

Item No.	Pay Item	Pay Unit
8043390	Precast Concrete Rip-Rap	Square Yard
8044100	PVC Coated-Wire Enclosed Rock Gabion	Cubic Yard
8047040	Slope Protection 4" Concrete	Square Yard
8047041	Slope Protection 4" Concrete (Fiber Reinforced)	Square Yard
80482XX	Geotextile For Erosion Control Under Rip-Rap (Class <i>(class)</i>) Type <i>(type)</i>)	Square Yard

SECTION 805

GUARDRAIL

805.01 Description. This work shall consist of constructing guardrail, of the type specified, in accordance with these specifications and in conformity with the lines and grades shown on the plans or established by the Engineer. The types of guardrail shall be in accordance with the plans and proposal and are designated as follows:

1. Steel Beam Guardrail (W-Beam)
2. Adjustable Guardrail
3. Steel Beam Guardrail (Double Layer)
4. Steel Beam Guardrail (Thrie)
5. Steel Beam Guardrail (Thrie-Double Layer)
6. Box Beam Median Barrier
7. Tubular Beam Guardrail (Bridge Railing)
8. Temporary Guardrail
9. Concrete Median Barrier
10. Temporary Concrete Median Barrier

The construction of the various types of guardrail shall

include the construction of anchor blocks and anchorage at the approach and off ends of bridges of the specified kind and dimensions, terminal and end anchor sections and blockouts; and shall include the assembly and erection of all component parts and materials complete at the locations shown on the plans or as directed.

MATERIALS

805.02 Steel Beam Guardrail. The rail elements shall be corrugated sheet steel beams of the shape W-beam or Thrie as specified, conforming to the requirements of AASHTO M 180 for Class A, Type 2.

When guardrail is to be erected on radii of 150 feet or less, the Contractor shall, in cooperation with the Engineer, before fabrication, make such field measurements as necessary to determine the proper curvature of the rail elements. The rail elements shall be shop fabricated to conform to the curvature of the radii. Whenever field fabrication as approved by the Engineer requires cutting or drilling, the cut or drilled members shall be coated as specified in Subsection **805.04A**.

805.03 Adjustable Guardrail. Steel Beam Guardrail (W-Beam) may be adjusted as shown in the plans.

Work shall consist of the careful removal of the existing rail element and adjusting the blockout assembly to raise the height of the guardrail and reinstalling the rail as shown on the plans.

All materials used shall conform to the material requirements shown on the plans.

The Department may allow the substitution of composite or plastic blockouts in place of treated wood blockouts provided they meet the requirements shown on plans, and as stated in Subsection **805.05B**.

Any additional materials, which may be required to adjust

the guardrail as shown on the plans, will be included in the bid price per linear foot for Adjusted Guardrail.

805.04 Posts. Guardrail posts may be wood or steel for W-Beam Guardrail. Wood guardrail posts may not be used with Thrie Beam Guardrail. Posts for Adjustable W-Beam Guardrail may be wooden or steel manufactured with the appropriate holes for blockout attachment. Additional holes may be field drilled or punched.

A. Steel Posts. Guardrail posts shall conform to the requirements of AASHTO M 270, Grade 36 steel. The dimensions and weight of the posts shall be as shown on the plans. The posts shall be fabricated from structural steel complying with the requirements of Section 709. The posts shall be galvanized in accordance with ASTM A 123 after fabrication.

Construction details shall be as shown on the plans. Whenever field fabrication, as approved, requires cutting or drilling, the cut or drilled member shall be protected by applying two coats of 90% minimum zinc rich cold galvanizing compound.

B. Wood Posts. Wood posts shall be southern pine conforming to the requirements for guardrail posts as set forth in Section 706, unless otherwise provided on the plans.

C. Extra Length Posts. When a guardrail post is required to be longer than the standard 6 feet, the additional length beyond 6 feet shall be measured and paid for as Additional Length of Guardrail Posts. Posts shall meet requirements in Subsection 805.04A or 805.04B.

805.05 Blockouts.

A. Wood. Wooden blockouts shall be southern pine conforming to the requirements for guardrail posts as set forth in Section 706 unless specified otherwise on the

plans. The dimensions of the blockout will be as described herein or as shown on the plans.

B. Composite or Plastic. The Department may allow approved composite or plastic blockouts to be substituted for wood blockouts. All dimensions are nominal and subject to manufacturing tolerances. An approval list for allowable composite or plastic blockouts may be obtained from the Department's Research and Materials Lab.

C. Steel. Steel blockouts shall comply with the requirements for steel post. Steel blockouts on steel posts are not allowed with use of the W-Beam Guardrail System.

805.06 Box Beam Median Barrier.

a. Hollow structural tubing shall conform to the requirements of ASTM A 500, Grade B or ASTM A 501, and shall conform in all respects to the plan details and dimensions. The beams shall be hot dipped zinc coated in accordance with AASHTO M 111.

b. Hot dipped zinc coated steel posts shall be of the section and length shown on the plans and shall conform to the requirements of Subsection **805.04A**.

c. Splice bolts, anchor bolts and nuts shall conform to the requirements of ASTM A 307 and shall be galvanized in accordance with Subsection **708.04**.

d. The rail hardware shall include end caps, bolts, nuts, splice joints, anchor assemblies and all other items to complete the railing. The rail hardware, except bolts and nuts, shall meet the requirements of AASHTO M 270 and shall be galvanized in accordance with ASTM A 123.

e. All fabrication shall be complete and ready for assembly before hot dipped zinc coating, and no punching, drilling, cutting or welding will be permitted after hot dipped zinc coating. Each rail length shall be furnished with

splice joint at one end as required. All welding shall conform to the current edition of AWS specifications.

805.07 Temporary Guardrail. Due to the staging of projects at locations shown in the plans, guardrail may be required on a temporary basis. This guardrail shall meet all requirements given in the plans and these standard guardrail specifications.

Temporary guardrail shall be placed at the locations shown in the plans. Removal of temporary guardrail shall be dictated by the staging requirements.

Carefully removed guardrail materials may be reused in permanent installations, provided they are undamaged and have been properly stored and maintained after their removal.

Guardrail shall be thoroughly cleaned and given two coats of 90% minimum zinc rich cold galvanizing to all steel parts that are reused that are not galvanized. All materials to be reused must be approved by the Engineer before installing them permanently.

805.08 Guardrail Hardware and Accessories for Steel Beam Guardrail. Blockouts and brackets shall be of the type shown on the plans and shall meet the same requirements as the posts.

Bolts of the sizes specified on the plans shall conform to ASTM A 307. Nuts shall conform to ASTM A 563. Washers shall conform to the requirements of AASHTO M 180. The bolts, nuts, and washers shall be coated after fabrication in accordance with AASHTO M 232. Post bolts used with steel or timber posts and timber or composite blockouts shall be long enough to extend through the nut and one washer but, not so long as to extend more than two inches beyond the nut and two washers.

End anchor sections and other guardrail appurtenances shall conform to the requirements shown on the plans.

805.09 Concrete and Reinforcing Steel. Concrete for fill-

ing around posts shall be Class 2500. Concrete for Concrete Median Barrier and Temporary Concrete Median Barrier shall be Class 3000. Each class shall conform to the requirements set forth in Section **701**. Reinforcing steel shall conform to the requirements set forth in Section **703**.

CONSTRUCTION REQUIREMENTS

805.10 Posts. Posts shall be set plumb, in hand or mechanically dug holes, driven in place, or set in concrete as hereinafter specified. Dissimilar metal-to-metal post or rail installations shall have contact surfaces separated by an approved protective coating. When posts are placed within paved areas, any pavement disrupted shall be restored to a depth of 4 inches in like kind.

A. Wooden Posts. Wood posts may be set in dug holes or driven. Excavated postholes shall have a firm bottom and be backfilled with suitable material and thoroughly compacted. The driving of posts shall be accomplished with approved methods and equipment that will leave the posts in their final position free from any distortion, battering, burring or any other damage. The Contractor will refrain from sawing treated posts.

B. Steel Posts. Steel posts may be set in dug holes or driven. Steel posts may be anchored to, but not set in concrete.

805.11 Rail Elements. Rail elements shall be erected at the proper height in a manner resulting in a smooth, continuous installation. All bolts, except those required at expansion joints, shall be drawn tight. Bolts through expansion joints shall be drawn as tight as practicable and still allow rail elements to slide past one another longitudinally.

Rail elements shall be supplied in such lengths that splices will occur at posts and shall be lapped in the direction of adjacent traffic.

Hot dipped zinc coated surfaces which have been

abraded so that the base metal is exposed and cut ends of bolts shall be protected by applying two coats of 90% minimum zinc rich cold galvanizing compound.

When new guardrail is being erected on a project that is open to traffic, work shall be done so in the direction of traffic flow, so that unfinished sections will not be facing oncoming traffic. The Contractor shall not begin work on any section of guardrail until preparations have been made to complete the installation of the section, including posts, rail, anchors and hardware as a continuous operation. Once the work has been initiated on a section, the work shall be continued to its completion unless inclement weather or other conditions beyond the control of the Contractor interfere with the work. Should leave-out sections be allowed, they will be adequately marked with barricades or other devices to protect the traveling public.

805.12 Reset Guardrail. This work shall consist of the careful removal of existing guardrail and, if necessary, storing it in a careful manner, and then erecting it where shown on the plans or as directed.

All steel parts, if not galvanized, shall be thoroughly cleaned and given two coats of 90% minimum zinc rich cold galvanizing compound.

When resetting or replacing existing guardrail, only that length of guardrail shall be removed that can be replaced or reset in the same day. Any reset guardrail shall be reset to the new guardrail standards with any additional materials necessary to perform this work being included in the contract price per linear foot of Reset Guardrail. All materials, including hardware, that remain from the resetting or replacing work shall be removed from the roadway immediately so that it will not create an obstacle for the traveling public. This material may be placed behind a completed section of guardrail or stored neatly in an area at least 30 feet from the travelway unless otherwise specified.

805.13 Adjustable Guardrail Blockouts and Post. This work shall consist of the careful removal of the existing rail element and adjusting the blockout assembly to raise the height of the guardrail as shown on the plans and reinstalling the rail where shown on the plans or as directed by the Engineer. Thrie Beam Guardrail is not adjustable. Steel blockouts are not allowed with adjustable "W-Beam" Guardrail. Any additional materials which may be required to adjust the guardrail as specified on the plans will not be paid for separately but will be included in the bid price per linear foot for Adjusted Guardrail. When the guardrail is adjusted, the area under and adjacent to the guardrail will be raised by adding Unclassified Excavation, Borrow Material or Asphalt Paving, in order to provide the proper height specified. Earthwork will be placed in accordance with Section **203**. Adjustable Guardrail shall comply with all other applicable requirements of Section **805** of the standard specifications.

If wood guardrail posts are used, the nominal dimensions of the guardrail blockout shall be 6 inches x 8 inches x 14 inches. The blockout is to be mounted to the wood post by means of a 5/8 inch bolt, of the necessary length, placed through a 3/4 inch diameter hole located 7 inches from the top and 3 inches from either side. An additional 3/4 inch hole shall be placed 11 inches from the top of the blockout and 3 inches from either side which will be used on the final adjustment which requires an additional bolt at that time. For initial installation and the first 2 inch adjustment, two 16d hot dipped zinc coated nails or corrugated fasteners (5/8 inch x 1 1/8 inch minimum) shall be driven through the blockout and into the post after the post bolt is installed to prevent the block from rotating.

If steel guardrail posts are used, the nominal dimensions of the guardrail blockout shall be 6 inches x 8 inches x 14 inches. A slot measuring 4 1/2 inches (maximum width) x 14 inches (nominal height) x 1/4 inch (minimum depth) shall be created, centered along the back of the blockout, to facilitate mounting to the steel guardrail post and to prevent rotation. The slot shall be created to allow a 7 1/2 inch minimum

offset from the post. The blockout is to be mounted to the steel guardrail post by means of a 5/8 inch bolt, of the necessary length, placed through a 3/4 inch diameter hole in the blockout located 7 inches from the top of the blockout and 1 5/8 inches from the side. An additional 3/4 inch hole shall be placed 11 inches from the top of the blockout and 1 5/8 inches from the same side as shown in the plans. Both holes will be used on the final adjustment and will require an additional bolt at that time.

805.14 Removal of Existing Guardrail. This work shall consist of the removal of existing guardrail. The removed guardrail components shall become property of either the Department or the Contractor, as stated in the contract.

A. If Property of the Department. If the guardrail that is removed is to remain the property of the Department, it shall be stored within the limits of the project, and shall be protected by the Contractor until it is removed from the project by the Department or for a period of thirty (30) days, whichever comes first.

B. If Property of the Contractor. If the guardrail that is removed is to become the property of the Contractor, the Contractor shall store the removed guardrail safely away from the traveling public until it is removed from the project.

805.15 Concrete Median Barrier. Concrete median barrier shall be constructed in accordance with plan details and the applicable provisions of Section 702. Concrete median barrier may be placed on pavement or directly on an earth or other foundation. Drill holes may be required in existing concrete pavement to accommodate dowel bars. Dowel bars, as shown on the plans, shall be grouted with approved grout.

When a trench is required, the trench for the base of the barrier shall be excavated to the lines and grades shown on the plans or established. The bottom of the trench shall be compacted, watered and shall be approved before placing

concrete.

An approved slip-form machine may be used to construct concrete median barrier provided satisfactory results are obtained. When, in the opinion of the Engineer, satisfactory results are not being obtained, the work shall be discontinued and the Contractor shall use form type of construction with no adjustment in compensation. Any unsatisfactory work shall be removed and replaced without any additional compensation.

Where median paving is removed or damaged in placing the barrier, the Contractor shall furnish an acceptable mix and shall repair the pavement without additional compensation.

805.16 Temporary Concrete Median Barrier. Temporary Concrete Median Barrier shall conform to the requirements as shown on the plans and the applicable provisions of Section 702. The barrier shall be installed at locations as shown on the plans or as directed by the Engineer.

805.17 Method of Measurement. Guardrail of the type specified will be measured by the linear foot along the centerline of the rail from end to end of completed and accepted rail and barrier as shown on the plans, including transitions and terminal sections, but excluding end anchorages and bridge end connectors. End anchorages and bridge end connectors will be measured by the actual number placed and accepted.

Temporary guardrail will be measured by the linear foot in the same way as permanent guardrail.

Additional length of guardrail posts will be measured by the linear foot. The quantity of Additional Length Guardrail Post will be that amount of required post that is in excess of the standard six foot length.

805.18 Basis of Payment. Minor excavation, disposal of surplus materials, painting, making necessary repairs to pavement, and other incidental items needed to complete the

work as specified will not be paid for separately, but shall be included in the cost of the guardrail or related guardrail work items. In these specifications, the items “guardrail” and “median barrier” are measured and paid for similarly.

Guardrail will be paid for at the contract unit price for Guardrail of the type specified complete in place, which price and payment shall be full compensation for furnishing and installing the guardrail, including anchorages to bridge ends, when a bridge end connector is not installed.

Removal of existing guardrail will be paid for at the contract unit price for Removal of Existing Guardrail, which price and payment shall be full compensation for dismantling, storing and protecting the guardrail and components, backfilling and compacting postholes, and all materials, equipment, labor, and work incidental to complete the work.

Resetting of guardrail will be paid for at the contract unit price for Reset Guardrail, which price and payment shall be full compensation for its removal, any necessary storage, resetting and replacement of damaged or missing parts. Reset Guardrail includes providing all new post as required.

Temporary guardrail will be paid for at the contract unit price for Temporary Guardrail, which price and payment shall include placing, anchoring guardrail to structures, maintaining (under traffic and after removal), removing, and all material, equipment, labor, and incidentals necessary to complete the work. This unit price and payment shall also include the disposal of any guardrail materials that cannot, or will not, be reused on the project.

Payment for end anchorages shall be at the contract unit price for End Anchors and shall include all concrete, reinforcing steel, structural steel, rail segments, cable, rods, turn buckles, anchor bolts, backing rail, soil tubes, plates, nuts, bolts, washers, attachments, transition sections, and all other work necessary to complete the work.

Payment for each item includes all direct and indirect costs and expenses required to complete the work.

Payment will be made under:

Item No.	Pay Item	Pay Unit
8051100	Steel Beam Guardrail	Linear Foot
8051101	Adjustable Guardrail Initial Installation	Linear Foot
8051102	Adjustable Guardrail 2 Inch Adjustment	Linear Foot
8051103	Adjustable Guardrail Final Adjustment	Linear Foot
8051110	Removal of Existing Guardrail	Linear Foot
8051200	Steel Beam Guardrail (Double Face)	Linear Foot
8051300	Steel Beam Guardrail (Thrie)	Linear Foot
8051400	Steel Beam Guardrail (Thrie-Double Face)	Linear Foot
8051600	Box Beam Median Barrier	Linear Foot
8051800	Temporary Guardrail	Linear Foot
8053000	Additional Length Guardrail Post	Linear Foot
8058XXX	Concrete Median Barrier (<i>type</i>)	Linear Foot
8059XXX	Temporary Concrete Median Barrier	Linear Foot
8051900	Reset Guardrail	Linear Foot
80522X0	End Anchors (Type (<i>type</i>))	Each

SECTION 806

FENCE

806.01 Description. This work shall consist of the construction of fence and gates in accordance with these specifications at the location shown on the plans or designated by the Engineer, and in conformity with the lines and grades shown on the plans or established.