



**Massachusetts Bay  
Transportation Authority**

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## **Better Bus Project Update**

FMCB, February 25, 2019



# Better Bus Project Process Map: Update

## Continuous Change

## Analysis

## Proposed Near-term Changes

## Multi-year Investment Strategy

## Future Network Redesign

### Phase 1

- ✓ Early Morning Pilot
- ✓ Late Night Pilot
- ✓ SL3 Service Expansion
- ✓ Dedicated Bus Lanes
- ✓ Transit Signal Prioritization
- ✓ Signal Optimization
- ✓ Addition Resources
- ✓ Dropped Trip Task Force
- ✓ Quarterly Goals

### Phase 2

- ✓ 1<sup>st</sup> Round Public/ Stakeholder/Operator Outreach
- ✓ Review existing service
- ✓ **Jan 28:** Release State of the System Report
- ✓ **Jan 28:** Release Market Analysis

### Phase 3

- ✓ **Ongoing:** Municipal and State Officials Outreach
- ✓ **Jan 28:** Release near-term service proposals
- ✓ **Jan 28 to Mar 13:** 2<sup>nd</sup> Round Public/ Stakeholder Outreach
- **Apr:** FMCB Vote: Go/No-Go
- **Early-May:** Build new schedules & routes
- **Fall:** Implementation

### Phase 4

- ✓ **Jan 28:** Release Route Profiles
- ✓ **Feb 25:** Discuss Multi-year Investment Strategies for FY20
- **Mar:** Finalize FY20 resource request
- **Apr:** Selection of FY20 investment level by the FMCB Board

### Phase 5

- ✓ **Nov:** RFP posted
- **Feb:** Consultant award (on track)



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## Executive Summary

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- **Significant gap exists** between current bus service and Service Delivery Policy (approved by FMCB in 2017)
- **There is no single solution** to resolve this gap, but it will require broad suite of investments over multiple years
- These changes will support **future network redesign** which will build on operational and infrastructure investments
- There are **low risk, high ROI investments** we can make now to move closer to **achieving the Service Delivery Policy**
- Today we seek the Board's feedback on a **proposed investment strategy**



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## Where We Stand in the Process

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Continuous  
Change

**Phase 1** - Ongoing

Analysis

**Phase 2** - Complete

Proposed  
Near-term  
Changes

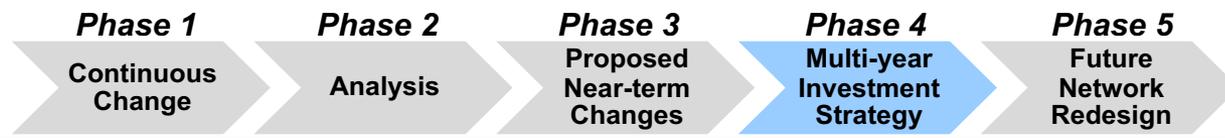
**Phase 3** - Proposals are underway and service changes can be implemented this Fall 2019 if Board approves proposed package in April after completion of public process

Multi-year  
Investment  
Strategy

**Phase 4** – Moves forward today with presentation of framework for initial investments in highest ridership routes

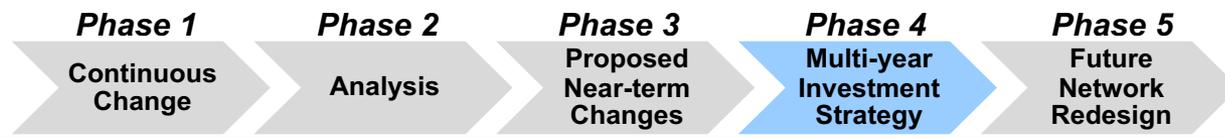
Future  
Network  
Redesign

**Phase 5** - Also advances this month with selection of consultant team (interviews completed last week)



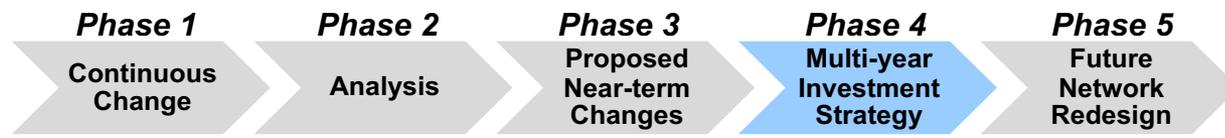
# Investment Framework for Improved Bus Service

INVESTMENT CATEGORY	WHY THIS INVESTMENT MATTERS	EXAMPLE INVESTMENTS
On Street Infrastructure	<ul style="list-style-type: none"> <li>Without on street infrastructure in congested areas, <b>no amount of buses and operators can guarantee that buses will run on time</b> (reliability), only that they will start trips on time</li> </ul>	<ul style="list-style-type: none"> <li>Bus lanes</li> <li>TSP</li> <li>Queue Jumps</li> <li>Bus Bumps</li> <li>Bus Stop Infr.</li> </ul>
Resources	<ul style="list-style-type: none"> <li>Even with on street infrastructure, additional buses and operators are required to <b>provide the level of service defined in the SDP</b></li> <li><b>Off-peak peoplepower can be utilized immediately</b>, but additional peak peoplepower will require <b>creative solutions</b> in short term due to bus and facility limitations</li> </ul>	<ul style="list-style-type: none"> <li>Peoplepower</li> <li>Buses</li> </ul>
Operational changes	<ul style="list-style-type: none"> <li>We need to <b>continuously improve</b> both operations and the underlying service network, and not rely only on major redesigns in order to respond to <b>ever-shifting demand and environs</b></li> </ul>	<ul style="list-style-type: none"> <li>Scheduling &amp; dispatching tools</li> <li>Pilots &amp; Route changes</li> <li>Network Redesign</li> </ul>



## Investments Critical to Improving Bus Service

INVESTMENT	KEY IMPACT	DEPENDENCIES
<b>Bus Lanes</b> <b>TSP + Queue Jumps + Bus Bumps</b> <b>Bus Stop Infrastructure</b>	Run-time consistency (reliability) & speed  Comfort & Improved Accessibility	Municipal participation
<b>Peoplepower</b> <b>Buses</b>	Frequency & run-time start (reliability)	Operating budget resources Maintenance garage(s) and/or contracted buses
<b>Scheduling &amp; Dispatching tools</b> <b>Pilots &amp; Route Changes</b> <b>Network Redesign</b>	Run-time cons. (reliability) & resource utilization Additional / Improved Service (All Aspects of SDP) New/Higher Ridership & Improved Accessibility	Software upgrades and/or hardware Municipal participation MBTA & Municipal Buy-In
	<b>On Street Infrastructure</b>	<b>Resources</b>
		<b>Operational Changes</b>



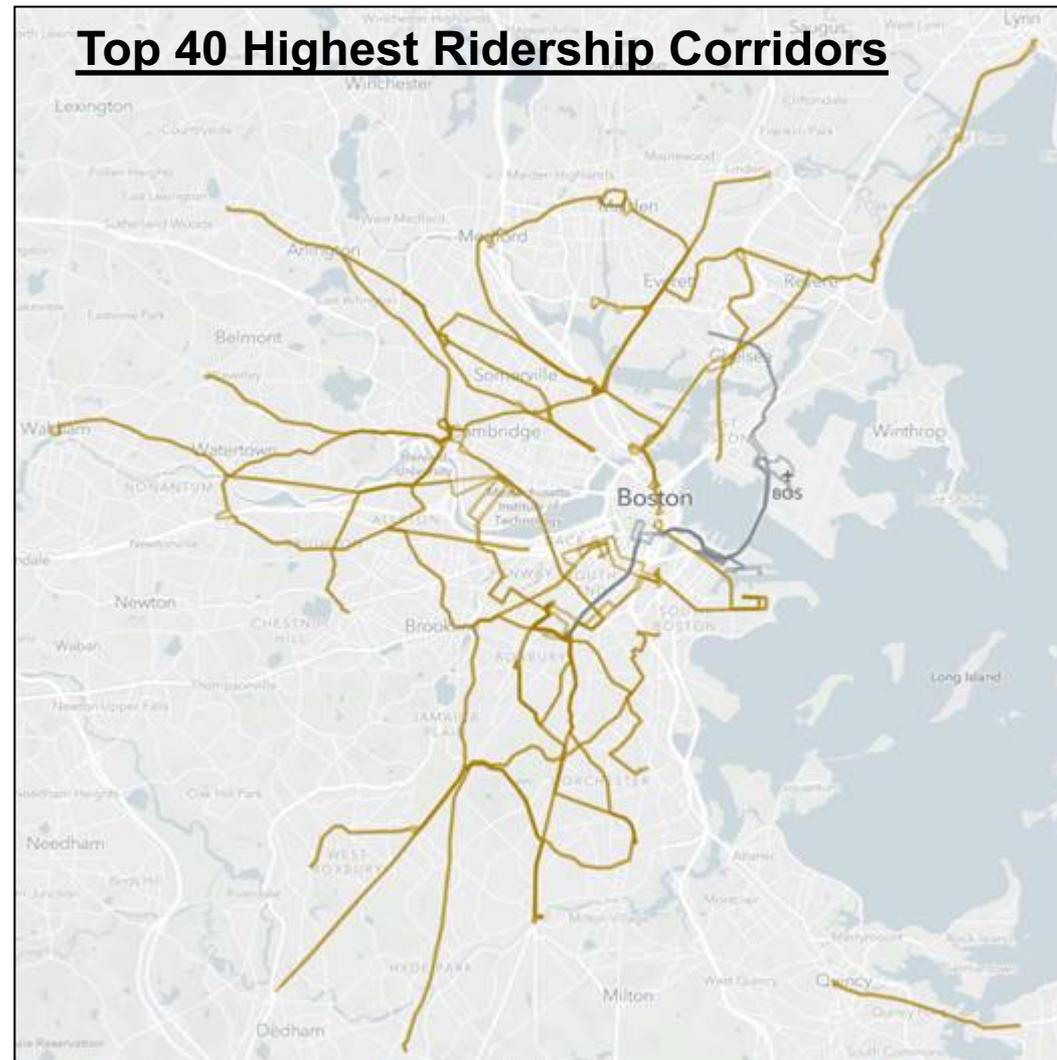
## Potential Multi-Year Investment Schedule (high-level)

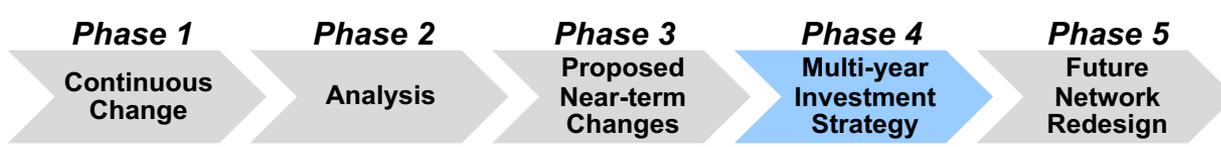
INVESTMENT	FY19	FY20	FY21	FY22+
<b>Bus Lanes</b>	3.5 miles built	Goal of 7 high priority corridor miles	Goal of 7 high priority corridor miles	Connect completed key corridors
<b>TSP + Queue Jumps + Bus Bumps</b>	Concurrent with bus lane corridors			Concurrent and beyond bus lane corridors
<b>Bus Stop Infrastructure</b>	Planning for shelter contract & PATI stop improvements	Procure new shelter contract & begin PATI construction	Continue construction of stop improvements & 1,000 PATI stops	
<b>Peoplepower</b>	Invest in additional operators (~70)	Hire off-peak operators	Hire additional operators	Hire additional operators
<b>Buses</b>	-	Procure expansion contract	Support peak service	New maintenance garage(s) & delivery of new buses
<b>Scheduling &amp; Dispatching tools</b>	Workforce Modernization Program, Bus Dispatching Pilot		Additional Optimization	
<b>Pilots &amp; Route Changes</b>	47 Near Term Proposals	Continuous improvement via piloting and route changes – targeting at least 5-10 / year <i>(see 111 example)</i>		
<b>Network Redesign</b>	Procure & Begin Design	Design	Implementation <i>(FY21 onwards)</i>	
	<b>On Street Infrastructure</b>	<b>Resources</b>		<b>Operational Changes</b>



## Prioritized Infrastructure Investments for Highest Ridership Corridors

- There are **~40 routes / corridors** that represent **65% of all daily weekday ridership**
  - Key bus routes (14), silver line (5), and highest ridership non-KBR bus corridors (21)
- Investing in **bus priority infrastructure** will have highest returns in these corridors; they will ensure our highest ridership buses can move **quickly and reliably** through these often congested corridors
- These corridors also **unlikely to be affected** by bus network redesign





# 40 Highest Ridership Routes / Corridors

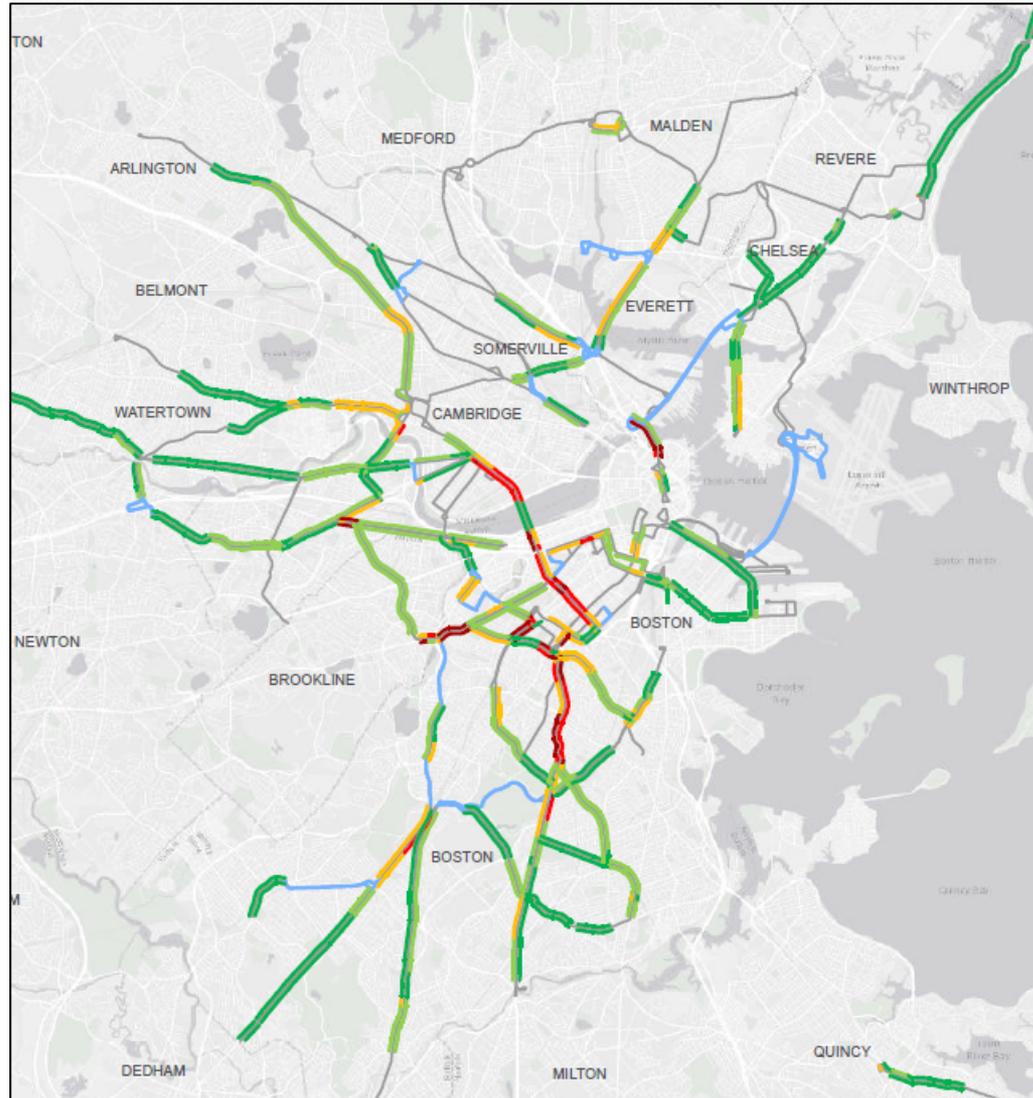
**Highest Ridership Routes / Corridors Definition: >3,200 daily weekday riders**

<b>Key Bus Routes (14)</b>	1	28	66	111		
	15	32	71	116/117*		
	22	39	73			
	23	57/57A*	77			
<b>Silver Line (5)</b>	SL1	SL3	SL5			
	SL2	SL4				
<b>Local Routes w/ highest ridership (21)</b>	7	31	47	88	104	441/442*
	9	34/34E*	70/70A*	89	109	
	16	35/36/37*	86	93	110	
	21	44	87	101	220/221/222*	

**Question for Board: Are you supportive of approach of focusing on Top 40 Highest Ridership Routes & Corridors?**



# Passenger Delays Along Top 40 Ridership Routes



## Areas with some of highest passenger delays:

- Blue Hill Ave.
- Massachusetts Ave.
- Tremont St.
- Huntington Ave.
- North Washington St.
- Mt. Auburn St.
- Brighton Ave.
- Broadway (Somerville/Everett)

## Delay in Passenger-Hours/Mile

0 - 20

21 - 40

41 - 60

61 - 80

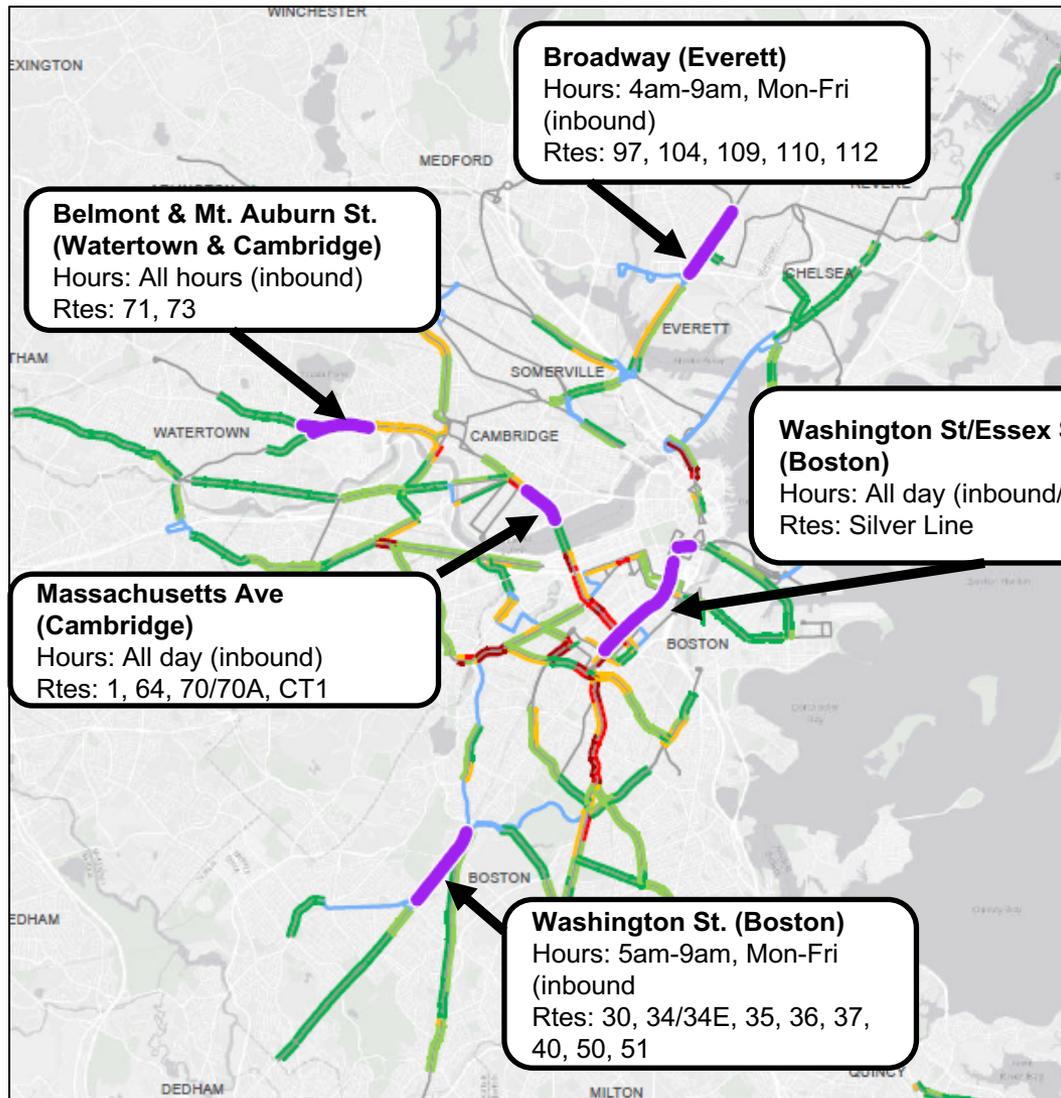
81 - 235

INRIX speed data not available

Top 40 route



## Existing and Planned On-street Bus Priority Investment

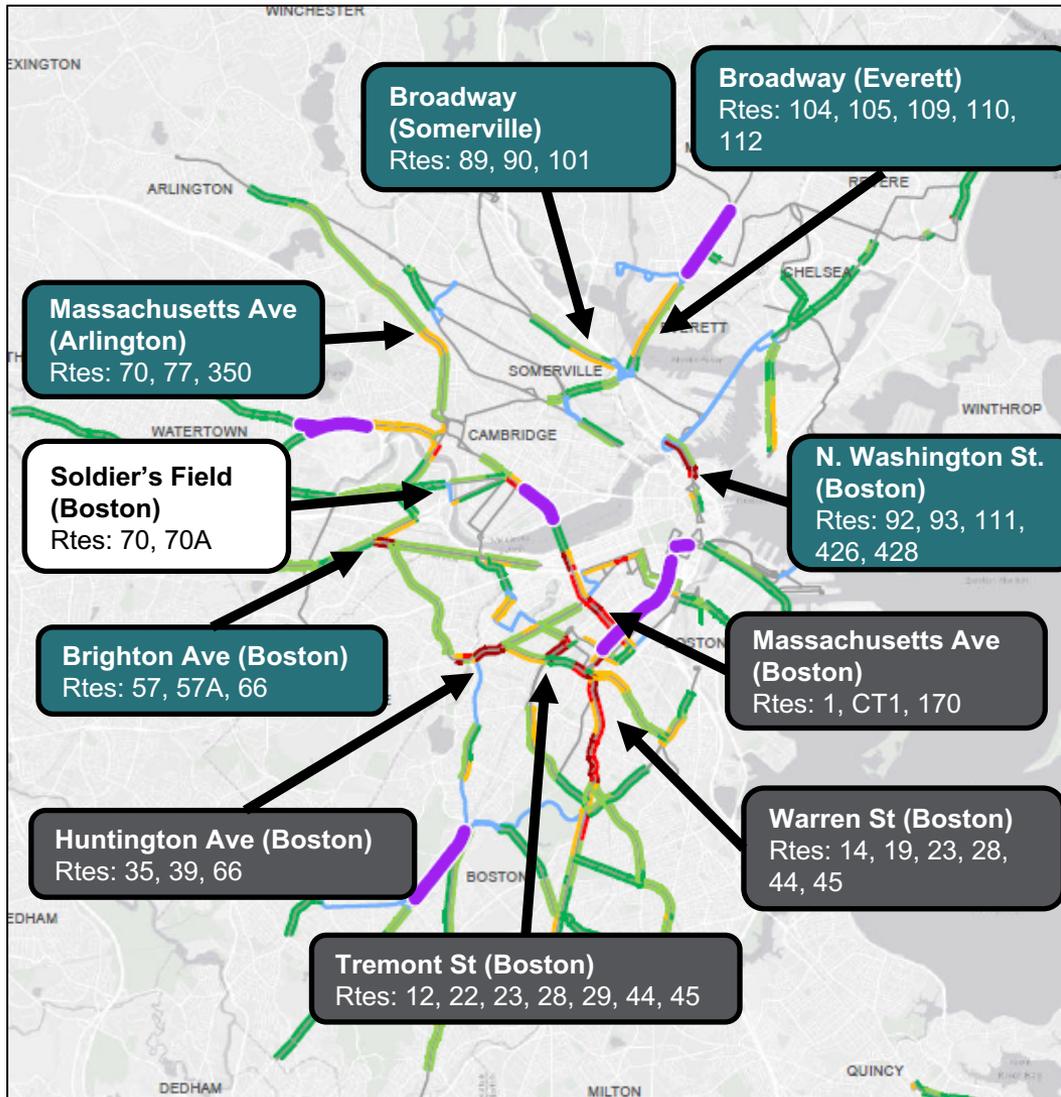


- Currently operate on **4.7 miles** of existing bus lane along Top 40 routes
- **14 corridor miles of additional high need for investment (>40 passenger / hours per mile)**
- At rate of \$150 - \$800K per mile, **estimated cost of \$2-11M** of capital investment

Note: Cost estimates include cost of paint, design and engineering, potential stop relocation, TSP. Does not include any acquisition of ROW, other infrastructure like tunnels or bridges, major curb and grading work, or new signal infrastructure



# Investment Plan for Up to 14 High Priority Corridor Miles

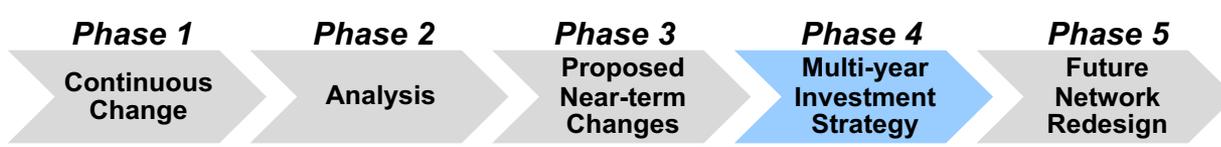


**Already planned for FY20:**  
 2.3 - 3.5 miles  
 Next steps: Design & implement

**High priority, requested CIP funding, target FY20 + FY21:**  
 Up to 11 miles (*examples shown to left not exhaustive*)  
 Next steps: Identify best suite of investments, design, and implement

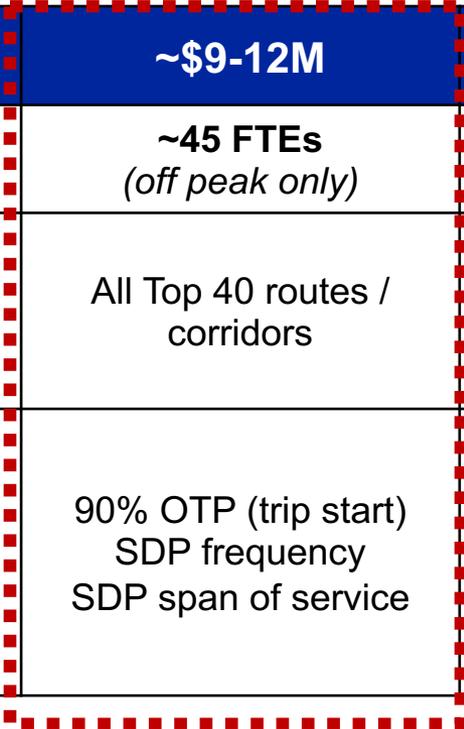
**Also planned in FY20, but moderate priority: 0.2 miles**

*Open question: What is best intervention in each corridor?*



# Peoplepower Investments We Can Make in FY20

What do we get for:	~\$6-8M	~\$9-12M	~\$12-16M
Additional operators	~30 FTEs <i>(off peak only)</i>	~45 FTEs <i>(off peak only)</i>	~60 FTEs <i>(off peak only)</i>
Deployed to which routes	50% of top 40 routes / corridors (based on greatest need)	All Top 40 routes / corridors	All top 40 routes and <b>create 3-5 new Key Bus Routes</b> (off peak)
Predicted impact <b>(off peak only)</b>	90% OTP (trip start) SDP frequency SDP span of service <b>(for ~20 routes)</b>	90% OTP (trip start) SDP frequency SDP span of service	90% OTP (trip start) SDP frequency SDP span of service + higher service level on 3-5 routes



*Recommended*

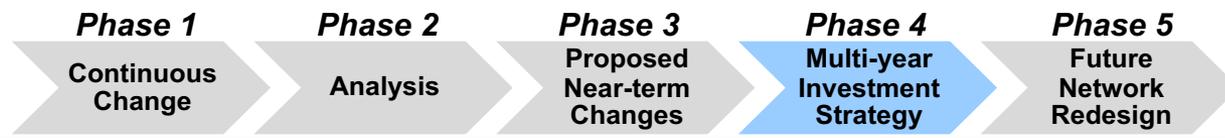
**Resources for post-FY20:** What size fleet is required to meet SDP? What facility space does that imply? What is the potential option set available for increasing bus fleet size and/or maintenance facility space?



## Example Pilot: Route 111 example



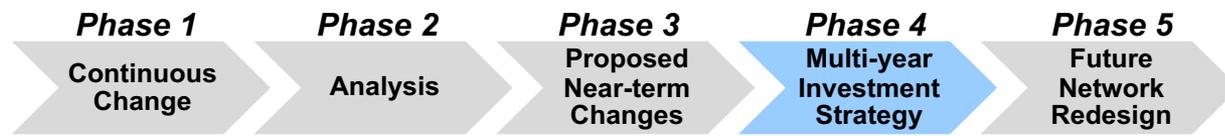
- **September 2018: Reliability, passenger comfort, and span improvements**
  - Added 4 bus operators to the schedule and updated run times for the Route 111 to **improve service reliability, reflect actual operating conditions, and improve passenger comfort.**
  - Added 15 bus operators since June at Charlestown District to help with cover list, which **maintains service** when regular drivers are not available.
  - **Added service** on Saturday nights 10pm-midnight and at 1:25AM due to **crowding and to provide new mobility.**
- **Results**
  - **Fewer dropped trips:** Dropped trip rate changed from 5% in Sept. 2016 and from up to 11% during several months in 2017, down to 2% in Sept. 2018.
  - **Better reliability:** on-time performance improved from 79% to 86% from Sept. 2017 to Sept. 2018.
  - **More comfortable passengers:** 33% reduction in crowded trips (over 54 passengers)



## Proposed Plan for FY20

INVESTMENT	PLAN	INVEST. LEVEL
<b>On Street Infrastructure</b>	<ul style="list-style-type: none"> <li>• Develop <b>policy</b> on prioritization of location, construction, and maintenance of bus infrastructure</li> <li>• Study &amp; design <b>highest need corridors</b> for bus infrastructure to better estimate feasibility and degree of difficulty to implement</li> <li>• Build <b>transit priority infrastructure along 7 miles of corridors</b> (2-3 miles already planned)</li> <li>• Procure <b>new shelter contract</b></li> <li>• Begin <b>PATI stop construction</b></li> </ul>	<p>~\$10-15M of capital funding (FY20 &amp; FY21) for on-street infrastructure* (\$3-4M already funded)</p>
<b>Resources</b>	<ul style="list-style-type: none"> <li>• Hire <b>45 additional bus operators</b> (off peak service)</li> <li>• Develop and procure <b>expansion contract</b> for additional buses (targeting FY21 impact for peak service)</li> <li>• Finalize <b>future fleet size needs</b> and implications (w/ inputs from Network Redesign)</li> </ul>	<p>~\$10M additional annual opex</p>
<b>Operational Changes</b>	<ul style="list-style-type: none"> <li>• Implement <b>Workforce Modernization</b> (Daily &amp; BidWeb)</li> <li>• Trial <b>bus dispatching pilot</b></li> <li>• Test <b>5-10 pilots</b> and/or route changes</li> <li>• Complete <b>Network Redesign</b> design</li> </ul>	<p><i>None identified at this time</i></p>

\*Excludes cost of any bus stop accessibility and amenity funding



## Key Next Steps

Date	Meeting/Deliverable Release
✓ Dec 10	<i>FMCB Presentation – Part 1 Work Plan Review, Overview of State of System and Market Analysis</i>
✓ Jan 14	<i>FMCB Presentation – Part 2 Overview of Near-term Change Proposals</i>
✓ Jan 28 to Mar 13	<ul style="list-style-type: none"> <li>• <b>Kick off Round 2 of public engagement</b></li> <li>• Release Market Analysis</li> <li>• Release State of the Bus System Report</li> <li>• Release Near-term Change Proposals</li> <li>• Release Route Profiles</li> </ul>
✓ Feb 25	<i>FMCB Presentation – Part 3 Discuss Multi-year Investment Strategies for FY20</i>
March	<b>Action:</b> <i>FMCB Propose FY20 Budget</i>
April	<b>Action:</b> <i>FMCB Vote on Package for Near-Term change proposals</i>
May	<i>FMCB Presentation – Draft FY20-24 CIP</i>
June	<b>Action:</b> <i>MassDOT Board vote on FY20-24 CIP</i>

*All proposals available online on at: [mbta.com/betterbus](http://mbta.com/betterbus)*

**Phase 1**  
Continuous Change

**Phase 2**  
Analysis

**Phase 3**  
Proposed Near-term Changes

**Phase 4**  
Multi-year Investment Strategy

**Phase 5**  
Future Network Redesign



# Appendix - Significant work completed to form basis for multi-year investment strategy

## ANALYSIS & RECOMMENDATIONS

### Near Term Proposals (47)

#### Cedarwood - Central Square, Cambridge Route 70/70A

You asked for buses that come on time & more often

#### Our proposal

- Improve Route 70 frequency and reliability between Waltham and Central Square
- Shift midday/evening Route 70 service from Cedarwood to Market Place Dr. to meet rider needs
- Mostly Route 70A to only operate between North Waltham and Waltham Center, with easier-to-understand routing and new Sunday service



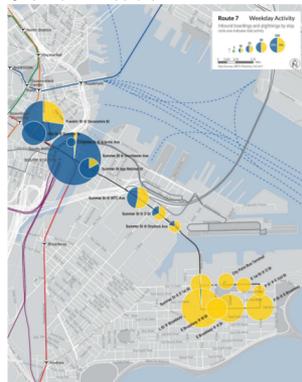
**5,013** passengers who'll get more consistent frequencies between Waltham Ctr. and University Park

**3** minutes shorter wait time for 71 (1%) Route 70 riders at Market Place Drive

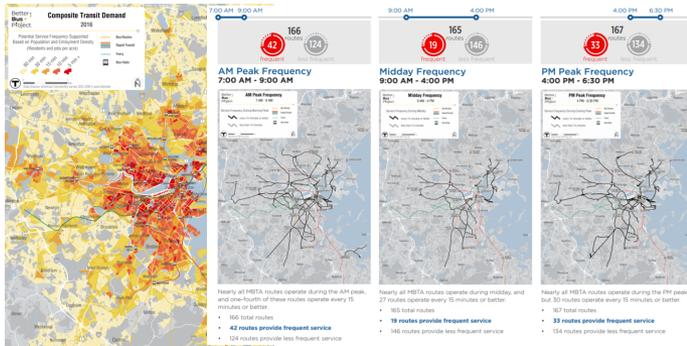
**216** increase in passenger trips on Route 70/70A each weekday

### Route Profiles (180)

Figure 2 | Weekday Inbound Ridership by Stop Map



## State of the Bus System and Market Analysis Reports (2)



## CONTINUOUS EFFORTS (NOT EXHAUSTIVE)

### Bus Transit Priority



### Quarterly Schedule / Route changes



### Better Bus Tracking & Predictions



### Public engagement & operator feedback





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## Appendix – Service Delivery Policy standards

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### Service Delivery Policy

Adopted in January 2017

Comfort

Passengers should have a reasonable amount of personal space during their trips

Reliability

Passengers should be able to expect service to arrive when scheduled

Frequency

Passengers should be able to access transit within a reasonable waiting time

Span

Passengers should have confidence that service will operate during expected hours

Coverage

The geographic area where service is provided



## Appendix - Key elements of Service Delivery Policy

	Key Bus Route (incl. Silver Line)	Local Bus Route
<b># of Routes</b>	15 (+5 SL)	117
<b>Span (Weekday)</b>	6am – 12am	7am – 7pm
<b>Span (Weekend)</b>	SAT: 6am – 12am SUN: 7am – 12am	SAT: 8am – 6:30pm SUN: 10am – 6:30pm <i>Standard only applies to high density areas</i>
<b>Frequency</b>	<u>AM Peak (7am – 9am):</u> Every 10 min	<u>AM Peak (7am – 9am):</u> Every 30 min
	<u>PM Peak (4pm – 6:30pm):</u> Every 10 min	<u>PM Peak (4pm – 6:30pm):</u> Every 30 min
	<u>All Other:</u> Every 15/20 min	<u>All Other:</u> Every 60 min
<b>Reliability (On-time performance)</b>	75% (Minimum) 80% (Target)	70% (Minimum) 75% (Target)
<b>Comfort</b>	Percent of passenger minutes in comfortable conditions 92% (Minimum), 96% (Target)	

Notes: Beginning of span of service is the time a bus will arrive / depart downtown Boston, or the route terminal if not serving downtown



## Appendix – Focus40 Goals for Bus



**Program Objective:** Achieve a better, faster, lower-emissions service, supported by off-board fare collection and exclusive busways, aligning with where riders live, work, and travel.

### We're Doing: Commitments through 2023

- **Better Bus Project Phase 1** to revamp routes, frequencies, and stops with implementation planned in 2019
  - Partnerships with cities and towns to implement bus lanes, traffic signal priority, "queue jumps" and other service enhancements
- **Better Bus Project Phase 2: Network Redesign** to look at better ways to serve bus riders through a network redesign
- **Municipal Collaboration to Improve High Priority Bus Facilities and Stops**
  - Improved access and safety features at over 200 high-priority bus stops for accessibility improvements
- **Bus Fleet Replacement and Expansion**
  - 460 40-foot buses scheduled for delivery 2021-25
  - Option order procurement of 194 hybrid buses
  - Exploring new and expanded maintenance facilities
- **Zero- Emissions Bus In-Service Testing** to inform future fleet procurement

### We're Planning: Next Priorities through 2040

- **Fleet Expansion to Serve Bus and Bus Rapid Transit Network**
- **Better Bus Project Phase 3: Implementation of Network Redesign**
- **Phased Conversion to Zero-Emissions Fleet**
  - Pending findings from testing
- **New Bus Rapid Transit (BRT) corridors** with more frequent, comfortable, accessible service and exclusive bus lanes

*We're Imagining: Autonomous bus shuttles that can serve new routes and deliver first-mile/last-mile connections for passengers to commuter rail and rapid transit*