



South Station Expansion Project

Appendix 9 (Part 3) – Ridership Forecasting Technical Report

October 2014



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1. Introduction

The Massachusetts Department of Transportation (MassDOT), the Massachusetts Bay Transportation Authority (MBTA), and the National Railroad Passenger Corporation (Amtrak) have for decades identified the expansion of rail capacity at Boston South Station as a crucial transportation need, one that has been articulated in multiple local, regional, state, and Northeast Corridor (NEC)-wide planning documents.¹ In cooperation with the Federal Railroad Administration (FRA), Amtrak, and the MBTA, MassDOT is now pursuing the expansion of South Station to support existing NEC and commuter rail services and to provide for future Amtrak and MBTA service expansions. The current track capacity, layout, and operations of South Station limit the ability to accommodate expanded services. In addition to expanding South Station terminal facilities, the South Station Expansion (SSX) project will also identify a solution to address existing and future intercity and commuter rail service layover needs. The SSX project includes planning, environmental reviews, and preliminary engineering for the five primary elements of the project:

1. **Expand the South Station terminal facilities**, including the addition of up to seven tracks and four platforms, and construction of a new passenger concourse and other amenities.
2. **Acquire and demolish the U.S. Postal Service (USPS) General Mail Facility** located on Dorchester Avenue adjacent to South Station, which will provide an approximate 14-acre site on which to expand South Station. (Note that the relocation of the USPS facility will be the subject of a separate environmental review process by others.) Dorchester Avenue will be restored for public and station access.
3. **Create an extension of the Harborwalk along reopened Dorchester Avenue.**
4. **Provide for the possibility of future joint public/private development** adjacent to and over an expanded South Station.
5. **Provide adequate rail vehicle layover space** to address existing and future intercity and commuter rail service needs.

This Ridership Forecasting Technical Report has been prepared in support of the Draft Environmental Impact Report (Draft EIR) and Environmental Assessment (EA) for the SSX project, in accordance with the Certificate of the Secretary of the Office of Energy and Environmental Affairs (EEA) on the Environmental Notification Form (ENF) for the SSX project (April 19, 2013), the Massachusetts Environmental Policy Act (MEPA) regulations, 301 CMR 11.00 (revised, May 10, 2013), and the FRA's Procedures for Considering Environmental Impacts, 64 Federal Register (FR) 101 (26 May 1999), pp. 28545-28556.

¹ Documents citing the need for an expanded South Station include: *Critical Infrastructure Needs on the Northeast Corridor* (2013), *The Northeast Corridor Infrastructure Master Plan* (2010); *The Amtrak Vision for High-Speed Rail in the Northeast Corridor* (2010), *A Vision for the Northeast Corridor* (2012), the Massachusetts Department of Transportation *Rail Plan* (2010), the Massachusetts Department of Transportation *Freight Plan* (2010), and the two most recent long range transportation plans of the Boston Region Metropolitan Planning Organization (2007, 2011).

1.1. Purpose

The purpose of this report is to document the methodology used to determine the ridership forecasts for MBTA and Amtrak services and other transit services to and from South Station to support the planning, environmental review, and preliminary engineering efforts for the SSX project. Ridership forecasts were developed for the existing conditions and the future No Build, as well as for the three Build Alternatives that are presented in this DEIR, including:

- Alternative 1 – Transportation Improvements Only
- Alternative 2 – Joint/Private Development Minimum Build
- Alternative 3 – Joint/Private Development Maximum Build

Ridership forecasts were developed for the following conditions: 2012 Existing Year, the 2035 Build Year, and the 2025 Opening Year. This document includes the results of the ridership forecasting effort, which include a comprehensive analysis of boardings, alightings and transfers to South Station's connecting transportation services (including commuter rail, intercity rail, local and intercity/commuter bus, rapid transit, automobile, bicycle and walk trips).

Outputs of the ridership forecasting effort inform many aspects of the environmental planning and preliminary design efforts for the SSX project, including the:

- Transit Crowding Analysis
- Traffic and Pedestrian Analysis
- Air Quality Analysis
- Environmental Justice Analysis
- Economic Impact Analysis
- Passenger Circulation Analysis/Passenger Facility Design

2. Summary

Ridership data for the SSX project were developed using standard transportation planning industry practice for the evaluation of transportation systems and infrastructure. Much of the analysis was based on the development of existing conditions and 2035 travel demand forecasts provided by the Central Transportation Planning Staff (CTPS) and assumes several proposed transportation projects [consistent with the currently adopted Regional Transportation Plan (RTP)] will be implemented by the 2035 Build Year.

CTPS is the staff to the Metropolitan Planning Organization (MPO) for the Boston region and works with the communities within the region to address issues relating to transportation, land use, and economic development. CTPS develops and maintains the regional transportation demand model. CTPS's method of travel demand forecasting follows the traditional four steps of trip generation, trip distribution, modal split, and travel assignment, and uses TransCAD software to run the travel demand model.

For the SSX project, CTPS provided a calibrated baseline, or existing condition, and developed 2035 No Build and Build Alternative forecasts for local and regional rail and bus ridership, as well as the associated impacts on the transportation network (auto traffic and pedestrian flows). Amtrak was responsible for providing 2035 intercity passenger rail ridership forecasts for the Build Alternatives.

Post-model adjustments to the CTPS results were applied to account for Silver Line Gateway² ridership (a project not included in the currently adopted RTP) and the Amtrak-provided intercity rail ridership projections to prepare final 2035 ridership forecasts. In addition, 2025 Opening Year ridership was estimated using an interpolation methodology developed by CTPS and described in Attachment I. The daily South Station ridership results for the 2012 Existing Year, 2025 Opening Year, and 2035 Build Year are summarized in Tables 1, 2, and 3, respectively.

As shown in Table 1, South Station currently handles approximately 128,000 daily combined Amtrak, MBTA (commuter rail, Red Line, Silver Line, and local bus), and intercity/commuter bus boardings and alightings.

Table 1—2012 Existing Conditions Daily Combined South Station Boardings and Alightings

	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
Existing Conditions	4,100	42,000	46,000	54,000	12,700	2,900	12,200	128,000

Source: *Final SSX Ridership Results*, Base Year Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results, which are rounded to the nearest 1,000.

^a Total values calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

As illustrated in Table 2, in the 2025 Opening Year, the Build Alternatives would result in approximately 183,000 to 187,000 daily combined Amtrak, MBTA, and intercity/commuter bus boardings and alightings. The No Build Alternative is projected to result in approximately 165,000 daily combined boardings and alightings.

In 2025, Alternative 1 would increase daily Amtrak and commuter rail boardings and alightings at South Station by approximately 28% compared to the No Build Alternative. Alternative 2 and Alternative 3 would increase daily Amtrak and commuter rail ridership at South Station by approximately 28% and 29%, respectively, compared to the No Build Alternative.

By 2035, the project Build Alternatives would result in approximately 198,000 to 203,000 daily combined Amtrak, MBTA, and intercity/commuter bus boardings and alightings, as shown in Table 3. The No Build Alternative is projected to result in approximately 175,000 daily combined boardings and alightings.

In 2035, Alternative 1 would increase daily Amtrak and commuter rail boardings and alightings at South Station by approximately 33% compared to the No Build Alternative. Alternative 2 and Alternative 3 would increase daily Amtrak and commuter rail ridership at South Station by approximately 33% and 36%, respectively, compared to the No Build Alternative.

² The proposed Silver Line Gateway project will extend Silver Line bus rapid transit (BRT) service from the Seaport District to Chelsea via East Boston. From South Station, the proposed Silver Line Gateway route will follow the existing Silver Line route into the Seaport District, connect to the Blue Line and East Boston neighborhoods at Airport Station, and then continue into Chelsea where the route will travel in a new dedicated busway serving four new stations at Eastern Avenue, Box District, Downtown Chelsea, and Mystic Mall.

Table 2—2025 Opening Year Daily Combined South Station Boardings and Alightings

Alternative	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
No Build Alternative	5,200	53,000	58,000	68,000	22,800	3,600	12,700	165,000
Alternative 1 - Transportation Improvements Only	8,100	65,000	74,000	70,000	23,200	3,600	12,500	183,000
Alternative 2 – Joint/Private Development Minimum Build	8,100	66,000	74,000	70,000	23,200	3,700	12,700	183,000
Alternative 3 – Joint/Private Development Maximum Build	8,100	67,000	75,000	72,000	23,600	3,800	13,100	187,000

Source: *Final SSX Ridership Results*, Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results, which are rounded to the nearest 1,000. Total values are calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

Table 3—2035 Build Year Daily Combined South Station Boardings and Alightings

Alternative	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
No Build Alternative	5,500	56,000	61,000	72,000	25,600	3,800	12,800	175,000
Alternative 1 - Transportation Improvements Only	9,300	72,000	81,000	74,000	26,100	3,800	12,600	198,000
Alternative 2 – Joint/Private Development Minimum Build	9,300	72,000	81,000	75,000	26,200	3,900	12,800	199,000
Alternative 3 – Joint/Private Development Maximum Build	9,300	74,000	83,000	77,000	26,700	4,000	13,300	203,000

Source: *Final SSX Ridership Results*, Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results which are rounded to the nearest 1,000. Total values are calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

3. Methodology

The methodology used to develop ridership data for the SSX project follows standard transportation planning industry practice for the evaluation of transportation systems and infrastructure. Much of the analysis was based on the development of existing conditions and 2035 travel demand forecasts provided by CTPS, and assumes that a number of proposed transportation projects (consistent with the currently adopted RTP) will be implemented by the 2035 Build Year. Except as noted in this document, other proposed transportation projects not included in the currently adopted RTP are not accounted for in the travel demand forecasts. Land use assumptions for the South Station area were approved by the Boston Redevelopment Authority (BRA) and the MPO for the Boston region, and include a number of development projects that were assumed to occur before the 2035 Build Year.³

CTPS is the staff to the Metropolitan Planning Organization (MPO) for the Boston region and works with the communities within the region to address issues relating to transportation, land use, and economic development. CTPS develops and maintains the regional transportation demand model. CTPS's method of travel demand forecasting follows the traditional four steps of trip generation, trip distribution, modal split, and travel assignment, and uses TransCAD software to run the travel demand model. Amtrak intercity rail, intercity/commuter bus services, and the proposed South Coast Rail service are not accounted for in the CTPS travel demand model. These services were incorporated into the SSX travel demand forecasting using post-modeling processes. A detailed summary of the travel demand model methodology utilized by CTPS is included in Attachment E.

For the SSX project, CTPS provided existing conditions and developed 2035 No Build and Build Alternative forecasts for local and regional rail and bus ridership, as well as the associated impacts on the transportation network (auto traffic and pedestrian flows). The objective was to examine how various transportation modes would be affected by the expansion of South Station and the potential redevelopment of the area around South Station. Amtrak provided 2035 intercity passenger rail ridership forecasts for the SSX Build Alternatives. To support the ridership modeling, the SSX project:

- Provided CTPS with inputs for the development of ridership estimates, including future commuter rail service levels and future land use data, including households and jobs. Descriptions of the land use and service level assumptions used for the No Build Alternative and the three Build alternatives (Alternative 1, Alternative 2, and Alternative 3) are contained in Attachment E.
- Reviewed Amtrak's proposed ridership estimates and future service plan for consistency with SSX project assumptions.
- Coordinated with CTPS and Amtrak to ensure consistency between the two forecasting efforts.
- Reviewed outputs from CTPS and provided feedback to clarify and refine results.
- Applied manual post-model adjustments to the CTPS results to account for Silver Line Gateway ridership (a project not included in the currently adopted RTP) and the Amtrak-provided intercity rail ridership projections to prepare final 2035 Build Year ridership forecasts.
- Estimated 2025 Opening Year ridership based on an interpolation methodology provided by CTPS (described in Attachment I) and the final 2012 Existing Year and 2035 Build Year ridership results.

³ A summary of the development projects assumed to occur before the 2035 Build Year is included in Appendix 9 - *Traffic Analysis Technical Report*.

3.1. Existing Conditions

Existing conditions for the SSX project are based on 2012 intercity rail ridership data provided by Amtrak and a series of pedestrian and passenger counts conducted by CTPS during 2012-2013.

3.1.1. Amtrak-Provided Existing Conditions Data

Average weekday intercity boardings and alightings by train at South Station, Back Bay, and Route 128 were provided by Amtrak, and are based on reservation system ticket counts from FY 2012-2013. The data represent a one-to-one correlation for all riders except for a very small percentage of multi-ride tickets, for which Amtrak used an estimated factor based upon historical experience. The data provided by Amtrak indicate that there are approximately 4,100 average weekday intercity rail boardings and alightings at South Station.

Amtrak's existing conditions data showed higher intercity rail ridership at South Station than the results of the CTPS passenger counts (described in further detail in the following section).⁴ Nonetheless, the SSX project based existing conditions on the Amtrak-provided data for South Station as they provide a more conservative projection for project planning purposes. Therefore, the CTPS existing conditions results were adjusted to reflect the Amtrak-provided ridership numbers.

3.1.2. CTPS-Provided Existing Conditions Data

CTPS provided existing conditions data, performed data collection on existing station activity (including counts of rail, intercity/commuter bus, and MBTA transit boardings and alightings), and updated and calibrated the travel demand model base year scenario accordingly. As described in the *South Station Expansion Model Year Representation* memorandum, dated March 17, 2014 (in Attachment F), the CTPS model base year represents 2009/2010 conditions, but was calibrated to the data collected in 2012-2013 to adequately represent the SSX project 2012 Existing Year.

3.1.3. Adjusted Existing Conditions Data

Adjustments to the preliminary CTPS existing conditions results are described in further detail in this section.

Pedestrian Transfer Matrices

As part of the existing conditions analysis for the SSX project, CTPS conducted a series of pedestrian and passenger counts at South Station between November 2012 and January 2013. Tables showing mode-to-mode transfers between 6:00 a.m. and midnight on an average weekday in the South Station complex were developed from these data and from other available sources including: the 2013 *Massachusetts Regional Bus Study*, CTPS's Spring 2012 commuter rail counts, September 2010 MBTA automated fare collection data, and the 2008-2009 MBTA on-board passenger survey.

The preliminary CTPS base year pedestrian transfer matrices, which quantify the mode-to-mode transfers at South Station, were adjusted to reflect the Amtrak-provided ridership data according to the following methodology:

⁴ The Amtrak ticket counts may represent a high estimate of ridership at South Station, as actual passenger boardings/alightings may not correspond with the station code on the ticket. For example, since the fare is the same for passengers boarding or alighting at South Station, Back Bay, or Route 128, passengers may purchase a ticket for South Station code BOS, but instead travel via Back Bay or Route 128.

- Existing Amtrak ridership by time period (AM Peak, Midday, PM Peak, and Night) was determined from the Amtrak-provided data.
- Modal distributions for passengers alighting from and boarding onto Amtrak trains to/from all other modes were calculated from the CTPS preliminary results.
- Based on total Amtrak ridership by time period and the CTPS modal distributions, the adjusted Amtrak boardings and alightings to/from all other modes were calculated.
- Daily transfer activities were calculated as the sum of the transfers from each time period.

Ridership Summary Tables

CTPS provided preliminary ridership summary tables by each time period (AM Peak, Midday, PM Peak, and Night) and a daily summary of boardings and alightings at South Station for the commuter rail, Red Line, Silver Line and local bus. The preliminary ridership summary tables were adjusted to be consistent with the final, adjusted transfer matrices. The final results are presented in Section 4.

3.2. 2035 Build Year Ridership Projections

2035 Build Year projections were based on the CTPS travel demand model results for the SSX project scenarios as well as Amtrak projections of intercity rail ridership. The travel demand forecasts assume that a number of proposed transportation projects (consistent with the currently adopted RTP) will be implemented by the 2035 Build Year.

Intercity/commuter bus services are not included in the CTPS model and, therefore, intercity/commuter bus ridership projections were incorporated into the SSX travel demand forecasting using post-modeling processes. Post-model adjustments were also applied to the preliminary CTPS results to incorporate projected ridership from the Silver Line Gateway project, a project not included in the currently adopted RTP and therefore not included in the CTPS travel demand model, and to incorporate the intercity rail ridership projections provided by Amtrak. A discussion of the future year Amtrak and CTPS forecasts, as well as the post-model adjustments to the preliminary CTPS model results, is provided in the following sections.

3.2.1. Amtrak Projections

Amtrak initially prepared a 2035 Build Year service plan and corresponding intercity ridership projections for the SSX project in September 2013. The projections included estimated ridership by train for the SSX Build Alternatives. Subsequent adjustments to the projections were made to update the ridership forecasts to correspond with Amtrak's updated November 2013 service plan (according to the methodology detailed in Attachment G). These ridership adjustments were then approved by Amtrak for use in the SSX project.

To estimate Amtrak ridership growth from 2012 to the 2035 No Build Alternative, Amtrak intercity ridership was assumed to grow at the same rate as MBTA commuter rail ridership, at an annual rate of approximately 1.2%. Compared to the 2.7% average annual intercity growth rate experienced across the NEC over the past fifteen years,⁵ an annual growth rate of 1.2% provides a reasonable assumption for intercity rail growth beyond 2012 as it reflects Amtrak's inability to provide substantial additional seating

⁵ Amtrak. *South Station Boston Expansion Project, Projected Intercity Train Movement and Ridership Data to Support the Evaluation of Yard and Training Servicing Needs and Pedestrian Modeling of the Station*, Memorandum to Massachusetts Department of Transportation, Revised, September 26, 2013.

until new rail service is implemented and the fact that the NEC has many existing infrastructure constraints that threaten to cap the intercity ridership growth experienced over the past decade and a half.

3.2.2. CTPS Model Projections

Preliminary CTPS ridership forecasts were prepared using the travel demand model 2035 No Build and Build scenarios. As stated above, the CTPS travel demand model did not include intercity/commuter bus services (which operate outside of the Eastern Massachusetts model region), the proposed Silver Line Gateway project (a project not included in the currently adopted RTP) or Amtrak-provided ridership data. Adjustments made for these services are described below.

3.2.3. Combined Adjusted 2035 Projections

Adjustments to the preliminary 2035 ridership results are described in further detail in the following sections.

Intercity/Commuter Bus Projections

CTPS's regional ridership model encompasses Eastern Massachusetts. Intercity/commuter bus services operate outside of the Eastern Massachusetts model region and, therefore, are not included in the CTPS model. As such, it was necessary for CTPS to prepare intercity/commuter bus ridership forecasts using post-model calculations.

As part of the South Station Air Rights (SSAR) project, it is anticipated that the existing bus terminal at South Station will be expanded by 2035. This expansion will provide additional capacity for increased bus service in the South Station terminal. While there are plans to expand the bus facility, no specific future year service plans for the existing private bus carriers are currently available. In the absence of these plans, intercity/commuter bus service levels were assumed to remain constant between the 2012 Existing Year and 2035 Build Year. Based on this assumption, the methodology used to develop the intercity/commuter bus ridership projections for each alternative is summarized below:

- 2035 No Build Alternative: Daily intercity/commuter bus boardings and alightings at South Station are projected to increase by approximately 5% compared to Existing Conditions due to anticipated population and employment growth between the 2012 Existing Year and the 2035 No Build Alternative.
- Alternative 1 – Transportation Improvements Only: Intercity/commuter bus ridership in Alternative 1 is projected to slightly decreased compared to the No Build Alternative, as it is anticipated that some riders would switch modes from intercity/commuter bus to rail due to the proposed increase in commuter rail and Amtrak service in the Build Alternatives.⁶ The estimated reduction of daily intercity/commuter bus boardings and alightings between the No Build Alternative and Alternative 1 also factored in the relocation of the USPS facility in Alternative 1, which would remove approximately 1,000 jobs from the South Station complex as compared to the No Build Alternative.
- Alternative 2 – Joint/Private Development Minimum Build: Approximately 1,200 new jobs would be added to the South Station complex as part of the proposed private/joint development in this Alternative. Alternative 2 is projected to regain the same level of intercity/commuter bus ridership

⁶ The proposed increase in Amtrak service in the Build Alternatives represents a 100% increase above the service levels in the No Build Alternative.

as the No Build Alternative due to this replacement of approximately the same amount of employment lost due to the USPS relocation in Alternative 1.

- **Alternative 3 – Joint/Private Development Maximum Build:** Approximately three times more employment and three times more housing are proposed in Alternative 3 compared to Alternative 2, and intercity/commuter bus ridership growth between the Build Alternatives is projected to roughly follow this trend.

Pedestrian Transfer Matrices

The preliminary 2035 pedestrian transfer matrices prepared by CTPS were adjusted to reflect Silver Line Gateway ridership and 2035 Amtrak projections according to the methodology outlined below:

- The modal distributions for passengers alighting from and boarding onto the Silver Line to/from all other modes were calculated based on the CTPS preliminary results.
- Based on the Silver Line Gateway boarding data by time period⁷ (prepared by CTPS separately for the Silver Line Gateway project), and preliminary modal distributions, the adjusted Silver Line boardings to/from all other modes were calculated.
- Total daily Silver Line Gateway alightings were assumed to equal total daily Silver Line Gateway boardings. The Silver Line Gateway alightings by time period were calculated based on the unadjusted Silver Line alighting ridership time period splits.
- Based on the calculated Silver Line Gateway alighting data by time period, and modal distributions, the adjusted Silver Line alightings to/from all other modes were calculated.
- Next, future Amtrak ridership by time period was calculated from the Amtrak 2035 projections (Attachment J).
- Modal distributions for passengers alighting from and boarding onto Amtrak trains to/from all other modes were calculated based on the Silver Line Gateway adjusted results.
- Based on the total Amtrak ridership by time period and modal distribution percentages, the adjusted Amtrak boardings and alightings to/from all other modes were estimated.
- Daily transfer activities were calculated as the sum of transfers from each time period.

Geographic Distribution of Ridership To/From Surrounding Neighborhoods

The CTPS travel demand model area is composed of 2,727 Transportation Analysis Zones (TAZs)⁸ that comprise nearly all of eastern Massachusetts. In order to analyze the geographic distribution of South Station trips that begin/end at the neighborhoods surrounding South Station, four TAZ subareas were defined, corresponding to the neighborhoods located immediately to the north, south, east and west of South Station. A map of the north, south, east and west TAZ subareas is illustrated in Attachment H. These travel demand model subareas were used to analyze the geographic distribution of Silver Line, Red Line and commuter rail ridership at South Station to and from each of the surrounding neighborhoods. The preliminary analysis prepared by CTPS was adjusted to reflect additional Silver Line Gateway ridership⁹ according to the methodology outlined below:

- Silver Line Gateway boardings that can be attributed to pedestrians arriving from the north, south, east and west TAZ subareas, corresponding to the neighborhoods surrounding South Station, were estimated based on the preliminary CTPS results for the existing Silver Line

⁷ Data for the Mystic Mall Busway Alternative (the Locally Preferred Alternative) were used for the SSX project ridership estimates.

⁸ A transportation analysis zone (TAZ) is an aggregation of census geography based on population and estimated trip volumes.

⁹ The Silver Line Gateway project is not included in the currently adopted RTP and is therefore not accounted for in the CTPS travel demand model. Silver Line Gateway ridership was incorporated into the SSX travel demand forecasting using post-modeling processes.

services. Silver Line Gateway alightings to the north, south, east and west TAZ subareas were assumed to equal Silver Line Gateway boardings from these four TAZ subareas.

- The geographic (north/south/east/west) distributions for daily, AM Peak, and PM Peak Silver Line ridership were calculated based on the preliminary CTPS results.
- Silver Line results for the future year scenarios were adjusted to reflect Silver Line Gateway ridership based on the geographic distributions and the calculated additional Silver Line Gateway ridership from the neighborhoods surrounding South Station. The analysis results, presented in Attachment J, represent the average of boardings and alightings from/to the north, south, east and west TAZ subareas immediately surrounding South Station.

Ridership Summary Tables

Similar to the existing conditions adjustments, the preliminary 2035 ridership summary tables prepared by CTPS were adjusted to be consistent with the final, adjusted 2035 transfer matrices. Final results are presented in Section 4 of this document.

3.3. 2025 Opening Year Ridership Projections

Using the final, adjusted ridership results for the 2012 Existing Year and 2035 Build Year scenarios, 2025 Opening Year forecasts were derived for the SSX project using an interpolation methodology developed by CTPS (refer to Attachment I). The method consists of applying a growth factor, based on projected household and employment growth, to estimate 2025 Opening Year ridership. Results are presented in the following section.

4. Results

Detailed final ridership results for the SSX project alternatives, including pedestrian transfer matrices, an analysis of the geographic distribution of ridership to/from neighborhoods surrounding South Station and ridership summary tables by time period for the 2012 Existing Year, 2025 Opening Year, and 2035 Build Year, are provided in Attachment J. Summarized below are the daily ridership results for Amtrak, MBTA (commuter rail, Red Line, Silver Line, and local bus) and intercity/commuter bus services at South Station.

4.1. Existing Conditions

As shown in Table 4, South Station currently handles approximately 128,000 daily combined Amtrak, MBTA, and intercity/commuter bus boardings and alightings.

Table 4—2012 Existing Conditions Daily Combined South Station Boardings and Alightings

	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
Existing Conditions	4,100	42,000	46,000	54,000	12,700	2,900	12,200	128,000

Source: *Final SSX Ridership Results*, Base Year Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results which are rounded to the nearest 1,000. ^a Total values are calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

4.2. 2025 Opening Year

As illustrated in Table 5, the Build Alternatives would result in approximately 183,000 to 187,000 daily combined Amtrak, MBTA, and intercity/commuter bus boardings and alightings in the 2025 Opening Year. The No Build Alternative is projected to result in approximately 165,000 daily combined boardings and alightings.

Projected ridership growth between Existing Conditions and the 2025 No Build Alternative is a result of forecasted growth in population, households, and employment, as well as changes in land use and transit services. In the No Build Alternative, increased frequencies on the Fairmount Line would contribute to the projected growth in commuter rail ridership at South Station. The proposed Silver Line Gateway project, combined with projected land use changes along the various Silver Line corridors, would result in substantial increases to Silver Line ridership at South Station between Existing Conditions and the No Build Alternative.

In the 2025 Opening Year, Alternative 1 would increase daily Amtrak and commuter rail boardings and alightings at South Station by approximately 28% compared to the No Build Alternative. This ridership increase is directly attributable to increased commuter rail and Amtrak intercity rail service made possible by the expansion of South Station. Land use changes corresponding to the proposed joint/private development in Alternative 2 and Alternative 3 would result in marginal additional increases to ridership. Alternative 2 and Alternative 3 would increase daily Amtrak and commuter rail ridership at South Station by approximately 28% and 29%, respectively, compared to the No Build Alternative.

Table 5—2025 Opening Year Daily Combined South Station Boardings and Alightings

Alternative	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
No Build Alternative	5,200	53,000	58,000	68,000	22,800	3,600	12,700	165,000
Alternative 1 - Transportation Improvements Only	8,100	65,000	74,000	70,000	23,200	3,600	12,500	183,000
Alternative 2 – Joint/Private Development Minimum Build	8,100	66,000	74,000	70,000	23,200	3,700	12,700	183,000
Alternative 3 – Joint/Private Development Maximum Build	8,100	67,000	75,000	72,000	23,600	3,800	13,100	187,000

Source: *Final SSX Ridership Results*, Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results which are rounded to the nearest 1,000.

^a Total values are calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

4.3. 2035 Build Year

By 2035, the Build Alternatives would result in approximately 198,000 to 203,000 daily combined Amtrak, MBTA, and intercity/commuter bus boardings and alightings, as shown in Table 6. The No Build Alternative is projected to result in approximately 175,000 daily combined boardings and alightings.

Projected ridership growth between Existing Conditions and the 2035 No Build Alternative is a result of forecasted growth in population, households, and employment, as well as changes in land use and transit services. In the No Build Alternative, increased frequencies on the Fairmount Line would contribute to the projected growth in commuter rail ridership at South Station. The proposed Silver Line Gateway project, combined with projected land use changes along the various Silver Line corridors, would result in substantial increases to Silver Line ridership at South Station between Existing Conditions and the No Build Alternative.

In the 2035 Build Year, Alternative 1 would increase daily Amtrak and commuter rail boardings and alightings at South Station by approximately 33% compared to the No Build Alternative. This ridership increase is directly attributable to increased commuter rail and Amtrak intercity rail service made possible by the expansion of South Station. Land use changes corresponding to the proposed joint/private development in Alternative 2 and Alternative 3 would result in marginal additional increases to ridership. Alternative 2 and Alternative 3 would increase daily Amtrak and commuter rail ridership at South Station by approximately 33% and 36%, respectively, compared to the No Build Alternative.

Table 6—2035 Build Year Daily Combined South Station Boardings and Alightings

Alternative	Amtrak	Commuter Rail	Amtrak and Commuter Rail Total ^a	Red Line	Silver Line	Local Bus	Intercity/Commuter Bus	Total ^a
No Build Alternative	5,500	56,000	61,000	72,000	25,600	3,800	12,800	175,000
Alternative 1 - Transportation Improvements Only	9,300	72,000	81,000	74,000	26,100	3,800	12,600	198,000
Alternative 2 – Joint/Private Development Minimum Build	9,300	72,000	81,000	75,000	26,200	3,900	12,800	199,000
Alternative 3 – Joint/Private Development Maximum Build	9,300	74,000	83,000	77,000	26,700	4,000	13,300	203,000

Source: *Final SSX Ridership Results*, Pedestrian Transfer Matrices (see Attachment J).

Note: All results rounded to the nearest 100, except for Commuter Rail, Red Line and Total results which are rounded to the nearest 1,000.

^a Total values are calculated using precise/unrounded results. As such, the sum of rounded individual ridership results may not add up to the rounded Total ridership results presented in this table.

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