

## 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

ASTM		AASHTO
A 123/ A 123M A 153/ A 153 M A 449 A 575 A 576 A 709/A 709M	A 741 A 769/A 769M B 209 (B 209M) B 211 (B 211M) F 568	M 180

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:

Bridge railing	Class B, Type II beams
Roadway guard rail	Class A, Type II beams

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:

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

###### 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 [OPL](#) 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:

Material	Requirements
Anchor and metal plates	Steel, ASTM A 709 (A 709M), Grade 36 (250)
Anchor rod	Steel, ASTM A 575 or A 576, Grade 1020
Anchor cable	Preformed, galvanized wire rope, ASTM A 741, Type II, 3/4 in (19 mm), 6 x 19, with right regular lay
Cable clips and cable thimble	Commercial quality, galvanized, drop-forged steel
Bolts and nuts	ASTM F 568
Swaged fittings	Steel, ASTM A 576, Grade 1035; annealed, galvanized, suitable for cold swaging Ensure the swaged fittings and stud assembly develop at least 100% of the breaking strength of the cable.
Galvanized stud	Steel, ASTM A 449
Concrete deadman	Precast Class A concrete, according to the Plans

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-forge 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  $\pm 1$  in ( $\pm 25$  mm). If the Plans specify a slope for the top, ensure that the slope does not vary more than  $\pm 1/4$  in ( $\pm 6$  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.