Chapter 1:

Toolkit Overview

Introduction

The Massachusetts Bay Transportation Authority (MBTA) and its partners are industry leaders for their recent accomplishments in bus priority. Since the launch of the MBTA Transit Priority Group in 2019, the MBTA and its municipal and state partners implemented over 17 miles of bus lanes and activated transit signal priority (TSP) at 85 locations. Transit priority improvements are a key component of the MBTA's Better Bus and Bus Transformation projects, which aim to address the equity gap in transit access, improve accessibility and customer experience, and travel times and encourage more transit use. The MBTA's Bus Network Redesign (BNRD), approved in late 2022, charts a vision for a bus network that serves shifting needs of populations across Greater Boston, including updated routes and new high-frequency service. The purpose of the toolkit is to support state agencies and municipalities expand transit priority across the MBTA region.

The toolkit builds off local and national best practices to provide a clear and consistent approach to planning and implementing transit priority treatments. The toolkit summarizes the lessons learned from recent projects, outlining the benefits and tradeoffs of each treatment with detailed and illustrative implementation considerations. The toolkit guides municipal, state, and MBTA staff through each step of the planning and implementation process to streamline coordination and decision-making and to encourage the consistent application of treatments throughout the region.

Figure 1: MBTA Service Area: Graphic of the municipalities included in the MBTA bus service area at the time of publication.
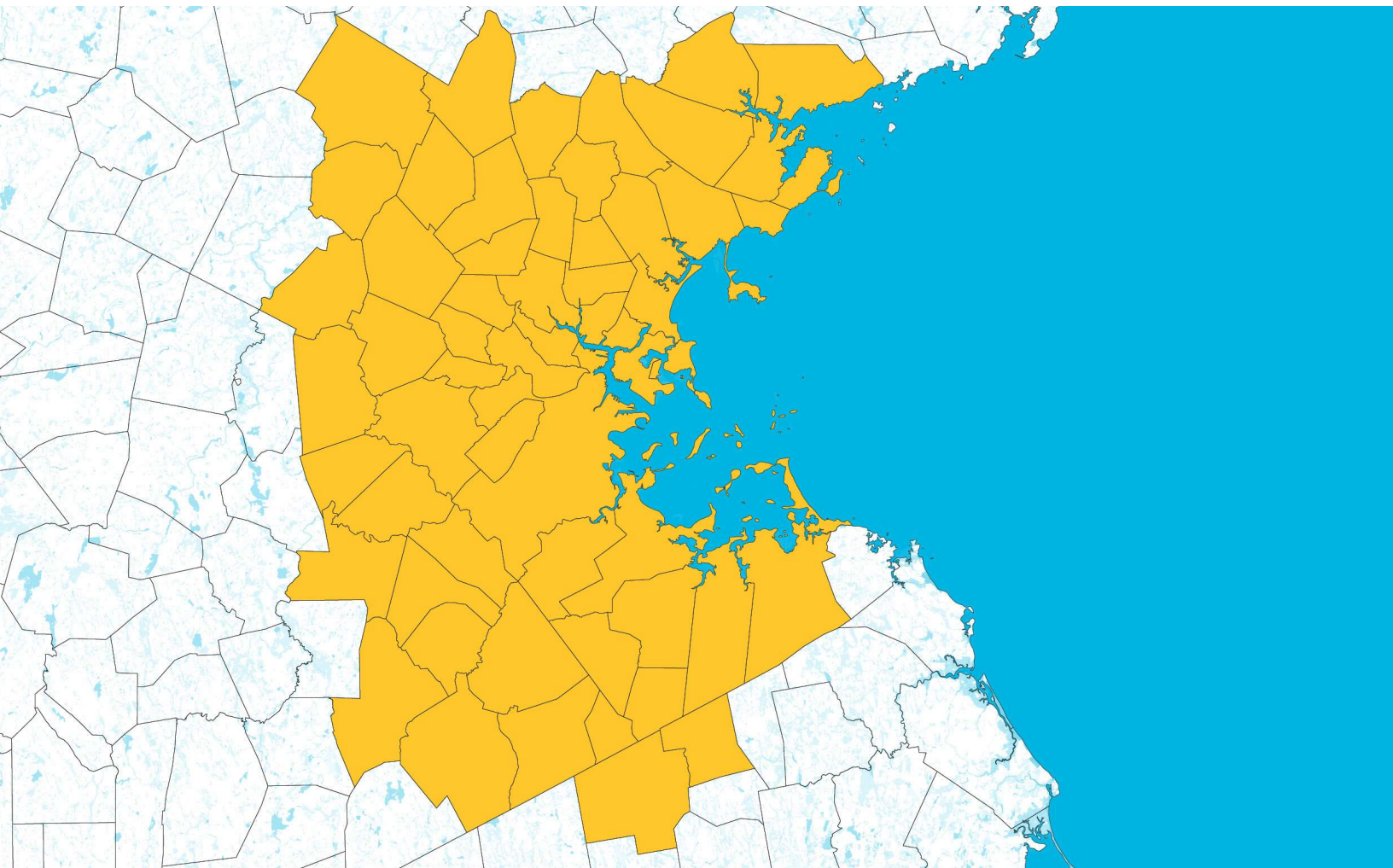
"I don't have to be guessing
when the bus is coming."

– Columbus Ave bus rider
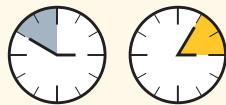
Why Bus Priority?

No one likes waiting and wondering if they are going to be late.

Bus travel times can vary, but when those trips take too long, we all feel the consequences.
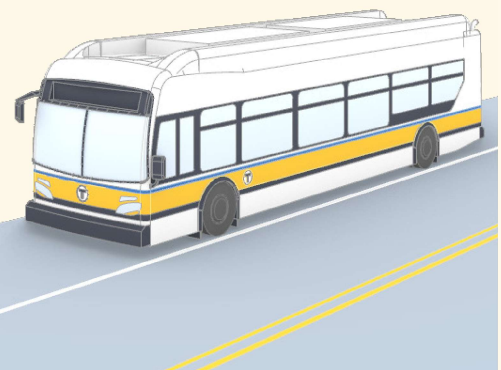
Schedules are conservative on purpose…

… because people would rather be early than late.

Buses are usually 80%-90% on time…

35 min

… but people don't want to be late 10%-20% of the time.

**Everyone benefits from bus priority improvements.**

Bus priority projects benefit the entire transportation system and everyone who travels through it.
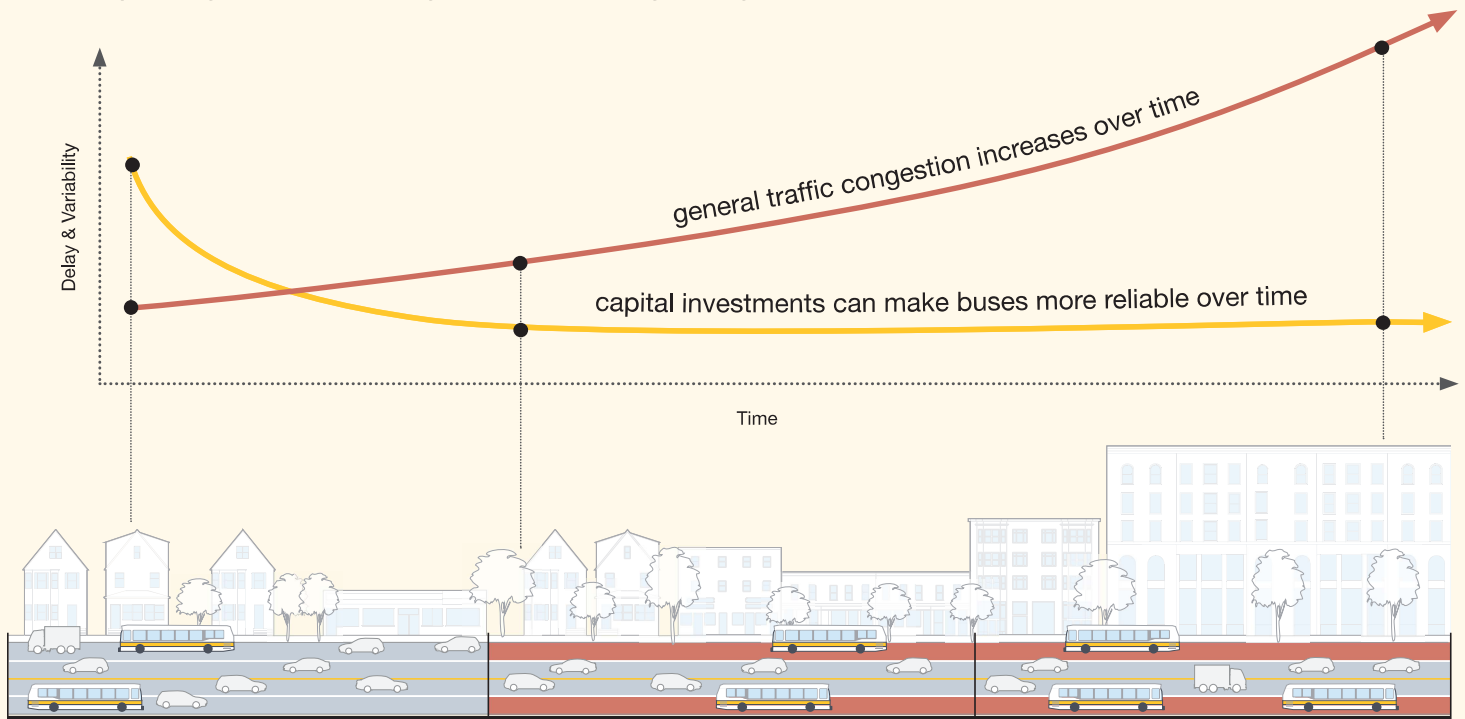
Bus lanes speed up bus service - keeping the bus on-time…

… which saves time along the entire route.

As bus travel times become more competitive with driving, more people take the bus, relieving traffic congestion across the city.

ONLY BUS
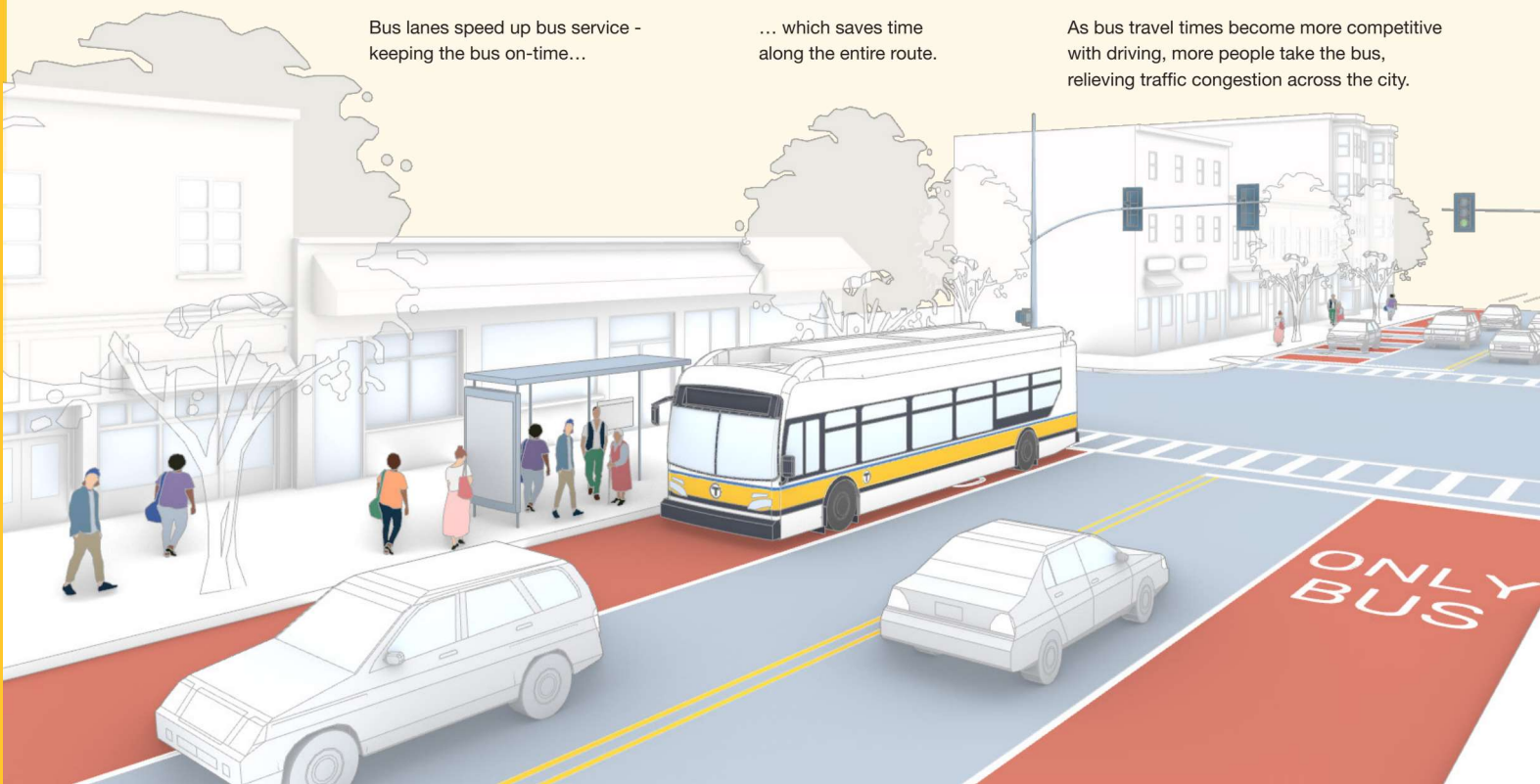
An investment made today will pay off tomorrow.
As our region continues to grow, more trips are made on the roads. Even if these roads are not congested today, over time if transit is not a viable option they will be. Investments in bus priority have long-lasting benefits, ensuring that buses don't get caught in future traffic.

Delay & Variability

general traffic congestion increases over time

capital investments can make buses more reliable over time

Time

Today

Short-Term Investment

Long-Term Outcome

① **Decreased Travel Times.** Transit priority provides a dedicated space for bus operations, allowing buses to bypass congestion, reducing transit travel times.

② **Improved Reliability.** With more reliable service riders can be confident their bus will arrive when the schedule says it will.

③ **Shifting Modes.** If buses are faster and more reliable than other options, they attract more riders

④ and encourage mode shift. **Better Access.** Faster travel times mean you can get to more places within a standard commute time

⑤ (e.g., jobs within 45 minutes). **Lowered Costs.** Speed and reliability improvements can lead to schedule changes, allowing the MBTA to deliver more service with fewer resources. From the riders perspective, more frequent and reliable service means shorter wait times and fewer consequences for being late.

The Importance of Travel Times and Reliability

Providing fast, reliable, and accessible service is vital to operating an efficient and effective transit system. To make transit a viable and attractive option, transit agencies, municipalities, and state agencies need to collaborate to make improvements to city streets and state roads that improve bus operations and eventually allow transit agencies to enhance service frequency.

For service to be attractive, transit needs to get people where they need to go on time, whether it be work, the grocery store, or healthcare centers, with minimal obstacles. People want to use the fastest, least expensive, most accessible and reliable form of transportation available to them. Faster and more reliable bus service improves the quality of life for todays transit riders and encourages more people to ride transit.

Delayed buses and inconsistent arrival times impact transit schedules and make it difficult for people to depend on transit. People start to buffer time to account for unpredictability when buses are frequently late, or take a different form of transportation altogether. Reducing transit travel times allows the MBTA to offer more efficient and reliable service competitive with other modes of transportation.

Delivering bus speed and reliability improvements requires coordination among MBTA staff, municipalities, and state agencies. This toolkit outlines operational and design treatments proven to deliver more efficient bus service with planning and implementation considerations for the MBTA and partner agencies.

When to Consider Bus Priority Treatments

Bus priority treatments reduce bus travel times, increase reliability, and improve walking and biking paths to transit, which encourages mode shift and transit use, reducing transportation emissions. Municipalities and state agencies can integrate transit priority into a variety of roadway projects, including those with space constraints, frequent delays, and unreliable service.

Municipalities and state agencies should implement bus priority treatments on streets where there are transit delays or where there are other operational conflicts with transit and people walking, biking, rolling, or driving. Repurposing parking or general purpose traffic lanes for transit increases the number of people that can travel on that roadway, and it encourages more transit use as a community grows.

Municipalities and state agencies should coordinate with the MBTA to include transit priority recommendations when updating their community/neighborhood plans, transportations plans, or transit-oriented development plans (TOD). Municipalities and state agencies should also consider transit priority treatments as part of their repaving program or other projects where the roadway is being reconfigured. In addition, municipalities and state agencies can negotiate transit priority treatments in private development plans. The table below lists potential roadway projects and transit priority considerations.

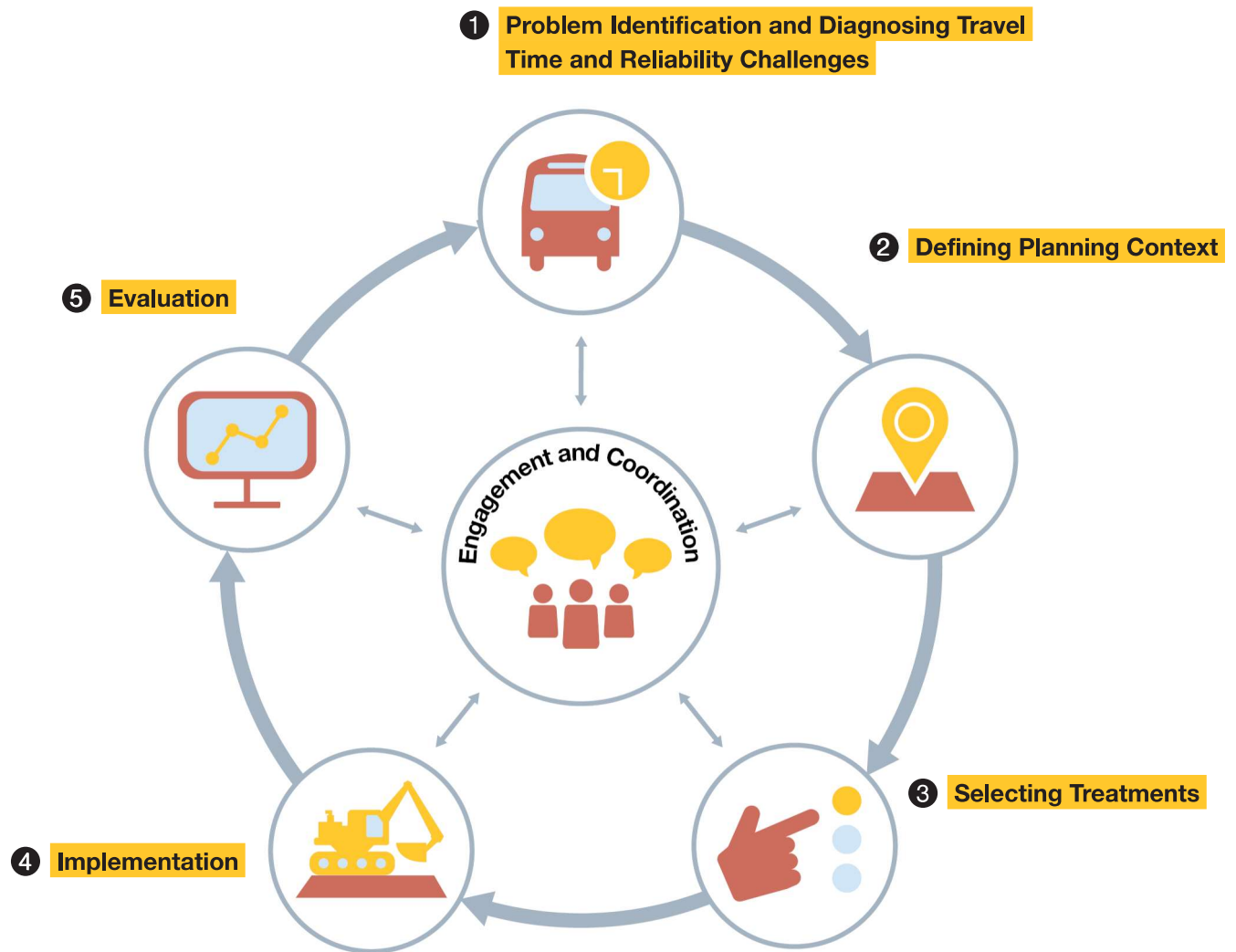**Table 1.** Bus Priority Treatment Considerations

Roadway Projects	Transit Priority Treatment Considerations
▶ Regular roadway maintenance or quick-build projects (e.g., restriping, resurfacing)	▶ Dedicated or part-time bus lanes ▶ Bus bulbs ▶ Bus stop accessibility upgrades
▶ Signal infrastructure upgrades and timing changes	▶ Transit signal priority (TSP) ▶ Queue jumps ▶ Leading pedestrian intervals
▶ Intensive street construction	▶ Center-running bus lanes ▶ Median bus platforms ▶ Separated busway ▶ Transit-only street ▶ Fixed guideway ▶ Pedestrian bulb outs and refuge islands ▶ Bus stop accessibility upgrades
▶ Bicycle infrastructure projects	▶ Floating bus stops ▶ Vertical protection (posts, concrete curbing, or parking) ▶ Bike signals and signage

The Project Lifecycle

Implementing bus priority treatments is most effective when the MBTA, local jurisdictions, and other stakeholders follow a common framework. Following this framework allows for consistency among all projects throughout the project lifecycle from project identification to evaluation. This project lifecycle consists of five steps outlined below and in Figure 2 on the following page.

1 **Problem Identification and Diagnosing Travel Time and Reliability Challenges** MBTA staff and municipalities jointly evaluate and monitor existing transit corridors and key performance indicators (KPI's) to assess mobility challenges and needs and identify the causes of transit delays and unreliable service.

2 **Defining Planning Context** The project lead and MBTA coordinate to define the purpose of the street and develop project goals and objectives consistent with state, regional, and local transportation policy and plans.

3 **Selecting Treatments** The project lead, MBTA, and local decision-makers work jointly to identify potential treatments that would address transit delays and improve overall mobility consistent with project goals and objectives. Treatments are selected with input from local stakeholders and an evaluation criteria.

4 **Implementation** The project lead and MBTA coordinate to establish cost-sharing agreements, construction plans, and traffic and transit reroutes. Construction plans are communicated to adjacent communities for their feedback and awareness.

5 **Evaluation** The project lead and MBTA report out the projects progress against KPI's and use the evaluation criteria to determine if the treatments are achieving their intended objectives. In addition, the project lead should seek feedback from the community on and the evaluation criteria developed jointly use the evaluation criteria developed in beginning project stages to evaluate treatment effectiveness.

Engagement and Coordination: MBTA staff, municipalities, and additional key stakeholders (e.g., advocates, community organizations, elected officials) coordinate and engage with one another throughout the project lifecyle. Who is involved and how is covered in more details in Chapter 6: Planning and Engagement (p. 100).

1 Problem Identification and Diagnosing Travel Time and Reliability Challenges

2 Defining Planning Context

3 Selecting Treatments

4 Implementation

5 Evaluation

Engagement and Coordination

The Project Lifecycle: This transit priority toolkit was developed to be useful throughout the main steps of the project lifecycle.

Toolkit Audience

This toolkit is primarily designed to help municipalities and MBTA transit staff. However, elected leaders, other public agency staff, transit advocates, and community members should be able to use this document for educational and advocacy purposes.
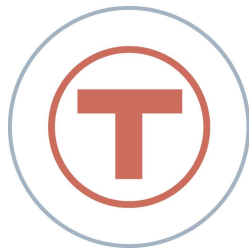
	MBTA	**State agencies**	**Municipalities**
About the audience	Develops service plans and route changes, short, medium, and long-term transportation plans, capital plans and budgets, operation and maintenance plans, and in some cases directly manages, designs and implements transit priority projects.	MassDOT, the Department of Conservation and Recreation (DCR), and Massport are responsible for a system of bridges, highways, and roads, that overlap with the MBTA service area.	Primary roadway owner. Addresses community planning and mobility needs and develops funding and planning recommendations. Designs and monitors street projects, coordinates with construction teams, oversees street operations and maintenance activities, and analyzes project viability.
How can they use the Bus Priority Toolkit?	Uses toolkit to identify and analyze speed and reliability challenges, and select and implement transit priority treatments—in coordination with municipalities.	Uses the toolkit to better understand how to support transit priority treatments on state-owned rights-of-way (ROW) and in support of state transportation and climate goals.	Uses toolkit to identify the root cause of travel time and reliability challenges, and select transit priority treatments—in coordination with the MBTA.

Community groups and advocates

Advocates for safe, reliable, and equitable transit within the community while also sharing information and knowledge within their community and to MBTA and local municipalities.

General public including transit riders

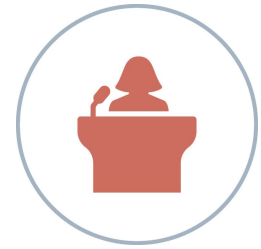Community member who lives within the MBTA service area. Intentionally seek perspectives of older adults and people with disabilities.

Private institutions and business community

Local chambers of commerce, Main Street districts, and small business owners.

Elected officials

Influences and approves local development and transportation plans, as well as municipal budgets, and local policy and planning regulations.

Uses toolkit to stay informed about the MBTA's approach to transit priority projects and to help advance projects important to their mission forward.

Uses toolkit to stay informed about MBTA decision-making and to prepare for discussions with the local and state agencies about potential projects in the community. Works with local advocates, community groups, and elected officials to advocate for changes.

Uses toolkit to develop projects that address local mobility needs and improve transit speed and reliability—in coordination with municipal staff. Communicates with constituents using toolkit planning and engagement guidance.

In addition, the toolkit is a resource for consultants, nonprofits, and foundations that support the MBTA, local municipalities, and MassDOT on transit priority projects.

Travel Time and Reliability Challenges in Operations and Design

Better bus service requires rethinking street design and the operating environment for buses to reduce transit delays, speed up bus service, and eliminate conflicts with other modes of transportation. Diagnosing transit delay is a key component to improving transit speed and reliability.

Prior to the pandemic and the expansion of the MBTA bus priority program, buses traveled less than 10 mph during peak periods, and on some routes buses traveled less than 4 or 5 mph—close to the average walking speed. Slow bus service creates a snowballing effect that leads to late buses, crowding, bus bunching, and ultimately leads to frustration and missed appointments for riders. Deteriorating service also disproportionately impacts Black transit riders, who spend on average 64 hours more a year on transit than their white counterparts, according to the Metropolitan Area Planning Council for the Greater Boston Region.

Diagnosing transit delays to select the most effective transit priority treatment is essential to continue to close the equity gap and make bus service more reliable. Transit delays are most commonly due to the following:

▶ Congested intersections and streets
▶ Right and left turn queues
▶ Heavy curbside loading and unloading activity
▶ Long boarding times
▶ Frequent stopping at signals or closely spaced stops
▶ Traffic signals and double stopping
▶ Bus stops that are not sufficiently long

While some delays are concentrated during peak-periods, mobility needs and delay type changes throughout the day. It's important for transit agencies and their municipal and state partners to coordinate regularly to review and evaluate data and develop shared solutions.

After identifying routes and streets where there are high concentrations of delay it's important to pinpoint exactly where that delay is occurring, whether it be at the intersection, stop, along the length of the street/route, or if it's an alignment issue.
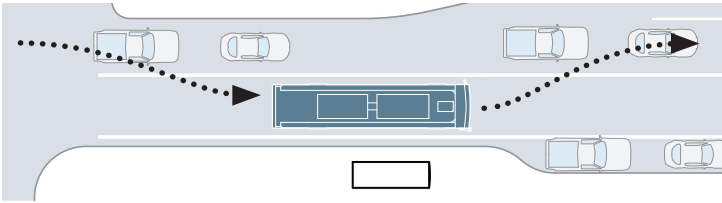
1 Bus Stops Delays are caused by the stop location and boarding environment. Treatments should make it easier to access the stop, reduce signal and boarding delays, and provide adequate space and amenities for riders. Bus stops should be long enough so that the ramp deploys to a flat and unobstructed location.
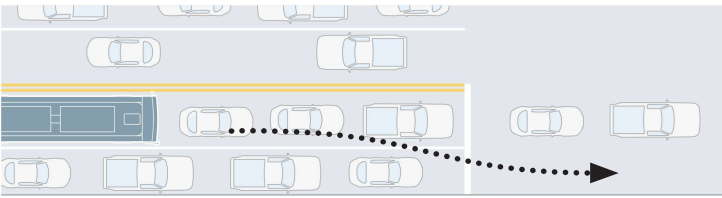
2 Intersections Delays are caused by long queues, which is typically due to turning traffic or down or upstream congestion. Treatments should allow buses to bypass slower vehicles and avoid red lights.
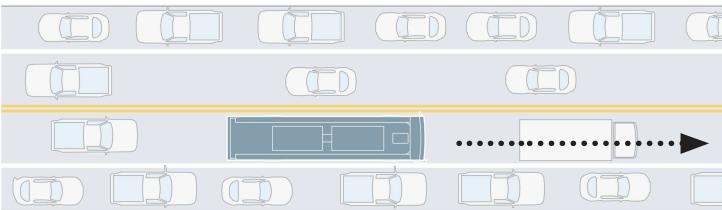
3 Traveling Delays while traveling are caused by congestion or heavy curbside activity or in many cases both. Treatments should allow buses to bypass traffic and loading/ unloading activities.

4 Operations Delays occur when there is a shortage of operators available, a mismatch in scheduling and run times, vehicle failures or safety issues, and deferred maintenance. This can exacerbate speed and reliability issues.
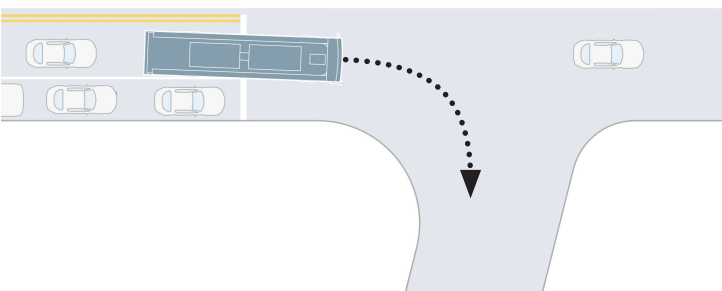
5 Route Design Routing decisions influence how often delays occur. Route design factors that most affect bus travel times include route conditions (traffic, walking, and biking environment, and adjacent land use), route length, stop spacing, the number of turns, and the turning radii.

Diagnosing Travel Time and Reliability Challenges

Municipalities can use transit key performance indicators (KPIs) identified as part of the MBTA's Service Delivery Policy (SDP), data from previous studies and municipal plans, and data collected from public outreach to diagnose travel time and reliability challenges. Some key tools and data used to identify where these challenges occur are discussed below and summarized in the table on the next page.

▶ **Transit data and KPIs** are the most readily available information to monitor performance. Transit data allows planners to analyze trends and compare routes within the MBTA system. Quantitative KPIs, such as ridership, run times, and on-time performance, help identify under-performing routes and prioritize route improvement plans. In addition, qualitative transit data, such as transit rider complaints and on-board survey results, can highlight operational blind spots. Municipalities can also use the MBTA's Plan for Accessible Transit Infrastructure data to prioritize remediating barriers to access at existing bus stops.

▶ **Municipal plans and previous studies** include collected data that may affect bus travel times such as congestion levels, population density, land uses, and growth projections, which help reveal opportunities for transit priority investments within the service region.

▶ **Data collection** informs travel time and reliability inquiries. This collection may include personal observations, field work, and outreach that observes operating conditions to assess first-hand experiences, including how transit interacts with people who bike, walk, and drive. In addition, this can include community outreach to evaluate why people do or do not ride transit and their sentiments about the quality of service.

The Bus Network Redesign Transit Priority Plan was developed to show where transit priority will best support the BNRD. Analysis of BNRD service frequency, existing bus and passenger delay, and speed and runtime variability was used to identify corridors where transit priority will help achieve the service and reliability vision for the new network. A Transit Criticality score was given to each segment to help roadway owners prioritize projects more equitably.

Table 2. Data and Tools Used to Diagnose Travel Time and Reliability Challenges

Type of Data or Tool	Qualitative	Quantitative
▶ Transit data and key performance indicators	▶ Customer satisfaction and complaints ▶ On-board survey results (e.g., purpose of trips)	▶ Ridership (e.g., by trip, route, or stop) ▶ Run times (from stop or timepoint level) ▶ Passenger loads ▶ On-time performance ▶ Travel speeds ▶ Revenue hours ▶ Dwell times ▶ Cost per passenger/hour ▶ Bus frequency/headways
▶ Existing municipal plans and previous studies (e.g., environmental impact studies)	▶ Neighborhood design ▶ Roadway types and hierarchy ▶ Right-of-way (ROW) configurations (e.g., lane widths, sidewalk widths, crossing and curb ramp data)	▶ Travel conditions (e.g., traffic congestion, traffic volume) ▶ Current population and projected population growth ▶ Travel flows ▶ Population density
▶ New data collection (e.g., surveys, charettes)	▶ Community survey (e.g., transit use) ▶ Customer Satisfaction survey	▶ Roadway incidents ▶ Bicycle/pedestrian counts