ITEM 606.0101 91 M - WIRE ROPE SAFETY FENCE (SOCKETED POST)
ITEM 606.0201 91 M – WIRE ROPE SAFETY FENCE END TERMINAL (STANDARD)
ITEM 606.0301 91 M – WIRE ROPE SAFETY FENCE END TERMINAL (WRGT)

DESCRIPTION

This work shall consist of furnishing and installing an NCHRP 350 compliant Wire Rope Safety Fence (WRSF). End terminals shall be of the type specified in the contract documents.

The WRSF described in this specification is a patented product and shall be obtained from the manufacturer: Brifen, USA, P.O. Box 9422, Oklahoma City, OK 73143 (405-793-9500).

MATERIALS

All materials used in this construction shall comply with the following requirements:

1. Wire Rope

(a) The galvanized wire rope shall be 19 mm 3 X 7 construction meeting ASTM A741-98 Type 1 Class A coating except as modified below:

Table 1 Type 1 Breaking Strength Minimum = 17.7 metric tons

(b) The wire rope shall be prestreched during manufacture to exhibit a minimum modulus of elasticity of 8300 kg/mm^2 after prestretching.

2. Fittings

(a) **Threaded Terminals** (swaged type) shall be furnished and may be shop or field swaged. Material shall be as per ASTM A29 & A576 or equivalent round steel bar. Threaded terminals shall be Right Hand (RH) or Left Hand (LH) threaded M24 X 3 pitch to ANSI B1.13M. The body of the threaded terminal shall provide a minimum of 150 mm wire rope engagement depth. Fully fitted ropes shall develop a Minimum Breaking Load (MBL) of 16.7 metric tons. Threaded terminals shall be galvanized after threading.

(b) **Turnbuckle or Rigging Screws** shall be of the size and shape as shown in the plans. Material shall be ASTM A513 Type 5 steel tubing or equivalent. One end of the rigging screw shall be threaded RH and the other end LH to ANSI B1.13M M24 X 3 to accept threaded rope terminals. Rigging screws shall be of the solid or closed body type with two inspection holes to determine threaded rope terminal penetration. They shall allow a minimum of 150mm of penetration from each end. Rigging screws shall develop minimum tensile load without yielding to 16.7 metric tons and shall be galvanized after threading.

(c) **Mechanical Anchor Fittings** shall be provided at the Standard End Terminal ends of each wire rope. They shall be of a cylindrical barrel design with an interior tapered bore into which the wire rope is inserted from the narrower end. This mechanical fitting shall be applied with a protective coating meeting the manufacturer's requirements. The mechanical fitting shall insure infinite adjustment along the wire rope for proper length and shall develop minimum tensile load of the entire wire rope of 16.7 metric tons without yielding.

(d) **Tensile Rods with Combination Mechanical Fittings** shall be provided at the WRGT End Terminal ends of each wire rope. Material shall be ASTM A139-B7 steel all thread or equivalent. The combination mechanical fitting shall be of a cylindrical design into which the wire rope is inserted, and threaded to accept the tensile rod. The fitting shall insure proper

adjustment of the wire rope for length and shall develop minimum tensile load of the entire wire rope of 16.7 metric tons without yielding.

3. Line Post

All posts shall be of the size and shape shown in the plans. Posts shall have rounded edges on the traffic approach side. They shall be available in the socketed version for use with a metal sleeve installed in the ground for insertion of the post. Posts and soil plates shall be ASTM A-36 steel and galvanized after fabrication. All posts shall have a means of holding the wire ropes at the design height without metal hooks or other metal hardware.

A low-density polyethylene excluder profiled to fit tightly around the post shall be provided to prevent debris from entering the socket. All posts shall be furnished with a low density polyethylene post cap. The post cap shall be provided with retro-reflective sheeting properly sized to fit the approach side of the post cap and meeting the requirements of section 730-05 class C. Minimum size shall be 50 mm^2. Cap reflectors shall be placed on one side, every fourth post, visible to approaching traffic. Color will be determined by the Engineer.

4. Sockets for Line Posts

Sockets conforming to the plans shall be provided. Sockets shall be fabricated from ten (10) gauge, hot rolled mild steel galvanized after fabrication. A 200 mm diameter reinforcing ring with 100 mm overlap made from number three (3) deformed rebar shall be furnished for installation in line post concrete foundations as shown in the plans or this reinforcement may be formed as a box shape with an approximately 250mm diagonal dimension and 100mm overlap.

5. End Terminals

5.1 Standard End Terminal

This end terminal incorporates two separate concrete foundations, each of which anchors two wire ropes, and includes two deflection posts placed in sockets which are set in concrete foundations.

(a) **Fabricated anchor frames and deflection posts with sockets** shall be of the size and shape as shown in the plans. Anchor frames and deflection posts shall be fabricated from materials meeting ASTM A-36 and galvanized after fabrication. All deflection posts shall be placed in sockets set in concrete foundations.

(b) **Safety Check Ropes** shall be furnished for each of the 19mm wire rope's end anchor termination. Safety check ropes shall be 8mm galvanized 6 X 19 construction with eye terminals on each end. Each main wire rope is fed through one end of their respective safety check rope prior to end anchorage termination with mechanical fitting. The other end of the safety check rope is attached to the end anchorage by use of a screw pin shackle. Assembled safety check ropes shall develop minimum breaking load of 3.7 metric tons.

(c) **Heavy Duty Steel Washers and HDPE Plastic Washers** shall be furnished at each slotted end anchor point. They shall be of the size and shape shown in the plans. Heavy steel washers shall be fabricated from ASTM A-36 material, galvanized after

fabrication.

5.2 WRGT End Terminal

This end terminal shall be NCHRP-350 complaint. All four wire ropes of this end terminal shall be anchored into one concrete foundation; four special posts placed in sockets set in concrete foundations shall be included.

(a) **Fabricated anchor components** shall be of the size and shape shown in the plans. The 4-slot breakaway anchorage frame assembly, reinforcing cage, posts and sockets shall be fabricated from materials meeting ASTM A-36 and galvanized after fabrication. All posts shall be placed in sockets set in concrete foundations.

(b) **Heavy Duty Steel Washers and HDPE Plastic or Nylon Washers** shall be furnished at each slotted end anchor point. They shall be of the size and shape shown in the plans. Heavy steel washers shall be fabricated from ASTM A-36 material galvanized after fabrication.

(c) **FHWA Acceptance** letter shall be provided by the manufacturer.

6. Concrete

Concrete shall meet the requirements of 606-2.06 of the Standard Specifications.

7. Galvanizing

All galvanizing shall meet the requirements of 719-01 of the Standard Specifications.

8. Welding

All welding shall be performed in accordance with the requirements of the New York State Steel Construction Manual, except radiographic inspection of shop welds will not be required.

9. Basis of Acceptance

The wire rope safety fence and end terminals shall be accepted on the basis of the manufacturer's certification that the product delivered is in conformance with these specifications.

CONSTRUCTION DETAILS

The requirements of Section 606-3.01 shall apply, except as modified below.

The alignment and location of the WRSF shall be according to the plans or as directed by the Engineer. Posts shall be of the socketed type and spaced as shown in the plans. Posts shall be set plumb, in line, to provide an aesthetically pleasing line of sight.

Wire rope shall be placed and installed at the proper height as per the manufacturer's recommendation. Beginning with the bottom strand, the rope shall be placed on alternate sides of consecutive posts. Placement of the second rope shall be on the opposite side of the post from the bottom rope. The third rope shall be placed opposite to the second strand. The fourth (top) rope shall be placed at the center of the posts.

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Wire rope shall be tensioned immediately after initial installation. Tensioning is to manufacturers' recommendations, based on tension chart requirements for the ambient temperature at the time on tensioning. The tension shall be rechecked three to five days after initial tensioning on segment lengths over 760 m and adjusted, if necessary. A tension log form shall be completed showing the time, date, location, ambient temperature, final tension reading, and WRSF manufacturer's recommended tension chart. The log shall be signed by the person performing the tension reading. The log shall be furnished to the Engineer upon completion of work.

Foundations for Socketed Posts: Socketed posts shall be set in concrete foundations as shown on the plans. Foundations shall be constructed as per Section 606-3.01E of the Standard Specifications.

Mechanical Anchor Fittings: A set of grooved wedges are inserted from the opposite end between the barrel and the wire rope. A cap is then screwed in place compressing a coil spring against the wedges preventing accidental release of the wedges while tension in the wire rope pulls the wedges tighter around the wire rope.

METHOD OF MEASUREMENT

The quantity of WRSF measured for payment will be the number of meters measured along the axis of the railing and between its extreme outer limits as shown on the plans or as directed by the Engineer.

WRSF end terminal units will be measured by the actual number of units installed in accordance with the plans, manufacturer's drawings, manufacturer's directions and/or as directed by the Engineer.

BASIS OF PAYMENT

The unit price bid per meter for the WRSF shall include the cost of all labor, equipment and material necessary to complete the work, including but not limited to the cost of excavation, concrete, backfill, compaction and the cost of any repairs required to the WRSF system. Progress payments will be made when the WRSF is erected in the position and manner indicated on the plans, manufacturer's drawings, manufacturer's directions and/or in a manner approved by the Engineer, exclusive of bituminous repair and final alignment. Payment will be made, at the unit price bid, for 90% of the measured quantity erected. The balance of the quantity erected will be paid for upon proper repair to the bituminous surfaces and final adjustment and alignment of the WRSF to the specified tolerances.

The unit price bid for each end terminal shall include the cost of furnishing all labor, materials and equipment necessary to complete the work, including the necessary concrete, excavation, backfill, reflectorization, and object markers when required at driveways and vehicle openings.