EXPECTED IMPLEMENTATION JANUARY 2014

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536 GUARDRAIL.
(REV 7-17-13) (FA 7-23-13) (1-14)

SECTION 536 (Pages 698 – 701) is deleted and the following substituted:

SECTION 536
GUARDRAIL

536-1 Description.

Construct metal guardrail on posts of timber, steel, or as specified in accordance with the Contract Documents and the Design Standards.

Also, remove existing guardrail, construct guardrail anchorages, and replace guardrail posts, as specified in the Plans.

536-2 Materials.

536-2.1 General: Use steel products meeting the requirements of 967-1. Obtain steel products from plants that are currently on the list of Producers with Accepted Quality Control Programs.

Use timber meeting the requirements of Section 954 and treated in accordance with the requirements for posts in Section 955. Obtain timber products from plants that are currently on the list of Producers with Accepted Quality Control Programs.

Producers seeking inclusion on the list of Producers with Accepted Quality Control Programs shall meet the requirements of Section 105.

536-2.2 Guardrail: Construct guardrail of the standard W-beam or thrie beam type.

536-2.3 Posts:

536-2.3.1 General: Unless the Contract Documents designate a particular type of post, the Contractor may choose the type of post to use. Use posts of either timber or steel, and of the sizes and dimensions shown in the Plans. Use the particular type selected throughout a run of rail, except where special steel posts are required.

536-2.3.2 Timber Posts: Shape and drill the posts prior to treatment, and ensure that they do not vary more than 1 inch from the specified length in the Design Standards. Dress all timber posts on all four sides (S4S).

536-2.3.3 Steel Posts: Drill the steel posts prior to galvanizing.

The Contractor may use steel guardrail posts of either a rolled section or a welded structural shape with nominal dimensions as shown in the Design Standards.

For welded structural shapes, meet the following requirements:

(1) Ensure that the design properties of the shape meet or exceed the design properties for a W 6 x 9 shape as contained in the AISC Manual of Steel Construction.

(2) Weld in accordance with the requirements of ASTM A769.

(3) After cutting steel posts to length, place a weld to seal the spaces between the web plate and flange plates.

(4) Galvanize as specified above after completing all drilling and welding.

536-2.4 Anchor Blocks: Use anchor blocks of Class I concrete, and construct and place them in accordance with the requirements shown in the Plans or as directed by the Engineer.

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536-2.5 Offset Blocks: Use guardrail offset blocks of either timber, steel, or composite material.

Provide timber offset blocks that are 6 inches wide, 8 inch offset and 14 inch elevation for w-beam application. Provide timber offset blocks that are 6 inches wide, 8 inch offset and 22 inch elevation for the thrie-beam applications. Dress all timber offset blocks on all four sides (S4S). Ensure that timber offset blocks do not vary more than 0.25 inch from the specified length.

Use composite offset blocks that are listed on the Qualified Products List, (QPL). Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6 and shall furnish a drawing of the product, with the product name and dimensions identified suitable for posting on the QPL, independent test reports that indicate the product meets all crash test requirements of National Cooperative Highway Research Program (NCHRP-350) or the Manual for Assessing Safety Hardware 2009 (MASH), per current FHWA directives and independent test reports that indicate the composite material meets all the following physical requirements:

Composite Block	Test Method	Requirement
Durometer Hardness	ASTM D2240 Shore D	Minimum 50
Durometer Hardness after UV exposure	ASTM D5870	< 15 points change from initial after exposure per ASTM D4329, 1000 hours, cycle C, type UVB-313 lamps

Provide composite blocks that are 7-3/8 inch to 8 inch in offset and 14 inch elevation for w-beam application. Provide composite blocks that are 7-3/8 inch to 8 inch in offset and 22 inch elevation for thrie-beam. Allow for dimensional tolerances of plus or minus 5/8 inch in elevation.

536-2.6 Barrier Delineator: Mount barrier delineators onto the guardrail post in accordance with the details shown in the Plans and the Design Standards. Provide delineators that meet the requirements of Section 705 and listed on the QPL. Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6 and Section 993.

536-2.7 Certification: Provide the Engineer a certification from the manufacturer confirming that all materials (timber posts, anchor and offset blocks, barrier delineators, and all other accessories) meet the requirements of this Section, Section 6 and the Design Standards. Provide the Engineer a copy of the certification at least ten days prior to guardrail construction.

For steel rail and rail elements, provide the Engineer with a certified mill analysis from the manufacturer meeting the requirements of Section 967.

For steel posts and steel offset blocks furnish the Engineer a certified mill analysis from the manufacturer showing the physical and chemical properties of each heat meeting the requirements of ASTM A36, the amount of spelter coating, and galvanization meeting the requirements of ASTM A123.

Also furnish the Engineer a Certificate of Compliance certifying that the guardrail system, materials and construction practices comply with applicable Design Standards and Specifications.

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Acceptance of furnished material will be based on the Certificate of Compliance, material certification and visual inspection by the Engineer.

536-3 Setting Posts.

Set standard length posts vertically to the depth shown in the Design Standards. Set special length posts vertically to the depth shown in the Plans. Align and realign posts as necessary, until final acceptance. Where the posts are not set in concrete or mounted on structures, backfill the post holes and thoroughly tamp material. As an alternate method, the Contractor may use a post-driving machine, meeting the approval of the Engineer and capable of driving the posts without damaging them.

For guardrail post replacement, backfill and compact the existing hole prior to setting the new post.

If driving timber posts, the Contractor may either block out holes in the asphalt for the posts during the asphalt paving operation or cut holes through the asphalt mat prior to the post installation. Blocked out holes or cut holes in the asphalt pavement shall be at least 50% larger than the sectional area of the timber post. After completing driving of the posts patch the area of asphalt around each post with fresh hot bituminous mixture.

If driving steel posts, drive the post directly through the asphalt mat. Fill depressions or cracks with fresh, hot bituminous mixture in a manner meeting the approval of the Engineer.

For either timber or steel post locations, in which rock, concrete or asphalt thicker than 2 inches exist, remove such material and backfill with suitable material, thoroughly tamped as detailed in the Design Standards.

536-4 End Anchorage Assemblies.

Use End Anchorage Assemblies listed on the QPL and obtained from plants that are currently on the list of Producers with Accepted Quality Control Programs

Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 6, include a product drawing showing that the product meets the requirements of this Section, and is signed and sealed by a registered Florida P.E., also furnish independent test reports that indicate the product meets all crash test requirements of the National Cooperative Highway Research Program Report 350 (NCHRP 350) or the Manual for Assessing Safety Hardware 2009 (MASH-09) and current FHWA directives.

Producers seeking inclusion on the list of Producers with Accepted Quality Control Programs shall meet the requirements of Section 105.

536-5 Erection of Rail.

Erect the guardrail panels, supports, anchors, etc., as shown in the Design Standards.

Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged galvanized guardrail will be metalized in accordance with Section 562 and 971. No burning of holes will be permitted.

536-6 Existing Guardrail.

Stockpile guardrail, so specified, within the right-of-way at a location approved by the Engineer. Dispose of all remaining guardrail not specified for stockpiling.

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536-7 Method of Measurement.

536-7.1 Guardrail: The quantity to be paid for will be the plan quantity, in feet, constructed, in place and accepted.

The plan length of a run of guardrail will be the end to end measurement including panels (thrie-beam, nested, and W-thrie beam transition panels) directly associated with anchorage assemblies and guardrail transitions.

536-7.2 End Anchorage Assembly: The quantity to be paid for will be the number of each type as designated, constructed, in place and accepted.

536-7.3 Special Guardrail Post: The quantity to be paid for will be the number of each, constructed, in place and accepted.

The designation "Special Guardrail Post" will include only such posts as require special fabrication, for installation at locations where the normal setting would conflict with concrete structures, such as approach slabs, culvert slabs, footings, inlets, etc. Special posts, however, will not include posts for double-face median guardrail, regardless of whether they are embedded in or attached to concrete.

536-7.4 Bridge Anchorage Assembly: The quantity to be paid for will be the number of each, constructed, in place and accepted.

536-7.5 Concrete Barrier Wall Anchorage Assembly: The quantity to be paid for will be the number of each, constructed, in place and accepted.

536-7.6 Guardrail Post Replacement: The quantity to be paid for will be the number of each, replaced.

536-7.7 Removal of Existing Guardrail: The quantity to be paid for will be the length, in feet, measured prior to removal.

536-7.8 Other Rail:

536-7.8.1 Rub Rail: The quantity to be paid for will be the plan quantity, in feet, constructed, in place and accepted.

536-7.8.2 Pipe Rail: The quantity to be paid for will be the plan quantity, in feet, constructed, in place and accepted.

536-8 Basis of Payment.

536-8.1 Guardrail: Price and payment will be full compensation for all work specified under this Section, including furnishing and installing barrier delineators, posts, all panels, and all other materials as specified. Payment will be made under the items as follows:

a. Where the Contractor furnishes all materials for the guardrail, and the Engineer does not require shop-bent rails, payment will be made under the basic item of guardrail.

b. Where the radius of the guardrail installation is such as to require shop bending of the guardrail panels, payment will be made under the item of Guardrail (Shop-bent Panels).

536-8.2 End Anchorage Assembly: Price and payment will include furnishing and installing all components specified in the Plans and Design Standards.

536-8.3 Special Guardrail Post: Price and payment will include all costs for furnishing and installing the special posts that are over and above the costs for the normal posts, which are replaced by such special posts.

536-8.4 Bridge Anchorage Assembly: Price and payment will include furnishing and installing the special end shoes, wood blocks or retrofit wing posts, concrete anchor posts, thrie-beam terminal connectors, backup plates, filler plates, barrier delineators for the entire bridge length, transition blocks, and other necessary hardware.

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536-8.5 Concrete Barrier Wall Anchorage Assembly: Price and payment will include furnishing and installing connections to concrete barrier walls, as shown on the Design Standards, Index Nos. 400 and 410.

536-8.6 Guardrail Post Replacement: Price and payment will include all labor, materials, and equipment required for removal and disposal of existing posts in areas provided by the Contractor, backfilling and compacting existing holes, and replacement with new posts.

536-8.7 Removal of Existing Guardrail: Price and payment will include all labor and equipment required for removal and disposition of the existing guardrail, as specified in the Plans. No additional payment will be made for the removal of the back rail on double face guardrail, thrie beam guardrail, nested rail, safety pipe rail, rub rail or end anchorages.

536-8.8 Other Rail:

536-8.8.1 Rub Rail: Price and payment will include all components specified in the Plans and Design Standards, Index No. 400.

536-8.8.2 Pipe Rail: Price and payment will include all components specified in the Plans and Design Standards, Index No. 400.

536-8.9 Payment Items: Payment will be made under:

Item No. 536- 1-	Guardrail - per foot.
Item No. 536- 2-	Guardrail (Shop-Bent Panels) - per foot.
Item No. 536- 5-	Rub Rail - per foot.
Item No. 536- 6-	Pipe Rail - per foot.
Item No. 536- 7-	Special Guardrail Post - each.
Item No. 536- 8-	Bridge Anchorage Assembly - each.
Item No. 536- 73-	Removal of Existing Guardrail - per foot.
Item No. 536- 76-	Special Length Guardrail Post - each.
Item No. 536- 82-	Concrete Barrier Wall Anchorage Assembly - each.
Item No. 536- 83-	Guardrail Post Replacement- each.
Item No. 536- 85-	End Anchorage Assembly - each.