

# Special Specification 5110

## Pedestrian Cable Railing with Mesh Infill



### 1. DESCRIPTION

Fabricate, furnish, and install the pedestrian railing system at locations shown on the Contract Plans, in accordance with the details shown on the plans, and as specified in these specifications. The pedestrian railing system consists of stainless steel woven mesh, cabling, posts, and handrailing. Provide the railing at high and low heights as shown on the plans.

### 2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 441, "Steel Structures"
- Item 442, "Metal for Structures"
- Item 446, "Cleaning and Painting Steel"
- Item 447, "Structural Bolting"
- Item 449, "Anchor Bolts"
- Item 450, "Railing"

Provide railing components as follows.

- 2.1. **Railings.** Hand railing pipe shall conform to Type 304L with glass bead peen finish. Railing pipe size and wall thickness as depicted on the plans. Railing bolts shall be stainless steel conforming to ASTM A193, Grade B8A. Coordinate and install threaded holes required for the proper installation of Hand Railing Mounted Luminaires. Provide hand railing mounting brackets as depicted on the plans.
- 2.2. **Railing Posts.** Provide stainless steel railing posts and plates conforming to ASTM A240, Type 316L with glass bead peened finish. Stainless Steel nuts shall conform to ASTM A194, Grade 8A. Stainless Steel washers shall conform to ASTM A666 Type 316, annealed with the dimensional requirements of ANSI B18.22.1.
- 2.3. **Cable.** Provide 1 x 19 Type 316 Stainless Steel Strand with a diameter as depicted on the plans.
- 2.4. **Cable Hardware.** For anchoring and terminating cable runs, use cable hardware conforming to ASTM A276 or ASTM A479 of Type 316 stainless steel. Use hardware compatible with the specified cable and railings. Use hardware that is mostly concealed within the vertical railing elements except for shallow button heads that are allowed on the opposite side of the cable on the railing post. Either swaged or swageless fittings are allowed provided the contractor can install with the specified amount of tension. Use grommets and washers compatible with the supplier's cable and hardware for protecting cable at entry and exit points in vertical railing posts.
- 2.5. **Post Anchorage to Concrete.** Use an adhesive anchoring system or other system as depicted on the plans. Anchor rods shall be stainless steel conforming to ASTM F593G, Type 316L and a diameter and length as depicted on the plans. Use stainless steel nuts and washers conforming to ATSM F594G, Type 316L, with

threads to match anchor rods. Install stainless steel washers over the short-slotted holes. Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, 14 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval before use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

2.6. **Mesh Fencing Infill.** Provide stainless steel structural wire-rope mesh engineered, manufactured, and tested for use as a permanent protective net infill for bridge railing. Manufactured products identified for the intended use include the following:

- Jacob Inox Line Stainless Steel AISI 316 Webnet, 1.5 mm diameter wire rope and mesh aperture of 25 mm (1 in) x 55.9 mm (2.2 in). All connection hardware shall be stainless steel AISI 316 and provided by the same manufacturer as mesh.
- Carl Stahl X-TEND CXE Series, Stainless Steel Cable Mesh, 1.5 mm diameter wire rope and mesh aperture of 25 mm (1 in) x 55.9 mm (2.2 in). All connection hardware shall be stainless steel AISI 316 and provided by the same manufacturer as mesh.
- Listed manufacturers and products must comply with all contract requirements even when listed for the intended use.

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### 3. EQUIPMENT

Use cable tensioning equipment approved by the cable system manufacturer in accordance with manufacturer recommendations.

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### 4. CONSTRUCTION

Construct railing in accordance with details, alignment, and grade designated on the plans. Unless otherwise directed, do not place railing until falsework or formwork, if any, for the span has been released. During construction, ensure that sleeved joints in the railing will function properly after the railing is installed.

#### 4.1. Railing Framework, Cables and Cable Hardware

4.1.1. **Submittals.** Prepare and submit for approval shop and erection drawings, product data, material samples, and manufacturer's installation instructions. Show all splice locations and details on the shop or erection drawings. Splice members only as provided on the plans. Submit shop drawings electronically and in accordance with TxDOT procedures and contract requirements. Provide electronic shop drawings with borders suitable for printing on 11 x 17 sheets. Submit all material samples and certifications required by the contract documents.

Provide specific written indication the material satisfies the requirements of the contract documents and clearly identify the material, supplier, product code or number, and the intended use. As indicated previously for shop drawings, paperwork for material samples and certifications may be submitted electronically. Before fabrication begins, submit welding procedures in accordance with AWS D1.6 to the Construction Division, Materials and Pavements Section.

4.1.2. **Fabrication.** Fabricate railing framework in sections conforming to the details shown on the plans and field-verified lines and grades. Fabricate adjacent sections so that they will accurately engage each other in the field. Match mark sections so they can be erected in the same position in which they were fabricated. Fabricate railing framework to the dimensions and cross-sections shown on the plans and within a tolerance of ¼ in. per 10 ft. in the straightness of either edge. Joint and connect metal rail elements to the posts as shown on the plans. Provide approved facilities, materials, and equipment required for inspection in accordance with Article 6.5, "Plant Inspection and Testing."

- 4.1.3. **Delivery, Storage, and Handling.** Deliver materials to the jobsite in good condition and properly protected against damage to finished surfaces. Store railings above ground on platforms, skids, or other supports, and kept them free from grease, dirt, and contact with dissimilar metals. Avoid bending railing members if stacking in storage. Store material in a clean, dry location and cover with waterproof paper, tarpaulin, or polyethylene sheeting in a manner that will permit air circulation inside the covering. Keep handling on site to a minimum. Avoid scratching, marring, denting, or otherwise damaging the railing. Pack anchor rods, nuts, washers, cable end fittings, and grommets separately and ship them in boxes or crates. Store and handle reels of cable as recommended by the manufacturer.
- 4.1.4. **Installation.** Notify authorized fabricator representatives and the Engineer a minimum of seven calendar days in advance of commencing work to install railing framework. Do not install adhesive anchors for posts until slab concrete has attained its 28-day concrete compressive strength. Ensure the installed framework will be compatible with fittings and cables supplied by the fabricator. Notify authorized fabricator representative and the Engineer a minimum of seven calendar days in advance of commencing work to install cable system.
- Do not tension any cables until adhesive for post anchors have cured enough, per adhesive manufacturer recommendations. Install cable system in accordance with shop drawings and manufacturer instructions. No field welding will be permitted. Use manufacturer's supplied cable hardware, terminating, and tensioning cables in accordance with manufacturer instructions. Tension cables to a minimum of 400 lbs. each in a sequence in accordance with manufacturer instructions. End and intermediate anchorage posts are indicated on the plans and shop drawings. Ensure cables are clean, parallel to each other, and without kinks or sags. Adjust cables and cable hardware as required to provide properly installed cable railing system as directed. As installation is completed, wash railings, cables, and fittings using clean water and soap and rinse with clean water. Do not use acid solution, steel wool, or other harsh abrasives. If stain remains after washing, remove finish and restore in accordance with NAAMM Metal Finishes Manual. Replace or repair defective or damaged elements as directed.

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## 5. MEASUREMENT

This Item will be measured by the foot, along the centerline of pedestrian cable railing installed.

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## 6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Railing Pedestrian" of the type specified. This price is full compensation for furnishing all materials, tools, equipment, labor, and incidentals necessary to complete the work.