Boston Transportation Management Center

Activity Report for FY 2011

Real-time Traffic Signal Adjustments

The Boston Transportation Department's Transportation Management Center (TMC) holds the mission to monitor, coordinate, and adjust the City's traffic signals on a real-time basis to improve the flow of traffic on city streets. The TMC accomplishes this mission through the use of specialized software to communicate and control traffic signals and through visual monitoring on CCTVs.

The TMC also serves as a central location to manage incidents and special events, identify and direct repair of malfunctioning traffic signals, detect and coordinate the removal of illegally parked vehicles blocking the roadways and serve as a coordination point with other transportation agencies and emergency respondents.

The TMC is staffed by BTD engineering staff from 6:00 a.m. to 10:00 p.m. on weekdays and from 9:00 a.m. to 5:00 p.m. on Saturdays. TMC staff may be contacted at (617) 635-4430.

Although traffic signals are programmed and timed based on traffic engineering studies, unusual traffic conditions can warrant real-time adjustments to increase or decrease cycle length, alter green splits to favor one approach over another and/or make adjustments to the traffic signal offset to improve progression along a corridor. Engineers use their knowledge of the traffic signal system and the local and regional roadway system to make timing adjustments via specialized software that allows communication between the TMC and signal controllers in the field. Currently, the TMC has computer control of 469 out of the 828 traffic signals operated by the Boston Transportation Department (57%).
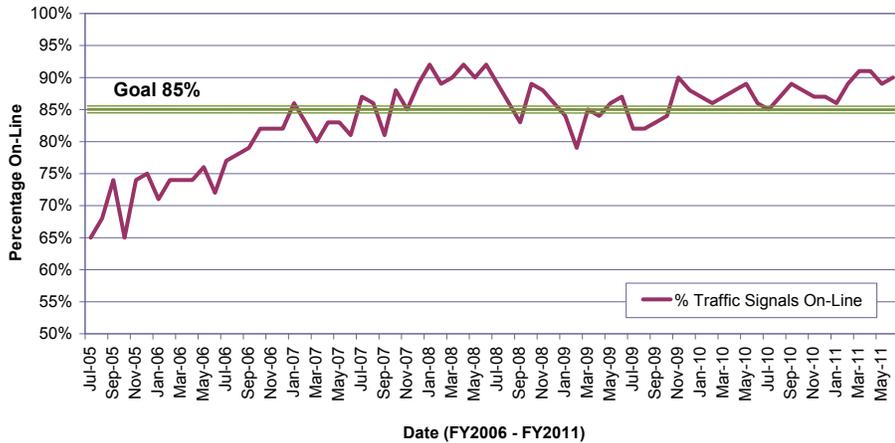
TMC staff made more than 9,800 real-time traffic signal adjustments during FY 2011.

Traffic Signal Repair Calls

In addition to making real-time traffic signal timing adjustments, the TMC identifies malfunctioning traffic signals and reports problems to expedite repairs. A signal malfunction could include various problems such as a knockdown, out-of-focus housing, conflict flash, loss of power, or loss of communication with central control. If these problems were not reported and corrected promptly, traffic congestion would develop. In FY 2011, the TMC reported the following numbers of traffic signal malfunctions:

Calls to BTD Signal Shop	3,421
Calls to Contractors (Tri-State, Vigil, etc)	136
Calls to Other Agencies (DCR, MassDOT, etc.)	177
TOTAL	**3,734**

In June 2011, an estimated 90% of the 469 computer-controlled signals were on-line—up from 65% in July 2005.

Percentage On-Line chart — FY2006–FY2011, showing % Traffic Signals On-Line rising from 65% toward 90%, with Goal 85% line. Y-axis: Percentage On-Line (50%–100%). X-axis: Date (FY2006 - FY2011), Jul-05 through May-11.
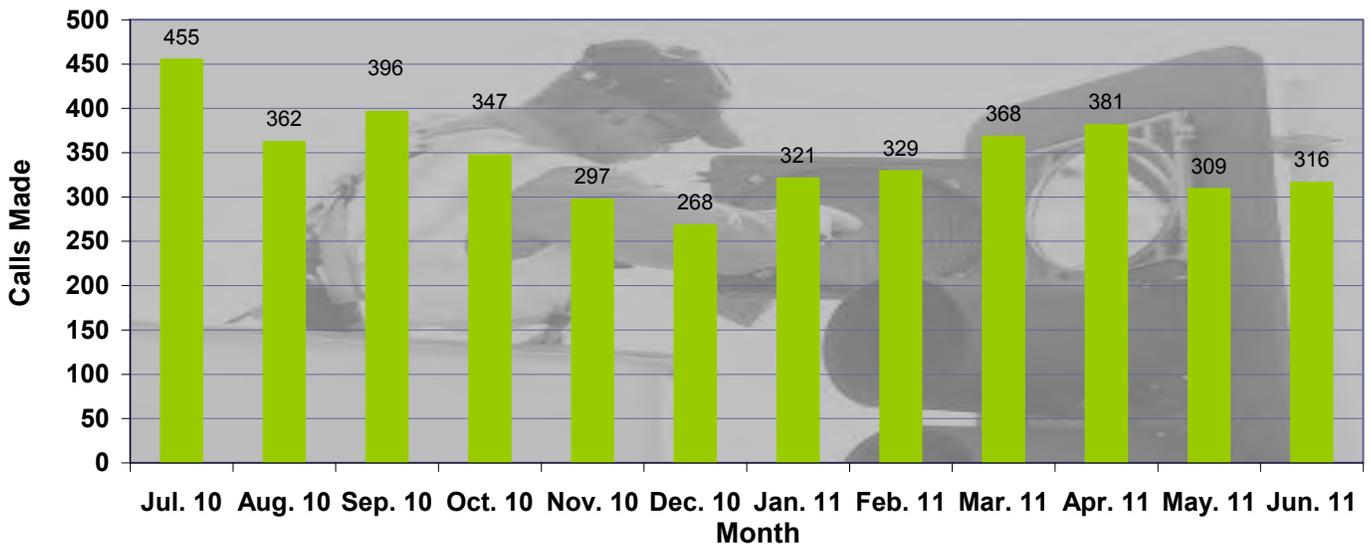
Traffic Enforcement Calls

With the use of CCTVs located on main city arterials, TMC Operators can detect illegal parking maneuvers that cause traffic disruption, such as double-parking, parking in a rush-hour No Stopping zone, etc. When a TMC Operator sees an illegally parked vehicle that will impede traffic, he notifies BTD Enforcement so that the violating vehicle can be ticketed and/or towed.

In FY 2011, the TMC reported 415 parking violators to the Enforcement Department.

Total Calls by Month

The following graph represents the total number of calls made by TMC Operators in FY 2011 for traffic signal repairs, enforcement, and other issues, with the aim of improving traffic flow.

Bar chart — Calls Made by Month:

Month	Calls Made
Jul. 10	455
Aug. 10	362
Sep. 10	396
Oct. 10	347
Nov. 10	297
Dec. 10	268
Jan. 11	321
Feb. 11	329
Mar. 11	368
Apr. 11	381
May. 11	309
Jun. 11	316

Incidents

An "incident" is a non-recurring situation that requires the TMC to perform additional traffic management. Incidents include special events, crashes, road closures, very heavy congestion, road work, etc. These types of situations require the TMC Operator to make several traffic signal timing and progression adjustments, disseminate traffic alerts (described below), and coordinate with police, DPW, contractors and other agencies.
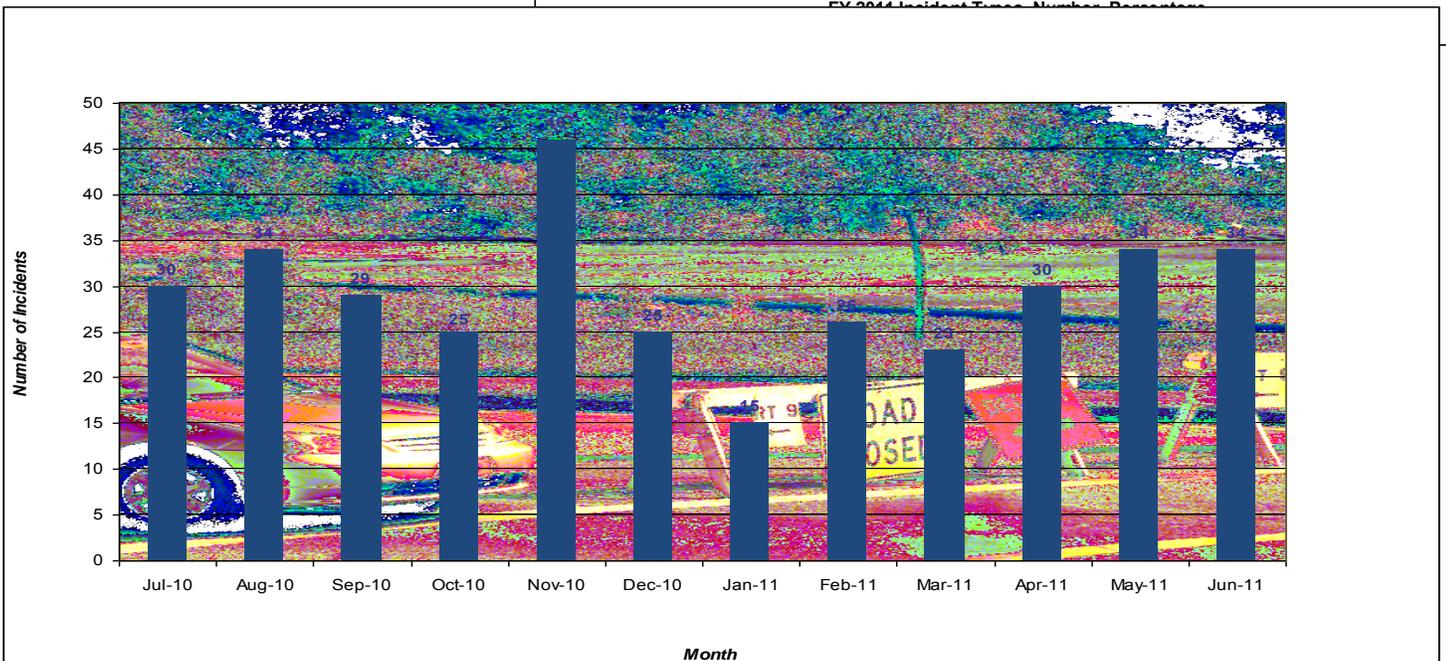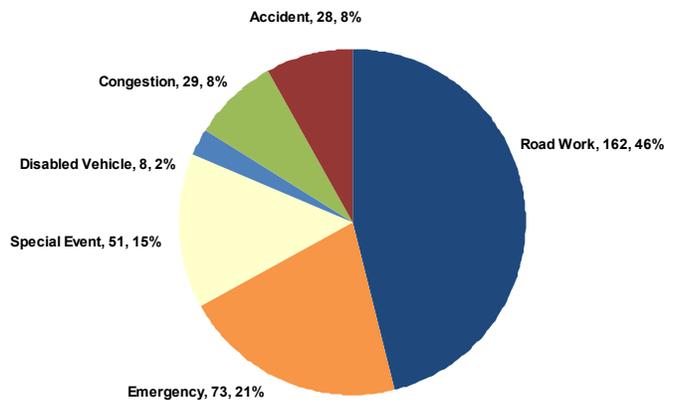
When roadwork is taking place, the TMC Operator checks the BTD Transportation Management Permitting System to ensure the contractor is allowed to be on the roadway and is operating within the guidelines of the permit (e.g., using the permitted number of lanes, or operating at the right time of day). If a contractor is not operating within acceptable parameters of a valid permit, the TMC notifies Boston Police to remove the contractors and equipment from the roadway.

In FY 2011, the TMC logged 351 incidents as follows:

◆ **51 special events incidents**

◆ **162 road work incidents**

◆ **73 emergency incidents**

◆ **28 crashes**

◆ **29 unusual traffic congestion incidents**

◆ **8 disabled vehicles**

FY 2011 Incident Types, Number, Percentage

Accident, 28, 8%
Congestion, 29, 8%
Disabled Vehicle, 8, 2%
Special Event, 51, 15%
Emergency, 73, 21%
Road Work, 162, 46%

Traffic Advisories

When an unusual traffic situation arises, the TMC sends a special message called a traffic advisory to City Department Heads and the Mayor's 24-hour Hotline via e-mail and text-messaging. The TMC keeps City staff informed of the event, and they in turn can share information with citizens who may inquire.

The event may be an accident, unusual congestion, roadwork, medical emergency, etc. Follow-up traffic alerts are sent when conditions change or the situation has ended.

In FY 2011, the TMC staff disseminated 424 traffic advisories.

TMC CCTV Operational Status

CCTVs are a key tool for TMC Operators to monitor Boston streets and arterials. CCTVs also allow TMC staff to determine the effectiveness of the traffic signal system, and to evaluate their own adjustments to signal timing and progression. CCTVs also allow the TMC to detect parking violators, accidents, disabled vehicles, roadwork (permitted and not permitted), police and fire emergencies, traffic congestion, etc.

Currently, BTD owns 141 CCTVs throughout the city. Additionally, the TMC is able to monitor and control several CCTVs provided by Boston Police and the Massachusetts' Interagency Video Information System (MIVIS).

Of the 141 BTD-owned CCTVs, an average of 59% were operational during FY 2011.

Corridor Traffic Conditions Checklist

Using CCTV, TMC Operators scan key Boston roadways on an hourly basis during the a.m. and p.m.


peak periods. Using the Corridor Traffic Conditions Checklist, the TMC Operators write down their observation of the roadway's level of service (LOS). This method ensures that the CCTVs are panned routinely to identify traffic issues that may be out of sight as the CCTV remains in a stationary position.

Once an Operator identifies a roadway operating at a poor LOS (typically LOS E or F), the Operator takes further action to remedy the situation, such as making signal timing and offset adjustments, requesting police and enforcement assistance, or taking other actions described previously in this report.

Permanent Traffic Signal Adjustments

Using the surveillance techniques described above, BTD Traffic Engineers are able to identify corridors and areas that require detailed re-evaluation and permanent adjustment of the current traffic signal operations. These can be due to changes in area traffic patterns or new developments that have a caused a traffic impact. BTD's goal is to re-revaluate each traffic signal once every 5 years.
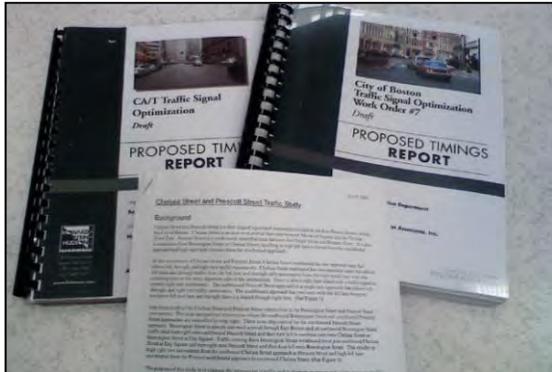
Once a corridor or area has been identified for re-evaluation, a detailed study of the traffic signals to be retimed is begun. Through BTD staff or one of its consultants, a field survey is taken of lane configurations, geometrics, vehicle, bicycle and pedestrian counts, pedestrian crossing distances, existing signal operation, traffic queue lengths, travel times, etc. This information is typically entered into the traffic simulation and optimzation model software called Synchro. The model is first adjusted to match exisitng traffic conditions observed in the field.

Once the existing traffic model is approved, Synchro optimizes the traffic signals to lower delay and improve capacity on all approaches by adjusting green split times and traffic signal cycle length. Delays and travel time are also reduced by improving progression along the main arterials. Pedestrian crossing phases are also examined to ensure safe crossing time and BTD seeks improvements to minimize pedestrian delays as well.

The new timings are then entered into the TMC signal software, which will then operate at the traffic signals in the field. BTD Engineers then monitor the new timings and make any fine tuning adjustments that the Synchro software could not take into account due to unique and unpredictable roadway characteristics.

The final timings entered into the TMC signal software database are considered permanent changes.

In FY 2011, TMC staff made 183 permanent traffic signal adjustments.