515 METAL PEDESTRIAN/BICYCLE RAILINGS, GUIDERAILS, AND HANDRAILS

(REV 4-28-23) (FA 12-5-23) (FY 2024-25)

SECTION 515 is deleted and the following substituted:

515-1 Description.

Furnish and install metal pedestrian/bicycle railings, including bullet rails, guiderails, and handrails in accordance with the Plans and Standard Plans.

515-2 Materials.

Meet the following requirements:

Concrete	Section 346
Anchor Bolts, Rods, Nuts and Washers*	Section 962
Adhesive Anchors**	Section 937
Aluminum**	Section 965
Bearing Pads**	932-2.5
Epoxy Mortar**	Section 926
Steel**	Section 962

*Do not use expansion anchors.

**Use products listed on the Department's Approved Product List (APL).

515-3 Construction Requirements.

515-3.1 General: Space posts to clear obstacles without exceeding maximum post spacing and maintain a uniform spacing with reasonable consistency. Place splices in approximately the same place within a railing section.

Railings must be free of burrs and sharp edges and all plug welds ground smooth.

515-3.2 Welds: An American Welding Society certified welding inspector must visually inspect all welds for final approval. Nondestructive testing of welds is not required, unless otherwise shown in the Plans. Prior to installation of the railings, a certifying statement from the welding inspector must be provided. The document must identify the project information, date of inspection, welding inspector name, and inspector certification number.

515-3.2.1 Aluminum Railing: Welds must be in accordance with Section 965. Filler material for seal welds, plug welds and bend splices may be ER4303.

515-3.2.2 Steel Railing: Meet the requirements of Section 962, except weld connections must be in accordance with AWS D1.1, Structural Welding Code, using E70XX weld material, unless otherwise shown in the Plans.

515-3.3 Coatings:

515-3.3.1 Aluminum Railing: Coating is not required, unless otherwise shown in the Plans. Finished product must have a smooth uniform appearance.

When a colored coating is required, use a fluoropolymer based powder coating system complying with American Architectural Manufacturers Association (AAMA) Specification No. 2605.

515-3.3.2 Steel Railing: Components must be hot-dip galvanized after fabrication in accordance with Section 962, unless otherwise shown in the Plans. When a colored coating is required, meet the requirements of 649-4.

515-4 Shop Drawings.

Submit shop drawings and obtain approval prior to fabrication in accordance with Section 5. Show project specific geometry (line and grade), post type and locations, expansion joint and splice locations.

Include other project specific details such as tapered end transitions, continuity or transition details post and panel infill type, and anchor bolt general details.

515-5 Installation.

515-5.1 General: Place a 1/8 inch thick bearing pad with dimensions matching the base plate between the base plate and concrete surface.

515-5.2 Bullet Railings: Install rail posts perpendicular to the profile grade longitudinally and plumb transversely.

515-5.3 Pedestrian /Bicycle Railings and Guiderails: For locations other than bridges, fabricate and install posts plumb. On bridges, fabricate and install posts perpendicular to the profile grade line longitudinally and plumb transversely. Use aluminum shim plates to make necessary adjustments. Bond stacked shim plates with adhesive bonding material and field trim shim plates to match the foundation contours. Beveled shim plates may be used in lieu of trimmed flat shim plates.

If shims greater than 1/2 inch total thickness are required, provide longer anchor bolts. Bolts must be long enough to secure washers and nuts and meet the minimum embedment length.

Post tolerance from plumb is plus or minus one inch, measured at 42 inches above the foundation. Rails must form a smooth continuous line without hills or dips greater than 1/2 inch between any three posts or side sway greater than 1/2 inch between post assemblies.

515-5.4 Anchoring:

515-5.4.1 General: Secure nuts to a snug tight condition. Tack weld nuts to stem or distort bolt threads to prevent nut loosening and removal. Coat damaged galvanizing on bolt stems, nuts, and tack welds in accordance with Section 562.

515-5.4.2 Adhesive Anchors: Install anchors in accordance with Section 416.

515-5.4.3 C-I-P and Thru-Bolt Anchors: Use galvanized hex head anchor bolts. When thru-bolting is used, coat cut reinforcing steel inside the drilled hole with a zinc galvanizing compound in accordance with Section 562 prior to installing bolts.

515-5.4.4 Embedded Guiderail Posts: Core holes into the foundation concrete, then clean holes, in accordance with the manufacturer's instructions. At a minimum, use oil free compressed air to remove loose particles, brush the inside surface to free loose particles, then use compressed air again to remove any remaining particles. Use a Type AB, or F epoxy compound to secure guiderail posts into the cored holes.

515-6 Method of Measurement.

The quantity of railing to be paid for will be the plan quantity, in linear feet, installed and accepted. The quantity will be measured along the centerline of the top rail.

515-7 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section, including all materials, hardware, labor, and incidentals required to complete the installation.

For relocation of existing railing, price and payment will be full compensation for the removal and reinstallation, including all materials, hardware, labor, and incidentals required to complete the installation.

Payment will be made under the following:

Item No. 515- 1-	Pipe Handrail-Guiderail - per linear foot.
Item No. 515- 2-	Pedestrian/Bicycle Railing - per linear foot.
Item No. 515- 3-	Handrail - Retrofit to Existing Railing - per linear foot.
Item No. 515- 4-	Aluminum Bullet Railings - per linear foot.