The Federal Highway Administration (FHWA) and the Port Authority of New York and New Jersey (PANYNJ) have prepared a Tier I Draft Environmental Impact Statement (DEIS) to evaluate Cross Harbor Freight Program (CHFP) alternatives. The primary purpose of the CHFP is to improve the movement of freight across New York Harbor between the east-of-Hudson and west-of-Hudson regions. By improving the movement of goods across the harbor, the CHFP would provide near-term and long-term improvements to the regional freight network, reduce truck traffic congestion, improve air quality, and provide economic benefits. Ten Build Alternatives have been selected for evaluation of benefits and potential environmental effects in the EIS. The benefits and potential environmental effects of the Build Alternatives are compared to the No Action Alternative, which assumes that CHFP would not be implemented but that other planned and funded actions of independent utility would move forward.

CHAPTER 1: PURPOSE AND NEED

The New York/New Jersey region's highway system suffers from significant peak period traffic congestion, which continues to expand in duration beyond the typical commuting hours. Planned highway improvements would address some local constraints, but would not significantly alleviate region-wide congestion. Due to the region's overwhelming dependence on trucking, highway congestion has a tremendous impact on freight movement, increasing the costs and environmental impacts of goods movement, while decreasing reliability and speed of freight delivery and safety of roadways and infrastructure. With the expected future growth in freight transport, truck vehicle miles traveled (VMT) would increase and the current inefficiencies of freight movement by truck and adverse effects of trucks would grow, with the higher transportation costs passed on to consumers as higher prices for goods.

This overwhelming dependence on trucks could be balanced by shifting freight movement from truck to other modes; however, the existing rail, waterborne, and domestic air systems in the region are also constrained. For example, existing waterborne and air cargo facilities in the region are plagued by the same deficiencies and constraints that limit truck-based freight transport—related to already congested highway system and crossings between the west-of-Hudson and east-of-Hudson regions—since freight transferred by waterborne modes across the water is still distributed by truck locally and regionally. Overall, the region has a well-developed freight rail system, but it is far better developed and better connected to the national rail network west of the Hudson River than it is east of the Hudson River. As a result, critical rail connections to the east-of-Hudson market are remote, inefficient, or have capacity restrictions, leading to a greater dependency on trucks for moving freight to and from the east-of-Hudson counties. As a result, a large portion of the region's freight shippers have a limited choice, in terms of transportation mode. Consequently, the highway connections between the west-of-Hudson and east-of-Hudson regions experience the greatest proportion of surface freight transport impacts, and freight shippers, receivers, and carriers throughout the region continue to experience the negative effects of growing highway congestion.

To appropriately account for the complexity of freight transport to and from the region, the EIS uses a 54-county modeling study area, comprising portions of southern New York, northern and central New Jersey, western and southern Connecticut, and a portion of eastern Pennsylvania (see **Figure ES-1**). This modeling area was used to determine the demand for freight movement, develop classifications and forecasts of freight movement, and project the ability of the Build Alternatives to divert the freight currently moved by trucks to rail and/or waterborne modes.

While the study of goods movement requires the consideration of a large regional area, the effects of the project on transportation, economic, and environmental resources will be most pronounced within a smaller region and on a local scale. Therefore, the EIS also uses targeted study areas to assess the potential for effects in areas where CHFP infrastructure (such as railcar float bridges, a tunnel, and support tracks) and related facilities (such as rail yards) would be constructed.

PROJECT GOALS

Four goals, outlined below, have been established for the CHFP. These goals are intended to address *some* of the freight movement and distribution problems described above; however, it is important to point out that the some of the project goals and objectives cannot be fully achieved by improvements that could be implemented under PANYNJ's current jurisdiction. Given the regional nature of the transportation network and goods movement, to fully address some of the project goals, cooperation across jurisdictional and geographic boundaries would be required for successful implementation and operation of the improvements proposed as part of the Build Alternatives, discussed in Chapter 4, "Alternatives." It is also important to acknowledge that the various goals and objectives identified below may be accomplished at various timescales—i.e., short-term and long-term improvements would address these goals to a different extent—and at various levels of capital investment.

The four project goals are as follows:

1. Reduce the contribution of cross-harbor truck trips to congestion along the region's major freight corridors relative to No Action conditions.
2. Provide cross-harbor freight shippers, receivers, and carriers with additional, attractive modal options to existing interstate trucking services.
3. Expand facilities for cross-harbor goods movement to enhance system resiliency, safety and security, and infrastructure protection.
4. Support development of integrated freight transportation/land use strategies.

Objectives—that further define the goals and provide specific and measurable criteria by which to evaluate and compare Build Alternatives—are also outlined in Chapter 1.

CHAPTER 2: REGULATORY PROCESS

The CHFP DEIS has been prepared in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations using "tiering," a staged process applied to the environmental review of complex projects. A Tier I EIS is prepared to inform high-level decision making regarding a project, prior to investing in detailed design and engineering of specific project elements. As detailed plans and designs are unavailable at the Tier I stage, specific environmental effects cannot be addressed with great precision, and therefore the Tier I

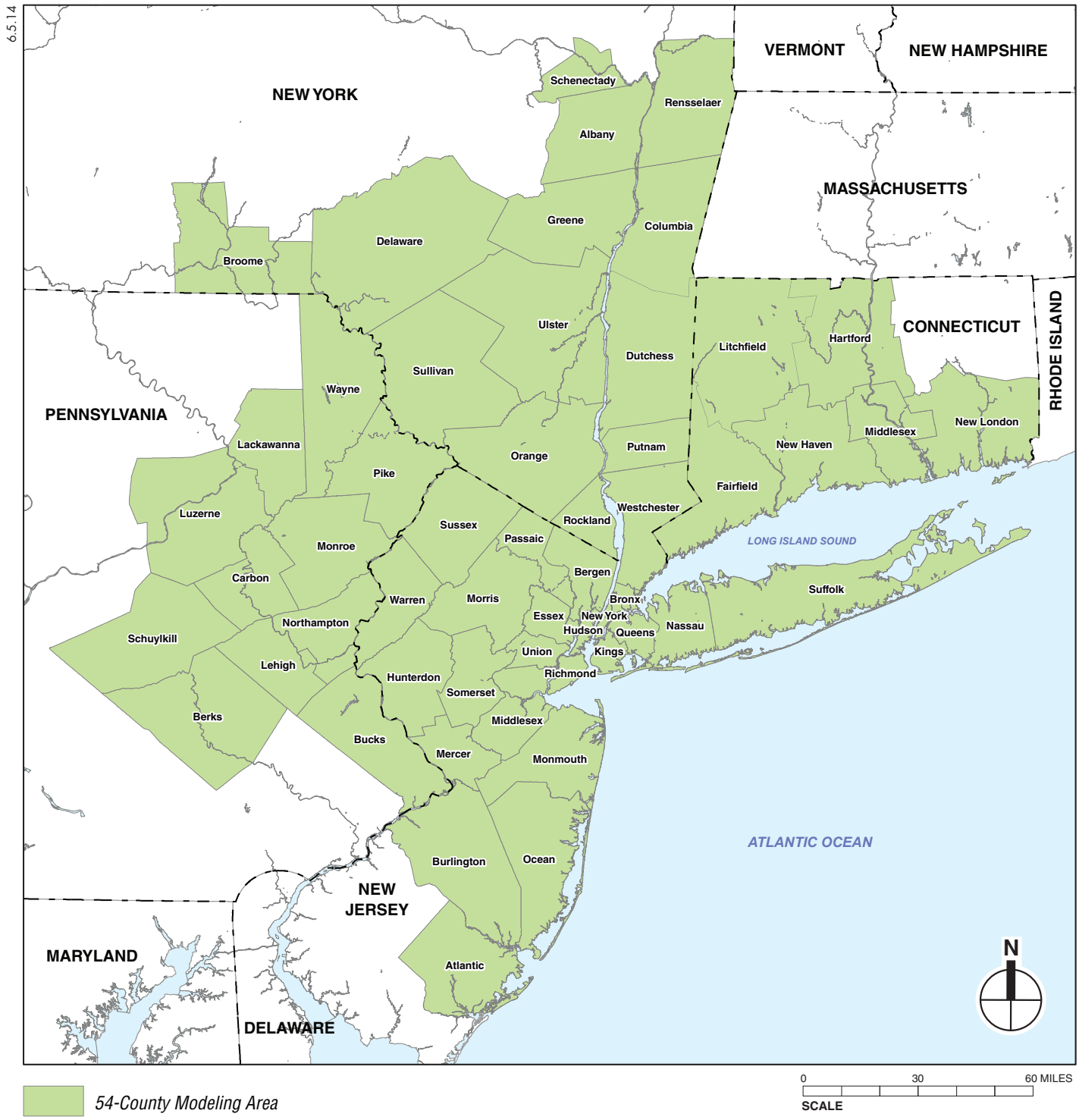

FIGURE ES-1

54-County Modeling Area

CROSS HARBOR FREIGHT PROGRAM

EIS identifies areas of potential concern and describes additional studies that would be required once design and planning progresses, as part of Tier II assessment.

The goal of the CHFP Tier I EIS is to identify and broadly evaluate viable Build Alternatives. The focus of the evaluation is the identification of freight transport corridors, assessment of the demand for goods movement along those corridors, modes by which goods are moved, and identification of new or expanded infrastructure (e.g., rail tunnel, railcar float terminal, track), waterfront termini, and support facilities needed for each Build Alternative. This Tier I EIS broadly presents the benefits of the Build Alternatives and identifies potential locations and environmental effects that may be of concern and require further study as part of any Tier II documentation.

The CHFP Tier I EIS will result in a Record of Decision (ROD) that will identify a preferred transportation mode or modes—or a combination of modes and alignments—with the appropriate level of detail for a corridor-level decision. The selected Tier I alternative(s) would then be subject to a more detailed and comprehensive analysis in the Tier II documentation. Tier II would include much more detailed design and operational data and would address site-specific environmental impacts, detailed costs, and specific mitigation measures.

CHAPTER 3: AGENCY COORDINATION AND PUBLIC INVOLVEMENT

An Agency Coordination and Public Involvement Program (ACPIP) has been conducted throughout the preparation of the Tier I EIS to inform interested parties of the progress of the project and to encourage continuous agency and community involvement in the decision-making process. The ACPIP has also included specific steps to comply with the National Environmental Policy Act of 1969 (NEPA) requirements for public scoping, as prescribed in 40 CFR 1501.7 and Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU).

SAFETEA-LU SECTION 6002 COORDINATION

The agency coordination portion of the project's ACPIP was guided by the project's SAFETEA-LU Coordination Plan (see **Appendix B**). FHWA, in coordination with PANYNJ, identified those federal, state, and local agencies that were invited to be cooperating agencies or participating agencies for this project under SAFETEA-LU Section 6002. As described in Chapter 3, the cooperating and participating agencies have been afforded several opportunities to provide input into the project process through attending agency coordination meetings and distributed project information.

TECHNICAL ADVISORY COMMITTEE

A Technical Advisory Committee (TAC), comprising representatives from various agencies, transportation industries, environmental organizations, community organizations, elected officials and city planning offices, provides guidance and structured review of technical material during the environmental review and public participation processes. Regular meetings have been conducted between the PANYNJ, FHWA, and TAC. To date, TAC has advised on technical subjects such as demand forecasting and transportation models; the alternative modes, alignments, and termini that will be analyzed in the EIS; and potential adverse effects and associated potential mitigation measures. A full list of TAC agencies can be found in **Appendix B**.

STAKEHOLDER ADVISORY COMMITTEE

A Stakeholder Advisory Committee (SAC) was also formed for the CHFP. Whereas members of the TAC have specific technical expertise in relation to the project, SAC members have a general interest in the project and can offer insights regarding its effect on business operations, the environment, historical structures, or their constituents. SAC members include elected officials and community organizations, in addition to freight industry representatives, transportation professionals, and other interested parties within the study area and/or affected communities. Members provide feedback on project information and participate in the public process. A full list of SAC agencies can be found in **Appendix B**. Regular meetings have been conducted between the PANYNJ, FHWA, and SAC.

PUBLIC INVOLVEMENT

The public involvement portion of the project's ACPIP was guided by a Public Involvement Plan (see **Appendix B**), the key goal of which was to inform interested parties about the project and seek input on a wide range of issues. The CHFP Public Involvement Plan encompassed a variety of communication vehicles (described in detail in Chapter 3) such as: a Needs Assessment document, newsletters, electronic communications, a project website, social media, and a number of in-person meetings.

PUBLIC SCOPING

Following the release in September 2010 of the Draft Scoping Document, Draft Environmental Methodology, and Needs Assessment (see **Appendix B**), a series of six public scoping meetings were announced and held in New York and New Jersey. Following a 60-day public comment period, all oral and written comments received were compiled into a Scoping Comments Summary (see **Appendix B**) and made available on the project website. Approximately 107 comments were received throughout the scoping process.

TARGETED PUBLIC OUTREACH

In addition to the formal scoping and advisory committee meetings, the CHFP Public Involvement Plan includes pro-active outreach efforts designed to educate and inform community organizations and select local officials, and to address concerns while the project was still in the planning stages.

CHAPTER 4: ALTERNATIVES

The alternatives selection and screening process outlined in Chapter 4 intended to focus the number of alternatives for consideration in any Tier II documentation and implementation through a comprehensive evaluation process. The alternative selection and screening process comprised the following steps, each of which is described in detail in Chapter 4:

1. **Development of the Long List of Alternatives** – Drawing on previous Cross Harbor studies, various other sources, public, stakeholder, and technical advisory committee input, a long list of 27 alternatives considering various modes and alignments/termini was developed.
2. **Initial Screening/Fatal Flaw Evaluation** – This alternatives screening step reduced the range of alternatives to those that were reasonable and feasible. Through the process, a total

of 13 alternatives were eliminated because they were either fatally flawed or warranted no further evaluation, based on the conclusions of prior work and considerations of new circumstances.

3. **Qualitative Screening Using Project Goals** – This alternatives screening step reduced the number of alternatives advanced for further evaluation based on their ability to meet the project goals and objectives. The assessment of the ability of an alternative to meet project goals and objectives was based on preliminary freight demand forecasting, mode choice, and broad qualitative criteria. The 14 alternatives that passed the Initial Screening/Fatal Flaw Evaluation were evaluated in this step. Four of the alternatives considered were eliminated based on their inability to sufficiently address project goals and objectives. However, elements of some of those alternatives that contributed to the project purpose and need were incorporated into other Build Alternatives that were selected for further evaluation.
4. **Detailed Evaluation** – 10 remaining Build Alternatives were selected for further evaluation of potential regional and local effects, based on transportation demand, socioeconomic factors, and broad environmental effects. Potential impacts of the Build Alternatives were compared with the No Action Alternative throughout the EIS.

As the last step, following the finalization of this EIS, the Tier I ROD will document the evaluation of the alternatives through the Tier I environmental process and specify the alternative or alternative(s) selected for further evaluation in Tier II, defining project elements that could move forward independently and describing the likely level of environmental review required.

NO ACTION ALTERNATIVE

The No Action Alternative includes highway and rail projects that are currently programmed, planned, or approved for the study area. It reflects projected growth in cross-harbor rail freight (approximately 1.6 million tons per year). The No Action Alternative also assumes that the actions approved by the *Categorical Exclusion Documentation and Final Section 4(f) Evaluation, for the Acquisition and Replacement of Greenville Yard Lift Bridge* (March 2011), and the subsequent *Greenville and 65th Street Yards Categorical Exclusion Re-evaluation Statement* will take place.

BUILD ALTERNATIVES

The 10 Build Alternatives that were evaluated in detail in the EIS include 5 Waterborne Alternatives and 5 Rail Tunnel Alternatives.

WATERBORNE ALTERNATIVES

Enhanced Railcar Float Alternative – The enhanced railcar float operation would expand existing service between Greenville Yard in Jersey City and 65th Street Yard in Brooklyn with hourly service at full operation and reestablish the operation to 51st Street Yard in Brooklyn, which was temporarily discontinued in the aftermath of Superstorm Sandy. With the Enhanced Railcar Float Alternative, the railcar float operation west-of-Hudson terminus would continue to be the Greenville Yard. Both the Brooklyn yards (at 51st Street and 65th Street) and the Oak Point Yard, in the Bronx, could serve as the east-of-Hudson crossing termini for this Build Alternative via railcar float, allowing freight to be delivered to the terminus closest to the

destination market. Supporting freight facilities needed to fully meet the demand for this Build Alternative would include Fresh Pond Yard, Maspeth Yard, Oak Point Yard, and existing and/or proposed facilities on Long Island.

Truck Float Alternative – With this alternative, truck trailers or whole trucks would move on a vessel across the harbor, without the truck drivers. In this alternative a truck driver would deliver a trailer or tractor-trailer to the terminus on one side of the harbor. Upon arrival to the other side of the harbor, a second driver would pick up the trailer or tractor-trailer for transport to its ultimate destination. The termini considered in this analysis in the west-of-Hudson region include Port Newark/Port Elizabeth. In the east-of-Hudson region, the termini considered include 65th Street Yard, 51st Street Yard, South Brooklyn Marine Terminal (SBMT), Oak Point, and Hunts Point.

Truck Ferry Alternative – This traditional vehicle ferry service involves a truck that is driven onto a ferry boat and both the truck and driver are carried across the water body. The alternative considered in this analysis would move trucks on a vessel between Port Newark/Port Elizabeth in New Jersey and 65th Street Yard, 51st Street Yard, South Brooklyn Marine Terminal, Oak Point, or Hunts Point in New York.

Lift On-Lift-Off (LOLO) Container Barge Alternative – The alternative analyzed in the EIS would provide barge service for international containerized cargo between Port Newark/Port Elizabeth or Greenville Yard, and SBMT, 65th Street Yard, 51st Street Yard, Red Hook Container Terminal, or Maspeth Yard, in New York. Service to New England was also considered, as freight market demand that could be served by barge was identified. For illustrative purposes of the assessment conducted in this Tier I EIS, Davisville, Rhode Island was considered as the New England trip end.

Roll On-Roll Off (RORO) Container Barge Alternative – RORO container barges serve the same market as the LOLO variety. RORO container barges differ only in the manner in which the barges are loaded and unloaded. Instead of lifting containers onto and off of the vessel using cranes, trucks are used to drive containers mounted on chassis onto and off of the barge. Truck ramps are therefore required at each terminus to allow the trucks access to the barge. The EIS evaluated the market demand for a RORO container barge service between Port Newark/Port Elizabeth or Greenville Yard, and SBMT, 65th Street Yard, Red Hook Container Terminal, Maspeth Yard, and Davisville, Rhode Island, as an illustrative New England terminus.

RAIL TUNNEL ALTERNATIVES

Rail Tunnel Alternative – The Rail Tunnel Alternative would provide a rail crossing from Greenville Yard to the LIRR's Bay Ridge Branch. The tunnel would be constructed to accommodate double-stacked container railcars and would allow for bi-directional service (double track). 65th Street Yard would process carload freight moving to and from Brooklyn, parts of Queens, and southern Long Island. Maspeth Yard in Queens would process both intermodal and carload freight. Oak Point Yard in the Bronx would process carload freight destined to and from northern parts of New York City and north of New York City. A Long Island Facility for processing carload, intermodal, and international container freight was assumed in this EIS to assess the potential costs and benefits, as well as socioeconomic and environmental effects of this alternative.

Rail Tunnel with Shuttle ("Open Technology') Service Alternative – The Shuttle would provide short-distance intermodal rail service using "Open Technology." With this service, also

known as the "Iron Highway," the train can be split into multiple parts, or opened, to facilitate loading. With this technology, the costs of loading and unloading railcars could be reduced. In addition, the technology would allow non-intermodal equipment—which cannot be easily lifted onto or off railcars—to use rail. These effects would make rail potentially competitive with trucks at shorter distances, supporting truck to rail diversion at trucking distances of less than 400 miles. Open Technology service would require dedicated train sets and specialized loading and unloading areas at the rail termini, but otherwise this alternative would operate on the same infrastructure as the conventional rail tunnel. The service would be provided between termini that would be constructed in the west-of-Hudson region, such as one of the existing freight facilities in Pennsylvania, and in Maspeth Yard, in Queens or at a Long Island Facility.

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 termini with truck loading and queuing areas. Much like the English Channel Tunnel, chunnel service would carry trucks through the tunnel on railcars. Chunnel service would require dedicated train sets and specialized loading and unloading terminals. Otherwise this alternative would operate on the same infrastructure as the conventional Rail Tunnel Alternative. The two terminals would be located at the Oak Island Yard in New Jersey and East New York Yard in Brooklyn.

Rail Tunnel with Automated Guided Vehicle (AGV) Technology Alternative – Automated Guided Vehicles are robotic, self-guided (via GPS or electronic signals) mobile platforms that carry items such as pallets, machinery, etc., and—in the case of marine terminals— containers. The use of AGVs can be expanded into the larger freight transportation network. AGVs can be steel-tired (operating on rail tracks) or rubber-tired (operating on guideways or pavement within the rail tunnel). They would offer a service combining aspects of traditional intermodal rail and a chunnel. Like intermodal rail, containers would be lifted from a truck to AGV at an originating terminal, carried through the tunnel, then lifted from AGV to truck at a destination terminal; the trucker would not accompany the freight. Fleets of alternative-fuel AGVs can be used as truck cabs, hooking themselves to over-the-road truck chassis at designated transfer yards and dragging the chassis through the tunnel to transfer yards on the other side of the Hudson River. The AGV terminals would be constructed in Greenville Yard and East New York.

Rail Tunnel with Truck Access Alternative – The Rail Tunnel with Truck Access Alternative could be designed with pavement to allow rubber-tired vehicles to pass through the tunnel during periods when trains are not present. With alternating truck and rail access, the service might be offered to trucks 12 hours a day, seven days a week (12/7 Tunnel). Trucks would enter near Exit 14B of the New Jersey Turnpike and would run through the tunnel to the Bay Ridge Branch. From there, slip ramps would be provided to Fort Hamilton Parkway to connect with I-278 and south Brooklyn. Trucks would also continue in the Bay Ridge Branch rail right-of-way and terminate at Linden Boulevard.

SCREENING ANALYSIS FOR WATERFRONT TERMINI AND FREIGHT FACILITIES

All of the Build Alternatives evaluated in this Tier I EIS would result in increased activity at existing or proposed freight facilities to process freight conveyed across New York Harbor and the Hudson River. Where the projected amount of freight destined to existing facilities would likely exceed the capacity of those facilities, the potential for expansion is considered. To that

end, an initial list of existing and potential new facility locations was developed; the sites initially considered are discussed in Chapter 4.

After an assessment of the facility location, size, potential for expansion, highway access, surrounding land uses, and other factors, the sites most suitable for the Build Alternatives were selected for further evaluation were identified. These sites include:

- Oak Island Yard, Newark, NJ
- Greenville Yard, Jersey City, NJ
- 65th Street, Brooklyn, NY
- 51St Street Yard, Brooklyn, NY
- South Brooklyn Marine Terminal, Brooklyn, NY
- Red Hook Container Terminal, Brooklyn, NY
- East New York Yard, Brooklyn, NY
- Fresh Pond Yard, Queens, NY
- Maspeth Yard, Queens, NY
- Oak Point Yard, Bronx, NY
- Long Island Facilities, NY – For the purposes of the environmental analysis, two sites are discussed as illustrative examples of the operational effects of the CHFP alternatives, the Pilgrim Intermodal Terminal and the Brookhaven Rail Terminal.
- New England Facilities – A number of existing ports could serve as New England terminus for the LOLO and RORO Container Barge Alternatives. For illustrative purposes, Davisville, Rhode Island is considered in this EIS. Due to the PANYNJ's jurisdictional limitations, partnerships would be sought as part of any Tier II documentation to secure a terminus that would meet the demand projected for New England with this alternative.

The potential environmental effects of the construction and operation of these sites are discussed in this EIS.

COST AND SCHEDULE

The projected capital costs of the Build Alternatives, including yard improvements and expansion, trackwork, equipment, and infrastructure, range from $100 to $600 million for the Waterborne Alternatives and $7 to $11 billion for the Rail Tunnel Alternatives. The costs include the construction, materials, and equipment as well as the cost of planning, design, and the regulatory approval process.

The regulatory approval and design for the Build Alternatives could take two to four years and construction could range from two years for the Waterborne Alternatives to a minimum of 8 years for the Rail Tunnel Alternatives. It should be noted that the design/approval and construction schedules do not include the time needed to make the significant cooperative effort required to get to the construction stage, secure funding, and engage in significant marketing amongst several rail entities to make these alternatives viable. This would be a challenging task that may take a substantial amount of time.

As discussed, the Build Alternatives are not mutually exclusive. Various combinations of alternatives are possible and could be implemented using a phased approach. This is due to the

fact that some alternatives could be implemented in a relatively short timeframe at a reduced cost as compared to the other more expensive and complex alternatives. This would allow for a more immediate improvement in cross-harbor freight movement while not necessarily precluding more comprehensive improvements over the long term. For example, considering the potential benefits, costs, and anticipated construction schedule, the Waterborne Alternatives (individually or in combination) could be implemented as a short-term solution, while the Rail Tunnel Alternatives could be implemented as the long-term solution, which uses the infrastructure improved and the markets established with the implementation of one or more Waterborne Alternatives.

CHAPTER 5: TRANSPORTATION

RESULTS OF THE DEMAND MODEL ANALYSIS

The regional and 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 results of the demand and mode choice modeling, shown in **Table ES-1** 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 existing routes and crossings.

The projected daily operations of each alternative (i.e., the number of local truck trips and train trips on specific local rail segments), along with the No Action Alternative, are shown in Chapter 5, "Transportation," and **Figures ES-2** through **ES-11**.

REGIONAL RAIL NETWORK EFFECTS

As discussed in Chapter 5, "Transportation," a rail network operations analysis was performed for the Enhanced Railcar Float Alternative (as it is primarily rail-based) 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. Overall, 13 of the 42 segments of the rail network analyzed resulted in deterioration in Level of Service (LOS) relative to the No Action Alternative in one or more of the Build 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 were impacted by any of the Build Alternatives with a decline in LOS that exceeds the theoretical volume-capacity threshold of 0.7. The LOS impacts associated with each alternative are illustrated in **Figure ES-12** and **Figure ES-13**.

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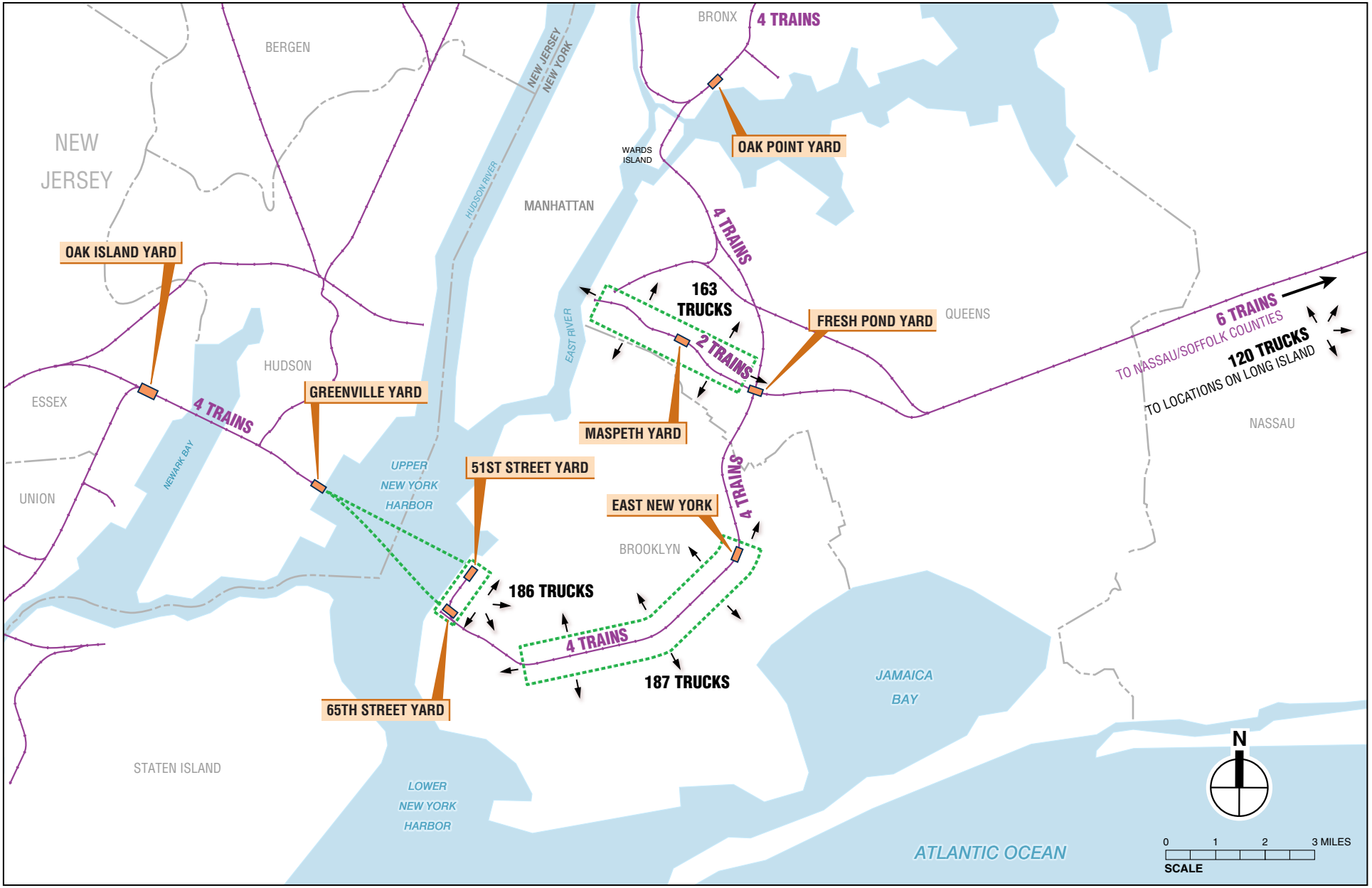

Freight Rail Line and Average Daily Train Passbys

Average Daily Truck Trips

FIGURE ES-2

No Action Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

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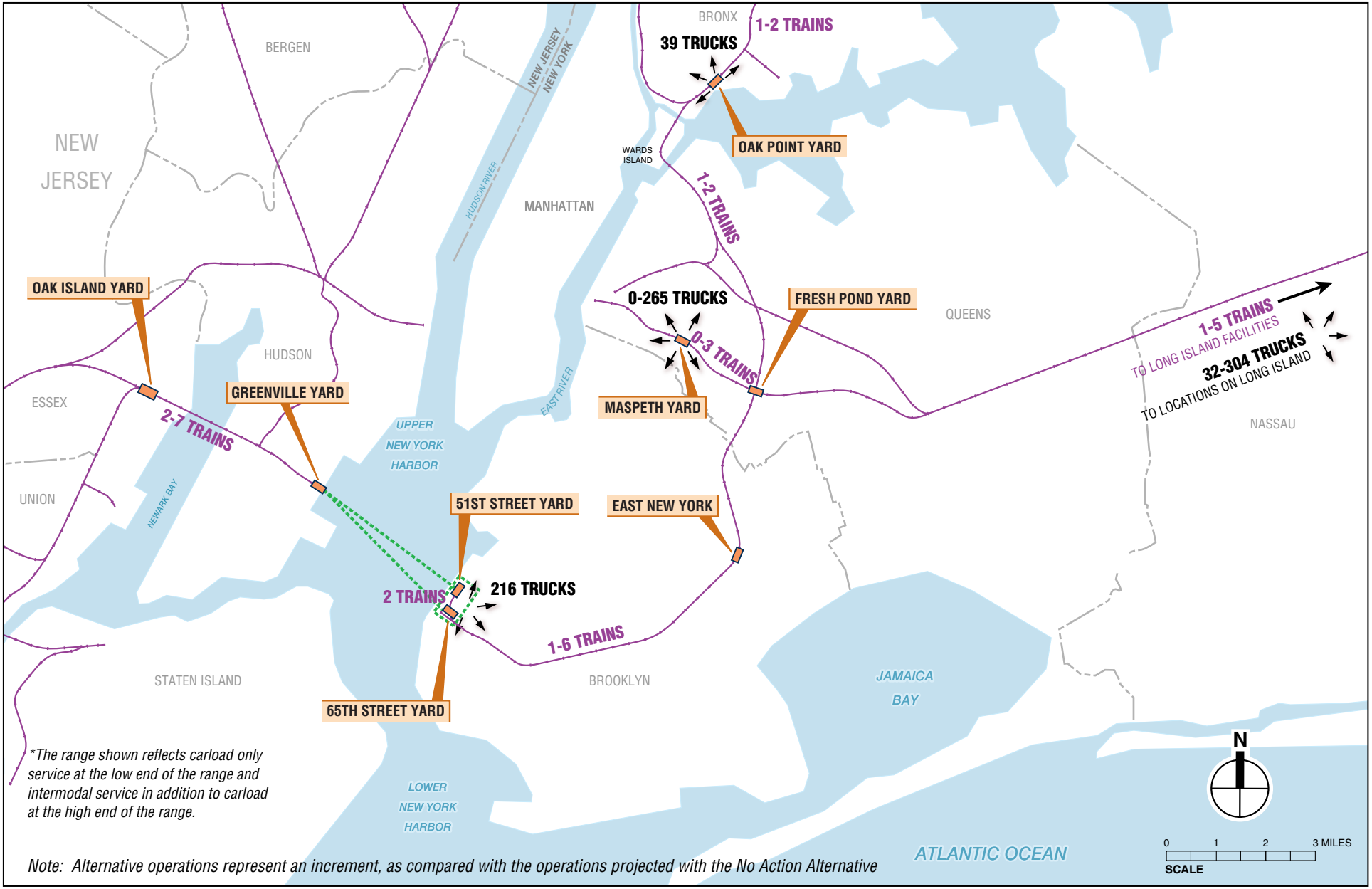


*The range shown reflects carload only service at the low end of the range and intermodal service in addition to carload at the high end of the range.

Note: Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative

Freight Rail Line and Average Daily Train Passbys

Enhanced Float Option

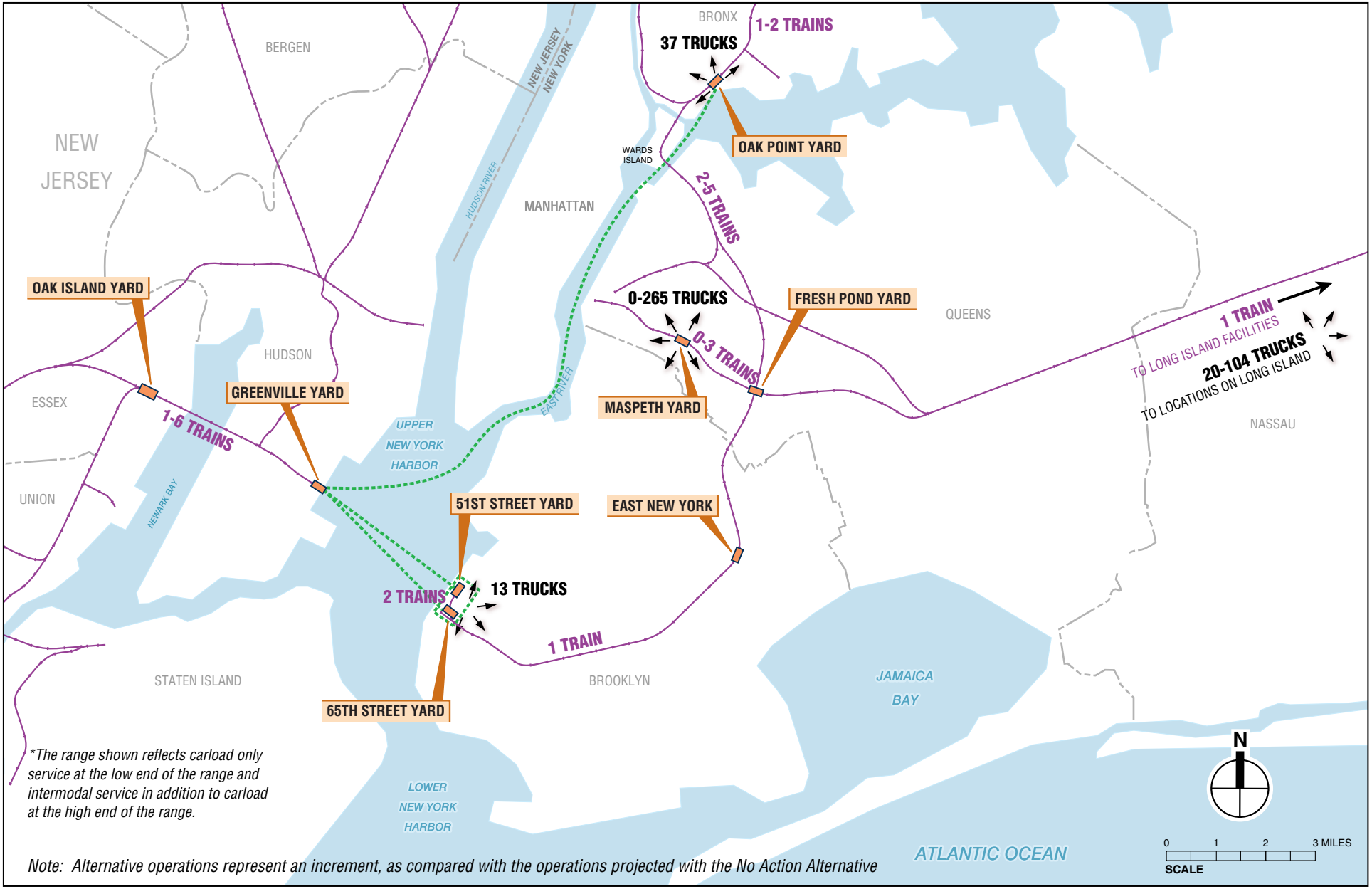
Average Daily Truck Trips

FIGURE ES-3

Enhanced Railcar Float to Brooklyn Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Freight Rail Line and Average Daily Train Passbys

Enhanced Float Option

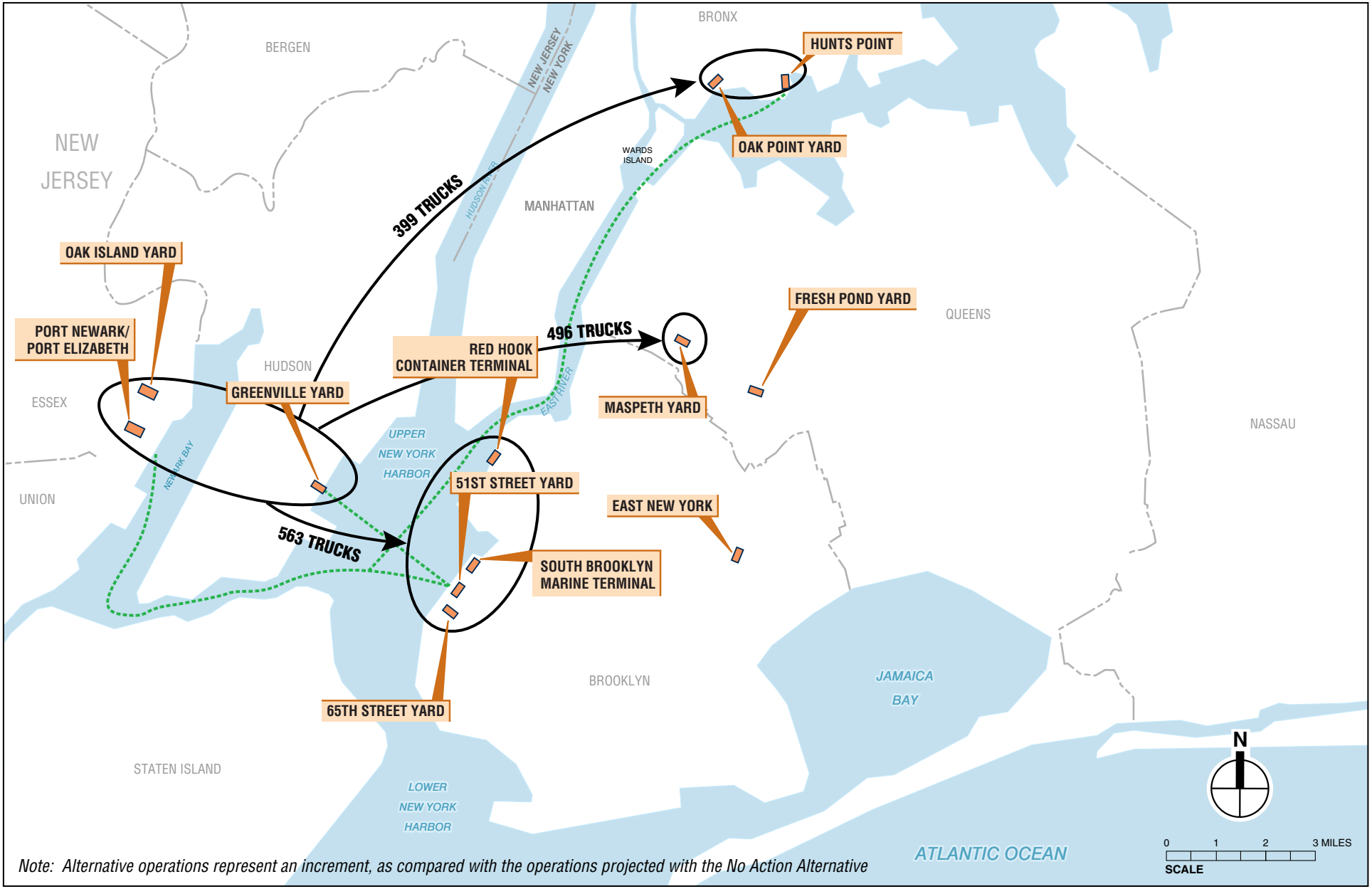
Average Daily Truck Trips

FIGURE ES-4

Enhanced Railcar Float to The Bronx Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14



Note: Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative

Truck Float / Ferry Operation

Destination and Number of Average Daily Truck Trips

FIGURE ES-5

Truck Float/Truck Ferry Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

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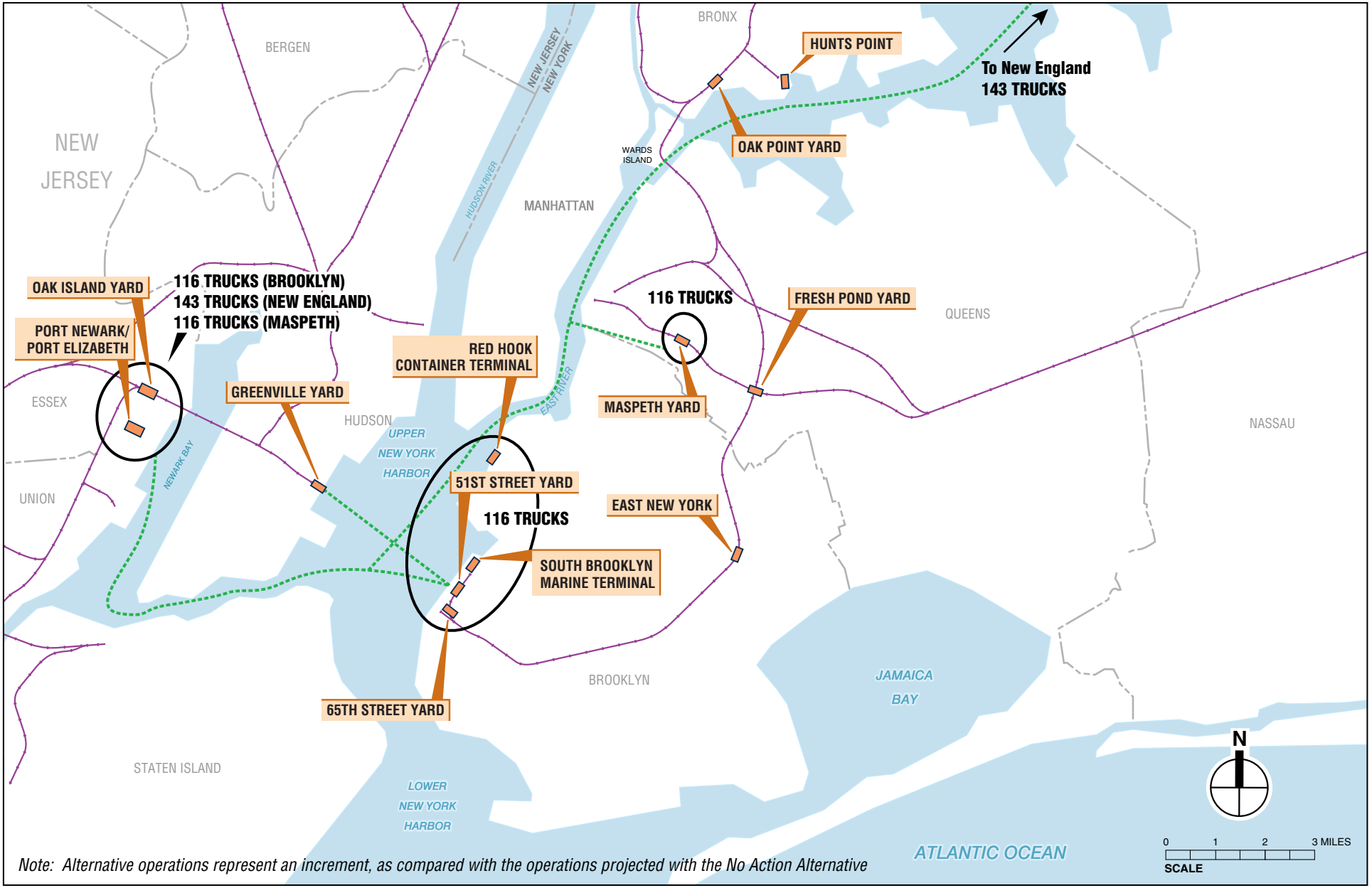


LOLO/RORO

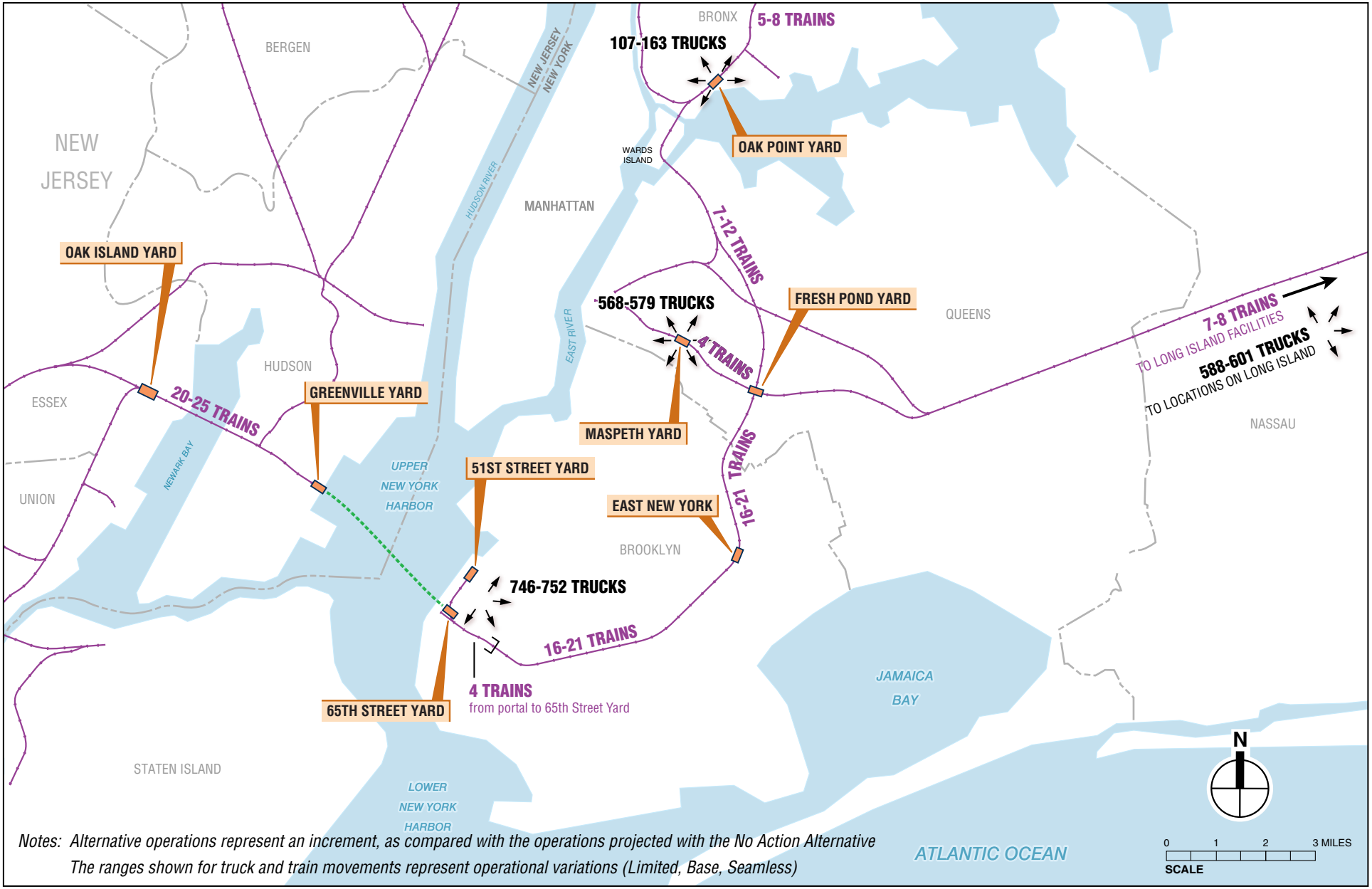
Destination and Number of Average Daily Truck Trips

FIGURE ES-6

LOLO/RORO Container Barge Alternative Projected 2035 Daily Operations

CROSS HARBOR FREIGHT PROGRAM

7.28.14

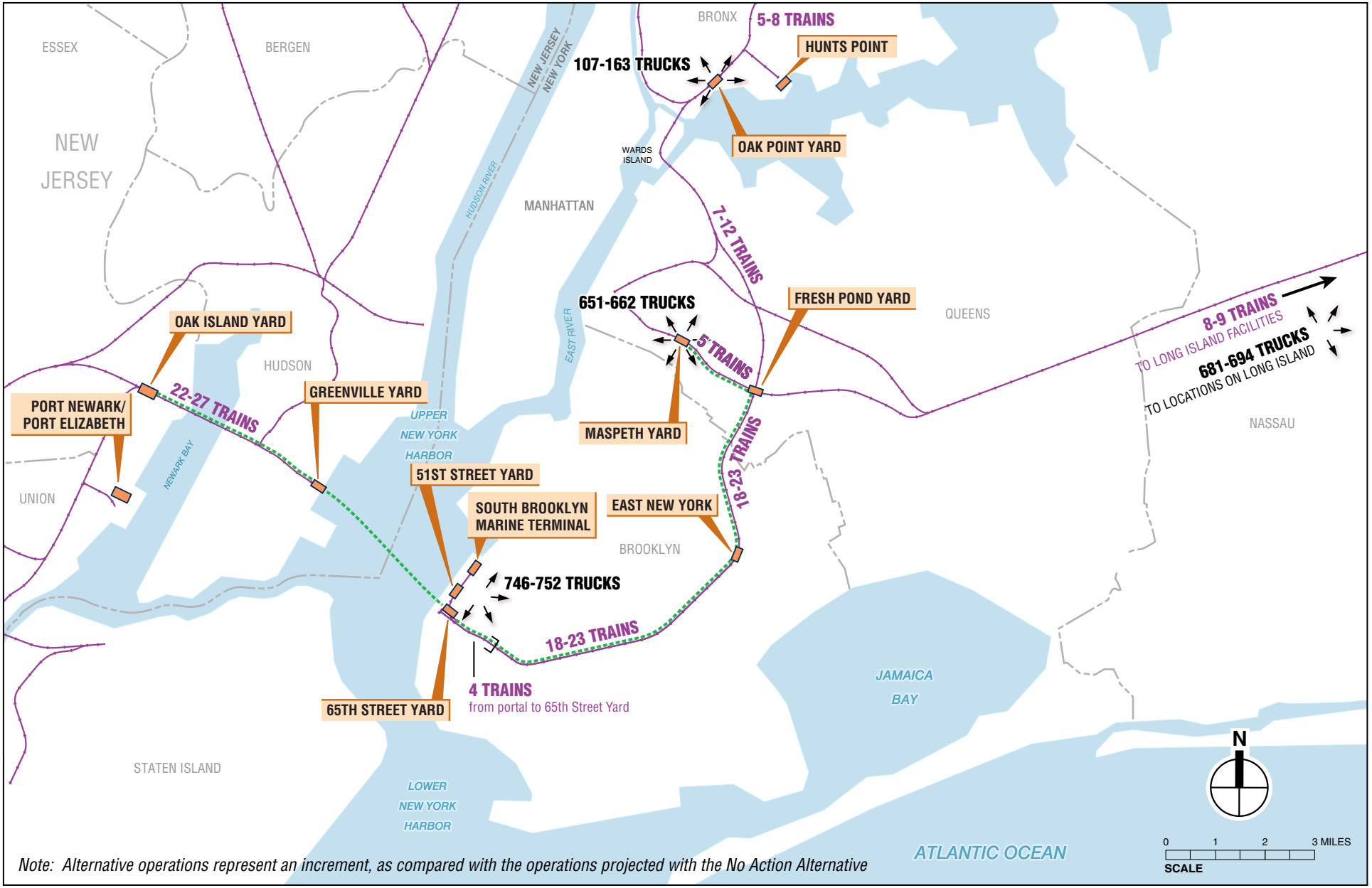


Notes: Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative
The ranges shown for truck and train movements represent operational variations (Limited, Base, Seamless)

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

FIGURE ES-7
Rail Tunnel Alternative Daily Operations
CROSS HARBOR FREIGHT PROGRAM

7.28.14



Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with Shuttle Service

Average Daily Truck Trips

FIGURE ES-8

Rail Tunnel with Shuttle Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

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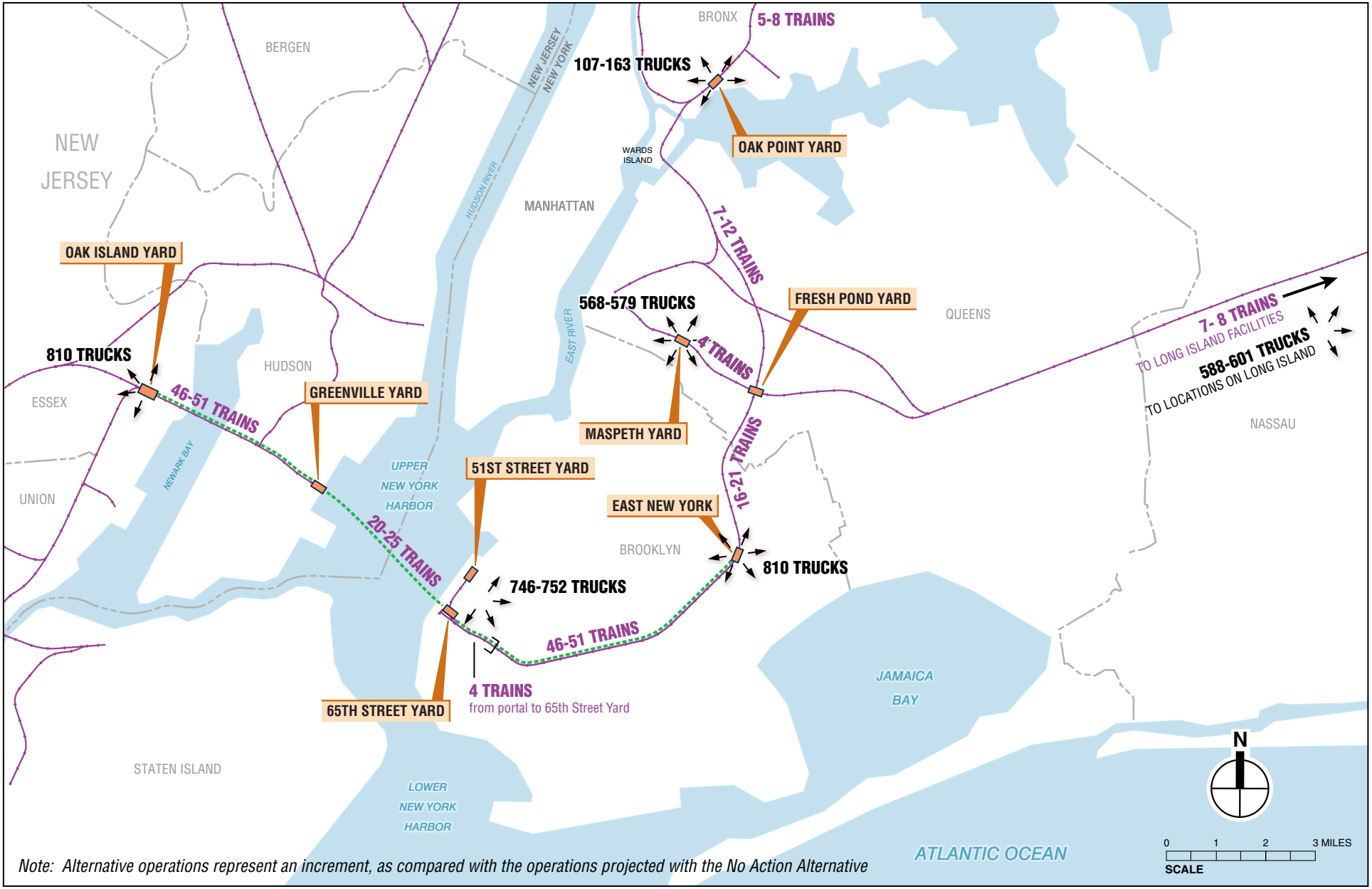

Note: Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative

Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with Chunnel Service

Average Daily Truck Trips

FIGURE ES-9

Rail Tunnel with Chunnel Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

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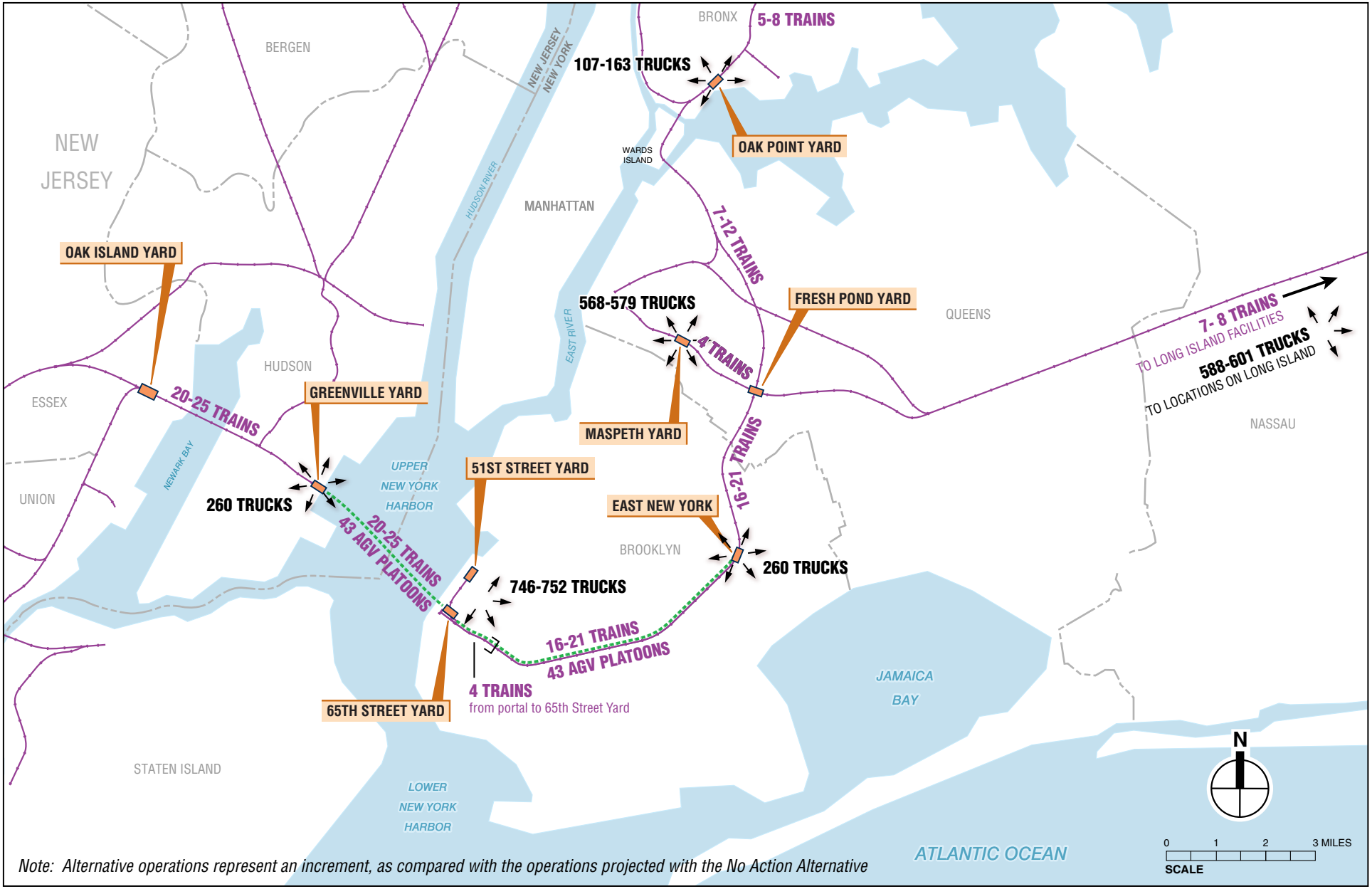

Note: Alternative operations represent an increment, as compared with the operations projected with the No Action Alternative

Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with AGV Technology

Average Daily Truck Trips

FIGURE ES-10

Rail Tunnel with AGV Service Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

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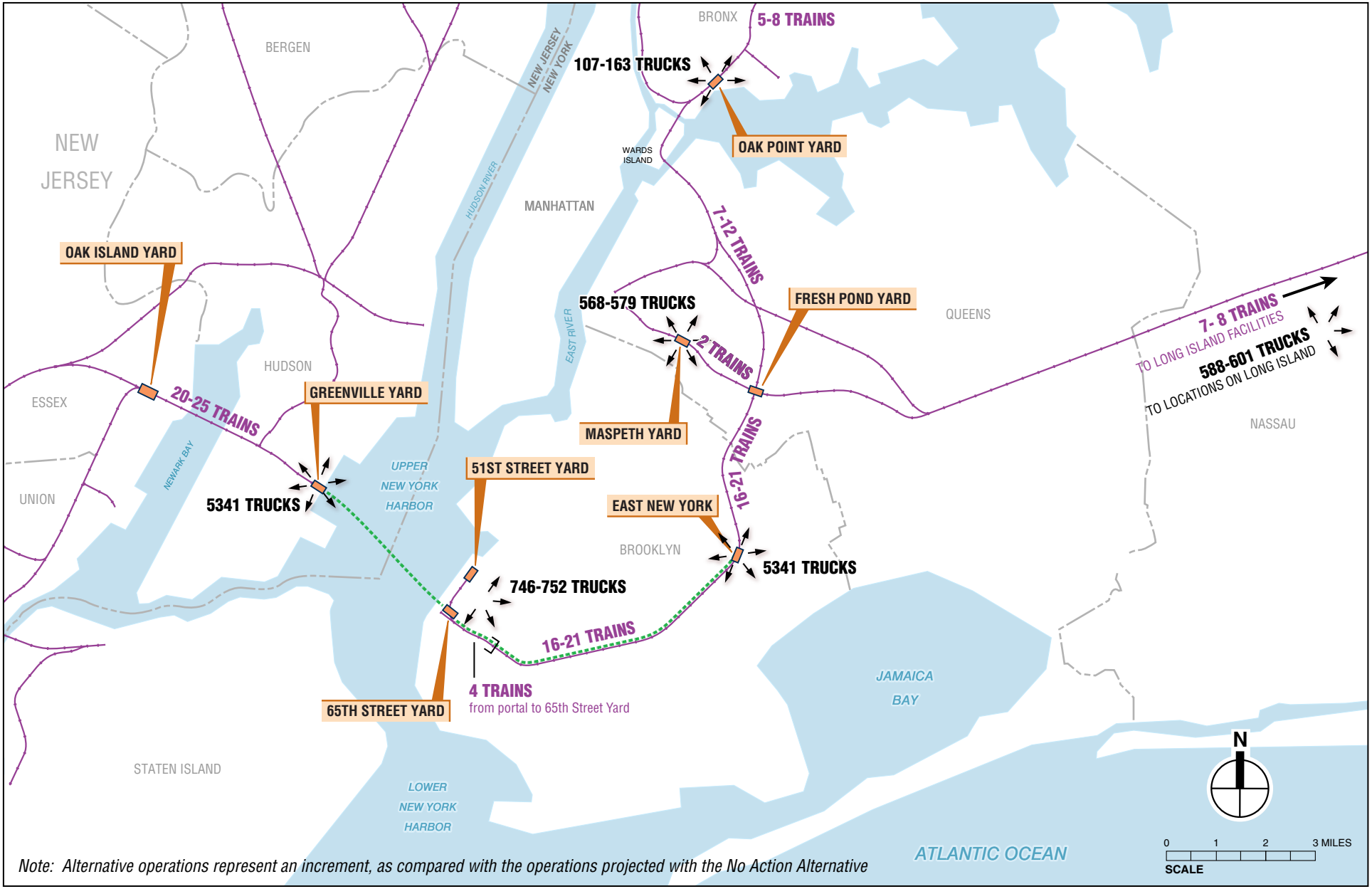


Freight Rail Line and Average Daily Train Passbys

Rail Tunnel with Truck Access

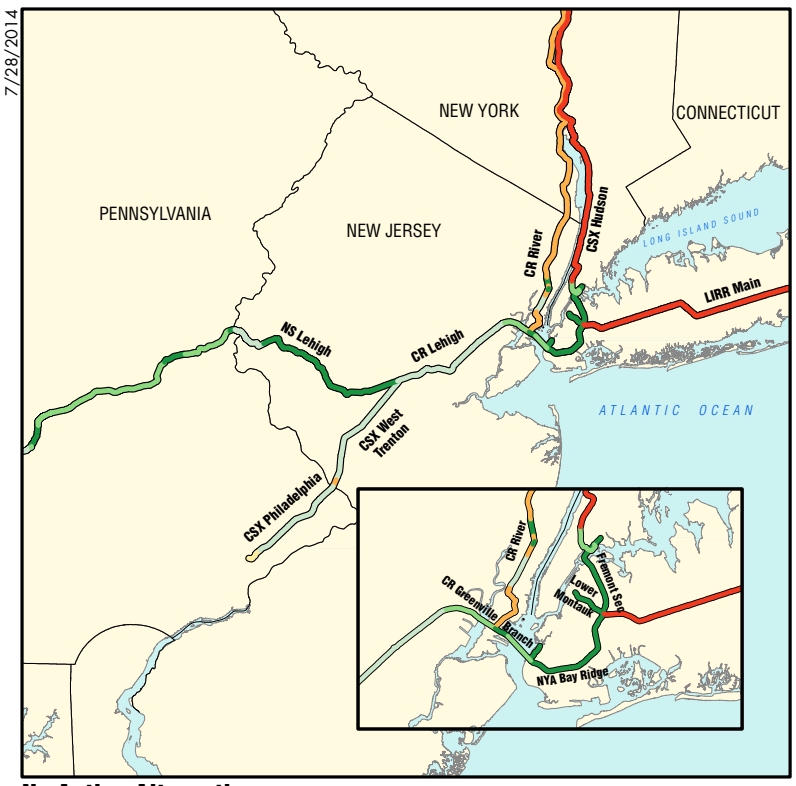
Average Daily Truck Trips

FIGURE ES-11

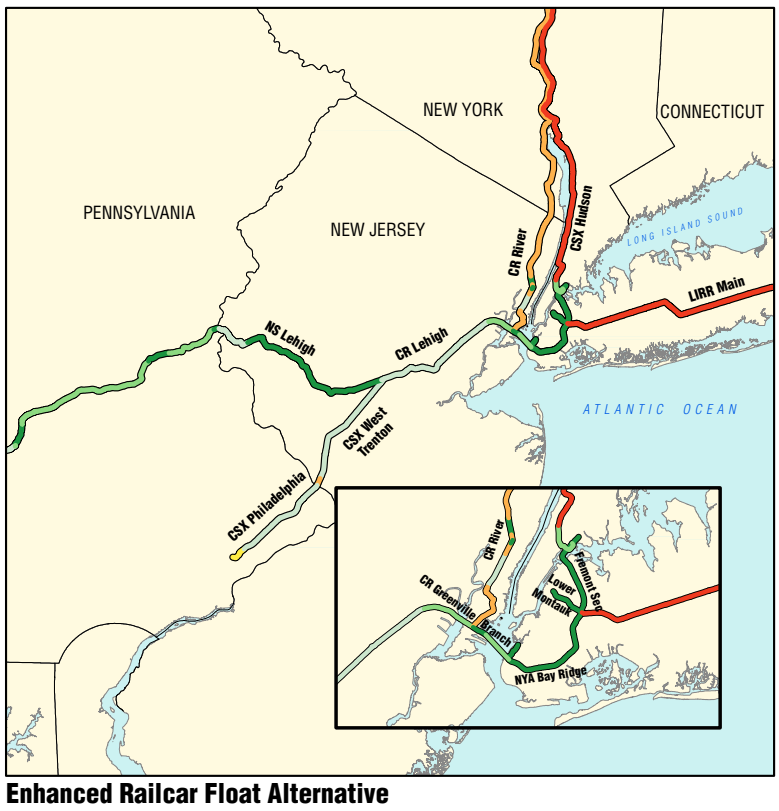
Rail Tunnel with Truck Access Alternative Daily Operations

CROSS HARBOR FREIGHT PROGRAM

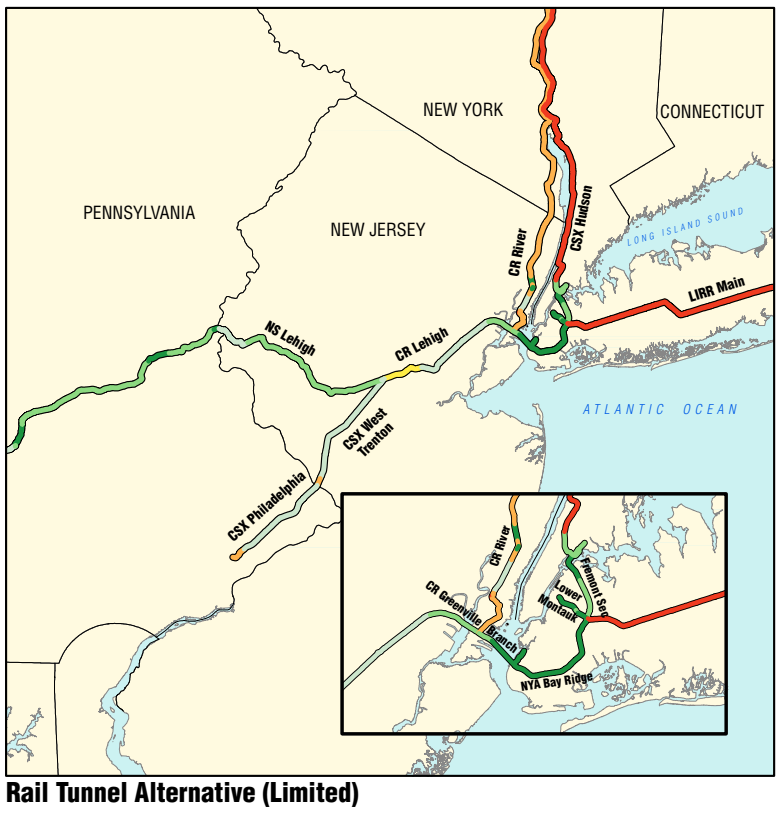
7/28/2014



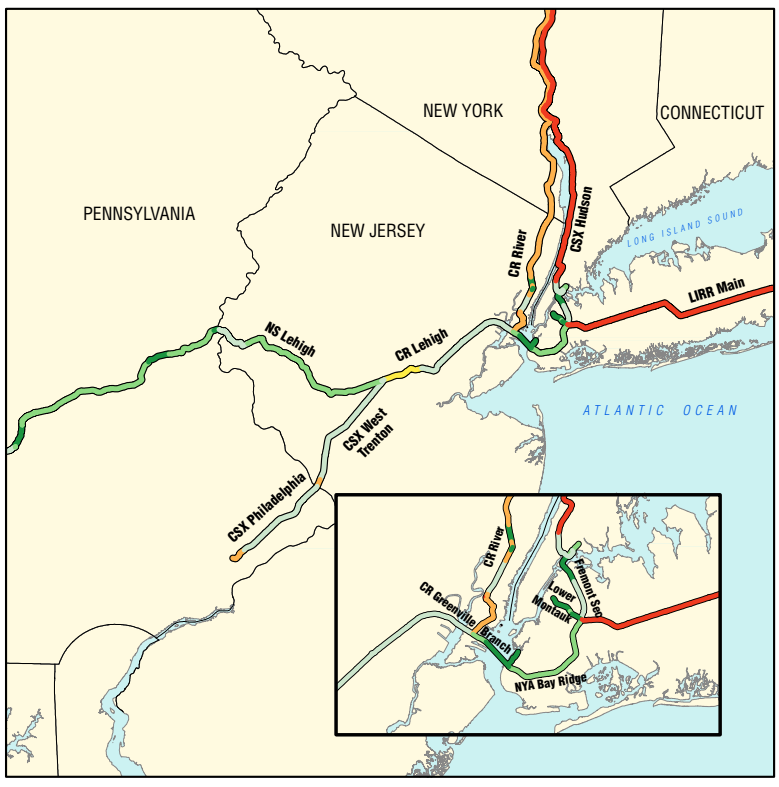
No Action Alternative



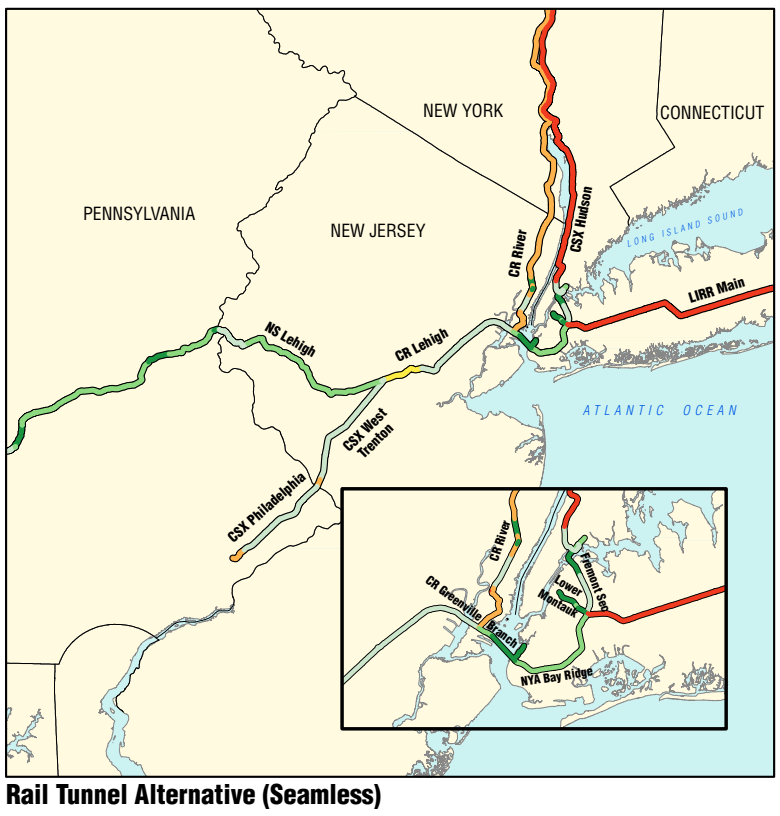
Enhanced Railcar Float Alternative



Rail Tunnel Alternative (Limited)



Rail Tunnel Alternative (Base)



Rail Tunnel Alternative (Seamless)

CROSS HARBOR FREIGHT PROGRAM ALTERNATIVES								
					Waterborne	*Rail Tunnel*		
Segment	Corridor	State	Miles	No Action	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

A B C D E F

FIGURE ES-12

Build Alternatives, Changes in Levels of Service (LOS)

CROSS HARBOR FREIGHT PROGRAM

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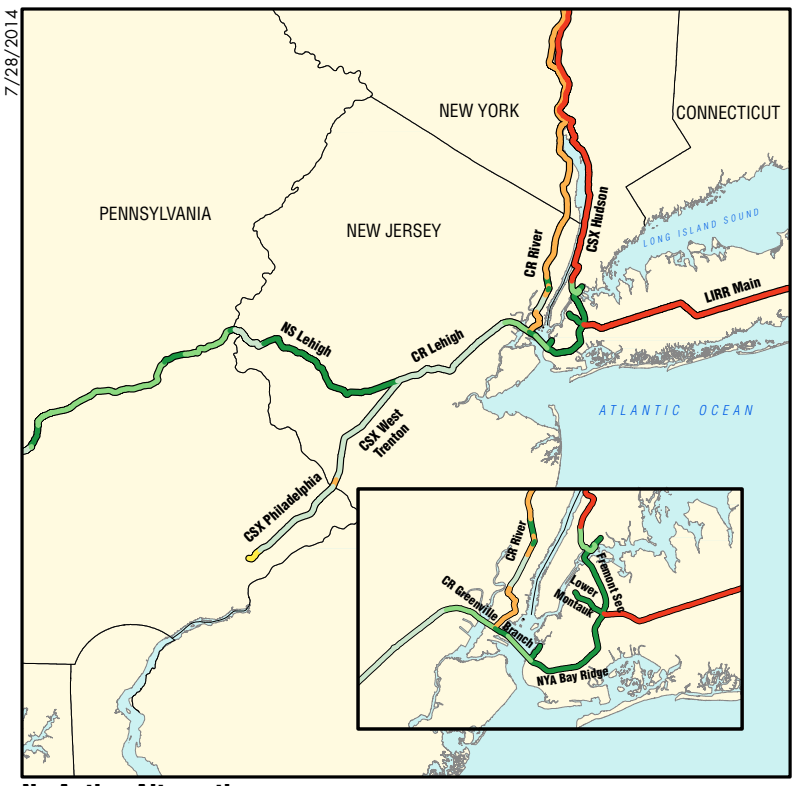
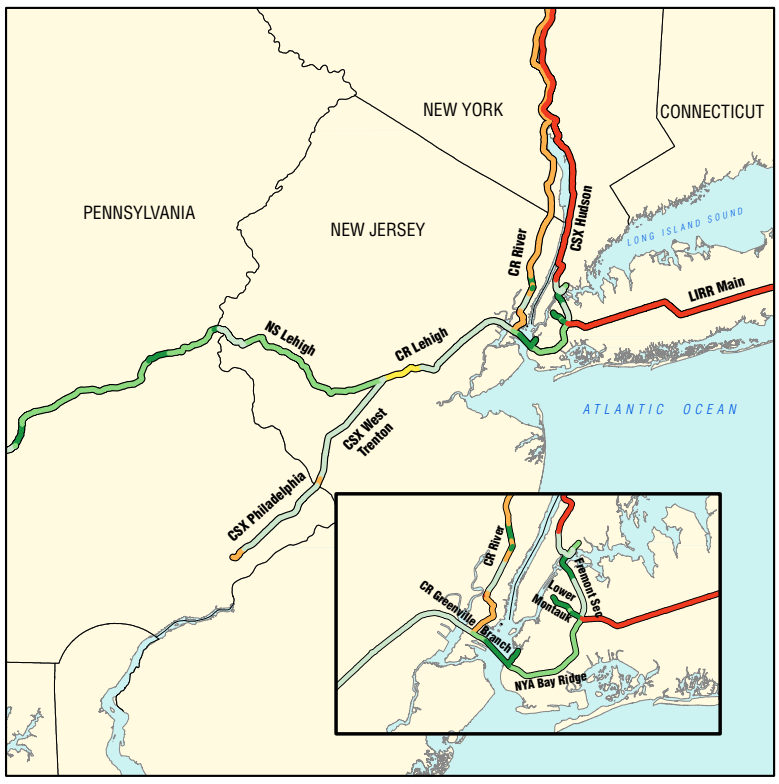
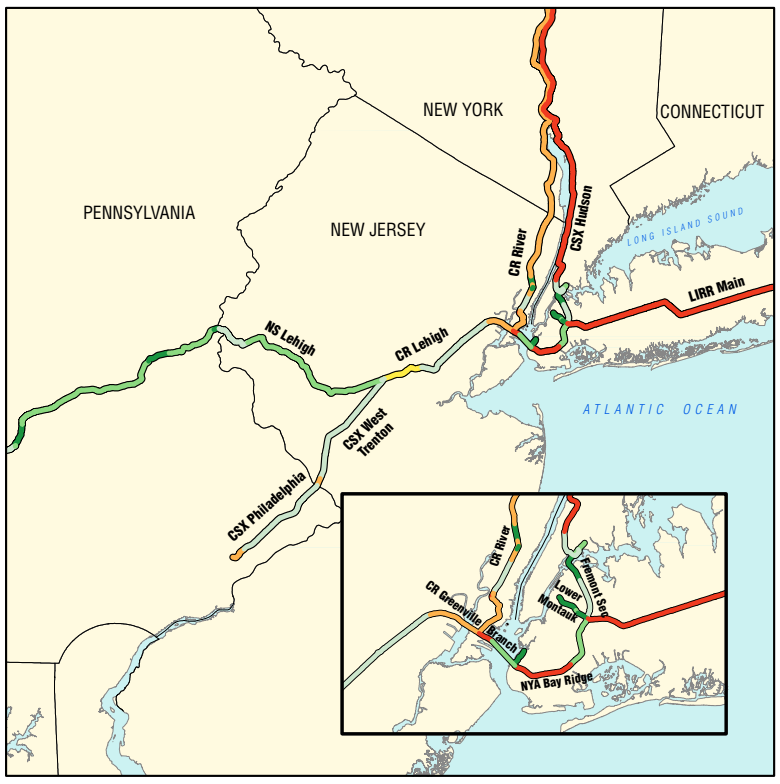


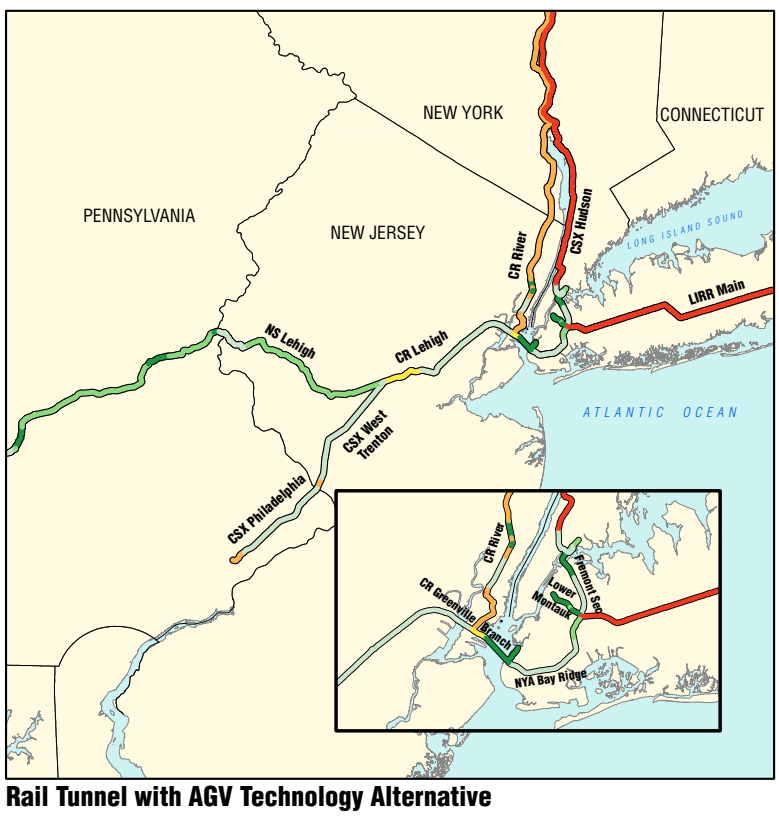
No Action Alternative



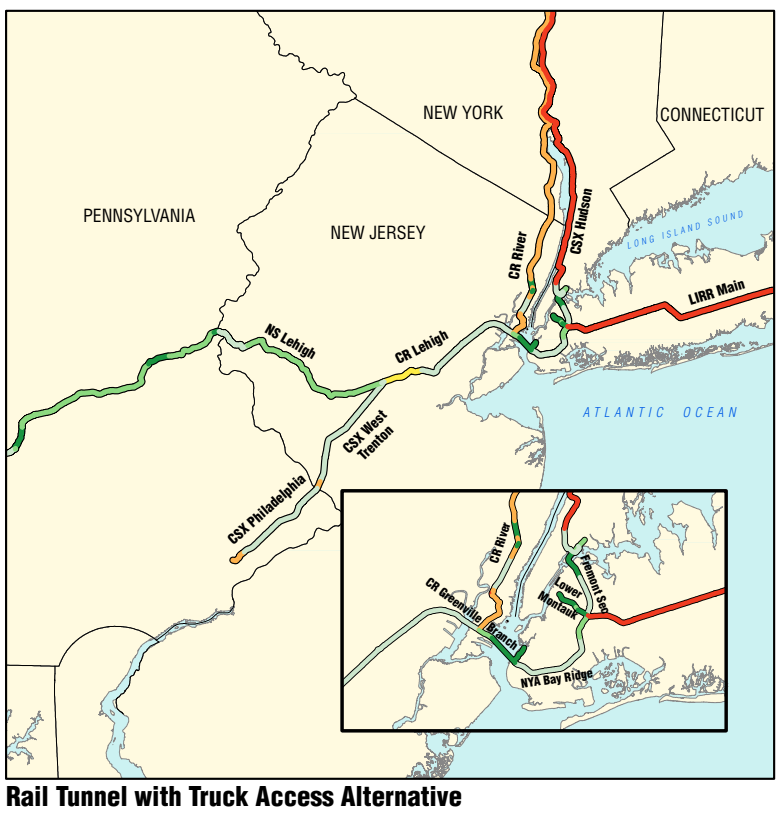
Rail Tunnel with Shuttle Service Alternative



Rail Tunnel with Chunnel Service Alternative



Rail Tunnel with AGV Technology Alternative



Rail Tunnel with Truck Access Alternative

CROSS HARBOR FREIGHT PROGRAM ALTERNATIVES								
					Rail Tunnel			
Segment	Corridor	State	Miles	No Action	with Shuttle Service	with Chunnel Service	with AGV Technology	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

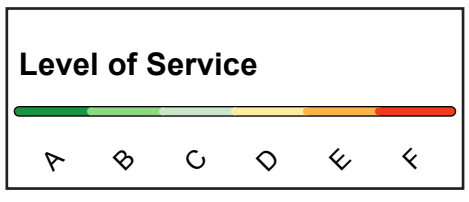


FIGURE ES-13

Build Alternatives, Changes in Levels of Service (LOS)

CROSS HARBOR FREIGHT PROGRAM

Table ES-1
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	Total
Waterborne	Enhanced Railcar Float	Carload and Intermodal	Greenville	Brooklyn	2.8
			Greenville	Bronx	1.6
		Carload Only	Greenville	Brooklyn	1.2
			Greenville	Bronx	0.5
	Truck Float/ Truck Ferry		New Jersey	Brooklyn Queens	1.7 1.5
			New Jersey	Bronx	1.2
	LOLO/RORO Container Barge		New Jersey	Brooklyn	0.3
			New Jersey	New England	0.4
Rail Tunnel	Rail Tunnel	Limited	New Jersey	Brooklyn	7.2
		Base	New Jersey	Brooklyn	8.1
		Seamless	New Jersey	Brooklyn	9.6
	Rail Tunnel (Base) with Shuttle Service		New Jersey	Brooklyn	8.7
	Rail Tunnel (Base) with Chunnel Service		New Jersey	Brooklyn	10.5
	Rail Tunnel (Base) with AGV Technology		New Jersey	Brooklyn	8.9
	Rail Tunnel (Base) with Truck Access		New Jersey	Brooklyn	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.

REGIONAL HIGHWAY NETWORK EFFECTS

The Waterborne Alternatives would result in less than 0.1 percent change in commodity truck VMT throughout the region. 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 alternatives. 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.

There are travel time savings for commodity trucks associated with the Build Alternatives as well. The Waterborne Alternatives would result in a 0.1 percent reduction in commodity truck vehicle-hours traveled (VHT) and 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.

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 per day from harbor and Hudson River crossings in the 23-county regional study area (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 to 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. 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.

At the same time, truck traffic diverted from existing crossings to the Build Alternatives may result in substantial increases in truck volumes on local roadways. 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.

LOCAL TRANSPORTATION

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 **Figures ES-3** through **ES-11**. As presented in these figures, each of the Build Alternatives would increase truck traffic near some of the existing, proposed, or representative freight facilities.

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.

AIR CARGO

None of the Build Alternatives would have an effect on air cargo operations.

CHAPTER 6.1: LAND USE, NEIGHBORHOOD CHARACTER AND SOCIAL CONDITIONS

The Build Alternatives would rely largely on existing infrastructure throughout the entire project area, and so neighborhood character, community facility, open space or population issues that could be identified at this level of analysis, would be related to direct changes in land use, or indirectly related to effects of increased truck traffic or changes in yard operations.

Direct effects to land use would result from the acquisition of those properties which are not currently used to support rail or transport functions. As noted in the table, some alternatives—such as the Truck Ferry Alternative, Truck Float Alternative, and the RORO/LOLO Container Barges—may not require any land acquisition but may be accommodated in existing waterfront freight handling facilities. As noted throughout this EIS, details regarding property acquisitions are not available in the Tier I EIS; therefore direct effects to land use are presented in Chapter 6.1 in a generalized manner. **Table ES-2** summarizes the land acquisition required to each alternative, as far as these requirements can be determined in Tier I.

Table ES-2
Potential Land Acquisition by Facility per Alternative

	Potential Land Acquisition in Acres									
	Waterborne Alternatives					Rail Tunnel Alternatives				
Facility	Enhanced Float	Truck Float[2]	Truck Ferry[2]	LOLO[2]	RORO[2]	Rail Tunnel	Shuttle[1]	Chunnel[1]	AGV[1]	Rail Truck Tunnel[1]
West-of-Hudson										
Oak Island Yard	NA	NA	NA	NA	NA	50	+0	+20	+0	+0
Greenville Yard	0	NA	NA	15	15	TBD	+0	+0	+30	+30
Port Newark/Port Elizabeth	NA	10	10	15	15	NA	NA	NA	NA	NA
East-of-Hudson										
65th Street Yard	7.5	10	10	15	15	7.5	+0	+0	+0	+0
51st Street Yard	0	10	10	15	15	0	0	0	0	0
SBMT	NA	10	10	15	15	NA	NA	NA	NA	NA
Red Hook Container Terminal	NA	NA	NA	15	15	NA	NA	NA	NA	NA
Oak Point Yard	TBD	10	10	NA	NA	9	+0	+0	+0	+0
Hunts Point Yard	NA	10	10	NA	NA	NA	NA	NA	NA	NA
East New York Yard	0	NA	NA	NA	NA	TBD	+0	+13	+15	+15
Fresh Pond Yard	3.5	NA	NA	NA	NA	3.5	+0	+0	+0	+0
Maspeth Yard	15	10	10	NA	NA	60	+10	+0	+0	+0
Pilgrim Intermodal Terminal	NA	NA	NA	NA	NA	TBD	TBD	NA	NA	NA
Brookhaven Rail Terminal	NA	NA	NA	NA	NA	TBD	TBD	NA	NA	NA

Notes: NA-Not Applicable TBD – To Be Determined

(1) Since the Shuttle, Chunnel, AGV and Truck Access Alternatives represent service options that may be added to the Rail Tunnel Alternative, the acreages shown here represent land acquisition in addition to what would be required under the Rail Tunnel Alternative.

(2) The acreage presented here represents a conservative estimate of acreage required for this alternative, since termini for these alternatives may be accommodated (in full or in part) at an existing facility and land acquisition may not be required. As noted in Chapter 4, "Alternatives," only one terminus east-of-Hudson and one terminus west-of-Hudson would be established under this alternative; therefore, these acreages are not cumulative

Most of the facilities required to support the Build Alternatives are located in industrial areas and/or near land uses related to freight handling. Therefore, no direct changes to land uses would be expected in these areas and no residential areas, community facilities or open space would be affected. One exception to this determination would be East New York, where a fillet/toupee operation would be established to accommodate double-stacked container traffic under the Rail

Tunnel Alternatives, and termini would be established under the Rail Tunnel with Chunnel Service Alternative and the Rail Tunnel with AGV Technology Alternative. Because each of these facilities would require an expansion of the Bay Ridge Branch right-of-way, the potential for direct effects to land use are likely as result of property acquisition.

None of the Build Alternatives involve the introduction or relocation of any residential populations or any substantial worker populations (as known at this time), and therefore no direct changes to social conditions are expected from any alternative. Indirect effects to open space and community facilities could also result from changes in demand for outdoor recreational areas, schools, hospitals, etc. However, since no direct effects on social conditions are expected at this time for any of the alternatives, indirect effects are also not expected at this time.

Construction activities related to the Build Alternatives would be located primarily within existing rail yards and rail corridors, where construction activities would not be anticipated to alter land use patterns, zoning, or public policy. Likewise, construction activities in these areas would not be anticipated to alter land use patterns or adversely affect a number of businesses to such an extent that residential or worker populations would change significantly or permanently.

Despite the fact that construction activity would occur largely within the existing rail yards and rights-of-way, construction work may occur near residences, community facilities and parks. Therefore, there remains the potential for construction period activities to affect neighborhood character, community facilities, and open space as a result of construction related effects to transportation, air quality, noise, and visual and aesthetic conditions associated with construction activities.

CHAPTER 6.2: ECONOMIC CONDITIONS AND EFFECTS

ECONOMIC IMPACTS FROM CONSTRUCTION

The Waterborne Alternatives would generate between 200 and 300 direct job-years, 478 to 720 total job-years (including indirect and induced jobs), $30 million to $45 million in wages, and $116 million to $175 million in total spending.

The Rail Tunnel Alternative would generate approximately 12,500 to 18,000 direct job-years, 28,000 to 41,000 total job-years (including indirect and induced jobs), $1 billion to $1.5 billion in direct wages, $1.8 billion to $2.6 billion in total wages, and $7.2 to $10.4 billion in total spending. The range represents the difference in construction costs estimated for the various Rail Tunnel Alternative operating scenarios (Limited, Base, Seamless). The incremental construction costs associated with each of the Rail Tunnel Alternatives with service and technology options also generate economic benefits. These additional expenditures could generate an additional 176 to 1,743 direct job-years, 418 to 4,122 total job-years (including indirect and induced jobs), $14 million to $144 million in direct wages, $26 million to $256 million in total wages, and $104 million to $1.0 billion in total spending. Because the Rail Tunnel with Truck Access Alternative requires the greatest construction expenditure, it will generate the greatest economic impact during the construction phase.

ECONOMIC IMPACTS FROM OPERATIONS

In 2035, the Waterborne Alternatives would save highway users between $1 million and $13 million in non-discounted 2012 dollars. The Rail Tunnel Alternative under the Limited, Base, and Seamless Operating Scenarios would save highway users between $130 and $135 million. The Rail Tunnel Alternatives with Chunnel Service, AGV Technology, Shuttle Service, and Truck Access options would save highway users between $116 and $162 million. Cumulative savings through 2060 resulting from the Rail Tunnel Alternative could range from $4.6 billion (Rail Tunnel Alternative under the Limited Operating Scenario) to $5.8 billion under the Rail Tunnel with AGV Technology Alternative.

BUSINESS AND EMPLOYMENT REDISTRIBUTION

With each of the Build Alternatives, more freight would move by rail and water modes, and more rail and float or barge employees would be needed, along with local truck drivers making delivery trips to and from the freight terminals. However, less traffic would move directly between freight shippers and receivers by truck only, truck VMT would be reduced, and as a result fewer truckers would be needed overall, resulting in a lower growth in trucker employment compared to the No Action Alternative. Overall, it is likely that these two effects—added freight facility employment and reduced trucker employment—would result in net increase in employment within the 23-county region for all Build Alternatives, except for the LOLO/RORO Container Barge and Truck Float and Truck Ferry Alternatives.

COST AND REVENUE ANALYSIS

The Rail Tunnel Alternatives would generate revenues for the railroads operating the service. Because the Enhanced Railcar Float Alternative is a rail service that uses a waterborne float, it can be expected to generate the same type of railroad revenues as well. Based on experience with private railroads, and from information made public through railroad-sponsored TIGER grant applications, a “fair rate” for rail service is equal to about 90 percent the cost of trucking. Of the price charged to customers, some of that revenue represents revenues to local truckers, some to warehouse and distribution center operators, or other intermediate service providers, and some is revenue to the railroads. The exact shares would vary, but on average it is reasonable to assume at least 50 percent of the total end-to-end transportation cost would be realized in the form of railroad revenues. From revenues, railroads make expenditures in many categories—labor and benefits, maintenance, debt service, taxes, and property (including rolling stock, land, track, terminals, and other equipment). It is reasonable to assume, using industry data, that about 17.5 percent of the revenue generated from the Rail Tunnel Alternatives could be reinvested in the property by a private railroad operator.

The Truck Float/Ferry Alternative and the Rail Tunnel with Truck Access Alternative would generate revenue in the form of truck tolls. In the case of the Rail Tunnel with Truck Access Alternative, the truck tolls would be revenue above and beyond the railroad revenue generated from the rail traffic.

The Container Barge Alternative requires significant transportation costs—including fuel, barge charges, barge fees, port fees, and labor—as well as stevedoring costs at each terminal, in the case of the LOLO Container Barge Alternative. Container barge services compete against trucking, and must offer a price that is competitive with the price of trucking in order to generate the projected demand.

Each of the Build Alternatives offer the potential to generate revenues in the form of user fees—including railroad revenue yielded from the price charged to move each railcar or intermodal container handled, tolls charged to trucks moving on the Truck Float/Ferry Alternative and the truck portion of the Rail Tunnel with Truck Access Alternative, and fees levied on each container moved by the Container Barge Alternative. This revenue potential could entice private sector participation in the financing and operation of the Build Alternatives. The revenue is not likely to cover all of the capital, operating, and maintenance costs, however, and public funding will likely be necessary. Identifying and evaluating potential sources for the additional required funding would be a critical task in a Tier II analysis.

LOCAL EFFECTS ANALYSIS

Table ES-2 above, shows the approximate acreage that would be required to establish new facilities to support the Build Alternatives or to expand existing freight handling facilities, such as rail yards (e.g., Fresh Pond) or waterfront facilities (e.g., Oak Point Yard). A more detailed discussion of the land needed by facility and by alternative is provided in Chapter 6.1, "Land Use, Neighborhood Character, and Social Conditions." Based on the approximate area needed for each alternative class, the assumption that only one set of crossing terminals would be developed for the Waterborne Alternatives, and preliminary acquisition footprints, job displacement by alternative can range from several hundred to several thousand jobs. Additional studies in any Tier II documentation would be required to determine the location of the land that would be acquired and assess the number of jobs that would be displaced with greater accuracy.

CHAPTER 6.3: CULTURAL RESOURCES

A broad APE (Area of Potential Effect) has been delineated to take into account the potential for direct and indirect effects from the Build Alternatives on architectural resources. There are twelve architectural resources in the west-of-Hudson (New Jersey) portion of the APE. One of these resources, the Morris Canal, is listed on the New Jersey and National Registers of Historic Places. The others have been determined eligible for S/NR listing. There are 41 known architectural resources in the east-of-Hudson (New York) portion of the Architectural Resources APE. Six of these are NYCLs, another two are NYCL-eligible; 12 are S/NR-listed, and 26 are S/NR-eligible.

The operation of the Waterborne Alternatives in the west-of-Hudson APE is not expected to result in any adverse direct or indirect effects to historic architectural resources or to the visual character of the architectural resources in the west-of-Hudson APE. Similarly, the operation of the Brooklyn waterfront facilities required for the Waterborne Alternatives and increased rail traffic on the Bay Ridge Branch (that would result from the Enhanced Railcar Float Alternative) would be in keeping with the historic and current uses of the Brooklyn waterfront facilities and the Bay Ridge Branch and would not be expected to adversely affect these architectural resources.

The operation of the Rail Tunnel Alternatives would result in an increase in rail traffic on existing rail lines; however, increased train activity would not be inconsistent with the existing rail uses in the west-of-Hudson (New Jersey) and east-of-Hudson (New York) APEs. The ventilation tunnel ventilation shafts required for all of the Rail Tunnel Alternatives would be constructed over the tunnel alignment, near the waterfront and there is the potential that the ventilation shaft could affect portions of nearby historic districts.

The construction activities associated with the Waterborne Alternatives would not be expected to adversely affect the character of the architectural resources located in the west-of-Hudson and east-of-Hudson APEs and would be in line with the industrial character of the existing facilities. Consequently, no adverse indirect effects would be expected to affect architectural resources located in the west-of-Hudson and east-of-Hudson APEs.

The construction of the tunnel for the Rail Tunnel Alternatives would have a physical effect on the Greenville Yard Historic District within the west-of-Hudson APE, since the tunnel construction would be located within the historic district boundaries. Within the east-of-Hudson APE, construction of the tunnel and tunnel portal would take place far below ground and no vibration effects would be expected to adversely affect the architectural resources within the east-of-Hudson APE. Further analysis of the potential for the project to result in direct or indirect effects should be undertaken at any future Tier II documentation.

Any potential impacts from any of the Build Alternatives on archaeological resources would be limited to construction period impacts. In the west-of-Hudson APE, the construction of any Build Alternatives in Greenville Yard has the potential to affect the Morris Canal, located within a small area of the western portion of the Greenville Yard. In the east-of-Hudson APE, project-related construction activities may affect 65th Street Yard (which was determined sensitive for late 19th century industrial or transportation-related archaeological resources by a previous study) and Maspeth Yard (which is sensitive for historic and prehistoric period archaeological resources), but would not affect archaeological resources in Fresh Pond.

The other sections of the study area have not been the subject of previous archaeological studies. While portions of these APEs were likely the subject of previous ground disturbance as a result of transportation infrastructure construction and maintenance, additional archaeological evaluation may be necessary to determine whether areas of archaeological sensitivity may exist within these areas. Consultation with NYSHPO would be undertaken as part of any future Tier II documentation.

PRELIMINARY SECTION 4(F) EVALUATION

As far as can be determined in Tier I, none of the identified Section 4(f) resources would experience a permanent or temporary use as a result of any of the Build Alternatives. While some would be occupied by the construction and operation of the Build Alternatives, these resources derive their significance from a railroad-related context and would not experience adverse effects from the proposed project. There is only one known S/NR-listed or eligible resource that may be affected by the construction of the Build Alternatives (i.e., Morris Canal in the New Jersey study area). While is not possible to determine a potential effect on this resource at this time without a detailed engineering design, it is not expected that the construction of the Build Alternatives would create a substantial effect on this resource that would constitute a permanent or temporary use of this resource under Section 4(f). In-depth analysis of potential adverse operational effects to architectural resources would be undertaken as part of any future Tier II documentation.

CHAPTER 6.4: VISUAL AND AESTHETIC CONSIDERATIONS

For most waterfront termini and support facilities, the addition of infrastructure required for the Waterborne Alternatives would not be expected to represent a substantial change from existing visual and aesthetic conditions, particularly since many of these facilities are located in

industrial areas or areas related to freight-handling. Additional consideration of new vertical structures (e.g., signal towers or ventilation towers) or changes to existing vertical structures (e.g., Bay Bridge Branch overpasses) may be required in subsequent environmental review when pertinent information would be available. All facilities supporting the Waterborne Alternatives would require some level of night-time lighting, both for security and also to support round the clock operations and further consideration of the visual effects of nighttime lighting may be necessary as part of subsequent environmental reviews.

Potential effects at rail yards and freight handling facilities under the Rail Tunnel Alternatives would be similar to the Waterborne Alternatives. At East New York, local effects to visual and aesthetic conditions are likely as result of property acquisition; however, many of the properties surrounding the yard are industrial in character and do not contribute positively to the visual quality of the surrounding streetscapes or neighborhood; their conversion would not generally represent a wholesale change to land use.

Overall, given the information available at this time, no substantial adverse effects to visual and aesthetic conditions resulting from project-related changes have been identified for any Build Alternative. Further analysis is recommended, and particularly for the potential effects to urban design in the vicinity of the East New York Yard site.

CHAPTER 6.5: ENERGY AND CLIMATE CHANGE

The CHFP would reduce energy consumption and greenhouse gas (GHG) emissions from freight transport by increasing the share of goods moved through the region by rail and marine vessels, modes that are more energy-efficient than transport by trucks. Some of the Build Alternatives would also reduce energy consumption and GHG emissions by reducing congestion and consequent vehicles idling on existing Hudson crossings and roadways used by heavy trucks. Energy consumed and GHG emitted by locomotives, tugs and ferries, and freight facility equipment would increase. Net changes in energy use with the Build Alternatives are shown in **Table ES-3** and the net changes in GHG emissions are shown in **Table ES-4**. Regional totals for the Build Alternatives show benefits both in terms of lower energy consumption and decrease in GHG emissions.

Chapter 6.5 finds that the CHFP would be consistent with local and regional energy and climate change planning efforts. In addition to the environmental benefit that a harbor crossing for freight rail would provide by reducing freight transport by truck, the Build Alternatives would also provide additional infrastructure that would be important in responding to emergencies, including potential emergencies resulting from severe weather events related to climate change.

A more quantified analysis of GHG emissions during construction and evaluation of options, including the options to reduce those emissions, would be performed as part of any Tier II documentation. Tier II documentation would also address the potential design and construction measures that would be implemented to make the CHFP infrastructure less vulnerable to the more likely projected effects of climate change.

Table ES-3
2035 Net Change in Energy Use

Alternative Class	Alternative	Net Change in Energy Use (Billion BTU per year)
Waterborne	Enhanced Railcar Float	-106
	Truck Float	Negligible
	Truck Ferry	
	LOLO Container Barge	
	RORO Container Barge	
Rail Tunnel	Rail Tunnel	-1,000 to -1,600
	Rail Tunnel with Shuttle Service	
	Rail Tunnel with Chunnel Service	
	Rail Tunnel with AGV Technology	
	Rail Tunnel with Truck Access	
	Rail Tunnel with Truck Access	

Note: The change in energy consumption for Build Alternatives is as compared with the No Action Alternative. Negative values reflect reduced energy use (benefit).

Table ES-4
2035 Net Change in GHG Emissions

Alternative Class	Alternative	Net Change in GHG Emissions (Metric Tons CO_2e per year)
Waterborne	Enhanced Railcar Float	-7,700
	Truck Float	Negligible
	Truck Ferry	
	LOLO Container Barge	
	RORO Container Barge	
Rail Tunnel	Rail Tunnel	-80,000 to -110,000
	Rail Tunnel with Shuttle Service	
	Rail Tunnel with Chunnel Service	
	Rail Tunnel with AGV Technology	
	Rail Tunnel with Truck Access	
	Rail Tunnel with Truck Access	

Note: The change in GHG emissions for Build Alternatives is as compared with the No Action Alternative. Negative values reflect GHG emissions reduced (benefit).

CHAPTER 6.6: AIR QUALITY

To a larger or lesser extent, all of the Build Alternatives would have the potential to ease congestion on existing Hudson River crossings by providing one or more additional routes for freight, as well as making rail and waterborne crossings of the Hudson River viable and more attractive options. By reducing congestion on existing crossings and roadways, the Build Alternatives would reduce emissions from vehicle idling, resulting in improvements in air quality. The Build Alternatives that would involve rail (Rail Tunnel Alternatives and the Enhanced Railcar Float Alternative) would also provide regional air quality benefits by shifting freight transport from trucks to rail, thereby reducing emissions from truck VMT and/or congestion and idling on existing roadways. However, an increase in emissions would result from freight locomotives (Rail Tunnel Alternatives and the Enhanced Railcar Float Alternative); activities at freight facilities, including local truck traffic to and from those facilities (all Build

Alternatives); tug boats and ferries (Waterborne Alternatives); and tunnel ventilation shafts (Rail Tunnel Alternatives).

The probable regional and local effects of the Build Alternatives are qualitatively summarized in **Table ES-5.**

Table ES-5
Qualitative Summary of the Effect of Build Alternatives on Air Quality

	Waterborne Alternatives					Rail Tunnel Alternatives				
Effect on Air Quality	**Enhanced Railcar Float**	**Truck Ferry**	**Truck Float**	**LOLO Container Barge**	**RORO Container Barge**	**Rail Tunnel**	**Rail Tunnel with Shuttle Service**	**Rail Tunnel with Chunnel Service**	**Rail Tunnel with AGV* Technology**	**Rail Tunnel with Truck Access**
Decrease Regional Truck VMT, Decrease Emissions	somewhat	no / negligible	no / negligible	no / negligible	no / negligible	yes	yes	yes	yes	yes
Increase Local Truck VMT, Increase Local Emissions	somewhat	yes	yes	yes	yes	somewhat	yes	yes	yes	yes
Reduce Idling on Existing Crossings, Reduce Regional Emissions	somewhat	somewhat	somewhat	somewhat	somewhat	yes	yes	yes	yes	yes
Increase Rail Miles, Increase Regional Emissions	somewhat	no / negligible	no / negligible	no / negligible	no / negligible	yes	yes	yes	yes	yes
Increase Local Emissions from Rail	somewhat	no / negligible	no / negligible	no / negligible	no / negligible	yes	yes	yes	yes	yes
Increase Marine Vessel Emissions	yes	yes	yes	yes	yes	no / negligible	no / negligible	no / negligible	no / negligible	no / negligible

Note: * AGV = Automated Guided Vehicle

In any subsequent Tier II documentation, an analysis of the potential effects of construction emissions on air quality would be needed for any of the sites where prolonged construction activity would take place. By implementing the construction emission reduction measures, emissions would be minimized and any potentially high concentrations at sensitive uses near the construction sites would likely be infrequent.

CHAPTER 6.7: NOISE

For the evaluation of noise and vibration impacts, the rail lines on which the rail-based Build Alternatives would be traveling was divided into 21 segments, based on similarities in train operations within those portions of the project area. The assessment concludes that the potential for moderate or severe impacts would occur on Segment 3, from Segment 5 through Segment 9 (comprising portions of the Bay Ridge Branch), from Segment 12 through Segment 18 (LIRR Main Line), and Segment 21 (the Chemical Coast Secondary between Oak Island Yard and E-Rail Terminal). Consequently, these results indicate that a detailed analysis would be needed as part of any Tier I documentation to more fully evaluate site-specific effects and the effectiveness of potential mitigation measures.

In terms of vibration and vibration-induced noise impacts, moderate or severe impacts can be expected for 14 out of the 21 rail segments analyzed for the Enhanced Railcar Float Alternative and for nearly all rail segments for the Rail Tunnel Alternatives. In addition, for the Enhanced Railcar Float Alternative and the Rail Tunnel Alternatives, anticipated vibration levels at the closest receptors of rail segments 1, 6, and 9 would be strong enough to warrant concern over possible minor cosmetic damage to fragile buildings. None of the Build Alternatives would be expected to result in vibration and vibration-induced (ground-borne) noise impacts due to truck activities.

Construction activities related to the development of terminals and freight facilities for all Build Alternatives and tunnel construction for the Rail Tunnel Alternatives would be substantial near the terminals, freight facilities, and tunnel entry points, but of relatively short duration. Because detailed design for the Build Alternatives is not available in Tier I, construction noise and vibration impacts cannot be determined at this time. Chapter 6.7," Noise," discusses the types of impacts that may be expected and potential mitigation measures. The need for such measures would be evaluated in subsequent Tier II investigations.

CHAPTER 6.8: NATURAL RESOURCES

Potential impacts on natural resources from operation of the Waterborne Alternatives would be limited to increased levels of disturbance to and risk of collisions with aquatic biota occurring in the vicinity of the waterborne routes across Upper New York Harbor. However, marine traffic is already heavy in the harbor, and the surrounding industrial land uses make conditions unsuitable for any species that are not disturbance-tolerant. The additional movement resulting from the operation of these alternatives would represent negligible increases in daily maritime traffic in the harbor and existing levels of disturbance to which wildlife and aquatic biota occurring in the area are accustomed.

Similarly, waterbirds foraging within the harbor may occasionally be displaced by waterborne traffic; however, increases in this brief and temporary form of disturbance that could result from operation of the alternatives would be minimal and would have no adverse effect on these species. The expansiveness of open water in the harbor and the slow traveling speed of the vessels for the Waterborne Alternatives would allow birds to easily distance themselves from any approaching traffic.

Potential operational effects from the facilities required for the Rail Tunnel Alternatives would be similar to the Waterborne Alternatives. Since the operation of the support facilities required for these alternatives would be similar to the existing facilities in these heavily industrial areas, wildlife occurring in the vicinity would not be affected, since it is largely limited to disturbance-tolerant, urban-adapted species. Wildlife occurring near the tunnel approach locations at Greenville Yard and the Bay Ridge Branch is limited to urban-adapted species that are tolerant of the heavy existing levels of disturbance and a lack of non-degraded habitat. As such, freight movement in and out of the tunnel approaches at the Greenville Yard and the Bay Ridge Branch would not be expected to disturb or otherwise adversely impact wildlife. The differences between the infrastructure requirements among the Rail Tunnel Alternatives would not have an observable effect on natural resources.

Potential impacts on natural resources from construction of the Rail Tunnel Alternatives are primarily limited to impacts on aquatic biota and their habitat within the area of the proposed tunnel alignment, particularly if an immersed tube is used for a portion of the alignment (boring

the entire distance would cause no disturbance to the harbor's benthic habitat or water quality). The immersed tube option would require dredging approximately 2 million cubic yards of the harbor floor to create a trench in which to lay the tunnel tube segments. The potential impacts of dredging to aquatic biota stem from changes in water quality such as increased concentrations of suspended sediment, decreased dissolved oxygen, release of contaminants contained in the sediment, sediment deposition, entrainment of organisms by hydraulic dredges, blockage of channels due to suspended sediment plumes or dredging equipment, noise associated with dredging, and loss or change of habitat and benthic organisms used as food to support other invertebrates and fish. Measures to minimize such impacts (including defining appropriate dredging restriction windows) would be developed in consultation with the U.S. Army Corps of Engineers (USACE), the National Marine Fisheries Service (NMFS), and the New York State Department of Environmental Conservation (NYSDEC) would be undertaken during subsequent Tier II investigations.

CHAPTER 6.9: WATER RESOURCES

The operation of the Waterborne Alternatives within the floodplain would not adversely affect floodplain resources. Because the surface waters in the regional study area are tidal waters, flooding of lands adjacent to these waters is controlled by the tidal conditions within Newark Bay, New York Bay, and the Atlantic Ocean and is not influenced by freshwater flow from upriver. Operation of the Waterborne Alternatives could involve the storage of petroleum or other chemicals at the facility as well as inside railcars and trucks. While releases are unlikely and existing reporting requirements and procedures would be followed to ensure that releases were addressed before they could adversely affect groundwater or surface waters.

The increased use of waterfront facilities and increases in marine traffic would not result in adverse water quality effects to the Upper New York Harbor. The waterfront locations where facilities associated with Waterborne Alternatives may be constructed have been used in the past for these activities; have engineered shorelines that would not be affected by erosion due to increased use of a waterfront facility, and have water depth sufficient for operation of the waterborne traffic.

The operation of the Rail Tunnel Alternatives would utilize many of the facility locations as described above under the Waterborne Alternatives, with the additional operation of a tunnel under the New York Harbor and associated facilities. The operation of the facilities required to support the Rail Tunnel Alternatives would not result in operational effects to floodplains, groundwater, or surface waters for the reasons described above under the Waterborne Alternatives.

Activities associated with the construction of waterfront termini and support facilities for the Build Alternatives would be expected to be conducted in accordance with state and federal regulations with respect to excavation and other construction within sites identified as having contaminated soils or groundwater, and in accordance with erosion and sediment control measures identified in a SWPPP prepared in accordance with NJPDES or SPDES requirements. With the implementation of these measures, construction activities would not adversely affect surface water resources of Newark Bay, Upper New York Harbor, or the East River.

Dredging that may be required for the construction of termini for the Waterborne Alternatives and the placement of the tunnel tube segments for the Rail Tunnel Alternatives under the immersed tube option would have the potential to result in the temporary resuspension of bottom

sediment and the release of sediment contaminants to the water column, and possible decreases in dissolved oxygen, adversely affecting water quality of the Upper New York Harbor. Any Tier II documentation would include a detailed assessment of the potential for these alternatives to adversely affect surface water quality of the Upper New York Harbor.

CHAPTER 6.10: HAZARDOUS MATERIALS

The operation of the termini and support facilities associated with the Build Alternatives and associated equipment would include a variety of fuels, lubricants, and oils. The proper use, storage, and disposal of these materials are covered by numerous applicable city, state, and federal regulations. At termini near the waterfront, additional procedures would be used to ensure that hazardous materials do not contaminate groundwater or surface water. All applicable regulations related to the waterborne, truck-based, and rail-based transportation of hazardous materials would be followed during the operation of the Build Alternatives.

The construction of many of the waterfront termini and support facilities for the Build Alternatives may result in disturbance to soils potentially contaminated with PAHs, metals, PCBs, solvents, petroleum constituents, and other contaminants. Many of the construction activities requiring excavation of potentially contaminated soil or dewatering, would occur in industrial areas, which would limit potential exposure to any sensitive uses (e.g., residences, schools, hospitals, parks, etc.) Preventative measures would be used to avoid the possibility of adverse impacts from any contamination discovered in the areas of concern. Standard remediation measures exist for all of the substances likely to be encountered. By implementing such measures, significant adverse impacts would be avoided or mitigated.

CHAPTER 6.11: ENVIRONMENTAL JUSTICE

On a regional level, the CHFP is anticipated to result in traffic and air quality improvements that would be experienced by environmental justice and non-environmental justice communities alike. However, the project alignment, which would be located largely on an existing rail line, transects a large portion of New York City and Hudson County in New Jersey, and therefore runs through or near a large number of environmental justice communities. Therefore, while creating a number of regional transportation and air quality benefits, the Build Alternatives would result in adverse local traffic, air quality, and noise impacts from their construction and operation, many of which would be borne by environmental justice communities.

Subsequent Tier II analyses, as identified in each chapter of this EIS, will be required to pinpoint and confirm many of the potentially adverse impacts identified in Tier I of this EIS. These targeted analyses will be required to determine whether the impacts borne by environmental justice communities may be disproportionately high. At that time, avoidance measures or mitigation would be developed to reduce impacts on environmental justice communities, as appropriate.

CHAPTER 6.12: COASTAL ZONE MANAGEMENT

Because all of the Build Alternatives have at least one potential waterfront terminus or support facility within New York City's coastal zone, it is subject to New York City's coastal zone management program. In New Jersey, the CHFP study area is outside the CAFRA Zone. However, the construction of some of the Build Alternatives may be subject to regulation under NJDEP's Waterfront Development Law. The Waterfront Development Law regulates not only

activities in tidal waters, but also the area adjacent to the water, extending from the mean high water line to the first paved public road, railroad, or surveyable property line.[1] As such, consistency with applicable Coastal Zone Management Rules (N.J.A.C. 7:7E) must be determined.

A detailed evaluation of each alternative's consistency with each individual policy cannot be performed at this time since detailed project design and operational information is not available in Tier II. However, Chapter 6.12 presents the applicability of each policy to each of the Build Alternatives. It is expected that the individual policies would be analyzed in detail during any future Tier II documentation and a subsequent permit application process.

CHAPTER 7: INDIRECT AND CUMULATIVE EFFECTS

While there are a number of resources available to guide an indirect and cumulative effects analysis under NEPA, comprehensive guidance on determining these effects in a tiered EIS does not exist at this time and the methodology used to describe effects in this chapter is adapted from non-tiered EIS guidance. As described throughout this EIS, since Tier I of the EIS does not include conceptual design of the alternatives or detailed service plans but only a high-level determination of modes, alignments, and termini for the viable alternatives, a detailed determination of indirect and cumulative impacts is not possible at this time. Therefore, in accordance with CEQ guidance, Chapter 7, makes a good faith effort to identify the effects that are not definitely known at this time, but are "reasonably foreseeable" (40 CFR 1508.8). The chapter provides an overview of the potential for secondary and cumulative effects of the project, as based on operational information available at this time and discusses the methodology for detailed analyses during any subsequent Tier II studies.

INDIRECT EFFECTS

Most of the waterfront termini or support facilities required for the Build Alternatives are located in industrial areas or in areas where railroad uses have existed historically. As these facilities would continue to function as rail and freight-handling facilities and consequently no indirect changes to land use patterns or development trends (and resultant effects to neighborhood character) in the vicinity would be expected.

In terms of the growth-inducing aspects of all Build Alternatives, areas near proposed facilities in Brooklyn and Queens may attract new activity in warehousing and distribution and may create local jobs in the vicinity of the freight handling facilities. These jobs, created by business attraction and retention, would be concentrated near the proposed freight handling facilities. Most of the development induced by the Build Alternatives (e.g., new or expanded warehouse space, supporting businesses such as restaurants, etc.) would be located near proposed facilities for this alternative to take advantage of proximity to these facilities. Therefore, these new uses would be consistent with the overall land use and zoning of the area would not result in any effects to neighborhood character.

This induced development could result in potential indirect environmental effects, including local increases in traffic, noise levels, and air pollutant emissions not directly accounted for in the technical analyses of this EIS, which build on explicit freight traffic increases along the

[1] slic.njstatelib.org/slic_files/digidocs/b365/coastalMgmt/AppendixD.pdf. Accessed July 11, 2013.

project alignment and at rail yards and local truck traffic increases near the various freight facilities required to support the Build Alternatives. However, quantifying specific environmental impacts related to induced development would be speculative and imprecise at this point in the tiered EIS process. Furthermore since the induced business growth would develop over time, any potential effects would be spread out as well. Subsequent Tier II investigations will provide a more in-depth analysis to determine any adverse effects from the growth that may be induced by the Build Alternatives.

The construction of the Build Alternatives would affect the regional economy by employing workers in the construction industry and procuring supplies and services from regional businesses. The construction of the Build Alternatives would not result in intense and wide-ranging construction activity or activities that would be prolonged enough to result in secondary land use and neighborhood character effects. A detailed analysis of potential construction effects would be undertaken in Tier II.

CUMULATIVE EFFECTS

This Tier I analysis considers the effects of each alternative in combination with other infrastructure projects that already exist or have been committed to within regional transportation plans, agency capital plans, or those projects that are otherwise likely to be implemented by public or private investment (also referred to as planned projects and reasonably foreseeable projects). Operational effects are discussed in relation to the Greenville Yard Master Plan, the expansion of the Global Marine Terminal, and the build-out of 65th Street Yard. Construction period effects are discussed in relation to the PANYNJ's Harbor Deepening Project, the Tappan Zee Hudson River Crossing Project, the Bayonne Bridge Navigational Clearance Program, the New Jersey Turnpike Interchange 1A and Newark Bay-Hudson County Bridge reconstruction, the Goethals Bridge replacement, and the Kosciuszko Bridge replacement.

CONCLUSION

Table ES-6 provides a summary of the detailed evaluation performed in the Tier I EIS on the ten CHFP Build Alternatives. The table describes the potential east-of-Hudson and west-of-Hudson termini and support facilities that would be required for the operation of each alternative. The table also summarizes the results of the market demand and transportation analyses, as well as discussing the likelihood of environmental impacts in the various analysis categories.

The CHFP Tier I EIS will result in a ROD that will identify a preferred transportation mode—or a combination of modes and alignments- with the appropriate level of detail for a corridor-level decision. The selected Tier I alternative(s) would then be subject to a more detailed and comprehensive analysis in Tier II. Tier II would include much more detailed design and operational data and would address site-specific environmental impacts, detailed costs, and specific mitigation measures.

Table ES-6
Summary of Detailed Evaluation of CHFP Build Alternatives

	Waterborne Alternatives					Rail Tunnel Alternatives				
	Enhanced Float	**Truck Float**	**Truck Ferry**	**LOLO**	**RORO**	**Rail Tunnel**	**Shuttle**	**Chunnel**	**AGV**	**Rail Truck Tunnel**
Logical Termini and Support Facilities										
West-of-Hudson termini	Greenville Yard	Greenville Yard Port Newark/Port Elizabeth	Greenville Yard Port Newark/Port Elizabeth	Greenville Yard Port Newark/Port Elizabeth	Greenville Yard Port Newark/Port Elizabeth	Greenville Yard	Pennsylvania (outside of the Port District)	Oak Island Yard	Greenville Yard	Greenville Yard
East-of-Hudson termini	65th Street Yard 51st Street Yard Oak Point Yard	65th Street Yard 51st Street Yard SBMT Maspeth Yard Oak Point Yard Hunts Point Yard	65th Street Yard 51st Street Yard SBMT Maspeth Yard Oak Point Yard Hunts Point Yard	65th Street Yard Red Hook Container Terminal SBMT New England (outside of the Port District)	65th Street Yard Red Hook Container Terminal SBMT New England (outside of the Port District)	Bay Ridge Branch, portal at 10th Avenue	Maspeth Yard Long Island Facility (Outside of the Port District)	East New York	East New York	East New York
Supporting facilities	Fresh Pond Yard Maspeth Yard Long Island Facilities (outside of the Port District)	N/A	N/A	N/A	N/A	Oak Island Yard Fresh Pond Yard Maspeth Yard East New York Yard Long Island Facilities (outside of the Port District)	Oak Island Yard Fresh Pond Yard Maspeth Yard East New York Yard Long Island Facilities (outside of the Port District)	Fresh Pond Yard Maspeth Yard East New York Yard Long Island Facilities (outside of the Port District)	Oak Island Yard Fresh Pond Yard Maspeth Yard East New York Yard Long Island Facilities (outside of the Port District)	Oak Island Yard Fresh Pond Yard Maspeth Yard East New York Yard Long Island Facilities (outside of the Port District)
Construction Costs (in millions of 2012 dollars)	142	190	95	106	132	6,927 – 9,987	Rail Tunnel +433	Rail Tunnel +90	Rail Tunnel +803	Rail Tunnel +888
Freight Diversion to Each Alternative (in million tons per year)	0.5 - 2.8	1.2 – 1.7		0.3 – 0.4		7.2 – 9.6	8.7	10.5	8.9	24.1
Transportation										
Projected Daily Transportation Operations	Figure 5-9 Figure 5-10	Figure 5-11		Figure 5-12		Figure 5-13	Figure 5-14	Figure 5-15	Figure 5-16	Figure 5-17
Regional Rail Network Effects	Figure 5-18A	N/A	N/A	N/A	N/A	Figure 5-18A	Figure 5-18B	Figure 5-18B	Figure 5-18B	Figure 5-18B
Regional Highway Network Effects										
Changes in Regional Truck VMT	0.1 percent change in commodity truck VMT					1.1 – 1.6 percent reduction in truck VMT				
Changes in Regional Truck VHT	0.1 percent change in commodity truck VHT					1.0 – 1.4 percent reduction in truck VHT				
Changes in Volume on harbor and Hudson crossings (eastbound)	0.8 reduction					2 - 2.5 percent reduction	2.7 – 3.6 percent reduction			8 percent reduction
Land Use, Neighborhood Character, Social Conditions										
Potential Impacts from operation and construction	Potential	Unlikely	Unlikely	Unlikely	Unlikely	Likely	Likely	Likely	Likely	Likely
Economic Conditions										
Shipper/Receiver Cost Savings (in millions of 2012 dollars)	143 – 196	None		0 – 1		621 – 641	637	646	639	636

Table ES-6 (cont'd)
Summary of Detailed Evaluation of CHFP Build Alternatives

	Waterborne Alternatives					Rail Tunnel Alternatives				
	Enhanced Float	**Truck Float**	**Truck Ferry**	**LOLO**	**RORO**	**Rail Tunnel**	**Shuttle**	**Chunnel**	**AGV**	**Rail Truck Tunnel**
Cultural Resources										
Architectural Resources	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Archaeological	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential
Visual Resources										
Potential Impacts from operation and construction	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Energy and Climate Change										
Reduction in Energy Use by 2035 (Billion BTU per year)	Likely	Negligible				Likely Substantial				
Reduction in GHG Emissions (Metric Tons CO_2e per year)	Likely	Negligible				Likely Substantial				
Air Quality										
Net Effect on Regional Air Quality	Potential Increases	Changes Unlikely				Potential Reductions				
Net Effect on Local Air Quality	Potential Increases	Changes Unlikely				Likely	Likely	Likely to be significant	Likely	Likely to be significant
Noise and Vibration										
Moderate to severe noise impacts on along rail lines	Likely	Unlikely	Unlikely	Unlikely	Unlikely	Likely	Likely	Likely	Likely	Likely
Vibration Impacts strong enough to warrant concern over fragile buildings	Likely	Unlikely	Unlikely	Unlikely	Unlikely	Likely	Likely	Likely	Likely	Likely
Natural Resources										
Potential for increased levels of disturbance to aquatic biota and collision risk	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Potential to increase existing levels of disturbances to waterbirds and other wildlife	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Potential impacts to upland wildlife communities	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Construction period water quality impacts	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Construction period impacts to aquatic organisms	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Construction period impacts to threatened or endangered species or special habitat areas.	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Water Resources										
Floodplains	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Groundwater	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Surface Waters	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Hazardous Materials										
Potential Impacts from operation and construction	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Environmental Justice										
Potential impacts to Environmental Justice Populations	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential	Potential
Inconsistency with Applicable Coastal Zone Management Policies	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Indirect and Cumulative Effects										
Potential for Indirect Effects	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential
Potential for Cumulative Effects	Potential	Unlikely	Unlikely	Unlikely	Unlikely	Potential	Potential	Potential	Potential	Potential

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