



BOSTON REGION METROPOLITAN PLANNING ORGANIZATION

Gina Fiandaca, MassDOT Secretary and CEO and MPO Chair
Tegin L. Teich, Executive Director, MPO Staff

WORK PROGRAM

BLUEBIKES FARE EQUITY ANALYSIS

MARCH 30, 2023

Proposed Motion

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

Project Identification

Unified Planning Work Program (UPWP) Classification

Not listed in federal fiscal year (FFY) 2023 UPWP

Project Number 22222

Client

City of Boston

Client Supervisor: Kim Foltz

City of Cambridge

Client Supervisor: Miguel Perez-Luna

City of Somerville

Client Supervisor: Greg Hanafin

Project Supervisors

Principal: Betsy Harvey

Manager: Emily Domanico

Funding Sources

City of Boston Contract

City of Cambridge Contract

City of Somerville Contract

Schedule and Budget

Schedule: 12 months from notice to proceed

Budget: \$96,310

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

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

The Bluebikes bikeshare system currently charges riders using a pass-based or a per-ride based fee, where users pay a set cost to access the bikeshare system regardless of travel distance. Many bikeshare systems across the United States, including Washington, DC's Capital Bikeshare, Philadelphia's Indego, and Chicago's Divvy, incorporate a per-minute fee structure for electric bike (e-bike) trips. The Cities of Boston, Somerville, and Cambridge are contracting with the Central Transportation Planning Staff (CTPS) to examine the equity implications of potential changes to the Bluebikes fare structure including fare product changes and the impacts of adding e-bikes to the Bluebikes fleet. This study will identify how potential fare changes could affect riders of underserved population groups, including people of color, people with low incomes, and people with limited English proficiency.

Objective

Develop a methodology to analyze equity impacts of fare changes to the Bluebikes bikeshare system that reports results using clear, useful metrics for determining whether changes to the fare structure is equitable.

Work Description

CTPS will coordinate with the Cities of Boston, Somerville, and Cambridge to analyze how potential changes to the Bluebikes fare structure and bike fleet composition will impact riders of underserved population groups. CTPS has conducted an initial feasibility assessment for this project that included a literature review and review of Bluebikes ridership data.

Task 1 Estimate Demographics of Riders

CTPS will develop a methodology to relate trip patterns and bikeshare ridership data to census demographic data. This process will be used to estimate the demographics of Bluebikes riders with consideration for known ridership patterns and limitations in bikeshare rider data. This analysis will be based on trip patterns, limited account-level demographic data, and US census demographic analyses. This work will include estimations of riders of different incomes, minority status, and English language proficiency.

Product of Task 1

A process to relate rider-level bikeshare data to census demographics that can be used to estimate bikeshare rider demographics

Task 2 Conduct a Demographic Survey

To supplement ridership-based demographic estimates, CTPS will develop a demographic survey to be distributed digitally and in person to bikeshare riders. CTPS will use this survey to verify ridership-based demographic estimates.

Subtask 2.1 Develop and conduct demographic survey

CTPS will develop the survey instrument and the sampling plan. The survey will be designed to collect responses on rider demographic information and awareness of Bluebikes fare products. CTPS will coordinate with the clients to distribute the survey to Bluebikes account holders via the internet. To complement internet-based survey distribution, CTPS will conduct in-person rider surveys around Bluebikes stations according to the sampling plan. CTPS will digitize in-person survey responses and upload them to a database. All survey responses will be combined and weighted to Bluebikes ridership and fare product usage. CTPS will produce aggregate summary survey results.

Subtask 2.2 Compare survey demographics to ridership-based estimates

CTPS will compare survey demographic results to ridership-based demographic estimates. If necessary, CTPS will use survey demographics to systematically adjust ridership-based demographic estimates.

Products of Task 2

- A process to verify ridership-based bikeshare demographic estimates that can be used in fare equity analyses
- Summary results of demographic survey of Bluebikes riders to verify and adjust ridership-based demographic estimates

Task 3 Estimate Fare Elasticity Impacts

CTPS staff will develop a method to project the impacts of fare changes on ridership patterns based on a literature review of research on bikeshare fare elasticity and an analysis of Bluebikes ridership changes due to changes in fares. To determine appropriate elasticities, CTPS will analyze ridership impacts based on previous fare changes in the Bluebikes system and other bikeshare systems where comparable. The analysis will consider the interaction of fare elasticity and different demographic populations. Fare elasticity projections will be compatible with the rider demographic estimation process.

Product of Task 3

A process to model fare elasticity in fare equity analyses including documentation for how elasticities are identified

Task 4 Model Equity Impacts from e-Bikes

CTPS will analyze the equity impacts of introducing e-bikes to the Bluebikes bikeshare system by focusing on two primary variables: (1) availability of e-bikes throughout the system, and (2) the fare structure associated with e-bikes. CTPS will develop a process to estimate how the geographic distribution of e-bikes throughout the fleet and their pricing structure could affect trip-making patterns of different demographic populations. To produce projected fare equity impacts, CTPS will quantify how much e-bike travel could cost riders under up to five different fare structures including per-minute travel cost, base-fare and per-minute costs, and membership fee plus per-minute costs.

Product of Task 4

A sensitivity analysis of projected impacts of the geographic distribution of e-bikes and the pricing structure on quantity of trips made, rider minutes traveled, and average fare per trip by demographic group

Task 5 Model Fare Change Scenarios

Applying processes developed in tasks 1 and 2, CTPS will build a model based on rider-level bikeshare trip-patterns that (1) prices travel based on the existing fare structure and (2) projects ridership changes in proposed fare change scenarios. Fare change scenarios will include price changes to existing fare products, potential retirement of existing fare products, and the introduction of new fare products. The modeling process will track projected impacts to the quantity of trips made, rider minutes traveled, and average fare per trip by demographic group. CTPS will coordinate with the clients to define up to five scenarios to evaluate in a sensitivity analysis.

Product of Task 5

A sensitivity analysis of how fare changes affect metrics across identified demographic groups.

Task 6 Develop Interactive Report

CTPS will develop an interactive report that can recalculate reporting metrics as changes are made to Bluebikes system variables, such as fare product prices and the number of e-bikes in the Bluebikes fleet.

Products of Task 6

An interactive report, hosted on CTPS' ShinyApps account, and access to supporting materials to set up and run the interactive report locally.

Task 7 Document Results

Staff will document the methodology and the results of this study.

Product of Task 7

A memorandum detailing the methodology and the results of the work completed as part of this work program

Task 8 Ongoing Support

CTPS will support the clients with the usage of the interactive report including support to set up and run the interactive report.

Exhibit 1
ESTIMATED SCHEDULE
Bluebikes Fare Equity Analysis

Task	Month												
	1	2	3	4	5	6	7	8	9	10	11	12	
1. Estimate demographics of riders	█												
2. Conduct demographic survey	█				A								
3. Estimate fare elasticity impacts	█												
4. Model equity impacts from e-bikes			█										
5. Model fare change scenarios			█										
6. Develop interactive report				█			B						
7. Document results				█			C						
8. Ongoing support								█					

Products/Milestones

- A: Demographic survey summary results
- B: Interactive report
- C: Technical memorandum

Exhibit 2
ESTIMATED COST
Bluebikes Fare Equity Analysis

Direct Salary and Overhead	\$96,010
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Task	Person-Weeks							Direct Salary	Overhead (119.34%)	Total Cost
	M-1	P-5	P-4	P-2	P-1	Temp	Total			
1. Estimate demographics of riders	0.0	0.5	0.2	2.0	0.0	0.0	2.8	\$3,883	\$4,634	\$8,517
2. Conduct demographic survey	0.3	0.0	0.0	3.1	0.3	5.6	9.3	\$9,586	\$11,439	\$21,025
3. Estimate fare elasticity impacts	0.0	0.5	0.0	1.5	0.0	0.0	2.0	\$2,862	\$3,416	\$6,279
4. Model equity impacts from e-bikes	0.0	0.5	0.0	3.2	0.0	0.0	3.8	\$5,126	\$6,118	\$11,244
5. Model fare change scenarios	0.0	1.0	0.2	5.5	0.0	0.0	6.8	\$9,322	\$11,125	\$20,447
6. Develop interactive report	0.0	0.8	0.1	2.0	0.0	0.0	2.9	\$4,191	\$5,001	\$9,192
7. Document results	2.2	0.7	0.1	1.0	0.0	0.0	4.0	\$7,188	\$8,579	\$15,767
8. Ongoing support	0.0	0.0	0.0	1.2	0.0	0.0	1.2	\$1,613	\$1,926	\$3,539
Total	2.5	4.0	0.8	19.6	0.3	5.6	32.8	\$43,772	\$52,238	\$96,010

Other Direct Costs	\$300
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Travel	\$300
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TOTAL COST	\$96,310
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Funding

- City of Boston Contract
- City of Cambridge Contract
- City of Somerville Contract

The Boston Region Metropolitan Planning Organization (MPO) operates its programs, services, and activities in compliance with federal nondiscrimination laws including Title VI of the Civil Rights Act of 1964 (Title VI), the Civil Rights Restoration Act of 1987, and related statutes and regulations. Title VI prohibits discrimination in federally assisted programs and requires that no person in the United States of America shall, on the grounds of race, color, or national origin (including limited English proficiency), be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination under any program or activity that receives federal assistance. Related federal nondiscrimination laws administered by the Federal Highway Administration, Federal Transit Administration, or both, prohibit discrimination on the basis of age, sex, and disability. The Boston Region MPO considers these protected populations in its Title VI Programs, consistent with federal interpretation and administration. In addition, the Boston Region MPO provides meaningful access to its programs, services, and activities to individuals with limited English proficiency, in compliance with U.S. Department of Transportation policy and guidance on federal Executive Order 13166.

The Boston Region MPO also complies with the Massachusetts Public Accommodation Law, M.G.L. c 272 sections 92a, 98, 98a, which prohibits making any distinction, discrimination, or restriction in admission to, or treatment in a place of public accommodation based on race, color, religious creed, national origin, sex, sexual orientation, disability, or ancestry. Likewise, the Boston Region MPO complies with the Governor's Executive Order 526, section 4, which requires that all programs, activities, and services provided, performed, licensed, chartered, funded, regulated, or contracted for by the state shall be conducted without unlawful discrimination based on race, color, age, gender, ethnicity, sexual orientation, gender identity or expression, religion, creed, ancestry, national origin, disability, veteran's status (including Vietnam-era veterans), or background.

A complaint form and additional information can be obtained by contacting the MPO or at http://www.bostonmpo.org/mpo_non_discrimination. To request this information in a different language or in an accessible format, please contact

Title VI Specialist
Boston Region MPO
10 Park Plaza, Suite 2150
Boston, MA 02116
civilrights@ctps.org

By Telephone:

857.702.3700 (voice)

For people with hearing or speaking difficulties, connect through the state MassRelay service:

- **Relay Using TTY or Hearing Carry-over:** 800.439.2370
- **Relay Using Voice Carry-over:** 866.887.6619
- **Relay Using Text to Speech:** 866.645.9870

For more information, including numbers for Spanish speakers, visit <https://www.mass.gov/massrelay>.