SPECIAL SPECIFICATION

6575

CCTV Camera Pole w/Two Lowering Devices

1. Description. Under this Item, the Contractor shall furnish and install a 80 ft. Camera Pole, with two Lowering Devices, including a camera pole with 80 ft. effective height above ground, fall-arrest safety system and 2 lowering devices for:

- A Closed Circuit Television Camera (CCTV)
- Microwave Equipments

The following microwave equipment will be attached/fixed on the camera poles:

- One or two Wireless Ethernet Access Point Units
- Microwave equipment styled antennas and radio units as specified in the plans and the equipment specification or as specified by the Engineer.

The 80 ft. Camera Pole with 2 Lowering Devices is to have a fall-arrest safety system and lowering system support arms that are attached to the pole. The geographic directions towards which these support arms point are as shown in the Contract Documents, or as directed by the Engineer.


A. General. The 80’ Camera Pole with 2 Lowering Devices that is to be furnished shall be compatible with the proposed Microwave Wireless Ethernet Unlicensed Frequency Access Point Unit, and the Camera Assembly equipment and systems to ensure proper integration.

The camera lowering system shall be designed to support and lower the microwave unit(s) and, standard closed circuit television camera, lens, housing, PTZ mechanism, cabling, connectors and other supporting field components with damage or causing degradation of camera operations. The camera lowering system device and the pole are interdependent; and thus, must be considered a single unit or system. The lowering system shall consist of a pole, suspension contact unit, divided support arm, a conduit mount adapter, a pole adapter for attachment to a pole top tenon, pole top junction box, and camera connection box. The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and insure the contact unit cannot twist under high wind conditions. Round support arms are not acceptable. The camera-lowering device shall withstand wind forces of 100 mph with a 30% gust factor using a 1.65 safety factor. The lowering device manufacturer, upon request, shall furnish independent laboratory testing documents certifying adherence to the stated wind force criteria utilizing, as a minimum effective projected area, the actual EPA or and EPA greater than that of the camera system to be attached. The lowering device to be furnished shall be the product of manufacturers.
with a minimum of 3 years of experience in the successful manufacturing of camera lowering systems. The lowering device provider shall be able to identify a minimum of 3 previous projects where the lowering system has been installed successfully for over a one-year period of time each.

**B. 80 ft. Camera Pole Assembly.** The Camera Pole assembly shall be 80 ft. in height with 2 lowering devices. All steel parts subject to wear, such as pins, rollers, etc. 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 applicable TxDOT Standard Specifications as they pertain to an 80 ft. Camera Pole with 2 support arms and lowering devices. The maximum allowable deflection at the top of the pole, with camera, Microwave equipment and lowering devices installed, shall not exceed 1 in. due to a 30 mile/hr (non-gust) winds calculated based on the AASHTO 2003 (or latest version) and Electronic Industrial Alliance/Telecommunications Industry Alliance (EIA/TIA) RS-222 G.

The lowering device manufacturer shall furnish a factory representative to assist the electrical contractor with the assembly and testing of the first lowering system onto the pole assembly. The manufacturer shall furnish the applicable TxDOT Engineer documentation certifying that the electrical contractor has been instructed on the installation, operation and safety features of the lowering device. The Contractor shall be responsible for providing the applicable maintenance personnel “on site” operational instructions.

**C. Suspension Contact Unit.** The suspension contact unit shall have a load capacity of 200 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and movable components of the lowering device. The movable assembly shall have a minimum of 2 latches. This latching mechanism shall securely hold the device and its mounted equipment. 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 form the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power, data or video cabling. The lowering device manufacturer shall provide a conduit mount adapter for housing the lowering cable. This adapter shall have and interface to allow the connection of a contractor provided conduit and be located just below the cable stop block at the back of the lowering device. The Contractor shall supply internal conduit in the pole as required by the device provider. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cable must remain stable and secure during lowering and raising operations.

The female and male socket contact halves of the connector block shall be made of thermosetting synthetic polymer known as Hypalon. The female brass socket contacts and the male high conductivity brass pin contacts shall be permanently molded into the polymer Hypalon body.
The current carrying male contacts shall be 1/8 in. in diameter. There shall be 2 male contacts that are longer than the rest which will make first and break last providing optimum grounding performance. The number of contacts shall be 14 and the camera mounted thereto, shall be capable of performing all of its necessary functions on 14 contacts or less.

The current carrying female contacts shall be 1/8 in. I.D. All of the contacts shall be recessed 0.125 in. from the face of the connector. Cored holes in the rubber measuring 0.25 in. in diameter and 0.125 in. deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

The wire leads from both the male and female contacts shall be permanently and integrally molded in the polymer Hypalon body. The current carrying and signal wires shall be constructed of #18/1 AWG Hypalon jacketed wire.

The contacts shall be self-wiping with a shoulder at the base of each male contact so that it will recess into the female block, thereby giving a rain-tight seal when mated.

D. **Lowering Tool.** The camera-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 electric drill motor. This tool shall be compatible with accessing the support cable through the hand hole of the pole. The lowering tool shall attach to the pole with one single bolt. The tool will support itself and the load assuring lowering operations and provide a means to prevent freewheeling when loaded. The lowering tool shall be delivered to the applicable TxDOT Engineer upon project completion. 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. The lowering tool shall be provided with and adapter for operating the lowering device by a portable drill using a clutch mechanism. The lowering tool shall be equipped with a positive breaking mechanism to secure the cable reel during raising and lowering operations and prevent freewheeling. The manufacturer shall provide a variable speed, heavy-duty reversible drill motor and a minimum of one lowering tool plus any additional tools required by plans notes. The lowering tool shall be made of durable and corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

E. **Lowering Device.** All pulleys for the camera lowering device and portable lowering tool shall have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered bronze bushings. The lowering cable shall be a minimum of 1/8-in. diameter stainless steel aircraft cable with a minimum breaking strength of 1740 lb. with 7 strands of 19 gauge wire each.

All electrical, data and video coaxial connections between the fixed and lowerable portion of the contact block 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 movable lowering device components shall be
designed to conduct high frequency data bits and 1 volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls. The electrical connections between the fixed and moveable antenna lowering device components shall be designed to conduct Fast Ethernet or high frequency RF signals.

The interface and locking components shall be made of stainless steel and/or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

The Camera Manufacturer shall provide weights and/or counterweights as necessary to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit will have sufficient weight to disengage the camera and its control components in order that it can be lowered properly.

The Camera Manufacturer shall provide the power and signal connectors for attachment to the bare leads in the pole top and camera junction boxes.

The Camera Manufacturer shall provide a mounting flange sufficient for mounting their respective camera assembly to the bottom of the Camera connection box.

F. Camera Lowering System Spun Concrete Pole.

1. Pole Design.
   - Poles shall be designed considering application of wind load and dead load.
   - The moment at any point along the length of the pole is the sum of the moments resulting from dead loads and forces from wind loads. The wind force is equal to the wind pressure multiplied by the effective projected area (EPA) of the objects involved.
   - Poles shall be designed to withstand 90, 100 or 110, 120, 130, 140 or 150 MPH 3-second gust wind speed as specified by TxDOT.
   - The 80 ft. poles shall be designed to have a minimal deflection not greater than 1.65 in. at 30 MPH non-gust wind speed calculated based on the AASHTO 2003 (or latest version) and EIA/TIA RS-222 G.
   - The natural frequency of the installed pole shall be outside the critical wind velocity (Vc) range of 6.25 MPH to 12.5 MPH.
   - The Contractor shall submit design computations to the Engineer a minimum of 30 days prior to the construction of the camera poles, pole foundation, lowering devices, and mounting plates. The design computations shall be approved, stamped, and signed by a Professional Engineer. The design shall be in accordance with the 2003 (or most recent version with latest revisions) AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.
   - The 80 ft. Concrete Pole with Two Lowering Devices shall be in compliance with the twist and sway requirements of EIA/TIA RS-222 G.

2. Pole Materials.
• Concrete – The pole shall achieve a minimum 28-day compressive strength of 8,000 psi. Cement shall conform to the latest requirements of Type I hydraulic cement in accordance with ASTM-C150. Maximum size aggregate may be ¾ in. or ¾ of the clear spacing between reinforcing steel and surface of the pole. Any water reducers, retarders, or accelerating admixtures shall conform to ASTM-C494. Water shall be free from foreign materials in amounts harmful to concrete and embedded steel.

• Reinforcing Steel – Deformed steel reinforcement shall conform to requirements of ASTM-A615 for Grade 60 Rebar.

• Pre-stressing Steel – Pre-stressing steel reinforcement shall conform to uncoated 7-wire, stress relieved strand; ASTM-A416.

• Spiral Reinforcement – Steel spiral reinforcement shall conform to the requirements of ASTM-A82 and shall not be less than 0.148-in. diameter.

• Hardware – All structural steel shall conform to ASTM-A36 and zinc alloy AC41A shall conform to ASTM-B240. The finish shall be hot dipped galvanized in accordance with ASTM-A153.

• Electrical Ground – All poles will be supplied with a #6 stranded copper ground wire cast into the wall of the pole at the hand hole box location.

G. Fall-Arrest Safety System. The 80 ft. Concrete Pole with Two Lowering Devices shall be equipped with the Fall – Arrest Safety System that include climbing facility (steps or ladder) and fall protection safety facility. 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. The climbing facility of the Fall-Arrest Safety System shall be designed to support a minimum 350 lb. concentrated live load. The support structure for the Fall-Arrest Safety System shall be designed to support a uniform live load of 35 lb/ft², but in no case shall the support structure be designed for less than a total live load of 700 lb. The working surface of the Fall-Arrest Safety System, such as grating, shall be designed to support 2- 350 lb. 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 freefall downward jerk to prevent the mass from descending. The Fall-Arrest Safety System shall comply with the common fall arresting device standards used in the industry, including:

• EIA/TIA RS-222 G, “Structural Standard for Steel Antenna Towers and Antenna Supporting Structure”

• Occupational Safety and Health Administration (OHSA) 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-M1992 (R 1999) Personal Fall Arrest


- All manufacturing tolerance, details of reinforcement, and finishes shall be in accordance with the Guide Specification for Pre-stressed Concrete Poles as published in the May-June, 1982, issue of the Journal of the Pre-stressed Concrete Institute.
- A concrete cylinder test shall be performed for each 100 cu. yd. of concrete poured. A final quality control check shall be carried out on each pole after manufacturing is complete. All quality control procedures shall be mandated in a written manual and be available for inspection.
- Poles shall be pre-stressed and the concrete placed by the centrifugal spinning process. The centrifugal spinning is to ensure both a 28-day compressive strength of 8,000 psi and a minimum of ¾ in. cover over the pre-stressing strand.
- Poles shall have a smooth natural form finish, soft gray in color.
- Poles shall be designed and constructed so that wiring and grounding facilities are concealed within the pole. All hand holes, couplings, thru-bolt holes and ground wire shall be cast into the pole during the manufacturing process.
- Poles shall be round in cross section and provide a continuous taper of 0.18 in. per foot of length and provide a minimum of ¾ in. of concrete coverage over the pre-stressing strands.
- All cable entry holes shall be in accordance with the location of submittal drawings, and sizes as required, and shall be free from sharp edges for passages of electrical wiring.
  - Two 3 in. x 12 in. conduit entrance openings centered 18 in. below grade.
  - One 4.5 in. x 30 in. steel galvanized reinforced hand hole frames with flush cover located above grade.
- Camera lowering device to mount to a special designed tenon bolted to the top of pole (see assembly drawings).
- All poles shall be provided with a fish wire to facilitate cable installation.
- All poles MUST have a minimum 5 in. raceway to handle all the cables and a dual mount system.


A. General. The Contractor shall survey the location and drive a stake at the location in order to provide clear marking for the 80 ft. Camera Pole with Two Lowering Devices for approval by the Engineer prior to any prefabrication or related construction. The pole and camera location shown on the plans shall be field checked for any condition that may affect their placement. Where changes are necessary, the exact location shall be determined in coordination with the Engineer.

The Contractor shall submit shop drawings 30 days prior to the installation of the pole to the Engineer for review and approval.

B. Handling and Erection.
• Pre-stressed concrete poles shall be lifted and supported during manufacturing, stockpiling, transporting and erection operations only at the points shown on the shop drawings.

• Transportation, site handling, and erection shall be performed with acceptable equipment and methods, and by qualified personnel.

C. Pole Burial. The Contractor shall bury and install the 80 ft. Concrete Pole with Two Lowering Devices at the locations on the plans and as directed by the Engineer. The Contractor shall install the pole based on the manufacturer’s standard and requirements for the pole installation. The 80 ft. Concrete Pole with Two Lowering Devices shall be direct buried with 80 ft. height above ground level.

The contractor shall test the soil bearing and shall provide the soil bearing report, the details of the pole installation including, burial details, and backfilling materials to be utilized to the Engineer for review and approval. If soil bearing strengths are in question by the manufacturer or the Engineer, the Contractor shall provide an engineered installation design for the poor soil condition locations and submit the design to the Engineer for approval. The Contractor soil report and Engineer’s seal are mandatory before submitting to the Engineer for review and approval.

D. Grounding. A copper clad ground rod, ground wire and fittings shall be installed as shown in the contract documents. The ground 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 TxDOT Standard Specifications. If the requirements of the testing are not met, additional ground rods, ground rod extensions, electrical bonding of metallic conduit, or other means may be required.

E. Camera and Antenna Lowering Devices. The camera lowering device shall be designed to support and lower a closed circuit television camera, lens, pan/tilt/zoom (PTZ) mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. In the case of the antenna lowering device, it shall be designed to support and lower antenna/microwave equipment with maximum equipment weight of 200 lbs. The antenna lowering device shall be able to let down the antenna, wireless unit, cabling, connectors, and other supporting field components, without damaging the antenna. Both the camera and antenna lowering devices shall consist of a suspension contact unit, conduit mount adapter, support arm and a pole adapter to attach to an 80 ft. pole. The support arm and receiver installation and to insure the contact unit cannot twist under high wind conditions. The CCTV pole shall be designed for a minimum 8 ft² as the total of the unshielded area for all equipment and lowering devices.

5. Measurement. This Item will be measured as each pole furnished, installed, and tested in accordance with the Contract Documents.

6. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “CCTV Camera Pole w/2 Lowering Devices”. This price is for equipment; cables and connectors;
documentation and testing; labor materials; warranty; training; and incidentals. The installation of the necessary mounting plates, grounding system, anchor bolts, lifting devices, pole assembly, erection and field galvanizing as required shall be included in the bid price.