

SL – Extension

Alternatives Analysis

Silver Line Extension Alternatives Analysis

EXECUTIVE SUMMARY

February 2024





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BUS ONLY

Introduction

The purpose of the Silver Line Extension Alternatives Analysis (SLXAA) project has been to explore the feasibility and utility of various corridor and service options to extend the Silver Line 3 from its current terminus in Chelsea through Everett and on to Somerville, Cambridge and/or Boston.

The primary recommendation from this study is to extend the Silver Line to the Sullivan Square MBTA station, providing a connection to the Orange Line and a dozen MBTA bus routes. This project is projected to increase daily ridership on the SL3 by over 15,000 riders, with a full daily ridership of over 27,800 riders, which is higher than many of the BRT projects in receipt of federal funding and in project development around the country. Furthermore, this extension will benefit transit-dependent riders by increasing frequencies outside of traditional peak commute hours and expanding access to an average of 345,000 jobs via a 45-minute transit commute.

The recommended alignment has the potential to provide transit service with exclusive bus transit right of way along 80% of the 6 1/3-mile extension and could be operated with the existing SL 3 bus fleet, with minimal impact to current service frequency. Other MBTA buses already in operation along portions of this alignment, including the routes 104, 105, and 109, could avail themselves of dedicated transit right of way investment and as a result see a total of 2.9-minute reduction in travel time delay per trip on a daily basis. The recommended alignment traverses three municipalities, Chelsea, Everett, and Boston, which have been actively engaged in the SLXAA process, and endorse this recommendation. Due to their endorsement and the ability of the existing SL3 fleet to serve this extension, implementation is anticipated to be achievable in a relatively short timeframe.

This study also assessed the feasibility of extending Silver Line service beyond the Orange Line. The Alternatives Analysis showed



a ridership benefit to providing service to either Kendall Square or downtown Boston. This service, referred to as the SL6 in this process to differentiate it from SL3 extension alternatives, assumed that the SL3 extension was in place to Everett Square and produced an additional 20,000-23,000 riders/day¹ for alignments to Kendall Square and 11,000-13,000 riders/day² for alignments to downtown Boston.

While extending Silver Line service beyond the Orange Line to either Kendall Square or downtown Boston provides potential ridership benefits, further study and the completion of ongoing planning efforts by others is required to determine the feasibility of implementing a Silver Line service to either location. Moreover, this study found that procuring additional Silver Line vehicles, and expanding vehicle maintenance and storage capacity would be required. A future study should consider the following:

1 when compared to the no build.
 2 Ibid.

- The ridership analysis should model the potential ridership using the Redesigned Bus Network that is currently being implemented by the MBTA;
- Further work be done on the Rutherford Ave. redesign effort and the Gilmore bridge project to better understand the potential for bus priority lanes within roadway infrastructure right of way; and
- More work be done to evaluate transit priority initiatives within Kendall square specifically.

In the near term, Bus Network Redesign will implement high frequency bus services from Chelsea to the Orange Line, and Sullivan Square to Kendall Square, creating the connections evaluated in this study to build market demand. Transitioning to Silver Line will be dependent on future operational resources, and fleet and on-street capital investments.



Background

MassDOT and the MBTA began the SLXAA process in 2021. Since that time the agencies have analyzed dozens of potential operational and corridor alignment options against a discrete set of goals and objectives, developed in concert with a Working Group of municipal and advocacy partners and the general public.

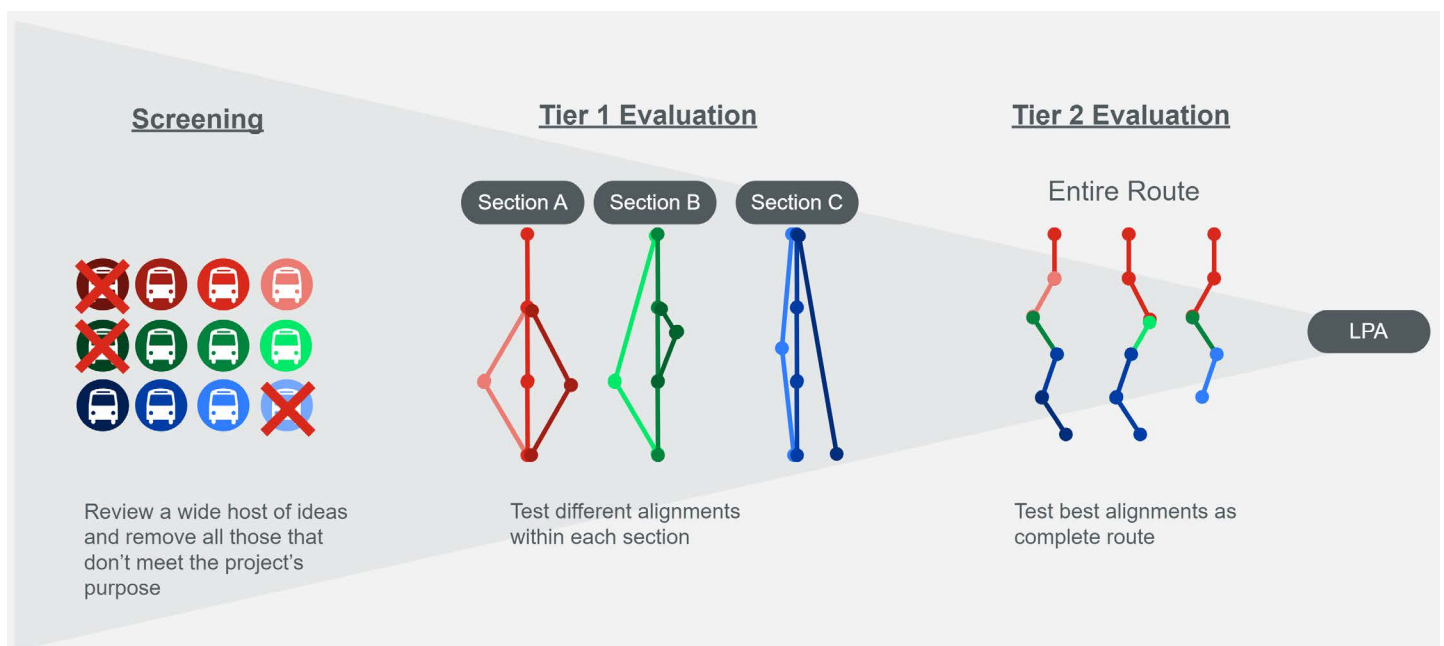
Following an analysis of needs, opportunities, and constraints, which featured Working Group discussions and a public meeting, MassDOT developed a universe of potential ideas. These were then narrowed over a course of three steps, illustrated below.

The first step broadly screened ideas against the project purpose, with ideas not meeting the purpose removed from further consideration. The second step evaluated concepts at a geographic scale – organized by logical breaking points. The most promising of these concepts were combined as end-to-end route alternatives for the third evaluation step. There were seven of these shortlisted route-level alternatives organized into two groups as follows:

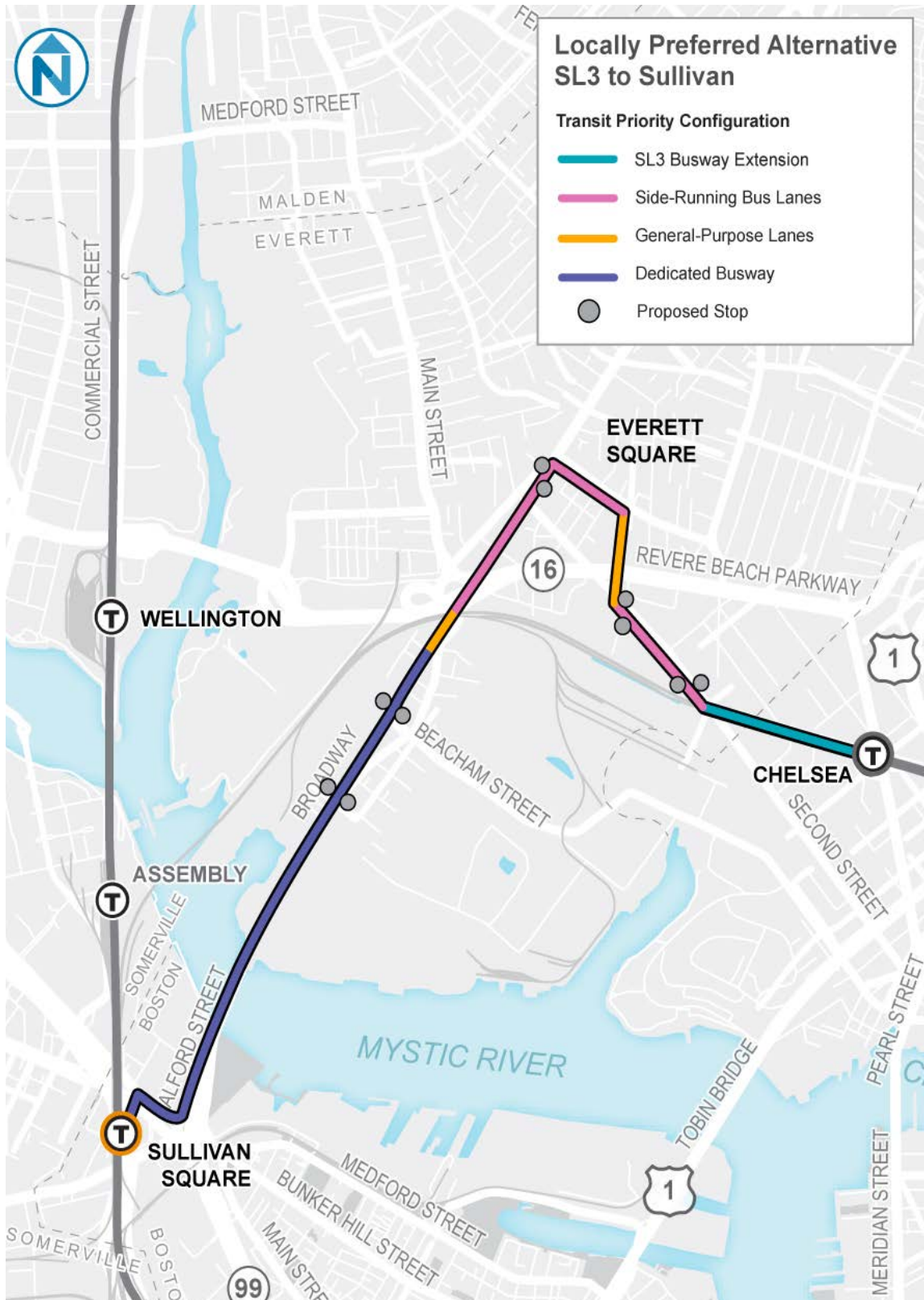
- A set of three alternatives extended the SL3 to the Orange Line (called SL3 extension alternatives, Alternative 1: SL3 to Malden Center, Alternative 2: SL3 to Wellington, Alternative 3: SL3 to Sullivan)
- A set of four alternatives that provide a new service (called the SL6 for evaluation purposes) extending from Everett into Kendall or downtown Boston (Alternative 4: SL6 to Kendall via McGrath, Alternative 5: SL6 to Kendall via Rutherford, Alternative 6: SL6 to Boston via Rutherford, and Alternative 7: SL6 to Kendall from Chelsea)

This final analysis step featured a robust evaluation including running the CTPS regional model. This work is now complete and results have been presented broadly to stakeholders and the public. MassDOT and the MBTA have selected the Locally Preferred Alternative (LPA) for SL3 Extension from its current terminus at Chelsea Station to the Sullivan Square Orange Line Station (Alternative 3), and recommend further modeling be done on the SL6 alternatives in the near future.

Silver Line Extension Alternatives Analysis Evaluation Process



Locally Preferred Alternative



Key Statistics

Length of the LPA: 6.36 Miles

Number of Stations: 8¹

Assumed Span of Service:

4:20 AM-1:15 AM Weekday

4:55 AM-1:45 AM Saturday

5:50 AM-1:50 AM Sunday

Frequency: 10 minutes AM + PM Peak

Assumed Vehicle Load: 65 passengers²

Extent of Operation in Exclusive Transit Right-of-way: 80% (5.18 miles)

Time Spent at Each Station: 24 seconds³

Average Daily Ridership (2040): 27,800

Major Transfer Locations:

Chelsea Station

Everett Square

Sullivan Station

Additional Silver Line buses needed: 4 buses

Capital Costs: \$95 M

Access to Jobs via 45-minute Transit Commute:

AM Peak: 347,000 jobs

Midday: 344,000 jobs

The SL3 LPA has been identified as an extension of the existing SL3 service from its current terminus at Chelsea Station to the Sullivan Square Orange Line Station. The primary attributes of this alternative are included in the table above.

This service would operate primarily on dedicated bus-only lanes along an extended Chelsea busway, Second Street, Spring Street, Chelsea Street, Broadway, Lower Broadway, Alford Street and across the Alford Bridge to Sullivan Station. There were several key differentiators between the SL3 Extension to Sullivan and the other SL3 Extension alternatives, described in the paragraphs below.

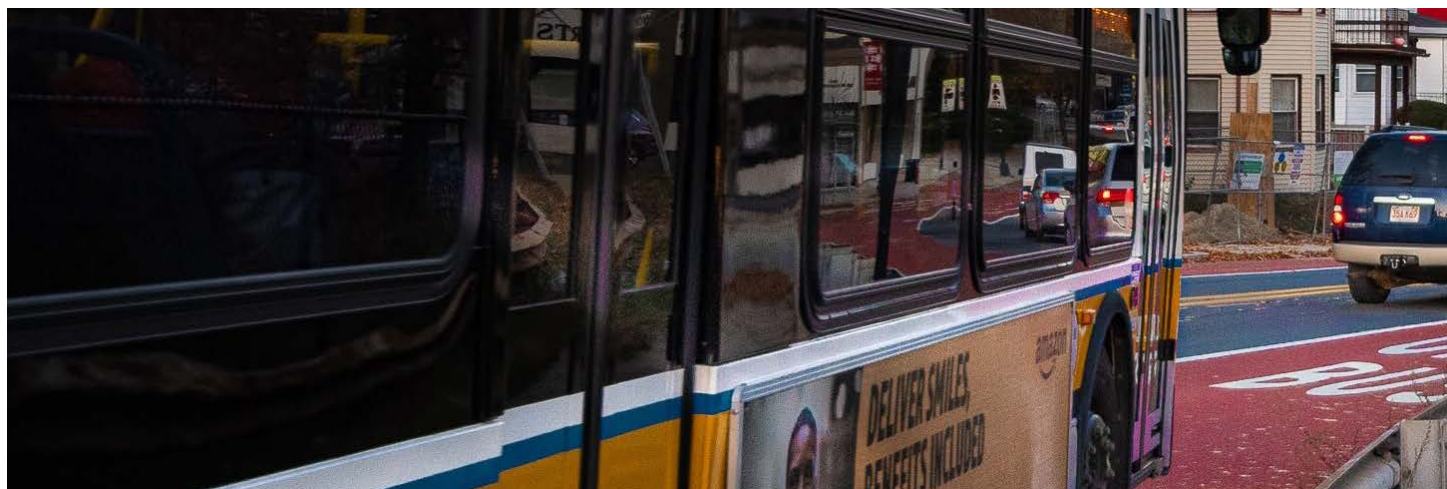
- While the existing part-time, side-running bus lanes on Upper Broadway in Everett have helped ease some of the congestion during the peak commute hours along the Broadway corridor, transit users still face tremendous congestion, amounting to thousands of daily passenger minutes in delay between Chelsea Street and Sweetser Circle alone.⁴
- The SL3 LPA would provide full-time dedicated bus lanes along 80% of its alignment and transit signal priority at 14 intersections, providing travel times that are faster than drive alone times, and travel times that are more reliable because with dedicated transit lanes the

1 Chelsea Station, 2nd St. at commuter rail ROW, 2nd St. at Spring Street, Broadway/Everett Square, Broadway at Gladstone St., Lower Broadway at Beacham, Lower Broadway at Dexter St., Sullivan Square.

2 MBTA Service Delivery Policy, page 47: <https://cdn.mbta.com/sites/default/files/2021-06/2021-service-delivery-policy.pdf>

3 All-Door Boarding Pilot on the Silver Line (2017), OPMI Data Blog: <https://massdotracker.com/datablog/?p=154>. Assuming front-door boarding.

4 All-Door Boarding Pilot on the Silver Line (2017), OPMI Data Blog: <https://massdotracker.com/datablog/?p=154>. Assuming front-door boarding.



Silver Line vehicles are not vulnerable to the traffic congestion experienced in the adjacent general-purpose lanes. The level of transit priority achieved under Alternative 3 is higher than the other SL3 Extension alternatives.

- In addition, other local bus routes that operate along the alignment can benefit from the bus lanes implemented as part of the SL3 extension. These include the MBTA Routes 97, 104, 105, 109, 110, and 112, several of which are among the MBTA's highest and most resilient ridership. On average, the proposed infrastructure could save its transit riders 3 daily minutes in delay. This is higher than any of the other SL3 Extension alternatives. The existing MBTA bus routes that operate along this alignment are more likely to serve people of color, people without access to a personal automobile, and people of lower incomes.
- The CTPS Travel Demand Model estimated that extending the SL3 to Sullivan could see up to 27,800 daily boardings by year 2040. This is 15,000 more daily boardings than the SL3 would experience if it were to end at its current terminus at Chelsea Station – a 120% increase. While some of these riders would be people who would have otherwise used local bus routes, our analysis shows that extending the SL3 to Sullivan Station could add up to 11,000 net new daily boardings to the system.

- There is strong support for the recommended LPA among municipal leaders as well as from the community at large. In our third feedback survey, respondents ranked the LPA as the SL3 extension alternative they would be most likely to use, ahead of connections to the Orange Line via Malden Center or Wellington.
- The SL3 could be extended to Sullivan using the existing Silver Line fleet. The extended service is assumed to operate with 10-minute headways during most of the day⁵⁷ which results in a requirement for 12 Silver Line vehicles, four more than what is needed for the existing SL3 service.

While the technical analysis showed that a BRT capital investment connection between Chelsea and Sullivan aligned the best with the study goals and objectives, pursuing this LPA would not preclude transit service to Malden Station and to Wellington Station. In fact, the Bus Network Redesign shows a frequent service route T104 connecting Airport Station to Malden Center via Everett, and frequent service route T110 connecting Wonderland to Wellington via Everett. As the SL3 extension moves into project development, additional refinements could be made to this and other MBTA bus route begin and end points to best serve ridership demand.

⁵⁷ Consistent with SL3 Winter 2020 schedule.



The Alford Street Drawbridge provides an uninterrupted connection between Everett and Charlestown during most of the day. It is closed for the passage of vessel traffic during the morning peak hours and between 5 p.m. and 6 p.m. daily and would minimally impact Silver Line operations across the corridor.



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