Special Specification 6341
Remove Multiplexor Equipment

1. DESCRIPTION

This Item will govern for fiber optic cable splices, the removal of existing Multiplexor equipment, removing electrical conductor cable with single mode fiber optic cable as detailed in accordance with these specifications and as shown in the plans.

2. CONSTRUCTION

2.1. Sequence of Work.

1. Splice Fiber Optic Cable – maintain and protect existing splices.

2. Remove T 1 Multiplexors – Coastcom Equipment to include T1 and channel bank, T1 transceiver, centercom mr820tr, at the hub cabinets, environmentally controlled vaults and at the TransVista Traffic Management Center (TMC) – parallel system i.e. video from Coastcom unit – reconnect data to local port.

   a. Furnish and install required single mode fiber optic cable where shown in the plans. If shown in the plans, remove the electrical conductor cable used by the T 1 Multiplexors – Coastcom Equipment to communicate with the DMS and LCS cabinets and replace with single mode fiber optic cable. Communication between TransVista and the CCTV, RVSD, DMS and LCS will use field Ethernet switches.

3. Remove OTN Multiplexors – OTN Equipment to include chassis, power supply, BORA with ULM, interface cards, and video interface equipment located at hub buildings or cabinets identified in the plans,

4. Test individual hubcabinets, environmentally controlled vaults and TransVista to verify proper operation (90 day test).

2.2. Sequence of Work. The equipment design and construction will utilize the latest available techniques with a minimum number of parts, subassemblies, circuits, cards and modules to maximize standardization and commonality.

The equipment should be designed for ease of maintenance. All component parts must be readily accessible for inspection and maintenance.

The equipment must be 19” rack mountable.

- ATM Video Encoder System. When requested by TxDOT, the Contractor will remove the existing codec from the fiber hub and return to TxDOT. The Contractor will install at the TMC the ATM encoder system specified in this specification. This includes the encoder, chassis power supply and all interconnect wiring and provisioning. The removed codec must be returned to TxDOT’s, Signal Shop, at 13301 Gateway West Blvd., El Paso, Texas.

- ATM Video Decoder System. When requested by TxDOT, the Contractor will remove 19 existing codec from the TransVista Management Center located at 13301 Gateway West Blvd., El Paso, Texas and replace it with 10 DUAL ATM decoder system specified in this specification. This includes the decoder module, chassis two power supplies and all interconnect wiring/optical cabling and provisioning. The removed codec must be returned to TxDOT’s, Signal Shop, at 13301 Gateway West Blvd., El Paso, Texas.
Singlemode Fiber Optic Video and Duplex Data Transceiver. When requested by TxDOT, the Contractor will furnish and install a transceiver in the field cabinet (fiber hub) and in the control center. The Contractor is responsible for all singlemode fiber optic cable splices, all interconnect cables, power supplies, cross connects in the field and at the TOC to make the system operational with the associated camera and transceiver.

All splices must use the fusion technique. Fusion splicing equipment will be provided by the Contractor and must be cleaned, calibrated and specifically adjusted to the fiber and environmental conditions at the start of each shift. Fusion splicing equipment used must be as approved by the Engineer.

Each splice fiber should be packaged in a protective sleeving or housing. Bare fiber should be completely recoated with a protective 8 RTV, gel or similar substance, prior to application of the sleeve or housing, so as to protect the fiber from scoring, dirt or microbending.

Rack mounted organizer trays must be used to hold the spliced fibers, with each fiber neatly secured to the tray.

Splice loss must not exceed 0.07 dB. All splice losses will be recorded in tabular form and submitted to the Engineer for approval.

Splices that are made between two (2) cables must be tested using an Optical Time Domain Reflectometer (OTDR). These splices must be tested at the required wavelength and printouts of the splice tests will be provided.

3. TESTING REQUIREMENTS

It is the policy of Texas Department of Transportation to require performance testing of all materials and equipment not previously tested and approved. If technical data is not considered adequate for approval, samples may be requested for test by the Engineer. The contract period will not be extended for time lost or delays caused by testing prior to final Texas Department of Transportation approval of any items.

The equipment covered by this specification will be subject to Design Approval Tests to determine conformance with all the specification requirements. The Contractor must arrange for and conduct the tests in accordance with the testing requirements stated herein. Unless otherwise specified, the Contractor is responsible for satisfying all inspection requirements prior to submission for the Texas Department of Transportation's inspection and acceptance. Texas Department of Transportation reserves the right to have a representative witness all design approval tests.

The results of each test must be compared with the requirements specified herein. Failure to conform to the requirements of any test will be counted as a defect, and the equipment will be subject to rejection by Texas Department of Transportation. Rejected equipment may be offered again for retest provided all non-compliances have been corrected and retested by the contractor and evidence thereof submitted to the Engineer.

Test Procedures: The Contractor will provide five (5) copies of all design approval, stand-alone and subsystem test procedures and data forms for the Engineer's approval at least 60 days prior to the day the tests are to begin. The test procedures will include the sequence in which the tests will be conducted. The test procedures must have the Engineer's approval prior to submission of equipment for tests.

Design Approval tests must be conducted by the Contractor on one (1) or more samples of equipment of each type, as approved by the Engineer, to determine if the design of the equipment meets the requirements of this specification. The test must be conducted in accordance with the approved test procedures as described herein. The Engineer must be notified a minimum of 30 calendar days in advance of the time these tests are to be conducted.
If the unit fails the design approval test, the design fault must be corrected and the entire design approval test must be repeated. All deliverable units will be modified, without additional costs to the Department, to include design changes required to pass the design approval tests.

Stand Alone Tests: The Contractor will conduct an approved stand-alone test of the equipment installation at the field site. The test must, as a minimum, exercise all stand-alone functional operations of the field equipment with all of the equipment installed or as directed by the Engineer. Approved data forms will be completed and turned over to the Engineer as the basis for review and rejection or acceptance. If any unit fails to pass its stand-alone test, the unit must be corrected or another unit substituted in its place and the test successfully repeated. If a unit has been modified as a result of a stand-alone test failure, a report must be prepared and delivered to the Engineer prior to the retesting of the unit. The report must describe the nature of the failure and the corrective action taken. The design modifications will be made to all units without additional cost to the Department.

Final Acceptance Test: The Contractor must perform a final acceptance test for the entire system without defects to the system for a period of not less than 60 days. The test must, as minimum, exercise all remote control functions. The test must be conducted on the field equipment with the central equipment located at TransVista. If a defect within the system is detected, the design fault must be corrected and the point of failure must be re-tested until a consecutive 30 day period is achieved, without a defect or as directed by the Engineer.

The Contractor will furnish data forms containing all of the data taken, as well as quantitative results from all tests. Data forms will be signed by an authorized representative (company official) of the Contractor equipment manufactured. At least one copy of the data forms will be sent to the Engineer.

The Contractor must demonstrate to the satisfaction of the Engineer that all requirements, as described within the specification and manufacturer specifications, are met and that all equipment and software can be operated from each workstation (operator and manager). Every item of every piece of equipment within this specification will be tested within the presence of the Engineer or his representative. If the equipment fails to pass its acceptance tests, the equipment must be corrected and the complete acceptance test must be repeated unless otherwise authorized by the Engineer.

4. **WARRANTY**

Equipment furnished and installed for this project must be guaranteed to perform according to the manufacturer's published specifications. Equipment must be warranted against defects and failure in design, materials and workmanship in accordance with the manufacturer’s standard warranty. The Contractor will assign, to the Department, all manufacturer’s normal warranties or guarantees on all such electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Defective equipment will be repaired or replaced, at the manufacturer’s option, during the warranty period at no cost to the Department.

All equipment used on this project must have no less than 95 percent of the manufacturer’s standard warranty remaining on the date that equipment invoices are submitted by the Contractor for payment. Any equipment with less than 95 percent of its warranty remaining will not be accepted by the Department.

5. **MEASUREMENT**

Remove Multiplexer Equipment will be measured by each Coastcom T1 Multiplexor or OTN Multiplexor, including associated equipment called for removal in the plans.

6. **PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for each Remove Multiplexer Equipment. This must include all equipment with all cables, connectors, jumpers, junction boxes, mounting attachments, enclosures
and for all documentation and testing; for furnishing all labor, materials, training, equipment and incidentals necessary to complete the work.