

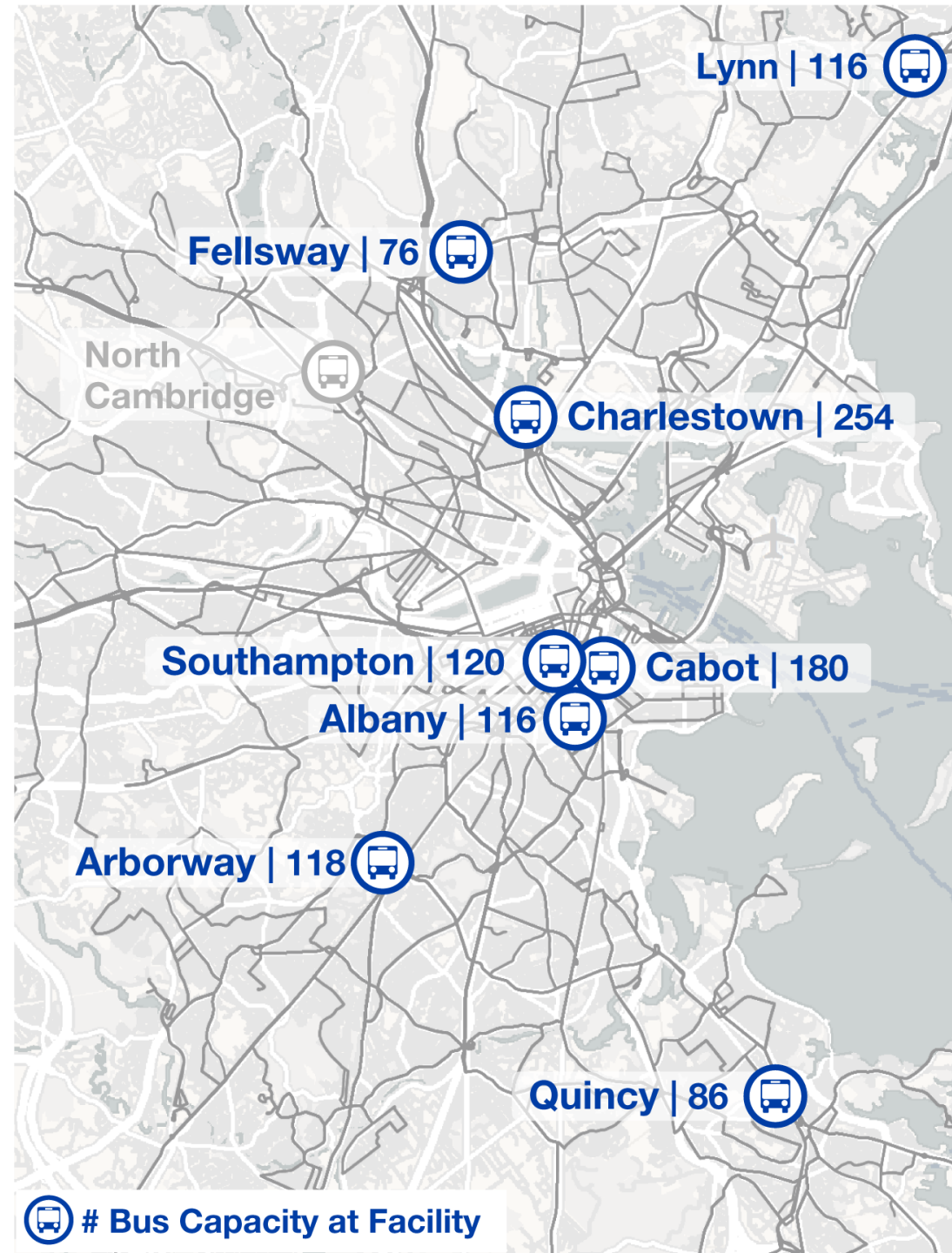
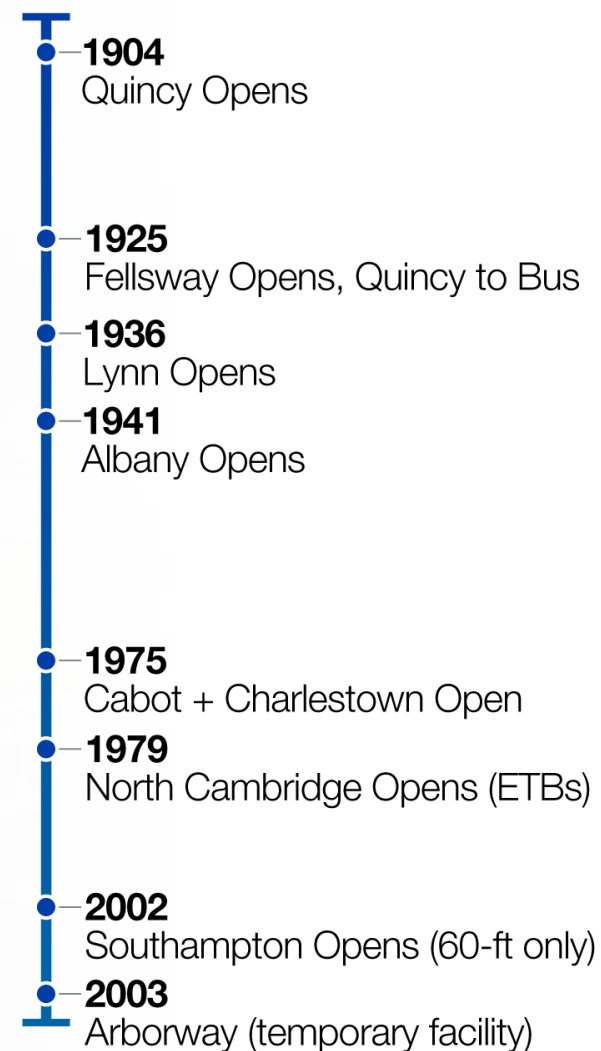


MBTA Battery Electric Bus Procurement Project Context and Award Vote

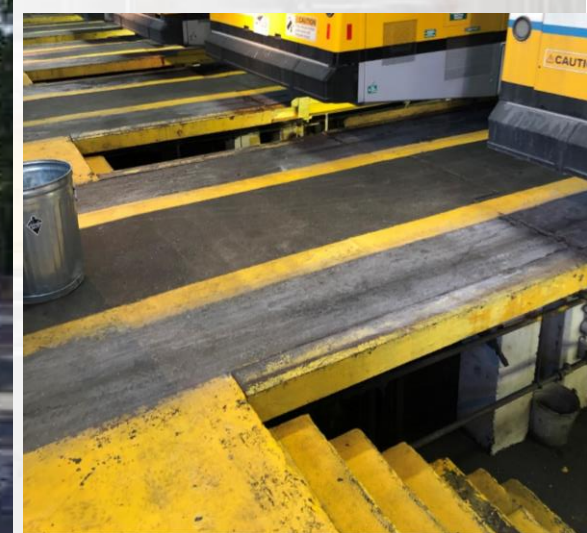
July 27, 2023

MBTA Bus Facility Network

Nine maintenance garages house more than **1,000 buses**, with a **limit on expansion** and **zero facilities** that accommodate a full BEB fleet.



Poor Conditions, Insufficient Electrical Capacity



Driver for Battery Electric Buses

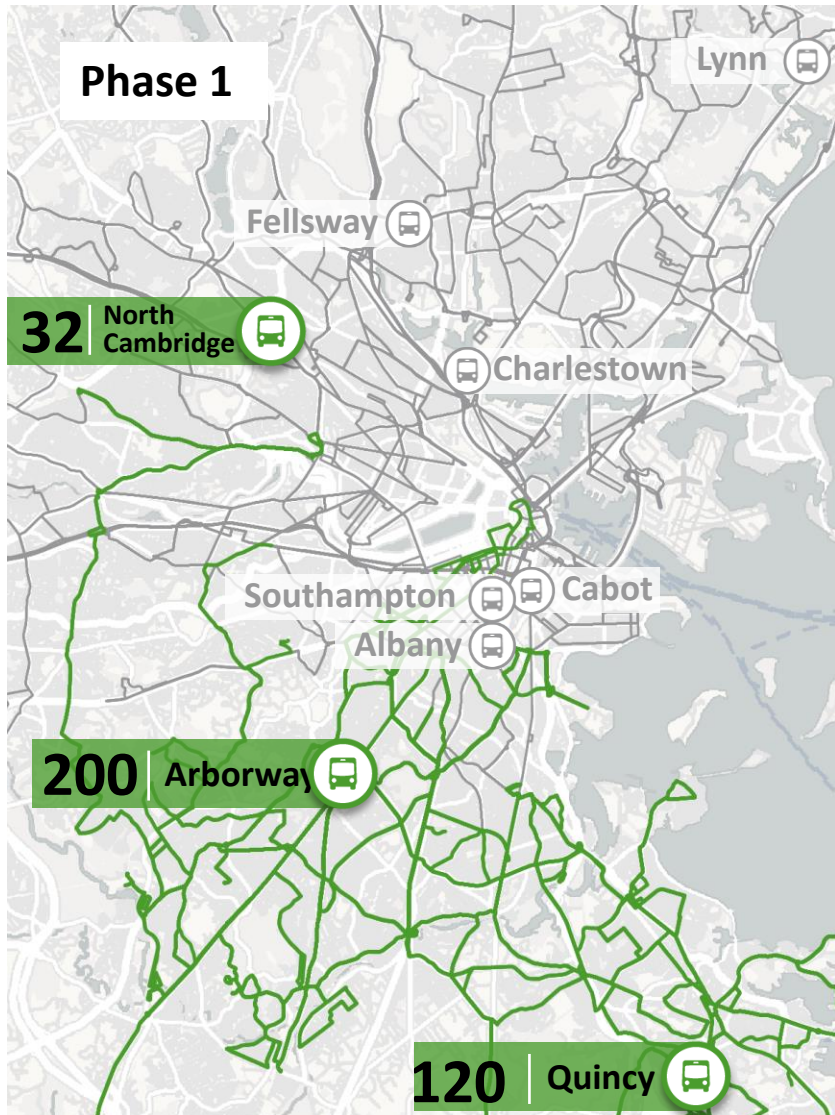
The Massachusetts Climate Law enacted in August 2022 requires MBTA to purchase solely zero emission buses after 2029 and fully electrify fleet by 2040

- BEBs support Commonwealth's Net Zero target by **reducing transportation emissions**
- BEBs have no tailpipe emissions, resulting in **better air quality in the communities** the MBTA serves compared to CNGs or diesel hybrids
- Just like electric cars, BEBs will be **quieter on the road** and when returning to maintenance facilities



Photo by Cait Sith810

Bus Electrification Plan



The MBTA is implementing a phased approach to meet the Legislative emissions mandate, improve fleet reliability, and provide safer, more efficient working conditions for workforce

- Construct new, modern facility with charging equipment every 2-3 years
- Parallel Electric + Hybrid bus procurements – allows for aggressive pace while meeting rider needs

The Bus Facility Modernization Program will return to the MBTA Board to review the implementation and funding strategy for future facilities.

Key Bus Electrification Accomplishments

- Created **implementation plan** based on equity, ridership, and fleet and facility condition
- Purchased **599 Burgin Parkway**, completed **100% design** and brought a **Construction Manager** on board for Quincy
- Completed **100% design** for North Cambridge
- **Expanded parking** at Southampton to accommodate larger 60-ft fleet
- Developed **15% design** for Arborway and procured final design
- Conducted **conceptual planning** for Wellington
- Received **\$116M FTA LoNo Award** for Battery Electric Bus procurement
- Selected **battery electric bus manufacturer** for initial contract
- Received **FTA Areas of Persistent Poverty Award** to support planning and design for on-route charging



Phase 1 Facility Modernization Update

North Cambridge

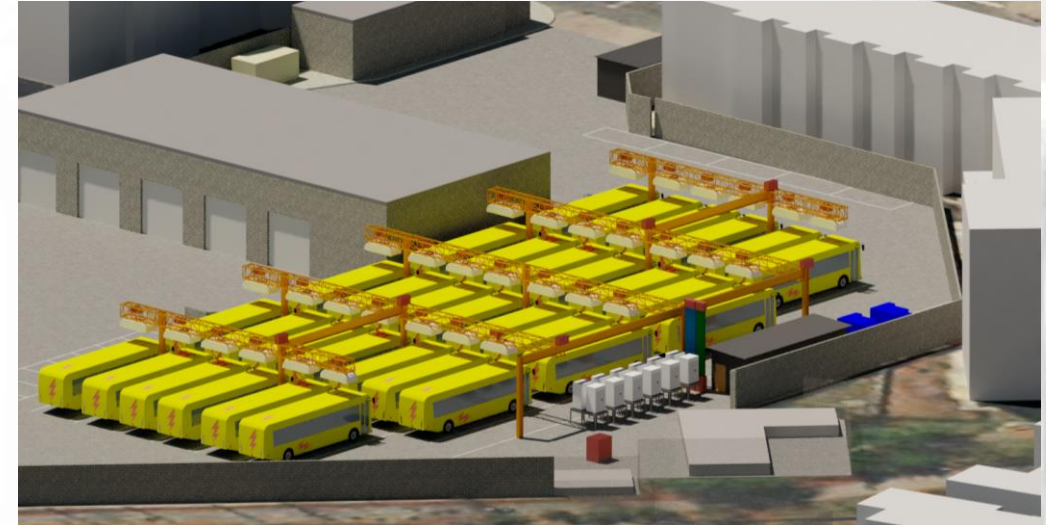
Retrofit project to install chargers to support fleet of 32 BEBs to replace trolleybuses (retired March 2022)

- Advertise construction contract Summer 2023
- Long lead electrical infrastructure as schedule driver – in process of procuring ahead of construction contract
- Target substantial completion Fall 2025 with early procurement

Quincy

New construction of all-indoor, modernized facility to store and maintain up to 120 BEBs

- Procure Trade Subcontractors for Final Guaranteed Maximum Price (GMP) – RFQ released in June 2023 and received SOQs. Shortlist for bidding planned by end of July.
- Set GMP Fall 2023 (Board Vote) with NTP to follow
- Target substantial completion Fall 2026



Current Challenge – Construction Costs

Construction cost increases and schedule delays due to subcontractor market availability, supply chain issues, inflation, and other market factors

Measures taken to reduce costs:

- Using CMAR delivery method allows us to make value engineering (VE) scope modifications, increases subcontractor pool and mitigates scope, schedule and cost risk
- Identified VE options to reduce project costs based on lessons learned from peer agencies (i.e. MTA)



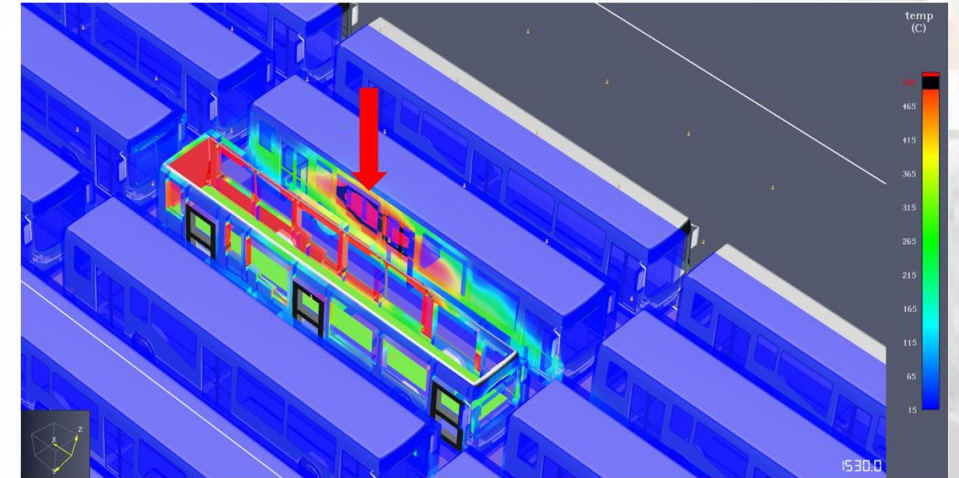
Current Challenge – Fire Suppression

Industry-wide, a holistic approach to battery and fire safety is needed to safely transition to zero-emissions fleets.

- Lithium-ion battery fires (thermal runaway) are most commonly due to manufacturing defects, damage, or improper charging
- Building Code does not explicitly prescribe design requirements for electric vehicle storage/maintenance facilities

The MBTA is employing a multi-pronged approach to fire prevention and suppression to address the safety of riders and staff. Measures taken to enhance fire suppression:

- Conducted enhanced fire modeling to redesign fire suppression systems to ensure effectiveness during thermal events
- Enhanced on-vehicle sensors monitoring battery currents, voltages, and temperatures as well as off-gassing as leading indicators of potential overheating events
- Included charge management systems and remote Emergency-Stop buttons to de-energize charging equipment and communicate with on-vehicle monitoring systems while buses are charging



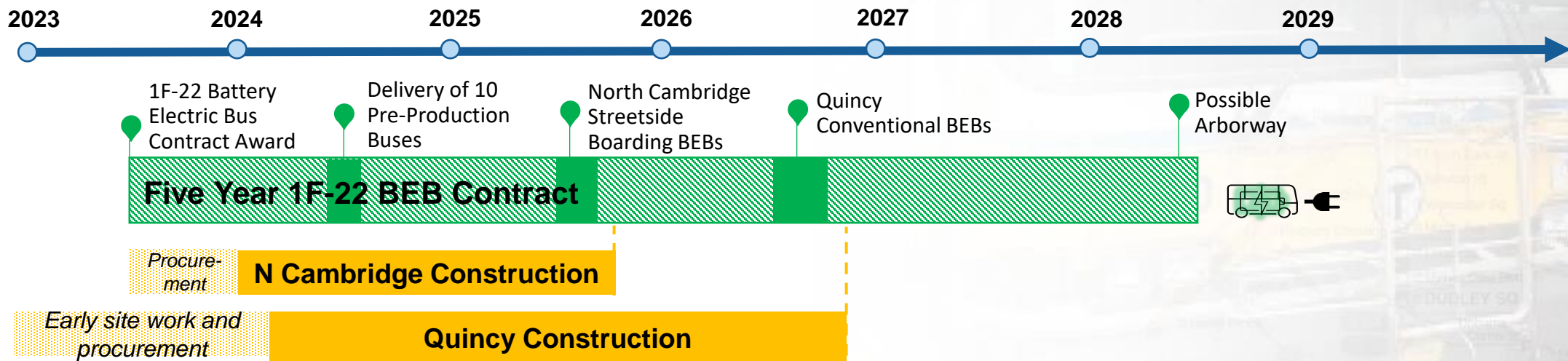
Phase 1 Battery Electric Bus Procurement

MBTA is advancing the Bus Electrification Plan with the procurement of Battery Electric Buses

- BEBs will replace the aging 2008-2009 New Flyer Emissions Controlled Diesel (ECD) fleet and the retired 2004 Neoplan Electric Trolley Bus (ETB) fleet
- Vehicle Engineering plans to execute RFP 1F-22 to procure a new fleet of 40-foot Battery Electric Buses (BEB) under Contract No. 1F-22 with New Flyer of America Inc.
- Proposed contract will support the procurement of 80 BEBs. Delivery of this fleet to begin with the arrival of ten pre-production buses in Summer 2024.
- Serial Production bus deliveries of the remaining 70 buses to be coordinated with forecasted opening of North Cambridge (2025) and Quincy (2026) facilities

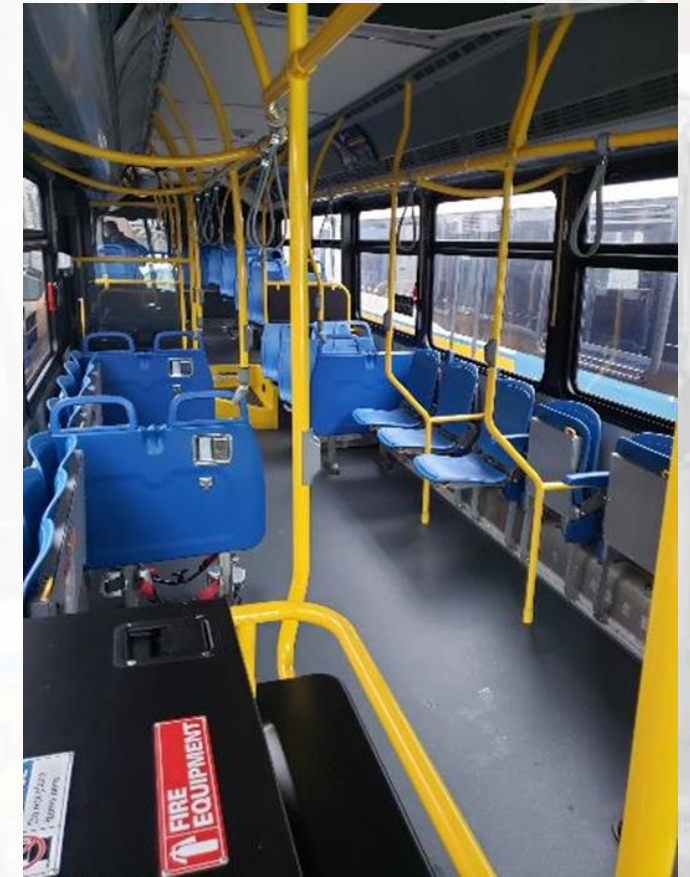
Battery Electric Bus Timeline

- **Proposed Contract 1F-22 is for 80 buses**, with options for up to a total of **460 BEBs over a 5-year period**
- Contract Order is split between **48 conventional BEBs** (base option) and **32 streetside boarding BEBs** (Option 2A, executed at award) to support Harvard Tunnel operations
- Pre-production delivery comprised of 5 conventional and 5 streetside boarding BEBs
- BEB Contract envisioned to support projected openings of Phase 1 facilities



New Flyer 40-Foot Battery Electric Bus Features

- Industry leading **Safety** features include advanced energy storage system (ESS) monitoring and early fault detection
- Range requirement of 120 miles minimizes operational impacts
- Option 2A buses include streetside boarding, with additional wheelchair ramp located at streetside rear door
- Additional design enhancements include:
 - Enhanced driver's security barrier
 - Meets or exceeds ADA accommodations
 - Flip-up seating configuration preferred by passengers who use mobility devices and people using baby carriages
- The following options will be included:
 - Dual sided Passenger Information Screen
 - Advanced Driver Assistance System
 - Geofence



New Flyer 40-Foot Battery Electric Bus

Quantity	Description	Unit Price/Cost		Total
5	Manufacturing, furnishing, and delivery of Forty-Foot Low Floor Battery Electric Buses (BEB) pre-production buses	\$	1,253,900.00	\$ 6,269,500.00
43	Manufacturing, furnishing, and delivery of Forty-Foot Low Floor Battery Electric Buses (BEB) production buses	\$	1,272,900.00	\$ 54,734,700.00
5	OPTION 2A -Manufacturing, furnishing, and delivery of Pre-production buses configured with street side boarding	\$	1,278,900.00	\$ 6,394,500.00
27	OPTION 2A - Manufacturing, furnishing, and delivery of production buses configured with street side boarding	\$	1,299,900.00	\$ 35,097,300.00
80	OPTION 10 - Mobileye Advanced Driver Assistance System	\$	12,948.79	\$ 1,035,903.20
80	OPTION 11 - Dual-sided LCD Passenger Information Screen	\$	22,429.53	\$ 1,794,362.40
80	OPTION 12 - Geofencing System	\$	79.68	\$ 6,374.40
	Manuals, Capital Spares, Training Aids, Training Program, Special Tools, and Test Equipment	\$	13,755,342.00	\$ 13,755,342.00
	Contract Total			\$ 119,087,982.00

\$116M Grant Award for Battery Electric Buses

- Bipartisan Infrastructure Law provides FTA *Low- and No-Emission* grant opportunities
 - FY22 Grants provided “\$1.66 Billion to transit agencies, territories, and states to invest in bus fleets and facilities”
- Grant application detailed the benefits of the Authority’s bus electrification strategy on our climate change goals and Environmental Justice communities in the region
- MBTA received the largest award in the country for this grant cycle -- \$116M to:
 - Allows us to replace our oldest diesel buses with BEBs
 - Develop workforce program to support training and safety efforts

Since the passage of the Bipartisan Infrastructure Law (BIL), the MBTA has won more than a dozen competitive grant awards totaling over \$252 million to help fund MBTA capital needs.

Request of the MBTA Board of Directors

Vehicle Engineering requests that the MBTA Board of Directors authorize the General Manager & CEO, or his designee, to award and execute Formal Contract No. 1F-22 to New Flyer of America Inc. to manufacture, furnish and deliver 48 new low floor forty-foot Battery Electric Buses. It is recommended that this procurement include contract Options 2A (32 Battery Electric Buses with streetside boarding), Option 10 (Provision for Mobileye Advanced Driver Assistance System), Option 11 (Provision for Dual-sided LCD Passenger Information Screen), Option 12 (Provision for Geofencing System), capital spares, training, training aids, operators driving simulator, special tools, publications, and communications for a total delivered amount **not to exceed \$119,087,982.00.**