SOUTH STATION
EXPANSION

South Station Expansion Project

Appendix 10 - Air Quality Technical Report

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massDOT
Massachusetts Department of Transportation

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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 projected future 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 Air Quality 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). It was also prepared in accordance with the Massachusetts Environmental Policy Act (MEPA) regulations, 301 CMR 11.00 (revised, May 10, 2013), and FRA's Procedures for Considering Environmental Impacts, 64 Federal Register (FR) 101 (26 May 1999), pp. 28545-28556.

2. Summary of Findings

Project-related air quality impacts are those caused by changes in emissions generated by changes in activity levels of sources associated with the proposed SSX project. These sources include locomotives operating at South Station and the layover facilities, intercity buses operating at the South Station Bus Terminal, and vehicular traffic within the air quality study area. A summary of project-related air quality impacts and a description of potential mitigation measures are presented below for the existing conditions

[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).

(2012); the No Build Alternative in the approximate opening year of 2025 and the project horizon year of 2035; and Alternative 1 – Transportation Improvements Only and Alternative 3 – Joint/Private Development Maximum Build in 2025 and 2035. air quality impacts for Alternative 2 – Joint/Private Development – Minimum Build, would only be evaluated if violations were predicted for the worst case, larger development of Alternative 3. Violations were not predicted, so Alternative 2 was not analyzed. The alternatives evaluated in the air quality analysis do not include alternatives for the station platforms or the track configurations as these alternatives were determined to have no environmental impacts.

2.1. Summary of Project-Related Emissions Inventories

An emission inventory is a listing, by source, of the amount of air pollutants discharged into the atmosphere for a given time period (typically one year). Project-related emissions inventories for the air quality study area were prepared for volatile organic compounds (VOC), oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter ($PM_{10}/PM_{2.5}$), and sulfur dioxide (SO_2). The emissions inventories included emissions from the diesel locomotives, as well as motor vehicles and intercity buses on roadways in the air quality study area.

The emission factors that were used to estimate the emissions from locomotives were based on the U.S. Environmental Protection Agency's (U.S. EPA) "Control of Emissions from Locomotives" in 40 CFR Chapter I, Subchapter U, Part 1033. The emission factors for 2012 (based on EPA's Tier 1 emission limits) are the highest that were evaluated. The EPA's Tier 4 emission factors that were used in the 2025 and 2035 analyses are an average of 83% lower than the Tier 1 emission factors.

The motor vehicle and bus emission factors were calculated using the most recently approved version of U.S. EPA's MOVES computer program (currently Version 2010b). Regulations require that motor vehicles meet increasingly stringent (i.e., lower) emission limits for all criteria pollutants with each new model year.

Thus, emissions for 2012 are the highest that were analyzed and emissions for 2025 are significantly lower, while emissions for 2035 are the lowest.

Annual emissions inventories in units of tons per year (tpy) were prepared for the South Station site area and the layover facility sites for the existing conditions (2012); the No Build Alternative in the approximate opening year of 2025 and the project horizon year of 2035; and Alternative 1 and Alternative 3 in 2025 and 2035. Because there would be almost no increases in local motor vehicle or bus traffic in the vicinity of the proposed layover facilities due to the SSX project, no emissions inventories for these sources were developed; however, emissions inventories for locomotives only were developed.

2.1.1. Summary of Project-related Emissions Inventories at the South Station Site

Table 1 presents a summary of the project-related emissions inventories in the vicinity of the South Station site. Project-related pollutant emissions for 2025 Alternative 1 are higher by an average of about 1% when compared to the project-related emissions for the 2025 No Build Alternative. Project-related emissions for Alternative 1 in 2035 are higher by an average of about 2% when compared to the project-related emissions for the 2035 No Build Alternative.

Table 1—Summary of Project-related Criteria Pollutant Emissions at the South Station Site by Alternative

Project Alternative	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
2012 Existing Conditions	7.30	26.96	1.88	1.19	84.38	0.47
2025 No Build Alternative	2.75	8.43	1.38	0.55	68.92	0.47
2025 Alternative 1	2.80	8.49	1.41	0.55	69.84	0.48
2025 Alternative 3	2.86	8.70	1.42	0.56	70.82	0.48
2035 No Build Alternative	2.69	7.88	1.47	0.56	73.08	0.48
2035 Alternative 1	2.74	8.00	1.49	0.58	74.41	0.49
2035 Alternative 3	2.78	8.11	1.52	0.59	75.42	0.49

tpy = tons per year

Project-related emissions for 2025 Alternative 3 are higher by an average of about 3% when compared to the project-related emissions for the 2025 No Build Alternative. Project-related emissions for Alternative 3 in 2025 increase by an average of less than 1% when compared to the project-related emissions for Alternative 1 in 2025.

Project-related emissions for Alternative 3 in 2035 are higher by an average of about 3% when compared to the project-related emissions for the 2035 No Build Alternative. Project-related emissions for Alternative 3 in 2035 increase by an average of less than 1% when compared to the project-related emissions for Alternative 1 in 2035.

These very large decreases in pollutant emissions in the vicinity of South Station between 2012 and 2025 are due to significant reductions in pollutant emission factors which offset the growth of motor vehicle traffic and train volumes in the area around South Station. The very small increases between 2025 and 2035 are due to very small reductions in pollutant emission factors from 2025 to 2035 and the growth of traffic and train volumes in the area around South Station.

2.1.2. Summary of Project-related Locomotive Emissions at the Layover Facility Sites

Table 2 presents a summary of the project-related emissions inventories in the vicinity of the layover facility sites. There are currently no MBTA trains using the Widett Circle Layover Facility or the Beacon Park Yard Layover Facility and there will be no trains using these facilities in the future No Build Alternatives. Therefore, pollutant emissions for these cases are indicated in Table 2 as "NA" (Not Applicable). There are, however, 10 MBTA trains per day currently using the Readville-Yard 2 Layover Facility and these trains will continue to be there in the future No Build Alternatives.

Emissions increases at these sites are essentially negligible when compared to other pollutant emissions in the region.

2.1.3. Conclusions of the Emissions Inventory Analysis

Based on the results of the emissions inventory analysis for the air quality study area, the very small increases in pollutant emissions in the vicinity of the South Station site or the layover facility sites due to the SSX project would not lead to exceedances of the Massachusetts or National Ambient Air Quality Standards and no adverse air quality impacts are expected to occur with any of the Build Alternatives. Based on the emissions inventory analysis, no mitigation measures would be required for any of the Build Alternatives.

Table 2—Summary of Project-related Locomotive Emissions at the Layover Facility Sites

Project Alternative	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Widett Circle Facility						
2012 Existing Conditions	NA[b]	NA	NA	NA	NA	NA
2025 No Build Alternative	NA	NA	NA	NA	NA	NA
2025 Alternative 1	0.03	0.28	0.01	0.01	0.32	0.05
2025 Alternative 3	0.03	0.28	0.01	0.01	0.32	0.05
2035 No Build Alternative	NA	NA	NA	NA	NA	NA
2035 Alternative 1	0.03	0.28	0.01	0.01	0.32	0.05
2035 Alternative 3	0.03	0.28	0.01	0.01	0.32	0.05
Beacon Park Yard Facility						
2012 Existing Conditions	NA	NA	NA	NA	NA	NA
2025 No Build Alternative	NA	NA	NA	NA	NA	NA
2025 Alternative 1	0.02	0.20	0.01	0.01	0.23	0.03
2025 Alternative 3	0.02	0.20	0.01	0.01	0.23	0.03
2035 No Build Alternative	NA	NA	NA	NA	NA	NA
2035 Alternative 1	0.02	0.20	0.01	0.01	0.23	0.03
2035 Alternative 3	0.02	0.20	0.01	0.01	0.23	0.03
Readville-Yard 2 Facility						
2012 Existing Conditions	0.06	0.78	0.02	0.02	0.23	0.02
2025 No Build Alternative	0.02	0.14	0.01	0.01	0.16	0.02
2025 Alternative 1	0.02	0.21	0.01	0.01	0.24	0.03
2025 Alternative 3	0.02	0.21	0.01	0.01	0.24	0.03
2035 No Build Alternative	0.02	0.14	0.01	0.01	0.16	0.02
2035 Alternative 1	0.02	0.21	0.01	0.01	0.24	0.03
2035 Alternative 3	0.02	0.21	0.01	0.01	0.24	0.03

tpy = tons per year
a no MBTA trains are currently using this facility for layover activities

2.2. Summary of CO Hot Spots Analyses

Hot spots are areas where concentrations of one or more air pollutants are expected to be elevated. A CO Hot Spot analysis was conducted for the SSX project. For the South Station area, the analysis evaluated the four worst case intersections based on level of service analysis, total traffic volume, and geographic coverage. For the layover facilities, one worst-case intersection per area was selected for the modeling analysis. The CO Hot Spot analyses were prepared in accordance with U.S. EPA procedures.

2.2.1. Summary of CO Hot Spots Analyses at the South Station Site

Table 3 presents a summary of the results of the CO Hot Spot analyses in the vicinity of the South Station site. All of the modeled 1- and 8-hour CO concentrations at all of the intersections modeled in the vicinity of the South Station site for all of the Project alternatives analyzed were well below the corresponding 1- and 8-hour CO National and Massachusetts standards of 35 and 9 parts per million (ppm), respectively. The decreases in CO concentrations in all future No Build and Build Alternatives

compared to the 2012 Existing Conditions are due to the decrease in motor vehicle CO emissions rates which more than offset the increase in motor vehicle traffic volumes.

Table 3—Summary of Estimated Maximum 1- and 8-Hour CO Concentrations at the South Station Site by Alternative

Project Alternative	Worst Case Intersection	Maximum 1-Hour CO Concentration (ppm)	Maximum 8-Hour CO Concentration (ppm)
2012 Existing Conditions	Surface Road at Kneeland Street	3.3	2.3
2025 No Build Alternative	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2025 Alternative 1	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2025 Alternative 3	Surface Road at Kneeland Street	2.3	1.6
2035 No Build Alternative	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2035 Alternative 1	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2035 Alternative 3	Surface Road at Kneeland Street	2.3	1.6

ppm = parts per million

2.2.2. Summary of CO Hot Spots Analyses at the Layover Facility Sites

Table 4 presents a summary of the results of the CO Hot Spot analyses in the vicinity of the layover facility sites. All of the modeled 1- and 8-hour CO concentrations at all of the intersections modeled in the vicinity of the layover facility sites for all of the project alternatives analyzed were well below the corresponding 1- and 8-hour CO National and Massachusetts standards of 35 and 9 ppm, respectively. The decreases in CO concentrations in all future No Build and Build Alternatives compared to the 2012 Existing Conditions are due to the decrease in motor vehicle CO emissions rates which more than offset the increase in motor vehicle traffic volumes.

Table 4—Summary of Estimated Maximum 1- and 8-Hour CO Concentrations in the Vicinity of the Layover Facility Sites by Alternative

Project Alternative	Maximum 1-Hour CO Concentration (ppm)	Maximum 8-Hour CO Concentration (ppm)
Widett Circle Layover Facility: Intersection of Frontage Road at Widett Circle Access Road		
2012 Existing Conditions	2.1	1.4
2025 No Build Alternative	2.0	1.3
2025 Alternative 1	2.0	1.3
2025 Alternative 3	2.0	1.3
2035 No Build Alternative	2.0	1.3
2035 Alternative 1	2.0	1.3
2035 Alternative 3	2.0	1.3
Beacon Park Yard Facility: Intersection of Cambridge Street at Lincoln Street		
2012 Existing Conditions	2.4	1.6
2025 No Build Alternative	2.3	1.6
2025 Alternative 1	2.3	1.6
2025 Alternative 3	2.3	1.6
2035 No Build Alternative	2.3	1.6
2035 Alternative 1	2.3	1.6
2035 Alternative 3	2.3	1.6
Readville-Yard 2 Facility: Intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square		
2012 Existing Conditions	2.2	1.5
2025 No Build Alternative	2.1	1.4
2025 Alternative 1	2.1	1.4
2025 Alternative 3	2.1	1.4
2035 No Build Alternative	2.1	1.4
2035 Alternative 1	2.1	1.4
2035 Alternative 3	2.1	1.4

ppm = parts per million

2.2.3. Conclusions of the CO Hot Spot Analysis

Based on the results of the CO modeling analysis at the selected traffic intersections in the air quality study area, increases in project-related motor vehicle traffic volumes would not lead to exceedances of the Massachusetts or National Ambient Air Quality Standards (NAAQS) for CO and no adverse air quality impacts are expected to occur with any of the Build Alternatives. Based on the CO Hot Spot analysis, no mitigation measures would be required for any of the traffic intersections analyzed for any of the Build Alternatives.

2.3. Summary of Mobile Source Air Toxics Analysis

Mobile Source Air Toxics (MSATs) are emitted in both gaseous form and particulate form from motor vehicles, locomotives, and non-road construction equipment. The MSATs can be present in the fuels, formed from incomplete combustion of fossil fuels, or formed as secondary reaction products from the combustion emissions in the atmosphere. Following FHWA's guidelines on air toxics, a qualitative assessment of MSATs was performed. The qualitative comparison of MSATs from the various project alternatives was developed from the estimates of VOC and $PM_{2.5}$ emissions, which were used as surrogates for indicating trends in MSAT emissions. The amount of MSATs emitted would be proportional to a combination of the project-related VOC and $PM_{2.5}$ emissions from SSX project, assuming that other variables such as motor vehicle and locomotive fleet mixes are the same for each alternative.

2.3.1. Summary of the MSAT Analysis

Table 5 presents the VOC and $PM_{2.5}$ project-related emission in the air quality study area by alternative for the SSX Project. The changes is VOC and $PM_{2.5}$ emissions mimic the changes is MSATs. For each time period and alternative, small increases between the No Build and Build alternatives are due to significant reductions in VOC and $PM_{2.5}$ emission factors despite growth of traffic and train volumes in the area around South Station.

Table 5—Summary of Estimated VOC and PM2.5 Emissions in the Vicinity of the South Station Site by Alternative

Project Alternative	Project-related VOC Emissions (tpy)	Project-related $PM_{2.5}$ Emissions (tpy)
2012 Existing Conditions	7.30	1.21
2025 No Build Alternative	2.76	0.55
2025 Alternative 1	2.80	0.55
2025 Alternative 3	2.86	0.56
2035 No Build Alternative	2.70	0.57
2035 Alternative 1	2.75	0.58
2035 Alternative 3	2.79	0.59

tpy = tons per year

2.3.2. Conclusions of the MSAT Analysis

The combined differences in VOC and $PM_{2.5}$ emissions from the 2025 Alternative 1 to the 2025 No Build Alternative result in a total increase of MSAT surrogates of just over 2%. The combined differences in VOC and $PM_{2.5}$ emissions from the 2035 Alternative 1 to the 2035 No Build Alternative result in a total increase of MSAT surrogates of about 2%.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2025 Alternative 3 to the 2025 No Build Alternative result in a total increase of MSAT surrogates of about 4%. The combined differences in VOC and $PM_{2.5}$ emissions from the 2035 Alternative 3 to the 2035 No Build Alternative result in a total increase of MSAT surrogates of about 4%.

These results indicate that there would be only a slight increase in MSAT emissions due to the SSX project compared to MSAT emissions from the No Build Alternatives. These small increases are unlikely to result in adverse health effects.

2.4. Additional Studies Requested by MEPA

In the Secretary's Certificate on the ENF for the SSX project dated April 19, 2013, MEPA requested several additional studies in addition to the emissions inventories, CO Hot Spot analyses, and the MSAT analyses. These assessments include diesel particulate matter, ultrafine particulates, as well as locomotive technologies that may provide additional air quality benefits to the region. A summary of these assessments is provided below and a complete discussion of these assessments is contained in the appendices to this report.

2.4.1. Summary of Diesel Particulate Matter Discussion

An expanded discussion of diesel particulate matter is presented in Attachment O. Diesel particulate matter (DPM) is part of a complex mixture that makes up diesel exhaust which is emitted from a broad range of diesel engines including on road diesel engines of trucks, buses and cars, and the off-road diesel engines that include railroad locomotives. Short-term exposure to high concentrations of DPM can cause headache, dizziness, and irritation of the eye, nose and throat. Prolonged DPM exposure can increase the risk of cardiovascular, cardiopulmonary and respiratory disease and lung cancer.

At the present time, sufficient data are not available to accurately achieve a quantitative assessment of Diesel Particulate emissions from various project alternatives. Information on DPM emissions for all sources (i.e., locomotives, and buses) are not available, however a general qualitative assessment assumes that emissions of DPM would follow the emissions trends of $PM_{2.5}$, as diesel fueled sources include locomotives and intercity buses.

Using $PM_{2.5}$ emissions from diesel-fueled sources as a surrogate, Diesel Particulate emissions are expected to increase with increased diesel-powered vehicles. For the same calendar year, Alternative 1 would produce more Diesel Particulate emissions than the No Build Alternative, and Alternative 3 would produce more Diesel Particulate emissions than either Alternative 1 or the No Build Alternatives.

2.4.2. Summary of the Discussion of Ultrafine Particles

An expanded discussion of ultrafine particles is presented in Attachment P. Ultrafine particulates (UFPs) refer to particulate matter that is generally less than 100 nanometers in size. Compared with $PM_{2.5}$, the ultrafine particles would be 0.1 microns and smaller or roughly 25 times smaller than the regulated $PM_{2.5}$. Ultrafine particles can come from natural sources, or be artificially created by humans. Man-made sources include combustion of all petroleum products, which include all non-electrical transportation sources, home heating, and power generation.

Compared with bigger particles of the same mass concentration, ultrafine particles have much higher numbers and surface areas to carry other toxic agents and penetrate deeper into the lungs. Once inside the lungs, the ultrafine particles could penetrate the tissues, and be absorbed into the blood stream. Therefore, ultrafines have the capacity to cause respiratory and cardiovascular effects.

The emissions of UFPs in the vicinity of South Station are similar to highway sources because they both include diesel and gasoline-burning transportation sources. The half-life of primary UFPs is short, and a sharp drop-off UFPs near a highway has been shown to occur from 2.5 to 4 times the width of the highway. Translating these results loosely, a similar drop of UFPs could be expected between 1,100 and 1,800 feet (or about 0.34 miles) from the center track of South Station.

For the same calendar year, Alternative 1 would produce more UFPs than the No Build Alternative, and Alternative 3 would produce more UFPs than either Alternative 1 or the No Build Alternatives. However, these increases are very small compared to the emissions from other sources in the area.

2.4.3. Discussion of New Locomotive Technologies

An expanded discussion of new locomotive technologies is presented in Attachment Q. Control technologies for locomotive emissions are presented below with respect to compliance with federal standards, alternative power sources, retrofit devices, alternative fuels, and operational strategies.

All new or re-manufactured locomotive engines will have to comply with more stringent emission limits over time. In addition to new locomotives, old locomotives can be fitted with devices to reduce emissions.. Retrofit devices are products that may be added to locomotive engines to further reduce emissions from engines that have already been certified to meet the mandated limits. Oxidation catalysts work better with fuel with low sulfur content. They are intended to lower both PM and HC emissions. Effectiveness on ultrafines is still not well defined.

Emissions from locomotives using South Station could be eliminated if all of the trains and tracks were electrified. Full electrification would mean new equipment and new infrastructure.

Diesel particulates filters (DPF) can reduce baseline PM emissions by as much as 95%. Selective catalytic reduction (SCR) systems use a reducing agent (often referred to as a diesel exhaust fluid or DEF) to convert NOx in the exhaust to N_2 (nitrogen gas). Reduction of NOx with this system can be as high as 75%.Exhaust gas recirculation (EGR) redirects some of the exhaust gas back into the engine to cool the peak combustion temperature, thereby reducing the production of NOx. With proper engine integration, EGR systems could potentially reduce NOx between 25 and 40%.Shore (electric plug-in) power exists today at South Station and Readville – Yard 2. Shore power is proposed at the expanded South Station and at the layover facility sites as part of the SSX project.

Furthermore, emissions from locomotives using South Station could be eliminated if all of the trains and tracks were electrified. Full electrification would mean new equipment and new infrastructure.

2.5. Summary of Potential Mitigation Measures

The air quality study demonstrated that emissions of criteria pollutants from the proposed SSX project Build Alternatives would not create a new violation of the NAAQS; would not increase in the frequency or severity of any existing violations; and would not delay the attainment of any NAAQS. Therefore, no mitigation of project-related emissions would be required.

The air quality analysis evaluated the potential impact of project-related motor vehicles on four worst-case Hot Spot (intersection) locations around the South Station site and at one location near each of the three layover facility sites. All of the modeled 1- and 8-hour CO concentrations at all of the intersections analyzed were well below the 1-hour and 8-hour CO National and Massachusetts standards. Therefore, no mitigation of project-related CO emissions at traffic intersections would be required.

Temporary air quality impacts could result from construction activities associated with the South Station Expansion project. Construction-related impacts can include fugitive dust emissions, direct emissions from construction equipment, and increased emissions from motor vehicles on local streets due to traffic disruption. While temporary, the close proximity of construction activities to nearby businesses, and other areas where the general public has reasonable access creates the need for appropriate mitigation

measures to be implemented during construction. Section 7.2 describes possible mitigation measures which could be employed during construction.

3. Regulatory Context

Air pollution is of concern because of its potential detrimental effects on human health. This is evidenced by the passage of the Clean Air Act (CAA) of 1970 and subsequent major Amendments (CAAA) in 1977 and 1990. Of special concern are the respiratory effects of the pollutants, as well as their general toxic effects. The air pollutants of concern in this assessment are listed here, along with a description of their potential health effects.

Ozone (O_3) is a strong oxidizer and a pulmonary irritant that affects the respiratory mucous membranes, other lung tissues, and respiratory functions. Exposure to O_3 can impair the ability to perform physical exercise; can result in symptoms such as tightness in the chest, coughing, and wheezing; and can ultimately result in asthma, bronchitis, and emphysema. Motor vehicles do not emit O_3 directly. Emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx) react in the presence of sunlight to form ozone in the atmosphere. These reactions occur over periods of hours to days during atmospheric mixing and transport downwind. Accordingly, O_3 and its precursors VOC and NOx are regulated at the regional level. Regional emission inventories of VOC and NOx for the existing conditions and for all future alternatives are included in the analysis.

Carbon Monoxide (CO) is a colorless and odorless gas, which is a product of incomplete combustion. CO is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches and nausea, and at sustained high concentration levels, can lead to coma and death. CO concentrations tend to be highest in localized areas that are affected by local traffic congestion, since motor vehicles have historically been a major source of CO emissions. Therefore, in addition to CO emission inventories, a CO Hot Spot assessment is also included in the analysis.

Particulate Matter (PM_{10} and $PM_{2.5}$) is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with an aerodynamic diameter of 10 micrometers and smaller, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller. Particles enter the body by way of the respiratory system. PM over 10 micrometers in size is captured in the nose and throat and is readily expelled from the body. PM smaller than 10 micrometers, and especially smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli). Particulate matter, especially $PM_{2.5}$, has been associated with increased incidence of respiratory diseases such as asthma, bronchitis, and emphysema; cardiopulmonary disease; and cancer. The majority of PM emissions from mobile sources are attributed to diesel vehicle exhaust. In addition to emission inventories of PM_{10} and $PM_{2.5}$, a quantitative assessment of $PM_{2.5}$ Hot Spots, in accordance with the Federal Highway Administration's (FHWA) latest guidance,[2] is also included in the analysis.

Sulfur Dioxide (SO_2) is a gas that is formed during the combustion of fuels containing sulfur compounds. It can cause irritation and inflammation of tissues with which it comes into contact. Inhalation can cause irritation of the mucous membranes causing bronchial damage, and it can exacerbate pre-existing respiratory diseases such as asthma, bronchitis, and emphysema. Exposure to SO_2 can cause damage to vegetation, corrosion to metallic materials, and soiling of clothing and buildings.

[2] U.S. Environmental Protection Agency, Transportation and Regional Programs Division, Office of Transportation and Air Quality. *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas, EPA-420-B-10-040.* December 2010.

Lead (Pb) is no longer considered to be a pollutant of concern for transportation projects. The major source of lead emissions to the atmosphere had been from motor vehicles burning gasoline with lead-containing additives. However, lead emissions from motor vehicle sources have been nearly eliminated as unleaded gasoline has replaced leaded gasoline nationwide. Also, locomotive diesel fuel contains almost no lead. Therefore, lead emissions are not assessed in this EIR.

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), and stationary sources (e.g., factories or refineries). The MSATs are compounds emitted from highway vehicles and non-road mobile equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. U.S. EPA has assessed the list of 188 air toxics in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System. There currently are no established ambient air quality standards for MSATs. In accordance with the FHWA's guidance regarding air toxic analysis[3], a qualitative assessment of MSATs is also included in the air quality analysis.

Diesel particulate matter is part of a complex mixture that makes up diesel exhaust. Diesel exhaust is composed of two phases, the gas phase and the particle phase, and both phases can contribute to the potential health risk. The gas phase is composed of many of the urban hazardous air pollutants, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde and polycyclic aromatic hydrocarbons. The particle phase also has many different types of particles that can be classified by size or composition. The size of diesel particulates that are of greatest health concern are those that are in the categories of fine, and ultrafine particles. The composition of these fine and ultrafine particles may be composed of elemental carbon with adsorbed compounds such as organic compounds, sulfate, nitrate, metals and other trace elements. Diesel exhaust is emitted from a broad range of diesel engines; the on road diesel engines of trucks, buses and cars and the off road diesel engines that include railroad locomotives. Further information on project-related diesel particulate matter can be found in Attachment O.

Ultrafine particulates refer to particulate matter that is generally less than 100 nanometers in size. Compared with $PM_{2.5}$, the ultrafine particles would be 0.1 microns and smaller or roughly 25 times smaller than the regulated $PM_{2.5}$. Ultrafines can come from natural sources, or be artificially created by humans. The natural sources include volcanic eruptions, sprays from ocean waves, and smoke from wildfires. Man-made sources include combustion of all petroleum products, which include all non-electrical transportation sources, home heating, and power generation. Man-made sources also include cooking, tobacco smoke, and the use of office machines such as laser printers and copiers. Once inside the lungs, the ultrafine particles can penetrate the tissues, and be absorbed into the blood stream. Ultrafines have the capacity to cause respiratory and cardiovascular effects. Further information on ultrafine particles can be found in Attachment P.

3.1. Federal

Under the authority of the Clean Air Act, as amended, U.S. EPA established a set of National Ambient Air Quality Standards (NAAQS) for various 'criteria' air pollutants. These standards are intended to protect the public health and welfare. Primary NAAQS are established at levels intended to protect public health, including sensitive population groups, with an adequate margin of safety. Secondary NAAQS are

[3] Federal Highway Administration. *Interim Guidance Update on Mobile Source Air Toxic Guidance Analysis in NEPA Documents.* September 30, 2009.

set at levels designed to protect the public by accounting for the effects of air pollution on vegetation, soil, materials, and other aspects of the general welfare. Currently, there are NAAQS for seven criteria pollutants: Ozone (O_3), nitrogen dioxide (NO_2), CO, PM_{10}, $PM_{2.5}$, SO_2, and Pb. States can develop ambient standards provided that they are at least as stringent as the federal standards. The NAAQS are summarized in Table 6. The Massachusetts ambient air quality standards (MAAQS) are identical to the NAAQS.

The CAAA mandated that U.S. EPA designate geographic regions in which measured ambient concentrations of air pollutants have exceeded the NAAQS as nonattainment areas. Areas of the country that have measured pollutant concentrations that are less than the NAAQS are designated attainment areas. Areas that have attained the standards after a period of nonattainment and that have plans in place to reduce emissions are classified as maintenance areas.

The SSX project is located in Suffolk County, which is part of the Boston-Lawrence-Worcester Eastern Massachusetts Nonattainment area. Massachusetts was designated as a Serious Nonattainment Area with respect to the 1997 8-hour ozone standard of 0.08 parts per million (ppm). However, all air quality monitors now show that Massachusetts meets the 1997 ozone standard statewide. U.S. EPA updated the 8-hour ozone standard to 0.075 ppm in 2008, and designated Massachusetts as attainment statewide except for Dukes County (Martha's Vineyard) in 2011.[4]

Massachusetts, through its State Implementation Plan (SIP), specifies target dates for achieving compliance with the NAAQS, and identifies specific emission reduction goals for nonattainment or maintenance areas. The SSX project's emissions are not explicitly included in the modeling emissions inventory for the Conformity analysis in a conforming Regional Transportation Plan (RTP) or a Transportation Improvement Program (TIP); therefore, preparation of a project level emissions inventory is required.

The Boston area is also designated as a Maintenance Area for carbon monoxide, having achieved attainment in 1995 after being designated as a Moderate Nonattainment area. Massachusetts is designated as in attainment or unclassifiable for all of the other criteria pollutants, including lead, nitrogen dioxide, particulate matter (including PM_{10} and $PM_{2.5}$), and sulfur dioxide.

Federally funded or approved projects, except those covered under the transportation conformity rule (U.S. EPA Transportation Conformity Rule (40 CFR 51 Subpart T)), located in nonattainment areas must comply with the U.S. EPA General Conformity Rule (40 CFR 51 Subpart W). FRA activities are not covered under transportation conformity; General Conformity regulations apply. Therefore, a regional analysis of project-related direct and indirect emissions is required for purposes of demonstrating compliance with the General Conformity Rules. The General Conformity Determination will be provided in the Environmental Assessment, to be prepared by MassDOT pursuant to the National Environmental Policy Act (NEPA).

3.2. State

Massachusetts General Laws Chapter 61 through 63, together with the regulations contained in the Code of Massachusetts Regulations at 301 C.M.R. 11.01 through 11.17, is known as the Massachusetts Environmental Policy Act (MEPA). The air quality regulations are located at 3012 CMR 11.03 (8). MEPA, which is administered by the Executive Office of Energy and Environmental Affairs, mandates that whenever a state agency is involved in a project, and the action by the state agency is likely to cause

[4] While the monitored pollutant concentrations are in compliance with the Massachusetts and National Ambient Air Quality Standards the process for redesignation for attainment is not yet complete.

significant environmental impacts, the agency's proposed actions are subject to public review and comment. The agency is required to consider ways to minimize or mitigate those environmental impacts, including consideration of alternatives to the proposed action.

Massachusetts, through its State Implementation Plan (SIP), specifies target dates for achieving compliance with the NAAQS, and identifies specific emission reduction goals for nonattainment or maintenance areas.

3.3. Local

There are no local ordinances that address air quality effects associated with transportation projects such as the SSX project. There are also no local regulations that pertain to emissions of CAA criteria pollutants.

Table 6—National and Massachusetts Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Standard Type	Averaging Period	Thresholds	Form of the Standard
Carbon Monoxide (CO)	Primary	1-hour	40 mg/m^3 (35 ppm)[a]	Not to be exceeded more than once per year
Carbon Monoxide (CO)	Primary	8-hour	10 mg/m^3 (9 ppm)	Not to be exceeded more than once per year
Lead (Pb)	Primary and Secondary	Rolling 3-month	0.15 $\mu g/m^3$	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1-hour	100 ppb (188 $\mu g/m^3$)	98th percentile, averaged over 3 years
Nitrogen Dioxide (NO_2)	Primary and Secondary	Annual	53 ppb (100 $\mu g/m^3$)	Annual arithmetic mean
Ozone (O_3)	Primary and Secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
PM_{10}	Primary and Secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
$PM_{2.5}$	Primary	Annual	12 $\mu g/m^3$	Annual arithmetic mean, averaged over 3 years
$PM_{2.5}$	Secondary	Annual	15 $\mu g/m^3$	Annual arithmetic mean, averaged over 3 years
$PM_{2.5}$	Primary and Secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
Sulfur Dioxide (SO_2)	Primary	1-hour	75 ppb[b]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Sulfur Dioxide (SO_2)	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: U.S. EPA, National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
a The units of pollutant concentrations are in milligrams per cubic meter (mg/m^3), micrograms per cubic meter ($\mu g/m^3$), parts per million by volume (ppm), or parts per billion by volume (ppb).
b Final rule signed June 2010. The 1971 annual and 24-hour SO2 standards were revoked in the same rulemaking.

4. Methodology

This section presents the methodologies that were used for the air quality analysis.

4.1. Area of Potential Impacts

For the air quality assessment, the areas of potential impacts will have both area-wide and local components. The area-wide component uses the same transportation study area as the transportation analysis. The local component focuses on an area around South Station where impacts of idling trains and trains entering and leaving the Station could be felt (this is the air quality study area). The local component includes traffic intersections that would affected by traffic associated with the project.

4.2. Emissions Inventories for Criteria Pollutants

An emission inventory is a listing, by source, of the amount of air pollutants discharged into the atmosphere for a given time period (typically one year). Emissions inventories were prepared for volatile organic compounds (VOC), oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter ($PM_{10}/PM_{2.5}$), and sulfur dioxide (SO_2) for the air quality study area. The emissions inventories included emissions from the diesel locomotives, and motor vehicles and intercity buses on roadways in the air quality study area. The motor vehicle and bus emission factors were calculated using the most recently approved version of U.S. EPA's MOVES program (currently Version 2010b). Annual emissions inventories in units of tons per year (tpy) were prepared for each pollutant in accordance with the SSX Air Quality Analysis Protocol[5] (provided in Attachment M) approved by Massachusetts Department of Environmental Protection (MassDEP) on June 4, 2014[6] (provided in Attachment N). Emissions were compared in terms of trends over time, and emissions from each of the Build Alternatives were compared with the No-Build emissions. Annual emissions inventories were prepared for the South Station site area and the layover facility sites for the existing conditions (2012); the No Build Alternative in the approximate opening year of 2025 and in the horizon year of 2035; and Alternative 1 in 2025 and 2035, and Alternative 3 in 2025 and 2035.

4.3. CO Hot Spots

The Boston area is designated as a maintenance area for carbon monoxide, having achieved attainment in 1995 after being designated as a moderate nonattainment area. Therefore, a CO Hot Spot (or intersection) analysis is required. Hot spots are areas where concentrations of one or more air pollutants are expected to be elevated. For the South Station area, the analysis evaluated the four worst case intersections based on level of service analysis, total traffic volume, and geographic coverage. For the layover facilities, one worst-case intersection per area was selected for the modeling analysis. The CO Hot Spot analyses were prepared in accordance with SSX Air Quality Analysis Protocol approved by Massachusetts Department of Environmental Protection (MassDEP) on June 4, 2014. U.S. EPA's CAL3QHC[7] was used as a screening tool to estimate worst-case one-hour CO concentrations. Idle CO emission factors for the dispersion modeling analysis were developed using U.S. EPA's recommended procedure[8]. Eight-hour concentrations were estimated by applying a persistence factor to the one-hour results. Background CO concentrations were chosen based on consultation with MassDEP.

[5] Massachusetts Department of Transportation. *SSX Project Air Quality Analysis Protocol*, May 16, 2014.
[6] Grafe, Jerome. Massachusetts Department of Environmental Protection, *SSX Project AQ Analysis*, Personal communication, KM Chng Environmental Inc., June 4, 2014.
[7] U.S. Environmental Protection Agency. *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections. Report number EPA-454/R-92-006. Research Triangle Park, NC.* 1992. Revised June 1993.
[8] U.S. Environmental Protection Agency, Office of Transportation and Air Quality. *Technical Guidance on the Use of MOBILE6.2 for Emission Inventory Preparation, Section 4.4.4, Transportation and Regional Programs Division. EPA420-R-04-013*. August 2004.

4.4. Mobile Source Air Toxics (MSATs)

Following FHWA's guidelines on air toxics, a qualitative assessment of Mobile Source Air Toxics (MSATs) was performed. The qualitative comparison of MSATs from the various project alternatives was developed from the estimates of VOC and $PM_{2.5}$ emissions, which were used as surrogates for indicating trends in MSAT emissions. The amount of MSATs emitted would be proportional to a combination of the project-related VOC and $PM_{2.5}$ emissions from SSX project, assuming that other variables such as motor vehicle and locomotive fleet mixes are the same for each alternative. The trends of MSAT emissions for both the No Build and Build Alternatives are described.

4.5. Construction Impacts

Construction activities can produce temporary air quality impacts. Air quality impacts during construction were assessed qualitatively, focusing on mitigation measures to alleviate any potential adverse impacts due to engine exhaust or fugitive dust.

4.6. $PM_{2.5}$ Hot Spot Analysis

A quantitative $PM_{2.5}$ hot spot analysis was conducted following U.S. EPA's December 2010 guidelines. The analysis focused only on the emissions from the diesel trains and the motor vehicles in the air quality study area. The $PM_{2.5}$ Hot Spot analysis was prepared in accordance with the SSX Air Quality Analysis Protocol approved by Massachusetts Department of Environmental Protection (MassDEP) on June 4, 2014. The U.S. EPA's MOVES emission factors prepared previously for the emissions inventory analysis and background $PM_{2.5}$ levels (from MassDEP) were used to estimate $PM_{2.5}$ impacts. The results were compared with the annual and 24-hour $PM_{2.5}$ standards. The detailed $PM_{2.5}$ Hot Spot analysis can be found in Attachment R.

4.7. NO_2 Modeling Analysis

Massachusetts is in attainment of the annual and one-hour NO_2 standards. To complete the localized impact assessment, a screening analysis of NO_2 concentrations using dispersion modeling was conducted. The NO_2 analysis was prepared in accordance with the guidance described in the SSX Air Quality Analysis Protocol approved by Massachusetts Department of Environmental Protection (MassDEP) on June 4, 2014. The results were compared with the annual and one-hour standards. The detailed NO_2 modeling analysis can be found in Attachment S.

5. Existing Conditions

Four sites are under consideration in the SSX project: the South Station site and three layover facility sites consisting of Widett Circle, Beacon Park Yard, and Readville-Yard 2. Figure 1 shows the locations of the four SSX project sites.

As stated previously, air pollution is of concern because of its potential detrimental effects on human health. However, due to the inherent nature of air pollution, it cannot be limited to a relatively small site location such as the South Station property or the individual layover facility sites. This section of this report assesses the existing air quality conditions in the air quality study area for use in comparing air quality trends and predicted air quality impacts of the project. The assessment of the existing air quality was based on review of measured data for existing and historical air quality conditions in the study area.

5.1. South Station Site

The South Station site occupies approximately 49 acres located near Chinatown, the Fort Point Channel, and the South Boston Waterfront. The site includes the following: South Station Rail/Transit Terminal and South Station Bus Terminal, the USPS General Mail Facility/South Postal Annex, including a portion of Dorchester Avenue fronting the site and running parallel to the Fort Point Channel. The site extends along a portion of the NEC Main Line to the west, extending past Cove Interlocking, and along a portion of the MBTA's Fairmount Line/Old Colony Railroad to the south, extending just past Broad Interlocking. The site also includes a small park, Harborwalk area, and a portion of the Fort Point Channel located at the southern end of the site.

The South Station Rail/Transit Station Terminal area currently consists of 13 tracks, eight platforms and a system of track work (also referred to as interlockings) that allow Amtrak and the MBTA trains to serve the station from the NEC and Framingham/Worcester Line from the north/west and the MBTA's Fairmount Line and Old Colony Railroad from the south/east. A future existing condition at the South Station site includes the South Station Air Rights (SSAR) project, consisting of approximate 1.8 million square foot mixed-use development to be located directly above the railroad tracks at the South Station headhouse.[9]

5.2. Layover Facility Sites

5.2.1. Widett Circle

Widett Circle totals approximately 29.4 acres and is comprised of two parcels located in the South Boston neighborhood of Boston: Cold Storage and Widett Circle. The industrial-zoned parcel is located on the MBTA Fairmount Line, approximately one track-mile from South Station. It is situated within Amtrak's wet/dry loop tracks just north of the New Boston Food Market, and adjacent to the MBTA's Fairmount Line and MBTA's South Side Service and Inspection facility. There are currently no MBTA trainsets[10] using Widett Circle as a layover facility.

5.2.2. Beacon Park Yard

Beacon Park Yard is located along Cambridge Street in the Allston neighborhood of Boston. The site is located on the MBTA Framingham/Worcester Line approximately 3.8 track-miles from South Station. The approximately 30-acre site has served for many years as a major freight rail yard and intermodal terminal in Boston for CSX Transportation, Inc., which recently relocated to central Massachusetts. There are currently no MBTA trainsets using the Beacon Park Yard as a layover facility.

5.2.3. Readville-Yard 2

The MBTA's Readville-Yard 2 is located in the Readville section of Hyde Park in Boston in the northeast quadrant of the intersection of the NEC and the MBTA Fairmount Line, approximately 8.8 track-miles south of South Station. Readville-Yard 2 is a maintenance repair facility and the largest layover yard used by the MBTA for its south side service. The layover yard has a total of 12 tracks. The MBTA currently uses Readville-Yard 2 for mid-day layover storage of up to 10 trainsets of variable lengths

[9] The South Station Air Rights Project was approved by the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) in 2006 (EEA No. 3205/9131).
[10] A trainset describes the physical makeup of a combination of locomotives and coaches coupled together and operating as one unit.

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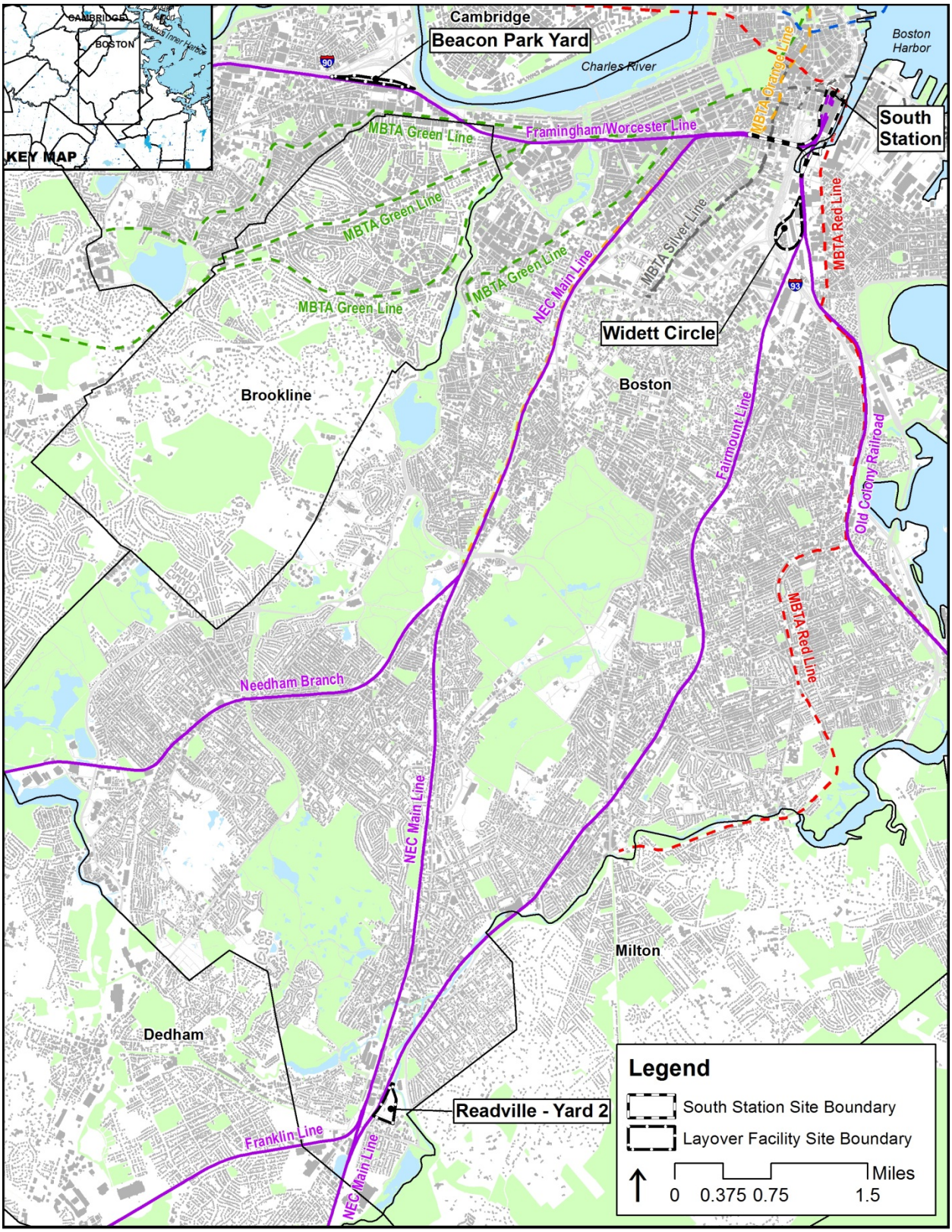

Figure 1—Location of the Four SSX Project Sites

5.3. Existing Regional Air Quality

5.3.1. Monitored Air Quality Levels

This section summarizes measured ambient air quality data for the region including the study area. The MassDEP maintains a statewide network of monitoring stations that continuously measure pollutant concentrations in the ambient air. These stations provide data to assess compliance with the NAAQS and the MAAQS and to evaluate the effectiveness of pollution control strategies. Table 7 presents the maximum ambient concentrations for the U.S. EPA's criteria pollutants measured at representative monitoring stations nearest to the project corridor for the most recently available full year of data (2012). Except for two exceedances of the 8-hour ozone standard (at the Long Island and Harrison Ave. sites) and two exceedances of the Annual NO_2 standard (at the Kenmore Sq. and Harrison Ave. sites), there were no exceedances in the air quality study area of any of the other NAAQS or MAAQS in 2012.

5.3.2. Regional Emissions Inventories

Emission inventories estimate the quantities (in mass units) of pollutants emitted over a given time period, and provide information about contributions from various sources. Emissions are estimated by multiplying emission factors by source activity levels. An emission factor represents the emissions from a single source for a unit of time or distance (e.g., grams of CO per vehicle mile traveled). The source activity is the number of vehicle-miles-traveled (VMT) by roadway segment in a given time period, such as one day.

The air quality impact analysis estimated emission inventories of volatile organic compounds (VOC), oxides of nitrogen (NOx), particulate matter of 10 microns and smaller (PM_{10}), particulate matter of 2.5 microns and smaller ($PM_{2.5}$), CO, and sulfur dioxide (SO_2) to quantify the amount of project-related pollutants emitted to the atmosphere in the air quality study area.

The emission inventories were estimated for railroad trains (locomotives) entering and leaving South Station; project-related motor vehicles in the air quality study area; and intercity buses entering and leaving the South Station Bus Terminal. Emissions for all pollutants except for CO were calculated for a 24-hour period using average summer temperatures and activity levels, to reflect conditions during the ozone season, as required by U.S. EPA. CO emissions were calculated for winter conditions reflecting the higher CO emission rates that occur during cold operating temperatures.

The emission factors that were used to estimate the emissions from locomotives came from the U.S. EPA's locomotive emissions limits. Idling locomotive emissions were calculated by multiplying the number of trains entering and leaving the station by the locomotive emission factors for idling and then by the amount of time the trains were idling when entering or leaving the station. Moving locomotive emissions were calculated by multiplying the number of trains entering and leaving the station by the locomotive emission factors for moving trains and then by amount of time the trains took to enter or leave the station.

For roadway vehicles and buses, emissions factors were calculated using the most recent approved version of the U.S. EPA MOVES Program (currently MOVES2010b). Annual emissions inventories were prepared for each pollutant. Emissions were calculated by multiplying the average daily traffic (ADT) volume on each link by the roadway link length to calculate VMT (see Appendix 9 – *Traffic Technical Report*). The VMT were then multiplied by the MOVES free-flow speed dependent emission factor for the average vehicle speed for that roadway link. The emissions for each link were summed to yield the average 24-hour emission inventories. Annual emissions in tons per year (tpy) were calculated by multiplying the average daily emissions by 365.

Table 7—Measured Regional Ambient Air Quality for 2012

Pollutant	Monitor Location	Averaging Period	Monitored Value	Standard
Ozone	Long Island[a] Boston	1 Hour	0.103 ppm	0.12 ppm
Ozone	Harrison Ave.[b] Boston	1 Hour	0.106 ppm	0.12 ppm
Ozone	Long Island Boston	8 Hours	**0.085 ppm**	0.075 ppm
Ozone	Harrison Ave. Boston	8 Hours	**0.080 ppm**	0.075 ppm
Particulate Matter (PM 2.5)	Kenmore Sq.[c] Boston	24 Hours	23.0 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	One City Sq.[d] Boston	24 Hours	24.7 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	Harrison Ave. Boston	24 Hours	23.2 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	174 North St.[e] Boston	24 Hours	27.9 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	Kenmore Sq. Boston	Annual	9.0 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	One City Sq. Boston	Annual	8.8 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	Harrison Ave. Boston	Annual	8.3 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	174 North St. Boston	Annual	9.5 µg/m^3	15.0 µg/m^3
Particulate Matter (PM10)	Kenmore Sq. Boston	24 Hours	37 µg/m^3	150 µg/m^3
Particulate Matter (PM10)	One City Sq. Boston	24 Hours	41 µg/m^3	150 µg/m^3
Particulate Matter (PM10)	Harrison Ave. Boston	24 Hours	25 µg/m^3	150 µg/m^3
Carbon Monoxide	Kenmore Sq. Boston	1 Hour	1.4 ppm	35.0 ppm
Carbon Monoxide	Harrison Ave. Boston	1 Hour	2.2 ppm	35.0 ppm
Carbon Monoxide	Kenmore Sq. Boston	8 Hours	1.1 ppm	9.0 ppm
Carbon Monoxide	Harrison Ave. Boston	8 Hours	1.9 ppm	9.0 ppm
Nitrogen Dioxide	Kenmore Sq. Boston	Annual	**61 ppb**	53 ppb
Nitrogen Dioxide	Long Island Boston	Annual	41 ppb	53 ppb
Nitrogen Dioxide	Harrison Ave. Boston	Annual	**67 ppb**	53 ppb
Nitrogen Dioxide	Kenmore Sq. Boston	1 Hour	61 ppb	100 ppb
Nitrogen Dioxide	Long Island Boston	1 Hour	41 ppb	100 ppb
Nitrogen Dioxide	Harrison Ave. Boston	1 Hour	67 ppb	100 ppb
Sulfur Dioxide	Kenmore Sq. Boston	1 Hour	16 ppb	75 ppb
Sulfur Dioxide	Harrison Ave. Boston	1 Hour	21 ppb	75 ppb
Sulfur Dioxide	Kenmore Sq. Boston	24 Hour	12 ppb	140 ppb
Sulfur Dioxide	Harrison Ave. Boston	24 Hour	12 ppb	140 ppb

Units of measure are parts per million (ppm) or parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m3).
Values in **BOLD** exceed the applicable standard level, but do not constitute a violation.
Source: U.S. EPA, Airdata website (http://www.epa.gov/airdata), Monitor Values Report accessed February 25, 2013.
a The Long Island Monitoring Station (ID No. 25-025-0041) is located on Long Island in Boston Harbor.
b The Harrison Ave. Monitoring Station (ID No. 25-025-0042) is located on Harrison Ave. in downtown Boston.
c The Kenmore Sq. Monitoring Station (ID No. 25-025-0002) is located at Kenmore Sq. in Boston.
d The One City Sq. Monitoring Station (ID No. 25-025-0027) is located at One City Sq. in Boston.
e The 174 North St. Monitoring Station (ID No. 25-025-0043) is located at 174 North St. in Boston.

5.3.3. Emissions Inventories at the South Station Site

Total annual VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for the 2012 Existing Conditions. As shown in Table 8 these results are 7.30 tpy for VOC, 26.96 tpy for NOx, 1.88 tpy for PM_{10}, 1.19 tpy for $PM_{2.5}$, 84.38 tpy for CO, and 0.47 tpy for SO_2. These results are presented for the purpose of comparing them to the emissions from the project alternatives in the opening and horizon years.

Table 8—Measured Regional Ambient Air Quality for 2012

Pollutant	Monitor Location	Averaging Period	Monitored Value	Standard
Ozone	Long Island[a] Boston	1 Hour	0.103 ppm	0.12 ppm
Ozone	Harrison Ave.[b] Boston	1 Hour	0.106 ppm	0.12 ppm
Ozone	Long Island Boston	8 Hours	**0.085 ppm**	0.075 ppm
Ozone	Harrison Ave. Boston	8 Hours	**0.080 ppm**	0.075 ppm
Particulate Matter (PM 2.5)	Kenmore Sq.[c] Boston	24 Hours	23.0 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	One City Sq.[d] Boston	24 Hours	24.7 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	Harrison Ave. Boston	24 Hours	23.2 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	174 North St.[e] Boston	24 Hours	27.9 µg/m^3	35 µg/m^3
Particulate Matter (PM 2.5)	Kenmore Sq. Boston	Annual	9.0 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	One City Sq. Boston	Annual	8.8 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	Harrison Ave. Boston	Annual	8.3 µg/m^3	15.0 µg/m^3
Particulate Matter (PM 2.5)	174 North St. Boston	Annual	9.5 µg/m^3	15.0 µg/m^3
Particulate Matter (PM10)	Kenmore Sq. Boston	24 Hours	37 µg/m^3	150 µg/m^3
Particulate Matter (PM10)	One City Sq. Boston	24 Hours	41 µg/m^3	150 µg/m^3
Particulate Matter (PM10)	Harrison Ave. Boston	24 Hours	25 µg/m^3	150 µg/m^3
Carbon Monoxide	Kenmore Sq. Boston	1 Hour	1.4 ppm	35.0 ppm
Carbon Monoxide	Harrison Ave. Boston	1 Hour	2.2 ppm	35.0 ppm
Carbon Monoxide	Kenmore Sq. Boston	8 Hours	1.1 ppm	9.0 ppm
Carbon Monoxide	Harrison Ave. Boston	8 Hours	1.9 ppm	9.0 ppm
Nitrogen Dioxide	Kenmore Sq. Boston	Annual	**61 ppb**	53 ppb
Nitrogen Dioxide	Long Island Boston	Annual	41 ppb	53 ppb
Nitrogen Dioxide	Harrison Ave. Boston	Annual	**67 ppb**	53 ppb
Nitrogen Dioxide	Kenmore Sq. Boston	1 Hour	61 ppb	100 ppb
Nitrogen Dioxide	Long Island Boston	1 Hour	41 ppb	100 ppb
Nitrogen Dioxide	Harrison Ave. Boston	1 Hour	67 ppb	100 ppb
Sulfur Dioxide	Kenmore Sq. Boston	1 Hour	16 ppb	75 ppb
Sulfur Dioxide	Harrison Ave. Boston	1 Hour	21 ppb	75 ppb
Sulfur Dioxide	Kenmore Sq. Boston	24 Hour	12 ppb	140 ppb
Sulfur Dioxide	Harrison Ave. Boston	24 Hour	12 ppb	140 ppb

Units of measure are parts per million (ppm) or parts per billion (ppb) by volume, and micrograms per cubic meter of air (µg/m3).
Values in **BOLD** exceed the applicable standard level, but do not constitute a violation.
Source: U.S. EPA, Airdata website (http://www.epa.gov/airdata), Monitor Values Report accessed February 25, 2013.
a The Long Island Monitoring Station (ID No. 25-025-0041) is located on Long Island in Boston Harbor.
b The Harrison Ave. Monitoring Station (ID No. 25-025-0042) is located on Harrison Ave. in downtown Boston.
c The Kenmore Sq. Monitoring Station (ID No. 25-025-0002) is located at Kenmore Sq. in Boston.
d The One City Sq. Monitoring Station (ID No. 25-025-0027) is located at One City Sq. in Boston.
e The 174 North St. Monitoring Station (ID No. 25-025-0043) is located at 174 North St. in Boston.

Table 9—Project-related Pollutant Emissions for the 2012 Existing Conditions in the Vicinity of the South Station Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.67	8.47	0.25	0.24	2.55	0.14
Motor Vehicles	3.77	14.90	1.30	0.67	80.82	0.31
Buses	2.86	3.59	0.33	0.28	1.01	0.02
Total All Sources	7.30	26.96	1.88	1.19	84.38	0.47

tpy = tons per year

5.3.4. CO Hot Spot Analysis at the South Station Site

A CO Hot Spot analysis was conducted for the 2012 existing conditions using U.S. EPA's MOVES emission factors and U.S. EPA's CAL3QHC dispersion model. A summary of the modeled maximum 1-hour and 8-hour CO concentrations at each of the street intersections selected for analysis for the 2012 Existing Conditions is presented in Table 9. The 1-hour CO concentrations include a background level of 1.8 parts per million (ppm). In order to estimate the 8-hour concentrations, the modeled 1-hour results (without the background) were multiplied by a persistence factor of 0.7, and a background of 1.2 ppm (also assumed to remain constant with time) was added.

The maximum modeled 1-hour CO concentration at any of the four intersections analyzed for the 2012 Existing Conditions was estimated to be 3.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at the intersection of Surface Road at Kneeland Street and occurred at a receptor located along the southbound approach of Surface Road about 25 meters from the intersection with Kneeland Street. All of the modeled 1-hour CO concentrations at all of the intersections modeled for the 2012 Existing Conditions were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

Table 10—Estimated Maximum 1- and 8-Hour Carbon Monoxide Concentrations for the 2012 Existing Conditions in the Vicinity of the South Station Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.4	1.6
Atlantic Avenue at Summer Street	2.5	1.7
Surface Road at Kneeland Street	3.3	2.3
Dorchester Avenue at West Broadway / Traveler Street	2.6	1.8

a Values include a background 1-hour CO concentration of 1.8 ppm
b Values include a background 8-hou CO concentration of 1.2 ppm
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

The maximum modeled 8-hour CO concentration at any of the four intersections analyzed for the 2012 Existing Conditions was estimated to be 2.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration also occurred at the intersection of Surface Road at Kneeland Street and at the same receptor location as the 1-hour concentration. All of the modeled 8-hour CO concentrations at all of the intersections modeled for the 2012 Existing Conditions were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

5.3.5. Emissions Inventories at the Widett Circle Layover Site

At the Widett Circle Layover site, there are no MBTA-related (rail or motor vehicle) pollutant emissions in the 2012 Existing Conditions, as there are currently no MBTA trainsets using the layover facility.

5.3.6. CO Hot Spot Concentrations at the Widett Circle Layover Site

The intersection of Frontage Road at Widett Circle Access Road is the only signalized intersection in the immediate vicinity of the Widett Circle Layover Facility site that could require an air quality analysis. As shown in Table 10, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2012 Existing Conditions was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2012 Existing Conditions were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2012 Existing Conditions was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2012 Existing Conditions were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 11—Estimated Maximum 1- and 8-Hour CO Concentrations at the Widett Circle Site for the 2012 Existing Conditions

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Frontage Road at Widett Circle Access Road	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

5.3.7. Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there are no MBTA-related (rail or motor vehicle) pollutant emissions in the 2012 Existing Conditions, as there are currently no MBTA trainsets using the layover facility.

5.3.8. CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 11, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2012 Existing Conditions was estimated to be 2.4 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for the 2012 Existing Conditions were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2012 Existing Conditions was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for the 2012 Existing Conditions were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 12—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for the 2012 Existing Conditions

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.4	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

5.3.9. Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there are negligible MBTA -related pollutant emissions from motor vehicles in the 2012 Existing Conditions because a small number of motor vehicles access the site each day. There are, however, emissions of criteria pollutants due to the up to 10 MBTA trainsets currently using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for the 2012 Existing Conditions. As shown in Table 12 project-related pollutant emissions from the locomotives using the Readville-Yard 2 Layover Facility for the 2012 Existing Conditions are estimated to be 0.06 tpy for VOC, 0.78 tpy for NOx, 0.02 tpy for PM_{10}, 0.02 tpy for $PM_{2.5}$, 0.23 tpy for CO, and 0.02 tpy for SO_2.

Table 13—Project-related Locomotive Emissions for the 2012 Existing Conditions at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.06	0.78	0.02	0.02	0.23	0.02

tpy = tons per year

5.3.10. CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 13, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2012 Existing Conditions was estimated to be 2.2 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northwest approach of Neponset Valley Parkway about 3 meters from the intersection with Hyde Park Avenue/Wolcott Court. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2012 Existing Conditions were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2012 Existing Conditions was estimated to be 1.5 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred

at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2012 Existing Conditions were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 14—Estimated Maximum 1- and 8-Hour CO Concentrations at the Readville-Yard 2 Site for the 2012 Existing Conditions

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.2	1.5

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

5.3.11. Mobile Source Air Toxics Analysis

Mobile Source Air Toxics (MSATs) are emitted in both gaseous form and particulate form from motor vehicles, locomotives, and non-road construction equipment. The MSATs can be present in the fuels, formed from incomplete combustion of fossil fuels, or formed as secondary reaction products from the combustion emissions in the atmosphere. A qualitative comparison of MSATs from the various project alternatives was developed from the estimates of VOC and $PM_{2.5}$ emissions, which were used as surrogates for indicating trends in MSAT emissions. The amount of MSATs emitted would be proportional to a combination of the project-related VOC and $PM_{2.5}$ emissions from the SSX project, assuming that other variables such as motor vehicle and locomotive fleet mixes are the same for each alternative.

MSATs are a subset of the 188 air toxics defined by the CAA. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), and stationary sources (e.g., factories or refineries). The MSATs are compounds emitted from highway vehicles and non-road mobile equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. The U.S. EPA has assessed the list of 188 air toxics in its latest rule on the Control of Hazardous Air Pollutants from Mobile Sources and identified a group of 93 compounds emitted from mobile sources that are listed in its Integrated Risk Information System. There currently are no established ambient air quality standards for MSATs. In accordance with the FHWA's guidance regarding air toxic analysis (FHWA 2009), a qualitative assessment of MSATs is also included in the air quality analysis.

Of the many MSATs that are regulated by the U.S. EPA, six are judged to be significant for transportation sources partly because of their suspected carcinogenicity and their relative abundance in vehicle exhaust. According to U.S. EPA's *Control of Emissions of Hazardous Air Pollutants from Mobile Sources Final Rule* (USEPA 2007), these six priority MSATs include benzene, acrolein, formaldehyde, 1,3-butadiene, acetaldehyde, and diesel particulate matter.

6. Project Impacts

The air quality analysis of the SSX project evaluated the existing and future air quality impacts in the air quality study area. The air quality analysis consisted of several components: an area-wide impact assessment which consisted of calculating area-wide project-related pollutant emission inventories, a CO Hot Spot analysis, a $PM_{2.5}$ Hot Spot analysis, an analysis of Mobile Source Air Toxics (MSATs), an assessment of NO_2 concentrations, and an assessment of construction impacts. The analyses were performed in accordance with guidance issued by the U. S. EPA and the MassDEP.

Detailed air quality evaluations were conducted for the No Build Alternative, Alternative 1, and Alternative 3. Air quality impacts for Alternative 2 would only be evaluated if violations were predicted for the worse case, larger development of Alternative 3. Violations are not anticipated, so Alternative 2 was not analyzed. The future alternatives were evaluated for the project's approximate opening year of 2025 and the project horizon year of 2035.

Because the potential air quality impacts of the proposed SSX project are not limited to the property boundaries of the South Station site and the sites of the individual layover facilities, the air quality assessments described here are applicable to the entire area encompassing all of these sites. A summary of these impacts is presented in Section 6.6.

6.1. Introduction

MassDOT conducted multiple alternatives analyses for the SSX project. Alternatives were evaluated and ranked according to the SSX project purpose and needs, performance objectives, and transportation-related goals. As applicable, alternatives were analyzed with respect to environmental considerations. The environmental impact evaluations presented in Section 6 address two sets of alternatives for the SSX project:

- Joint/private development alternatives at the South Station site; and
- Layover facility site alternatives.

6.2. No Build Alternative

The No Build Alternative represents a future baseline condition against which the Build Alternatives are compared. With the No Build Alternative, South Station, including the headhouse and track operations, and the USPS General Mail Facility, would remain as they currently exist. The majority of Dorchester Avenue at the site would remain in private use by the USPS in support of USPS operations. Extending from the southern line of Summer Street, the MBTA would continue to maintain a permanent easement along Dorchester Avenue for pedestrians and vehicles of over approximately 200 feet. Generally unrestricted public access would continue to be provided along Dorchester Avenue of over approximately 400 feet for customer use of USPS facilities.

With the No Build Alternative, there would be no private development associated with South Station beyond the development previously approved by the Massachusetts EEA: the South Station Air Rights (SSAR) project. The SSAR project was approved by the Secretary of EEA in 2006 (EEA Number 3205/9131) as an approximate 1.8 million sf mixed-use development to be located directly above the railroad tracks at the South Station headhouse. The SSAR project also includes a horizontally expanded bus terminal of approximately 70,000 square feet, pedestrian connections from the train station concourse and platforms to the expanded bus terminal, and a three-level parking garage with 775 spaces located above the bus terminal.

With the No Build Alternative, the Widett Circle site would remain in private development. The Beacon Park Yard site would remain largely the same as today, with the exception of highway reconfiguration of the Massachusetts Turnpike to the north of the site and MBTA Worcester Line track improvements to the south of the site. The MBTA would continue to use Readville – Yard 2 to provide layover space for ten trainsets.

6.2.1. 2025 No Build Alternative for the South Station Site

Emissions Inventory of Criteria Pollutants for the 2025 No Build Alternative

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for the 2025 No Build Alternative. As shown in Table 14, project-related pollutant emissions are estimated to be 2.75 tpy for VOC, 8.43 tpy for NOx, 1.38 tpy for PM_{10}, 0.55 tpy for $PM_{2.5}$, 68.92 tpy for CO, and 0.47 tpy for SO_2. Emissions for the 2025 No Build Alternative decrease by an average of about 38% when compared to the project-related emissions for the 2012 Existing Conditions. VOC emissions are estimated to decrease by over 62%, NOx emissions decrease by about 69%, PM_{10} emissions decrease by 27%, $PM_{2.5}$ emissions decrease by 54%, CO emissions decrease by 18%, and SO_2 emissions remain the same.

Table 15—Project-related Pollutant Emissions for the 2025 No Build Alternative at the South Station Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.17	1.46	0.03	0.03	1.68	0.13
Motor Vehicles	2.25	6.12	1.27	0.48	67.05	0.32
Buses	0.33	0.85	0.08	0.04	0.19	0.02
Total All Sources	2.75	8.43	1.38	0.55	68.92	0.47

tpy = tons per year

CO Hot Spot Concentrations for the 2025 No Build Alternative

As shown in Table 15, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for the 2025 No Build Alternative was estimated to be 2.3 ppm. This maximum 1-hour CO concentration occurred at the intersection of Atlantic Avenue at Seaport Boulevard at a receptor located along the northbound approach of Atlantic Avenue about 3 meters from the intersection with Seaport Boulevard. All of the modeled 1-hour CO concentrations for all of the intersections modeled for the 2025 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum 8-hour CO concentration for the 2025 No Build Alternative occurred at the same intersection and at the same receptor location as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for the 2025 No Build Alternative were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Table 16—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2025 No Build Alternative at the South Station Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.3	1.6
Atlantic Avenue at Summer Street	2.2	1.5
Surface Road at Kneeland Street	2.2	1.5
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

Mobile Source Air Toxics for the 2025 No Build Alternative

A qualitative comparison of MSATs from the various project alternatives was developed from the estimates of VOC and $PM_{2.5}$ emissions, which were used as surrogates for indicating trends in MSAT emissions. The amount of MSATs emitted would be proportional to a combination of the project-related VOC and $PM_{2.5}$ emissions from SSX project, assuming that other variables such as motor vehicle and locomotive fleet mixes are the same for each alternative.

Project-related VOC emissions in the vicinity of South Station for the 2025 No Build Alternative are estimated to be 2.76 tpy. When compared to the VOC emissions for the 2012 Existing Conditions of 7.30 tpy, the VOC emissions for the 2025 No Build Alternative decrease by over 60%. Project-related $PM_{2.5}$ emissions in the air quality study area for the 2025 No Build Alternative are estimated to be 0.55 tpy. When compared to the $PM_{2.5}$ emissions for the 2012 Existing Conditions of 1.21 tpy, the $PM_{2.5}$ emissions for the 2025 No Build Alternative decrease by over 50%. This reduction in VOC and $PM_{2.5}$ emissions, and thus, mobile source-related MSAT surrogates, is due to a significant reduction in pollutant emission factors combined with the natural growth of traffic and train volumes in the area around South Station.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2012 Existing Conditions to the 2025 No Build Alternative result in a total decrease of MSAT surrogates of about 60%.

6.2.2. 2025 No Build Alternative for the Widett Circle Layover Facility Site

At the Widett Circle Layover site with the 2025 No Build Alternative, it is anticipated the existing parcels would continue in private ownership, and the site would continue to be used for industrial/heavy industrial land uses. In October 2013, Celtic Recycling, LLC received approval from the Massachusetts EEA to renovate and convert existing facilities at the Cold Storage site, located at 100 Widett Circle, into a material recycling facility. In the No Build Alternative, there would continue to be no MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for the 2025 No Build Alternative

At the Widett Circle Layover site, there would be no project-related pollutant emissions in the 2025 No Build Alternative, as there would be no MBTA trainsets using the layover facility.

CO Hot Spot Concentrations for the 2025 No Build Alternative

As shown in Table 16, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2025 No Build Alternative was estimated to be 2.0 ppm and

included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2025 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2025 No Build Alternative was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2025 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 17—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2025 No Build Alternative at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Frontage Road at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.2.3. 2025 No Build Alternative for the Beacon Park Yard Layover Site

An agreement in principal has been reached between Harvard and MassDOT to use approximately 22 acres of Beacon Park Yard for a new commuter rail layover, maintenance facility and rail station. For the purposes of this analysis, no usage of the facility is assumed for the 2025 No Build.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there would be no MBTA-related pollutant emissions (rail and motor vehicles) in the 2025 No Build Alternative, as it is assumed there would be no MBTA trainsets using the layover facility.

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 17, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2025 No Build Alternative was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for the 2025 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2025 No Build Alternative was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street

at Lincoln Street modeled for the 2025 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 18—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for the 2025 No Build Alternative

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.2.4. 2025 No Build Alternative for the Readville-Yard 2 Layover Site

In the 2025 No Build Alternative, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would continue to require layover for up to 10 eight-car trainsets to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no additional MBTA-related pollutant emissions from motor vehicles in the 2025 No Build Alternative, because the very small number of additional motor vehicles due to the SSX project (i.e., employee vehicles) would not change the level of pollutants in any measureable way. There would, however, be emissions of criteria pollutants due to the up to 10 MBTA trainsets currently using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for the 2025 No Build Alternative. As shown in Table 18, project-related pollutant emissions from the locomotives using the Readville-Yard 2 Layover Facility in the 2025 No Build Alternative are estimated to be 0.02 tpy for VOC, 0.14 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.16 tpy for CO, and 0.02 tpy for SO_2.

Table 19—Project-related Locomotive Emissions for the 2025 No Build Alternative at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.14	0.01	0.01	0.16	0.02

tpy = tons per year.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 19, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2025 No Build Alternative was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northbound departure of Wolcott Court about 3 meters from the intersection with Neponset Valley Parkway. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2025 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2025 No Build Alternative was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2025 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 20—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2025 No Build Alternative at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.2.5. 2035 No Build Alternative for the South Station Site

Emissions Inventory of Criteria Pollutants for the 2035 No Build Alternative

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for the 2035 No Build Alternative. As shown in Table 20, project-related pollutant emissions are estimated to be 2.69 tpy for VOC, 7.88 tpy for NOx, 1.47 tpy for PM_{10}, 0.56 tpy for $PM_{2.5}$, 73.08 tpy for CO, and 0.48 tpy for SO_2. Emissions for the 2035 No Build Alternative decrease by an average of 37% when compared to the project-related emissions for the 2012 Existing Conditions. VOC emissions are estimated to decrease by 63%, NOx emissions decrease by 71%, PM_{10} emissions decrease by 22%, $PM_{2.5}$ emissions decrease by 53%, CO emissions decrease by 13%, and SO_2 emissions increase by about 2%.

Table 21—Project-related Pollutant Emissions for the 2035 No Build Alternative at the South Station Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.17	1.46	0.03	0.03	1.68	0.13
Motor Vehicles	2.23	5.80	1.36	0.50	71.24	0.33
Buses	0.29	0.62	0.08	0.03	0.16	0.02
Total All Sources	2.69	7.88	1.47	0.56	73.08	0.48

tpy = tons per year.

CO Hot Spot Concentrations for the 2035 No Build Alternative

As shown in Table 21, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for the 2035 No Build Alternative was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at the intersection of Atlantic Avenue at Seaport Boulevard and occurred at a receptor located along the northbound approach of Atlantic Avenue about 3 meters from the intersection with Seaport Boulevard. All of the modeled 1-hour CO concentrations for all of the intersections modeled for the 2035 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum 8-hour CO concentration for the 2035 No Build Alternative occurred at the same intersection and at the same receptor location as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for the 2035 No Build Alternative were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Table 22—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2035 No Build Alternative

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.3	1.6
Atlantic Avenue at Summer Street	2.2	1.5
Surface Road at Kneeland Street	2.2	1.5
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

Mobile Source Air Toxics for the 2035 No Build Alternative

A qualitative comparison of MSATs from the various project alternatives was developed from the estimates of VOC and $PM_{2.5}$ emissions, which were used as surrogates for indicating trends in MSAT emissions. The amount of MSATs emitted would be proportional to a combination of the project-related VOC and $PM_{2.5}$ emissions from SSX project, assuming that other variables such as motor vehicle and locomotive fleet mixes are the same for each alternative.

Project-related VOC emissions in the air quality study area for the 2035 No Build Alternative are estimated to be 2.70 tpy. When compared to the VOC emissions for the 2012 Existing Conditions of 7.30 tpy, the VOC emissions for the 2035 No Build Alternative decrease by over 63%. Project-related $PM_{2.5}$ emissions in the air quality study area for the 2035 No Build Alternative are estimated to be 0.57 tpy. When compared to the $PM_{2.5}$ emissions for the 2012 Existing Conditions of 1.21 tpy, the $PM_{2.5}$ emissions for the 2025 No Build Alternative decrease by almost 53%. This reduction in VOC and $PM_{2.5}$ emissions, and thus, mobile source-related MSAT surrogates, is due to a significant reduction in pollutant emission factors offsetting the growth of traffic and train volumes in the area around South Station.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2012 Existing Conditions to the 2035 No Build Alternative result in a total decrease of MSAT surrogates of about 60%.

6.2.6. 2035 No Build Alternative for the Widett Circle Layover Facility Site

In the 2035 No Build Alternative, there would continue to be no MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for the 2035 No Build Alternative

At the Widett Circle Layover site, there would be no MBTA-related pollutant emissions (rail and motor vehicles) in the 2035 No Build Alternative, as there would be no MBTA trainsets using the layover facility.

CO Hot Spot Concentrations for the 2035 No Build Alternative

As shown in Table 22, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2035 No Build Alternative was estimated to be 2.0 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2035 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for the 2035 No Build Alternative was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for the 2035 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 23—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2035 No Build Alternative at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Frontage Road at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.2.7. 2035 No Build Alternative for the Beacon Park Yard Layover Site

An agreement in principal has been reached between Harvard and MassDOT to use approximately 22 acres of Beacon Park Yard for a new commuter rail layover, maintenance facility and rail station. A future For the purposes of this analysis, no usage of this facility is assumed for the 2035 No Build.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover Site, there would be no MBTA-related pollutant emissions (rail and motor vehicles) in the 2035 No Build Alternative, as it is assumed there would be no MBTA trainsets using the layover facility.

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 23, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2035 No Build Alternative was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for the 2035 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for the 2025 No Build Alternative was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for the 2035 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 24—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for the 2035 No Build Alternative

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.2.8. 2035 No Build Alternative for the Readville-Yard 2 Layover Site

In the 2035 No Build Alternative, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would continue to require layover for up to 10 eight-car trainsets to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no additional MBTA-related pollutant emissions from motor vehicles in the 2035 No Build Alternative, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 10 MBTA trainsets currently using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for the 2035 No Build Alternative. As shown in Table 24, project-related pollutant emissions from the locomotives using the Readville-Yard 2 Layover Facility in the 2035 No Build Alternative are estimated to be 0.02 tpy for VOC, 0.14 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.16 tpy for CO, and 0.02 tpy for SO_2.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 25, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2035 No Build Alternative was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northbound departure of Wolcott Court about 3 meters from the intersection with Neponset Valley Parkway. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2035 No Build Alternative were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

Table 25—Project-related Locomotive Emissions for the 2035 No Build Alternative at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.14	0.01	0.01	0.16	0.02

tpy = tons per year

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for the 2035 No Build Alternative was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for the 2035 No Build Alternative were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 26—Estimated Maximum 1- and 8-Hour CO Concentrations for the 2035 No Build Alternative at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3. Alternative 1 - Transportation Improvements Only

Alternative 1 would include the previously-approved private development described in the No Build Alternative. In addition, South Station would be expanded onto the adjacent 14-acre USPS property. MassDOT would acquire and demolish the USPS General Mail Facility/South Postal Annex. The existing South Station Terminal, totaling approximately 210,000 square feet (sf), would include expanded passenger concourse and passenger support service areas. Capacity improvements would include construction of up to seven new tracks and four platforms and extension of some existing platforms, for a total of 20 tracks. Cove, Broad, and Tower 1 Interlockings at the terminal approach would be reconstructed. In Alternative 1, South Station expansion and development would be in accordance with Chapter 91 standards for nonwater-dependent infrastructure facilities and city zoning requirements. In this alternative, no provision would be made for future private development as part of the SSX project.

Dorchester Avenue would be restored for public and station access. Restoration of Dorchester Avenue would reconnect Dorchester Avenue to Summer Street as a public way. It would include landscaping and improved pedestrian and cycling connections and facilities (adjacent sidewalks, crosswalks, and cycle track). Restoration also would include construction of a long-awaited extension of the Harborwalk along reopened Dorchester Avenue. Alternative 1 would include construction of layover facilities.

6.3.1. 2025 Alternative 1 for the South Station Site

Emissions Inventory of Criteria Pollutants for Alternative 1 in 2025

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for Alternative 1 in 2025. As shown in Table 26 project-related pollutant emissions are estimated to be

2.80 tpy for VOC, 8.49 tpy for NOx, 1.41 tpy for PM_{10}, 0.55 tpy for $PM_{2.5}$, 69.84 tpy for CO, and 0.48 tpy for SO_2. Emissions for Alternative 1 in 2025 increase by an average of about 1% when compared to the project-related emissions for the 2025 No Build Alternative. VOC emissions are estimated to increase by about 2%, NOx emissions increase by about 1%, PM_{10} emissions increase by 2%, $PM_{2.5}$ emissions are unchanged, CO emissions increase by about 1%, and SO_2 emissions decrease by 2%.

Table 27—Project-related Pollutant Emissions for Alternative 1 in 2025 at the South Station Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.17	1.40	0.03	0.03	1.67	0.13
Motor Vehicles	2.28	6.20	1.29	0.48	67.97	0.33
Buses	0.35	0.89	0.09	0.04	0.20	0.02
Total All Sources	2.80	8.49	1.41	0.55	69.84	0.48

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 1 in 2025

As shown in Table 27, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for Alternative 1 in 2025 was estimated to be 2.3 ppm. This maximum 1-hour CO concentration occurred at the intersection of Atlantic Avenue at Seaport Boulevard and at the intersection of Surface Road and Kneeland Street. At the intersection of Atlantic Avenue and Seaport Boulevard, the maximum 1-hour CO concentration occurred at a receptor located along the northbound approach of Atlantic Avenue about 3 meters from the intersection with Seaport Boulevard. At the intersection of Surface Road and Kneeland Street, the maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Surface Road about 25 meters from the intersection with Kneeland Street. All of the modeled 1-hour CO concentrations for all of the intersections modeled for Alternative 1 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum 8-hour CO concentration for Alternative 1 in 2025 occurred at the same intersections and at the same receptor locations as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for Alternative 1 in 2025 were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Table 28—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2025 at the South Station Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.3	1.6
Atlantic Avenue at Summer Street	2.1	1.4
Surface Road at Kneeland Street	2.3	1.6
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

Mobile Source Air Toxics for Alternative 1 in 2025

Project-related VOC emissions in the air quality study area for Alternative 1 in 2025 are estimated to be 2.80 tpy. When compared to the VOC emissions for the 2025 No Build Alternative of 2.76 tpy, the VOC

emissions for Alternative 1 in 2025 increase by less than 2%. Project-related $PM_{2.5}$ emissions in the air quality study area for Alternative 1 in 2025 are estimated to be 0.55 tpy. When compared to the $PM_{2.5}$ emissions for the 2025 No Build Alternative of 0.55 tpy, there is no change in $PM_{2.5}$ emissions for Alternative 1 in 2025. This small increase in VOC emissions and no change in $PM_{2.5}$ emissions from the 2025 No Build Alternative, and thus, mobile source-related MSAT surrogates, are due to significant reductions in VOC and $PM_{2.5}$ emission factors despite the growth of traffic and train volumes the area around South Station due to the 2025 Alternative 1.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2025 No Build Alternative to the 2025 Alternative 1 result in a total increase of MSAT surrogates of less than 2%.

6.3.2. 2025 Alternative 1 for the Widett Circle Layover Facility Site

In the 2025 Alternative 1, there would be up to 30 MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for Alternative 1 in 2025

At the Widett Circle Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 30 MBTA train sets which would be using the layover facility each day, i.e., 30 trains arriving and 30 trains departing the facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 28, project-related pollutant emissions from the locomotives using the Widett Circle Layover Facility in the 2025 Alternative 1 are estimated to be 0.03 tpy for VOC, 0.28 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.32 tpy for CO, and 0.05 tpy for SO_2.

Table 29—Project-related Locomotive Emissions for Alternative 1 in 2025 at the Widett Circle Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.03	0.28	0.01	0.01	0.32	0.05

tpy = tons per year

CO Hot Spot Concentrations for Alternative 1 in 2025

As shown in Table 29, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 1 in 2025 was estimated to be 2.0 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 1 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 1 in 2025 was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 1 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 30—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2025 at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Frontage Road at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3.3. 2025 Alternative 1 for the Beacon Park Yard Layover Site

For the 2025 analysis of Alternative 1, there would be up to 20 MBTA trainsets using the Beacon Park Yard as a layover facility.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 20 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 30, project-related pollutant emissions from the locomotives using the Beacon Park Yard Layover Facility in the 2025 Alternative 1 are estimated to be 0.02 tpy for VOC, 0.20 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.23 tpy for CO, and 0.03 tpy for SO_2.

Table 31—Project-related Locomotive Emissions for Alternative 1 in 2025 at the Beacon Park Yard Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.20	0.01	0.01	0.23	0.03

tpy = tons per year

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard layover facility site that could require an air quality analysis. As shown in Table 31, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 1 in 2025 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 1 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 1 in 2025 was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 1 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 32—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for Alternative 1 in 2025

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3.4. 2025 Alternative 1 for the Readville-Yard 2 Layover Site

In the 2025 Alternative 1, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would increase the number of trainsets using this layover facility each day from 10 to up to 18 to continue to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 18 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 32, project-related pollutant emissions from the locomotives using the Readville-Yard 2 Layover Facility in the 2025 Alternative 1 are estimated to be 0.02 tpy for VOC, 0.21 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.24 tpy for CO, and 0.03 tpy for SO_2.

Table 33—Project-related Locomotive Emissions for Alternative 1 in 2025 at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.21	0.01	0.01	0.24	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 33, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 1 in 2025 was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northwest approach of Neponset Valley Parkway about 3 meters from the intersection with Hyde Park Avenue/Wolcott Court. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 1 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 1 in 2025 was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations

at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 1 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 34—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2025 at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3.5. 2035 Alternative 1 for the South Station Site

Emissions Inventory of Criteria Pollutants for Alternative 1 in 2035

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for Alternative 1 in 2035. As shown in Table 34, project-related pollutant emissions are estimated to be 2.74 tpy for VOC, 8.00 tpy for NOx, 1.49 tpy for PM_{10}, 0.58 tpy for $PM_{2.5}$, 74.41 tpy for CO, and 0.49 tpy for SO_2. Emissions for Alternative 1 in 2035 increase by an average of about 2% when compared to the project-related emissions for the 2035 No Build Alternative. VOC emissions are estimated to increase by 2%, NOx emissions increase by about 2%, PM_{10} emissions increase by about 1%, $PM_{2.5}$ emissions increase by 4%, CO emissions increase by 2%, and SO_2 emissions increase by about 2%.

Table 35—Project-related Pollutant Emissions for Alternative 1 in 2035

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.16	1.45	0.03	0.03	1.67	0.13
Motor Vehicles	2.27	5.91	1.38	0.51	72.57	0.34
Buses	0.31	0.64	0.08	0.04	0.17	0.02
Total All Sources	2.74	8.00	1.49	0.58	74.41	0.49

tpy = tons per year

CO Hot Spot Concentrations for Alternative 1 in 2035

As shown in Table 35, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for Alternative 1 in 2035 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at the intersection of Atlantic Avenue at Seaport Boulevard and at the intersection of Surface Road and Kneeland Street. At the intersection of Atlantic Avenue and Seaport Boulevard, the maximum 1-hour CO concentration occurred at a receptor located along the northbound approach of Atlantic Avenue about 3 meters from the intersection with Seaport Boulevard. At the intersection of Surface Road and Kneeland Street, the maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Surface Road about 25 meters from the intersection with Kneeland Street. All of the modeled 1-hour CO concentrations for all of the intersections modeled for Alternative 1 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

Table 36—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2035

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.3	1.6
Atlantic Avenue at Summer Street	2.1	1.4
Surface Road at Kneeland Street	2.3	1.6
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

The maximum 8-hour CO concentration for Alternative 1 in 2035 occurred at the same intersections and at the same receptor locations as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for Alternative 1 in 2035 were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Mobile Source Air Toxics for Alternative 1 in 2035

Project-related VOC emissions in the air quality study area for Alternative 1 in 2035 are estimated to be 2.75 tpy. When compared to the VOC emissions for the 2035 No Build Alternative of 2.70 tpy, the VOC emissions for Alternative 1 in 2035 increase by about 2%. Project-related $PM_{2.5}$ emissions in the air quality study area for Alternative 1 in 2035 are estimated to be 0.58 tpy. When compared to the $PM_{2.5}$ emissions for the 2035 No Build Alternative of 0.57 tpy, the $PM_{2.5}$ emissions for Alternative 1 in 2035 increase by 2%. These small increases in VOC and $PM_{2.5}$ emissions from the 2035 No Build Alternative, and thus, mobile source-related MSAT surrogates, are due to growth of traffic volumes the area around South Station due to the 2035 Alternative 1.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2035 No Build Alternative to the 2035 Alternative 1 result in a total increase of MSAT surrogates of about 2%.

6.3.6. 2035 Alternative 1 for the Widett Circle Layover Facility Site

In the 2035 Alternative 1, there could be up to 30 MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for Alternative 1 in 2035

At the Widett Circle Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 30 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2035. As shown in Table 36, project-related pollutant emissions from the locomotives using the Widett Circle Layover Facility in the 2035 Alternative 1 are estimated to be 0.03 tpy for VOC, 0.28 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.32 tpy for CO, and 0.05 tpy for SO_2.

Table 37—Project-related Locomotive Emissions for Alternative 1 in 2035 at the Widett Circle Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.03	0.28	0.01	0.01	0.32	0.05

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 1 in 2035

As shown in Table 37, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 1 in 2035 was estimated to be 2.0 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 1 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 1 in 2035 was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 1 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 38—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2035 at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Widett Circle at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3.7. 2035 Alternative 1 for the Beacon Park Yard Layover Site

In the 2035 Alternative 1, there would be up to 20 MBTA trainsets using the Beacon Park Yard as a layover facility.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 20 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2035. As shown in Table 38, project-related pollutant emissions from the locomotives using the Beacon Park Yard Layover Facility in the 2035 Alternative 1 are estimated to be 0.02 tpy for VOC, 0.20 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.23 tpy for CO, and 0.03 tpy for SO_2.

Table 39—Project-related Locomotive Emissions for Alternative 1 in 2035 at the Beacon Park Yard Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.20	0.01	0.01	0.23	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 39, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 1 in 2035 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 1 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 1 in 2035 was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 1 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 40—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for Alternative 1 in 2035

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.3.8. 2035 Alternative 1 for the Readville-Yard 2 Layover Site

In the 2035 Alternative 1, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would increase the number of trainsets using this layover facility each day from 10 to up to 18 to continue to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no additional MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 1, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 18 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2035. As shown in Table 40, project-related pollutant emissions from the locomotives using the

Readville-Yard 2 Layover Facility in the 2035 Alternative 1 are estimated to be 0.02 tpy for VOC, 0.21 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.24 tpy for CO, and 0.03 tpy for SO_2.

Table 41—Project-related Locomotive Emissions for Alternative 1 in 2035 at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.21	0.01	0.01	0.24	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 41, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 1 in 2035 was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northwest approach of Neponset Valley Parkway about 3 meters from the intersection with Hyde Park Avenue/Wolcott Court. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 1 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 1 in 2035 was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 1 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 42—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 1 in 2035 at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4. Alternative 3 - Joint/Private Development Maximum Build

The Joint/ Private Development Alternative 3 would include Alternative 1, as well as provisions for future private development by incorporating appropriate structural foundations into the overall station and track design.

With Alternative 3, the maximum level of future private development at the South Station complex would be limited by the Federal Aviation Administration's (FAA's) maximum building height limits, pursuant to the Terminal Instrument Procedures (TERPS) regulations applicable to Boston Logan International Airport. Accordingly, building heights would be limited to approximately 290 feet.

With Alternative 3, the potential for future private development at the South Station site could include approximately 2.0 million square feet of mixed-use development along Dorchester Avenue, consisting of residential, office, and commercial uses, including retail and hotel uses, with building heights up to approximately 21 stories. Development could include approximately 506 parking spaces. Alternative 3 would include construction of additional layover facilities.

6.4.1. 2025 Alternative 3 for the South Station Site

Emissions Inventory of Criteria Pollutants for Alternative 3 in 2025

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for Alternative 3 in 2025. As shown in

Table 42, project-related pollutant emissions are estimated to be 2.86 tpy for VOC, 8.70 tpy for NOx, 1.42 tpy for PM_{10}, 1.37 tpy for $PM_{2.5}$, 70.82 tpy for CO, and 0.48 tpy for SO_2. Emissions for Alternative 3 in 2025 increase by an average of about 3% when compared to the project-related emissions for the 2025 No Build Alternative. VOC emissions are estimated to increase by 4%, NOx emissions increase by about 3%, PM_{10} emissions increase by about 3%, $PM_{2.5}$ emissions increase by about 2%, CO emissions increase by 3%, and SO_2 emissions increase by 2%. Emissions for Alternative 3 in 2025 increase by an average of less than 1% when compared to the project-related emissions for Alternative 1 in 2025. VOC emissions are estimated to increase by about 2%, NOx emissions increase by almost 3%, PM_{10} emissions increase by about 1%, $PM_{2.5}$ emissions increase by about 2%, CO emissions increase by less than 1%, and SO_2 emissions remain unchanged.

Table 43—Project-related Pollutant Emissions for Alternative 3 in 2025

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.17	1.46	0.03	0.03	1.68	0.13
Motor Vehicles	2.32	6.29	1.30	0.49	68.93	0.33
Buses	0.37	0.95	0.09	0.04	0.21	0.02
Total All Sources	2.86	8.70	1.42	0.56	70.82	0.48

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 3 in 2025

As shown in Table 43, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for Alternative 3 in 2025 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at the intersection of Surface Road and Kneeland Street and occurred at a receptor located along the southbound approach of Surface Road about 25 meters from the intersection with Kneeland Street. All of the modeled 1-hour CO concentrations for all of the intersections modeled for Alternative 3 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

Table 44—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2025

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.2	1.5
Atlantic Avenue at Summer Street	2.2	1.5
Surface Road at Kneeland Street	2.3	1.6
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

The maximum 8-hour CO concentration for Alternative 3 in 2025 occurred at the same intersection and at the same receptor location as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for Alternative 3 in 2025 were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Mobile Source Air Toxics for Alternative 3 in 2025

Project-related VOC emissions in the air quality study area for Alternative 3 in 2025 are estimated to be 2.86 tpy. When compared to the VOC emissions for the 2025 No Build Alternative of 2.76 tpy, the VOC emissions for Alternative 3 in 2025 increase by less than 4%. Project-related $PM_{2.5}$ emissions in the air quality study area for Alternative 3 in 2025 are estimated to be 0.56 tpy. When compared to the $PM_{2.5}$ emissions for the 2025 No Build Alternative of 0.55 tpy, the $PM_{2.5}$ emissions for Alternative 3 in 2025 increase by about 2%. These small increases in combined VOC and $PM_{2.5}$ emissions from the 2025 No Build Alternative, and thus, mobile source-related MSAT surrogates, are due to growth of traffic volumes the area around South Station due to the 2025 Alternative 3.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2025 No Build Alternative to the 2025 Alternative 3 result in a total increase of MSAT surrogates of about 3%.

6.4.2. 2025 Alternative 3 for the Widett Circle Layover Facility Site

In the 2025 Alternative 3, there would be up to 30 MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for Alternative 3 in 2025

At the Widett Circle Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 30 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 3 in 2025. As shown in Table 44, project-related pollutant emissions from the locomotives using the Widett Circle Layover Facility in the 2025 Alternative 3 are estimated to be 0.03 tpy for VOC, 0.28 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.32 tpy for CO, and 0.05 tpy for SO_2.

Table 45—Project-related Locomotive Emissions for Alternative 3 in 2025 at the Widett Circle Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.03	0.28	0.01	0.01	0.32	0.05

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 3 in 2025

As shown in Table 45, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 3 in 2025 was estimated to be 2.0 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 3 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 3 in 2025 was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 3 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 46—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2025 at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Widett Circle at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4.3. 2025 Alternative 3 for the Beacon Park Yard Layover Site

In the 2025 Alternative 3, there would be up to 20 MBTA trainsets using the Beacon Park Yard as a layover facility.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 20 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 46, project-related pollutant emissions from the locomotives using the Beacon Park Yard Layover Facility in the 2025 Alternative 3 are estimated to be 0.02 tpy for VOC, 0.20 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.23 tpy for CO, and 0.03 tpy for SO_2.

Table 47—Project-related Locomotive Emissions for Alternative 3 in 2025 at the Beacon Park Yard Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.20	0.01	0.01	0.23	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 47, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 3 in 2025 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 3 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 3 in 2025 was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 3 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 48—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for Alternative 3 in 2025

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4.4. 2025 Alternative 3 for the Readville-Yard 2 Layover Site

In the 2025 Alternative 3, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would increase the number of trainsets using this layover facility from 10 to up to 18 to continue to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2025 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 18 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 48, project-related pollutant emissions from the locomotives using the Readville-Yard

2 Layover Facility in the 2025 Alternative 3 are estimated to be 0.02 tpy for VOC, 0.21 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.24 tpy for CO, and 0.03 tpy for SO_2.

Table 49—Project-related Locomotive Emissions for Alternative 3 in 2025 at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.21	0.01	0.01	0.24	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 49, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 3 in 2025 was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northwest approach of Neponset Valley Parkway about 3 meters from the intersection with Hyde Park Avenue/Wolcott Court. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 3 in 2025 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 3 in 2025 was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 3 in 2025 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 50—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2025 at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4.5. 2035 Alternative 3 for the South Station Site

Emissions Inventory of Criteria Pollutants for Alternative 3 in 2035

VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving South Station, and motor vehicles and buses on the roadway network included in the study area were estimated for Alternative 3 in 2035. As shown in Table 50, project-related pollutant emissions are estimated to be 2.78 tpy for VOC, 8.11 tpy for NOx, 1.52 tpy for PM_{10}, 0.59 tpy for $PM_{2.5}$, 75.42 tpy for CO, and 0.49 tpy for SO_2. Emissions for Alternative 3 in 2035 increase by an average of about 3% when compared to the project-related emissions for the 2035 No Build Alternative. VOC emissions are estimated to increase by less than 3%, NOx emissions increase by about 3%, PM_{10} emissions increase by 3%, $PM_{2.5}$ emissions

increase by 5%, CO emissions increase by 3%, and SO_2 emissions increase by about 2%. Emissions for Alternative 3 in 2035 increase by an average of less than 1% when compared to the project-related emissions for Alternative 1 in 2035. VOC emissions are estimated to increase by 2%, NOx emissions increase by about 1%, PM_{10} emissions increase by about 2%, $PM_{2.5}$ emissions increase by 2%, CO emissions increase by about 1%, and SO_2 emissions remain the same.

Table 51—Project-related Pollutant Emissions for Alternative 3 in 2035

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.16	1.45	0.03	0.03	1.67	0.13
Motor Vehicles	2.30	5.99	1.40	0.52	73.58	0.34
Buses	0.32	0.67	0.09	0.04	0.17	0.02
Total All Sources	2.78	8.11	1.52	0.59	75.42	0.49

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 3 in 2035

As shown in Table 51, the maximum modeled 1-hour CO concentration at any of the four intersections analyzed for Alternative 3 in 2035 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at the intersection of Surface Road and Kneeland Street. The maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Surface Road about 25 meters from the intersection with Kneeland Street. All of the modeled 1-hour CO concentrations for all of the intersections modeled for Alternative 3 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum 8-hour CO concentration for Alternative 3 in 2035 occurred at the same intersection and at the same receptor location as the 1-hour concentration. The maximum 8-hour concentration was estimated to be 1.6 ppm and included a background CO concentration of 1.2 ppm. All of the modeled 8-hour CO concentrations at all of the intersections modeled for Alternative 3 in 2035 were also well below the corresponding 8-hour CO National and Massachusetts standard of 9 ppm.

Table 52—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2035

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Atlantic Avenue at Seaport Boulevard	2.2	1.5
Atlantic Avenue at Summer Street	2.2	1.5
Surface Road at Kneeland Street	2.3	1.6
Dorchester Avenue at West Broadway / Traveler Street	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

Mobile Source Air Toxics for Alternative 3 in 2035

Project-related VOC emissions in the air quality study area for Alternative 3 in 2035 are estimated to be 2.79 tpy. When compared to the VOC emissions for the 2035 No Build Alternative of 2.70 tpy, the VOC emissions for Alternative 3 in 2035 increase by less than 4%. Project-related $PM_{2.5}$ emissions in the air quality study area for Alternative 3 in 2035 are estimated to be 0.59 tpy. When compared to the $PM_{2.5}$ emissions for the 2035 No Build Alternative of 0.57 tpy, the $PM_{2.5}$ emissions for Alternative 3 in 2035 increase by about 3%. These small increases in combined VOC and $PM_{2.5}$ emissions from the 2035 No

Build Alternative, and thus, mobile source-related MSAT surrogates, are due to growth of traffic volumes the area around South Station attributed to the 2035 Alternative 3.

The combined differences in VOC and $PM_{2.5}$ emissions from the 2035 No Build Alternative to the 2035 Alternative 3 result in a total increase of MSAT surrogates of about 3%.

6.4.6. 2035 Alternative 3 for the Widett Circle Layover Facility Site

In the 2035 Alternative 3, there would be up to 30 MBTA trainsets using Widett Circle as a layover facility.

Emissions Inventory of Criteria Pollutants for Alternative 3 in 2035

At the Widett Circle Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 30 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 3 in 2035. As shown in Table 52, project-related pollutant emissions from the locomotives using the Widett Circle Layover Facility in the 2035 Alternative 3 are estimated to be 0.03 tpy for VOC, 0.28 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.32 tpy for CO, and 0.05 tpy for SO_2.

Table 53—Project-related Locomotive Emissions for Alternative 3 in 2035 at the Widett Circle Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.03	0.28	0.01	0.01	0.32	0.05

tpy = tons per year.

CO Hot Spot Concentrations for Alternative 3 in 2035

As shown in Table 53, the maximum modeled 1-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 3 in 2035 was estimated to be 2.0 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the southbound approach of Frontage Road about 25 meters from the intersection with Widett Circle Access Road. All of the modeled 1-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 3 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Frontage Road at Widett Circle Access Road for Alternative 3 in 2035 was estimated to be 1.3 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Frontage Road at Widett Circle Access Road modeled for Alternative 3 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 54—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2035 at the Widett Circle Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Frontage Road at Widett Circle Access Road	2.0	1.3

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4.7. 2035 Alternative 3 for the Beacon Park Yard Layover Site

In the 2035 Alternative 3, there would be up to 20 MBTA trainsets using the Beacon Park Yard as a layover facility.

Emissions Inventories at the Beacon Park Yard Layover Site

At the Beacon Park Yard Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the up to 20 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 54, project-related pollutant emissions from the locomotives using the Beacon Park Yard Layover Facility in the 2035 Alternative 3 are estimated to be 0.02 tpy for VOC, 0.20 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.23 tpy for CO, and 0.03 tpy for SO_2.

Table 55—Project-related Locomotive Emissions for Alternative 3 in 2035 at the Beacon Park Yard Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.20	0.01	0.01	0.23	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Beacon Park Yard Layover Site

The intersection of Cambridge Street at Lincoln Street is the only signalized intersection in the immediate vicinity of the Beacon Park Yard Layover Facility site that could require an air quality analysis. As shown in Table 55, the maximum modeled 1-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 3 in 2035 was estimated to be 2.3 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the westbound approach of Cambridge Street about 25 meters from the intersection with Lincoln Street. All of the modeled 1-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 3 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Cambridge Street at Lincoln Street for Alternative 3 in 2035 was estimated to be 1.6 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations at the intersection of Cambridge Street at Lincoln Street modeled for Alternative 3 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 56—Estimated Maximum 1- and 8-Hour CO Concentrations at the Beacon Park Yard Site for Alternative 3 in 2035

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Cambridge Street at Lincoln Street	2.3	1.6

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.4.8. 2035 Alternative 3 for the Readville-Yard 2 Layover Site

In the 2035 Alternative 3, MassDOT would continue to use Readville-Yard 2 as its maintenance repair facility and largest layover yard for its south side service. It is anticipated that MassDOT would increase the number of trainsets using this layover facility from 10 to up to 18 to continue to support South Station operations.

Emissions Inventories at the Readville-Yard 2 Layover Site

At the Readville-Yard - 2 Layover site, there would be no MBTA-related pollutant emissions from motor vehicles in the 2035 Alternative 3, as there would be no measurable increase in motor vehicle traffic due to the SSX project. There would, however, be emissions of criteria pollutants due to the 18 MBTA trainsets which would be using the layover facility. VOC, NOx, PM_{10}, $PM_{2.5}$, CO, and SO_2 emissions from the locomotives entering and leaving the layover facility were estimated for Alternative 1 in 2025. As shown in Table 56, project-related pollutant emissions from the locomotives using the Readville-Yard 2 Layover Facility in the 2035 Alternative 3 are estimated to be 0.02 tpy for VOC, 0.21 tpy for NOx, 0.01 tpy for PM_{10}, 0.01 tpy for $PM_{2.5}$, 0.24 tpy for CO, and 0.03 tpy for SO_2.

Table 57—Project-related Locomotive Emissions for Alternative 3 in 2035 at the Readville-Yard 2 Site

Emission Source	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
Locomotives	0.02	0.21	0.01	0.01	0.24	0.03

tpy = tons per year.

CO Hot Spot Concentrations at the Readville-Yard 2 Layover Site

The intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square is the only signalized intersection in the immediate vicinity of the Readville-Yard 2 Layover Facility site that could require an air quality analysis. As shown in Table 57, the maximum modeled 1-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 3 in 2035 was estimated to be 2.1 ppm and included a background concentration of 1.8 ppm. This maximum 1-hour CO concentration occurred at a receptor located along the northwest approach of Neponset Valley Parkway about 3 meters from the intersection with Hyde Park Avenue/Wolcott Court. All of the modeled 1-hour CO concentrations at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 3 in 2035 were well below the 1-hour CO National and Massachusetts standard of 35 ppm.

The maximum modeled 8-hour CO concentration at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square for Alternative 3 in 2035 was estimated to be 1.4 ppm and included a background concentration of 1.2 ppm. This maximum 8-hour CO concentration occurred at the same receptor location as did the 1-hour concentration. All of the modeled 8-hour CO concentrations

at the intersection of Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square modeled for Alternative 3 in 2035 were well below the 8-hour CO National and Massachusetts standard of 9 ppm.

Table 58—Estimated Maximum 1- and 8-Hour CO Concentrations for Alternative 3 in 2035 at the Readville-Yard 2 Site

Intersection Name	Maximum 1-hour[a] (ppm)	Maximum 8-hour[b] (ppm)
Hyde Park Avenue/Neponset Valley Pkwy/Wolcott Ct/Wolcott Square	2.1	1.4

a Values include a background 1-hour CO concentration of 1.8 ppm.
b Values include a background 8-hou CO concentration of 1.2 ppm.
ppm = parts per million.
The National Ambient Air Quality Standards for carbon monoxide are: 1-hour = 35 ppm and 8-hour = 9 ppm.

6.5. Construction Impacts

Construction-related activities can result in short-term impacts on ambient air quality. These potential impacts can include fugitive dust emissions, direct emissions from construction equipment and truck exhausts, and increased emissions from motor vehicles on local streets due to traffic disruption.

6.5.1. Fugitive Dust Emissions

Fugitive dust emissions can result from movement of construction equipment and transport of materials to and from a construction site. Dust emissions can also occur during site preparation activities such as building demolition, grading, or removal of vegetation to prepare a site for construction. Fugitive dust would generally be a problem during periods of intense construction activity and would be accentuated by windy and/or dry conditions. DEP regulation 310 CMR 7.09 requires that dust impacts be mitigated.

Uncovered construction vehicles that transport excavated material on local roadways can also result in fugitive dust emissions. Trucks travelling near residential and other sensitive receptor locations may aggravate these potential impacts.

6.5.2. Direct Emissions from Construction Equipment

Direct emissions from construction equipment and truck exhausts can result in short-term impacts on local air quality levels. Compared with emissions from other motor vehicle sources in the air quality study area, emissions from construction equipment and trucks are generally insignificant with respect to compliance with the ambient air quality standards. Furthermore, Administrative Consent Order (ACO-BO-00-7001) entered into by the DEP and the Massachusetts Executive Office of Transportation (EOT) on January 26, 2005, and its Amendments, requires the EOT (now MassDOT) to implement a construction equipment retrofit program and retrofit equipment with emission control technologies such as oxidation catalysts and particulate filters for large MassDOT-funded projects.

Requiring "clean diesel" practices for construction equipment, such as Tier 4 engines or best available retrofit technology on older engines, would help mitigate any temporary impacts. In accordance with EPA's Non-Road Diesel Rule, diesel engines used for the construction equipment would be required to use the fuel to better enhance emission controls. When the equipment is properly operated and maintained, no adverse impacts on ambient air quality standards are expected.

6.5.3. Traffic Disruption and Congestion

Construction activities can also result in traffic disruption and rerouting. Traffic disruption, such as decreased roadway capacity or detouring, can lead to increased traffic congestion, thereby increasing motor vehicle exhaust emissions on nearby roadways. Proper traffic management during the construction period can mitigate potential effects.

6.6. Summary of Project-related Air Quality Impacts at South Station

Table 58 presents a summary of the project-related emissions inventories in the vicinity of the South Station site, described in detail throughout Section 6 above. Project-related pollutant emissions for 2025 Alternative 1 are higher by an average of about 1% when compared to the project-related emissions for the 2025 No Build Alternative. Project-related emissions for Alternative 1 in 2035 are higher by an average of about 2% when compared to the project-related emissions for the 2035 No Build Alternative.

Table 59—Summary of Project-related Criteria Pollutant Emissions at the South Station Site by Alternative

Project Alternative	VOC (tpy)	NOx (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO (tpy)	SO_2 (tpy)
2012 Existing Conditions	7.30	26.96	1.88	1.19	84.38	0.47
2025 No Build Alternative	2.75	8.43	1.38	0.55	68.92	0.47
2025 Alternative 1	2.80	8.49	1.41	0.55	69.84	0.48
2025 Alternative 3	2.86	8.70	1.42	0.56	70.82	0.48
2035 No Build Alternative	2.69	7.88	1.47	0.56	73.08	0.48
2035 Alternative 1	2.74	8.00	1.49	0.58	74.41	0.49
2035 Alternative 3	2.78	8.11	1.52	0.59	75.42	0.49

tpy = tons per year

These very large decreases in pollutant emissions in the vicinity of South Station between 2012 and 2025 are due to significant reductions in pollutant emission factors which offset the growth of motor vehicle traffic and train volumes in the area around South Station. The very small increases between 2025 and 2035 are due to very small reductions in pollutant emission factors from 2025 to 2035 and the growth of traffic and train volumes in the area around South Station.

Table 60—Summary of Estimated Maximum 1- and 8-Hour CO Concentrations at the South Station Site by Alternative

Project Alternative	Worst Case Intersection	Maximum 1-Hour CO Concentration (ppm)	Maximum 8-Hour CO Concentration (ppm)
2012 Existing Conditions	Surface Road at Kneeland Street	3.3	2.3
2025 No Build Alternative	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2025 Alternative 1	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2025 Alternative 3	Surface Road at Kneeland Street	2.3	1.6
2035 No Build Alternative	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2035 Alternative 1	Atlantic Avenue at Seaport Blvd.	2.3	1.6
2035 Alternative 3	Surface Road at Kneeland Street	2.3	1.6

ppm = parts per million

7. Proposed Mitigation/Consistency with Regulatory Requirements

7.1. Proposed Mitigation for the SSX Project

The air quality study included an emissions inventory analysis that estimated the project-related area wide VOC, NOX, CO, PM_{10}, $PM_{2.5}$, and SO_2 emissions. This analysis evaluated the changes in emissions based upon changes in the average daily railroad operations, average daily traffic volumes, and locomotive and motor vehicle emission rates. Using EPA recommended air quality modeling techniques, total pollutant emissions were calculated for the existing conditions (2012); the No Build Alternative in the approximate opening year of 2025 and in the horizon year of 2035; Alternative 1 in 2025 and 2035, and Alternative 3 in 2025 and 2035. The mesoscale analysis results for each of the alternatives evaluated are presented in Section 6.

7.1.1. Emissions Inventory Analysis

Project-related pollutant emissions for Alternative 1 in both 2025 and 2035 are higher from 1 to 2% when compared to the project-related emissions for the respective No Build Alternatives. Project-related emissions for Alternative 3 in both 2025 and 2035 are higher by about 3% when compared to the project-related emissions for the respective No Build Alternative.

This air quality study demonstrated that emissions from the proposed SSX project would not create a new violation of the NAAQS; would not increase in the frequency or severity of any existing violations; and would not delay the attainment of any NAAQS. Therefore, no mitigation of project-related emissions would be required.

7.1.2. CO Hot Spot Analysis

The CO Hot Spot analysis demonstrated that all of the modeled 1- and 8-hour CO concentrations at all of the intersections analyzed were well below the 1-hour and 8-hour CO National and Massachusetts standards of 35 ppm and 9 ppm, respectively. Therefore, no mitigation of project-related CO emissions at traffic intersections would be required.

7.2. Construction Mitigation Measures

Temporary air quality impacts could result from construction activities associated with the South Station Expansion project. Construction-related impacts can include fugitive dust emissions, direct emissions from construction equipment, and increased emissions from motor vehicles on local streets due to traffic disruption. However, the close proximity of construction activities to nearby businesses, and other areas where the general public has reasonable access creates the need for appropriate mitigation measures to be implemented during construction. The construction contractor would need to prepare an emissions control plan that would address the areas of fugitive dust, construction equipment and vehicle exhaust, and potential traffic disruption and congestion. Potential mitigation measures for these areas are discussed below.

7.2.1. Fugitive Dust

DEP regulation 310 CMR 7.09, as well as local ordinances require that fugitive dust be controlled. Good "housekeeping" practices, such as wetting exposed earth areas, covering dust-producing materials during transport, and limiting construction activities during high wind conditions, can help to minimize the dust impacts. Potential mitigation measures that may be employed by the construction contractor, as part of the emissions control plan discussed above, include:

- Seeding, paving, covering, wetting, or otherwise treating disturbed soil surfaces;
- Minimizing storage and unnecessary transfers of spoils and debris on-site;
- Using wind screens or fences;
- Covering all truckloads of dust-producing material;
- Removing all loose or unsecured debris or materials from empty trucks prior to leaving the site;
- Reducing traffic speeds on any unpaved surfaces;
- Vacuum sweeping or watering of all paved surfaces and roadways on which equipment and truck traffic enter and leave the construction areas;
- Using wheel and truck washes at site egresses; and
- Modifying work schedules when weather conditions could lead to adverse impacts (e.g., very dry soil and high winds).

7.2.2. Construction Equipment and Vehicle Exhaust

MassDOT and its contractors must comply with MassDEP's Diesel Retrofit Program (DRP), a program that was developed by MassDEP as a means to control emissions from construction equipment by promoting the use of such engine emission controls as oxidation catalysts or particulate filters for diesel engines to the maximum extent practicable. Additionally, compliance with the State's Low Sulfur Diesel standards (301 CMR 7.05) must be met. Furthermore, all construction equipment would be required to comply with 310 CMR 7.11 (1) (b) which requires that engines idle for no more than five minutes.

U.S. EPA has implemented the Clean Air Nonroad Diesel Rule to reduce emissions from nonroad diesel engines by combining engine and fuel controls to achieve maximum emission reductions. U.S. EPA established strict Tier 4 emission standards for manufacturers of new nonroad engines that would reduce exhaust emissions from these engines by approximately 90%. The use of Low Sulfur Diesel and Ultra Low Sulfur Diesel allows manufacturers to install advanced emission control systems that would lead to significant decreases in nonroad engine emissions. However, older diesel construction equipment would still emit higher levels of pollutant emissions.

In order to mitigate emissions from older construction equipment, MassDEP has established the Massachusetts Diesel Retrofit Program (MDRP) to reduce excessive diesel emissions at state-funded construction projects. After-engine emission controls, such as oxidation catalysts and particulate filters, are used on construction equipment and other heavy-duty mobile sources to reduce harmful emissions. In January 2008, MassDEP amended the retrofit applicability requirement to include engines of 50 horsepower or greater that would be on-site for 30 days or more.

In addition to the MDRP mitigation, all equipment and vehicles should be kept properly maintained and repaired to minimize exhaust emissions, including odors. As part of the emissions control plan, the construction contractor should also establish and maintain records of the routine maintenance programs for internal combustion engine-powered vehicles and equipment used for the project. Proper maintenance and repair would minimize potential odor impacts due to diesel exhaust from construction equipment and trucks. Gasoline-fueled vehicles and equipment generally do not generate significant odor impacts when properly operated and maintained.

Excessive idling of vehicles and equipment (greater than five minutes) should be prohibited, as required by Massachusetts General Law Ch.90, Section 16A and DEP regulation 310 CMR 7.11. Other potential mitigation measures may include the use of alternative-fueled or electric equipment where feasible.

7.2.3. Traffic Disruption and Congestion

Implementing appropriate traffic management techniques during the construction period can mitigate increases in emissions from traffic congestion due to the construction project and vehicles accessing the sites. Traffic Management Plans (TMPs) for each of the work zones should be developed and implemented. The TMPs should be coordinated with the emissions control plan discussed above. Examples of traffic management techniques that may be applicable include the following:

- Prohibiting construction vehicle travel during peak traffic periods;
- Using temporary signage and variable message displays;
- Applying physical controls such as temporary pavement markings and channelization;
- Using traffic control officers and flaggers;
- Notifying the public (e.g., through traveler information services) of construction-related traffic congestion;
- Designating construction staging areas and worker parking areas; and
- Designating construction truck routes.

7.2.4. Additional Dust Control Considerations

Based on the extent of planned construction activity, and recognizing that any impacts on the general public and sensitive receptors would be temporary, the air quality mitigation measures recommended above are expected to be adequate to avoid adverse air quality impacts from the proposed project. Nevertheless, additional mitigation measures may still be necessary to further reduce the potential for dust impacts if frequent or persistent complaints arise during construction. These measures could include the following:

- Consideration of alternative methods of construction;
- Minimization of equipment usage in close proximity to sensitive receptors;
- Minimization of the numbers of pieces of equipment and trucks in use or staged in the construction site area;

- Curtailment of work during conditions that are conducive to dust impacts (e.g., dry weather with high wind speeds);
- More frequent inspection or review of construction activities; and
- Enhanced procedures for community relations and notification.

Because of the temporary nature of the intended construction activities, and the anticipated mitigation measures to be implemented, air quality monitoring in the community is not expected to be needed for this project. However, any Occupational Safety and Health Administration requirements for air quality monitoring for worker health and safety, or for confined space entry, would need to be satisfied by the construction contractor.