



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 15, 2012
TO Boston Region Metropolitan Planning Organization
FROM Karl H. Quackenbush
CTPS Executive Director
RE Work Program for: MBTA 2013 Review of Fare Structure, Tariffs, and Service

Action Required

Review and approval

Proposed Motion

That the Boston Region Metropolitan Planning Organization, upon the recommendation of the Massachusetts Bay Transportation Authority, vote to approve the work program for MBTA 2013 Review of Fare Structure, Tariffs, and Service in the form of the draft dated November 15, 2012.

Project Identification

Unified Planning Work Program Classification

Technical Support/Operations Analysis Projects

CTPS Project Number

11386

Client

Massachusetts Bay Transportation Authority
Project Supervisor: Charles Planck

CTPS Project Supervisors

Principal: Annette Demchur
Manager: Steven Andrews

Funding

Future MBTA contract

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 MBTA implemented several fare and service changes on July 1, 2012. Fares were increased by an average of slightly less than 23 percent, four bus routes were completely eliminated, and service on several other bus routes, commuter rail lines, and ferries was reduced. Revenue realized from the fare increase and the saved operating costs from the service changes was needed to address a substantial budget shortfall in fiscal year 2013 and anticipated shortfalls in subsequent years. These shortfalls were caused by, and continue to occur, in large part, because of gaps between anticipated and actual dedicated revenue from the state sales tax. The increased costs of labor, materials, and interest payments on debt also contribute to budget gaps.

The MBTA has requested that CTPS analyze the impacts of potential changes in fare structure, tariffs, and service at this time. CTPS has provided technical assistance related to such changes in the past, most recently in 1991, 2000, 2004, 2007, and 2012. For the most recent fare increase, CTPS produced an analysis, much like the one proposed in this work program, which included projections of revenue, ridership, environmental, and socioeconomic impacts related to the proposed fare increase. It is expected that CTPS will accomplish the current analysis by relying on the Boston Region MPO's regional travel demand model set, along with various other data sources and analysis tools.

As part of the 2004 fare increase, the MBTA Board of Directors created the Rider Oversight Committee (ROC) to discuss customer-service improvements and service-quality issues. This committee is composed of members from three different groups: MBTA staff, transportation advocacy organizations, and riders at large. In late 2004, the MBTA began working with the ROC Finance Subcommittee to explore restructuring the fares. CTPS staff provided extensive technical support to this effort, estimating the revenue and ridership impacts of potential fare-structure changes. As the need for a fare increase in 2007 became apparent, CTPS continued to provide technical support to the ROC Finance Subcommittee by analyzing the impacts of raising the fares, in addition to the impacts of restructuring them. An integral part of the ROC involvement in restructuring the fares was their contribution to the development of a new Fare Policy, which established the goals and objectives to guide any subsequent fare restructuring. The Fare Policy, which codifies the fare structure, was finalized through the efforts of an internal MBTA Fare Policy committee. The ROC Finance Committee was similarly involved in discussions

about the 2012 fare and service changes. Changes to the fare and fare structure were incorporated into the Fare Policy.

Objective

To forecast the ridership, revenue, environmental, and socioeconomic impacts of potential changes in the MBTA's fare structure, tariffs, and service.

Work Description

Task 1 Participate in Regular Meetings

The ROC holds meetings of its full membership on a monthly basis, and invites the MBTA General Manager and Secretary of Transportation to participate in every third meeting. The ROC standing committees meet monthly, including the ROC Capital Improvement and Finance Subcommittee, which discusses issues related to fares and fare structure. CTPS will provide professional staff support for each of the monthly meetings and will also participate in ROC Finance Subcommittee meetings. During the course of these meetings, CTPS staff will respond to any technical questions that may arise, especially as they may pertain to ridership statistics, the current fare structure, adherence to the standards of the Service Delivery Policy, and the Boston region's capital planning process. CTPS will also model, to the extent possible, the ridership and revenue impacts of fare levels and structures suggested by the ROC.

CTPS staff will also participate in meetings with the MBTA and the ROC, as needed, to discuss revisions to the MBTA Fare Policy with respect to potential changes to the fare structure.

Task 2 Forecast Ridership Impacts of Potential Changes in Fare Structure, Tariffs, and Service

CTPS uses two methodologies to forecast ridership. The first is a spreadsheet-based model that CTPS constructed to analyze the 2007 fare increase and restructuring. The spreadsheet-based model lists the number of linked trips for each product type on each mode, including parking utilization. This model then applies price changes to each category, along with various elasticities of demand with respect to fares. These elasticities are based on past experiences with fare changes at the MBTA and at peer transit properties around North America. The second methodology uses the MPO's model set, a four-step model that estimates the frequency of origins and destinations of trips in each travel zone by trip purposes (trip generation), matches origins with destinations (trip distribution), assigns a specific transportation mode (such as private vehicle, public transportation, and walking) to each origin-destination trip pair (mode choice), and determines the route between the origin and destination using the chosen mode (route assignment).

The primary difference between the two methodologies is that the regional model set can forecast impacts caused by both fare changes and service changes, while the spreadsheet-based model can only be used to estimate the impacts of a fare change, so that the ridership impacts from service changes must be estimated independently of the spreadsheet-based model and then integrated into its projections. MBTA Service Planning will estimate the impact of service changes on ridership and provide these data to CTPS.

The chief strengths of the CTPS spreadsheet-based model are that it accounts for every distinct fare that can be paid for an MBTA transit service and that it properly assigns the fare to the correct number of passengers who are in that fare-payment and modal category (for example, those who use the LinkPass to ride both a bus and train in the conduct of a trip). In comparison, the regional model set does not permit analysis of fares at this detailed level, but assumes an average modal fare across all fare types. The spreadsheet-based model also estimates the diversion of riders between modal and fare-payment categories; for example, when some transit users, faced with a fare increase, choose to continue using the MBTA, but switch to a different route or mode in order to lessen the financial impact of the fare increase. However, unlike the regional model set, the spreadsheet-based model cannot predict how many riders who leave the system due to a fare increase are switching to driving alone, carpooling, or walking. The regional model set also provides the outputs necessary for conducting the environmental and socioeconomic impact analyses.

Using the spreadsheet-based model, CTPS will analyze fare-pricing and fare-structure scenarios, as permitted by the budget, per possible recommendations from the MBTA, MassDOT, or the ROC Capital Improvement and Finance Subcommittee. Summaries of each scenario will describe the potential fare changes for each fare-payment category and each transit mode. In addition, a package of proposed service changes will be provided to CTPS by the MBTA to be evaluated in conjunction with the fare structure and tariffs that are ultimately proposed. CTPS will use the regional model set to analyze one scenario that reflects the final proposal for changes in fare structure, tariffs, and service.

Due to their complementary nature, the regional model set and the spreadsheet-based model will be used together. As the regional model set's fare categories are much more limited than those used in the spreadsheet-based model, the more detailed fare categories in the spreadsheet-based model will be aggregated and averaged to provide the inputs used in the regional model set. These average fares will be used in the regional model set to forecast ridership changes resulting from the changes in fare structure and tariffs, by line and mode, and these changes will be compared to the estimates from the spreadsheet-based model. These results will be added to estimates of the changes resulting from the proposed service changes to provide a complete estimate of the likely changes.

The two models' results will be summarized in tabular and graphical form for review by the MBTA.

Products of Task 2

- Forecasts of ridership changes by line and mode of the proposed fare-structure, tariff, and service scenario
- Forecasts of diversions to the drive-alone, carpool, and walk modes
- Forecasts of change in vehicle-miles traveled (VMT) due to diversions to the drive-alone and carpool modes

Task 3 Forecast Revenue Impacts of Potential Changes in Fare Structure, Tariffs, and Service

The spreadsheet-based model described above calculates fare-revenue changes along with ridership changes resulting from a fare-structure and/or tariff change. The regional model set also estimates revenue based on the average fare inputs. As was done for ridership, the changes in revenue forecast by the two models will be summarized in tabular and graphical form for review by the MBTA.

Product of Task 3

Forecasts of the fare-revenue impact of the proposed fare-structure, tariff, and service scenario

Task 4 Forecast Air Quality Impacts of Potential Changes in Fare Structure, Tariffs, and Service

The environmental analysis will consist of forecasting changes in vehicular emissions of ozone precursors (volatile organic compounds and nitrogen oxides) and other pollutants that might result from changes in fare structure, tariffs, and service. This will entail forecasting changes in both transit-vehicle and automobile emissions, and CTPS has well-established procedures for doing both. The VMT-by-roadway-link output from the regional model set will be combined with the latest MOBILE emissions rates to estimate the total change in emissions for the region.

Product of Task 4

Forecasts of emission changes resulting from the proposed fare-structure, tariff, and service scenario

Task 5 Forecast Title VI and Environmental Justice Impacts of Potential Changes in Fare Structure, Tariffs, and Service

In this task, the potential impact of changes in fare structure, tariffs, and service on different socioeconomic groups will be analyzed in accordance with the requirements of the Federal Transit Administration (FTA) Circular 4702.1B and

FTA Circular 4703.1. This work will be closely related to ongoing work at CTPS in the areas of Title VI and environmental justice, and some of the analytical approaches used in that work will be brought to bear in this project. The MBTA measures the impact of service changes on Title VI and environmental justice populations (target populations) compared to all other populations, as part of its biennial service-planning process and ongoing Title VI monitoring program.

As was done for the 2012 pre-fare-increase impacts analysis, the average fare-structure and/or tariff changes, in both absolute and percentage terms, will be computed and compared to existing conditions using the regional model set for both target populations and non-target populations. This comparison will be performed for the entire MBTA service area. To the extent that proposed service changes are modeled, CTPS will also compare the estimated changes in walking access and egress times, waiting times, and in-vehicle travel times, and the number of transfers for both target populations and the non-target populations.

The regional model set is needed to perform the previously mentioned equity analyses. However, an additional equity analysis will be performed using the spreadsheet model and the systemwide passenger survey. While not as comprehensive as the analysis performed by the regional model set, this analysis can be performed much more quickly, permitting the MBTA to use it in its planning process. This analysis will estimate the projected increase in the average fare for minority vs. nonminority passengers and for low-income vs. non-low-income passengers. CTPS will prepare a service and fare equity (SAFE) analysis of the selected scenario that will evaluate the impacts of the proposed changes on minority and low-income populations.

Products of Task 5

- Comparative analysis of fares from the proposed fare-structure, tariff, and service scenario
- Comparative analysis of walking access and egress times, waiting times, and in-vehicle travel times, and the number of transfers resulting from the proposed service-change scenario
- Additional equity analysis using the spreadsheet model and the systemwide passenger survey
- Draft Service and Fare Equity (SAFE) report

Task 6 Produce a Draft Report for Public Review

In this task, CTPS will compile the results of the analyses performed in Tasks 1-5 into a draft report that will be released for review during the public process.

Product of Task 6

Draft report in electronic format

Task 7 Assist the MBTA in Preparing Communication Materials for Public Hearings and Fare Change Implementation

In this task, CTPS will provide the MBTA with explanatory materials in appropriate formats for use at public meetings and hearings and for general customer communication in advance of the potential fare increase, and will conduct analyses to advise the MBTA about the need for translating materials and providing interpreters at meetings. In the past, such materials have explained the need for a fare increase, summarized the impacts of the proposed increase, and listed the new fares in tabular format.

Product of Task 7

Information and materials needed by the MBTA for public hearings

Task 8 Perform Additional Analysis as Suggested by Public Hearings

There may be ideas presented during the public process that the MBTA will ask CTPS to analyze. CTPS will use the spreadsheet-based model to analyze the projected ridership, revenue, and fare-equity impacts of these ideas. The MBTA may request that CTPS perform the full analysis described in Tasks 2 through 5 for one additional scenario.

Product of Task 8

Additional analysis, if requested by the MBTA following the public hearings

Task 9 Prepare Final Report and Equity Analysis

If the scenario selected by the MBTA for implementation is the same scenario that was analyzed in the draft report, the final report will include whatever edits and/or revisions are needed to finalize the draft report. If the MBTA selects a scenario that differs from that analyzed in the draft report, the final report will reflect only the analysis of this final scenario.

Products of Task 9

- Final report
- Final Service and Fare Equity report

Estimated Schedule

It is estimated that this project will be completed six 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 \$147,890. This includes the cost of 55.3 person-weeks of staff time and overhead at the rate of 96.58 percent. A detailed breakdown of estimated costs is presented in Exhibit 2.

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Exhibit 1
ESTIMATED SCHEDULE
MBTA 2013 Review of Fare Structure, Tariffs, and Service

Task	Month					
	1	2	3	4	5	6
1. Participate in Regular Meetings	[Bar spanning months 1-6]					
2. Forecast Ridership Impacts	[Bar spanning months 1-2]					
3. Forecast Revenue Impacts	[Bar spanning months 1-2]					
4. Forecast Air Quality Impacts		[Bar spanning month 2]				
5. Forecast Title VI and EJ Impacts		[Bar spanning month 2]				
6. Produce Draft Report		[Bar spanning month 2]				
7. Prepare Communication Materials			[Bar spanning months 3-5]			
8. Perform Additional Analysis			[Bar spanning months 3-5]			
9. Prepare Final Report and Equity Analysis						[Bar spanning month 6]

Products/Milestones

- A: SAFE report
- B: Draft report
- C: Final report and final SAFE report

Exhibit 2
ESTIMATED COST
MBTA 2013 Review of Fare Structure, Tariffs, and Service

Direct Salary and Overhead	\$147,890
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Task	Person-Weeks						Direct Salary	Overhead (96.58%)	Total Cost
	M-1	P-5	P-4	P-3	P-2	Total			
1. Participate in Regular Meetings	2.0	0.0	2.0	3.0	0.0	7.0	\$9,055	\$8,745	\$17,800
2. Forecast Ridership Impacts	0.6	1.5	0.2	3.0	0.0	5.3	\$6,928	\$6,691	\$13,619
3. Forecast Revenue Impacts	0.4	1.5	0.2	3.0	0.0	5.1	\$6,589	\$6,364	\$12,953
4. Forecast Air Quality Impacts	0.4	1.0	0.0	0.1	0.0	1.5	\$2,460	\$2,376	\$4,836
5. Forecast Title VI and EJ Impacts	0.4	1.0	0.0	1.5	0.0	2.9	\$3,927	\$3,792	\$7,719
6. Produce Draft Report	3.6	0.0	0.0	2.0	0.0	5.6	\$8,194	\$7,914	\$16,108
7. Prepare Communication Materials	0.7	3.5	0.0	2.0	0.0	6.2	\$9,153	\$8,840	\$17,993
8. Perform Additional Analysis	2.4	2.9	0.2	6.5	0.0	12.0	\$15,993	\$15,446	\$31,438
9. Prepare Final Report and Equity Analysis	4.0	0.5	0.2	4.0	1.0	9.7	\$12,933	\$12,491	\$25,424
Total	14.5	11.9	2.8	25.1	1.0	55.3	\$75,232	\$72,659	\$147,890

Other Direct Costs	\$0
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TOTAL COST	\$147,890
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Funding
 Future MBTA contract