Greater Boston Bus Experiments: From Pilots to Permanent Impacts

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Why Are Buses Important for Boston?

- Buses carry **450,000 people** daily throughout Greater Boston.

- Bus riders make up **30% of MBTA users** but bus reliability lags far behind both the commuter rail and subway lines, where trains arrive on schedule at a rate approaching **90%**.

- Buses meet the MBTA’s own reliability targets of 75% just **14% of the time** with “non-key” routes meeting targets only 9% of the time.

- Boston was recently named the **most congested city in the US** during rush hour (#CongestionChamps) and is ranked **7th most congested city in the world**.

- Approximately **7 miles of Boston streets** are holding back more than **1/5 of all MBTA bus riders**.

- Black riders spend **64 hours* more per year on MBTA buses relative to white riders** (*MAPC Regional Indicators Report, 2014*).
Buses Experience a lot of Delays

Red = delays during rush hour

http://bostonography.com/bus/
Boston’s Traffic Takes a Toll on Bus Riders

• MBTA buses stuck in traffic increase operating costs for the agency and decrease service reliability for riders.

• The #111 bus, the sixth-busiest bus line in the MBTA system, regularly takes 25-45 minutes to travel the 2.7 miles from Chelsea to downtown Boston (average of ~6mph).
Buses are Stuck at the Station

**Dudley to Downtown Current Sources of Delay**
- Bus Stop Delay: 14%
- Intersection Delay: 19%
- Congestion Delay: 67%

**Mattapan to Dudley Sources of Delay**
- Bus Stop Delay: 13%
- Intersection Delay: 40%
- Congestion Delay: 47%

Figure 10: Dudley to Downtown: current sources of delay by percentage
Figure 11: Mattapan to Dudley: current sources of delay by percentage
Bus Riders Face Poor, Inequitable Conditions

Annual Travel Time Disparity Compared to White Riders

- Black Riders: +64 hours
- Latinx Riders: +10 hours

Source: MAPC Regional Indicators, 2014
Boston Has Big Goals to Meet

- Cut citywide greenhouse gas emissions by 50% by 2030 and statewide by 80% by 2050

Mayor Walsh's Climate Plan: City Must Cut Car Use In Half By 2030

Go Boston 2030 Mode Shift Targets

<table>
<thead>
<tr>
<th>2030 Targets</th>
<th>Today Mode Share</th>
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<tbody>
<tr>
<td>Up by a third</td>
<td>PUBLIC TRANSIT</td>
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<tr>
<td>Up by almost a half</td>
<td>WALK</td>
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<tr>
<td>Increases fourfold</td>
<td>BIKE</td>
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<tr>
<td>Declines marginally</td>
<td>CARPOOL</td>
</tr>
<tr>
<td>Down by half</td>
<td>DRIVE ALONE</td>
</tr>
<tr>
<td>Slight increase in Work from Home</td>
<td>OTHER/WORK FROM HOME</td>
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By Christian Millen  Oct 11, 2019  3 COMMENTS

Boston Mayor Marty Walsh.

Building a Resilient & Carbon Neutral City.
BRT as a Solution for US Cities
Can BRT Work in Boston?

5 PRIME CORRIDORS FOR BRT IN GREATER BOSTON

Dudley to Downtown (Haymarket)

Harvard to Dudley

Readville to Forest Hills

Dudley to Mattapan

Sullivan to Ruggles
BRT Would Cut Bus Travel Times by 20-45%
"Quick Build" Bus Lane Pilots on the Rise

Bus Lane Pilots → Permanent Improvements

Top: Massachusetts Ave, Arlington
Top Right: Broadway, Everett
Right: Washington St, Boston

Mount Auburn Street, Cambridge/Watertown
## Bus Lane Project Investments

**Pre-2019 Bus Lane Investments:**
2. Boston: Washington St. (Roslindale)
4. Cambridge: Mt. Auburn St.
5. Everett: Broadway
6. Somerville: Prospect St.

**Completed in 2019:**
10. Somerville: Broadway

**Planned in 2019:**
15. Cambridge/MassDOT: Alewife access ramp

**In Planning for Early 2020:**
20. Boston: Roslindale

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
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<tbody>
<tr>
<td>Pre-2019</td>
<td>6.78 miles</td>
</tr>
<tr>
<td>2019</td>
<td>3.74 miles</td>
</tr>
<tr>
<td>Early 2020</td>
<td>4.19 miles</td>
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BostonBRT: Local Pilots 2018
(grant funded by the Barr Foundation)
Program Goals

- Save waiting time.
- Save traveling time.
- Improve the wait.
- Reduce travel stress.

✓ Testing elements of BRT on high ridership, high capacity corridors with significant delays.

Accelerate the Service

Elevate the Experience
Moving More People in Fewer Vehicles

Source: City of Cambridge, Mount Auburn Street
Unique Branding System
Transit Agency + Municipalities Working in Collaboration
Massachusetts Avenue Bus Priority Pilot

Arlington, Massachusetts

- One month duration
- Only during morning commute (6-9 am)
- Eastbound (inbound) direction only
- No permanent construction
- Extensive business & community
- Tied to local sustainability goals
Design Approach

Break Study Area Into Three Manageable Areas
Design Elements

Focus on Four Design Elements

Exclusive Bus Lane

Transit Signal Priority

Bus Stop Relocation

Queue Jump Lanes
Relocate Bus Stop to Far Side of Intersection/Add TSP

**Final Design**
Mass Ave at Lake Street

Relocate bus stop to far side of intersection

**Alternative:** With Transit Signal Priority

**Location:** Massachusetts Avenue from Lake Street to Alewife Brook Parkway

**Duration:** One Month Only

**Timeframe:** Weekday Morning Peak Period Only (6-9 AM)

**Direction:** Eastbound Direction Only

3 Parking Spaces
Temporarily Displaced
Final Design
Mass Ave Running Way

Provide Curbside Bus Lane from Varnum Street to Alewife Brook Parkway

Massachusetts Avenue from Lake Street to Alewife Brook Parkway
One Month Only
Weekday Morning Peak Period Only (6-9 AM)
Eastbound Direction Only

Remove curb extension

19 Parking Spaces Temporarily Displaced
Final Design
Mass Ave at Alewife Brook Parkway

Split Phase on EB Approach with Shared Left-Through Movement
Partnership with local Artists: “ArtBRT”
Pilot Outcomes: Buses Ran Faster

- Buses ran 5 minutes faster on average through the pilot corridor especially during 7:00-8:00 a.m. and 8:00-9:00 a.m.

**Route 77 Median Travel Time, Inbound**

- Before Pilot: 21.2 minutes
- During Pilot: 14 minutes
- 34% faster during pilot

- Before Pilot: 23.9 minutes
- During Pilot: 13.2 minutes
- 45% faster during pilot

**Route 77 Median Travel Time, Inbound**

- Before Pilot: 8.3 minutes
- During Pilot: 4.9 minutes
- 41% faster during pilot

- Before Pilot: 10.9 minutes
- During Pilot: 5.1 minutes
- 53% faster during pilot

Source: Massachusetts Bay Transportation Authority, APC Data—MBTA Route 77, September 9 – November 9, 2018
Pilot Outcomes: Buses Were More Consistent

- MBTA Buses ran consistently faster and reliability increased – variability fell below 5 minutes for all routes.
- Travel time in pilot corridor 8:00-9:00 a.m. for Route 77 before pilot: 11-17 minutes; during pilot: 5-7 minutes.

Route 77 Difference Between Median and 90th Percentile

Source: Massachusetts Bay Transportation Authority, APC Data—MBTA Route 77, September 9 – November 9, 2018
Pilot Outcomes: People Approved

- 3 surveys totaling 970 responses; post-pilot survey received 382 responses

- Respondents: drivers (43%), bus riders (36%), cyclists (14%), walkers (4%)

- 73% said the dedicated bus lane should remain; 58% said dedicated lane should be extended to Lake Street

Post-pilot survey: Based on your experience in your most common mode of travel, how satisfied are you with the BRT Pilot on Mass Ave?

- Very Satisfied: 47%
- Satisfied: 18%
- Neutral: 7%
- Dissatisfied: 20%
- Strongly Dissatisfied: 8%
Making it Permanent

Section 1:
- Trapezoidal area: 174sf
- Dashed bike lane: 4.7W x 20L (5 dashes, each 4.7W x 2L, 147sf)
- Bike lane: 4.7W x 106.5L (500.55sf)
- Solid dividing line: 1.5W x 146.7L (230.05sf)
- Parking gap 1: 8W x 27L (216sf)
- Parking gap 2: 8W x 4.8L (38.4sf)
- Parking gap 3: 8W x 6L (48sf)
- Paint area:
  - Red: 1,244sf
  - White: 20 sf

Section 2:
- Signs: Sign A refer to sign spec sheet
  - Sign B refer to sign spec sheet
- 9' skip striping with 1:1 skip to stripe ratio
  - Wide stripes: 4 lines, 15'L x 5W
  - White edge line: 8 lines, 9'L x 6W
  - Lettering: 6' tall letters, 1'6" gap between lines
- Paint area:
  - Red: 300 sf
  - White: 20 sf

Section 3:
- Dividing line: 4.7W x 146.2L (687.14sf)
- Parking gap 4: 8W x 4.8L (38.4sf)
- Parking gap 5: 8W x 52.4L (419.2sf)
- Bus stop: 263.62sf
- Parking gap 6: 8.5W x 23L (218.5sf)
- Paint area:
  - Red: 1,790.36sf

Section 4:
- 9' skip striping with 1:1 skip to stripe ratio
  - Wide stripes: 4 lines, 15'L x 5W
  - White edge line: 8 lines, 9'L x 6W
  - Lettering: 6' tall letters, 1'6" gap between lines
  - Paint area:
    - Rect: 300 sf
    - White: 20 sf

Section 5:
- Described on Part 2 of 3
- Signs: Sign A refer to sign spec sheet

Note: The diagram shows a road layout with various sections and specifications for making it permanent. The sections include details about paint areas, street signs, and dividing lines, among other elements.
Making it Permanent

• Coordination of and communication among multiple parties/ stakeholders
• Competitive procurement for lane painting as an add/alt for standard lane marking contract
• Use TNC funds from Lyft/Uber surcharge as funding source
Mount Auburn St. Bus Priority Pilot

October 2019 - Present

- No end date
- All day bus lanes coupled with permanent pedestrian safety improvements
- Extensive public & neighborhood engagement
- Multi-stakeholder collaboration
Mount Auburn Street is typically two lanes in each direction and carries up to 19,000 vehicles per day. The area is mainly residential with neighborhood commerce and offices. Bus routes connect important regional centers – Watertown and Harvard Squares.

MBTA Route 71 and 73: 12,000 weekday daily passenger trips combined.

Hospital university and employer shuttles
Project elements

- Little to no construction: flexposts, paint, signal changes, and signs
- No specific end date: to test, evaluate, develop a long-term plan
- Education and enforcement during and immediately after implementation

*Queue jumps in Watertown at Grove St. and School St.*
Partnership was key

- 2016 - 2017
  DCR Mt. Auburn Street Corridor Study

- 2018
  DCR Short Term Design Implementation

- 2018
  Cambridge Boston BRT Mt. Auburn St. Bus Priority Pilot

- 2018 - 2021
  Cambridge Belmont St. Design and Construction

- 2022
  Watertown Mt. Auburn St. Complete Street Project

DCR Mt. Auburn Corridor Study Area

- DCR Short Term Design
- Cambridge Mt. Auburn St. Bus Priority Pilot
- Cambridge Belmont St. Reconstruction
- Watertown Mt. Auburn St. Complete Street Project
Street design elements

- **Shared bus/bike-only lanes** eastbound, bicycle lane westbound
- **Transit signal priority** and queue jump signals
- **Queue jump lanes** in Watertown
- **Bent side street approach** to Mount Auburn St. with safer pedestrian crossings
Improved pedestrian crossings
Outcomes: Buses Ran Faster

People on MBTA buses save **36,000 hours**, cumulatively in a year.

With no measurable impacts to travel time for people driving.
Outcomes: People Approved

All respondents: How satisfied are you with the design of Mount Auburn St.?

All respondents: How comfortable would you rate Mount Auburn Street on a scale of 1 to 5?
Outcomes

• “It has completely changed my commute and given me back precious time. My commute is shorter 25 to 30 minutes each day.”

• “I can't say enough about how much better this dedicated bus lane makes my daily commute. It has improved my quality of life!”

• “I think this project might be too successful. The bus service has improved so much that I think there are many other passengers like myself who have started taking this bus route because it's so much faster.”
Keys to success

• Coordinate frequently with partner agencies and orgs
• Invest in as much outreach, education, and evaluation as possible
• Improve in a way that benefits more than one mode
• Be flexible during implementation – “make lemonade”
• Explore unconventional sources of data – e.g. Google API
Thank you!

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