



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

Frank DePaola, Acting MassDOT Secretary and CEO and MPO Chairman
Karl H. Quackenbush, Executive Director, MPO Staff

MEMORANDUM

DATE January 8, 2015
TO Boston Region Metropolitan Planning Organization
FROM Karl H. Quackenbush
CTPS Executive Director
RE Work Program for: Core Capacity Constraints

Action Required

Review and approval

Proposed Motion

That the Boston Region Metropolitan Planning Organization, vote to approve the work program for Core Capacity Constraints presented in this memorandum

Project Identification

Unified Planning Work Program Classification

Planning Studies

CTPS Project Number

23326

Clients

Boston Metropolitan Planning Organization

CTPS Project Supervisors

Principal: Scott Peterson

Manager: Bruce Kaplan

Funding

MPO Planning Contract #84053

MPO §5303 Contract #84080

Impact on MPO Work

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

Background

The transportation system is heavily utilized within the city of Boston and its immediate surrounding communities—the metropolitan region’s core area. Daily congestion on roadways and crowding on the transit system impact the reliability of the facilities and increase people’s travel times. These problems are a result of a combination of factors, including the density of land use, trip-making activity associated with different land-use types, and the capacity of each distinct transportation mode to handle trip-making during specific times of day. Sustained growth in population, housing, and employment in the core communities continues to place a strain on this already taxed transportation system. Roadway congestion and unreliable transit services could possibly inhibit growth and deter people from establishing businesses in this area and from living there.

In this study, MPO staff will examine existing and future conditions of the transportation system in the core area, its ability to accommodate future growth, and the effect of major developments on the transportation system. This analysis will support ongoing long-range planning and improvement activities by isolating existing and future capacity problems.

Presently, municipalities require developers to take measures designed to offset and mitigate the problems caused by their projects. This study will also examine how different stakeholders in the core area identify and implement mitigation measures, including the processes for directing funds to the appropriate agencies that oversee each transportation mode.

Objectives

The three objectives are:

1. Examine current and future levels of transportation congestion in the core area.
2. Understand the impacts of the transportation mitigation policies employed in the core area to offset proposed development. This will involve examining local processes for generating mitigation efforts and identifying how mitigation funds are allocated to different transportation modes, especially to transit.
3. Identify the impact the 20 largest proposed development projects in the core area would have on the transportation system, with a focus on the transit system.

Work Description

The analysis in this project will be carried out in the following major tasks:

- Document historical demographic transportation system usage of the core area
- Develop a baseline of current conditions consisting of a demographic profile and transportation usage summaries
- Calibrate the Boston Region MPO's regional travel demand model set to existing conditions
- Identify up to 20 of the largest proposed developments for the core area
- Forecast future-year (2040) travel patterns with and without the proposed developments and examine their impact on the transportation system
- Review proposed transportation mitigation strategies and the processes for funding transportation mitigation projects

Task 1 Document Core Area Land Use, Demographic and Transportation System Changes

Using various data sources, MPO staff will document the changes in land use and demography in the core area's neighborhoods over the last 30 years. The core area will consist of neighborhoods within Commuter Rail Fare Zone 1A of the Massachusetts Bay Transportation Authority (MBTA).¹ Trends and changes in the utilization of major roadways and transit modes in the core area will also be documented. Staff will initially focus on rapid transit lines, high-ridership bus routes, commuter rail, and Silver Line service, but will also consider other transit modes if capacity issues are identified.

Products of Task 1

Tabular and graphical summaries of historical land use and transportation system usage in the core area

Task 2 Analyze Existing Transit Ridership Data and Traffic Count Data

Staff will document current and potential constrained conditions on the core area's roadway and transit systems during the AM (6:00 to 9:00 AM) and PM (3:00 to 6:00 PM) peak travel periods, as well as the peak hour, if possible, the

¹ The neighborhoods with access to MBTA Commuter Rail Zone 1a service are located in the following municipalities: Arlington, Boston, Brookline, Cambridge, Chelsea, Everett, Medford, Revere, and Somerville.

times of the systems' heaviest usage. Performance metrics will identify constrained conditions; for transit, these could include load factors (carrying capacities) that exceed MBTA service policy levels while for higher-functional-class roadways, these could include and volume-to-capacity ratios.

Staff will collect and analyze the most recent transit ridership data covering the core area to identify the existing peak-period load factors (riders per seat) on boat, rapid transit, bus, and rail services. Special attention will be paid to the portions of the services where load factors exceed MBTA service policy levels. The most recent traffic count data on higher-functional-class roadways (limited-access roads and major arterials), in the core area will be analyzed to identify the traffic volume-to-capacity ratios. The count locations where the traffic volumes exceed 85 percent of the carrying capacity will be identified.

This task will draw on the products of the recent Needs Assessment work of the MPO's Long-Range Transportation Plan, but will also incorporate updates of relevant information when available.

Products of Task 2

- Tabular summaries of transit load factors for core area transit services.
- Tabular summaries of roadway volume-to-capacity ratios for core area higher-functional-class roadways.
- List of core area transit services whose ridership-to-capacity ratios exceed MBTA service policy levels.
- List of core area higher-functional-class roadways with volume-to-capacity ratios exceeding 0.85

Task 3 Calibrate the Base-Year Model

The transit ridership and traffic count data assembled in Task 2 will be used to calibrate the regional model set's AM and PM period for the base year. Upon calibration, the transit ridership levels estimated by the model in the core area will be reviewed to identify additional transit services with ridership load factors exceeding MBTA service policy levels not included in the lists assembled in Task 2. Additionally, segments of higher-functional-class roadways in the core area with vehicle volumes estimated by the model exceeding a critical portion of the carrying capacity and are not included in the lists assembled in Task 2 will be identified.

Products of Task 3

- A calibrated base-year model set for the AM and PM peak periods
- List of core area transit services with ridership-capacity ratios exceeding MBTA service policy levels
- List of core area higher-functional-class roadways with volume-capacity ratios exceeding 0.85

Task 4 Identify Large-Scale Development Plans and Mitigation Processes in Core Area Communities

CTPS staff will meet with representatives from the MBTA Fare Zone 1A in the core area communities in MBTA Fare Zone 1A and representatives from the Metropolitan Area Planning Council (MAPC), to compile a list of up to 20 of the largest development projects expected to occur in the core area by the horizon year (2040) that would have the greatest impact on the transportation system. In addition to the developments' locations, the expected number and type of employees and residents expected to be housed by each project, on-site parking availability, and mitigation measures the developers may be expected to make will also be documented. During these discussions, staff will also learn how transportation mitigation funds and projects are negotiated with developers and how this may vary by transportation mode.

Product of Task 4

List of up to 20 planned large-scale developments planned in the core area, containing expected locations, size (number of residents and employees), and anticipated mitigation measures

Task 5 Forecast Future-Year (2040) Scenarios

Staff will model two distinct future-year scenarios. The model set's Long-Range Transportation Plan's Existing 2040 No-Build scenario will be run. A second scenario, in which the development projects identified in Task 4 are absent from the No-Build scenario, will then be run. This potentially involves adjusting the future-year 2040 demographic forecasts to reflect the number of residents and employees included in the planned facilities. The impacts of the large-scale developments identified in Task 4 on the transportation system will be examined. The estimated ridership volumes will be reviewed to produce a list of transit service segments with ridership-to-capacity ratios that exceed MBTA service policy levels, and the estimated vehicle volumes will be studied to reveal a list of the roadway segments with vehicle-to-capacity ratios that exceed 85 percent.

Products of Task 5

- List of core area transit services with future-year ridership-to-capacity ratios that exceed MBTA service policy levels
- List of core area higher-functional-class roadways with future-year volume-to-capacity ratios that exceed 0.85
- List of forecast transportation impacts of the development in the core area

Task 6 Review the Processes for Funding Transportation Mitigation Projects

Staff will compile and document the processes identified in Task 4 used by core area communities to review proposed developments and to mitigate their transportation impacts.

Product of Task 6

Memorandum discussing the existing review processes used by core area communities to evaluate transportation mitigation strategies and their possible modifications given the quantification of development impacts examined in Task 5

Task 7 Prepare a Final Memorandum or Report

CTPS staff will produce a final memorandum or report for this project, which will summarize the findings of the project.

Products of Task 7

Memorandum or report

Estimated Schedule

It is estimated that this project will be completed eight 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 \$120,000. This includes the cost of 44.3 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.

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Exhibit 1
ESTIMATED SCHEDULE
Core Capacity Constraints

Task	Month							
	1	2	3	4	5	6	7	8
1. Document Core Area Land-Use, Demographic, and Transportation System Changes	█							
2. Analyze Existing Transit Ridership and Traffic Count Data		█						
3. Calibrate the Base-Year Model		█	█					
4. Identify Large-Scale Development Plans and Mitigation Processes in Core Area Communities				█	█	█		
5. Forecast Future-Year (2040) Scenarios					█	█	█	
6. Review the Processes for Funding Transportation Mitigation Projects						█	█	█
7. Prepare a Final Memorandum or Report								█

Products/Milestones

- A: Mitigation memorandum
- B: Final memorandum or report

Exhibit 2
ESTIMATED COST
Core Capacity Constraints

Direct Salary and Overhead							\$120,000		
Task	Person-Weeks					Direct Salary	Overhead (91.82%)	Total Cost	
	M-1	P-5	P-4	P-3	Total				
1. Document Core Area Land-Use, Demographic, and Transportation System Changes	0.5	0.5	2.5	1.5	5.0	\$6,712	\$6,163	\$12,874	
2. Analyze Existing Transit Ridership and Traffic Count Data	0.5	0.5	1.5	2.5	5.0	\$6,492	\$5,961	\$12,454	
3. Calibrate the Base-Year Model	1.0	0.5	2.7	2.1	6.3	\$8,515	\$7,818	\$16,333	
4. Identify Large-Scale Development Plans and Mitigation Processes in Core Area Communities	1.2	1.0	2.5	1.7	6.4	\$9,072	\$8,330	\$17,402	
5. Forecast Future-Year (2040) Scenarios	1.0	1.8	3.5	2.5	8.8	\$12,308	\$11,301	\$23,610	
6. Review the Processes for Funding Transportation Mitigation Projects	1.2	1.5	0.0	1.5	4.2	\$6,393	\$5,870	\$12,264	
7. Prepare a Final Memorandum or Report	3.0	1.8	2.5	1.2	8.5	\$13,066	\$11,997	\$25,064	
Total	8.4	7.6	15.2	13.0	44.3	\$62,558	\$57,441	\$120,000	
Other Direct Costs							\$0		
TOTAL COST							\$120,000		

Funding

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