BOSTON REGION METROPOLITAN PLANNING ORGANIZATION
Richard A. Davey, MassDOT Secretary and CEO and MPO Chairman
Karl H. Quackenbush, Executive Director, MPO Staff

MEMORANDUM

DATE **September 12, 2014**

TO **Boston Region Metropolitan Planning Organization**

FROM **Karl H. Quackenbush**
CTPS Executive Director

RE **Work Program for: TIP Project Impacts Before-After Evaluation, FFY 2014**

Action Required

Review and approval

Proposed Motion

That the Boston Region Metropolitan Planning Organization votes to approve the work program for TIP Projects Impacts Before-After Evaluation, FFY 2014 in the form of the draft dated September 12, 2013.

Project Identification

Unified Planning Work Program Classification

Technical Support/Operations Analysis Projects

CTPS Project Number

12203

Client

Boston Metropolitan Planning Organization

CTPS Project Supervisors

Principal: Efi Pagitsas
Manager: Mark Abbott

Funding

MPO Planning Contract #78890

Impact on MPO Work

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

Background

The purpose of this study is to identify the effectiveness of selected TIP projects. Measuring project effectiveness is important in evaluating whether the employed strategies work well and are, therefore, suitable for application in similar situations. It is also required by federal regulation as part of the mandatory Congestion Management Process (CMP).

The MPO authorized funding for a pilot study in federal fiscal years (FFY) 2012. That study compared “before” and “after” conditions for three TIP projects in Arlington, Watertown, and Westwood. The analysis indicated that the improvement strategies employed in the designs of the three projects were successful in reducing delay and crashes.

Continuing with the analytical process employed in the pilot study, staff will select TIP projects that were constructed in federal fiscal years 2010 and 2011. This will allow users at each project location to become familiar with the operations and for user demand to normalize in the area. The “before” data and relevant measures of effectiveness will be gathered from existing functional design reports (FDRs) and traffic studies. The “after” data will be collected by MPO staff in the field. The measures of effectiveness will be calculated from these data.

The types of “before” and “after” data that will be collected and the associated performance measures that will be calculated depend on the type of project and improvements that are being assessed and also on the primary objective of the TIP project. Typically, for intersection improvement projects, intersection operations and safety will be evaluated using turning-movement counts, operational performance measures, and crash data. Staff will compare the two sets of data and draw conclusions on changes in performance.

Objective

This study will determine if certain improvement strategies work well and are therefore suitable to propose for other project locations in the Boston Region MPO area. Up to eight project locations could be evaluated as part of this study.

Work Description

Task 1 Select Projects

This task will initially identify up to eight project locations throughout the region that meet the following criteria; the locations were listed in previous TIPs and

MassDOT project files; there are FDRs available for those locations; and they were reconstructed in 2010 or 2011, using designs that were based on the recommended improvements found in the FDRs. Staff will select projects for the study that were constructed during that time period in order to allow traffic patterns to stabilize in order to obtain adequate data for “after” conditions before comparing them to pre-project conditions. Staff will select this group of projects by employing a variety of strategies:

- Review past TIP and MassDOT projects to identify prospective locations that have been reconstructed.
- Review locations with MassDOT to obtain reports or studies.
- Give priority to project locations that have an MBTA or other bus route passing through the project location.
- Give priority to projects that have a less traditional design improvement (such as roundabouts and signal coordination).

The project list could include isolated signalized intersection reconstruction, groups of intersections along a reconstructed corridor, interchange reconstruction projects, and/or bike-pedestrian accommodations. Criteria for selecting a particular project from the list will include:

- Construction completed in the last three years
- Availability of FDRs or traffic/other studies that can provide “before” data
- Special consideration will be given to urban and suburban environments

Product of Task 1

A table listing projects that together include up to eight locations throughout the region, selected as described above. The table will include information explaining why the projects were chosen and the type of improvements that were implemented.

Task 2 Perform Field Reconnaissance and Collect Data

Once the projects have been selected, staff will collect detailed “after” data and information pertaining to each project location. This will involve visiting each site and inventorying all relevant geometric, land use, and operational features. For example, for intersection projects, data may include:

- Manual turning-movement counts (MTMCs)
- Bicycle counts
- Pedestrian counts

- Transit vehicle counts
- Signal timing data (phases, timing lengths)
- Queue lengths
- Geometric data (such as lanes, curb cuts, sidewalks, crosswalks, pedestrian buttons, and transit amenities)
- Land use and zoning information
- Jurisdictional and administrative responsibilities
- Crash data

Products of Task 2

Depending on the type of project evaluated, products may include summaries of traffic counts, signal information, queues, geometric data, land use and jurisdictional information, and other relevant performance data.

Task 3 Evaluate Selected Projects

Staff will evaluate the locations of each project using various types of analysis, which will depend on the type of project being evaluated. The tasks described below pertain largely to intersection projects. First, counts such as turning-movement counts, automatic traffic recorder (ATR) counts, pedestrian counts, and bicycle counts will be compared to determine if the traffic has increased as expected. Second, the area will be examined to find out if any land developments have occurred after the “before” data were collected to enable staff to differentiate the traffic impacts of the improvement and those of increased development. Third, the crash data for each location will be analyzed with regard to crash type and severity and whether bicycles or pedestrians were involved in the crashes. Fourth, a capacity analysis will be performed in order to determine the operational level of service at each intersection. Particular attention will be given to the evaluation of the existing pedestrian signal phases, if any, or the need for them. Fifth, field observations will be performed to gain a full understanding of safety levels and of the operations of vehicles, bicycles, and pedestrians at each location.

Finally, to the extent feasible within the budgetary constraints of this project, the perceptions of project users regarding the impacts of the project will be elicited. The rationale for this is that, irrespective of whether measurable improvements can be detected and attributed to a project, travelers’ perceptions about how an investment affected their trip are ultimately of primary importance. This effort may include administering a set of questions to the users encountered during field

reconnaissance. It is easier to question pedestrians than motorists, but if there is a safe, effective way to elicit the views of the latter, it will be tested.

Staff may also collaborate with the Metropolitan Area Planning Council (MAPC), as that agency may have access to transportation-oriented surveys of employees near a project area, and there is some chance that data from those surveys could yield insights into user perceptions about the impacts of a transportation project near their work site.

The following measures of effectiveness (MOEs) will likely be used in evaluating the project:

- Level of service (LOS)
- Traffic volumes
- Pedestrian and bicycle activity
- Intersection and approach delay
- Queue length
- Comparison of “before” and “after” crash data: number of crashes and crash types
- Crash rates (if a minimum of three years’ recent MassDOT crash data are available for the reconstructed intersection)
- Air quality assessment: fuel usage, economy, emissions, and greenhouse gases (if data are available from FDRs or traffic reports)

Products of Task 3

Summaries of “before” and “after” performance measures for the selected projects, including (for intersection projects) level of service, incidence and types of crashes, and an overall safety assessment, and how well or how poorly traffic, including bus traffic, is processed at the location.

Task 4 Document Findings

Once the projects have been selected, staff will collect detailed “after” data and information pertaining to each project location. This will involve visiting each site and inventorying all relevant geometric, land use, and operational features. For example, for intersection projects, data may include:

- Manual turning-movement counts (MTMCs)
- Bicycle counts

- Pedestrian counts
- Transit vehicle counts
- Signal timing data (such as signal design and phase duration)
- Queue lengths
- Geometric data such (lanes, curb cuts, sidewalks, crosswalks, pedestrian buttons, and transit amenities)
- Land use and zoning information
- Jurisdictional and administrative responsibilities
- Crash data

Products of Task 4

A technical memorandum documenting Tasks 1 through 3, including documentation of any conclusions based on the before-after analysis and a summary of the types of improvements, along with the positive or negative impacts of those improvements.

Estimated Schedule

It is estimated that this project will be completed six 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 $39,973. This includes the cost of 13.8 person-weeks of staff time, overhead at the rate of 97.42 percent, and travel. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/EP/ep

Exhibit 1
ESTIMATED SCHEDULE
TIP Project Impacts Before-After Evaluation, FFY 2014

Task	Month					
	1	2	3	4	5	6
1. Select Projects	A					
2. Perform Field Reconnaissance and Collect Data		B				
3. Evaluate Selected Projects			C			
4. Document Findings				D		

Products/Milestones

A: List of projects to evaluate
B: Notes on reconnaissance, and gathered data
C: Notes on evaluation results
D: Technical memorandum

Exhibit 2
ESTIMATED COST
TIP Project Impacts Before-After Evaluation, FFY 2014

Direct Salary and Overhead	**$39,802**

Task	Person-Weeks M-1	P-5	P-4	Temp	Total	Direct Salary	Overhead (97.42%)	Total Cost
1. Select Projects	0.2	1.5	0.0	0.0	1.7	$2,879	$2,805	$5,683
2. Perform Field Reconnaissance and Collect Data	0.2	0.5	0.0	2.1	2.8	$2,245	$2,188	$4,433
3. Evaluate Selected Projects	0.2	3.0	0.9	0.0	4.1	$6,556	$6,387	$12,942
4. Document Findings	2.0	3.0	0.0	0.0	5.0	$8,481	$8,262	$16,743
Total	2.6	8.0	0.9	2.1	13.6	$20,161	$19,641	$39,802

Other Direct Costs	**$150**
Travel	$150

TOTAL COST	**$39,952**

Funding
MPO Planning Contract #78890