



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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

MEMORANDUM

Date August 7, 2014
TO Boston Region Metropolitan Planning Organization
FROM Karl H. Quackenbush
CTPS Executive Director
RE Work Plan for: Route 3 South Express Toll Lanes – Public-Private
Partnership Study: Modeling Support

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 Route 3 South Express Toll Lanes – Public-Private Partnership Study: Modeling Support, presented in this memorandum

Project Identification

Unified Planning Work Program Classification

Planning Studies

CTPS Project Number

73218

Client

Massachusetts Department of Transportation, Highway Division
Project Supervisor: Diane Madden

CTPS Project Supervisors

Principal: Scott Peterson
Manager: Ian Harrington

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

Route 3 South has three travel lanes in each direction from Interchange 16 (Route 18) to the interchange with I-93 (the "Braintree Split"). South of Route 18 there are two lanes in each direction, but during the peak period of travel, traffic is allowed to use the shoulder/breakdown lane in the peak direction as a travel lane. Use of the shoulder/breakdown lane as a travel lane is restricted to the segment that has two lanes in that direction. There is no HOV lane on Route 3 South.

For several years, traffic congestion has been increasing on the segment of Route 3 south of the Braintree Split. A traffic queue often builds up in the northbound direction during the AM peak period between Interchange 15 (Derby Street) and Interchange 18 (Burgin Parkway/MBTA Quincy Adams Station), and a southbound queue is common during the PM peak period from Interchange 17 back onto the Southeast Expressway. This Massachusetts Department of Transportation (MassDOT) project is designed to explore options for increasing traffic capacity along this stretch of the roadway by adding express toll lanes.

In these times of limited resources, MassDOT is looking for ways to reduce the cost of adding roadway capacity, and they hope to make use of private funding and of electronic tolling technology to control traffic flow. There have been several examples around the country of private investment financing the construction and operation of public infrastructure. Since the roadway to be expanded is a high-volume roadway that is not an interstate highway, this seems to be an opportunity to explore the possibility of a public-private partnership in Massachusetts. This study is designed to prepare the information that would be needed to solicit private investment in a potential construction project. With adequate funding, MassDOT could explore the possibility of adding capacity in the form of toll lanes on this segment of roadway. Since electronic tolling technology has developed to the point where it is now possible to collect tolls without slowing down traffic flow, Massachusetts is moving to adopt this technology on the facilities that are presently tolled (the Massachusetts Turnpike, Tobin Bridge, Ted Williams Tunnel, and Sumner Tunnel). Using this technology on Route 3 South, which is not currently a toll road, would be much less expensive than constructing and operating traditional tolling facilities and would, therefore, make the construction project more attractive to private investment.

Due to time constraints, work was begun on this project on July 7, 2014. The MassDOT Office of Transportation Planning provided up to \$20,000 in SPR funds to

be used to pay for work on Tasks 1, 2, and 3 until the contract funding this project becomes available. The budget presented in this scope includes the SPR funds that were used for the initial period of work.

Objectives

This modeling study is designed to provide initial estimates of the changes in travel demand that would result from potential additions to the infrastructure of Route 3 south of the interchange with Interstate 93 and the resultant impacts on traffic congestion. This information will be provided to the MassDOT project team to be used in evaluating the feasibility of the proposed roadway improvements, and it could also be used to solicit private investment in the roadway construction project. Due to the time sensitivity of this project, the work outlined in this scope will be limited in order to enable its prompt completion. If the project is deemed to be promising, more thorough analysis will be undertaken later.

Work Description

Work on this study will consist of the following six tasks: base-year model calibration, select link analyses of the Route 3 South segment, modeling a future-year no-build scenario, modeling five future-year build scenarios, producing a technical memorandum, and providing ongoing modeling assistance.

Task 1 Perform Base-Year (2012) Model Calibration

CTPS will take the most up-to-date version of the base year (2012) Boston Region MPO travel demand model and calibrate it to the available data on Route 3 South traffic patterns. Since the time available for this task is less than usual, this effort will be limited; it will be restricted to modifying the network depiction of the Route 3 South roadway and ramps, assigning existing base-year trip tables, and using existing CTPS balanced volumes for comparisons (in other words, not using any new counts or any calibration of mode choice or distribution models).

Products of Task 1

- Regional model network with accurate representation of the Route 3 South corridor
- Tabular summary comparing assigned AM peak, PM peak, and average weekday vehicle volumes with CTPS balanced volumes for Route 3 South mainline and ramps

Task 2 Perform Select Link Analyses of Route 3 South

A thorough understanding of base-year travel is needed, so CTPS will carry out up to 40 select link analyses. These analyses will include four select link analyses (entering AM traffic, entering PM traffic, exiting AM traffic, and exiting

PM traffic) at each of 10 Route 3 South interchanges (Exits 11 through 20), using the calibrated base-year model prepared in Task 1.

Product of Task 2

Tabular summaries of origin and destination TAZs from each of up to 40 select link analyses

Task 3 Model a Future-Year (2020) No-Build Scenario

CTPS will model a future-year version of the Boston Region MPO travel demand model, using the latest available demographic forecasts for 2020 (which, at this point, is thought to be the likely opening year for the project) and transportation networks that will include all of the projects that would be in place by 2020 under the current adopted MPO's Long-Range Transportation Plan. The process will begin with an existing 2020 model, and then all four steps of the travel demand model will be applied to the scenario. Four select link assignments (entering AM traffic, entering PM traffic, exiting AM traffic, and exiting PM traffic) will then be run. Since less detail is required for the future-year scenarios than for the base-year scenario, the study analysis will not require select link assignments at as many interchanges. Select link analyses will thus be limited to four interchanges in order to reduce the time required for this study.

Products of Task 3

- Tabular summaries of traffic growth estimates from the base year to the future year in AM peak, PM peak, and average weekday vehicle volumes for the Route 3 South mainline and ramps
- Tabular summaries of origin and destination TAZs from each of 16 future-year no-build scenario select link analyses

Task 4 Model Future-Year (2020) Build Scenarios

CTPS will apply the future-year Boston Region MPO travel demand model (prepared in Task 3) to up to five build scenarios. Each scenario will specify the proposed modifications to the roadway and the tolls to be charged for traveling on the new facility.

The process will begin with a modification of the 2020 network to represent the road network changes and applying the proposed toll for each time period for the new facilities (which, due to limitations of the travel demand model, must be static throughout each time period). Then all four steps of the travel demand model will be applied to each scenario. Four select link assignments (entering AM traffic, entering PM traffic, exiting AM traffic, and exiting PM traffic) will then be run at each of four interchanges.

Products of Task 4

- Tabular summaries of changes in traffic volumes from the future-year no-build scenario to each future-year build scenario in AM peak, PM peak, and average weekday vehicle volumes for Route 3 South mainline and ramps
- Tabular summaries of origin and destination TAZs from each of 16 select link analyses for each future-year build scenario.

Task 5 Produce a Technical Memorandum

CTPS will produce a technical memorandum describing the models and techniques used in carrying out the analysis during this study.

Product of Task 5

Technical memorandum documenting the analytical procedures used in this study

Task 6 Provide Additional Technical Assistance

CTPS will provide up to 3.5 person-weeks of additional support to the modeling efforts performed for the MassDOT Route 3 South project. This work could include attending MassDOT project team meetings and public meetings.

Product of Task 6

Tabular or graphical summaries of the results of additional analysis performed as part of this task

Estimated Schedule

It is estimated that this project will be completed 11 weeks 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 \$85,548. This includes the cost of 28.0 person-weeks of staff time and overhead at the rate of 91.82 percent. A detailed breakdown of estimated costs is presented in Exhibit 2.

KQ/IEH/ieh

Exhibit 1

ESTIMATED SCHEDULE

Route 3 South Express Toll Lanes – Public-Private Partnership Study: Modeling Support

Task	Week											
	1	2	3	4	5	6	7	8	9	10	11	
1. Perform Base-Year Model Calibration	A											
2. Perform Select Link Analyses of Route 3 South			B									
3. Model a Future-Year No-Build Scenario			D									
4. Model Future-Year Build Scenarios				E F G H I								
5. Produce a Technical Memorandum									J			
6. Provide Additional Modeling Support												

Products/Milestones

- A: Comparison of estimated volumes and counts
- B: Summaries of select link analysis of Route 3 south
- D: Summaries of traffic growth estimates
- E: Summary of results of first build scenario
- F: Summary of results of second build scenario
- G: Summary of results of third build scenario
- H: Summary of results of fourth build scenario
- I: Summary of results of fifth build scenario
- J: Technical memorandum

Exhibit 2

ESTIMATED COST

Route 3 South Express Toll Lanes – Public-Private Partnership Study: Modeling Support

Direct Salary and Overhead								\$85,548
Task	Person-Weeks				Direct Salary	Overhead (91.82%)	Total Cost	
	M-1	P-5	P-4	Total				
1. Perform Base-Year Model Calibration	0.5	2.0	1.5	4.0	\$6,371	\$5,850	\$12,221	
2. Perform Select Link Analyses of Route 3 South	0.0	1.0	1.5	2.5	\$3,738	\$3,432	\$7,169	
3. Model a Future-Year No-Build Scenario	0.5	1.5	0.5	2.5	\$4,172	\$3,831	\$8,003	
4. Model Future-Year Build Scenarios	0.5	7.0	5.0	12.5	\$19,774	\$18,157	\$37,931	
5. Produce a Technical Memorandum	1.5	1.0	1.0	3.5	\$5,711	\$5,243	\$10,954	
6. Provide Additional Modeling Support	0.5	1.5	1.0	3.0	\$4,833	\$4,437	\$9,270	
Total	3.5	14.0	10.5	28.0	\$44,598	\$40,950	\$85,548	
Other Direct Costs								\$0
TOTAL COST								\$85,548

Funding

Future MassDOT Contract #TBD