

**SUPPLEMENTAL SPECIFICATION**

**REVISIONS TO STANDARD SPECIFICATION 606 –  
GUARDRAIL**

**606-1 DESCRIPTION**

**606-1.01 Scope**

- a. This work shall consist of furnishing and erecting W beam guardrail systems and other types of metal barriers, all named collectively as guardrail, in accordance with these specifications, the standard drawings and in conformity with the lines, grades, types, details and locations shown on the plans or established by the Engineer.
- b. The work shall also include, when called for in the contract documents:
  - 1. The removal and resetting of existing guardrail as shown on the plans or as ordered by the Engineer.
  - 2. The removal, storage, and delivery of existing guardrail to be salvaged as shown on the contract documents, plans or as ordered by the Engineer.
  - 3. The refurbishing of existing guardrail according to plans or as directed by the engineer.
  - 4. The furnishing and erecting of crashworthy end terminals at locations shown on the plans and according to this specification and standard drawings.
  - 5. The furnishing and erecting guardrail transition sections to be installed on existing guardrail or on existing or new transition modules in accordance with these specifications, the standard drawings and in conformity with the lines, grades, types, details and locations shown on the plans or established by the Engineer.
- c. The construction of the guardrail system shall include the assembly and erection of all necessary component parts and materials as required by the manufacturer and standard drawings at the locations shown on the plans or as directed by the Engineer.
- d. This work shall include the submittal of an installation schedule for all guardrail works.

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#### **606-2 MATERIALS**

**606-2.01** Materials for guardrail, guardrail transition sections, guardrail posts, offset blockouts and any other necessary hardware to complete the proper guardrail system installation shall conform to the Specification 710, standard drawings, or as shown on the plans.

**606-2.02** Manufactured materials, including guardrail systems, metal barriers and crashworthy end terminals will be accepted on the basis of the Authority's inspection, and submission of manufacturer's certificate of compliance with the specifications. This certificate shall be completed meeting the requirements of the Article 106.06 of the General Provisions and the Buy America Clause Special Provision. The certificate shall clearly refer to the specific materials being delivered to the project site and shall be submitted to the Engineer prior to starting the installation of the guardrail. The Authority reserves the right to inspect the manufacturing plant and/or to test samples of materials as it deems appropriate. Failure of the Contractor to comply with the above requirements will be cause for the rejection of the guardrail.

**606-2.03** All materials shall be new. The use of reconditioned used materials will not be permitted except as provided under paragraphs 606-1.01 b.1, and 606-1.01 b.3 of the Article 606-1.01 above.

#### **606-3 CONSTRUCTION REQUIREMENTS**

##### **606-3.01 Posts**

- a. Posts shall be driven unless otherwise specified on the plans or by the Engineer. The driving shall be accomplished with equipment and methods that will drive the posts plumb in their final position, free of any distortion, burring or damage.
- b. When driving is not possible, the posts shall be set in dug holes which shall be backfilled with acceptable material as indicated in the standard drawings. Posts should be attached to concrete slab as indicated in the standard drawings.
- c. When posts are driven on holes cut through concrete or treated material, the Contractor shall backfill as indicated in the standard drawings.
- d. All posts shall be aligned to a tolerance of 0.6 centimeters for plumb and grade line.

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e. When required, and as approved by the Engineer, posts shall be cut with a saw to obtain a clean uniform finish. The cut surface shall be repaired within 15 centimeters of the cut and prior to post installation, with two coats of paint containing zinc dust meeting the requirements of the ASTM A780. Apply the paint as in accordance with the manufacturer's printed instructions. This work shall be considered as a subsidiary obligation of the Contractor.

**606-3.02 Rail Elements** - Rail elements shall be erected in a manner resulting in a smooth, continuous installation. Washers shall be used at the rear of the posts. All bolts shall be drawn tight with adjustment bolts to be tightened after adjustments are completed. Bolts shall be of sufficient length to extend beyond the nuts. Rail plates shall be spliced by lapping in the direction of traffic.

**606-3.03 Repair of Galvanized Surfaces** - Galvanized surfaces which have been abraded during handling and erection so that the base metal is exposed, threaded portion of all fittings and fasteners, and cut ends of bolts shall be repair conforming to ASTM A780. Use paint containing zinc dust. Apply the paint as in accordance with the manufacturer's printed instructions. This work shall be considered as a subsidiary obligation of the Contractor.

#### **606-3.04 Removing and Resetting Guardrail**

a. The Contractor shall carefully remove and store existing guardrail sections, including posts, from the locations shown on the plans. The Contractor shall reset the reusable components at the locations shown on the plans or ordered by the Engineer.

b. The Engineer will determine which components are reusable. Existing concrete posts and wood blockouts shall not be reused. They shall be replaced by steel posts and blockouts in accordance with the standard drawings.

c. The Contractor shall replace unusable or missing components with new materials for a complete system installation as a subsidiary obligation of the Contractor under this pay item.

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- d. Reusable components that have rusted portions shall be thoroughly sanded to remove the rust and these portions shall be repaired with two coats of paint containing zinc-dust meeting the requirements of the ASTM A780, at no extra cost.
- e. Holes left when guardrail posts have been removed, shall be backfilled with suitable material and compacted in a manner approved by the Engineer.
- f. Resetting of guardrail shall be accomplished in the same manner specified in Article 3.01, 3.02 and 3.03 above for new guardrail installations.
- g. Unusable material shall be disposed of by the Contractor away from the project site.

**606-3.05 Removing, Storing and Delivering Guardrail**

- a. The Contractor shall carefully remove and store existing guardrail, including posts, from the locations shown on the plans or directed by the Engineer. The work shall be done in a neat and workmanlike manner so as to salvage all reusable parts.
- b. Unusable material, such as concrete posts and wood blockouts, as determined by the Engineer, shall be disposed by the Contractor outside the project site.
- c. Usable materials shall be delivered by the Contractor to the location indicated by the Engineer.
- d. All holes left from removal of guardrail shall be backfilled as indicated in paragraph 606-3.04e above.

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#### **606-3.06 Refurbishing Existing Guardrails**

- a. Remove steel blockouts in existing guardrails and replace them with blockouts specified in the standard drawings. Spray the connecting bolts with penetrating oil for easier removal.
- b. Drill new holes on the posts to meet the blockout and guardrail elevation shown on the standard drawings, if necessary. Provide new bolts, nuts and washers required to install the blockout and guardrail beam.
- c. Remove the existing rectangular washer located between rail and post bolt head.
- d. Provide guardrail reflector as per standard drawings and as directed by the Engineer.
- e. The Contractor shall replace missing components with new materials for a complete system installation in compliance with the standard drawings as a subsidiary obligation under the refurbishing existing guardrail pay items. This includes:
  1. Bolts, nuts and washers
  2. Blockouts
  3. Guardrail reflectors
  4. Anchorage components (either double face or single face) including: W-beam panel, Post, W-Beam End Section (rounded or buffer), Anchor Bracket, Cable Anchor Assembly, Soil Plate, Bearing Plate, and all necessary hardware for the construction of the anchorage.
- f. Make sure all 8 bolts are in place in each splice connection. If there are missing bolts at a splice, install new bolts, nuts and washers. Tightened snug all bolt connections on the refurbished guardrail, either new or existing bolts.
- g. No rail, post or bolt assembly shall be subjected to torch cutting. Any new holes shall be drilled.
- h. Existing components to remain that have rusted portions shall be thoroughly sanded to remove the rust and these portions shall be painted with two coats of zinc-dust paint meeting the requirements of the ASTM A780 as a subsidiary obligation.

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- i. Unusable material shall be disposed of by the Contractor away from the project site at approved locations.

#### **606-3.07 Crashworthy End Terminals (CET)**

- a. CET shall be installed following all manufacturers' recommendations, plans and specifications.
- b. The Contractor shall submit a copy of manufacturer's installation manual and shop drawings to the Engineer prior to the guardrail installation activities.
- c. The Contractor shall conform to the required type, test level, grading limits and transversable clear zone shown on plans and standard drawings.
- d. The Contractor, as a subsidiary obligation, shall submit an inventory data (Attachment A included in this specification for reference) for each CET installed following the items below:
  1. Each CET inventory data shall include the following:
    - a. Project information
    - b. Contractor's information
    - c. CET Id (Name).
    - d. CET manufacturer and serial number
    - e. Location of the top center of the CET ( X and Y coordinates NAD 1983)
    - f. CET Description
    - g. Installation date
    - h. Final Acceptance date
    - i. Photo taken after Final Acceptance date
    - j. SHP File for all information required

2. The Contractor is required to submit the inventory data to the Engineer in Excel format and SHP file via electronic media. The Contractor is responsible to obtain from the Engineer the required electronic format

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- e. A certificate of installation indicating full compliance with the manufacturer's shop drawings and installation manual shall be furnished by the Contractor to the Authority for each CET installed in the project. The Certificate of Installation shall be sealed and certified by a Professional Engineer authorized to perform engineering works in Puerto Rico.
- f. Acceptance of each CET installed on the project will be based upon submittal of all required documentation and inspection by the Authority.

#### **606-3.08 W- Beam Guardrail Transition Connection Sections**

- a. Thrie-beam transition section shall be installed following the standard drawings.
- b. Acceptance of each thrie-beam transition section installed on the project will be based upon inspection by the Authority.

#### **606-3.09 Installation Schedule**

- a. The Contractor shall submit an installation schedule with at least fifteen (15) days in advance the installation works begin. Acceptance or rejection of this schedule will be issued by the Engineer within ten (10) days after the submittal. If the schedule is rejected, the Contractor shall submit a revised installation schedule within the next three (3) days for approval.
- b. The Contractor shall not begin any activity related to the installation of guardrail, without the approval of the installation schedule.
- c. No time extensions will be issued because of modifications of the original installation schedule.
- d. The installation schedule shall include:
  - 1. Location in the project where each activity occurs.
  - 2. Procedures to keep the guardrail system operational during the project construction.
  - 3. Procedures for removal of guardrail in an orderly manner.

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4. Procedures to avoid untreated end of barriers or roadside obstacles within the clear zone.
5. Any field condition that may affect the guardrail installation, and needs technical attention.

#### **606-4 METHOD OF MEASUREMENT**

**606-4.01** The quantity of new guardrail measured for payment will be the number of linear meters, to the nearest tenth of a meter, of guardrail erected and accepted, measured from center to center of end posts. Single and double faced guardrails will be measured individually as they are separate pay items.

**606-4.02** End terminals, end sections, connections, transitions and anchorages will be included in the quantity of guardrail measured as provided in Article 606-4.01 above and will not be measured separately. Crashworthy End Terminals will be measured and paid for each one properly installed.

**606-4.03** The removal and resetting of guardrail will be measured by the linear meter to the nearest tenth, of guardrail installed and accepted. The measurement will be made along the face of the beam of guardrail. For the removal and resetting of double face guardrail measure will be along each face of the beam through the length of guardrail (i.e. twice the length of the guard rail). This work shall include the replacement of unusable or missing components, the utilization of reusable components and any other requirement established on Article 606-3.04 at no additional cost to the Authority.

**606-4.04** The removal, storage and delivery of guardrail will be measured by the linear meter, to the nearest tenth of a meter, of guardrail removed and delivered or disposed of as per Article 606-3.05 above, measured from center to center of end posts or structure end connection. Anchorages, end terminals and end sections will not be measured separately but will be considered as included in the quantity of guardrail removed and measured as indicated herein.

**606-4.05** The refurbishing of existing guardrails will be measured by the linear meter to the nearest tenth of a meter, of guardrail refurbished as per Article 606.3.06 above and accepted, measured from center to center of end posts, except where end connections are made to structures in which case measurement will be to the face of such structures. This work shall include replacement of unusable or missing components, and any other requirement established on Article 606-3.06. Single and double faced guardrails will be measured individually as they are separate pay items.

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**606-4.06** Excavation and backfill will not be measured for payment but shall be a subsidiary obligation of the Contractor under the items of guardrail.

**606-4.07** The transition connection of the w-beam guardrail to concrete parapet section will be measured by the unit, which price and payment shall constitute full compensation for furnishing and installing the guardrail transition section as defined in the standard drawings, and any other works or appurtenances necessary to complete the item.

**606-5 BASIS OF PAYMENT**

**606-5.01** The accepted quantities of the various guardrail items included in the contract, measured as provided above, will be paid for at the corresponding unit price per unit of measurement. Such prices and payment shall constitute full compensation for furnishing and installing all materials, and for all equipment, tools, labor and incidentals necessary to complete each item as required by the plans, standard drawings and specifications.

**606-5.02** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
W-Beam Guardrail, Single Face .....	Linear Meter
W-Beam Guardrail, Double Face .....	Linear Meter
Removal and Resetting of Existing Guardrail.....	Linear Meter
Removal, Storage and Delivery of Existing Guardrail (any type) .....	Linear Meter
Refurbishing Existing Guardrail, Single Face.....	Linear Meter
Refurbishing Existing Guardrail, Double Face .....	Linear Meter
Crashworthy End Terminal Type _____, Test Level _____ .....	Each
Thrie-Beam Transition Section Type _____ .....	Each

