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**FORMED STEEL BEAM RAILING, CABLE RAIL, ANCHOR CABLE,  
& STEEL POST FOR GUARDRAIL  
& BEAM GUARDRAIL TERMINAL**

**BEAM RAILING**

Rail elements, fasteners, terminal sections, and transition sections (end and/or buffer sections), shall meet the requirements of AASHTO M180 and chemical requirement ASTM A1011. Rail elements and terminal sections shall be Class A, Type I unless a greater thickness is required by the plans. Acceptance shall be based on an approved Brand Registration Guarantee and compliance of all test results on any random samples secured from the project or the supplier.

**BRAND REGISTRATION & GUARANTEE**

Prior to furnishing materials for a project the fabricator will furnish a Brand Registration and Guarantee in accordance with all the requirements of AASHTO M180 for approval of the engineer. Detailed drawings and samples of each rail component will also be submitted with each request. The above requirements apply to each fabricating plant even though the Brand Registration may be the same. A Brand Registration and Guarantee shall be submitted annually for approval.

Approved Fabricator Brand Registrations and Guarantees are listed in [Appendix A](#).

**CABLE RAIL & ANCHOR CABLE**

Cable rail shall meet the requirements of AASHTO M30, Type I Construction, Class A Coating.

Anchor cable shall meet the requirements of AASHTO M30, Type II Construction, Class A Coating.

**WOOD POST**

Wood posts shall meet the requirements of [Section 4161](#) of the Standard Specifications.

**STEEL POST**

Steel posts shall meet the requirements of ASTM A36/A36M Structural Steel of the dimensions shown in the contract documents. Steel posts shall be galvanized in accordance with the requirements of ASTM A123. Bolt holes shall be provided in accordance with [Section 2408.39B](#). Galvanizing shall be done after fabrication and after all bolt holes have been drilled.

### **SPACER BLOCKS**

Wood spacer blocks shall meet the requirements for wood posts. Steel spacer blocks shall meet the requirements for steel posts. Spacer blocks manufactured from alternate materials that have not received FHWA approval may not be substituted for wood or steel blocks.

### **ACCEPTANCE OF BEAM RAILING**

Material shall be accepted on the basis of manufacturer certification, approved brand registration (listed in [Appendix A](#)) and guarantee, as required by AASHTO M180. If there is evidence of misbranding as determined by random sampling and detection of inadequate tensile strength, yield strength, elongation, improper chemical composition, inadequate or improper coating, deficient thickness or improper fabrication, the material shall be rejected and approval for further use shall be withdrawn until subsequently re-approved. Samples of the materials for testing may be secured from the project site.

Prior to incorporation into a project, the markings on the beam element end sections and backup plates shall be in accordance with AASHTO M180 requirements and shall be checked for name or brand of manufacturer and shall be documented in the field book. Markings for end sections and back-up plates may be accepted on durable tags securely attached to each section or bundle in lieu of the above on the individual pieces.

The beam elements shall be identified as follows:

1. Name & Brand of Manufacturer
2. Identification Symbols or Code for Heat Number
3. Coating Lot
4. AASHTO Specification Designation Number
5. Class & Type

### **ACCEPTANCE OF STEEL POST**

Acceptance of steel posts to be incorporated into a project shall be based on a Certified Mill Test Analysis of the steel.

### **MONITORING SAMPLING & TESTING**

For direct shipments only, the District Materials Office will secure monitor samples periodically. The frequency may be based on the quantity of material furnished for use in each District. A minimum of one sample should be secured annually for each fabricator with an approved Brand Registration & Guarantee. The sample size shall be 1 in. (25.4 mm) by 12 in. (304.8 mm) secured from the edge of beam railing. One set per size of nuts, bolts, and washers shall be secured at random for testing.

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## **SAMPLING & REPORTING AT SUPPLIER WAREHOUSE**

Sampling and inspecting will be done at the supplier warehouse on each shipment of guardrail material. Once the shipment is approved, the District Materials Engineer shall report the material on a project-by-project basis.

## **MATERIAL REQUIREMENTS**

- Beam, transition section shall meet the requirements of AASHTO M180, Class A, where the base metal nominal thickness is 0.108 inch (2.67 mm), 12 gauge, tensile strength minimum, 70,000 psi, elongation of 2 inches (50 mm) minimum, 12 percent and yield point, 50,000 psi. Tolerance for the under specified thickness is 0.009 inch (23 mm). No limit for over thickness.
- Beam Guardrail Terminal (Fleat-350)
  - When Fleat-350 Guardrail Terminal is being specified in the contract document, it shall meet the requirements of standard road plan RE-76 which requires that Fleat-350 Guardrail Terminals be designed, manufactured, and supplied by “Road Systems, Inc.” or by a designated distributor and shall consist of materials manufactured to their specifications. The contractor shall install the Fleat-350 according to manufacturer’s recommendations.
- End and buffer sections, yield point, minimum 33,000 psi and tensile strength, minimum 45,000 psi.
- Zinc for beam railing shall be Type I and shall meet the requirements of ASTM B6. Zinc coating, minimum single-spot 1.80 oz./ft.<sup>2</sup> (550 g/m<sup>2</sup>)
- Bolts and Nuts: Unless otherwise specified, Bolts shall meet the requirements of ASTM A307, Grade A. **NOTE:** All connections or splices shall be formed with oval shoulder button-headed bolts to minimize projections on the roadside of the guardrail. Nuts shall meet the requirements of ASTM A563 DH, Heavy Hex. Washers shall be flat and shall meet the requirements of ASTM F436. Bolts, nuts and washers shall be galvanized in accordance with ASTM A153, Class C. **NOTE:** Zinc-coated nuts shall be tapped over-size as specified in ASTM A563. All other bolts, nuts and washers shall meet the requirements of ASTM A307, Grade A, ASTM A563, Grade A, hex and ASTM F844 respectively.
- Cable shall meet the requirements of AASHTO M30 or ASTM A741, Type I, Class A.
- Anchor cable shall meet the requirements of AASHTO M30, Type II, Class A.
- All connections and splices shall be formed using oval shoulder button-headed bolts to minimize projections on the roadside of guardrail.
- Anchor bolts, nuts and washers used to attach beam rail to bridge barrier rail shall meet the requirements of ASTM A325 or A449, Grade 55 and shall be full-length, galvanized. Nuts shall meet the requirements of ASTM A563 DH, Heavy Hex, Class 2B. Washers shall meet

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the requirements of ASTM F436, Type I. Anchor bolts, nuts and washers shall be galvanized and shall meet the requirements of F2329 or ASTM B695, Class 50, Type I.

- All other bolts, nuts, and washers shall meet the requirements of ASTM A307 Grade A, ASTM A563 Grade A Hex, and ASTM F844 respectively.
- All bolts shall be tightened by a method approved by the engineer to obtain the specified torque requirements for each bolt size.
- **Torquing Guidelines**

<u>Bolt Size</u>	<u>Torque</u>
1/2"	100 ft. lbs.
5/8"	180ft. lbs.
3/4"	320 ft. lbs.
7/8"	470 ft. lbs.

- Steel posts shall meet the requirements of ASTM A36/A36M.
- Galvanizing of steel posts shall be in accordance to ASTM A123.
- Threads shall be the coarse thread series ANSI/ASME B1.1 and shall have Class 2A tolerance.
- Chemical requirements for beams, transition, end and buffer sections shall meet the requirements of ASTM A36.
- Types: Type I – Zinc-coated 1.80 oz./ft.<sup>2</sup> (550 g/m<sup>2</sup>) minimum single spot  
Type II- Zinc-coated 3.60 oz./ft.<sup>2</sup> (1100 g/m<sup>2</sup>) minimum single spot
- Classes: Class A – Base metal nominal thickness 0.015 in. (2.67 mm)  
Class B – Base metal nominal thickness 1.0135 in./ (3.43 mm)
- Plate Cuts shall be saw cuts or flame cuts with prior approval of the engineer. All cut edges shall be ground smooth. Metal projection beyond the plane of the plate face shall not be allowed.

### **GALVANIZING REPAIR**

Where the galvanizing on guardrail or fittings has been damaged, the coating shall be repaired by re-galvanizing or the surface repaired by painting with separate coats of zinc dust/zinc oxide paint conforming to the requirements of [IM 410](#).

Note: Paint containing zinc dust shall have a concentration of zinc dust in the range of at least 65 – 69% or above 92% in the dried film.

If welding is employed FCAW process shall be used welding shall be performed by a certified welder. All welds shall be ground smooth and mechanically cleaned before galvanizing repair.

Certification Statement – Required

The material itemized in this shipment is certified to meet the specification requirements of the Iowa Department of Transportation.

All Beam Guardrail, bolts, nuts, and washers were tested and approved under Materials Lab Numbers:

Lab: