Bus Transformation Update

Fiscal and Management Control Board
January 25, 2021
Kat Benesh
Agenda

• Vision for Bus Transformation
• Achievements to Date
• Key Projects: Fleet & Facilities, Bus Network Redesign, Bus Priority
• Bus Transformation Governance
• Next Steps
Pre-pandemic, the MBTA Bus Service network served nearly **450,000 trips** on a single weekday **across more than 50 cities and towns**, and provided **more than a third of all MBTA trips**.

Riders of the MBTA bus service **are more likely to be low-income or people of color** than any other fixed route mode.

And during the COVID-19 pandemic, bus ridership was **more durable than any other mode**, retaining up to **4x more of its riders** than Commuter Rail or Ferry.

All of these things call for a bus system that meets the needs of the region.
Bus Transformation Vision

Achieve a better, faster, lower emissions service, supported by all-door boarding and exclusive busways, that is more aligned with where riders live, work, and travel (Focus40).

Focus40 and the MBTA strategic plan highlight equity, sustainability, livability, competitiveness, and safety, all of which will guide the bus transformation work.
## Bus Transformation Program Goals

<table>
<thead>
<tr>
<th>Program Goals</th>
<th>Progress to Date</th>
<th>Timeline Horizon*</th>
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</thead>
<tbody>
<tr>
<td>A route network that goes where people need to go when they need it and is</td>
<td>• Better Bus Project 2019 changes incl. addition of off-peak service</td>
<td>Start phased implementation of Bus Network Redesign in <strong>FY22</strong>, expected to take 3-5 years</td>
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<tr>
<td>simple to use</td>
<td>• Bus Network Redesign planning underway</td>
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<td>• SL3 opened, SLX concept planning planning underway</td>
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<td>A core network of high priority corridors with all day frequent service,</td>
<td>• Approximately 20 lane miles implemented since 2002</td>
<td>Targeting ~75-100 lane miles within next 5 years</td>
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<td>supported by transit priority facilities and infrastructure</td>
<td>• 41% of weekday passenger miles system-wide benefit</td>
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<td>• 28 TSP intersections</td>
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<td>A fast, reliable, and competitive bus experience that includes all-door</td>
<td>• Planning all door boarding through Fare Transformation</td>
<td>Ongoing</td>
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<td>boarding, and safe, accessible, and comfortable bus stops and busways</td>
<td>• 218 bus stops made accessible or eliminated through PATI process</td>
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<td>Reliable and easy to understand passenger information online, at the stop,</td>
<td>• Pilot E-ink signs</td>
<td>Ongoing</td>
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<td>and on the bus</td>
<td>• Bus real-time crowding information</td>
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<td></td>
<td>• Improved bus arrival time predictions</td>
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*All timelines contingent on securing future funding
# Bus Transformation Program Goals (continued)

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<tr>
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</table>
| Modern work environments & vehicles to improve conditions for employees and riders | • $50m in investments in existing bus facilities  
• Average age of bus fleet decreased from 9.7 years (2016) to 6.6 years | Ongoing |
| A zero-emissions fleet of battery-electric buses to reduce emissions | • Five bus BEB pilot on Silver Line  
• New Quincy BMF designed to accommodate BEBs at opening | 2023/2024 for North Cambridge/Quincy BEB capability; dependent on pace of additional facility modernizations beyond 2024 |
| More service, enabled by a larger fleet in new facilities | • 60 additional 40’ buses and procurement of larger Silver Line replacement fleet (13 bus increase)  
• New Quincy BMF designed for 40% increase in fleet size  
• North Cambridge modifications to accommodate 25% increase | 2023/2024 for North Cambridge/Quincy capacity increases; dependent on pace of additional facility modernizations beyond 2024 |

*All timelines contingent on securing future funding.*
Three key projects we are focusing on today

Fleet & Facilities
We need to replace old buses, and we need new facilities to operate them, to expand, and to electrify.

Bus Network Redesign
We need a new network that goes where people need it to go when they need it and is easier to understand.

Bus Priority
We need transit priority infrastructure to keep buses moving through traffic.

Other key projects include:
- Accessible bus stops (PATI)
- Modern bus stop amenities
- Fare Transformation
- Improved rider information
- Dispatching tools
...and more
Vision to modernize fleet and facilities

Fleet & Facilities vision will support **bus electrification** and improved **reliability** and working conditions:

- **Modernized Facilities:** Approx. $4.5B to support design, real estate acquisition, and construction of new bus maintenance facilities.
- **Rolling Fleet Procurements:** $100 - 130M annually to purchase 80 to 100 buses to replace buses at end of service life, *technology (BEB or hybrid) pending facility capacity*.
- **Distributed Charging Network:** Investment in any additional systemwide charging infrastructure to support BEB operations.
- **Operational Transition:** Investment in hiring, training, deadhead mileage, and other operational impacts; $15M to support software upgrades for scheduling BEBs.
Fleet and facilities top priority: Quincy

- New **120 bus facility** will usher in the modern era for the MBTA
  - First all indoor facility to support **fully zero emissions fleet**
  - Built with **room to grow** to meet future demand
- **However**, investment is essential to **maintaining service beyond 2024**
  - Existing facility only accommodates **oldest diesel buses** (currently already 12 - 15 years old)
  - **Poor conditions** hinder workforce ability to work effectively
- **Funding needed to keep Quincy project on schedule to complete in 2024**
  - **Programmed:** $65M for real estate and final design
  - **Unprogrammed:** $305M for construction (demo in Fall 2021; construction Summer 2022, facility opening in December 2024)
Fleet and Facilities: Beyond Quincy

Accomplishing **systemwide electrification** will require the last procurement of hybrid buses to occur at least **14 years prior** (given FTA mandated minimum service life).

To achieve this within the Focus40 planning horizon, new facilities need to come online **every 2-3 years** (Quincy 2024, next facility 2027).

- Funding/schedule expectations based on Quincy experience (120 bus facility)
  - Preliminary design (0-15%) - **6 months, programmed through PM contract**
  - Final design (30-100%) - **2 years, $70M (includes real estate)**
  - Construction - **2.5 years, $300M**

- Major cost variables
  - **Size:** Charlestown garage (the MBTA’s largest) houses 242 buses
  - **Real estate:** Boston industrial market remains extremely competitive
  - **Operations:** Temporary relocations when rebuilding in place (anticipated for Cabot, Charlestown, Southampton)
Vision to bring back service in the future

The Bus Network Redesign is 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.

The Bus Network Redesign will serve as a blueprint for how to rebuild the longer-term network in the future and requires:

- Planning (underway)
- New service (can be cost neutral) & demonstration projects (unprogrammed, $3-5M)
- Project management (programmed)
- Service planning and scheduling capacity (unprogrammed, $1-4M)
- Public outreach and marketing (unprogrammed, $2-4M)
- Infrastructure: signage, transit priority (see slide 14 for costs), bus stop improvements/changes (partially programmed, $2-10M)

New tools will help us evaluate and adjust.
The High Priority Corridors help prioritize investments:

- These would not all be implemented at once, and we can prioritize based on value (cost/benefit) of each corridor to the network.

- These corridors would provide better service for transit critical populations since the analysis prioritizes travel made by communities of color and low-income populations.

- Many of the corridors that show up here are corridors that have retained ridership during COVID and are part of the service being preserved (79% of essential service routes).

- The current transit priority work supports build out of this vision.

Map will continue to evolve based on further analysis, public input, and coordination with roadway owners.
Vision to improve speed and reliability

- Continue to build out **Bus Priority network** with municipal and other agency partners, focusing on:
  - High Priority Corridors for Network Redesign
  - Additional corridors with (a) durable ridership, (b) chronic delay, and (c) high social impact / essential riders
  - Targeting 10-20 lane miles per year ($200-$350M unprogrammed over the next 5 years)

- **Pilot advanced TSP** to improve TSP benefits, reliability, and measurements

- Develop and publish **public-facing and municipality-facing tools** to help evaluate where bus lanes are needed most, and to evaluate effectiveness of completed transit priority projects

- Develop and publish **Speed and Reliability Toolkit** - standard set of guidelines for municipalities, engineers and planners to help ensure adherence to national and local best practices and requirements
<table>
<thead>
<tr>
<th>Investment Type</th>
<th>Project</th>
<th>FY 2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
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<tbody>
<tr>
<td>Rider Facing</td>
<td>Rider Digital Screens</td>
<td>Roll out of more E-ink signs</td>
<td>Pilot of on-vehicle digital screen - unprogrammed $2M</td>
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<td>Information</td>
<td></td>
<td>Additional screens at bus stops</td>
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<td></td>
<td>Other Customer Tools</td>
<td>Real-time crowding info on 95% of bus routes</td>
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<td>Rider alert improvements</td>
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<td>Digital flag stop pilot</td>
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<tr>
<td>Connections &amp; Hubs</td>
<td>Plan for Accessible Infrastructure (PATI)</td>
<td>258 additional bus stops to be upgraded</td>
<td>Complete the remaining 489 bus stops identified - unprogrammed $26M</td>
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<td>Street Furniture</td>
<td>Pilot new form factors (i.e. information kiosks, small shelters, etc.)</td>
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<td></td>
<td>Street Furniture Rollout - partially programmed $35M</td>
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<td>People &amp; Processes</td>
<td>Skate and Dispatch Tools</td>
<td>Begin development of Operations Control Center features</td>
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<td>“Digital Bus Platform” dispatch pilots - unprogrammed $4M</td>
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<td></td>
<td>Service Delivery Policy (SDP)</td>
<td>Development of network quality measures and evaluation tools to track progress</td>
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<td>Periodic updates to the SDP to reflect better data sources and methodologies</td>
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<td>Foundational Enablers</td>
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Indicates project is partially programmed or unprogrammed
Bus transformation pillars: many parts of the organization working together to accomplish Bus Transformation goals
Bus Transformation Governance Structure

<table>
<thead>
<tr>
<th>Main Accountable department (Accountable)</th>
<th>Supporting departments (Responsible or Consulted)</th>
</tr>
</thead>
</table>
| Fleet & Facilities and other major infrastructure | Office of Chief Engineer (OCE) | •Vehicle Engineering  
•Vehicle Maintenance  
•Bus Operations  
•E&M  
•Capital Delivery  
•Environmental  
•Real Estate  
•OPSS |
| Service & Street Design | Operations Planning, Scheduling & Strategy (OPSS) | •Office of Transportation Planning (OTP)  
•Bus Ops  
•Capital Delivery  
•OPSI |
| Connections & Hubs (incl. Bus Stops) | Dept. varies on specific issue | •SWA  
•Revenue  
•Real Estate / TOD  
•OPSS  
•Bus Ops  
•E&M |
| Rider Facing Information | Customer Experience (CX) and Customer Technology (CTD) | •OCC  
•OPMI  
•OPSS  
•Capital Delivery |
| Process & People | Bus Operations | •OPSS  
•CTD  
•Workforce Planning  
•Safety  
•Training  
•OCC |
| Foundational Enablers (Planning & Policy) | Policy | •OPMI  
•Legislative Affairs  
•Fare Transformation  
•Other Transformation Offices |

- Bus Transformation is an already **organizational-wide** focus
- Governance is a **matrix-approach**, with clear owners for most major “pillars”
- **Cross-functional decision-making** driven via coordinating mechanisms (examples below):
  - Bus Facility Modernization Task Force
  - Design Project Development Group meetings
  - Electrification Team Meetings
  - Bus Network Redesign Internal Task Force
  - Quarterly Service Planning Meetings
- Goal for FY22 is to hire a **Bus Transformation Lead** to help drive coordination and planning
Next Steps

**Fleet & Facilities**
- Complete property acquisition for the new Quincy Bus Maintenance Facility *(Spring 2021, programmed)*
- Award contract for 160 hybrid bus procurement *(Summer 2021, programmed)*
- Finalize design for North Cambridge BEB conversion *(Winter 2022, unprogrammed)*
- Initiate procurement process for North Cambridge and Quincy BEB fleets *(Winter 2022, partially programmed)*
- Complete final design and begin construction on Quincy BMF *(Spring 2022, $23M programmed for design, $305M for construction unprogrammed)*
- Begin design for second modernized facility *(Winter 2022)*

**Bus Network Redesign**
- Planning process to continue with final recommendation on new bus network structure and phased implementation plan *(Spring 2022, programmed)*
- Phased implementation to begin Summer 2022 *(Spring 2022, $3.2M programmed, $20M unprogrammed over 3-5 years)*

**Transit Priority**
- Finalize CY21 & CY22 priorities with municipal and agency partners *(Spring 2021, unprogrammed)*
- Design & build with partners CY21 bus priority *(throughout 2021, partially programmed)*
Appendix
## Bus Transformation: Achievements to Date (Detailed)

<table>
<thead>
<tr>
<th>Investment Type</th>
<th>Project</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>Spend to Date (November 2020)</th>
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</thead>
<tbody>
<tr>
<td><strong>Bus Procurement</strong></td>
<td>Bus Deliveries: 156 40' Hybrid buses 175 40' CNG buses 44 60' Hybrid Buses</td>
<td>1 - 60' Enhanced Electric Hybrid (test bus)</td>
<td>SL3 open</td>
<td>5 - 60' Battery Electric Buses (BEB)</td>
<td>254 40' Hybrid buses (194 option and 60 VA option) delivered across 3 years.</td>
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<td>$530.2M</td>
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<tr>
<td><strong>Fleet &amp; Facilities and other major investments</strong></td>
<td>Major Capital projects (ROW + Facilities)</td>
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<tr>
<td><strong>Service Design</strong></td>
<td>Transit Priority: 1.1 miles, incl. Broadway (Everett) 1.1 lane miles, incl. Roslindale (Boston)</td>
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<td></td>
<td>Service Design</td>
<td>1.7 lane miles</td>
<td>4.4 lane miles</td>
<td>~9 lane miles built, piloting or under construction</td>
<td>Better Bus Project 2019 Route Changes Implemented</td>
<td>Bus Network Redesign Planning</td>
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<td></td>
<td>Facilities</td>
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<td>$49.1M</td>
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<td></td>
<td>Facilities: Albany Door Retrofit (to enable use of newer buses)</td>
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<td>$1.5M</td>
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<td>Facilities: Quincy Facility Concept Design</td>
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<td>$5M</td>
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<td></td>
<td>Facilities: North Cambridge Design</td>
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<td>$0.5M</td>
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<td></td>
<td>Facilities: Program Management Contract Awarded</td>
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<td>$46M</td>
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**Notes:**
- **SL3 open** indicates the completion of a significant project.
- **Program Management Contract Awarded** signifies the successful procurement of project management services.
- **Better Bus Project 2019 Route Changes Implemented** reflects the implementation of route changes as part of the Better Bus Project 2019.
## Bus Transformation: Achievements to Date (Detailed)

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<tr>
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<tr>
<td>Rider Facing Information</td>
<td>Bus Tracking Technology</td>
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<td>Rider Digital Screens</td>
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<td></td>
<td>Real-time Crowding Info</td>
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<tr>
<td>People &amp; Process</td>
<td>Skate: dispatch app for bus officials</td>
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<td>HASTUS Daily, Bid &amp; BidWeb</td>
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<tr>
<td>Connections &amp; Hubs</td>
<td>Plan for Accessible Infrastructure (PATI)</td>
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<td>Phase 1 Construction Contract awarded</td>
<td>$8M</td>
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<tr>
<td>Foundational Enablers</td>
<td>Service Delivery Policy (SDP)</td>
<td>Major overhaul of Service Delivery Policy with focus on passenger-weighted metrics. Adopted in 2017</td>
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<td>Development of network quality measures to expand SDP</td>
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<td>HASTUS Daily, Bid &amp; BidWeb</td>
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<td>Development of network quality measures to expand SDP</td>
<td>N/A</td>
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</table>

- **Spend to Date (November 2020):**
  - Rider Facing Information: Bus Tracking Technology - $1.6M
  - Rider Facing Information: Rider Digital Screens - $1.1M
  - Rider Facing Information: Real-time Crowding Info - $0.3M
  - People & Process: Skate: dispatch app for bus officials - $0.9M
  - People & Process: HASTUS Daily, Bid & BidWeb - TBD
  - Connections & Hubs: Plan for Accessible Infrastructure (PATI) - $8M
  - Foundational Enablers: Service Delivery Policy (SDP) - N/A
# Bus Transformation: Look Ahead (Detailed)

<table>
<thead>
<tr>
<th>Investment Type</th>
<th>Project</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
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<th>2025</th>
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<tbody>
<tr>
<td>Fleet &amp; Facilities and other major investments</td>
<td>Fleet</td>
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<td></td>
<td>Fleet</td>
<td>Exercising option to purchase BEBs or EEHs, dependent on facilities</td>
<td>$287M - $356M est., Unprogrammed</td>
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<td></td>
<td>Quincy Real Estate (FY21); Quincy Final Design (FY22)</td>
<td>Quincy Construction - $305M, Unprogrammed</td>
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<td>Quincy Opens</td>
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<td></td>
<td>North Cambridge Construction - $21M, Unprogrammed</td>
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<td>Concept Design Facility #2 (Jacobs Contract)</td>
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<td>Final Design Facility #2 (Jacobs Contract)</td>
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<td>Construction Facility #3 - $25-35M, Unprogrammed</td>
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<td>Construction Facility #3 - Approx. $400M Unprogrammed</td>
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<td>Service and Street Design</td>
<td>Transit Priority</td>
<td>Targeting 10-20 lane miles per year ($200-$350M unprogrammed over the next 5 years)</td>
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<tr>
<td></td>
<td>Bus Network Redesign</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Phased Implementation of Bus Network Redesign - Partially Programmed</td>
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</tbody>
</table>
## Bus Transformation: Look Ahead (Detailed)

<table>
<thead>
<tr>
<th>Investment Type</th>
<th>Project</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rider Facing Information</td>
<td>Rider Digital Screens</td>
<td>Additional screens at bus stops</td>
<td>Pilot of on-vehicle digital screen - unprogrammed</td>
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<td></td>
<td>Other Customer Tools</td>
<td>Digital flag stop pilot - unprogrammed</td>
<td>Rider alert improvements - unprogrammed</td>
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<tr>
<td>Connections &amp; Hubs</td>
<td>Plan for Accessible Infrastructure (PATI)</td>
<td>115 anticipated bus stops completed</td>
<td>PATI Phase 3 to complete the remaining 489 bus stops - unprogrammed</td>
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<td></td>
<td>Street Furniture</td>
<td>Plan deployment and pilot new form factors (i.e. information kiosks, small shelters, etc.)</td>
<td>Street Furniture Rollout - Partially Programmed</td>
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<tr>
<td>People &amp; Processes</td>
<td>Skate and Dispatch Tools</td>
<td>Begin development of OCC features</td>
<td>OCC features complete</td>
<td>&quot;Digital Bus Platform&quot; dispatch pilots - unprogrammed</td>
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<tr>
<td>Foundational Enablers</td>
<td>Service Delivery Policy (SDP)</td>
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<td>Periodic updates to the SDP to reflect better data sources and methodologies</td>
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</tbody>
</table>
Fleet & Facilities: Program Updates

• **Fleet Procurement:** Technical BEB specification under development, anticipated release Spring 2021
  - Release RFP for 160 EEH's - replace 2006 diesel fleet – Now
  - Releasd RFP for BEB's - North Cambridge / Quincy - Summer 2021

• **Bus Facility Design:**
  - Quincy Final Design awarded December 2020; anticipated opening Fall 2024 with **partial fleet of BEBs**
  - North Cambridge preliminary design commenced November 2020, anticipated opening Fall 2023 with **full BEB fleet**

• **Bus Facility Strategy:** Conducting planning work to scope and prioritize remaining facilities

• **Electrification Strategy:** Conducting analysis to identity most feasible/cost effective approach to implementation at Quincy and North Cambridge, scope of additional investment, backup power and resiliency
## Current Bus Network Redesign project timeline

<table>
<thead>
<tr>
<th>FALL 2020</th>
<th>WINTER 2021</th>
<th>SPRING 2021</th>
<th>SUMMER 2021</th>
<th>FALL 2021</th>
<th>WINTER 2022</th>
<th>SPRING 2022</th>
<th>SUMMER 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify High Priority Corridors</td>
<td>Finalize High Priority Corridors</td>
<td>Develop network alternatives to discuss policy trade-offs</td>
<td>Outreach on network alts</td>
<td>Develop draft network structure and phased implementation plan</td>
<td>Outreach on draft network structure and phased implementation plan</td>
<td>Outreach continues</td>
<td>Implementation will be phased over 3-5 years but could start Summer 2022</td>
</tr>
</tbody>
</table>

- **FMCB decision on preferred alternative**
- **MBTA Board input on draft rec. before public input & after**
- **MBTA Board vote to adopt new bus network structure to be implemented over time**

This decision will guide us on how to allocate resources to the network.

This will adopt a network structure; exact frequencies and spans of service, as well as phasing, will be determined based on resources.
Bus Network Redesign Goals

1. Create a **more equitable network** that connects people, in particular low income people, people of color, and people with disabilities, to where they need and want to go with a high quality transit option.

2. Design a **more logical system** that is more adaptable to change.

3. Create a **framework for a future bus network that can be implemented over time**.

4. Identify **High Priority Corridors** that merit high frequency service and guide future investments.

5. Identify **new or underserved destinations** to better serve with transit.

6. Create **metrics that are flexible, data-driven, and assess service quality** so that as the region evolves, so will the bus network.
Approach to designing a new network: corridors to routes

Travel demand data (location based services data) is being used to assess travel in the region.

Corridors connect areas of demand.

Corridors with high travel demand made by transit critical populations are identified as High Priority Corridors that warrant high frequency service.

Corridors are applied to roadways to identify where to prioritize investments in bus infrastructure.

Routes are the service that run in corridors. Corridors with bus infrastructure can be shared by multiple routes in order to optimize investments and improve connections.
High Priority Corridors are the first step in redesigning the entire network.

High Priority Corridors cover 79% of essential trips.*

As we continue with Bus Network Redesign, we will examine what the best structure for neighborhood service is in order to integrate other essential trips into the network.

Core network of High Priority Corridors exist under any future Network Redesign.

*Essential Trips are defined as part of Forging Ahead: https://www.mbta.com/forging-ahead
The current transit priority work supports build out of this vision.

**Current transit priority projects**
1. Mass Ave - Cambridge
2. Columbus Ave Corridor
3. Hyde Park Ave
4. Blue Hill Ave
5. Broadway & Sweetser Circle - Everett
6. Broadway - Chelsea
7. Washington Street - Roslindale
8. Washington Street - Somerville
10. Mass Ave - Boston
11. Nubian to Ruggles via Malcolm X Blvd
12. Summer Street
13. Brighton Ave - Allston
14. Mass Ave - Arlington
15. Broadway - Somerville
16. Tobin Bridge
17. Mt Auburn Area Cambridge
18. Warren Street

*Note: bus numbers on the map represent service in that corridor, not routes that exactly create that entire connection.*