BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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

MEMORANDUM

DATE **February 20, 2014**

TO **Boston Region Metropolitan Planning Organization**

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

RE **Work Program for: Massachusetts Turnpike Allston Interchange Traffic Study**

Action Required

Review and approval

Proposed Motion

That the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Department of Transportation, vote to approve the work program for the Massachusetts Turnpike Allston Interchange Traffic Study presented in this memorandum

Project Identification

Unified Planning Work Program Classification

Planning Studies

CTPS Project Number

53219

Client

Massachusetts Department of Transportation
Project Supervisor: Michael O'Dowd

CTPS Project Supervisors

Principal: Scott Peterson
Manager: Ying Bao

Funding

MassDOT Contract #TBD

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 Massachusetts Turnpike (MassPike) has passed through Allston for nearly a half-century. Its alignment and accompanying interchange configuration in Allston were shaped by the layout of the abutting Beacon Park freight rail yard. Consequently, a meandering half-mile-long viaduct, consisting of nearly 30 bridge structures and several looping ramps, was constructed.

Recently, ownership of the Beacon Park rail yard changed following the cessation of freight rail operations at the facility. The new owner, Harvard University, intends to redevelop the 80-acre site. The end of freight rail operations at Beacon Park not only freed up the property for Harvard's redevelopment, but also for redevelopment by MassDOT, since it retains transportation easement rights around the site. This presents an opportunity to straighten the MassPike's alignment, replace the structurally deficient and outdated 50-year-old viaduct, preserve space for commuter rail operations, and reconfigure the roadway transportation network to optimize the site's development.

MassDOT wishes to investigate two conceptual options for straightening the MassPike, and for reconfiguring exit and entrance ramps and some local roads in the Allston-Brighton toll plaza area. CTPS has been asked to provide assistance to MassDOT for this effort.

Objective

Using the Boston Region MPO regional travel demand model set, CTPS will support MassDOT and the study team by assessing the existing traffic conditions and travel patterns, and by providing modeling results and analyses for use in the evaluation of various proposed construction plans for the MassPike Allston interchange area for the horizon year of 2035. CTPS will also provide subarea highway volume forecasts, air quality analysis, environmental-justice analysis, and economic impact analysis. The results will be summarized in sufficient detail to allow the study team to realistically compare alternatives.

Work Description

The work required to accomplish the study objectives will be carried out in 12 tasks, as described below:

Task 1 Conduct a License Plate Survey

CTPS will conduct a license plate survey in the AM peak period on the ramps of MassPike interchanges 17 and 18-20, and on selected intersections close to the Allston interchange. The license plate survey will be performed on two days. On day one, focus will be on 18 locations of the on/off ramp of interchange 18-20 and the surrounding key intersections to trace the traffic flows. On day two, 11 locations will be surveyed to examine travel between interchange 17 and 18-20.

At these locations, CTPS staff will station visual or audio equipment for the recording of the license plates of the passing vehicles. The origin towns and transportation analysis zones (TAZs) of the vehicles passing these ramps and intersections will be mapped by matching each vehicle's license plate to the town where the vehicle is garaged (according to Registry of Motor Vehicles records). The license plate survey will help the study team to understand the traffic flows on the MassPike and within the study area. The results from this survey will be utilized to analyze the travel patterns estimated by the base-year model.

Products of Task 1

- Tabular and graphic summaries of trip origins from the license plate survey
- A memorandum documenting the methodology and findings of the license plate survey

Task 2 Perform Base-Year Model Calibration

This task consists of refining and enhancing the Boston Region MPO regional travel demand model set's roadway network in the vicinity of the Allston interchange study area and along the MassPike. CTPS will compile all available counts relevant to this study, including Masspike toll plaza counts, interchange automatic-traffic-recorder (ATR) counts, and turning-movement counts already collected by the study team for this study. These counts will be utilized for base-year model calibration to the greatest extent possible. CTPS will coordinate with the project team to review the existing TAZ structure within the regional model set and potentially disaggregate TAZs (divide them into sub-TAZs) for more detailed traffic analyses.

The calibration efforts will focus on comparing peak-hour (AM and PM) and daily volumes produced by the model to empirical counts for roadways and turning-movement volumes at up to seven intersections in the study area. CTPS will develop a method for converting the model's peak-period volumes to peak-hour volumes using the most recent count data. The peak-period trip flows on the key ramps will be carefully examined by conducting select link analyses to ensure that modeled trip origins are comparable to data from to the license plate survey.

Daily ridership on selected transit services in the study area including commuter rail and buses near the study area will be compared to recent counts.

Product of Task 2

A calibrated multimodal travel demand model set for the study area

Task 3 Model the 2035 No-Build Scenario

CTPS will develop a 2035 no-build scenario, using the MPO's current Long-Range Transportation Plan (LRTP), that encompasses the programmed multimodal transportation systems and land use data, while allowing for limited modifications to provide accessibility to the proposed developments. The outputs of the no-build model run will be used as the basis for analyzing the impacts of the build scenarios described in the next task.

Product of Task 3

Tabular and graphic summaries of the peak-hour and daily traffic in the 2035 no-build scenarios

Task 4 Develop and Update the 2035 Land Use Inputs

In this task, CTPS will develop land use data in 2035 for the travel demand model based on the project build-out development plan in the study area. The number of jobs and number of residential units generated by the proposed future uses and gross estimates of square footage will be converted into the proper data format required for the trip generation process of the model.

Product of Task 4

Land use data in tabular form for the model in the requested format

Task 5 Develop and Model the Build Scenarios and Analyze the Results

CTPS will model one no-build scenario and up to six build scenarios using the updated land use data developed in the previous task. Open-road toll collection will be modeled in all scenarios for this study.

The results will be analyzed, comparing traffic conditions under the no-build scenario to conditions with various interchange reconfigurations. The comparisons will be made for peak-hour and daily volumes, daily vehicle-miles traveled (VMT), daily vehicle-hours traveled (VHT), and mode shifts in the study area. CTPS will conduct select link analyses on the MassPike and on the key ramps of the Allston interchange to examine the change of traffic flows and regional travel patterns due to the modeled improvements.

The daily passenger ridership on selected transit service in the study area will be summarized to evaluate the impacts of the improvements on public transit.

Product of Task 5

Tabular and graphic summaries comparing each modeled build scenario with the no-build scenario in terms of traffic volumes, turning movements, VMT, VHT, and transit ridership

Task 6 Model the Preferred Scenarios with LRTP Land Use Data

This task will examine traffic impacts on up to two preferred network scenarios using the adopted LRTP land use data. Open-road toll collection will be modeled for these scenarios. The analysis conducted in this task will focus on identifying the differences in traffic conditions between these scenarios and the Task 5 scenarios. Comparisons will be in terms of peak-hour volumes, VMT, VHT, emissions, and linked and unlinked transit trips by mode.

Product of Task 6

Tabular summaries comparing the changes of traffic volumes, VMT, VHT, and transit ridership in the study area

Task 7 Extract the Subarea Network and Trip Table

CTPS will support the project team to build a micro-simulation model for a traffic study. In this task, CTPS will extract the subarea network and accompanying trip tables from up to three modeled scenarios for the AM and PM peak periods. CTPS will create a subarea polygon that will be overlaid on the regional model, and will define the external stations. Typically, the subarea is consistent with the study area, although in some cases it is larger in order to include certain travel patterns within the regional model.

Product of Task 7

Subarea network and trip tables for the selected scenarios

Task 8 Perform Regional Air Quality Analysis

CTPS will work in coordination with the study team on an air quality analysis based on the model results. The analysis will use EPA's MOVES emission factors. It will be used to estimate mobile emissions from cars and trucks for carbon monoxide (CO), carbon dioxide (CO_2), nitrogen oxides (NOx), volatile organic compounds (VOCs), and two categories of particulate matter (PM2.5 and PM10). Emissions from commuter rail diesel locomotives, transit service boats, and MBTA buses, and some automobile emissions associated with park-and-ride lots, will be estimated off-model.

Product of Task 8

Tabular summaries of emissions in the study area

Task 9 Perform Environmental Justice Analysis

CTPS will conduct an environmental-justice analysis for the proposed improvements. After identifying communities of concern, performance measures—accessibility to health care, higher education, and jobs; mobility and congestion; and environmental impacts—will be used as indicators of benefits and burdens for environmental-justice and non-environmental-justice communities.

Product of Task 9

Tabular summaries of the environmental-justice analysis

Task 10 Perform Economic Impact Analysis

Given the magnitude of investment in the interchange construction and the potential service improvements in local and regional traffic flow, it is important to understand the economic impacts this investment would have on the state's economy. CTPS will use an economic modeling tool to examine the benefits and burdens associated with the reconfiguration of the interchange, and the resulting land use changes to consumer, producer, and labor markets. This will be performed for up to two selected scenarios.

Product of Task 10

A memorandum summarizing the results of the economic analysis

Task 11 Coordinate with the Project Team and Provide Ongoing Technical Assistance

CTPS will work with the project team throughout the study, with an anticipated time frame for modeling of approximately one year. In the event of project delays beyond the control of CTPS, the timing of project deliverables will be consistent with revised schedules set by the MassDOT project team. CTPS staff time and budget estimates reflect attendance at a maximum of 12 internal meetings and six project stakeholder meetings. (If necessary, and upon mutual agreement between CTPS and the MassDOT project team, the number of meetings may be revised and/or restructured to be responsive to any changes in the project schedule.) CTPS will fulfill any data requests from the project team when the data are readily available, and will educate the stakeholders about the work included in this scope.

Product of Task 11

Coordination with the study team, attendance at meetings, and other assistance as needed

Task 12 Produce Technical Memorandum

A technical memorandum documenting all of the model methodology, assumptions, and results, and the analysis findings, to be provided to MassDOT and the study team

Product of Task 12

A technical memorandum documenting the project

Estimated Schedule

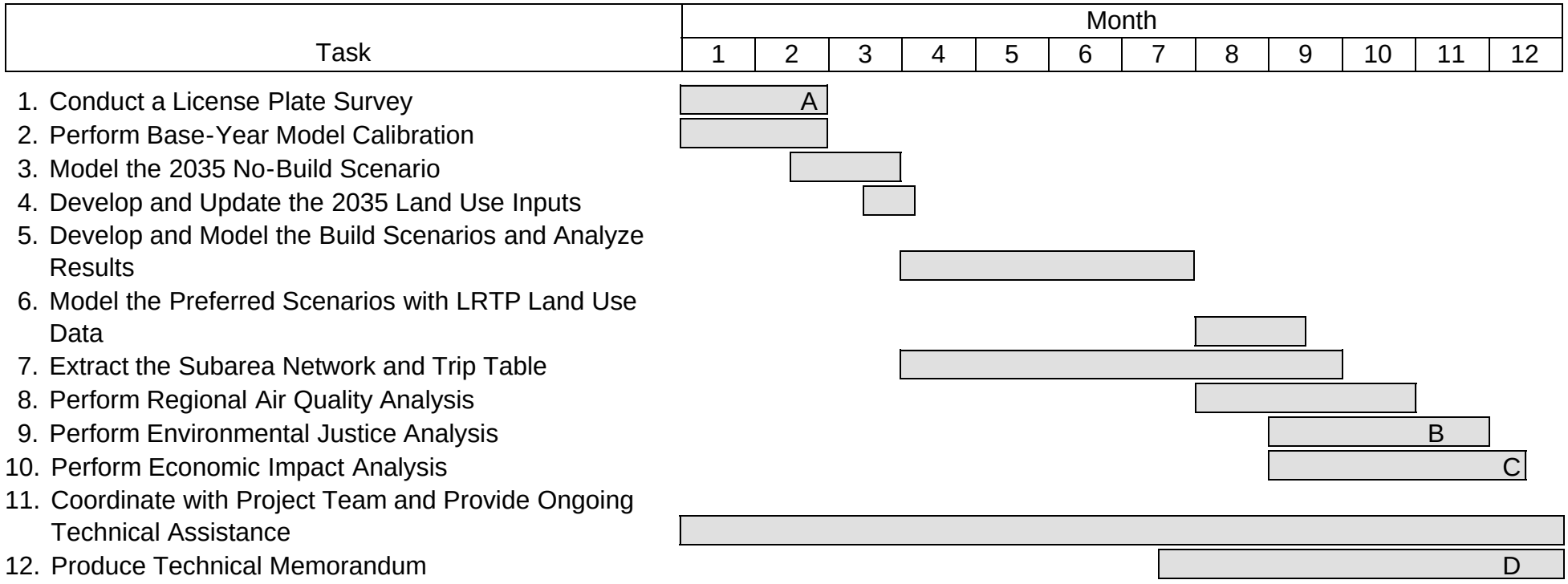
It is estimated that this project will be completed 12 months after work commences. The proposed schedule, by task, is shown in Exhibit 1.

Estimated Cost

The total cost of this project is estimated to be $220,000. This includes the cost of 88.8 person-weeks of staff time, overhead at the rate of 97.42 percent, travel, and equipment. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/YB/yb

Exhibit 1
ESTIMATED SCHEDULE
Massachusetts Turnpike Allston Interchange Traffic Study



Products/Milestones

A: A memo documenting the methodology and findings of the license plate survey
B: A memorandum documenting the methodology and results of the environmental justice analysis
C: A memorandum documenting the methodology and results of the economic impact analysis
D: A memorandum documenting the methodology and results of the traffic analysis

Exhibit 2
ESTIMATED COST
Massachusetts Turnpike Allston Interchange Traffic Study

Direct Salary and Overhead	**$215,150**

Task	Person-Weeks							Direct Salary	Overhead (97.42%)	Total Cost
	M-1	P-5	P-4	P-3	P-2	Temp	Total			
1. Conduct a License Plate Survey	2.0	4.4	0.0	4.0	5.2	19.0	34.6	$29,356	$28,599	$57,955
2. Perform Base-Year Model Calibration	0.5	4.0	0.0	1.0	0.0	0.0	5.5	$8,681	$8,457	$17,138
3. Model the 2035 No-Build Scenario	0.2	1.3	2.0	0.0	0.0	0.0	3.5	$5,070	$4,939	$10,009
4. Develop and Update the 2035 Land Use Inputs	0.2	0.5	0.8	0.0	0.0	0.0	1.5	$2,198	$2,142	$4,340
5. Develop and Model the Build Scenarios and Analyze Results	1.5	3.0	9.0	0.0	0.0	0.0	13.5	$19,013	$18,523	$37,536
6. Model the Preferred Scenarios with LRTP Land Use Data	0.2	1.0	2.5	0.0	0.0	0.0	3.7	$5,195	$5,061	$10,255
7. Extract the Subarea Network and Trip Table	0.4	1.0	2.5	0.0	0.0	0.0	3.9	$5,535	$5,392	$10,928
8. Perform Regional Air Quality Analysis	0.2	0.5	1.5	0.0	0.0	0.0	2.2	$3,084	$3,004	$6,088
9. Perform Environmental Justice Analysis	0.7	1.2	2.0	0.0	0.0	0.0	3.9	$5,752	$5,603	$11,355
10. Perform Economic Impact Analysis	2.0	2.0	0.0	2.5	0.0	0.0	6.5	$9,426	$9,183	$18,609
11. Coordinate with Project Team and Provide Ongoing Technical Assistance	1.5	2.0	0.0	0.0	0.0	0.0	3.5	$5,938	$5,785	$11,722
12. Produce Technical Memorandum	1.5	2.0	3.0	0.0	0.0	0.0	6.5	$9,732	$9,481	$19,213
Total	10.9	22.9	23.3	7.5	5.2	19.0	88.8	$108,981	$106,169	$215,150

Other Direct Costs	**$4,850**
Travel	$400
Other (Rental of 14 video cameras for three days; and purchase of tapes and batteries)	$4,450

TOTAL COST	**$220,000**

Funding

MassDOT Contract #TBD