

SECTION 02582

TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel traffic signal pole assemblies, including anchor bolts.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. Payment for Traffic Signal Pole Assemblies will be measured by each traffic signal pole assembly.
2. Payment for the work performed and materials furnished in accordance with this item will be paid for at the unit price bid for "Traffic Signal Pole Assemblies (Steel)", of the various types and sizes as specified.

1.03 REFERENCES

- A. Reference standards applicable to this section:

1. AASHTO: American Association of State Highway Transportation Officials
 - a. LTS-1: Structural Supports for Highway Signs, Luminaires and Traffic Signals
2. AISC: American Institute of Steel Construction
3. AISI: American Iron and Steel Institute
4. ASTM: American Society for Testing Materials
 - a. A36: Structural Steel
 - b. A123: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - c. A153: Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - d. A325: High Strength Bolts for Structural Steel Joints

- e. A501: Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
- f. A563: Carbon and Alloy Steel Nuts
- g. A570: Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
- h. A572: High Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
- i. A595: Steel Tubes, Low-Carbon, Tapered for Structural Use
- j. F1554: Hooked, headed and threaded anchor rods

PART 2 PRODUCTS

2.01 MATERIALS

- A. All items shall be new materials of the latest product in production to the commercial trade, and shall be of the highest quality as to materials used and workmanship. The manufacturer of these items shall be experienced in design and construction of such items and shall furnish evidence of having supplied similar items, which have been in successful operation, for not less than three (3) years.

2.02 SILENCE OF SPECIFICATIONS

- A. The apparent silence of these specifications as to any detail, or the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practice shall prevail and that only material and workmanship of the finest quality shall be used. All interpretations of these specifications shall be made on the basis of this statement.

2.03 TRAFFIC SIGNAL POLE ASSEMBLIES

- A. The traffic signal poles shall be designed in accordance with the 1994 edition of the AASHTO standard specifications.
- B. Anchorage: Included with each pole shall be a minimum of four steel anchor bolts, complete with double hex nuts, lock washers and flat washers. Nuts, washers and threaded areas of anchor bolts shall be hot-dip galvanized to ASTM - A153. Anchor bolts shall meet the requirements of ASTM F1554, Gr. 55. An anchor bolt template shall be included with each pole assembly.
- C. Wind Resistance: Entire pole and arm assembly to be rated to withstand AASHTO requirements for 90 mile per hour wind.

- D. Welds: All welds shall meet the requirements of AWS D1.1.
- E. Material Certification: Material certifications shall be provided for all ASTM numbers referred to in this specification.
- F. Complete design drawings and complete technical data must be submitted for approval to the City of Houston prior to starting fabrication. Shop drawings shall be signed and sealed by a Registered Professional Engineer.
- G. The pole unit and all materials used in its manufacture shall meet the requirements of the American Association of State Highway and Transportation Officials (AASHTO), specifically LTS-1: Standard Specifications of Structural Supports for Highway Signs, Luminaries and Traffic Signals.
- H. Pole shaft and arms shall be circular or octagonal in cross-section with no transverse joints or welds and no more than one (1) longitudinal welds per pole or arm. Refer to the standard drawings for exact sizes on the pole diameters. They shall be uniform in cross-section and shall uniformly taper from the pole shaft to the end of the arm. The end of the arm shall be at a height above the pavement, as detailed on the standard drawing, with design vertical loadings, when installed on the pole.

2.04 POLE SHAFT

- A. The pole shaft for the Type 1 poles shall be fabricated from a minimum of 3-gauge (0.2391 inch) hot rolled commercial steel. The shaft shall have only one (1) longitudinal, automatically, electrically welded joint, and shall have no intermediate horizontal joints nor welds. After forming and welding, the tapered shaft shall be longitudinally cold rolled over a hardened steel mandrel under sufficient hydraulic pressure to flatten the weld and increase the physical characteristics of the shaft. The shaft shall meet the chemical and physical properties of ASTM-A595 GR. A, having a minimum yield strength of 55,000 psi. Only one (1) length of steel sheet shall be used, which shall be formed into a continuously tapered shaft, having a taper of approximately 0.14 inch per foot.
- B. The pole shaft for the Type 2 poles shall be fabricated from a minimum 0.375 inch hot rolled commercial steel. The shaft shall have only one (1) longitudinal, automatically, electrically welded joint, and shall have no intermediate horizontal joints nor welds. The shaft shall meet the chemical and physical properties of ASTM-A572 GR. 55, having a minimum yield strength of 55,000 psi. Only one (1) length of steel sheet shall be used, which shall be formed into a continuously tapered shaft, having a taper of approximately 0.14 inch per foot.
- C. The base plate shall conform to ASTM-A36 or ASTM A572 steel. It shall telescope the shaft and be attached by means of two continuous welds, one on the inside of the base at the end of

the shaft, the other on the outside at the top of base. The base plate shall be arranged to accept four (4) 2-1/4 inch diameter anchor bolts on an 18 inch bolt circle.

- D. The pole shaft shall be furnished with a reinforced handhole frame with steel cover and a 1/2 inch - 13 UNC grounding provision. Dimensions shall be as shown on the detail drawings.
- E. Each pole shaft shall include a steel pole plate welded to shaft for the mast arm connection. It shall be arranged to accept four (4) connecting bolts. Pole plate material shall conform to the requirements of ASTM-A36 or ASTM A572 Grade 50 steel.
- F. As required, each pole shall be provided with an ornamental pole top. The final shaped pole top shall be mechanically attached to the top of the shaft to provide access for wiring signals secured by a J-hook wire support; also provided. Pole top material shall conform to the requirements of AA-319.OF aluminum.
- G. The pole shaft shall be drilled in the field at required signal locations.

2.05 MAST ARM

- A. The mast arm shall be fabricated from a minimum 7-gauge (0.179 inch) hot rolled commercial steel in accordance with ASTM A595 Grade A and shall have a yield of not less than 55,000 psi. It shall be fabricated and formed into a round shape as required, using the same cold rolling process as the pole shaft and shall have the same physical properties and yield strength. Arm dimensions shall be equivalent in strength for the loads shown in the plans.
- B. Mast arm shall be a straight flange plate mounted style and shall include a steel arm plate with four (4) connecting bolts. Arm plate material shall conform to the requirements of ASTM-A36 or ASTM A572 Grade 42 steel. Bolts shall be internally mounted to pole plate and meet the requirements of ASTM-A325.
- C. A slip joint shall be permissible for arms forty (40) feet and greater in length. The slip joint shall be made in the shop but may be match marked and shipped disassembled. An automatic submerged arc process shall weld pole shaft and arm. Pole and arm diameters shall be uniform at any cross-section and shall be reasonably straight.
- D. Tenons for mounting the vehicle signal head assemblies shall be provided on the mast arm at locations required. Refer to the standard drawings for tenon details.

2.06 LUMINAIRE ARM

- A. The luminaire arm shall be fabricated from 2-inch Schedule 80 pipe.

- B. The length of the luminaire arm shall be as shown in the standard drawings or required in the plans.
- C. The luminaire arm shall be connected to the pole shaft with simplex fittings, and in accordance with details shown on the standard drawings.

2.07 HOT-DIP GALVANIZING

- A. Surface Preparation.
 - 1. Prior to being incorporated into an assembled product, steel plates 3/4 inch or more in thickness may require blast cleaning to remove rolled-in mill scale, impurities, and non-metallic foreign materials. After assembly, all weld flux shall be mechanically removed.
 - 2. The iron or steel product is degreased by immersion in an agitated 4.5%-6% concentrated caustic solution elevated to a temperature ranging from 150 to 190-degrees Fahrenheit. It is then pickled by immersion in a heated sulfuric acid solution of 6%-13% concentration, controlling the temperature between 150 and 190-degrees Fahrenheit. It is next rinsed clean from any residual effects of the caustic or acid solutions by immersion in a circulating fresh water bath.
 - 3. Final preparation is done by immersion in a concentrated zinc ammonium chloride flux solution heated to 130-degrees Fahrenheit. The solution's acidity content is maintained between 4.5-5.0 pH. The assembly is air dried to remove any moisture remaining in the flux coat and/or trapped within the product.
- B. Pole shaft and arm shall be hot-dip galvanized after fabrication in conformance with ASTM A123 requirements, with a minimum of two (2) ounces per square foot of galvanized coating.
- C. All ancillary parts for pole structures shall be hot-dip galvanized after fabrication in conformance with ASTM A153 requirements. The galvanized coating shall be a minimum thickness of two (2) ounces per square foot. All threaded material shall be brushed or retapped after galvanizing. Fabricated products shall be free and clear of teardrop edges, flaking zinc, rough appearance, holes covered with zinc membrane, and similar unattractive finishes. In general, the complete product shall be smooth, clean and unscarred when delivered. Any part of the structures not meeting these requirements shall be rejected.

2.08 POWDER COATING OVER GALVANIZING

- A. Surface Preparation. The pole shaft, arm and ancillary parts shall be prepared in accordance with the hot-dip galvanizing requirements of Part 2.06 in this section.

- B. Top Coat. All galvanized exterior surfaces visually exposed are to be coated with a Urethane or Triglycidyl Isocyanurate (TGIC) Polyester Powder to a minimum film thickness of 2.0 mils. The galvanized exterior should be etched, preheated, then powder coated. The coating shall be electrostatically applied and cured in a gas-fired convection oven by heating the steel substrate to a minimum of 350-degrees Fahrenheit and a maximum of 400-degrees Fahrenheit.
- C. Packaging. In order to protect the finish during transportation, a wrapping of 3/16" U.V. inhibited plastic-backed packing foam must be applied prior to shipment of small poles. Larger poles are cradled in a 1-inch rubberized foam base. A nylon ripcord shall be placed beneath the wrapping the entire length of the pole for removal of the wrapping without the use of knives or any other sharp instrument that may damage the painted surface.

2.09 SUBMITTALS

- A. The Contractor shall furnish mill test report(s) on steel used in pole fabrication. The mill test report(s) shall be furnished prior to or at the time of pole delivery
- B. Six (6) copies of shop drawings shall be furnished for CITY OF HOUSTON review and approval prior to pole fabrication.
- C. Two (2) copies of shop drawings shall be returned by CITY OF HOUSTON to the manufacturer for its files.

END OF SECTION