1. **DESCRIPTION**

Transport, install, and test Department furnished Digital Video Encoder (Ethernet) systems, Ethernet media converter (Transceivers), Hardened Ethernet switches, and Ethernet surge protectors as shown on the plans, as detailed in the special specification, and as directed.

2. **MATERIALS**

The Department will furnish; Digital Video Encoder and Power Supply unit, Transceiver, Transceiver Power Supply unit, Hardened Ethernet switches with Power Supply cable, and Ethernet surge protectors.

Provide all materials not supplied by the Department necessary for the Digital Video Encoder (Ethernet) systems installation, Transceiver installation, Hardened Ethernet switch installation, and Ethernet surge protector installation. All materials provided by the Contractor must be new.

Unless otherwise shown on the plans, equipment for the Digital Video Encoder (Ethernet) systems, Transceivers, Hardened Ethernet switches, and Ethernet surge protector for this project will be stored by the Department for pick up at TxDOT Houston District Traffic Signals Office, 6810 Old Katy Road, Houston, TX 77024.

Ensure that all materials and construction methods necessary to complete the installation conform to the requirements of this Item, the plans, and the pertinent requirements of the following item:

- Item 620, “Electrical Conductors”

3. **POWER REQUIREMENTS**

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

3.1. **Wiring.** Provide wiring that meets the requirements of the National Electric Code. 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.

3.2. **Power Service Protection.** Provide equipment that contains readily accessible, manually re-settable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection.

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

4. **MECHANICAL REQUIREMENTS**

4.1. **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 terminated 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 solder type connections by a piece of heat shrink tubing securely shrunk to insure that it protects the connection.

4.2. **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.

5. **INSTALLATION OF ETHERNET MEDIA CONVERTER (TRANSCEIVER)**

Install all materials, equipment, power, and control cabling. Ensure an operating and functional system.

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

5.1. **Testing.** Verify operation of the Transceiver, together with operation of their wireless link, demonstrate that the data communication links can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the Transceiver data packets are being received at the central site via a networked computer.

5.2. **Experience Requirements.** The Contractor or designated subcontractors involved in the installation and testing of the Transceiver, as a minimum, meet the following:

Two year experience in the installation of Transceivers.

Two installed Transceivers where they have been in continuously satisfactory operation for at least 1 year. The Contractor shall submit as proof, supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the system.

Provide necessary documentation of subcontractor qualifications pursuant to contract award.

6. **INSTALLATION OF DIGITAL VIDEO ENCODER (ETHERNET) SYSTEM**

Install all materials, equipment, power, video and control cabling. Ensure an operating and functional system.

Prevent damage to all Digital Video Encoder (Ethernet) system components supplied by the Department. Replace any component that is damaged or lost during transportation or installation at the Contractor’s expense.

6.1. **Testing.** Verify operation of the digital video encoder, together with operation of their wireless link, demonstrate that video images can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the video image is being received at the central site and in a window on the monitor. The frame rate demonstrated at the field shall be at least 6 frames per second for a traffic scene which has 30 percent of the scene being updated by moving vehicles.

6.2. **Experience Requirements.** The Contractor or designated subcontractors involved in the installation and testing of the Digital Video Encoder shall, as minimum, meet the following:

Two year experience in the installation of Digital Video Encoder (Ethernet) equipment.

Two installed Digital Video Encoder (Ethernet) systems where they have been in continuously satisfactory operation for at least 1 year. The Contractor shall submit as proof, photographs or other supporting
documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the system.

Provide necessary documentation of subcontractor's qualifications pursuant to contract award.

7. INSTALLATION OF HARDENED ETHERNET SWITCHES

Install all materials, equipment, power, video and control cabling. Ensure an operating and functional system.

Prevent damage to all Hardened Ethernet Switches system components supply by the Department. Replace any component that is damaged or lost during transportation or installation at the Contractor's expense.

7.1. Testing. Verify operation of the Hardened Ethernet Switch, together with operation of its links, demonstrate that data can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the hardened Ethernet Switch data packets are being received at the central site via a networked computer.

7.2. Experience Requirements. The Contractor or designated subcontractors involved in the installation and testing of the Hardened Ethernet Switches shall, as minimum, meet the following:

Two year experience in the installation of Hardened Ethernet Switches.

Two installed Hardened Ethernet Switches where they have been in continuously satisfactory operation for at least 1 year. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the system.

Provide necessary documentation of subcontractor qualifications pursuant to contract award.

8. INSTALLATION OF ETHERNET SURGE PROTECTORS

Install all materials, equipment, power, video and control cabling. Ensure an operating and functional system.

Prevent damage to all Ethernet Surge Protector system components supply by the Department. Replace any component that is damaged or lost during transportation or installation at the Contractor's expense.

8.1. Testing. Verify operation of the Ethernet Surge Protectors, together with operation of its links, demonstrate that data can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the Ethernet Surge Protector data packets are being received at the central site via a networked computer.

8.2. Experience Requirements. The Contractor or designated subcontractors involved in the installation and testing of the Ethernet Surge Protectors shall, as minimum, meet the following:

Two year experience in the installation of Ethernet Surge Protectors.

Two installed Ethernet Surge Protector where they have been in continuously satisfactory operation for at least 1 year. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses and telephone numbers of the operating personnel who can be contacted regarding the system.

Provide necessary documentation of subcontractor qualifications pursuant to contract award.

9. MEASUREMENT

This Item will be measured as each Digital Video Encoder, Transceiver, Hardened Ethernet Switch, and Ethernet Surge Protector installed, made fully operational, and tested.
10. 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 “Installation of Digital Video Encoder”, or “Installation of Transceiver”, or “Installation of Hardened Ethernet Switch”, or “Installation of Ethernet Surge Protector”. 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; all documentation and testing; all labor, manipulations, materials, tools, equipment and incidentals.