

## SECTION 59

### STEEL BEAM GUARD RAIL

#### 59.1 DESCRIPTION

**A. General:** This work consists of furnishing and installing steel beam guardrail.

**B. Related Work:**

Section 19	Incidental Work
Section 56	Class M6 Concrete for Curb & Gutter and Flatwork
Section 203	Submittals

#### 59.2 MATERIALS

**A. Wood Posts and Offset Blocks:** Shall be made of a timber with a stress grade of at least 1200 psi. Stress grading shall be in accordance with the rules of the West Coast Lumber Inspection Bureau, Southern Pine Inspection Bureau, or other appropriate timber association. Timber for posts shall either be rough sawn or sawn 4 sides (S4S) with nominal dimensions indicated. The size tolerance of the posts in the direction parallel to the axis of the bolt holes shall not be more than  $\pm 1/4$  inch. Posts and blocks with checks or cracks more than 1/4 inch wide and deeper than 3 inches will not be acceptable.

Preservative treatment for Wood post and blocks shall comply with EPA, AASHTO M 133, and the AWPA Standard U1 referenced in AASHTO M 133. The posts and blocks shall be treated with retention specifications from commodity specification B, use category 4B. lumber in contact with the ground shall be treated with creosote, ammoniacal copper zinc arsenate, copper naphthenate, pentachlorophenol, or chromated copper arsenate.

**B. Steel Beam Guard Rail:** Shall be type conforming to the requirements of AASHTO M 180 Type 1, Unless the plans specify another type.

**C. Bolts, Nuts and Washers:** Shall be as specified in AASHTO M 180.

**D. Concrete:** Shall conform to Class M6 as specified in Section 56.

#### 59.3 CONSTRUCTION REQUIREMENTS

**A. Guardrail Alignment:** Posts and rail shall be set to the plans shown alignment using a string line or other approved methods.

**B. Posts:** Posts shall be set plumb. When posts are installed in augured or dug holes, the holes shall be backfilled with material approved by the Engineer. The backfill shall

be placed and compacted in 4 inch lifts, using a mechanical tamper with an appropriate sized tamping head without displacing the post alignment. Surplus excavated material will be disposed of at locations approved by the Engineer.

In lieu of the above requirements, post may be set by driving. Driving shall be accomplished by mechanical means, which will give the necessary accuracy of placement without any damage. Damaged posts shall be replaced at the Contractor's expense.

Regardless of the method of setting posts, the posts shall be firm, and at the locations, spacing, and height shown on the plans.

When guardrail posts are installed through asphalt concrete shoulders, the Contractor shall take care to minimize damage to the asphalt concrete. If during post installation the asphalt concrete shoulder is raised more than 2 inches, lowered more than 1 inch, or otherwise damaged, the Contractor shall repair the damaged shoulders.

The method of repair may require patching, recompaction, or removal and replacement of the affected asphalt concrete. The method of repair is subject to the approval of the Engineer, depending on the type and extent of the shoulder damage. All repair costs shall be at the Contractor's expense.

Drilling postholes in pavement shall be done without damage to the surrounding pavement. The Engineer must approve the proposed drilling method and equipment before the work begins.

Upon completion of the installation of the guardrail posts, the Contractor shall place and compact asphalt concrete or asphalt concrete cold mix material around the posts to fill and level any voids created by the driving of the posts through the asphalt concrete. The material shall be placed 1/2 inch to 1 inch high around the posts to force water to flow away from the post-hole. Cost for this work shall be incidental to the contract unit prices for the various guardrail items.

Field cuts in treated wood shall be given two applications of a compatible preservative material meeting AWPA Standard M4, with a minimum time lapse of 2 hours between applications. Field bored holes may be left untreated.

- C. Rails:** The rail elements shall be ready for assembly when delivered to the project site. Welding of rail elements will not be allowed. Field cutting of rail elements shall be accomplished with a plasma cutter or other method approved by the Engineer. All field made cuts or holes shall be a neat line. Rail elements that have been altered in the field or have been damaged in transporting, handling, or installing shall be repaired at the Contractor's expense. The altered or damaged surface area of rail element shall be thoroughly cleaned and painted with two coats of matching zinc-rich paint.

When nested rail is specified, rail elements shall not be staggered.

- D. W Beam End Terminal:** The W beam end terminal to be used shall be the Contractor's choice selected from the SD DOT's Approved Products List unless otherwise specified on the plans. The W beam end terminal is to be installed according to the manufacturer's installation instructions. A copy of the installation instructions and drawings for the W beam end terminal being installed shall be furnished to the Engineer prior to installation. The drawings shall contain all components of the W beam end terminal. Surfacing and embankment shall be placed as detailed on the standard plates.
- E. Remove Beam Guardrail:** Beam guardrail removed, including end terminals, steel beam rail, posts, blocks, and hardware shall become the property of the Contractor unless otherwise noted on the plans.

Any holes left after removal of the guardrail shall be backfilled with material furnished by the Contractor. Wherever posts were set through asphalt, the top 3 inches of the hole shall be backfilled with bituminous mix.

- F. Completion Requirements:** On projects where existing cable or steel beam guardrail is to be removed and replaced or reinstalled and the roadway will be open to traffic during construction, the guardrail installation shall be completed within 14 calendar days from the day the controlling item of work is sufficiently complete to allow guardrail installation. A guardrail installation is defined as each individual run of guardrail (i.e., a typical bridge would have 4 guardrail installations). Controlling items for guardrail include, but are not limited to: structure, structure end block, and surfacing work. Typically, there will be a sequence of controlling items for guardrail. Prior to any guardrail removal, the Contractor shall submit and the Engineer must approve a written construction schedule for work in the guardrail area. In no case shall work cease between controlling items of work for more than 4 working days.

Once the existing guardrail is removed from a bridge end, box culvert, bridge column, etc., the Contractor shall place drums or Type II barricades at 25 foot intervals at each location where existing guardrail is removed. These devices shall extend 175 feet beyond the item of concern for each direction of traffic. Drums and barricades shall remain in place until new guardrail has been installed. Cost for furnishing, installing, and maintaining drums and barricades shall be incidental to the contract lump sum price for traffic control miscellaneous.

Post end, beam, and end terminal sections shall be installed in a continuous operation within each individual run of guardrail. Incomplete guardrail installations shall be marked by delineation as noted in the previous paragraph.

If the Contractor does not complete the required work within the time allowed, the Contractor shall install an approved safety treatment that complies with crashworthy requirements for test level 3 of National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH) to protect the site at no additional cost to the Department.

**59.4 METHOD OF MEASUREMENT**

- A. Steel Beam Guard Rail:** Each class and type will be measured by the linear foot along the centerline of the rail. The length in feet shall be understood to be the overall length center to center of end posts or to connections with bridges and culverts.
- B. W Beam End Terminal:** The quantity will be the actual number installed.
- C. Remove Beam Guardrail:** Remove Beam Guardrail will be measured to the nearest linear foot along the centerline of the rail.

**59.5 BASIS OF PAYMENT**

- A. Steel Beam Guard Rail:** Guardrail will be paid for at the contract unit price per linear foot to the nearest whole foot for each class and type installed. Payment will be full compensation for materials, labor, equipment, and incidentals required.
- B. W Beam End Terminal:** W beam end terminals will be paid for at the contract unit price per each. Payment will be full compensation for labor, materials, equipment, and incidentals required.
- C. Remove Beam Guardrail:** Remove Beam Guardrail will be paid for at the contract unit price per foot. Payment will be full compensation for the backfill of holes and the removal of the guardrail including end terminals, beam guardrail, posts, blocks, and hardware from the project limits.

**END OF SECTION**