A. INTRODUCTION

This chapter discusses the development and evaluation of alternatives for addressing the goals and objectives of the Cross Harbor Freight Program (CHFP) as presented in Chapter 1, "Purpose and Need." At the Tier I level, the evaluation of alternatives for transportation projects typically focuses on selecting the mode and alignment, or transportation corridor. Therefore the alternatives analysis for CHFP in this Tier I document focused on the selection of transportation mode, harbor crossing termini, preliminary identification of additional freight facilities needed, as well as the identification of possible technologies and operational options.

A series of evaluations were undertaken to develop alternatives that were carried forward for further evaluation in the Tier I EIS, including the analysis of demand (freight tonnage that would be transported by each alternative), broad transportation and economic effects, as well as the identification of potential environmental effects that would in most cases warrant further study as part of any Tier II documentation.

The following describes the process and methodology that were used for the development and evaluation of project alternatives and the preparation of this EIS, which will ultimately lead to the selection of a Preferred Alternative or Alternatives in the Tier I Record of Decision (ROD). The process consists of five major steps: (1) development of a long list of alternatives, considering previous studies and incorporating input from public participation and stakeholders, (2) initial screening/fatal flaw analysis, (3) qualitative analysis of alternatives with respect to the project's goals and objectives, (4) detailed evaluation of the remaining alternatives, and (5) the Tier I EIS ROD. These steps are intended to winnow the number of alternatives for consideration in any Tier II documentation and implementation through a comprehensive evaluation process. The alternatives evaluation in this chapter consists of steps (1) through (3), while the remainder of the EIS accomplishes step (4). Public hearings will be held and comments on the EIS will be solicited to finalize the EIS and in the Tier I ROD select the alternative or alternative(s) that will be carried forward beyond Tier I.

The following is an overview of the five major steps:

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, as discussed in more detail in Section D, "Screening Analysis."
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.
5. **Tier I EIS ROD** – 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.

B. DEVELOPMENT OF LONG LIST OF ALTERNATIVES

The development of alternatives began with the formulation of a long list of potential alternatives, comprising combinations of freight movement modes and technologies and existing or potential facility locations. The alternatives were developed using a variety of sources. As described in Chapter 1, "Purpose and Need," several previous studies examined possible alternatives to improve freight movements across the Hudson River and New York Harbor. The Cross Harbor Freight Movement Major Investment Study (MIS), commissioned by the New York City Economic Development Corporation (NYCEDC) and completed in 2000, identified alternatives and strategies to improve regional freight mobility; expand shippers' choices of route and mode; enhance the region's environmental quality; and promote regional economic development. Fifteen alternatives—involving highway, rail, waterborne, and air systems, and a combination of these modes—were initially evaluated, with the most promising strategies advanced to a subsequent phase of refinement and evaluation.

Build Alternatives from the MIS that were advanced for study in a Draft EIS (DEIS) included an Expanded Float Operations Alternative and a Rail Freight Tunnel Alternative, with two alignment options—between Jersey City, New Jersey, and Brooklyn, New York, and between Staten Island and Brooklyn, New York. The DEIS was published in April 2004 by the Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA), acting as co-lead agencies, and NYCEDC, acting as the project sponsor. The 2004 *Cross Harbor Freight Movement Project DEIS* ("2004 DEIS") was the subject of public hearings in May and June in 2004 and an extended public comment period, with many substantive submittals by public agencies as well as interested stakeholders. Subsequent to the hearings, NYCEDC suspended active work on the DEIS. The input received as part of the 2004 DEIS review process has been constructively incorporated into this Tier I EIS. For example, many substantive comments on the 2004 DEIS expressed concern regarding potential adverse effects in areas near the freight facilities that were proposed in Queens at that time. This Tier I EIS will analyze multiple

potential freight facilities and termini to serve the range of Build Alternatives under consideration. Furthermore this EIS identifies mitigation measures that would be considered in any Tier II documentation to minimize any projected significant adverse effects.

This EIS builds on the MIS and 2004 DEIS, as the alternatives selected as Preferred Alternatives at the conclusion of those studies were considered in developing the long list of alternatives shown in **Table 4-1**.

As part of the alternatives development and evaluation process, input was sought from, numerous stakeholders, including public agencies, elected officials, railroads, planning organizations, community groups, and the general public. Chapter 3, "Agency Coordination and Public Involvement," describes this process in detail. Through this process new technologies and service options were identified and considered in this EIS.

The long list of potential alternatives considered for the current study is included in **Table 4-1**. Sources of additional information and/or available illustrations for the alternatives are also referenced in the table.

Table 4-1
Long List of Alternatives

Alternative Class	No. and Source[1]	Alternative	Description
TSM	1 (2004 DEIS – modified)	Freight Movement Efficiency/Safety Improvements	Maximize the utilization and efficiency of the existing transportation network with relatively low-cost improvements that can improve freight movement capacity beyond those committed projects that are included in the No Action Alternative.
	2 (MIS – modified)	Railcar Float Efficiency/Safety Improvements	Employ high power and low emission tug boats; use barges of higher capacity; improve rail operations at the two termini to reduce transfer time.
	3 (MIS)	High Speed Loading and Unloading of Railcar Floats	Decrease loading and unloading times for float bridge using specialized vessel design, advanced loading and unloading equipment, and new technology.
TDM	4 (MIS – modified)	Bridge/Tunnel Pricing	Implement pricing strategies and other incentives or disincentives to optimize the freight movement demand, its geographic distribution, and time-of-day distribution.
	5 (New)	"Managed Trucking" Facilities/Franchises	Cluster freight logistics, transportation, and distribution facilities, thereby reducing truck vehicle miles traveled. Examples of such facilities include truck drop-yards, consolidated distribution centers, freight villages, and inland ports. These facilities could be developed at any number of locations in the east-of-Hudson region.
Waterborne	6 (MIS)	"Hub Tub" Concept for Port Activities Alternative/Strategy	Use large floating vessels to facilitate the transshipment of marine cargo between large ships and smaller vessels which would distribute cargo along the coastline and up major navigable rivers to inland destinations.
	7 (MIS)	Use of a Containment Island for Port Activities	Create a containment island by filling an area of the harbor or ocean for ships to dock at and exchange their cargo, either for transfer to smaller ships or to a mode of transportation that would be created to connect to mainland locations.

Table 4-1 (cont'd)
Long List of Alternatives

Alternative Class	No. and Source[1]	Alternative	Description
Waterborne	8 (MIS/2004 DEIS)	Enhanced Railcar Float	Improve existing railcar float service from Greenville to Brooklyn and associated rail infrastructure and yards. Potentially develop additional railcar float termini in Brooklyn and Bronx, if needed based on demand modeling. See **Figure 4-1** and **Figure 4-2**.
	9 (2004 DEIS)	Railcar Float Port Ivory Service	Develop a railcar float terminus at Port Ivory on Staten Island, from which railcars would be floated to Brooklyn.
	10 (New)	Truck Ferry	Move truck trailers or whole trucks on a vessel between New Jersey termini and Brooklyn, Queens, or Bronx, with the truck drivers. See **Figure 4-1** and **Figure 4-2**.
	11 (New)	Truck Float	Move truck trailers or whole trucks on a vessel between New Jersey termini and Brooklyn, Queens, or Bronx, without the truck drivers. See **Figure 4-1** and **Figure 4-2**.
	12 (New)	Roll On-Roll Off (RORO) Container Barge	Provide barge service for international containerized cargo between New Jersey termini and Brooklyn or New England, with containers on rubber tire platform. See **Figure 4-1** and **Figure 4-2**.
	13 (New)	Lift On-Lift Off (LOLO) Container Barge	Provide barge service for international containerized cargo between New Jersey termini and Brooklyn or New England. See **Figure 4-1** and **Figure 4-2**.
Airborne And Air Cargo Related	14 (MIS)	Vertical Takeoff and Landing (VTOL)	Use a fleet of specially designed aircraft to airlift up to two 40-foot containers each between intermodal facilities on both sides of the Hudson River.
	15 (MIS)	Link to JFK International Airport for Air Cargo Movements	Improve links to John F. Kennedy International Airport (JFK) for air cargo movements, as JFK is one of the highest-volume air cargo airports in the nation. Hundreds of trucking companies use JFK's cargo facilities. LaGuardia Airport (LGA) currently carries a negligible amount of freight and has very limited space to expand for freight operations. Newark Liberty International Airport (EWR) processes less cargo than JFK and most of it does not cross the harbor.
Rail Tunnel	16 (MIS)	Access to the Region's Core with Freight Rail	Construct a rail tunnel (for both passenger and freight cars) under the Hudson River from New Jersey to Penn Station in Manhattan. Also suggested as part of Amtrak's Gateway project.
	17 (MIS)	Staten Island to Brooklyn Shared Passenger and Freight Rail Tunnel	Provide a tunnel connection between the MTA's Staten Island Rapid Transit (SIRT) Line on Staten Island and the New York City subway system in Brooklyn to accommodate both rail freight and passenger subway service. Accommodate passenger rail on the Bay Ridge Branch.
	18 (MIS/ 2004 DEIS)	Staten Island to Brooklyn Rail Tunnel	Construct a rail tunnel on the Staten Island to the Bay Ridge Branch in Brooklyn.

10.30.14

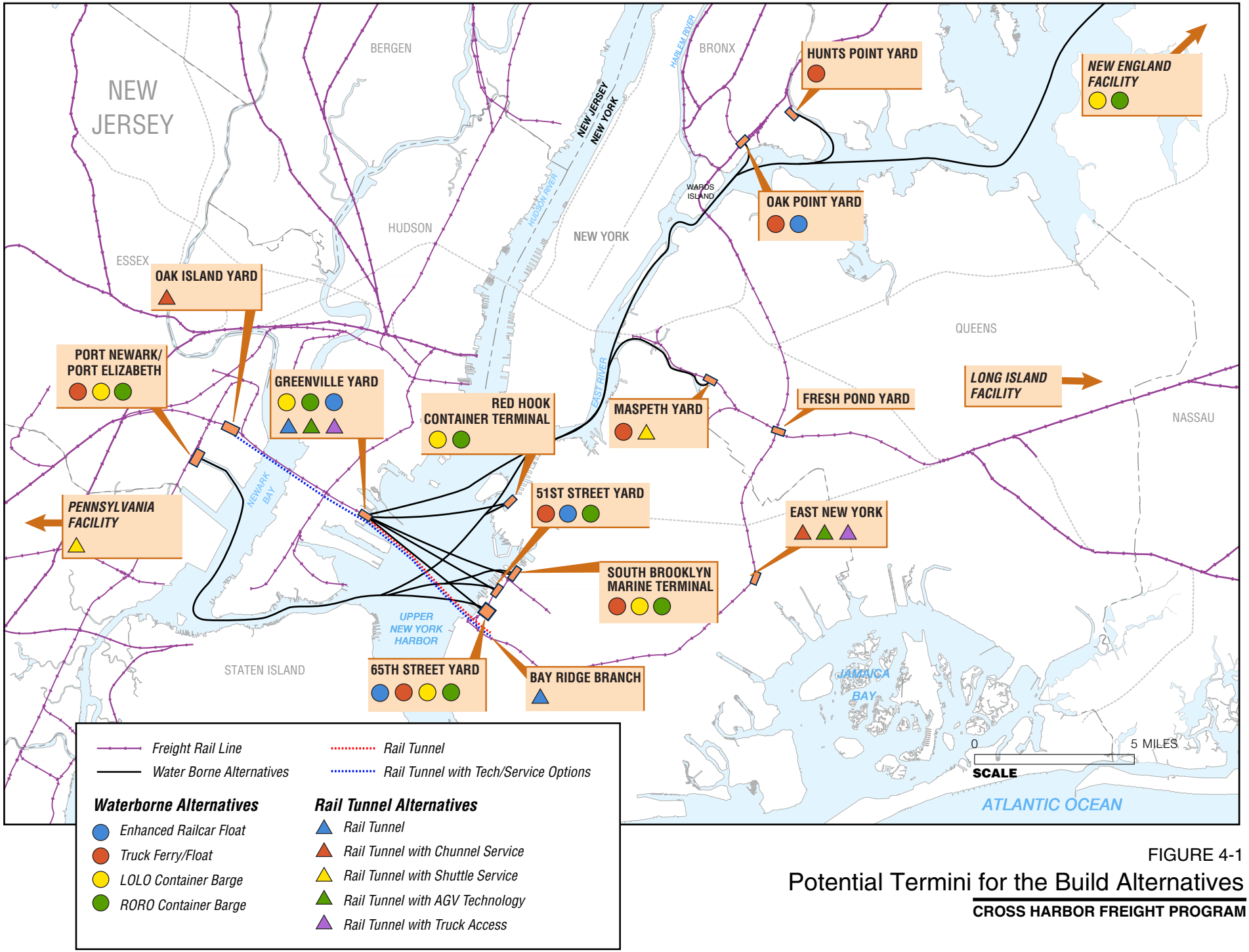


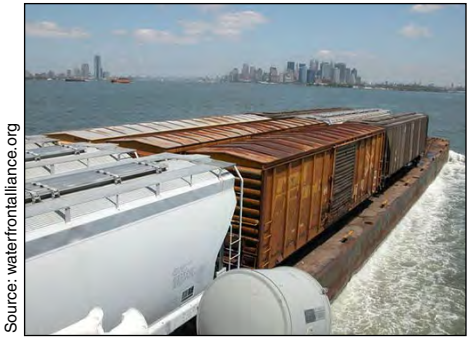
FIGURE 4-1

Potential Termini for the Build Alternatives

CROSS HARBOR FREIGHT PROGRAM

Source: eurotunnel.com

Double Track Tunnel (typical)



Source: waterfrontalliance.org

Railcar Float (typical)

Source: truckferry.com

Truck Float (typical)

Source: flickr.com (user anr 2899)

Truck Ferry (typical)

Source: flickr.com (user Koos_Fernhout)

Container Barge (typical)

Source: indiatimes.com

Rail Tunnel with Shuttle ("Open Technology") service (typical)

Source: indiatimes.com

Rail Tunnel with Chunnel Service (typical)

Source: demagcranes-ag.de

Rail Tunnel with AGV Technology (typical)

FIGURE 4-2

Examples of Build Alternative Technologies

CROSS HARBOR FREIGHT PROGRAM

Table 4-1 (cont'd)
Long List of Alternatives

Alternative Class	No. and Source[1]	Alternative	Description
Rail Tunnel	19 (MIS/2004 DEIS – modified)	Rail Tunnel	Construct a rail tunnel to provide a rail crossing from Greenville Yard to the LIRR's Bay Ridge Branch. Accommodate double-stacked container railcars and allow for bi-directional service (double track). See **Figure 4-1** and **Figure 4-2**.
	20 (New)	Rail Tunnel with Shuttle ("Open Technology") Service	Construct a rail tunnel from New Jersey to Brooklyn and provide short-distance intermodal rail service using "Open Technology" for trucks to be rolled on and off rail flatcars via loading ramps. The technology would also allow non-intermodal equipment—which cannot be easily lifted onto or off railcars—to use rail. See **Figure 4-1** and **Figure 4-2**.
	21 (New)	Rail Tunnel with Chunnel Service	Construct a rail tunnel from New Jersey to Brooklyn, adding chunnel service that would carry trucks through the tunnel on railcars. See **Figure 4-1** and **Figure 4-2**.
	22 (New)	Rail Tunnel with AGV Technology	Construct a rail tunnel from New Jersey to Brooklyn and use Automated Guided Vehicle (AGV) technology to provide service through the rail tunnel that combines aspects of traditional intermodal rail with service for trucks. See **Figure 4-1** and **Figure 4-2**.
	23 (2004 DEIS)	Rail Tunnel from New Jersey to Brooklyn Waterfront, near Owl's Head Park	Rail tunnel connection from New Jersey to the Brooklyn waterfront, near Owl's Head Park to provide access to port development along the waterfront. From this point, trains would continue to either the Bay Ridge Branch or to the Brooklyn waterfront, north along First Avenue to 46th Street where it would connect to the First Avenue Rail Line.
	24 (MIS – modified)	Rail Tunnel with Truck Access	Construct a rail tunnel from New Jersey to Brooklyn and allow rubber-tired vehicles to use the tunnel during periods when trains are not present (12/7 Tunnel). With this alternative trucks would use the tunnel during the day and trains would use it at night. See **Figure 4-1** and **Figure 4-2**.
	25 (MIS – modified)	Rail Tunnel with Continuous Truck Access	Construct a rail tunnel from New Jersey to Brooklyn and accommodate continuous truck access through dedicated truck lanes, without impacting rail operations (24/7 Tunnel). See **Figure 4-1** and **Figure 4-2**.

Table 4-1 (cont'd)
Long List of Alternatives

Alternative Class	No. and Source[1]	Alternative	Description
Other Rail	26 (MIS)	Rail Freight Connection to the Brooklyn Navy Yard	Provide a rail freight connection to the Brooklyn Navy Yard from the existing east-of-Hudson rail network.
	27 (TZB)	Tappan Zee Bridge Freight Rail	Accommodate rail freight on a commuter rail alignment on the Tappan Zee Bridge.

Notes:
1. The source documents that describe each of the alternatives in more detail are listed as abbreviations in parentheses next to the alternative number. The full reference or explanation for each source abbreviation is provided below:
(MIS) - New York City Economic Development Corporation (NYCEDC), *Cross Harbor Freight Movement Major Investment Study (MIS),* 2000
(2004 DEIS) New York City Economic Development Corporation, *Cross Harbor Freight Movement Draft Environmental Impact Statement*, 2004.
(TZB) New York State Department of Transportation, New York State Thruway Authority, and MTA Metro-North Railroad, *Tappan Zee Bridge/I-287 Environmental Review, Alternatives Analysis Report*, 2006.
(modified) Reflects an alternative that is generally based on prior studies (MIS or 2004 DEIS) but that has since been refined or modified.
(**New)** Reflects an alternative that was developed as part of the stakeholder input or scoping process for the current study.

C. INITIAL SCREENING/FATAL FLAW EVALUATION

In the next step, an initial screening and fatal flaw analysis was performed to eliminate alternatives that are not feasible or were previously studied and rejected for reasons that are still valid. Basic feasibility criteria were established for this project to eliminate non-viable alternatives. The feasibility criteria, or "fatal flaw" criteria, included:

a) Clearly inconsistent with or unlikely to meet the project purpose and need.
b) Requires technologies, service concepts, etc., whose feasibility and effects cannot be reliably tested through the evaluation process.
c) Requires the use of resources or properties which are highly unlikely to be available.
d) Clearly incompatible with existing or planned operations of current passenger rail services and any associated long-term investments.

Table 4-2 lists the alternatives that were eliminated based the fatal flaw criteria, and briefly describes the reasons for the elimination. Additional information as to why some of the alternatives previously studied in other documents were eliminated is available in those documents, referenced in **Table 4-1** by alternative.

Table 4-2
Initial Screening / Fatal Flaw Evaluation

Alternative Class	No.	Alternative	Fatal Flaw Screening Criteria				Reasons for Elimination
			a	b	c	d	
Waterborne	3	High Speed Loading and Unloading of Railcar Floats		√			Specialized vessel design as well as advanced loading and unloading equipment would have to be designed at a scale that has not been successfully realized to date. Several proprietary systems were suggested at public meetings. Most are in pre-prototype, conceptual stages, including one that proposes vessels sized to transport up to 80 railcars in a single crossing.
	6	"Hub Tub" Concept for Port Activities Alternative/Strategy	√				This alternative addresses port development, not cross-harbor freight movement.
	7	Use of a Containment Island for Port Activities	√				This addresses port development, not cross-harbor freight movement.
	9	Railcar Float Port Ivory Service	√				The Port Ivory terminus would compete with the Greenville terminus for the same traffic. As a result, no additional traffic would be diverted from truck to rail and the purpose and need of the project would not be met. With two float termini, float operating costs and capital costs for tug boats and barges would double and termini and support costs would increase by more than fifty percent. This alternative was eliminated by prior studies and, since the conclusions of those studies remain valid, the alternative is eliminated from further study in this EIS.
Airborne And Air Cargo Related	14	Vertical Takeoff and Landing (VTOL)		√			The equipment is still in a conceptual stage of development.
	15	Link to JFK International Airport for Air Cargo Movements	√				Since this alternative relates to local freight movement, and not cross-harbor freight movement, it clearly doesn't meet Purpose and Need or project goals.

Table 4-2 (cont'd)
Initial Screening / Fatal Flaw Evaluation

Alternative Class	No.	Alternative	Fatal Flaw Screening Criteria A	b	c	d	Reasons for Elimination
Rail Tunnel	16	Access to the Region's Core with Freight Rail and/or Amtrak's Gateway Project	√			√	Potential operational and scheduling constraints on rail freight imposed by sharing track with passenger service along the nation's most heavily used passenger corridor would result in minimal windows for freight, at best.
	17	Staten Island to Brooklyn Shared Passenger and Freight Rail Tunnel				√	Previous studies have found freight and subway service to be incompatible in the project area. Incompatibility includes safety concerns and the incompatibility of double stack trains with the third rail used by passenger trains. The Bay Ridge Branch, which is a vital east-of-Hudson rail line for freight would not have the capacity to accommodate passenger service.
	18	Staten Island to Brooklyn Rail Tunnel				√	The Staten Island alignment was eliminated in favor of the New Jersey rail tunnel alignment in previous studies due to the more direct routing with the New Jersey alignment and several significant environmental and neighborhood character impacts exclusive to the Staten Island alignment.
	23	Rail Tunnel from New Jersey to Brooklyn Waterfront, near Owl's Head Park			√		Previous studies eliminated this alternative in favor of the connection to the Bay Ridge Branch, which is much less costly and provides comparable benefit. Therefore, this alternative is eliminated from further study in this EIS.
	25	Rail Tunnel with Continuous Truck Access			√		To provide continuous truck access, the rail tunnel would need to be more than twice the size of the tunnel needed for 12/7 truck access, and extensive property beyond the rail right-of-way would be required in Brooklyn. The costs and socioeconomic effects would be prohibitive. Therefore, this alternative was eliminated.
Other Rail	26	Rail Freight Connection to the Brooklyn Navy Yard			√		This alternative was eliminated in prior studies because it was determined that there was no feasible way for a rail connection to the east-of-Hudson rail network. As these circumstances have not changed and non-freight uses have been proposed and approved at the Brooklyn Navy Yard, the alternative was eliminated.

Table 4-2 (cont'd)
Initial Screening / Fatal Flaw Evaluation

Alternative Class	No.	Alternative	Fatal Flaw Screening Criteria				Reasons for Elimination
			a	b	c	d	
Other Rail	27	Tappan Zee Bridge Freight Rail	√			√	The Tappan Zee Bridge Freight Rail Alternative was eliminated in Tappan Zee Bridge studies due to limitations on the Hudson Line and Port Jervis Line, including weight restrictions, hours of operations, and operating rules; vertical clearance restrictions and other infrastructure impediments along the Hudson Line; circuitous rail routing that is less cost-effective than over-the-road transport; and existence of a third rail for the commuter rail operation and inadequate horizontal clearance that would preclude double stack intermodal service and would not have the potential to sufficiently meet the project purpose and need.

Sources: New York City Economic Development Corporation (NYCEDC), *Cross Harbor Freight Movement Major Investment Study (MIS)* 2000; New York City Economic Development Corporation, *Cross Harbor Freight Movement Draft Environmental Impact Statement*, 2004;
New York State Department of Transportation, New York State Thruway Authority, and MTA Metro-North Railroad, *Tappan Zee Bridge/I-287 Environmental Review, Alternatives Analysis Report*, 2006.

The alternatives that were not eliminated due to fatal flaws (those that are not listed in **Table 4-2**) were carried forward to the next step of alternatives screening—the qualitative evaluation of performance with respect to project goals and objectives. As discussed in Chapter 1, "Purpose and Need," the project goals and objectives were developed in partnership with public agencies, stakeholders, and the general public through the scoping process. The alternatives that are carried forward are shown in the Short List of Alternatives, **Table 4-3**.

Table 4-3
Short List of Alternatives

TSM	Freight Movement Efficiency/Safety Improvements
	Railcar Float Efficiency/Safety Improvements
TDM	Bridge/Tunnel Pricing
	"Managed Trucking" Facilities/Franchises
Waterborne	Enhanced Railcar Float
	Truck Ferry
	Truck Float
	Roll on-Roll off (RORO) Container Barge
	Lift on-Lift off (LOLO) Container Barge
Rail Tunnel	Rail Tunnel
	Rail Tunnel with Shuttle ("Open Technology") Service
	Rail Tunnel with Chunnel Service
	Rail Tunnel with AGV Technology
	Rail Tunnel with Truck Access

D. SCREENING ANALYSIS

The alternatives that were considered in the screening analysis are briefly described below. The Cross Harbor routes and termini, as well as supporting freight facilities and elements of the alternatives are shown in **Figure 4-1**. The alternatives are not mutually exclusive—combinations are possible—but at this stage they were analyzed independently in this EIS to isolate their specific market, socioeconomic and broad environmental effects. The key freight transportation modes and technologies envisioned for the various Build Alternatives are shown in **Figure 4-2**.

DESCRIPTIONS OF THE ALTERNATIVES EVALUATED IN THE SCREENING ANALYSIS

NO ACTION ALTERNATIVE

The No Action Alternative includes projects that are currently programmed, planned, or approved for the study area. The projects explicitly included in the transportation analysis are listed in **Appendix A** and are generally described as follows:

- For highways, it includes improvements represented in the year 2035, "existing and committed" Build scenarios from NYMTC and North Jersey Transportation Planning Authority (NJTPA) regional highway transportation models, as well as any project updates or adjustments identified by NYMTC, NYSDOT, NJTPA, New Jersey Department of Transportation (NJDOT), or other responsible agencies.
- For rail, it includes approved improvements from the region's freight and passenger railroads and yard operators and approved independent utility projects at Greenville Yard and 65th Street Yard. Specifically, the No Action Alternative reflects projected growth in cross-harbor rail freight (approximately 1.6 million tons per year). The No Action Alternative 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. These actions would include: long-term lease by PANYNJ of portions of Greenville Yard, construction of up to two hydraulic transfer bridges and new fender system, site work and track improvements, design and construction of two railcar floats, procurement of three ultra-low emission locomotives to replace functionally obsolete and fuel-inefficient locomotives that are currently used, and track rehabilitation and fender system modifications at 65th Street Yard. Although the No Action Alternative projects at Greenville Yard and 65th Street Yard have independent utility, they would also be essential for the success of the Enhanced Railcar Float Alternative and the Rail Tunnel Alternatives, which would build upon those No Action improvements. The No Action Alternative also includes projects advanced by New York City Economic Development Corporation (NYCEDC) and programmed or planned rail improvements with the participation of NJDOT or NYSDOT.

In developing the No Action Alternative, representatives from PANYNJ, NJTPA, and NYMTC were consulted.

TRANSPORTATION SYSTEMS MANAGEMENT (TSM) ALTERNATIVES

Transportation System Management: Freight Movement Efficiency/Safety Improvements

TSM aims to maximize the utilization and efficiency of the existing transportation network with relatively low-cost improvements that can improve its functional capacity. These improvements would provide additional freight movement capacity beyond those committed projects that are included in the No Action Alternative described above.

In relation to the above definition, this TSM Alternative would include:

- Increased capacity of the Oak Island Rail Yard in Newark, New Jersey with additional tracks.
- Improvements to the existing Lehigh Valley Line, beyond the improvements that are proposed by NJDOT.
- Additional improvements to the Chemical Coast Line in New Jersey, in the vicinity of its junction with the Staten Island Rail Line, including increased storage capacity along the tracks.
- Improved rail freight movement along the Hudson Line through better coordination of rail operators using the line, as well as upgraded signaling to enable tighter spacing between trains.
- Upgrading the existing rail bridge at Selkirk, NY, some 140 miles north of New York Harbor.
- Upgrading the existing container barge (the Red Hook Container Terminal) between American Stevedoring facilities at Red Hook, Brooklyn, and Port Newark.
- Track and signal improvements to the Bay Ridge Branch and Montauk Branch rail lines.
- Expansion of facilities at the Oak Point Yard in the Bronx.
- Consideration of traffic management strategies for vehicular crossings and connecting roadway corridors related to existing truck crossings, particularly Intelligent Transportation Systems applications.

Transportation System Management: Railcar Float Efficiency/Safety Improvements

- Improving the existing rail yard at 65th Street in Brooklyn, and service to and from the 65th Street float bridge. Improvements could include employing high power and low emission tug boats; using barges of higher capacity; improving rail operations at the two termini to reduce transfer time.

This TSM Alternative when it was originally proposed contained elements that were since advanced and approved as part of early action Cross Harbor improvements and are now described as being part of the No Action Alternative, as discussed in the preceding section. Since these improvements are being implemented, they are no longer considered to be a part of this TSM Alternative.

TRANSPORTATION DEMAND MANAGEMENT (TDM) ALTERNATIVES

Transportation Demand Management: Bridge/Tunnel Pricing

TDM aims to reduce, redistribute or “better fit” the amount of demand to the available capacity using pricing strategies and other incentives or disincentives to modify transportation behavior

and choices. To achieve a better relationship between demand and capacity, TDM Alternatives could include:

- Truck congestion pricing and improved tolling to optimize the magnitude of freight movement demand, its geographic distribution, and time-of-day distribution.
- Passenger vehicle congestion pricing and improved tolling, to move cars "out of the way" of trucks.
- Capacity management strategies that provide priority treatment for truck movements where and when appropriate and feasible.
- Other fees, regulations, or policies affecting transportation behavior and choices.

Transportation Demand Management: "Managed Trucking" Facilities/Franchises

Another strategy for managing freight transportation demand is to develop facilities that cluster freight logistics, transportation, and distribution activities, thereby reducing truck vehicle miles traveled. Examples of such facilities include truck drop-yards, consolidated distribution centers, freight villages, and inland ports. These facilities could be developed at any number of locations in the region, but are most likely to have an effect on Hudson River crossings if they are located close to shippers, receivers, and consumers in the east-of-Hudson region, where there are currently fewer such facilities.

- Drop-yards are secure locations where trucks can drop off a trailer for another driver to pick up at a later time. Drop-yards can be combined with tolling or off-peak delivery strategies in order to allow for the transport of a trailer into the region during off-peak hours, and pick-up and distribution of the trailer and/or its contents to a receiver during business hours.
- Consolidated distribution centers are locations where several small shipments can be bundled into a larger shipment for transport outside the region. In reverse, inbound shipments can be deconsolidated and distributed locally in smaller shipments. Freight consolidation can realize greater efficiency, and could potentially reduce the number of truck trips into and out of the region, and shipping costs.
- Freight villages are defined areas within which all activities relating to the transport, logistics, and distribution of goods are carried out by various operators. Freight villages include warehousing and distribution space, transfer and transloading facilities, and a number of supporting services such as truck parking, vehicle service and repair, services for employees (including restaurants, motel/hotel, transit services, etc.). A freight village could include consolidated distribution centers and/or drop-yards as well. By offering all of these functions and services in one location, a freight village could potentially result in a slight reduction in truck trips and vehicle miles traveled.
- Inland ports are inland sites connected to a seaport via rail or another efficient transportation facility. Inland ports serve as locations where loaded international shipping containers that enter the country at seaports can be sent for sorting, processing, and distribution.

WATERBORNE ALTERNATIVES

Enhanced Railcar Float Alternative

The existing railcar float system operates between Greenville Yard in Jersey City and 65th Street Yard in Brooklyn. The enhanced railcar float operation would expand this existing service 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, when the pontoon transfer bridge that was serving 51st Street Yard was moved to Greenville Yard, as temporary replacement of the Greenville Yard bridge, which was destroyed by the storm. The Greenville to Brooklyn crossing is a federally recognized interstate crossing and that connection has been established physically, operationally, and legally. With the Enhanced Railcar Float Alternative, west-of-Hudson terminus of the railcar float operation 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 termini for this Build Alternative, allowing freight to be delivered to the terminus closest to the destination market. 51st Street Yard could be served by the 65th Street float bridge (via the First Avenue rail connection), or directly from the 51st Street float bridge, when reestablished. 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. The railcar float termini considered in the EIS are shown in **Figure 4-1**.

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. Relative to the Truck Float and Container Barge Alternatives, the advantage of this concept is no required coordination of two drivers. The disadvantage is that the driver remains "on the clock," and unless ferry transit times can meet or beat the highway times, a net loss to the driver is experienced, and he/she is unlikely to use the service. Truck ferries are most attractive in cases where they provide a "shortcut" between two points that would otherwise require a circuitous route. An example of an existing service that provides such an advantage is the Bridgeport, Connecticut-Port Jefferson, New York Ferry. 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.

Truck Float Alternative

With this alternative, truck trailers or whole trucks would move on a vessel across the harbor, without the truck drivers. 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.

This alternative could move truck trailers or integrated "single unit" trucks across the harbor, without their drivers. Only one example of this type of service operates in North America, between Detroit, Michigan and Windsor, Ontario. The Detroit-Windsor service operates "on demand" and is typically chartered for shipments requiring special handling (e.g., oversize/overweight). Trucks are driven onto a simple deck barge and towed by a tug boat. As with railcar floats, larger and faster self-powered vessels are available. For the short distances involved, however, a larger and faster vessel might be counter-productive, since it would increase costs and reduce service frequency in exchange for negligible increases in speed. This type of system requires the coordination of two different drivers, one on each end of the trip, and reduces the total amount of driver hours devoted to the move, since some of the mileage is traversed without any driver "on the clock." The termini considered in this analysis in the west-of-Hudson region include Port Newark/Port Elizabeth, 65th Street Yard, 51st Street Yard, South Brooklyn Marine Terminal (SBMT), Oak Point, and Hunts Point.

Lift On-Lift Off (LOLO) Container Barge Alternative

Containers on barges are currently moved across New York Harbor between Red Hook Container Terminal in Brooklyn and Port Newark Container Terminal in New Jersey. Expansion of this system between other origin and destination points could provide an alternative for international container traffic arriving on one side of the harbor to move to the other side without involving truck transport; however, these moves represent a very small share of the total cross-harbor freight movement.

A LOLO operation requires the termini at each end of the trip to have berths and cranes capable of lifting containers from the wharf, or from a chassis, onto the barge. Cranes are used at the other end of the trip to lift containers off of the barge and set them on the wharf or on a truck chassis for transport over land to the final destination. Although LOLO vessels have the advantage of allowing more efficient loading of containers than RORO vessels, the increased labor and handling costs are significant disadvantages.

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. There are a number of existing facilities in New England that could process freight transported by barge across the harbor. PANYNJ does not have jurisdiction in New England and therefore partnerships with freight facility owners in New England and agencies with jurisdiction there would need to be established in any Tier II documentation if the LOLO Container Barge Alternative were selected for implementation. For illustrative purposes of the assessment conducted in this Tier I EIS, Davisville, Rhode Island was considered as the New England trip end, due to the existence of LOLO container handling capability and its proximity to areas of Rhode Island and eastern Massachusetts, which are significant destinations for New England-bound containers leaving the port.

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. The Port of Davisville currently has RORO capability. As noted above, New England termini are outside of the Port District (Figure 1-6), but could be implemented in partnership with others to serve the demand for long-distance freight movement that was identified as part of this study.

RAIL TUNNEL ALTERNATIVES

Rail Tunnel Alternative

The Rail Tunnel Alternative would provide a rail crossing from Greenville Yard to the Bay Ridge Branch, owned by Long Island Railroad. The tunnel would be constructed to

accommodate double-stacked container railcars and would allow for bi-directional service (double track).

Under all operating scenarios, 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. Demand for freight that could be moved by the Rail Tunnel Alternative was identified on Long Island, in Nassau and Suffolk Counties, as part of this study. To fully achieve the potential benefits of this alternative, the use and expansion of existing freight facilities or development of new freight facilities on Long Island would be needed. Therefore, 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. Since Nassau and Suffolk Counties are outside of the Port District, it is assumed that the facility would be developed by others. The needed partnerships and steps needed for developing freight facilities on Long Island would be identified as part of any Tier II documentation.

The distinction between demand and capacity also needs to be illustrated in the context of freight facilities to clarify the implications of not developing a Long Island Facility, or any other specific yard. Based on the demand model, described in detail in **Appendix A**, there is a need for improved freight movement across the harbor and some of the goods transported across the harbor are destined to or originate from Long Island, New England, or other areas outside of the Port District. The construction of the tunnel would provide a means to cross the harbor by rail, but would not enable the Rail Tunnel Alternative to fully meet the projected demand (provided in Chapter 5, "Transportation"), unless there are facilities that have the capacity to process the freight, close to the areas where there is demand. If the available processing capacity is lower than the projected demand, the effects of the alternative, including benefits, would be lower than the maximum potential that would be achieved by fully meeting the demand.

Therefore, while the critical elements of the Rail Tunnel Alternative are the tunnel itself and the harbor crossing termini (at Greenville Yard and along the Bay Ridge Branch), for the alternatives relying on rail, including the Rail Tunnel Alternative, a new or improved harbor crossing alone is not sufficient to fully address the projected demand for freight movement. Rail as a mode can be competitive only over longer distances and only if the entire rail system along the selected corridor runs smoothly. Therefore, in addition to the harbor crossing tunnel, the successful implementation of the Rail Tunnel Alternative would depend on tracks leading to and from the tunnel on both sides of the harbor, as well as on the availability of facilities that would have the capacity to process the freight transported. Therefore, the Rail Tunnel Alternative, like all alternatives involving rail, includes supporting freight facilities, in addition to the crossing termini.

The Rail Tunnel Alternative assumes a tunnel designed for conventional rail equipment, serving traditional markets—carload freight (carrying commodities such as lumber, metals, food products, and chemicals) and intermodal (containerized) freight. The Rail Tunnel Alternative with Technology Options examined three advanced technologies that could be accommodated along with the conventional Rail Tunnel Alternative services and rail traffic. These technology options offer the potential for use of a rail connection beyond what would be achieved by the conventional Rail Tunnel Alternative. The three technology options evaluated in the screening analysis are described below.

Rail Tunnel with Shuttle ("Open Technology") Service Alternative

The Shuttle would provide short-distance intermodal rail service using "Open Technology." In past years, CSX Corporation (CSX) operated a service in which trucks were rolled on and off rail flatcars via loading ramps. With this service, also known as the "Iron Highway," the train can be split into multiple parts, or "opened," to facilitate loading. CSX is not using this technology now, but it is being used by Canadian Pacific Railway (CP) in Canada between Montreal and Toronto, and has been used to reach Windsor as well. 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, outside of the Port District, and in Maspeth Yard, in Queens or at a Long Island Facility (also outside of the Port District). As discussed previously, termini and facilities outside of the Port District would need to be developed by others, or in partnership with others. Such partnerships and steps for implementation would be identified in any Tier II documentation.

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. Truckers would drive onto the railcars, get out of their trucks, and go to a passenger car. The train would take the truckers and their trucks through the tunnel and then the truckers would get back into their trucks on the other side of the harbor. This service could potentially attract any trucker looking to cross the Hudson River and reach a point near the terminus of the chunnel service. 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.

At each terminal, drive-on or drive-off operations would take approximately 30 minutes. The transit time between the two terminals would be 30 minutes. 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 increasingly popular in marine terminals, warehouse and distribution centers, and factories. They 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. AGV service would enable the truckers to drop off and pick up their loads outside congested core areas and avoid double handling of the cargo, since the cargo would not have to be lifted onto or off of its chassis. As with the chunnel service, the AGV service would be very frequent and scheduled, with single AGV platforms or a set of platforms (also known as platoons). It could potentially attract any trucker looking to cross the Hudson River and reach a point near the terminus of the AGV service. 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 would be similar to the Whittier Tunnel in Alaska, which is a single-track rail tunnel that operates with alternating rail and vehicle (truck, bus, and private auto) traffic, running in alternate directions, according to a fixed schedule. The Cross Harbor Rail Tunnel could be designed with pavement to allow rubber-tired vehicles to run 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). For the Rail Tunnel with Truck Access Alternative, it was assumed that trucks would enter near Exit 14B of the New Jersey Turnpike and would run through the tunnel to the Bay Ridge Branch. Trucks would continue in the Bay Ridge Branch rail right-of-way and terminate at Linden Boulevard. Previous studies that considered a rail tunnel with truck access determined that a direct connection to the Gowanus Expressway or the Van Wyck Expressway was not feasible and it should be noted that the access points currently proposed are different. The combined tunnel would be tolled and would accommodate a truck-only lane in each direction.

SCREENING CRITERIA

The alternatives were then qualitatively evaluated against project goals and objectives to determine if they are consistent with the broad qualitative measures for the objectives. For some objectives, such an evaluation was not possible at the screening level since the alternatives and their potential effects have not been defined or analyzed in enough detail. In this case, criteria are assessed as part of Step 4—the detailed evaluation throughout this EIS.

The following **Table 4-4** describes the broad screening criteria for each of the project goals and objectives.

Table 4-4
Broad Screening Criteria

Goals and Objectives	Broad Screening Criteria
Goal 1: Reduce the contribution of Cross Harbor trucks trips to congestion along the region's major freight corridors.	
Reduce the vehicle miles traveled by freight trucks which cross the Hudson River.	Likely change in regional truck vehicle miles of travel (VMT).
Reduced travel-time and delay on regional highway network.	Not evaluated for screening analysis.
Maximize efficient use of available capacity on existing transportation infrastructure.	Qualitative comparison of alternative conceptual plans.
Maintain or improve regional freight network performance.	Likely change in regional freight system demand.
Goal 2: Provide Cross Harbor freight shippers, receivers, and carriers with additional, attractive modal options to existing interstate trucking services.	
Increase the number of modal options available for Cross Harbor freight transportation.	Qualitative comparison of alternative conceptual plans.
Provide modal options and choices that offer attractive and competitive performance, consistent with business requirements.	Comparison of likely market demand.
Goal 3: Expand facilities for Cross Harbor goods movement to enhance system resiliency, safety and security, and infrastructure protection.	
Provide Cross Harbor freight facilities and services that improve system redundancy and resilience in event of a major interruption of service on existing interstate highway corridors serving the region.	Provision of new freight capacity other than existing interstate highway corridors.
Support contingency planning for emergency alternative Cross Harbor goods movement operations	Provision of new freight capacity other than existing interstate highway corridors.
Reduce the number of freight vehicle related accidents.	Likely change in regional truck VMT.
Develop effective alternative options for transporting overweight/non-standard cargo to support infrastructure protection for regional bridges and highway network.	Qualitative comparison of alternative conceptual plans.
Goal 4: Support development of integrated freight transportation/land use strategies.	
Maximize underutilized freight transportation infrastructure and related land uses.	Qualitative comparison of alternative conceptual plans.
Support services to existing freight distribution centers in the region.	Qualitative comparison of alternative conceptual plans.
Integrate freight services with local land use and transportation planning objectives.	Not evaluated for screening analysis.
Integrate freight development with statewide freight and passenger rail plans.	Not evaluated for screening analysis.

Using the Broad Screening criteria, the Short List of Alternatives was evaluated with respect to project objectives. For each objective considered, an alternative was classified as meeting the objective, contributing to meeting the objective, or not meeting the objective. The results of the evaluation are presented in **Figure 4-3**. Based on this analysis, the TDM Alternatives were eliminated from further study, as they fail to meet a majority of the project objectives. Specifically, the Bridge/Tunnel Pricing Alternative does not meet or contribute to meeting 10 out of 11 project objectives considered. The "Managed Trucking" Facilities and Franchises Alternative does not meet 6 out of 11 project objectives considered, while meeting only one out of 11 objectives, and somewhat contributing to meeting 4 objectives. Although these facilities offer the potential to consolidate and/or reduce truck trips, the impact on regional truck traffic volumes is imperceptible. Traffic impact analysis conducted as part of NYMTC's Feasibility of Freight Villages in the NYMTC Region study found that the development of a prototypical freight village in the NYMTC region would reduce truck VMT by 1,119 daily vehicle-miles, or 0.000072 percent of regional daily commodity truck VMT. The effect of a freight village land use pattern alone was found to be quite small, but the introduction of a multi-modal connection

Goals		Objectives	TSM		TDM		Waterborne					Rail Tunnel				
			Freight Movement Efficiency/Safety Improvements	Railcar Float Efficiency/Safety Improvements	Bridge/Tunnel Pricing	"Managed Trucking" Facilities/Franchises	Enhanced Railcar Float	Truck Ferry	Truck Float	Roll on-Roll off Container Barge	Lift on-Lift off Container Barge	(Double-Stack, Double Track)	With Shuttle ("Open Technology") Service	With "Chunnel" Service	With AGV Technology	With Truck Access
Goal 1: Reduce the contribution of Cross Harbor trucks to congestion.	a	Reduce the VMT from Cross Harbor trucks	🟡	🟡	🔴	🟡	🟢	🔴	🔴	🟡	🟡	🟢	🟢	🟢	🟢	🟢
	c	Maximize use of existing infrastructure	🟢	🟢	🔴	🟡	🟢	🔴	🔴	🟡	🟡	🟢	🟢	🟢	🟢	🟢
	d	Maintain or improve regional freight network	🟢	🟢	🔴	🔴	🟢	🔴	🔴	🟡	🟡	🟢	🟢	🟢	🟢	🟢
Goal 2: Provide modal options to trucking services.	a	Increase modal options for Cross Harbor freight	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
	b	Provide modal options and choices that offer attractive and competitive performance	🟡	🟡	🔴	🔴	🟢	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟢	🟢
Goal 3: Expand facilities for Cross Harbor goods movement to enhance system resiliency, safety and security, and infrastructure protection.	a	Provide Cross Harbor freight facilities and services that improve system redundancy and resilience	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢
	b	Support contingency planning for emergency Cross Harbor operations	🟡	🟡	🔴	🔴	🟢	🟢	🟢	🟡	🟡	🟢	🟢	🟢	🟢	🟢
	c	Reduce the number of freight vehicle-related accidents	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟢	🟢	🟢	🟢	🟢
	d	Develop effective alternative options for transporting overweight/non-standard cargo	🟡	🟡	🔴	🔴	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡
Goal 4: Support development of integrated freight transportation/land use strategies.	a	Maximize use of underutilized freight infrastructure and land	🟡	🟡	🔴	🟡	🟢	🔴	🔴	🟡	🟡	🟢	🟢	🟢	🟢	🟢
	b	Support existing freight distribution centers	🟡	🟡	🔴	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢

🟢 *meets objective* 🟡 *contributes to meeting objective* 🔴 *does not meet objective*

Figure 4-3
Qualitative Screening Using Project Goals
CROSS HARBOR FREIGHT PROGRAM

(such as truck-to-rail or water-to-rail) would allow for a more significant shift of freight to modes other than truck and allow businesses in the freight village to take fuller advantage of the travel time and transportation cost efficiencies that come with co-location of facilities.[1]

It should be noted that while the freight village land use pattern alone does not offer substantial regional truck VMT reduction benefits, it could play an important role in enhancing freight movement as part of larger system improvements, such as those proposed as part of the Build Alternatives. While not considered a part of the Build Alternative(s) at this time, any Tier II documentation could explore added benefits of encouraging the development of freight villages in conjunction with the Build Alternative(s) selected for implementation.

The results of the screening analysis also revealed that the TSM Alternatives are a step in accomplishing the project objectives, but that they would not independently meet the project purpose and need. As indicated in **Figure 4-3**, the Freight Movement Efficiency and Safety Improvements Alternative and the Railcar Float Efficiency and Safety Improvements Alternative partially meet 9 out of 11 objectives, but fully meet only two objectives. In addition, since the Railcar Float Efficiency and Safety Improvements Alternative was originally proposed, many of its elements have been included in the *Categorical Exclusion Documentation 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* and are now part of the No Build Alternative. The remaining elements of both TSM Alternatives are considered as needed components of other Build Alternatives, but are not considered further in this EIS as an independent Build Alternative as these improvements are insufficient to meet the project purpose and need. The following list indicates how the elements of TSM Alternatives were incorporated into the Build Alternatives.

- Increased capacity of the Oak Island Rail Yard in Newark, New Jersey with additional tracks (Rail Tunnel Alternatives).
- Improvements to the rail lines used by freight, such as storage capacity, coordination of rail operators, and signal timing (Enhanced Railcar Float and Rail Tunnel Alternatives, as mitigation options, if needed based on Tier II assessment).
- Upgrading the existing rail bridge at Selkirk, New York, some 140 miles north of New York Harbor (Not carried over to Build Alternatives as the Selkirk crossing does not address cross-harbor freight movement).
- Upgrading the existing container barge (the Red Hook Container Terminal) between American Stevedoring facilities at Red Hook, Brooklyn, and Port Newark (to the extent that it would support the LOLO/RORO Container Barge Alternative).
- Track and signal improvements to the Bay Ridge Branch and Montauk Branch rail lines (Enhanced Railcar Float Alternative and Rail Tunnel Alternatives).
- Expansion of Oak Point Yard in the Bronx (Waterborne Alternatives using this facility as a terminus and all Rail Tunnel Alternatives).
- Consideration of traffic management strategies for vehicular crossings and connecting roadway corridors related to existing truck crossings, particularly Intelligent Transportation

[1] New York Metropolitan Transportation Council, *Feasibility of Freight Villages in the NYMTC Region: Task 6 - Site Impact Assessment*, 2011, available from: http://www.nymtc.org/project/freight_planning/frtvillage/FrtVillage_files/Task_6_Report-FINAL.pdf.

Systems applications (Not carried over to Build Alternatives as this strategy does not address the need for improving modal choice).

E. ALTERNATIVES SELECTED FOR DETAILED EVALUATION

The following Build Alternatives were selected for detailed evaluation and comparison with the No Action Alternative throughout this EIS:

- Waterborne Alternatives:
  - Enhanced Railcar Float Alternative
  - Truck Float Alternative
  - Truck Ferry Alternative
  - RORO Container Barge Alternative
  - LOLO Container Barge Alternative
- Rail Tunnel Alternatives
  - Rail Tunnel Alternative
  - Rail Tunnel with Shuttle ("Open Technology") Service Alternative
  - Rail Tunnel with Chunnel Service Alternative
  - Rail Tunnel with AGV Technology Alternative
  - Rail Tunnel with Truck Access Alternative

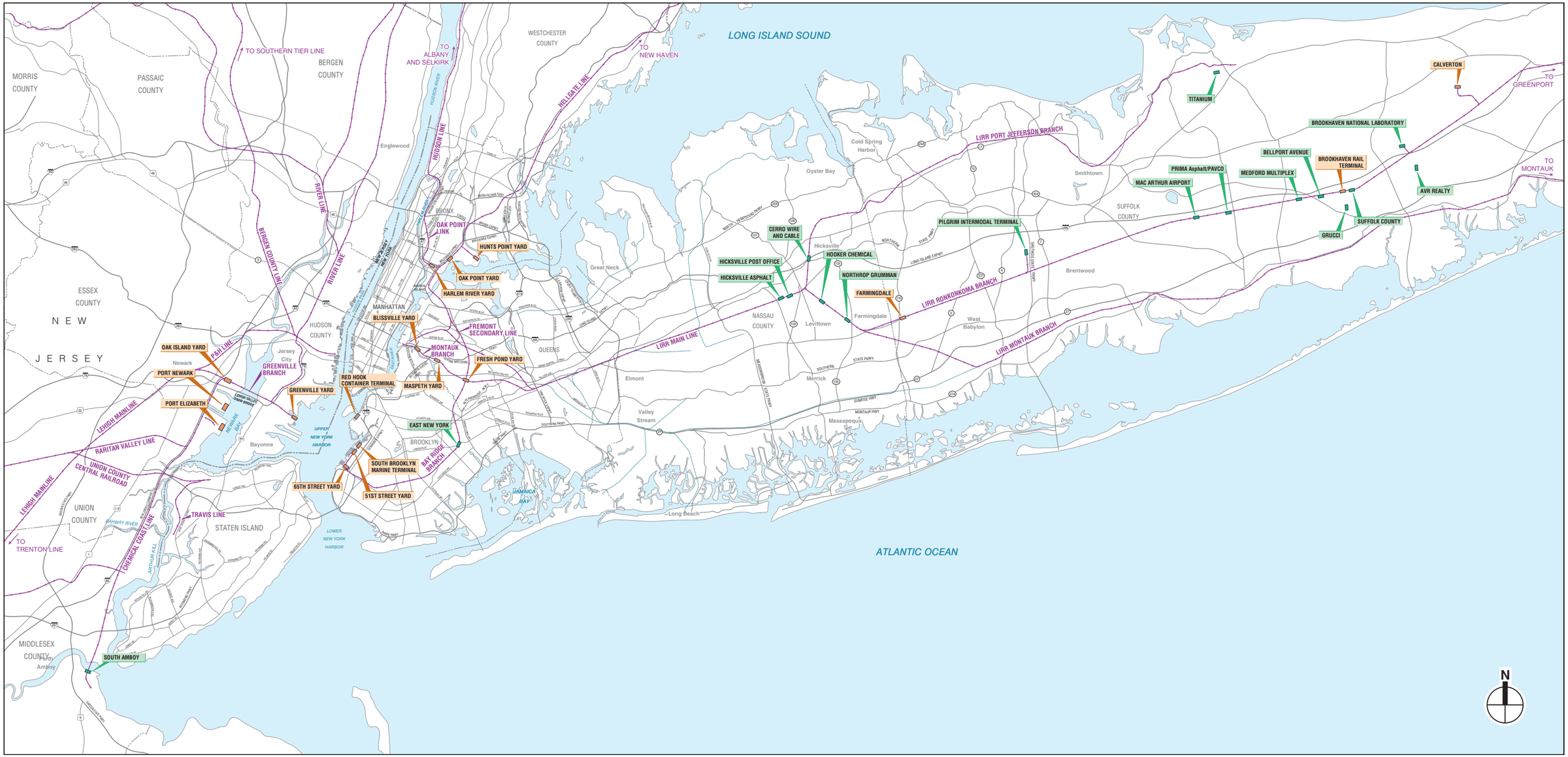
Each alternative is described in the sections below in more detail, with the assumptions regarding the location of harbor crossing termini and service schedule. Potential environmental effects from the operation and construction of each alternative are considered in Chapter 6, "Environmental Effects," and Chapter 7, "Indirect and Cumulative Effects."

F. SCREENING ANALYSIS FOR TERMINI AND FREIGHT FACILITIES

Early in the planning process, a long list of harbor crossing termini, existing freight facilities and potential locations where new freight facilities could be developed to support the project was developed. There are dozens of existing and potential future locations for freight operations within the study area. 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. Where the projected amount of freight destined for 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 shown in **Figure 4-4** and discussed in this chapter. 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 and selected for further evaluation were identified. The potential environmental effects of the construction and operation of these sites are discussed in this EIS.

Planning was guided by a few key principles and objectives:

- Waterborne Alternatives require at least one terminus on each side of the harbor. The preferred termini are those that have space for loading and unloading and storage of freight,



0 2 4 6 8 10 MILES
SCALE

Freight Rail Line

Existing Freight Facility Location

Potential Freight Facility Location

FIGURE 4-4

Rail Freight Facilities and Potential Sites

CROSS HARBOR FREIGHT PROGRAM

as well as good access to other modes (rail or truck) for transporting the goods beyond the harbor crossing.

- Rail carload equipment (box cars, flatcars, hopper cars, tank cars, etc.) should be accommodated as close as possible to the east-of-Hudson market being served. Carload freight is typically not time sensitive, nor does it typically require very large or expensive processing facilities, which means that it can be dispersed throughout the rail network. Separate rail carload facilities are therefore identified in Brooklyn, Queens, the Bronx, as well as the use of existing New York and Atlantic Railway (NY&A) facilities in the Nassau/Suffolk area. Rail freight bound north of the Bronx could likely be suitably accommodated; however, operations north of the Bronx will require further consideration in a Tier II analysis.
- Rail intermodal equipment (containers) requires larger and more expensive freight facilities and handling equipment, and, in many cases, also involves time-sensitive freight. For these reasons, it is better to consolidate rail intermodal traffic at a limited number of key hubs. Therefore, one hub should be selected to serve the New York City boroughs. It was also assumed that one hub would serve the Nassau/Suffolk intermodal market. Several potential sites would be suitable for such a hub. As Nassau and Suffolk Counties are outside of PANYNJ jurisdiction, any intermodal facility would have to be developed by a different public or private sponsor. The development of any new rail facilities in the Nassau/Suffolk area would require further approvals. Partnerships would be sought as part of any Tier II documentation to secure a terminus that would accommodate the demand projected for the Build Alternatives.
- Chunnel, shuttle, and AGV services, as well as truck access to the tunnel, require specialized terminal facilities and do not need to be co-located with other types of rail services. In fact, to the extent that these services seek to emulate highway alternatives, their proximity and access to highways is the primary factor in identifying a suitable location. To provide the most frequent and attractive service, two terminals are assumed in this EIS, one on each side of the harbor. In the future, if there is sufficient demand, additional terminals could be provided.

FREIGHT TERMINI AND SUPPORTING FACILITY SCREENING CRITERIA

Consistent with the key planning principles and objectives discussed, the following criteria were considered in selecting the freight facilities and potential sites for the project:

- Location – Preference for yards centrally located for ease of distribution to final destinations of the freight, with the goal of minimizing dray (short distance transfer) distances.
- Size and layout – 15 acres of land are typically needed for a small bulk facility, while approximately 30 acres are needed for intermodal operations. As important as the size of a site is its shape, the preference being for rectangular sites, with enough length to fit the needed tracks. Sites with room to expand are preferred to sites with limited potential for expansion.
- Water access – For Waterborne Alternatives, preference for termini that already provide proposed services but could further be expanded; preference for sites with both rail and truck access; preference for sites that enable shortest trips between the west-of-Hudson and east-of-Hudson regions.

- Rail connection – Preference for sites with direct connection to rail for the Rail Tunnel Alternatives.
- Truck access – Preference for sites with access to truck routes and the highway network, with minimum impact to local roads.
- Land use – Preference for sites located in industrial areas, near clusters of freight users and warehouses, with consideration of the current uses and the proximity of residential and other sensitive uses.

The freight facilities and potential sites initially considered as termini for the Build Alternatives are shown in **Figure 4-4**. Facilities selected as potential termini for the Build Alternatives are shown in **Figure 4-1**. Yards eliminated from further consideration based on the above listed criteria include the following:

South Amboy – The site is away from I-95 and major truck routes, which connect the site to truck origin and destination points, and offers less direct access than other nearby yards with better proximity to truck routes. It would also provide a more circuitous and much longer water route across the harbor than other New Jersey waterfront freight facilities that were considered.

Blissville Yard – The site is currently under development for other railroad use. Since Maspeth Yard provides direct and shorter connections for the Cross Harbor trains, this site is not considered as the preferred yard site to serve Queens.

Harlem River Yard – The site is currently developed for other railroad and freight use, with expandable vacant land. Since Oak Point Yard provides direct and shorter connections for the Cross Harbor freight, this site is not considered as the preferred yard site to serve the Bronx.

It is important to note that the yard selection was focused on the east-of-Hudson region, where the need for freight facilities is greatest, and on the west-of-Hudson yards that could accommodate the needed infrastructure for the termini of the Build Alternatives (railcar float bridges; truck ferry, truck float, and container barge landings; rail tunnel portal; and chunnel, AGV, and shuttle service terminals). Other planned facilities in the west-of-Hudson region, such as the Raritan Logistics Center, in Edison, New Jersey, and expansion of the intermodal facility in Harrisburg, PA would support cross-harbor movement by rail. The development of freight facilities outside of the Cross Harbor project area would also encourage competition and additional options for shippers, which could result in greater efficiencies and lower costs to shippers and receivers. However, the development of freight facilities in the east-of-Hudson region would have a greater effect on cross-harbor goods movement because the existing facilities in the east-of-Hudson region are not sufficient. There is therefore a greater focus on the east-of-Hudson freight facilities in this EIS; however, the development of the east-of-Hudson facilities would benefit movement of goods on both sides of the harbor.

In Nassau and Suffolk Counties, existing freight facilities and those currently proposed by others—including Pilgrim Intermodal Terminal, Northrop Grumman in Bethpage, Calverton Yard, and the existing Brookhaven Rail Terminal site—would be adequate for processing carload freight. To process intermodal freight and/or to serve international container freight, at least one of these facilities would have to be developed and/or expanded. Due to the PANYNJ's jurisdictional limitations, as well as the existence of a number of proposed public and private initiatives regarding new and expanded rail facilities on Long Island, the CHFP is not selecting or recommending which yard(s) would serve as a distribution facility for the project's forecasted demand. However, since some of the project Build Alternatives would result in additional

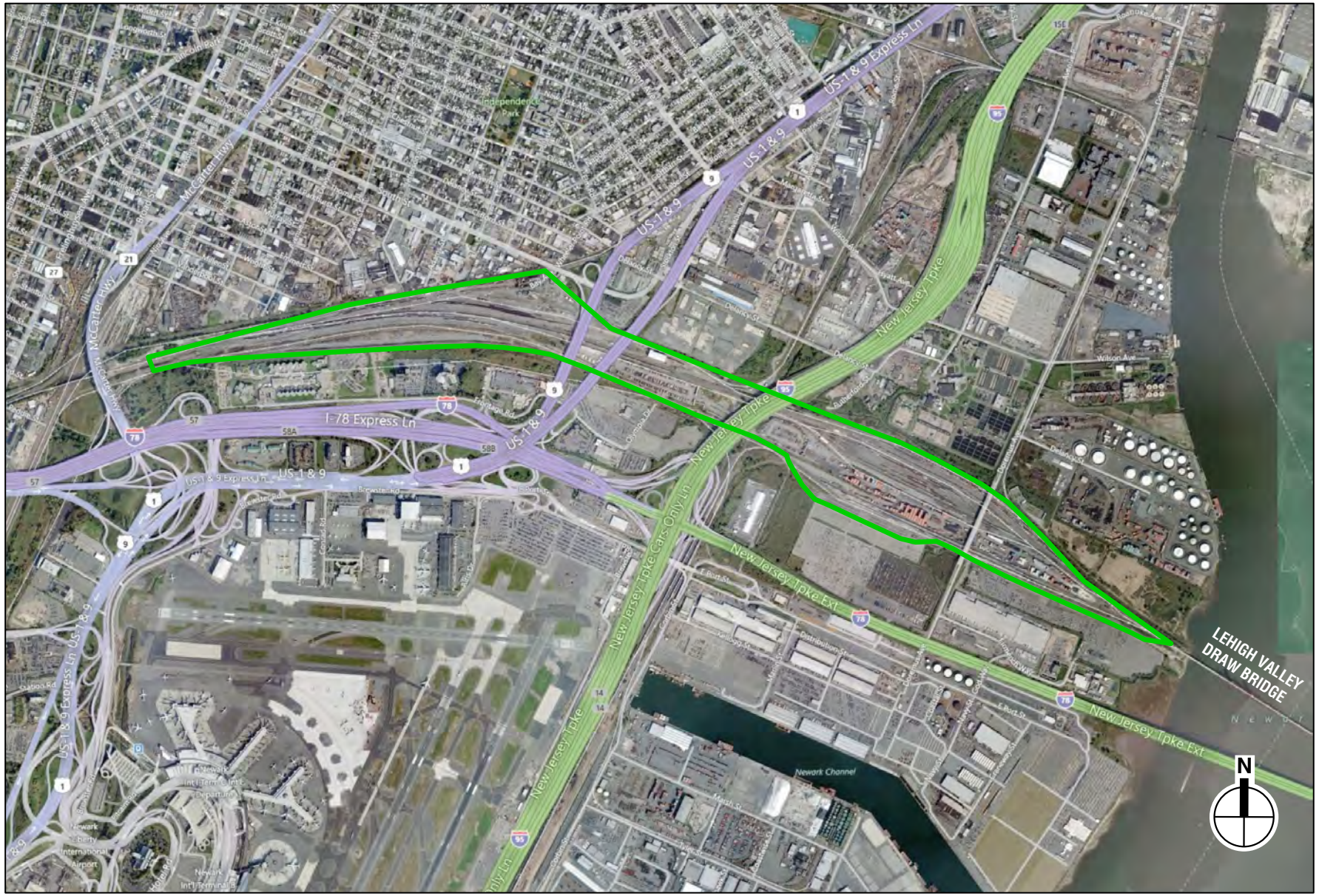
demand for any of these existing future facilities, the EIS includes an analysis of the operational impacts associated with the changes to freight movement activity on Long Island.

It is assumed for the purposes of this Tier I EIS that an intermodal and international freight processing yard would be developed in the Nassau/Suffolk area independent of the CHFP. Such a site is generically referred to as "the Long Island Facility" throughout this EIS.

Crossing termini and supporting freight facilities selected for detailed evaluation in the EIS for the Build Alternatives are shown in **Table 4-5** and illustrated in **Figures 4-5** through **4-14**.

The development of such a facility would require further approval. However, since the CHFP would result in an increase in activity at or near such facilities, the operational effects of the CHFP are broadly considered and, where relevant, presented in Chapter 6, "Environmental Effects." For the purposes of this Tier I EIS, the Long Island Rail-Truck Inter Modal (LITRIM) facility (i.e., the Pilgrim Intermodal Terminal), proposed by New York State Department of Transportation (NYSDOT), and the existing Brookhaven Rail Terminal site serve as illustrative examples for the determination of potential environmental effects resulting from CHFP operation in Nassau/Suffolk. These two sites are not the only possible sites for the Long Island Facility, but rather sites that are generally representative of potential environmental effects on Long Island due to the operation of CHFP alternatives.

The container barge service to New England is assumed to land in Davisville, Rhode Island, due to that port's capacity to handle LOLO and RORO cargo, and its proximity to sources of freight travel demand in Rhode Island and eastern Massachusetts. The Port of Davisville has three berths, 50 acres of storage capacity, and a 150-ton mobile harbor crane. Due to their relatively close proximity, several other ports in the vicinity, such as: Providence, Rhode Island; New Bedford, Massachusetts; Fall River, Massachusetts; and New London, Connecticut could be considered alternate destinations without a significant impact on the demand estimate, but each of these alternative ports will require development of infrastructure to handle RORO and/or LOLO cargo. Due to the PANYNJ's jurisdictional limitations, the CHFP is not selecting or recommending which port would serve as the New England terminus for the Container Barge Alternatives. 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. For similar reasons, the west-of-Hudson terminal for Shuttle Service, outside of the Port District is not being selected in this EIS.



Existing Yard

0 1500 3000 FEET
SCALE

FIGURE 4-5
Oak Island Yard
CROSS HARBOR FREIGHT PROGRAM

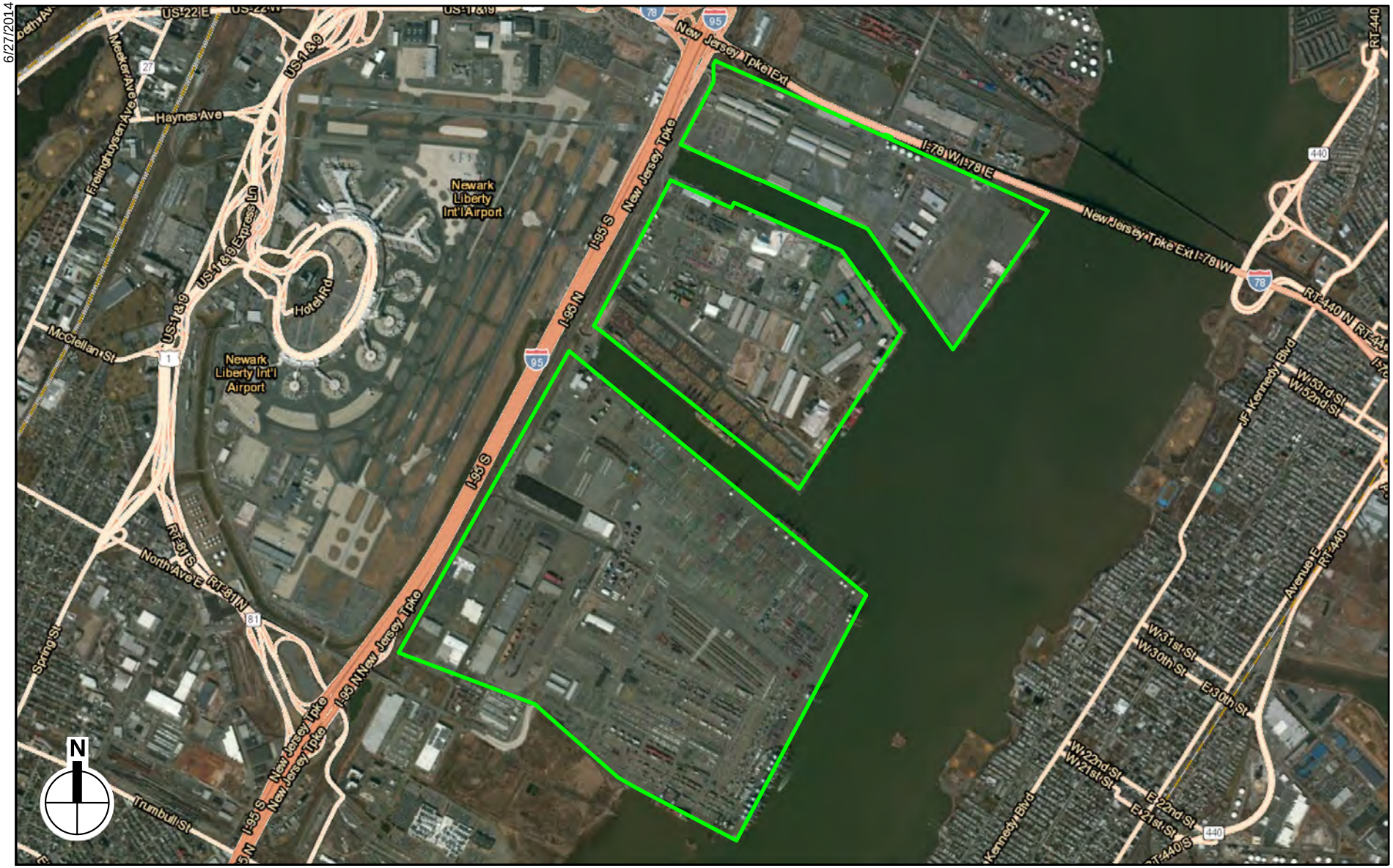
6.27.14

Existing Yard

0 500 1000 1500 FEET
SCALE

FIGURE 4-6
Greenville Yard
CROSS HARBOR FREIGHT PROGRAM

6/27/2014



Existing Terminal

0 3,000 Feet

FIGURE 4-7

Port Newark / Port Elizabeth

CROSS HARBOR FREIGHT PROGRAM

Existing Yard

0 500 1000 1500 FEET
SCALE

FIGURE 4-8

65th Street Yard and 51st Street Yard

CROSS HARBOR FREIGHT PROGRAM

6/30/2014

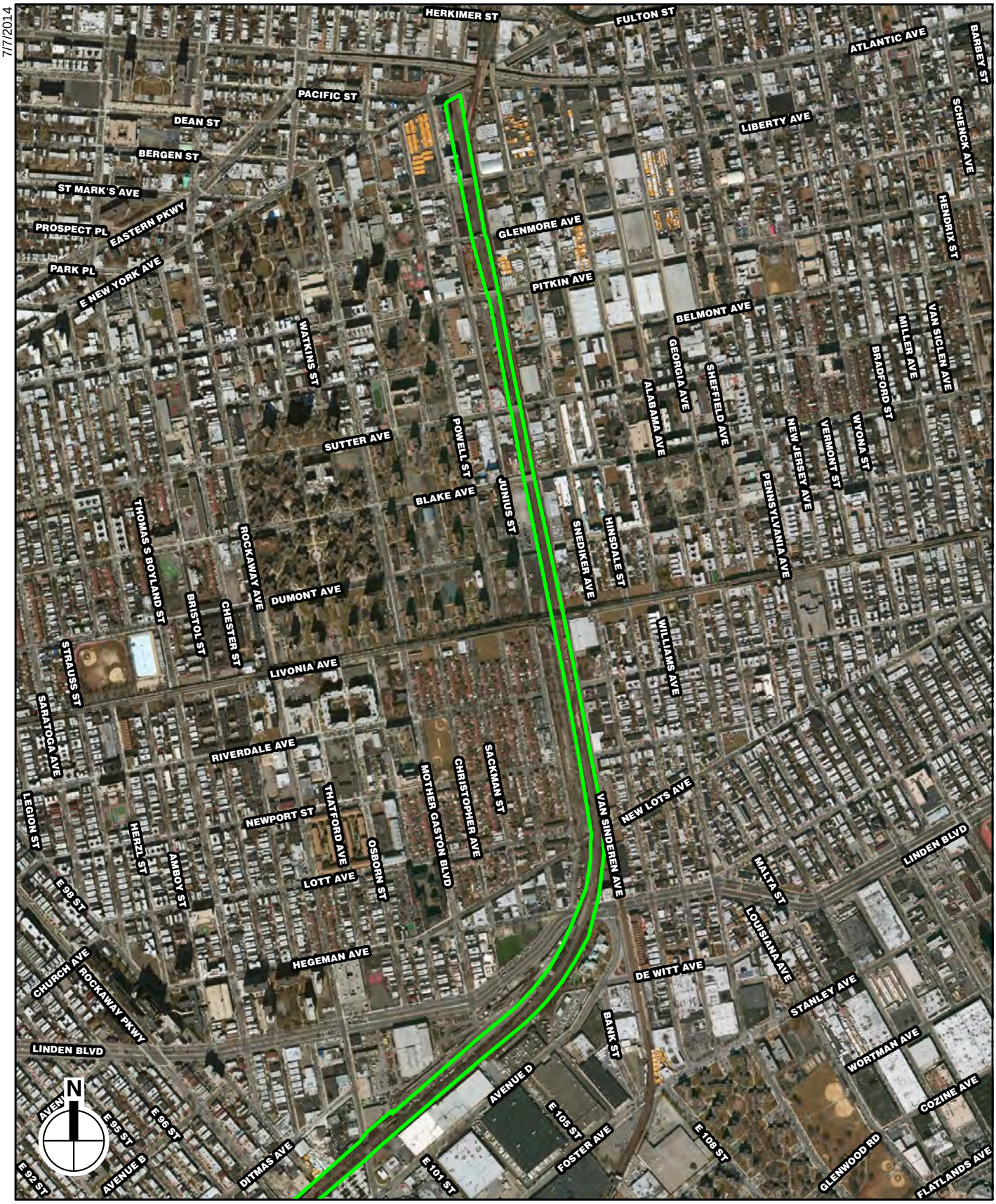
Existing Marine Terminal

FIGURE 4-9

Red Hook Marine Terminal and South Brooklyn Marine Terminal

CROSS HARBOR FREIGHT PROGRAM

7/7/2014



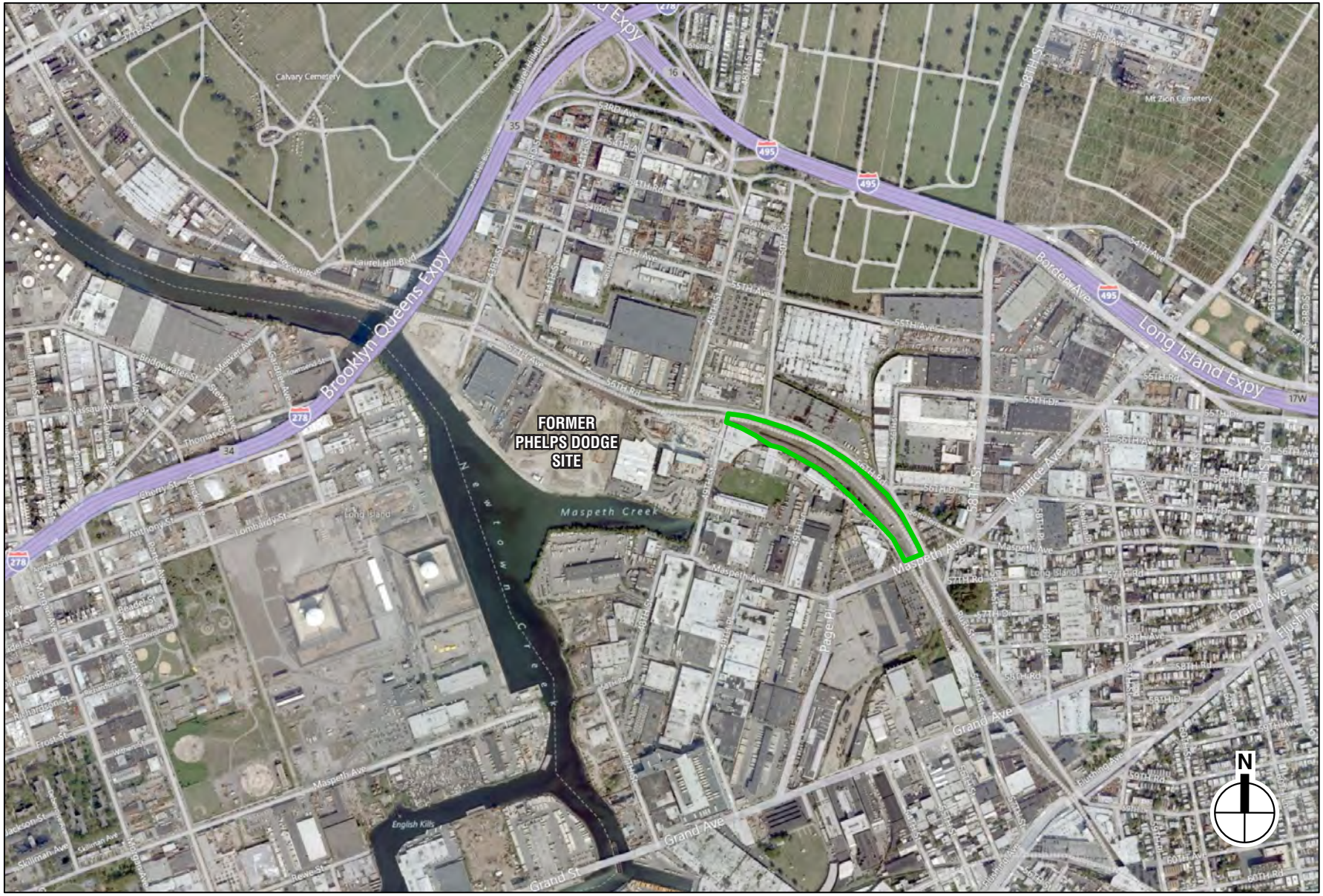
Existing Right-of-Way

0 2,000 Feet

FIGURE 4-10

East New York Site

CROSS HARBOR FREIGHT PROGRAM



Existing Yard

0 500 1000 1500 FEET
SCALE

FIGURE 4-11
Maspeth Yard
CROSS HARBOR FREIGHT PROGRAM

6.27.14

Existing Yard

0 500 1000 1500 FEET
SCALE

FIGURE 4-12

Fresh Pond Yard

CROSS HARBOR FREIGHT PROGRAM

6.27.14

Existing Yard

0 500 1000 1500 FEET
SCALE

FIGURE 4-13

Oak Point Yard

CROSS HARBOR FREIGHT PROGRAM

6/30/2014

Potential Site

0 1,000 Feet

FIGURE 4-14

Hunts Point Site

CROSS HARBOR FREIGHT PROGRAM

Table 4-5
Crossing Termini and Supporting Freight Facilities by Alternative

Alternative Class	Alternative	Western Termini Options	Eastern Termini Options	Supporting Facilities
Waterborne	Enhanced Railcar Float	• Greenville Yard	• 65th Street Yard • 51st Street Yard • Oak Point Yard	• Fresh Pond Yard • Long Island Facilities (outside of the Port District)[1] • Maspeth Yard
	Truck Float	• Port Newark/Port Elizabeth	• 65th Street Yard • 51st Street Yard • South Brooklyn Marine Terminal (SBMT) • Maspeth Yard • Oak Point Yard • Hunts Point Yard	
	Truck Ferry	• Port Newark/Port Elizabeth	• 65th Street Yard • 51st Street Yard • South Brooklyn Marine Terminal (SBMT) • Maspeth Yard • Oak Point Yard • Hunts Point Yard	
	LOLO Container Barge	• Greenville Yard • Port Newark/Port Elizabeth	• 65th Street Yard • Red Hook Container Terminal • South Brooklyn Marine Terminal (SBMT) • New England (outside of the Port District)[2]	
	RORO Container Barge	• Greenville Yard • Port Newark/Port Elizabeth	• 65th Street Yard • Red Hook Container Terminal • 51st Street Yard • South Brooklyn Marine Terminal (SBMT) • New England (outside of the Port District)[2]	

Table 4-5 (cont'd)
Crossing Termini and Supporting Freight Facilities by Alternative

Alternative Class	Alternative	Western Termini Options	Eastern Termini Options	Supporting Facilities
Rail Tunnel	Rail Tunnel	• Greenville Yard	• Bay Ridge Branch, near 65th Street	• Oak Island Yard • Fresh Pond Yard • Maspeth Yard • East New York Yard • Long Island Facilities (outside of the Port District)[1]
	Rail Tunnel with Shuttle Service	• Pennsylvania (outside of the Port District)[3]	• Maspeth Yard • Long Island Facility (Outside of the Port District)[1]	• Oak Island Yard • Fresh Pond Yard • Maspeth Yard • East New York Yard • Long Island Facilities (outside of the Port District)[1]
	Rail Tunnel with Chunnel Service	• Oak Island Yard	• East New York	• Fresh Pond Yard • Maspeth Yard • East New York Yard • Long Island Facilities (outside of the Port District)[1]
	Rail Tunnel with AGV Technology	• Greenville Yard	• East New York	• Oak Island Yard • Fresh Pond Yard • Maspeth Yard • East New York Yard • Long Island Facilities (outside of the Port District)[1]
	Rail Tunnel with Truck Access	• Greenville Yard	• East New York	• Oak Island Yard • Fresh Pond Yard • Maspeth Yard • East New York Yard • Long Island Facilities (outside of the Port District)[1]

Notes:

1. Long Island Facilities could include any of the existing or potential facility locations east of Fresh Pond Yard, shown in **Figure 4-4**. For the purposes of this Tier I EIS, the Long Island Rail-Truck Inter Modal (LITRIM) facility (i.e., the Pilgrim Intermodal Terminal), proposed by New York State Department of Transportation (NYSDOT), and the existing Brookhaven Rail Terminal site serve as illustrative examples for the determination of potential environmental effects resulting from CHFP operation in Nassau/Suffolk. Since Nassau and Suffolk Counties are outside of the Port District, shown in Figure 1-6, partnerships (to be identified in Tier II) would be needed for developing freight facilities on Long Island.
2. 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.
3. To provide Shuttle Service that would be attractive to shippers, the shuttle service termini need to be further than what would be achievable within the Port District (distance between termini should be on the order of 400 miles). Therefore, facilities in Pennsylvania would be suitable. For illustrative purposes, the existing freight facility in Harrisburg, Pennsylvania is considered in this EIS. To develop a shuttle terminal in Pennsylvania, partnerships would be needed and sought as part of Tier II.

G. DESCRIPTIONS OF ALTERNATIVES AND REQUIRED INFRASTRUCTURE

WATERBORNE ALTERNATIVES

ENHANCED RAILCAR FLOAT ALTERNATIVE

The Enhanced Railcar Float Alternative would include enhanced capacity for the railcar float system across New York Harbor between Greenville Yard, in Jersey City (see **Figure 4-6**) and the existing yards in Brooklyn, shown in **Figure 4-8** (65th Street Yards and 51st Street Yard), as well as potential additional termini in the Bronx, as shown in **Table 4-5**, and illustrated in **Figure 4-13**. The enhancements would build upon the improvements approved for Greenville Yard and 65th Street Yard under the No Action Alternative and would include frequent and scheduled float operations, as well as improved schedule coordination between float operations and the rail operations, providing connecting service on either side of the harbor. Specifically, this alternative would include the following elements:

- Increased efficiency in float operations between Greenville Yard and 65th Street Yard (beyond the improvements planned for Greenville Yard under the No Action Alternative), frequent and scheduled float operations, and improved schedule coordination between float operations and the bulk rail operations;
- Construction of an additional railcar float bridge at Greenville Yard (for a total of three operational bridges);
- Construction of an additional railcar float bridge at 65th Street Yard or reestablishment of one bridge at 51st Street (for a total of three) with upgrades to float bridges and tracks connecting the bridge to the 51st Street Yard, to better serve float operations;
- Construction and rehabilitation of support tracks at 65th Street Yard and 51st St/Bush Terminal Yard;
- Expansion of Oak Point Yard for bulk operations and potential construction of an additional float terminal;
- Purchase of additional railcar floats;
- Track upgrades along the Bay Ridge Branch, including replacement of tracks, railroad ties, and ballast in certain locations to allow higher service speeds;
- A possible restoration of sidings to the east of 65th Street Yard and/or sidings at East New York Yard;
- Minor adjustments to clearance heights along the Bay Ridge Branch and Montauk Branch of the LIRR between Fresh Pond Yard, shown in **Figure 4-12**, and West Maspeth; and
- Signal improvements on the Montauk Branch to permit bi-directional operation on existing tracks.

TRUCK FERRY ALTERNATIVE

- Truck ferry terminals at the waterfront would need vehicle ramps, truck staging and parking areas, and access to highway truck routes. If needed, new bulkhead and fendering systems would have to be constructed at the terminals.
- This alternative would require the purchase or lease of truck ferries.

TRUCK FLOAT ALTERNATIVE

- Truck float terminals at the waterfront would need vehicle ramps, truck staging/parking areas, and access to highway truck routes. If needed, new bulkhead and fendering systems would have to be constructed at the terminal.
- This alternative would require the purchase or lease of truck float barges and tug boats.

ROLL ON-ROLL OFF (RORO) CONTAINER BARGE ALTERNATIVE

- Container RORO terminals at the waterfront would need new bulkhead and fendering systems, vehicle ramps, tractor staging area, trailer and chassis parking, truck staging/parking areas, and access to highway truck routes.
- This alternative would require the purchase of barges and tugboats. The two terminals would also need equipment (e.g., yard tractors, ramp, container chassis, reach stackers, forklifts, gate/office, and a maintenance facility).

LIFT ON-LIFT OFF (LOLO) CONTAINER BARGE ALTERNATIVE

- Container LOLO terminals at the waterfront would need new bulkhead and fendering systems, mobile harbor cranes, container storage area, tractor staging area, truck staging/parking areas, and access to highway truck routes.
- This alternative would require the purchase or lease of barges and tugboats. The two terminals would also need equipment, e.g., harbor cranes, adjustable spreaders, yard tractors, container chassis, reach stackers, gate/office, and maintenance facility.

RAIL TUNNEL ALTERNATIVES

RAIL TUNNEL ALTERNATIVE

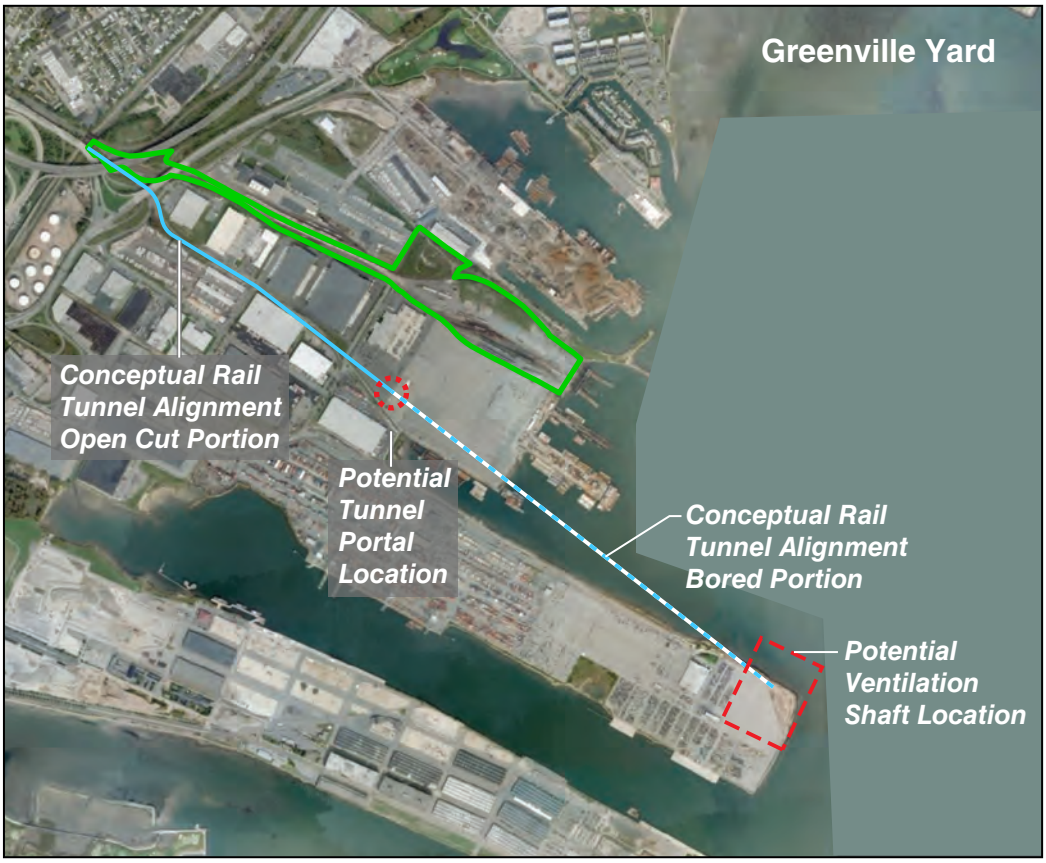
The Rail Tunnel Alternative would establish a direct freight rail connection across the harbor, between Greenville Yard in New Jersey and the Bay Ridge Branch in Brooklyn. The tunnel would be double-tracked and have double-stack clearance.

The length of the tunnel and portal locations are determined to a large extent by grade—the more gradual the grade, the longer the tunnel. Freight trains are long and heavy, and require additional horsepower to ascend an incline. Additional horsepower translates into higher emissions and greater ventilation requirements. To optimize tunnel length, energy requirements and ventilation requirements, the tunnel would be designed at a grade not to exceed 2 percent.

The tunnel would generally follow the Jersey City to Brooklyn alignment investigated in the 2004 DEIS. As reflected in **Table 4-2**, other potential rail tunnel alignments have been eliminated based on potential costs and effect identified in previous studies.

The Rail Tunnel Alternative portal in New Jersey would be located to the south of Greenville Yard, close to the end of Polar Way (please see **Figure 4-15**). From there, the alignment would follow a segment of Port Jersey Railway to the west and merge into Greenville Branch. The portal in Brooklyn would be located at approximately 10th Avenue. The Tunnel would be bored through to a point between 8th and 9th Avenues, constructed using cut and cover through to the portal, and travel in a cut until coming to grade between 12th and 13th Avenues along the Bay Ridge Branch right-of-way, as shown in **Figure 4-15**.

8.1.14



N

0 1000 2000 FEET
SCALE

N

0 1000 2000 FEET
SCALE

Existing Yard

FIGURE 4-15

Potential Tunnel Portal and Ventilation Shaft Locations

CROSS HARBOR FREIGHT PROGRAM

Ventilation requirements are the primary factor affecting tunnel capacity. Exhaust and heat generated by diesel locomotives must be adequately ventilated from the tunnel before another train can travel through it. Therefore, ventilation shafts for the tunnel would be built on either side of the harbor or on land, near the shoreline. Available sites for the ventilation shafts are limited since criteria for vent shaft location include: avoiding impacts on marine and shipping traffic; minimizing the length of the segment to be vented (i.e., placing vent closer to shoreline results in smaller segment); and placing the vent shaft directly above tunnel alignment. Based on these criteria, it is likely that the ventilation shafts would be built adjacent to the northeast tip of the Global Marine Terminal pier in New Jersey and at 65th Street pier in Brooklyn, as shown in **Figure 4-15**.

Associated Infrastructure Improvements

The rail freight infrastructure would need to be significantly upgraded to service modern trains that would use the tunnel. In some cases, construction of additional mainline tracks would be required. Such new tracks would be constructed near and parallel to the existing tracks and within the existing rail right-of-way. The following rail infrastructure improvements would be needed to implement this Build Alternative and to realize its full benefits. Except where noted otherwise, the improvements would be made within the Port District, illustrated in Figure 1-6.

- Expanded and/or new rail facilities, including the expansion of Oak Island Yard (shown in **Figure 4-5**), Maspeth Yard (shown in **Figure 4-11**), and development of a Long Island facility (outside of the Port District);
- Rehabilitation of existing mainline track and re-establishment of second mainline track along the Bay Ridge Branch between Brooklyn tunnel portal area and Fresh Pond Yard (shown in **Figure 4-12**), with clearances increased to 22.5 feet along the line;
- Improvements to two existing mainline tracks along the length of the Montauk Branch of the LIRR between Fresh Pond Yard and West Maspeth Yard, with clearances increased to 22.5 feet along the line;
- Improvements to two existing mainline tracks from the Lehigh Valley Drawbridge (shown in **Figure 4-5**) to the tunnel portal near Greenville Yard and addition of a third track for the Greenville Line, between Greenville Yard and the drawbridge; and
- Improvements to address height and weight tolerance restrictions east of Fresh Pond Yard (outside of the Port District).

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

Rail Shuttle terminals would need vehicle ramps, a tractor staging area, trailer and chassis parking, truck staging/parking areas, and access to highway truck routes. Otherwise, this alternative would operate on the same infrastructure as the conventional Rail Tunnel Alternative.

RAIL TUNNEL WITH CHUNNEL SERVICE ALTERNATIVE

The chunnel service would require infrastructure specific to accommodating chunnel trains, beyond the infrastructure identified above as necessary for the Rail Tunnel Alternative. A new terminal would be constructed along the Bay Ridge Branch at East New York Yard, shown in **Figure 4-10**. The new terminal would include the following elements, as conceptually illustrated in **Figure 4-16**:

- Three parallel 2,500-foot tracks;

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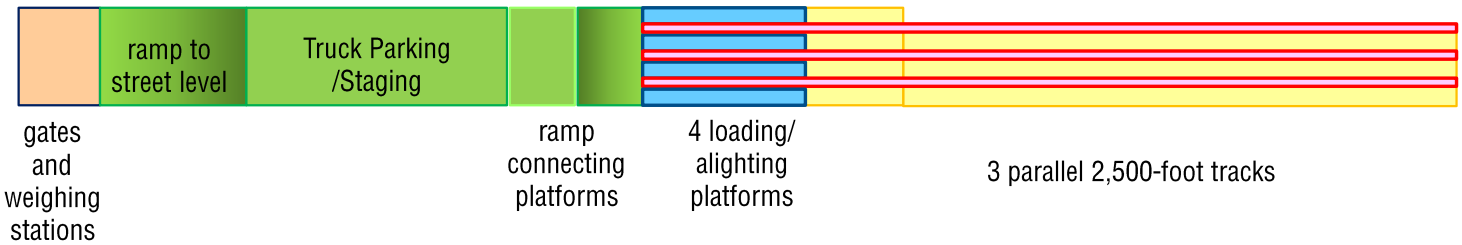

FIGURE 4-16

Rail Tunnel with Chunnel Service Alternative Conceptual Layout of Terminal Elements

CROSS HARBOR FREIGHT PROGRAM

- Four loading/alighting platforms on both sides of the tracks;
- A truck staging area that would include a ramp connecting the platforms, a truck maneuvering area, a ramp up to street level, and an area for gates and weighing stations; and
- Road and signal improvements to facilitate truck movements.

At the Oak Island Yard in New Jersey, shown in **Figure 4-5**, a similar terminal would be constructed. This terminal would be well connected to US-1/9 utilizing existing ramps, and thus no road improvements would be needed. However, the yard would need to be expanded.

RAIL TUNNEL WITH AUTOMATED GUIDED VEHICLE (AGV) TECHNOLOGY ALTERNATIVE

AGV service would require AGV platforms and control systems, dedicated train sets and specialized loading and unloading terminals (at locations shown in **Figure 4-6** and **Figure 4-10**). Otherwise, this alternative would operate on the same infrastructure as the conventional Rail Tunnel Alternative.

RAIL TUNNEL WITH TRUCK ACCESS ALTERNATIVE

In this alternative, two access areas would be constructed to provide truck access to rail tunnel and alignment. One would be at Greenville Yard (shown in **Figure 4-6**) and the other at East New York (see **Figure 4-10**). Both access areas would include truck parking areas, staging/queuing areas, truck ramps to rail tracks, and access to highway truck routes. Otherwise, this alternative would operate on the same infrastructure as the conventional Rail Tunnel Alternative.

H. COST AND SCHEDULE

The projected capital costs of the Build Alternatives, including yard improvements and expansion, trackwork, equipment, and infrastructure, are shown in **Table 4-6**. The costs include the construction, materials, and equipment as well as the cost of planning, design, and the regulatory approval process. As shown in the table, the cost of the Rail Tunnel Alternatives is much greater than the cost of the Waterborne Alternatives; however, the Rail Tunnel Alternatives would result in greater freight diversion and would offer additional freight movement capacity and transportation benefits, beyond the year 2035, for which benefits were quantified throughout this EIS.

Table 4-6
Capital Costs of the Build Alternatives

Alternatives	Total Cost (Million Dollars)
Waterborne	100 -600
Rail Tunnel	7,000 -11,000
Notes: All costs are presented in 2012 dollars.	

SCHEDULE AND IMPLEMENTATION

The anticipated duration for the approval and design, and the duration of construction for each class of the Build Alternatives are discussed in this section. Anticipated completion of Tier II documentation, final design, and regulatory permits for the Rail Tunnel Alternatives would take

approximately twice as long as for the Waterborne Alternatives. The construction of the Waterborne Alternatives would take two years and the construction of the Rail Tunnel Alternatives would take a minimum of 8 years. 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 noted previously, 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 long-term solution, using the infrastructure improved and the markets established with the implementation of one or more Waterborne Alternatives.

I. CONSTRUCTION

The construction elements for the proposed Build Alternatives can be separated into three categories: (1) freight facilities—expansion of existing facilities or development of new facilities and terminals; (2) rail lines and roadways—new tracks or sidings and improved rail clearances to accommodate increased demand and modern rail equipment, and truck access improvements; and (3) tunnel-specific infrastructure, such as the tunnel itself and associated structures.

WATERBORNE ALTERNATIVES

ENHANCED RAILCAR FLOAT ALTERNATIVE

The Enhanced Railcar Float Alternative would include the following construction activities in addition to those of the No Action Alternative. Freight facilities where construction mentioned below would occur are illustrated in **Figure 4-1**.

- Construction of one additional railcar float bridge in Greenville Yard (for a total of three) and additional track.
- Construction of one additional railcar float bridge in 65th Street Yard or at 51st Street (for a total of three).
- The expansion of 65th Street Yard plus associated trackwork.
- Construction of two sidings along the Bay Ridge Branch at East New York Yard.
- Improvements at Fresh Pond Yard, including track to facilitate increased rail traffic.
- The expansion of Oak Point Yard and associated track to support yard operations.
- Potential development of an additional railcar float terminal in the Bronx, as listed in **Table 4-5**.

TRUCK FERRY ALTERNATIVE

The Truck Ferry Alternative would include the following construction activities in addition to those of the No Action Alternative:

- Ferry terminals at the waterfront, which include vehicle ramps, truck staging/parking areas, utility, gate/office, and maintenance facility.
- New bulkhead and fendering systems have to be constructed at the terminal, if needed.
- Road access to highway truck routes, including driveway and truck ramp, if needed.

TRUCK FLOAT ALTERNATIVE

The Truck Float Alternative would include the following construction activities in addition to those of the No Action Alternative:

- Truck float terminals at the waterfront, which include vehicle ramps, truck staging/parking areas, utility, gate/office, and maintenance facility.
- New bulkhead and fendering systems have to be constructed at the terminal, if needed.
- Road access to highway truck routes, including driveway and truck ramp, if needed.

ROLL ON-ROLL OFF (RORO) CONTAINER BARGE ALTERNATIVE

The RORO Container Barge Alternative would include the following construction activities in addition to those of the No Action Alternative:

- Container terminals at the waterfront, which include vehicle ramps, tractor staging area, trailer and chassis parking, truck staging/parking areas, utility, gate/office, and maintenance facility.
- Road access to highway truck routes, including driveway and truck ramp, if needed
- New bulkhead and fendering systems, if needed.

LIFT ON-LIFT OFF (LOLO) CONTAINER BARGE ALTERNATIVE

The LOLO Container Barge Alternative would include the following construction activities in addition to those of the No Action Alternative:

- Container terminals at the waterfront, which include mobile harbor cranes, tractor staging area, trailer and chassis parking, truck staging/parking areas, utility, gate/office, and maintenance facility.
- Road access to highway truck routes, including driveway and truck ramp, if needed.
- New bulkhead and fendering systems, if needed.

RAIL TUNNEL ALTERNATIVES

RAIL TUNNEL ALTERNATIVE

The Rail Tunnel Alternative would require a construction process involving many different types of activities throughout the study area, including the construction of the tunnel and its related infrastructure, trackwork and improved clearances, and rail yard expansion or construction. It is expected that the Bay Ridge Branch would remain operational during the construction period to

allow existing freight volumes to move through the region. The discussion below provides a description of the main elements of the construction methods and processes under the Rail Tunnel Alternative.

Tunnel and Associated Infrastructure

The proposed tunnel configuration would most likely consist of two bores, each with a single track. From portal to portal, the tunnel would be approximately 30,000 feet in length, with its western portal near the end of Polar Way at Greenville (Jersey City, New Jersey) within the Port Jersey Line right-of-way, just south of Greenville Yard, and its eastern portal around 11th Avenue (Brooklyn) within the Bay Ridge Branch right-of-way (**Figure 4-15**). The tunnel would consist of four parts: (1) an open cut section on either end as the tracks begin their descent and approach to the tunnel portals, (2) a cut and cover section from each tunnel portal to the point where the tracks reach the grade of the bored tunnel, (3) the bored portion underneath the harbor, and (4) the ventilation structures.

The current concept for tunnel construction is a hybrid approach that combines the use of a tunnel boring machine (TBM) with a short section using an immersed tube adjacent to the New Jersey shoreline. The immersed tube construction would be used for the area off the coast of New Jersey just south of Greenville Yard where it may be difficult to use a TBM. This portion of the tunnel would connect the bored tunnel with the cut and cover section in New Jersey. However, detailed engineering design would be required to determine if a completely bored tunnel could be used in lieu of the hybrid approach. This would avoid many of the potential adverse environmental effects, such as the potential effects from dredging across the harbor on water quality and aquatic resources associated with the construction of an immersed tube tunnel in the harbor.

The length of the tunnel between the portals and the bored section would be constructed using the cut and cover technique. In this zone, the tracks would be descending to the grade of the tunnel. This construction method is necessary because a TBM requires about one tunnel-width of cover above it to ensure safe and proper operation. As the name implies, cut and cover construction entails cutting the ground surface open, excavating to the required depth, and then re-covering it once construction is complete.

The excavation for the cut and cover tunnel portion in New Jersey would start at the portal and extend several thousand feet to the shoreline, where a cofferdam would serve as a transition structure to connect to the immersed tube. The immersed tube would continue approximately 4,200 feet to a cofferdam constructed at the end of the Global Marine Terminal/NEAT pier (**Figure 4-15**) and in turn connect to the bored tunnel. Once tunneling work is completed, a ventilation structure would be constructed on the site of the cofferdam.

The cut and cover section in Brooklyn would run west from the tunnel portal, approximately at 11th Avenue, to a point between 8th and 9th Avenues (**Figure 4-15**). Before the start of excavation, the existing tracks would be relocated to allow for continued rail operations at 65th Street Yard and along the Bay Ridge Branch.

Shaft Site

Shaft sites for construction of the tunnel would be required near each shoreline. The shaft sites would also be used to transport materials, workers, and tunnel spoils (i.e., the excavated rock and soil) to and from the surface as well as to provide energy and ventilation for the tunneling operations. A staging area where material and equipment is stored, maintenance shops,

construction trailers, employee parking, and other ancillary facilities would be set up adjacent to the shaft site.

In Brooklyn, the shaft would likely be located within 65th Street Yard, near the waterline. The TBMs would be launched east toward the end of the cut and cover section at approximately 11th Avenue and west toward the cofferdam off the New Jersey coast where the other shaft site would be located. However, depending upon further engineering during any Tier II work, the New Jersey shaft could be relocated if a fully bored tunnel is shown to be feasible. Tunnel spoils would be transported by barge or rail to the extent possible.

Ventilation structures would be required, one near each end of the tunnel—in Brooklyn and in the vicinity of the New Jersey shoreline most likely in the areas of the shaft sites (**Figure 4-15**).

*Freight Facilities (**Figure 4-1** and **Figure 4-4** through **Figure 4-14**)*

Oak Island Yard

The yard, shown in **Figure 4-5** would be used for freight car classification and storage. The yard would also be used for fillet/toupee operations. To support these operations, the yard would need to be expanded from its existing boundaries. The yard would be composed of 17 approximately 4,000-foot tracks in ladders and support tracks for storage, switching, and maintenance. Pavement would be needed at the container transfer (fillet/toupee) area for lift equipment.

65th Street Yard

Additional land would be needed to support rail operations at this site, shown in **Figure 4-8**. Operations at the yard would include storage, sorting, and merchandise transloading operations. A total of 12,000 feet of classification and transloading tracks would be constructed.

East New York Site

Two sidings would be constructed at East New York site, shown in **Figure 4-10**, parallel to the Bay Ridge Branch mainline to facilitate train movements. This site could serve as an additional fillet/toupee yard or a potential alternative to the proposed fillet/toupee operations at the Oak Point Yard (**Figure 4-5**). This would require rehabilitation of two mainline tracks and two new rail sidings to parallel the Bay Ridge Branch mainline from Kings Highway to the portal of the East New York Tunnel, with supporting switches. In the segment between New Lots Avenue and Pitkin Avenue, sufficient space would be provided on both sides of the sidings for crane legs. One of the mainline tracks into the East New York Tunnel and sidings between Kings Highway and New Lots Avenue would be used to move and store trains for fillet/toupee operations.

Fresh Pond Yard

To accommodate an increase in rail traffic, improvements at Fresh Pond Yard (shown in **Figure 4-12**) would be needed, including extension of tracks and switches, and addition of sidings and crossovers. The east leg of the wye would need to be realigned, with a reduced radius curve that would allow use of six axle power and higher speeds. To accommodate bulk and intermodal trains to Maspeth Yard (shown in **Figure 4-11**), the improvement of the west leg of the wye connecting the Bay Ridge Branch and the western section of Fresh Pond Yard would include two tracks with a reduced radius curve that would allow for use of six axle power and higher speeds.

Maspeth Yard

Maspeth Yard (shown in **Figure 4-11**) would need to be expanded to handle both bulk and intermodal freight. The yard would be built on the land between the existing Maspeth Yard and

the 37-acre underutilized former Phelps Dodge site (shown in **Figure 4-11**). It would serve as a main location in New York City for the transfer of intermodal freight. Yard construction would include trackwork and switches for both intermodal and merchandise transloading operations.

Oak Point Yard

Oak Point Yard (shown in **Figure 4-13**) improvements would include 7,000-foot trackwork and six switches for transloading and storage operations.

Rail Line Construction

Waverly Loop

It is possible that accommodating the increased freight volumes forecast with the Rail Tunnel Alternative may require the construction of a second Waverly Loop to connect the Passaic and Harsimus (P&H) Line (labeled in **Figure 4-4**) and the Greenville Branch (**Figure 4-4**). This connection would involve the installation of rail track and shallow excavation. Preliminary engineering associated with a Tier II EIS would determine if this is a necessary improvement.

Bay Ridge Branch

The Rail Tunnel Alternative would require the complete rehabilitation of the Bay Ridge Branch to provide the necessary vertical and horizontal clearance to accommodate modern rail freight equipment as well as the installation of new mainline tracks and sidings. Minor work would include utility relocations, signals, right-of-way fencing, and retaining walls. It is anticipated that clearance work would be required at over 47 locations where road and subway bridges pass over the depressed Bay Ridge Branch. Much of the clearance work would be accomplished by lowering the existing track several feet and replacing or shoring the adjacent foundations of the existing bridges.

The work for the clearances would likely be staged from within the Bay Ridge Branch right-of-way.

Major reconstruction work would be required to provide double-stack clearance at the East New York Tunnel. This tunnel extends from Liberty Avenue to Evergreen Avenue, shown in **Figure 4-17**. The existing tunnel is a four-cell concrete frame structure. One cell carries the Buckeye Pipeline that transports jet fuel and other fuels to LGA and JFK and would not be disturbed. The remaining three cells would be converted into a two-cell frame to provide the required clearances.

Once the earth and structural work is complete, new track bed, ties, and rails would be installed over the entire 10 miles of the Bay Ridge Branch from the tunnel portal to Fresh Pond Yard, shown in **Figure 4-17**. Two additional tracks, on each side of the mainline tracks, would be constructed from East 43rd to East 98th Street along with new signals and retaining walls.

Montauk Branch

The Montauk Branch rehabilitation (shown in **Figure 4-17**) would include track and clearance work and would occur entirely within the existing right-of-way.

The clearance work would involve the excavation of a 4,800-foot-long trench from Fresh Pond Yard to west of Andrews Avenue. Five bridges would require underpinning, and two additional bridges (at Fresh Pond Road and the M train overpass) would require complete reconstruction. In addition to the clearance work, new track would be installed from Fresh Pond Yard to Maspeth Yard. Signal work would also be required, which would be performed after the clearance work was completed, and would be linked to the signal work on the Bay Ridge Branch.

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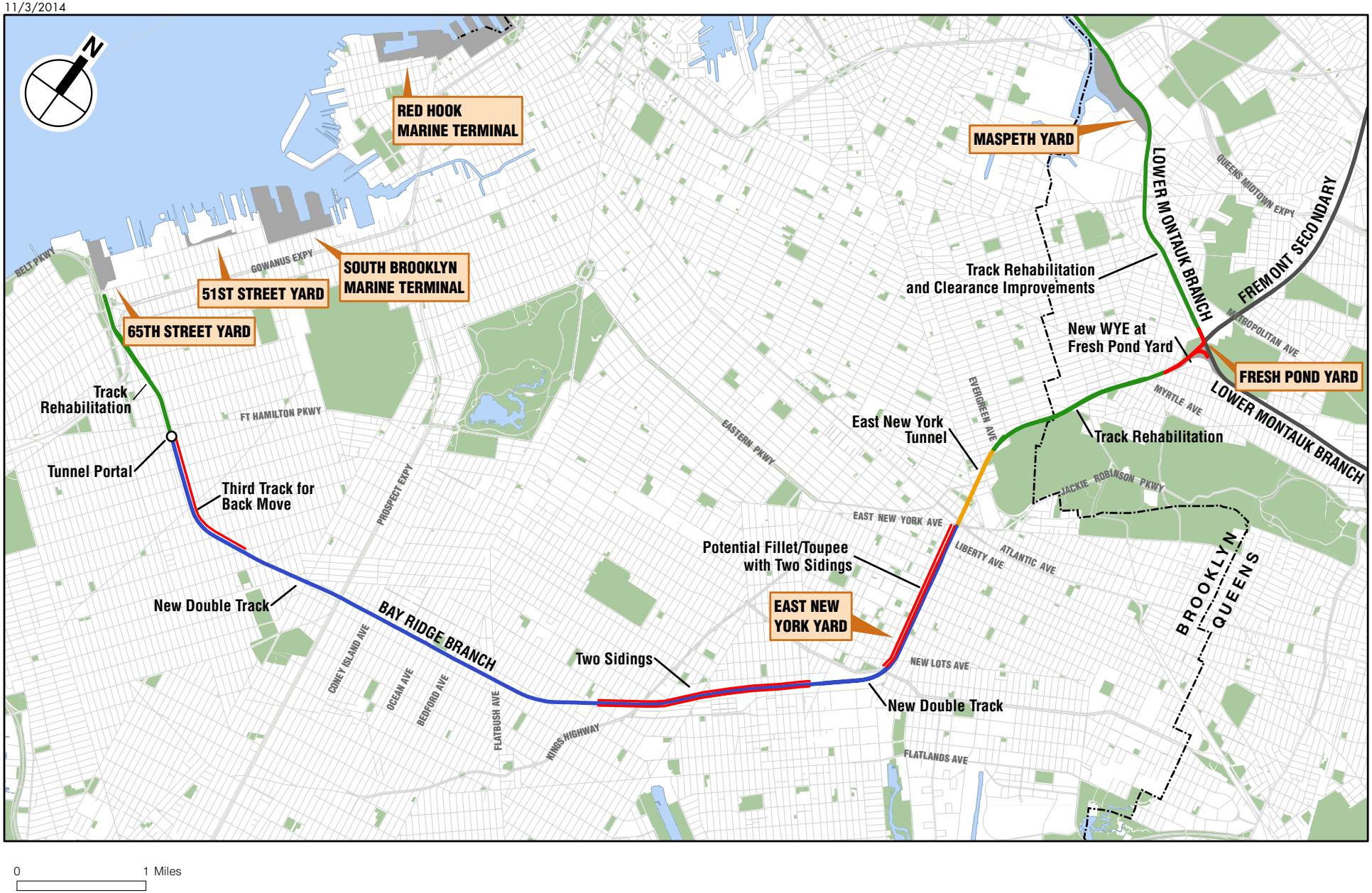

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FIGURE 4-17

Bay Ridge Branch and Montauk Branch Improvements for Enhanced Railcar Float and Rail Tunnel Alternatives

CROSS HARBOR FREIGHT PROGRAM

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

The Rail Tunnel with Shuttle Service Alternative is nearly identical to the Rail Tunnel Alternative in its infrastructure requirements, except in the specific areas discussed below. Shuttle operations would require additional facilities beyond those of the Rail Tunnel Alternative. The west-of-Hudson terminal would be located at a suitable location outside of the Port District, such as the intermodal facility in Harrisburg, Pennsylvania, while the east-of-Hudson terminal would be at Maspeth Yard (**Figure 4-1**). A shuttle terminal facility that could handle intermodal freight could also be developed on Long Island, which is also outside of the Port District. At each terminal, there would be a container storage area, a trailer/chassis parking area, tractor staging area, cranes, truck parking/staging areas, gates, driveways, truck ramps, office, and auxiliary buildings.

Freight Facilities

Pennsylvania or other West-of-Hudson (Outside of the Port District)

In addition to the yard construction discussed for the Rail Tunnel Alternative, an independent container loading terminal would be constructed, which would include cranes, container storage area, trailer/chassis parking area, tractor staging area, and truck parking/staging areas. The terminal would also include truck driveways, ramps, office space, and other service facilities.

Bay Ridge Branch

A total of 25,000 feet of trackwork would be conducted between Kings Highway and New Lots Avenue, shown in **Figure 4-17**.

Maspeth Yard

Maspeth Yard (shown in **Figure 4-11**) would be developed as an intermodal yard. In addition to handling carload and intermodal freight, it would also include a truck loading terminal, which would include cranes, container storage area, trailer/chassis parking area, tractor staging area, and truck parking/staging areas. The yard would also include truck driveways, ramps, office, and other service facilities. A similar terminal could be developed in Nassau or Suffolk County in addition or instead.

RAIL TUNNEL WITH CHUNNEL SERVICE ALTERNATIVE

The Rail Tunnel with Chunnel Service Alternative is nearly identical to the Rail Tunnel Alternative in its infrastructure requirements, except for specific elements discussed below. Chunnel operations would require additional facilities beyond those of the Rail Tunnel Alternative. The additional facilities would be located at Oak Island Yard (**Figure 4-5**) and East New York Site (**Figure 4-10**). At each terminal, there would be platforms, truck parking/staging areas, gates, driveways, truck ramps, office, and auxiliary buildings. At the East New York terminal, the truck staging area would be at an underground structure.

Freight Facilities

Oak Island Yard

In addition to the yard construction for the Rail Tunnel Alternative, an independent truck loading terminal would be constructed at this yard. The terminal would also include truck driveways, ramps, platforms, staging areas, office space, and other service facilities.

Bay Ridge Branch

A total of 25,000 feet of trackwork would be conducted between Kings Highway and New Lots Avenue, shown in **Figure 4-17**.

East New York Yard

In addition to the mainline improvements for the Rail Tunnel Alternative, an independent truck loading terminal would be constructed between New Lots Avenue and Pitkin Avenue (see **Figure 4-10**). The terminal would also include truck driveways, ramps, platforms, staging areas, office, and other service facilities.

RAIL TUNNEL WITH AUTOMATED GUIDED VEHICLE (AGV) TECHNOLOGY ALTERNATIVE

The Rail Tunnel with AGV Technology Alternative is nearly identical to the Rail Tunnel Alternative in its infrastructure requirements, except in the specific areas discussed below. AGV operations would require additional facilities beyond those of the Rail Tunnel Alternative. These additional facilities would be located at Greenville Yard (**Figure 4-6**) and East New York (**Figure 4-10**). At each terminal, there would be container storage area, cranes, AGV staging area, truck ramps, truck parking/staging areas, gates, driveways, office, and auxiliary buildings. At the East New York terminal, the truck staging area would be at an underground structure.

Freight Facilities

Greenville Yard

In addition to the yard construction for the Rail Tunnel Alternative, an independent AGV loading terminal would be constructed at this yard, which would include a container storage area, an AGV staging area, and an AGV queuing area. The AGV queuing area would have a direct and easy access to the tunnel portal. The terminal would also include crane, truck driveways, ramps, truck staging areas, office space, and other service facilities.

Bay Ridge Branch

A total of 25,000 feet of trackwork would be conducted between Kings Highway and New Lots Avenue, shown in **Figure 4-17**.

East New York Site

In addition to the mainline improvements needed for the Rail Tunnel Alternative, an independent AGV loading terminal would be constructed between New Lots Avenue and Pitkin Avenue (shown in **Figure 4-10**), which would include a container storage area, an AGV staging area, and an AGV queuing area. The AGV queuing area would have a direct and easy access to the rail tracks. The terminal would also include truck driveways, ramps, platforms, staging areas, office, and other service facilities.

RAIL TUNNEL WITH TRUCK ACCESS ALTERNATIVE

The Rail Tunnel with Truck Access Alternative is nearly identical to the Rail Tunnel Alternative in its infrastructure requirements, except in the specific areas discussed below. Truck operations would require additional facilities beyond those of the Rail Tunnel Alternative. These facilities would be located at the two proposed terminals at Greenville Yard (**Figure 4-6**) and East New York (**Figure 4-10**). At each terminal, there would be truck ramps, truck parking/staging areas, gates, driveways, office, and auxiliary buildings. At the East New York terminal, the truck staging area would be at an underground structure.

Freight Facilities

Greenville Yard

In addition to the yard construction needed for the Rail Tunnel Alternative, an independent truck access terminal would be constructed at this yard, shown in **Figure 4-6**, which would include a truck parking area, a staging/queuing area, and truck ramps to rail tracks. The truck queuing area would have a direct and easy access to the tunnel portal. The terminal would also include driveways, ramps, truck staging areas, office space, and other service facilities. Road access to highway truck routes would be constructed, including Interstate-78, Route 185 and Route 440. These highway truck routes are shown in **Figure 4-6**.

Bay Ridge Branch

Space between rails would be paved to allow truck movements.

East New York Yard

In addition to the mainline improvements needed for the Rail Tunnel Alternative, an independent truck access terminal would be constructed between New Lots Avenue and Pitkin Avenue (shown in **Figure 4-10**), which would include a truck parking area, a staging/queuing area, and truck ramps to rail tracks. The truck queuing area would have a direct and easy access to the rail tracks. The terminal would also include driveways, ramps, truck staging areas, office space, and other service facilities. Road access to city truck routes would be constructed, including Atlantic Avenue, Linden Boulevard and Avenue D. These roads are shown in **Figure 4-6**. ✷