

# Research Summary

## Flexible Transit Services

### Research Need

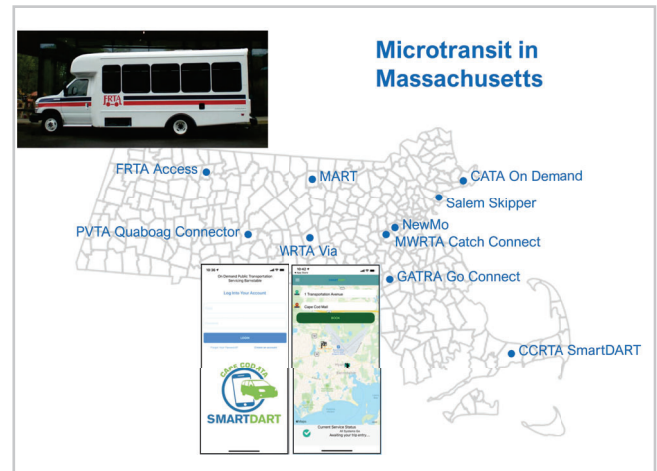
Conventional transit service can be inefficient for areas with low density and dispersed demand. There is a research need to identify flexible transit services that could be operated more cost-effectively in communities that are difficult to serve with fixed routes. Several Regional Transit Authorities (RTAs) across Massachusetts are piloting microtransit services to address this need. There is also a need for systematic methods to collect, track, and report data for flexible transit services.

### Goals/Objectives

The three main objectives of this project are:

- 1) to develop a method for identifying potential markets for flexible transit service and the type of service that would most cost-effectively serve the demand;
- 2) to use data from flexible transit pilot programs in Massachusetts to compare theoretical analysis and pilot program data in order to identify lessons learned and guidance for future implementations;
- 3) to identify the data requirements for planning, implementing, and monitoring a flexible transit service with an automated reservation system.

The overall goal of the project is to develop useful guidance for future transit operations. The research will provide quantitative models to identify appropriate markets for flexible transit. The research will also provide qualitative insights on the best practices for planning and implementing flexible transit.



### Methodology

Public transit services in Massachusetts typically operate fixed routes with a published schedule. Fixed routes are not cost-effective for low-density rural and suburban areas. The first part of this study is a theoretical analysis of the various forms of flexible transit service, ranging from deviating routes and schedules to fully demand responsive service. The models are used to compare the costs of different services or communities of varying density and size. The second part of the study is an analysis of data from microtransit pilot programs implemented by RTAs in Massachusetts. The experiences of RTAs are compared with the results of the theoretical analysis to make recommendations for future flexible transit implementations. Finally, an analysis of the data requirements for planning (based on quantitative models), implementation (based on commercial and in-house app development), and monitoring (for ongoing performance evaluation).

## Key Findings

The research conducted through this study supports four general findings:

1) Flexible transit includes many different service models that can reduce costs when demand is too low to support fixed-route transit. The demand threshold to select flexible transit or microtransit depends on the size of the region, the distribution of demand in time and space, and the characteristics of the vehicles. Both the literature and modeling suggest that when demand is distributed and the density is less than 10 trips/hr./sq. mi., flexible transit is more efficient than fixed routes.

2) RTAs in Massachusetts have generally viewed microtransit pilots as successful. Demand responsive microtransit either replaced under-performing fixed route service or introduced service to areas with low demand density. Several RTAs have expanded or are planning to expand microtransit to more geographic areas or more hours of service.

3) COVID-19 suppressed demand for most travel, but microtransit continued to serve a critical need in some communities. Lower demand made the initial implementation easier, as RTAs could take time to work out the details of apps, scheduling, marketing, etc. The viability of microtransit during the pandemic showed that it is a resilient transit solution, especially for rural and suburban communities.

4) Data management for real-time operations can utilize off-the-shelf commercial products or systems developed in-house. The choice embodies a trade-off: commercial products are easier to start using but have some limits on functionality; a custom app requires more in-house expertise and time to develop but retains for the agency full control of data, functionality, and integration with other systems.

## Project Information

This project was completed as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

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### MassDOT Research Project Number:

### Key Words:

flexible transit, microtransit, demand responsive transit

## Use of Findings

The findings of this study are useful for MassDOT and the RTAs as a resource that documents that state of practice for flexible transit operation across the United States and in Massachusetts. The study provides a quantitative method for comparing the performance and cost-effectiveness of various flexible transit services with fixed routes. The study also documents and compares the experiences of RTAs in implementing microtransit pilots in diverse contexts across Massachusetts. By synthesizing the models, data, and experiences of RTAs, the study provides insights about the reasons for implementing a flexible transit services and the various decisions that an agency must consider for planning and implementing flexible transit that supports the needs of the community.

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