SP-090053
(New)

Iowa Department of Transportation

SPECIAL PROVISIONS
FOR
STREET LIGHTING

POLK COUNTY

Project No.
HDP-44-6(14)--71-77

Effective Date
MARCH 16, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

1. GENERAL

A. This part of the Special Provisions consists of the requirements necessary when furnishing a highway lighting installation complete, in place and operative as described in the project plans and these specifications.

B. The Standard Specifications for Highway and Bridge Construction, Series of 2009, Iowa Department of Transportation, as modified by these specifications or other appropriate special provisions shall apply to this project. The installation of the highway lighting and appurtenances shall be in conformance with the National Electrical Code, latest edition.

2. EQUIPMENT AND MATERIALS

A. Fabrication or assembly process materials shall comply with the applicable parts of Section 2523 "Highway Lighting" and Section 4185 "Highway Lighting Materials" of the "2009 Standard Specifications" with additions and modifications as stated herein.

B. Equipment and materials shall be of new stock unless the plans provide for the relocation or the use of equipment furnished by others. New equipment and materials shall be the product of reputable manufacturers of electrical equipment, and shall meet the approval of the Engineer.

1. Shop Drawings and Catalog Cuts

Eight (8) copies of shop drawings shall be furnished for control cabinets, hand holes and pull boxes, splices and taps, and fuses and fuse holders to be furnished on the Project. Eight (8) copies of catalog cuts and manufacturer's specifications shall be furnished for all standard off-the-shelf items.

Review by the Engineer of shop drawings and equipment and material lists shall not relieve the Contractor of any of their responsibility under the Contract or the successful completion of the work in conformity with the Plans and Specifications.

2. Before acceptance of the work, the Contractor shall furnish the Engineer with three (3) copies of the manufacturer's instructions for maintenance and operation of lighting equipment, wiring diagrams of the installation or system, and a parts list sufficient for the ordering of any parts.

C. Electrical equipment shall conform to the standards of the National Electrical Manufacturers Association (NEMA). In addition to the requirement of the plans and these Special Provisions; all material and work shall conform to the requirements of the National Electrical Code, the Standards of the American Society for Testing Materials (ASTM), the American Standards Association (ASA), and local ordinances.

Wherever reference is made in these Special Provisions or in the standard provisions to the code, the safety orders, the general order, or the standards mentioned above, the reference shall be construed to mean the code, order, or standard that is in effect at the date of advertising of these Special Provisions.

D. Certification from the manufacturers of all electrical equipment, conduit and conductors shall be supplied by the Contractor stating said material complies with these Specifications.

E. Any existing equipment designated to be removed on the project shall remain the property of the City of Grimes. The Contractor shall deliver any removed equipment to the City Public Works Department.

3. BASIS OF PAYMENT

The highway lighting installation(s) measured as provided above will be paid for at the contract unit priced bid, which price shall be full compensation for furnishing all equipment, materials, and all other work necessary or incidental to the construction of the complete installation and for all equipment, tools, labor, and incidentals necessary to complete the work.

4. REPLACING DAMAGED IMPROVEMENTS

Improvements such as sidewalks, curbs, driveways, roadway pavement and any other improvements removed, broken, or damaged by the Contractor shall be replaced or reconstructed with the same kind of materials found on the work or with materials of equal quality. The new work shall be left in serviceable condition satisfactory to the Engineer. Whenever a part of a square or slab of existing concrete sidewalk, driveway, or pavement is broken or damaged, the entire square or slab shall be removed and the concrete reconstructed.

5. TESTING OF LIGHTING EQUIPMENT

A. After the electrical system is complete, and at such time as approved by the Engineer, conduct an operating test.

B. Demonstrate equipment to operate in accordance with requirements of the Specifications and Drawings.

C. Furnish instruments and personnel required for tests.

6. LABELS

Disconnects, control switches, contactors, load centers, etc. shall be labeled with engraved plastic nameplates. The nameplates shall have white letters on a black background and shall be provided with beveled edges and adhesive backs.

7. CONDUIT

A. The number, type, and size of conduit shall be as indicated on the plans. Conduit shall meet the requirements of Section 2523 and Article 4185.10 of the Standard Specifications.

1. Conduit shown on the plans as rigid steel shall be galvanized steel meeting the requirements of ANSI Standard Specification C80.1, latest revision.

2. Conduit shown on the plans as polyvinyl chloride (PVC) shall be rigid polyvinyl chloride conduit meeting the requirements of NEMA TC-2, EPC-40 OR EPC-80, and applicable UL Standards. All materials and methods for attaching and making fittings shall comply with applicable requirements of NEMA TC-3 and the manufacturer's recommendation and shall be subject to approval of the Engineer. HDPE conduit with an SDR of 13.5 may be used subject to approval of the Engineer.

B. Conduit shall be placed as indicated on the plans. Change in direction of conduit shall be accomplished by bending the conduit. Bends shall be made so that the conduit will not be injured or its internal diameter changed. Bends shall be of uniform curvature and the inside radius of curvature of any bend shall not be less than six (6) times the internal diameter of the conduit.

C. When heating PVC conduit to for a bend, an approved conduit heating device shall be used. Direct flame shall not be applied to the conduit.

D. When it is necessary to cut and thread steel conduit, no exposed threads will be permitted. Couplings shall be tightened until the ends of conduits are brought together so that an electrical connection will be made throughout the entire length of the conduit run. Conduit and fittings shall be free from burrs and rough places and all conduit runs shall be cleaned, swabbed and reamed before cables are installed. Nipples shall be used to eliminate cutting and threading where short lengths of conduit are required. Where the galvanized finish on conduit has been injured in handling, such places shall be painted with zinc rich paint. Fittings used with rigid steel conduit shall be galvanized steel only.

E. Approved conduit bushings shall be installed on the exposed ends of conduits.

F. Conduit buried in open trenches shall be placed a minimum of 24 inches deep unless otherwise directed by the Engineer. Open trench methods of placing conduit will be permitted except where the conduit is to be placed under existing pavement. Conduit in pavement areas shall be placed to a minimum depth of 36 inches below the finished pavement surface or as directed by the Engineer.

G. The backfill material from the placement of conduit in open trenches shall be deposited in the trench in layers not to exceed 6 inches in depth and each layer shall be thoroughly compacted by means of vibratory plate compaction, or approved equal, before the next layer is placed. Cinders, broken concrete, or other hard or abrasive materials shall be removed and shall not be used in the backfill material. Surplus material shall be removed from the public right-of-way.

H. Whenever excavation is made across parkways, driveways or sodded areas, the sod, topsoil, crushed stone or gravel shall be replaced or restored as nearly as possible to its original position and the whole area involved shall be left in a neat and presentable condition. Concrete sidewalks, pavements, base courses and bituminous surfaces shall be replaced with new materials.

I. Pushed conduit shall be placed by jacking, pushing, boring or any other means necessary to place the conduit without cutting or removing pavement. The size of a bored hole shall not

exceed the outside diameter of the conduit that is to be placed. Tunneling under the pavement or water jetting will not be permitted. Pits for boring shall not be closer than 2 feet to the back of curb unless otherwise directed by the Engineer.

J. Conduit openings in the controller cabinet, handholes, and bases shall be sealed with an approved sealing compound. This compound shall be readily workable soft plastic. It shall be workable at temperatures as low as 30°F, and shall not melt or run at temperatures as high as 300°F.

8. CONDUCTORS

A. Conductors shall be copper unless indicated otherwise on the Drawings or in the Specifications. Conductors for power wiring shall be NEC Type THWN. Minimum size for branch circuit conductors shall be No. 10 AWG. Conductors from hand holes to luminaires and receptacles shall be No. 12 AWG. Conductors for control wiring shall be NEC Type THWN. Minimum size for control pilot circuit conductors shall be No. 14 AWG.

1. Comply with wiring sizes indicated on the Drawings and in schedules.

2. Pull conductors in only clean, dry conduit, use pulling grips; lubricated with suitable lubricant.

3. Combining of power circuits in a common raceway is permitted only as listed in conduit or wiring schedules as indicated on the Drawings.

B. Conductors shall be continuous between hand holes and pull boxes. No splices shall be made except within hand holes and pull boxes. Conductors shall be continuous from the hand hole at each pole to its corresponding luminaire or receptacle. Make splices, connections and terminations in accordance with this specification.

C. Color code all wiring using white finished wire for the neutral and bare for equipment grounding conductors. Neutral conductors No. 6 AWG and smaller shall be provided with white insulation for their entire length; conductors No. 4 AWG and larger may use black insulation with white marking tape if marked at 6 inch intervals wherever accessible.

D. Tag conductors with the corresponding circuit number in panels and at accessible locations.

E. Connections to the lighting and receptacle branch circuit breakers and contactors shall be made with No. 10 AWG wire. The No. 10 conductors shall be spliced (in the cabinet/pedestal) to the larger field circuit conductors indicated on the Drawings.

F. Test installed wiring for shorts or grounds. Check conductor insulation resistance after installation in conduit. Replace conductors with less than acceptable insulation resistance with new conductors and retest.

9. HANDHOLES AND PULL BOXES

A. Hand holes shall be 12 inch by 12 inch by 12 inch (nominal) UL Listed, ANSI Tier 15 rated, precast polymer concrete. Covers shall be precast polymer concrete, bolt-down, ANSI Tier 8 rated with skid-resistant surface and provided with “STREET LIGHTING” logos.

B. Pull boxes shall be UL Listed, 11inch by 18 inch by 12 inch (nominal) UL Listed, ANSI Tier 15 rated, precast polymer concrete. Covers shall be precast polymer concrete, bolt-down, ANSI Tier 8 rated with skid-resistant surface and provided with “STREET LIGHTING” logos.

10. GROUNDING AND BONDING

A. Comply with requirements of NEC Article 250 and of the utility company.

B. Provide grounding connections as indicated on the Drawings.

C. Provide separate equipment grounding conductors of the size indicated in raceway to effectively ground all luminaires, receptacles, controls, and non-current carrying metal enclosures. The grounding conductors shall be connected to respective source ground buses.

D. Bond the equipment grounding conductor and the supplemental grounding electrode conductor to the grounding lug at each pole base.

E. Exothermic welding (Cadweld) shall be used to connect grounding electrode conductors to ground rods.

11. GROUND RODS

A. Ground rods shall be copper-weld, 5/8 inch by 10 feet, and one piece. Locate as required to provide an effective grounding system.

B. Service ground rods shall be installed as double ground rods with a minimum spacing of 20 feet between the rods.

C. Grounding electrode conductors shall be No. 6 AWG bare copper.

12. SPLICES AND TAPS

A. Splices within luminaires shall be made with wire nuts.

B. Splices and taps at underground or wet locations, such as in hand holes, shall be made with UL Listed, insulated, submersible, multiple tap connectors with heavy duty EPDM covers and screw caps. Openings in the splicing devices shall be closed when conductor installation is completed. Connectors shall have a minimum of three ports and shall be suitable for terminating the conductor sizes present.

C. Splices and taps at dry, above grade locations (other than within luminaires) shall be made with UL Listed, insulated, multiple tap connectors with screw caps. Openings in the splicing devices shall be closed when conductor installation is completed. Connectors shall have a minimum of four ports and shall be suitable for terminating the conductor sizes present.

D. Split bolt connectors may only be used for joining equipment grounding conductors to grounding electrode conductors in hand holes.

E. Splices shall NOT be made with fuse holders.

13. FUSES AND FUSE HOLDERS

A. Fuses shall be installed in the hand hole for each luminaire. Fuses shall be Class CC (13/32 inch by 1-1/2 inch) rejection type, and shall be of the type and size as recommended by the luminaire manufacturer.

B. Fuse holders shall be two pole, water-resistant. The terminals shall be suitable for terminating the conductors used. Insulating boots shall be provided for both the line and load sides of the fuse holders.

C. The line side of each fuse holder shall be provided with permanent markers identifying the circuit number to which the fuse holder is connected.

14. ELECTRIC SERVICES

A. The Contractor shall furnish and install the electrical services as indicated on the Drawings. The services shall be 120/240 volt, single phase, 3 wire, 200 amp, underground. Work related to the service installations shall be coordinated with the electric utility.

B. The Contractor shall furnish and install the service conduits and conductors from the utility transformers to the meter sockets. The meter sockets shall be provided as part of the electrical control pedestals specified herein, or the traffic signal control cabinets specified in the Traffic Signal specifications. The electric utility will furnish and install the meters, and will connect the service conductors to the utility transformers.

C. Install the services in accordance with the provision of Article 230 of the NEC.

D. The utility service disconnect switches are included as part of the electrical control pedestals and traffic control cabinets.

E. Service equipment including but not limited to the service conduit, and liquid-tight flexible metallic conduit shall be bonded in accordance with NEC 250.92.

F. The electric utility is MidAmerican Energy. The utility representative is Dawn Martino, 515-252-6597.

15. ELECTRICAL CONTROL PEDESTALS AND AUXILIARY EQUIPMENT

A. Provide two (2) electrical control pedestals. The pedestal at S.W. Brookside Drive shall be designated “Electrical Control Pedestal No. 1”. The pedestal at S. Gateway Drive shall be designated “Electrical Control Pedestal No. 2”.

B. The electrical control pedestals shall be as manufactured by Milbank, Meyers, Pacific Utilities, or equal.

C. Each pedestal shall be suitable for operation on a 120/240 volt, 200 amp, single phase, three wire system. Each pedestal shall be rated for 22 KAIC.

D. The pedestals shall be NEMA 3R rated and have a UL 508 label.

E. The pedestals shall be aluminum with a smooth, untreated finish.

F. Install each pedestal on the manufacturer’s pedestal mounting base embedded in concrete, as indicated.

G. Each pedestal shall have a separate, isolated, pad-lockable section for metering equipment, utility termination, and customer equipment.

H. Each metering section shall include a 200 amp MidAmerican Energy approved lever by-pass meter socket. The pedestals shall meet all utility requirements.

I. Provide each pedestal with a 200 amp, twenty-four space, unswitched load center with 200 amp main circuit breaker and flush cover. The panel in Electrical Control Pedestal No. 1 shall be designated “Panel PA”. The panel in Electrical Control Pedestal No. 2 shall be designated “Panel PD”. Provide branch circuit breakers as indicated in the schedules. The neutral bus of each panel shall be bonded to the grounding system.

J. Connect the ground bus of each pedestal to double ground rods, as specified herein.

K. Provide a typed schedule for each panel.

L. Provide each pedestal with a twelve-pole, NEMA rated, 30 amp, electrically held lighting contactor with 120 volt operating coil for controlling the lighting circuits.

M. Provide each pedestal with a twelve-pole, NEMA rated, 30 amp, electrically held contactor with 120 volt operating coil for controlling the receptacle circuits.

N. Provide each pedestal with an internally-mounted NEMA twist-lock photo cell, with window and glare shield. The photo cell shall turn on at 1.5 foot-candles, and shall have a turn on/turn off ratio of 1:3. The photo cell shall be electronic with silicon sensor and have a rated life of at least 5000 operations at rated load.

O. Provide each pedestal with two (2) Hand-Off-Auto control switches for controlling the lighting and receptacle contactors. In Hand, each switch shall connect control power directly to its respective contactor coil. In Auto, control power shall be routed through the photo cell to the respective contactor coil. The control switches shall be 30.5 mm with knob-lever operators.

P. Provide two (2) indicator lights to indicate when each contactor coil is energized. The indicator lights shall be 30.5 mm, 120 vac, of the press-to-test transformer type and shall be provided with LED light sources. Color shall be red.

16. LIGHT POLES AND RELATED APPURTENANCES

A. Poles and mast arms will be furnished by the Owner and shall be installed by the Contractor as part of this contract. Receptacles and covers shall be provided by the Contractor, as specified herein.

B. The Contractor shall transport the equipment to the job site and install poles complete with accessories as indicated on the Drawings or listed in the Pole schedule.

C. Poles shall be erected vertically, with mast arms oriented at 90 degrees to the curb line, unless otherwise specified.

D. Receptacles shall be specification grade, duplex, 20 amp, GFCI, weather-resistant type. Provide cast metal, weatherproof in-use covers, with black factory finish.

17. LUMINAIRES

A. Luminaires will be furnished by the Owner and shall be installed by the Contractor as part of this contract. Lamps shall be provided by the Contractor, as specified herein.

B. The Contractor shall transport the equipment to the job site and install luminaires complete with accessories and lamps as indicated on the Drawings or listed in the luminaire schedule. Where luminaires or lamps are damaged during construction, they shall be replaced with products as indicated on the Drawings and specified below.

C. Ballasts will be protected by Class CC fuses (13/32 inch by 1-1/2 inch) installed in the hand hole at each pole. The Contractor shall verify the correct fuse type and size for each luminaire wattage with the luminaire manufacturer.

D. Luminaires shall be installed in accordance with the Drawings and the manufacturer's instructions. Luminaires shall be mounted rigidly and carefully and shall be supplied with suitable hardware. The mounting of luminaires shall present a neat and workmanlike appearance.

E. Lamps shall be 250 watt, clear, high pressure sodium with 40,000 hour rated life and 27,500 initial lumens (minimum).