
Item 690

Maintenance of Traffic Signals



1. DESCRIPTION

Furnish, install, modify, repair, replace, or remove components of a traffic signal:

2. MATERIALS

The Department will only furnish traffic signal poles, mast arms, and controllers that become part of the final installation, unless otherwise noted on the plans. Submit a materials list to the Engineer for all poles, mast arms, and controllers needed. Pick up materials at the locations and times shown on the plans. Designate in writing the persons authorized to pick up the materials.

Assume responsibility for all materials furnished by the Department. 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. Dispose of materials deemed unsalvageable by the Engineer, in accordance with federal, state, and local regulations. When materials are required to be furnished by the Contractor, meet the Materials Article requirements of the pertinent Item.

3. EQUIPMENT

Use equipment that includes, but is not limited to:

- an aerial device capable of reaching overhead work,
- trenching machine,
- boring machine,
- concrete saw, and
- digger-boom truck.

Use only equipment, tools, and machinery in good repair and operating condition. Repair or replace any equipment that, in the opinion of the Engineer, may affect the quality of work or safety.

4. WORK METHODS

Conform to the NEC, local utility requirements, requirements of this Item, and pertinent requirements of the following Items:

- Item 416, "Drilled Shaft Foundations,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 476, "Jacking, Boring, or Tunneling Pipe or Box,"
- Item 610, "Roadway Illumination Assemblies,"
- Item 618, "Conduit,"
- Item 620, "Electrical Conductors,"
- Item 622, "Duct Cable,"
- Item 624, "Ground Boxes,"
- Item 625, "Zinc-Coated Steel Wire Strand,"
- Item 627, "Treated Timber Poles,"

- Item 628, "Electrical Services,"
- Item 636, "Signs,"
- Item 656, "Foundations for Traffic Control Devices,"
- Item 680, "Highway Traffic Signals,"
- Item 682, "Vehicle and Pedestrian Signal Heads,"
- Item 684, "Traffic Signal Cables,"
- Item 685, "Roadside Flashing Beacon Assemblies,"
- Item 686, "Traffic Signal Pole Assemblies (Steel),"
- Item 687, "Pedestrian Pole Assemblies," and
- Item 688, "Pedestrian Detectors and Vehicle Loop Detectors."

Perform the following work as directed:

- 4.1. **Conduit.** Install, replace, remove, or modify conduits in accordance with Item 618, "Conduit"; as shown on the plans; or as directed. Use 90° "sweep" type elbow on conduits entering a ground box.
- 4.2. **Foundations.** Install, replace, or remove foundations for traffic signal pole, pedestal pole, and ground mount controller cabinets in accordance with Item 416, "Drilled Shaft Foundations"; and in accordance with Item 656, "Foundations for Traffic Control Devices"; as shown on the plans; or as directed.
- 4.3. **Concrete.** Install concrete in accordance with Item 421, "Hydraulic Cement Concrete."
- 4.4. **Ground Boxes.** Install, repair, replace, remove, or modify ground boxes in accordance with Item 624, "Ground Boxes"; as shown on the plans; or as directed.
- 4.5. **Vehicle and Pedestrian Detectors.** Install, repair, replace, remove, or modify pedestrian push buttons and vehicle loop detectors in accordance with Item 688, "Pedestrian Detectors and Vehicle Loop Detectors"; as shown on the plans; or as directed.
- 4.6. **Electrical Service.** Install, repair, replace, remove, or modify an electrical service assembly in accordance with Item 628, "Electrical Services"; as shown on the plans; or as directed. Mount any or all of the following on an electrical service support assembly: conduit, weather head, load center, meter base, lightning protection, wiring, and associated hardware.
- 4.7. **Signal Pole.** Install, repair, replace, remove, or modify signal poles in accordance with pertinent Items, as shown on the plans, or as directed. Comply with Item 627, "Treated Timber Poles," for timber signal poles with guy wires and anchors and Item 686, "Traffic Signal Pole Assemblies (Steel)," for steel poles with concrete foundations. Remove timber poles and anchors completely, to 24 in. below ground level, or as directed. Remove concrete foundations to 24 in. below ground level, or as directed.

Install, repair, replace, remove, or modify pedestrian signal pole assemblies in accordance with Item 687, "Pedestrian Pole Assemblies"; as shown on the plans; or as directed. Install, repair, replace, remove, or modify roadside flashing beacons in accordance with Item 685, "Roadside Flashing Beacon Assemblies"; as shown on the plans; or as directed.
- 4.8. **Down Guy.** Install, replace, remove, or modify down guy with guard or down guy with anchor and guard.
- 4.9. **Steel Wire Strand.** Install, replace, or remove steel wire strand in accordance with Item 625, "Zinc-Coated Steel Wire Strand"; as shown on the plans; or as directed. Attach span wire on timber poles using a 5/8-in. straight thimble-eye bolt. Attach span wire on metal poles using at least 2 turns of wire around the pole. Place and properly tighten the 3-bolt clamp as near as possible to the pole.
- 4.10. **Luminaire Head and Mast Arm.** Install, replace, remove, or modify luminaire heads, arms, bulbs, photocells, and hardware on timber or steel signal poles. Install material using manufacturer's specifications.

Fuse luminaires individually in the signal pole hand-hole. Install a separate cable from the breaker load panel to each luminaire.

- 4.11. **Signal Head Assembly.** Install, repair, replace, remove, or modify pedestrian signal heads or vehicle signal head assemblies in accordance with Item 682, "Vehicle and Pedestrian Signal Heads"; as shown on the plans; or as directed. Mount signal heads by a span wire hanger clamp, bracket arm assembly, or mast arm bracket assembly. Signal head assemblies consist of 1 to 12 signal sections. Install signal heads as shown on the plans, or as directed.

Assemble the signal heads with backplates, louvers, and brackets as needed. Mount all signal heads at the same elevation. Install signal head perpendicular to the travel lane it controls. Plumb all signal heads vertically and horizontally.

- 4.12. **Traffic Signal Controller Cabinet, Ground Mount.** Install, repair, replace, remove, or modify ground-mounted cabinet. Plumb and tighten the cabinet. Apply silicone sealant around the base of the cabinet. Coil all cabling that enters the cabinet neatly on the cabinet floor. Mark and terminate each cable as shown on the plans, or as directed.

- 4.13. **Traffic Signal Controller Cabinet, Pole Mount.** Install, repair, replace, remove, or modify pole-mounted cabinet. Plumb and tighten the cabinet. Coil all cabling that enters the cabinet neatly on the cabinet floor. Mark and terminate each cable as shown on the plans, or as directed.

- 4.14. **Flashing Beacon Controller Cabinet.** Install, repair, replace, remove, or modify flasher cabinet. Plumb and tighten the cabinet. Coil all cabling that enters the cabinet neatly on the cabinet floor. Mark and terminate each cable as shown on the plans, or as directed.

- 4.15. **Cables.** Install, repair, replace, remove, or modify signal, loop lead-in, electrical, communication, or illumination cables in conduits or along messenger cables in accordance with Item 620, "Electrical Conductors"; in accordance with Item 684, "Traffic Signal Cables"; as shown on the plans; or as directed.

Attach aerial cable at 1-ft. intervals using approved cable ties along a messenger span cable. Install a drip loop with at least 2 turns at each pole, signal head, and weather head.

Label each cable brought into the controller cabinet. Coil 5 ft. of cable neatly on the traffic signal controller cabinet floor for each cable.

Install solderless pressure connectors that meet the requirements of the NEC for all wires attached to terminal posts. Use a ratchet-type full-circle crimper for insulated terminals to provide a solderless pressure connector.

- 4.16. **Sealing.** Install, repair, replace, remove, or modify sealant in detector saw slots, at the open end of all conduits terminated at the roadway edge, and in ground boxes. Apply sealant as shown on the plans or as directed.

- 4.17. **Salvage Operations.** Remove traffic signal when no replacement is required. Return unused or removed material deemed salvageable by the Engineer to the Department. Dispose of all other material.

- 4.18. **Signal-Related Signs.** Install, repair, replace, remove, or modify small post-mounted or overhead signs.

- 4.19. **Curbs, Ramps, and Sidewalks.** Install, repair, replace, remove, or modify curbs, ramps, and sidewalks. Secure permission to install traffic signal items before cutting into or removing curbs, ramps, and sidewalks. Replace all curbs, ramps, and sidewalks as shown on the plans. Install pedestrian access ramps as shown on the plans.

- 4.20. **Protection of Utilities.** Locate and protect all public lines and utility customer service lines in the work area. Notify the utility company and locate and mark, uncover, or otherwise protect all such lines in the construction area. Obtain information on the location and grade of water, sewer, gas, telephone, electric lines, and other utilities in the work area from the utility company. This information does not relieve the Contractor of responsibility for protecting utilities.
- Reimburse the utility line owner for expenses or costs (including fines that may be levied against the utility company) that may result from unauthorized or accidental damage to any utility lines in work area.
- 4.21. **Preservation of Sod, Shrubbery, and Trees.** Preserve all sod, shrubbery, and trees at the site during the Contract. Obtain permission to remove any sod, shrubbery, or tree branches. Preserve and restore sod and shrubbery into their original position. Replace damaged sod or shrubbery at the Contractor's expense.
- 4.22. **PVC Weatherproof Enclosures.** Install, remove, or replace 12 × 12 × 6-in. PVC weatherproof enclosure at locations shown on the plans or as directed. Only use enclosure for reconnecting or terminating traffic signal cables at the top of a timber or steel strain pole which has been replaced or reinstalled due to accidental knock down.
- 4.23. **LED Lamp Unit.** Install, replace, or remove LED optical unit in accordance with Item 682, "Vehicle and Pedestrian Signal Heads"; as shown on the plans; or as directed.
- 4.24. **Spread Spectrum Radio Antennas.** Replace, repair, or install spread spectrum radio antenna in accordance with Special Specification, "Spread Spectrum Radios for Traffic Signals"; as shown on the plan; or as directed.
- 4.25. **Video Imaging Vehicle Detection System (VIVDS).** Install, repair, replace, remove, or modify VIVDS in accordance with Special Specification, "Video Imaging Vehicle Detection System," as shown on the plans, or as directed.

5. MEASUREMENT

Measurement will be as follows:

- 5.1. **Removal of Conduit.** By the foot of conduit.
- 5.2. **Installation of Conduit by Trenching.** By the foot of the trench containing conduit, regardless of the size of conduit.
- 5.3. **Installation of Conduit by Jacking or Boring.** By the foot of road bore made. Pits for jacking or boring are subsidiary to this Item.
- 5.4. **Installation of Vehicle Detectors.** By the foot of saw-cut containing detector wire.
- 5.5. **Removal, Replacement, or Installation of Ground Boxes.** By each box removed, replaced, or installed, regardless of the type of box. A concrete apron around the box will be considered subsidiary to this Item.
- 5.6. **Removal, Replacement, or Installation of Cables.** By the foot of traffic signal cables removed, replaced, or installed, except measurement will not be made for cable inside signal heads and controllers or cable coiled in ground boxes, in pole bases, and on span wires.
- 5.7. **Installation of Duct Cables.** By the foot of trench containing duct cable.
- 5.8. **Removal, Replacement, or Installation of Cables by Messenger Cable.** By the foot removed, replaced, or installed.

- 5.9. **Removal, Replacement, or Installation of Span Cable Assembly.** By the foot of span removed, replaced, or installed. A span is defined as the distance from one pole to the next pole.
- 5.10. **Replacement or Installation of Electrical Service.** By each electrical service replaced or installed. The removal of the existing assembly will be considered subsidiary to this Item.
- 5.11. **Removal, Replacement, or Installation of Timber Poles.** By each timber pole removed, replaced, or installed. Attachment of required hardware is subsidiary to this Item.
- 5.12. **Removal, Replacement, or Installation of Signal Head Assemblies.** By each head removed, replaced, or installed. Assembly and wiring are subsidiary to this Item.
- 5.13. **Removal, Replacement, or Installation of Signal Related Signs.** By each sign assembly removed, replaced, or installed.
- 5.14. **Removal, Replacement, or Installation of Pedestrian Push Buttons.** By each push button removed, replaced, or installed.
- 5.15. **Removal, Replacement, or Installation of Traffic Signal Pole Foundations.** By the foot, of the type of foundation removed, replaced, or installed.
- 5.16. **Installation of Foundations for Ground Mount or Pole Mount Cabinets.** By each foundation installed.
- 5.17. **Removal, Replacement, or Installation of Controller Cabinet, Ground Mount.** By each cabinet removed, replaced, or installed.
- 5.18. **Removal, Replacement, or Installation of Controller Cabinet, Pole Mount.** By each cabinet removed, replaced, or installed.
- 5.19. **Removal, Replacement, or Installation of Flasher Cabinet.** By each cabinet removed, replaced, or installed.
- 5.20. **Installation of Foundations for Roadside Flashing Beacon Assemblies.** By each foundation installed.
- 5.21. **Removal, Replacement, or Installation of Roadside Flashing Beacon Assemblies.** By each assembly removed, replaced, or installed.
- 5.22. **Removal, Replacement, or Installation of Signal Pole Assemblies.** By each assembly, according to the type of pole assembly removed, replaced, or installed. Wiring in the pole and hardware is subsidiary to this Item.
- 5.23. **Removal, Replacement, or Installation of Curbs.** By the foot removed, replaced, or installed.
- 5.24. **Removal, Replacement, or Installation of Pedestrian Ramps.** By each ramp removed, replaced, or installed.
- 5.25. **Removal, Replacement, or Installation of Sidewalks.** By the square foot removed, replaced, or installed.
- 5.26. **Removal of Concrete Foundations.** By each foundation removed.
- 5.27. **Removal, Replacement, or Installation of Luminaire Heads.** By each luminaire head removed, replaced, or installed.
- 5.28. **Removal, Replacement, or Installation of Luminaire Mast Arms.** By each mast arm removed, replaced, or installed.

- 5.29. **Removal, Replacement, or Installation of Down Guy with Guard.** By each down guy with guard removed, replaced, or installed.
- 5.30. **Removal, Replacement, or Installation of Down Guy with Guard and Anchor.** By each down guy with guard and anchor removed, replaced, or installed.
- 5.31. **Remove and Salvage Traffic Signals.** By each signalized intersection salvaged. A signalized intersection is a group of traffic signals operated by a single controller.
- 5.32. **Removal, Replacement, or Installation of 12 × 12 × 6-in. PVC Weatherproof Enclosure.** By each PVC weatherproof enclosure removed, replaced, or installed.
- 5.33. **Removal, Replacement, or Installation of LED Lamp Unit.** By each LED lamp unit removed, replaced, or installed.
- 5.34. **Removal, Replacement, or Installation of Spread Spectrum Radio Antennas.** By each radio antenna removed, replaced, or installed.
- 5.35. **Removal, Replacement, or Installation of Video Imaging Vehicle Detection System (VIVDS).** By each camera assembly removed, replaced, or installed.

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 prices for the various designations. This price is full compensation for furnishing all materials, equipment, labor, fines, tools, and incidentals. The Department will pay for electrical energy consumed by the traffic signal.

Wiring in the pole; splices; backfill (soil or concrete); sealing of conduit ends and loop detector saw slots; installation of loop wire and PVC for encased loops; protection of utilities; and preservation of sod, shrubbery, and trees will not be measured or paid for directly but will be subsidiary to pertinent Items.