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2.19 GUARDRAIL AND GUIDE POSTS**2.19.1 GENERAL**

The Work consists of the erection, removal, salvage and reinstallation or disposal of guardrail and guide posts.

2.19.2 MATERIALS

The Contractor shall supply all new materials required for the construction of guardrail, barrier and guide posts in accordance with:

Specification 5.25, Supply of W-Beam Guardrail and Posts;
Specification 5.26, Supply of Box Beam Guardrail and Posts;
Specification 5.27, Supply of Cable Barrier and Metal Posts; and
Specification 5.28, Supply of Flexible Guide Post Traffic Delineators.

When the Contract specifies the removal, salvage and reinstallation of guardrail, only materials from the existing installations shall be used. Contractor stockpiles of used material from other sources will not be considered acceptable.

2.19.3 CONSTRUCTION**2.19.3.1 General**

Guardrail and guide posts shall be accurately set to the required depth and alignment, in a manner resulting in a smooth continuous installation, as shown on the drawings or as directed by the Consultant. Permissible tolerance for plumb and grade of posts shall be 6 mm maximum.

Holes shall be excavated by auger. The diameter of the holes augered for guardrail shall be of sufficient size to allow for pneumatic tamping. Prior to digging any holes, the Contractor shall contact all applicable utility companies to arrange for utility location and marking.

Unsuitable material at the bottom of the holes excavated for guardrail shall be replaced with granular material at the Contractor's expense, as directed by the Consultant. The Contractor shall thoroughly compact the bottom of the hole. The guardrail posts shall rest directly and solidly on the bottom of the hole at the time of installation.

Excavated material which is unsuitable for use as backfill shall be substituted with granular material by the Contractor at his expense. Backfill shall be thoroughly compacted, using pneumatic tampers, in layers not exceeding 150 mm, for the full depth of the excavation.

Guardrail laps shall be in the direction of traffic flow. Bolts shall be tightened to a torque of 100 N·m. Metal reflectors (Scotchlite or equivalent) shall be attached to the top of every third guardrail post with two 50 mm nails.

The Contractor shall take all necessary precautions to eliminate damage to galvanizing. Minor abrasions shall be repaired by painting with two coats of zinc rich paint. Major abrasions shall be repaired by re-galvanizing. The method to be used for repair of any damage shall be approved by the Consultant before such work is commenced. The Contractor, at his own cost, shall carry out the repair or replace components to the satisfaction of the Consultant.

The guardrail shall be connected to new or existing bridge walls or parapets as shown on the drawings. Surplus excavated material and debris shall be removed from the site by the Contractor at his expense.

Upon completion of the installation, the work area shall be restored to its original condition.

At the end of the one year warranty period, the permissible tolerance for plumb and grade of all posts shall be 13 mm.

Construction of guardrail and guide posts will include several types of installations in accordance with the plans and specifications and as directed by the Consultant. Drawings referenced as TEB drawings are found in the latest edition of the Department's manual entitled "Standard Drawings for Highway Construction". Installations will include but not be limited to:

2.19.3.1.1 W-Beam Guardrail

Standard w-beam installations shall be in accordance with drawing TEB 3.12. Installations at bridge approaches shall be in accordance with drawing TEB 3.48, and construction shall always be started at the bridge. A Strong Post System of installation as shown in drawing TEB 3.09, shall be used when directed by the Consultant.

2.19.3.1.2 Box Beam Guardrail

Standard box beam installations shall be in accordance with drawings TEB 3.27, TEB 3.28, TEB 3.33, TEB 3.34, TEB 3.35, TEB 3.36, TEB 3.37, TEB 3.38, TEB 3.39, TEB 3.40, TEB 3.41, TEB 3.46, and TEB 3.47. Installations at bridge approaches shall be in accordance with drawings TEB 3.41 and TEB 3.47 and construction shall always be started at the bridge.

Median box beam installations shall be in accordance with drawings TEB 3.22, TEB 3.23, TEB 3.24, TEB 3.25, TEB 3.26, TEB 3.27A, TEB 3.28A, TEB 3.29 and TEB 3.30. Installations at bridge approaches shall be in accordance with drawing TEB 3.29 and construction shall always be started at the bridge.

2.19.3.1.3 Cable Barrier

Cable barrier installations shall be in accordance with drawings TEB 3.42, TEB 3.43, TEB 3.44 and TEB 3.45.

2.19.3.1.4 Installation on Base Course Projects

When installing guardrail on base course projects, installation of guardrail and construction of base course shall be performed in accordance with drawing TEB 3.56 as directed by the Consultant.

2.19.3.1.5 Guide Posts

The Contractor shall remove and dispose of existing guide posts and/or install new guide posts at locations identified by the Consultant.

Guide posts shall be installed straight and plumbed vertical to a uniform depth in accordance with the applicable drawings TEB 3.49a, TEB 3.49b, TEB 3.49c, TEB 3.49d, TEB 3.49e, TEB 3.50 and TEB 3.51.

All replaced soil around the delineator shall be firmly compacted. The Contractor shall supply any additional material required to ensure that the delineator has a suitable foundation.

2.19.3.2 Removal and Salvage or Disposal of Existing Guardrail**2.19.3.2.1 General**

The Contractor shall remove the designated sections of guardrail including posts and shall fill and compact all holes left from post removal before nightfall.

The Consultant will designate the material to be reused and the material for disposal. Material damaged by the Contractor during removal shall be replaced with new material by the Contractor at his own expense.

2.19.3.2.2 Remove and Salvage

When salvaged material is being reinstalled, the Contractor shall haul it when necessary, and neatly pile the salvaged material near the site of the proposed installation as directed by the Consultant.

At sites where existing guardrail is to be removed and new or salvaged guardrail is to be installed at the same location, the Contractor shall complete the installation within 5 working days of the site becoming available for re-erection of the guardrail.

Until guardrail is erected, the Contractor shall erect barricades as shown on drawing TCS-B-4.2. Other safety protection shall be provided as directed by the Consultant.

2.19.3.2.3 Remove and Dispose

All materials designed for removal and disposal, those damaged during removal and any materials not required for reinstallation as determined by the Consultant, shall become the property of the Contractor and shall be disposed of in a manner and location satisfactory to the Consultant.

2.19.4 MEASUREMENT AND PAYMENT**2.19.4.1 Supply and Install Guardrail or Barrier**

Measurement for supplying and installing barrier or guardrail sections, including end terminals and bridge connections and posts, will be in metres of the length of each type of barrier or guardrail installed.

Payment will be made at the applicable unit price bid per metre for "W-Beam Guardrail - Supply and Install", "Strong Post W-Beam Guardrail - Supply and Install", "Box Beam Guardrail - Supply and Install" or "Cable Barrier - Supply and Install". These payments will be full compensation for supplying and installing all guardrail and cable barrier materials including end terminals and bridge connections and posts.

2.19.4.2 Removal, Salvage and Reinstallation of Existing Guardrail or Barrier

Measurement for removal, salvage and reinstallation of barrier or guardrail sections, including end terminals and bridge connections and posts, will be in metres of the length of each type of guardrail or barrier removed and reinstalled.

Payment will be made at the unit price bid per metre for "Remove, Salvage and Reinstall Existing Guardrail" for the type of guardrail removed. This payment will be full compensation for removing, salvaging, and reinstalling the guardrail including end terminals and bridge connections and posts.

2.19.4.3 Removal and Disposal of Existing Guardrail or Barrier

Measurement for removal and disposal of barrier or guardrail sections, including end terminals and bridge connections and posts, will be in metres of the length of each type of barrier or guardrail removed.

Payment will be made at the unit price bid per metre for "Remove and Dispose of Existing Guardrail" for the type of guardrail removed. This payment will be full compensation for removing and disposing of the guardrail material as directed by the Consultant.

2.19.4.4 Haul of Guardrail Materials

No separate payment will be made for hauling existing guardrail designated for salvage or disposal. Haul will be considered incidental to the Work.

2.19.4.5 Supply and Install Guide Posts

Measurement will be made of the number of each type of guide post installed.

Payment will be made at the applicable unit price bid per guide post for "Flexible Guide Post/Delineators - Round - Supply and Install" or "Flexible Guide Post/Delineators -Semi Flat - Supply and Install". This payment will be full compensation for supplying and installing the new posts.

No separate payment will be made for guide post removal. The removal and disposal of existing guide posts is considered incidental to the work.