



# BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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

## MEMORANDUM

**DATE:** November 7, 2013  
**TO:** Boston Region Metropolitan Planning Organization  
**FROM:** Karl H. Quackenbush, CTPS Executive Director  
**RE:** Revised Work Program for: Massachusetts Turnpike Boston Ramps and Bowker Overpass Study – Technical Support

### Action Required

Review and approval

### Proposed Motion

That the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Department of Transportation's Office of Transportation Planning, vote to approve the work program for Massachusetts Turnpike Boston Ramps and Bowker Overpass Study Technical Study presented in this memorandum.

### Project Identification

Unified Planning Work Program Classification

Technical Support/Operations Analysis

CTPS Project Number

97101

Clients

Massachusetts Department of Transportation, Office of Transportation Planning  
Project Supervisor: Paul Nelson

CTPS Project Supervisors

*Principal:* Efi Pagitsas  
*Manager:* Mark Abbott

Funding

MassDOT SPR Contract #76960  
Future MassDOT SPR Contracts

## 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 nor reduce the quality of other work in the Unified Planning Work Program (UPWP).

## Background

The Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning (OTP) is currently conducting the Boston Ramps Study, a review of regional highway connections in the Back Bay neighborhood of Boston. In response to requests from Back Bay business groups and legislators, the study was started in 2009 as a review of potential new Massachusetts Turnpike ramp connections, with a focus on providing a westbound off-ramp connection and/or an eastbound on-ramp connection (connections that do not currently exist). The study was largely suspended for approximately one year during the agency consolidation that resulted from the Transportation Reform Law.

Work was reinitiated on the study in 2011, at which time there was strong demand expressed by local residents and civic organizations to remove the Bowker Overpass and replace it with surface connections. In the view of these neighborhood groups, the removal of the Bowker Overpass is a component of a larger goal to downgrade the functionality of Storrow Drive, remove highway infrastructure, and enhance neighborhood links to the Esplanade. Because of the interaction between Turnpike ramp concepts in the Back Bay, Storrow Drive traffic, and Bowker Overpass connections, the Back Bay Ramps Study was expanded to encompass the Bowker Overpass analysis.

MassDOT has requested that CTPS staff provide technical support for the study to include evaluating the proposed alternatives for: 1) new ramps or alterations to the existing ramps along the Massachusetts Turnpike between Commonwealth Avenue in Allston and Interstate 93 in Chinatown in the city of Boston; and 2) for new ramps or alterations at the Bowker Overpass, which connects Boylston Street with Commonwealth Avenue and Storrow Drive in the city of Boston. Upon completion of the evaluation of proposed alternatives, CTPS will produce a report that summarizes the process, analysis, the development and evaluation of alternatives, and recommendations for both the Boston Ramps Study and Bowker Overpass.

MassDOT has previously evaluated the existing conditions for the study and developed the possible connections and ramp alternatives listed below. However, the analysis needs to be updated to current conditions that apply the current Highway Capacity Manual (HCM) methodologies.

### List of Developed Ramp Alternatives

- **Back Bay Alternative 1:** Construction of a new I-90 westbound off-ramp to Berkeley Street with closure of the existing I-90 westbound on-ramp from Arlington Street
- **Back Bay Alternative 2:** Construction of a new I-90 westbound off-ramp to Trinity Place with closure of the existing I-90 westbound on-ramps from Clarendon Street and Arlington Street
- **Back Bay Alternative 3:** Construction of a new I-90 westbound off-ramp to Brookline Avenue
- **Back Bay Alternative 4:** Construction of a new I-90 eastbound on-ramp from the Bowker Overpass northbound
- **Bowker Alternative 1:** The Bowker Overpass is removed and all movements are accommodated on the Charlesgate roadways
- **Bowker Alternative 2:** The Bowker Overpass is lowered to an at-grade roadway and the Charlesgate roadways are downgraded to provide only local access
- **Bowker Alternative 3:** The Bowker Overpass is removed and a new interchange is constructed to connect the Turnpike to Boylston Street with the local connection to Storrow Drive maintained at Charlesgate
- **Bowker Alternative 4:** The Bowker Overpass is removed and a new interchange is constructed to connect the Turnpike to Boylston Street, with the local connection to Storrow Drive provided by a new interchange with Massachusetts Avenue

The original CTPS-MassDOT contract was for CTPS to assist MassDOT with the traffic analysis of the I-90 ramps only. That scope was dated February 7, 2013, and had a cost estimate of \$75,456. The purpose of the present scope is to update the original scope to include additional analysis related to the Bowker Overpass, and a written report citing the analysis and findings of both the I-90 ramps and the Bowker Overpass. Prior to joining together the I-90 ramps and the Bowker Overpass for study, there have been other efforts to assist MassDOT with analysis of the I-90 ramps, in addition to the \$75,456 study referenced above.

### Objectives

The goal of this study is for CTPS to assist MassDOT with the completion of its joint study of the Boston Ramps and the Bowker Overpass. The objectives of the work program are as follows:

- Review existing data and analysis to determine what is available
- Update existing conditions analysis
- Gather and analyze data relating to the existing demographics of those potentially impacted by this project, and articulate the relative benefits and burdens to those groups
- Conduct future-year analysis for future no-build conditions and four possible concept alternatives along the Massachusetts Turnpike between Commonwealth Avenue in Allston and Interstate 93 in Chinatown in the city of Boston
- Conduct future-year analysis for four possible Bowker Overpass concept alternatives
- Conduct Environmental Justice Assessment and Title VI analysis
- Complete a report that includes both the Boston Ramps study and Bowker Overpass study

## Work Description

### Task 1 Update Existing Traffic Conditions Analysis

Staff will review the previous existing conditions analysis completed in 2011 using the 2000 HCM methodologies and available data files from MassDOT. The existing conditions analysis will then be updated using the previously collected traffic data and 2010 HCM methodologies. The analysis will include the following:

- AM and PM merge and diverge analysis at 14 ramp locations:
  1. I-90 EB Cambridge Street on-ramp
  2. I-90 EB Copley Square off-ramp
  3. I-90 EB I-93/South Station off-ramp
  4. I-90 EB South Boston off-ramp
  5. I-90 EB I-93 northbound on-ramp
  6. I-90 EB South Boston on-ramp
  7. I-90 EB HOV on-ramp
  8. I-90 WB I-93/South Boston off-ramp
  9. I-90 WB South Boston on-ramp
  10. I-90 WB I-93 northbound on-ramp
  11. I-90 WB Arlington Street on-ramp
  12. I-90 WB Clarendon Street on-ramp

13. I-90 WB Massachusetts Avenue on-ramp
  14. I-90 WB Cambridge Street off-ramp
- AM and PM mainline analysis along six sections of I-90 (Massachusetts Turnpike):
    1. I-90 EB between Allston toll and Prudential tunnel
    2. I-90 WB between Prudential Tunnel and Allston toll
    3. I-90 EB between Prudential tunnel and I-93 exit
    4. I-90 WB between I-93 exit and Prudential tunnel
    5. I-90 EB in Ted Williams Tunnel
    6. I-90 WB in Ted Williams Tunnel
  - AM and PM intersection analysis at 36 intersections:
    1. Commonwealth Avenue at Harvard Street
    2. River Street at Soldiers Field Road
    3. Commonwealth Avenue at Carlton Street
    4. Park Drive at Brookline Avenue/Boylston Street
    5. Kenmore Square (Commonwealth Avenue/Brookline Avenue/Beacon Street)
    6. Boylston Street at Bowker Overpass
    7. Huntington Avenue at Francis Street
    8. Huntington Avenue at Longwood Avenue
    9. Huntington Avenue at Ruggles Street
    10. Tremont Street at Ruggles Street
    11. Tremont Street at Melnea Cass Boulevard
    12. Massachusetts Avenue at Melnea Call Boulevard
    13. Massachusetts Avenue at Beacon Street
    14. Dartmouth Street at Saint James Avenue
    15. Arlington Street at Beacon Street
    16. Arlington Street at Stuart Street/Columbus Avenue
    17. Washington Street at Kneeland Street
    18. Washington Street at Essex Street/Boylston Street
    19. Atlantic Avenue at Summer Street

20. Congress Street at East Service Road
  21. West Fourth Street at Dorchester Avenue
  22. Albany Street at Herald Street
  23. Leverett Circle
  24. Charlesgate at Boylston Street and Fenway
  25. Charlesgate East at Commonwealth Avenue eastbound
  26. Charlesgate East at Commonwealth Avenue westbound
  27. Charlesgate West at Commonwealth Avenue eastbound
  28. Charlesgate West at Commonwealth Avenue westbound
  29. Charlesgate East at Beacon Street
  30. Charlesgate West at Beacon Street
  31. Charlesgate East at Marlborough Street
  32. Saint James Avenue at Dartmouth Street
  33. Stuart Street at Arlington Street
  34. Kenmore Square
  35. Bowker Overpass at Boylston Street
  36. Beacon Street at Massachusetts Avenue
- AM and PM arterial analysis at 11 key arterial locations
    1. Boston University Bridge – NB and SB
    2. Harvard Bridge – NB and SB
    3. Longfellow Bridge – EB and WB
    4. Memorial Drive between BU Bridge and Harvard Bridge – EB and WB
    5. Memorial Drive between Harvard Bridge and Longfellow Bridge – EB and WB
    6. Storrow Drive between Harvard Bridge and Longfellow Bridge – EB and WB
    7. Storrow Drive between Longfellow Bridge and Leverett Circle – EB and WB
    8. Callahan Tunnel - NB
    9. Sumner Tunnel – SB
    10. Zakim Bridge – NB and SB

- AM and PM pedestrian and bicycle accommodation analysis at the areas impacted by the eight alternatives.

#### *Products of Task 1*

Tables summarizing the completed existing conditions analysis update

#### **Task 2 Update Crash Data**

Staff will update the 2005–07 crash data used in the earlier existing conditions analysis to 2006–10 data.

#### *Products of Task 2*

Tables summarizing the updated crash data

#### **Task 3 Update Transit Data**

Transit data will be updated from 2008 to the most recently available data from CTPS's Transit Service Planning Group and an effort will be made to assess future impacts on transit to the degree possible. Updates will be sought for the following data:

- Daily, AM, and PM boardings for the Silver Line, Orange Line, and Green Line
- Ridership data for the Framingham/Worcester commuter rail line for weekday AM and PM trains
- Ridership data for MBTA bus routes and the Longwood Medical Area shuttle buses in the study area, to the degree that data is readily available. (MassDOT will need to provide information on how the previous summary was created.)
- Proposed projects in the area that include transit options

#### *Product of Task 3*

Updated summary of transit data and assessment of impact to transit, to the degree feasible

#### **Task 4 Update Data on Existing Conditions**

Readily available data will be gathered from existing sources as part of this task for use in the analysis of equity impacts that will be completed in Task 6. This includes collection of demographic data to identify the locations of minority, low-income, and elderly populations, as well as those with limited English proficiency, within the study area.

To the degree possible, data will be collected from existing sources on the primary means of transportation access both *to* the neighborhoods with these identified populations and *from* these neighborhoods to key destinations

including, but not limited to, civic, commercial, educational, and health care institutions.

The data collection will also include an inventory of geometric data (layout plans, lanes, curb cuts, sidewalks, crosswalks, pedestrian buttons, transit accommodations, etc.) to identify any breaks in accessible paths of travel.

#### *Products of Task 4*

Updated demographics from existing sources identifying existing social equity impacts

#### **Task 5 Conduct a Future-Year Analysis**

In this task, a future-year conditions analysis for 2035 for the no-build and eight build scenarios will be conducted using 2010 HCM methodologies.

As part of this task, staff will reference the future-year data that were used as input to the development of future traffic forecasts, including population, employment, and known developments that were assumed to have been completed and occupied by 2035.

The analysis will include the following:

- AM and PM merge and diverge analysis at the 14 locations listed previously in the existing conditions task
- AM and PM mainline analysis along six sections of I-90 (Massachusetts Turnpike), as listed previously in the existing conditions task
- AM and PM peak-hour freeway analysis for the Massachusetts Turnpike Bowker Overpass ramp alternative
- AM and PM intersection analysis at 19 key intersections at the following locations:
  1. Saint James Avenue at Dartmouth Street
  2. Stuart Street at Arlington Street
  3. Kenmore Square
  4. Brookline Avenue at Boylston Street
  5. Bowker Overpass at Boylston Street
  6. Beacon Street at Massachusetts Avenue
  7. Charlesgate at Boylston Street and Fenway
  8. Charlesgate East at Commonwealth Avenue eastbound
  9. Charlesgate East at Commonwealth Avenue westbound



10. Charlesgate West at Commonwealth Avenue eastbound
11. Charlesgate West at Commonwealth Avenue westbound
12. Charlesgate East at Beacon Street
13. Charlesgate West at Beacon Street
14. Charlesgate East at Marlborough Street
15. Saint James Avenue at Dartmouth Street
16. Stuart Street at Arlington Street
17. Kenmore Square
18. Bowker Overpass at Boylston Street
19. Beacon Street at Massachusetts Avenue

- AM and PM arterial analysis at 11 key arterial locations as listed previously in the existing conditions task
- Intersection analysis under future conditions will include “new” intersections created as part of any alternatives developed. For example, new intersections may be developed at the crossing of the Grounded Bowker Overpass roadway with Commonwealth Avenue, Beacon Street, and other roadways, an estimate of four intersections, in addition to those listed above, for a total of as many as 23 intersections.
- AM and PM pedestrian and bicycle accommodation analysis for each alternative

#### *Products of Task 5*

Tables summarizing the completed future-year analysis

#### **Task 6 Review Alternative Designs, Develop Cost Estimates, and Examine Air Quality Impacts**

For the eight proposed concept alternatives, CTPS will perform the following:

- Provide preliminary concept design refinements and concept graphics of alternatives
- Develop preliminary project cost estimates in conjunction with the MassDOT Highway Division
- Analyze, both qualitatively and quantitatively, the possible equity impacts of the proposed alternatives using the data collected in Task 4. To complete this analysis, CTPS will use methods consistent with those outlined in NCHRP Report 532 – Effective Methods for Environmental Justice Assessment. CTPS will analyze the air quality impacts of the proposed alternatives on the minority and low-income populations that have been

identified. CTPS will determine whether any of the alternatives would have any disproportionately high and adverse impacts on these populations. If so, CTPS will identify potential mitigation measures.

- Examine the air quality impacts associated with the alternatives

#### *Products of Task 6*

Preliminary concept designs and associated preliminary cost estimates of the alternatives, and environmental justice analysis of each alternative

#### **Task 7 Support MassDOT's Public Involvement Plan**

MassDOT will be responsible for developing and executing all elements of the Public Involvement Plan so that they include specific communication strategies to provide continuous and meaningful opportunities for involvement by the public throughout the study process using standards of the applicable federal Environmental Justice orders and regulations, as well as Title VI of the Civil Rights Act of 1964.

CTPS staff will attend as many as three public meetings and as many as two other meetings. In addition, CTPS will support MassDOT's Office of Transportation Planning by answering technical questions related to the completed analysis, and, if necessary, by providing graphics to display alternatives.

#### *Product of Task 7*

- Attendance at as many as three public meetings and as many as two other meetings
- Graphics showing alternatives, if necessary

#### **Task 8 Produce a Final Report**

Produce a single report that includes both the Boston Ramps and Bowker Overpass studies. The report will be accessible and meet MassDOT report standards. The report will summarize the study process, alternative development and evaluation, and the study's conclusions.

#### *Product of Task 8*

A completed report for both the Boston Ramps and Bowker Overpass studies

### **Estimated Schedule**

It is estimated that this project will be completed in 14 months from February 12, 2013, which is the date that the original work was approved for funding. The proposed schedule, by task, is shown in Exhibit 1.

## Estimated Cost

The total cost of this project is estimated to be \$208,103, which represents the total for all work, including the original \$75,456 that was approved on February 7, 2013. This includes the cost of 67.0 person-weeks of staff time, overhead at the rate of 97.42 percent, and travel costs. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/MSA/msa

**Exhibit 1**

**ESTIMATED SCHEDULE**

**Massachusetts Turnpike Boston Ramps and Bowker Overpass Study – Technical Support**

Task	Month														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1. Update Existing Traffic Conditions Analysis	█								█						
2. Update Crash Data		█													
3. Examine Transit Data		█								█					
4. Update Data on Existing Conditions									█						
5. Conduct a Future-Year Analysis					█			█							
6. Review Alternative Designs, Develop Cost Estimates, and Examine Air Quality Impacts									█						
7. Support MassDOT's Public Involvement Plan									█						
8. Produce a Final Report	█											A	B	C	

**Products/Milestones**

A: Draft report for internal review

B: Draft report for public review

C: Final report

**Exhibit 2****ESTIMATED COST****Massachusetts Turnpike Boston Ramps and Bowker Overpass Study – Technical Support****Direct Salary and Overhead** **\$208,033**

Task	Person-Weeks				Direct Salary	Overhead (97.42%)	Total Cost
	M-1	P-5	P-4	Total			
1. Update Existing Traffic Conditions Analysis	0.6	5.0	3.0	8.6	\$13,277	\$12,935	\$26,212
2. Update Crash Data	0.2	1.0	1.0	2.2	\$3,298	\$3,212	\$6,510
3. Examine Transit Data	0.3	2.0	0.0	2.3	\$3,895	\$3,795	\$7,690
4. Update Data on Existing Conditions	0.2	2.0	0.0	2.2	\$3,725	\$3,629	\$7,354
5. Conduct a Future-Year Analysis	0.6	4.0	4.0	8.6	\$12,850	\$12,518	\$25,368
6. Review Alternative Designs, Develop Cost Estimates, and Examine Air Quality Impacts	1.0	8.0	0.0	9.0	\$15,241	\$14,847	\$30,088
7. Support MassDOT's Public Involvement Plan	1.0	2.4	2.0	5.4	\$8,293	\$8,079	\$16,373
8. Produce a Final Report	7.7	12.0	9.0	28.7	\$44,797	\$43,641	\$88,439
Total	11.6	36.4	19.0	67.0	\$105,376	\$102,657	\$208,033

**Other Direct Costs** **\$70**

Travel	\$70
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**TOTAL COST** **\$208,103****Funding**

MassDOT SPR Contract #76960  
Future MassDOT SPR Contracts