SOUTH STATION
EXPANSION

Layover Facility Alternatives Analysis

March 2013 Version 0

massDOT
Massachusetts Department of Transportation

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1. Introduction

The Massachusetts Department of Transportation (MassDOT), in cooperation with the Massachusetts Bay Transportation Authority (MBTA), National Railroad Passenger Corporation (Amtrak) and the Federal Railroad Administration (FRA), is evaluating an expansion of Boston's South Station. The South Station Expansion (SSX) project is being undertaken by MassDOT to allow for additional intercity and high-speed rail (HSR) service into Boston's South Station without limiting the MBTA's ability to deliver efficient commuter rail service.

The current track capacity, layout, and operations of South Station limit the ability to achieve projected future expanded services. The SSX project includes planning, environmental reviews, and preliminary engineering for five primary elements of the project:

1. **Expand the South Station terminal facilities**, including the addition of up to seven (7) tracks and platforms and construction of a new passenger concourse and other amenities.
2. **Acquire and demolish the U.S. Postal Service (USPS) general mail facility** located on Dorchester Avenue adjacent to South Station, which will provide an approximate 16-acre site onto which to expand South Station. (Note that the relocation of the USPS facility will be the subject of a separate environmental review process by others.) Dorchester Avenue will be restored for public and station access.
3. **Create an extension of the Harborwalk along reopened Dorchester Avenue.**
4. **Provide for the possibility of future joint public/private development** adjacent to and over an expanded South Station.
5. **Provide adequate rail vehicle layover space** to address existing and future intercity and commuter rail service needs.

Figure 1 illustrates the South Station project area, which encompasses the South Station headhouse, the South Station Bus Terminal, and the USPS facility.

The focus of this report is the layover element of the project. This report assesses existing and future layover capacity needs at South Station and identifies and evaluates potential layover sites to accommodate future growth. It is organized in six chapters:

- **Chapter 1 – Introduction:** Chapter 1 provides context for the layover alternatives analysis by describing the history of South Station, the purpose of the SSX project, and an overview of how current operations are hindered by limited layover capacity.
- **Chapter 2 – Existing Conditions:** Chapter 2 describes the existing layover facilities and compares the layover capacity to existing demands of Amtrak and the MBTA, thereby establishing a baseline condition to aid in future projections.
- **Chapter 3 – Future Conditions**: Building on the baseline condition presented in Chapter 2, Chapter 3 develops a forecasted supply and demand relationship to the year 2025 and 2040, thereby defining the future need that will help identify and evaluate new or expanded layover sites for consideration.
- **Chapter 4 – Identification of Layover Sites:** Chapter 4 presents the candidate layover sites that were considered for South Station operations along with the evaluation criteria used to identify these potential locations. A total of 28 layover sites are presented in this chapter.

- **Chapter 5 – Screening of Layover Sites:** In Chapter 5, the 28 candidate layover sites are evaluated based on a two-tiered screening process, which culminates in a set of three layover sites that are recommended to be carried forward for further operational analysis, environmental analysis and advanced conceptual design.
- **Chapter 6 – Conclusions and Next Steps:** Chapter 6 summarizes the next steps involving the conceptual design, refinement, and vetting of the recommended layover site(s).

1.1. Layover Alternatives Analysis Study Area

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 location to stage trains during off-peak periods, thereby keeping unused trains off active tracks to minimize congestion at stations. Some are also used for daily service and inspection activities.

As depicted on Figure 2, Amtrak and the MBTA currently utilize four layover yards for operations at South Station. They are as follows:

1. Amtrak's Southampton Street Yard;
2. Amtrak's Front Yard;
3. MBTA's South Side Service and Inspection Facility; and
4. MBTA's Readville - Yard 2.

This report demonstrates how South Station lacks sufficient layover capacity under current operations and how this will constrain future growth potential without new or expanded layover space. Keeping the current needs as a baseline, the analyses in this report consider projected operations and layover needs for Amtrak and the MBTA for the 2025 and 2040 planning horizons.

Figure 1 South Station Expansion Project Area Map

Figure 1: **South Station Expansion Project Area Map**

Figure 2 Existing Layover Facilities

1.2. Background

South Station is the principal passenger rail hub in New England. South Station was constructed over 110 years ago and is one of the most significant and iconic architectural structures in the City of Boston. When it first opened in 1899, South Station had 28 tracks but now has only 13, constraining current and future rail mobility not only within Massachusetts but also throughout southern New England and along Amtrak's Northeast Corridor (NEC).

Amtrak owns and operates 363 miles of the 457-mile NEC between Washington and Boston (a total of 1,219 track-miles). South Station is the terminus of Amtrak's NEC service, as well as Amtrak's Lake Shore Limited service from Chicago via Albany. Annually, the NEC carries 13 million Amtrak passengers on the Acela Express and Northeast Regional Amtrak services. Amtrak's NEC is the busiest railroad in North America, with more than 2,200 trains operating over some portion of the Washington-Boston route each day. Approximately 1.36 million Amtrak passengers traveled through South Station in 2011.[1] As the only high-speed rail service in the U.S., Amtrak's ridership share on the NEC continues to grow and now dominates the air/rail market (75 percent of the New York-Washington market and 55 percent of the New York-Boston market).

South Station is also the terminus for the western and southern lines of the MBTA's commuter rail system, and provides connections to the MBTA Red Line and to Logan International Airport via the MBTA Silver Line. South Station's bus terminal is also a hub for intercity, regional, and local bus service in eastern Massachusetts. The MBTA's commuter rail, Red Line subway, Silver Line busway, and fixed-route city buses all serve South Station. The MBTA owns the 38 miles of the NEC between the Massachusetts/Rhode Island border and Boston/South Station that is operated and maintained by Amtrak through an operating agreement. The MBTA currently provides commuter rail service on seven branch lines on the southern portion of their system, which includes the Framingham/Worcester, Needham, Franklin, Providence/Wickford Junction, Stoughton, Fairmount, and Old Colony (Middleborough, Plymouth/Kingston, and Greenbush) lines.

In May 2010, Amtrak finalized the *Northeast Corridor Infrastructure Master Plan*[2] which identified initial infrastructure improvements needed to bring the NEC into a state of good repair, providing sufficient capacity to accommodate estimated ridership demand through 2030. Amtrak projects that by 2040, overall NEC ridership will increase by nearly threefold. Amtrak's goal is to provide hourly service between Boston and New York City with an overall trip time of approximately three hours (20-30 minutes faster than the existing trip time). This level of service will require reliable infrastructure, sufficient capacity, changes to existing track alignment, and rolling stock capable of operating at high speeds and accelerating quickly to reduce the trip time between Boston and New York. In order to realize the cumulative 50 percent increase in Amtrak high-speed and intercity passenger rail service to Boston called for in Amtrak's 2010 *Northeast Corridor Infrastructure Master Plan*, South Station and its support facilities must be expanded and improved.

South Station is operating at its design capacity for efficient train operations. All 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 mid-day has also been exceeded. In addition to trains that layover at one of the four facilities, due to the combination of layover capacity constraints, track capacity constraints, and current operating practices, Amtrak and the MBTA are forced to store trains in the South Station terminal while waiting for slots at the existing south side layover yards. The use of platform

[1] Amtrak. *Amtrak National Fact Sheet, FY 2011*; Amtrak Media Relations: June 2012, http://www.amtrak.com/
[2] Amtrak. *Northeast Corridor Infrastructure Master Plan*, June 4, 2010. www.amtrak.com

tracks for layover increases congestion at the terminal and creates operational conflicts for revenue trains, especially during morning and evening peak periods. The problem is exacerbated in inclement weather, when trains run behind schedule, when equipment needs to be changed out, or when other issues such as equipment failures occur.

Regionally there is substantial future growth in passenger rail service anticipated – including 50 percent more Amtrak high speed and intercity service planned as part of Amtrak's long-term vision for the NEC.[3] With anticipated increased service demands for both Amtrak and the MBTA, the lack of layover capacity will become a major constraint and limit the planned growth in rail service at South Station. To meet these needs it is critical that layover facilities provide sufficient capacity to accommodate future service increases and fleet expansions. This would allow for optimal efficiency and flexibility at South Station for revenue operations. The expansion of South Station along with additional layover capacity will reduce operating capacity constraints that currently impact on-time performance for services into the station.

[3] Amtrak. *The Amtrak Vision for the Northeast Corridor – 2012 Update*. July 9, 2012. www.amtrak.com

2. Existing Conditions

This chapter presents a review of existing conditions, including an inventory of the four existing layover areas and the type of activities conducted at each. Also included is a review of current layover needs for Amtrak and the MBTA compared to the existing capabilities.

As depicted on Figure 2 through Figure 6, there are four existing layover areas that support South Station operations - two are owned by Amtrak (Southampton Street Yard and Front Yard) and two are owned by the MBTA (South Side Service and Inspection Facility and Readville - Yard 2). In general, the purpose of a layover facility is to provide a central location, easily accessible to service and inspection facilities and maintenance facilities, to stage trains and relieve train crews between revenue runs, typically during off-peak hours in the midday period. Service and inspection facilities are used to perform short interval inspections of the equipment as required by the FRA, railroad company policy and manufacturer guidelines, and to perform regular service on the equipment, such as fueling, sanding, sanitary system cleaning, watering, and washing.

2.1. Amtrak Layover Facilities

This section describes Amtrak's existing layover areas that support South Station operations, namely the Southampton Street Yard and the Front Yard. Table 1 summarizes the activities that occur at each yard which are illustrated on Figure 3.

Table 1 Amtrak Layover Facilities

	Main Line Access	Train Storage	Vehicle Inspection	Office/Welfare Space	Running Repair	Wheel Truing	Fueling and Sanding	Sanitary and Water	Interior Cleaning	Washing	Equipment and Materials Storage	Material Control	Food Service	Security and Lighting	Parking and Site Circulation	Maintenance-of-Way, Communication & Signals Support Areas
Amtrak's Southampton Street Yard	X	X	X	X	X	X	X	X	X	X[1]	X	X	X	X	X	X
Amtrak's Front Yard	X	X		X					X		X				X	X

[1] Amtrak's wash facility is situated on the wet loop track at Widett Circle, adjacent to Southampton Street Yard.

2.1.1. Amtrak's Southampton Street Yard

As illustrated on Figure 3, the Southampton Street Yard is located north of Southampton Street, between the MBTA Old Colony Main Line and the Dorchester Branch. The Southampton Street Yard is owned and operated by Amtrak and serves as the primary train storage and layover facility for Amtrak in Boston. The MBTA has an agreement with Amtrak to store train consists[4] at Southampton Street Yard during daylight hours. The entire yard has an overhead contact system, or catenary, to provide power to electric

[4] A consist is railroad term used to describe the physical makeup of a combination of locomotives and coaches coupled together and operating as one unit.

trains. Of the 16 tracks at Southampton Street Yard, seven are dedicated to shop access for the Amtrak Southampton Street Yard Maintenance Facility, the HSR building and the Service and Inspection building. The remaining nine tracks, of which four are used by Amtrak and five are used by MBTA during the midday period, range from approximately 1,100 feet to 1,500 feet in storage length. Amtrak has access to all yard tracks during the overnight period.

The service functions located at the Southampton Street Yard maintenance facility support all Amtrak operations in metropolitan Boston including the Acela Express, Northeast Regional, Lake Shore Limited, and the Downeaster service trains. Currently, Acela Express and Amtrak Regional trains are serviced in separate on-site buildings, accessible from the seven dedicated shop tracks on the western portion of the property (which include the Amtrak Police, material control department, yardmaster office, hazmat building, engineering building, food service, and waste treatment facility). Although the Downeaster service does not operate into South Station, the Southampton Street Yard is currently the nearest maintenance facility operated by Amtrak and is therefore used to perform maintenance and repairs for that equipment.

The majority of Amtrak's layover needs are for overnight storage, allowing the MBTA to utilize a portion of the yard during the midday hours. The MBTA currently utilizes five tracks located at the yard, tracks 13 through 17, for midday layover of trains. These tracks range from approximately 1,300 feet to 1,500 feet in storage length as measured from clearance point to clearance point. The MBTA's use of these tracks is limited to midday hours only (approximately 10 a.m. to 4 p.m.). Typically, the MBTA utilizes one of these tracks as a passing track and the remaining four tracks for train storage. Although the tracks are not long enough to accommodate two full-length consists (one locomotive with eight-coaches), it is possible to sequence the storage of two trainsets on a single track at the same time given that MBTA train consists currently vary from five coaches to eight coaches in length. Along with several individual Amtrak support buildings, a MBTA Mechanical Department office trailer is located at the site.

The Southampton Street Yard has a direct connection to Amtrak's train wash shed which is located on the wet/dry loop track as illustrated on Figure 4. The wet/dry loop tracks are situated north of Front Yard and west of the MBTA's South Side Service and Inspection facility in an area known as Widett Circle. There is a direct track connection from the Southampton Street Yard which crosses the Dorchester Branch at-grade to both tracks near Widett Circle. The tracks are primarily used by Amtrak to turn trains and to wash trains in the train wash shed.

2.1.2. Amtrak's Front Yard

As shown on Figures 3 and 4, Amtrak's Front Yard is located east of the Widett Circle Access Road and north of the Dorchester Branch, between Amtrak's Southampton Street Yard maintenance facility and the wet/dry loop tracks for the Amtrak train wash building. The yard, owned by Amtrak, consists of five parallel stub-ended tracks; it is not equipped with an overhead catenary system. Each track is approximately 575-feet in length and capable of storing consists with six coaches or less.

The yard is currently used for layover of MBTA commuter train consists on three of the tracks. The remaining two tracks are currently used for Amtrak storage of on-track, non-revenue equipment and maintenance-of-way materials. Two modular office trailers and several storage containers are situated at the southwest end of the yard and serve as office space for employees of the MBTA's current commuter rail operator, Massachusetts Bay Commuter Rail (MBCR).

Figure 3 Amtrak-Owned Layover Facilities

Figure 3: **Amtrak-Owned Layover Facilities**

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Figure 4 Amtrak's Wet/Dry Loop Tracks

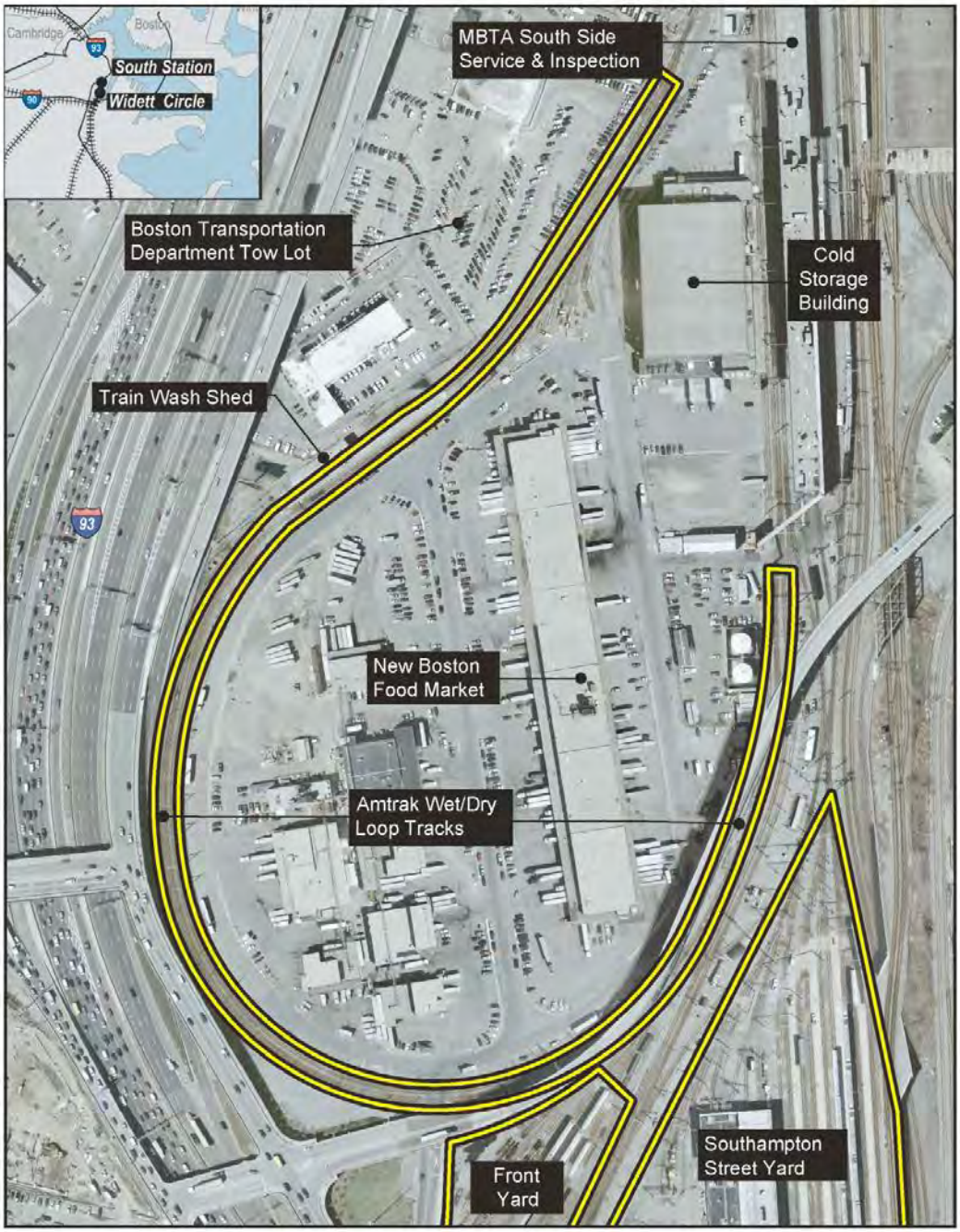

Figure 4: **Amtrak's Wet/Dry Loop Tracks**

2.2. MBTA Layover Facilities

This section describes the MBTA-owned layover areas that support South Station operations: the South Side Service and Inspection facility and Readville - Yard 2. Table 2 summarizes the activities that occur at each yard which are illustrated on Figures 5 and 6.

Table 2 MBTA Layover Facilities

	Main Line Access	Train Storage	Vehicle Inspection	Office/Welfare Space	Running Repair	Wheel Truing	Fueling and Sanding	Sanitary and Water	Interior Cleaning	Washing	Equipment and Materials Storage	Food Service	Security and Lighting	Parking and Site Circulation	Maintenance-of-Way, Communication & Signals Support Areas
MBTA's South Side Service and Inspection	X		X	X	X		X	X	X	X	X		X	X	X
MBTA's Readville - Yard 2	X	X	X	X	X	X			X		X		X	X	X

2.2.1. MBTA's South Side Service and Inspection Facility

The South Side Service and Inspection facility is owned and operated by the MBTA and is situated adjacent to Widett Circle, between South Station and Amtrak's Southampton Street Yard as shown on Figure 5. The facility consists of four buildings with approximately 57,000 square feet of indoor space, including a two-track running maintenance facility used to perform service, inspections, and running repair functions to MBTA's south side train consists. Two additional outdoor tracks, each approximately 785-feet long, parallel the South Side Service and Inspection facility building to the east. These are primarily used for locomotive fueling and train servicing.

The MBTA's South Side Service and Inspection facility building has provisions for adding essential supplies (fuel, sand, lubricants, and coolant) to a locomotive as well as sanitary dumping stations and water for coaches equipped with restrooms. The South Side Service and Inspection facility maintenance shop is equipped with an overhead crane, single axle drop table, car washer, and ground power stations. Two 250,000-gallon above ground storage tanks (with containment) are available for use for the bulk storage of diesel fuel. Other buildings include a parts warehouse, a fuel pump house and the Engineering Department's maintenance building. As referenced in the *MBTA Commuter Rail Infrastructure Needs Assessment Study*,[5] inspection and fueling records indicate that each consist is fueled daily and the maintenance/service activity at the MBTA's Service and Inspection building is four to six consists each day. At this rate, each of the MBTA's 38 consists would return to the facility once every two weeks for service.

[5] Massachusetts Bay Transportation Authority. *Commuter Rail Infrastructure Needs Assessment Study*, April 30, 2004.

2.2.2. MBTA's Readville - Yard 2

Shown in Figure 6, the MBTA's Readville - Yard 2 is located in the Readville section of Boston in the northeast quadrant of the intersection of the NEC and the MBTA Dorchester Branch. It is approximately 8.8 track-miles south of South Station. Roadway access is via Wolcott Court. Readville - Yard 2 currently serves as a layover yard and maintenance repair facility. This is the largest layover yard used by the MBTA for their south side service. The layover yard has a total of 12 tracks, ranging from 594 feet to 1,129 feet in length, with capacity to accommodate two six-coach consists, one seven-coach consist, and nine eight-coach consists. It is possible to store up to 10 eight-coach consists at Readville - Yard 2, however, the functionality of two shorter adjacent yard tracks is operationally limited while the 10^{th} consist is laying over.

The yard features paved roads to access all tracks as well as auxiliary ground power for plug-ins. The equipment shop, while not a full service and inspection facility, provides many functions. Three tracks of two coach-lengths each are housed within the shop and provide a pit track for undercarriage/brake inspection, wheel truing, cab signal installations, equipment modifications, and special projects. The shop also features caged storage for spare parts and a car mover capable of shuttling cars within the shop area. Numerous modular buildings and storage containers are present at this site as well as laydown areas for track materials.

Figure 5 MBTA's South Side Service and Inspection Facility

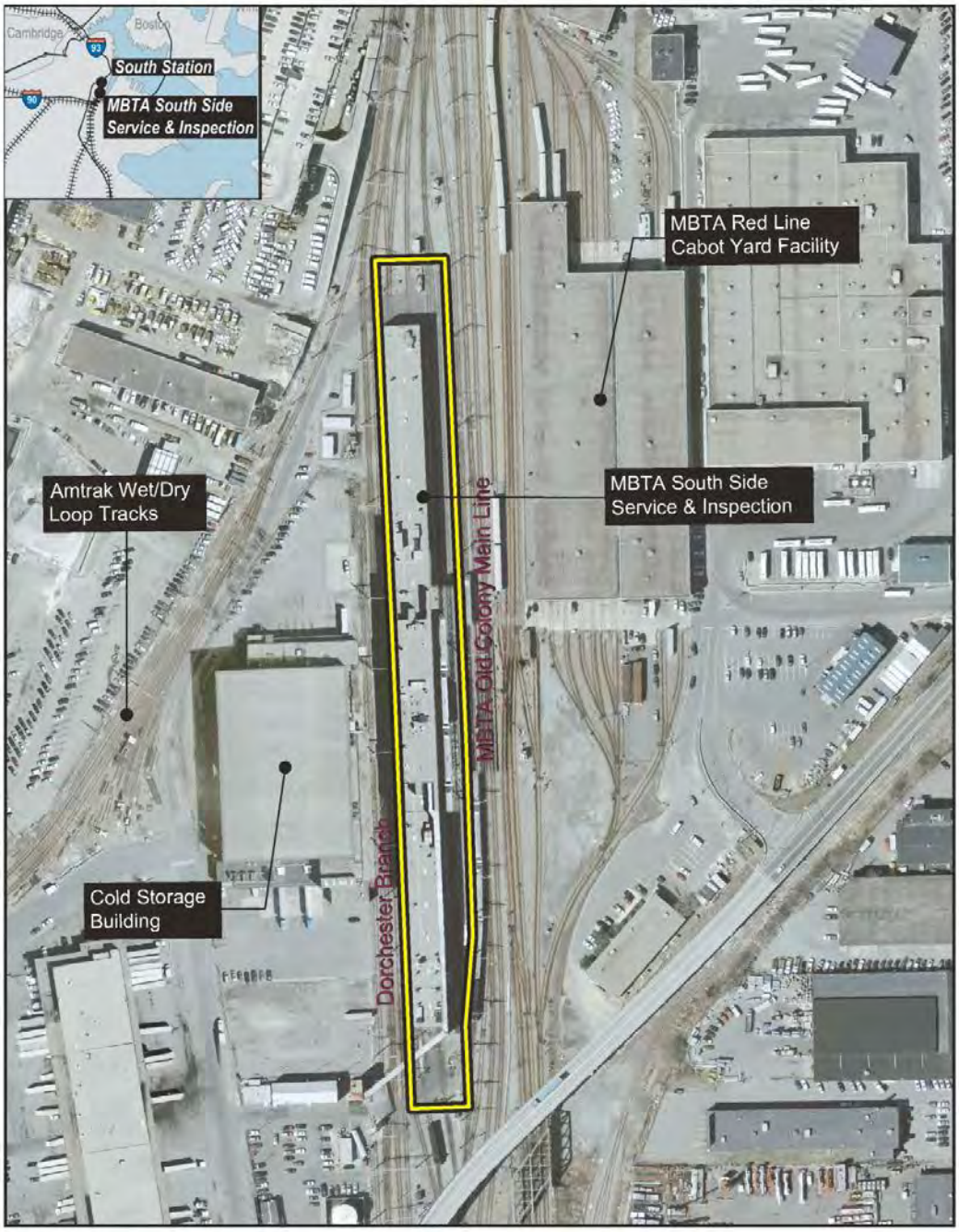

Figure 5: **MBTA's South Side Service and Inspection Facility**

Figure 6 MBTA's Readville - Yard 2

Figure 6: **MBTA's Readville - Yard 2**

2.3. Existing Layover Need

This section describes the existing layover needs necessary to support Amtrak's and the MBTA's current operations at South Station.

2.3.1. Amtrak

Table 3 summarizes the existing layover requirements for Amtrak during the midday and overnight. All of Amtrak's layover needs are accommodated at the Southampton Street Yard layover. As discussed previously, Amtrak's Front Yard is not used by Amtrak for layover functions. It is used for MBTA layover and Amtrak non-revenue, rail-bound equipment storage as well as Amtrak maintenance-of-way material storage needs. Based on information received from Amtrak, the peak layover need for Amtrak's South Station service is eight consists during the midday and 13 consists overnight.

Table 3 Existing Amtrak Layover Requirements

Southampton Street Layover Yard	Midday Layover Requirement (Number of Consists)	Overnight Layover Requirement (Number of Consists)
Southampton Street Yard	4	9
Southampton Service and Inspection Building	2	2
Southampton HSR Building	2	2
Total	**8**	**13**

2.3.2. MBTA

Table 4 summarizes the present fleet composition of the MBTA trains serving South Station. Based on the existing equipment cycle provided by the MBTA,[6] a total of 38 consists are currently required to support its daily South Station commuter rail operations during a typical weekday. Of these 38 consists, 28 are in layover status during a typical midday period. These consists are a mixture of single and bi-level passenger coaches, ranging from five to eight coaches in length. Based on the current MBTA equipment cycle, the earliest trains to enter layover do so around 7:30 a.m. with the last leaving by 5:00 p.m. The shortest layover duration at a layover yard is approximately one hour and 34 minutes and the longest is approximately 10 hours and 25 minutes, with the average layover duration at approximately five hours and 30 minutes.

Each of the 38 consists operate throughout the day and have a "deadheading", or non-revenue period, of more than one hour when it moves to a layover yard. Trains requiring layover for less than one hour typically remain at South Station until the next revenue run. To ensure that a standard level of service is maintained on all lines, not all consists layover simultaneously – the layover periods are staggered. Figure 7 shows that the current weekday peak demand for layover space occurs between 1:00 p.m. and 2:00 p.m. where 28 of the 38 consists are in a layover status, or approximately 74 percent of the entire south side fleet. The midday layover needs of the MBTA complement the overnight layover needs of Amtrak allowing joint usage of the limited space at Southampton Street Yard.

[6] Massachusetts Bay Transportation Authority. *FY2011-FY2025 Commuter Rail Fleet Management Plan*, January 2011.

Table 4 MBTA's Existing (2012) South Side Fleet Make-up

Consist Size	Number of Consists
8 cars	1
7 cars	5
6 cars	30
5 cars	2
Total	**38**

Figure 7 MBTA's Existing Weekday Layover Consists Requirement

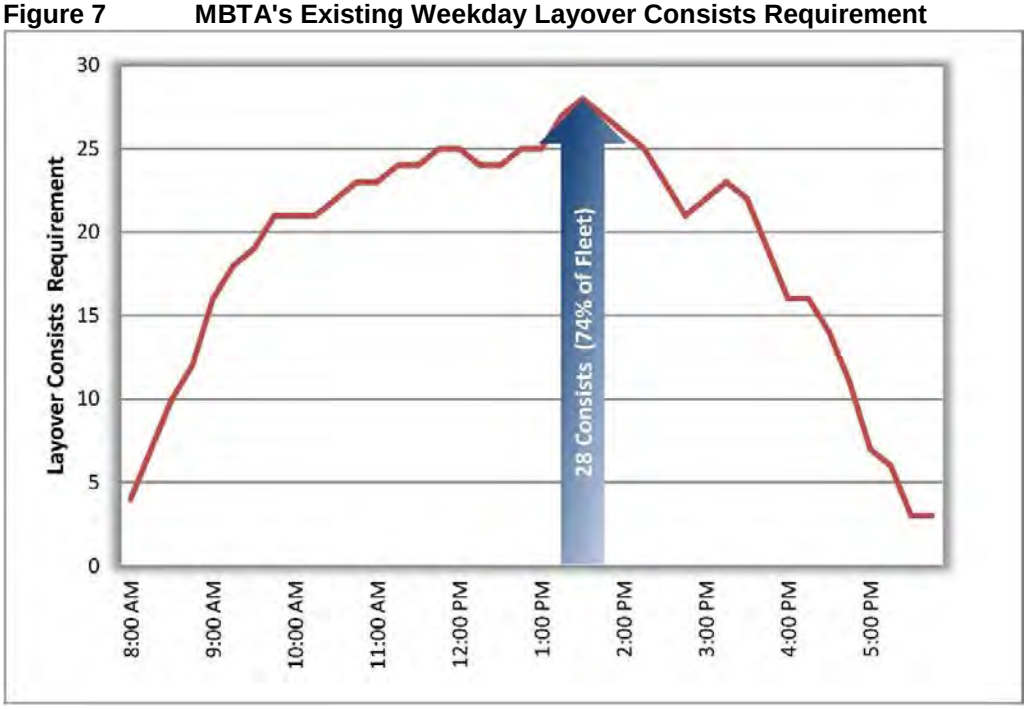

Table 5 MBTA's Capacity at Existing Layover Yards

Layover Yard	Maximum Storage Capacity	
	Number of Consists	Consist lengths
Amtrak's Southampton Street Yard	8	4 consists with 7 cars 4 consists with 8 cars
Amtrak's Front Yard	3	3 consists with 6 cars
MBTA's South Side Service and Inspection	4	4 consists with 8 cars
MBTA's Readville - Yard 2	10 [a]	10 consists of variable lengths
Total Capacity	**25**	
Total Peak Layover Demand (midday)	**28**	
Capacity vs. Demand	**-3**	

[a] Of the 12 yard tracks at Readville, it is possible to store up to 10, eight-coach consists. However, the functionality of two shorter adjacent yard tracks is limited while the 10th consist is laying over. The MBTA currently stores 10 consists of variable lengths at Readville - Yard 2.

As summarized in Table 5, the layover capacity for the MBTA's south side commuter rail service area is inadequate under existing conditions – there is a shortfall of three consists. This shortfall results in restrictive scheduling of revenue and non-revenue trains in and out of South Station. In addition to trains that layover at one of the four facilities, due to the combination of layover capacity constraints, track capacity constraints, and current operating practices, Amtrak and the MBTA are forced to store trains in the South Station terminal while waiting for slots at the existing south side layover facilities. While not ideal, this is an accepted practice for layover times of less than one hour. However, given the layover yard capacity constraints, layover times at South Station can be greater than one hour. The use of the platform tracks as a layover site increases congestion at the terminal and creates operational conflicts, especially during morning and evening peak periods. This situation is exacerbated in inclement weather, when trains run behind schedule, when equipment needs to be changed out, or when other issues such as equipment failures occur. In order to expand service at South Station, the track use needs to be optimized along with added layover capabilities to improve the efficiency of the transition from active service to layover status.

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3. Future Conditions

Chapter 3 presents the future layover needs necessary to support Amtrak and MBTA operations at South Station projected to the year 2025 and 2040. This assessment includes several assumptions regarding layover yard utilization as well as projected service increases for Amtrak and the MBTA.

3.1. 2025 Layover Forecast Assumptions

The following assumptions were made to forecast Amtrak's and the MBTA's layover needs for 2025:

- It is anticipated that Amtrak will be able to meet its 2025 overnight layover needs within its layover facilities. This assumption is based on the following information from *The Amtrak Vision for the Northeast Corridor – 2012 Update:*[7]

  > Amtrak plans to replace the equipment currently operating on the NEC with new express equipment capable of operating at maximum speeds of 160 miles per hour (mph) in 2020. Amtrak is in the process of procuring new trainsets to support this service. The new trainsets could be longer than the current Acela express units, thereby requiring more track length for layover. With the procurement of new express trainset equipment, Amtrak plans to modify their Service and Inspection facilities (including those at Southampton Street Yard) to accommodate potentially longer consist lengths. Completion of the expanded Service and Inspection facilities is anticipated in 2015 to support the new NextGen HSR trainsets anticipated to be serving South Station by 2020.

- The MBTA's agreement with Amtrak allows the use of the Southampton Street Yard for midday layover needs. For the purposes of this analysis, it is assumed that the MBTA will continue to utilize Southampton Street Yard for midday train storage.
- For the purposes of this analysis, it is assumed that the MBTA will continue to use Amtrak's Front Yard, Readville - Yard 2, and the South Side Service and Inspection for layover in the same capacity as today.
- For purposes of this analysis, it is assumed that, by 2025, the MBTA will be using a four-track layover yard on an MBTA easement at Beacon Park Yard for layover of 12 consists.
- Trains laying over for less than one hour will remain at South Station and the percentage of the MBTA's south side fleet that will be in a layover status (74 percent) will not change from existing to future 2025 conditions.
- The MBTA's planned growth of 20 additional consists in 2025 and projected fleet mix is based on the MBTA's *FY2011-FY2025 Commuter Rail Fleet Management Plan (CRFMP).*[8]
- MBTA service will increase by one peak period round trip for each line (excluding Old Colony Railroad, which will have no peak increase).

[7] Amtrak. *The Amtrak Vision for the Northeast Corridor – 2012 Update.* July 9, 2012. www.amtrak.com
[8] *FY2011-FY2025 Commuter Rail Fleet Management Plan*, Massachusetts Bay Transportation Authority, January 2011.

3.2. 2025 Layover Forecast

Based on the 2025 layover forecast assumptions, and in accordance with the MBTA's CRFMP, approximately 58 MBTA consists (comprised of 58 locomotives and 340 coaches) will be operating on the South Side by 2025. Table 6 summarizes the MBTA's projected fleet size compared to the existing fleet size.

Table 6 MBTA's 2025 South Side Fleet Make-up

Consist Size	Existing 2012 Number of Consists	Projected 2025 Number of Consists
8 cars	1	14
7 cars	5	--
6 cars	30	20
5 cars	2	12
4 cars	--	12
Total	**38**	**58**

Table 7 MBTA's 2025 Layover Capacity vs. Demand

	Existing 2012	Projected 2025
Number of Consists Needed to Support Service	38	58
Peak Layover Demand (Midday)	28	43[a]
Layover Capacity	25	37
Capacity vs. Demand	**-3**	**-6**

[a] The projected peak layover demand for 2025 is based on the assumption that the percentage of consists requiring layover (74 percent) would remain constant into the future.

Figure 8 MBTA's 2025 Layover Peak Consists Requirement

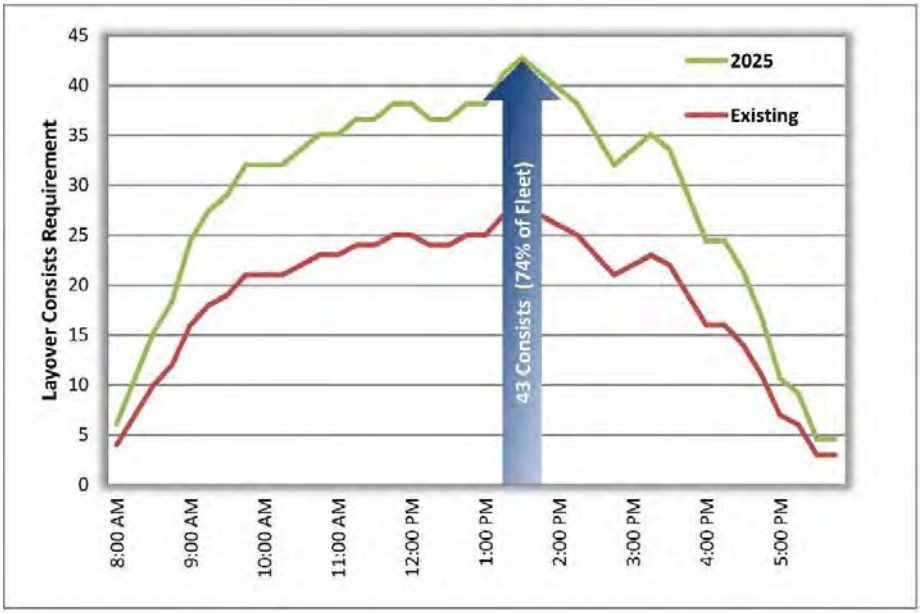


Table 7 summarizes the peak layover demand compared to capacity for existing conditions and 2025 conditions. In 2025, approximately 43 of the MBTA's 58 consists (approximately 74 percent) are projected to be in layover during the midday, which is also illustrated on Figure 8. With the addition of Beacon Park Yard, the layover capacity in 2025 is estimated to be 37 consists. In 2025, it is estimated that the MBTA would need additional layover capacity to accommodate six more train consists than can be currently accommodated at existing areas.

3.3. 2040 Layover Forecast Assumptions

The following assumptions were made to forecast Amtrak's and the MBTA's layover needs for 2040:

- Amtrak's *The Amtrak Vision for the Northeast Corridor – 2012 Update*[9] assumes that the NEC NextGen HSR projects will be completed from 2012-2040 to accommodate a maximum speed of 220 mph on a new NextGen HSR alignment. Additionally, the existing NEC will be used to operate the Shore Line Express route, which will provide express NextGen HSR service between Washington, D.C. and New York to meet higher demand along the southern portion of the NEC continuing along the NEC route between New Rochelle, New York and South Station in Boston. In the year 2040, NextGen HSR will be operated using a fleet of 46 new consists.
- In addition to the 46 NextGen HSR consists projected to be operated by Amtrak in 2040, additional equipment and layover needs will be needed to support other Regional service lines utilizing South Station as a terminal facility, including potential revival of the Massachusetts Inland Route connecting Boston, Framingham, Worcester, and Springfield. As part of the new Downeaster Route to Brunswick, Maine that started in November 2012, Amtrak is planning for potential construction of a new layover yard in Brunswick, which would be anticipated to handle some of the maintenance functions currently being performed at the Southampton Street Yard. Other potential future expansion plans for Amtrak Intercity Passenger Rail include restoration of service between North Station in Boston to Manchester/Concord, New Hampshire as well as other outlying destinations north of Boston.[10] Specific details of Amtrak's 2040 layover needs and service and inspection requirements (including track length and support facilities) are not yet known, but it is assumed that Amtrak will need layover space beyond what is currently available.
- By 2040, it is assumed that all MBTA consists will be eight bi-level coaches and one locomotive. For the purposes of this analysis, it is assumed that the MBTA will continue to accommodate its future midday train storage needs at Southampton Street Yard, however, the use of eight-car consists by the MBTA will reduce capacity from eight consists to four consists at this location.
- By 2040, the track lengths at Amtrak's Front Yard will not be able to accommodate the expanded MBTA eight coach and one locomotive consists.
- The MBTA will continue to use Readville - Yard 2 and the South Side Service and Inspection facility as layover sites in the same capacity as today.
- The MBTA will continue to use its easement at Beacon Park Yard for layover of 12 consists.
- Trains laying up less than one hour will remain in South Station.
- The number of consists anticipated for the MBTA commuter rail service in the year 2040 was calculated using the historic growth from 1990 through 2010 (an approximate 0.9 percent increase per year) and the planned growth projected by the MBTA from their CRFMP.

[9] Amtrak. *The Amtrak Vision for the Northeast Corridor – 2012 Update*. July 9, 2012. www.amtrak.com
[10] Amtrak. *Northeast Corridor Infrastructure Master Plan*, June 4, 2010. www.amtrak.com

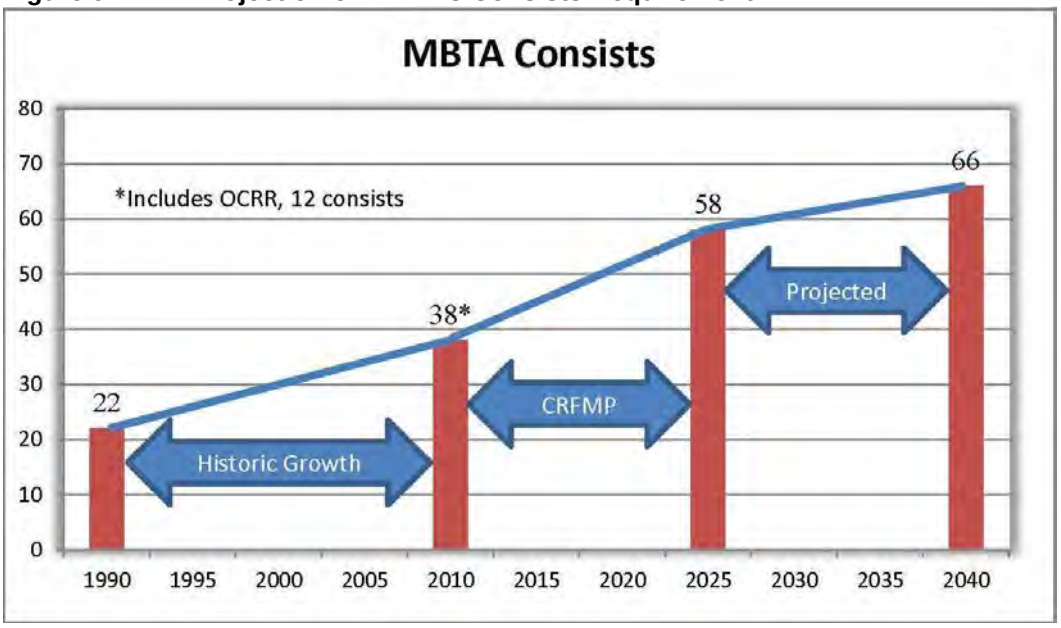
- To accommodate projected ridership demand, it is assumed that all MBTA commuter rail train consists will be expanded to eight bi-level coaches powered by a single locomotive to maximize seat utilization. Given the magnitude of changes required for consists of nine or more coaches, and the considerable capacity increase of the projected eight bi-level coach consists, consists longer than eight cars have not been assumed in this analysis. Based on the operating parameters of the existing equipment fleet, potential expansion to nine or more passenger coaches per train would require providing a second locomotive to each train consist in order to provide adequate acceleration. Additionally, existing station platforms and other support facilities would need to be substantially modified to accommodate consists longer than eight coaches and one locomotive.

3.4. 2040 Layover Forecast

Figure 9 illustrates the historic growth, planned growth, and projected growth from 2025 to 2040 needed to meet the MBTA's anticipated ridership demand on its south side. Of the MBTA's 66 consists projected in 2040, a total of 49 (approximately 74 percent) will require simultaneous layover during the midday period as shown on Figure 10.

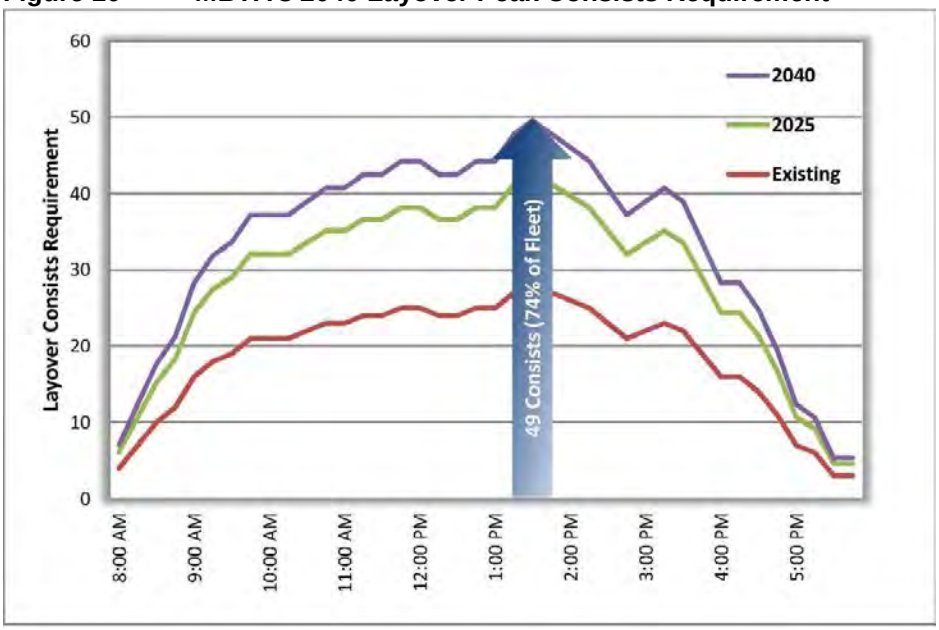
In order to accommodate a fleet of eight bi-level coaches and a single locomotive, all layover yards will need to be configured with minimum clear-track lengths of at least 760-feet. Therefore, the three tracks located at Amtrak's Front Yard will not be long enough to accommodate the MBTA's future eight-coach consists. The layover capacity currently used by the MBTA at Amtrak's Southampton Street Yard will be reduced to four consists.

Figure 9 Projection of MBTA's Consists Requirement



CRFMP = MBTA's Commuter Rail Fleet Management Plan
OCRR = Old Colony Railroad
* Includes service expansion of 12 consists for MBTA Old Colony Commuter Rail Line

Figure 10 MBTA's 2040 Layover Peak Consists Requirement



As summarized in Table 8, existing facilities will have the capacity to store only 30 of the 49 train consist spaces needed by 2040. This is seven consists fewer than the 37 available in 2025 due to the fact that the longer consists needed by 2040 will no longer be able to be accommodated at Front Yard and the reduced capacity at Southampton Street Yard. In 2040, given the increasing service demands from Amtrak and the MBTA, a total of 19 MBTA consists will not be accommodated for layover operations during the midday period.

Table 8 MBTA's 2040 Layover Capacity vs. Demand

	Existing (2012)	Projected 2025	Projected 2040
Number of Consists Needed to Support Service	38	58	66
Peak Layover Demand (Midday)	28	43 [a]	49 [a]
Layover Capacity	25	37	30 [b]
Capacity vs. Demand	**-3**	**-6**	**-19**

[a] The peak layover demand for 2025 and 2040 is based on the assumption that the percentage of consists requiring layover (74 percent) would remain constant into the future.
[b] Assumes reduced capacity at Southampton Street Yard and Front Yard is not large enough to accommodate MBTA eight-car consists.

3.5. Summary of Layover Needs

As ridership and service levels have increased, the existing capacity at MBTA's layover facilities during the mid-day has also been exceeded. The layover capacity for the MBTA's south side commuter rail service area is inadequate under existing conditions: there is a shortfall of three consists. This shortfall results in restrictive scheduling of revenue and non-revenue trains in and out of South Station. In addition to trains that use one of the four layover areas, due to the combination of track and layover capacity constraints, and current operating practices, Amtrak and the MBTA are forced to store trains in the South Station terminal while waiting for slots at the existing south side layover yards. The use of the platform tracks as a layover site increases congestion at the terminal and creates operational conflicts, especially during morning and evening peak periods. This situation is exacerbated in inclement weather, when trains

run behind schedule, when equipment needs to be changed out, or when other issues such as equipment failures occur.

As previously indicated, both Amtrak and the MBTA anticipate substantial future growth in passenger rail service. In its long-term vision for the NEC, Amtrak projects a nearly threefold increase in NEC ridership associated with HSR and intercity service. In its *The Amtrak Vision for the Northeast Corridor – 2012 Update,*[11] Amtrak projects the use of additional consists associated with its NEC NextGen HSR projects to be completed from 2020 to 2040. Amtrak also has stated plans to potentially expand Southampton Street Yard to accommodate its future overnight layover needs. Additional equipment and layover capacity will be needed to support other new regional rail services using South Station as a terminal facility, including revival of the Massachusetts Inland Route connecting Boston, Framingham, Worcester, and Springfield. By 2025, due to planned Amtrak and MBTA service expansions and increased MBTA ridership demand, it is estimated that the MBTA shortfall in layover capacity will be six train consists. By 2040, due to planned ridership growth and reduction of layover capacity at some yards due to increased MBTA consist lengths, it is estimated that the MBTA shortfall in layover capacity will be 19 train consists. Specific details of Amtrak's 2040 layover needs and service and inspection requirements (including track length and support facilities) are not yet known, but it is assumed that Amtrak will need layover space beyond what is currently available.

With anticipated increased service demands for both Amtrak and the MBTA, the lack of layover capacity will become a major constraint and limit the planned growth in rail service at South Station. While both Amtrak and the MBTA are constrained in their ability to store their current fleet of vehicles, MassDOT is also keenly aware of the growing opportunity to provide rail service using different types of vehicle technologies. As part of analyzing layover needs related to the South Station Expansion project, MassDOT will consider the layover and servicing needs of vehicle types beyond those in the current MBTA fleet. To meet the layover needs, it is critical that layover yards provide sufficient capacity to accommodate future service increases and fleet expansions. This will allow for optimal efficiency and flexibility at South Station for revenue operations. The expansion of South Station, along with additional layover capacity, will reduce operating capacity constraints that currently impact on-time performance for service into the station. The MBTA's midday layover needs could complement Amtrak's overnight layover needs, allowing joint usage of future layover space.

[11] Amtrak. *The Amtrak Vision for the Northeast Corridor – 2012 Update*. July 9, 2012. www.amtrak.com

4. Identification of Layover Sites

This chapter describes how potential layover sites were identified and provides a description of each of the alternative sites. By reviewing previous plans and studies and working with MassDOT, the MBTA, City of Boston officials, and other project stakeholders, a list of 28 alternative sites was identified and reviewed to address the existing and future layover needs discussed in Chapters 2 and 3.

4.1. Layover Site Identification Criteria

Identifying candidate sites for new or expanded layover capabilities required, as an initial step, developing the key project criteria required for rail layover areas. The objective was to consider any reasonable site that could satisfy the site criteria necessary to adequately support railroad operations at South Station. The criteria include:

- Direct or nearly direct access to an existing rail line;
- Adjacent uses compatible with the characteristics of a layover facility, avoiding adjacency with residences, if possible;
- Site size and configuration suitable for the storage of eight car plus one locomotive consists; and
- Proximity to South Station, favoring locations closer to South Station over those farther away.

4.2. Candidate Layover Sites

Using the initial set of evaluation criteria, 28 potential sites were identified.

- Alternative 1 – Commuter Rail Maintenance Facility (CRMF)
- Alternative 2 – Beacon Park Yard
- Alternative 3 – Cold Storage
- Alternative 4 – Widett Circle
- Alternative 4A – Foodmart Road
- Alternative 5 – Boston Transportation Department Tow Lot
- Alternative 6 – Cabot Yard Red Line
- Alternative 7 – Cabot Yard Bus Facility
- Alternative 8 – Boston Department of Public Works
- Alternative 9 – Amtrak Southampton Street Service & Inspection
- Alternative 10 – Amtrak Southampton Street Service & Inspection – West
- Alternative 10A – Amtrak Front Yard
- Alternative 11 – Dorchester Avenue
- Alternative 12 – Von Hillern Street
- Alternative 13 – Boston Globe
- Alternative 14 – Freeport Way
- Alternative 15 – Freeport Street

- Alternative 16 – Victory Road
- Alternative 17 – NSTAR
- Alternative 18 – Forest Hills
- Alternative 19 – Lanesville Terrace
- Alternative 20 – Readville - Yard 2
- Alternative 20A – Readville - Yard 5
- Alternative 20B – Readville - Yard 1
- Alternative 21 – Arborway Bus Facility
- Alternative 22 – Arborway MBTA Design & Construction Building
- Alternative 23 – D Street
- Alternative 24 – A Street

These 28 locations are illustrated on Figure 11 and each site is depicted on Figures 12 through 39, provided in Attachment A. The following section provides a general description of each of the sites.

Alternative 1 – Commuter Rail Maintenance Facility (Existing Rail Facility)

Alternative 1, Commuter Rail Maintenance Facility (CRMF), is located in Somerville and is depicted on Figure 12. The majority of the approximately 7.9-acre site is owned by the MBTA. This site is located approximately 6.9 track-miles from South Station with rail access from the MBTA Fitchburg Line via the Grand Junction Running Track (GJRT) and the MBTA Framingham/Worcester Line. The majority of this industrial-zoned site is located at the southern end of the Inner Belt Road industrial park area and currently houses the MBTA's CRMF and layover yard for north side commuter rail service. Primary existing functions for this site include heavy maintenance, service and inspection of railroad equipment, and staging of trains, mostly during the midday period.

Alternative 2 – Beacon Park Yard (Existing Rail Facility in Transition)

Alternative 2, Beacon Park Yard, is located along Cambridge Street in the Allston neighborhood of Boston as shown on Figure 13. This site is located on the MBTA Framingham/Worcester Line approximately 3.8 track-miles from South Station, and is an industrial-zoned site located between the Massachusetts Turnpike Interstate Route 90 (I-90) Allston Toll Plaza and the MBTA Framingham/Worcester Line. This approximately 22.4-acre site has served for many years as a major freight rail yard and intermodal terminal in Boston for CSX Transportation, Inc. (CSXT). Today, the freight and intermodal functions are in transition to be relocated to central Massachusetts in 2013. The entire property is currently owned by Harvard University Beacon Yards LLC, and is encumbered by CSXT's operating rights. Provisions in an agreement with Harvard University include the rights for the MBTA to maintain within a portion of the overall site, among other uses, a double track MBTA main line and a four-track layover/layup yard for trains in active use on an MBTA railroad easement. Through another agreement, MassDOT has an option to acquire an easement over a portion of the overall site adjacent to the MBTA easement for the purpose of developing an intermodal facility for freight to, from or through the Port of Boston. Both areas are subject to existing rights in favor of CSXT that have not been released.

Figure 11 Alternative Layover Sites - Regional Overview

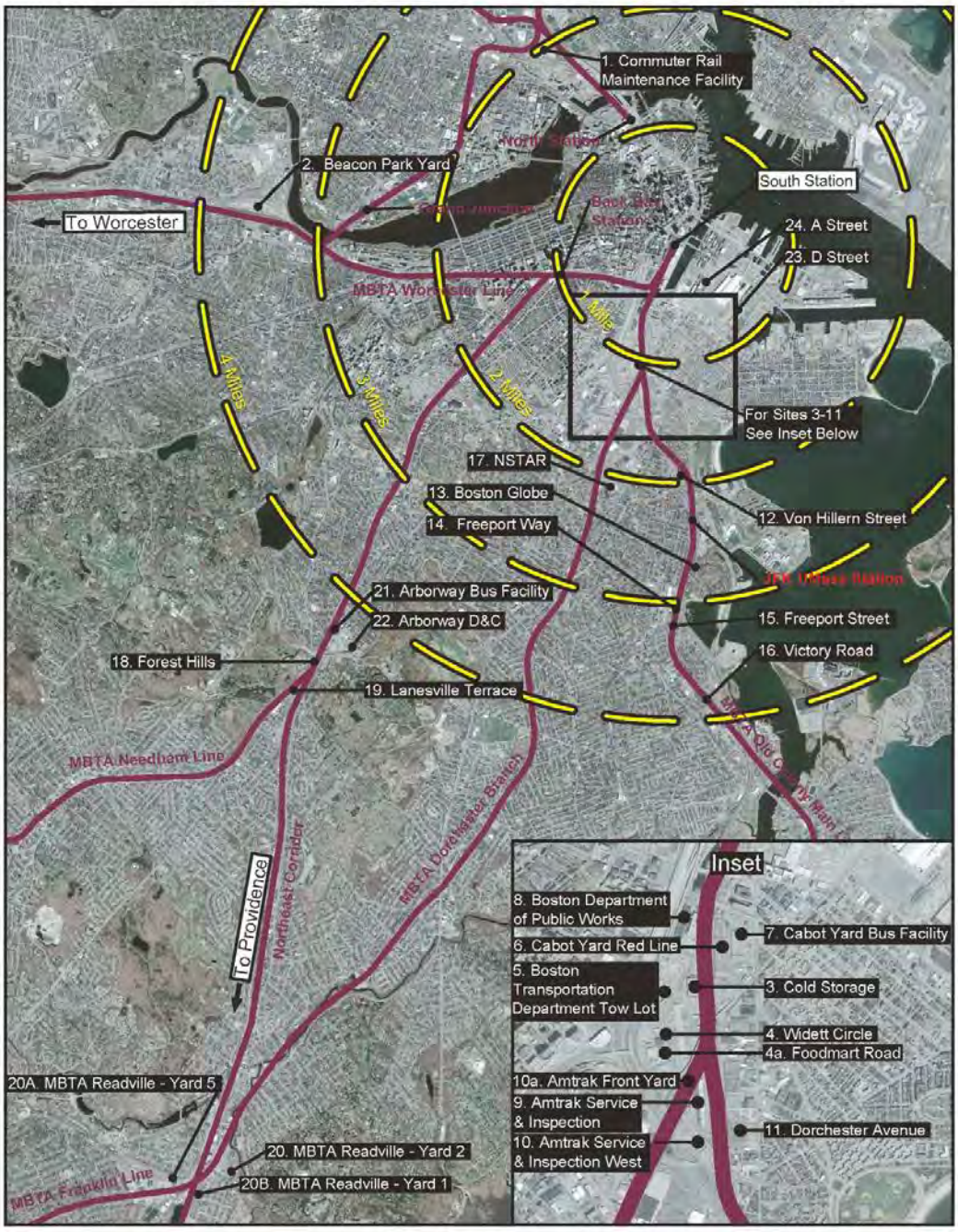


Figure 11: **Alternative Layover Sites**
Regional Overview

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Alternative 3 – Cold Storage (Private Businesses)

Alternative 3, Cold Storage, is located primarily[12] at 100 Widett Circle in Boston as shown on Figure 14. This site is located on the MBTA Dorchester Branch, approximately 0.9 track-miles from South Station. This approximately 6.6-acre site would require the use of two easements from Amtrak and the New Boston Food Market Development Corporation, and acquisition of property owned by Art Mortgage Borrower Propco 2006-2 LP. This industrial-zoned site is situated within Amtrak's wet/dry loop tracks just north of the New Boston Food Market, and adjacent to the MBTA Dorchester Branch and MBTA's South Side Service and Inspection facility. The location is currently occupied by Americold and Crocker and Winsor Seafoods and existing functions include temperature-controlled food storage and distribution.

Alternative 4 – Widett Circle (Private Businesses)

Alternative 4, Widett Circle, is located primarily at 1 and 2 Foodmart Road in Boston within an industrial-zoned area commonly referred to as Widett Circle, as illustrated on Figure 15. This site is located on the MBTA Dorchester Branch, approximately 1.1 track-miles from South Station. This approximately 18.6-acre site would require property acquisition from The New Boston Food Market Development Corporation. The site would also require property easements from public right-of-way and from adjacent parcels also owned by the New Boston Food Market Development Corporation. The property owned by the New Boston Food Market Development Corporation is made up of approximately 30 units leased to multiple businesses in the food processing, food storage and food logistics industry.

Alternative 4A – Foodmart Road (Private Businesses)

Alternative 4A, Foodmart Road, is located primarily at 1 Foodmart Road in Boston as shown on Figure 16. This site is located on the MBTA Dorchester Branch, approximately 1.1 track-miles from South Station. This industrial-zoned site is situated within Amtrak's wet/dry loop tracks to the east of Foodmart Road. This site is owned by various entities and would require property acquisition from the New Boston Food Market Development Corporation and Art Mortgage Borrower Propco 2006-2 LP and is approximately 17.8-acres in size. This site would also require several easements for use of Amtrak and state property. The property owned by the New Boston Food Market Development Corporation is made up of approximately 20 units leased to multiple businesses in the food processing, food storage and food logistics industry.

Alternative 5 – Boston Transportation Department Tow Lot (City Property)

Alternative 5, Boston Transportation Department (BTD) Tow Lot, is located along Frontage Road in Boston as depicted on Figure 17. This site is located on the MBTA Dorchester Branch, approximately 0.9 track-miles from South Station. The site is primarily owned by the City of Boston for the storage of impounded vehicles from within Boston and is approximately 10.9-acres in size. This industrial-zoned site would also require partial acquisition of adjacent land operated by the Boston Department of Public Works (DPW). Use of this site would also require the use of a substantial portion of the adjacent Boston DPW property which would impact the existing fueling facility, salt pile, single story garages and the ramp to access the west side of the parking garage. This site would also require an easement from Amtrak.

[12] Where noted, some layover alternatives could require easements or partial acquisition of adjacent property.

Alternative 6 – Cabot Yard Red Line (Existing Transit Facility)

Alternative 6, Cabot Yard Red Line, is located primarily at 163 Dorchester Avenue and 71 Foundry Street in Boston as shown on Figure 18. This site is located to the east of the MBTA Old Colony Main Line between the Fort Point Channel and the South Boston Bypass Road, approximately 1.2 track-miles from South Station. The majority of this approximately 18.1-acre site is owned by the MBTA. An easement would also be required within public right-of-way. The site is industrial-zoned to the south of West Fourth Street and is zoned as Restricted Manufacturing with an Interim Planning overlay to the north of West Fourth Street. This location currently houses MBTA's Cabot Yard Red Line facility and the primary existing functions include storage and maintenance of the MBTA's Red Line subway cars.

Alternative 7 – Cabot Yard Bus Facility (Existing Bus Facility)

Alternative 7, Cabot Yard Bus Facility, is located at 163 Dorchester Avenue in Boston as shown on Figure 19. This site is located on the MBTA Old Colony Main Line, approximately 1.73 track-miles from South Station. This site is owned by the MBTA and is approximately 11.9-acres in size. This industrial-zoned site is located to the east of the MBTA Cabot Yard Red Line facility. The location currently houses MBTA's Cabot Yard bus facility and primary existing functions include storage and maintenance of approximately 20 percent of MBTA's active bus fleet.[13]

Alternative 8 – Boston Department of Public Works (DPW) (City Property)

Alternative 8, Boston DPW, is located along Frontage Road in Boston, as shown on Figure 20. This site is located on the MBTA Dorchester Branch, approximately 0.8 track-miles from South Station. The majority of this site is owned by the City of Boston and is approximately 13.2-acres in size. This site would also require use of property owned MassDOT's Highway Department. This industrial-zoned site is located south of West Fourth Street between the MBTA Dorchester Branch and Frontage Road. The location houses Boston's DPW and the northern part of the BTD tow lot. Primary existing functions for this site include parking, DPW offices, DPW vehicle storage and maintenance garages, sand and salt storage, municipal police offices, and storage of impounded vehicles from within Boston.

Alternative 9 – Amtrak Southampton Street Service & Inspection (Existing Rail Facility)

Alternative 9, Amtrak's Southampton Street Service and Inspection Facility, is primarily located at 400 Southampton Street in Boston. This site is located on the MBTA Old Colony Main Line, approximately 1.3 track-miles from South Station. The site is owned by Amtrak and is approximately 7.1-acres in size. As depicted on Figure 21, this industrial-zoned site is located near the intersection of Frontage Road and Southampton Street between the MBTA Dorchester Branch and Old Colony Main Line. This location currently houses Amtrak's Service and Inspection facility, maintenance facility, support functions, layover yard, and an employee parking lot. Primary existing functions for this site include layover and maintenance of Amtrak trains. By agreement with Amtrak, the MBTA currently uses a portion of the yard for midday layover of its commuter rail trains, with Amtrak using the yard mostly during overnight hours.

[13] Massachusetts Bay Transportation Authority. *Ridership and Service Statistics*. Thirteenth Edition. *2010.*

Alternative 10 – Amtrak Southampton Street Service & Inspection - West (Existing Rail Facility)

Alternative 10, Amtrak Southampton Street Service and Inspection Facility - West, is primarily located at 400 Southampton Street in Boston as shown on Figure 22. This site is located on the MBTA Old Colony Main Line approximately 1.8 track-miles from South Station. This site is owned by Amtrak and is approximately 6.8-acres in size. This industrial-zoned site is located near the intersection of Frontage Road and Southampton Street between the MBTA Dorchester Branch and Old Colony Main Line. This location currently houses support buildings for Amtrak's Service and Inspection facility and layover yard and an employee parking lot. Primary existing functions for this site include parking and support for Amtrak operations including offices and crew quarters.

Alternative 10A – Front Yard (Existing Rail Facility)

Alternative 10A, Front Yard, is depicted on Figure 23 and is located on Frontage Road in Boston. This site is located on the MBTA Dorchester Branch approximately 1.3 track-miles from South Station. This site is owned by Amtrak and is approximately 2.5-acres in size. This industrial-zoned site is located to the east of Access Road that leads to Widett Circle and north of the MBTA Dorchester Branch. This location currently houses Amtrak's Front Yard which consists of five existing tracks, each approximately 575-feet in length. Two tracks are currently used by Amtrak for storage of on-track, non-revenue equipment and maintenance-of-way materials, and the remaining three tracks are used by agreement for layover of MBTA commuter rail trains.

Alternative 11 – Dorchester Avenue (Private Businesses)

Alternative 11, Dorchester Avenue, is primarily located along Dorchester Avenue in Boston as depicted on Figure 24. This site is located on the MBTA Old Colony Main Line approximately 2.0 track-miles from South Station. The site consists of 26 parcels owned by multiple commercial businesses and vacant land and is approximately 29.5-acres in size. This industrial-zoned site is located to the west of Dorchester Avenue between South Boston Bypass Road and Southampton Street. The majority of the businesses are related to the construction industry including contractors, equipment, and materials but other uses include warehouses, an auto shop, and gyms.

Alternative 12 – Von Hillern Street (Private Businesses)

Alternative 12, Von Hillern Street, is located along Von Hillern Street in the Dorchester section of Boston as depicted on Figure 25. This site is located on the MBTA Old Colony Main Line and is approximately 2.0 track-miles from South Station. This site consists of multiple parcels and is owned by multiple commercial businesses and is approximately 6.2-acres in size. This manufacturing-zoned site is located on Von Hillern Street, between Interstate Route 93 (I-93) and the MBTA Red Line and just north of Columbia Road. The commercial businesses at this location include a promotional products company, an architectural restoration business, a tile and marble company, and an electrical products company.

Alternative 13 – Boston Globe (Private Businesses)

Alternative 13, Boston Globe, is located at 25 to 135 Morrissey Boulevard in the Dorchester section of Boston as shown on Figure 26. This site is located on the MBTA Old Colony Main Line and is approximately 2.6 track-miles from South Station. The site is owned by Globe Newspaper Company and WHDH TV, among others and is approximately 27.6-acres in size. This commercial and industrial-zoned site is located at the intersection of Morrissey Boulevard and Columbia Road. The location currently houses Boston Globe newspaper company, CW56 TV broadcasting station, a Shaw's supermarket, and various office buildings.

Alternative 14 – Freeport Way (Mixed-Use - City Property and Private Businesses)

Alternative 14, Freeport Way, is located in the area of Freeport Way, Freeport Street, Hoyt Street and Dewar Street in the Dorchester section of Boston as shown on Figure 27. This site is located on the MBTA Old Colony Main Line approximately 3.3 track-miles from South Station. The site is owned by various entities and is approximately 16.2-acres in size. This industrial-zoned site is located near the intersection of Freeport Way and Freeport Street. This site is utilized by the City of Boston and commercial entities for City operations, Boston Edison operations and school bus storage.

Alternative 15 – Freeport Street (Mixed-Use – State/City Property and Private Businesses)

Alternative 15, Freeport Street, is located in the area of Freeport Street in Dorchester as shown on Figure 28. This site is located on the MBTA Old Colony Main Line approximately 3.4 track-miles from South Station. The site is owned by various entities including the MBTA, Massachusetts DPW, the Local 103 International Brotherhood of Electrical Workers (IBEW), IBEW Building Corporation, and Robert N TS Sheinkopf and is approximately 12.9-acres in size. This commercially-zoned site is located at the intersection of Freeport Street and Beach Street. The site is occupied by the MBTA Quality Control Facility, Massachusetts Water Resources Authority (MWRA) Fox Point Combined Sewer Overflow Treatment Facility, Local 103 IBEW and Joint Apprenticeship and Training Committee for the electrical industry.

Alternative 16 – Victory Road (Private Businesses)

Alternative 16, Victory Road, is located at Victory Road and William T Morrissey Boulevard in Dorchester as shown on Figure 29. This site is located on the MBTA Old Colony Main Line approximately 4.1 track-miles from South Station. The site is primarily owned by various commercial entities including Bay Cove Human Services, GPB Real Estate Holdings LLC, and Lambert Ferdinand G Trusts and is approximately 9.3-acres in size. This commercially-zoned site is occupied by various service industry entities such as non-profit health care and real estate firms.

Alternative 17 – NSTAR (Private Businesses)

Alternative 17, NSTAR, is primarily located at 1165 Massachusetts Avenue in Dorchester as shown on Figure 30. This site is located on the MBTA Dorchester Branch approximately 2.1 track-miles from South Station. The majority of this approximately 29.1-acre site is owned by the Boston Edison Company. This industrial-zoned site is located at the intersection of Massachusetts Avenue and Allstate Road. The location currently houses NSTAR corporate operations.

Alternative 18 – Forest Hills (Mixed-Use – State Property and Private Businesses)

Alternative 18, Forest Hills, is located primarily at 3521 and 3593 Washington Street in Jamaica Plain, as shown on Figure 31. This site is located on the NEC approximately 4.8 track-miles from South Station. The site is owned by several entities and occupied partially by the MBTA and is approximately 11.1-acres in size. This industrial-zoned site is located at the intersection of McBride Street and Washington Street. The location currently houses several commercial sites as well as MBTA properties. Primary existing functions for this site include warehousing, small industry and MBTA operations.

Alternative 19 – Lanesville Terrace (Mixed-Use – Residential and Private Businesses)

Alternative 19, Lanesville Terrace, is located along Lanesville Terrace, Washington Street, Arboretum Road, and Lochdale Road in Roslindale, as shown on Figure 32. This site is located on the MBTA Needham Line approximately 5.5 track-miles from South Station. The approximately 10.7-acre site is owned by several individual residential property owners and multiple industrial and commercial service businesses. This site is situated within two zoning subdistricts; local industrial and neighborhood shopping.

Alternative 20 – Readville - Yard 2 (Existing Rail Facility)

Alternative 20, Readville - Yard 2, is located primarily at 50 Wolcott Court in Readville, as shown on Figure 33. This site is located on the MBTA Dorchester Branch approximately 8.8 track-miles from South Station. The site, owned by the MBTA, is approximately 17.4-acres in size. This industrial-zoned site is located at the intersection of Wolcott Court and Hyde Park Avenue and is occupied by the MBTA Readville layover facility. Primary existing functions for this site include maintenance and repair operations and layover capacity of up to 12 MBTA commuter rail consists of varying lengths.

Alternative 20A – Readville-Yard 5 (Vacant/Former Rail Facility)

Alternative 20A, Readville-Yard 5, is located west of Sprague Street and north of Industrial Drive in the Readville section of Boston, as shown on Figure 34. This site is located on the NEC approximately 9.9 track-miles from South Station. The site, currently owned by the MBTA, has historically served as railroad layover yard by multiple entities and is approximately 16.0-acres in size. Environmental remediation of this industrial-zoned site was completed in 2011. The MBTA has plans at Readville - Yard 5 for use as a solar panel farm in the Dedham portion of the property (outside of this site), and to sell the land in the Boston portion of the site for private redevelopment.

Alternative 20B – Readville-Yard 1 (Existing Rail Facility)

Alternative 20B, Readville-Yard 1, is located primarily at 10 Milton Street in the Readville section of Boston, as shown on Figure 35. This site is located on the MBTA Dorchester Branch approximately 9.3 track-miles from South Station. The majority of the approximately 17.2-acre site is owned by the MBTA. This industrial-zoned site is located just south of Readville Station, between the NEC and Prescott Street, and is currently used as a freight rail yard by CSXT. This facility is a double ended yard that connects the NEC with the MBTA Dorchester Branch.

Alternative 21 – Arborway Bus Facility (State Property)

Alternative 21, MBTA Arborway Bus Facility, is located at 3600 Washington Street in Jamaica Plain, as shown on Figure 36. This site is located adjacent to the NEC approximately 5.7 track-miles from South Station. Rail access would be via a tunnel from Forest Hills Station. The site is owned by the MBTA and is approximately 8.3-acres in size. This industrial-zoned site is located on Arborway Street between Washington Street and Stonley Road and currently houses the MBTA Arborway bus facility. Primary existing functions for this site include storage of MBTA buses.

Alternative 22 – Arborway MBTA Design and Construction Building (State Property)

Alternative 22, MBTA Arborway Design and Construction Building, is located at Arborway Street in Jamaica Plain, as shown on Figure 37. This site is located on the NEC approximately 5.8 track-miles from South Station with rail access via Forest Hills Station. This site consists of two parcels owned by the MBTA and the City of Boston and is approximately 18.8-acres in size. This industrial-zoned site is located on Arborway Street between Washington Street and Forest Hills Street. The location currently houses MBTA offices and City of Boston DPW yard and garage and primary existing functions include business and engineering administration as well as material and equipment storage.

Alternative 23 – D Street (Private Businesses)

Alternative 23, D Street, is located along B Street, D Street and E Street in Boston, as shown on Figure 38. This site is approximately 2.4 track-miles from South Station, located off of the Boston Terminal Running Track, which connects to the MBTA Old Colony Main Line. The approximately 10.9-acre site is owned by multiple commercial entities. This industrial-zoned site is located at the intersection of Cypher Street and D Street. Existing functions for this site include a private investment firm and a commercial printing service.

Alternative 24 – A Street (Mixed-Use – State Property and Private Businesses)

Alternative 24, A Street, is located along the South Boston Bypass Road in Boston as shown on Figure 39. This site is approximately 2.3 track-miles from South Station, located on the Boston Terminal Running Track, which connects to the MBTA Old Colony Main Line. The approximately 14.7-acre site consists of multiple private businesses and state-owned property. Owners include Nicholas J Contos, the Massachusetts Convention Center Authority, the USPS, the Commonwealth of Massachusetts and MassDOT. This restricted manufacturing-zoned (with planned development area designation) site is located at the intersection of A Street and West First Street. Primary existing functions for this site are USPS operations, the South Boston Bypass Road, and parking.

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5. Screening of Layover Sites

A two-tier screening assessment was conducted to refine the initial list of 28 layover sites to a set of potential locations for further analysis and conceptual design. The first tier involved a "fatal flaw" screening based on three key criteria including site suitability, railroad operations, and site access. The second tier involved a more detailed comparison of candidate sites based on factors such as consistency with zoning, distance from South Station, site topography, environmental impacts, layover yard and main line operations, and capital improvement requirements. For the second tier screening, a conceptual plan was prepared for each potential site. This analysis avoided residential acquisitions and relocations to the greatest extent possible. This analysis also minimized acquisitions and relocations of private businesses when other options may be available. At the end of this screening process, a number of sites were identified for further evaluation as part of the environmental review process.

5.1. Tier 1 Screening

Once the initial candidate sites were identified, the next step involved conducting a Tier 1 screening. The goal of the Tier 1 screening was to evaluate the ability of the alternatives to meet the overarching transportation and program objectives established for the project and eliminate sites that were deemed to have fatal flaws. As a result of this initial screening, sites were either eliminated from further consideration or advanced to the Tier 2 screening for more detailed analysis and evaluation against an expanded set of evaluation criteria.

5.1.1. Tier 1 Screening Criteria

The Tier 1 screening criteria includes:

- **Site suitability** – Sites that would require extensive or complicated acquisitions and relocations, and sites already programmed for other uses were eliminated from further consideration. Acquisition of residential property was avoided to the greatest extent possible. Acquisition of private businesses was minimized when other options may be available.
- **Railroad operations** – Capacity along main lines, running tracks and yards were considered when evaluating the practicability of each site under the railroad operations criterion. Main line, running track and yard track capacity should be able to accommodate existing and proposed revenue operations as well as non-revenue moves to and from a layover area.
- **Site access** – Each site must be able to reasonably access a railroad main line to provide the most efficient operation of train movements between South Station and the layover. Infrastructure constraints, including issues with topography and physical barriers were evaluated under this criterion.

Any site determined to not satisfy all three criteria were eliminated from further consideration.

5.1.2. Tier 1 Screening Analysis

All 28 alternative sites were evaluated for their ability to meet the Tier 1 evaluation criteria: site suitability, railroad operations, and site access. Those sites that did not meet these criteria were eliminated from further review and were not advanced into the Tier 2 screening process. The following section describes each of the alternatives eliminated, and the reasoning as compared to the Tier 1 evaluation criteria.

Site Suitability

The following eight alternatives were determined infeasible due to site suitability constraints:

- Alternative 4 – Widett Circle
- Alternative 4A – Foodmart Road
- Alternative 6 – Cabot Yard Red Line
- Alternative 7 – Cabot Yard Bus Facility
- Alternative 8 – Boston Department of Public Works
- Alternative 9 – Amtrak Southampton Street Service & Inspection
- Alternative 20A – Readville – Yard 5
- Alternative 24 – A Street

The site suitability issues associated with each eliminated site are:

- **Alternative 4 – Widett Circle / Alternative 4A – Foodmart Road:** These two sites contain numerous private businesses leasing units from the property owner, New Boston Food Market Development Corporation. Collectively, these businesses, known as The New Boston Food Market, are situated on two parcels of land within a mile of the central business district of Boston and designated for use as outlined under Chapter 121A of the Massachusetts General Laws. Due to complications associated with relocating multiple businesses with special requirements in common (temperature controlled storage, food processing), Chapter 121A development complexities, and the need to be in close proximity to the metropolitan market, these alternatives are not feasible at this time.
- **Alternative 6 – Cabot Yard Red Line / Alternative 7 – Cabot Yard Bus Facility:** Alternatives 6 and 7 require relocation of major transportation support infrastructure. The relocation of Cabot Yard Red Line facility would require a site of similar or better characteristics than the existing site. The site would also need to be situated on or adjacent to the MBTA Red Line corridor and meet the requirements of the MBTA Red Line rapid transit operations. The relocation of Cabot Yard Bus Facility would also be a major undertaking, requiring a centralized location for easy access to a majority of the MBTA bus routes in downtown Boston as well as other program requirements of MBTA Bus operations. Due to the difficulties in relocating either of these existing facilities, it was determined that both sites are not feasible.
- **Alternative 8 – Boston Department of Public Works (DPW):** The Boston DPW facility has recently undergone some rehabilitation work. In addition, this alternative would require reconstruction of an overhead bridge located at West Fourth Street and impact access to the adjacent Tow Lot property. The City plans to continue to use this facility for DPW functions and it would be extremely difficult to relocate in its entirety. Therefore, the DPW site is unavailable for a layover site.
- **Alternative 9 – Amtrak Southampton Street Service & Inspection:** The layover facility at Southampton Street Yard is generally limited to its existing footprint. This yard is bound by the MBTA Red Line Cabot Yard Lead Tracks, MBTA Old Colony Main Line, MBTA Dorchester Branch, Southampton Street and I-93, which restricts the ability to expand capacity at Southampton Street Yard. This site is not available because it would be infeasible and cost prohibitive to impact I-93 and other major existing transportation infrastructure.

- **Alternative 20A – Readville - Yard 5:** The MBTA has recently conducted extensive environmental remediation at Yard 5 by treating and removing contaminated soil from the site. The MBTA has committed the Dedham portion of the site for redevelopment as a solar farm and the Boston portion of the site for sale with the intention of private development. For these reasons, it was determined that the site for a layover site is not appropriate.
- **Alternative 24 – A Street:** Alternative 24 covers an area partially occupied by the South Boston Bypass Road and the West Service Road, both important roadway connections between the Seaport District and I-93. Substantial portions of both roadways would require relocation in order to maximize the use of A Street as a railroad layover site. Relocation of these roadways would sever direct connections to I-90, Congress Street, Haul Road and Seaport Boulevard. Relocation of the South Boston Bypass Road would also potentially cause major impacts to adjacent roadways due to heavy truck traffic. Additionally, the City has identified this area for future redevelopment activities. For these reasons, it was determined that the site for an A Street layover site is not appropriate.

Railroad Operations

Operational considerations include capacity along main lines, running tracks and yards, which is critical in determining the operational feasibility of a site. Main line, running track and yard track capacity should be able to accommodate existing and proposed revenue operations as well as non-revenue moves to and from the layover. The 28 alternative sites were reviewed for their ability to meet this criterion. From this review, the following seven alternatives were removed from further consideration due to railroad operating constraints and impacts to the system:

- Alternative 10A – Amtrak Front Yard
- Alternative 12 – Von Hillern Street
- Alternative 13 – Boston Globe
- Alternative 14 – Freeport Way
- Alternative 15 – Freeport Street
- Alternative 16 – Victory Road
- Alternative 20B – Readville - Yard 1

The railroad operations issues associated with each eliminated site are described in this section.

- **Alternative 10A – Amtrak Front Yard** – The expansion of tracks at Front Yard was considered, in order to accommodate eight-car consists. However, due to constraints with existing infrastructure (I-93, Bypass Road, Dorchester Branch, etc.), it was determined that expansion of Front Yard to accommodate eight-car consists is cost prohibitive and not practicable for the purpose of this project. Due to the track length constraints in this yard, it will not accommodate the eight-car consists required for future railroad operations and therefore Alternative 10A was eliminated from further consideration.

- **Alternative 12 – Von Hillern Street / Alternative 13 – Boston Globe / Alternative 14 – Freeport Way / Alternative 15 – Freeport Street / Alternative 16 – Victory Road**: With the operational constraints documented in previous studies (as discussed below) and the current volume of trains in both directions on the Old Colony Main Line, this analysis concluded there is no capacity for expansion of rail traffic on this segment of railroad and thus, the alternatives located along the MBTA Old Colony Main Line were eliminated from further consideration.

  There are four major rail corridors that access South Station, which consist of the MBTA Old Colony Main Line, the MBTA Dorchester Branch, the NEC, and the MBTA Worcester Line. The MBTA Dorchester Branch, NEC, and the MBTA Worcester Line have at least two main line tracks. The MBTA Old Colony Main Line, however, is constrained to a single main line track south of Southampton Street. Currently, there are 72 MBTA revenue trains that serve the MBTA Middleborough/Lakeville, Plymouth/Kingston and Greenbush lines operating over this single track main line and are split equally between inbound and outbound trains.

  The capacity of the MBTA Old Colony Main Line has been analyzed as part of several studies in the past. The New Bedford/Fall River Commuter Rail Extension project documented the MBTA Old Colony capacity constraints as part of the DEIR submitted in July, 1999.[14] As part of this study, additional train service was modeled to determine if it was operationally feasible to add more train operations to the MBTA Old Colony Main Line. The analysis showed that with a limited number of additional trains the potential for signal delays would result in gridlock on the entire MBTA Old Colony Main Line. This study concluded that the MBTA Old Colony Railroad's single track segments north of Braintree had insufficient capacity to support the Old Colony services and accommodate any additional trains north of Braintree.

  The April 2004 *MBTA Commuter Rail Infrastructure Needs Assessment Study* (CRINA Report)[15] documented the commuter rail infrastructure and rolling stock investment requirements necessary to support the anticipated ridership and service levels for the MBTA through 2025. The report concluded that in order to increase services on the MBTA Old Colony Lines, substantial infrastructure investments would be necessary including double tracking the main line and expanding outlying layover capacity.

- **Alternative 20B – Readville - Yard 1:** Readville – Yard 1 is currently used as a freight yard by CSXT. Two CSXT local trains originate out of Yard 1 five days a week to serve customers and perform switching duties between Readville and Attleboro. The crews for these two trains report to the CSXT office near the south end of the yard to start and end their shift. The yard tracks are used to stage freight cars, block cars and build trains. Use of this yard for a layover site would severely impact CSXT's ability to conduct freight operations in the area. For this reason, Alternative 20B was determined to be infeasible as a layover site.

[14] Massachusetts Bay Transportation Authority. *Draft Environmental Impact Report*, New Bedford/Fall River Commuter Rail Extension Project. July, 1999.
[15] Massachusetts Bay Transportation Authority. *Final Technical Report*, MBTA Commuter Rail Infrastructure Needs Assessment Study. April, 2004.

Site Access

Each site must be able to reasonably access a railroad main line to provide the most efficient operation of train movements to and from layover. Infrastructure constraints, including issues with topography and physical barriers, were evaluated under this criterion. The following three alternatives were determined infeasible due to site access constraints:

- Alternative 21 – Arborway Bus Facility
- Alternative 22 – Arborway MBTA Design and Construction Building
- Alternative 23 – D Street

The site access issues associated with each eliminated site are described in this section.

- **Alternative 21 – Arborway Bus Facility / Alternative 22 – Arborway MBTA Design and Construction Building:** Two sites, the MBTA Arborway Bus Facility and MBTA Arborway Design and Construction Building, are northeast of the Forest Hills Station located along the NEC in the Jamaica Plain section of Boston. Rail access to either one of these sites would require a substantial change in elevation, tunneling through an existing station and under three major roadways, substantial construction impacts and potentially very high capital cost. Given the impacts to existing infrastructure and utilities imposed by the construction of these alternatives, these sites were eliminated from further consideration.
- **Alternative 23 – D Street:** Much of the area surrounding the D Street parcel has recently been acquired for the development of an apartment complex and two hotels on two separate sites. In addition, accessing the D Street area would require either a shared-use right-of-way (street running) or a permanent easement or acquisition to re-establish the railroad tracks that once existed parallel to Cypher Street, immediately to the southwest of the site. At least two new grade crossings would be required under the easement/taking option. The street running option would require full-depth reconstruction of Cypher Street and relocation of utilities in the roadway. This option would yield a scenario with public vehicular traffic that would compromise the operationally reliability of accessing the site.

5.1.3. Tier 1 Screening Summary

Of the initial list of 28 candidate sites, 18 were eliminated from further consideration based on the Tier 1 screening evaluation. All alternatives were compared to the three Tier 1 evaluation criteria: site suitability, railroad operations, and site access. Those that met the criteria were advanced to the Tier 2 screening. Those that did not meet the Tier 1 criteria were removed from further consideration. The following 18 sites did not meet the basic needs of the project and were dismissed:

- Alternative 4 – Widett Circle (dismissed for site suitability issues)
- Alternative 4A – Foodmart Road (dismissed for site suitability issues)
- Alternative 6 – Cabot Yard Red Line (dismissed for site suitability issues)
- Alternative 7 – Cabot Yard Bus Facility (dismissed for site suitability issues)
- Alternative 8 – Boston Department of Public Works (dismissed for site suitability issues)
- Alternative 9 – Amtrak Southampton Street Service & Inspection (dismissed for site suitability issues)
- Alternative 10A – Amtrak Front Yard (dismissed due to railroad operating constraints)

- Alternative 12 – Von Hillern Street (dismissed due to railroad operating constraints)
- Alternative 13 – Boston Globe (dismissed due to railroad operating constraints)
- Alternative 14 – Freeport Way (dismissed due to railroad operating constraints)
- Alternative 15 – Freeport Street (dismissed due to railroad operating constraints)
- Alternative 16 – Victory Road (dismissed due to railroad operating constraints)
- Alternative 20A – Readville – Yard 5 (dismissed for site suitability issues)
- Alternative 20B – Readville – Yard 1 (dismissed for railroad operations issues)
- Alternative 21 – Arborway Bus Facility (dismissed due to limited site access)
- Alternative 22 – Arborway MBTA Design and Construction Building (dismissed due to limited site access)
- Alternative 23 – D Street (dismissed due to limited site access)
- Alternative 24 – A Street (dismissed for site suitability issues)

Of the 28 sites considered, the following ten locations were carried forward into the Tier 2 evaluation and screening process. These alternatives meet the overall requirements for a layover site and will be evaluated further in the Tier 2 screening.

- Alternative 1 – Commuter Rail Maintenance Facility (CRMF)
- Alternative 2 – Beacon Park Yard
- Alternative 3 – Cold Storage
- Alternative 5 – Boston Transportation Department Tow Lot
- Alternative 10 – Amtrak Southampton Street Service & Inspection – West
- Alternative 11 – Dorchester Avenue
- Alternative 17 – NSTAR
- Alternative 18 – Forest Hills
- Alternative 19 – Lanesville Terrace
- Alternative 20 – Readville - Yard 2

5.3. Tier 2 Screening

The Tier 2 screening process included development of more detailed screening criteria by which to evaluate the remaining alternatives. Refinement of each of the remaining 10 alternatives included development of conceptual designs, further evaluation of railroad operating characteristics, and major capital requirements necessary to construct each alternative. The purpose of the Tier 2 screening is to compare each of the sites relative to each other using the evaluation criteria to select potential layover sites. Unlike the Tier 1 analysis, the Tier 2 screening analysis was more detailed and not simply a "pass or fail" evaluation. From this Tier 2 screening process, the sites that best met the objectives and goals of the project were selected to move into the environmental review process.

5.3.1. Tier 2 Screening Criteria

The Tier 2 screening evaluation criteria, developed in coordination with interested parties, are described in this section. They are organized into the following six categories and described in the following sections:

A. Consistency with adopted plans and zoning;

B. ability to meet location requirements;

C. railroad operations;

D. environmental impacts;

E. site suitability; and

F. capital improvements.

A. Consistency with Adopted Plans and Zoning

This criterion was used to assess each site's consistency with locally adopted plans and zoning. Included is a review of the land use of the site, the zoning classification of each site (given the nature of layover operations, industrial zoning is preferred), and any known planned land use for the site.

B. Ability to Meet Location Requirements

This criterion was used to determine the ability of each site to meet location requirements for rail and roadway access. Main line rail access was assessed in terms of whether the site would have direct (no reverse moves) and exclusive access (not sharing with other railroad functions). Direct access less than 200 feet away is preferred and increasing distance to access track is considered less desirable. Any streets that would have to be crossed by the access tracks were identified because they are deemed to be operationally disruptive or could have potential traffic and safety impacts. Another measure was whether the site was already accessible by rail.

While rail access is vital to the layover site, roadway access is also important. Roadway access to a layover site is necessary for staff access, the delivery of supplies and other materials and the removal of trash. The roadway access route should avoid, to the greatest extent possible, routes through residential and other sensitive areas.

Lastly, site characteristics such as topography and potential train storage capacity were considered. A level site is preferred although a site that requires some grading can be acceptable in certain situations. Storage capacity was measured by the number of eight-car trains consists with a single locomotive that could be accommodated at each location.

C. Railroad Operations

Railroad operations relating to the layover areas were based on a set of four subcriteria including: yard operations, main line impacts, distance to South Station, and travel time to South Station.

Yard operations for layover purposes were based on whether the site would have a single lead track, could accommodate parallel lead tracks, could accommodate a loop track or was accessible from both ends. The purpose of this measure is to place a higher value on sites that would be least likely to disrupt operations in the event that one yard lead is fouled by a failed switch, locomotive or another unexpected event. Having flexibility in accessing and using the site is a desirable quality in a layover site.

The capacity of the main line was considered relative to the layover train capacity of a given site. A smaller site with fewer layover trains would potentially have less of an impact on the main line leading to the layover site, but other conditions could exist that make it undesirable as well. Sites with larger capacity for train storage would demand more train volume on the main line accessing the site, however, a large capacity site may be situated on a main line with inadequate capacity to fully utilize that layover.

Distance to South Station was another measure used to assess the operational characteristics of each site. Generally, the further from South Station a layover site lies, the more time it would take to move trains to and from South Station (deadhead miles), which has cost implications. A location within two miles was considered ideal, one within four miles was considered desirable and sites beyond four miles were considered less desirable and were evaluated on a case-by-case basis in terms of operations.

The final measure of this criterion was the travel time to each layover site, with lower travel times preferred. While the distance from South Station has implications for travel time, there are additional factors that can affect travel time including the speeds on the intervening track. Factors that affect speeds include track geometry and the amount of switching required to access a site. Some sites would require a train to travel past the site and reverse direction to access and exit the site, a situation that is much less desirable than sites that do not require such maneuvers.

D. Environmental Impacts

For the environmental impact criterion, the preliminary screening measures included whether the site was adjacent to residential areas or other sensitive receptors (schools, nursing homes, hospitals) and whether there were known environmental issues associated with the site. This analysis also assessed whether each site was located in designated environmental justice areas, using data provided by the Commonwealth's Office of Geographic Systems (MassGIS) Environmental Justice Viewer database. While any noise, vibration or visual impacts from sites adjacent to residential areas can be buffered through the use of mitigation (such as berms, walls or intervening space), it is preferable to avoid such proximity. Known environmental issues include any condition that would complicate or even prevent use of the site.

E. Site Suitability

Site suitability was judged in terms of the nature and number of relocations each site would require. There are a number of situations that could make a site difficult to acquire. While a privately held site could be condemned if necessary, condemnation is not the preferred method of site acquisition but the last available option. Sites already owned by public entities can only be acquired through agreement with the public entity. Similarly, railroad sites, such as those owned by Amtrak or the MBTA, have to be acquired through agreement. If there is substantial reason to believe such an agreement could not be achieved a site would be considered less desirable. The amount of acquisitions required could make the location cost prohibitive as a layover yard.

The final factor in this criterion was the number and type of uses that would have to be relocated to make the site available. Any current usage would have to be relocated under Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs[16] requirements whether the user is a lessor or owner of the site. The fewer the number of current users, the easier a replacement site would be to find. In some cases the current user or users would need a suitable replacement site that could be difficult to find. This could include the need to locate a site with the appropriate zoning, access, or proximity to complementary uses.

F. Capital Improvements

The major capital improvement (infrastructure) requirements were summarized for each alternative to determine whether certain components would influence the cost of constructing a particular layover site. Items with major cost factors were considered in this section such as major earthwork, major known utility relocations, major track and/or signal improvements, new or modified interlockings, and infrastructure modifications or relocations. Building demolition and site clean-up were also considered under this criterion.

5.3.2. Tier 2 Screening Analysis

The purpose of the Tier 2 screening analysis is to evaluate the concepts developed for each of the 10 remaining sites and measure how each site performs when compared to each other. Figures 40 through 49, provided in Attachment B, illustrate the conceptual layout of each site and the capacity of the site as a layover yard. The following sections describe each site.

Alternative 1 – Commuter Rail Maintenance Facility (CRMF)

Alternative 1, Commuter Rail Maintenance Facility (CRMF), is located primarily in Somerville with smaller portions in Cambridge, and is situated on the south side of the MBTA Fitchburg Line. The conceptual layover design would optimize the use of existing CRMF tracks and/or provide additional tracks parallel to the Fitchburg Line which would allow for storage of up to six consists. This concept is shown in Figure 40 provided in Attachment B. The following section provides details on the Tier 2 screening for Alternative 1.

A. Consistency with Adopted Plans and Zoning

The site lies within both Somerville and Cambridge and is subject to different zoning regulations in each city. The Somerville portion of this site is zoned IB, Industrial B, which allows railroad layover functions. The Cambridge portion is zoned as NP PUD-6, North Point District with a Planned Unit Development overlay, which is designated for residential, office and business development. The North Point District zoning code does not allow a railroad layover use. This site is currently being used for parking, material storage and non-revenue rail equipment storage by MBTA.

B. Ability to Meet Location Requirements

This site has existing rail access from the MBTA Fitchburg Line via the Grand Junction Running Track (GJRT) and the MBTA Framingham/Worcester Line. Rail access to this site from South Station is neither direct nor exclusive as trains traveling to the layover would be competing with freight operations, north side and south side Amtrak and MBTA revenue trains and other non-revenue moves required by Amtrak and the MBTA. To access the site, trains would be required to traverse six highway-rail at-grade crossings

[16] United States Department of Transportation. 42 United States Code Chapter 61, *Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs*. January 1, 2012. Available at: http://uscode.house.gov/download/pls/42C61.txt

on the GJRT in Cambridge, including several major roads, plus three pedestrian at-grade crossings. Road access would be from Washington Street via Inner Belt Road and Third Avenue. The topography is favorable at this site for use as a layover site.

C. Railroad Operations

The distance by rail from South Station to this site is approximately 6.9 track-miles. Close to three miles of the route is on the GJRT which is restricted to speeds of 10 mph or less. Additionally, the GJRT is single track, with six at-grade highway crossings and three at-grade pedestrian crossings in Cambridge. This relatively slow running speed, in addition to a reverse move that is required at Beacon Park Yard, contributes to a travel time in excess of 20 minutes each way which is greater than any other site in the Tier 2 screening. The yard operations would include double ended access with ladders; however, there are some railroad operational concerns with this site. There are some main line impacts since non-revenue trains going to CRMF from the south side would be required to travel on main line tracks along the MBTA Framingham/Worcester Line between Boston and Beacon Park Yard and along the MBTA Fitchburg Line between the GJRT and CRMF. Additionally, current infrastructure along the GJRT is not conducive to adding up to 12 trains per day (six in each direction) to this segment of track without substantial improvement to signals and/or track.

D. Environmental

This site is located in an existing industrial area on the south side of the MBTA Fitchburg Line. A layover site in this location is not anticipated to have an adverse effect on natural resources. Potential soil and groundwater contamination is likely present at this location due to past and present railroad/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and polycyclic chlorinated biphenyls (PCBs) among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. According to the Commonwealth's Office of Geographic Information (MassGIS) Environmental Justice viewer,[17] this site is partially located within a designated environmental justice area for minority populations. The proposed NorthPoint mixed-use development site is located directly adjacent to this site to the south. Noise and/or vibration mitigation measures may be required to address any moderate or severe impacts, if any, to adjacent residential land uses. Overall, the placement of the layover area in an existing industrial district would not result in any substantial changes to the local visual environment. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This alternative would not require acquisition as the MBTA already owns this land. However, using this part of the property as a layover site would displace its current use of parking, material storage and equipment storage. Expansion of this site is not feasible so these functions would need to be relocated on site.

F. Capital Improvements

This site would require construction of a new interlocking or extensive modifications to an existing interlocking on the MBTA Fitchburg Line. Other construction activities would include relocating sidings that are currently used to store non-revenue rail-bound equipment as well as relocating employee parking, lay-down areas for maintenance-of-way materials and storage of communication and signal equipment.

[17] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

Currently, the GJRT is non-signaled territory where there are no scheduled revenue passenger trains. However, occasional non-revenue passenger train moves are made over this section of track to transfer railroad equipment between the north side and south side of the rail system in Boston. CSXT has operating rights on the GJRT and uses the line regularly to serve their freight customers. In order to make railroad operations more efficient, substantial track and signal improvements may be warranted along the GJRT between the MBTA Fitchburg Line and the MBTA Framingham/Worcester Line to support increased rail traffic traveling to and from the CRMF.

Recommendation – Dismiss Alternative 1 from further consideration for the following reasons:

- **Distance and travel time to layover are substantial;**
- **Reverse move required at Beacon Park to access the new yard;**
- **GJRT is limited to "restricted speed," not exceeding 10mph and has eight existing at-grade crossings including major roads in Cambridge; and**
- **Major infrastructure improvements would be required including extensive modifications to the MBTA Fitchburg Route interlocking and substantial track and signal improvements on the GJRT.**

Alternative 2 – Beacon Park Yard

Alternative 2, Beacon Park Yard, is located in the Allston section of Boston on the north side of the MBTA Framingham/Worcester Line. The conceptual layover design would provide tracks parallel to the MBTA Framingham/Worcester Line to store up to 30 consists. This concept is shown in Figure 41 provided in Attachment B. The following section provides details on the Tier 2 screening for Alternative 2.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the Boston Redevelopment Authority (BRA) as the Allston Landing South Economic Development Area (EDA). According to Article 51 Section 22 of the Boston Zoning Code "The purpose of this Allston Landing South EDA is to promote industrial and manufacturing uses and to preserve and maintain the existing industrial uses which are vital to the City, State, and regional economy."[18] This site has served for many years as a major freight rail yard and intermodal terminal in Boston for CSXT. Today, the freight and intermodal functions are in transition to be relocated to central Massachusetts in 2013. The entire property is currently owned by Harvard University Beacon Yards LLC, and is encumbered by CSXT's operating rights. As previously described, this site is the location of both an MBTA easement area and an option running in favor of MassDOT, both of which are also encumbered by CSXT's rights. With both the easement and the option area, this site would provide space for 30 consists. A rail freight terminal and accessory railroad storage yard are approved uses without restrictions within the Allston Landing South EDA. A planned commuter rail station west of the yard will have minimal or negligible impacts on the use of this site as a layover yard.

B. Ability to Meet Location Requirements

The nature of this site as an existing rail facility would simplify the construction of the layover yard. The site has existing rail access via the MBTA Framingham/Worcester Line. Rail access to this site from South Station is direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from an existing driveway at the intersection of Cambridge Street and Lincoln Street. The topography is favorable at this site for use as a layover site.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 3.8 track-miles. Despite the distance to this site and two MBTA stations (Back Bay Station and Yawkey Station) along the route, good main line access and main line track speeds allow trains to access this site in approximately 10 to 15 minutes. While this site has a large potential capacity and double-ended access for operations, there are some railroad operational concerns. By using this site to layover up to 30 consists, the MBTA Framingham/Worcester Line would experience some impacts. Capacity on the main line tracks would be in high demand between the non-revenue moves to and from the yard and revenue trains on the MBTA Framingham/Worcester Line. With the increased volume of trains, schedule changes may be necessary and congestion may become an issue on the main line during peak hours.

[18] City of Boston, Boston Redevelopment Authority. Zoning Code. *Article 51 – Allston-Brighton Neighborhood District, Section 22*. November 13, 1991. Available at: http://www.bostonredevelopmentauthority.org/pdf/ZoningCode/Article51.pdf

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present railroad/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. Existing residential areas are present to the south of the existing MBTA Framingham/Worcester Line. There is no known planned residential use at or directly adjacent to this site. Noise and/or vibration mitigation measures may be required to address any moderate or severe impacts, if any, to nearby residential land uses. A layover site in this location is not anticipated to have an adverse effect on natural resources. According to the MassGIS Environmental Justice viewer,[19] this site is located within a designated environmental justice area for minority and low-income populations. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

The location currently serves as a freight rail yard, bulk transfer facility, intermodal facility, engine facility and provides several other railroad functions. It is assumed for the purposes of this analysis that the MBTA will use its easement area to build the layover infrastructure as soon as the site is available. Up to 12 consists can be accommodated on the MBTA easement. The storage of 12 consists on this easement is considered a "future existing condition," whereby construction has not yet started but it is anticipated that the MBTA easement portion of this site will be used before the start of this project, and will be coordinated with other MassDOT-related needs in the area.

However, in order to accommodate additional consists at this site to meet the existing and future layover need, use of more land beyond the MBTA easement area is necessary. An additional 132-foot wide area, immediately to the north of the MBTA easement area, is the subject of MassDOT's option agreement. MassDOT expects that the area subject to the option would fulfill the land requirement necessary to build tracks for 30 consists. Because the MassDOT option area is reserved for unrelated purposes, additional rights beyond what MassDOT now has would be necessary to accomplish this outcome. Additional rights may also be necessary within the MBTA easement area depending upon the ultimate use and functions decided upon. MassDOT and the MBTA have had preliminary discussions with the property owner and intend to begin negotiations on this issue in the near future.

F. Capital Improvements

Construction at this site would require demolition of several small railroad support buildings and four larger buildings. Other demolition would include reclaiming salvageable rail and ties and disposal of a large quantity of bituminous and cement concrete as well as scrap rail and ties. Two interlockings on the MBTA Framingham/Worcester Line would require modifications for controlled yard access.

As part of the current agreement between Harvard University and the MBTA, the MBTA would be required to construct a ventilation system, fire protection, heat dissipation, and lighting if Harvard chooses to exercise the air rights/overbuild clause of the agreement. This clause also requires that railroad infrastructure be constructed so as to not preclude the use of surface area for such items as building foundations, building access/egress, vehicle access and utilities.

[19] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

Recommendation – Advance Alternative 2 for further evaluation and concept refinement.

- **Existing use of this site as a rail yard would simplify construction;**
- **The MBTA easement agreement already exists;**
- **No property acquisitions are required; and**
- **Topography and current land use are favorable for this site for layover purposes.**

Alternative 3 – Cold Storage

Alternative 3, Cold Storage, is located in Boston on the west side of the MBTA Dorchester Branch. The conceptual layover design would provide tracks along the east property line of the site to store up to six consists. This concept is shown in Figure 42 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 3.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as I-2, General Industrial, which allows railroad layover functions. The site currently houses a temperature controlled food storage and distribution facility that is use by Americold and Crocker and Winsor Seafoods. The building has an active CSXT-served rail siding with space for six freight cars.

B. Ability to Meet Location Requirements

This site has existing rail access from the MBTA Dorchester Branch; however, the tracks would need to be reconfigured and expanded to maximize the potential of this parcel as a layover site. Rail access to this site from South Station is direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from Frontage Road via Widett Circle and Foodmart Road. The topography is favorable at this site for use as a layover site.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 0.9 track-miles and travel time would be an estimated 5 to 10 minutes. Rail access to the site is direct, but limited to a single yard lead off the MBTA Dorchester Branch, which is not optimal. There are no major main line impacts, given that the site is located a short distance from South Station.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present railroad/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. There is no existing or known planned residential use at or directly adjacent to this site. According to the MassGIS Environmental Justice viewer,[20] this site is not located within a designated environmental justice area. Overall, the placement of the layover site in an existing industrial district would not result in any substantial changes to the local visual environment. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This alternative would require an approximately 6.6 acre site, which would involve the full acquisition of 100 Widett Circle, a 4.7 acre parcel that contains the Americold cold storage facility. A portion of 0 West Fourth Street (owned by Amtrak) and a portion of 0 Widett Circle (owned by New Boston Food Market Development Corporation) would also be required. Use of this site would also require the displacement and relocation of Americold plus any businesses that operate at this facility, with specific needs of temperature controlled food storage and freight rail access.

[20] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

F. Capital Improvements

Construction of this site would include demolition of a large concrete and steel building along with one track and a substantial area of bituminous concrete pavement. Roadway access to the MBTA's Service and Inspection building would need to be maintained or relocated.

Recommendation – Dismiss Alternative 3 from further consideration for the following reasons:

- **Acquisition and relocation would be extremely challenging due to relocating private businesses with special requirements (temperature controlled storage, food processing, and need for close proximity to the metropolitan market) and Chapter 121A development complexities.**
- **MassDOT is sensitive to the displacement of private businesses when publicly owned options could be further utilized for layover purposes. It is determined that this site is not feasible.**

Alternative 5 – BTD Tow Lot

Alternative 5, BTD Tow Lot, is located in Boston, to the west of the MBTA Dorchester Branch. The conceptual layover design would provide tracks to the west of Amtrak's wet/dry loop tracks to store up to 10 consists. This concept is shown in Figure 43 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 5.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as I-2, General Industrial, which allows railroad layover functions. The site is currently used by the BTD as a centrally-located automobile tow lot.

B. Ability to Meet Location Requirements

There is no existing rail access to this site; however, this site is located just to the west of the MBTA Dorchester Branch and Amtrak's wet/dry loop tracks, so it is possible to make a rail connection. Rail access to this site from South Station would be direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from Frontage Road. The topography is favorable at this site for use as a layover site.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 0.9 track-miles and travel time would be an estimated 5 to 10 minutes. Rail access to this site would be via parallel lead tracks off the MBTA Dorchester Branch. This site has no major main line impacts, given that the site is located a short distance from South Station.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present land use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. There is no existing or known planned residential use for or directly adjacent to this site. According to the MassGIS Environmental Justice viewer,[21] this site is not located within a designated environmental justice area. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This approximately 10.9-acre site would require acquisition of three full parcels and a portion of an additional parcel owned by the City of Boston. An easement would be required from Amtrak for the use of a portion of property located at 0 West Fourth Street. Use of this site would require displacement and relocation of the BTD tow lot, a city-owned facility that requires a centrally located site. Use of this site would also require a substantial portion of the adjacent Boston DPW property that would impact the existing fueling facility, salt pile, single-story garages and the ramp to access the west side of the parking garage. Due to site constraints, relocation of the parking garage access ramp and site circulation considerations would be required. Additionally, with the displacement of the fueling facility, salt pile, and single story garages, it may not be feasible to relocate these components on site due to the land area required for these functions. Due to the nature of City operations at the DPW, it could be a challenge to

[21] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

separate these functions from the main DPW facility, relocate them to another property within City limits, and still maintain an efficient operation.

F. Capital Improvements

Construction at this site would include demolition of the BTD tow lot and maintenance building, as well as a fueling station and bulk storage bins located on the Boston DPW site. Extensive modifications or relocation of the ramp accessing the Boston DPW parking garage would be required to accommodate the lead tracks for the layover yard. Relocation of a large single story DPW garage, DPW fueling facility and DPW salt pile would also be required. A new or modified interlocking would be required for controlled rail access to the yard.

Recommendation – Advance Alternative 5 for further evaluation and concept refinement.

- **Close and direct rail access to and from South Station and good road access via Frontage Road;**
- **Publicly-owned facility;**
- **Relative to other sites, minimal site work is required to establish this site for layover purposes; and**
- **Topography of this site is favorable for layover purposes.**

Alternative 10 – Amtrak Southampton Street Service & Inspection - West

Alternative 10, Amtrak Southampton Street Service & Inspection -West, is located in Boston to the west of the MBTA Old Colony Main Line. The conceptual layover design would provide tracks along the northeast side of Frontage Road to store up to nine consists. This concept is shown in Figure 44 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 10.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as I-2, General Industrial, which allows railroad layover functions. The site is currently used by Amtrak and the MBTA for multiple functions related to passenger rail, including offices and crew quarters to support existing layover uses. Amtrak plans to continue to use this site to support its passenger rail equipment so its use as a layover site would not be consistent with the planned use.

B. Ability to Meet Location Requirements

There is no existing rail access to the site but it is in close proximity to the existing Southampton Street Yard and MBTA Old Colony Main Line. Rail access to this site from South Station would not be direct, as trains would be required to stop and reverse direction to access the site. Additionally, rail access would not be exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from Southampton Street via Frontage Road. The topography is favorable at this site for layover purposes.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 1.8 track-miles; however, rail access is a concern for this site. To access the layover yard, trains would have to enter Amtrak's Southampton Street Yard from the MBTA Old Colony Main Line or Dorchester Branch, travel through the yard and then make a reverse move to enter the Southampton Street Service and Inspection - West site through a single yard lead. These moves would impact Amtrak's Southampton Street Yard operations. Despite the close proximity to South Station, the reverse move to enter the layover site increases the transit time to an estimated 10 to 15 minutes, affecting the efficiency of the site. There are no major main line impacts, given that the reverse move is off the main line and that the site is located a short distance from South Station.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present railroad/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. There is no existing or planned residential use at or directly adjacent to this site. According to the MassGIS Environmental Justice viewer,[22] this site is located within a designated environmental justice area for low-income and minority populations. It is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

[22] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

E. Site Suitability

This approximately 6.8-acre site would require use of approximately 6.4-acres of property at 400 Southampton Street, currently owned by Amtrak. Use of this parcel would require displacement and relocation of multiple facilities that are required to support Amtrak operations. This site also requires four easements for 0.4 acres of property owned by the MBTA or the Commonwealth of Massachusetts.

F. Capital Improvements

Construction at this site would require relocation of several of Amtrak's vital railroad support functions, including the demolition of the current structure in which they are housed. Real estate constraints in this area and the need to keep the railroad support functions in close proximity to the existing Southampton Street Yard may necessitate structured parking and office space while reserving surface area for deliveries and bulk storage.

Recommendation – Dismiss Alternative 10 from further consideration for the following reasons:

- **Operational impacts to Amtrak's Southampton Street Yard due to access through the existing yard;**
- **Displacement of Amtrak layover support buildings; and**
- **Reverse move required to access the new yard.**

Alternative 11 – Dorchester Avenue

Alternative 11, Dorchester Avenue, is located in Boston on the east side of the MBTA Old Colony Main Line. The conceptual layover design would provide 26 storage tracks parallel to Dorchester Avenue and the Old Colony Main Line to store up to 38 consists. This concept is shown in Figure 45 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 11.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as I-2, General Industrial. The majority of this site consists of commercial businesses including those related to construction, auto repair, warehouse storage, and personal fitness with some adjacent residential uses. While the current zoning code allows railroad layover functions, existing and planned uses are not consistent with railroad use although a portion of the site has an abandoned rail spur.

B. Ability to Meet Location Requirements

There is no existing rail access to this site; however, the MBTA Old Colony Main Line runs along the west edge of the site so it would be relatively easy to provide rail connection. Rail access to this site from South Station would not be direct, as trains would be required to stop and reverse direction on a future tail track that this alternative would propose off of the MBTA Old Colony Main Line, in order to gain access the site. Additionally, rail access would not be exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this site. Road access would be from Southampton Street. The topography is favorable at this site for use as a layover site.

C. Railroad Operations

The distance by rail from South Station to this site is approximately 2.0 track-miles. Rail access to the site would be through a single yard lead off the MBTA Old Colony Main Line, which is not optimal, and a reverse move using a new tail track off the MBTA Old Colony Line would be required to enter or exit the yard. Despite the close proximity to South Station, the reverse move increases the transit time to an estimated 10 to 15 minutes, impacting the efficiency of the site. This site has some main line impacts, with a potential for up to 38 trains laying over at this location, capacity on the main line tracks would be in high demand between the non-revenue moves to and from the yard and revenue trains on the MBTA Old Colony Main Line.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present commercial/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. While there are some residences in close proximity to this site, there is no known planned residential use for or directly adjacent to this site. Noise and/or vibration mitigation measures may be required to address any moderate or severe impacts, if any, to adjacent residential land uses. According to the MassGIS Environmental Justice viewer,[23] this site is located within a designated environmental justice area for low-income populations. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this

[23] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This approximately 29.5-acre site would require property acquisition from approximately 24 parcels and three easements on public property. Use of this site would require displacement and relocation of more than 30 commercial businesses. Acquisition of parcels necessary to utilize this site for layover purposes would be a major undertaking.

F. Capital Improvements

Construction of this site would require substantial building demolition and site cleanup of all required parcels. Modifications to a nearby interlocking on the MBTA Old Colony Main Line would include the addition of a tail track and reconfiguration of an existing industrial track lead. The tail track would be used to divert trains entering/exiting the layover from the main line so as to not disrupt revenue rail traffic. The Southampton Street overhead bridge would also need to be rebuilt to accommodate the yard lead and tail track.

Recommendation – Dismiss Alternative 11 from further consideration for the following reasons:

- **A reverse move is required to access the site and access is via a single yard lead;**
- **Due to the large storage capacity and the location of this site, the volume of trains traveling to and from this site would negatively impact operations on the MBTA Old Colony Main Line;**
- **Close proximity to residential area;**
- **Many commercial businesses would be displaced to accommodate layover at this site; and**
- **Property acquisition is expected to be difficult given the number of parcels required.**

Alternative 17 – NSTAR

Alternative 17, NSTAR, is located in the Dorchester section of Boston to the east of the MBTA Dorchester Branch. The conceptual layover design would provide storage tracks for up to 18 consists, along the north side of Norfolk Avenue and East Cottage Street. This concept is shown in Figure 46 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 17.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as LI, a Local Industrial Subdistrict. Currently, the main use of this site is office, warehouse, shops, and material storage for NSTAR. According to Article 65, Section 20 of the Boston Zoning Code "The purpose of the Local Industrial Subdistricts is to encourage the expansion of light manufacturing and research and development uses…within the Dorchester Neighborhood District."[24] Accordingly, current and planned uses are not consistent with railroad use.

B. Ability to Meet Location Requirements

There is no existing rail access to this site but it is adjacent to the MBTA Dorchester Branch main line tracks, although the site is situated approximately 17 feet lower in elevation than the main line. Rail access to this site from South Station would be direct but not exclusive as trains traveling to layover areas would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover site. Road access would be from Massachusetts Avenue. The topography of the site is flat; however, the elevation drop between the main line tracks and the site is not favorable.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 2.1 track-miles and travel time would be an estimated 5 to 10 minutes. Rail access would be through a single yard lead off of one of the MBTA Dorchester Branch main line tracks, which is not optimal, and an approximately 17-foot drop in grade to the proposed storage track elevation from the main line would be required. The large storage capacity of this site means a heavy volume of additional trains would be traveling on the MBTA Dorchester Branch, creating some impacts to existing rail traffic. To help avoid additional main line impacts from reverse running on Dorchester Branch Track 2 for a long distance, a new crossover on the MBTA Dorchester Branch would be needed.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present commercial/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. There is no known existing or planned residential land use at or directly adjacent to this site. According to the MassGIS Environmental Justice viewer,[25] this site is located within a designated environmental justice area for minority, low-income and English isolation populations. It is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

[24] City of Boston, Boston Redevelopment Authority. Zoning Code. *Article 65 – Dorchester Neighborhood District, Section 20*. July 17, 2002. Available at: http://www.bostonredevelopmentauthority.org/pdf/ZoningCode/Article65.PDF

[25] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

E. Site Suitability

This approximately 29.1-acre site would require property acquisition of four privately owned parcels and partial acquisition of MBTA and publicly owned property. The NSTAR facility, comprised of a 23.9-acre parcel owned by Boston Edison Co. and a 3.5 acre parcel owned by SG National LLC, makes up the majority of the site. This site would require displacement and relocation of the NSTAR facility and two smaller entities including Norfolk Auto Tech and Norfolk Tap. NSTAR would likely have specific requirements for relocation.

F. Capital Improvements

Construction of this site would include demolition of large office and warehouse-type buildings along with several smaller building structures. A substantial amount of earthwork would be required in order to meet the design guidelines for a layover site. Construction of a new interlocking on the MBTA Dorchester Branch would also be required to access the site via rail.

Recommendation – Dismiss Alternative 17 from further consideration for the following reasons:

- **Residential land use exists directly adjacent to this site;**
- **The MBTA Dorchester Branch main line is situated at a much higher elevation than the site; and**
- **NSTAR would be a substantial acquisition and relocation of this facility would be extremely challenging.**

Alternative 18 – Forest Hills

Alternative 18, Forest Hills, is located in the Jamaica Plain section of Boston on the east side of the NEC. The conceptual layover design would provide storage tracks parallel to the NEC to store up to five consists. This concept is shown in Figure 47 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 18.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as LI, a Local Industrial Subdistrict. Current uses of this site include automobile sales warehouses and the Neighborhood Assistance Corporation of America offices. According to Article 55 Section 18 of the Boston Zoning Code "The purpose of the Local Industrial Subdistricts is to encourage the preservation of the existing manufacturing and industrial base in a manner that is sensitive to and preserves the quality of life of the surrounding neighborhoods."[26] Accordingly, current and planned uses are not consistent with railroad use. Additionally, there are several residences adjacent to this site that may be negatively impacted by a layover site.

B. Ability to Meet Location Requirements

There is no existing rail access to this site but it is adjacent to the NEC main line tracks. The site is substantially higher in elevation than the main line. Rail access to this site from South Station would be direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from Washington Street via McBride Street. The topography of the site is flat; however, the elevation difference between the site and the main line tracks is not favorable. Use of this site may necessitate earthwork to lower the elevation of the entire site closer to the main line elevation.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 4.8 track-miles and travel time would be an estimated 10 to 15 minutes. However, travel times could be higher due to the already congested nature of the NEC and the priority given to revenue trains. Rail access would be through a single yard lead off of the NEC Track 2, which is not optimal because of directional high-speed, main line revenue rail traffic. Also, a substantial incline from the main line to the proposed storage track elevation would be required if the site elevation is not lowered. This site also has major main line impacts, as it would require non-revenue trains to travel reverse direction for approximately four miles between Cove interlocking and the layover yard, passing through Back Bay and Ruggles Stations on the primarily inbound NEC Track 2. This would have profound impacts to the NEC and would be detrimental to both MBTA and Amtrak operations along the entire line.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present commercial/industrial land use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. Residential land use exists directly adjacent to this site. No additional residential use is planned for this site or directly adjacent to this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. Noise and/or vibration mitigation measures

[26] City of Boston, Boston Redevelopment Authority. Zoning Code. *Article 55 – Jamaica Plan Neighborhood District, Section 18.* September 7, 1993. Available at: http://www.bostonredevelopmentauthority.org/pdf/ZoningCode/Article55.PDF

may be required to address any moderate or severe impacts, if any, to adjacent residential land uses. According to the MassGIS Environmental Justice viewer,[27] this site is located within a designated environmental justice area for minority populations. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This approximately 11.1-acre site would require property acquisition of four full parcels and one partial parcel. The four full parcels (approximately 6.2 acres of the site) are privately owned and would require acquisition. The remaining 4.9 acres of the site would be the partial use of an MBTA owned parcel use for a power substation. Use of this site would require displacement and relocation of multiple businesses including Flanagan & Seaton Motor Car Co. and the Neighborhood Assistance Corporation of America. Acquisition of parcels necessary to utilize this site for a layover site would be a major undertaking.

F. Capital Improvements

Construction of this site would include demolition of several buildings and a substantial length of concrete retaining wall. A substantial amount of earthwork would be required to accommodate the layover tracks near the same elevation as the adjacent main line tracks. A new interlocking would be required on Track 2 of the NEC.

Recommendation – Dismiss Alternative 18 from further consideration for the following reasons:

- **Residential land use exists directly adjacent to this site;**
- **The NEC main line is situated at a much lower elevation than the site; and**
- **The need for reverse running over an extended distance on the primarily inbound NEC Track 2 to enter the yard makes this layover alternative infeasible.**

[27] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

Alternative 19 – Lanesville Terrace

Alternative 19, Lanesville Terrace, is located in the Roslindale section of Boston on the southeast side of the MBTA Needham Line. The conceptual layover design would provide storage tracks for up to 10 consists parallel to the MBTA Needham Line. This concept is shown in Figure 48 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 19.

The following section describes the results of this alternative in the Tier 2 evaluation.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as LI, a Local Industrial Subdistrict. This site, although located in Roslindale, for zoning purposes is considered part of the Jamaica Plain Neighborhood District. Some current uses of this site include a self-storage facility, a catering company, an ice cream wholesale and retail business, a vibration isolation equipment manufacturer, cemetery monument manufacturers, and a gas station with food mart, car wash, and oil change facilities. According to Article 55 Section 18 of the Boston Zoning Code "The purpose of the Local Industrial Subdistricts is to encourage the preservation of the existing manufacturing and industrial base in a manner that is sensitive to and preserves the quality of life of the surrounding neighborhoods."[28] Accordingly, current and planned uses are not consistent with railroad use, although the MBTA Orange Line has a small layover yard adjacent to this site. Additionally, there are several residences adjacent to this site that may be negatively impacted.

B. Ability to Meet Location Requirements

There is no existing rail access to the site but it is adjacent to the MBTA Needham Line main lines tracks. The site is substantially higher in elevation than the main line. Rail access to this site from South Station would be direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with Amtrak and MBTA revenue trains, non-revenue moves required by Amtrak and the MBTA, and occasional freight traffic. There are no at-grade crossings along the route to this layover. Road access would be from Washington Street via Lanesville Terrace. The topography of the site is flat; however, the elevation difference between the site and the main line tracks is not favorable. Use of this site would likely require some widening the MBTA Needham Line tunnel under Washington Street as well as lowering the elevation of part of or the entire site closer to the main line elevation.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 5.5 track-miles and travel time would be an estimated 15 to 20 minutes. Rail access would be through a single yard lead off of the MBTA Needham Line, which is not optimal, and would require a below grade connection from MBTA Forest Hills Station. Additionally, a substantial incline from the main line to the proposed storage track elevation would be required if the site elevation is not dropped, requiring a longer lead track. This site also has main line impacts, given that it requires non-revenue trains to travel on the congested NEC between South Station and the MBTA Forest Hills Station, competing for capacity with revenue MBTA and Amtrak operations. Adding additional trains to the NEC would be detrimental to both MBTA and Amtrak operations along the line. Additionally, priority is typically given to revenue trains, thus layover trains could be sidelined and may experience longer than the estimated travel time range.

[28] City of Boston, Boston Redevelopment Authority. Zoning Code. *Article 55 – Jamaica Plan Neighborhood District, Section 18.* September 7, 1993. Available at: http://www.bostonredevelopmentauthority.org/pdf/ZoningCode/Article55.PDF

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present commercial/industrial land use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present in the building materials and/or fixtures that would require demolition at this site. A layover site in this location is not anticipated to have an adverse effect on natural resources. Residential land use exists directly adjacent to this site, however, no additional residential use is planned for this site or directly adjacent to this site. Noise and/or vibration mitigation measures may be required to address any moderate or severe impacts, if any, to adjacent residential land uses. According to the MassGIS Environmental Justice viewer,[29] this site is located within a designated environmental justice area for minority populations. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from a proposed layover site at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

E. Site Suitability

This approximately 10.7-acre site would require property acquisition of 23 privately owned parcels. This site would also require the use of approximately 1.8 acres of MBTA and publicly owned property. Use of this site would require displacement and relocation of many businesses including Roslindale Self Storage, Gourmet Caterers, Puritan Ice Cream, Kinetic Systems, Davis Monuments, Wellsmere Monumental Works, and Emporium Gas. Full acquisition of 23 parcels would be necessary which would be a major undertaking.

F. Capital Improvements

Construction at this site would require demolition of several buildings along with clearing of vegetation. Earthwork would be necessary to accommodate the layover tracks closer to the elevation of the adjacent main line tracks. A new interlocking would be required to gain rail access to the site via the Needham Line. Additionally, the MBTA Needham Line tunnel under Washington Street would need to be widened to accommodate the yard lead tracks.

Recommendation – Dismiss Alternative 19 from further consideration for the following reasons:

- **Residential land use exists directly adjacent to this site;**
- **Many existing businesses would be displaced by a layover site at this location;**
- **The MBTA Needham Line main line is situated at a much lower elevation than the site;**
- **The MBTA Needham Line tunnel under Washington Street would need to be widened; and,**
- **Adding trains to the NEC would be detrimental to MBTA and Amtrak operations.**

[29] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

Alternative 20 – Readville - Yard 2 (Existing Rail Facility)

Alternative 20, Readville - Yard 2, is located in the Readville section of Boston to the east of the MBTA Dorchester Branch. The conceptual layover design would provide eight additional storage tracks for total storage capacity of up to 18 consists adjacent to the MBTA Dorchester Branch. This concept is shown in Figure 49 provided in Attachment B. The following section describes the Tier 2 screening for Alternative 20.

The following section describes the results of this alternative in the Tier 2 evaluation.

A. Consistency with Adopted Plans and Zoning

The zoning of this site is identified by the BRA as LI-1, Local Industrial. An accessory railroad storage yard is an allowable use within the LI-1 Subdistrict. The site is currently used by the MBTA primarily as a railroad layover facility. Other uses of the site include the MBTA's rail equipment maintenance shop, welfare facilities for train crews, and railroad material storage. A review of Boston Zoning District Map 12 indicates that the site potentially abuts a Riverfront Protection Overlay District and a single-family residential subdistrict (1F-6000 Subdistrict, at Wolcott Court). The expansion of layover at Readville - Yard 2 would be consistent with the existing industrial use.

B. Ability to Meet Location Requirements

This site is an existing MBTA layover facility and has existing rail access via the MBTA Dorchester Branch. Rail access to this site from South Station is direct but not exclusive as trains traveling to the layover would need to compete for main line capacity with MBTA revenue trains and occasional freight traffic. There are no at-grade crossings along the route to this layover facility. Road access would be from an existing driveway at the intersection of Wolcott Court and Wolcott Street. The topography is favorable at this site for use as a layover area.

C. Railroad Operations

The distance by rail from South Station to the site is approximately 8.8 miles and travel time would be an estimated 15 to 20 minutes, which is a significant distance from South Station. Rail access would be via an existing yard lead connection to the MBTA Dorchester Branch at Dana Interlocking. Additional non-revenue movements to and from Readville - Yard 2 on the MBTA Dorchester Branch could impact current revenue operations as well as future service increases.

D. Environmental

Potential soil and groundwater contamination is likely present at this location due to past and present railroad/industrial use activities. Asbestos containing materials, lead-based paint, mercury, and PCBs among other contaminants may be present at this site. The expansion of layover functions in this location is not anticipated to have an adverse effect on natural resources. There is existing residential use directly adjacent to the southeast of this site. Noise and/or vibration mitigation measures may be required to address any moderate or severe impacts, if any, to adjacent residential land uses. According to the MassGIS Environmental Justice viewer,[30] this site is located within a designated environmental justice area for minority populations. With mitigation (if required), it is anticipated that no disproportionate environmental justice impacts would result from an increase in layover capacity at this location. Additional environmental analyses would be required if this site is selected to advance for further evaluation.

[30] Commonwealth of Massachusetts *Office of Geographic Information* (MassGIS) *Environmental Justice Viewer*. Accessed January 7, 2013 at http://maps.massgis.state.ma.us/map_ol/ej.php

E. Site Suitability

This approximately 17.4-acre site would use existing MBTA property and no additional property acquisition or relocation would be necessary for the increased layover capacity at this location. Formerly used as a rail yard by predecessor railroads, the topography, shape and size of the site lend itself well for use a layover site. In order to expand this site to allow for construction of additional tracks, some railroad track materials will need to be relocated.

F. Capital Improvements

Construction of the additional tracks at this site would require slope stabilization or a retaining wall along the bank of the Neponset River at the north end of the yard. No major demolition, clearing or earthwork would be required to build the additional eight tracks at this site.

Recommendation – Advance Alternative 20 for further evaluation and concept refinement.

- **While its distance from South Station could pose operational constraints and would increase operating costs, this site is an existing rail facility currently owned by the MBTA;**
- **Relative to other sites, minimal site work is required to increase layover capacity of this site;**
- **No additional property acquisition or relocation required; and**
- **Topography of this site is favorable for layover purposes.**

5.3.3. Tier 2 Screening Summary

Of the 10 locations recommended for further evaluation from the Tier 1 screening, seven locations were eliminated in the Tier 2 screening based on the Tier 2 screening evaluation criteria. All alternatives were compared to the six Tier 2 evaluation criteria: consistency with adopted plans and zoning, ability to meet location requirements, railroad operations, environmental impacts, site suitability and capital improvements. Those that best met the criteria will advance to the environmental review process. Those that did not perform well when compared to these criteria were removed from further consideration. Table 9 provides the results of the Tier 2 screening evaluation.

Table 9 Results of the Tier 2 Screening Evaluation

Alternative Site	Tier 2 Screening Criteria						Recommendation
	A. Consistency with Adopted Plans/Zoning	B. Ability to Meet Location Requirements	C. Railroad Operations	D. Environmental Impacts	E. Site Suitability	F. Capital Improvements Required	
1. Commuter Rail Maintenance Facility	Unfavorable	Neutral	Unfavorable	Neutral	Neutral	Unfavorable	**Dismiss**
2. Beacon Park Yard	Favorable	Favorable	Neutral	Favorable	Favorable	Favorable	**Advance**
3. Cold Storage	Neutral	Favorable	Neutral	Favorable	Unfavorable	Unfavorable	**Dismiss**
5. BTD Tow Lot	Neutral	Favorable	Favorable	Favorable	Unfavorable	Neutral	**Advance**
10. Amtrak Southampton Street Service & Inspection – West	Neutral	Unfavorable	Neutral	Favorable	Unfavorable	Neutral	**Dismiss**
11. Dorchester Avenue	Neutral	Neutral	Neutral	Favorable	Unfavorable	Unfavorable	**Dismiss**
17. NSTAR	Unfavorable	Neutral	Neutral	Neutral	Unfavorable	Unfavorable	**Dismiss**
18. Forest Hills	Unfavorable	Neutral	Unfavorable	Neutral	Neutral	Unfavorable	**Dismiss**
19. Lanesville Terrace	Unfavorable	Neutral	Unfavorable	Neutral	Unfavorable	Unfavorable	**Dismiss**
20. Readville - Yard 2	Favorable	Neutral	Unfavorable	Favorable	Favorable	Favorable	**Advance**

The following seven sites will not advance for further consideration:

- Alternative 1 – Commuter Rail Maintenance Facility
- Alternative 3 – Cold Storage; and
- Alternative 10 – Amtrak Southampton Street Service & Inspection – West
- Alternative 11 – Dorchester Avenue
- Alternative 17 – NSTAR
- Alternative 18 – Forest Hills
- Alternative 19 – Lanesville Terrace

The following three sites are recommended to advance for further evaluation and concept refinement during the environmental review process:

- Alternative 2 – Beacon Park Yard
- Alternative 5 – BTD Tow Lot
- Alternative 20 – Readville - Yard 2

5.4. Screening Summary

The two-tiered screening process used to assess candidate layover sites followed several steps, as documented in this chapter. The initial, or Tier 1 screening, evaluated the ability of each site to meet the overarching transportation and program objectives for the 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 Tier 2 evaluation.

The Tier 2 screening process involved developing conceptual designs, developing preliminary operating plans, and identifying infrastructure requirements. Of the 10 candidate sites from the Tier 1 screening, three locations were identified as having the ability to best meet the needs of the South Station project and are recommended to move forward into the environmental review phase of the project:

- Alternative 2 – Beacon Park Yard
- Alternative 5 – BTD Tow Lot
- Alternative 20 – Readville - Yard 2

The concept plans prepared in the Tier 2 screening determined that no single remaining alternative has the physical space needed to fulfill the entire layover need in the year 2040. This analysis also determined that layover of too many trainsets approaching South Station from one location could cause conflicting railroad operations and create a bottleneck. Thus, the next phase of the layover assessment will include evaluating combinations of the three recommended sites to test how they integrate with the existing four layover sites serving South Station. This involves refining the concept plan for each site and developing rail operations plans to determine the alternative that will best meet the needs of this project.

6. Conclusions and Next Steps

The primary goal of this analysis was to identify potential locations for a new layover site or a combination of new sites to resolve inadequate existing and future layover capacity for South Station railroad operations. Of the initial 28 alternatives identified as having potential for layover to serve South Station, the following three sites are recommended for further evaluation in the environmental review phase of the project:

- **Alternative 2 – Beacon Park Yard** (Figures 13 and 41). The Beacon Park Yard site is located along Cambridge Street in the Allston section of Boston between the I-90 Massachusetts Turnpike Allston Toll Plaza and the MBTA Framingham/Worcester Line. This 22.4-acre site is approximately 3.8 track-miles from South Station.
- **Alternative 5 – BTD Tow Lot** (Figures 17 and 43). The BTD Tow Lot site is located along Frontage Road in Boston. The approximately 10.9-acre site is located on the MBTA Dorchester Branch, approximately 0.9 track-mile from South Station.
- **Alternative 20 – Readville - Yard 2** (Figures 33 and 49). The Readville - Yard 2 site is the location of the existing MBTA Readville layover facility located primarily at 50 Wolcott Court in Readville. The approximately 17.4-acre site is located on the MBTA Dorchester Branch, approximately 8.8 track-miles from South Station. While its distance from South Station is less desirable and would increase operating costs, this site is an existing MBTA-owned rail facility and would not require acquisition or relocation of residential property or private businesses.

These three potential layover site locations meet the project's goals and objectives when measured against operational needs, property requirements, potential environmental benefits and impacts, consistency with local planning, and capital improvements. The next phase of analysis, the environmental review process, will thoroughly examine different combinations of the three remaining alternatives that could meet the existing and future layover needs for the South Station expansion. This phase of review and analysis will include the development of:

- Refined conceptual plans;
- A phasing plan that addresses sequencing and timing of the three sites based on operational need;
- Conceptual operating plans;
- Capital, operations and maintenance cost estimates; and
- Identification of potential environmental impacts.

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Attachment A Tier 1 Alternatives – Figures

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Figure 12 Commuter Rail Maintenance Facility – Alternative 1

Figure 12: **Commuter Rail Maintenance Facility**
Alternative 1

SOUTH STATION EXPANSION

Layover Facility Alternatives Analysis

Figure 13 Beacon Park Yard – Alternative 2

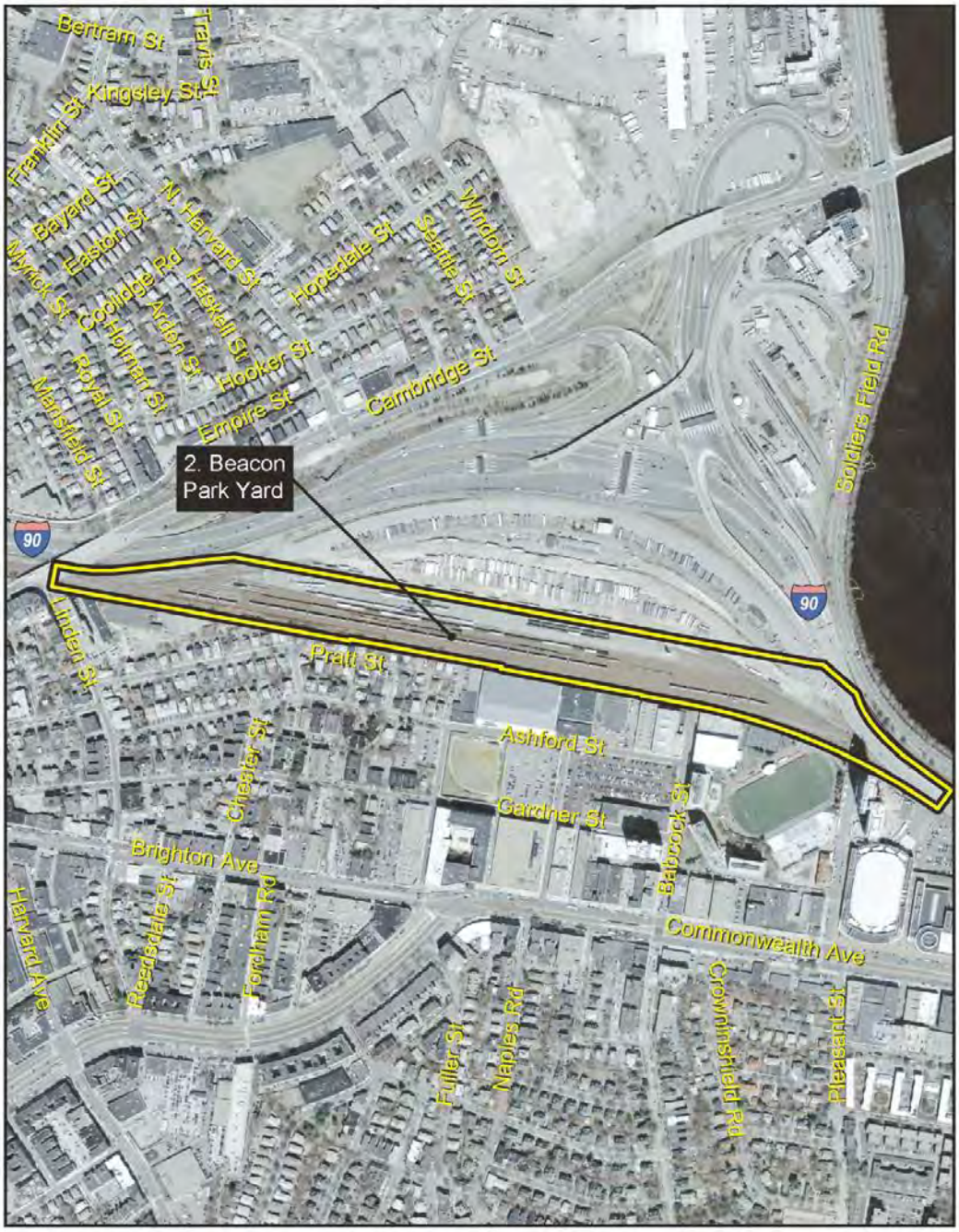

Figure 13: **Beacon Park Yard**
Alternative 2

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 14 Cold Storage – Alternative 3

Figure 14: **Cold Storage**
Alternative 3

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 15 Widett Circle – Alternative 4

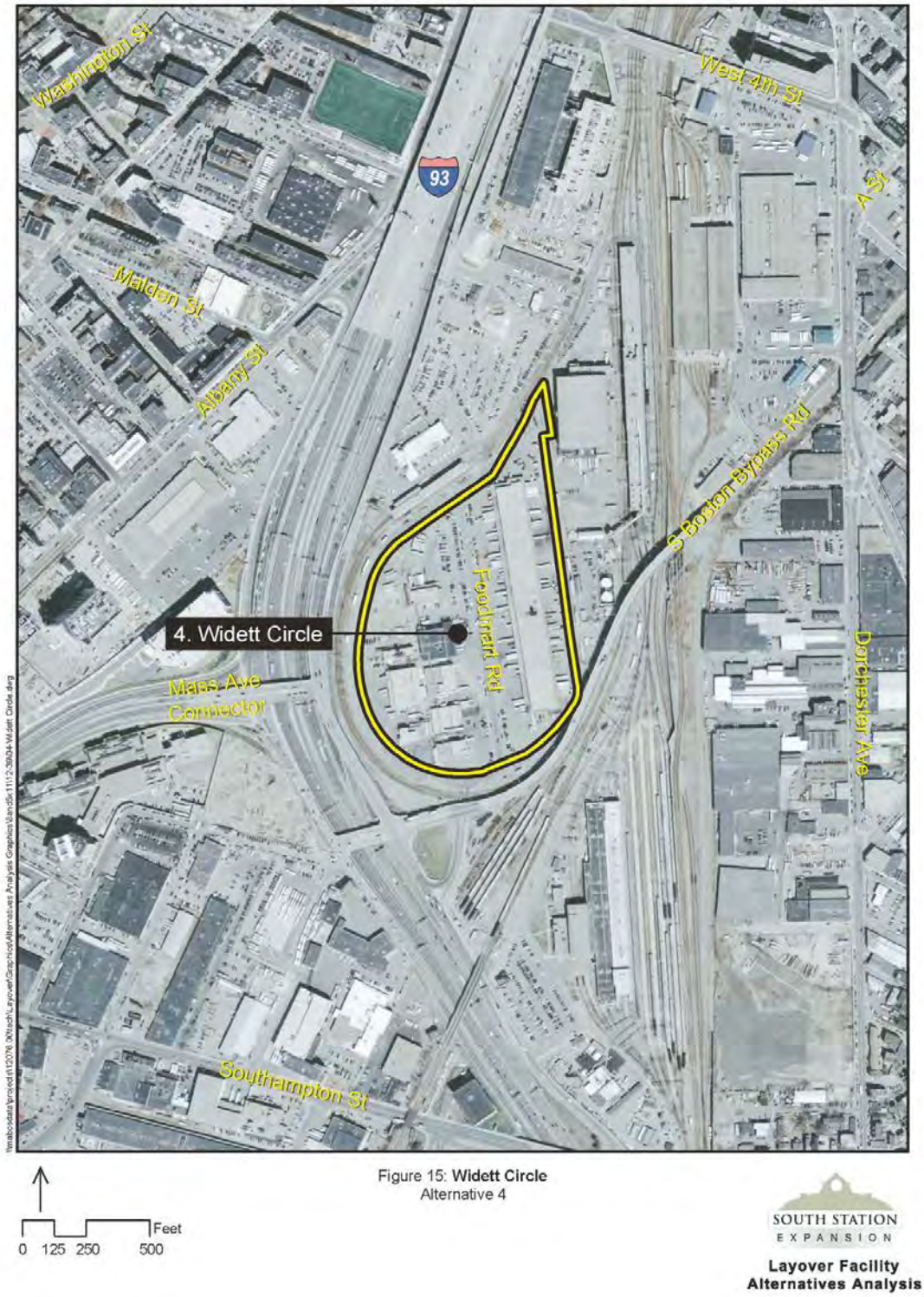

Figure 16 Foodmart Road – Alternative 4A

Figure 16: **Foodmart Road**
Alternative 4A

Figure 17 Boston Transportation Department Tow Lot– Alternative 5

Figure 17: **Boston Transportation Department Tow Lot**
Alternative 5

Figure 18 Cabot Yard Red Line – Alternative 6

Figure 18: **Cabot Yard Red Line**
Alternative 6

Figure 19 Cabot Yard Bus Facility – Alternative 7

Figure 19: **Cabot Yard Bus Facility**
Alternative 7

Figure 20 Boston Department of Public Works – Alternative 8

Figure 21 Amtrak Southampton Street Service & Inspection – Alternative 9

Figure 21: **Amtrak Southampton Street Service & Inspection**
Alternative 9

Figure 22 Amtrak Southampton Street Service & Inspection - West – Alternative 10

Figure 22: **Amtrak Southampton Street Service & Inspection-West**
Alternative 10

Figure 23 Amtrak Front Yard – Alternative 10A

Figure 23: **Amtrak Front Yard**
Alternative 10A

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 24 Dorchester Avenue – Alternative 11

Figure 24: **Dorchester Avenue**
Alternative 11

Figure 25 Von Hillern Street – Alternative 12

Figure 25: **Von Hillern Street**
Alternative 12

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 26 Boston Globe – Alternative 13

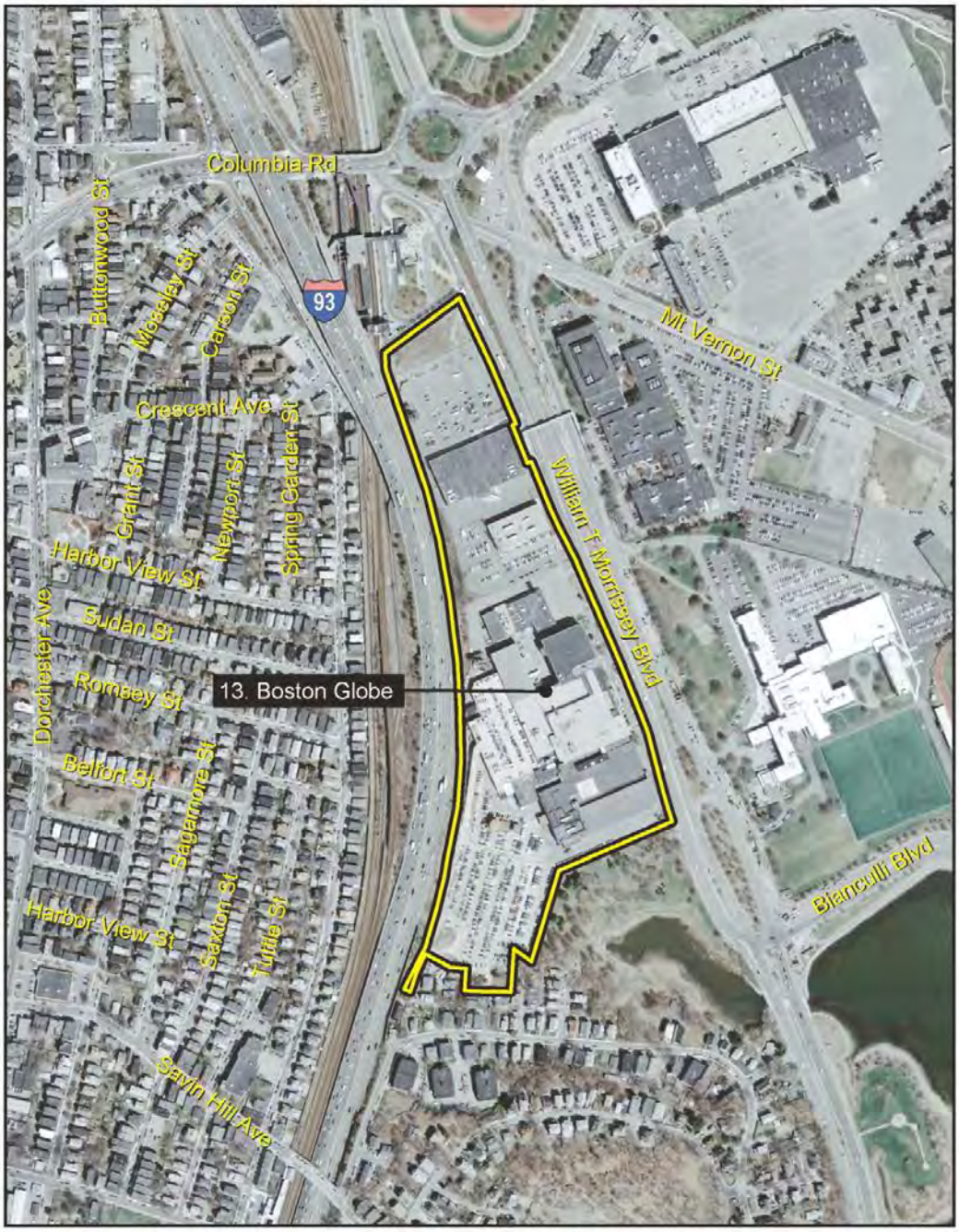

Figure 26: **Boston Globe**
Alternative 13

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 27 Freeport Way – Alternative 14

Figure 27: **Freeport Way**
Alternative 14

Figure 28 Freeport Street – Alternative 15

Figure 28: **Freeport Street**
Alternative 15

Figure 29 Victory Road – Alternative 16

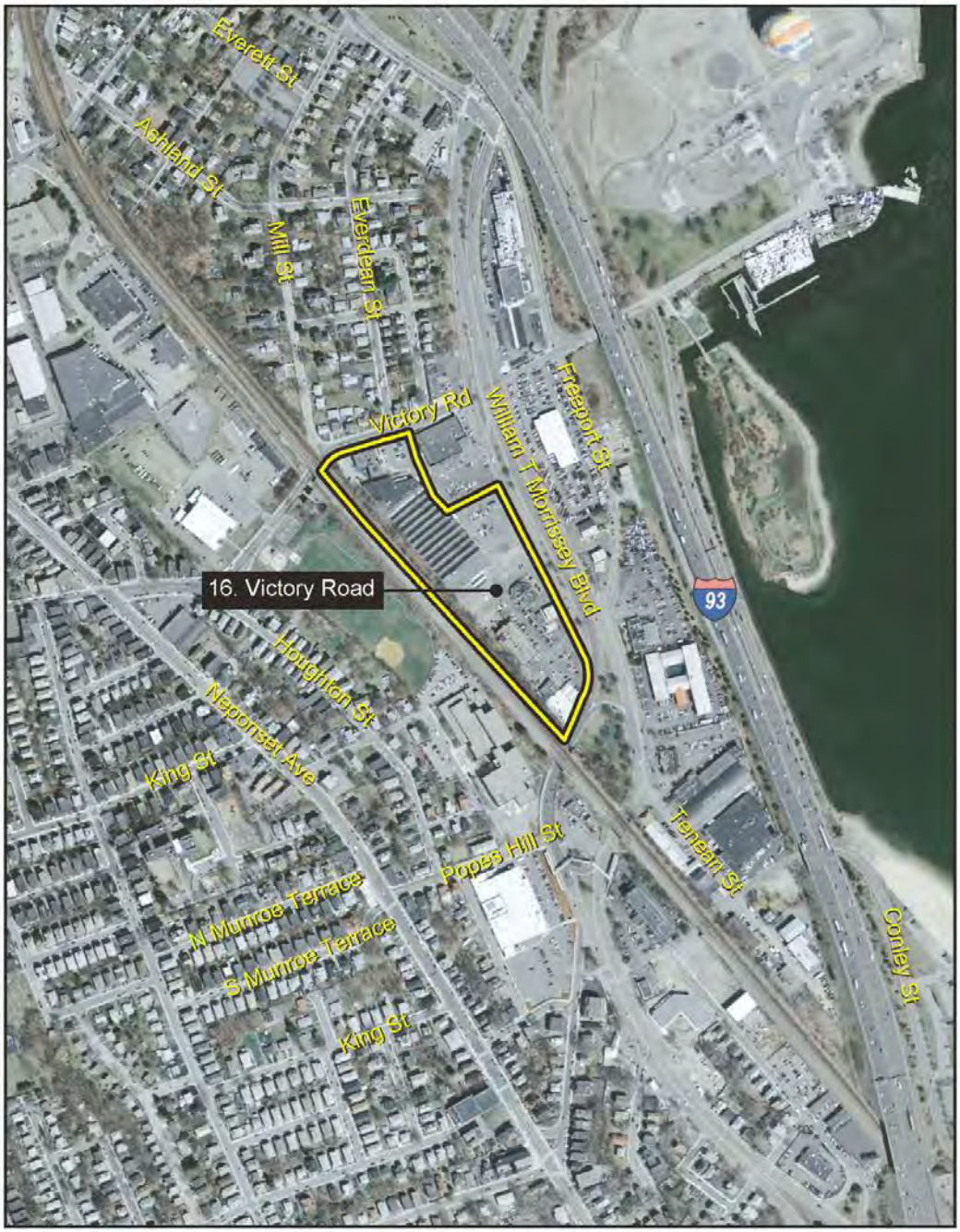

Figure 29: **Victory Road**
Alternative 16

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 30 NSTAR – Alternative 17

Figure 30: **NSTAR**
Alternative 17

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 31 Forest Hills – Alternative 18

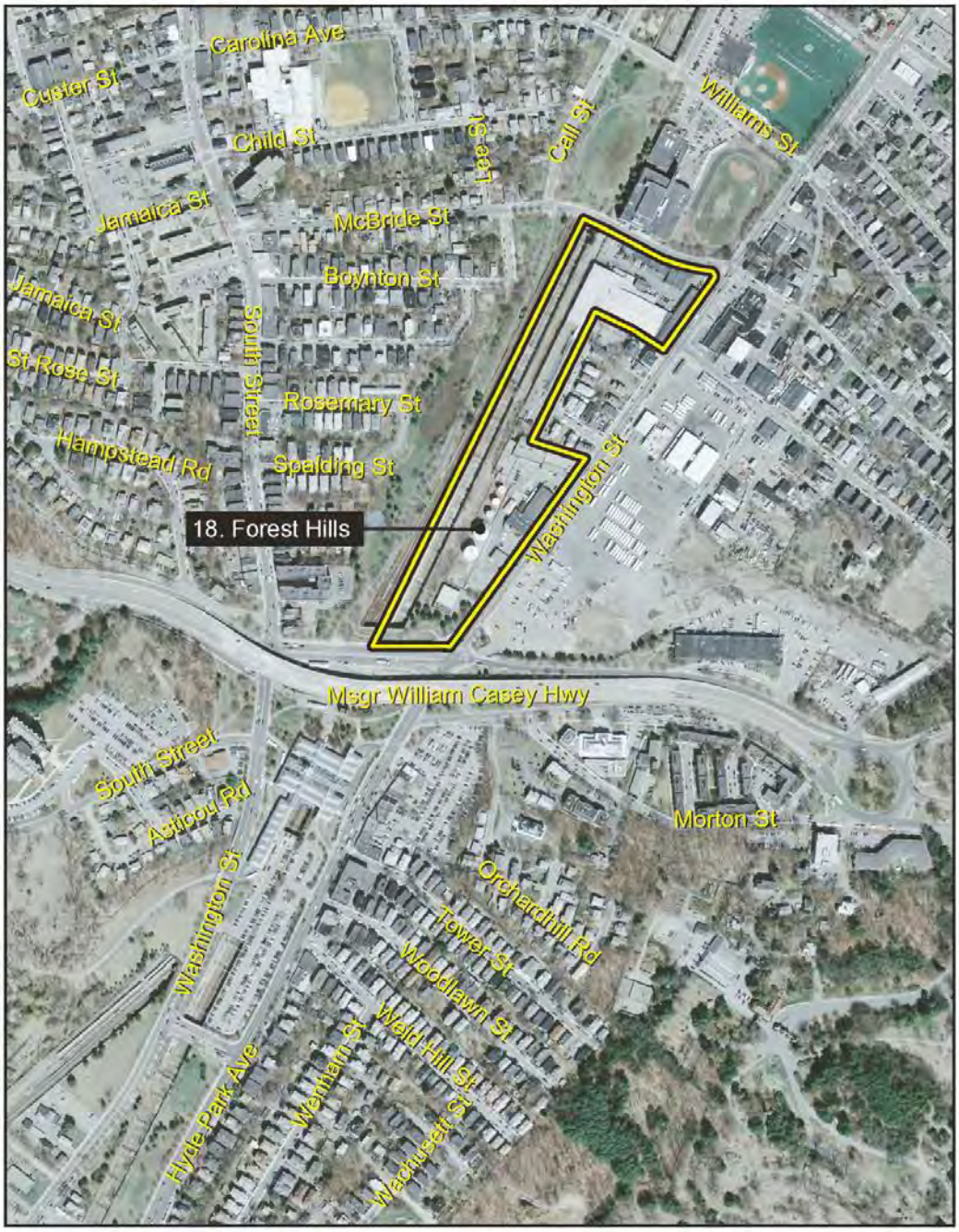

Figure 31: **Forest Hills**
Alternative 18

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 32 Lanesville Terrace – Alternative 19

Figure 32: **Lanesville Terrace**
Alternative 19

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 33 Readville - Yard 2 – Alternative 20

Figure 33: **Readville-Yard 2**
Alternative 20

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 34 Readville - Yard 5 – Alternative 20A

Figure 34: **Readville-Yard 5**
Alternative 20A

Figure 35 Readville - Yard 1 – Alternative 20B

Figure 35: **Readville-Yard 1**
Alternative 20B

Figure 36 Arborway Bus Facility – Alternative 21

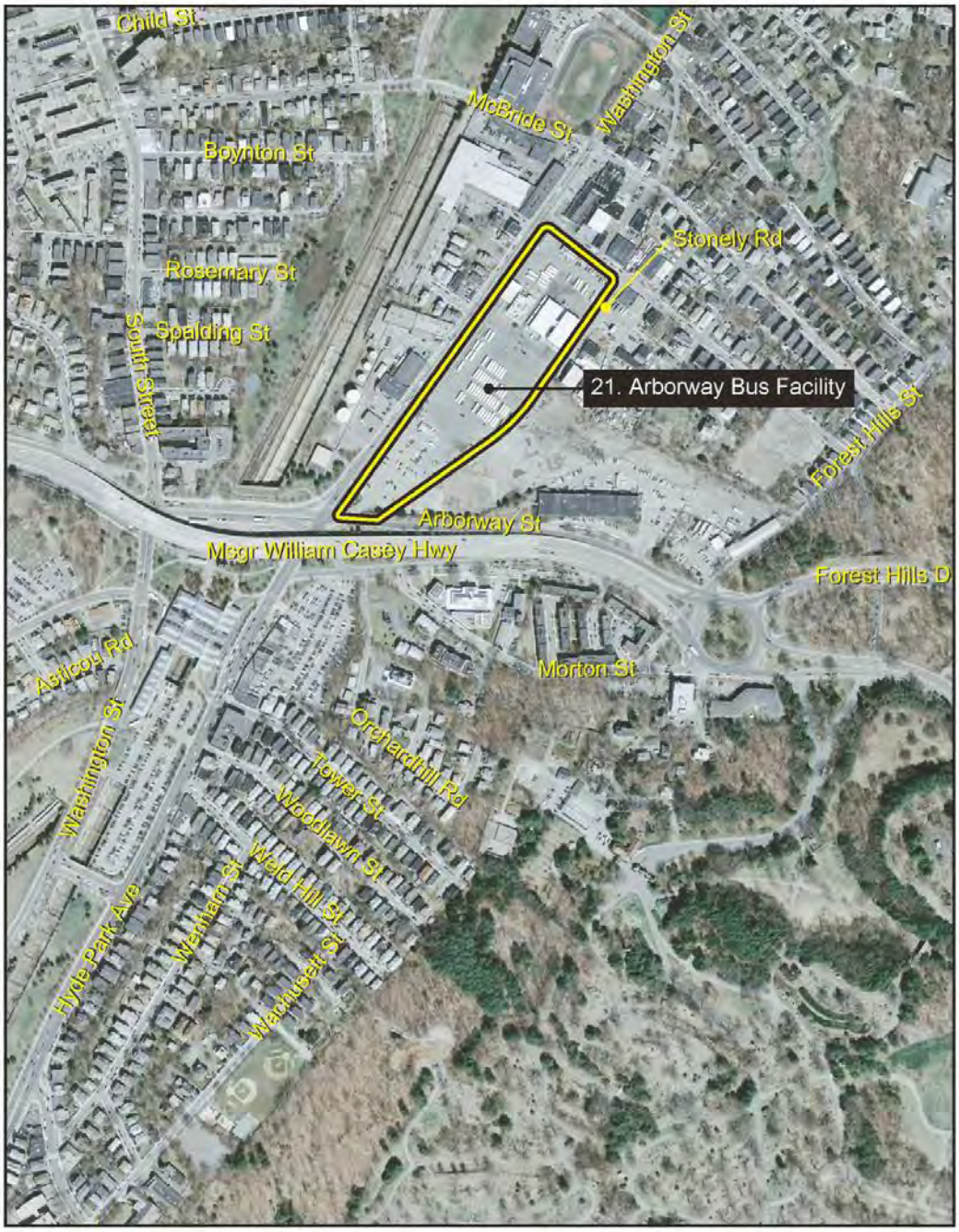

Figure 36: **Arborway Bus Facility**
Alternative 21

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 37 Arborway MBTA Design & Construction Building – Alternative 22

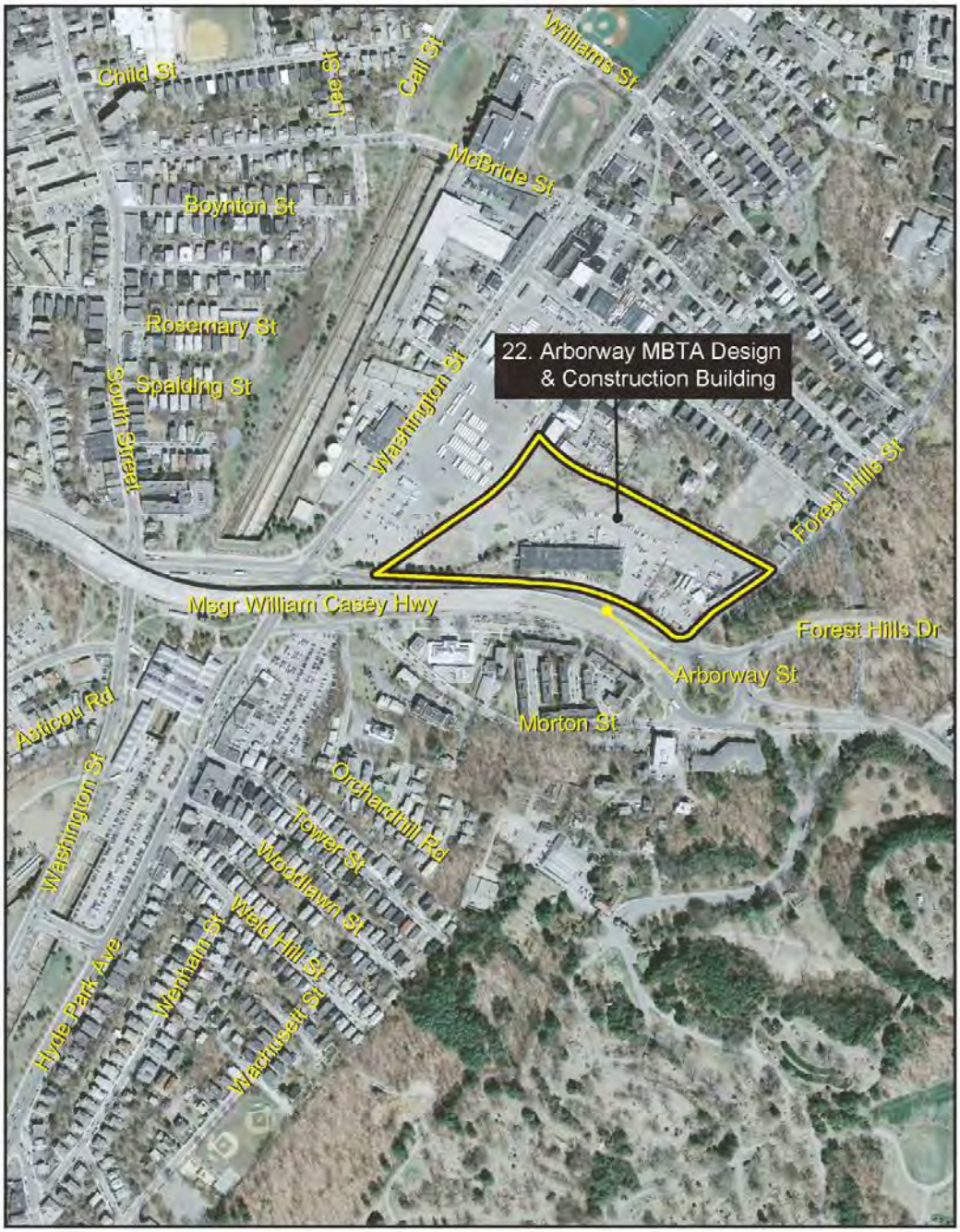

Figure 37: **Arborway MBTA Design & Construction Building**
Alternative 22

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 38 D Street – Alternative 23

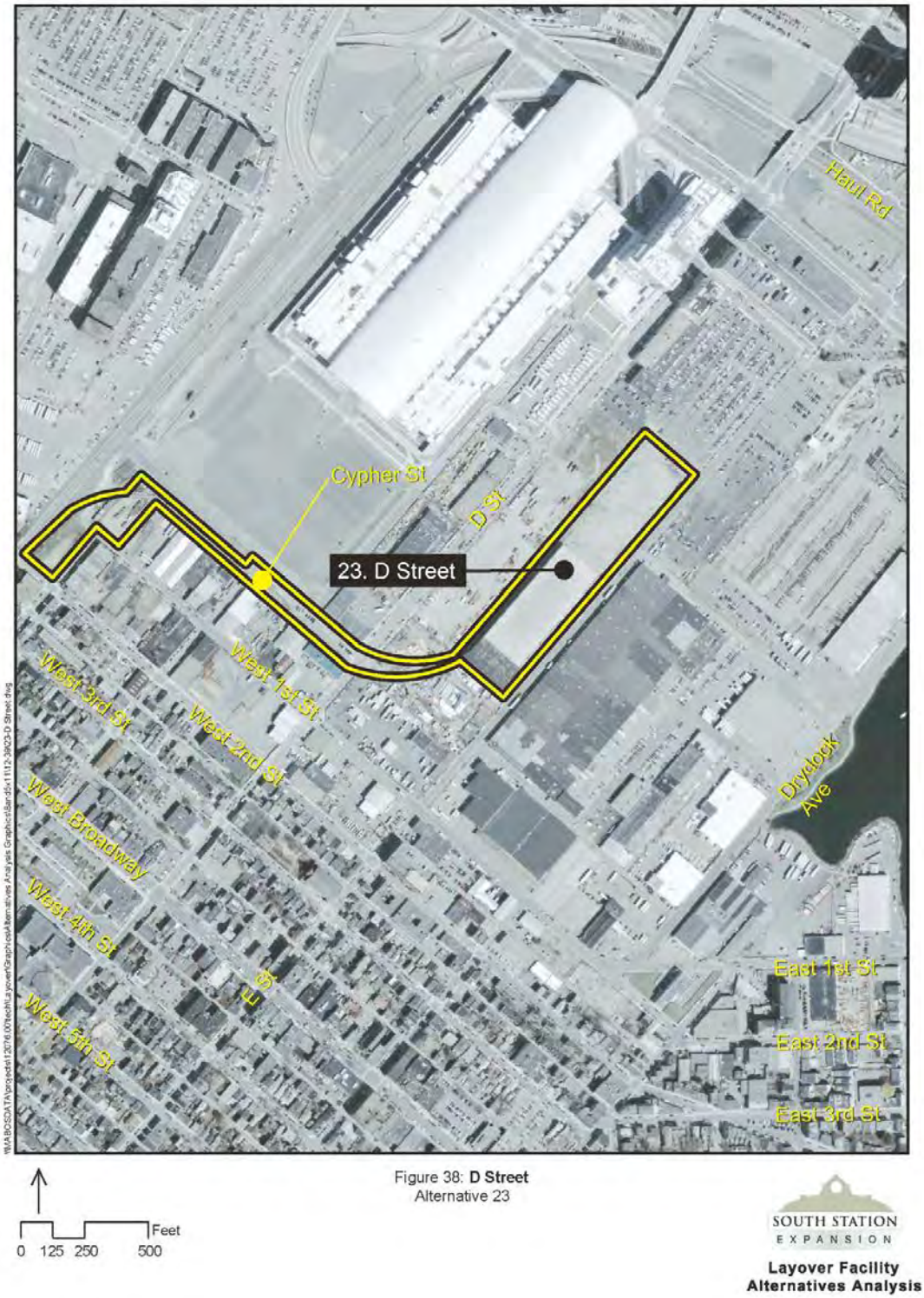

Figure 39 A Street – Alternative 24

Attachment B Tier 2 Alternatives - Figures

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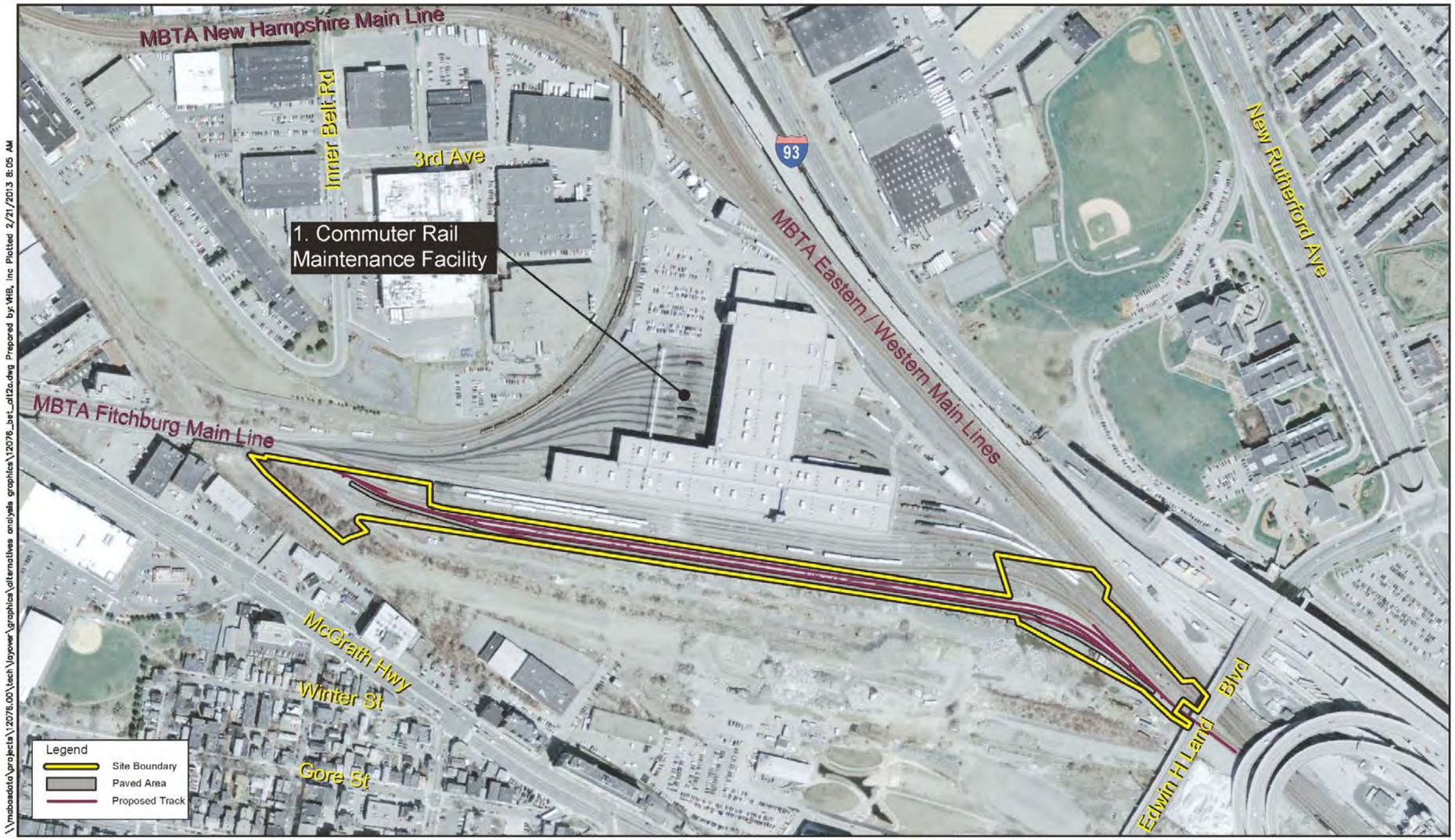
Figure 40 Commuter Rail Maintenance Facility – Alternative 1



Train Capacity Summary Chart	
8-CAR TRAINS AND 1 LOCOMOTIVE	6

Figure 40: **Commuter Rail Maintenance Facility**
Alternative 1

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 41 Beacon Park Yard – Alternative 2

Train Capacity Summary Chart	
8-Car Trains and 1 Locomotive	30

Figure 41: **Beacon Park Yard**
Alternative 2

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 42 Cold Storage – Alternative 3

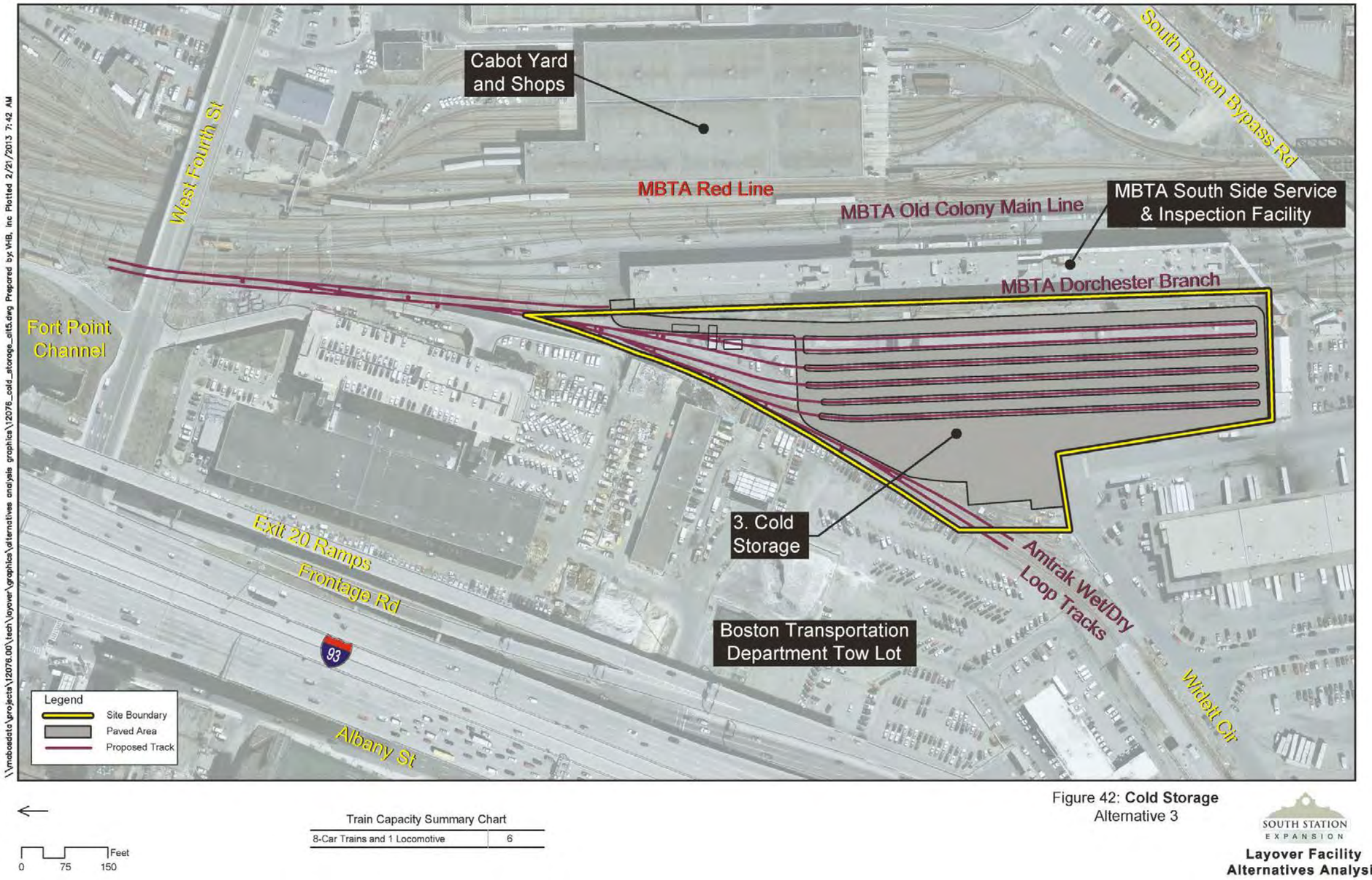


Figure 42: **Cold Storage**
Alternative 3

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 43 Boston Transportation Department Tow Lot – Alternative 5

Train Capacity Summary Chart

8-Car Trains and 1 Locomotive	10

0 37.5 75 150 Feet

Figure 43: **Boston Transportation Department Tow Lot**
Alternative 5

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 44 Amtrak Southampton Street Service & Inspection West – Alternative 10

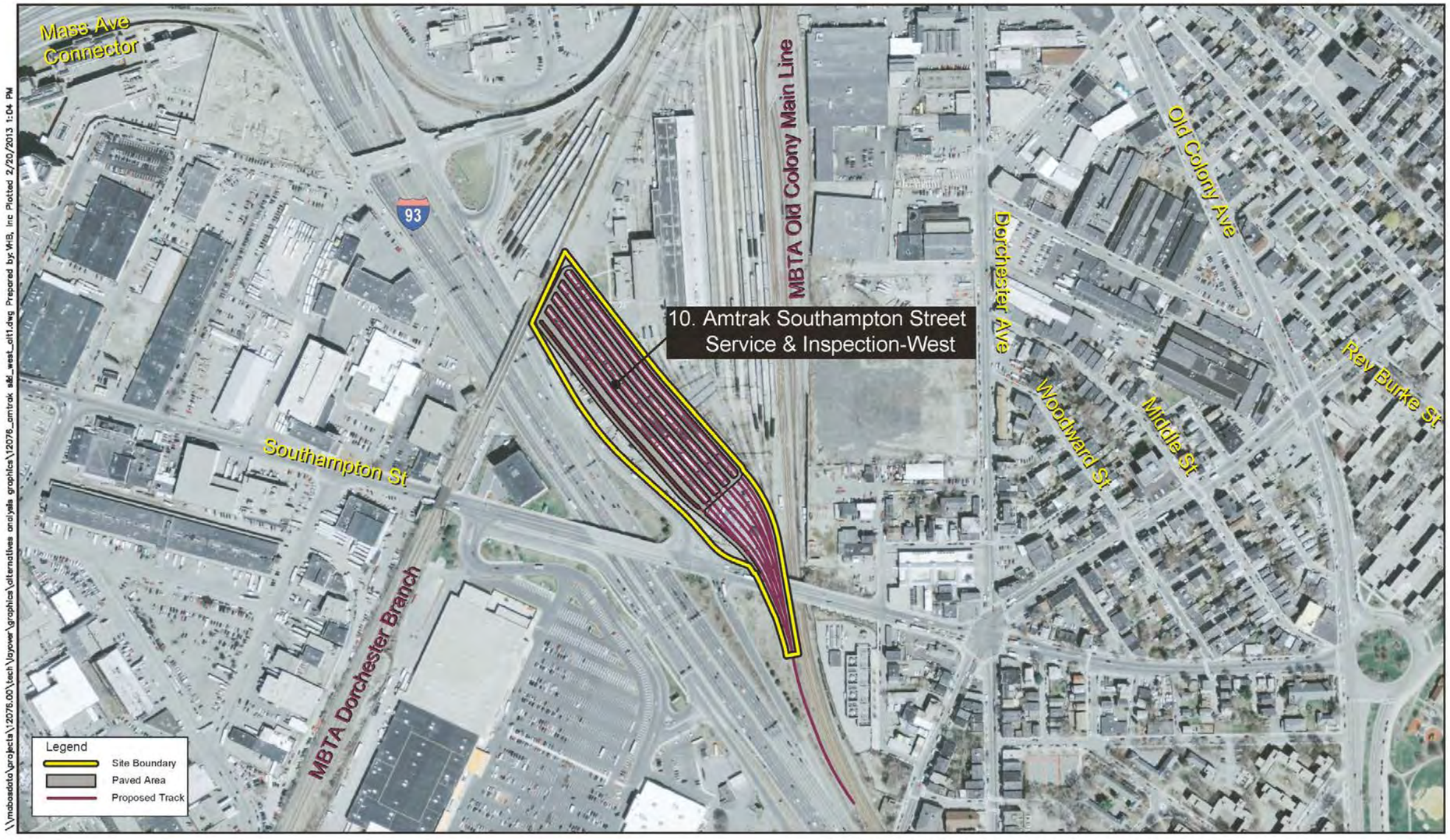


Figure 45 Dorchester Avenue – Alternative 11

Train Capacity Summary Chart

8-Car Trains and 1 Locomotive	38

0 125 250 500 Feet

Figure 45: **Dorchester Avenue**
Alternative 11

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 46 NSTAR – Alternative 17

Figure 47 Forest Hills – Alternative 18

Train Capacity Summary Chart

8-Car Trains and 1 Locomotive	5

Figure 47: **Forest Hills**
Alternative 18

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 48 Lanesville Terrace – Alternative 19

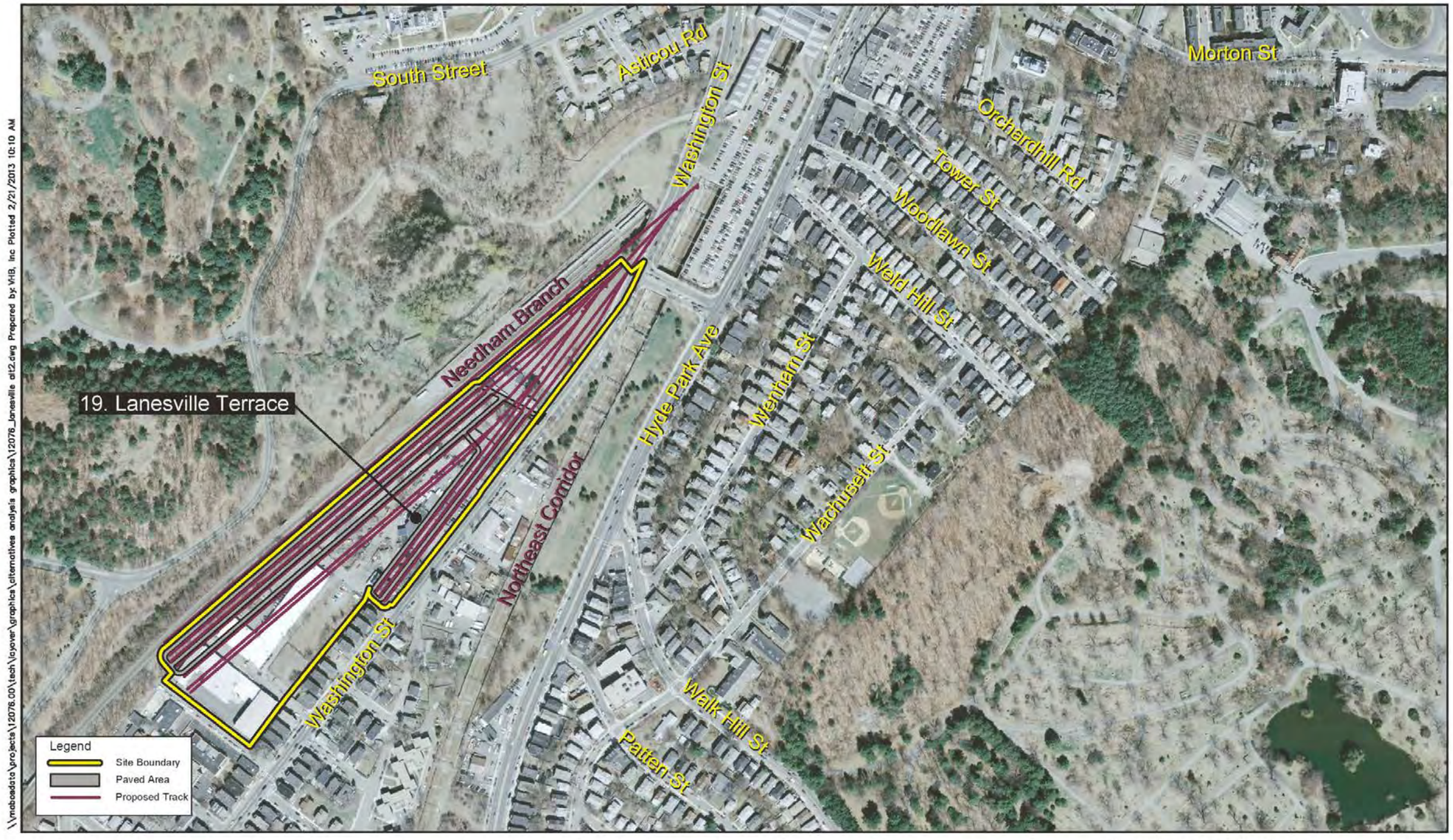
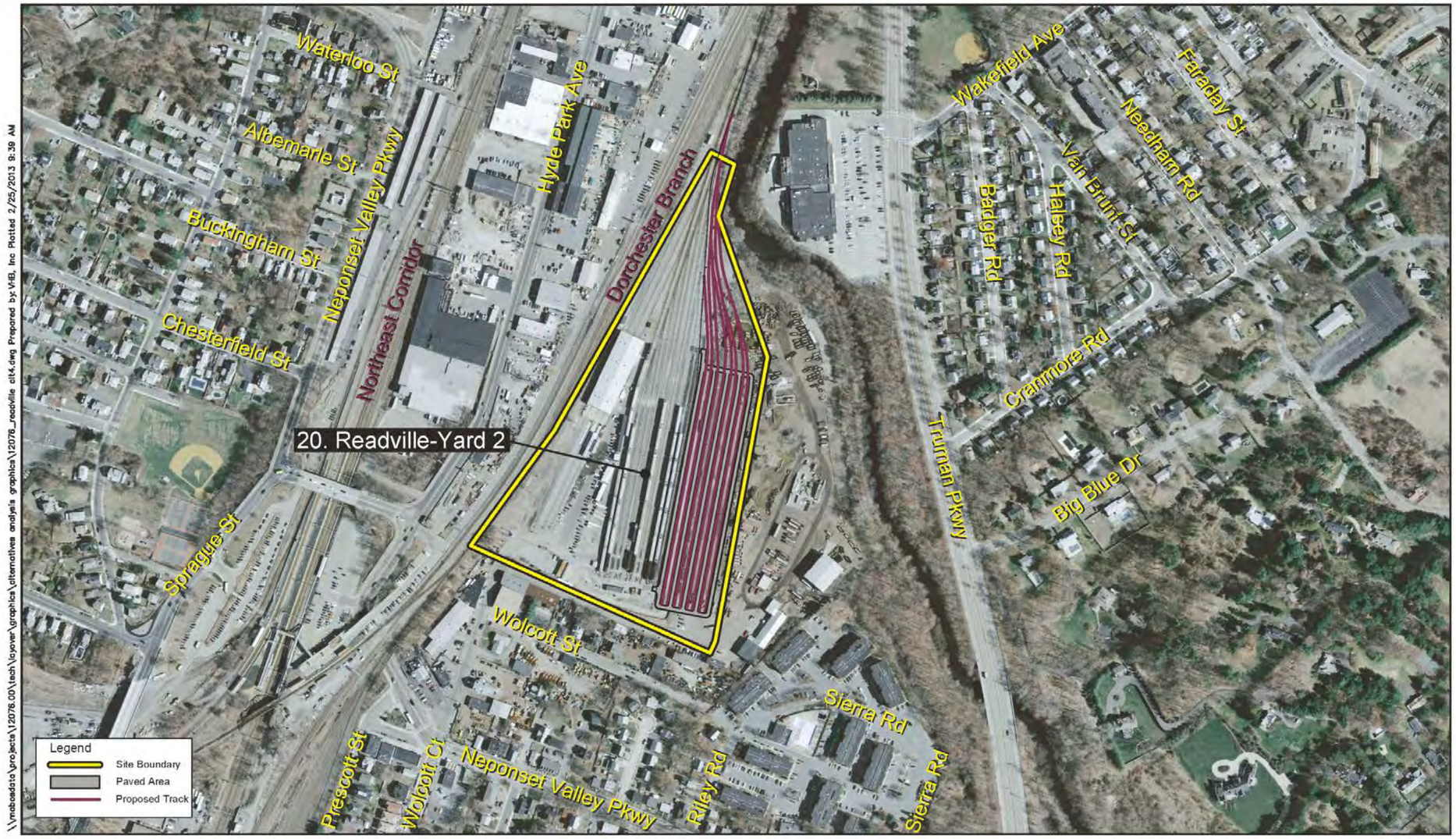


Figure 48: **Lanesville Terrace**
Alternative 19

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Figure 49 Readville - Yard 2 – Alternative 20



Train Capacity Summary Chart

8-Car Trains and 1 Locomotive, Existing	10
8-Car Trains and 1 Locomotive, Proposed	8

Figure 49: **Readville-Yard 2**
Alternative 20

SOUTH STATION EXPANSION
Layover Facility Alternatives Analysis

Attachment C Layover Design Guidelines

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Layover Design Guidelines

This chapter describes the general guidelines used in the site selection process of a new passenger rail layover site. These guidelines have been established based on communications and documentation of existing Amtrak and MBTA layover operations. Layover sites serve two main purposes:

- Provide an area to store trains and stage them for the next revenue run, and;
- Provide an area to service, inspect and perform minor repairs of railroad equipment.

This chapter describes the typical guidelines for layover sites including: location guidelines; service, inspection and maintenance guidelines; rail yard guidelines; and operational guidelines.

Location Guidelines

There are several variables to analyze when considering the optimal location of a proposed layover site. Some of these variables have a potential to play a major role in the overall efficiency of Amtrak's and/or the MBTA's daily operations. These variables include, but are not limited to, the following:

- **Main Line Rail Access**: The new layover site shall be directly accessible from a main line track to provide the most efficient operation of train movements to and from layover. Yard lead tracks should be long enough to accommodate switching movements (such as rearranging car order in a layover yard) without fouling[31] the main running tracks. Rail access routes that would require public or private at-grade crossings or that would traverse sensitive areas are also to be avoided, to the greatest extent possible. Routes that entail tight curves or other operating conditions that restrict train movements or create undesirable impacts on adjacent land uses should also be avoided to the greatest extent possible.
- **Roadway Site Access:** The new layover site shall be accessible to commercial and emergency service vehicles as well as accessible to employees who will work at, or report to this site. Commercial vehicles need access to deliver supplies such as fuel, oil, parts, food, parcels, and oversized shipments.
- **Proximity to South Station:** Trains traveling to or from the layover sites deadhead to and from South Station.[32] Deadhead distance should be minimized to reduce congestion on main lines, wear and tear on equipment and infrastructure, crew time and operating costs. The distance and/or time it takes a train and crew to deadhead to and from South Station will have an impact on operations and maintenance (O&M) costs for the life of the project. Sites within four track-miles are preferred.
- **Site Characteristics:** The site must accommodate multiple trains on parallel tracks. A level site is a necessity for any tracks where trains will be staged. Rectangular or elongated sites are preferred. In addition to the tracks, the site may also need to accommodate features such as buildings, circulation roads, stormwater runoff infrastructure, power substation, parking, and storage.

[31] Fouling a track is a railroad industry term used to describe the placement of an individual or an item of equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment, or within a pre-determined distance from the nearest running track.

[32] Deadheading is a railroad industry term used for the movement of revenue equipment in a non-revenue mode. Deadheading is used to shift equipment and/or crews between locations when they are not in revenue service.

- **Environmental Elements:** Depending on the location of the layover site and the nature of nearby land uses, it may be necessary to provide a noise barrier and/or visual screen of the yard along one or multiple sides. Additionally, if train service and/or fueling are conducted at a site, recovery/containment systems are required to provide a means of collecting fluids that may be spilled to prevent potential pollution of the surrounding environment. An on-site treatment facility may also be provided in combination with the recovery/containment system to process, treat, and/or discharge the wastes in accordance with applicable environmental regulations and permits. Layover sites require that stormwater management practices are conducted in accordance with applicable environmental regulations. Typical stormwater management practices required at a layover site may include a detention basin and an oil/water separator tank. All of the aforementioned environmental elements are anticipated to support layover sites for Amtrak and the MBTA in the vicinity of South Station.

Railroad Equipment Service Guidelines

Railroad equipment requires service, inspection, running repairs, and maintenance on a regular basis. The nature of the requirements to keep railroad equipment operating safely and efficiently vary greatly and can be federally mandated or based on industry standards, manufacturer guidelines and/or railroad policy. Layover sites provide a number of functions beyond the temporary storage of trains when they are out of revenue service. Facilities must be properly designed and equipped to perform several other train service and inspection functions. In some cases more than one location is required for a railroad to adequately support its operations. For the purposes of this study, it is assumed that both Amtrak and MBTA will continue to operate layover and other support areas in close proximity to South Station to complete these support functions, including:

- **Equipment inspection:** Title 49 of the Code of Federal Regulations (CFR) Part 238,[33] requires new brake inspections and added requirements for maintaining brake system pressurization for parked trains. The brake system pressurization requirement mandates re-testing of the brakes if the brake system is disconnected from a source of compressed air for more than four hours. Yard air systems are needed to allow locomotives to be shut down during layover.

  The FRA brake inspection requirements contained in 49 CFR Part 238 also require brake systems be visually inspected for proper application. While the condition of some coach brake systems may be verified visually from grade level to insure proper application, the increasing use of inboard brakes requires inspection from within the gauge of the track, under the car. This has often been accomplished through provision of an inspection pit running the full length of a train. Alternatively a shorter pit can be used with the inspections occurring as the trains roll slowly over the pit. The inspection pit must be equipped with adequate lighting and drainage, with provision for drainage to be carried into a spill containment system. Remote inspection systems, which accomplish some aspects of this task without use of an inspection pit, have been implemented by other railroads as an industry standard which Amtrak and/or MBTA may elect to adopt for use in their respective facilities in the future. The MBTA's policy for servicing and maintaining its commuter rail fleet adheres to these three factors: MBTA guidelines to inspect and maintain the equipment to a state of good repair and reliability;

- The manufacturer's service and maintenance guidelines ("owner's manual"); and

- All applicable federal regulations including Part 229 Railroad Locomotive Safety Standards[34] and Part 238 Passenger Equipment Safety Standards, both of which are detailed in Title 49 of the CFR.

It is assumed that Amtrak maintains a similar policy for servicing and maintaining its fleet of equipment.

- **Running repairs:** Running repair consists of minor maintenance that can be accomplished in the time available during a scheduled train layover. Typical running repair activities include replacement of lights, brake shoes, air hoses, and HVAC system components as well as fixing jammed doors, and patching of seats. Running repairs also include checking and topping off fluids as needed to support train consists.

[33] Federal Railroad Administration, Department of Transportation. Title 49 Code of Federal Regulations Part 238 – *Passenger Equipment Safety Standards*. November 1, 2011. Accessed at: http://www.gpo.gov
[34] Federal Railroad Administration, Department of Transportation. Title 49 Code of Federal Regulations Part 229 – *Railroad Locomotive Safety Standards*. April 9, 2012. Accessed at: http://www.gpo.gov

- **Interior cleaning:** During layover periods, the interior of each vehicle is picked up and any trash is removed. Lost and abandoned items are removed and sent to a lost and found facility. Cleaning of the coaches can be performed in the Service and Inspection building or in the layover yard itself. In general, it is preferred that cleaning takes place inside the Service and Inspection building, in a controlled environment, with high level platform access to the coaches.
- **Food service and preparation:** There are no dining services provided on MBTA commuter rail trains; however Amtrak currently supplies the food and meals for their café cars at the Southampton Street Yard Maintenance facility. This function is currently performed in a standalone building with good vehicular access for deliveries and for supplying provisions to the coach café cars.
- **Equipment and material storage areas:** Because light maintenance and cleaning are conducted during layover periods, a secure location for the storage of supplies and spare parts is needed. Separate storage areas should be considered for support of the site itself, such as paper products, office supplies, snow equipment, cleaning equipment and restroom supplies. Storage areas must adequately store equipment and materials required to support the operation and maintenance activities conducted by the various crews at each layover location.

Table 10 Functions by Facility Type

Frequency	Function	Facility Type		
		Layover	**Service and Inspection**	**Maintenance**
Daily	Calendar Day Mechanical Inspection *	●		
	Cleaning Service *	●		
	Storage of Consists*	●		
	Food Service and Preparation	●		
	Fueling Service		●	
	Sanding Service		●	
Bi-Weekly (10-14 days)	Septic Flushing Service		●	
	Watering Service		●	
	Washing Service		●	
	Running Repairs	●	●	●
Quarterly (92 days)	Inspection and Repair		●	●
Semi-annual (184 days)	Inspection and Repair		●	●
Annual (368 days), Annual+	Inspection, Repair and Testing			●
Biennial (736 days)	Inspection, Repair and Testing			●
Triennial (1,104 days)	Inspection, Repair and Testing			●
Quadrennial (1,476 days)	Inspection, Repair and Testing			●
Sexennial (2,208 days)	Inspection, Repair and Testing			●

*Typically performed at overnight layover facility

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Layover Facility Infrastructure Guidelines

Infrastructure required to accommodate the functions of a layover site will vary at any given facility. Utilities, building structures, roadways, tracks, landscaping, fencing, lighting, among other site-specific items, are all part of the infrastructure of a layover site, as discussed below:

- **Train Storage:** Layover areas must have enough tracks of sufficient length to accommodate the number of full length trains programmed for each site. By 2040, it is assumed that all MBTA consists will be eight bi-level coaches and one locomotive. The tracks must be configured so the breakdown of a single train would not trap other operational trains at the site. Design provisions to avoid trapping operational trains behind a disabled train at layover facilities include providing an escape track, internal yard crossovers, or a tail track to allow an engine to run around a disabled train. Layover areas and supporting infrastructure must be properly sized and configured appropriately to accommodate these longer train sets without impacting service.

- **Train Movements:** The majority of train movements in the layover yard will be train consists entering and exiting the yard as well as train consists moving to or from the Service and Inspection area. There will likely be a dedicated crew and locomotive in the yard to make up new consists, swap out equipment, and to shuttle crewless train consists from a layover track to the Service and Inspection area and back. Not all trains will need to enter the Service and Inspection building every day, but will require fueling and sanding on a daily basis. Track configurations through and adjacent to the Service and Inspection/fueling area should be double-ended to allow for the most efficient train movements. Simultaneous train moves in the yard should be possible and at times throughout the day, necessary to maintain schedules at the Service and Inspection area and timetable revenue passenger schedules. The layout of the yard and configuration of tracks should allow flexibility and redundancy in the case of a disabled train, or track out of service.

- **Vehicular Circulation:** In addition to the parking area and the main site access road, every track in the yard that is used to store trains shall be adjacent to at least one access lane. These access lanes shall be able to accommodate train crews, mechanical crews, cleaning crews, maintenance-of-way crews, emergency vehicles, passenger vehicles, pickup trucks and snow removal equipment.

- **Utilities:** Utilities may include electricity, sewer, water, cable/telephone, and gas. While most utilities will be routed underground, a power substation may be required. The power substation could require a large footprint on the site, especially if the rail yard has an electric catenary system.

- **Buildings and Structures:** A layover site includes enclosed space to support the various railroad department crews and equipment required by all aspects of operations occurring within that site. At a minimum, operating department road foremen, yardmasters, and trainmasters will require office space to perform their duties to support train movements within the yard. Storage areas must adequately store equipment and materials required to support the operation and maintenance activities conducted by the various crews at each layover location.

  Train layovers in the area of South Station typically operate between two to four hours daily (weekdays). In some cases they may be operational 10 hours or longer, necessitating crew accommodations with rest areas, HVAC, restrooms, lockers and provisions for waiting possibly including a food preparation area and/or vending machines. The accommodations should also

include a separate space for conducting job briefings for crews going back on duty as well as an area to assemble train orders and obtain track authority paperwork. These sites typically serve as headquarters for switching crews working in the yard.

Other supporting departments, such as engineering, railroad police, maintenance-of-way, communication and signals, bridge and buildings, power, or overhead contact systems, often use a centralized facility such as a layover facility as a headquarters location.

- **Security and Lighting:** Security measures must also be implemented to insure that sites are not accessible to the general public. Site security measures typically include perimeter fencing and gates, site lighting, key/card access to buildings, remote cameras, and building alarms.

Operational Guidelines

While a single alternative may provide all or most of the physical space needed to fulfill the projected layover need, using a single location to layover too many consists may be detrimental to railroad operations at South Station's interlocking plant, known as Tower 1. In railway signaling terms, an interlocking is defined as an arrangement of signals and apparatus that prevents conflicting movements through an arrangement of tracks such as junctions or crossings.

In keeping with the overall objective of the project to allow for increased high speed and intercity rail service, the layover sites should be situated so as to not interfere with Amtrak operations to the greatest extent possible. This means that revenue trains heading to layover or layover trains heading for revenue service should minimize, to the greatest extent possible, the need to unnecessarily cross over tracks at Tower 1 and the setup interlockings. Because of a split in the South Station/Tower 1 area, in order to allow for optimal performance of railroad operations, trains should be traveling to layover sites based on their platform location at South Station. Trains on western platforms should be laying over at points west or southwest of the station while trains on the eastern platforms should be laying over at points south of the station. It is assumed that Amtrak will continue to use its Southampton Street Yard facility for layover and maintenance purposes so Amtrak trains would be best to use the centrally located platform tracks. The MBTA Framingham/Worcester, Needham, some Franklin and some Providence/Stoughton Line trains would be best to use the tracks situated on the western side of the station. The MBTA Greenbush, Plymouth/Kingston, Middleborough/Lakeville, Fairmount, some Franklin and some Providence/Stoughton Line trains would use the eastern side of the station.

The general layout of layover facilities, support buildings, yard tracks and lead tracks should complement the overall operational need of the layover site. The yard lead should be designed in a manner that will expedite the movement of trains in preparation of peak periods and allow some redundancy for operational flexibility.

A control tower and a yard switcher would also be operational guidelines of a new layover site and would have the functions described as follows:

- **Control Tower:** The purpose of the control tower or control office, is to expedite train movements. Train operations within a complex layover yard and maintenance facility will require a control system to manipulate turnouts and signals used within yard limits. The yard office typically accepts trains exiting a main line track and routes them through the yard to the proper storage or maintenance track. This takes the burden off of the main line dispatcher and allows the yardmaster to coordinate trains locally.
- **Yard Switcher:** The yard switcher will serve several purposes inside and outside of the layover yard. Some of the duties assigned to the yard switcher are:
    - When trains enter the layover yard and the crews are released to the welfare facilities, the train consists will still need to move about the yard to get fueled and run through the Service and Inspection shop. In this instance, it makes sense to have a crew dedicated to shuffling trains in the yard, whether by boarding the consist or by coupling to the consist with a switcher locomotive.
    - From time to time, new consists will need to be assembled to fulfill the needs of the equipment cycle. The yard switcher builds trains, swaps equipment and moves the equipment to the necessary tracks.
    - Shuttling equipment back and forth from the MBTA's Commuter Rail Maintenance Facility (CRMF) in Somerville is usually performed with the use of the yard switcher. This is

necessary to exchange equipment that is due for FRA interval inspections or heavy maintenance and repairs.

- The yard switcher is on standby to rescue disabled equipment on the main lines and return the equipment to the Service and Inspection shops, if necessary.

Railroad Design Criteria

The purpose of this section is to identify the design parameters used during conceptual design of the new layover site and the basis of design as this project moves forward into Preliminary Engineering. As this project progresses, the designs will be refined and modified to accommodate changes in design guidelines for this project. This section contains descriptions for the following design criteria:

- General
- Design Speeds
- Horizontal Alignment Design Criteria
- Vertical Alignment Design Criteria
- Track Gauge
- Trackwork Design
- Track Structure
- Roadway Design
- Clearances
- Overbuild of Right-of-Way

General

Roadway design shall conform to the *MBTA Commuter Rail Design Standards Manual, Chapter 3, Geometric Design Criteria*[35] except as noted herein.

- In territory with Amtrak operations, the roadway design shall also conform to National Railroad Passenger Corporation *Limits and Specifications for Track Safety Maintenance and Construction MW 1000*[36] and Amtrak SPEC NO 63 *Track Design Specification*.[37]
- Minimum track length shall accommodate an eight car consist with one locomotive, resulting in 751 feet between clearance points.
- While it is desirable that yard tracks are tangent, since yards are not within platform limits, curved track will be acceptable.

Design Speeds

- Main Tracks (Passenger): 70 mph (2.75" Unbalance superelevation)
- Maximum speed: Maximum speed allowed by local conditions

Freight trains' maximum authorized speed shall be governed by the optimal geometry for passenger operations.

[35] Massachusetts Bay Transportation Authority. *Commuter Rail Design Standards Manual*, Volume 1, Section 1 - Track and Roadway, Chapter 3, Geometric Design Criteria. Revision No. 1, April 19, 1996.
[36] National Railroad Passenger Corporation, Amtrak Engineering. *Amtrak Specification No. 63, Track Design Specification*. Revised October 15, 2011.
[37] National Railroad Passenger Corporation. *Amtrak Safety Limits and Specifications for Maintenance and Construction of Track.* M.W. -1000. Revision 2, January 1, 1992.

Horizontal Alignment Design Criteria

- Turnouts for main line will be Number 10 or greater.
- Turnouts for yards will be Number 8 or greater.
- Turnouts for industry tracks shall meet MBTA Design Criteria.
- Curvature will be defined by chord definition and degree of curvature.
- Maximum degree of curvature in yards will be 12° 30'.
- Superelevation:
  - Freights are assumed to operate on all sections of existing track, where the maximum actual superelevation (Ea) shall be 4 inches.
  - In areas where track is not used by freight trains maximum actual superelevation (Ea) shall be 6 inches.
  - In areas where track is used by freight trains maximum actual superelevation (Ea) shall be 3 inches based on 1 ½ inches of unbalance.
- Combining Spirals:
  - Combining spirals shall be used between compound curves except where Ea does not change and the difference in Eu is less than 1/2 inch.
  - Spiral lengths shall equal or exceed the following values:
    - Ls (compound) ≥ 1.63 (Δ Eu) V
    - Ls (compound) ≥ 80 (Δ Ea)
    - Ls (compound) ≥ 62 Δ Ea (where V ≤ 50 mph)

If combining spirals are used, additional definitions and equations shall be provided from *Route Locations and Design*, Fifth Edition, by Thomas F. Hickerson, McGraw-Hill Book Company, 1964.

Vertical Alignment Design Criteria

- The vertical alignment shall be designed using the *MBTA Commuter Rail Design Standards Manual*[38] except as noted below.
- The minimum length of vertical curves shall be designed based on the *American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual* Chapter 5, Section 3.6 - Vertical Curves (Figure II-1).[39]

Track Gauge

- 4 feet 8-1/2 inches measured 5/8 of an inch below top of rail on gauge face of the rail.

[38] Massachusetts Bay Transportation Authority. *Commuter Rail Design Standards Manual*, Volume 1, Section 1 - Track and Roadway, April 19, 1996.
[39] American Railway Engineering and Maintenance-of-Way Association. *American Railway Engineering and Maintenance-of-Way Association Manual.* Chapter 5- Track, Section 3.6 Vertical Curves (2002), Figure II-1.

Trackwork Design

Ballasted track construction will be used at all locations except on open deck bridges subject to MBTA approval. Track materials shall conform to the *MBTA Commuter Rail Design Standards Manual, Chapter 4, Trackwork Criteria*[40] except as noted herein.

Track Structure

- **Rail:** All new rail shall be 132 RE section, continuously welded rail (CWR). Electric flash butt welding shall be used wherever possible for field welds. CWR strings shall be field cut for insertion of special trackwork and insulated joints. Insulated rail joints shall be shop-manufactured per MBTA Drawing Number 1340.

  Suitable relay rail may be used on freight sidings and yards, maintenance of way tracks, and other non-revenue areas.

- **Ties:** Wood crossties shall be used on all main tracks, bridges with bridge guardrail and special trackwork. Rail shall be fastened to the ties using a resilient fastener system to be specified by the MBTA. Vibration dampening tie plates and fasteners shall be used on all open deck bridges and on direct fixation trackwork.

- **Rail Lubricators:** All existing rail lubricators shall be relocated as required.

- **Railroad Signs:** Mileposts, whistle and repeat whistle posts, and speed restriction signs shall be as specified in the MBTA's *Railroad Operations Book of Standard Plans.*[41]

Roadway Design

Roadway Design shall conform to the *MBTA Commuter Rail Design Standards Manual, Chapter 5, Roadway Criteria*[42] except as noted herein.

- **Track Roadbed:** Track roadbed shall generally conform to MBTA Standard Drawing Numbers 1000 and 1002.

- **Slopes and Walls:** Side slopes shall generally be 2H:1V. Stabilized 1.5H:1V slopes will be considered where steeper slopes are required to avoid wetlands, right-of-way lines, or excessive earthwork, and existing slopes in the vicinity demonstrate that 1.5H:1V slopes are stable.

- Retaining walls or reinforced slopes may be used to avoid land acquisition or wetlands impacts associated with normal side slopes. A reinforced slope will be specified where a 1H:1V slope can be placed within the site constraints; otherwise a retaining wall will be used. Retaining walls will generally be contractor designed based on a wall elevation and performance specifications. Mechanically stabilized earth panel walls and precast modular walls will be approved systems. Walls shall be placed at least 10 feet from centerline of nearest track wherever possible. Walls shall be topped with a concrete cap with embedded 6-foot chain link fence. Wall layout and specifications shall account for the characteristics of all permitted wall systems including, tiebacks and whalers, geogrids, and wall thickness. Design of track drains and culverts must be

[40] Massachusetts Bay Transportation Authority. *Commuter Rail Design Standards Manual*, Volume 1, Section 1 - Track and Roadway, Chapter 4 – Trackwork Criteria, April 19, 1996.
[41] Massachusetts Bay Transportation Authority. *Railroad Operations Book of Standard Plan,* October 28, 1992. Revised April 29, 1996.
[42] Massachusetts Bay Transportation Authority. *Commuter Rail Design Standards Manual*, Volume 1, Section 1 - Track and Roadway, Chapter 5 – Roadway Criteria, April 19, 1996.

coordinated with layout and drainage requirements of each wall. Duct banks or cable troughs may be required to avoid conflicts between signal and communications cables and buried wall components such as geogrids.

Clearances

Track centers and clearances to horizontal and vertical obstructions shall conform to the *MBTA Commuter Rail Design Standards Manual, Chapter 6, Clearance Criteria*[43] except as noted herein.

- **Track Centers in Tangent Section of Track:** the minimum horizontal distance between railroad track centerlines shall be 14 feet.
- **Track Centers within yard limits:** the minimum horizontal distance between railroad track centerlines shall be 18 feet.
- Road widths within yard limits shall be 14 feet with 24 feet between track centers.
- **Track Centers in Curved Sections of Track:** the minimum horizontal distance between track centers and track center widening in curves shall be as shown in MBTA Standard Drawings, 1000 Series.
- **Yard tracks and Industry Sidings Track Centers:** the minimum distance between yard tracks and freight sidings parallel to a main track shall be no closer than 17 feet-0 inches from the centerline of any main track. See MBTA Drawing Number 1020 for more information on Industry Sidings.
- **Standard Side Clearances:** Standard side clearances from the centerline of track including clearance increases for curvature and superelevation shall be as shown in MBTA standard drawings.
- Track with existing freight service shall provide minimum clearances and allow for Plate E clearance.
- Bridges passing over the railroad will be required to meet existing vertical clearances.
- Vertical Clearances are measured from the top of rail projected 8 feet -6 inches from centerline of track to bottom of structure.
- The above clearances are based on the following assumptions:
  - Provision for future track raising is not included.
  - Provision for double stack freight clearances is not provided.
- **Standard Clearances Tangent Track Signal Equipment & Utility Crossings:** Standard Clearances Tangent Track Signal Equipment and Utility Crossings shall be as shown in MBTA Drawing Number 1014.
- Dwarf signals, through plate girders shall be as shown in MBTA Drawing Number 1014.
- **Safety Niches:** Continuous obstructions (e.g. sound barriers, walls.) are allowed to encroach within standard clearance. See the *MBTA Commuter Rail Design Standards Manual* for more information.
- Any horizontal clearance below standard clearance track requires written approval.

[43] Massachusetts Bay Transportation Authority. *Commuter Rail Design Standards Manual*, Volume 1, Section 1 - Track and Roadway, Chapter 6 – Clearance Criteria, April 19, 1996.

- Minimum distance from track center to face of catenary pole shall not be less than 8 feet-6 inches in tangents.

Overbuild of Right-of-Way

Layover yards located in closed or partially enclosed structures shall provide for adequate ventilation, illumination, emergency egress and fire protection to provide a safe environment for employees during normal and emergency operations. The design will make all accommodations to the above grade structure, and shall be responsible for the design, construction and maintenance of the systems in conformance with MBTA design standards, AREMA guidelines, FRA regulations, and applicable local, state and federal building codes and referenced documents.

Overbuild and air rights legal agreements between two or more parties may also contain conditions of design or design criteria specific to the agreement. The conditions of such agreements pertaining to design shall be met to the greatest extent possible without conflict of the aforementioned standards, guidelines, regulations and codes.

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