Chapter 3 – Alternatives Analysis and Concept Design

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3. ALTERNATIVES ANALYSIS AND CONCEPT DESIGN

3.1. Introduction

As noted in Chapter 1, the ENF for the SSX project identified a number of alternatives that would be evaluated as part of environmental review. The SSX project alternatives were categorized into (1) South Station Terminal - Joint/Private Development alternatives, and (2) Layover Facility Site alternatives. The four South Station Terminal - Joint/Private Development alternatives developed and presented in the ENF are:

- No Build Alternative
- Alternative 1 – Transportation Improvements Only
- Alternative 2 – Joint/Private Development Minimum Build
- Alternative 3 – Joint/Private Development Maximum Build

The Joint/Private Development Build Alternatives primarily are distinguished by the degree to which private development would or would not be accommodated. Alternative 1 would not provide for potential private development at South Station. Alternatives 2 and 3 represent the lower and upper bounds of potential private development at South Station. To the extent that the environmental impacts of the future private development are not addressed in the evaluation of the SSX project, additional MEPA filings may be necessary. Additionally, future private development would require filings with the City of Boston pursuant to Article 80 of the Boston Zoning Code. All Build Alternatives would include construction of additional layover facilities at one or more sites to service South Station operations.

Although demolition of the USPS facility after it is vacated is part of the SSX project, the relocation of the USPS facility is not part of the SSX project and is not included in this alternatives analysis. The USPS would determine the future location(s) to which its operations would be relocated, and the facility relocation would be subject to its own environmental review as required by state and federal regulations.

Since the ENF, MassDOT has further evaluated concepts related to four primary areas for the SSX project:

- Track configuration and platform alternatives;
- Station concept design;
- Layover facility site concepts; and
- Joint/private development alternatives.

For each of these project elements, alternatives were considered and/or concepts were further developed, which is described in more detail in this chapter. As part of this process, concept designs were developed for the track, station, layover and joint/private development elements of the project. MassDOT developed concepts or design principles for each project element, dismissed those that were not feasible, and identified those concepts that would best meet the goals of the projects, while being compatible with the other project elements. These concepts were incorporated into the Build Alternatives previously identified in the ENF and then advanced into environmental review.

The following section describes the existing conditions of the SSX project sites under consideration; a description of the No Build Alternative; a discussion of the process utilized to evaluate and further the concept design of the track, station, layover and joint/development elements of the project; and a summary of the proposed alternatives that are the subject of this DEIR. Descriptions and plans of the

existing conditions of the project sites are provided in the following sections. Proposed concept plans for the SSX project alternatives are presented at the end of this Chapter.

3.2. Existing Conditions

The SSX project consists of the 49-acre site located in and around the existing South Station Transportation Center, which consists of the South Station Rail Terminal, Bus Terminal and existing USPS property and adjacent roadways. Additionally, the SSX project includes evaluation of three potential layover facility sites, located at Widett Circle, Beacon Park Yard, and Readville-Yard 2. Each of these sites are shown in Figure 3-1. The following sections describe the existing conditions at each of these four sites.

3.2.1. South Station

The South Station site is located near Chinatown, Fort Point Channel, and the South Boston Waterfront/Innovation District. The approximately 49-acre site includes the following: South Station Rail/Transit Terminal; South Station Bus Terminal; and USPS General Mail Facility/South Postal Annex, including that portion of Dorchester Avenue fronting the site and running parallel to 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. Figure 3-2 presents the existing South Station site, including terminal, approach interlockings and key facilities.

The South Station Terminal area currently consists of 13 tracks, eight platforms, and a system of trackwork (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 west and the MBTA's Fairmount Line and Old Colony Railroad from the south/east. There are nine main line approach tracks that currently converge into the South Station terminal area. Of these nine tracks, five arrive at South Station from the west, consisting of the NEC Main Line, which operate on Tracks 1, 2, and 3, and the Framingham/Worcester Line, which operates on Tracks 5 and 7. The remaining four tracks arrive at South Station from the south, and consist of the Fairmount Line, which operates on the Fairmount Line/Dorchester Branch tracks and the Old Colony Line, which operates on Old Colony tracks. Amtrak and the MBTA currently utilize one main and two approach interlockings for routing trains into and out of South Station. The three South Station interlockings, in order from closest to most distant from South Station, are as follows: Tower 1, Cove, and Broad Interlockings. Other components of the rail system are signal systems, traction power, overhead contact system (OCS), communications, and civil works as well as appurtenant structures.

Existing South Station platforms are 17 feet-6 inches wide and of varying lengths. Existing platform track lengths limit the potential to provide the longer trainsets required to meet the future demands. While nine of the existing platform tracks can accommodate the future longer platform needs, four of the platform tracks are limited in length. Specifically, three of the existing tracks can hold trainsets[1] up to seven-cars long each, and one track can hold a trainset up to six cars long. Mid-platform boarding[2] is also currently not an option at South Station, as the only access to the main station headhouse is from the north end of the platforms, which creates crowded conditions for passenger alighting and boarding.

[1] A trainset describes the physical makeup of a combination of locomotives and coaches coupled together and operating as one unit.
[2] Stations with mid-platform boarding allow for passengers to access the platforms at locations other than the end, via stairs, escalators, ramps or elevators. This alleviates congestion when boarding or alighting trains by spreading out the flow of passengers over a larger number of entrances to the platform area.

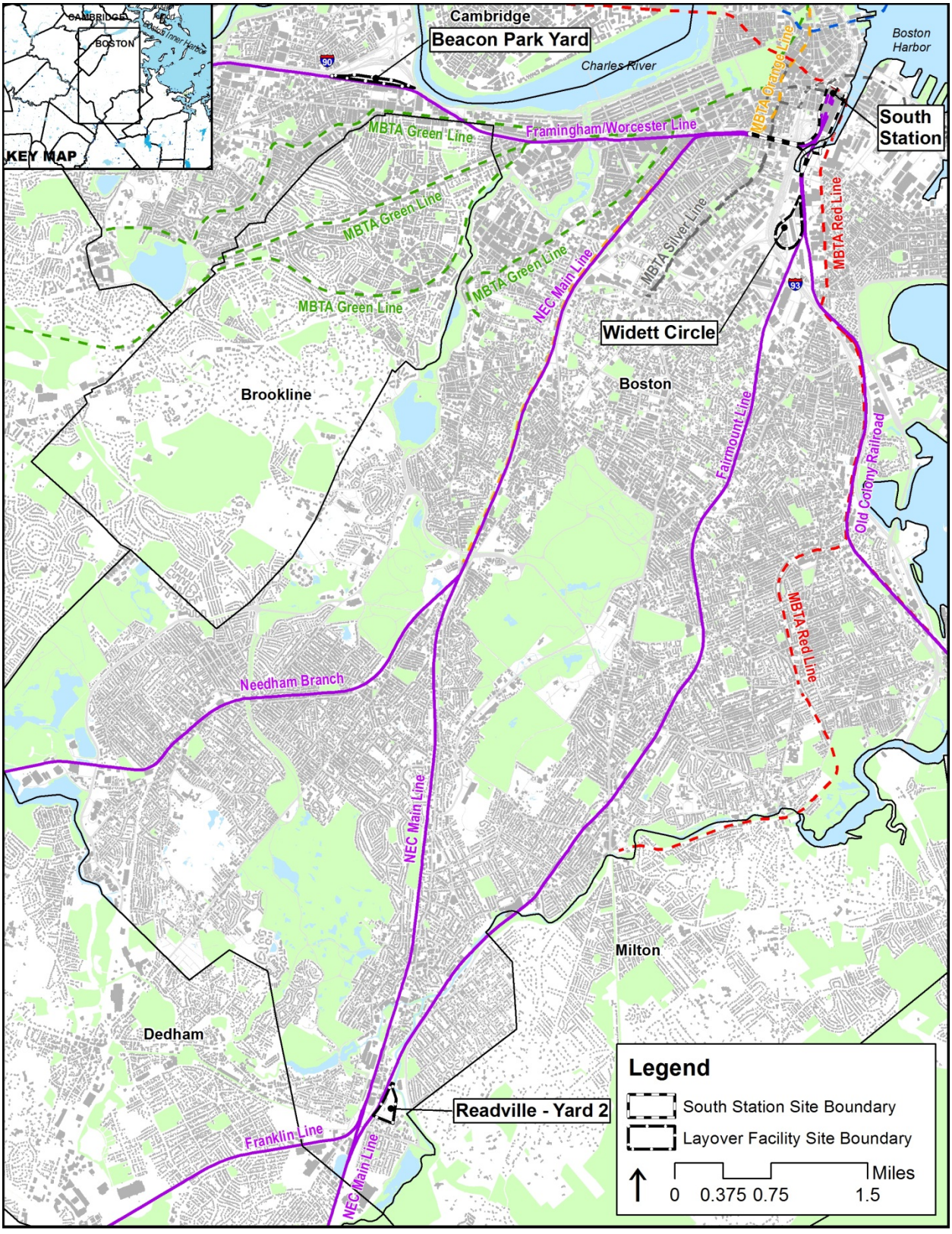


Figure 3-1—SSX Project Sites

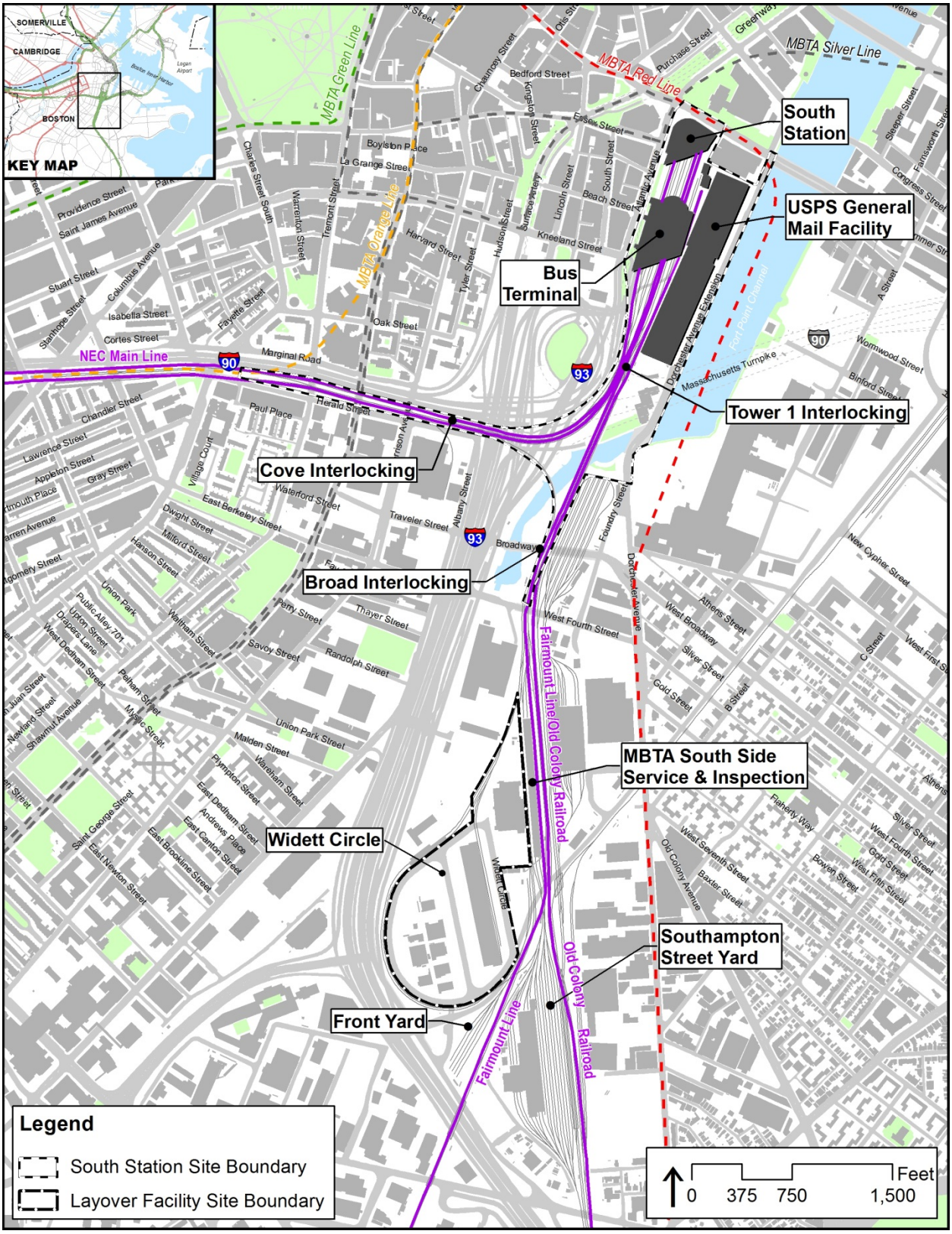


Figure 3-2—South Station Project Site: Terminal, Approach Interlockings and Key Facilities

Prior to the expansion of South Station, it is anticipated that the site will include the planned South Station Air Rights (SSAR) project, consisting of approximately 1.8 million sf of mixed-use development to be located directly above the railroad tracks at the existing South Station headhouse.[3] The SSAR project will also include expansion of the existing bus terminal towards the existing headhouse. The SSAR project was approved by the Secretary of EEA in 2006; however it has not yet begun construction. Nonetheless, for environmental review of the SSX project, the SSAR project is assumed to be built for the future year analysis, and is part of the SSX project's No Build Alternative. Coordination of the design elements of the SSAR project and the SSX project will be required in the next phase of project development. Consideration of the interrelationship of the two project's design elements, such as platform lengths, column placement and passenger access, will be carefully reviewed to ensure consistency in planning and design.

3.2.2. Layover Facility Sites

Amtrak and the MBTA currently use four existing layover[4] yards to support South Station operations: Amtrak's Southampton Street Yard, Amtrak's Front Yard, MBTA's South Side Service and Inspection (S&I) Facility, and MBTA's Readville – Yard 2. All of Amtrak's existing layover needs (daytime and overnight) are accommodated at the Southampton Street Yard, which allows the MBTA to utilize a portion of the Amtrak yards during the midday hours. Current MBTA service levels require daytime layover space for 28 trainsets, but space exists only for 22 trains. This shortfall of six layover spaces requires the MBTA to store non-revenue trains at the station platforms while waiting for available slots at the existing south side layover facilities, limiting station capacity.

The SSX project includes the evaluation of three potential layover facility sites, Widett Circle, Beacon Park Yard, and Readville – Yard 2, to expand existing layover capacity and meet current and future South Station layover needs.

Widett Circle

The Widett Circle site, totaling approximately 29.4 acres, is located in South Boston along the MBTA's Fairmount Line, approximately one track-mile from South Station. It is comprised of two parcels, primarily in private ownership: Cold Storage and Widett Circle. Cold Storage, approximately 6.6 acres, located primarily at 100 Widett Circle, currently houses a temperature controlled food storage and distribution facility, owned by Art Mortgage Borrower Propco 2006 2 LP, and used by Americold/Crocker & Winsor Seafoods. The building has an active rail siding served by CSX Transportation, Inc. (CSXT) with space for six freight cars. A change in ownership of the Cold Storage parcel within the Widett Circle site is anticipated. In October 2013, Celtic Recycling, LLC received approval from the Massachusetts Environmental Policy Act (MEPA) Office (EEA No. 15070) to renovate and convert existing facilities at the Cold Storage parcel, located at 100 Widett Circle, into a material recycling facility. Widett Circle, located primarily at 1 and 2 Foodmart Road, is owned by The New Boston Food Market Development Corporation and is made up of approximately 30 units leased to multiple businesses in the food processing, food storage, and food logistics industry.

Beacon Park Yard

The Beacon Park Yard site, totaling approximately 30 acres, is located in Allston along the MBTA's Worcester Line approximately 3.8 track miles from South Station. The site served for many years as a

[3] 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).
[4] A layover yard is a place to park train vehicles midday or overnight, as well as to perform light maintenance and cleaning functions as necessary.

major freight rail yard and intermodal terminal in Boston for CSXT, which recently relocated to central Massachusetts. It contains a number of buildings that formerly supported various railroad functions, including a freight rail yard, bulk transfer facility, intermodal facility, and engine facility. Beacon Park Yard is owned by Harvard University and remains encumbered by CSXT's operating rights. 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.

MassDOT intends to expand layover capacity to the west and south of South Station to provide a more-balanced mix of layover sites. MassDOT has identified the preferred location in the west as Beacon Park Yard.

Readville – Yard 2

Readville - Yard 2, totaling approximately 17.4 acres, is located in the Readville section of Hyde Park in Boston, at the intersection of the NEC and the MBTA's Fairmount Line, approximately 8.8 track-miles from South Station. Owned by the MBTA, Readville - Yard 2 is a maintenance repair facility and the largest layover yard used by the MBTA for its south side commuter service. The layover yard has a total of 12 tracks, 10 of which are used for storage and two of which are used for switching and movement of trains. Additionally, the building on site has three tracks for maintenance functions. The yard also contains several railroad support structures. The MBTA currently uses Readville – Yard 2 for midday layover storage of 10 trainsets of variable lengths.

3.3. No Build Alternative

The No Build Alternative consists of the existing transportation facilities and services and all future committed transportation improvement projects in the vicinity of South Station. It represents the base condition against which the transportation benefits and environmental impacts of the future baseline and Build Alternatives are measured.

3.3.1. South Station Site Conditions

In the No Build Alternative, South Station would remain as it currently exists, with 13 tracks and eight platforms. With the exception of activities conducted as part of the MBTA's State of Good Repair (SGR) program, the terminal operations, including Tower 1 and the approach interlocking configuration, would remain as they currently exist.

The USPS General Mail Facility would not be relocated in the No Build Alternative. The majority of Dorchester Avenue at the site would remain in private use by the USPS in support of its operations. Only a minor portion of the roadway would remain available for public use.[5] Other than retail that could occur within the existing headhouse, there would be no private development associated with the South Station site other than the SSAR project previously approved by the Secretary of EEA.

In the No Build Alternative, there would be no public access to the waterfront at the South Station site. The Harborwalk on the western side of Fort Point Channel would remain fragmented. The privately-owned Dorchester Avenue that fronts the USPS facility currently creates a gap in the Harborwalk, between Rolling Bridge Park (to the south) and the Federal Reserve Bank Building (to the north). Similarly, bicycle infrastructure facilities in the vicinity of the South Station site would remain separated

[5] Extending south of Summer Street, generally unrestricted public access currently is provided along approximately 400 feet of Dorchester Avenue for customer use of USPS facilities. The MBTA also maintains a permanent easement of approximately 200 feet along Dorchester Avenue for pedestrians and vehicles.

from other existing and proposed bicycle facilities, including the South Bay Harbor Trail and the Summer Street Corridor cycle track. Figure 3-3 shows the connectivity of the Harborwalk and bicycle trails.

In the No Build Alternative, the current roadway congestion in the immediate vicinity of South Station, especially curbside congestion along Atlantic Avenue, is expected to worsen due to the anticipated increase in traffic volumes associated with area-wide growth. Figures 3-12 through 3-16 present the No Build Alternative at the South Station site.

3.3.2. Layover Facility Conditions

Amtrak and MBTA Layover Facility Operations

In the No Build Alternative, Amtrak and the MBTA would continue to use Amtrak's Southampton Street Yard and the MBTA's Readville Yard – 2 and Southside S&I facility as midday layover sites to support South Station operations. Due to the planned expansion of the MBTA's fleet to all eight-car trainsets from its current use of varied trainsets (from five-car to eight-car), the MBTA would experience reduced layover capacity at Southampton Street Yard. Amtrak's Front Yard, currently used by the MBTA for midday layover and capable of storing MBTA trainsets of six coaches or less, would not be available in the No Build Alternative, as the yard is not long enough to accommodate the MBTA's eight-car trainsets. The net result would be a layover shortage that would force the MBTA to increasingly rely on storing non-revenue trains at South Station platforms, at outlying facilities, or by moving around the MBTA system while waiting for available slots at the existing south side layover facilities.[6]

Layover Facility Sites

In the No Build Alternative, it is anticipated that the Widett Circle site would remain in private ownership. In October 2013, Celtic Recycling, LLC received approval from the Massachusetts EEA No. 15070 to renovate and convert existing facilities at the Cold Storage parcel into a material recycling facility.[7] It is anticipated that the Widett Circle parcel would continue to be occupied by businesses in the food processing, food storage, and food logistics industry.

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. Section 3.6.3 describes MassDOT's plans relative to this site.

As previously cited, in the No Build Alternative, the MBTA would continue use of Readville – Yard 2 for the storage of 10 trainsets to support South Station operations.

[6] Massachusetts Department of Transportation. *Layover Facility Alternatives Analysis*, Version 3. Draft. November 2013
[7] Massachusetts Executive Office of Environmental Affairs. *Final Record of Decision: Celtic Recycling Material Recycling Facility (EEA No. 15070)*. October 11, 2013.

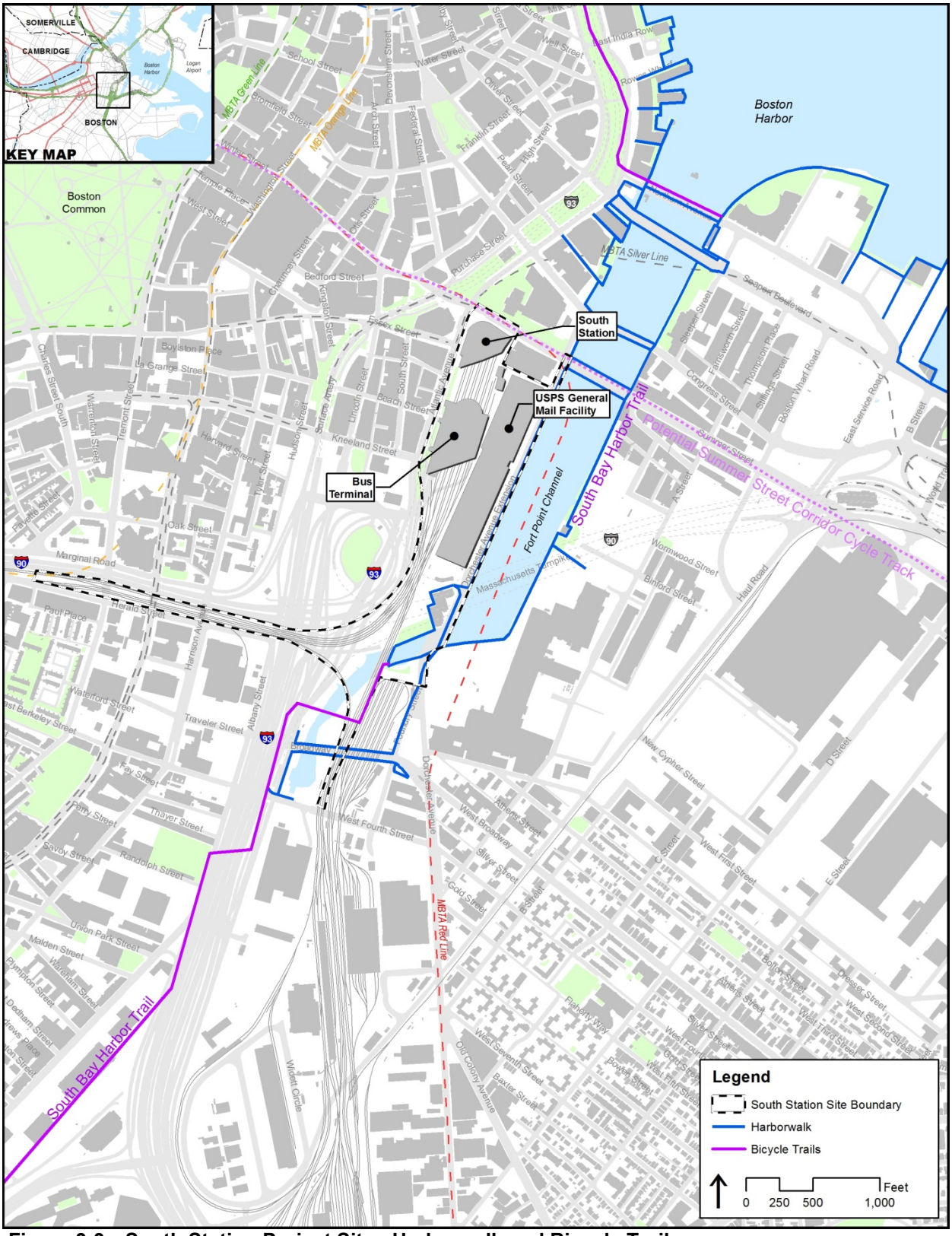


Figure 3-3—South Station Project Site: Harborwalk and Bicycle Trails

3.4. Terminal Track Configurations Alternatives Analysis

3.4.1. Initial Screening

By the year 2035, 554 daily train movements are anticipated at South Station, consisting of 80 weekday Amtrak revenue trips, up to 315 weekday MBTA commuter rail revenue trips, and 159 Amtrak and MBTA non-revenue trips.[8] To accommodate the 2035 operating plan, MassDOT determined that terminal expansion to 20 tracks is needed. A determination on the size of the expanded South Station terminal tracks was made previously through operations modeling and rail simulation.[9] Simulation tests showed that 20 station tracks represent the appropriate number for an expanded station, taking into account Amtrak's and the MBTA's future service plans and geographic constraints of Tower 1 Interlocking. The use of 19 tracks was contemplated, but the study found that while the service plan was possible, delays could result. As such, it would be preferable to have 20 tracks for the expansion program. A new station with 20 tracks would provide the appropriate size to allow train volumes to pass through the Tower 1 Interlocking. MassDOT also established platform capacity requirements to accommodate Amtrak's future berthing requirement of 1,050 feet and the MBTA's future berthing requirement of 850 feet.

MassDOT's development of track configuration alternatives for expansion of the South Station terminal facilities onto the adjacent USPS facility site included initial assessments of alternative scenarios that were categorized as "unconstrained" and "constrained" rail alternatives. The Appendix 2 - *Terminal Track Configuration Alternatives Analysis – Tier 1 Screening Technical Report* contains additional information on the development of these scenarios and the process by which they were screened.

"Unconstrained" rail alternatives were defined by those that are not limited by existing site boundaries and also include opportunities located outside of the original South Station site study area. MassDOT determined that while these alternatives would accommodate proposed Amtrak and MBTA service expansions, the challenges associated with land acquisition, construction phasing, and separated passenger rail services would outweigh potential benefits. As a result, three of these alternatives were not advanced, and one was refined and advanced for further analysis as part of the "constrained" rail alternatives.

"Constrained" rail alternatives focused on minimizing impacts to existing infrastructure within the South Station site study area, including the SSAR project infrastructure, while still improving operations to and from the terminal. MassDOT developed four of these alternatives (shown in Table 3-1) comprising various layouts at the South Station Terminal and Tower 1 Interlocking that would optimize operational flexibility, minimize disruption to existing operations, and/or maximize joint development potential. Additionally, improvements to Cove and Broad Interlocking would be implemented in all of the track configuration alternatives. Each of these alternatives was screened through a set of evaluation criteria:

- *Platform Rating*, including platform accessibility by each service route and ability of a platform to accommodate Amtrak and MBTA berthing requirements.
- *Infrastructure Maintenance Rating*, correlated to the amount of rail infrastructure installed at the interlockings.
- *Constructability Rating*, measured by the degree to which the alternatives would minimize impacts to existing infrastructure and minimize disruption to passenger service.
- *Capital Cost Rating.*

[8] Massachusetts Department of Transportation. *Basis of Operations Analysis and Assumptions Verification Report*, Version 3. June 2014.
[9] Massachusetts Department of Transportation, *South Station HSIPR Expansion Project, Technical Memorandum: Network Simulation Analysis of Proposed 2030 MBTA/Amtrak Operations at South Station*. Final Report. August 1, 2010. http://www.massdot.state.ma.us/Portals/25/Docs/FRA_HSIPR/Appendix_A1.pdf.

As shown in Table 3-1, two terminal track configuration alternatives rated consistently lower than the other two alternatives. Constrained Rail Alternative 1 - Redesign/Redevelopment, which would involve a complete redesign of South Station, was dismissed due to its low constructability rating and high capital and maintenance costs. Constrained Rail Alternative 4 - Maximize Overbuild Potential, which would require a total redesign of existing tracks, platforms, and the overhead contact system (OCS) without impacting the existing SSAR project overbuild support structures, was dismissed because it would not meet Amtrak's future platform berthing requirements at any of the station tracks and would only meet the MBTA's current platform berthing requirements at eight out of 20 station tracks. Additionally, Constrained Rail Alternative 4 would involve high capital costs with a low constructability rating.

Table 3-1—Track Configuration Tier 1 Screening, Constrained Rail Alternatives 1 through 4

Constrained Rail Alternative	Platform Rating		Infrastructure Maintenance Rating	Constructability Rating	Capital Cost Rating
	Accessibility	Berthing			
1 – Redesign/Redevelopment	1	1*	4	4	4
2 – Streamline Operations	2*	1*	2*	2	2
3 – Minimize Disruption to Operations	2*	3	1	1	1
4 – Maximize Overbuild Potential	4	4	2*	3	3

A rating of 1 indicates the most favorable alternative in comparison to other alternatives for the specific criterion. A rating of 4 indicates the least favorable alternative in comparison to other alternatives for the specific criterion.
*Indicates that the alternatives have equal ratings in the criterion.

3.4.2. Initial Screening Results

As noted in Appendix 2 - *South Station Terminal Track Configuration Alternatives Analysis – Tier 1 Screening Technical Report*, Constrained Rail Alternatives 2 and 3 had the most favorable ratings and were advanced to a Tier 2 analysis.

MassDOT's track design focuses on optimizing operational flexibility, maximizing service growth potential, & minimizing service disruptions

Constrained Rail Alternative 2 would streamline operations at South Station: the NEC and Worcester/Framingham routes would access the westerly station tracks and the Fairmount and Old Colony routes would access the easterly station tracks. This setup would streamline operations by redesigning Tower 1 Interlocking and reducing the number of conflicting movements through the interlocking. Constrained Rail Alternative 2 also would allow access to the S&I facility for 18 of the terminal tracks. To achieve this operational optimization, however, Tower 1 Interlocking would require extensive reconfiguration. While the reconfiguration could be staged to avoid completely halting South Station service during construction, the impact to existing South Station operations in Constrained Rail Alternative 2 could be substantial.

Constrained Rail Alternative 3 would result in minimal impact to the Tower 1 interlocking configuration, which would minimize disruptions during the SSX project construction period. Additional terminal tracks would be accommodated by adding special trackwork to the existing interlocking, with minimal impact to existing operations. In addition to minimizing construction staging impacts, Constrained Rail Alternative 3 would provide maximum platform accessibility. Trains approaching South Station via the Fairmount and Old Colony routes would have universal platform accessibility. For the Framingham/Worcester and NEC service routes, platform access would vary depending on whether the crossover moves would be made at Tower 1 or Cove interlocking. If the crossover moves were made at

Cove Interlocking, then the Framingham/Worcester and NEC service routes would have access to station Tracks 1 through 14. This increased flexibility would allow for greater operational opportunities for dispatchers in the event of delays. This setup would allow access to the S&I facility for all tracks.

Compared to Constrainted Rail Alternatives 1 and 4, Constrained Rail Alternatives 2 and 3 would be less impactful to the existing infrastructure, as they would maintain the existing South Station track and platform configuration and expand the terminal tracks to the east onto the USPS property with the construction of seven new tracks and associated platforms parallel to the existing tracks. Both alternatives would increase overall terminal capacity by approximately 55%. On the newly constructed platforms, both alternatives would create new 26-foot wide platforms that meet current National Fire Protection Association (NFPA) and American with Disabilities Act (ADA) standards. Both alternatives would avoid impacts to the existing South Station Bus Terminal and would minimize structural impacts to future bus expansion opportunities as proposed within the SSAR project. By expanding rail capacity without impacting bus service, Constrained Rail Alternatives 2 and 3 would increase opportunities for multimodality, as all existing and new platforms could have direct access to the bus terminal, as well as other modes available at South Station. Additionally, Constrained Rail Alternatives 2 and 3 would provide for expanded opportunities for street-level retail along Dorchester Avenue due to the proposed track footprint. Early analysis indicates that there would be enough land for mixed-use development on the ground supporting air rights over the tracks.

Constrained Rail Alternatives 2 and 3 would reconfigure the approach interlockings at Cove and Broad. The proposed future 20-track South Station layout would support up to eight trains moving simultaneously through Tower 1 Interlocking. Improvements at the approach interlockings would allow crossover movements to occur at a higher speed, making the necessary movements more efficient and pushing conflicting movements to an area of higher-speed crossovers and away from Tower 1 Interlocking. Approach interlocking improvements would include the installation of new crossovers; track realignment; and, at Broad interlocking, the installation of a third running track.

3.4.3. Next Steps – Terminal Track Configurations

In the Tier 2 analysis, MassDOT will conduct operations simulation modeling of Constrained Rail Alternatives 2 and 3, which would be evaluated for their ability to accommodate Amtrak's and the MBTA's future service plans; meet project OTP and delay goals; and to allow parallel moves between Tower 1 Interlocking and the terminal. MassDOT would also reassess platform capabilities and berthing abilities, including the number of platforms accessible to each track. MassDOT will also evaluate these alternatives based on their impacts to existing infrastructure, construction staging, capital and maintenance costs, and operations with respect to accommodating and coordinating other SSX project elements, including the station and midday layover facility sites, as well as the SSAR project.

3.5. Station Conceptual Design

3.5.1. Initial Screening

MassDOT's goals for the expansion of South Station focus on transportation improvements, passenger experience, and intermodal connections. Initial unconstrained concepts included expanding the South Station footprint to include the USPS facility site and 245 Summer Street, as well as relocating or altering the SSAR project. After an initial screening, MassDOT opted to eliminate concepts that would involve acquisition of 245 Summer Street or would relocate or substantially alter the SSAR project. By maintaining a station boundary inclusive of the current station and USPS site, MassDOT is able to progress station designs that are more readily constructible and financially feasible while continuing to meet its design principles.

3.5.2. Initial Screening Results - Design Principles

MassDOT has established a series of design principles for the South Station headhouse expansion, addressing planning and urban design, station architecture, access and connectivity, and historic preservation. The design principles are as follows:

- Design an exemplary new passenger terminal with welcoming and functional public spaces, including: natural light; improved circulation and egress measures; safety, security, and emergency response enhancements; and improved passenger amenities (e.g., weather protected boarding, ticketing, and waiting areas).
- Optimize connectivity for pedestrians (including commuters and visitors) to the Financial District, Chinatown, Leather District, South Boston Waterfront/Innovation District, Convention Center, the Rose Kennedy Greenway, Harborwalk, and other downtown destinations and activities.
- Maximize the station's inter-modality by promoting connections to multiple transit services, airport access, walking, bicycling, and taxis.
- Design project components to reduce carbon production and incorporate state-of-the-art technology in green design.
- Enable South Station and its environs to be a great urban district that connects to adjacent neighborhoods and open spaces, including the waterfront, through the thoughtful programming of uses and design of the public realm, and by leveraging associated development opportunities.
- Create a dynamic mixed-use development in the station that includes a vibrant mix of retail to ensure the creation of a destination beyond transportation, but balanced enough so as not to disrupt the station's primary transportation functions.
- Activate the building edges and streetscapes on all sides of the station to draw pedestrians to Dorchester Avenue, Summer Street, and Atlantic Avenue, with the Dewey Square entrance serving as the primary focal point of the station.
- Create a work of civic architecture that celebrates the sense of arrival and whose components comprise a contemporary and innovative design solution that complements the historic significance of the 1899 headhouse.
- Recognize and protect the historic integrity of the existing South Station headhouse and its value as a public space. Consider historic precedent in the design and integrate the expansion design with the existing station architecture. Maintain a public presence in the existing lobby, including the possible inclusion of information kiosks and displays, as well as retail.

MassDOT's key station design objective is to create an adequately-sized, integrated, and multimodal station

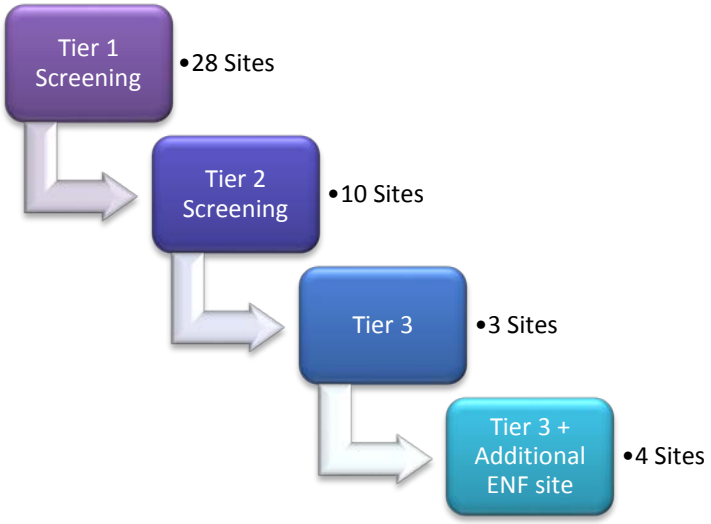
3.5.3. Next Steps – Station Concept Design

While engaging the public in the design of the expanded station, MassDOT will consider station design concepts incorporating the desired design criteria. Design concepts will be evaluated relative to their ability to meet MassDOT's design principles for South Station, as well as the project purpose and need and performance objectives as determined. It is anticipated that the design evaluation and review will continue through the FEIR process. The FEIR will present the selected station expansion design as the preferred alternative. Further detail will be available on the MassDOT website as the public engagement process proceeds.

3.6. Layover Facility Site Alternatives Analysis

3.6.1. Initial Screening

MassDOT developed a tiered alternatives analysis process to identify potential locations to meet South Station's future layover needs. Initially, MassDOT identified 28 alternatives for Tier 1 screening. The Tier 1 screening evaluated the ability of each site to meet the overarching transportation and program objectives for the SSX project, using criteria such as ease of land acquisition; effect on operations; and ability to integrate the site into the existing rail and roadway networks. Of the 28 candidate sites, 10 locations advanced to the Tier 2 evaluation. In the Tier 2 screening process, MassDOT developed conceptual designs and preliminary operating plans, and identified infrastructure requirements. Seven out of the ten Tier 2 alternatives did not perform well when compared to the Tier 2 evaluation criteria: consistency with adopted plans and zoning; ability to meet location requirements; railroad operations, environmental impacts; site suitability; and capital improvements. Of the ten candidate sites, three locations best met the Tier 2 criteria and were advanced to the Tier 3 evaluation. These sites included Beacon Park Yard, the Boston Transportation Department (BTD) Tow Lot (located on the Fairmount Line approximately one track-mile from South Station with BTD and Department of Public Works [DPW] functions), and Readville - Yard 2.



In the Secretary's Certificate on the ENF, one additional site was requested for further evaluation: the "Widett Circle" area, comprised of Widett Circle and Cold Storage, two Tier 2 sites.

MassDOT tested layover combinations that would meet rail operational requirements, resolve capacity problems & maximize cost-efficiencies

MassDOT evaluated the four alternative sites, Beacon Park Yard, BTD Tow Lot, Readville - Yard 2, and Widett Circle/Cold Storage (Widett Circle), in a Tier 3 screening. MassDOT determined that no single site could meet the physical and operational requirements to fully meet South Station's future layover needs. During Tier 3 screening, MassDOT tested combinations of the sites to determine their ability to best meet the layover needs of the SSX project, including assessing how each combination of sites would integrate with the existing four layover sites serving South Station. Multiple conceptual layouts were developed for the Tier 3 sites to identify the best combination of sites when compared to three screening criteria: ability to meet layover capacity and program needs, railroad operational requirements, and order-of-magnitude cost estimates.

3.6.2. Initial Screening Results

MassDOT next performed the layover Tier 3 screening process, which focused on determining the feasibility and viability of each site. A number of concepts were developed to determine the impact that a layover facility would have on each site and its surrounding area.

BTD Tow Lot

The BTD Tow Lot site is primarily owned by the City of Boston for the storage of impounded vehicles from within Boston. Use of this site would also require the use of a large portion of the adjacent Boston Department of Public Works (DPW) property. This site would also require an easement from Amtrak.

With greater coordination with the City of Boston, MassDOT was able to obtain and analyze more detailed information regarding the complexities of the critical city operations performed on the Tow Lot site. The City of Boston identified the following requirements for any relocation of BTD uses currently at that location:

- The site must be centrally located within the city of Boston.
- The site must maintain a close proximity to public transit.
- The site must maintain good highway access.
- The site must be able to provide adequate space (greater than 20 acres) to fulfill all existing site functions.

Use of the Tow Lot site also had a significant impact on the adjacent DPW facility and would require major modifications and relocation of DPW functions to another site. DPW functions that would be impacted include a fueling facility, salt pile, single-story garages, and a ramp that accesses the west side of the parking garage. Additionally, some of these facilities currently are being renovated or are scheduled for major rehabilitation in the near future. Input received from officials indicated that relocating these functions would render the facility inoperable and, therefore, a full relocation of the DPW facility would be required.

MassDOT attempted to identify potential relocation sites that might satisfy the requirements of BTD and DPW. No site was determined to meet the City's criteria for a suitable relocation site for BTD and DPW facilities. Due to the considerable impacts this site would have on critical city operations, and the inability to identify a suitable relocation site that would meet BTD's and DPW's requirements, MassDOT determined that acquisition of the BTD Tow Lot site is impractical and eliminated the BTD Tow Lot site from further consideration.

Widett Circle Site

Widett Circle could provide layover space for up to 30 eight-car trainsets. Support facilities would include a crew building, support shed, and power substation, totaling approximately 44,000 sf.

Beacon Park Yard Site

Beacon Park Yard could provide layover space for up to 20 eight-car trainsets. Support facilities would include a crew building, support shed, and power substation, totaling approximately 31,400 sf.

Readville – Yard 2 Site

Readville – Yard 2 could expand the existing layover facility by up to eight 8-car trainsets, for a total layover space of 18 eight-car trainsets. Support facilities would include expansion of the existing crew building and support shed, and construction of a power substation, totaling approximately 11,700 sf. The expansion of the 17-acre Readville – Yard 2 footprint would increase the facility at existing Readville Yard by approximately seven acres, of which the MBTA currently owns the majority. However, a partial taking of approximately 0.7 acres of an adjacent privately-owned property, owned by James Grant Co., would be required to complete the expansion.

MassDOT determined that scenarios that maximized use of the Widett Circle and Beacon Park Yard sites, in combination with additional capacity at Readville – Yard 2, have the potential to provide the greatest capacity and operational flexibility when compared to other scenarios. Based on the results of the Tier 3 screening, MassDOT selected the combination of Widett Circle, Beacon Park Yard, and Readville – Yard 2 to continue in the DEIR analysis. The environmental analysis of each of the sites can be found within this document.

3.6.3. Next Steps - Layover

MassDOT intends to expand layover capacity to the west and south of South Station to provide a more-balanced mix of layover sites. MassDOT has identified the preferred location in the west as Beacon Park Yard. MassDOT is simultaneously performing environmental review of the I-90 Allston Interchange project, which is located in an area that includes the Beacon Park Yard rail site and I-90 (the Massachusetts Turnpike). The Interchange project is examining how to best realign the transportation assets in this area while also addressing significant structural needs; highway operational changes (the introduction of All-Electronic Tolling); the construction of a commuter rail station; and the introduction of significant off-road multimodal connections throughout the area. MassDOT has determined that it is appropriate to consider these potential transportation changes under a single environmental review process. Therefore, MassDOT plans to continue environmental review of the Beacon Park Yard site as a layover facility as part of the I-90 Allston Interchange project's environmental review. An ENF for that project is anticipated to be filed with the Secretary of EEA in late 2014 concurrent with this DEIR.

MassDOT is continuing assessments on the remaining layover facility sites on the south at Widett Circle and Readville – Yard 2 to include a phasing plan that addresses sequencing and timing of the sites to meet terminal operational requirements. Following these analyses, and incorporating the results of the environmental impact assessments described in Chapter 4, MassDOT will select the preferred alternative for the layover facility sites on the south serving South Station, and present its finding in the SSX project FEIR. Any environmental impacts resulting from future changes in the use of Beacon Park Yard layover in the west would be analyzed in the I-90 Allston Interchange project's environmental review.

3.7. Joint/Private Development Alternatives Assessment

At the South Station site, MassDOT developed three joint/private development alternatives, primarily distinguished by the degree to which private development would or would not be accommodated. MassDOT's development of the joint/private development alternatives was based on a number of criteria, including:

MassDOT established joint/private development alternatives based on station requirements, engineering considerations, urban design criteria, and financial feasibility

- Existing property rights, including public and private ownership, easements, and agreements.
- Station expansion requirements, including circulation, access, egress, and track requirements.
- Engineering considerations, including ventilation requirements, and determination of available column locations for supporting joint development structures.
- Urban design criteria, Chapter 91 regulations, local zoning building heights and massing requirements, development program, and parking ratio recommendations from the BRA and BTD.
- Financial feasibility assessments, including evaluation of real estate market conditions and potential revenue from air rights leasing.

The following sections provide a summary of the three joint/private development alternatives at the South Station site.

3.7.1. Alternative 1 – Transportation Improvements Only

In Alternative 1, 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 sf, would be expanded by approximately 400,000 sf, consisting of passenger platform and concourse levels with passenger support services, including amenities such as retail and food and beverage sales. Capacity improvements would include construction of seven new tracks and four new platforms for a total of 20 tracks and 11 platforms. Additionally, several existing tracks and platforms would be reconfigured. Tower 1 and four approach interlockings would be reconfigured. Alternative 1 would not provide for potential private development at the South Station site, other than the previously-approved SSAR project.[10]

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 (including adjacent sidewalks and crosswalks). Restoration also would include construction of a long-awaited extension of the Harborwalk along a reopened Dorchester Avenue, extending for approximately 2,500 linear feet and providing approximately 1 acre of additional open space.

3.7.2. Alternative 2 – Joint/Private Development Minimum Build

Alternative 2 would include all of the transportation improvements provided in Alternative 1, as well as provisions for future private development at the South Station site by incorporating appropriate structural foundations into the overall station and track design.

[10] Programming of land resulting from replacement of USPS facility to be determined.

In Alternative 2, the potential for future private development at the South Station site would comply with existing state and local regulations, including existing Chapter 91 regulations regarding building height and setback from Fort Point Channel, Fort Point Downtown Municipal Harbor Planning Area requirements, and the Massachusetts Coastal Zone Management program. Future private development could include approximately 660,000 sf of mixed uses consisting of residential; office; and commercial uses, including retail and hotel, located in six separate buildings with open space and plazas. The land use program and conceptual joint development within the six buildings are described below in Tables 3-2 and 3-3 and shown on Figures 3-20 to 3-24.

Table 3-2—Alternative 2 – Joint/ Private Development Minimum Build Land Use Program

Land Use	Square Footage (sf)	Percentage
Residential	220,600	33%
Office	255,500	39%
Retail	79,300	12%
Hotel	104,600	16%
Total	*660,000*	*100%*
Parking	234 Spaces	

Building heights could range up to approximately 12 stories (reaching a maximum height of approximately 142 feet). Approximately 2 acres of land fronting Dorchester Avenue would be available for ground floor development; additional construction could occur via air rights over the expanded tracks and platforms.

Table 3-3—Alternative 2 – Joint/ Private Development Minimum Build Building Sizes

Building (JD1)	Building (JD2)	Building (JD3)	Building (JD4)	Building (JD5)	Building (JD6)	Total
115,500	100,500	130,600	122,500	89,500	101,400	660,000 sf

Development could include approximately 234 parking spaces, provided in structured underground parking.[11] In addition to the open space provided through the Harborwalk, Alternative 2 would provide approximately seven acres of ground level open space.

3.7.3. Alternative 3 – Joint/Private Development Maximum Build

Alternative 3 would include all of the transportation improvement provided in Alternative 1, as well as provisions for future private development at the South Station site by incorporating appropriate structural foundations into the overall station and track design.

As opposed to Alternative 2, Alternative 3 would not be limited to existing building height and setback requirements. In Alternative 3, the maximum potential for future private development at the South Station complex would only be limited by the Federal Aviation Administration's (FAA's) maximum building height limit of approximately 290 feet, pursuant to the Terminal Instrument Procedures (TERPS) regulations applicable to Boston Logan International Airport. As a result, Alternative 3 would require an amendment to the Municipal Harbor Plan, modifying applicable Chapter 91 regulations. Future private development could include approximately 2,000,000 sf of mixed uses consisting of residential; office; and commercial uses, including retail and hotel uses, located in six separate buildings with open space and plazas. The land use program and conceptual joint development within the six buildings are described below in Tables 3-4 and 3-5 and shown on Figures 3-25 to 3-29.

[11] Parking ratios were verified by BTD.

Table 3-4—Alternative 3 – Joint/ Private Development Maximum Build Land Use Program

Land Use	Square Footage (sf)	Percentage
Residential	774,700	38%
Office	917,300	45%
Retail	75,620	4%
Hotel	266,600	13%
Total	*2,034,220*	*100%*
Parking	506 Spaces	

Building heights could range up to approximately 21 stories (not exceeding a maximum height of 290 feet). Approximately 2.6 acres of land fronting Dorchester Avenue would be available for ground floor development; additional construction would occur via air rights over the expanded tracks and platforms.

Table 3-5—Alternative 3 – Joint/ Private Development Maximum Build Building Sizes

Building (JD1)	Building (JD2)	Building (JD3)	Building (JD4)	Building (JD5)	Building (JD6)	Total
266,600	290,900	501,100	439,200	340,520	195,900	2,034,220 sf

Development could include approximately 506 parking spaces, provided in underground structured parking.[12] In addition to the open space provided through the Harborwalk, Alternative 3 would provide approximately 6.6 acres of ground level open space.

3.7.4. Summary of Joint/Private Development Alternatives

Table 3-6 provides a summary table of transportation improvements proposed for the South Station site in Alternative 1 – Transportation Improvements Only, which are applicable to all Build Alternatives. All Build Alternatives would increase rail capacity by adding seven tracks and three platforms to existing South Station, for a total of 20 tracks and 11 platforms. Additionally, all Build Alternatives would provide for an expanded South Station headhouse in place of the existing USPS facility, and all Build Alternatives would reconstruct Dorchester Avenue, including extending the Harborwalk and constructing bicycle accommodations or cycle track.

Table 3-6—Proposed Transportation Improvements at the South Station Site

South Station Site Transportation Elements	Existing Conditions	SSX Program	Change from Existing
Rail Elements			
Tracks	13	20	7
Platforms	8	11	3
Facilities/Parking			
Terminal Expansion	--	403,000 sf	403,000 sf
USPS Facility	1,136,000 sf	0 sf	-1,136,000 sf
USPS Parking Spaces	242	0	-242
Dorchester Avenue			
Public Way (linear feet)	400 lf[a]	2,500 lf	2,100 lf
Travel Lanes (width)	---	two 11-foot	two 11-foot
Harborwalk (width)	---	20 feet	20 feet
Cycle track (width)	---	15 feet	15 feet

a Generally, unrestricted public access is provided over approximately 400 feet for customer use of USPS facilities. The MBTA maintains a permanent easement for pedestrians and vehicles over approximately 200 feet.

[12] Parking ratios were verified by BTD.

Table 3-7 provides a comparison table of elements proposed for the South Station site in the joint/private development alternatives.

Table 3-7—Comparison of Joint/Private Development Alternatives at the South Station Site

South Station Site Project Elements	Alternative 1		Alternative 2		Alternative 3	
	Program	Change from Existing	Program	Change from Existing	Program	Change from Existing
Facilities						
Joint Development	0 sf	--	660,000 sf		2,034,220 sf	
Net Change[a]		-733,000 sf		-73,400 sf		+1,301,220 sf
Parking Spaces						
Joint Development	0	--	234		506	
Net Change		-242		-8		264
Transportation						
Sidewalk width	32 feet	32 feet	32 feet	32 feet	12 feet	12 feet
South Station Connector Extension	--	--	1-way/25 ft 2-way/40 ft		1-way/25 ft 2-way/40 ft	
Joint Development/ ground level Open Space	6.6 acres	+3.9 acres	7.0 acres	+4.3 acres	6.6 acres	+3.9 acres

a Calculation of change from existing is derived from removal of USPS and addition of expanded SSX buildings.

3.7.5. Next Steps – Joint/Private Development Alternatives

MassDOT is conducting an in-depth financial feasibility analysis of the joint/private development alternatives to determine if the potential development opportunities would be financially viable from the perspective of the real estate industry, and to determine the revenues it could accrue with leasing the air rights to a developer. Following this analysis, and incorporating the results of the environmental impact assessments described in Chapter 4, MassDOT would select the preferred joint/private development alternative for the South Station site. MassDOT's findings would be presented in the SSX project FEIR.

3.8. DEIR Alternatives

For the SSX project, MassDOT considered alternative concept designs on the track configuration, station concept, layover facility sites, and joint/private development elements of the project. These analyses identified concepts for consideration and provided refinements to designs. From this analysis, the Build Alternatives for the DEIR were refined and utilized as the basis for the environmental analysis.

The concepts developed for the *track configuration, station design* and *layover facility sites* are the same in each Build Alternative and would result in no variations in environmental impacts across each alternative. Differences in the DEIR project alternatives apply only to the joint/private development alternatives. Each alternative includes an assessment of the environmental impacts for track configuration, station location and layover facility sites, as well as variations in the joint/private development program.

The concepts developed for the *track configuration, station design* and *layover facility sites* are the same in each Build Alternative and would result in no variations in environmental impacts across each alternative.

The four project alternatives developed and presented in this DEIR are:

- No Build Alternative.
- Alternative 1 – Transportation Improvements Only.
- Alternative 2 – Joint/Private Development Minimum Build.
- Alternative 3 – Joint/Private Development Maximum Build.

This DEIR provides an evaluation of the four proposed project alternatives. At this time, MassDOT has not identified a preferred alternative for all project components. However, through this evaluation, MassDOT has determined that a layover facility located west of South Station is needed and, therefore, has identified Beacon Park Yard as a component of the preferred alternative. After completion of this DEIR process, MassDOT would move to fully identify all components of the preferred alternative for the project. Said preferred alternative would be identified in the FEIR.

3.9. SSX Project Alternatives Drawings

A number of graphics were developed to demonstrate the existing and proposed conditions that were utilized in the development of project concepts related to layover, joint/private development and Dorchester Avenue. The SSX project concept drawings that are provided on the following pages include:

- Layover facility site alternatives, consisting of the Widett Circle, Beacon Park Yard, and Readville – Yard 2 sites (Figures 3-4 through 3-6).
- Joint/Private Development alternatives, including existing conditions and the No Build Alternative at the South Station site (Figures 3-7 through 3-29).
- Proposed Dorchester Avenue roadway cross-sections (Figure 3-30).

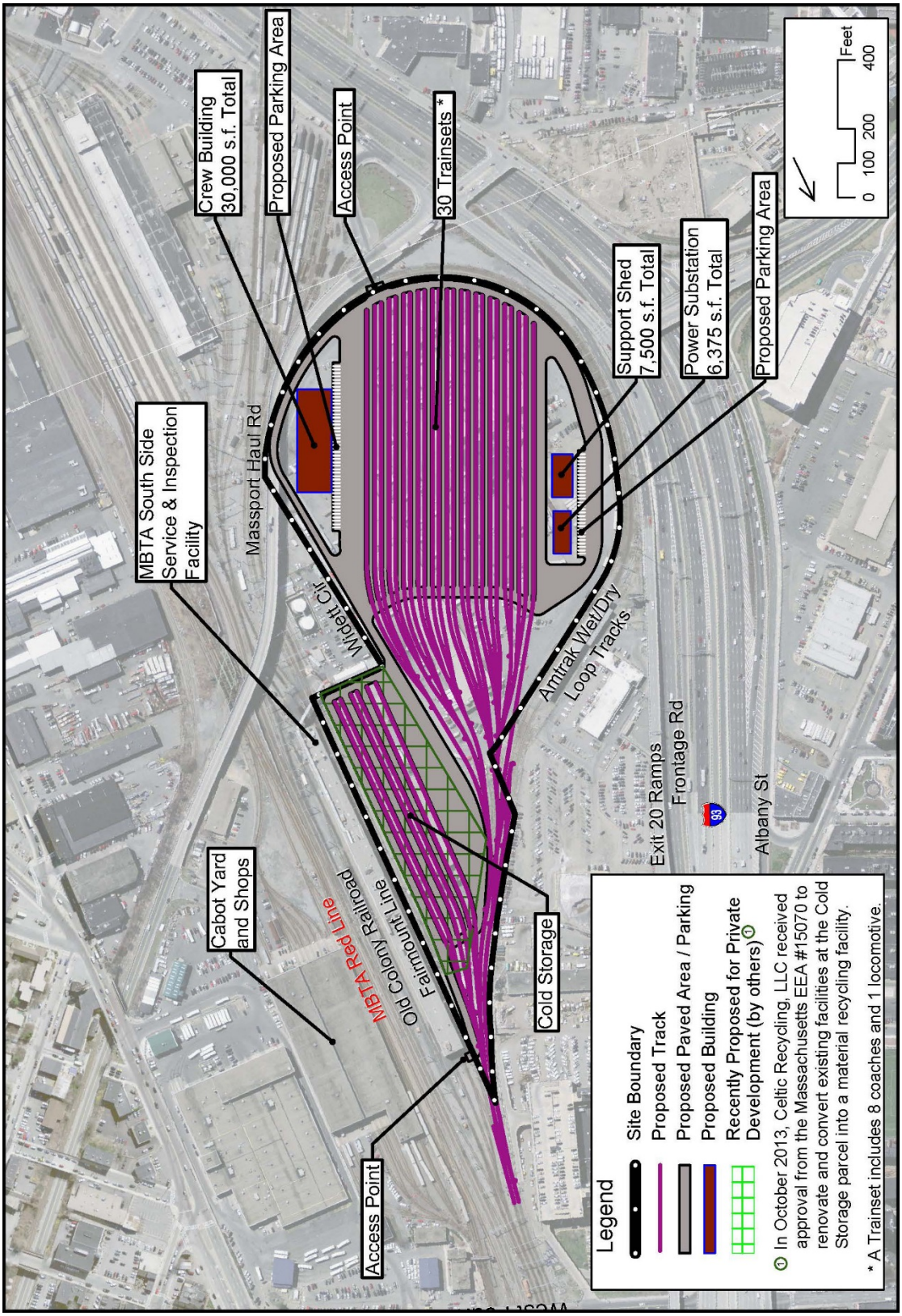


Figure 3-4—Widett Circle Layover Facility Site Plan

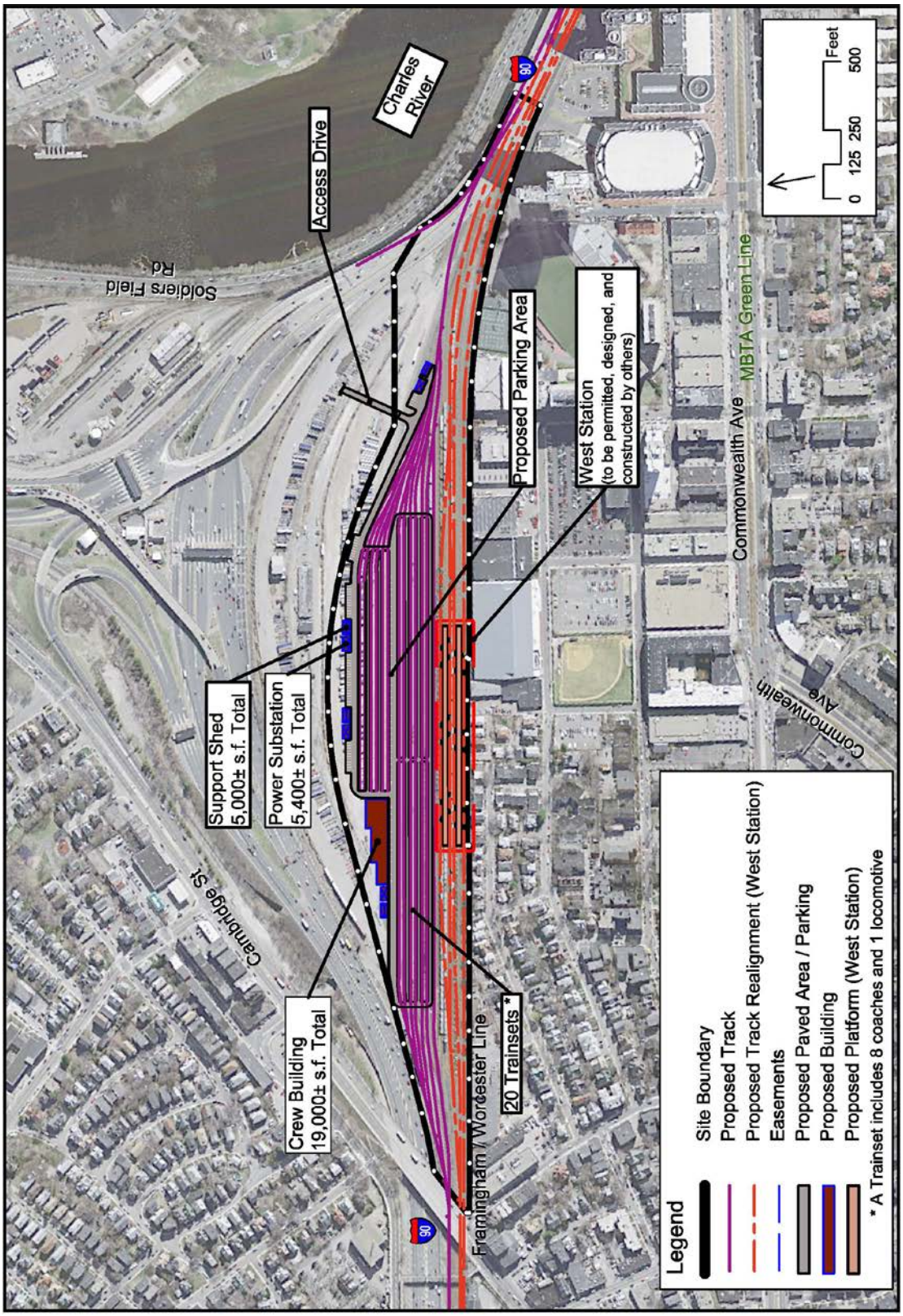


Figure 3-5—Beacon Park Yard Layover Facility Site Plan

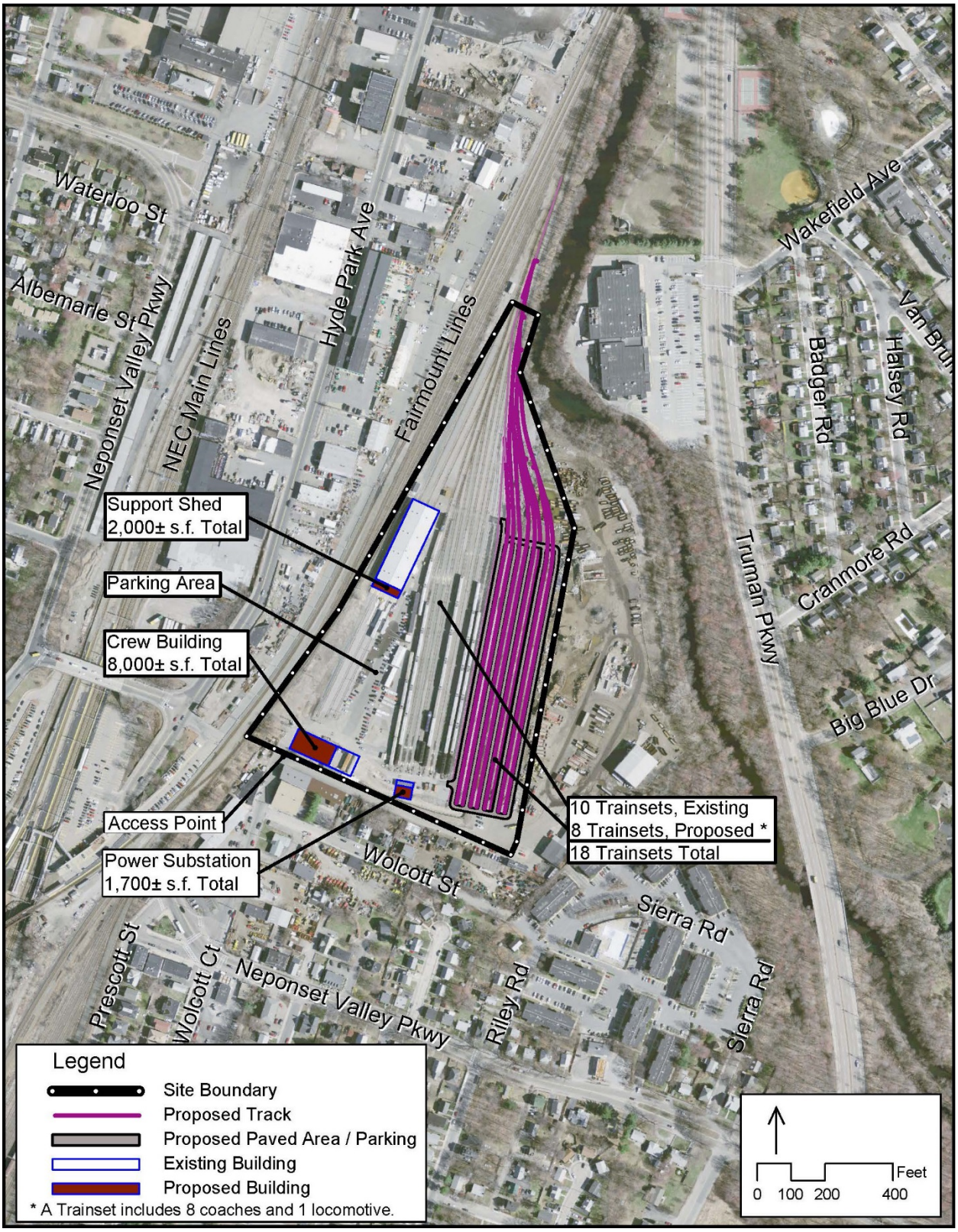


Figure 3-6—Readville – Yard 2 Layover Facility Site Plan

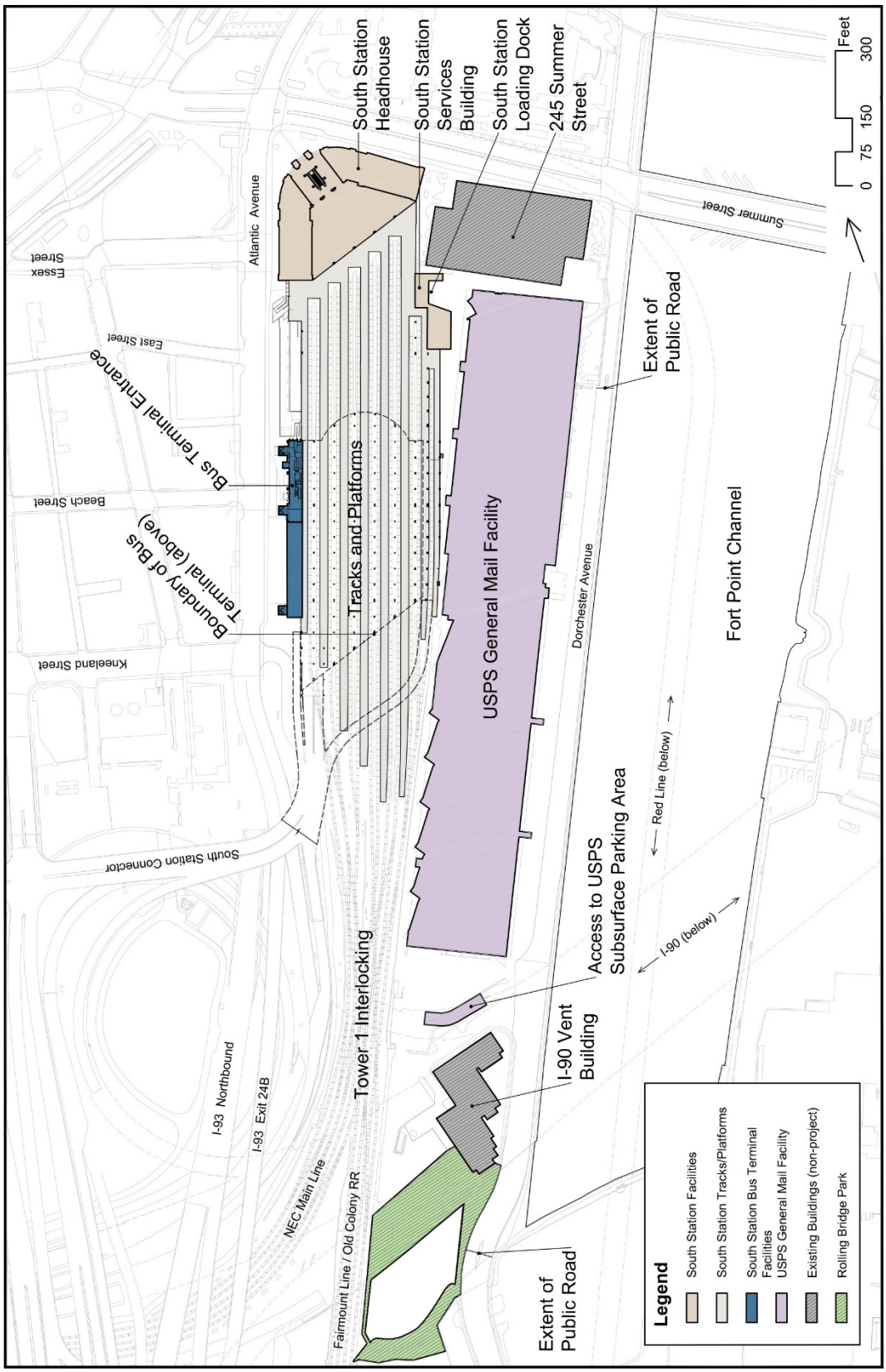


Figure 3-7—South Station Site Existing Conditions, Platform Level Plan

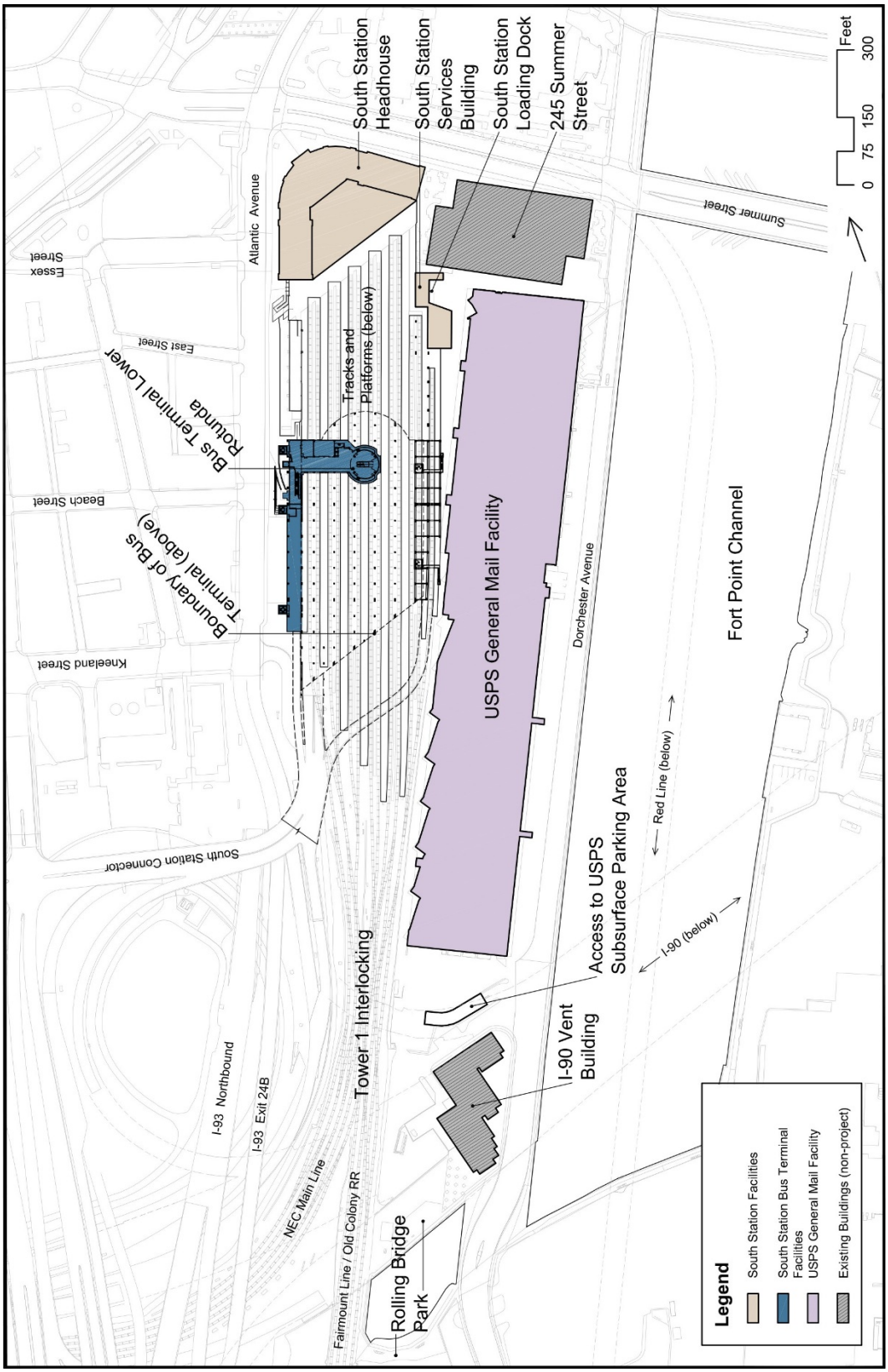


Figure 3-8—South Station Site Existing Conditions, Lower Concourse Level Plan

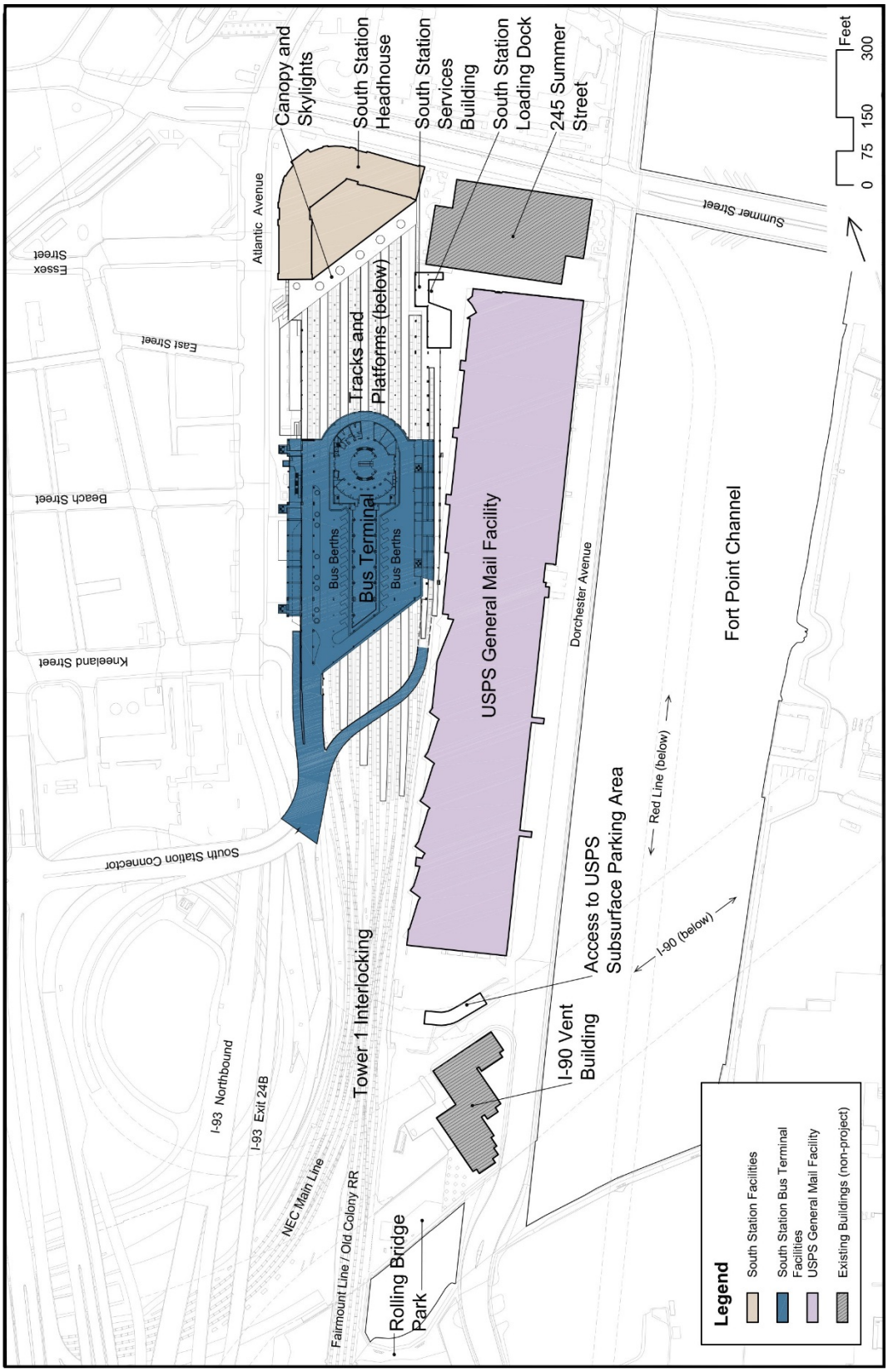


Figure 3-9—South Station Site Existing Conditions, Upper Concourse Level Plan

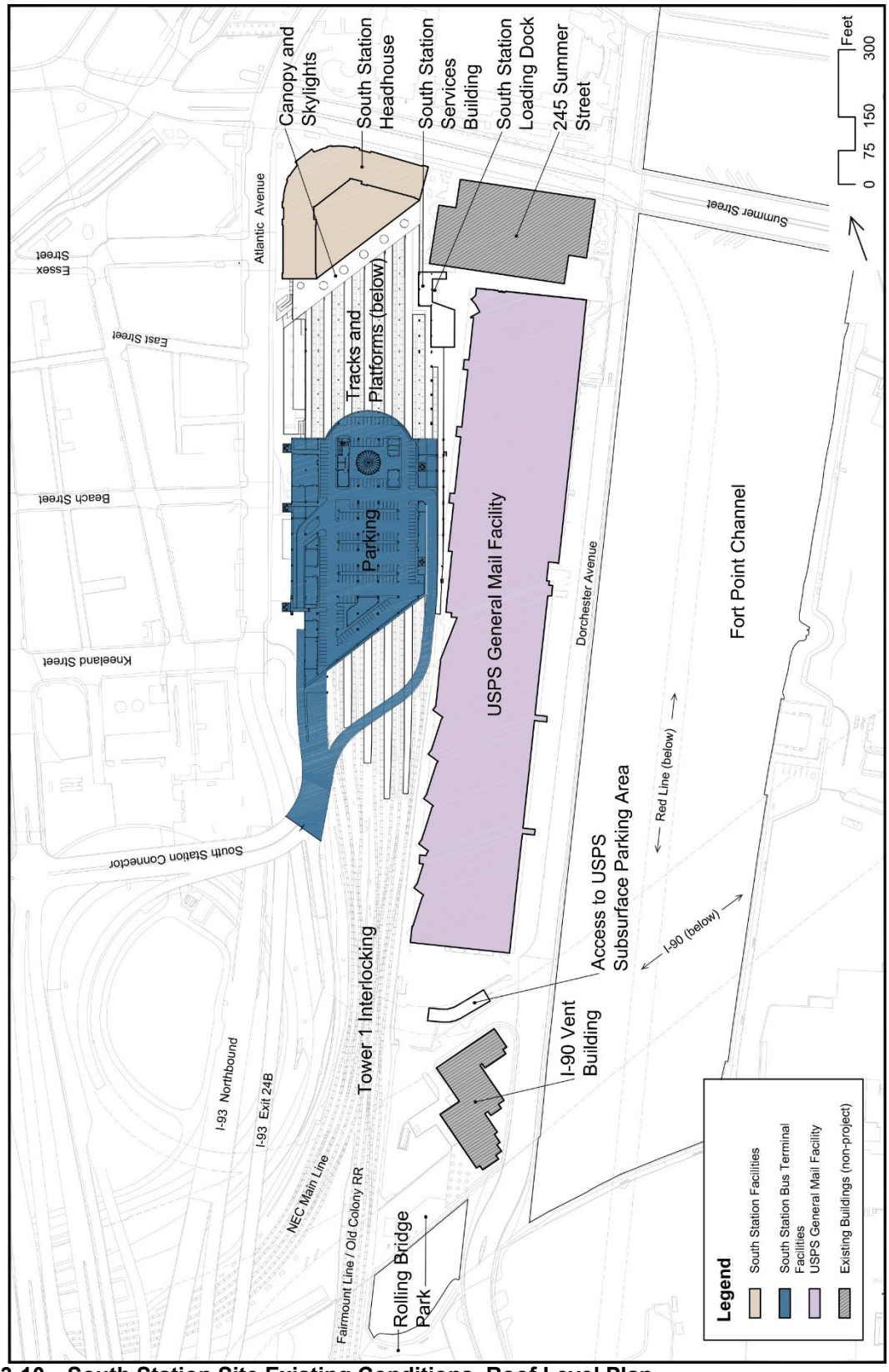


Figure 3-10—South Station Site Existing Conditions, Roof Level Plan

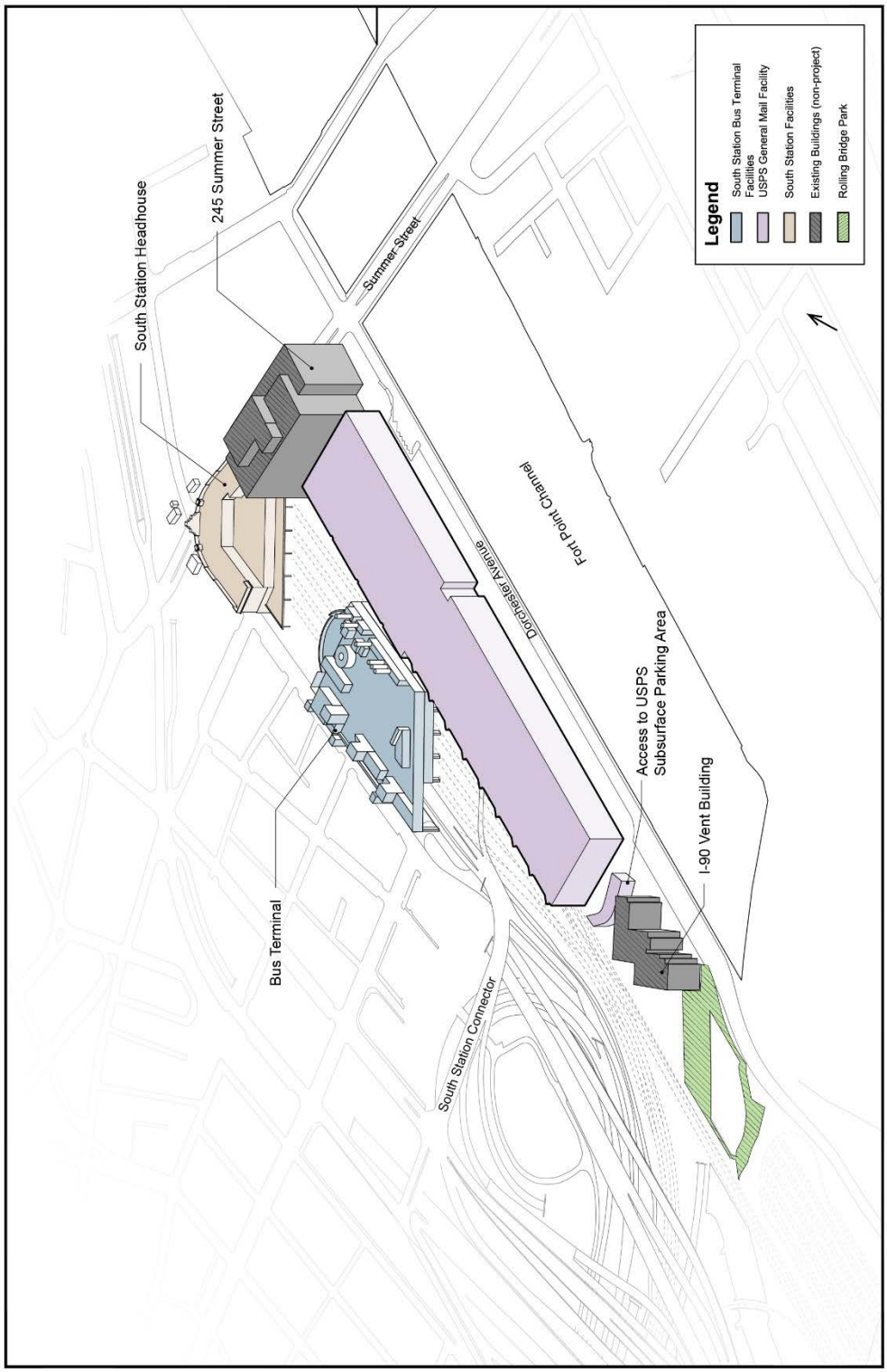


Figure 3-11—South Station Site Existing Conditions, Massing Concept

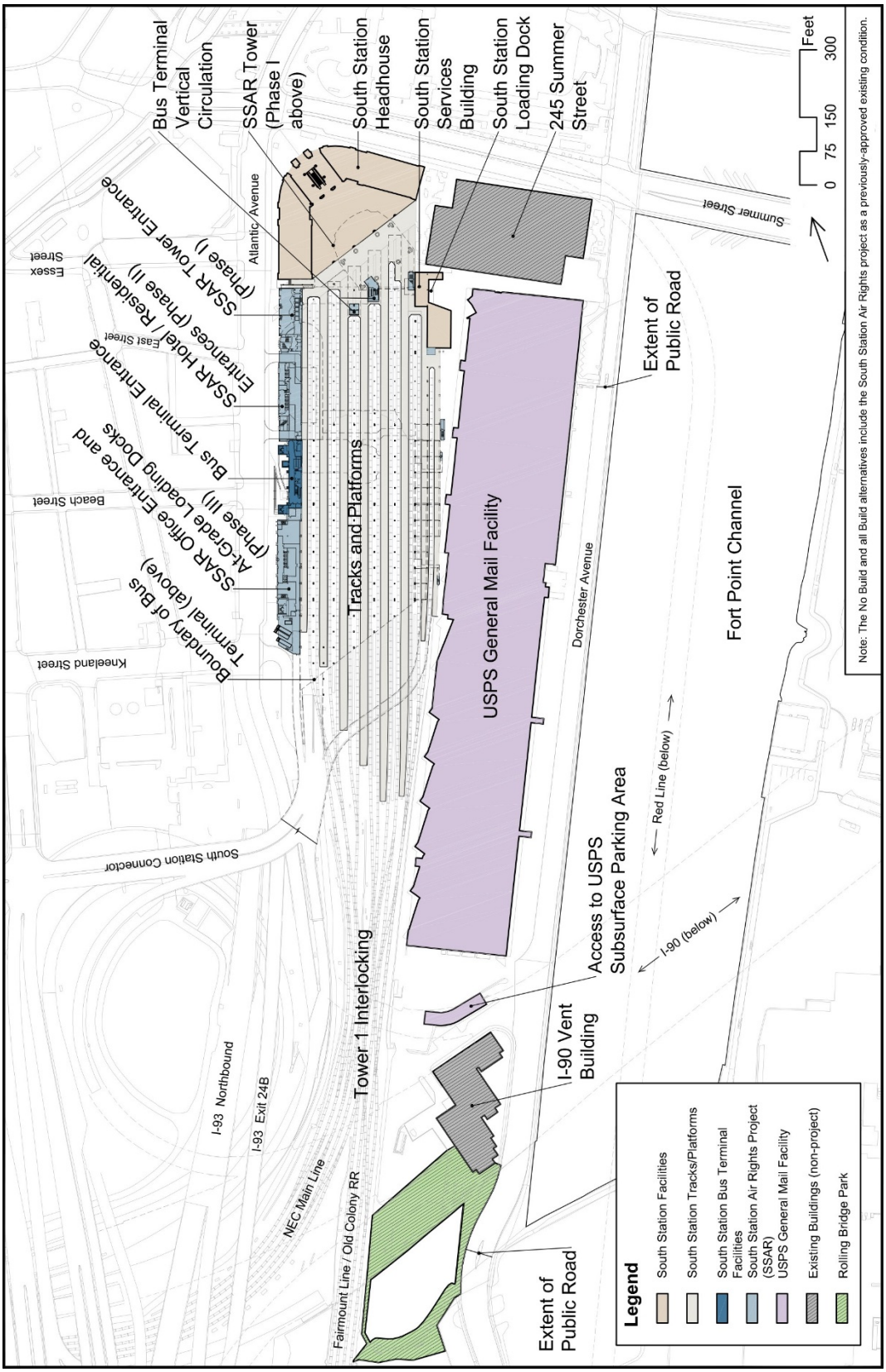


Figure 3-12—South Station Site No Build Alternative, Platform Level Plan

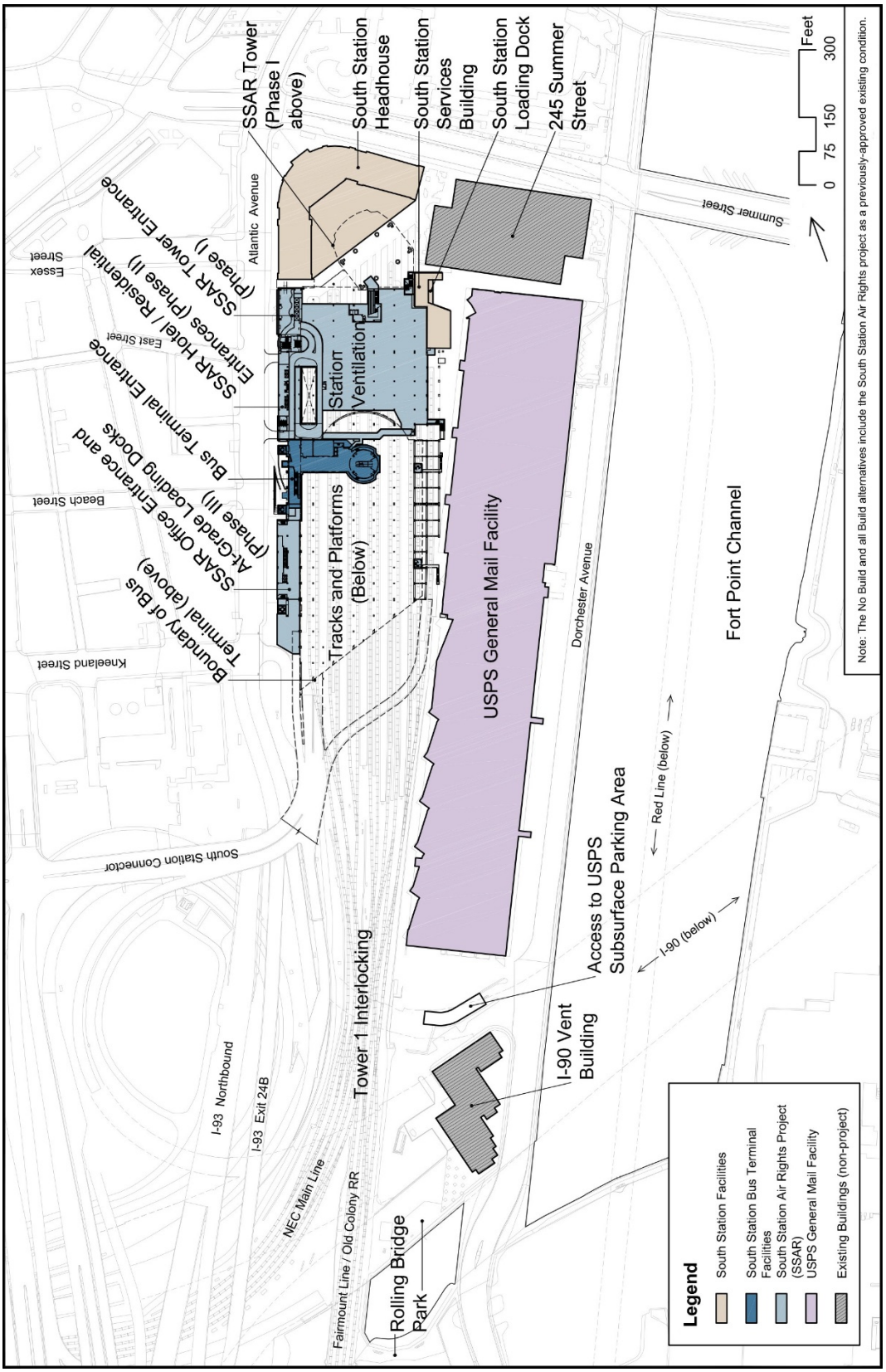


Figure 3-13—South Station Site No Build Alternative, Lower Concourse Level Plan

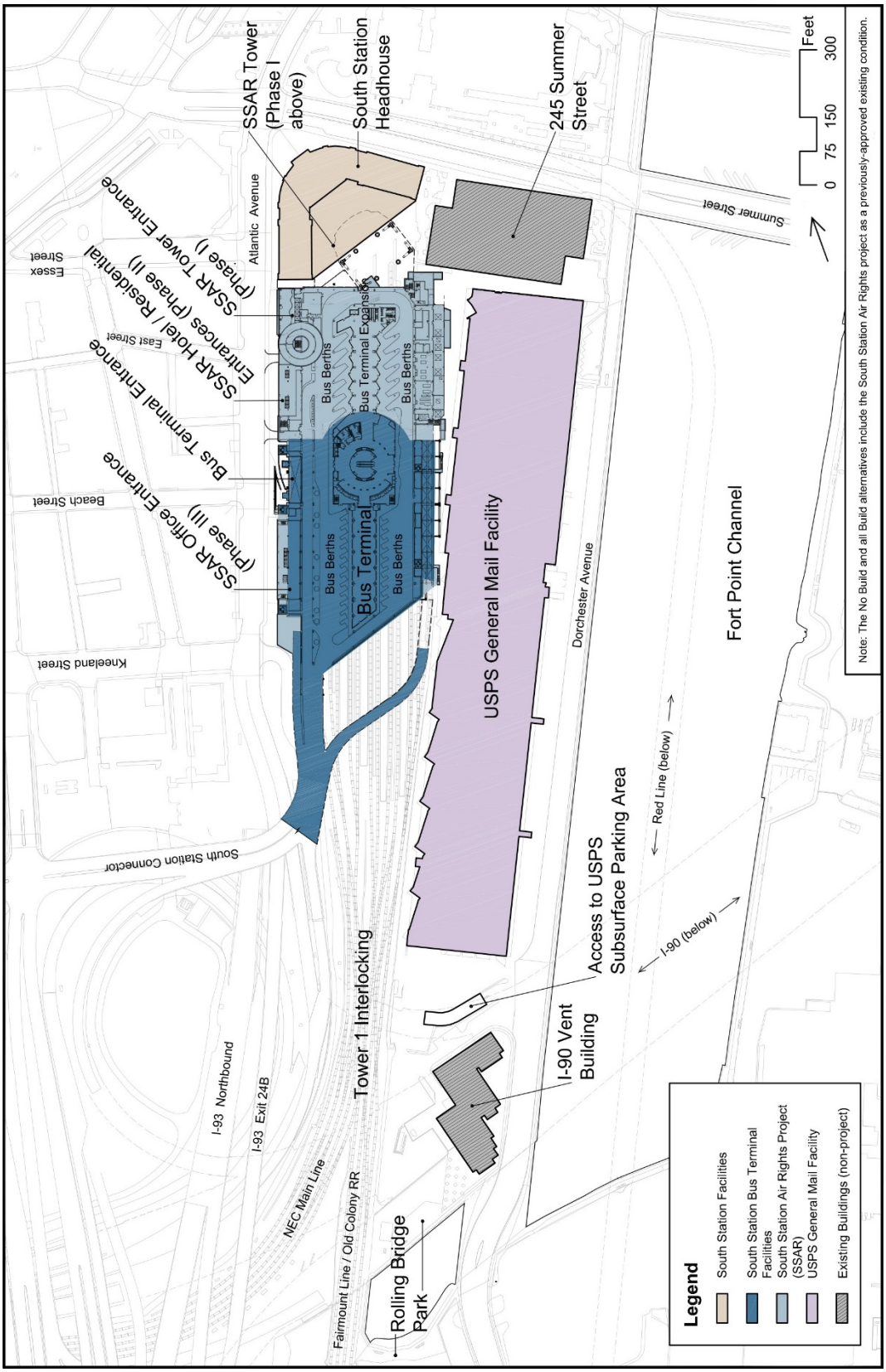


Figure 3-14—South Station Site No Build Alternative, Upper Concourse Level Plan

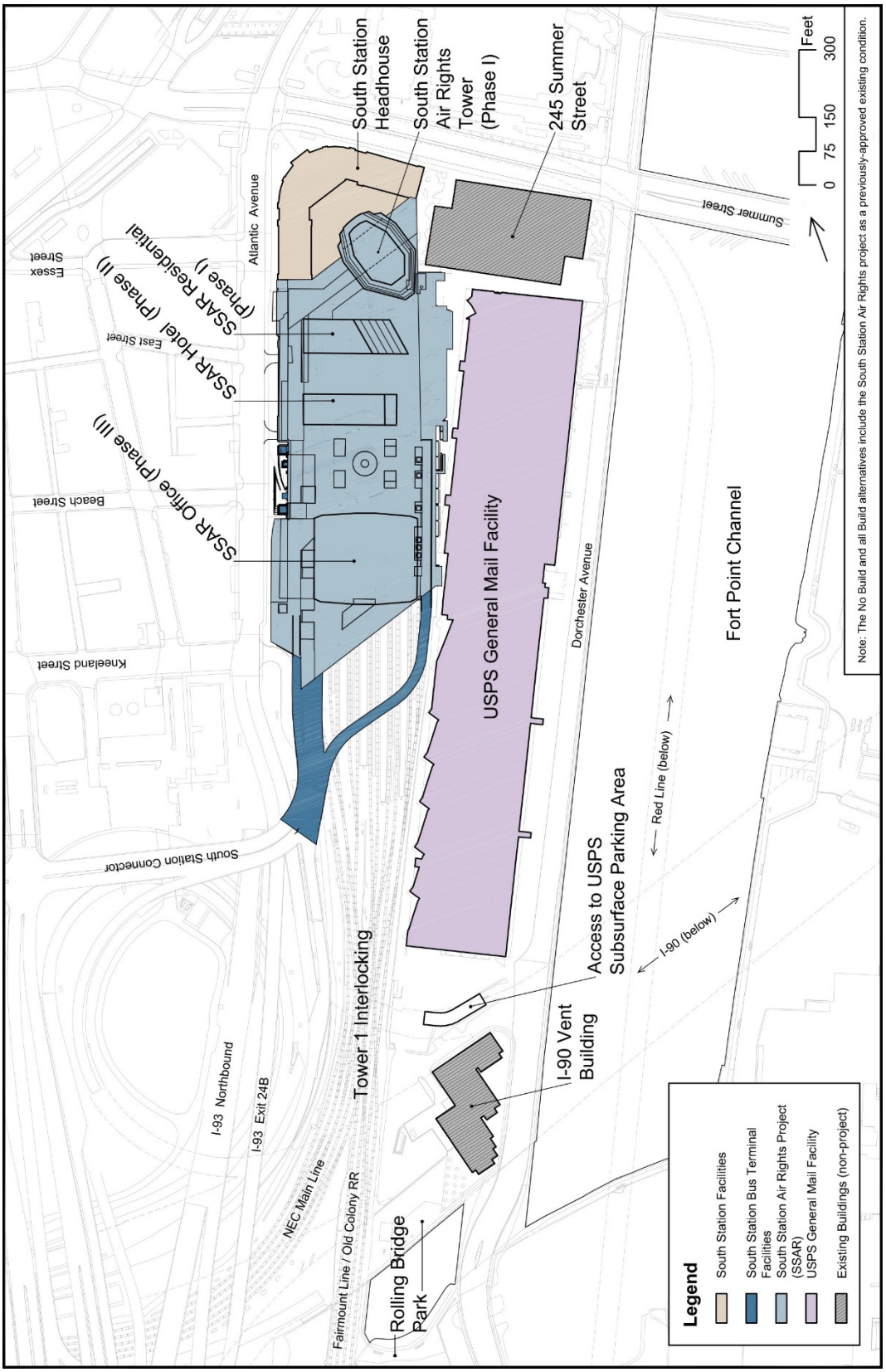


Figure 3-15—South Station Site No Build Alternative, Roof Level Plan

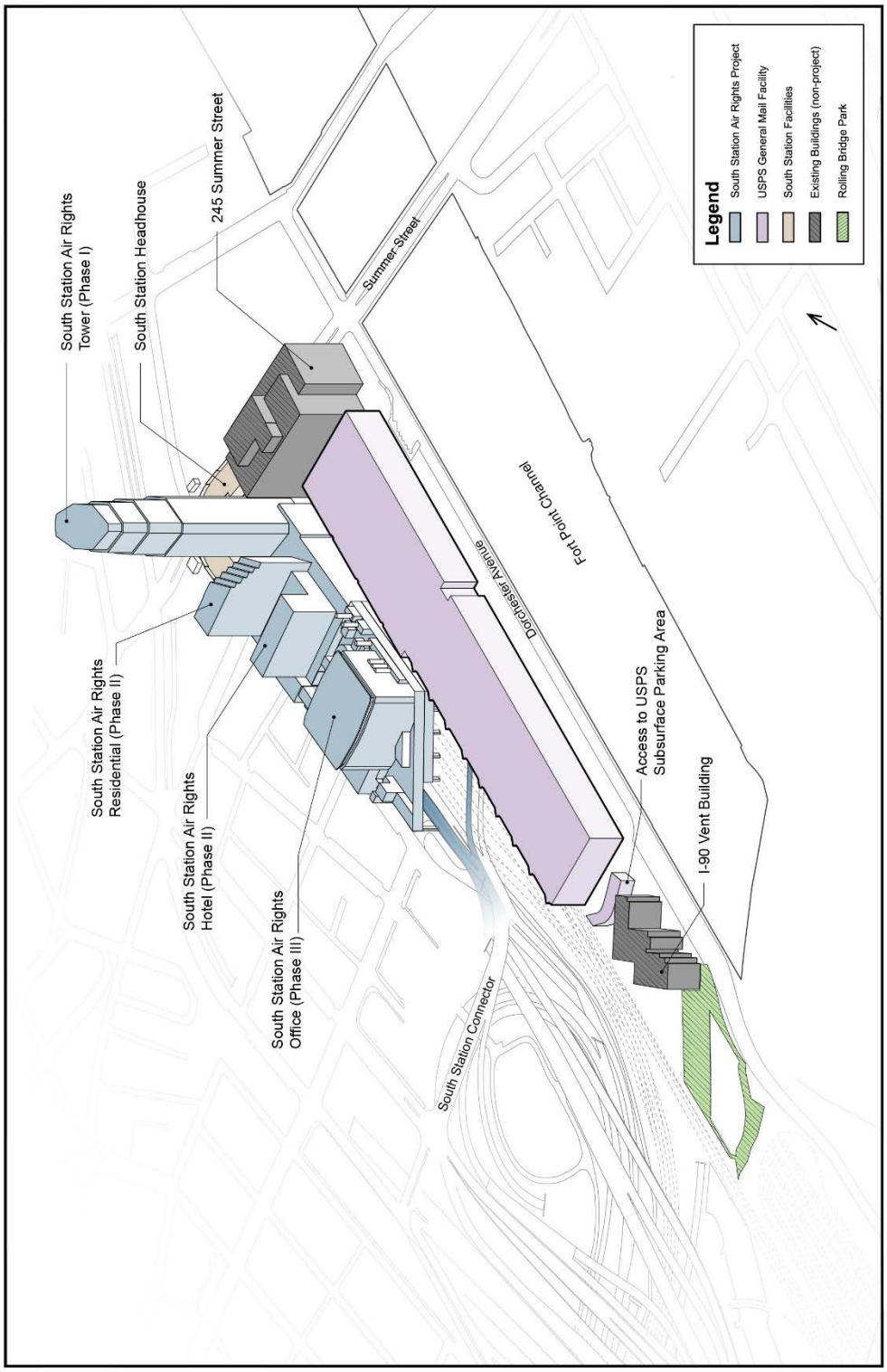


Figure 3-16—South Station Site No Build Alternative, Massing Concept

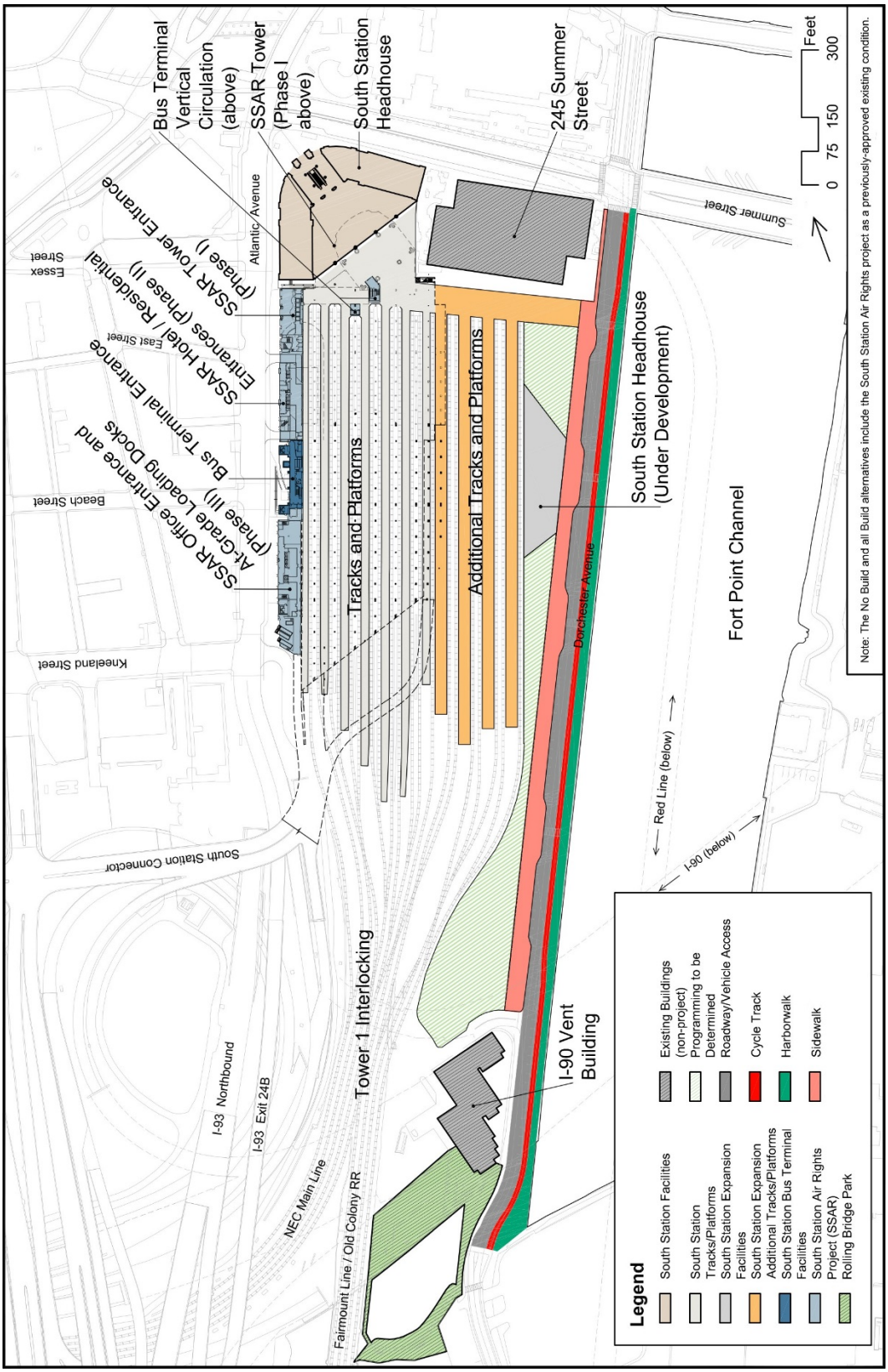


Figure 3-17—South Station Site Joint/Private Development Alternative 1, Platform Level Plan

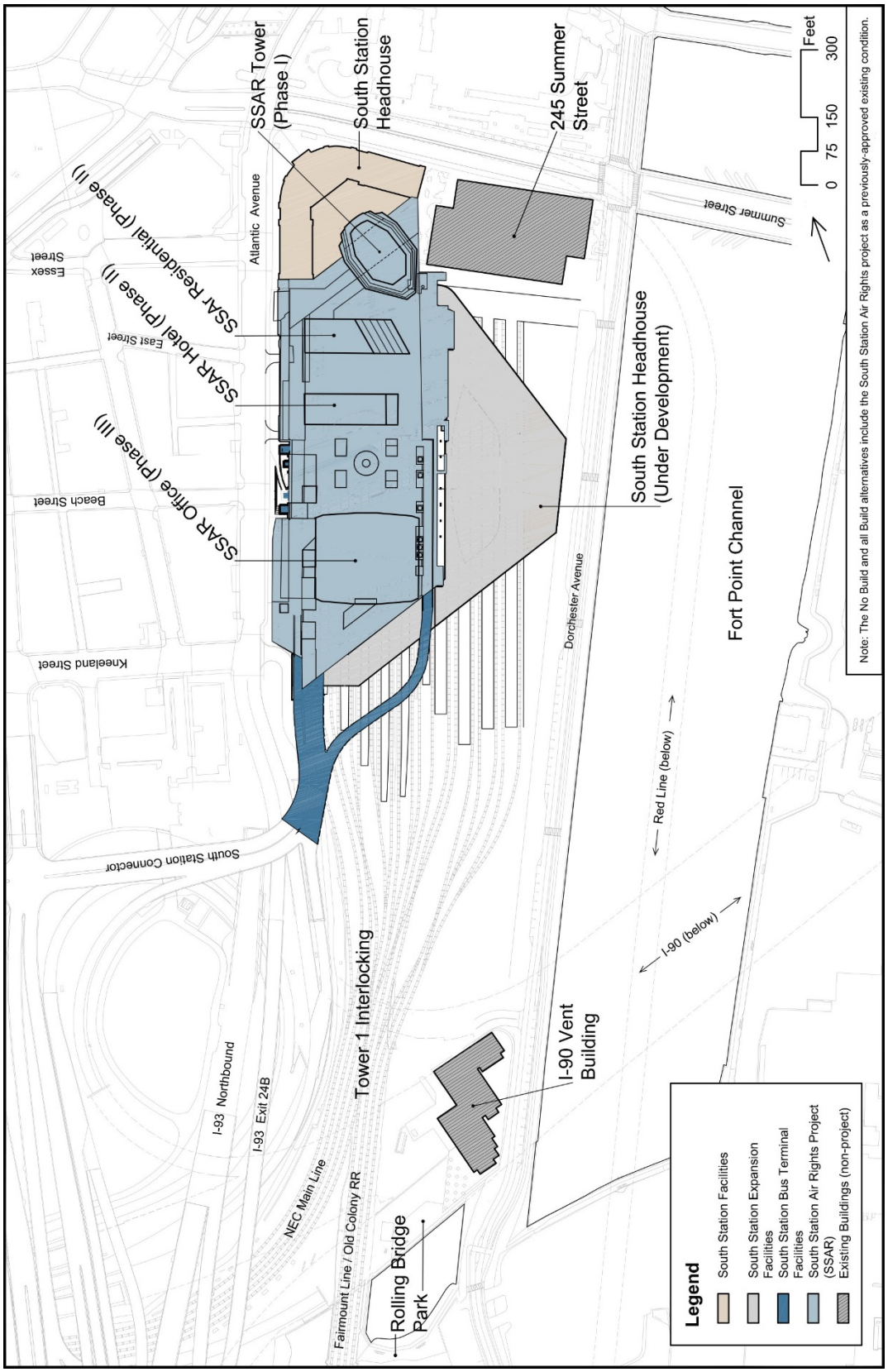


Figure 3-18—South Station Site Joint/Private Development Alternative 1, Roof Level Plan

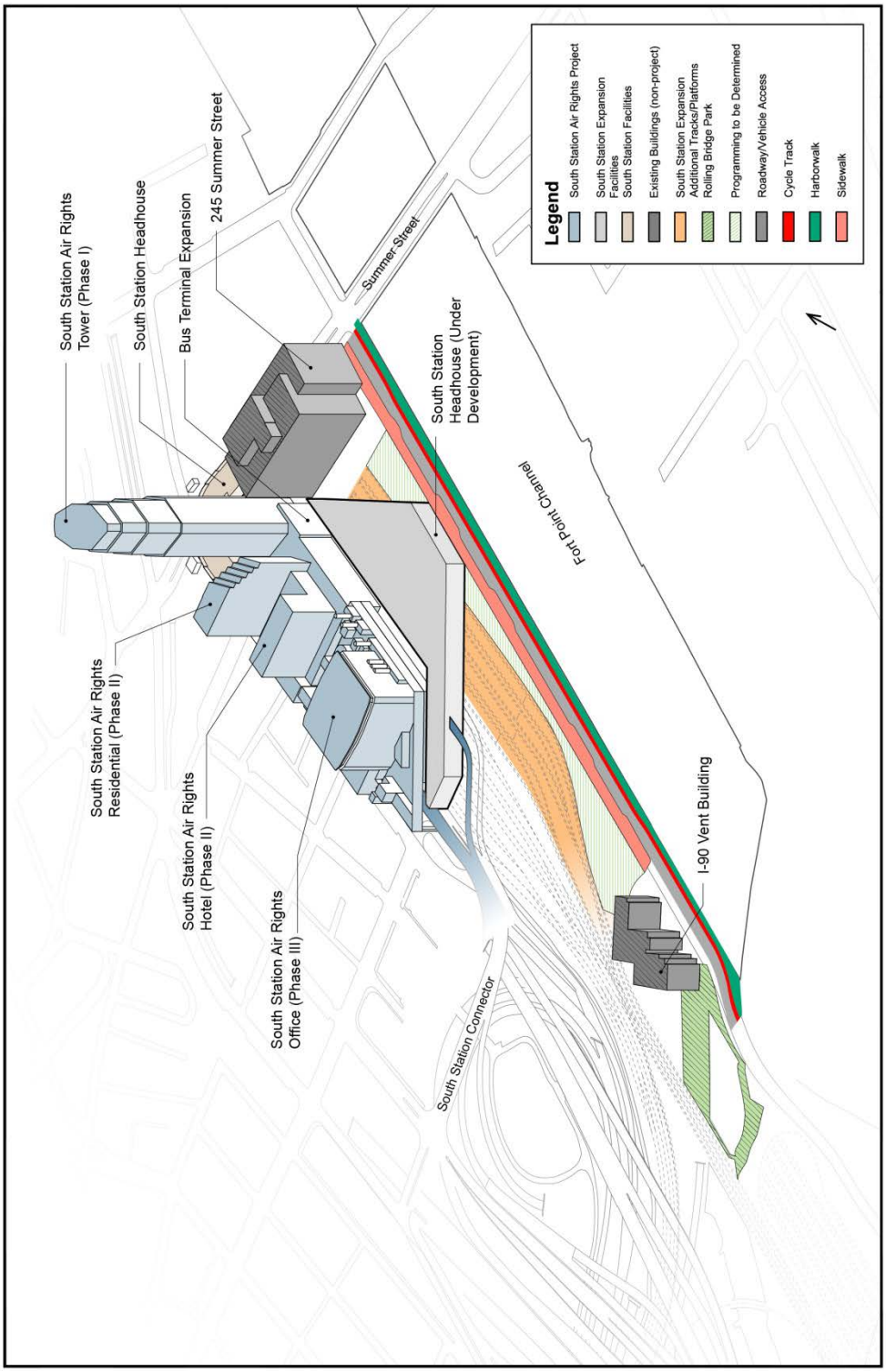


Figure 3-19—South Station Site Joint/Private Development Alternative 1, Massing Concept

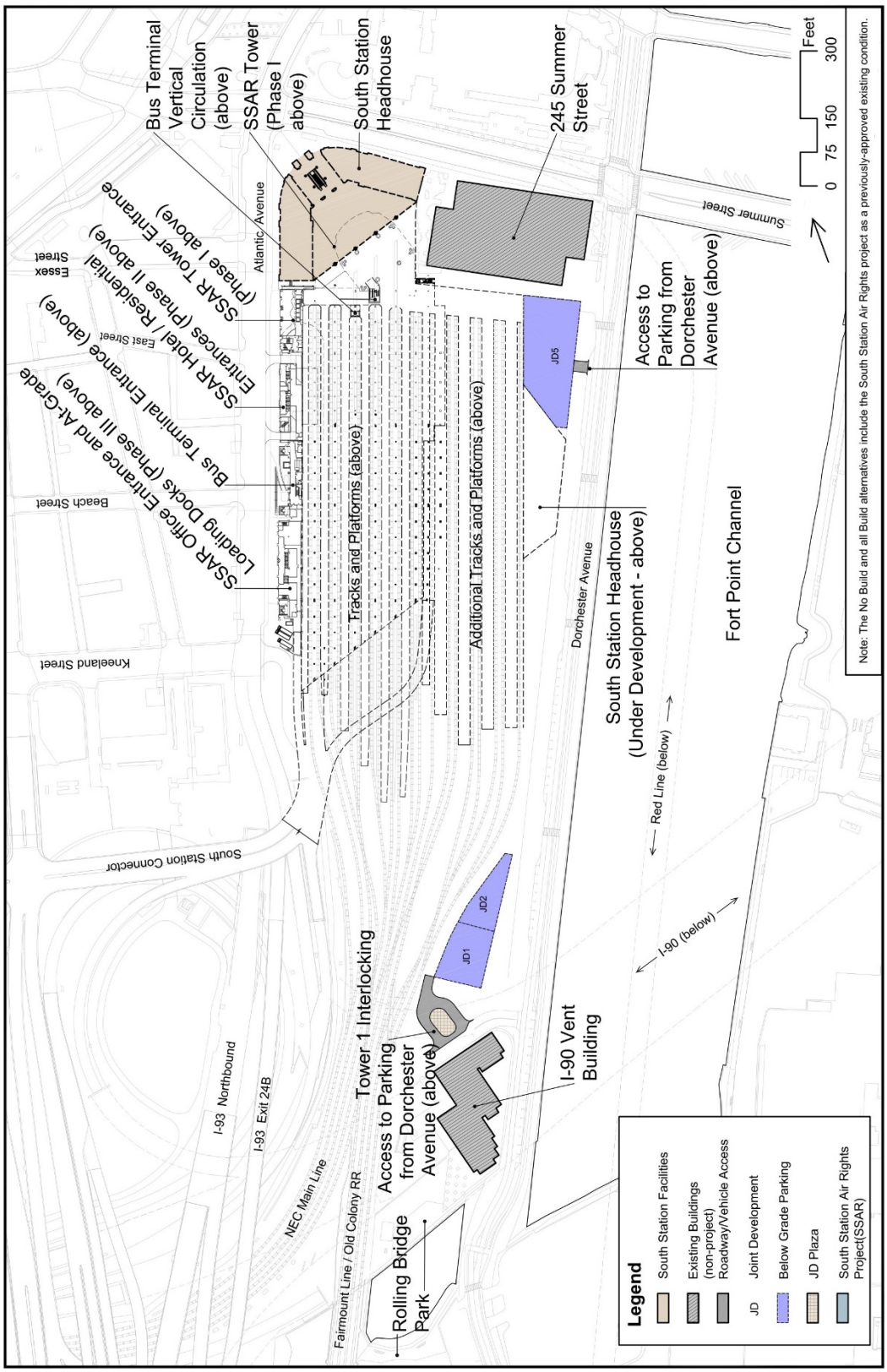


Figure 3-20—South Station Site Joint/Private Development Alternative 2, Below Platform Level Plan

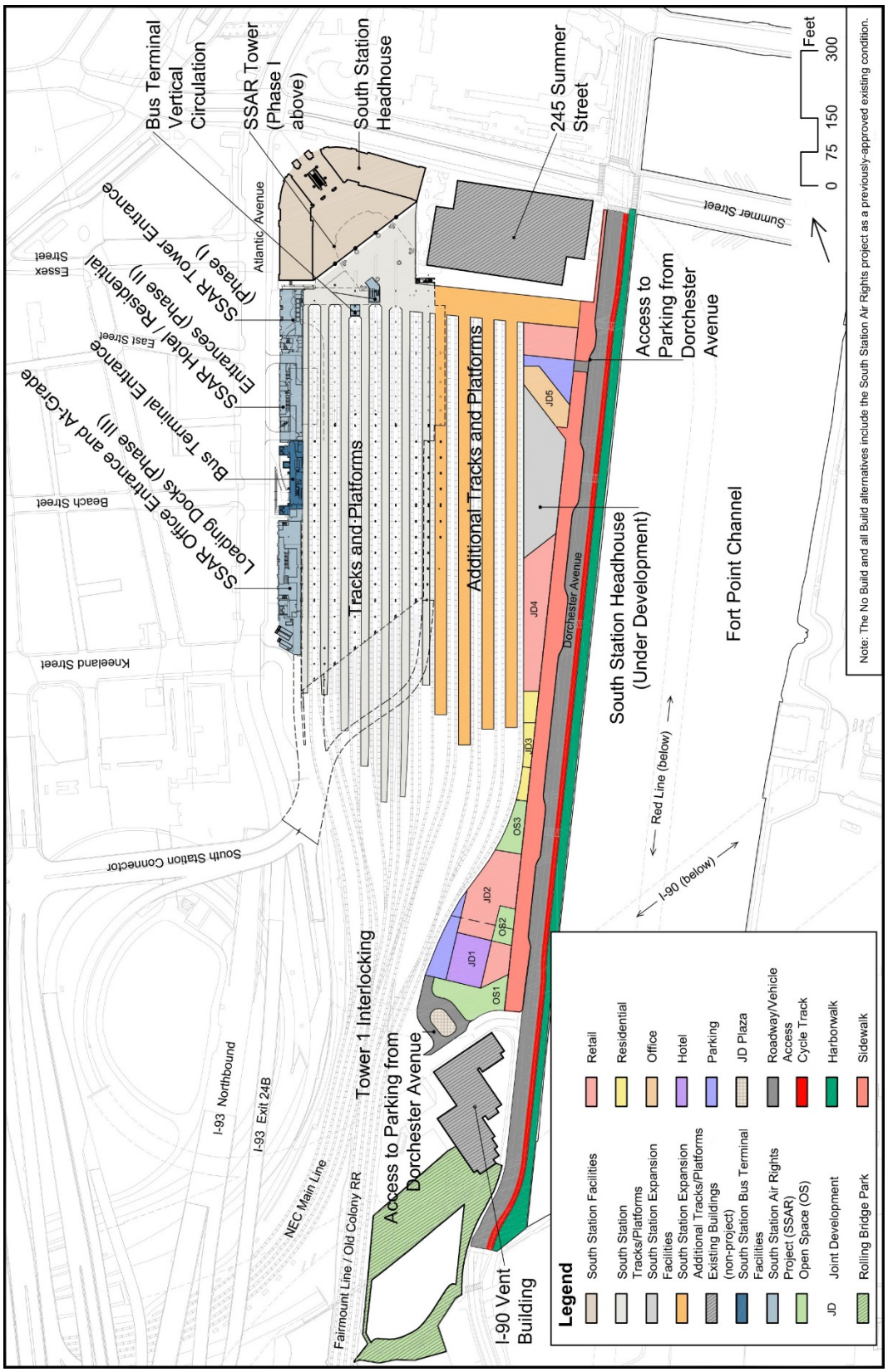


Figure 3-21—South Station Site Joint/Private Development Alternative 2, Platform Level Plan

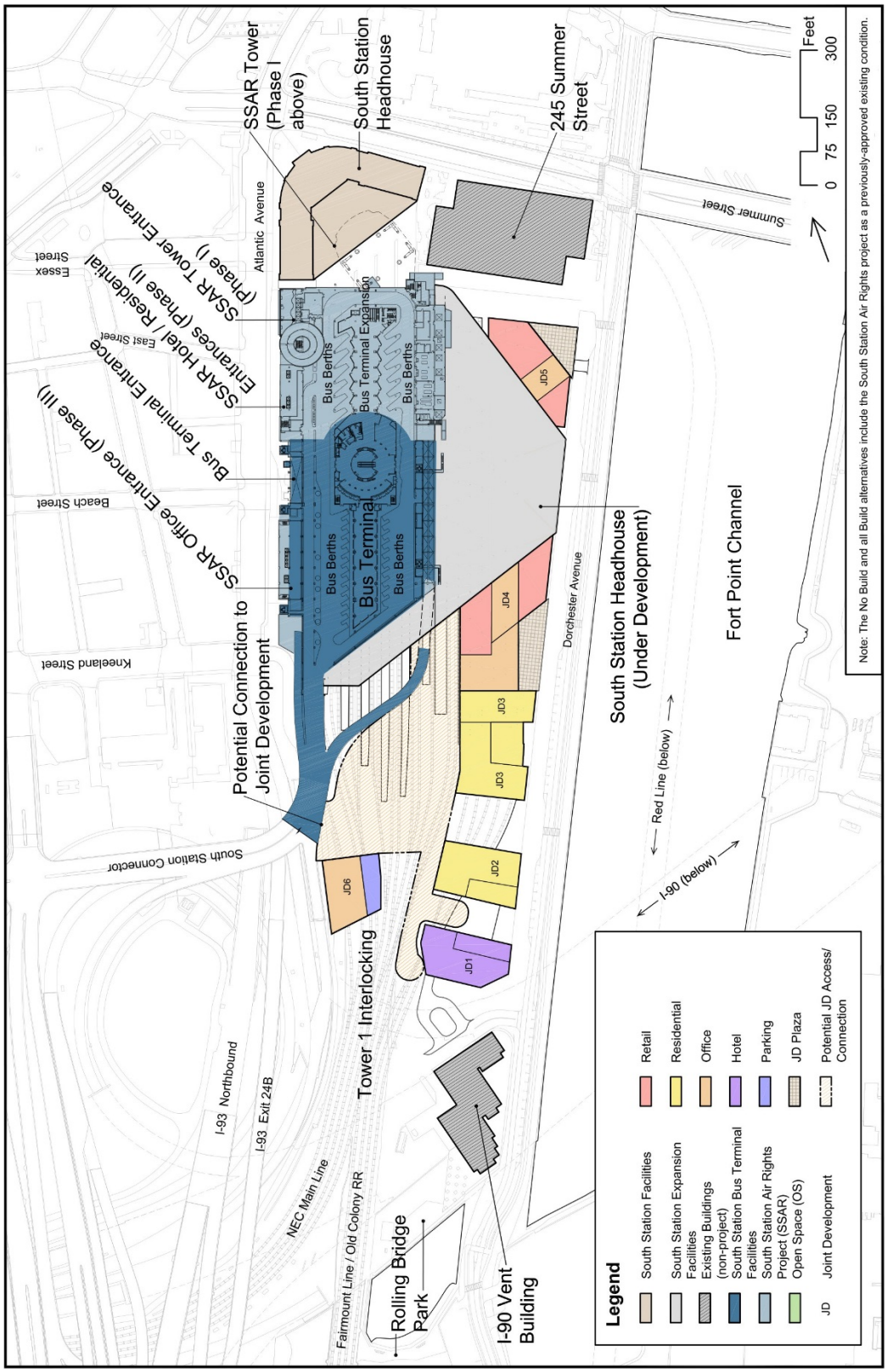


Figure 3-22—South Station Site Joint/Private Development Alternative 2, Upper Concourse Level Plan

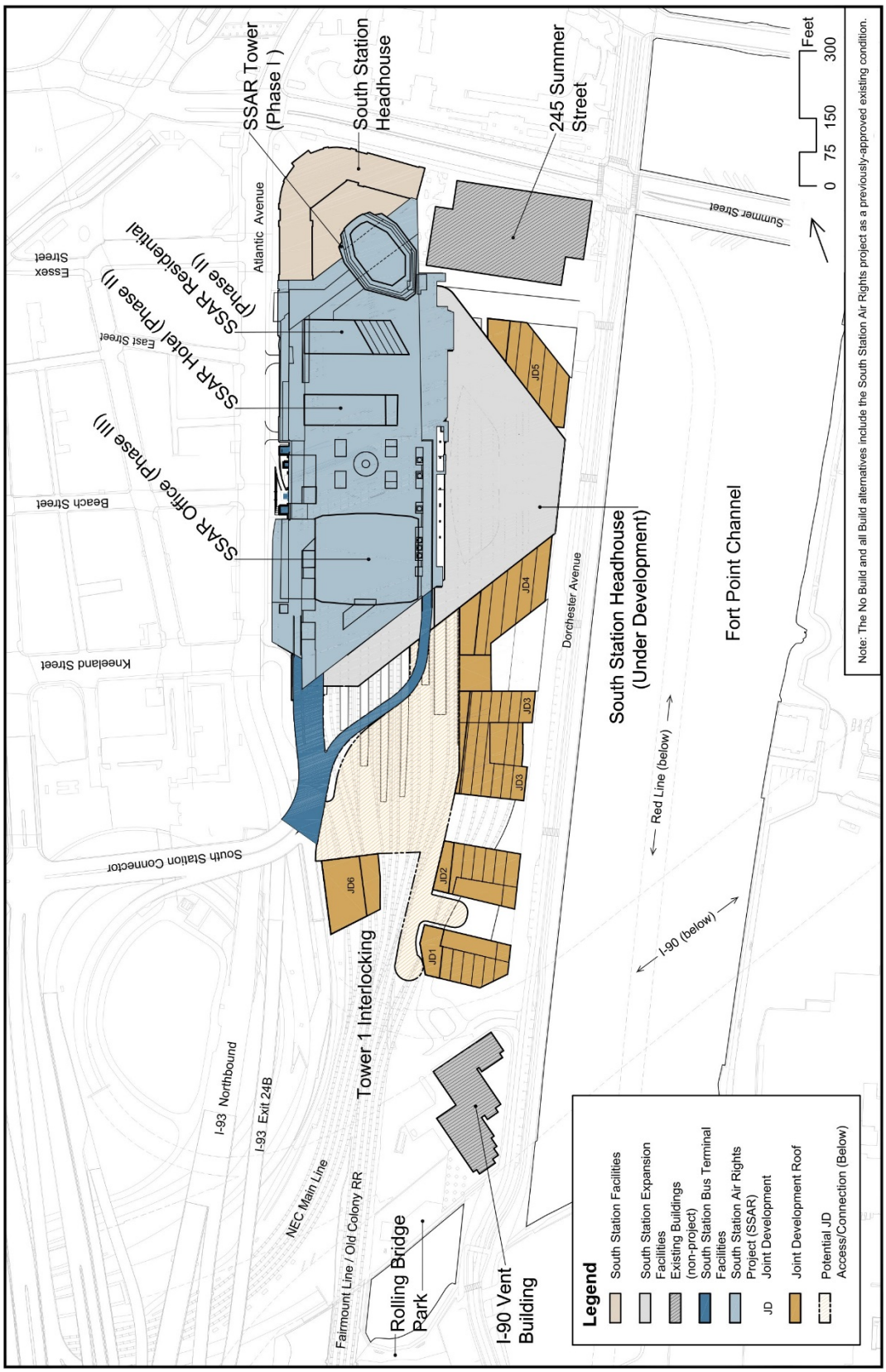


Figure 3-23—South Station Site Joint/Private Development Alternative 2, Roof Level Plan

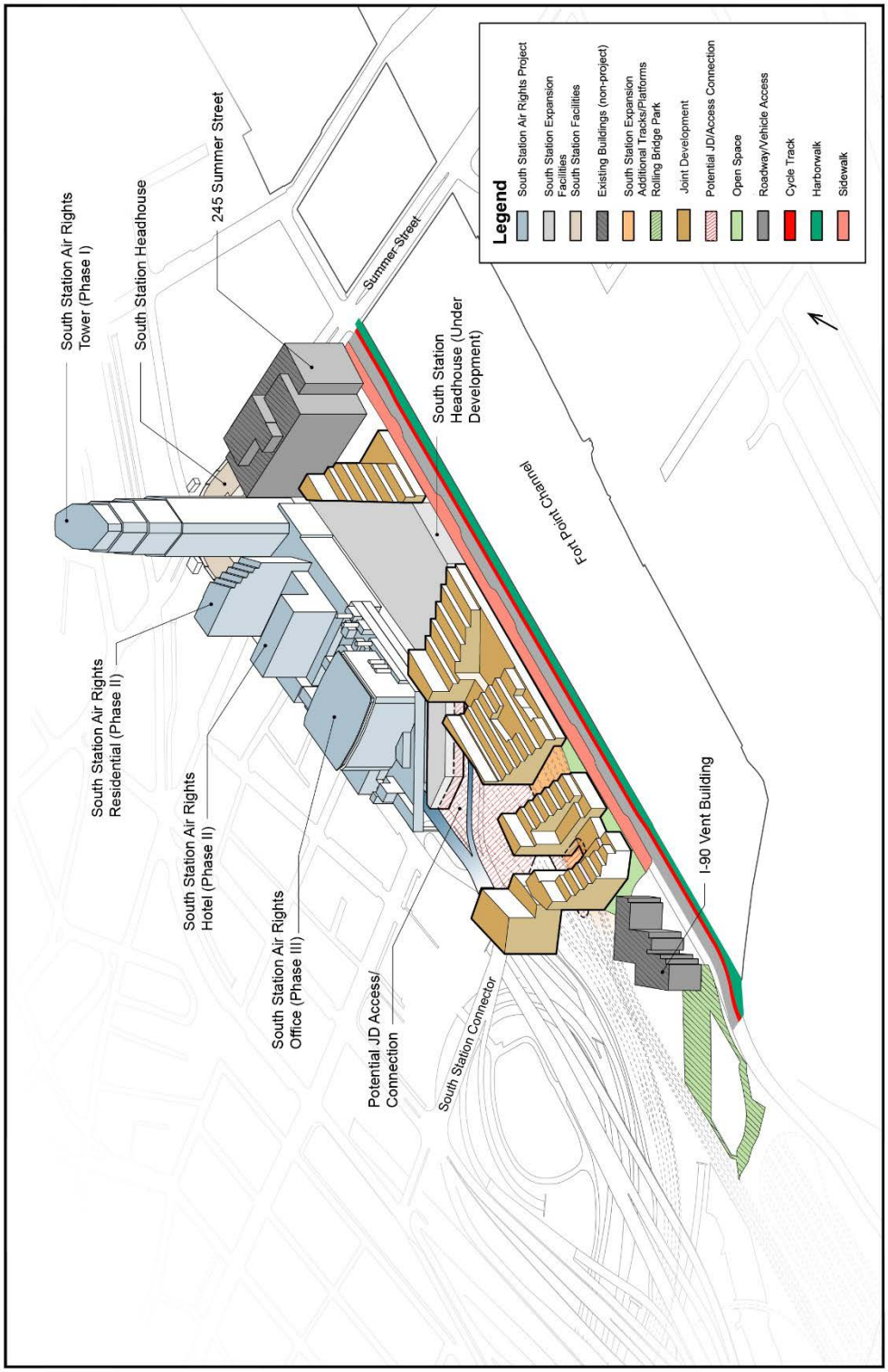


Figure 3-24—South Station Site Joint/Private Development Alternative 2, Massing Concept

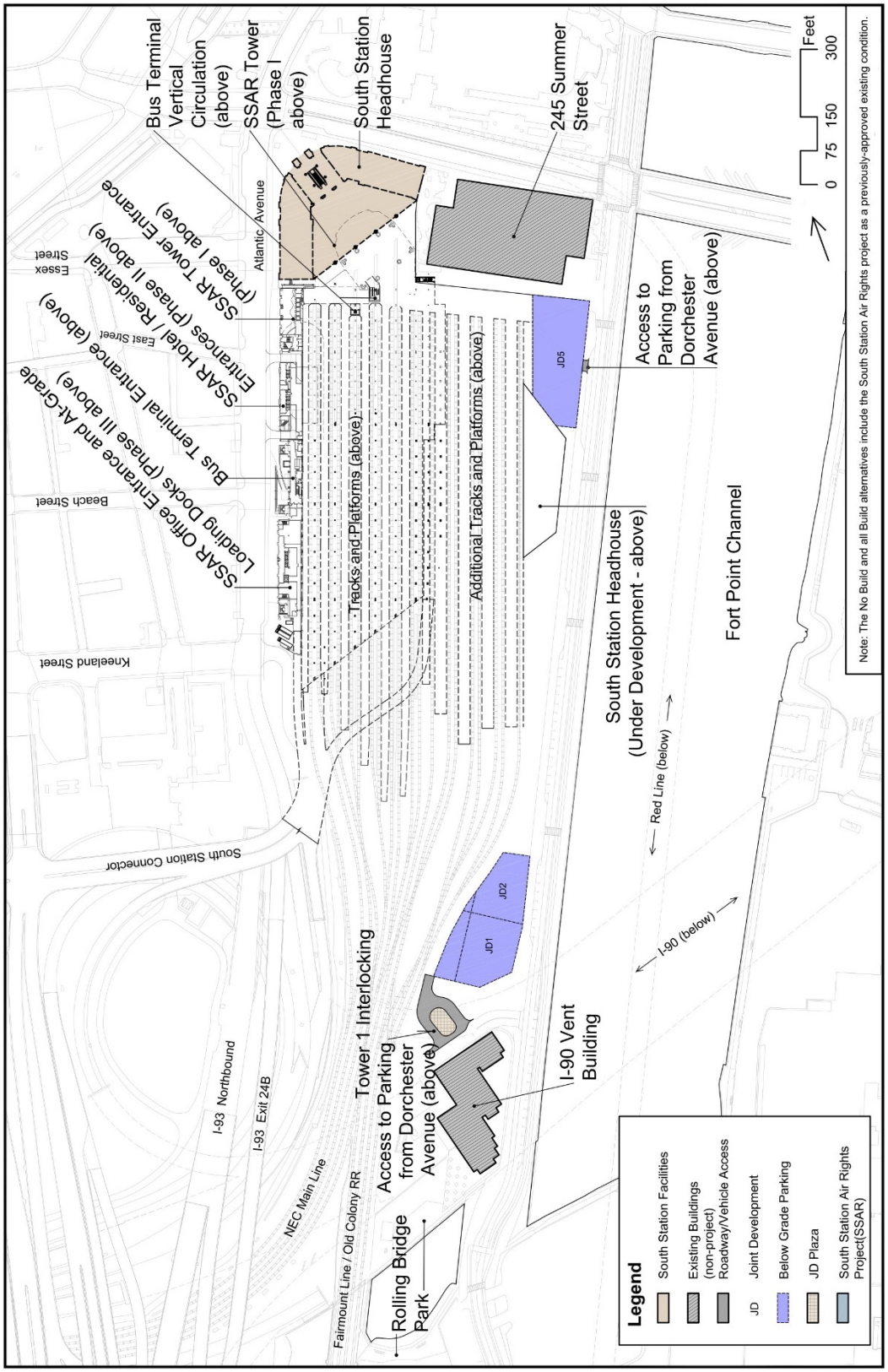


Figure 3-25—South Station Site Joint/Private Development Alternative 3, Below Platform Level Plan

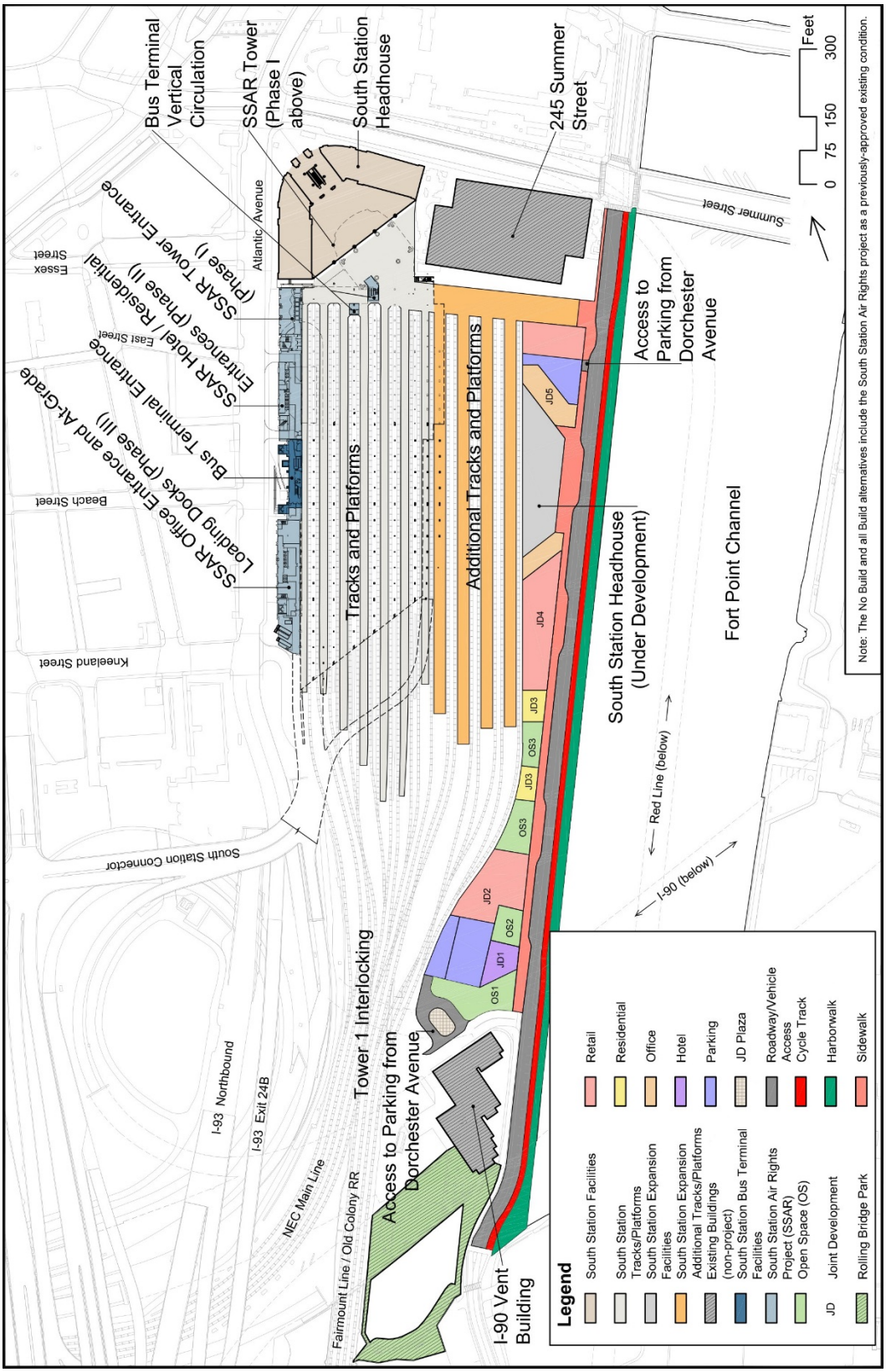


Figure 3-26—South Station Site Joint/Private Development Alternative 3, Platform Level Plan

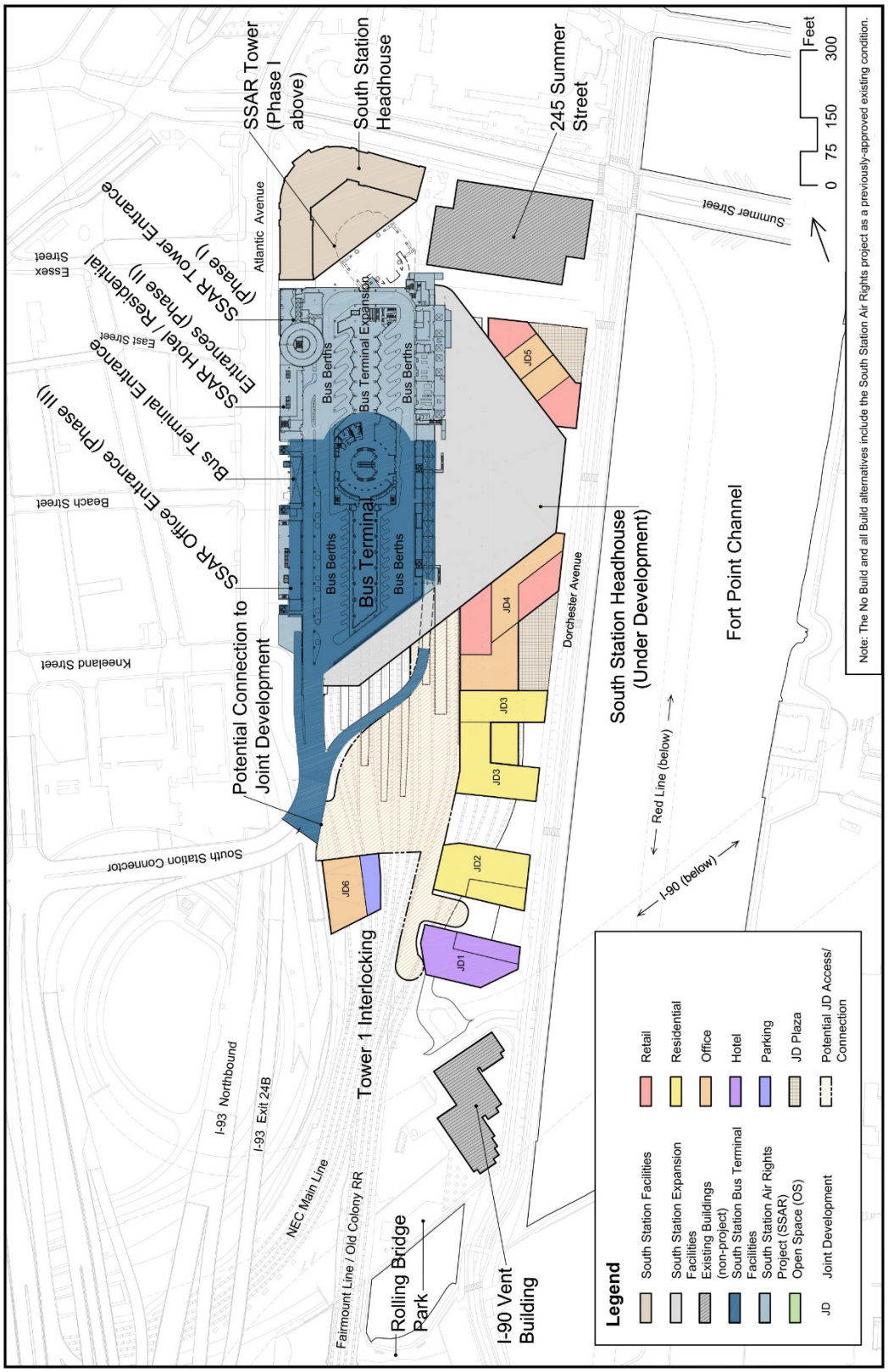


Figure 3-27—South Station Site Joint/Private Development Alternative 3, Upper Concourse Level Plan

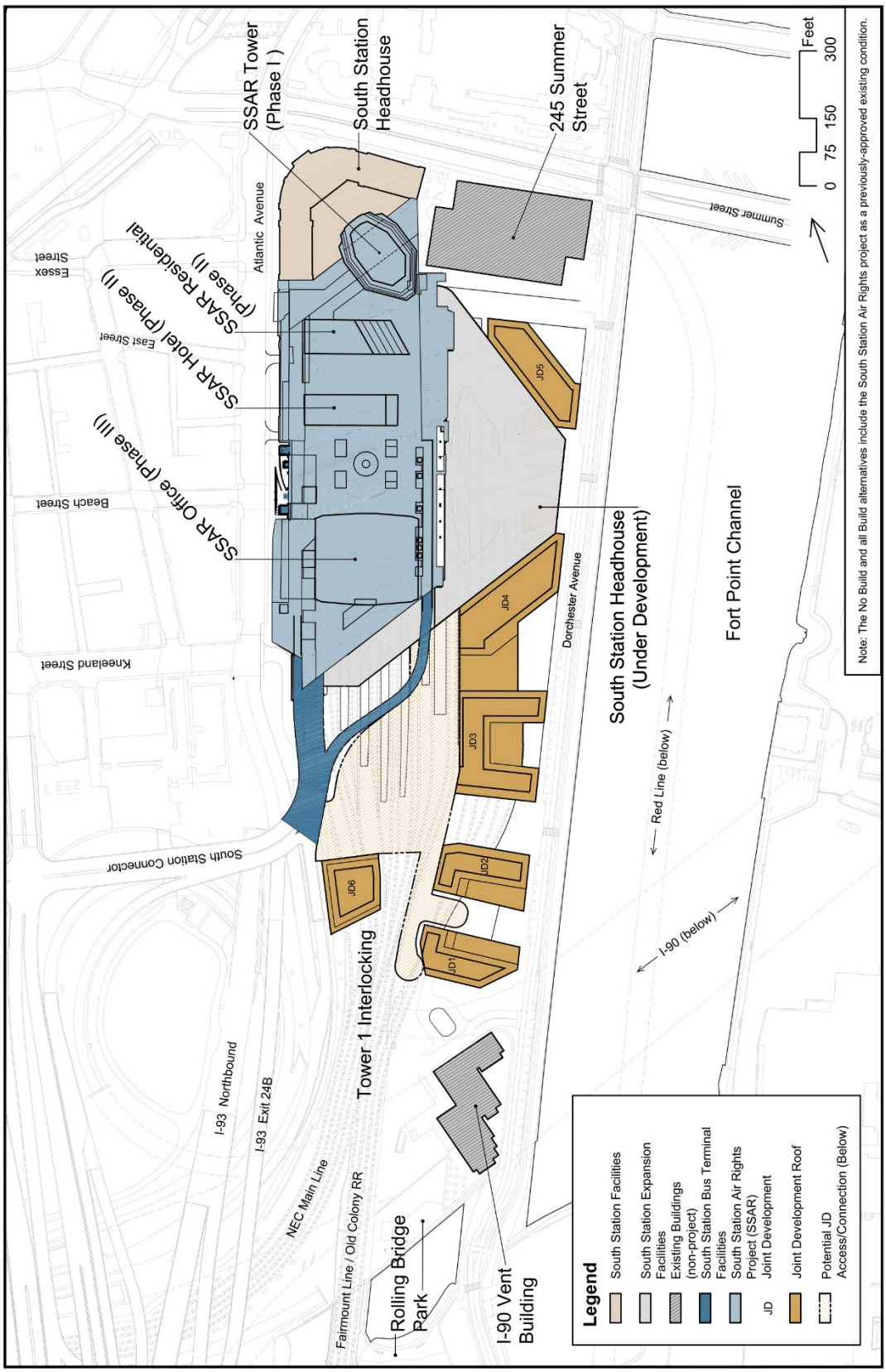


Figure 3-28—South Station Site Joint/Private Development Alternative 3, Roof Level Plan

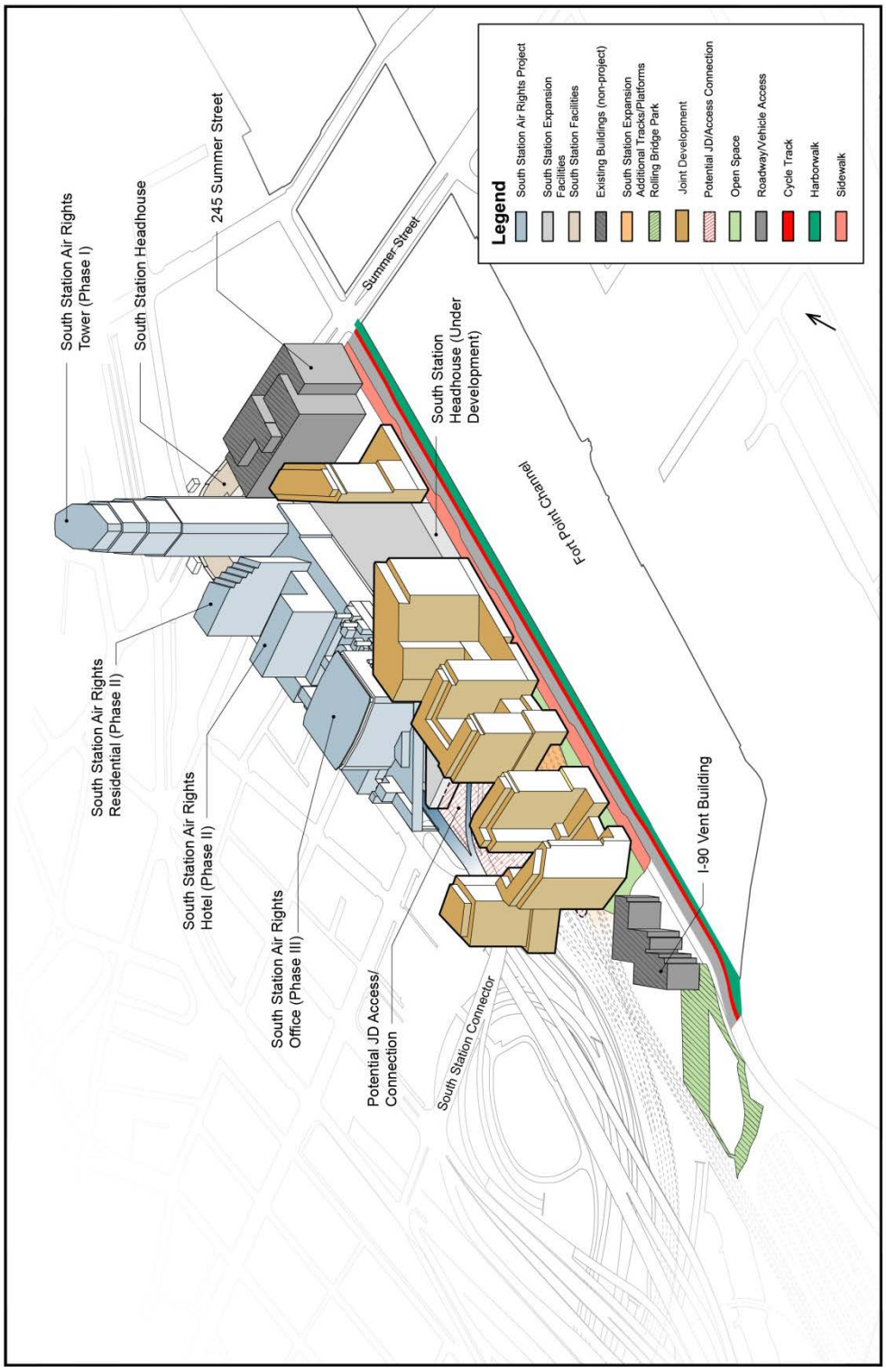


Figure 3-29—South Station Site Joint/Private Development Alternative 3, Massing Concept

Figure 3-30—Dorchester Avenue Alternative Typical Cross-Section

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