Section 859—Guard Rail

859.1 General Description
This section includes the requirements for guard rail components, such as:

- Guard rail elements, terminal sections, and fittings
- Cable end anchor assemblies
- Steel guard rail posts and offset blocks
- Wood guard rail posts and offset blocks

859.1.01 Related References
A. Standard Specifications

Section 106—Control of Materials
Section 863—Preservative Treatment of Timber Products

B. Referenced Documents

<table>
<thead>
<tr>
<th>ASTM</th>
<th>AASHTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 123/ A 123M</td>
<td>A 741</td>
</tr>
<tr>
<td>A 153/ A 153 M</td>
<td>A 769/A 769M</td>
</tr>
<tr>
<td>A 449</td>
<td>B 209 (B 209M)</td>
</tr>
<tr>
<td>A 575</td>
<td>B 211 (B 211M)</td>
</tr>
<tr>
<td>A 576</td>
<td>F 568</td>
</tr>
<tr>
<td>A 709/A 709M</td>
<td>M 180</td>
</tr>
</tbody>
</table>

1994 SPIB rules, paragraph 402

QPL 8

859.2 Materials

859.2.01 Guard Rail Elements, Terminal Sections, and Fittings
A. Requirements

1. Steel Guard rail
   Use guard rail parts that meet AASHTO M 180 requirements and are composed of the following elements:

<table>
<thead>
<tr>
<th>Bridge railing</th>
<th>Roadway guard rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class B, Type II beams</td>
<td>Class A, Type II beams</td>
</tr>
</tbody>
</table>

   Use guard rail from suppliers found on QPL 8.

2. Aluminum Guard Rail
   Use rail elements made from aluminum alloy alclad 2024-T3 sheet that meets ASTM B 209 (B 209M) requirements. Use the following fittings:

<table>
<thead>
<tr>
<th>Fittings</th>
<th>Material Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum bolts</td>
<td>Alloy 2024-T4 [ASTM B 211(B 211M)] with 30-minute anodize and 30-minute seal</td>
</tr>
<tr>
<td>Hex nuts</td>
<td>Aluminum alloy 6061-T6, not anodized</td>
</tr>
<tr>
<td>Washers</td>
<td>May meet ASTM B 209 (B 209M) Alclad 2024-T4, not anodized</td>
</tr>
</tbody>
</table>

3. Certification
   Submit a certification as in Subsection 106.05, “Materials Certification.”
Section 859—Guard Rail

B. Fabrication

1. General
   a. Make highway guard rail elements according to the Plans.
   b. Ensure that all guard rail elements, terminal sections, and fittings are interchangeable with similar parts, regardless of the source or manufacturer.
   c. If constructing guard rail on curves with a radius of 150 ft (45 m) or less, curve the rail elements in the shop to the radius on the road side of the rail, either concave or convex, as required.

2. Aluminum Guard Rail Elements
   a. Form the rail elements into beams at least 1 ft (300 mm) wide and 3 in (75 mm) deep, and at least 0.156 in (3.96 mm) thick.
   b. Form the terminal ends from the same material as the beams or from Alclad 2024-T42.

C. Acceptance

1. Steel Guard Rail
   The Department will accept the material based on the provisions of AASHTO M 180 or ASTM B 209 (B 209M).

2. Aluminum Guard Rail
   The Department will accept the material based on the manufacturer’s QPL status or on tests conducted by the Department.

D. Materials Warranty

Steel Guard Rail: Ensure that the manufacturer’s logo and heat numbers remain legible for at least 5 years after galvanizing.

859.2.02 Cable and Anchor Assembly

A. Requirements

1. Type
   Ensure that the cable and anchor materials meet the following requirements, unless shown otherwise on the Plans:

<table>
<thead>
<tr>
<th>Material</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor and metal plates</td>
<td>Steel, ASTM A 709 (A 709M), Grade 36 (250)</td>
</tr>
<tr>
<td>Anchor rod</td>
<td>Steel, ASTM A 575 or A 576, Grade 1020</td>
</tr>
<tr>
<td>Anchor cable</td>
<td>Preformed, galvanized wire rope, ASTM A 741, Type II, 3/4 in (19 mm), 6 x 19, with right regular lay</td>
</tr>
<tr>
<td>Cable clips and cable thimble</td>
<td>Commercial quality, galvanized, drop-forged steel</td>
</tr>
<tr>
<td>Bolts and nuts</td>
<td>ASTM F 568</td>
</tr>
<tr>
<td>Swaged fittings</td>
<td>Steel, ASTM A 576, Grade 1035; annealed, galvanized, suitable for cold swaging</td>
</tr>
<tr>
<td>Galvanized stud</td>
<td>Steel, ASTM A 449</td>
</tr>
<tr>
<td>Concrete deadman</td>
<td>Precast Class A concrete, according to the Plans</td>
</tr>
</tbody>
</table>

2. Certification
   Submit a certification for these materials according to Subsection 106.05, “Materials Certification.”

B. Fabrication

Fabricate and assemble according to the Plans.

1. Anchor/Metal Plates
   Build up anchor plates and other metal plates, as shown on the Plans, or form them on a press, with or without welded seams.
Section 859—Guard Rail

2. Anchor Rod
   Drop-forgé or form the eye of the anchor rod with a full penetration weld that develops 100 percent of the rod strength.

3. Metal Components:
   a. Galvanize all metal components of the assembly, except the anchor cable, according to ASTM A 123/A 123M.
   b. Galvanize bolts, washers, etc., as stated in ASTM A 153/A 153M.

C. Acceptance
   The Department will accept material based on the certification.

D. Materials Warranty
   General Provisions 101 through 150.

859.2.03 Steel Guard Rail Posts and Offset Blocks
A. Requirements
   1. Type
      Use steel posts of the dimensions and shapes shown on the Plans for guard rails. Unless the Plans show otherwise, use posts that meet the requirements of ASTM A 709 (A 709M), Grade 36 (250) or ASTM A 769 (A 769M) Class I, Grade 40 (380), and found in QPL 8.
   2. Certification
      Submit a certification according to Subsection 106.05, “Materials Certification.”

B. Fabrication
   Galvanize steel posts and offset blocks according to ASTM A 123/ A 123M.

C. Acceptance
   The Department will accept the material based on the certification.

D. Materials Warranty
   General Provisions 101 through 150.

859.2.04 Wood Guard Rail Posts and Offset Blocks
A. Requirements
   1. Grade
      Use posts and offset blocks that meet the requirements for No. 1 timbers, paragraph 402, of the 1994 SPIB rules. Do not use offset blocks with splits longer than 3 in (75 mm).

B. Fabrication
   1. Tolerances
      Ensure that the posts do not vary from the specified length by more than ± 1 in (± 25 mm). If the Plans specify a slope for the top, ensure that the slope does not vary more than ±1/4 in (± 6 mm).
   2. Seasoning and Preservative Treatment
      Bore and frame posts, then treat the posts and offset blocks according to the requirements of Section 863.

C. Acceptance
   The Department will accept the material based on tests conducted by the Department or on the manufacturer’s QPL status.

D. Materials Warranty
   General Provisions 101 through 150.

859.2.05 Plastic Offset Blocks
A. Requirements
   1. Type
Section 859—Guard Rail

Use only plastic offset blocks that are listed on QPL 8.

Use plastic offset blocks that consist of 70 percent low density polyethylene and approximately 30 percent high density polyethylene with a trace of other plastic.

Other compositions may be used if approved by the Office of Materials and Research.

2. Certification

Submit a certification according to Subsection 106.05, “Materials Certification.”

B. Fabrication

General Provisions 101 through 150.

C. Acceptance

The Department will accept the material based on the manufacturer’s certification.

D. Materials Warranty

General Provisions 101 through 150.