Chapter 5B: Transportation Services

5B.1 INTRODUCTION

Chapter 5 of this Environmental Impact Statement (EIS) evaluates the impacts of construction and operation of the Hudson Tunnel Project on transportation conditions. It is divided into two subchapters, Chapter 5A, "Traffic and Pedestrians," and Chapter 5B, "Transportation Services." Chapter 5A evaluates the Project's effects during construction and operations on vehicular traffic on roadways and on pedestrian conditions. Chapter 5B evaluates the Project's effects during construction and operation on the transportation services operating in the Project area, including passenger rail service (intercity passenger rail service and commuter rail services); the Hudson-Bergen Light Rail (HBLR) and New York City subway service; surface bus operations; Port Authority Trans-Hudson (PATH) rail service; freight rail; ferry and other maritime services; and helicopter operations at the West 30th Street Heliport in Manhattan.

Unlike other chapters of this EIS that follow, this chapter is organized by transportation mode rather than geography.

This chapter contains the following sections:

5B.2 ANALYSIS METHODOLOGY

During development of this EIS, the Federal Railroad Administration (FRA) and NJ TRANSIT developed methodologies for evaluating the potential effects of the Hudson Tunnel Project in coordination with the Project's Cooperating and Participating Agencies (i.e., agencies with a permitting or review role for the Project). The methodologies used for analysis of transportation services are summarized in this chapter.

5B.2.1 REGULATORY CONTEXT

The transportation modes in the Project area are regulated and/or monitored by Federal, state, and local agencies, including FRA, Federal Transit Administration (FTA), Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), U.S. Coast Guard (USCG), NJ TRANSIT, New York City Department of Transportation (NYCDOT), and New York's Metropolitan Transportation Authority (MTA).

5B.2.2 ANALYSIS TECHNIQUES

This analysis in this chapter is based on information on existing and projected future transportation services from the transportation service operators and other organizations responsible for these services in the Project area. These include the following: the National Railroad Passenger Corporation (Amtrak), NJ TRANSIT, the Port Authority of New York & New Jersey (PANYNJ), MTA, FAA, freight railroads, ferry and other maritime operators, USCG, and bus service and heliport operators.

For analysis of construction-related transportation impacts, analysis years in this chapter correspond to peak construction activities for the construction of the new Hudson River Tunnel

and the rehabilitation of the existing North River Tunnel. For permanent impacts, the analysis year is the year when the Preferred Alternative would be complete, 2030.

5B.2.3 STUDY AREAS

The study area for consideration of transportation services consists of the Project site, as outlined in Chapter 4, "Analysis Framework," and immediate areas to the Project site.

5B.3 AFFECTED ENVIRONMENT: EXISTING CONDITIONS

5B.3.1 INTERCITY AND COMMUTER PASSENGER RAIL SERVICE

5B.3.1.1 PSNY COMPLEX

Penn Station New York (PSNY) provides access to New York City for passenger railroad trains operated by Amtrak, MTA Long Island Rail Road (LIRR), and NJ TRANSIT. The station operates both as a through station for Amtrak and as a terminal station for all three railroads. During peak operations, Amtrak uses Platform Tracks 5 through 12 (Platforms 3 through 6), NJ TRANSIT uses Platform Tracks 1 through 12 (Platforms 1 through 6), and LIRR uses Platform Tracks 13 through 21 (Platforms 7 through 11). During off-peak operations, Amtrak and NJ TRANSIT also use Tracks Platform 13 through 16. Track and platform usage is dictated by use agreements[1] between the three railroads and also by track connections that provide access to the various tracks and platforms. The maximum operating speed within the existing PSNY complex is 15 miles per hour (mph). Not all platforms can accommodate the longest trains operated.

The platform tracks in PSNY are connected to a network of tracks to the east and west (see Figure 2-1 in Chapter 2, "Project Alternatives and Description of the Preferred Alternative"). On the west, Amtrak and NJ TRANSIT passenger trains on the Northeast Corridor (NEC) to and from New Jersey use the North River Tunnel, which consists of two single-track, electrified rail tubes. Trains move between the North River Tunnel and passenger platforms via ladder tracks that provide connections to each of the platform tracks. Amtrak also operates its Empire Line, serving Albany and northward to Niagara Falls via a route along the eastern shore of the Hudson River, into PSNY. The Empire Line joins the NEC in Manhattan just west of PSNY (at approximately Tenth Avenue, south of the North River Tunnel tracks).

West of PSNY, the blocks are occupied by the PSNY approach tracks and ladder tracks and several rail storage yards. The largest yard, the LIRR's John D. Caemmerer Yard West Side Yard, is bounded by Tenth Avenue, Twelfth Avenue (New York State Route 9A), West 30th Street, and West 34th Street, and is used by LIRR for midday storage of trains. On the north side of the North River Tunnel, four tracks connect to the West Side Yard. In addition, several smaller rail storage yards—including A Yard, D Yard, and E Yard—are located between Eighth and Tenth Avenues in the below-grade track area just west of PSNY and are used primarily by NJ TRANSIT and occasionally by Amtrak for midday storage of trains, for overnight storage and servicing of trains, and for operational flexibility.

Amtrak positions two standby locomotives in the storage tracks west of PSNY, typically in Yard D, which are kept continuously available for emergencies or as substitute power if a revenue train experiences a locomotive failure. Amtrak also stores engineering equipment used to maintain the railroad infrastructure in all three yard areas but predominantly in A Yard or E Yard.

[1] Track and platform usage agreements in place include the Joint Venture Agreement between LIRR and Amtrak; and the NEC Services Agreement (an operating agreement), and Slot Agreement (proscribing allowable trains per hour/per peak period) between NJ TRANSIT and Amtrak.

NJ TRANSIT stores five train sets during the midday in these PSNY yards: two at E Yard, one at D Yard, and two at A Yard. NJ TRANSIT also stores one train set overnight on an available storage track in this area.

East of the PSNY platforms, the station's tracks connect to the East River Tunnels, which consist of four single-track electrified rail tubes that are used by Amtrak, LIRR, and NJ TRANSIT. These tubes are used for operations to Queens, New York, where tracks connect to Sunnyside Yard (a large Amtrak storage and maintenance yard that is also used for midday storage by NJ TRANSIT), to the segment of Amtrak's NEC known as the Hell Gate Line (for operations toward New England), and to LIRR's rail lines to the east.

Prompted by the growing demand for passenger service to and from Manhattan in recent decades, the three railroads have performed extensive operations analysis and have implemented infrastructure improvements to expand service levels. The three railroads now fully use the capacity of the tracks and platforms within PSNY in peak hours. There is no additional capacity to process trains at the platforms, given the time required for trains to wait at the platform for passengers to board and alight, and to move through the station. In addition, no peak-period capacity is available to route additional trains through the East River Tunnels for midday storage in Sunnyside Yard, and there is limited storage capacity within the PSNY complex.

5B.3.1.2 AMTRAK AND NJ TRANSIT OPERATIONS VIA THE NORTHEAST CORRIDOR

Passenger rail service (which includes both commuter and intercity passenger rail service) into Manhattan from New Jersey operates on the NEC (owned by Amtrak in this area), which connects New Jersey to PSNY using the North River Tunnel under the Palisades and the Hudson River. Both Amtrak and NJ TRANSIT use this tunnel to access PSNY. Only electric-powered passenger trains are permitted to operate into PSNY through the North River Tunnel.

The NEC is the most heavily used passenger rail line in the U.S., both in terms of ridership and service frequency. The NEC extends from Washington, D.C.'s Union Station in the south to Boston, Massachusetts' South Station in the north, serving the densely populated Northeast region, including PSNY. Amtrak, the nationwide intercity passenger rail operator, operates over the entire NEC, providing regional service, long-distance service, and high-speed Acela Express service. Amtrak owns the majority of the NEC, including the portion in New Jersey and the North River Tunnel. NJ TRANSIT operates an extensive commuter rail network in New Jersey that extends to Philadelphia, Pennsylvania; Orange and Rockland Counties in New York; and New York City. In New Jersey, NJ TRANSIT owns much of the commuter rail network that converges on the NEC. NJ TRANSIT's rail lines all include direct or connecting service to PSNY.

The North River Tunnel, built in 1910 as part of the construction of PSNY, is more than 100 years old and was designed and built to early 20th century standards. As described in Chapter 1, "Purpose and Need," service reliability through the tunnel, already suboptimal because of the tunnel's age and antiquated design, has been further compromised because of the damage to tunnel components caused by Superstorm Sandy. Since Superstorm Sandy, Amtrak has been making repairs to the tunnel, and the repairs are ongoing. This involves scheduled work during evening off-peak periods as well as full closure of one tube each weekend for a 55-hour window beginning on Friday evening and ending early on Monday morning. These closures dramatically limit the number of trans-Hudson trains that can be operated on a given weekend day and constrain NJ TRANSIT's ability to serve current customer demand for weekend travel. Additional emergency maintenance has been necessary with increasing frequency since Superstorm Sandy and disrupts service for hundreds of thousands of rail passengers throughout the region.

Capacity demands are of particular concern for commuter rail services into Manhattan. The existing North River Tunnel operates with a maximum peak-hour, peak direction capacity of 24 trains per hour for both the AM (eastbound) and PM (westbound) peak hours—20 NJ TRANSIT trains and 4 Amtrak trains. Both the morning peak hour and the evening peak hour operate at this capacity (the reverse peak capacity for both the AM and PM peak hours is 11 trains), for a total peak-hour train capacity moving in both directions through the existing North River Tunnel of 35 trains. Trains operate at a maximum speed of 60 mph in the existing tunnel, dropping to a maximum of 15 mph entering and leaving PSNY. The complexities of the track network leading into and out of PSNY and the high volume of train movements in the PSNY complex often reduce trains speeds further, as trains wait for other trains to cross or for open platforms.

In the morning peak period, eastbound trains from New Jersey drop off passengers at the platforms of PSNY and then either reverse for westward service (or move westward out of the station without passengers) or continue eastward to Sunnyside Yard (for NJ TRANSIT) and beyond (for Amtrak). PSNY currently operates at capacity during the peak periods—there is no additional capacity to process trains at the platforms, given the time required for trains to wait at the platform for passengers to board and alight, and to move through the station. In addition, no capacity is available to route additional trains through the East River Tunnels for midday storage in Sunnyside Yard, and there is limited storage capacity within the PSNY complex.

The North River Tunnel is heavily used throughout the day, with a total of more than 500 trains per day in both directions on weekdays (110 Amtrak trains and 412 NJ TRANSIT trains). Although the volume of weekend service offered by NJ TRANSIT and Amtrak is limited by closures of one North River Tunnel track from Friday night to Monday morning by Amtrak for ongoing maintenance, even with the reduced weekend schedules, nearly 300 trains per day use the North River Tunnel on weekends.

Amtrak operates high-speed Acela Express trains, Northeast Regional trains, and long-distance trains through the North River Tunnel to and from PSNY. Four of NJ TRANSIT's electrified rail lines—NEC, North Jersey Coast Line, Morris and Essex Lines, and Montclair-Boonton Line—provide direct, one-seat ride service into PSNY during peak and off-peak periods. In addition, using dual-power locomotives (i.e., locomotives that operate in diesel mode on non-electrified lines and electric mode on electrified lines), NJ TRANSIT also operates off-peak Raritan Valley Line trains through the North River Tunnel to and from PSNY.

In 2016, Amtrak carried approximately 20,500 weekday passenger trips (one-way ride) each day on more than 100 trains between New York and New Jersey, not counting passengers who traveled through the North River Tunnel and PSNY but did not get off or on at PSNY. An additional 4,400 passenger trips (one-way ride) traveled into or out of PSNY on Amtrak's Empire Corridor service. In 2016, NJ TRANSIT carried approximately 192,000 weekday trips each day on approximately 350 trains between New York and New Jersey.

5B.3.2 HUDSON-BERGEN LIGHT RAIL

NJ TRANSIT's HBLR serves Hudson County, New Jersey, municipalities, including Hoboken and Weehawken. The two-track segment of the system between 9th Street-Congress Street Station in Hoboken and the Lincoln Harbor Station in Weehawken traverses the study area (see **Figure 5B-1**). This line segment is located at ground level over the path of the proposed Hudson River Tunnel and over the existing North River Tunnel. Light rail trains operate with varying frequencies depending on the time of day, but trains operate in each direction as close as two minutes apart in peak time periods. During peak hours, as many as 11 trains per hour are operated on each track on this line segment.

As of March 31, 2016, the HBLR system had an annual average weekday ridership of 54,350 trips.

HUDSON TUNNEL PROJECT

Hudson-Bergen Light Rail Route in the Study Area

Figure 5B-1

5B.3.3 NEW YORK CITY SUBWAY SERVICE

In the vicinity of PSNY, MTA New York City Transit (NYCT) operates subway service that serves PSNY, including the Broadway (N, Q, R, W), Sixth Avenue (B, D, F, M), Seventh Avenue (Nos. 1, 2, and 3 trains) and Eighth Avenue (A, C, E) northbound and southbound subway routes. Each of these routes has a 34th Street station at or near PSNY. In addition, NYCT operates the No. 7 line to its eastern terminus at the 34th Street-Hudson Yards Station under Eleventh Avenue. The No. 7 line infrastructure includes tail tracks[2] that extend under Eleventh Avenue south of the 34th Street Station to 25th Street.

5B.3.4 BUS SERVICE

The bus services operating in the study area consist of numerous NJ TRANSIT, NYCT, and New York Waterway ferry bus routes. In addition, north of the study area, a high volume of buses use the highways and roads that lead to the Lincoln Tunnel and operate through the Lincoln Tunnel to and from the Port Authority Bus Terminal (PABT) in New York City. The PABT bus services include both commuter and intercity services. They are operated by NJ TRANSIT and several private bus operators serving the nearby communities as well as communities throughout the region. Many of the bus services that operate to and from the PABT during the morning peak period utilize the Exclusive Bus Lane (XBL) on Interstate 495 (I-495) that accommodates approximately 700 buses per hour. In total, more than 1,800 buses and 65,000 commuters travel through the Lincoln Tunnel in the four-hour AM peak period via the XBL. In addition to the regular daily use, when NJ TRANSIT commuter rail service is disrupted, customers rely on other trans-Hudson transportation modes to get to their jobs, which include the trans-Hudson bus routes.

In New Jersey, several local NJ TRANSIT bus routes operate on surface streets in the study area in North Bergen, Union City, Weehawken, and Hoboken. The bus services include Route 2 (on Secaucus Road just north of the NEC); Route 22 (south of the Project site in Hoboken and continuing on the Palisades in Union City); Route 23 (on Park Avenue and JFK Boulevard through Hoboken and Weehawken, passing close to the Hoboken staging area); Routes 63, 64, and 68 (on Willow Avenue and 19th Street through Hoboken and Weehawken, passing close to the Hoboken staging area); and Routes 89, 119, and 126 (on Willow Avenue through Hoboken and Weehawken, passing close to the Hoboken staging area). **Figure 5B-2a** shows the bus routes in the New Jersey portion of the study area.

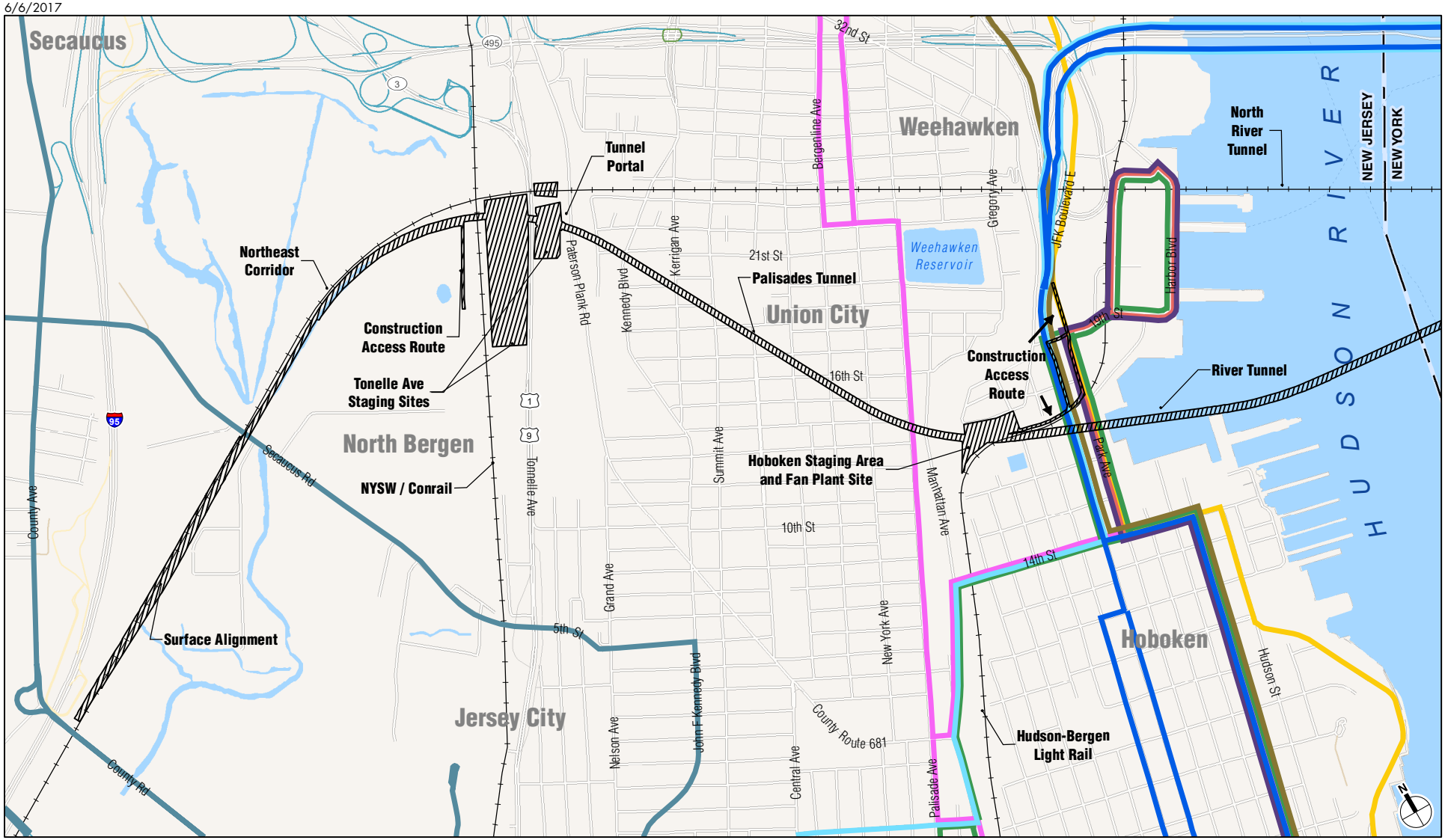
NYCT bus routes and New York Waterway ferry bus routes operate on surface streets in the New York portion of the study area (see **Figure 5B-2b**). NYCT bus services operate on Tenth, Eleventh, and Twelfth Avenues and on 33rd and 34th Streets. New York Waterway ferry bus services operate on Twelfth Avenue and on 34th Street. Bus routes that operate in the study area include NYCT bus routes M11 (on Ninth and Tenth Avenues), M12 (on Eleventh and Twelfth Avenues), M34 (on 34th Street), and the New York Waterway downtown bus, on 34th Street and other streets nearby.

5B.3.5 PATH SERVICE

In addition to Amtrak and NJ TRANSIT passenger rail service between New Jersey and New York and extensive bus service via the Lincoln Tunnel, the Port Authority operates a local commuter rail service between New Jersey and New York, the PATH system. PATH is an electrified, heavy-rail rapid transit system that operates 24 hours a day, seven days a week

[2] Tail tracks are located at the end of a rail line to provide a place to store or hold trains, or for trains to switch tracks to reverse direction.

6/6/2017



HUDSON TUNNEL PROJECT

Bus Routes in New Jersey

Figure 5B-2a

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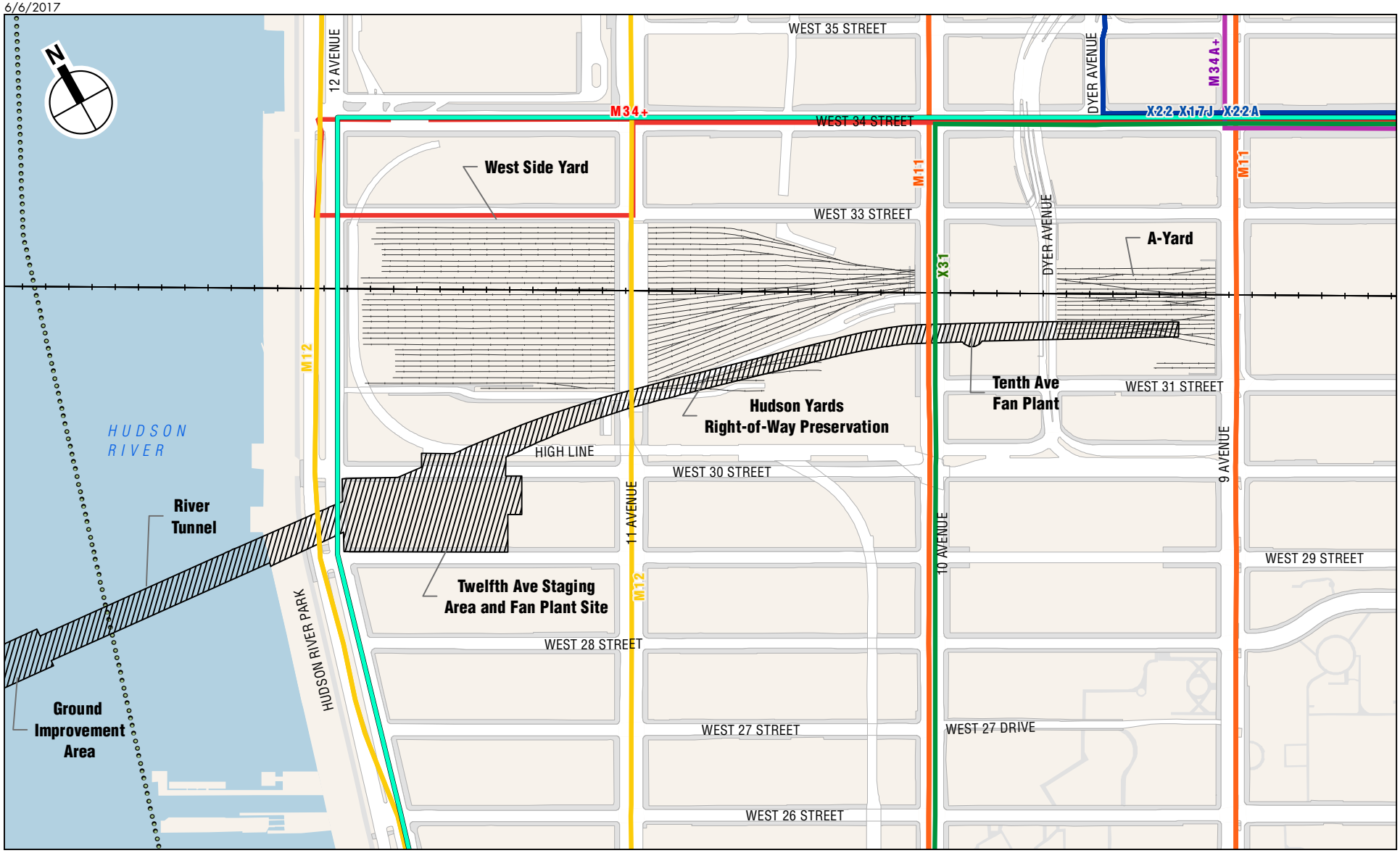

Project Site

Existing Northeast Corridor

Express Bus Routes

X17J, X22, and X22A

X31

MTA/NYCT Bus Routes

M11

M12

M34+

M34A+

NY Waterway Ferry Bus

0 500 FEET

HUDSON TUNNEL PROJECT

Bus Routes in New York

Figure 5B-2b

along four routes between northeastern New Jersey (the cities of Newark, Hoboken, and Jersey City and the Town of Harrison) and Manhattan. The PATH system includes 13.8 route miles and has two termini in New Jersey (Newark Penn Station and Hoboken) and two termini in Manhattan (33rd Street near PSNY and the World Trade Center. PATH carries approximately 270,000 customers per day and cross-honors tickets when NJ TRANSIT commuter rail service is disrupted. In addition to the regular daily use, when NJ TRANSIT commuter rail service is disrupted, customers rely on other trans-Hudson transportation modes to get to their jobs, which include the PATH system.

5B.3.6 FREIGHT RAILROAD SERVICES

A number of freight railroad services, including CSX Transportation, Inc. (a subsidiary of CSX Corporation), Conrail, Norfolk Southern, and the New York, Susquehanna & Western Railway (NYSW) operate in or near the study area in New Jersey. The following freight railroads operate on railroad tracks that cross under the NEC tracks: the Conrail Shared Assets Area Northern Branch; NYSW; and the Norfolk Southern Croxton Yard. While some portions of the NEC are used for rail freight, the North River Tunnel is not used for freight.

The Norfolk Southern Croxton Yard is west of the Project site, adjacent to the Frank R. Lautenberg Secaucus Junction Station. The NEC crosses the yard on a viaduct.

Conrail's Northern Branch consists of two tracks in the study area, running parallel and to the west of Tonnelle Avenue in North Bergen, New Jersey. The NEC is elevated over the Northern Branch west of Tonnelle Avenue. It connects to several rail freight lines and yards that are used for the movement of goods to and from the Port of New York and New Jersey, and for the movement of goods to or from the New Jersey/New York metropolitan region or through the region. CSX Transportation is the most frequent user of the Northern Branch since the branch connects to CSX Transportation's River Line. An average of 40 freight trains operate in a 24-hour period through the study area. No passenger trains utilize the Northern Branch corridor. Time table speed through the study area is 30 mph. There are no train schedules.

The NYSW right-of-way, which includes one track, is adjacent to and on the west side of the Northern Branch in the study area. The NEC is elevated over the NYSW right-of-way. It connects to both CSX Transportation and Norfolk Southern services in New Jersey. Its trains operate north into Bergen, Passaic, Morris and Sussex Counties in New Jersey, as well as into New York State to Binghamton.

5B.3.7 HUDSON RIVER MARITIME TRAFFIC

Maritime traffic on the Hudson River in the study area includes passenger ferries, freight and barge traffic, cruise vessels, and other commercial and recreational boats.

The Hudson River estuary system is a major waterway of the northeastern United States. There are one main and two secondary navigation channels in the Hudson River through the Project area. The main navigable channel, with an approximate width of 2,000 feet, has a required minimum depth of 45 feet. The secondary channels, known as wing channels, are located between the main navigable channel and the pierhead lines on each side of the river, and have a required minimum depth of 40 feet. On the Manhattan and New Jersey sides of the river within the study area, these wing channels are approximately 550 feet wide and 250 feet wide, respectively.

Passenger ferry service traverses the Hudson River to and from both Midtown and Lower Manhattan. NJ TRANSIT has collaborated with New York Waterway to coordinate fares and improve ferry service for approximately 30,000 daily passengers travelling between New Jersey and New York. Ferry services that operate on the Hudson River near the Project site are listed in

Table 5B-1. In addition to the regular daily use, when NJ TRANSIT commuter rail service is disrupted, customers rely on other trans-Hudson transportation modes to get to their jobs, which include these ferry routes.

Table 5B-1
Daily Weekday Ferry Trips – September 2016

NJ/NY Terminals	Midtown West 39th Street	World Financial Center	Pier 11 Wall Street
Port Imperial		38	44
Hoboken 14th Street	101		
Paulus Hook Jersey City	29		
Belford	11		
Source: www.newyorkwaterway.com, 2016.			

Most maritime freight movements through the study area are tug and barge combinations shipping various bulk commodities, such as oil, sand, stone, and aggregates. Large container vessels do not travel through the area. There are many work vessels engaged in marine construction typically using the waterway. Cruise vessels up to 1,000 feet in length pass through the Project area going to and from the Manhattan Cruise Terminal, which is located near 48th Street and handles approximately 150 ships annually. The most recent annual volumes of commercial maritime traffic on the Hudson River from the U.S. Army Corps of Engineers (USACE), for 2010-2014, show an average of 222,106 vessels per year traversing the Project site, with a majority of those vessels having a draft of 12 feet or less (approximately 99 percent). This average does not include the numerous private pleasure craft and ferries that also operate within this area. Although the activity is year round, the majority of vessel movements in the study area occur during the summer and fall months. Sightseeing boats and privately owned yachts and smaller watercraft are commonly active in the study area, particularly in the warmer months.

5B.3.8 WEST 30TH STREET HELIPORT

The West 30th Street Heliport extends from approximately West 29th Street to West 33rd Street (within the boundaries of Hudson River Park). The heliport has 10 helipads and provides commercial, general aviation, and air taxi services. The West 30th Street Heliport is currently operated by a private company, Air Pegasus. At the heliport, approximately 73 percent of the flights are air taxi services, 16 percent are general aviation, 10 percent are commercial, and less than 1 percent are military. No tourist flights operate from the West 30th Street Heliport. The facility operates seven days a week with flight activity somewhat seasonal. Its busiest times coincide with normal AM and PM peak commuter traffic periods. In the summer and fringe months[3] (i.e., May and October), the facility operates from 7 AM to 9 PM, averaging about 72 flights daily. In the winter and fringe months (i.e., November and April), the facility operates from 8 AM to 6 PM, with about 36 flights daily. The portion of the heliport within the Project site includes a driveway and parking area at the western end of West 30th Street and 2 of the heliport's 10 helipads, and includes a helicopter fueling area.

[3] Fringe months are the months immediately before and after the months that correspond to the season being discussed (e.g., the summer fringe months would be May and October, as summer runs from June through September).

5B.4 AFFECTED ENVIRONMENT: FUTURE CONDITIONS

This section describes future conditions anticipated in the Project's study area by the analysis year considered in this EIS (2030) and is the baseline against which the impacts of both the No Action and Preferred Alternatives are compared.

5B.4.1 INTERCITY AND COMMUTER PASSENGER RAIL SERVICE

5B.4.1.1 AMTRAK AND NJ TRANSIT

Amtrak has performed engineering analyses of the existing North River Tunnel and has concluded that continued reliable operations on both tracks in the North River Tunnel cannot be assured for the long term as a result of the tunnel's age in combination with the damage and ongoing deterioration of tunnel elements caused by flooding from Superstorm Sandy. As time allows in off-peak periods, maintenance and repair is done to try to avoid major service disruptions. Despite the ongoing maintenance, the damage caused by the storm continues to degrade systems in the tunnel and can only be addressed through a comprehensive reconstruction of the tunnel.

However, given the uncertainty about the timing and extent of any closure of the tunnel, for the purposes of EIS analyses, FRA and NJ TRANSIT assume that ongoing maintenance and repairs to the North River Tunnel will continue in the future in the No Action condition so that the tunnel would remain in service until the analysis year of 2030, with service outages potentially occurring as a result of the continuing deterioration of the tunnel. In addition, late night and weekend service would continue to be limited to allow for the ongoing maintenance of the tunnel. If Amtrak and NJ TRANSIT operations become less reliable, reduced customer satisfaction may reduce ridership.

PSNY is currently operating at capacity during peak hours and without any projects to improve the capacity of PSNY, train operations in the station will remain at the same level as they are today.

To maintain existing service levels, both Amtrak and NJ TRANSIT have defined rail rolling stock plans that propose to maintain equipment and to replace it as it reaches the end of its useful life. Amtrak is currently procuring new equipment for its Acela Express train service to replace the existing fleet and to expand its capacity. NJ TRANSIT proposes to procure additional multilevel coaches and electric multiple-unit cars to replace life-expired equipment and to increase the capacity of existing trains. The use of multilevel rail cars to replace older cars of lower individual capacity is expected to enable NJ TRANSIT to accommodate a modest level of passenger growth as the new cars are put into service, even though it would not be possible to increase the number of trains during peak hours when current train slots to and from PSNY are fully utilized.

Although the number of peak hour trains would not increase, Amtrak and NJ TRANSIT will be replacing rail passenger equipment with higher capacity vehicles, which will accommodate limited increases in ridership.

5B.4.1.2 MODIFICATIONS TO PSNY

Projects are under way to improve PSNY's passenger environment. These include projects by the Amtrak, together with NJ TRANSIT and LIRR, to improve infrastructure at the station and initiatives by the Moynihan Station Development Corporation, the MTA, and NJ TRANSIT to improve and expand PSNY passenger facilities. Benefits of these projects include expanded passenger waiting areas, additional and widened station concourses, more amenities for passengers, including retail offerings, increased vertical circulation capacity between station platforms and concourses, and additional connections between the station and streets.

Amtrak, in partnership with NJ TRANSIT and the LIRR, is undertaking the Penn Station Infrastructure Renewal Project to strengthen and improve operations and reliability at PSNY. The project will involve accelerated maintenance and repairs to the tracks and systems at PSNY. This work will require track outages for tracks that lead to station platforms. A majority of this work will take place during weekends with little or no disruption to weekday service; however, more extensive work is also required and will be conducted on weekdays, requiring modifications to train schedules. Renewal work is already underway, with major work scheduled to occur in July and August 2017. Additional renewal work will last through 2018, at a minimum, with future work schedules to be developed.

The Moynihan Station Project is currently redeveloping the James A. Farley Post Office Building into the new Manhattan home for Amtrak, and additional passenger facilities for the LIRR would be provided by the Moynihan Station Project as well. The project is advancing in phases, and the first phase is now substantially complete, providing the following improvements:

- West End Concourse Expansion: An expanded and ADA-compliant concourse connected to Tracks 5 to 21 underneath the Farley Building with new entrances at the corners of Eighth Avenue and 31st and 33rd Streets.
- Connecting Corridor Expansion and Rehabilitation: An improved underground connecting corridor between the new West End Concourse and PSNY, and new and reconfigured subway entrances for the A/C/E subway station to ease passenger flow.
- Emergency Ventilation System: An emergency ventilation system for the railroad platforms under the Farley Building.

Following the completion of Phase I, a public-private partnership will complete a new 255,000-square-foot Train Hall in the Farley Building by December 2020. This hall will house passenger facilities for the LIRR and Amtrak.

Concurrently with the Moynihan Station Project, the MTA will advance a comprehensive redesign of the LIRR's existing 33rd Street Concourse in PSNY and an extensive renovation to the adjacent 34th Street stations at Seventh and Eighth Avenues. The redesign will include nearly tripling the width of the existing corridor to decrease passenger congestion.

By the 2030 analysis year, MTA commuter rail service to and from Manhattan will be modified with the completion of the East Side Access Project, which will allow LIRR operations to Grand Central Terminal in New York City in addition to PSNY. Once complete, LIRR is anticipating a substantial increase in service with trains serving both Manhattan terminals. At PSNY, LIRR plans to run the same number of trains as it does today, but with shorter train lengths. In addition, MTA Metro-North Railroad is currently in the planning stages of a Penn Station Access Project to enable Metro-North Railroad's New Haven Line trains to operate to PSNY. Metro-North Railroad's New Haven Line currently provides service between New Haven, Connecticut and Grand Central Terminal, serving stations in Connecticut and New York State. The project includes three miles of new track on existing right-of-way in the Bronx, and four new stations in the Bronx. Service to PSNY would not begin until after the East Side Access Project is complete. The MTA is completing a multi-year analysis of future rail operations at PSNY to gain a better understanding of operations that can be run at the station.

NJ TRANSIT is also planning to expand passenger facilities at PSNY with the construction of a Central Concourse to provide improved vertical circulation to and from the platforms serving Tracks 1 to 12. The Central Concourse would be located between the Seventh Avenue Concourse and the Exit Concourse and would connect to the east/west Hilton Corridor, which is slated to be improved.

Although they may not be implemented by the 2030 analysis year, two comprehensive planning initiatives are identifying improvements to passenger rail service on the NEC, the Gateway Program, and FRA's NEC FUTURE program. The Gateway Program is a comprehensive program of strategic rail infrastructure improvements designed to preserve and improve current services and create new capacity that will allow the doubling of passenger trains on the NEC between Newark, New Jersey, and PSNY. The Gateway Program will increase track, tunnel, bridge, and station capacity, eventually creating four mainline tracks between Newark and PSNY, though the specific details of most of the capacity-enhancing elements are still under development.[4] In addition to capacity expansion, the Gateway Program also includes preservation projects to update and modernize existing infrastructure and repairs to infrastructure elements that are damaged due to age or events such as Superstorm Sandy. The Gateway Program is in the planning and design phase and is included in the NEC FUTURE Preferred Alternative, but certain discrete, non-capacity-enhancing projects that are components of the Gateway Program, including the Hudson Tunnel Project and Portal North Bridge, are proceeding ahead of the rest of the program as critical infrastructure projects with their own independent utility.

The Portal Bridge is a two-track movable bridge that carries the NEC across the Hackensack River between Newark Penn Station and Secaucus Junction Station. This bridge is more than 100 years old and has reached the end of its useful life; malfunctions in the mechanical components of the bridge can cause extensive delays on the NEC. The bridge will be replaced by a new high-level, fixed-span bridge with two tracks parallel to, and north of, the existing bridge. Final design and permitting for this bridge, referred to as the Portal North Bridge, are complete.

The purpose of the NEC FUTURE program is to create a comprehensive investment plan to improve current and future intercity and commuter passenger rail service along the NEC rail corridor between Washington, D.C., and Boston, Massachusetts. With the NEC FUTURE Preferred Alternative, FRA proposes a series of investments to upgrade aging infrastructure and improve the reliability, capacity, connectivity, performance, and resiliency of passenger rail service on the NEC, while promoting environmental sustainability and economic growth. FRA initiated NEC FUTURE in early 2012 and released a Tier I Final EIS in December 2016. The Preferred Alternative consists of an investment program that grows the role of rail by identifying numerous upgrades and state-of-good-repair projects along the length of the NEC. The Preferred Alternative includes all of the elements of the Gateway Program discussed above. A new two-track tunnel under the Hudson River into midtown Manhattan, which as explained above has independent utility, is a critical element of the NEC FUTURE Preferred Alternative.

5B.4.2 HUDSON-BERGEN LIGHT RAIL

HBLR ridership will increase in the coming years and longer light rail trains will accommodate most of this growth. In addition, NJ TRANSIT is planning, and is now preparing an EIS for, the extension of the HBLR from its existing terminus at the Tonnelle Avenue station using the Northern Branch rail right-of-way to Englewood, New Jersey, with a terminal station at

[4] One capacity-enhancing element, Portal South Bridge, has already been planned. In addition to the new Portal North Bridge, a second bridge is also proposed to carry the NEC over the Hackensack River. This bridge, Portal South Bridge, would be a two-track bridge south of and parallel to the new north bridge. Portal South Bridge is proposed as part of the Gateway Program to facilitate an increase in capacity on the NEC. The project is beyond the early conceptual stage but is not funded for construction.

Englewood Hospital. The proposed operating plan for this extension of the HBLR includes 12 trains per hour in the peak hours to accommodate the estimated passenger demand.

5B.4.3 NEW YORK CITY SUBWAY SERVICE

The existing subway services in the study area will not change substantially by the 2030 analysis year. As noted, the number of passenger rail trains operating through the North River Tunnel to and from PSNY in the peak hours will not increase since PSNY is now operating at capacity during peak hours. Consequently, passengers transferring between the passenger trains and NYCT subway routes during peak periods will continue at levels similar to the current volume.

5B.4.4 BUS SERVICE

The existing bus services in the study area will not change substantially by the 2030 analysis year. Ridership increase will increase as background growth continues and as the various known development projects planned and under construction on the Far West Side of Manhattan are completed (these are described in Chapter 6A, "Land Use, Zoning, and Public Policy," Section 6A.4.3). Per MTA policy, bus service will be modified as necessary to accommodate additional riders in this area, as necessary.

5B.4.5 PATH SERVICE

The PANYNJ is planning improvements to PATH service that will accommodate increased ridership in the future. These include implementation of a new signal system using Automatic Train Control, which will allow more frequent service that can increase PATH system capacity by about 20 minutes; upgrades to certain stations to accommodate longer trains; and potential operation of longer trains throughout the system.

5B.4.6 FREIGHT RAILROAD SERVICES

Rail freight service will continue on the rail lines in the study area, but the number of trains may vary depending on market conditions for transporting freight goods over long distances. The North Jersey Transportation Planning Authority sponsored the preparation of the *2040 Freight Industry Level Forecasts* study, completed December 2012. The study estimated that by 2040, overall commodity flows into, out of, and within North Jersey are expected to increase by about 43 percent, from 473 million tons to 675 million tons (a difference of 202 million tons). The study anticipates that rail would gain a slightly larger share of the freight transport market in the future (7.2 percent in 2040, compared to 6.5 percent in 2007). By the 2030 analysis year, it is therefore possible that rail freight operations will increase on the Conrail and NYSW rail lines that cross the NEC in North Bergen, New Jersey.

5B.4.7 HUDSON RIVER MARITIME TRAFFIC

The Hudson River is an industrial, commercial, and recreational waterway that will continue to be an important part of the region's economy and quality of life. In particular, as development continues along the Hudson River, coastline waterborne transportation will remain an important option for regular commuters.

5B.4.8 WEST 30TH STREET HELIPORT

As discussed in Chapter 8, "Open Space and Recreational Facilities," Section 8.3.3, Hudson River Park will continue to be improved in the future. This park is being gradually developed as funding becomes available. Park improvements in this area will require relocation of the West 30th Street Heliport to another suitable location. The timing of such a move is unknown.

5B.5 IMPACTS OF NO ACTION ALTERNATIVE

5B.5.1 INTERCITY AND COMMUTER PASSENGER RAIL SERVICE

Both tubes in the existing North River Tunnel were inundated with seawater during Superstorm Sandy in October 2012. After the North River Tunnel was dewatered, chlorides and sulfates from the seawater continue to cause ongoing damage to a number of tunnel elements, including the tunnel's concrete liner, bench walls, and ballast, as well as to embedded steel, track and third rail systems, and signaling, mechanical and electrical components. As time allows in off-peak periods, maintenance and repair is done to try to avoid major service disruptions. In the No Action Alternative, the existing maintenance regimen in the North River Tunnel will continue. However, this maintenance cannot address the damage to the ballast and bench walls in the North River Tunnel, which require full removal of the tracks, ties, and bench walls—work that cannot be accomplished without full shutdown of the tunnel's two tubes over a period of almost two years for each tube. Therefore, despite the ongoing maintenance that will continue in the No Action Alternative, damage to the North River Tunnel caused by the storm will continue to degrade systems in the tunnel. This deterioration combined with the tunnel's age and intensity of use will likely lead to increasing uncertainty about and disruptions of rail operations in the North River Tunnel, and may lead to its eventual closure.

With the No Action Alternative, this EIS assumes the same level of train service would continue through the North River Tunnel in the future, subject to ongoing maintenance and repairs. The existing two-track North River Tunnel, which is at capacity in the peak hours and heavily utilized at other times, currently provides no operational flexibility when trains are delayed on the tunnel tracks or when emergency repairs are needed. In the No Action Alternative, late night and weekend service would continue to be limited to allow for the ongoing maintenance of the tunnel.

The No Action Alternative would result in negative impacts to passenger rail services on the NEC across the Hudson River as service disruptions would increase as a result of the continuing deterioration of the North River Tunnel. If Amtrak and NJ TRANSIT operations become less reliable, reduced customer satisfaction may reduce ridership.

With the No Action Alternative, as the reliability of the trans-Hudson rail system worsens because of ongoing deterioration in the North River Tunnel, and congestion on each trans-Hudson mode continues to increase to keep pace with future demand, the frequency and severity of each service disruption will be magnified compared to what is experienced today. As NEC North River Tunnel passenger rail service is disrupted for emergency repairs, passengers would divert to trans-Hudson bus services, as well as to ferries, automobiles, and PATH rail service, as occurs today when there is a disruption to NJ TRANSIT service between New Jersey and New York. Each time the North River Tunnel is closed, the disruption would affect up to 20,500 daily weekday Amtrak passenger trips (one-way rides) and up to 192,000 daily weekday NJ TRANSIT passenger trips based on existing ridership, on up to approximately 450 trains per day, as a worst-case scenario. Even if only one tube of the North River Tunnel closes, this would disrupt up to 75 percent of the train service through the tunnel. Because all trans-Hudson transportation routes and services are operating at or near capacity during peak travel hours, public transportation services paralleling the North River Tunnel (PATH trains, commuter buses, and ferries) would experience extreme overcrowding and delays and many passengers might elect to travel not to make the trip or to make the trip via automobile on the region's congested roadway system.

5B.5.2 HUDSON-BERGEN LIGHT RAIL

The No Action Alternative would not affect HBLR service, operations, or ridership.

5B.5.3 NEW YORK CITY SUBWAY SERVICE

The No Action Alternative would not affect NYCT subway service, operations, or ridership.

5B.5.4 BUS SERVICE

The No Action Alternative could result in negative impacts to trans-Hudson bus service as passenger rail service disruptions transfer more riders from rail to buses, overburdening a system that is also close to capacity.

5B.5.5 PATH SERVICE

With the No Action Alternative, if disruptions to trans-Hudson passenger rail service on Amtrak and NJ TRANSIT service increase due to ongoing deterioration in the North River Tunnel, riders would transfer to the PATH system (as well as buses and ferries), overburdening these parallel services.

5B.5.6 FREIGHT RAILROAD SERVICES

The No Action Alternative would not affect freight railroad services in the Project study area, which cross the NEC in Secaucus and North Bergen.

5B.5.7 HUDSON RIVER MARITIME TRAFFIC

The No Action Alternative would not affect maritime traffic directly, but if NEC passenger rail service between New Jersey and New York is disrupted for repairs to the North River Tunnel, passengers would likely divert to ferries and other modes, resulting in potential overcrowding on trans-Hudson ferry routes.

5B.5.8 WEST 30TH STREET HELIPORT

The No Action Alternative would not affect the West 30th Street Heliport.

5B.6 CONSTRUCTION IMPACTS OF THE PREFERRED ALTERNATIVE

5B.6.1 OVERVIEW

This analysis considers the effects of construction of the Preferred Alternative on transportation systems in the study area for the years when peak construction activity would occur.

5B.6.2 INTERCITY AND COMMUTER PASSENGER RAIL SERVICE

As described in Chapter 1, “Purpose and Need,” the purpose of the Hudson Tunnel Project is to preserve the current functionality of Amtrak’s NEC service and NJ TRANSIT’s commuter rail service between New Jersey and PSNY by repairing the deteriorating North River Tunnel; and to strengthen the NEC’s resiliency to support reliable service by providing redundant capability under the Hudson River for Amtrak and NJ TRANSIT NEC trains between New Jersey and the existing PSNY. These improvements must be achieved while maintaining uninterrupted commuter and intercity rail service and by optimizing the use of existing infrastructure. The Preferred Alternative, with a new Hudson River Tunnel to carry passenger trains while the North River Tunnel is being rehabilitated, was developed and selected specifically for this purpose. Further, in light of this purpose, the Preferred Alternative is being designed to allow continued NEC operations first as the new Hudson River Tunnel is being constructed and then as the North River Tunnel is being rehabilitated.

Construction activities for the new Hudson Tunnel would involve modifications to the existing NEC, in New Jersey where connections would be made into Allied Interlocking, and in New York where the Preferred Alternative would connect to the PSNY approach tracks at A Yard east of Tenth Avenue, as discussed below. In addition, construction activities associated with the North River Tunnel rehabilitation would involve work close to active tracks on the NEC near Tonnelle Avenue (at the west portal of the North River Tunnel).

5B.6.2.1 ALLIED INTERLOCKING (NEW JERSEY)

Existing tracks, electrification, and signals within Allied Interlocking just east of Secaucus Junction Station would be modified to connect, control, and provide traction power to the new tracks connecting with the NEC. This would include track connections and switches within the interlocking as well as modifications to the overhead contact system and signal towers along the existing NEC to accommodate the new tracks. This is discussed in more detail in Chapter 3, "Construction Methods and Activities," Section 3.3.1.

The construction activities to connect the new tracks to the existing NEC would be carefully staged to minimize impacts to Amtrak's and NJ TRANSIT's train operations. Most construction work would occur during nights and weekends to avoid disruptions to daytime train service. However, there may be some disruptions to train service or schedules as a result of construction activities and the corresponding safety measures that would be in place during construction (e.g., slower speeds along segments of the existing NEC surface alignment to accommodate construction safely). Since this work would occur over approximately seven years, as described in detail in Chapter 3, "Construction Methods and Activities," in Section 3.3.1, it would be coordinated with NJ TRANSIT and Amtrak to avoid or minimize service disruptions, especially during peak commuter periods.

5B.6.2.2 NEC AT TONNELLE AVENUE (WEST PORTAL OF NORTH RIVER TUNNEL)

The North River Tunnel rehabilitation would be conducted one tube at a time, with the other tube in active service, so that a total of three active tracks are available under the Hudson River for NEC passenger rail service. As discussed in Chapter 3, "Construction Methods and Activities," Section 3.3.10, rehabilitation work would be accomplished by taking one tube out of service at a time for reconstruction while the other tube remains in service. Once rehabilitation of the first tube is complete, that tube would be recommissioned (i.e., put back in service) and the second tube would be taken out service for rehabilitation. Each tube would require approximately 1.5 years for rehabilitation, during which time train service could not be reinstated in that tube, since tracks and systems would not be present.

Based on conceptual design for the rehabilitation work, the Project contractor would use a deck and crane trestle system over the tracks of the NEC at the tunnel portal, where the tracks are located in an open cut. Use of a deck system would allow the Project contractor to lower construction material onto the construction track and lift debris from the track, while shielding the active track from debris and protecting the overhead contact system (catenary). In this way, work on the dead track could occur safely while the adjacent track remains active.

5B.6.2.3 PSNY COMPLEX (NEW YORK)

In Manhattan, the track connections for the Preferred Alternative in the subsurface area east of Tenth Avenue would require demolition of a portion of the A Yard retaining wall and selective underpinning and/or relocation of support columns for 450 West 33rd Street (the Lerner Building). Construction in this area is discussed in more detail in Chapter 3, "Construction Methods and Activities," Section 3.3.8.4.

This work would require trackwork and minor excavation to lower the profile of several tracks so that they can meet the grade of the new tunnel tracks at the new portal within A Yard. An existing track that runs diagonal to the existing track network to provide connections to the PSNY platform tracks, known as the I Ladder, would be extended to connect to the new tunnel's tracks, so that connections are available from the new tunnel to PSNY Tracks 1 through 18. In addition, certain tracks within A Yard would be modified. The new tunnel's tracks would connect to two of the A Yard tracks, which would be connected to the station platform tracks via the extended I Ladder and a shorter connection referred to as the J Ladder. Other switches in A Yard would be modified to support the new tunnel operations.

As discussed above in Section 5B.3.1, Amtrak stores standby locomotives and engineering equipment in the storage tracks west of PSNY and NJ TRANSIT stores five train sets during the midday in these PSNY yards: two at E Yard, one at D Yard, and two at A Yard. NJ TRANSIT also stores one train set overnight on an available storage track in this area. The tracks Amtrak uses for locomotives and equipment would not be affected by the construction. In addition, the two E Yard tracks and the overnight storage track NJ TRANSIT uses would not be affected by the construction. During the approximately six-month period when construction is occurring in A Yard, storage tracks at D Yard and A Yard would not be available. NJ TRANSIT would relocate the three trains it currently stores in A Yard and D Yard to other storage locations, depending on availability and time of day needed, either at Sunnyside Yard in Queens or in New Jersey

This also includes modifications to the Empire Line tunnel near Tenth Avenue. Approximately 100 linear feet of the Empire Line tunnel beneath Tenth Avenue would have to be lowered so that the Empire Line tracks would connect to the lower track profile in the A Yard area created to connect to the new tunnel. This would be accomplished through mechanical rock excavation. If possible, the work would be conducted during weekends over an approximately 20-month period so that train service would be maintained on weekdays. If this is not practicable, full closure of the Empire Line tunnel connection to PSNY may be required for two to three months, with trains diverted to Grand Central Terminal.

Additionally, construction of the new track connections for the Preferred Alternative would involve modifications to the existing track systems at PSNY (including signals, electrification for traction power, and any other related railroad infrastructure components). This work would require trackwork and minor excavation to lower the profile of several tracks so they can meet the grade of the new tunnel tracks at the new portal within A Yard.

All of this work, including the associated tie-ins to existing railroad facilities, would be carefully staged to occur during nights and weekends to minimize disruption to daytime train service to the extent possible. However, as this is a constricted area, there may be some disruptions to train service or schedules as a result of construction activities and the corresponding safety measures that would be in place during construction. The detailed plan for implementing the tie-ins and the associated modifications to operations, including the identification of mitigation for any disruptions, will be developed in consultation with Amtrak, NJ TRANSIT, and any other affected rail operators, during the final design of this aspect of the Preferred Alternative. The new connections to PSNY, including track modifications, regrading of A Yard, and lowering existing track profiles, would take approximately 21 months. If possible, work in A Yard would be coordinated with and perhaps accelerated by the Penn Station Infrastructure Renewal Project, a maintenance program part of which is planned to be undertaken during the summer months of 2018.

Construction of the Preferred Alternative would not affect the LIRR West Side Yard or maintenance facilities in the West Side Yard. The Hudson Yards Right-of-Way Preservation Project (the concrete tunnel box that Amtrak is building in the West Side Yard) would be

completed in advance of construction of the new Hudson River Tunnel, and the concrete tunnel box would be used for the new tunnel. The tunnel box would be fitted out as described in Chapter 3, "Construction Methods and Activities," Section 3.3.8.2, with the new tracks and other Project components for use as part of the new tunnel.

Once the new tunnel is complete (estimated for 2026), passenger rail service would shift to use the two tubes of the new tunnel, and rehabilitation of the North River Tunnel would occur one tube at a time. Both tubes of the North River Tunnel would not be closed simultaneously for rehabilitation because the new tunnel's two tubes alone, without either North River Tunnel tube, would not provide the same level of peak-hour capacity as the North River Tunnel does today. This is because the new tunnel would connect to PSNY farther south than the North River Tunnel tracks do: trains using the new tunnel would not be able to access PSNY Track 19, and access to Tracks 9 through 18 would be solely via the single-track I Ladder with no parallel route available. This limitation is compounded by the fact that platform Tracks 1 through 6 have more limited capacity than the other station platforms and cannot handle the longest 12-car trains used by NJ TRANSIT. To avoid the reduction in capacity that would otherwise occur, one tube of the North River Tunnel would remain open while the other is being rehabilitated.

A specific operating plan for Amtrak and NJ TRANSIT's use of the three tubes during rehabilitation of the North River Tunnel has not yet been developed. Amtrak and NJ TRANSIT have developed and modeled representative 2026 operating plans to confirm the feasibility of this approach. The detailed operating plan for use of three tubes during North River Tunnel rehabilitation, and the associated modifications to operations, including the identification of mitigation for any disruptions will be developed in consultation with Amtrak, NJ TRANSIT, and any other affected rail operators during the final design of this aspect of the Preferred Alternative. Both railroads plan to operate at full capacity, as they do today.

5B.6.3 HUDSON-BERGEN LIGHT RAIL

The construction of the segment of the Preferred Alternative's new tunnel in Hoboken would involve the construction of an access shaft and a construction staging area south of West 18th Street and north of the HBLR tracks. In addition, a fan plant would be constructed at this location for tunnel ventilation. Truck access to and from the site would be provided via a temporary access route that would be constructed parallel to and north of the HBLR tracks. The temporary road would extend from the access shaft site and the construction staging area eastward to provide an at-grade connection to the Willow Avenue service road and the Park Avenue service road (see Chapter 3, "Construction Methods and Activities," Section 3.3.3). Construction of the access shaft, temporary access road, and the fan plant would be designed to be outside the operating envelope of the HBLR, and if any work is within the operating envelope of the HBLR, it would be scheduled during off-peak time periods to avoid impacts on HBLR services. Because of the proximity of the temporary access road to the HBLR tracks, any required special safety protocols would be coordinated with NJ TRANSIT and the operators of the HBLR.

With the Preferred Alternative, the new Hudson River Tunnel would pass beneath the HBLR right-of-way in Hoboken, just east of the Hoboken shaft site and staging area. Prior to tunneling, ground improvement (such as hardening through injection of jet grout into the soil) would be conducted in the area of the alignment near the HBLR right-of-way. This would protect the HBLR tracks from potential disturbance that might otherwise occur as the tunnel passes below.

The rehabilitation of the existing North River Tunnel in Weehawken would be done without any surface disturbance at the location where the HBLR tracks cross over the tunnel.

5B.6.4 NEW YORK CITY SUBWAY SERVICE

The alignment of the Preferred Alternative does not intersect with NYCT subway lines and construction activities would not be located such that there would not be any impacts to subway service or facilities. The alignment of the new tunnel would pass approximately 50 feet above the No. 7 subway line tunnel below Eleventh Avenue. This portion of the alignment would be within the concrete box constructed as part of Amtrak's separate Hudson Yards Right-of-Way Preservation Project, and therefore no impacts to the No. 7 train tunnel or service would occur as the tracks and associated equipment are installed in this segment of the new Hudson River Tunnel.

5B.6.5 BUS SERVICE

With the Preferred Alternative, some disruptions to traffic patterns and flows on roads used by bus services in New Jersey and New York could occur.

In New Jersey, no bus routes travel on Tonnelle Avenue near the Tonnelle Avenue staging site for the Preferred Alternative, and therefore none would be affected by construction activities for the Preferred Alternative there. In Hoboken, construction traffic traveling to and from the Hoboken staging area would follow truck routes that use the Willow Avenue service road, 19th Street, and JFK Boulevard East and the Park Avenue service road, resulting in increased traffic on those roadways (see Figure 3-6 in Chapter 3, "Construction Methods and Activities"). These roads are also part of several NJ TRANSIT bus routes, including Routes 23, 63, 64, 68, 89, 119, and 126 (see **Figure 5B-2a**).

As described in detail in Chapter 5A, "Traffic and Pedestrians," Section 5A.6.2, construction traffic would result in increased congestion and delays on Willow and Park Avenues at 19th Street in Weehawken, and on Park Avenue/JFK Boulevard East as it connects to the I-495 service roads that also carry buses. For the intersections of Willow and Park Avenues at 19th Street, mitigation measures including signal timing changes and the use of a Maintenance and Protection of Traffic (MPT) plan would address potential impacts and therefore bus service would not have slower travel times at these locations. At the intersection of JFK Boulevard East and South Marginal Highway, the construction traffic would result in traffic impacts that cannot be fully mitigated and would slow bus traffic on bus route 23.

In addition, the Preferred Alternative would require temporary disruptions to traffic on the Willow Avenue viaduct, which is used by a number of bus routes. This viaduct would be underpinned prior to construction of the new tunnel in this area. The roadway would remain open throughout this process, with only short-term, intermittent closures during off-peak hours or weekends, and therefore bus service would not be adversely affected.

In New York, bus service could be affected by increased delays due to construction traffic, and also by lane closures associated with the cut-and-cover excavation of the new tunnel alignment across Tenth Avenue. As described in Chapter 5A, "Traffic and Pedestrians," Section 5A.6.4, the reduced traffic levels of service would occur at intersections along bus routes on Tenth, Eleventh, and Twelfth Avenues and on 34th Street. At all intersections, mitigation such as signal timing changes and implementation of an MPT plan would address some of the increased congestion associated with the Preferred Alternative's construction traffic. At most locations, mitigation can maintain intersection levels of service and avoid impacts that would otherwise occur. However, impacts at the intersections of 34th Street and Tenth, Eleventh, and Twelfth Avenues, and Tenth Avenue and 33rd Street would consist of some movements or approaches that could not be fully mitigated, resulting in slow bus traffic at these locations during construction of the Preferred Alternative.

During excavation of the tunnel alignment across Tenth Avenue, the Tenth Avenue roadway would remain open throughout this process, although temporary lane closures would occur. Implementation of an MPT plan in this area would address potential slowdowns that may result from temporary lane closures.

While the traffic impacts would slow bus travel times in some portions of the study area, during construction, these effects would be temporary. There would not be any reductions in bus service, and bus routes and locations of bus stops would remain unchanged during construction of the Preferred Alternative.

5B.6.6 PATH SERVICE

Construction activities for the Preferred Alternative would not affect PATH service, since it is not located in the area where construction would occur.

5B.6.7 FREIGHT RAILROAD SERVICES

With the Preferred Alternative, a new two-track rail bridge for the new Hudson River Tunnel's approach tracks would be constructed across the railroad right-of-way west of Tonnelle Avenue that is used by Conrail and NYSW. This would involve the construction of the bridge abutments, supported by piles, with the bridge spans constructed last to support the new tracks. The construction of the viaduct structure would be scheduled in coordination with the freight train operators so as to minimize any required disruptions to freight rail operations. Construction activities at the Conrail-NYSW bridge would be scheduled in coordination with the freight rail companies to avoid impacts to their operations.

In addition, during construction of the new surface tracks east of Secaucus Road in the Meadowlands, the Preferred Alternative would obtain a temporary easement through a freight railroad storage yard and laydown area at the terminus of 16th Street, North Bergen, adjacent to the NYSW freight tracks, referred to as NYSW's resource yard. The Preferred Alternative would use a portion of this yard as a truck access route to the construction zone for a period of approximately 4.5 years. This would temporarily reduce the amount of storage space available in the yard. Based on the large amount of parking available in the vicinity, it is likely that replacement storage space would be available. The property would be fully restored once construction is complete.

The rehabilitation of the existing North River Tunnel would not include construction work that could affect the freight railroad tracks, since all construction related to the rehabilitation would occur in the tunnel or nearby staging areas along Tonnelle Avenue.

5B.6.8 HUDSON RIVER MARITIME TRAFFIC

As discussed in Chapter 3, "Construction Methods and Activities," Section 3.3.5, the Preferred Alternative would require in-water construction activities in the Hudson River in a small area approximately 700 feet from the New York bulkhead (200 feet past the pierhead line) for a period of approximately 15 months. In this area, ground improvements (most likely via jet grouting) would be made during construction to harden the soil above the tunnel.

The area in which ground improvement would be required is approximately 550 feet long and 120 feet wide. In this area, a cofferdam would be installed and ground improvement would be conducted from barges moored outside the cofferdam. The proposed ground improvement work would be conducted in three sections (each approximately 150 to 200 feet in length) to minimize the area that is disturbed at any one time. A work zone approximately 100 feet wide around the cofferdams would be established for barges and other equipment. (It is anticipated that typical barges used would be approximately 30 feet wide by 90 feet long.) Workers would travel to the

construction zone on small boats (i.e., tugboats or dinghies) from established piers on the Hudson River shoreline. Two boats are likely to be needed one for the crew and the other for material delivery. The barges around the cofferdam would be permanently moored in place until the construction in the river is complete.

The majority of the work area would be located within the wing channel on the New York side of the river; the westernmost approximately 100 feet of the work area would be located within the main navigation channel. In combination with the 100-foot work zone outside the cofferdam, this would result in an approximately 200-foot intrusion into the main navigable channel (as shown in Figure 3-8 in Chapter 3, "Construction Methods and Activities"). Modifications to the river bottom would require a permit from the USACE and must meet conditions imposed by the USACE to protect the navigation channel and maritime safety.

Maritime traffic on the Hudson River in the study area includes passenger ferries operating to and from the Midtown West 39th Street, Port Imperial, and Hoboken 14th Street ferry terminals, freight and barge traffic, cruise vessels, and other commercial and recreational boats. Accordingly, during construction, safety measures would be followed to protect maritime commerce and boating safety. Measures would include notifications to mariners via the USCG, installation of lighting on barges and the cofferdam, and automatic identification system (AIS) transponders affixed to barges and the cofferdam to enable electronic locating of the cofferdam and tracking of the barges.

Considering that nearly 90 percent of the width of the main navigable channel would remain available during in-water construction, and that measures to ensure that there will be no conflicts with marine traffic will be implemented during construction, including lighting and AIS transponders, there would be no adverse impacts on maritime operations during construction of the Preferred Alternative.

5B.6.9 WEST 30TH STREET HELIPORT

If the West 30th Street Heliport is not relocated from the Project site prior to construction of the Preferred Alternative, construction activities for the Preferred Alternative would affect heliport operations.

Equipment used for the in-water construction described above could require rerouting of helicopters headed to and from the West 30th Street Heliport to avoid conflicts between aircraft and tall construction equipment.

In addition, construction activities related to ground freezing and tunneling would also affect the West 30th Street Heliport. Two to three helipads, the fueling area, and a heliport driveway and parking area would have to be closed for the full 18-month period when the ground freezing pipes are installed and remain in place. This would require the relocation of fueling facilities for the heliport. During that time, equipment related to the ground freezing would be located within the closed heliport area. In addition to the two to three helipads directly affected, there could be the need to reroute helicopters headed to and from the West 30th Street Heliport to avoid conflicts between aircraft and tall construction equipment during ground freezing and during the in-water construction activities. This activity would be subject to a permit from the FAA.

For temporary construction period impacts to the West 30th Street Heliport, the Project Sponsor would determine the specific measures and methods to mitigate the impacts identified above, in coordination with the heliport operator.

5B.7 PERMANENT IMPACTS OF THE PREFERRED ALTERNATIVE

5B.7.1 OVERVIEW

As described in Chapter 2, "Project Alternatives and Description of the Preferred Alternative," there would be no change in rail capacity in the future as a result of the Preferred Alternative and no change to the Amtrak or NJ TRANSIT commuter rail service plans in comparison to the No Action Alternative. As ridership would not change or shift to different modes as a result of the operation of the Preferred Alternative, there would also be no change in intercity and commuter passenger rail, HBLR, NYCT subway, or public bus services, compared with future No Action conditions. There would be no change in provision of freight rail, ferry or other maritime services, or service changes at the West 30th Street heliport with the Preferred Alternative. Therefore, the operation of the Preferred Alternative would not have the potential to result in any adverse impacts to transportation services operating in the Project area.

5B.7.2 INTERCITY AND COMMUTER PASSENGER RAIL SERVICE

At completion, the Preferred Alternative would consist of two major elements: the two-track Hudson River Tunnel and the rehabilitated two-track North River Tunnel.

When the Hudson Tunnel Project is complete and both the North River Tunnel and new tunnel are in service in 2030, a total of four tracks would be available for the Hudson River crossing between New Jersey and New York. Amtrak and NJ TRANSIT's NEC service between New Jersey and New York would benefit from redundant capability and increased operational flexibility for future regular maintenance activities as well as during emergencies.

All four tracks would connect to PSNY platform Tracks 1 through 18, with the North River Tunnel tracks also having access to Track 19. Eastbound trains leaving Secaucus and westbound trains leaving PSNY could each be routed on two different tracks, providing increased operational flexibility. A specific operating plan for Amtrak and NJ TRANSIT's use of the two tunnels together has not yet been developed.

At the completion of the Project, Amtrak and NJ TRANSIT would operate the same number of peak-period trains using the four tracks beneath the Hudson River as in the No Action Alternative, when only two tracks would be available. While the Project addresses maintenance and resilience of the NEC Hudson River crossing, it would not increase rail capacity, which would remain constrained at PSNY. Without additional capacity at PSNY, the proposed Hudson River Tunnel would not enable Amtrak and NJ TRANSIT to expand peak-hour service between New Jersey and PSNY. As a result, the four tracks between Secaucus Junction Station and PSNY would continue to provide a capacity of 24 trains per hour in the peak hours in the peak direction.

The Preferred Alternative would increase operational reliability on the NEC between Newark and PSNY. With two tunnels and four tracks, the Preferred Alternative would reduce the likelihood of service disruptions resulting from repair work and night and weekend outages, as compared to the No Action Alternative, and would increase the resiliency and reliability of the NEC under the Hudson River. In addition, the addition of two new tracks would provide redundancy, allowing Amtrak and NJ TRANSIT operational flexibility when trains are delayed on the tunnel tracks or when emergency repairs are needed. This service flexibility would improve the resilience and reliability of NEC train operations for Amtrak and NJ TRANSIT between Secaucus Junction Station and PSNY. In addition, by enabling Amtrak and NJ TRANSIT trains to more closely adhere to the defined train schedules, the overall reliability of operations in PSNY would be

improved. Since platforms and tracks are shared by Amtrak, NJ TRANSIT, LIRR and, by 2030, potentially Metro-North Railroad, this improvement would benefit all of the PSNY train services.

As described in Chapter 2, "Project Alternatives and Description of the Preferred Alternative" (Sections 2.5.4.5 and 2.5.6.9), the design of the Hudson River Tunnel and the rehabilitation of the North River Tunnel includes resilient infrastructure features. For example, the existing ballasted track and drainage systems in the North River Tunnel would be removed and replaced with a direct fixation track system and drainage system which would require less maintenance than is now required. The new Hudson River Tunnel would have direct fixation track system. In addition, the Preferred Alternative would include flood prevention infrastructure to lessen the potential for future flooding of both the new Hudson River Tunnel and the rehabilitated North River Tunnel during extreme weather events. As a result of these and other Project features, the four tunnel tracks would be more resilient than the existing North River Tunnel.

The Preferred Alternative would also address the Project goal of not precluding future trans-Hudson rail capacity expansion projects and allowing for connections to future capacity expansion projects, including connections to station expansion projects in the area of PSNY. This would include the improvements described above (see Section 5B.4.1.2) for the proposed Gateway Program. These potential future projects that would separately expand NEC trans-Hudson passenger rail capacity and the capacity of PSNY have been considered in the development of the Preferred Alternative.

5B.7.3 HUDSON-BERGEN LIGHT RAIL

The Preferred Alternative would cross under the HBLR tracks in Hoboken in a tunnel that would not involve any permanent modifications or changes to the HBLR tracks or operations. The ventilation facility in Hoboken for the Preferred Alternative would be adjacent to the HBLR right-of-way, but it would not interfere with or connect to the HBLR infrastructure. Therefore, the Preferred Alternative would not result in permanent impacts to the HBLR system.

5B.7.4 NEW YORK CITY SUBWAY SERVICE

Since the Preferred Alternative would not modify existing NEC train service between New Jersey and PSNY, it would not increase ridership to or from PSNY where passengers transfer between NEC passenger trains and NYCT subway trains. Therefore, the Preferred Alternative would not result in permanent impacts to the NYCT subway system.

5B.7.5 BUS SERVICE

Since the Preferred Alternative would not modify existing NEC train service between New Jersey and PSNY, it would not affect trans-Hudson travel patterns or cause ridership changes to bus services in the study area. As noted above, with the Preferred Alternative, NEC service between New Jersey and New York would benefit from redundant capability and increased operational flexibility for future regular maintenance activities as well as during emergencies. This would also benefit trans-Hudson bus service, by greatly reducing the need for commuters to transfer to buses when disruptions to NJ TRANSIT service occur.

5B.7.6 PATH SERVICE

As noted above, with the Preferred Alternative, NEC service between New Jersey and New York would benefit from redundant capability and increased operational flexibility for future regular maintenance activities as well as during emergencies. This would also benefit PATH service by greatly reducing the need for commuters to transfer to the PATH system when disruptions to NJ TRANSIT service occur.

5B.7.7 FREIGHT RAILROAD SERVICES

The Preferred Alternative would be constructed on a viaduct structure that would cross over Conrail and NYSW tracks, but not involve any permanent modifications to the tracks or train operations. Therefore, the Preferred Alternative would not result in permanent impacts to freight railroad services in New Jersey.

5B.7.8 HUDSON RIVER MARITIME TRAFFIC

The Preferred Alternative would cross beneath the Hudson River in a tunnel constructed at a depth where it would not interfere with the navigable channel in the river. The only infrastructure that would remain in the river after completion of construction would be located in the low-cover area described above, where the river bottom would be hardened. Modifications to the river bottom would require a permit from the USACE and must meet conditions imposed by the USACE to protect the navigation channel and maritime safety. This new hardened area of the river bottom would be designated as a no-anchor zone on navigation charts. With this designation in place, mariners would be aware of the anchorage restrictions in this area, and the Preferred Alternative would not result in permanent adverse impacts to maritime traffic in the Hudson River.

For a portion of this hardened river bottom area, the jet grouting would extend up to 2 feet above the bottom of the river, to provide additional cover above the tunnel crown. However, the hardened area of the river bottom would still be below the depth of the authorized navigation channel. The characteristics of the hardened area would be within the practical range of removal by both hydraulic and mechanical type dredging equipment. Therefore, hardened area of the river bottom would not impede future dredging to maintain the navigational channel.

As noted above, with the Preferred Alternative, NEC service between New Jersey and New York would benefit from redundant capability and increased operational flexibility for future regular maintenance activities as well as during emergencies. This would also benefit trans-Hudson ferry service, by greatly reducing the need for commuters to transfer to ferries when disruptions to NJ TRANSIT service occur.

5B.7.9 WEST 30TH STREET HELIPORT

If the West 30th Street Heliport is not relocated from the Project site prior to construction of the Preferred Alternative, once construction of the waterfront portion of the Project alignment is complete, helicopter operations could resume and there would be no permanent impact to the heliport as a result of the Preferred Alternative.

5B.8 MEASURES TO AVOID, MINIMIZE, AND MITIGATE IMPACTS

Construction activities for the Preferred Alternative will include implementation of the following mitigation measures to avoid, minimize, or eliminate adverse impacts on transportation services:

- Construction work in the vicinity of active passenger rail tracks on the NEC and near PSNY, including at the ladder tracks and yard tracks to the west of PSNY, would be carefully staged to minimize impacts to train operations. To the extent possible, this work would be conducted during nights and weekends to avoid the need for daytime train outages. If possible, work in A Yard would be coordinated with and perhaps accelerated by the Penn Station Infrastructure Renewal Project, a maintenance program part of which is planned to be undertaken during the summer months of 2018.

- If any construction work at or near the Hoboken staging area is within the operating envelope of the HBLR, it would be scheduled during off-peak time periods to avoid impacts on HBLR services.
- Because of the proximity of the temporary access road to the HBLR tracks, any required special safety protocols would be coordinated with NJ TRANSIT and the operators of the HBLR.
- Traffic mitigation measures, including an MPT plan, would be implemented (as described in Chapter 5A, "Traffic and Pedestrians," Section 5A.8) to minimize delays to traffic on roads where construction would occur or that would be used as truck routes for construction traffic. This would address potential impacts to bus service on those roadways.
- Construction activities at the new viaduct over the Conrail and NYSW right-of-way would be scheduled in coordination with the freight rail companies to avoid impacts on their operations.
- Construction in the Hudson River would be conducted in three stages to minimize the area that is disturbed at any one time. Safety measures would be followed to protect maritime commerce and boating safety, including notifications to mariners via the USCG, installation of lighting on barges and the cofferdam, and AIS transponders affixed to barges and the cofferdam to enable electronic locating of the cofferdam and tracking of the barges.
- For temporary construction period impacts to the West 30th Street Heliport, the Project Sponsor would determine measures to mitigate these impacts in coordination with the heliport operator.

The Preferred Alternative would not result in any construction period impacts to rail passenger service (i.e., intercity rail passenger service and commuter rail services); HBLR and NYCT subway service; surface bus operations; freight rail; or ferry services. In addition, the Preferred Alternative would result in improved resiliency and reliability of Amtrak and NJ TRANSIT NEC passenger rail services between Secaucus Junction Station and PSNY, which would be a benefit. Therefore, no mitigation measures are required for any of these transportation services. ✶