BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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

MEMORANDUM

DATE September 15, 2016

TO Boston Region Metropolitan Planning Organization

FROM Karl H. Quackenbush
CTPS Executive Director

RE Work Program for: Section 405C Traffic Records Improvement

Action Required

Review and approval

Proposed Motion

That the Boston Region Metropolitan Planning Organization, upon the recommendation of the Executive Office of Public Safety and Security's (EOPSS) Executive Traffic Records Coordinating Committee, vote to approve the work program for Section 405C Traffic Records Improvement presented in this memorandum

Project Identification

Unified Planning Work Program Classification

Other Transportation Client Planning Studies and Technical Analyses

Project Identification

CTPS Project Number 11158

Clients

EOPSS, Office of Grants and Research, *Grant Supervisor:* Barbara Rizzuti
MassDOT Office of Transportation Planning, *Project Supervisor:* Kevin Lopes
MassDOT Traffic and Safety Engineering, *Project Supervisor:* Bonnie Polin

CTPS Project Supervisors

Principal: Mark Abbott
Manager: Kathy Jacob

Funding

EOPSS, federal fiscal year (FFY) 2016 Traffic Information Systems Improvement Grant (405C)

Impact on MPO Work

The MPO staff has sufficient resources to complete this work in a capable and timely manner. By undertaking this work, the MPO staff will neither delay the completion of nor reduce the quality of any work in the UPWP.

Background

The federal transportation reauthorizing legislation, Moving Ahead for Progress in the 21st Century (MAP-21), identified the need for improved and more robust safety data to support development of states' Strategic Highway Safety Plans (SHSPs) and Highway Safety Improvement Programs (HSIPs).

As a result, the Federal Highway Administration (FHWA) developed database guidelines for roadway and traffic elements critical to safety management, called Model Inventory of Roadway Elements (MIRE); and the National Highway Transportation Safety Administration (NHTSA) developed a companion set of guidelines for crash elements, Model Minimum Uniform Crash Criteria (MMUCC), to address the database needs for crash analyses. Many of these database elements overlap, but because this project will deal with building a database for Road Inventory and traffic-control data, it will emphasize the MIRE elements.

In 2015, the latest authorizing federal legislation, Fixing America's Surface Transportation (FAST) Act, was signed into law; and as of April 14, 2016, FHWA established rules requiring states to:

- "Incorporate specific quantifiable and anticipated improvements for the collection of MIRE Fundamental Data Elements into their Traffic Records Strategic Plan by July 1, 2017," and
- "Have access to the complete collection of the MIRE fundamental elements by September 30, 2026."

There are 202 MIRE elements, 37 of which are considered Fundamental Data Elements (FDEs). Of the 37 FDEs, 18 are roadway segment data elements, 11 are interchange data elements, and eight are junction (or intersection) data elements. The FDE junction elements include the following: a unique junction identifier (ID); location ID for each facility crossing point; intersection geometry; intersection traffic control; average annual daily traffic (AADT) for each intersecting facility; AADT year for each intersecting road; and a unique approach identifier.

Currently, the MassDOT Road Inventory does not have a junction component, so by 2017 one will need to be built. A consultant, Vanasse Hangen Brustlin, Inc. (VHB), is in the process of developing a template tool to enable collection of the required MIRE data elements for junctions. The Central Transportation Planning Staff (CTPS) will test and evaluate this tool by using various datasets to populate a representative

subset of the traffic-control elements. CTPS will also investigate other sources of traffic-control data and methods that might expedite collection of traffic-control data.

Objectives

- Test and evaluate a tool developed by MassDOT's consultant that will help to collect MIRE data elements
- Collect geographic information systems (GIS) data for signalized and un-signalized junctions
- Examine junction data and MIRE data elements for accuracy, completeness, and uniformity
- Estimate the time and personnel that will be required to complete the FDE requirement statewide by the 2017 deadline, and ultimately all of the MIRE elements by 2026

Work Description

Traffic-control data is not standardized, and the datasets that support signalized and un-signalized intersections come in many forms. For this project, staff will combine two sources described below (one existing database from MassDOT, and one from CTPS) to create a test database with information about locations of approximately 5,400 junctions that are believed to be signalized.

Task 1 Collect, Evaluate, and Verify FDEs for Signalized Intersections

MassDOT has a physical asset inventory comprised of approximately 1,500 state-owned traffic signals, which contains spatial data identifying the location of each signal. CTPS maintains a GIS database of traffic signals that have been gathered from MassDOT's signal permit archives of municipally owned signals, CTPS studies, and seven municipalities in the Boston Region MPO—the cities of Boston, Cambridge, Everett, Newton, Somerville and the towns of Brookline and Dedham. Combined, these resources will form the test database of 5,400 signalized locations. For this part of the project, CTPS will collect FDEs at each of these junctions using the template tool developed by VHB; and will examine them using MassGIS Ortho-photography, Pictometry Imagery, Google StreetView, and Bing StreetView.

Product of Task 1

A signalized junction spatial test database populated with approximately 5,400 records containing the required FDEs

Task 2 Collect, Evaluate, and Verify FDEs for Non-signalized Locations

MassDOT Traffic Safety and Engineering staff will identify approximately 100 junctions in the Commonwealth that they believe are not signalized. CTPS will collect the FDEs at each of these junctions using the template tool developed by VHB; and

will examine them using MassGIS Ortho-photography, Pictometry Imagery, Google StreetView, and Bing StreetView.

Product of Task 2

A non-signalized junction spatial test database populated with approximately 100 records containing the required FDEs

Task 3 Investigate Methodologies of Automatic Collection of Traffic-Signal Data

CTPS and MassDOT Traffic and Safety Engineering staff will investigate automated and semi-automated methodologies in GIS and explore how other data sources, such as the Crash Data System, which include information about signals, could help improve the data-collection process.

Product of Task 3

Results of investigation into other data sources and automated and semi-automated methods of data collection

Task 4 Collect Data about What Other Traffic-Control Information Exists in the State

CTPS staff will contact 1) municipal officials in the approximately 340 cities and towns in Massachusetts for which CTPS does not have traffic signal data, and 2) officials in other MPOs in the state, and attempt to collect, inventory, and examine whatever traffic-signal data each city, town, or MPO has. Staff will compile the data into a statewide GIS database of municipal traffic signals that will be delivered to the GIS manager in MassDOT's Office of Transportation Planning. The GIS data will be delivered in the form of a shapefile or GeoDatabase, which can be used to create an "event layer" for incorporation into the statewide Road Inventory.

This process will involve the following steps:

- Develop a list of municipal and agency officials responsible for traffic-control data
- Contact these officials by letter, email, or phone to gather traffic-control data from them

Products of Task 4

- Traffic-control contact list
- Populated spreadsheet citing the condition and information available for traffic-control devices across the state
- Spatial databases of any traffic-control data that are collected

Task 5 Evaluation Report and Documentation for Junction Databases

CTPS will document its experience using the template, identify the methodology it used to populate the FDEs in all of the databases, and identify the level of effort required to accomplish this task, including a discussion of any alternative approaches that may have arisen during research. Finally, CTPS will discuss what other traffic-control data may exist, including their form and condition, in order to provide the client with an estimate of the future level of effort required to complete collection of FDEs for the approximately 200,000 remaining junctions (or intersections) in Massachusetts.

Product of Task 5

- Evaluation report in portable document format (PDF) and hypertext markup language (HTML) files
- Documentation for the spatial databases that are produced or collected during the course of this project

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 $96,724. This includes the cost of 42.1 person-weeks of staff time, and overhead at the rate of 102.7 percent. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/MA/sap

Exhibit 1
ESTIMATED SCHEDULE
Section 405C Traffic Records Improvement

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Collect, Evaluate, and Verify FDEs for Signalized Intersections												
2. Collect, Evaluate, and Verify FDEs Non-signalized Locations												
3. Investigate Methodologies of Automatic Collection of Traffic Signal Data												
4. Collect Data on What Other Traffic Control Information Exists in the State												
5. Evaluation Report and Documentation for Junction Databases												

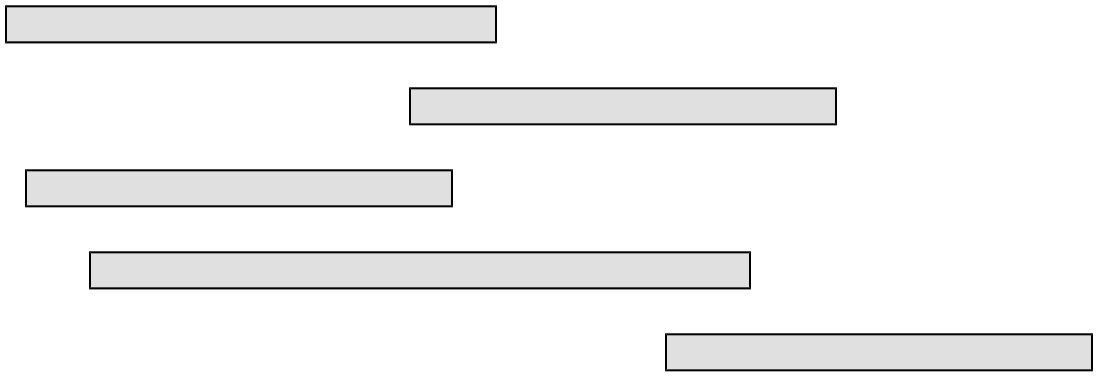

Exhibit 2
ESTIMATED COST
Section 405C Traffic Records Improvement

Direct Salary and Overhead	**$96,724**

Task	Person-Weeks					Direct Salary	Overhead (102.70%)	Total Cost
	M-1	P-5	P-4	Temp	Total			
1. Collect, Evaluate, and Verify FDEs for Signalized Intersections	1.2	0.0	17.7	7.0	25.9	$29,696	$30,498	$60,195
2. Collect, Evaluate, and Verify FDEs Non-signalized Locations	0.1	0.0	0.8	1.0	1.9	$1,789	$1,838	$3,627
3. Investigate Methodologies of Automatic Collection of Traffic Signal Data	0.4	0.6	0.2	0.0	1.2	$2,109	$2,166	$4,275
4. Collect Data on What Other Traffic Control Information Exists in the State	0.4	0.0	1.5	4.0	5.9	$4,814	$4,944	$9,759
5. Evaluation Report and Documentation for Junction Databases	3.0	0.0	2.1	2.0	7.1	$9,308	$9,560	$18,868
Total	5.1	0.6	22.4	14.0	42.1	$47,718	$49,006	$96,724

Other Direct Costs	**$0**

TOTAL COST	**$96,724**

Funding
Section 405C Grant