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Advisory Committee Meeting Presentation

JULY 18, 2019

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Purpose of Today's Meeting

1. Welcome
2. Status Update
3. Review of Tier 2 Alternatives
4. Preliminary Findings: Tier 2 Alternatives 1-3
5. Next Steps
6. Public Comment

Status Update

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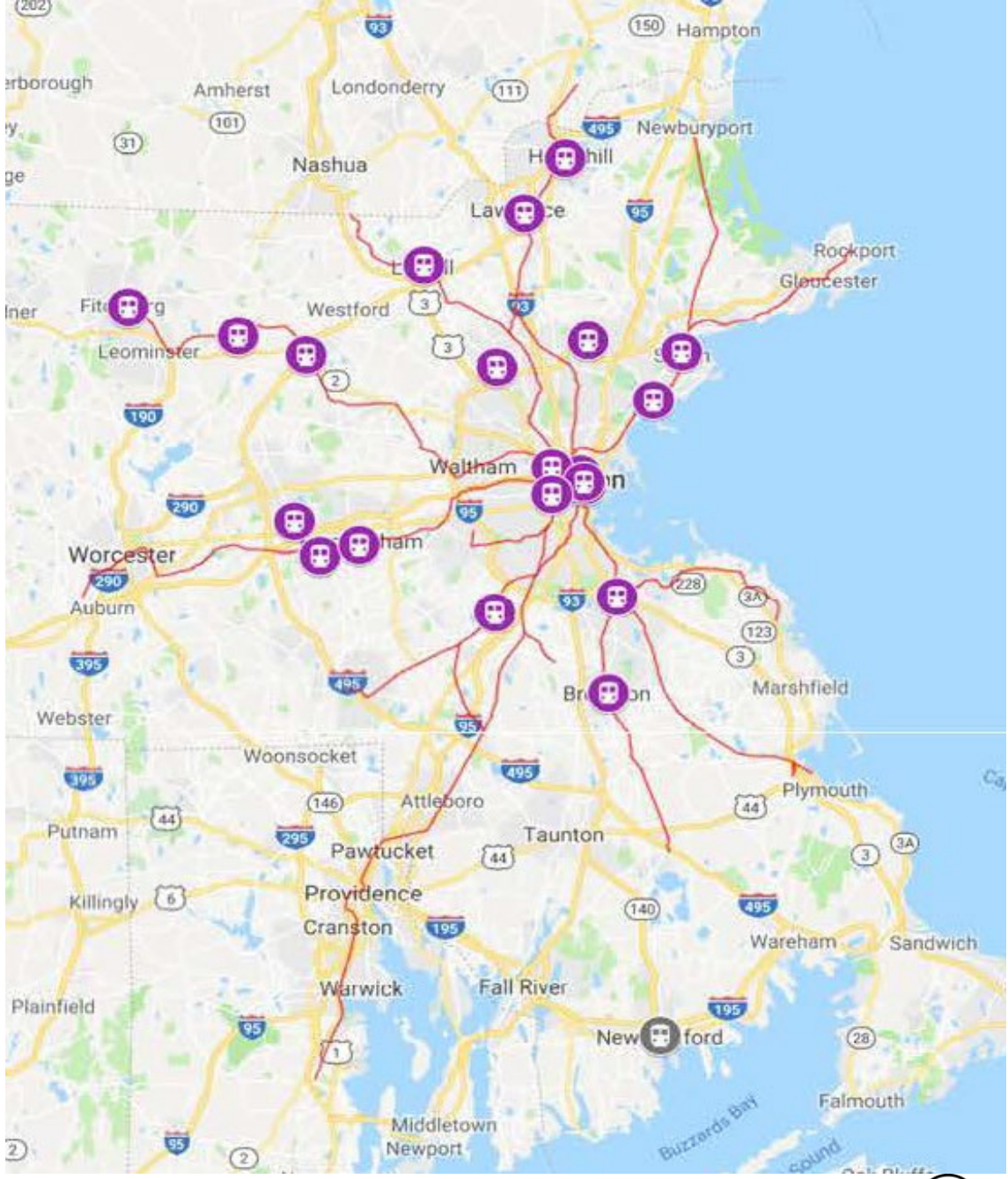
Stakeholder Engagement

- Peer Reviews
- Advisory Committee (6 meetings + optional)
- Public Meeting and Open House
- State House/Legislative Briefing (2)
- Briefings/Meetings throughout the region (40, to date)
- Non-Rider Survey focused on trade-offs gathered nearly 3,000 responses



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What We Learned

- Provide more frequent service
- Introduce service patterns to respond to the needs of the future (i.e. bi-directional)
- Not be fiscally constrained
- Consider electrification (full or partial)
- Be transformational

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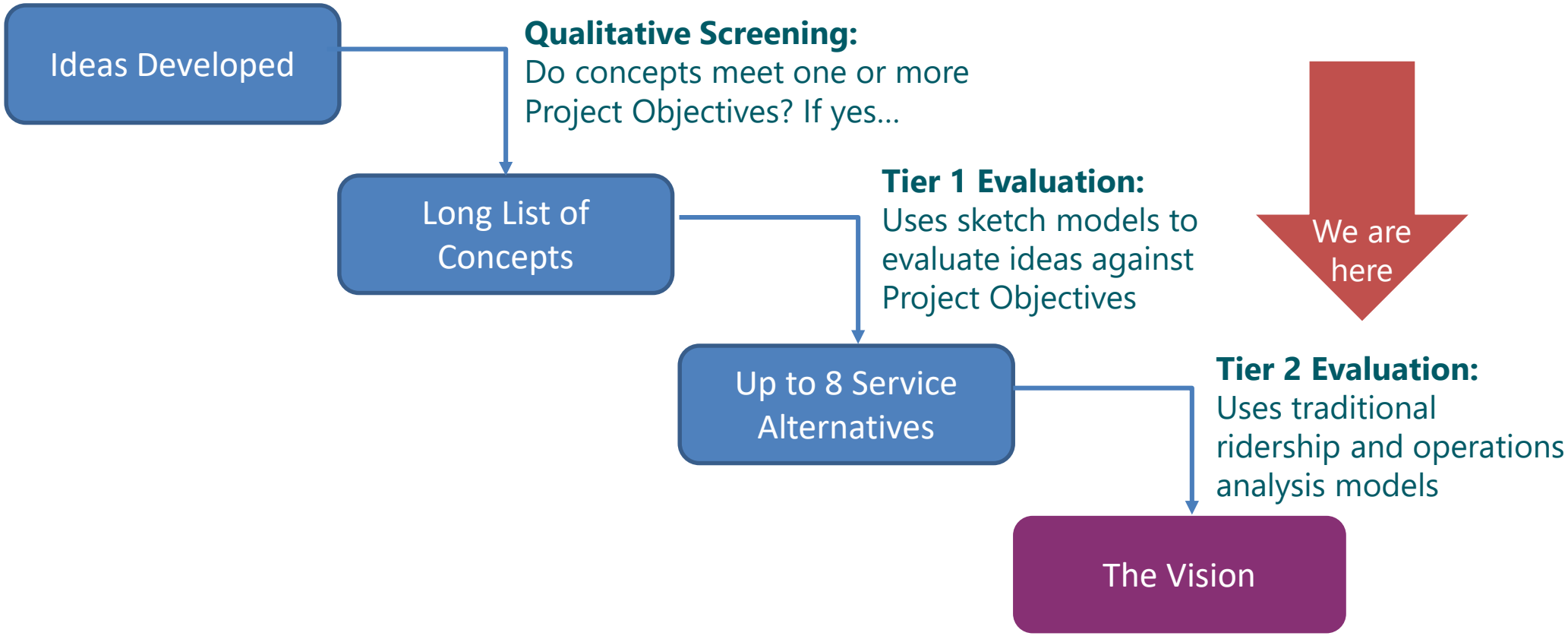
Evaluation Process



Review of Tier 2 Alternatives

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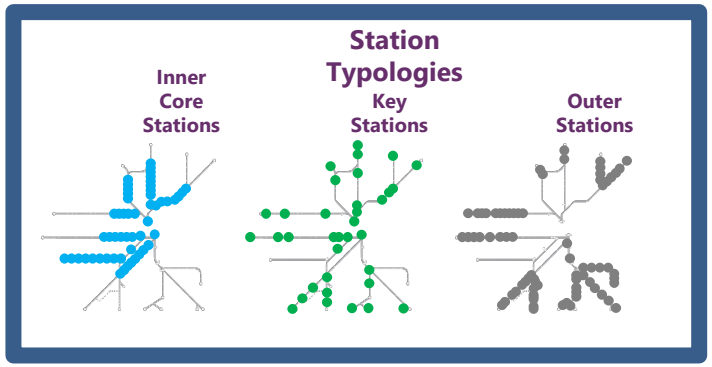
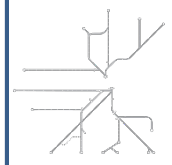
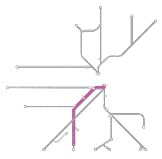
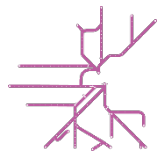
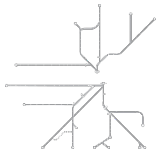
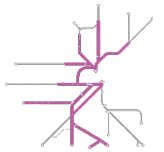
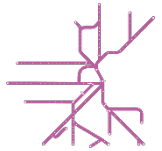
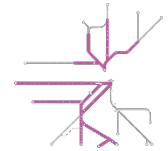
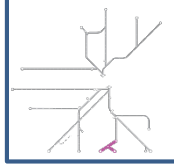
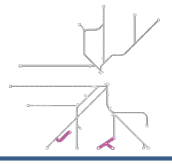
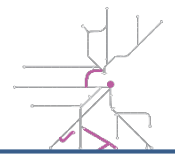
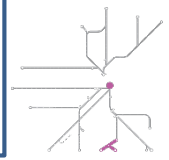
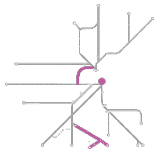
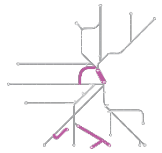
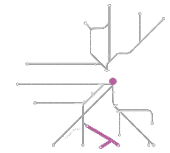
Comparing Alternatives



Evaluating relative benefits and costs across the seven alternatives will provide the foundation to build one or more Visions for the future of commuter rail, which may combine features from multiple alternatives to maximize the effectiveness of the MBTA rail network.

	1: Higher Frequency Commuter Rail	2: Regional Rail to Key Stations (Diesel)	3. Regional Rail to Key Stations (Electric)	4: Urban Rail (Diesel)	5. Urban Rail (Electric)	6. Full Transformation	7. Hybrid System
Typical Frequency (Peak/Off-Peak)							
Key Stations	30/60	15/15 (North Side) 30/30 (South Side)	15/15	30/60	30/60	15/15	30/60
Inner Core	30/60	30/60	30/60	15/15	15/15	15/15	15/30
Outer Stations	30/60	30/60	30/60	30/60	30/60	15/30	30/60
Fully Accessible High-Level Platforms							
Key Stations	Existing or Programmed Upgrades Only	✓	✓	-	-	✓	✓
Inner Core		-	-	✓	✓	✓	✓
Outer Stations		-	-	-	-	✓	-
Electrification							
Major Expansions							

Note: The alternatives as described above are subject to change during the modeling process. All text and maps describe a typical application at the system level but may vary to some extent at the line, station, or segment levels.

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Methodology – No-Build Demand (2040)

- Modeled using CTPS regional travel demand model for 2040 Future Year using MAPC projected land use
- Alternatives are compared to a 2040 No-Build Scenario
  - **No-Build is demand, not ridership. It does not constrain boardings to available seats, but does constrain to current parking supply** and assumes existing MBTA services and expansions from financially constrained plans (e.g., SCR Phase 1)
- Systemwide commuter rail demand increases in all alternatives
- Other modes are impacted by increased commuter rail service (diversions, connectivity), so demand increases by 12% (157,400 boardings)

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General Findings – No-Build Demand (2040)

No-Build Results	Total 2040 No-Build Daily Boardings	Increase in Daily Boardings (2018 – 2040)	% Increase in Daily Boardings (2018 – 2040)	Findings on Growth
Commuter Rail	150,800	24,000	19%	Growth without Rail Vision in place by 2040
North Side	46,100	3,800	9%	Highest on Haverhill and Lowell Lines
South Side	104,700	20,200	24%	Highest on Old Colony Lines and SCR
Other Modes	1,500,500	157,400	12%	Highest on Rapid Transit and Silver Line

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General Findings and Methodology – Capital Needs

- The degree of capital investment required varies across alternatives
- Initial needs are identified but were **not designed or engineered**
- Major investments include:
  - Station upgrades for additional platforms and/or accessibility improvements
  - Track and signal upgrades for increased service and operational flexibility; PTC is assumed to be in place as part of No-Build conditions
  - Fleet and layover/maintenance areas are needed to support the additional service for each alternative; existing and planned MBTA layover/maintenance facilities are assumed to remain and/or be upgraded, with additional allowances have been made for additional layover/maintenance space resulting from increased fleet size
  - Electrification assumes a traditional approach and will require upgrades to the entire MBTA system, including signals, stations, low clearance bridges, and layover and maintenance facilities

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General Findings and Methodology - Fleet and Consist Sizing

- Fleet sizes (number of vehicles) are calculated based on service plans needs, based on the following:
  - Consist sizes (lengths of trains) are based on CTPS ridership estimates
  - Estimates provided may change based on period and direction ridership data and associated consist sizing
- Fleet Estimates for Costs Estimates
  - Current Approach - Estimate incremental fleet or new vehicle types needed beyond today's MBTA diesel fleet
  - Potential Variations to Fleet Estimates
    - Assume fully new fleet for all alternatives
    - Identify a "credit" for current and future MBTA investments

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General Findings and Methodology – Order-of-Magnitude (OOM) Capital Costs

- Presented in 2020$ and 2030$
  - Unit costs obtained from similar MBTA and peer agency projects
  - Fleet unit costs based on market conditions and industry comparisons, and includes ancillary costs such as spare parts and training
  - Major expansion costs (e.g., SSX, NSRL) based on previous work
  - Real estate impacts accounted for to the extent practicable (i.e., major takings)
  - Contingencies and soft costs applied consistent with MBTA project controls
  - Capital costs estimated in current year dollars (2020$) and escalated to 2030$ to reflect an approximated time period for future construction
- Fleet, and associated layover/maintenance, and electrification found to be the largest capital costs
- Initial findings do not account for life cycle costs

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General Findings and Methodology – Operating and Maintenance (O&M) Costs

- Presented in 2020$
  - Presented as increase over baseline costs and annualized
  - Grounded in existing cost data from the MBTA commuter rail
  - Peer US commuter rail system data used for:
    - Electric locomotives and EMUs
    - Electric transmission system (catenary, etc.) costs
    - DMUs
  - Uses operational and ridership outputs from each alternative as inputs into the model
  - Costs are not offset by revenue
- All alternatives increase operating costs
  - Increase in service levels drives increase in operating costs

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Comparison of Alternatives – Key Characteristics

	Alternative 1: Higher Frequency Commuter Rail	Alternative 2: Regional Rail to Key Stations (Diesel)	Alternative 3: Regional Rail to Key Stations (Electric)
Objective	**Predictable, bi-directional** service with modest investments in infrastructure	Greatly improves service to select **high-density areas outside the core**	Greatly improves service to select **high-density areas outside the core with EMUs**
Typical Frequency (Peak min/Off-Peak min Headway)	All Stations: **30/60** bi-directional	Key Stations (North Side): **15/15** bi-directional Key Stations (South Side): **30/30** bi-directional All Other Stations: **30/60** bi-directional	Key Stations: **15/15** bi-directional All Other Stations: **30/60** bi-directional
Station Accessibility	High-level boarding platforms at stations where they are **currently existing or programmed**	**All Key Stations** would have high-level boarding platforms	**All Key Stations** would have high-level boarding platforms
Electrification	None	Service between Boston and Providence would be electrified	The full system would be **electrified**
Train Type(s)	Diesel Locomotives	Diesel Locomotives Electric Locomotives (to Providence)	Electric Multiple Units (EMUs)
Major Expansions	South Coast Rail Phase 1	South Coast Rail Phase 1 Foxboro	South Station Expansion South Coast Rail Full Build Grand Junction (Shuttle) Foxboro

Preliminary Findings: Alternative 1 Higher Frequency Commuter Rail

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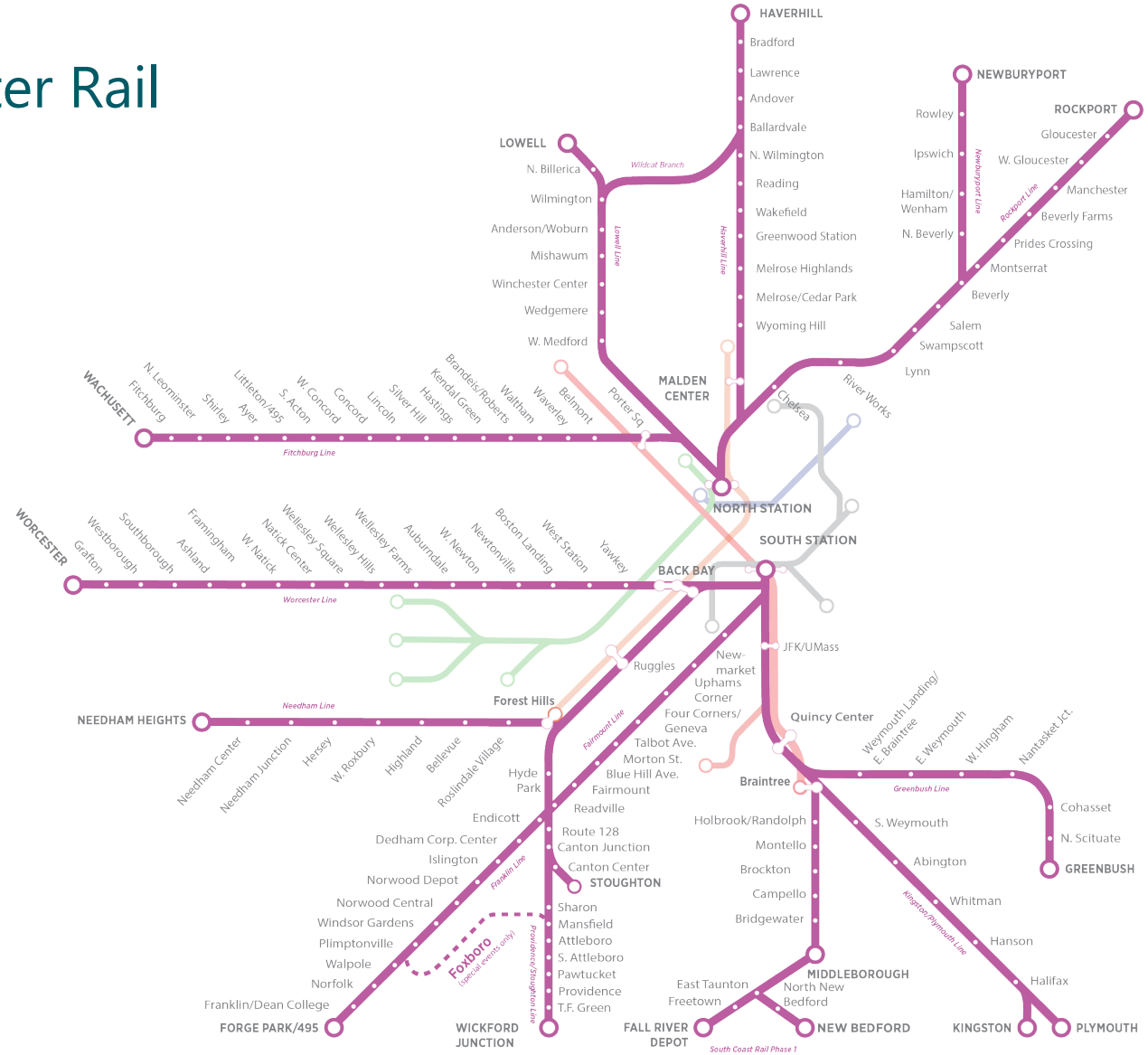
Alternative 1: Higher Frequency Commuter Rail

Goal:
Assess costs and benefits of providing predictable, bi-directional service every **30 minutes during peak periods and 60 minutes during off-peak periods to all stations***, with modest investments in new infrastructure

Key Features	
Typical Frequency (Peak/Off-Peak)	All Stations*: 30/60 bi-directional
Station Accessibility	High-level boarding platforms at stations where they are currently existing or programmed
Electrification	None
Train Type(s)	Diesel Locomotives
Major Expansions	South Coast Rail Phase 1



***Note:** Approximate 30 minute peak period and 60 minute off-peak period service applies to all stations, with the exception of Mishawum, Plimptonville, Wickford Jctn, TF Green and Old Colony/SCR Stations, which are consistent with today's service schedules.

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Alternative 1: Higher Frequency Commuter Rail – Preliminary Operations

Opportunities
Able to achieve 30-minute peak and 60-minute off-peak frequency on most lines with moderate investments
Longer lines get more express services (Worcester, Fitchburg, Haverhill)
Interlining alleviates existing terminal capacity constraints
Limitations
Frequency increases seen primarily in off-peak period and reverse peak direction
Interlining of Franklin Line and Fairmount Line reduces connection to Back Bay and Ruggles
Old Colony services are constrained where the three lines share track; as a result only achieves the proposed service levels obtained in SCR Phase 1

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Alternative 1: Higher Frequency Commuter Rail – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares

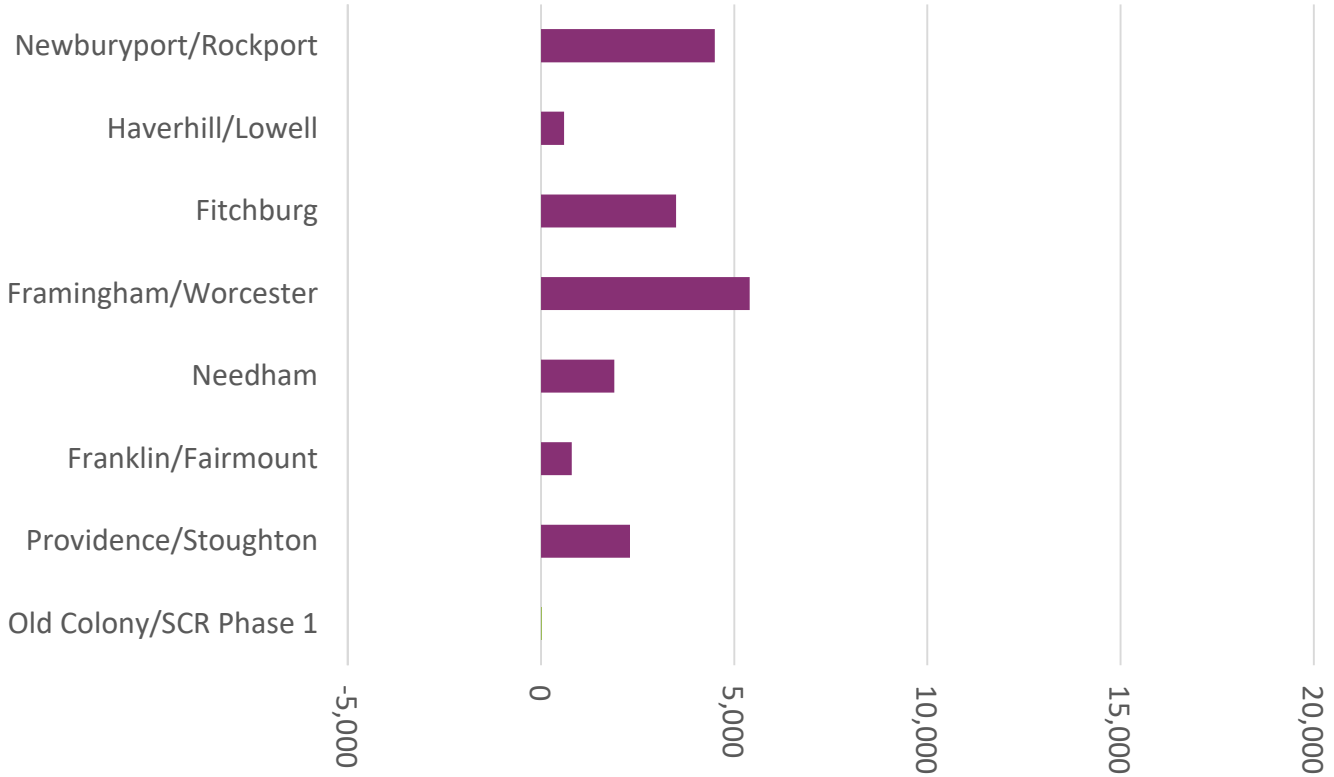
Alternative 1	Increase in Daily Boardings over No-Build Demand	% Increase in Daily Boardings over No-Build Demand	Findings on Growth
Commuter Rail	19,000	13%	Overall growth
North Side	8,600	19%	Highest on Newburyport/Rockport and Fitchburg Lines
South Side	10,400	10%	Highest on Framingham/ Worcester Line; **Old Colony/SCR service pattern does not change in Alternative 1**
Other Modes	6,000	<1%	Increases on Green, Red, Silver Lines; Blue Line and bus reductions/diversions

Note: Emissions, equity, and connectivity will be analyzed for each alternative as part of the upcoming analysis.

Alternative 1: Higher Frequency Commuter Rail – Preliminary Ridership (2040)

- Ridership increases vary by line

Change in Daily Boardings
(Compared to No-Build)



Change in Daily Train Trips
No-Build vs. Alternative 1

67 Trips → 96 Trips **(+29)**

92 Trips → 144 Trips **(+52)**

38 Trips → 60 Trips **(+22)**

54 Trips → 130 Trips **(+76)**

32 Trips → 48 Trips **(+16)**

79 Trips → 90 Trips **(+11)**

71 Trips → 96 Trips **(+25)**

74 Trips → 74 Trips **(+0)**

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Alternative 1: Preliminary Capital Needs

- Stations (9)
- Trackwork (~ 4 miles)
- Signals and Systems
- Grade crossings (6)
- Bridges/Structures (6)
- Fleet Needs:
  - Equipment
    - Diesel Locomotives
    - Bi-Level Cab Cars
    - Bi-Level Coaches
  - Maintenance and Layover areas

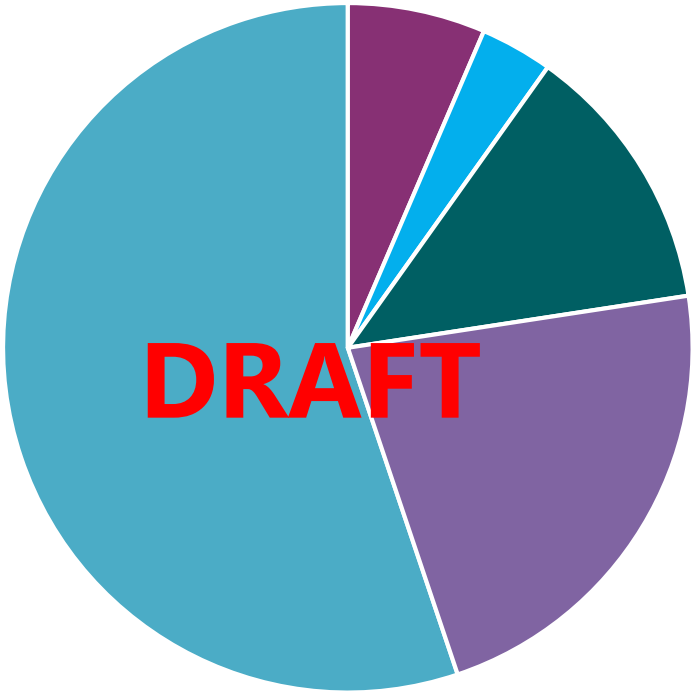
Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 1: Higher Frequency Commuter Rail - Preliminary Capital Costs

OOM Capital Costs (2020$/2030$)

$2.2B (2020$)/$3.1B (2030$)
(Expand Existing Fleet)

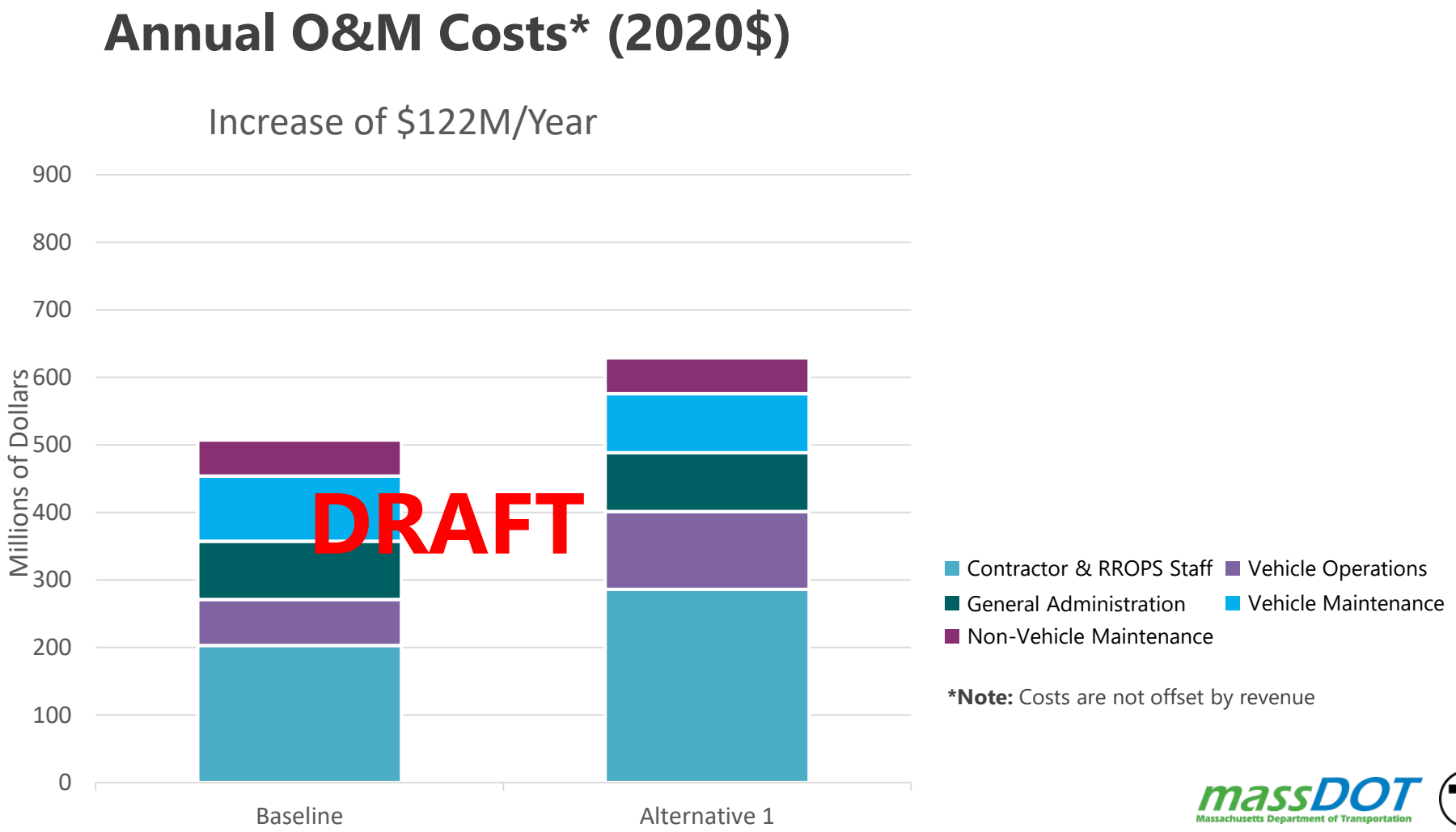
Fleet costs are based on incremental fleet for diesel options



- Fleet Procurement
- Layover and Maintenance Facilities
- Stations
- Structures
- Track and Signal Work

Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 1: Higher Frequency Commuter Rail - Preliminary Operations and Maintenance Costs



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Preliminary Findings: Alternatives 2 and 3 Regional Rail to Key Stations

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Comparison of Alternatives 2 and 3

	Alternative 2 – Regional Rail to Key Stations (Diesel)	Alternative 3 – Regional Rail to Key Stations (Electric)
Typical Frequency (peak/off-peak headways)	Key Stations (North Side): 15/15 Key Stations (South Side): 30/30 All Other Stations: 30/60	Key Stations (North Side): 15/15 Key Stations (South Side): 15/15 All Other Stations: 30/60
Fleet Type	Diesel Locomotives Electric Locomotives (to Providence)	EMUs
Terminals	Existing	Expanded South Station and modified North Station (for Grand Junction)
Expansions	Foxboro SCR Phase 1	Foxboro SCR Full-Build Grand Junction
Major Infrastructure Investments	-	Electrification (including facility upgrades) Double Tracking of Old Colony Line- Braintree to South Station

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Preliminary Findings: Alternative 2 Regional Rail to Key Stations (Diesel)

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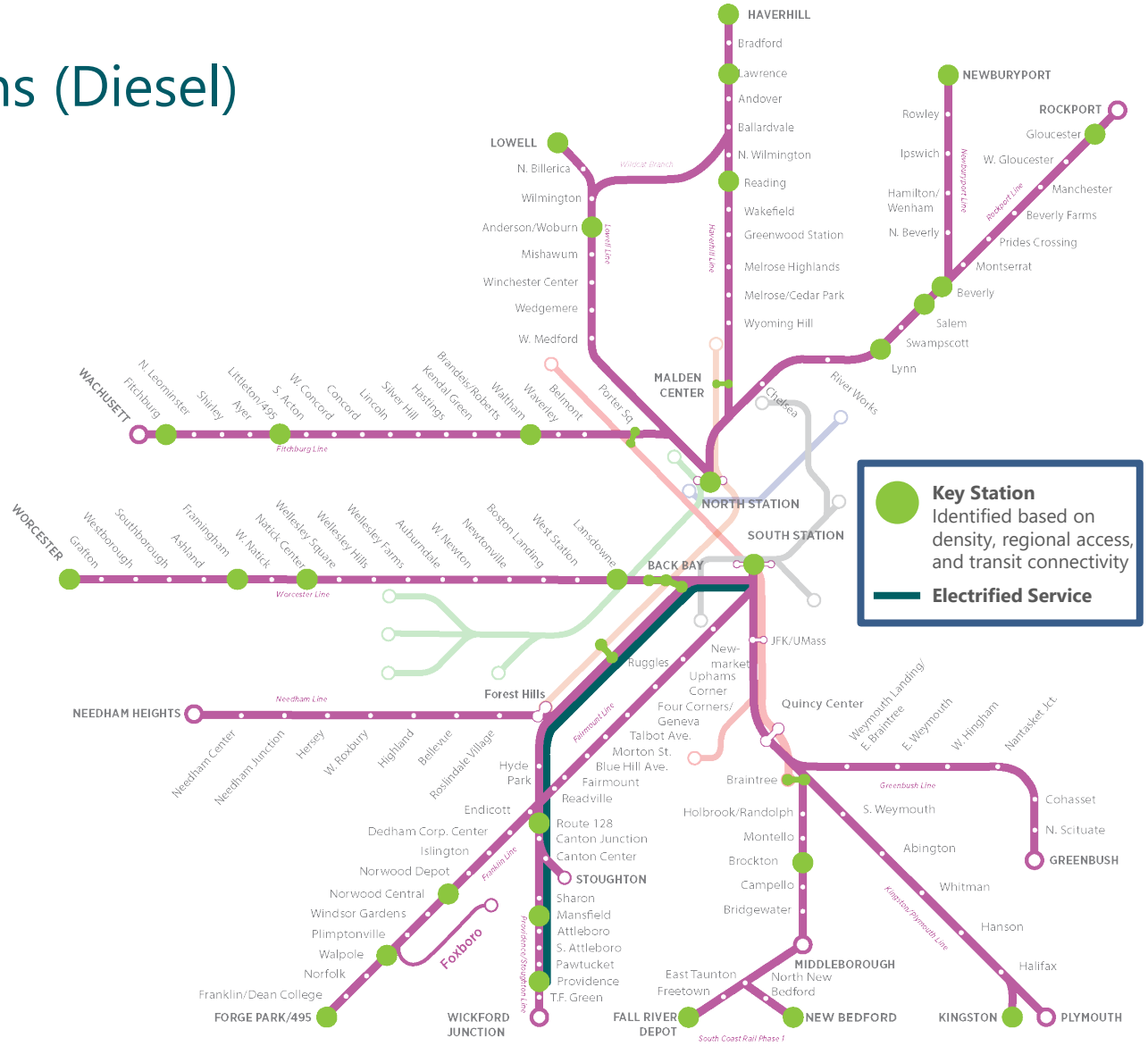
Alternative 2: Regional Rail to Key Stations (Diesel)

Goal:
Focus on regional rail – high-frequency service for longer-distance trips to key stations – using mainly diesel-powered locomotives. Key stations are in Gateway Cities, dense areas outside the core, and/or provide regional access and transit connectivity. Stations not identified as key stations would receive more modest increases in service.

Key Features	
Typical Frequency (Peak/Off-Peak)	Key Stations (North Side): 15/15 bi-directional Key Stations (South Side): 30/30 bi-directional All Other Stations: 30/60 bi-directional
Station Accessibility	All Key Stations would have high-level boarding platforms
Electrification	Service between Boston and Providence would be electrified
Train Type(s)	Diesel Locomotives Electric Locomotives (to Providence)
Major Expansions	South Coast Rail Phase 1 Foxboro



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Alternative 2: Regional Rail to Key Stations (Diesel) – Preliminary Operations

Opportunities
Achieves 15-minute all-day frequency to most north side Key Stations
Supplements service with 30-minute peak and 60-minute off-peak frequency on most lines
Greatly improves service to select high-density areas outside the core
Express service results in faster trips to Key Stations
Improves on today's frequency for some lines, even for stations not defined as Key Stations
Limitations
Mixing service types strains system capacity
Does not achieve 15-minute all-day frequency to south side lines due to lack of South Station Expansion.* Delivers 30-minute all-day frequency to most south side Key Stations.

* Alternative 3 tests 15-minutes all-day service to most south side key stations

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Alternative 2: Regional Rail to Key Stations (Diesel) – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares; **unconstrained parking at Key Stations**

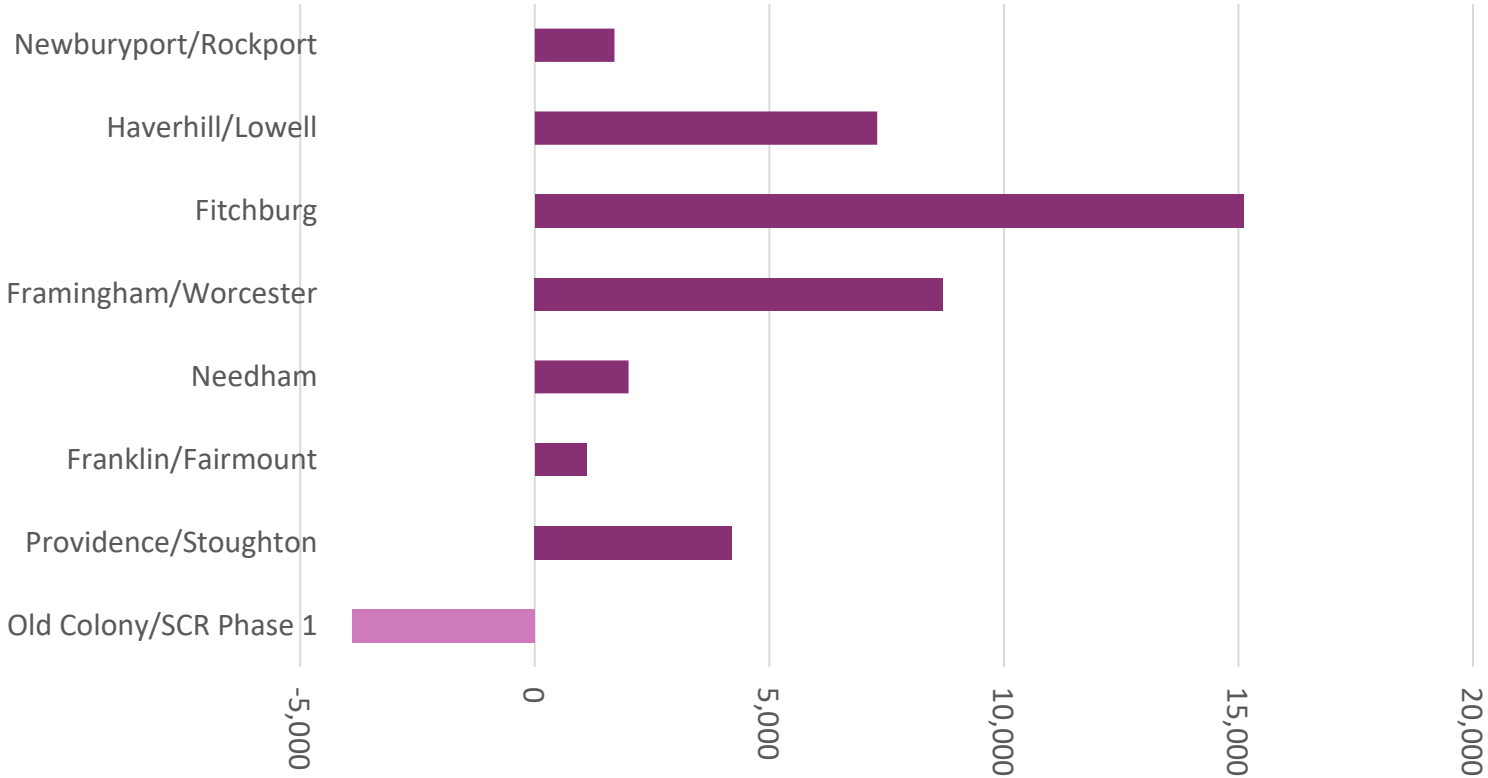
Alternative 1	Increase in Daily Boardings over No-Build Demand	% Increase in Daily Boardings over No-Build Demand	Findings on Growth
Commuter Rail	36,200	24%	Growth primarily on North Side due to less frequency on South Side (terminal capacity limitations)
North Side	24,100	52%	Highest on Fitchburg and Haverhill/Lowell Lines
South Side	12,100	12%	Highest on Framingham/ Worcester Line; **Reductions on Old Colony lines due to diversions to unconstrained parking (e.g., Red Line/Braintree)**
Other Modes	40,500	3%	Highest on Red Line, Green Line; Local bus reductions/diversions

Note: Emissions, equity, and connectivity will be analyzed for each alternative as part of the upcoming analysis.

Alternative 2: Regional Rail to Key Stations (Diesel) – Preliminary Ridership (2040)

- Ridership increases vary by line

Change in Daily Boardings
(Compared to No-Build)



Change in Daily Train Trips
No-Build vs. Alternative 2

Newburyport/Rockport	67 Trips → 144 Trips **(+77)**
Haverhill/Lowell	92 Trips → 288 Trips **(+196)**
Fitchburg	38 Trips → 144 Trips **(+106)**
Framingham/Worcester	54 Trips → 150 Trips **(+96)**
Needham	32 Trips → 48 Trips **(+16)**
Franklin/Fairmount	79 Trips → 108 Trips **(+29)**
Providence/Stoughton	71 Trips → 120 Trips **(+49)**
Old Colony/SCR Phase 1	74 Trips → 74 Trips **(+0)**

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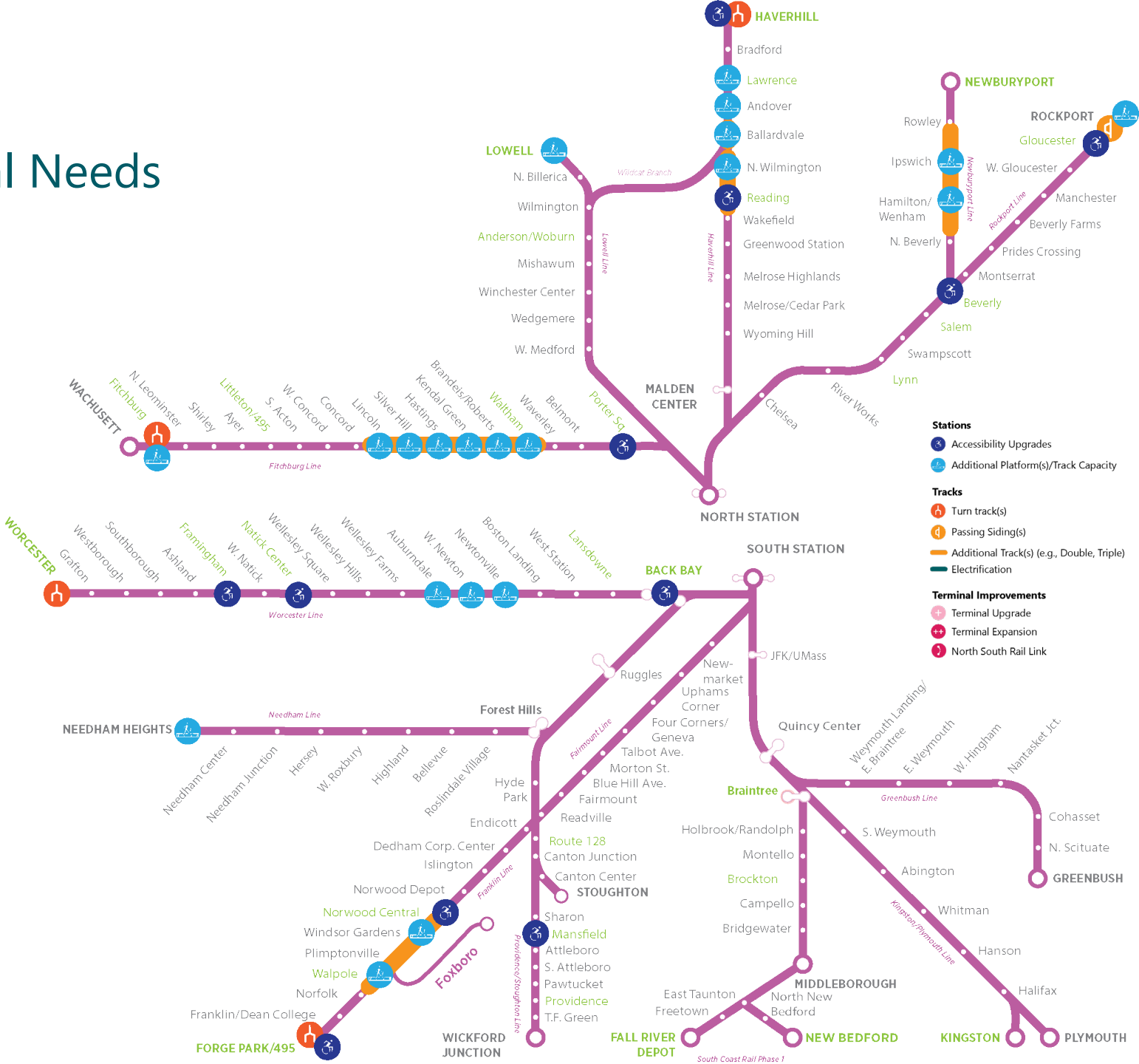
Alternative 2: Preliminary Capital Needs

- Stations (32)
- Trackwork (~ 34 miles)
- Signals and Systems
- Grade crossings (35)
- Bridges/Structures (36)
- Fleet Needs:
  - Equipment
    - Diesel Locomotives
    - Electric Locomotives
    - Bi-Level Cab Cars
    - Bi-Level Coaches
  - Maintenance and Layover areas



Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 2: Regional Rail to Key Stations (Diesel)- Preliminary Capital Costs

OOM Capital Costs (2020$/2030$)

$5.3B (2020$)/$7.5B (2030$)
(Expand Existing Fleet)

Fleet costs are based on incremental fleet for diesel options

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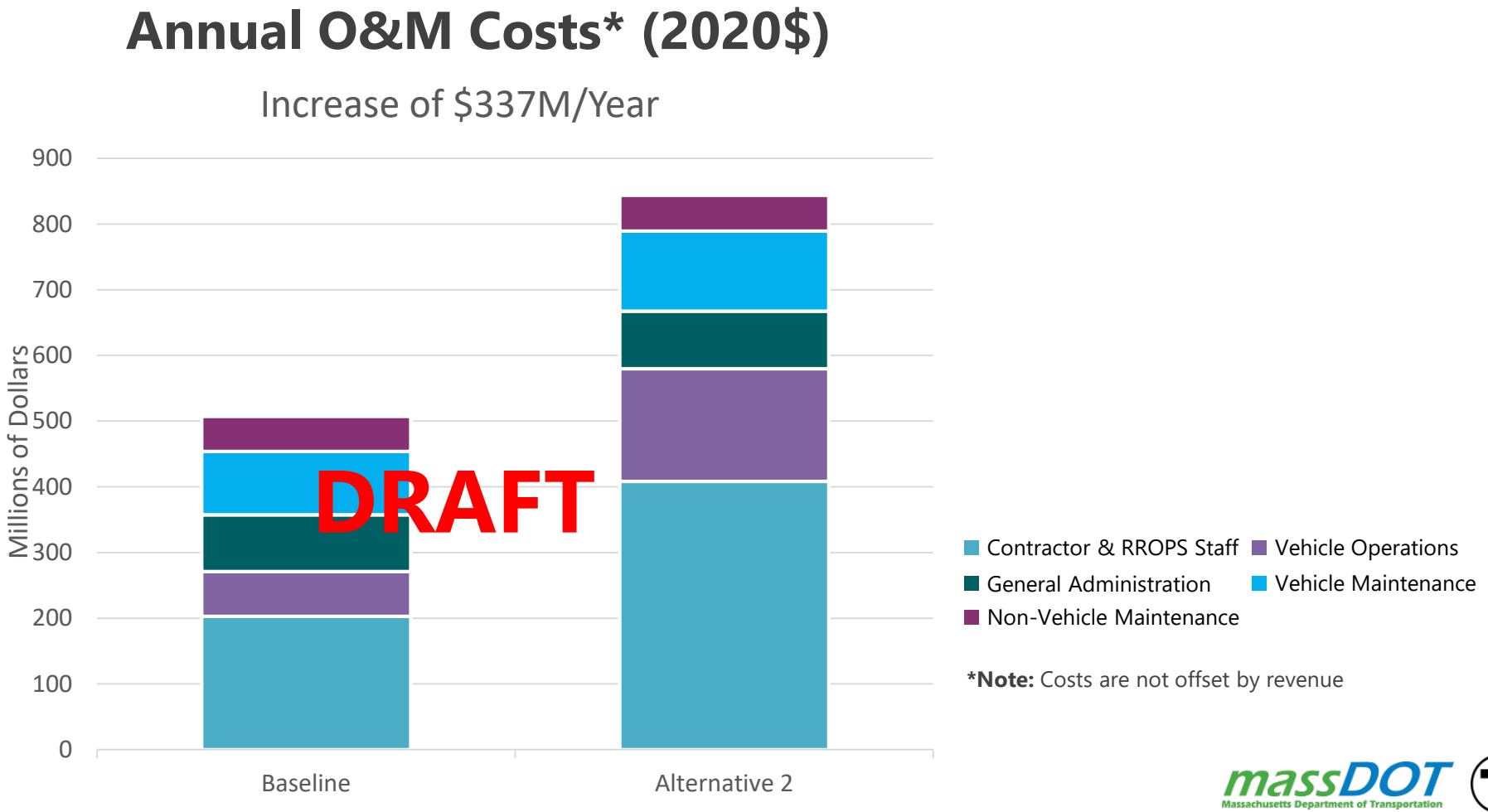
Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 2: Regional Rail to Key Stations (Diesel)- Preliminary Operations and Maintenance Costs



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Preliminary Findings: Alternative 3 Regional Rail to Key Stations (Electric)

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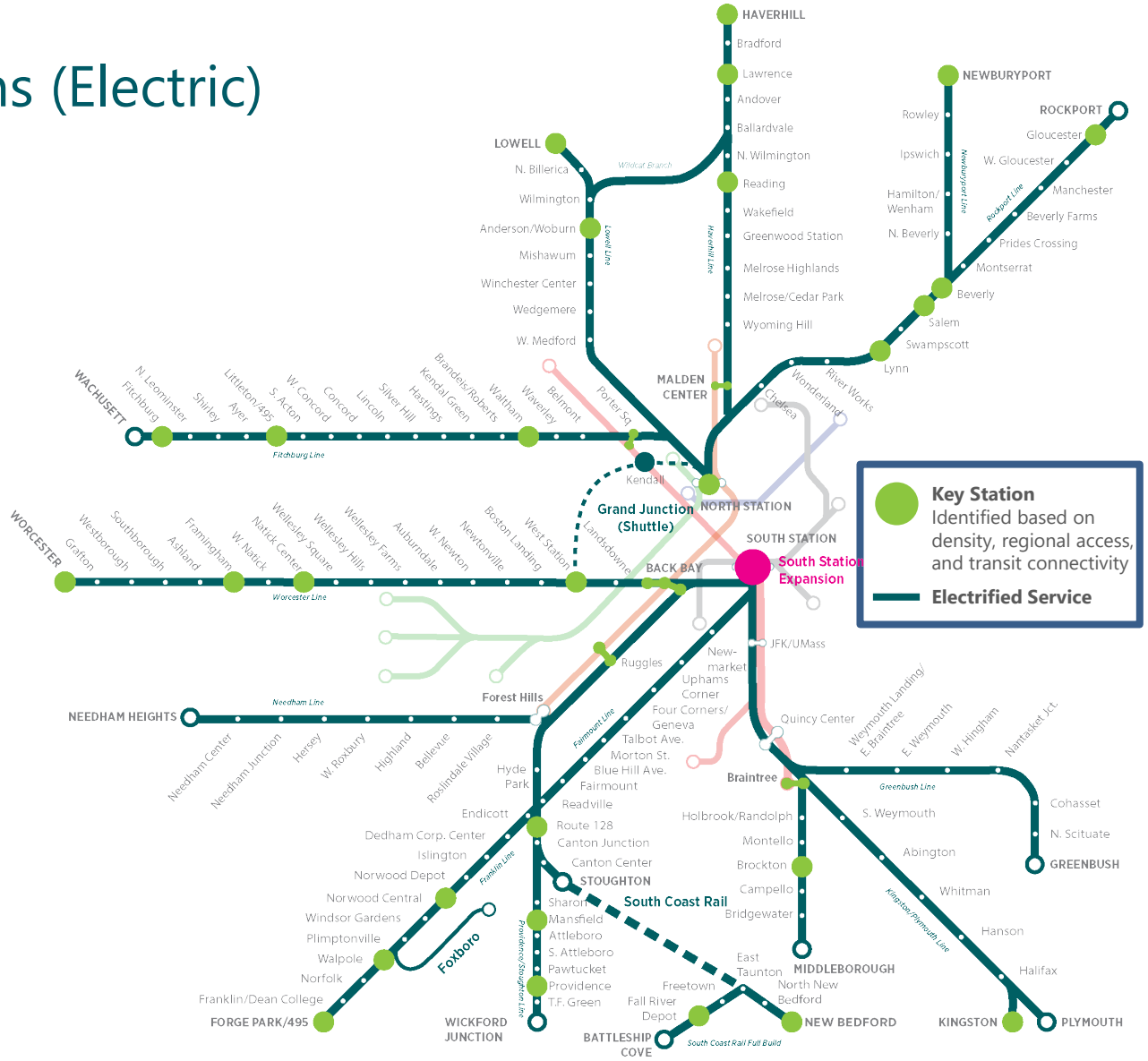
Alternative 3: Regional Rail to Key Stations (Electric)

Goal:
Focus on regional rail – high-frequency service for longer-distance trips to key stations – flexible electric-powered train sets called electric multiple units (EMUs) that can vary in train size to meet demand. Key stations are in Gateway Cities, dense areas outside the core, and/or provide regional access and transit connectivity. Stations not identified as key stations would receive more modest increases in service.

Key Features	
Typical Frequency (Peak/Off-Peak)	Key Stations: 15/15 bi-directional All Other Stations: 30/60 bi-directional
Station Accessibility	All Key Stations would have high-level boarding platforms
Electrification	The full system would be electrified
Train Type(s)	Electric Multiple Units (EMUs)
Major Expansions	South Station Expansion South Coast Rail Full Build Grand Junction (Shuttle) Foxboro



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Alternative 3: Regional Rail to Key Stations (Electric) – Preliminary Operations

Opportunities
Achieves 15-minute all-day frequency to most Key Stations (including South Side due to SSX) Supplements service with 30-minute peak frequency and 60-minute off-peak frequency on all lines
Greatly improves service to select high-density areas outside the core
Express service results in faster trips to Key Stations
Faster trips to all stations resulting from acceleration benefits
Improves on today's frequency for some lines, even for stations not defined as Key Stations
Reduces emissions while providing lower travel times and fewer operating conflicts between different service types
Limitations
Mixing service types strains system capacity
More infrastructure required to achieve objective of alternative

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Alternative 3: Regional Rail to Key Stations (Electric) – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares; **unconstrained parking at Key Stations**

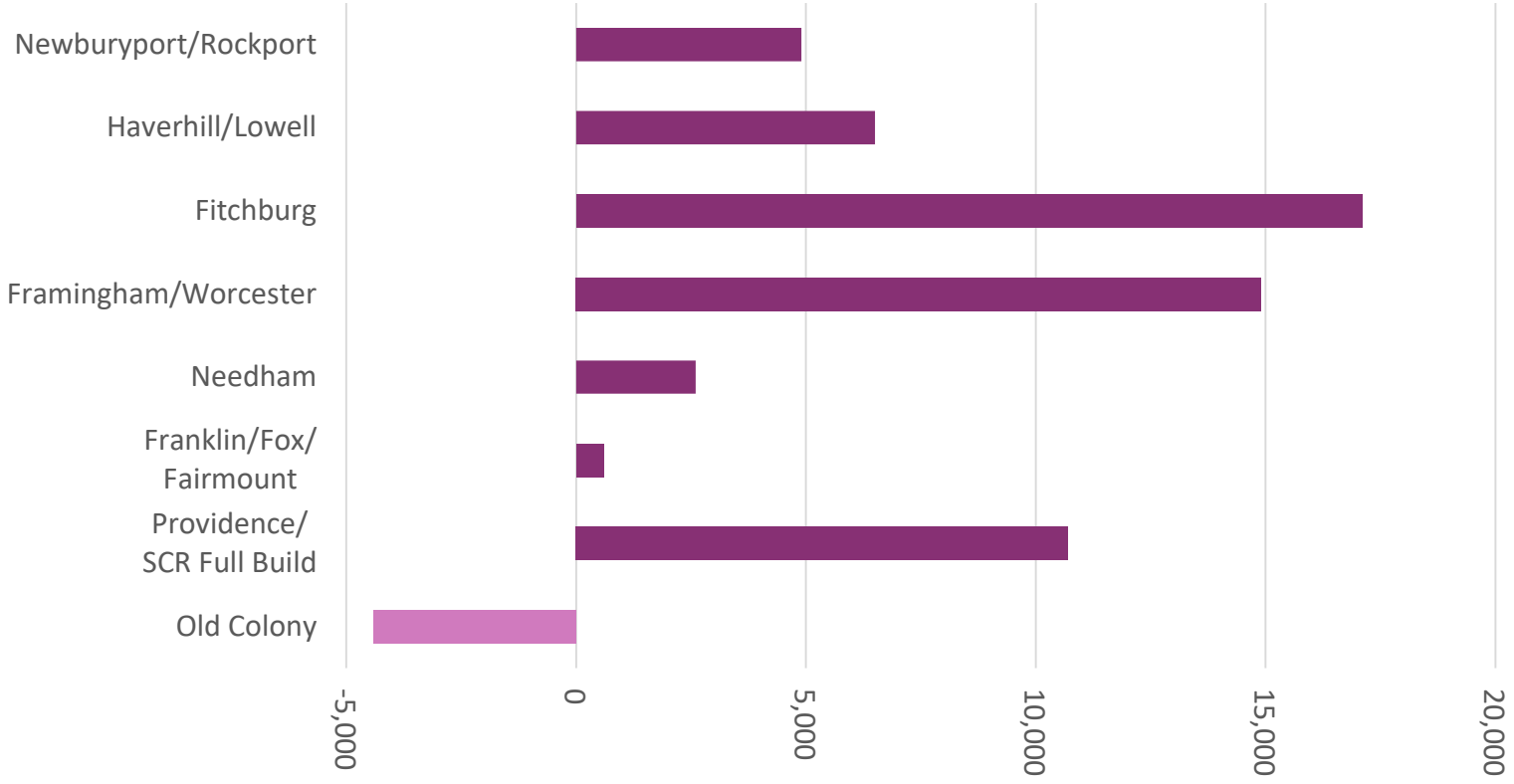
Alternative 1	Increase in Daily Boardings over No-Build Demand	% Increase in Daily Boardings over No-Build Demand	Findings on Growth
Commuter Rail	52,900	35%	SSX allows for more south side growth than in Alternative 2; Some ridership growth from electrification
North Side	28,500	62%	Highest on Fitchburg and Haverhill/Lowell Lines
South Side	24,400	23%	Highest on Framingham/ Worcester Line and Providence/SCR Full Build; **Reductions on Old Colony Lines due to interlining (Kingston/Greenbush) and diversions to unconstrained parking (e.g., Red Line/Braintree)**
Other Modes	47,900	3%	Highest on Red Line, Orange Line, Green Line; MBTA local bus reductions/diversions

Note: Emissions, equity, and connectivity will be analyzed for each alternative as part of the upcoming analysis.

Alternative 3: Regional Rail to Key Stations (Electric) – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares; **unconstrained parking at Key Stations**

Change in Daily Boardings
(Compared to No-Build)



Change in Daily Train Trips
No-Build vs. Alternative 3

Newburyport/Rockport	67 Trips → 144 Trips **(+77)**
Haverhill/Lowell	92 Trips → 288 Trips **(+196)**
Fitchburg	38 Trips → 144 Trips **(+106)**
Framingham/Worcester	54 Trips → 156 Trips* **(+102)**
Needham	32 Trips → 48 Trips **(+16)**
Franklin/Fox/ Fairmount	79 Trips → 144 Trips **(+65)**
Providence/ SCR Full Build	71 Trips → 216 Trips **(+145)**
Old Colony	74 Trips → 204** Trips **(+130)**

*144 additional Grand Junction trips are also included in Worcester Line ridership
**36 of these trips interline between Kingston and Greenbush

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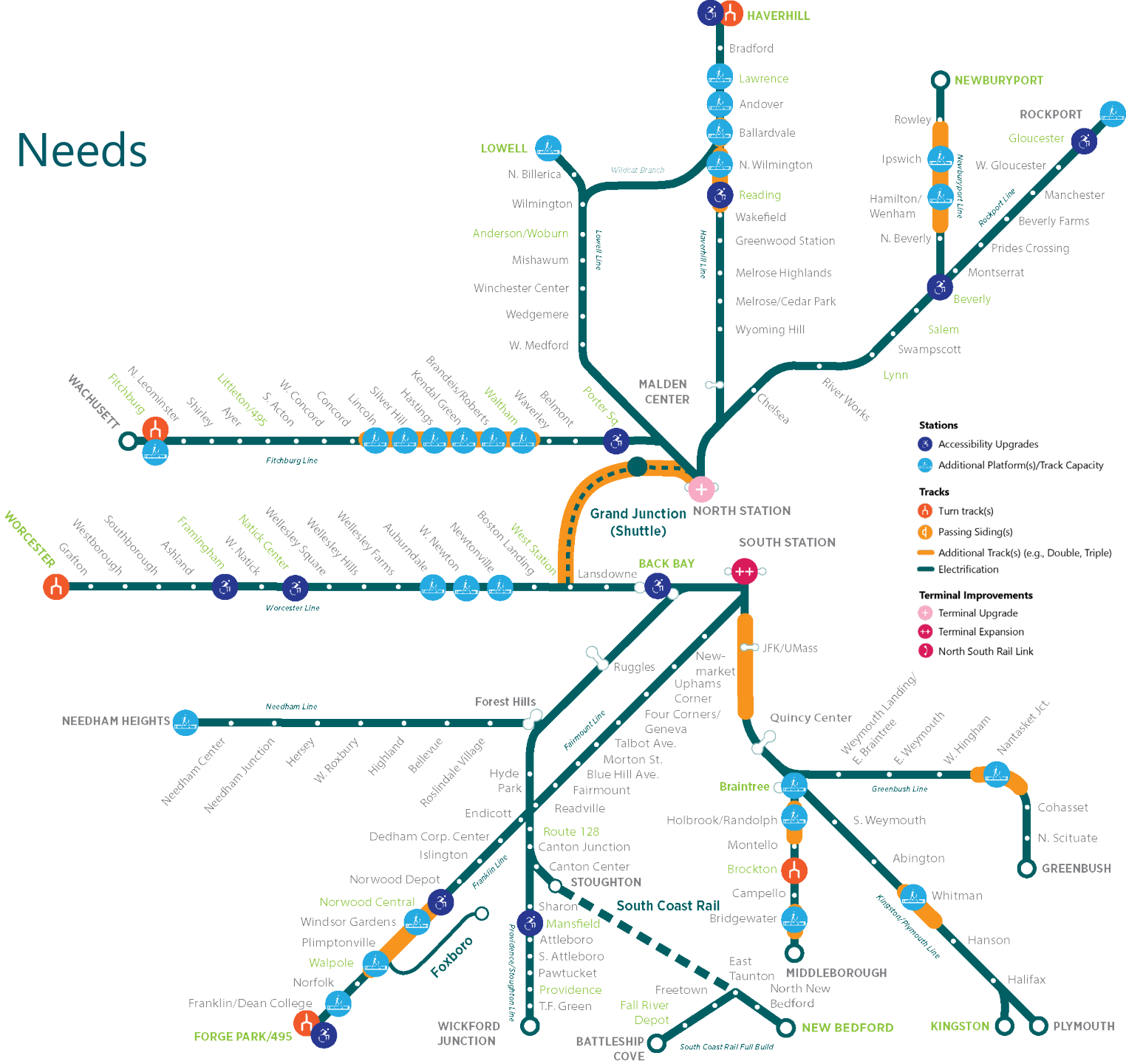
Alternative 3: Preliminary Capital Needs

- Stations (38)
- Trackwork (~ 50 miles)
- Signals and Systems
- Grade crossings (51)
- Bridges/Structures (~50)
- Fleet Needs:
  - Equipment (EMUs)
  - Maintenance and Layover areas
- Electrification
- Expansions
  - Grand Junction
  - Foxboro
  - South Coast Rail Full Build
  - South Station



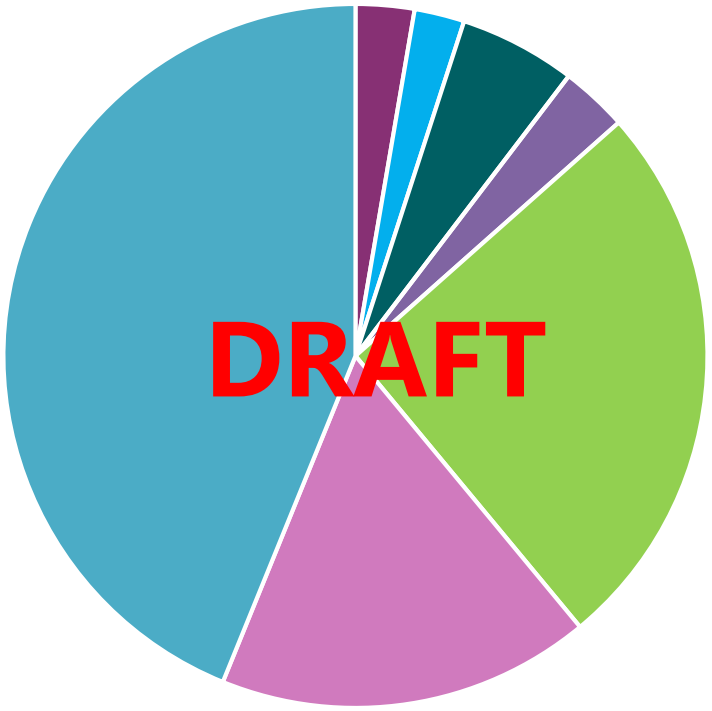
Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 3: Regional Rail to Key Stations (Electric) – Preliminary Capital Costs

OOM Capital Costs (2020$/2030$)

$23.6B (2020$)/$33.3B (2030$)
(includes Expansions)

Fleet costs are based on need for entire new electric fleet

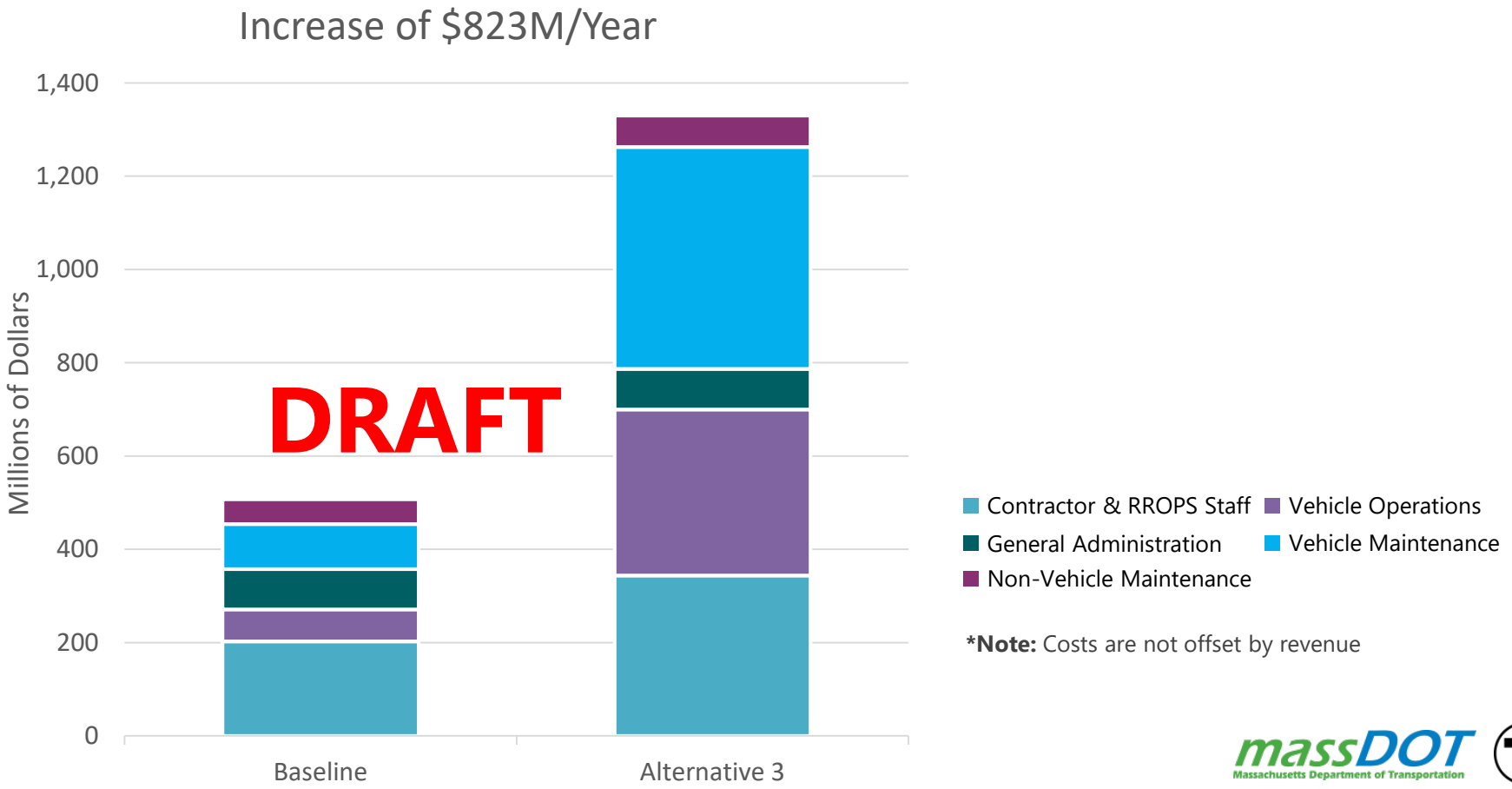


Expansions include SSX, Grand Junction, Old Colony Braintree to South Station Double Track, and modified North Station, and excludes SCR Full Build and Foxboro

Final costs may change based on period and direction ridership data and associated consist sizing

Alternative 3: Regional Rail to Key Stations (Electric) – Preliminary Costs

Annual O&M Costs (2020$)



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South Station Expansion Needed for Target Frequencies

- An expanded station with **more platforms and tracks** is necessary to deliver **higher levels of frequency** to South Side lines, due to capacity constraints with current station.
- The team tested Regional Rail without South Station Expansion (SSX) by adjusting the frequency to South Side Key Stations to 30-minutes all-day in Alternative 2. Alternative 3 includes SSX and achieves 15-minute all-day frequency for most South Side Key Stations using an electrified service.
- The projected South Side ridership growth of 24,400 daily boardings in Alternative 3 illustrates the total effect of electrification, increased frequency enabled by SSX, and other factors.

	North Side Growth	South Side Growth
Alternative 1	8,600 (19%)	10,400 (10%)
Alternative 2	24,100 (52%)	12,100 (12%)
Alternative 3	28,500 (62%)	24,400 (23%)

Assessing the ridership difference in North Side service between Alternatives 1, 2, and 3 provides insight into the individual effects of increased frequency and electrification on ridership. ***The largest increase in North Side ridership occurs when shifting from Alternative 1 to Alternative 2, implying that frequency accounts for more ridership growth than electrification.***

Comparison of Alternatives – Preliminary Results

	Alternative 1: Higher Frequency Commuter Rail	Alternative 2: Regional Rail to Key Stations (Diesel)	Alternative 3: Regional Rail to Key Stations (Electric)
2040 Ridership (compared to No-Build)	Increase of **19,000** daily boardings **(13%)** on Commuter Rail • North Side: **8,600 (19%)** • South Side: **10,400 (10%)** **9,200** new transit trips systemwide	Increase of **36,200** daily boardings **(24%)** on Commuter Rail • North Side: **24,100 (52%)** • South Side: **12,100 (12%)** **21,200** new transit trips systemwide	Increase of **52,900** daily boardings **(35%)** on Commuter Rail • North Side: **28,500 (62%)** • South Side: **24,400 (23%)** **35,800** new transit trips systemwide
Capital Needs	Minimal	Moderate	Significant
Fleet Needs	Diesel Locomotives Bi-Level Cab Cars Bi-Level Coaches	Diesel Locomotives Electric Locomotives Bi-Level Cab Cars Bi-Level Coaches	EMUs
OOM Capital Costs (2020$/ 2030$)	**$2.2B (2020$)/$3.1B (2030$)**	**$5.3B (2020$)/$7.5B(2030$)**	**$23.6B (2020$)/$33.3B(2030$)**
Annualized O&M Costs (2020$) Increase/Year	**$122M/year**	**$337M/year**	**$823M/year**
Key Takeaways	Longer Lines get more express services (Worcester, Fitchburg, Haverhill) Frequency increases seen primarily in off-peak period and reverse peak directions	Improves on today's frequency for some lines, even for stations not defined as Key Stations Significant increases on other modes from diversions and connectivity Existing terminal capacity constraints limit the ability to expand service	Reduces emissions while providing lower travel times and fewer operating conflicts between different service types Significant increases on other modes from diversions and connectivity Benefits of terminal capacity are seen

Seeking Your Feedback

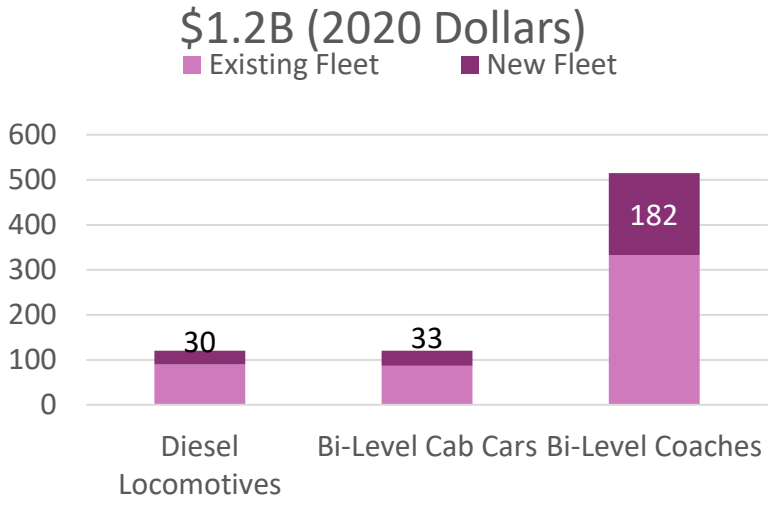
1. How should we consider the costs of fleets as we assess results?
2. Do you have peer examples of innovative, cost-saving approaches to major capital investments from which we can learn?
3. What have you learned and how should consider it when evaluating investments across the Alternatives (by service type, line, etc.)?

Fleet needs may change based on period and direction ridership data and associated consist sizing

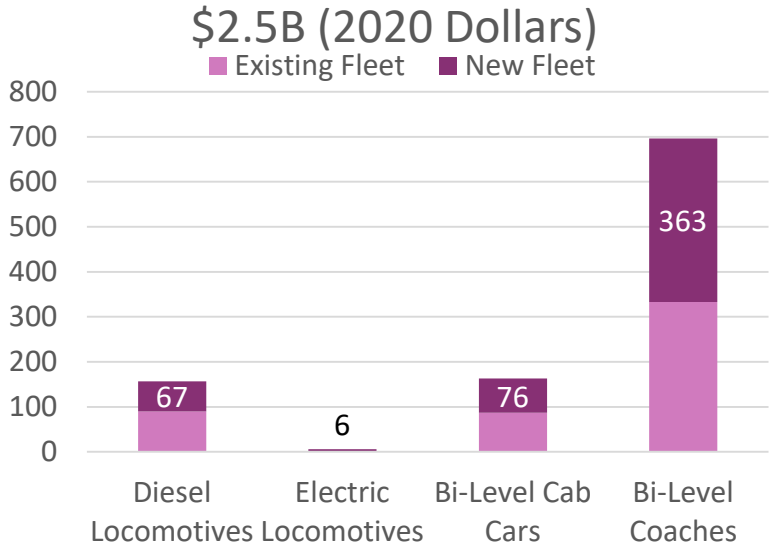
DRAFT

Fleet Estimate (Current Approach): Estimate Incremental and/or New Fleet Growth

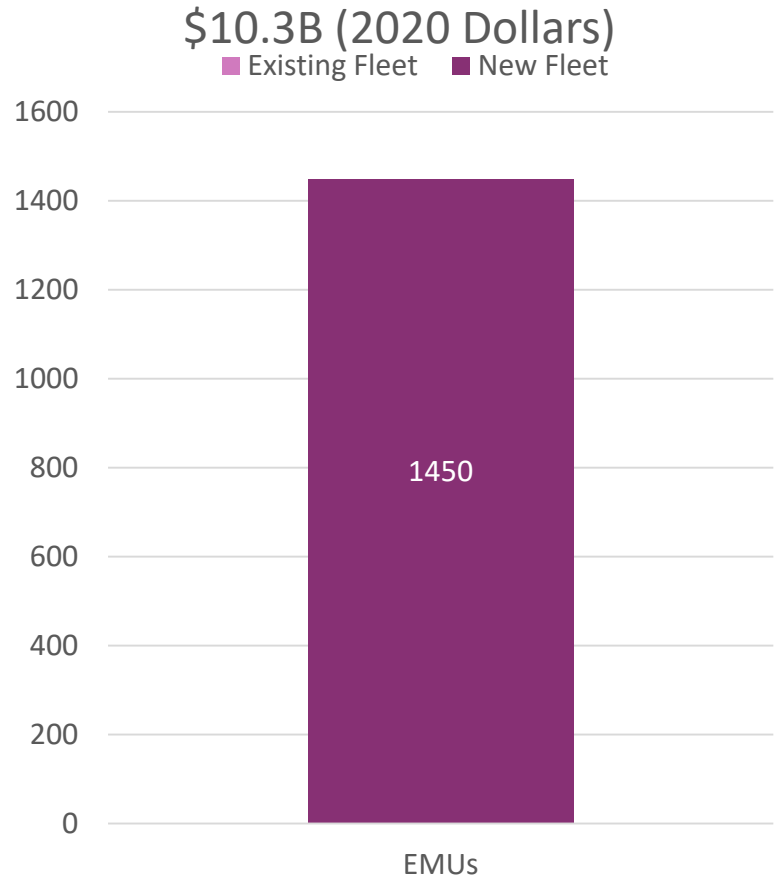
Alternative 1: Higher Frequency Commuter Rail



Alternative 2: Regional Rail to Key Stations (Diesel)



Alternative 3: Regional Rail to Key Stations (Electric)



Note: Costs shown in 2020$ for comparative purposes. Escalation to 2030$ will be included with fleet costs in future materials.

Fleet needs may change based on period and direction ridership data and associated consist sizing

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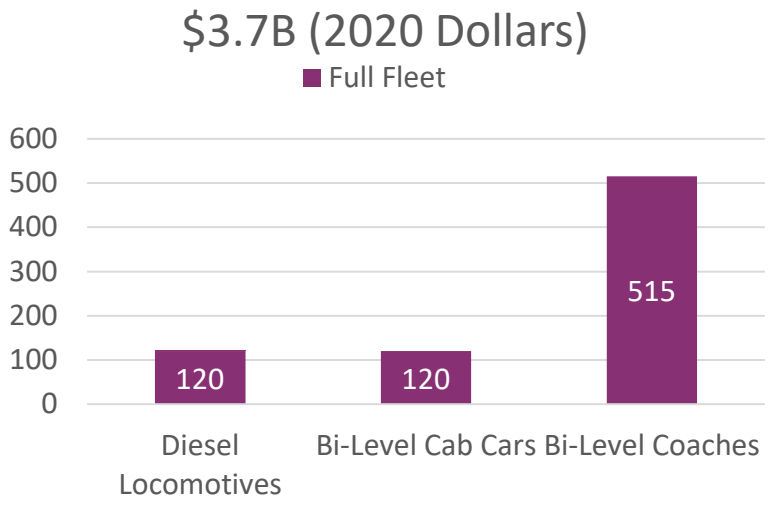
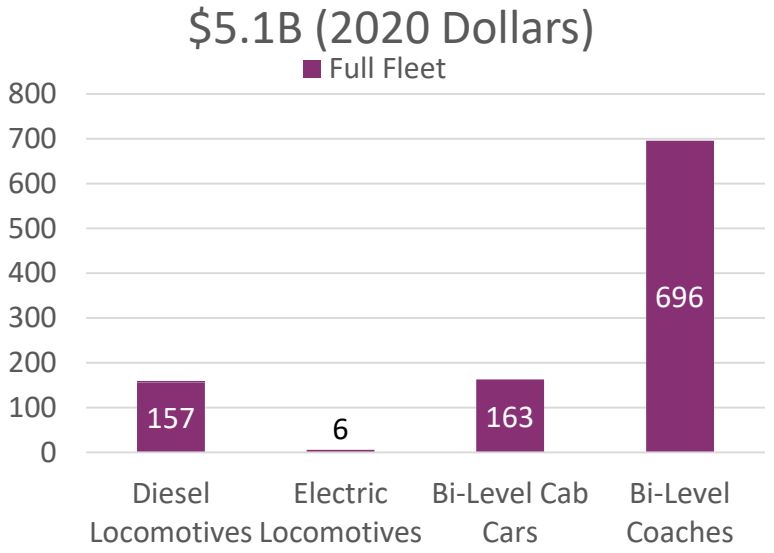
Potential Variation: Assume Full New Fleet

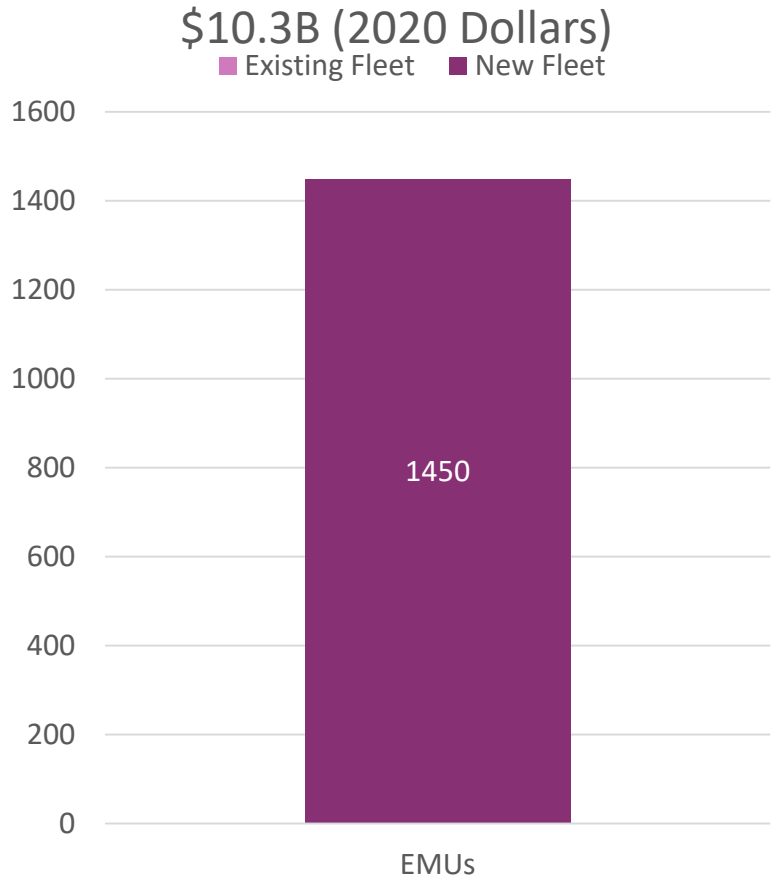
Alternative 1: Higher Frequency Commuter Rail



Alternative 2: Regional Rail to Key Stations (Diesel)



Alternative 3: Regional Rail to Key Stations (Electric)



Note: Costs shown in 2020$ for comparative purposes. Escalation to 2030$ will be included with fleet costs in future materials.

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Seeking Your Feedback

1. How should we consider the costs of fleets as we assess results?
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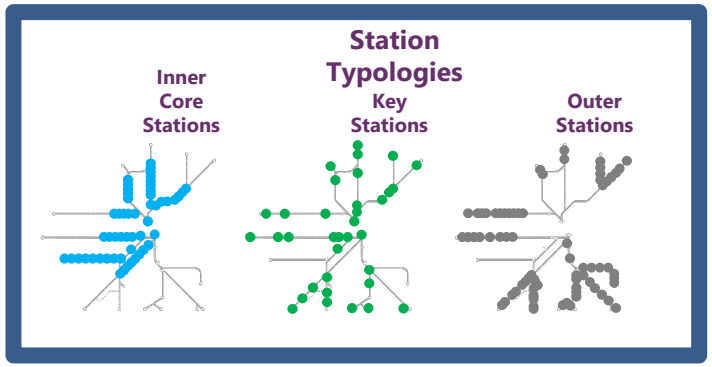
3. What have you learned and how should consider it when evaluating investments across the Alternatives (by service type, line, etc.)?

Looking Ahead: Alternatives 4 – 7



Evaluating relative benefits and costs across the seven alternatives will provide the foundation to build one or more Visions for the future of commuter rail, which may combine features from multiple alternatives to maximize the effectiveness of the MBTA rail network.

	1: Higher Frequency Commuter Rail	2: Regional Rail to Key Stations (Diesel)	3. Regional Rail to Key Stations (Electric)	4: Urban Rail (Diesel)	5. Urban Rail (Electric)	6. Full Transformation	7. Hybrid System
Typical Frequency (Peak/Off-Peak)							
Key Stations	30/60	15/15 (North Side) 30/30 (South Side)	15/15	30/60	30/60	15/15	30/60
Inner Core	30/60	30/60	30/60	15/15	15/15	15/15	15/30
Outer Stations	30/60	30/60	30/60	30/60	30/60	15/30	30/60
Fully Accessible High-Level Platforms							
Key Stations	Existing or Programmed Upgrades Only	✓	✓	-	-	✓	✓
Inner Core		-	-	✓	✓	✓	✓
Outer Stations		-	-	-	-	✓	-
Electrification							
Major Expansions							

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Note: The alternatives as described above are subject to change during the modeling process. All text and maps describe a typical application at the system level but may vary to some extent at the line, station, or segment levels.

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Next Steps

- Upcoming Meetings
  - Advisory Committee: Results for Alternatives 4, 5, 6, and 7 – September 12
  - Joint MassDOT/FMCB Meeting – July 22 and September 16
  - Metrolinx "Lessons Learned" – September 23
- Additional Modeling to Support Findings
  - Ridership – emissions, VMT, etc.
  - Land Use
- Implementation Plan Development

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Public Comment