State of Wyoming
Department of Transportation
Cheyenne, Wyoming

Standard Specifications
for
Road and Bridge Construction

2003 Edition

Specifications Pertaining to Bridge Railing
SECTION 503
Bridge Railing

503.1 DESCRIPTION

This section describes the requirements for constructing steel bridge railing, pedestrian railing, and bridge railing modifications.

503.2 MATERIALS

Provide materials in accordance with the following:

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Use an adhesive anchorage system approved by the Bridge Program.

503.3 EQUIPMENT—Vacant

503.4 CONSTRUCTION

503.4.1 General

Fabricate and construct bridge railing in accordance with Section 501, Steel Structures.

503.4.2 Fabrication

Ensure that venting and pick-up holes in rails and sleeves are shown on the fabricator’s shop drawings. Place vent holes on the underside of the rail members as installed.

Ensure that post base plates are flat after fabrication.

Shop-curve rail members for curved bridges with a radius of less than 1000 ft [300 m].
Grind rough edges on posts and rails smooth before galvanizing. Galvanize railing and hardware in accordance with Subsection 501.4.1.25, Galvanizing. Straight or unwelded tubes may be galvanized before fabrication, provided that cut surfaces are repaired in accordance with Subsection 501.4.1.25, Galvanizing. In addition to the requirements of AASHTO M 111, ensure that the galvanizing is free of general roughness, dross pimples, blisters, and wet storage stain.

Use nonmetallic spacers at least 1½ in [38 mm] thick to separate rails bundled together for storage or shipment. Ensure that metal bundling straps do not touch the rails.

503.4.3 Erection

503.4.3.1 General

1 After installing rail elements, paint the exposed rail bolt threads with two coats of zinc-rich paint in accordance with ASTM A 780.

503.4.3.2 New Construction

1 Place and properly align railing posts before placing new concrete.

503.4.3.3 Railing Modification

1 For railing modification, remove existing rail, posts, associated hardware, and portions of anchor bolts protruding beyond the concrete surface when required. Removed bridge railing becomes the contractor’s property.

2 If removing and resetting bridge railing, reuse rails, posts, and splice sleeves. Toggle bolts become property of the contractor; do not reuse them. Use new U-bolts to reattach rails to the posts. Match-mark items to be reused before removal. Replace items damaged during removal and resetting at no additional cost to the department.

3 Set anchor bolts or threaded rods for railing modification in epoxy resin grout or an alternate adhesive anchorage system in accordance with Subsection 501.4.2.7, Setting Anchor Bolts. If using an alternate system, ensure that the anchor holes in the concrete are the diameter and length recommended by the adhesive manufacturer to achieve a minimum pullout capacity equaling the ultimate tensile strength of the anchor bolt or threaded rod. Preserve at least 2 in
[50 mm] between the bottom of drilled holes and the underside of the concrete slab.

### 503.5 MEASUREMENT and PAYMENT

1. The engineer will measure:
   1. Bridge Railing and Pedestrian Railing by the foot [meter].
   2. Bridge Railing Modification, Pedestrian Rail Modification, and Reset Bridge Railing by the foot [meter] or by the complete unit.

2. The engineer will not include sleeves for attaching guardrail in the measurement for Bridge Railing or Bridge Railing Modification.

3. The department will pay as follows:

<table>
<thead>
<tr>
<th>Pay Item</th>
<th>Pay Unit</th>
<th>Measure to the Nearest</th>
<th>Pay to the Nearest</th>
</tr>
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<tbody>
<tr>
<td>Bridge Railing</td>
<td>FT [m]</td>
<td>0.1 ft [0.05 m]</td>
<td>FT [0.5 m]</td>
</tr>
<tr>
<td>Bridge Railing Modification</td>
<td>LS, FT [LS, m]</td>
<td>LS, 0.1 ft [LS, 0.05 m]</td>
<td>LS, FT [LS, 0.5 m]</td>
</tr>
<tr>
<td>Pedestrian Railing</td>
<td>FT [m]</td>
<td>0.1 ft [0.05 m]</td>
<td>FT [0.5 m]</td>
</tr>
<tr>
<td>Pedestrian Railing</td>
<td>LS, FT [LS, m]</td>
<td>LS, 0.1 ft [LS, 0.05 m]</td>
<td>LS, FT [LS, 0.5 m]</td>
</tr>
<tr>
<td>Reset Bridge Railing</td>
<td>LS, FT [LS, m]</td>
<td>LS, 0.1 ft [LS, 0.05 m]</td>
<td>LS, FT [LS, 0.5 m]</td>
</tr>
</tbody>
</table>
815.6 Bolts and Fasteners

1. Other than high-strength bolts, ensure the provision and use of bolts and fasteners in accordance with ASTM A 307, grade A [ASTM F 568, class 4.6], or SAE, grade 2, with course threads.

815.9 Bridge Railing

1. Ensure the provision and use of structural-tube railing made from structural tubing in accordance with ASTM A 501 or ASTM A 500, grade A or B.

2. If ASTM A 500 structural-tube is used, ensure railing is tested in accordance with ASTM E 436, after galvanizing; ensure a testing temperature of 0 °F [-18 °C]. Ensure six specimens from the longest side of the tube are used to determine the percentage shear area; do not use specimens containing a weld. The department will not accept material in which the average percent shear area is less than 50.

3. Provide standard and expansion sleeves made from structural steel in accordance with ASTM A 709, grade 36 [ASTM A 709M, grade 250], and galvanized in accordance with Subsection 501.4.1.25, Galvanizing, and Subsection 815.14, Galvanized Coating.

4. Provide posts made from structural steel in accordance with ASTM A 709 grade 36 [ASTM A 709M, grade 250].

   For bridge railing, provide anchor bolts in accordance with Subsection 815.18, High-Strength Anchor Bolts.

5. Provide anchor bolts, posts, and railing galvanized or cadmium-coated in accordance with Subsection 501.4.1.25, Galvanizing, and Subsection 815.14, Galvanized Coating.

6. For concrete anchorage, provide and use unpainted, nongalvanized hardware consisting of steel bars in accordance with ASTM A 709, grade 36 [ASTM A 709M, grade 250].

819.2 Epoxy Resin Grout

1. For epoxy resin grout, provide and use a product in accordance with AASHTO M 235, type IV, grade 2; use grade 3 for horizontal holes and vertical and overhead applications. Provide a class of grout suitable for the temperature of the concrete at the time of use. The engineer may approve the use of other polymer adhesives.
815.14 Galvanized Coating

1 As specified, ensure that products made from rolled, pressed, and forged steel shapes, plates, bars, and % in [3 mm] and thicker strip are zinc (hot-dipped galvanized) coated in accordance with AASHTO M 111.

2 As specified, provide and use iron and steel hardware galvanized in accordance with ASTM A 153 [ASTM A 153M] or ASTM B 633, or cadmium-coated in accordance with ASTM B 766, class 8, type II or III; ensure that type II cadmium coating is bronze or brown.

815.18 High-Strength Anchor Bolts

1 As specified, provide and use cast-in high-strength anchor bolts or threaded anchor rods in accordance with ASTM A 449; supply ASTM A 563 nuts of appropriate grade and finish to match the anchor bolts [AASHTO M 164M or ASTM F 568, class 8.8, with ASTM A 563M, class 12 nuts].

2 For grouted-in high-strength anchor bolts, provide and use swedge bolts or threaded rod in accordance with ASTM A 193, grade B7; supply nuts in accordance with ASTM A 194 [ASTM A 194M].

3 Ensure that galvanized bolts have an ultimate tensile strength no greater than 150,000 psi [1034 214 kPa].