

**812.05. METHOD OF MEASUREMENT.**

*High mast poles* will be measured by each unit of the size and finish specified, installed in place, complete with all accessories and attachments.

**812.06. BASIS OF PAYMENT.**

The accepted high mast poles, measured as provided above, will be paid for at the contract unit price bid as follows:

HIGH MAST POLE ..... EACH

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals required for completing the work as specified.

**SECTION 813  
HIGH MAST LOWERING DEVICE**

**813.01. DESCRIPTION.**

This work shall consist of furnishing materials and installing of a raise and lower device in accordance with these Specifications and details shown on the Plans or established by the Engineer.

**813.02. MATERIALS.**

Prior to starting work, submit to the Engineer 5 copies, in brochure form of the bill of materials and equipment replacement parts list for items proposed for the project. Also include 5 copies of the service manual and operating manual. Include in the schedule part brand names, catalogue numbers, descriptions, cuts, diagrams and shop drawings, with all part numbers and materials finishes labeled, as may serve to establish compliance with these Specifications. (Materials normally used in highway construction and covered by the Standard Specifications as to requirements, sampling, and acceptance need not be included in the schedules.)

The lowering device manufacturer shall have manufactured and satisfactorily installed this a minimum of 5 years, unless otherwise approved by the Design Engineer. Final acceptance of any submitted lowering device design will rest solely with the Design Engineer.

(a) **Structural Design.**

1. The lowering device shall be of proven design, construction, and materials that will assure a long, reliable, safe, and low-maintenance life.
2. The lowering device shall lower a ring of luminaires to within approximately 3 feet (1m) of the pole base so that routine luminaire maintenance can be accomplished safely and efficiently.
3. There shall be facilities to energize the entire ring of luminaires while the lowering device is in the lowered position. Each pole shall be supplied with a power cable and connectors for this purpose. The service receptacle for this cable shall be weatherproof, twistlock, rated at 600 volts.

4. The hoisting cables shall be attached and equally spaced to the luminaire ring. A method shall be provided by which the tension on the hoisting cables will be equalized.
  5. In raised position, the luminaire ring shall have a minimum free movement and shall be rigidly suspended from equally spaced points by either purely mechanical latches or by cables in tension as specified in the Plans and approved by the Engineer.
    - (a) If Type I is specified, the automatic mechanical latching system shall be positive and require no manual or electrical tripping devices to either latch or unlatch the system. That portion of the latching system which is permanently attached to the top of the pole shall have no moving parts or contain any parts that require adjustment after the pole is erected. There shall be visual indication of positive latching. The latching system shall not be impaired by snow or ice accumulations. When latched, all tension will be removed from the hoisting and winch cables.
    - (b) If Type II is specified, the cables in tension system shall have a positive guide and positioning method to prevent rotational, horizontal, or vertical movement of the luminaire ring. The hoisting cables will be in tension all the time and a method shall be provided to equalize the stress on all three cables and remove all tension from the winch and cable assembly when the ring is in the raised position.
  6. Guide arms and/or rollers shall be installed on the luminaire ring. They shall prevent hang-up of the ring during raising and lowering, prevent damage to the finish of the tower shaft, and keep the luminaire ring equidistant from the pole at all times.
  7. The self-lubricating pulleys which are located at the top of the pole must be housed under a weather-tight cover similar in color to the support assembly.
  8. The suspension shall be highly stable and operable (raised or lowered) in 30 mph (48 km/hr) winds.
  9. The lowering device winch shall be powered by a lightweight remotely controlled portable motor. The motor shall be a heavy-duty reversible type, minimum of 3/4 horsepower (560 Watt) electric motor. The lowering device shall also have provisions for manual operation as a backup, in the event of a loss of power.
  10. The lowering device manufacturer shall certify in writing that he has coordinated his design to accept the installation of the pole and high mast luminaires to insure the proper function of the total system mechanically, electrically, and in all other respects.
  11. At the top of the pole there shall be no electromechanical disconnect installed in the circuit supplying power to the luminaires. The power cable shall be wired direct to the terminal blocks in the junction box on the luminaire ring.
  12. The power cable shall be attached to the luminaire ring in such a manner as to support the full weight of the cable while in the raised position, without pulling out or causing damage to the cable.
- (b) **Materials.**
1. Wire rope attachments, such as thimbles for eyes, clips, compression, and swedge-type fittings shall be approved by the Engineer and installed and torqued in accordance with the wire rope manufacturer's recommendations.

2. The luminaire ring and mast arms shall be constructed of weldable, structural steel with the mast arms of 2 inch (50 mm) diameter pipes for slip-fitter connections to the high mast luminaires; these arms shall be equally spaced around the ring, unless otherwise specified. The number of mast arms required shall be as shown on the Plans. The luminaire ring shall be prewired to distribute power from the main power cable and shall be weatherproof. The mast arms shall be easily attached or removed and one mast arm shall be provided for each high mast luminaire.
3. The high mast support assembly shall be fabricated from weldable structural steel and attached to the pole shaft. A positive method of pole attachment shall be devised in cooperation with the pole manufacturer to prevent any rotation of the support assembly on the pole top. The support assembly shall house all required pulleys and mechanical latching devices to support the luminaire ring and the luminaires.
4. The winch assembly shall be located at the base of the pole shaft adjacent to the hand hole and shall be a worm gear drive with a reduction ratio of 30:1, self-locking type and equipped with a take-up guide to prevent cable overlap. It shall be adequately sized to raise and lower the luminaire ring and luminaires at a minimum of 10 feet (3 m) per minute. The winch shall be supplied with an inboard and outboard support and be designed for hand and mechanical operation by means of a portable electric motor. The winch cable shall be securely attached to the winch drum and shall have at least three wraps on the drum when the luminaire ring is in the lowered position.
5. The luminaire ring shall be equipped, unless otherwise specified, with an double FAA approved red aircraft obstruction marker and dry type transformer, mounted on the ring assembly with a suitable bracket. Pipe with conduit lock rings are not considered satisfactory. The marker shall be located so as to be visible 360 degrees around the pole and shall be turned "on" and "off" with the luminaires. The lights shall be equipped with a multiple transfer relay to instantly change over to a reserve lamp when operating lamp fails. The transfer relay shall be installed in a weather tight enclosure and the relay should be a plug-in type.
6. All hardware shall be of noncorrosive materials or shall be plated with sufficient coatings to be compatible and comparable thickness as the structural parts of the lowering device.
7. All fasteners and pins shall be secured in a manner that will preclude their becoming loosened by vibration. Self-locking nuts, jam nuts and cotter pins shall be used for such purposes.
8. The pole shall be grounded as shown on the Plans.

(c) **Welding.**

1. All welding shall conform to the latest edition of the "Standard Specifications for Highway Construction" and Supplemental Specifications of the Oklahoma Department of Transportation and AWS D1.1 latest revisions.
2. No field welds shall be permitted.
3. All welds shall be visually inspected and may be tested by the ultrasonic method to AWS D1.1, latest revisions, magnetic particle method to ASTM E-709 or radiographic method to ASTM E-94, E-390 or E-142-92, as applicable and certified results submitted, if required by the Engineer.
4. All welding shall be completed and all weld splatter removed before finishing.

- (d) **Finish.** The high mast lowering device shall be galvanized after fabrication in accordance with ASTM A-123-89a (AASHTOM-111-94)

**813.04. CONSTRUCTION METHODS.**

Recruit the services of the manufacturer’s representative to assist in the proper installation of the lowering device. The manufacturer shall supply a written manual for installation and operation of the lowering device, with a minimum of 5 copies per project or one copy per device, whichever is greater.

Following the installation of the lowering device on the tower, but prior to its erection, request an inspection by the Traffic Engineer of the fully rigged device. Do not erect the tower without this inspection and/or approval by the Engineer. Take care not to damage the lowering device during the installation and erection of the tower.

**813.05. METHOD OF MEASUREMENT.**

The *high mast lowering device* will be measured by each unit of the size and type specified, installed in place, complete with all accessories, attachments, wiring, circuit breakers, etc., necessary to provide a complete mechanical and electrical system ready for connecting the high mast luminaires.

**813.06. BASIS OF PAYMENT.**

The accepted high mast lowering device, measured as provided above, will be paid for at the contract unit price bid as follows:

HIGH MAST LOWERING DEVICE ..... EACH

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals required to complete the work, as specified.

**SECTION 825  
TRAFFIC SIGNAL CONTROLLER ASSEMBLY**

**825.01. DESCRIPTION.**

This specification describes the minimum acceptable requirements for a full- traffic-actuated controller assembly with the options specified on the plans.

The controller assembly shall include a cabinet, a solid state full-actuated controller unit, load switches, flasher, conflict monitor, and pertinent documentation.

The controller assembly shall meet the requirements of NEMA (National Electrical Manufacturers Association) Standards Publication No. TS-1. In addition, all inputs and outputs to the controller unit shall conform to all interface and environmental standards in NEMA TS-1. Where a difference occurs, these requirements shall govern.

When called for on the plans, the controller assembly shall meet the requirements of NEMA Standards Publication No. TS-2.