

SECTION 20600

CONCRETE GRADE CROSSINGS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Section includes specification for furnishing and installing concrete grade crossing panels.

1.02 REFERENCE STANDARDS

- A. Caltrain Standard Drawings
- B. American Railway Engineering and Maintenance of Way Association (AREMA):
 - 1. Manual for Railway Engineering (Manual)
- C. American Society for Testing and Materials (ASTM International)

1.03 SUBMITTALS

- A. Submit crossing panel system shop drawings.
- B. Submit list of all crossing panel system materials.
- C. Submit installation instructions.
- D. Qualifications: Submit documentation for Engineer's approval that manufacturer has satisfactorily furnished grade crossing panels and complies with qualification requirements specified herein.

1.04 QUALITY ASSURANCE

- A. Qualifications of the Crossing Panel Manufacturer: Manufacturer shall have furnished concrete grade crossing panels to Class 1 Freight or Commuter Railroads for use on 10 feet long concrete ties within the past two years.

PART 2 – PRODUCTS

2.01 CONCRETE GRADE CROSSING SYSTEM

- A. Grade crossing system shall be designed for 136 RE rail. System shall be complete with all components, including 10 foot long precast concrete crossing panels, rubber seat pads for gage and field panels, assemblies, rubber flangeway inserts, fasteners, metal panel end deflectors and end restraints in accordance with Caltrain Standard Drawings.
- B. The panels shall be shunt resistant.

- C. Furnish panels with permanent mark on each panel top, imprinted in the concrete during fabrication, indicating the size of rail, weight of panel, manufacturer's name, and month/day/year of manufacture. Additionally, mark ends of panels with paint indicating size of rail and weight of panel.
- D. Materials:
 - 1. Rebar: ASTM Grade 60
 - 2. Steel Angle: ASTM Grade 36
- E. Concrete compressive strength shall be minimum 6000 psi.

2.02 CONCRETE CROSSTIES

- A. The grade crossing panels shall be compatible with the 10 feet long grade crossing concrete ties. The concrete crossties shall be new 10 feet long flat-top crossties conforming to the requirements in Section 20140, Concrete Crossties and Rail Fastener Assemblies. The concrete crossties and concrete panels shall fit properly together and the ties shall provide a stable load bearing surface.
- B. See Caltrain Standard Drawing SD-2212 for rail fastener requirements.

2.03 TIMBER CROSSTIES

- A. Timber crossties for concrete grade crossings shall be new 7 by 9 inch by 10 feet 0 inch long. Timber ties shall conform to the requirements in Section 20130, Timber Crossties and Switch Ties.
- B. Fasteners for timber ties under the concrete grade crossings: Two 16-inch Pandrol plates, four (4) galvanized Pandrol E-2055 clips, and eight 15/16 inch by 6 1/2 inch long screw spikes.

2.04 OTHER TRACK MATERIALS

- A. Except where otherwise required by panel manufacturer, other track materials used in connection with installation of grade crossings shall be as specified in Section 20120, Track Appurtenances and Other Track Material.
- B. Ultimate tensile strength of screw spikes shall be 75,000 psi minimum.
- C. Rubber inserts or fillers for the grade crossing panels shall be manufactured from 100 percent extruded virgin rubber (virgin SBR – Styrene Butadiene Rubber) and shall meet the following requirements:
 - 1. Rubber filler shall fit both 132# and 136# rail sections. See Caltrain Standard Drawings for dimensions.
 - 2. Rubber filler shall have connector pins at the joints to prevent gaps and maintaining continuity throughout the railroad crossing.
 - 3. Rubber filler shall fit snugly against the top of rail without gaps.

4. Material properties:
 - i. Tensile: 2,000 psi
 - ii. Elongation: 400%
 - iii. Hardness: 65 ± 5 Durometer Shore A

2.05 SOURCE QUALITY CONTROL

- A. If the crossing panel manufacturer is different from the tie manufacturer, panel manufacturer shall assemble one complete 10 foot grade crossing panel prototype along with six crossties at the panel manufacturer's plant to demonstrate the compatibility of the two products. Both the panels and the crossties shall fit together properly and provide a stable load bearing surface.
 1. Notify the Engineer sufficiently in advance of prototype assembly to give the Engineer the opportunity to observe the demonstration.

PART 3 – EXECUTION

3.01 DEMOLITION

- A. Remove any existing pavement, track structure, ballast, natural ground and other materials down to the elevations shown in the Contract Drawings and as specified in Sections 02100, Demolition, and 02300, Earthwork.

3.02 TRACKBED PREPARATION

- A. Excavate existing ballast and other existing base in accordance with Caltrain Standard Drawings and the Contract Drawings.
- B. Construct the trackbed, including aggregate base and HMAC underlayment in accordance with Caltrain Standard Drawings and the Contract Drawings.
- C. Install surface ditches and other drainage facilities, including track subdrains, as shown on the Contract Drawings. Clean all existing drainage ditches and channels adjacent to the grade crossing and slope to provide drainage away from the grade crossing.

3.03 TRACK CONSTRUCTION

- A. Construct track at grade crossings as specified in Section 20400, Track Construction, and related sections, as modified and appended in this Section. No field welds of rail is allowed within the limits of the new grade crossing.
- B. Within the limits of the crossing, the gage of the track shall be 56-1/2 inches, plus or minus 1/16 inch.
- C. Within the limits of crossing on concrete crossties, place ties at 24-inch spacing. Place transition ties on each end of the crossing as shown on the Caltrain Standard Drawings.

- D. Within the limits of crossings on timber crossties, place ties at 20-inch spacing. Place the transition ties on each end of the crossing as shown on the Caltrain Standard Drawings.
- E. Outside the limits of the grade crossing and beyond the transition ties, fully box anchor all timber ties for 195 feet on each side of the grade crossing.
- F. Final align and surface the track in accordance with the requirements in Section 20400, Track Construction, prior to placement of crossing panels.

3.04 EXAMINATION AND APPROVAL

- A. Prior to installation of crossing panels, perform inspection on track final profile, all fastenings of the rail to the ties, and grading.
- B. Notify the Engineer prior to installing panels for inspection and approval of the track surface and alignment. Obtain Engineer's approval prior to installation.

3.05 INSTALLATION OF THE CROSSING

- A. Be familiar with the type of installation to be performed, and install the grade crossing system in accordance with panel manufacturer's installation instructions.
- B. Do not to drop or strike the panels.
- C. Remove deleterious materials from the top of the ties prior to installation of the concrete panels, and ensure that the panels are seated with good bearing on the ties. Crossing panels shall not "rock" on the crossties once in final position.
- D. Install rubber flangeway inserts to fit snugly to the web and (if applicable) head of the rail in accordance with Caltrain Standard Drawings.
- E. The crossing components shall fit snugly and have a uniform surface without sharp edges resulting from elevation change between adjacent panels, the panels and the rail, the panels and flangeway inserts, the rail and flangeway inserts, or any other combination of crossing surface components. Crossing surface that has significant elevation breaks greater than 1/4 inch between adjoining components is not acceptable.
- F. Weld crossing panels together with a minimum of six 8-inch to 10-inch beads at time of installation, in accordance with Caltrain Standard Drawings. Finished grade crossings shall match grade crossing approach pavement.
- G. Install end restraints and metal deflectors on each end of the crossing in accordance with Caltrain Standard Drawings. Tack-weld deflectors and end restraints to the ends of the panels. Fasten end restraints to concrete ties with tack welds. Fasten end restraints to timber ties with screw spikes.
- H. Refer to Section 02720, Asphalt Paving. Place asphalt pavement at the ends of crossing panels as indicated on Caltrain Standard Drawings and the Contract Drawings.

- I. Fill eye hooks for lifting panels with manufacturer's recommended epoxy. Final surface shall be smooth and flush with the panels.
- J. Provide the necessary signal support. All associated signal tests shall be completed and the results accepted by the Engineer prior to placing the grade crossing in service.
- K. Complete paving work at crossing approaches and related drainage, sidewalk, and other work as indicated on the Contract Documents.

3.06 REPAIR OR REPLACEMENT

- A. Repair or replace any damage to the concrete panels, flangeway inserts, or other components resulting from handling and installation.

3.07 FIELD QUALITY CONTROL

- A. At completion of work, prior to returning grade crossing to service, perform a road test with cars and trucks passing newly installed grade crossing panels at the speed limit to demonstrate the quality of smooth ride on the road and that concrete panels are free of "rocking" action on the crossties.
- B. Perform any other tests required by the jurisdictional authority of the roadway.

END OF SECTION