

# RAIL VISION

## Commuter Rail Communities Coalition Presentation

OCTOBER 11 , 2019



## Purpose of Today's Meeting

1. Welcome
2. Review of Alternatives
3. Preliminary Findings: Alternatives 1-6
4. Next Steps

## Project Goal

Leverage the MBTA's extensive commuter rail network to best meet the transportation and economic growth needs of the region.

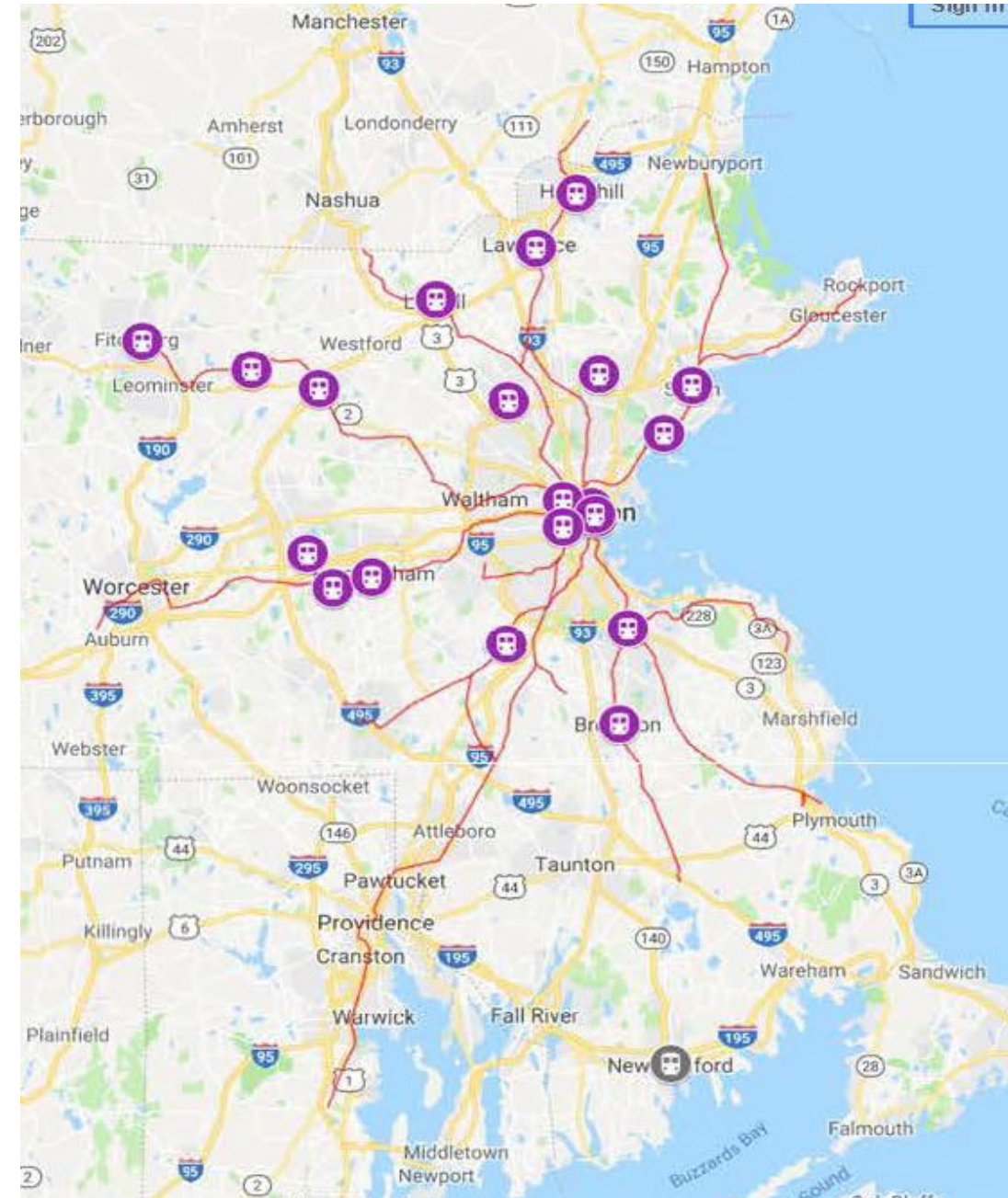
## Project Objectives

1. Match service with the growing and changing needs of the region
2. Enhance economic vitality
3. Improve the passenger experience
4. Provide an equitable and balanced suite of investments
5. Help the Commonwealth achieve its climate change resiliency targets
6. Maximize return on investment (financial stewardship)

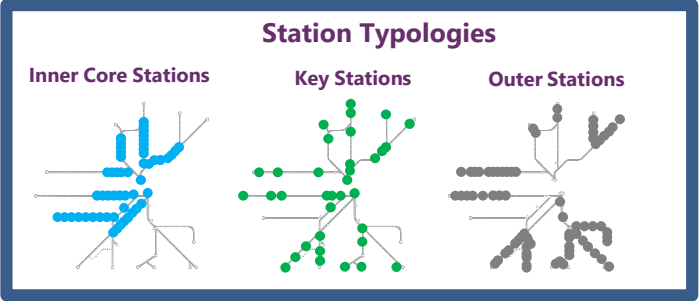
# Stakeholder Engagement

- 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
  - nearly 3,000 responses

*I would like the rail service to be:*



# Review of Alternatives



	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
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
Inner Core	● 30/60	● 30/60	● 30/60	● 15/15	● 15/15	● 15/15
Outer Stations	● 30/60	● 30/60	● 30/60	● 30/60	● 30/60	● 15/15
Fully Accessible High-Level Platforms						
Key Stations		✓	✓	-	-	✓
Inner Core	Existing or Programmed Upgrades Only	-	-	✓	✓	✓
Outer Stations		-	-	-	-	✓
Parking Modeled as Unconstrained						
Most Key Stations		✓	✓	-	-	✓
Urban Rail Termini	Parking Modeled Fully Constrained	-	-	✓	✓	✓
Non-Rapid Transit Stations with >50 Spaces		-	-	-	-	✓
Electrification						
Major Expansions						

Evaluating relative benefits and costs across the 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.

**Note:** 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. Parking constraints defined on ridership slides for each alternative.

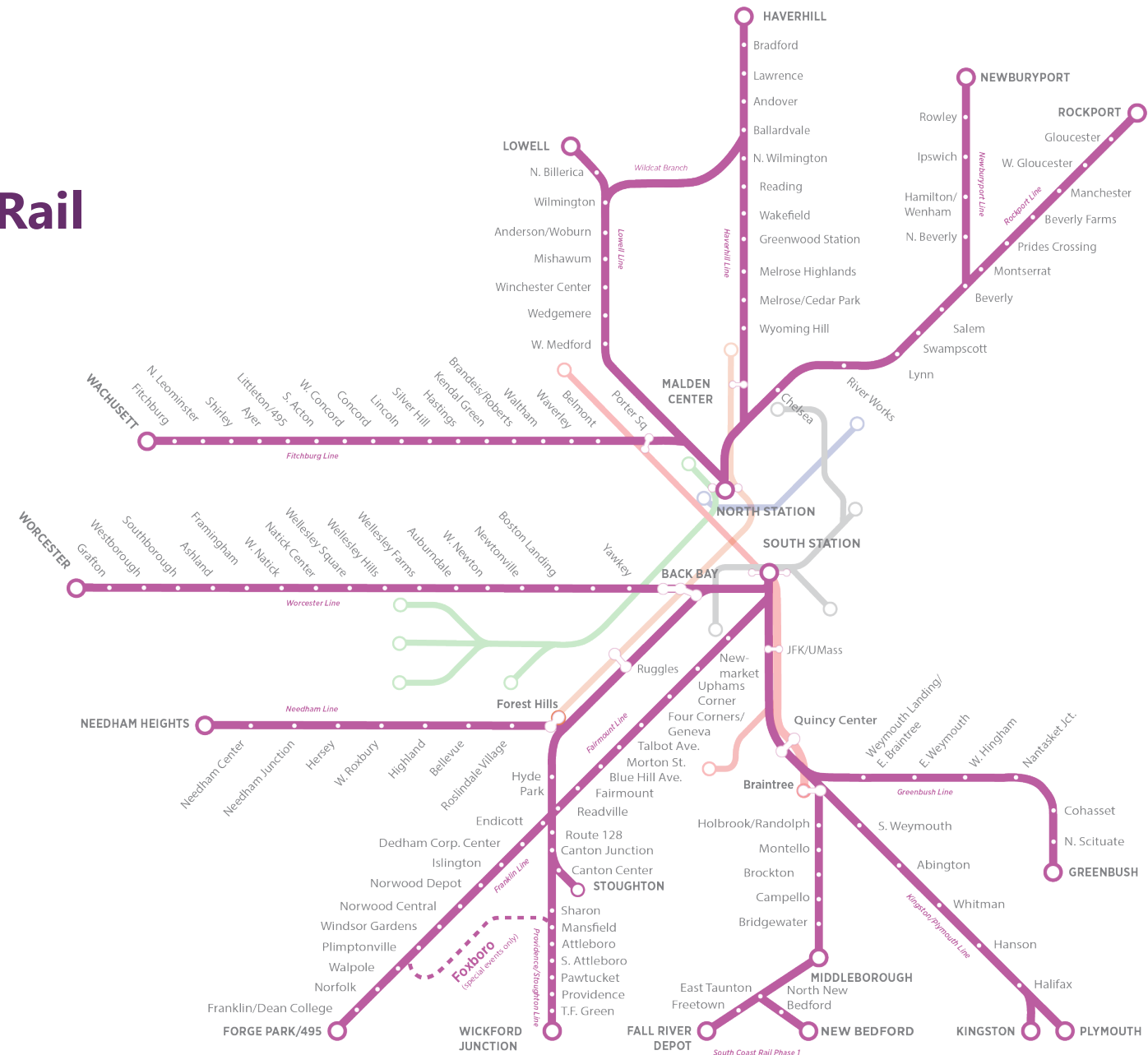


## Service Alternative #1: Higher Frequency Commuter Rail

Alternative 1 focuses on **maximizing the functionality of the existing system** by providing predictable, frequent peak service, and hourly off-peak service. All service would be bi-directional. Stations would receive increases in service where it is feasible to do so with modest investments in new infrastructure.

## Key Features

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



## 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%	<b>Highest on Newburyport/Rockport and Fitchburg Lines</b>
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

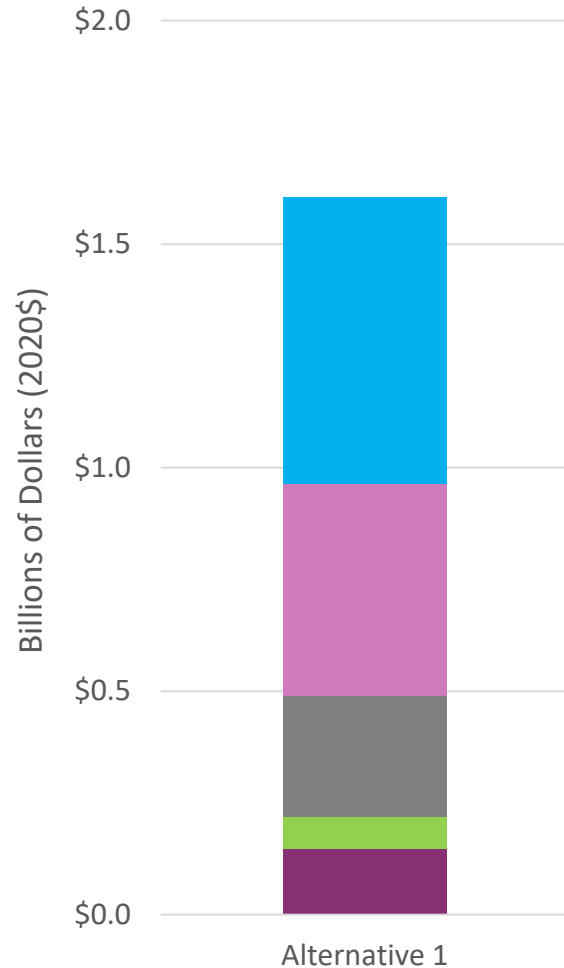
## Alternative 1: Preliminary Capital Needs

- Station improvements, including new stations, platforms, tracks, and accessibility upgrades (9 stations)
- Additional track mileage (~4 miles)
- Signals and systems upgrades
- Grade crossing upgrades (6)
- Bridge/Structure improvements or replacements (6)
- Fleet Needs:
  - Equipment
    - Diesel Locomotives
    - Bi-Level Cab Cars and Coaches
  - Maintenance and Layover areas
- Expansions:
  - South Coast Rail Phase 1





# Alternative 1: Higher Frequency Commuter Rail – Preliminary Capital Costs



Preliminary Capital Costs (2020\$/2030\$)  
**\$1.7B (2020\$)/\$2.3B (2030\$)**

Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.2B
Structures	\$0.1B
Stations	\$0.3B
Layover and Maintenance Facilities	\$0.5B
Fleet Procurement	\$0.6B

**Note:** Values are rounded and may not sum to totals. **\$1.7 B (2020\$)**

Fleet costs are based on incremental fleet for diesel options

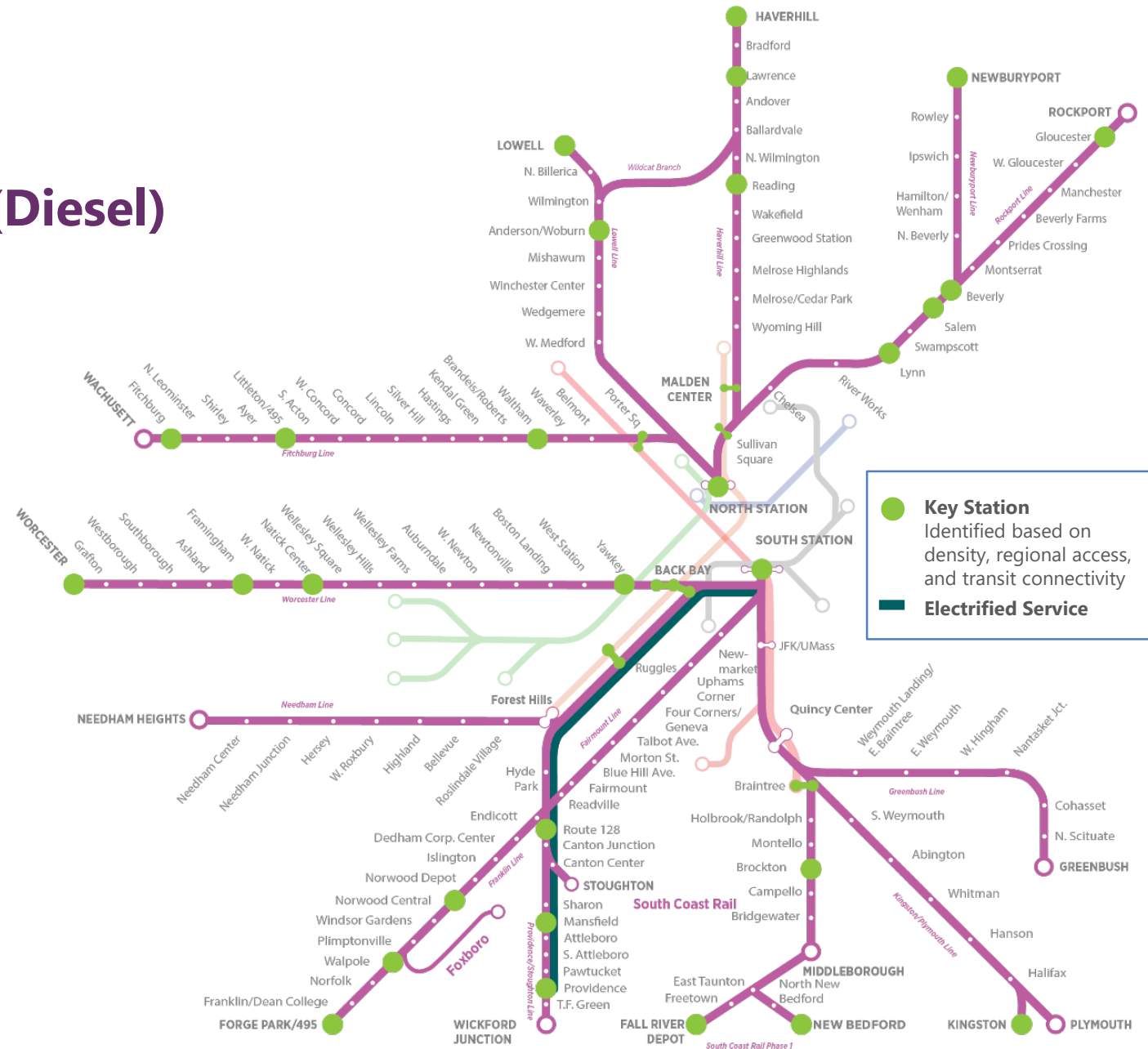
Expansions exclude SCR Phase 1

## Service Alternative #2: Regional Rail to Key Stations (Diesel)

Alternative 2 focuses 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

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

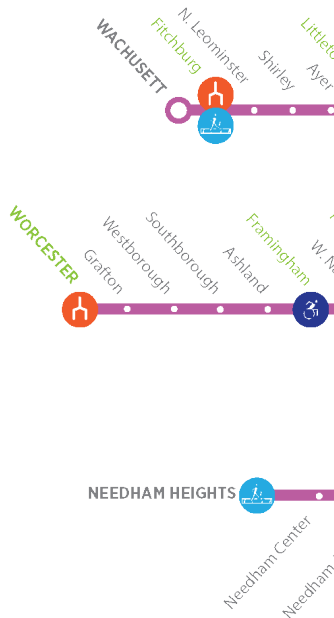


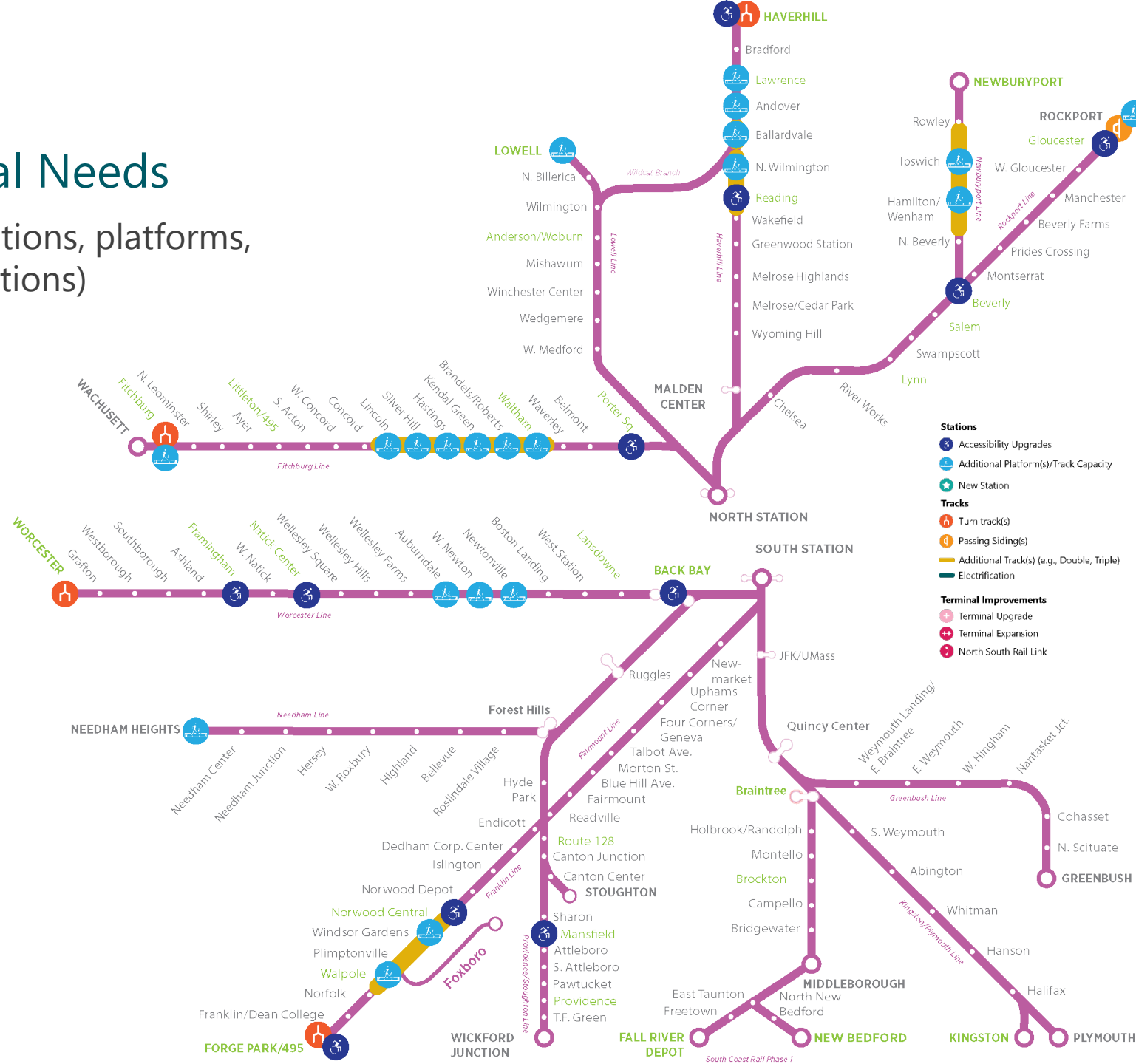
## Alternative 2: Regional Rail to Key Stations (Diesel) – Preliminary Ridership (2040)

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

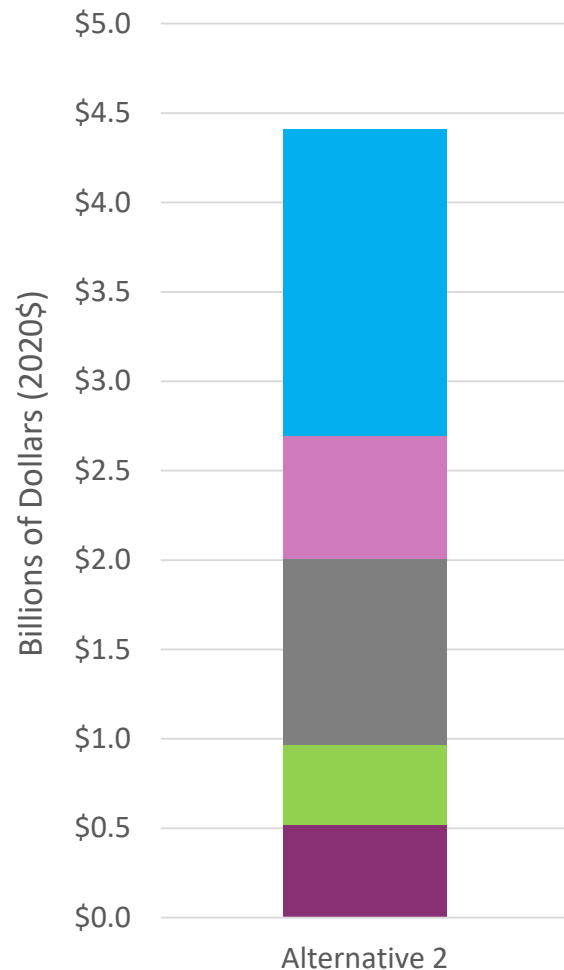
Alternative 1	Increase in Daily Boardings over No-Build Demand	% Increase in Daily Boardings over No-Build Demand	Findings on Growth
Commuter Rail	36,200	24%	Growth primarily on North Side due to less frequency on South Side (terminal capacity limitations)
North Side	24,100	52%	<b>Highest on Fitchburg and Haverhill/Lowell Lines</b>
South Side	12,100	12%	Less growth than North Side as alternative does not reach target 15-min all-day frequency 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

## Alternative 2: Preliminary Capital Needs

- Station improvements, including new stations, platforms, tracks, and accessibility upgrades (32 stations)
  - Additional track mileage (~34 miles)
  - Signals and systems upgrades
  - Grade crossing upgrades (35)
  - Bridge/Structure improvements or replacements (36)
  - Fleet Needs:
    - Equipment
      - Diesel Locomotives
      - Electric Locomotives
      - Bi-Level Cab Cars and Coaches
    - Maintenance and Layover areas
  - Expansions:
    - South Coast Rail Phase 1
    - Foxboro
- 
- The map illustrates a segment of the Northeast Corridor rail line, running from Worcester, Massachusetts, in the west to New York City, in the east. The line is represented by a thick purple line with white dots indicating stations. Key stations labeled include Worcester, Grafton, Westborough, Southborough, Framingham, Ashland, W. Needham, Needham Center, and Needham Heights. A red circle with a white 'H' is located near Worcester, and a blue circle with a white 'H' is located near Needham Heights. The map also shows the line curving north towards Boston, with stations like Fitchburg, N. Leominster, Shirley, and Ayer visible. The map is oriented with Worcester at the bottom left and New York City at the top right.



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



Preliminary Capital Costs (2020\$/2030\$)  
**\$4.5B (2020\$)/\$6.3B (2030\$)**

Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.5B
Structures	\$0.4B
Stations	\$1.0B
Layover and Maintenance Facilities	\$0.7B
Fleet Procurement	\$1.7B

**Note:** Values are rounded and may not sum to totals.

**\$4.5B (2020\$)**

Fleet costs are based on incremental fleet for diesel options

Expansions exclude SCR Phase 1, Foxboro

## Service Alternative #3: Regional Rail to Key Stations (Electric)

Alternative 5 focuses on regional rail – **high-frequency service for longer-distance trips to key stations** – using 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

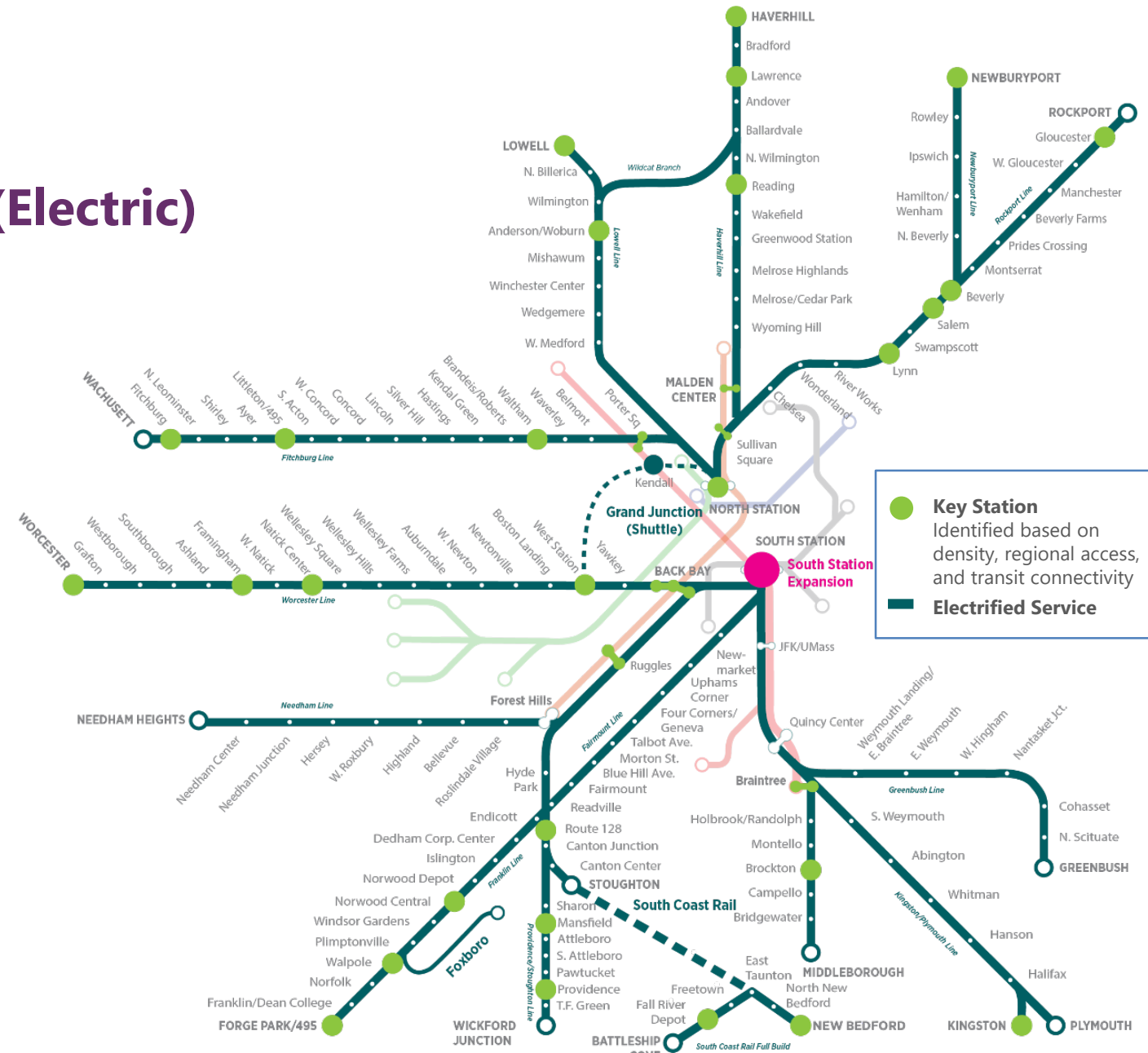
**Typical Frequency (Peak/Off-Peak)** Key Stations: 15/15 bi-directional  
All Other Stations: 30/60 bi-directional

**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





## 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%	<b>Highest on Fitchburg and Haverhill/Lowell Lines</b>
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: Preliminary Capital Needs

- Station improvements, including new stations, platforms, tracks, and accessibility upgrades (38 stations)
- Additional track mileage (~ 50 miles)
- Signals and systems upgrades
- Grade crossing upgrades (51)
- Bridge/Structure improvements or replacements (~50)
- Fleet Needs:
  - Equipment (EMUs)
  - Maintenance and Layover areas
- Electrification
- Expansions
  - South Coast Rail Full Build
  - South Station Expansion
  - Grand Junction
  - Foxboro



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

Preliminary Capital Costs (2020\$/2030\$)

**\$17.9B (2020\$)/\$25.2B (2030\$)**



Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.6B
Structures	\$0.6B
Stations	\$1.2B
Layover and Maintenance Facilities	\$0.6B
Fleet Procurement	\$4.8B
Electrification	\$6.0B
System Expansions <ul style="list-style-type: none"> <li>- South Station Expansion</li> <li>- Modified North Station</li> <li>- Grand Junction</li> <li>- Old Colony Braintree to S Station Double Track</li> </ul>	\$4.0B

**Note:** Values are rounded and may not sum to totals.

**\$17.9B (2020\$)**

Fleet costs are based on need for entire new electric fleet

Expansions exclude SCR Full Build and Foxboro

# Alternative 4: Urban Rail (Diesel)

## Goal:

Focuses on urban rail – high-frequency, rapid-transit-like service to stations in the inner core – using flexible diesel-powered train sets called diesel multiple units (DMUs) that can vary in train size to meet demand. Stations in the outer regions of the system would receive more modest increases in service.

## Key Features

### Typical Frequency (Peak/Off-Peak)

Inner Core: 15/15 bi-directional  
All Other Stations: 30/60 bi-directional

### Station Accessibility

All Inner Core Stations would have high-level boarding platforms

### Electrification

None

### Train Type(s)

Diesel Locomotives  
Single-Level Diesel Multiple Units (DMUs)

### Major Expansions

South Station Expansion  
South Coast Rail Phase 1



## Alternative 4: Urban Rail (Diesel) – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares; **unconstrained parking at Urban Rail Termini**

Daily Boardings	No-Build	Alternative 4	Change in Daily Boardings	% Change in Daily Boardings	Findings on Growth
<b>Commuter Rail</b>	<b>150,800</b>	<b>231,200</b>	<b>80,400</b>	<b>53%</b>	<b>Highest absolute growth on the South Side, but greater % increase on the North Side</b>
North Side	46,100	76,900	30,800	67%	Highest on Newburyport/Rockport
South Side	104,700	154,300	49,600	47%	Highest on Framingham/Worcester Line; Reductions on some lines due to diversions to other lines
Drive Access	92,800	105,400	12,600	14%	Due to unconstrained parking at urban rail termini
Walk Access	58,000	125,800	67,800	117%	Ridership increases in the dense inner core
<b>Other Transit Modes</b>	<b>1,500,500</b>	<b>1,470,100</b>	<b>-30,400</b>	<b>-2%</b>	<b>Diversions to urban rail</b>

**Notes:** Parking was modeled as unconstrained at Beverly, I-93, Anderson/Woburn, I-95, Riverside, Needham Heights, and Route 128.

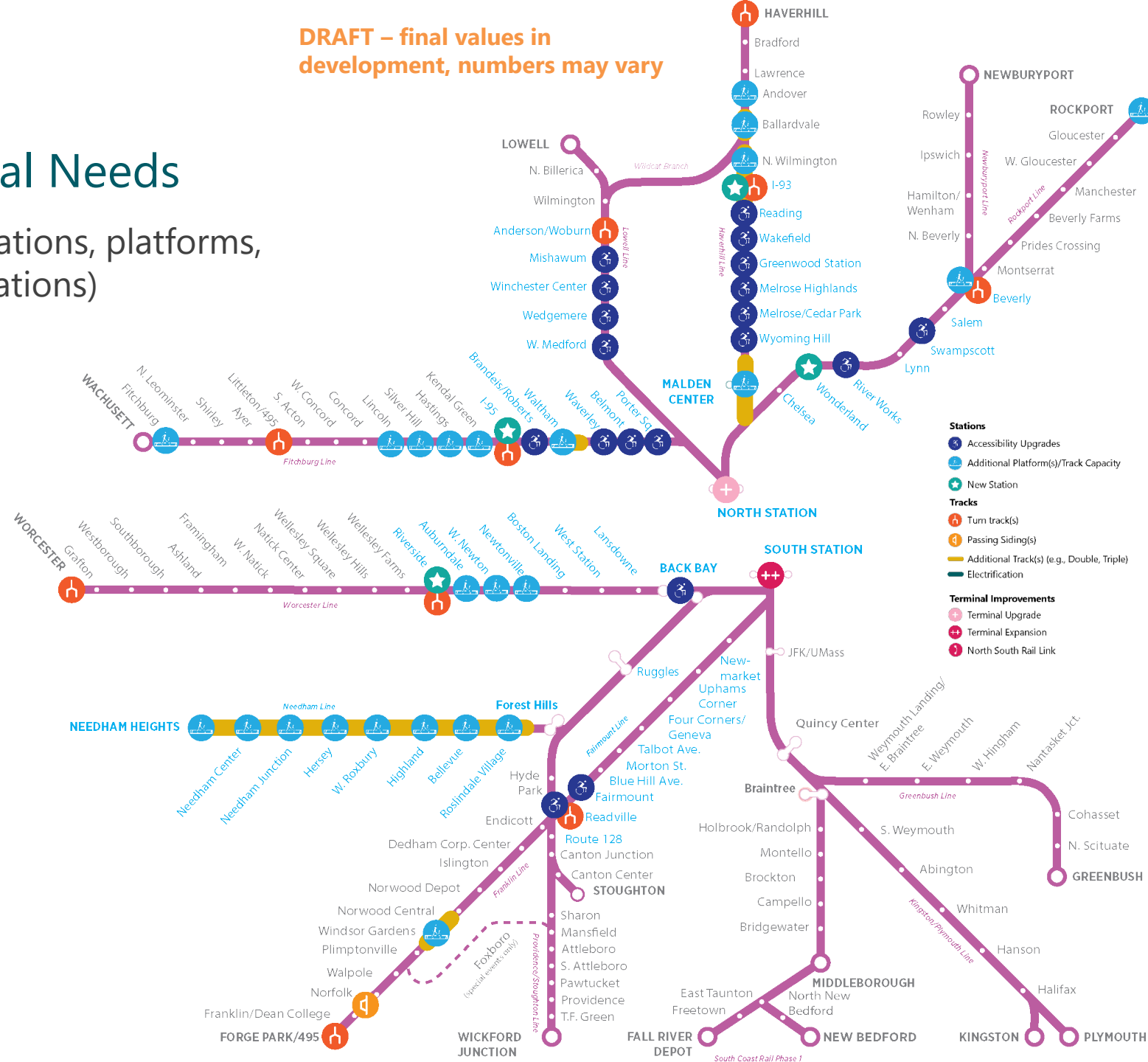
Other transit modes include rapid transit, BRT, local bus (including other RTAs), express bus (including private and Logan buses), shuttle bus (including Logan and MGH shuttles), and ferry. The percentage change for other transit modes is in comparison to the No-Build demand for these modes.

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

## Alternative 4: Preliminary Capital Needs

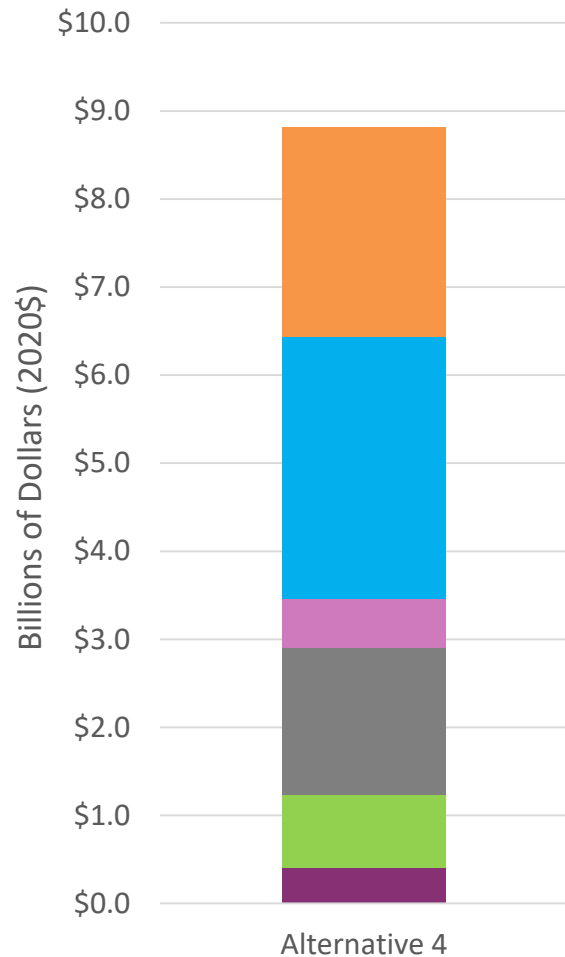
- Station improvements, including new stations, platforms, tracks, and accessibility upgrades (47 stations)
- Additional track mileage (~24 miles)
- Signals and systems upgrades
- Grade crossing upgrades (21)
- Bridge/Structure improvements or replacements (49)
- Fleet Needs:
  - Equipment
    - Diesel Locomotives
    - Bi-Level Cab Cars and Coaches
    - DMUs
  - Maintenance and Layover areas
- Expansions:
  - South Station Expansion
  - South Coast Rail Phase 1

DRAFT – final values in development, numbers may vary





## Alternative 4: Urban Rail (Diesel) – Preliminary Capital Costs



Preliminary Capital Costs (2020\$/2030\$)  
**\$8.9B (2020\$)/\$12.6B (2030\$)**

Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.4B
Structures	\$0.8B
Stations	\$1.7B
Layover and Maintenance Facilities	\$0.6B
Fleet Procurement	\$3.0B
System Expansions	\$2.4B
- South Station Expansion	
- Modified North Station	

**Note:** Values are rounded and may not sum to total.

**\$8.9B (2020\$)**

Fleet costs are based on incremental fleet, and include entirely new DMU fleet. Total fleet includes:

- 114 locomotives
- 114 bi-level cab cars
- 443 bi-level coaches
- 336 DMUs

Expansions exclude SCR Phase 1

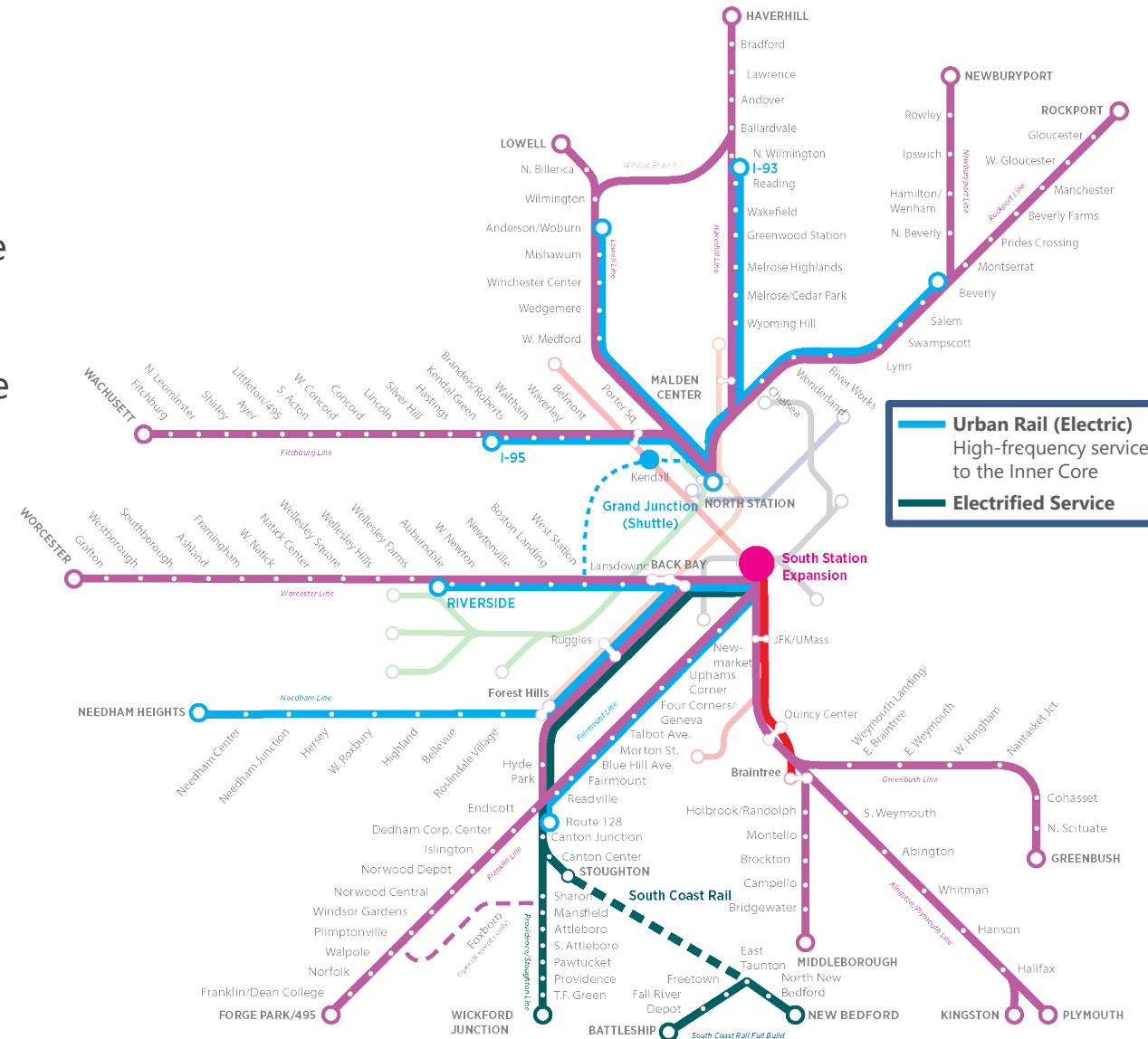
# Alternative 5: Urban Rail (Electric)

## Goal:

Focus on urban rail – high-frequency, rapid-transit-like service to stations in the inner core – using flexible electric-powered train sets called electric multiple units (EMUs) that can vary in train size to meet demand. Stations in the outer regions of the system would receive more modest increases in service.

### Key Features

<b>Typical Frequency (Peak/Off-Peak)</b>	Inner Core: 15/15 bi-directional All Other Stations: 30/60 bi-directional
<b>Station Accessibility</b>	All Inner Core Stations would have high-level boarding platforms
<b>Electrification</b>	Urban rail service would be electrified Service on the Providence Line and South Coast Rail would be electrified
<b>Train Type(s)</b>	Diesel Locomotives Bi-Level Electric Multiple Units (EMUs)
<b>Major Expansions</b>	South Station Expansion South Coast Rail Full Build Grand Junction (Shuttle)



## Alternative 5: Urban Rail (Electric) – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes current fares; **unconstrained parking at Urban Rail Termini**

Daily Boardings	No-Build	Alternative 5	Change in Daily Boardings	% Change in Daily Boardings	Findings on Growth
<b>Commuter Rail</b>	<b>150,800</b>	<b>232,400</b>	<b>81,600</b>	<b>54%</b>	<b>Highest absolute growth on the South Side, but greater % increase on the North Side</b>
North Side	46,100	77,000	30,900	67%	Highest on Newburyport/Rockport
South Side	104,700	155,400	50,700	48%	Highest on Framingham/Worcester Line; Reductions on some lines due to diversions to other lines
Drive Access	92,800	103,100	10,300	11%	Due to unconstrained parking at urban rail termini
Walk Access	58,000	129,300	71,300	123%	Ridership increases in the dense inner core
<b>Other Transit Modes</b>	<b>1,500,500</b>	<b>1,478,200</b>	<b>-22,300</b>	<b>-1%</b>	<b>Diversions to urban rail</b>

**Notes:** Parking was modeled as unconstrained at Beverly, I-93, Anderson/Woburn, I-95, Riverside, Needham Heights, and Route 128.

Other transit modes include rapid transit, BRT, local bus (including other RTAs), express bus (including private and Logan buses), shuttle bus (including Logan and MGH shuttles), and ferry.

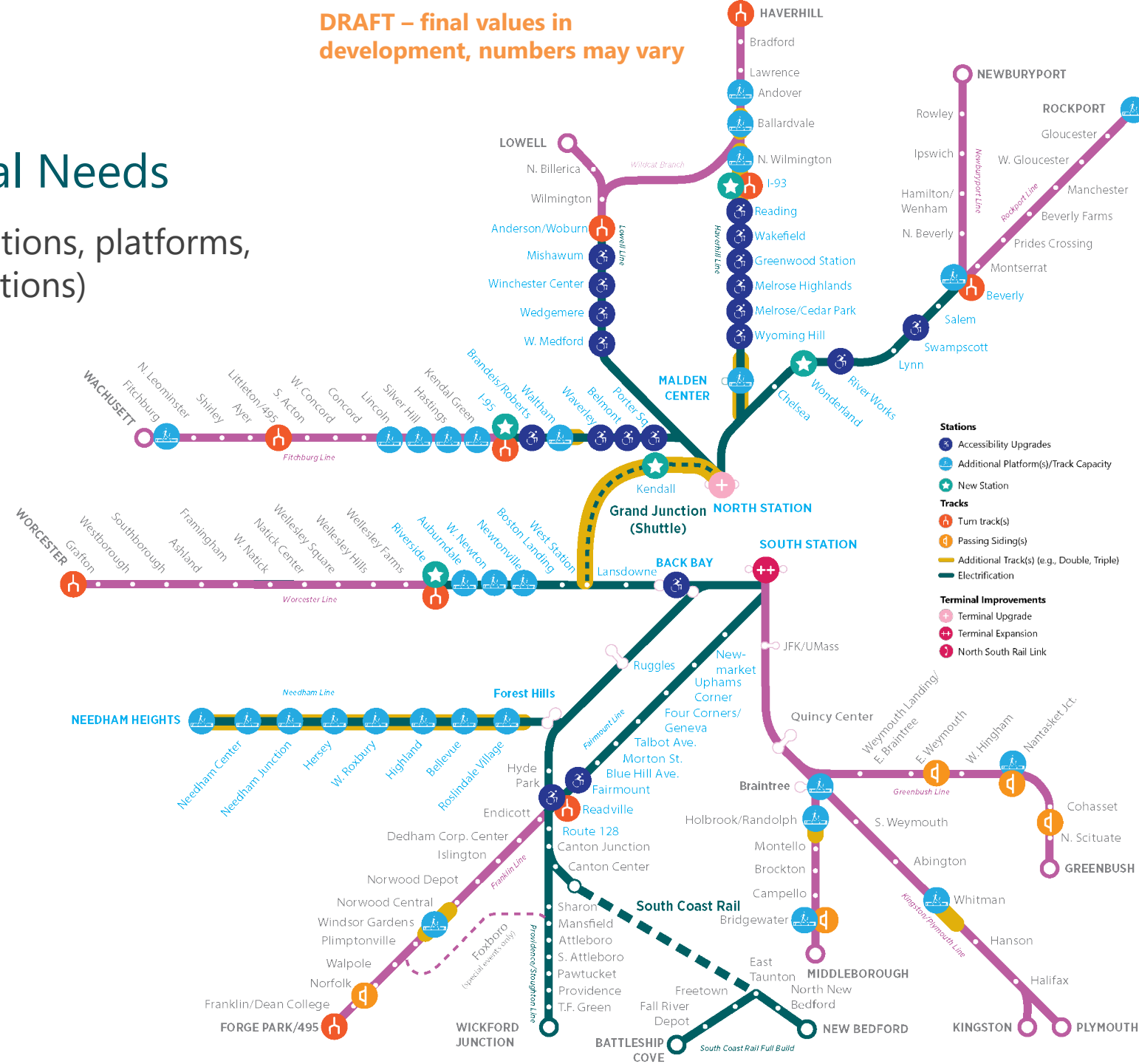
The percentage change for other transit modes is in comparison to the No-Build demand for these modes.

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

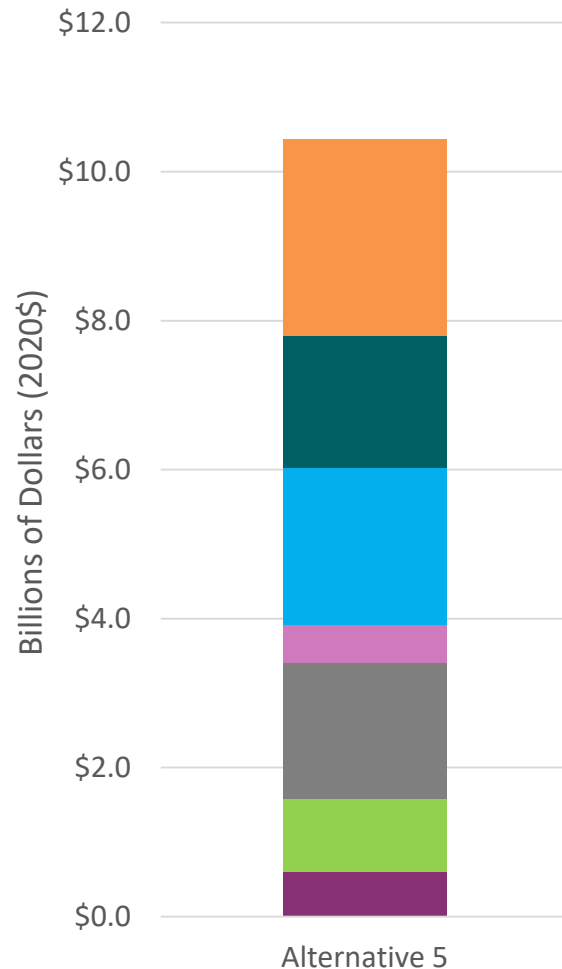
## Alternative 5: Preliminary Capital Needs

- Station improvements, including new stations, platforms, tracks, and accessibility upgrades (53 stations)
- Additional track mileage (~39 miles)
- Signals and systems upgrades
- Grade crossing upgrades (40)
- Bridge/Structure improvements or replacements (58)
- Fleet Needs:
  - Equipment
    - Diesel Locomotives
    - Bi-Level Cab Cars and Coaches
    - EMUs
  - Maintenance and Layover areas
- Partial Electrification
- Expansions:
  - South Station Expansion
  - South Coast Rail Full Build
  - Grand Junction (Shuttle)

DRAFT – final values in development, numbers may vary



## Alternative 5: Urban Rail (Electric) – Preliminary Capital Costs



Preliminary Capital Costs (2020\$/2030\$)  
**\$10.6B (2020\$)/\$14.9B (2030\$)**

Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.6B
Structures	\$1.0B
Stations	\$1.8B
Layover and Maintenance Facilities	\$0.5B
Fleet Procurement	\$2.1B
Electrification	\$1.8B
System Expansions <ul style="list-style-type: none"> <li>- South Station Expansion</li> <li>- Modified North Station</li> <li>- Grand Junction</li> </ul>	\$2.6B

**Note:** Values are rounded and may not sum to totals.

**\$10.6B (2020\$)**

Fleet costs are based on incremental fleet, and include entirely new EMU fleet. Total fleet includes:

- 112 locomotives
- 112 bi-level cab cars
- 450 bi-level coaches
- 185 EMUs

Expansions exclude SCR Full Build

## Alternative 5 Modified for Lower Fares: Urban Rail (Electric) – Preliminary Ridership (2040)

- A second version of Alternative 5 was modeled with **lower urban rail fares** to understand impact that fares have on ridership
- Providing a lower fare structure resulted in ridership increases of approximately 7% systemwide total daily boardings, but increases vary by line and occur through both drive and walk access

Daily Boardings	Alternative 5 Total Daily Boardings	Alternative 5 Modified for Lower Fares Total Daily Boardings	Change in Total Daily Boardings	% Change in Total Daily Boardings	Findings Related to Lower Fares
<b>Commuter Rail</b>	<b>232,400</b>	<b>249,800</b>	<b>+17,400</b>	<b>7%</b>	<b>Highest benefit on North Side</b>
North Side	77,000	92,200	+15,200	20%	Highest growth on Fitchburg Line; all lines at least 15% growth
South Side	155,400	157,600	+2,200	1%	Limited growth on all urban rail lines
Drive Access	103,100	112,800	+9,700	9%	Lower fares increase drive access to urban rail fare zones
Walk Access	129,300	137,000	+7,700	6%	Some increase in walk access due to lower fares
<b>Other Transit Modes</b>	<b>1,478,200</b>	<b>1,472,000</b>	<b>-6,200</b>	<b>0%</b>	<b>Diversions to urban rail greatest on Blue Line</b>

**Notes:** Parking was modeled as unconstrained at Beverly, I-93, Anderson/Woburn, I-95, Riverside, Needham Heights, and Route 128.

The modeling for the lower fare alternative assumed a flat urban rail fare between the existing Zone 1A and Zone 1 pricing. Zone 1A trips maintained Zone 1A pricing.

Other transit modes include rapid transit, BRT, local bus (including other RTAs), express bus (including private and Logan buses), shuttle bus (including Logan and MGH shuttles), and ferry. The percentage change for other transit modes is in comparison to the No-Build demand for these modes.

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



## Key Takeaways for Urban Rail Alternatives

- Ridership projections for Alternative 4 and 5 show nearly identical increases in daily boardings, **indicating that the benefit of increased frequency plays a larger role in demand than the moderate reductions in travel time associated with electrification**. Modified Alternative 5 shows that **lower fares** drive additional ridership.
- Benefits of electrification appears to lie in emissions and other associated benefits, compared to ridership.
- Alternative 5 has greater capital costs and lower O&M costs, both largely associated with the partial system electrification.

	Alternative 4: Urban Rail (Diesel)	Alternative 5: Urban Rail (Electric)	Alternative 5 Modified for Lower Fares: Urban Rail (Electric)
Core Service Components	Inner Core: 15/15 bi-directional	Inner Core: 15/15 bi-directional Moderate reductions in travel time due to electrification	Inner Core: 15/15 bi-directional Moderate reductions in travel time due to electrification
Operational Components	A mix of DMU and diesel locomotive service	Electrified urban rail service operated with EMUs Electrified service on the Providence Line and South Coast Rail	Electrified urban rail service operated with EMUs Electrified service on the Providence Line and South Coast Rail
2040 Ridership (compared to No-Build)	<b>+80,400</b> daily boardings on Commuter Rail <b>+47,500</b> new transit trips in system	<b>+81,600</b> daily boardings on Commuter Rail <b>+47,500</b> new transit trips in system	<b>+99,000</b> daily boardings on Commuter Rail <b>+59,100</b> new transit trips in system
Preliminary Capital Costs	<b>\$8.9B (2020\$)/\$12.6B (2030\$)</b>	<b>\$10.6B (2020\$)/\$15.0B(2030\$)</b>	<b>\$10.6B (2020\$)/\$15.0B(2030\$)</b>
Annualized Gross O&M Costs (2020\$) Increase/Year	<b>+\$333M/year</b>	<b>+\$304M/year</b>	<b>+\$304M/year</b>

# Alternative 6: Full Transformation

**Goal:**  
 Provide a combination of regional rail and urban rail – resulting in high-frequency service throughout the network – using flexible electric-powered train sets called electric multiple units (EMUs) that can vary in train size to meet demand. North-South Rail Link provides through trips for the inner core. Nearly every station in the network would receive service every 15 minutes.

## Key Features

<b>Typical Frequency (Peak/Off-Peak)</b>	Key Stations: 15/15 bi-directional Inner Core: 15/15 bi-directional Outer Stations: 15/15 bi-directional where possible
<b>Station Accessibility</b>	All Stations would have high-level boarding platforms
<b>Electrification</b>	The full system would be electrified
<b>Train Type(s)</b>	Electric Multiple Units (EMUs)

<b>Major Expansions</b>	North South Rail Link South Coast Rail Full Build Grand Junction (Shuttle) Foxboro
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## Alternative 6: Full Transformation – Preliminary Ridership (2040)

- Daily boardings compared against 2040 No-Build Demand
- Assumes a flat urban rail fare (outside of Zone 1A) and non-urban rail mileage based fares; **unconstrained parking at most stations**

Daily Boardings	No-Build	Alternative 6	Change in Daily Boardings	% Change in Daily Boardings	Findings on Growth
<b>Commuter Rail</b>	<b>150,800</b>	<b>376,700</b>	<b>225,900</b>	<b>150%</b>	<b>Highest absolute growth on the South Side, but greater % increase on the North Side</b>
North Side	46,100	133,100	87,000	189%	Highest on Newburyport/Rockport
South Side	104,700	243,600	138,900	133%	Highest on Framingham/Worcester Line
Drive Access	92,800	187,200	94,400	102%	Unconstrained parking significantly increases drive access
Walk Access	58,000	189,500	131,500	227%	High frequency to high-density locations throughout the network results significant increase in walk access
<b>Other Transit Modes</b>	<b>1,500,500</b>	<b>1,450,400</b>	<b>-50,100</b>	<b>-3%</b>	<b>Diversions from most other transit modes</b>

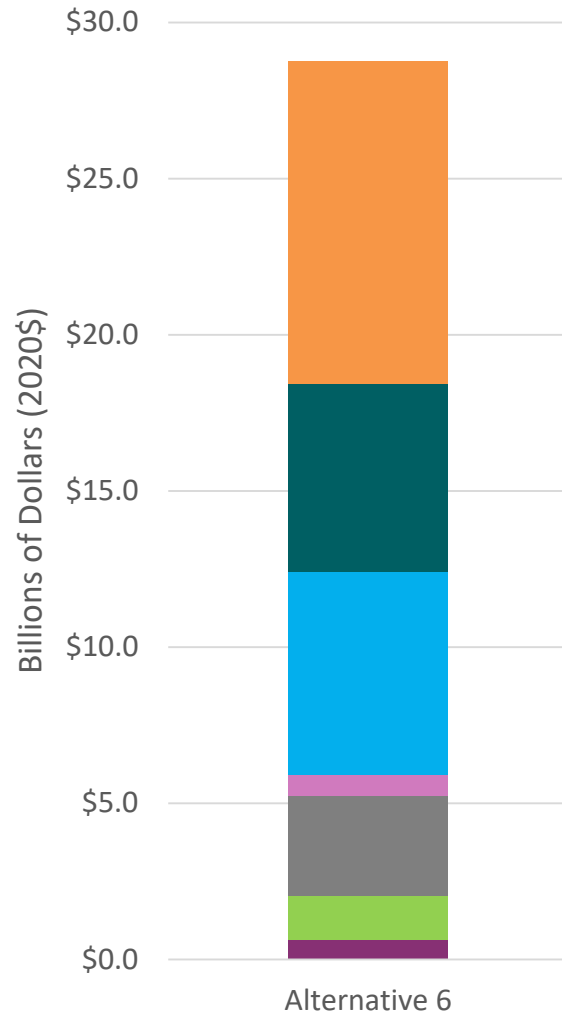
**Notes:** Parking was modeled as unconstrained at all commuter rail stations that currently have at least 50 spaces and are not rapid transit stations. The modeling assumed a flat urban rail fare between the existing Zone 1A and Zone 1 pricing. Zone 1A trips maintained Zone 1A pricing. All other fares are mileage-based. Growth in north side and south side boardings includes NSRL ridership, and uses an approximate distribution of boardings for through-running trips. Other transit modes include rapid transit, BRT, local bus (including other RTAs), express bus (including private and Logan buses), shuttle bus (including Logan and MGH shuttles), and ferry. The percentage change for other transit modes is in comparison to the No-Build demand for these modes. Emissions, equity, and connectivity will be analyzed for each alternative as part of the upcoming analysis.

## Ridership Growth Analysis for Alternative 6 – Full Transformation

- Growth in ridership (+225,900 daily boardings) reflects three factors – **unconstrained parking**, **reduced fares**, and **improved service**. Comparing Alternative 6 ridership projections with other Alternatives and baseline data provides insight into how to interpret these results and understand how each factor influenced them.
- **Parking:** Alternative 6 projects over 94,000 new “drive access” boardings, which equates to up to 47,000 round trips. Some of the new boardings in Alternative 6 may be a result of unlocking parking access, rather than service changes. However, Alternative 6 also projects over 131,000 new “walk access” boardings, attributable to improved fares and service.
- **Fares:** Alternative 6 and a variation of Alternative 5 model a lower fare than exists today for inner core stations outside of Zone 1A, inducing an increase in boardings. Applying the existing fare structure to Alternative 6 would likely result in a reduction of systemwide ridership. For example, comparing the ridership between Alternative 5 and its lower fare variation resulted in an increase of 17,400 total daily boardings systemwide.
- **Service:** The analysis demonstrates that a portion of ridership is attributable to the increased frequency of 15 minutes systemwide, reduced travel times, and improved connectivity from North South Rail Link modeled in Alternative 6. Preliminary estimates show approximately 35,000 daily boardings using new through-service via North South Rail Link, some of which currently occur on rapid transit.



## Alternative 6: Full Transformation – Preliminary Capital Costs



Preliminary Capital Costs (2020\$/2030\$)  
**\$28.9B (2020\$)/\$40.7B (2030\$)**

Improvement Category	Cost (2020\$)
Track and Signal Work	\$0.6B
Structures	\$1.4B
Stations	\$3.2B
Layover and Maintenance Facilities	\$0.7B
Fleet Procurement	\$6.5B
Electrification	\$6.0B
System Expansions	
- North South Rail Link (Including Modifications)*	
- Grand Junction	
- Old Colony Braintree to S Station Double Track	
	\$10.3B

**Note:** Values are rounded and may not sum to totals.

**\$28.9B (2020\$)**

Fleet costs are based on need for entire new electric fleet Total fleet includes:

- 964 EMUs

Expansions exclude SCR Full Build and Foxboro



## Parking Capacity and Demand in Alternatives 1-6

- Ridership increases are partially driven by unconstrained parking for Alternatives 2-6
- Drive access boardings increase in all alternatives
- Drive access comparison to existing capacity demonstrates a need for additional parking to support the projected ridership

	Approximate Existing Parking Availability	Alternative 1: Higher Frequency Commuter Rail	Alternative 2: Regional Rail to Key Stations (Diesel)	Alternative 3: Regional Rail to Key Stations (Electric)	Alternative 4: Urban Rail (Diesel)	Alternative 5: Urban Rail (Electric)	Alternative 6: Full Transformation
Daily Drive Access Boardings (2040)	~43,000 Spaces Exist Today (Includes both Public and Private)	98,100	103,000	112,200	105,400	103,100	187,200
Additional Parking Spaces Required*		~10,000	~15,000	~21,000	~16,000	~16,000	~45,000

**Note:** Parking capacities were estimated for each station based on the Boston MPO 2012-13 *Inventory of Park-and-Ride Lots at MBTA Facilities*, and was updated based on the MBTA website and further review. Station-level estimates include MBTA facilities as well as municipal and private facilities. Station-level estimates were aggregated to the line-level and compared to line-level drive access boardings, assuming that every two drive access boardings (one inbound and one outbound boarding) requires one parking space. This results in a conservative estimate of the additional parking spaces required as it does not account for potential kiss-and-ride boardings included in the drive access totals, and assumes all drive access boardings are in single-occupancy vehicles. For Alternative 6, drive access boardings on trips traveling through the North South Rail Link were distributed to the line level based on the period-level directional ridership.

## Comparison of Alternatives 1-6 – Preliminary Results

	<b>Alternative 1:</b> Higher Frequency Commuter Rail	<b>Alternative 2:</b> Regional Rail to Key Stations (Diesel)	<b>Alternative 3:</b> Regional Rail to Key Stations (Electric)	<b>Alternative 4:</b> Urban Rail (Diesel)	<b>Alternative 5:</b> Urban Rail (Electric)	<b>Alternative 6:</b> Full Transformation
2040 Ridership (compared to No-Build)  Assumptions: <i>-Fare Structure</i>  <i>-Parking</i>	<b>+19,000</b> daily CR boardings <b>(+13%)</b>  <b>+9,200</b> new linked transit trips in system  <i>-Current fares</i>  <i>-Parking constrained</i>	<b>+36,200</b> daily CR boardings <b>(+24%)</b>  <b>+21,200</b> new linked transit trips in system  <i>-Current fares</i>  <b>-Parking unconstrained at most key stations</b>	<b>+52,900</b> daily CR boardings <b>(+35%)</b>  <b>+35,800</b> new linked transit trips in system  <i>-Current fares</i>  <b>-Parking unconstrained at most key stations</b>	<b>+80,400</b> daily CR boardings <b>(+53%)</b>  <b>+47,500</b> new transit trips in system  <i>-Current fares</i>  <b>-Parking unconstrained at urban rail termini</b>	<b>+81,600</b> daily CR boardings <b>(+54%)</b>  <b>+47,500</b> new transit trips in system  <i>-Current fares</i>  <b>-Parking unconstrained at urban rail termini</b>	<b>+225,900</b> daily CR boardings <b>(+150%)</b>  <b>+122,400</b> new transit trips in system  <b>-Urban rail fares and distance-based fares</b>  <b>-Parking unconstrained at all stations (excluding rapid transit &amp; limited parking stations)</b>
Fleet Needs	Diesel Locomotives Bi-Level Cab Cars Bi-Level Coaches	Diesel Locomotives Electric Locomotives Bi-Level Cab Cars Bi-Level Coaches	Bi-level EMUs	Diesel Locomotives Bi-Level Cab Cars Bi-Level Coaches Single-Level DMUs	Diesel Locomotives Bi-Level Cab Cars Bi-Level Coaches Bi-Level EMUs	Bi-Level EMUs
Preliminary Capital Costs (2020\$/ 2030\$)	<b>\$1.7B</b> (2020\$)/ <b>\$2.3B</b> (2030\$)	<b>\$4.5B</b> (2020\$)/ <b>\$6.3B</b> (2030\$)	<b>\$17.9B</b> (2020\$)/ <b>\$25.2B</b> (2030\$)	<b>\$8.9B</b> (2020\$)/ <b>\$12.6B</b> (2030\$)	<b>\$10.6B</b> (2020\$)/ <b>\$14.9B</b> (2030\$)	<b>\$28.9B</b> (2020\$)/ <b>\$40.7B</b> (2030\$)
Increase in Commuter Rail Operating & Maintenance Costs (2020\$)	<b>\$130M</b> /Year	<b>\$379M</b> /Year	<b>\$439M</b> /Year	<b>\$333M</b> /year	<b>\$304M</b> /year	<b>\$643M</b> /year

# Updated Alternative 1-3 Results\*

**DRAFT – final costs in development, numbers may vary**

	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 <b>19,000</b> daily boardings ( <b>13%</b> ) on Commuter Rail <ul style="list-style-type: none"> <li>• North Side: <b>8,600 (19%)</b></li> <li>• South Side: <b>10,400 (10%)</b></li> </ul> <b>9,200</b> new linked transit trips in system	Increase of <b>36,200</b> daily boardings ( <b>24%</b> ) on Commuter Rail <ul style="list-style-type: none"> <li>• North Side: <b>24,100 (52%)</b></li> <li>• South Side: <b>12,100 (12%)</b></li> </ul> <b>21,200</b> new linked transit trips in system	Increase of <b>52,900</b> daily boardings ( <b>35%</b> ) on Commuter Rail <ul style="list-style-type: none"> <li>• North Side: <b>28,500 (62%)</b></li> <li>• South Side: <b>24,400 (23%)</b></li> </ul> <b>35,800</b> new linked transit trips in system
Fleet Needs	Diesel Locomotives Bi-Level Cab Cars/Coaches	Diesel Locomotives Electric Locomotives Bi-Level Cab Cars/Coaches	Bi-level EMUs
Preliminary Capital Costs (2020\$/2030\$)	<b>\$1.7B (2020\$)/\$2.3B (2030\$)</b>	<b>\$4.5B (2020\$)/\$6.3B(2030\$)</b>	<b>\$17.9B (2020\$)/\$25.2B(2030\$)</b>
Annualized Gross O&M Costs (2020\$) Increase/Year	<b>+\$130M/Year</b>	<b>+\$379M/Year</b>	<b>+\$439M/Year</b>
2040 Auto Usage Reductions from No-Build, Select Statistics	-60.2 million VMT per year (-0.1%) -7.9 million VHT per year (-0.3%) -2.6 million auto-person trips per year (-0.03%)	-189.6 million VMT per year (-0.3%) -44.9 million VHT per year (-1.8%) -11.2 million auto-person trips per year (-0.12%)	-261.7 million VMT per year (-0.4%) -52.9 million VHT per year (-2.1%) -15.3 million auto-person trips per year (-0.16%)
Equity: EJ Population not More Adversely Affected than Non-EJ	✓	✓	✓

\*Updates highlighted in purple

## Next Steps – Moving Towards Rail Vision

- Advisory Committee – October 18
- Public Meeting – October 23
- Joint FMCB + Rail Vision Advisory Committee meeting – October 28