



# BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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Jeffrey B. Mullan  
MassDOT Secretary and CEO  
and MPO Chairman

Karl H. Quackenbush  
Acting Director, MPO Staff

The Boston Region MPO, the federally designated entity responsible for transportation decision-making for the 101 cities and towns in the MPO region, is composed of:

MassDOT Office of Planning and Programming  
City of Boston  
City of Newton  
City of Somerville  
Town of Bedford  
Town of Braintree  
Town of Framingham  
Town of Hopkinton  
Metropolitan Area Planning Council  
Massachusetts Bay Transportation Authority Advisory Board  
Massachusetts Bay Transportation Authority  
MassDOT Highway Division  
Massachusetts Port Authority  
Regional Transportation Advisory Council (nonvoting)  
Federal Highway Administration (nonvoting)  
Federal Transit Administration (nonvoting)

## MEMORANDUM

**DATE** June 9, 2011  
**TO** Transportation Planning and Programming Committee  
of the Boston Region Metropolitan Planning Organization  
**FROM** Karl H. Quackenbush, Acting CTPS Director  
**RE** Work Program for: McGrath Highway De-elevation, and Urban  
Streetscape and Adaptive Reuse Plan for the Inner Belt/Brickbottom  
Districts

### ACTION REQUIRED

Review and approval

### PROPOSED MOTION

That the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization, upon the recommendation of MassDOT and City of Somerville, vote to approve the work program for McGrath Highway De-elevation, and Urban Streetscape and Adaptive Reuse Plan for the Inner Belt/Brickbottom Districts in the form of the draft dated June 9, 2011.

### PROJECT IDENTIFICATION

#### Unified Planning Work Program Classification

Planning Studies

#### CTPS Project Number

95043

#### Client

Massachusetts Department of Transportation

*Project Supervisor:* Ethan Britland

#### CTPS Project Supervisors

*Principal:* Karl Quackenbush

*Manager:* Scott Peterson

#### Funding

MassDOT SPR funds

## **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 other work in the UPWP.

## **BACKGROUND**

The area made up of the Inner Belt and Brickbottom districts is a 120-acre zone including a small portion of land that is within the Boston city limits (in Charlestown) but otherwise located in the southeast section of the city of Somerville. A majority of the area contains light and heavy industrial uses ranging from telecommunications to solid waste removal activities. The Inner Belt and Brickbottom districts have long been characterized by isolation. Although they are only 1.5 miles from downtown Boston, they are surrounded by I-93, McGrath Highway, Washington Street, and the Lowell and Fitchburg rail lines. These physical barriers not only separate both Inner Belt and Brickbottom from the adjacent neighborhoods in Somerville, Cambridge, and Charlestown, but also disconnect the grid patterns of their internal roadways.

Currently, MassDOT and the Massachusetts Bay Transportation Authority (MBTA) are proceeding with plans to extend the Green Line and provide light rail rapid transit along Somerville's northwest-running rail corridor. The Green Line extension project, with a proposed station stop located in the northwest corner of the study area, offers new opportunities to improve access and potentially transform the area into a dynamic transit-oriented community. The Green Line extension project also proposes a vehicle maintenance facility yard to be located in the study area. In coordination with the Green Line extension project, a clear vision for the area, together with appropriate land use policies and targeted public investment, is needed to reduce barriers in the area, improve roadway connections, and increase the area's economic viability.

McGrath Highway is a major transportation facility north of Boston stretching from Mystic Avenue/I-93 in Medford to the Somerville-Cambridge city line. The majority of McGrath Highway north of Medford Street is at grade (with the exception of a short bridge over the MBTA's Lowell commuter rail line, a short bridge over Gilman Street, and a short tunnel under the I-93 ramps). South of Medford Street it is primarily an elevated structure (except for a short at-grade section going northbound), named the McCarthy Overpass. The elevated and at-grade portions of the roadway are both part of the state's numbered-route system, namely Route 28, which is classified as an "other freeway."

While McGrath Highway carries a high volume of local and regional traffic—the annual average daily traffic (AADT) is 32,700 at the Somerville-Cambridge line—it also acts as a significant barrier between, on its east side, East Somerville and the Inner Belt industrial area and, on its west side, the rest of Somerville. The City of Somerville has expressed a desire to change McGrath from its current "other freeway" character to a street more akin to a

boulevard. The City believes this would facilitate east-west movement across the corridor by Somerville residents and visitors and create a more attractive environment for redevelopment along the corridor.

The McCarthy Overpass is in poor condition and will likely be rated structurally deficient in the near future by MassDOT's Highway Division. Restoring the elevated structure will require significant concrete work, steel repair, and deck restoration. The size of the investment necessary for completing this work suggests that now is an opportune time to evaluate the feasibility, benefits, impacts, long-term maintenance savings, and costs of removing at least a portion of the elevated structure on McGrath Highway.

## **OBJECTIVES**

This project will serve two basic purposes: One is to support the McGrath Highway De-elevation Study, and the other is to support the Adaptive Reuse Plan for the Inner Belt and Brickbottom Districts. Each of these studies has its own consultant team. The objectives of this work are:

1. To provide general technical assistance, as needed, and attend stakeholder meetings
2. To assess the existing traffic conditions and collect data, including peak-hour traffic volumes and turning movements, for base-year model calibration
3. To evaluate the travel patterns of the existing conditions, estimate the future-year no-build conditions, and estimate the changes in traffic conditions under the future-year build alternatives resulting from various proposed construction plans for the McCarthy Overpass
4. To incorporate in the model the build scenarios for the Inner Belt and Brickbottom districts resulting from the Adaptive Reuse Plan and to examine the impacts of these scenarios on traffic volumes and travel patterns

## **WORK DESCRIPTION**

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

### **Task 1 Coordinate with Both Project Teams and Provide Ongoing Technical Assistance**

CTPS will work with the McGrath Highway project team for up to one year from the start date of this project. The work will consist of attending up to a maximum of seven internal meetings and three meetings with stakeholders. CTPS will fulfill any data requests from

the project team, when data is readily available, and educate the stakeholders about any past or proposed work discussed in this scope.

CTPS will work with the Inner Belt and Brickbottom team for up to one year from the start date of this project. The work will consist of attending up to a maximum of eight internal meetings, two community meetings/workshops, and six agency meetings. CTPS will fulfill any reasonable data requests from the project team during the life of this project.

### ***Products of Task 1***

Coordinate with the project teams, attend meetings, provide data to the project teams, and prepare memos and presentations as needed

## **Task 2 Collect Traffic Data**

CTPS will investigate all available counts relevant to this study, including MassDOT historical traffic volumes, automatic-traffic-recorder (ATR) counts, and turning movements collected in the cities of Cambridge, Somerville, and Boston. The existing traffic counts from recent studies will be utilized to the greatest extent possible. Additional traffic counts (Manual turning movements) will be conducted, if required, at up to 10 locations in the vicinity of the McCarthy Overpass study area.

CTPS will also review and summarize the license plate surveys performed on McGrath Highway for a previous study that included this roadway, Toward a Route 28 Corridor Transportation Plan: An Emerging Vision, which was prepared by the staff of the Boston Region Metropolitan Planning Organization (2008). The information from these surveys will be utilized to compare and evaluate the travel patterns estimated using the base-year model.

### ***Products of Task 2***

- Tabular summaries of hourly counts and turning movements in the AM and PM peak periods
- Tabular summaries of results from license plate surveys

## **Task 3 Conduct Origin-Destination Survey**

CTPS will conduct an origin-destination survey (OD survey) on the selected locations at entry and exit points between the pedestrian overpass over McGrath Highway, located between Pearl Street and Broadway, and the Museum of Science. This OD survey will identify vehicle entrances and exits within the study area in the cities of Somerville and Cambridge by matching vehicles' license plates between the street intersections. It will also identify the origin towns and TAZs of the vehicles entering the study area by mapping vehicle license plates to the town where the vehicle is garaged, according to Registry of Motor Vehicles records. The results from this survey will be utilized to compare and evaluate the travel patterns estimated by the base-year model.

At the above locations, CTPS staff will station visual or audio equipment for the recording of license plates as vehicles pass these stations. It is estimated that 11 video cameras will be required and 3 audio tape recorders to collect data at 3 origin locations and 8 destination locations. The data collection will be done by traffic lane at each of the entry/exit locations on a May or June weekday morning peak period between 7:00 and 9:00 AM.

This task was pre-approved along with the other direct costs under video camera rentals, videotapes, and batteries on May 11, 2011.

### ***Products of Task 3***

Tabular summaries of trip origins and destinations from OD survey

## **Task 4 Develop and Calibrate Base-Year (2009) Model**

This task consists of refining the roadway network of the regional model in the Inner Belt and Brickbottom districts and along McGrath Highway in the cities of Somerville and Cambridge so that it will accurately replicate the base-year (2009) conditions. The calibration efforts will focus on comparing peak-hour volumes (AM and PM) to counts. A methodology for converting the model's peak-period volumes to peak-hour volumes will be developed. The trip flows on McGrath Highway associated with the transportation analysis zones (TAZs) in the vicinity of the study area will be examined and possibly adjusted based on the summaries of license plate surveys. Daily ridership on selected transit lines and boardings at selected stations near the study area will be compared to recent counts.

### ***Products of Task 4***

- A calibrated and validated base-year model set
- Tabular and graphical summaries of highway assignment results for the study area
- Tabular and graphical summaries of turning movements for selected intersections
- Tabular summaries of transit ridership and boardings for selected transit lines and stations

## **Task 5 Model Future-Year No-Build Scenario for 2035**

In this task, the 2035 no-build roadway network in the study area will be created, based on the Boston Region MPO Long-Range Transportation Plan (LRTP) currently under development, and it will include some enhancements in the Inner Belt and Brickbottom districts. The 2035 no-build scenario will use the most recent land use assumptions approved by the MPO for this LRTP. The outputs of the no-build model run will be used as the basis for analyzing the impacts of the build scenarios described in Task 5.

### ***Products of Task 5***

- A 2035 no-build model set using the MPO-approved land use

- Highway and transit trip tables to use as inputs to the build scenarios
- Tabular and graphic summaries corresponding to those produced in Task 3 for the base year

### **Task 6 Develop and Model Multiple Build Scenarios and Analyze Results**

CTPS will modify the no-build model roadway network to reflect up to a maximum of four build scenarios. The build scenarios will utilize the same land use assumptions as the no-build scenario. The results of this modeling will be analyzed, comparing traffic conditions under the no-build scenario to conditions with various de-elevation configurations of McGrath Highway. The comparisons will be made for peak-hour volumes, vehicle-miles traveled (VMT), vehicle-hours traveled (VHT), emissions, and linked and unlinked transit trips by mode in the study area. CTPS will also assist in the environmental justice analysis and provide data as needed.

#### ***Products of Task 6***

- Tabular summaries of the travel model results in the study area, the rest of Somerville and Charlestown, and Cambridge
- Tabular and graphic summaries comparing each build scenario with the no-build in terms of traffic volumes, turning movements, VMT, VHT, and transit ridership
- Tabular summaries of emissions in the study area for the air quality study
- Tabular summaries of environmental justice analysis

### **Task 7 Develop Inputs for a Preferred Land Use Scenario for 2035**

In this task, CTPS will prepare data for the travel demand model based on the preferred land use resulting from the Adaptive Reuse Plan for the Inner Belt and Brickbottom Districts. 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. CTPS will also provide guidance and support to the City of Somerville and the project team pertaining to adjustment of the socioeconomic data for the Inner Belt and Brickbottom districts provided by the City of Somerville. The adjustment will be based on control totals for households, population, and employment from the LRTP. If the data cannot be provided by the City of Somerville, CTPS staff will produce data using their professional judgment.

#### ***Product of Task 7***

Data in tabular form based on the preferred land use plan for the model in the requested format

### **Task 8 Incorporate the Land Use Development into Build Scenarios**

This task will incorporate the adaptive land use developments in the Inner Belt and Brickbottom districts generated in Task 6 into one or two build scenarios. The

configuration of McGrath Highway either will be selected from the build scenarios in Task 5 or will be a new design that relates specifically to the new proposed land use developments in the study area. CTPS will modify the roadway network to replicate the improvements in roadway connectivity in the project study area. The analysis conducted in this task will focus on identifying the differences in traffic conditions between the Task 5 scenarios and the Task 6 scenario(s). The comparison will be in terms of peak-hour volumes, VMT, VHT, emissions, and linked and unlinked transit trips by mode. CTPS will also assist in the environmental justice analysis and provide data as needed.

#### ***Products of Task 8***

- Tabular and graphic summaries comparing the Task 6 scenario(s) and the Task 5 scenarios in terms of traffic volumes, VMT, VHT, and transit ridership in the study area
- Tabular summaries of emissions in the study area for the air quality study
- Tabular summaries of environmental justice analysis

#### **Task 9 Produce Technical Memoranda**

Two technical memoranda will be prepared for this project. One will focus on the impact on traffic of McGrath Highway de-elevation. The other will address the improvement of traffic conditions and other transportation effects potentially resulting from the proposed land use changes. Both technical memoranda will document all of the model methodology, assumptions, and results used for the analysis.

#### ***Products of Task 9***

Two technical memoranda documenting the analyses and the model assumptions, methods, and results used

### **ESTIMATED SCHEDULE**

It is estimated that this project will be completed 12 months after the notice to proceed is received. The proposed schedule, by task, is shown in Exhibit 1.

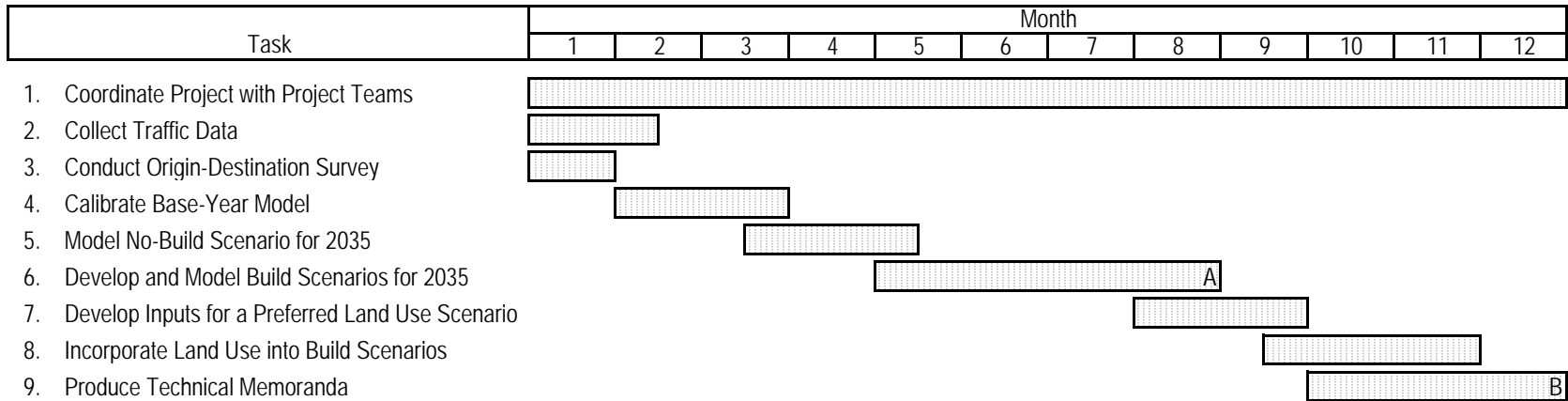
### **ESTIMATED COST**

The total cost of this project is estimated to be \$120,200. This includes the cost of 56.2 person-weeks of staff time, overhead at the rate of 90.69 percent, and travel. A detailed breakdown of estimated costs is presented in Exhibit 2. The City of Somerville will be participating in the funding of this project through an agreement with MassDOT.

Exhibit 1

ESTIMATED SCHEDULE

McGrath Highway De-elevation, and Urban Streetscape and Adaptive Reuse Plan for the Inner Belt/Brickbottom Districts



Products/Milestones

A: Technical memorandum focusing on impact of de-elevation on traffic

B: Technical memorandum on possible transportation improvements resulting from land-use changes



Exhibit 2

ESTIMATED COST

McGrath Highway De-elevation, and Urban Streetscape and Adaptive Reuse Plan for the Inner Belt/Brickbottom Districts

<b>Direct Salary and Overhead</b>	<b>\$118,650</b>
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Task								Total	Direct Salary	Overhead (@ 90.69%)	Total Cost
	M-1	P-5	P-4	P-3	P-1	SP-3	Temp				
1. Coordinate Project with Project Teams	1.7	0.0	1.8	0.5	0.0	0.0	0.0	4.0	\$5,506	\$4,994	\$10,500
2. Collect Traffic Data	0.0	0.0	0.0	0.5	0.0	2.5	0.0	3.0	\$2,465	\$2,235	\$4,700
3. Conduct Origin-Destination Survey	0.5	4.5	0.2	0.0	1.5	0.0	9.5	16.2	\$14,081	\$12,770	\$26,850
4. Calibrate Base-Year Model	0.5	0.0	3.6	2.4	0.0	0.0	0.0	6.5	\$7,657	\$6,944	\$14,600
5. Model No-Build Scenario for 2035	0.5	0.0	1.5	1.5	0.0	0.0	0.0	3.5	\$4,195	\$3,805	\$8,000
6. Develop and Model Build Scenarios for 2035	0.8	0.0	4.2	2.9	0.0	0.0	0.0	7.9	\$9,440	\$8,561	\$18,000
7. Develop Inputs for a Preferred Land Use Scenario	1.0	0.0	4.0	1.0	0.0	0.0	0.0	6.0	\$7,551	\$6,848	\$14,400
8. Incorporate Land Use into Build Scenarios	0.3	0.0	1.7	1.0	0.0	0.0	0.0	3.0	\$3,619	\$3,282	\$6,900
9. Produce Technical Memoranda	1.3	0.0	3.6	1.1	0.0	0.0	0.0	6.0	\$7,709	\$6,991	\$14,700
Total	6.6	4.5	20.6	11.0	1.5	2.5	9.5	56.2	\$62,222	\$56,429	\$118,650

<b>Other Direct Costs</b>	<b>\$1,550</b>
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Travel	\$50
Video camera rentals, videotapes, batteries	\$1,500

<b>TOTAL COST</b>	<b>\$120,200</b>
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*Funding*

*MassDOT SPR funds*



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Massachusetts Bay Transportation  
Authority Advisory Board  
Massachusetts Bay Transportation  
Authority  
MassDOT Highway Division  
Massachusetts Port Authority  
Regional Transportation Advisory  
Council (nonvoting)  
Federal Highway Administration  
(nonvoting)  
Federal Transit Administration  
(nonvoting)

**MEMORANDUM**

**DATE** June 9, 2011  
**TO** Transportation Planning and Programming Committee  
of the Boston Region Metropolitan Planning Organization  
**FROM** Karl H. Quackenbush, CTPS Acting Director  
**RE** Work Program for: Roxbury/Dorchester/Mattapan Transit Needs  
Study

**ACTION REQUIRED**

Review and approval

**PROPOSED MOTION**

That the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Department of Transportation, vote to approve the work program for Roxbury/Dorchester/Mattapan Transit Needs Study in the form of the draft dated June 9, 2011.

**PROJECT IDENTIFICATION**

**Unified Planning Work Program Classification**

Planning Studies

**CTPS Project Number**

22335

**Client**

Massachusetts Department of Transportation

*Project Supervisors:* Steve Woelfel and Scott Hamway

**CTPS Project Supervisors**

*Principal:* Karl H. Quackenbush

*Manager:* Scott Peterson

**Funding**

MassDOT Section 5303 Contract #67438

## **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 other work in the UPWP.

## **BACKGROUND**

In the summer of 2009, the Massachusetts Department of Transportation (MassDOT) advanced a proposal to use American Recovery and Reinvestment Act (ARRA) economic stimulus funds to construct a bus rapid transit (BRT) system to replace the Massachusetts Bay Transportation Authority's Route 28 bus in the Boston neighborhoods of Roxbury, Dorchester, and Mattapan. The proposal, named the "28X," would have created a dedicated median busway along Blue Hill Avenue, a dedicated bus lane in one direction on Warren Street, and a number of other BRT enhancements. Due to a number of factors, MassDOT was unable to secure the support from stakeholders necessary to implement the proposed 28X project. Nonetheless, at the request of the corridor's elected officials, MassDOT committed to continuing public transportation planning in the corridor in order to build on the interest generated by the 28X proposal.

Roxbury, Dorchester and Mattapan are home to tens of thousands of residents who rely on the MBTA network to access employment, education, shopping, and entertainment opportunities, in addition to healthcare and government services. While many residents and workers in these communities have good access to rapid transit subway service on the Orange and Red Lines—in addition to complementary services provided on the Mattapan High-Speed Line, Fairmount commuter rail line, and the Silver Line—roughly half of the neighborhood residents do not have convenient access to rapid transit. As a result, a sizable portion of this transit-dependent market relies on local bus service for at least a portion of their trips. In fact, the MBTA's six highest ridership bus routes, serving more than 70,000 passengers each weekday, all serve at least one of the three neighborhoods covered in this study.

Roxbury, Dorchester and Mattapan are served by several MBTA bus routes, many of which run at very high frequencies. The routes also provide generally comprehensive coverage of the neighborhoods. However, many of these routes are also plagued by a variety of problems, including poor reliability, slow travel speeds, overcrowding, and a lack of customer amenities. Because of the challenges faced by the large numbers of bus riders in these communities, MassDOT will undertake a Roxbury/Dorchester/Mattapan (RDM) Transit Needs Study.

CTPS performed travel demand forecasting for the 28X project using its regional model, and is proposing to fill this same role for the RDM Transit Needs Study.

## OBJECTIVES

The objectives of this work are:

- Assess the study area's existing conditions (demographics, transportation system, land uses, and development characteristics) and projected conditions.
- Evaluate the corridor's existing MBTA service and its ability to meet current and future transportation needs in the area.
- Identify and evaluate up to five service-planning strategies that would enhance the quality and reliability of the public transportation system for residents and businesses in the corridor.

## WORK DESCRIPTION

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

### **Task 1 Calibrate Base-Year Model**

This task includes potential refinement of the 2009 base-year scenario of the regional model in the study area. The goal is to achieve a good representation of travel patterns within and to/from Roxbury/Dorchester/Mattapan. Calibration efforts may focus on replicating modeled peak road volumes at major intersections so that they are consistent with actual counts. Modeled ridership of the study area's major transit lines and station boardings will be compared with existing counts.

#### *Product of Task 1*

A calibrated base-year model set

### **Task 2 Run Horizon-Year No-Build Scenario**

Using the model work done for the latest Boston Region MPO's Long-Range Transportation Plan (LRTP), CTPS will fashion a no-build scenario for the 2035 horizon year. A model run will be conducted for this no-build scenario for use with comparison to the service-planning strategies proposed in later tasks.

#### *Products of Task 2*

Summary of travel forecasts and outputs for the No-Build Scenario

### **Task 3 Develop Service-Planning Strategies**

CTPS will assist the consultant and client in helping to refine up to five service-planning strategies developed in conjunction with stakeholders and the public during the extensive

outreach, engagement, and public participation process. Each of these strategies will be assumed to be in place by 2035, the model horizon year. CTPS's Transportation Analysis and Design Group will assist in this refinement process, especially concerning the use of signal-priority and other time-saving roadway enhancement strategies.

***Product of Task 3***

Compilation of Service-Planning Strategies

**Task 4 Model Service-Planning Strategies**

CTPS will model up to five service-planning strategies refined from Task 3. Traffic at major intersections, station boardings, transit ridership, and travel patterns will be compared to the results from the no-build scenario in Task 2. Such a comparison will be a way to measure transportation improvements for the study area.

***Products of Task 4***

- Summary of travel forecasts and outputs for the service-planning strategies
- Tabular and graphic summaries comparing the changes in traffic, transit ridership, and station boardings to the no-build scenario in Task 2

**Task 5 Perform Environmental-Justice Analyses**

CTPS will conduct environmental-justice analyses for the tested service-planning strategies. 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 5***

Memorandum documenting the environmental justice analyses

**Task 6 Produce a Technical Memorandum**

A technical memorandum documenting all of the model methodology, assumptions, and results used for the analysis will be provided to MassDOT and the consultant.

***Products of Task 6***

A technical memorandum documenting the project's assumptions, methods, and results

**ESTIMATED SCHEDULE**

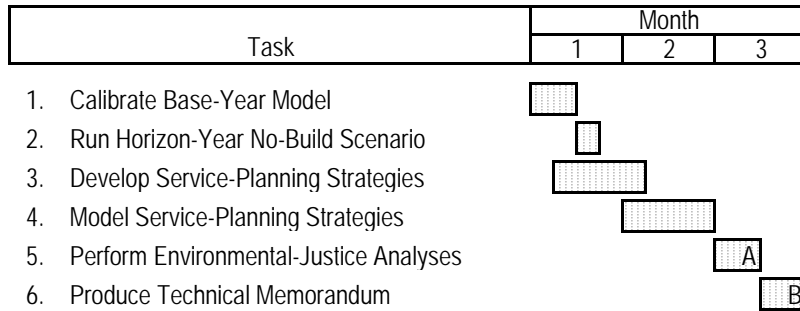
It is estimated that this project would be completed three months after the notice to proceed is received. The proposed schedule, by task, is shown in Exhibit 1.

**ESTIMATED COST**

The total cost of this project is estimated to be \$60,000. This includes the cost of 20.5 person-weeks of staff time, overhead at the rate of 90.69 percent, and travel. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/SAP/BK/bk

Exhibit 1  
 ESTIMATED SCHEDULE  
 Roxbury/Dorchester/Mattapan Transit Needs Study




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Milestones

- A: Environmental-justice memorandum
- B: Technical memorandum

Exhibit 2  
 ESTIMATED COST  
 Roxbury/Dorchester/Mattapan Transit Needs Study

**Direct Salary and Overhead** **\$59,992**

Task	Person-Weeks					Direct Salary	Overhead (@ 90.69%)	Total Cost
	M-1	P-5	P-4	P-3	Total			
1. Calibrate Base-Year Model	0.0	0.5	2.0	1.0	3.5	\$4,266	\$3,869	\$8,136
2. Run Horizon-Year No-Build Scenario	0.0	0.0	1.0	0.0	1.0	\$1,220	\$1,106	\$2,326
3. Develop Service-Planning Strategies	1.0	1.5	3.0	0.0	5.5	\$7,690	\$6,974	\$14,664
4. Model Service-Planning Strategies	0.0	0.0	4.0	0.0	4.0	\$4,880	\$4,425	\$9,305
5. Perform Environmental-Justice Analyses	0.0	0.5	2.0	0.0	2.5	\$7,690	\$6,974	\$14,664
6. Produce Technical Memorandum	2.0	0.0	2.0	0.0	4.0	\$5,714	\$5,182	\$10,897
Total	3.0	2.5	14.0	1.0	20.5	\$31,460	\$28,531	\$59,992

**Other Direct Costs** **\$8**

Travel \$8

**TOTAL COST** **\$60,000**

*Funding*  
 MassDOT Section 5303 Contract #67438





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## MEMORANDUM

**DATE** June 9, 2011  
**TO** Transportation Planning and Programming Committee  
of the Boston Region Metropolitan Planning Organization  
**FROM** Karl H. Quackenbush, CTPS Acting Director  
**RE** Work Program for: Emergency Evacuation and Hazard Mitigation  
Mapping, Phase II

### ACTION REQUIRED

Review and approval

### PROPOSED MOTION

That the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Department of Transportation, vote to approve the work program for Emergency Evacuation and Hazard Mitigation Mapping, Phase II, in the form of the draft dated June 9, 2011.

### PROJECT IDENTIFICATION

**Unified Planning Work Program Classification**  
Technical Support/Operations Analysis Projects

**CTPS Project Number**  
11141

**Clients**  
Boston Region Metropolitan Planning Organization

**CTPS Project Supervisors**  
*Principal:* Pam Wolfe  
*Manager:* Maureen Kelly

**Funding**  
MPO §5303 Contract #67436; MPO 3C Planning Contract #66104

## **IMPACT ON MPO WORK**

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

## **BACKGROUND**

This work program will build upon the work conducted for the first phase of the Emergency Evacuation and Hazard Mitigation Mapping project, which was funded through the FFY 2010 Unified Planning Work Program using the MPO's 3C planning funds. The products of the first phase were a series of maps showing the transportation network and the locations of transportation projects proposed for MPO funding in relation to areas prone to natural hazards (flooding, hurricane storm surges, sea level rise, and earthquakes), and to routes and infrastructure that are important for conducting evacuations and for maintaining the security of the transportation system.

The information generated from Phase I was used as the basis of the security evaluation for projects proposed for the FFY 2011–14 Transportation Improvement Program (TIP). This information enables the MPO to consider whether projects could help the region to better withstand the impacts of natural hazards and climate change or improve infrastructure in ways that would have benefits for emergency management. Specifically, it provides information for determining whether a project addresses a flooding problem or enables a facility to function during a flood, includes an adaptation for sea level rise, improves routes out of a hurricane zone, or upgrades an older facility to current seismic design standards. It also provides information that can be used to determine if a project has benefits for an emergency response, such as by improving an evacuation route or highway diversion route, improving an access route to an emergency-support location, or protecting critical transportation infrastructure.

Phase II will involve the development of a GIS (geographic information system) tool on the MPO's website that will provide access to all-hazards planning information for agencies responsible for all-hazards planning in the region. The non-secure information would also be available to members of the public and city and town planners. Since some data that have been provided to the MPO for its security work is considered sensitive, the viewing of some GIS layers would be limited to authorized users. The sensitive material includes certain information provided by MassDOT, the City of Boston, and the Metropolitan Area Planning Council.

Phase II will also update data layers in the MPO's GIS system, add information that is being developed as regional evacuation planning proceeds, and create new maps of certain potential threats to the transportation system requested by members of the MPO's Transportation Planning and Programming Committee.

The products of this work program will provide current information for use in conducting the security evaluation for projects proposed for future TIPs and the Long-Range Transportation Plan (LRTP).

The MPO conducts this all-hazards planning work in response to federal law (SAFETEA-LU, Title 23, Section 134) that requires MPOs to consider security a distinct planning factor in the metropolitan planning process and to provide for the consideration of projects and strategies that will increase the security of the transportation system for motorized and nonmotorized users.

## **OBJECTIVE(S)**

There are three objectives of this work program:

1. The first objective is to build a GIS tool that can be accessed by the public, local planners, and agencies and other entities in the region involved in natural hazard protection and security planning. This tool could be updated and augmented as new regional planning data becomes available.
2. The second objective is to identify areas where the operability of the transportation system could be affected (as well as the ability to conduct emergency response or evacuations) due to the failure of, or damage to, non-transportation infrastructure and facilities. The scenarios considered will include dam failure and fires from liquefied natural gas facilities or ships, and other hazards as the project budget allows.
3. The third objective is to maintain an up-to-date collection of data for continuing to evaluate proposed transportation projects for their security benefits.

## **WORK DESCRIPTION**

The outcome of this work program will be GIS-based maps and a GIS mapping tool.

### **Task 1 Update and Build Upon GIS Data from Phase I**

The maps created in Phase I included security- and evacuation-planning information gathered from the City of Boston, the Massachusetts Department of Transportation (MassDOT), the State Police, the Metropolitan Area Planning Council (MAPC), and the Massachusetts Emergency Management Agency (MEMA). Staff will continue to follow the work of these agencies and other entities and update GIS data layers as new planning information becomes available. This will involve following the work that is being done by the City of Boston, MassDOT, and agencies under the Executive Office of Public Safety and Security to develop a regional evacuation plan.

Staff will also incorporate updated critical infrastructure information as it becomes available from Pre-Disaster Mitigation (PDM) plans, which are plans for mitigating natural hazards in the region. (MAPC oversees the PDM planning process in the Boston region.)

***Product of Task 1***

An updated GIS data file, which will be used to inform the security evaluations of proposed transportation projects, and which will be available to other agencies and other entities involved in all-hazards planning.

**Task 2 Create Maps of Vulnerable Locations in the Transportation System**

Phase I of this project identified areas where the transportation system could be impacted by natural disasters. Phase II will begin to identify areas where the operability of the system could be affected (as well as the ability to conduct an emergency response or evacuations) due to the failure of or damage to non-transportation infrastructure and facilities.

The first series of maps will show the location of dams in the region that have the potential to cause significant damage if they fail and release impounded water. Staff will focus first on mapping municipally owned dams in the region that are in poor condition.

The second series of maps will focus on liquefied natural gas facilities and shipping routes in the cities of Boston, Chelsea, and Everett. They will depict thermal hazard zones where fires could occur in the event of an explosion.

Maps of dams and LNG routes and facilities were requested by members of the Transportation Planning and Programming Committee. Other hazards may be included if the budget allows, such as nuclear power plants and hazardous material storage areas.

***Products of Task 2***

Maps depicting the transportation system and the location of dams and LNG routes and facilities in the region, and possibly other facilities as the budget allows.

**Task 3 Create GIS Tool**

Several public agencies and other entities in the Boston region are conducting security and evacuation planning and planning to protect infrastructure from natural hazards. Staff will develop a digital GIS tool that would provide the information—which is currently only available on paper maps and PDFs—in an electronic format. This tool would enable users to choose among the various GIS layers that were used to create the natural hazard maps in Phase I and the new maps proposed for Phase II. Users would be able to click layers on and off as needed for their own planning purposes. This tool will also allow the public to view the location of proposed Transportation Improvement Program projects in the transportation network and in relation to hazard areas.

While the majority of the data will be available to the public, certain information that is considered sensitive by data providers and is restricted from public disclosure would be password-protected. Staff would request agreement amongst the agencies and other entities that contribute data to approve the use of their information in this way. As part of this work program, staff will contact the contributing agencies regarding this issue.

***Product of Task 3***

GIS tool

**ESTIMATED SCHEDULE**

It is estimated that this project will be completed seven months after the notice to proceed is received. The proposed schedule, by task, is shown in Exhibit 1.

**ESTIMATED COST**

The total cost of this project is estimated to be \$29,807. This includes the cost of 11.3 person-weeks of staff time and overhead at the rate of 90.69 percent. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/MK/mk

**Exhibit 1**  
**ESTIMATED SCHEDULE**  
**Emergency Evacuation and Hazard Mitigation Mapping, Phase II**

Task	Month							
	1	2	3	4	5	6	7	
1. Update GIS Data	█							
2. Create Maps of Vulnerable Locations		█						
3. Create GIS Tool			█					

**Exhibit 2**  
**ESTIMATED COST**  
**Emergency Evacuation and Hazard Mitigation Mapping, Phase II**

<b>Direct Salary and Overhead</b>	<b>\$29,807</b>
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Task	Person-Weeks					Total	Direct Salary	Overhead (@ 90.69%)	Total Cost
	M-1	P-5	P-4	P-3	Total				
1. Update GIS Data	0.0	0.0	0.5	1.5	2.0	\$2,153	\$1,953	\$4,106	
2. Create Maps of Vulnerable Locations	0.0	0.0	1.0	0.5	1.5	\$1,734	\$1,573	\$3,307	
3. Create GIS Tool	1.3	5.0	0.5	1.0	7.8	\$11,744	\$10,650	\$22,394	
Total	1.3	5.0	2.0	3.0	11.3	\$15,631	\$14,176	\$29,807	

<b>Other Direct Costs</b>	<b>\$0</b>
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<b>TOTAL COST</b>	<b>\$29,807</b>
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**Funding**  
MPO §5303 Contract #67436; MPO 3C Planning Contract #66104



# BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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Jeffrey B. Mullan  
MassDOT Secretary and CEO  
and MPO Chairman

Karl H. Quackenbush  
Acting Director, MPO Staff

The Boston Region MPO,  
the federally designated  
entity responsible for  
transportation decision-  
making for the 101 cities  
and towns in the MPO  
region, is composed of:

MassDOT Office of Planning and  
Programming  
City of Boston  
City of Newton  
City of Somerville  
Town of Bedford  
Town of Braintree  
Town of Framingham  
Town of Hopkinton  
Metropolitan Area Planning Council  
Massachusetts Bay Transportation  
Authority Advisory Board  
Massachusetts Bay Transportation  
Authority  
MassDOT Highway Division  
Massachusetts Port Authority  
Regional Transportation Advisory  
Council (nonvoting)  
Federal Highway Administration  
(nonvoting)  
Federal Transit Administration  
(nonvoting)

## MEMORANDUM

**DATE** June 9, 2011  
**TO** Transportation Planning and Programming Committee  
of the Boston Region Metropolitan Planning Organization  
**FROM** Karl H. Quackenbush, CTPS Acting Director  
**RE** Work Program for: SIP Mitigation for Green Line Extension Delay

### ACTION REQUIRED

Review and approval

### PROPOSED MOTION

That the Transportation Planning and Programming Committee of the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Department of Transportation, vote to approve the work program for SIP Mitigation for Green Line Extension Delay in the form of the draft dated June 9, 2011.

### PROJECT IDENTIFICATION

#### Unified Planning Work Program Classification

Planning Studies

#### CTPS Project Number

11377

#### Client

Massachusetts Department of Transportation

*Project Supervisors:* Steve Woelfel and Kate Fichter

#### CTPS Project Supervisors

*Principal:* Karl H. Quackenbush

*Manager:* Scott Peterson

#### Funding

MassDOT SPR Contract #68456



## **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 other work in the UPWP.

## **BACKGROUND**

The Green Line Extension is one of the four outstanding transportation control measure (TCM) commitments currently listed in the State Implementation Plan (SIP). According to 310 CMR 7.36, this project is required to be built by the Commonwealth as an air quality mitigation measure for the Central Artery/Third Harbor Tunnel (CA/T) project by December 31, 2014. Completion of construction and commencement of operations on the Green Line Extension's two branches – between Lechmere Station and Medford Hillside, and between Lechmere Station and Union Square – have to meet this legal deadline. However, given the complexity of the project and sheer length of time required for construction, MassDOT is currently estimating that the Green Line Extension project will be ready for in-service start-up some time after the aforementioned legal deadline.

A provision exists in 310 CMR 7.36 which allows for approval of project delays if interim measures are implemented that result in emission reductions in non-methane hydrocarbons (NMHC), carbon monoxide (CO), and nitrogen oxides (NO<sub>x</sub>) equal to or greater than the emission reductions that would have been achieved had the required project not been delayed. In order to act on this provision, MassDOT must petition the Massachusetts Department of Environmental Protection (DEP) to authorize delay of the project and to accept one or more interim offset projects that can be demonstrated to achieve the aforementioned desired level of emission reductions for NMHC, CO and NO<sub>x</sub>.

MassDOT, in consultation with CTPS, is developing a list of projects, programs, and measures for interim offsets. CTPS, using its regional travel demand model, will test these measures to ascertain their impacts and determine if they meet or exceed the emissions reductions forecast for the Green Line Extension project.

## **OBJECTIVES**

The objectives of this work are:

1. To assist in development of potential transit system improvement projects and programs in eastern Massachusetts to be substituted in the SIP for the Green Line Extension.

2. To evaluate the emissions reductions produced by these potential Green Line Extension interim offset projects and ascertain if they meet or exceed the required level.

## **WORK DESCRIPTION**

CTPS's regional travel demand model will be used in this work. This model set, using the most recent base-year land use data and conforming to the appropriate project list in the Preferred Plan, will have been previously calibrated for the Green Line Extension New Starts submission. The work required to accomplish the study objectives will be carried out in six tasks, as described below:

### **Task 1 Create Opening-Year Model Set**

CTPS will use the most currently calibrated model set to create a no-build scenario representing conditions that would be expected, if the Green Line Extension is not completed on schedule, during what would have been the first year of operations for the extension. This will involve creating appropriate trip tables, highway and transit networks, and other needed inputs. These data for the opening model year will be interpolated from the established base-year (2009) and future-year model inputs. Air quality emissions will be produced for this no-build scenario based on factors calculated by the Environmental Protection Agency's (EPA's) MOBILE 6.2 Vehicle Emissions Modeling Software.

#### ***Products of Task 1***

An opening-year No-Build scenario and its accompanying air quality outputs

### **Task 2 Calculate Opening-Year Green Line Extension Emissions Reductions and Offsets**

CTPS will use the model set created in Task 1 to calculate the air quality benefits produced by the proposed Green Line Extension in its first year of operations. Air quality emissions will be produced for this scenario based on factors calculated by the EPA's MOBILE 6.2 Vehicle Emissions Modeling Software and then will be subtracted from the no-build scenario emissions from Task 1. These benefits will be computed for several different geographic areas.

#### ***Products of Task 2***

An opening-year Green Line Extension scenario and the air quality benefits associated with it

### **Task 3 Generate and Model Potential Alternative Interim Offset Projects**

MassDOT, with assistance from CTPS and in conjunction with a public solicitation for suggestions, will generate up to seven potential interim offset projects or measures to be modeled. Such projects will have been pre-screened for viability and constructability; they may be located anywhere in eastern Massachusetts. CTPS and MassDOT may also generate potential interim offset projects that will be evaluated without use of the model. All these projects will be oriented towards producing the maximum amount of air quality benefits in order to offset the delay. They will be modeled using the model set from Task 1 and will have their air quality benefits measured using methods similar to those used in Task 2. These benefits will be compared against the air quality benefits generated in Task 2 by the Green Line Extension.

#### ***Products of Task 3***

- Set of interim offset projects, programs, and measures
- Air quality benefits associated with each project for multiple geographies
- Comparison of each scenario's air quality benefits with Green Line Extension air quality benefits

### **Task 4 Engage Public**

CTPS, in conjunction with MassDOT, will make a concerted effort to solicit comments and feedback from the public regarding possible regional mitigation efforts. Such suggestions will potentially be used in refining and revisiting some of the Task 3 work.

#### ***Product of Task 4***

Involvement in the public participation process, as instructed by MassDOT

### **Task 5 Produce a Technical Memorandum**

A technical memorandum documenting the analysis and results, including the model methodology and assumptions used, will be provided to MassDOT.

#### ***Product of Task 5***

A technical memorandum documenting the study methodology and results

### **Task 6 Support MassDOT**

CTPS will provide further technical support and aid to MassDOT throughout the process of choosing substitution projects. CTPS's activity may include holding public hearings as well as interacting with various agencies and stakeholders.

#### ***Product of Task 6***

Assistance to MassDOT

**ESTIMATED SCHEDULE**

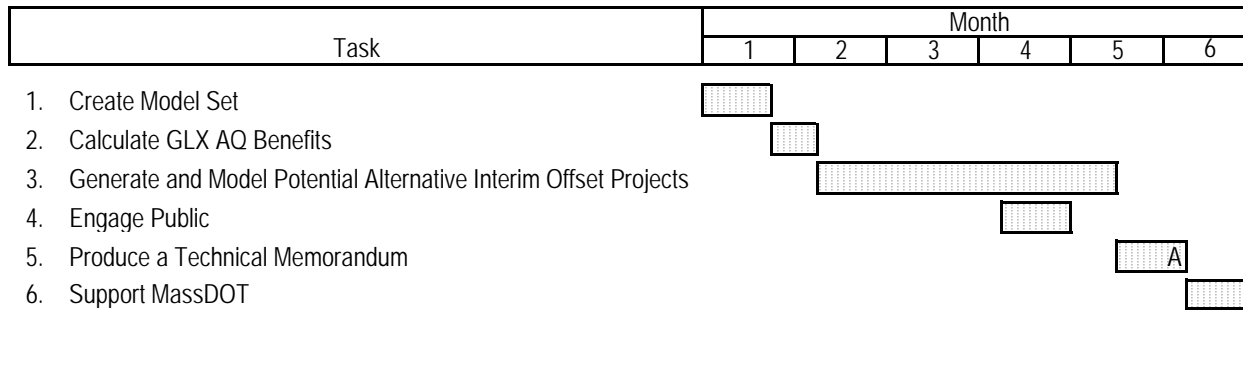
It is estimated that this project will be completed approximately six months after the notice to proceed is received. The proposed schedule, by task, is shown in Exhibit 1.

**ESTIMATED COST**

The total cost of this project is estimated to be \$80,000. This includes the cost of 31.1 person-weeks of staff time, overhead at the rate of 90.69 percent, and travel. A detailed breakdown of estimated costs is presented in Exhibit 2.

SAP/BK/bk

Exhibit 1  
 ESTIMATED SCHEDULE  
 SIP Mitigation for Green Line Extension Delay




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Products/Milestones  
 A: Technical memorandum

Exhibit 2  
 ESTIMATED COST  
 SIP Mitigation for Green Line Extension Delay

**Direct Salary and Overhead** **\$79,939**

Task	Person-Weeks					Direct Salary	Overhead (@ 90.69%)	Total Cost
	M-1	P-5	P-4	P-3	Total			
1. Create Model Set	0.0	1.0	2.0	0.0	3.0	\$4,035	\$3,659	\$7,694
2. Calculate GLX AQ Benefits	0.3	0.5	1.4	0.0	2.1	\$2,890	\$2,621	\$5,512
3. Generate and Model Potential Alternative Interim Offset Projects	1.0	0.0	12.0	3.0	16.0	\$19,363	\$17,560	\$36,923
4. Engage Public	1.5	0.0	1.5	0.0	3.0	\$5,714	\$5,182	\$10,897
5. Produce a Technical Memorandum	2.0	0.0	2.0	0.0	4.0	\$4,204	\$3,812	\$8,016
6. Support MassDOT	1.5	0.0	1.5	0.0	3.0	\$5,714	\$5,182	\$10,897
<b>Total</b>	<b>6.2</b>	<b>1.5</b>	<b>20.4</b>	<b>3.0</b>	<b>31.1</b>	<b>\$41,921</b>	<b>\$38,018</b>	<b>\$79,939</b>

**Other Direct Costs** **\$61**

Travel \$61

**TOTAL COST** **\$80,000**

*Funding*  
 MassDOT SPR Contract #68456