807.01

Section 807. GUARDRAIL, GUARDRAIL TERMINALS, AND MISCELLANEOUS POSTS

807.01. Description. This work consists of constructing, reconstructing and erecting guardrail, guard posts, guide posts, guardrail terminals, guardrail anchorages and mailbox posts, and excavating, backfilling and disposing of surplus materials.

807.02. Materials. Provide material in accordance the following:

- Sound Earth ................................................................. 205
- Guardrail Beam Elements and Hardware ........................ 908
- Reflectors ..................................................................... 908
- Steel Posts .................................................................. 908
- Wood Posts .................................................................. 912
- Guardrail Blocks ........................................................... 912

807.03. Construction.

A. Grading and Drainage. Before constructing guardrail elements, grade the shoulder and berm to provide drainage. For approach guardrail terminals, grade to Class A slope tolerances.

Remove excess material and dispose in accordance with subsection 205.03.P. The Engineer may allow this material to be spread thinly over the roadway slopes, provided it does not kill vegetation or block drainage.

B. Placing Posts. Either drive posts or set in augered holes. For posts located within 3 feet of existing culverts, use augered holes. The Engineer will allow a ±3-inch tolerance in the depth of augered holes. Compact the bottom of augered holes to provide a stable foundation. Ensure the exposed portion of posts meet plan dimensions. Ensure posts are plumb, and backfill with sound earth compacted in 12-inch layers.

Remove and replace posts damaged during driving that would prevent proper functioning of the guardrail, as determined by the Engineer. Do not damage nearby structures, shoulders, or slopes during driving. Replace damaged posts and repair damage to structures, shoulders, and slopes at no additional cost to the Department.

Use the same material for all posts in a discrete run of guardrail, except where the plans require wood posts. Do not burn or weld posts in the field.

C. Guardrail Beam Elements, Blocks and Hardware. Erect beam guardrail to conform to the line and grade shown in the contract.
Bolt the beam elements and blocks to each post. Make splices, only at posts, by lapping in the direction of traffic. Do not burn or weld beam elements in the field. Where placing guardrail on a curve with a radius between 150 feet and 1,000 feet, tighten splice bolts before attaching to the posts.

Shop bend beam elements for curves with a radius of 150 feet or less. Identify each shop-bent curved beam element with a metal tag or permanent marking showing the radius of curvature to the nearest 5 feet as shown on Standard Plan R-60 Series.

Bolt lengths shown on the plans are based on the standard dimensions given for the materials and do not include manufacturer’s tolerances. Draw bolts tight and flush with the nuts. If using wood posts, do not leave bolts for Type BD and Type TD guardrail extending more than ½ inch beyond the nuts. Do not leave bolts for other types of guardrail extending more than 1½ inch beyond the nuts.

D. Repair of Wood Posts and Blocks. Field treat cuts, holes, and damage to posts and blocks, that occurs after pressure treatment, in accordance with subsection 912.03.

E. Repair of Damaged Galvanized Surface. Repair zinc coating on beam elements, steel posts, and fittings damaged in transporting, handling, or erection in accordance with subsection 716.03.E. Make repairs to galvanized surfaces at no additional cost to the Department.

F. Guardrail Terminals and Anchorages. For guardrail terminals, the Engineer will allow field drilling of galvanized beam elements to attach terminal end shoes and anchor plates. Install the reflectorized obstacle marker panel on the nose of each terminal in accordance with the manufacturer’s specifications.

For structure anchorages, either sleeve or core drill bolt holes through concrete. Avoid spalling concrete during coring. If spalling occurs, remove the fragments and loosened concrete before installing the bolt.

G. Incomplete Guardrail Installations. Within 5 calendar days, complete a continuous section of guardrail, including structure anchorages and guardrail terminals, or bridge thrie beam retrofit guardrail. This time period begins with the start of work on a continuous section of guardrail, and ends with the completion of work on a continuous section of guardrail.

Ensure adequate materials are available on the project before removing sections of guardrail or beginning new installations. Leave existing guardrail in place until preparatory work such as widening, embankment,
and other construction items are complete. To reduce exposure of unprotected areas, coordinate and expedite shoulder construction where guardrail removal and replacement will occur.

If a guardrail section cannot be completely removed or installed by the end of the working day and the exposed beam element ending would face oncoming traffic, temporarily attach a Type 2 approach terminal impact head in accordance with Standard Plan R-62 Series. An impact head must be attached, regardless of the type of beam guardrail. At the end of an incomplete thrie-beam rail section, temporarily install a thrie-beam transition and a 12½-foot length of W-beam rail in accordance with Standard Plan R-60 Series. For both thrie-beam and W-beam rail sections, slip a Type 2 impact head over the end of the last W-beam section and temporarily bolt the rail to the last post using a ¾ inch by 9½ inch bolt with washers. At the first post down stream from the impact head, do not bolt the guardrail to the post, or block it out. Install and tighten the bolts. The Engineer will not require a cable assembly and strut. Attaching the impact head does not waive the 5-day completion requirement.

If bridge approach guardrail cannot be properly attached to the bridge railing or connected to the bridge thrie-beam retrofit guardrail, fit the free end of the rail with the required special end shoe or thrie-beam terminal connector and temporarily attach to the bridge rail in accordance with the following:

1. Fit the exposed thrie-beam retrofit beam ending that faces oncoming traffic with a thrie-beam terminal connector. Attach the terminal connector to the reinforced concrete railing. Install and tighten splice bolts. Secure the terminal connector to the railing with at least one bolt extending completely through the railing in accordance with Standard Plan R-67 Series.

2. Attach bridge approach guardrail that cannot be properly attached to the bridge railing, to a portion of reinforced concrete railing in accordance with Standard Plan R-67 Series, except that only one bolt will be required to secure the special end shoe or thrie-beam terminal connector to the railing. Install and tighten splice bolts. Extend the rail at least 3½ feet onto the bridge. If the Engineer approves, this temporary attachment may remain beyond the five-day requirement stipulated above.

3. If the area of incomplete or removed guardrail is not behind traffic control devices installed for other work, install a lighted SHOULDER WORK (W21-5) sign and lighted, steady-burn, plastic drums, spaced at maximum intervals of 100 feet to delineate the incomplete portion of the guardrail section during the time it is exposed to traffic. Place
plastic drums near the edge of the shoulder. Other traffic control
devices may be required by the contract, or as directed by the
Engineer.

H. Temporary Beam Guardrail and Temporary Guardrail Terminals.
Construct temporary beam guardrail and temporary guardrail terminals in
accordance with subsection 807.03 for beam guardrail and guardrail
 terminals. The Engineer may approve the use of salvaged or new
materials for temporary installations; ensure the Engineer approves,
before using salvaged materials.

Remove the guardrail and terminals when no longer required. Backfill
and compact the post holes in lifts no greater than 12 inches. Take
possession of the materials, disassemble, and remove them from the
project.

I. Salvaging Beam Guardrail. Remove existing single or multiple
beam guardrail and posts. Backfill the post holes in layers compacted to
no greater than 12 inches. Deliver the beam elements to the locations
designated in the contract documents, and stack the beams neatly,
according to length. Unless otherwise required by the contract
documents, take ownership of posts and hardware.

J. Mailbox Posts. Move existing mailbox supports and mailboxes, but
maintain serviceability during construction. Install a new post at the
permanent location after construction is complete. Attach the existing
mailbox to the post and dispose of the existing support at the property
owner’s option. Set mailbox posts in the ground so the top is 4 feet
above the surface of the shoulder of the road or mailbox turnout. The
Engineer will determine the exact height. Use posts in accordance with
Standard Plan R-74 Series, and saw the top of the post level. The
Engineer may approve alternate mailbox support designs that meet the
criteria specified in NCHRP Report 350 or the requirements of the
AASHTO Manual for Assessing Safety Hardware (MASH). Remove,
store, and provide to the property owner, newspaper boxes and supports
that interfere with construction.

K. Guard Posts and Guide Posts. Drive or set guard posts and guide
posts in augered holes in accordance with subsection 807.03.B.

807.04. Measurement and Payment.

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<tr>
<th>Pay Item</th>
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<tr>
<td>Guardrail, Curved, Type __</td>
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<tr>
<td>Guardrail, Type __</td>
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<td>Guardrail, Backed, Det __</td>
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<tr>
<td>Guardrail Post, Culv</td>
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A. **Blading.** The cost of grading the shoulder and berm to provide drainage and disposing of excess material is included in unit price for related items of work.

B. **Guardrail.** The Engineer will measure **Guardrail, Curved, Guardrail, and Guardrail, Temp** along the face of the rail, excluding terminals, end shoes, and W-beam backed guardrail that spans culverts. The unit price for **Guardrail, Curved** includes the cost of portions of guardrail with shop-bent beam elements.

The unit price for **Guardrail** includes the cost of providing and placing guardrail posts, blocks, and miscellaneous hardware.

The unit price for **Guardrail, Backed** includes the cost of providing beam elements, hardware, posts, and spacer blocks necessary to construct the span shown on the plans.

The unit prices for **Guardrail, Temp, Guardrail Approach Terminal, Temp, and Guardrail Departing Terminal, Temp** include the cost of removing temporary guardrail and terminals and backfilling postholes.

The Engineer will measure **Guardrail, Salvage and Guardrail, Multiple, Salvage** along the face of the rail (one face for multiple beams), including terminals and end shoes.

The cost of providing, installing, and removing temporary guardrail beam elements, impact heads, transition elements and hardware, and traffic control items described for incomplete guardrail installations in subsection 807.03.G.3 is included in the unit price for related guardrail pay items.
C. Guardrail Terminals. The Engineer will measure guardrail terminals to the limits shown on the plans.

The Engineer will measure, and the Department will pay for Guardrail Approach Terminal as individual units. The unit price for Guardrail Approach Terminal includes the cost of proprietary and standard elements, and hardware required for installation, including obstacle marker panel, and terminal end shoes.

The unit price for Guardrail Departing Terminal includes the cost of terminal end shoes.

D. Miscellaneous Posts. The unit price for Post, Mailbox includes the cost of the following:

1. Removing and relocating the existing mailbox support during construction activities;
2. Maintaining serviceability;
3. Placing a new post at the permanent location after construction activities are complete;
4. Removing the mailbox from the old support and attaching it firmly to the new post;
5. Disposing of the old support, at the property owner’s option; and
6. Removing, storing, and providing the property owner existing newspaper boxes and supports.

The Engineer will measure, and the Department will pay for constructing posts on box or slab culverts in accordance with Standard Plan R-73 Series as Guardrail Post, Culv.