SP-150645
(New)

SPECIAL PROVISIONS
FOR
SELF SUPPORTING TOWER INSTALLTION

Harrison County
ITS-030-1(168)--25-43

Effective Date
June 16, 2020

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150645.01 DESCRIPTION.

This project involves supplying and installing all materials and labor required for the foundation, grounding, tower sections, and ancillary materials for a Nebraska DOT Self Supporting Tower to support ITS device installations. Installation of meter pedestal, handholes, conduit and conductors are included in the ITS Infrastructure Installation Special Provisions.

150645.02 GENERAL.

A. This special provision consists of the requirements to construct a Camera Tower, as described in the contract documents. This work shall include all materials, labor, tools, and incidentals required to erect a climbable tower on the west end of the US 30 Missouri River Bridge at the location shown in the contract documents.

B. Contractor shall supply new materials only. All materials and installations shall comply with the Underwriter's Laboratory and National Electric Code.

C. The Engineer shall authorize any changes to the contract documents in writing before performing the installation. No additional compensation shall be provided for additional work associated with or resulting from unauthorized changes to the contract documents.

D. Components, accessories, and hardware shall be compatible.

E. All Manufacturers manuals, instructions and warrantees shall be transferred to Iowa DOT.

F. Required Submittals: In addition to submissions required under each pay item, Contractor shall provide shop drawings or catalog cuts for each material prescribed including manufacturer name and model number.

G. Any damage to galvanized surfaces shall be repaired with zinc rich paint from the NDOT approved products list. Repairs shall be inspected by the Engineer.

H. Wires/cables noted in the plans shall follow section 402 of the current NDOT Standards and Specifications Book.

150645.03 MATERIAL AND INSTALLATION.

A. Tower.

1. The contractor shall furnish and construct a tower for mounting a CCTV camera at a height indicated in the plans. The furnished tower shall include but not be limited to a tower, foundation, mounting struts for the cabinet and camera mounting plate as shown in the plans. The tower shall be equipped with a tower manufacture approved safety climb system if specified height is over 40 feet.

2. The tower shall have a deflection of no more than 1/2 inch in a 30 mph sustained or non-gusting wind.

3. The self-supporting metal tower shall be of tripod-design that meets EIA/TIA-222-F code requirements. Tower shall be:
- Sabre Model 1800 SRWD,
- Valmont Site Pro 1 Broadband Tower, or
- Iowa DOT approved equal.

4. Tower anchor bolts and anchor bolt template shall meet the manufacturer requirements and current NDOT Standards and Specifications Book. All tower bolt tightening shall be in accordance with the current NDOT Standards and Specifications Book Section 708.03.10.g.

5. Concrete for the foundation shall be in accordance with current Nebraska Standard Specifications Book Section 1002. The foundation shall be designed and constructed in accordance with the manufacturer's specifications, based upon worst-case soil conditions in the area of the tower's installation.

6. Tower framework shall be truss-based, to allow for climbing of the latticework. Contractor shall remove any excess galvanization that is deemed a hazard to climbing activities by the Engineer.

B. Molded-Case Circuit Breaker.

1. Manufacturers.
- Eaton Corporation; Cutler-Hammer Products
- General Electric Co.; Electrical Distribution & Control Division
- Square D/Group Schneider

2. NEMA AB 1, with interrupting capacity to meet available fault currents.

3. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low- level overloads and instantaneous magnetic trip element for short circuits.

4. Molded-Case Circuit-Breaker Features and Accessories:
a. Verify that accessories retained below are available and appropriate for circuit-breaker types and ratings specified.
b. Standard frame sizes, trip ratings, and number of poles.

5. Lugs: Mechanical style with compression lug kits suitable for number, size, trip ratings, and conductor material.

6. Molded-Case Switches: Molded-case circuit breaker with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.

7. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

C. Grounding and Bonding.

1. In raceways, use insulated equipment-grounding conductors.

2. Ground all metal conduit using a No. 6 AWG copper, non-insulated wire bonded to copper-clad metal, driven electrodes using a weld.

3. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections. Iowa DOT shall inspect welds before burial.

4. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

5. Equipment Grounding Conductors

6. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

7. Install equipment-grounding conductors in all feeders and circuits.

8. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

9. Install at least ten rods spaced as shown in plans.

10. Drive ground rods until tops are a minimum 18 inches below finished final grade.

11. Interconnect ground rods with grounding electrode conductors. Use exothermic welds. Make connections without exposing steel or damaging copper coating.

12. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

13. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

D. Grounding and Bonding Connections.

1. Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be compatible.

2. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

3. Make connections with clean, bare metal at points of contact.

4. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

5. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

6. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

7. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

8. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

9. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

10. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

11. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

12. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

E. Grounding Conductors.

1. Insulated with green-colored insulation.

2. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

F. Grounding Electrode Conductors: Stranded cable.
Sizes and types below are typical. Adjust to suit project conditions and requirements.

1. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

2. Bare Copper Conductors: Comply with the following:
   a. Solid Conductors: ASTM B 3.

b. Assembly of Stranded Conductors: ASTM B 8.

3. Tinned Conductors: ASTM B 33.

4. Copper Bonding Conductors: As follows:
- **a.** Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
- **b.** Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
- **c.** Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1 5/8 inches wide and 1/16 inch thick.
- **d.** Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1 5/8 inches wide and 1/16 inch thick.

5. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators.

G. Connector Products.

1. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

2. Bolted Connectors: UL Listed Ground Bolted-pressure-type connectors, or compression type.

3. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

H. Grounding Electrodes.

1. Ground Rods: Copper-clad steel.

2. Size: 3/4 by 96 inches.

I. Pull Ropes.
All conduits shall include one polypropylene pull rope with a minimum 2,670N proper tensile strength.

J. Conduits on Tower.

1. Use hot-dipped galvanized steel conduit for all exposed conduit on the tower unless otherwise indicated. Support exposed conduit with steel hangers at regular intervals.

2. Accomplish change in direction of steel conduit by bending or installing a junction box. Perform bending in a manner that does not change the internal diameter of the conduit, with a uniform curvature, and an inside radius of curvature complying with bending specifications of materials to be installed in conduit. Cut and thread steel conduit to eliminate exposed threads after completing connections. Use paste and tighten all couplings until the adjoining conduit ends meet to allow a continuous inner surface throughout the entire length of the conduit run. Remove all burrs and roughened surfaces from conduits and fittings. Ream, clean, and swab all conduit runs before installation. Use nipples to eliminate cutting and threading short lengths of conduit. Use only galvanized steel fittings with rigid steel conduit.

3. Install standard conduit pipe caps on all conduit ends until installing wiring. Replace caps with approved conduit bushing before wire installation. Seal all conduit openings using an approved sealing compound.

150645.04 FINAL ACCEPTANCE.

A. As-built record plans will be the responsibility of, and completed by, an on-site representative of the Engineer. As such, it will be the responsibility of the Engineer's representative to coordinate directly with the Contractor to ensure that a master record set of the plans is maintained throughout construction to document all installations and any deviations from the design shown in the contract documents.

B. It is the responsibility of the Contractor to maintain written records of daily construction progress, areas worked, and quantities installed to aid in the completeness of as-constructed documentation by the Engineer's on-site representative.

C. The Engineer's on-site representative will be responsible for collecting GPS data of all installations including, but not limited to conduit routing and handholes. All efforts will be made by the Engineer's on-site representative to coordinate with the Contractor and collect daily construction progress.

D. The Contractor shall be responsible to coordinate and assist the Engineer's on-site representative in this effort by staking, flagging or otherwise locating all installed features until such time that the GPS data can be collected.

E. Transfer all required standard materials warranties on the date of final acceptance to the Iowa DOT.

F. Warranty periods shall not commence prior to final acceptance of the work.

G. Perform the following field quality-control testing:

1. After installing grounding/lightning system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Test completed grounding/lightning system. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.

3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Iowa DOT ITS Project Manager promptly and include recommendations to reduce ground resistance.

150645.05 METHOD OF MEASUREMENT.
Measurement for the quantities of Self Supporting Tower will be by count.

150645.06 BASIS OF PAYMENT.
Payment for the quantities of Self Supporting Tower will be at the contract unit price per each. Payment is full compensation for equipment, materials and equipment to provide a self supporting tower as described in the contract documents.

ADDITIONAL BIDDING ATTACHMENTS

Equipment and Materials List for Submittal Requirements.

DESCRIPTION	MANUFACTURER	CATALOG NUMBER
SELF SUPPORTING TOWER		
RIGID STEEL CONDUIT AND FITTINGS		
CIRCUIT BREAKER		
GROUNDING CONDUCTORS		
GROUND ROD		
GROUND CONNECTORS		

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