

Special Specification 6093

Existing Traffic Management Equipment



1. DESCRIPTION

Remove and relocate existing Communication Cabinets, Fiber Hubs, CCTV (Closed Circuit Television) Field Equipment, Lane Control Systems (LCS), Fiber Optic Dynamic Message Sign Systems, Video Imaging Vehicle Detection Systems (VIVDS), Radar Vehicle Sensing Devices, Wireless Ethernet Radios, and remove existing Acoustic Vehicle Sensor Systems at sites shown on plans and as specified within this specification.

2. REMOVE EXISTING COMMUNICATION CABINET

2.1. **Materials.** Remove the following equipment at each Communication Cabinet field site as shown on the plans (includes but is not limited to)

- Communication Cabinet (CC) including all internal components.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Communication Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

2.2. **Construction.** Prior to removal of the Communication Cabinet, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Communication Cabinet, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

Store all Communication Cabinets and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

3. RELOCATE EXISTING COMMUNICATION CABINET

3.1. **Materials.** Relocate the following equipment at each Communication Cabinet field site shown on the plans (includes but is not limited to):

- Communication Cabinet (CC) with all internal components.

Contractor is responsible for reconfiguring the Local Control Unit and for all provisioning and addressing changes required in the cabinet and at TransGuide.

Construct new Communication Cabinet Foundation for relocated Communication Cabinet as shown in plans and as specified in this specification

Make the relocated Communication Cabinet fully operational and integrated with the TransGuide system.

If plans show radar detectors to be connected to relocated Communication Cabinet instead of surveillance loop detectors, remove existing digital loop vehicle detection units and deliver to TransGuide to make space for radar detector cards.

- 3.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation. Any portion of Communication Cabinet assembly damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

4. REMOVE EXSITING FIBER HUB

- 4.1. **Materials.** Remove the following equipment at each Fiber Hub field site as shown on the plans (includes but is not limited to):

- Fiber Hub (FH) with external and internal cabinets including all internal components.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- LifeLink Equipment (if existing).
- Automated Vehicle Identification System (AVI) (if existing).
- Fiber Hub Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

- 4.2. **Construction.** Prior to removal of the Fiber Hub, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Fiber Hub, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

Deliver LifeLink and AVI equipment to TransGuide.

Store all Fiber Hubs and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

5. RELOCAT EXISTING FIBER HUB

The following are the minimum requirements to relocate existing Fiber Hub and field equipment as shown on the plans.

- 5.1. **Materials.** Relocate the following equipment at each Fiber Hub field site shown on the plans (includes but is not limited to):

- Fiber Hub (FH) with external and internal cabinet and all internal components.

Furnish and install all new cables, conduit, junction boxes, grounding (ground rod), mounting hardware, etc. necessary to make the associated CCTV Field Equipment fully operational.

Contractor is responsible for reconfiguring the Local Control Unit, for furnishing, installing, provisioning and making all cross connects for any additional cards (e.g. 52B, 43B, 232, etc.) necessary (both in the Fiber Hub and at TransGuide) for TMS equipment that will be communicating with the relocated Fiber Hub, and for any other provisioning and addressing changes required in the Fiber Hub and at TransGuide. Deliver any cards not needed in relocated Fiber Hubs to TransGuide.

Construct new Fiber Hub Foundation for relocated Fiber Hub as shown in plans and as specified in this specification.

Make the relocated Fiber Hub fully operational and integrated with the TransGuide system.

- 5.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance.

Maintain safe construction practices during relocation. Any portion of Fiber Hub assembly damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

6. REMOVE EXISTING CCTV FIELD EQUIPMENT

- 6.1. **Materials.** Remove the following equipment at each CCTV Field Equipment site as shown on the plans (includes but is not limited to):

- CCTV Field Equipment.
- Cabling from power source to camera.
- Cabling and connectors from telecommunications source to camera.
- CCTV Tube Mount or Camera Pole.
- Lifelink Equipment and associated cabling (if existing).
- Camera Pole Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

- 6.2. **Construction.** Prior to removal of the CCTV Field Equipment, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the CCTV Field Equipment or Lifelink equipment damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

Deliver LifeLink equipment to TransGuide.

See plans for those locations where removed CCTV Field Equipment is to be delivered to TransGuide.

Store all CCTV Field Equipment and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

7. RELOCATE EXISTING CCTV FIELD EQUIPMENT

The following are the minimum requirements to relocate existing CCTV Field Equipment as shown on the plans.

7.1. **Materials.** Relocate the following equipment at CCTV Field Equipment sites shown on the plans (includes but is not limited to):

- CCTV Field Equipment.
- CCTV Tube mount or Camera Pole.

New foundation for relocated Camera Pole will be paid for under Item 416.

Furnish and install all new conduit, cables, junction boxes, grounding (ground rod), mounting hardware, etc., to make the relocated CCTV Field Equipment fully operational with the TransGuide system.

7.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of CCTV Field equipment, Lifelink equipment, or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

8. REMOVE EXISTING LANE CONTROL SYSTEM

8.1. **Materials.** Remove the following equipment at each Lane Control System field site as shown on the plans (includes but is not limited to):

- Lane Control System (LCS) heads and mounting hardware. Remove the LCS heads from the structure immediately after the system becomes non-operational.
- LCS Controller and Cabinet.
- Cabling, conduit and connectors from LCS Controller to LCS heads.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- LCS Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

8.2. **Construction.** Prior to removal of the Lane Control System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Lane Control System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

Store all Lane Control System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

9. RELOCATE EXISTING LANE CONTROL SYSTEM

The following are the minimum requirements to relocate existing Lane Control System (LCS) and field equipment as shown on the plans.

- 9.1. **Materials.** Relocate the following equipment at each LCS field site shown on the plans (includes but is not limited to):
- Lane Control System heads with all mounting hardware. Furnish and install any additional "L" brackets necessary. Furnish and install additional LCS heads, if shown on the plans, with all necessary mounting hardware, subsidiary to this item.
 - LCS Controller and Cabinet - The Contractor is responsible for configuration and for any addressing changes required.

Furnish and install all new cable and conduit from LCS Controller to LCS heads.

Construct new LCS Cabinet Foundation for relocated LCS cabinet as shown in plans and as specified in this specification.

Make the relocated Lane Control System fully operational with the TransGuide system.

- 9.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of LCS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

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

Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated LCS Heads and shift the existing LCS heads on structures as shown on the plans and as directed by the Engineer. Reuse existing LCS head mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of LCS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with LCS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of LCS heads. Show on drawings any additional L brackets, head support connections, and methods of attachment of the heads to the support.

10. REMOVE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 2)

10.1. **Materials.** Remove the following equipment at each Dynamic Message Sign (DMS) field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with all mounting brackets. Remove the sign from the structure immediately after the system becomes non-operational.
- DMS Controller and Cabinet.
- Cabling and connectors from DMS Controller to DMS.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Cabinet foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

10.2. **Construction.** Prior to removal of the Dynamic Message Sign System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Dynamic Message Sign System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

Store all Dynamic Message Sign System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

11. RELOCATE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 2)

The following are the minimum requirements to relocate existing Dynamic Message Sign (DMS) and field equipment as shown on the plans.

11.1. **Materials.** Relocate the following equipment at each DMS field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with mounting hardware.
- DMS Controller and Cabinet.

Furnish and install all new cabling and conduit from the sign to controller cabinet.

Construct new Fiber Optic Dynamic Message Sign Cabinet Foundation for relocated DMS cabinet as shown in plans and as specified in this specification.

Make the relocated DMS system fully operational with the TransGuide system.

- 11.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of DMS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated DMS sign and shift the existing signs on structures as shown on the plans and as directed by the Engineer. Reuse existing DMS sign mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of DMS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with DMS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of DMS signs, except where 2 or more signs are of identical design, in which case a drawing for only one of the signs is necessary. Show on drawings any additional sign brackets, sign support connections, and methods of attachment of the signs to the support.

12. REMOVE EXISTING VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS)

- 12.1. Materials. Remove the following equipment at each VIVDS field site as shown on the plans (may include but is not limited to):

- VIVDS sensors and all mounting brackets.
- Conduit, cables, and connectors from power source and telecommunications source to VIVDS sensors.
- Tube Mount (6 in. x 4 in. x 1/4 in. structural steel) mounted to Overhead Sign Bridge with Air Terminal.
- 40 ft. poles (Roadway Illumination Assembly) with 10 ft. arm.
- Pole drill shaft foundations. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved.
- VIVDS equipment cabinet with all internal components.
- Junction boxes used for VIVDS cables.
- VIVDS equipment inside TransGuide Communication Cabinet or Fiber Hub.
- Telephone communication link and components.

- 12.2. **Construction.** Prior to removal of the VIVDS, disconnect and isolate any existing electrical power supply, adhering to requirements of the National Electrical Code.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the VIVDS damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

Contact Telephone Company and terminate service at locations where telephone communication is disconnected. Provide documentation of discontinuance of service.

Store all VIVDS equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

13. RELOCATE EXISTING VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS)

The following are the minimum requirements to relocate existing VIVDS as shown on the plans.

13.1. **Materials.** Relocate the following equipment at each VIVDS field site as shown on the plans (may include but is not limited to):

- VIVDS sensors and mounting brackets.
- 40 ft. poles with 10 ft. arm.
- VIVDS equipment cabinet with all internal components.
- VIVDS junction boxes.

Furnish and install new Tube Mount (6 in. x 4 in. x 1/4 in. structural steel) mounted to Overhead Sign Bridge with Air Terminal if shown on plans. Do not reuse tube mounts removed from VIVDS sites. Relocated VIVDS sensor units must be 40 ft. above roadway, therefore new tube mounts of proper length must be furnished and installed for VIVDS being relocated to Overhead Sign Bridges.

Furnish new drill shaft foundations for relocated 40 ft. poles, paid for under Item 416, as shown on plans.

Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated VIVDS fully operational with the TransGuide system.

13.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of VIVDS or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Where VIVDS are relocated to existing OSB's, review the structure and submit mounting details for approval.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Recalibrate each of the relocated VIVDS sensors for the conditions at each site (number of lanes, speeds, etc.) using radar as a control.

Provide phone numbers of new VIVDS locations where new phone service communications have been established.

14. REMOVE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 3)

14.1. **Materials.** Remove the following equipment at each Dynamic Message Sign (DMS) field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with all mounting brackets. Remove the sign from the structure immediately after the system becomes non-operational.
- DMS Pole
- DMS Controller and Cabinet.
- Cabling and connectors from DMS Controller to DMS.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Cabinet foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.
- DMS Pole drilled shaft foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

14.2. **Construction.** Prior to removal of the Dynamic Message Sign System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Dynamic Message Sign System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

Store all Dynamic Message Sign System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

15. RELOCATE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 3)

The following are the minimum requirements to relocate existing Dynamic Message Sign (DMS) and field equipment as shown on the plans.

15.1. **Materials.** Relocate the following equipment at each DMS field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with mounting hardware.
- DMS pole.
- DMS Controller and Cabinet.

Furnish and install all new cabling and conduit from the sign to controller cabinet.

Construct new Fiber Optic Dynamic Message Sign Cabinet Foundation for relocated DMS cabinet as shown in plans and as specified in this specification.

New drilled shaft for relocated DMS pole will be paid for under Item 416, "Drilled Shaft Foundations" and constructed as shown in the plans.

Make the relocated DMS system fully operational with the TransGuide system.

- 15.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of DMS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated DMS sign on the relocated pole as shown on the plans and as directed by the Engineer. Reuse existing DMS sign mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of DMS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with DMS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of DMS signs, except where 2 or more signs are of identical design, in which case a drawing for only one of the signs is necessary.

Show on drawings any additional sign brackets, sign support connections, and methods of attachment of the signs to the support.

16. REMOVE EXISTING RADAR VEHICLE SENSING DEVICE (RVSD)

- 16.1. **Materials.** Equipment to be removed at each RVSD site shown on the plans (includes but is not limited to):

- RVSD including all mounting hardware.
- Conduit, cables, connectors from Device to cabinet.
- Dual Loop emulation cards (if existing)

- 16.2. **Construction.** Prior to removal of the RVSD, disconnect and isolate any existing electrical power supply, adhering to requirements of the National Electrical Code.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the RVSD damaged or lost will be replaced by the Contractor at no cost to the Department.

Store all RVSD equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

All materials not designated for reuse or retention by the State 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 State to TransGuide.

17. RELOCATE EXISTING RADAR VEHICLE SENSING DEVICE (RVSD)

The following are the minimum requirements to relocate existing RVSD's as shown on the plans.

- 17.1. **Materials.** Relocate the following equipment at each RVSD field site as shown on the plans (may include but is not limited to):
- RVSD.
- Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated RVSD fully operational with the TransGuide system.
- 17.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.
- Use care to prevent damage to any support structures. Any portion of RVSD or support structure damaged or lost will be replaced by the Contractor at his expense.
- Where RVSD is relocated to existing OSB or other structure, review the structure and submit mounting details for approval.
- Mounting height and angle of relocated RVSD must be as recommended by manufacturer of RVSD.
- Connect RVSD to communication network as shown in plans.
- Make all arrangements for connection to the power supply and telecommunications source (if shown in plans) including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).
- Recalibrate the relocated RVSD for the conditions at each site (number of lanes, speeds, etc.) using radar as a control.
- 17.3. Provide phone numbers if necessary of new RVSD locations where new phone service communications have been established.

18. REMOVE EXISTING WIRELESS ETHERNET RADIO (WER) LINK

- 18.1. **Materials.** Remove the following equipment at each WER Link as shown on the plans (includes but is not limited to):
- Wireless Ethernet Radios (1 at each end of link).
 - Mounting brackets at each end of link.
 - Cables, conduit and connectors from network and power connections to wireless Ethernet radios.
 - Wireless Ethernet radio external antennas and mounting brackets (if existing).
- 18.2. **Construction.** Prior to removal of the Wireless Ethernet Radio Link, disconnect and isolate any existing electrical power supply.
- Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.
- Any portion of the Wireless Ethernet Radio Link damaged or lost will be replaced by the Contractor at no cost to the Department.
- All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

See plans for those locations where removed WER Equipment is to be delivered to TransGuide.

Store all WER equipment and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

19. RELOCATE EXISTING WIRELESS ETHERNET RADIO (LINK)

19.1. **Materials.** Relocate the following equipment at each WER Link as shown on the plans (includes but is not limited to):

- Wireless Ethernet Radios (1 at each end of link).
- Wireless Ethernet radio external antennas and mounting brackets (if existing).

Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated WER Link fully operational with the TransGuide system.

19.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any support structures. Any portion of the WER Link or support structure damaged or lost will be replaced by the Contractor at his expense.

Where WER Link is relocated to existing or other structures, review the structures and submit mounting details for approval.

Mounting height and angle of relocated WER must be as recommended by manufacturer of WER.

Provide an interference analysis for each WER Link to identify potential sources of interference. Adjust antenna polarities and channel plans on equipment to minimize interference from other sources.

Ensure that a manufacturer's technical representative is available on site to assist with the installation of the WER Link and communication system configuration. Alignment and configuration of WER radios is critical to obtain maximum throughput.

Connect WER to communication network as shown in plans.

Make all arrangements for connection to the power supply and telecommunications source (if shown in plans) including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Provision the relocated WER Link for the conditions at each site.

19.3. **Testing.** Test the WER Link after installation and provide all test results to the Engineer. Tests will include the following:

- Measure and record transmitter/receiver channel frequency and polarity
- Measure and record transmitter power
- Measure and record receiver fade margin
- Perform a 1 hour Bit Error Rate Test (BERT) and record the results
- Prior to above testing, provide Engineer with a copy of test procedure as well as test date.

20. REMOVE EXISTING ACOUSTIC VEHICLE SENSOR SYSTEM

- 20.1. **Materials.** Equipment to be removed at each Acoustic Vehicle Sensor System site shown on the plans includes the following:
- All Acoustic Vehicle Sensors including all mounting hardware.
 - Controller Card or Cards.
 - Cabling and connectors from sensor to cabinet.
- 20.2. **Construction.** Perform the removal in strict conformance with the requirements herein stated. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.
- Any portion of the Acoustic Vehicle Sensor System, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.
- Deliver all materials designated to be removed to TransGuide.

21. COMMUNICATION CABINET FOUNDATION

- 21.1. **Materials.** Construct new Communication Cabinet Foundation for relocated Communication Cabinet as shown on "Cabinet Foundation Details" layout.
- 21.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.
- 21.3. Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

22. FIBER HUB FOUNDATION

- 22.1. **Materials.** Construct new Fiber Hub Foundation for relocated Fiber Hub as shown on "Fiber Hub Details" layout.
- 22.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.
- 22.3. Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

23. LCS CABINET FOUNDATION

- 23.1. **Materials.** Construct new LCS Cabinet Foundation for relocated LCS Cabinet as shown on "Cabinet Foundation Details" layout.
- 23.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.
- Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

24. FIBER OPTIC DYNAMIC MESSAGE SIGN CABINET FOUNDATION

- 24.1. **Materials.** Construct new DMS Cabinet Foundation for relocated DMS Cabinet as shown on "Cabinet Foundation Details" layout.

- 24.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

Construct the foundation in accordance with Item 656 "Foundations for Traffic Control Devices".

25. TESTING

- 25.1. **Pre-Test.** Conduct performance testing prior to removal of the equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and TxDOT. 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 State. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.

- 25.2. **Post Test.** Testing of the TMS system is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all TMS equipment has been installed, conduct approved continuity, stand alone, and TMS equipment system tests. Furnish test data forms containing the sequence of tests including all of the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin.

Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.

The State will conduct approved TMS equipment system tests on the field equipment with the TransGuide central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the contract period.

26. TMS EXPERIENCE REQUIREMENTS

The Contractor or subcontractor must meet the following experience requirements prior to removal and/or relocation of TMS Equipment.

- 26.1. Two years continuous existence by the Contractor or the subcontractor offering services in the installation of Fiber Optic Dynamic Message Signs (DMS), Lane Control Systems (LCS), Fiber Hubs, Communication Cabinets, VIVDS, and Closed Circuit Television cameras (CCTV).
- 26.2. Two completed projects for each of the following items: A minimum of 2 DMS, 2 LCS, 5 CCTV-cameras, 5 VIVDS, 1 Fiber Hub, 1 Communication Cabinet, 5 Radar Vehicle Sensing Devices, and 2 Wireless Ethernet Radio Links where the Contractor or the subcontractor's personnel installed and tested this equipment. All

components listed above need not be part of the same project, however, additional project references may be required in order to meet the minimum number of installed equipment items listed above. The DMS and LCS must have been installed outdoors, permanently mounted on overhead structure(s) with related sign and LCS equipment. The VIVDS, RVSD's, and WER's must have been installed outdoors, permanently mounted with related communication equipment.

The CCTV cameras must have been installed outdoors, permanently mounted on overhead structure(s) with related camera control and transmission equipment. The completed system installations must have been in continuous satisfactory operation for a minimum of 1 year.

Prior to removal and/or relocation of TMS equipment, furnish a statement which outlines contractor or subcontractor's qualifications on system installation experience. Information on system installation experience must include specific projects, locations, and dates for beginning and completion of installation. The statement must also include the name, telephone number, and address of a representative of the agency or business owning the system, who will be contacted by the Department. If requested by the State, demonstrate to the Engineer's satisfaction a working computerized control system with the various equipment items as described above.

Demonstrate a system similar in design to the system proposed. The demonstration must be performed within the state of Texas. The Contractor will not be required nor expected to pay any associated travel or living expenses of the State's representatives to witness the demonstration. Failure to meet the above requirements will be sufficient reason for not being approved for the removal and/or relocation of the TMS equipment.

If any approved subcontractors fail to complete the entire project, qualification material for other subcontractors will have to be submitted and approved before work can be continued.

Any qualification statements which do not correctly address all specified items will be rejected for the reason of insufficient data. Submit the statement 2 weeks prior to removal and/or relocation of TMS equipment to allow the Department adequate time to review and respond to the Contractor for additional information if required. Failure to submit a complete and satisfactory statement will be sufficient reason for not being approved for the removal and/or relocation work. Submit all statements required by this Special Specification to the Traffic Management Engineer located at 3500 N.W. Loop 410, San Antonio, Texas.

27.

MEASUREMENT

Remove Existing Communication Cabinet (CC) will be measured as each Communication Cabinet with all internal components removed in accordance with this specification and as shown on the plans.

Relocate Existing Communication Cabinet (CC) will be measured as each Communication Cabinet with all internal components relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Hub (FH) will be measured as each Fiber Hub, including external and internal cabinets with all internal components including but not limited to LifeLink, AVI and camera equipment removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Hub (FH) will be measured as each Fiber Hub including external and internal cabinets with all internal components including but not limited to LifeLink, AVI and camera equipment relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove existing CCTV Field Equipment will be measured as each CCTV Field Equipment removed in accordance with this specification and as shown on the plans.

Relocate existing CCTV Field Equipment will be measured as each CCTV Field Equipment relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Lane Control System will be measured as each Lane Control System, including field equipment to operate the Lane Control System, removed in accordance with this specification and as shown on the plans.

Relocate Existing Lane Control System will be measured as each Lane Control System, including field equipment to operate the Lane Control System, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Optic Dynamic Message Sign System (Type 2) will be measured as each sign, including field equipment to operate the sign, removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Optic Dynamic Message Sign System (Type 2) will be measured as each sign, including field equipment to operate the sign, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Video Imaging Vehicle Detection System will be measured as each VIVDS with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Video Imaging Vehicle Detection System will be measured as each VIVDS with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Optic Dynamic Message Sign System (Type 3) will be measured as each sign with pole, including field equipment to operate the sign, removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Optic Dynamic Message Sign System (Type 3) will be measured as each sign with pole, including field equipment to operate sign, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Radar Vehicle Sensing Device will be measured as each RVSD with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Radar Vehicle Sensing Device will be measured as each RVSD with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Wireless Ethernet Radio (Link) will be measured as each WER Link with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Wireless Ethernet Radio (Link) will be measured as each WER Link with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Acoustic Vehicle Sensor System will be measured as each system removed in accordance with this specification and as shown on the plans.

Communication Cabinet Foundation will be measured as each foundation installed as shown on plans.

Fiber Hub Foundation will be measured as each foundation installed as shown on plans.

LCS Cabinet Foundation will be measured as each foundation installed as shown on plans.

Fiber Optic Dynamic Message Sign Foundation will be measured as each foundation installed as shown on plans.

28. 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 "Remove Existing Communication Cabinet", "Relocate Existing Communication Cabinet", "Remove Existing Fiber Hub", "Relocate Existing Fiber Hub", "Remove Existing CCTV Field Equipment", "Relocate Existing CCTV Field Equipment", "Remove Existing Lane Control System", "Relocate Existing Lane Control System", "Remove Existing Fiber Optic Dynamic Message Sign System (Type 2)", "Relocate Existing Fiber Optic Dynamic Message Sign System (Type 2)", "Remove Existing Video Imaging Vehicle Detection System", "Relocate Existing Video Imaging Vehicle Detection System", "Remove Existing Fiber Optic Dynamic Message Sign System (Type 3)", "Relocate Existing Fiber Optic Dynamic Message Sign System (Type 3)", "Remove Existing Radar Vehicle Sensing Device", "Relocate Existing Radar Vehicle Sensing Device", "Remove Existing Wireless Ethernet Radio Link", "Relocate Existing Wireless Ethernet Radio Link", "Remove Existing Acoustic Vehicle Sensor System", "Communication Cabinet Foundation", "Fiber Hub Foundation", "LCS Cabinet Foundation", "DMS Cabinet Foundation", and "Fiber Optic Dynamic Message Sign Foundation". This price is full compensation for removing and relocating as shown on the plans; for testing, delivery and storage of components designated for retention or reuse; and for all manipulations, materials, labor, tools, equipment, and incidentals.