	"
-	FTR31 " " " "	"
-	FTR33 " " " "	"
-	FTR27 Modified Hook Twin Tie Plates	"
-	FTR29 " " " " "	"
2	FTR31 " " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

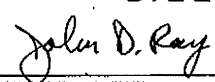
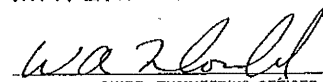
Quantity	Description	Reference Plan No.
2	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
2	Bolted, Poly Type Insulated Joint Assembly	-
-	19'-6" Bonded Insulated Joint Plug Rail	1340
2	39'-0" Lengths of Fully Heat Treated Rail	-
1 ea.	Various Lengths of Fully Heat Treated Rail, as follows: 23'-6", 23'-6", 16'-3 1/8", 26'-0", 25'-4 3/8", 23'-0", 21'-4", 33'-0", 13'-11", 19'-6"	-
1065	7" Lock Spikes	1216
100	5" x 6" AREA Spikes **	1210
450	Resilient Fastener Spring Clips - Type "E"	-
16	Resilient Fastener Spring Clips - Type Modified "E"	-
175	Standard Resilient Fastener Tie Plates	1224
-	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No. 20 only)	2202
16	Standard Joint Bar Assemblies	1322 or 1320
64	Standard Track Bolts with Nuts and Washers	1332

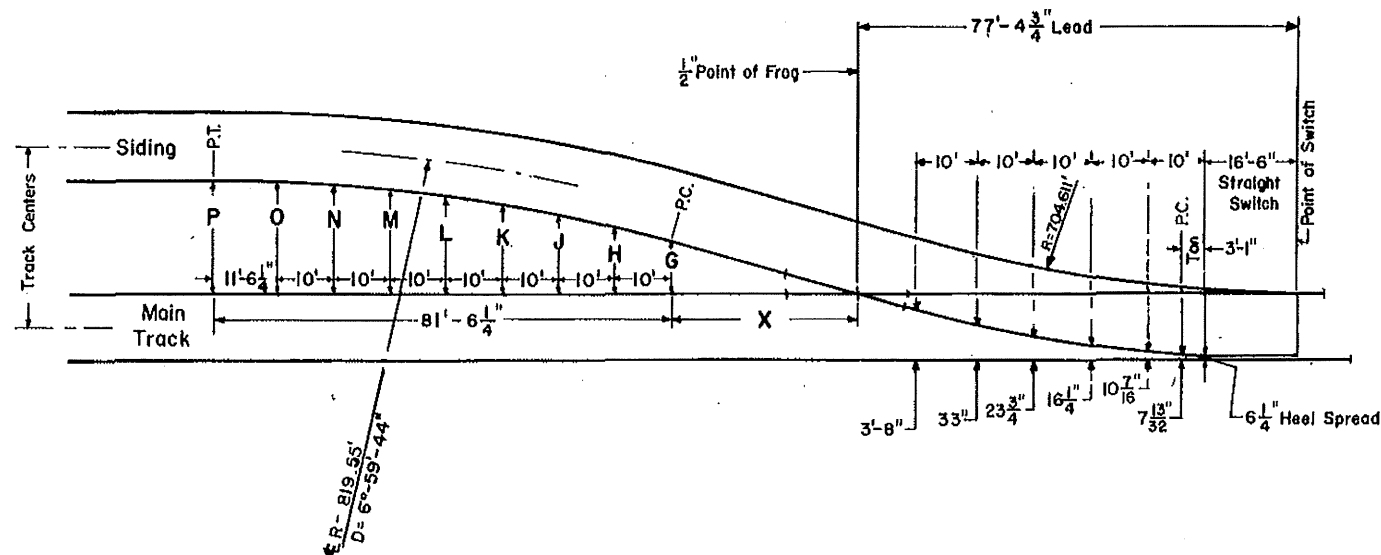
** Cut Spikes are furnished by the installer.

• Weld Kits (16) to be furnished by the installer.

Notes:

1. Turnouts supplied shall be either 115 or 132 L.B. RE as specified in the order.
2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physically installed such as on turnout plates near heel.
3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.
4. For Switch Timber Schedule, see Plan 2102

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2100
		Oct. 28, 1992 (2) ISSUE DATE ISSUE NO.
NO. 10 TURNOUT BILL OF MATERIAL		
 ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	G	H	J	K	L	M	N	O	P
12'-2"	33'-3 7/8"	3'-4 5/8"	4'-3 7/8"	5'-1 5/8"	5'-10"	6'-4 7/8"	6'-10 1/4"	7'-2 5/8"	7'-4 1/2"	7'-5 1/2"
12'-4"	34'-11 7/8"	3'-6 5/8"	4'-5 7/8"	5'-3 5/8"	6'-0"	6'-6 7/8"	7'-0 1/4"	7'-4 5/8"	7'-6 1/2"	7'-7 1/2"
12'-6"	36'-7 3/4"	3'-8 5/8"	4'-7 7/8"	5'-5 5/8"	6'-2"	6'-8 7/8"	7'-2 1/4"	7'-6 5/8"	7'-8 1/2"	7'-9 1/2"
12'-8"	38'-3 3/4"	3'-10 5/8"	4'-9 7/8"	5'-7 5/8"	6'-4"	6'-10 7/8"	7'-4 1/4"	7'-8 5/8"	7'-10 1/2"	7'-11 1/2"
12'-10"	39'-11 3/4"	4'-0 5/8"	4'-11 7/8"	5'-9 5/8"	6'-6"	7'-0 7/8"	7'-6 1/4"	7'-10 5/8"	8'-0 1/2"	8'-1 1/2"
13'-0"	41'-7 5/8"	4'-2 5/8"	5'-1 7/8"	5'-11 5/8"	6'-8"	7'-2 7/8"	7'-8 1/4"	8'-0 5/8"	8'-2 1/2"	8'-3 1/2"
13'-2"	43'-3 1/2"	4'-4 5/8"	5'-3 7/8"	6'-1 5/8"	6'-10"	7'-4 7/8"	7'-10 1/4"	8'-2 5/8"	8'-4 1/2"	8'-5 1/2"
13'-4"	44'-11 5/8"	4'-6 5/8"	5'-5 7/8"	6'-3 5/8"	7'-0"	7'-6 7/8"	8'-0 1/4"	8'-4 5/8"	8'-6 1/2"	8'-7 1/2"
13'-6"	46'-7 1/2"	4'-8 5/8"	5'-7 7/8"	6'-5 5/8"	7'-2"	7'-8 7/8"	8'-2 1/4"	8'-6 5/8"	8'-8 1/2"	8'-9 1/2"

Values for track centers not shown may be determined by interpolation

TURNOUT DATA

FROG - No. 10 Angle 5°-43'-29"

FROG DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH		
		TOE	HEEL	TOTAL
115, 132	RBM	9'-6"	13'-6"	23'-0"
115, 132	S.G.	3'-9"	7'-7 1/2"	11'-4 1/2"

SWITCH RAILS

Length ----- 16'-6"
 Type ----- Straight
 Switch Angle For Samson Switch Points ----- 1°-48'-32"
 Heel Block Angle ----- Same As Switch Angle
 Point of Switch to P.C. ----- 19'-7"

LEAD

Point of Switch to 1/2 Point of Frog ----- 77'-4 3/4"
 Degree of Curve ----- 8°-06'-40"
 Radius ----- 706.965'

CLOSURE RAIL DIMENSIONS

RAIL SECTION	FROG TYPE	LENGTH OF CLOSURE RAILS	
		CURVED	STRAIGHT
115, 132	RBM	51'-6 1/8"	51'-4 3/4"
115, 132	S.G.	57'-3 1/8"	57'-1 3/4"



MASSACHUSETTS
BAY
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AUTHORITY

RAILROAD
OPERATIONS

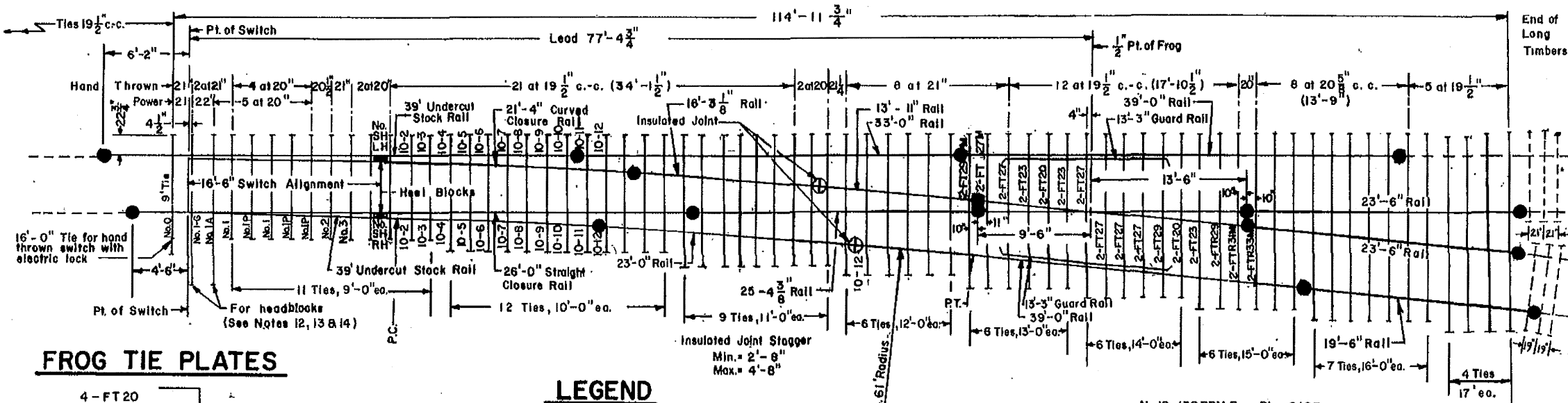
DWG.
NO. 2101
Nov. 17, 1986
ISSUE DATE
ISSUE NO. 1

OFFSETS FOR NO. 10 TURNOUT

115 OR 132 R.E. RAIL-UNDERCUT

Daniel Breen
ENGINEERING OFFICER

W. A. M. R. L. L.
CHIEF ENGINEERING OFFICER



FROG TIE PLATES

- 4 - FT 20
- 6 - FT 23
- 10 - FT 27
- 2 - FT 27 Modified
- 2 - FT 29
- 2 - FT 29 Modified
- 2 - FTR 29
- 2 - FTR 31 Modified
- 2 - FTR 33 Modified

Plan 2326

NOTES

- 1 - Stock rails and switch points and all rails furnished to be fully heat treated.
- 2 - Switch points per A.R.E.A. detail 5100 as shown on plan 2104.
- 3 - 39' stock rails, to be undercut as per Plan 2104.
- 4 - For switch details see Plan 2104
- 5 - Gage plate No. 1-G as per Plan 2108.
- 6 - Switch plates Nos. O, I, JA and IP as per Plan 2106.
- 7 - Turnout plates, No. 2 thru No. 12, as per Plan 2340.
- 8 - Vertical insulated switch rods and adjustable rocker clips, generally as per Plan 2107.
- 9 - Heel block as per Plan 2350.
- 10 - All rails, including switch rails, to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Forces designated by the Authority to field drill first hole when necessary.
- 11 - All tie plates to be resiliently fastened except frog tie plates and guard rails.
- 12 - Two 9"x 10" x 13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'
- 13 - Three 9"x 10" x 16' Headblocks needed for hand thrown switch with electric lock.
- 14 - Two 9"x 10" x 12' Headblocks needed for power operated switch.
- 15 - See Plan 2100 for Bill of Material.
- 16 - Use bolted, poly type insulated joints except when revenue passenger service operates over joints. In that case, use bonded insulated joint plug rails and modify rail lengths accordingly.
- 17 - Rail lengths are computed to allow a $\frac{1}{8}$ " gap for temporarily bolting of the field welded joints and $\frac{3}{16}$ " gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.

LEGEND

- Indicates rails furnished by the manufacturer.
- - - Indicates rails furnished by the installer.
- Indicates joints at heel of switch - not to be welded.
- ⊕ Indicates insulated joints with $\frac{3}{16}$ " opening. (Bolted, Poly Type) See Note 16.
- Indicates joints to be field welded

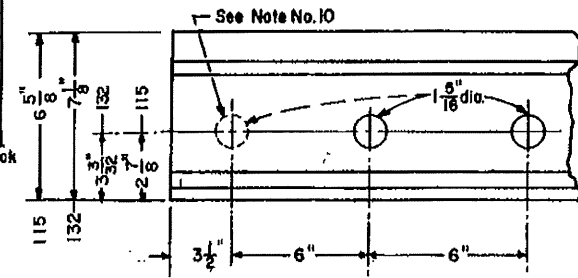
LONG TIMBERS REQUIRED

QUANTITY	LENGTH
12 *	9'-0"
12	10'-0"
9	11'-0"
6	12'-0"
6	13'-0"
6	14'-0"
6	15'-0"
7	16'-0"
4 **	17'-0"
68 +	18'-0"

+ 67 w. electric lock

Headblocks not shown in table, see notes 12, 13 & 14.

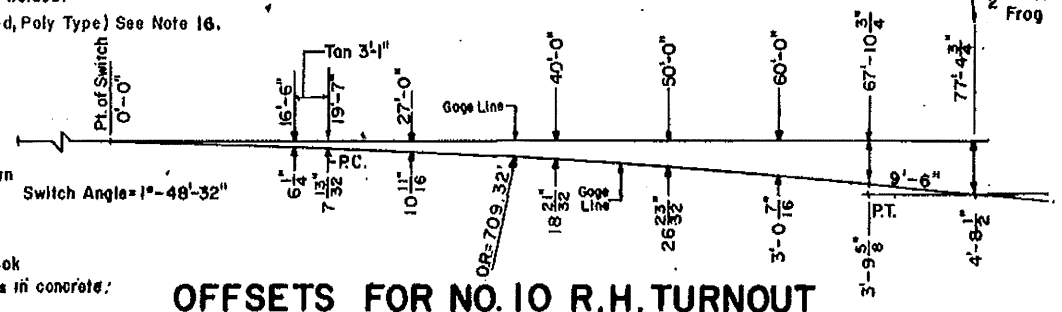
* 11 with electric lock
** 5 - 17'-0" ties in concrete tie territory



RAIL END DRILLING

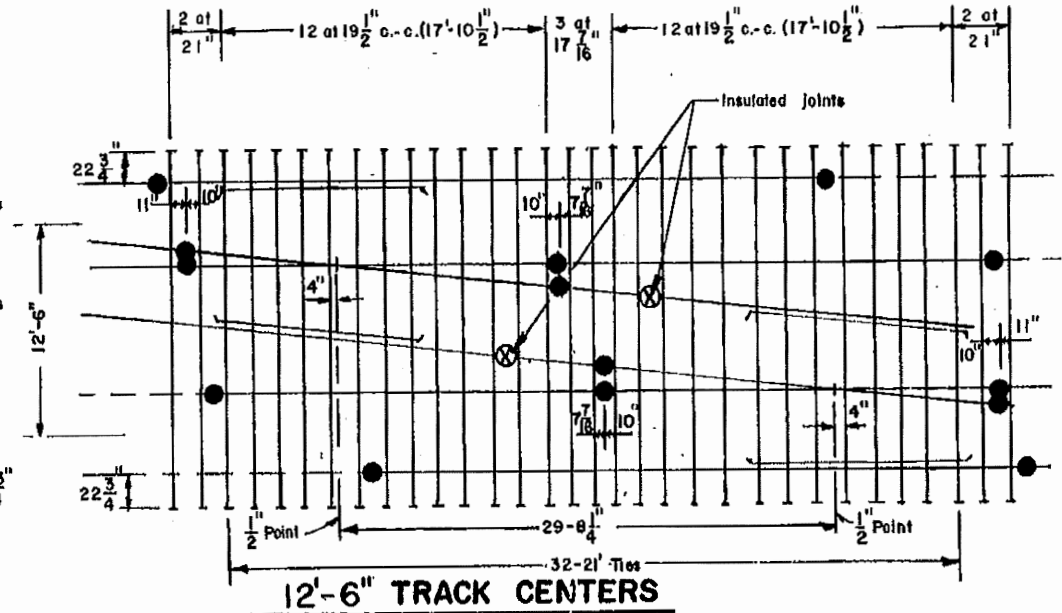
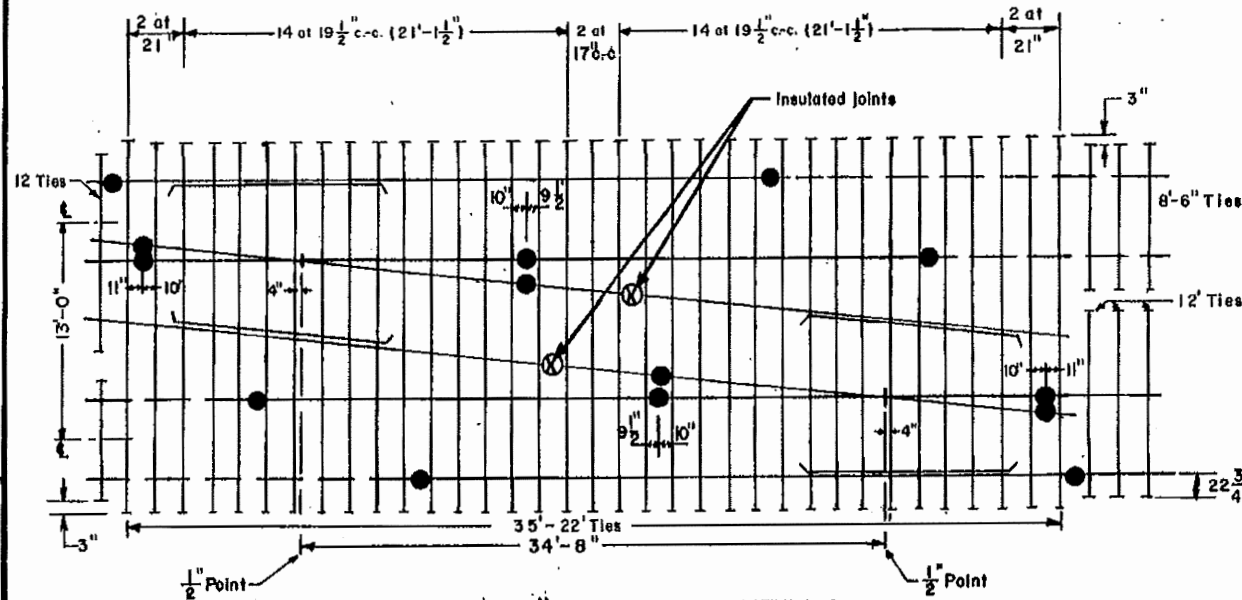
No. 10-132 RBM Frog Plan 2105.

In concrete tie territory provide 1 additional 17'-0" tie

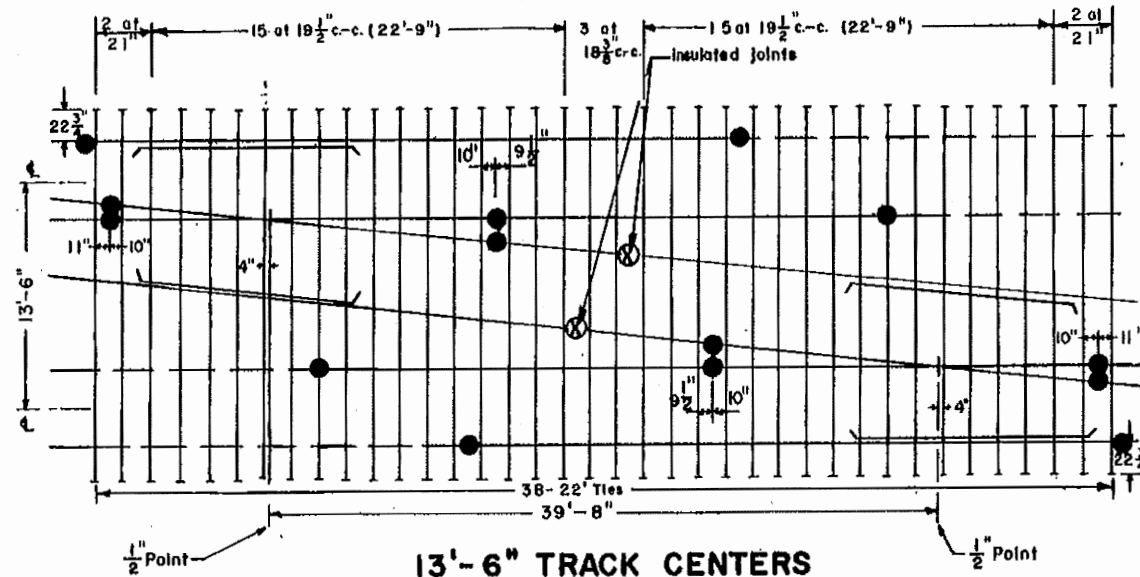


OFFSETS FOR NO. 10 R.H. TURNOUT

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2102
			Oct. 28, 1992
			ISSUE DATE
NO. 10 WELDED TURNOUT TIE AND RAIL LAYOUT			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



For every 1" change in track centers, the horizontal distance between $\frac{1}{2}$ " frog points will change 10" (approx.)



Frog Angle = 5°-43'-29"

SWITCH TIMBER FOR A CROSSOVER

TRACK CENTERS	TIMBER LENGTHS						
	9'-0"	10'-0"	11'-0"	12'-0"	13'-0"	21'-0"	22'-0"
12'-6"	24	24	18	12	—	32	—
13'-0"	24	24	18	12	—	—	35
13'-6"	24	24	18	12	—	—	38

FOR HEADBLOCKS, ADD THE FOLLOWING 9" x 10" TIMBERS:

Handthrown Switch - 4 - 13'-0" with switchstand less than 3' high, 16'-0" w/ 3' stand.
 *Handthrown Switch with Electric Locking - 6 - 16'-0" and delete 2 - 9'-0" from Table
 Power Operated Switch - 4 - 12'-0"

NOTE: Timber layout shown is for exact track centers indicated. Other track centers require adjusting the timber schedule and timber spacing as required.



MASSACHUSETTS
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RAILROAD
OPERATIONS

DWG. NO. 2103

Oct. 28, 1992

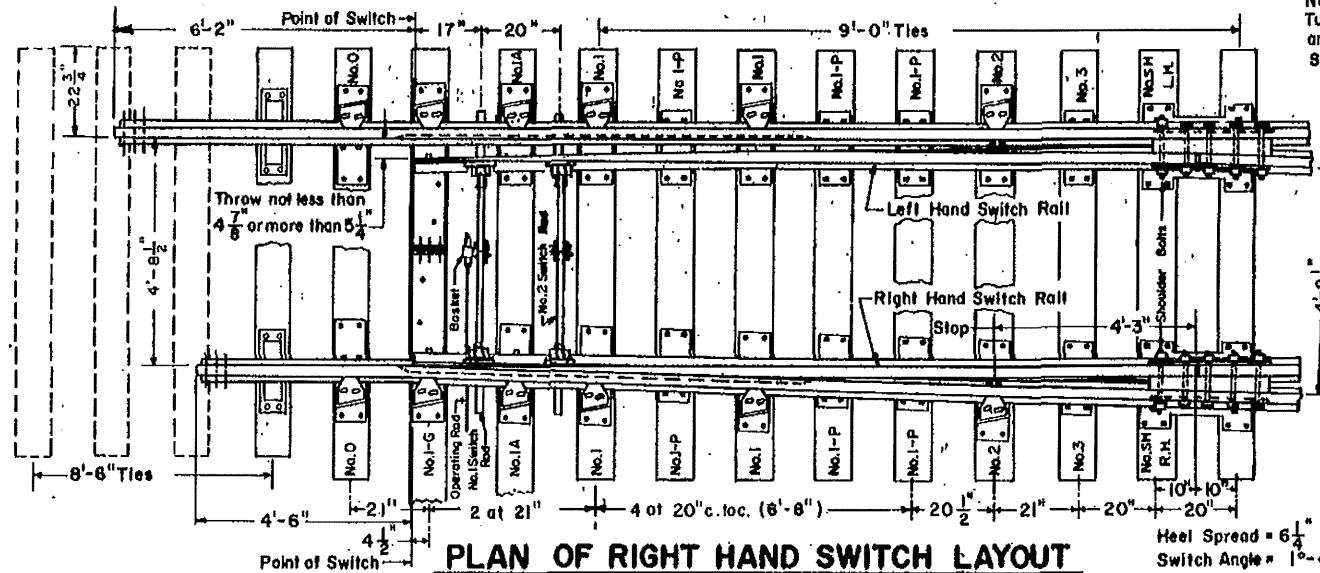
ISSUE DATE

ISSUE NO. 2

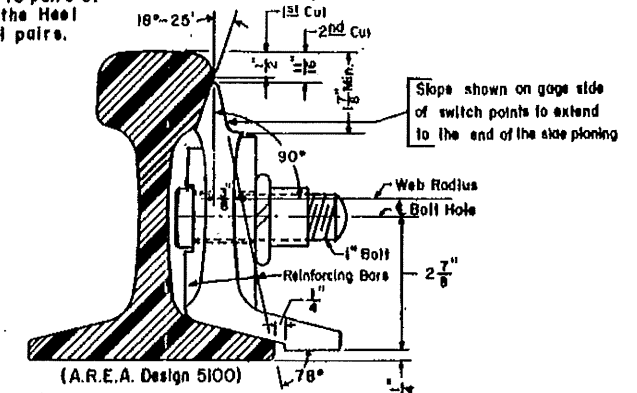
NO. 10 CROSSOVER TIE AND RAIL LAYOUT

John D. Ray
ENGINEERING OFFICER

W. J. [Signature]
CHIEF ENGINEERING OFFICER



No. 8 Turnout Requires 10 pairs of Turnout Plates behind the Heel and No. 10 Turnout, 11 pairs. See Plan 2340.



SWITCH POINT DETAIL

BILL OF MATERIAL

- 1-Pair 16'-6" Straight Switch Points, complete with reinforcing bars, side jaw clips and rail stops attached.
- * 1-39'-0" Straight Stock Rail, L.H. Undercut.
- * 1-39'-0" Bent Stock Rail, R.H. Undercut.
- 2-Vertical Switch Rods, with basket. See Plan 2107
- 2-Heel Block Assemblies, complete. See Plan 2350
- 1-No. 1-G Insulated Gage Plate
- 2-No. 0 Adjustable Brace Slide Plate
- 2-No. 1-A " " " " " "
- 4-No. 1 " " " " " "
- 2-No. 2 " " " " " "
- 6-No. 1-P Shoulder Slide Plate
- 2-No. 3 " " " " " "
- 2-No. SH Heel Plates, L-R.H. & L-L.H.
- 4-Side Jaw Clips for Vertical switch rods. See Plan 2107
- 12-Adjustable Rail Braces, Resilient Type - Plan 2352
- 2-Switch Slopes, See Plan 2360.

TURNOUT INFORMATION

OFFSETS-

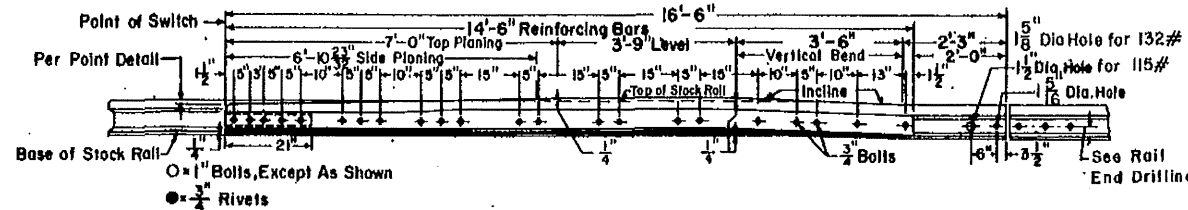
No. 8 T.O.-Plan 2081

No. 10 T.O.-Plan 2101

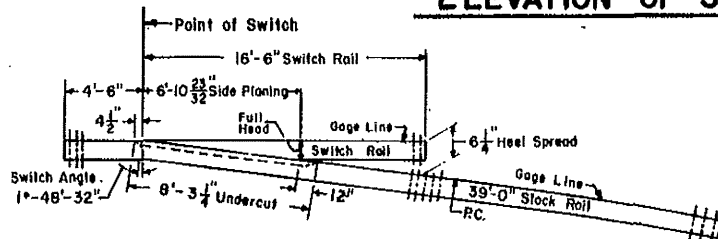
RAIL AND TIE LAYOUT

No. 8 T.O.-Plan 2082

No. 10 T.O.-Plan 2102

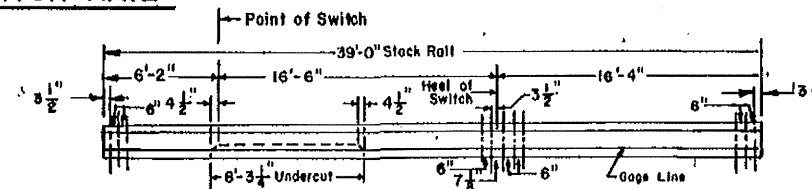


ELEVATION OF SWITCH RAIL



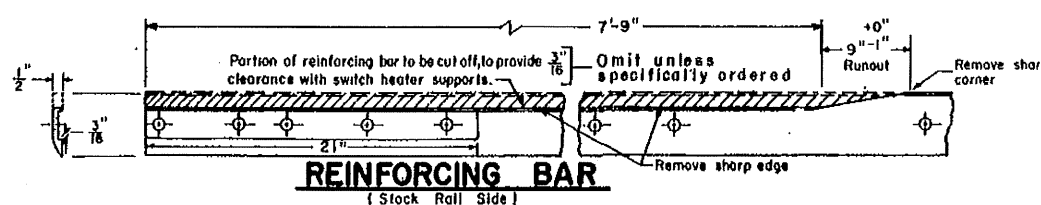
BENT STOCK RAIL

(R.H. As Shown)



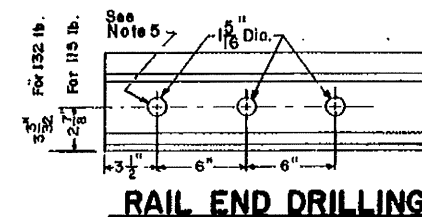
STRAIGHT STOCK RAIL

(L.H. As Shown)



REINFORCING BAR

(Stock Rail Side)



RAIL END DRILLING

NOTES

- 1- This plan is for use with A.R.E.A. recommended standards for 115 & 132 RE Rail.
- 2- Stock rails and switch points and all rail supplied, to be fully heat treated.
- 3- All bolts shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.
- * 4- When ordering a Left Hand Switch - these items shall be opposite hand.
- 5- The first end hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG. NO. 2104

Jan. 5, 1996

ISSUE DATE

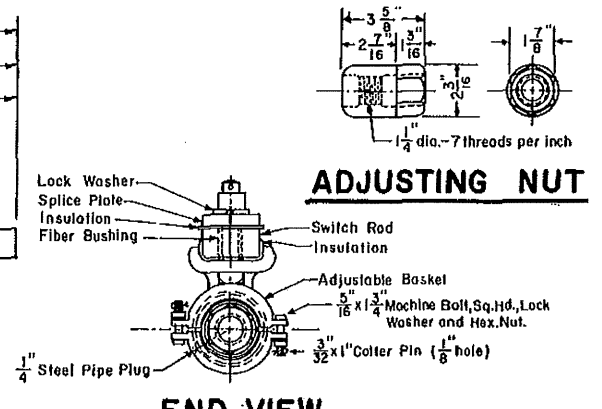
ISSUE NO.

16'-6" STRAIGHT SPLIT SWITCH

115 OR 132 R.E. RAIL - INSULATED & UNDERCUT

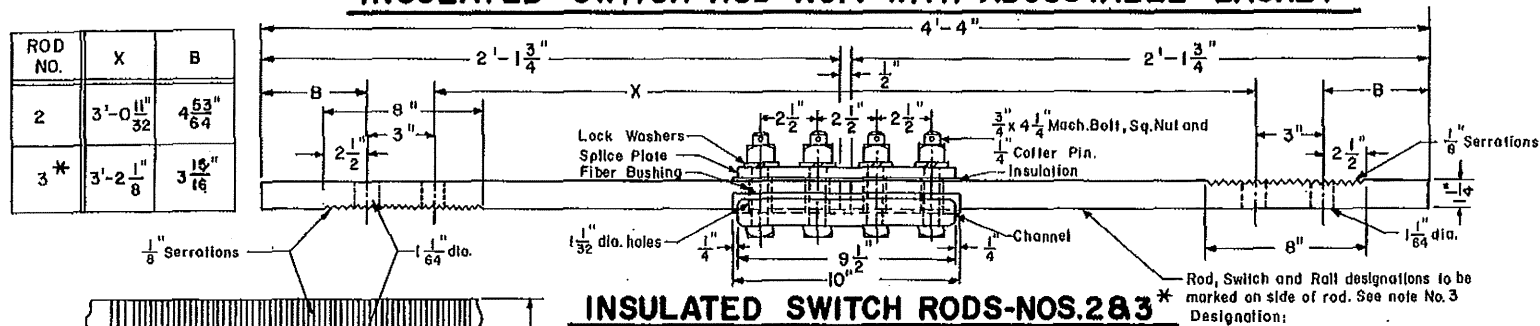
John D. Ray

SECTION CHIEF

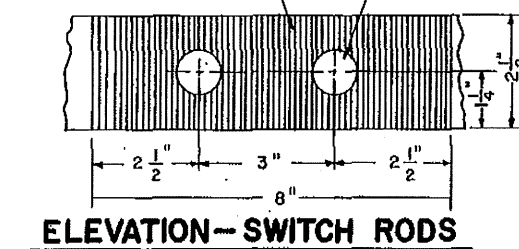


INSULATED SWITCH ROD NO. 1 WITH ADJUSTABLE BASKET

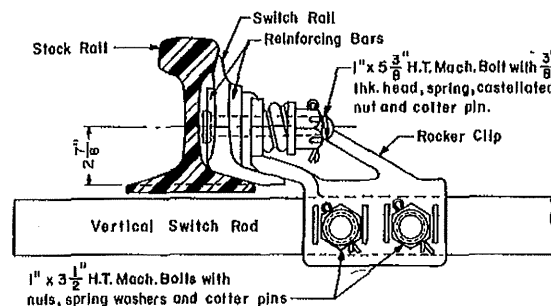
ROD NO.	X	B
2	$3'-0\frac{11}{32}$	$4\frac{53}{64}$
3 *	$3'-2\frac{1}{8}$	$3\frac{15}{16}$



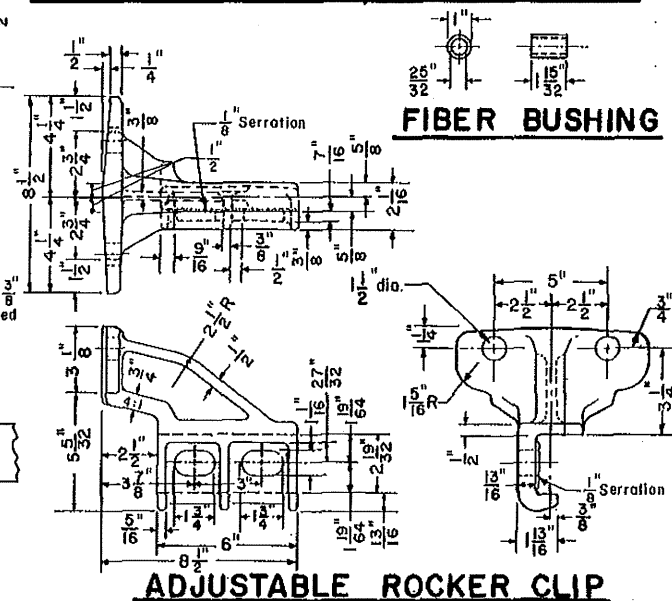
INSULATED SWITCH RODS-NOS.2&3



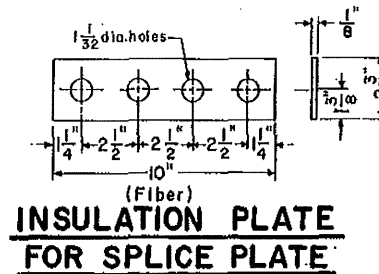
ELEVATION-SWITCH RODS



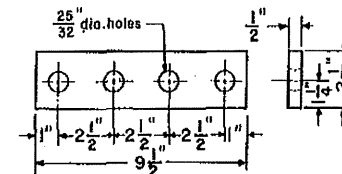
ASSEMBLED ROCKER CLIP



ADJUSTABLE ROCKER CLIP



INSULATION PLATE
FOR SPLICE PLATE



SPLICE PLATE

NOTES

- 1- All switch rods shall conform to current A.R.E.A. Specifications.
- 2- All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specifications 13 - Hard Fiber.
- 3- Each switch rod shall be marked with deeply cut characters, not less than $\frac{1}{8}$ " high, with rod, switch and rail designations.
- *4- No. 3 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2107
			Oct. 28, 1992 ISSUE DATE 2 ISSUE NO.
VERTICAL SWITCH RODS AND ADJUSTABLE ROCKER CLIPS FOR 16'-6" SWITCH-115 LB. OR 132 L.B. RE RAIL			
<i>John D. Ray</i> ENGINEERING OFFICER		<i>W. A. Z. [Signature]</i> CHIEF ENGINEERING OFFICER	

**NO. 10 TURNOUT WITH FLOATING HEEL BLOCKS -
BILL OF MATERIAL**

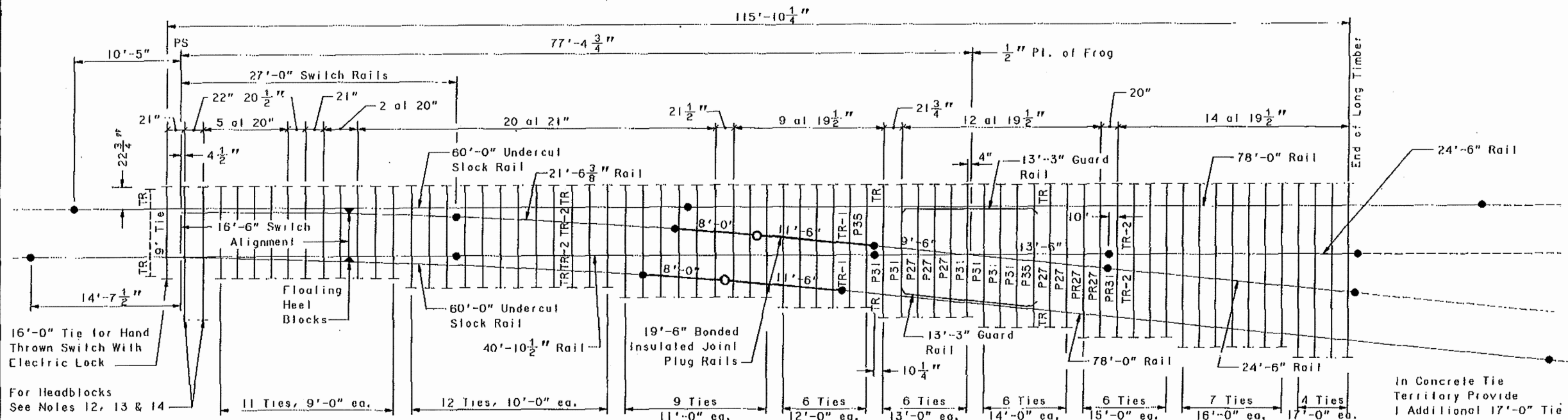
QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 27'-0" SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2114
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
1	INSULATED GAGE PLATES (NO. 1G)	2106
2	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
6	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 1A ADJUSTABLE BRACE SLIDE PLATES	2106
8	NO. 1P SHOULDER SLIDE PLATES	2106
4	NO. 1P HEEL PLATES	2106
2	SWITCH RAIL STOPS	2350
6	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2107
3	INSULATED VERTICAL SWITCH RODS (NO. 1, 2 & 3)	2107
22*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 10-2 R/L TO 10-5 R/L & NO. 10-6 TO 10-12)x2	2342
12	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 10 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2105
10	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
12	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. P35 SELF ALIGNING SHOULDER TIE PLATE	2328
4	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
-	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA.	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 40'-10 1/2", 24'-6", 24'-6", 21'-6 1/2"	-
840	1/2" SCREW SPIKES	1218
58**	1/4" x 6" TRACK DRIVE SCREWS	1217
404	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
14	1:80 CANT TRANSITION TIE PLATES	2348
126	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
16	STANDARD JOINT BAR ASSEMBLIES	1322
64	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED.
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS.
** SUPPLIED BY THE INSTALLER

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. No. 2110
		JAN. 5, 1996
		ISSUE NO. (2)

**NO. 10 FLOATING HEEL BLOCK TURNOUT
BILL OF MATERIAL**


SECTION CHIEF



FROG TIE PLATES

- 10 - P27 SAS (Self-Aligning Shoulder)
- 12 - P31 SAS
- 4 - P35 SAS
- 4 - PR27 SAS
- 2 - PR31 SAS

NOTES

- 1-Stock rails and switch points and all rails furnished to be fully heel treated.
- 2-Switch Points per A.R.E.A. Detail 5100 as shown on Plan 2104.
- 3-60' stock rails, to be undercut as per Plan 2360.
- 4-For switch details see Plan 2114.
- 5-Gage plate No. 1 - G as per Plan 2106.
- 6-Switch plates Nos. 0, 1, 1A, 1P and HP as per Plan 2106.
- 7-Turnout plates, No. 2 thru No. 12, as per Plan 2342.
- 8-Vertical insulated switch rods and adjustable rocker clips, as per Plan 2107.
- 9-Floating Heel block as per Plan 2350.
- 10-All rails to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Installer to field drill first hole when necessary.
- 11-All tie plates to be resiliently fastened except guard rails.
- 12-Two 9"x10"x13' Headblocks needed with switch stand 3' high or less, 16' long with stands over 3'.
- 13-Three 9"x10"x16' Headblocks needed for hand thrown switch with electric lock.
- 14-Two 9"x10"x12' Headblocks needed for power operated switch.
- 15-See Plan 2110 for Bill of Material.
- 16-Rail lengths are computed to allow a 1/8" gap for temporarily bolting the field joints and 1/16" gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.
- 17-Transition Plates (TR) 1:80 Cant, as per Plan 2348.

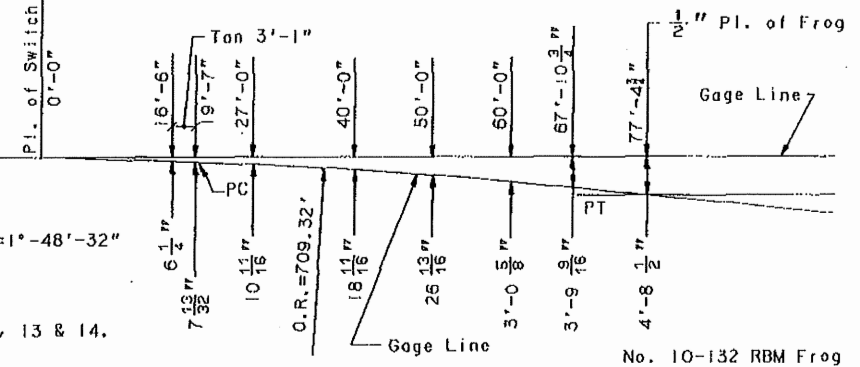
LEGEND

- Indicates rails furnished by the manufacturer.
- - - Indicates rails furnished by the installer.
- ▲ Indicates "floating" heel blocks.
- Indicates insulated joints with 3/16" opening.
- Indicates joints to be field welded.
- Indicates Bonded Insulated Joint Plug Rail

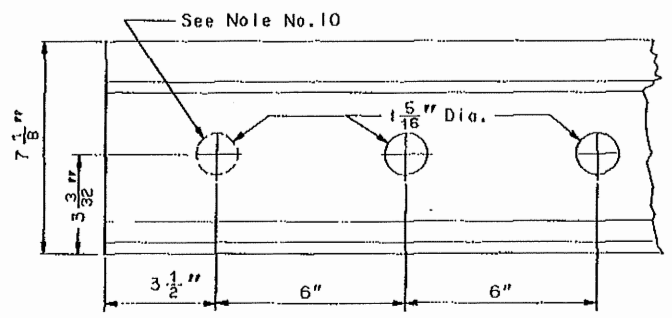
LONG TIMBERS REQUIRED

Quantity	Length
12*	9'-0"
12	10'-0"
9	11'-0"
6	12'-0"
6	13'-0"
6	14'-0"
6	15'-0"
7	16'-0"
4**	17'-0"
68	Total

*Headblocks not shown in table, see notes 12, 13 & 14.
 ** 11 with electric lock
 *** 5, 17'-0" ties in concrete tie territory



OFFSETS FOR NO. 10 R.H. TURNOUT



RAIL END DRILLING

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG.
NO. 2112

JAN. 5, 1996

ISSUE DATE

NO. 10 TURNOUT WITH FLOATING HEEL
BLOCKS - TIE & RAIL LAYOUT

John D. Rany
SECTION CHIEF

BILL OF MATERIAL FOR A NO. 15 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 26'-0" Switch Points, complete with reinforcing bars, clips and stops attached	2155
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2155
3	Insulated Gage Plates (Nos. 0-G, 1-G, 2-G)	2155
8	No. 1 Adjustable Brace Slide Plates	2157
2	No. 3 Adjustable Brace Slide Plates	2157
12	No. 1-P Shoulder Slide Plates	2157
2	No. 2 Shoulder Slide Plates	2157
2	No. 4 Shoulder Slide Plates	2157
2	No. 5H Heel Plates, 1-RH and 1-LH	2157
4	Switch Rail Stops	2350
8	Adjustable Rocker Clips for Vertical Switch Rods	2158
4	Insulated Vertical Switch Rods (No. 1, 2, 3 & 4)	2158
26	Turnout Plates for use behind heel of switch (15-2 to 15-14 x 2)	2340
16	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 15 Railbound Manganese Steel Frog, Complete	2156
7	FT20 Hook Twin Tie Plates	2326
6	FT23 " " " "	"
16	FT27 " " " "	"
1	FT29 " " " "	"
—	FT33 " " " "	"
2	FT23 Modified Hook Twin Tie Plates	"
2	FT27 " " " "	"
—	FT29 " " " "	"
—	FT33 " " " "	"
2	FTR27 Hook Twin Tie Plates	"
2	FTR29 " " " "	"
2	FTR31 " " " "	"
2	FTR33 " " " "	"
4	FTR27 Modified Hook Twin Tie Plates	"
—	FTR29 " " " "	"
—	FTR31 " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

Quantity	Description	Reference Plan No.
—	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
—	Bolted, Poly Type Insulated Joint Assembly	—
2	19'-6" Bonded Insulated Joint Plug Rail	1340
6	39'-0" Lengths of Fully Heat Treated Rail	—
1 ea. †	Various Lengths of Fully Heat Treated Rail as follows: 38'-2 9/16", 36'-8", 35'-0", 28'-7 3/4", 27'-9", 26'-8 1/2", 21'-8", 19'-9 1/4"	—
1040	7" Lock Spikes	1216
120	5" x 6" AREA Spikes * *	1210
760	Resilient Fastener Spring Clips - Type "E"	—
16	Resilient Fastener Spring Clips - Type Modified "E"	—
310	Standard Resilient Fastener Tie Plates	1224
—	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No. 20 only)	2202
22	Standard Joint Bar Assemblies	1322 or 1320
88	Standard Track Bolts with Nuts and Washers	1332

* * Cut Spikes to be furnished by the installer.

• Weld Kits (22) to be furnished by the installer.

† For Equilateral Turnout, closure rails have slightly different lengths, See Equilateral Drawing (2153).

Notes:

1. Turnouts supplied shall be either 115 or 132 LB. RE as specified in the order.

2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physically installed such as on turnout plates near heel.

3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.

4. For Switch Timber Schedule, see Plan: 2152.



RAILROAD
OPERATIONS

DWG.
NO. 2150

Oct. 28, 1992

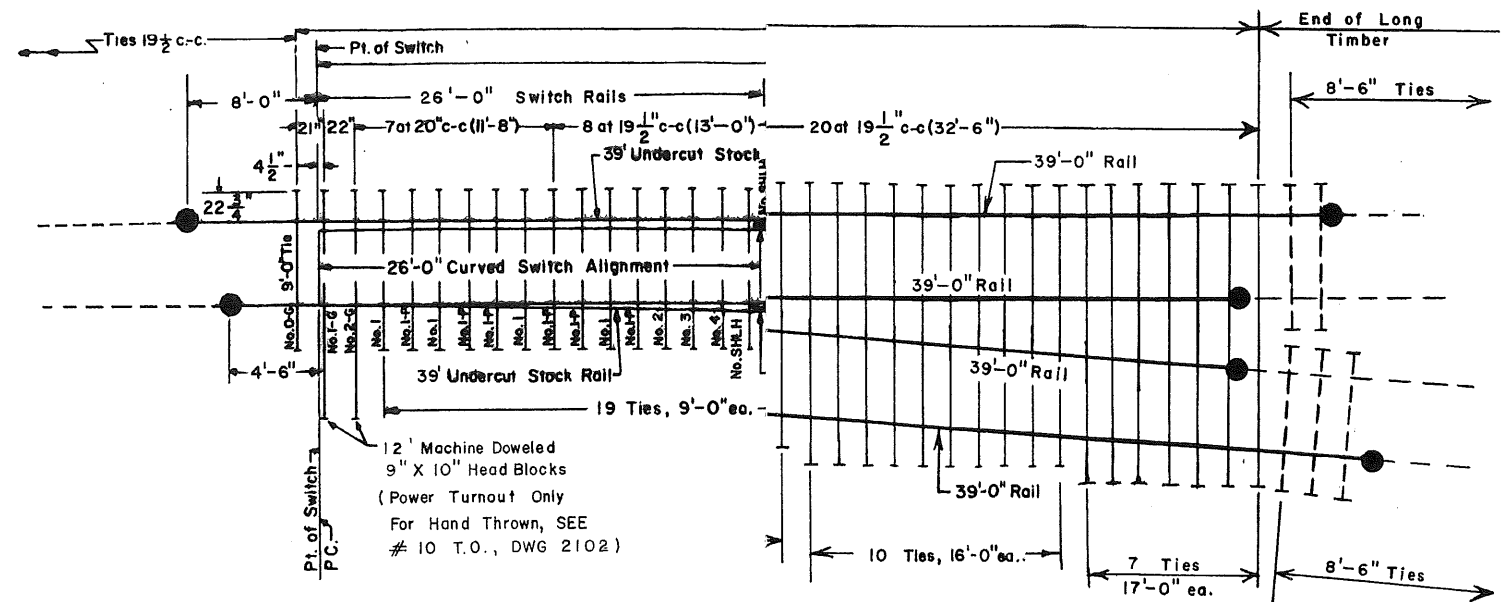
ISSUE DATE

2
ISSUE NO.

NO. 15 TURNOUT BILL OF MATERIAL

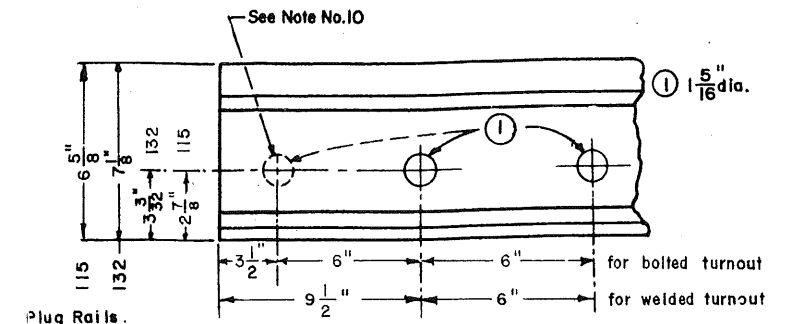
John B. Ray
ENGINEERING OFFICER

W. A. Z. [Signature]
CHIEF ENGINEERING OFFICER



NOTES

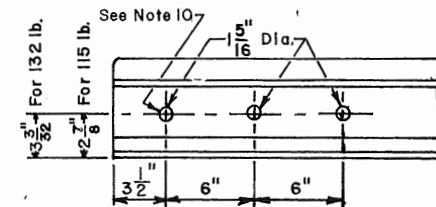
- 1 - Stock rails and switch points and all rails furnished with the turnout to be fully heat treated.
- 2 - Switch Points per A.R.E.A. Detail 5100 as shown on plan 2155.
- 3 - 39' stock rails, to be undercut as per Plan 2155.
- 4 - For switch detail see Plan 2155.
- 5 - Gage plates O-G, I-G and 2-G as per Plan 2157.
- 6 - Switch plates Nos. 1 and I-P as per Plan 2157.
- 7 - Turnout plates, No. 2 thru No. 14 as per Plan 2340
- 8 - Vertical insulated switch rods and adjustable rocker clips, generally as per Plan 2158.
- 9 - Heel block, as per Plan 2350.
- 10 - All rails, including switch rails, to be drilled as shown on this plan, except that first hole is not to be drilled by the manufacturer. Forces, designated by the Authority, are to drill the first hole when necessary.
- 11 - All tie plates to be resiliently fastened, except, frog tie plates and gage.
- 12 - Rail lengths are computed to allow a $\frac{1}{8}$ " gap for temporarily bolting field welded joints and $\frac{3}{16}$ " gap for insulated joints. When rails are in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.



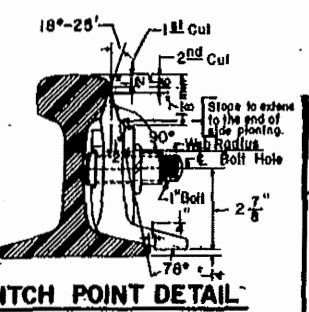
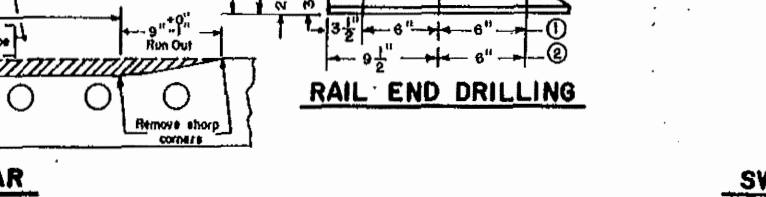
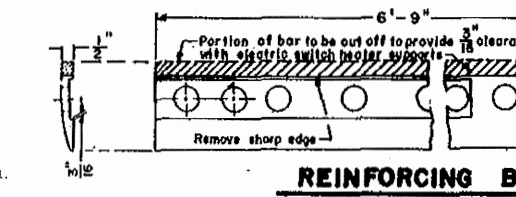
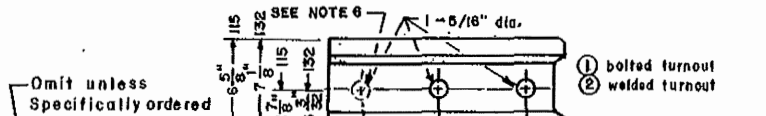
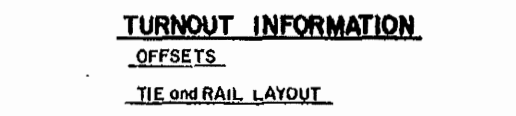
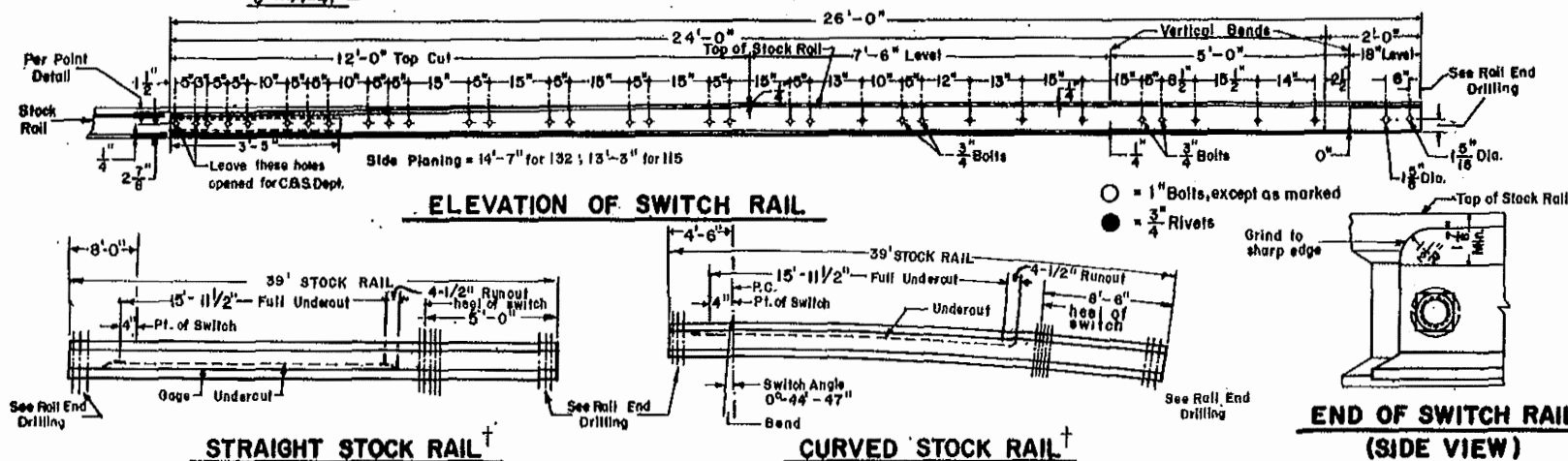
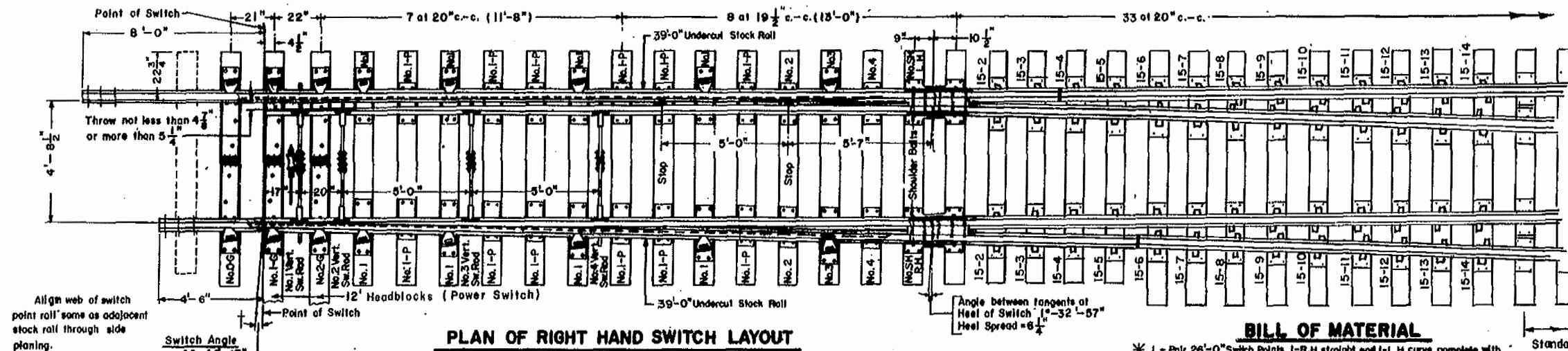
RAIL END DRILLING

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2152
			Oct. 26, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

NO. 15 WELDED TURNOUT TIE AND RAIL LAYOUT



RAIL END DRILLING

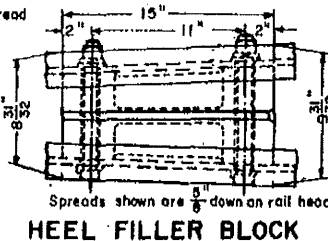
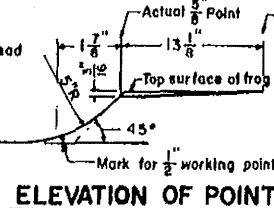
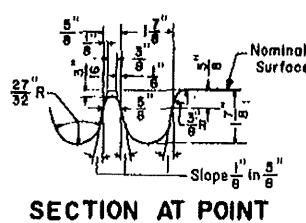
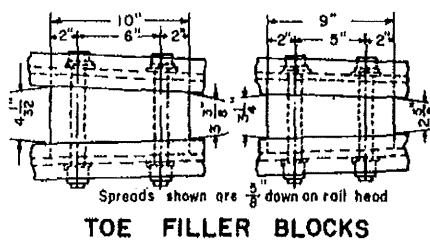
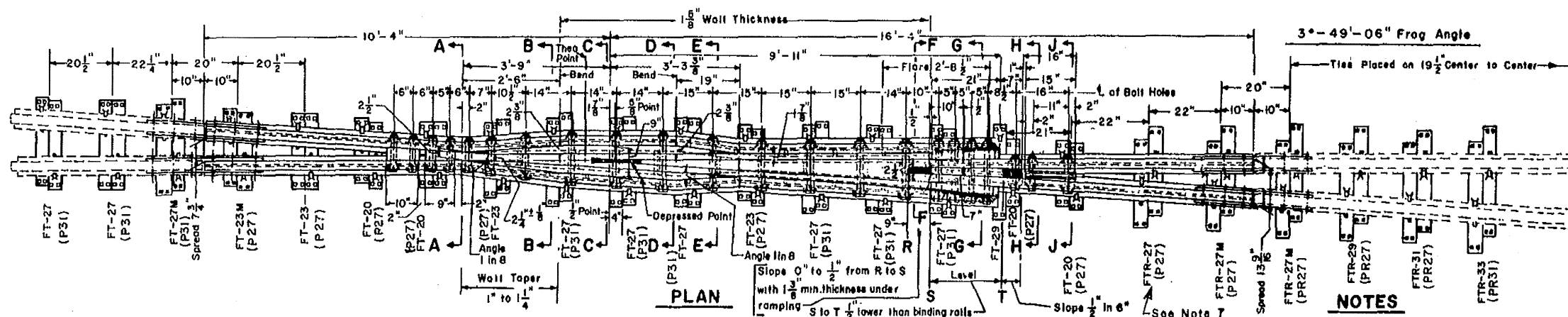


BILL OF MATERIAL

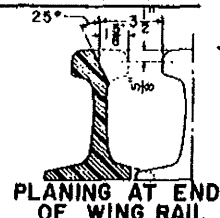
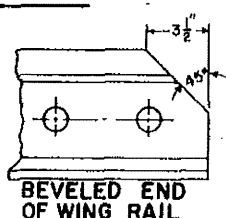
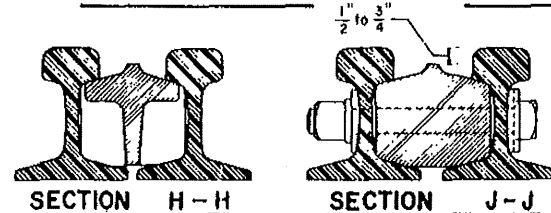
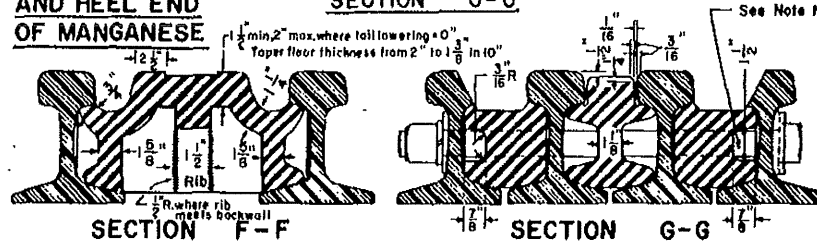
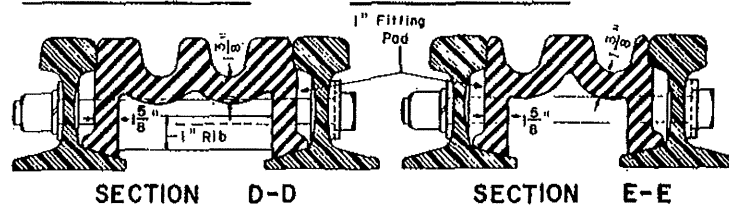
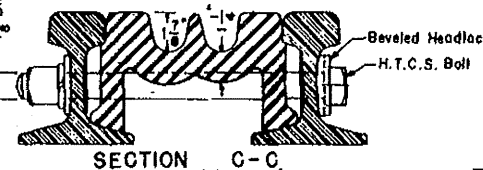
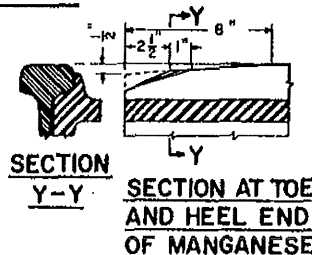
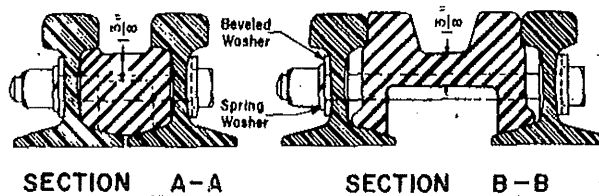
* 1 - Pair 26'-0" Switch Points, I-R.H. straight and I-L.H. curve, complete with reinforcing bars, clips and stops attached.	Standard Resilient Fastener Plates
2 - 39'-0" Undercut Stock Rails.	
4 - Insulated Vertical Switch Rods, with basket. See Plan 2158.	
2 - Heel Block Assemblies, complete. See Plan 2350.	
3 - Insulated Gage Plates, No. 0-0, No. 1-0 and No. 2-0	
8 - No. 1 Adjustable Brace Slide Plates	
2 - No. 3 " " " "	
12 - No. 1-P Shoulder Slide Plates	
2 - No. 2 " " " "	
2 - No. 4 " " " "	
2 - No. SH Heel Plates, I-R.H. and I-L.H.	See Plan 2157
16 - Adjustable Rail Braces, Resilient Type, complete. See Plan 2352.	
4 - Switch Stops. See Plan 2350.	
8 - Adjustable Rocker Clips for Vertical Switch Rods. See Plan 2158.	
28 - Turnout Pocket Plates with Welded Pressed Steel Shoulders for Resilient Fasteners	
Plan 2840	

- NOTES**
- 1 - This plan is for use with A.R.E.A. recommended standards for 132 or 115 RE Rail.
 - 2 - Stock rails, switch rails and all supplied rail, to be fully heat treated.
 - 3 - All bolts shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease.
 - 4 - When ordering a Left Hand Switch, these items shall be opposite hand.
 - 5 - For stock rails, switch angles, and offsets for an equilateral - see Plan 2153.
 - 6 - All rails, to be drilled as shown on this plan, except, the first hole is not to be drilled by manufacturer. Installer to drill first hole.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2155
			Oct. 28, 1992
26'-0" CURVED SPLIT SWITCH 115 OR 132 R.E. RAIL - INSULATED & UNDERCUT		ENGINEERING OFFICER: <i>John D. Ray</i> CHIEF ENGINEERING OFFICER: <i>W.A. Z...</i>	

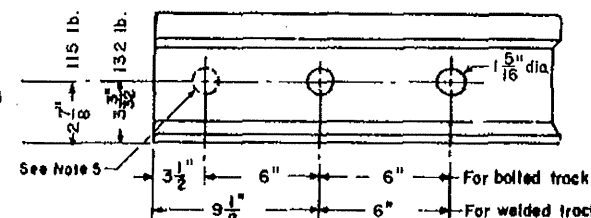


- NOTES**
- 1 - This plan is for use with A.R.E.A. recommended standards for 115 & 132 lb. R.E. Rail, Heavy Wall Section.
 - 2 - Workmanship and materials, including beveling shall be per current "A.R.E.A. Specifications".
 - 3 - Groove for band wires shall extend from end of filler block at least to center line of second bolt.
 - 4 - All bolts used in construction of frog and switch material shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease manufactured for this purpose.
 - 5 - When frog is to be used in bolted track, the first bolt hole to be drilled in the field by MBTA Forces.
 - 6 - Casting to be explosion hardened, with toe and heel arms to be fully heated rails.



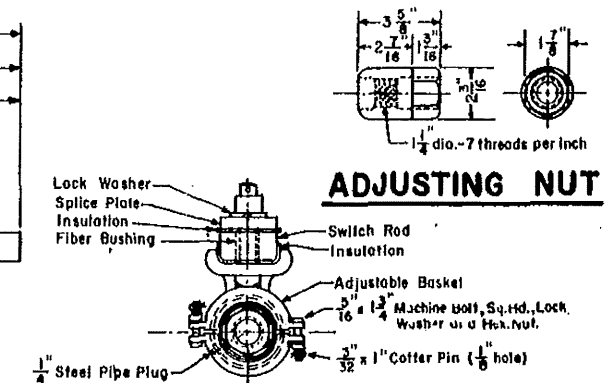
FROG TIE PLATES REQUIRED

- | | |
|--------------|---------------|
| 7-FT 20 | 2-FTR 27 |
| 6-FT 23 | 4-FTR 27 Mod. |
| 2-FT 23 Mod. | 2-FTR 29 |
| 16-FT 27 | 2-FTR 31 |
| 2-FT 27 Mod. | 2-FTR 33 |
| 1-FT 29 | |
- OR
- 20-P27 SAS (Self Aligning Shoulder)
- 18-P31 SAS
- 6-PR27 SAS
- 2-PR31 SAS
- See Note 7

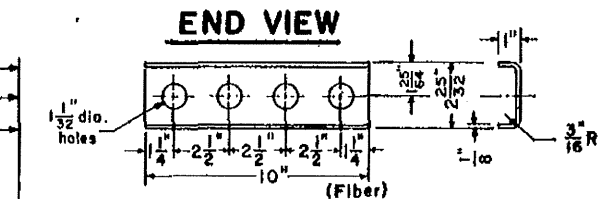


- 7 - Both FT and SAS Plates (in parenthesis) shown. Furnish SAS Plates unless otherwise specified.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2156
			Jan. 5, 1996
			ISSUE NO. 3
No. 15 RAILBOUND MANGANESE STEEL FROG FOR 115 LB OR 132 LB. R.E. RAIL <i>John D. Ray</i> SECTION CHIEF			

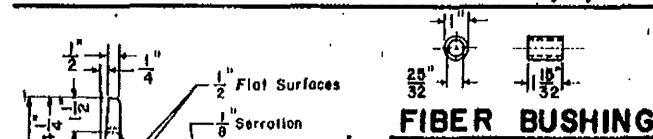


INSULATED SWITCH ROD NO.1 WITH ADJUSTABLE BASKET

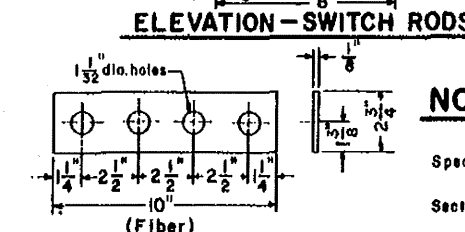


INSULATION FOR CHANNEL

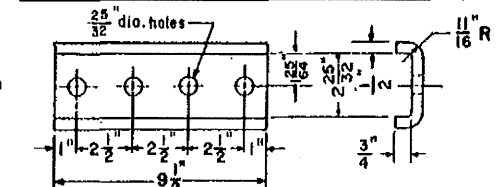
INSULATED SWITCH RODS NOS. 2,3,4 & 5*



FIBER BUSHING



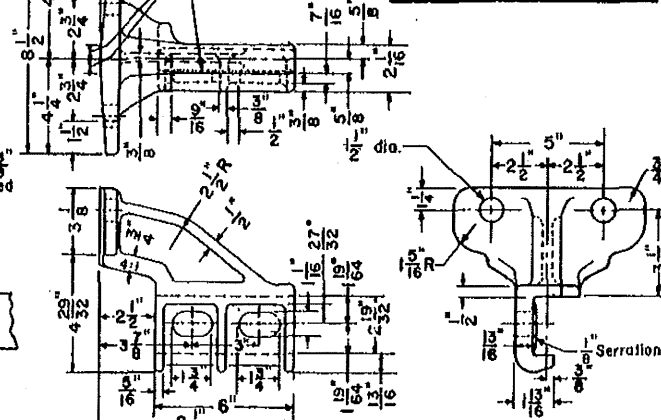
ELEVATION - SWITCH RODS



CHANNEL-STEEL

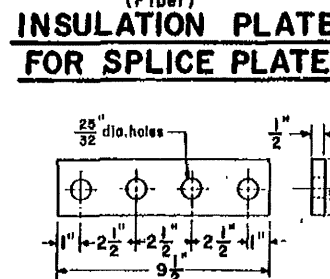
NOTES

- 1-- All switch rods shall conform to current A.R.E.A. Specifications.
- 2-- All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 58, Specifications 13--Hard Fiber.
- 3-- Each switch rod shall be marked with deeply cut characters, not less than $\frac{1}{2}$ " high, with rod designation and rail section.
- *4-- No. 5 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.



ASSEMBLED ROCKER CLIP

ADJUSTABLE ROCKER CLIP



SPLICE PLATE

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2158
			OCT. 28, 1992 ISSUE DATE
		2 ISSUE NO.	

**VERTICAL SWITCH RODS
AND ADJUSTABLE ROCKER CLIPS**
 FOR 26'-0" SWITCH 115 LB. OR 132 LB. RE RAIL

John D. Ray

 ENGINEERING OFFICER

W. A. Z. Hall

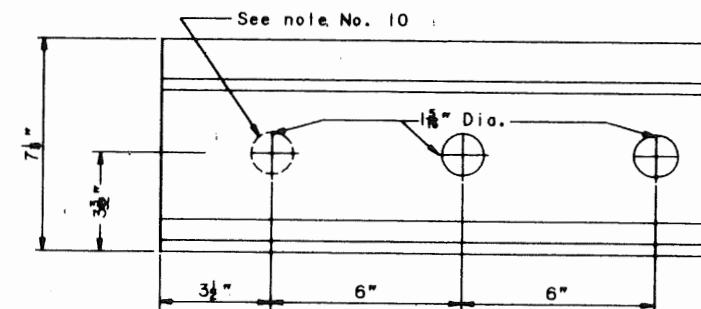
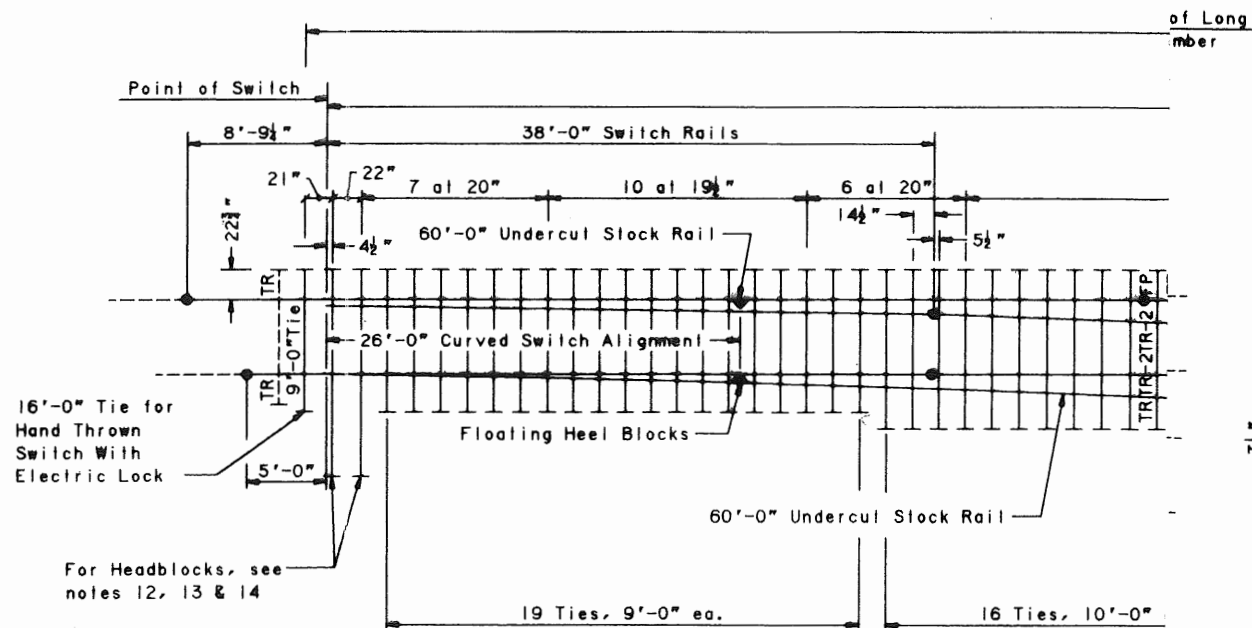
 CHIEF ENGINEERING OFFICER

**NO. 15 TURNOUT WITH FLOATING HEEL BLOCKS -
BILL OF MATERIAL**

QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 38'-0" CURVED SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2165
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
3	INSULATED GAGE PLATES (NO. 06, 16, & 26)	2157
10	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2157
16	NO. 1P SHOULDER SLIDES PLATES	2157
4	NO. HP HEEL PLATES	2157
4	SWITCH RAIL STOPS	2350
10	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2158
5	INSULATED VERTICAL SWITCH RODS (NO. 1, 2, 3, 4 & 5)	2158
20*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 15-2 R/L TO 15-8 R/L & 15-9 TO 15-15) x 2	2343
16	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 15 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2156
20	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
18	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
6	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
2	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
3	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA. +	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 62'-10 1/2", 22'-9 1/2", 20'-8"	-
1276	3/4" SCREW SPIKES	1218
62**	3/4" x 6" TRACK DRIVE SPIKES	1217
528	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
190	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
14	1:80 CANT TRANSITION TIE PLATES	2348
1	FLAT PLATE TIE PLATE	2348
19	STANDARD JOINT BAR ASSEMBLIES	1322
76	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS
** SUPPLIED BY THE INSTALLER

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2160
		JAN. 5, 1996 ISSUE DATE
NO. 15 FLOATING HEEL BLOCK TURNOUT BILL OF MATERIAL		
 SECTION CHIEF		



RAIL END DRILLING

LONG TIMBERS REQUIRED

Quantity	Length
20	9'-0"
16	10'-0"
11	11'-0"
10	12'-0"
9	13'-0"
8	14'-0"
9	15'-0"
10	16'-0"
8	17'-0"
101	Total

Headblocks not shown in table, see notes 12, 13 & 14.

NOTES

- 1-Stock rails, switch points and all rails furnished heat treated.
- 2-Switch points per A.R.E.A. Detail 5100 as shown.
- 3-60' stock rails, to be undercut as per Plan 231.
- 4-For switch details see Plan 2165.
- 5-Gage plate No. 1 - G as per Plan 2157.
- 6-Switch plates Nos. 0, 1, 1A, HP and IP as per 1.
- 7-Turnout plates, No. 2 thru No. 15, as per Plan 2157.
- 8-Vertical insulated switch rods and adjustable as per Plan 2158.
- 9-Floating Heel block as per Plan 2350.
- 10-All rails, including switch rails, to be drilled in this plan, except that first hole is not to be drilled by manufacturer. Installer to field drill first hole.
- 11-All tie plates to be resiliently fastened except as noted.
- 12-Two 9"x10"x13' Headblocks needed with switch stands, 16' long with stands over 3'.
- 13-Three 9"x10"x16' Headblocks needed for hand thrown electric lock.
- 14-Two 9"x10"x12' Headblocks needed for power operation.
- 15-See Plan 2160 for Bill of Material.
- 16-Rail lengths are computed to allow a 1/4" gap for bolting the field welded joints and 1/4" gap for when rails are welded in the field, they must be recommended by the weld kit manufacturer.
- 17-Transition Plates (TR) 1:80 Cant, and Flat Plate

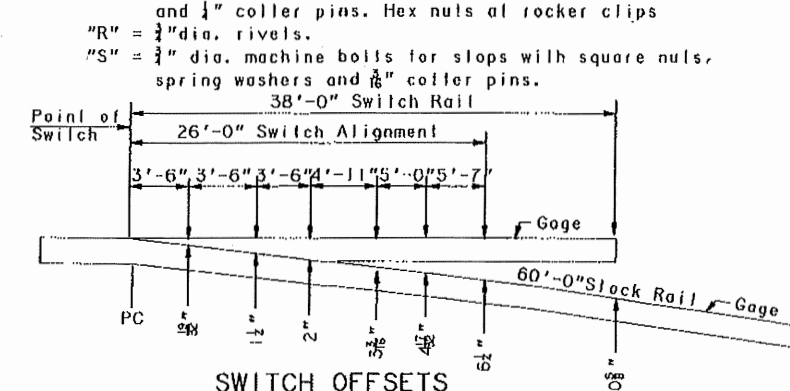
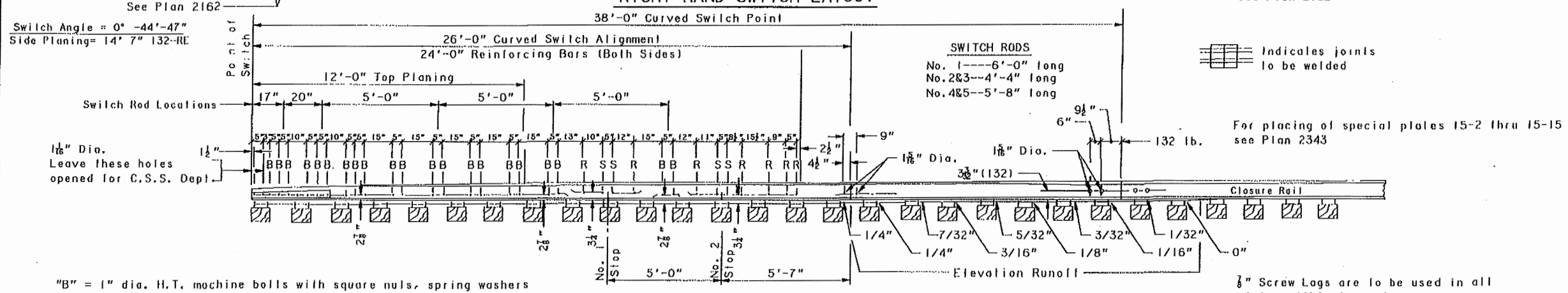
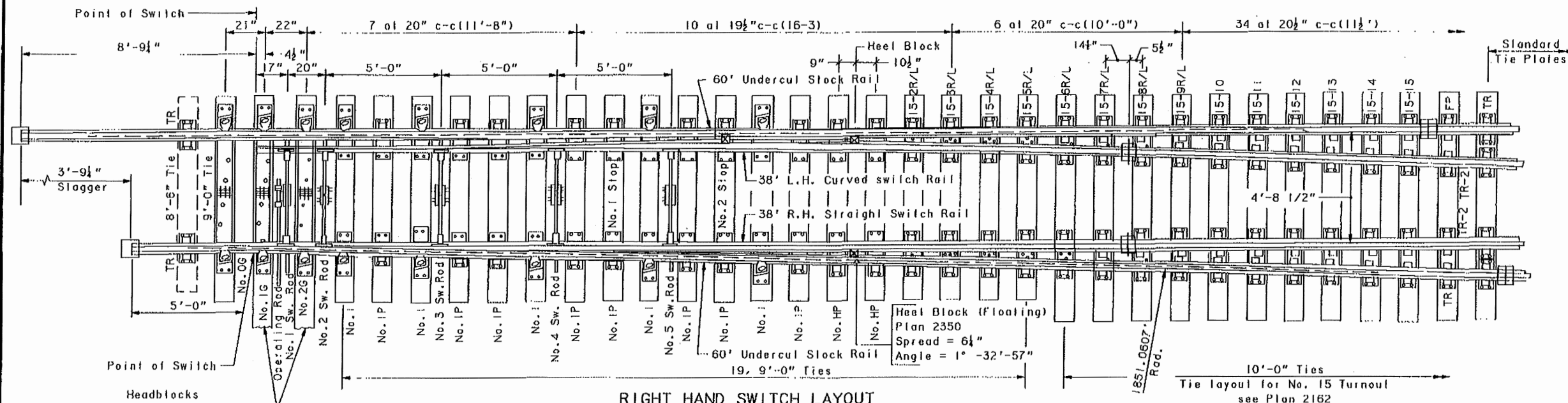
LEGEND

- Indicates rails furnished by the manufacturer.
- - - Indicates rails furnished by the installer.
- ▲ Indicates "floating" heel blocks.
- Indicates insulated joints with 3/16" opening.
- Indicates joints to be field welded.
- Indicates Bonded Insulated Joint Plug Rail

FROG TIE PLATES

- 20 - P27 SAS (self-aligning shoulder)
- 18 - P31 SAS
- 6 - PR27 SAS
- 2 - PR31 SAS

	RAILROAD OPERATIONS	DWG. NO. 2162	(2)
		JAN. 5, 1996 ISSUE DATE	
NO. 15 TURNOUT WITH FLOATING HEEL BLOCKS - TIE & RAIL LAYOUT			
John D. Long SECTION CHIEF			



- NOTES
- This plan for use with A.R.E.A. recommended standards for 132 R.E..
 - Workmanship and materials shall be as per current A.R.E.A. Specifications.
 - Gage Plates OG, IG and 2G as shown on Plan 2157.
 - Switch Plates Nos. 1, 1P and HP shown on Plan 2157.
 - Turnout Plates No. 2 thru No. 15 as shown on Plans 2343.
 - Stock Rails to be undercul as per Plan 2360.
 - Switch Rails to be undercul per A.R.E.A. Design 5100.
 - All rails to be Fully Heal Treated.
 - Vertical insulated switch rods and adjustable rocker clips as per Plan 2158.
 - All rails, including switch rails, to be drilled per Plan 2162 for 132 R.E. rail, with the first hole not to be drilled by manufacturer. Installer to field drill first hole when necessary.
 - See Plan 2160 for Bill of Material.
 - All bolts shall be dipped in a non-oxidizing grease immediately before applying so that all threads are thoroughly coated.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2165
		Jan 5, 1996 ISSUE DATE
26' CURVED SPLIT SWITCH WITH FLOATING HEEL BLOCKS		2

John D. Ray
SECTION CHIEF

BILL OF MATERIAL FOR A NO. 20 TURNOUT

Quantity	Description	Reference Plan No.
* 1	Pair of 39'-0" Switch Points, complete with reinforcing bars, clips and stops attached	2205
2	Heel Block Assemblies, complete	2350
* 2	39'-0" Undercut Stock Rails	2205
3	Insulated Gage Plates (Nos. 0-G, 1-G & 2-G)	2207
14	No. 1 Adjustable Brace Slide Plates	"
2	No. 3 Adjustable Brace Slide Plates	"
22	No. 1-P Shoulder Slide Plates	"
2	No. 2 Shoulder Slide Plates	"
2	No. 4 Shoulder Slide Plates	"
2	No. SH Heel Plates, 1-RH and 1-LH	"
5	Switch Rail Stops	2350
10	Adjustable Rucker Clips for Vertical Switch Rods	2208
5	Insulated Vertical Switch Rods (No. 1, 2, 3, 4 & 5)	2208
40	Turnout Plates for use behind heel of switch (No. 20-2 to 20-21 x 2)	2340
22	Resiliently Fastened Adjustable Rail Brace	2352
1	No. 20 Railbound Manganese Steel Frog, Complete	2206
2	FT20 Hook Twin Tie Plates	2326
14	FT23 " " " "	"
22	FT27 " " " "	"
4	FT29 " " " "	"
—	FT33 " " " "	"
—	FT23 Modified Hook Twin Tie Plates	"
4	FT27 " " " " "	"
—	FT29 " " " " "	"
—	FT33 " " " " "	"
2	FTR27 Hook Twin Tie Plates	"
—	FTR29 " " " "	"
2	FTR31 " " " "	"
6	FTR33 " " " "	"
—	FTR27 Modified Hook Twin Tie Plates	"
4	FTR29 " " " " "	"
—	FTR31 " " " " "	"

* These items shall be supplied for R.H., L.H. or Equilateral Turnout as required.

Quantity	Description	Reference Plan No.
—	FTR33 Modified Hook Twin Tie Plates	2326
2	13'-3" Manganese Steel One Piece Guard Rails	2302
—	Bonded Insulated Joint Assembly	—
2	39'-0" Bonded Insulated Joint Plug Rail	1340
12	39'-0" Lengths of Fully Heat Treated Rail	—
1ea. †	Various Lengths of Fully Heat Treated Rail as follows: 34'-0", 29'-6", 24'-5", 24'-5 3/16"	—
1966	7" Lock Spikes	1218
140	5/8 x 6" AREA Spikes**	1210
967	Resilient Fastener Spring Clips - Type "E"	—
16	Resilient Fastener Spring Clips - Type Modified "E"	—
396	Standard Resilient Fastener Tie Plates	1224
2	Pairs of Modified Joint Bar Assemblies (Head & Toe of Gage Side Bars Removed to Allow Switch Movement at Joint near Heel of Switch - No. 20 only)	2202
1	Mechanism for Bell Crank Helper, Complete	2209
22	Standard Joint Bar Assemblies	1322 or 1320
88	Standard Track Bolts with Nuts and Washers	1332

** Cut Spikes are to be furnished by the installer.

Weld Kits (24) to be furnished by the installer.

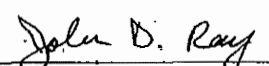
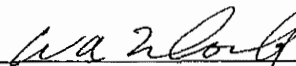
† For Equilateral Turnout, closure rails have slightly different lengths. See Equilateral Drawing (2203).

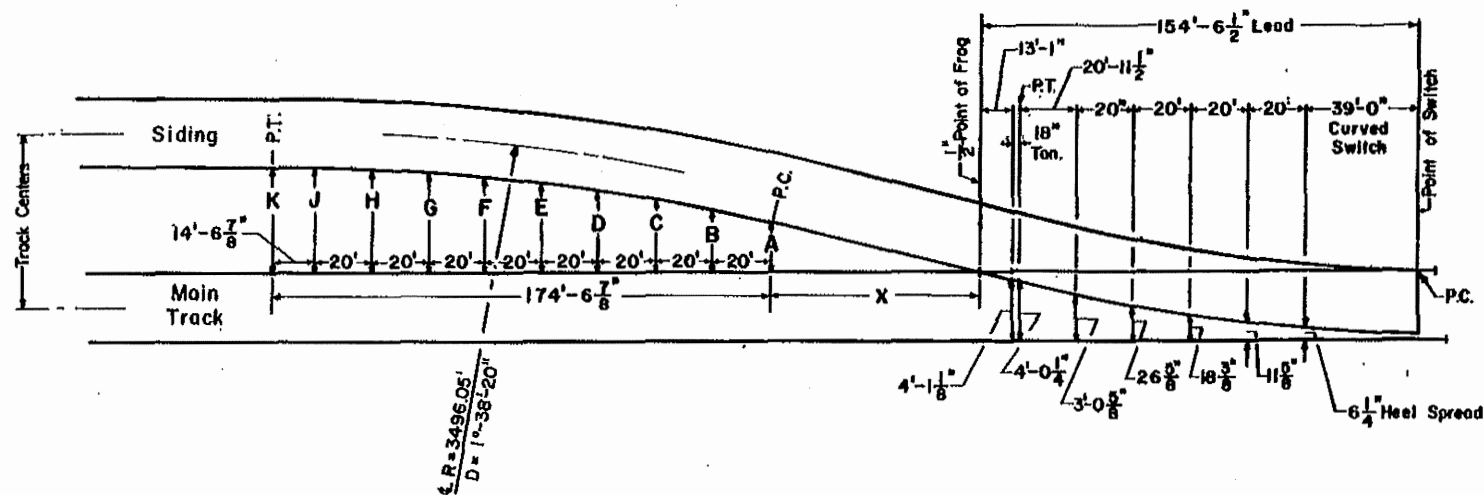
Notes: 1. Turnouts supplied shall be either 115 or 132 LB. RE as specified in the order.

2. Turnouts shall be resiliently fastened throughout, except Frog Tie Plates, Guard Rails and locations where Spring Clips cannot be physically installed such as on turnout plates near heel.

3. Fabricator shall supply all material required for the complete installation of the turnout except switch timber unless otherwise specified in the order.

4. For Switch Timber Schedule, see Plan 2202.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2200
		Apr. 29, 1996 ISSUE DATE
NO. 20 TURNOUT BILL OF MATERIAL		
 ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



OFFSETS BEHIND THE HEEL OF FROG

TRACK CENTERS	X	A	B	C	D	E	F	G	H	J	K
12'-2"	61'-0 ¹ / ₈ "	3'-1 ¹ / ₈ "	4'-0 ¹ / ₂ "	4'-10 ³ / ₈ "	5'-7"	6'-2 ¹ / ₈ "	6'-9"	7'-0 ³ / ₈ "	7'-3 ¹ / ₂ "	7'-5 ¹ / ₈ "	7'-5 ¹ / ₂ "
12'-4"	64'-4 ¹ / ₈ "	3'-3 ¹ / ₈ "	4'-2 ¹ / ₂ "	5'-0 ³ / ₈ "	5'-9"	6'-4 ¹ / ₈ "	6'-10"	7'-2 ³ / ₈ "	7'-5 ¹ / ₂ "	7'-7 ¹ / ₈ "	7'-7 ¹ / ₂ "
12'-6"	67'-8 ¹ / ₈ "	3'-6 ¹ / ₈ "	4'-4 ¹ / ₂ "	5'-2 ³ / ₈ "	5'-11"	6'-6 ¹ / ₈ "	7'-0"	7'-4 ³ / ₈ "	7'-7 ¹ / ₂ "	7'-9 ¹ / ₈ "	7'-9 ¹ / ₂ "
12'-8"	71'-0 ¹ / ₄ "	3'-7 ¹ / ₈ "	4'-6 ¹ / ₂ "	5'-4 ³ / ₈ "	6'-1"	6'-8 ¹ / ₈ "	7'-2"	7'-6 ³ / ₈ "	7'-9 ¹ / ₂ "	7'-11 ¹ / ₈ "	7'-11 ¹ / ₂ "
12'-10"	74'-4"	3'-9 ¹ / ₈ "	4'-8 ¹ / ₂ "	5'-6 ³ / ₈ "	6'-3"	6'-10 ¹ / ₈ "	7'-4"	7'-8 ³ / ₈ "	7'-11 ¹ / ₂ "	8'-1 ¹ / ₈ "	8'-1 ¹ / ₂ "
13'-0"	77'-8"	3'-11 ¹ / ₈ "	4'-10 ¹ / ₂ "	5'-8 ³ / ₈ "	6'-5"	7'-0 ¹ / ₈ "	7'-6"	7'-10 ³ / ₈ "	8'-1 ¹ / ₂ "	8'-3 ¹ / ₈ "	8'-3 ¹ / ₂ "
13'-2"	80'-11 ⁷ / ₈ "	4'-1 ¹ / ₈ "	5'-0 ¹ / ₂ "	5'-10 ³ / ₈ "	6'-7"	7'-2 ¹ / ₈ "	7'-8"	8'-0 ³ / ₈ "	8'-3 ¹ / ₂ "	8'-5 ¹ / ₈ "	8'-5 ¹ / ₂ "
13'-4"	84'-3 ⁷ / ₈ "	4'-3 ¹ / ₈ "	5'-2 ¹ / ₂ "	6'-0 ³ / ₈ "	6'-9"	7'-4 ¹ / ₈ "	7'-10"	8'-2 ³ / ₈ "	8'-5 ¹ / ₂ "	8'-7 ¹ / ₈ "	8'-7 ¹ / ₂ "
13'-6"	87'-8"	4'-6 ¹ / ₈ "	5'-4 ¹ / ₂ "	6'-2 ³ / ₈ "	6'-11"	7'-6 ¹ / ₈ "	8'-0"	8'-4 ³ / ₈ "	8'-7 ¹ / ₂ "	8'-9 ¹ / ₈ "	8'-9 ¹ / ₂ "

Values for track centers not shown may be determined by interpolation.

TURNOUT DATA FOR BOLTED TRACK

FROG-R.B.M.

Number	20
Angle	2°-51'-51"
Toe Length	13'-1"
Heel Length	21'-1"
Total Length	34'-2"

SWITCH RAILS

Length	39'-0"
Type	Curved
Switch Angle For Undercut Points	0°-25'-32"
Heel Block Angle	1°-06'-17"
Point of Curve (P.C.)	At Switch Point

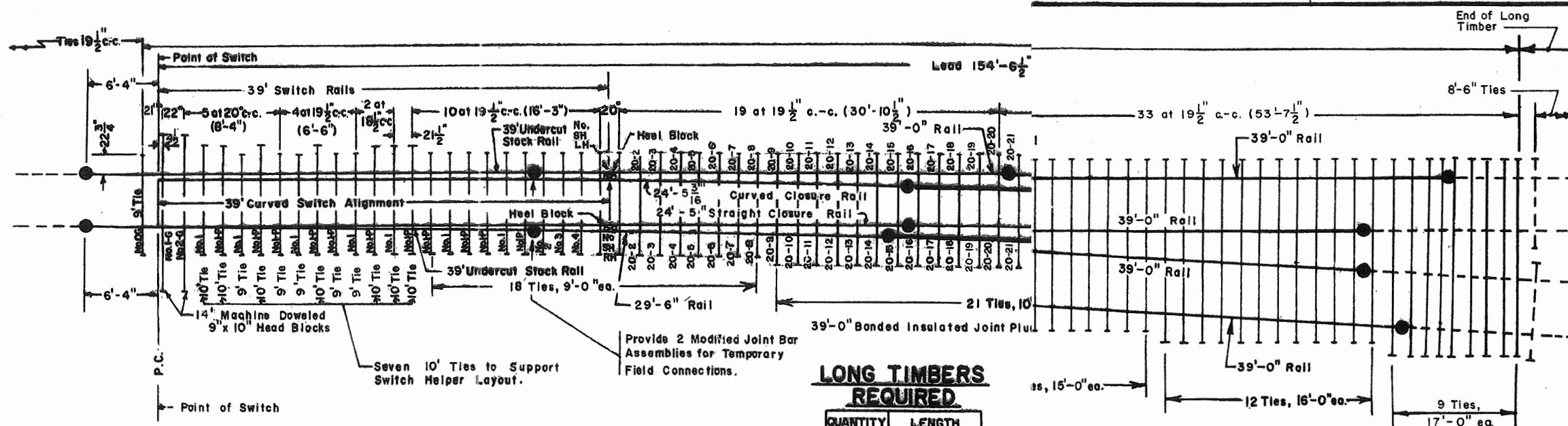
LEAD

Point of Switch to $\frac{1}{2}$ " Point of Frog	154'-6 ¹ / ₂ "
Radius	3289.332'
Degree of Curve	1°-44'-31"
Length of Curved Closure Rail	102'-6 ¹ / ₂ "
Length of Straight Closure Rail	102'-5 ¹ / ₂ "

NOTES

- The lines of the diagram indicate gage lines.
- For details see the following plans:-
Switch- 2205 or 2215
Frog-R.B.M. 2206
- For welded turnouts see Plan 2202 or 2212 for offsets between the point of switch and the toe of frog.

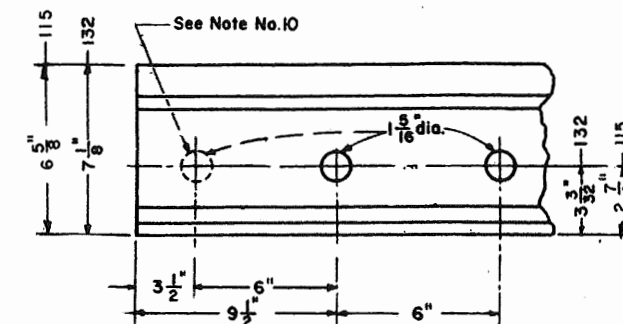
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2201
		Oct. 28, 1992 ISSUE DATE
OFFSETS FOR NO. 20 TURNOUT 115 OR 132 R.E. RAIL-UNDERCUT		
John D. Ray ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



LONG TIMBERS REQUIRED

QUANTITY	LENGTH
24	9'-0"
28	10'-0"
17	11'-0"
13	12'-0"
13	13'-0"
14 *	14'-0"
12	15'-0"
12	16'-0"
9	17'-0"
142	Total

* Includes 2 - 9"x10" Head Blocks



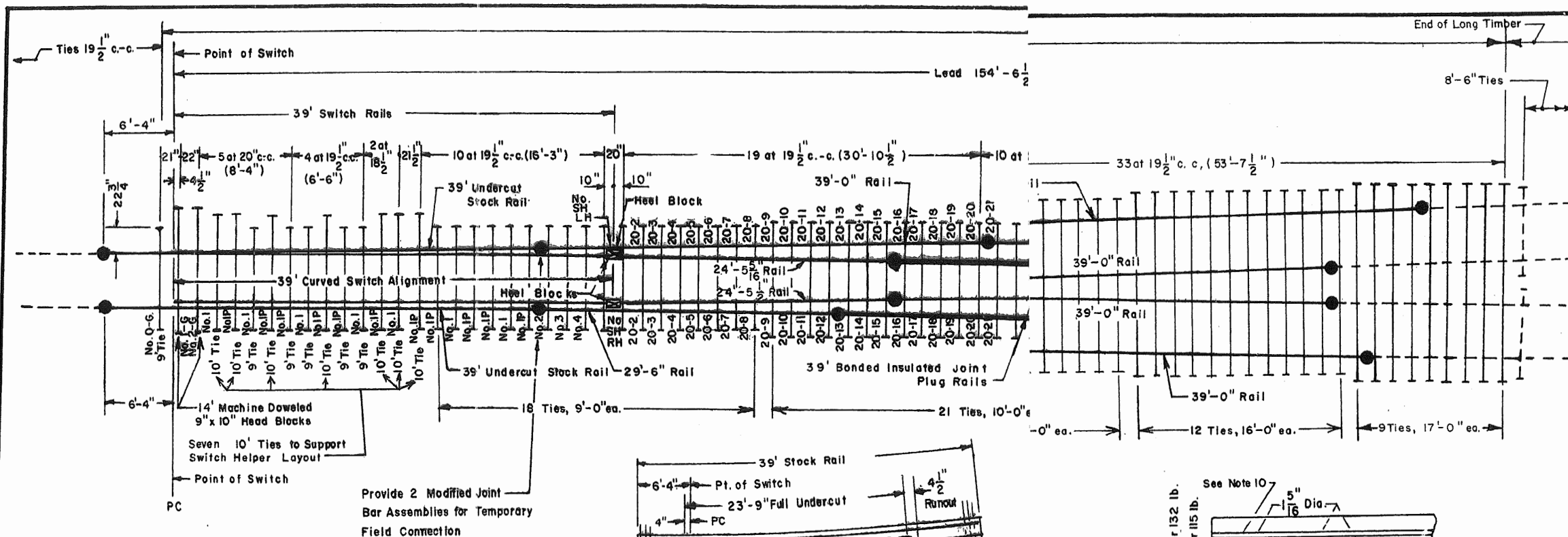
RAIL END DRILLING

NOTES

- 1 - Stock rails and switch points and all rails furnished with the turnout are to be fully heat treated.
- 2 - Switch Points per A.R.E.A. Detail 5100 as shown on plan 2205.
- 3 - 39' stock rails, are to be undercut as per Plan 2205
- 4 - Gage plates O-G, I-G and 2-G as per Plan 2207
- 5 - Switch plates Nos. 1 and I-P as per Plan 2207
- 6 - For turnout plates behind heel, see Plan 2340.
- 7 - Vertical insulated switch rods and adjustable rocker clips generally as per Plan 2208
- 8 - Heel Blocks as per Plan 2350
- 9 - For switch details see Plan 2205
- 10 - All rails, including switch rails, to be drilled as shown on this sheet, except that first hole is not to be drilled by the manufacturer. Forces, designated by the Authority, are to drill the first hole when necessary.
- 11 - All tie plates to be resiliently fastened, except, frog tie plates and guard rails.
- 12 - See Plan 2200 for Bill of Materials.
- 13 - Rail lengths are computed to allow a $\frac{1}{8}$ " gap for temporarily bolting the field welded joints and $\frac{3}{16}$ " gap for insulated joints. When rails are welded in the field, they must be cut to provide gaps recommended by the weld kit manufacturer.

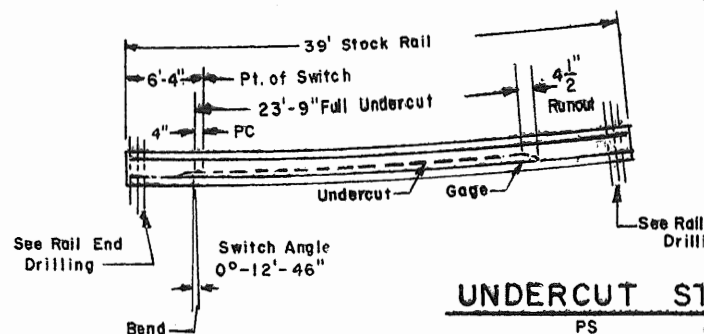
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2202
			Apr. 29, 1996 ISSUE DATE
SECTION CHIEF		ISSUE NO. 3	

NO. 20 WELDED TURNOUT TIE AND RAIL LAYOUT

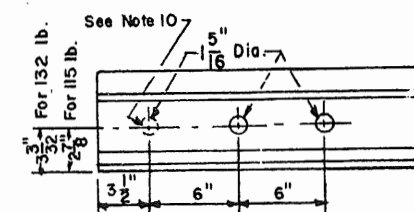
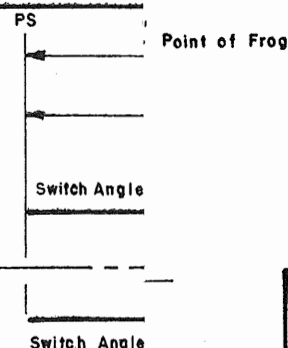


NOTES

- 1- Stock rails, switch rails and all rail furnished with the turnout to be fully heat treated.
- 2- Switch Points per A.R.E.A. Detail 5100 as shown on dwg. 2205.
- 3- 39' stock rails are to be undercut as shown on this plan.
- 4- Gage plates O-G, I-G and 2-G as per plan 2207.
- 5- Switch plates Nos. I and I-P as per plan 2207.
- 6- For turnout plates behind heel, see Plan 2340.
- 7- Vertical insulated switch rods and adjustable rocker clips generally as per plan 2208.
- 8- Heel blocks as per Plan 2350.
- 9- For switch details, see Plan 2205, modified as indicated for an equilateral.
- 10- All rails, including switch rails, to be drilled as shown on this sheet except that the first hole is not to be drilled by the manufacturer. MBTA forces to field drill first hole when necessary.
- 11- See Plan 2200 for bill of materials.
- 12- All tie plates to be resiliently fastened, except frog tie plates and guard rails.
- 13- Rail lengths are computed to allow a $\frac{1}{8}$ gap for temporarily bolting the field welded joints and $\frac{3}{16}$ gap for insulated joints. When rails are welded in the field, they must be cut to allow gaps recommended by the weld kit manufacturer.

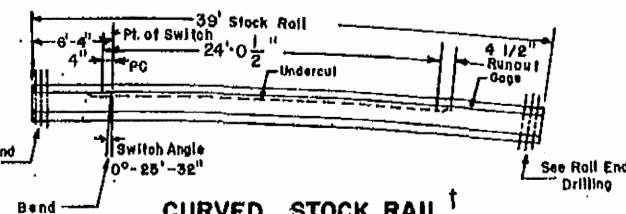
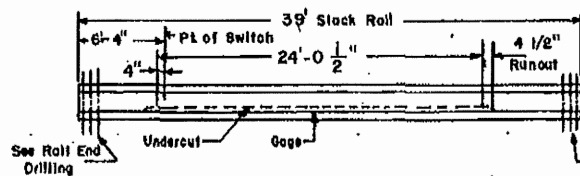
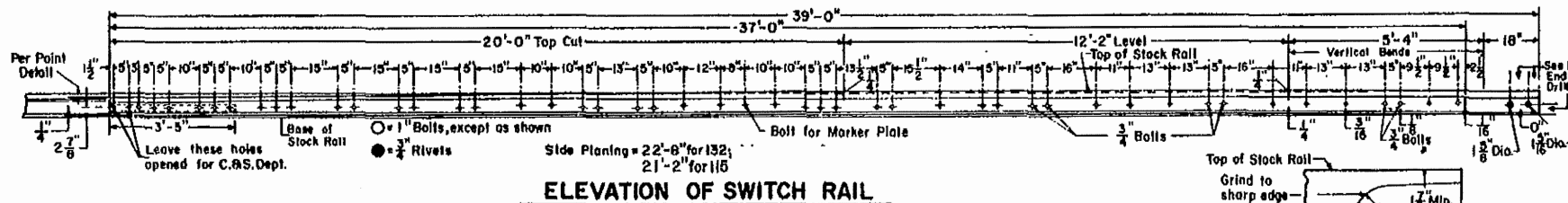
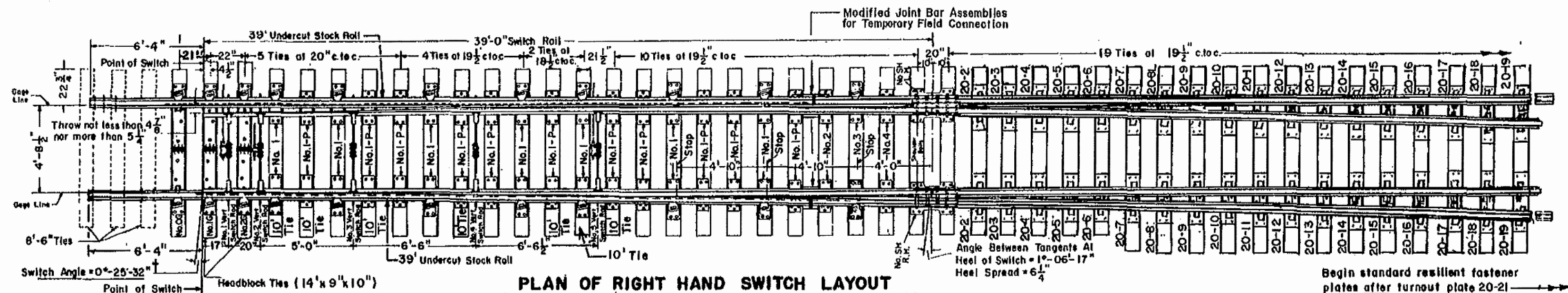


UNDERCUT STOCK RAIL



RAIL END DRILLING

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2203
			Apr. 29, 1992
			ISSUE DATE
			ISSUE NO. 3
NO. 20 EQUILATERAL TURNOUT TIE AND RAIL LAYOUT SECTION CHIEF			



END OF SWITCH RAIL

STRAIGHT STOCK RAIL

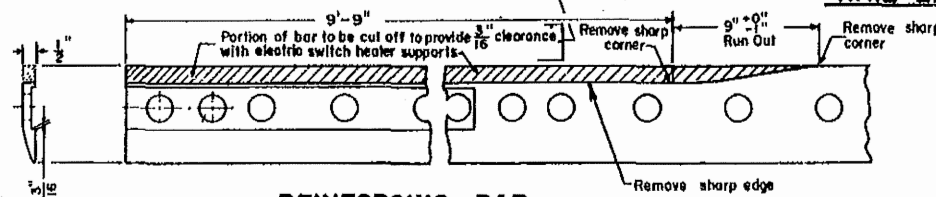
CURVED STOCK RAIL

TURNOUT INFORMATION

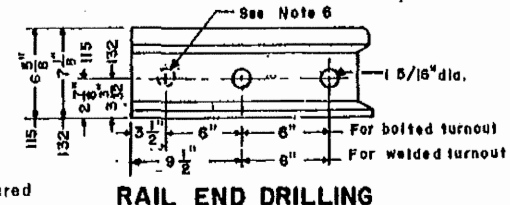
OFFSETS - Plan 2201

TIE and RAIL LAYOUT

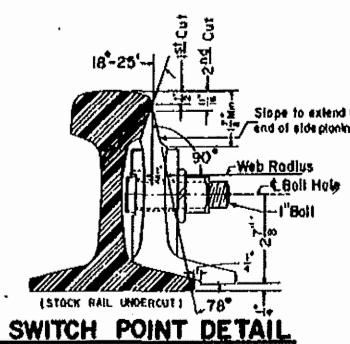
Plan 2202



REINFORCING BAR



RAIL END DRILLING



SWITCH POINT DETAIL

BILL OF MATERIAL

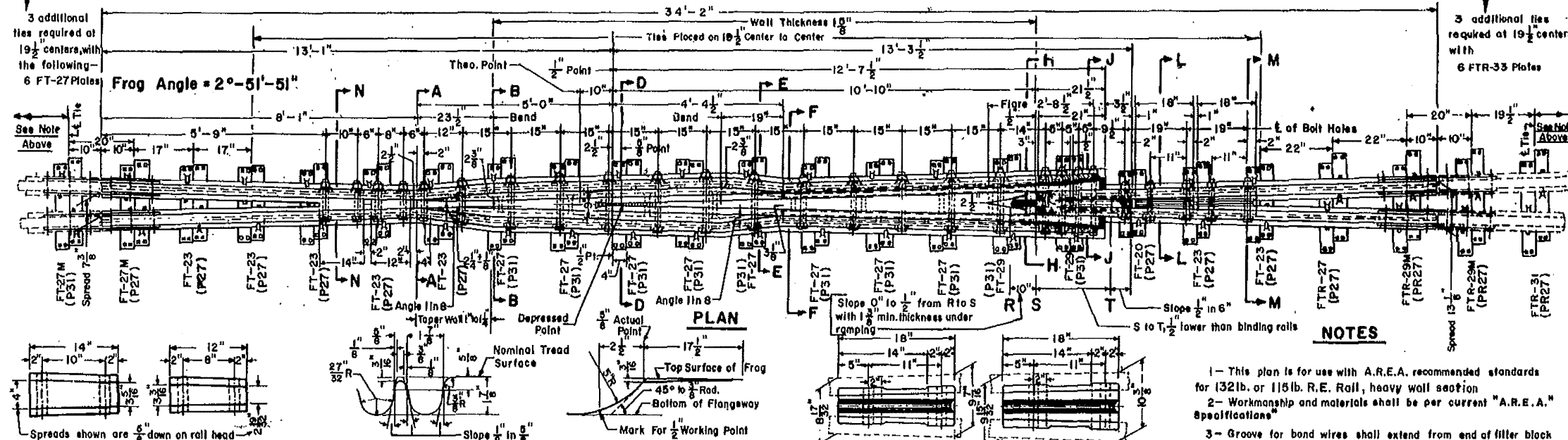
- * 1 - Pair 39'-0" Switch Points, 1-R.H. straight and 1-L.H. curved, complete with reinforcing bars, clips and stops attached.
- 2 - 39'-0" Undercut Stock Rails.
- 5 - Insulated Vertical Switch Rods, 2 with baskets - Plan 2208.
- 2 - Heel Block assemblies, complete - Plan 2350.
- 3 - Insulated Gage Plates Nos. 0-6, 1-G & 2-G.
- 14 - No. 1 Adjustable Brace Slide Plates
- 2 - No. 3 " " "
- 22 - No. 1-P Shoulder Slide Plates
- 2 - No. 2 " " "
- 2 - No. 4 " " "
- 2 - No. SH Heel Plates, 1-R.H. and 1-L.H.
- 5 - Switch Rail Stops.
- (10 - Adjustable Rocker Clips for vertical switch rods - Plan 2208.
- 40 - Turnout Pocket Plates with welded pressed steel shoulders for resilient fasteners - Plan 2340.
- 22 - Resiliently fastened Adjustable Rail Braces - Plan 2352.
- 4 - (two pairs) Modified Joint Bar Assemblies.

NOTES

- 1 - This plan is for use with A.R.E.A. recommended standards for 115 or 132 R.E. rail.
- 2 - All rail to be fully heat treated.
- † 3 - For stock rails, switch angles and offsets for an equilateral, see Plan 2208.
- 4 - All bolts shall be dipped immediately before applying (so that threads are thoroughly coated) in grease
- * 5 - When ordering a Left Hand Switch, these items shall be opposite hand.
- * 6 - For bolted turnouts, the first bolt hole is to be drilled in the field.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2205
			Apr. 29, 1996 ISSUE DATE
		39'-0" CURVED SPLIT SWITCH 115 OR 132 R.E. RAIL - INSULATED & UNDERCUT	
		John D. Ray SECTION CHIEF	

With Floating Heel Block Type Turnout, 3 additional ties at 19 1/2" centers and the following - 4 PR27 & 2 PR31.



TOE FILLER BLOCKS

SECTION AT POINT

ELEVATION OF POINT

HEEL FILLER BLOCKS

SECTION N-N

SECTION A-A

**SECTION AT TOE AND HEEL
END OF MANGANESE**

SECTION 8-B

SECTION D - D

SECTION E-E

SECTION F-F

SECTION H-H

SECTION J-

SECTION L-L

SECTION M-M

BEVELED END OF RAIL

PLANING AT END
OF WING RAIL

RAIL DRILLING

- 1- This plan is for use with A.R.E.A. recommended standards for (32lb. or 115lb. R.E. Rail, heavy well section
- 2- Workmanship and materials shall be per current "A.R.E.A. Specifications"
- 3- Groove for bond wires shall extend from end of filler block at least to center line of second bolt hole.
- 4- All bolts used in construction of frog and switch material shall be dipped immediately before applying (so that all threads are thoroughly coated) in grease manufactured for this purpose.
- 5- When frog is to be used in bolted track, the first bolt hole to be drilled in the field by the installer.
- 6- Casting to be explosion hardened, with toe and heel arms to be fully heat treated rails.

FROG TIE PLATES REQUIRED

2-FT 20 2-FTR27
14-FT 23 4-FTR29 Modified Plan 2326
22-FT 27 2-FTR31
4-FT 27 Modified 6-FTR33
4-FT 29 or (See Note 7)
20- P27 SAS (Self Adjusting Shoulder)
28- P31 SAS
10- PR27 SAS Plan 2326
2- PR31 SAS



**MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS	
------------------------	--

DWG. NO. **2206**

S Jan. 5, 1996
ISSUE DATE

ISSUE NO. 3

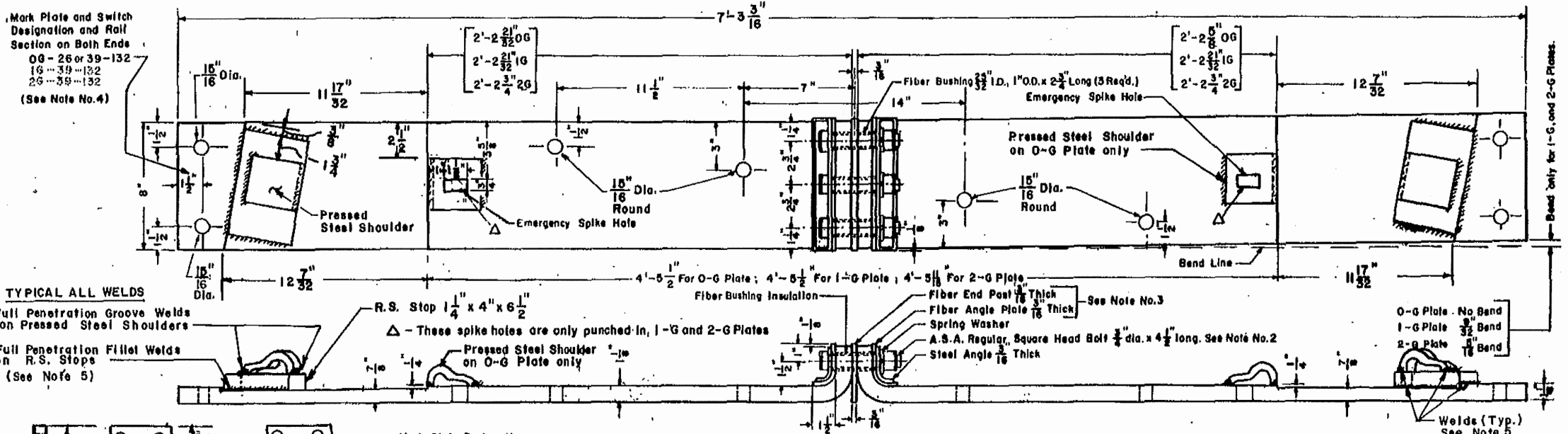
No. 20 RAILBOUND MANGANESE STEEL FROG

FOR 115 LB. OR 132 LB. R.E. RAIL

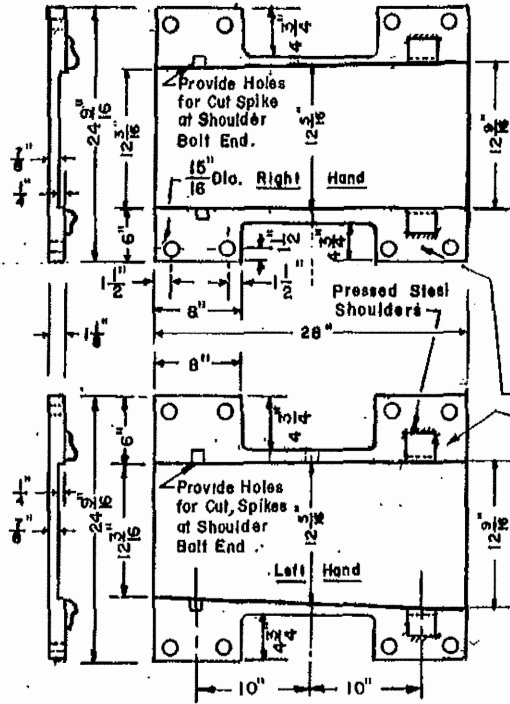
SECTION CHIEF

Mark Plate and Switch Designation and Rail Section on Both Ends
 00 - 26 or 39-132
 16 - 39-132
 26 - 39-132
 (See Note No. 4)

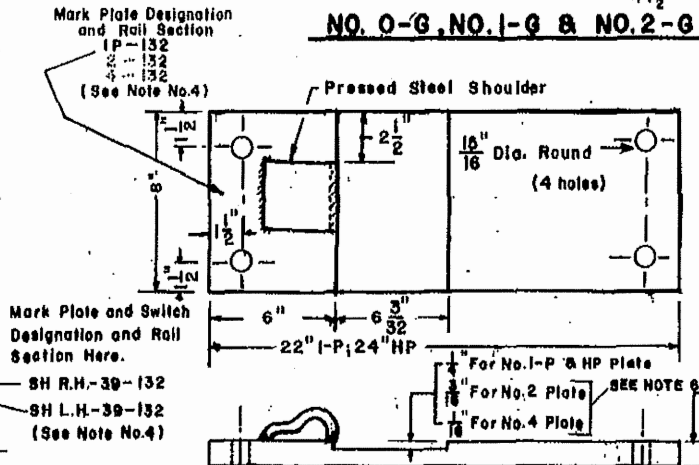
TYPICAL ALL WELDS
 Full Penetration Groove Welds on Pressed Steel Shoulders
 Full Penetration Fillet Welds on R.S. Stops
 (See Note 5)



NO. 0-G, NO. 1-G & NO. 2-G INSULATED GAGE PLATES



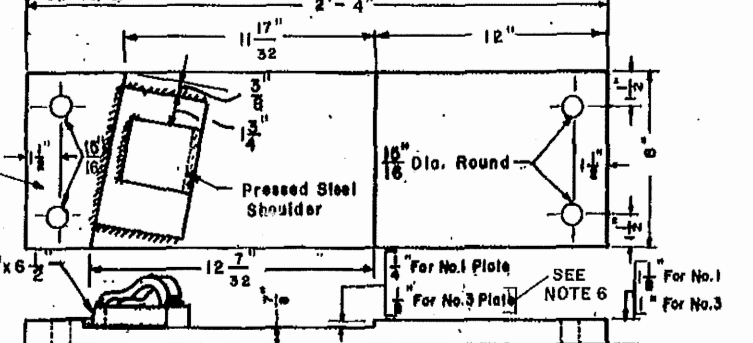
NO. 5H (R.H. & L.H.) HEEL PLATES



NO. 1-P, NO. 2, NO. 4 & NO. HP SHOULDER SLIDE PLATES

- NOTES:**
- 1 - Switch Plates shall conform to current A.R.E.A. Specifications for Low-Carbon Steel Tie Plates, with copper.
 - 2 - All gage plate bolts shall have A.S.A. Regular square heads and A.S.A. Heavy square nuts. All bolts shall be carbon-steel with medium-carbon steel nuts and conform to current A.R.E.A. "Specifications for Heat-Treated Carbon-Steel Track Bolts and Carbon Steel Nuts."
 - 3 - All fiber parts shall conform to current A.A.R. Signal Section Manual, Part 50, Specification No. 13 for "Hard Fiber" and A.A.R. Signal Section Manual, Part No. 170 covering "Requirements for Fabricated Fiber Parts for Track Insulation."
 - 4 - Each plate shall be marked by deeply cut characters, not less than 1/2" high, in the position as indicated on this plan.
 - 5 - Welds shall be made so that they do not interfere with the installation of resilient fasteners and rail braces.
 - 6 - Modify contour of pressed steel shoulders or shim plates 2, 3 & 4 to maintain uniform toe pressure from the resilient fasteners.

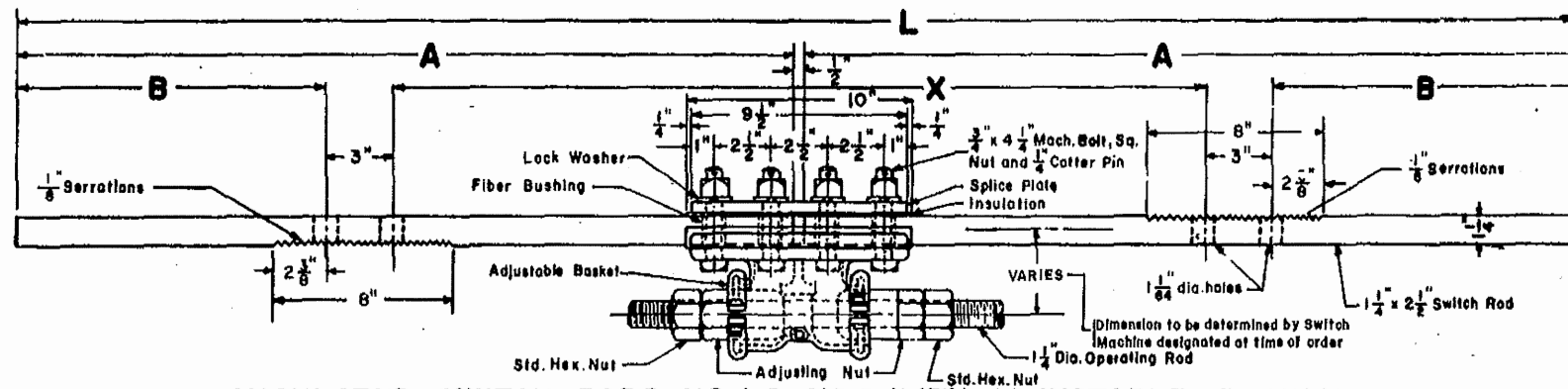
Mark Plate Designation and Rail Section Here.
 1-132
 3-132
 (See Note No. 4)



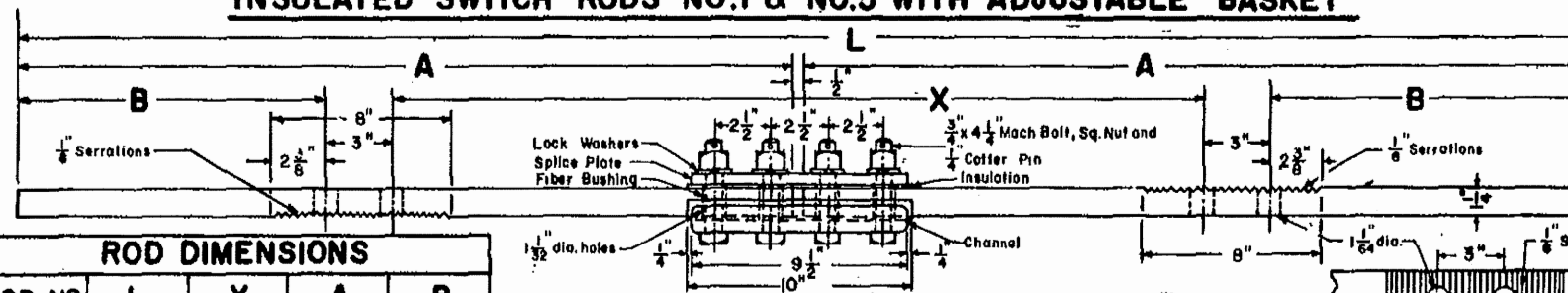
NO. 1 & NO. 3 ADJUSTABLE BRACE SLIDE PLATES

7 - For adjustable brace used with these plates, see Dwg. No. 2352

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2207
			Oct. 28, 1992 2
SWITCH PLATES and GAGE PLATES FOR 39'-0" SWITCH-132 LB RAIL		ENGINEERING OFFICER <i>John D. Ray</i> CHIEF ENGINEERING OFFICER <i>W. A. ...</i>	



INSULATED SWITCH RODS NO.1 & NO.5 WITH ADJUSTABLE BASKET

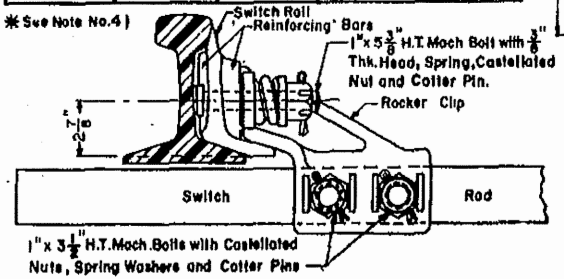


INSULATED SWITCH RODS-NOS. 2, 3, 4 & 6 *

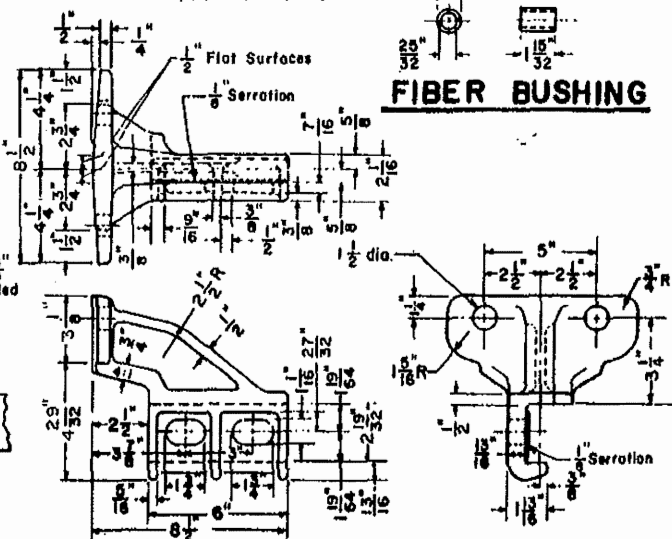
(See Note No. 4)

ROD DIMENSIONS				
ROD NO.	L	X	A	B
1	5'-10"	2'-11 7/8"	2'-10 3/4"	14 1/16"
2	5'-10"	2'-11 15/16"	2'-10 3/4"	14 1/16"
3	4'-4"	3'-0 3/32"	2'-1 3/4"	4 53/64"
4	5'-10"	3'-1 7/16"	2'-10 3/4"	13 9/32"
5	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"
* 6	5'-10"	3'-2 7/16"	2'-10 3/4"	12 25/32"

(* See Note No. 4)

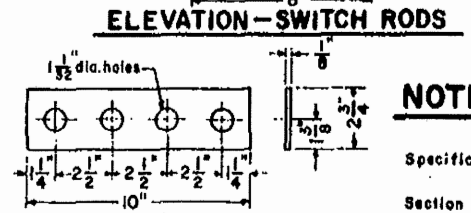


ASSEMBLED ROCKER CLIP

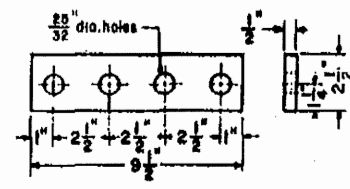


ADJUSTABLE ROCKER CLIP

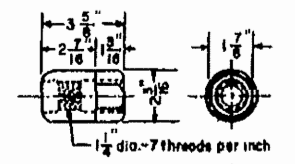
FIBER BUSHING



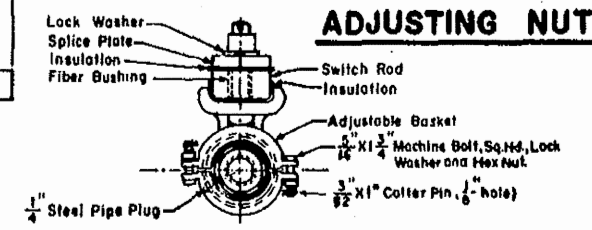
INSULATION PLATE FOR SPLICE PLATE



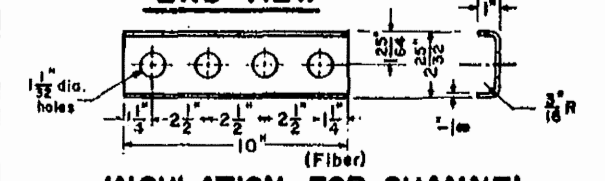
SPLICE PLATE



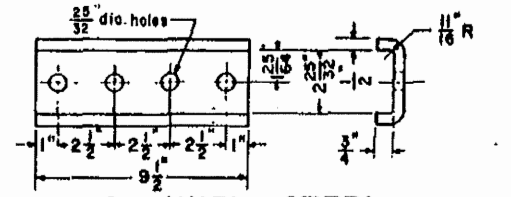
ADJUSTING NUT



END VIEW



INSULATION FOR CHANNEL

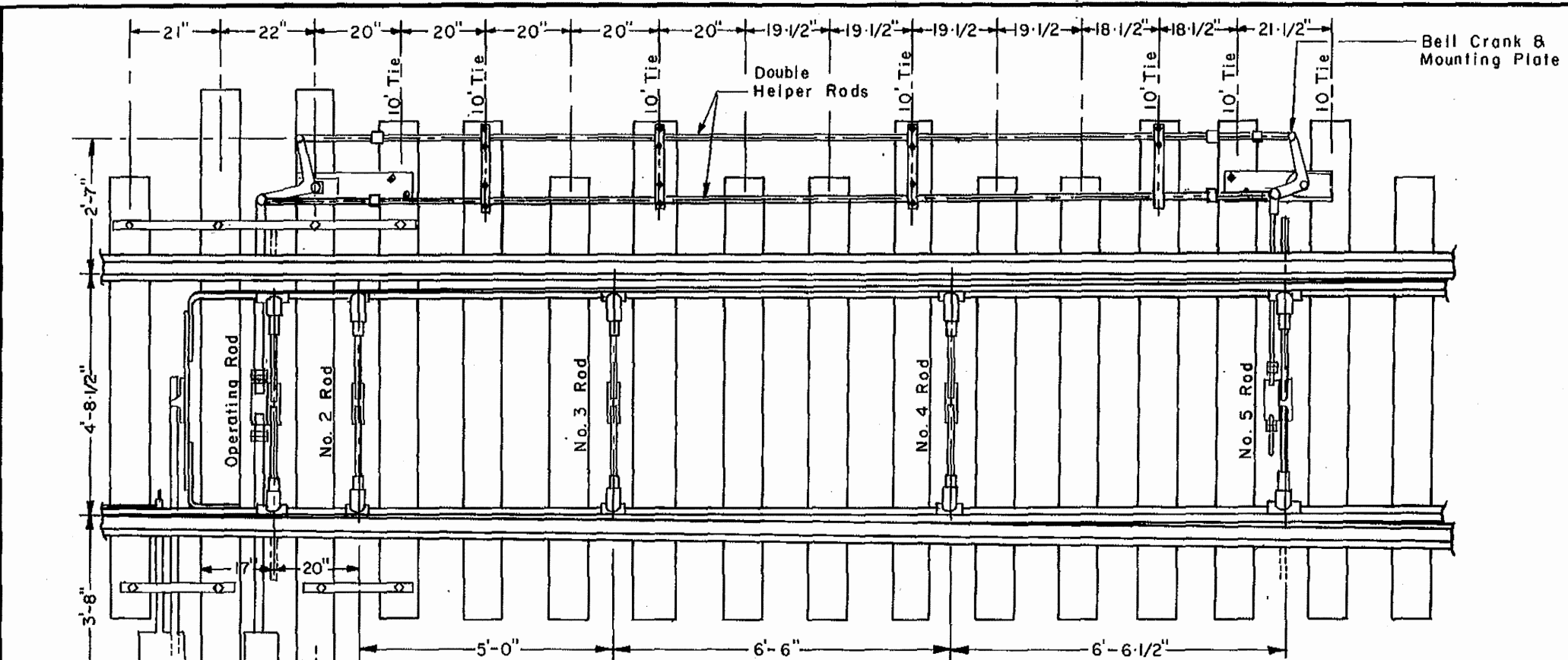


CHANNEL-STEEL

NOTES

- 1- All switch rods shall conform to current A.R.E.A. Specifications.
- 2- All fiber parts shall conform to current A.R. Signal Section Manual, Part 58, Specifications 13 - Hard Fiber.
- 3- Each switch rod shall be marked with deeply cut characters, not less than 1/8" high, with rod designation and rail section.
- * 4- No. 6 Rod is not required for turnouts with solid heel blocks but is required with floating heel blocks.

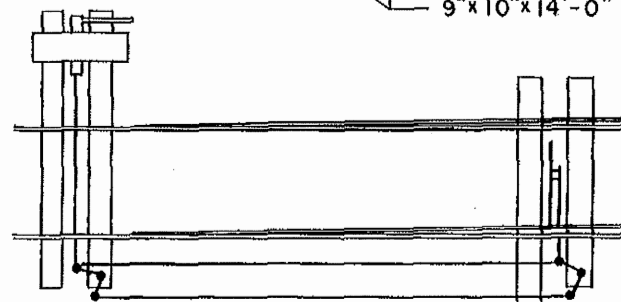
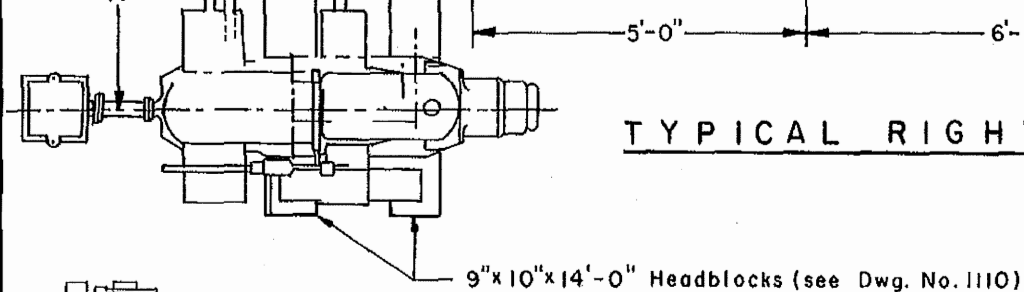
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2208 Oct. 28, 1992 ISSUE DATE	(2) ISSUE NO.
	VERTICAL SWITCH RODS AND ADJUSTABLE ROCKER CLIPS FOR 39'-0" SWITCH-115 LB. OR 132 LB. R.E. RAIL			
	John P. Ray ENGINEERING OFFICER			
				W. A. ... CHIEF ENGINEERING OFFICER



TYPICAL RIGHT HAND LAYOUT

NOTE:

Helper layout is used only with 39'-0" switch
(No. 20 Turnout)



TYPICAL LEFT HAND LAYOUT

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2209
		Apr. 29, 1996 ISSUE DATE
TYPICAL POWER SWITCH LAYOUT WITH HELPER		
Julia D. Ray SECTION CHIEF		

**NO. 20 TURNOUT WITH FLOATING HEEL BLOCKS -
BILL OF MATERIAL**

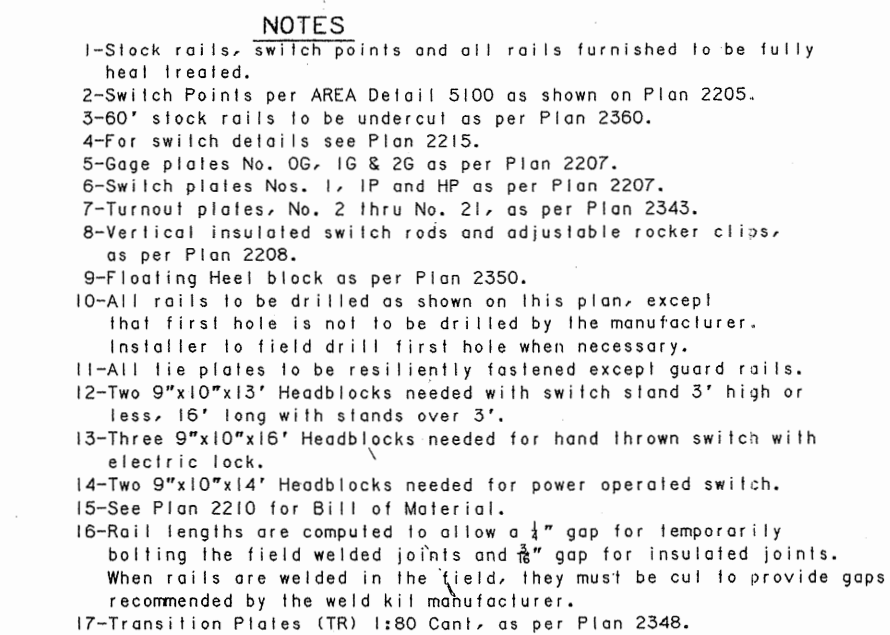
QUANTITY	DESCRIPTION	REFERENCE PLAN NO.
1*	PAIR 59'-6" CURVED SWITCH POINTS COMPLETE WITH REINFORCING BARS, CLIPS AND STOPS ATTACHED.	2215
2	FLOATING HEEL BLOCKS	2350
2	60'-0" UNDERCUT STOCK RAILS	2360
3	INSULATED GAGE PLATES (NO. 06, 16, & 26)	2207
16	NO. 1 ADJUSTABLE BRACE SLIDE PLATES	2207
26	NO. 1P SHOULDER SLIDES PLATES	2207
4	NO. 1P HEEL PLATES	2207
6	SWITCH RAIL STOPS	2350
12	ADJUSTABLE ROCKER CLIPS FOR VERTICAL SWITCH RODS	2208
6	INSULATED VERTICAL SWITCH RODS (NO. 1, 2, 3, 4, 5, & 6)	2208
40*	TURNOUT PLATES FOR USE BEHIND HEEL OF SWITCH (NO. 20-2 R/L TO 20-8 R/L & 20-9 TO 20-21)x2	2343
22	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE	2352
1	NO. 20 RAILBOUND MANGANESE STEEL FROG, COMPLETE	2206
20	NO. P27 SELF ALIGNING SHOULDER TIE PLATE	2328
28	NO. P31 SELF ALIGNING SHOULDER TIE PLATE	2328
10	NO. PR27 SELF ALIGNING SHOULDER TIE PLATE	2328
2	NO. PR31 SELF ALIGNING SHOULDER TIE PLATE	2328
2	13'-3" MANGANESE STEEL ONE PIECE GUARD RAILS	2302
2	19'-6" BONDED INSULATED JOINT PLUG RAIL	1340
3	78'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
4	39'-0" LENGTHS OF FULLY HEAT TREATED RAIL	-
1 EA. +	VARIOUS LENGTHS OF FULLY HEAT TREATED RAIL AS FOLLOWS: 42'-11 1/2", 37'-4", 25'-1 1/2"	-
1744	1/2" SCREW SPIKES	1218
78**	1 1/2" x 6" TRACK DRIVE SPIKES	1217
838	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
8	RESILIENT FASTENER SPRING CLIPS - TYPE MODIFIED "E"	-
286	RESILIENT FASTENER TIE PLATES FOR SCREW SPIKES	1225
14	1:80 CANT TRANSITION TIE PLATES	2348
20	STANDARD JOINT BAR ASSEMBLIES	1322
80	STANDARD TRACK BOLTS WITH NUTS & WASHERS	1332
1	HELPER LAYOUT	2209

* THESE ITEMS SHALL BE SUPPLIED FOR R.H., L.H. OR EQUILATERAL TURNOUT, AS REQUIRED
+ FOR EQUILATERAL TURNOUTS, CLOSURE RAILS HAVE SLIGHTLY DIFFERENT LENGTHS
** SUPPLIED BY THE INSTALLER

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2210
		APR. 29, 1996 ISSUE DATE

**NO. 20 FLOATING HEEL BLOCK TURNOUT
BILL OF MATERIAL**


 SECTION CHIEF

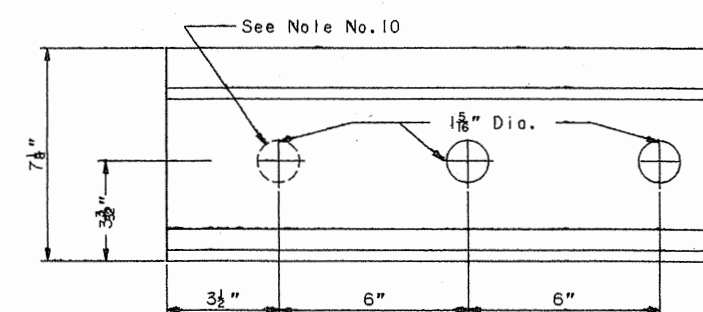


	Indicates rails furnished by the manufacturer.
	Indicates rails furnished by the Installer.
	Indicates "floating" heel blocks..
	Indicates insulated joints with 3/16" opening.
	Indicates joints to be field welded.
	Indicates Bonded Insulated Joint Plug Rail

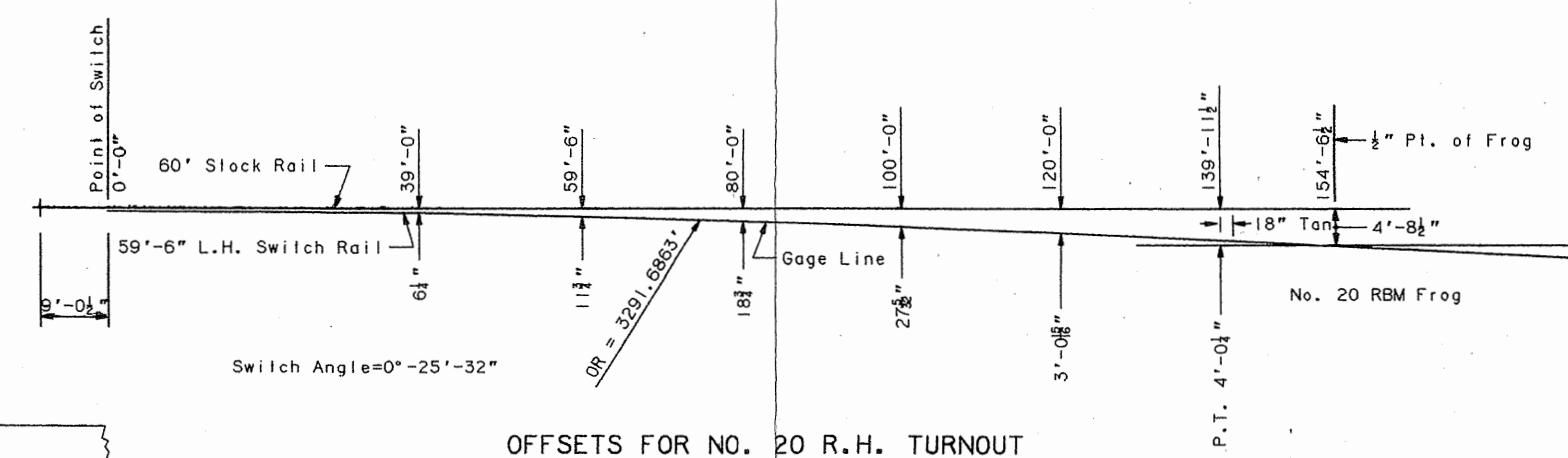
20 - P27 SAS (self-aligning shoulder)
28 - P31 SAS
10 - PR27 SAS
2 - PR31 SAS

Quantity	Length
22	9'-0"
29	10'-0"
16	11'-0"
12	12'-0"
12	13'-0"
14	14'-0"
12	15'-0"
12	16'-0"
10	17'-0"
139	Total

Headblocks are not shown in table
see notes 12, 13 & 14



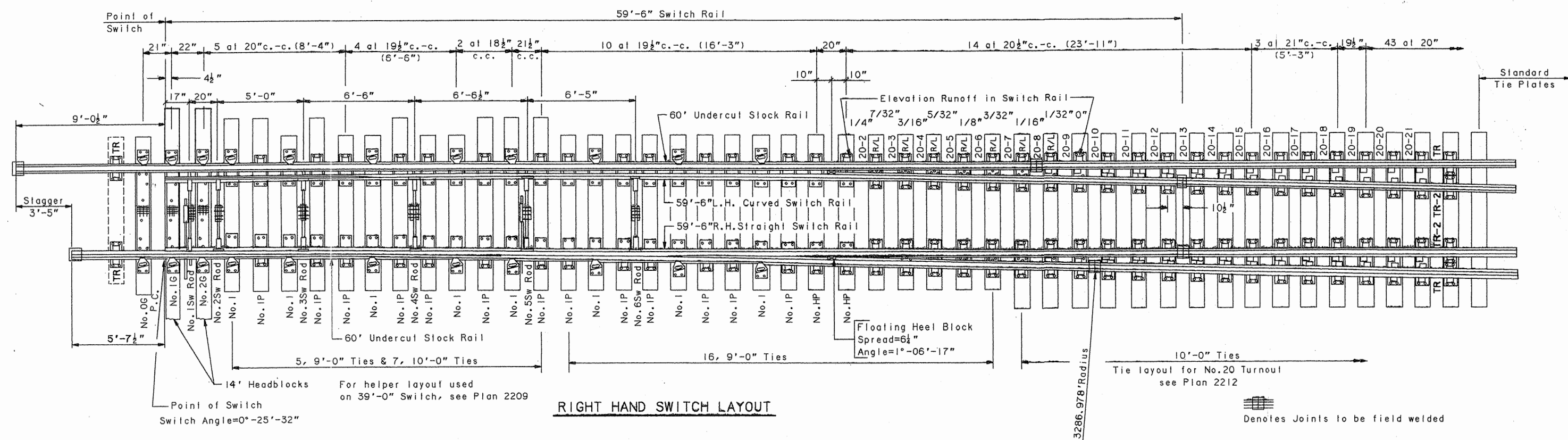
RAIL END DRILLING



 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2212	(3) ISSUE NO.
		Apr. 29, 1996 ISSUE DATE	

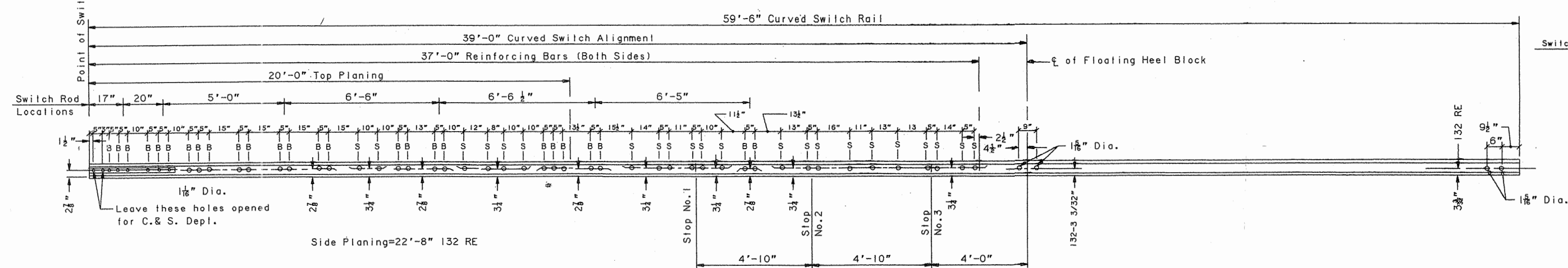
NO. 20 TURNOUT WITH FLOATING HEEL
BLOCKS - TIE & RAIL LAYOUT

John D. Roney
SECTION CHIEF



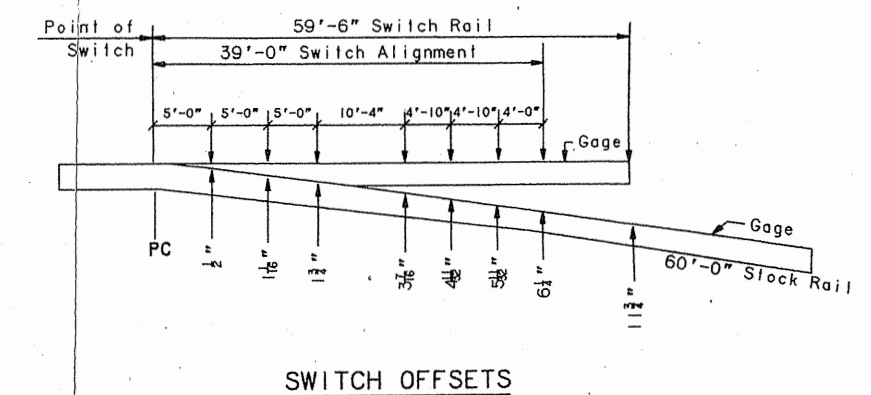
NOTES

1. - This plan is for use with A.R.E.A. recommended standards for 132 RE
2. - Workmanship and materials shall be per current A.R.E.A. Specifications.
3. - Gage Plates No. 1-G and 2-G as shown on Plan 2207.
4. - Switch Plates No. 1, No. 1p and No. 1p as shown on Plan 2207.
5. - Turnout Plates No. 2 thru No. 21 as shown on Plan 2343.
6. - Stock Rails to be undercut as shown on Plan 2360.
7. - Switch Rails to be undercut per A.R.E.A. Design 5100.
8. - All rails to be Fully Heat Treated.
9. - Vertical insulated switch rods and adjustable rocker clips as per Plan 2208.
10. - All rails, including switch rails, to be drilled by the manufacturer, except first hole to be left blank. Installer to drill first hole when necessary.
11. - See Plan 2110 for Bill of Material.
12. - All bolts shall be dipped in a non-oxidizing grease immediately before applying so that all threads are thoroughly coated.

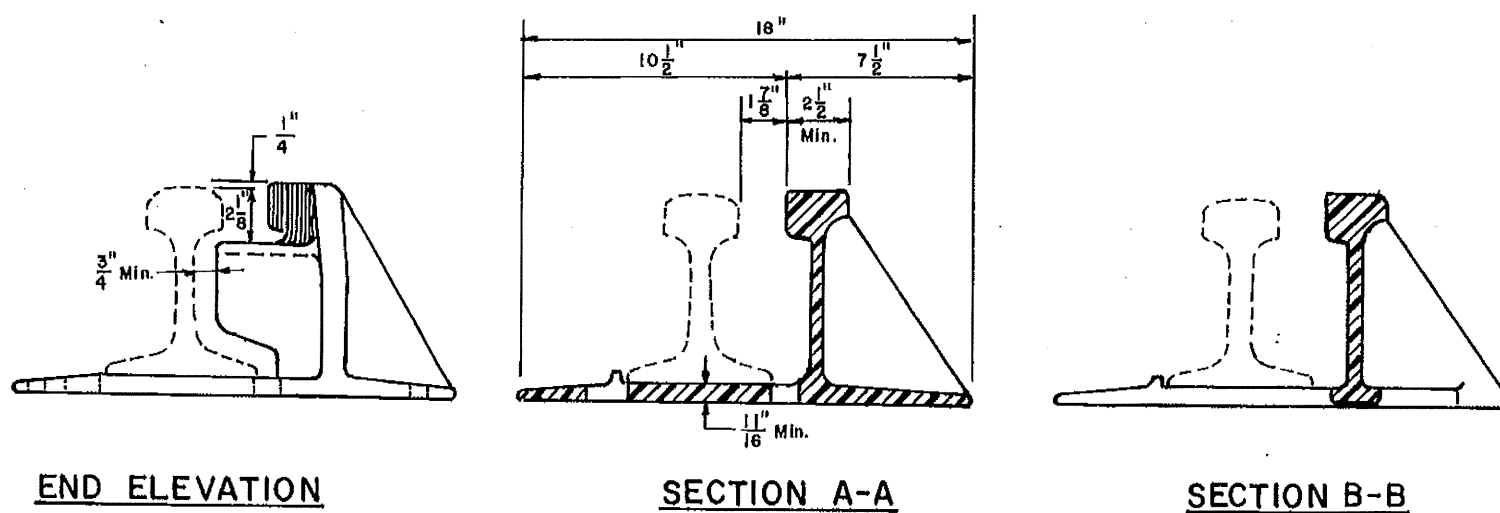
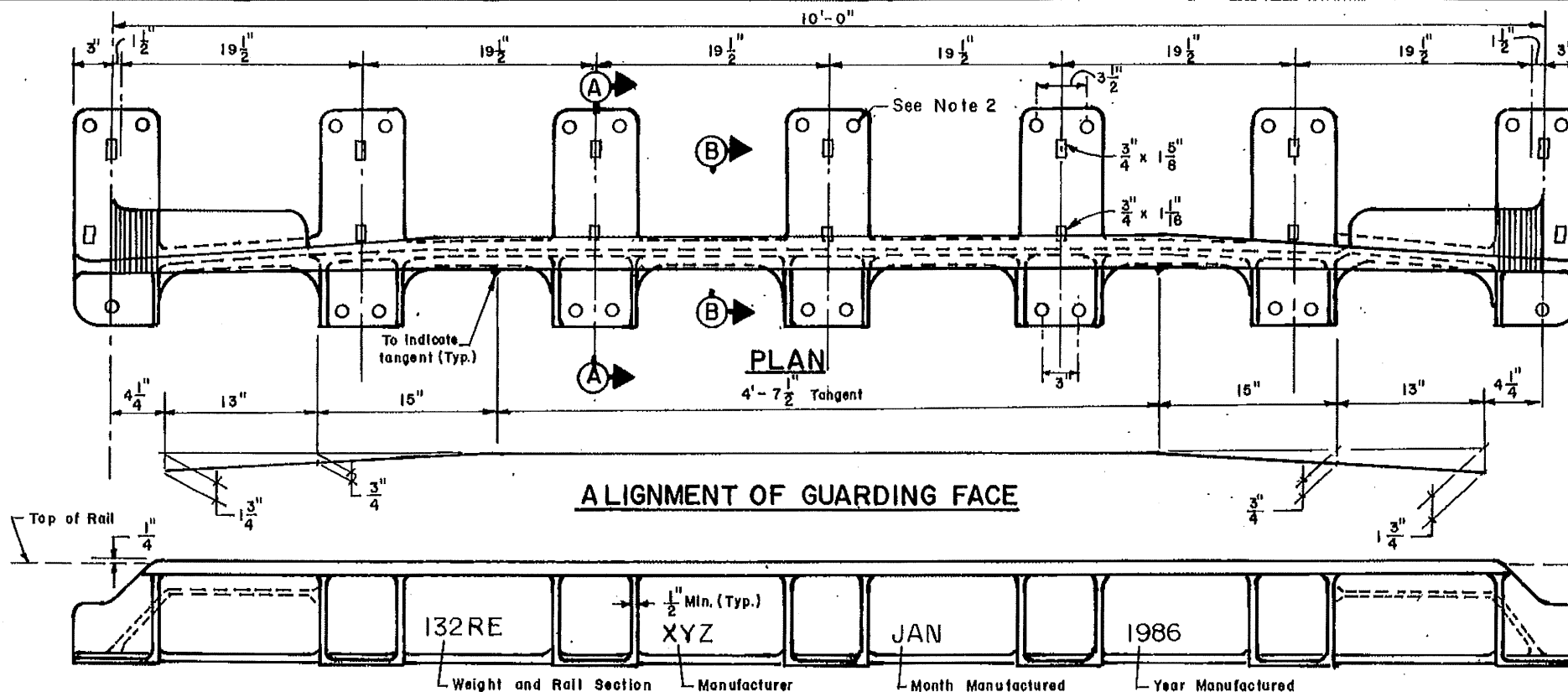


"B"=1" Dia. H.T. machine bolts with square nuts, spring washers and 1/4" cotter pins. Hex nuts at rocker clips.
 "S"=3/8" machine bolts for stops with square nuts, spring washers and 1/4" cotter pins.

ELEVATION OF SWITCH RAIL



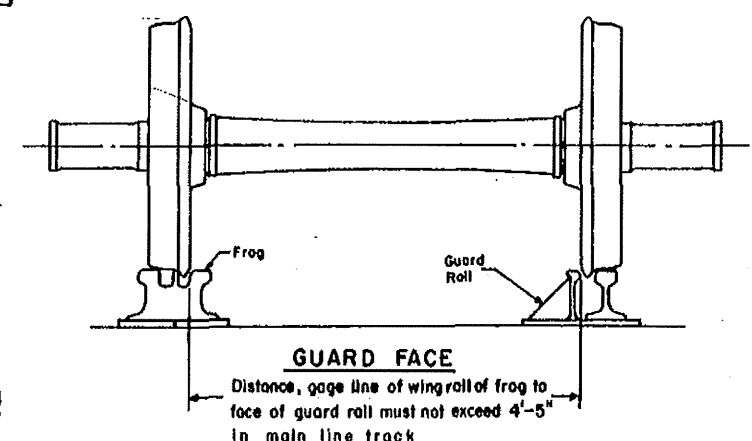
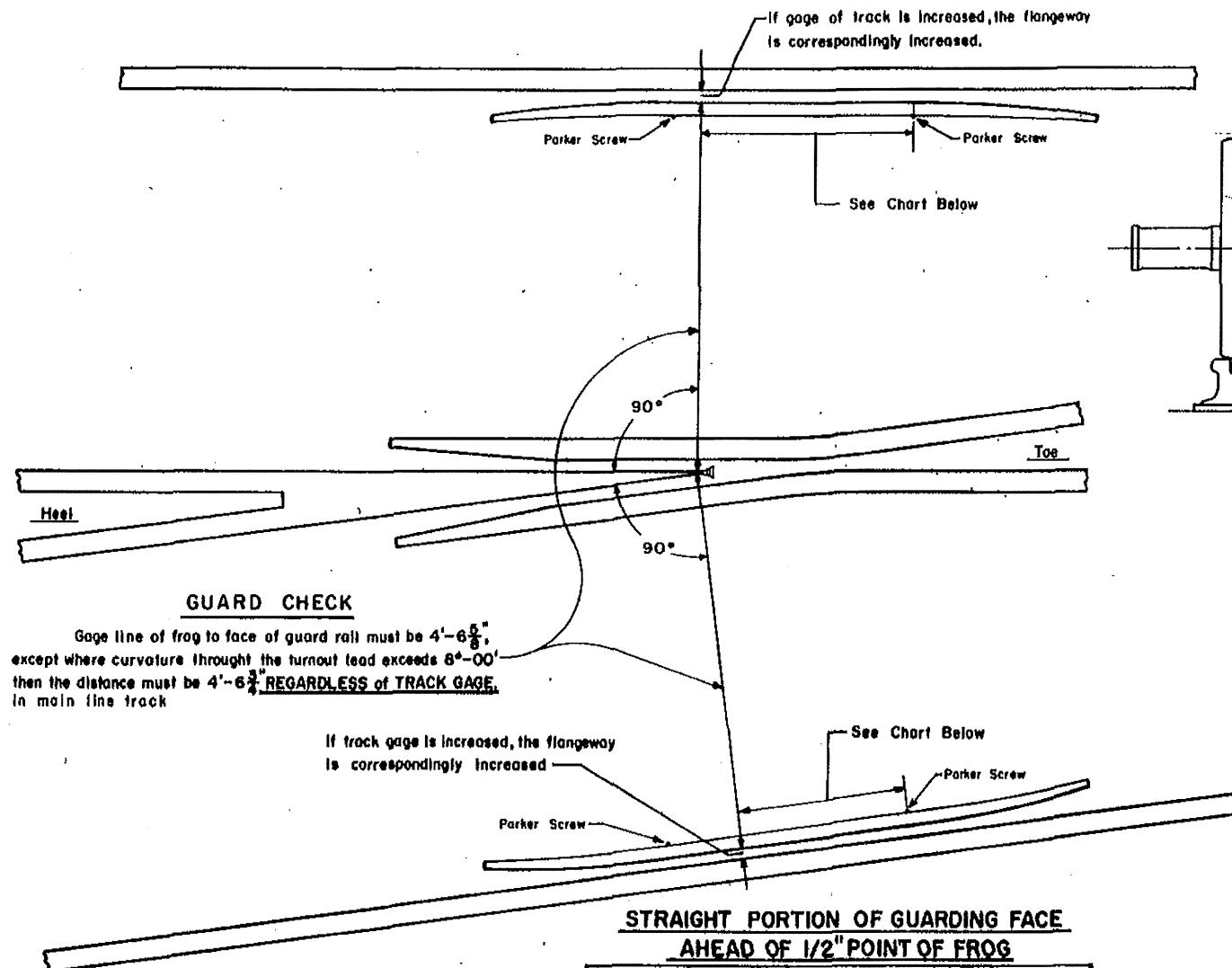
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2215
	APR. 29, 1996	ISSUE NO. 3
39' CURVED SPLIT SWITCH WITH FLOATING HEEL BLOCKS		
John D. Remy SECTION CHIEF		



NOTES:

1. For details of setting guard rail, see Plan 2310.
2. Furnish with 15/16" diameter holes.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2300
			Oct. 28, 1992
10'-0" MANGANESE STEEL ONE PIECE GUARD RAIL		ISSUE DATE	ISSUE NO. 2
John D. Ray ENGINEERING OFFICER		[Signature] CHIEF ENGINEERING OFFICER	

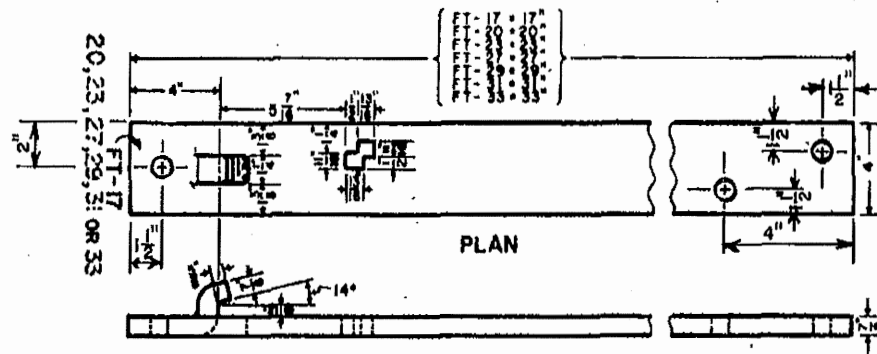


NOTES

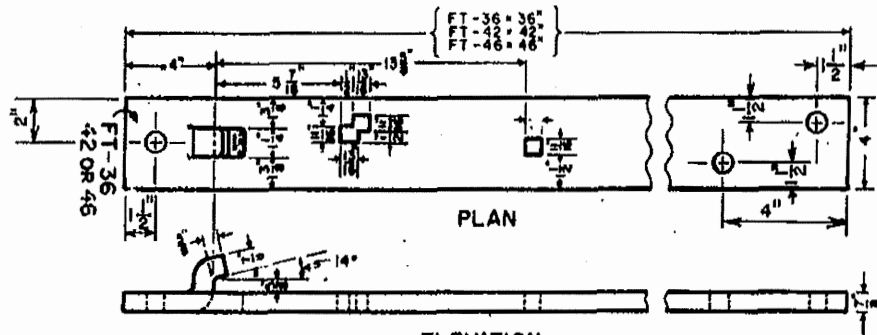
- 1 - Guard rails must conform to MBTA Specifications for one piece manganese steel guard rails.
- 2 - Each tie bearing portion of the guard rails must be fully supported by a tie, which shall be kept well tamped at all times.
- 3 - For details of guard rails see Plan No. 2300 & 2302.
- 4 - Parker Screws on the back of the guard rail indicates the extent of the straight portion of the guarding face.
- 5 - For Additional data, See MW-1 Manual - Section 213.143

FROG NO.	GUARD RAIL LENGTH	DESIRED SETTING (BASED ON TIE & RAIL LAYOUT PLANS IN BOOK)	SAFETY MINIMUM
6	10'-0"		22"
8	10'-0"	3'-7 1/4"	22"
10	13'-3"	4'-3 1/4"	22"
15	13'-3"	5'-2 3/4"	22"
20	13'-3"	5'-2 3/4"	36"

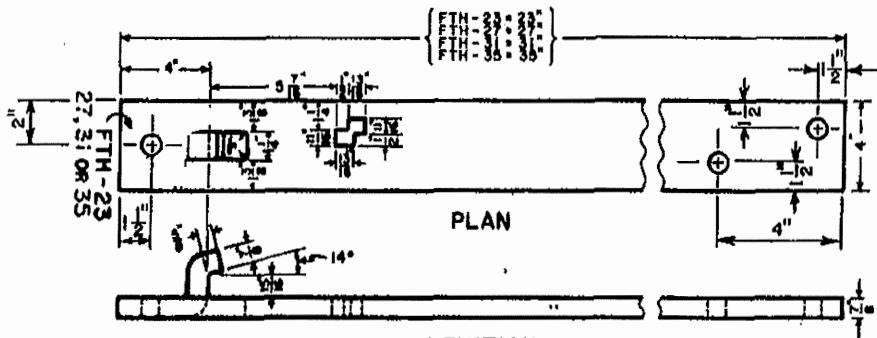
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2310
		Oct. 28, 1992 (2) ISSUE DATE ISSUE NO.
GUARD RAIL INSTALLATION AND MAINTENANCE		
<i>John D. Ray</i> ENGINEERING OFFICER	<i>W. A. ...</i> CHIEF ENGINEERING OFFICER	



ELEVATION
FT PLATE

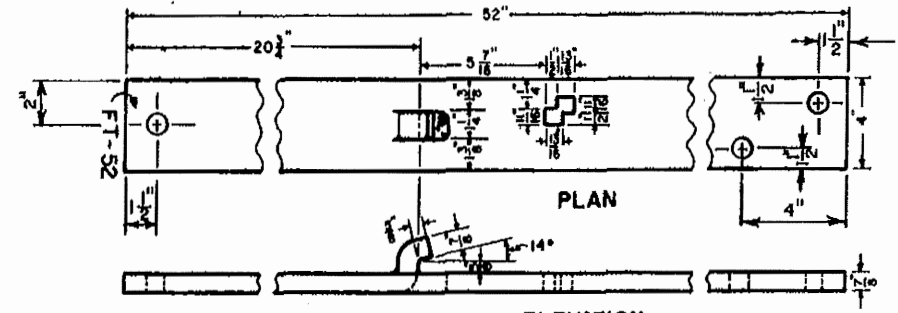


ELEVATION
FT PLATE

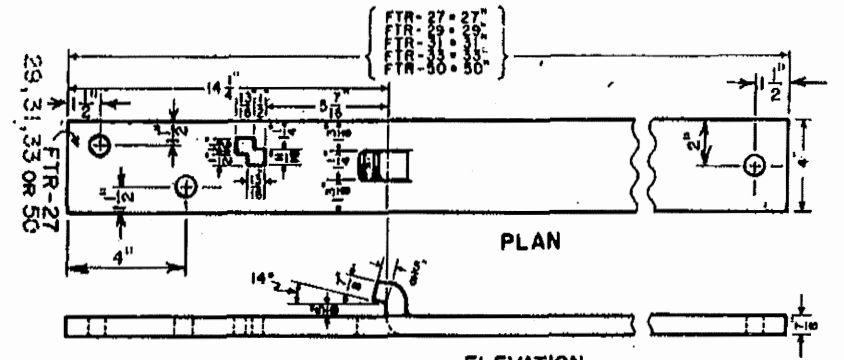


ELEVATION
FTH PLATE

NOTE:
ALL PLATE HOLDING SCREW LAG
HOLES ARE 16/16" DIA.



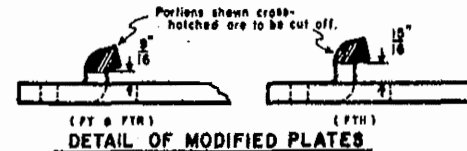
ELEVATION
FT-52 PLATE



ELEVATION
FTR PLATE

PLATE DESIGNATION

FT = Frog Tie Plate
FTH = Frog Tie Plate (High Hook)
FTR = Frog Tie Plate (Reverse Hook)
FT-MOD. } Modified plates will
FTH-MOD. } have the hook cut back
FTR-MOD. } as detailed below.

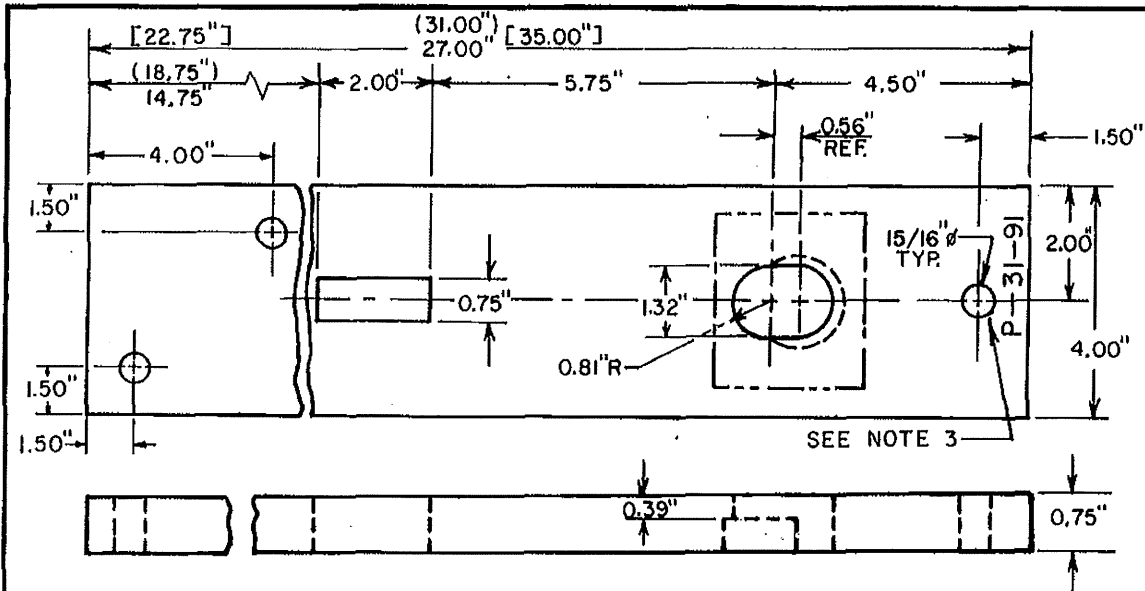


Note
Where hook on Frog Tie Plate will impinge upon base of frog
or base of joint bar, the Frog Tie Plate must be modified as detailed.

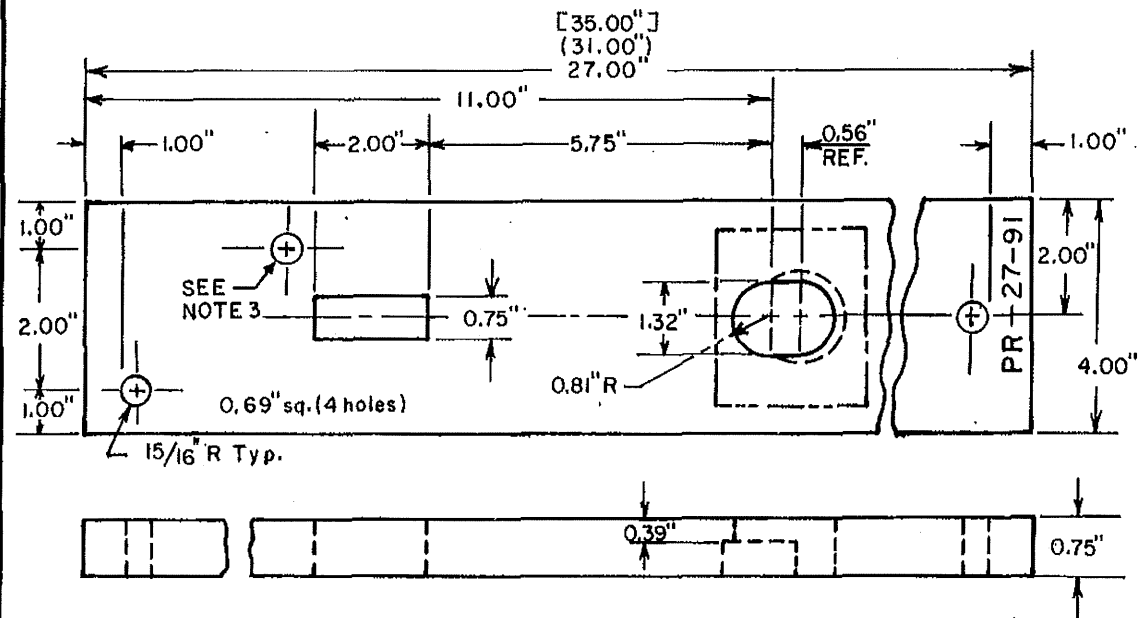
NOTES

Plates shall conform to the current A.R.E.A. Specifications for Low-Carbon
Steel Tie Plates, with copper.
Each plate shall be marked by deeply cut characters, not less than one half
inch high, in the position as indicated on this plan, with the plate designation as
shown.

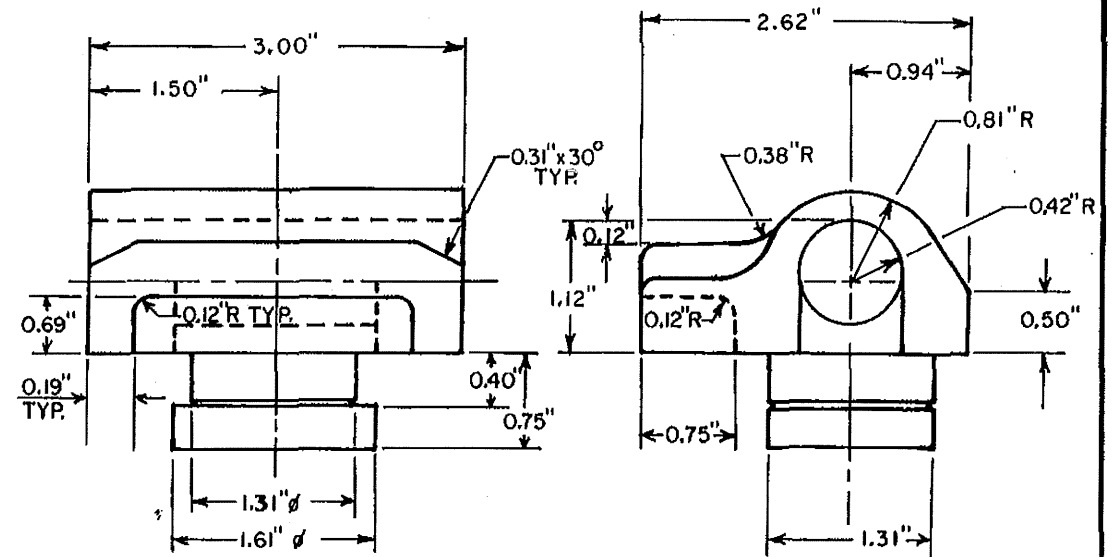
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2326
			Oct. 28, 1992 ISSUE DATE
FROG TIE PLATES RAILBOUND MANGANESE FROG		ISSUE NO. (2)	
John B. Ray ENGINEERING OFFICER		[Signature] CHIEF ENGINEERING OFFICER	



NORMAL FROG PLATE



REVERSE FROG PLATE



Note: Unspecified radii
to be 0.06\" max.

SWIVEL SHOULDER INSERT

NOTES:

1. Plates shown are manufactured by PANDROL, INC.
2. Material shall be Low-Carbon Steel and the plates shall conform to current A.R.E.A. specifications.
3. Furnish plates with 15/16\" diameter holes for screw lags.
4. Tie plates shall be branded with a letter to designate the manufacturer, the letter 'R' when the plate is reverse shoulder, two numbers indicating the length (27\", 31\" or 35\"), and the last two digits of the year manufactured.



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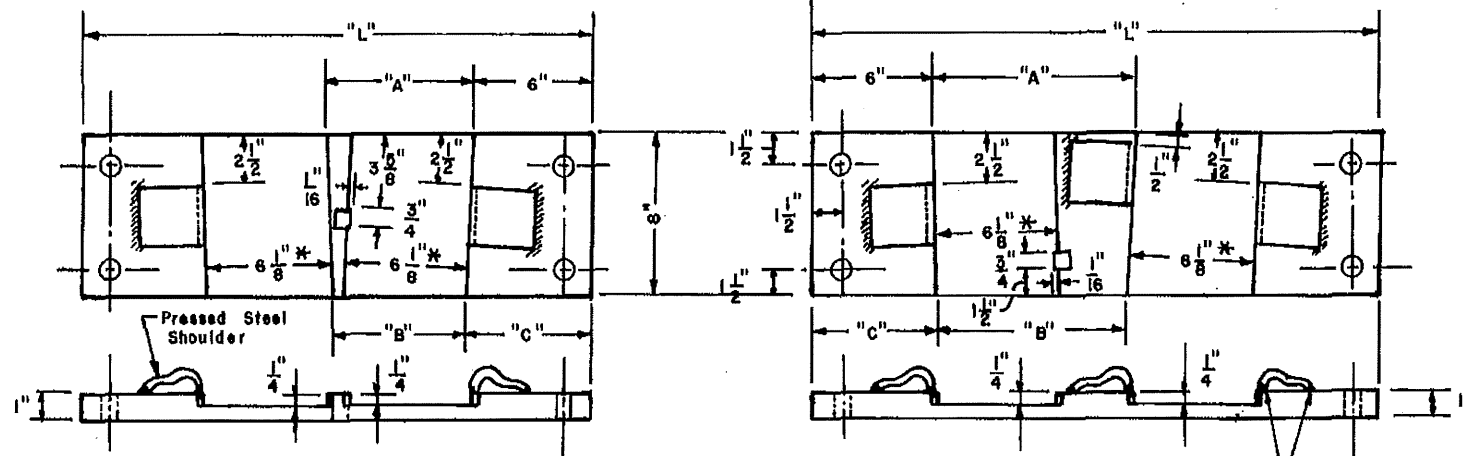
DWG.
NO. 2328

Jan. 5, 1996

ISSUE DATE ISSUE NO.

**SELF-ALIGNING
SHOULDER TIE PLATES**

John D. Ray
SECTION CHIEF

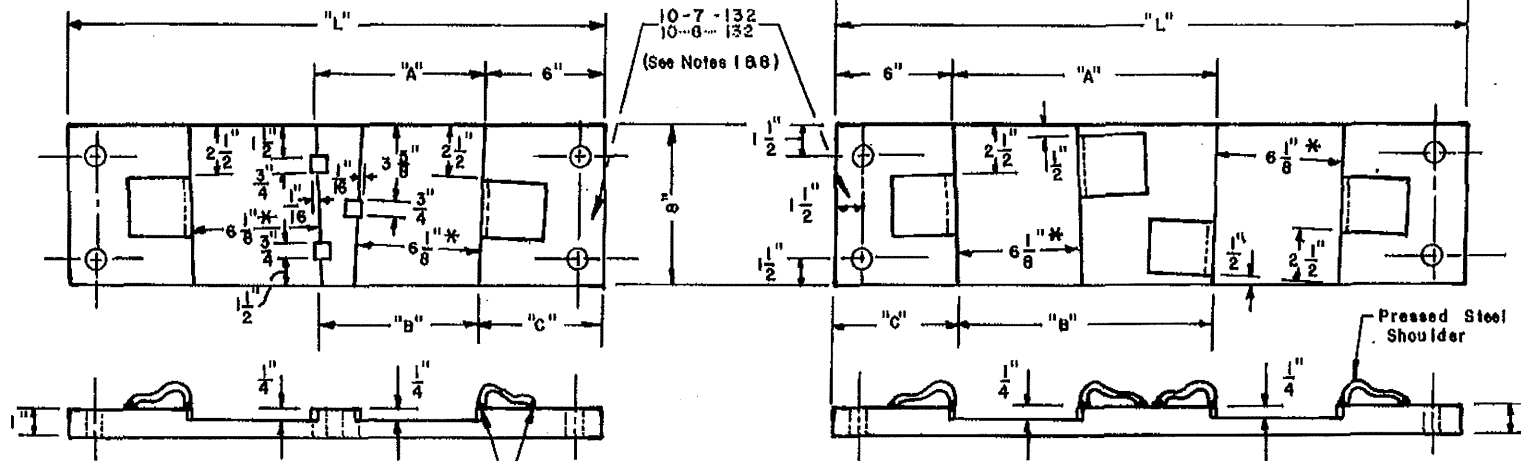


PLATES 8-2, 10-2, 15-2 & 20-2
(2 PER TURNOUT)

Mark Plate Designation on Alternate
Ends of Plates so that it will always
be on the Field Side

PLATE 8-6
PLATE 10-6
PLATES 15-6 & 15-7
PLATES 20-9 & 20-10
(2 PER TURNOUT)

Welds (Typ.)
See Note 5



PLATES 8-3 TO 8-5
PLATES 10-3 TO 10-5
PLATES 15-3 TO 15-5
PLATES 20-3 TO 20-8
(2 PER TURNOUT)

Welds (Typ.)
See Note 5

PLATES 8-7 TO 8-11
PLATES 10-7 TO 10-12
PLATES 15-8 TO 15-14
PLATES 20-11 TO 20-21
(2 PER TURNOUT)

Pressed Steel
Shoulder

* $6\frac{1}{8}$ " for 132 RE rail, $5\frac{5}{8}$ " for 115 RE rail.

NOTES:

1. First number in plate designation is turnout frog number, second is number of ties from heel block which counts as one.
2. Switch plates shall conform to current AREA specifications, Low-Carbon Steel Tie Plates with Copper.
3. Round holes for plate holding screw lugs are $15/16$ " dia.
4. Rectangular holes for track spikes are $3/4$ " x $13/16$ " with $1/16$ " under the rail base.
5. Welds shall not interfere with the application of the resilient fasteners. Welds shall be full penetration groove welds.
6. Plates shown are for a graduated riser turnout only.
7. Variable dimensions A, B, C & L are shown on the following plan (No. 2341).
8. Each plate shall be marked with deeply cut characters not less than $\frac{1}{2}$ " high, in the positions indicated on this plan.



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DWG.
NO. 2340.
Oct. 28, 1992
ISSUE DATE
ISSUE NO. 2

RESILIENTLY FASTENED TURNOUT PLATES

NUMBER 8, 10, 15, 20 TURNOUTS
FOR USE BEHIND HEEL OF SWITCH WITH GRADUATED
RISERS

John D. Ray
ENGINEERING OFFICER

W. A. M. M. M.
CHIEF ENGINEERING OFFICER

NO. 8 TURNOUT				
Plate No.	A	B	C	L
8-2	7 $\frac{5}{16}$ "	7 $\frac{1}{32}$ "	6 $\frac{1}{8}$ "	25 $\frac{1}{2}$ "
8-3	7 $\frac{31}{32}$ "	7 $\frac{11}{16}$ "	6 $\frac{1}{8}$ "	26 "
8-4	8 $\frac{21}{32}$ "	8 $\frac{3}{8}$ "	6 $\frac{5}{32}$ "	27 "
8-5	9 $\frac{15}{32}$ "	9 $\frac{1}{8}$ "	6 $\frac{5}{32}$ "	27 $\frac{1}{2}$ "
8-6	10 $\frac{5}{16}$ "	9 $\frac{31}{32}$ "	6 $\frac{3}{16}$ "	29 "
8-7	11 $\frac{1}{4}$ "	10 $\frac{7}{8}$ "	6 $\frac{3}{16}$ "	29 $\frac{1}{2}$ "
8-8	12 $\frac{1}{4}$ "	11 $\frac{27}{32}$ "	6 $\frac{3}{16}$ "	30 $\frac{1}{2}$ "
8-9	13 $\frac{5}{16}$ "	12 $\frac{7}{8}$ "	6 $\frac{7}{32}$ "	31 $\frac{1}{2}$ "
8-10	14 $\frac{15}{32}$ "	14 "	6 $\frac{7}{32}$ "	32 $\frac{1}{2}$ "
8-11	15 $\frac{11}{16}$ "	15 $\frac{3}{16}$ "	6 $\frac{1}{4}$ "	34 "

NO. 10 TURNOUT				
Plate No.	A	B	C	L
10-2	7 $\frac{5}{16}$ "	7 $\frac{1}{16}$ "	6 $\frac{1}{8}$ "	25 $\frac{1}{2}$ "
10-3	7 $\frac{15}{16}$ "	7 $\frac{11}{16}$ "	6 $\frac{1}{8}$ "	26 "
10-4	8 $\frac{5}{8}$ "	8 $\frac{11}{32}$ "	6 $\frac{1}{8}$ "	27 "
10-5	9 $\frac{11}{32}$ "	9 $\frac{1}{32}$ "	6 $\frac{5}{32}$ "	27 $\frac{1}{2}$ "
10-6	10 $\frac{3}{32}$ "	9 $\frac{25}{32}$ "	6 $\frac{5}{32}$ "	28 $\frac{1}{2}$ "
10-7	10 $\frac{29}{32}$ "	10 $\frac{9}{16}$ "	6 $\frac{5}{32}$ "	29 "
10-8	11 $\frac{25}{32}$ "	11 $\frac{13}{32}$ "	6 $\frac{3}{16}$ "	30 "
10-9	12 $\frac{21}{32}$ "	12 $\frac{9}{32}$ "	6 $\frac{3}{16}$ "	31 "
10-10	13 $\frac{5}{8}$ "	13 $\frac{7}{32}$ "	6 $\frac{3}{16}$ "	32 "
10-11	14 $\frac{19}{32}$ "	14 $\frac{3}{16}$ "	6 $\frac{3}{16}$ "	33 "
10-12	15 $\frac{5}{8}$ "	15 $\frac{7}{32}$ "	6 $\frac{7}{32}$ "	33 $\frac{1}{2}$ "

NO. 15 TURNOUT				
Plate No.	A	B	C	L
15-2	7 $\frac{7}{32}$ "	6 $\frac{31}{32}$ "	6 $\frac{1}{8}$ "	25 $\frac{1}{2}$ "
15-3	7 $\frac{25}{32}$ "	7 $\frac{9}{16}$ "	6 $\frac{1}{8}$ "	26 "
15-4	8 $\frac{3}{8}$ "	8 $\frac{5}{32}$ "	6 $\frac{1}{8}$ "	26 $\frac{1}{2}$ "
15-5	9 "	8 $\frac{3}{4}$ "	6 $\frac{1}{8}$ "	27 "
15-6	9 $\frac{5}{8}$ "	9 $\frac{3}{8}$ "	6 $\frac{1}{8}$ "	28 "
15-7	10 $\frac{5}{16}$ "	10 $\frac{1}{32}$ "	6 $\frac{1}{8}$ "	28 $\frac{1}{2}$ "
15-8	10 $\frac{31}{32}$ "	10 $\frac{11}{16}$ "	6 $\frac{1}{8}$ "	29 "
15-9	11 $\frac{21}{32}$ "	11 $\frac{3}{8}$ "	6 $\frac{1}{8}$ "	30 "
15-10	12 $\frac{3}{8}$ "	12 $\frac{1}{16}$ "	6 $\frac{5}{32}$ "	30 $\frac{1}{2}$ "
15-11	13 $\frac{3}{32}$ "	12 $\frac{25}{32}$ "	6 $\frac{5}{32}$ "	31 $\frac{1}{2}$ "
15-12	13 $\frac{27}{32}$ "	13 $\frac{17}{32}$ "	6 $\frac{5}{32}$ "	32 "
15-13	14 $\frac{19}{32}$ "	14 $\frac{9}{32}$ "	6 $\frac{5}{32}$ "	33 "
15-14	15 $\frac{3}{8}$ "	15 $\frac{1}{16}$ "	6 $\frac{5}{32}$ "	33 $\frac{1}{2}$ "

NO. 20 TURNOUT				
Plate No.	A	B	C	L
20-2	6 $\frac{29}{32}$ "	6 $\frac{3}{4}$ "	6 $\frac{3}{32}$ "	25 "
20-3	7 $\frac{5}{16}$ "	7 $\frac{5}{32}$ "	6 $\frac{3}{32}$ "	25 $\frac{1}{2}$ "
20-4	7 $\frac{23}{32}$ "	7 $\frac{9}{16}$ "	6 $\frac{3}{32}$ "	26 "
20-5	8 $\frac{1}{8}$ "	7 $\frac{31}{32}$ "	6 $\frac{3}{32}$ "	26 $\frac{1}{2}$ "
20-6	8 $\frac{9}{16}$ "	8 $\frac{3}{8}$ "	6 $\frac{3}{32}$ "	27 "
20-7	9 "	8 $\frac{13}{16}$ "	6 $\frac{3}{32}$ "	27 $\frac{1}{2}$ "
20-8	9 $\frac{7}{16}$ "	9 $\frac{1}{4}$ "	6 $\frac{3}{32}$ "	27 $\frac{1}{2}$ "
20-9	9 $\frac{29}{32}$ "	9 $\frac{23}{32}$ "	6 $\frac{3}{32}$ "	28 "
20-10	10 $\frac{3}{8}$ "	10 $\frac{5}{32}$ "	6 $\frac{3}{32}$ "	28 $\frac{1}{2}$ "
20-11	10 $\frac{27}{32}$ "	10 $\frac{5}{8}$ "	6 $\frac{3}{32}$ "	29 "
20-12	11 $\frac{5}{16}$ "	11 $\frac{1}{8}$ "	6 $\frac{3}{32}$ "	29 $\frac{1}{2}$ "
20-13	11 $\frac{13}{16}$ "	11 $\frac{19}{32}$ "	6 $\frac{3}{32}$ "	30 "
20-14	12 $\frac{5}{16}$ "	12 $\frac{3}{32}$ "	6 $\frac{3}{32}$ "	30 $\frac{1}{2}$ "
20-15	12 $\frac{13}{16}$ "	12 $\frac{5}{8}$ "	6 $\frac{3}{32}$ "	31 "
20-16	13 $\frac{1}{32}$ "	13 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	31 $\frac{1}{2}$ "
20-17	13 $\frac{7}{8}$ "	13 $\frac{21}{32}$ "	6 $\frac{1}{8}$ "	32 "
20-18	14 $\frac{7}{16}$ "	14 $\frac{3}{16}$ "	6 $\frac{1}{8}$ "	32 $\frac{1}{2}$ "
20-19	14 $\frac{31}{32}$ "	14 $\frac{3}{4}$ "	6 $\frac{1}{8}$ "	33 $\frac{1}{2}$ "
20-20	15 $\frac{9}{16}$ "	15 $\frac{5}{16}$ "	6 $\frac{1}{8}$ "	34 "
20-21	16 $\frac{1}{32}$ "	15 $\frac{3}{4}$ "	6 $\frac{1}{8}$ "	34 $\frac{1}{2}$ "

NOTES

1—See previous plan (No. 2340-1) for diagram showing the location of dimensions A, B, C, & L.

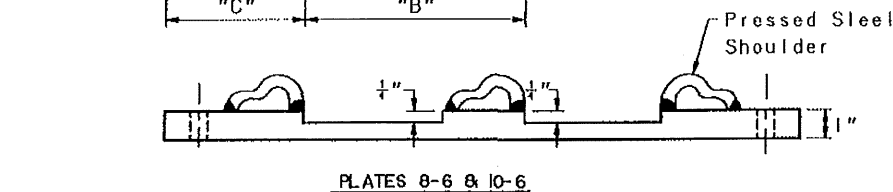
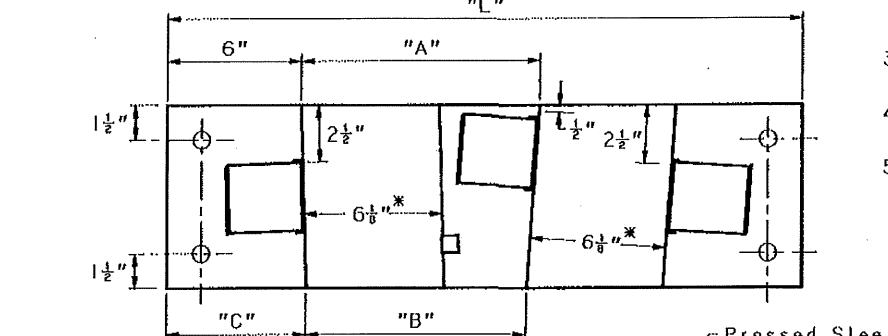
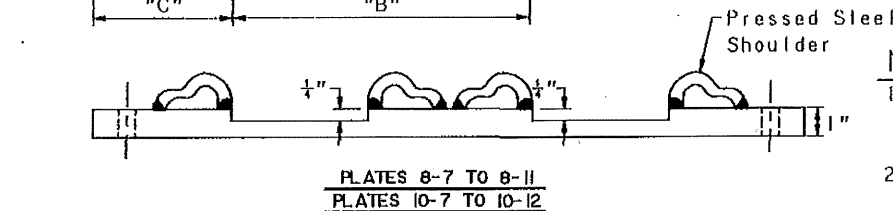
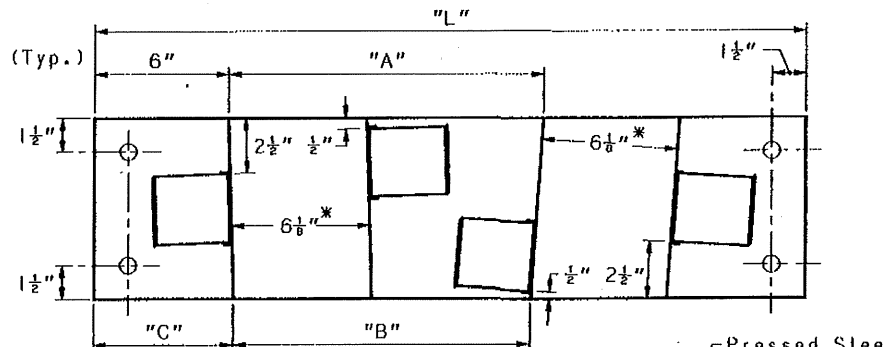
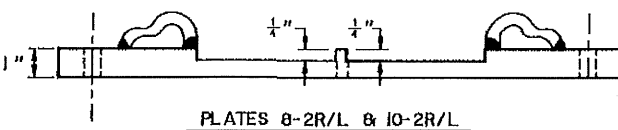
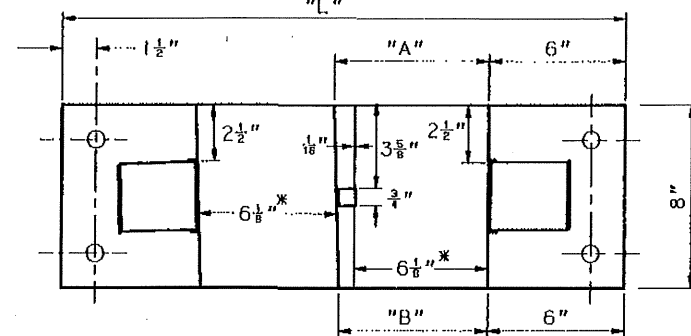
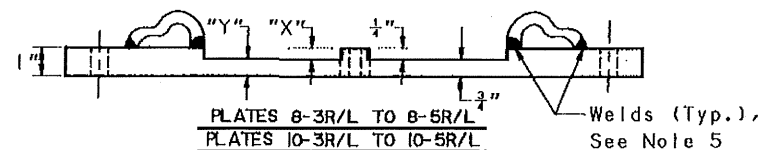
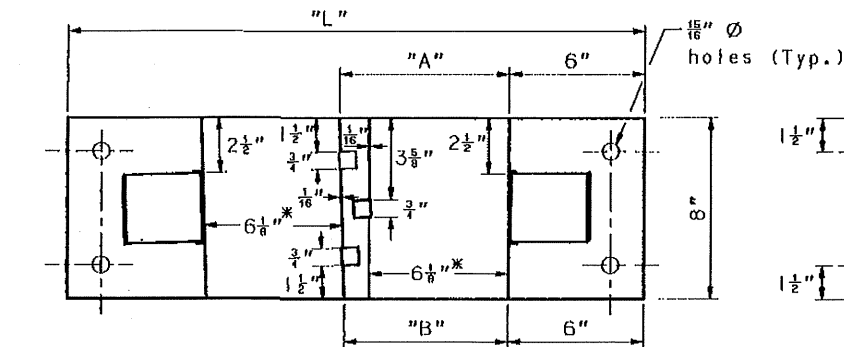
2—Dimensions shown are only for tie spacings shown on corresponding Tie and Rail Layout Plans.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	OWG. NO. 2341
		Oct. 28, 1992 ISSUE DATE
TABLE OF DIMENSIONS FOR RESILIENTLY FASTENED TURNOUT PLATES		
<i>Julie D. Roy</i> ENGINEERING OFFICER	<i>William R. Kelly</i> CHIEF ENGINEERING OFFICER	

PLATE No.	A	B	X	Y	L
8-2 R/L	7 $\frac{15}{32}$ "	7 $\frac{7}{32}$ "	$\frac{1}{16}$ "	$\frac{15}{16}$ "	25 $\frac{1}{2}$ "
8-3 R/L	8 $\frac{5}{32}$ "	7 $\frac{7}{8}$ "	$\frac{1}{8}$ "	$\frac{7}{8}$ "	26 $\frac{1}{2}$ "
8-4 R/L	8 $\frac{15}{16}$ "	8 $\frac{5}{8}$ "	$\frac{3}{16}$ "	$\frac{13}{16}$ "	27"
8-5 R/L	9 $\frac{13}{16}$ "	9 $\frac{15}{32}$ "	$\frac{1}{4}$ "	$\frac{3}{4}$ "	28"
10-2 R/L	7 $\frac{11}{32}$ "	7 $\frac{3}{32}$ "	$\frac{1}{16}$ "	$\frac{15}{16}$ "	25 $\frac{1}{2}$ "
10-3 R/L	7 $\frac{31}{32}$ "	7 $\frac{3}{4}$ "	$\frac{1}{8}$ "	$\frac{7}{8}$ "	26"
10-4 R/L	8 $\frac{3}{4}$ "	8 $\frac{15}{32}$ "	$\frac{3}{16}$ "	$\frac{13}{16}$ "	27"
10-5 R/L	9 $\frac{13}{32}$ "	9 $\frac{1}{4}$ "	$\frac{1}{4}$ "	$\frac{3}{4}$ "	28"

PLATE No.	A	B	C	L
8-6	10 $\frac{3}{4}$ "	9 $\frac{31}{32}$ "	6 $\frac{3}{16}$ "	29"
8-7	11 $\frac{3}{4}$ "	11 $\frac{11}{32}$ "	6 $\frac{3}{16}$ "	30"
8-8	12 $\frac{27}{32}$ "	12 $\frac{7}{16}$ "	6 $\frac{3}{16}$ "	31"
8-9	14 $\frac{1}{32}$ "	13 $\frac{9}{16}$ "	6 $\frac{3}{16}$ "	32 $\frac{1}{2}$ "
8-10	15 $\frac{9}{32}$ "	14 $\frac{25}{32}$ "	6 $\frac{1}{4}$ "	33 $\frac{1}{2}$ "
8-11	16 $\frac{7}{16}$ "	16 $\frac{3}{32}$ "	6 $\frac{1}{4}$ "	35"
10-6	10 $\frac{3}{8}$ "	10 $\frac{1}{16}$ "	6 $\frac{3}{16}$ "	29"
10-7	11 $\frac{9}{32}$ "	10 $\frac{15}{16}$ "	6 $\frac{3}{16}$ "	29 $\frac{1}{2}$ "
10-8	12 $\frac{7}{32}$ "	11 $\frac{27}{32}$ "	6 $\frac{3}{16}$ "	30 $\frac{1}{2}$ "
10-9	13 $\frac{9}{32}$ "	12 $\frac{13}{16}$ "	6 $\frac{3}{16}$ "	31 $\frac{1}{2}$ "
10-10	14 $\frac{1}{4}$ "	13 $\frac{27}{32}$ "	6 $\frac{3}{16}$ "	32 $\frac{1}{2}$ "
10-11	15 $\frac{11}{32}$ "	14 $\frac{15}{16}$ "	6 $\frac{3}{16}$ "	33 $\frac{1}{2}$ "
10-12	16 $\frac{1}{2}$ "	16 $\frac{1}{16}$ "	6 $\frac{3}{16}$ "	35"

* 6 $\frac{1}{8}$ " for 132 & 136 RE Rail, 5 $\frac{5}{8}$ " for 115 RE Rail.



Notes:

- Plates 8-2R/L to 8-5R/L and 10-2R/L to 10-5R/L have a "hand" and must be fabricated for either a LH or RH turnout.
- Each plate shall be marked with deeply cut characters not less than $\frac{1}{2}$ " high. First number is turnout frog number, second is number of ties from heel block plates which count as one.
- Switch plates shall conform to A.R.E.A. specifications for low carbon steel plates with copper.
- Rectangular holes for track spikes are $\frac{3}{4}$ " x $\frac{13}{16}$ " with $\frac{1}{16}$ " under the base of rail.
- Welds shall be made so as not to interfere with resilient fasteners. Welds shall be full penetration groove welds.



RAILROAD
OPERATIONS

DWG. NO. 2342
JAN. 5, 1996
ISSUE DATE
ISSUE NO. 2

RESILIENTLY FASTENED TURNOUT PLATES
NO. 8 & 10 FLOATING HEEL BLOCK TURNOUTS

John D. Ray

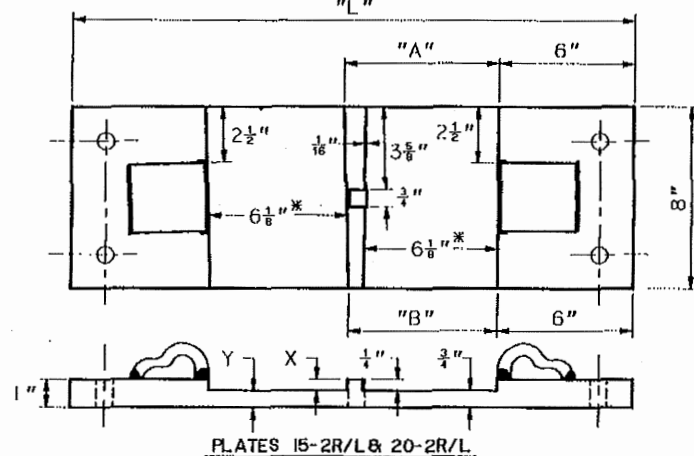
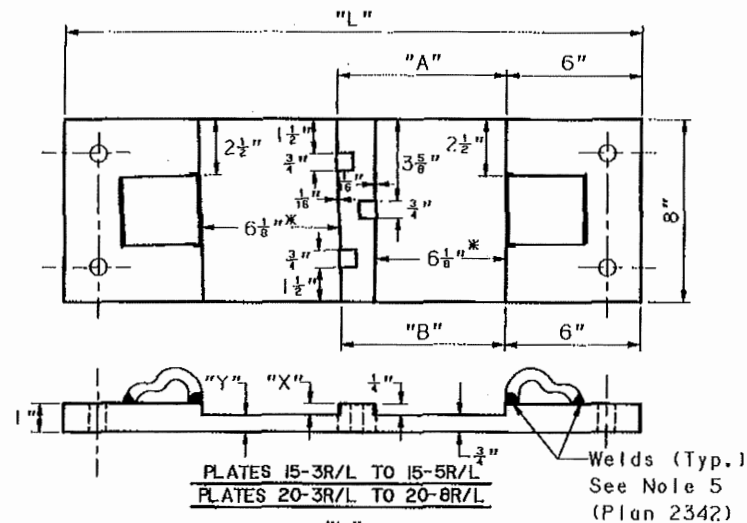
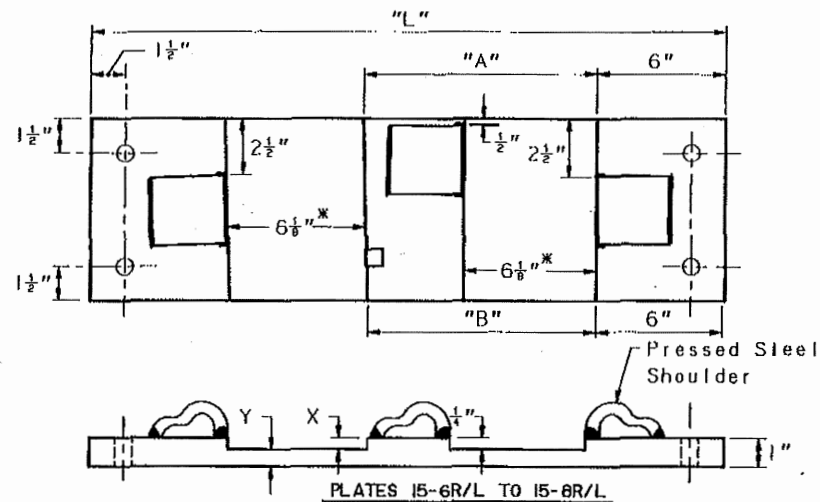
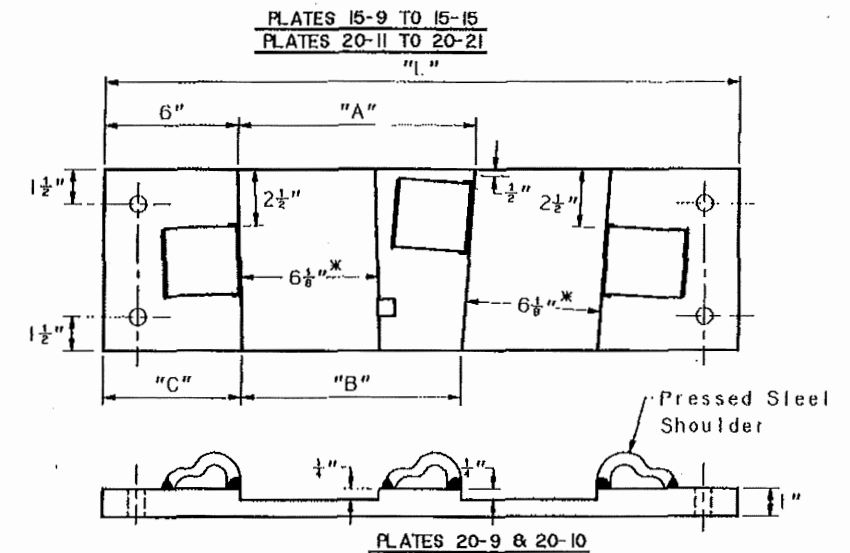
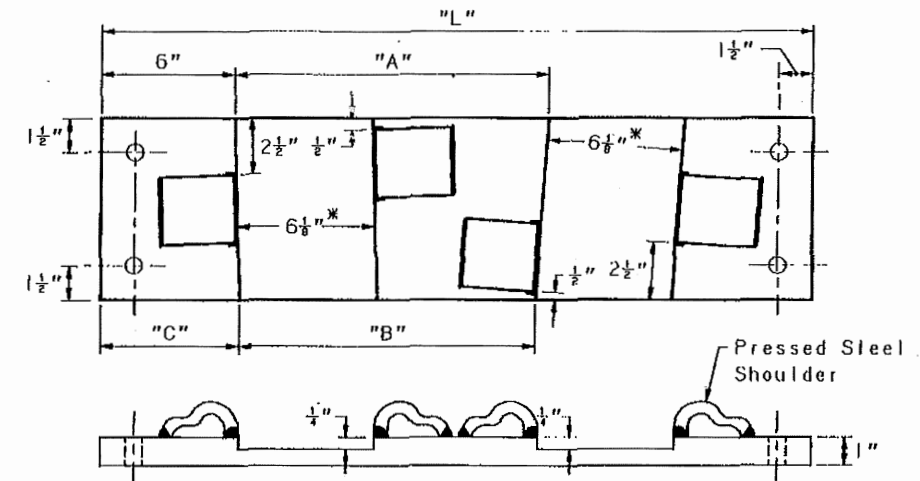


PLATE No.	A	B	X	Y	L
15-2 R/L	7 $\frac{3}{16}$ "	6 $\frac{31}{32}$ "	1 $\frac{1}{32}$ "	31 $\frac{1}{32}$ "	25 $\frac{1}{2}$ "
15-3 R/L	7 $\frac{3}{4}$ "	7 $\frac{17}{32}$ "	1 $\frac{1}{16}$ "	15 $\frac{1}{16}$ "	26"
15-4 R/L	8 $\frac{3}{8}$ "	8 $\frac{1}{8}$ "	3 $\frac{3}{32}$ "	29 $\frac{3}{32}$ "	26 $\frac{1}{2}$ "
15-5 R/L	8 $\frac{31}{32}$ "	8 $\frac{23}{32}$ "	1 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	27 $\frac{1}{2}$ "
15-6 R/L	9 $\frac{5}{8}$ "	9 $\frac{11}{32}$ "	5 $\frac{5}{32}$ "	27 $\frac{1}{32}$ "	28"
15-7 R/L	10 $\frac{1}{4}$ "	10"	3 $\frac{1}{16}$ "	13 $\frac{1}{16}$ "	28 $\frac{1}{2}$ "
15-8 R/L	10 $\frac{13}{16}$ "	10 $\frac{21}{32}$ "	7 $\frac{1}{32}$ "	25 $\frac{1}{32}$ "	29"
20-2 R/L	6 $\frac{15}{16}$ "	6 $\frac{25}{32}$ "	1 $\frac{1}{32}$ "	31 $\frac{1}{32}$ "	25 $\frac{1}{2}$ "
20-3 R/L	7 $\frac{11}{32}$ "	7 $\frac{3}{16}$ "	1 $\frac{1}{16}$ "	15 $\frac{1}{16}$ "	26"
20-4 R/L	7 $\frac{25}{32}$ "	7 $\frac{5}{8}$ "	3 $\frac{3}{32}$ "	29 $\frac{3}{32}$ "	26 $\frac{1}{2}$ "
20-5 R/L	8 $\frac{7}{32}$ "	8 $\frac{1}{16}$ "	1 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	27"
20-6 R/L	8 $\frac{11}{16}$ "	8 $\frac{1}{2}$ "	5 $\frac{5}{32}$ "	27 $\frac{1}{32}$ "	27 $\frac{1}{2}$ "
20-7 R/L	9 $\frac{1}{8}$ "	8 $\frac{15}{16}$ "	3 $\frac{1}{16}$ "	13 $\frac{1}{16}$ "	27 $\frac{1}{2}$ "
20-8 R/L	9 $\frac{19}{32}$ "	9 $\frac{13}{32}$ "	7 $\frac{1}{32}$ "	25 $\frac{1}{32}$ "	28"

PLATE No.	A	B	C	L
15-9	11 $\frac{5}{8}$ "	11 $\frac{11}{32}$ "	6 $\frac{1}{8}$ "	30"
15-10	12 $\frac{11}{32}$ "	12 $\frac{1}{16}$ "	6 $\frac{5}{32}$ "	30 $\frac{1}{2}$ "
15-11	13 $\frac{3}{32}$ "	12 $\frac{13}{16}$ "	6 $\frac{5}{32}$ "	31 $\frac{1}{2}$ "
15-12	13 $\frac{27}{32}$ "	13 $\frac{9}{16}$ "	6 $\frac{5}{32}$ "	32"
15-13	14 $\frac{5}{8}$ "	14 $\frac{5}{16}$ "	6 $\frac{5}{32}$ "	33"
15-14	15 $\frac{7}{16}$ "	14 $\frac{25}{32}$ "	6 $\frac{5}{32}$ "	34"
15-15	16 $\frac{1}{4}$ "	15 $\frac{15}{16}$ "	6 $\frac{3}{16}$ "	34 $\frac{1}{2}$ "
20-9	10 $\frac{3}{32}$ "	9 $\frac{29}{32}$ "	6 $\frac{3}{32}$ "	28 $\frac{1}{2}$ "
20-10	10 $\frac{19}{32}$ "	10 $\frac{3}{8}$ "	6 $\frac{3}{32}$ "	29"
20-11	11 $\frac{3}{32}$ "	10 $\frac{7}{8}$ "	6 $\frac{3}{32}$ "	29 $\frac{1}{2}$ "
20-12	11 $\frac{19}{32}$ "	11 $\frac{13}{32}$ "	6 $\frac{3}{32}$ "	30"
20-13	12 $\frac{1}{8}$ "	11 $\frac{29}{32}$ "	6 $\frac{3}{32}$ "	30 $\frac{1}{2}$ "
20-14	12 $\frac{21}{32}$ "	12 $\frac{7}{16}$ "	6 $\frac{3}{32}$ "	31"
20-15	13 $\frac{3}{16}$ "	13"	6 $\frac{3}{32}$ "	31 $\frac{1}{2}$ "
20-16	13 $\frac{25}{32}$ "	13 $\frac{9}{16}$ "	6 $\frac{1}{8}$ "	32"
20-17	14 $\frac{3}{8}$ "	14 $\frac{1}{8}$ "	6 $\frac{1}{8}$ "	32 $\frac{1}{2}$ "
20-18	14 $\frac{15}{16}$ "	14 $\frac{25}{32}$ "	6 $\frac{1}{8}$ "	33"
20-19	15 $\frac{1}{2}$ "	15 $\frac{9}{32}$ "	6 $\frac{1}{8}$ "	34"
20-20	16 $\frac{3}{32}$ "	15 $\frac{27}{32}$ "	6 $\frac{1}{8}$ "	34 $\frac{1}{2}$ "
20-21	16 $\frac{11}{16}$ "	16 $\frac{7}{16}$ "	6 $\frac{1}{8}$ "	35"

Notes:

- Plates 15-2R/L to 15-8R/L and 20-2R/L to 20-8R/L have a "hand" and must be fabricated for either a LH or RH turnout.
 - For additional notes, see Plan 2342.
- * 6 $\frac{1}{8}$ " for 132 & 136 RE Rail, 5 $\frac{5}{8}$ " for 115 RE Rail.



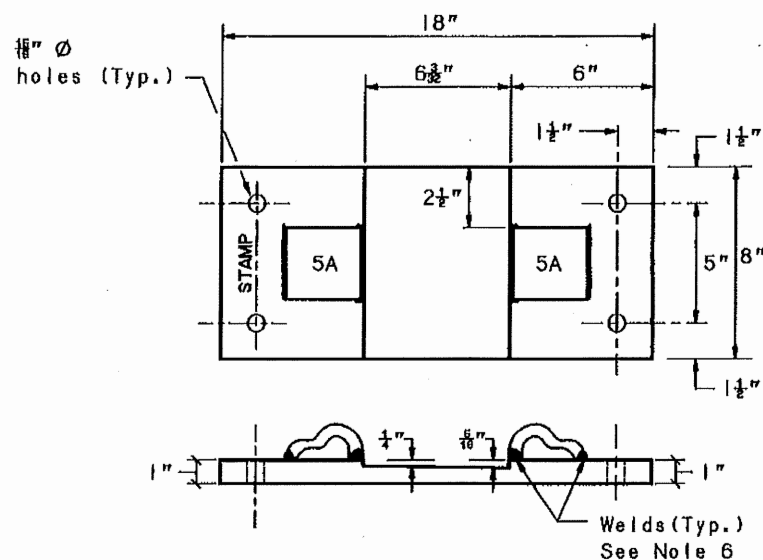
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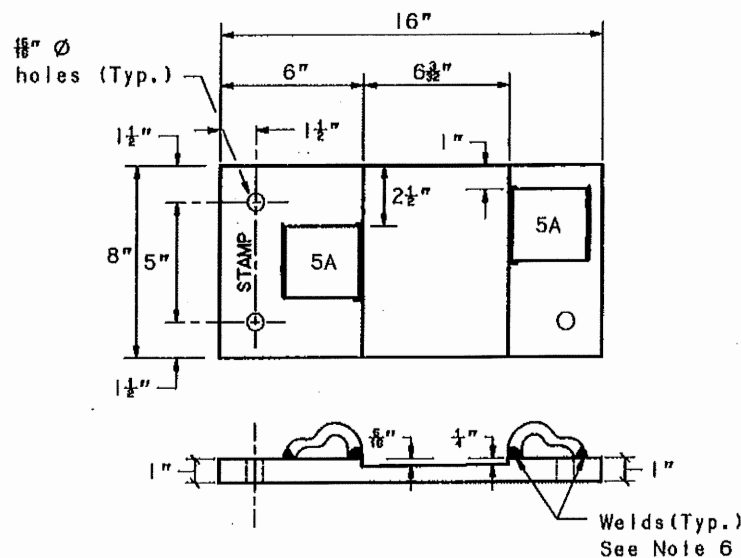
DWG. NO. 2343
JAN. 5, 1996
ISSUE DATE
ISSUE NO. 2

RESILIENTLY FASTENED TURNOUT PLATES
NO. 15 & 20 FLOATING HEEL BLOCK TURNOUTS

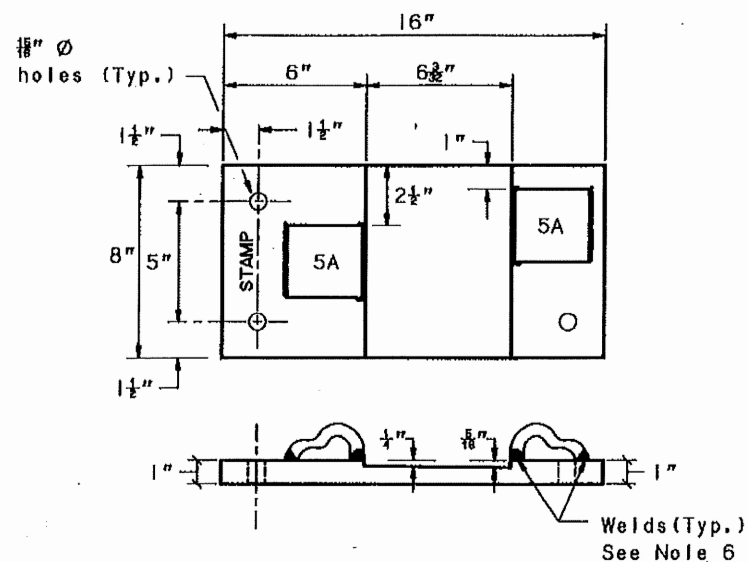
John D. Ray
SECTION CHIEF



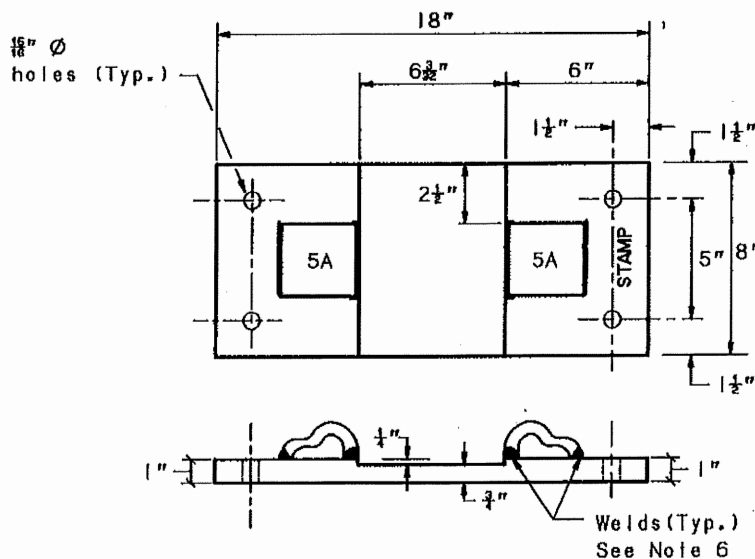
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TRANSITION PLATE #TR-2 ~ CANTED 1:80



TRANSITION PLATE #TR-1 ~ CANTED 1:80

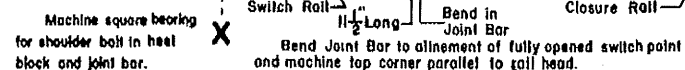


FLAT PLATE #FP

Notes:

1. All plate holding spike holes 1/8" dia.
2. All Pandrol Shoulders Type 2172-5.
3. Rail seal must be free of weld, slag and spatter.
4. Stamp each plate with its pl. no., 132RE where indicated.
5. Stamp turnout plates on alternate ends of plates so that the mark will always be on the field side.
6. Welds shall be full penetration groove welds on shoulder and full penetration fillet welds on stops. (3/8")
7. FP Plates to be used where rail joint falls in transition area.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2348	① ISSUE NO.
		JAN. 5, 1996 ISSUE DATE	
SPECIAL FLAT AND TRANSITION CANTED PLATES			
SECTION CHIEF			



CAST STEEL, CLASS B-HARD OR DUCTILE IRON)



Portion to be cut off to provide $\frac{3}{16}$ " clearance with electric switch heater supports.

1 5/8"

1"

7"

5"

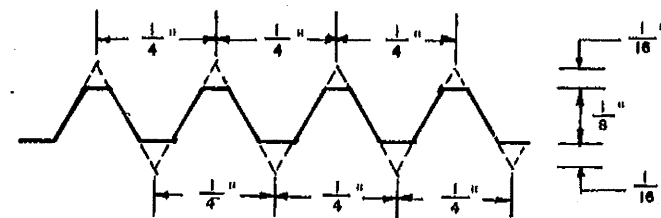
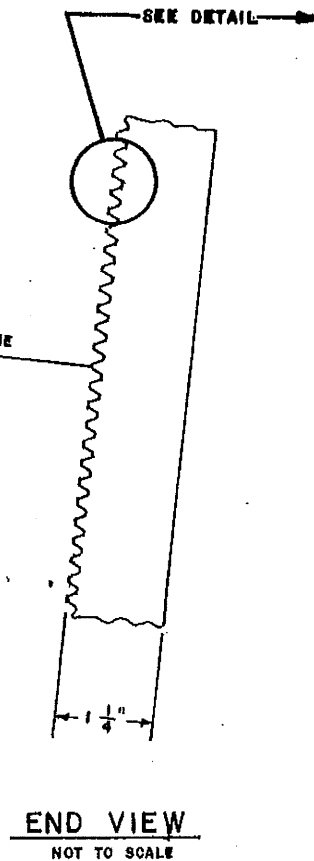
1"

13 1/16" dia.

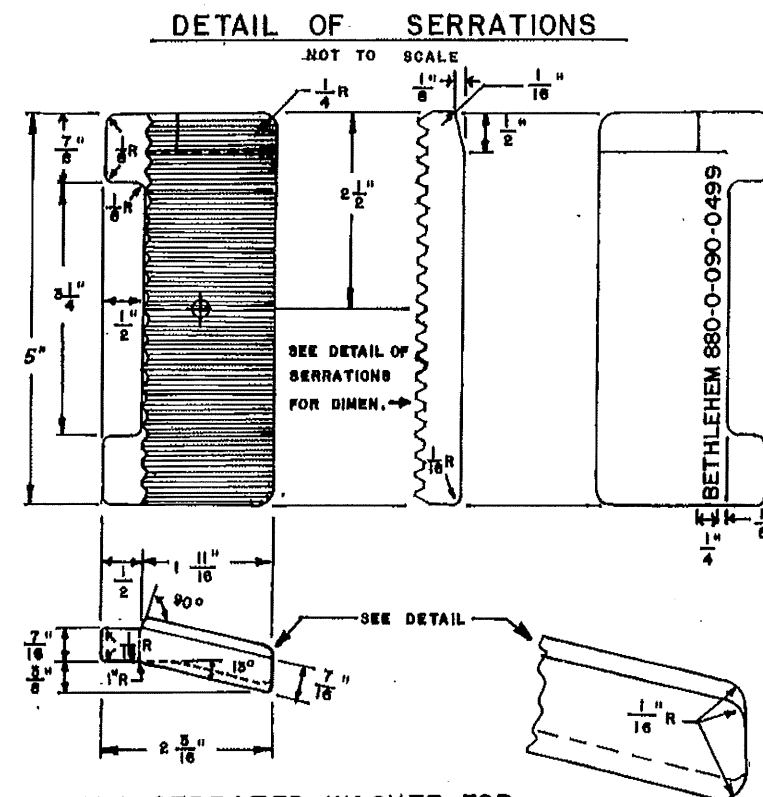
2 1/2"

SWITCH RAIL STOP

 MASSACHUSETTS DAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2350
		Oc1. 28, 1992 ISSUE DATE
HEEL BLOCK AND SWITCH RAIL STOP		(2) ISSUE NO.
11', 16'-6", 26' & 39' SWITCHES - 115 R.E. & 132 R.E. RAIL		
<i>John D. Ray</i> ENGINEERING OFFICER	<i>W. A. Hall</i> CHIEF ENGINEERING OFFICER	

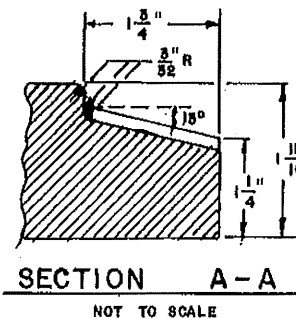


M A T E R I A L
D.I. * DUCTILE
IRON
M.I. * MALEABLE
IRON



M.I. SERRATED WASHER FOR
PLATE BASE

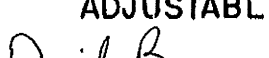
**THIS BRACE IS A PATENTED DESIGN
OF BETHLEHEM STEEL CORP.**



	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2352
			ISSUE DATE 6-5-87



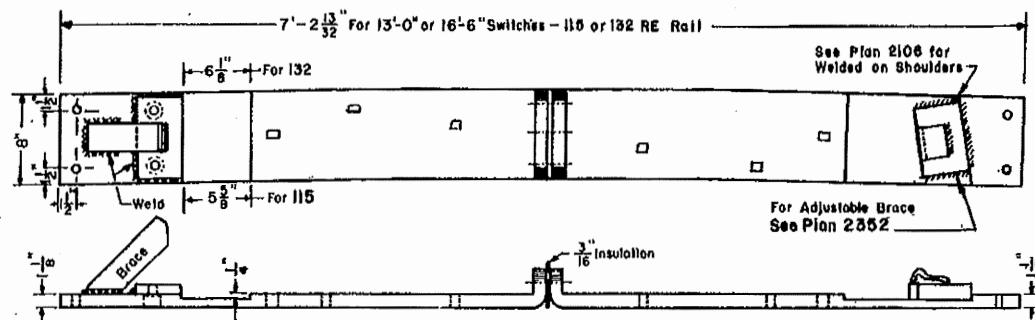
RESILIENTLY FASTENED ADJUSTABLE RAIL BRACE



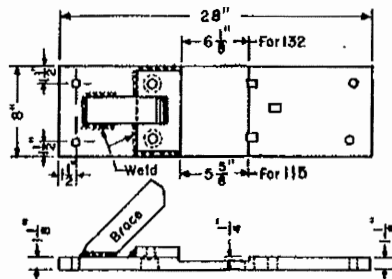
ENGINEERING OFFICER



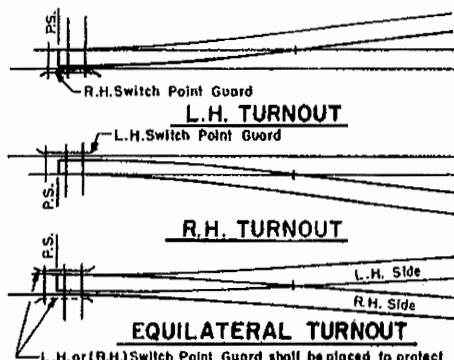
CHIEF ENGINEERING OFFICER



GAGE PLATE "IG"-INSULATED

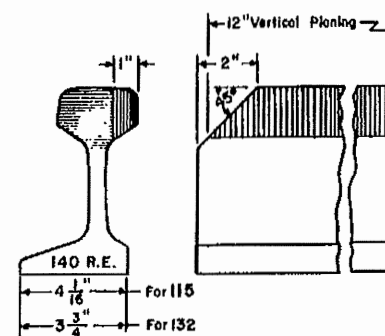


SLIDE PLATE "SP"



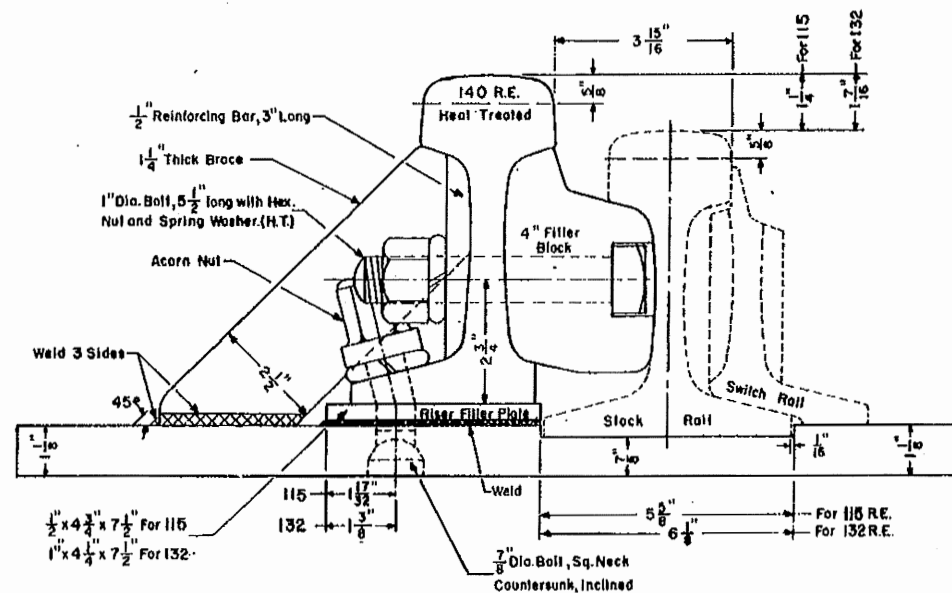
NOTE: All switch point guards are located to protect the diverging point.

SWITCH POINT GUARD DESIGNATIONS

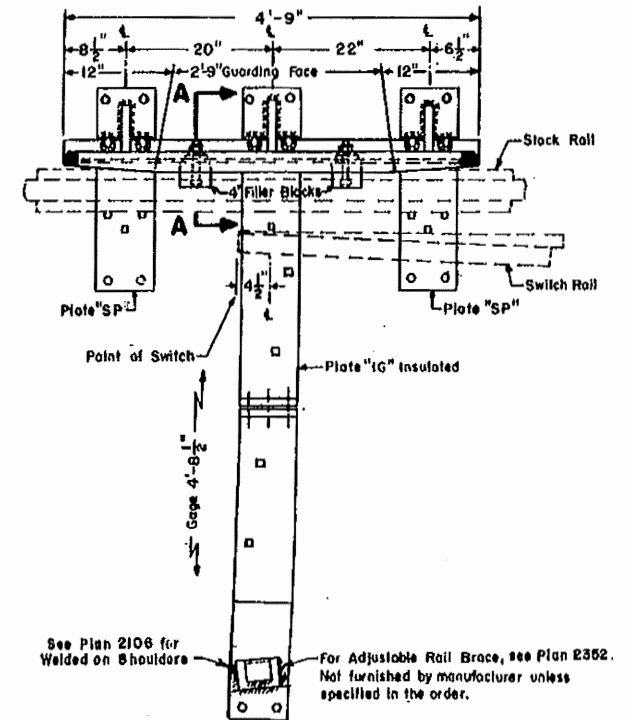


PLANING OF GUARD ENDS

Manufactured By Pettibone-Ohio
(Formerly Cleveland Frog & Crossing Co.)



SECTION A-A (TYPICAL)



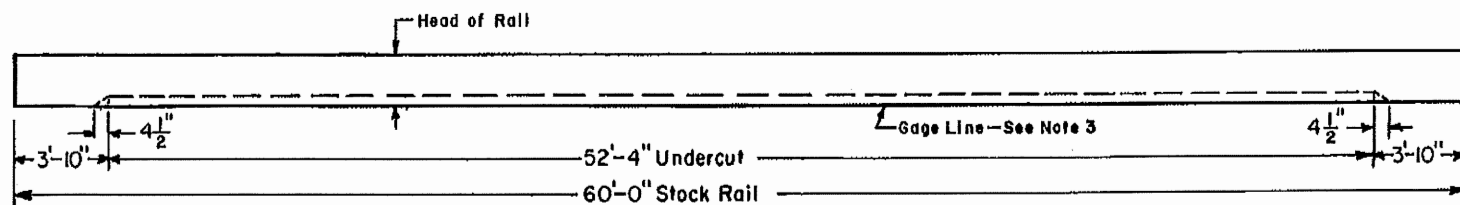
PLAN

R.H. Turnout As Shown

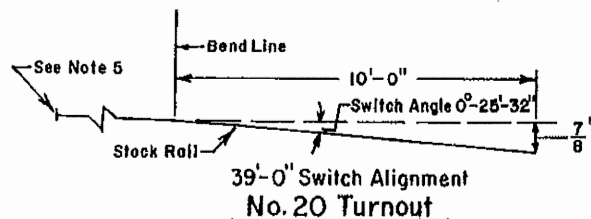
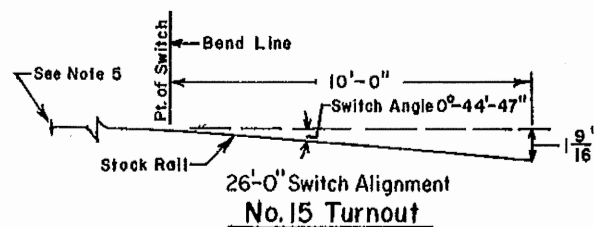
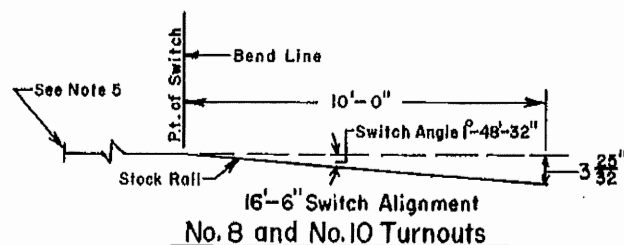
NOTES

- 1 - All plates to be open hearth mild steel
- 2 - All guard rails heat treated and oil quenched to a Brinell Hardness of 321 to 375.
- 3 - All plates to be stamped with plate designation and rail section. The gage plate to be also stamped with hand and length of switch rail.
- 4 - When a non-insulated gage plate is required, the gage plate shall be furnished solid.
- 5 - When ordering switch point guard specify weight of rail, length of switch rail and hand.
- 6 - All plate holding screw lag holes shall be 15/16" dia. to accommodate 7/8" screw lags.

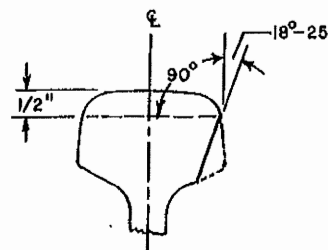
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2356
			Oct. 28, 1992 ISSUE DATE
SWITCH POINT GUARD FOR 11' or 16'-6" SWITCHES - 115 or 132 RAIL			
<i>John D. Ray</i> ENGINEERING OFFICER		<i>W. A. [Signature]</i> CHIEF ENGINEERING OFFICER	



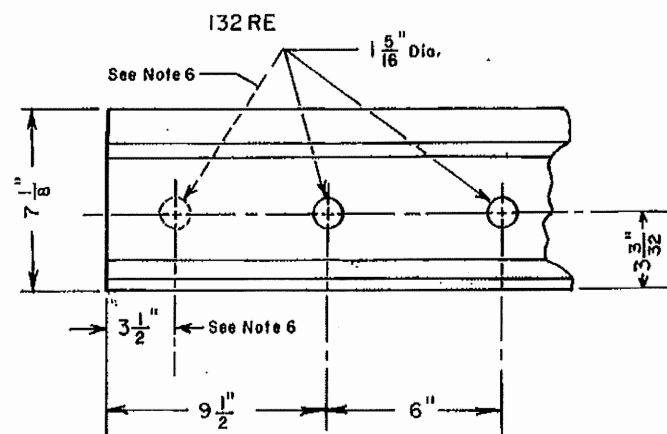
NO HAND 60 FT. UNDERCUT STOCK RAIL



BENDING OF STOCK RAILS (See Notes 4 & 5)



DETAIL OF UNDERCUT



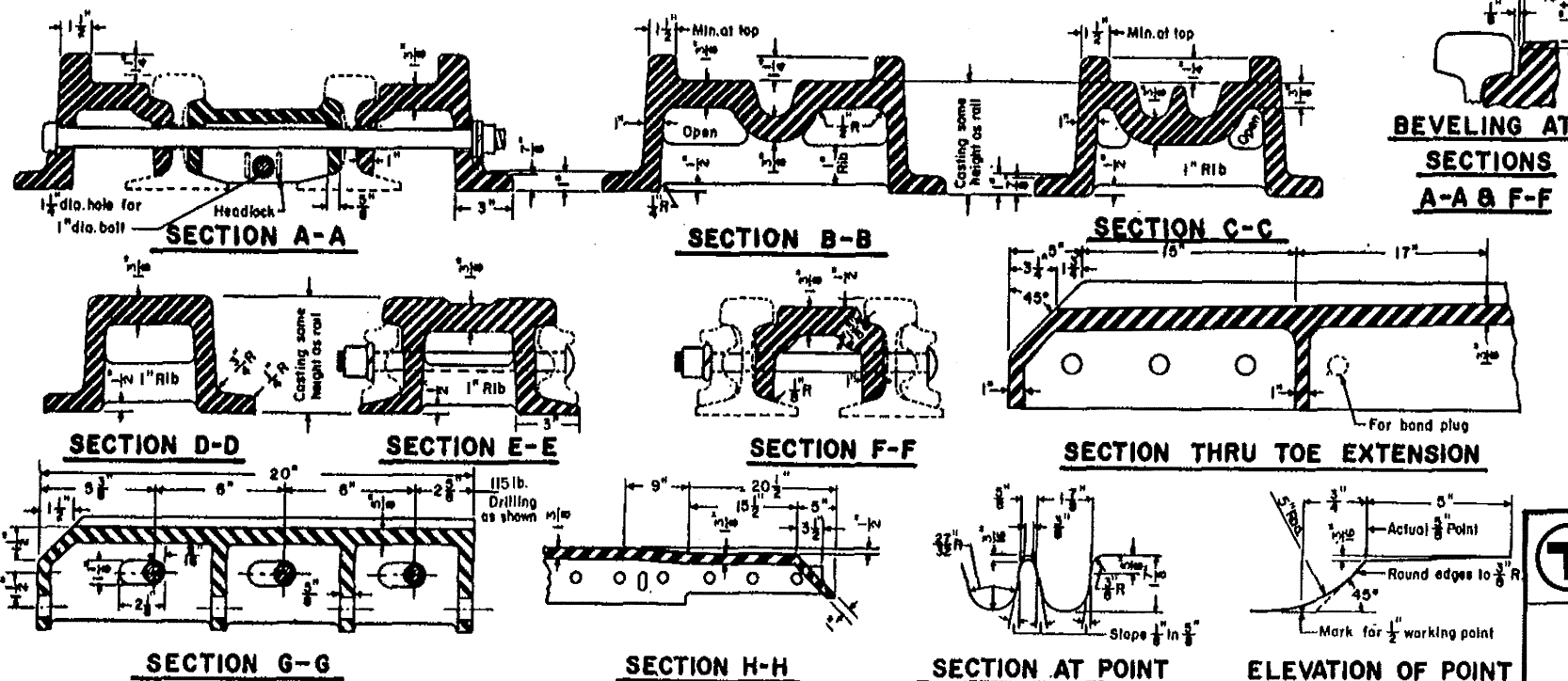
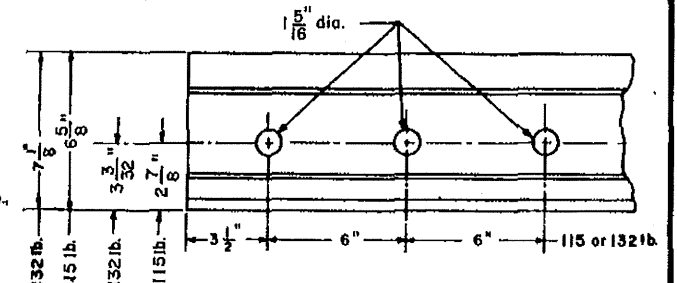
NOTES:

- Rail to conform to current MBTA specifications.
- Stock rails to be fully heat treated.
- Undercut to be on the opposite side of the rail brand.
- Stock rails are to be bent and curved to the alignment specified on this Plan.
- Initial bend line location of stock rail will vary according to the distance the stock rail is placed ahead of the point of switch. The distance ahead of the point of switch to the end of the stock rail shall conform to MBTA Standard Plans: -

Turnout No.	Drawing No.	Switch Alignment	Stock Rails Ahead of Point	
			Straight	Curved
10	2112	16'-6"	10'-6"	14'-7 1/4"
15	2162	26'-0"	8'-9 1/4"	5'-0"
20	2212	39'-0"	9'-0 1/2"	5'-7 1/2"

- When stock rail ends are not to be field welded, the first bolt hole shall be drilled in the field by installer.
- For offsets for curving 60'-0" stock rails, see standard turnout plans. (Drawing No.'s are listed in table above.)

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. No. 2360 Issued 28, 1992 ISSUE DATE	ISSUE NO. 1
	60 FT. UNDERCUT STOCK RAIL ENGINEERING OFFICER CHIEF ENGINEERING OFFICER			



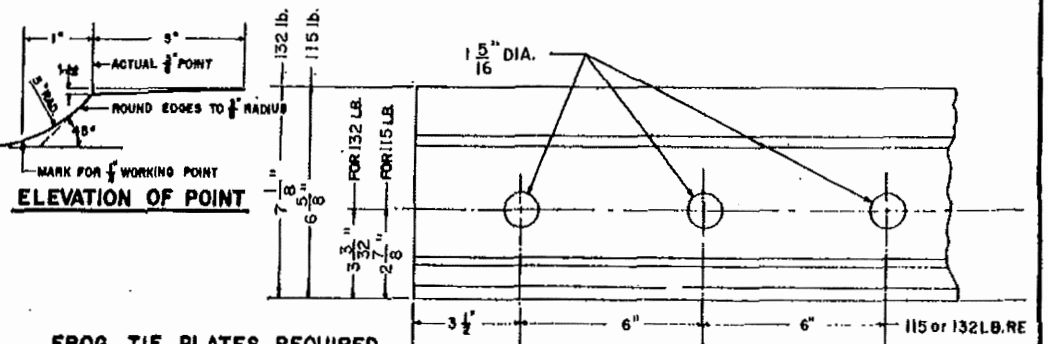
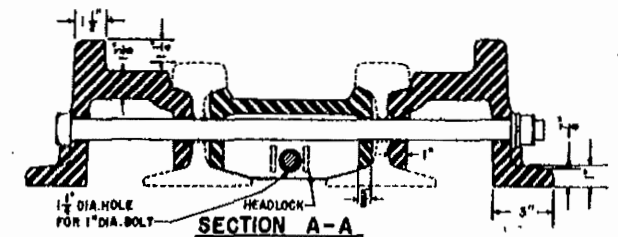
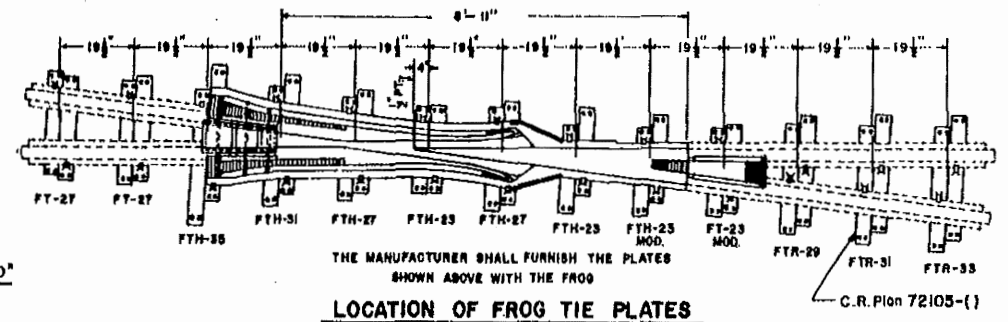
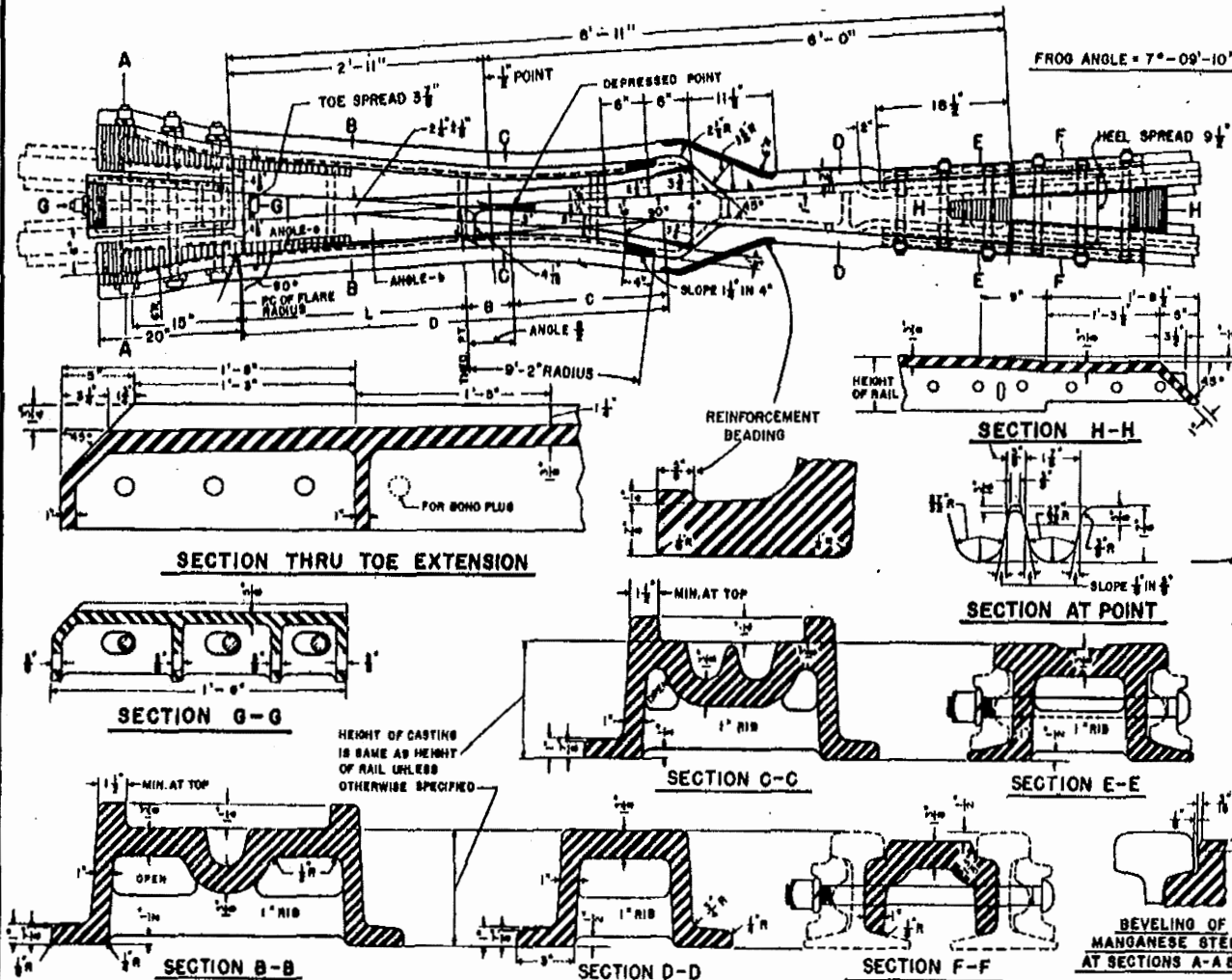
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2370
			Oct. 28, 1992 ISSUE DATE
NO. 6 SOLID SELF-GUARDED MANGANESE STEEL FROG			ISSUE NO. 1
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

DIMENSIONS OF RAISED GUARDS						
RAIL SEC.	ANGLE-b	ANGLE-c	D	C	L	B
115 lb.	0°-34'-40"	7°-43'-00"	8'-0 1/2"	22 3/4"	2'-7"	7 1/2"
132 lb.						

STRAIGHT CROSS RIBS
SPACED APPROXIMATELY
16" CENTER TO CENTER.

FORMULA FOR VARIABLE RADIUS OF RAISED GUARDS

$$\begin{aligned} \text{TAN ANGLE } b &= 5/16" / L \\ \text{ANGLE } a &= \text{ANGLE } b + \text{FROG ANGLE} \\ D &= \text{TOE SPREAD} + 4 \cdot 3/8" \\ C &= 3" / \sin a \\ B &= D - (L \cdot \sin a) \\ \text{RADIUS} &= B / \tan a/2 \end{aligned}$$



FROG TIE PLATES REQUIRED

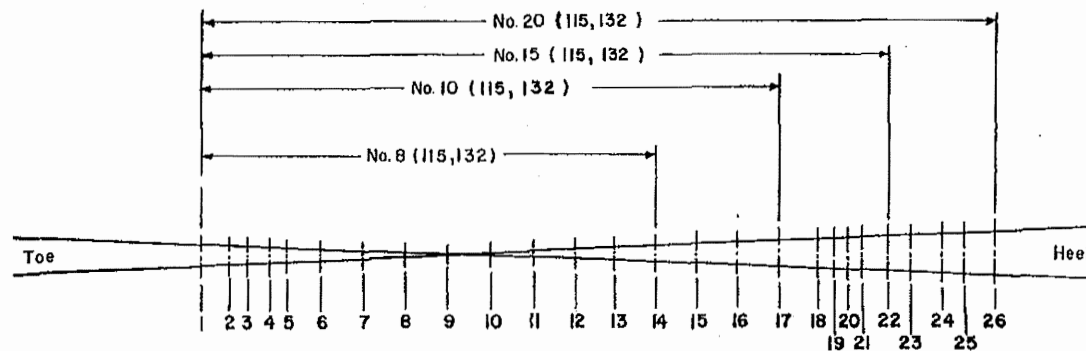
- 2 - FT-23 MOD. FROG TIE PLATES
- 4 - FTH-23 FROG TIE PLATES
- 2 - FTH-23 MOD. FROG TIE PLATES
- 4 - FT-27 FROG TIE PLATES
- 4 - FTH-27 FROG TIE PLATES
- 2 - FTR-29 FROG TIE PLATES
- 2 - FTH-31 FROG TIE PLATES
- 2 - FTR-31 FROG TIE PLATES
- 2 - FTR-33 FROG TIE PLATES
- 2 - FTH-35 FROG TIE PLATES

RAIL END DRILLINGS

- NOTES**
- 1 - THIS PLAN IS FOR USE WITH A.R.E.A. RECOMMENDED STANDARDS FOR 115 RE., 132 RE.
 - 2 - WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT "A.R.E.A. SPECIFICATIONS."

- 3 - ALL BOLTS SHALL BE DIPPED IMMEDIATELY BEFORE APPLYING (SO THAT ALL THREADS ARE THOROUGHLY COATED) WITH GREASE.
- 4 - ALL FROG TIE PLATES MUST BE CLEARLY MARKED TO SHOW PLATE DESIGNATION.

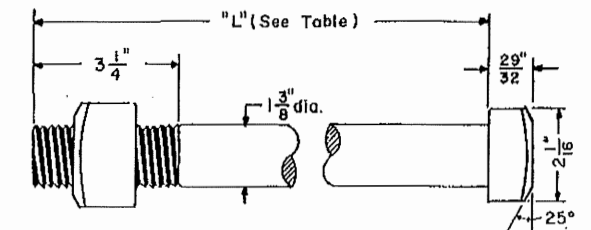
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2372 Oct. 28, 1992 ISSUE DATE	ISSUE NO. 1
	NO. 8 SOLID SELF-GUARDED MANGANESE STEEL FROG			
	John D. Remy ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



BOLT LOCATIONS

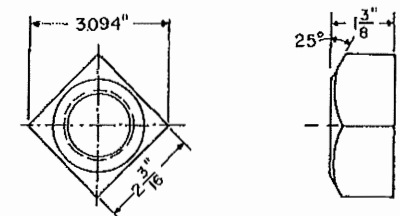
BOLT LENGTHS

FROG NO.	RAIL SECT.	PLAN NO.	BOLTS NUMBERED IN ORDER FROM TOE TO HEEL OF FROG																									
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
			LENGTH "L" UNDER HEAD (INCHES)																									
8	115	2084	11	11	10	13	15	16	15	15	16	17	18	19	20	12												
	132		12	11	11	13	15	16	15	16	17	18	19	20	20	12												
10	115	2105	11	11	11	12	14	16	15	14	15	16	17	18	19	19	11	11	12									
	132		11	11	11	12	14	16	15	15	16	17	18	19	20	20	11	13	13									
15	115	2156	11	11	11	10	10	12	13	16	17	18	16	15	16	17	18	18	19	19	19	10	11	11				
	132		12	11	11	11	12	14	16	17	18	18	16	16	17	18	18	19	19	19	20	11	11	13				
20	115	2206	11	11	10	10	10	13	15	16	16	17	18	16	15	15	16	17	18	18	19	19	19	10	10	11	11	12
	132		11	11	10	10	10	13	15	16	16	17	18	16	15	15	16	17	18	18	19	19	19	10	10	11	11	12



(Square Head)

FROG BOLT



SQUARE NUT

NOTES

1- Bolts and nuts shall conform to current AREA Specifications for special trackwork, Article 11, and details shown on this plan.

Bolts and nuts per A.S.A.-B18.2.2-1965

Threads-@A.S.A.-B1.1-1960 Class 2 Fit, Coarse Thread

Series with cut threads.

2- All nuts to be wrench fit and Medium Carbon Steel.

(0.40 Minimum - 0.55 Maximum)

3- Bolts shall be 1 3/8 inch dia.



MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

RAILROAD
OPERATIONS

DWG.
NO. 2502

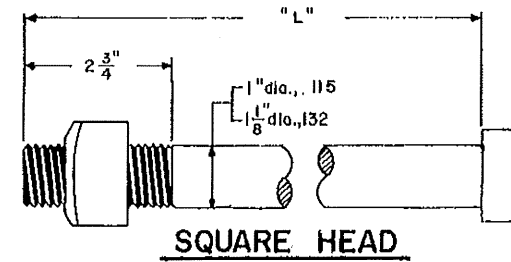
Oct. 28, 1992
ISSUE DATE

1
ISSUE NO.

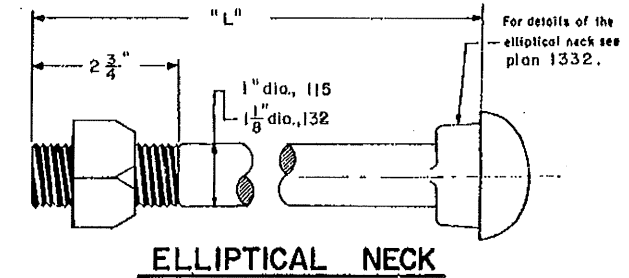
REPLACEMENT BOLTS FOR
RAILBOUND MANGANESE FROGS

John D. Ray
ENGINEERING OFFICER

W. A. Z. Gault
CHIEF ENGINEERING OFFICER

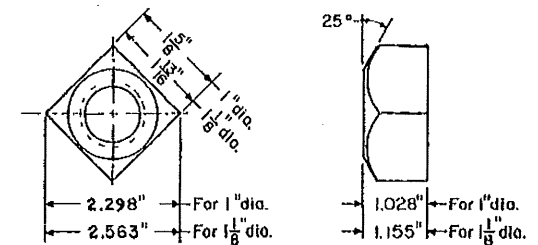


SQUARE HEAD



ELLIPTICAL NECK

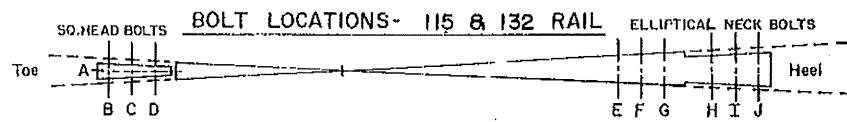
FROG BOLTS



HEAVY SQUARE NUT

NOTES

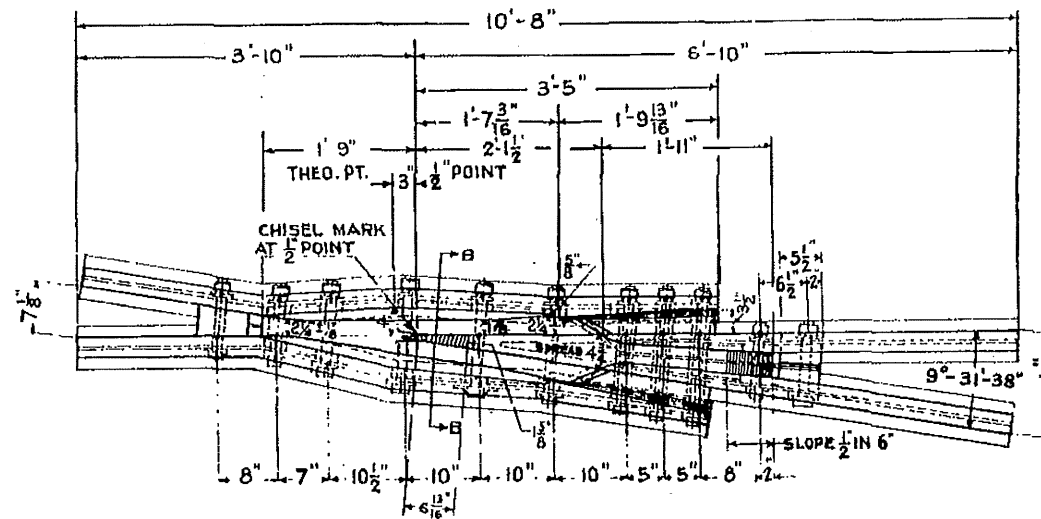
- 1-Bolts and nuts shall conform to current A.R.E.A. Specifications for special trackwork, Article 14 and details shown on this plan.
Bolts and nuts per A.S.A.-B18.2.2-1965
Threads-A.S.A.-B1.1-1960 Class 2 Fit, Coarse Threads
Series with cut threads.
- 2-All nuts to be wrench fit.
- 3-Bolts for frogs 115 lbs. or lighter shall be 1" diameter;
Bolts for frogs heavier than 115 lbs. shall be 1 1/8" diameter.



BOLT LENGTHS FOR FROG NOS. 6, 8, 10- 115 & 132 LB. RAIL

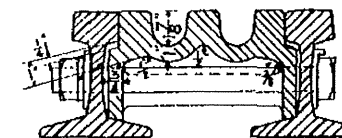
FROG NO.	RAIL SECTION	BOLT DIA.	BOLTS LETTERED IN ORDER-TOE TO HEEL OF FROG									
			SQUARE HEAD				ELLIPTICAL NECK					
			A	B	C	D	E	F	G	H	I	J
			LENGTH "L" UNDER HEAD (INCHES)									
6	115	1"	24	26	24	21	10	11	12	13	14	15
8			24	25	22	20	12	12	13	14	14	15
10			25	25	22	20	12	12	13	14	14	15
6	132	1 ¹ / ₈ "	24	26	24	21	10	11	12	14	14	15
8			24	25	22	20	12	13	13	14	15	14
10			24	24	22	20	12	12	13	14	14	15

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2504
			Oct. 28, 1992
		ISSUE DATE	ISSUE NO. 1
REPLACEMENT BOLTS FOR SELF-GUARDED FROGS			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

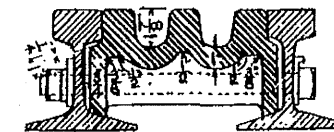


NOTE:- ACTUAL FROG POINT TO BE ³/₁₆" BELOW WING LEVEL, SLOPING TO ZERO AT ¹/₅" WIDTH OF POINT (TOP SLOPE ³/₁₆" IN 6¹/₁₆")

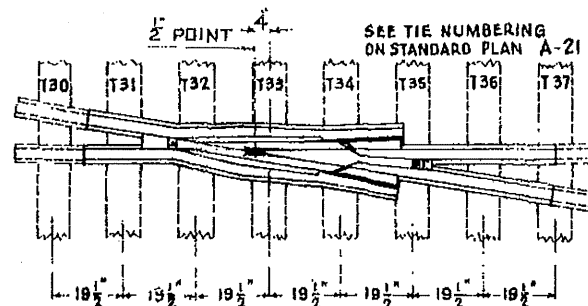
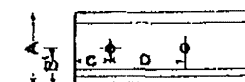
INCHES 12 6 0 SCALE 0 1 2 FEET



SECTION B-B
FOR 100 LB AND HEAVIER RAILS.



SECTION B-B
FOR 35 LB RAILS



TIE SPACING

INCHES 12 6 0 SCALE 0 1 2 3 FEET

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS:-

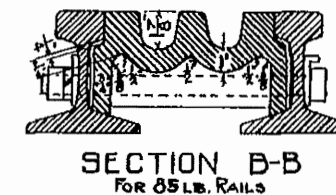
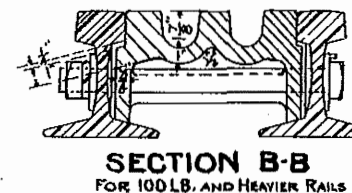
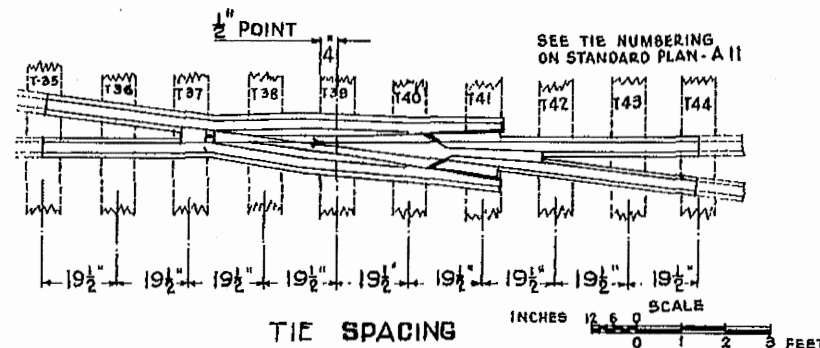
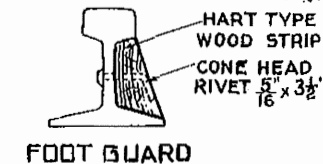
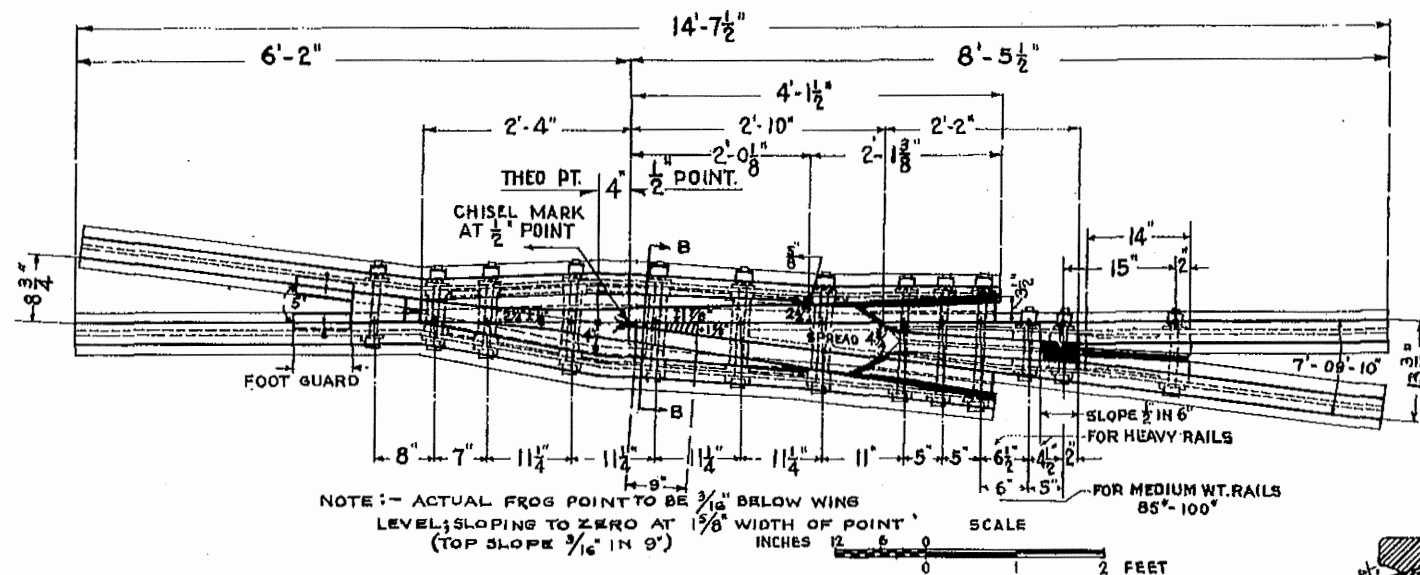
*600 - DATA AND SECTIONS. *600-B - FROG POINT AND FLANGEWAYS.
*601-3 GENERAL PLAN. NOTE-NO. 3.

FROG BOLTS- A.R.E.A. SPECIFICATIONS 1936. FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS; MANG. HOLES ¹/₄" LARGER THAN FROG BOLT DIA. PLATES- THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R. WORKMANSHIP AND MATERIALS- A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES:- ON FROG CASTING FOR 100-112-115-130-131 RAILS.
BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY, AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.
I BEAM DESIGN TO BE USED IN HEEL EXTENSION.

WEIGHT	RAIL DRILLING FOR JOINTS				DIAM. OF JOINT HOLE	BOLTS DIAM. OVER THREADS	
	A	B	C	D		JOINT	FROG
85 [#]	5 ³ / ₈ "	2 ¹ / ₂ "	2 ¹ / ₂ "	6"	1 ³ / ₂ "	5 ¹ / ₈ "	1 ¹ / ₈ "
100 [#]	6"	2 ¹ / ₂ "	2 ¹ / ₂ "	7"	1 ³ / ₂ "	1 ¹ / ₈ "	1 ¹ / ₈ "
112 [#]	6 ³ / ₈ "	2 ¹ / ₂ "	2 ¹ / ₂ "	6 ¹ / ₂ "	1 ³ / ₂ "	1 ¹ / ₈ "	1 ¹ / ₈ "
130 [#]	6 ³ / ₈ "	3 ¹ / ₈ "	2 ¹ / ₂ "	5 ¹ / ₂ "	1 ³ / ₂ "	1 ¹ / ₈ "	1 ¹ / ₈ "
131 [#]	7 ¹ / ₈ "	3 ¹ / ₂ "	2 ¹ / ₂ "	6 ¹ / ₂ "	1 ³ / ₂ "	1 ¹ / ₈ "	1 ¹ / ₈ "
115 [*]	6 ³ / ₈ "	2 ¹ / ₂ "	3 ¹ / ₂ "	6"	1 ³ / ₂ "	1 ¹ / ₈ "	1 ¹ / ₈ "

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2506 Nov. 17, 1986 ISSUE DATE	① ISSUE NO.
	B & M NO. 6 RAILBOUND MANGANESE STEEL FROG			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER		



WEIGHT	RAIL DRILLING FOR JOINTS.				DIAM. OF JOINT HOLE	BOLTS DIAM. OVER THREADS.	
	A	B	C	D		JOINT	FROG
85*	5 3/8"	2 1/4"	2 1/16"	6"	1 1/2"	1 1/8"	1 1/8"
100*	6"	2 3/4"	2 1/16"	7"	1 1/2"	1 1/8"	1 1/8"
112*	6 5/8"	2 3/8"	2 1/16"	6 1/2"	1 1/2"	1 1/8"	1 1/8"
130*	6 3/4"	3 1/16"	2 3/16"	5 1/2"	1 1/2"	1 1/8"	1 1/8"
131*	7 1/8"	3 3/16"	2 1/2"	6 1/2"	1 1/2"	1 1/8"	1 1/8"
115*	6 3/4"	2 3/4"	3/2"	6"	1 1/2"	1 1/8"	1 1/8"

NOTES:-

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.
REFERENCES TO A.R.E.A. TRACKWORK PLANS:-

*600 - DATA AND SECTIONS. #600-B - FROG POINT AND FLANGWAYS.

#601-3 GENERAL PLAN, NOTE NO. 3

FROG BOLTS - A.R.E.A. SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES 1" LARGER THAN FROG BOLT DIA. PLATES - THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R. WORKMANSHIP AND MATERIALS - A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES:- ON FROG CASTING FOR 100-112-115-130-131 RAILS.

BOLT SHROUDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY, AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES. T BEAM DESIGN TO BE USED IN HEEL EXTENSION.



RAILROAD OPERATIONS

DWG. NO. 2508

Nov. 17, 1986

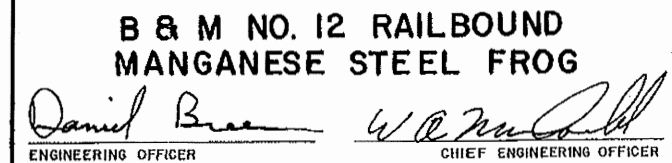
ISSUE DATE

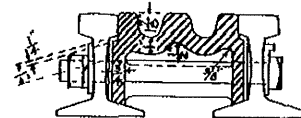
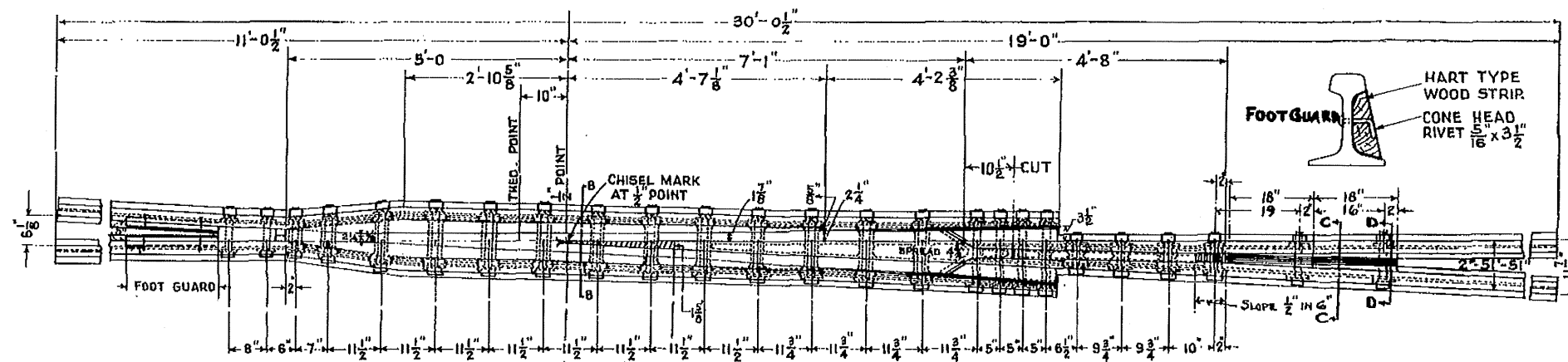
ISSUE NO.

B & M NO. 8 RAILBOUND
MANGANESE STEEL FROG

David Breen
ENGINEERING OFFICER

W. A. M. R. D.
CHIEF ENGINEERING OFFICER

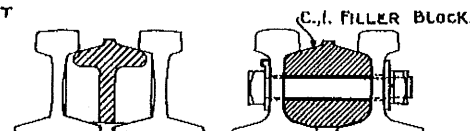




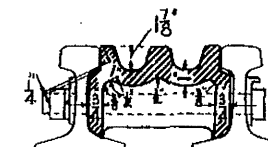
SECTION B-B
FOR 100 LB. AND HEAVIER RAILS

NOTE 1 - ACTUAL FROG POINT TO BE $\frac{3}{16}$ " BELOW WING LEVEL, SLOPING TO ZERO AT $\frac{1}{8}$ " WIDTH OF POINT (TOP SLOPE $\frac{3}{16}$ " IN $12\frac{1}{4}$ ")

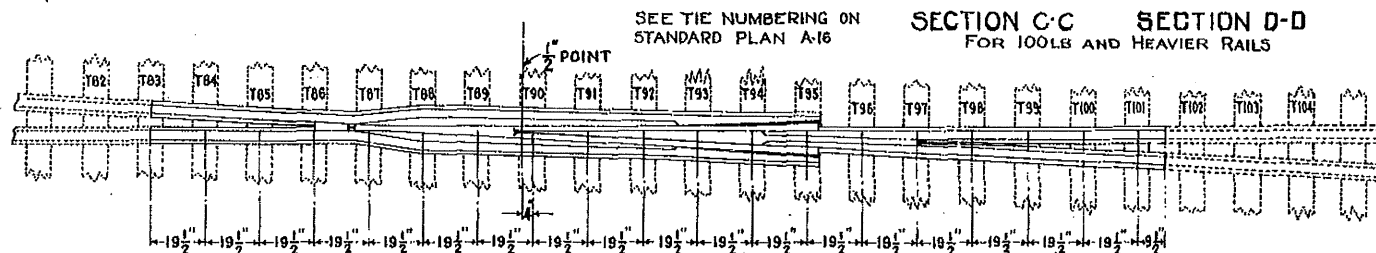
INCHES 12 6 0 SCALE 0 1 2 3 FEET



SECTION C-C **SECTION D-D**
FOR 100 LB. AND HEAVIER RAILS



SECTION B-B
FOR 85 LB. RAIL



TIE SPACING

INCHES 12 6 0 SCALE 0 1 2 3 4 FEET

NOTES

DESIGN, DETAILS, AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTICE.
REFERENCES TO A.R.E.A. TRACKWORK PLANS -

- *600 - DATA AND SECTIONS.
- *600-B - FROG POINT AND FLANGWAYS.
- *606-7 - GENERAL PLAN, NOTE - NO. 3.

FROG BOLTS - A.R.E.A. SPECIFICATIONS 1936 FOR HIGH TENSILE STRENGTH, QUENCHED CARBON BOLTS WITH SQUARE HEADS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS. MANG. HOLES $\frac{1}{8}$ " LARGER THAN FROG BOLT DIA. PLATES - THICKNESS 1". FURNISHED ONLY WHEN SPECIFIED. FOOT GUARDS FURNISHED BY R.R. WORKMANSHIP AND MATERIALS - A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

NOTES - ON FROG CASTING FOR 100-112-115-130-131 RAILS.

BOLT SHROUDDS TO BE ELIMINATED. CROSS RIBS BETWEEN THE SIDE WALLS TO BE S-SHAPED. CROSS RIBS TO BE ATTACHED TO SIDE WALLS ONLY AND TO BE PLACED APPROXIMATELY EVERY SECOND BOLT SPACING AND OCCUR BETWEEN BOLT HOLES.

WEIGHT	RAIL DRILLING FOR JOINTS				DIAM. OF HOLE	BOLTS DIAM. OVER THREADS	
	A	B	C	O		JOINT	FROG
85	5 1/8	2 1/4	2 1/4	6	1 3/32	1 1/8	1 1/8
100	6	2 3/4	2 1/4	7	1 1/32	1 1/8	1 1/4
112	6 1/2	2 3/4	2 1/2	6 1/2	1 1/4	1 1/8	1 3/8
130	6 1/4	3 1/8	2 3/4	5 1/2	1 1/4	1 1/8	1 3/8
131	7 1/8	3 3/4	2 1/2	6 1/2	1 1/4	1 1/8	1 3/8
115	6 3/8	2 3/4	3 1/2	6	1 1/4	1 1/8	1 3/8



MASSACHUSETTS
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AUTHORITY

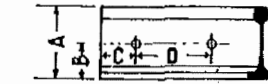
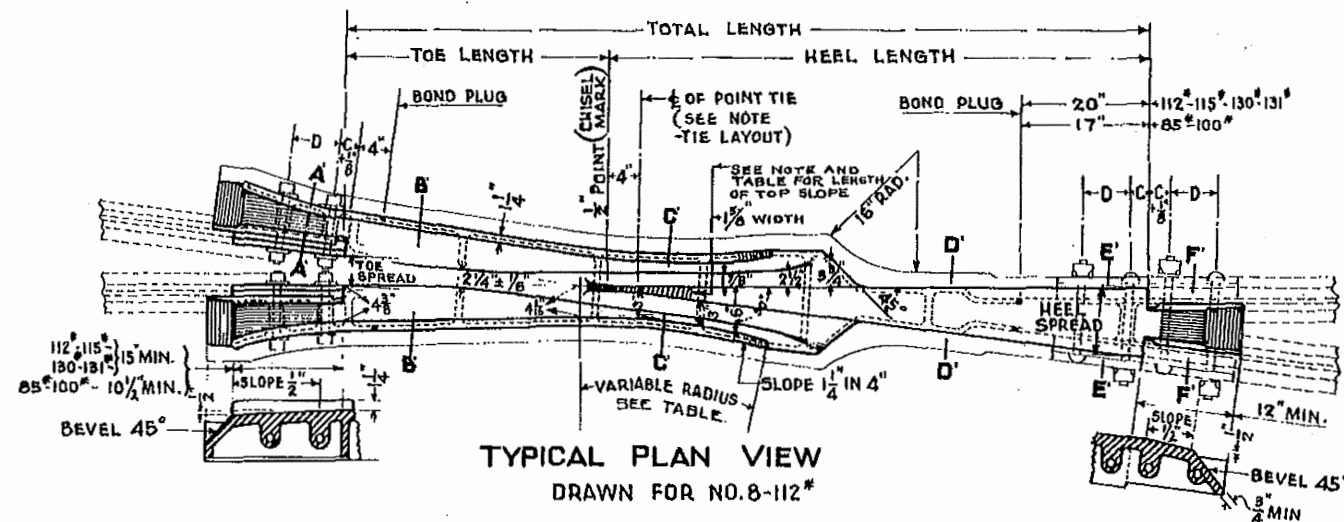
**RAILROAD
OPERATIONS**

DWG. NO. **2520**
Nov. 17, 1986.
ISSUE DATE

**B & M NO. 20 RAILBOUND
MANGANESE STEEL FROG**

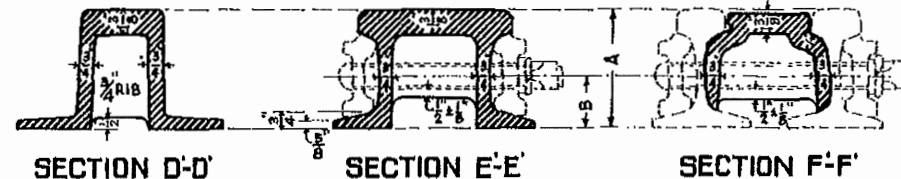
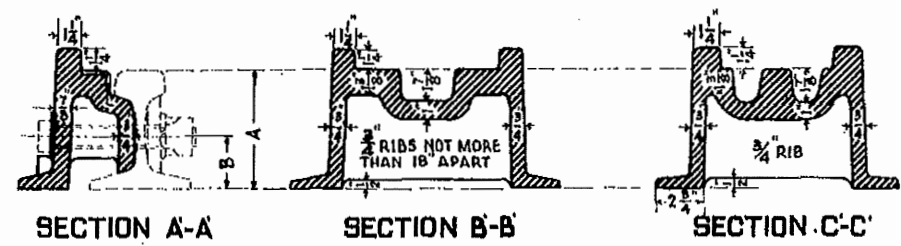
Daniel Brennan
ENGINEERING OFFICER

W. A. R. R. R.
CHIEF ENGINEERING OFFICER



RAIL DRILLING FOR JOINTS					JOINT BOLT DIAM. OVER THROES
WEIGHT	A	B	C	D	
85*	5 1/16"	2 1/4"	2 1/8"	6"	1 1/2"
100*	6"	2 1/4"	2 1/8"	7"	1 3/4"
112*	6 3/8"	2 1/8"	2 1/2"	6 1/2"	1 1/2"
130*	6 7/8"	3 1/8"	2 3/4"	5 1/2"	1 1/2"
131*	7 1/8"	3 1/2"	2 1/2"	6 1/2"	1 1/2"
115*	6 5/8"	2 3/8"	3 1/2"	6"	1 1/2"

FROG LENGTHS														
85* RAIL					* 100* RAIL					112, 115, 130, 131* RAILS				
NO.	ANGLE	TOTAL LGTH	TOE LGTH	HEEL LGTH	TOTAL LGTH	TOE LGTH	HEEL LGTH	VAR. RAD.	HEEL LGTH	TOTAL LGTH	TOE LGTH	HEEL LGTH	VAR. RAD.	HEEL LGTH
6	9°-31'-38"	5'-3"	20"	2 1/8"	3'-9"	8"	4'-9"	5'-8"	21"	3"	3'-11"	8 1/8"	4'-10"	7'-4"
7	8°-10'-18"	6'-3"	23"	2 1/2"	4'-4"	7 1/8"	6'-8"	6'-7"	2'-0"	2 1/8"	4'-7"	8 3/8"	6'-8"	6'-12"
8	7°-09'-10"	7'-3"	2'-3"	2 1/8"	5'-0"	8"	8'-9"	7'-7"	2'-4"	3"	5'-3"	8 3/8"	8'-10"	8'-11"
9	6°-21'-35"	8'-1"	2'-6"	2 1/8"	5'-7"	7 1/8"	11'-2"	8'-5"	2'-7"	2 1/8"	5'-10"	8 1/4"	11'-3"	9'-9"
10	5°-43'-29"	8'-11"	2'-9"	2 1/8"	6'-2"	7 1/8"	13'-11"	9'-4"	2'-10"	2 1/8"	6'-8"	8 1/8"	14'-0"	11'-4 1/2"



NOTES:

DESIGN, DETAILS AND CONSTRUCTION SHALL CONFORM TO THE PLANS ADOPTED BY THE AMERICAN RAILWAY ENGINEERING ASSOCIATION AS RECOMMENDED PRACTISE.

REFERENCES TO A.R.E.A. TRACKWORK PLANS:-

*640-DATA AND SECTIONS. *600B-FROG POINT AND FLANGEWAY.

BOLTS-FURNISHED WITH FROG. A.S.T.M. SPECIFICATION A50 FOR HIGH TENSION CARBON BOLTS, EXTRA HEAVY SQUARE NUTS, NUT LOCKS, ROLLED STEEL ANGLE WASHERS AND HEAD LOCKS.

BOLT HOLES-DIAMETER OF HOLES IN CASTINGS TO BE 1/8" LARGER THAN DIAMETER OF BOLTS.

BOND PLUGS-INSERTS OF 1/2" SOFT STEEL IN VERTICAL WALLS. TO BE DRILLED WITH 3/8" HOLES AND PLUGGED TIGHTLY AT ONCE WITH LEAD RIVETS.

JOINT BARS-AT TOE TO BE FURNISHED WITH FROG. AT HEEL TO BE FURNISHED BY RAILROAD.

PLATES- FURNISHED ONLY WHEN SPECIALLY ORDERED.

MARKING-FROGS TO BE MARKED WITH NUMBER-WEIGHT OF RAIL AND MANUFACTURER'S NAME.

WORKMANSHIP AND MATERIAL-A.R.E.A. SPECIFICATIONS FOR GENERAL TRACKWORK.

TIE LAYOUTS FOR ALL SOLID MANG. SELF GUARDED FROGS- CENTER LINE OF POINT TIE IS 4" FROM THE 1/2" POINT-TOWARDS HEEL OF FROG. ALL OTHER TIES ARE SPACED 19 1/2" CENTER TO CENTER FROM THIS TIE.

NOTE:-ACTUAL FROG POINT TO BE 1/8" BELOW WING LEVEL, SLOPING TO ZERO AT 1 1/8" WIDTH OF POINT.

FROG NO.	TOP SLOPE LENGTH
6	6 3/16"
7	7 7/8"
8	9"
9	10 1/8"
10	11 1/4"

FOR 8, 9, 10-100 FROGS - FURNISH RACOR INTEGRAL BASE SOLID MANGANESE STEEL SELF GUARDED FROG PER RAMAPO-AJAX PLAN (3206-H)

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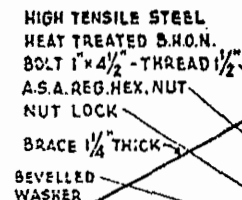
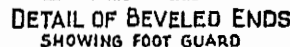
RAILROAD
OPERATIONS

DWG. NO. **2530**
Nov. 17, 1986
ISSUE DATE

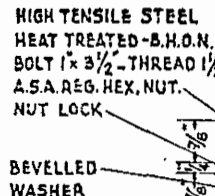
**B & M SOLID MANGANESE STEEL
SELF GUARDED FROGS**

Daniel Breen
ENGINEERING OFFICER

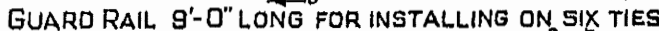
W.A. Ramapaul
CHIEF ENGINEERING OFFICER



SECTION B-B THRU CENTER PLATE



SECTION A-A AT END PLATE



GUARD RAIL 13'-0" LONG FOR INSTALLING ON EIGHT TIES

PLACING OF HOOK FLANGE GUARD RAILS

NUMBER OF FROG	LENGTH OF GUARD RAIL	GUARD RAIL ONTIES NO.	PLACE PT. OF FROG ON TIE NO.	FOR TIE REFERENCE SEE STD. PLAN NO.
RIGID FROGS				
8	9 FT.	36 TO 41 INC	39	F 8
9	" "	38 " 43 "	41	F 13
10	" "	42 " 47 "	45	F 9
12	13 "	52 " 59 "	57	F 12
15	" "	70 " 77 "	75	F 10
20	" "	85 " 92 "	90	F 11
SPRING RAIL FROGS				
8	9 FT.	36 TO 41 INC	39	F 8
10	13 "	40 " 47 "	45	F 9
12	" "	52 " 59 "	57	F 12



**MASSACHUSETTS
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TRANSPORTATION
AUTHORITY**

RAILROAD OPERATIONS

DWG. NO. **2540**

Nov. 17, 1986

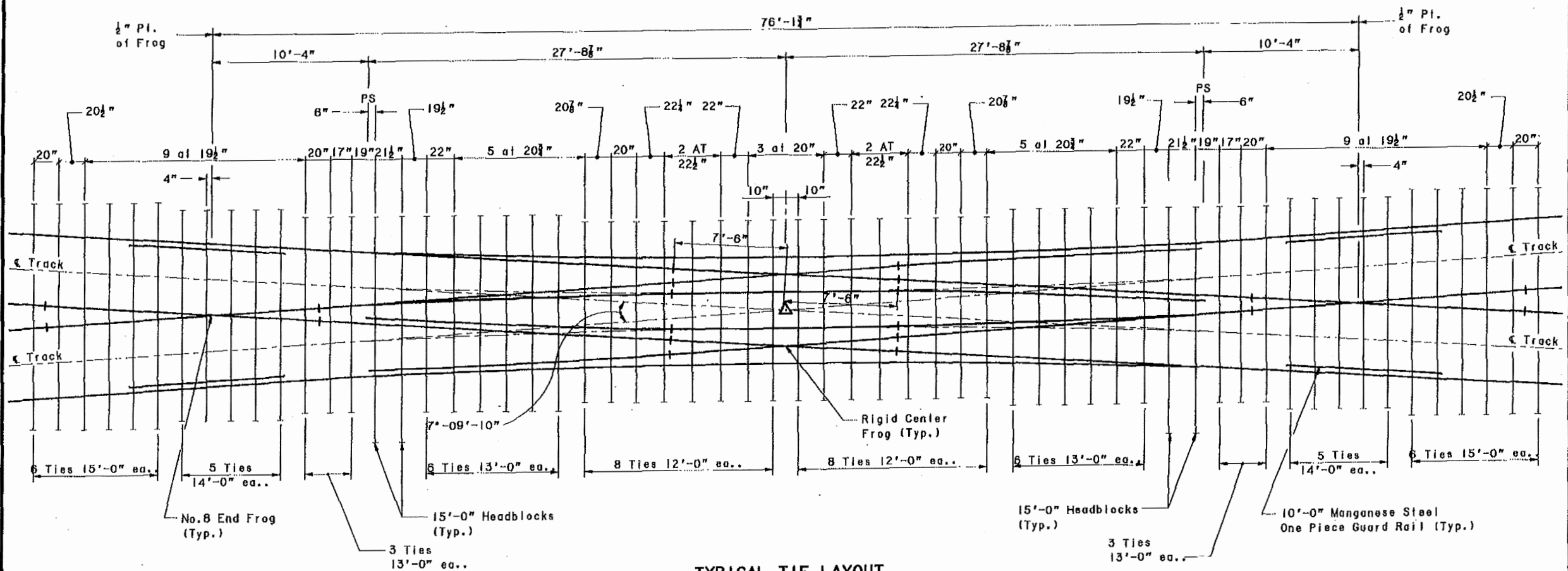
ISSUE DATE

ISSUE N

B & M HOOK FLANGE GUARD RAILS

Daniel Brown
ENGINEERING OFFICER

W. A. K. R. R.
CHIEF ENGINEERING OFFICER



TYPICAL TIE LAYOUT

Notes:

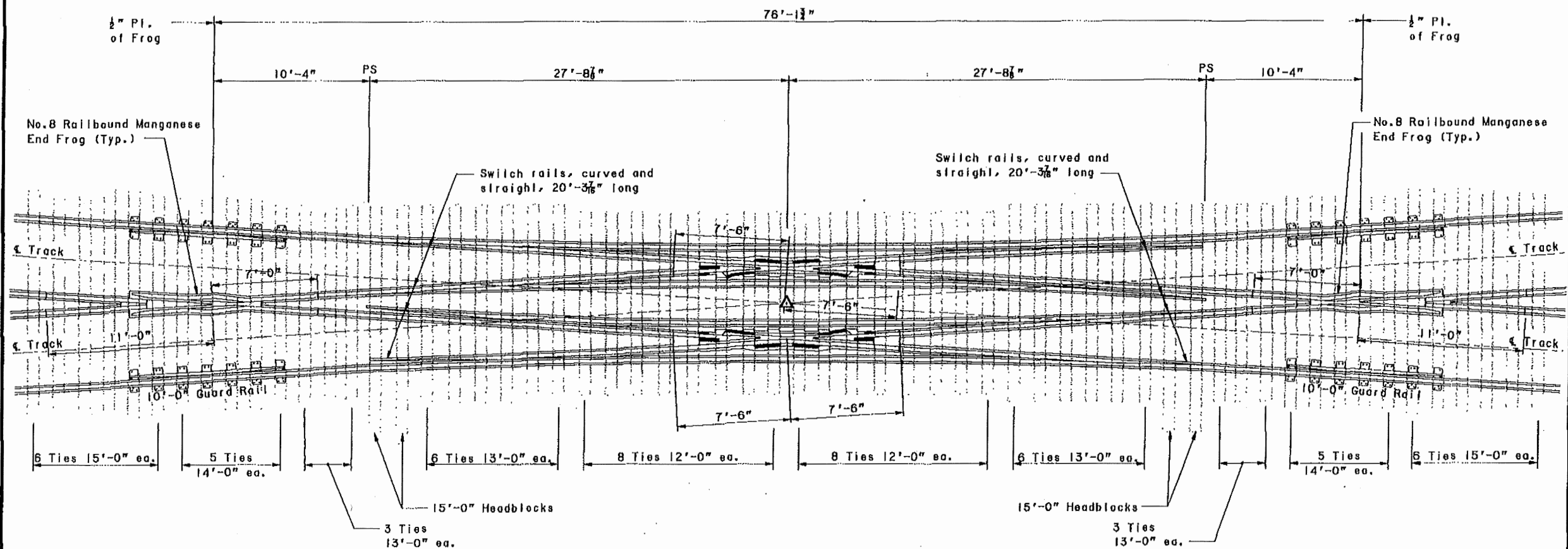
1. Length of headblock timbers and orientation dependent on switch machine type and field location as affected by other adjacent special trackwork units.
2. Additional (or less) long timbers may be required depending on size and location of other adjacent special trackwork units.
3. No rail welds shall be made within limits of double slip switches. All connections shall be bolted except heel ends of end frogs may be welded.
4. Insulated joints shall be bolted "Poly" type joints.
5. Location and number of insulated joints and other rail joints to be determined on a site specific basis.

LONG TIMBERS REQUIRED

Quantity	Length
16	12'-0"
18	13'-0"
10	14'-0"
12	15'-0"
4	Headblocks
60	Total

Note 1
Note 2

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2602	(1) ISSUE NO.
		JAN. 5, 1996 ISSUE DATE	
NO. 8 DOUBLE SLIP/RIGID FROG TIE LAYOUT			
John D. Ray SECTION CHIEF			



GENERAL LAYOUT

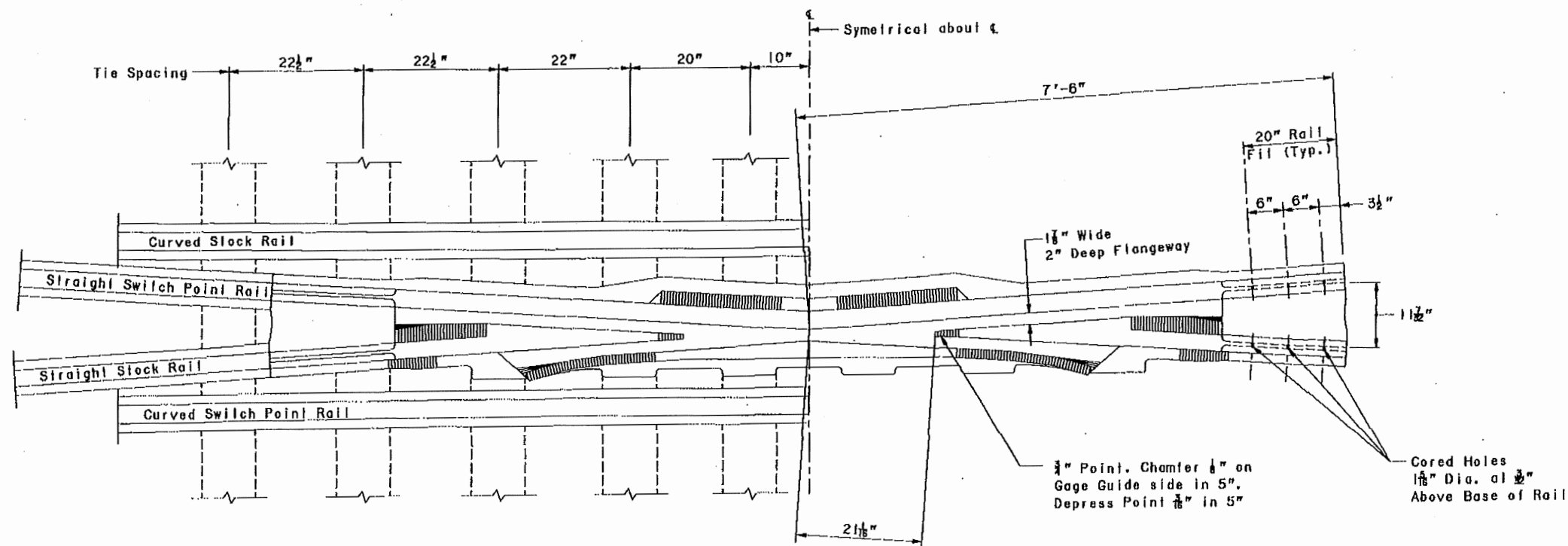
Notes:

1. 10'-0" Long One Piece Manganese Steel Guard Rails (4) per Standard Plan No. 2300.
2. No. 8 Railbound Manganese Steel End Frogs (2) per Standard Plan No. 2084.
3. No. 8 Rigid, Solid Manganese Center Frogs (2) per Standard Plan 2605.
4. Furnish not less than 2 Gage Plates spanning all rails at Center Frogs and 1 Gage Plate spanning all rails at both switch point locations.
5. Furnish 1:80 Cant Transition Tie Plates and Flat Plates as required on both ends of double slip.
6. Entire unit to be resiliently fastened except through guard rails.
7. All switch rods to be vertical.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2604
			JAN. 5, 1996 ISSUE DATE

**NO. 8 DOUBLE SLIP/RIGID FROG
GENERAL LAYOUT**

John D. Ray



CENTER FROG

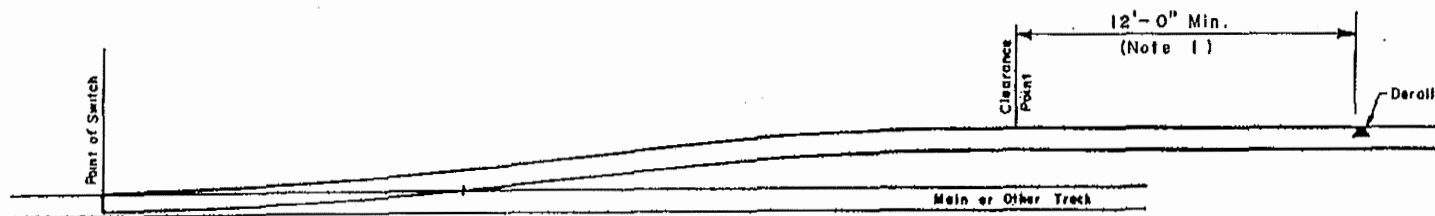
Notes:

1. Frog Angle is 7°-09'-10".
2. All Switch Point and Stock Rail Connections to Casting to be bolted, not welded.

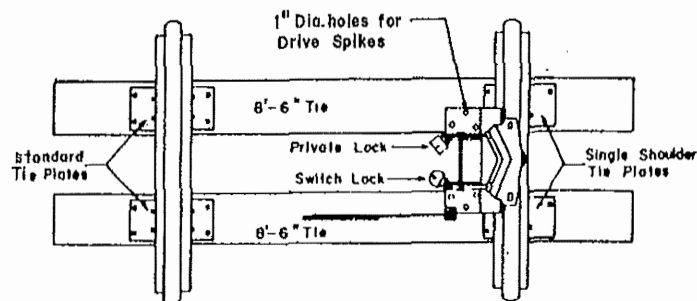
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 2605	
		Jan. 5, 1996 ISSUE DATE	

NO.8 DOUBLE SLIP/RIGID,
SOLID MANGENESE CENTER FROG

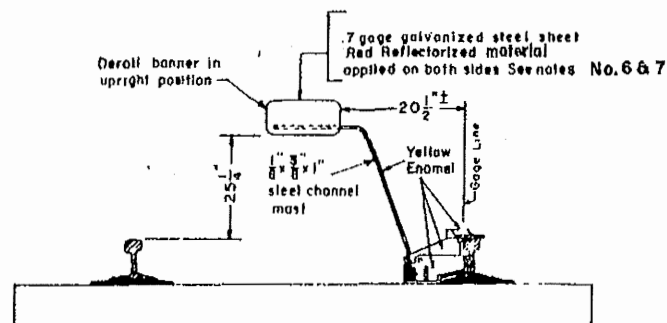
John D. Ray



LOCATION OF DERAIL

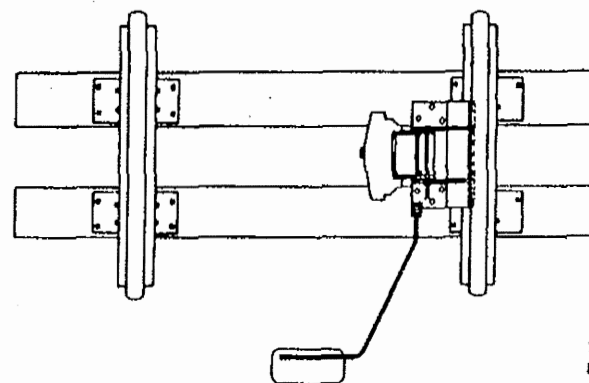


TOP VIEW

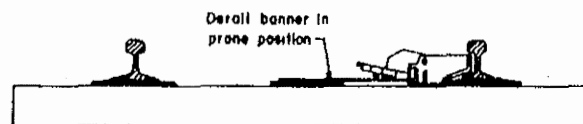


SIDE VIEW

DERAIL IN "NORMAL POSITION"



TOP VIEW



SIDE VIEW

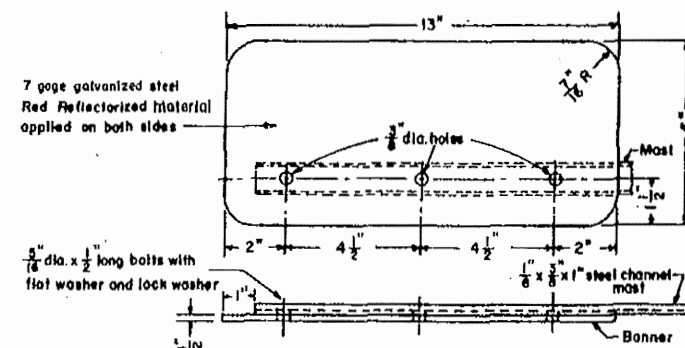
DERAIL IN "REVERSE POSITION"

NOTE:

- Derail shall be placed a sufficient distance back from the clearance point to assure that derailed rolling equipment will not foul main or other track(s).
- Hinged block type derails to be used only on enginehouse ready and storage tracks.
- When ordering derail specify size:

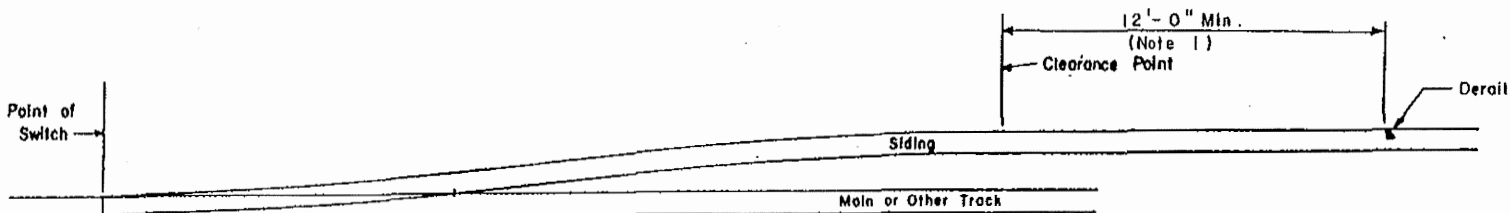
Size	Weight of Rail
5	70 to 100 lb.
6	90 to 110 lb.
7	110 to 140 lb.
8	140 to 155 lb.
- Derail is to be painted yellow enamel over primer.
- All derails to accommodate padlocks on both ends, one a switch lock; the other a private lock.
- Reflectorized derail banners shall be used where high visibility is necessary and where not prohibited by public authorities having jurisdiction.
- Reflectorized sheeting material shall conform and be applied in accordance with current and applicable Mass. Highway Dept. Standards.
- Banners shall be fabricated from 7 gage galvanized steel sheet as one contiguous piece (No Joints or Seams Allowed).
- Shade of coloration shall be approved by the MBTA or their designated agent.
- Should reflectorized material be prohibited, a red, fade resistant paint shall be applied over a rust inhibitive primer on the banner.

NOTE: The derail shown is manufactured by Western-Cullen-Hayes

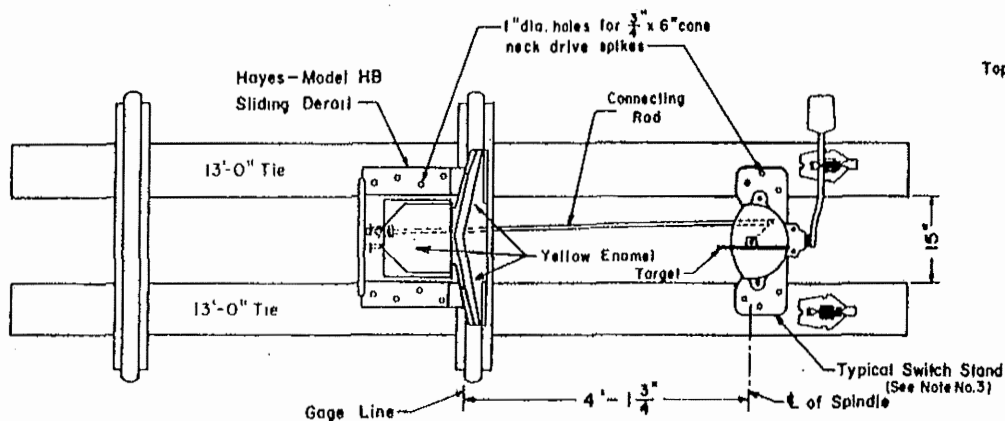


DETAIL OF BANNER

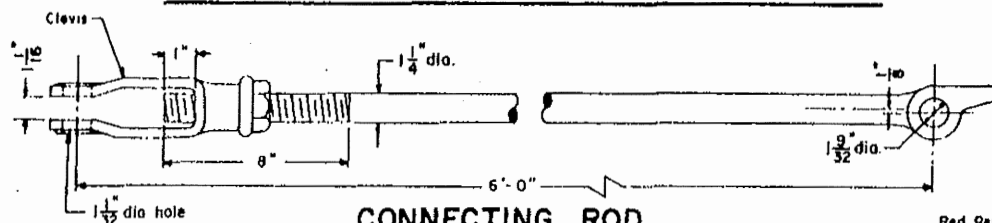
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3000	ISSUE NO. 1
		Oct. 28, 1992 ISSUE DATE	
HINGED BLOCK DERAIL			
John D. Ray ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER		



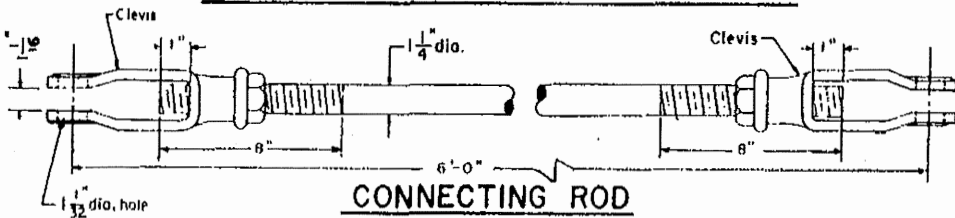
LOCATION OF DERAIL



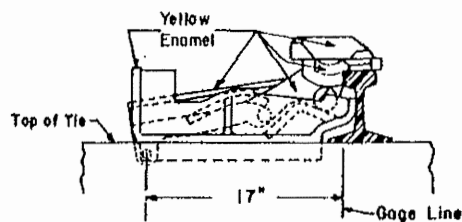
SWITCH STAND AND DERAIL INSTALLATION



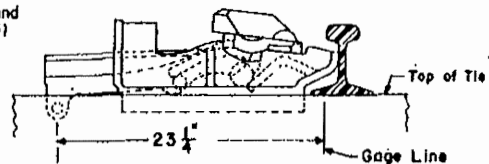
CONNECTING ROD FOR NEW CENTURY SWITCH STAND



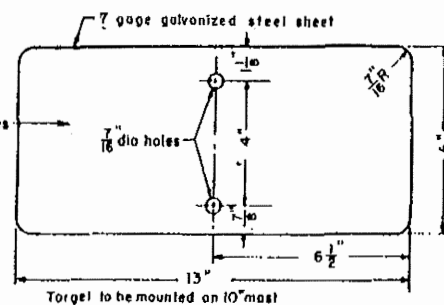
CONNECTING ROD FOR OTHER TYPES OF SWITCH STANDS



DERAIL IN "NORMAL POSITION"



DERAIL IN "REVERSE POSITION"



TARGET DETAILS

NOTES

- 1 - Derail shall be placed a sufficient distance back of the clearance point to make sure that derailed rolling equipment will not foul the main or other track.
- 2 - The following switch stand is to be used to operate derail: New Century Switch Stand, Model 50-A as manufactured by Bethlehem Steel.
- Others as approved by Chief Engineering Officer.
- 3 - Switch stand to be in tension, with red target perpendicular to the rail, when the derail is in the normal position.
- 4 - When ordering derail specify - Model and Size
 - Size 6 - for 90lb rail to 110lb rail
 - Size 7 - for 110lb rail to 140lb rail
 - Size 8 - for 140lb rail to 155 lb rail

Order derails with double ended derailing flanges which will operate as either left or right hand derails.

5 - All orders should state that derails will be operated by switch stands having a 4 3/4" throw

6 - All derails to accommodate padlocks on both ends, one a switch lock; the other a private lock.

7 - Reflectorized derail banners shall be used where high visibility is necessary and where not prohibited by public authorities having jurisdiction.

8 - Reflectorized sheeting material shall conform and be applied in accordance with current and applicable MHD Standards.

9 - Banners shall be fabricated from 7 gage galvanized steel sheet as one contiguous piece (No Joints or Seams Allowed).

10 - Shade of coloration shall be approved by the MBTA or their designated agent.

11 - Should reflectorized material be prohibited, a red, fade resistant paint shall be applied over a rust inhibitive primer on the banner.

12 - All items shown for maintenance of existing equipment, only.

13 - This type of derail shall NOT be installed in new installations without the written approval of the Chief Engineering Officer of the MBTA.

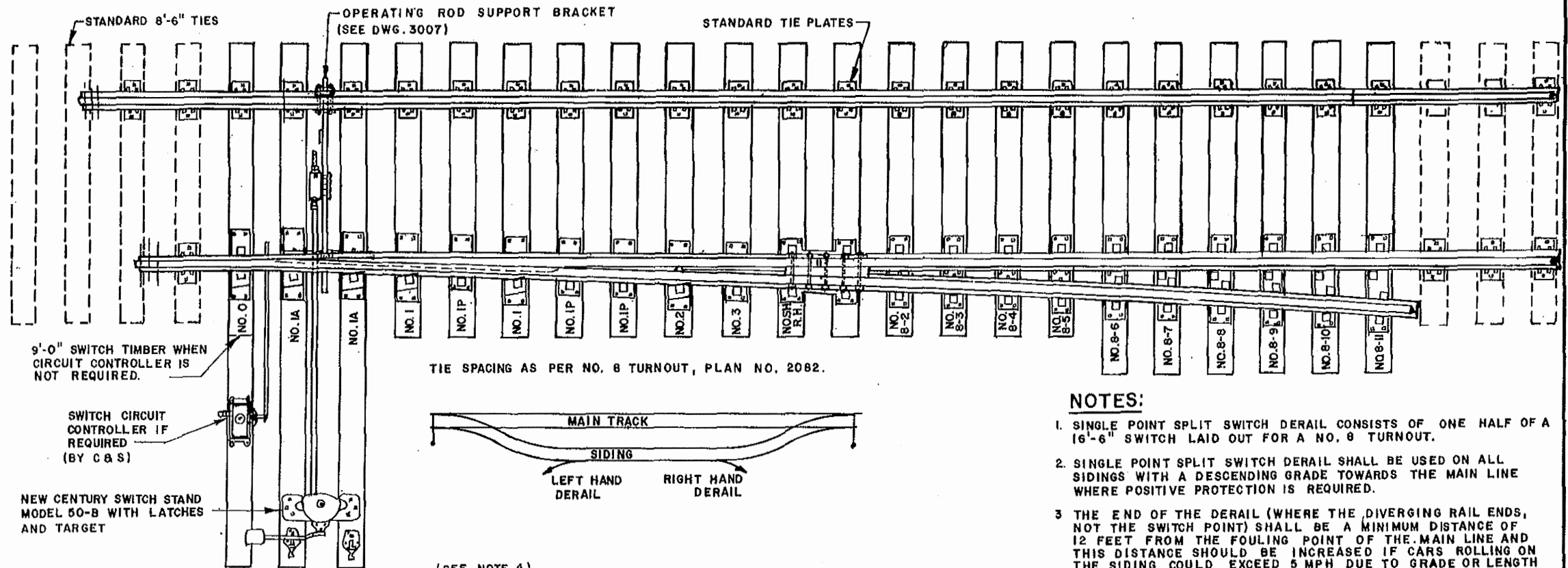
NOTE: The Derail Shown is Manufactured by Western-Cullen-Hayes.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3004	
			Oct. 28, 1992	
			ISSUE DATE	

SLIDING BLOCK DERAIL

John D. Ray
ENGINEERING OFFICER

W. Cullen Hayes
CHIEF ENGINEERING OFFICER



NOTES:

1. SINGLE POINT SPLIT SWITCH DERAIL CONSISTS OF ONE HALF OF A 16'-6" SWITCH LAID OUT FOR A NO. 8 TURNOUT.
2. SINGLE POINT SPLIT SWITCH DERAIL SHALL BE USED ON ALL SIDINGS WITH A DESCENDING GRADE TOWARDS THE MAIN LINE WHERE POSITIVE PROTECTION IS REQUIRED.
3. THE END OF THE DERAIL (WHERE THE DIVERGING RAIL ENDS, NOT THE SWITCH POINT) SHALL BE A MINIMUM DISTANCE OF 12 FEET FROM THE FOULING POINT OF THE MAIN LINE AND THIS DISTANCE SHOULD BE INCREASED IF CARS ROLLING ON THE SIDING COULD EXCEED 5 MPH DUE TO GRADE OR LENGTH OF GRADE ON THE SIDING.
4. OTHER TYPE TIE PLATES, SUCH AS TWIN HOOKS BEHIND THE HEEL MAY BE SUBSTITUTED IN PLACE OF RESILIENT FASTENER TYPE SHOWN, PROVIDED THAT DERAIL IS NOT IN MAIN TRACK.
5. SWITCH STAND TO BE COMPLETE WITH 10'-0" OPERATING ROD PER PLAN 3020-1 WITH TWO LATCHES AND TARGET

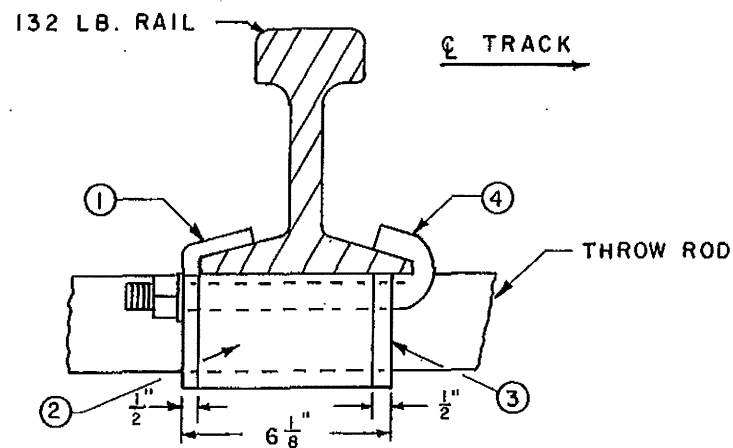
(SEE NOTE 4) BILL OF MATERIAL

*SUPPLIED BY THE INSTALLER

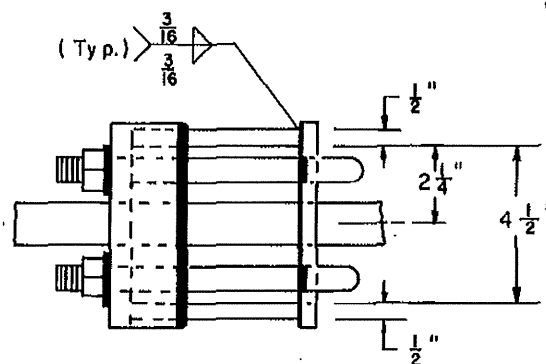
QUAN.	DESCRIPTION	Reference Plan No.
1	16'-6" SWITCH POINT (R.H. or L.H.) COMPLETE WITH REINFORCING BARS, CLIP FOR NO. 1 ROD AND STOPS	2104
1	HEEL BLOCK ASSEMBLY, COMPLETE	2350
1	39'-0" UNDERCUT STOCK RAIL (R.H. or L.H.)	2104
1	NO. 0 ADJUSTABLE BRACE SLIDE PLATES	2106
2	NO. 1A " " " "	2106
2	NO. 1 " " " "	2106
1	NO. 2 " " " "	2106
3	NO. 1P SHOULDER SLIDE PLATES	2106
1	NO. 3 " " " "	2106
1	NO. SH HEEL PLATE (R.H. or L.H.)	2106
1	SWITCH RAIL STOP	2350
1	ADJUSTABLE ROCKER CLIP FOR VERT. SWITCH RODS	2107
1	INSULATED VERTICAL SWITCH ROD (NO. 1 ONLY)	2107

QUAN.	DESCRIPTION	Reference Plan No.
10	TURNOUT PLATES FOR USE BEHIND HEEL (NO. 8-2 to 8-11)	2340
6	RESILIENTLY FASTENED ADJUSTABLE RAIL BRACES	2352
100	7" LOCK SPIKES	1216
13	5/8" x 6" AREA Spikes *	1210
44	RESILIENT FASTENER SPRING CLIPS - TYPE "E"	-
4	RESILIENT FASTENER SPRING CLIPS - TYPE MOD. "E"	-
1	NEW CENTURY SWITCH STAND MODEL 50-B COMPLETE WITH 10'-0" OPERATING ROD, 2 LATCHES & TARGET	3020
1	OPERATING ROD SUPPORT BRACKET	3007
3	16'-0" HEADBLOCKS (2 IF NO CIRCUIT CONTROLLER)	-
13	9'-0" SWITCH TIMBERS (14 " " " ")	-
6	10'-0" SWITCH TIMBERS	-

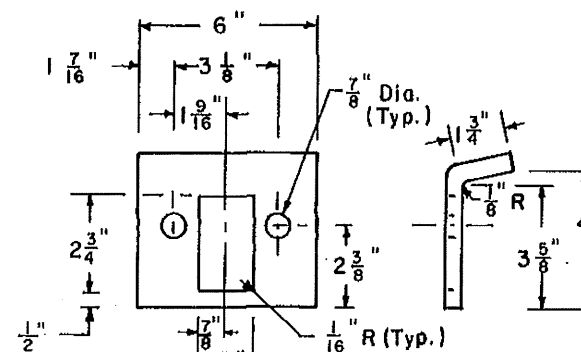
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3006 Oct. 28, 1992 ISSUE DATE	① ISSUE NO.
	SPLIT SWITCH DERAIL			
	 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



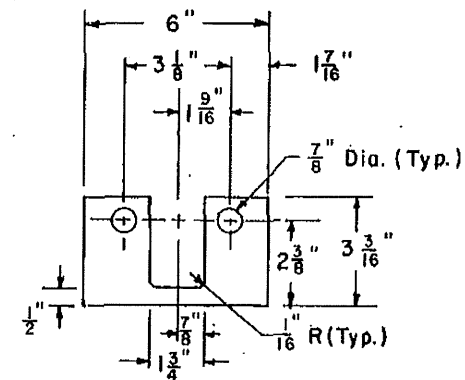
SIDE VIEW



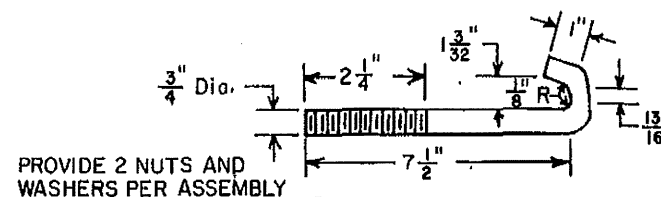
PLAN VIEW



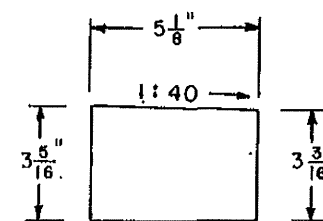
① HEAD PLATE



③ BACK PLATE

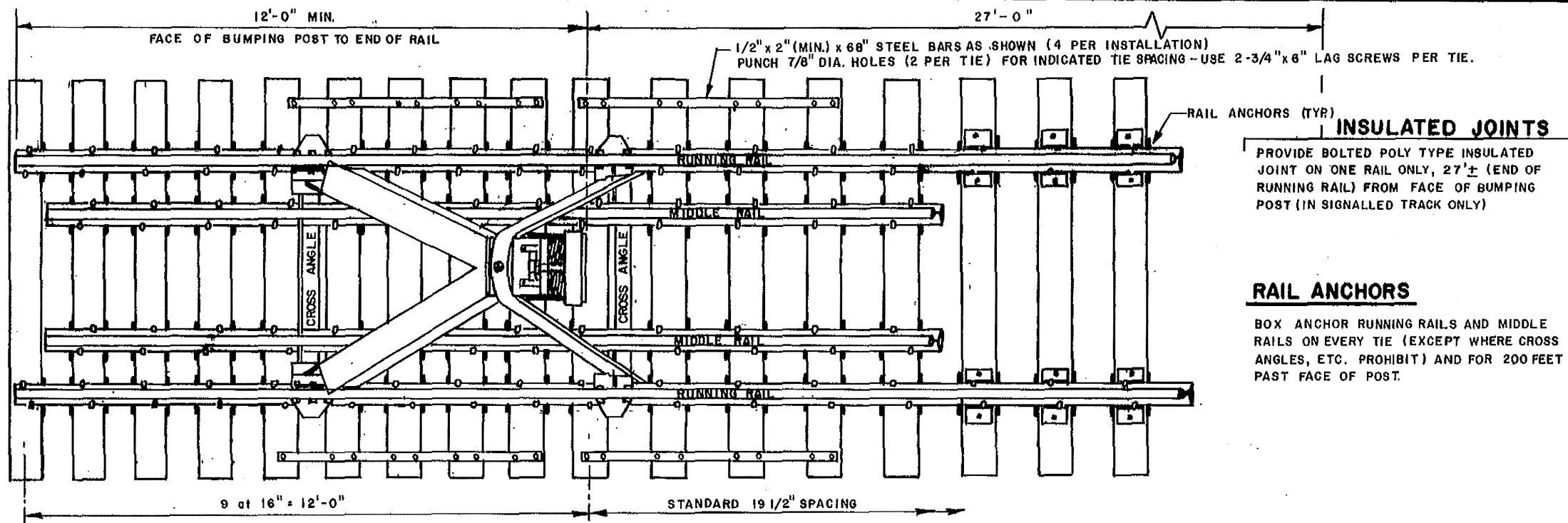


④ HOOK BOLT
2 REQ'D.

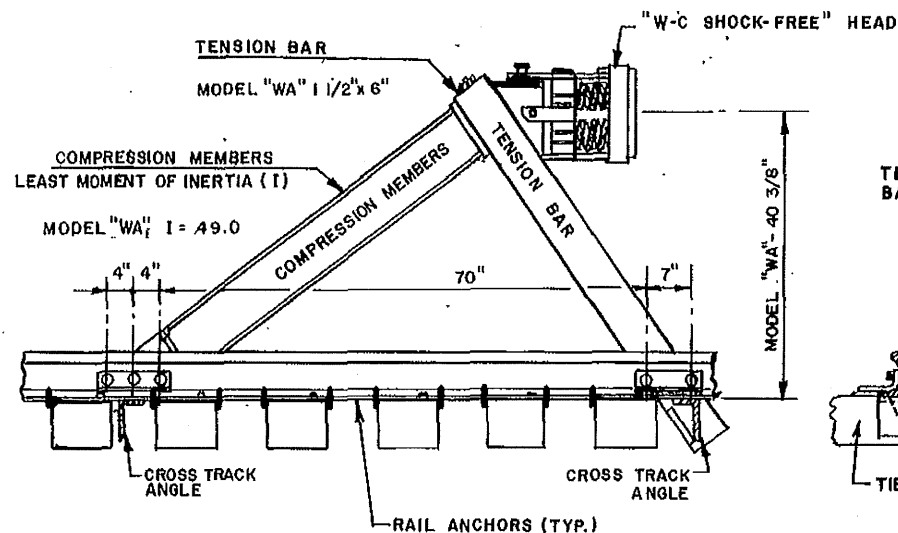


② SIDE PLATE
(2 Required)

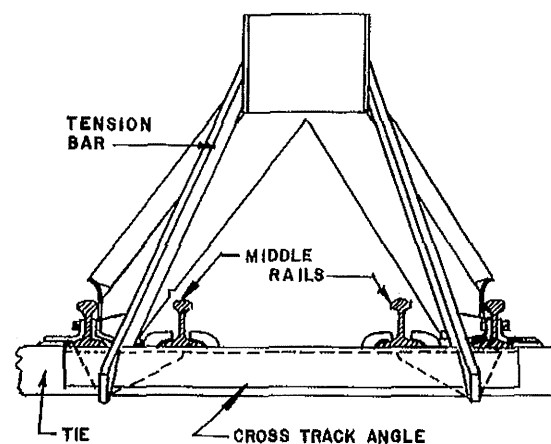
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG NO. 3007 Oct. 28, 1992 ISSUE DATE	① ISSUE NO.
	OPERATING ROD SUPPORT BRACKET FOR SPLIT SWITCH DERAIL John D. Ray ENGINEERING OFFICER			
wa h... CHIEF ENGINEERING OFFICER				



PLAN



SIDE ELEVATION



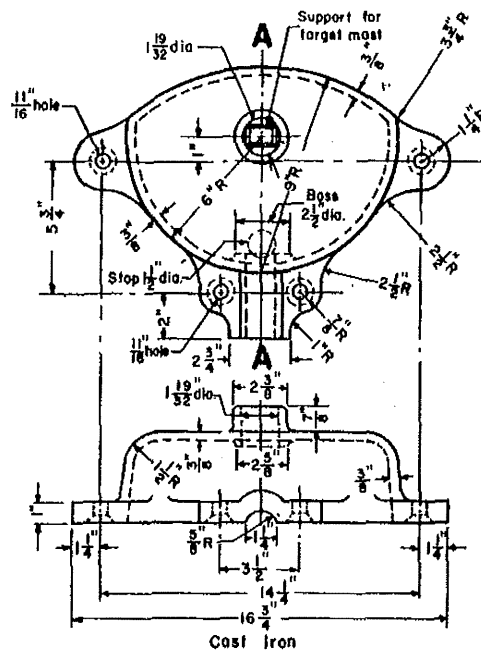
FRONT ELEVATION

NOTES:

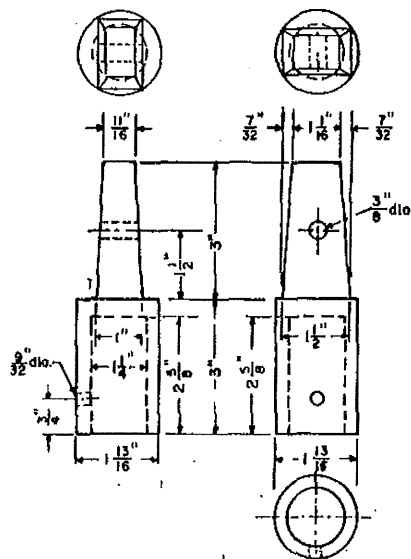
1. MODEL "WA" IS AN EXTRA HEAVY DESIGN (1655 lbs). USE ON ALL ENDS WHERE REVENUE PASSENGER SERVICE OPERATES EXCEPT AT MAJOR PASSENGER TERMINALS.
2. A MODEL "W-C SHOCK FREE" IMPACT ABSORBING HEAD (435 lbs) SHALL BE FURNISHED AND INSTALLED ON ALL BUMPING POSTS UNLESS OTHERWISE DIRECTED BY THE CHIEF ENGINEERING OFFICER.
3. END TIE PLATES 5 TIES AHEAD OF THE BUMPING POST.
4. THE MIDDLE RAILS SHOULD BE AT LEAST 19.5' LONG (1/2 RAIL LENGTH)
5. EACH RUNNING AND MIDDLE RAIL SHALL BE SPIKED TO EACH TIE WITH TWO CUT SPIKES (ONE ON EACH SIDE OF THE RAIL BASE).
6. THE INSTALLATION INSTRUCTIONS OF THE MANUFACTURER SHALL BE CAREFULLY & COMPLETELY FOLLOWED.
7. BUMPING POST SHOWN IS MANUFACTURED BY WESTERN-CULLEN-HAYES.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3010
			Oct. 28, 1992 ISSUE DATE
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

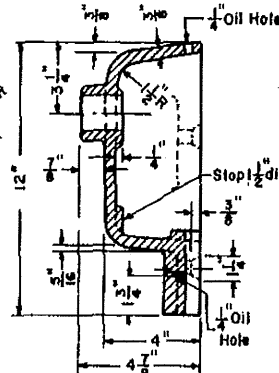
STEEL BUMPING POST



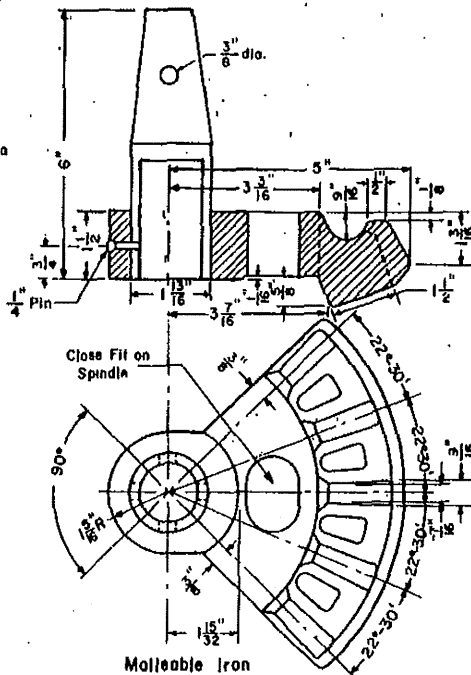
TOP OF SWITCH STAND-50A



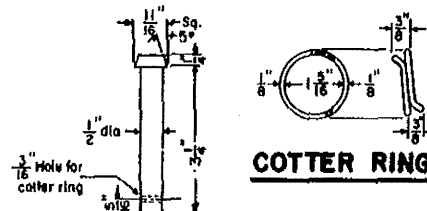
TARGET SUPPORT-50A



SECTION A-A

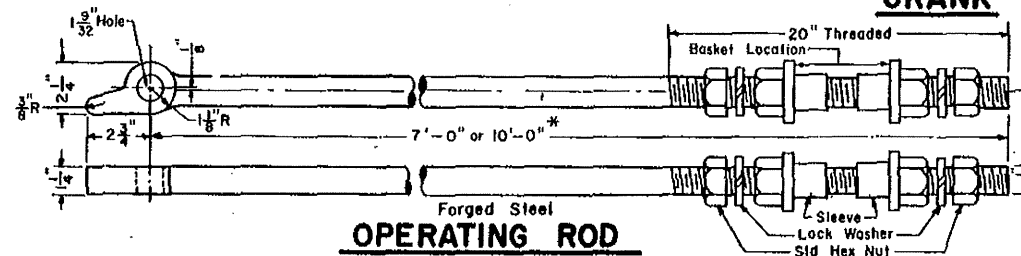


SEGMENT GEAR-50A or 50B



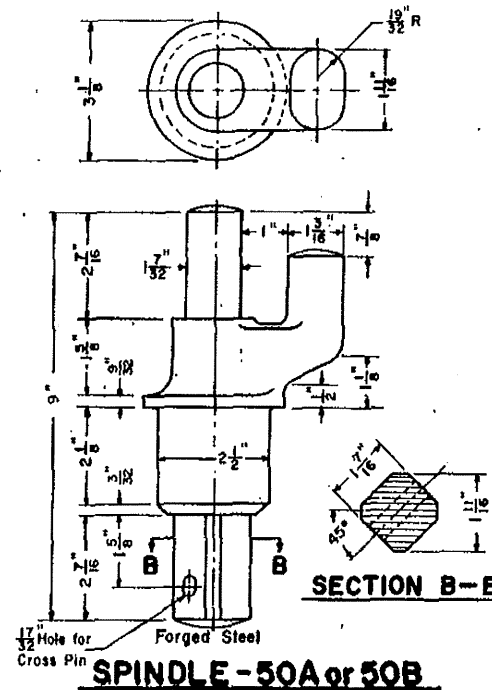
COTTER RING

CROSS PIN

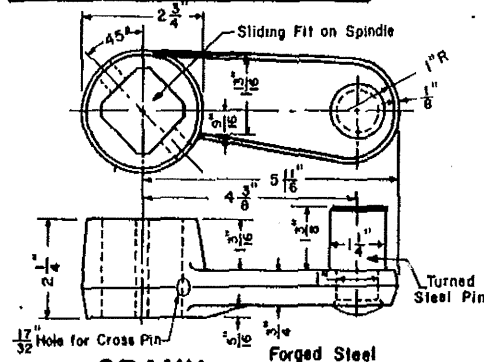


OPERATING ROD

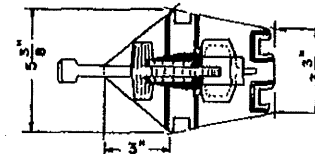
*Provide 7'-0" rod with stand 50-A and 10'-0" rod with stand 50-B.



SPINDLE - 50A or 50B



CRANK



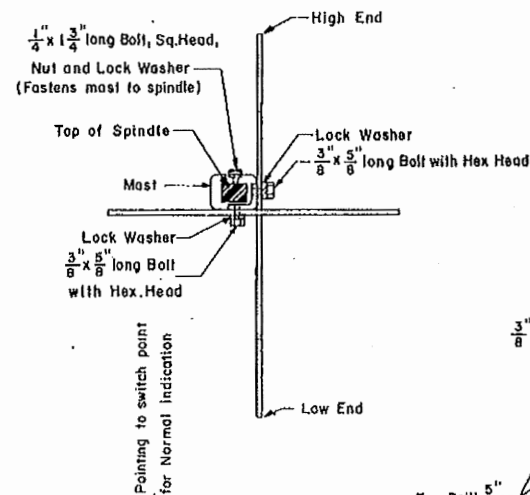
LATCH

2 Required

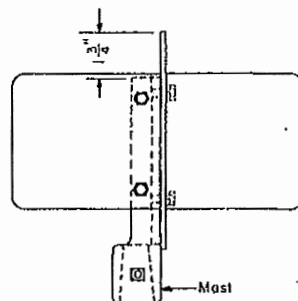
NOTES:

1. For additional details, see Plan 3020-2.
2. These switch stands are manufactured by Bethlehem Steel Corporation.
3. Model 50-A is a low type 10" high. Use in yards and terminals on switches that are not electrically locked and where there is limited clearance. Do not use on Mainline switches without specific authorization of the Chief Engineering Officer.
4. Model 50-B is an intermediate height stand. Use on Mainline switches and at all locations where there is sufficient side clearance for the required 16' long headblocks.
5. Throw in switch stand to be 5".

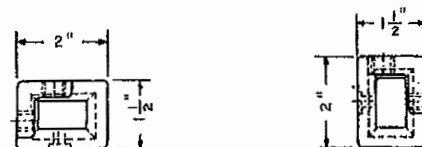
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3020-1
			Oct. 28, 1992
NEW CENTURY SWITCH STAND INTERMEDIATE - MODEL 50-B AND LOW - MODEL 50-A		ISSUE DATE ISSUE NO.	
John D. Ray ENGINEERING OFFICER		W. A. ... CHIEF ENGINEERING OFFICER	



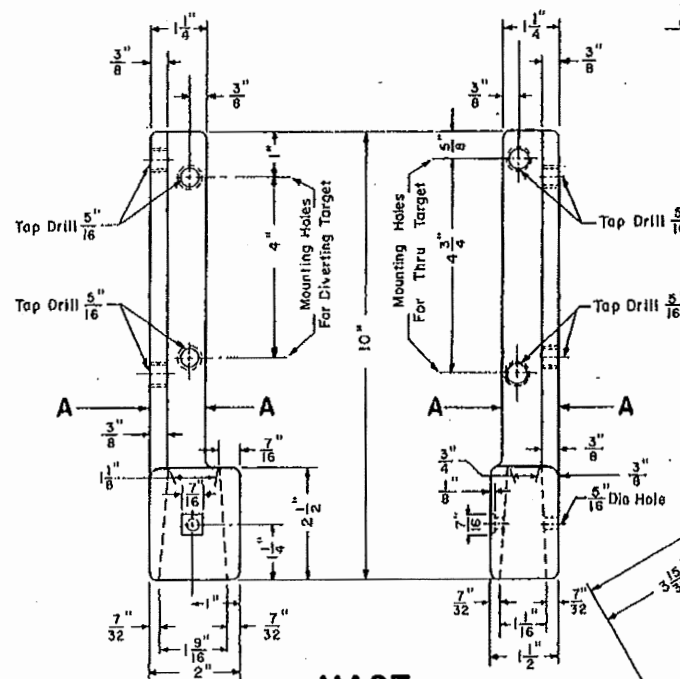
TOP VIEW



SIDE VIEW

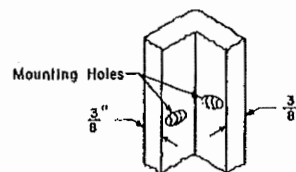


TOP VIEWS

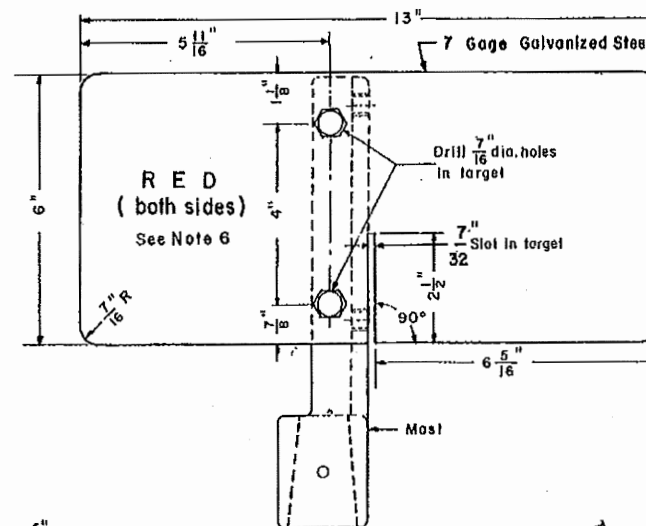


MAST

Cost Aluminum

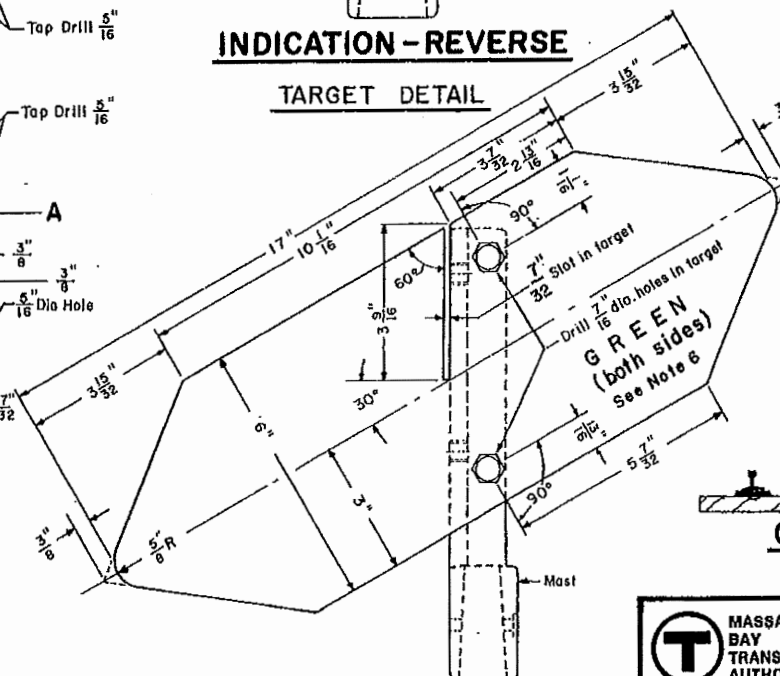


**A-A
VIEW AT MOUNTING HOLES**



INDICATION - REVERSE

TARGET DETAIL

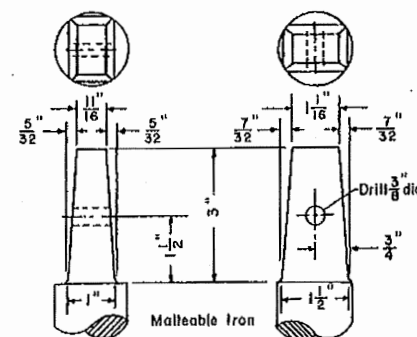


INDICATION-NORMAL

TARGET DETAIL

NOTES:

1. Targets shall be 7 gage Galvanized Steel Sheet.
2. All corners and edges of masts and targets shall have a smooth finish.
3. The steel surface of the targets shall be thoroughly cleaned with Oakite 33 before the application of reflectorized Scotchlite.
4. Scotchlite shall be applied to both surfaces following the manufacturer's instructions completely using a heat and vacuum process.
5. Care must be exercised when sliding targets into slots and fastening them to the mast to reduce the possibility of damaging the Scotchlite material.
6. **COLOR**
Red - No. 2872 Red Hi-Intensity Scotchlite
Green - No. 2877 Green Hi-Intensity Scotchlite



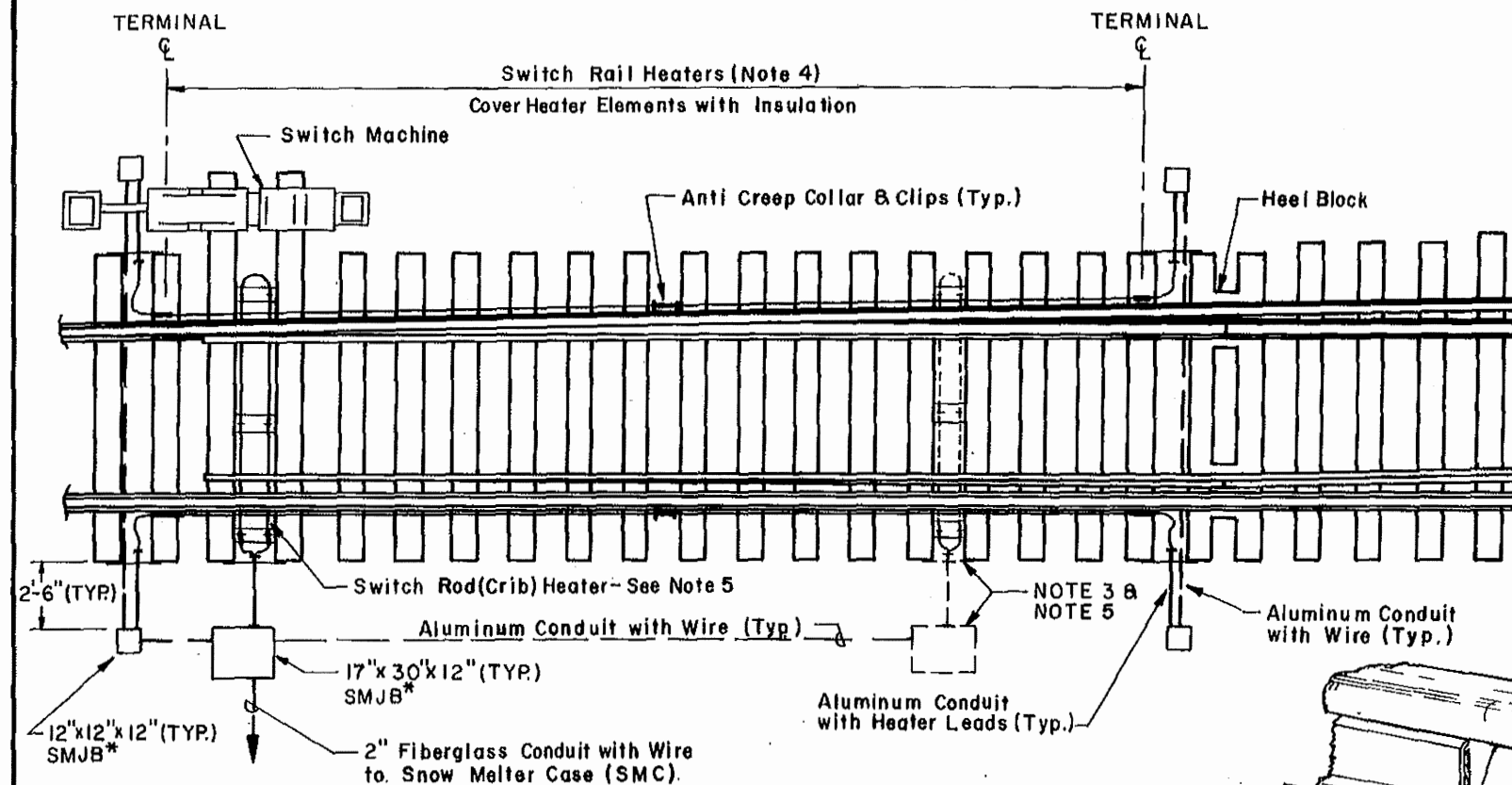
TOP OF SPINDLE

Upward point shall always point away from track when switch is set normal for thru movement

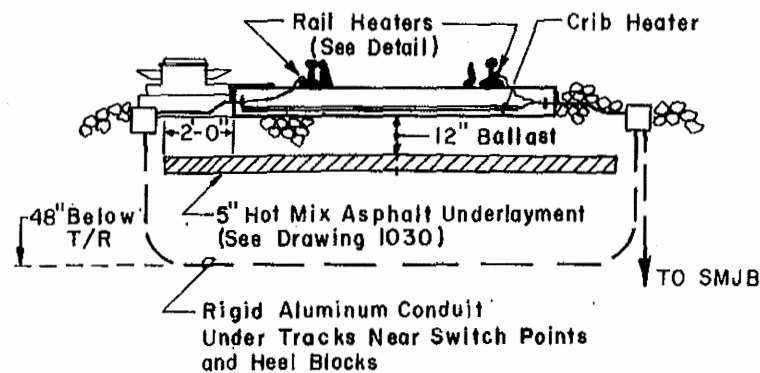


GENERAL APPLICATION

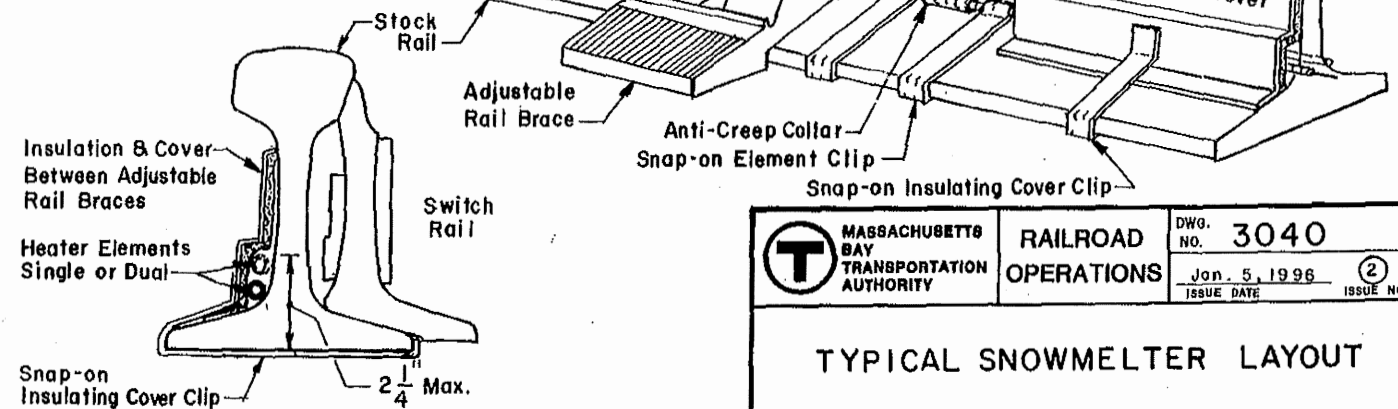
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3030 Oct. 28, 1992 ISSUE DATE	(2) ISSUE NO.
	SWITCH STAND TARGET			
John D. Ray ENGINEERING OFFICER		W. A. [Signature] CHIEF ENGINEERING OFFICER		



TYPICAL SNOWMELTER LAYOUT



TYPICAL SECTION



DETAIL AT RAIL HEATER INSTALLATION

NOTES:

1. All mounting hardware including snap-on clips, bolts, nuts and washers shall be hot dipped galvanized or stainless steel.
2. All snowmelter elements shall be provided complete with fastening hardware.
3. For a No. 20 layout, add a crib heater in the helper rod bay and a snow melter junction box.
4. At operationally critical locations, dual switch rail and crib heaters shall be installed as directed.
5. Brackets supporting the crib heaters shall be installed 5 1/2" below the base of rail. The area under the crib heaters must be clear and sloped for drainage of the crib.

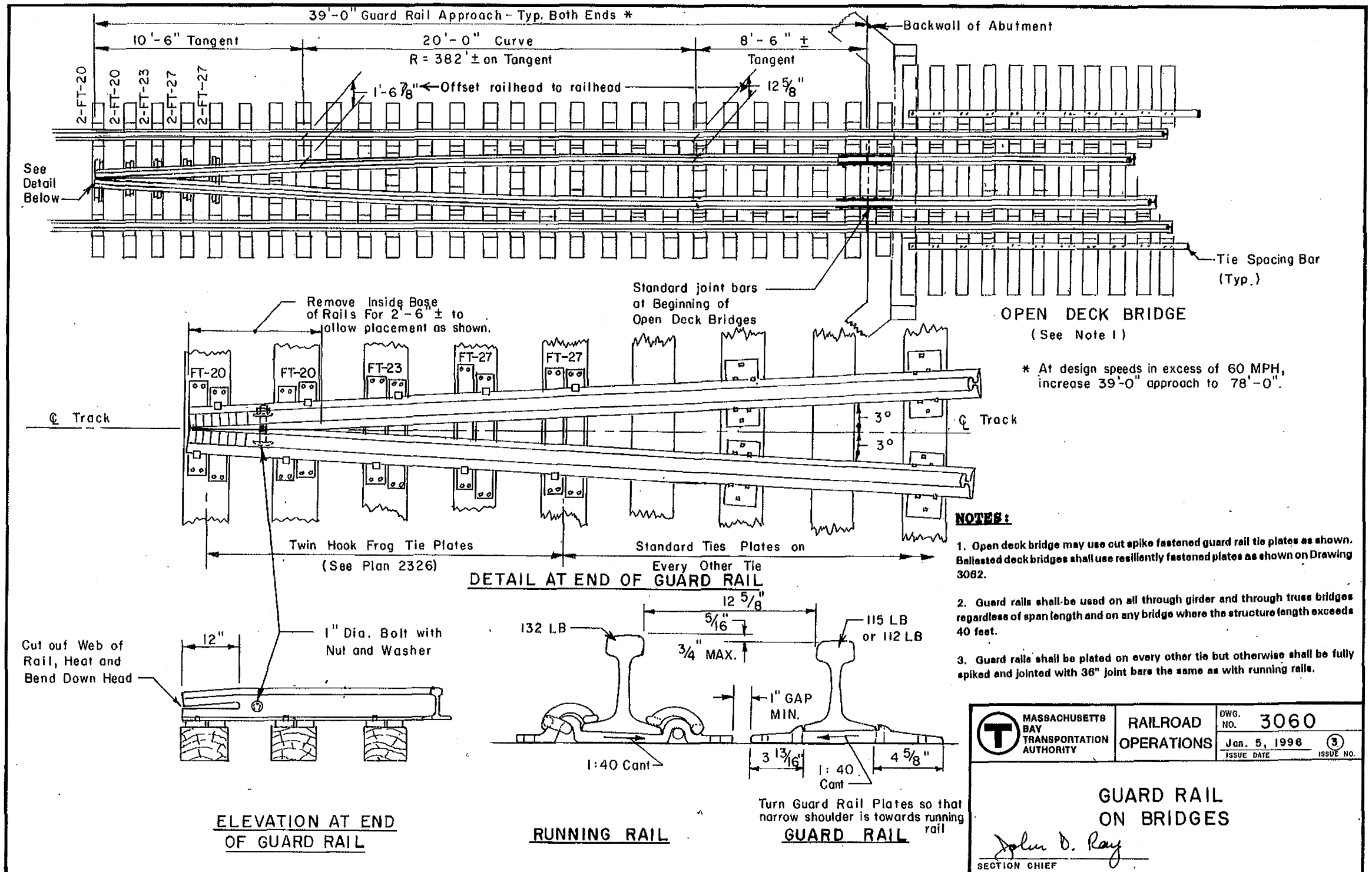
LEGEND

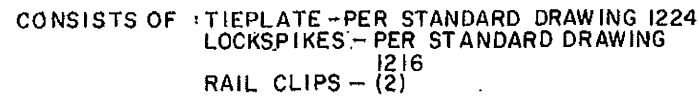
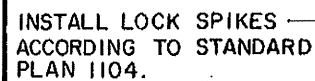
- * SMJB = Snowmelter Junction Box
- = Aluminum Conduit with Heater Leads
- = Aluminum/Fiberglass Conduit with Wire
- = Switch rod/Rail Heaters with Sealed Terminals

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3040
			Jan. 5, 1996
			ISSUE DATE

TYPICAL SNOWMELTER LAYOUT

John D. Ray
SECTION CHIEF



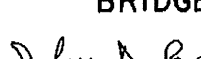


1. This installation shall be used on ballasted deck bridges with timber ties.
2. For additional details of guard rail installation, see Drawing No. 3060.
3. Tie plates shall conform to current AREA specifications.
4. Guard rail plates shall be branded to designate the section, three letters or a trademark to indicate the producer and two figures being the last year rolled. Lettering shall be on the gage side of the plate.
5. Material shall be ASTM A-36 steel.
6. Guard rail rails shall be placed on every other tie unless otherwise specified.
7. Welds shall be made so as not to interfere with the installation of the rail or the rail clips.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3062
			Jan. 5, 1996 ISSUE DATE

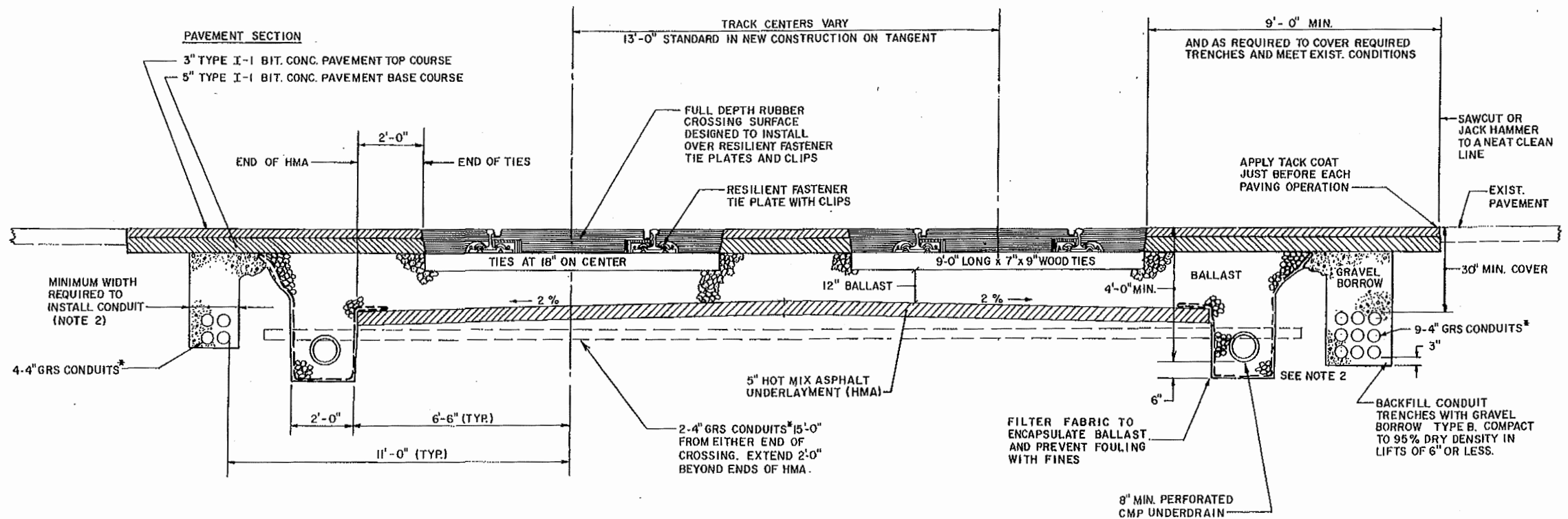
RESILIENTLY FASTENED

BRIDGE GUARD RAIL



SECTION CHIEF

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3100 Oct. 28, 1992 ISSUE DATE	(1) ISSUE NO.
	GRADE CROSSING LAYOUT		
 _____ ENGINEERING OFFICER		 _____ CHIEF ENGINEERING OFFICER	

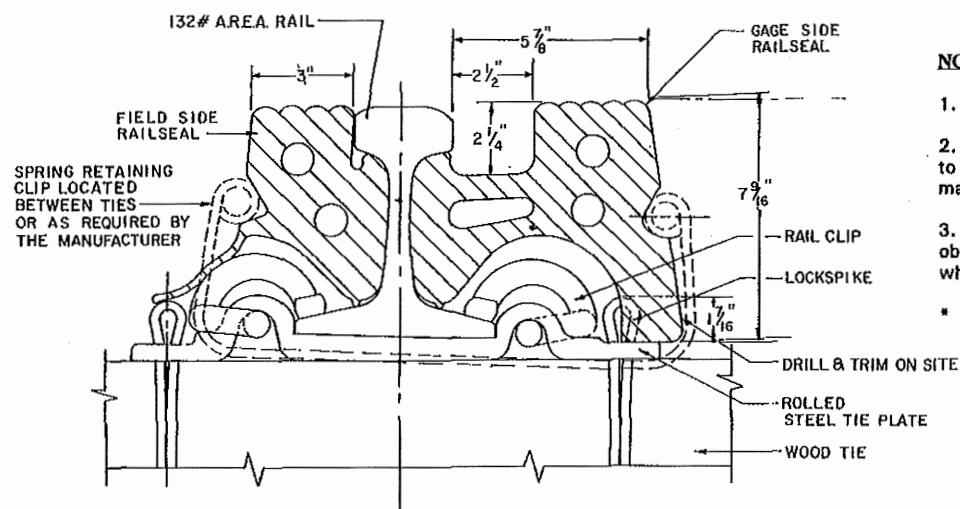
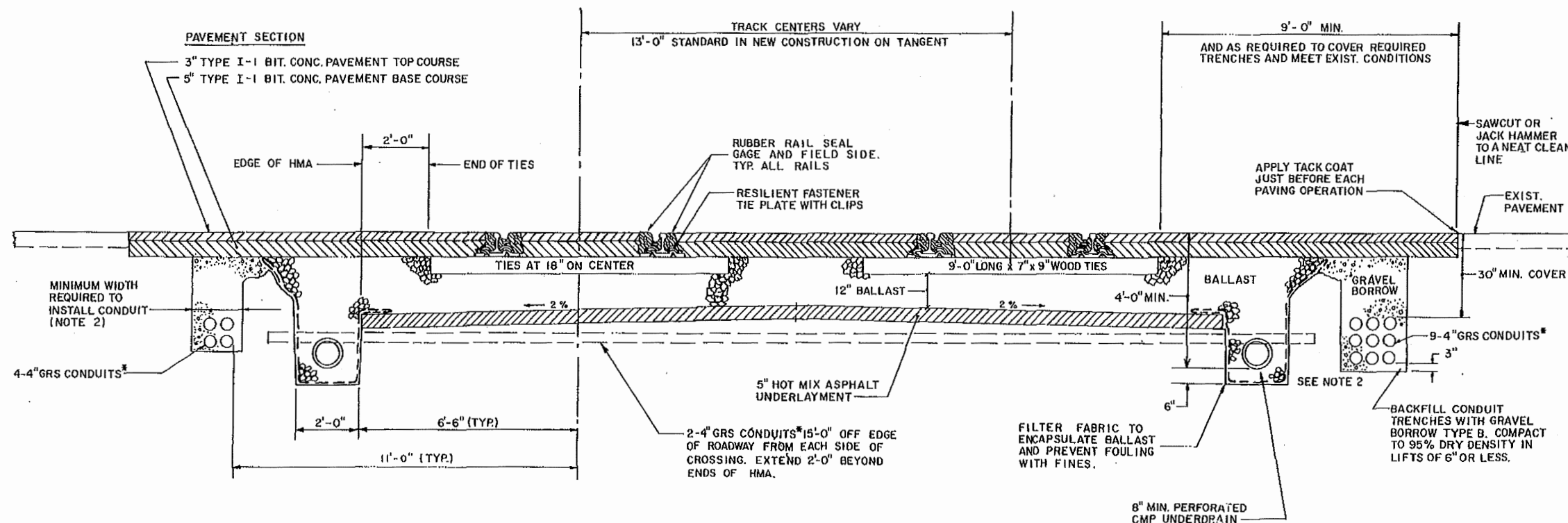


NOTES:

1. For plan of typical crossing, see drawing 3100.
2. To minimize settlement, keep excavation for underdrains and conduits to a minimum. Compact backfill in lifts not exceeding 6" to 95% of maximum dry density.
3. If soil or drainage conditions at the site are poor, the designer must obtain subsurface data and design subgrade and drainage modifications which may differ from what is shown on this standard design.

* GRS = Galvanized Rigid Steel (conduit).

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3106
			Oct. 28, 1992 ISSUE DATE
TYPICAL SECTION FULL DEPTH RUBBER CROSSING			
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	



DETAIL AT RAIL SEAL

DIMENSIONS ARE FOR 132 LB RE RAIL

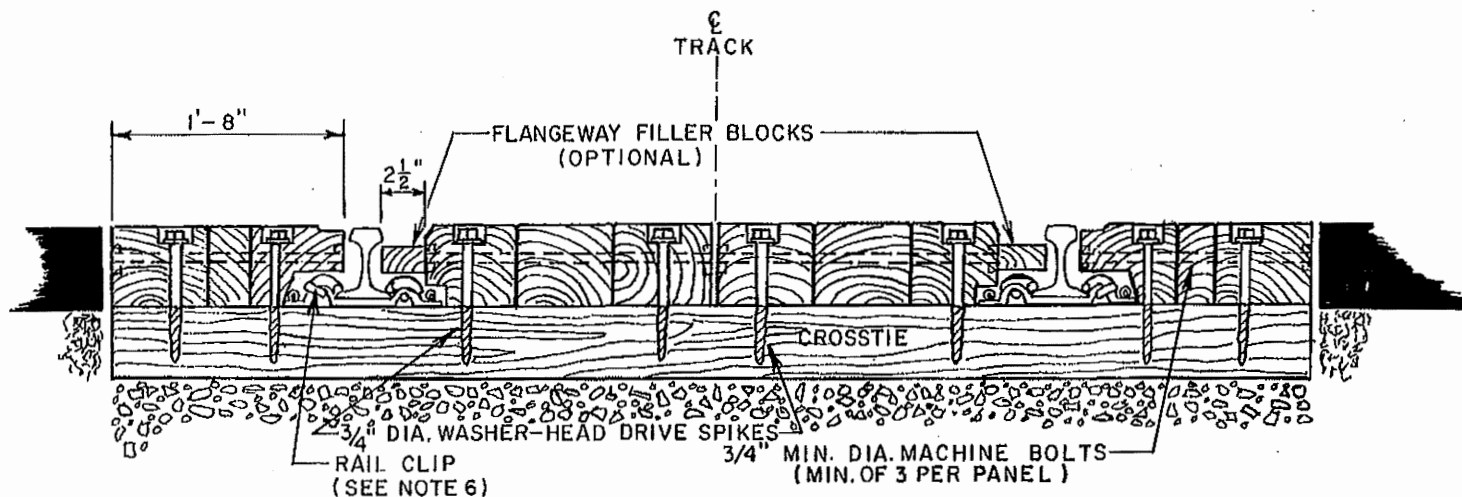
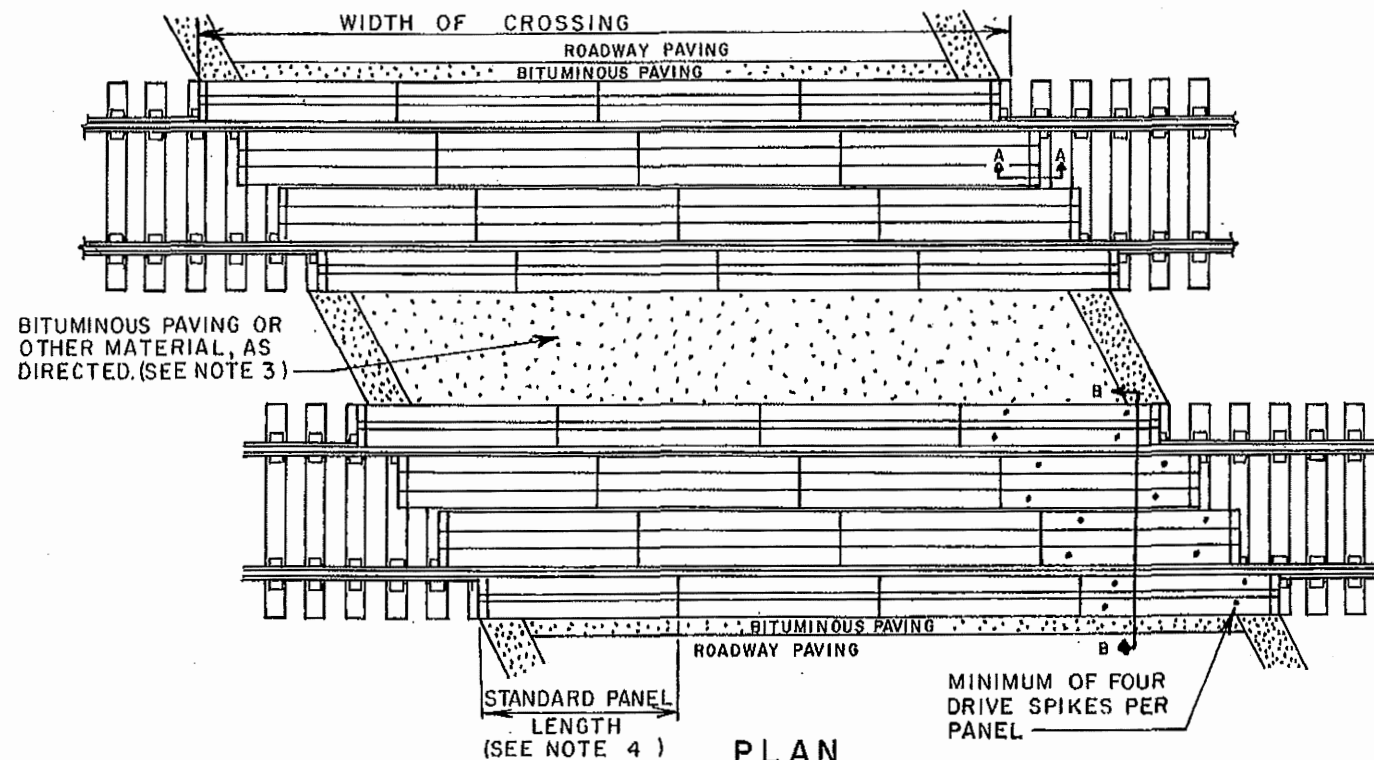
NOTES:

1. For plan of typical crossing, see drawing 3100.
2. To minimize settlement, keep excavation for underdrains and conduits to a minimum. Compact backfill in lifts not exceeding 6" to 95% of maximum dry density.
3. If soil or drainage conditions at the site are poor, the designer must obtain subsurface data and design subgrade and drainage modifications which may differ from what is shown on this standard design.

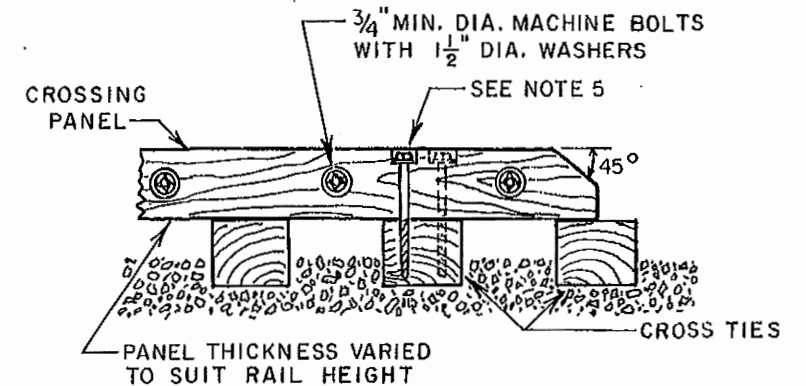
* GRS = Galvanized Rigid Steel (conduit).

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3108
			Oct. 28, 1992 ISSUE DATE
John D. Remy ENGINEERING OFFICER		[Signature] CHIEF ENGINEERING OFFICER	

TYPICAL SECTION RUBBER RAIL SEAL CROSSING



TYPICAL TRACK SECTION
Section B-B

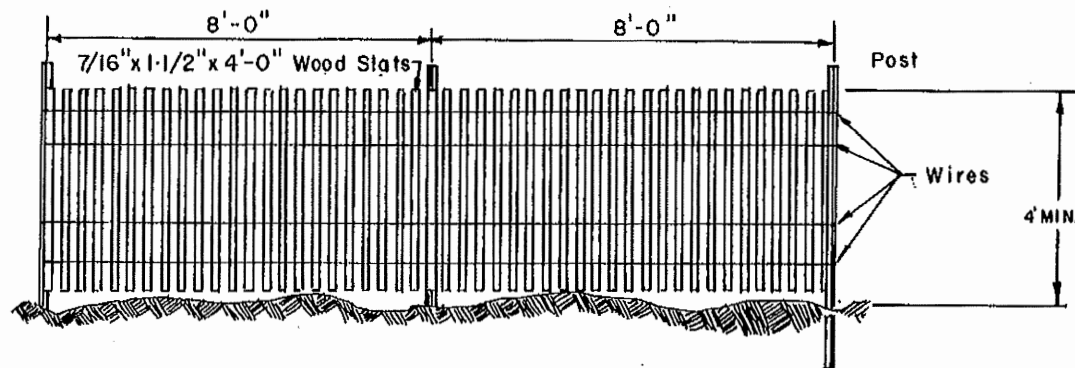


SIDE VIEW OF END PANEL
Section A-A

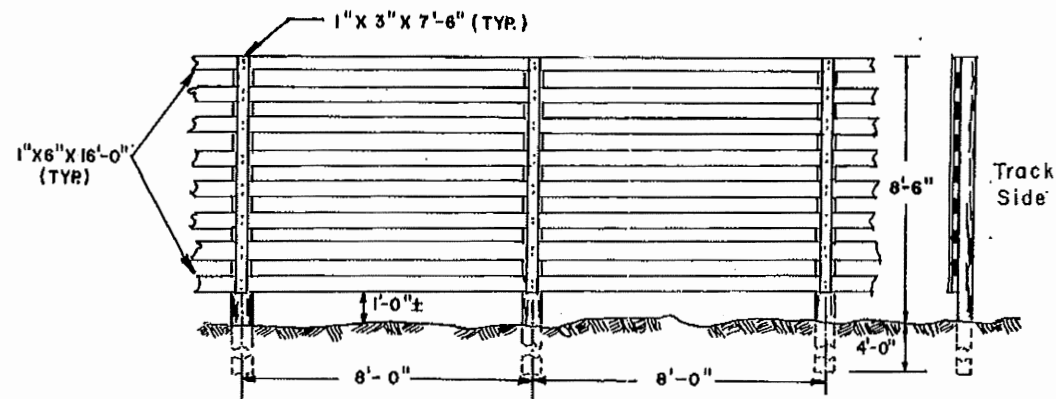
NOTES:

1. Timber grade crossing is to be used as a temporary crossing only, as directed or approved by the Chief Engineer.
2. When grade crossing is removed, spike holes shall be treated and plugged.
3. When the grade crossing contains multiple tracks, the paving material between the tracks shall be approved by the Chief Engineer.
4. Standard panel lengths are 8'-0" and 6'-4 3/4". Additional lengths are attained through multiples of these basic units.
5. Crossing panels to be bored in the field to fit existing tie spacing.
6. Timber panels to be manufactured to clear resilient track fastening system. Rail clip type and/or number to be provided to grade crossing supplier.
7. Timber panels shall be treated with creosote preservative as per A.R.E.A., Chapter 3.

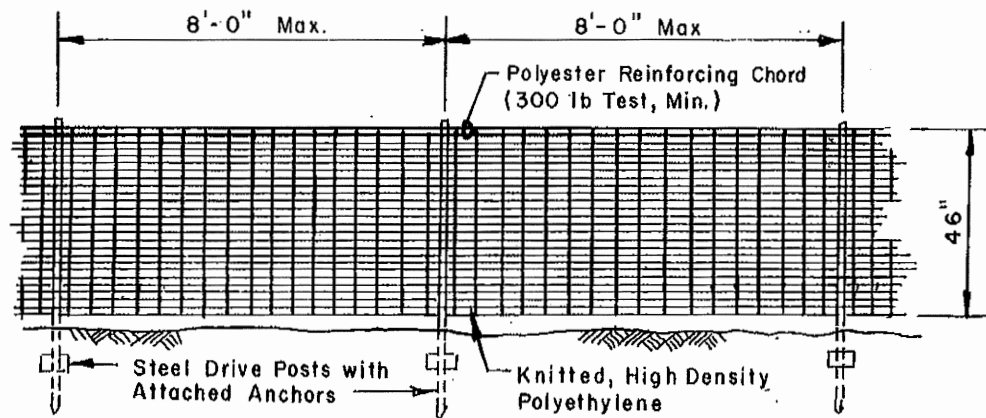
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3120
			Oct. 28, 1992 ISSUE DATE
TEMPORARY TIMBER GRADE CROSSING			ISSUE NO. 1
John D. Ray ENGINEERING OFFICER		[Signature] CHIEF ENGINEERING OFFICER	



SLAT TYPE PORTABLE SNOW FENCE



WOOD OPEN BOARD SNOW FENCE



PORTABLE PLASTIC SNOW FENCE

NOTE

1. Posts and other materials used in the construction/erection of the snow fencing shall conform to the applicable standards of the AREA Manual, Part 6.

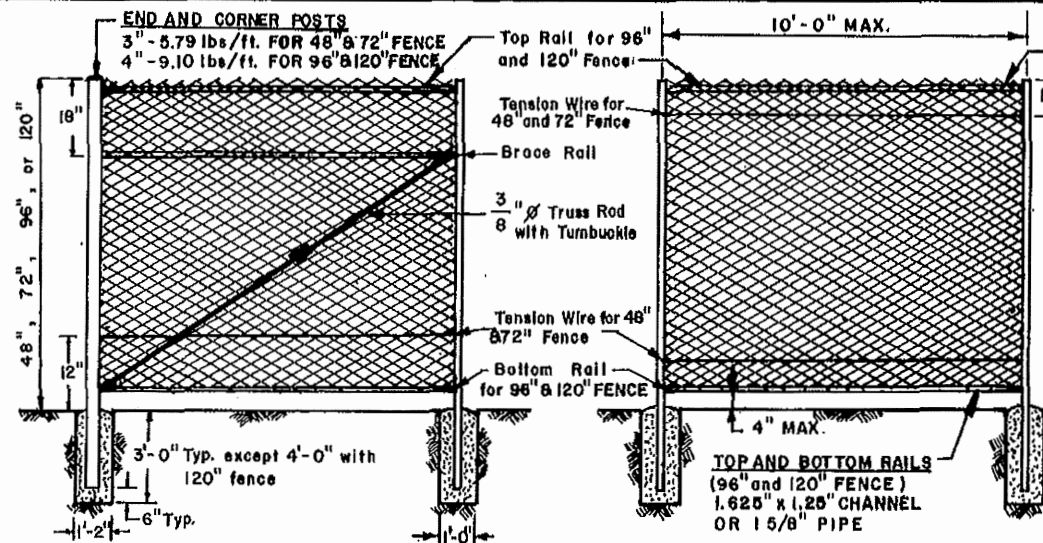
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3200
		Oct. 28, 1992 ISSUE DATE
SNOW FENCES		
John D. Ray ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	

[illegible]

NOTES:

-
- Top & Bottom Rails with 3/8" ϕ Truss Rod on End Panels only.
- 10'-0" (Typ.) End Panel
- 10'-0" (Typ.) Line Panel (Note 6)
- 4'-0"
- 9 Gage Tension Wire
- Fabric
- 6" Max.
- Leave space to prevent debris accumulation and allow escape of small animals.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3204 Oct. 28, 1992 ISSUE DATE	(1) ISSUE NO.
	INTERTRACK FENCE		
 _____ ENGINEERING OFFICER		 _____ CHIEF ENGINEERING OFFICER	



END OR CORNER PANEL*

*BRACE PANEL TO INCLUDE AN ADDITIONAL PANEL BRACED AS SHOWN EXCEPT TRUSS ROD IN OPPOSITE DIRECTION.

LINE PANEL

TOP AND BOTTOM RAILS
(96" and 120" FENCE)
1.625" x 1.25" CHANNEL
OR 1 5/8" PIPE

FENCE FABRIC - SHALL BE TYPE I, GALV. STEEL
ASTM A392, SIZE 6, COATING 2 OR TYPE II,
ALUMINUM COATED STEEL, ASTM A491, SIZE 6.
MESH, 2" MAX.

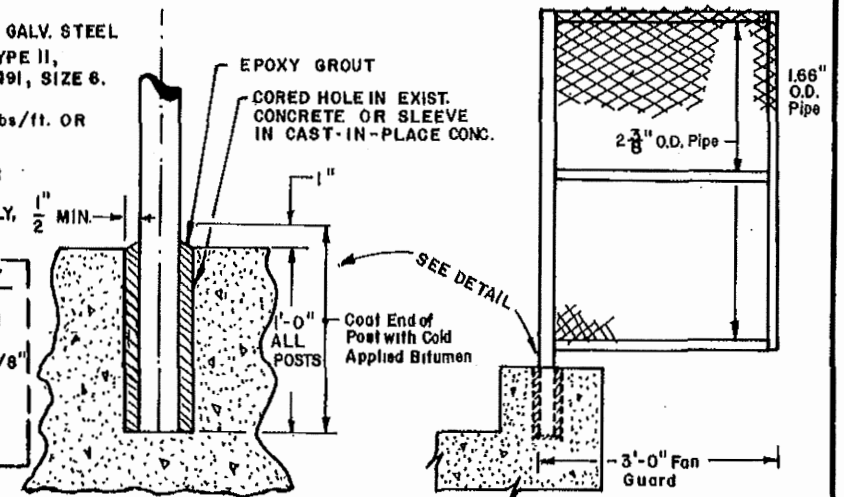
LINE POSTS - SHALL BE 2 3/8" - 3.12 lbs./ft. OR
AS FOLLOWS:

- 72" FENCE - 2.25" x 1.70" 'H' POSTS OR
48" FENCE - 'C' POSTS.
- 96" FENCE - 2.25" x 1.70" 'H' POSTS ONLY, 1/2" MIN.

HIGH SECURITY FENCE ONLY

WHEN HIGH SECURITY FENCE IS
INDICATED, MODIFY ITEMS SHOWN ON
THIS SHEET AS FOLLOWS:

• FABRIC - ASTM A491, Size II, Mesh 3/8"
• LINE POSTS - 3" - 5.79 lbs./ft.
• END POSTS - 4" - 9.10 lbs./ft.
• USE TOP & BOTTOM RAILS FOR 120",
96" & 72" FENCE
• POST SPACING 6' - 0" MAX



POST ANCHORED INTO CONCRETE

CANTILEVER FENCE DETAIL

BARBED WIRE TOP

USE ON FENCE AND GATES WHEN INDICATED.
SHALL BE THREE STRANDS OF BARBED
WIRE SUPPORTED ON EXTENSION ARMS
LOCATED ON ALL POSTS.

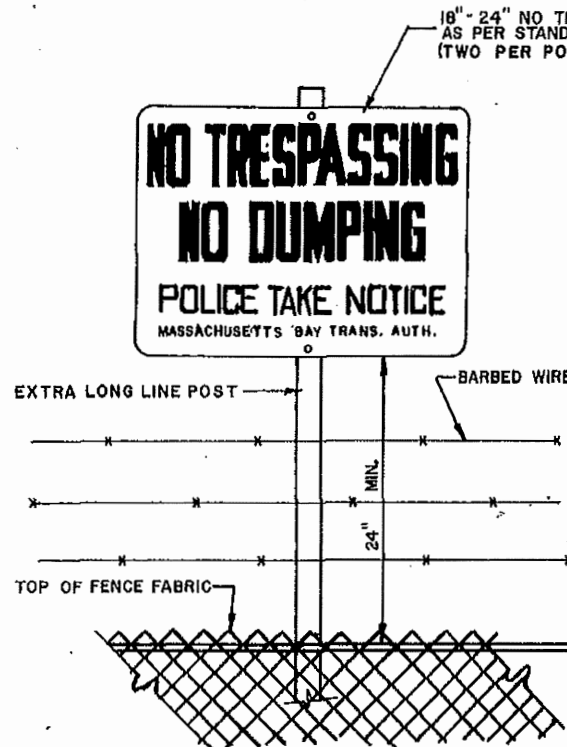
SIGN INSTALLATION NOTES

*NO TRESPASSING SIGNS TO BE INSTALLED
ON BOTH SIDES OF POSTS, FASTEN WITH
2 - 3/8" HIGH STRENGTH BOLTS, NUTS
AND WASHERS. END OF BOLTS TO BE
TACK WELDED TO PREVENT
EASY REMOVAL OF SIGNS.

: SIGNS TO BE INSTALLED AT 200' MAX
INTERVALS, ALL LOCATIONS WHERE FENCE
ANGLE CHANGES MORE THAN 30° AND ON
ALL GATES. (FOR GATE INSTALLATION,
SEE PLAN NO. 3208.)

GENERAL NOTES

1. FOR HIGH SECURITY FENCE, SEE THE DASHED BOX
TOP CENTER OF DRAWING.
2. FOR INTERMEDIATE BRACING PANEL, SEE "END OR
CORNER PANEL".
3. ALL PIPE DIMENSIONS ARE OUTSIDE DIAMETER.
4. ALL POSTS AND HARDWARE SHALL BE HOT-DIPPED
GALVANIZED STEEL.

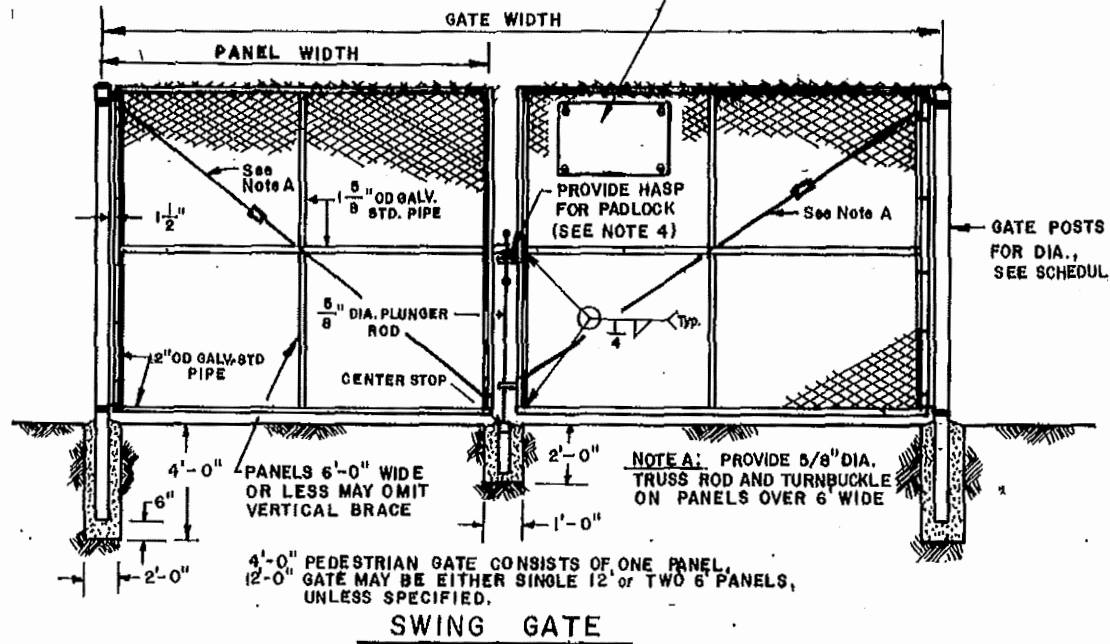


SIGN MOUNTING DETAIL

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3206
			Oct. 28, 1992 ISSUE DATE
CHAIN LINK FENCING 48", 72", 96", 120" and "HIGH SECURITY" TYPE		ISSUE NO. (2)	
John D. Ray ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	

When barbed wire fence is indicated, the barbed wire shall also be placed on the gates

All gates shall have a NO TRESPASSING sign mounted on the outside of the fence fabric as shown below.



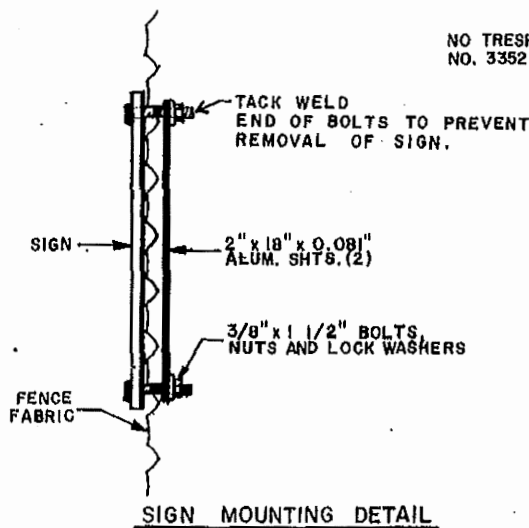
GATE POST SCHEDULE

HEIGHT OF FENCE	GATE WIDTH	GATE POSTS	
		O. D.	WEIGHT
96" and 120"	4'-0"	4"	9.10 lbs./ft.
	12'-0"	6 5/8"	18.97 "
	20'-0"	6 5/8"	18.97 "
	24'-0"	6 5/8"	18.97 "
48" and 72"	30'-0"	8 5/8"	28.55 "
	4'-0"	3"	5.79 lbs./ft.
	12'-0"	4"	9.10 "
	20'-0"	6 5/8"	18.97 "
	24'-0"	6 5/8"	18.97 "
	30'-0"	6 5/8"	18.97 "

NOTES:

1. For fabric, see drawing NO. 3206
2. All hinges and hardware to be the heaviest available and hot dip galvanized.
3. Sliding or cantilever type gates may also be used. Details must be submitted for approval.
4. Hasp shall have a hole diameter & overall size to accept the MBTA's standard R.O.W. lock.

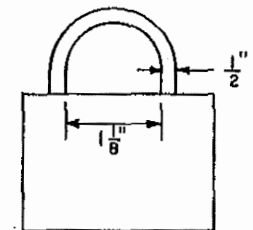
Gate panels over 15'-0" must have additional bracing than that shown



NO TRESPASSING sign as per STD PLAN NO. 3352

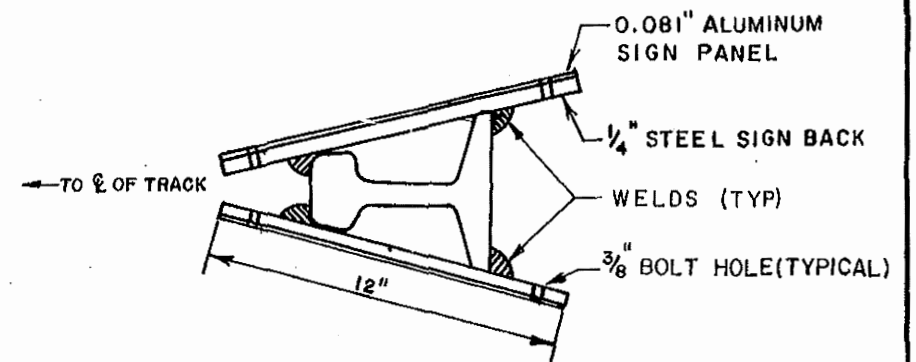
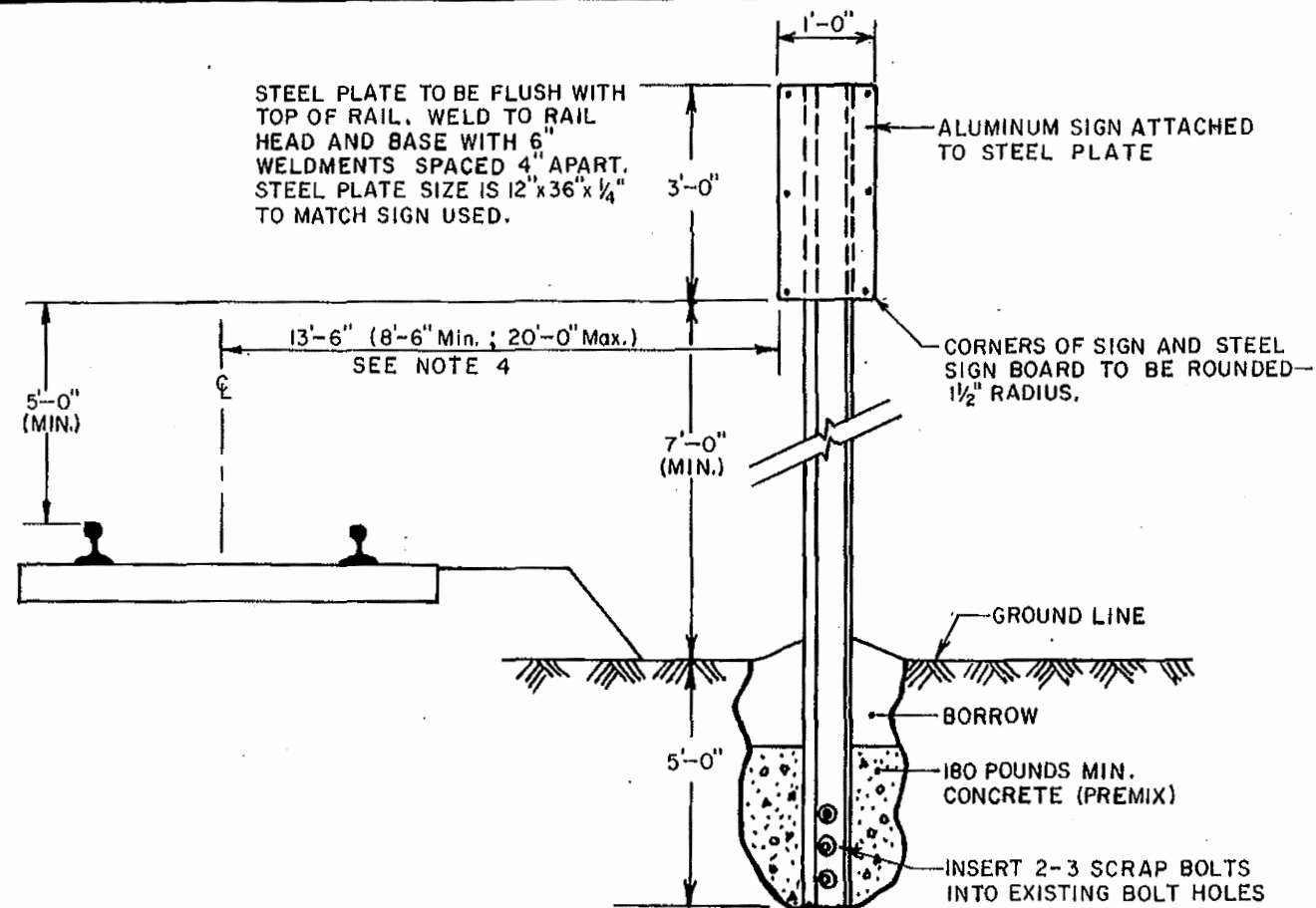


2" x 18" x 0.081 ALUM. SHEETS BEHIND SIGN AND FABRIC FOR MOUNTING.



STANDARD MBTA R.O.W. LOCK

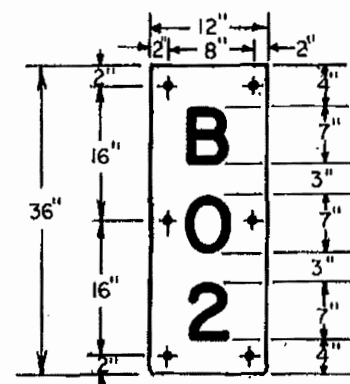
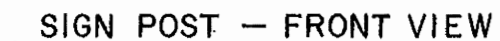
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3208
			Oct. 28, 1992
		ISSUE DATE	
		ISSUE NO. 1	
CHAIN LINK FENCE GATES			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



SIGN - TOP VIEW
Not to Scale

NOTES:

1. Posts are to be made from scrap rail, not less than 112 LB section, free from bends, kinks or visible damage. Length of posts shall be as required to place sign boards at the indicated dimensions and will be 15 feet long, minimum.
2. Two sign backs per post shall be 12"x36", 1/4" thick steel. Remove edging burrs, sharp edges, and corners.
3. Sign boards and rail posts shall be carefully cleaned with a solvent to remove all dirt and grease. A coat of primer suitable for use on metal shall be applied to all surfaces, and two finish coats of durable white enamel suitable for outdoor use over metal shall be applied with 24 hours minimum drying time between coats.
4. 13'-6" dimension, sign to centerline of track, may be altered where conditions such as steep embankment slope prohibit placement. In no case shall sign be closer than 8'-6" to centerline of track, nor further than 20'-0".
5. Sign to be 12"x36"x.081" Aluminum Alloy 6061-T6 with 6 - 3/8" holes as shown.
6. Mount sign to 1/4" steel plate with 4 - 5/16" bolts 1" long, 4 flat washers, 4 lock washers and 4 nuts all cadmium plated. Steel plate shall be sized and drilled to match sign.
7. Background to be white reflectorized, FSL-S-300 A type, class 1 or 2, reflectivity 1.
8. Mileage numerals and letters shall be 7" high Helvetica Medium style, black glass silk screen letters MHD materials spec. M7.04.12.



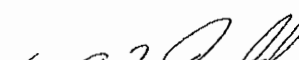
SIGN — FRONT VIEW
Not to Scale

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3302
		Oct. 28, 1992 ISSUE DATE

MILE POSTS



 ENGINEERING OFFICER



 CHIEF ENGINEERING OFFICER

RAILROAD
OPERATIONS

DWG. NO. 3302

Oct. 28, 1992

ISSUE DATE

1

ISSUE NO.

Oct. 28, 1992
ISSUE DATE

ISSUE DATE _____ ISSUE NO. _____

①
SUE NO.

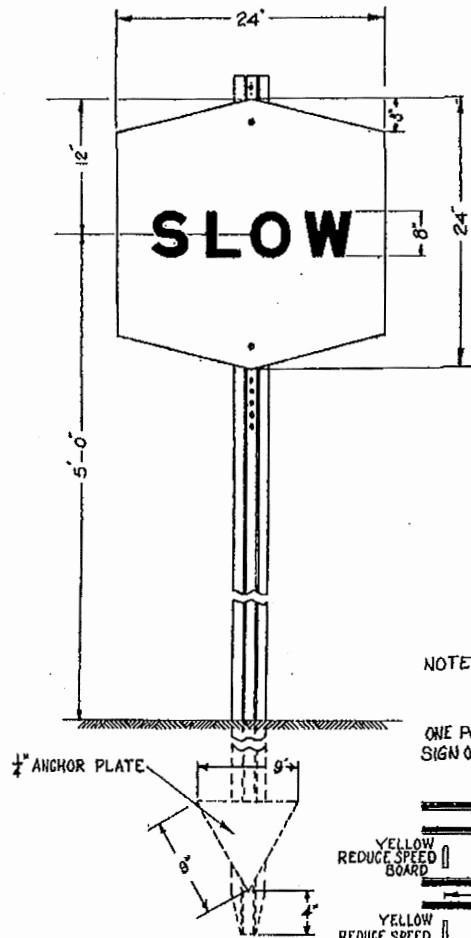
MILE POSTS

John D. Ray
ENGINEERING OFFICER

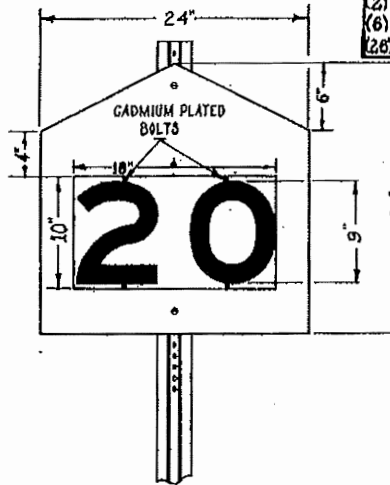

CHIEF ENGINEERING OFFICER

REQUIREMENTS

FOR ONE SINGLE-TRACK LOCATION	(2) REDUCE-SPEED BOARDS -	(2) PLATES 10"x18" (30-40)
	(2) SLOW BOARDS -	(6) U-SECTION POSTS 9'-6" LONG
	(2) RESUME-SPEED BOARDS -	(26 2" BOLTS
	(2) PLATES 10"x18" (10-20) -	
FOR ONE DOUBLE-TRACK LOCATION	(2) REDUCE-SPEED BOARDS	(2) REDUCE-SPEED BOARDS
	(2) SLOW BOARDS -	(2) SLOW BOARDS -
	(2) RESUME-SPEED BOARDS -	(2) RESUME-SPEED BOARDS -
	(2) PLATES 10"x18" (10-20) -	(2) PLATES 7"x12" (10-20) *
	(2) PLATES 10"x18" (30-40) -	(2) PLATES 7"x12" (30-40) "
	(6) U-SECTION POSTS 9'-6" LONG	(4) U-SECTION POSTS 4'-11" LONG
	(26) 2" BOLTS	(20) 2" BOLTS



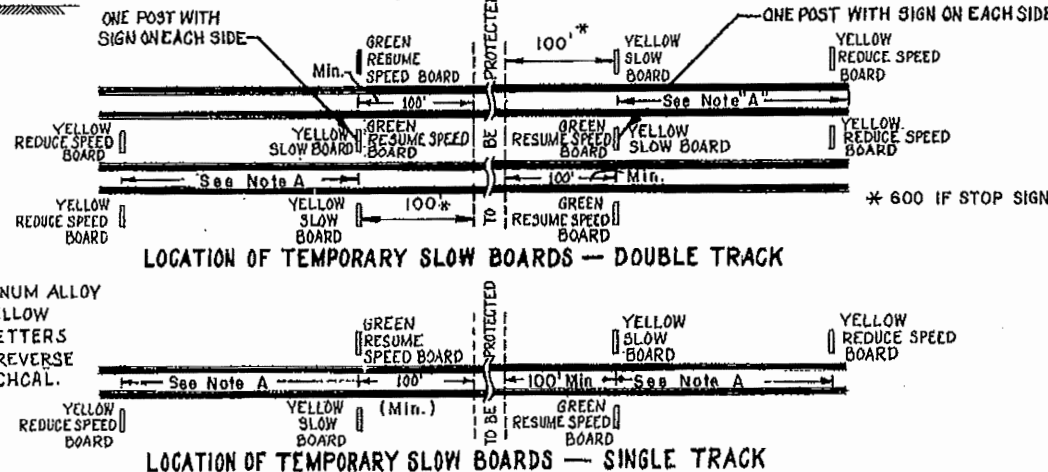
SLOW BOARD
USE A 24"x24"x.081" ALUMINUM ALLOY
6061-T6, No. 2271 YELLOW
SCOTCHLITE, 8" SERIES 'D' LETTERS
605 BLACK SCOTCHCAL. ON REVERSE
SIDE. USE 485 BLACK SCOTCHCAL.



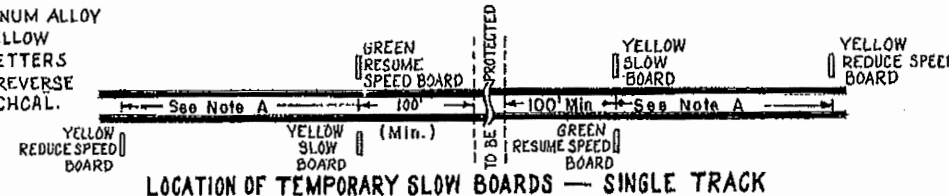
REDUCE SPEED BOARD
USE A 24"x24"x.081" ALUMINUM ALLOY
6061-T6, No. 2271 YELLOW SCOTCHLITE
ON REVERSE, SIDE USE 485 BLACK SCOTCHCAL.

TWO ATTACHABLE (10"x18" ALUMINUM PLATES) WITH
9" SERIES 'D' NUMBERS (605 BLACK SCOTCHCAL)
AND NO. 2271 YELLOW SCOTCHLITE ON EACH SIDE
AS FOLLOWS: (10-20), (30-40) (ATTACH PLATES
WITH CADMIUM PLATED BOLTS AND WASHERS)

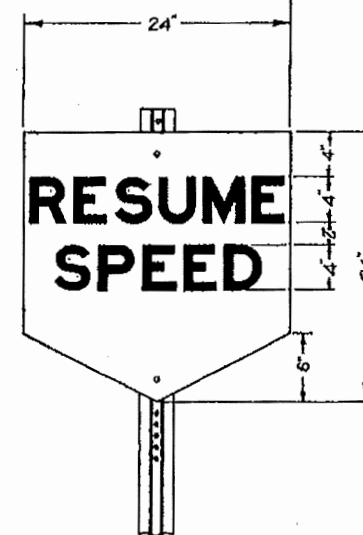
NOTE: PUNCH 3/8" HOLES AS SHOWN ON EACH
PLATE FOR 5/8" BOLTS 2" LONG
WITH CADMIUM PLATED WASHERS.



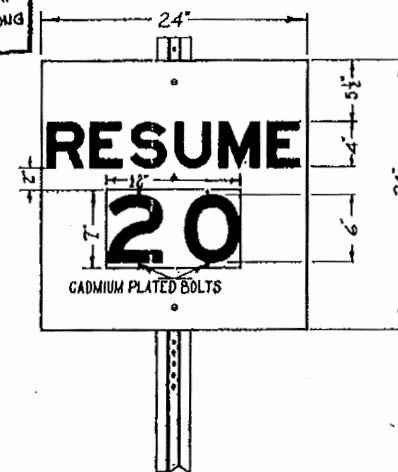
LOCATION OF TEMPORARY SLOW BOARDS — DOUBLE TRACK



LOCATION OF TEMPORARY SLOW BOARDS — SINGLE TRACK



RESUME SPEED BOARD
USE A 24"x24"x.081" ALUMINUM ALLOY
6061-T6, No. 2277 GREEN SCOTCHLITE,
4" SERIES 'D' LETTERS 605 BLACK
SCOTCHCAL. ON REVERSE SIDE USE
485 BLACK SCOTCHCAL.



**INTERMEDIATE
RESUME SPEED BOARD**
USE A 24"x24"x.081" ALUMINUM ALLOY
6061-T6, No. 2271 YELLOW SCOTCHLITE,
4" SERIES 'D' LETTERS 605 BLACK SCOTCHCAL
ON REVERSE SIDE USE 485 BLACK SCOTCHCAL.
TWO ATTACHABLE (7"x12" ALUMINUM PLATES) WITH
6" SERIES 'D' NUMBERS (605 BLACK SCOTCHCAL)
AND NO. 2271 YELLOW SCOTCHLITE ON EACH SIDE
AS FOLLOWS: (10-20), (30-40) (ATTACH PLATES
WITH CADMIUM PLATED BOLTS AND WASHERS)

(TO BE USED WHEN A SECONDARY RESTRICTION
IS SET UP WITHIN THE LIMITS OF RESTRICTION)
LOCATION: 100 FT. BEYOND THE POINT TO BE
PROTECTED AND UPON THE RIGHT OF AND
ADJOINING TRACK TO WHICH IT REFERS.

NOTE A THE DISTANCES BETWEEN SIGNS IS VARIABLE AND
IS A FUNCTION OF TRACK SPEED. SEE DRAWING 3307.

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3306 Oct. 28, 1992 ISSUE DATE
	TEMPORARY SLOW BOARDS 		
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER	

Speed - MPH Reduced		Distance Between Signs - FEET (Level or Ascending Grade) *	
From	To	Passenger	Freight
80	70	1300	
"	60	2300	
"	50	3200	
"	40	4000	
"	30	4500	
"	20	5000	
"	10	5200	
"	STOP	5700	
70	60	1100	
"	50	2000	
"	40	2700	
"	30	3300	
"	20	3700	
"	10	4000	
"	STOP	4500	
60	50	1000	
"	40	1700	
"	30	2300	
"	20	2700	
"	10	3000	
"	STOP	3500	
50	40	800	2700
"	30	1400	4700
"	20	1800	6200
"	10	2200	7100
"	STOP	2700	7600

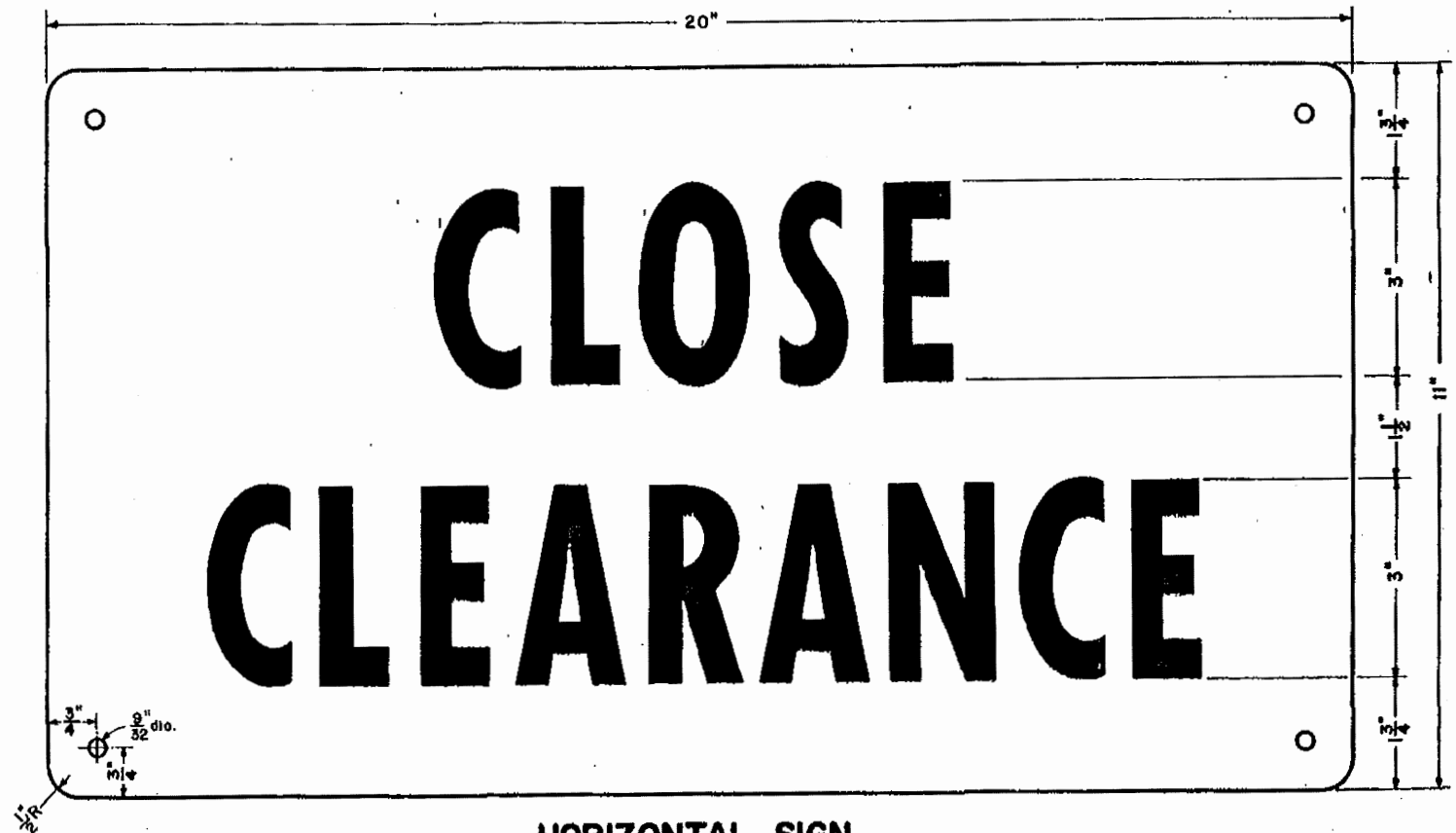
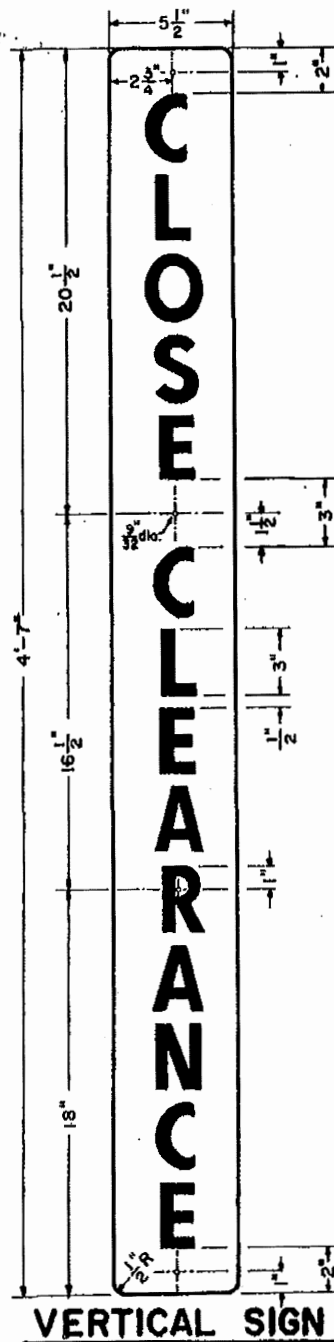
Speed - MPH Reduced		Distance Between Signs - FEET (Level or Ascending Grade) *	
From	To	Passenger	Freight
40	30	600	2100
"	20	1100	3500
"	10	1500	4500
"	STOP	2000	5000
30	20	500	1500
"	10	900	2400
"	STOP	1400	2900
20	10	400	900
"	STOP	900	1400
10	STOP	500	700

* For descending grades in percent, increase distances above as follows.

Level to 0.10 % - NONE	0.93% to 1.14 % - 40%	1.65% to 1.78 % - 80%
0.11% to 0.36 % - 10%	1.15% to 1.33 % - 50%	1.79% to 1.90 % - 90%
0.37% to 0.66 % - 20%	1.34% to 1.50 % - 60%	1.91% to 2.00 % - 100%
0.67% to 0.92 % - 30%	1.51% to 1.64 % - 70%	2.01% to 2.10 % - 110%

NOTE:
See Drawing NO. 3306 for sign detail and placement.

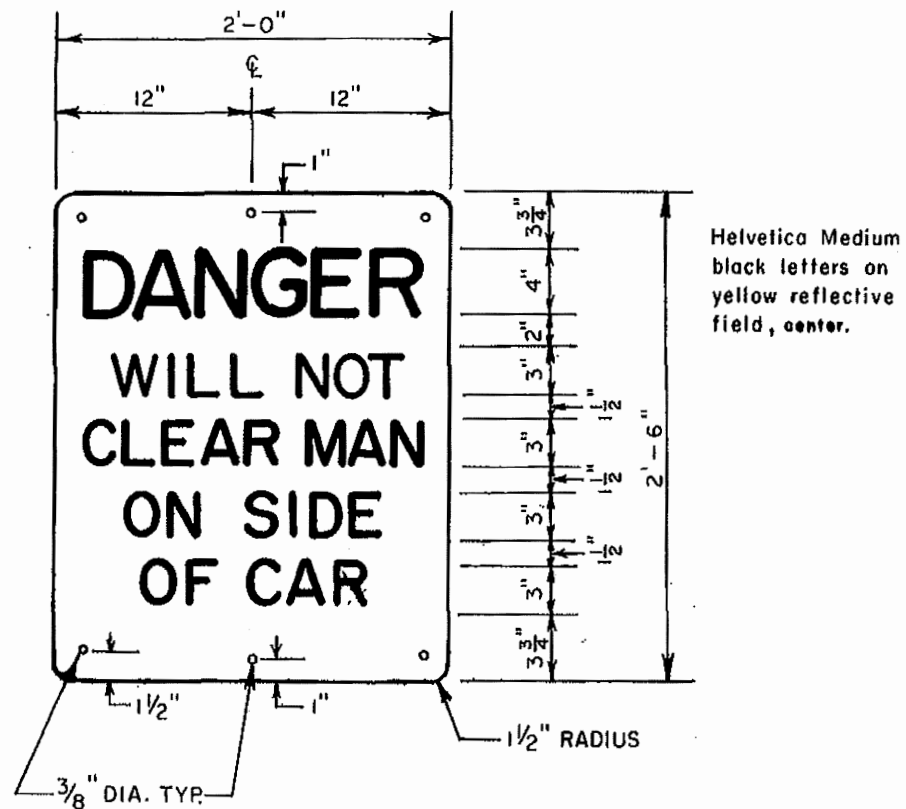
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3307
		Oct. 28, 1992 ISSUE DATE
TABLE OF SLOW BOARD PLACEMENT DISTANCES		
<i>John D. Ray</i> ENGINEERING OFFICER	<i>W. A. Ball</i> CHIEF ENGINEERING OFFICER	



NOTES

- 1 - The sign plate shall be 6061-T6 aluminum sheeting .081" thick, with one side covered with No.2870 Silver Scotchlite and No.605 Black Scotchlite letters.
- 2 - "Close Clearance" signs shall be displayed where objects do not provide for full clearance as per Plans 1012 to 1018. The signs shall be attached to the side of a building or other flat surface and shall be held away from the surface about 1" with furring strips or spools, to allow for ventilation. No.14 aluminum round head wood screws or 1/4" dia. aluminum bolts shall be used to attach the signs. Aluminum washers shall be used under heads of bolts or screws.
- 3 - Lettering to be .MBTA Standard Helvetica for the vertical sign and in the condensed form for the horizontal sign.
- 4 - Signs to be furnished with attachment hardware.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3312	ISSUE DATE	ISSUE NO. 1
		Nov. 17, 1986		
CLOSE CLEARANCE SIGNS				
Daniel Brown ENGINEERING OFFICER		W. A. Minchilli CHIEF ENGINEERING OFFICER		

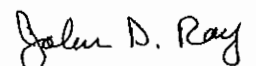


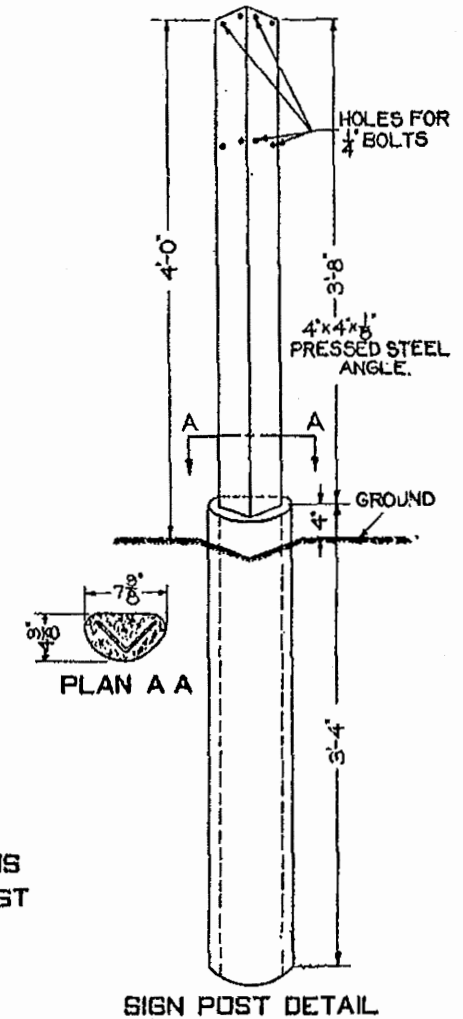
CLEARANCE WARNING SIGN

- Signs to be 0.081" thick aluminum alloy sheet, ASTM B 209.
- Black gloss silk letters MHD materials spec. M7.04.12.

NOTES:

1. Free standing signs shall be mounted on steel "U" shaped posts. Signs attached to structures shall be attached using threaded inserts.
2. All signs shall have six holes drilled to allow mounting on either posts or structures.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3314	ISSUE NO. 1
		Oct. 28, 1992 ISSUE DATE	
CLEARANCE WARNING SIGN			
 ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



SIGNS TO BE MADE OF #18 GAGE STEEL AND HAVE PORCELAIN ENAMEL FINISH.
COLORS-WORDS "DO NOT DIG" BLACK. BALANCE OF SIGN WHITE. WORD CABLE BLACK
ON YELLOW OVAL. LINE AROUND OVAL BLACK. BALANCE OF SIGN WHITE.
POST-4"x4"x $\frac{1}{8}$ " PRESSED STEEL ANGLE IRON, GALVANIZED & SET IN CONCRETE FOOTING.
BOLTS-SIGN BOLTS $\frac{1}{2}$ "x $\frac{3}{4}$ " AS SHOWN, TO BE BRONZE OR BRASS.

DWG. NO. **3344**
Nov. 17, 1986
ISSUE DATE 1 ISSUE NO.

DO NOT DIG-
BURIED CABLES

Daniel Breen
ENGINEERING OFFICER

W a Macdonald
CHIEF ENGINEERING OFFICER

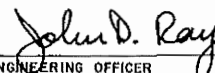
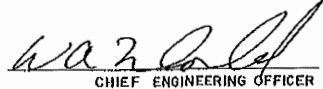


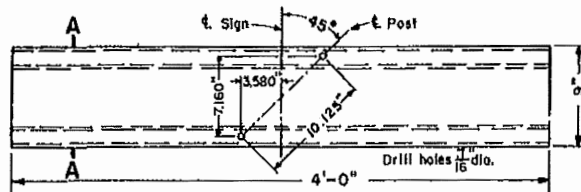
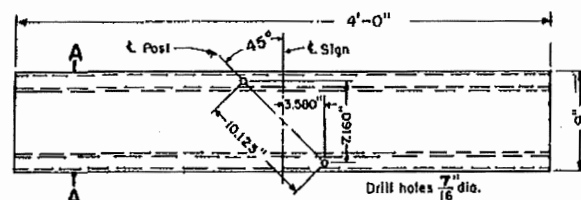
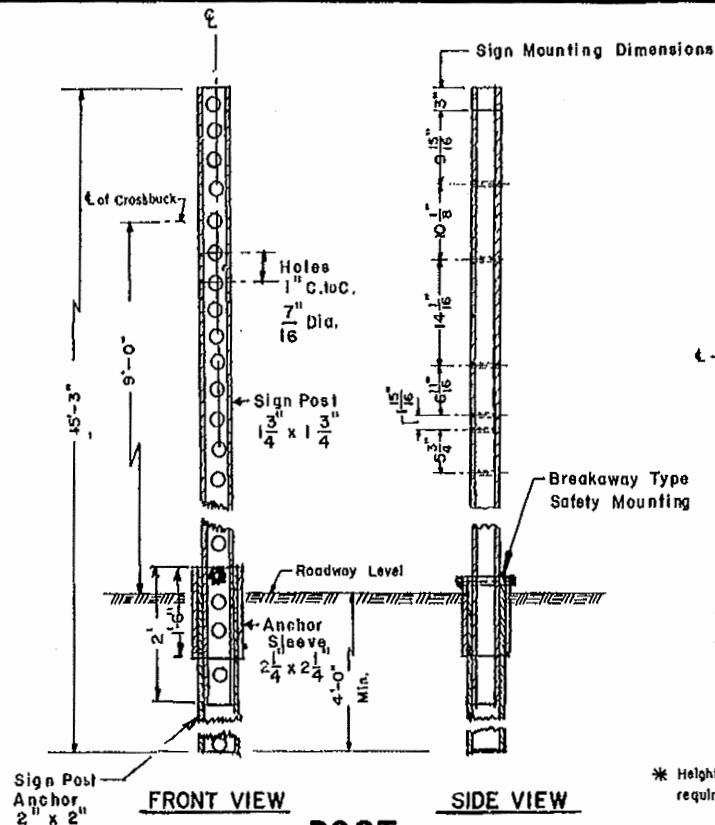
NOTES:

1. Free standing signs not attached to fences to be mounted on steel "U" shaped posts.
2. Place signs on both sides of right of way facing back towards highway grade crossing, at end of station platforms and at any location where trespassing is a problem.
3. Place on ROW fences at intervals not exceeding 200' (see Dwg. No.3206) and on all gates (see Dwg. No.3208).
4. All signs shall have six holes drilled to allow mounting on either posts or fence fabric.

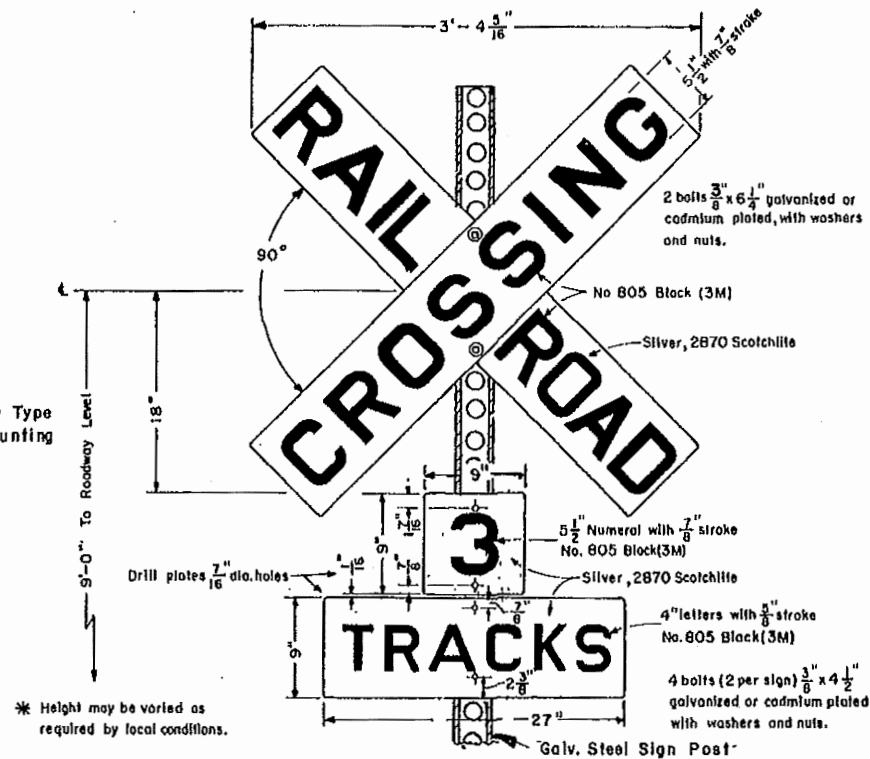
NO TRESPASSING SIGN

- Signs to be 0.081" thick aluminum alloy sheet - ASTM B 209
- White reflectorized background, FS L-S-300 A TYPE, Class 1 or 2, reflectivity 1
- Black gloss silk screen letters MHD materials spec. M7.04.12

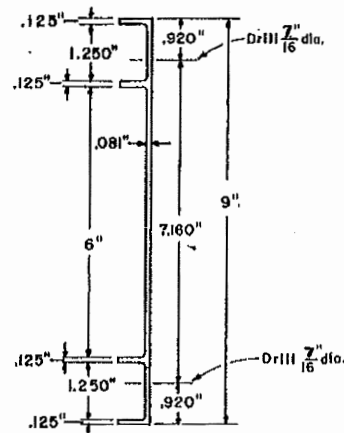
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3352
		Oct. 28, 1992 ISSUE DATE
NO TRESPASSING SIGN   ENGINEERING OFFICER CHIEF ENGINEERING OFFICER		



EXTRUDED ALUMINUM BLADES



* Height may be varied as required by local conditions.



NOTES

Highway Crossing Sign for use where automatic signal protection is not required.

Location—The sign shall be erected on the right hand side of the roadway on each approach to the crossing. The center line of the post shall be placed not less than 10'-6" or more than 15'-0" from the center line of the track and 6 feet from the edge of the highway shoulder or 12 feet from the edge of the traveled way in rural areas and 2 feet from the face of the curb in urban areas will usually be attainable. Where unusual conditions demand, variations determined by good judgement should provide the best possible combination of view and safety clearances attainable. The height should be 9'-0" above the roadway level to the center of the crossbuck, but may be varied to suit local conditions.

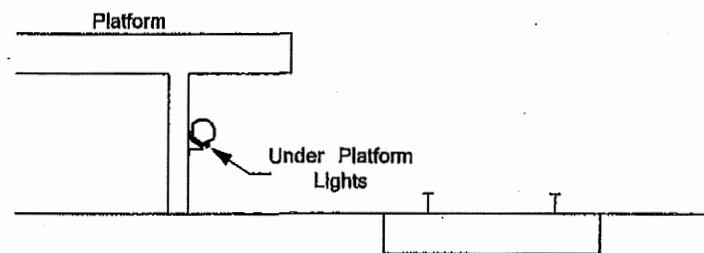
Crossbuck—The blades shall be 6063-T6 extruded aluminum. The face of the blades shall be covered with No. 2870 Silver, High Intensity Grade, Scotchlite sheeting with No. 805 Black Ink (3M) letters, or equal.

Number of Tracks Sign—The sign to be used where there are two or more tracks. The number displayed on the sign shall be the total number of tracks crossed, including sidings. Normally, where the distance between tracks, measured along the highway, exceeds 100 feet, an additional crossing sign should be erected unless local conditions require otherwise. The sign shall be .081", 6061-T6 aluminum sheet. The face of the sign shall be covered with No. 2870 Silver, High Intensity Grade, Scotchlite sheeting with No. 805 Black Ink (3M) letters, or equal.

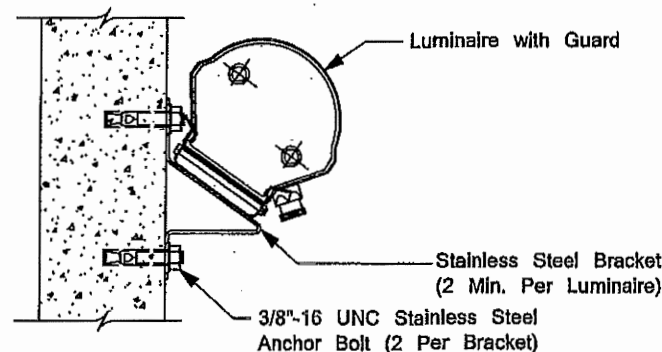
Specifications—As per current issue of the Federal Highway Administration, Part VIII Traffic Control Systems for Railroad Grade Crossings. The letters and numerals as per current A.A.R. Signal Section Plans 1712, 1713 and 1714.

Ordering—Specify sign complete or individual crossbuck, track sign or post, in addition the numeral for the track sign must be specified. Any modifications necessary to comply with legal requirements must be specified.

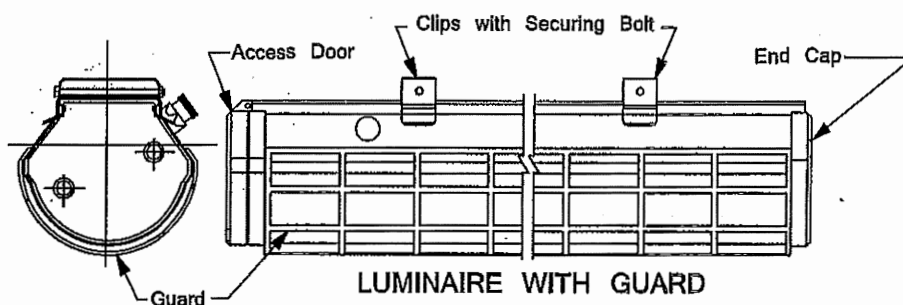
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 3388 Nov. 17, 1986 ISSUE DATE	① ISSUE NO.
	PUBLIC CROSSING NO WARNING DEVICES Daniel Braum WA Mark			
ENGINEERING OFFICER		CHIEF ENGINEERING OFFICER		



LUMINAIRE LOCATION



LUMINAIRE MOUNTING



LUMINAIRE WITH GUARD

LUMINAIRE SPECIFICATIONS

Housing: Extruded anodized aluminum. Finish shall be resistant to UV, salt spray, and humidity per ASTM G7, ASTM B117, and ASTM D2247.

Lens: Clear extruded tempered prismatic glass protector sealed to the housing.

Housing Compartment Rating: IP67

Impact Resistance: 1K 06/ 1K 10 per Standard EN 50102.

Fire Resistance: M1 per Standard NF.P.92507.

Ballast Tray: Easily removable for maintenance purposes. Electrical components shall be connected through a quick disconnect device with fully isolated terminals for easy servicing.

Lamp: One long twin tube compact fluorescent straight lamp, 36W.

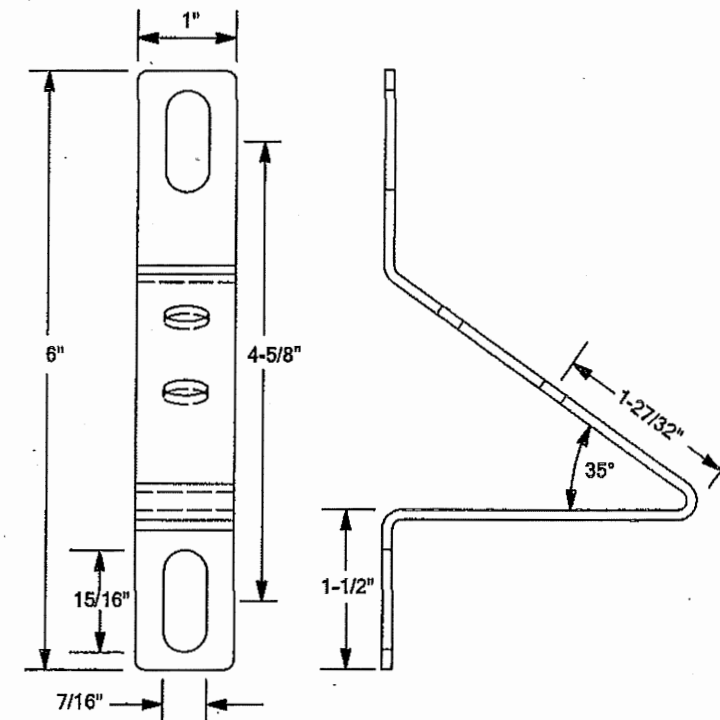
Ballast: Electronic type, high power factor, sound rated Class A, 277 volt

Mounting Hardware: Stainless steel.

Electrical Cable Fitting: Watertight fitting.

Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.

Specifications based on Schreder MY2-36TT-1-277-EL-EW1-NA-CAS210-RAL5019 luminaire with P00579 Amtrak Lens Guard.



MOUNTING BRACKET DETAIL

UNDER PLATFORM LIGHTING CRITERIA

Purpose: Provide lighting for walking along track area. Detail inspection of track area will require auxiliary lighting. Lights are continuously lit.

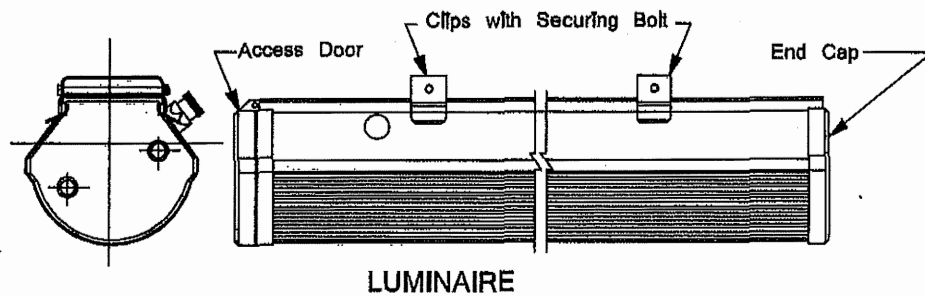
Installation: NFPA 101, National Fire Protection Agency, Life Safety Code, latest edition.

Lighting Level: 2 foot candles horizontal minimum, including Light Loss Factor (LLF) and measured at top of rail at centerline of track. Lighting level shall be provided for entire length of platform.

Design LFF: Based on a 2 year maintenance period. 70% Rated Life Factor shall be 0.95. Dirt Depreciation Factor shall 0.7. Fixture Depreciation Factor shall be 0.95. Total LLF shall be the product of these factors, or $0.95 \times 0.7 \times 0.95 = 0.63$.

Installed Fixture Spacing Under Platform: 20ft. or less, centerline to centerline.

 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG NO. 3408
		MAR. 18, 2008 ISSUE DATE
TRACK AREA LIGHTING UNDER PLATFORMS FOR ENCLOSED STATIONS		
ENGINEERING OFFICER	 CHIEF ENGINEERING OFFICER	



LUMINAIRE SPECIFICATIONS

Housing: Extruded anodized aluminum. Finish shall be resistant to UV, salt spray, and humidity per ASTM G7, ASTM B117, and ASTM D2247.

Lens: Clear extruded tempered prismatic glass protector sealed to the housing.

Housing Compartment Rating: IP67

Impact Resistance: 1K 08/ 1K 10 per Standard EN 50102.

Fire Resistance: M1 per Standard NF.P.92507.

Ballast Tray: Easily removable for maintenance purposes. Electrical components shall be connected through a quick disconnect device with fully isolated terminals for easy servicing.

Lamp: Fluorescent, T5 straight lamp, high output, 18-58 watts, 1 or 2 lamps per luminaire. Wattage, number of lamps per luminaire, and lamp length per Designer to meet minimum criteria.

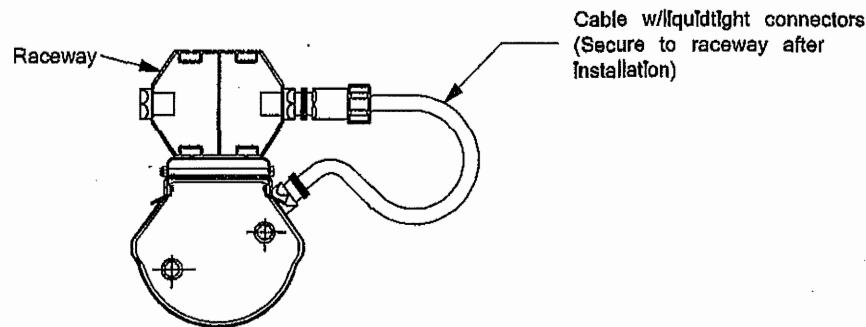
Ballast: Electronic type, high power factor, sound rated Class A, 277 volt

Mounting Hardware: Stainless steel.

Electrical Cable Fitting: Watertight fitting.

Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.

Specification based on Schreder MY2 luminaire.



LUMINAIRE WITH ATTACHED RACEWAY

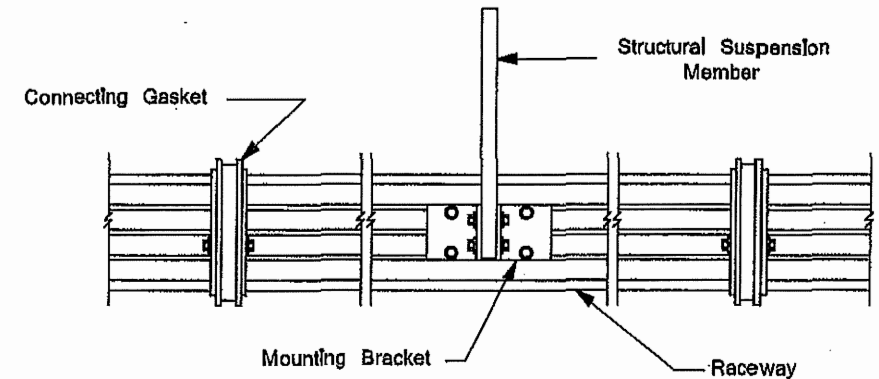
RACEWAY SPECIFICATIONS

Raceway: Extruded aluminum alloy, with anodized finish. Raceway shown with two channels - number of channels and outer dimensions to be determined by the Designer. Where channel is utilized for circuits in addition to the lighting circuits, a minimum of one spare channel shall be provided for future cables. Designer to submit cable loading calculations for approval. "T" shaped grooves along the raceway shall be provided to permit adjustment of the bracket and luminaire using concealed captive hardware.

Raceway Length: To be determined by the Designer.

Connecting Hardware: Stainless steel.

Ground Lugs: Aluminum terminals, fastened to the end cap of the raceway, one for each lighting circuit wiring channel.



RACEWAY INSTALLATION

Connecting Gaskets: Die cut gaskets, per Manufacturer's recommendations.

Mounting Bracket: Aluminum, with two holes for mating "U" shaped junctions.

Wiring: No. 12 AWG. Raceway shall be factory wired. Connectors between raceway sections shall be Amp Mate and Lock or approved equal, 3 poles, rated 600 volts, 15 amps, complete with fully isolated terminals. Power connections to fixtures shall alternate phases to adjacent fixtures - for a three phase system, every third fixture shall be connected to the same phase.

PLATFORM LIGHTING DESIGN CRITERIA

Purpose: Passenger station platform lighting

Installation: Per NFPA 101, National Fire Protection Agency, Life Safety Code, latest edition.

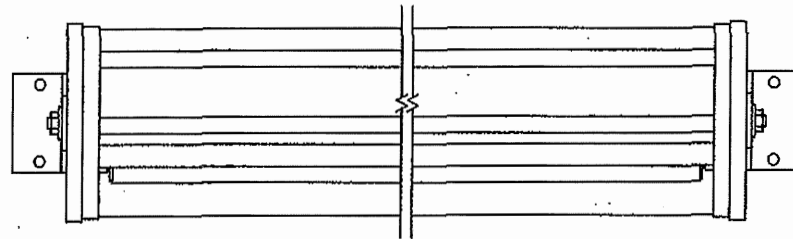
Lighting Level: 20 foot candles horizontal minimum, including Light Loss Factor (LLF) at platform level. Lighting level shall be maintained for entire length of platform.

Lighting Uniformity: Maximum ratio of 1.3 between maximum footcandles and minimum footcandles.

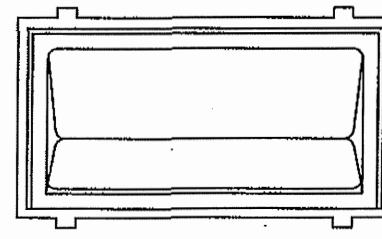
LLF: Based on 2 year maintenance period. 70% Rated Life Factor shall be 0.95. Dirt Depreciation factor shall be 0.7. Fixture Depreciation Factor shall be 0.95. Total LLF shall be the product of these factors, or $0.95 \times 0.7 \times 0.95 = 0.63$

Emergency Lighting Level: 1 foot candle minimum, including LLF.

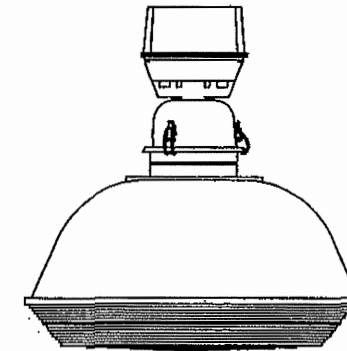
	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG NO. 3400 MAR. 18, 2008 ISSUE DATE	1 ISSUE NO.
	PLATFORM LIGHTING FOR ENCLOSED STATIONS			
ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER		



FLUORESCENT



WALL/COLUMN MOUNTED
METAL HALIDE



SUSPENDED METAL HALIDE

LUMINAIRE SPECIFICATIONS

Luminaire Type: Fluorescent T5 or Metal Halide

Housing: Compartment Rating: IP67

Mounting Bracket and Hardware: Stainless steel.

Identification Label: Permanent identification of Manufacturer, luminaire type and model, wattage, voltage, and frequency.

Installation: Mounting to columns or other structures between tracks not shown, and to be provided by Designer.

Wiring: Each fixture to be grounded to power supply ground.

LIGHTING CRITERIA FOR BETWEEN TRACKS

Purpose: Provide lighting for walking within the platform track area between tracks at locations where there is no platform between the tracks. Detail inspection will require auxiliary lighting.

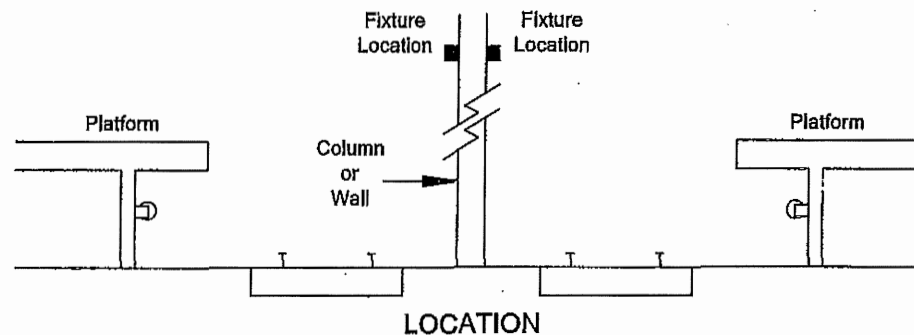
Installation: NFPA 101, National Fire Protection Agency, Life safety Code, latest edition.

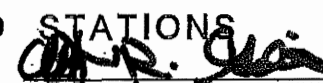
Lighting Level: 2 foot candles minimum, including Light Loss Factor (LLF) and measured at top of rail at centerline of both tracks. Minimum lighting level applies to track area with the tracks occupied and with the tracks unoccupied.

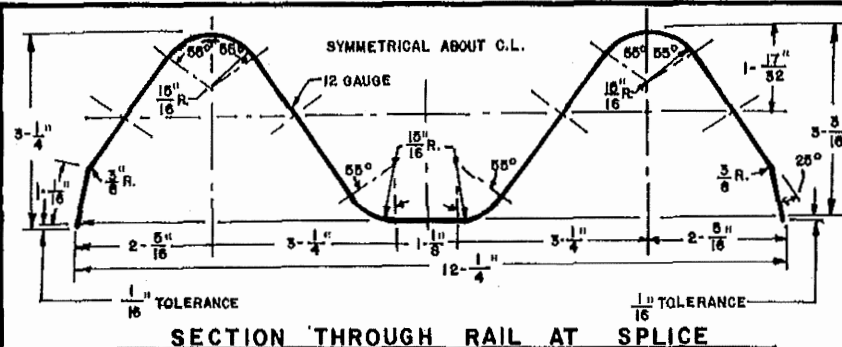
Design LFF: Based on a 2 year maintenance period, 70% Rated Life Factor shall be 0.95 for fluorescent fixtures and 0.7 for metal halide fixtures. Dirt Depreciation Factor shall be 0.7 for both fixture types. Fixture Depreciation Factor shall be 0.95. Burn-out factor shall be 1.0. Total Design LLF shall be the product of these factors, or 0.63 for fluorescent fixtures and 0.47 for metal halide fixtures.

Location: Fixtures shall be installed outside of dynamic train clearances and shall be located along the full length of track within the platform limits. Lighting height and aiming shall avoid any glare for the train operator entering and leaving the platform tracks.

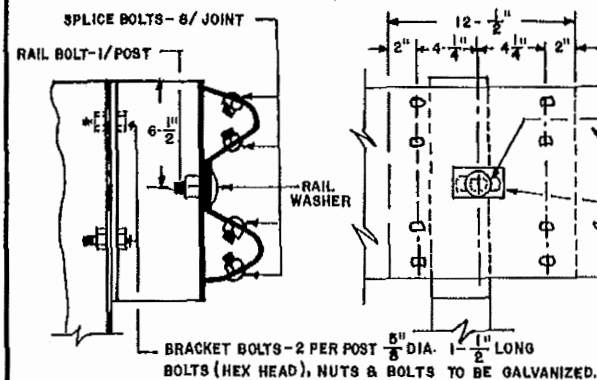
Control: Each circuit between each set of tracks shall be controlled by a minimum of three switches accessible from the track level and mounted to the columns or other supports. Switches shall be located at both ends of the platform length, and at the platform midpoint. Switches shall be wired in a 3-way arrangement to permit any switch to turn all the lights for that track on or off. Each circuit shall also be controlled with a timer to automatically turn off the lights after an adjustable time period. The timer shall also include a manual by-pass to permit the lights to remain on.



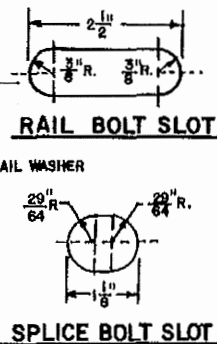
 MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG NO. 3404 MAR. 18, 2008 ISSUE DATE	1 ISSUE NO.
	TRACK AREA LIGHTING BETWEEN TRACKS FOR ENCLOSED STATIONS		
ENGINEERING OFFICER		 CHIEF ENGINEERING OFFICER	



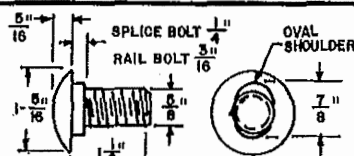
SECTION THROUGH RAIL AT SPLICE



RAIL SPLICE

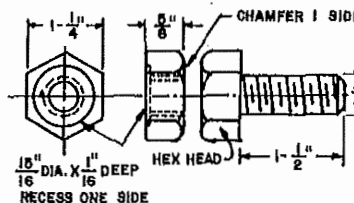


RAIL BOLT SLOT

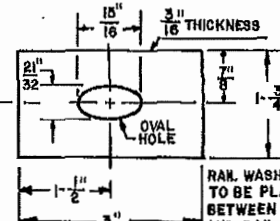


RAIL BOLTS TO BE 2" LONG
ALL BOLTS AND NUTS TO BE GALV.

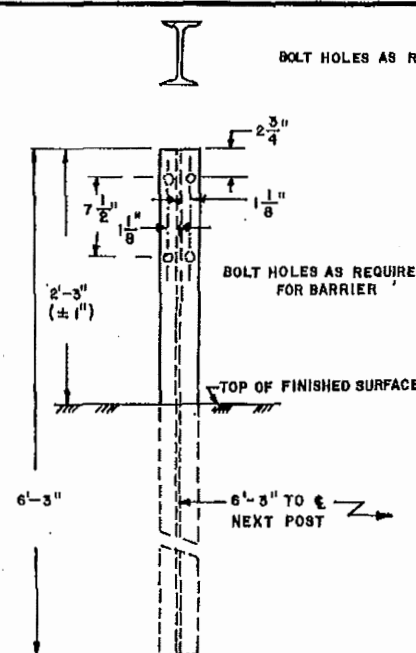
RAIL & SPLICE BOLTS & NUTS



BRACKET BOLT

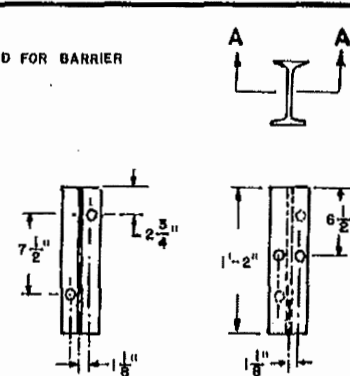


RAIL WASHER

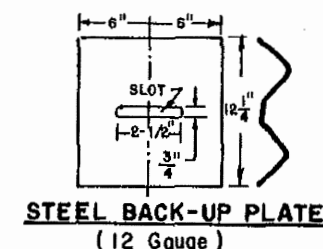


POST

POST SPACING =
6'-3" $\pm$ TO $\pm$



SECTION A-A

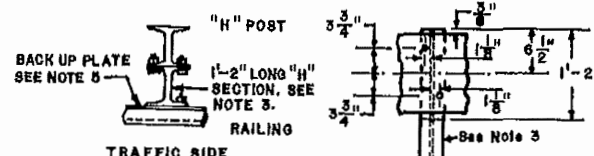


STEEL BACK-UP PLATE
(12 Gauge)

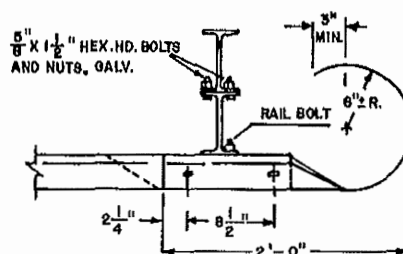
OFFSET BRACKET

NOTES:

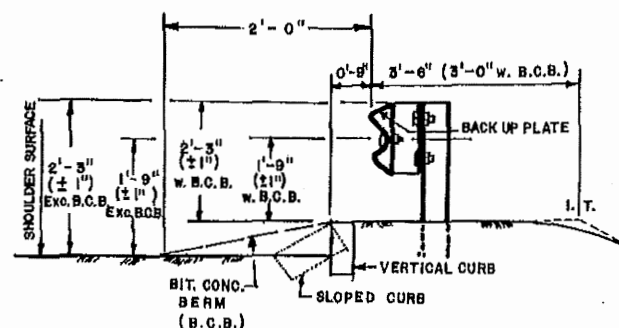
1. Spacing of Posts to be 6'-3" centerline of Post to centerline of Post.
2. Terminal Section shown for parking areas or low vehicular speed areas Only. See Mass. Dept. of Public Works Standards for End Treatment in higher speed areas (Steel Beam Highway Guard Type SS).
3. Post and offset brackets to be fabricated from 6" X 4", 8-1/2 lbs. per linear foot, steel "H" sections.
4. Post and bracket holes to be 3/4" dia.
5. Back up plate to be used on posts where no splice occurs.
6. All metal parts to be galvanized steel.



TYPICAL DETAILS



TERMINAL SECTION
(SEE NOTE 2)



TYPICAL PLACEMENT SECTION

	MASSACHUSETTS BAY TRANSPORTATION AUTHORITY	RAILROAD OPERATIONS	DWG. NO. 4056 Nov. 17, 1986 ISSUE DATE	ISSUE NO. 1
	STEEL BEAM GUARD RAIL DETAIL Daniel Brown W.A. MacRae ENGINEERING OFFICER CHIEF ENGINEERING OFFICER			