



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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

MEMORANDUM

DATE March 21, 2013
TO Boston Region Metropolitan Planning Organization
FROM Karl H. Quackenbush
CTPS Executive Director
RE Work Program for: MBTA Bus Service Data Collection VIII

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 Bus Service Data Collection VIII in the form of the draft dated March 21, 2013.

Project Identification

Unified Planning Work Program Classification

Technical Support/Operations Analysis Projects

CTPS Project Number

11384

Client

Massachusetts Bay Transportation Authority
Project Supervisors: Melissa Dullea, Greg Strangeways

CTPS Project Supervisors

Principal: Annette Demchur
Manager: Jonathan Belcher

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

In 1996, CTPS began the Comprehensive Ridecheck Program for the MBTA. This effort produced a full set of bus ridership and schedule adherence data, covering all routes within the span of one year. The data were used as the primary input for the MBTA's 1998 Service Plan. A second round of the Comprehensive Ridecheck Program was conducted in 1997 and 1998. This second set of data was used as one of the inputs for the 2002 Service Plan.

Since January 1999, CTPS has been performing ongoing monitoring of MBTA bus service, including ridechecks, timechecks, and pointchecks. The goal of this ongoing effort was to update the comprehensive ridecheck database, with each route being ridechecked every three to five years, on average. These data have been used for the biennial MBTA Service Planning process (including development of the 2004, 2006, and 2008 MBTA Service Plans), and provide supplemental information for short-term corridor and subarea bus studies. The current ongoing program allows for much more flexibility in data collection than the previous comprehensive efforts.

During the past 15 years, CTPS has also provided MBTA Service Planning with analytical assistance to interpret the ridership and schedule adherence data. In particular, raw data are often examined immediately after being collected to determine whether there are any acute problems in the field. Completed ridecheck trip summaries and load profiles, along with timecheck and pointcheck summaries, are also examined before being transmitted to MBTA Service Planning. CTPS staff regularly recommend adjustments to the scheduled frequency and running times to address identified problems.

Beginning in late 2007, the MBTA began using automated passenger counters (APCs) on some of its buses. These devices provide the MBTA with information on the number of boardings and alightings at each stop. Although the need for manual ridechecks has decreased since the introduction of APCs, it can take several months to collect enough data using APCs to review peak crowding conditions, since only about 12% of the MBTA buses are currently APC-equipped. Therefore, pointchecks continue to be a valuable method for quickly collecting data on multiple routes during peak periods.

The MBTA also completed the installation of an automated-fare-collection (AFC) system in 2007. While this system can be used to determine daily counts of boardings at rapid transit stations, manual counts will still be required at key transfer

stations to determine the distribution by mode of heavy rail, light rail, and bus rapid transit. Additional manual counts may also be required to determine boardings by direction.

Objectives

1. To perform various forms of data collection on MBTA bus routes, including the following:

Ridechecks

Using the same methods employed in previous rounds of the Bus Service Data Collection Program, stop-by-stop ridership and running-time data will be collected on selected routes as requested by the MBTA.

Timechecks

For bus routes and surface Green Line branches that have peak-period headways of 12 minutes or less, timechecks may be conducted to monitor schedule adherence, travel time, headway maintenance, and overall ridership on the surface Green Line.

Pointchecks

Pointchecks, or peak-load checks, may also be conducted to monitor overall ridership on selected routes.

2. To provide analytical assistance to the MBTA with identifying crowding or schedule adherence problems on bus and trackless trolley routes, and to recommend changes in scheduled frequency and running times to address those problems.
3. To continue modifying the CTPS ridecheck database to accommodate ridership data input from automated passenger counters.
4. To conduct manual counts at one rapid transit station per year where multiple modes serve one facility, or at stations where boarding information by direction is required.

Work Description

Task 1 Determine the Overall Schedule

In cooperation with MBTA Service Planning, an overall schedule of data collection will be devised. This schedule will reflect the analysis priorities of the service planning process as well as other ongoing studies. It is likely that the schedule will be updated quarter by quarter.

Product of Task 1

Overall schedule for data collection

Task 2 Prepare Assignments and Data-Collection Forms

Within the guidelines of the overall schedule, specific assignments will be created on a week-to-week basis. Ridecheck assignments will be derived from MBTA timetables, as in the past. Assignments for timechecks and pointchecks will be designed as appropriate for the routes being studied.

Electronic data-collection forms for ridechecks, and paper data-collection forms for pointchecks and timechecks, will be prepared. These forms will be updated as necessary to properly coordinate with the MBTA Scheduling Department's stop database.

Products of Task 2

- Data-collection assignments
- Data-collection forms

Task 3 Collect Data

CTPS staff members will carry out the assignments prepared in Task 2. As in the past, ridecheck data to be collected will include boardings and alightings by stop, farebox readings, vehicle trip times, departure and arrival times, and intermediate times. Both timecheck and pointcheck data include the vehicle number, direction, and time at each specified location, and the number of passengers on board. Pointchecks, however, are conducted only at or near the peak-load point along a route, while timechecks require personnel to be positioned at the peak-load point, both termini, and other key locations. Rapid transit station counts require personnel at all entry locations to count passengers entering the system, and sometimes require counts at stairwells, escalators, and elevators within a station to determine what mode passengers are using and what direction they are traveling.

Product of Task 3

Ridership and schedule adherence data in digital or paper form

Task 4 Process and Analyze Data

Ridecheck data will be uploaded into CTPS's bus and trackless trolley ridership database to ensure ready access. The database will be maintained by CTPS to facilitate specialized reports that may be requested periodically, including load profiles or trip summaries by day or time period, and ridership-at-stop reports.

Timecheck and pointcheck data will be summarized in spreadsheets to facilitate the analysis of run times by segment and provide peak-load summaries. Rapid transit station counts will be summarized in a database.

Products of Task 4

- Summaries of timecheck and pointcheck data
- Ridecheck data in standardized database format

Task 5 Produce Systematic Documentation

The pointcheck, timecheck, and ridecheck data processed in Task 4 will be compiled into summaries and reports generated as Excel files and in other electronic formats, as requested by the MBTA.

Products of Task 5

Summary reports of pointcheck, timecheck, and ridecheck data

Task 6 Review Ridecheck Results

The results of Task 5 will be examined to identify problems with vehicle loads or schedule adherence on a route-by-route basis. Existing schedules will then be reviewed to determine appropriate corrective actions. These actions may include assigning additional vehicles to a route, lengthening or reducing segment-level running times, implementing short-turn services, and other modifications. Projected hours-of-service costs of implementing any recommended corrective actions will also be provided to the MBTA.

Upon request from MBTA Service Planning, CTPS may also utilize ridecheck results to generate tables showing, for example, the net cost per passenger, boardings per hour, and ridership by stop. These data are regularly used in systemwide performance evaluations of MBTA bus service and in decisions to reallocate vehicle resources from underutilized routes to those with unmet demand.

Products of Task 6

- Periodic summaries of service performance
- Periodic technical memoranda describing recommendations for service changes and associated cost projections

Task 7 Provide Ongoing Technical Support for Ridecheck Database

As part of previous segments of the ongoing Bus Service Data Collection Program, CTPS developed an improved Ridecheck Database Program that facilitates the creation of bus ridecheck assignments, the downloading of assignments to handheld computers and uploading of completed ridecheck assignments from handheld computers, and generation of customized reports that are consistent with the MBTA Biennial Service Planning Process. The ridecheck database requires occasional technical support to continue to maintain both data processing functions and report generation.

Task 8 Incorporate APC Data into the Ridecheck Database on an Ongoing Basis

As described in the background section above, since 2007 the MBTA has been in the process of installing APC equipment on its buses. Under a separate work program, CTPS is identifying data interchange methods, and formats for importing APC data into its existing ridecheck database application.

In this task, CTPS will develop and employ a methodology and schedule for incorporating APC data into the ridecheck database on an ongoing basis.

Product of Task 8

Regular updates of the ridecheck database using APC data

Estimated Schedule

It is estimated that this project will be completed 36 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 \$450,000. This includes the cost of 307.3 person-weeks of staff time, overhead at the rate of 96.58 percent, and travel. A detailed breakdown of estimated costs is presented in Exhibit 2.

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Exhibit 1
ESTIMATED SCHEDULE
MBTA Bus Service Data Collection VIII

Task	Quarter											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Determine the Overall Schedule	■	■	■	■	■	■	■	■	■	■	■	■
2. Prepare Assignments and Data-Collection Forms	■											
3. Collect Data	■											
4. Process and Analyze Data	■											
5. Produce Systematic Documentation	■											
6. Review Ridecheck Results	■											
7. Provide Ongoing Technical Support for Ridecheck Database	■											
8. Incorporate APC Data into the Ridecheck Database	■											

Exhibit 2
ESTIMATED COST
MBTA Bus Service Data Collection VIII

Direct Salary and Overhead	\$486,417
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Task	Person-Weeks								Direct Salary	Overhead (96.58%)	Total Cost
	M-1	P-5	P-4	P-3	SP-3	SP-1	Temp	Total			
1. Determine the Overall Schedule	0.6	0.0	0.8	0.0	0.3	0.0	0.0	1.7	\$2,263	\$2,185	\$4,448
2. Prepare Assignments and Data-Collection Forms	0.8	0.0	1.8	0.0	10.0	0.0	0.0	12.6	\$11,511	\$11,118	\$22,629
3. Collect Data	0.2	0.0	0.0	0.0	46.2	52.0	120.0	218.4	\$147,364	\$142,325	\$289,689
4. Process and Analyze Data	0.5	0.0	6.2	4.0	11.0	2.0	0.0	23.6	\$22,771	\$21,992	\$44,763
5. Produce Systematic Documentation	0.0	0.0	0.8	4.0	3.0	0.0	0.0	7.8	\$7,565	\$7,306	\$14,871
6. Review Ridecheck Results	2.5	0.0	13.6	4.0	0.0	0.0	0.0	20.2	\$25,651	\$24,774	\$50,424
7. Provide Ongoing Technical Support for Ridecheck Database	2.5	0.0	13.2	4.0	0.0	0.0	0.0	19.7	\$25,083	\$24,225	\$49,308
8. Incorporate APC Data into the Ridecheck Database	0.6	2.2	0.0	0.5	0.0	0.0	0.0	3.3	\$5,231	\$5,052	\$10,284
Total	7.7	2.2	36.4	16.5	70.5	54.0	120.0	307.3	\$247,440	\$238,977	\$486,417

Other Direct Costs	\$510
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Travel	\$510
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TOTAL COST	\$486,927
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Funding

Future MBTA Contract