Massachusetts Bay Transportation Authority

Integrated Fleet and Facilities Plan (IFFP)

Part Five: Light Rail

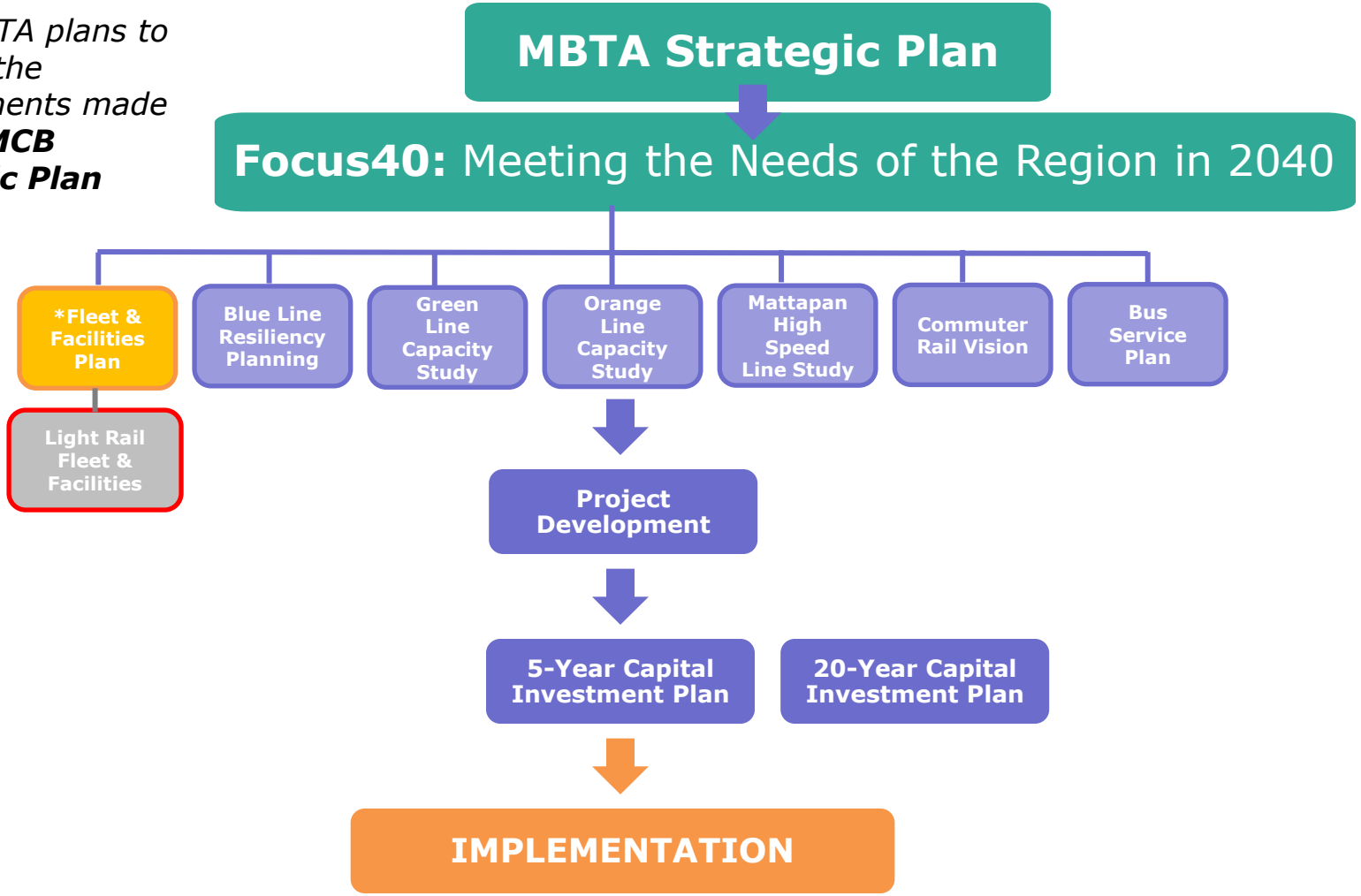
December 18, 2017

Goals of the Presentation

- General update on the state of the light rail fleets and facilities
  - Mattapan High Speed Line
  - Green Line
- Provide FMCB Board an update on fleet and facilities investment needs
- Generate discussion regarding possible future impacts to these modes

Aligned with MBTA Strategic Vision - Focus40 Planning

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



Integrated Fleet and Facilities Plan Overview

The Integrated Fleet and Facilities Plan is an early step in a larger organizational effort, and is not intended to address all aspects of MBTA operations

The IFFP is:

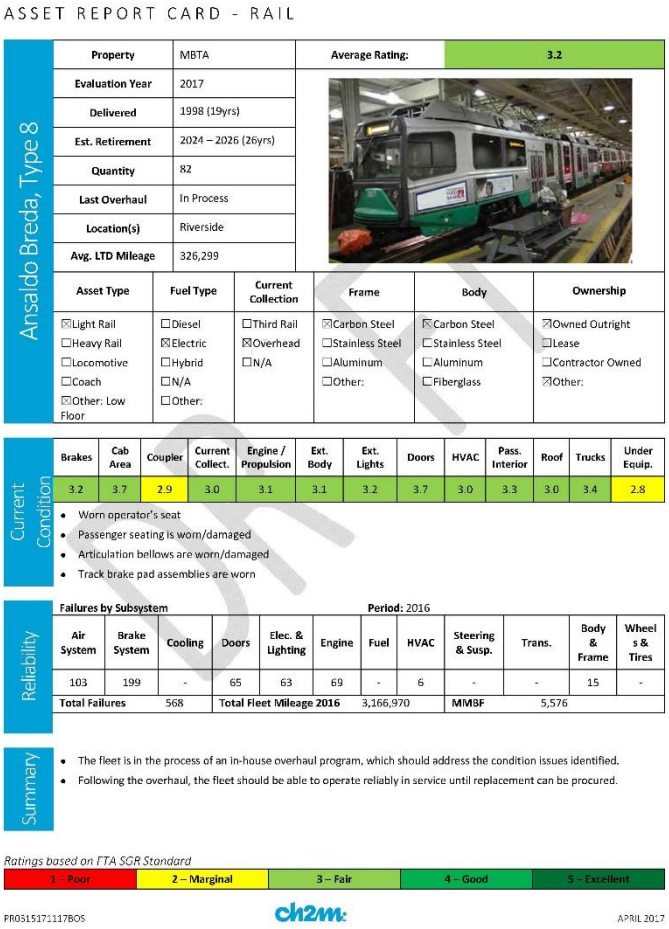
- Revenue fleets & maintenance facilities
- Currently fiscally unconstrained
- Designed to be implemented over 15 years
- Consistent with MBTA strategic plan
- Being aligned with Focus40 projections for ridership growth
- Focused initially on current MBTA service
- An evolving document, subject to annual updates
- A starting point for strategic fleet maintenance

The IFFP is **not**:

- A plan for stations, non-revenue vehicles, track, signals, and other infrastructure
- Fiscally constrained and therefor is not reconciled with the 5-year CIP
- Solely SGR – it assumes both modernization and capacity investments
- A plan for one-for-one replacement of existing vehicles
- Inclusive of operating costs
- Phased to ensure MBTA has sufficient bandwidth to execute simultaneous fleet procurement

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



ASSET REPORT CARD - RAIL

Ansaldo Breda, Type 8

Property	MBTA	Average Rating:	3.2
Evaluation Year	2017		
Delivered	1998 (19yrs)		
Est. Retirement	2024 – 2026 (26yrs)		
Quantity	82		
Last Overhaul	In Process		
Location(s)	Riverside		
Avg. LTD Mileage	326,299		

Asset Type	Fuel Type	Current Collection	Frame	Body	Ownership
☒Light Rail ☐Heavy Rail ☐Locomotive ☐Coach ☒Other: Low Floor	☐Diesel ☒Electric ☐Hybrid ☐N/A ☐Other:	☐Third Rail ☒Overhead ☐N/A	☒Carbon Steel ☐Stainless Steel ☐Aluminum ☐Other:	☒Carbon Steel ☐Stainless Steel ☐Aluminum ☐Fiberglass	☒Owned Outright ☐Lease ☐Contractor Owned ☒Other:

Current Condition

Brakes	Cab Area	Coupler	Current Collect.	Engine / Propulsion	Ext. Body	Ext. Lights	Doors	HVAC	Pass. Interior	Roof	Trucks	Under Equip.
3.2	3.7	2.9	3.0	3.1	3.1	3.2	3.7	3.0	3.3	3.0	3.4	2.8

- Worn operator's seat
- Passenger seating is worn/damaged
- Articulation bellows are worn/damaged
- Track brake pad assemblies are worn

Reliability

Failures by Subsystem — Period: 2016

Air System	Brake System	Cooling	Doors	Elec. & Lighting	Engine	Fuel	HVAC	Steering & Susp.	Trans.	Body & Frame	Wheels & Tires
103	199	-	65	63	69	-	6	-	-	15	-

Total Failures 568 | Total Fleet Mileage 2016 3,166,970 | MMBF 5,576

Summary

- The fleet is in the process of an in-house overhaul program, which should address the condition issues identified.
- Following the overhaul, the fleet should be able to operate reliably in service until replacement can be procured.

Ratings based on FTA SGR Standard

1 – Poor	2 – Marginal	3 – Fair	4 – Good	5 – Excellent

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Mattapan High Speed Line Fleets and Facilities

Inventory and Condition – Mattapan High Speed Line (MHSL)

Mattapan High Speed Line Fleet

Fleet	*Age (yrs)*	*Total Qty*
PCC Fleet	70	10*

* 2 cars out of service long term

Mattapan Maintenance Facility

- The MHSL fleet is maintained in a dedicated open air shed at Mattapan Yard, with support from Everett Shops for truck maintenance
- The maintenance area was originally constructed in 1929 and partially enclosed with a roof and two sidewalls in 2007
- Recommendations for this maintenance area will be part of the ongoing study on the MHSL anticipated early 2018

Green Line
Fleets and Facilities

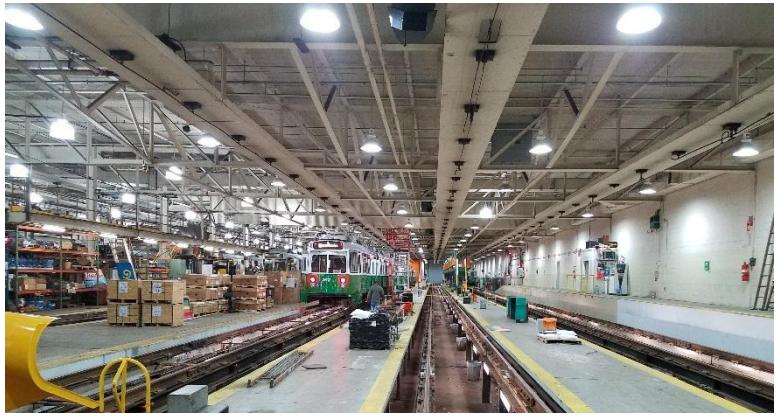
Inventory and Condition – Green Line Fleet

Fleet	*Age (yrs)*	*Total Qty*	*Condition Rating*
Type 7	32	86	3.2
Type 7 Option	20	17	3.2
Type 8	19	94	3.2
Fleet	***24.8***	***197***	***3.2***

- Green Line Type 7 fleets are currently undergoing Selective Systems Overhaul to increase reliability and maintain a SGR to extended useful life
- Green Line Type 8 fleet currently undergoing systems reliability maintenance program which has significantly increased reliability
- New Type 9 fleet (24 cars) will be delivered in 2018 to support overall operations and provide additional capacity for GLX

Inventory and Condition – Green Line Facilities

Facility	*Age*	*Condition Rating*
Lake Street	38	2.5
Reservoir	32	2.7
Riverside	41	2.7
Facility	***37***	***2.6***



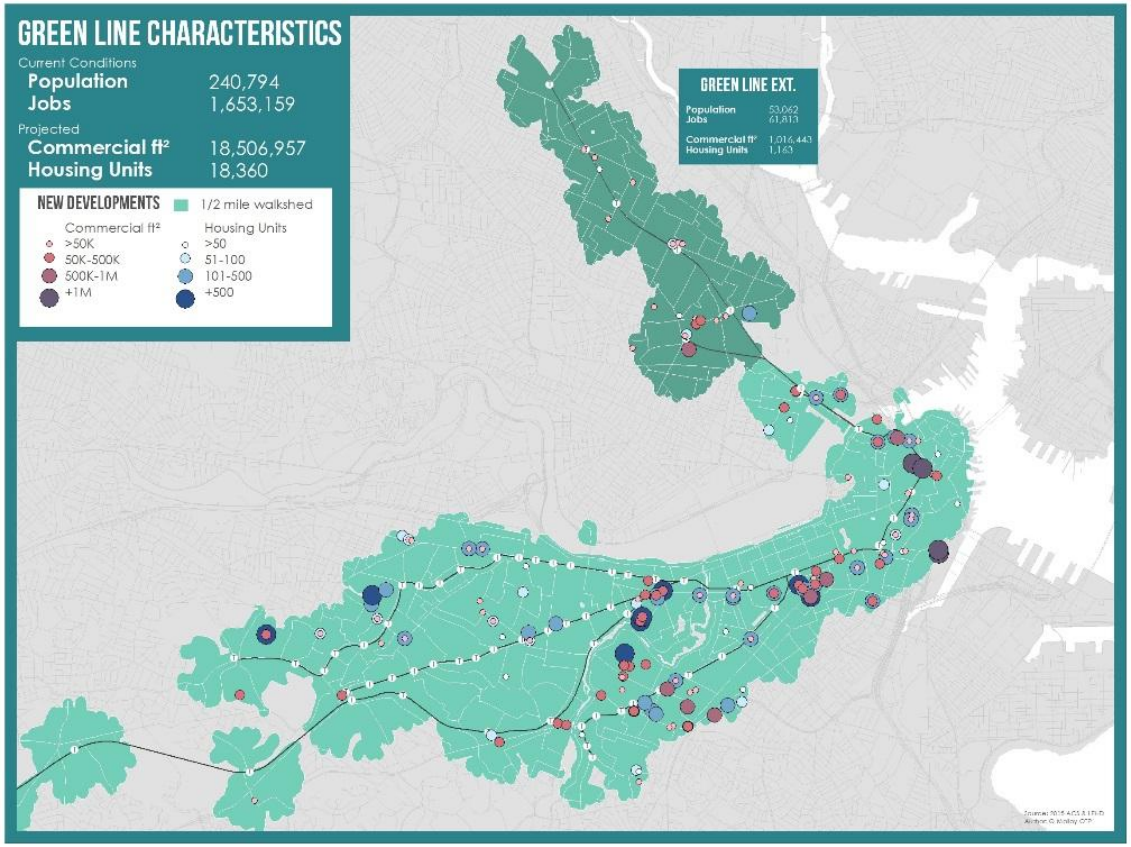
Green Line Maintenance Facilities

- Maintenance facilities are in marginal condition, items identified include;
  - Inadequate lifts
  - Hoists in need of overhaul
  - Overhead doors
  - Core building systems require upgrade
- Facility upgrades will be required at the time of the next major vehicle procurement
- Future of Lake Street facility should be considered, as part of future Green line fleet investments

Green Line Future Capacity

MassDOT/MBTA is taking a multi-faceted approach to addressing Green Line demand through 2040:

- Developing better projections for demand along the corridor with a sensitivity analysis.
- Assessing infrastructure needs to fully transition the fleet to potentially larger (Type 10) vehicles that can accommodate greater capacity.
- Identifying a range of strategies to improve operations and better match supply with demand.
- Coordinating with partners along the corridor.



Green Line Studies to be completed in 2018

Light Rail Projects: Ongoing and Near-Term

Ongoing Light Rail Programs

Type 7 Selective System Overhaul
$169M (Programmed)

- Type 7 fleet is undergoing selective system overhaul at Alstom in Hornell, NY
- HVAC Units
- Car bodies overhaul
- Complete truck overhaul
- 9 additional major systems overhauled

Type 8 Targeted System Overhaul
$66M (Programmed)

- Systems reliability program – 2 phase program expected to be competed in 36 months
- Complete truck overhaul
- Car overhaul
- Coupler overhaul
- Air compressor replacement

Type 9 Procurement
$183M (Programmed)

- 24 new cars will provide support to overall operations
- Will also add capacity to support GLX
- Delivery expected in 2018

Mattapan PCC System Overhaul
$8.7M (Programmed)

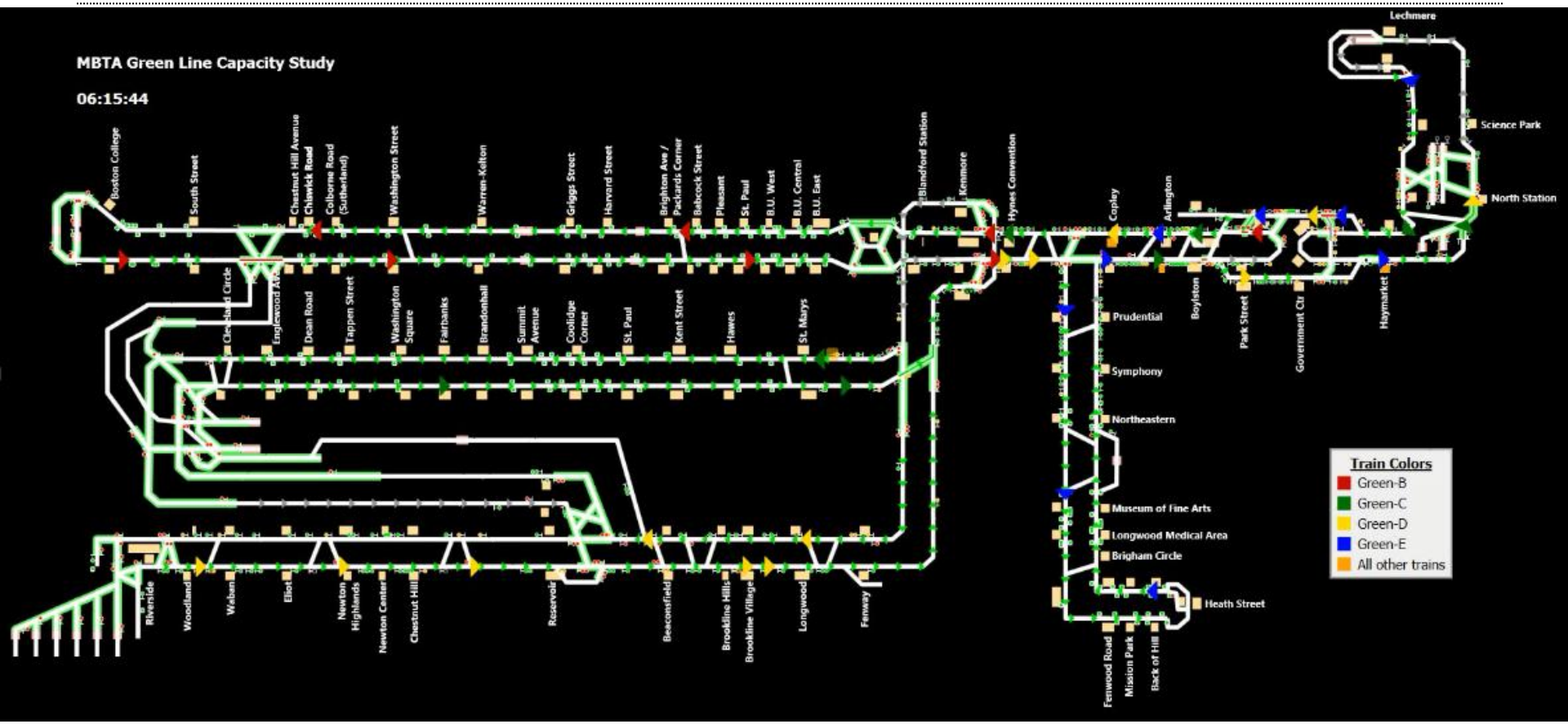
- Trucks, propulsion, and power upgrades
- Work being performed at Everett Shops and Mattapan maintenance facility
- Goal is to extend useful life beyond 2020

Future Fleet Alternative Evaluations

Green Line Capacity Study

- Evaluating impact of vehicle performance characteristics
- Baseline model established
- Route profiles and simulation models
- Facility and storage analysis for conceptual Type 10 cars
- Evaluation of conceptual Type 10 cars
- Roadmap for implementation
- **Update will be provided in late January 2018**

Green Line Base Line Operational Model Built and Being Calibrated



Future Fleet Alternative Evaluations

Mattapan HSL Due Diligence Evaluation

- Outside firm has been contracted to evaluate the future of the HSL
- Effort underway since early 2017
- Final report is expected in early 2018

Fleet Investment Plan – Light Rail

• Type 7 Selective System Overhaul	Through 2018
• Mattapan PCC System Overhaul	Through 2019
• Type 8 Targeted System Overhaul	Through 2021
• Type 9 Procurement	Through 2018
• Align future fleet and facility investment plan with Green Line Capacity study	2018 -2019

IFFP Light Rail Investment Impact

Ongoing Light Rail Programs

$243.7M (ongoing)

- Increase fleet reliability
- Improve service
- Improve customer experience
- Reduce maintenance costs

New Green Line Type 10 Procurement

(Scope under review)

- Improve headways
- Increase fleet reliability
- Improve customer experience
- Reduced lifecycle maintenance costs
- RCM maintenance

GLX Facility

$143M (Programmed)

- Support GLX operations & maintenance
- Additional GL maintenance capability
- Reduced maintenance costs
- Improve operational efficiency
- Improve effectiveness of future RCM program

Green Line Facility Upgrades

(Scope under review)

- Improve facility capability to better support revenue fleet
- Increase fleet reliability
- Reduce maintenance cost
- Improve effectiveness of future RCM program

Key Takeaways

Mattapan HSL

- Due diligence report expected in early 2018
- Complete PCC overhauls to extend life of existing fleet
- Align future editions of the IFFP with HSL long term vision

Green Line

- Complete on-going overhaul programs on Type 7 & 8 Cars
- Complete studies underway regarding future Green Line fleet, infrastructure, and capacity needs
- Update on Green Line Capacity Study by AGM late January 2018
- Align Green Line Type 10 pre-procurement / specification development after completion of capacity study and in-service evaluation of Type 9 fleet
- Align future Green Line maintenance facility modernization programs with new fleet requirements

Next Steps to Finalize IFFP in 2018

- Compiling feedback from FMCB
- Conducting the analysis on recommendations provided by FMCB
- Provide summary presentation to the FMCB
- Revise IFFP to incorporate final FMCB direction & relevant studies
  - Foucus40
  - Green Line Capacity
- Future editions of the IFFP will incorporate outcomes of key studies;
  - Commuter Rail vision
  - BEB Feasibility Study