

FOX RIVER TROLLEY MUSEUM SPECIFICATION: TRACK

Existing Conditions. The existing Trolley Museum mainline track is 70.40ASCE rail with 4 hole 24" skirted bars 5-5-5 drilling, and 13/16" oval neck, wrench fit bolts with lock washers. Ties are on 21" centers, with 15" centers at suspended joints. The existing Trolley Museum spur track is 90.20 RA rail with 4 hole 24" skirted bars 5 1/2-5 1/2-5 1/2 drilling, and 7/8" oval neck, wrench fit bolts with lock washers. Ties are on 21" centers, with 18" centers at suspended joints. Both tracks use single shoulder plates with a variety of punchings; up to 4 holes, and a variety of widths up to 5". Neither the mainline nor the spur is anchored in this area. Ties are creosoted wood, 6"x8"x8'. Both tracks are ballasted with cinder ballast. The mainline existing Trolley Museum rail track design speed is 20 mph. The spur existing Trolley Museum rail track design speed is 5 mph.

References.

- a. Manual for Railway Engineering, American Railway Engineering and Maintenance-of-Way Association (AREMA)
- b. Track Safety Standards part 213, Federal Railroad Administration (FRA)

Track Construction. Tracks shall be constructed in accordance with the current revision AREMA Manual For Railway Engineering (AREMA Manual) Chapter 5 -Part 4, Section 1, Recommended Practices for Track Construction (Recommended Practices). The referenced sections of the AREMA Manual are incorporated herein. AREMA Sections are referenced as follows Chapter -Part.Section.Article.Subsection.i.e. Chapter 5 Part 4 Section 2 Article 1 subsection d is listed as AREMA 5-4.2.1.d. It shall be the responsibility of the Contractor(s) to maintain a current copy of the AREMA Manual and FRA Track Safety Standards Part 213 on site and familiarize themselves with the project requirements contained therein.

These specifications only cover work by the Contactor and apply only to the initial construction. References to follow-up work in the Recommended Practice, including but not limited to resurfacing track, tightening bolts etc, after acceptance of the construction work are excluded from the work except where called for in the Special Provisions.

General Notes

Where the Recommended Practice refers to the Railway Company, Railroad Company, or railroad the "Museum" shall be substituted.

Material. The Contractor shall furnish materials for all work in this section, except as specifically noted herein superseding AREMA 5-4.1.1 .e. All material shall be made available for inspection by the Museum before construction and shall be satisfactory to the Railroad Engineer. Material is incidental to the work and shall not be paid for separately superseding AREMA references to Measurement and Payment.

Temporary Construction. Material for temporary tracks shall be the same as for permanent tracks, except as noted below.

- a. **Rail.** Rail shall be provided in 39' lengths, except as required to tie into existing joints. Rails shall not be shorter than 12'. Rail shall be a minimum of 90# section.

Rail quality shall be as noted in AREMA 5-4.1.3.c and Class III as provided in AREMA 4-2, Table 4-2-7. Rail shall be free of FRA defects requiring remedies A through G and I as described in FRA Track Safety Standards Part 213.113. Defects requiring remedy H are acceptable. Rail shall be straight and true as defined by AREMA 4-2.1.13.

- b. **Ties.** Ties shall be new oak or an approved equal. Ties shall be AREMA 7" grade meeting the requirements of AREMA 30-3.1.1. Ties shall be a minimum of 8' in length, except under and within 10' either side of the approach roadway for the at-grade crossings, where the ties shall be a minimum of 10' in length. Relay ties may be used subject to the inspection and approval of the Railroad Engineer prior to installation. Relay ties shall conform to FRA 213.109(e) except that no tie may be cut through more than 1½", superseding FRA 213.109(e)(4). One steel multi-nail plate type anti-splitting device, applied to each end of the relay tie, is to be at least 18-gage galvanized steel per AREMA 30-3.1.6 and 30-3.1.7. The Railroad Engineer may at his discretion reject any relay tie. All holes in relay ties shall be plugged as noted herein
- c. **Crossing Surface.** Crossing surface is to be full depth timber, or better, with flangeway fillers, matching the rail section applied to. Timbers shall be made of Oak or approved equal. Relay timbers are acceptable. Crossing surface should be designed and manufactured to be flush with the top of rail when newly installed and include lag screws or other devices, as proscribed by the manufacturer to hold the crossing surface in place, flush with the top of rail, under roadway and rail traffic. Securing devices must be countersunk or otherwise made to be flush with or below the top of rail.
- d. **Ballast.** Ballast shall be size 5 as specified in AREMA 1-2.4.4, Table 1-2-2 meeting the requirements of AREMA 1-2.2 through 2.8. The Contractor is solely responsible for transportation and placement of the ballast; however Contractor may independently contract with the railroad to deliver and/or distribute the ballast by railcar. Ballast may be new or reclaimed, provided it meets the gradation requirements.

Permanent Track. To the extent possible materials previously removed from the track will be utilized to reconstruct the permanent track. Below materials for the permanent track are to replace existing materials that, in the opinion of the Railroad Engineer, are unsuitable for reinstallation due to damage in the removal or reinstallation process, or due to their disturbance by the work. Ties installed to support extension of the at-grade crossing rail to the nearest joint will be considered permanent work as they will be left in place when the existing rail is reinstalled.

- a. **Rail.** Rail shall match the weight and section of the existing rail superseding AREMA 5-4.1.3.c. Rail quality shall be Class III as provided in AREMA 4-2, Table 4-2-7. Rail shall be free of FRA defects requiring remedies A through G and I as described in FRA Track Safety Standards Part 213.113. Defects requiring remedy H are acceptable. Rail shall be straight and true as defined by AREMA 4-2.1.13.
- b. **Ties.** Per AREMA 5-4.1.1(1) ties shall be new oak or an approved equal. Ties shall be AREMA 6" grade a minimum of 8' in length meeting the requirements of AREMA

30-3.1.1. Ties shall be creosote treated in accordance with AREMA 30-3.9. One steel multi-nail plate type anti-splitting device, applied to each end of the tie plate, is to be at least 18-gage galvanized steel per AREMA 30-3.1.6 and 30-3.1.7.

- c. **Tie Plates.** Tie plates shall be a minimum of 10" base, 7" wide, 6 hole punch with single shoulders and a rail seat matching the rail base for the selected section of rail as shown in AREMA 5-1.3, Table 5-1-3, or as approved by the Railroad Engineer for rail section base widths not shown on Table 5-1-3. Second hand plates are acceptable provided plates are flat exhibiting no more than 1/8" warp across the full dimension of the plate in any direction. Plate and/or holes must not be torch cut. Holes must not be more than 1/8" larger than AREMA plan dimensions for the selected plate size. One size of tie plate only shall be used for each weight of rail.
- d. **Spikes.** Spikes shall meet the requirements of AREMA 5-2 and be a minimum of 5/8" X 5 1/2" " as shown in AREMA 5-2.1, figure 5-2-1. Second hand spikes may be used provided they are:
 - Straight — no greater than 1/8" deviation from straight over the length of the spike,
 - Do not exhibit excessive section loss - 1/8" in any dimension, and
 - Can be driven without bending.
- e. **Tie Plugs.** Tie plugs shall meet the requirements of AREMA 30-3.1.5.
- f. **Joint Bars.** Joint bars shall be manufactured for the rail section to be joined, and fully bolted with nut locks. Only one type of joint bar and hole spacing shall be used for each rail section. Offset bars, or transition rails, conforming to the rail sections being installed, shall be used to join rails of different sizes. Transition rails specifically manufactured for the rail sections to be joined may be used in lieu of offset bars or welds. Homemade bars are not acceptable. Second hand bars may be used provided they are:
 - Straight – no greater than 1/4" deviation from straight over the length of the bar,
 - Do not exhibit excessive section loss - 1/8" in any dimension, and
 - The holes are not excessively worn or misshapen, 1/8" in any dimension from round or oval. Oval holes must be capable of restraining nut for tensioning.
- g. **Bolts, Washers and Nuts.** Bolts shall be oval neck conforming to AREMA 4-1.4 with dimension "D" no less than 1/16" smaller than the joint bar holes, staggered so that alternate bolts have nuts on opposite sides. Bolts shall have a minimum diameter of 13/16" for 70# rail, and 7/8" for 90# rail, with rail and joints selected accordingly. Bolts shall be wrench fit, have lock washers of the type and size required for the bolt and meet the requirements of AREMA 4-2.10. Second hand material may be used provided they are:
 - Straight — no greater than 1/8" deviation from straight over the length of the bolt,
 - Do not exhibit excessive section loss - 1/8" in any dimension, and
 - The threads are not excessively worn or misshapen.
 - Oval or elliptical bolts must be capable of restraining nut for tensioning. Bolt and nut threads must be capable of being properly tensioned against the bar without stripping.

- h. **Rail Anchors.** Rail anchors shall be as specified in AREMA 5-7.1. Second hand material may be used provided they are:

- Straight - no greater than 1/8" deviation from straight over the length of the anchor

- Do not exhibit excessive section loss - 1/8" in any dimension, and

- Are capable of providing the required resistance to slippage.

The same type and size of anchor shall be used for each weight of rail.

- i. **Ballast.** Only ballast reclaimed from the track removals is to be used on the permanent track. Supplemental ballast, if any will be as specified by the Railroad Engineer.

- j. **Subballast.** Subballast shall be meet DOT specifications for CA-I4.

Construction. The tracks will be reconstructed a minimum of 10' either side of the approach roadway for the temporary at-grade crossings. Except as otherwise noted in the Special Provisions, track shall be constructed to dimensional tolerances specified for FRA Class 3 track. The contractor shall be responsible for all layouts, superseding AREMA 5-4.1.1 .j.

- a. **Temporary Construction.** Procedures for temporary tracks shall be the same as for permanent tracks, except as noted below.

- b. **Layout.** Prior to installation of the temporary track and crossings the contractor shall lay out the limits of temporary track, and additional rail replacement between existing joints. The Railroad engineer will mark for replacement any ties, within the limits of the track replacement and the tie in to the existing joints, requiring replacement to adequately secure the new rail. Railroad Engineer will also designate any removed materials that will be unsuitable for reinstallation.

- c. **Removal.** Contractor shall remove the existing track and stockpile for reinstallation at the end of the project at a location on the Museum grounds so designated by the Railroad Engineer, disposing of unsuitable materials, as designated by the Railroad Engineer in Layout. Unsuitable materials may not be used for the Temporary Construction without the approval of the Railroad Engineer. Ballast shall be protected so as to avoid contamination by foreign materials in the storage or retrieval process. Torch cutting of the bolts is permitted.

- d. **Rail.** No joints will be permitted within the limits of the at-grade crossings. Joint stagger should be a minimum of 2'-6". Box joints are not permitted.

- e. **Ties.** Ties shall be placed on 18" centers within 10' of the approach road to the crossing and at rail joints, and 21" spacing thereafter. Ties shall be placed so that rail joints are suspended. Additional ties designated to be replaced by the Railroad Engineer during Layout need not be respaced. Ties designated for removal from the track by the Railroad Engineer shall not be reused without approval of the Railroad Engineer.

- f. **Crossing Surface.** Crossing surface to be installed so as to extend to the ends of the ties, and 2' beyond the edge of approach roadway. Crossing shall be firmly secured, flush with the rail per the manufacturers' recommendations, or to the

satisfaction of the Railroad Engineer. All securements or openings for securements must be utilized, unless otherwise directed by the manufacturers' installation instructions. At a minimum, each timber crossing plank shall be secured every third tie, and for the first two ties on each end of the plank.

Permanent Track. Permanent track is track that will be left in place when the work is complete.

- a. **Rail.** Rail shall be seated on the tie plates free of dirt and debris. Rail shall at all times be handled with tools and clamps specifically designed for such purposes to avoid chipping, nicking, bending, or otherwise damaging the rail. Torch cutting of the rail is expressly prohibited. Joint stagger shall match existing pattern.
- b. **Ties.** Ties shall be placed at a minimum of 21" centers, except at rail joints where joints are to be suspended between ties on 15" centers for 70# rail and 18" centers for 90# rail, ± 1.0 " superseding AREMA 5-4.1.1.1, but no less than 102 ties provided over any 175' segment. Turnout, crossover and other special trackwork ties shall be placed as shown on the manufacturer's standard plan for the item being installed, or included as an exhibit superseding AREMA 5-4.1.1.1(11).
- c. **Spikes.** Contractor shall install 4 spikes per tie on tangent track and 6? spikes per tie on curves, superseding AREMA 5-4.1.1.1(8). The spikes shall be staggered such that all outside spikes are on the same side of the tie and all inside spikes are on the opposite side of the tie.
- d. **Gage.** Gage shall be 4'8 1/2" except on curves greater than 10 degrees where it shall be 4'9"
- e. **Joint Bars.** All joint bars shall be fully bolted with nut locks. Holes shall be drilled in the rail in accordance with AREMA 4. 2.1.12.b to match the joint bars $\pm 1/16$ ". There shall be no other holes in the rail within the limits of the joint bar. Burning of the holes in the rail is prohibited. Bolts shall be tightened as prescribed in AREMA 5-5.2.a and 5-5.2.c. Retightening after completion of the work is not a part of this scope.
- f. **Bonding.** Any rails installed, replaced, modified or disturbed, shall be bonded in accordance with the Museum's specifications for Rail Bonds.
- g. **Track Panels.** Track panels may be used, but rails must be adjusted to the stager prescribed in AREMA 5-4.1.1 .u superseding AREMA 5-4 1.1 .w.
- h. **Rail Anchors.** Where anchors are currently in use, box anchor every 3rd tie and install tight against the tie in accordance with AREMA 5-7.2.
- i. **Superelevation.** Curved tracks shall be elevated a minimum of 1/2" runoff in 16.5' either side of the curve or as shown on the plans, by raising the outside rail above the profile grade of the inside rail. Where spirals are provided, the change in elevation through the spiral shall be uniform over the length of the spiral. Curves must be constructed so that the inside rail of the curve is never higher than the outside rail.

- j. **Ballasting.** Ballast shall be placed in accordance with AREMA 5-4.1.1.ac, to a depth required to match the existing rail profile, superseding AREMA 5-4.1.3.1.
- k. **Subballast.** Subballast shall be installed in accordance with DOT Standard Specifications for Road and Bridge Construction, Adopted January 1, 2007 and the latest Supplemental Specifications And Recurring Special Provisions, except that:
 - The contractor shall provide certification that the material has been tested with a copy of the test results including dry density and optimum moisture, superseding 351.05(b) paragraph 3, and
 - Contractor shall provide for compaction field-testing at 200' intervals at each lift, to be observed by the engineer, superseding 351.05(b) paragraph 6.
- l. **Derails.** Derails shall be installed with the standard plan, manufacturers' instructions and the specifications for individual items listed herein.

Maintenance. Contractor shall be responsible to maintain the at-grade crossing surface as well as the rail joints, and track gage, line, warp, and profile, within the limits of the temporary construction, to FRA class 2 limits, or as directed by the Railroad Engineer, for the duration of the work. Work shall be performed without impacting Museum operations.

General Clean-up. All rubbish and debris resulting from the Work of this section shall be collected, removed from the site and disposed of legally.

Emergency Repairs. In the event of failure of the Contractor to maintain the temporary track or repair damage to the track Museum may, upon notification to the Contractor and Engineer, make repairs necessary to insure safe and timely operations at the Contractor's expense. Repair costs incurred by the Museum shall be paid for by the Contractor directly to the Museum within 30 days of receipt of each invoice.

Review and Inspection. The cost of the review of submittals and inspections by the Museum shall be paid for by the Contractor directly to the Museum within 30 days of receipt of each invoice.

Method of Measurement and Basis of Payment. The work shall be performed at the Contractor's sole cost and expense or upon concurrence by the Museum performed by the Contractor at no cost to the Museum. Work performed by the Museum for benefit of the Contractor shall be billed to the Contractor at actual cost and paid for by the Contractor directly to the Museum within 30 days of receipt of each invoice.