

## SECTION 670 GENERAL REQUIREMENTS FOR INTELLIGENT TRANSPORTATION SYSTEMS

### 670.1 Description

- (1) This section describes additional personnel qualifications, construction methods, and testing requirements used to perform ITS work.

### 670.2 Materials

- (1) Furnish ITS materials conforming to the general requirements for electrical work as specified in [651.2](#).

### 670.3 Construction

#### 670.3.1 General

- (1) Perform all ITS work conforming to the general requirements for electrical work as specified in [651.3](#).

#### 670.3.2 Personnel Qualifications

##### 670.3.2.1 Field System Integrator

- (1) Perform ITS work with onsite assistance and under the supervision of a qualified field system integrator selected from the department's approved field system integrator list. The field system integrator shall provide assistance and expertise to the contractor in the areas of equipment installation, operation, integration with existing equipment, testing, and network management. The field system integrator is responsible for ensuring all equipment installed operates as the plans show. Assistance is required in the submission of material lists, shop drawings, documentation, as-builts, test results, training and operation manuals and presentations, wiring schematics, equipment test procedures.
- (2) The department defines ITS work as related construction required under the contract, performed according to these specifications, the special provisions, and plans applicable to electrical construction.
- (3) Proof of qualification to do field system integrator work shall meet a minimum of 2 years experience in at least 3 of the following:
  - Maintain or service traffic signal controllers, including NEMA, 170, and 2070 controllers.
  - Install, maintain, integration, or service of vehicle detection systems including, but not limited to, inductive loop sensors, video detection, microwave detectors, and acoustic sensors.
  - Install, maintain, integration, or service of digital communications equipment on either fiber optic or microwave networks. The experience must include a minimum of work with SONET networks, multiplexes, and video encoders and decoders.
  - Install, maintain, integration, or service of computer networks and network equipment including switches, routers, hubs. Provide documentation of training and work experience in network management, SNMP, and software integration.
  - Install, maintain, integration, or service dynamic or variable message displays of various types including LED and flip disk.
  - Install, maintain, integration, or service of closed circuit television systems for traffic surveillance or security. Knowledge of control systems, video signals, switches, and encoding devices is required.
  - Install, maintain, integration, or service of fiber optic cable including splicing and termination. Provide documentation of work history and training that includes a minimum of one 4-day class on fiber optic equipment installation conducted by a major manufacturer of fiber optic equipment, or a FOA certification as a fiber optic technician.

##### 670.3.2.2 Certified Fiber Optic Technician

- (1) Have a certified fiber optic technician perform all work for fiber optic terminations, splicing, and testing. Have a certified fiber optic technician supervise all fiber optic cable installation.
- (2) Submit material to certify technicians meet the following requirements:
  - Education: attend and successfully complete at least one 4-day class on installation of fiber optic products conducted by major manufacturer and have FOA certification.
  - Work history: demonstrate a minimum of 2 years work experience in the last 5 years with splicing, termination, and testing of fiber optic cable.
- (3) Remove, replace, and reinstall work performed by non-certified technicians for fiber optic communications equipment and material.

### **670.3.3 Testing**

#### **670.3.3.1 Contractor-Furnished Equipment and Materials**

- (1) Furnish all equipment necessary to test the completed installation. Test and demonstrate to the engineer's satisfaction that all equipment is in working order.
- (2) Submit documentation required that demonstrates component performance and operation as specified in contract.
- (3) The field system integrator will approve final set up and testing of all equipment and materials.
- (4) Perform all tests on weekdays during normal working hours. Obtain the engineer's approval for test times and dates.
- (5) Resubmittal of rejected equipment or material is allowed for consideration with proof of correction and testing. The department may approve rejected material but is not considered final acceptance for equipment or material until final post-installation testing.

#### **670.3.3.2 Department-Furnished Equipment and Materials**

- (1) The department will test department-furnished equipment and material before the contractor takes possession of it. Coordinate with the department to assist and witness testing. If the contractor fails to coordinate with the department, once in possession of equipment and material, the contractor shall take full responsibility for replacement of damaged or malfunctioning components or other elements.
- (2) The department will replace damaged, malfunctioning components, or other elements associated with equipment or material if found during testing.

#### **670.3.3.3 Post-Installation Testing**

- (1) Furnish test procedures for each component in the contract. A component is defined as a subsystem confined to the end functionality of the device. Components include field devices, processor, assemblies, cabling, connections, communications, and any additional elements associated with proper operation and full functionality of the field device.
- (2) Submit 5 copies of component test procedures to the department. The field system integrator and contractor shall develop test procedures 30 days before initial installation. The department will approve test procedure within 30 days of the date received and provide a written approval.
- (3) Resubmit rejected test procedures within 15 days of notification. The department will provide written approval of resubmitted test procedures within 30 days of the date received.

### **670.3.4 ITS Documentation**

#### **670.3.4.1 Pre-Construction Work**

- (1) Provide 5 copies of equipment list and drawings 28 days after notice of award to the engineer. The engineer will review the equipment list and drawings within 30 days of submittal. Obtain the engineer's written approval before procuring equipment and beginning the work.
- (2) Equipment list will include all bid items in the work and contain names and addresses of all manufacturers, catalog tear sheets showing catalog numbers, and specifications. Resubmit a new alternative for all partial or totally rejected equipment within 15 days of written notice. The engineer will review within 30 days of submittal.
- (3) Do not make substitutions or changes to engineer-approved materials without the engineer's written approval. Check the availability, price, and delivery date before making submittal of equipment or material.

#### **670.3.4.2 Post-Construction Work**

- (1) The department will not consider the project complete and accepted as final under [105.11.2.4](#) until after the contractor provides 5 copies of the ITS documentation. The ITS documentation includes but is not limited to the following:
  - Operator's manual: submit a manual containing detailed operating instructions for each different type or model of equipment and or operation performed.
  - Maintenance procedures manuals: submit a manual containing detailed preventive and corrective maintenance procedures for each type or model of equipment furnished in the work.
  - Cabinet fiber optic wiring diagram: submit a cabinet wiring diagram, identified by location for each cabinet. Include both electrical wiring and fiber optic conductor and cable connections. Place one copy of the fiber

optic wiring diagram in a weatherproof holder in the cabinet. Deliver the other copies to the department or engineer.

- As-built drawings: submit final as-built drawings that detail the final placement of all conduit, cabling, equipment, and geometric modifications within the contract. Provide all documentation in an electronic format adhering to the region's ITS computer aided drafting standards and according to the department's as-built requirements. The department will review the as-built drawings for content and electronic format. Modify both the content and format of as-built drawings until meeting all requirements.
- Equipment inventory list: submit an inventory list including serial number, make, model, date installed, and location installed of all equipment installed under the contract.

#### **670.4 Measurement**

- (1) The department will measure Field System Integrator and ITS Documentation as a single lump sum unit for each service acceptably completed.

#### **670.5 Payment**

- (1) The department will pay for measured quantities at the contract unit price under the following bid items:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
670.0100	Field System Integrator	LS
670.0200	ITS Documentation	LS

- (2) Payment for Field System Integrator and ITS Documentation is full compensation for providing specified expertise, assistance, and documents. The department will pay separately for other ITS work under the various ITS bid items of [section 671](#) through [section 678](#).
- (3) The department will not pay for removing, replacing, and reinstalling work performed by non-certified technicians as required under [670.3.2.2](#).