Regional Rail: Challenges and Constraints to Full Implementation

A railroad operates as an interconnected system of tracks, signals, stations, trains, and schedules. Every part of the network must work together to move trains safely and efficiently. Because trains are limited to fixed infrastructure, conditions in one location can affect operations across an entire corridor. Track layouts, station configurations, and operating rules influence how many trains can operate, how closely they can follow one another, and how reliably they can stay on schedule.

Regional Rail transforms the MBTA commuter rail into a bidirectional network operating all day at predictable frequency. Moving beyond traditional peak-hour commuting to Boston, this model improves travel times and expands service for a wider variety of trips across the region.

The ability to provide frequent and reliable service is influenced by a variety of infrastructure and operational conditions. Single-track segments, station layouts, signal systems, grade crossings, speed restrictions, and shared-use operations can all affect railroad capacity, operating flexibility, travel times, and schedule reliability. Understanding where these conditions exist helps explain why service operates differently across the system and where opportunities may exist to make future Regional Rail service improvements. Visuals of each MBTA Commuter Rail line are used to show where these infrastructure and operating considerations occur and how they may influence service along each corridor.

These visuals illustrate the infrastructure and operational constraints that may affect future Regional Rail service. Each visual identifies physical and operating conditions that could limit service frequency, reliability, and flexibility. The summary metrics provide context for each corridor, while the symbols and line treatments highlight specific constraints across five categories. Labels and comment blocks provide additional detail on location-specific issues, illustrating where existing infrastructure and operating conditions may present challenges to implementation.

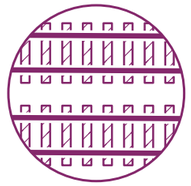
Taken together, they highlight the constraints within the existing rail network that could affect Regional Rail implementation. They provide an understanding of the infrastructure and operational challenges across each corridor, identifying where targeted improvements may be needed to support more frequent, reliable service over time.

At-a-Glance Metrics



Weekday Ridership

Average number of passengers trips in both directions during “typical” weekdays



Route Miles

Line length from Boston to end points



Weekday Trains

Service level, defined as the number of trains each day in both directions



Stations

Number of stations served, excluding South Station and North Station

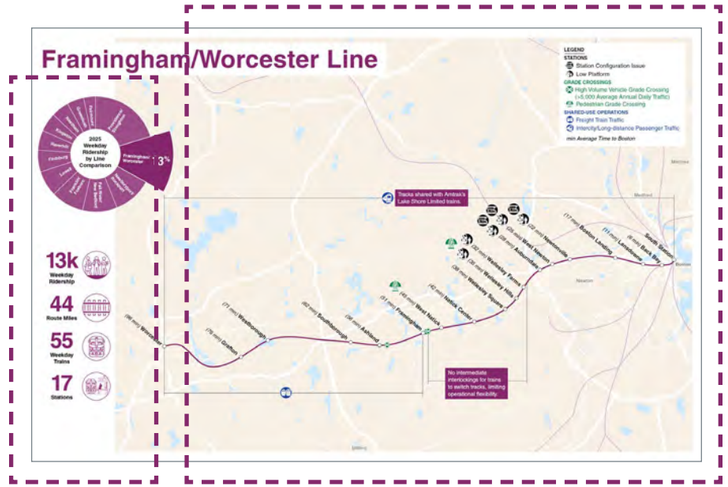
Five Condition Categories

1. Track Configuration
2. Stations
3. Shared-Use Operations
4. Grade Crossings
5. Speed Restrictions

How Content is Organized

The block on left provides reference metrics and other key background information.

The visual highlights the line’s operational considerations and constraints.



Systemwide Constraints

Signal system characteristics

Long signal blocks and other aspects of the signal system that have not been optimized can limit train speeds and line capacity, resulting in slower and less reliable service.

Electrical capacity and limits of electrification

Future electrification would require sufficient power to support multiple trains operating and accelerating simultaneously. Bridges and tunnels may need to be rebuilt to accommodate overhead wires. Service beyond electrified territory would require passenger transfers or trains capable of operating without overhead power.

Interlocking spacing

Increased service will require additional interlockings to allow trains to switch tracks, conduct maintenance, and accommodate unplanned events.

Inefficient layover facilities

Trains are easiest to prepare for service when a layover facility is at the end of a line. If it is located elsewhere, extra non-revenue movements may be needed to put trains in the right place for service.

Travel-time effect

Longer trips can make rail less appealing. Average Time to Boston is adjacent to station names and may vary.

Rolling Stock

Expanded Regional Rail service requires sufficient trains to support more frequent operations. Fleet availability, maintenance needs, and storage and servicing facility capacity may limit service frequency, reliability, and opportunities for expansion.

Workforce

More frequent Regional Rail service requires additional qualified train crews, maintenance personnel, and support staff. Workforce availability, training requirements, and staffing constraints may affect the ability to expand and reliably maintain service.

Location-Specific Constraints

1. Track Configuration

Single-track segments

When trains in both directions share one track, there is less room to add service and fewer options to reduce the impact of delays. The typical track type is noted in the legend.

Drawbridges

Trains may be slowed or held when a bridge opens for boats, has lower speed limits, or needs maintenance. Slowing or holding trains causes delays and lengthens trip times.

2. Stations

Station configuration

Stations with single-sided platforms may require trains traveling in both directions to use the same track for passenger boarding. If two trains need to use the platform at the same time, it can cause delays and fewer scheduling options.

Low platforms

Boarding can take longer when passengers need to use steps, lengthening trip time, and low-level platforms are not accessible for persons with special mobility needs.

3. Shared-Use Infrastructure

Shared trunk line

Several services using the same tracks, or “trunk lines” near the main terminal, which can limit how many trains can fit into the schedule.

Freight train traffic

Freight trains are often longer, slower, or scheduled differently from passenger trains, so they may affect when Regional Rail trains can run.

Intercity/long-distance passenger rail traffic

Intercity and Long distance trains are scheduled differently from regional rail trains so they may affect when regional rail trains can run.

4. Grade Crossings

High Volume Grade Crossing

Crossings with more than 5,000 vehicles per day, measured as annual average daily traffic (AADT), may require improvements before train service increases.

Pedestrian Grade Crossing

At-grade pedestrian crossings between platforms can prevent two trains from stopping at a station simultaneously. Trains may need to wait for passengers to safely cross the tracks, resulting in delays, reduced scheduling flexibility, and constraints on increasing service frequency.

5. Speed Restrictions

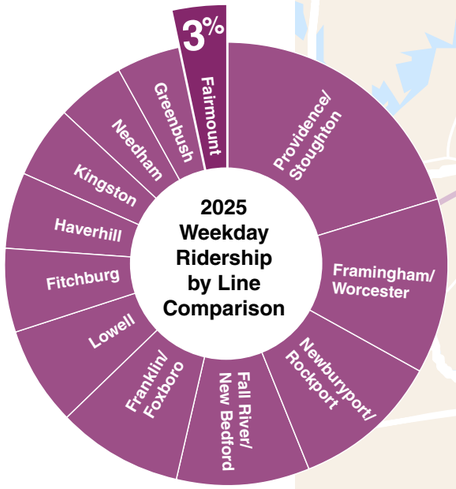
Track geometry

Curves, grades, and track conditions may limit train speeds. Federal standards also establish speed limits based on track class and curvature.

Signal limitations

Signal spacing and design may require trains to operate at reduced speeds to maintain safe stopping distances, as required by federal safety regulations.

Fairmount Line

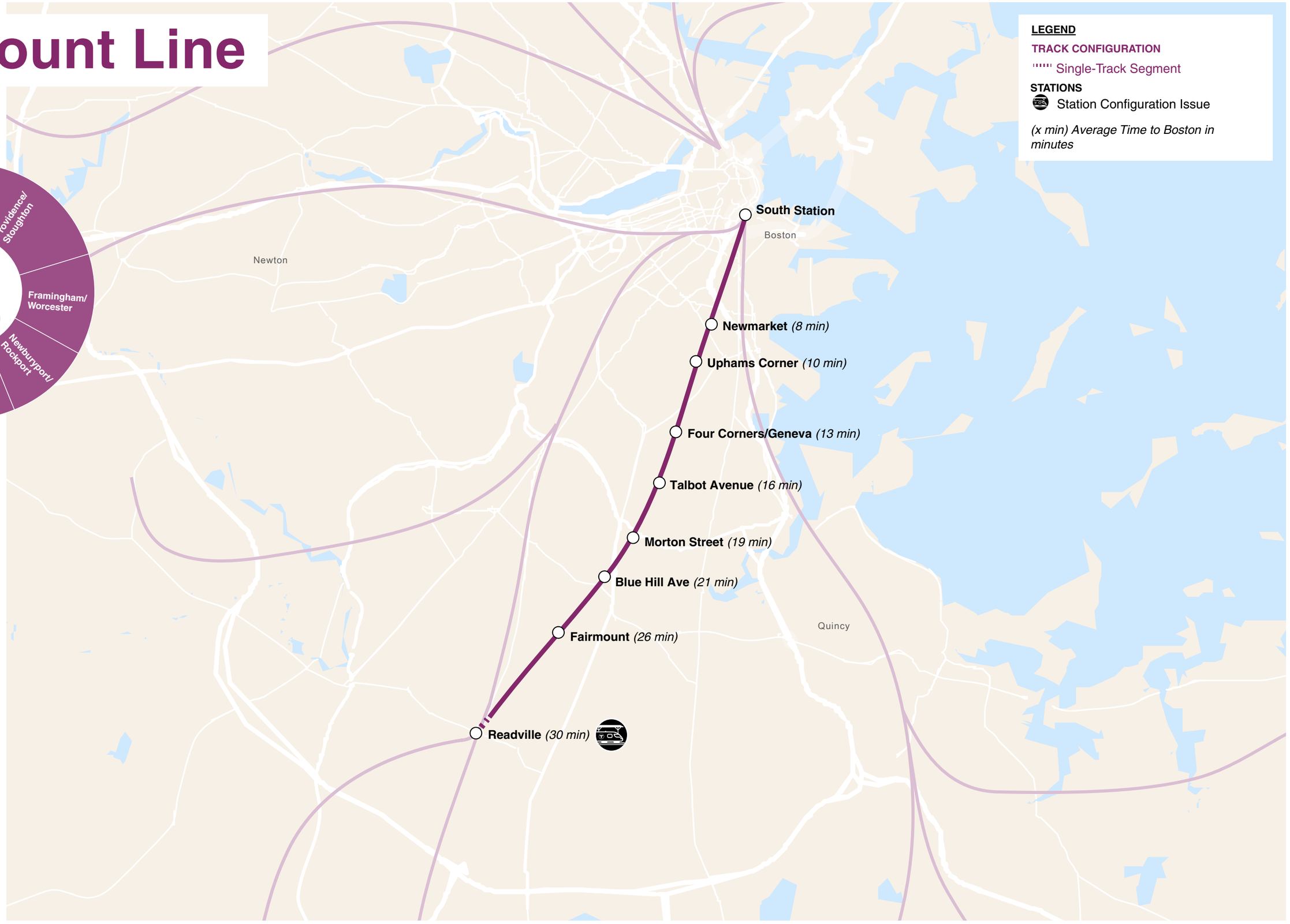


3.2k Weekday Ridership

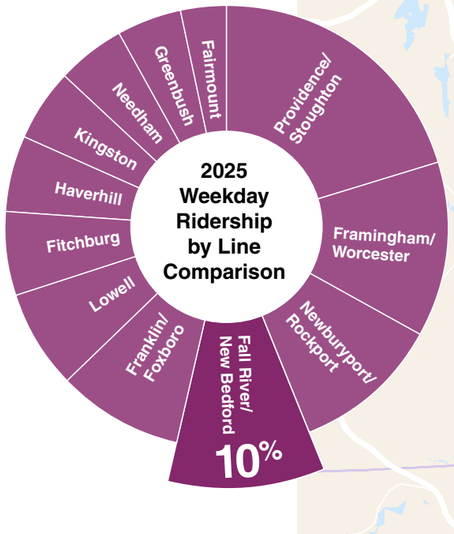
9.6 Route Miles

68 Weekday Trains

8 Stations



Fall River/ New Bedford Line



9.9k Weekday Ridership

66 Route Miles

32* Weekday Trains

14 Stations

* Does not include shuttles to and from East Taunton

South Station
Boston
JFK/UMass *(7 min)*
Quincy Center *(16 min)*
Braintree *(23 min)*
Holbrook/Randolph *(31 min)*
Montello *(37 min)*
Brockton *(41 min)*
Campello *(45 min)*
Bridgewater *(54 min)*
Middleborough *(65 min)*
East Taunton *(76 min)*
Freetown *(88 min)*
Fall River Depot *(103 min)*
Church Street *(94 min)*
New Bedford *(101 min)*

Tracks shared with Greenbush and Kingston Lines.

Layover facility is not at the end of line and requires extra train movements.

Newton
Quincy
Milford
Brockton
Plymouth
Taunton
Central Falls
Providence
Cranston
Warwick
Woonsocket

LEGEND

TRACK CONFIGURATION
- Single-Track Segment

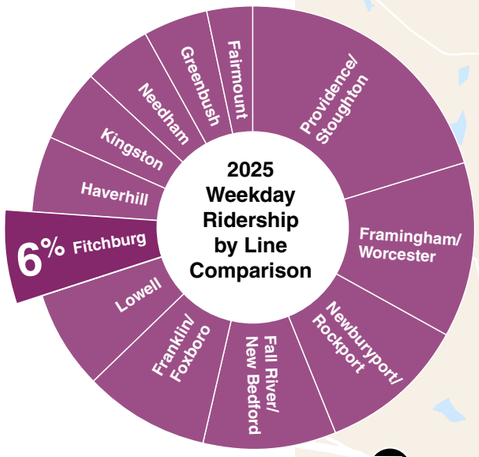
GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SPEED RESTRICTIONS
- Low Speed Limit - Track Geometry
- Low Speed Limit - Signal Limitations

SHARED-USE OPERATIONS
- Freight Train Traffic
- Shared Trunk Line

(x min) Average Time to Boston in minutes

Fitchburg Line



6.3k
Weekday Ridership

54
Route Miles

38
Weekday Trains

17
Stations

LEGEND

TRACK CONFIGURATION
Single-Track Segment

STATIONS
Station Configuration Issue
Low Platform

SHARED-USE OPERATIONS
Freight Train Traffic

GRADE CROSSINGS
High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
Pedestrian Grade Crossing

SPEED RESTRICTIONS
Low Speed Limit - Track Geometry

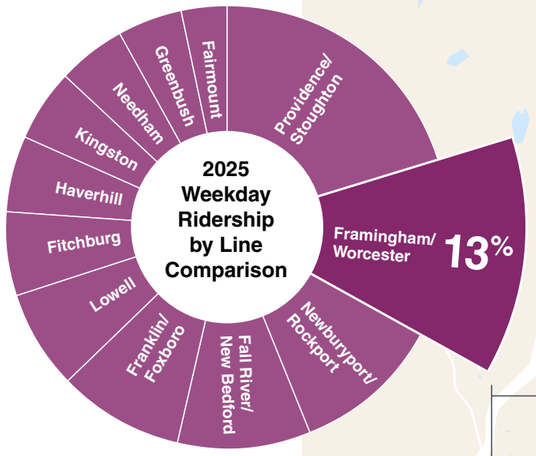
(x min) Average Time to Boston in minutes

Wachusett *(98 min)*
Fitchburg *(89 min)*
North Leominster *(80 min)*
Shirley *(71 min)*
Ayer *(66 min)*
Littleton/Route 495 *(59 min)*
South Acton *(50 min)*
West Concord *(49 min)*
Concord *(44 min)*
Lincoln *(39 min)*
Silver Hill *(33 min)*
Kendal Green *(33 min)*
Brandeis/Roberts *(29 min)*
Waltham *(23 min)*
Waverley *(20 min)*
Belmont *(18 min)*
Porter *(13 min)*
North Station

Single-track at Waltham Station.

Nashua
Lowell
Melrose
Medford
Revere
Boston
Newton

Framingham/Worcester Line



13k
Weekday Ridership

44
Route Miles

55
Weekday Trains

17
Stations

LEGEND

STATIONS
- Station Configuration Issue
- Low Platform

GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SHARED-USE OPERATIONS
- Freight Train Traffic
- Intercity/Long-distance Passenger Traffic

(x min) Average Time to Boston in minutes

Tracks shared with Amtrak's Lake Shore Limited trains.

(96 min) **Worcester**

Layover facility is at capacity.

(76 min) **Grafton**

(71 min) **Westborough**

(62 min) **Southborough**

(56 min) **Ashland**

(51 min) **Framingham**

(45 min) **West Natick**

(42 min) **Natick Center**

(38 min) **Wellesley Square**

(35 min) **Wellesley Hills**

(32 min) **Wellesley Farms**

(28 min) **Auburndale**

(25 min) **West Newton**

(22 min) **Newtonville**

(17 min) **Boston Landing**

(11 min) **Lansdowne**

(6 min) **Back Bay**

South Station

Boston

No intermediate interlockings for trains to switch tracks, limiting operational flexibility.

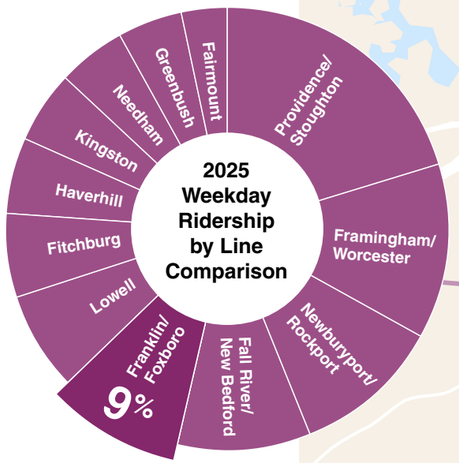
Milford

Newton

Medford

Melrose

Franklin/Foxboro Line



9k
Weekday Ridership

35
Route Miles

47*
Weekday Trains

16
Stations

* Late-night service requires passengers to transfer at Readville.

Newton
Framingham
Milford
Brockton

South Station
Back Bay
Ruggles *(10 min)*
Forest Hills *(15 min)*
Hyde Park *(18 min)*
Readville *(23 min)*
Endicott *(27 min)*
Dedham Corp Center *(29 min)*
Islington *(32 min)*
Norwood Depot *(35 min)*
Norwood Central *(38 min)*
Windsor Gardens *(42 min)*
Walpole *(46 min)*
Norfolk *(53 min)*
Forge Park/495 *(71 min)*
Franklin *(60 min)*
Foxboro *(62 min)*

Tracks shared with Providence/ Stoughton and Needham

Tracks shared with Amtrak's Northeast Regional and Acela trains.

No platform for Foxboro trains.

Track geometry and signal limitations restrict operating speeds.

The layover facility is not at the line end, requiring extra movements.

LEGEND

TRACK CONFIGURATION
- Single-Track Segment

STATIONS
- Station Configuration Issue
- Low Platform

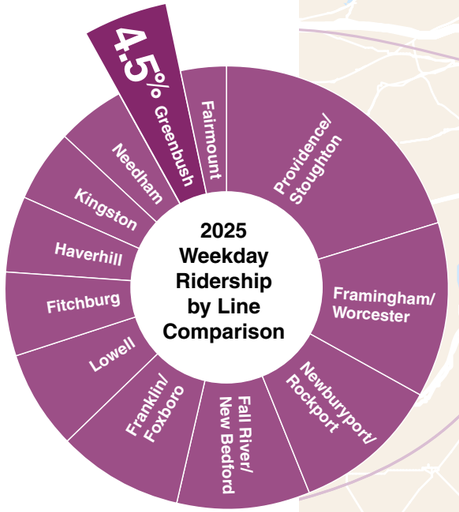
GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SPEED RESTRICTIONS
- Low Speed Limit - Track Geometry
- Low Speed Limit - Signal Limitations

SHARED-USE OPERATIONS
- Intercity/Long-distance Passenger Traffic
- Shared Trunk Line

(x min) Average Time to Boston in minutes

Greenbush Line

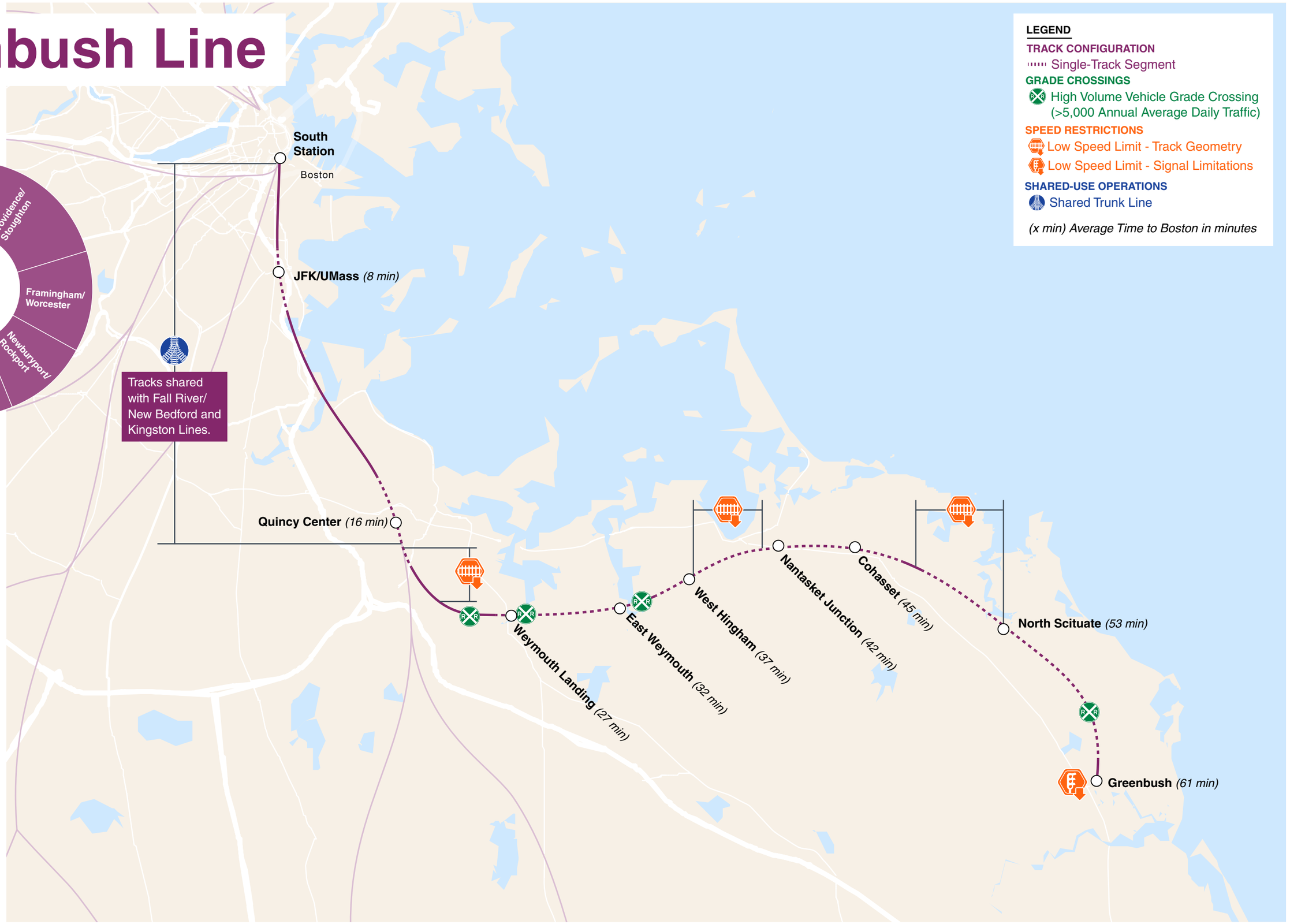


4.6k Weekday Ridership

28 Route Miles

24 Weekday Trains

9 Stations



LEGEND

TRACK CONFIGURATION
- Single-Track Segment

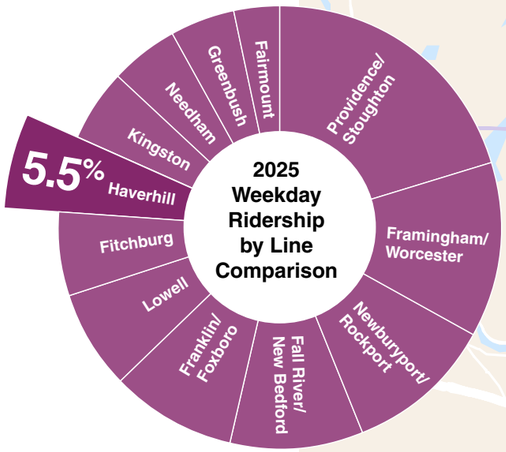
GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)

SPEED RESTRICTIONS
- Low Speed Limit - Track Geometry
- Low Speed Limit - Signal Limitations

SHARED-USE OPERATIONS
- Shared Trunk Line

(x min) Average Time to Boston in minutes

Haverhill Line



5.6k Weekday Ridership

33 Route Miles

44* Weekday Trains

14 Stations

* Some trains utilize the Lowell Line via the Wildcat Branch

Haverhill

Haverhill *(73 min)*

Bradford *(69 min)*

Layover facility is not located at the end of the line, requiring extra train movements.

Methuen

Tracks shared with Amtrak's Downeaster trains.

Lawrence *(60 min)*

Lowell

Andover *(53 min)*

Ballardvale *(48 min)*

WILDCAT BRANCH

North Wilmington *(42 min)*

Danvers

Reading *(36 min)*

Salem

Wakefield *(29 min)*

Greenwood *(25 min)*

Melrose Highlands *(22 min)*

Melrose/Cedar Park *(20 min)*

Wyoming Hill *(18 min)*

Oak Grove *(16 min)*

Medford

Malden Center *(14 min)*

Waltham

Revere

North Station

LEGEND

TRACK CONFIGURATION

Single-Track Segment

STATIONS

Station Configuration Issue

Low Platform

SHARED-USE OPERATIONS

Freight Train Traffic

Intercity/Long-distance Passenger Traffic

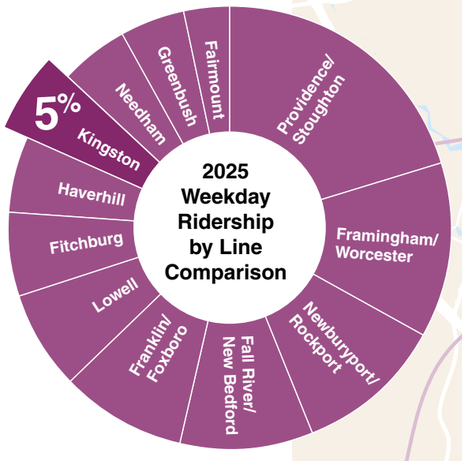
GRADE CROSSINGS

High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)

Pedestrian Grade Crossing

(x min) Average Time to Boston in minutes

Kingston Line

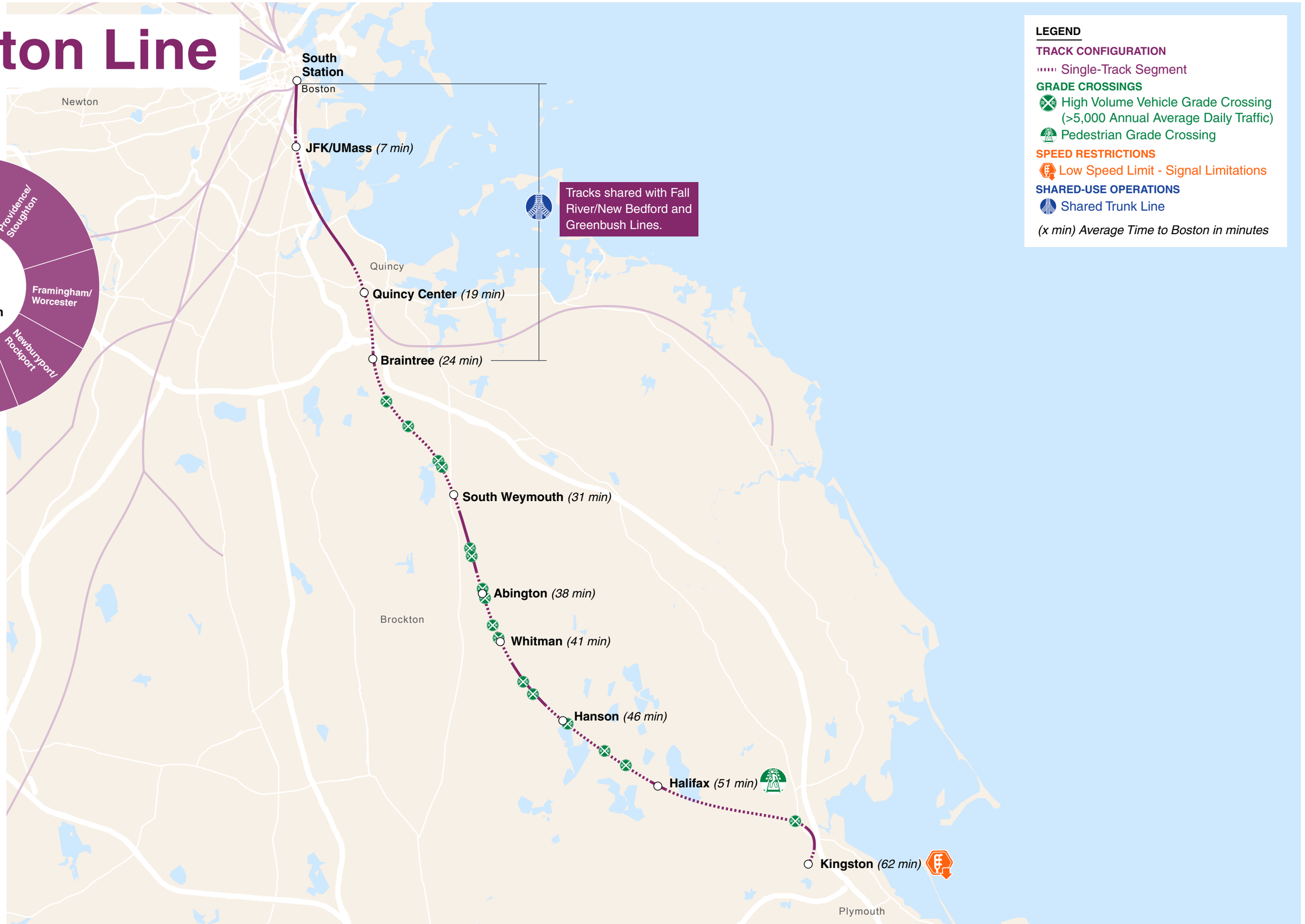


5.5k
Weekday Ridership

35
Route Miles

25
Weekday Trains

9
Stations



LEGEND

TRACK CONFIGURATION
- Single-Track Segment

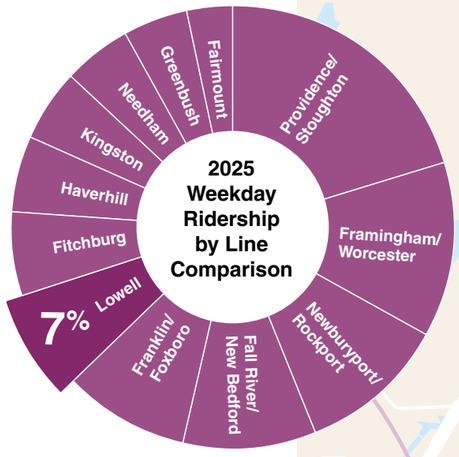
GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SPEED RESTRICTIONS
- Low Speed Limit - Signal Limitations

SHARED-USE OPERATIONS
- Shared Trunk Line

(x min) Average Time to Boston in minutes

Lowell Line



7.3k
Weekday Ridership

25
Route Miles

46
Weekday Trains

7
Stations

LEGEND

SHARED-USE OPERATIONS
- Freight Train Traffic
- Intercity/Long-distance Passenger Traffic

GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SPEED RESTRICTIONS
- Low Speed Limit - Signal Limitations

(x min) Average Time to Boston in minutes

Lowell *(47 min)*

No end-of-line layover facility.

North Billerica *(37 min)*

Wilmington *(28 min)*

Anderson/Woburn *(24 min)*

Tracks shared with Amtrak's Downeaster trains.

Winchester Center *(18 min)*

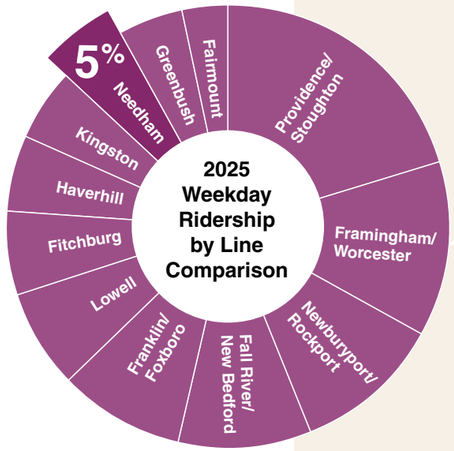
Wedgemere *(16 min)*

West Medford *(12 min)*

North Station

Lowell
Danvers
Lynn
Melrose
Revere
Waltham
Newton
Boston

Needham Line

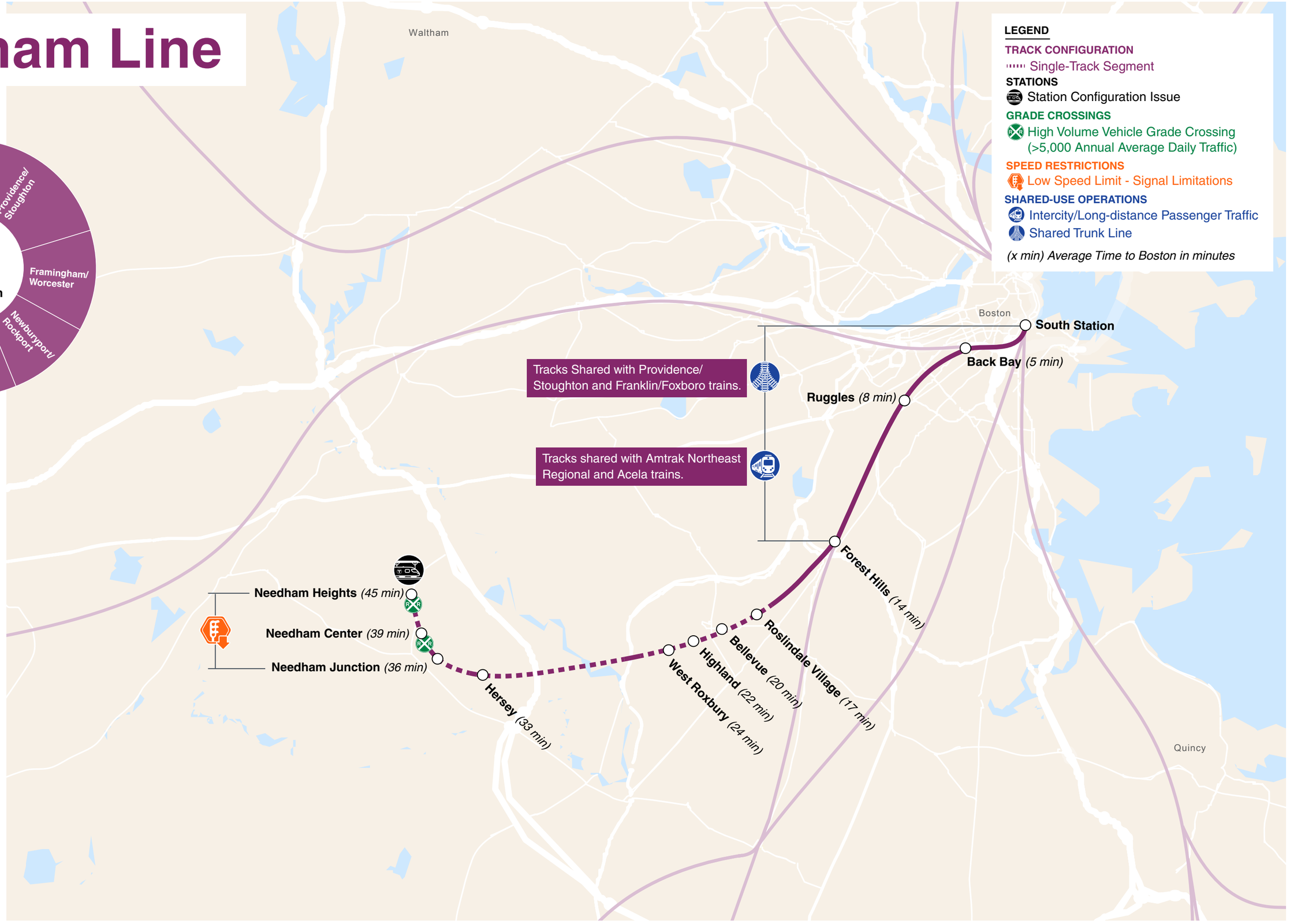


5k
Weekday Ridership

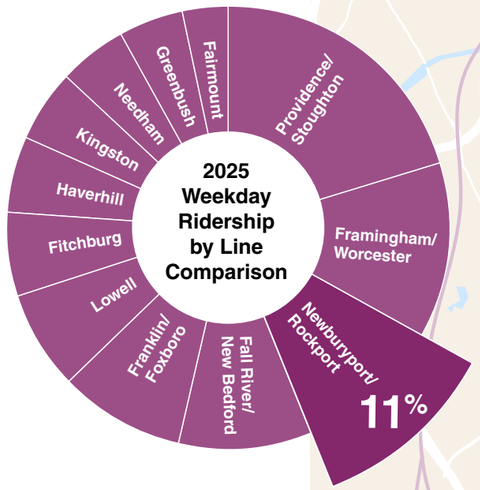
14
Route Miles

34
Weekday Trains

11
Stations



Newburyport/ Rockport Line



11k
Weekday Ridership

53
Route Miles

54
Weekday Trains

17
Stations

LEGEND

TRACK CONFIGURATION
- Single-Track Segment
- Draw Bridge

STATIONS
- Station Configuration Issue
- Low Platform

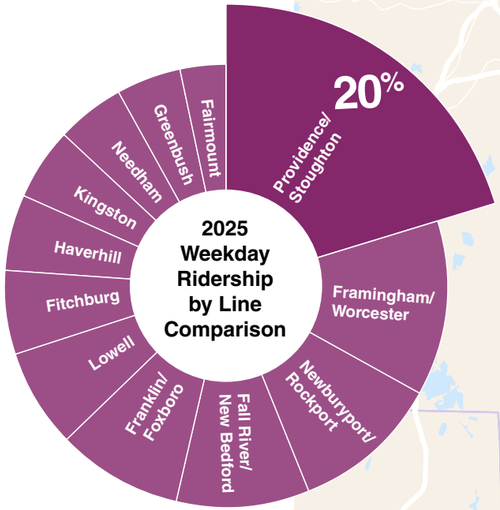
GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)
- Pedestrian Grade Crossing

SPEED RESTRICTIONS
- Low Speed Limit - Track Geometry

(x min) Average Time to Boston in minutes

Newburyport *(69 min)*
Rowley *(61 min)*
Ipswich *(55 min)*
Hamilton/Wenham *(49 min)*
North Beverly *(45 min)*
Manchester Drawbridge
Manchester *(56 min)*
Beverly Farms *(50 min)*
Montserrat *(45 min)*
Beverly *(39 min)*
Beverly Drawbridge
Salem *(35 min)*
Single-track at Salem tunnel and through station
Salem
Swampscott *(28 min)*
Lynn
Lynn *(24 min)*
River Works *(23 min)*
Saugus Drawbridge
Melrose
Revere
Chelsea *(13 min)*
North Station
Gloucester Drawbridge
Rockport *(77 min)*
Gloucester *(67 min)*
West Gloucester *(62 min)*

Providence/ Stoughton Line



20k
Weekday Ridership

67
Route Miles

74
Weekday Trains

17
Stations

*All grade crossings are located on the Stoughton Line

Tracks shared with Needham and Franklin/ Foxboro lines.

Layover facility is not located at the end of the line, requiring extra train movements.

Single-sided platform on non-electrified siding at Wickford Junction.

Tracks shared with Amtrak's Northeast Regional and Acela trains.

LEGEND

TRACK CONFIGURATION
- Single-Track Segment

STATIONS
- Station Configuration Issue

GRADE CROSSINGS
- High Volume Vehicle Grade Crossing (>5,000 Annual Average Daily Traffic)

SPEED RESTRICTIONS
- Low Speed Limit - Track Geometry
- Low Speed Limit - Signal Limitations

SHARED-USE OPERATIONS
- Intercity/Long-distance Passenger Traffic
- Shared Trunk Line

(x min) Average Time to Boston in minutes

Waltham
Newton
Boston
Milford
Woonsocket
Brockton
Plymouth
Taunton
Central Falls
Cranston
Warwick
Fall River
New Bedford

South Station
Back Bay *(5 min)*
Ruggles *(9 min)*
Forest Hills *(13 min)*
Hyde Park *(18 min)*
Readville *(21 min)*
Route 128 *(23 min)*
Canton Junction *(28 min)*
Canton Center *(31 min)*
Sharon *(34 min)*
Stoughton *(39 min)*
Mansfield *(42 min)*
Attleboro *(51 min)*
South Attleboro *(62 min)*
Pawtucket/Central Falls *(63 min)*
Providence *(73 min)*
TF Green Airport *(87 min)*
Wickford Junction *(104 min)*