SECTION 34 11 23.01

SPECIAL TRACKWORK PROCUREMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Designing, manufacturing, testing, shop assembly, inspecting, packaging, shipping, delivery, unloading and stockpiling of special trackwork materials.

1. Providing all special trackwork components delivered to the site ready for installation. Coordination of all special trackwork components with proposed rail size, proposed fastening methods/systems, and conditions of abutting trackwork is considered to be part of providing special trackwork.

1.02 RELATED SECTIONS

A. Section 01 33 00 Submittal Procedures
B. Section 01 43 10 Project Quality Program Requirements – Design/Build
C. Section 34 11 23.16 Special Trackwork Construction – Direct Fixation
D. Section 34 11 37 Direct Fixation Rail Fasteners

1.03 REFERENCES

A. American National Standards Institute, Inc. (ANSI)
   1. ANSI B1.1 Unified Inch Screw Threads (UN and UNR Thread Form)
   2. ANSI B1.3M Screw Thread Gaging Systems For Dimensional Acceptability - Inch and Metric Screw Threads (UN, UNR, UNJ, M and MJ)
   3. ASME B18.22.1. Plain Washers
B. American Railway Engineering and Maintenance of Way Association (AREMA)
   1. AREMA Manual Specifications For Steel Rails Vol. I, Ch. 4, Part 2
   2. AREMA Portfolio of Trackwork Plans
C. American Society For Testing and Materials (ASTM)
   1. ASTM A36/A36M Structural Steel
   2. ASTM A148 Steel Castings, High Strength, For Structural Purposes
3. ASTM A307  Carbon Steel Externally Threaded Standard Fasteners
4. ASTM A325  High-Strength Bolts For Structural Steel Joints
5. ASTM A525  Steel Sheet, Zinc-coated (Galvanized) by the Hot-Dip Process, General Requirements
6. ASTM B633  Electrodeposited Coatings of Zinc on Iron and Steel
7. ASTM C307  Tensile Strength of Chemical - Resistant Mortar Grouts, and Monolithic Surfacings
8. ASTM C579  Compressive Strength of Chemical - Resistant Mortars, Grouts, and Monolithic Surfacings
9. ASTM C827  Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
10. ASTM D257 D-C  Resistance or Conductance of Insulating Materials
11. ASTM D395  Rubber Property - Compression Set
12. ASTM D412  Rubber Properties in Tension
13. ASTM D471  Rubber Property - Effect of Liquids
14. ASTM D518  Rubber Deterioration - Surface Cracking
15. ASTM D573  Rubber Deterioration in an Air Oven
16. ASTM D1149  Rubber Deterioration - Surface Ozone Cracking in a Chamber (Flat Specimen)
17. ASTM D1193  Reagent Water
18. ASTM D1566  Standard Terminology Relating to Rubber
19. ASTM D2240  Rubber Property - Durometer Hardness
20. ASTM E162  Surface Flammability of Materials Using a Radiant Heat Energy Source

D. Association of American Railroads (AAR)
   1. AAR Manual, Assembly and Test of Insulated Track Part 16, Signal Section

E. National Electrical Manufacturers Association (NEMA)
   1. NEMA LI-1  Industrial Laminated Thermosetting Products

F. Society of Automotive Engineers, Inc (SAE)
   1. SAE J429  Mechanical and Material Requirements for Externally Threaded Fasteners
2. SAE J995 Mechanical and Material Requirements for Steel Nuts

G. Steel Structures Painting Council (SSPC)
   1. SSPC SP 1 Solvent Cleaning
   2. SSPC SP 5 White Metal Blast Cleaning

1.04 QUALITY ASSURANCE

A. Comply with requirements of Section 01 43 10, Project Quality Program Requirements – Design/Build.

B. Tolerances
   1. Conform to the American Railway Engineering and Maintenance of Way Association (AREMA) Portfolio of Trackwork Plans - Plan No. 1010, Permissible Variations In Completed Frogs; Plan No. 1011, Permissible Variations In Completed Switches; the AREMA Specifications For Special Trackwork, Section 7, Permissible Variations In Dimensions, Fits and Other Physical Attributes; and the AREMA Specifications For Steel Rails, Section 5, Section.

C. Reference Specifications
   1. Except as modified in the Contract Documents, design, manufacture, test, assemble, inspect, ship unload and stack special trackwork in accordance with the AREMA Specifications For Special Trackwork, the AREMA Portfolio of Trackwork Plans, and the AREMA Manual For Railway Engineering.

   2. Except as modified in the Contract Documents, use rail in the special trackwork conforming to the requirements of the AREMA Manual For Railway Engineering, Volume I, Chapter 4, Part 2, Specifications for Steel Rails, and Part 3, Report Forms.

1.05 SUBMITTALS

A. Refer to Section 01 33 00, Submittal Procedures.

B. Product Data
   1. The procedure to be used in the depth hardening of frog castings.
   2. The procedure to be used in the end hardening of rail.
   3. The procedure to be used in the heat treating of switch point rails and stock rails.

C. Shop Drawings
1. Provide scaled, detailed shop drawings for each rail, component, casting special trackwork direct fixation rail fasteners. Layout drawings for double crossovers shall be prepared as a complete assembly from extreme points on each end of the location, and represent all dimensions and components, including special trackwork rail fasteners in the form of a single large assembly.

2. Insulated curved split switches, including stock rails for both right- and left-hand switches, as well as switch point rollers.

3. Insulated switch rods, including clip assemblies.

4. Railbound manganese steel frogs

5. Closure rails

6. Buffer rails

7. Crossover connecting rails

8. Frog guard rails

9. Special trackwork rail fasteners for direct fixation track, including details of components.

10. Special trackwork plates for ballasted track, including details of components.

11. Crossing Diamonds

D. Samples

E. Certificates

1. Certificates of material compliance required by AREMA and this Specification

F. Delegated Design Submittals

G. Test and Evaluation Reports

1. Test reports of chemical analyses, Brinell hardness, electric insulation, and other tests required by AREMA and this Specification.

2. Frog depth hardening results.

3. A certified copy of reports on the analyses and tests required by referenced ASTM specifications.

1.06 DEFINITIONS

A. Buffer rails - Rails which are installed adjacent to the stock rails and main tracks
B. Closure rails - Lead rails connecting the heels of the switch points to the frog rails in a turnout.

C. Crossover connecting rails - Additional running rails forming the connecting track in either single or double crossover units.

1.07 TESTING

A. Metro Notification – Notify Metro or its designee in writing not less than 14 days in advance of dates scheduled for any test. Metro or its designee retains the right to witness testing. Do not conduct test until authorized by Metro or its designee.

B. Testing Laboratory

1. Perform qualification and production quality control tests using either an independent testing laboratory or a qualified manufacturer's laboratory accepted by Metro or its designee. If an independent testing laboratory is selected, it shall be a member of the American Council of Independent Laboratories. If a manufacturer's laboratory is selected, it shall satisfy the requirements of the American Council of Independent Laboratories' Manual of Practice - Quality Control System - Requirements for Testing and Inspection Laboratory, and ASTM E329.

2. The selected laboratory shall use the proper equipment and qualified personnel for testing such as described in this Section.

C. Testing Equipment - Provide equipment in good operating condition, of adequate capacity and range, and accurately calibrated. Use testing equipment that is in calibration with standards which are certified and traceable to the National Bureau of Standards within one year immediately preceding the test date. Submit copies of calibration certificates with test reports.

D. Documentation - In conjunction with the specified tests, submit the following documents for review and acceptance.

1. Test program plan - In this plan, identify the Contractors' approach for accomplishing each of the specified qualification and production quality control tests. Include the projected schedule for test procedure submittals, test executions, and test results report submittals.

2. Test procedures for each test, describing the objective, equipment, and instrumentation that will be used, procedure to be implemented, and the anticipated results. Include Working Drawings detailing test equipment and set-up of each material that will be tested.

3. Test report

   a. A separate report of test results for each test which includes original data calculations, test procedure references, test equipment identification, test personnel, date of test, specified requirements, actual test results,
nonconformances if any, and interpretation of the results. Highlight conformance or deviation in a Report summary.

b. Accompanying the written test reports with a photographic record of the tests. Include photographs of sufficient clarity to distinguish relevant details as described or referenced in the respective written report.

1.08 PRODUCTION QUALITY CONTROL TESTS OF INSULATION PIECES

A. Test insulated gauge plates and switch rods in accordance with AAR Manual, Part 116, Signal Section, Assembly and Test of Insulated Track Fittings.

1.09 PREASSEMBLY

A. Prior to shipment, for one of each type of special trackwork, completely assemble a unit of turnouts, crossing diamonds and crossovers, including special trackwork plates temporarily attached to the special trackwork rail fasteners temporarily attached to the rail, in the Manufacturer’s fabrication shop for inspection by Metro or its designee.

B. Fully bolt and assemble rail joints, using specified joint bars. Install 3/16 inch post shim where insulated joint bars are indicated. Do not apply adhesives during this process.

C. No bracing, wedging or support blocking will be permitted to hold components to proper gauge and alignment.

D. Variations from the accepted Shop Drawings or the Contract Documents will constitute non-compliance and will not be accepted for shipment unless or until proper modifications are made and accepted by Metro or its designee.

E. Inspect material in accordance with the AREMA Specifications for Special Trackwork, except as listed herein.

F. Make available to Metro or its designee, without charge, the facilities and assistance to examine the Work during its progress, and when the product is finished, to satisfy Metro or its designee that the finished product will comply with the Contract Documents. Provide templates and three foot straight edges or longer, as necessary, to check flangeways, rail end drilling, switch rail planning and other features of the Work usually checked by templates. The design of the templates will be such that using them requires only one person.

G. Present material for inspection in a safe area away from excessive noise and manufacturing activities. Provide labor to facilitate inspection of the top, side and bottom of frogs and switches.

H. Following inspection and acceptance, match-mark rails in accordance with an accepted system. The match-marking system used as indicated on the Shop Drawings and submit for acceptance by Metro or its designee before matchmarking commences.
I. Give Metro or its designee adequate notice for inspection. Adequate notice is considered to be five days before an inspector leaves the Los Angeles area plus travel time from Los Angeles to the point of inspection.

PART 2 - PRODUCTS

2.01 SWITCH POINTS AND STOCK RAILS

A. General - Except as modified by the Contract Drawings, drill switch points in accordance with the referenced AREMA Plans and Contract Drawings, including holes for attachment of front rods and point detector rods. Front rods and point detector rods and their associated attachments, clips, bolts, and nuts are discussed elsewhere in these Specifications. Double reinforce switch points reinforced with 1/2 inch thick rolled "D" bars. Contractor may elect to furnish equivalent strength thick web rail, machined to standard switch point cross Section.

1. Curved split switches:
   a. 19'-6" Curved Split Switch with Graduated Risers, in accordance with AREMA Plan Nos. 124 and 221 using point detail 5100 and the Contract Drawings as indicated.

2. Stock rails: 60 feet long, universally (no-hand) undercut as indicated and in accordance with AREMA Plan No. 221.

B. Materials - Switch and stock rails - Conform to 115 RE high strength rail in accordance with AREMA Manual Railway Engineering, Volume I, Chapter 4, Rail.

C. Incorporate switch point rollers for No. 10, No. 8, and No. 190 turnouts.

D. Manufacture

1. Switch points and stock rails may be machined initially and subsequently heat treated to achieve the requirements of high strength rail as specified in AREMA, Specifications for Steel Rails.

2. Drill switch and stock rails for reinforcing bars, heel block assembly, switch rods, bonded joints as indicated and in accordance with AREMA Specifications for Rail Drilling, Bar Punching, and Track Bolts.

3. Bevel switch and stock rail ends in accordance with AREMA Plan No. 1005.

4. Remove rail brands in reinforcing bar area and within one foot eight inches of the rail end.

E. Identification

1. Stencil paint mark each component prior to shipment. Use white paint on a background of black paint. Place markings onto opposite sides near the end of the piece, with letters and numerals not less than two inches high. Place
markings in an area that will not subsequently be covered by joint bars, heel blocks, or other components.

2. Provide a permanent, high-quality exterior-grade paint used for stencil paint marking of rail that is designed for application on steel. Show proposed type of paint on the special trackwork Shop Drawings.

3. Identification markings for switch and stock rails - Provide the following information:
   a. Component installation location;
   b. Component identity number;
   c. Turnout number and turnout hand;
   d. Crossing diamond angles.

4. Attach aluminum tag to the web of the gauge side of the switch point rail. Include switch or frog length, rail section, right hand or left hand, and switch number on tag.

2.02 TURNOUT AND CROSSING FROGS

A. Turnout, Frog and Crossing Diamond Center and End Frogs - Heavy-wall railbound manganese steel frogs as indicated and in accordance with AREMA Plan Nos. 600A, 600B, 621, 622, 623, 624, 700, 750, 761, and 769.

B. Design castings for 115RE rail sections.

C. Drill frogs for bonded joints as indicated and in accordance with AREMA Specifications for Rail Drilling, Bar Punching, and Track Bolts.

D. Materials
   1. Rail used in the manufacture of frog components conform to 115 RE high-strength rail in accordance with AREMA Manual For Railway Engineering, Chapter 4, Rail.
   2. The castings for the frog inserts manganese steel in accordance with AREMA Specifications For Special Trackwork, Article M2.

E. Manufacture
   1. Spring Frogs are prohibited.
   2. Depth harden the impact areas of the manganese steel castings for turnout and crossing frogs by explosive, press, or hammer hardening procedure in accordance with AREMA Specifications for Special Trackwork, Manganese Steel Castings, Section M2.7, Depth Hardening.
3. Drill frog rails for standard joints as indicated and in accordance with AREMA Specifications for Rail Drilling, Bar Punching, and Track Bolts.

4. Bevel rail ends in accordance with AREMA Plan No. 1005.

5. Remove rail brands in reinforcing bar area and within one foot eight inches of rail end.

6. Epoxy "glue" frogs fully in accordance with current industry practice.

F. Identification

1. Stencil paint mark each frog prior to shipment. Use white paint on a background of black paint, as specified in Paragraph 2.01E. Place marking on two opposite sides near the end of the piece, with letters and numerals not less than two inches high.

2. Place markings in an area that will not subsequently be covered by joint bars, or other components.

3. Identification marking for frogs shall provide the following information:
   a. Frog installation location;
   b. Either frog number or frog type with angle or radius;
   c. Frog hand, if applicable.

2.03 SPECIAL TRACKWORK RAILS

A. General

1. Provide special trackwork rails, such as the closure, buffer, and crossover connecting rails, at the lengths specified on Contract Drawings.

2. Drill special trackwork rails for standard joint, bonded joint, or frog guard rail installation as specified on Contract Drawings and in accordance with AREMA.

B. Materials - Provide high-strength rail for closure, buffer, and crossover connecting rails as specified in AREMA Specification For Steel Rails.

C. Manufacture

1. Drill and cut special trackwork rails which are not indicated as continuous welded rail in the Contract Drawings.

2. Bevel special trackwork rail ends in accordance with AREMA Plan No. 1005.

3. Remove rail brands within one foot eight inches of the rail end.

4. Supply rails to lengths indicated without additional joints.
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D. Identification

1. Stencil paint mark each component prior to shipment. Use white paint on a background of black paint, as specified in Paragraph 2.01E. Place markings on two opposite sides near the end of the piece, with letters and numerals not less than two inches high.

2. Place markings in an area that will not subsequently be covered by joint bars, or other components.

3. Identification markings for special trackwork rails to provide:
   a. Component installation location;
   b. Component part name.

2.04 ADJUSTABLE RAIL BRACES

A. Adjustable Rail Brace - In accordance with either AREMA Plan No. 224, Type Fit A or accepted equal.

B. Materials, Adjustable Rail Braces - Made of either copper-bearing mild steel, cast steel, ductile iron, or malleable iron. Type and grade of material selected; in accordance with AREMA Specifications For Special Trackwork, and consistent with the strength requirements of the design. The material type and grade used as indicated on the Shop Drawings.

2.05 ADJUSTABLE FROG GUARD RAILS

A. General

1. Frog guard rails - Planed tee rail design as indicated and in accordance with AREMA Plan No. 504 and the Contract Drawings, complete with filler blocks, shims, bolts, nuts, etc. Frog guard rails shall be wear resistant.

2. Frog guard rails: 16’-6” long, as indicated on Contract Drawings.
   a. In diamond crossovers modify the frog guard rails as necessary to accommodate installation of the crossings and frogs.

3. Cast fillers - Adjustable design with matching shims and match the 115 RE rail Section as indicated on the Drawings.

B. Materials - Manufacture frog guard rails from high strength rail in accordance with AREMA Manual For Railway Engineering, Volume I, Chapter 4, Rail.

C. Manufacture - Frog guard rails may be machined initially and subsequently heat treated to achieve the requirements of high strength rail as Specified in AREMA Specifications For Steel Rails.

D. Identification
1. Stencil paint mark each component prior to shipment. Use white paint on a background of black paint, as specified in Paragraph 2.01E.

2. Identification markings for frog guard rails shall provide:
   a. Component part name;
   b. Centerline of guard rail.
   c. Component installation location

2.06 SWITCH FLOATING HEEL BLOCK ASSEMBLY AND SEPARATOR BLOCK

A. General
   1. Switch floating heel block assembly - As indicated.
   2. Switch floating heel block assembly - Include a one-bolt block design, complete with bars, bolts, nuts, and washers. Heel block; a no-hand design which can be used either on right or left side.
   3. Separator blocks for switches; five inches long with a single 1-3/8 inch diameter bolt.

B. Materials - Switch heel block and separator block for Special Trackwork; carbon steel casting in accordance with AREMA Specifications, Article M3.1.1.

C. Identification - Stamp switch heel block with the following information:
   1. Switch rail length.
   2. Rail Section (115 RE).

2.07 SWITCH ROD ASSEMBLY

A. General
   1. Switch rod assemblies - Vertical rod design, insulated, and as indicated on Contract Drawings.
   2. Switch rod assemblies - In accordance with AREMA specifications and Plan No. 222-79; or approved equivalent.
   3. Drill switch rod assembly for adjustable basket. Coordinate details with supplier of switch operating rods.

B. Materials
   1. Switch rod assemblies - Conform to AREMA Specifications for Special Trackwork, Rolled Mild Steel.

C. Manufacture - Seal cut edges of fiberglass with two part coatings and before assembly, paint contact metal surfaces with insulating enamel. During assembly, fill areas between outside edge of bolts and inside edge of holes with clear silicon rubber paste, Devon Silite 100, General Electric RTV 108 or accepted equivalent.

D. Identification - Stamp assembled switch rods No. 1 and No. 2 as required.

2.08 SPECIAL TRACKWORK RAIL FASTENERS – DIRECT FIXATION

A. Provide special trackwork direct fixation rail fasteners in accordance with Section 34 11 37 Direct Fixation Rail Fasteners. Lengths shall be modified as shown on the Contract Drawings to accommodate and support the switches, frogs and connecting rails.

B. Adjustable Brace - Provide adjustable rail brace assemblies for switch and gauge-plate DF fasteners, as shown on Contract Drawings.

C. Gauge Plate Insulation - In accordance with AREMA Plan No. 223, Detail 4103. Fiberglass insulation as specified in Paragraph 2.07B.2.

D. All direct fixation fasteners within special trackwork shall be flat and have no cant.

PART 3 - EXECUTION – NOT USED

END OF SECTION