



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

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WORK PROGRAM

MBTA SFY 2026 NATIONAL TRANSIT DATABASE: DATA COLLECTION AND ANALYSIS

APRIL 17, 2025

Proposed Motion

The Boston Region Metropolitan Planning Organization (MPO) votes to approve this work program.

Project Identification

Unified Planning Work Program (UPWP) Classification

Agency and Other Client Transportation Planning Studies and Technical Analyses

Project Number 14380

Client

Massachusetts Bay Transportation Authority (MBTA)

Client Supervisor: Joshua Weiland

Project Supervisors

Principal: Rose McCarron

Manager: Bradley Putnam

Funding Source

Future MBTA Contract

Schedule and Budget

Schedule: 18 months from notice to proceed

Budget: \$248,692

Schedule and budget details are shown in Exhibits 1 and 2, respectively.

The overhead rate used to calculate the budget is subject to change every July 1st based on the approved projected overhead rate for the state fiscal year (SFY).

Relationship to MPO Work

This study is supported in full with non-MPO funding. Committing MPO staff to this project will not impinge on the quality or timeliness of MPO-funded work.

Background

For decades, the Central Transportation Planning Staff (CTPS) has supported the Massachusetts Bay Transportation Authority's (MBTA) submittals to the National Transit Database (NTD). NTD is the Federal Transit Administration's (FTA) national repository of transit statistics. At first, CTPS produced estimates of passenger-miles traveled and unlinked passenger trips for the MBTA's bus and trackless trolley modes.¹ Over the years, the scope of these analyses expanded to include other modes: Heavy and light rail were added in SFY 1996, commuter rail in SFY 2000, purchased-service bus routes (routes for which the MBTA contracts with a private carrier to provide service) in SFY 2001, and shuttle buses in SFY 2021.

Directly Operated Bus Data

The MBTA uses its automatic passenger counter (APC) data, verified by on-board passenger counts (also called ridechecks), to estimate the unlinked passenger trips and passenger-miles traveled on its directly operated bus (MBDO) and rapid-bus (RBDO) modes. The MBTA has submitted APC data to NTD since FTA allowed the practice in SFY 2014. As directed by FTA in SFY 2016, CTPS began verifying these data with ridechecks on APC-equipped buses.

Scheduled Purchased-Transportation Bus Data

In SFY 2019, some of the purchased-transportation bus routes (MBPT) began to use APC-equipped vehicles. For these routes, the MBTA used APC data to estimate unlinked trips and passenger-miles traveled. As with MBDO, CTPS conducted ridechecks on APC-equipped MBPT buses to verify APC data. CTPS used full-route ridechecks to estimate total passenger-miles traveled and unlinked passenger trips for MBPT bus routes not equipped with APCs. CTPS will continue to collect these data in SFY 2026.

Shuttle Bus Data

In SFY 2021, CTPS began collecting data to estimate unlinked passenger trips and passenger-miles traveled for shuttle buses (both MBDO and MBPT), which the MBTA provides when portions of rail service are temporarily suspended for maintenance. This data collection will continue in SFY 2026.

¹ In SFY 2022, the MBTA replaced its trackless trolleys with motor buses; so SFY 2022 was the final year in which CTPS collected data on trackless trolleys.

Summary

Table 1 summarizes the data that CTPS collects and processes to estimate the average trip length, passenger-miles traveled, and unlinked trips for each mode, and the sources of these data.

**Table 1
Data and Sources for Unlinked Passenger Trips
and Average Trip Length Calculations**

Mode	Unlinked Passenger Trips						Average Trip Length					
	MB	RB	MB	HR	LR	CR	MB	RB	MB	HR	LR	CR
	DO	DO	PT	DO	DO	PT	DO	DO	PT	DO	DO	PT
CTPS Data												
Ridecheck data for APC verification	X	X	X				X	X	X			
Full-route ridecheck*			X						X			
Noninteraction survey				X	X							
Transit trip survey				X	X					X	X	
MBTA Data												
APC data	X	X	X				X	X	X			
AFC boardings				X	X							
ODX data (potential)				X	X					X	X	
Conductor counts (Keolis)												X
mTicket data												X

Note: ODX data, if used, would replace transit trip survey data to estimate transfer factors and average trip lengths.

* Full-route ridechecks will only be conducted for regularly scheduled purchased-transportation bus routes that do not have APCs.

AFC = Automated Fare Collection. APC = Automatic Passenger Counter. CR = Commuter Rail. CTPS = Central Transportation Planning Staff. DO = Directly Operated. HR = Heavy Rail. LR = Light Rail. MB = Motorbus. MBTA = Massachusetts Bay Transportation Authority. mTicket = Mobile Ticketing. ODX = Origin-Destination-Transfer Model. PT = Purchased Transportation. RB = Rapid Bus.

Objectives

The objectives of this project are as follows:

- Develop estimates of passenger-miles traveled and unlinked trips for the MBTA's directly operated heavy rail (HRDO) and light rail (LRDO) modes
- Develop estimates of passenger-miles traveled and unlinked trips for the following bus modes:
 - regularly scheduled MBPT bus routes
 - temporary MBPT and MBDO shuttle buses substituting for rapid transit
 - temporary MBPT and MBDO shuttle buses substituting for commuter rail
- Develop an estimate of the average trip length per passenger for commuter rail
- Develop estimates of passenger-miles traveled in each urbanized area served by the MBTA for the following modes:
 - commuter rail
 - shuttle buses substituting for commuter rail²

CTPS will use the following methods to collect the data on which these estimates will be based:

1. Ridechecks on samples of APC-equipped MBDO, RBDO, and MBPT buses
2. Full-route ridechecks on MBPT buses for the routes without APC-equipped buses
3. Transit trip surveys on HRDO, LRDO, and RBDO services to determine origins, destinations, transfer rates, and average trip lengths
4. Faregate noninteraction, farebox noninteraction, and rear-door entry surveys from stations or Green Line vehicles equipped with automated fare collection (AFC) technology (noninteraction surveys count passengers who pass by faregates or fareboxes, including those who do not use fare media)
5. Inferred origin-destination information from AFC data, if available from the MBTA or its partners, to determine origin-destination information (transfer rates and average trip lengths)
6. Commuter rail ridership data obtained from passenger counts conducted by the MBTA or its contractors, or from the MBTA's mobile-ticketing vendor
7. Counts of shuttle bus passengers during sample periods when portions of rapid transit or commuter rail service are temporarily suspended and replaced with bus service

If the MBTA's data sources change, CTPS will consult with the MBTA about making corresponding changes to the methods listed above.

² The MBTA serves the following urbanized areas: Boston, MA–NH; Providence RI–MA; Worcester, MA–CT, Leominster-Fitchburg, MA; and New Bedford, MA.

Work Description

Task 1 Develop Sampling Plans

For MBDO and RBDO, CTPS will work with MBTA staff to develop a sampling plan for conducting ridechecks during SFY 2026. CTPS's staffing availability and the MBTA's needs will determine the extent of the data collection.³

For MBPT, CTPS will develop a sampling plan for conducting ridechecks to verify the accuracy of the APC data in consultation with MBTA staff. CTPS will also develop a sampling plan for conducting full-route ridechecks on the non-APC equipped routes. CTPS will perform the ridechecks over the course of a single quarter during SFY 2026. CTPS's staffing availability will determine the selection of quarters.

For HRDO, LRDO, and RBDO, CTPS will develop a passenger survey sampling plan for conducting surveys at a random selection of stations over the course of an entire year. The sampling plan will ensure that the results represent all days of the week and all service periods. CTPS will also conduct noninteraction surveys at the stations that have faregates.

Because not all passengers interact with fare-collection equipment when boarding vehicles at Green Line surface stops, CTPS will conduct counts of passengers who do not interact with the farebox or fare readers. CTPS will develop a sampling plan that will ensure that these observations are conducted on Green Line surface stops over the entire year for all days of the week and all service periods.

For the commuter rail mode, CTPS may obtain and analyze four potential data sources: conductor audits, data from the MBTA's mobile-ticketing vendor, Keolis Commuter Services' passenger counts, and CTPS's passenger counts collected as a part of a separate project. No direct data collection is planned for commuter rail.

For the ferry mode, CTPS may choose a small selection of trips on which to count boarding or alighting passengers. The MBTA will use CTPS's counts to verify passenger count data received from the ferry operator.

For shuttle buses, CTPS will develop a sampling plan for counting passengers who board or alight buses that are providing substitute service for segments of rapid transit lines that have been temporarily suspended.

³ Every three years the MBTA submits its APC recertification to FTA. The most recent recertification was in SFY 2025, and the next is anticipated in SFY 2028. In recertification years, CTPS collects data for 60 trips each on MBDO, RBDO, and MBPT.

Products of Task 1

- Sampling plan for SFY 2026 bus ridechecks
- Sampling plan for SFY 2026 passenger surveys
- Sampling plan for SFY 2026 faregate noninteraction counts and surface Green Line observations
- Sampling plan for SFY 2026 shuttle bus counts

Task 2 Collect Data

CTPS will complete the bus ridecheck assignments generated by the sampling plans created in Task 1. For HRDO and LRDO, CTPS will conduct passenger surveys at each of the survey locations. Staff will conduct counts of the number of passengers passing through faregates, including those who do not interact with the faregates, at survey locations in stations that have faregates. Along Green Line surface routes, CTPS will conduct onboard counts of passengers, including those who do not interact with the farebox or fare readers. For shuttle buses, CTPS will count bus boardings at locations where the MBTA is substituting bus service for rapid transit service.

The MBTA will provide CTPS with detailed AFC data for HRDO and LRDO; monthly and annual fare revenue reports for MBPT; and APC data for the purposes of verifying MBDO, RBDO, and APC-equipped MBPT bus unlinked passenger trips and average trip length. If the MBTA concludes that data from the MBTA's origin-destination-transfer model (ODX) is sufficient for NTD reporting purposes, the MBTA will provide CTPS with relevant ODX output in addition to AFC data.

Products of Task 2

- Ridecheck data for a selection of trips on MBDO, RBDO, and MBPT with APC-equipped buses for verifying APC data
- Full-route ridecheck data for MBPT without APC-equipped buses
- Transit trip survey results
- Noninteraction data for faregates at stations and for fareboxes and fare readers on Green Line surface stops
- Potential ODX transfer factors and average passenger trip length for HRDO, LRDO, and gated portions of RBDO
- Counts of shuttle bus boardings or alightings

Task 3 Process Ridecheck, Passenger Survey, and Passenger Count Data

CTPS will process the ridecheck, passenger survey, and passenger count data, including data on passenger noninteraction with faregates and fareboxes. Completed assignments will be checked for accuracy and completeness, and incomplete assignments will be redone. The number and types of remaining assignments will be monitored throughout the fiscal year to ensure that all types of assignments are completed in a timely manner.

The data collected on ridechecks will be uploaded to CTPS's bus ridership database, and these data will be checked for completeness and accuracy. Passenger survey results and passenger count data will be uploaded to a different database, and these data will be checked for completeness and accuracy.

Product of Task 3

Processed ridecheck, passenger survey, and passenger count data

Task 4 Estimate Passenger-Miles Traveled and Unlinked Trips

For MBDO and RBDO, CTPS will select some APC-equipped buses on which to conduct passenger counts for use in APC data verification. The MBTA will use these CTPS-produced results to verify the APC data it uses to estimate passenger-miles traveled and unlinked passenger trips.

CTPS will obtain AFC faregate passenger counts from the MBTA, which will provide information about the total number of passengers boarding at gated HRDO, LRDO, and RBDO stations. CTPS will then estimate the factors that account for the number of transfers between modes based on the origin-destination passenger surveys conducted in Task 2. In addition, CTPS will develop a faregate noninteraction factor from the observations at station survey locations and will apply the factor to the AFC faregate counts to estimate the total number of unlinked trips on HRDO and LRDO.

For Green Line surface stops, CTPS will use counts of boarding passengers who do not interact with the farebox or fare readers to develop a farebox noninteraction factor. CTPS will apply this factor to the AFC farebox counts of the total number of passengers at Green Line surface stops. CTPS will then apply additional factors to account for transfers between Green Line branches, to heavy rail lines, or to the Mattapan Line, which will generate estimates of the total of unlinked light rail and heavy rail riders attributable to light rail surface boardings. These transfer factors will be derived from the origin-destination passenger surveys.

For HRDO and LRDO, CTPS will convert the origin-destination data generated by the passenger surveys and the processed AFC data into estimates of the average passenger-miles traveled per mode. The average passenger-miles traveled per passenger will be multiplied by the total number of passengers to yield estimates of the total number of passenger-miles traveled for each mode.

If the MBTA decides to use ODX as the basis of reporting to the NTD, CTPS will adjust the methodology as needed to incorporate the ODX outputs.

For the commuter rail mode, CTPS will use one or more of the sources of ridership counts described in Task 1 as the basis for estimating unlinked passenger trips. In recent years, because conductor audit data were not available, CTPS obtained anonymized origin-destination data from the MBTA's mobile-ticketing vendor. That dataset was sufficient for estimating the average passenger-miles traveled per trip.

In addition, CTPS will examine Keolis's passenger counts; this dataset should also be sufficient for calculating the average passenger-miles traveled per trip. However, CTPS does not produce estimates of unlinked passenger trips or total passenger-miles traveled for commuter rail, and CTPS does not expect to conduct any direct observations of the commuter rail mode.

CTPS will also use commuter rail mobile ticketing data to estimate passenger-miles traveled on commuter rail in each of the urbanized areas the MBTA serves. Urbanized areas are defined by the US Census Bureau using data from the 2020 US Census.

For shuttle buses substituting for rapid transit, CTPS will obtain AFC faregate passenger counts from the MBTA for comparable periods with regular rail service and use counts of shuttle boardings or alightings as well as AFC faregate passenger counts during diversion service where applicable (when fare gates remain closed at terminal stations) to develop a shuttle scaling factor. CTPS will use AFC counts and the scaling factor to estimate annual and monthly unlinked passenger trips and passenger-miles traveled on shuttle buses substituting for rapid transit. For shuttle buses substituting for commuter rail, CTPS will take a similar approach while using conductor counts instead of AFC faregate passenger counts. CTPS will also estimate passenger-miles traveled on shuttle buses substituting for commuter rail in each of the urbanized areas the MBTA serves.

For MBPT, CTPS will produce annual and monthly estimates of passenger-miles traveled and unlinked trips using output from CTPS's database of bus ridership. CTPS will estimate the average trip length per passenger based on ridecheck observations. The total passenger-miles traveled will be calculated by multiplying the total unlinked trips by the average trip length per passenger. The MBTA will use APC data to produce estimates of passenger-miles traveled and unlinked trips on APC-equipped routes. CTPS will combine the results from APC-equipped routes and routes without APCs into a single set of values for MBPT.

For ferry, CTPS will assist the MBTA in estimating directional route-miles.

Products of Task 4

- Estimates of passenger-miles traveled and unlinked trips, including a summary by service day of week, for HRDO, LRDO, and buses
- Estimates of average passenger trip lengths on commuter rail

Task 5 Document Results

CTPS will document the results of Task 4 and the methodology of the study in four technical memoranda: one each for regularly scheduled MBPT, directly operated services, commuter rail, and shuttle buses. The technical memoranda will describe the data-collection and analysis processes and present a summary of the results.

The MBTA has requested that CTPS transmit a draft copy of the memoranda by October 1, 2026, and a final version by October 15, 2026.

Products of Task 5

Four technical memoranda and other underlying data as requested

Task 6 Assist with the Compliance Audit

The FTA requires that an independent auditor review and verify the MBTA's estimates of passenger-miles traveled and unlinked trips. As the agency responsible for these estimates, CTPS will provide materials and assistance necessary for the audit.

Products of Task 6

Materials and assistance necessary to the independent auditor

Exhibit 1
ESTIMATED SCHEDULE
MBTA SFY 2026 National Transit Database: Data Collection and Analysis

Task	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Develop Sampling Plans																		
2. Collect Data																		
3. Process Ridecheck, Passenger Survey, and Passenger Count Data																		
4. Estimate Passenger-Miles Traveled and Unlinked Trips																		
5. Document Results																		
6. Assist with the Compliance Audit																		

Products/Milestones
 A: Four technical memoranda

Exhibit 2

ESTIMATED COST

MBTA SFY 2026 National Transit Database: Data Collection and Analysis

Direct Salary and Overhead										\$248,392
Task	Person-Weeks by Pay Grade						Direct Salary	Overhead (120.3%)	Total Cost	
	G-8	G-7	G-6	G-2	G-1	Total				
1. Develop Sampling Plans	0.0	0.0	1.0	0.0	0.0	1.0	\$1,610	\$1,936	\$3,546	
2. Collect Data	4.0	0.0	0.0	8.0	46.0	58.0	\$56,644	\$68,142	\$124,786	
3. Process Ridecheck, Passenger Survey, and Passenger Count Data	0.0	0.0	15.0	0.0	0.0	15.0	\$24,144	\$29,046	\$53,190	
4. Estimate Passenger-Miles Traveled and Unlinked Trips	0.0	0.0	13.0	0.0	0.0	13.0	\$19,829	\$23,854	\$43,683	
5. Document Results	1.0	1.0	3.0	0.0	0.0	5.0	\$8,915	\$10,725	\$19,641	
6. Assist with the Compliance Audit	0.0	0.0	1.0	0.0	0.0	1.0	\$1,610	\$1,936	\$3,546	
Total	5.0	1.0	33.0	8.0	46.0	93.0	\$112,751	\$135,640	\$248,392	
Other Direct Costs										\$300
Travel										\$300
TOTAL COST										\$248,692

Funding

Future MBTA Contract

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