



# BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

Richard A. Davey, MassDOT Secretary and CEO and MPO Chairman  
Karl H. Quackenbush, Executive Director, MPO Staff

## MEMORANDUM

**DATE** January 9, 2014  
**TO** Boston Region Metropolitan Planning Organization  
**FROM** Karl H. Quackenbush  
CTPS Executive Director  
**RE** Work Program for: Traffic Signal Retiming Program

### Action Required

Review and approval

### Proposed Motion

That the Boston Region Metropolitan Planning Organization vote to approve the work program for the Traffic Signal Retiming Program presented in this memorandum

### Project Identification

Unified Planning Work Program Classification

Planning Studies

CTPS Project Number

13263

Client

Boston Region Metropolitan Planning Organization

CTPS Project Supervisors

*Principal:* Efi Pagitsas

*Manager:* Beth Isler

Funding

MPO Planning Contract #78890

MPO §5303 Contract #78922

## Impact on MPO Work

This is MPO work and will be carried out in conformance with the priorities established by the MPO.

## Background

This study is one of the recommendations from the MPO's Congestion Management Process (CMP). Traffic signal retiming promotes efficient traffic operations and is one of the most cost-effective ways to improve traffic movement through an intersection or along an arterial segment. The Institute of Transportation Engineers has reported that comprehensive signal retiming programs have documented benefits of a 7 to 13 percent reduction in overall travel time and a 15 to 37 percent reduction in delay (ITE, *Traffic Signal Timing Manual*, 2009). In addition, when signalized intersections are properly timed and operate efficiently, safety improves, fuel consumption is reduced, and air quality improves. Therefore, it is important that signal timing be reviewed periodically in cities and towns throughout the Boston Region MPO area to maintain operational efficiency.

## Objective

The purpose of this study is to review up to 10 signalized intersections in the Boston region that have been identified by local planners or engineers, and to recommend to each municipality specific settings for traffic signal retiming to improve traffic flow and safety.

Local planners or engineers will identify intersections that experience problems that could be addressed by traffic signal retiming. Intersections that need geometric changes or other adjustments that do not primarily involve signal retiming will not be considered in this study. Applications will be solicited from cities and towns in the MPO region. Staff will select up to 10 intersections that are under municipal jurisdiction and are not currently being studied by MPO staff, MassDOT, or the municipality. Signal timing improvements that would enhance operations for all transportation modes, including transit, walking, and bicycling, will be recommended for implementation through the Transportation Improvement Program (TIP) Intersection Improvement Program.

## Work Description

### Task 1 Select Intersections

Staff will elicit interest from city and town planners in the MPO region via the MPO's bimonthly newsletter, *TRANSREPORT*, and presentations at subregion meetings. Municipal planners and engineers who are interested in receiving assistance for retiming a signal within their jurisdiction will contact CTPS to be considered as candidates.

Up to 10 intersections will be selected from the candidate list, based on the following criteria:

- The intersection regularly experiences traffic operation problems such as delays and inadequate pedestrian crossing times.
- There are safety concerns at the intersection related to signal timing.
- There is a strong indication from the community that it will implement the recommended improvements through the TIP Intersection Improvement Program.

Equivalent Property Damage Only (EPDO) crash-severity ratings and the number of crashes involving pedestrians will be used to screen applications. Intersections potentially requiring geometric redesign, such as grade separation or additional travel lanes, will not be selected.

#### *Product of Task 1*

A table listing the applicants that were considered and the final set of selected intersections, including justification for the selections

#### **Task 2 Perform Field Reconnaissance and Collect Data**

Staff will collect or gather the following data and information pertaining to each intersection:

- Turning-movement counts
- Vehicle classifications
- Bicycle counts
- Pedestrian counts
- Signal timing data (phases, timing lengths)
- Queue lengths
- Geometric data (lanes, curb cuts, sidewalks, crosswalks, pedestrian-actuated buttons)
- Jurisdictional responsibilities
- Crash types over a three-year period

Field observations will yield a full understanding of safety and operations of vehicles, bicycles, and pedestrians at each intersection.

*Products of Task 2*

Summaries of count, signal, queue, and geometric data, as well as land use and jurisdictional information, for the selected intersections

**Task 3 Evaluate and Analyze the Selected Intersections***Subtask 3.1 Review Crash Data*

The crash data for each intersection will be reviewed with regard to crash type and severity and whether bicycles or pedestrians were involved in the crashes. This review will indicate whether there are any discernable patterns that need to be addressed.

*Subtask 1.2 Evaluate the Level of Service of Each Intersection*

Staff will use Synchro traffic analysis software to evaluate the level of service for each intersection under existing conditions. Potential improvements will then be identified by optimizing signal cycles, phasing (such as green, yellow and red phases), and sequencing, to increase safety and operational efficiency. Staff will also review signal equipment and suggest upgrades, where needed.

*Products of Task 3*

- Safety summaries for each intersection showing the types and severity of crashes
- Operational summaries for each intersection showing the level of service under existing conditions and with proposed improvements

**Task 4 Recommend Improvements and Implementation Strategies**

Staff will meet with municipal officials in each community to discuss the analysis, findings, and proposed improvements. Staff will add the intersections from this study to the priority list compiled for consideration in the TIP Intersection Improvement Program.

*Products of Task 4*

- Summary of input from municipalities
- List of proposed improvements, including estimated costs

**Task 5 Document Findings and Recommendations**

One draft memorandum documenting the study tasks will be sent to MassDOT and to each of the municipalities participating in the study; the recipients will have two weeks to review and comment on the draft. The memorandum will then be revised and finalized.

*Products of Task 5*

- Draft memo
- Final memo

**Estimated Schedule**

It is estimated that this project will be completed eight months after work commences. The proposed schedule, by task, is shown in Exhibit 1.

**Estimated Cost**

The total cost of this project is estimated to be \$40,000. This includes the cost of 14.2 person-weeks of staff time, overhead at the rate of 97.42 percent, travel, and other direct costs. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/EP/BI/bi

**Exhibit 1**  
**ESTIMATED SCHEDULE**  
**Traffic Signal Retiming Program**

Task	Month								
	1	2	3	4	5	6	7	8	
1. Select Intersections	A								
2. Perform Field Reconnaissance and Collect Data		B							
3. Evaluate and Analyze the Selected Intersections			C						
4. Recommend Improvements and Implementation Strategies				D					
5. Document Findings and Recommendations						E			

**Products/Milestones**

- A: List of the intersections selected for study
- B: Summaries of collected data
- C: Level-of-service and crash summaries for study intersections
- D: List of recommendations
- E: Technical memorandum

**Exhibit 2**  
**ESTIMATED COST**  
**Traffic Signal Retiming Program**

<b>Direct Salary and Overhead</b>	<b>\$35,240</b>
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Task	Person-Weeks						Direct Salary	Overhead (97.42%)	Total Cost
	M-1	P-4	P-2	SP-1	Temp	Total			
1. Select Intersections	0.2	0.8	0.0	0.0	0.0	1.0	\$1,352	\$1,317	\$2,670
2. Perform Field Reconnaissance and Collect Data	0.0	1.0	0.0	1.0	1.0	3.0	\$2,438	\$2,375	\$4,814
3. Evaluate and Analyze the Selected Intersections	0.2	3.0	0.3	0.0	0.0	3.5	\$4,405	\$4,291	\$8,696
4. Recommend Improvements and Implementation Strategies	0.2	2.0	0.0	0.0	0.0	2.2	\$2,870	\$2,796	\$5,666
5. Document Findings and Recommendations	2.5	2.0	0.0	0.0	0.0	4.5	\$6,785	\$6,610	\$13,395
Total	3.1	8.8	0.3	1.0	1.0	14.2	\$17,850	\$17,390	\$35,240

<b>Other Direct Costs</b>	<b>\$4,760</b>
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Travel	\$10
Other (Project Support Budgets)	\$4,750

<b>TOTAL COST</b>	<b>\$40,000</b>
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**Funding**

MPO Planning Contract #78890  
MPO §5303 Contract #78922