Special Specification 6423
Installation of Traffic Management Equipment

1. DESCRIPTION

Install, relocate, or remove Traffic Management Equipment at locations shown on the plans or as directed.

2. MATERIALS

2.1. **General.** Traffic Management Equipment consists of the following:

- Digital Video Encoder,
- Field Hardened Ethernet Switch,
- Ethernet Surge Protector,
- Cellular Modem, and
- Ethernet Contact Closure.

The Department will furnish Traffic Management Equipment and power supply, if any, that becomes part of the final installation. Any programming required for the Traffic Management Equipment will be performed by the Department.

Provide a minimum of 30 days' notice to the Department for pickup of Department-furnished materials.

Traffic Management Equipment for this project will be stored by the Department for pick up at TxDOT Laredo District Office, 1817 Bob Bullock LP, Laredo, TX 78043 unless otherwise shown on the plans. Designate in writing the person(s) authorized to pick up materials.

Assume responsibility for all materials furnished by the Department. Prevent damage to all components. Use materials furnished by the Department for this Contract only. Return unused or removed materials deemed salvageable by the Engineer to the Department upon completion of the work and before final payment at location shown on the plans or as directed. Accept ownership of materials deemed unsalvageable by the Engineer and dispose of in accordance with federal, state, and local regulations.

Provide all materials not supplied by the Department necessary for Traffic Management Equipment installation.

Provide all mounting hardware and cabling necessary to install and make operational all equipment.

Provide new materials that comply with the details shown on the plans, the requirements of this Specification, and the pertinent requirements of the following Items:

- Item 620, "Electrical Conductors," and
- Item 618, "Conduit."

2.2. **Wiring.** Provide wiring that meets the requirements of the National Electrical Code (NEC). Provide appropriate length of all cables necessary to complete the work and make the Traffic Management Equipment fully operational at each installation site.

2.3. **Electrical.** Provide equipment as required to ensure that operations are not affected by the transient voltages, surges, and sags normally experienced on commercial power lines.

Provide equipment that contains power source protection. Equipment must have readily accessible circuit protection devices such as circuit breakers or fuses. Circuit protection devices must be manually re-settable or replaceable.

Provide and size circuit breakers or fuses such that no wire, component, connector, PC board, or assembly is subjected to sustained current in excess of their respective design limits upon failure of any single element or wiring.

2.4. **Connectors and Harnesses.** Provide external connections made by means of connectors. Provide connectors that are keyed to preclude improper hookups. Color code wires and appropriately mark origin and destination of each cable.

Provide connecting harnesses of appropriate length and that terminate with matching connectors for interconnection with the communications system equipment.

Provide pins and mating connectors that are plated to improve conductivity and resist corrosion. Cover connectors utilizing a piece of heat shrink tubing securely shrunk to ensure that it protects the connection.

2.5. **Mechanical Components.** Provide external screws, nuts and locking washers that are stainless steel. Provide parts made of corrosion resistant material, such as plastic, stainless steel, anodized aluminum, or brass. Protect materials from fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

3. CONSTRUCTION

3.1. **Installation.** Transport and install all materials, equipment, power, video, and control cabling. Ensure an operating and functional system.

Perform work in accordance with the details shown on the plans, the NEC, the National Electrical Safety Code (NESC), and the requirements of this Specification. Maintain safe construction practices. Ensure the mechanical execution of work complies with the NEC. Equipment must be installed in a neat and workmanlike manner.

Adjustments on Traffic Management Equipment's mounting components, attachment hardware, support brackets, and appurtenances (such as conduit, etc.) may be necessary for compatibility with specified positioning recommended by the manufacturer or as shown on the plans.

Prevent damage to all Traffic Management Equipment components supplied by the Department. Replace any component that is damaged or lost during transportation or installation at the Contractor's expense.

3.2. **Relocation.** Perform relocation in strict conformance with all requirements and as shown on the plans. Completion of the work must present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing Traffic Management Equipment with a representative from the Department and document any evidence of damage prior to removal. Conduct testing in accordance with Section 3.4., "Testing." Remove and deliver equipment that fails inspection to the Department.

Before removal of existing Traffic Management Equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until relocation. Remove existing Traffic Management Equipment as shown on the plans.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (for items approved by the Engineer) at no cost to the Department.

Make all arrangements for connection to the power supply and communication source including any permits required for the work to be done under the Contract.

3.3. **Removal.** Perform the removal in strict conformance with all requirements and as shown on the plans. Completion of the work must present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Inspect Traffic Management Equipment to be salvaged with a representative from the Department and document any evidence of damage prior to removal. Conduct testing in accordance with Section 3.4., "Testing."

Disconnect and isolate any existing electrical power supply prior to removal of existing field equipment.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (for items approved by the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

3.4. **Testing.**

3.4.1. **Installation.** Verify operation of the Traffic Management Equipment and all its links. Demonstrate that the video images and data communication links can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the Traffic Management Equipment data packets are being received at the central site via a network computer.

3.4.2. **Relocation and Removal.** Conduct basic functionality testing prior to removal of Traffic Management Equipment that is to be relocated or salvaged. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data prior to removal and after new installation. The performance test results must be equal to or better than the test results prior to removal. Repair or replace those components within the system that failed after relocation but passed prior to removal.

3.5. **Wiring.** Provide wires that are cut to proper length before assembly. Provide cable slacks to facilitate removal and replacement of assemblies, panels, and modules. Do not double back wire to take up slack. Lace wires neatly into cable with nylon lacing or plastic straps. Secure cables with non-adhesive clamps and anchors. Provide service loops at connections.

3.6. **Grounding.** Ensure all Traffic Management Equipment components and supports are grounded in accordance with the NEC and manufacturer recommendations.

3.7. **Experience Requirements.** The Contractor or designated subcontractors involved in the installation and testing of the Traffic Management Equipment must, at a minimum, meet the following:

- two-year experience in the installation of Traffic Management Equipment, and
- 2 recorded installations of Traffic Management Equipment that has been in continuously satisfactory operation for at least 1 yr.

Submit the names, addresses, and telephone numbers of references that can be contacted to verify the experience requirements given above. Provide necessary documentation of subcontractor qualifications pursuant to contract award.

4. MEASUREMENT

This Item will be measured as each Digital Video Encoder, Field Hardened Ethernet Switch, Ethernet Surge Protector, Cellular Modem, or Ethernet Contact Closure installed, relocated, or removed.

5. PAYMENT

The work performed and material furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Digital Video Encoder (Install Only)," "Field Hardened Ethernet Switch (Install Only)," "Ethernet Surge Protector (Install Only)," "Cellular Modem (Install Only)," "Ethernet Contact Closure (Install Only)," "Digital Video Encoder (Relocate)", "Field Hardened Ethernet Switch (Relocate)," "Ethernet Surge Protector (Relocate)," "Cellular Modem (Relocate)," "Ethernet Contact Closure (Relocate)," "Digital Video Encoder (Remove)", "Field Hardened Ethernet Switch (Remove)," "Ethernet Surge Protector (Remove)," "Cellular Modem (Remove)," or "Ethernet Contact Closure (Remove)."

5.1. **Install Only.** This price is full compensation for transportation and installation of all equipment described under this Item; furnishing and installing all cables, connectors, and mounting assemblies; making fully operational; all documentation and testing; all labor, manipulations, materials tools, equipment, and incidentals. Consider all mounting hardware and cables as subsidiary to this item with no direct payment. All adjustments and additional materials will not be paid for directly but will be subsidiary to this item.

5.2. **Relocate.** This price is full compensation for relocating and making fully operational existing Traffic Management Equipment as show on the plans; furnishing and installing all cables, connectors, and mounting assemblies; all documentation and testing; storing the components to be reused or salvaged; all labor, manipulations, materials tools, equipment, and incidentals. Consider all mounting hardware and cables as subsidiary to this item with no direct payment. All adjustments and additional materials will not be paid for directly but will be subsidiary to this item.

5.3. **Remove.** This price is full compensation for removing existing Traffic Management Equipment as show on the plans; removal all cables, connectors, and mounting assemblies; storing the components to be reused or salvaged; all documentation and testing; all labor, manipulations, materials tools, equipment, and incidentals. Consider removal of all mounting hardware and cables as subsidiary to this item with no direct payment. All adjustments will not be paid for directly but will be subsidiary to this item.