

Special Specification 6119

Signal Equipment Maintenance



1. DESCRIPTION

Replace damaged signal parts, signal heads, illumination parts, ground boxes, and down guys. Repair signal assemblies and maintain controller cabinets. Clean camera lenses and inspect signal installations at intersections and interchanges. Inform the Engineer of damage observed.

2. MATERIALS

The Department will furnish materials that are part of the final work unless otherwise specified. Submit a list of required materials to the Department at least 24 hr. in advance of the requested pickup date between the hours of 8:00 AM and 4:00 PM, Monday – Thursday, at sites designated in the General Notes. Designate in writing the person(s) authorized to pick up the materials.

Assume responsibility for material furnished by the Department. Use material furnished by the Department for this Contract only. Return unused or removed material deemed salvageable upon completion of the work and prior to final payment at the location shown in the plans. Dispose of material deemed unsalvageable in accordance with federal, state, and local regulations.

3. EQUIPMENT

Furnish equipment and labor necessary for completion of the work described. Required equipment includes, but is not limited to an aerial device capable of reaching overhead work, arrow board, truck-mounted attenuator, etc. 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 safety or quality of work.

4. WORK METHODS

Conform to the most current version of the National Electrical Code (NEC), local utility requirements, the requirements of this Item, and the pertinent requirements of the following Items:

- 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 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"

Work orders will be issued to the Contractor detailing work locations and type of work.

Worksheets will be provided to the Contractor to document all devices inspected, cleaned or repaired, and to report other deficiencies that require attention. The Contractor will submit completed worksheets to the Engineer. No payment will be made to the Contractor for any locations where a worksheet is not submitted.

- 4.1. **Preventive Maintenance.** Perform the following work for each traffic signal installation:
- 4.1.1. **Cables.** Inspect cable (tray, heliax, coaxial, signal) for damage or deterioration, proper attachment, excess slack and tangled cables. Re-lash, tighten and straighten span cables as necessary. Document span and signal cables that show signs of damage or deterioration. Submit written notification to the Engineer of necessary repairs.
- 4.1.2. **Pole and Mast Arms.** Inspect pole bases, foundations, and mast arms. Check welds on pole for fatigue or cracking. Tighten bolts as needed. Remove debris from pole bases. Remove all unnecessary signs. Replace missing hand-hole covers.
- 4.1.3. **Span Wire.** Inspect steel wire (span, tether, messenger), brackets, set screws, clamps, and fittings and service sleeves. Tighten, align, or replace as directed. Check clearance between roadway and signal heads and adjust to 18 ft. or as directed by the Engineer.
- 4.1.4. **Conduit.** Inspect conduit affixed to poles and reattach as necessary. Ensure conduit ends are sealed with an approved sealant.
- 4.1.5. **Pedestrian Push Buttons.** Inspect pedestrian push buttons for proper operation and report damage or malfunctions to the Engineer. Replace as directed.
- 4.1.6. **Ground Boxes.** Inspect ground boxes, clean out debris, and replace or install missing lid bolts. Seal conduit ends as necessary with approved sealant. If necessary, backfill with gravel to insure compliance with Item 624.
- 4.1.7. **Illumination.** Test Illumination circuits. Notify Engineer of test results and recommend repairs as appropriate.
- 4.1.8. **Signal/Pedestrian Heads.** Inspect signal and pedestrian head lenses, reflectors, visors and back plates for visibility or damage. Clean lenses and appropriate components with soft cloth, soap and water. Relamp each signal section and pedestrian head when existing lamp is observed to be more than 50% inoperable and as directed by the Engineer. Ensure correct alignment of signal heads as directed. Install signal back plates as directed.
- Pass the wiring to each signal head from the mast arm through the signal head bracing or attachment hardware to the signal head. Exposed cable or wiring is not permitted.
- 4.1.9. **Down Guys.** Inspect steel wire, clamps, service sleeves, guards and anchor rods. Tighten or replace components as necessary and report deterioration of any elements to the Engineer.
- 4.1.10. **Detector Loops.** Inspect all detector loops in the roadway surface for exposed wires, or deterioration. Seal exposed wires with an approved sealant.
- 4.1.11. **VIVDS.** When Video Detection Cameras are present at the intersection, clean camera lenses with a soft cloth that has been dampened with water. Tighten any loose brackets. Check camera connections and report if loose or corroded.
- 4.2. **Illumination.** Replace as necessary any lamps, photoelectric cells, and heads.
- 4.3. **Pedestrian Push Buttons.** Replace push buttons. Push buttons must meet the requirements of the Americans with Disability Act (ADA).

- 4.4. **Install Ground Box w/Apron.** Install ground boxes in conformance with the details shown on the plans. Wiring connections required inside the box are considered subsidiary to this bid item.
- 4.3. **Signal Heads/Countdown Pedestrian Heads.** Replace complete traffic or countdown pedestrian signal head, brackets and back plates as directed. Undamaged LED signal sections or material deemed salvageable by the Engineer must remain the property of the Department and must be delivered to the location(s) as shown on the plans.
- Pass the wiring to each signal head from the mast arm through the signal head bracing or attachment hardware to the signal head. Exposed cable or wiring is not permitted.
- Ensure correct alignment of signal heads as directed.
- 4.6. **LED Signal Lamp.** Install, replace, or remove LED lamp in accordance with Item 682, "Vehicle and Pedestrian Signal Heads," as shown on the plans or as directed.
- 4.7. **Traffic Signal Support System.** Replace complete traffic signal support system, as directed.
- 4.8. **Signal-Related Signs.** Install, repair, replace, remove, or modify small post-mounted or overhead signs.
- 4.9. **Down Guy Replacement.** Replace down guy including guard.
- 4.10. **Splices.** Splices will not be permitted except as shown on the plans, unless the Engineer approves each individual splice. Ensure allowed splices are water tight. Insulate splices using heavy duty heat shrinkable tubing with factory applied sealant.
- 4.11. **Controller Cabinet.** Perform the following maintenance services to the controller cabinet as shown on the plans or as directed:
- Clean filters.
 - Replace filter.
 - Lubricate hinges and lock with graphite spray.
 - Check weatherproof seal (gasket).
 - Check anchor bolts and tighten as necessary.
 - Check for water accumulation and duct sealant.
 - Check ground rod and entire grounding system.
 - Check wiring schematics and records.
 - Check operation of fan and heater.
 - Check ground fault receptacle.
 - Clean all shelves in cabinet with soft, damp cloth. Remove any foreign residue from shelves.
 - Measure voltages at service inputs in cabinet.
 - Check and record any current being drawn.
 - Vacuum cabinet interior.
 - Remove all graffiti and unauthorized signs or stickers from controller cabinets and signal poles.
 - Replace cabinet lamp as necessary.
 - Apply pesticides as directed.

5. MEASUREMENT

This Item will be measured as follows:

- 5.1. **Preventive Maintenance.** This Item will be measured by each traffic signal or beacon location regardless of the number of signal heads included at the installation. It should be further understood that any roadside flashers (advance warning) associated with a given signal or beacon location are considered part of the main

signal or beacon installation. For the purpose of this Item, a diamond intersection will be considered as two (2) installations (locations) if it has two (2) controller cabinets.

- 5.2. **Illumination Lamp.** By the each illumination lamp replaced.
- 5.3. **Photoelectric Cell.** By the each photoelectric cell replaced.
- 5.4. **Illumination Head.** By the each illumination head replaced.
- 5.5. **Pedestrian Push Buttons.** By the each pedestrian push button replaced.
- 5.6. **Install Ground Box.** By the each ground box installed with apron and required conductor connections.
- 5.7. **Signal Heads/Countdown Pedestrian Heads.** By the each traffic or countdown pedestrian signal head replaced.
- 5.8. **Removal, Replacement or Installation of LED Signal Lamp.** By each LED Signal lamp unit removed, replaced or installed.
- 5.9. **Traffic Signal Support System.** By the each traffic signal support system replaced. Measurement for this Item will also include each ground box, each signal head, each illumination head, each illumination lamp, each photo cell, each pedestrian push button, each traffic signal support system, each solder and weatherproof splice, each maintain controller cabinet, and each down guy, inspected, replaced or installed. Signal fittings and replacing signal visors will be subsidiary to pertinent Items.
- 5.10. **Removal, Replacement, or Installation of Signal Related Signs.** By the each sign assembly removed, replaced, or installed.
- 5.11. **Down Guy.** By the each down guy replaced.
- 5.12. **Splices.** By the each splice regardless of the number of conductors in a cable.
- 5.13. **Controller Cabinet.** By the each controller cabinet replaced.
- 5.14. **Replace Span Cable.** By the foot of span cable replaced.
- 5.15. **Replace Ground Rod.** By the each of ground rod replaced as directed.

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 "Preventive Maintenance," "Illumination Lamp (Replace)," "Photo Cell (Replace)," "Illumination Head (Replace)," "Pedestrian Push Button (Replace)," "Ground Box (Install), of the type specified," "Traffic Signal Head (Replace), of the type specified," "Countdown Pedestrian Head (Install), of the type specified," "LED Signal Lamp (Replace), of the type specified," "Traffic Signal Support System (Replace)," "Signal-Related Signs (Replace)," "Down Guy (Replace)," "Solder and Weatherproof Wire Splice," "Maintain Controller Cabinet," "Span Cable (Replace)," and "Ground Rod (Replace)." This price is full compensation for inspections, repairs and replacement and for furnishing labor, tools, equipment and incidentals.