MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

MAINTENANCE OF WAY DIVISION

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TYPICAL ROADBED SECTION
DOUBLE TRACK -- TANGENT ALIGNMENT

SECTION WHEN SIDE DITCH IS NOT POSSIBLE

NOTES:
* At locations where side ditch use is precluded due to clearance constraints, use perforated pipe underdrain (12" min. diameter).
# Place geotext fabric below subgrade when subgrade conditions require its use.

RTL TRACK
TYPICAL ROADBED SECTION (Tangent)
TYPICAL ROADBED SECTION

DOUBLE TRACK -- CURVED ALIGNMENT

- Recommended Design Criteria -

NOTES:

4 At locations where side ditch use is precluded due to clearance constraints, use perforated pipe underdrain (12" minimum diameter).
5 Place geotext fabric below subballast when subgrade conditions require its use.
6 If center track has greater superelevation than inner track, increase track centers 3.5" for each 1" of additional SB.
7 Add calculated middle and end overhangs for applicable curvature and equipment to "minimum".

SECTION WHEN SIDE DITCH IS NOT POSSIBLE
NOTES:
1. DYNAMIC ENVELOPE SHOWN FOR LOADED CAR WITH:
   A) AIR BAGS IN NORMAL OPERATING CONDITION
   B) LATERAL STOPS
   C) ROLL ANGLE AT BODY = 3'-1''
   D) LATERAL TRANSLATION OF TRUCK = 1 1/2''
2. ENVELOPE INDICATES CAR ON TANGENT TRACK WITH 0'' SUPERELEVATION.
   CALCULATED CAR BODY OERHANG AND ACTUAL SE MUST BE CONSIDERED.
3. RECOMMENDED CLEARANCE IS 6'' BEYOND DYNAMIC ENVELOPE WITH ANY CURVATURE AND/OR SUPERELEVATION ADDED. ABSOLUTE MINIMUM CLEARANCE IS 3'' BEYOND WORST CASE DYNAMIC ENVELOPE OF CAR. FIELD SURVEY OF TRACK CONDITIONS AND USE OF CLEARANCE CAR AND/OR CAR BODY TEMPLATE ADJUSTED FOR TRACK GEOMETRY IS REQUIRED TO CONFIRM ACTUAL CLEARANCE LIMITS.

TOP OF PLATFORM

3'-3 1/4'' (FIXED)

CATERANARY WIRE HEIGHT (VARIES)

2'-8 1/2''

2'-10 7/8''

4'-10 3/4''

4'-10 7/8''

4'-9 5/8''

4'-5''

4'-1''

4'-6 1/2'' (FIXED)

4'-0 1/8''

TOP OF RAIL

0.9''

2/3.2''

2/3/4.2''

5 1/16''

1/4.8''

4.9''

12'-8''

6'-6''

4'-6''
NOTES:
1. DYNAMIC ENVELOPE SHOWN FOR LOADED CAR WITH; A) AIR BAGS IN NORMAL OPERATING CONDITION B) LATERAL STOPS C) ROLL ANGLE AT BODY = 3°-1° D) LATERAL TRANSLATION OF TRUCK = 1 1/16"
2. ENVELOPE INDICATES CAR ON TANGENT TRACK WITH 0" SUPERELEVATION. CALCULATED CAR BODY OVERHANG AND ACTUAL SE MUST BE CONSIDERED.
3. RECOMMENDED CLEARANCE IS 6" BEYOND DYNAMIC ENVELOPE WITH ANY CURVATURE AND/OR SUPERELEVATION ADDED. ABSOLUTE MINIMUM CLEARANCE IS 3" BEYOND WORST CASE DYNAMIC ENVELOPE OF CAR. FIELD SURVEY OF TRACK CONDITIONS AND USE OF CLEARANCE CAR AND/OR CAR BODY TEMPLATE ADJUSTED FOR TRACK GEOMETRY IS REQUIRED TO CONFIRM ACTUAL CLEARANCE LIMITS.
TYPICAL ROADBED SECTION

DOUBLE TRACK -- TANGENT ALIGNMENT

-RECOMMENDED DESIGN CRITERIA-

NOTES:
*AT LOCATIONS WHERE SIDE DITCH USE IS PRECLUDED
DUE TO CLEARANCE CONSTRAINTS, USE PERFORATED PIPE
UNDERDRAIN (12" MIN. DIAMETER)
*PLACE GEOTEX FABRIC BELOW SUBBALLAST WHEN
SUBGRADE CONDITIONS REQUIRE ITS USE

SECTION WHEN SIDE DITCH IS NOT POSSIBLE
TYPICAL ROADBED SECTION
DOUBLE TRACK—CURVED ALIGNMENT
—RECOMMENDED DESIGN CRITERIA—

NOTES:
1. AT LOCATIONS WHERE SIDE DITCH USE IS PRECLUDED DUE TO CLEARANCE CONSTRAINTS, USE PERFORATED PIPE UNDERDRAIN (12” MINIMUM DIAMETER).
2. PLACE GEOTEX FABRIC BELOW SUBBALLAST WHEN SUBRADE CONDITIONS REQUIRE ITS USE.
3. IF OUTER TRACK HAS GREATER SUPERELEVATION THAN INNER TRACK, INCREASE TRACK CENTERS 3.5” FOR EACH 1” OF ADDITIONAL SE.
4. ADD CALCULATED MIDDLE AND END OVERHANGS FOR APPLICABLE CURVATURE AND EQUIPMENT TO "MINIMUM".

SECTION WHEN SIDE DITCH IS NOT POSSIBLE
TYPICAL ROADBED SECTION
DOUBLE LRT TRACK IN RESERVATION

NOTES:
1. REFER TO SECTION 5 OF THE TRANSIT DESIGN STANDARDS MANUAL FOR CRITERIA GOVERNING ROADWAY DESIGN.
NOTES:
1. EDGE BEAM = 7”x7” PRESSURE TREATED TIMBER LAGGED INTO EVERY OTHER CROSS TIE WITH 12”x96” GALV. DOME HEAD LAG SCREW. COUNTERSINK BOLT HEAD IN SURFACE OF EDGE BEAM.
2. SLOPE PLATFORM SURFACE AWAY FROM TRACK. PROVIDE DRAINS AT BACK OF PLATFORM WHERE JERSEY BARRIERS OR SIMILAR OBSTRUCTION TO WATER FLOW IS USED.
3. PLACE GEOTECH FABRIC BELOW SUBBALLAST WHEN SUBGRADE CONDITIONS REQUIRE ITS USE.
4. INSTALL 8” UNDERDRAIN IN SUBBALLAST ON SURFACE OF SUBGRADE AND TIE INTO EXISTING STREET DRAINAGE SYSTEM. MINIMUM UNDERDRAIN SLOPE TO BE 0.5%.

NOTES FOR ACCESSIBLE DETAIL (AT LEFT):
5. TACTILE WARNING STRIP TO BE MECHANICALLY FASTED TO PRECAST UNITS PER MANUFACTURER’S SPECS.
6. PRECAST CONCRETE EDGE UNITS TO BE 2”-0” WIDE BY 2”-6” HIGH BY 8”-0” LONG REINFORCED AS INDICATED.
TIE SPACING TYPICAL AS SHOWN FOR BOTH TRACKS

USE 18" TIE SPACING BENEATH ENTIRE CROSSING AND FOR 3 TIES BEYOND THE INTERSECTION OF CROSSING UNIT AND THE END OF EACH TRACK ON EACH END

NOTE: MOW DIVISION LRT TRACK

TYPICAL FULL-DEPTH RUBBER GRADE CROSSING LAYOUT

NOTES:
1. REFER TO DRAW NO 150 IN THE BOOK OF STANDARD TRACKWORK PLANS, THE DESIGN STANDARDS MANUAL AND M.O.W. ISV MATERIAL SPECIFICATIONS FOR FULL-DEPTH RUBBER CROSSING DETAILS.
2. THE LIMITS OF FULL-DEPTH TRACK RECONSTRUCTION VARY BY SITE AND ARE IDENTIFIED IN THE SPECIFICATIONS.
3. STAGGER FIELD AND GAUGE CROSSING PANELS AS SHOWN ON 18" CENTERS WHEN THE CROSSING ANGLE IS LESS THAN 50 DEGREES.
4. PROVIDE 8" DEEP UNDERDRAIN TIES TO EXISTING STREET DRAINAGE SYSTEM OR RUN TO DAYLIGHT DOWNHILL SIDE OF CROSSING AS DIRECTED BY THE ENGINEER.
5. WHEN CALLED FOR IN SPECIFICATIONS, INSTALL 5" FRP UNDERLAYMENT IN 2 COURSES BENEATH CROSSING TO 12" BEYOND THE ENDS LONGITUDINALLY TO THE LIMITS SPECIFIED.

SLOPE PAVING 3:1 TO TOP OF BALLAST (TYP)

UNDERDRAIN 24" BEYOND ENDS OF TIES.
(MET NOTE 4) MINIMUM SLOPE TO BE 0.5 %

PAVEMENT SAWCUT

GRANITE CURBING (TYP)

1/4" THICK STEEL REFLECTOR PLATES AT ENDS OF ALL CROSSING PANELS (EXCEPT AT PLATFORM EDGES)
M.O.W. DIVISION

LRT TRACK
TYPICAL SECTION -- DOUBLE TRACK CROSSING WITH FULL-DEPTH RUBBER

NOTES:
1. 115 RE RAIL WITH RESILIENT FASTENERS ON WOODEN CROSS TIES @ 10' CENTERS.
2. COMPACT EXISTING SUBGRADE PRIOR TO PLACEMENT OF ASPHALT, ROLL AND COMPACT PAVING MATERIAL EXCLUSIVELY IN AREA BETWEEN TRACKS AND AT ALL TRANSITIONS TO CROSSING PANELS.
3. INSTALL GEDTEX FABRIC UNDER TRACK STRUCTURE, UP BOTH SIDES OF EXCAVATED TRENCH AND AROUND SUBRAIN PIPE WHERE APPLICABLE.
4. SLOPE NEW PAVEMENT TO EXISTING USING STREET PROFILE SPECIFIED. PROVIDE SMOOTH TRANSITION AT PAVEMENT JOINT AND SEAL WITH BITUMINOLASTIC COMPOUND.
M.O.W. DIVISION

LRT TRACK
TYPICAL FULL-DEPTH RUBBER GRADE CROSSING LAYOUT

5" BITUMINOUS CONCRETE TOP COURSE

3" BITUMINOUS CONCRETE BASE COURSE

COMPACTED SUBGRADE

TRACK CENTERS VARY

SEE NOTE 1

FILTER FABRIC (BOLD) ON COMPACTED SUBGRADE

SEE NOTE 5

8" (MIN) PERFORATED PIPE SUBDRAIN (WHEN SPECIFIED) TIED INTO EXISTING STREET DRAINAGE SYSTEM. (MINIMUM 0.5 % SLOPE OF SUBDRAIN)

NOTES:
1. 115 RE RAIL WITH RESILIENT FASTENERS ON WOODEN CROSSTIES @ 18" CENTERS.
2. COMPACT EXISTING SUBGRADE PRIOR TO PLACEMENT OF ASPHALT ROLL AND COMPACT PAVING MATERIAL ESPECIALLY IN AREA BETWEEN TRACKS AND AT ALL TRANSITIONS TO RUBBER MAIN SEAL.
3. INSTALL GEOTEX FABRIC UNDER TRACK STRUCTURE, UP BOTH SIDES OF EXCAVATED TRENCH AND AROUND SUBDRAIN PIPE WHERE APPLICABLE.
4. SLOPE NEW PAVEMENT TO EXISTING USING STREET PROFILE SPECIFIED. PROVIDE SMOOTH TRANSITION AT PAVEMENT JOINT AND SEAL WITH BITUMINOUS COMPOUND.
5. RUBBER RAIL SEAL TO BE FABRICATED FROM EXTRUDED VIRGIN RUBBER, MUST BE DESIGNED TO SPAN RESILIENT RAIL FASTENERS AND BEAR ON TIE SURFACE BEYOND ENDS OF TIE PLATES. GAGE SIDE RAIL SEAL MUST PROVIDE A FLEXIBLE FLANGEWAY OPENING >= 1/2" <= 2" FOR 115 RE RAIL. RAIL SEAL SECTIONS MUST BE MANUFACTURED IN CONTINUOUS STRIPS >= 15' LONG OF INSULATING MATERIAL WHICH SHALL PROVIDE COLUMN RESISTIVITY OF 1X10^-7 OHM•CM ACCORDING TO LATEST ASTM D257. ANY DEVIATION FROM THESE REQUIREMENTS SUBJECT TO APPROVAL OF THE ENGINEER.
1. DYNAMIC ENVELOPE SHOWN FOR LOADED CAR WITH TRUCK YAW = 18° AND 3.23 DEGREES ROLL ANGLE AT CAR BODY.

2. CLEARANCE ENVELOPE REPRESENTS CAR ON TANGENT TRACK WITH 0° SUPERELEVATION. CALCULATED CAR BODY OVERHANG AND ACTUAL SE MUST BE CONSIDERED, BECAUSE OF NON-RECTANGULAR CONFIGURATION OF THE LRV CAR BODY. SPECIAL CONSIDERATION APPLY TO END OVERHANG CALCULATIONS (IN CURVES). ADDITIONAL DATA IS AVAILABLE FROM THE M.O.W. DIVISION TRACK ENGINEERS STAFF.

3. RECOMMENDED CLEARANCE IS 6" BEYOND DYNAMIC ENVELOPE REPRESENTED HERE WITH OVERHANG DUE TO CURVATURE AND ANY SE ADDED. ABSOLUTE MINIMUM CLEARANCE CAR AND/OR CAR BODY TEMPLATE ADJUSTED FOR TRACK GEOMETRY IS REQUIRED TO CONFIRM ACTUAL CLEARANCE REQUIREMENTS.
M.O.W. DIVISION

STANDARD WOODEN CROSSTIES

TIE BUNDLES TO CONSIST OF 4 ROWS OF 6 TIES EACH ON EDGE FOR A TOTAL OF 24

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

TOP OF TIE

- 8' - 6½"
- 9"

APPLY GANG-NAIL/ANTI-SPLITTING DEVICE BOTH ENDS OF TIE PER M.O.W. DIVISION SPECIFICATIONS

BUNDLES FOR SHIPMENT

2" X 105" HEAVY DUTY STEEL STRAPS WITH 2 SEALS PER BAND
NOTES:
1. THE ANTI-SPLITTING END PLATE SHALL BE MANUFACTURED FROM A MINIMUM 18 GA. (0.0478") GALVANIZED STEEL PLATE CONFORMING TO ASTM A446, GRADE 4, GALVANIZING CONFORMING TO ASTM A525.
2. END PLATE SHALL HAVE NAIL TEETH NOT LESS THAN 3/8" IN LENGTH AND OF SUFFICIENT SHARPNESS TO FULLY PENETRATE HARDWOOD TIMBERS USED FOR CROSSTIES.
3. END PLATE SHALL BE MACHINED APPLIED TO THE TIE ENDS BY A MECHANICAL DEVICE CAPABLE OF SQUEEZING ANY SPLITS IN TIE ENDS TOGETHER BEFORE APPLICATION OF END PLATE.
   END PLATE APPLICATOR SHALL INSTALL END LATES WITH UNIFORM PRESSURE AND MINIMUM TEETH BENDING, AND SO THAT THE NAIL TEETH SIDE OF THE END PLATE IS FLUSH WITH THE END SURFACE OF THE TIE.
4. THE END PLATE IS TO BE INSTALLED IN NEW TIRES PRIOR TO SEASONING.
5. THE CENTER OF THE END PLATE SHALL BE INSTALLED NO MORE THAN 3/8" OFF THE HORIZONTAL AND VERTICAL CENTERLINE INTERSECTIONS OF THE TIE END.
6. THE END PLATE SHALL BE FABRICATED SO THAT THE TEETH TWIST VERTICAL FOR BETTER GRIPPING CAPABILITY IN THE TIE.
7. MARK AND INSTALL PLATES TO INDICATE LOCATION OF HEARTWOOD (KERR MARKS).
M.O.W.
DIVISION
CONCRETE TIES

NOTES:
1. TIES SHALL BE PERMANENTLY LABELED BY INJECTED 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 800Ibs.
3. CONCRETE STRENGTH (CF), 7000 PSI MIN AT 28 DAYS

STANDARD TRACK GAGE = 56\frac{1}{2}''

DIMENSIONS

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<tr>
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<th>MAXIMUM</th>
<th>TOLERANCE</th>
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<tbody>
<tr>
<td>TOP WIDTH</td>
<td>9''</td>
<td>10''</td>
<td>+/-\frac{1}{8}''</td>
</tr>
<tr>
<td>BOTTOM WIDTH</td>
<td>11''</td>
<td>12''</td>
<td>+/-\frac{1}{8}''</td>
</tr>
<tr>
<td>DEPTH AT CENTER</td>
<td>7''</td>
<td>10''</td>
<td>+/-\frac{1}{8}''</td>
</tr>
<tr>
<td>DEPTH AT RAIL SEAT</td>
<td>9\frac{1}{2}''</td>
<td>10\frac{1}{2}''</td>
<td>+/-\frac{1}{8}''</td>
</tr>
</tbody>
</table>
STANDARD TIE PLATE (9-6 PUNCHING) WITH CURT SPIKES
- INDICATES RAIL HOLDING SPIKES
- INDICATES ADDITIONAL CUT SPIKES

TANGENT TRACK AND UNRESTRAINED CURVES ≥1500' R

HIGH RAIL IN RESTRAINED CURVES AND IN UNRESTRAINED CURVES <1500' R

IN SPECIAL CIRCUMSTANCES WHERE PLATE MOVEMENT IS EVIDENT.

STANDARD SPICING CONFIGURATION

STANDARD RESILIENTLY FASTENED TIE PLATE
- INDICATES USE OF LOCK SPIKE IN SPIKE HOLE
- PREBORE HOLES FOR LOCK SPIKES, ⅜ DIA × 6' DEEP
- DO NOT BORE HOLES ALL THE WAY THROUGH THE TIE

TIE SPACING

TIMBER TIES
- STANDARD MAIN LINE TRACK------24'
- WITHIN GRADE CROSSINGS------10'

CONCRETE TIES
- STANDARD MAIN LINE TRACK------30'

* USE 9'-0" TIES WITHIN FULL-DEPTH RUBBER CROSSINGS PER PLAN NO. 145

STANDARD TIE SPACING, USAGE AND SPIKING PATTERNS

M.O.W. DIVISION

ISSUE NO. 210

MASSACHUSETTS DOT TRANSPORTATION AUTHORITY

ISSUE DATE APRIL 18, 2013

© DIRECTOR - M.O.W.
"STANDARD" TIE SPACING
SEE DRAWING NO 210
10 TIES (8'-6") AT 22" O.C.  10 TIES (8'-6") AT 20" O.C.  10 TIES (8'-6") AT 18" O.C.

"STIFFER" TRACK STRUCTURE

NOTES:
1. TRANSITION TIES TO BE USED WHEREVER A SIGNIFICANT CHANGE IN TRACK MODULUS STIFFNESS) OCCURS.
2. "STIFFER TRACK STRUCTURE CONSISTS OF A) CONCRETE TIES, B) BRIDGE DECK OR APPROACH SLAB, C) HMA UNDERLAYMENT FOR GRADE XING, TURNOUT ETC. OR D) DIRECT FIXATION TRACK CONSTRUCTION.
3. TRANSITION TIE SPACING SHOWN IS FOR 50 MPH TRACK. SUBSTANTIAL LATITUDE IN TRANSITION TIE SPACING REQUIREMENTS IS POSSIBLE FOR LOWER SPEED TRACK AT THE DISCRETION OF THE MANAGER OF TRACK ENGINEERING.
NOTES:

1. LOCKSPIKES SHALL BE MANUFACTURED FROM 3/8" X 5/8" ALLOY SPRING STEEL WITH A MINIMAL TENSILE STRENGTH OF 160,000 PSI AND ELONGATION OF 25%.

2. LOCKSPIKES DRIVEN INTO AN 1/4" SQUARE SPIKE HOLE SHALL CAUSE THE LEGS TO OPEN A MINIMUM OF 7/8".

3. SEE DWG NO 210 FOR SPIKING PATTERNS.

NOTES:

1. SCREW SPIKES TO BE FORGED FROM MEDIUM CARBON STEEL CONFORMING WITH ASTM A-66.

2. FURNISH 5/8" DIAMETER SCREW SPIKES UNLESS SPECIFIED OTHERWISE.

3. APPROXIMATE WEIGHT EACH SPIKE = 1.5 LBS
Standard Evergrip single head screw spike

15" SCREW
16 SPIKES

NOTES:
1. SCREW SPIKES TO BE FORGED FROM MEDIUM CARBON STEEL CONFORMING WITH ASTM A-66.
2. FURNISH B DIAMETER SCREW SPIKES UNLESS SPECIFIED OTHERWISE.
3. APPROXIMATE WEIGHT EACH SPIKE = 1.1 LBS
M.O.W. DIVISION

RESILIENT FASTENER TIE PLATE

NOTES:
1. TIE PLATES SHALL CONFORM TO CURRENT A.R.E.M.A. SPECIFICATIONS.

2. TIE PLATES SHALL BE BRANDED 115 RE 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.

4. TO FASTEN PLATE WITH SCREW SPIKES, 4 OUTSIDE HOLES TO BE PUNCHED 1" DIA ROUND AS INDICATED BY DASHED CIRCLE. USE $\frac{1}{2}$" DIA SCREW SPIKE IN 1" DIA HOLES.

CALCULATED WEIGHT (APPROX.) OF PUNCHED PLATE 115 LB RE-------23.40 LBS

MASSACHUSETTS TRANSPORTATION AUTHORITY

M.O.W. NO. 225

REVISION

RESILIENT FASTENER TIE PLATE

MASSACHUSETTS TRANSPORTATION AUTHORITY

M.O.W. DIVISION

225

ISSUE DATE

REVISION NO.

RESILIENT FASTENER TIE PLATE
NOTES:
1. TIE PLATES SHALL CONFORM TO CURRENT A.R.E.M.A. SPECIFICATIONS.
2. TIE PLATES SHALL BE BRANDED 115RE TO DESIGNATE THE SECTION, THREE LETTERS OR A TRADEMARK TO INDICATE THE PRODUCER AND TWO CHARACTERS 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. APPROXIMATE CALCULATED WEIGHT OF THE 115 LB. RE PUNCHED PLATE IS 23.4 LBS.

SECTION

PLAN

RESILIENT FASTENER
TIE PLATE FOR SCREW SPIKES
**NOTES:**

1. SIX (6) LOCKSPIKES SHALL BE INSTALLED PER TWO (2) PLATE ASSEMBLY AS INDICATED BY HOLES SHOWN. PREBORE SPIKEHOLES 3/8" X 6" DEEP, NOT THROUGH TIE BOTTOM.

2. 3/8" HOLE IS PROVIDED FOR TEMPORARY 3/8" CUT SPIKE INSTALLATION, IF REQUIRED SHOULDN'T RUNNING RAIL NEED TO BE INSTALLED WITHOUT RESTRING RAIL TEMPORILY TO FACILITATE PHASED TRACK CONSTRUCTION.

3. MATERIAL SHALL BE LOW-CARBON STEEL AND SHALL CONFORM TO CURRENT AREMA SPECIFICATIONS.
1" DIA. ROUND HOLE (TYP.)
(FOR USE WITH 15/16" SCREW SPIKE)

PLAN

DESIRED FOR USE WITH PANDROL TYPE "e" CLIP
NORMAL TOE LOAD OF 2,750 LBS.

MATERIAL SHALL BE LOW – CARBON STEEL AND SHALL CONFORM TO CURRENT AREMA SPECIFICATIONS

SECTION
NOTES:
1. TIE PLATES SHALL CONFORM TO CURRENT A.R.E.M.A SPECIFICATIONS.
2. MATERIAL SHALL BE LOW-CARBON STEEL
3. APPROXIMATE WEIGHT IS 33.8 LB.
4. LETTER "G" SHALL BE ON THE GAGE SIDE OF THE PLATE. (PANDROL ITEM 13096 OR EQUAL)

1-5/8" FOR GREEN LINE (USE 0.56" POST NYLON INSULATOR - PANDROL PART NO. 3456-2)
1-7/8" FOR RAPID TRANSIT LINES (USE 0.315" POST NYLON INSULATOR - PANDROL PART NO. 4263)
CLIP
BAR DIAMETER 20 MM
NOMINAL TOE LOAD 2,750 LBS.
WORKING DEFLECTION 7 16"
NOMINAL RAIL SEAT CLAMMING FORCE 5,500 LBS.
SURFACE AREA IN CONTACT WITH INSULATOR OR RAIL .82 SQ. IN.

CHAMFERED CENTER LEG ALLOWS EASY SETTING AND DRIVING.

THE "E" CLIP DESIGN UTILIZES THE TOW TO BEAR ON THE RAIL BASE. THE TOW IS FLATTENED TO PROVIDE A LARGE BEARING AREA ON THE RAIL OR INSULATOR.

NOTES:

1) CLIPS SHALL BE ONE PIECE, THREADLESS DETACHABLE, FABRICATED FROM HEAT-TREATED ALLOY SPRING STEEL AND SHALL GENERATE RAIL HOLDING FORCE BY SPRING ACTION. TWO CLIPS MAKE A COMPLETE ASSEMBLY. CLIPS MUST BE CAPABLE OF BEING INSTALLED AND REMOVED BY ONE PERSON WITH STANDARD TRACKWORK TOOLS.

2) CLIPS SHALL EXERT A MINIMUM HOLD-DOWN FORCE (TOE LOAD) OF 2,750 LBS. PER CLIP, 5,000 LBS. PER COMPLETE ASSEMBLY FOR THE TYPICAL APPLICATION. ATYPICAL APPLICATION MAY REQUIRE DIFFERENT HOLD-DOWN FORCES.

3) THE MINIMUM STATIC LONGITUDINAL SLIP PER COMPLETE ASSEMBLY SHALL BE 2,400 LBS. PER AREMA SPECIFICATIONS.

4) CLIPS SHALL BE DESIGNED AND PRODUCED BY AN ISO 9000 CERTIFIED MANUFACTURER WITH AT LEAST 10 YEARS PROVEN, SUCCESSFUL IN-TRACK SERVICE WITHIN THE U.S.

5) RANDOM PRODUCTION SAMPLES OF CLIPS WITH A HOLD-DOWN FORCE AS SPECIFIED IN #2 ABOVE MUST PASS A 3,000,000 CYCLE VERTICAL DYNAMIC DEFLECTION TEST OF 0.04" (+/- .002") ABOVE NOMINAL RAIL CLIP INSTALLED DEFLECTION WITHOUT FAILURE.

6) CLIPS SHALL BE SUPPLIED BY THE MANUFACTURER OF THE CLIP HOUSING (RESILIENT FASTENER TIE PLATE, WELD-ON SHOULDER, EMBEDDED SHOULDER, ETC.) TO ENSURE THE INTEGRITY OF THE FASTENER SYSTEM.

7) EACH CLIP MUST BEAR MANUFACTURER'S IDENTIFICATION AND THE LAST TWO DIGITS OF THE YEAR OF MANUFACTURE.
NOTE:
RAIL SHALL CONFORM IN EVERY
RESPECT WITH THE CURRENT AREMA
SPECS., VOL. 1, CHAP. 4, EXCEPT
AS MODIFIED HEREIN AND IN THE
MBTA
"SPECIFICATION FOR STEEL RAILS"
CONTAINED IN THE M.O.W. DIV.
BOOK OF STANDARD SPECS.

MINIMUM MATHEMATICAL ATTRIBUTES

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<th>SEC MODULUS OF BASE</th>
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<th>RATIO SEC MODULUS HEAD TO AREA</th>
<th>RATIO HEIGHT TO BASE</th>
<th>WEIGHT PER YARD</th>
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NOTE:
RAIL SHALL CONFORM IN ALL RESPECTS WITH THE CURRENT AREMA SPECIFICATIONS, VOLUME 1, CHAPTER 4, EXCEPT AS MODIFIED HEREON AND IN THE MBTA "SPECIFICATION FOR STEEL RAILS" CONTAINED IN THE M.O.W. DIVISION BOOK OF STANDARD SPECS.
"STRAP GUARD" 115 RE

(AAS MANUFACTURED B BETHLEHEM STEEL CORP.
FOR PORT AUTHORITY OF ALLEGHENY COUNTY)
SECTION 118
GIRDER GUARD RAIL

END OF RAIL

2 1/2" 4" 4"
NOTES:
1) JOINT BARS TO BE IN ACCORDANCE WITH CURRENT AREMA "SPECIFICATIONS FOR QUENCHED CARBON STEEL JOINT BARS".
2) JOINT BARS TO BE SHORT TOE AND HEADFREE DESIGN. BARS SHOWN ARE FOR USE WITH 1" ELLIPTICAL NECK TRACK BOLTS.
SECTION

NOTES:
1) JOINT BARS TO BE IN ACCORDANCE WITH CURRENT AREMA "SPECIFICATIONS FOR QUENCHED CARBON STEEL JOINT BARS".
2) JOINT BARS TO BE SHORT TOE AND HEADFREE DESIGN. BARS SHOWN ARE FOR USE WITH 1" ELLIPTICAL NECK TRACK BOLTS.
NOTES:
1) RAILS TO CONFORM WITH CURRENT AREMA SPECIFICATIONS FOR HEAT-TREATED RAILS.
2) CONICAL REAMER TO BE APPLIED TO BOLT HOLES AT BONDED JOINT TO REMOVE BURRS.
3) USE ONLY MODIFIED "E" CLIP AT BONDED JOINT.
4) REFER TO SPECIFICATIONS FOR "INSULATED JOINT KIT" IN MBTA BOOK OF MATERIAL SPECS.
NOTES:
1) BAR FOR OUTSIDE OF ASSEMBLY TO BE STANDARD, HEADFREE 24” LONG WITH 
   PUNCHING FOR FOUR 1” OVAL NECK, HEAT TREATED CARBON STEEL TRACK BOLTS.
2) BAR ON 115 RE SIDE OF ASSEMBLY TO BE MACHINED STEEL WITH TRUE FISHING 
   FOR 132 RE RAIL. BAR TO BE 1” THICK X 24” LONG WITH FOUR $\frac{1}{16}$” CIRCULAR 
   HOLES
3) BOTH BARS TO BE IN ACCORDANCE WITH CURRENT AREMA "SPECIFICATIONS FOR 
   QUENCHED CARBON STEEL JOINT BARS" AS MODIFIED HEREIN.
REFER TO MBTA SPECIFICATION FOR "INSULATED JOINT BARS" IN THE BOOK OF STANDARD TRACK MATERIAL SPECIFICATIONS.
NOTES:
1) CHEMICAL COMPOSITION OF STEEL TO BE IN ACCORDANCE WITH CURRENT AREMA "SPECIFICATIONS FOR QUENCHED CARBON STEEL JOINT BARS".
2) BOTH FIELD SIDE AND GAGE SIDE BARS TO BE 1¼" THICK AND OTHERWISE DIMENSIONALLY AS INDICATED.
M.O.W. DIVISION

JOINT BAR DETAILS FOR GGR-118 RAIL

NOTES:
1) CHEMICAL COMPOSITION OF STEEL TO BE IN ACCORDANCE WITH CURRENT AREMA "SPECIFICATIONS FOR QUENCHED CARBON STEEL JOINT BARS".
2) HOLE DIMENSIONS SHOWN ON FIELD AND GAUGE SIDE ELEVATIONS ARE OUTSIDE FACES OF BARS.
NOTES:

1. All joint bars to be machined or forged, heat-treated and shaped to the web configuration of rails specified as shown. Bars to be 24" long unless otherwise specified.
2. Bars shall conform to current AREMA specifications for Quenched Carbon Steel Joint Bars.
ADJUSTABLE SPACER BLOCK ASSEMBLY

TABLE OF DIMENSIONS

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<thead>
<tr>
<th>THEORETICAL DIMENSIONS</th>
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<tr>
<td>A</td>
<td>B</td>
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<tr>
<td>Surface Lines (Green Line)</td>
<td>1&quot; 45° 10° 2 1 1/2&quot;</td>
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<tr>
<td>Rapid Transit (Red, Orange, Blue)</td>
<td>1/2&quot; 45° 10° 2 1 1/2&quot; (Tolerance of Completed Assembly = ± 1/32&quot;)</td>
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*Restraining rail standard for surface line curves 100’ Rad. and above but less than 1,000’ Rad.; rapid transit curves 150’ Rad. and above but less than 1,000’ Rad.

Bolts and spacer blocks typ. 30° o.c. located midway between ties or fasteners.
A = FROG ANGLE
B = ACTUAL LEAD
C = POINT OF INTERSECTION TO 1/8" POINT OF SWITCH
D = POINT OF INTERSECTION TO 1/2" POINT OF FROG
E = LENGTH OF SWITCH POINT
F = LENGTH OF FROG
G = TOE LENGTH
H = HEEL LENGTH
I = GUARD RAIL LENGTH
J = 1/2" FROG POINT TO END OF GUARD RAIL
K = 1/2" FROG POINT TO END OF GUARD RAIL
L = 1/8" POINT OF SWITCH TO END OF STOCK RAIL
M = 1/8" POINT OF SWITCH TO END OF STOCK RAIL

NOTE: DIMENSIONS GIVEN ARE BASED ON TRACK GAGE OF 4'-8 1/2" THROUGHOUT.
FOR TRACK CENTERS OTHER THAN SHOWN IN TABLE.

C = TRACK CENTERS / TANGENT ANGLE A
D = TRACK CENTERS / SINE ANGLE A
E = DIMENSIONS C + 2B

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TRACK CENTERS MUST BE CALCULATED USING DECIMALS OF A FOOT.

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STANDARD CROSSOVERS
GENERAL LAYOUT
DETAIL 5100 (FOR AAR WHEELS)
SCALE: 1/4 FULL

NOTE: ABOVE DETAIL USED ON ALL RAPID TRANSIT LINES. (EXCLUDES GREEN & MATTAPAN LINES)

REINFORCING BARS TO BE 1/2" THICK, SECURED BY 3/4" NUTS IN CENTER LINE OF WEB EXCEPT FOR HOLES WITH 1" DIAMETER BOLTS AS INDICATED ON PLAN NUMBERS 121-62, 123-62, 125-62 & 127-62 IN AREMA PORTFOLIO OF TRACKWORK PLANS.

1/4" DIA. BOLT WITH SQUARE HEAD, SQUARE NUT, SPRING WASHER AND COTTER PIN

5/16" DIA. HOLE

POINT STOP DETAIL 2024
SCALE: 1/8 FULL

BASE DETAIL PLAN
SCALE: 1/16 FULL

CROSS SECTION X-X
SCALE: 1/16 FULL

SWITCH POINT PLANING ELEVATION & PLAN VIEWS
SCALE: 1/8" = 1'-0"
MODIFIED 5100 DETAIL (FOR LRT WHEELS)

NOTE: ABOVE DETAIL USED ON ALL LIGHT RAIL LINES. (GREEN & MATTAPAN LINES)

REINFORCING BARS TO BE 1/8" THICK; SECURED BY 3/4" RIVETS IN CENTER LINE OF WEB EXCEPT FOR HOLES WITH 1" DIAMETER BOLTS AS INDICATED ON PLAN NUMBERS 121-62, 125-62, 127-62 & 129-62 IN AREMA PORTFOLIO OF TRACKWORK PLANS.

TOP OF STOCK RAIL - GRIND TO SHARP EDGE

DETAIL OF SHOULDER BOLT

D = DIAMETER OF BOLT
ALLOY STEEL S.A.E. 4130 OR EQUIVALENT
HEAT TREATED - BRINELL MIN. 275

HEEL JOINT ASSEMBLY

SCALE: 1/8 FULL

CROSS SECTION B - B

SCALE: 1/8 FULL

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
M.O.W. DIVISION

MODIFIED DETAIL 5100 AND HEEL BLOCK ASSEMBLY

MADE DEC. 1, 2000
MODIFIED NO. 411
M.O.W. NO.

STANDARD SWITCH POINT DETAILS

DRAWN: 1ST.

ISSUE

HEAD LOCK: CAST OR WELDED, CLASS B, HARD, FOR FIT, SEE PLANS BASIC NO. 1010 AND 1011.
BOLTS - HIGH TENSILE STEEL AND GENERALLY PER SECTION 402, APPENDIX A.
DIAMETER OF BOLTS AND SPACING OF HOLES SHALL COMPLIANCE TO JOINT BAR DETAIL SPECIFIED, EXCEPT THAT WHEN SIX HOLE BARS ARE DESIGNED, THE SIXTH HOLE TOWARD THE NARROW END WILL BE OMITTED AND THE JOINT BARS SHORTENED CORRESPONDINGLY.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
M.O.W. DIVISION

MODIFIED DETAIL 5100 AND HEEL BLOCK ASSEMBLY

DRAWN: 1ST.

ISSUE

HEAD LOCK: CAST OR WELDED, CLASS B, HARD, FOR FIT, SEE PLANS BASIC NO. 1010 AND 1011.
BOLTS - HIGH TENSILE STEEL AND GENERALLY PER SECTION 402, APPENDIX A.
DIAMETER OF BOLTS AND SPACING OF HOLES SHALL COMPLIANCE TO JOINT BAR DETAIL SPECIFIED, EXCEPT THAT WHEN SIX HOLE BARS ARE DESIGNED, THE SIXTH HOLE TOWARD THE NARROW END WILL BE OMITTED AND THE JOINT BARS SHORTENED CORRESPONDINGLY.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
M.O.W. DIVISION

MODIFIED DETAIL 5100 AND HEEL BLOCK ASSEMBLY

DRAWN: 1ST.

ISSUE

HEAD LOCK: CAST OR WELDED, CLASS B, HARD, FOR FIT, SEE PLANS BASIC NO. 1010 AND 1011.
BOLTS - HIGH TENSILE STEEL AND GENERALLY PER SECTION 402, APPENDIX A.
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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
M.O.W. DIVISION

MODIFIED DETAIL 5100 AND HEEL BLOCK ASSEMBLY

DRAWN: 1ST.

ISSUE

HEAD LOCK: CAST OR WELDED, CLASS B, HARD, FOR FIT, SEE PLANS BASIC NO. 1010 AND 1011.
BOLTS - HIGH TENSILE STEEL AND GENERALLY PER SECTION 402, APPENDIX A.
DIAMETER OF BOLTS AND SPACING OF HOLES SHALL COMPLIANCE TO JOINT BAR DETAIL SPECIFIED, EXCEPT THAT WHEN SIX HOLE BARS ARE DESIGNED, THE SIXTH HOLE TOWARD THE NARROW END WILL BE OMITTED AND THE JOINT BARS SHORTENED CORRESPONDINGLY.
150' C.R. R.H. TURNOUT (FULLY GUARDED)

SCALE: 1/8" = 1' - 0"

NOTES
1. THIS TURNOUT USED ON RAPID TRANSIT LINES
2. GAGE TRANSITIONS IN TEN FOOT LENGTHS AS SHOWN.
MODIFIED # 6 R.H. TURNOUT

SCALE: 1/8" = 1' - 0"

NOTES:
1. GAGE TRANSITIONS ALWAYS MADE ON INSIDE RAIL OF CURVE AND ON THROUGH SIDE ON STRAIGHT CLOSURE RAIL.
2. THIS TURNOUT USED ON RAPID TRANSIT LINES.

Massachusetts Bay Transportation Authority

AREMA MODIFIED # 6 TURNOUT (Compound Geometry)
FULLY GUARDED DESIGN

LEGEND

A INDICATES RAIL BRACE LOCATIONS

SHEET: 1
NO. 510
50' C.R. R.H. TURNOUT  (FULLY GUARDED)

SCALE: 1/8" = 1'-0"  

NOTES
1. THIS TURNOUT USED ON LIGHT RAIL TRACK.
2. GAUGE TRANSITIONS IN TEN FOOT LENGTHS AS SHOWN.
150' C.R. R.H. TURNOUT (FULLY GUARDED)

SCALE: 1/8" = 1' - 0"

NOTES
1. THIS TURNOUT USED ON LIGHT RAIL TRACK.
2. GAGE TRANSITIONS IN TEN FOOT LENGTHS AS SHOWN.
EQUILATERAL TURNOUTS VARY WITH GEOMETRY, SEE M.O.W. STAFF FOR DETAILS

STANDARD GIRDER RAIL TURNOUTS

SWITCH RADIUS | ANGLE | DIMENSIONS | COMMENTS
--- | --- | --- | ---
52' | 20°-31°-45° | 21°-8.58° 12°-10.58° 8°-10° | P.T. @ HEEL OF FROG
72' | 20°-26°-24° | 25°-6.78° 15°-3.92° 11°-3.51° 12°-0° 8°-0° | P.T. @ HEEL OF FROG
100° W | 17°-22°-00° | 0°-0° 12°-0 10°-4.31° 10°-0° 8°-0° | P.T. @ T.P.F.
100° E | 15°-40°-00° | 0°-0° 17°-0.76° 10°-4.54° 10°-0° 8°-0° | P.T. @ HEEL OF FROG
150° | 15°-40°-00° | 0°-0° 10°-5.16° 10°-10.15° 15°-0° 8°-0° | P.T. @ TOE OF FROG
200° | 15°-15°-00° | 40°-4.34° 18°-0° 20°-10.04° 10°-0° 8°-0° | P.T. @ TOE OF FROG

NOTES
1. LOCATION OF P.C. TURNOUT, RELATIVE TO END OF CASTING, VARIIES WITH GEOMETRY. REFER TO MSTA PLAN NO. 701 FOR DETAILS.
2. REFER TO APPENDIX 1 OF GIRDER RAIL SPECIAL TRACKWORK SPECIFICATION FOR GAGING AND FLANGEWAY CRITERIA.
Tongue Switch Elevation

Ref: Plans Nos. 702 and 703 for sections and tongue switch details
Section of Tongue Switch at Throw Connection

(Symmetric section - dimensions apply both sides)
NOTES:
1. Refer to Plan No. 701 for location of Sections X-X, Y-Y and Z-Z on Plan View of Tongue Switch.
2. Refer to Plan No. 702 for other sections and details of Tongue Switch fabrication.

SECTION X-X
(Ref. Plan 701)

SECTION Y-Y
(Ref. Plan 701)

SECTION Z-Z
(Ref. Plan 701)
NOTES:

1. Flangeway dimensions designated for dimension measured 1/4" down from plane of rail running surface. Nominal flangeway dimensions are 1 7/8" and 1 9/16" for 449# rail and 118# rail respectively.

2. Refer to Plan Nos. 700-704 for girder rail special trackwork layout and details.

NOTES:

1. Refer to Plan No. 704b for additional point mate details.
2. All joint drilling to be 1/4" diameter holes, 3" above base. Spacing as indicated.
3. Dimensioning shown representative of 100’ section. Different geometric requirements will necessitate recalculation of many dimensions shown on this drawing.
4. This drawing shows 194 rail section.
5. Refer to Plan Nos. 700, 701, 702 and 703 for girder rail special trackwork and details.
NOTES:
1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING / FLANGEWAY CRITERIA.
2.) REFER TO MBTA DRAWING NO. 700, 701, 702, 703, 740, 741, 748, AND 750 FOR DATA AND DETAILS RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

50' C.R. GIRDER RAIL TURNOUT
SCALE: 1/8" = 1'-0"

LRT GIRDER RAIL SPECIAL TRACKWORK
50° C.R. TURNOUT

MASSACHUSETTS
SAY TRANSPORTATION AUTHORITY
M.O.W. DIVISION

M.O.W. NO. 705

DRAUGHTER M.O.W.

D Non. 1, 2000

RAIL TRACK ENGINEERING
NOTES:

1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING / FLANGEWAY CRITERIA.

2.) REFER TO MBTA DRAWING NOS. 700, 701, 702, 735, 740, 741, 749, AND 750 FOR DATA AND DETAILS RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

75' C.R. GIRDER RAIL TURNOUT

SCALE: 1/8" = 1' - 0"

GIRDER RAIL PROG. - 2 ARMS CURVED
TOE SPREAD = 15 5/16"
HEEL SPREAD = 17 5/8"
NOTES:

1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING / FLANGEWAY CRITERIA.

2.) REFER TO MBTA DRAWING NOS. 700, 701, 709, 718, 740, 741, 748, AND 750 FOR DATA AND DETAILS RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

100' C.R. GIRDER RAIL TURNOUT (TYPE "A")

SCALE: 1/8" = 1'- 0"


NOTES:

1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING / FLANGEWAY CRITERIA.

2.) REFER TO MBTA DRAWING NO. 700, 701, 702, 735, 740, 741, 747, AND 750 FOR DATA AND DETAILS RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

100' C.R. GIRDER RAIL TURNOUT

SACLE: 1/8" = 1'-0"

100' C.R. TYPE "B" TURNOUT

M.O.W. NO. 720

LRT GIRDER RAIL SPECIAL TRACKWORK
100' C.R. TYPE "B" TURNOUT
NOTES:
1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING/FLANGEWAY CRITERIA.
2.) REFER TO MBTA DRAWING NOS. 700, 701, 702, 735, 740, 741, 745, AND 750 FOR DATA AND DETAIL ARE RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

150' C.R. GIRDER RAIL TURNOUT

SCALE: 1/8" = 1' - 0"

P.C.T.O. 37'-7" T.P.F.

P.I. FIELD LAYOUT

P.I. 35 SPACES @ 20" - 56" - 4"

JT. @ C.L. OF TIE

17' 11 1/32" CURVED CLOSURE RAIL (INCLUDES 1/4" FOR JOINT ALLOWANCE)

1/8" POINT MA Te

15'-0" TONGUE SWITCH REF NOTE

6'-23/43"

5TH CLOSURE RAIL - 17' - 6 3/4"
(INCLUDES 1/4" FOR JOINT ALLOWANCE)

INNER RAIL - 16'-11"
CURVED LENGTH (INCLUDES 1/8" FOR JOINT ALLOWANCE) GAGE RAD. = 147'-7 1/2"

39'-0" GIRDER STOCK RAIL

GIRDER RAIL FROG - 4 STR. ARMS
TOE & HEEL SPREAD = 10 5/8"
NOTES:

1.) REFER TO GIRDER RAIL SPECIAL TRACKWORK DESIGN SPECIFICATIONS FOR COMPONENT FABRICATION DETAILS AND GAGING / FLANGEWAY CRITERIA.

2.) REFER TO MBTA DRAWING NO. 700, 701, 702, 735, 740, 741, 745, AND 750 FOR DATA AND DETAILS RELATED TO GIRDER RAIL SPECIAL TRACKWORK.

200' C.R. GIRDER RAIL TURNOUT

SCALE: 1/8" = 1'-0"
NOTES:
1. Flange bearing geometry conforms to A.T.E.A. Standard.
2. Refer to Drawing No. 735 for details of SAB V-wheel.
3. Refer to Girder Rail Special Trackwork Drawings, Solid manganese frog details and other associated drawings in the M.O.W. Division Book of Standard Trackwork Plans.
4. Refer to Girder Rail Special Trackwork design specification in the MBTA M.O.W. Division Book of Standard Track Material Specifications.

M.B.T.A. S.A.B. V-WHEEL

Representation is Full-Size
NOTES:
1) MECHANISM BOX BODY AND COVER TO BE CAST OR FABRICATED STEEL WITH APPROVAL OF MGR. OF TRACK ENGINEERING.
2) OTHER MECHANISM COMPONENTS FABRICATED AS INDICATED.
3) THE DIMENSION SHOWN FOR 149 RETA RAIL. DIMENSION MAY VARY DEPENDENT ON RAIL SECTION SPECIFIED.
4) REFER TO PLAN NO. 701, 703, 745. ALSO REFER TO SPECIFICATION FOR GIRDER RAIL SPECIAL TRACKWORK IN THE BOOK OF STANDARD TRACK MATERIAL SPECIFICATIONS.

SPRING (SEE PLAN VIEW)
2½" OUTSIDE DIAMETER
¾" WIRE
5" FREE LENGTH
7 COILS

SECTION A-A

MASSACHUSETTS
TRANSPORTATION
AUTHORITY

LRT GIRDER RAIL SPECIAL
TRACKWORK SWITCH MECHANISM
DETAILS (1 OF 2)

M.O.W.
DIVISION

004
740

6/18/2013

M.O.W. TRACK ENGINEERING
DIRECTOR - M.O.W.
NOTES:
1) REFERENCE GIRDER RAIL SPECIAL TRACKWORK SPEC. IN BOOK OF STANDARD TRACK MATERIAL SPECIFICATIONS.
2) REFERENCE DWG. NOS. 701 AND 702 IN BOOK OF STANDARD TRACKWORK PLANS.
NOTES:
1) NEW WHEEL DIAMETER=26". CONDEMNIG LIMIT IS 24". WHEEL WEIGHS 357 LBS (±4 LBS).
2) SURFACE HARDNESS OF TIRE 321–363 BRINELL.
Track and Guard Rail Gage Data

Notes:

1. Gate may vary in curved side of turnout. Refer to special turnout plans for details.
2. Track must be installed ± 1/8" from standard guard check and guard face gages as indicated regardless of track gage.
3. Guard rail fabrication per Plan Nos. 600 and 601 and 100-06 in the AM/3 Portfolio of Trackwork Plans.
4. Refer to M.O.W. Div. track maintenance standards for guard check and guard face gage maintenance thresholds.

Effective Guarding Face (Measure from 1/8" PF)

<table>
<thead>
<tr>
<th>Track Number</th>
<th>Length of Guard Rail</th>
<th>Required Distance A</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>10'</td>
<td>43&quot;</td>
</tr>
<tr>
<td>8</td>
<td>10'</td>
<td>43&quot;</td>
</tr>
<tr>
<td>10</td>
<td>13'-3&quot;</td>
<td>51&quot;</td>
</tr>
<tr>
<td>15</td>
<td>13'-3&quot;</td>
<td>63&quot;</td>
</tr>
<tr>
<td>20</td>
<td>13'-3&quot;</td>
<td>63&quot;</td>
</tr>
</tbody>
</table>
NORMAL FROG PLATE

SWIVEL SHOULDER INSERT

REVERSE FROG PLATE

NOTES:
1. Plates shown are manufactured by PANDROL, INC.
2. Material shall be Low-Carbon Steel and the plates shall conform to current AREMA specifications.
3. Furnish plates with 15/16" diameter holes for screw tags.
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.
NOTES:
2) Reference MBTA Plan Nos. 410, 411, 826, 830, 835, 840 and any other applicable plans and specifications.
3) Switch throw as indicated in Spec. for 115 RE Guarded SP Track.
4) Switch points fully heat-treated to 321-388 Brinell.

DETAILS SHOWN ARE FOR 200' RADIUS SWITCH IN LRT TRACK. DIFFERENT GEOMETRY WILL NECESSITATE RE-CALCULATION OF EACH DIMENSION SHOWN. NOTE FLANGEWAY DIFFERENTIAL BETWEEN RYL AND LRT TRACK.

GUARDED SWITCH POINT
DESIGN DETAILS

Main Track Engineering
Director M.O.W.
SECTION "A-A"

SECTION AT NOTCH

SECTION AT HEEL

NOTES:
1) REFERENCE SPECIFICATION FOR 115 RE GUARDED SPECIAL TRACKWORK IN THE BOOK OF STANDARD TRACK MATERIAL AND CONSTRUCTION SPECS.
2) REFERENCE DWG. NO. 825 AND ALL OTHER APPLICABLE DRAWINGS AND SPECS

SECTIONS AND DETAILS SHOWN ARE FOR 200' RADIUS SWITCH IN RT TRACK. DIFFERENT GEOMETRY WILL NECESSITATE RECALCULATION OF EACH DIMENSION. NOTE GAGE, FLANGEWAY AND WHEEL TREAD CLEARANCE DIFFERENTIAL BETWEEN LRT AND RTL TRACK.

GAGE = 4'-8½" AT VERTEX (P.C.) INCREASING 4'-8½" AT KINK

ALIGNMENT SKETCH
FOR GEOMETRY SHOWN ON DWG. NO. 825
NOTES:

1. GUARD BAR COMPONENT TO CONFORM TO THE A.R.E.A. SPECIFICATIONS FOR SPECIAL TRACKWORK IN THE PORTFOLIO OF TRACKWORK PLANS SECTION 100-96, PART M-2. TORCH CUTTING TO FACILITATE FIT OF MANGANESE BAR WITH OTHER COMPONENTS IS PROHIBITED.


PLAN VIEW
SCALE: 1" = 1'-0"
LEFT HAND AS SHOWN
RIGHT HAND OPPOSITE

ELEVATION
SCALE: 1" = 1'-0"

STANDARD COVER GUARD
200' C.R. T RAIL LEFT HAND TURNOUT
SECTION C - C
SCALE: 1" = 1'-0"

PLAN VIEW
SCALE: 1" = 1'-0"

NOTE:
1. REFER TO SPECIFICATION FOR 115 RE GUARDED SPECIAL TRACKWORK IN THE BOOK OF STANDARD MATERIAL / CONSTRUCTION SPECIFICATIONS.
NOTES:
1) STOCK RAILS TO BE FULLY HEAT–TREATED PER CURRENT AREMA SPECIFICATIONS.
2) UNDERCUT SIDE OF RAIL TO BE OPPOSITE RAIL BRAND SIDE OF RAIL.
3) DRILL BOTH ENDS OF STOCK RAIL 3½"–"–6"@2½" A.B., 1½" DIAMETER HOLES UNLESS DIRECTED OTHERWISE. NO HEEL BLOCK DRILLING UNLESS SPECIFIED.
SOLID MANGANESE FROG DETAILS

NOTES:
1) SOLID MANGANESE FROG PER ARENA PLAN NO. 671 AS MODIFIED HEREIN. REFER TO TRACKWORK PLANS FOR SPECIFIC GEOMETRIC CRITERIA.
2) DETACHABLE WING RAILS AND 132/115 COMBO HEEL SHOWN FOR ILLUSTRATION PURPOSES ONLY. REFER TO TRACKWORK PLANS TO DETERMINE IF HEEL GUARDING REQUIRED.
NOTES:

1. Refer to associated drawings for 3rd rail system in the Book of Standard Trackwork Plans.


SECTION BREAK

OVERHEAD STRUCTURE BREAK

TRANSITION @ STATION

EXTRACTION BREAK

AT-GRADE CROSSING BREAK

3rd RAIL SYSTEM LAYOUT DETAILS

Hsr. Trk Engineering  Director-M.O.W.
NOTES:
1) REFER TO ASSOCIATED DRAWINGS FOR SPLICE JOINT DETAILS, ANCHOR ASSEMBLIES, INSULATORS, ETC. IN THE BOOK OF STANDARD TRACKWORK PLANS.
2) REFER TO SPECIFICATIONS FOR CONTACT RAIL SYSTEM IN THE BOOK OF STANDARD TRACK MATERIAL/CONSTRUCTION SPECIFICATIONS.
85 LB COMPOSITE CONTACT RAIL SPlice JOINT DETAILS

85 LB CONTACT RAIL (ASCE RAIL SECTION)

ALUMINUM SPLICE BAR

ALUMINUM SPLICE BAR

1 1/8"

6"

3"

3"

6"

1 1/8"

7/8" LOCK BOLT WITH FLANGED COLLAR 1/8" HOLE, TYP

TOP SURFACE TO BE SMOOTH AND EVEN

ALUMINUM CONDUCTOR EXTRUSION

ALUMINUM SPLICE BAR

7/8" LOCK BOLT WITH FLANGED COLLAR 1/8" HOLE, TYP

SECTION A2-A2

85 LB CONTACT RAIL (ASCE RAIL SECTION)

ALUMINUM SPLICE BAR

ALUMINUM CONDUCTOR EXTRUSION

7/8" LOCK BOLT WITH FLANGED COLLAR

CL LOCK BOLT

COAT INTERFACE WITH GREASE INHIBITOR PASTE, TYP

45°, TYP

3"

2 2/8"
NOTES:

1. Refer to Specifications for Contact Rail Insulator found in the Book of Standard Track Material/Construction Specifications.

2. Refer to associated drawings related to the Contact Rail System in the Book of Standard Trackwork Plans.

3. Top of insulator base must contact insulator cap bottom. Insulator cap must fit inside insulator base. Every bond must be continuous, without "holidays" and must be plainly visible around circumference of underside of cap.

4. Stainless steel clip as indicated - 2 @ 1/8" x 1" - A". clip shall be receptive to aluminum configuration when aluminum rail is specified.
1\frac{1}{2}'' HEIGHT SHOWN, 2'', 3'' AND 4'' ARE SIMILAR

SECTION

PLAN VIEW

NOT TO SCALE

NOTES:
1/ REFER TO M.O.W TRACK MAINTENANCE STANDARD DWG NO. 872 FOR INSULATOR DETAIL
NOTES:
1. Refer to associated 3rd Rail System drawings in the Book of Std. Trackwork Plans.
PLAN VIEW

ELEVATION

TIE-DOWN BRACKET DETAIL

ANCHOR INSULATOR ROD ASSEMBLY

NOTES:
Refer to Notes on DWG. 874.

85# 3RD RAIL
ANCHOR ASSEMBLY DETAILS

M.O.W. DIVISION
DWG. No. 876
DATE ISSUE NO.

Main Track Engineering Director - M.O.W.
3rd Rail Clearance Detail

Section A-A (see detail at left)

Section B-B (see Plan 1 at left)

Section C-C (see Plan 2 at left)

Notes:
3. Clearance in other special trackwork configurations shall be calculated on an individual basis and calculations (with sketches) submitted to the M.O.W. Division Manager of Track Engineering for review and approval.
4. Relationship of top of running rail to top of 3rd rail is typical. Refer to Track Maintenance and Safety Standards for blue, orange, and red lines for maintenance limits.

3rd Rail Clearance
In Special Trackwork

Mgr Track Engineering
Director-M.O.W.
OPEN DECK BRIDGE (SEE NOTE 1)

NOTES:
1) BALLASTED DECK BRIDGES SHALL USE RESILIENTLY FASTENED PLATES AS SHOWN ON PLAN NO. 905 ALTERNATIVE USE OF CUT SPIKE FASTENED GUARD RAIL PLATES ON OPEN DECK BRIDGES AS SHOWN.

2) GUARD RAIL REQUIRED ON APPROACH END OF ALL BRIDGES AS DESCRIBED IN SECTION 4.C.13.9 OF THE TRANSIT DESIGN STANDARDS MANUAL ALONG WITH REQUIRED LENGTH END OF BRIDGES AS DIRECTED OR SHOWN ON TRACKWORK PLANS.

3) PLATE GUARD RAIL AS SHOWN OTHERWISE FULL JOINTED AND SPIKE THE SAME AS RUNNING RAILS.

DETAIL AT END OF GUARD RAIL

ELEVATION AT END OF GUARD RAIL

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

M.O.W.
DIVISION

DRAWING
900

DATE
APR. 18, 2013

ISSUE NO.

BRIDGE GUARD
INSTALLATION DETAILS

M.T.E.
PROJECT ENGINEERING

M.W.
DIRECTOR - M.O.W.
NOTES:

1. Installation shown for use on ballasted deck bridges on wood ties and elsewhere as directed.

2. Ref. Plan No. 90a for additional guard rail installation details.


4. Material to be A 325 steel unless otherwise specified. Brand guard rail plates to indicate producer and year produced. Guard rail plate assemblies every other tie unless directed otherwise.

Massachusetts Bay Transportation Authority

M.O.W. Division

Dwg. No. 905

Data

RESILIENTLY FASTENED BRIDGES GUARD

T

Rail Track Engineering

Director - M.O.W.
PLAN VIEW

8" PIPE (BELOW)

8'-0"

13'-0"

1/4" PLATE COVER (LOOSE)

5/8" SO. COVER BEARING FLANGE - ALL AROUND

1/2" A-36 GALV. PLATE (TYPICAL THROUGHOUT)

1/4" PLATE COVER

3/8"

3/8"

2'-0"

3/4" Holes (TYP.)

NO PERFORATIONS IN BOTTOM OF DRAIN

6" NON-PERFORATED BAND AT SIDE WALL BOTTOM - TYPICAL

9° CUTOUT

SIDE VIEW

END VIEW

SECTION A

DETAIL 1

STEEL BALLAST TRACK DRAIN

M. W. ENGINEERING

DIRECTOR - M. W.
NOTES:
2. See Table below for height of Bumping Post cushion head as shown in "Elevation" view.

<table>
<thead>
<tr>
<th>Line</th>
<th>&quot;A&quot;</th>
<th>&quot;B&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Line</td>
<td>40 5/8&quot;</td>
<td>52 3/8&quot;</td>
</tr>
<tr>
<td>Orange Line</td>
<td>44&quot;</td>
<td>55 5/8&quot;</td>
</tr>
<tr>
<td>Red Line</td>
<td>48 3/4&quot;</td>
<td>59 1/8&quot;</td>
</tr>
</tbody>
</table>

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BUMPING POST
for Blue, Orange and Red Lines

M.T. Track Engineering  Director M.O.W.
BUMPING POST
for Green Line (GRT) Track

18' Long
11/2" Middle
Rails" Spiked
To Every Tie

NOTES:
(Refer to Bumping Post Specification
in the Book of Standard Track Material/
Construction Specifications.)
NOTES:
(a) Ref. Plan No. 930b for additional details.
(b) Model's 50A and 50B are manufactured by Bethlehem Steel Corp.
(c) Model 50A is a low profile switch stand, 10' high, use as directed by the Transit Design Standards Manual, Section 4, C. 11.
(d) Throw in switch stand = 5°.