BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

Stephanie Pollack, MassDOT Secretary and CEO and MPO Chair
Karl H. Quackenbush, Executive Director, MPO Staff

MEMORANDUM

DATE December 21, 2017

TO David J. Mohler, Executive Director
Office of Transportation Planning, MassDOT

FROM Karl H. Quackenbush, Executive Director

RE Work Plan for Congestion Management Process (CTPS Project #2118)

Background

Purpose

The Congestion Management Process (CMP) is an integral part of the metropolitan transportation planning process. The purpose of the CMP is to apply a systematic, performance-driven approach to measuring and identifying locations that are congested and which lack mobility, in order to assess safety and mobility concerns and their causes.

Findings from the CMP are used to propose mitigation projects and strategies to be included in the MPO's Long-Range Transportation Plan (LRTP). Projects that are funded by the MPO's Transportation Improvement Program (TIP) are evaluated through the CMP. The CMP utilizes data to evaluate the effectiveness of strategies that already have been implemented. In addition, the CMP recommends appropriate detailed follow-up studies and prioritizes them for funding in the MPO's Unified Planning Work Program (UPWP).

Synopsis of the Boston Region MPO's CMP Program

The MPO began its CMP program in 1995 through the federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) legislation. Fixing America's Surface Transportation (FAST) Act, which is the current federal transportation legislation, expanded the CMP role. New legislative requirements include monitoring congestion reduction and system reliability. The national goal of congestion reduction is "to achieve a significant reduction in congestion on the national highway system." The national goal of system reliability is "to improve the efficiency of the surface transportation system."

As a result of CMP monitoring, numerous studies have been included in the UPWP, and many projects have been included in the LRTP and TIP for construction funding. CMP products may be viewed on the Boston Region MPO's website, in the Plans and Programs section. Listed below is a sampling of current and past work conducted by MPO staff that was based on recommendations from CMP monitoring.

- Needs Assessments for the LRTP
- Roadway Speeds and Travel Time Monitoring using INRIX Data (2013–present)
- Boston Region MPO Congestion Management Process: Performance-Based Planning for Efficiency, Mobility, and Safety (2013)
- Transportation Improvement Program (TIP) Intersection Improvement Program (2014–16)
- Route 20 East Corridor Study in Marlborough (2017)
- Summer Street/George Washington Boulevard Subregional Priority Roadway Study in Hingham and Hull (2015)
- Washington Street Subregional Priority Roadway Study in Newton (2015)
- Routes 127A/127 Subregional Priority Roadway Study in Gloucester and Rockport (2014)
- Route 3A Subregional Priority Roadway Study in Cohasset and Scituate (2014)
- Priority Corridors for the LRTP Needs Assessment: Traffic Signal-Retiming Study for Route 2 in Concord and Lincoln (2014)
- Priority Corridors for the LRTP Needs Assessment: Route 30 Study (Route 30 Arterial Segment Study in Framingham and Natick, 2013)
- Route 114 in Danvers, Interstate 95 to the Peabody City Line: Safety, Operations, and Access Management Study (2012)
- Route 203 (Gallivan Boulevard and Morton Street): Safety, Mobility, and Access Management (2012)
- Federal Fiscal Year (FFY) 2013, 2014, and 2016 Safety and Operations Analyses at Selected Intersections
- Low-Cost Improvements to Bottleneck Locations, Phase I (2011)
- Low-Cost Improvements to Bottleneck Locations Phase II (2012)
- Low-Cost Improvements to Bottleneck Locations Phase III (2015)
- 2012–13 Inventory of Park-and-Ride Lots at MBTA Facilities
- 2012 Inventory of Bicycle Parking Spaces and Number of Parked Bicycles at MBTA Stations
- Arterial and Freeway Average Travel Speed Maps
- Lists of the Most Congested Intersections
- Massachusetts Department of Transportation (MassDOT) Park-and-Ride Lot Capacity and Utilization Monitoring
- HOV Monitoring

- Freeway Speed and Travel Time Monitoring

In 2013, the Boston Region MPO began purchasing pre-collected roadway travel-time data for 2012 from INRIX, which enabled the CMP to increase the scope of its performance monitoring. In 2016, an additional dataset was purchased from INRIX, which represents roadway conditions for 2015.

Objectives

The mission of the Boston Region MPO's CMP is to:

Support sustainable growth in economic activity, sustain livability in the region, prevent the increase in congestion, and improve mobility, efficiency, and safety for people, goods, and services by encouraging programs that reduce single-occupant-vehicle use, including transportation systems management and operations, travel demand management, and technology.

The objectives of this work plan are:

- Continue to support and coordinate with the MPO's CMP Committee in CMP program guidance
- Recommend strategies for improving mobility and access, and reducing congestion at specific intersections and transit stations in the region's transportation system
- Identify, evaluate, and select strategies to include in the LRTP, TIP, and UPWP
- Monitor the effectiveness of congestion-management strategies implemented through the TIP
- Devise innovative ways to communicate the results of roadway travel time data analysis to public officials and the general public
- Determine if the duration or extent of congestion varies according to individual roadway facilities
- Ensure that the Boston Region MPO's CMP conforms to FAST Act standards
- Establish and refine measures to understand the transportation system's performance

Work Description

Task 1: Support for the CMP committee and other CMP staff activities

The Boston Region MPO's CMP committee was formed in January 2012. The purpose of the CMP committee is to help implement recommended solutions from the most recent CMP report, the LRTP, the TIP, and corridor studies.

The CMP committee will meet approximately four times during federal fiscal year (FFY) 2018. In order to support the CMP committee, MPO staff will organize and attend CMP committee meetings; create agendas, take minutes, present materials; and ensure that the meetings are accessible according to the Americans with Disabilities Act. When CMP staff completes a task, it will present the results formally to the MPO. The CMP also monitors the progress of evaluating projects for CMP criteria that were submitted for the FFYs 2019–23 TIP.

Subtasks

- Prepare materials for CMP committee meetings
- Evaluate FFYs 2019–23 TIP Projects through the CMP
- Ensure that the CMP complies with the FAST act

Products of subtask

- Materials for CMP committee meetings
- List of TIP projects that passed CMP evaluation

Task 2: MBTA bicycle parking/MBTA park-and-ride lot monitoring (including nearby private lots and on-street parking)—FFY 2018

In the past, Boston Region MPO staff have assembled MBTA parking lot (2013) and bicycle parking inventories (2012) separately, and then shared this analysis with MassDOT and the MBTA. MassDOT has expressed interest in working with MPO staff to collect updated bicycle parking data at MBTA stations.

Two hundred and eighty one (281) MBTA stations would need to be surveyed for bicycle parking data. In addition, the MBTA parking lots, which have not been surveyed since 2013, also would need to be updated. Because it is less costly to make a single visit to stations that offer parking for both modes, this collection effort will combine data for both bicycle and automobile parking. In addition to MBTA-operated parking lots, staff will analyze private lots and on-street parking used by MBTA commuters. Factors such as parking lot prices will be analyzed to determine how utilization is affected.

Station fare data may be available from the MBTA, which could help determine park-and-ride utilization. Bicycle parking data may be available from the MBTA for cyclists who are registered to store bikes in cages. Staff collected some data for bicycle parking in FFY 2017 and will continue this effort into FFY 2019.

Work for FFY 2018 will include: 1) continue to collect data at MBTA park-and-ride lots; 2) enter collected data into a Microsoft Access database; and 3) write a brief memorandum to summarize the data-collection process and data analysis results at the stations for which data were collected through fall 2017.

Subtasks (FFY 2018)

- Continue to collect data at MBTA stations. Collected data will include bicycle and automobile parking at MBTA stations. Approximately 80 percent of all MBTA stations will be surveyed by the end of FFY 2018.
- Write a brief memorandum after the fall 2017 data collection season, summarizing the stations that have been surveyed by fall 2017.
- Input collected data into a Microsoft Access database.

Subtasks (future work)

- Analyze data; including parking capacity, parking utilization, and parking price elasticity at MBTA stations
- Write memorandum to summarize findings from analyzing data at all MBTA stations
- Present analysis to MPO and/or CMP committee
- Products of Task 2 (FFY 2018)
- Brief memorandum summarizing the stations from which data have been collected through fall 2017

Products of subtask (future work)

- Memorandum summarizing automobile parking at MBTA stations
- Memorandum summarizing bicycle parking at MBTA stations

Task 3: Validate roadway data sources (INRIX, NPMRDS, and the like)

The Boston Region MPO has access to several roadway monitoring datasets, including the INRIX dataset, The National Performance Management Research Data Set (NPMRDS), and MassDOT Go-Time dataset. INRIX is a private company that probes vehicles to record roadway travel speeds. Until February 2017, the NPMRDS used data that was provided by a company named HERE; beginning in February 2017 (until the present), NPMRDS uses generic INRIX data (that is, without confidence scores). The MassDOT Go-Time dataset consists of roadway travel times that were collected with Bluetooth readers by MassDOT staff.

Recently, it was discovered that vehicle probe data could be mined from interactive map displays such as google maps and open street maps through application programming Interface (API) calls; and this data potentially could be used to fill coverage gaps that may persist in other datasets. For example, because NPMRDS covers only the National Highway System (NHS), other data sources would be required to determine roadway

speeds for roads that are not a part of the NHS, but which are part of the CMP network. This task will compare each of these datasets to discern which ones are best suited for the various roadway monitoring tasks for the Boston Region MPO.

Subtasks

- Select datasets to be evaluated
- Conduct analysis to compare datasets
- Draw conclusions and recommend uses for each dataset; determine if any selected datasets would need to be adjusted before being used
- Write brief memorandum to document findings

Product of subtask

- Brief memorandum to recommend uses for each dataset

Task 4: MAP 21 performance measures

Beginning in 2018, state DOTs and MPOs will have new requirements from the FHWA, which will require them to monitor new congestion performance measures. These performance measures reveal the travel time reliability, or variability of the roadway network. State DOTs and MPOs are also required to set performance targets for each of these measures, and state DOTs are required to meet each set target for the roadway network during future monitoring activities. This is required to be a coordinated effort between the MPO and the state DOT. The NPMRDS be used to calculate these performance measures. The new federally required CMP related performance measures are:

- Level of Travel Time Reliability (LOTTR)
- Interstate Travel Time Reliability Measure (ITTRM)
- Non-Interstate NHS Travel Time Reliability Measure (NITTRM)
- Peak Hour Excessive Delay (PHED)
- This performance-monitoring effort must be conducted annually to determine the MPO's progress towards meeting its performance targets.

Subtasks

- Coordinate with MassDOT to construct a plan to monitor the required new performance measures
- Download and archive the NPMRDS and any other data needed to calculate the required performance measures
- Conduct queries and calculations to determine the values of each performance measure on a roadway link and regional scale

- Produce a geographic information systems map that will show the performance measure results
- Produce a list to show the performance measure results on a regional scale
- Determine performance targets that the MPO must achieve in the future products

Products of subtask

- A roadway network map, which would display the results of the performance measures
- A brief list, which would show the performance measure results on a regional scale; to be posted on MPO website
- A list of performance targets; to be posted on MPO website

Task 5: MBTA Transit—Snapshot summary of transit performance measures for fall 2017

In FFY 2017, staff evaluated and selected transit performance measures—which analyzed data about MBTA buses during fall 2016—for the CMP. MPO Staff will use RStudio software to calculate the performance measures. Once the performance measures for fall 2017 are calculated, MPO staff will create a graphical snapshot summary that shows the change in performance measures between fall 2016 and fall 2017, comparing the results to identify any trends. This interactive dashboard would compare the changes in CMP transit performance measures for each bus route between fall 2016 and fall 2017; and could be displayed on the MPO website.

Subtasks

- Calculate transit performance measures for each bus route and the entire MBTA bus system.
- Compare the performance measure results of fall 2017 with the results of fall 2016.
- Create a snapshot summary that will display the changes in performance measures between fall 2016 and fall 2017.
- Create an interactive dashboard that will be displayed on the MPO website, which would compare transit performance measure results for fall 2016 and fall 2017.

Products of subtask

- Brief snapshot summary that would contain graphic depictions of congestion on the MBTA bus system, according to CMP transit performance measures

- A transit performance measure dashboard that would show the performance measure results for fall 2016 and fall 2017

Task 6: Document comparison of 2012–15 INRIX datasets

This task will continue to examine the 2012 and 2015 INRIX datasets. In addition, activities that were performed previously to compare these datasets would be documented. The documentation would include, locations where roadway speeds increased or decreased, possible reasons for the change (construction, land use changes, and so forth), and the procedures for creating the comparator application.

Subtasks

- Conduct any additional analysis that has not been done for comparing 2012 and 2015 INRIX datasets.
- Write a memorandum summarizing all activities that were performed to compare the 2012 and 2015 INRIX dataset. The memorandum would include a list of locations where roadway speeds changed dramatically, possible reasons for the change, and the methodology for creating the comparator application.

Product of subtask

- Memorandum that would summarize all activities related to comparing the 2012 and 2015 INRIX datasets

Estimated Schedule

It is estimated that this project will be completed 12 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 $111,895. This includes the cost of 44.4 person-weeks of staff time, overhead at the rate of 105.66% percent, travel, and other direct costs. A detailed breakdown of estimated costs is presented in Exhibit 2.

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Exhibit 1
ESTIMATED SCHEDULE
CMP Work Plan (2017-2018)

Task	Month 1	2	3	4	5	6	7	8	9	10	11	12
1. Support for the CMP committee and other CMP staff activities												
2. MBTA bicycle parking/MBTA park-and-ride lot monitoring												
3. Validate roadway data sources (INRIX, NPMRDS, and the like)												
4. MAP 21 performance measures												
5. MBTA Transit—Snapshot summary of transit performance measures for fall 2017												
6. Document comparison of 2012–15 INRIX datasets												

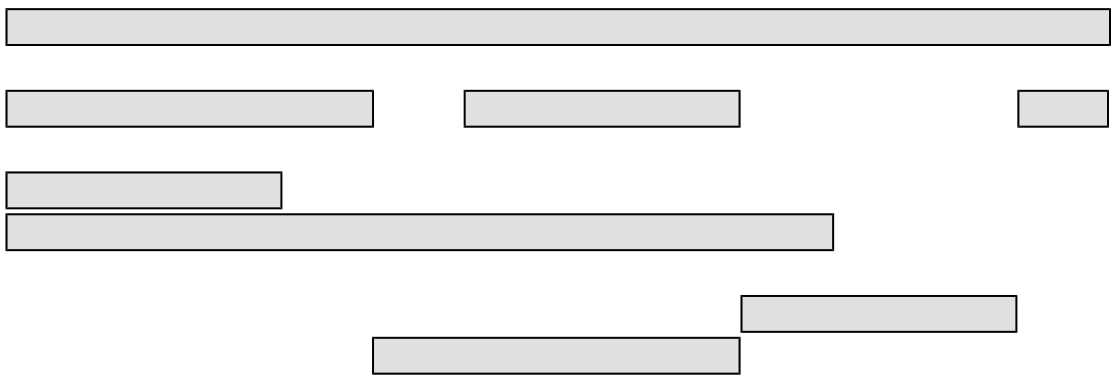

Exhibit 2
ESTIMATED COST
CMP Work Plan (2017-2018)

Direct Salary and Overhead									**$110,395**
Task	Person-Weeks						Direct Salary	Overhead (105.66%)	Total Cost
	M-1	P-5	P-4	P-3	Temp	Total			
1. Support for the CMP committee and other CMP staff activities	0.6	0.2	3.6	0.0	0.0	4.4	$6,508	$6,876	$13,384
2. MBTA bicycle parking/MBTA park-and-ride lot monitoring	0.0	0.0	5.5	0.0	11.0	16.5	$13,263	$14,014	$27,278
3. Validate roadway data sources (INRIX, NPMRDS, and the like)	1.2	0.0	4.3	1.5	0.0	7.0	$10,054	$10,623	$20,676
4. MAP 21 performance measures	0.6	0.5	3.3	0.0	0.0	4.4	$6,722	$7,102	$13,824
5. MBTA Transit—Snapshot summary of transit performance measures for fall 2017	0.5	0.5	2.1	3.0	0.0	6.1	$8,480	$8,960	$17,439
6. Document comparison of 2012–15 INRIX datasets	1.0	0.0	4.0	1.0	0.0	6.0	$8,652	$9,142	$17,794
Total	3.9	1.2	22.8	5.5	11.0	44.4	$53,678	$56,716	$110,395
Other Direct Costs									**$1,500**
Travel									$1,500
TOTAL COST									**$111,895**

Funding