

ITEM 540

METAL BEAM GUARD FENCE

540.1. Description. Furnish and install, replace, or adjust metal beam guard fence consisting of metal beam rail element support on timber or steel posts.

540.2. Materials. When directed, provide samples of metal beam rail elements, terminal sections, bolts, and nuts for testing for compliance with the physical and chemical property requirements of AASHTO M 180 in accordance with Tex-708-I and Tex-713-I.

When the plans designate that the Department will furnish the materials, pick up the materials at the locations shown on the plans.

A. Metal Beam Rail Elements. Furnish new metal beam rail elements for rail and terminal anchor sections that meet the requirements of Table 1.

Type I or II is allowed unless otherwise shown on the plans. Base metal for metal beam rail elements must not contain more than 0.04% phosphorous nor more than 0.05% sulfur.

Furnish metal beam rail elements from approved manufacturers. A list of Department-approved manufacturers is maintained by the Construction Division.

B. Posts. Furnish new round timber, rectangular timber, or rolled steel section posts in accordance with details shown in the plans and the following requirements:

1. **Timber Posts.** Meet the requirements of DMS-7200, “Timber Posts and Blocks for Metal Beam Guard Fence.”
2. **Steel Posts.** Provide rolled sections conforming to the material requirements of ASTM A 36. Drill or punch posts for rail attachment as shown on the plans. Galvanize in accordance with Item 445, “Galvanizing.”

**Table 1
Rail Element Requirements**

Specification	AASHTO M 180
Class	A – Base metal nominal thickness 0.105 in. ±0.008 in., or B – Base metal nominal thickness 0.135 in. ±0.008 in.
Type	I – Zinc-coated 1.80 ounces per square foot minimum single-spot, or II – Zinc-coated 3.60 ounces per square foot minimum single-spot. IV – Weathering Steel (required when shown on the plans).
Shape	W-beam or thrie beam or W-beam-to-thrie-beam transition.
Markings	Permanently mark each metal beam rail element with the information required in AASHTO M 180. Permanently mark all curved sections of metal beam rail element with the radius of the curved section in the format “R = xx ft.” Markings (die-imprinted letters and numerals no more than 1/2 in. high) must be on the back of the metal beam rail section away from traffic and visible after erection.

C. Blocks. Furnish new rectangular timber or composite blocks in accordance with details shown in the plans and the following requirements:

1. **Timber.** Meet the requirements of DMS-7200, “Timber Posts and Blocks for Metal Beam Guard Fence.”
2. **Composite.** Meet the requirements of DMS-7210, “Composite Material Posts and Blocks for Metal Beam Guard Fence.”

D. Fittings. Furnish new fittings (bolts, nuts, and washers) in accordance with the details shown on the plans and galvanized in accordance with Item 445, “Galvanizing.”

- E. Terminal Connectors.** Furnish new terminal connectors, where required, meeting the material and galvanizing requirements specified for metal beam rail elements.
- F. Concrete.** Furnish concrete for terminal anchor posts meeting the requirements for Class A concrete as required in Item 421, "Hydraulic Cement Concrete."
- G. Curb.** If indicated in the details, furnish the curb shown with metal beam guard fence transition as required by Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

540.3. Construction. Install posts and rail elements in accordance with the details shown on the plans.

- A. Posts.** Install posts by either drilling or driving.
 - 1. Drilling.** Drill holes and set posts plumb and firm to the line and grade shown. Backfill posts by thoroughly tamping the fill material in 4 in. layers.
 - 2. Driving.** Drive posts plumb with approved power hammers (steam, compressed air, vibratory, or diesel) or gravity hammers to the line and grade shown. Use a structural steel driving head suitable for the type and size of post being driven with wood cushion blocks as necessary to prevent damage to the post. Rope mat, belting, or other similar cushioning material may be used in addition to wood cushion blocks. Use pilot holes when required or permitted. Determine the size and depth of pilot holes with the approval of the Engineer based on results of trial operations of the first few posts driven. Thoroughly tamp loosened soil around the post, fill with suitable material any void between the soil and the post resulting from the driving, and thoroughly compact to the density of adjacent undisturbed material.
- B. Rail Elements.** Erect metal beam rail elements to produce a smooth, continuous rail paralleling the line and grade of the roadway surface or as shown on the plans. Bolt rail elements end to end and lap in the direction of traffic in the lane adjacent to the guard fence. Curve metal beam rail elements during fabrication, to the radius shown. Field-drill or punch holes in rail elements for special details only when approved.
- C. Terminal Anchor Posts.** Embed terminal anchor posts in concrete unless otherwise shown on the plans.
- D. Galvanizing Repair.** After erection, repair all parts of galvanized steel posts, washers, bolts, and rail elements on which the galvanizing has become scratched, chipped, or otherwise damaged. Repair in accordance with Section 445.3.D, "Repairs."
- E. Guard Rail Adjustment.** Work includes vertical adjustment of the rail element. Perform work in accordance with details shown on the plans. Materials provided by the Department will be as shown on the plans.
- F. Curb.** If indicated in the details, construct the curb shown with metal beam guard fence transition as required by Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

540.4. Measurement.

- A. Guard Fence Installation, Adjustment, and Anchor Sections.** Measurement will be by the foot of fence. Fence will be measured on the face of the rail in place, from center to center of end posts. For terminal anchor sections or structure-to-railing connections, measure from the points shown on the plans. Terminal anchor sections will be measured by the foot, unless specified as a separate bid item.
- B. Terminal Anchor Sections.** When a separate bid item is specified for terminal anchor sections, measurement will be by each section, complete in place, consisting of a terminal anchor post and one 25 ft. section of rail element.
- C. Transitions.** Transitions for rail connection will be measured by each transition.

540.5. Payment. The work performed and material furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Metal W-Beam Guard Fence" of the post type specified, "Metal Thrie-Beam Guard Fence" of the post type specified, "Terminal Anchor Section," "Metal Beam Guard Fence Transition," "Metal W-Beam Guard Fence Adjustment," "Metal Thrie-Beam Guard Fence Adjustment," "Terminal Anchor Section Adjustment," or "Transition Adjustment." When weathering steel is required, Type IV will be specified.

When posts are required to be removed, payment for removal of posts, rail elements, fittings, and terminal anchor sections will be made under Item 542, "Removing Metal Beam Guard Fence." Guardrail end treatments will be paid for in accordance with Item 544, "Guardrail End Treatments."

Samples furnished to the Department for testing purposes will not be paid for directly but are subsidiary to this Item. Special backfill materials required will not be paid for directly but are subsidiary to this Item. Concrete curbs will not be paid for directly but are subsidiary to this Item.

- A. Guard Fence.** The price bid for "Metal W-Beam Guard Fence" or "Metal Thrie-Beam Guard Fence" is full compensation for materials, hauling, erection, setting posts in concrete, blocks, driving posts, excavating, backfilling, equipment, labor, tools, and incidentals.
- B. Terminal Anchor Section.** When a separate bid item is specified, the price bid for "Terminal Anchor Section" is full compensation for furnishing the rail element, anchor assembly, terminal anchor post, and foundations; installing the rail element anchor assembly and the terminal anchor post and foundations; excavation and backfilling; and equipment, labor, tools, and incidentals.
- C. Transition.** The price bid for "Metal Beam Guard Fence Transition" is full compensation for furnishing the nested sections of thrie beam, the thrie-beam-to-W-beam transitional rail piece, posts, concrete, curb, connections to W-beam guard fence and bridge rails, and the thrie-beam terminal connectors; excavation and backfilling; and equipment, labor, tools, and incidentals.
- D. Guard Rail Fence Adjustment.** The price bid for "Metal W-Beam Guard Fence Adjustment," "Metal Thrie-Beam Guard Fence Adjustment," "Terminal Anchor Section Adjustment," and "Transition Adjustment" is full compensation for furnishing materials not supplied by the Department, drilling holes in posts, hauling, erection, blocks, excavation, backfill, cleaning, salvaging materials, setting rail element anchor assembly and terminal anchor post, removal of rail element, concrete, curb, equipment, labor, tools, and incidentals.