Integrated Fleet and Facilities Plan (IFFP)

Part Three: Bus

December 4, 2017
Goals of the Presentation

- General update on the state of the bus fleets and facilities
- Provide FMCB an update on Focus40 bus ridership projection and fleet growth methodology
- Highlight critical fleet and facilities investment needs
  - Opportunities for alternative procurement and financing
- Review of the next generation MBTA fleet – Zero / No emission goals
Aligned with MBTA Strategic Vision - Focus40 Planning

*The MBTA plans to execute the commitments made in the FMCB Strategic Plan

MBTA Strategic Plan

Focus40: Meeting the Needs of the Region in 2040

- Blue Line Resiliency Planning
- Green Line Capacity Study
- Orange Line Capacity Study
- Mattapan High Speed Line Study
- Commuter Rail Vision
- Bus Service Plan

Project Development

5-Year Capital Investment Plan
20-Year Capital Investment Plan

IMPLEMENTATION
State of the Fleet & Maintenance Facilities
Inventory and Condition Approach

- Fleet and facilities inventory and condition assessment activities performed between January and March 2017
- Consistent with MBTA asset management plan and strategy (MAP-21)
- Physical assessments utilized the FTA 1-5 condition rating scale
- Report cards were prepared summarizing key findings for fleets and facilities
## Inventory and Condition – Bus Fleet 40 ft

### 40’ Bus Fleet

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<th>Fleet</th>
<th>Age</th>
<th>Total Qty</th>
<th>Condition Rating</th>
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<td>New Flyer CNG</td>
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<td>175</td>
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*Not physically evaluated

- 40-foot fleet assessment excludes contingency fleet and hydrogen bus
- 325 New Flyer buses delivered in 2016-17 assumed as 5.0 “Excellent”
### Inventory and Condition – Bus Fleet 60 ft

#### 60’ Bus Fleet

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<td><strong>Fleet</strong></td>
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*Not physically evaluated

- DMA overhaul currently underway
- 25 New Flyer Hybrid overhaul in planning
- 44 New Flyer buses delivered in 2016-17 assumed as 5.0 “Excellent”
Inventory and Condition – Bus Facilities

<table>
<thead>
<tr>
<th>Facility</th>
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<td>Arborway</td>
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<td>Cabot</td>
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<tr>
<td>Charlestown (maint.)</td>
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<tr>
<td>Charlestown (storage)</td>
<td>42</td>
<td>-</td>
<td>2.5</td>
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<tr>
<td>Fellsway</td>
<td>92</td>
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<tr>
<td>Lynn</td>
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<td>North Cambridge</td>
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<td>Quincy</td>
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<tr>
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</table>

- Most facilities are in marginal condition and are at or over practical capacity
- Some facilities also suffer from capability limitations, which impact efficiency
Inventory and Condition – Bus Facilities

- Poor layouts
- Uneven / Degraded floors
- Outdated Shop Equipment
- Low roof restricts maintenance
- Door size restricts bus size
- Maintenance pits poor
Planning for the Future
Average Weekday Ridership by Mode

Ridership by Transit Mode
Average Weekday, October 2016 to September 2017

Thousands of Riders

- RAPID TRANSIT: 781k
  - BL: [Bar]
  - OL: [Bar]
  - GL: [Bar]
- BUS: 390K
  - KBR: [Bar]
  - SL: [Bar]
- COMMUTER RAIL: 127k
- FERRY: 5.3k

Source: MBTA Back on Track Data
IFFP Key Planning Objectives and Actions – Bus

- Achieve State of Good Repair (SGR) in 15 years
- Modernize and build new maintenance facilities
- Replace the entire 40’ and 60’ bus fleet
- Expand the 40’ and 60’ vehicle fleet to satisfy projected increases in ridership
- Establish goals and timelines for moving toward a zero/no emission fleet
- Move toward long term procurements with scheduled annual deliveries
- Improve standardization and improve the versatility of the overall fleet
- Implement RCM program for new buses and avoid major midlife overhauls
Current Service Areas

- Average age 54 years old
- Strained capacity
- No room for expansion
- Fuel infrastructure dependent
- Maintenance constraints
- No facility redundancy
- Quincy & Albany garages cannot physically accommodate new buses
**Conceptual Service Areas**

- **North West Service Area**
  - 250-350 buses

- **North East Service Area**
  - 250-350 buses

- **Central Service Area**
  - 400-500 buses

- **South West Service Area**
  - 250-350 buses

- **South East Service Area**
  - 150-200 buses

- Framework for the future
- Geographic approach to bus facility needs
- 5 service areas
- Increased capacity
- Modernized facilities
- Operational flexibility – 40’ & 60’ fleet
- Facilities will comply with sustainable initiatives
**IFFP Bus Fleet Investment Strategy**

- Based on traditional procurement model
- Expansion garage needed before capacity can be added
- Short term – execute available hybrid bus option (194 buses)
- Implementing RCM program

**Discussion Points**

- Long term – execute new procurement (5 year contract)
  - Predictable annual replacements
  - 100 buses per year
- Zero / no emission bus strategy
**Integrated Fleet and Facilities Plan (IFFP)**

## IFFP Bus Facilities Modernization – Conceptual Strategy

<table>
<thead>
<tr>
<th>Year</th>
<th>Project</th>
<th>Garage Capacity Impact</th>
<th>Net Capacity Impact</th>
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<td>2020</td>
<td>New Southeast Garage – 200 buses</td>
<td>+200</td>
<td>+114</td>
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<td></td>
<td>Close Quincy</td>
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<td>2022</td>
<td>Expand Southampton – 250 buses</td>
<td>+150</td>
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<td>Rehab Cabot – 200 buses</td>
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<td>Close Albany</td>
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<td>2024</td>
<td>New Southwest Garage – 250 buses</td>
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<td>2028</td>
<td>New Northeast Garage – 250 buses</td>
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<td>Close Lynn</td>
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<td>New Northwest Garage – 200 buses</td>
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<td>Rehab Charlestown – 250 buses</td>
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<td>Close Fellsway</td>
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<td>Close North Cambridge</td>
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Factors to Consider for Strategic Bus Facility Planning

- Community Interests
- Land Acquisitions
- Environmental Stewardship and climate resiliency
- Service planning (growth areas, route profiles, and dead head miles)
- Optimal facility capacity and size
- Ownership of new and existing facilities
- Timing and location of future back shop support
IFFP Task Force – Bus Maintenance Facilities

• Develop and prioritize bus maintenance facility strategy

• Actionable plan addressing
  o Maintenance facility replacements
  o Expansion
  o Rehab
  o Closures
  o Alternative procurement and financing models

  o Key Stakeholders
    o Focus40
    o Operations & Maintenance
    o Vehicle Engineering
    o Transit Facility Maintenance
    o Service Planning
    o Capital Delivery
    o Real Estate
    o Budget Office

New DART Leed Gold bus maintenance facility
Integrated Fleet and Facilities Plan (IFFP)

**IFFP Bus Investment Impact**

**1200-1350 New Buses**  
(75% 40-foot, 25% 60-foot)  
$1.1 – 1.3B (not programmed)

- Increase passenger capacity  
- Improve headways  
- Increase fleet reliability  
- Improve customer experience  
- Reduced emissions

**Maintenance Facility Modernization**  
$808M (not programmed)

- Enable facilities to continue supporting revenue fleet  
- Increase fleet reliability  
- Reduce maintenance costs  
- Improve technical capabilities

**Reliability Centered Maintenance Program**  
Scope under review

- Increase fleet reliability  
- Reduce lifecycle costs  
- Eliminate major fleet overhauls

**Fleet Overhauls**  
$218M (Partially programmed, Scope under review)

- Complete ongoing and upcoming overhaul programs  
- Begin transition to light overhaul approach  
- Increase fleet reliability  
- Reduce lifecycle maintenance costs  
- Maximize asset lifecycle
An initial review of global and domestic procurement and financing models has been conducted.

For each project, delivery options will be screened in light of specific policy objectives and benefits and costs will be fully evaluated.

Key considerations in selecting a delivery strategy:
- Alignment with MBTA policy objectives
- Risk transfer and risk mitigation
- Performance incentives
- Efficiencies and lifecycle cost optimization
- Procurement and delivery speed and ease of execution
- Private sector market
- Federal funding and credit assistance

Legend:
- ○ Public responsibility
- ● Private responsibility
- ◇ Either public or private responsibility depending on contract options
## Alternative Procurement and Financing Considerations

<table>
<thead>
<tr>
<th>Policy Objectives</th>
<th>Improve budget stability and visibility</th>
<th>Improve incentives for acceleration &amp; time certainty</th>
<th>Incentivize performance</th>
<th>Mitigate cost overrun risks</th>
<th>Mitigate interface risks</th>
<th>Mitigate technology risks</th>
<th>Opportunity for innovation</th>
<th>Opportunity for lifecycle cost optimization</th>
<th>Opportunity for economies of scale</th>
<th>Control design and specifications</th>
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Next Generation Fleet
Path to a Zero Emissions Fleet

2000: First Compressed Natural Gas Bus

2004: Electric Trolley Bus (ETB) Fleet

2004: Dual Mode Articulated (DMA)- Silver Line Fleet

2010: 60’ Diesel Hybrid Fleet

2015: 40’ Diesel Hybrid Fleet

2015: 40’ Hydrogen Fuel Cell Bus (Pilot)

2017-18: 40’ Battery Electric Bus (BEB) Feasibility Study

2018: 60’ New Flyer XE60 – Battery Electric Bus
Silver Line – Zero Emission Bus Project

- February 2015 – FTA Awarded the MBTA - Zero Emissions Silver line Project
  - Low or No Emission (LoNo) Vehicle Deployment Program
  - 2 Grants totaling -$10.1M
- FTA Objectives:
  - Deploy the cleanest and most energy Efficient U.S. manufactured transit buses that are not yet widely deployed in transit fleets.
  - Focus on nonattainment areas for ozone and carbon monoxide
- Partnered with CTA, New Flyer and Transworld Associates LLC, UTCEM.
- 5 - 60ft Battery Electric Buses
- Buses enter production spring 2018
- Buses expected to be delivered 2018
Seaport District Growth – Transit Focus

- Silver Line service requires focused attention to meet growing ridership demand, particularly in the Seaport District.

- Rapid development in the Seaport District suggests that models based on urban population growth will understate demand.

- MBTA’s plan to move toward a 100% “Transitway Tunnel” 60-foot fleet will improve service and overall vehicle utilization in the medium term.

- 60-foot bus maintenance capacity is critical to support long term fleet growth.

- MBTA’s partnership with Massport should continue to be leveraged to support Silver Line service.
40 ft. Battery Electric Bus (BEB) Feasibility Study

• Joint Partnership – MassDot Transportation Planning & MBTA

• Massachusetts Global Warming Solutions Act (GWSA)
  o 25% Reduction of GHG Emission by 2020
  o 80% reduction of GHG Emissions by 2050

• MBTA Bus Fleet Contributed over 25% of the MassDot Total GHG Emissions FY2016

• Strategic Planning Approach

• Align BEB Integration roadmap with Fleet & Facilities plan

• Estimated Completion Fall 2018
1. Identify key pilot components through in-depth route, vehicle technology and supporting systems assessment
   - Real world Driving Cycle Simulations
   - Advanced Route & Vehicle Performance Analysis
   - Charging Infrastructure Plan
   - Facility and Infrastructure Strategy
   - Operations & Maintenance Cost estimates

2. Pilot Implementation Plan
   - North Cambridge Pilot
   - Performance Monitoring and Evaluation Plan

3. Roadmap Report
   - Action Plan & Time Line for large Scale Deployment
   - Capital Investment & ROI
   - GHG Benefits
Key Takeaways

• Execute option with New Flyer for 194 hybrid buses to replace aging Neoplan diesel fleet

• Bus facilities are in critical need of modernization and replacement
  • Remaining buses which can be physically accommodated at Quincy and Albany garages will be retired by 2023
  • Critical action required to begin planning efforts for replacement facilities

• Outcome of battery electric Bus feasibility Study will have a significant impact to future feet profile and maintenance facilities.

• Long term bus procurement strategy will continue to evolve as ridership projections are refined
Upcoming Presentations

- Commuter Rail, Ferry, and Paratransit – December 11th
- Light Rail (Green Line and Mattapan) – December 18th