Chapter 5: Transportation

A. INTRODUCTION

This chapter discusses the potential effects of the Cross Harbor Freight Program (CHFP) on regional freight movement and identifies regional and local components of the region's transportation system that could be affected by the Build Alternatives. The project would result in a freight transportation mode shift from truck to rail and waterborne modes, as well as route shifts for trucks, and to a smaller extent rail. At the regional level, the project would improve mobility by reducing truck travel on regional roadways and existing harbor and Hudson River crossings, with some of the alternatives reducing truck vehicle miles traveled (VMT) and truck hours of travel (VHT). At the same time, the project alternatives would result in localized effects on specific elements of the transportation system, including increased truck traffic on local roadways near new and expanded freight facilities. These local effects are broadly discussed.

This chapter begins with a summary of the methodology used to quantify the demand for the Build Alternatives, conduct transportation network analyses and to evaluate the potential local effects. The chapter then discusses the existing regional freight transportation system as well as local traffic conditions, where appropriate. Finally, the chapter discloses the potential effects of the project alternatives, identifies the need for further study in any Tier II documentation, and identifies possible types of measures for mitigation of potential adverse effects.

B. METHODOLOGY

MARKET DEMAND

The regional transportation and environmental effects of the Build Alternatives are largely driven by the market demand for those alternatives. An extensive study of the existing freight movement market, freight movement logistics, and demand was undertaken for this project, as described in **Appendix A**, "Market Demand." The goal of the study was to identify those freight movement markets that could potentially be diverted from existing crossings to using one of the proposed Build Alternatives. The markets are listed below and described in more detail in **Appendix A**.

- *Rail via Selkirk*. This is freight that currently crosses the Hudson River by rail at Selkirk or Mechanicville, New York, near Albany, well north of the Build Alternative crossings shown in Figure 1-2. Cross Harbor improvements have the potential to re-route some of the traffic from northern rail crossings to Build Alternative rail crossings that provide much shorter routes to and from geographic Long Island.
- *Rail Drayage*. This is freight that either originates in or is destined for the 54-county Cross Harbor modeling study area, shown in Chapter 1, "Purpose and Need" (Figure 1-6), arriving and departing through a combination of rail and truck modes.

- *Container Drayage*. This is international container traffic—moving through the Port Authority of New York and New Jersey (PANYNJ) marine terminals in northern New Jersey—which has a landside origin or destination east of the Hudson River.
- *Other Short Haul Truck*. These are mostly short-haul truck trips of less than 400 miles, other than rail drayage and container drayage trips. The rail drayage and container drayage trips are analyzed separately here because their connection to rail yards and seaports offers special opportunities for the CHFP. However, rail drayage and container drayage represent a relatively small share of overall short-haul truck trips, so the remainder of short-haul truck trips and some long-haul truck trips are grouped into this separate freight market category.
- *Truck Reroute.* These are truck trips, the population of which consists mostly of short-haul trips, that currently use one of the existing Hudson River crossings to travel to or from the east-of-Hudson region. This is a potential market for the Truck Ferry or Truck Float Alternatives, as these alternatives would provide an alternate truck route crossing the Hudson River.
- *Study Area Long-Haul Truck*. Truck trips to and from the modeling study area longer than 400 miles present an important market opportunity for truck-to-rail diversion, because as travel distances become longer, rail service (particularly intermodal rail service) becomes more competitive with trucking.
- *Through Trip Long-Haul Truck*. Trips that have neither an origin nor destination within the modeling study area. The area analyzed includes all crossings between the Outerbridge (New Jersey to the southern end of Staten Island) and I-90 (the Massachusetts Turnpike).

Working with these categories of freight movement markets, the market potential for each project alternative advanced for further study in this EIS was carefully evaluated by quantifying the total market potential, and developing levels of service (cost, speed, and reliability) for different alternatives, as described in **Appendix A**.

The results of the market demand analysis provide a comparison of the alternatives with respect to their projected ability to divert freight from existing modes (mainly trucks) and existing routes (congested Hudson River crossings). The potential to shift the mode of freight transport and decrease truck volumes on existing routes are important measures in determining the benefits of an alternative.

BUILD ALTERNATIVE SCENARIOS CONSIDERED IN THE DEMAND MODEL

Waterborne Alternatives

Waterborne Alternatives include a variety of technologies that would carry freight using marine vessels and have the potential to capture the demand for merchandise rail, intermodal rail, international and domestic container, and trucking freight. Truck Ferry and Truck Float Alternatives may target a specific market that would not be directly affected by other alternatives. The Enhanced Railcar Float Alternative has the potential to capture the demand for carload, intermodal, and international container freight, while the Lift On-Lift Off (LOLO)/Roll On-Roll Off (RORO) Container Barge Alternatives would only capture certain international and domestic container demand.

Several potential terminals are under consideration for the Waterborne Alternatives, as discussed in Chapter 4, “Alternatives.” The demand is not affected by the selection of a particular terminal in the same geographic area (for example, along the Brooklyn waterfront) and is only slightly affected when the terminals are further apart (for example Brooklyn vs. Bronx or New England).

Therefore, for the purposes of the demand model, the potential terminals for each of the Waterborne Alternatives were grouped by geographic area, in cases where the demand would not be affected by the choice of location within that area.

In principle, each of the Waterborne Alternatives could provide service to multiple terminals, allowing freight to be delivered to the terminal closest to the destination market. However, the option to develop multiple terminals would increase project costs, as infrastructure improvements would be needed at more than one location, while the market demand and associated benefits would not substantially increase. Providing service to single or multiple terminals would be essentially a business decision (a more appropriate Tier II topic) and would be affected by existing uses, closeness to concentrations of customers, and pre-build conditions of terminals.

Rail Tunnel Alternatives

The Rail Tunnel Alternative was modeled assuming three different operating scenarios affecting the potential to capture through trip long-haul truck markets, reflecting different level of service penalties, including time and cost of fillet/toupee operations (converting double-stack containers to single-stack, and vice-versa), time and cost of interchanges between different railroads, etc. The operating scenarios were formulated as follows:

- “Seamless” operation reflects the best-case scenario, in which each railroad can provide the equivalent of end-to-end service without interchange penalties. Under such a Seamless Operating Scenario, system-wide operating characteristics, interchanging, and pricing schemes were assumed to be less burdensome than they are presently. In this scenario the service would operate as (or as if) one Class I railroad operates through the entire Southern Gateway system, which consists of the entire Oak Island-Greenville-Tunnel-Long Island route.
- “Base” operation reflects typical operating characteristics, interchanging and pricing schemes that resemble present rail service. Under the Base Operating Scenario, a rail trip between Oak Island Yard and southwestern Connecticut via the tunnel would operate over track owned by five different railroads and freight rights owned by four. The trip would require three interchanges, each of which could incur a time penalty ranging from several hours to a full day. For a hypothetical rail trip between Oak Island Yard and southwestern Connecticut, freight would be carried over Consolidated Rail Company (Conrail) tracks from Oak Island Yard to Greenville Yard, where it would interchange with New York-New Jersey Rail (NYNJR), which would operate the crossing. At 65th Street, the train would be handed off to New York and Atlantic, which would then interchange with CSX Corporation (CSX) or Providence and Worcester (PW) at Fresh Pond Yard.
- “Limited” operation reflects more significant interchange penalties that would discourage or limit the amount of through traffic. The Limited Operating Scenario accounts for the potential unreliability of timely connecting services, unfavorable operating agreements, service disruptions, or other situations that could result in regular time and cost penalties.

To fully realize the potential benefits of the Rail Tunnel Alternative and the associated improvements to the rail system, rail yards, and terminals, cooperation from a number of participants involved in moving freight to and through the area would be necessary. This would require changes in the institutional organization by New York and New Jersey area public agencies and the private freight railroads. The main goal of reorganization would be to streamline the current operational structure, and align commercial interests of the railroads with the goal of maximizing the public return on the proposed investments. Improved operation across the lower Hudson River and New York Harbor would accrue benefits in the New York and New Jersey area, but would also form the prerequisite for implementing viable service into New England. As the complexities associated with New England service are distinct, and transcend the jurisdiction of PANYNJ and other New York and New Jersey entities, they are discussed separately from the strategies for institutional improvements in the narrower Cross Harbor region. The following local institutional changes are identified for consideration:

- Grant Cross Harbor freight operations on Long Island to a single operator, increasing operating efficiencies and reducing delays though better scheduling. The operator would secure full control over the tunnel operations, including switching activities at both Greenville Yard and 65th Street. This arrangement would ensure the proper coordination of train and tunnel operations and offer higher total freight revenues for the operator, and lower costs for handling freight over this route. This would improve the financial viability of the tunnel, potentially reducing overall cost to a level that is more price competitive with other transportation options.
- Building upon the operational consolidation described above, to improve efficiency, the tunnel operator should be allowed to access Oak Island Yard for pick-up and drop-off of Long Island bound freight. This would ensure optimal coordination across the entire Southern Gateway system route and further minimize delays that might occur at hand-off between the parties.

For through traffic, an operator focusing on marketing strategies and close cooperation with Amtrak, Metro-North, as well as other freight rail carriers serving New England is most likely to achieve the modest potential projected for this route. However, the exclusive freight rights over Amtrak's Hell Gate line and Metro-North currently held by CSX would have to be released. Even if access to this route can be gained, its attractiveness for freight is limited due to restrictive operating conditions caused by extensive passenger train operations, weight and clearance limits that hamper the use of many modern freight cars, as well as high usage fees over Amtrak-owned segments.

Although the range of operating scenarios (Limited, Base, and Seamless) is possible with the Rail Tunnel with Shuttle Service Alternative, Rail Tunnel with Chunnel Service Alternative, Rail Tunnel with Automated Guided Vehicle (AGV) Technology Alternative, and Rail Tunnel with Truck Access Alternative, only the Base Operating Scenario is analyzed quantitatively, as that is the most likely of the three operating scenarios, as it assumes that the ownership of the rail network and interchanges between railroads in the region will be handled similarly to how they are handled today.

REGIONAL RAIL NETWORK MODELING

As described in Chapter 4, "Alternatives," a number of the project alternatives require infrastructure enhancements that could lead to substantial changes in regional rail operations, in addition to changes required to accommodate rail traffic growth under the No Action Alternative. Alternatives that have the potential to affect the rail network (i.e., those that use rail) include the Enhanced Railcar Float Alternative and all of the Rail Tunnel Alternatives. Waterborne Alternatives other than the Enhanced Railcar Float Alternative would not generate additional traffic on the rail network.

A rail network operations analysis was performed for the Enhanced Railcar Float and Rail Tunnel Alternatives by developing high-level projections of changes to rail traffic density as a result of each alternative and evaluating the broad implications in terms of rail network capacity. The methodology for conducting this analysis is described in detail in **Appendix A**; an overview is provided below.

A rigorous methodology was used to perform this assessment, using a train scheduling and line capacity modeling tool. The model is capable of evaluating different scenarios regarding train volumes, equipment types, and the distribution of origins and destinations. The output is a high-level traffic density projection, and an assessment of capacity constraints defined by levels of service (LOS) on a scale from A to F (see **Table 5-1**).

Table 5-1
Volume/Capacity Ratios and Level of Service (LOS) Grades

LOS Grade	Description		Volume/Capacity Ratio
A	Below Capacity	Low to moderate train flow with capacity to accommodate maintenance and recover from incidents	0.0-0.2
B			0.2-0.4
C			0.4-0.7
D	Near Capacity	Heavy train flow with moderate capacity to accommodate maintenance and recover from incidents	0.7-0.8
E	At Capacity	Very heavy train flow with very limited capacity to accommodate maintenance and recover from incidents	0.8-1.0
F	Above Capacity	Unstable flows; service breakdown conditions	>1.0

The development of the rail network model began with a representation of the rail network in the 54-county modeling study area, plus extensions over key corridors where changes in traffic density resulting from the project alternatives might be reasonably expected to have an impact on overall traffic densities. Key corridors integrated in the network included the Norfolk Southern (NS) and Conrail Lehigh Line, Conrail National Docks Secondary, CSX West Trenton Line, CSX River Line, CSX Hudson Line, LIRR Main Line, the New York & Atlantic Railway (NY&A) Bay Ridge Branch, the First Avenue Line in Brooklyn, and the LIRR Lower Montauk Branch. The corridors are mapped in **Figure 5-1**. Attributes such as number of tracks, signal system, and number of interchanges between different rail carriers were incorporated into the network links. The Oak Ridge National Laboratory's national rail network attributes of segment mileage, ownership, subdivision, number of tracks, track class and type, and control system were used as default values in the rail network, and adjustments were made based on stakeholder input.[1]

[1] The Oak Ridge National Laboratory's Center for Transportation Analysis (CTA) Railroad Network is a geographic representation of the North American railroad system, containing all rail lines that have been active since 1993. The network is designed for network programming, traffic analysis, and mapping applications. The database includes physical characteristics, such as number of tracks and signal system, and ownership and haulage rights agreements attributes. The CTA Railroad Network is the rail network listed on FHWA's list of recommended Freight Planning Data Sources, available from: http://www.fhwa.dot.gov/planning/freight_planning/data.cfm.

FIGURE 5-1
Modeled Rail Network Segments
CROSS HARBOR FREIGHT PROGRAM

Each of these corridors was further subdivided into 42 segments aggregated by corridor, state, number of tracks, type of control system, owner, and projected train volumes. Segments can be disjointed, provided the above characteristics are the same. The 38 segments, plus two segments representing the Enhanced Railcar Float Alternative and the Tunnel Alternatives, are listed in **Table 5-2**.

Table 5-2
Modeled Rail Network Segments

Segment	Corridor	State	Miles	No. of Tracks	Control System
1	Conrail Lehigh Line	NJ	9.4	1	C - centralized traffic control
2	Conrail Lehigh Line	NJ	6.1	2	C - centralized traffic control
3	Conrail Lehigh Line	NJ	7.6	2	C - centralized traffic control
4	CSX West Trenton Line	NJ	24.4	1	C - centralized traffic control
5	CSX West Trenton Line	NJ	1.5	2	B - automatic block signals
6	CSX Philadelphia Subdivision	PA	11.9	2	C - centralized traffic control
7	CSX Philadelphia Subdivision	PA	3.4	2	C - centralized traffic control
8	CSX Philadelphia Subdivision	PA	5.6	2	C - centralized traffic control
9	CSX Philadelphia Subdivision	PA	4.4	2	C - centralized traffic control
10	CSX Philadelphia Subdivision	PA	1.8	2	B - automatic block signals
11	NS Lehigh Line	PA	51.0	2	B - automatic block signals
12	NS Lehigh Line	PA	0.2	2	C - centralized traffic control
13	NS Lehigh Line	NJ	34.5	1	C - centralized traffic control
14	NS Lehigh Line	NJ	6.4	1	C - centralized traffic control
15	NS Lehigh Line	NJ	0.1	1	C - centralized traffic control
16	NS Lehigh Line	PA	1.1	1	C - centralized traffic control
17	NS Lehigh Line	PA	43.1	2	B - automatic block signals
18	NS Lehigh Line	PA	9.1	2	C - centralized traffic control
19	Conrail River Line	NJ	0.6	1	B - automatic block signals
20	Conrail National Docks Secondary	NJ	3.4	2	C - centralized traffic control
21	Conrail National Docks Secondary	NJ	9.1	1	B - automatic block signals
22	CSX River Line	NJ	6.3	1	C - centralized traffic control
23	Conrail River Line	NJ	14.9	1	C - centralized traffic control
24	CSX River Line	NY	111.5	1	C - centralized traffic control
25	CSX Hudson Line	NY	4.1	2	C - centralized traffic control
26	CSX Oak Point Link	NY	3.7	1	M - manual
27	CSX Hudson Line	NY	119.5	2	C - centralized traffic control
28	CSX Fremont Secondary	NY	0.7	1	B - automatic block signals
29	CSX Fremont Secondary	NY	4.4	1	M - manual
30	CSX Fremont Secondary	NY	3.2	2	C - centralized traffic control
31	NY&A Bay Ridge Branch	NY	2.0	1	B - automatic block signals
32	NY&A Bay Ridge Branch	NY	6.1	1	B - automatic block signals
33	NY&A Bay Ridge Branch	NY	3.1	1	B - automatic block signals
34	NY&A 1st Avenue Line	NY	1.0	1	M - manual
35	LIRR Lower Montauk Branch	NY	1.2	1	C - centralized traffic control
36	LIRR Lower Montauk Branch	NY	0.4	1	M - manual
37	LIRR Main Line	NY	4.2	1	B - automatic block signals
38	LIRR Main Line	NY	19.6	1	C - centralized traffic control
39	LIRR Main Line	NY	20.0	2	C - centralized traffic control
40	NYNJR Greenville	NJ	1.3	1	M - manual
41	NYNJR Cross Harbor Railcar Float	NY/NJ	4.5	1	M - manual
42	NYNJR Cross Harbor Rail Tunnel	NY/NJ	4.5	2	C - centralized traffic control

Notes:
CSX = CSX Corporation
LIRR = MTA/Long Island Railroad
NS = Norfolk Southern
NY&A = New York and Atlantic Railway
NYNJR = New York New Jersey Rail
Sources: Cambridge Systematics Volume Projections, Oliver Wyman Analysis

Train volumes were projected by applying the following annual growth rates to 2012 train volumes:[1]

- Carload freight – 1.70 percent annual growth
- Intermodal freight – 1.72 percent annual growth
- Passenger trains – 0 percent annual growth

These growth rates were applied equally to loaded and empty cars. The 0 percent growth in passenger trains does not reflect a belief of no growth in passenger service, but instead, it allows isolation of the freight service to determine the rail congestion impacts of increased freight business.

The practical capacity of the rail segments is derived from the values in **Table 5-3**, which uses the methodology established by an Association of American Railroads (AAR) study on national rail freight network capacity.[2] The number of tracks and the type of control (signaling) system are used to determine the lower and upper bounds on the number of trains per day. This assumption is then adjusted to account for the mix of freight and passenger traffic, since a rail line with a homogeneous fleet of trains all running at the same speed has a higher capacity than a rail line with a mixed fleet of trains running at different speeds.

Table 5-3
Potential Capacity Ranges by Track Characteristic

No. of Tracks	Control	Capacity (trains/day)		Adjustment for Train Mix
		Lower Bound	Upper Bound	
1	Manual	15	20	10.6
1	ABS	20	25	10.6
1	CTC	30	45	31.8
2	Manual	35	40	10.6
2	ABS	45	80	74.2
2	CTC	70	100	63.6
3	CTC	115	150	74.2

Three types of control systems were evaluated as capacity factors[3]:

- Automatic Block Signaling (ABS) – is a signal system that controls when a train can advance into the next track block by determining if another train is already occupying that block. A block is a section of track with traffic control signals at each end.

[1] Annual growth rates for the period of 2007 through 2035 were provided by Cambridge Systematics with input and validation provided by freight railroads operating in the region. These growth rates were applied to 2012 train volume data, which was the latest available at the time of the analysis.
[2] A more detailed explanation can be found in the "National Rail Freight Infrastructure Capacity and Investment Study," prepared for the Association of American Railroads, prepared by Cambridge Systematics, September 2007.
[3] Positive Train Control (PTC), which has been maintained by the Federal Railroad Administration for selected rail lines in the U.S., is not considered in this analysis. As currently defined, PTC will be overlaid on top of the existing control system providing additional safety, but no material increase in effective line capacity or train speeds.

- Centralized Traffic Control (CTC) – is a system that uses electrical circuits in the tracks to monitor the location of trains, allowing railroad dispatchers to control train movements from a remote location, typically a central dispatching office. CTC increases capacity by detecting track occupancy and allowing dispatchers to safely decrease the spacing between trains.
- Manual (No Signal or Track Warrant Control) – is the least expensive and lowest capacity train control system, and is generally reserved for low-volume track. It requires train crews to obtain permission or warrants before entering a section of track; usually by radio, phone, or electronic transmission from the dispatcher.

The practical capacity afforded by these signaling systems was then converted into a theoretical capacity by dividing the practical capacity by 0.7. This theoretical threshold allows a "capacity buffer" to maintain fluidity of operations (including accounting for maintenance, traffic variability, unique or special events or circumstances) without sacrificing system performance and reliability. This theoretical capacity threshold is consistent with the AAR's recommended rail level of service analysis approach.[1]

Next, a current year traffic database, utilizing the Surface Transportation Board's Full Waybill Sample, was assigned to the rail network using a "least path" assignment algorithm, which selected routes from the rail network based on the route that offers the least resistance due to distance, cost, and interchanges. This process developed estimates of current rail traffic densities by line.

The future-year baseline growth was estimated using the TRANSEARCH growth forecasts, and then assigned over the network. TRANSEARCH tonnage was converted to trains assuming that carloads average 70 tons each, intermodal containers average 20 tons, and that intermodal and carload trains average 110 cars in length. Fractional values were used to represent shorter train lengths on several segments of the network. For example, east of Fresh Pond Junction, each carload train was counted in the model as 0.3 trains due to the shorter train lengths operating in that area.

The effects of changes in cross-harbor rail infrastructure and services—in terms of changes in volumes over existing and new infrastructure—were modeled. Current and projected intermodal unit origination/termination counts were also estimated for key facilities in the terminal area, including the Conrail and CSX River Line, Conrail and NS Lehigh Line, Conrail National Docks Secondary, CSX West Trenton Line, CSX Hudson Line, LIRR Main Line, and NY&A Bay Ridge Branch. Each section of rail line was graded in terms of current capacity, traffic mix, service schedules, signaling, dispatching procedures, time-of-day peaking factors, and other attributes. Current and projected line densities were then used to identify where line capacity issues may arise in the future, and, where possible, reflect the extent to which these issues arise from general economic growth versus the impacts of the CHFP.

RAIL FACILITY OPERATIONAL EVALUATION

For yards and facilities associated with the proposed alternatives, a preliminary evaluation was undertaken to identify potential locations for yards and facilities, minimum yard sizes needed, and any infrastructure needs.

---

[1] *National Rail Freight Infrastructure Capacity and Investment Study*, prepared for the Association of American Railroads, prepared by Cambridge Systematics, September 2007.

As is appropriate for a Tier I EIS, the evaluation of rail yards was conducted at the concept level, and was aimed at validating the functionality of proposed yard locations with respect to the Build Alternatives. The impact of rail operations on the proposed yards would be related to train frequency, train length, and transloading needs. Therefore, the need for facility expansion was approximated based on location, static total yard capacity, receiving and departure capability, size of storage, the longest train that could be accommodated, connectivity to main lines, transloading capability, and road/highway access. Order of magnitude cost estimates presented in Chapter 4 for the construction of the alternatives were developed based on these high-level estimates.

Detailed operational analyses of each existing and proposed rail yards would be conducted in any subsequent Tier II analyses to assess whether the proposed freight facilities could serve the demand with acceptable levels of service.

REGIONAL HIGHWAY NETWORK MODELING

The analyses of regional traffic effects focused on two main indicators. First, changes in regional truck VMT and VHT, by county or subregion would indicate effects on overall mobility in each county or subregion. The VHT and VMT forecasts were based on estimates derived from a regional travel demand modeling tool derived from NYMTC's Best Practice Model (BPM) and NJTPA's Regional Transportation Model-Enhanced (RTM-E).[1] This travel demand model tool sufficiently estimates changes in VMT and VMT in the 23-county analysis area, shown in **Figure 5-2**, consisting of:

- The 10 NYMTC counties, including all five New York City boroughs/counties, the two Long Island counties—Nassau and Suffolk, and the three Hudson Valley counties of Westchester, Rockland and Putnam; and
- The 13 NJTPA counties, including Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren.

Second, changes in traffic volumes on major roadways and harbor and Hudson River crossings in the metropolitan region as a result of the Build Alternatives in 2035 were also evaluated. Traffic effects, specifically for the harbor and Hudson River crossings, Staten Island bridge crossings, the East River crossings, and selected "inland" roadways, are discussed. The analyses are based on the project's travel demand model and focus on assessing the ability of the alternatives to reduce the overall regional and subregional VMT and VHT, and the volume of commodity trucks on these crossings and roadways. Commodity trucks are analyzed specifically because they carry the types of goods that would be diverted with the Build Alternatives.

LOCAL TRAFFIC ASSESSMENT

The Build Alternatives would reduce the volume of trucks on the regional highway network, but would increase truck activity at new or existing transfer yards. The volume of truck trips generated at each freight facility was determined using the freight forecast model developed for

[1] The BPM and RTM-E model networks represent existing highway networks and future (2035) highway networks, and take into account all highway projects included in the regional Transportation Improvement Program (TIP) project lists for each region. Highway network improvements such as the Goethals Bridge replacement, Bayonne Bridge Navigational Clearance Program, among others, are represented in the 2035 networks.

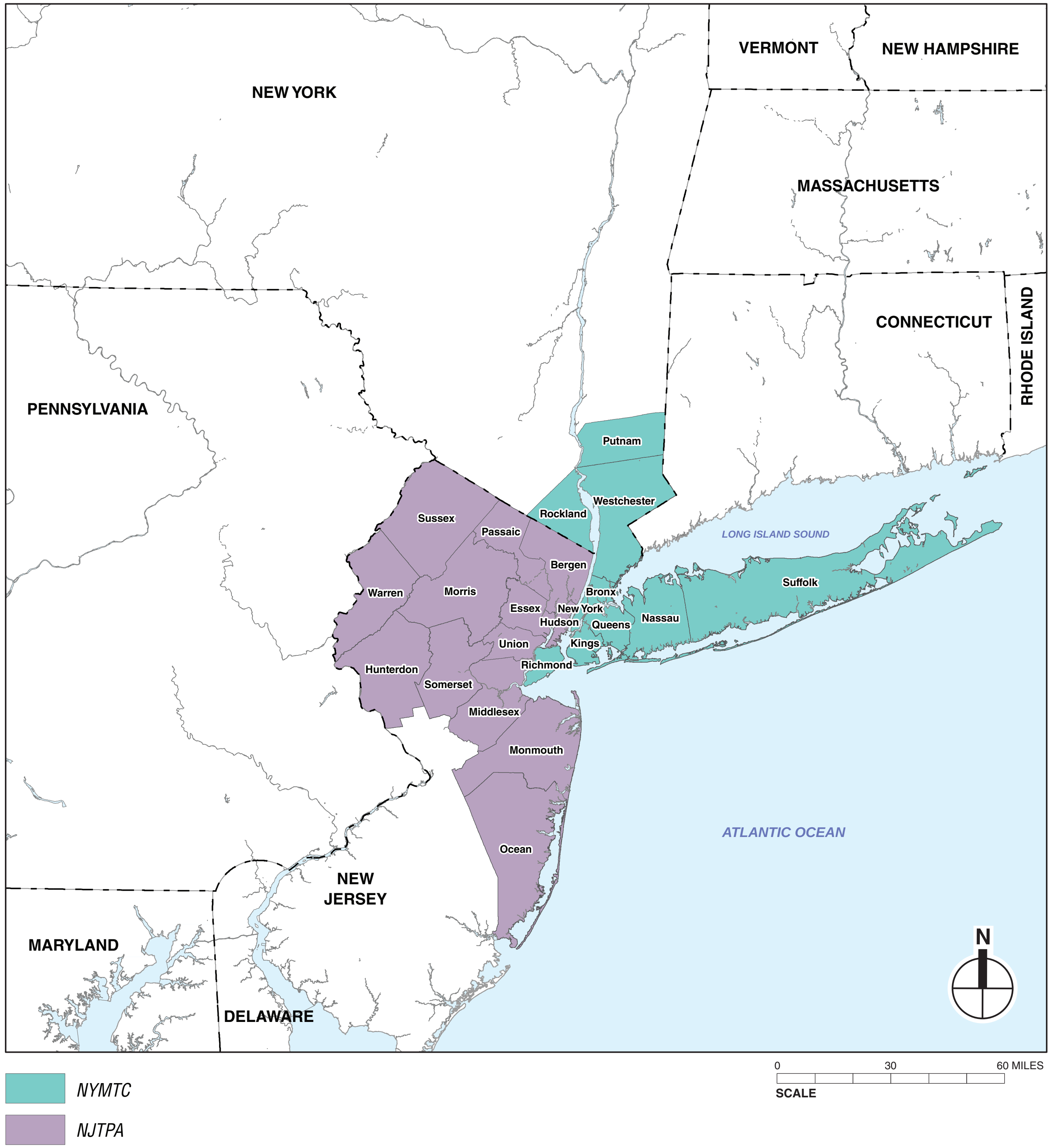


FIGURE 5-2
Regional Environmental Analysis Study Area

this project. This Tier I assessment focused on identifying intersections for analysis during any future Tier II documentation.

The following list identifies intersections that would potentially require detailed analysis. Note that this list is based on an initial assessment and that changes may be needed once more detailed information on trip generation, assignment, and scheduling is developed as part of Tier II documentation.

OAK ISLAND YARD

- Frontage Road and the I-78 on- and off-ramps
- Critical ramp weaving areas between I-78 and Routes 1 and 9

PORT NEWARK/PORT ELIZABETH

- North Avenue and Ikea Drive
- North Avenue and Scargo Earhart Drive
- I-95 on- and off-ramps and Route 81 toll facility
- Port Street ramps to and from I-78 and Route 1/9

GREENVILLE YARD

- Port Jersey Boulevard and Colony Road
- Critical ramp weaving areas on Port Jersey Boulevard to and from I-78 and Route 440

SOUTH BROOKLYN MARINE TERMINAL

- 39th Street and first Avenue
- Off-ramps of I-278 on 38th and 39th streets
- Fourth Avenue and 38th and 39th streets
- 58th Street and 6th Avenue

RED HOOK

- Van Brunt Street and Delevan Street
- Van Brunt Street and Hamilton Avenue
- Degraw Street and Columbia Street
- On- and Off-ramps of I-278 to and from Columbia Street

HUNTS POINT

- Two intersections of Halleck Street and Food Center Drive
- Bruckner Boulevard and Edgewater Road
- Bruckner Boulevard and Bryant Street
- Bruckner Boulevard and Tiffany Street
- Bruckner Boulevard and Leggett Avenue

51ST STREET YARD AND 65TH STREET YARD

- 2nd Avenue and 39th Street
- 3rd Avenue and 39th Street
- 2nd Avenue and 58th Street
- 3rd Avenue and 58th Street
- 3rd Avenue and 60th Street
- 6th Avenue and 60th Street
- 6th Avenue and 65th Street

EAST NEW YORK YARD

- Linden Boulevard at Van Sinderen Avenue
- Linden Boulevard at Avenue D
- Atlantic Avenue at Pennsylvania Avenue
- Atlantic Avenue at Rockaway Avenue
- Pitkin Avenue at Junius Street
- Pitkin Avenue at Van Sinderen Avenue

MASPETH YARD

- Grand Avenue and Page Place
- Laurel Hill Boulevard and 48th Street
- Laurel Hill Boulevard and 56th Drive
- Maurice Avenue / Maspeth Avenue / 58th Street / 56th Terrace
- Grand Avenue and Rust Street
- Grand Avenue and Flushing Avenue
- Grand Avenue and Eastbound and Westbound LIE Service Roads
- Van Dam Street and Greenpoint Avenue/Review Avenue
- Laurel Hill Boulevard and 56th Road
- 48th Street and 56th Road
- 48th Street and 53rd Avenue
- 58th Street and Westbound LIE Service Road
- 58th Street and 56th Drive
- Maurice Avenue and Eastbound and Westbound LIE Service Roads
- Maurice Avenue and 56th Drive
- Meeker Avenue and Apollo Street
- Meeker Avenue and Vandervoort Avenue
- Vandervoort Avenue and Metropolitan Avenue
- Vandervoort Avenue and Grand Street

OAK POINT YARD

- Barry Street and Leggett Avenue
- Leggett Avenue and Garrison Avenue
- Bruckner Boulevard and Leggett Avenue

Rail facilities on Long Island would not be developed by PANYNJ without partners on Long Island who have jurisdiction or land in the area. Such partners may be identified in the future, but at this point the development of specific facilities outside of PANYNJ jurisdiction cannot be assumed. To illustrate the potential effect of truck traffic that would be induced on Long Island by Cross Harbor freight operation and identify the need for more detailed analyses, the Pilgrim Intermodal Terminal and Brookhaven Rail Terminal are analyzed. Therefore, as an example, the following list identifies intersections that would potentially require detailed analysis based on an initial assessment at each illustrative Long Island facility.

PILGRIM INTERMODAL TERMINAL

- County Road 106 and Crooked Hill Road
- County Road 106 and Wicks Road
- LIE Service Roadways and Crooked Hill Road
- LIE Service Roadways and Wicks Road

BROOKHAVEN RAIL TERMINAL

- County Road 101 and State Street
- County Road 101 and LIE Service Roadways

C. EXISTING CONDITIONS

As discussed in Chapter 1, “Purpose and Need,” in 2007, the base year in the most-up-to-date commodity flow databases available for this study, more than 1.1 billion tons of freight moved to, from, within, or through the 54-county freight data analysis region by all modes. Approximately 23 percent passed through the region, while 77 percent originated in or were destined for somewhere within the 54-county study area. Of the 1 billion tons traveling by truck or rail in the study area, about 81 percent of this freight moved by truck. Nearly 9 percent moved by rail (7.2 percent carload, 1.5 percent in intermodal containers or trailers). Water carried 9.4 percent of freight moving in the area, air carried 0.1 percent, and other modes, such as pipeline, carried 0.5 percent.

In addition, approximately 105 million tons of domestic freight moved by water in 2007. About 40 percent of waterborne tonnage traveled between origins and destinations within the 54-county region. About 32 percent traveled inbound to the 54-county region from an origin outside the region, and 28 percent traveled from the 54-county region to a destination outside the region.

RAIL NETWORK

WEST-OF-HUDSON FREIGHT RAIL SYSTEM

Any discussion of rail improvements serving the study area counties east of the Hudson River must first consider conditions in the west-of-Hudson region, because connections between the east-of-Hudson region and the rest of the nation must traverse the west-of-Hudson infrastructure. Unlike the east-of-Hudson region, several freight-only mainlines serve the region as part of the national rail network. The west-of-Hudson freight rail system, as part of the national freight system, carries significant intermodal and non-intermodal traffic and includes extensive facilities, many of which have been recently upgraded. This system is mainly operated by three Class I railroads — CSX Corporation (CSX), Norfolk Southern (NS), and Canadian Pacific (CP). CSX and NS own the majority of track mileage, with CP presently using CSX to gain access to New Jersey through a trackage rights agreement along the CSX River Line. Some regional and short lines connect Class I systems to local markets, notably the New York, Susquehanna and Western (NYSW), which reaches New Jersey from Binghamton, NY.

Rail Connections

The four major routes—River Line, Southern Tier Line, Lehigh Line and Trenton Line—described below are used to deliver rail freight to the west-of-Hudson region. These routes provide access from the north, west and southwest. (See **Figure 5-3**). Of the four major routes, the CSX River Line is the only freight-only line. Other lines or their segments are shared with NJ Transit.

River Line

Freight access along the Water Level Route, which runs between Chicago and Northern New Jersey via a route parallel to the southern shore of Lake Erie, the Erie Canal and the Hudson River, is routed via the CSX River Line south of Selkirk, New York. Located near Albany, trains dispatched from Selkirk Yard travel south along the west shore of the Hudson River to North Bergen, Kearny, Little Ferry, and ExpressRail Newark and ExpressRail Elizabeth yards in Northern New Jersey.[1] Speeds along the single-track 132 mile River Line range between 45-50 mph, with traffic managed by CSX using a Centralized Traffic Control system. Passenger trains are absent from this heavily used route, which has seen some lengthening and addition of passing sidings in recent years to accommodate traffic growth and improve reliability.

Southern Tier Line

The Southern Tier Line provides access by NS from Buffalo to New Jersey via Binghamton, NY. This 420-mile corridor is shared with NJ Transit/Metro-North passenger trains for a distance of 88 miles south of Port Jervis. Since 2004, local freight service between Binghamton and Port Jervis has been provided by the Central New York Railroad, with NS retaining ownership and the rights to operate through traffic. The line is mostly single-track, with a double-track alignment in place south of Suffern (31 miles). Freight train speeds of 40 mph are permitted for most of the distance. The NS dispatcher controls freight train movement as far as Suffern, where the NJ Transit dispatcher assumes control for the remaining segment to Croxton Yard. The potential conflict with passenger trains is cited as a reason for limiting its use as a heavy freight corridor, and in recent years, there has been little through freight traffic.

Lehigh Line

The third major corridor to northern New Jersey is the NS Lehigh Line from Harrisburg, PA. This route provides access to Oak Island Yard directly, and to ExpressRail Elizabeth, ExpressRail Newark, and E-Rail Terminal via the Elizabeth Industrial Track. Access to the Staten Island Railroad is also possible at Cranford Junction. This alignment, which is primarily used as a freight corridor, is single-track with a generous allocation of passing sidings to facilitate bi-directional operation. The northern-most 13 miles of the Lehigh Line consists of a

[1] The ExpressRail facilities are on-dock rail facilities at Port Newark and Port Elizabeth, which accommodate the transfer of international containers from ship to rail. A third ExpressRail facility, ExpressRail Staten Island, is located adjacent to New York Container Terminal.

7.9.14

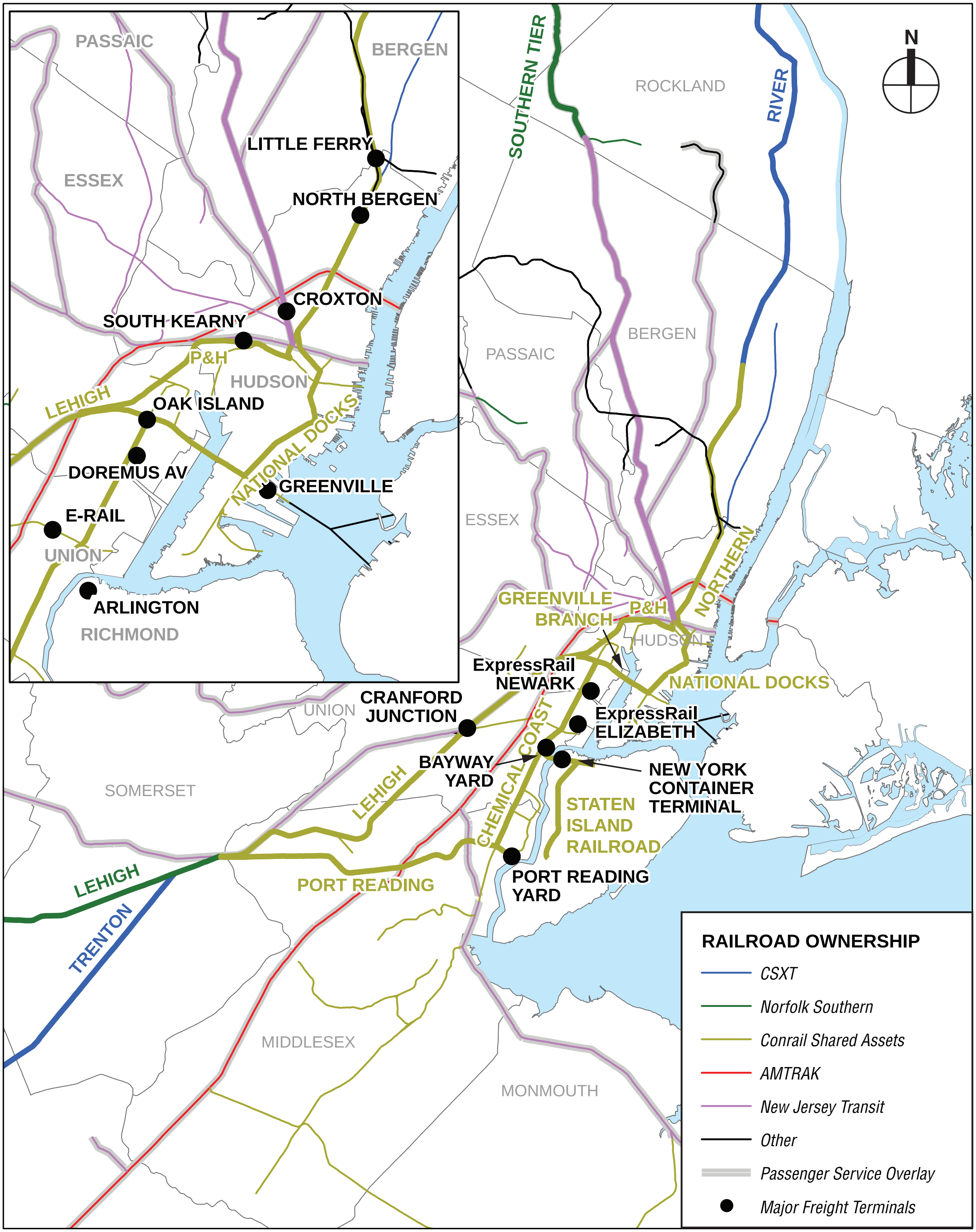


FIGURE 5-3
West-of-Hudson Freight Rail Network
CROSS HARBOR FREIGHT PROGRAM

double-track alignment, which is shared with NJ Transit's Raritan Valley Line passenger trains. Train movement is controlled by the NS dispatcher as far as Aldene, where control shifts to the NJ Transit dispatcher. Freight trains move at 40-50 mph along the length of the Lehigh Line.

Trenton Line

CSX utilizes the Trenton Line for service from Philadelphia and points south and southwest. The Trenton Line joins with the Lehigh Line at Port Reading Junction, where trains operate either directly to Oak Island Yard or diverge at CP Bound Brook to the Port Reading Secondary. The Trenton Line is a combination of single- (35 mi.) and double- (22 mi.) track alignments that accommodate speeds of 40-50 mph. The final leg of the journey to Oak Island Yard is either via the Lehigh Line (25 mi.) or the Port Reading Secondary/Chemical Coast Secondary. The CSX Main Line dispatcher controls movements over the Trenton Line, while the NS dispatcher and the NJ Transit dispatcher control movements into Oak Island Yard.

Northeast Corridor

In addition to the major corridors described above, the four-track Amtrak Northeast Corridor (NEC) is used for a small percentage of freight train movements between Newark (Oak Island) and Metuchen. The NEC, however, carries a full schedule of Amtrak and NJ Transit passenger trains (322 trains per weekday), which results in few opportunities for relatively slow freight train movements.

Conrail Shared Assets Organization

The major corridors in Northern New Jersey are supplemented with a number of local corridors that serve to route freight traffic between major yards, to effect interconnections with several railroads, and to service line-side industries. These local corridors and some of the yards they connect are operated by the Conrail and are managed by a staff whose function is to promote the seamless handling of freight trains from the several carriers serving the west-of-Hudson Region. Unlike the major corridors, these conduits are relatively short and do not sustain operating speeds in excess of 30 mph. The local corridors include:

- *Chemical Coast Secondary*. This corridor connects Perth Amboy with the Greenville Branch. Yards served by this corridor are Bayway, ExpressRail Newark, Doremus Avenue, and Oak Island.
- *National Docks Branch.* This corridor links Croxton and Oak Island Yards, with access to the Northern Branch/River Line and North Bergen Yard.
- *Port Reading Secondary*. The Port Reading Secondary connects the Lehigh Line (at CP Bound Brook) with the Chemical Coast Secondary (at CP PD, Port Reading Yard).
- *Passaic and Harsimus Line.* The Passaic and Harsimus Line (P&H) connects the Lehigh Line and the Northeast Corridor at Waverly with the Northern Running Track at Marion Junction. East of Marion Junction, the P&H passes through Journal Square Transportation Center.
- *Northern Running Track.* This line connects the Passaic and Harsimus Line at Marion Junction, via the Marion Running Track, with the National Docks Secondary and Croxton Yard in Jersey City and with the Northern Branch and River Line at North Bergen Yard at the line's northern end.

Conrail reports that portions of the freight-only connecting railroad network that links the yards used to serve industrial customers or classify carloads (known as "serving yards" and "classification yards," respectively), and intermodal terminals in northern New Jersey are in need of upgrade. Service delivery would be enhanced if some segments were double-tracked with signal and speed improvements.

The New Jersey Statewide Freight Rail Strategic Plan (2012) and the NJTPA Rail Freight Capacity and Needs Assessment to Year 2040 (2013) each identified key constraints in the rail network that could compromise the network's ability to accommodate future freight rail demand. Specifically, segments of the NS Lehigh Line, single-track sections of the CSX Trenton Line, the Conrail Lehigh Line in the vicinity of Manville and between Aldene and Newark, the Northern Branch in the vicinity of Marion Junction, the National Docks Secondary, and the CSX River Line in the vicinity of Teaneck, are portions of the network likely to approach or exceed capacity between 2020 and 2040. Accommodation of forecasted growth in total freight traffic will require an increase in capacity along key rail lines and terminals in New Jersey if railroads are to maintain current market share, let alone add service to increase it.

The State Rail Plan identified 41 freight rail projects that aim to expand capacity, improve trackage, or otherwise improve the efficiency of the freight rail system in New Jersey, including 13 projects that could improve capacity along the aforementioned lines in the northern New Jersey region. The 13 projects are listed below with their status (as of December 2012) in parentheses. It is expected that the private carriers, the Port Authority, the state of New Jersey, and NJ TRANSIT will work in public-private partnership to cooperatively fund these necessary enhancements.

- Double-track the Chemical Coast Secondary between CP Bayway and CP PD (funding subject to negotiations);
- Add a second track to the ½-mile elevated segment at Marion Junction (funding subject to negotiations);
- Add a second track to the 1.8-mile segment of the Passaic and Harsimus Line between CP Kearny and CP Hack (funding subject to negotiations);
- Construct the Waverly Loop to improve operational efficiency (funding subject to negotiations);
- Construct 2,214-foot siding along New York, Susquehanna & Western Railway (NYS&W) between mile post (MP) 6.85 and MP 7.25 in North Bergen (funded);
- Add a second track along CSX Trenton Subdivision between CP Ewing and Manville (suggested in State Rail Plan);
- River Draw improvement to allow 286K carloads (proposed);
- Rehabilitate main line track along NYS&W between MP 40.0 in Butler, NJ and MP 50.0 in Stockholm, NJ (funded);
- Add second track to NS Lehigh Line between Pattenburg Tunnel and Manville (TBD);
- Main and Bergen Line improvements to allow 286K carloads, including HX Bridge (in development);
- Reconfigure track at Port Reading Junction interlocking to improve train flow and increase capacity (under construction);
- Install TCS upgrade rail for 15.9 miles along Port Reading Secondary and extend Durham Siding for 1.5 miles (funding subject to negotiations); and
- Construct 3,432-foot siding between MP 63.71 and MP 64.36 in Sparta, NJ (eligible for NJDOT Rail Freight Assistance Program funding).

Current Operations

Freight trains reach the west-of-Hudson region primarily via the River Line from Selkirk Yard near Albany and via the Lehigh Line and Trenton Line from the south and southwest (see **Figure 5-4**. Freight volumes via the Southern Tier Line to Croxton are modest; therefore, further assessment of operations on this line is not presented here.

Service via the River Line

CSX is the owner of the freight-only River Line, a corridor that sees the movement of 30-40 trains per day. The line begins at Selkirk Yard and terminates at North Bergen Yard. This route is free of clearance restrictions and permits the movement of double stack container cars. Also, the River Line is the primary route for CSX to reach the three ExpressRail yards from the north and west.

The on-dock facility known as ExpressRail Elizabeth and ExpressRail Newark was opened in 1996 and provides for double stack Intermodal transfer service between rail, ship, barge and truck. Owned by PANYNJ and operated by Maher Terminal Inc, the terminal is configured with five tracks each 1,800 feet long. The terminal experiences 12 train movements per week, serving both CSX and NS railroads.

Trains consisting of double stack cars of international freight are terminated at South Kearny. Much of this traffic is from the west coast, and is either distributed to local markets or placed aboard ships. Traffic levels at this facility involve approximately 14 train movements per week.

Trains consisting of premium trailer-on-flat-car (TOFC) traffic are terminated at North Bergen Yard. This facility handles mostly UPS cargo, a service that requires a high degree of schedule reliability. The yard accommodates approximately 24 train movements per week.

The CSX terminal at Little Ferry is currently the least-used of its principal North Jersey facilities. This terminal can handle both TOFC and double stack operations, although the majority of the shipments served here are TOFC. Traffic levels of 30 trains per week are handled at Little Ferry.

Service via the Lehigh Line and Trenton Line

NS uses the Lehigh Line to Northern New Jersey, serving the principal Intermodal terminals of E-Rail, Croxton and ExpressRail Elizabeth and ExpressRail Newark Yards. Merchandise trains are routed to Oak Island Yard. Tracks north of Cranford Junction are shared with approximately 60 weekday NJ transit passenger trains. CSX also serves ExpressRail Newark, NYCT and Tropicana at Greenville Yard via the Lehigh Line from the west and south.

CSX operates trains on the Trenton Line, which connects with the Lehigh Line at Port Reading Junction. Trains may be operated through to Oak Island Yard or diverge at CP Bound Brook to reach Port Newark or Doremus Avenue Yards.

E-Rail Terminal is the major destination for double stack transcontinental and international marine containers and TOFC handled by NS. The terminal is operated by Rail-Bridge Terminals Inc. (a subsidiary of K-Line) and is equipped with a host of machinery and electronic data systems to support the operation. There are more than ten train movements per week serving this facility.

Service to Croxton Yard, which is owned by NS, is more frequent, with approximately 40 train movements per week. The terminal, which has double stack capability, is primarily devoted to Intermodal service. It further contains warehousing and refrigeration facilities, along with the

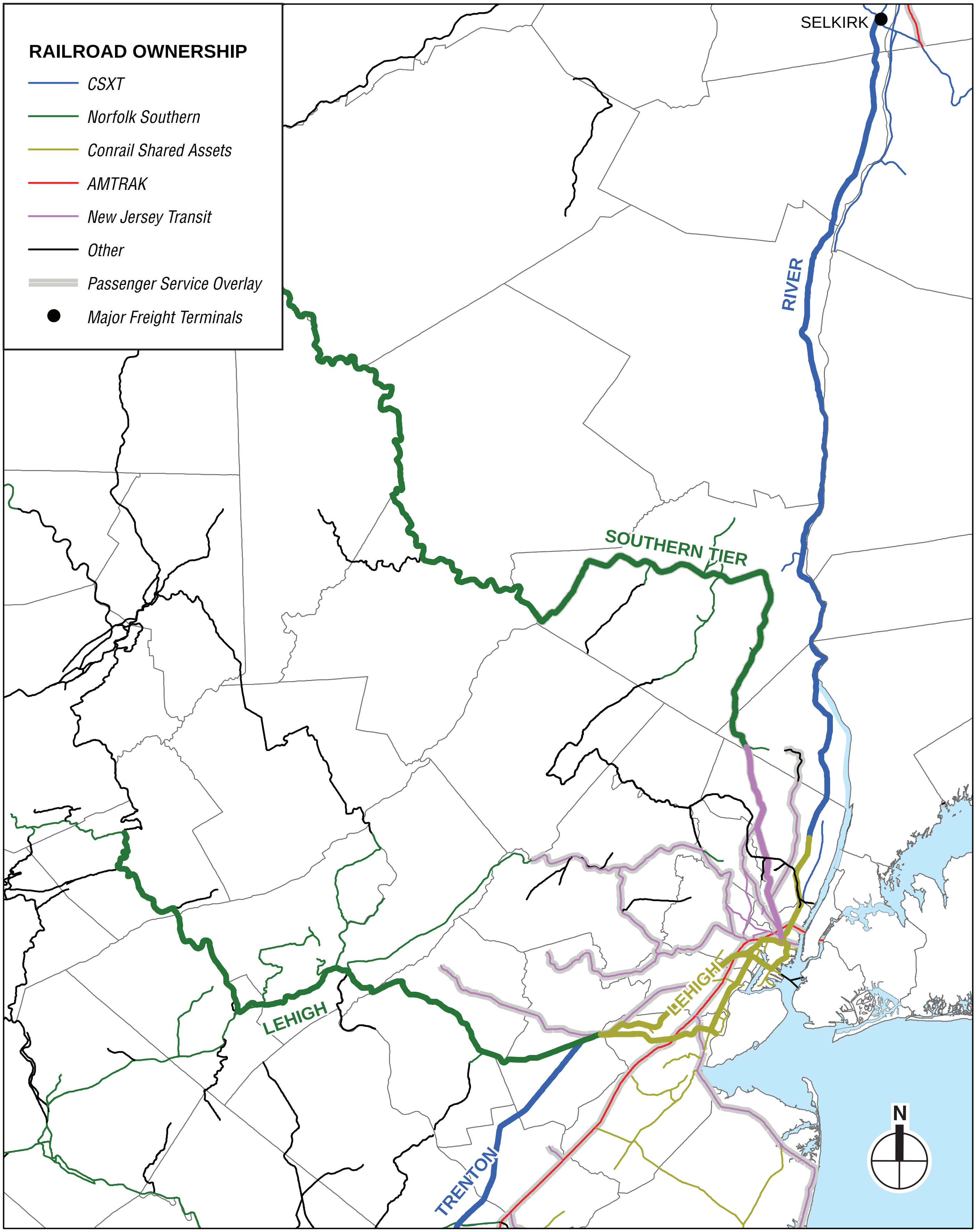


FIGURE 5-4

Primary Access Routes into West-of Hudson Region

CROSS HARBOR FREIGHT PROGRAM

requisite electronic data processing equipment to facilitate the efficient tracking and billing activities inherent with the movement of high value freight.

NS and CSX manifest trains are handled at Oak Island Yard, the primary classification facility for loose car traffic in north Jersey. This facility processes approximately 20 inbound and outbound trains for each railroad. Oak Island also contains a transload facility owned by CP. Intermodal container handling at CP's terminal was terminated in 2005.

Service to Greenville

Train movement to Greenville Yard is conducted by Conrail. Deliveries are made from CSX and NS via Oak Island Yard and the Upper Bay (moveable) bridge. Most shipments to the Cross Harbor railcar float consist of merchandise cars, although transit and commuter rail cars are also moved by railcar float. A modest volume of intermodal transload (rail-to-truck) activity is also performed at Greenville Yard and may be accommodated in the future.

Barriers and Constraints

West-Of-Hudson Constraints

Capacity at the main receiving and classification yards can be an issue when traffic levels are high, and with further growth, will become an increasing challenge. The 2012 New Jersey Statewide Freight Rail Strategic Plan and NJTPA Rail Freight Capacity and Needs Assessment to Year 2040 studies identified potential future congestion at Greenville Yard due to expected growth in traffic volumes through the yard, Kearny Yard due to the single track running out of the yard to the east, and Oak Island Yard on occasions when nearby yards such as Bayway, Port Newark, and Port Reading become backed-up with customer traffic. The Waverly Loop project will address some of the capacity issues at Oak Island, but in order to accommodate the forecasted growth in freight traffic an increase in capacity in key rail lines and terminals in New Jersey would be required, if railroads are to maintain or increase market share.

Access to East-Of-Hudson Freight Customers

Freight access from the main rail hubs in New Jersey to Long Island and other points east is limited to either a circuitous overland route or the existing NYNJR railcar float operations. Approximately one fifth of the intermodal shipments grounded in northern New Jersey are drayed to and from the east-of-Hudson service area. A substantial volume of carload freight shipments that arrive or depart from northern New Jersey is also produced or consumed in the east-of-Hudson region. With better access to the east-of-Hudson region (and concomitant supporting improvements in freight capacity), rail terminal capacity and dray truck circulation could benefit northern New Jersey. However, improved rail access to the east-of-Hudson region could induce additional rail demand, on west-of-Hudson tracks and switching yards. More traffic would be carried across the Hudson River by rail. Less traffic would need to be drayed from intermodal yards, transload terminals, and warehouses by trucks crossing the George Washington and Verrazano-Narrows Bridge.

Highway Access to Rail Facilities

Currently, most rail traffic bound for the east-of-Hudson region arrives at railheads in northern New Jersey, and is trucked across the Hudson River for delivery to regional destinations. Despite plans to improve rail connections and expand east-of-Hudson rail service, northern New Jersey is likely to remain the dominant rail transfer point for the foreseeable future. Because of this condition, access between rail terminals in northern New Jersey and New York is an integral part of the region's rail freight system. Cross Hudson drays must utilize congested river crossings, and incur tolls to reach their destination. These additional barriers translate into higher overall prices for regional shippers to offset toll and congestion costs, as well as reduced delivery reliability in the face of chronic congestion on river crossings.

EAST-OF-HUDSON FREIGHT RAIL SYSTEM

Beginning in the mid-19th century, freight movement throughout the New York and New Jersey region was extensively served by railroads. Volumes were substantial, with approximately 5,300 cars per day moved in 1937. A steep decline in railcar float traffic began in the 1950s; within 25 years, only a single railcar float operation remained across New York Harbor—between Greenville Yard and Bush Terminal (51st Street) in Brooklyn. A significant factor in the decline of New York City's rail freight service was the public investment in vehicular crossings of the harbor and the Hudson River, rather than rail crossings.

Beginning in the 1950s railroads experienced increasingly severe financial problems.[1] The federal government established Consolidated Rail Corp. on April 1, 1976, as a means to consolidate and restructure the bankrupt northeastern railroads. Critical in the financial turnaround of Conrail was the passage of the Staggers Act in 1980. This Act substantially reduced economic regulation of the railroads, and recognized that most traffic handled by the railroads was not only intra- but also inter-modally competitive. Henceforth, carriers could establish confidential rates and were only permitted to jointly set rates on traffic in which they were actual participants, rather than on all rates. They were also given the freedom to adjust reciprocal switching charges and discontinue joint rates and routes that could be proven to be inefficient. These latter provisions enabled Conrail to simplify its operations, and discontinue services that were viewed as being insufficiently profitable. The combined effect of these changes dramatically reduced rail freight access to New York City which was historically already quite isolated from the national freight rail network due to its island location and limited bridge crossings.

The rise of intermodal traffic (first trailer-on-flatcar and then container-on-flatcar) resulted in the development of large intermodal terminals in New Jersey. Population growth, availability of vacant and underdeveloped land, and the better transportation infrastructure west of the Hudson River shifted the "center of gravity" for distribution activities to New Jersey. The state of New York attempted to revitalize rail traffic across the Hudson through the Oak Point Intermodal Terminal and the Oak Point Link projects in the 1990s. Due in large part to these improvements, the likelihood of improvements to the NYNJR railcar float service, Brookhaven Rail Terminal, and track improvements on Long Island, railcar volume has increased since the 1990s east-of-Hudson. NY&A volumes, for example, grew at a rate of more than 5 percent per year between 1996 and 2013, as **Table 5-4** shows.

[1] Various national and local changes to the freight industry described in detail in the Cross Harbor Freight Program Needs Assessment (September 2010)

Table 5-4
New York and Atlantic Railway
Railcar Volume, 1996-2013

Year	Annual Loaded Railcars
1996	11,099
1997	9,492
1998	9,492
1999	11,196
2000	13,801
2001	13,635
2002	13,514
2003	15,908
2004	18,851
2005	21,401
2006	22,693
2007	19,642
2008	16,961
2009	17,488
2010	22,339
2011	22,981
2012	23,018
2013	28,094
Compound Annual Growth Rate (CAGR) 1996-2013	5.61%

More significant growth directly to/from New York has been limited due to the only direct rail route to the west being via the Alfred H. Smith Memorial Bridge at Selkirk, accessed through Metro-North's busy Hudson Line. In addition, most of the New York region's distribution infrastructure is located west of the Hudson River, with a limited amount of direct traffic that moves directly by carload or intermodal freight into the New York area without first being handled at a distribution facility on the west side of the Hudson River.

Bay Ridge Branch

The Bay Ridge Branch is an example of a freight-only rail line through Brooklyn and Queens that is currently underutilized due to the decline in rail freight traffic. Once part of a rail freight corridor that utilized the cross-harbor ferries to connect New Jersey with Long Island and southern New England, the Bay Ridge Branch carried upwards of 600,000 railcar-loads annually. It now carries fewer than 3,000 carloads per year, of which the majority come over to Long Island from the north.

Today, the Bay Ridge Branch has only one active track, with occasional sidings. It has no signals, with train movements controlled by train order. Existing yards of significance are the 51st Street Yard, which has in the past been used for railcar float operations, the 65th Street Yard, currently used for railcar float operations, and at Fresh Pond Junction. The East New York Tunnel, located between East New York Avenue and Bushwick Avenue, has four bores, but only one is currently in service. Two other tunnel bores have tracks in place, but the tracks are not connected. The fourth bore conveys a petroleum pipeline. The Bay Ridge Branch is entirely grade-separated, with 44 overhead structures or bridges in the segment of the line between East New York and Bay Ridge. A survey of the branch completed as part of the State of New York's Full Freight Access Program identified five of the 44 bridges as having clearances of 17'6" (minimum clearance for trailer-on-flatcar) or less, while 30 of these 44 bridges have a 20'6" clearance (minimum clearance for high-cube double-stack railcars) or less. Since 1997, NY&A, a short line railroad contracted by the LIRR to provide freight service on the island, operates the Bay Ridge Branch. Shippers and consignee demand on this rail line is generally on an as-needed basis, and averages only about one freight train per day. Although only one freight train operates per day, the volume of freight moving on this facility is increasing.

Southwestern Connecticut Freight Rail

CSX holds the rights to offer freight service into Connecticut across the Metro-North between New Rochelle and New Haven (see **Figure 5-5**) but little traffic has moved along this route since the 1980s. Presently, CSX Connecticut operations are limited to Cedar Hill Yard, a terminal in New Haven, which it reaches over trackage rights on Amtrak's Inland Route from its Boston and Albany main line in Springfield, Massachusetts.[1] New York area traffic destined for New England is routed via the eastern or western sides of the Hudson River to Selkirk, and thence eastward on the Boston and Albany route through Pittsfield, Springfield and Worcester, Massachusetts.

CSX also delivers rail freight cars to line-side consignees and shippers in the Bronx and Fairfield County in Southern Connecticut via Metro-North's Northeast Corridor/New Haven Line. Passenger train movements along this route are high, with an excess of 40 Amtrak and 220 Metro-North trains on a typical weekday. Between Oak Point Yard and New Rochelle, freight trains operate over Amtrak's New York Division, and are dispatched by Amtrak. Freight train movements on the Hudson Line and Northeast Corridor/New Haven Line are conducted at 50 mph and 40 mph respectively, while the speed on industrial and yard tracks is limited to 10 mph.

In Connecticut, Providence and Worcester Railroad (P&W) has limited overhead trackage rights along the Northeast Corridor/New Haven Line between the Bronx and New Haven, but does not serve local customers along that segment. P&W serves customers along the Danbury Branch between South Norwalk and Danbury, and along the Waterbury Branch between Devon and Derby Junction. P&W has overhead trackage rights along the Maybrook Branch between Derby Junction and Danbury. P&W interchanges with CSX at New Haven.

The Housatonic Railroad (HRRC) serves local customers along the Maybrook Branch between Derby Junction and Beacon, New York, and on the Berkshire Line between Danbury and Pittsfield, Massachusetts. Inbound HRRC traffic is classified at Selkirk, then transported to Pittsfield for interchange to HRRC. Outbound HRRC traffic interchanges with CSX at West Springfield, Massachusetts and is then classified at Selkirk.

Rail Connections

At present, there are two primary routes for rail freight access to the east-of-Hudson region (see **Figure 5-6**), which carry commodities such as building materials, lumber, food products,

[1] CSX sublets its trackage rights between West Springfield and New Haven to the Connecticut Southern (CSO), a RailAmerica property. In turn, CSO handles CSX traffic between the two terminals through a haulage agreement.

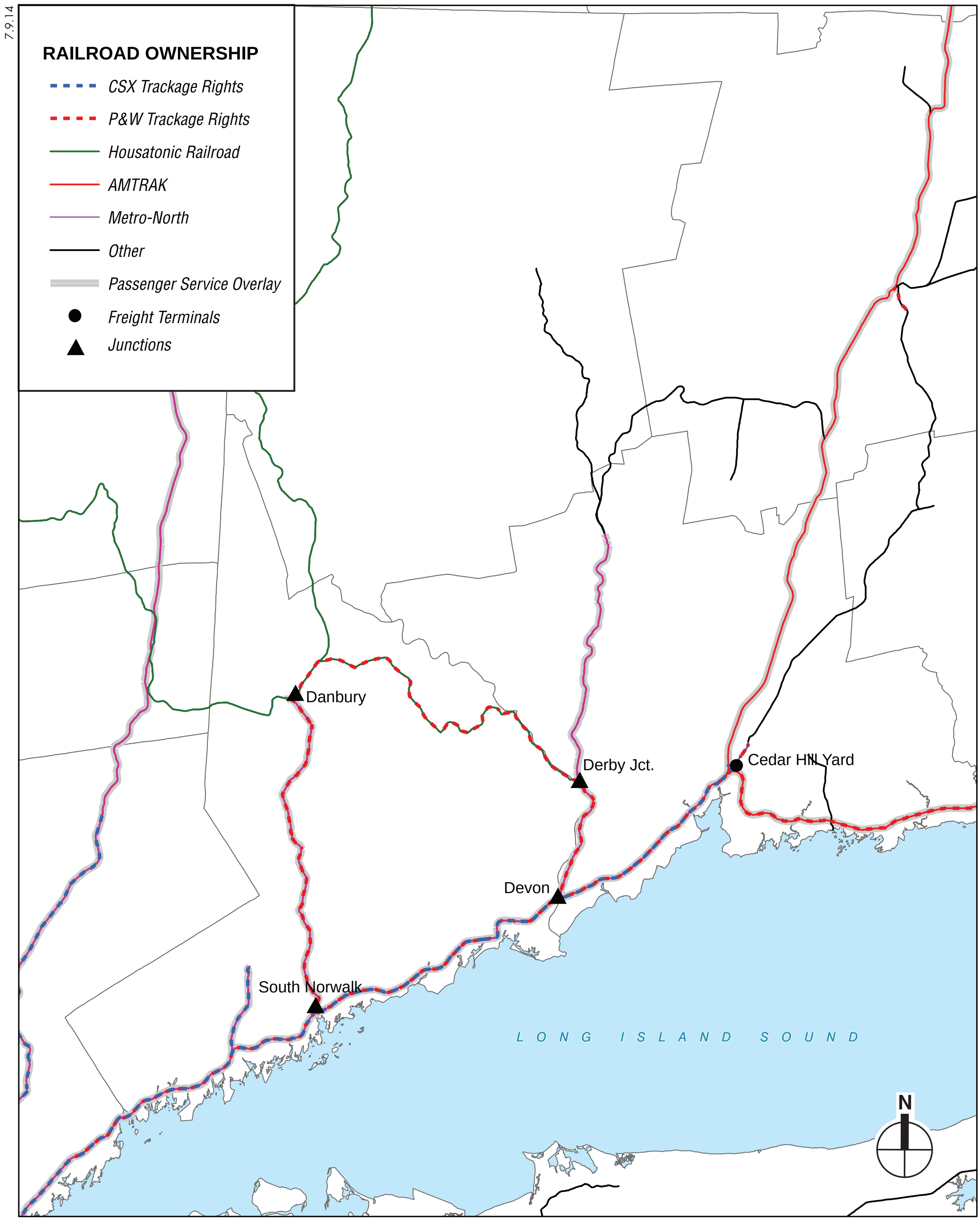
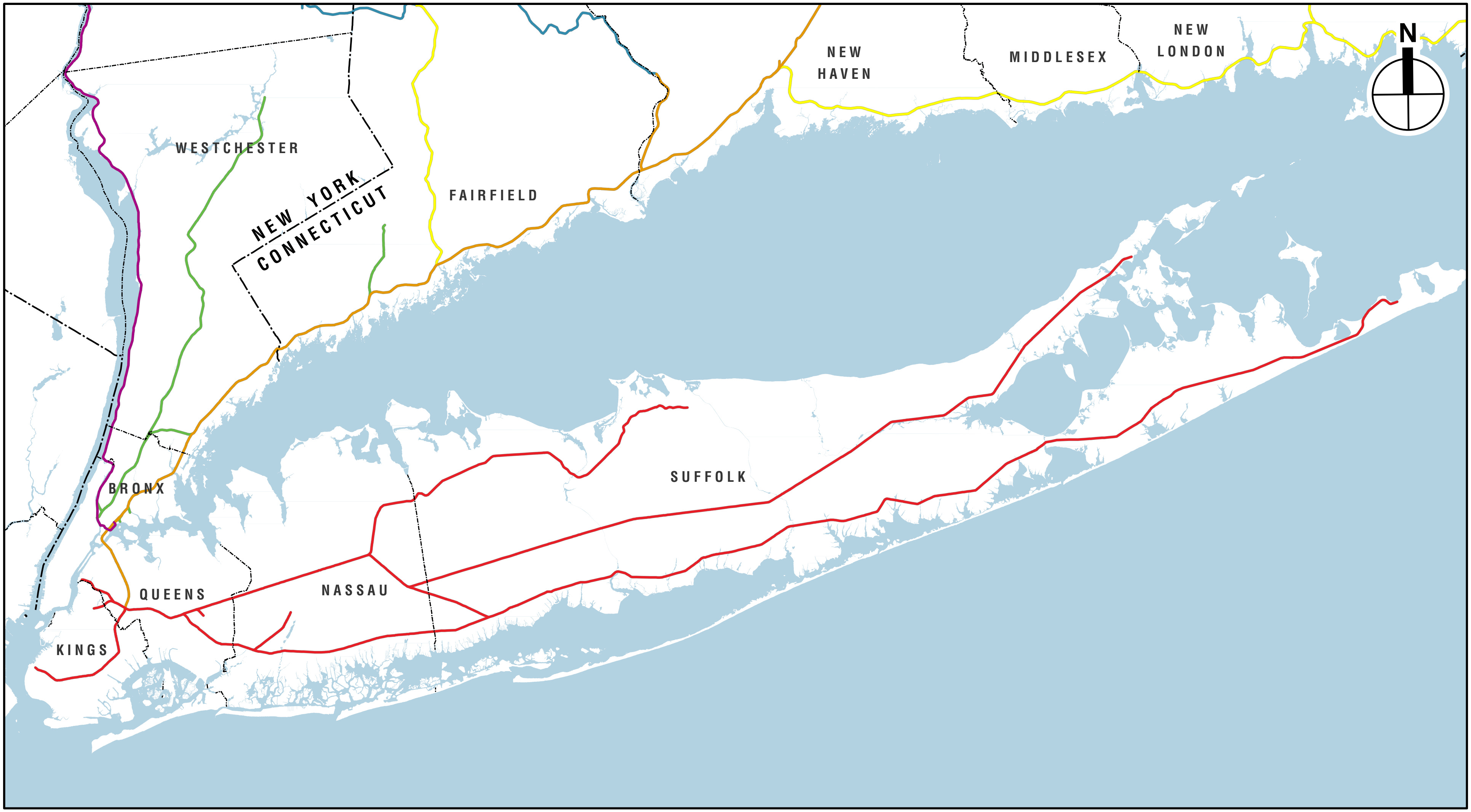


FIGURE 5-5

Southwestern Connecticut Freight Rail Network

CROSS HARBOR FREIGHT PROGRAM

11.2.14



FREIGHT SERVING RAILROADS

New York and Atlantic Railway

*CSX-Canadian Pacific Railway**

CSX-Providence and Worcester Railroad

CSX

Providence and Worcester Railroad

Housatonic Railroad

**Canadian Pacific Railway retains trackage rights but does not currently provide service*

0 10 Miles

FIGURE 5-6

East-of-Hudson Freight Rail Network

CROSS HARBOR FREIGHT PROGRAM

plastics, liquefied petroleum gas inbound and construction and demolition debris, municipal solid waste, and scrap metal outbound. A third route is presently used for the seasonal delivery of crushed rock. These routes supply all the rail service to Long Island (including Brooklyn and Queens) and to the Bronx and southernmost Connecticut:

- The first major rail freight access route is via the corridor beginning at Selkirk Yard (CSX)[1], which is located on the west side of the Hudson River near Albany. Trains destined for Long Island and southern Connecticut cross the river and join the multi-track CSX Hudson Line at Castleton, New York. Freight traffic on the Hudson Line shares the track with Amtrak and, south of Poughkeepsie, with Metro-North passenger trains. Traveling south, freight trains are routed to the Oak Point Link in the Bronx, a single-track freight-only alignment that provides a grade-separated route through the Bronx to Oak Point Yard. Trains are then dispatched to their ultimate destinations in southern Connecticut, the Bronx and Long Island. The CSX dispatcher controls trains operating on the Hudson Line between Castleton and Poughkeepsie; the tracks south of Poughkeepsie are under the control of the Metro-North dispatcher. Approximately 40 Amtrak and 160 Metro-North trains operate over the Hudson Line on a typical weekday.

  Connecting Oak Point Yard with Long Island is the single track Fremont Industrial Track. This track, owned and maintained by CSX, utilizes Amtrak's Hell Gate Bridge route to Sunnyside Junction, where it splits off to reach Fresh Pond Junction Yard. Train movement on the Fremont Industrial Track is under the control of the yardmaster at Oak Point Yard. Freight cars are interchanged with NY&A at Fresh Pond Junction, a grade-separated interchange with the Montauk Branch of the LIRR. At present, this route is the primary means of rail freight access to Long Island.

- The second major rail freight access route is via the NYNJR railcar float between Greenville Yard in New Jersey and 65th Street Yard. This route provides for access from the south and southwest and is the remnant of the once-vibrant marine transfer activities in and around New York Harbor. This activity was drastically curtailed with the merger of the Pennsylvania and New York Central Railroads and the subsequent formation of Conrail. The NYNJR, currently owned by the PANYNJ, performs local switching services along the Brooklyn waterfront and interchanges cars with NY&A on the Bay Ridge Branch in the vicinity of 4th Avenue and, occasionally, at 65th Street in Bay Ridge. As mentioned previously, the lift bridge structure at Greenville used for freight transfer operations at this yard was severely damaged by Superstorm Sandy in the fall of 2012. The operation is currently served by a temporary pontoon bridge. In the near future, PANYNJ plans to replace this temporary bridge with a modern hydraulic structure. The pontoon bridge had been used for railcar float operations at 51st Street Yard. There is presently no service at the 51st Street Yard, but it is anticipated that service would be restored.
- The third route utilizes the Metro-North New Haven Line from New Haven, Connecticut to New Rochelle, New York, thence Amtrak to Oak Point, and the Fremont Secondary to reach Long Island. Once a primary freight route to New England from the south, this route is presently utilized by New England regional railroad P&W, which delivers unit trains of

[1] CP, which has trackage rights along the East Hudson route, ceased operating its own trains from Saratoga Yard in 2010, relying instead on CSX to handle its traffic through a haulage agreement. This arrangement does not have a measurable effect on overall freight demand in the region, as the freight formerly moved by CP is moving into and out of the region via CSX.

crushed rock to Fresh Pond Junction from New Haven on a seasonal basis. P&W's access to Long Island is presently limited to this particular service through a commercial agreement with CSX.

The principal deficiency with respect to the primary routes is the lack of a direct route between the east-of-Hudson region and the national rail hubs in northern New Jersey, as described above. The nearest land-based crossings—the tunnels under the Hudson and East Rivers—are restricted to passenger service, and have insufficient vertical and horizontal clearance to handle modern freight rail cars. Thus, rail freight traveling between Long Island and points west of the Hudson River must complete a 48 hour and 300 mile trip up to Selkirk, or utilize the NYNJR's railcar float between Greenville Yard and 65th Street Yard.

Freight service on Long Island is provided mostly by the suburban Main Line, Montauk Branch, and Port Jefferson Branch in Nassau and Suffolk Counties and to the industrial areas of Queens and Brooklyn via the Montauk, Bay Ridge and Bushwick branches. Other LIRR branches experience little or no freight deliveries. Train movements to the former are conducted between regularly scheduled passenger trains, while service to the industrial areas is delivered on (mostly) freight-only tracks. Passenger traffic varies widely during the course of each weekday, with some congestion during the peak commute hours.

East-of-Hudson Barriers and Constraints

Expanded freight service in the east-of-Hudson region is subject to four types of barriers. These are as follows:

- 1. **Conflicts with passenger service** limit the flexibility, reliability, and transit times of freight operations;
- 2. **Clearance issues** prevent freight carriers from operating their most modern and efficient rail equipment in the study area;
- 3. **Weight restrictions** prevent freight carriers from operating their highest volume and lowest cost bulk equipment in the study area; and
- 4. **Yards and terminals**, when brought to a state of good repair will be adequate for current volumes of traffic, but would require expansion to accommodate increased freight demand and provide more efficient service.

The following sections discuss each of these issues in order.

Conflicts with Passenger Service

Conflicts with passenger service limit the flexibility, reliability and transit times of freight operations. Most of the rail lines east-of-Hudson are publicly owned and maintained. The public agencies that acquired the lines were primarily motivated to maintain (and later expand and improve) passenger rail services that are critical to the economy of this region. During the ensuing decades, public agencies have made large investments to improve and expand rail passenger services in the region. Fewer public investments were made in the maintenance and growth of rail freight, which has traditionally been a for-profit private enterprise. LIRR owns and maintains most of the conventional railroad lines on geographic Long Island, and is one of the most heavily traveled commuter railroads in North America. The Metro-North owns and maintains most of the railroad lines in the Bronx, and in Westchester, Putnam, and Dutchess counties. It also maintains the rail lines owned by the State of Connecticut extending to New Canaan, Danbury, Waterbury, and New Haven. Amtrak owns the lines leading to New York's Pennsylvania Station from New Rochelle in the north, and Washington, DC in the south.

Amtrak's West River tunnels under the Hudson River are the only conventional railroad crossings of the Hudson River south of Albany.

The principal mission of the public agencies that own and control these critical regional railways is the prompt and safe movement of passenger trains. Only about 20 daily freight trains operate east-of-Hudson, in the Bronx and Long Island. Most of them share tracks with the extensive network of passenger service. In excess of 250 passenger trains operate on some line segments on weekdays, which are given scheduling priority over freight movements. This condition limits the capability of freight railroads to compete for certain time-sensitive commodities that must arrive or depart during passenger peaks. It also prevents freight railroads from reliably serving line-side industries on weekdays when they are typically staffed, which is an important consideration for many rail shippers. In addition, if passenger operations become delayed or off-schedule, freight railroad reliability is severely impacted because freight trains are typically accorded the lowest priority. If the window of operation is missed for a particular freight movement, it is oftentimes subject to very extensive delays that greatly increase costs and result in unreliable freight service.

Clearances

Several physical constraints prevent the broad utilization of some North American rail equipment on Long Island, thereby limiting the ability for it to develop to its full potential. Vertical and horizontal clearance constraints prevent freight carriers from operating their most modern and efficient rail equipment in the study area. The rail lines in the east-of-Hudson region were designed and engineered when the railcar fleet in the U.S. was shorter and lighter than many of today's cars. In the 1970s, the disparity in dimensions between freight and passenger rail vehicles was not great, and the rail lines east-of-Hudson accommodated most freight cars.

However, freight carriers are increasingly relying on cars that cannot be operated east-of-Hudson for a number of reasons related to clearances. Clearance envelopes on Long Island range from 14'6" to single-level container-on-flatcar clearance (17'6") and are limited to vertical clearances to the Association of American Railroads (AAR) Plate C standard (15 feet, 6 inches) over much of the network. None of the rail lines are cleared for equipment that is double stacked (20'6") or higher and none of the track east-of-Hudson, except for a portion of the Hudson Line from Albany to Tarrytown, is cleared for car-carrying railcars (autoracks). In addition, well cars, a common car type used for carrying containers and trailers, cannot be used on lines with electrified third-rail. Horizontal clearances are not a constraint on the LIRR or Metro-North networks. LIRR station platforms are, at minimum, 5 feet, 8 inches from the center of the track. The Metro-North standard horizontal clearance is 5 feet, 7 inches from the center of the track to the edge of the platform. These clearances can accommodate all standard North American rail equipment corresponding to the dimensions of AAR Plates A through H.

Track geometry and grades also pose restrictions to east-of-Hudson service. At Fresh Pond Yard, a 22 degree curve on the east leg of the wye precludes the use of six-axle locomotives on most of geographic Long Island. However, six-axle locomotives can be used on a Bay Ridge – Fresh Pond – Oak Point route that would comprise a through service linking New England with New Jersey by cross-Hudson ferry. Six axle locomotives are preferable on this route, as it permits hauling high tonnage trains over the 1.8 percent eastbound and 2 percent westbound ruling grades over the Bay Ridge/Hell Gate Bridge route with 30 to 50 percent fewer locomotives than would be required with four-axle units.

Weight Restrictions

Weight restrictions prevent freight carriers from operating their highest volume and lowest cost bulk equipment in the study area. Light-loading railcars to comply with lower weight limits decreases the cost competitiveness of rail relative to other modes and, as a result, could make it difficult for railroads to retain or attract customers. Weight limits on some key routes are currently restricted to 263,000 pounds (263k), while most of the North American network is migrating to a 286,000 pound (286k) standard. Currently only the Hudson Line and connections to Fresh Pond , the Bay Ridge Branch, the Lower Montauk Branch to Long Island City and the Main Line east to Yaphank are rated at 286,000 pounds. A NYSDOT project upgraded the single freight track on the Hell Gate Bridge with continuously welded rail and new ties, which make it capable of carrying 286,000 pound gross weight railcars. For through traffic, weight limits beyond Oak Point along the Hudson River and in Metro-North territory also would have to be addressed. LIRR has an ongoing program to increase weight limits on their system, and has completed analyses of several routes as a first step to making the necessary improvements. As weight limits are largely driven by bridge conditions, completion of these modifications is primarily being done as part of larger capital projects.

Yards and Terminals

Due to very low rail freight volumes in the east-of-Hudson region, the few existing yards and terminals can accommodate current demand. However, freight traffic levels would not be able to grow substantially without some expansion and enhancement to terminal facilities. For most yards and terminals in the east-of-Hudson study area, investments in trackage, connections, and control systems would be required to support the increase in use of these underutilized yards to achieve the level of activity found in the west-of-Hudson region. Chapter 4, “Alternatives,” outlines the expansions and enhancements to existing facilities that would be required to support the project alternatives. That chapter also discusses that many of these freight facilities would be developed both within the areas controlled by PANYNJ, i.e., the Port District (see Figure 1-6); however, some facilities would be located outside of the Port District, where cooperation from other agencies and stakeholders would be required.

One of the principal deficiencies for rail facilities east of the Hudson River is the lack of direct access to regional highways and major truck routes, requiring trucks to travel long and circuitous distances on the local street network. These indirect connections add to shipment time, cost, and potential for service interruptions. Large numbers of trucks maneuvering on local streets also create safety hazards, and increase the impact on surrounding communities. Specific examples of circuitous connections include:

- Rail facilities on the Brooklyn waterfront, such as the Bay Ridge 65th Street Yard, can only be served from the Gowanus Expressway via a circuitous route using heavily trafficked Third Avenue.
- Trucks accessing the rail facilities at Hunts Point and Oak Point Yard must use Bruckner Boulevard. Since this arterial runs in the footprint of the elevated Bruckner Expressway, it is difficult for trucks to negotiate left turns, U-turns, or other maneuvers around the expressway’s support piers.
- Fresh Pond Yard is adjacent to a residential community, and is five miles from the Long Island Expressway and six miles from the Brooklyn/Queens Expressway. Immediate access is provided only by Metropolitan Avenue and Fresh Pond Road.
- The replacement of the Kosciuszko Bridge over Newtown Creek would need to be considered in the development of designs for expansion or reconfiguration of Maspeth Yard. Maspeth Yard today is 0.5 miles east of the bridge and will not be directly affected by the

project. Any future tracks connecting Maspeth Yard to the Montauk Branch to the west would have to be designed around the piers of the bridge. This impact is relatively minor and would not significantly affect the yard capacity and operations, because the main connection to the mainline would be at the east end of the yard.

- Truck drays are also subject to general chronic regional congestion and price surcharges.

Institutional Constraints

At present, rail shipments destined for east of the Hudson locations often involve multiple parties and/or very inefficient routing. Each interaction incurs considerable administrative expense and holds the potential for delay and conflict, with the net effect being higher costs and inferior service for the shipping public.

Historically, traffic coming up from the south and west could utilize one of the cross-harbor railcar float operations. These involved only one or two railroads, the Pennsylvania Railroad, and the New York, New Haven and Hartford Railroad. Greenville Yard and the railcar float was controlled by the Pennsylvania, while the 65th Street Yard was under the auspices of the Long Island Railroad. Through service to Oak Point Yard and New England was operated by the New Haven. This arrangement provided for an efficient handling of traffic onto Long Island, and further provided a competitive service route for southern New England freight.

The successive restructuring of the once dominant northeastern railroads led to divestment of assets to short line operators and public agencies. Thus, under current conditions, national rail traffic utilizing the Cross Harbor railcar float necessitates the involvement of three or more carriers:

- The class I carriers CSX and NS, which operate trains from their respective networks to Oak Island Yard, Northern New Jersey’s largest carload yard.
- Conrail, operator of Oak Island Yard, provides switching service to and from Greenville Yard.
- NYNJR, which operates the railcar floats and associated terminals at Greenville Yard and 65th Street Yard in Brooklyn.
- NY&A, which provides freight service on the Bay Ridge Branch and throughout Long Island.
- CSX, which serves the Fresh Pond Junction yard from Oak Point Yard over the Hell Gate Bridge and the Fremont Secondary.

For west-of-Hudson traffic, CSX and NS trains destined for the New York region terminate at Oak Island Yard. Conrail disassembles the train, sorting out the cars destined for Long Island and other locations. Then, depending on schedules and volumes, a block of cars bound for Long Island is moved from Oak Island to Greenville Yard, where NYNJR takes possession, loads the cars onto the railcar float, and transports them across the Hudson River to Brooklyn. In Brooklyn, NYNJR unloads the cars from the railcar float, arranging them for pick-up by NY&A. In turn, NY&A delivers the cars to Long Island receivers, using the Fresh Pond Junction yard as the primary sorting and staging facility for island traffic. Shipments bound for off-island locations would be interchanged once more at Fresh Pond Junction with CSX transporting the cars over the Hell Gate Bridge to Oak Point Yard and forwarding to their eventual destination or interchanged at the 65th Street Yard for west bound trips by railcar float.

Each of these interchanges produces a delay of at least a half-day, with the result that railcars destined for Long Island take at least two days to reach their destination upon arrival at Oak

Island. While operational delays might be surmounted through improved coordination and increased volumes forcing more frequent train operations, of equal or greater importance will be the need to overcome impediments in the commercial realm. Given that railroads are a network industry, geography is destiny, and a direct presence or close partnership is imperative to being a viable competitor. The competitive postures of NS and CSX, the rival Class I carriers serving the eastern half of the U.S., drive day to day tactical and long-term strategic decisions regarding markets served, train operations, schedules, prices, and relationships with connections. At the same time, each of the smaller participants also must deal in their own direct self-interest. The end result is a sub-optimal outcome for east-of-Hudson service, and Long Island in particular.

EXISTING RAIL NETWORK LEVEL OF SERVICE

In the operational scenario used to demonstrate existing network conditions, most of the network performs at LOS A through C. (See **Figure 5-7**) Portions of the CSX River Line between the New York/New Jersey border and Bergen Junction, and the Conrail Lehigh Line east of Manville (where the Conrail Lehigh Line, NS Lehigh Line, and CSX West Trenton Line intersect) operate at LOS D. Much of the CSX River Line in New York State and short single track segments of the Conrail National Docks Secondary near Oak Island and the CSX West Trenton Line in the vicinity of the SEPTA West Trenton station operate at LOS E. The LIRR Main Line and the CSX Hudson Line operate at LOS F.

REGIONAL HIGHWAY NETWORK

The highway network plays a critical role in the regional freight transportation system, and includes key Hudson River and East River bridge and tunnel crossings and several major highway corridors used by trucks in New York and New Jersey (see Figures 1-1and1-2). Commercial vehicles are permitted to use limited-access expressways throughout the five New York City boroughs, but are not allowed on roads designated as parkways. The overall network of expressways is limited, and this reduces the number of roadway options available to trucks. In some parts of the City, through truck traffic is confined to a single route option and often results in extreme congestion as both trucks and private automobiles compete for limited capacity available on these routes. The City’s arterial and street network includes designated truck routes, which provide a secondary, but generally much slower, alternative for trucks.

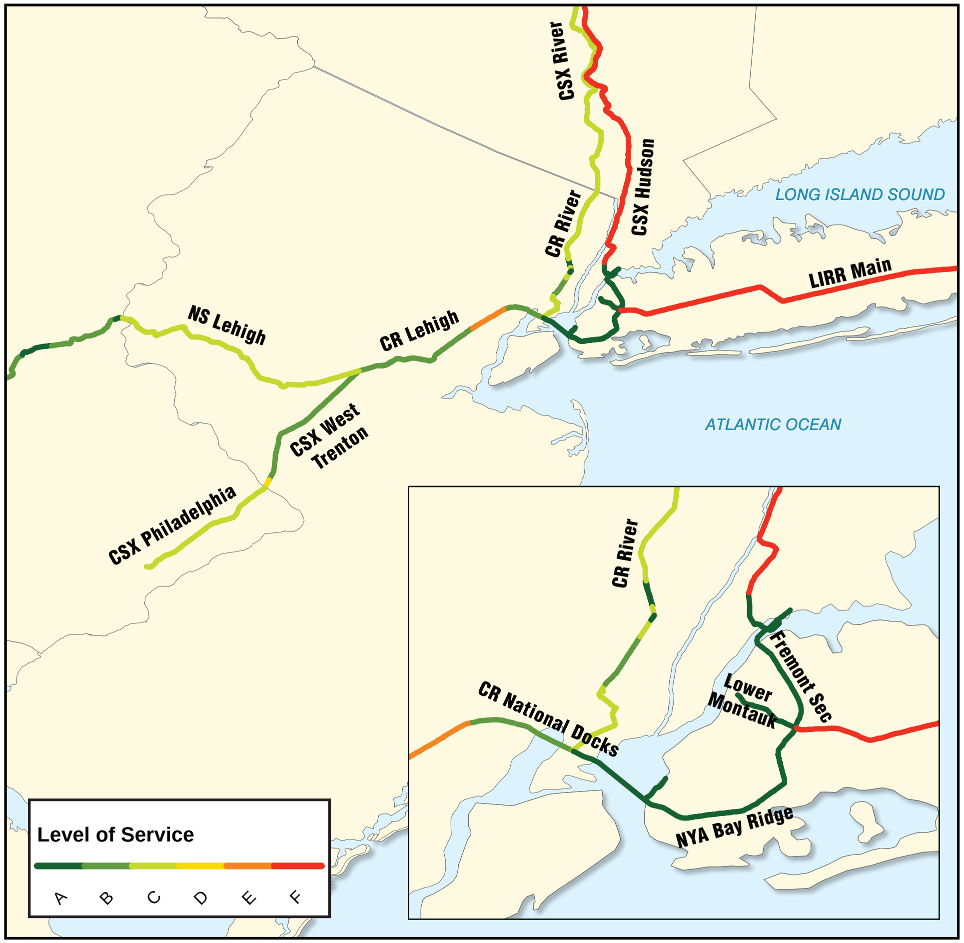
To reach destinations in Westchester or on Long Island, 53-foot trailers are limited to using the following routes:

- I-95 from Bronx/Westchester County line to I-295
- I-295 from I-95 to Throgs Neck Bridge to the Long Island Expressway (I-495)
- I-495 from I-295 to Queens/Nassau County line

Outside of New York City, 53-foot trailer combinations are restricted to the following highways within the project study area:

- I-87 (New York State Thruway)
- I-95 (New England Thruway)
- I-495 (Long Island Expressway)

In New Jersey, a hierarchy of roadways has been established upon which to direct the travel of large trucks and includes the National Network, New Jersey Access Network, and all other



Segment	Corridor	State	Miles	# of Tracks	Control System	Trains / Day Volume (2007)	Trains / Day Practical Capacity	V/C	LOS
1	CR Lehigh Line	NJ	9.4	2	C - centralized traffic control	44.0	86.2	0.36	B
2	CR Lehigh Line	NJ	6.1	2	C - centralized traffic control	104.0	75.9	0.96	E
3	CR Lehigh Line	NJ	7.6	2	C - centralized traffic control	44.0	86.2	0.36	B
4	CSX West Trenton Line	NJ	24.4	1	C - centralized traffic control	17.8	38.5	0.32	B
5	CSX West Trenton Line	NJ	1.5	2	B - automatic block signals	68.8	67.6	0.71	D
6	CSX Philadelphia Subdivision	PA	11.9	2	C - centralized traffic control	60.8	82.8	0.51	C
7	CSX Philadelphia Subdivision	PA	3.4	2	C - centralized traffic control	59.0	88.0	0.47	C
8	CSX Philadelphia Subdivision	PA	5.6	2	C - centralized traffic control	69.0	89.3	0.54	C
9	CSX Philadelphia Subdivision	PA	4.4	2	C - centralized traffic control	68.8	89.4	0.54	C
10	CSX Philadelphia Subdivision	PA	1.8	2	B - automatic block signals	59.0	66.0	0.63	C
11	NS Lehigh Line	PA	51.0	2	B - automatic block signals	50.6	64.0	0.55	C
12	NS Lehigh Line	PA	0.2	2	C - centralized traffic control	26.7	91.1	0.21	A
13	NS Lehigh Line	NJ	34.5	1	C - centralized traffic control	17.0	42.6	0.28	C
14	NS Lehigh Line	NJ	6.4	1	C - centralized traffic control	17.0	41.9	0.28	C
15	NS Lehigh Line	NJ	0.1	1	C - centralized traffic control	16.4	39.9	0.29	C
16	NS Lehigh Line	PA	1.1	1	C - centralized traffic control	1.7	70.2	0.02	A
17	NS Lehigh Line	PA	43.1	2	B - automatic block signals	23.9	34.0	0.49	C
18	NS Lehigh Line	PA	9.1	2	C - centralized traffic control	14.9	91.2	0.11	A
19	CR Northern Branch	NJ	0.6	1	B - automatic block signals	20.6	22.7	0.64	C
20	CR National Docks Secondary	NJ	3.4	2	C - centralized traffic control	31.0	39.4	0.55	C
21	CR National Docks Secondary	NJ	9.1	1	B - automatic block signals	22.7	64.3	0.25	B
22	CR River Line	NJ	6.3	1	C - centralized traffic control	3.2	39.9	0.06	A
23	CR River Line	NJ	14.9	1	C - centralized traffic control	33.8	40.1	0.59	C
24	CSX River Line	NY	111.5	1	C - centralized traffic control	34.0	40.5	0.59	C
25	CSX Hudson Line	NY	4.1	2	C - centralized traffic control	180.0	96.7	1.30	F
26	CSX Oak Point Link	NY	3.7	1	M - manual	4.0	19.6	0.14	A
27	CSX Hudson Line	NY	119.5	2	C - centralized traffic control	204.0	96.8	1.48	F
28	CSX Fremont Secondary	NY	0.7	1	B - automatic block signals	3.0	24.6	0.09	A
29	CSX Fremont Secondary	NY	4.4	1	M - manual	3.0	19.6	0.11	A
30	CSX Fremont Secondary	NY	3.2	2	C - centralized traffic control	3.0	97.6	0.02	A
31	NYA Bay Ridge Branch	NY	2.0	1	B - automatic block signals	0.9	24.6	0.03	A
32	NYA Bay Ridge Branch	NY	6.1	1	B - automatic block signals	0.9	24.6	0.03	A
33	NYA Bay Ridge Branch	NY	3.1	1	B - automatic block signals	0.9	24.6	0.03	A
34	NYA 1st Avenue Line	NY	1.0	1	M - manual	0.0	25.6	0.00	A
35	LIRR Lower Montauk Branch	NY	1.2	1	C - centralized traffic control	3.0	43.8	0.05	A
36	LIRR Lower Montauk Branch	NY	0.4	1	M - manual	3.0	19.6	0.11	A
37	LIRR Main Line	NY	4.2	1	B - automatic block signals	270.0	24.5	7.71	F
38	LIRR Main Line	NY	19.6	1	C - centralized traffic control	270.0	97.3	1.94	F
39	LIRR Main Line	NY	20.0	2	C - centralized traffic control	270.0	146.8	1.29	F
40	NYNJ Rail Greenville	NJ	1.3	1	M - manual	2.0	34.0	0.04	A
41	NYNJ Rail Cross Harbor Float	NY/NJ	4.5	1	M - manual	2.0	25.6	0.05	A

FIGURE 5-7

Existing Condition (2012) Level of Service (LOS)

CROSS HARBOR FREIGHT PROGRAM

unrestricted roadways. Key regional New Jersey highways within the study area that are part of the National Network include:

- The New Jersey Turnpike
- I-78 except between Henderson Street in Jersey City and the Holland Tunnel
- NJ Route 81 from I-95 in Elizabeth City to US 1 at Newark Liberty International Airport (EWR)
- NJ Route 440 from the New Jersey Turnpike to the Outerbridge Crossing

New Jersey Access Network highways within the study area include:

- U.S. Routes 1 and 9
- State routes NJ 139, NJ 185, and NJ 440
- County routes 501 and 508

HUDSON AND EAST RIVER BRIDGE AND TUNNEL CROSSINGS

Tappan Zee Bridge (TZB) — connects Westchester and Rockland counties and has a total of seven travel lanes and a moveable barrier that can provide four of the seven travel lanes for peak direction traffic. All vehicles pay a toll to cross in the eastbound direction only. Lane widths are 11 feet 8 inches and the bridge's annual average daily traffic (AADT) is 140,000 vehicles. Eastbound trucks represent 4 and 6 percent of the AM and PM peak period traffic, respectively. Westbound trucks represent 13 and 10 percent of the AM and PM peak period traffic, respectively. The TZB is heavily used by "through trucks"—trucks passing through the region on their way to or from New England. In 2013, the New York State Thruway Authority began building the new New Tappen Zee Bridge, which will be a double-span bridge (four lanes per span in opposite directions). The first span of the new bridge is scheduled to open in 2016 and the rest will be completed in 2018.

Verrazano-Narrows Bridge (VNB) — has an upper level and a lower level, with three travel lanes per direction on each level. The total AADT for the VNB is 202,000 vehicles. The VNB has a toll only in the westbound direction but charges the toll based on both east and westbound travel. The VNB is the only Hudson River crossing between Staten Island and Brooklyn and points east. In the eastbound direction, truck traffic averages 12 and 10 percent in the AM and PM peak periods, respectively. In the westbound direction, truck traffic averages 13 and 9 percent during these same periods, respectively.

Brooklyn-Battery Tunnel (BBT) — carries two 12-foot travel lanes in each direction, has an AADT of 51,000 vehicles, and a toll must be paid in each direction. Over a 24-hour period, trucks account for two percent of the total traffic. The BBT has a vertical clearance of 12 feet 3 inches.

Brooklyn Bridge — has a three-ton weight limit and large trucks and buses are prohibited from using it. Over a 24-hour period, small trucks (i.e., single-unit trucks) account for less than 1 percent of the total traffic. The bridge's AADT is 125,000 vehicles, and there is no toll to cross it.

Manhattan Bridge — has an upper level and a lower level, with two travel lanes per direction on the upper level and a total of three travel lanes on the lower level; lane widths are approximately 10 feet each. The AADT for the bridge is 72,000 vehicles, and there is no toll to cross it. The Manhattan Bridge represents a major East River truck crossing because it provides a linkage between the Holland Tunnel (via Canal Street) and Brooklyn. Trucks are restricted to using the lower level from 5 AM to 3 PM. Truck volumes range from 6 to 17 percent of the total traffic stream in the AM and PM peak periods.

Williamsburg Bridge — carries two inner roadways and two outer roadways, each with two travel lanes, for an overall total of eight lanes. Travel lane widths vary from 10 to 11 feet. The bridge has an AADT of 108,000 vehicles. The Williamsburg Bridge is a toll-free East River crossing that connects indirectly to the Holland tunnel via east-west streets in Lower Manhattan (i.e., Delancey Street and Kenmare Street). Trucks are allowed only on the outer roadways, yet commercial vans may use the inner roadways. Over a 24-hour period, truck traffic accounts for approximately 1 percent of the total traffic volume.

Queens-Midtown Tunnel (QMT) — consists of two tubes with two travel lanes in each direction. The height restriction is 12 feet 1 inch. Tolls are collected in both directions. The QMT provides direct access between Midtown Manhattan and the Long Island Expressway in western Queens, connecting westward in Midtown Manhattan primarily via 34th Street, which is one of Manhattan's few east-west truck routes through the borough. The speed limit is 40 mph and the QMT has an AADT of 85,000 vehicles. Over a 24-hour period, large trucks account for 3 percent of the total traffic.

Queensboro Bridge — provides an East River crossing between East Midtown Manhattan and Queens. The bridge is not tolled, and carries an AADT of 180,000 vehicles. The bridge has both upper and lower levels as well as outer roadways alongside the main roadway of the lower level. The lower level provides two traffic lanes towards Manhattan plus a two-directional bicycle lane along the outer roadway on the north side of the bridge. The upper level has two travel lanes in each direction. Trucks are only permitted on the lower level. Trucks over 12 feet, 1 inch in height on the Manhattan-bound LIE are diverted to the Ed Koch Queensboro Bridge due to the height restriction at the QMT. Over a 24-hour period, truck traffic accounts for 4 percent of the total traffic volume.

Throgs Neck Bridge — connects the Bronx and New England with Queens. It provides a direct connection to the Clearview Expressway and the Cross Island Parkway on the Queens side of the bridge. The bridge has three travel lanes in each direction and carries an AADT of 107,000 vehicles. Tolls are collected in both directions.

Bronx-Whitestone Bridge — connects the Bronx with Queens, with direct connections to the Whitestone and Van Wyck Expressways on the Queens side of the bridge. Tolls are collected in both directions. This crossing carries an AADT of 113,000 vehicles.

RFK Bridge — links the Bronx, Queens, and Manhattan, via roadway connections to the Major Deegan and Bruckner Expressways in the Bronx, the Grand Central Parkway in Queens, and Harlem River Drive/FDR Drive in Manhattan. The Manhattan "bridge" has an AADT of 92,000 vehicles; over a 24-hour period. The Bronx "bridge" has an AADT of 78,000 vehicles; over a 24-hour period. Tolls are collected on both bridges in both directions.

Goethals Bridge — is one of three bridges linking Staten Island with New Jersey. The bridge's AADT is 71,000 vehicles, and tolls are collected only in the eastbound direction. The capacity of the bridge is limited by its narrow 10-foot travel lanes, with two lanes in each direction. The height restriction is 14 feet and the width restriction is 8.5 feet. The *Goethals Bridge Replacement EIS* indicated that the bridge is operating at close to capacity (LOS E) in the westbound direction during the AM peak period and eastbound during the PM peak. The bridge has a speed limit of 45 mph. The construction of a new six-lane bridge to replace the existing one started in 2013 and is expected to be completed in 2018. A Public-Private-Partnership (P3) design-build-finance-maintain (DBFM) contract has been awarded by the PANYNJ to the private partner, NYNJR Link.

Outerbridge Crossing — connects southern Staten Island with New Jersey. It has a speed limit of 45 mph and carries an AADT of 75,000 vehicles. There are two 10-foot travel lanes per direction. These narrow lanes pose a problem to truck traffic. The height restriction is 14 feet. Tolls are collected in the eastbound direction only.

Bayonne Bridge — connects Staten Island to New Jersey. It is a toll facility with two 10-foot wide travel lanes in each direction. A toll is collected only in the Staten Island-bound direction. The AADT for the bridge is 19,000 vehicles. Trucks account for approximately 11 percent of the traffic stream over a 24-hour period. The roadbed of the Bayonne Bridge, initially built 151 feet above the water, is being replaced with a new roadbed that will be positioned 215 feet above the water. This project, called the Bayonne Bridge Navigational Clearance Program, is providing more air draft space beneath the bridge, allowing larger container ships to travel beneath the bridge and access Port Authority marine terminals in Elizabeth, Newark, and Staten Island. Although the project will allow larger ships to access the port, the impact on overall container volume is expected to be small, according to the project's environmental analysis. The project is expected to be completed in 2018.[1]

LOCAL TRANSPORTATION (FREIGHT FACILITIES)

VEHICULAR TRAFFIC

The sections below describe the existing traffic conditions near the freight facilities where one or more of the CHFP alternatives would generate truck traffic. Fresh Pond Yard would serve as a classification yard. No freight would be transloaded to trucks at this location. Therefore, no traffic analysis of the street network near Fresh Pond Yard is necessary.

Greenville Yard

Located in Jersey City, New Jersey, Greenville Yard is easily accessible from a number of major roadways. The new terminals in the Rail Tunnel with AGV Technology and Rail Tunnel with Truck Access Alternatives would be located along the Port Jersey Branch, to the south of the existing and to-be-built rail yard and within a close vicinity of Port Jersey Boulevard. As the major truck route serving Global Container Terminal, Port Jersey Boulevard provides access to Exit 14A of I-78, Route 440, and Route 185. Traveling on Route 440, vehicles would be able to access I-278 in Staten Island via Bayonne Bridge in the south or Route 1/9 Truck in the north.

Port Newark/Port Elizabeth

Located just east of EWR, Port Newark/Elizabeth is easily accessible from a number of major roadways. Local access to the new terminals in Waterborne Alternatives is by Corbin Street, the major truck route serving the ports. Trucks would either go north, take Port Street to access I-78 and Route 1/9 or go south, take North Avenue to access I-95 and Route 1/9 via Route 81.

Oak Island Yard

Located just north of EWR, Oak Island Yard is easily accessible from a number of major roadways. Oak Island Yard is bounded by I-78 to the south and by I-95/New Jersey Turnpike to the east. In addition, the yard is located under Routes 1 and 9. Local access to the yard (as well

---

[1] "Bayonne Bridge Navigational Clearance Program," Port Authority of New York and New Jersey, available from: http://www.panynj.gov/bayonnebridge, (accessed June 23, 2014).

as adjacent industrial sites) is by Frontage Road, a bi-directional roadway with one lane per direction running along its southern perimeter. This roadway connects directly with I-78 and Routes 1 and 9; traveling on I-95, vehicles would need to merge with I-78 to access the yard. Similarly, trucks could also use McCarter Highway, to connect to I-78, west of the yard.

65th Street Yard and 51st Street Yard

The traffic study area for the 65th Street Yard consists of the major intersections along arterials that serve as access routes into and out of the area, including the key locations through which project generated truck traffic would be concentrated. Third Avenue is a major at-grade arterial that passes under the elevated Gowanus Expressway in the section near the 65th Street Yard and 51st Street Yard. South of 5th Street, 3rd Avenue operates with main and service roads of two to three lanes each in both directions separated by raised medians. There are exclusive left-turn lanes at major intersections along with exclusive signal phases allocated to these movements.

Many trucks accessing the 65th Street Yard and 51st Street Yard would travel via the Gowanus Expressway. Truck arrivals from the north would likely use the southbound 39th Street Gowanus Expressway ramp to southbound 1st Avenue. Trucks returning to the north would likely use the Gowanus Expressway entrance ramp from 65th Street and 4th Avenue. From the south, arriving trucks would exit the northbound Gowanus Expressway onto 3rd Avenue and then turn left at 58th Street to 1st Avenue. The return southbound trip would follow the reverse routing of eastbound 58th Street to southbound 3rd Avenue to the Gowanus Expressway.

Each of the east-west cross streets that connect 2nd Avenue and 4th Avenue typically has one to two travel lanes per direction, with curb parking allowed on both sides of the street. West of 3rd Avenue, the streets pass through a mostly industrial area, with a few residential pockets. The area east of 3rd Avenue is primarily residential. Local truck routes west of 3rd Avenue designated by New York City Department of Transportation (NYCDOT) include 39th Street, 43rd Street, 58th Street, and 60th Street.

South Brooklyn Marine Terminal

Located in the Sunset Park neighborhood on the South Brooklyn waterfront, SBMT is accessible from both local and through truck routes. The major through truck route is Gowanus Expressway, which provides access to Queens/Bronx via BQE, Manhattan via Battery Tunnel, and Staten Island via Verrazano-Narrows Bridge. From SBMT, vehicles would use local truck routes along 39th Street, First Avenue, Third Avenue, and Fourth Avenue to connect to Gowanus Expressway. Inbound traffic would use the two off-ramps around 39th Street to access the new terminal.

Red Hook Container Terminal

Located on the Brooklyn waterfront, Red Hook Container Terminal is in close vicinity of Brooklyn-Queens Expressway and Battery Tunnel. To access these through truck routes, vehicles from the terminal would use local truck routes such as Van Brunt Street, Delevan Street, Nelson Street, Hamilton Avenue, Degraw Street, Clinton Street and Columbia Street. Some traffic would also use Atlantic Avenue in the north or Ocean Parkway in the south to access different Brooklyn communities.

East New York Yard

The traffic study area for the East New York Yard consists of the major intersections along arterials that serve as access routes into and out of the area, including the key locations through which project generated truck traffic would be concentrated.

The street network in much of this area of Brooklyn includes many irregular, multi-legged intersections, where sharp turns may pose problems for large trucks. Local streets in the area are typically an alternating series of one-way north/east and south/west roadways. Atlantic Avenue is a major east-west arterial north of the site that handles some of the area's highest traffic volumes throughout the day. It is an at-grade arterial with three lanes in each direction west of Eastern Parkway and east of Georgia Avenue. Between Eastern Parkway and Georgia Avenue, Atlantic Avenue consists of a main roadway, elevated above a Long Island Rail Road (LIRR) viaduct, with two travel lanes per direction, and an at-grade service road, with one travel lane per direction. Atlantic Avenue connects to Conduit Avenue, as well as to the Van Wyck Expressway. Linden Boulevard is a major east-west arterial south of the site that connects to Conduit Avenue, Nassau Expressway, and eastern destinations. North-south access to and from the site is available via Utica Avenue and Pennsylvania Avenue, which are arterial roadways with one to two travel lanes. Broadway is a southeast-northwest arterial with one travel lane in each direction that extends from the Brooklyn-Queens Expressway in Williamsburg and terminates at East New York Avenue. East New York Avenue is a northeast-southwest arterial that extends between Utica Avenue and Atlantic Avenue. It provides two-way traffic with one lane in each direction up to Sackman Street, east of where it becomes a one-way eastbound street. All the roadways mentioned above are NYCDOT-designated truck routes that would carry the majority of the traffic generated by Build Alternatives.

Maspeth Yard

The traffic study area for the Maspeth Yard consists of major intersections along access routes into and out of the area, including the key locations at which freight-related truck traffic could be concentrated.

The street network in the industrial area near Maspeth Yard includes a number of multi-legged intersections or other locations where streets cross at angles requiring sharp turns that can be challenging for large trucks. Maurice Avenue, for example, crosses through the area at odd angles to the prevailing West Maspeth grid, with several intersections along it having multiple or sharply angled approaches. Maspeth Yard would consist of several large blocks that could be accessed only via a few streets in the area.

Trucks could use several primary routes to connect to the BQE and LIE. To the north and east, trucks could use 48th Street, 58th Street, Maurice Avenue, and Grand Avenue; to the west, they could use Grand Avenue and Metropolitan Avenue. Each of these streets is a designated NYCDOT truck route with one or two travel lanes. Most intersections along these routes within the study area are signalized.

Other relevant local streets in Queens south of the LIE are Rust Street, a two-lane, two-way street and Laurel Hill Boulevard/Review Avenue, another two-lane, two-way arterial. This street is located north of the site and allows for access to the BQE-LIE interchange to the north and to Greenpoint Avenue to the west.

In Brooklyn just west of Newtown Creek, both Metropolitan Avenue and Grand Street (called Grand Avenue in Queens) extend to the BQE and beyond and have one or two moving lanes of traffic in each direction. Vandervoort Avenue is an important arterial that allows trucks to exit the BQE at the Meeker Avenue interchange and travel to and from Maspeth Yard via Grand Street/Avenue. Maspeth Avenue in Brooklyn may take on added importance as a Maspeth Yard access route.

Oak Point Yard

The traffic study area for the Oak Point Yard consists of the major intersections along Bruckner Boulevard, including the key local truck routes in Hunts Point, such as Leggett Avenue, Garrison Avenues, and Barry Street.

The street network in much of this highly industrialized area of Hunts Point is laid out in a grid manner, particularly north of Tiffany Street. The streets in this particular section of the borough have substantial truck traffic volumes since they provide access to major expressways that extend into the New York metropolitan and tri-state area. Bruckner Boulevard is one of the major north-south arterials in the Bronx, with some of the area's highest traffic volumes throughout the day. Through the study area, Bruckner Boulevard is a major at-grade arterial with the elevated Bruckner Expressway aligned within (and above) its right-of-way. The boulevard is very wide, with main and service roads of two to three lanes in each direction, separated by raised medians. There are exclusive left-turn lanes at major intersections, along with exclusive signal phases allocated to these movements. To the north, Bruckner Boulevard provides access to upstate New York, Connecticut, and New Jersey via the Bruckner Expressway, which, in turn, connects with the Cross Bronx Expressway and New England Thruway. To the south, access to Queens, Manhattan, and Long Island is possible via the RFK Bridge.

Each of Bruckner Boulevard's intersecting streets serve the Hunts Point area, including Hunts Point Avenue, Barretto Street, Tiffany Street, Longwood Avenue, and Leggett Avenue. These streets typically operate with one to two travel lanes per direction with curb parking allowed on both sides of the street. The uses in the area are predominately industrial and manufacturing, although there are some residential and retail uses near Bruckner Boulevard and on Tiffany Street.

Hunts Point

Located in the Hunts Point neighborhood of south Bronx, the new terminal would be close to Sheridan Expressway (I-895)/Bruckner Expressway (I-278) interchange. To access these through truck routes, vehicles from the terminal would use local truck routes such as Food Center Drive, Halleck Street, Viele Avenue, Tiffany Street, Oak Point Avenue, Edgewater Road, Randall Avenue, Leggett Avenue, Garrison Avenue, and Bruckner Boulevard.

Bruckner Boulevard is one of the major north-south arterials in the Bronx, with some of the area's highest traffic volumes throughout the day. To the north, Bruckner Boulevard provides access to upstate New York, Connecticut, and New Jersey via the Bruckner Expressway, which, in turn, connects with the Cross Bronx Expressway and New England Thruway. To the south, access to Queens, Manhattan, and Long Island is possible via the RFK Bridge.

Each of Bruckner Boulevard's intersecting streets serve the Hunts Point area, including Hunts Point Avenue, Barretto Street, Tiffany Street, Longwood Avenue, and Leggett Avenue. These streets typically operate with one to two travel lanes per direction with curb parking allowed on both sides of the street. The uses in the area are predominately industrial and manufacturing, although there are some residential and retail uses near Bruckner Boulevard and on Tiffany Street.

Long Island Facilities

As discussed in Chapter 4, "Alternatives," a number of existing and proposed locations on Long Island would be suitable for receiving and distributing freight generated by the Cross Harbor project alternatives. Existing facilities would be able to accommodate the projected carload merchandise forecasted to be destined for Nassau and Suffolk counties. However, the international container and intermodal cargo transported by the Rail Tunnel Alternatives would require a new or expanded facility to meet the forecasted demand. The CHFP is not selecting or recommending which yard or yards would be developed on Long Island. However, the EIS includes an analysis of the operational effects associated with the increased rail and truck activity on Long Island resulting from the project alternatives. For the Rail Tunnel Alternatives, it was assumed that the service and infrastructure (including intermodal yards on Long Island) would be provided and that the full market demand would be met with the implementation of these alternatives. For the purposes of the environmental analysis, two sites, which have been proposed or developed by others and have already begun or completed the environmental review process, are discussed as illustrative examples of the operational effects of the CHFP alternatives. The two illustrative sites are the Pilgrim Intermodal Terminal and the Brookhaven Rail Terminal.

Pilgrim Intermodal Terminal

The preferable access route to the Pilgrim Intermodal Terminal site is via G Road/County Route 106. Country Road 106 serves two-way traffic yet it is not striped and is narrow along the psychiatric center property. The roadway widens (with two through lanes and one left-turning lane for westbound traffic) as it meets Crooked Hill Road and Wicks Road at signalized intersections. Crooked Hill Road is an arterial with two moving lanes per direction with an additional left-turning lane at intersections, providing access to the LIE West. Wicks Road provides one travel lane per direction and access to the LIE East.

Brookhaven Rail Terminal

Brookhaven Rail Terminal is bounded by the LIE south service road to the north, and to the west by Country Road 101, a north-south arterial. Country Road 101 has two moving lanes per direction with a grassy median. At the signalized intersection of State Street and Country Road 101, the arterial provides a left-turning lane and a right-turning lane for the northbound direction and a northbound left-turning lane. State Street is a two-way local road that runs through the site. The trucks would use State Street to access Country Road 101. Country Road 101 connects to the Long Island Expressway service roads at signalized intersections just northwest of the rail yard.

MARINE OPERATIONS

The Port of New York and New Jersey is the largest port complex on the United States Atlantic seaboard. It consists of publicly owned and privately owned marine terminal facilities located throughout the region's waterfront. Terminals located in New Jersey, include Port Newark/Port Elizabeth along Newark Bay and the Port Jersey Global Marine Terminal on Upper New York Bay, and terminals located in New York include New York Container Terminal in Staten Island and Red Hook Container Terminal in Brooklyn. In 2013, these existing container terminals handled about 5.5 million twenty-foot equivalent units, estimated at a value in excess of $200 billion, 71 million tons of bulk cargo, and over 745,000 vehicles.[1]

In addition to Port Authority terminals, hundreds of facilities, most of which are quite small compared to the Port Authority terminals, located along navigable waterways throughout the 54-county region, handle tens of millions of tons of bulk and breakbulk waterborne cargo. About

[1] "2013 Trade Statistics," Port Authority of New York and New Jersey, available from: http://www.panynj.gov/port/pdf/2013_trade_statistics_sheet.pdf (accessed 06/02/2014).

two-thirds of the more than 100 million tons of domestic waterborne cargo moving in the region consists of refined petroleum products. Other top waterborne commodities include crude petroleum, waste or scrap materials, nonmetallic minerals, other building materials, and coal.[1]

Marine operations in Newark Bay north of the Port Newark and Port Elizabeth terminals can affect, or be affected by rail moves across the Upper Bay Lift Bridge. The bridge is used by rail traffic to access the National Docks Secondary and Greenville Yard, the western terminus of most of the CHFP alternatives. The Upper Bay Lift Bridge is a rail bridge located just north of Port Newark/Port Elizabeth and connects Jersey City to Newark. The bridge spans 300 feet with a 135-foot clearance in the up position and 35 feet of clearance in the down position. On average, 10 vessels that require opening of the bridge pass daily. Openings consist of scheduled appointments and unscheduled "as-needed" lifts. Activity is highest in the late afternoon and evening and lowest in the early morning. Most of the vessels are tug/barge combination, though there are some tankers. The cycle time to lift, hold open, and close the bridge for tug/barge combination vessels, which make up 97 percent of the traffic, is approximately 12 minutes. In cases where the bridge was held open to allow for more than one vessel to pass, the cycle time ranged between 15 and 30 minutes. Some tugs can fit under the bridge at low tide if they lower their antennas, but most request an opening. Based on average vessel use, the time that the bridge is unavailable for rail operation is 1.6 hours per day.

The Port Authority of New York and New Jersey is currently managing a project to increase the navigational clearance underneath the Bayonne Bridge from 151 feet above water to 215 feet above water. This project will allow larger container vessels, which are expected to call the Port of New York and New Jersey upon completion of the Panama Canal widening project. The Bayonne Bridge project will be completed in 2018.

AIR CARGO

The aviation industry centered on John F. Kennedy International Airport (JFK), EWR, and LaGuardia Airport (LGA) provides direct air transportation services to more than 200 cities in 70 countries. In 2010, the regional airport system allowed the handling of over 2.4 million tons of cargo, consisting of nearly 2.3 million tons of freight and nearly 0.2 million tons of revenue mail. JFK handled approximately 1.4 million tons of cargo, followed by EWR with nearly .9 million tons and LGA with 7,500 tons. Because JFK remains one of the highest-volume air cargo airports in the nation, and because access to this airport (via Hudson crossings and other gateways) is wholly truck-dependent, air cargo represents a market that could potentially benefit from an improved cross-harbor service.

Air cargo mainly consists of high value goods, including precious stones and metals, machinery, precision medical instruments, art and antiques, aircraft parts, and pharmaceutical products. During the past decade, the region's total air cargo decreased by 23 percent. Factors responsible for the decrease in cargo shipments by air include high jet fuel prices and fuel surcharges, increased shift to trucks for shorter distances, and a shift to vessel from air for some cargo from Asia. Despite the reduction in volume, the New York-New Jersey region handled 22.5 percent of the value of all air cargo leaving or entering the United States and remains the number one gateway for international air cargo.

[1] IHS Global Insight TRANSEARCH database, analyzed and enhanced with USDOT Freight Analysis Framework version 3, Cambridge Systematics.

JFK has more than four million square feet of office and warehouse space for air cargo, hosting 1,000 cargo companies. The entire air cargo area is designated as a Foreign-Trade Zone and is home to the northeast region's U.S. Customs headquarters. Hundreds of long-haul and short-haul trucking companies use JFK's cargo facilities. The airport is well connected to the highway network. Van Wyck Expressway (I-678), Rockaway Boulevard and Belt Parkway Service Road (Conduit Avenue) are the designated truck routes serving the airport.

EWR is a major hub for express carriers with nearly 1.4 million square feet of cargo space. The airport is adjacent to Port Newark, Port Elizabeth, and Foreign-Trade Zone No. 49, providing fast and efficient air-sea connections. Route 1/9 and Interstate 95 provide good road connection for truck carriers.

LGA specializes in short- and medium-haul cargo service. Passenger traffic is well served by Grand Central Parkway, while trucks are only allowed to access the airport via 82nd Street and 94th Street.

While air transport is a part of the regional freight network, air freight carriers do not typically transport the type of freight typically moved by truck, rail, or waterborne modes. Air cargo mainly consists of high value goods that are urgently needed—precious stones and metals, machinery, precision medical instruments, art and antiques, aircraft parts, and pharmaceutical products. Therefore, while by weight, air cargo makes up a small percentage of all freight moving through the region, air transport serves a small but important niche role in the movement of lightweight, high value, time-sensitive goods for which shippers are willing to pay a high price. It is best exemplified by the overnight delivery services such as Federal Express and its competitors. In the future, air freight will continue to be a niche player in the movement of regional freight and critical to the region's financial and service sectors, but unable to move large volumes of key consumption products such as food, lumber, clay, and concrete, or waste and construction debris.

Furthermore, while each of these air cargo facilities is relatively well connected to the regional highway network, they are also subject to the same truck access constraints as truck-based freight movement. For example, although direct expressway access is available to JFK, it is limited to the Van Wyck Expressway, which is heavily congested at most times of the day. Since air cargoes are time-sensitive, the access delays can be serious. EWR is better situated in terms of regional highway access; it has direct access to I-78 with good connections to the New Jersey Turnpike (I-95), as well as direct access to U.S. Routes 1 and 9 and U.S. Route 22. Still, any trucks traveling between these airports and locations east of the Hudson River must pass through the same bottlenecks and pay tolls to cross the water.

Nonetheless, because JFK remains one of the highest-volume air cargo airports in the nation, and because access to this east-of-Hudson region airport (via Hudson crossings and other gateways) is wholly truck-dependent, air cargo represents a relatively small market that could potentially benefit from an improved cross-harbor service.

D. POTENTIAL EFFECTS OF THE PROJECT ALTERNATIVES

RESULTS OF THE DEMAND MODEL ANALYSIS

The results of the demand and mode choice modeling, shown in **Table 5-4**, provide an indication of the ability of the alternatives to divert freight from existing harbor roadway crossings. The table shows the potential for each alternative and service option or operating scenario to divert freight from each of the aforementioned freight markets.

ENHANCED RAILCAR FLOAT ALTERNATIVE

As shown in **Table 5-4**, the Enhanced Railcar Float Alternative, with service between Greenville Yard and the Brooklyn waterfront, has the potential to divert 2.8 million tons of freight, in addition to the diversion that would be achieved by the No Action Alternative, if intermodal freight could be accommodated. Service from Greenville to the Bronx waterfront would divert 1.6 million tons of freight, in addition to the diversion that would be achieved by the No Action Alternative, if intermodal freight could be accommodated. The markets that the alternative with the intermodal option could capture include rail drayage, and long-haul trucks with an origin or destination within the study area. The Enhanced Railcar Float Alternative would also capture a very limited amount of traffic re-routed from the Selkirk crossing.

While there is market demand for transferring intermodal and international container freight via the Enhanced Railcar Float Alternative, meeting this demand involves high costs for intermodal processing facilities and the removal of capacity and/or operational constraints in the west of Hudson region, specifically at Greenville Yard. Therefore, as discussed previously, carload only service was also considered. Under the carload only scenario, Enhanced Railcar Float Alternative with service between Greenville Yard and the Brooklyn waterfront would capture 1.1 million tons of carload freight, in addition to the diversion that would be achieved by the No Action Alternative. With service to the Bronx waterfront, approximately 500,000 tons of carload freight, in addition to the diversion that would be achieved by the No Action Alternative, would be diverted. The markets captured would include rail drayage and long-haul trucks with an origin or destination within the study area, as well as a limited amount of traffic re-routed from the Selkirk crossing.

It should be noted that if the Enhanced Railcar Float Alternative is selected as a precursor to the Rail Tunnel Alternatives, the alternative may be designed in a way that sets up the development of intermodal yards and establishes the market and routes for the tunnel. The logistics of developing the infrastructure and service needed to move intermodal freight under the Enhanced Railcar Float Alternative would be further considered or studied as part of future Tier II documentation.

TRUCK FLOAT AND TRUCK FERRY ALTERNATIVES

The Truck Float and Truck Ferry Alternatives would not result in a modal shift from truck to rail. However, these alternatives would result in a modest diversion of truck traffic from existing roadway crossings. The regional benefits of these alternatives would therefore be limited to their effect on relieving congestion on local crossing. These alternatives would also result in local traffic increases associated with the diversion of truck traffic from existing crossings into Brooklyn and the Bronx. The Truck Float Alternative and the Truck Ferry Alternative tap the short-haul truck market that represents a portion of the demand for the Rail Tunnel with Shuttle, the Rail Tunnel with Chunnel, the Rail Tunnel with AGV, and the Rail Tunnel with Truck Access alternatives described below.

LIFT ON-LIFT OFF (LOLO) AND ROLL ON-ROLL OFF (RORO) CONTAINER BARGE ALTERNATIVES

The LOLO and RORO Container Barge Alternatives would result in a modest diversion of intermodal freight 0.3 to 0.4 million tons per year, mostly consisting of international containerized freight. The choice of terminals would not affect demand by much and neither would the loading and unloading technology (i.e., LOLO and RORO).

RAIL TUNNEL ALTERNATIVE

The Rail Tunnel Alternative would divert 7.2 to 9.6 million tons of freight per year (see **Table 5-4**). The range of potential benefits illustrates the effect of the operating scenarios modeled. The low end of the range reflects the Limited Operating Scenario, while the high end of the range reflects the Seamless Operating Scenario. The Rail Tunnel Alternative with the Base Operating Scenario would divert 8.1 million tons of freight per year. All three operating scenarios would divert the same amount of freight from rail drayage and long-haul truck trips within the 54-county Cross Harbor modeling study area. The Seamless Operating Scenario would divert slightly more freight from rail via Selkirk than the Base and the Limited Operating Scenarios. The greatest difference among the three operating scenarios lies in their ability to divert freight currently transported through long-haul truck trips, with origin and destination outside of the 54-county modeling study area. Locally, the difference between the three operating scenarios affects mostly the number of through trains, which would not contribute much to the activity at the local rail facilities, but do add to the overall frequency of trains along the local rail lines and may therefore have an effect on environmental conditions sensitive to the frequency of train service.

RAIL TUNNEL WITH SHUTTLE ("OPEN TECHNOLOGY") SERVICE ALTERNATIVE

The Rail Tunnel with Shuttle Service Alternative would enable the tunnel to capture more freight than the Rail Tunnel Alternative by enabling truck chassis on a rail platform to move through the tunnel. This alternative would divert 8.7 million tons of freight per year, which is approximately 0.5 million tons per year more than the Rail Tunnel Alternative under the Base Operating Scenario.

RAIL TUNNEL WITH CHUNNEL SERVICE ALTERNATIVE

The chunnel service is an alternative way to get trucks through the tunnel, without having them drive through the tunnel. Instead, the trucks drive onto and off of special railcars at two terminals with truck loading and queuing areas. The two terminals would be located at the expanded Oak Island Yard in New Jersey and expanded East New York Yard in Brooklyn. The Rail Tunnel with Chunnel Service Alternative would divert 10.5 million tons of freight per year, enhancing the Rail Tunnel Alternative under the Base Operating Scenario by 2.4 million tons per year (see **Table 5-4**).

RAIL TUNNEL WITH AUTOMATED GUIDED VEHICLE (AGV) SERVICE ALTERNATIVE

AGVs would enable trucks to cross the harbor through the rail tunnel. The Rail Tunnel with AGV Service Alternative would enable the tunnel to capture more freight than the Rail Tunnel Alternative, diverting 8.9 million tons of freight per year from existing modes and routes. The AGV service enables the capture of 0.8 million tons per year of truck freight that would otherwise be carried over existing highway crossings, in addition to what would be achieved by the Rail Tunnel Alternative under the Base Operating Scenario.

RAIL TUNNEL WITH TRUCK ACCESS ALTERNATIVE

With this alternative, trucks would use the tunnel during the day, and freight trains would use it at night. In addition to what would be achieved with the Rail Tunnel Alternative under the Base Operating Scenario, the truck access would divert 16 million tons per year of freight on trucks that would otherwise use existing crossings. The total diversion with the Rail Tunnel with Truck Access Alternative would be 24.1 million tons of freight per year. Of all the Build Alternatives, the Rail

Tunnel with Truck Access Alternative would result in the greatest amount of freight diversion from existing crossings.

Table 5-5
Freight Diversion with Build Alternatives
In Addition to No Action Alternative
(million tons per year)

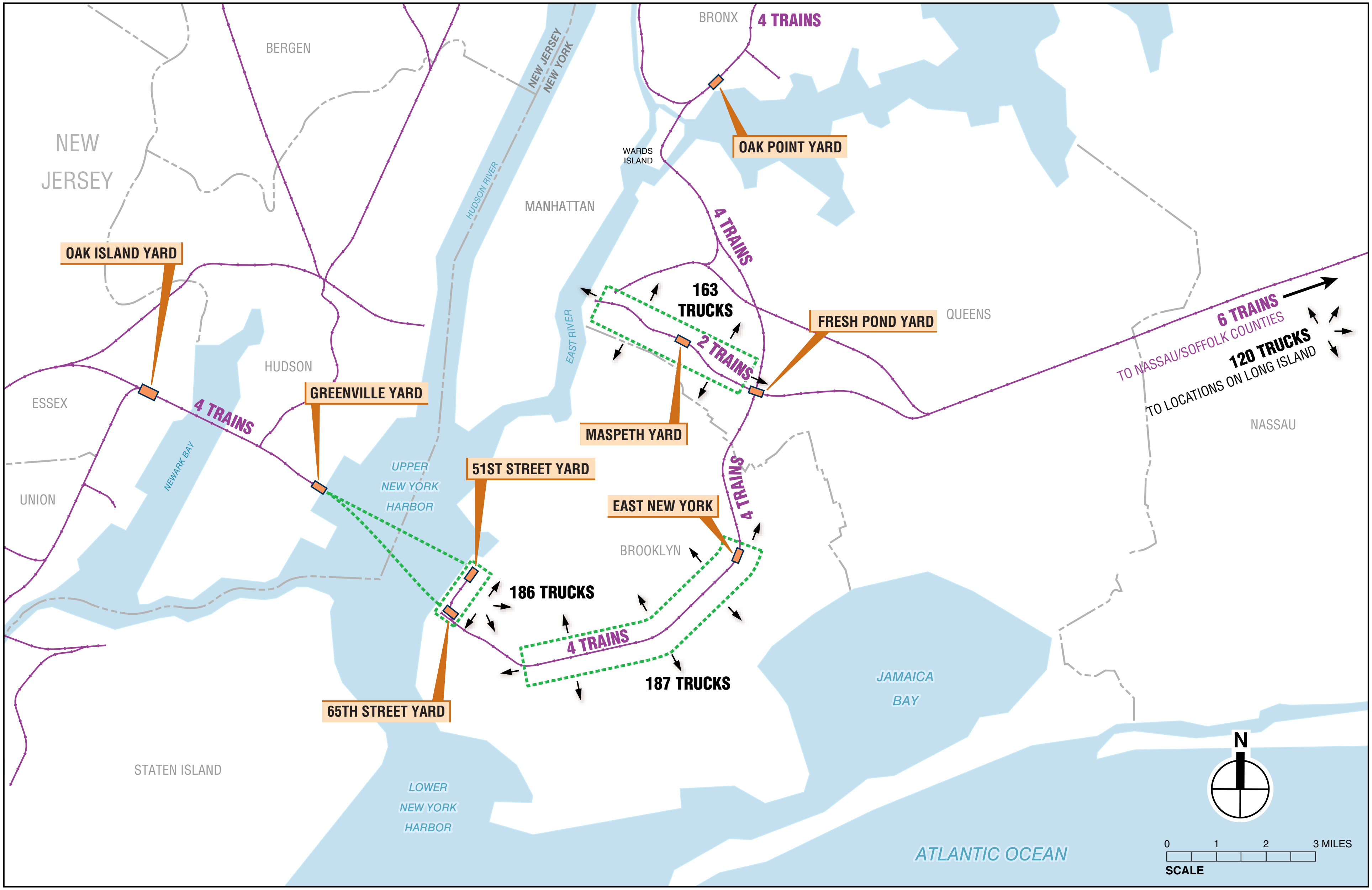
Alternative Class	Alternative		West of Hudson Crossing Terminals	East of Hudson Terminals	Rail Drayage	Container Drayage	Other Short-Haul Truck	Study Area Long-Haul Truck	Rail via Selkirk	Through Trip Long-Haul Truck	Total
Waterborne	Enhanced Railcar Float	Carload and Intermodal	Greenville	Brooklyn	0.7	0.6		1.2	0.3		2.8
			Greenville	Bronx	0.7			0.7	0.1		1.6
		Carload Only	Greenville	Brooklyn	<0.1			0.8	0.3		1.2
			Greenville	Bronx				0.4	0.1		0.5
	Truck Float/ Truck Ferry		New Jersey	Brooklyn Queens			1.7* 1.5*				1.7 1.5
			New Jersey	Bronx			1.2*				1.2
	LOLO/RORO Container Barge		New Jersey	Brooklyn		0.3					0.3
			New Jersey	New England		0.4					0.4
Rail Tunnel	Rail Tunnel	Limited	New Jersey	Brooklyn	0.8	0.6		3.3	0.5	2.0	7.2
		Base	New Jersey	Brooklyn	0.8	0.6		3.3	0.7	2.8	8.1
		Seamless	New Jersey	Brooklyn	0.8	0.6		3.3	0.8	4.0	9.6
	Rail Tunnel (Base) with Shuttle Service		New Jersey	Brooklyn	0.8	0.6	0.5	3.3	0.7	2.8	8.7
	Rail Tunnel (Base) with Chunnel Service		New Jersey	Brooklyn	0.8	0.6	2.4	3.3	0.7	2.8	10.5
	Rail Tunnel (Base) with AGV Technology		New Jersey	Brooklyn	0.8	0.6	0.8	3.3	0.7	2.8	8.9
	Rail Tunnel (Base) with Truck Access		New Jersey	Brooklyn	0.8	0.6	16.0*	3.3	0.7	2.8	24.1

Note: The values reflect incremental demand as compared with the No Action Alternative. The total diversion shown in the table may be slightly different than the sum of the diversion by market, due to rounding.
* Includes Truck Reroute market.

TRANSPORTATION OPERATIONS

Projected daily operations of local truck trips that would be generated as a result of the Cross Harbor-related activities by the No Action Alternative are shown in **Figure 5-8**. The projected daily operations for the Enhanced Railcar Float Alternative are shown in **Figures 5-9** and **5-10**. The Truck Float/Truck Ferry Alternative operations, with all combinations of crossing termini are illustrated in **Figure 5-11**. The operations for the LOLO/RORO Container Barge Alternatives are illustrated in **Figure 5-12.** The Rail Tunnel Alternative operations are illustrated in **Figure 5-13**, with the low end of the range shown reflecting the Limited Operating Scenario, and the high end of the range reflecting the Seamless Operating Scenario. The ranges shown for other Rail Tunnel Alternatives also reflect the operating scenarios. The daily operations for the Rail Tunnel with Shuttle Service Alternative are shown in **Figure 5-14**; the Rail Tunnel with Chunnel Service Alternative in **Figure 5-15**; the Rail Tunnel with AGV Technology in **Figure 5-16**, and the Rail Tunnel with Truck Access Alternative in **Figure 5-17**. The train trips and truck trips shown for all alternatives reflect both east-of-Hudson bound trips and west-of-

7.28.14



Freight Rail Line and Average Daily Train Passbys

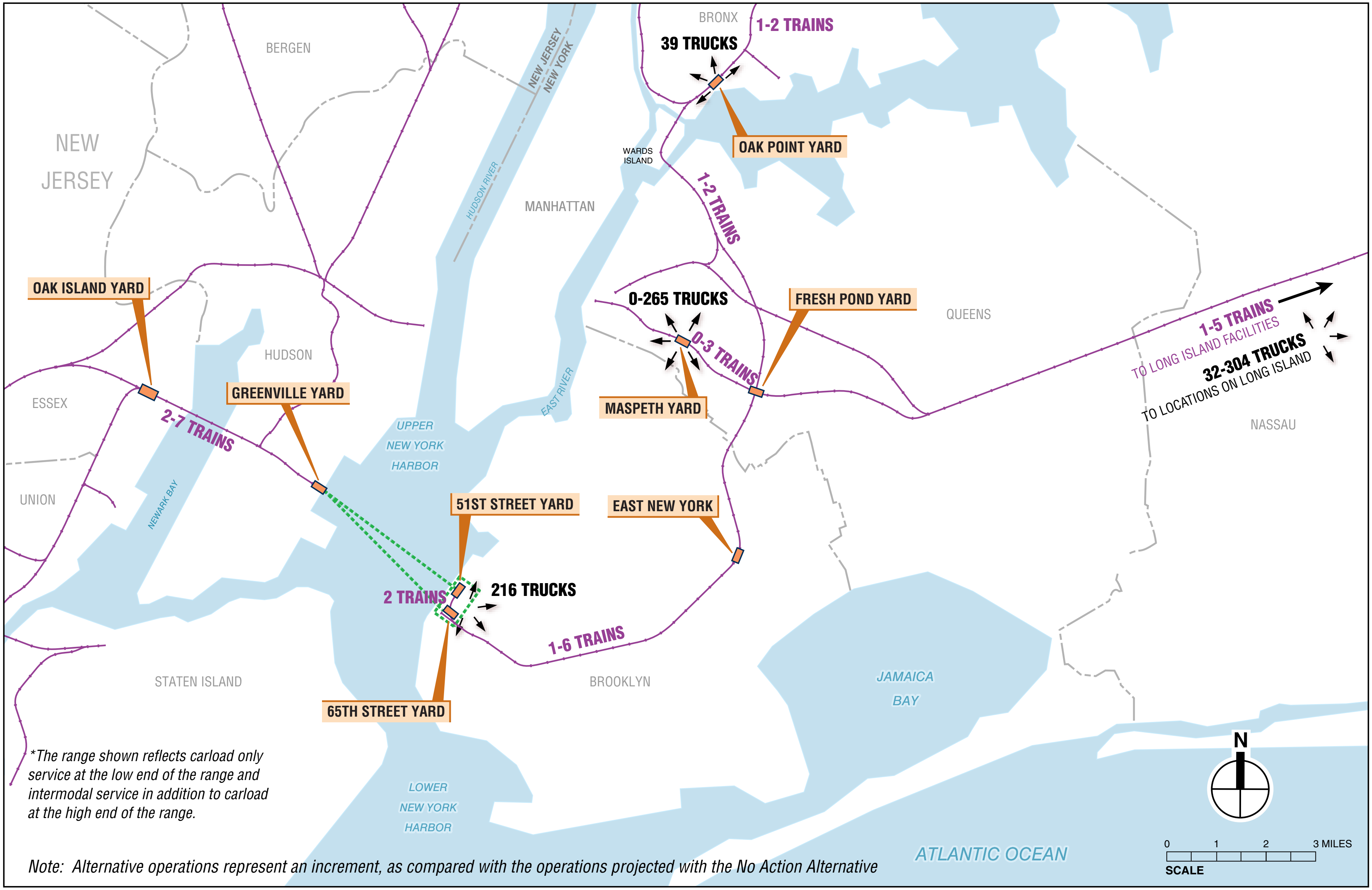
Average Daily Truck Trips

FIGURE 5-8

No Action Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Freight Rail Line and Average Daily Train Passbys

Enhanced Float Option

Average Daily Truck Trips

FIGURE 5-9

Enhanced Railcar Float to Brooklyn Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14

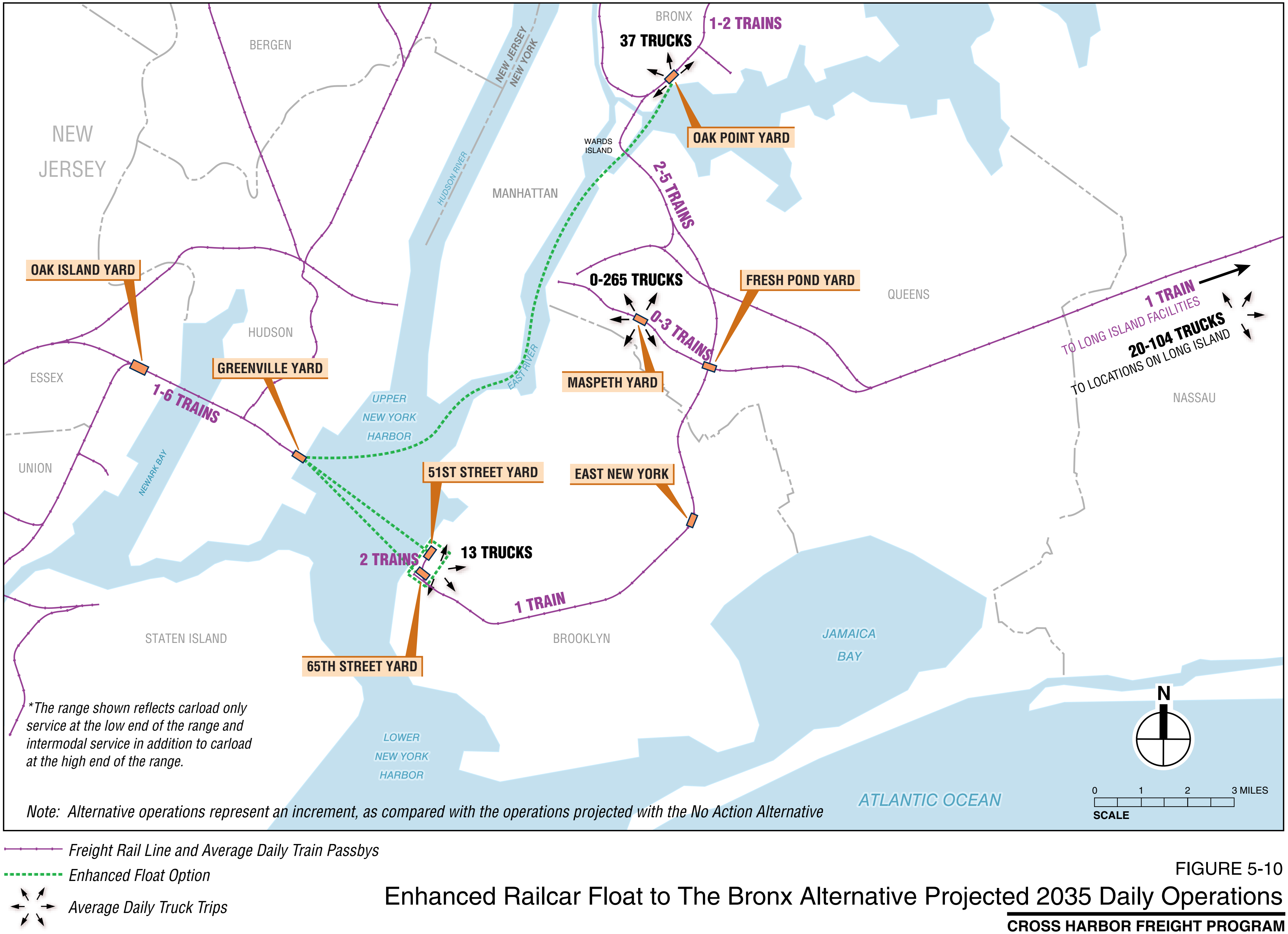
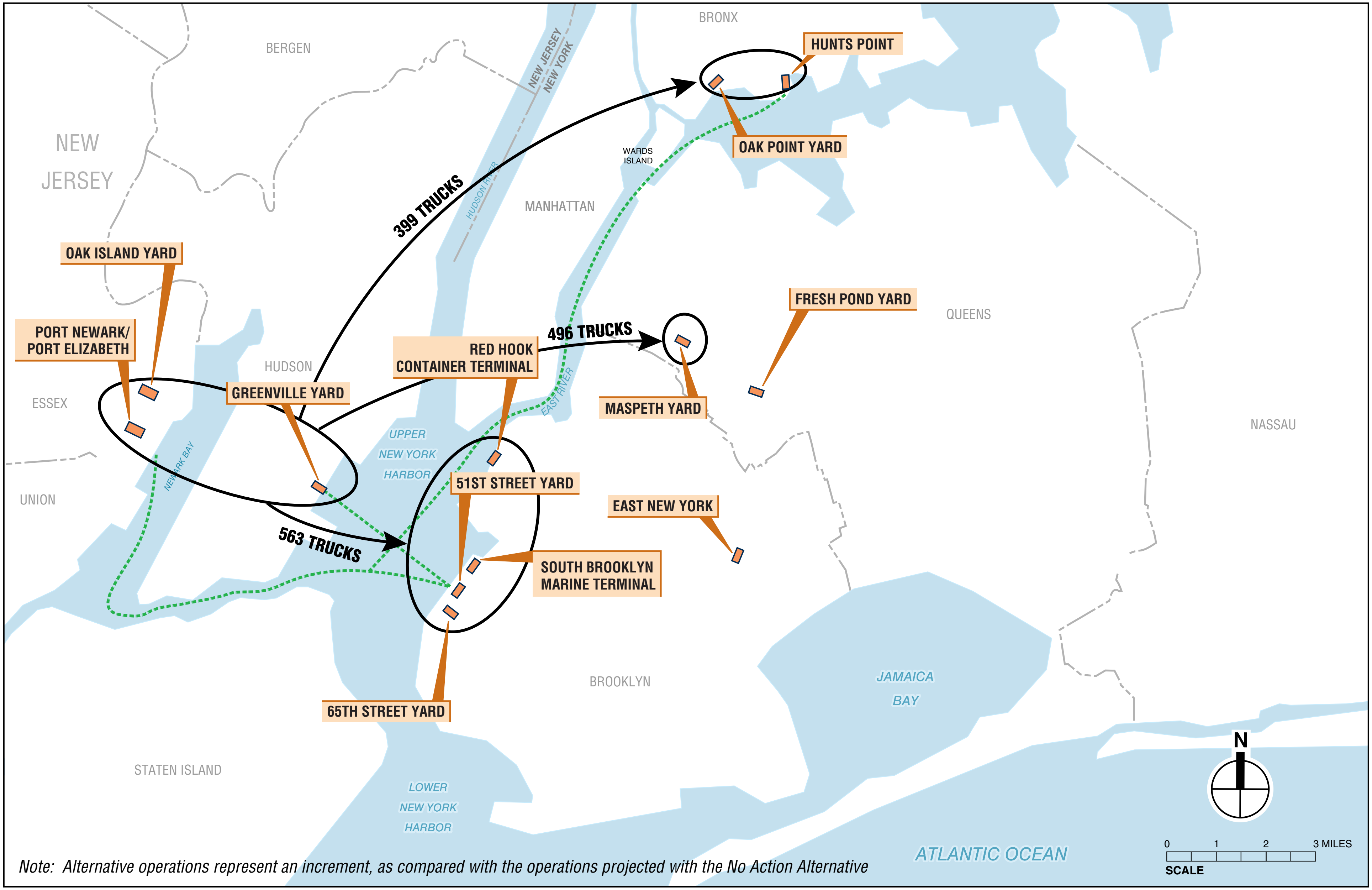


FIGURE 5-10

Enhanced Railcar Float to The Bronx Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Truck Float / Ferry Operation

Destination and Number of Average Daily Truck Trips

FIGURE 5-11

Truck Float/Truck Ferry Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14

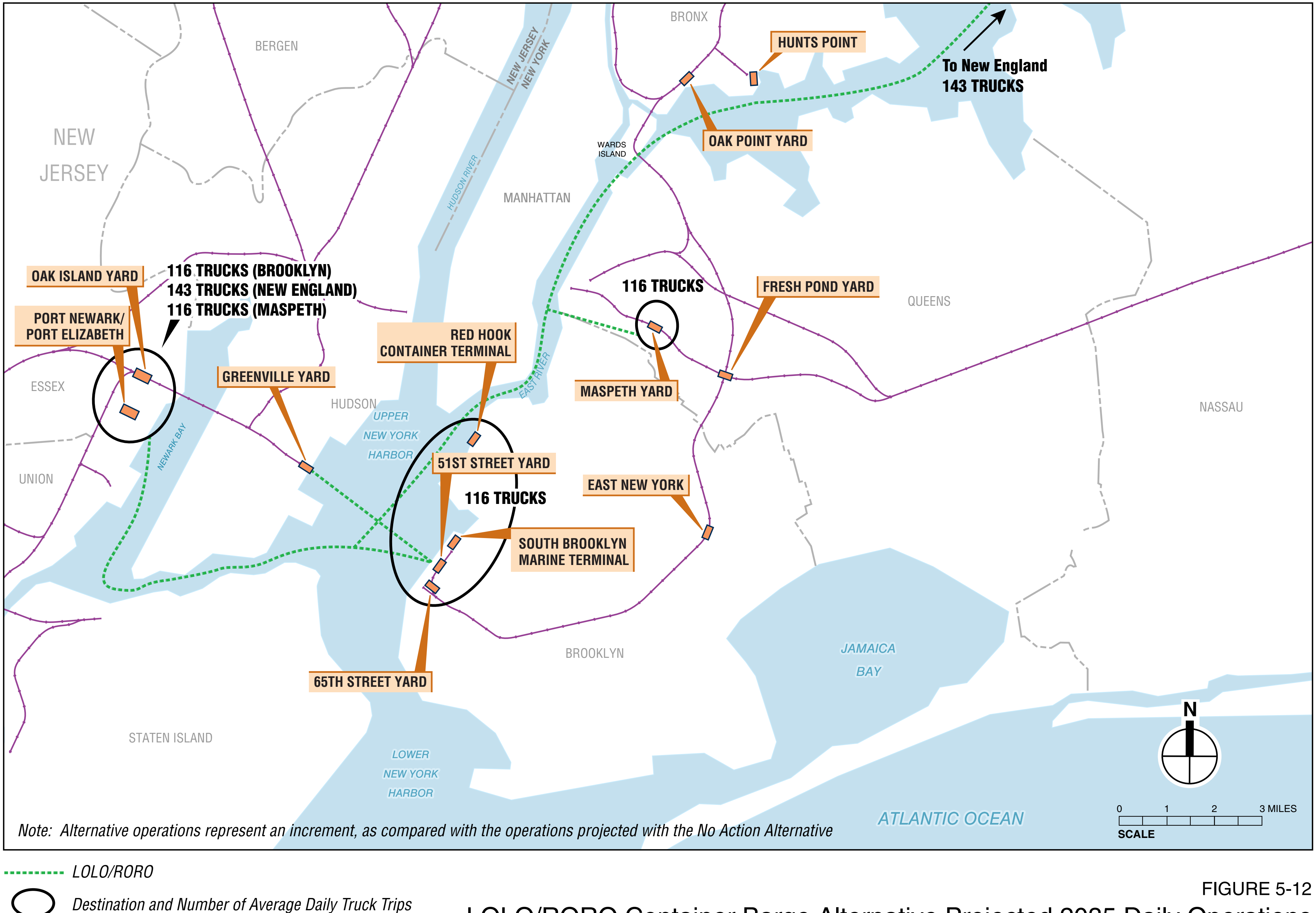
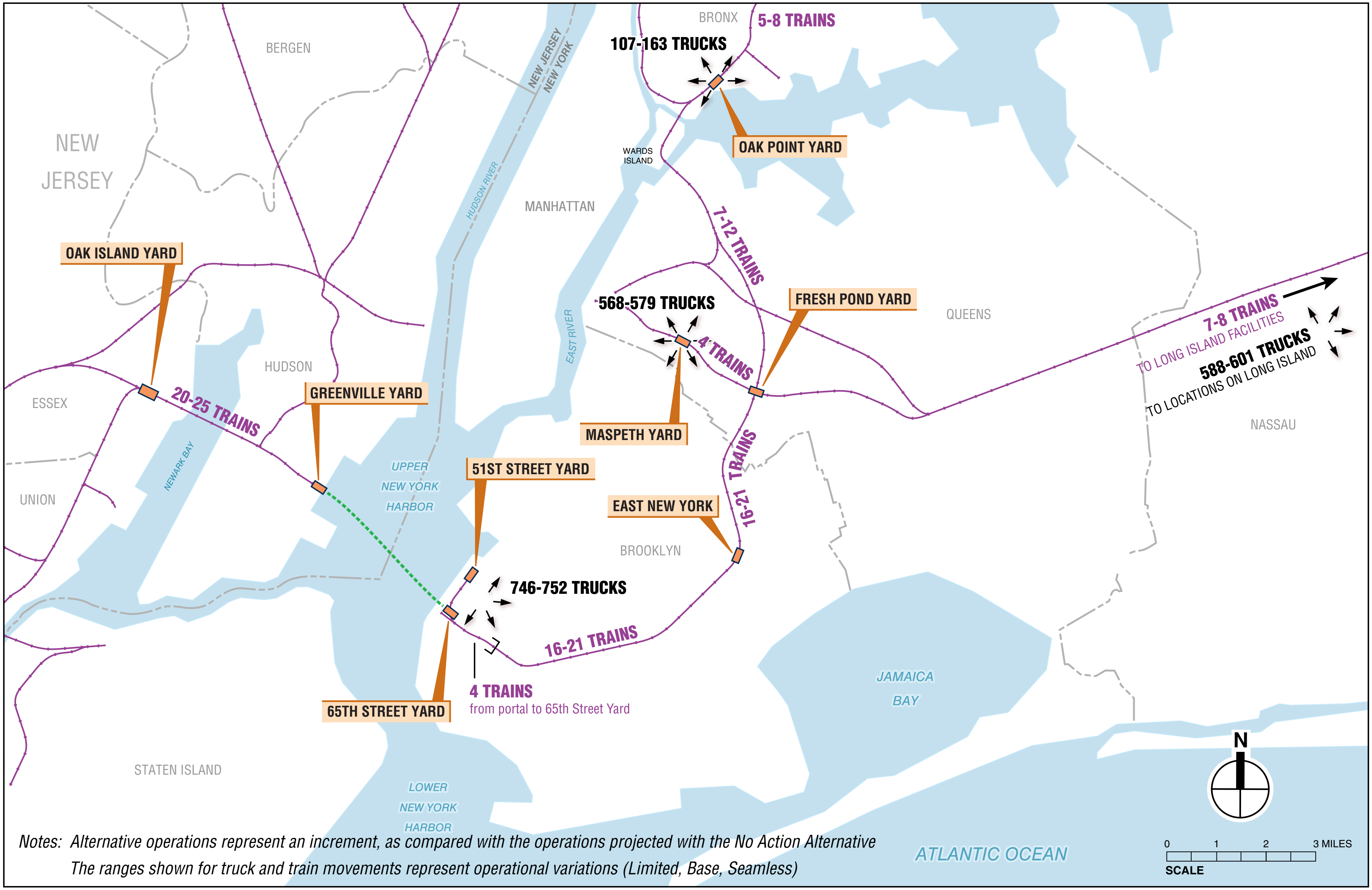


FIGURE 5-12

LOLO/RORO Container Barge Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Notes: *Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative*
The ranges shown for truck and train movements represent operational variations (Limited, Base, Seamless)

Freight Rail Line and Average Daily Train Passbys
Rail Tunnel
Average Daily Truck Trips

FIGURE 5-13
Rail Tunnel Alternative Daily Operations
CROSS HARBOR FREIGHT PROGRAM

7.28.14

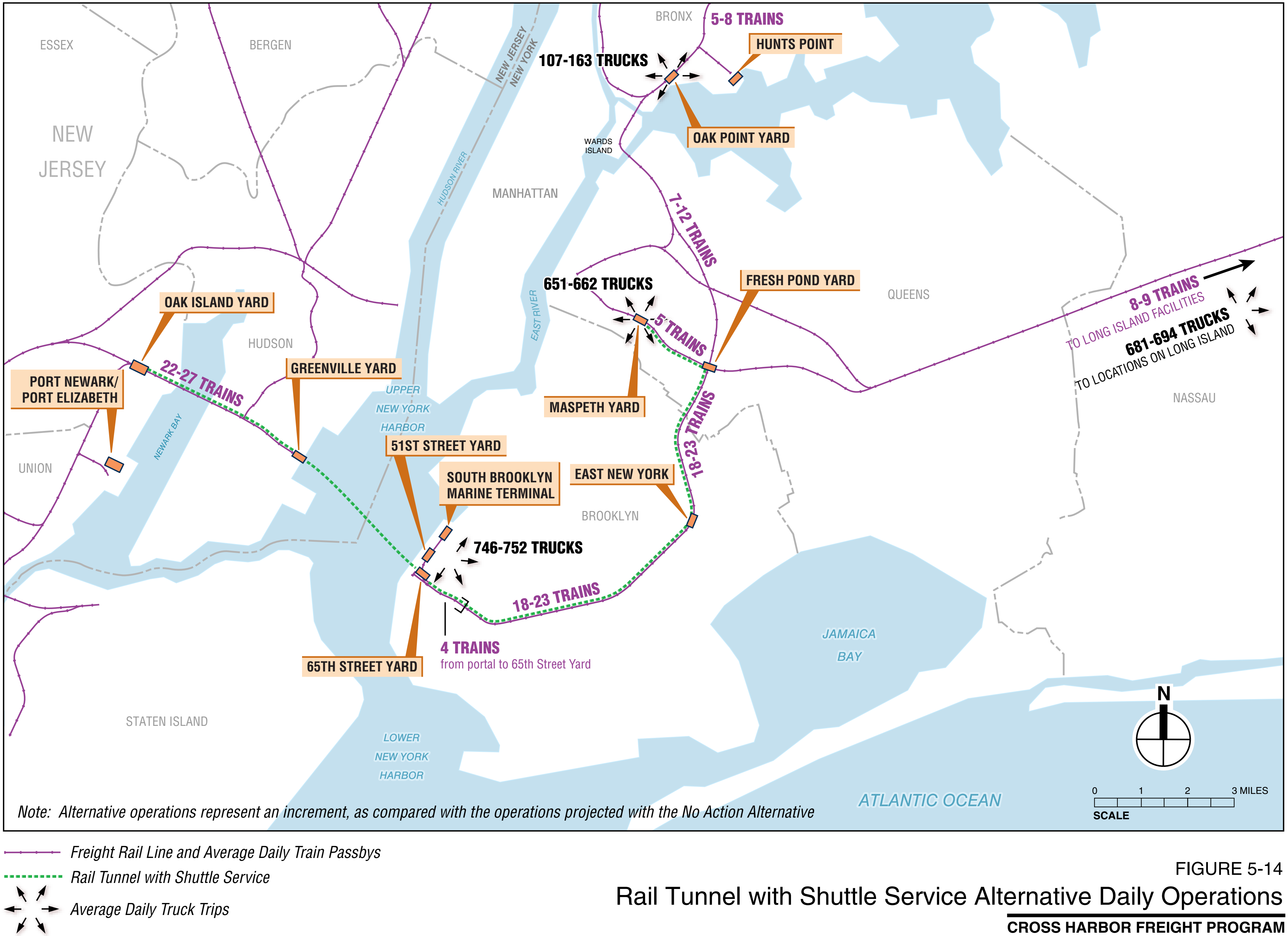
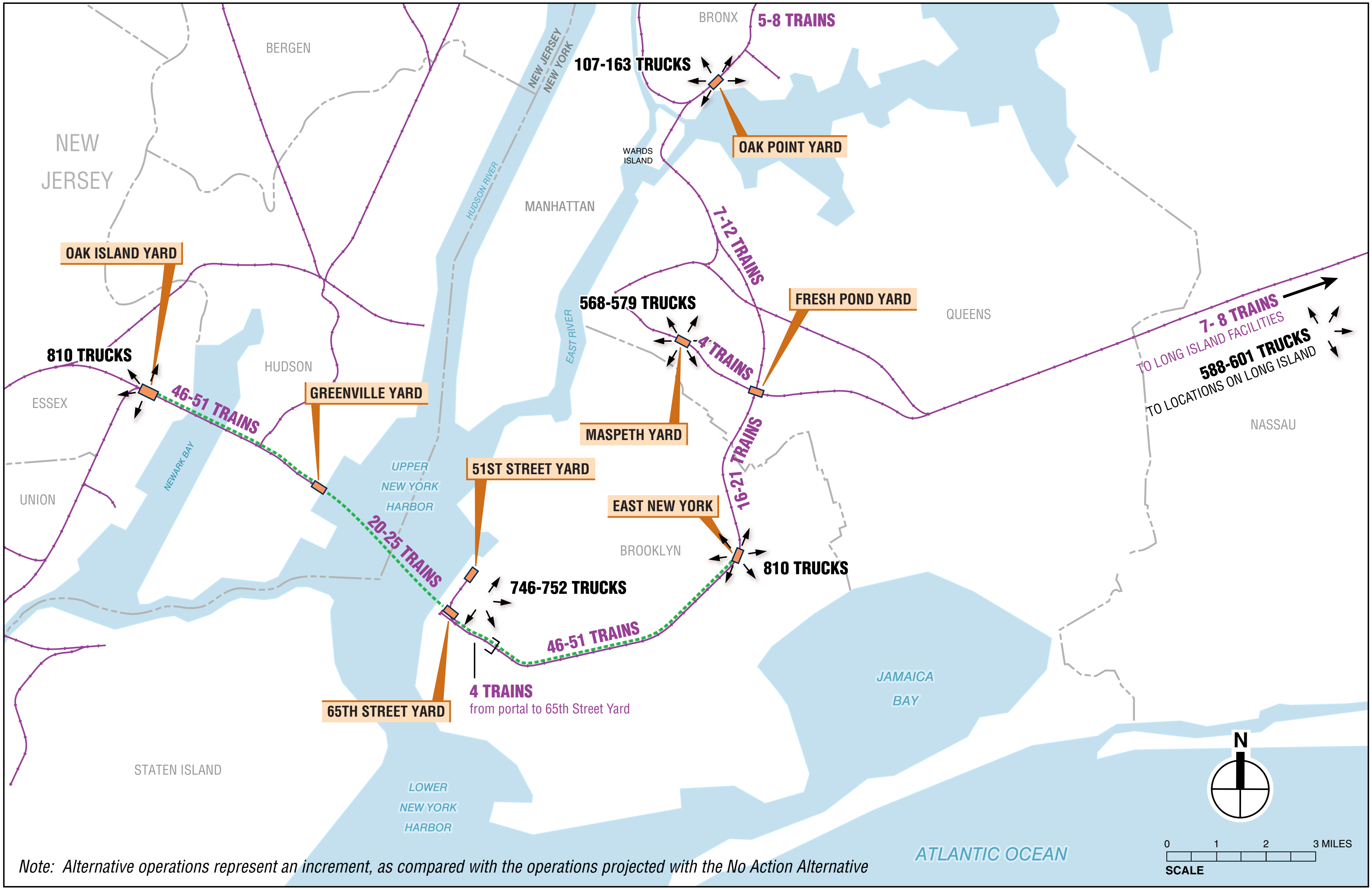


FIGURE 5-14

Rail Tunnel with Shuttle Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with Chunnel Service

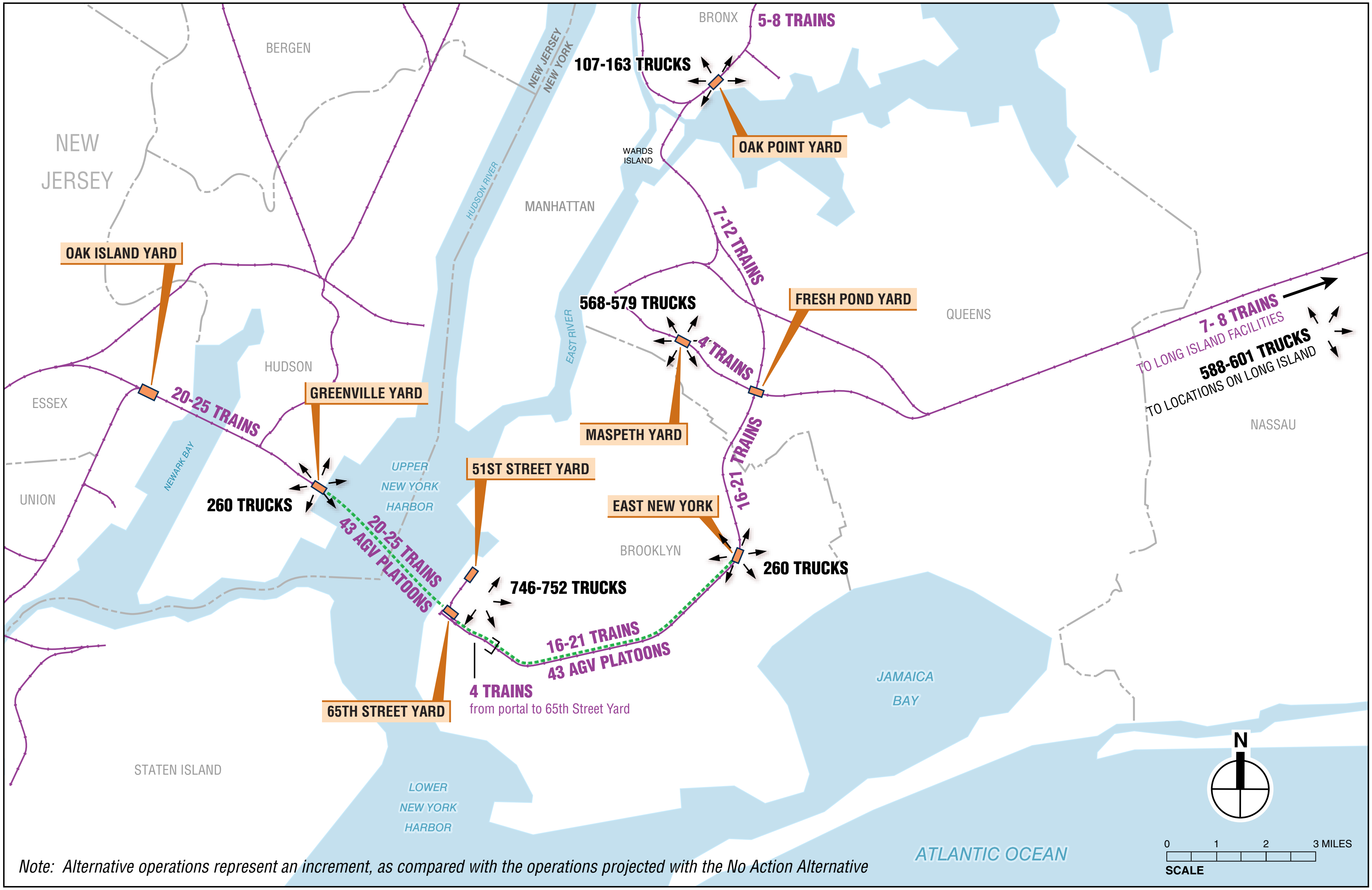
Average Daily Truck Trips

FIGURE 5-15

Rail Tunnel with Chunnel Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14

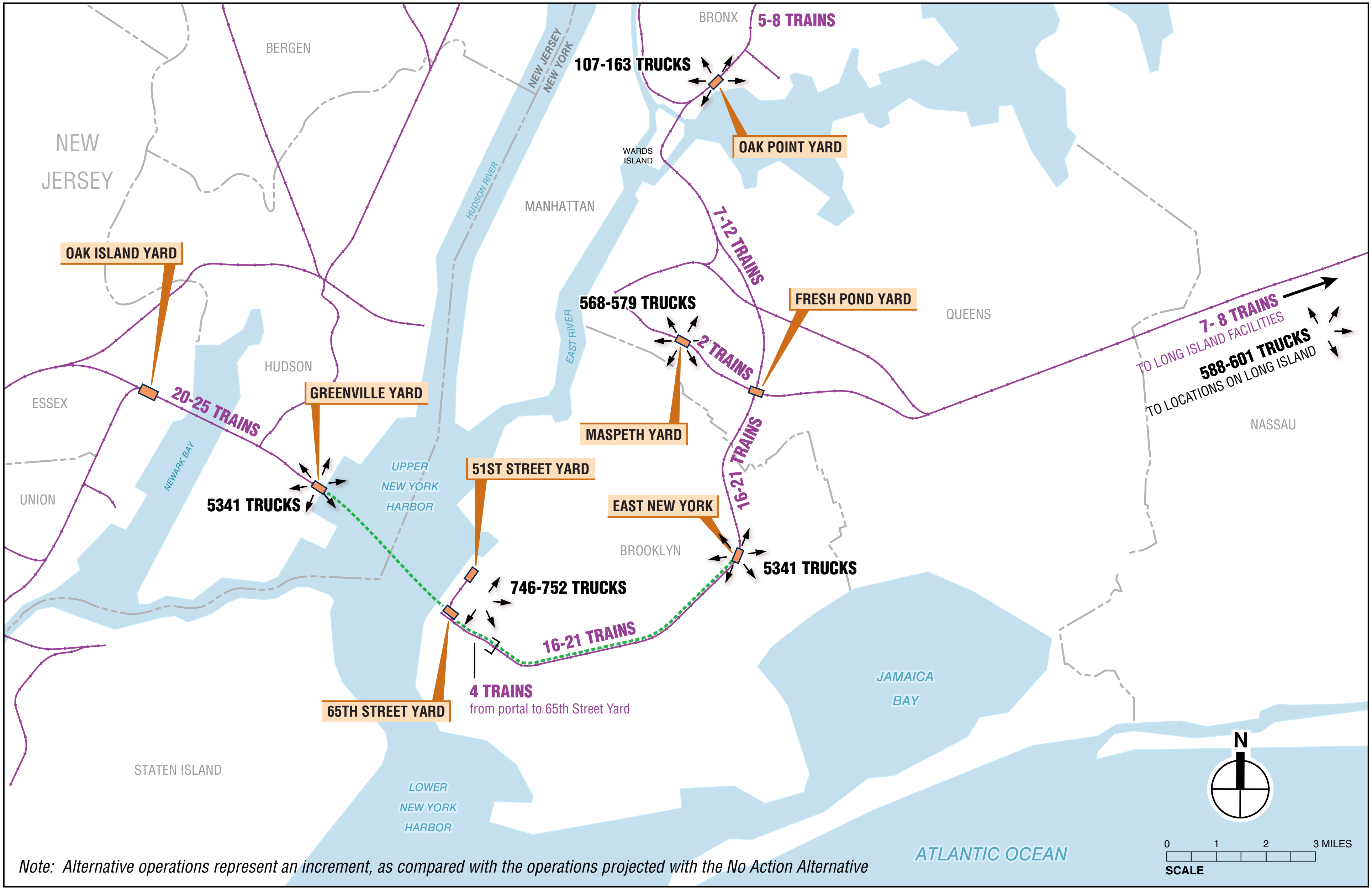


Freight Rail Line and Average Daily Train Passbys
Rail Tunnel with AGV Technology
Average Daily Truck Trips

FIGURE 5-16
Rail Tunnel with AGV Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with Truck Access

Average Daily Truck Trips

FIGURE 5-17

Rail Tunnel with Truck Access Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

Hudson bound trips, as well as both loaded cars and trucks and empties. The daily truck and train trips shown for the Build Alternatives are increments from the No Action Alternative.

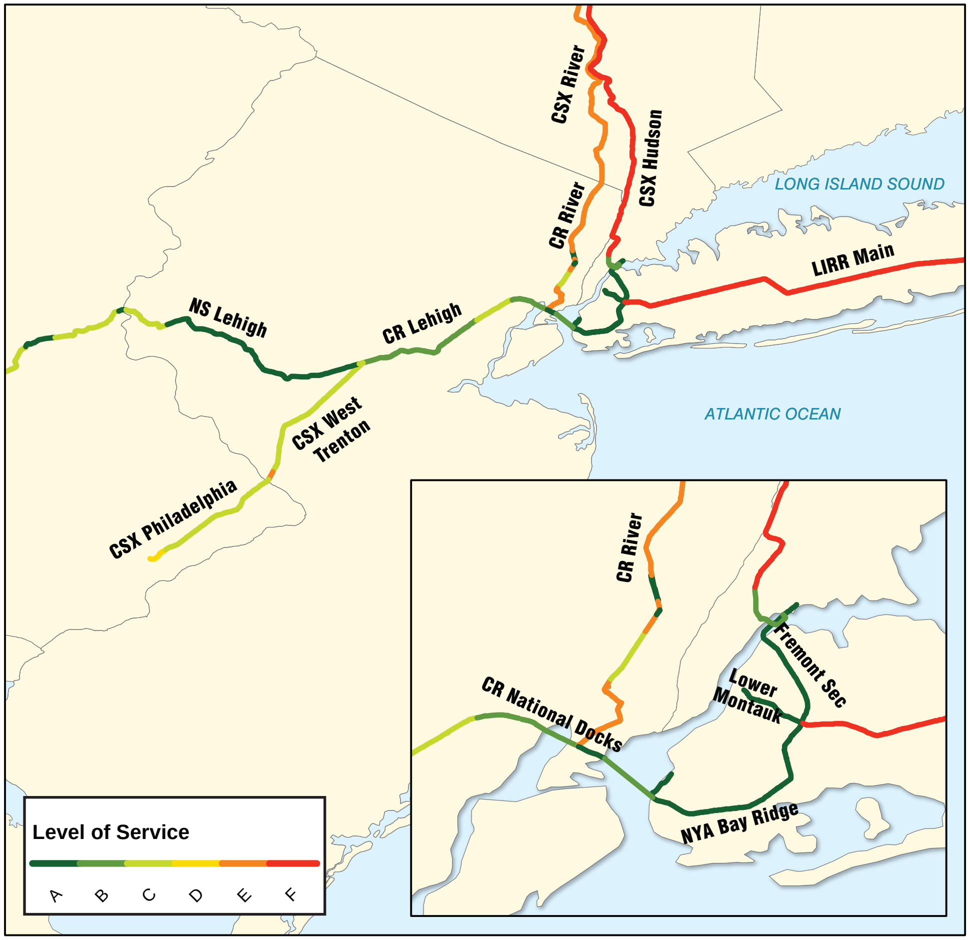
REGIONAL RAIL NETWORK EFFECTS

Under the No Action Alternative, the projected growth in Hudson-crossing carload and intermodal rail traffic over the forecast period (70 percent and 72 percent, respectively) is expected to result in deterioration in the level of service on several segments of the modeled freight rail network, as discussed in Chapter 1, "Purpose and Need." Compared to 2007, portions of the network, namely the CSX River Line, the Conrail National Docks Secondary north of Constable Junction, and a 1.8-mile section of the CSX Philadelphia Subdivision are expected to see increases in traffic that would result in a volume-capacity ratio that exceeds the theoretical capacity threshold of 0.7.

The Conrail Lehigh Line between Aldene and Newark and the NS Lehigh Line between Manville and the Pattenburg Tunnel in Warren County are assumed to have an improved level of service (from LOS E to LOS C and from LOS C to LOS A, respectively) due to capacity enhancements that are planned to be completed before 2035. These enhancements include the addition of a third main line track between Aldene and Newark and the addition of a second main line track between Manville and the Pattenburg Tunnel. The 2035 No Action levels of service on the network segments used for analysis are depicted on **Figure 5-18**.

Using the projected growth in freight trains by 2035 as the baseline for comparison, **Table 5-6** describes traffic and level of service impacts for each of the project alternatives, including a brief overview of the alternative, the projected daily change in rail freight traffic, and the identification of those rail line segments that show a change in the LOS. Overall, 13 of the 42 segments had a deterioration in LOS relative to the No Action Alternative in one or more of the project alternatives. Two-thirds of the affected segments are expected to maintain a level of service below the theoretical volume-capacity threshold of 0.7, with a decline in LOS from A to B or from B to C. Therefore, only 7 segments, or 28.1 track miles, were impacted by any of the project alternatives with a decline in LOS that exceeds the theoretical volume-capacity threshold of 0.7. The single freight track on the Hell Gate Bridge is expected to be able to accommodate future no action volumes as well as the projected volume under each alternative scenario. The LOS impacts associated with each alternative are illustrated in **Figure 5-19A** and **Figure 5-19B**. As mentioned previously, the analysis does not factor in any growth of rail passenger train volumes on the segments that are shared with passenger service.

7.28.14



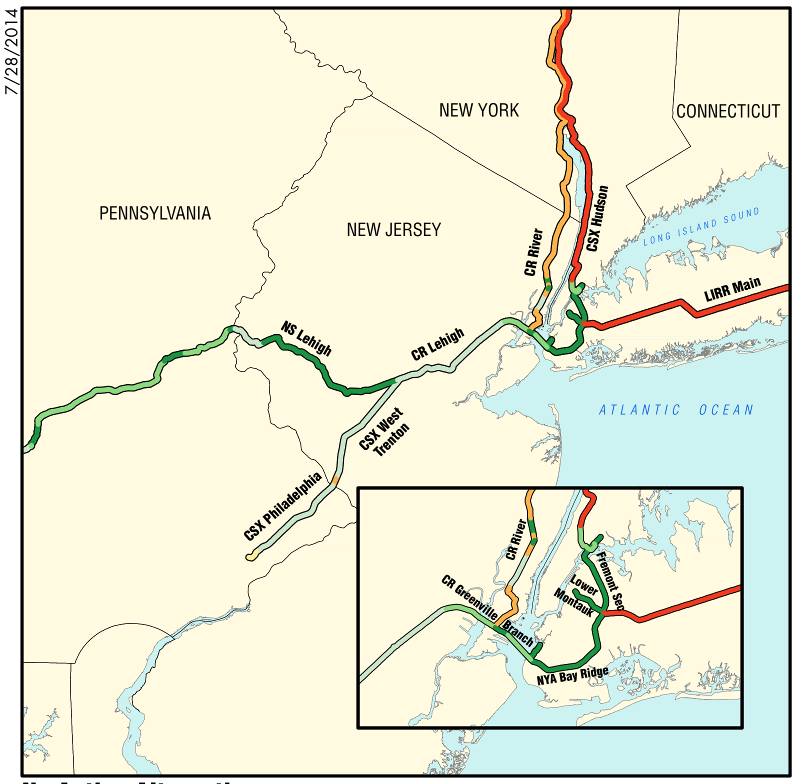
Segment	Corridor	State	Miles	No. of Tracks 2012	Control System	Volume (2035)	Practical Capacity	V/C	LOS
1	CR Lehigh Line	NJ	9.4	2	C - centralized traffic control	65.2	85.4	0.53	C
2	CR Lehigh Line	NJ	6.1	3	C - centralized traffic control	120.2	121.9	0.69	B
3	CR Lehigh Line	NJ	7.6	2	C - centralized traffic control	65.2	85.4	0.53	C
4	CSX West Trenton Line	NJ	24.4	1	C - centralized traffic control	23.4	38.3	0.43	C
5	CSX West Trenton Line	NJ	1.5	2	B - automatic block signals	76.6	64.0	0.84	E
6	CSX Philadelphia Subdivision	PA	11.9	2	C - centralized traffic control	25.2	82.2	0.21	B
7	CSX Philadelphia Subdivision	PA	3.4	2	C - centralized traffic control	66.9	84.2	0.56	C
8	CSX Philadelphia Subdivision	PA	5.6	2	C - centralized traffic control	76.9	86.2	0.62	C
9	CSX Philadelphia Subdivision	PA	4.4	2	C - centralized traffic control	76.6	86.3	0.62	C
10	CSX Philadelphia Subdivision	PA	1.8	2	B - automatic block signals	66.9	61.6	0.76	D
11	NS Lehigh Line	PA	51.0	2	B - automatic block signals	44.5	64.9	0.48	C
12	NS Lehigh Line	PA	0.2	2	C - centralized traffic control	39.6	91.9	0.30	B
13	NS Lehigh Line	NJ	34.5	2	C - centralized traffic control	25.2	95.2	0.19	A
14	NS Lehigh Line	NJ	6.4	1	C - centralized traffic control	25.2	42.6	0.41	C
15	NS Lehigh Line	NJ	0.1	1	C - centralized traffic control	0.4	41.7	0.01	A
16	NS Lehigh Line	PA	1.1	1	C - centralized traffic control	2.6	38.9	0.05	A
17	NS Lehigh Line	PA	43.1	2	B - automatic block signals	35.5	71.2	0.35	B
18	NS Lehigh Line	PA	9.1	2	C - centralized traffic control	22.1	91.9	0.17	A
19	CR Northern Branch	NJ	0.6	1	B - automatic block signals	30.6	26.0	0.82	E
20	CR National Docks Secondary	NJ	3.4	2	C - centralized traffic control	45.9	39.5	0.82	E
21	CR National Docks Secondary	NJ	9.1	1	B - automatic block signals	33.7	63.5	0.37	B
22	CR River Line	NJ	6.3	1	C - centralized traffic control	4.9	39.8	0.09	A
23	CR River Line	NJ	14.9	1	C - centralized traffic control	50.2	40.3	0.87	E
24	CSX River Line	NY	111.5	1	C - centralized traffic control	50.4	40.8	0.86	E
25	CSX Hudson Line	NY	4.1	2	C - centralized traffic control	181.9	98.6	1.29	F
26	CSX Oak Point Link	NY	3.7	1	M - manual	5.9	20.0	0.21	B
27	CSX Hudson Line	NY	119.5	2	C - centralized traffic control	205.9	98.7	1.46	F
28	CSX Fremont Secondary	NY	0.7	1	B - automatic block signals	4.4	25.0	0.12	A
29	CSX Fremont Secondary	NY	4.4	1	M - manual	4.4	20.0	0.15	A
30	CSX Fremont Secondary	NY	3.2	2	C - centralized traffic control	4.4	100.0	0.03	A
31	NYA Bay Ridge Branch	NY	2.0	1	B - automatic block signals	1.3	25.0	0.04	A
32	NYA Bay Ridge Branch	NY	6.1	1	B - automatic block signals	1.3	25.0	0.04	A
33	NYA Bay Ridge Branch	NY	3.1	1	B - automatic block signals	1.3	25.0	0.04	A
34	NYA 1st Avenue Line	NY	1.0	1	M - manual	0.5	20.0	0.02	A
35	LIRR Lower Montauk Branch	NY	1.2	1	C - centralized traffic control	4.4	45.0	0.07	A
36	LIRR Lower Montauk Branch	NY	0.4	1	M - manual	4.4	20.0	0.15	A
37	LIRR Main Line	NY	4.2	1	B - automatic block signals	270.9	24.9	7.61	F
38	LIRR Main Line	NY	19.6	1	C - centralized traffic control	270.9	99.5	1.91	F
39	LIRR Main Line	NY	20.0	2	C - centralized traffic control	270.9	149.4	1.27	F
40	NYNJ Rail Greenville	NJ	1.3	2	M - manual	3.5	34.0	0.07	A
41	NYNJ Rail Cross Harbor Float	NY/NJ	4.5	1	M - manual	0.5	20.0	0.02	A

FIGURE 5-18

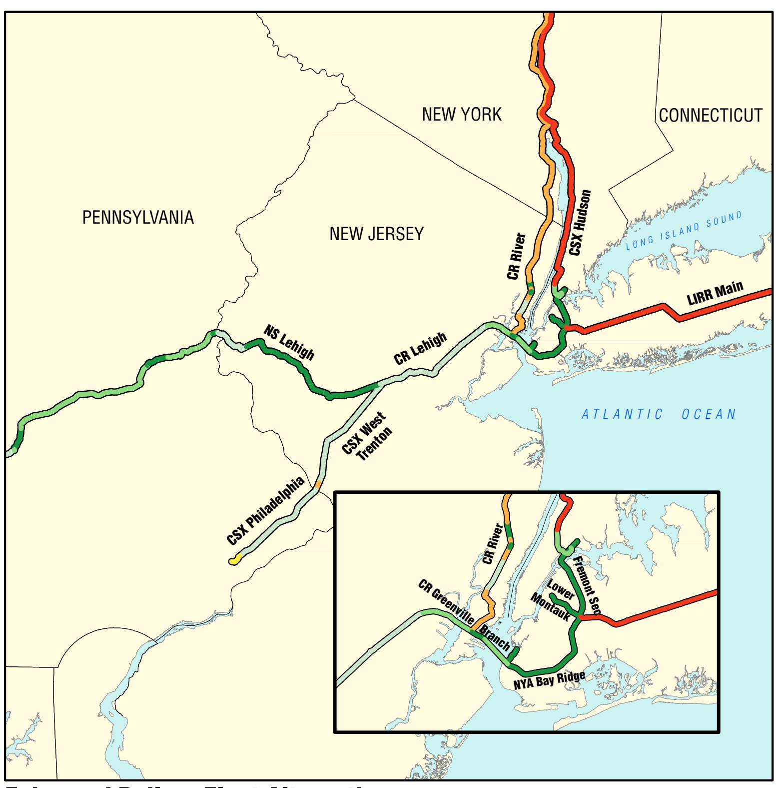
No Action Level of Service (LOS)

CROSS HARBOR FREIGHT PROGRAM

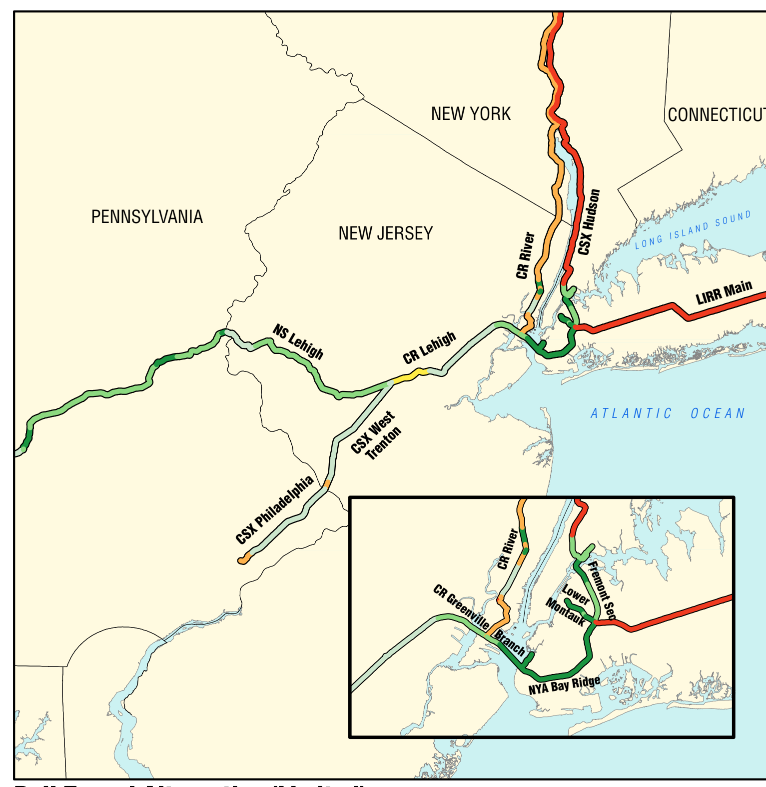
7/28/2014



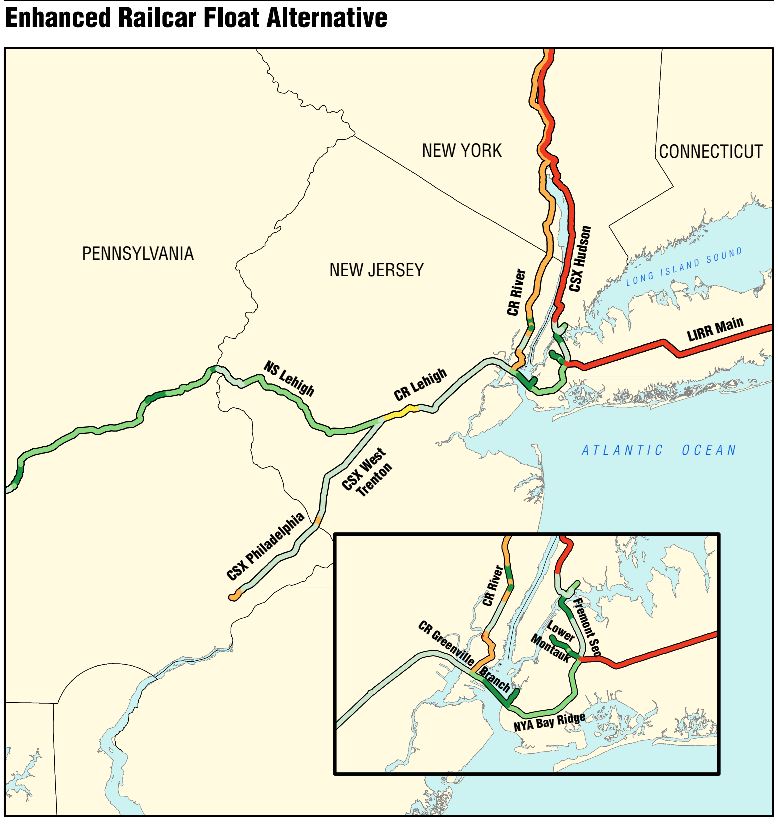
No Action Alternative



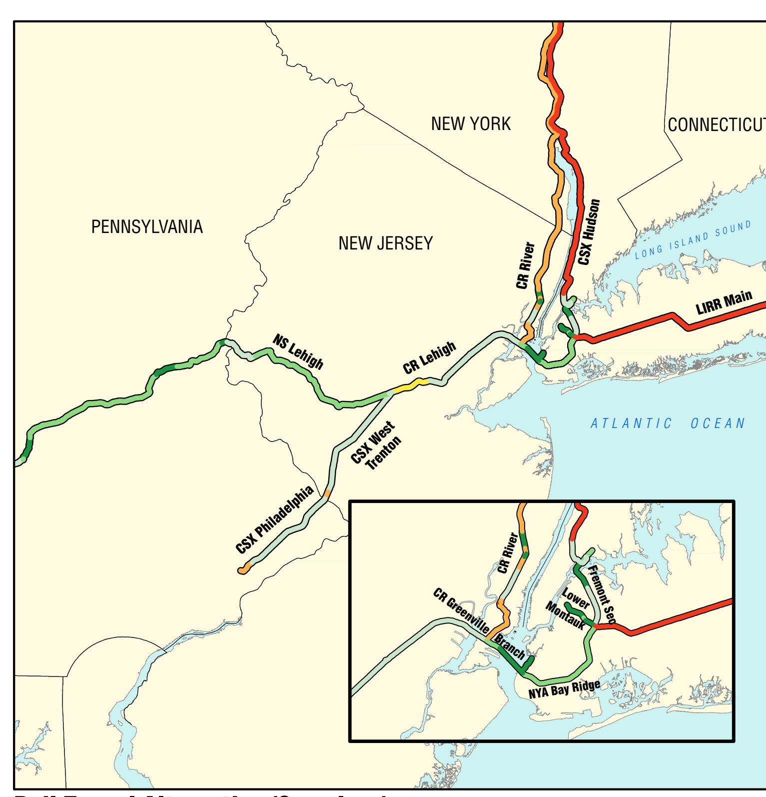
Enhanced Railcar Float Alternative



Rail Tunnel Alternative (Limited)



Rail Tunnel Alternative (Base)



Rail Tunnel Alternative (Seamless)

CROSS HARBOR FREIGHT PROGRAM ALTERNATIVES

Segment	Corridor	State	Miles	No Action	*Waterborne*	*Rail Tunnel*		
					Enhanced Railcar Float	Rail Tunnel (Limited)	Rail Tunnel (Base)	Rail Tunnel (Seamless)
2	CR Lehigh Line	NJ	6.1	C	C	D	D	D
10	CSX Philadelphia Subdivision	PA	1.8	D	D	E	E	E
13	NS Lehigh Line	NJ	34.5	A	A	B	B	B
19	CR Northern Branch	NJ	0.6	E	E	F	F	F
21	CR Greenville Branch	NJ	9.1	B	B	B	C	C
29	CSX Fremont Secondary	NY	4.4	A	A	B	C	C
31	NYA Bay Ridge Branch	NY	2.0	A	A	A	B	B
32	NYA Bay Ridge Branch	NY	6.1	A	A	A	B	B
33	NYA Bay Ridge Branch	NY	3.1	A	A	A	B	B
36	LIRR Lower Montauk Branch	NY	0.4	A	A	B	B	B
40	NYNJ Rail Greenville	NJ	1.3	A	A	B	B	B
41	NYNJ Rail Cross Harbor Float	NY/NJ	4.5	A	B	A	A	A
42	NYNJ Rail Cross Harbor Tunnel	NY/NJ	4.5	N/A	N/A	A	A	A

Level of Service

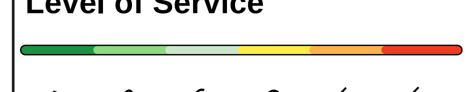
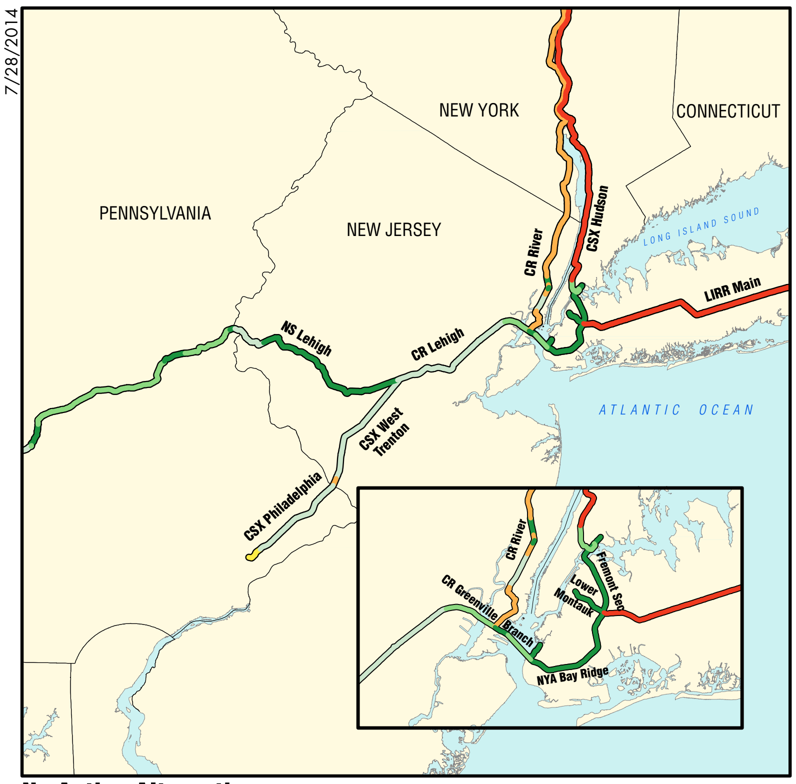


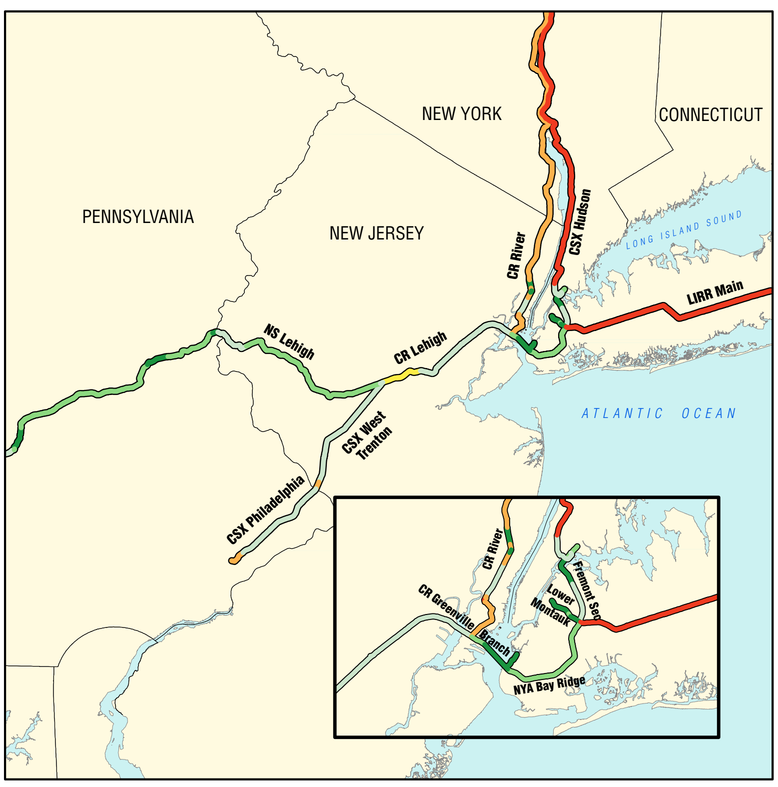
FIGURE 5-19A

Build Alternatives, Changes in Levels of Service (LOS)

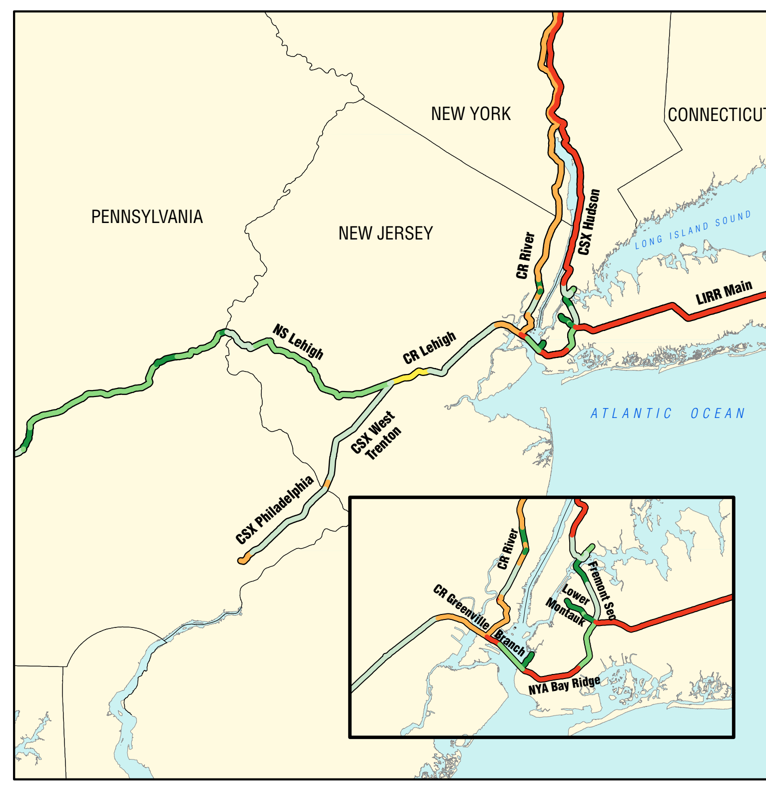
7/28/2014



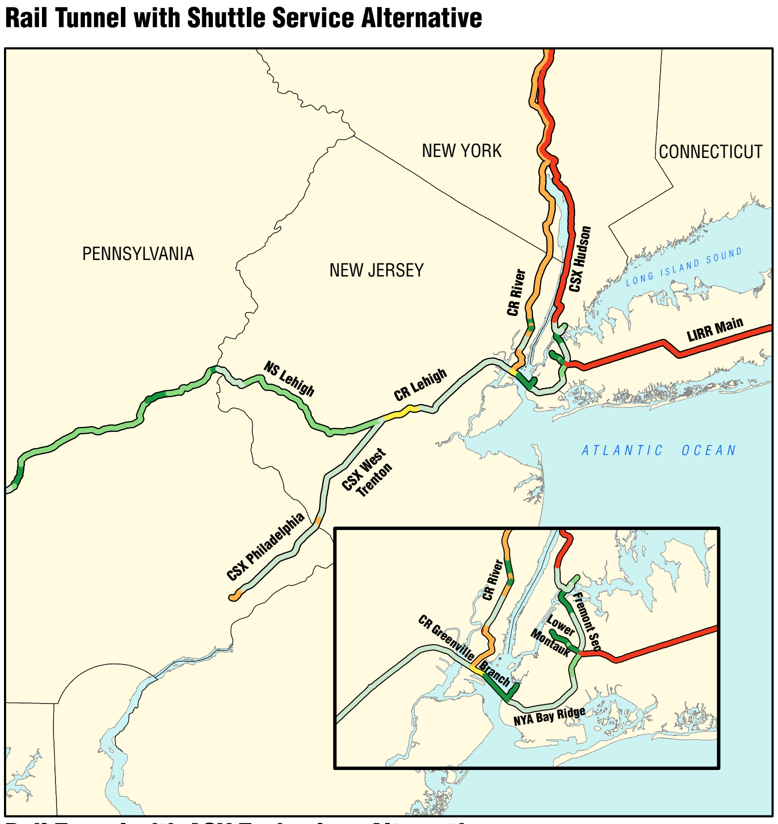
No Action Alternative



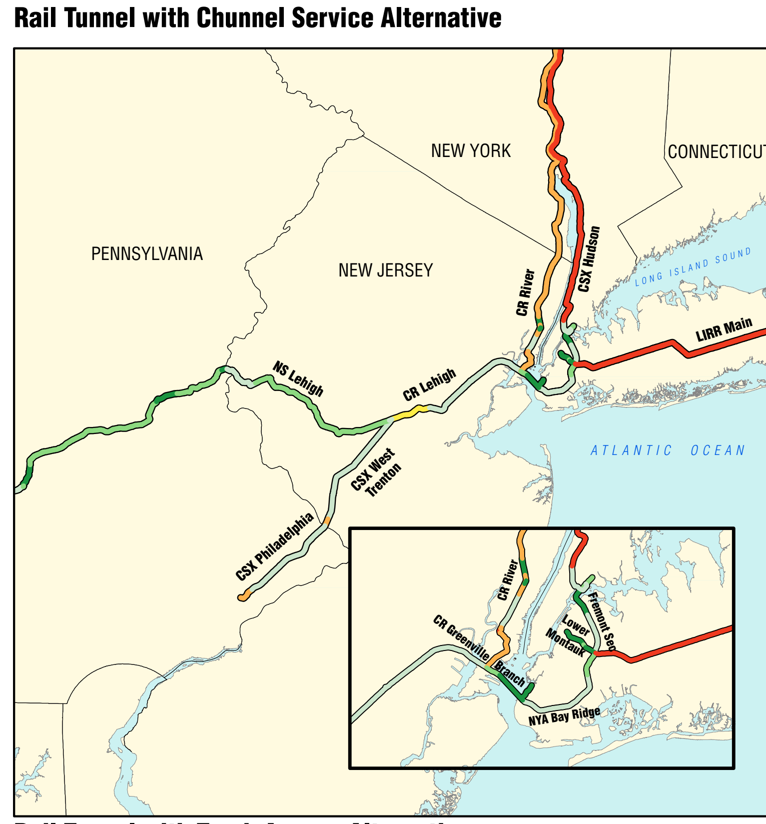
Rail Tunnel with Shuttle Service Alternative



Rail Tunnel with Chunnel Service Alternative



Rail Tunnel with AGV Technology Alternative



Rail Tunnel with Truck Access Alternative

CROSS HARBOR FREIGHT PROGRAM ALTERNATIVES

Segment	Corridor	State	Miles	No Action	*Rail Tunnel* with Shuttle Service	*Rail Tunnel* with Chunnel Service	*Rail Tunnel* with AGV Technology	*Rail Tunnel* with Truck Access
2	CR Lehigh Line	NJ	6.1	C	D	D	D	D
10	CSX Philadelphia Subdivision	PA	1.8	D	E	E	E	E
13	NS Lehigh Line	NJ	34.5	A	B	B	B	B
19	CR Northern Branch	NJ	0.6	E	F	F	F	F
21	CR Greenville Branch	NJ	9.1	B	C	E	C	C
29	CSX Fremont Secondary	NY	4.4	A	C	C	C	C
31	NYA Bay Ridge Branch	NY	2.0	A	B	B	B	C
32	NYA Bay Ridge Branch	NY	6.1	A	B	F	C	C
33	NYA Bay Ridge Branch	NY	3.1	A	B	F	C	C
36	LIRR Lower Montauk Branch	NY	0.4	A	B	B	B	B
40	NYNJ Rail Greenville	NJ	1.3	A	B	F	D	B
41	NYNJ Rail Cross Harbor Float	NY/NJ	4.5	A	A	A	A	A
42	NYNJ Rail Cross Harbor Tunnel	NY/NJ	4.5	N/A	A	B	A	A

Level of Service

A B C D E F

FIGURE 5-19B

Build Alternatives, Changes in Levels of Service (LOS)

CROSS HARBOR FREIGHT PROGRAM

Table 5-6
LOS Changes Resulting from the Project Alternatives

Alternative Class	Alternative	Item	Description
No Action	No Action	Overview	Assumes no action is taken on improving rail service between Northern New Jersey and Long Island, above and beyond planned or programmed capacity expansion projects.
		Traffic Impact	Most rail traffic impacts are related to anticipated "background" growth in carload and intermodal rail traffic throughout the region. An additional volume of 20,000 annual revenue cars of rail traffic (replacing some drayage movements) is assumed to cross between Greenville area and 65st street.
		LOS Impact	The network impacts observed in the No Action Alternative compared to the 2007 existing conditions are attributable to the growth in background traffic expected between 2007 and 2035. Changes in volume that would result in a deterioration in LOS to a condition of D, E or F include portions of the Conrail River Line that may deteriorate from C to E, the CSX River Line that may decline from C to E, a drop from LOS C to LOS E on the Conrail National Docks Secondary north of Constable Junction. There would be an improvement in LOS on the NS Lehigh Line (from LOS C to LOS A) and the Conrail Lehigh Line (from LOS E to LOS C) due to planned capacity expansion on these lines.
Waterborne	Enhanced Railcar Float	Overview	Assumes improvements to increase traffic on the existing railcar float service, but does not make investments to support intermodal traffic.
		Traffic Impact	Compared to the No Action Alternative, the Enhanced Railcar Float would add 1.2 trains per day (approximately 3 train trips) through Greenville, and 0.5 train per day on the Lehigh and West Trenton lines.
		LOS Impact	Compared to the No Action Alternative, there was no change in LOS on any of the segments under the Enhanced Railcar Float Alternative.
	Truck Float, Truck Ferry, and Container Barge	Overview	The Truck Float, Truck Ferry, and Container Barge Alternatives draw from truck-served freight markets.
		Traffic Impact	There would be no effect on the rail traffic volumes in the region as a result of the implementation of these alternatives.
		LOS Impact	There would be no effect on the performance of the rail network as a result of the implementation of these alternatives.
Rail Tunnel	Rail Tunnel Alternative (Limited Operating Scenario)	Overview	Assumes a two-track rail tunnel with system wide operating characteristics, interchanging, and pricing schemes that discourage or limit the amount of through traffic expected. The addition of a second track to the Bay Ridge Branch and Greenville Lead is assumed in this scenario.
		Traffic Impact	The Rail Tunnel Alternative with Limited Operating Scenario added up to 7 daily freight trains (up to 14 train trips) through Greenville (up to 5 merchandise and 2 intermodal trains), with about 5 of these trains continuing to Fresh Pond. The CSX's West Trenton line had 2.2 more trains per day, while the River Line from Selkirk and the NS Lehigh Line added approximately 1.5 daily trains each. The CSX line east of the Hudson from the Albany area added about 3 daily freight trains.
		LOS Impact	Under the Rail Tunnel Alternative with Limited Operating Scenario, there would be a 1.8 mile segment on the West Trenton in Pennsylvania line where the LOS would change from D to E. A 3-mile segment of the Fremont Secondary north of Fresh Pond Jct. would fall from LOS A to LOS B. A 0.6-mile segment of the Conrail Northern Branch in Jersey City would decline from LOS E to LOS F. The Conrail Lehigh Line between Bound Brook and Manville would change from LOS B to LOS C, and the NS Lehigh Line between Manville and the Pattenburg Tunnel would change from LOS A to LOS B. In this alternative, Segment 42 would be activated and operate at LOS A. The Cross Harbor railcar float LOS improves from B to A.

Table 5-6 (cont'd)
LOS Changes Resulting from the Project Alternatives

Alternative Class	Alternative	Item	Description
Rail Tunnel (continued)	Rail Tunnel Alternative (Base Operating Scenario)	Overview	Assumes a two-track rail tunnel with systemwide operating characteristics, interchanging, and pricing schemes that resemble how rail services are priced today. The addition of a second track to the Bay Ridge Branch and Greenville Lead is assumed in this scenario.
		Traffic Impact	This scenario added up to 9 daily freight trains (up to 18 train trips) through Greenville (up to 6 merchandise and up to 3 intermodal), with about 7 of these trains continuing to Fresh Pond. The CSX's West Trenton line had 2.6 more trains per day, while the River Line from Selkirk and the NS Lehigh Line added approximately 1.5 daily trains each. The CSX line east of the Hudson from the Albany area added over 6 daily freight trains.
		LOS Impact	Under the Base Tunnel Scenario, the National Docks Secondary segment over Newark Bay Bridge and through Oak Island Yard would shift from LOS B to LOS C. East of Hudson, the Bay Ridge Branch would change from LOS A to LOS B. A 3-mile segment of the Fremont Secondary and the Oak Point Link become LOS C.
	Rail Tunnel Alternative (Seamless Operating Scenario)	Overview	Assumes a two-track rail tunnel with systemwide operating characteristics, interchanging, and pricing schemes that are less burdensome than today. The addition of a second track to the Bay Ridge Branch and Greenville Lead is assumed in this scenario.
		Traffic Impact	This scenario would add 10 daily freight trains (20 train trips) through Greenville (up to 7 merchandise and up to 3 intermodal), with up to 9 of these trains continuing to Fresh Pond. The CSX's West Trenton line had 3 more trains per day, while the River Line from Selkirk and the NS Lehigh Line added approximately 2 daily trains each. The CSX line east of the Hudson from the Albany area added close to 8 daily freight trains.
		LOS Impact	Under the Seamless Operating Scenario for the Rail Tunnel Alternative, no segments deteriorate in LOS relative to the Base Tunnel Scenario.
	Rail Tunnel with Chunnel Service Alternative	Overview	The Rail Tunnel with Chunnel Service Alternative assumes the same two-track tunnel and railroad operating scenario as the Rail Tunnel (Base Operating Scenario). In addition to traditional rail carload and rail intermodal traffic, trucks would be loaded onto truck-carrying flatcars for transport through the tunnel.
		Traffic Impact	Approximately 15 daily "chunnel" trains (30 chunnel train trips) would operate between Northern New Jersey and East New York, along with an additional 7 to 8 merchandise and intermodal trains (up to 15 train trips).
		LOS Impact	Under the Rail Tunnel with Chunnel Service Alternative, the Conrail National Docks Secondary between Oak Island and Greenville would deteriorate from LOS C to LOS E. The Greenville Yard Lead Track would decline from LOS B to LOS F. The NY&A Bay Ridge Branch would decline from LOS B to LOS F between 65th Street and East New York. The NYNJR Cross Harbor tunnel link LOS would fall from A to B.
	Rail Tunnel with Shuttle Alternative	Overview	The Rail Tunnel with Shuttle Alternative assumes the same two-track tunnel and railroad operating scenario as the Rail Tunnel (Base Operating Scenario). In addition to the rail carload and intermodal traffic, this alternative, enables truck chassis on a rail platform to move through the tunnel
		Traffic Impact	The shuttle service option will add approximately 3 additional trains per day on the region's rail network, two of which travel between the west-of-Hudson region and an intermodal yard in Long Island, and one of train which will travel between the west-of-Hudson region and Maspeth, Queens.
		LOS Impact	Under the Rail Tunnel with Shuttle Alternative, each segment of the region's rail network would operate at the same LOS as under the Rail Tunnel (Base Operating Scenario).
	Rail Tunnel with Automated Guided Vehicle (AGV) Technology Alternative	Overview	The Rail Tunnel with Automated Guided Vehicle (AGV) Technology Alternative assumes the same two-track tunnel and railroad operating scenario as the Rail Tunnel (Base Operating Scenario). In addition to traditional rail carload and rail intermodal traffic, AGVs would carry intermodal trailers or containers through the tunnel when trains are not occupying the tunnel. The AGVs would operate between terminals at Greenville Yard and East New York.
		Traffic Impact	Approximately 260 containers or trailers would move through the tunnel using AGV technology, in addition to the traffic expected in the Rail Tunnel Alternative (Base Operating Scenario) between Greenville Yard and East New York. Relative to the Rail Tunnel Alternative (Base Operating Scenario), there would be no change to traffic volumes elsewhere in the rail network.

Table 5-6 (cont'd)
LOS Changes Resulting from the Project Alternatives

Alternative Class	Alternative	Item	Description
Rail Tunnel (continued)		LOS Impact	Under the Rail Tunnel with AGV Technology Alternative, the NYNJR Cross Harbor tunnel link would operate at LOS A. The NY&A Bay Ridge Branch would operate at LOS C between 65th Street and East New York. The rest of the region's rail network would perform as specified in the Rail Tunnel Alternative (Base Operating Scenario).
	Rail Tunnel with Truck Access	Overview	The Rail Tunnel with Truck Access Alternative would make use of one tunnel, in which trains would operate 12 hours per day, and trucks would travel through during the remaining 12 hours of the day. The Rail Tunnel with Truck Access Alternative draw from the Rail Tunnel Alternative (Base Operating Scenario) rail and truck demand markets, as well as short-haul trucking.
		Traffic Impact	On the rail network, the traffic impact would be the same as the Rail Tunnel Alternative (Base Operating Scenario).
		LOS Impact	The LOS impact of Rail Tunnel with Truck Access Alternative would be the same as the Rail Tunnel Alternative (Base Operating Scenario), with the exception of the Bay Ridge Branch between the eastern tunnel portal and East New York, which would operate at LOS C.
Sources: Oliver Wyman and Cambridge Systematics, 2012, updated 2014.			

REGIONAL HIGHWAY NETWORK EFFECTS

CHANGES IN REGIONAL TRUCK VMT AND VHT

As compared with the No Action Alternative, the volume of commodity trucks traveling in the 23-county analysis region, and overall truck VMT would be reduced by implementing any of the Build Alternatives. With respect to the effects of each class of alternatives:

- The Waterborne Alternatives would result in less than 0.1 percent change in commodity truck VMT throughout the region. Accounting for non-commodity trucks and automobiles, all alternatives result in a change in VMT of less than 0.1 percent regionally.
- The Rail Tunnel Alternatives would reduce truck VMT by 1.1 percent to 1.6 percent. The range accounts for the change in demand associated with each of the rail tunnel operating scenarios considered (Base, Limited, and Seamless), and the chunnel, shuttle, and AGV service options. The greatest reductions in commodity truck VMT would occur in Hudson, Bronx, and Richmond counties, each of which would enjoy a 2.5 percent to 2.6 percent reduction in commodity truck VMT. The Rail Tunnel with Truck Access Alternative would result in a 1.3 percent reduction in truck VMT region-wide. This alternative's local effects would be more significant, including a 15 percent reduction in Richmond County, but an 11 percent increase in Hudson County and a 14 percent increase in Kings County.

There are travel time savings for commodity trucks associated with the Build Alternatives as well, specifically:

- The Waterborne Alternatives would result in a 0.1 percent reduction in commodity truck VHT. The impact across all vehicle types would be less significant, as the Rail Tunnel Alternative, Rail Tunnel with Chunnel Service Alternative, and Rail Tunnel with AGV Technology Alternative would result in a 0.1 percent reduction in VHT across all vehicle types throughout the region. The Rail Tunnel with Truck Access Alternative would reduce VHT by 0.04 percent and the Waterborne Alternatives would reduce VHT by 0.01 percent for all vehicles throughout the region.

- The Rail Tunnel Alternatives would result in a 1.0 percent to 1.4 percent savings in VHT for commodity trucks across the region, compared to the No Action Alternative. The Rail Tunnel with Truck Access Alternative would result in a 1.0 percent reduction in commodity truck VHT, which includes a 16 percent reduction in Richmond County, but significant increases in VHT in Hudson County (17 percent), and Kings County (15 percent). In the areas neighboring the George Washington Bridge and Cross Bronx Expressway corridor, the Rail Tunnel with Truck Access Alternative would result in a 4 to 5 percent reduction in commodity truck VHT in New York and Bronx counties, and an imperceptible change in commodity truck VHT in Bergen County.

CHANGES IN VOLUME ON HUDSON RIVER CROSSINGS

Compared to the No Action Alternative, the Waterborne Alternatives would result in a reduction of nearly 300 trucks from harbor and Hudson River crossings in the 23-county analysis region (including all crossings between the Verrazano-Narrows Bridge and the Bear Mountain Bridge) in the eastbound direction, a 0.8 percent reduction. The Rail Tunnel Alternatives would result in a reduction of 700-900 trucks per day, or 2 to 2.5 percent, across all bridges crossing the harbor and Hudson River in the 23-county analysis region in the eastbound direction. On the George Washington Bridge, the Rail Tunnel Alternatives would result in the reduction of daily truck volumes by 500 to 650 eastbound trucks, a 2 to 3 percent reduction compared to the No Action Alternative. The addition of the chunnel, AGV, or shuttle service options would reduce truck volumes on the crossings by 950 to 1,300 trucks per day, or 2.7 to 3.6 percent. The Rail Tunnel with Truck Access Alternative would result in a reduction of nearly 3,000 trucks per day in the eastbound direction on all crossings, or 8 percent.

CHANGES IN VOLUME ON ARTERIAL ROADWAYS

Segments of the region's arterial highway network that would experience the greatest changes in volume as a result of the Build Alternatives are those segments that serve as the primary access routes to or from Hudson River crossings, or which are the primary access routes to or from the termini of the Build Alternatives. For example, the Cross Bronx Expressway, which is the primary truck route on the eastern approach to the George Washington Bridge, could see reductions in daily truck volumes ranging from 130 trucks per day in the Waterborne Alternatives to between 700 and 1,200 trucks per day under the Rail Tunnel Alternatives. The Staten Island Expressway, which connects the Outerbridge Crossing and Goethals Bridge crossings between New York and New Jersey, could see a reduction in daily truck traffic ranging from 220 to more than 400 trucks per day under the Rail Tunnel Alternatives, and smaller reductions resulting from the Waterborne Alternatives.

Linden Boulevard in East New York, near the eastern terminus of the Rail Tunnel with Truck Access Alternative, could see an increase of more than 5,200 trucks per day. As many as 3,000 additional trucks per day could use the Newark Bay Extension of the New Jersey Turnpike and Routes 1 and 9 in Northern New Jersey to access the western terminus of the Rail Tunnel with Truck Access Alternative. Changes in truck volumes on these highways will be modest by comparison under the other alternatives.

LOCAL TRANSPORTATION

VEHICULAR TRAFFIC

The volume of truck trips that would be generated at the local freight facilities would vary by alternative and terminal/service option as summarized in **Figure 5-9** through **Figure 5-17**. As presented in these figures, each of the Build Alternatives would increase truck traffic near some of the existing, proposed, or representative freight facilities. It is assumed that intermodal rail facilities on Long Island would be developed by others, and the exact location of these yards has not been determined. However, as with other analyses in this EIS, two sites (i.e., Pilgrim Intermodal Terminal and Brookhaven Rail Terminal) are used as illustrative examples to assess the effect of the operation of the project on local traffic. Furthermore, for traffic analysis purposes, this study conservatively assumes that all intermodal truck traffic would go to one rail yard. Within Long Island, some railcars would be destined to businesses at existing or future rail spur sites along the corridor, which would likely generate a very low volume of local truck trips, and consequently, would not be included in the local traffic assessment.

MARINE OPERATIONS

The operation of the Waterborne Alternatives would not have a significant adverse impact on existing and future marine traffic in Upper New York Bay, the East River, Newtown Creek, Newark Bay, Kill Van Kull, or Long Island Sound. The operations proposed for the Waterborne Alternatives would abide by all relevant maritime regulations. The operation of the Tunnel Alternatives would not affect marine operations.

AIR CARGO

None of the project alternatives would have an effect on air cargo operations. The Rail Tunnel with Chunnel Service Alternative and the Rail Tunnel with Truck Access Alternative may have the potential to attract high value cargo destined for the regional airports, particularly due to the alternative's connection to Linden Boulevard, a major truck route that leads to JFK. Because its termini at Oak Island South and East New York are close to EWR and JFK, the Rail Tunnel with Truck Access Alternative may benefit inter-terminal air cargo movements. The terminals of Rail Tunnel with Truck Access alternative are close to the two airports as well and would provide similar benefits.

E. POTENTIAL TIER II ANALYSIS AND MITIGATION MEASURES

As mentioned previously, analyses completed to support Tier I of the EIS focus on general transportation modes and alignments for the proposed project, including logical termini and regional transportation effects. Tier I of the EIS will result in a Record of Decision (ROD) that will identify the transportation mode and alignment for the proposed project with the appropriate level of detail for corridor-level decisions. Subsequent Tier II documentation would explore the preferred alternative(s) in greater detail to evaluate regional and localized environmental impacts of each alternative and outline specific mitigation measures in project-level environmental documentation. The Tier II analyses would include assessments of the preferred alternative(s)'s impacts on railroad train assignments and operations, yard operations, local vehicular traffic, and marine terminal operations, generated or relocated as a result of the implementation of the alternatives.

The following describes potential detailed analyses that may be conducted in subsequent Tier II studies. Tier II would also identify mitigation actions to address potential negative impacts of the proposed changes in railroad and local vehicular operations; potential mitigation measures are identified below.

RAILROAD OPERATIONS

REFINED TRAIN ASSIGNMENT PROCESS

On the basis of the preliminary analyses conducted for this Tier I EIS—evaluations of railroad operations and train traffic, identification of institutional and infrastructure issues and potential solutions—detailed daily train operating schedules and yard operating plans for all freight railroads would be developed and utilized in the Tier II analysis to refine rail line volumes and assess their impact on existing rail operations throughout the region. The refinement would also be influenced by the institutional and operational arrangements between agencies and rail carriers, which would determine important parameters such as operation priorities, operation territories, numbers of interchanges, locations of interchanges, railroad pick-up/drop-off frequencies, train lengths, yard idle time, and number of locomotives.

IMPACTS ON RAIL SYSTEM

Daily train operating schedules and yard operating plans would be used to identify impacts on regional rail lines. The network impacts of Cross Harbor rail traffic would be evaluated in greater detail. The impact on a given rail line is highly dependent on the routes and carriers. Line impacts are the results of additional trains, as well as the rerouting of existing trains to reach the harbor crossing point (railcar float or tunnel) or to eliminate the reversing movements. The analysis would include the Brooklyn waterfront, the Bay Ridge Branch, Lower Montauk Branch, Fremont Secondary, LIRR Main Line, small branches that are connected to these lines, and the west-of-Hudson rail system.

RAIL SIMULATION AND OPERATIONAL ASSESSMENT

With up-to-date schedules of passenger trains and light (empty) moves, a Tier II analysis would develop a series of operating plans for the project. As a means of validating system design and operating plans, an operating simulation would be conducted.

A “discrete event” simulation would be used to determine if the designs and operating plans can accommodate the forecasted levels of demand and provide the required levels of service. A discrete-event simulation is a powerful tool for modeling and analyzing complex logistics movements. The model processes simulated events according to user inputs, such as train destination, route, travel speed, and presence of scheduling conflicts. The model results provide information on the train performance in the form of stringline diagram (graphs showing the position of each train on the network over a specific period).

RAIL FREIGHT FACILITY OPERATIONS

The large increase in the number of merchandise and intermodal railcars transiting to geographic Long Island with the Enhanced Railcar Float Alternative and the Rail Tunnel Alternatives would increase the throughput at rail facilities. A detailed operational analysis of rail yards would be conducted to determine if the existing and proposed yards could serve the demand with acceptable levels of service.

Oak Island Yard, Greenville Yard, 65th Street Yard, East New York Yard, Fresh Pond Yard, Maspeth Yard, East New York Yard, Oak Point Yard would be analyzed in more detail, if needed for any alternatives that would be advanced to Tier II assessment, as the potential capacity constraints are greatest at these locations. The operational analysis for these yards would detail the proposed improvements in yard layouts. Operating schemes would be established based on the refined train assignments and aim to meet the maximum freight demand from the selected alternatives.

For Rail Tunnel with Chunnel Service Alternative, Rail Tunnel with AGV Technology Alternative, and Rail Tunnel with Truck Access Alternative, analysis would also be needed to address the specific multi-modal operations at the terminals. For the Rail Tunnel with Chunnel Service Alternative, the analysis would include truck staging and loading/unloading operations at Oak Island and East New York terminals, and the time-sharing use of tunnel with freight rail. For the

Rail Tunnel with AGV Technology Alternative, the analysis would include AGV operations at Greenville and East New York terminals, and time-sharing use of tunnel. For the Rail Tunnel with Truck Access Alternative, the analysis would include truck staging and Greenville and East New York terminals and management of truck movements along the rail line.

MARITIME NETWORK AND FACILITY CONDITION AND OPERATIONS

For any Waterborne Alternatives advancing to Tier II, an assessment of the condition and operations of the termini and in the channels approaching each terminal, including:

- Greenville Yard, Jersey City;
- 65th Street Yard, Brooklyn;
- Port Newark/Port Elizabeth, New Jersey;
- South Brooklyn Marine Terminal, Brooklyn;
- Oak Point or Hunts Point, Bronx; and
- Davisville, Rhode Island.

Profile of existing conditions with respect to terminal infrastructure and operations, including:

- Maritime traffic volumes and frequency of vessel arrivals;
- Channel and berth depths;
- Number, size, and location of berths;
- Condition of berths;
- Number, capacity, and condition of equipment such as cranes and ramps;
- Capacity of backlands to accommodate staging of freight, vehicles, and equipment;
- Landside access capacity and constraints; and
- Availability of lay berths, moorings, and/or anchorages to facilitate staging of vessels at or in the vicinity of the desired terminal locations will be determined.

Evaluation of all of these attributes will lead to an assessment of the effects the Build Alternatives are likely to have on the operations of maritime facilities, and lead to the identification of any necessary mitigation measures.

LOCAL VEHICULAR TRANSPORTATION

The Build Alternatives at the freight facilities would increase traffic volumes at several intersections adjacent to or along primary routes leading to and from the freight facilities. Therefore, any Tier II documentation would include a more detailed traffic analysis of these locations. The analysis would entail:

- Inventory of existing traffic volumes, signal timings, geometric and operational characteristics for the study intersections to perform intersection capacity analyses and quantify existing level-of-service conditions.
- Projection of existing traffic volumes to the 2035 analysis year and incorporation of proposed roadway improvements to establish 2035 No Action LOS conditions that would serve as the baseline for assessing the effects of the Build Alternatives.
- Obtaining regional model assignments for each freight facility to route truck trips on the local truck route network.

- Developing operational schedules for each freight facility to more accurately develop a temporal distribution of truck and employee vehicle trips to and from each facility, thereby identifying the facility's peak travel hours. If necessary, sample 24-hour traffic counts can be performed at representative freight and intermodal yards.
- Performing LOS analyses for the Build Alternatives to quantify traffic effects and determine appropriate mitigation measures. These mitigation measures could range from low-cost and easily implementable improvements such as signal timing/phasing adjustments and travel-lane-use reconfigurations to more high-cost measures such as ROW acquisitions for roadway widening.

Rail facilities on Long Island would not be developed by PANYNJ without partners on Long Island who have jurisdiction or land in the area. Such partners may be identified in the future, but at this point the development of specific facilities outside of PANYNJ jurisdiction cannot be assumed. To illustrate the potential effect of truck traffic that would be induced on Long Island by Cross Harbor Freight operation and identify the need for more detailed analyses, the Pilgrim Intermodal Terminal and the Brookhaven Rail Terminal are analyzed. Therefore, as an example, the list in Section B identifies intersections that would potentially require detailed analysis based on an initial assessment at each illustrative Long Island facility.

POTENTIAL MITIGATION MEASURES

REGIONAL RAIL MITIGATION

Based on the results of the discrete event simulation modeling and yard operational analysis, both operational and infrastructural improvements would be proposed, which may include scheduling adjustments to reduce conflicts with passenger traffic, rerouting, adding sidings, and modifications of signal control.

LOCAL TRAFFIC MITIGATION

The level of service analyses would be performed to identify intersections potentially under significant traffic impacts. Mitigation measures would be proposed to eliminate these impacts, which may include signal timing changes, parking policy changes, installation of new traffic signals and signs, truck route changes, and restriping approaches. For those intersections that are identified as having a significant impact, a simulation study would be conducted as part of Tier II to identify mitigation measures.

MARINE TERMINAL EFFECTS MITIGATION

Based on the assessment of existing conditions and operations of maritime freight facilities, a number of mitigation strategies may be recommended in order to ensure the maritime traffic associated with any of the advancing Build Alternatives can be accommodated safely and efficiently, without negative impacts to pre-existing maritime freight operations. Mitigation strategies could include upgrades to berths, equipment purchases or upgrades, dredging of berths or channels, and/or landside access improvements (see "Local Traffic Mitigation"). *