

Section 2414. Railings

2414.01 DESCRIPTION.

Furnish and construct railings of the type, dimensions, and materials shown in the contract documents.

2414.02 MATERIALS.

Apply [Section 2403](#).

A. Concrete Railings.

1. **Concrete Barrier Railing.**
Apply [Section 2406](#) and [Article 2513.02](#).
2. **Concrete Open Railing.**
Apply [Section 2406](#).
3. **Retrofit Concrete Barrier Railing.**
Apply [Section 2406](#) and [Article 2513.02](#).

B. Pipe and Structural Steel Pedestrian Hand Railings.

1. Use pipe that meets the requirements of [Section 4153](#). Use structural steel that meets the requirements of [Section 4152](#).
2. On all Primary projects and when specified on Secondary projects, use pipe and structural steel railings galvanized according to [Article 4100.07](#).

C. Wood Railings.

Unless provided otherwise in the contract documents, apply [Section 4162](#).

D. Formed Steel Beam Guardrail.

1. Meet the requirements of [Section 4155](#).
2. On Primary projects and when specified for Secondary projects, use steel galvanized according to [Article 4100.07](#) for posts which are placed on concrete by means of anchor bolts.

E. Aluminum Pedestrian Hand Railings.

1. **Aluminum Parts.**
Apply [Section 4190](#).
2. **Anchor Bolts, Nuts, and Washers.**
Apply [Article 4153.06](#) unless shown otherwise in the contract documents.

2414.03 CONSTRUCTION.

Apply [Section 2403](#).

A. Concrete Railings.

1. **Concrete Barrier Railing.**
Construct to the dimensions and length shown in the contract documents and according to [Sections 2406](#) and [2513](#).
2. **Concrete Open Railing.**
Construct to the dimensions and length shown in the contract documents. Apply the requirements of [Section 2406](#).
3. **Retrofit Concrete Barrier Railing.**
Construct to the dimensions and length shown in the contract documents. Apply the requirements of [Sections 2406](#) and [2513](#).

B. Pipe and Structural Steel Pedestrian Hand Railings.

1. Construct pipe hand railings, structural steel hand railings, and posts as indicated in the contract documents. Install posts as provided in [Article 2414.03, E, 2.](#)
2. The Contractor for the substructure shall furnish and install protection railings on abutments.
3. Paint ungalvanized metal railings according to [Section 2508](#). The Contractor for the superstructure shall furnish and apply field coats of paint.

C. Wood Railings.

Unless provided otherwise in the contract documents, construct wood railings of common class lumber as defined in [Section 4162](#). Ensure details of the construction comply with [Section 2409](#). Paint wood railings as provided in [Article 2409.03, K.](#)

D. Formed Steel Beam Guardrail.

Furnish and install formed steel beam guardrail for bridge structures or approaches according to the contract documents and [Section 2505](#). Use structural steel posts furnished and installed as part of the bridge structure for rails on new bridge structures.

E. Aluminum Pedestrian Hand Railings.

Construct aluminum hand railings with aluminum posts supporting rails of aluminum tubing according to the contract documents and the following:

1. **Handling and Storage.**
 - a. Carefully handle and store aluminum posts and rails at the work site. Do not store aluminum parts in contact with the ground or where they may be attacked by acid or alkali.
 - b. Replace members which are marred or damaged to the extent that their usefulness or appearance is impaired at no additional cost to the Contracting Authority.
2. **Installation.**
 - a. Set anchor bolts in the concrete curb at the correct location and elevation. Hold them firmly in place using suitable templates that will insure their correct position during placing and hardening of the concrete.
 - b. Assemble and align the rails. If necessary, shim the rails to bring them to the correct elevation. Tighten anchor nuts to hold the rails firmly in place. After aligning the rails, position them to accommodate the anticipated expansion. Tighten the setscrews to hold the rails firmly in place. Cap the ends of tubular rails.
 - c. After erection, carefully remove all dirt and grease from the rails, posts, and concrete around the post base using a cleaning method the Engineer approves.

2414.04 METHOD OF MEASUREMENT.

Measurement for the various items involved in the construction of railings will be as follows:

A. Concrete Railings.

1. **Concrete Barrier Railing.**

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections. Measurement for the weight (mass) of reinforcement steel installed in the barrier will be according to [Article 2404.04](#).
2. **Concrete Open Railing.**

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections. Measurement for the weight (mass) of reinforcement steel installed in the barrier will be according to [Article 2404.04](#).
3. **Retrofit Concrete Barrier Railing.**

Linear feet (meters) shown in the contract documents, measured from end to end of the barrier, including end sections and transition sections. Reinforcement steel in Retrofit Concrete Barrier Railing will not be measured for payment.

- 4. **Electrical Circuits.**
 - a. When electrical conduit and junction boxes are installed as part of [Section 2525, Article 2525.04](#) applies; otherwise, electrical conduit and junction boxes will not be measured.
- B. **Steel Pipe Pedestrian Hand Railing and Structural Steel Pedestrian Hand Railing.**

Linear feet (meters) shown in the contract documents, from end to end of the railing.
- C. **Wood Railings.**

[Article 2409.04](#) applies.
- D. **Formed Steel Beam Guardrail.**
 - 1. [Article 2505.04](#) applies.
 - 2. [Section 2408](#) applies for steel posts.
- E. **Aluminum Pedestrian Hand Railings.**

Aluminum railing will be the quantity shown in linear feet (meters) in the contract documents for Aluminum Pedestrian Hand Railing.

2414.05 BASIS OF PAYMENT.

Payment for the quantities of various items of construction, measured as specified in [Article 2414.04](#), will be the contract unit price as described below. Payment is full compensation for furnishing all materials, equipment, and labor necessary to construct the rail as shown in the contract documents.

- A. **Concrete Railings.**
 - 1. Concrete Barrier Railing, Concrete Open Railing, or Retrofit Concrete Barrier Railing: per linear foot (meter).
 - 2. Reinforcement measured for payment: [Article 2404.05](#) applies. The reinforcement quantities may be included in the quantities for the superstructure or abutments. Reinforcement Steel in Retrofit Concrete Barrier Railing will not be paid for separately, but will be included in the price bid for Retrofit Concrete Barrier Railing.
 - 3. Electrical Circuits:

When electrical conduit and junction boxes are installed as part of [Section 2525](#), payment will be according to [Article 2525.05](#); otherwise, electrical conduit and junction boxes will be incidental to the concrete railing.
- B. **Steel Pipe Pedestrian Hand Railing and Structural Steel Pedestrian Hand Railing.**

Contract unit price for structural steel when measured by weight (mass), and contract unit price per linear foot (meter) when measured in linear feet (meters).
- C. **Wood Railings.**

[Article 2409.05](#) for lumber and hardware.
- D. **Formed Steel Beam Guardrail.**
 - 1. Apply [Article 2505.05](#).
 - 2. [Article 2408.05](#) applies for steel posts.
- E. **Aluminum Pedestrian Hand Railings.**

Per linear foot (meter).