Chapter 2 – Alternatives Analysis

This chapter provides an overview of the alternatives analysis conducted during earlier phases of the project in order to develop the Build Alternative, which is also this project's Preferred Alternative. The following sections discuss the identification and evaluation of the key project components; provide a summary of the alternatives development process; and provide a description of the No Build and Build Alternative. The SSX project consists of the following primary components (presented in order of the proposed construction sequence):

- Acquire and demolish the USPS facility;
- Reopen Dorchester Avenue and extend the Harborwalk;
- Expand the South Station Terminal; and
- Construct rail layover facilities.

The purpose of the SSX project is to expand South Station Rail Terminal capacity and related layover capacity to meet current and anticipated future (2035) high-speed, intercity, and commuter rail service needs to:

- Enable growth in passenger rail transportation along the NEC and within the Commonwealth of Massachusetts;
- Improve service reliability through updates to the rail infrastructure and related layover capacity;
- Improve the passenger capacity and experience of using South Station;
- Promote city-building in a key area of Boston; and
- Allow for Dorchester Avenue to be reopened for public use and enjoyment for the first time in decades.

In order to develop an alternative that could address the project purpose and need, MassDOT and FRA (sometimes referred to as the Project Team) divided the Proposed Action into five major elements, and established a separate alternatives analysis process for each of those elements:

- Station headhouse alternatives;
- Rail alternatives;
- Layover alternatives;
- Joint development alternatives; and
- Roadway alternatives.

The Project Team developed a separate set of alternatives for each of these five elements, and conducted a screening process for each set of alternatives, dismissing those alternatives that were not feasible, and identifying those alternatives that would best meet the goals of the project, while being compatible with other project elements. MassDOT and FRA conducted the alternatives evaluation for each of the element alternatives using criteria and principles specific to that element. The Project Team coordinated with the appropriate stakeholders throughout each distinctive element's alternatives analysis to ensure that project input would be comprehensive. The stakeholder groups included users of South Station, abutting neighborhoods, and municipal, state, and federal agencies. See Chapter 5 – *Public Involvement and Agency Coordination* for more information on the stakeholder outreach.

MassDOT designed the alternatives identified for the station headhouse, rail, layover, and joint development elements to be compatible with each other so that each element alternative the Project Team selected to be part of the project Build Alternative was interchangeable. By making the element alternatives compatible, the Project Team could conduct the alternatives analyses for each element simultaneously. The only element not compatible with every other element was the roadway element, which the Project Team developed to correspond with specific joint development alternatives (see Figure 2-1). As shown in Figure 2-1, the preferred headhouse, rail, and layover alternatives progressed in the process and were then modified by the two remaining elements, joint development and roadway.

The Project Team chose the Transportation Improvements Only joint development alternative and the corresponding roadway alternative to move forward. The Preferred Build Alternative analyzed in this Environmental Assessment (EA) is comprised of the preferred alternative of each of the five major elements: station headhouse, rail, layover, joint development, and roadway.

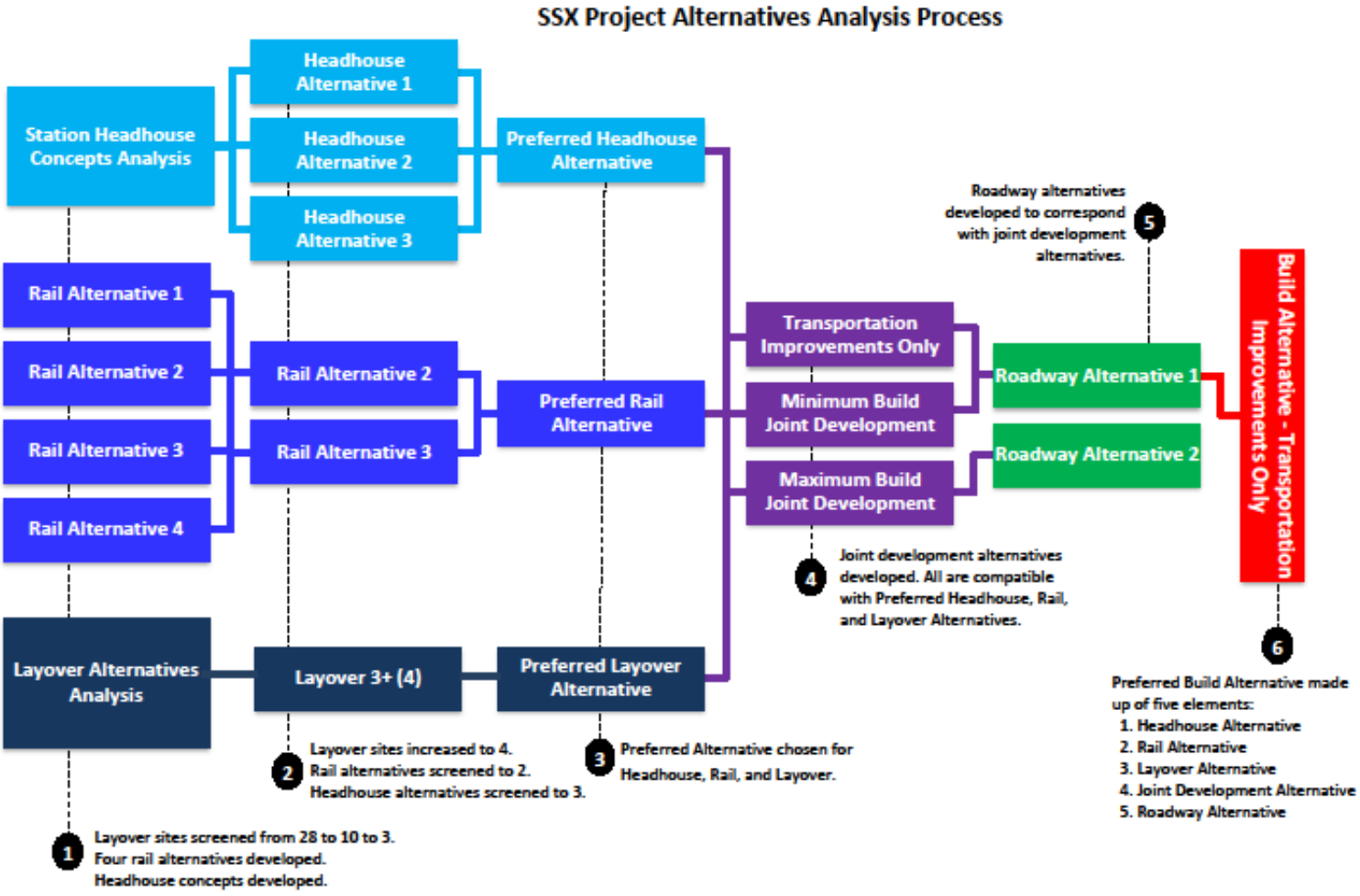


Figure 2-1 — SSX Project Alternatives Analysis Process

2.1. Alternatives Considered but Dismissed

The alternative identified for each project element that the Project Team determined best met the purpose and needs of the project was incorporated into the Build Alternative, which was then advanced for full environmental evaluation. A discussion of the alternatives analysis process, by element, is provided below. In consultation with FRA, MassDOT pursued separate NEPA and MEPA documents for the SSX project. MassDOT produced a Draft Environmental Impact Report (DEIR) and Final Environmental Impact Report (FEIR), which are available on the project website[1], as part of the MEPA process. More information on the alternatives analysis process can be found in the DEIR and FEIR.

2.1.1. Station Headhouse Alternatives Analysis

As part of the SSX project, MassDOT analyzed the headhouse expansion alternatives, as further detailed in Appendix A, *Station Headhouse Alternatives Analysis*. The analysis was influenced by numerous factors, including: project vision[2], future passenger experience, pedestrian flow and amenities, opportunities for and impacts of joint development/overbuild, and project purpose and need. The analysis of the headhouse expansion alternatives takes into consideration the urban context of South Station; existing and anticipated passenger circulation paths within and around the station; existing connections to the station headhouse and between MBTA rail, bus, and subway facilities; existing and anticipated passenger circulation paths between the rail station, its proposed expansion, and the existing bus facility; and existing and anticipated passenger circulation paths between the rail station and the existing office building at 245 Summer Street. The Project Team also considered the SSAR project,[3] which the Secretary of EEA approved in 2006 and the developer filed a Notice of Project Change in 2016.[4,5] Although not yet constructed, the SSAR project is considered an existing condition for purposes of SSX project analyses. The Project Team examined how the station headhouse expansion is integrated with the SSAR project to realize a coherent and functional multimodal station for bus, rail, subway, and intercity patrons at South Station.

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 relocate or require substantial changes to the SSAR project.

[1] Massachusetts Department of Transportation, South Station Expansion Project. *Environmental Notification Form*, *Appendix C*. March 2013.
Massachusetts Department of Transportation, South Station Expansion Project. *Draft Environmental Impact Report*, *Chapter 3 and Appendix 2*. October 2014.
Massachusetts Department of Transportation, South Station Expansion Project. *Final Environmental Impact Report*, *Appendix D*. June 2016.
All available at: https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

[2] The vision is defined in detail of Chapter 4 of Appendix A. By expanding and improving South Station, MassDOT intends to create a safe, attractive, and comfortable transportation facility, one that fully integrates passenger rail, public transit, well-designed bike/pedestrian facilities, and curbside pick-up and drop-off. This new vision for the station emphasizes convenient and comfortable passenger waiting areas with height, natural light, clear lines of sight and easy orientation, and view corridors to Fort Point Channel and the urban neighborhoods beyond. More broadly, MassDOT envisions an expanded South Station that is linked – physically and visually – to the waterfront via Dorchester Avenue (currently closed to the public) and an extension of the Harborwalk

[3] The South Station Air Rights Project (SSAR), (also referred to as the Hines Project) was approved by the Secretary of the EEA in 2006 (EEA Number 3205/9131) as an approximately 1.8 million square foot 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, pedestrian connections from the train station concourse and platforms to the expanded bus terminal, and a 3-level parking garage located above the bus terminal. In 1998, the Boston Redevelopment Authority (BRA), now Boston Planning and Development Agency (BPDA), designated the joint venture between Tufts University Development Corporation (TUDC) (an affiliate of Tufts University) and Hines as the redeveloper for the SSAR site.

[4] The South Station Air Rights project filed a Notice of Project Change with the BPDA on July 29, 2016, and received BPDA Board Approval on December 15, 2016. http://www.bostonplans.org/getattachment/147f7f58-dd54-4702-8659-ce81707bfc35

[5] The South Station Air Rights Project Notice of Project Change received a Certificate from the Secretary of EEA on October 7, 2016. http://209.80.128.250/EEA/emepa/mepacerts/2016/sc/npc/3205%20-9131%20NPC3%20South%20Station%20Air%20Rights%20Boston.pdf

MassDOT 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 intermodality by promoting connections to multiple transit services, walking and bicycling facilities, and taxis. Design project components to reduce carbon production and incorporate sustainable design elements.
- Connect South Station to adjacent neighborhoods and open spaces, including the waterfront and potential future air rights development,[6] through the thoughtful programming of uses and design of the public realm.
- 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.
- 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.

Over the course of the project, the Project Team has developed and analyzed a wide range of expanded headhouse concepts. Some of the concepts presented dramatic shapes and spaces along the reopened Dorchester Avenue with expansive interior areas and some of the concepts presented smaller functionally efficient spaces that improved passenger flow, but did not meet stakeholder approval. Three main headhouse expansion alternatives evolved from the alternatives analysis process:

- **Headhouse Alternative 1: Base Condition – Single-level Concourse**, consisting of single-level boarding/exiting platforms utilizing the main existing headhouse entrance with side entrances to Atlantic and Dorchester Avenues.
- **Headhouse Alternative 2: Functional Concourses**, consisting of bridges located above platforms and connected to a new train shed with a Dorchester Avenue station entrance. Additional station entrances would be provided along Atlantic Avenue from the concourse bridges.
- **Headhouse Alternative 3: Diagonal Concourses**, consisting of bridges located above platforms and connected to an expanded headhouse with a prominent Dorchester Avenue station entrance. Additional station access would be provided along Atlantic Avenue from the concourse bridges.

The three headhouse expansion alternatives were compared and screened using various evaluation criteria, including: overall passenger circulation (including LOS), multimodal/integrated station, platform deficiencies, passenger experience and amenities, NFPA standards, ventilation, construction cost, phasing/constructability, and project vision. After discussions with the MBTA, MassDOT established an

[6] "Potential future air rights development" means development in addition to the SSAR project, which is considered an existing condition for the purposes of SSX project analyses.

overall goal of LOS C for the South Station public circulation and waiting areas to accommodate the increase in passengers associated with Amtrak's and the MBTA's future service increases.

The analysis resulted in the development of a new headhouse expansion alternative that incorporates elements from both Headhouse Expansion Alternative 2 and 3. Regulatory requirements, and desired passenger and service improvements guide the framework design of the new headhouse expansion alternative. MassDOT is committed to achieving the project goals outlined in the design principles, meeting and/or exceeding regulatory requirements, and providing a multimodal station that will serve all passengers today and in the future. Therefore, the new headhouse expansion alternative became the preferred headhouse expansion alternative because it accommodates increased rail service; enhances the passenger experience at the station; improves the multimodal connections; and integrates the station with the adjacent neighborhoods and open spaces. Additionally, the preferred headhouse expansion alternative would be aligned with Dorchester Avenue so that it would not preclude any future air rights development.

2.1.2. Rail Alternatives: Terminal Track Configurations

The SSX project includes an alternatives analysis to determine how to best expand the rail elements of the station in order to improve existing and proposed rail service – local, regional, and intercity – in and out of Boston. The expansion would include improvements to tracks, platforms, interlockings, passenger facilities, and other attendant infrastructure. The Project Team identified and evaluated two sets of rail infrastructure concepts, unconstrained rail alternatives and constrained rail alternatives.

Unconstrained rail alternatives were not limited by the boundary of the existing South Station and USPS property and/or constituted a complete rebuild of the South Station Terminal to capture all potential operational benefits. These unconstrained rail alternatives explored opportunities that were outside of the original study area, but could help achieve the project goals. However, the unconstrained rail alternatives substantially impacted the major infrastructure adjacent to and within the terminal, including: existing South Station headhouse; I-90 tunnels and ramps; I-93 and ramps; Central Artery/Tunnel vent buildings; and the MBTA Red Line. The costs associated with the unconstrained rail alternatives outweighed the operational benefits gained, and the Project Team then analyzed rail alternatives within a more defined boundary, the constrained rail alternatives, known henceforth as simply the "Rail Alternatives".

The Project Team analyzed a total of four rail alternatives[7] with a more conservative approach in order to minimize impacts to the existing infrastructure while still improving operations to and from the terminal. Rail Alternative 1 proposed a total of 19 tracks; Rail Alternatives 2 through 4 proposed a total of 20 station tracks. Benefits shared among the rail alternatives include streamlining operations, minimizing disruption to existing operations, and maximizing joint development potential. The rail alternatives comprise various layouts at the South Station terminal area and Tower 1 Interlocking, as described below:

- **Rail Alternative 1** – Prioritizes operational flexibility within the terminal and provides a complete redesign of the existing South Station terminal area and existing Bus Terminal, and would require a complete reconfiguration of the Tower 1 Interlocking. This alternative shifts the alignment of the terminal to reduce complex movements, eases the approach through a redesigned Tower 1 Interlocking, and allows for full mid-platform boarding at all tracks.
- **Rail Alternative 2** – Streamlines operations and completely reconfigures the existing Tower 1 Interlocking. This alternative adds new station tracks and platforms to the terminal and provides

[7] Massachusetts Department of Transportation, South Station Expansion Project, *Draft Environmental Impact Report*, *Chapter 3 and Appendix 2*. October 2014. Available at: https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

operational improvements such as parallel moves at a separate mini-terminal in an effort to reduce conflicting movements.

- **Rail Alternative 3** – Minimizes disruptions to existing operations and minimizes the level of reconstruction of existing infrastructure within the terminal. This alternative maintains, to the greatest extent possible, the existing platform configuration while adding new tracks and platforms parallel to the existing ones and allows for maximum platform accessibility for incoming trains.
- **Rail Alternative 4** – Maximizes the potential to build within the available airspace over the terminal track area ("overbuild"). This alternative consists of a complete redesign of the South Station terminal area without impacting the existing bus terminal and enhances the opportunity for future overbuild development by prioritizing the location of the overbuild support columns.

MassDOT, in consultation with FRA, dismissed Rail Alternatives 1 and 4 from further consideration because of the impacts to existing infrastructure and challenges each of the alternatives would cause throughout the construction period. In particular, both of these rail alternatives included a complete redesign of the existing terminal that would require a total shutdown of rail service for a significant period of time. The Project Team selected Rail Alternative 2 and Rail Alternative 3 to advance for further analysis.

MassDOT, in consultation with FRA, advanced certain elements of the designs for Rail Alternatives 2 and 3 to improve functionality and better address the project goals. This was followed by a second level of screening of Rail Alternatives 2 and 3, as detailed in the FEIR.[8] As the primary operators of the passenger trains utilizing South Station, Amtrak's and MBTA's perspectives on the functionality of terminal track configuration alternatives was particularly valuable, and hence, they were provided opportunities to review and comment on Rail Alternatives 2 and 3. Their comments and preferences were important to consider as part of each evaluation criteria. The Project Team evaluated Rail Alternatives 2 and 3 using the following criteria:

- **Platform accessibility**: MassDOT rated the platform designs of the rail alternatives for their accessibility by each service line and their ability to berth future Amtrak and MBTA trainsets. The goal is to provide maximum platform accessibility. In the case of an emergency or a stopped vehicle, flexibility in platform accessibility is critical. Platform accessibility is measured by the number of station tracks that each service track can access whether the crossover move occurs at the approach interlocking or at Tower 1 Interlocking.
- **Berthing:** MassDOT rated the platform designs of the rail alternatives for their ability to berth future Amtrak and MBTA trainsets. The goal is to accommodate Amtrak and MBTA platform berthing standards. In order for a trainset to use any platform, adequate berthing length is required.
- **Service reliability and ability to meet future service goals**: MassDOT ran operations simulations for each rail alternative and evaluated how each rail alternative would support future 2035 service levels, as well as its OTP and delay performance. Additionally, MassDOT identified operational efficiencies and limitations of each alternative.
- **Constructability** is measured by the degree to which each rail alternative would minimize impacts to existing infrastructure and minimize disruption to passenger service. The goals are to:
    - Minimize impacts to existing infrastructure including the station tracks and platforms, bus terminal, and foundations for future development (e.g., the SSAR project).
    - Minimize disruption to passenger service. South Station is one of the busiest terminals in the Northeast, thus, keeping the trains running during construction with the least impact

[8] Massachusetts Department of Transportation, South Station Expansion Project, *Final Environmental Impact Report*, *Appendix D*. June 2016. Available at: https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

to their schedules is a challenge. It is critical that construction phasing minimize disruption to operations and maximize safety.

- **Order-of-magnitude capital cost:** MassDOT evaluated the degree to which each of the rail alternatives minimize capital costs. MassDOT used order-of-magnitude costs to evaluate the constrained rail alternatives. Capital costs include station area track and platforms, Tower 1 Interlocking, approach interlockings, signals, communication system, and OCS.
- **Maintenance cost**: MassDOT evaluated the degree to which each of the rail alternatives minimize maintenance costs. It is not possible at this time to determine actual maintenance costs; therefore, MassDOT compared the quantity of maintenance expected for each of the constrained rail alternatives.

Results of the Analysis

Platform Accessibility: 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. Rail Alternative 3 presents increased flexibility in platform accessibility when compared to Rail Alternative 2. This increased flexibility would allow for greater operational opportunities for dispatchers in the event of delays.

Amtrak commented that Rail Alternative 3 is more consistent with their current dispatching than Rail Alternative 2, and expressed concerns with the differences between Rail Alternative 2 and their current dispatching. The MBTA commented that they would prefer the versatility of Rail Alternative 3.

Berthing: Both Rail Alternatives 2 and 3 would meet platform berthing standards for MBTA trainsets at all station tracks, providing design modifications[9] can be applied at all platforms. However, Rail Alternative 3 would accommodate MBTA trainsets at more station tracks than Rail Alternative 2 if platform design modifications are not permitted at some or all platforms. Rail Alternative 3 would meet platform berthing standards for Amtrak trainsets at 14 out of 20 station tracks. Rail Alternative 2 would meet platform berthing standards for Amtrak trainsets at only 10 out of 20 station tracks.

Service Reliability and Ability to meet Future Service Goals: The results of the analysis indicate that the proposed infrastructure for both Rail Alternative 2 and 3 would support proposed future operations and meet or exceed the MBTA Commuter Rail Schedule Adherence Standard OTP threshold of 95% of all trips departing and arriving at terminals within five minutes of scheduled departure and arrival times. The results also meet or exceed Amtrak's 2030 OTP target for Acela Express service and Northeast Regional service (95%).[10, 11] These results indicate the proposed infrastructure for both alternatives is robust and flexible enough to provide reliable service given the large increase in future 2035 trip volumes and will help to prepare the station to accommodate future service defined through FRA's NEC FUTURE program.

[9] MassDOT developed design modifications to enhance platform capabilities and accommodate Amtrak and MBTA berthing length standards. These modifications are design and operational solutions that vary from standard practice; however, they have been implemented successfully in other projects with similar constraints. For more details, see: Massachusetts Department of Transportation, South Station Expansion Project, *Final Environmental Impact Report, Appendix D*. June 2016.
Available at: https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

[10] Massachusetts Department of Transportation, South Station Expansion Project, *Final Environmental Impact Report, Appendix E*. June 2016.
Available at: https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

[11] Amtrak *Intercity Passenger Rail On-Time Performance: Twentieth Quarterly Report to Congress*. February 2013. Viewed June 12, 2013 at www.fra.dot.gov.

Alternative 3 does not provide the same level of operational efficiency or number of parallel moves as Alternative 2; but it does provide increased flexibility for non-revenue moves between the station platform tracks and the south side layover facilities with two ladders to access the Dorchester Branch tracks. This second Fairmount Line/Dorchester Branch ladder track provides more options to avoid delays if a disabled train or other unexpected activity blocked trackwork within the Tower 1 Interlocking.

Both Amtrak and the MBTA commented that the lack of a second ladder connection for the Fairmount Line/Dorchester Branch in Rail Alternative 2 was a significant concern and differs from what occurs today at South Station. It was stated that Rail Alternative 3 would be preferred as it would provide the second ladder connection within the terminal area. During stakeholder meetings, Amtrak and the MBTA both reflected on recent events where the second ladder connection was necessary for access to the terminal.

Constructability: Rail Alternative 2 would require a complete reconfiguration of the existing Tower 1 Interlocking and would require a new operations plan to be implemented by the dispatcher, while retaining existing station Track 1-13 alignments and platform widths. This complete reconfiguration of the existing interlocking is challenging to construct because it will require significant disruptions to current service to the terminal during construction. Rail Alternative 3 would maintain the existing configuration of Tower 1 Interlocking with modifications and replacements to a much lesser degree than Rail Alternative 2; it would not require the extensive realignment required in Rail Alternative 2. The additional track expansion in Rail Alternative 3 would tie into the eastern side of Tower 1 Interlocking, limiting the required track outages and impacts to rail service, especially for the tracks entering the terminal from the west.

Order-of-Magnitude Capital Cost: Capital costs were calculated for all tracks, signal system, OCS, communication system, and associated civil work within terminal and station areas including work at Tower 1, and the approach interlockings. These cost estimates were based on the initial conceptual designs and were used to compare Rail Alternatives 2 and 3. The capital costs analyzed do not represent present project costs. MassDOT selected Rail Alternative 3 to advance because it requires less additional infrastructure and is the less expensive option.

Maintenance Cost: Although specific costs associated with maintenance have not been calculated, the quantity of maintenance for the two alternatives can be compared. It is anticipated that Rail Alternative 3 would require the highest overall maintenance requirements because it would require a greater amount of special trackwork at Tower 1 Interlocking. Rail Alternative 2 would require a lesser amount of special trackwork at Tower 1 Interlocking and is therefore anticipated to require the least amount of overall maintenance and to have lower maintenance costs.

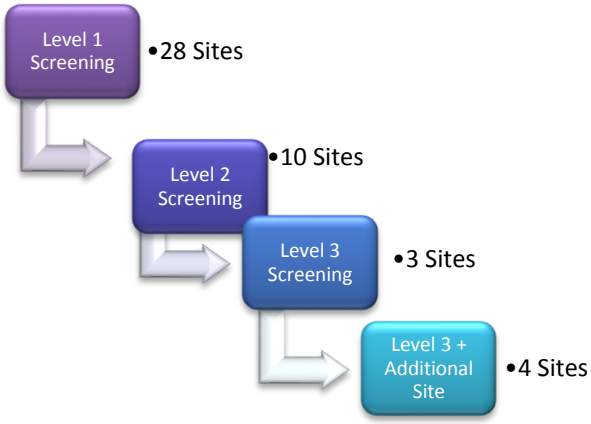
The Project Team evaluated Rail Alternatives 2 and 3 for their ability to meet future South Station performance objectives, including the need to accommodate future MBTA and Amtrak service plans and to meet on-time performance goals. Rail Alternative 3 performed better than Rail Alternative 2 the majority of the rating categories, including stakeholder preference. MassDOT, in consultation with FRA, selected Rail Alternative 3 as the track configuration alternative to advance, as it best meets project needs.

2.1.3. Layover Facility Alternatives Analysis

South Station is operating at its design capacity for efficient train operations. At certain times of the day, its 13 tracks are fully utilized by Amtrak and the MBTA. As ridership and service levels have increased, the capacity at the MBTA's existing layover facilities during the midday has also been exceeded. An integral component of South Station operations is the utilization of nearby layover yards to store, service, inspect, and maintain trains when they are not in service. Layover yards are critical to operations because they provide a nearby location to stage trains during off-peak periods, thereby keeping unused trains off active tracks to minimize congestion at South Station. Additional layover space to service the MBTA south

side commuter rail operations is a critical need for the SSX project. The dense urban environment in close proximity to South Station, compounded with plans for additional development along the rail corridors, make selection of a suitable location for layover increasingly more difficult.

MassDOT used a three-tiered screening alternatives analysis to identify potential locations to satisfy future layover needs. MassDOT identified 28 initial alternatives for this layover alternatives analysis. The first tier of 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 were carried forward to the second tier evaluation.



The second tier screening of layover alternatives involved two elements: 1) developing conceptual designs and preliminary operating plans, and 2) identifying infrastructure requirements for each site. Evaluation criteria included consistency with adopted plans and zoning, ability to meet location requirements, railroad operations, environmental impacts, site suitability, and capital improvements.

Of the 10 candidate sites, three locations best met the second tier screening criteria and advanced to the third tier of screening during the DEIR:

- Beacon Park Yard (BPY),
- Boston Transportation Department (BTD) Tow Lot, and
- Expansion of existing Readville – Yard 2.

The Secretary of the EEA requested the Widett Circle site also be carried forward for further evaluation in the DEIR.

MassDOT evaluated these four layover alternative sites and determined with FRA that no single site could meet the storage capacity and operational requirements to fully meet South Station's midday layover needs. During the third tier of screening, MassDOT tested combinations of these 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 midday layover sites currently serving South Station. MassDOT developed multiple conceptual layouts for the four sites to identify the best combination of sites when compared to these screening criteria: ability to meet layover capacity and program needs, railroad operational requirements, and order-of-magnitude cost estimates.

MassDOT did not advance the BTD Tow Lot site for further consideration because of the considerable impacts its use would have on critical City operations, including a Department of Public Works garage and the lack of a suitable location to relocate these functions based on City of Boston needs. MassDOT and FRA selected the combination of BPY, expanded Readville – Yard 2, and Widett Circle to advance for further environmental analysis. MassDOT and FRA are performing a full evaluation of two potential layover facility sites, Widett Circle and Readville – Yard 2 as part of the SSX project. MassDOT is permitting the maximum possible capacity at both of these properties and recognizes that some combination of both Widett Circle and an expanded Readville – Yard 2 would be required to meet the projected future

midday layover needs. Widett Circle can provide layover space for up to 30 eight-car trainsets, and Readville – Yard 2 can be expanded to accommodate up to eight additional eight-car trainsets.

BPY in Allston, previously identified as a third layover facility alternative, is now being evaluated under MEPA review as part of the I-90 Allston Interchange Improvement project (I-90 project),[12] as adjustments to the I-90 interchange would likely require reconfiguration of the Beacon Park Yard layover area. MassDOT decided to evaluate the impacts of using the BPY layover site in the I-90 project because the I-90 project, including the construction of the BPY layover facility, is expected to advance to construction prior to South Station and doing so would allow MassDOT to provide a more focused discussion of impacts in the affected community.

MassDOT will perform the NEPA process for the I-90 project following the MEPA DEIR review for that project. Although the NEPA class of action has not been formally identified, MassDOT anticipates that the I-90 project, including BPY, will be reviewed as an EA and will include involvement from both Federal Highway Administration (FHWA) and Federal Transit Administration (FTA).

2.1.4. Joint Development Alternatives Analysis

The SSX project is primarily a transportation project aimed at expanding rail capacity South Station. However, due to the layout of the existing infrastructure, there is also an opportunity for future joint development at the site. Joint development was considered to be non-transportation related development located in the remainder of the land acquired from the USPS that would not be occupied by the proposed transportation infrastructure. MassDOT defined an area for expansion of the headhouse to accommodate the projected increase in passengers and the additional service enabled by expanding the tracks. Factors influencing the definition of that area included space needed for circulation and waiting areas, station area retail, fire and life safety requirements for access and egress, and the need to avoid areas dedicated for the SSAR project.

MassDOT studied the South Station site and its environs, examined land use and zoning restrictions, and took into consideration the existing and proposed expansion of the tracks and headhouse to formulate joint development alternatives. MassDOT also worked with the City of Boston to determine an approach to future development that would be commensurate with the area around South Station today as well as future plans for the neighborhood. MassDOT examined proposed joint development alternatives from a structural engineering perspective to determine the locations and sizes of columns needed to support joint development and also considered the ventilation requirements that would be necessary for development over the tracks.

MassDOT evaluated three joint development alternatives for the SSX project:

- **Joint Development Alternative 1 – Transportation Improvements Only**, would not include joint development. The design of the expanded headhouse and terminal will not preclude, and to the extent practicable, will support private transit-oriented development in the future.

- **Joint Development Alternative 2 – Joint Development Minimum Build**, would include future private development of approximately 660,000 square feet (sq ft) of mixed uses consisting of residential, office, and commercial uses, including retail and hotel, located in six separate buildings with open space and plazas.

[12] The I-90 Allston Interchange Improvement Project (I-90 project) site includes the I-90 interchange, land owned by Harvard University, former CSX rail yard, and an intermodal terminal known as Beacon Park Yard, as well as the MBTA's Framingham/Worcester branch of the MBTA's commuter rail line.

- **Joint Development Alternative 3 – Joint Development Maximum Build**, would include future private development of approximately 2,000,000 sq ft 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. This alternative would also require an amendment to the Municipal Harbor Plan, modifying applicable Chapter 91 regulations.

In consultation with the City of Boston, MassDOT selected "Joint Development Alternative 1 – Transportation Improvements Only," an alternative that does not include joint development, thereby eliminating the environmental impacts of the project associated with those development scenarios. The design of the expanded headhouse and terminal will not preclude, and to the extent practicable, will support private transit-oriented development in the future. MassDOT continues to be committed to working with the City of Boston, interested stakeholders, and the general public to ultimately realize a vision of an expanded South Station integrated with transit-oriented development that contributes to a vibrant Downtown Boston with private development and non-transportation uses. However, with the City of Boston currently engaged in the Imagine Boston[13] planning process, it would be premature to speculate on the development component of SSX at this time.

2.1.5. Roadway Alternatives: Dorchester Avenue and Harborwalk

MassDOT evaluated alternatives for restoring Dorchester Avenue for public use and station access corresponding with the joint development alternatives. In all roadway alternatives, 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 an extension of the Harborwalk along reopened Dorchester Avenue. The Project Team evaluated following roadway alternatives for the restoration of Dorchester Avenue and the extension of the Harborwalk:

- **Roadway Alternative 1** – The Dorchester Avenue typical cross-section would extend approximately 100 feet from the Fort Point Channel, from the Harborwalk to the sidewalk/storefront zone. This alternative includes an expanded sidewalk/storefront zone to maximize pedestrian circulation. MassDOT selected Roadway Alternative 1 as the roadway alternative to advance, as it best complements the Transportation Improvements Only alternative.

- **Roadway Alternative 2** – The Dorchester Avenue typical cross-section would extend approximately 80 feet from the Fort Point Channel. The sidewalk/storefront zone would be reduced in order to accommodate future joint development that was considered as part of this alternative.

2.2. Build Alternative

Upon completion of each of the alternatives analyses discussed above, the Project Team selected the Build Alternative for the SSX project consisting of:

- The **Preferred Headhouse Alternative** is a combination of multiple headhouse alternatives that accommodates increased rail service; enhances the passenger experience at the station; improves the multimodal connections; and integrates the station with the adjacent neighborhoods and open spaces.

[13] Imagine Boston will be Boston's first citywide plan in 50 years. The planning process began in 2015 and is anticipated to be completed in 2017.

- The **Preferred Rail Alternative**, Rail Alternative 3, largely maintains the existing platform configuration while adding new tracks and platforms parallel to the existing ones and allows for maximum platform accessibility for incoming trains.
- The **Preferred Layover Alternative** consists of three layover facilities: Widett Circle, Readville – Yard 2, and Beacon Park Yard (BPY). As stated above, BPY is being permitted as part of a separate MassDOT project. MassDOT anticipates that a combination of all three facilities would be necessary to accommodate future service.
- The **Preferred Joint Development Alternative**, Transportation Improvements Only, does not include a specific joint development program, but does not preclude development on the site in the future.
- The **Preferred Roadway Alternative**, Roadway Alternative 1, is directly tied to the Preferred Joint Development Alternative and would extend approximately 100 feet from the Fort Point Channel, from the Harborwalk to the sidewalk/storefront zone. This alternative includes an expanded sidewalk/storefront zone to maximize pedestrian circulation.

The Build Alternative would:

- Acquire and demolish the USPS Facility;
- Reopen Dorchester Avenue and extend the Harborwalk;
- Expand the South Station Terminal; and
- Construct rail layover facilities.

2.2.1. Acquire and Demolish the USPS Facility

The Build Alternative would involve acquisition and demolition of the USPS GMF located on Dorchester Avenue adjacent to South Station, which would provide an approximately 14-acre site on which to expand South Station. Although acquisition and demolition of the USPS facility is part of the project for the purposes of environmental review, the relocation of USPS operations is not part of the project. The USPS would determine the future location(s) to which its operations would be relocated, and the relocation would be subject to its own environmental review as required by federal regulations. Should the acquisition of the USPS facility advance before funding is identified for the entire project, MassDOT may consider moving forward with the demolition of the USPS and reopening of Dorchester Avenue (along with associated Harborwalk improvements) before other project components in order to provide improved public access along the Fort Point Channel.

2.2.2. Reopen Dorchester Avenue and Extend the Harborwalk

Currently, access along the majority of Dorchester Avenue in the immediate vicinity of South Station is restricted for use by the USPS in support of its operations, with very limited public access allowed for USPS customers and MBTA commuters. The project would restore approximately 0.5 miles of Dorchester Avenue for public use and provide multiple access points into the expanded station from Dorchester Avenue. These access points would allow passengers multiple station arrival and departure options and would provide connectivity through the station between Atlantic Avenue and Dorchester Avenue and the waterfront. Restoring Dorchester Avenue includes landscaping and improved pedestrian and cycling connections and facilities, including adjacent sidewalks and crosswalks. Figure 2-2 presents a typical cross-section for Dorchester Avenue.

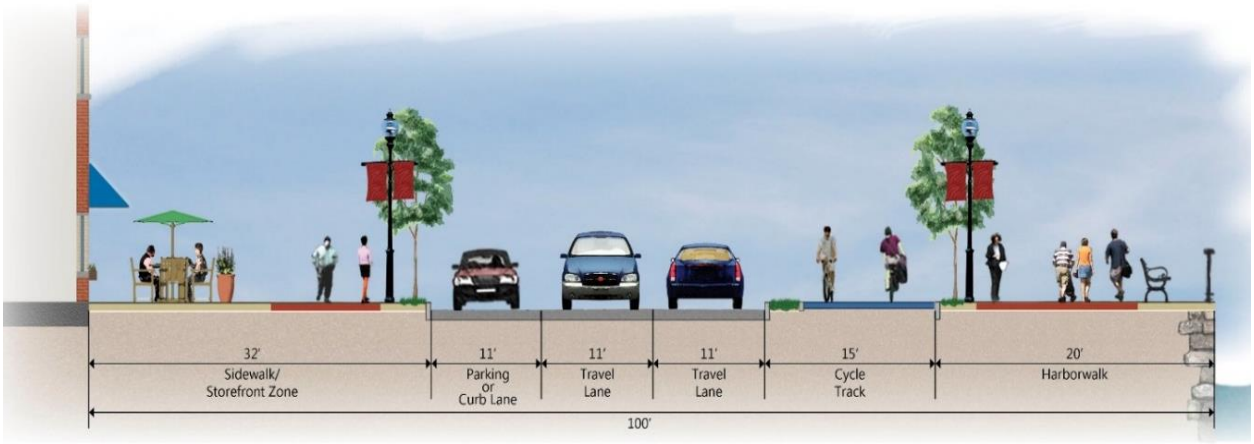


Figure 2-2 — Dorchester Avenue – Typical Cross-Section (Proposed) Looking Northeast

Restoring Dorchester Avenue would include construction of a 0.5-mile section of the Harborwalk network. The Harborwalk is a 40-mile public walkway extending along the Boston Harbor waterfront. As depicted in Figure 1-1, the Harborwalk extends to the north and south along Fort Point Channel in the vicinity of the project. There is currently no Harborwalk along Dorchester Avenue between Summer Street and Rolling Bridge Park. The project's Harborwalk extension would close one of the last remaining gaps in an otherwise continuous waterfront walkway. The sidewalk zone would include landscaping and street furniture, and would add more than one acre of open space to the area.

2.2.3. Expand the South Station Terminal

The project would include improvements to the existing rail infrastructure at South Station Terminal and the approach interlockings.[14] The aging rail infrastructure at the Terminal, including tracks, signals, and communication, have contributed to service delays and upgrading these systems will have a direct improvement to service reliability and capacity. Modifications to the Tower 1 Interlocking (Figure 1-2), as well as one approach interlocking, would be required in order to reduce conflicting movements through the terminal area and improve efficiencies.

The Build Alternative would expand the South Station Terminal, adding seven new tracks and four platforms for a total of 20 tracks and 11 platforms. Figures 2-3 and 2-4 depict proposed conditions at the South Station site. The Build Alternative assumes three berthing tracks to accommodate Amtrak's desired length (1,050 feet) and 14 berthing tracks to accommodate the MBTA's desired length (850 feet). Additional analysis is neccesary during preliminary engineering to determine exact berthing lengths in order to accommodate Amtrak and MBTA berthing standards. Reconfiguration of several existing tracks and platforms would be required and platform lengths would be designed to meet Amtrak's and the MBTA's future berthing requirements.[15] The proposed platform upgrades would improve existing access and emergency egress measures. The new tracks, platforms, and station expansion would be aligned so that it would not preclude any future air rights development.

[14] An interlocking is a segment of railroad infrastructure comprised of track, turnouts, and signals linked (interlocked) in a way that allows trains to move from one track to another, or across tracks safely, preventing conflicting train movements. The interlockings enable train dispatchers to route incoming trains over a variety of tracks to/from available station tracks. An approach interlocking is an interlocking leading up to a terminal interlocking and station. Typically, approach interlockings are only a short distance from the terminal and allow trains to switch tracks leading into the terminal to prepare to berth at specific platform tracks. Making these movements at the approach interlocking instead of at the terminal also allows for more efficient operations as the crossing movements can be made at higher speeds while avoiding conflicting movements.

[15] The future berthing requirement is the length of track adjacent to the platform required to allow passengers to enter or exit the train cars. This length is based on potential future trainset length.

The expansion of the South Station Terminal would include new structures totaling approximately 385,000 sq ft, including an expanded headhouse, with a major station entrance along Dorchester Avenue, to provide larger passenger circulation and waiting areas as well as amenities such as retail and food outlets. The station expansion would also include a mid-platform elevated concourse. The concourse would span above the new and existing platforms, located at the midpoint of the platforms' north-south axis. The concourse would provide a direct connection to the existing bus terminal, a direct connection to the existing headhouse, and would also provide a mid-block pedestrian connection between Atlantic Avenue and the newly reopened Dorchester Avenue. The vertical connection between the elevated concourse and the historic headhouse would be coordinated with the vertical elements planned as part of the SSAR project.

The proposed station would have two access points on Dorchester Avenue. The more prominent one would be proximate to the Dorchester Avenue and Summer Street intersection and would provide direct access to the trackhead and the existing headhouse. The other would provide direct access to the mid-platform elevated concourse. Both access points would be designed to integrate with potential future development on the remaining land along Dorchester Avenue.

2.2.4. Construct Rail Layover Facilities

The Build Alternative would provide additional midday layover space at two sites to meet future layover facility program needs and operational requirements.[16, 17, 18] MassDOT would construct a new layover facility at the Widett Circle site for up to 30 eight-car trainsets, as shown in Figure 2-5. Support facilities would include a crew building, support shed, and power substation. Section 3.12, *Land Use and Zoning*, addresses project property land use and ownership in more detail.

The Build Alternative would expand the existing Readville – Yard 2 layover facility by up to eight eight-car trainsets, for total layover site capacity of 18 trainsets, as presented in Figure 2-6. Support facilities would include expansion of the existing crew building and support shed, and construction of a power substation.

2.3. No Build Alternative

As required by the CEQ regulation Section 1502.14(d) MassDOT analyzed a 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 future Build Alternative is measured.

2.3.1. South Station Site

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. Delays would become more frequent and the OTP for South Station would

[16] BPY in Allston, previously identified as a third layover facility alternative in the DEIR, is now subject to environmental review as part of the I-90 project (EEA No. 15278). The I-90 project is further refining the concept design and environmental evaluation of BPY, which is occurring concurrently with the SSX project.

[17] A detailed layover facility site alternatives analysis is included in Appendix C of the Massachusetts Department of Transportation, *Environmental Notification Form*, March 2013. https://www.massdot.state.ma.us/southstationexpansion/Documents.aspx

[18] MassDOT and the MBTA are evaluating an additional midday layover facility at BPY, as part of the state environmental review process for the I-90 project. That facility, which is particularly well situated for service arriving from the west of Boston, is expected to be constructed and in service in advance of the ultimate construction of the SSX project.

decline further below the MBTA's and Amtrak's OTP goals. Expanded Amtrak and MBTA service operations would be unreliable and extremely difficult to operate.

In the No Build Alternative, the USPS GMF would not be relocated. 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.[19]

Prior to the expansion of South Station, it is anticipated that the site will include the planned SSAR project, consisting of approximately 1.8 million sq ft of mixed-use development to be located directly above the railroad tracks at the existing South Station headhouse. The SSAR[20] project will include expansion of the existing bus terminal over the existing tracks and platforms towards the existing headhouse with multiple mid-rise buildings over the existing and expanded bus garage having street access along Atlantic Avenue. The SSAR project 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.

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 from other existing and proposed bicycle facilities, including the South Bay Harbor Trail and the Summer Street Corridor cycle track. Figure 1-1 (Page 1-3) shows the connectivity of the Harborwalk. In the No Build Alternative, roadway congestion in the immediate vicinity of South Station, especially curbside congestion along Atlantic Avenue, would lead to an increase in traffic volumes associated with area-wide growth.

2.3.2. Layover Facilities

The Widett Circle layover facility site, totaling approximately 30.2 acres, is located in South Boston along the MBTA's Fairmount Line, approximately one track-mile from South Station, as shown in Figure 2-5. It is comprised primarily of two parcels in private ownership, known as the Cold Storage and Widett Circle properties. The Cold Storage property, located at 100 Widett Circle, currently houses a temperature-controlled food storage and distribution facility, owned by Art Mortgage Borrower Propco 2006-2 LP, and operated by Americold/Crocker & Winsor Seafoods. 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. In the No Build Alternative, it is anticipated that the Widett Circle site would remain in private ownership, occupied by businesses in the food processing, food storage, and food logistics industry.

The Readville – Yard 2 layover facility site, totaling approximately 17.5 acres, is located in the Readville section of Hyde Park, at the intersection of the NEC and the MBTA's Fairmount Line, approximately 8.8 track-miles from South Station, as shown in Figure 2-6. Owned by the MBTA, Readville – Yard 2 is currently a maintenance repair facility and the largest midday layover yard used by the MBTA for its south side commuter service. 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.

[19] 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.

[20] The SSAR project was approved by the Secretary of the Executive Office of EEA in 2006 (EEA No. 3205/9131).

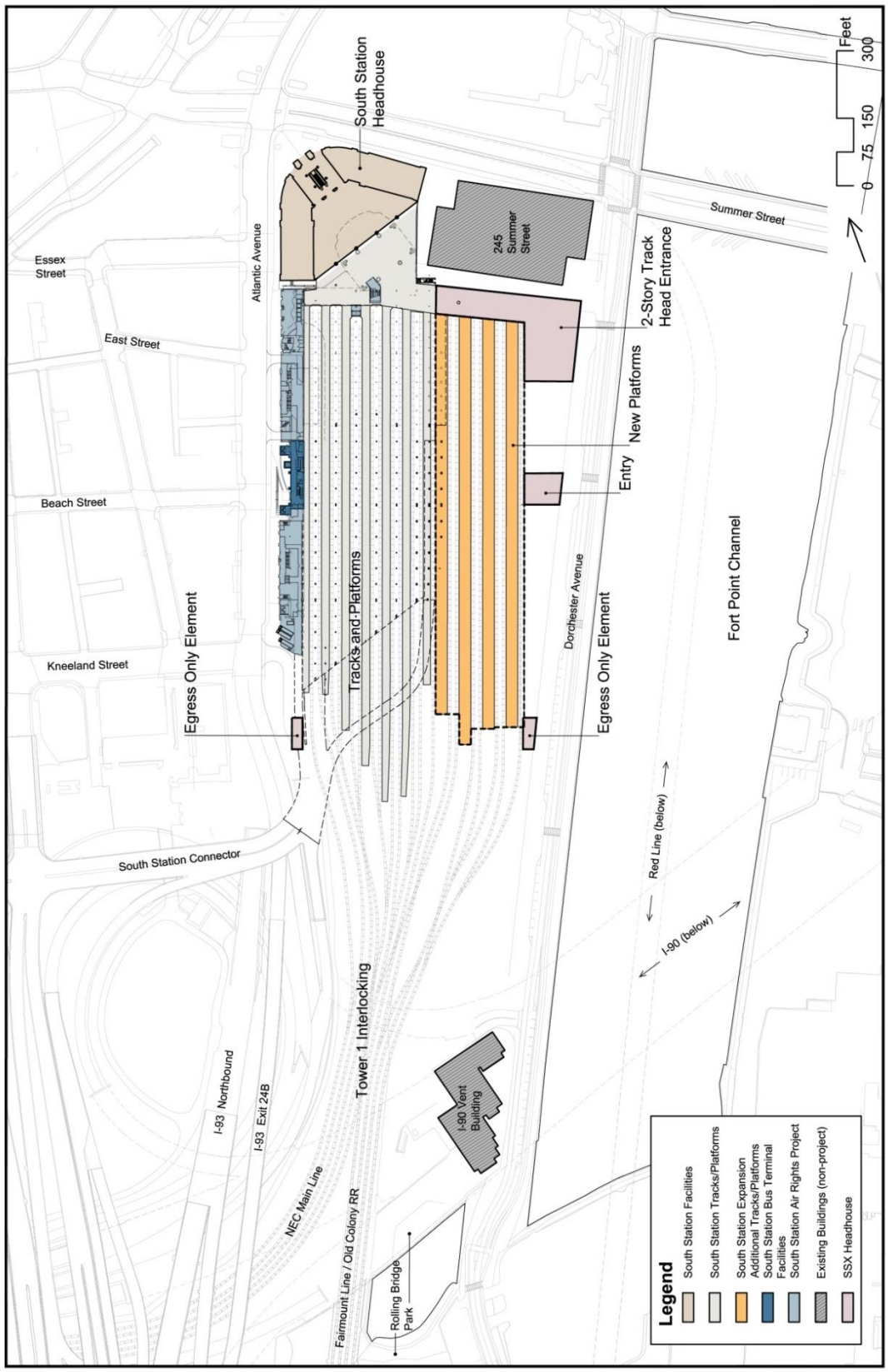


Figure 2-3 — South Station Site – Proposed Platform Level

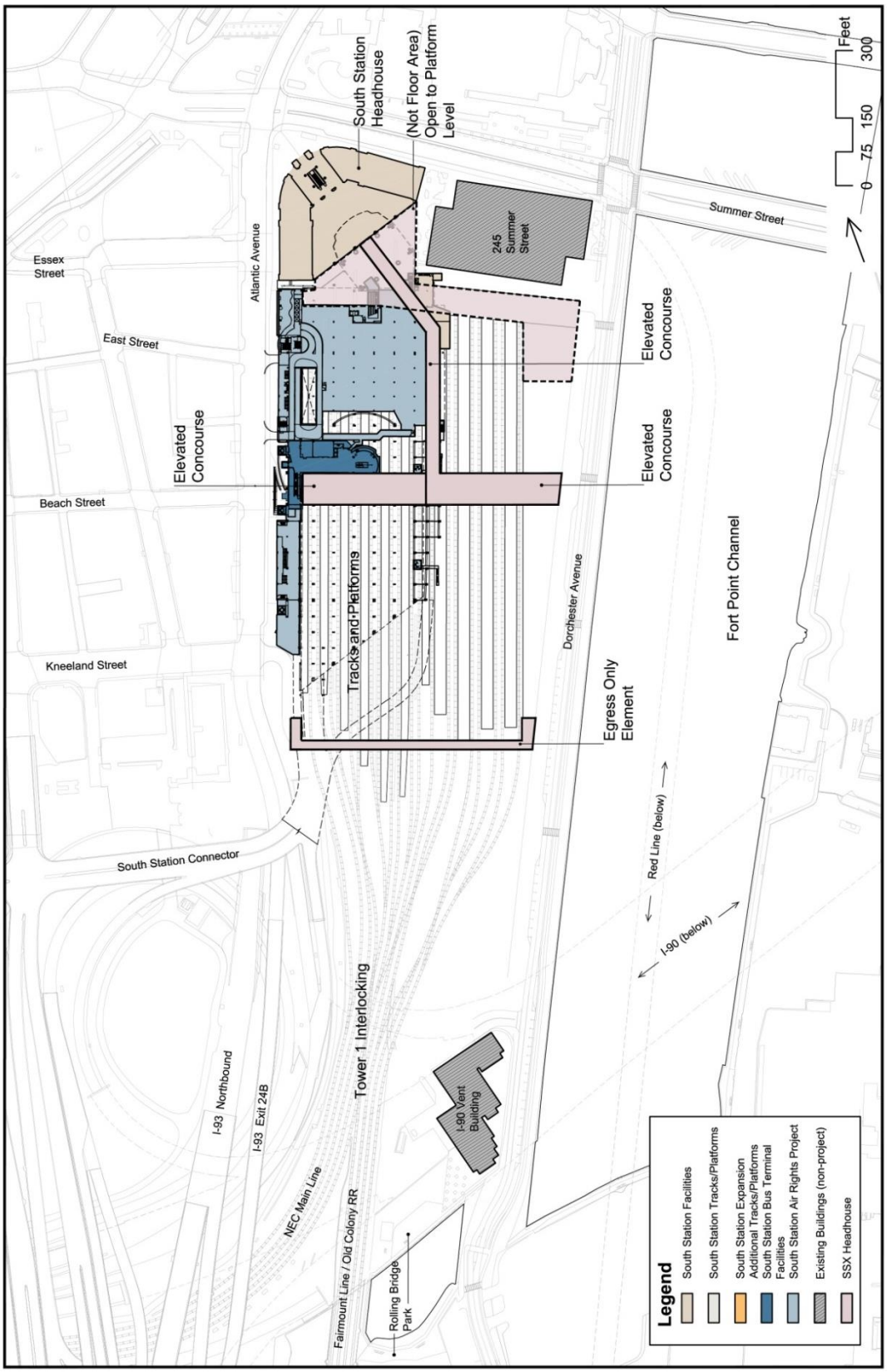


Figure 2-4 — South Station Site – Proposed Elevated Concourse Level

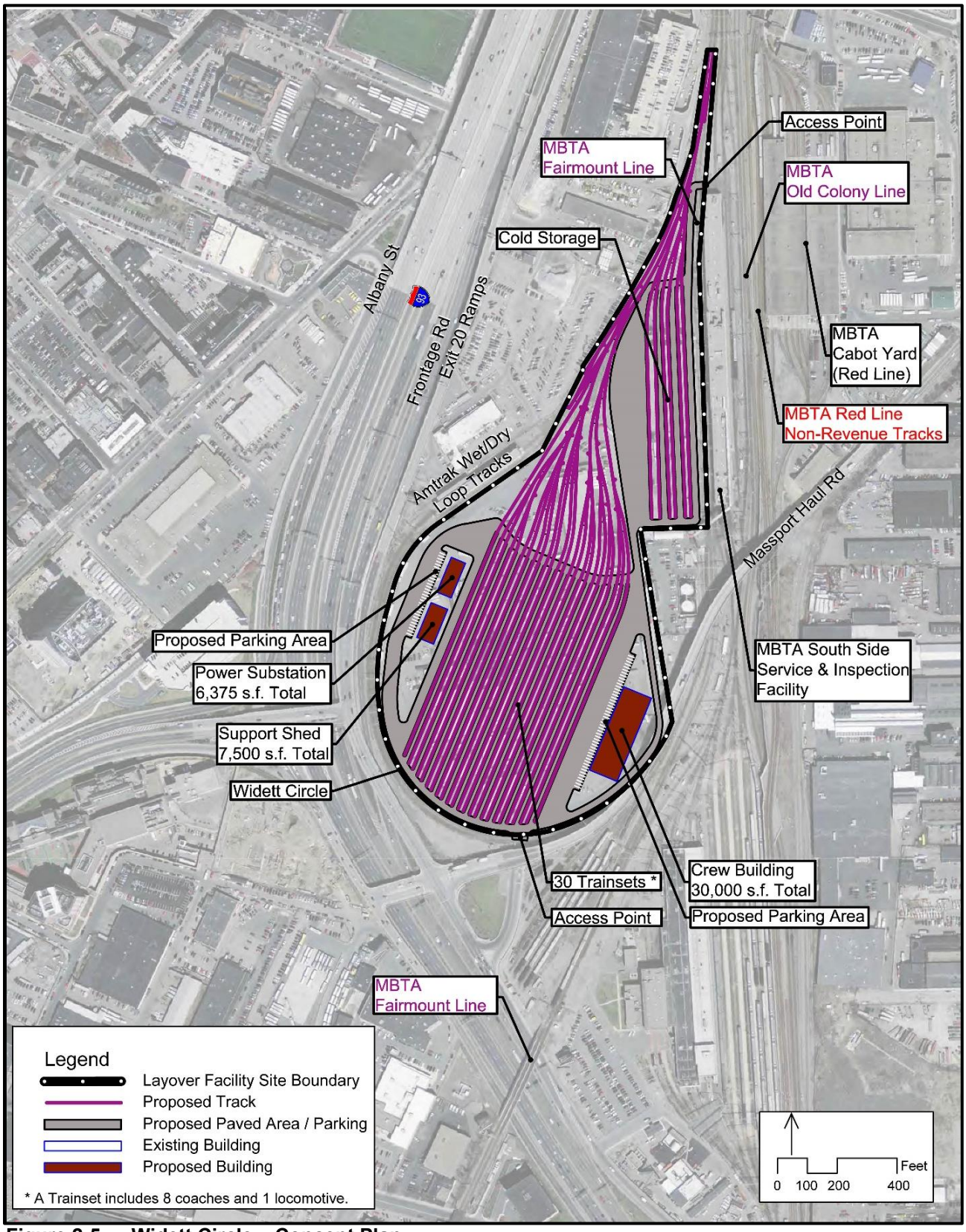


Figure 2-5 — Widett Circle – Concept Plan

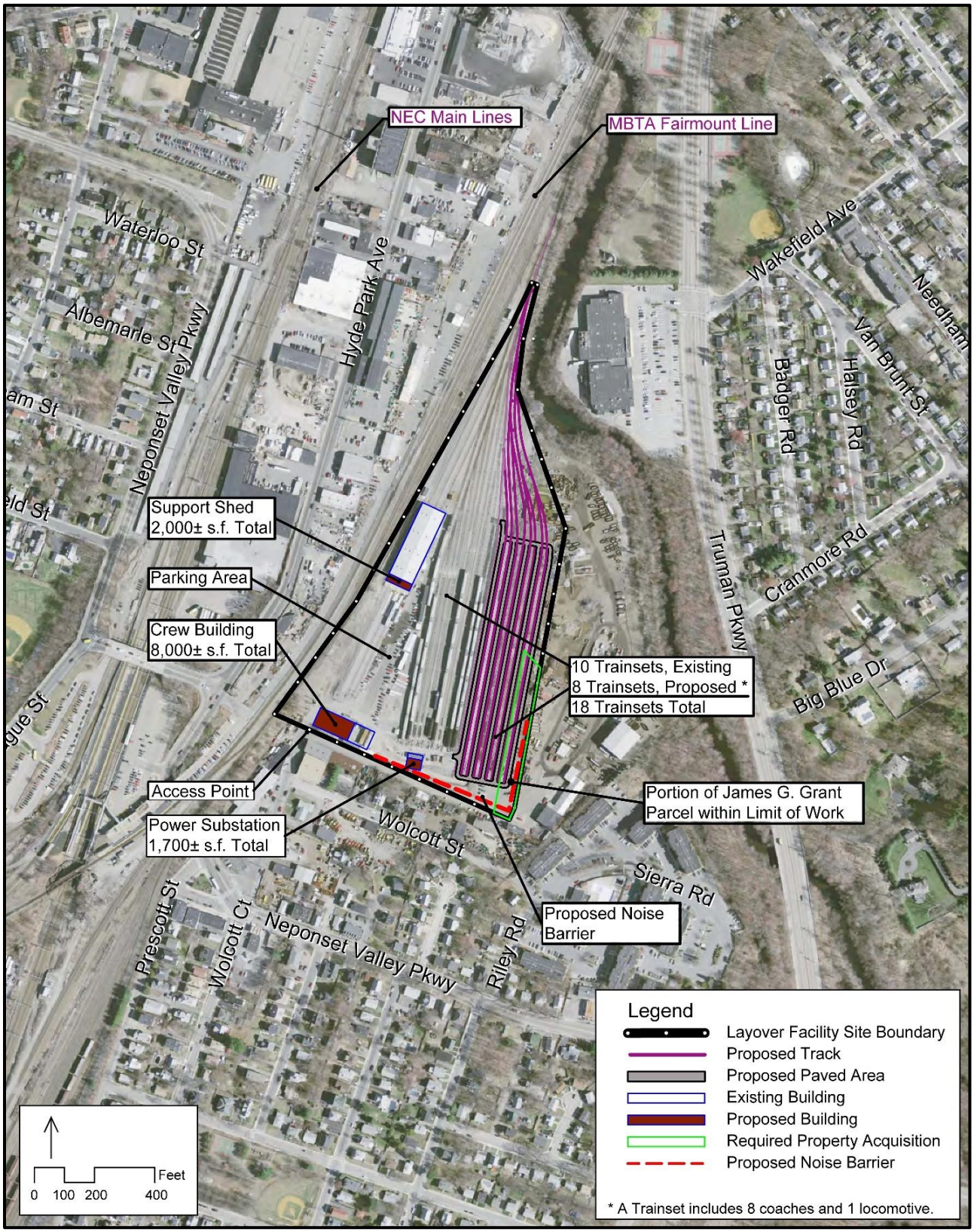


Figure 2-6 — Readville – Yard 2 – Concept Plan

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