

SECTION 02750**SIGNAL POLES AND MAST ARMS****02750.01 GENERAL****A. Description**

Signal poles and mast arms shall include, but not necessarily be limited to, furnishing and installing poles and mast arms of the number and sizes shown on the Plans or on the Standard Details and in accordance with the Contract Documents or as directed by the Engineer.

B. Related Work Included Elsewhere

1. Structure excavation; Section 02220.
2. Electrical conduit and fittings; Section 02731.
3. Concrete foundations; Section 02734.

C. Quality Assurance

1. Inspection

The Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

2. Coating Testing

After coating, each pole shall be checked for continuity using a 67-1/2 volt wet sponge detector to check for holidays, pinholes, and discontinuities. The coating thickness of each pole shall be checked with a properly calibrated "Mikrotest" magnetic gauge. Poles requiring limited repair for minor defects shall be touched up with a liquid touch-up. All poles shall be wrapped to insure safe arrival at jobsite.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all signal poles and mast arms. The shop drawings shall show the overall dimensions of the poles and mast arms, details of construction, and include bolt circle data.

2. Certificate of Compliance

Certificate of compliance shall be submitted in accordance with the "General Provisions" stating that the material requirements specified in Section 02750.02 have been met and that the fabricator's workmanship has been inspected.

3. Guarantee

The manufacturer shall furnish the Engineer with all warranties on equipment and material offered by the manufacturer as normal trade practice.

02750.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for signal poles and mast arms.

B. Contractor's Options

Alternate mast arm design will be considered using sectional construction provided each section is 20 foot minimum in length except for the outermost section. Overlap between sections shall be 18 inches. Alternate post designs may be straight (non tapered) sections and less than 16 inch diameter at the base. Any alternate design shall be structurally equivalent to the requirement of this specification. Bolt circle diameters shall be followed.

C. Detailed Material Requirements

1. General

Materials shall meet the minimum requirements as specified in the latest edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals except as modified herein.

2. Steel Pole Shafts and Mast Arms

Steel pole shafts and mast arms shall meet the requirements of ASTM A 595, Grade A or B or ASTM A 607, grade 55 or 60; galvanized to meet the requirements of ASTM A 123 or ASTM A 153, or coated in accordance with Section 02750.03.

3. Steel Base Plates

Steel base plates shall meet the requirements of ASTM A 36; or ASTM A 27, Grade 65-35 galvanized to meet the requirements of ASTM A 123 or ASTM A 153.

4. Anchor Bolts, Locking and Leveling Nuts

Anchor bolts, locking and leveling nuts shall meet the requirements of Section 02734.02.

5. Bolts for Flange Plates

Bolts for flange plates shall meet the requirements of Section 02734.02, galvanized to meet the requirements of ASTM A 153 or coated as specified in Section 02750.03.

6. Removable Ornamental Covers and Pole and Mast Arm Caps

Removable ornamental covers and pole and mast arm caps shall be made of cast iron meeting the requirements of ASTM A 126, Class A, or cast aluminum meeting the requirements of ASTM B 108, Alloy ANSI 365.0 T6.

02750.03 EXECUTION

A. Design Criteria

All mast arm poles shall be designed to support, at the free end of the mast arm, a minimum vertical downward dead load of 150 pounds and a minimum horizontal wind load applied at right angles to the mast arm of 700 pounds. Design stress for the mast arm poles and all its components shall not exceed 55% of yield strength of the material used, equivalent to a 1.8 factor of safety.

B. Fabrication

1. Monotube-Mast Arm Poles

- a. The shaft and arm shall be fabricated of one length and shall have one longitudinal weld with no transverse welds in the fabrication of the shaft and arm. The longitudinal weld shall be furnished to form a smooth outside surface and the wall of the shaft and mast arm shall be uniform in thickness throughout the welded area. The shaft and arm shall be round or multisided (less than 8 sides not acceptable) in cross section and be uniformly tapered from butt to tip approximately 1 inch diameter for each 7 feet in length (0.14 inches per foot). Two piece arms will be accepted when mast arms are 30 foot and over but any combination of two pieces of the same butt diameter arms must be fit together. For example, for the group 40 foot thru 50 foot arm lengths, any arm piece with flange plate must fit with all extensions of arms in that group. Furnish bolted splice connection as noted. The bolted connection for two piece arms shall be as noted in the Standard Details.

2. Anchor Base

All mast arm poles shall be supplied with anchor base. The material shall be of sufficient size, strength, and secured to the lower end of the shaft by two continuous electric arc welds. The base shall telescope the shaft with one weld on the inside of the base at the end of the shaft, while the other weld shall be on the outside at the top of the base and shall be such that the weld connection shall develop the full strength of the adjacent shaft to resist bending action. A 5/16 inch welded threaded grounding stud and nut shall be supplied.

3. Anchor Bolts

All mast arm poles shall be supplied with 4 anchor bolts. The length and diameter of the anchor bolts and the bolt circle shall be as shown in the Standard Details. A 90° ell bend, 6 inches long, shall be part of the overall bolt length.

4. Mast Arm Attachment

All shafts and poles are to be supplied with two flange plates as noted. These attachments including the bolts shall be attached in such a manner as to develop the minimum guaranteed yield and ultimate tensile strength of the shaft and mast arm and shall be capable of transferring the maximum moment being carried by the mast arm without distortion or rotation of the mast arm or the attachment. The flange plates shall be connected by the use of four bolts. The size of plates and bolts shall be as shown in the Standard Details. Grommet holes shall be drilled at the factory and located according to the Plans. Hole diameter to be 1-1/2 inches. Rubber grommets shall be furnished.

5. Handhole

A 4 inch by 8 inch handhole complete with frame, welded into the shaft, and cover shall be provided completed with a stainless steel captive chain and is to be held in place with two 1/4 inch-20 U.N.C. stainless steel screws. Orientation under arm or under longer arm for twin mast arms.

6. Entranceways

Poles are to be provided with entranceways for cable as noted. These holes shall be factory drilled and a threaded blind half coupling for each hole shall be installed. The coupling shall protrude 1/4 inch from the face of the pole and shall be welded to the poles surface. The holes shall be the sizes as noted in the Standard Details.

7. Anchor Bolt Covers

Four (4) removal ornamental covers shall be provided with each base for attachment to the base by hex head screws.

8. Caps

Each shaft and mast arm shall be supplied with removable cap, fabricated from either galvanized steel or spun aluminum.

9. Cable Support

A "J" hook shall be welded near the top of the shaft for cable support.

C. Coating Signal Poles - Bronze Finish

Signal pole assemblies shall be finished in 2-stage process consisting of a Phenolic Primer and an epoxy finish coat as follows:

1. The coating system shall be applied in an environmentally controlled plant that is fully enclosed.
2. All poles shall be free of oil or any mill coating. All edges shall be radiused, all welds ground smooth, all weld splatter removed, and poles will be free of burrs, pits, rust, or other surface imperfections.
3. Steel poles shall be gritblasted or near white (SSPC SP-10) using steel grit #40, steel shot #390, or a mixture of both. Cleaned poles shall be free of surface moisture. The poles shall not be allowed to flash rust before coating. Blast profile shall be approximately 1 to 1.4 mils, but not greater than 2 mils, as checked with a Test-0-Tex surface profile gauge. The coating shall be applied as an electrostatically charged dry powder sprayed onto a ground pole using an electrostatic spray system. The coated pole shall be given a thermal time/temperature cure to provide a fully cured finish. The coating thickness after cure shall be 6 mils plus 2 mils when measured in accordance with ASTM G 12.
4. Coated poles shall be individually wrapped at the factory or coating facility to protect the coating. The wrapping shall not be removed until the pole and/or mast arm is installed at the job site.

D. Handling

At job site and during installation, all poles shall be handled with nylon slings.

E. Footings

Concrete footings shall be constructed to the dimensions shown on the plans and meet the requirements of Section 02734.03. The top part of the footing shall be formed as shown on the Plans.

Suitable templates for setting anchor bolts shall be accurately set and left in place until the forms can be removed.

Conduit elbows shall be set in the footing excavation before the concrete is poured. They shall be of the number and diameter shown on the plans.

F. Installation

Poles shall be installed on prepared concrete foundations utilizing shim nuts to plumb the pole. Once the pole has been properly aligned, it shall be held in place with anchor nuts. The space between the pole base and the top of the concrete foundation shall be filled with grout.

02750.04 METHOD OF MEASUREMENT**A. Signal Poles and Mast Arms**

Measurement for signal poles and mast arms will be made of the number of each type and size specified and satisfactorily installed.

B. Conduit Elbows

Measurement for conduit elbows will not be made but is considered incidental to this item of work.

C. Foundations

Measurement for concrete foundations will not be made but is considered incidental to this item of work.

02750.05 BASIS OF PAYMENT**A. Signal Poles and Mast Arms**

Payment for signal poles and mast arms will be made at the price bid each for the number of each type and size furnished and installed, complete in place. The price bid shall include furnishing all concrete foundations, anchor bolts, reinforcing steel, ground rods, ground wire, pole, master arm(s), miscellaneous hardware, and for all labor, materials, and equipment necessary to complete this item of work as shown and specified in strict accordance with the Contract Documents.