ITEM 683.04105008 – 50 FOOT STEEL CAMERA POLE WITH 2 LOWERING DEVICES

DESCRIPTION

This work shall consist of the furnishing and installing a 50 Foot Camera Pole, with 2 Lowering Devices for:

1. Closed Circuit Television Camera (CCTV) cameras
2. Wireless Microwave License or Unlicensed Radio equipment or similar Wireless equipment as directed by the Engineer.
3. Various sensors

This work shall be in accordance with the Contract documents and as directed by the Engineer.

MATERIALS

a. General
The 50 Foot Camera Pole with 2 Lowering Devices shall be compatible with the NYSDOT microwave and millimeter radio equipment, and the Camera Assembly equipment used in the Contract to ensure proper integration. The Radio and CCTV camera equipment are specified and paid for under separate items.

b. 50 Foot Camera Pole Assembly
The Camera Pole assembly shall be 50 Feet in height with two lowering devices and secured with anchor bolts. All parts subject to wear shall be made from stainless steel. All other components of the poles, mounting apparatus, and lowering devices shall be constructed of hot dipped galvanized steel. The poles shall meet the requirements of NYSDOT Standard Specifications Subsection 724-03 as they pertain to a 50 Foot Camera Pole with two 35” support arms and lowering devices. In addition, the natural frequency of the installed pole shall be outside the critical wind velocity (Vc) range of 6 mph to 12 mph. The maximum allowable horizontal deflection at the elevation of cameras shall not exceed the following:

- One (1) inch due to 43 mph (3 sec.-gust) winds calculated based on the latest version of EIA/TIA RS-222-G.
- One (1) inch due to 30 mph (non-gust) winds calculated based on the latest version of EIA/TIA RS-222-G.

The Contractor shall furnish and install the 50 Foot Camera Pole with 2 Lowering Devices in compliance with the twist and sway requirements of Electronic Industrial Alliance/Telecommunications Industry Alliance (EIA/TIA) RS-222-G (or latest revision) code or the antenna manufacturer’s requirements, whichever is more stringent. The maximum allowable horizontal deflection of antennas shall be as per the EIA/TIA RS-222-G (or latest revision) code or as per antenna manufacturer’s specifications, whichever is more stringent.

c. LOWERING DEVICES
Each lowering device shall be able to carry and lower a minimum of two devices including cameras, radios or sensors. Each lowering device shall operate independently.
Lowering devices shall utilize heavy-duty connectors. The female and male socket contact halves of the connector block shall be made of either a thermosetting synthetic rubber or shall be built-up of multiple component blocks designed for outdoor telecommunications and/or automotive “under the hood” applications with a minimum heat distortion temperature of 208 degrees F, as approved by the Engineer. Any materials used to seal and/or waterproof the built-up connector shall be 100% silicone sealant with a temperature range of -80 degrees F to 450 degrees F.

The current carrying male and female contacts shall be corrosion resistant, high conductivity or CAT. 5e/6 cable. Each contact shall be rated up to 600V, 7A Max and shall be derated according to the wire used in the application. The number of contacts shall be dictated by the requirements of the device(s) to be mounted thereto. The number of contacts shall be enough to satisfy the maximum number of equipment items to be lowered.

MECHANICAL

All pulleys for the lowering devices and portable lowering tools shall have sealed, self lubricated bearings or tight bronze bearings sealed and lubricated with oil. The lowering cable shall be a minimum diameter of 0.125 inches, stainless steel aircraft cable with a minimum breaking strength of 391 lbs. The lowering cable shall be housed inside of a conduit to prevent it from contacting any cabling that may be running through the inside of the pole.

The interface and locking components shall be made of stainless steel. All external components of the lowering device shall be made of corrosion resistant materials. All components fabricated from steel or cast iron shall be galvanized in accordance with NYSDOT Standard Specifications Subsection 719-01 Galvanized Coatings and Repair Methods, Type II. The contact unit housing shall have a replaceable neoprene gasket.

- LOWERING TOOL
  The lowering tool shall be made of steel, cast iron or aluminum components. Steel and cast iron parts shall be galvanized in accordance with NYSDOT Standard Specifications Subsection 719-01 Galvanized Coatings and Repair Methods, Type II.

- LOAD CAPACITY
  The lowering device shall have a load capacity safety factor of 2 to 1. The maximum load and safety factor calculation shall be calculated by the Contractor and provided to the Engineer for review as per the Documentation section of this specification.

- FALL ARREST SAFETY SYSTEM
  The Fall-Arrest Safety System shall be designed to minimize accidental falls, or to limit the distance of falls. The Fall-Arrest Safety System shall permit the person to ascend or descend the structure without having to continually manipulate the Fall-Arrest Safety System or any part of the system. Climbing facility of Fall Arrest Safety System shall be designed to support a minimum 350 pound concentrated live load. The support structure for the Fall Arrest Safety System shall be designed to support a uniform live load of 35 psf, but in no case shall the support structure be designed for less than a total live load of...
700 pounds. The step surface of Fall Arrest Safety System, such as grating, shall be designed to support two 350 pound loads. These loads are not to be applied concurrently with wind and ice loads.

All components of the Fall- Arrest Safety System– including harness attachment, harness, brake pawl(s), ratchet wheel(s), trolley, rail, and brackets – shall function as a unit during such free-fall downward jerk to prevent the mass from descending. The Fall-Arrest Safety System shall comply with the common fall arresting device standards used industry, including:
- Electronic Industrial Alliance/Telecommunications Industry Alliance (EIA/TIA) RS-222-G,
- “Structural Standard for Steel Antenna Towers and Antenna Supporting Structure”
- Occupational Safety and Health Administration (OSHA) standards 29 CFR 1910 – 268, pertaining to telecommunications work and other applicable OSHA standard.
- OSHA Class 7216-81, Personal Protective Equipment
- ANSI Z359.2.1-M2007 (R 2007) Personal Fall Arrest

d. POLE CABLELING
Each Lowering device shall have the following power, data and control cables assignment:
- Four (4) Pairs Ethernet Cable 1 (Cat. 6 Outdoor Rated) for Digital Device 1 - IP camera (8 pins),
- Four (4) Pairs Ethernet Cable 2 (Cat. 6 Outdoor Rated) for Digital Device 2 – IP Device (8 pins),
- Two (2) conductor # 12 AWG AC Power (2 pins)
- Ground wire (one pin),
- Seven Conductors (7) Alarm or control cable, (7 pins)
- RF LMR-200 cable (If applicable and as per Engineer’s direction )

All cables shall be outdoor rated cables applicable for vertical and horizontal installation. The Contractor shall coordinate the pole electrical, data and control cables installation with the Engineer and the Transportation Management Center.

CONSTRUCTION DETAILS

The Contractor shall survey the location – and drive a stake at the location in order to provide clear marking - for the 50 Foot Camera Pole with 2 Lowering Devices for approval by the Engineer 30 days prior to any construction. The pole and camera locations shown on the plans shall be field checked for any condition that may affect their placement. Where changes are necessary, the exact location will be determined in coordination with the Engineer.

a. Pole Construction
The pole shall be erected in accordance with the contract documents. Pole erection shall include installation of attachment fittings as specified in the contract documents as follows:
- Anchor bolt covers in areas subject to pedestrian traffic
ITEM 683.04105008 – 50 FOOT STEEL CAMERA POLE WITH 2 LOWERING DEVICES

- Weather heads and couplings
- Pole cap
- Cabinet mounting fittings, plates, brackets as needed
- Reinforced couplings for wire entrances to cabinets
- Transmission line hoist grips
- Pole Painting: If required in the Contract documents, Camera Pole painting shall meet the requirements of Section 657 Painting Galvanized and Aluminum Surfaces of the Standard Specifications.
- Grounding system.

b. **Grounding System Construction**
   A copper clad ground rod, ground wire and fittings shall be installed as shown in the contract documents. The grounding system shall be electrically connected to the grounding terminal on the pole or cabinet. The grounding system, when completed, shall be tested in accordance with Section 680-3.32 of the NYSDOT Standard Specifications Construction and Materials. If the requirements of the test are not met, additional ground rods, ground rod extensions, electrical bonding of metallic conduit, or other means may be required.

c. **Lowering Device Construction**
   Each lowering device shall be designed to support and lower multiple devices such as cameras, radios, sensors and antennas.

   In case of carrying a closed circuit television camera, the lowering device shall support the camera, lens, camera housing, mounting hardware, pan/tilt/zoom (PTZ) mechanism, cabling, connectors and other supporting field components. The lowering device operation shall not damage or degrade camera operations.

   In the case of carrying a radio, antenna or sensor, the lowering device shall support radios, antennas, sensors, cabling, and mounting brackets, mounting fixtures or supports. The lowering device operation shall not miss align the radio antennas. The radio mounting support and bracket should have an antenna alignment position marking system for use during the radio link set up.

   The lowering device shall be designed to support and lower a minimum of two devices such as cameras, sensors or radio/antenna(s) – with maximum equipment weight of 330 lbs and capacity for a maximum equipment projection area of 3 sf, each. Each Lowering device shall be furnished and installed with the necessary fixture/mounting hardware for supporting the multiple devices.

   The antenna lowering device shall be able to lower the antenna, cabling, connectors, and other supporting field components, without damaging the antenna.

   The lowering devices shall consist of a suspension contact unit, support arm and a pole adapter to attach to a 50 Foot Camera Pole. The support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and to insure the contact unit cannot twist under high wind conditions.

   The Camera Pole shall be designed for a minimum of six (6) square feet as the total of the unshielded area for all equipment and lowering devices.
The lowering device manufacturer shall provide a factory representative to assist the Contractor with the assembly and testing of the first set of two lowering systems onto the pole assembly at the site location as specified on the plans. The Contractor shall furnish the Engineer with documentation certifying that the Contractor has been instructed on the installation, operation and safety features of the lowering device.

Each lowering device’s suspension contact unit shall have a load capacity of 330 lbs with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The moveable assembly shall have a minimum of two (2) latches. This latching mechanism shall securely hold the camera and its control equipment free of vibration or motion between the components. The latching mechanism shall operate by alternately raising and lowering the assembly using the winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and the means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a replaceable neoprene gasket provided to seal the interior from dust and moisture.

All electrical, Ethernet, RF, data and video cable connections between the fixed and moveable lowering device components shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and moveable lowering device components shall be designed to conduct high frequency data bits, and one (1) volt peak to peak CCTV video signals as well as the power requirements for operation of equipment environmental controls. The electrical connections between the fixed and moveable antenna lowering device components shall be designed to conduct high frequency RF signals.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting any electrical cabling. The only cable permitted to move within the pole or lowering device during lowering or lifting shall be the lowering cable. All other cables shall remain stable and secure during lowering and raising operations.

The Contractor shall obtain weights and/or counterweights as necessary from the lowering system manufacturer to assure that the alignment of pins and connectors are proper for the device’s support to be raised into position without binding. The lowering unit shall have sufficient weight for disengagement so that it can be lowered properly.

The lowering device orientation shall be installed in accordance with the contract documents or as directed by the Engineer.

d. **Lowering Tool**

   Each lowering device shall be operated by use of a portable lowering tool. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, a quick release cable connector, an adjustable safety clutch and a variable speed industrial duty battery powered electric drill motor. This tool shall be compatible by accessing the support cable through the hand hole of the pole. When attached through the hand hole, the tool shall support itself and the load assuring lowering operations and provide a means to prevent uncontrolled freewheeling drops when loaded. The lowering tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity
load. It shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism. The Lowering tool shall be equipped with positive locking mechanism to secure the cable reel during raising and lowering operations. For every five (5) 50 Foot Camera Poles installed, the contractor shall provide one (1) variable speed drill (500 rpm maximum) that has a heavy-duty drill motor and any additional tools required by plan notes.

e. Foundation Construction
The Contractor shall construct a foundation for the 50 Foot Camera Pole with 2 Lowering Devices that meets the requirements of NYSDOT Standard Specifications Section 680 and appropriate standard sheets. Anchor Bolt pattern shall be per the pole manufacturer’s recommendations, but should meet the requirements of Section 680 of the Standard Specifications and standard Sheet 680-01. The pole foundation will be paid under the appropriate items of work in accordance with the contract documents.

f. Lowering Device Test
The Contractor shall perform the following test as part of the Lowering device approval.

- Lowering Device Connector Test
  The Contractor shall provide a demonstration of the lowering device connector (for video, RF signal and Ethernet connectivity). This test shall be performed as per direction of the Engineer. The contractor shall coordinate schedule of this test with the Transportation Management Center. The test method shall be based on the UL Standard 2556: Wire and Cable Test Method, Standard TIA-566-C (Continuity Test).

- Electrical Test
  All Lowering device cables including Ethernet, Serial Data, Power, Ground and control cables shall be tested prior to installation. After assembly and installation of the lowering device the cables shall be tested from the Lowering device junction box at the pole to the field equipment cabinet / Cable Termination point. The Test shall be performed with Ethernet/Data Cable Tester (Ethernet and Serial) and Multi-meter (Power and Ground).

- Lowering Device Operation Test
  After installation of all equipment on the Camera Pole, the Contractor shall perform the lowering device operation test. Under this test, all full functionality and operation of all devices including cameras, radios and/or sensors will be tested before and after lowering device actions. As a minimum, each lowering device and associated field equipment shall be lowered and raised three (3) times. All equipment shall be returned to their original positions and no misalignment should be observed. The radio antennas alignment shall not be affected by the lowering device operation and the performance of the wireless link and cameras shall not be adversely affected. Based on the installed equipment on each lowering device, the contractor shall submit the Lowering Device Operation Test Plan to the Transportation Management Center for review and approval.
90 Days Operation Test:

After successfully completion of the Lowering Device Operation Test the lowering device shall be in use and the connectivity of the CCTV camera or Radio equipment on the Lowering device will be monitor by the Transportation Management Center for a duration of 90 days. During this period, the contractor may lower the CCTV or Radio equipment as per Regional TMC request. At the End of 90 days period, no equipment function and operational issue should be observed. If any issue or maintenance is required, the Contractor shall fix the problem and 90 days Operation Test shall be started again.

Documentation:

Within 60 days of Authorization to Proceed, the Contractor shall submit the following for review and approval:

A. Camera Pole Design Submission

The Camera Pole Design drawings package shall include but not limited to:

- Pole Manufacturer Cut Sheets
- Lowering Device Cut Sheets
- Pole Design Shop Drawings
- Pole Design Calculations
- Lowering Device Shop Drawings
- Lowering Device Wiring Drawings
- Lowering Device Connector Information and Test Data
- Lowering Device multi device/equipment mounting support/fixture Shop Drawing
- Camera, Radio, Antenna and other equipment mounting Detail Drawing
- Cables and Wiring Labeling Details
- Lowering Device Connector Pin Assignment Details
- Cabinet Equipment Placement Layout Drawings
- Lowering Device Connector Performance Test Plan

The design computations must be approved, stamped, and signed by a New York State Professional Engineer. The design shall be in accordance with the 2013 (or most recent version with latest revisions) of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals and the latest version of EIA/TIA RS-222-G.

The Engineer will approve the submission or respond with comments within 15 working days of receiving the Contractor’s submission.

B. Final Camera Pole Drawing Package: The Final Camera Pole Drawing Package shall be approved by the Transportation Management Center prior to final acceptance. The Final Camera Pole drawings package shall include but not limited to:
ITEM 683.04105008 – 50 FOOT STEEL CAMERA POLE WITH 2 LOWERING DEVICES

- Camera Pole Final Site Layout, Pole location, Lowering Device Orientation, installed equipment, Cabinet, pull boxes and cables and wires Details- As Built Copy
- Pole Design Final Shop Drawings- As Built Copy
- Lowering Device Final Wiring Drawings - As Built Copy
- Camera, Radio, Antenna and other equipment mounting Detail Final Shop Drawing - As Built Copy
- Cables and Wiring Labeling Final Details
- Lowering Device Connector Final Pin Assignment Details
- Lowering Device schematics, parts lists, and maintenance manual

All Camera Pole drawings shall be 11 x 17 in size. All drawings shall be submitted in hard copy, electronic, and CAD/Microstation (latest version used by NYSDOT) formats.

The Engineer will approve the submission or respond with comments within 15 working days of receiving the Contractor’s submission.

WARRANTY

The Contractor shall provide warranties and guarantees to the State of New York Department of Transportation in accordance with Article 104-08 of the Standard Specifications.

METHOD OF MEASUREMENT

This work shall be measured for the actual number of 50 Foot Camera Pole with 2 Lowering Devices that are satisfactorily furnished and installed in accordance with the Contract Documents.

BASIS OF PAYMENT

The unit price bid shall include the cost of furnishing all materials, labor, and equipment for each 50 Feet Camera Pole with 2 Lowering Devices for each pole, including lowering devices, mounting fixtures and supports, mounting brackets, testing and all documentation necessary to satisfactorily complete the work.

Progress payments will be made as follows:

Twenty Five percent (25%) of the bid price of each item will be paid upon satisfactory completion and approval of the Camera Pole Design Submittal, Sixty percent (60%) will be paid upon satisfactory completion of the pole and lowering device connector, electrical and operational tests, installation and inspection, Final Camera Pole Drawing Package approval and Lowering Device Operation Test acceptance; Fifteen percent (15%) will be paid upon satisfactory completion of 90-Day Operational Test of the 50 Feet Camera Pole with 2 Lowering Devices.