651 General Requirements for Electrical Work

651.1 Description

(1) This section describes general personnel qualifications, materials, construction methods, and testing requirements used to perform electrical work required in the contract under 652 through 678.

651.2 Materials

(1) Furnish materials conforming to the WSEC. The department is not a municipal electric department under the provisions of the SPS 316 component of the WSEC.

(2) The department specifies selected materials and manufactured products for electrical work on the QPL.

(3) Within 10 business days after notice of award of the contract, furnish a materials list and shop drawings to the engineer. Include bid items, names and addresses of manufacturers, catalog cut sheets with catalog numbers, and manufacturer's specifications in the materials list. Do not deliver materials or begin the work without the engineer's written approval. The engineer may reject all or part of the materials list. Resubmit alternatives for rejected materials within 15 business days of receipt of the engineer's written rejection. Do not substitute or change materials without the engineer's written approval.

(4) Provide UL or NRTL listed electrical materials or obtain the engineer's approval for materials that do not have a UL or NRTL standard.

(5) Furnish samples of materials proposing to use for testing at the engineer's request. The department will compensate the contractor if material is destroyed.

(6) Return materials loaned from the region electrical units stock to that region electrical unit under the following terms:

- Ensure that return materials are new and in original packaging.
- Return materials to the electrical unit within 6 months of the date that they were picked up.
- Region electrical personnel will not release loaned materials for contractor pick up until the region traffic engineer has a copy of the contractor's order forms for exact replacement materials.
- Ensure that contractor-ordered replacement materials conform to the latest specifications and drawings used for new state replacement orders.
- The department will not accept monetary reimbursement.

651.3 Construction

651.3.1 General

(1) Perform electrical work according to WSEC and the WMUTCD.

(2) Excavate as required to perform the work. If the contractor encounters rock, stones, boulders, debris, or other material during excavation, remove and dispose of that material. Place trench backfill in 12-inch or shallower thoroughly-compact layers. Dispose of excess material as specified for disposing of surplus unsuitable material in 205.3.12. Restore areas damaged or disturbed by the contractor's operations.

(3) Before assembly, apply anti-seize compound to the threads and mating surfaces of threaded connections exposed to the weather. Do not use spray-on products. Do not apply anti-seize compound to the following:

- Electrical Connections.
- Anchor rods and anchor assemblies associated with type 9, 10, 12, & 13 poles under 657, high mast light poles under 660, and camera poles under 677.
- Friction connections using ASTM F3125 A325 high-strength steel bolts.

(4) Unless the contract specifies or engineer directs otherwise, touch up damage to painted equipment with 2 coats of synthetic resin enamel or with 2 coats of engineer-approved zinc-rich paint. Repair damage to galvanized coatings with 2 coats of zinc dust/zinc oxide paint conforming to 614.2. These requirements apply to both contractor-furnished and state-furnished equipment.

(5) Exothermically weld electrical connections between grounding electrode conductors and grounding electrodes.

(6) Each day before electrical crews leave a signalized intersection open to public traffic do the following:

- Remove unused signal heads or cover them from traffic's view.
- Energize and turn on available intersection lighting if signalization is not operational unless the engineer approves otherwise.

(7) Provide as-built drawings detailing the final placement of conduit, cabling, equipment, and geometric modifications under the contract. Provide a PDF copy conforming to CMM 165.14. The engineer will reject as-builts with incomplete or incorrect content or not conforming to CMM standards.

651.3.2 Personnel Qualifications

(1) Perform electrical work using a journey worker electrician or an electrical apprentice under the onsite supervision of a journey worker electrician. Before performing electrical work, provide the documentation specified in 651.3.2(3) to the engineer proving that the electricians performing the work have attained status as journey worker and apprentice electricians.

(2) The department defines electrical work as electrical and related construction required under the contract, performed as specified in the standard specifications, contract special provisions, standard detail drawings, and plan details applicable to electrical construction.

(3) Provide a completion certificate from a state apprenticeship program or a card issued by the Wisconsin department of safety and professional services to prove electricians are qualified.

651.3.3 Testing

(1) After installation and before final hookup, disconnect loads whether buried or not, and test grounded conductors, equipment grounding conductors, ungrounded conductors, and shielding contained in the cable with a megger. Submit the megger test results to the engineer. Ensure that the megger reads greater than 500 mega ohms during each of the following tests:

- To ground.
- Between each conductor.
- Between each shield.

(2) Furnish equipment necessary to test the completed electrical installation. Test and demonstrate to the engineer's satisfaction that the following conditions exist:

1. The circuits are properly connected, continuous, and free from short circuits and unspecified grounds.
2. The connection conforms to the specified wiring layout, or the manufacturer's wiring layout or both.
3. Each circuit operates as designed.

(3) Notify the engineer and request a signal inspection at least 5 business days before the date of the requested inspection. In the event of deficiencies, request a reinspection when the work is corrected. The engineer will not authorize turn-on until the contractor corrects deficiencies.

(4) Operate the completed traffic signal installation for 72 hours consecutively, using the specified signal sequence and all special functions, such as preemption, as the plans show, or as the engineer approves.

(5) The traffic signal installation is not complete until the electrical work is complete and electrical systems work properly.

(6) Operate the completed lighting installation for 20 consecutive nights without failure. Each component that fails must be repaired or replaced and that component must again be subject to the twenty-night proper working order test.

(7) The lighting system is not complete until electrical work is complete and inspected by the engineer, and electrical systems work properly.

651.4 (Vacant)

651.5 Payment

(1) The department will pay for the work specified in 651 separately under the various traffic signal, lighting, and ITS contract bid items.