Chapter 9 Electrical System Maintenance

9-1 General

All electrical systems require regularly scheduled maintenance in addition to non-scheduled maintenance caused by unpredictable events such as storms, accidents, and equipment failure. The intent of periodic maintenance is to keep the system operating correctly and effectively for the longest possible service lifetime. All maintenance activities shall be documented in the Signal Maintenance Management System (SIMMS) for all equipment tracked in SIMMS.

Certain maintenance activities are common to all systems, regardless of type. These activities should always be performed on the cycle applicable for the system. These activities are defined as follows:

9-2 Wiring and Connection Maintenance

- Clean conductors, terminals, and connectors of all corrosion.
- Tighten terminals and connectors including breaker, transformer, and contactor connectors.
- Check the equipment grounding system, including conduit end bushing connections, bonds, equipment grounding conductors, enclosure grounding connections, and pole grounding connections.
- Check the grounding electrode, grounding electrode conductor, and associated connections.
- Check conductor insulation for damage, and repair if necessary.
- Replace deteriorated or missing conductor and terminal identification markings.
- Reference *Standard Specification* 8-20.3(5), 8-20.3(8), 8-20.3(9), and Standard Plan J-60.05.

9-3 Enclosure Maintenance

- Clean enclosure inside and out.
- Repair corroded surfaces, fasteners, and anchor bolts.
- Lubricate lock, latch assembly, and hinges.
- Check door gaskets and base seals.
- Clean vent filter and replace if necessary.
- Clean drain hole.

9-4 Documentation

- Note all checks and repairs that are performed.
- Note major repairs that are required.

9-5 Dynamic (Variable) Message Sign Systems

- Observe operation.
- Lubricate hinges and check springs.
- Clean sign face.
- Relamp bulb matrix signs.
- Spot-paint sign lamp visors, sunscreen, and background, where necessary.
- Clean legend on disk signs.
- Verify network connectivity and remote operation.

9-6 Drain Pump Systems

- Check pump pit for water.
- Check water pipes for corrosion.
- Clean sump.
- Check high water alarm.
- Test pump and lubricate.
- Check heater and thermostat.

9-7 Gate and Barrier Systems

9-7.1 *Minor*

- Check relays, test switch, and limit switches.
- Operate per instructions and check all moving parts.

9-7.2 *Major*

- Check relays, test switch, and limit switches.
- Operate per instructions and check all moving parts.
- Clean gate surface.
- Tighten all mechanical connections.
- Lubricate shear pins, bull gear, and shaft.
- Check transmission level.
- Check collars.
- Check brake.
- Check heater.
- Remove flash guards and inspect.

9-8 Flashing Beacon Systems (Includes Intersection Control Beacons)

- Check flasher assembly.
- Spot-paint deteriorated areas of visor, head, and mount.
- Check signal mounting.
- Check signal supports.
- Check vertical clearance (16’ - 6” minimum for overhead locations).

LED displays:

- Clean lens.
- Replace LED optical unit every 15 years.

Incandescent displays:

- Relamp or replace with LED optical unit.
- Clean lens and reflector.

9-9 Illumination Systems

9-9.1 *Roadway Illumination Systems*

- Check fusing in pole base (*Standard Specification* Section 9-29.10).
- Check bolt torque on slip bases.
- Check slip bases clear of debris.
- Document any slip bases without required grading (see Standard Plan J-28.22)
- Check if conductors are secured on breakaway base installations at adjacent junction boxes (Standard Plan J-28.70).
- Replace damaged or missing pole identification markings.
- Check junction boxes, adjust if necessary.

LED luminaires:

- Clean LED array/lens cover.
- Check shields when present.
- Replace luminaire every 15 years.

HID luminaires:

- Relamp every 4 years or replace with LED luminaire.
- Clean reflector and refractor.

9-9.2 Sign Lighting Systems

Contact HQ Traffic Office before planning work on Sign Lighting Systems.

- Relamp.
- Clean reflector and refractor.
- Check support mountings.
- Check fusing.

9-10 Services

- Check photocell.
- Check timers.
- Check contactors.
- Replace deteriorated or missing arc flash hazard warning label.
- Replace deteriorated or missing service, circuit, and wiring identification markings.
- Check control transformer on 480 volt services.
- Check test switch.
- Check heater and thermostat.

9-11 Signal Systems

(Includes traffic signal systems, reversible lane signals, emergency vehicle signals, data accumulator stations, and ramp meter signals.)

9-11.1 Vehicle Detection Systems

- Check detector operation by observing traffic and display panel indicators.
- Check loops and repair if required (See Standard Plans J-50.05 through J-50.30).
- Megger test loop circuits and record.
- Clean and verify proper operation of emergency vehicle preemption (EVP) detectors.

9-11.2 Vehicle Display Systems

- Spot-paint steel mounting brackets. Aluminum or bronze mountings will not require painting.
- Check mountings for wear and tightness.
- Check tether cable assemblies.
- Check seals on aerial junction boxes.
- Check vertical clearance (16’ - 6” minimum for overhead displays).
- Check signal supports, messenger cable connections, and back guys.
- Replace missing cable ties on span wire systems.
- Adjust junction boxes, replace missing or damaged lids.

LED displays:

- Clean lens.
- Replace LED optical unit every 15 years.

Incandescent displays:

- Relamp or replace with LED optical unit.
- Clean lens and reflector.

9-11.3 *Pedestrian Detection and Display System*

- Check all buttons for operation. Verify Accessible Pedestrian Signal (APS) speech messages.
- Replace damaged buttons and/or signs (Standard Plan J-20.26).
- Remove neon grid displays and replace with LED displays.
- Spot-paint housings and mounting brackets as required.

LED displays:

- Clean lens.
- Verify proper countdown timer operation.
- Replace LED optical unit every 15 years.

Incandescent displays:

- Clean lens and reflector.
- Relamp

9-11.4 *Signal Control Systems*

- Observe controller timing functions.
- Check load switches.
- Check display panel, replace burned out indicator lights.
- Check coordination and communication equipment.
- Verify network connectivity and remote operation/access.
- Check cabinet seal, locks, hinges, ventilation, lighting, etc.
- Replace filter(s).

Major:

- Check all cabinet wiring, terminals, and associated markings/labels.
- Test conflict monitor/replace conflict monitor programming card/key.

9-12 Sprinkler Systems

- Cycle controller on 5 minute cycle.
- Check solenoids.
- Adjust junction boxes.

9-13 Camera (CCTV) Systems

- Lubricate mounting assembly.
- Check operation.
- Remove camera and shop-test.
- Verify network connectivity and remote operation.