629.1 DESCRIPTION

This work consists of constructing cable guardrail.

629.2 MATERIALS

A. Cable: Cable shall be ¾ inch (19 mm), Type I, Class A coating, conforming to AASHTO M30.

B. Cable Splices, Ends, Fittings, and Anchor Assembly: When galvanizing is specified, these materials shall be galvanized after fabrication to meet the requirements of ASTM A123.

C. Compensating Device: Design for alternate combination, or single unit compensating device and turnbuckle assembly, may be submitted for approval.

D. Hook Bolts: Hook bolts shall develop an ultimate pull open strength, applied in a direction normal to the longitudinal axis of the post, from 500 to 1000 pounds (2 to 4.5 kN).

E. Steel Posts:

1. **Structural Steel Posts:** Structural steel posts and anchor plates shall conform to the requirements of ASTM A36 (ASTM A709M, Grade 50 Steel). They shall be galvanized after fabrication in accordance with ASTM A123.

2. **Flanged Channel Posts:** Flanged channel posts shall be fabricated from rerolled rail steel bars conforming to ASTM A499, Grade 60 (415) except that the minimum yield strength shall be 70,000 psi (480 MPa). The post shall meet the chemical properties of ASTM A1 for rails 30 pounds per foot (44.56 kg/m) and heavier.

   Post lengths shall be as specified plus or minus one inch and shall weigh a minimum of 4.0 pounds per foot (5.95 kg/m) plus or minus 3.5 percent. Posts shall be painted with a baked on high quality dark green enamel. Holes 3/8-inch (9.52 mm) in diameter shall be punched or bored on one-inch (25 mm) centers beginning at the top of the post and extending to the bottom. All punching, boring, cutting, shearing, and welding shall be done prior to painting.

F. Concrete: Concrete shall be Class M6 (I28), as specified in Section 462.

629.3 CONSTRUCTION REQUIREMENTS

A. Guardrail Alignment: Posts and rail shall be set to the plans shown alignment using a string line or other approved methods.

B. Posts: Posts shall be set plumb. Regardless of the method of setting posts, the posts shall be firm, and at the locations, spacing, and height shown on the plans.

When guardrail posts are installed through asphalt concrete shoulders, the Contractor shall take care to minimize damage to the asphalt concrete. If during post installation the asphalt concrete

shoulder is raised more than two inches, lowered more than one inch, or otherwise damaged, the Contractor shall repair the damaged shoulders.

The method of repair may require patching, recompaction, or removal and replacement of the effected asphalt concrete. The method of repair is subject to the approval of the Engineer, depending on the type and extent of the shoulder damage. All repair costs shall be at the expense of the Contractor.

Drilling postholes in pavement shall be done without damage to the surrounding pavement. The Engineer shall approve the proposed drilling method and equipment before the work begins.

Upon completion of installation of the guardrail posts, the Contractor shall place and compact either asphalt concrete, cold milled asphalt concrete material or asphalt concrete cold mix material around the posts to fill and level any voids created by the driving of the posts through the asphalt concrete. The material shall be placed ½ inch high around the posts to force water to flow away from the post-hole. Cost for this work shall be incidental to the contract unit prices for the various guardrail items.

C. Pretension of Three Cable Guardrail:

1. Properly seat the spring in the compensator device and permanently mark the unloaded spring position on the compensator rod.

2. Install spring end assemblies at one end of the barrier and secure to the anchor.

3. With cable strung through the hook bolts, introduce tension in the cable at the opposite end of the barrier to compress the installed springs approximately 3½ inches (90 mm).

4. Clamp this tension in the cable while the end assemblies are installed at the second anchor.

5. Remove the slack between the clamp point and the second anchor by taking up the turnbuckle. If springs are also used at this end, compress them approximately 3½ inches (90 mm).

6. After two weeks at this setting, reset the spring compression as indicated in the standard sheet table on the plans. Ample turnbuckle take up must be left at both ends to permit future adjustments.

D. Remove Three Cable Guardrail:

Three cable guardrail removed, including cable, posts, and hardware shall become the property of the Contractor unless otherwise noted on the plans.

Any holes left after removal of the guardrail shall be backfilled with material furnished by the Contractor. Wherever posts were set through asphalt, the top 3 inches of the hole shall be backfilled with bituminous mix.

E. Completion Requirements:

On projects where existing cable or steel beam guardrail is to be removed and replaced or reinstalled, and the roadway will be open to traffic during construction, the guardrail installation shall be completed within fourteen (14) calendar days from the day the controlling item of work is sufficiently complete to allow guardrail installation to commence. A guardrail installation is defined as each individual run of guardrail (i.e., a typical bridge would have 4 guardrail installations). Controlling items for guardrail include but are not limited to: structure, structure end block and surfacing work. Typically, there will be a sequence of controlling items for guardrail. Prior to any guardrail removal, a written construction schedule for work in the guardrail area shall be developed by the Contractor and approved by the Engineer. In no case shall work cease between controlling items of work for more than four (4) working days.

Once the existing guardrail is removed from any item of concern (bridge end, box culvert, bridge column, etc.), the Contractor shall place drums or Type II Barricades at 25-foot intervals at each location where existing guardrail is removed. These devices shall extend 175 feet beyond the item of concern for each direction of traffic. Drums or Barricades shall remain in place until new guardrail has been installed. Cost for furnishing, installing and maintaining drums or barricades shall be incidental to the contract lump sum price for Traffic Control Miscellaneous.

Post end, beam, and end terminal sections shall be erected in a continuous operation within each individual run of guardrail. Incomplete guardrail installations shall be marked by delineation as noted in the previous paragraph.

If the Contractor fails to complete the required work within the time allowed, the Contractor shall install an approved safety treatment that complies with NCHRP 350, level 3, to protect the site.

629.4 METHOD OF MEASUREMENT

A. Three Cable Guardrail: Three Cable guardrail will be measured by the foot (0.1 meter) along the axis of the cable. Measurement of three cable guardrail will include the length of the anchorage sections. If the guardrail is anchored to a concrete bridge end anchor, measurement of cable guardrail shall be up to the anchor block.

B. Anchor Assembly: Anchor Assembly will be measured by the each.

C. Remove Three Cable Guardrail: Remove Three Cable Guardrail will be measured to the nearest foot (0.1) meter along the centerline of the cable.

D. Remove Anchor Assembly: Remove of Anchor Assembly will be measured by the each.

629.5 BASIS OF PAYMENT

A. Three Cable Guardrail: Three cable guardrail will be paid for at the contract unit price per foot (0.1 meter). Payment will be full compensation for the cost of furnishing labor, materials, and equipment necessary, except anchorage units.

B. Anchor Assembly: Anchor Assembly will be paid for at the contract unit price per each. Payment will be full compensation for end posts with base plates, anchor assemblies, turnbuckles and compensating devices, appurtenant hardware, dead man, and necessary excavation and backfill.

If the guardrail is anchored to a concrete bridge end anchor, compensation, devices, turnbuckles, and appurtenant hardware shall be incidental to the contract unit price for cable guardrail.

C. Remove Three Cable Guardrail: Remove Three Cable Guardrail will be paid for at the contract unit price per foot (0.1 meter). Payment will be full compensation for the backfill of holes and the removal of the cable, posts, and hardware from the project limits.

D. Remove Anchor Assembly: Remove Anchor Assembly will be paid for at the contract unit price per each. Payment will be full compensation for removal of end posts with base plates, anchor assemblies, turnbuckles and compensating devices, appurtenant hardware, dead man, and necessary excavation and backfill.