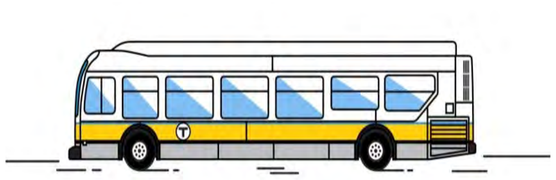
Better Bus Project
Making transit better together

What is the Better Bus Project?

The Better Bus Project Is

- ***A major step in our efforts to improve bus service and the system as a whole***
- ***A key part of our system-wide $8 billion, 5-year capital investment program that began July 1, 2018***
- ***The MBTA's partnership with more than 50 municipalities and MassDOT***

Riders can see some of these efforts in action—like priority bus lanes and bus stop accessibility improvements. Some of our work—like new garages and better software for supervisors—is behind the scenes, and it helps keep 1,000 buses operating to carry about 400,000 riders each day. All of this together is the Better Bus Project.



What Is the Initiative?

How Does the Initiative Improve My Experience?

	It is easy to find the best transit route to my destination	*The bus, stop, and sidewalks are comfortable, safe, and accessible*	*At the stop there is good information on what route to take and when the next bus is coming*	*The bus is frequent*	*It is easy to board (even with a wheelchair, a stroller, or luggage)*	*The trip is fast*	*The trip is reliable*	*The route is direct*	*Connections are easy to understand, reliable, and comfortable*
Bus Transit Priority	○	○	○	●	○	●	●	○	●
Bus Network Redesign	●	●	○	●	○	●	●	●	●
2019 Route Changes	●	●	○	●	○	●	●	●	●
Bus Stops: Accessibility Improvements, Shelters, and Amenities	○	●	●	○	●	○	○	○	●
Bus Modernization: Fleet and Facilities	○	●	○	●	●	○	●	○	○
Improved Passenger Information: E-Ink Signs	●	○	●	○	○	○	○	○	●
Bus Operations: Skate—Mobile Dispatching	○	○	○	●	○	○	●	○	○

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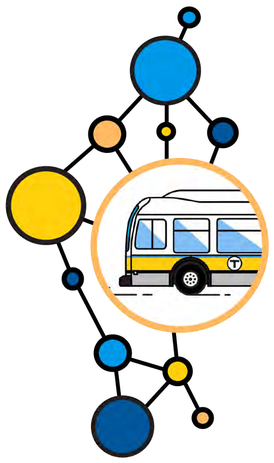
Bus Network Redesign

What Is the Bus Network Redesign?



Bus Network Redesign

An initiative of the Better Bus Project

A complete re-imagining of the MBTA's bus network to reflect the travel needs of the region and create a more competitive bus service for current and future bus riders.

WHERE ARE PEOPLE GOING?

TRAVEL DEMAND

IS TRANSIT CONNECTING PEOPLE TO WHERE THEY NEED AND WANT TO GO?

ACCESS

IS TRANSIT A GOOD OPTION?

COMPETITIVENESS

Why Are We Redesigning the Bus Network?

Greater Boston has experienced significant changes in recent years, while the bus network has largely stayed the same:

New employment districts have emerged

Travel patterns have changed

Demographics have shifted

Traffic congestion has increased

Ridership has declined

In order to respond to these changes, the Bus Network Redesign will recommend a new network that better serves the needs of the region.

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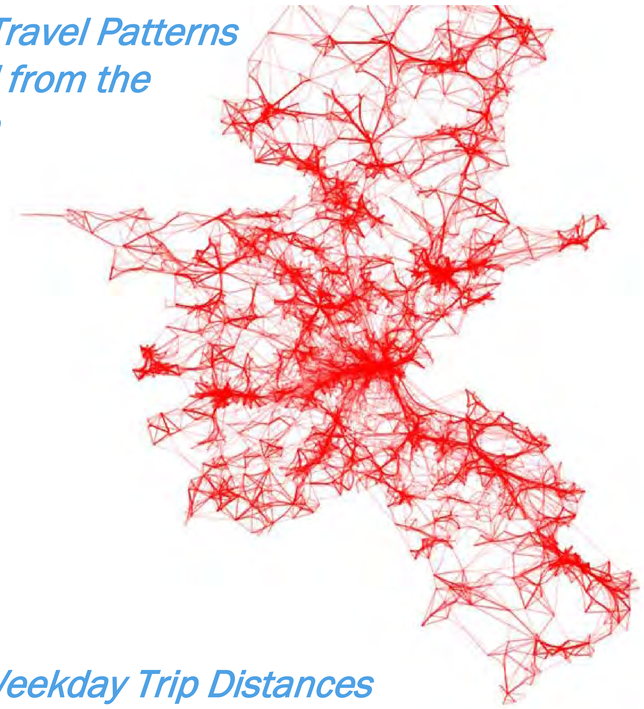
Using Location Based Data to Understand How People Travel

How Are We Measuring Travel Demand?

Location Based Services (LBS) data provides a way to examine total travel demand so we know what to evaluate our network against. LBS data:

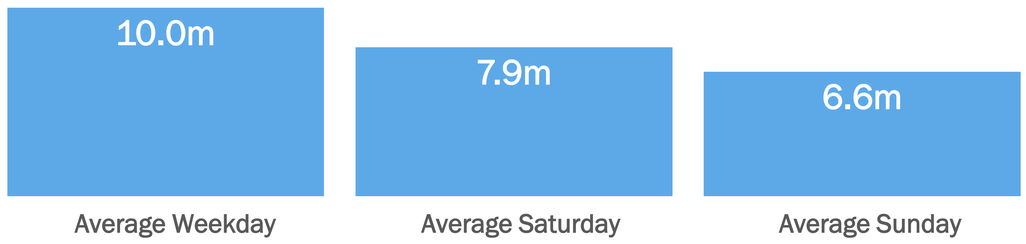
- Describes average weekday, Saturday, and Sunday travel based on 12 months of travel across *all* modes (not just transit).
- Comes from a range of smart phone applications (multi-language, lifestyle, travel, news, etc.) that have opted into location-based services.
- Is anonymized and unlinked from cell phone numbers and individuals to preserve privacy.
- Is validated against local conditions, the National Household Travel Survey, etc.

General Travel Patterns Exhibited from the LBS Data

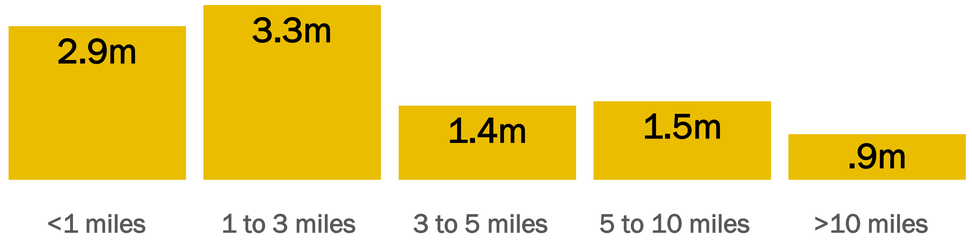


Initial Findings

Total Travel on an Average Day in 2018



Distribution of Average Weekday Trip Distances



Average Weekday Trip Distance by Trip Purpose

What Does Your Phone Think is a Trip?

1. **Home to daycare** – home-based other trip
2. **Daycare to work** – non-home-based trip
3. **Work to grocery** – non-home-based
4. **Grocery to daycare** – non-home-based
5. **Daycare to home** – home-based other trip
6. **Home to work** – home-based regular/commute

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Measuring Equity with Data

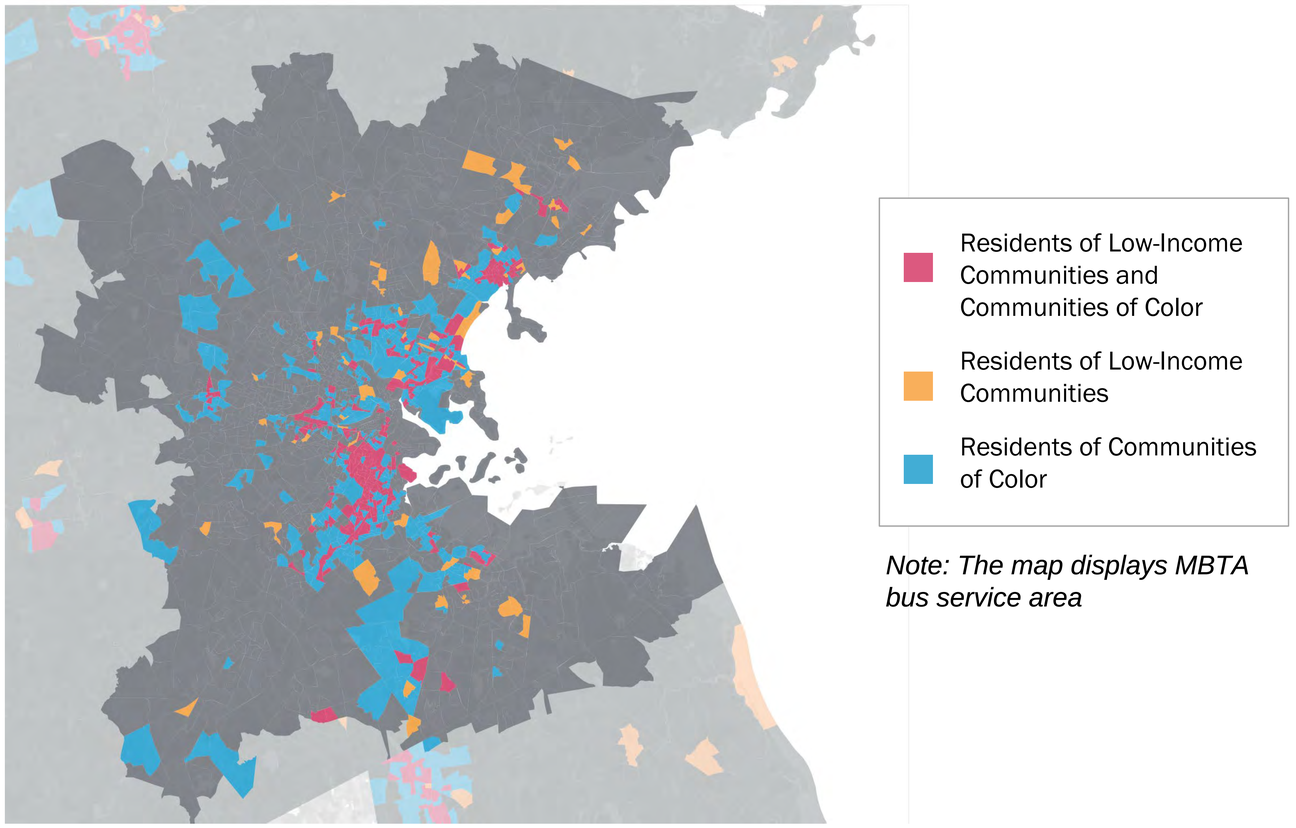
Initial Findings

- We identified geographies that have a high proportion of low-income people and people of color and tagged devices that have a "home" in that geography. The trips made by those devices also were tagged as made by a resident of a low-income community or community of color.

- Even when a trip happened between two high-income areas, for example, the trip was tagged as belonging to a person with a home in a low-income area. This is important because a high-percentage of trips start and end outside of the device's home geography.

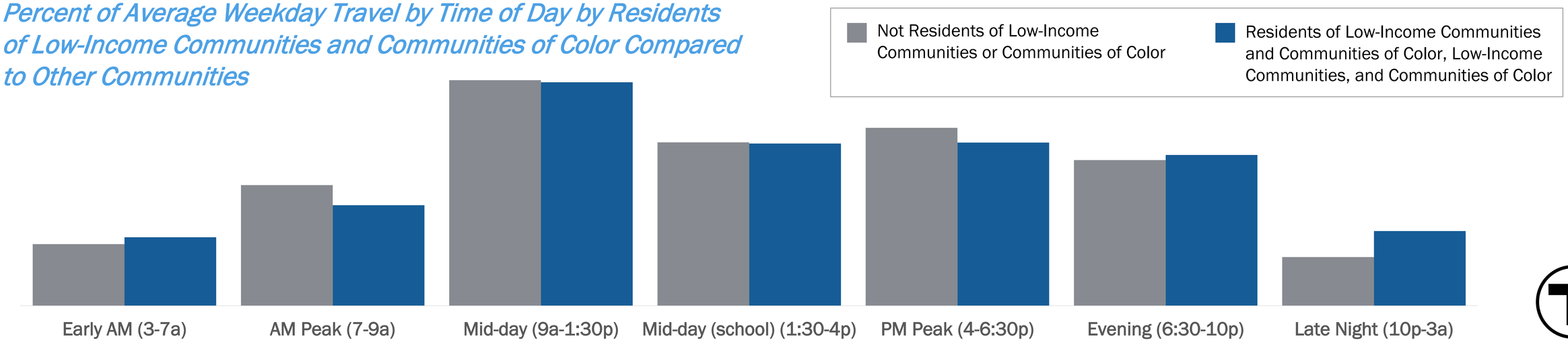
- According to the Location-Based Services (LBS) data, residents of low-income communities and communities of color make relatively more trips during early morning and late night hours, and relatively fewer trips in the morning and afternoon peak periods.

Low-Income Communities and Communities of Color in the MBTA Bus Service Area



Note: The map displays MBTA bus service area

Percent of Average Weekday Travel by Time of Day by Residents of Low-Income Communities and Communities of Color Compared to Other Communities



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Measuring Success for the Bus Network Redesign

All About Competitive Access

1 Is the MBTA connecting people where they need to go? → Access

2 Is transit a reasonable option to make the trip? → Competitive

Measuring Competitive Access

TRIP COVERAGE

The portion of the region's trips that have a competitive transit option.

REGIONAL ACCESS

The portion of the region's residents that can reach their regional and local destinations with a competitive transit option.

EQUITY

Both measures will be evaluated for low-income people, people of color, people with disabilities, and other groups identified through outreach.

Public Input for Measures

WHAT DOES IT MEAN FOR TRANSIT TO BE COMPETITIVE?

- How far are you willing to walk to reach transit? Are you willing to transfer?
- How frequent is good service? How fast is good service?

WHICH DESTINATIONS ARE IMPORTANT TO YOU?

- What are the major regional destinations that are important for you to access?
- What area do you consider local?

WHICH TYPES OF TRIPS SHOULD WE CONSIDER?

- How long does a trip have to be for you to consider public transit?

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Tell Us What Makes Transit a Good Option for Your Regular Commute to and from Work

We are interested in learning more about what makes transit a competitive option for different people. This includes both understanding people's preferences for different aspects of service, including walk distance, frequency, transfers, and travel time, as well as understanding how these preferences change for different types of trips. The following are examples of the types of questions we will be asking through this process:

What level of convenience would you experience if you had to walk the following distances to transit service?

	Convenient	**Inconvenient** I would take the service if other aspects of it were convenient	**Unacceptable** I would not take the service
0.05 miles about 1 minute			
0.25 miles about 5 minutes			
0.5 miles about 10 minutes			
0.75 miles about 15 minutes			
1 mile about 20 minutes			
1.25 miles about 25 minutes			

What level of convenience would you experience if transit service came at the following frequencies?

	Convenient	**Inconvenient** I would take the service if other aspects of it were convenient	**Unacceptable** I would not take the service
Every **5 minutes**			
Every **10 minutes**			
Every **15 minutes**			
Every **20 minutes**			
Every **30 minutes**			
Every **1 hour**			

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Tell Us What Makes Transit a Good Option for Your Trip to a Friend's House

We are interested in learning more about what makes transit a competitive option for different people. This includes both understanding people's preferences for different aspects of service, including walk distance, frequency, transfers, and travel time, as well as understanding how these preferences change for different types of trips. The following are examples of the types of questions we will be asking through this process:

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Every **10 minutes**			
Every **15 minutes**			
Every **20 minutes**			
Every **30 minutes**			
Every **1 hour**			

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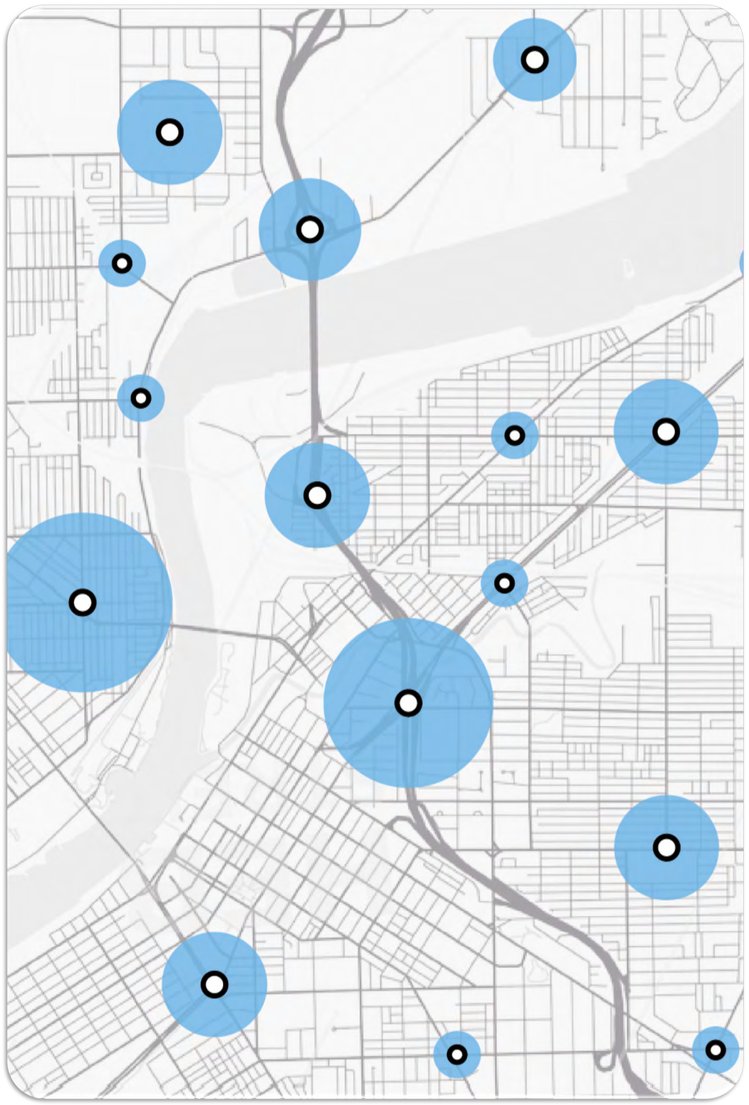
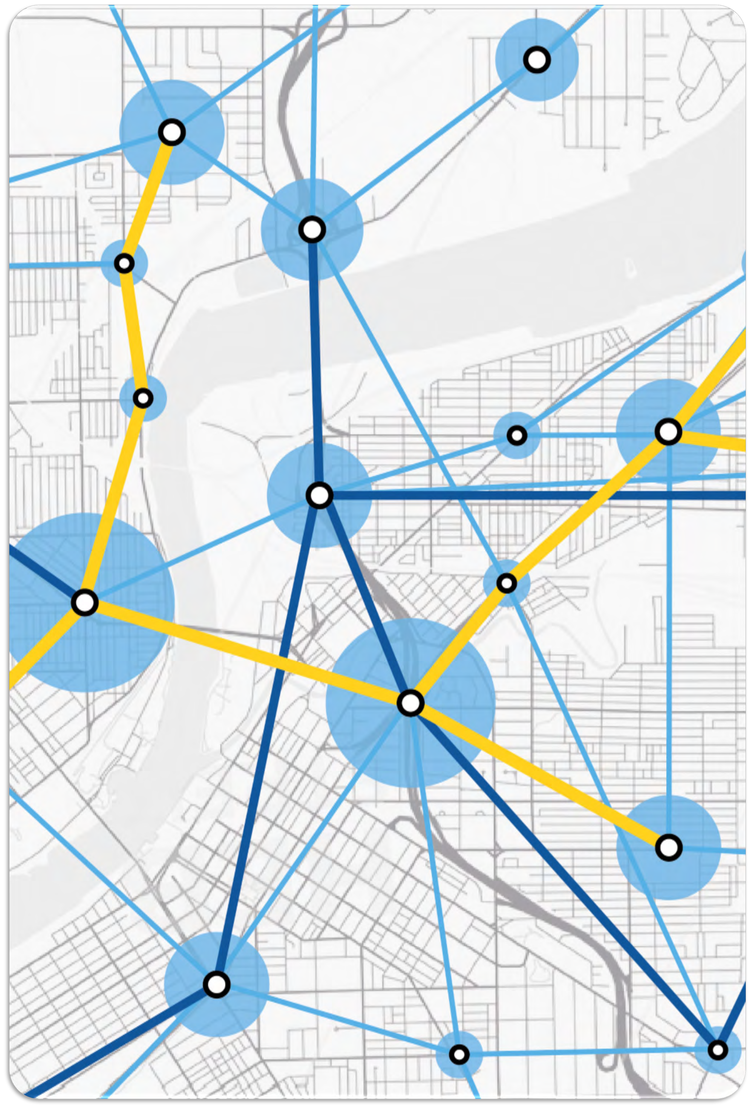
Designing a Better Bus Network

STEP 1: What Does Travel Demand Look Like in the Region?



STEP 2: Where Do We Need Service?



STEP 3: What Is the Network That Best Serves the Needs of the Region?

Destinations — High Frequency — Medium Frequency — Low Frequency

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Building a Better Bus Network

From Planning to Implementation

Help us build a Better Bus Network – there will be multiple opportunities to provide input

Project Timeline

In-Depth Data and Analysis		Develop and Evaluate Bus Network Alternatives	Final Recommendation	*First Phase of New Service* *New network to be phased in over 3-5 years*
2019 through Winter 2020	Spring/Summer 2020	Fall/Winter 2020	2021	2022

Gather Public Input

Fall/Winter 2020 — Multiple Network Maps

- ***Routes and level of service***
- ***High priority/high frequency corridors*** that need transit priority
- ***How competitive are different network options:*** Walk time, travel time, frequency, and number of transfers between key destinations

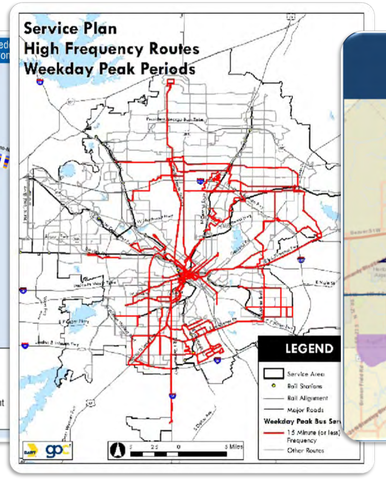
2021 — Draft Network Map

Same information as before PLUS:

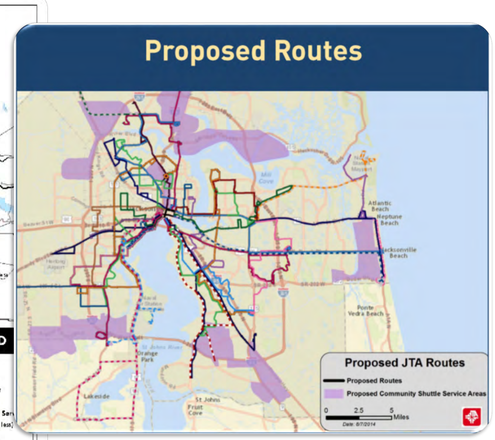
- ***Detailed routes*** with stop spacing
- ***Span of service***
- Title VI ***equity analysis***
- Details required for ***implementation:*** bus and facility needs

Bus Network Map Examples

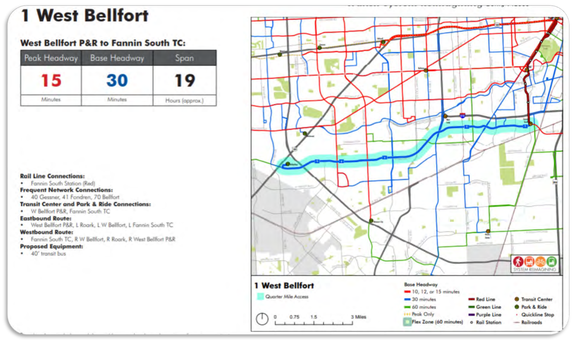
Staten Island



Dallas



Jacksonville



Example route-level details from Houston

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Equity and Title VI

48%

of MBTA bus passengers self-identified as having minority status

42%

of MBTA bus passengers were identified as low-income individuals

What is Title VI?

Title VI of the Civil Rights Act of 1964 is a Federal law that protects people from discrimination based on race, color, or national origin, in programs and services that receive federal financial assistance.

The MBTA Follows Title VI By:

- ***Providing Notice of Nondiscrimination***
- ***Responding to Civil Rights Complaints***
- ***Providing Translation Assistance***
- ***Ensuring Inclusive Public Participation***
- ***Studying Service and Fare Changes to Avoid Risk of Bias***
- ***Reporting on MBTA Title VI Activities***

Data Source: 2015-2017 MBTA Systemwide Passenger Survey

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Equity Analysis: Major Service Change

Bus Network Service Change

+/- 10% of Total
Network Service Hours

EXAMPLE: Extended late night service on all routes

Route Service Change

+/- 25% of
Service Hours

OR

+/- 3 miles or 25%
Service Miles

EXAMPLE: Extended route five miles

Why Does the MBTA Do This?

To identify the risk of:

Disproportionate Burdens

Disparate Impacts

How Does the MBTA Do This?

1. ***Propose Changes***
2. ***Inform Board***
3. ***Develop Service Options***
4. ***Analyze Changes***
5. ***Conduct Outreach***
6. ***Develop Final Recommendations***

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2019 Route Changes

We Made Improvements to 50 Bus Routes in Fall and Winter 2019

In 2019, we implemented two rounds of route changes to make our bus system more reliable, improve frequency, and make routes easier for riders to understand. The first round of service changes went into effect September 1, 2019, and the second round went into effect December 22, 2019.

HOW YOU HELPED US GET THERE

In early 2019, we shared 47 proposals for near-term changes that would allow us to better invest in long-term changes that will improve frequency and reliability, and make our service easier for our customers to use. These proposals included plans for:

- ***Consolidating duplicate routes***
- ***Improving the space available at bus stops***
- ***Eliminating obsolete variants of some routes***

In May 2019, the Fiscal and Management Control Board (FMCB) approved 36 bus route service changes: 27 of the 47 near-term change proposals without adjustments, and 9 with adjustments based on public feedback.

Over 6 weeks of public engagement, the project team had over 2,500 in-person interactions across about 75 meetings, briefings, open houses at stations, and conversations with riders at bus stops.

Final Package of Near-Term Changes to Bus Service
Adopted May 2019

1 & CT1	4	5 & 16	9	34 & 34 E	35
36	37	59	60	64	70 & 70 A
72, 74, & 75	89	90	92	95	106
111	120	134	210 & 202	220	222
225	350	411	424	428	435
441, 442, 448, & 449	455 & 459	501, 502, 503, & 504			

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Bus Transit Priority

Why Prioritize Buses on City Streets?

One third of MBTA ridership is on the bus, connecting riders in over 50 municipalities across Metro Boston. Since 2016, bus priority projects have been speeding up buses and saving riders time.

EVIDENCE FROM RECENT PROJECTS

- After implementing a bus lane on Washington Street in Roslindale, commuters saw a ***20 to 25% reduction in travel time*** during the worst hour of congestion.
- On Broadway in Somerville, bus lanes contributed to an increase in ridership with an additional ***230 more weekday riders and over 400 more daily riders on weekends.***

Brighton Ave, Boston

How We Can Improve Your Bus Commute

By partnering with local municipalities, the MBTA is improving bus commutes by implementing:

- ***Bus Lanes***
- ***Improved Boarding***
- ***Transit Signal Priority***

Most of these solutions can be done quickly through low-cost methods.

Broadway, Everett

Bus Lanes

Speeding up buses on busy streets

Charles St, Boston

Improved Boarding

Creating accessible, comfortable bus stops


Mass Ave, Arlington

Transit Signal Priority

Extending green lights for buses at busy intersections

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Bus Shelters and Amenities

About the Project

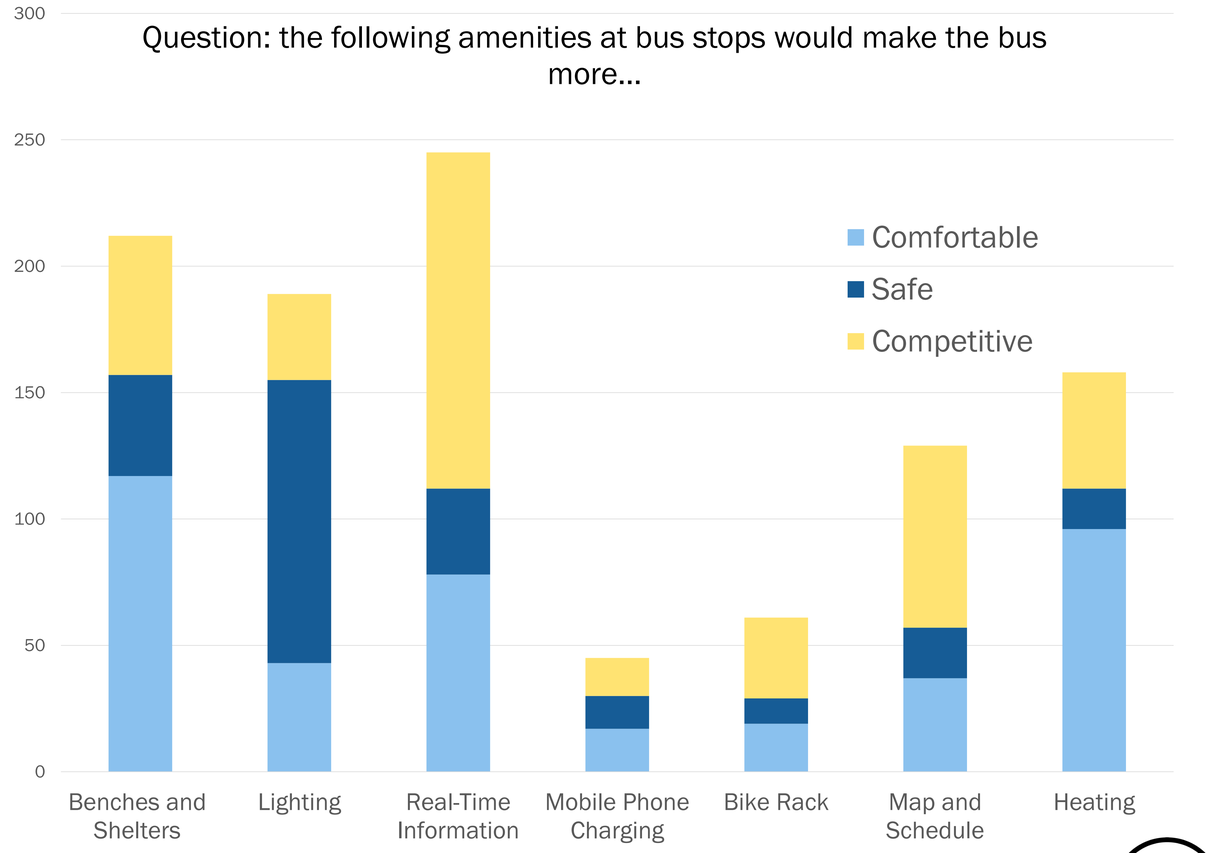
The Bus Shelters and Amenities Program seeks to provide a safe and dignified bus stop experience across the MBTA's service area.

For the last year, the MBTA has been speaking with riders, communities, and municipalities about how amenities can support and encourage bus ridership.

Project goals

- Human-centered network of amenities
- Consistent customer experience across all municipalities
- Clear and enforceable maintenance standards
- Target maximum number of customer journeys
- Use ongoing revenue streams to support amenities

How do bus stop amenities affect your travel?



Source: MBTA Better Bus Project Community Meetings. (2019).

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Bus Stop Accessibility

Plan for Accessible Transit Infrastructure

SURVEY → DATABASE → METHOD → 20 YEAR PLAN

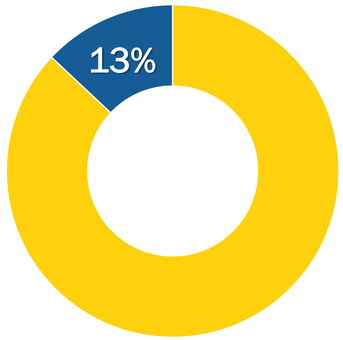
System-Wide survey all Bus Stops, Subway and Commuter Rail Stations

Create a catalogue and database of all meaningful barriers to accessibility

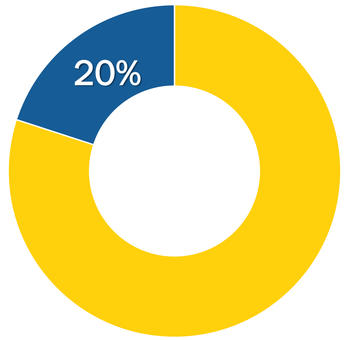
With guidance from community stakeholders, establish a repeatable methodology for prioritizing access improvements

Develop 2019 recommendations for expanding access system-wide over next 20 years

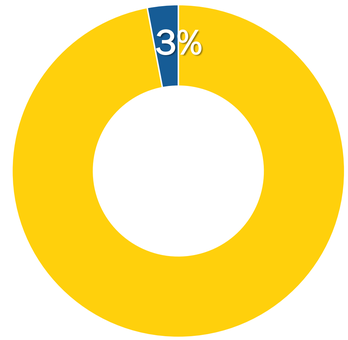
Snapshot of Barriers



Stops with Missing Curb Ramp



Stops with Narrow Sidewalk



Stops with Critical Barriers

System-Wide Survey of Bus Stops

170 Critical bus stops identified for closure due to very low/no ridership:

- ***46 have already been closed due to very low/no ridership and missing signage***
- ***Remaining stops require a higher level of municipal coordination***

Stops Surveyed: ***7690***
Towns Impacted: ***51***
Routes Covered: ***184***

130 Critical bus stops identified for reconstruction:

- ***63 stops have been completed to date***
- ***67 will be constructed by spring 2020***
- ***45 stops are in conceptual design, to be constructed in 2020***

600+ High priority bus stops are being reviewed for concept level design.

Bus Stop Accessibility Improvements:

Before

After

- ***New landing pads***
- ***New sidewalks***
- ***New bus stop signs***
- ***New curb ramps***
- ***New crosswalks***
- ***New pedestrian signals***

Bus Stop: High Street Opposite Nichols Road, Hingham

The MBTA is sharing data with municipalities to encourage barriers be addressed in coordination with sidewalk, curb ramp and crosswalk upgrades.

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Bus Stop E-Ink Pilot

About the Pilot

Riders consistently tell us that real-time information is the bus stop amenity that they want most, and the one that would make them most likely to ride the bus more often. But we have 7,500+ bus stops across 50+ cities and towns, and all but a few don't have power. This makes live-updating real-time information a real challenge.

OUR GOAL

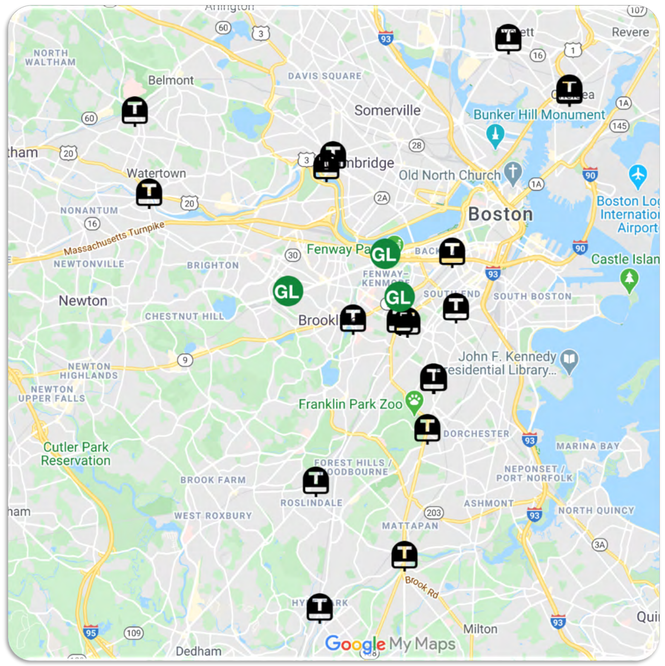
The objective of the pilot is to understand if and how these signs improve bus riders' experience. We plan to survey riders ourselves, and have partnered with the Institute for Human Centered Design to do a full accessibility review of the signs, too.

Where It's Happening

There are 18 E-Ink signs at bus stops in six cities and towns:

- ***Belmont (1)***
- ***Boston (11)***
- ***Cambridge (2)***
- ***Chelsea (2)***
- ***Everett (1)***
- ***Watertown (1)***

Stops were selected based on solar exposure and ridership.



See mbta.com/einkmap for more.

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Skate: Bus Dispatch App

What is Skate?

Skate is a new web application designed and built by the MBTA, for the MBTA, with one goal in mind: to give bus inspectors in the field access to the real time information they need to keep buses running smoothly for our riders.

WHY WE BUILT SKATE

There's no shortage of mobile apps designed to make it easier for riders to know when and where to catch the next bus or train, but there's no equivalent app on the market designed to help transit staff to manage bus service. So, we decided to build it ourselves.

Bus operations partnered with our in-house technology team in April of last year, and the first version of Skate was launched four months later.

Progress to Date

- ***Skate v1.0 was launched to bus inspectors in July of 2019***
- ***A feature designed to assist with the management of planned shuttles (due to subway improvements) was added in fall 2019***
- ***Each weekday, about 60 bus inspectors use Skate***
- ***New features are being added to Skate every week based on field research and feedback from bus inspectors***
- ***Skate is open source, and other transit agencies around the country have begun to explore setting up their own instance of Skate***

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Bus Facility Modernization Program

Objectives

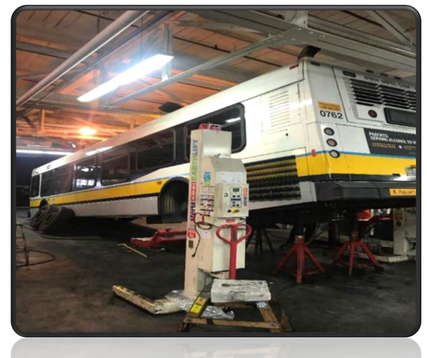
1) Increase bus storage/maintenance capacity to provide the MBTA with the opportunity to add service in the peak
2) Support the conversion of the MBTA bus fleet to zero-emission technology
3) Modernize conditions in MBTA facilities for our workforce

Challenges

- Facility network is currently at capacity, with no ability to shut down facilities during capital projects
- Technological challenges associated with electric buses require further planning
- Significant funding and public support will be key for overall network modernization

Highlighted Project

QUINCY BUS GARAGE



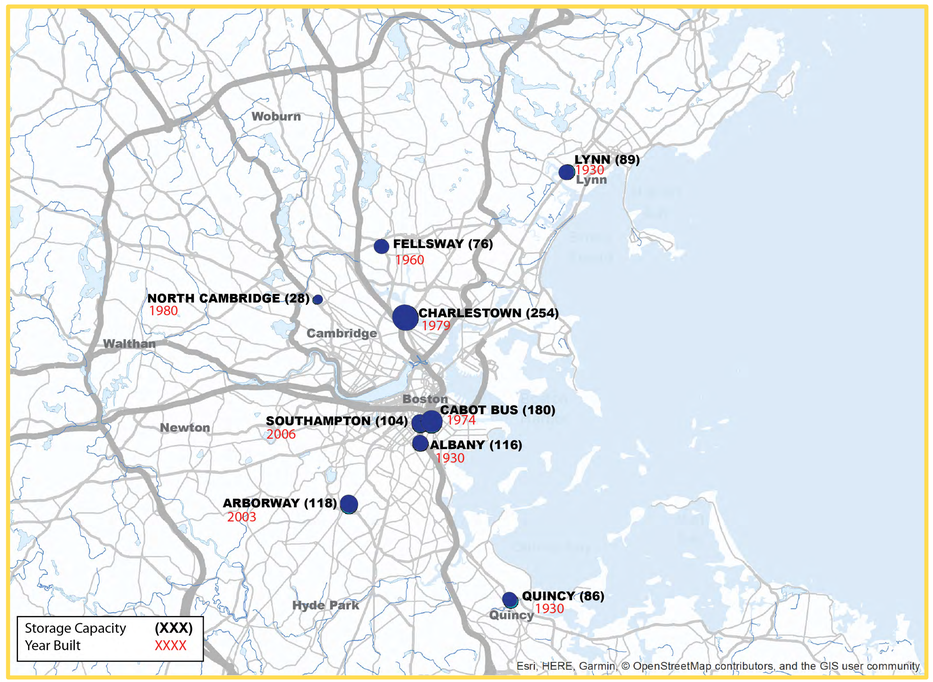
Facility need

- Current facility unable to accommodate modern buses
- Hancock Street location too small for future needs

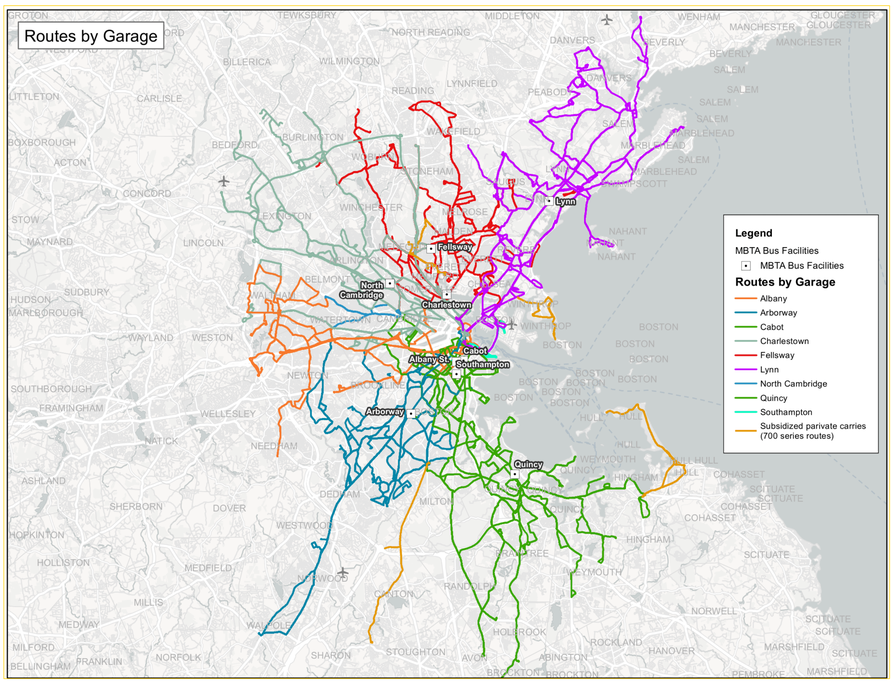
Proposed project

- Indoor state of the art facility
- Accommodate newest/cleanest buses
- Designed for battery-electric bus conversion
- Expanded capacity (from 86-120 buses)

MBTA BUS GARAGES



ROUTES BY GARAGE



Proposed Site For New Quincy Bus Garage

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Transition to Electric Bus Technology

About the Current Fleet

MBTA fleet consists of a variety of different bus types (clean diesel, CNG, battery-electric hybrid, dual-mode, electric trolley, and battery), which operate out of 9 MBTA facilities.

In order to make the transition to an electric bus fleet, facilities need to be updated to make them battery bus capable.

In the meantime, hybrid buses are being procured to replace aging fleets within the system.

Hybrid Buses Utilized as a Bridge Technology to All-Electric Vehicles

- Hybrid buses with ***increasing battery capacity,*** are capable of increased ***zero-emissions operation*** (engine off) and improved fuel economy.
- ***On-board charging*** (no wayside infrastructure required).
- ***Geo-fencing technology*** will enable MBTA to maximize hybrid benefits and reduce localized emissions.
- ***No range anxiety with cold weather.***

Types of Electric Buses

Charger Type	Image	Max. Charge Rate (kW)
PLUG-IN (electric cable plugs into bus)		100-150
OVERHEAD (automated overhead gantry)		300-500
INDUCTIVE (charger integrated with road surface)		50 or 200

Battery Bus Technology Challenges

COLD WEATHER RANGE REDUCTION

- ***Cold weather operation can reduce advertised range by upwards of 40+% without the use of a fuel fired auxiliary heater***

INFRASTRUCTURE REQUIREMENTS

- ***Major upgrades and capital investments to infrastructure required***
- ***Power demands are significant***

Battery Bus Technology Opportunities

- ***Agencies continue to evaluate various zero-emissions technologies on small scales***
- ***Battery technology and battery energy density continue to improve***