

## Special Specification 6506

# Traffic Data Collection System—Vehicle Classification (TDCS-VC)



### 1. DESCRIPTION

Install or replace and calibrate traffic data collection system—vehicle classification (TDCS-VC) in pavement at the location shown on the plans.

### 2. MATERIALS

- 2.1. Provide all materials, not supplied by the Department, necessary for the TDCS-VC. Provide a task in the project schedule for delivery of Department furnished materials and provide a minimum of 30-day notice to the Department for delivery of Department furnished materials.

Act in accordance with the pertinent requirements of the following Items:

- Item 360, "Concrete Pavement"
- Item 400, "Excavation and Backfill for Structures"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"
- Item 624, "Ground Boxes"
- Item 628, "Electrical Services"
- Item 656, "Foundations for Traffic Control Devices"
- Item 680, "Highway Traffic Signals"
- Item 684, "Traffic Signal Cables"
- Item 688, "Pedestrian Detectors and Vehicle Loop Detectors."

- 2.2. **Loop Wire.** Use stranded copper No. 14 AWG XHHW cross-linked-thermosetting-polyethylene-insulated conductor rated for 600 v AC for vehicle detector loop wire unless otherwise shown on the plans. Show the name or trademark of the manufacturer, insulation voltage rating, wire gauge, and insulation type at approximate two ft. intervals on the insulation surface of each length of wire.

Use sealant for the vehicle detector loops in accordance with [DMS-6340](#), "Vehicle Loop Wire Sealant."

- 2.3. **Loop Lead-in Wire.** Use Type C cables meeting material requirements in Standard Specifications found in Item 684.

- 2.4. **Splice Protection.** Use through-splice connector, Uraseal Type ES200SV or other equivalent, for small hard to splice areas that provides a 100% watertight seal and provide insulation protection up to 600 VAC same as the insulation requirements found in Item 684.

- 2.5. **Department Furnished Materials.** The Department must furnish the following TDCS-VC equipment and materials to the Contractor:

- Kistler piezoelectric class II sensors with lead-in wires,
- specialized epoxy for Kistler piezoelectric class II sensors,

- traffic data collection cabinet—typically Type 5 cabinet unless otherwise shown on the plans,
- cabinet base,
- cabinet and base hardware,
- VC controller, and
- Internet protocol (IP) cellular modem.

Contact Department representative to coordinate delivery of Department furnished materials. Certify that they are in good condition and sign off on delivery of the materials.

### 3. EQUIPMENT

Provide all equipment, including but not limited to, boring equipment; concrete wet saws; shovels; fish tape; screwdriver; flashlight; gloves; safety glasses; head protection; safety footwear; and other equipment necessary to install a fully functional TDCS-VC. Provide boring equipment equipped with guidance and location devices.

### 4. CONSTRUCTION

Layout, stake, and install sensors, loops, conduit, ground boxes, and foundation as shown on the plans. The TDCS locations on the plans are diagrammatical, and the Department representative may shift within design guidelines where necessary to secure a more desirable location. Use established industry and utility safety practices when working near overhead or underground utilities. Consult with the appropriate utility company before beginning work.

Provide a minimum of 30-day notice before installation and saw cutting. Have Department representative onsite during installation and saw cutting.

- 4.1. **Conduit.** Install conduit in the specified types and sizes shown on the plans. Install conductors and seal the ends of conduits terminating in ground boxes and in the controller assembly enclosure with an approved sealing compound.

Install conduit by the horizontal directional drilling method when boring. A soil investigation is not required.

- 4.2. **Loop.** Install or replace conductors for loop lead-in cable consisting of two No. 14 stranded tinned copper. Ensure loop lead-in cable is in accordance with the calculated cross-sectional area of ASTM B 286, Table 1. Use lead-in cable that is insulated with high-density polyethylene. Ensure that the conductors are twisted together with at least two turns per ft., and the twisted pair is protected with a copper or aluminum polyester shield.

Cut slots for loops no deeper than 3 in., but deep enough to provide a minimum of 1 in. depth of sealant over the wire and wide enough such that the loop wire wraps will fit loosely in the slot. Wash clean, blow out, and thoroughly dry slots cut in the pavement before installing conductors. Install five turns of wire for each loop. Twist each wire pair from the loop to the shoulder termination ground box a minimum of five turns per ft. After conductors are installed in the slots cut in the pavement, fill the slots with loop sealant to within 1/8-in. of the pavement surface in a manner such that the loop wire is encapsulated with the sealant to the bottom of the slot, with a minimum sealant thickness of 1 in. above the top conductor in the saw cut. Remove all surplus sealant from the adjacent road surfaces without the use of solvents before the sealant sets.

Cut slots for replacement loops at same locations as previous installation. The previously installed loops are not salvageable.

Install loop conductors without splices, terminating in the nearest ground box. Seal the open end of cable jackets or tubing in a manner similar to the splicing requirements found in Item 684 to prevent the entrance of water.

Provide all materials including, but not limited to, loop wire, loop lead-in wire, splices, backer rod, and loop wire sealant.

- 4.3. **Sensor and Loop Lead-in Wire Identification.** Use a minimum of four wraps of colored electrical tape or heat shrink sleeves based on the following color code unless otherwise shown on the plans. Use brown for first lane, red for second, orange for third, yellow for fourth, green for fifth, and blue for sixth. Identify Lane 1 as the outside lane of the dominant direction of either northbound or eastbound based on roadway designation. Identify the entrance lane sensor lead-in wire and loop lead-in wire with a single-color band and the exit lane loop lead-in wire with a double-color band. Entrance and exit are based on traffic direction.

- 4.4. **VC Piezoelectric Class II Sensor Slot.** Cut the slot with a pavement milling machine. Wash clean, blow out, and thoroughly dry slots cut in the pavement before installation. Provide equipment and materials at the site to perform additional chipping, grinding, and cleaning of the slot.

Cut slots for replacement sensors at same locations as previous installation. The previously installed sensors are not salvageable.

- 4.5. **VC Piezoelectric Class II Sensor Installation.** Install piezoelectric sensor conforming to manufacturer's requirements. Provide equipment, tools, and materials at the site to perform installation of piezoelectric sensors.

- 4.6. **VC Conductors and Splicing Identification.** Make splices between loop lead-in wire and loop detector wires only in the ground box near the loop the cable is servicing. Use non-corrosive solder for splices. Splice loop wires to the loop lead-in cables. Identify each loop wire pair, loop lead-in wire, and VC lead-in or extension cable based on loop number or piezoelectric sensor number in each ground box and in the cabinet enclosure as per Section 4.3., "Sensor and Loop Lead-in Wire Identification." Do not splice the piezoelectric sensor wire.

- 4.7. **Controller Assembly.** Construct controller foundation in accordance with Item 656. Install Department furnished cabinet in accordance with Item 680.

- 4.8. **Performance Tests.** Complete the "Sensor Reading Data Sheet." The "Sensor Reading Data Sheet" must be provided by the Department. Ensure all measurements meet the parameters conforming to the manufacturer's manual and in accordance with "FHWA's 13 Vehicle Category Classification" in the *FHWA Traffic Monitoring Guide (TMG)*  
[https://www.fhwa.dot.gov/policyinformation/tmguidetmg\\_fhwa\\_pl\\_13\\_015.pdf](https://www.fhwa.dot.gov/policyinformation/tmguidetmg_fhwa_pl_13_015.pdf).

Replace failed or damaged existing TCDS-VC components when caused by the Contractor. The Department must relieve the Contractor of maintenance responsibilities upon passing a 30-day performance test of the TCDS-VC and acceptance of the Contract. If any failure occurs during the 30-day test period, repair or replace the component failure. This repair or replacement will start a new 30-day test period.

- 4.9. **Removal.** Remove existing electrical services, controllers, cables, conduit, ground boxes, and other accessories. Remove materials so damage does not occur or abandon in place. Remove and store items designated for reuse or salvage at locations shown on the plans or as directed.

Remove abandoned concrete foundations, including rebar, to a point 2 ft. below final grade. Backfill holes with material equal in composition and density to the surrounding area. Replace surface material with similar material to an equivalent condition.

Accept ownership and dispose of unsalvageable materials in conformance with federal, state, and local regulations.

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**5. MEASUREMENT**

This item will be measured by the foot of saw cut containing loop wire and by each Sensor Installation or Replacement and Removal.

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**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 "Saw cut Loop Installation," "Sensor Installation or Replacement", and "Removal." This price is full compensation for furnishing all equipment, materials, labor, tools, and incidentals.

Conduit will be paid for under Item 618. Conductors will be paid for under Item 620. Ground boxes will be paid for under Item 624. Electrical services will be paid for under Item 628. Foundations will be paid for under Item 656. Cabinet installation will be paid for under Item 680.

- 6.1. **Saw Cut Loop Installation.** This price is full compensation for removing and disconnecting loop wires; saw cutting pavement, installing new loops, loop lead-in wires, and connections; accessing existing conduit and bores, as applicable; replacing damaged components; disposing of unsalvageable materials; and materials, equipment, labor, tools, and incidentals.
- 6.2. **Sensor Installation or Replacement.** This price is full compensation for installing sensors and making connections; saw cutting pavement, installing new Department furnished materials, including, but not limited to, Piezoelectric Class II Sensors; installing connections and conductors; accessing existing conduit and bores, as applicable; replacing damaged components; disposing of unsalvageable materials; and materials, equipment, labor, tools, and incidentals. If replacement, the price includes removing and disconnecting sensor conductors.
- 6.3. **Removal.** This price is full compensation for removing, salvaging and disassembling, and stockpiling cabinet, controller, and modem; abandoning in place existing conduit; removing existing foundations; backfilling and surface placement; disposing of unsalvageable materials; and materials, equipment, labor, tools, and incidentals.