Boston Traffic Management Center

Annual Activity Report for FY 2015

The mission of the Traffic Management Center (TMC) within the Boston Transportation Department is to monitor, coordinate, and adjust the City's traffic signals in order to improve the flow of traffic on city streets. TMC staff accomplishes this by using traffic monitoring cameras and specialized computer hardware and software to communicate with and control traffic signals in real-time.

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

The TMC is routinely staffed from 7:00 a.m. to 10:00 p.m. on weekdays and from 9:00 a.m. to 5:00 p.m. on Saturdays. During certain major special events, the TMC is opened for extended hours. TMC staff may be contacted during these hours at (617) 635-4430.

Real-time Traffic Signal Adjustments

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 556 out of the 849 traffic signals operated by the Boston Transportation Department (66%).

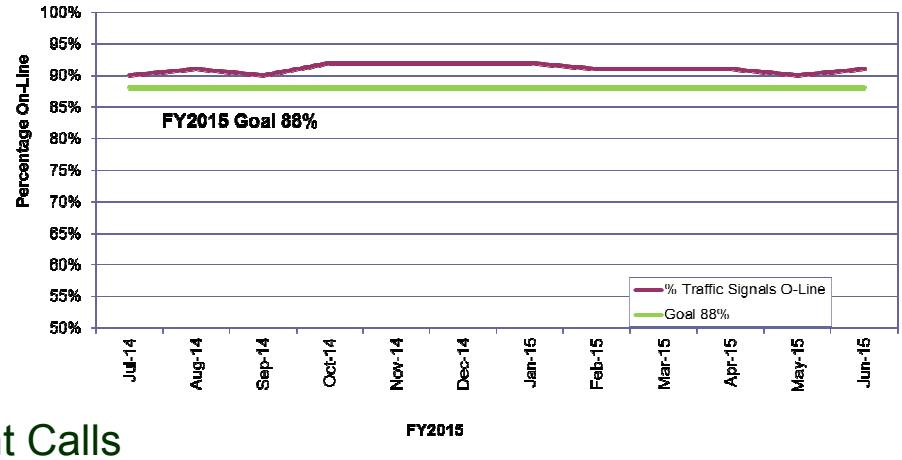
TMC staff made more than 40,200 real-time traffic signal adjustments during FY 2015.

Traffic Signal Repair Calls

In addition to making real-time traffic signal timing adjustments, TMC staff identifies malfunctioning traffic signals and reports problems to expedite repairs. A signal may malfunction as a result of a knockdown, out-of-focus housing, conflict flash, loss of power, or loss of communication with central control. If these malfunctions were not reported and corrected promptly, traffic congestion would develop and traffic safety would be compromised. In FY 2015, staff reported the following traffic signal malfunctions:

Calls to BTD Signal Shop	2,018
Calls to Contractors	89
Calls to Other Agencies (DCR, MassDOT, etc.)	127
TOTAL	**2,234**

In FY 2015, an estimated 91% of the 556 computer-controlled signals were on-line.



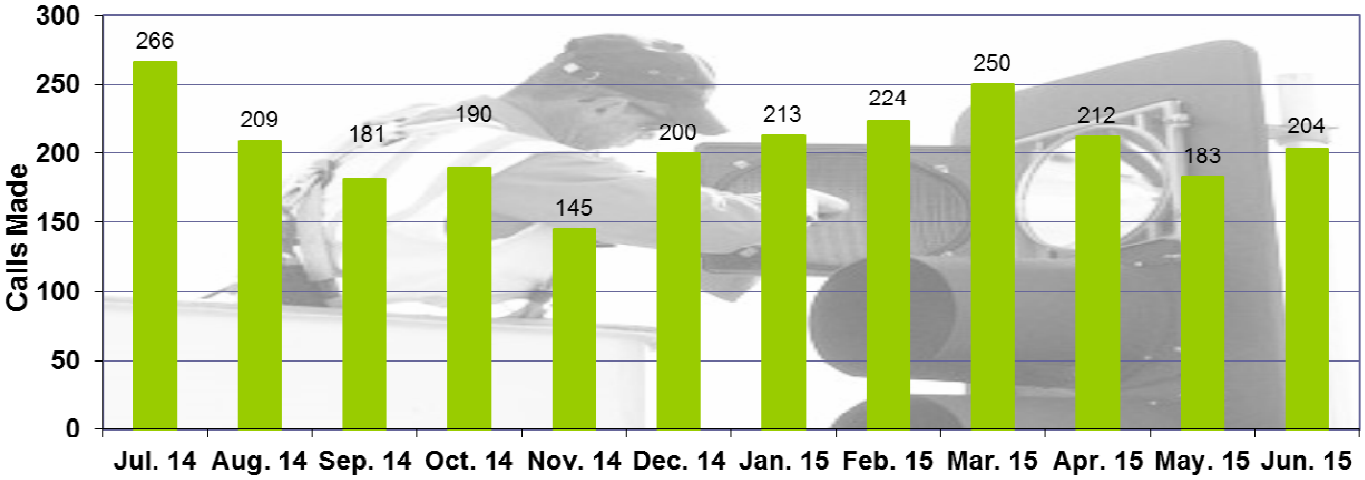
Traffic Enforcement Calls

With the use of traffic monitoring cameras located on city arterial streets, TMC operators can detect illegal parking maneuvers that cause traffic disruption, such as double-parking, parking in a No Stopping zone, etc. When a TMC operator sees an illegally parked vehicle that will impede traffic, he/she notifies BTD Enforcement so that the violating vehicle can be ticketed and/or towed.

In FY 2015, TMC staff reported 243 parking violators to the BTD Enforcement Division.

Total Calls by Month

The following graph represents the total number of calls made by TMC staff in FY 2015 for traffic signal repairs, enforcement, and other issues, with the aim of improving traffic flow.



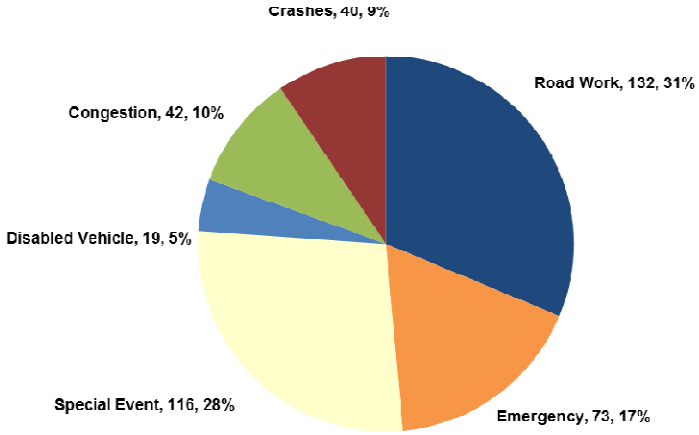
Incidents

An "incident" is a non-recurring situation that requires TMC staff to manage traffic. Incidents may include: special events, crashes, unusually heavy traffic volume, road closures, detours, construction / 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.

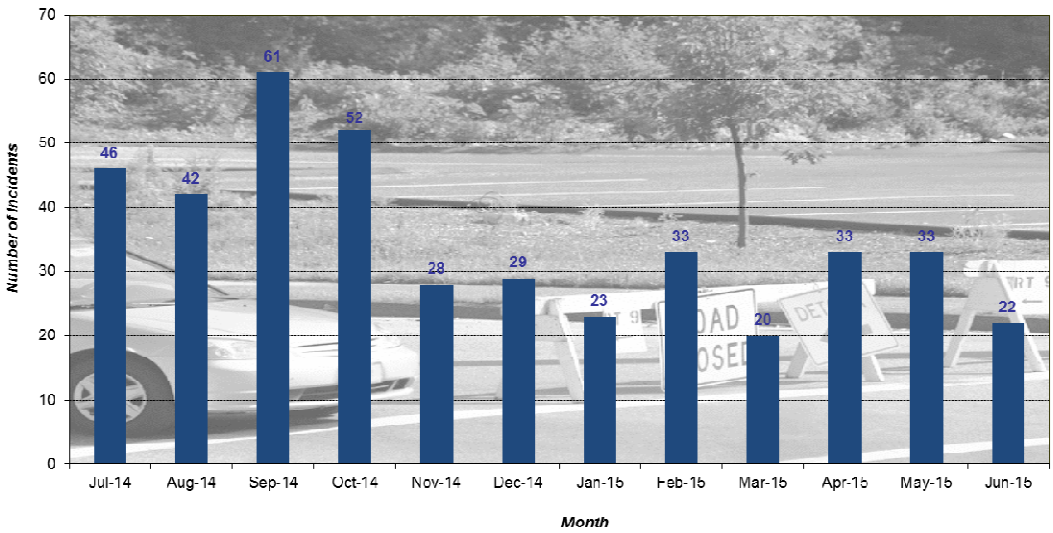
When an operator observes road work taking place on an arterial street, he/she checks the BTD Traffic Management Permitting System to determine if the contractor has been granted permission to occupy the roadway and is operating within the guidelines of the permit (e.g., using the permitted number of lanes, or operating at the right time of day). If it is determined by the TMC operator that a contractor is not operating within acceptable parameters of a valid permit, the TMC operator immediately notifies the Boston Police Department to remove the contractors and equipment from the roadway.

In FY 2015, the TMC logged 422 incidents as follows:

- **116 special events**
- **132 construction / road work**
- **73 emergencies**
- **40 crashes**
- **42 unusually heavy traffic volume**
- **19 disabled vehicles**



FY 2015 Incident Types, Number, Percentage



Traffic Advisories

When an incident occurs, TMC staff send traffic advisories to City Department Heads and the Mayor's 24-hour Hotline via e-mail and text-messaging. The TMC keeps key city staff informed of the event, and they in turn can share information with their staff and constituents as needed.

Follow up traffic advisories are sent when conditions change or the incident has ended.

In FY 2015, the TMC staff disseminated 1,534 traffic advisories.

Traffic Monitoring Camera Status

Traffic monitoring cameras are a key tool for TMC staff to manage traffic in the city. These cameras allow TMC staff to verify and detect incidents, monitor congestion levels, and evaluate adjustments to signal timing and progression. As previously discussed, the cameras are also used to detect parking violators, crashes, disabled vehicles, road work (permitted and not permitted), police and fire emergencies, etc.

Currently, BTD owns 247 traffic monitoring cameras throughout the city. 18 CCTVs were added during FY 2015. Additionally, the TMC is able to monitor 93 cameras owned by Boston Police Department and 197 cameras owned by Massachusetts Department of Transportation through the Massachusetts' Interagency Video Information System (MIVIS) and Interagency Video Management System (IVMS).

An average of 75% of the traffic monitoring cameras were fully operational during FY 2015.

Traffic Status Map

Throughout the City, BTD has installed system loop detectors in streets near signalized intersections. The system loops are used to calculate vehicle presence on the loop, otherwise known as 'vehicle occupancy'. The percentage of time that the system loops are occupied by a vehicle traveling over it is considered a measure of roadway congestion; the higher the vehicle occupancy, the

greater the congestion. The occupancy data is transmitted back to the Traffic Management Center and then used on a color-coded map to inform TMC Operators of congestion. Three different colors are used: Green means free-flowing traffic, yellow means moderate congestion, and red means heavy congestion. Operators use the Traffic Congestion Map to detect congested streets and then verify with cameras. Once the congestion is visually confirmed, TMC Operators can make signal timing adjustments and/or take other actions to mitigate the congestion. The TMC Operators also record the map data during the AM and PM peak times as a method to document traffic trends along key corridors. The results for FY 2015 are attached to the end of this report. The Traffic Congestion Map is under development as system loop/vehicle occupancy data is added to key arterials.

Traffic Signal Timing

Signal timing is the process of optimizing the operations of signalized intersections. The objective of signal timing is to respond to the demands of all types of motor vehicles, pedestrians, and bicycles in an optimal manner. BTD traffic engineers are able to identify locations and corridors that require detailed reevaluation and retiming by using the surveillance techniques discussed above. Because travel patterns and volumes change over time, traffic signal timing plans need to be updated periodically to maintain intersection safety and efficiency. Our goal is to retime key corridors at least once every 5 years.

Once a location or corridor has been identified for retiming, a detailed study of the traffic signals is begun. Through BTD staff or a consultant, a field assessment is made to determine lane configurations, geometrics, vehicle, bicycle and pedestrian counts, pedestrian crossing distances, existing signal operation, traffic queue lengths, travel times, etc. This data is entered into *Synchro,* the traffic simulation and optimzation software used by BTD.

The model is first calibrated to match exisitng traffic conditions observed in the field. Once the existing traffic model is approved, traffic engineers optimize the traffic signal timing by adjusting green split times, offsets, and traffic signal cycle lengths in order to minimize the number of stops and delays, fuel consumption, and air pollution emissions, and to maximize progression along an arterial.

The proposed timings are entered into the traffic signal system database, which gives engineers the ability to control traffic signals from the TMC. BTD engineers then monitor the new timings and make any fine-tuning adjustments that may be needed. After the fine-tuning adjustments are made, the timing plans are updated and the new settings are entered into the traffic signal system database.

Traffic signal retiming has been a proven and cost-effective tool in decreasing delay, lowering emissions, reducing fuel consumption, and improving safety in Boston.

In FY 2015, TMC staff implemented new timing plans for 115 intersections.

Traffic Congestion Observations – FY 2015

Critical Corridor	Limits		AM AVG	PM AVG
Arlington St	Beacon St	Columbus Ave	1.6	1.9
Atlantic Ave	Kneeland St	Cross St	2.0	2.0
Beacon St	Clarendon St	Park St	1.4	2.2
Beacon St/Comm Ave	Kenmore Sq		1.5	1.7
Bennington St	Neptune St	Saratoga	1.8	1.9
Berkeley St	Columbus Ave	Beacon St	1.3	1.9
Boylston St	Exeter St	Washington St	1.2	1.6
Brookline Ave	Longwood Ave	Park Dr	2.0	1.6
Brookline Ave	Longwood Ave	Riverway	2.1	1.6
Cambridge St	Charles Circle	Sudbury St	1.9	1.6
Cambridge St	Sudbury St	Beacon St	1.5	1.1
Causeway St	North Washington St	Merrimac St	1.7	1.3
Clarendon St	Commonwealth Ave	Stuart St	1.4	1.5
Columbia Rd	Seaver St	Dorchester Ave	2.0	1.9
Congress St	Milk St	Dorchester Ave	1.8	1.5
Congress St	New Chardon St	Milk St	1.5	1.4
Court St/State St	Broad St	Cambridge St/Tremont St	1.4	1.5
Cross St	Atlantic Ave	North Washington St	1.5	1.7
D St	Northern Ave	Summer St	1.3	1.2
Dartmouth St	Stuart St	Boylston St	1.1	1.1
East Berkeley St	Albany St	Tremont St	1.5	1.8
Essex St	Washington St	Surface Rd	1.7	2.1
Exeter St	Boylston St	Huntington Ave	1.4	1.1
Herald St	Shawmut Ave	Albany St	1.2	2.0
Huntington Ave	Jamaicaway	Massachusetts Ave	2.0	1.7
Hyde Park Ave	New Washington St	River St	2.0	1.7
Kneeland St	Atlantic Ave	Washington St	1.9	1.8
Massachusetts Ave	Beacon St	Haviland St	1.7	2.0
Massachusetts Ave	Tremont St	Melnea Cass Blvd	1.9	2.0
Merrimac St	Causeway St	New Chardon St	1.9	1.3
Nashua St	Spalding Hosp.	Leverett Circle	1.5	1.6
New Chardon St	Congress St	North Washington St	1.9	1.9
North St	Surface Rd	Congress St	1.7	1.4
North Washington St	Cross St	Causeway St	1.9	2.0
Purchase St/Surface Rd	New Sudbury St	Summer St	1.8	2.0
Seaport Blvd	Atlantic Ave	Sleeper St	1.5	1.9
Stuart St	Washington St	Dartmouth St	1.5	1.9
Summer St	Dorchester Ave	High St	1.9	1.7
Surface Rd	Summer St	Kneeland St	1.7	1.8
Tremont St	Beacon St	Stuart St	1.1	1.8
Washington St	East Berkeley St	Avery St	1.1	1.0
Washington St	Massachusetts Ave	East Berkeley St	1.0	1.2

1 = Light Traffic
2 = Moderate Traffic
3 = Heavy Traffic