



*Tech Brief Series*

Tech Brief - 2019-2

# Preventative Maintenance of Traffic Signals

Preventive maintenance is a key component of a traffic signal management plan, helping to meet the agency's overall goal of providing good basic service. In Connecticut, municipalities can be held liable for defects in the roadway, which include improperly maintained traffic signals. An agency may be found negligent if it fails to maintain traffic control signal equipment in a reasonably safe condition.

## Benefits of Preventive Maintenance

- Reduced frequency and severity of malfunctions
- Reduced agency liability
- Reduced life-cycle costs
- Extended life of installations
- Optimized signal operation

In order to reduce liability and maintain signals in good working order, the following components of a comprehensive preventive maintenance program are recommended:

- Perform routine inspections of traffic signal equipment.
- Take proper safety precautions while performing maintenance.
- Ensure that signal technicians are equipped with the proper tools and training.
- Implement a program of maintenance record keeping.



## Routine Inspections

Routine inspections of traffic signals should be performed at minimum once every other year. Reviewing your agency's maintenance records and service requests can assist with timing preventive maintenance and establishing a replacement schedule for components.

The following items should be inspected during a routine inspection:

- Controller components
- Cabinet fan and filter
- Vehicular and pedestrian signal heads
- Pedestrian push buttons and signs
- Signal poles and/or mast arms
- Span wire installations
- Conduit system and junction boxes
- Cables
- Detection systems
- Overhead street name signs
- UPS (battery backup)
- Cabinet prints (up to date and in good condition)

A sample checklist for routine inspections is provided in the resources section below. Regular review of intersection crash data as part of the annual inspection may alert maintenance staff to potential hazards or defects at the intersection which may be related to the traffic signal. A link to the Connecticut Crash Data Repository is provided as a resource below.

## Safety

Maintenance staff should receive training in temporary traffic control, electrical line safety and fall protection. Temporary traffic controls should be set up prior to performing any signal-related maintenance activities. For more information on setting up temporary traffic control in accordance with MUTCD standards, you may refer to our tech brief on work zone safety for signal maintainers, provided in the resources section below.



# Tools and Training

Agencies performing traffic signal maintenance should have the means of inspecting and testing traffic signal equipment routinely. The following list of equipment, though not exhaustive, is an example of items recommended for those performing routine inspections and maintenance:

- A computer with agency-specified software installed
- A certified CMU or MMU tester (printouts of system timing tests, voltage tests, power conflict, red fail conflict, short yellow indicator, AC power failure transfer, restore, power fluctuation, etc.)



- Loop detector analyzer and tester for testing loops and detector amplifiers (signal strength, inductance and change of inductance, resistance)



- Video monitor to observe detection operation



- Suitcase tester or test box for controller



- Load switch tester (verify current outputs)



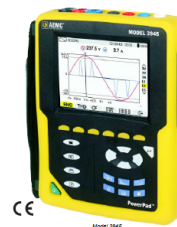
- BIU tester



- Earth ground clamp



- Power quality meter



- Digital multimeter



- Test kits for communication

While inspecting traffic signals, maintenance staff may identify worn or damaged components requiring replacement. Commonly used spare parts to have on hand include:

- Push buttons and accompanying signs
- Spare cabinet fans and thermostats
- Spare controller
- Signal and flash load switches
- Flash transfer relays
- Replacement air filters
- Spare controller cabinet bulbs
- Spare circuit breakers
- Spare ground fault circuit interrupter (GFCI) receptacles
- Spare detector panel relay sockets and relays
- Spare preemption relay sockets and relays
- Spare communication equipment
- Spare gasket material for cabinets
- Replacement LED modules
- Spare UPS batteries
- Spare loop detector amplifiers
- Spare video detection card and camera interface panel
- Spare power supply for detector cards

Comprehensive training for traffic signal maintainers and a bi-monthly journal on signal-related topics are currently available through the International Municipal Signal Association (IMSA). Technical briefs and additional training offerings will be made available through the UConn T2 Center's Traffic Signal Academy as they are developed. For information on upcoming training opportunities, subscribe to our traffic signals listserv by emailing Mary McCarthy: [mary.c.mccarthy@uconn.edu](mailto:mary.c.mccarthy@uconn.edu).

## Recordkeeping

Adequate maintenance records are essential for ensuring proper operation of the signals and as evidence to protect the agency from liability. Records may be in hardcopy or electronic format. Duplicate records should be stored at an offsite location in case of server failure, fire, flooding or other impacts.

Service requests should be entered into a management system with the following information:

- Name and contact information of the caller
- Date and time the complaint was received
- Location
- Description of the problem as reported
- Name of the employee recording the request

When maintenance personnel are sent to the field, additional information should be added to the ticket, including:

- Name of the maintainer
- Time dispatched
- Time of arrival on location
- Issues as identified by maintenance staff
- Components replaced
- Actions taken
- Time at which the issue was resolved

Traffic signal plans should be kept on site in the controller cabinet as well as in the offices of personnel responsible for the traffic signals (the LTA, town engineer or public works director). In addition, a log book should be maintained in the cabinet showing the dates and times of service, the maintainer providing the service, as well as any part numbers or serial numbers for the components installed. Damage due to rodent activity is common in Connecticut, so in-cabinet documents should be protected to prevent destruction.

Installation, removal or changes made to town-owned signals in Connecticut must be approved by CTDOT. A link to the CTDOT traffic signal permit application is provided in the resources below.

## References and Resources

**FHWA Traffic Control Systems Handbook** <https://ops.fhwa.dot.gov/publications/fhwahop06006/>

**Connecticut Traffic Signal Academy**

[https://www.t2center.uconn.edu/educational%20programs/traffic\\_signal\\_academy.php](https://www.t2center.uconn.edu/educational%20programs/traffic_signal_academy.php)

**Sample Inspection Checklist** <https://www.t2center.uconn.edu/pdfs/Traffic%20Signal%20Maintenance%20Checklist%202015-12-28.pdf>

**Work Zone Safety Tech Brief** [https://www.t2center.uconn.edu/pdfs/Traffic%20Signal%20Brief\\_Work%20Zone%20Safety%20for%20Signal%20Maintainers\\_2018\\_4.pdf](https://www.t2center.uconn.edu/pdfs/Traffic%20Signal%20Brief_Work%20Zone%20Safety%20for%20Signal%20Maintainers_2018_4.pdf)

**CT DOT Traffic Signal Application** [https://www.ct.gov/dot/lib/dot/documents/dstc/forms/signal\\_application.pdf](https://www.ct.gov/dot/lib/dot/documents/dstc/forms/signal_application.pdf)

**IMSA Training and Resources** <http://www.imsasafety.org/IMSA/Default.aspx>

**Crash Data Repository** <https://www.ctcrash.uconn.edu/>

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