Bayonne Bridge Navigational Clearance Program

Final Environmental Assessment

THE PORT AUTHORITY OF NY & NJ

Federal Lead Agency:
United States Coast Guard

May 2013

U.S. COAST GUARD

ENVIRONMENTAL ASSESSMENT

FOR

PROPOSED MODIFICATION OF THE BAYONNE BRIDGE ACROSS THE KILL VAN KULL BETWEEN BAYONNE, HUDSON COUNTY, NEW JERSEY AND STATEN ISLAND, RICHMOND COUNTY, NEW YORK

This Coast Guard Environmental Assessment was prepared in accordance with Commandant's Manual Instruction M16475.1D and is in compliance with the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321) and the Council on Environmental Quality Regulations dated 29 November 1978 (40 CFR 1500-1508).

This Environmental Assessment serves as a concise public document to provide sufficient evidence and analysis for determining the need to prepare an Environmental Impact Statement or a Finding of No Significant Impact.

This Environmental Assessment concisely describes the proposed action, the need for the proposal, the alternatives, the environmental impacts of the proposal and alternatives, comparative analysis of the action and alternatives, a statement of environmental significance, and lists the agencies and persons consulted during its preparation.

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AADT	Average Annual Daily Traffic
AAPA	American Association of Port Authorities
AASHTO	American Association of State Highway And Transportation Officials
ABFE	Advisory Base Flood Elevation
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos Containing Materials
ACS	American Community Survey
AHERA	Asbestos Hazardous Emergency Response Act
AIRS	Aerometric Information Retrieval System
ANSI	American National Standards Institute
APE	Area of Potential Effect
AST	Aboveground Storage Tank
ASTM	American Society of Testing And Materials Standards
ATR	Automatic Traffic Recorders
BBADA	Bayonne Bridge Air Draft Analysis
BG	Block Group
BLPC	Bayonne Landmarks Preservation Commission
BMP	Best Management Practices
BMS	Brownfields Management System
BRT	Bus Rapid Transit
CAA	Clean Air Act
CAF	Consistency Assessment Form
CAFE	Corporate Average Fuel Economy
CAFRA	Coastal Area Facility Review Act
CAGR	Compound Annual Growth Rate
CEQ	Council on Environmental Quality
CEQR	City Environmental Quality Review

CERCLA	Comprehensive Environmental Response, Compensation, And Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, And Liability Information System
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
CMP	Coastal Management Program
CO	Carbon Monoxide
CPIP	Comprehensive Port Improvement Plan
CSI	Cambridge Systematics, Inc.
CWA	Clean Water Act
CZM	Coastal Zone Management
DCA	Department of Community Affairs
DCP	New York City Department Of City Planning
DEC	New York State Department of Environmental Conservation
DEIS	Draft Environmental Impact Statement
DEP	Department of Environmental Protection
DHS	Department of Homeland Security
EA	Environmental Assessment
EAF	Environmental Assessment Form
EAS	Environmental Assessment Statement
EC	Engineering Control Sites
EDPL	Eminent Domain Procedures Law
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ERB	Executive Review Board
ENSP	Endangered and Nongame Species Program
EPA	Environmental Protection Agency
EPC	Environmental Performance Commitment
EPCRA	Emergency Planning and Community Right-To-Know Act
ERNS	Emergency Response Notification System
ES	Environmental Screening
ESA	Environmental Site Assessment

ESC	Erosion and Sediment Control
FAA	Federal Aviation Administration
FAR	Floor Area Ratio
FDNY	New York City Fire Department
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FINDS	Facility Index System List
FIRM	Flood Insurance Rate Maps
FOIA	Freedom of Information Act
FONSI	Finding of No Significant Impact
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GWP	Global Warming Potential
HAER	Historic American Engineering Record
HBLR	Hudson Bergen Light Rail
HCM	Highway Capacity Manual 2000
HFC	Hydrofluorocarbons
HIA	Health Impact Assessment
HMIRS	Hazardous Materials Incident Response System
HNS	Harbor Navigation Study
HRA	Health Risk Assessment
HVAC	Heating, Ventilation, and Air Conditioning
HW	Height to Width
IC	Institutional Control Sites
IMO	International Maritime Organization
ISO	International Standards Organization
KTMH	Keel to Mast Height
LED	Light-Emitting Diodes
LOCMA	Lower Orange County Metropolitan Area
LOS	Level of Service
LSRP	Licensed Site Remediation Professional
LUST	Leaking Underground Storage Tank
LZ	Littoral Zone

MBTA	Migratory Bird Treaty Act
MHHW	Mean Higher High Water
MHW	Mean High Water
MLW	Mean Low Water
MOA	Memorandum of Agreement
MODD	Modified Wetlands
MOTBY	Military Ocean Terminal at Bayonne
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emissions Simulator
MTA	Metropolitan Transportation Authority
MY	Model Year
NAA	Non-Attainment Areas
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NATA	National-Scale Air Toxics Assessment
NB	Northbound
NCDB	National Compliance Date Base System
NCHRP	National Cooperative Highway Research Program
NED	National Economic Development
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFRAP	No Further Remedial Action Planned
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NJDEP	New Jersey Department of Environmental Protection
NJDOH	New Jersey Department of Health
NJDOT	New Jersey Department of Transportation
NJEF	New Jersey Environmental Federation
NJHPO	New Jersey Historic Preservation Office
NJNHP	New Jersey Natural Heritage Program
NJPDES	New Jersey Pollution Discharge Elimination System
NJTA	New Jersey Turnpike Authority
NLR	No Longer Regulated

NMFS	National Marine Fisheries Service
NO	Nitric Oxide
NO2	Nitrogen Dioxide
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NPCC	New York City Panel on Climate Change
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NR	National Register Of Historic Places
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NYCDCP	New York City Department of City Planning
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOE	New York City Department of Education
NYCDOH	New York City Department of Health And Mental Hygiene
NYCDOT	New York City Department of Transportation
NYCDPR	New York City Department of Parks and Recreation
NYCEDC	New York City Economic Development Corporation
NYCL	New York City Landmark
NYCRR	New York Codes, Rules and Regulations
NYCT	New York City Transit
NYNHP	New York Natural Heritage Program
NYNJHNS	New York and New Jersey Harbor Navigation Study
NYSDEC	New York State Department of Environmental Conservation
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
NYSHPO	New York State Historic Preservation Office
NYSR	New York State Register of Historic Places
OCMC	Office of Construction Mitigation and Coordination
OPRHP	Office of Parks, Recreation, and Historic Preservation

OSHA	Occupational Safety and Health Administration
PADS	PCB Activity Database System
PAH	Polynuclear Aromatic Hydrocarbons
PANYNJ	Port Authority of New York and New Jersey
PCB	Polychlorinated Biphenyls
PFC	Perfluorocarbons
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
PS	Public School
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
REC	Recognized Environmental Conditions
ROSI	Recreation and Open Space Inventory
RPAD	Real Property Assessment Database
SAV	Submerged Aquatic Vegetation
SB	Southbound
SBMT	South Brooklyn Marine Terminal
SCM	Supplementary Cementitious Materials
SDWA	Safe Drinking Water Act
SEQRA	State Environmental Quality Review Act
SHPO	State Historic Preservation Office
SIEDC	Staten Island Economic Development Corporation
SIIAS	Staten Island Institute of Arts and Sciences
SIP	State Implementation Plan
SIR	Staten Island Railway
SLM	Sound Level Meters
SMIA	Significant Maritime and Industrial Area
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SPCC	Spill Prevention, Countermeasures, and Containment Plan

SPDES	State Pollutant Discharge Elimination System
SR	State Register of Historic Places
SRRA	Site Remediation Reform Act
SWL	Solid Waste Facilities/Landfills
SWPPP	Stormwater Pollution Prevention Plan
TCI	Transportation Climate Initiative
TEM	The Environmental Manual
TEU	Twenty-Foot Equivalent Units
TMC	Turning Movement Counts
TMDL	Total Maximum Daily Load
TP	Total Pollutant
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
TSS	Total Suspended Solids
TWA	Treatment Works Approval
UEZ	Urban Enterprise Zone
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
WOUS	Waters of the United States
WRP	Waterfront Revitalization Program

S-1 INTRODUCTION

United States Coast Guard (USCG) as the lead agency, in consultation with Port Authority of New York and New Jersey (PANYNJ), has prepared this environmental documentation pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.; NEPA). This Environmental Assessment (EA) examines the potential environmental effects of the Bayonne Bridge Navigational Clearance Program. Where potential adverse impacts have been identified, this document discusses practical measures to avoid, minimize, or mitigate them. Revisions made subsequent to publication of the Draft EA, based on public and agency comments and any project refinements, are indicated in this Final EA with double-underlines.[1] For further details on the public review process, see Chapter 3, "Process, Agency Coordination, and Public Participation," and Chapter 20, "Responses to Comments."

S-2 PURPOSE AND NEED

The purpose of the project is to reconstruct the roadway of the Bayonne Bridge over the Kill Van Kull. As noted below, the project would increase vertical clearance, improve substandard features, and provide seismic stability. In addition, the project would preserve the long-term economic efficiency and sustainability of the Port of New York and New Jersey, and bring the bridge into conformance with modern highway and structural design standards.

The Bayonne Bridge—which provides a crossing over the Kill Van Kull, a shipping access channel for the Port of New York and New Jersey—was constructed in 1931 and pre-dates many modern traffic and design standards. The project would upgrade the bridge to these modern design standards, thereby sustaining an important component of the region's transportation infrastructure, consistent with PANYNJ's charge to maintain interstate transportation facilities in the New York metropolitan area. In addition, the project would increase the vertical navigational clearance of the bridge to adapt to changes in the shipping industry and ensure the long-term vitality and efficiency of the Port of New York and New Jersey. The Panama Canal Authority is expanding the capacity of its facilities to accommodate vessels that have a load carrying capacity of approximately 12,000 twenty-foot equivalent units (TEUs). Larger cargo vessels are being constructed and more frequently used to increase carrying capacity and attain greater economies of scale. The increase in vertical clearance (also called air draft limitation) of the Bayonne Bridge is necessary to allow these larger vessels to pass beneath the bridge to the Port of New York and New Jersey. The Port

[1] Chapter 20, "Responses to Comments," is an entirely new chapter in the EA and therefore does not include double-underlined text.

includes four container facilities that constitute the third busiest port in United States and the largest on the Eastern Seaboard. In 2010, the Port of New York and New Jersey handled more than 2,725 vessels and 5.29 million TEUs of cargo. On average, the TEUs loaded or unloaded in terminals west of the bridge represent 40 percent of the total TEUs carried on ships arriving at those terminals.

As described further in Chapter 1, "Purpose and Need," the Bayonne Bridge Air Draft Analysis prepared by the U.S. Army Corps of Engineers (USACE) estimated the National Economic Development (NED) benefits from removing the Bayonne Bridge clearance restriction and allowing larger ships to call on the Port. NED benefits are transportation cost savings to the nation that can be attributed to economies of scale resulting from using larger vessels, i.e. the cost difference between operating smaller, less economically efficient vessels not constrained by the existing bridge, and larger vessels that could be used when the air draft restriction is removed. The cost of constructing the project alternatives and associated operating costs are factored into the calculation of project benefits. The *Bayonne Bridge Air Draft Analysis (BBADA)* found that raising the bridge would have long-term NED benefits of over $3 billion, and up to $169 million in average NED annual net benefits (assuming a 50-year project life).

The project is needed to sustain this important component of the region's transportation infrastructure. The project is consistent with the PANYNJ's objective as a bi-state governmental entity to maintain and modernize interstate transportation facilities such as bridges, and to sustain the Port of New York and New Jersey as modern, efficient, and competitive. Like most PANYNJ projects, it is not revenue-enhancing, although the Port, as a consumer of goods and services, would likely realize some of the cost savings resulting from the increased access to the Port by larger container ships. That increased access, however, is not expected to markedly alter the market share or hinterland of the Port relative to other ports or result in any substantial increase in the volume of cargo through the Port.

S-3 PROJECT ALTERNATIVES

This EA considers two alternatives—No Build Alternative and Raise the Roadway Alternative. Previous studies prepared in connection with the project concluded that other alternatives are not prudent because of their construction risks, environmental impacts, and costs as compared to the proposed project. The following alternatives were considered but discarded: Jack the Arch Alternative; Lift Bridge Alternative; Tunnel Alternative; New Cargo Terminals Alternative; Ferry Service Alternative, and Military Ocean Terminal at Bayonne (MOTBY). Therefore, this EA does not consider the potential environmental effects of the discarded alternatives for the Bayonne Bridge Navigational Clearance Program.

S-3-1 NO BUILD ALTERNATIVE

The No Build Alternative would involve the continued operation of the existing bridge with a navigational clearance of 151 feet above mean high water (MHW). The No Build Alternative serves as the baseline condition against which the potential benefits and impacts of the Raise the Roadway Alternative are evaluated.

S-3-2 RAISE THE ROADWAY ALTERNATIVE

The Raise the Roadway Alternative would include the following elements:

- An increase to 215 feet of vertical clearance above Mean High Water would meet the height requirements for most Post-Panamax vessels.
- The existing channel width of 800 feet through the Kill van Kull would be maintained.
- The width of the bridge's main span roadway would be increased from approximately 40 to 70 feet. The deck would consist of four, 12-foot travel lanes (two lanes in each direction), a 6-foot, 8-inch median with a barrier, and outside shoulders including a safety wall.
- A 12-foot-wide, shared-use (pedestrian and bicycle) path would be provided along the east side of the northbound lanes along the outside of the arch. The total width of the bridge deck, including a shared-use path, a utility catwalk, and the arch structure, would be approximately 98 feet. The shared-use path would be continuous along the bridge at a length of approximately 7,000 feet.
- The project would increase the grade of the approach spans to a 4.85 percent slope in New Jersey and a 5.0 percent slope in New York to meet the higher road deck of the bridge. The approach roadways would be widened from 50 feet to 90 feet to allow for the upgrade to current roadway design standards. Acceleration and deceleration lanes would be located at the landings in Bayonne and Staten Island thereby creating a total maximum width of approximately 115 feet.
- The existing approach roadway piers would be demolished below existing ground and new ones built supporting the approach roadway at the new higher elevation.
- The bridge's design would not preclude potential transit service on the bridge in the future.

S-4 PROCESS, AGENCY COORDINATION, AND PUBLIC PARTICIPATION

PANYNJ is requesting approvals from United States Coast Guard (USCG) and USACE for implementation of the Bayonne Bridge Navigational Clearance Program. These federal approvals are subject to environmental review under NEPA. As this project involves a bridge over a navigable waterway, USCG is serving as the federal lead agency for NEPA review.

The project is classified as a State Environmental Quality Review Act (SEQRA) Type I action (6 NYCRR Part 617.4), indicating that it has the potential for environmental impacts that should be evaluated under SEQRA. Therefore, this EA should assist in achieving compliance with the requirements of SEQRA. In accordance with 6 NYCRR Part 617.15, the NEPA and SEQRA processes are coordinated. Implementation and construction of the project is subject to a number of state and federal permits and approvals in addition to complying with the requirements of NEPA and SEQRA.

Section 106 requires that agency officials work with New York and New Jersey State Historic Preservation Offices (SHPOs) to identify parties to participate in the Section

106 process ("Consulting Parties"). A Programmatic Agreement was prepared and is included in this EA (see **Appendix B**). Consistent with the commitments of the Programmatic Agreement, there will be ongoing involvement by the Consulting Parties as the project advances through design and construction.

Continuing the commitment to an open, participatory process, the project has solicited feedback from the public and from agencies; encouraged open discussion of project details and issues; and provided opportunities for comments and questions. The project's public outreach program, including outreach to the environmental justice communities of concern, has been ongoing throughout the environmental review process in accordance with applicable regulations.

S-5 ENVIRONMENTAL EFFECTS

Summarized in this section in tabular form are the findings of the environmental analyses performed for this EA. Analyses were performed to determine the potential for adverse and/or beneficial impacts in the following categories: land use and social conditions; economic conditions; natural resources; historic and cultural resources; parklands and recreational resources; visual and aesthetic resources; transportation; air quality; climate change and greenhouse gas emissions; noise; hazardous and contaminated materials; and construction impacts.

S-5-1 OPERATIONAL EFFECTS

Table S-1 provides a summary of the long-term (operational) environmental effects of the No Build and Raise the Roadway Alternatives. The implementation and operation of the Raise the Roadway Alternative has the potential to result in adverse impacts on historic and cultural resources. Mitigation measures to avoid or minimize these adverse impacts as outlined in the Programmatic Agreement are discussed in **Table S-1**. The project would result in reduced emissions from ships in the harbor, thus resulting in a regional benefit in air quality. It would also provide for the treatment of stormwater from the roadway, which currently discharges untreated into the Kill Van Kull.

S-5-2 CONSTRUCTION EFFECTS

With the project, the new roadway of the main span would be reconstructed at a higher level within the existing arch of the Bayonne Bridge, utilizing an overhead gantry system. The raised superstructure outside of the arch would increase in height and be supported by additional cross bracing. The approach structures would be demolished and constructed at a higher elevation through the use of new taller piers. The proposed construction sequence and schedule would require simultaneous work on both sides of the Kill Van Kull. With the exception of a new stormwater outfall from the New Jersey shoreline and temporary barges in place for eight to ten 8-hour partial channel closures to remove the existing deck, no in-water work would be required.

It is anticipated that project construction would require a total of approximately 45 months to complete. The project would be constructed in five stages, which occasionally overlap. A summary of the project's construction sequence is as follows:

Stage 1 (26 months): Reduce traffic to two lanes of 12 feet, 6 inches (one in each direction) at east side of existing roadway. Remove sidewalk on west side (southbound). Extend roadway on west side. Install temporary E-Z Pass gantry and system (west side).

Stage 2 (24 months): Shift two lanes of traffic (one 12-foot, 6-inch lane in each direction) to west side of existing structure. Demolish east side of existing roadway and approach structures. Begin construction of eastern side of raised roadway in arch span (floorbeams, stringers, and deck) and new piers and roadway of approaches on east side.

Stage 3 (15 months): Install temporary toll collection gantry and system (east side). Complete construction of approach structure, new roadway deck in arch span, approach embankments and walls on east side.

Stage 4 (17 months): Shift traffic to new elevated roadway on east side, one 12-foot, 6-inch lane in each direction. Open temporary E-Z Pass gantry and system (east side). Demolish remainder of existing roadway and approach structures.

Stage 5 (19 months): Construct western portion of raised roadway in arch span (floorbeams, stringers, and deck). Construct new piers and roadway on west side of approaches. Construct approach embankments and walls. Install permanent E-Z Pass gantry and system. Install permanent barriers. Open final roadway to traffic, two lanes in each direction.

Much of the project's construction staging would occur within the approximately 40-foot construction work zone, thereby limiting any effects on surrounding roadways and pedestrian elements. Where practicable and feasible, the design and construction of the Raise the Roadway Alternative would incorporate proposed mitigation measures to minimize the environmental impacts from construction. **Table S-2** identifies the potential construction-period effects of the Raise the Roadway Alternative, including proposed mitigation measures.

S-5-3 COASTAL ZONE MANAGEMENT

The project would be located in the Coastal Area as designated by the New York State Waterfront Revitalization of Coastal Areas and Inland Waterways Act and under New Jersey Department of Environmental Protection's New Jersey Administration Code (N.J.A.C.) Section 7:7E. In accordance with the New York State program, New York City adopted a local waterfront revitalization program, the New York City Waterfront Revitalization Program (WRP).

The project was reviewed for consistency with the New York City WRP and the NJDEP Coastal Zone Management (CZM) Policies. The policies address various potential effects of projects in the coastal zone including land use and coastal character, fish and wildlife, flooding and erosion, general safeguards, public access, recreation, historic resources and visual quality, agricultural lands, energy and ice management, water and air quality, and wetlands. The project would be consistent with the CZM policies that are applicable to the project. The New York City Department of City Planning and the New York State Department of State (NYSDOS) provided their consistency determination concurrences in February 2013 and March 2013, respectively (see **Appendix A**). NJDEP's coastal zone consistency review is ongoing as part of its Waterfront Development Permit process.

S-5-4 ENVIRONMENTAL JUSTICE

Based on a review of the likely potential impacts of the project, taking into account the potentially impaired resiliency of the affected population, the analysis concludes that minority and low-income populations would not bear a disproportionately high and adverse share of operational or construction impacts as a result of the project. While some localized adverse effects would occur in the study area during the construction phase of the project, these effects would be temporary and would end once construction is complete. Moreover, any air emissions from the project would comply with the National Ambient Air Quality Standards, which set the standards to protect sensitive populations. Additionally, measures would be employed to minimize any potential impacts during construction, ensuring that they would not be disproportionately high and adverse in the-low income and minority populations living near the bridge.

S-5-5 INDIRECT AND CUMULATIVE IMPACTS

The analysis concludes that the project, in eliminating the Bayonne Bridge air draft restriction, would not be expected to substantially alter broader maritime trade patterns in the United States, and therefore would not have the potential to indirectly result in significant adverse impacts at this level. The project is not expected to markedly alter the market share or hinterland of the Port of New York and New Jersey relative to other ports. While the Port anticipates growth over time based on historic records and economic trends, the project is not expected to result in substantial induced growth. An induced demand analysis (discussed in Chapter 18, "Indirect and Cumulative Effects") looked at the potential for the project to induce growth at the Port by indirectly resulting in cost savings to shippers by accommodating larger Post-Panamax ships. The analysis determined that potential induced cargo volume could result in 54 additional truck trips per day at the Port terminals west of the Bayonne Bridge, equating to 1–2 truck trips per hour from each terminal, thereby having negligible impacts on traffic, noise, and air quality. Therefore, the project is not expected to result in significant adverse indirect local impacts or significant adverse indirect impacts related to overall regional shipping and market conditions.

Potential indirect effects are generally defined as those impacts that are induced or "caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable." Therefore, there is no potential for indirect effects to be generated by construction activities. However, construction activities could have the potential to result in cumulative effects with other concurrent projects. The analysis finds that there are no planned projects that would combine with the project to result in cumulative construction impacts.

S-5-6 COMMITMENT OF RESOURCES

The project would result in the irretrievable and/or irreversible commitment building materials, energy, and human effort (time and labor). It would be developed within the existing PANYNJ right-of-way, thereby limiting the use of land resources. As resources required for the project are not expected to be in short supply, the project would not result in any adverse effects related to the irreversible and irretrievable commitment of resources.

Table S-1
Summary of Environmental Effects—Operational Period

Environmental Resource Area	No Build Alternative	Raise the Roadway Alternative
Land Use and Social Conditions	The continued operation of the Bayonne Bridge under the No Build Alternative would not affect land uses or land use plans, social conditions, or other community characteristics of the Bayonne and Staten Island Study Areas. The No Build Alternative would not result in progression toward any of the goals of the New York City Mayor's Office of Long-term Planning and Sustainability's *PlaNYC: A Greener, Greater New York* or the Bayonne Master Plan. The opportunity to upgrade a major transportation link between New York City and New Jersey would also go unfulfilled. Additionally, the No Build Alternative would not materially affect development and revitalization of adjacent waterfront areas.	Overall, the project would not adversely impact the land use and social conditions of the study area, including land use, public policy, and population and employment. The project would likely remove six encroachments from existing PANYNJ right-of-way within the construction work zone in Bayonne. The project would be supportive of certain PlaNYC initiatives and recommendations in the Bayonne Master Plan. Overall, the isolated removal of encroachments would not affect land use and social conditions.
Economic Conditions	The No Build Alternative would not require permanent property acquisition, temporary or permanent easements, or the removal of encroachments on PANYNJ right-of-way that fall within the construction work zone. As the Bayonne Bridge would remain at its current height, the fleet that could pass under the current bridge would be composed of smaller (less economically efficient) vessels. The No Build Alternative would not result in the economic benefits that would result from the removal of the Bayonne Bridge clearance restriction.	With the Raise the Roadway Alternative, private property that encroaches on PANYNJ right-of-way and falls within the construction work zone would be reclaimed during the construction period, and any improvements built on the encroachment would be removed. Aerial easements would be required for the permanent wider structure overhead. The Raise the Roadway Alternative would preserve the economic efficiency and sustainability of the Port of New York and New Jersey.
Natural Resources	In the future without the project, terrestrial and aquatic resources within the study area would remain in their current conditions and would continue to provide habitat to wildlife, as described in the previous sections. The No Build Alternative would continue operation of the existing Bayonne Bridge. USCG and PANYNJ would coordinate maintenance and repair activities with NYSDEC, NYCDEP, and NJDEP to protect water quality, wetlands, and to implement any peregrine falcon and/or osprey protection measures developed with these agencies. Therefore, there would be no significant adverse impacts on natural resources from continued operation of the existing bridge.	The use of a portion of the 100-year and 500-year floodplain within the New York and New Jersey portions of the study area would not result in adverse impacts to floodplain resources or result in increased flooding of adjacent areas during the long-term operation of the project. A stormwater outfall would extend beneath a small portion of to jurisdictional wetlands. The outfall would be constructed by "jacking" starting from an area landward of the wetland; the end of the outfall would be located in state open waters. Disturbance to jurisdictional wetlands is not expected. The implementation of water quality treatment measures would result in water quality improvements in the Kill Van Kull during the long-term operation of the project. Operation of the project would not adversely impact ecological resources. The New York State-endangered plant species located in areas of disturbance may require relocation of the plants or other protection measures. Operation of the project would not increase noise or other disturbances to wildlife above levels that are attributable to the existing bridge, and thus, any species currently inhabiting the area would continue to occur with the same likelihood.
Historic and Cultural Resources	The No Build Alternative would involve the continued operation of the existing four-lane Bayonne Bridge. Under the No Build Alternative, there would be no subsurface disturbance or changes to the historic Bayonne Bridge. Changes to the architectural resources identified above or to their settings may occur irrespective of the project. It is possible that some architectural resources in the Area of Potential Effect (APE) may be removed or deteriorate, while others may be restored. Other projects may be developed in the vicinity of the APE. The planned construction of residential units at JFK Boulevard between 2nd and 3rd Streets in the APE and planned construction of residential units at 79-87 JFK Boulevard just outside the APE, both in Bayonne, would not remove or alter historic properties	The project would adversely affect the NR-eligible Bayonne Bridge by removal and replacement of historic features of the bridge. Measures to mitigate this direct Adverse Effect are described in the executed Programmatic Agreement, including design consultation with the New York State Historic Preservation Office (NYSHPO) and the New Jersey Historic Preservation Office (NJHPO) with respect to development of bridge design documents. The following mitigation measures would be taken: Unanticipated Archaeological Discovery Program; Documentation and Curation; Historic American Engineering Record (HAER) documentation of the bridge; produce educational materials for use by local libraries, historical societies, and educational institutions; and signage and exhibits that inform the public of the history of the bridge; and a re-dedication ceremony. A construction protection plan would be prepared to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, New Jersey; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents. USCG will coordinate navigation in the channel of the Kill Van Kull with the USACE. The APE is determined to have a low sensitivity for archaeological resources; therefore, the project would have no adverse impacts on archaeological resources.
Parklands and Recreational Resources	The No Build Alternative would not alter any existing or planned parklands or recreational areas within the study area. The No Build Alternative would maintain the existing walkway along the southbound lanes of the Bayonne Bridge. Cyclists would continue to walk their bikes across the bridge, since the pathway would not be widened.	The project is not expected to result in any adverse effects on parklands and recreational resources. No Staten Island parklands or recreational resources are located within the 40-foot construction work zone, and therefore, none would be directly affected by the project. In Bayonne, Al Slootsky Playground and two ball fields located on PANYNJ property are within the construction work zone and would be closed. PANYNJ is working with the City of Bayonne regarding displacement of the ball fields and potential relocation of the Al Slootsky Playground, which may include provision of funds for additional recreational improvements in the City of Bayonne. The project would improve certain conditions in adjacent parklands by raising the elevation of the Bayonne Bridge. The increased elevation would improve air, light, and noise conditions and some views that are currently obstructed by the bridge. The project would provide for a 12-foot shared use (pedestrian and bicycle) path.
Visual and Aesthetic Resources	The No Build Alternative would involve the continued operation of the existing four-lane Bayonne Bridge. Under the No Build Alternative, there would be no significant changes to visual quality or views associated with the project.	By raising the roadway, the project would change the visual character of the bridge and approaches. While the change in the bridge's appearance would be perceptible, the overall change in the visual character and quality of the bridge would not be significant.

Table S-1 (cont'd)
Summary of Environmental Effects—Operational Period

Environmental Resource Area	No Build Alternative	Raise the Roadway Alternative
Transportation	The No Build Alternative would include traffic volumes increased by the prescribed annual background growth rate and marine traffic volume predictions, excluding the larger Post-Panamax vessels. Under the No Build Alternative, the current limited-stop S89 bus route would remain in service and the current six foot pedestrian walkway would remain.	Overall, the Raise the Roadway Alternative would not result in adverse impacts on long term vehicular traffic. The bridge deck would be widened to a configuration of four travel lanes, measuring 12-feet each, two shoulders (two-foot-wide left shoulders and 4-foot 9-inch-wide right shoulders), a median barrier, and a 12-foot wide shared-use path. The bridge deck would rise by about 64 feet over the navigational channel, changing the roadway's vertical alignment. An acceleration lane would be built on the western side of southbound Route 440. As the Raise the Roadway Alternative would increase the vertical clearance of the navigable channel, larger ships would likely be utilized, requiring fewer overall ship movements past the Bayonne Bridge. The project would not result in adverse impacts on marine transport, and the fewer number of vessels operating through the Kill Van Kull would be a beneficial impact. The current bus route service would not be affected, and the bridge's design would not preclude potential transit service on the bridge in the future.
Air Quality	Since the No Build Alternative would not affect any change, air quality would not be affected.	No significant change in air quality due to mobile sources would be expected due to the operation of the new bridge and access roads. Changes in elevation and grade may result in small reductions in local air pollutant concentrations. Potential air quality impacts from the emergency generators would be insignificant. Since the project would result in reduced emissions from ships in the harbor, the project would result in a regional benefit in air quality.
Climate Change and Greenhouse Gas Emissions	Under the No Build Alternative scenario, shipping operations would continue to grow, but the size of ships serving destinations west of the bridge would be limited, precluding the use of more fuel-efficient larger ships and the ensuing reduction in greenhouse gas (GHG) emissions. Since construction would not be required, no construction emissions would occur.	Although construction would result in GHG emissions associated with engine operation and the use of materials, the project is expected to result in a net reduction in GHG emissions due to the increased efficiency of larger ships. Overall, the project would not result in adverse impacts on energy or climate change.
Noise	Under the No Build Alternative, no significant land use changes are expected in the neighborhoods and areas surrounding the Bayonne Bridge, and no significant roadway changes are expected. Future vehicular traffic on roadway segments without the proposed project would be expected to increase by a maximum of approximately 20% by the year 2017. Using proportional modeling techniques, this small increase in traffic would be expected to increase Leq(1) noise levels by less than 1.0 dBA compared to existing noise levels. Increases of this magnitude would not be perceptible.	In the future with the project, no significant land use changes are expected in the neighborhoods and areas surrounding the Bayonne Bridge. Future vehicular traffic on roadway segments with the project would be expected to be the same as future traffic levels without the project. However, for Build conditions there would be some small changes in elevation and alignments of the reconstructed bridge. The changes in elevation and alignment would result in increases in Leq(1) noise levels of 0 to approximately 1.5 dBA. Consequently, noise levels in the future with the project would be similar to noise levels in the future without the project. Comparing Leq(1) noise levels with and without the project, the change in noise levels at any receptor location would be expected to be less than 2 dBA, an imperceptible change. Changes of this magnitude would not result in any significant impacts.
Hazardous and Contaminated Materials	Under the No Build Alternative, the existing bridge and the remainder of the project limits would continue in their current uses. There would be no significant health risks associated with the No Build Alternative.	With adherence to applicable laws and regulations, there would be no impacts on hazardous and contaminated materials. Following project construction, no significant potential for exposure to subsurface contamination would occur.

Table S-2
Summary Environmental Effects—Construction Period

Environmental Resource Area	Proposed Environmental Commitment
Land Use and Social Conditions	Construction would not require any land acquisition. The businesses in the study area would not be adversely affected during construction of the project. The project will not result in adverse impacts for land use or social conditions. While some localized adverse impacts could occur in the study area during the construction phase of the project, these impacts will be temporary and will end once construction is complete.
Economic Conditions	Private property that encroaches on PANYNJ right-of-way would be reclaimed by PANYNJ during construction. No easements of private property would be required. However, portions of streets in Bayonne and Staten Island, Ramp Q in Bayonne, and a parking lot in Staten Island would require temporary construction easements. These streets would likely experience staggered temporary or full closures during portions of construction. Business operations are expected to be able to continue during construction, and long-term adverse impacts to local businesses are not anticipated.
Natural Resources	Project construction would not result in impacts to terrestrial communities, wildlife, federally-listed and/or New York and New Jersey-protected species, wetlands, floodplains, or aquatic resources in the study area. A 1.93-acre USACE jurisdictional wetland is present within the potential staging area in Bayonne. Mitigation for the 1.93 acres of temporary impact would be determined through USACE and NJDEP wetlands permitting process, if impacts to the wetland could not be avoided during construction. <u>However, in light of available space within the PANYNJ right-of-way, it is unlikely that this potential staging area would be used.</u> The project would not involve construction within the Kill Van Kull, with the exception of a new stormwater outfall in New Jersey. Construction activities would comply with any NYSDEC- and NJDEP-approved Stormwater Pollution Prevention Plans (SWPPPs). Erosion and Sediment Control (ESC) plans would implement measures (i.e., silt fencing, hay bales) to minimize soil erosion. The New York State-endangered plant species in areas of disturbance may require relocation of the plants or other protection measures. The wildlife species most likely to be affected are those that would occur in closest proximity to the areas of construction, such as peregrine falcons and waterbirds. Measures to protect the peregrine during construction would be implemented. Waterbirds that forage in the Kill Van Kull would in most cases be expected to temporarily avoid the areas of construction activity.
Historic and Cultural Resources	A construction protection plan would be prepared to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, New Jersey; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents.. The APE is determined to have a low sensitivity for archaeological resources; therefore, the project would have no adverse impacts on archaeological resources.
Parklands and Recreational Resources	The project is not expected to adversely impact any parks or recreational resources in the Staten Island study area. Al Slootsky Playground and two baseball fields located on Port Authority property near the bridge would be closed to the public. PANYNJ is working with the City of Bayonne regarding displacement of the ball fields and potential relocation of Al Slootsky Playground facilities<u>, which may include provision of funds for additional recreational improvements in the City of Bayonne</u>.
Transportation	Local impacts would occur resulting from the extended closure of local streets during construction, closure of ramps leading to and from Route 440, limited periodic weekend closures, and nightly closures that would divert traffic to other regional facilities. Measures to address those impacts include signal retiming, pavement restriping, and allowance of right turns on red. During Construction Stages 2 and 3, two streets would be open to traffic in one direction only, along southbound Newark Avenue and westbound Innis Street. During construction, the Bayonne Bridge roadway would be open to traffic with one lane per direction. An adverse impact would be expected to only occur on weekdays creating one additional minute of delay to travel through the length of the two-mile construction zone. <u>Public bus routes may require temporary detours and relocation of bus stops due to temporary road closures. This would be coordinated with New York City Transit (NYCT) to minimize disruption to service and passengers.</u> A modest traffic increase is expected at the major regional river crossings. Full weekend closure impacts are anticipated to have more severe effects on delay and level of service (LOS). The number of full weekend closures will be minimized to an estimated 8 weekends per year. During construction, the lowering of the existing road deck sections would require the temporary mooring of barges in the Kill Van Kull navigational channel. Any limited, temporary closures required during construction would be approved by the USCG and be closely coordinated with waterway users, facilities and USACE.
Air Quality	With the following control measures, emissions from construction equipment would not result in adverse impacts on particulate matter, carbon monoxide, or annual-average nitrogen dioxide concentrations. - Clean Fuel - Best Available Tailpipe Reduction Technologies - Utilization Of Newer Equipment: All non-road construction equipment would meet United States Environmental Protection Agency (USEPA) Tier 3 emissions standards or better. - All reasonable efforts would be made to address heavy duty vehicle idling at the project site in order to reduce fuel usage (and associated costs) and emissions. On-road diesel fueled trucks may not idle for more than three consecutive minutes except under certain specific conditions. In addition to enforcing the on-road idling prohibition, all reasonable efforts will be made to reduce non-productive idling of non-road diesel powered equipment. - Fugitive dust control plans would be implemented and expected to reduce dust emissions by at least 50 percent for demolition, excavation, stockpiles, and handling of materials. Levels exceeding the 1-hour NO_2 NAAQS cannot be ruled out. Therefore, construction contracts would require that all land-based non-road diesel-powered construction engines with a power output rating of 50 horsepower or greater be rated Tier 3 or higher where the use of such equipment is practicable.
Climate Change and Greenhouse Gas Emissions	The project would implement several measures during construction, where practicable, aimed at reducing GHG emissions associated with construction, including the use of supplementary cementitious materials, reducing concrete waste, optimizing cement content, reusing excavated materials and reducing transport distance of waste materials, and using recycled steel. The use of biodiesel for construction engines is also being investigated and will be incorporated if found to be practicable.
Noise and Vibration	PANYNJ will make use of monitors to measure real-time noise levels during construction. In an effort to further reduce interior noise levels at residences, public facilities, and institutions, PANYNJ will make provisions for an assistance program to accommodate impacted residents accordingly. Where practicable and feasible, measures would be implemented to reduce potential vibration effects, including the use of alternative construction methods, use of newer equipment with lower vibration levels, and use of abatement. Vibration monitoring will be conducted during construction.
Hazardous and Contaminated Materials	In order to prevent exposure pathways, the project would include appropriate health and safety and investigative/remedial measures. A site-specific Construction Health and Safety Plan (CHASP) would be developed to outline appropriate handling and disposal methods of any identified hazardous or contaminated materials.
Indirect and Cumulative Effects	Construction impacts (traffic, air quality, and noise) would be localized and temporary in nature. The analysis finds that there are no planned projects that would combine with the project to result in cumulative adverse construction impacts.

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Chapter 1: Purpose and Need

1-1 INTRODUCTION

United States Coast Guard (USCG) as the lead agency, in consultation with Port Authority of New York and New Jersey (PANYNJ), has prepared this environmental documentation pursuant to the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.; NEPA). This Environmental Assessment (EA) examines the potential environmental effects of the Bayonne Bridge Navigational Clearance Program. Where potential adverse impacts have been identified, this document discusses practical measures to avoid, minimize, or mitigate them. Revisions made subsequent to publication of the Draft EA, based on public and agency comments and any project refinements, are indicated in this Final EA with double-underlines.[1] For further details on the public review process, see Chapter 3, "Process, Agency Coordination, and Public Participation," and Chapter 20, "Responses to Comments."

1-1-1 PURPOSE OF THE PROJECT

The purpose of the project is to reconstruct the roadway of the Bayonne Bridge over the Kill Van Kull to increase its vertical clearance, improve substandard features, and provide seismic stability. In addition, the project would preserve the economic efficiency and sustainability of the Port of New York and New Jersey, and bring the bridge into conformance with modern highway and structural design standards.

1-1-2 NEED FOR THE PROJECT

The project is needed to sustain an important component of the region's transportation infrastructure. The project is consistent with the PANYNJ's objective, as a bi-state governmental entity created by a compact between New York and New Jersey, to maintain and modernize interstate transportation facilities such as bridges, and to sustain the Port of New York and New Jersey as modern, efficient, and competitive. This proposal, like other PANYNJ infrastructure projects, is designed to serve the region and, in this case, the nation. Also, like most PANYNJ projects, it is not revenue-enhancing.

The project would serve several needs. Having been built in 1931, the Bayonne Bridge pre-dates modern traffic and structural design standards, features that the project would improve. The project would be a reinvestment in this aging, yet important, transportation infrastructure to ensure its long-term sustainability and improve its safety for motorists and pedestrians. The project would also remove potential impediments to marine transport along the Kill Van Kull to adapt to changes in the shipping industry and ensure the long-term vitality and efficiency of the Port of New York and New Jersey. Larger

[1] Chapter 20, "Responses to Comments," is an entirely new chapter in the EA and therefore does not include double-underlined text.

cargo vessels (commonly referred to as Post-Panamax vessels) are being constructed and are more frequently used to increase carrying capacity and attain greater economies of scale. The increase in vertical clearance (also called air draft limitation) of the Bayonne Bridge is necessary to adapt to this current trend in the shipping industry and allow these larger vessels to pass beneath the bridge to the Port of New York and New Jersey.

The elimination of the air draft limitation of the Bayonne Bridge would have national economic benefits in terms of reductions in shipping costs. The *Bayonne Bridge Air Draft Analysis,* prepared in 2009 by the U.S. Army Corps of Engineers (USACE), found that raising the bridge would have National Economic Development (NED) long-term benefits of over $3 billion, and up to $169 million in average NED annual net benefits (assuming a 50-year project life). Based on the origin and destination of the Port's current container traffic, many of these net economic benefits could be realized in the Port's inner hinterland.[1] The efficiencies associated with the larger vessels would reduce costs for shippers, and some portion of those savings would likely be passed on to consumers in the region served by the Port of New York and New Jersey, although that percentage cannot be determined because it is subject to shippers' discretion. As a consumer of goods and services, the Port also would realize some of these savings.

Maintaining the existing air draft limitation could put the region served by the Port of New York and New Jersey at an economic disadvantage as it could not make maximum use of the increased efficiencies and reduced shipping costs anticipated with the Post-Panamax vessels and thus the costs of consumer goods in the region could increase but would not decrease. While the Port's east coast market share is primarily driven by the relatively large size, density, and income of its local populations, losing these efficiencies and shipping cost reductions would make it more difficult for the Port to compete with other ports serving the margins of the Port's outer hinterland.

The project would also provide environmental benefits associated with reduced energy consumption, pollutant emissions, and greenhouse gas production. In addition to port considerations, the project would upgrade design features of the Bayonne Bridge as it does not meet modern highway safety and seismic design standards.

1-2 OVERVIEW AND PLANNING CONTEXT

The Bayonne Bridge spans the Kill Van Kull between Staten Island, NY and Bayonne, NJ (see **Figure 1-1**), providing a vehicular connection between Staten Island and the Bayonne Peninsula. It also spans the primary shipping channel between New York Harbor and the cargo ports at Newark-Elizabeth and Howland Hook.

1-2-1 DESCRIPTION OF THE BRIDGE

The Bayonne Bridge opened to traffic in 1931 and was designed by Othmar Ammann and Cass Gilbert. It is a steel arch bridge that carries four traffic lanes. The bridge span is approximately 5,780 feet long. Its arch rises to a height of 325 feet above the Kill Van Kull, and the low steel of the bridge is approximately 151 feet above the Kill Van Kull at

[1] The geographic area comprising a port's market (the area from which its customers are drawn) is generally referred to as its hinterland.

10.31.11

Project Site and Facilities in the Port of New York and New Jersey
Figure 1-1

mean high water.[1] The bridge is eligible for listing in the National Register of Historic Places and in both the New York and New Jersey State Historic Registers.

The Bayonne Bridge carries Route 440 over the Kill Van Kull between Bayonne, NJ and Staten Island, NY. Route 440 is a New York and New Jersey State highway that runs from Interstate 278 in Edison, NJ through Staten Island, NY, culminating at Routes 1 & 9 in Jersey City, NJ. It is the north-south freeway (Dr. Martin Luther King, Jr. Expressway) through Staten Island and links the Bayonne Bridge and Outerbridge Crossing. Approximately 1,500 and 2,200 vehicles cross the bridge in the AM and PM peak hours, respectively, at average travel speeds of 50 miles per hour. The bridge carried approximately 7 million vehicles in 2010. The bridge also provides a pedestrian walkway across the Kill Van Kull.

1-2-2 DESCRIPTION OF THE PORT OF NEW YORK AND NEW JERSEY

The Port of New York and New Jersey consists of the waterbodies, shipping channels, passenger terminals, and container and cargo facilities located around the New York Harbor. The Port includes four container facilities—Howland Hook Marine Terminal, Port Jersey Marine Terminal, Port Newark-Elizabeth Marine Terminal (sometimes referred to as two separate terminals), and Brooklyn Marine Terminal. Combined, these facilities constitute the third busiest port in the United States and the largest on the Eastern Seaboard. In 2010, the Port of New York and New Jersey handled more than 2,725 vessels and 5.29 million twenty-foot equivalent units (TEUs) of cargo.

The Kill Van Kull is a primary shipping channel of the Port of New York and New Jersey. It provides access between the New York Harbor and two of the Port's four cargo facilities—Port Newark-Elizabeth Marine Terminal and Howland Hook Marine Terminal. Port Newark-Elizabeth Marine Terminal complex is the largest and busiest cargo facility in the Port of New York and New Jersey. In 2010, more than 2,085 vessels and more than 4.86 million TEUs passed beneath the Bayonne Bridge en route to and from these terminals. Alternate access is not possible via the Arthur Kill due to the restrictions of the Arthur Kill Railroad Bridge between Elizabethport, NJ, and Howland Hook Marine Terminal on Staten Island, NY.

As part of its assessment of future Port activity, PANYNJ forecasts indicate that the Port will continue to experience stable growth over time, consistent with historical trends. As detailed in Chapter 18, "Indirect and Cumulative Effects," future TEU demand west of the Bayonne Bridge ranges from 6.6 percent (from 2012 to 2020) and 3.5 percent (between 2020 and 2035). This is a slightly higher rate than the overall Port due to the increasing percentage of containerization as a means to transport cargo, which is primarily handled at the Port's terminals west of the Bayonne Bridge. As shown in Tables 18-3 and 18-4 of Chapter 18, total forecasted TEUs west of the Bayonne Bridge are predicted to be about 7.0 million TEUs in 2020 and 10.6 million TEUs by 2035. This growth is predicted to occur with or without increasing the vertical navigational clearance of the Bayonne Bridge. Because the shipping industry is evolving to improve transportation efficiency by using larger vessels, increasing the vertical navigational clearance of the Bayonne Bridge is necessary to adapt to these changes and ensure

[1] Port Authority of New York and New Jersey, "Bayonne Bridge Facts and Figures" (http://www.panynj.gov/bridges-tunnels/bayonne-bridge-facts-info.html), accessed October 11, 2011.

the Port's long-term vitality. As described in Chapter 18, increasing the access of Post-Panamax container ships to the Port of New York and New Jersey is not expected to markedly alter the market share or hinterland of the Port relative to other ports or result in any substantial increase in the volume of cargo through the Port.

1-2-3 PLANNING CONTEXT

Over the past several years, there has been a worldwide trend to increase the carrying capacity of cargo vessels. Larger vessels attain greater economies of scale and have been increasingly sought to reduce shipping costs between Asia and the United States. However, the utility of implementing larger ships has been constrained by limitations of existing shipping channels, including the Panama Canal, and frequently-called port facilities.

In recognition of this worldwide trend in shipping, the Panama Canal Authority is expanding the capacity of its facilities to accommodate larger vessels. In September 2007, the Panama Canal Expansion Project commenced with the goal of providing a wider, deeper navigation channel and locks. The project is planned for completion in 2015.

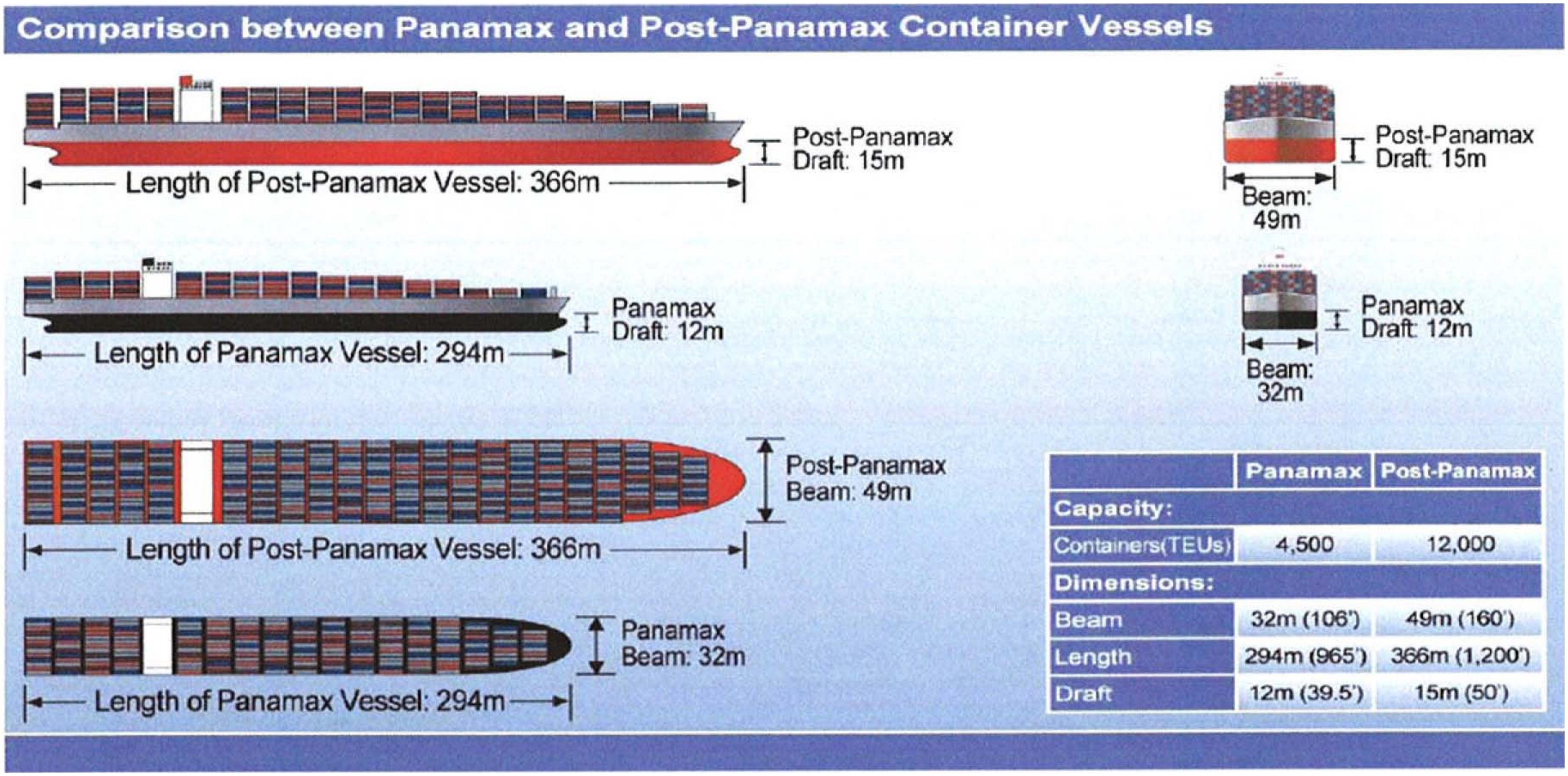
The Panama Canal Authority has restrictions on the maximum dimensions of ships that can traverse the canal, and vessels that meet these requirements are referred to as "Panamax." Presently, the dimensions of the canal's infrastructure limit cargo capacities of Panamax vessels to approximately 4,500 TEU vessels (see **Table 1-1** and **Figure 1-2**). Once the expansion is completed, the requirements will be increased, accommodating larger vessels. Thus, the Panama Canal will be able to support vessels that have a load carrying capacity of approximately 12,000 TEUs. For the purposes of this EA, the larger vessels supported by the expansion of the Panama Canal will be referred to as "Post-Panamax."

Table 1-1
Comparison of Panamax and Post-Panamax Dimensions

Dimension	Panamax	Post-Panamax
Length	965 ft (294.13 m)	1,200 ft (366 m)
Beam	106 ft (32.31 m)	160 ft (49 m)
Depth / Water Draft*	39.5 ft (12.04 m)	50 ft (15 m)
Height / Air Draft	190 ft (57.91 m) (Up to 205 ft (62.5 m) with prior approval)	190 ft (57.91 m) (Up to 205 ft (62.5 m) with prior approval)
Keel-to-Mast Height	229.5 ft. (69.95 m) (Up to 244.5 ft (74.54 m)	240 ft. (72.91 m) (Up to 255 ft (77.5 m)
TEU	4,500	12,000

Notes: *Draft in typical freshwater conditions.
Sources: Autoridad del Canal de Panama, OP Notice to Shipping No. N-1-2010: Vessel Requirements, January 2010.
USACE, *Bayonne Bridge Air Draft Analysis*, September 2009.

The height restrictions on the Panama Canal will continue to be controlled by the clearance of the Bridge of the Americas over the Panama Canal. Ship height (air draft)



	Panamax	Post-Panamax
Capacity:		
Containers(TEUs)	4,500	12,000
Dimensions:		
Beam	32m (106')	49m (160')
Length	294m (965')	366m (1,200')
Draft	12m (39.5')	15m (50')

SOURCE: U.S. Army Corps of Engineers, Bayonne Bridge Air Draft Analysis, September 2009

Comparison of Panamax and Post-Panamax Vessels
Figure 1-2

is restricted to 190 feet under normal conditions. With prior permission, a height of 205 feet is permitted but requires passage under the bridge at low tide.[1]

USACE has been deepening shipping channels of the Port of New York and New Jersey since the mid 1990s. A program of dredging and blasting has deepened the shipping channel of the Kill Van Kull beneath the Bayonne Bridge to approximately 50 feet. The program continues with the goal of achieving a 50 foot channel depth between Port Newark-Elizabeth Marine Terminal and the Atlantic Ocean by 2012.[2]

The air draft limitation was first acknowledged in the *Feasibility Report and Final Environmental Impact Statement (EIS) for the New York and New Jersey Harbor Navigation Study (NYNJHNS)*, completed by USACE in 1999. While that document focused on the depth limitations of the harbor and the constraints they posed on cargo handling of the Port, the EIS stated:

> Containerships of all sizes currently use the Port, including the world's largest container vessels. Depending on how they are loaded, the largest container vessels approach or exceed the limits of existing navigation conditions and practices at the Port. Air draft is also a concern on the Kill Van Kull due to the 151-foot vertical clearance at the Bayonne Bridge, but it is not yet a limiting factor.[3]

While the NYNJHNS addressed the most immediate constraint (i.e., channel depth) to the Port, it recognized that the air draft limitations would impact the Port Newark-Elizabeth Marine Terminal and Howland Hook Marine Terminal in the future.

Over the ensuing decade, a number of studies were undertaken to define a long-term cargo handling demand for the Port of New York and New Jersey and to determine the possible land-side improvements required to meet this demand. The *Comprehensive Port Improvement Plan (CPIP)* defined a set of water and landside infrastructure developments that would allow the Port to meet the future cargo handling demand. In the end, CPIP recommended a menu of options for development within the present footprints of the Port facilities—noting that landside improvements were not needed at that time to meet the future volume.

Neither the NYNJHNS nor the CPIP recognized the Bayonne Bridge vertical clearance restriction as a factor limiting the Port's ability to handle large vessels in the short term. However, both studies acknowledged that the bridge clearance would pose a concern in the future. Most recently, the *Bayonne Bridge Air Draft Analysis,* prepared in 2009 by USACE for PANYNJ, concluded that the Bayonne Bridge poses an obstruction to large ships that would otherwise call on the Port, and that the national benefits of removing the bridge obstruction would outweigh the costs.

One of the significant factors common to all of these studies is the recognition on behalf of PANYNJ that the container terminals at Port Newark and Port Elizabeth are the key

[1] Autoridad del Canal de Panama, OP Notice to Shipping No. N-1-2010: Vessel Requirements, January 2010

[2] U.S. Army Corps of Engineers, "New York and New Jersey Harbor: 50 ft. Deepening Navigation Project" (http://www.nan.usace.army.mil/project/newjers/factsh/pdf/nynj.pdf), Accessed October 11, 2010

[3] US Army Corps of Engineers, Feasibility Report for New York and New Jersey Harbor Navigation Study, page 16, paragraph 37

to accommodating the Port's long-term future container ship demand. Expansion options for facilities east of the bridge were thoroughly evaluated. Even with large increases in productivity, Port Jersey Marine Terminal and Brooklyn Marine Terminal would not have the terminal capacity to handle the Port's commerce within their current footprints. An expansion of these facilities into mega terminals would require extraordinary coordination between the various private terminal operators in the Port. Most important, expansion of the Port Jersey Peninsula facilities would require extensive improvements to local roadway and rail networks, and facilities on Brooklyn Marine Terminal would discharge massive amounts of cargo onto the already congested roadway networks in the east-of-Hudson region.

Following the NYNJHNS and the CPIP, the size of vessels has increased faster than anticipated. The *Bayonne Bridge Air Draft Analysis* points out that as of September 2009, the largest vessels in the service were between 12,500 and 14,000 TEUs, which is larger than the 6,400 TEU Regina Maersk, considered the leading edge of container ship size in 1999. The air draft restriction of the Bayonne Bridge now poses a clear restriction on the ability of large ships to call the Port and remains an impediment to the long-term economic efficiency and sustainability of the Port of New York and New Jersey.

1-3 PROBLEM DEFINITION

The limited vertical clearance of the Bayonne Bridge threatens the long-term economic efficiency and sustainability of the Port of New York and New Jersey. In addition, the Bayonne Bridge does not meet modern highway safety and seismic design standards. Each of these is discussed below.

1-3-1 BRIDGE CLEARANCE

As described above, the Bayonne Bridge has a vertical clearance of 151 feet above mean high tide. Vertical clearance increases to approximately 156 feet at mean low tide. To allow for safe navigation of the channel, vessels are limited to a 204-foot keel to mast height (KTMH) during low tide and 199 KTMH during high tide. However, the available clearance depends on a number of variables including time of arrival, loading patterns, and travel patterns. Therefore, transits during maximum vertical clearance under the Bayonne Bridge rarely occur.[1]

The *Bayonne Bridge Air Draft Analysis* examined the KTMH and TEU capacity of 600 vessels of the worldwide fleet. The data concluded that 57 percent of ships reviewed have a KTMH that would clear the Bayonne Bridge at low tide, but 22 percent of the total sample would be within five feet of the low steel components of the bridge. In terms of capacity, the height clearance of the Bayonne Bridge restricts access to Howland Hook Marine Terminal and Port Newark-Elizabeth Marine Terminal for 100 percent of the world's 10,000 or larger TEU fleet, 92 percent of the world's 8,000 to 10,000 TEU fleet, and 56 percent of the world's 6,000 to 8,000 TEU fleet. Overall, the bridge restricts access to these facilities for 62 percent of the world's TEU capacity. [2]

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[1] USACE, *Bayonne Bridge Air Draft Analysis*, September 2009.

[2] USACE, *Bayonne Bridge Air Draft Analysis*, September 2009.

At present, restrictions on vessels that traverse the Panama Canal make the Port of New York and New Jersey less vulnerable to the clearance requirements of the Bayonne Bridge. While the bridge does not accommodate exactly the same KTMH as the canal, restrictions are similar, and many shippers use vessels that can navigate both facilities. In 2015, the deepening and widening of the Panama Canal will allow for ships of up to 255 KTMH and approximately 12,000 TEU to use the Canal. The Bayonne Bridge will not accommodate vessels of this size without increased vertical clearance.

1-3-2 ECONOMICS OF GOODS MOVEMENT

As discussed above, the clearance of the Bayonne Bridge restricts the height of ships that can traverse the Kill Van Kull. These ships transport goods between the Atlantic Ocean, Howland Hook Marine Terminal, and Port Newark-Elizabeth Marine Terminal. When larger ships are able to call on the Panama Canal, the height restriction of the Bayonne Bridge would limit the opportunity for the Port of New York and New Jersey to adapt to current shipping trends that call for more efficient and economically beneficial larger vessels.

Suppliers are always attracted to using larger vessels to reduce transport costs, and this trend is expected to accelerate with the expansion of the Panama Canal. Larger vessels require less fuel and crew per unit of cargo, and therefore transport goods at a lower cost per container.

The *Bayonne Bridge Air Draft Analysis* estimated the NED benefits from removing the Bayonne Bridge clearance restriction and allowing larger ships to call on the Port. NED benefits are transportation cost savings to the nation that can be attributed to economies of scale resulting from using larger vessels, i.e., the cost difference between operating smaller, less economically efficient vessels not constrained by the existing bridge, and larger vessels that could be used when the air draft restriction is removed. The cost of constructing the project alternatives and associated operating costs are factored into the calculation of project benefits.

The *Bayonne Bridge Air Draft Analysis* concludes that the removal of the Bayonne Bridge clearance restriction would produce between $93 million and $169 million in average NED annual net benefits, depending on the alternative selected and assuming construction costs ranging from $1.32 billion to $3.10 billion.

The Port imports and exports goods to and from New York, New Jersey, and beyond; it is a major employer of the area; and it maximizes the use of non-road infrastructure for goods movement, which in-turn has environmental benefits from reduced vehicle congestion. Continued benefits to the region can be realized by the Port remaining competitive in accommodating the latest advances in shipping technology. Furthermore, as described in Chapter 11, since the project would result in reduced emissions from ships in the harbor, continued reliance on smaller vessels to reach the larger Port terminals would be less environmentally sustainable as it would increase energy consumption, pollutant emissions, and greenhouse gas production.

1-3-3 HIGHWAY SAFETY

The American Association of State Highway and Transportation Officials (AASHTO) provides design standards to assist in the development of transportation infrastructure.

For highway bridges, AASHTO recommends 12-foot travel lanes with a full shoulder. The Bayonne Bridge operates with four, 10-foot traffic lanes and has no shoulders. Since the current configuration of the Bayonne Bridge does not meet AASHTO design standards for highway bridges, the design improvements would be an added benefit of the project.

1-3-4 SEISMIC DESIGN STANDARDS

The Bayonne Bridge is a critical link between Staten Island, NY and Bayonne, NJ, and serves as an emergency evacuation route. The bridge also traverses a critical shipping channel of the Port of New York and New Jersey. Therefore, the continued structural integrity of the bridge is important to the transportation infrastructure of the New York Metropolitan region.

The superstructure of the Bayonne Bridge is nearly 80 years old. Recognizing the importance of its infrastructure to the mobility and economic sustainability of the New York region, PANYNJ has undertaken seismic studies to identify necessary steps to protect its facilities from seismic events. A 2002 seismic vulnerability report prepared for the Bayonne Bridge concluded that the existing bridge piers need to be retrofitted to meet AASHTO seismic design standards. The seismic design improvements would be an added benefit of the project.

1-4 GOALS AND OBJECTIVES

Based on the problems identified above, PANYNJ has developed three goals and supporting objectives for the project.

1-4-1 PRESERVE THE LONG-TERM ECONOMIC EFFICIENCY AND SUSTAINABILITY OF THE PORT OF NEW YORK AND NEW JERSEY

- Provide for a vertical clearance to support Post-Panamax vessels;
- Maximize the continued use of existing port infrastructure; and
- Deliver the project at reasonable cost and within a reasonable timeframe.

1-4-2 MEET CURRENT ROADWAY DESIGN AND SAFETY STANDARDS

- Provide that the structure meet PANYNJ's seismic safety standards;
- Provide for 12-foot vehicle lanes, a median, and a shoulder consistent with AASHTO highway design standards; and
- Provide grades and approaches consistent with AASHTO highway design standards.

1-4-3 MINIMIZE ADVERSE IMPACTS ON THE BUILT AND NATURAL ENVIRONMENT

- Avoid acquisition of additional right-of-way;
- Avoid, minimize, or mitigate impacts on historic and visual resources;
- Minimize adverse effects on the water quality of the Kill Van Kull;
- Avoid or minimize effects on natural habitats and water resources;

- Improve the efficiency of bridge operations, including reductions in vehicle delays and air quality emissions; and
- Minimize temporary construction impacts to the extent feasible.

These goals and objectives were used to identify and evaluate alternatives for the Bayonne Bridge Navigational Clearance Project and to select the preferred option for design, construction, and operation.

2-1 INTRODUCTION

This chapter describes the alternatives that have been evaluated in this Environmental Assessment (EA) for the Bayonne Bridge Navigational Clearance Program, as well as alternatives that were studied and eliminated due to engineering and operational considerations.

Previous studies prepared in connection with the project concluded that other alternatives are not prudent because of their construction risks, environmental impacts, and costs as compared to the proposed project. The following alternatives were considered but discarded:

- Jack the Arch Alternative;
- Lift Bridge Alternative;
- Replacement Bridge Alternative;
- Tunnel Alternative;
- New Cargo Terminals Alternative; and
- Ferry Service Alternative.
- Military Ocean Terminal at Bayonne (MOTBY)

Therefore, this EA does not consider the potential environmental effects of the discarded alternatives for the Bayonne Bridge Navigational Clearance Program. This EA considers two alternatives for the project as follows:

- ***No Build Alternative.*** The No Build Alternative would involve the continued operation of the existing bridge with a navigational clearance of 151 feet above mean high water (MHW); and
- ***Raise the Roadway Alternative.*** The Raise the Roadway Alternative would lift the roadway within the arches to increase the navigational clearance to 215 feet above MHW over the Kill Van Kull.

The general characteristics of the Raise the Roadway Alternative have been identified and are the basis of the impacts assessment in this EA.

2-2 ALTERNATIVES CONSIDERED BUT DISCARDED

2-2-1 JACK THE ARCH

This alternative would keep the existing steel arch structure and roadway, but raise the piers—it would preserve the arch structure and appearance. Specifically, this alternative would involve reconstruction of the bridge abutments to support the bridge at a higher elevation, and to facilitate lifting the bridge from above by the use of high-capacity strand jacks with rollers to counteract the horizontal thrust. The new abutment foundation footprint would extend beyond the existing abutment footings in both directions into the Kill Van Kull. The additional footing would be tied to the existing footing within a cofferdam. This alternative was discarded because jacking the arch span would be a major undertaking, as a lift of this magnitude (24,000 tons) has never been done before to a bridge structure. In order to jack the arch without closing the navigation channel, thrust blocks and rollers would be required to balance the horizontal force (16,000 tons) at the ends of the arch. This alternative would require the construction of new abutments and lifting beams and significant work within the waters of the Kill Van Kull, which would have the potential to result in adverse impacts to wetlands, waterways, and aquatic resources. In addition to extended traffic closures likely required in order to strengthen the arch, construction schedule delays and cost overruns would also be expected.

2-2-2 LIFT BRIDGE

This alternative involves converting the fixed arch bridge with a suspended deck into an arch bridge with a deck that could be lifted vertically by installing a lift mechanism. Lifting the roadway would require closing the bridge to vehicular traffic. A managed approach to lifting the roadway would be needed to mitigate the delays and user costs to traffic. The United States Coast Guard (USCG) would require fender systems to guide vessels through the navigational channel and protect the bridge structure, which would result in a substantially narrower horizontal channel (600 feet versus 800 feet). A bridge protection system (cofferdams) would likely be required on both sides of the lift section, adding substantial additional cost to the project. This alternative was discarded because marine traffic would be disrupted during lifting of the bridge to allow for large vessels to pass, creating a navigational safety issue. Other reasons for discarding this alternative include narrowing of the navigable channel, potential impacts on traffic, and potential impacts to historic resources. This alternative would not allow for any functional improvements to the existing bridge, and the complex mechanical systems of the lift bridge would need to be maintained and periodically replaced. In addition, this alternative would have a life-span of approximately 50 years, about half that of Bayonne Bridge modifications or a new bridge.

2-2-3 NEW BRIDGE

Several options were explored to construct a completely new Bayonne Bridge. These options include variations in the vertical clearance and the location of the bridge—to the east or west of the existing bridge. A new bridge would require substantial property acquisition, including occupied buildings, to establish the new right-of-way. The new bridge would affect existing traffic ramps, require replacement of approach abutments, and require changes to traffic patterns, and would have the potential to result in adverse traffic impacts. Demolition of the existing bridge would result in an adverse impact to historic resources, which may be unacceptable given the other viable alternative. Construction of a new bridge would involve in-water work and would have the potential to result in adverse impacts to wetlands, waterways, and aquatic resources, as well as disruption of commerce. This alternative was discarded because of the need for substantial property acquisitions, the potential adverse effect on the historic bridge, and the potential for wide-reaching, long-term community impacts. In addition, the cost of a new bridge would be almost double the cost of the bridge modification alternatives.

2-2-4 TUNNEL

For this alternative, the existing Bayonne Bridge would be eliminated and a new bored tunnel would be constructed under the channel. Construction would also be required for the tunnel approaches and two ventilation plants, one in Staten Island and one in Bayonne. The bored tunnel option would require the permanent acquisition of approximately 20 properties, thereby displacing current occupants and property owners. In addition, approximately 46 properties that are located directly on or adjacent to the cut and cover section of the alignment would need to be cleared of structures. Following construction, this land could be reused for other purposes. The new tunnel alternative would have the potential to result in adverse environmental impacts—traffic, historic resources, wetlands, waterways, and aquatic resources. Similar to the new bridge alternative, this alternative was discarded because of the need for substantial property acquisitions, the potential for wide-reaching, long-term community impacts, and the impact on the historic bridge. In addition, the cost of a new tunnel would be almost double the cost of the bridge modification alternatives.

2-2-5 NEW CARGO TERMINALS

Other alternatives that would not involve any modification to the existing Bayonne Bridge were also evaluated. Potential new cargo terminals would be in addition to the current expansion activities at the Global Marine Terminal (including the addition of 900 feet of dock, and an increase of the terminal's acreage from 98 to 170 acres) and the PANYNJ development at the adjacent Greenville rail yard. As described in greater detail in Chapter 18, "Indirect and Cumulative Effects," this expansion would add only limited additional capacity to accommodate large vessels, and does not constitute an alternative to the project.

The New Cargo Terminals alternative includes developing new cargo terminals to the east of the Bayonne Bridge, with a site in Brooklyn, NY, and a site in Jersey City, NJ. The New York site considered was the South Brooklyn Marine Terminal (SBMT). A total of approximately 370 acres would be required for the new port, a significant portion of which are listed on the National Wetlands Inventory. In addition, approximately 225 acres of landside property acquisition would be required. Access to the closest main transportation artery is limited and constrained. Moreover, the capacity limitations in the Brooklyn-Queens and Gowanus Expressways would adversely affect the efficient flow of cargo. The second site, referred to as the Port Jersey Piers, would require extending the existing piers further east. A total of approximately 250 acres would be required for the new port, a significant portion of which are listed on the National Wetlands Inventory. Most important, the expansion of facilities on the Port Jersey Peninsula would require extensive improvements to the local roadway and rail networks in that area. Facilities on the Brooklyn site of the Port would discharge considerable amounts of cargo onto the already congested roadway networks in the east-of-Hudson region. Although the two sites would provide incremental cargo capacity, they would not fully satisfy the forecasted demand. While the new port facilities, including development of both sites discussed above, would provide incremental cargo capacity, they would not fully satisfy the forecasted demand. Due to the capital funding needs and design and construction complexities, it is estimated that implementation of these options would take a minimum of 10 years to complete. This alternative was discarded due to the inability to meet the full cargo capacity for the forecasted demand, the potential for impacts on the environment, community, and transportation, the need for substantial property acquisitions, the cost, and the length of time that would be required for completion.

2-2-6 FERRY SERVICE

Another non-bridge alternative evaluated was the use of a new vehicle-passenger ferry service to act as a Bayonne Bridge replacement. For this alternative, ferry terminals would need to be constructed on both sides of the Kill Van Kull, and property acquisition would be required to develop the ferry terminals. Further analysis of a ferry replacement concluded that it would not adequately meet the key elements in providing efficient and cost-effective ferry service. The ferry system does not benefit from a strong ferry-oriented travel market and ultimately would not be able to compete with nearby travel alternatives in terms of travel time, reliability, and frequency of service. The Ferry Service alternative would not meet the types of travel markets that are conducive to ferry travel: geography-based, tourist-based, and Central Business District-commute based. This alternative was discarded due to potential environmental impacts, land use requirements, the low level of accessibility a ferry service would provide, and cost.

2-2-7 MILITARY OCEAN TERMINAL AT BAYONNE (MOTBY)

MOTBY is a now defunct marine terminal along the eastern shore of Bayonne, NJ, south of Port Jersey Marine Terminal. Consideration was given to rehabilitating MOTBY to accommodate Post-Panamax vessels; however, preliminary analysis indicated that this alternative would require extensive, costly improvements and result in potentially extensive environmental impacts, and would not meet the purpose and need of the project.

The PA does not have firm plans for the 130-acre MOTBY site, but it is not an ideal site for an expanded, modern container terminal. Tenants currently occupy a large part of it: an agreement with Royal Caribbean Cruise Line gives them right of first refusal to expand their footprint to two cruise berths from the present one berth, and indications are that they wish to move forward with that project and a new terminal and parking facility. Bayonne Dry Dock has also indicated a desire to stay on the property.

Developing the MOTBY site in Bayonne would not provide sufficient berthing or terminal space for all of the Post-Panamax vessels projected to call at the Port in the future, even when combined with developing the Port Jersey site. Preparing the MOTBY site for container ships would require significant investments in improving both road and rail networks that currently do not exist. Truck access would need to be improved, and a new rail line built down the Bayonne peninsula to connect with the new terminal. It would cost $50 million to demolish existing structures at MOTBY, $80 million to build a truck route connecting MOTBY with the existing road network, and $160 million to build a new rail line to MOTBY, exclusive of additional infrastructure such as regional rail improvements and any necessary improvements to roadways leading to the road connection, such as a direct connection to the NJ Turnpike. Conversely, Howland Hook, Port Newark, Elizabeth, and Global Terminal in Jersey City are already well connected and integrated into local and national rail and road networks.

It was recently estimated that it would cost $300 million to develop 30 additional acres in Howland Hook; MOTBY development costs would be much higher since a larger area would be developed and additional land bought or wetlands filled in. The 130 acres of land that the PA owns at MOTBY is not sufficient to construct a modern container terminal. Additional land acquisitions would be required, and should wetlands need to be filled in, an extensive permitting and environmental review process would take place. Permits for fill would not be issued until all other non-fill options had been exhausted, resulting in a lengthy process. Generally, regulatory agencies require that the filling of wetlands must be mitigated by creating new wetlands at about a 3:1 areal ratio. Based on the above, this alternative was discarded due to cost, potential environmental impacts, limited practicality in accommodating Post-Panamax vessels, and a time line that is not consistent with the purpose and need of the project.

2-3 ALTERNATIVES ANALYZED IN THIS ENVIRONMENTAL ASSESSMENT

The following describes the No Build and Raise the Roadway Alternatives, which are analyzed in detail in this EA.

2-3-1 NO BUILD ALTERNATIVE

The No Build Alternative assumes that the Bayonne Bridge and its approaches would remain unaltered and be subject only to regular maintenance. The No Build Alternative serves as a baseline for the evaluation of potential impacts and benefits of the Raise the Roadway Alternative.

Under the No Build Alternative, the Bayonne Bridge would maintain a 40-foot road deck with four, substandard 10-foot lanes and no shoulders. A 6-foot pedestrian walkway would continue to be provided across the span. In addition, seismic vulnerabilities would remain along the approach spans.

Historic trends have shown steady and stable growth of activities at the Port of New York and New Jersey, which is expected to continue over time. In response to anticipated growth, the Port Authority of New York and New Jersey (PANYNJ) has made a number of recent capital investments and plans to make future investments in improving operations and efficiency at the port (see Chapter 18, “Indirect and Cumulative Effects” for a more detailed description of these improvements). With improvements at the Panama Canal, but for Port capacity restrictions, a greater proportion of containers would arrive in the future on larger Post-Panamax vessels, which would have environmental and cost benefits based on the efficiency of the new vessels and the per container unit cost of shipping. However, under the No Build Alternative, the larger terminals of the Port of New York and New Jersey could not accommodate Post-Panamax[1] vessels. While the New York market will continue to be one of the largest sources of demand for products to arrive by containers, the limitation on accepting Post-Panamax vessels would not allow for the national economic benefits

[1] Post-Panamax container vessels are approximately 1,200 feet in length, with a beam of 160 feet, a draft of 50 feet, and a capacity of up to 12,000 twenty-foot equivalent units (TEUs).

associated with the project[1] and could put the Port of New York and New Jersey and the region it serves at risk for an economic disadvantage in terms of overall shipping costs and ultimate costs to consumers. (Projections for freight throughput and vessel size distribution in the future with and without the project are described in detail in Chapter 18, “Indirect and Cumulative Effects”.)

If larger ships cannot call on the Port of New York and New Jersey, there would generally be two options to provide overseas shipping to the New York area. The first is that large ships would call on other east coast ports (e.g., Halifax or Norfolk), and goods would then be transported overland to the New York area. However, based on the manifold variables that go into the economic decision-making of cargo movements (see Chapter 18, “Indirect and Cumulative Effects,” for a more detailed discussion), it is too speculative to predict any diversions that would occur under the No Build Alternative. The second option, which is anticipated to occur, is that shippers would call in the Port of New York and New Jersey with smaller vessels and would require more frequent trips since they would carry less cargo per vessel. These options would not offer the economic savings associated with the project and would be less environmentally sustainable as they would result in higher energy consumption, pollutant emissions, and greenhouse gas production.

2-3-2 RAISE THE ROADWAY ALTERNATIVE

The Raise the Roadway Alternative would result in increased navigational clearance over the Kill Van Kull from 151 feet to up to 215 feet (see **Figure 2-1**). The Raise the Roadway Alternative would occupy the right-of-way of the existing Bayonne Bridge, with additional area to account for the increased width. The planning for the Raise the Roadway Alternative considered a footprint that would maximize the use of existing PANYNJ right-of-way while minimizing effects on existing infrastructure and surrounding properties in Bayonne, NJ, and Staten Island, NY.

The existing and proposed Raise the Roadway Alternative design elements are detailed in **Table 2-1** below. **Figure 2-2** shows a conceptual design of the proposed roadway.

The Raise the Roadway Alternative is not anticipated to require any permanent property acquisition, with the exception of permanent aerial easements. With no substantial changes in traffic capacity, the project is not anticipated to result in any long-term effects on the local or regional traffic network. Furthermore, the Raise the Roadway Alternative would avoid substantial construction activities within the waters of the Kill Van Kull.

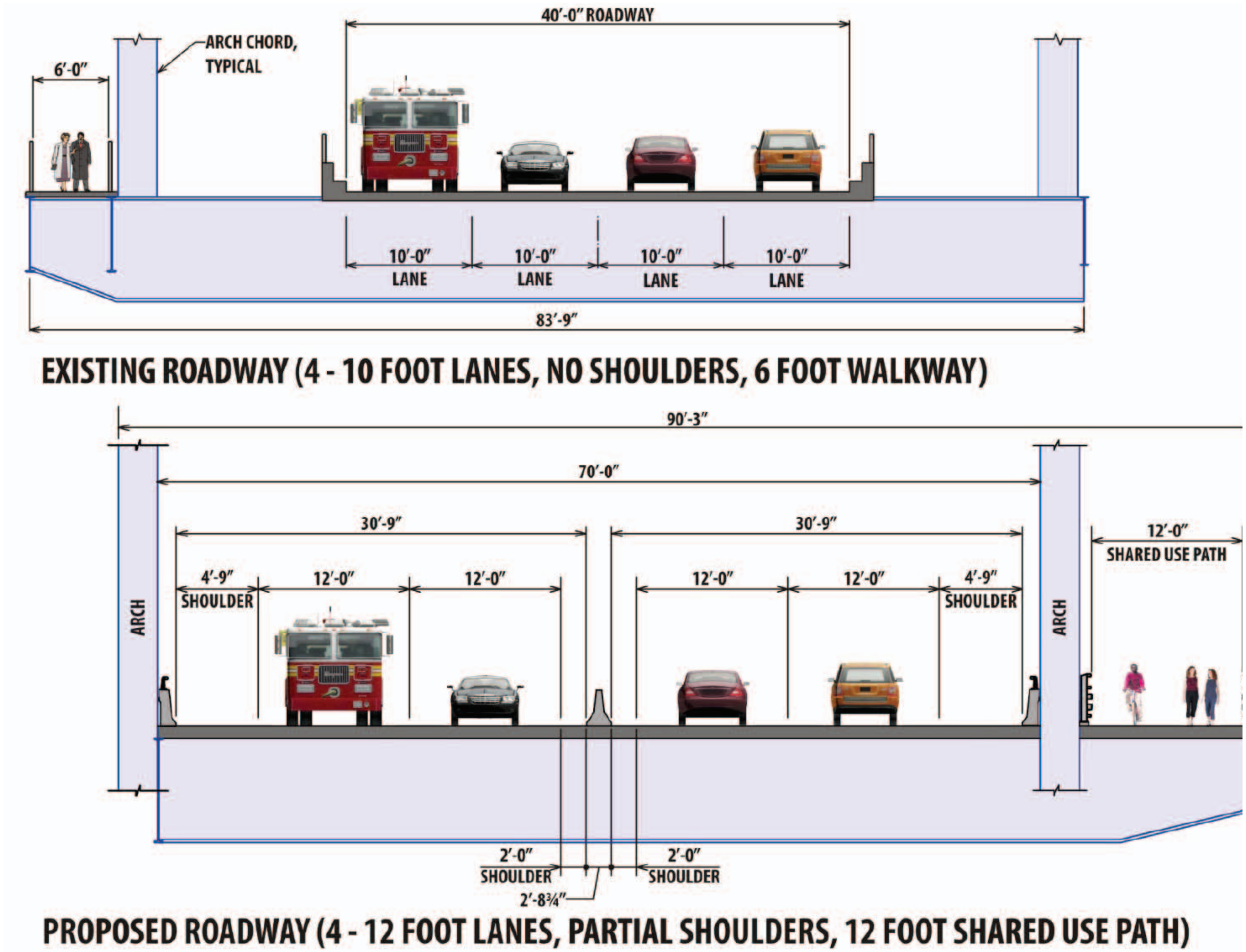
[1] U.S. Army Corps of Engineers, “New York and New Jersey Harbor: 50 ft. Deepening Navigation Project” (http://www.nan.usace.army.mil/project/newjers/factsh/pdf/nynj.pdf), Accessed October 11, 2010

Existing Bridge

Proposed Bridge

Existing and Proposed Bridge Schematic

Figure 2-1



Existing Roadway and Conceptual Design of Proposed Roadway (Looking North)
Figure 2-2

Table 2-1
Design Criteria

Element		Existing	Proposed
Average Annual Daily Traffic (AADT)		10,460	10,460
Peak Hourly Traffic		1175	1175
Design Speed		55 mph	55 mph
Posted Speed		45 mph	45 mph
Lane Width		10 ft.	12 ft.
Grade	New Jersey	4.0 %	4.85%
	New York	4.0%	5.0 %
Shared-Use Path Width		6 ft.	12 ft
Approach Roadway Width		50 ft.	90 ft.
Stopping Sight Distance	New Jersey	425 ft.	425 ft.
	New York	495 ft.	495 ft.
Design Precludes Transit		Yes	No

Notes: [1] AADT and Peak Hourly Daily Traffic values are based on 2011 data.

[2] The Bayonne Bridge is categorized as an urban arterial and, as such, AASHTO standards allow for a grade of up to 5 %. The state of New Jersey also allows for a 5 % grade on this classification of roadway. The state of New York has a 4 % grade limitation but allows design exceptions for an additional 1 % in urban areas. PANYNJ will be requesting a design exception for the grade on the New York side. This issue has been discussed with NYSDOT.

2-3-2-1 ANCILLARY FACILITIES

The existing toll plaza in Staten Island would be demolished and replaced with a gantry structure. Tolls would continue to be collected only for southbound (Staten Island-bound) traffic.

New emergency generators would be provided to back up power to the new fire standpipes, roadway lights, cameras, tolling equipment and other critical systems required for the bridge. An approximately 500-kilowatt (kW) emergency generator would be installed within a new building at each the Bayonne and Staten Island bridge abutments. These structures would be located within existing PANYNJ right-of-way.

2-3-2-2 CONSTRUCTION ALTERNATIVES

Several construction alternatives were evaluated, including retrofitting the existing piers, utilizing a steel supported superstructure in place of pre-cast segmental concrete box sections for the approaches, and retaining the shared use path on the west side of the bridge. These alternatives were found not to be viable or feasible.

2-3-2-3 CONSTRUCTION DURATION AND COST

The Raise the Roadway Alternative would be constructed over an approximate three year period and range in cost from approximately $600 Million to $800 Million. PANYNJ has authorized $1 billion in capital capacity for this program. As such, federal funding is not anticipated for the completion of the Bayonne Bridge Navigational Clearance Program. The various stages of construction are described in greater detail in Chapter 16, “Construction Effects.”

Chapter 3: Process, Agency Coordination, and Public Participation

3-1 INTRODUCTION

This chapter describes the regulatory requirements that must be met to implement the Raise the Roadway Alternative, the public agencies with permitting or other regulatory authority or approvals necessary for the project, and the process by which to engage public in the project's environmental review.

3-2 PROCESS

3-2-1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

Port Authority of New York and New Jersey (PANYNJ) is requesting approvals from United States Coast Guard (USCG) and United States Army Corps of Engineers (USACE) for implementation of the Bayonne Bridge Navigational Clearance Project. These federal approvals are subject to environmental review under the National Environmental Policy Act (NEPA). The procedural provisions of NEPA (set forth in 40 CFR §§ 1500-1508) require federal agencies to consider the environmental consequences of their actions, including direct, indirect, and cumulative effects.

As this project involves a bridge over a navigable water of the United States, USCG is serving as the federal lead agency for NEPA review. This EA is prepared to examine the extent of environmental impacts of the project.

The steps in the NEPA process are described below.

- ***Scoping.*** A NEPA Work Plan was prepared and made publicly available. The NEPA Work Plan included a description of the project's purpose and need, goals and objectives, alternatives to be considered in this EA, and the framework of analysis for this EA. An interagency meeting was held on October 31, 2011. The comment period for project Work Plan ended on December 9, 2011.
- ***Draft Environmental Assessment (EA).*** The Draft EA was prepared to assess the environmental effects of the project consistent with NEPA and other applicable regulations and requirements. Once USCG approved the Draft EA for public circulation, the document was made available for public review.
- ***Public Review.*** During the public review period of the Draft EA, the document was made available to government agencies, elected officials, civic and interested groups, and the general public. USCG extended its originally 45-day review period for the EA to 60 days, ending on March 5, 2013. During that time, public meetings were held on February 5, 7, and 13, 2013 in order to provide members of the public an opportunity to offer oral comments on the findings of the EA. Written comments were also accepted.

- ***Final Environmental Assessment and Findings.*** After the public comment period on the Draft EA closed, a Final EA was prepared. This Final EA includes the comments and responses on the Draft EA, as well as any necessary revisions to the EA to address the comments. After public comments were received and considered, a determination of the significance of the impacts was made. The Final EA was made publicly available.

3-2-2 STATE ENVIRONMENTAL QUALITY REVIEW ACT (SEQRA)

State agencies must review their discretionary actions in accordance with New York State legislature enacted the State Environmental Quality Review Act (SEQRA), unless such actions fall within certain statutory or regulatory exemptions, before undertaking, funding, or approving the actions.

The project is classified as a SEQRA Type I action (6 NYCRR Part 617.4), indicating that it has the potential for environmental impacts that should be evaluated under SEQRA. Therefore, this EA would assist in achieving compliance with the requirements of SEQRA. In accordance with 6 NYCRR Part 617.15, the NEPA and SEQRA processes are coordinated. Accordingly, when an EA for an action has been prepared under NEPA, SEQRA provides for the preparation of an Environmental Assessment Form (EAF) when a New York State agency is involved and is designated as lead agency, and the City Environmental Quality Review (CEQR) provides for preparation of an Environmental Assessment Statement (EAS) when a City agency is involved and is designated as lead agency; either document may incorporate the EA for purposes of the lead agency making a determination of significance. For this project, which requires discretionary approvals by New York City, the Office of the Deputy Mayor for Economic Development has proposed to act as lead agency for SEQRA/CEQR. An EAS has been submitted by PANYNJ to that agency.

3-2-3 OTHER FEDERAL AND STATE REGULATORY REQUIREMENTS, PERMITS, AND APPROVALS

Implementation and construction of the project is subject to a number of state and federal permits and approvals in addition to complying with the requirements of NEPA and SEQRA. Ongoing coordination meetings have taken place with all federal, state, and local permitting agencies including the New York State Department of Transportation (NYSDOT), New York State Department of Environmental Conservation (NYSDEC), New Jersey Department of Transportation (NJDOT), New Jersey Department of Environmental Protection (NJDEP), the City of New York, and the City of Bayonne. In addition to confirming the required permits, each agency was provided the opportunity to review the proposed design during a series of pre-application meetings and their respective comments have been incorporated. Where feasible, the permit and approval requirements are being coordinated with the analysis prepared for this EA. **Table 3-1** lists the required permits and approvals by agency.

Table 3-1
Permits and Approvals by Agency

Jurisdiction	Type of Permit / Approval	Permit Issuing Agency
Federal	Section 106 of National Historic Preservation Act/ New Jersey Register of Historic Places Act	Advisory Council (NYSOPRHP/NJHPO)
Federal	Review under Endangered Species Act	USFWS/NMFS
Federal	Clean Air Act-General Conformity Determination	USCG
Federal	US Coast Guard Bridge Permit	USCG
Federal	USACE-Nationwide Permit 15 (Section 10 Rivers/Harbors Permit & Section 404 Dredge/Fill Permit)	USACE
State	NYS Tidal Wetlands (6 NYCRR 661)	NYSDEC
State	Section 401 Water Quality Certification	NYSDEC
State / City	Coastal Zone Management Act / Waterfront Revitalization Program	NYSDOS, NYCDCP and NJDEP
State	Endangered Species, Threatened Species	NYNHP
State	Endangered Species Act	NJNHP
State	NYS SPDES (6 NYCRR 750)-Stormwater Discharge	NYSDEC
State	NYS SWPPP	NYSDEC
State	Petroleum Bulk Storage Permit	NYSDEC
State	Petroleum Tank Removal Permit	NYSDEC
State	Waterfront Development Permit (NJAC 7:7E)	NJDEP
State	Waterfront Development Permit (NJAC 7:7E)-Up Land: Combined Waterfront Development/Coastal Wetlands/Water Quality Certification application	NJDEP
State	Flood Hazard Area Permit	NJDEP
State	Construction Activity Stormwater General Permit (NJPDES Permit No. NJ0088323)-N.J.A.C. 7:14A	NJDEP
State	Backflow Preventer/Physical Connection Permit N.J.A.C. 7:10 New Jersey Safe Drinking Water Act	NJDEP
State	General Permit (GP-005)	NJDEP
State	Highway Agency Stormwater General Permit	NJDEP
State	Construction Permit	NYSDOT
State	Memorandum of Agreement	NJDOT
State	Coordination with NJTA for use of Permanent VMS messages	NJTA
City	Contract Drawing Review	NYCDEP
City	Backflow Preventer Permit	NYCDEP
City	Fire Hydrant Connection Permit	NYCDEP
City	Registration for Internal Combustion Fuel Burning Equipment (Form AR 504)	NYCDEP
City	Site Connection Application Approval	NYCDEP
City	Watermain Application Approval	NYCDEP
City	Drainage Design Approval	NYCDEP
City	Lane Occupancy on Route 440/Martin Luther King Expwy	NYCDOT-Highway
City	Lane and Sidewalk Occupancy on city street	NYCDOT-Street
City	Tree Work Permit	NYCDPR
City	Approval	FDNY
City	Coordination	NYC OCMC
City	Modified Connections to the Bayonne Bridge	NYC Mayor
City	Aerial Easements	NYC Deputy Mayor of Economic Development
City	Temporary Bus Stop/Route Relocation Coordination	MTA/NYCT
City	Roadway Construction on Bayonne streets	City of Bayonne
City	Traffic Signal Coordination, Ramp Closures, Local Street Closures, Local Street Detours	City of Bayonne
City	New Jersey State Uniform Construction Code	City of Bayonne
City	Fire Department	City of Bayonne
City	Tree Permit	City of Bayonne
City	Noise Ordinance Variance	City of Bayonne
City	New Electrical Service Connection	Con Ed & PSE&G
County	Lane and Sidewalk Occupancy on JFK Boulevard.	County of Hudson
County	Roadway Construction on JFK Boulevard.	County of Hudson
County	Traffic Signal Coordination	County of Hudson
County	Soil Erosion and Sediment Control	Hudson, Essex, Passaic Soil Conservation District

3-2-4 SECTION 106 COORDINATION

Section 106 of the National Historic Preservation Act (NHPA; 36 CFR § 800) requires federal agencies to take into account the effects of their undertakings on historic properties that are listed in or meet the eligibility criteria for listing in the National Register of Historic Places (NRHP).

Section 106 requires that agency officials work with the New York and New Jersey State Historic Preservation Offices (SHPO) to identify parties to participate in the Section 106 process ("Consulting Parties"). Consulting Parties may include federally recognized Native American tribes (Tribal Government Organizations [TGOs]), local governments, and individuals and organizations with a demonstrated interest in the project due to the nature of their legal or economic relationship to the project or affected historic properties, or their concern with the project's effects on historic properties.

3-2-4-1 SHPO REVIEW

In September 2011, USCG initiated the Section 106 process with both state SHPOs and proposed a study area (Area of Potential Effect or APE) and a methodology. In January 2012, both state SHPOs were provided historic surveys for review and comment (one of architectural resources and one of archaeological resources). After initial comments were received and modified surveys were submitted and reviewed, both SHPOs concurred with the findings of no archaeological adverse effect and an adverse architectural effect limited to the bridge itself.

3-2-4-2 ACHP REVIEW

In September 2011, USCG informed the Advisory Council on Historic Preservation (ACHP) that the Section 106 process had been initiated. In May 2012, the USCG sent the ACHP a letter notifying them of their determination of no archaeological adverse effect and an adverse architectural effect limited to the bridge itself and inviting them to serve as a signatory to the MOA. In June 2012, USCG invited ACHP to participate in the Section 106 process, and ACHP accepted in a letter dated June 25, 2012.

3-2-4-3 CONSULTING PARTY REVIEW

In February 2012, USCG extended invitations to local historic preservation organizations, local governments, and federal and state listed tribal nations with property interests in the region, to participate as Section 106 Consulting Parties (see **Table 3-2**). The Invited and Consulting Parties of the Section 106 process include the following:

Consulting Parties were provided an initiation package to assist in their participation under Section 106. The initiation package included maps of the project's Area of Potential Effect (APE), preliminary information on buildings and potential archaeological sites within the APE, and a methodology for the analysis of the project's effects. On March 21, 2012, architectural and archaeological surveys were provided to consulting parties for review and comment.

Table 3-2
Invited and Consulting Parties

Invited	Accepted
Absentee-Shawnee Tribe of Oklahoma	
Bayonne Historical Society	X
Bayonne Historic Preservation Commission	X
Cherokee Nation of New Jersey	X
Cherokee Tribe of New Jersey	
City of Bayonne	X
City of Newark	
Delaware Nation Cultural Preservation Office	
Delaware Nation, Cultural Preservation Department	
Delaware Tribe of Indians	
Delaware Tribe of Indians Historic Preservation Office	
Engineering and Industrial Heritage, PC	
Historic Districts Council	
Hudson County Office of Cultural and Heritage Affairs	X
Ironbound Community Corporation	
Landmarks Preservation Commission	X
Metropolitan Waterfront Alliance	X
Municipal Arts Society	X
Naticoke Lenni-Lenape Indians of New Jersey	
Newark Preservation and Landmarks Committee	X
New Jersey Historic Preservation Office	X
New York Landmarks Conservancy	X
Office of Congressman Michael Grimm	X
Powhattan Renape Nation, care of NJ Department of State	
Rampough Lenape Nation	
Sand Hill Band of Indians	
Sand Hill Indian Historical Association	
Sand Hill Historical Association	X
Shawnee Tribe of Oklahoma, Historic Preservation Department	
Shinnecock Nation	
Staten Island Borough Presidents Office	X
Stockbridge-Munsee Community Band of Mohican Indians	
Unkechaug Nation	

To address potential adverse effects on historic resources, a draft Memorandum of Agreement (MOA) was prepared pursuant to Section 106 and was included in the Draft EA. Subsequent to publication of the Draft EA, at the suggestion of ACHP, USCG decided to advance development of a Programmatic Agreement instead of the previously drafted MOA. The Programmatic Agreement contains the same general stipulations as the draft MOA, but allows for increased flexibility to address any unanticipated discoveries during construction and provides a process for amending the agreement, if needed. Consistent with the commitments of the Programmatic

Agreement, there will be ongoing involvement by the Consulting Parties as the project advances through design and construction. On June 5, 2012 and February 11, 2013, meetings of consulting parties were held to discuss any comments on the surveys and present potential mitigation commitments to be incorporated in the Programmatic Agreement. Relevant comments have been incorporated into the final Programmatic Agreement, which was executed in May 2013.

3-2-5 ENVIRONMENTAL JUSTICE COORDINATION

Executive Order 12898 requires federal agencies to involve the public on project issues related to human health and the environment. The U.S. Department of Transportation's "Final Order on Environmental Justice" indicates that project sponsors should elicit public involvement opportunities, including soliciting input from affected minority and low-income populations in considering project alternatives. The project has engaged and will continue to engage environmental justice communities, as necessary, through targeted media outlets and will continue to provide special services (i.e., translation) for these communities, as necessary, to engage their participation in public involvement activities. In addition, USCG has and will continue to conduct public outreach meetings, as necessary, with environmental justice communities to assess and address their concerns.

3-3 PUBLIC PARTICIPATION

Public involvement activities for the project have included extensive outreach efforts. Continuing the commitment to an open, participatory process, the project has solicited feedback from the public and from agencies; encouraged open discussion of project details and issues; and provided opportunities for comments and questions. Tools that were used to implement the public involvement program included:

- ***Public review.*** Throughout the project, environmental review documents have been made available to the public with opportunities to provide written and/or oral comments, in accordance with NEPA requirements. During the scoping process, the NEPA Workplan underwent a 30-day public review period, during which written comments were received and considered in the EA. Publication of the Draft EA—announced with a Notice of Availability in the Federal Register on January 4, 2013 as well as notices in local newspapers—initiated a 45-day public review period, which was extended to 60 days in response to requests. Written comments were accepted during this public review period and considered in this Final EA.

- ***Public meetings.*** The public was invited to comment during the circulation of the Draft EA at three public meetings, which were held in Staten Island, Bayonne, and Newark. Comments raised in the public meetings and during the EA comment period were responded to in this final document. Meetings were advertised in local newspapers to promote maximum public participation in the environmental review process. In addition, prior to publication of the Draft EA, USCG met with representatives from minority and low-income communities, such as the Elm Park Civic Association and the North Shore Water Conservancy in Staten Island, New York, as well as the Healthy Ports Coalition in Newark, New Jersey to address their concerns during the environmental review process.

- ***Project website.*** A project website (http://www.panynj.gov/bayonnebridge/) has been established so that the public can keep up to date on the project. The site will continue to be updated regularly and will include announcements of project meetings as well as project documents, which will be posted as they become available.
- ***Mailing list.*** A project mailing list, totaling more than 500 names and addresses, was compiled during the project. The mailing list includes elected officials, public agency contacts, stakeholder and community groups, media, and individuals. Included within the list are organizations, media, and individuals that have relevance and connections with environmental justice communities in the study area. The mailing list has and will continue to be used to distribute meeting announcements and information about the project, as necessary.
- ***Informational materials.*** Content included written information on the project as well as visuals (photos, maps, and charts) and contact information. Presentations, meeting handouts, and other materials have and will continue to be developed as appropriate to keep the public fully informed about project developments.
- ***Media outreach.*** When appropriate, a media outreach effort will be conducted. This will involve contacting the media when there are new project developments to communicate, as well as issuing press releases at major milestones. This effort includes outreach to newspapers serving low-income and minority communities.
- ***Repositories.*** Local repositories throughout the project area have and will continue to enable members of the public to examine project documents, including EA documents, and other informational materials. The repositories include local libraries, town halls, and other locations.

3-4 REPOSITORIES

This EA is available for public viewing at the locations listed below.

Lead Agency Office
United States Coast Guard
One South Street
New York, NY 10004

Staten Island

Port Richmond Library
75 Bennett Street
Staten Island, NY 10302

Staten Island Borough Hall
10 Richmond Terrace, Room 100
Staten Island, NY 10301

Staten Island Community Board 1
1 Edgewater Plaza, Room 217
Staten Island, NY 10305

New York City Council District 49
130 Stuyvesant Place
Staten Island, NY 10301

New York Assembly District 61
853 Forest Avenue
Staten Island, NY 10301

Bayonne

Bayonne Library
697 Avenue C
Bayonne, NJ 07002

Bayonne City Hall
630 Avenue C
Bayonne, NJ 07002

New Jersey Legislative District 31
447 Broadway
Bayonne, NJ 07002

Other
Ironbound Community Corporation
317 Elm Street
Newark, NJ 07105

Chapter 4: Land Use and Social Conditions

4-1 INTRODUCTION

This chapter provides an assessment of potential impacts on land uses, population, and employment from long-term operation of the Raise the Roadway Alternative. This information also serves as context for the other technical analyses in this Environmental Assessment (EA) document. Overall, this analysis finds that the operations of the project would not result in any adverse impacts on land use and social conditions in the study area. While the project would disrupt certain land uses during construction (see Chapter 16, “Construction Effects”), these impacts would be temporary and would not result in long-term adverse impacts to land use and social conditions. The project would also permanently remove certain encroachments from Port Authority of New York and New Jersey (PANYNJ) right-of-way. While the removal of these encroachments would impact certain property owners, their removal would not affect the overall character of the area or its land use patterns.

4-2 METHODOLOGY

The effects of the project on land use and social conditions are analyzed below for the study area, which is defined as the ¼-mile perimeter surrounding the limit of the construction work zone (see **Figure 4-1**). The assessment begins with a description of existing conditions that details current land uses, zoning, population and demographics, employment, and applicable public policies. Next, conditions in the future without the project are described. The probable impacts of the project are assessed based on a comparison with conditions in the future without the project.

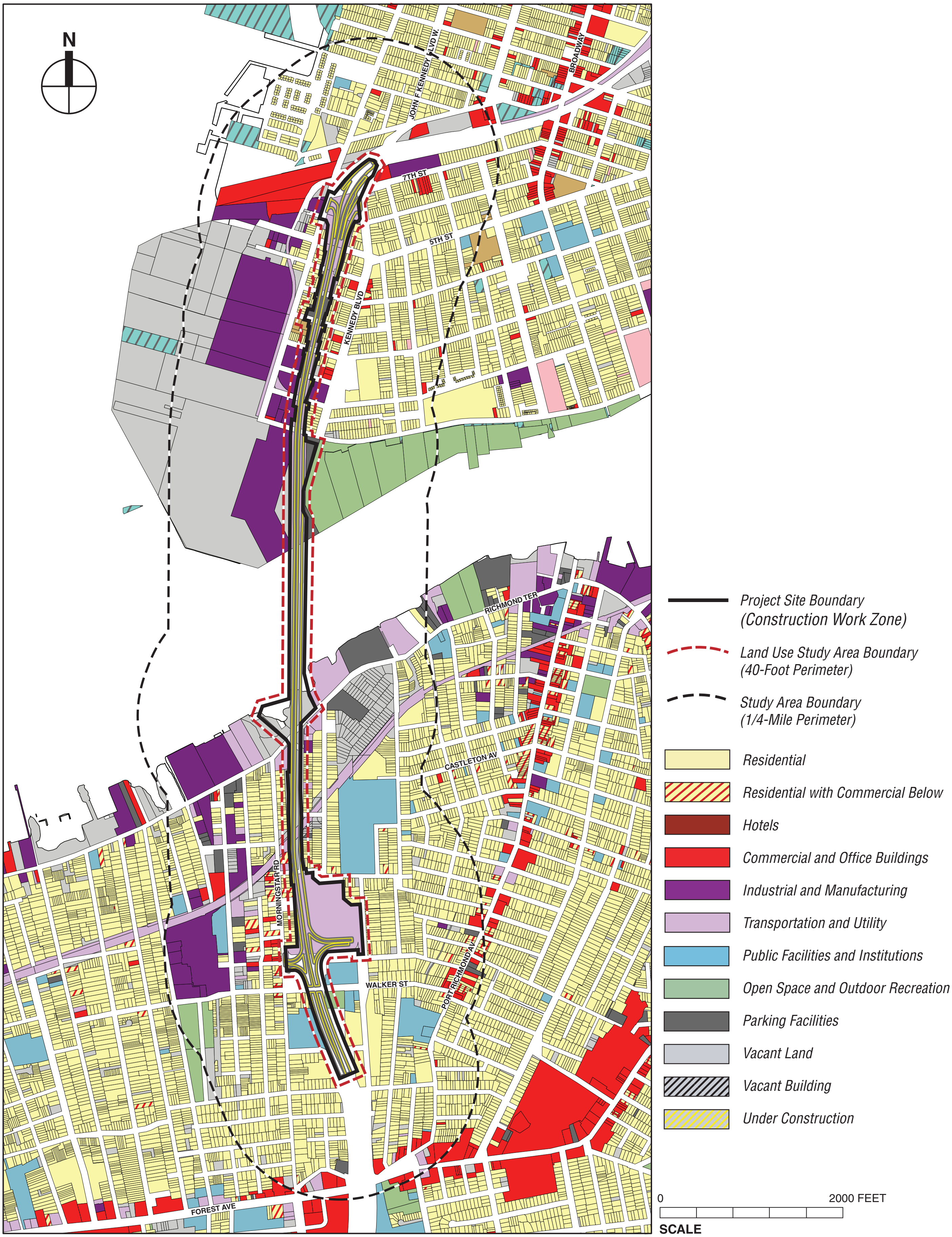
Various sources were used to prepare this chapter, including field surveys, previously published planning and environmental studies, and information supplied PANYNJ, New York City Department of City Planning (NYCDCP), New York City Department of Buildings (NYCDOB), New York State Department of Transportation (NYSDOT), New Jersey Department of Transportation (NJDOT), and the City of Bayonne.

4-3 AFFECTED ENVIRONMENT

4-3-1 STATEN ISLAND

The Staten Island borough of New York City is located in Lower New York Bay and is separated from New Jersey by the Kill Van Kull on the north and the Arthur Kill on the west. According to the 2010 US Census, the borough (also known as Richmond County) is home to approximately 469,000 residents.

On the Staten Island side of the Bayonne Bridge, the ¼-mile study area extends north to the Kill Van Kull waterfront; south to approximately Forest Avenue, Monsey Place, and Riegelmann Street; east to approximately Treadwell Avenue, Port Richmond



Land Use Study Area

Figure 4-1

Avenue, and Decker Avenue; and west to approximately Simonson Avenue. This area is located within Staten Island Community District 1.

4-3-1-1 LAND USE

The study area is predominantly residential. Residential uses in this area are low density and generally take the form of one- and two-family residences.

Commercial uses are concentrated along certain corridors, such as Port Richmond Avenue and Forest Avenue. Port Richmond Avenue generally contains local retail businesses. Forest Avenue is characterized by larger, car-oriented retail establishments and national chains. There are also some commercial uses, such as restaurants, gas stations, automotive businesses, and delis, in small concentrations or isolated locations throughout the study area.

Industrial uses in the study area include warehouses, automotive shops, and metalworking facilities. Industrial uses are generally located along the waterfront or in the area surrounding Granite Avenue between Walker Street and Richmond Terrace.

There are numerous community facility uses within the study area that serve the local residential population. Public New York City schools include: Port Richmond High School; PS 21 Elm Park School; PS 22 Graniteville Elementary School; and IS 51 East Markham Intermediate School. Independent schools within the study area include: Eden II School, which is a school for children with autism; St. Adalbert's School, a Catholic school; and Therese Program, a private school.

Places of worship include Christ United Methodist Church, the Kingdom Hall of Jehovah's Witnesses, and the Staten Island Buddhist Temple. Other community facility uses include the Catholic Guardian Society, Bridgeview Senior Housing, and the Jewish Board of Family and Children's Services.

Open spaces resources in the study area include Faber Park and Pool, Graniteville Quarry Park, Markham Playground, Egbert Triangle, and Julius Weissglass Memorial Park. Chapter 8, "Parklands and Recreational Resources," contains more information on these resources.

The largest concentration of vacant land in the study area is along the abandoned railway corridor of the North Shore Line of the Staten Island Railway, which was decommissioned in 1953. Remnants of the Elm Park station, including the station platform, still exist in an open cut east of Morningstar Road between Innis Street and Newark Avenue.

The study area is also characterized by the Bayonne Bridge itself, which is accessed by Martin Luther King Jr. Expressway (Route 440). To the south of the study area, the Martin Luther King Jr. Expressway interchanges with the Staten Island Expressway (I-278), which connects Staten Island to Brooklyn via the Verrazano-Narrows Bridge, and to Elizabeth, NJ via the Goethals Bridge.

As discussed in Chapter 5, "Economic Conditions", there are no properties in Staten Island that encroach on PANYNJ right-of-way and are located in the construction work zone.

4-3-1-2 ZONING

Zoning districts within the study area are summarized below in **Table 4-1** and shown in **Figure 4-2**. Zoning in this area is generally of low-density, single-family homes and low-rise commercial uses. Multi-family dwellings are permitted in certain areas. The study area also contains low- and high-density manufacturing districts.

Table 4-1
Zoning Districts in the Staten Island Study Area

Zoning District	Maximum FAR[1]	Uses/Zone Type
R2	0.5 residential	Single-family detached residence district
R3A	0.5 residential (0.6 with attic bonus)	Single- and two-family contextual residence district
R3-1	0.5 residential (0.6 with attic bonus)	Semi-detached one- and two-family residence district
R3-2	0.5 residential (0.6 with attic bonus)	All housing types up to small apartment buildings
C1-1	1.0 commercial	Local retail uses in residential districts
C1-2	1.0 commercial	Local retail uses in residential districts
C2-2	1.0 commercial	Local retail uses in residential districts
C4-1	1.0 commercial, 1.25 residential	General retail district
C4-2	3.4 commercial, 0.78-2.43 residential	General retail district
C8-1	1.0 commercial	Automotive commercial district
M1-1	1.0 manufacturing	Light industrial district
M2-1	2.0 manufacturing	Medium industrial district
M3-1	3.0 manufacturing	Heavy industrial district

Notes: [1] Floor area ratio (FAR) is a measure of density establishing the amount of development allowed in proportion to the lot area. For example, a lot of 10,000 square feet with a FAR of 1 has an allowable building area of 10,000 square feet. The same lot with an FAR of 10 has an allowable building area of 100,000 square feet.

Sources: *New York City Zoning Resolution.*

4-3-1-3 POPULATION AND EMPLOYMENT

For the analysis of population and employment, the study area includes those census block groups that are at least 50 percent within the study area (the area within a ¼ mile surrounding the limit of the construction work zone). Population, households, and housing statistics are reported from the 2010 Census. The latest data on mode of transportation, income, and poverty is reported from the 2007–2011 American Community Survey.

There are 7 census block groups in the Staten Island study area, based on 2010 census boundaries.

Population and Households

The total population of the Staten Island study area is 10,100 residents (see **Table 4-2**). There are 3,065 households in the study area, indicating an average household size of 3.3 persons.

Zoning Map - Staten Island Study Area

Figure 4-2

Table 4-2
Population and Households in the Staten Island Study Area

Geographic Area	Population	Number of Households
Staten Island, Census Tract 207, Block Group 1	2,304	608
Staten Island, Census Tract 213, Block Group 4	1,084	319
Staten Island, Census Tract 213, Block Group 5	743	231
Staten Island, Census Tract 223, Block Group 2	1,336	394
Staten Island, Census Tract 239, Block Group 1	1,944	612
Staten Island, Census Tract 239, Block Group 2	1,306	396
Staten Island, Census Tract 247, Block Group 1	1,383	505
Total Staten Island Study Area:	10,100	3,065

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *Census 2010.*

Race and Ethnicity

As shown in **Table 4-3**, the largest racial or ethnic group is Hispanic (44.4 percent). African-Americans constitute the second largest group (26.1 percent), followed by whites (21.9 percent). Asian-Americans make up 4.6 percent of the study area and those of another racial or ethnic group are 3.0 percent of the total study area population. The racial and ethnic composition of the study area is not uniformly distributed by block group.

Table 4-3
Race and Ethnicity in the Staten Island Study Area

Geographic Area	White	%	Black	%	Asian	%	Other	%	Hispanic	%
Staten Island, CT 207, BG 1	266	11.5	778	33.8	18	0.8	62	2.7	1,180	51.2
Staten Island, CT 213, BG 4	330	30.4	194	17.9	24	2.2	34	3.1	502	46.3
Staten Island, CT 213, BG 5	136	18.3	185	24.9	13	1.7	29	3.9	380	51.1
Staten Island, CT 223, BG 2	279	20.9	434	32.5	25	1.9	39	2.9	559	41.8
Staten Island, CT 239, BG 1	402	20.7	450	23.1	180	9.3	56	2.9	856	44.0
Staten Island, CT 239, BG 2	423	32.4	177	13.6	113	8.7	25	1.9	568	43.5
Staten Island, CT 247, BG 1	371	26.8	420	30.4	93	6.7	54	3.9	445	32.2
Total Staten Island Study Area:	2,207	21.9	2,638	26.1	466	4.6	299	3.0	4,490	44.5

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *Census 2010.*

Housing

In total, the Staten Island study area contains approximately 3,325 housing units. Of these, 7.8 percent of units are vacant and 92.2 percent of units are occupied (see **Table**

4-4). Of the occupied housing units, 48.0 percent are occupied by renters, while 44.2 percent of units are owner-occupied.

Table 4-4
Housing Units in the Staten Island Study Area

Geographic Area	Vacant	%	Renter-Occupied	%	Owner-Occupied	%	Total Units
Staten Island, CT 207, BG 1	74	10.9	389	57.0	219	32.1	682
Staten Island, CT 213, BG 4	30	8.6	140	40.1	179	51.3	349
Staten Island, CT 213, BG 5	15	6.1	141	57.3	90	36.6	246
Staten Island, CT 223, BG 2	37	8.6	153	35.5	241	55.9	431
Staten Island, CT 239, BG 1	41	6.3	286	43.8	326	49.9	653
Staten Island, CT 239, BG 2	43	9.8	130	29.6	266	60.6	439
Staten Island, CT 247, BG 1	20	3.8	356	67.8	149	28.4	525
Total Staten Island Study Area:	260	7.8	1,595	48.0	1,470	44.2	3,325

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *Census 2010.*

Mode of Transportation

Driving is the predominant form of transportation in the Staten Island study area, as about 60 percent of area residents drive to work (see **Table 4-5**). Approximately 30.7 percent of study area residents take public transportation to work (including bus, railway, and ferry). About one percent bicycle to work, 3.1 percent walk, and 3.7 percent work at home.

Table 4-5
Mode of Transportation to Work in the Staten Island Study Area

Geographic Area	Car, Truck, Van %	Public Transportation %	Bicycle %	Walk %	Work at Home or Other %
Staten Island, CT 207 BG 1	45.8	41.9	6.9	2.5	2.9
Staten Island, CT 213 BG 4	46.0	51.1	0.0	2.9	0.0
Staten Island, CT 213 BG 5	69.1	11.7	0.0	10.2	9.1
Staten Island, CT 223 BG 2	66.1	27.7	2.0	1.6	2.6
Staten Island, CT 239 BG 1	58.9	39.8	0.0	1.3	0.0
Staten Island, CT 239, BG 2	73.2	18.3	0.0	4.8	3.7
Staten Island, CT 247 BG 1	69.8	20.9	0.0	0.0	9.4
Total Staten Island Study Area:	60.9	30.7	1.6	3.1	3.7

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *American Community Survey 2007-2011.*

Economic Characteristics

The mean household income of the Staten Island study area is $67,641 and 20 percent of the population of this area is below the poverty line[1] (see **Table 4-6**).

Table 4-6
Income and Poverty Characteristics of the Staten Island Study Area

Geographic Area	Median Household Income $	Individuals Below Poverty Line %
Staten Island, CT 207 BG 1	45,700	34.4
Staten Island, CT 213 BG 4	38,772	43.0
Staten Island, CT 213 BG 5	61,500	10.6
Staten Island, CT 223 BG 2	62,115	3.9
Staten Island, CT 239 BG 1	50,778	13.8
Staten Island, CT 239, BG 2	92,813	10.6
Staten Island, CT 247 BG 1	59,167	20.6
Total Staten Island Study Area:	n/a	19.1

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *American Community Survey 2007–2011.*

4-3-1-4 PUBLIC POLICY

PlaNYC 2030

In April 2007, the New York City Mayor's Office of Long-term Planning and Sustainability released *PlaNYC: A Greener, Greater New York*. An update to PlaNYC in April 2011 built upon the goals set forth in 2007 and provided new goals and strategies. PlaNYC represents a comprehensive and integrated approach to planning for New York City's future. It includes policies to address three key challenges that the City faces over the next 20 years: (1) population growth; (2) aging infrastructure; and (3) global climate change. In the 2011 update, elements of the plan are organized into ten categories—housing and neighborhoods, parks and public space, brownfields, waterways, water supply, transportation, energy, air quality, solid waste, and climate change—with corresponding goals and initiatives for each category.

4-3-2 BAYONNE

Bayonne is an incorporated city within Hudson County, in the State of New Jersey. The city is located on a peninsula and is bounded by Jersey City to the north, the Kill van Kull to the south, New York Bay to the east, and Newark Bay to the west. According to the 2010 US Census, the 5.6 square mile city is home to approximately 63,000 residents. Traditionally, Bayonne has been a center of manufacturing, industry, and

[1] The U.S. Census Bureau's established income threshold for poverty level defines poverty level. See the following for an explanation of Census Bureau methodology: http://www.census.gov/hhes/www/poverty/poverty-cal-in-acs.pdf

maritime activities, which has diminished but remains important today. The city also contains low- to medium-density residential neighborhoods.

On the Bayonne side of the Bayonne Bridge, the ¼-mile study area extends north to roughly 10th Street, south to the Kill Van Kull waterfront, east to roughly Avenue C,; and west to the Newark Bay waterfront.

4-3-2-1 LAND USE

Residential uses in the Bayonne study area generally take the form of detached and semi-detached one- and two-family houses. There are also multi-family apartment buildings in the study area of up to eight stories.

Industrial uses in the study area are located primarily along the waterfront, west of Avenue A. These facilities mainly produce, process or store asphalt, metal, or chemicals. There are also isolated industrial uses in other locations within the study area.

Local retail uses are located on Broadway north of East 5th Street, and in a shopping plaza located west of Avenue A, between North Street and West 5th Street. Other low-density commercial uses are scattered throughout the study area.

Community facility uses within the study area include the Story Court Library and the Bayonne Museum. Schools in the study area include two public schools under the jurisdiction of the Bayonne Board of Education: Henry E. Harris Number 1 Elementary School, and Mary J. Donohue Number 4 Elementary School. There are also two private schools within the study area: Saint Andrew's Catholic School; and Holy Family Academy. Places of worship in the study area include Bergen Point Community Church, Trinity Episcopal Church, and Saint Andrew the Apostle Church.

The 8th Street Hudson Bergen Light Rail (HBLR) station is located at Avenue C and West 8th Street. The HBLR connects Bayonne residents to Jersey City, Hoboken, Weehawken, and Union City, before terminating in North Bergen. The other major transportation infrastructure in the study area is Route 440, which connects to the Bayonne Bridge, the New Jersey Turnpike Extension (Interstate 78), and U.S. Routes 1 and 9.

Open space resources in the study area include Al Slootsky Playground, Dennis P. Collins Park, and Edward F. Clark Park. Chapter 8, "Parklands and Recreational Resources," contains more information on these resources.

There are also substantial tracts of vacant land on the city's waterfront, primarily in the area directly west of the Bayonne Bridge. This area, the site of a former Texaco refinery, is designated for future development by the City of Bayonne (see "No Build Alternative," below).

As discussed in Chapter 5, "Economic Conditions," six properties in Bayonne encroach on the PANYNJ right-of-way and are within the construction work zone. Three of these properties contain industrial or commercial uses, and two are parks. In one case, PANYNJ property is being used as a thoroughfare and for parking by the public, though it is not a mapped street.

4-3-2-2 ZONING

As set forth in the City of Bayonne Master Plan (2000), Bayonne contains residential, commercial, industrial, and mixed-use districts (see **Table 4-7**). **Figure 4-3** shows where the zoning districts in the study area are located.

Table 4-7
Zoning Districts in the Bayonne Study Area

Zoning Designation	Maximum Density	Permitted Uses
R-2	10 to 25 units per acre	Single-family detached houses, two-family detached houses, and one- and two-family townhouses
R-3	35 to 44 units per acre	Medium density residential uses up to small apartment buildings
R-M	44 to 109 units per acre	High density residential uses such as high-rise apartment buildings
C-1	1.5 FAR[1]	Local retail uses. Residential uses permitted on upper floors
C-2	N/A[2]	Medium density retail uses. Major office or department store uses not permitted.
IL-A	N/A[2]	Light industrial uses
I-H	N/A[2]	Heavy industrial uses
WD	N/A[2]	Mixed use district permitting residential, retail, and waterfront commercial uses.

Notes: [1]FAR=Floor Area Ratio
[2]N/A: The Bayonne Zoning Code sets forth regulations on lot size, setbacks, and building heights, but no specific density controls for these zoning districts.
Sources: City of Bayonne

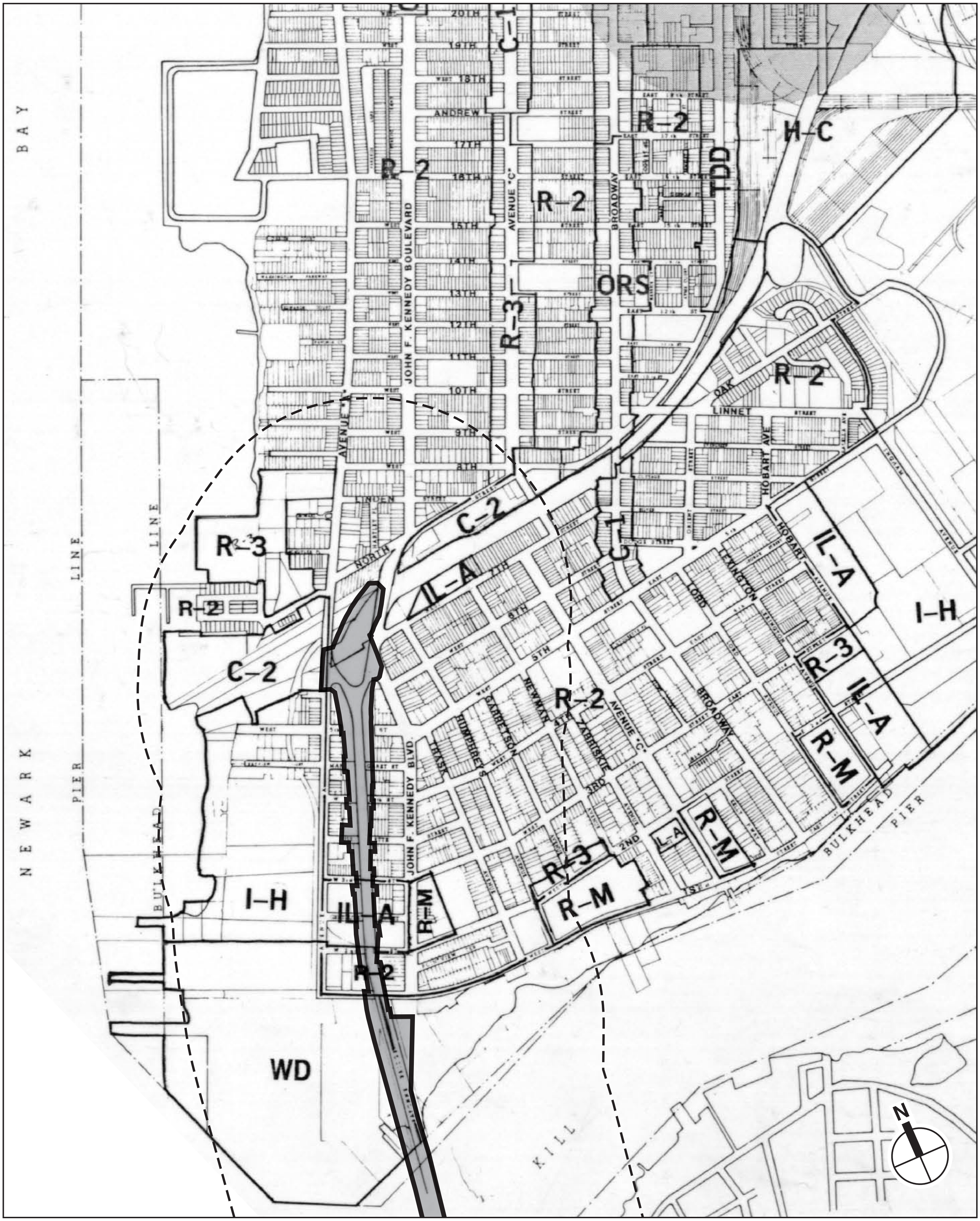
4-3-2-3 POPULATION AND EMPLOYMENT

There are six census block groups in Bayonne that fall at least 50 percent within the ¼-mile study area surrounding the limit of the construction work zone.

Population and Households

The total population of the Bayonne is approximately 7,000 residents (see **Table 4-8**). There are 2,764 households in the study area, indicating an average household size of 2.5 persons.

2.1.12



Project Site Boundary (Construction Work Zone)

Study Area Boundary (1/4-MilePerimeter)

0 400 1000 FEET

SCALE

Zoning Map - Bayonne Study Area

Figure 4-3

Table 4-8
Population and Households in the Bayonne Study Area

Geographic Area	Population	Number of Households
Hudson County, Census Tract 112, Block Group 3	662	258
Hudson County, Census Tract 112, Block Group 4	2,217	885
Hudson County, Census Tract 115, Block Group 1	985	369
Hudson County, Census Tract 115, Block Group 2	1,469	578
Hudson County, Census Tract 115, Block Group 3	719	281
Hudson County, Census Tract 116, Block Group 1	948	393
Total Bayonne Study Area:	7,000	2,764

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Source: US Census Bureau, *Census 2010.*

Race and Ethnicity

As shown in **Table 4-9**, 68.5 percent of the study area is white, followed by 20.5 percent who are Hispanic, 4.8 percent who are Asian-American, 4.7 percent who are African-American, and 1.4 percent who identify with another racial or ethnic category. All of the block groups in the study area are majority white.

Table 4-9
Race and Ethnicity in the Bayonne Study Area

Geographic Area	White	%	Black	%	Asian	%	Other	%	Hispanic	%
Hudson County, CT 112 BG 3	496	74.9	51	7.7	11	1.7	14	2.1	90	13.6
Hudson County, CT 112 BG 4	1,534	69.2	73	3.3	173	7.8	33	1.5	404	18.2
Hudson County, CT 115 BG 1	658	66.8	12	1.2	58	5.9	11	1.1	246	25.0
Hudson County, CT 115 BG 2	1,108	75.4	41	2.8	49	3.3	16	1.1	255	17.4
Hudson County, CT 115 BG 3	462	64.3	40	5.6	14	1.9	12	1.7	191	26.6
Hudson County, CT 116 BG 1	538	56.8	113	11.9	33	3.5	14	1.5	250	26.4
Total Bayonne Study Area:	4,796	68.5	330	4.7	338	4.8	100	1.4	1,436	20.5

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Sources: US Census Bureau, *Census 2010.*

Housing

In total, the Bayonne study area contains approximately 2,958 housing units. Of this total, 6.6 percent of units are vacant and 93.5 percent of units are occupied (see **Table 4-10**). Of the occupied housing units, 46.9 percent are occupied by renters, while 46.6 percent of units are owner-occupied.

Table 4-10
Housing Units in the Bayonne Study Area

Geographic Area	Vacant	%	Renter-Occupied	%	Owner-Occupied	%	Total Units
Hudson County, CT 112 BG 3	19	6.9	110	39.7	148	53.4	277
Hudson County, CT 112 BG 4	56	6.0	388	41.2	497	52.8	941
Hudson County, CT 115 BG 1	15	3.9	183	47.7	186	48.4	384
Hudson County, CT 115 BG 2	64	10.0	268	41.7	310	48.3	642
Hudson County, CT 115 BG 3	21	7.0	163	54.0	118	39.1	302
Hudson County, CT 116 BG 1	19	4.6	274	66.5	119	28.9	412
Total Bayonne Study Area:	194	6.6	1,386	46.9	1,378	46.6	2,958

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Sources: US Census Bureau, *Census 2010.*

Mode of Transportation

The predominant form of transportation in the Bayonne study area is by car, as 64.7 percent of workers drive to work (see **Table 4-11**). Approximately 24.6 percent of workers use public transportation, while 8.3 percent walk and 2.3 percent work at home or use another form of transportation.

Table 4-11
Mode of Transportation to Work in the Bayonne Study Area

Geographic Area	Car, Truck, Van %	Public Transportation %	Bicycle %	Walk %	Work at Home or Other %
Hudson County, CT 112 BG 3	69.0	25.7	0	5.3	0
Hudson County, CT 112 BG 4	62.8	32.3	0	4.9	0
Hudson County, CT 115 BG 1	66.2	23.4	0	10.4	0
Hudson County, CT 115 BG 2	71.1	11.5	0	17.4	0
Hudson County, CT 115 BG 3	57.5	27.0	0	6.4	9.2
Hudson County, CT 116 BG 1	61.1	28.8	0	2.8	7.4
Total Bayonne Study Area:	64.7	24.6	0	8.3	2.3

Notes: Percentages may not add up to 100 due to rounding.
CT: Census Tract
BG: Block Group
Sources: US Census Bureau, *American Community Survey 2007-2011.*

Economic Characteristics

The mean household income in the Bayonne study area is $81,040 and the poverty rate is 10 percent, as shown in **Table 4-12**.

Table 4-12
Income and Poverty Characteristics of the Bayonne Study Area

Geographic Area	Median Household Income $	Individuals Below Poverty Line %
Hudson County, CT 112 BG 3	72,750	8.6
Hudson County, CT 112 BG 4	69,648	1.0
Hudson County, CT 115 BG 1	51,615	14.9
Hudson County, CT 115 BG 2	52,250	9.3
Hudson County, CT 115 BG 3	44,872	1.5
Hudson County, CT 116 BG 1	53.533	24.0
Total Bayonne Study Area:	n/a	7.8
Sources: US Census Bureau, *American Community Survey 2007-2011.*		

4-3-2-4 PUBLIC POLICY

City of Bayonne Master Plan (2000)

The City of Bayonne Master Plan is intended to guide the growth and development of Bayonne. The plan's vision for the year 2020 is of a growing and vibrant community with a balance of land uses, a diversified economy, well-maintained infrastructure, extensive community facilities, and a high standard of life. The plan identifies major development projects that are expected to help Bayonne achieve these goals, as well as objectives under nine categories: land use, circulation, economic development; housing; community facilities; parks, recreation and open space; conservation; utilities; historic preservation; and recycling.

Hudson County Master Plan (2002)

Hudson County contains 46.6 square miles and approximately 609,000 residents, making it the smallest county in New Jersey in terms of land area, but the most densely populated. Hudson County is also the sixth most densely populated county in the nation. Historically a blue-collar community, the county is grappling with how to allocate resources in a way that provides maximum economic development and positions the county into the future. To this end, the Hudson County Master Plan focuses on three areas: economic development, labor force development, and quality of life. Key projects identified in the plan to further these goals include the completion of the Hudson-Bergen Light Rail Transit line to the 8th Street Station in Bayonne; road and infrastructure improvements; enhanced job training programs; support for public education and higher education; and expansion of the county's parks and other public service facilities.

4-4 ENVIRONMENTAL CONSEQUENCES

4-4-1 NO BUILD ALTERNATIVE

4-4-1-1 LAND USE

In the future without the project, 12 development projects are expected to be built by 2017 within the ¼-mile study area (see **Table 4-13**). In Bayonne, multi-family residential

Table 4-13
Background Development Projects

Map No.	Location	Description
1	79-87 Kennedy Boulevard, Bayonne	48 residential units
2	Kennedy Boulevard between 2nd and 3rd Streets, Bayonne	96 residential units
3	26 North Street, Bayonne	74 residential units
4	453 Morningstar Road, Staten Island	New garage
5	65 Winant Street, Staten Island	Two-family house and garage
6	190 Dixon Avenue, Staten Island	Two-family house and garage
7	186 Dixon Avenue, Staten Island	Two-family house and garage
8	47-49 Walker Street, Staten Island	Two single family houses
9	1815 Forest Avenue, Staten Island	4,000 square feet commercial development
10	33 Laforge Avenue, Staten Island	New garage
11	Riverside Lane, Staten Island	Three two-family houses
12	601 Villa Avenue, Staten Island	Two-family house
Sources: NYCDOB; NYCDCP; City of Bayonne		

projects will add 218 residential units to the study area. In Staten Island, seven small-scale residential projects will be built, which will add 16 new residential units. In addition, a new 4,000-square-foot commercial development will be built at Forest Avenue and Morningstar Road. **Figure 4-4** shows where these projects are located.

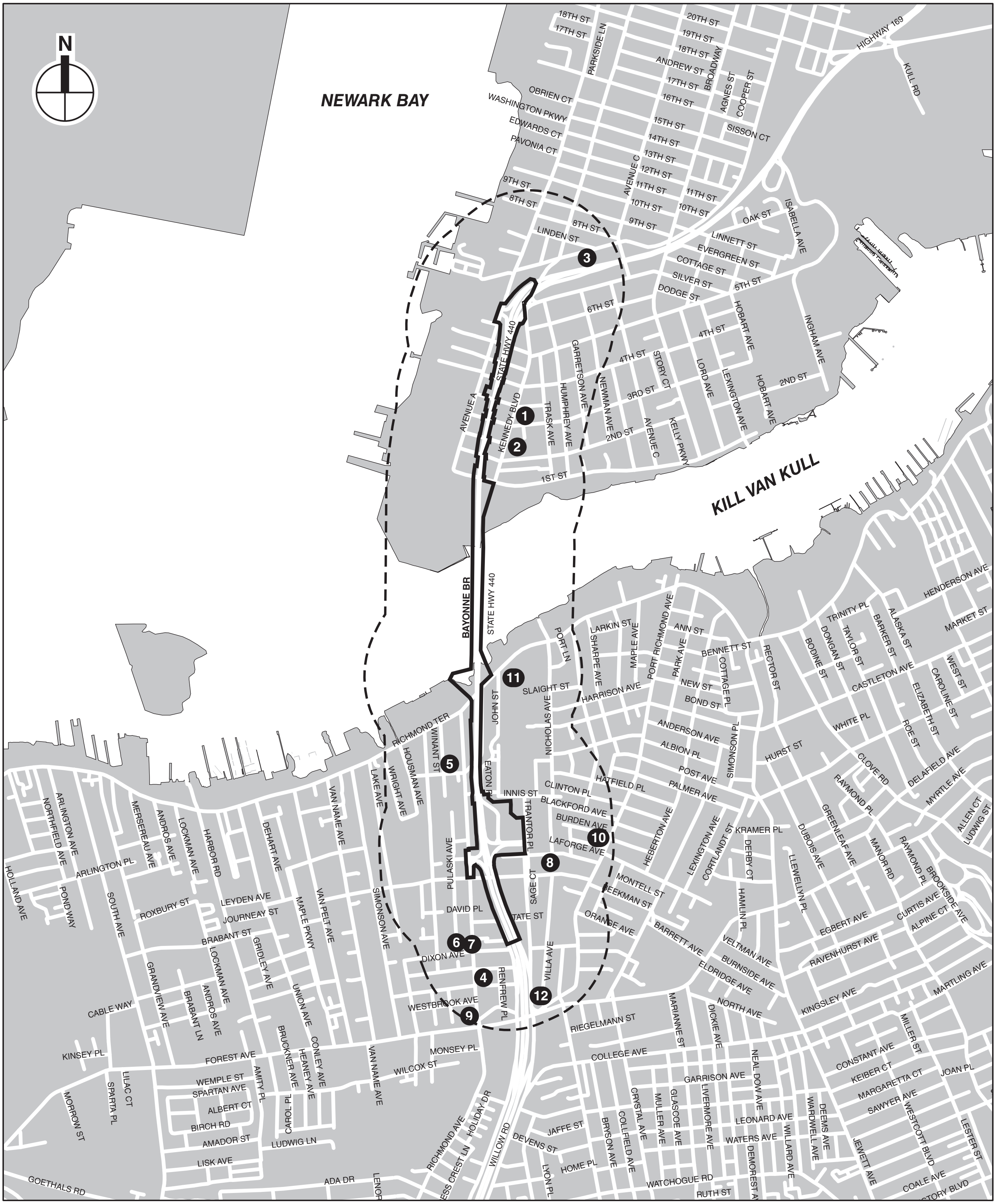
There are also two regional transportation projects on the New Jersey Turnpike that will include construction activities by 2017. In Bayonne, Interchange 14A of Route 440 will be reconstructed and enlarged. The interchange connects to the Newark Bay-Hudson County Bridge, whose deck will be replaced in two phases. Phase One started in 2010 and will be complete by 2013. Phase Two will start in 2013 and be complete by 2015. If implemented, Phase Three would include replacement of the ramps to the bridge between 2016 and 2017.

The continued operation of the Bayonne Bridge under the No Build Alternative would not affect land uses or land use plans, social conditions, or other community characteristics of the Bayonne and Staten Island Study Areas. The Bayonne Bridge would continue to serve as a link between these areas and the regional roadways that lie to their north and south. It is anticipated that the encroachments on PANYNJ right-of-way would remain, but PANYNJ would have the option to remove these encroachments for maintenance or safety considerations.

4-4-1-2 PUBLIC POLICY

PlaNYC establishes initiatives that are germane to the Bayonne Bridge, including: improve freight movement; improve New York City's gateways to the nation and to the world; and maintain and improve roads and bridges. The plan also aims to increase economic opportunity in the City and revitalize underutilized waterfront areas. The No Build Alternative would not result in progression toward any of these goals. Instead, the economic competitiveness of the region may be diminished because larger ships would not be able to access PANYNJ port facilities. The opportunity to upgrade a major transportation link between New York City and New Jersey would also go unfulfilled.

3.22.13



Primary Study Area Boundary (Construction Work Zone)

Secondary Study Area Boundary (1/4-Mile Perimeter)

❶ *Background Development Project*

Background Development Projects

Figure 4-4

Additionally, the No Build Alternative would not materially affect development and revitalization of adjacent waterfront areas.

Certain land use policies in Staten Island could change by 2017 as a result of the North Shore Land Use and Transportation Study. The study was initiated in 2008 as part of the City's continuing efforts to preserve the neighborhood character of the borough's lower density neighborhoods while balancing the needs of the working waterfront. The Kill Van Kull waterfront is home to many historic communities and also the largest concentration of tugboats, dry docks and barges serving all of New York Harbor. The plan includes a series of recommendations, including new waterfront open space and development, and studying the reactivation of the former Staten Island North Shore Line. To date, there are no specific proposals to enact these recommendations.

New York City Transit (NYCT) of the Metropolitan Transportation Authority (MTA) is also studying transportation in this area through the North Shore Alternatives Analysis Study. The purpose of this study is to examine reactivating transit uses on the currently dormant North Shore rail line. The study aims to assess and refine transit alternatives (such as light rail transit and bus rapid transit) and select a Locally Preferred Alternative. In May 2012, MTA chose Bus Rapid Transit is the Locally Preferred Alternative. It is unknown when planning or construction will begin.

In 2009, the Staten Island Economic Development Corporation (SIEDC) released the West Shore Light Rail Phase II Study. The Phase II study examined multiple light rail alignments in the western portion of Staten Island that would connect the Richmond Valley Staten Island Railway (SIR) station to the south, to the Hudson Bergen Light Rail (HBLR) system in Bayonne to the north, via the Bayonne Bridge. The West Shore Light Rail system could also connect to potential rail service on the North Shore rail line, as discussed above. The Phase II study found that a light rail system would be conceptually feasible. However, to date, no funding source has been identified for the project, and no implementation plans have been developed. If the West Shore Light Rail project proceeds, it would be implemented after the 2017 build year for the Bayonne Bridge project.

The Bayonne Master Plan recommends the redevelopment of currently vacant waterfront lands to the west of the Bayonne Bridge with a mixture of residential, retail, and waterfront commercial uses. The plan also recommends extending the HBLR service to this site, and providing a waterfront walkway that would connect to Dennis P. Collins Park, underneath the Bayonne Bridge. The plan notes that infrastructure investments have been vital to Bayonne's economic development. The No Action Alternative would not help to further any of these goals. The No Action alternative would not encourage the redevelopment of underutilized waterfront lands, and would forego the opportunity for critical infrastructure investment.

The City of Bayonne is currently working to release a new version of the City's Master Plan, which was last updated in 2000. The plan is expected to continue the broad policy goals and framework of the 2000 plan, while updating it for current economic and demographic trends.

4-4-2 RAISE THE ROADWAY ALTERNATIVE

Overall, the project would not adversely impact the aforementioned conditions of the study area, including land use, public policy, and population and employment, due to the following factors:

- The project would likely remove six encroachments from existing PANYNJ right-of-way within the construction work zone in Bayonne. In most cases, these encroachments are ancillary to adjacent uses, and their removal would not adversely impact the continuation of these uses. Of these six, two commercial properties would experience displacement of a portion of their facilities due to construction activities. The remaining four include a warehouse operated by the Bayonne Board of Education, an unmapped street, and portions of two parks (see Chapter 8, "Parklands and Recreational Resources"). As analyzed in Chapter 5, "Economic Conditions," the removal of these encroachments would not result in adverse impacts. Overall, the isolated removal of encroachments would not affect land use and social conditions.
- While the project would result in temporary, localized impacts during construction (see Chapter 16, "Construction Effects"), it would not result in any permanent changes to land use and social conditions.
- The project would not alter or preclude public policy initiatives or planned future development projects.
- The project would impact certain conditions in the study area by raising the elevation of the Bayonne Bridge. The change in elevation would alter the air and light conditions, in some cases improving views that are currently obstructed by the bridge. The aesthetic effects of the project are described in greater detail in Chapter 9, "Visual Resources."
- The project would be supportive of certain PlaNYC initiatives. It would support the following: economic development in the region by maintaining the competitiveness of PANYNJ port facilities; upgrade a major transportation infrastructure asset linking New York City to New Jersey; and encourage redevelopment of underutilized portions of the Staten Island waterfront by improving air, light, and view conditions, as noted above.
- The project would be supportive of certain recommendations in the Bayonne Master Plan, including: investment in Bayonne's infrastructure and local economy; contribution to economic development in the region by maintaining the competitiveness of PANYNJ port facilities; and encourage redevelopment of vacant adjacent waterfront land by improving air, light, and view conditions, as noted above.

4-5 MITIGATION

The project would not result in adverse impacts to land use or social conditions. Therefore, mitigation measures are not necessary.

Chapter 5: Economic Conditions

5-1 INTRODUCTION

This chapter examines the potential of the Raise the Roadway Alternative to result in adverse economic impacts by directly or indirectly displacing businesses or residents. The project would not require any permanent property acquisition. Therefore, this discussion of impacts on economic conditions focuses on easements and encroachments within the construction work zone.

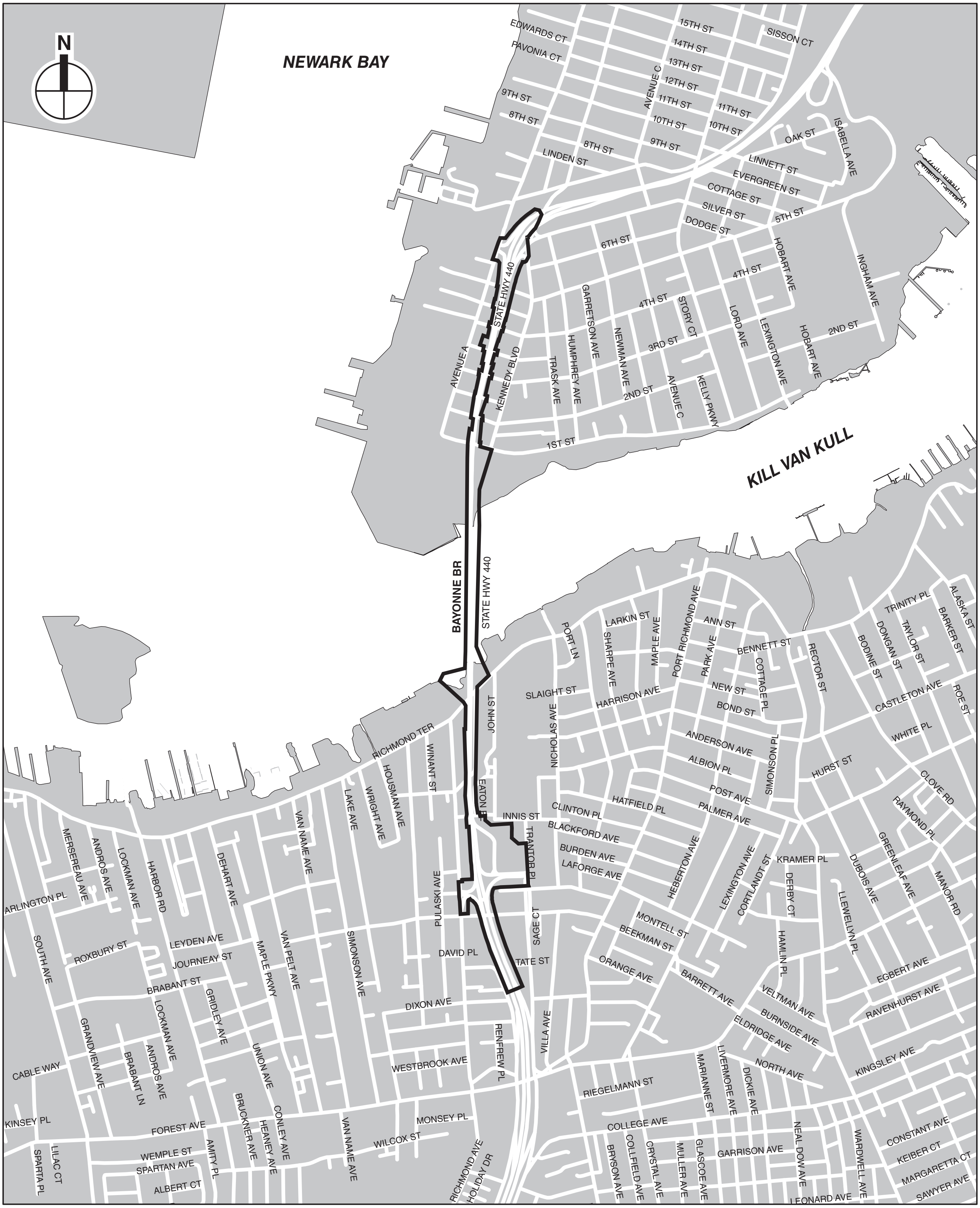
5-2 METHODOLOGY

Transportation projects often require property acquisition and relocation. A federally funded project must adhere to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in Title 42, Sections 4601 et seq., of the United States Code, and the applicable implementing regulations set forth in Title 49, Part 24, of the Code of Federal Regulations (collectively, "the Uniform Act"). This involves the process regarding relocation services, moving payments, replacement housing payments, and other allowable payment related to commercial and residential moving costs. The rights of property owners and tenants of real property to be acquired to implement the project are protected under the Uniform Act, which is intended to ensure that individuals do not suffer disproportionate injuries as a result of programs and projects designed for the benefit of the public as a whole, and to minimize the hardship of displacement on such persons. In New York, acquisition of real property must also adhere to the New York State Eminent Domain Procedures Law (EDPL), which seeks to establish the exclusive procedure by which property is acquired in New York State, ensure just compensation is paid, and establish opportunities for public participation in the planning of projects necessitating the exercise of eminent domain. In New Jersey, the acquisition of real property is subject to the Eminent Domain Act of 1971, under which the Superior Court of New Jersey has jurisdiction to determine the authority to exercise the power of eminent domain, compel the exercise of such power, and determine the compensation to be paid to all affected parties.

The project would require easements for government-owned property and removal of encroachments on Port Authority of New York and New Jersey (PANYNJ) right-of-way within the construction work zone. Therefore, the construction work zones underneath and on each side of the bridge constitute the study area (see **Figure 5-1**).

Various sources were used for this assessment, including information supplied by PANYNJ, New York City Department of City Planning (NYCDCP), Hudson County Division of Planning, New York City Department of Finance Real Property Assessment Database (RPAD), and site visits.

1.24.12



Economic Conditions Affected Environment Boundary (Construction Work Zone)

0 2000 FEET

SCALE

Economic Conditions Affected Environment

Figure 5-1

5-3 AFFECTED ENVIRONMENT

The construction work zone includes PANYNJ property that is currently occupied by adjacent businesses as well as property under municipal ownership.

- Encroachments occur when one owner builds on or uses the property of another owner. In the case of this project, real estate encroachments refer to private or public property that has extended onto property within PANYNJ right-of-way and within the construction work zone. In total, there are six properties or uses in Bayonne that encroach on PANYNJ right-of-way and are within the construction work zone.
- Easements in this case refer to agreements between property owners and PANYNJ that allow PANYNJ to use property that falls within the construction work zone. Temporary construction easements and permanent aerial easements will likely be required. Within the construction work zone, there are 14 street segments, ramps, and highway segments (eight in Bayonne and six in Staten Island)and one segment of rail tracks in Staten Island that fall outside of PANYNJ right-of-way and would require easements during construction. Eleven of these would also require aerial easements for a permanent wider structure overhead.

Table 5-1 and **Figures 5-2 through 5-5** detail the properties and streets of the affected environment in Bayonne and Staten Island.

5-3-1 ENCROACHMENTS

There are no properties in Staten Island that encroach on the PANYNJ right-of-way and that are located in the construction work zone. As stated in Chapter 4, "Land Use and Social Conditions," the project would likely remove six encroachments from the existing PANYNJ right-of-way within the construction work zone in Bayonne. Of these six, two commercial properties would experience displacement of a portion of their facilities due to construction activities. The remaining four include a warehouse operated by Bayonne Board of Education, unmapped PANYNJ property that is being used without authorization as a thoroughfare and for parking by the public, and portions of two parks. Brief descriptions of the existing conditions of the encroaching properties in the construction work zone are provided below. One park and two ball fields would be affected. The ball fields along West First Street and Al Slootsky Playground, located on the block between Juliette Street and West Fourth Street, are within PANYNJ property and fall within the construction work zone (see **Figure 5-2** Mapped Point #1 and **Figure 5-3**, Mapped Point #5). In each of these cases, the City of Bayonne has a license with PANYNJ for the encroachment.

- Williams Industries, located at 233 West First Street, occupies a lot containing a four-story industrial building and a one-story warehouse shed. The one-story warehouse building and a driveway that provides access to a loading dock encroaches on PANYNJ property and is within the construction work zone (see **Figure 5-2**, Mapped Point #2). PANYNJ had a lease with a former occupant of the site. The lease was assigned to Williams Industries in 1968. The lease has expired, and the company has been paying monthly rent to PANYNJ since May 2004.

Economic Conditions Affected Environment Boundary (Construction Work Zone)

3 Encroachment

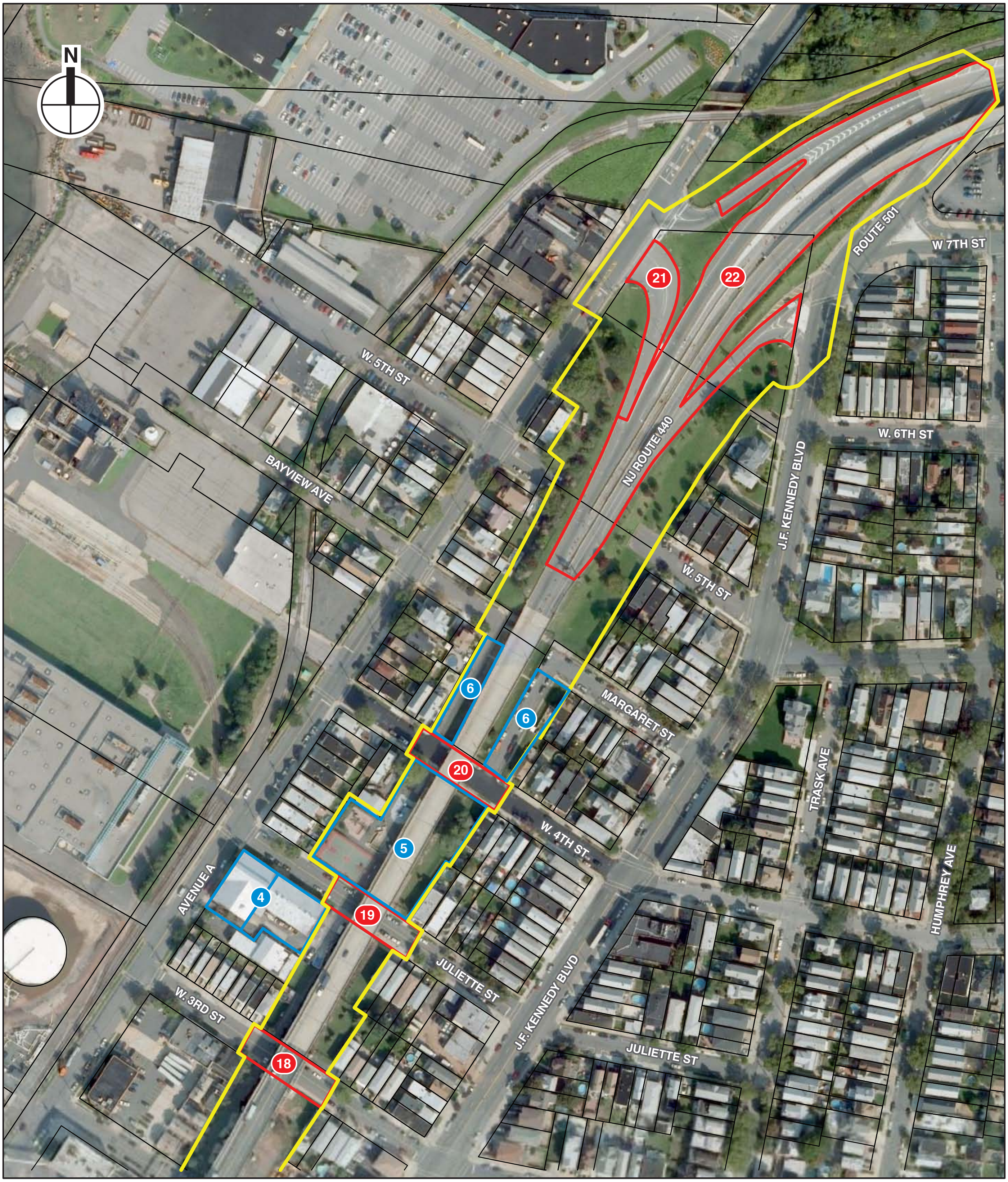
1 Easement

0 200 400 FEET

SCALE

Encroachments and Easements
Bayonne, New Jersey
Figure 5-2

3.19.13



Economic Conditions Affected Environment Boundary (Construction Work Zone)

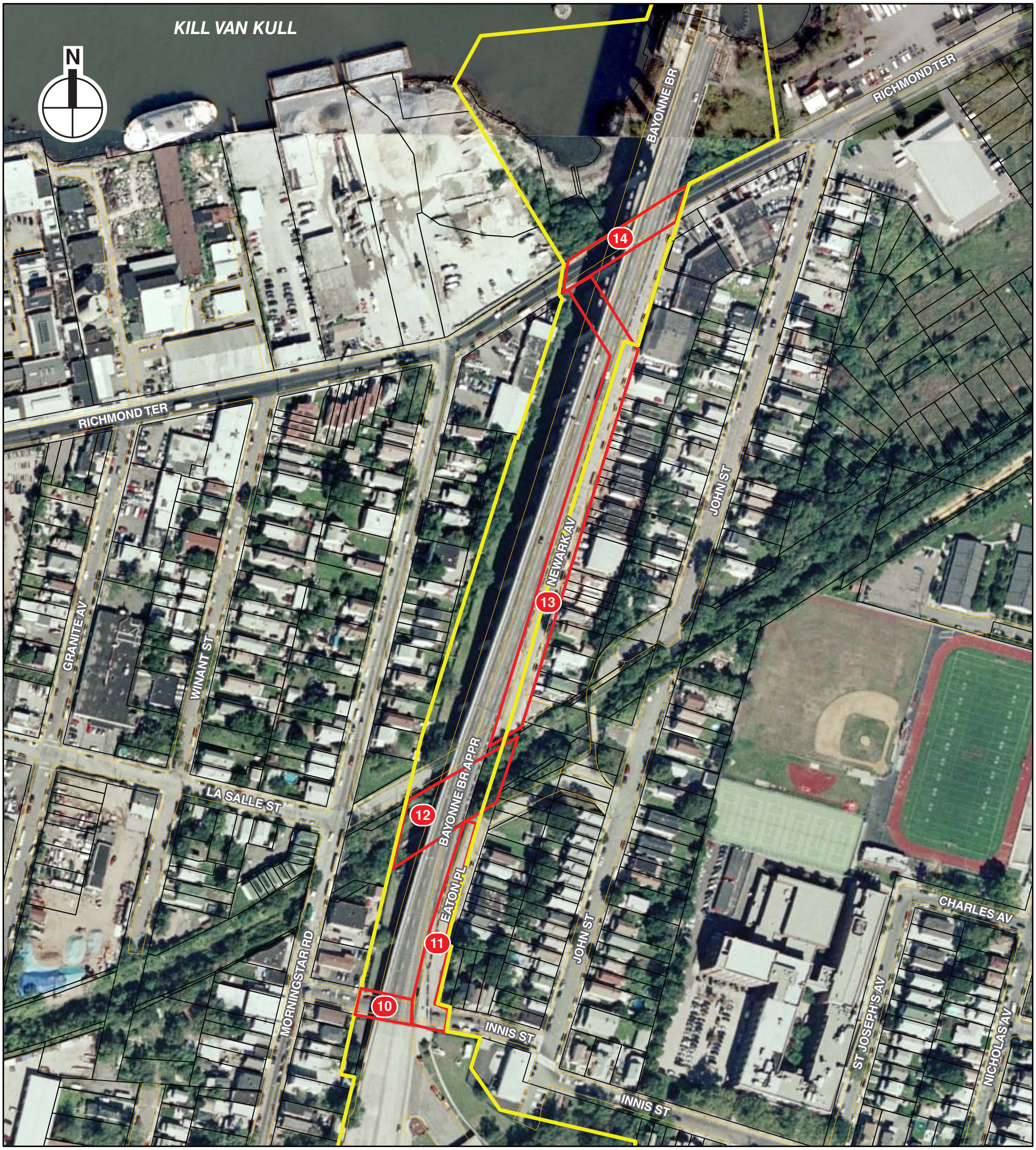
12 *Encroachment*

11 *Easement*

0 200 400 FEET

SCALE

Encroachments and Easements
Bayonne, New Jersey
Figure 5-3

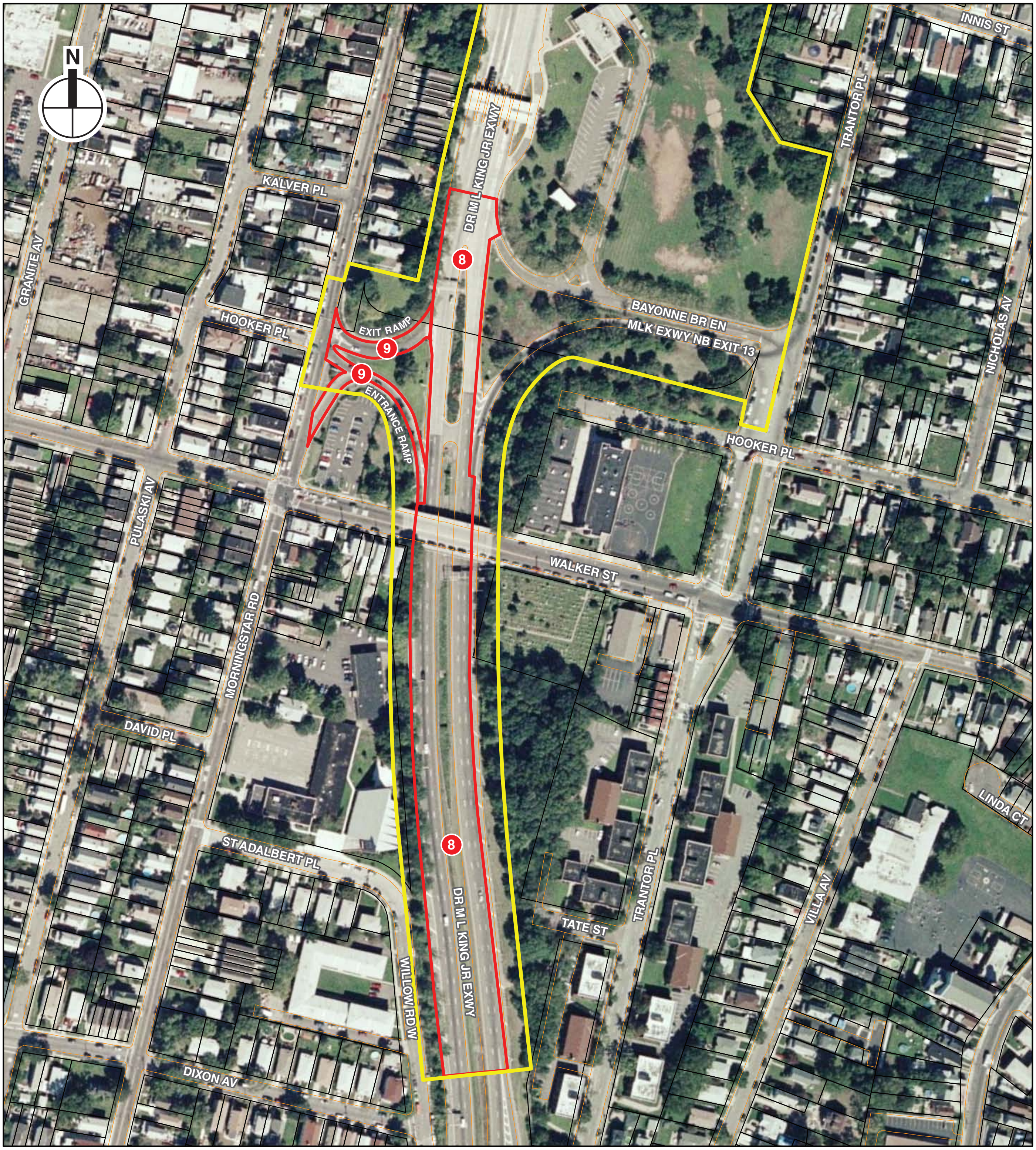


Economic Conditions Affected Environment Boundary (Construction Work Zone)

7 *Encroachment*

4 *Easement*

Encroachments and Easements
Staten Island, New York
Figure 5-4



Economic Conditions Affected Environment Boundary (40-Foot Work Zone)

2 *Encroachment*

1 *Easement*

Encroachments and Easements
Staten Island, New York
Figure 5-5

Table 5-1
Encroachments and Easements in the Affected Environment with the Raise the Roadway Alternative

Map No.[1]	State	PANYNJ Property within the construction work zone	Owner and Location of Adjacent Encroaching Property	Land Use Details[2]	Type of Action[4]
Encroachments					
1	NJ	Block 391, Lot 3	PANYNJ (licensed to City of Bayonne)	City of Bayonne use as ball field with fencing and signage	Displace ball field
2	NJ	Block 373, Lot 3	Williams Industry (Block 373, Lot 2)	Warehouse; access to loading dock and ancillary shed. Expired lease; paying monthly rent	Change in site use
3	NJ	Block 362, Lot 1	Ideal Window MFG, Inc (Block 362, Lot 2)	Industrial; ancillary single-story building. Expired lease; paying monthly rent	Change in site use
4	NJ	Block 346, Lot 11	Board of Education (Block 346, Lots 29 and 31)	Warehouse; vehicle storage and repair with access to garage bay	Change in site use
5	NJ	Block 345, Lot 1	PANYNJ (licensed to City of Bayonne)	Park; "Al Slootsky Playground" and basketball court (also called Juliette Park)	Relocate park
6	NJ	Block 334, Lot 5	W 4th Street and Margaret Street[3]	Used as a thoroughfare (not mapped) parallel to the bridge and for parking by public	Temporarily closed during construction; Aerial easement for permanent wider structure overhead
Easements					
8	NY	MLK Expressway	State-owned	Public Street	Temporary easement for reconstruction
9	NY	Morningstar Ramp	State-owned	Public Street	Temporary easement for reconstruction
10	NY	Innis Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead and temporary easement for construction
11	NY	Eaton Place north of Innis Street (parallel to the bridge on the east)	City-owned	Public Street	Aerial easement for permanent wider structure overhead and temporary easement for construction
12	NY	Rail Tracks (Block 1125, Lot 17)	NYCEDC	Transportation (not active)	Aerial easement for permanent wider structure overhead and temporary easement for construction
13	NY	Newark Avenue (between rail tracks and Richmond Avenue)	City-owned	Public Street	Aerial easement for permanent wider structure overhead and temporary easement for construction
14	NY	Richmond Terrace	City-owned	Public Street	Aerial easement for permanent wider structure overhead and temporary easement for construction

Table 5-1, cont'd
Encroachments and Easements in the Affected Environment with the Raise the Roadway Alternative

Map No.[1]	State	PANYNJ Property within the construction work zone	Owner and Location of Adjacent Encroaching Property	Land Use Details[2]	Type of Action[4]
Easements, cont'd					
Map No.[1]	**State**	**Location**	**Owner**	**Land Use**	**Type of Action**
15	NJ	West 1st Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
16	NJ	West 2nd Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
17	NJ	Gertrude Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
18	NJ	West 3rd Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
19	NJ	Juliette Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
20	NJ	West 4th Street	City-owned	Public Street	Aerial easement for permanent wider structure overhead
21	NJ	Ramp Q (Avenue A)	State-owned	Public Street	Temporary easement for reconstruction
22	NJ	Route 440 and JFK Boulevard	State-owned	Public Street	Temporary easement for reconstruction

Notes: 1. See **Figures 5-2** through **5-5** for map locations. For encroachments, map locations refer to the adjacent, encroaching property.
2. For encroachments, refers to property/uses that encroach and are in the construction work zone. Some property/uses encroach on PANYNJ property but fall outside of the affected environment (the construction work zone).
3. PANYNJ owns this property, but it is being used without authorization for parking and through traffic.
4. Actions are addressed in Section 5-4-2, Raise the Roadway Alternative.

Source: PANYNJ

- Ideal Windows, located between West Second and Gertrude Streets occupies a lot on the east side of the bridge that includes a large, non-encroaching building and a smaller, single-story industrial building that encroaches on PANYNJ property within the construction work zone (see **Figure 5-2**, Mapped Point #3). In addition, the single story portion of the building includes a loading dock and an adjacent area under the bridge has been used for truck access and material storage. The company's lease with PANYNJ for the encroachment has expired, and Ideal Windows has been paying PANYNJ rent on a month-to-month basis since August 2004. However, the lease was for the area of the single story building and did not include the use of the area under the bridge.
- At 54 Juliette Street, a lot owned by Bayonne Board of Education encroaches on PANYNJ property within the construction work zone on the west side of the bridge. The encroachment area includes approximately 3,500 square feet (25 feet of frontage) that provides access to the lot. Alternative access is available to the lot from Avenue A. However, the encroachment area includes the only vehicular access into the building. The Bayonne Board of Education does not have a license with PANYNJ for the encroachment (see **Figure 5-3**, Mapped Point #4).
- Unmapped street segments on the east and west sides of the bridge between Margaret Street and West Fourth Street encroach on PANYNJ property and fall within the construction work zone. The street segments are being used as

thoroughfares between Margaret Street and West Fourth Street and for on-street parking (see **Figure 5-3** Mapped Point #6).

In addition to the encroaching properties located in the construction work zone, PANYNJ has identified several adjacent properties that encroach on PANYNJ right-of-way, but that do not fall within the construction work zone. These properties are discussed in section 5-4-2, Raise the Roadway Alternative.

5-3-2 EASEMENTS

No easements of private property would be required. In Staten Island, aerial easements would be required for a permanent wider structure overhead for portions of Innis Street, Eaton Place, Newark Avenue, Richmond Terrace, as well as rail tracks (between Newark Avenue and Eaton Place) that are underneath the bridge (see **Figure 5-4** Mapped Points #10 through 14). Temporary construction easements would also be required for those streets. In Bayonne, portions of West First Street, West Second Street, Gertrude Street, West Third Street, Juliette Street, and West Fourth Street that are underneath the bridge would require easements or construction permits for wider structures overhead (see **Figure 5-2** Mapped Points #15 through 17 and **Figure 5-3** Mapped Points #18 through 20).

In Staten Island, temporary easements would be required for the reconstruction of MLK Expressway and the Morningstar Ramp (see **Figure 5-5**, Mapped Points #8 and 9). In Bayonne, temporary easements would be required for the reconstruction of Ramp Q, which provides access to the bridge from Avenue A, as well as Route 440 and JFK Boulevard (see **Figure 5-3**, Mapped Points #21 and 22).

5-4 ENVIRONMENTAL CONSEQUENCES

5-4-1 NO BUILD ALTERNATIVE

The No Build Alternative would not require permanent property acquisition, temporary or permanent easements, or the removal of encroachments on PANYNJ right-of-way that fall within the construction work zone.

The No Build Alternative would result in no structural improvements to the Bayonne Bridge or the adjacent roadway. Under the No Build Alternative, the Bayonne Bridge would remain at its current height and the New York fleet would be composed of vessels that could pass under the current Bayonne Bridge. These vessels are smaller and less economically efficient than taller, larger vessels that would be restricted by the height of the bridge. As more large container ships enter the world fleet, the Bayonne Bridge would increasingly become an obstacle for these large vessels. As a consequence, the No Build Alternative would not result in the economic benefits (described in detail in Chapter 1, “Purpose and Need”) that would result from the removal of the Bayonne Bridge clearance restriction.

In addition, under the No Build Alternative, any diversions to other east coast ports, while most likely to be small, would still contribute to an increase in energy consumption, pollutant emissions, and greenhouse gas production for additional land-based transport to the region.

5-4-2 RAISE THE ROADWAY ALTERNATIVE

With the Raise the Roadway Alternative, private property that encroaches on the PANYNJ right-of-way and falls within the construction work zone would be reclaimed during the construction period, and any improvements built on the encroachment would have to be removed. Any existing licenses pertaining to encroachments within the construction work zone would be terminated.

For cases in which the construction work zone would extend onto City-owned property or local streets, temporary easements, aerial easements, or construction permits would be obtained. **Table 5-1** details the properties and streets within the affected environment in Staten Island and Bayonne as well as the types of actions resulting from the project. The following describes the impacts from the removal of encroachments and the acquisition of necessary easements.

5-4-2-1 ENCROACHMENTS

Two ballfields along West First Street and Al Slootsky Playground are within the PANYNJ right-of-way as well as the construction work zone. The ball fields—owned by PANYNJ but licensed to the City of Bayonne—would be closed to the public during the construction period, and vehicles would be cleared from the area within 10 days of written notice prior to the start of construction. PANYNJ is coordinating with the City of Bayonne regarding this displacement. Al Slootsky Playground, also owned by PANYNJ but licensed to the City of Bayonne, would be used during the construction period. PANYNJ is working with the City of Bayonne to relocate the playground facilities on a permanent basis prior to the construction period (see Chapter 8, “Parklands and Recreational Resources”).

There are two commercial properties (Williams Industries and Ideal Windows) that encroach on PANYNJ right-of-way that fall within the construction work zone and would experience a modification or a displacement of a portion of their facilities due to construction activities.

Williams Industries occupies a lot containing a four-story industrial building and a one-story warehouse shed that includes a loading dock. The four-story industrial building does not encroach on PANYNJ property and would not be directly affected by the construction. However, the one-story warehouse shed encroaches on the PANYNJ, but it does not fall within the construction work zone and could remain during construction. The driveway that provides access to a loading dock, which is within the PANYNJ right-of-way, would need to be modified, but it appears that the use of the loading dock could continue. Williams Industries would have to vacate the encroaching portion of the driveway by the start of construction. These modifications would not affect the overall economic viability of the company.

Similarly, the single-story building addition owned by Ideal Windows encroaches on the PANYNJ right-of-way while their larger structure does not. The single-story addition at this location falls within the work zone and the encroachment would need to be vacated prior to construction. However, independent of the Raise the Roadway Alternative, Ideal Properties’ use of the area under the bridge, particularly for the parking of trucks, represents a security concern. The portion of the Ideal Windows operations that are conducted in the non-encroaching building, which does not fall within the PANYNJ right-of-way, would not be impacted. The loss of the use of the area under the bridge could affect their operation; however, this use was not covered by Ideal Properties' lease and the modification to Ideal Properties' use is related to security concerns of the PANYNJ and not to the Raise the Roadway Alternative. While operations at Ideal Properties could be affected, this would not adversely affect overall economic conditions in the study area.

The building at 54 Juliette Street is occupied by the Bayonne Board of Education and is used as a bus storage and maintenance facility. While access to these facilities may be limited during a portion of the construction period, this is not expected to significantly affect the operations of the Bayonne Board of Education.

The unmapped street segments between Margaret Street and West Fourth Street which are being used for parking and as a thoroughfare would be closed during construction. After construction, the street segments would be returned to existing use. As these street segments are in a residential neighborhood with ample off-street parking for residents, their closures would not significantly affect any businesses or residents. JFK Boulevard, one block east, could be used as an alternate thoroughfare during construction.

As discussed above, there are also several adjacent properties that have been identified by PANYNJ as encroaching on the PANYNJ right-of-way that do not fall within the construction work zone. During the construction period, fencing would be erected along the PANYNJ property line to prevent further encroachments during construction. No uses of these encroachments would be affected during construction.

5-4-2-2 EASEMENTS

The new wider roadway of the Bayonne Bridge approaches would remain within PANYNJ right-of-way, but would be located above local streets, thereby requiring aerial easements. These aerial easements would not alter use of any local streets and would not affect private property. In Staten Island, the aerial easements, as well as modifications to the bridge approaches, are being coordinated with the City of New York pursuant to Sections 6517 and 6511 of the Unconsolidated Laws of New York. Modifications to the bridge approaches over local streets in Bayonne would require approval from the City of Bayonne.

The streets in Staten Island and Bayonne that would be impacted by the project would most likely experience temporary closures during construction. Closures would be staggered according to the construction schedule to minimize disruption of traffic (see Chapter 16, "Construction Effects"). Although street closures may inconvenience some local businesses and deliveries, the closures would not be long term and alternative access would be available. Business operations are expected to be able to continue during construction and long term adverse impacts to local businesses are not anticipated.

The rail right-of-way between Newark Avenue and Eaton Place are not in use, and the easement over this portion of rail right-of-way would not preclude any future redevelopment and reuse of the tracks. Therefore, the project would not impact the rail right-of-way.

5-5 MITIGATION

There would be no significant adverse impacts to economic conditions. Therefore, no mitigation is required.

6-1 INTRODUCTION

This chapter describes existing terrestrial resources including vegetation and wildlife, wetlands, aquatic resources including water quality and aquatic biota, and threatened and endangered species in the study area. Potential impacts on these resources during long-term operation of the project are also assessed (see Chapter 16, "Construction Effects," for potential construction impacts), and measures that would avoid or minimize potential impacts are identified.

6-2 REGULATORY CONTEXT

Activities within or adjacent to wetlands, waters, special habitats, or activities with the potential to affect threatened and endangered species must comply with federal and state legislation and regulatory programs as described in **Table 6-1**.

Table 6-1
Federal and State Regulations that Apply to the Project

Regulation	Summary
Federal Regulations	
Endangered Species Act of 1973 (16 USC §§ 1531-1544; 50 CFR Part 402)	Requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) for any project activities that may jeopardize threatened or endangered species or destroy or adversely modify their critical habitats.
Clean Water Act (33 USC §§ 1251-1387)	Regulates point and non-point sources of water pollution and discharges of dredged or fill material to navigable waters and other waters of the United States. Under Section 401 of the Act, any applicant for a federal permit that may result in a discharge to navigable waters must provide to the federal agency issuing a permit a certificate that the discharge would comply with the Clean Water Act (CWA). Under Section 404 of the Act any applicant for a federal permit that may result in the discharge of dredged or fill material into waters of the United States must comply with the CWA. Activities authorized under Section 404 must comply with Section 401 of the Act.
General Bridge Act of 1946 (33 USC § 525)	Requires a permit for the construction of bridges over navigable waters of the United States which is issued by the U.S. Coast Guard (USCG). The bridge permit under the General Bridge Act also satisfies the requirements of the Bridge Act of 1906 (33 USC 491).
Rivers and Harbors Act 1899 (33 U.S.C. 403)	Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army acting through the U.S. Army Corps of Engineers (USACE) for the construction of certain structures in navigable waters of the United States; the excavation from or deposition of dredged fill material in a water of the U.S. is subject to USACE jurisdiction under Section 404 of the CWA, described above.

Table 6-1 (cont'd)
Federal and State Regulations that Apply to the Project

Regulation	Summary
Federal Regulations (cont'd)	
National Flood Insurance Act of 1968 (44 CFR § 59)	Regulates development in floodplains.
11988 Floodplain Management Executive Order (42 FR 26951)	Requires federal agencies to avoid adverse impacts to floodplains and to seek alternatives where practicable.
Executive Order 13112 "Invasive Species"	Requires federal agencies to prevent, to the extent practicable and permitted by law, the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.
Executive Order 11990 "Protection of Wetlands"	Requires federal agencies to avoid undertaking or providing assistance for new construction in wetlands unless there is no practical alternative to such construction and the proposed action includes all practicable measures to minimize harm to the wetland.
Fish and Wildlife Coordination Act	Entrusts the Secretary of the Interior with providing assistance to, and cooperation with, federal, state, and public or private agencies and organizations to ensure that wildlife conservation receives equal consideration and coordination with other water-resource development programs. These programs can include the control (such as a diversion), modification (such as channel deepening), or impoundment (dam) of a body of water.
Migratory Bird Treaty Act of 1918	Protects birds migrating between the U.S. and Canada, the U.S. and Mexico, the U.S. and Japan, and the U.S. and the former Soviet Union. The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture, kill or sell birds listed (over 800 species) under the Act.
Coastal Zone Management Act of 1972 (16 USC §§ 1451 to 1465)	Encourages coastal states to develop programs that manage land and water uses within coastal areas and to reduce conflicts between development and the protection of natural resources of the coastal zone. Federal permits for activities in the coastal zone issued in New York must be accompanied by a Coastal Zone Consistency Determination that evaluates consistency with New York's federally approved coastal zone management program. In New Jersey, coastal zone consistency is determined through the issuance of a Waterfront Development Permit. In addition, since New York City has an approved local program, that consistency determination must be made in accordance with the City Waterfront Revitalization Program (WRP).
Magnuson-Stevens Fishery and Conservation Management Act (16 USC §§ 1801-1884).	Outlines the process for the NMFS and the Regional Fishery Management Councils to comment on activities proposed by federal agencies that may adversely impact areas designated as Essential Fish Habitat (EFH).
Marine Mammal Protection Act of 1972	Prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. All marine mammals are protected under the act.
New York Regulations	
Endangered and Threatened Species of Fish and Wildlife, Species of Special Concern (Article 11)	Prohibits the taking, import, transport, possession, or selling of any endangered or threatened species of fish or wildlife, or any hide, or other part of these species as listed by the state.
Removal of Protected Plants (Article 9)	Prohibits the removal or damage of state-listed protected plants without the consent of the owner.

Table 6-1 (cont'd)
Federal and State Regulations that Apply to the Project

Regulation	Summary
New York Regulations (cont'd)	
State Pollutant Discharge Elimination System (SPDES), (Article 17)	Title 8 of Article 17, ECL, Water Pollution Control, authorizes the creation of the SPDES to regulate discharges to the State's waters. Activities requiring a SPDES permit include point source discharges of wastewater into surface or ground waters of the State, including discharge of stormwater, and construction activities that disturb one acre or more.
Waterfront Revitalization of Coastal Areas and Inland Waterways Act (Article 42)	New York State Department of State (NYSDOS) is responsible for administering the Coastal Management Program (CMP). The Act also authorizes the State to encourage local governments to adopt Waterfront Revitalization Programs (WRPs) that incorporate the State's policies. New York City has a WRP administered by the Department of City Planning (DCP).
Tidal Wetlands Act, Article 25	Regulates activities in and adjacent to tidal wetlands. Requires a permit for almost any activity that would alter tidal wetlands or the adjacent areas.
New Jersey Regulations	
Endangered and Nongame Species Act (N.J.S.A. 23:2A-6 ET SEQ, Rules N.J.A.C. 7:25-4)	Regulates the taking, possession, transportation, exportation, etc. of any state or federally listed endangered species of wildlife and nongame species regulated pursuant to this act. A permit is required for the possession of exotic or non-game species.
Waterfront Development Law (N.J.S.A. 12:5-3 and N.J.A.C. 7:7 and 7:7E)	Regulates all plans for the development of any waterfront of tidal waters and their adjacent areas (e.g., construction or alteration of bulkhead, bridge, pipeline, etc.).
Flood Hazard Area Control Act (N.J.S.A. 58:16A-50, Rules N.J.A.C. 7:13)	Regulates waterfront development, coastal areas, tidelands (i.e., riparian rights), and flood hazard area encroachment.
Coastal Zone Management Act (N.J.S.A. 12:5-3, 13:1D-29 ET SEQ., 13:9A-1 ET SEQ., and 13:19-1 ET SEQ., N.J.A.C. 7:7E)	Regulates the use and development of coastal resources and establishes goals for their protection as approved under the Federal Coastal Zone Management Act.
Freshwater Wetlands Protection Act (N.J.S.A. 13:9B, Rules N.J.A.C. 7:A)	Regulate development in and around freshwater wetlands. The state assumes the freshwater wetlands permit jurisdiction currently exercised by the USACE.
Water Pollution Control Act (N.J.S.A. 13:19, Rules N.J.A.C. 7:14A.)	Establishes rules on the implementation and operation of the New Jersey Pollutant Discharge Elimination System (NJPDES) permit program and the Treatment Works Approval (TWA) program.
Stormwater Management Program (N.J.S.A. 13:19, Rules N.J.A.C. 7:8)	Establishes general requirements for stormwater management plans, control ordinances, and provides content requirements and procedures for the adoption and implementation of regional and municipal stormwater management plans.
Surface Water Quality Standards (N.J.S.A. 13:19, Rules N.J.A.C. 7:9B)	Designates uses and water quality criteria for the fresh and saline surface waters of the state and establishes water quality-based effluent limitations for surface waters.
Notes: This list includes regulations that apply to the construction and/or operation of the project.	

6-3 METHODOLOGY

6-3-1 STUDY AREA

6-3-1-1 ASSUMPTIONS FOR ANALYSIS

During long-term operation of the project, Post-Panamax vessels would traverse the Kill Van Kull to transport cargo to and from the marine terminals west of the Bayonne Bridge. This analysis is based on current design plans for the Raise the Roadway Alternative, and the effects determination is guided by the following:

- No additional channel improvements would be required to accommodate the larger vessels (i.e. there would be no dredging or filling within the open waters of the Kill Van Kull); and
- With the exception of the construction of one stormwater outfall, no structures would be installed in the Kill Van Kull.

Regulations expected to apply during operation of the project pertain to the discharge of treated stormwater and fill within protected wetlands and waters. These regulations include the Clean Water Act, New York State Pollution Discharge Elimination System (SPDES) and Protection of Waters programs, New Jersey Water Pollution Control Act, Stormwater Management, and Surface Water Quality Standards regulations. Discharge of treated stormwater during the operation of the project would be in compliance with these regulatory programs.

Due to surrounding urban land uses, the study area for the assessment of natural resources is limited to 40 feet on each side of the Bayonne Bridge, its approach ramps, and the potential staging areas. However, exceptions were made for the study area for federally listed and New York and New Jersey state-listed species and aquatic resources. State-listed species and ecological communities were assessed for a 0.5-mile radius from the Bayonne Bridge. With respect to aquatic resources, water quality data were analyzed for the closest New York City Department of Environmental Protection (NYCDEP) Harbor Survey station (K2) located in the Kill Van Kull less than one mile west of the Bayonne Bridge. Published studies of sediments and aquatic biota were also examined for both the Harbor Estuary and the Kill Van Kull.

6-3-2 AFFECTED ENVIRONMENT

In order to document the existing conditions of the study area, field investigations were conducted on July 13, 2011 and September 14, 2011. The purpose of the July site visit was to perform a wetlands reconnaissance investigation. This investigation involved walking the unpaved portions of the study area and the potential staging area to identify the presence of hydrophytic vegetation, wetlands hydrology, and hydric soils, and to determine whether a wetland delineation would be required per the U.S. Army Corps of Engineers (USACE) *Corps of Engineers Wetlands Delineation Manual* (1987). As part of the methodology, field staff referenced New York State tidal wetlands maps, National Wetlands Inventory (NWI) maps, and New Jersey freshwater wetlands maps.

The field investigation involved walking the study area to record general descriptions of dominant terrestrial ecological communities and individual flora and wildlife species that were readily observable. In addition to the field investigation, existing conditions were summarized from information identified in literature sources. Literature sources used in this analysis included the following databases, reports, and maps:

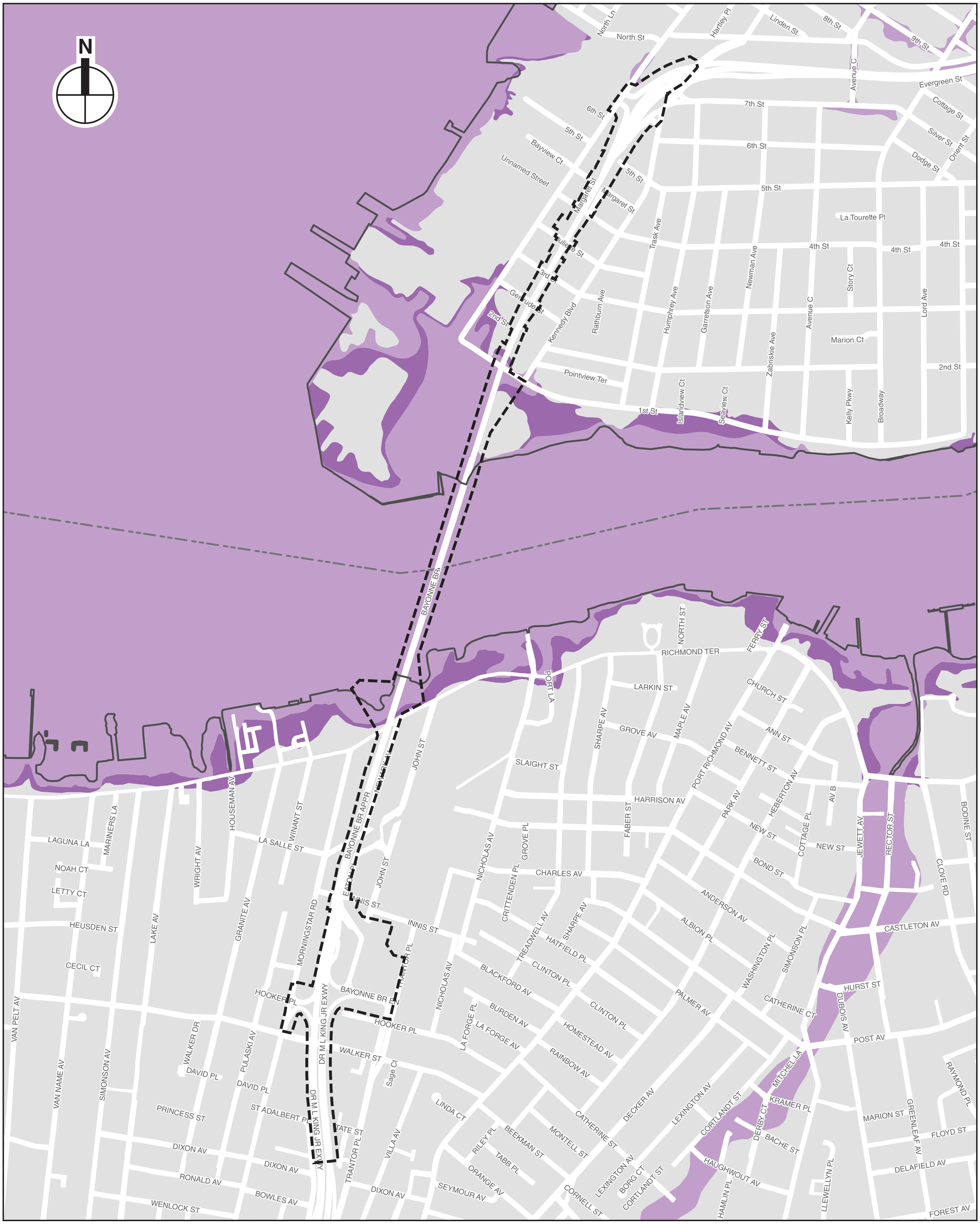
- United States Geological Survey (USGS)—topographic map for the Elizabeth quadrangle;
- New York State Department of Environmental Conservation (NYSDEC)—Breeding Bird Atlas data, tidal wetlands maps, and Amphibian and Reptile Atlas Project data;
- New Jersey Department of Environmental Protection (NJDEP)—freshwater wetlands maps;
- NYCDEP—Harbor Survey data for station K-2;
- Federal Emergency Management Agency (FEMA) —Flood Insurance maps (2007);
- United States Fish and Wildlife Service (USFWS—NWI maps and species listed under Section 7(a)(2) of the Endangered Species Act (ESA) for Richmond County (Staten Island), New York and municipalities of New Jersey;
- Wetland and Waters of the U.S. Delineation Report (HDR 2012) (see **Appendix A-1**);
- USACE regulatory jurisdictional determination for wetlands of the project area (Handell 2012; Tomer 2012) (see **Appendix A-2**);
- Tree Location Survey (Kupper LLC 2012) (see **Appendix A-3**);
- Ecological Communities of New York State (Edinger et al. (2002)); and
- Responses to requests to the New York Natural Heritage Program (NYNHP), New Jersey Natural Heritage Program (NJNHP), and NMFS for information on rare, threatened and endangered species or ecological communities within the study area.

Potential impacts to natural resources were assessed by considering the existing and expected future natural resources of the study area and the potential changes to these natural resources that would occur as a result of the operation of the project following the construction period (2014 and 2017).

6-4 EXISTING CONDITIONS

6-4-1 FLOODPLAINS

New York City is affected by flash (e.g., flooding of inland portions of the city from short-term, high-intensity rain events in areas with poor drainage), fluvial (e.g., rivers and streams overflowing their banks), and coastal flooding (e.g., long and short wave surges that affect the shores of the Atlantic Ocean, bays such as Upper New York Bay, and tidally influenced rivers and straits such as the Kill Van Kull, streams, and inlets [FEMA 2007]). Because the Kill Van Kull is tidal, the water level is controlled by the tidal conditions within the New York Bay and the Atlantic Ocean, and is not influenced by freshwater flow. **Figure 6-1a** presents the 100-year (area with a 1 percent chance of flooding each year) and the 500-year (area with a 0.2 percent chance of flooding each year) floodplain boundaries for the study area. Portions of the staging area, some of the bridge piers, and bulkheads are located within the 100-year and 500-year floodplains. In the immediate vicinity of the bridge, the 100-year flood elevation is 5.9 feet in Staten Island and 6.9 feet in Bayonne above the North American Vertical Datum (NAVD 88).



Source: Digital Flood Insurance Rate Map, FEMA, 2007

Project Site Boundary

NY/NJ Boundary

100-Year Floodplain

500-Year Floodplain

0 1000 FEET

SCALE

FEMA Floodplain

Figure 6-1a

BAYONNE BRIDGE OVER THE KILL VAN KULL

Floodplain boundaries based on existing Preliminary Flood Insurance Rate Maps (FIRMs) are currently the only regulatory standard relating to elevations of new developments. On February 25, 2013, FEMA released Advisory Base Flood Elevation (ABFE)[1] maps for areas in New York City, including the project site (see **Figure 6-1b**). The bridge and portions of the potential staging area are located in Zones A and V. Zone A areas are not subject to high velocity wave action, but are still considered to be at a high risk for flooding. Zone V areas are subject to high velocity wave action (i.e., a 3-ft breaking wave) from a 100-year flood. The ABFEs in the vicinity of the bridge in Bayonne are 16 feet and 21 feet for a 100-year flood and 500-year flood, respectively. Elevations for the 100-year and 500-year for Zone A in the potential staging area are 12 and 17 feet, respectively. The ABFEs for Zone V in the potential staging area are 13 and 18 feet for the 100-year and 500-year floodplains, respectively. In Staten Island, the existing bridge is located in Zone V. The ABFEs are 13 feet and 17 feet for a 100-year flood and 500-year flood, respectively.

Although the ABFE is subject to further review, if it is adopted into the FIRM, the proposed project elements where the ABFE differs from the existing FIRM elevation would comply with the updated flood elevations.

6-4-2 WETLANDS

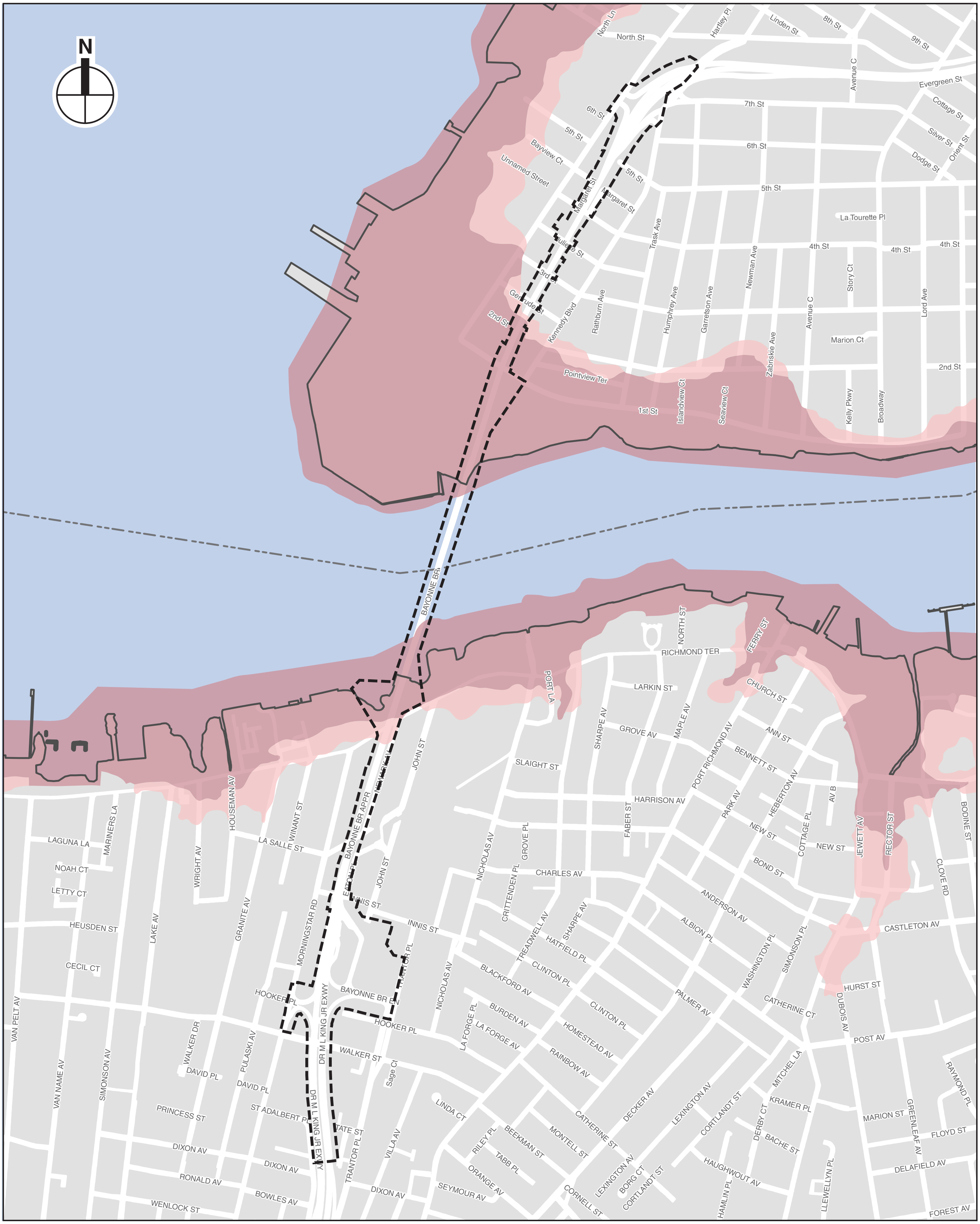
6-4-2-1 ONSITE WETLAND INSPECTION

In general, the majority of the study area consists of maintained and unmaintained uplands. A high marsh is present along the Staten Island, New York shoreline, estuarine wetlands are present along the New Jersey shoreline, and palustrine wetlands are present in the potential staging area in Bayonne, New Jersey. A small woodland is present in the vicinity of the Route 440 right-of-way, but the hydrology and soils do not meet wetland criteria. With the exception of the wetlands in the vicinity of the Kill Van Kull shoreline and staging area described above, no other vegetated wetlands are present in the study area. These wetlands were delineated in 2011 and are described below (see **Appendix A-1** for the full delineation report). The USACE conducted a site visit on February 22, 2012 and issued two jurisdictional determinations on March 7, 2012 and July 6, 2012 (see **Appendix A-2** for the jurisdictional determinations).

6-4-2-2 NEW YORK

As shown in **Figure 6-2**, NYSDEC has mapped the open water portions of the Kill Van Kull as littoral zone (LZ). The LZ encompasses "all lands under tidal waters which are not included in any other category. There shall be no LZ under waters deeper than six feet at mean low water [MLW]." Although LZ wetlands are mapped for all of the open water of the Kill Van Kull within the study area, bathymetry data show that LZ is primarily restricted to a cove area along the western shoreline within the study area (HDR 2012). NWI-mapped estuarine wetlands with unconsolidated bottoms with a subtidal water regime (E1UBL) are associated with the LZ mapped by NYSDEC (see **Figure 6-3**). These are wetlands and deepwater habitats that are permanently flooded

[1] Elevations reference the North American Vertical Datum of 1988 (NAVD 88)



Source: Digital Flood Insurance Rate Map, FEMA, 2007

Project Site Boundary — *100-Year Floodplain*

NY/NJ Boundary — *500-Year Floodplain*

0 — 1000 FEET

SCALE

FEMA ABFE Floodplain

Figure 6-1b

1.30.12

NYSDEC Tidal Wetlands
Figure 6-2

National Wetland Inventory Wetlands

Figure 6-3

with tidal water that have at least 25 percent cover of particles smaller than stones (less than 6-7 cm). Vegetative cover in E1UBL wetlands is less than 30 percent.

As shown in **Figure 6-3**, NWI-mapped estuarine emergent common reed (*Phragmites australis*) dominated wetlands that are irregularly flooded by tidal water (E2EM5P) are present along the shoreline within the vicinity of the Bayonne Bridge piers. Site inspection reveals that this area is significantly disturbed. Construction and demolition debris were used in part to fill the wetlands in this portion of the Kill Van Kull. Concrete, brick, and other construction and demolition materials are present along the eroding shoreline. Natural (e.g., wood, plant materials, and shells) and human-made (e.g., wooden beams and household litter) debris form a dense layer along the shoreline.

Vegetated wetlands are limited to a 0.05-acre patch of high marsh located in a cove on the west side of the bridge in Staten Island (Wetland A) (see **Figure 6-4**). Dominant hydrophytic species of this high marsh include common reed, marsh elder (*Iva frutescens*), and seaside goldenrod (*Solidago sempervirens*) (see **Figure 6-5**) (AKRF 2011; HDR 2012). This wetland offers few ecological functions. On March 7, 2012, USACE issued a determination that this 0.05-acre wetland is not a jurisdictional wetland, but instead falls within waters of the United States (Handell 2012).

6-4-2-3 NEW JERSEY

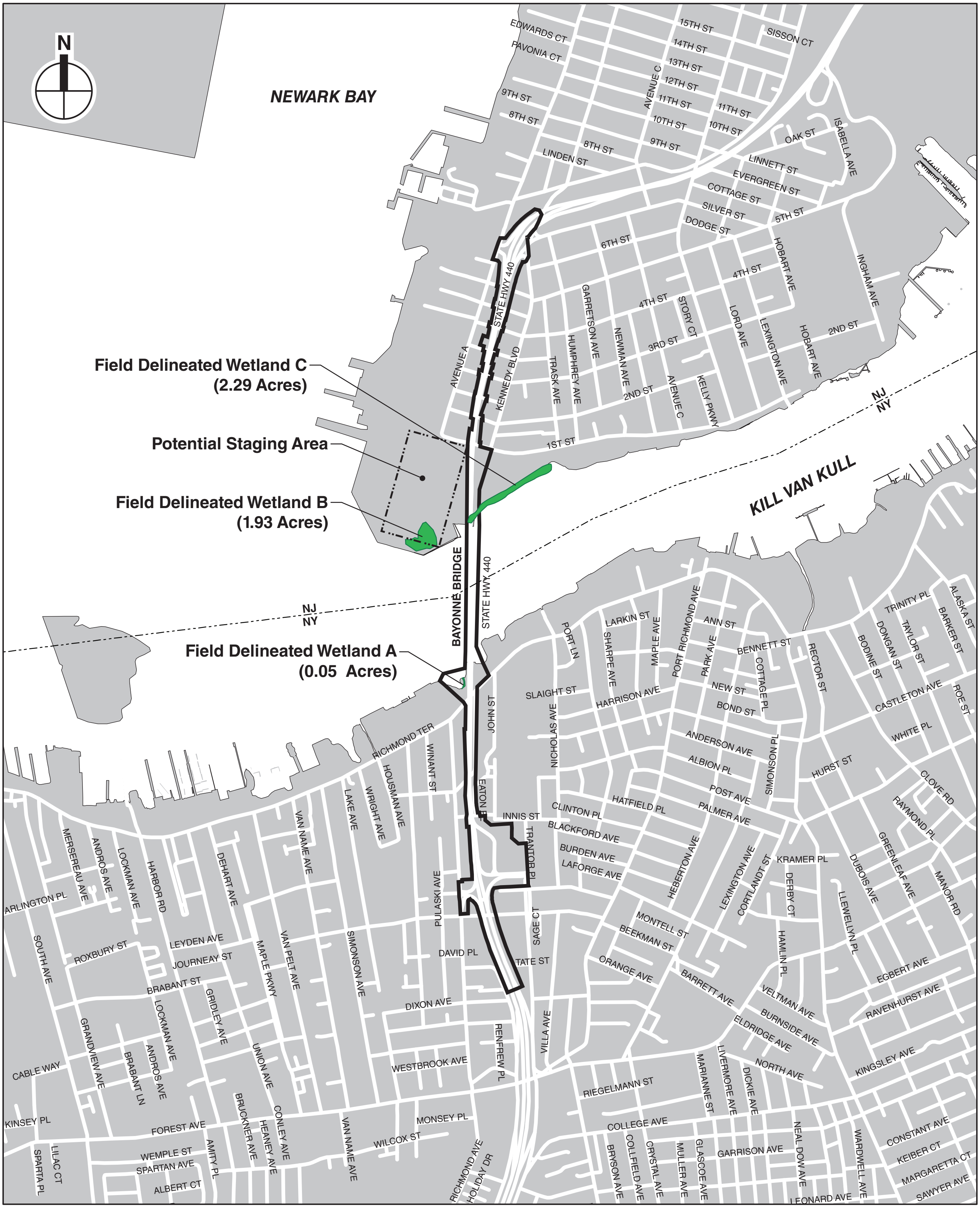
Shoreline

As shown in **Figure 6-3**, NWI-mapped wetlands associated with the study area include E1UBL wetlands. The shoreline of the study area in Mayor Dennis P. Collins Park is mapped by NWI as an estuarine intertidal wetland with an unconsolidated shore that is irregularly flooded with tidal waters (E2USP). This wetland connects with NWI-mapped estuarine intertidal aquatic algal beds that are regularly flooded (E2AB1N) and estuarine unconsolidated sand shores that are irregularly flooded (E2US2P) located east of the study area. The shoreline of the study area consists of a sand beach and riprap, both of which are bordered by a maintained lawn (see **Figure 6-6**). Collectively, the wetlands along the shoreline occupy 2.29 acres (see Wetland C in **Figure 6-4**). On July 6, 2012, USACE determined that this 2.29-acre area is a jurisdictional wetland (see **Appendix A-2**).

Potential Staging Area

As shown in **Figure 6-7**, NJDEP has mapped a portion of the potential staging area as modified wetlands (MODD). Observations of the potential staging area indicate that a large portion of this property is covered with gravel. To the west of the potential staging area there is a large freshwater wetland mapped by NWI as a palustrine wetland with emergent vegetation that is seasonally flooded or saturated (PEM1E). Pockets of this wetland type are also present in the gravel areas mapped as MODD of the potential staging area. The 2011 wetland delineation identified a 1.93-acre wetland, a portion of which overlaps with the MODD mapped wetland (HDR 2011). The USACE has determined that this is a jurisdictional wetland (see **Appendix A-2**). The 1.93-acre wetland is located within the potential staging area (see Wetland B in **Figure 6-4**). Dominant species in Wetland B include common reed, purple loosestrife (*Lythrum salicaria*), and Indian hemp (*Apocynum cannabinum*) (AKRF 2011; HDR 2012). Other species include late boneset (*Eupatorium serotinum*), seaside goldenrod, and bindweeds (*Conovolvulus* spp.). In addition, there are large pools of standing water

7.12.12



Construction Work Zone

Field Delineated Wetlands

NOTE: The Wetland C boundaries are based on an USACE field inspection (02/23/2012) and USGS elevation and NOAA tidal data.

0 2000 FEET
SCALE

Field Delineated Wetlands
Figure 6-4

View of high marsh (Wetland A) facing east at Bayonne Bridge, Staten Island, NY **1**

View of high marsh (Wetland A) facing north at Bayonne Bridge, Staten Island, NY **2**

Project Site Wetlands Photographs
(New York)

Figure 6-5

View of shoreline (Wetland C) facing east **3**

View of shoreline (Wetland C) facing west **4**

Shoreline of Mayor Dennis P. Collins Park

Figure 6-6

NJDEP Freshwater Wetlands
Figure 6-7

containing algae in this wetland (see **Figure 6-8**) (AKRF 2011). This wetland offers few ecological functions.

6-4-3 TERRESTRIAL RESOURCES

6-4-3-1 TOPOGRAPHY AND SOILS

The topography in both the New York and New Jersey portions of the study area consists of mostly level to gently sloping areas with some steep portions of bedrock along the right-of-way in Staten Island. The geotechnical conditions along the bridge alignment are variable, with both anthropocentric fill and natural glacial deposits overlying bedrock. Bedrock exists within about 20- to 40-foot depths. The more recent glacial deposits form a layer, greater than 10 feet in thickness, of manmade fill which consists of mainly reworked natural sediments often with anthropogenic material such as cinders, brick, glass, concrete, coal and tile. Stratification of glacial drift deposits in this area is generally uniform, though significant variations in the thickness and location of the individual units are common. The strata on the New Jersey approach is characterized by a 3- to 10-foot thick layer of discontinuous, brown, coarse to fine sand, and a gravel layer overlain by a 10- to 15-foot thick layer of red-brown silty clay with varying amounts of coarse to fine subangular to subrounded sand and gravel. The strata on the New York approach are similar, though the sand and gravel layer is continuous and appears to thicken slightly to the south. Discontinuous lenses, 3 to 10 feet in thickness, of decomposed bedrock are localized just south of the bridge's southern arc abutment.

Along the shorelines of Kill Van Kull are 3- to 10-foot thick layers of very soft, fluvial organic silt, clays, and sands.

On Staten Island, 80 percent impervious pavement and buildings covers the surface (NRCS 2005) within the study area.

6-4-3-2 ECOLOGICAL COMMUNITIES

The study area includes several vegetative communities which can be characterized as "terrestrial cultural communities" because they have been created or maintained by humans. In addition, small portions of the study area have been left to regrow with native and non-native plants and are currently in a more forested condition. Dominant ecological communities[1] observed during site inspection include paved road, mowed roadside/pathway, mowed lawn, mowed lawn with trees, and successional southern hardwoods.[2] These communities, which include paved surfaces and mowed vegetation of the Route 440 right-of-way, are described in more detail below.

A tree survey was conducted and is included in **Appendix A-3**. The survey includes the species or genus of tree, size, height, health, and coordinates for each tree

[1] As described in "Ecological Communities of New York State, Second Edition," Edinger et al. 2002.

[2] Due to habitat similarities within the study area within both states, the community descriptions for New York are also used to describe communities of the study are in New Jersey.

Palustrine wetland (Wetland B) observed in potential staging area **5**

Ponded water in potential staging area **6**

Wetlands Observed in Potential Staging Area
Figure 6-8

Roads and Mowed Areas

The mowed roadside community includes a narrow strip of mowed lawn along the edges of the paved surfaces within the study area. Bordering these areas are mowed lawns and mowed lawns with trees. A mixture of common trees and shrubs is present within these communities throughout the study area. Common species observed within the study area include pin oak (*Quercus palustris*), honey locust (*Gleditsia triacanthos*), Londonplane (*Platanus* x *acerifolia*), black cherry (*Prunus serotina*), white mulberry (*Morus alba*), Japanese black pine (*Pinus thunbergeii*), Chinese elm (*Ulmus parvifolia*), and Norway maple (*Acer platanoides*). Examples of common forbs and grasses observed within these mowed areas include clovers (*Trifolium repens*, *T. hybridum*), chickory (*Cichorium intybus*), Queen Anne's lace (*Daucus carota*), and mugwort (*Artemisia vulgaris*).

Successional Southern Hardwoods

Successional southern hardwoods are defined as "a hardwood or mixed forest that occurs on sites that have been cleared or otherwise disturbed." Throughout the study area there are small pockets of successional southern hardwoods that border the roads and the mowed communities described above. Tree composition consists of a mixture of black locust, tree-of-heaven, mulberry, sweetgum (*Liquidambar styraciflua*), pin oak, black walnut (*Juglans nigra*), black cherry, Norway maple, and other common urban-adapted species. While these communities may contain a mixture of trees in the canopy, the understories are dominated by one or two non-native invasive species, specifically mugwort and Japanese knotweed (*Polygonum cuspidatum*).

Red Maple-Sweetgum Swamp (Woodlot)

In an area along the northbound Route 440 right-of-way south of Walker Street, there is a small, wooded pocket where sweetgum and pin oak are dominant in the canopy. Other less common species observed in the canopy and sub-canopy include red oak (*Quercus rubra*), black gum (*Nyssa sylvatica*), sycamore, Norway maple, sycamore maple (*Acer pseudoplatanus*), red maple, willow oak (*Quercus phellos*)[1], and black cherry. Southern arrowwood (*Viburnum dentatum*), roundleaf brier (*Smilax rotundifolia*), and spicebush (*Lindera benzoin*) are scattered in the shrub layer. The understory is dominated by Japanese knotweed (*Polygonum cuspidatum*), but pockets of jumpseed (*Polygonum virginianum*), white wood aster (*Eurybia divaricata*), and poison ivy (*Toxicodendron radicans*) are also present.

Based on the vegetation, this community would be best described as a remnant red maple-sweetgum swamp, as defined by Edinger et al. (2002). However, extensive disturbance has occurred in this pocket woodland whereby fill materials and dumping are evident. Despite some of the borderline hydrophytic vegetation present within this woodland, the hydrology and soils do not meet the wetland criteria.[2] If this community

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[1] This is a New York State-listed endangered plant and is described in more detail below in section 6-4-5" Endangered, Threatened, Rare, and Special Concern Species and Ecological Communities."

[2] A wetland must have hydrophytic vegetation, hydric soils, and hydrology to be defined as a wetland according to USACE. New York State also follows this methodology.

demonstrated the composition and structure more closely resembling the red maple-sweetgum swamp, it would be expected to have been mapped by the NYNHP, as this is community type is ranked by the state as S1[1]. However, this community is not mapped most likely due to its poor structure, composition, small size, and disturbed condition.

6-4-3-3 WILDLIFE

Birds

The New York State Breeding Bird Atlas is a survey to document the distribution of breeding birds across New York State. The most recent survey was conducted from 2000-2005 and documented 73 species as confirmed or probable/possible breeders in the survey block in which the study area is located (Block 5649B). The same species composition would be expected in Bayonne, NJ. The atlas blocks span 3 square miles, and Block 5649B encompasses larger and more diverse habitats than what is present within the study area. As such, many bird species that appear in the atlas are unlikely to breed in the project area. Only 20 of the 73 species in the atlas are considered to have the potential to breed in study area on the basis of their habitat requirements (**Appendix A-4**, **Table A-4.1**). These species include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), peregrine falcon (*Falco peregrinus*), killdeer (*Charadrius vociferous*), chimney swift (*Chaetura pelagica*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), northern mockingbird (*Mimus polyglottos*) European starling (*Sturnus vulgaris*), common yellowthroat (*Geothlypis trichas*), chipping sparrow (*Spizella passerine),* song sparrow (*Melospiza melodia*), northern cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoeniceus*), house finch (*Carpodacus mexicanus*), mourning dove (*Zenaida macroura*), rock dove (*Columa livia*), and house sparrow (*Passer domesticus*). The majority of these birds are disturbance-tolerant, generalist species that can thrive in highly modified and degraded habitats, and are ubiquitous in urban areas. Examples include American robin, blue jay, European starling, house sparrow, mourning dove, rock dove, and northern cardinal. Wetland B may provide nesting habitat for some additional disturbance-tolerant species such as red-winged blackbird, common yellowthroat, and song sparrow. The New York- and New Jersey-listed endangered peregrine falcon, which has increasingly adapted to life in urban areas and nests on many of the region's bridges (Cade et al. 1996), has nested on the Bayonne Bridge in past years (Martell et al. 2000), as discussed below in section 6-4-5, "Endangered, Threatened, Rare, and Special Concern Species and Ecological Communities."

Regionally significant breeding colonies of wading birds such as great blue heron (*Ardea herodias*), snowy egret (*Egretta thula*), and great egret (*Ardea alba*) occur throughout New York Harbor, including the waterways surrounding Staten Island (USFWS 1997). However, the study area only encompasses the Kill Van Kull waterway, where recent surveys found no active wading bird colonies (Craig 2010). Structural

[1] A state rarity rank of S1 means that typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology makes it especially vulnerable in New York State

vegetation needed to support breeding colonies of wading birds is lacking along the Kill Van Kull within the study area. Suitable foraging habitat is limited as well due to the rip-rapped shoreline and lack of shallow waters and exposed mud flats.

Many of the birds that occur in the study area during the breeding season are year-round residents that remain during winter. Other species that breed elsewhere may also overwinter in the area. Landbirds, or passerines, which are expected to occur in the terrestrial habitats of the study area during winter, include mostly urban-adapted species such as American goldfinch (*Carduelis tristis*), house finch, blue jay, dark-eyed junco (*Junco hyemalis*), European starling, house sparrow, mourning dove, rock dove, northern cardinal, and white-throated sparrow (*Zonotrichia albicollis*). Peregrine falcons that nest in New York City typically remain year-round. Waterfowl and other waterbirds commonly found throughout New York Harbor during winter and with the potential to occur within the study area include American black duck (*Anas rubripes*), bufflehead (*Bucephala albeola*), Canada goose, canvasback (*Aythya valisineria*), common goldeneye (*Bucephala clangula*), common merganser (*Mergus merganser*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), mallard, mute swan (*Cygnus olor*), and ring-necked duck (*Aythya collaris*) (Fowle and Kerlinger 2001).

During Spring and Fall, landbirds migrating through the area and in need of a stopover site may briefly occur in the study area's terrestrial habitats. Examples include yellow-rumped warbler (*Dendroica coronata*), northern parula (*Parula americana*), palm warbler (*Dendroica palmarum*), white-throated sparrow, and dark-eyed junco. Migrating common yellowthroats, swamp sparrows (*Melospiza georgiana*), song sparrows, and red-winged blackbirds are some wetland-associated species that may briefly stop over in the potential staging area. Wetland B could provide foraging habitat for killdeer, spotted sandpiper, and other shorebirds. However, suitable stopover habitat for shorebirds is lacking along the shoreline of the Kill Van Kull in the study area due to rip-rap and lack of exposed mud flats.

Shooter's Island Bird Sanctuary is located approximately one mile west of the bridge and is outside of the study area. The most recent Harbor Herons Survey report by NYC Audubon (2012) found no active wading bird colonies on Shooter's Island.

Birds observed in the study area during the field observations include cormorant (*Phalacrocorax auritus*), Canada goose, red winged black bird, ring-billed gull (*Larus delawarensis*), American robin, house sparrow, and European starling.

With the exception of the European starling, house sparrow, rock dove, and mute swan, the species listed above are protected under the Migratory Bird Treaty Act.

Mammals

Mammals with the potential to occur in the study area are typical urban species with a high tolerance to human disturbance, and none would be dependent upon habitats specific to the study area. Species with the potential to occur include small mammals such as Norway rat (*Rattus norvegicus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), domestic cat (*Felis catus*), house mouse (*Mus musculus*), moles (*Scalopus* spp.), and gray squirrel (*Sciurus carolinensis*). The gray squirrel was observed during the field investigation.

Reptiles and Amphibians

The NYSDEC Amphibian and Reptile Atlas Project conducted a survey between 1990 and 2007 documenting the geographic distribution of New York's reptiles (i.e., turtles, snakes, and lizards) and amphibians (i.e., frogs, toads, and salamanders). Of the species documented for Staten Island, only species adapted to urban, residential, and/or disturbed areas would be expected to occur within the study area. Online Field Guides for Amphibians and Reptiles of New Jersey indicate that the same species with the potential to occur within the study area in New York would also have the potential to occur within the study area in New Jersey. These species may include the northern redback salamander (*Plethodon c. cinereus*), Fowler's toad (*Bufo fowleri*), northern spring peeper (*Pseudacris c. crucifer*), common garter snake (*Thamnophis sirtalis*), eastern milk snake (*Lampropeltis t. triangulum*), and northern brown snake (*Storeria d. dekayi*). No reptiles or amphibians were observed on the study area during the field investigation.

6-4-4 AQUATIC RESOURCES

6-4-4-1 EXISTING WATER QUALITY CONDITIONS

The Kill Van Kull is a channelized waterbody that accommodates a substantial amount of maritime traffic, as it is the major waterway connecting Upper New York Bay with the major intermodal port areas of Port Newark/Elizabeth within Newark Bay and Howland Hook on Staten Island. This approximately five mile long tidal strait is generally bounded by Upper New York Bay to the east, Newark Bay to the north, the Arthur Kill to the west, and Staten Island to the south. The waterbody has a tidal range of approximately five feet. Depths of the Kill Van Kull range between 11 and 50 feet below MLW, with an 800 foot-wide, dredged federal navigation channel that is flanked by shallow inshore areas. As part of the Kill Van Kull-Newark Bay Channels Phase II Deepening Project, the federal navigational channel of the Kill Van Kull is currently under construction. Construction has been completed on the portion of the project within the vicinity of the Bayonne Bridge. According to the USACE, the navigational channel of the Kill Van Kull in the study area now has a baseline depth of 50 feet MLW (USACE 2011).

The Kill Van Kull is listed on the New York and New Jersey 2012 Section 303(d) lists of "Impaired Waters Requiring a [Total Maximum Daily Load] TMDL/Other Strategy" (NYSDEC 2012; NJDEP 2012). Impairments are due to floatables from urban runoff, stormwater, municipal and industrial point discharges, atmospheric deposition, and combine sewer overflows and contaminated sediment associated with polychlorinated biphenyls (PCBs), dioxins, and other toxins. The Kill Van Kull is classified by NYSDEC as a Class SD saline waterbody and by NJDEP as an SE3 (saline estuarine) waterbody. For the purposes of this analysis, water quality data for the Kill Van Kull are summarized from data collected by NYCDEP. The following provides a brief summary of the water quality conditions in the sampling region (Inner Harbor) of the Harbor Survey, which includes the study area. The closest sampling station (K2) is located to the west of the study area. **Table 6-2** presents a summary of water quality measurements at this station between 2000 and 2010.

Table 6-2
2000-2010 NYCDEP Water Quality Data for the K2 Sampling Station

Parameter	Surface			Bottom		
	Min	High	Mean	Min	High	Mean
Total Fecal Coliforms (per 100 mL)	3	1620	187	NM	NM	NM
Dissolved Oxygen (mg/L)	4.9	11.4	7.6	4.9	11.3	7.5
Temperature (°C)	2.1	25.6	18.1	2.2	25.5	17.8
Salinity (ppt)	15.1	24.6	21.7	16.0	25.3	22.7
Chlorophyll *a* (µg/L)	1	15.8	6.01	NM	NM	NM
Secchi Transparency (feet)	2.5	5.5	3.75	NM	NM	NM

Note: NM = Not Measured.
Source: NYCDEP 2010.

As shown in **Table 6-2**, water quality at the K2 sampling station meets the state standard for fecal coliform in SB[1] (suitable for bathing) waters (less than or equal to 2,000 colonies/100 mL). However, fecal coliform did exceed the New Jersey-state standards (less than or equal to 1,500 colonies/100mL), but the average fecal coliform was well below 1,500 colonies/100mL. As shown in **Table 6-2**, during the period from 2000 to 2010, dissolved oxygen concentrations recorded at station K2 were well above the standard as established by New York and New Jersey (no less than 3 mg/L). Secchi transparency measurements collected at Station K2 indicate that water quality in this portion of the Kill Van Kull is only occasionally (16 of 227 measurements) impaired by reduced water transparency (i.e., Secchi transparencies of less than 3 feet). Chlorophyll-a levels reached as high as 15.3 µg/l at station K2, with an average of 6.0 µg/l, indicating that this portion of the Kill Van Kull does not experience eutrophication[2] (NYCDEP 2010).

6-4-4-2 AQUATIC BIOTA

The following sections provide a brief description of aquatic biota found within the Kill Van Kull and Harbor Estuary. The descriptions are largely drawn from existing information on the Harbor Estuary's aquatic resources. Because the Kill Van Kull is connected to the Upper New York Harbor and the Lower New York Bay via the Arthur Kill, the aquatic community would be expected to include species found in Newark Bay, lower Hudson River, East River, and Upper New York Harbor.

Phytoplankton and Zooplankton

Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Resident times of phytoplankton species within the Harbor Estuary are short, and species move quickly through the system. Species found in the Harbor Estuary would also likely be present within the waters adjacent the study area. In a 1993 survey of the New York Harbor Estuary, 29 taxa of phytoplankton were identified, with the diatom *Skeletonema costatum* and the green algae *Nannochlorus atomus* determined to be the most abundant species at the monitored sites (Brosnan and O'Shea 1995).

[1] New York State does not have a standard for fecal coliform for SD waters.

[2] Chlorophyll-a concentrations greater than 20 µg/l are suggestive of eutrophic conditions.

Zooplankton (early life stages of fish, decapods and barnacles; copepods, rotifers, cumaceans, mysid shrimp, and amphipods [Stepien et al. 1981; USACE 1984]) are another integral component of the aquatic food web. The most dominant species in the Harbor Estuary include the copepods *Acartia tonsa*, *Acartia hudsonica*, *Eurytemora affinis*, and *Temora longicornis*, with each species being prevalent in certain seasons.

Benthic Invertebrates

Invertebrate organisms that inhabit river bottom sediments as well as surfaces of submerged objects (such as rocks, pilings, or debris) are commonly referred to as benthic invertebrates. A literature review identified over 180 benthic taxa in the Hudson River, East River, and Upper New York Harbor (PBS&J 1998). Common infaunal macroinvertebrates collected within the Harbor Estuary system include aquatic earthworms, segmented worms, snails, bivalves and soft shell clams, barnacles, cumaceans, amphipods, isopods, crabs and shrimp (EEA 1988; EA Engineering, Science and Technology 1990; NJDEP 1984; Princeton Aqua Science 1985a & 1985b; LMS 1984; Wildish and Kristmanson 1997; Cerrato 1986). Epifauna include hydrozoans, sea anemones, flatworms, oligochaete worms, polychaetes, bivalve, barnacles, gammaridean and caprellid amphipods, isopods, sea squirts, hermit crabs, rock crabs, grass shrimp, sand shrimp, blue crabs, mud dog whelks, mud crabs, horseshoe crabs, blue mussels, softshell clams, and sea slugs (EEA 1988; EA Engineering, Science and Technology 1990; Able et al. 1995).

Fish

New York City is located at the convergence of several major river systems, all of which connect to the New York Bight portion of the Atlantic Ocean. The finfish community in the Harbor Estuary is typical of large, coastal estuaries along the Mid-Atlantic Bight, supporting a variety of estuarine, marine, and anadromous fish species that use the area for spawning habitat, as a migratory pathway, and as a nursery and foraging area. Populations of numerically dominant fish within the Harbor Estuary, such as hogchoker (*Trinectes maculatus*), winter flounder (*Pseudopluronectes americanus*), white perch (*Morone americana*), and striped bass (*Morone saxatilis*), remain relatively stable from year to year (Woodhead 1990).

Estuarine species (e.g., Atlantic silverside (*Menidia menidia*), mummichog (*Fundulus heteroclitus*), are year-round residents of the Harbor Estuary and use the different habitats available for shelter and food during various life stages. Anadromous fish (e.g., alewife [*Alosa pseudoharengus*], American shad [*Alosa sapidissima*]) migrate through the Harbor Estuary on the way to spawning areas in the Hudson River or its tributaries and on their seaward migration out of the estuary. American eel (*Anguilla rostrata*) is the only catadromous species that occurs in the Harbor Estuary.

6-4-4-3 SEDIMENT QUALITY

A 1998 survey found that the mean sediment contaminant concentration in the Harbor Estuary was statistically higher than other coastal areas of the East Coast for 50 of the 59 chemicals measured (Adams et al. 1998) and Newark and Jamaica Bays have been ranked highest in the Harbor Estuary for the most toxic sediments on the basis of sediment chemistry, toxicity, and benthic community (Adams and Benyi 2003). While the sediments of the Harbor Estuary are contaminated, the levels of contaminants (e.g., dioxin, DDT, and mercury) have decreased on average over the past 30 years

(Steinberg et al. 2002). Between 1993 and 1998, the percentage of sediment samplings with benthic macroinvertebrate communities considered impacted or of degraded quality, decreased throughout the Harbor Estuary (Steinberg et al. 2004). However, sediment toxicity studies on relatively sensitive taxa indicate highly toxic conditions in the Arthur Kill, Newark Bay, the lower Passaic River, and the Kill Van Kull (NOAA 1995). Within the Kill Van Kull, sediments are particularly toxic west of the study area (from Shooters Island to the Isle of Meadows in the Arthur Kill (NOAA 1995).

6-4-5 ENDANGERED, THREATENED, RARE, AND SPECIAL CONCERN SPECIES AND ECOLOGICAL COMMUNITIES

A request for information on rare, threatened, or endangered species within a 0.5 mile radius of the study area was submitted to the NYNHP and to NJNHP on October 21, 2011. In correspondence dated November 4, 2011, NYNHP indicated that two species listed by NYNHP have been recorded for the study area (Pietrusiak 2011). NJNHP indicated in correspondence dated November 10, 2011, that a total of nine New Jersey State-listed fish and wildlife species have been recorded within a 0.25 mile area around the study area (Cartica 2011). According to USFWS's list of threatened or endangered species for Staten Island, New York and Hudson County, New Jersey reviewed on September 6, 2011, only one aquatic species, the shortnose sturgeon (*Acipenser brevirostrum*), has the potential to occur within the waters of Richmond and Hudson counties. In correspondence dated October 26, 2011, NMFS indicated that no federally listed species or critical habitat for federally listed species is present in the study area (Colligan 2011). In addition, four birds are listed by the New York State Breeding Bird Atlas as breeding birds in Block 5852D. Finally, the New York state-listed endangered willow oak is present within the study area. A summary of the status of these species is provided in **Table 6-3** and brief descriptions of these species are presented below.

Table 6-3
Summary of New York- and New Jersey-listed Species with the Potential to Occur within the Vicinity of the Study Area

Common Name	Scientific Name	New York Status	New Jersey Status	Federal Status	Probability of Occurrence
Shortnose Sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	Endangered	Low
Atlantic Sturgeon	*Acipenser oxyrinchus oxyrinchus*	Not Listed****	Not Listed****	Endangered****	Low
Cattle Egret	*Bubulcus ibis*	Not Listed	Special Concern/Special Concern	Not Listed	Low
Little Blue Heron	*Egretta caerulea*	Not Listed	Special Concern/Special Concern	Not Listed	Low
Snowy Egret	*Egretta thula*	Not Listed	Special Concern/Stable	Not Listed	Low
Tri-colored Heron	*Egretta tricolor*	Not Listed	Special Concern/Special Concern	Not Listed	Low
Black-Crowned Night-Heron	*Nycticorax nycticorax*	Not Listed	Threatened/Special Concern	Not Listed	Low
Yellow-crowned Night-Heron	*Nyctanassa violacea*	Not Listed	Threatened/Threatened	Not Listed	Low
Glossy Ibis	*Plegadis falcinellus*	Not Listed	Special Concern/Stable	Not Listed	Low
Osprey	*Pandion haliaetus*	Special Concern	Threatened*	Not Listed	High
Cooper's Hawk	*Accipiter cooperii*	Special Concern	Threatened	Not Listed	Low
Peregrine Falcon	*Falco peregrines*	Endangered	Endangered	Not Listed	High
Least Tern	*Sterna antil larum*	Threatened	Endangered	Not Listed	Low
Barn Owl	*Tyto alba*	Unlisted	Special Concern*	Unlisted	Low
Yellow-breasted Chat	*Icteria virens*	Special Concern	Not Listed	Not Listed	Low
Loggerhead Turtle	*Caretta caretta*	Threatened	Endangered	Threatened***	Low
Green Turtle	*Chelonia mydas*	Threatened	Threatened	Threatened**	Low
Kemp's Ridley Turtle	*Lepidochelys kempii*	Endangered	Endangered	Endangered	Low
Leatherback Turtle	*Dermochelys coriacea*	Endangered	Endangered	Endangered	Low
Willow Oak	*Quercus phellos*	Endangered	Not Listed	Not Listed	Present

Notes: (*) denotes breeding population; (**) denotes non-breeding population; (***) denotes that the species is a candidate for endangered status in the Northeast; (****) denotes that the New York Bight population was recently (February 6, 2012) listed as federally endangered and became effective on April 6, 2012. In New Jersey, the species separated by a slash (/) indicate a duel status. First status refers to the state breeding population and the second status refers to the migratory or winter population. All of the fish and wildlife species on this list are listed as "Species of Greatest Conservation Need" in New York State. All of the birds on this list are protected by the Migratory Bird Treaty Act of 1918.

Sources: New York State Breeding Bird Atlas 2000-2005 for block 5852D, NYNHP correspondence dated November 4, 2011, NJDEP New Jersey's Threatened and Endangered Wildlife (2004), NJNHP correspondence dated November 10, 2011.

6-4-5-1 FISH AND WILDLIFE

United Fish and Wildlife Service (USFWS)

Shortnose Sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is a federally listed and New York- and New Jersey-listed endangered fish species. Shortnose sturgeon is an amphidromous species often found in tidal rivers, estuaries, and bays, including the Hudson River estuary in New York. In New Jersey, the shortnose sturgeon is considered rare, with a large portion of the population occurring in the upper tidal Delaware River in the southern region of the state (NJDEP 2011). There are no known shortnose sturgeon populations in the rivers between the Hudson and Delaware Rivers (NMFS 1998). In New York, this species spawns, develops, and overwinters in the Hudson River well upriver (i.e., upriver of river mile [RM] 24) of its confluence with New York Harbor, and prefers colder, deeper waters during all life stages. Individuals are only expected to use the lower Hudson River (i.e., downstream of RM 24) when traveling to or from the upriver spawning, nursery and overwintering areas (Bain et al. 2007). Similarly, shortnose sturgeon would only be expected to use the Kill Van Kull when traveling to or from the Hudson River for spawning, nursery, or overwintering areas. Fish sampling by NMFS in the Kill Van Kull in 1993 and 1994 did not collect any shortnose sturgeon (USACE undated). Therefore, it is unlikely that the shortnose sturgeon would occur within the Kill Van Kull, except as an occasional transient.

National Marine Fisheries Service (NMFS)

Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*)

The Atlantic sturgeon population of the New York Bight was recently (February 6, 2012) listed as federally endangered.[1] The Atlantic sturgeon is an anadromous species that spawns in freshwaters and spends most of its adult life in coastal waters of the Atlantic Ocean from New Brunswick to Florida. Atlantic sturgeon migrate up rivers from the ocean to spawn above the salt front from April to early July (Smith 1985, Stegemann 1999). Female sturgeon move out of rivers following spawning, but males may remain in rivers until October or November. In New York, the species occurs within New York Harbor (Woodhead 1990) and the Hudson River Estuary, and, in New Jersey, in the Delaware River. In the Hudson River, Atlantic sturgeon are found in the deeper portions and do not occur further upstream than Hudson, New York. Because this species spends much of its time in the open Atlantic Ocean or in the freshwater reaches of spawning rivers, it is unlikely that the Atlantic sturgeon would occur within the Kill Van Kull, except as an occasional transient. Furthermore, this species' preference for deep water would limit its occurrence in the Kill Van Kull to occasional use of the navigation channel.

New York Natural Heritage Program (NYNHP)

Peregrine Falcon (*Falco peregrines*)

The peregrine falcon is globally widespread and common in many areas (White et al. 2002), but remains listed as endangered in New York and New Jersey as populations continue to recover from declines experienced in the 1960s and 1970s. Peregrine falcons traditionally nest on cliff ledges, but also commonly nest on bridges, buildings, and other tall artificial structures, often in cities. Peregrine falcons generally prefer open landscapes, particularly for foraging, and occupy similar areas during the breeding and non-breeding periods (White et al. 2002). In New York City, the peregrine falcon is a year-round resident (NYCDEP 2011). Within the study area peregrine falcons have been recorded on the Bayonne Bridge (Wheeler and O'Gorman 2011, Loucks 2010), which has also been used in the past as a nesting site (Martell et al. 2000).

[1] This listing became effective on April 6, 2012.

Barn Owl (*Tyto alba*)

The breeding barn owl population is listed as a species of special concern in New Jersey. The barn owl is not listed by New York. However, NYNHP lists the barn owl as a S1S2 because of extreme rarity (5 or fewer sites or very few remaining individuals) or extremely vulnerable to extirpation from New York State due to biological or human factors/ rarity (6–20 sites or few remaining individuals) or highly vulnerable to extirpation from New York State due to biological or human factors. The barn owl prefers open habitats such as agricultural fields, pastures, and marshland. Foraging habitats are typically open areas, such as grassy fields (natural and agricultural), wet meadows, and fresh and salt water marshes (NYNHP 2011). They roost by day in trees, but are occasionally found in structures as well such as church steeples and belfries, platforms within commercial and industrial buildings (NJDEP 2004), attics of abandoned or occupied houses, ledges within chimneys, and platforms beneath bridges (NYNHP 2011). In New Jersey, owls breed throughout the state and are very common in some areas. In New York, barn owls are concentrated in the southern part of New York in Bronx, Kings, Nassau, Queens, Richmond, and Suffolk counties. Although the study area may provide foraging habitat in the potential staging area, the study area contains limited nesting habitat. Therefore, the barn owl may occasionally forage in the potential staging area, but it would not be expected to nest in the potential staging area or the study area.

New Jersey Natural Heritage Program (NJNHP)

Cattle Egret (*Bubulcus ibis*)

The breeding population of cattle egret is listed as a species of special concern in New Jersey. However, the cattle egret is not a state-listed species in New York. The cattle egret is native to Africa and colonized the United States via the Indies and South America by flying over the Atlantic Ocean. By 1950 the bird was established in New Jersey. The cattle egret is the most terrestrial of all herons and egrets. This species prefers agricultural areas (particularly wet pastureland) and marsh areas. Cattle egrets nest in trees or shrubs near water, often with other species of heron and egret. In New Jersey, cattle egrets nest within marshland along the coast. This species also nests on islands within the Arthur Kill. Cattle egrets only occur in New Jersey during the summer (Conserve Wildlife Foundation of New Jersey 2011). As stated above, recent surveys found no active wading bird colonies in the Kill Van Kull (Craig 2010) and nesting and foraging habitat is limited in the study area. Therefore, the cattle egret would not be likely to occur within the study area.

Little blue heron (*Egretta caerulea*)

The wintering and breeding populations of the little blue heron are listed as a species of special concern in New Jersey. However, the little blue heron is not a state-listed species in New York. In New Jersey, the little blue heron is primarily a coastal species with preferred habitats including wetlands and forests that border waterbodies. This species breeds near fresh, brackish, or salt water. Nesting occurs between 8 and 15 feet above ground in trees or shrubs by fresh or salt water. These birds forage in and alongside water bodies and marshes, including those located outside of the coastal area (Conserve Wildlife Foundation of New Jersey 2011). As stated above, recent surveys found no active wading bird colonies (Craig 2010) and nesting and foraging habitat is limited in the study area. Therefore, the little blue heron would not be likely to occur within the study area.

Snowy egret (*Egretta thula*)

The snowy egret breeding population is listed as a species of special concern in New Jersey. However, the snowy egret is not a state-listed species in New York. In New Jersey, the snowy egret only occurs in the state during the breeding season and is primarily restricted to coastal habitats. Occasionally, these species are observed inland, but in small numbers. Preferred habitat includes wetlands and forests that border waterbodies. Nesting typically occurs 5 to 10 feet above the ground in trees adjacent to fresh or saltwater (Conserve Wildlife Foundation of New Jersey 2011). As stated above, recent surveys found no active wading bird colonies (Craig 2010) and nesting and foraging habitat is limited in the study area. Therefore, the snowy egret would not be likely to occur within the study area.

Tricolor Heron (*Egretta tricolor*)

Breeding and wintering populations of the tricolored heron (*Egretta tricolor*) are listed as a species of special concern in New Jersey, although New Jersey is at the northernmost extreme of the species' wintering range and wintering of tricolored herons north of the mid-Atlantic region is uncommon (Frederick 1997). The species is not listed in New York State. The tricolored heron nests colonially, mostly in coastal habitats such as estuaries and salt marshes, but also nests in freshwater areas. Nesting colonies are usually located on islands that are densely vegetated with small trees and shrubs, and surrounded by open water (Frederick 1997). Tricolored herons forage exclusively in wetlands, usually in areas that have low vegetation and are less than one foot deep (Powell 1987, Frederick 1997). Foraging generally occurs within a few miles of the nesting colony (Frederick 1997). Suitable nesting and foraging habitat is not present within the study area and wintering of tricolored herons as far north as the study area is rare. As such, occurrence of tricolored herons in the study area is unlikely during both the breeding and non-breeding periods.

Black-Crowned Night-Heron (*Nycticorax nycticorax*)

The black-crowned night heron is a New Jersey-listed threatened species with its migratory/wintering population listed as special concern. However, the black-crowned night-heron is not a listed species in New York. Nesting, roosting, and foraging habitat for the black-crowned night heron includes mixed forests containing red maple, sweetgum, black gum, and blueberry, scrub/shrub thickets consisting of red cedar (*Juniperus virginiana*), holly (*Ilex opaca*), green briar, and poison ivy (*Toxicodendron radicans*), marshes containing common reed and marsh elder, and ponds. Heronries include wooded swamps, coastal dune forests, vegetated dredge spoil islands, scrub thickets, and common reed marshes that are near open water. Black-crowned night-herons also forage in marshes and along the edges of ponds, creeks, coastal salt marshes, shallow tide pools, and tidal channels (NJDEP 2004). Although the black-crowned night-heron may occasionally forage in the study area, it would not be expected to nest in the study area due to the lack of nesting habitat.

Yellow-Crowned Night Heron (*Nyctanassa violacea*)

The breeding and migratory/wintering populations of yellow-crowned night heron is listed as threatened in New Jersey. The yellow-crowned night-heron is not a listed species in New York. Yellow-crowned night-heron nesting and roosting habitat includes barrier islands, dredge spoil islands, and bay islands that contain forested wetlands or scrub/shrub thickets. Colonies may be located in dense shrubby thickets, forests with an open understory or suburban parks and yards. Yellow-crowned night-herons avoid roosting and nesting in areas with insufficient cover. Yellow-crowned night-herons forage along the shores of tidal creeks and tide pools within salt and brackish marshes dominated by salt marsh cordgrass (*Spartina alterniflora*) (NJDEP 2004). Although the yellow-crowned night-heron may occasionally forage in the study area, it would not be expected to nest in the study area due to the lack of nesting habitat.

Glossy Ibis (*Plegadis falcinellus*)

The breeding population of glossy ibis in New Jersey is listed as a species of special concern. This species is not listed in New York State. The glossy ibis colonized the Western Hemisphere by flying across the Atlantic Ocean most likely from Africa. The glossy ibis primarily occurs along the coast within New Jersey only during the breeding season. Preferred habitat includes marshes, swamps, edges of ponds or lakes, estuaries, bays, and forests along waterbodies. Nesting occurs near fresh or salt water on the ground or in small trees or bushes typically no higher than 10 feet above the ground. Foraging habitat includes the waters and benthic substrates of coastal waterbodies (Conserve Wildlife Foundation of New Jersey 2011). Although the glossy ibis may occasionally forage in the study area, it would not be expected to nest in the study area due to the lack of nesting habitat.

Least Tern (*Sterna antillarum*)

The least tern is a New York-listed threatened species and a New Jersey-listed endangered species that nests on open sand beaches, sand flats, barrier islands, and dredge spoil sites (NYNHP 2011; NJDEP 2004) that are sparsely vegetated. In New Jersey, nesting colonies are also found near sand and gravel pits where sand piles from mining operations provide suitable nesting habitat. Foraging habitat includes bays, lagoons, estuaries, rivers, and lakes along the coast (NJDEP 2004). Although the least tern may occasional forage in the study area, it would not be expected to nest in the study area due to the lack of nesting habitat.

New York State Breeding Bird Atlas

Osprey (*Pandion haliaetus*)

The osprey is listed as a species of special concern in New York and a threatened species in New Jersey. In New York, osprey can be found along the coastline, and on lakes and rivers, but there are two main breeding populations: one on Long Island and the other in the Adirondack Mountains (NYSDEC 2011a). The majority of the population of osprey in New Jersey is found along waterbodies along the Atlantic Coast (NJDEP 2004). The osprey is strictly associated with bodies of water that support adequate fish populations. Ospreys nest on live or dead trees, nesting platforms, light poles, channel markers, abandoned duck blinds, or other artificial structures that are in close proximity to fishing areas. Infrequently, ospreys nest on the ground within coastal marshes (NJDEP 2004). A nesting platform is present in the vicinity of the Bayonne Bridge on the New York side, approximately 150 feet west of the bridge and about 200 feet from the shoreline, but no osprey were observed on or near the platform and no osprey were observed elsewhere during the field investigations. Therefore, the osprey has the potential to nest within the study area.

Cooper's Hawk (*Accipiter cooperii*)

The Cooper's hawk is listed as a species of special concern in New York and a threatened species in New Jersey. The Cooper's hawk is one of North America's most widespread and common raptors. Cooper's hawk populations in the eastern U.S. appear to have fully recovered from population declines experienced in the mid-1900s (Curtis et al. 2006). In New York, the density and range of both breeding and overwintering Cooper's hawks have increased markedly in recent decades (Curtis et al. 2006), but the special concern status remains. Recent surveys have also shown a substantial increase in the breeding population of Cooper's hawks in New Jersey. As a result, the status of the Cooper's hawk was reclassified from endangered to threatened in New Jersey in 1999 (NJDEP 2004).

Cooper's hawks generally nest in deep interior deciduous and mixed forests, but they are considered relatively tolerant of human disturbance and fragmentation, and are occasionally found nesting in small woodlots and even urban parks (DeCandido and Allen 2006, Curtis et al. 2006). During migration and winter, Cooper's hawks utilize a variety of forest habitats, ranging from large woodland tracts to agricultural shelter belts and small parks. The study area does not contain deep interior forest that is preferred by Cooper's hawks for nesting. In addition, foraging habitat includes forests, woodland edges, and occasionally, residential areas (NJDEP 2004). Therefore, the Cooper's hawk is unlikely to nest or forage in the study area, particularly since there are more suitable habitats within Block 5852D, the BBA census block in which the study area is located.

Peregrine Falcon (*Falco peregrines*)

See species profile above.

Yellow-Breasted Chat (*Icteria virens*)

The yellow-breasted chat is a species of special concern in New York, but is not listed in New Jersey. The yellow-breasted chat is generally a southern species that entered New York along the river systems of the Hudson Valley and Appalachian Plateau. The preferred habitat for this bird is dense thickets and brush in the understory edges of deciduous and coniferous forests and riparian corridors (Eckerle and Thompson 2001). During the 2000-2005 New York State Breeding Bird Atlas survey period, this species was only recorded in 26 survey blocks indicating that it is an uncommon and local breeder (NYSDEC 2011b). Range-wide populations appear to be stable, but it has experienced fluctuations in peripheral and local populations. While populations in the eastern part of its range are declining, they are increasing in the west (NYSDEC 2011b; Eckerle and Thompson 2001). The study area does not contain suitable habitat preferred by the yellow-breasted chat. Therefore, it is unlikely that this species would occur within the vicinity of the study area, particularly when suitable habitat is located elsewhere in Block 5852D.

Marine Turtles

Four species of marine turtles—loggerhead (*Caretta caretta*), green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), and leatherback (*Dermochelys coriacea*)—all New York-, New Jersey-, and federally listed (NYSDEC 2012; NJDEP 2004), have the potential to occur in the Harbor Estuary. Juvenile Kemp's ridley and large loggerhead turtles enter the New York Harbor and bays in the summer and fall. The other two species, green sea turtle and leatherback sea turtle, are usually restricted to the higher salinity areas of the Harbor (USFWS 1997). In general, however, these four turtles mostly inhabit Long Island Sound and Peconic and Southern Bays. They neither nest in the New York Harbor Estuary, nor reside there year-round (Morreale and Standora 1993). Turtles leaving Long Island Sound for the winter usually do so by heading east to the Atlantic Ocean before turning south (Standora et al. 1990). It is unlikely that these turtle species would occur in the Kill Van Kull except as occasional transients.

Marine Mammals

As stated above, NMFS indicated that no federally listed species or critical habitat for federally listed species is present in the study area. Marine mammals use the waters of the New York Bight, and occasionally come into New York Harbor, but are not commonly observed in the Lower Hudson River Estuary. The most commonly observed marine mammal in the Bight is the harbor seal (*Phoca vitulina*) which winters in the harbor and hauls out onto islands in Jamaica Bay, Sandy Hook, Staten Island, and the Westchester and Connecticut shorelines of Long Island Sound. Less frequently, but seen in similar locations, is the grey seal (*Halichoerus grypus*). A harp seal (*Pagophilus groenlandicus*) was observed within the Hudson River Park in the winter of 2005. The occasional sightings of cetaceans (e.g., dolphins and whales) in the harbor are generally of individuals that are likely to be unhealthy and/or lost. Historic records indicate the harbor porpoise (*Phocoena phocoena*) may have once been a regular visitor to the harbor (USFWS 1997). Therefore, it is unlikely that marine mammals would occur in the Kill Van Kull.

6-4-5-2 PLANTS

Willow Oak

The willow oak is a New York State-listed endangered species that occurs mostly on the coastal plain in moist soils or swamps (Gleason and Cronquist 1963). It is ranked as "S1" by NYNHP, indicating that it is critically imperiled in the state because of extreme rarity (i.e., five or fewer sites or very few remaining individuals) (Young 2010). The willow oak is not a protected species in New Jersey. The range of the willow oak in New York State is limited to New York City and portions of Long Island as this species is more commonly known to occur south of New York State (USDA 2011). Willow oaks measuring approximately 12 to 14 inches diameter at breast height (dbh) were observed in the small red maple-sweetgum forest fragment located along the east side of Route 440 in Staten Island and one (measuring approximately 4 inches dbh) is present in the lawn area adjacent the woodland. Willow oak is commonly planted as a street tree in New York City and listed on the New York City Department of Parks and Recreation's (NYCDPR) approved tree planting list for sidewalk and right-of-way areas. One of the trees observed during the field inspection appears to have been planted within the right-of-way. However, those in the red-maple sweetgum swamp woodlot appear to be naturally occurring.

6-4-6 ESSENTIAL FISH HABITAT

The NMFS designates Essential Fish Habitat (EFH) within 10-minute by 10-minute quadrants identified by latitude and longitude coordinates. The study area is within a portion of the Hudson River estuary EFH that is situated in the NMFS 10-minute by 10-minute quadrant with coordinates (North) 40°40.0' N, (East) 74°00.0' W, (South) 40°30.0' N, (West) 74°10.0' W. This square includes the following waters: Staten Island, from Port Richmond, on the northwest around to Great Kills South Harbor of Great Kills, New York, south of Bayonne, New Jersey. **Table 6-4** lists the species and life stages of fish identified as having EFH in the portion of the Kill Van Kull near the study area (NOAA 2011).

Table 6-4
Essential Fish Habitat Designated Species in the Vicinity of the Kill Van Kull

Species	Eggs	Larvae	Juveniles	Adults
Red hake (*Urophycis chuss*)	X	X	X	
Redfish (*Sebastes fasciatus*)	n/a			
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
Atlantic sea herring (*Clupea harengus*)		X	X	X
Bluefish (*Pomatomus saltatrix*)			X	X
Long finned squid (*Loligo pealeii*)	n/a			
Short finned squid (*Illex illecebrosus*)	n/a			
Atlantic butterfish (*Peprilus triacanthus*)		X	X	X
Atlantic mackerel (*Scomber scombrus*)			X	X
Summer flounder (*Paralicthys dentatus*)		X	X	X
Scup (*Stenotomus chrysops*)	X	X	X	X
Black sea bass (*Centropristus striata*)	n/a		X	X
Surf clam (*Spinsula solidissima*)	n/a	n/a		
Ocean quahog (*Artica islandica*)	n/a	n/a		
Spiny dogfish (*Squalus acanthias*)	n/a	n/a		
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Clearnose skate (*Raja eglanteria*)			X	X
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X
Sand tiger shark (*Odontaspis taurus*)		X[(1)]		
Dusky shark (*Charcharinus obscurus*)		X[(1)]	X	
Sandbar shark (*Charcharinus plumbeus*)		X[(1)]		X

Notes:
n/a – insufficient data for this lifestage exists and no EFH designation has been made.
[(1)] Neither of these species have a free-swimming larval stage; rather they are live bearers that give birth to fully formed juveniles. For the purposes of this table, “larvae” for sand tiger and sandbar sharks refers to neonates and early juveniles.
Source:
National Marine Fisheries Service. “Summary of Essential Fish Habitat (EFH) Designation”
http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40307410.html
http://www.nero.noaa.gov/hcd/skateefhmaps.htm

6-5 ENVIRONMENTAL CONSEQUENCES

6-5-1 NO BUILD ALTERNATIVE

In the future without the project, terrestrial and aquatic resources within the study area would remain in their current conditions and would continue to provide habitat to wildlife, as described in the previous sections.

The No Build Alternative would continue operation of the existing Bayonne Bridge. USCG and PANYNJ would coordinate maintenance and repair activities with NYSDEC, NYCDEP, and NJDEP to protect water quality, wetlands, and to implement any peregrine falcon and/or osprey protection measures developed with these agencies. Therefore, there would be no significant adverse impacts on natural resources from continued operation of the existing bridge.

6-5-2 RAISE THE ROADWAY ALTERNATIVE

The project would result in increased navigational clearance over the Kill Van Kull from 151 feet to up to 215 feet. As discussed in Chapter 2, "Project Alternatives," the project would involve the following:

- The existing channel width of 800 feet through the Kill Van Kull would be maintained.
- The width of the bridge, including the main span roadway and a shared-use path, would be increased from the existing 40 feet to approximately 90 feet.
- The project would increase the grade of the approach spans to a 4.85 percent slope in New Jersey and 5.0 percent slope in New York to meet the higher road deck of the bridge. The Bayonne approach would begin just north of 7th Street, and the Staten Island approach would begin at Dixon Avenue. Both approaches would meet the abutments at the shoreline. The approach roadways would be widened from 50 feet to 90 feet to allow for the upgrade to modern roadway design standards. New acceleration and deceleration lanes would be located at the landings in Bayonne and Staten Island at a maximum approximate width of 115 feet.

This section provides an assessment of the operational impacts of the project on floodplains, wetlands, terrestrial resources, threatened, endangered, rare, and special concern species and ecological communities, aquatic resources, and EFH.

6-5-2-1 FLOODPLAINS

The project would involve modifications to existing bridge approach footings and roadway approaches within the floodplain. Some of the existing approach footings would be demolished and new approach footings would be installed and spaced further apart than the existing approach footings. <u>Within the 100-year and 500-year floodplains in Staten Island, there would be no increase in impervious surface. All impervious surfaces being introduced within the limits of these areas would be on structures and located well above the ABFEs.</u> Approximately 0.0<u>4</u> acres of the existing approach footings would be removed in the 100-year floodplain. Within the 500-year floodplain, approximately 0.002 acres of impervious surface area would be removed through the demolition of the existing piers.

Within New York City, tidal flooding is the primary cause of flood damage. The floodplain within and adjacent to the study area is affected by coastal flooding and would not be affected by construction or regrading/filling of the floodplain as would occur within a riverine floodplain[1]. Coastal floodplains are influenced by astronomic tide and meteorological forces (e.g., northeasters and hurricanes [FEMA 2007]) and not by fluvial flooding. Therefore, the use of a portion of the 100-year and 500-year floodplain within the New York and New Jersey portions of the study area for the expansion of the approach roadways and/or piers would not result in adverse impacts to floodplain resources or result in increased flooding of adjacent areas during the long-term operation of the project.

As discussed in Chapter 12, "Climate Change and Greenhouse Gas Emissions," with respect to climate change on floodplains, it is reasonable to assume that sea level would increase by up to 2 feet by the end of the century, with a smaller chance of increases up to 4.5 feet. Based on the New York City Panel on Climate Change (NPCC) projections, by the end of the century the 100-year floodplain could extend farther, encompassing an area roughly equivalent to the current 500-year floodplain. The 500-year floodplain in the future could extend farther south in Staten Island and farther north in Bayonne (by roughly 750 feet at most). However, neither of these levels would flood the bridge approaches or the bridge itself even in future conditions.

6-5-2-2 WETLANDS

The project would not result in any work in mapped wetlands in the study area in Staten Island. As described below under "Aquatic Resources," the proposed height and width of the bridge would not result in adverse shading impacts to tidal wetlands and open waters during the long-term operation of the project. (See Chapter 16, "Construction Effects" for descriptions of measures to protect nearby wetlands during construction.)

As shown on **Figure 6-4**, with respect to New Jersey wetlands, all of the 1.93 acres of Wetland B, associated with the New Jersey-mapped MODD wetland in the potential staging area may be temporarily impacted during the construction period (see Chapter 16, "Construction Effects" for details). As stated in Chapter 16, "Construction Effects," compensatory mitigation would be implemented to offset the temporary impacts during the construction period as per USACE and NJDEP permit requirements. However, in light of available space within the PANYNJ right-of-way, it is unlikely that this potential staging area would be used.

In addition, a stormwater outfall would extend beneath a small portion of Wetland C. The outfall would be constructed by "jacking" (a technique similar to horizontal directional drilling) starting from an area landward of the wetland. The end of the outfall will be located in state open waters. Disturbance to Wetland C is not expected. Therefore, the operation of the bridge would not result in adverse impacts to wetlands during the long-term operation of the project.

[1] Filling of a riverine floodplain obstructs flood flows, which can result in flooding upstream and on adjacent properties. It also reduces the ability of the floodplain to store excess water which results in more water being sent downstream and increases the elevation of the floodwater.

6-5-2-3 TERRESTRIAL RESOURCES

Topography and Soils

As discussed in Chapter 16, “Construction Effects,” and above, the soils and topography have been altered in the study area as a result of development. Soils consist of a mixture of anthropocentric materials and natural soils and 80 percent of the area is covered by pavement and other structures. The project is consistent with the existing and surrounding land uses. As stated in Chapter 16, “Construction Effects,” areas of exposed soil would be revegetated following the construction period. Therefore, the operation of the project would not be expected to adversely impact topography and soils of the region, nor would the operation of the project contribute to soil erosion.

Ecological Communities

As discussed in Chapter 16, “Construction Effects,” portions of low value terrestrial cultural ecological communities and a low value red-maple sweetgum swamp lot would be impacted. The operation of the project would not preclude these communities from developing or impact the quality and species composition of these communities throughout the region. Therefore, the long-term operation of the project would not result in an adverse impact to terrestrial ecological communities of the region.

Wildlife

Noise disturbance

Operation of the project would involve traffic noise from vehicles crossing the bridge and vessels passing under the bridge. Anthropogenic noise levels can influence wildlife community composition by displacing some species while increasing the abundance of others (Bayne et al. 2008, Francis et al. 2009). Anthropogenic noise can decrease fecundity (Habib et al. 2007) and increase predation rates (Chan et al. 2010). At the individual level, physiological and behavioral responses of animals to anthropogenic noise generally include increased acute stress levels, increased heart rates, and fleeing from the source of the noise. However, such responses are usually in response to unusual, newly introduced disturbances, and animals often gradually habituate to and tolerate loud noises after initial exposure (Bowles 1995).

Because the study area has been developed with present land use for many years, the wildlife communities have already been shaped in part by existing noise levels. These communities are primarily composed of urban-adapted, disturbance-tolerant species that inhabit areas with high noise levels and other disturbances resulting from the existing bridge, heavily traveled roadways, and vessel traffic on the Kill Van Kull. Operation of the project is not expected to increase disturbance levels above what is currently attributable to the existing bridge. In fact, as discussed below, vessel traffic noise is expected to reduce in the long-term due to an expected reduction in vessels using the Kill Van Kull. Thus, any species currently inhabiting the area would continue to occur in the area in the future. Individual animals currently inhabiting the study area are habituated to existing noise levels from roadway and vessel traffic; operation of the project would not elicit any new incremental negative physiological or behavioral responses, and would not alter current rates of predation or reproductive success. In addition, the project is not expected to affect the habitat of Shooters Island Bird Sanctuary, given its distance from the bridge. Overall, noise resulting from the long-term operation of the project would not have any adverse impacts to wildlife.

Bird collisions and disorientation

Obstruction beacons and other lights can disorient night-migrating birds and result in collisions with structures, particularly in foggy conditions with low cloud cover when birds migrate at lower altitudes (Gautreaux and Belser 2006, Longcore et al. 2008, Gehring et al. 2009). Thus, lighting used during operation of the project could impact birds migrating over the Kill Van Kull at night (primarily songbirds). Collision risk, however, would be highly dependent on the light characteristics, and could be diminished through the selection of particular lighting schemes. The USFWS recommends the following lighting scheme to reduce the potential for bird collisions with bridges:

- Use low-intensity, low-wavelength blue, turquoise, or green lights. Avoid red and yellow lights.
- Use blue jelly jar LED (light-emitting diodes) lights on suspension cables and rectangular blue LED lights on bridge deck. These lights have low energy consumption, produce bright but directional light (25 percent as bright as a 100-watt bulb), and provide long-distance viewing while minimizing light pollution.
- Minimize the use of lights during spring and fall bird migration periods, particularly during overcast, cloudy, or foggy conditions.

In addition, collision risk can be dramatically reduced by using flashing obstruction lights Instead of steady-burning lights (Longcore et al. 2008, Gehring et al. 2009).

The project would not raise the arch of the bridge from the existing condition and only the bridge deck would be heightened within the existing arch. Therefore, the project would not be expected to pose any additional collision risk to birds, including those protected under the Migratory Bird Treaty Act, during the long-term operation of the project with respect to bridge configuration. However, the existing bridge is equipped with red, white, and blue LED lighting along its arch, which does not fully meet the bird collision reduction requirements described above. Any of these lighting scheme options described above would result in the potential for reduced bird collision. Therefore, USCG/PANYNJ would investigate which, if any, of these measures can be implemented into the lighting scheme as part of the project.

6-5-2-4 ENDANGERED, THREATENED, RARE, AND SPECIAL CONCERN SPECIES AND ECOLOGICAL COMMUNITIES

Plants

New York State-listed endangered willow oak trees are present near the construction work zone on Staten Island. Measures would be implemented to avoid impacts to this species during construction, as discussed in Chapter 16, “Construction Effects.” However, should these trees be impacted during construction, then any potential long-term adverse impacts to this species would be coordinated with NYNHP and NYCDPR, and measures to avoid a significant adverse ecological impacts, such as planting willow oak trees during the construction of the project, as discussed in Chapter 16, "Construction Effects," would be developed in consultation with these agencies.[1] With these measures in place, there would be no adverse impacts to the willow oak during the long-term operation of the project.

Wildlife

With the exception of the peregrine falcon and osprey, the threatened, endangered, or special concern species previously listed in Section 6-4-5 "Endangered, Threatened, Rare, and Special Concern Species and Ecological Communities" would not be expected to occur within the study area due to the lack of appropriate habitat. Because operation of the project is not expected to increase disturbance levels above what is generated by the existing bridge and approach roadways, neither the peregrine falcon nor osprey would be impacted by the operation of the project. Both species would have the potential to occur in the study area with the same likelihood as at present.

As stated above, the peregrine falcon is known to nest on the Bayonne Bridge. The nesting season of peregrine falcons in New York City is generally from February through August. The timing of the construction would be performed in consultation with NYSDEC, NYCDEP, and NJDEP wildlife biologists to protect peregrine falcons during the construction period (e.g., avoid nests during construction or relocation of nests/nesting platforms during construction). As stated in Chapter 16, "Construction Effects," the same procedure would be implemented should wildlife biologists determine that osprey use the bridge and the nearby platform for nesting. As such, if the falcon and osprey are determined to use the study area for nesting, it is expected that they would relocate to the bridge/nesting platforms during the long-term operation of the project. Therefore, there would be no adverse impact to peregrine falcons and osprey due to the long-term operation of the project.

6-5-2-5 AQUATIC RESOURCES

Water quality

The project would not require any in-water work in the Kill Van Kull, with the exception of the construction of a stormwater outfall from the New Jersey shoreline. Therefore, during operation, the project would only affect water quality from the discharge of stormwater to the Kill Van Kull. Currently, stormwater runoff from the existing bridge and the Route 440 approaches is conveyed in a system of catch basins that ultimately discharge untreated stormwater directly to the Kill Van Kull. As discussed above, under "Existing Conditions," the Kill Van Kull is listed on the New York and New Jersey 303(d) lists as an impaired water body in part due to stormwater discharges. Waterbodies listed as impaired are required to develop a TMDL or other strategy to reduce the input of the specific pollutant(s) that restrict waterbody uses, in order to restore and protect such uses. As part of the project, the bridge travel roadway and approaches would be improved to meet the current NYSDEC, NYCDEP, and NJDEP rules and regulations for

[1] As stated above, willow oak is commonly planted as a street tree in New York City and listed on the NYCDPR approved tree planting list for sidewalk and right-of-way areas and one of the trees observed during the field inspection appears to have been planted within the right-of-way.

stormwater management through the New York State Pollutant Discharge Elimination System (NY SPDES) and New Jersey Pollutant Discharge Elimination System (NJPDES) programs, respectively, as approved by the National Pollutant Discharge Elimination System (NPDES) permit program. The drainage improvements would eliminate the direct stormwater discharge from the bridge travel roadway to the Kill Van Kull, provide stormwater water quality treatment, and would incorporate detention with controlled release rates to the existing conveyance systems. Pursuant to 401 of the CWA, a New Jersey Water Quality Certificate would be obtained prior to the discharge of treated stormwater to the Kill Van Kull from the proposed outfall on the New Jersey shoreline to ensure compliance with the water quality standards.

Within New Jersey, the bridge drainage and a portion of the approaches would be routed to stormwater management basins and underground detention systems within the right-of-way that convey stormwater to a new outfall into the Kill Van Kull. These stormwater management basins would incorporate a combination of best management practices (BMPs), and meet the Stormwater Management Rules requirements of NJDEP. Within New York on the bridge travel roadway and approach spans, stormwater would be captured, detained, and released to the NYCDEP system through above ground detention ponds. The detention ponds, which have been developed through consultation with NYCDEP, would connect to NYCDEP’s combined sewer system upstream of the regulator. The drainage improvements would eliminate direct discharge of stormwater runoff from the bridge travel roadway to the Kill Van Kull. The water quality improvements would provide an 80-percent reduction in total suspended solids (TSS) and 40-percent reduction of total pollutant (TP) loading that is currently discharged to the Kill Van Kull. These water quality treatment measures would reduce the sources of the impairments associated with stormwater as described on the New York and New Jersey 303(d) lists. Thus, the implementation of these water quality treatment measures would result in water quality improvements in the Kill Van Kull during the long-term operation of the project.

At the request of NYCDEP, a proposed outfall on the New York side was eliminated. Instead, NYCDEP combined sewer would be upgraded from John Street to Morningstar Road. The stormwater would be discharged into this newly constructed NYCDEP sewer. All connections to the combined sewer system have been designed with control flow devices or orifices to reduce flow rates. The predetermined flow rates, determined by NYCDEP, would result in a system that does not exceed existing flows to the combined sewer.

Aquatic Biota

Bridge Traffic

Operation of the project would involve traffic noise from vehicles using the bridge. However, because the bridge has existed for approximately 80 years in this location, the fish community currently in the project area has already been acclimated to existing noise levels. Operation of the project is not expected to increase disturbance levels above what is currently attributable to the existing bridge. Thus, any species currently inhabiting the area would continue to occur in the area during the long-term operation of the project. Presumably any noise levels which currently elicit a behavioral response under the current condition would continue to elicit a similar response after completion of the project. Overall, noise resulting from the long-term operation of the project would not be expected to have any adverse impacts on the fish community.

Vessel Traffic

Commercial shipping vessels are a source of low frequency (5-500 hertz [Hz]) noise in the marine environment (Jasny et al. 1999; Stocker 2002; Hildebrand 2004). The size and frequency of use of commercial vessels are considered a greater source of noise impacts compared to the more numerous fishing and recreational boats that travel coastal waters (Hildebrand 2004). Sources of noise include engines, pumps, cooling systems, generators, and movement of water across the hull and propellers (Stocker 2002; Hildebrand 2004). As stated above, the Kill Van Kull is an active navigational route traversed by a variety of commercial vessels travelling to and from the Port of New York. It is anticipated that fewer, but larger vessels would use the Kill Van Kull. As discussed in Chapter 1, “Purpose and Need,” the size of the vessel would have capacities as great as 12,000 twenty-foot equivalent units (TEUs) up from 4,500 TEUs. In 2020, it is anticipated that approximately 3,080 vessels would use the Kill Van Kull without the project and approximately 2,840 vessels would use the Kill Van Kull in the future with the project. By 2035, the difference would even be greater, with approximately 4,450 vessel trips made in the Kill Van Kull without the project and approximately 3,620 vessels expected to use the Kill Van Kull under the project. It is expected that the larger vessels would not result in a significant increase in underwater noise levels in the future with the project. Therefore, the long-term operation of the project would not result in a significant adverse impact with respect to noise on aquatic biota.

Shading

It has been maintained that shading of estuarine habitats can result in decreased light levels and reduced benthic and water-column primary production, both of which may adversely affect invertebrates and fishes that use these areas (Able et al. 1998, and Struck et al. 2004). The amount of area shaded by overwater structures is affected by the height and width of the structure, construction materials, orientation of the structure relative to the arc of the sun (Burdick and Short 1995, Fresh et al. 1995 and 2000, Olson 1996, 1997 in Nightingale and Simenstad 2001) and piling density. Shading due to bridges has been found to affect plant communities such as tidal marshes and submerged aquatic vegetation (SAV), as well as benthic invertebrate communities within tidal marshes (Struck et al. 2004, and Broome et al., 2005 in CZR 2009). However, adverse effects on marsh vegetation and benthic macroinvertebrates have been found to be minimal when the bridge height-to-width ratio is greater than 0.7 (Struck et al, 2004, Broome et al. 2005 in CZR 2009). Significantly fewer oligochaete worms, which are common in the Harbor Estuary, were found under bridges with a height-to-width ratio less than 0.7 when compared to marshes not affected by shading (Struck et al. 2004). Struck et al. (2004) found that bridges with height-to-width ratios greater than 1.5 had the lowest light attenuation beneath the bridge.

With respect to open water and tidal wetlands, the lowest point of the bridge would be above the MHHW line with the greatest height over open water. The existing bridge height at the MHHW mark has a height-to-width ratio of 2.3, well above the 0.7 and 1.5 height-to-width ratio thresholds. The height-to-width ratio under the condition at the

MHHW mark would be lower with a ratio of 2.0, but this ratio is still well above the 0.7 and 1.5 thresholds. Therefore, the change in bridge deck height and width would not have an adverse impact on aquatic biota or tidal wetlands during the long-term operation of the project.

Stormwater

As stated above, stormwater management measures would be implemented in the project. These measures would be developed pursuant to the rules and regulations established by NYSDEC and NJDEP. Stormwater conveyed to the proposed outfall along the New Jersey shoreline would be treated according to NJDEP standards prior to its discharge to the Kill Van Kull. Therefore, the project would not be expected to result in adverse impacts on aquatic biota during operation.

Vessel Impacts on Coastal Erosion

Since the project would afford Post-Panamax vessels access to traverse the Kill Van Kull, an assessment of the potential effects of these vessels on the study area's natural resources, particularly coastal erosion and effects on tidal wetlands, was conducted.

Through its New York and New Jersey Harbor Deepening Project, USACE examined vessel generated waves on coastal erosion and concluded that the larger vessels that would use the deeper channel would not have an impact on channel bank erosion (USACE 1999, USACE 2004). Based on analytical ship wake modeling, it is anticipated that wakes generated by the design vessel would remain unchanged, as the increase in vessel size would be offset by deeper channels. Additional studies (Moffatt & Nichol Engineers 2003) show that tug boats, which present a larger percentage of vessel traffic in the Harbor Estuary, generate short secondary waves that have the potential to break at the channel shorelines, thus contributing to shoreline erosion. Conversely, large vessels generate long waves that do not typically break at the shoreline. Thus, their impact to the shoreline is relatively small. This study used measured data from vessels traversing the Arthur Kill Channel beginning at its confluence with the Kill Van Kull and Newark Bay channels along with analytical models to determine the potential effects of the larger ships anticipated as part of the harbor deepening project. While the vessels in that study were somewhat smaller than those that may arrive in the future with the project, it was clear that the larger vessels (up to 145 foot beam and a draft of 42 feet), which are close in size to the Post-Panamax design, did not produce the wakes generated by the tugs in the Kill. This is consistent with ship wake modeling theory that demonstrates that the most significant erosion potential exists from secondary waves as the vessel passes a given point and that these waves are an exponential function of the vessel speed. Therefore, unburdened tugs which typically travel at twice the speed of the container ships, exhibit a much greater potential for wake-induced erosion as compared to the larger vessels. This is due to the fact that secondary wave prediction model is a linear function of vessel size by a quadratic function of vessel speed resulting in an exponential increase in wave height as the speed of the vessel increases.

The 2003 study by Moffatt & Nichol Engineers found that the shoreline retreated an average of approximately 33 feet and a maximum of 66 feet between 1974 and 1990. However, shoreline retreat following 1990 was found to be relatively minor. There is no apparent explanation for this difference in the shoreline retreat rate except that episodic events contributed to the higher retreat rate prior to 1990. In addition, the number of tug vessels transiting the channel may have been reduced after 1990. This observation was also supported by observations by the NYCDPR Marsh Restoration Team in the early 1990s, which indicated that approximately seven vessels per hour that produced "breaking" waves transited the channel at that time. However, recent observations suggest fewer than two events with breaking waves occur per hour. This reduction in vessel traffic and the use of larger ships may also account for the apparent shoreline stability since 1990.

As stated in Chapter 1, "Purpose and Need," the primary purpose of the project is to preserve the long term economic efficiency and sustainability of the Port of New York and New Jersey by affording access to Post-Panamax vessels. Based on the studies conducted for the New York and New Jersey Harbor Deepening Project, larger vessels that would use the Kill Van Kull as a result of the taller bridge clearance would not result in adverse impacts with respect to coastal erosion. Furthermore, an increase in large vessel traffic would reduce vessel traffic overall and decrease the use of the Kill Van Kull by smaller tug vessels, which tend to have a higher impact on shoreline erosion. By 2020 and 2035, it is estimated that 6,167 and 8,894 tug boats, respectively, would use the Kill Van Kull in the future without the project. However, in the future with the project it is estimated that 437 fewer tug boats (i.e., 5,730 tug boats) and 1,482 fewer tug boats (i.e., 7,412 tug boats) would use the Kill Van Kull in 2020 and 2035, respectively. In addition, the tug-wake prediction models confirm that a deeper channel would result in a decrease in wake height. This overall reduction would reduce the total wake energy absorbed at the shoreline with a reduction in the potential for bank erosion. Therefore, the long-term operation of the project would not significantly contribute to coastal erosion.

A study conducted on the potential impacts of Post-Panamax vessels on salt-marsh retreat in Savannah Georgia found that Post-Panamax vessels would not significantly accelerate marsh retreat. However, the study stated that further monitoring would be required to determine the effects of channel deepening and how future Post-Panamax wave heights would impact the shoreline. The study found that wind accounted for 25 percent of the cumulative wave force and that there no direct evidence that marsh erosion occurred as a result of wakes from individual vessels. Rather, the study found that vessel-generated wakes have the potential to contribute to shoreline erosion when wave heights are already high due to storm surges that occur over several consecutive tidal cycles. The study concluded that although wake heights generated by vessels at the shoreline could be reduced to lower the size of the storm-generated wind waves through reductions in vessel speed, there is insufficient evidence to link marsh retreat directly to vessel-generated waves (Houser 2010).

In terms of sediment re-suspension, the USACE (2012) found that vessel-caused turbulence disturbs bottom communities and contributes to turbidity, which deprives submerged plants and sight-feeding species of necessary light, but that this is only a minor source of turbidity compared with nutrient and sediment runoff from other anthropogenic sources within a given watershed. Results of a study conducted by Houser (2011) suggests that not only does transport of the shoreline depend on the size of the wake, but that it also depends on the timing of that wake and sediment resuspension relative to secondary currents and water level variations already present.

The study suggests that subcritical wake of a container ship will not necessarily lead to onshore transport and shoreline accretion, but that the direction of transport and shoreline in response to container ships will likely be site specific (Houser 2011).

6-5-2-6 ESSENTIAL FISH HABITAT (EFH)

As stated in Chapter 16, “Construction Effects,” no in-water or wetlands work would be conducted as part of the project, with the exception of the construction of one stormwater outfall. No long-term shading impacts would occur during the operation of the project. With respect to all aquatic biota, operation of the project is not expected to increase disturbance levels above what is currently attributable to the existing bridge, and thus any species currently inhabiting the area would continue to occur in the area during the long-term operation of the project. In addition, stormwater would be treated, according to the rules and regulations established by New York and New Jersey, prior to its discharge to the Kill Van Kull. As stated above, this stormwater treatment would result in an approximate 80 percent decrease in the TSS and 40-percent decrease in TP loadings to the Kill Van Kull. As discussed in Chapter 16, “Construction Effects,” coordination with NMFS would occur during the permitting phase of the project to minimize impacts to EFH during project construction and operation of the stormwater outfall. Therefore, no adverse impacts on EFH species or EFH habitat would occur during the long-term operation of the project.

6-6 MITIGATION

As discussed in Chapter 16, “Construction Effects,” and in this chapter, no construction would take place in any wetlands in Staten Island. However, approximately 1.93 acres of wetlands may be temporarily impacted in the potential staging area during construction. Mitigation for these wetlands impacts would be conducted according to USACE and NJDEP permit requirements. Stormwater management practices would be developed in accordance with any applicable NYCDEP, NYSDEC and NJDEP regulations. Stormwater generated during the operation of the project and conveyed to the proposed outfall along the New Jersey shoreline would be treated and discharged in accordance with NJDEP regulations. With respect to the peregrine falcon and osprey, the timing of the construction would be performed in consultation with NYSDEC, NYCDEP, and NJDEP wildlife biologists to protect (i.e., avoid construction during nesting period, avoid nests during construction, or relocation of nests/nesting platforms during construction) peregrine falcons and/or osprey during the construction period. These species, if present, would be expected to relocate to the study area during the long-term operation of the project. Finally, should the willow oak be impacted during construction, then any potential long-term adverse impacts to this species would be coordinated with NYNHP and NYCDPR and mitigation measures, such as planting willow oak trees during the construction of the project, as discussed in Chapter 16, “Construction Effects,” would be developed in consultation with these agencies. With these measures in place, there would not be any adverse impacts on this species within the region as a result of the long-term operation of the project. Therefore, the long-term operation of the project would not result in adverse impacts to terrestrial communities and wildlife, federally listed and/or New York and New Jersey-protected species, wetlands, floodplains, and aquatic resources of the study area.

Chapter 7: Historic and Cultural Resources

7-1 INTRODUCTION

This chapter considers the potential of the Raise the Roadway Alternative to affect historic and cultural resources, including architectural historic resources ("historic resources") and buried archaeological resources.

The analysis in this Environmental Assessment (EA) was prepared in accordance with NEPA and Section 106 of the National Historic Preservation Act of 1966 (NHPA), as implemented by federal regulations appearing in 36 CFR Part 800, in consultation with the New York State Historic Preservation Officer (NYSHPO) of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP), the State Historic Preservation Office (SHPO) at the New Jersey Department of Environmental Protection (NJDEP)—New Jersey State Historic Preservation Office (NJHPO), and other consulting parties.

7-2 REGULATORY CONTEXT

Section 106 of the NHPA mandates that federal agencies consider the effect of their actions on any properties listed on or determined eligible for listing on the National Register of Historic Places (NR) and affords the federal Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to participate in the Section 106 process. Section 101(d)(6)(B) of the NHPA requires the lead federal agency to consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to historic properties that may be affected by the undertaking. The lead federal agency shall ensure that consultation in the Section 106 process provides the Indian tribe or Native Hawaiian organization a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects. Section 106 also requires consultation with local governments and other individuals and organizations with a demonstrated interest in the undertaking, whose participation is subject to approval by the responsible federal agency. The basic steps of the Section 106 process are: identification of historic properties that may be affected by the project and that are included on or eligible for the NR; assessment of adverse effects on each historic property; and resolution of adverse effects.

The United States Coast Guard (USCG) as the lead federal agency under Section 106 has, in consultation with NYSHPO and NJHPO, determined that the proposed action constitutes an adverse effect on the Bayonne Bridge, a property eligible for NR listing. The Section 106 Consulting Parties for the project include a federally recognized Indian tribe, preservation organizations, and local governments. The list of Invited and Consulting Parties can be found in Chapter 3, "Process, Agency Coordination, and

Public Participation" of this EA**.** Materials, including the cultural resources survey reports prepared for the project and correspondence with the NYSHPO and NJHPO, have been provided to the Consulting Parties. Meetings were held on June 5, 2012 and February 11, 2013 to seek and consider views of the Consulting Parties regarding the project's effects on historic and cultural resources and proposals to resolve adverse effects.

The review under Section 106 is being conducted in coordination with analyses conducted for the National Environmental Policy Act (NEPA) (36 CFR § 800.8). Because the views of the public are essential to federal decision-making in the Section 106 process, the public has been kept informed about the project and its effects on historic properties and given the opportunity to comment. This public comment element was combined with the public participation component required by NEPA. The public participation efforts being conducted for the project are described in Chapter 3, "Process, Agency Coordination, and Public Participation."

7-3 METHODOLOGY

A methodology for the identification of the project's Area of Potential Effect (APE), historic and cultural resources within the APE, and criteria under which effects on historic and cultural resources would be assessed, was prepared and submitted by USCG to NYSHPO and NJHPO in September 2011.[1] NYSHPO concurred with the methodologies set forth in the document in a letter dated November 1, 2011. NJHPO also concurred with the proposed methodologies in a letter dated November 2, 2011.

7-3-1 DEFINITION OF THE AREA OF POTENTIAL EFFECT

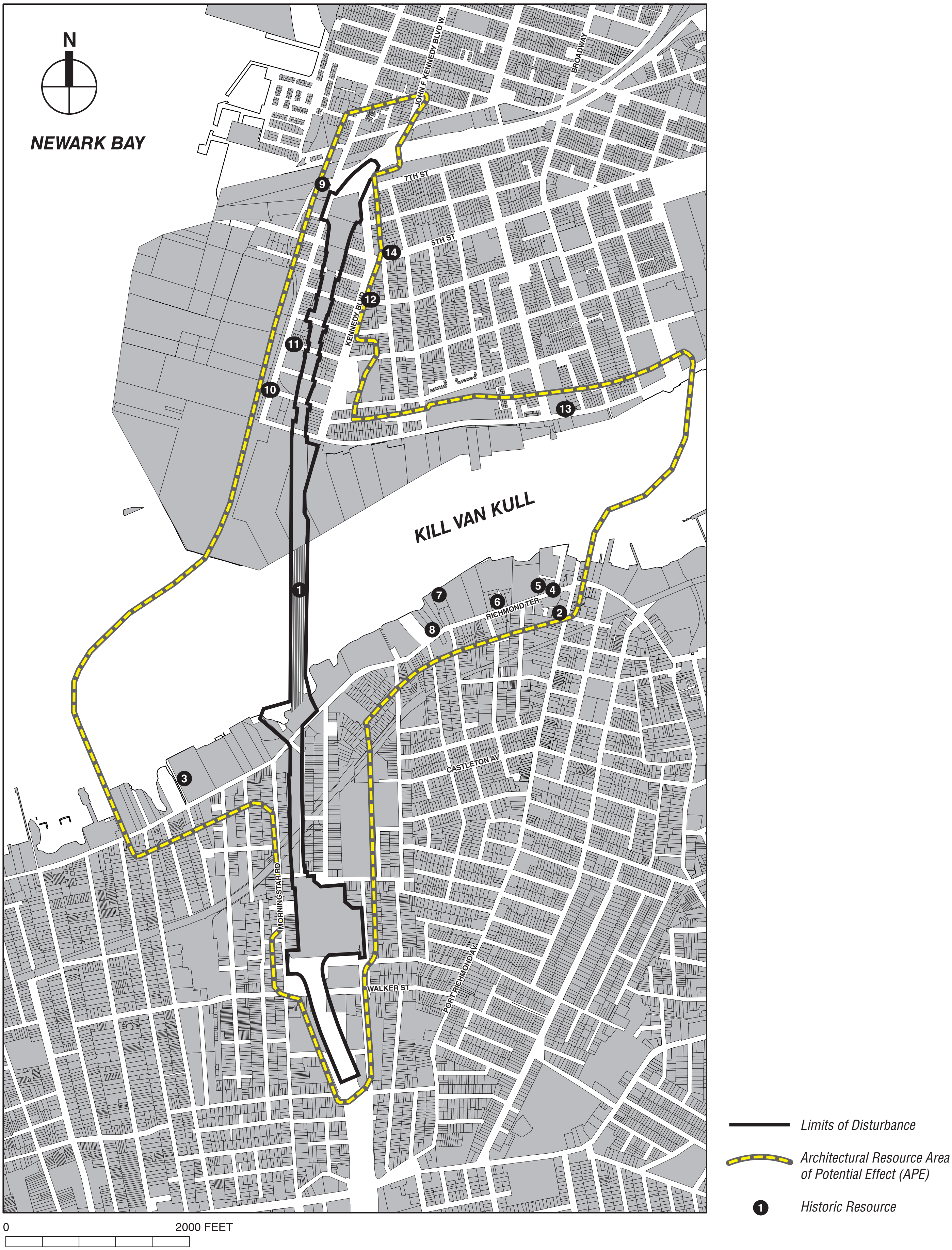
The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if such properties exist." The APE is influenced by the scale and nature of an undertaking (36 CFR § 800.16[d]).

In general, as defined by the Advisory Council on Historic Preservation, adverse effects on historic resources can include both direct physical effects—demolition, alteration, or damage from construction—and indirect effects, such as the introduction of visual, audible, or atmospheric elements that may alter the characteristics of the historic property that qualify it for inclusion on the NR in a manner that would diminish the integrity of the property's significant historic features. Potential archaeological resources may be affected by construction activities as a result of disturbance to the ground surface from activities such as excavation, grading, cutting and filling, and staging. Adverse effects may also include reasonably foreseeable effects caused by activities that may occur later in time, be farther removed in distance, or be cumulative.

The APE for archaeological resources is defined as those areas that would be directly impacted by the project, or the limits of disturbance for the project (see **Figure 7-1**). The APE for historic resources is defined as the area surrounding the project site within

[1] Port Authority of New York and New Jersey, *Bayonne Bridge Navigational Program NEPA Work Plan*, Attachment A: Cultural Resources Methodology, Section 106 initiation materials submitted by USCG to NYSHPO and NJHPO, September 2011.

5.17.12



Historic Resources Within the APE
Figure 7-1

BAYONNE BRIDGE OVER THE KILL VAN KULL

visual range for the inland areas and for longer distances in the waterfront area of the Kill Van Kull east and west of the Bayonne Bridge. The architectural resources APE also accounts for potential construction-related impacts. The APE for architectural resources is generally defined as the area within 100 feet of the north and south ends of the bridge approaches (see **Figure 7-1**).

- Bayonne portion of the APE—The architectural APE for the bridge approach in Bayonne is generally bounded by the north side of County Road 735 (West First Street), the western blockfronts of Avenue A, and the north side of North Street. East of the bridge approach in Bayonne, the APE extends eastward to the east end of Dennis P. Collins Park. The remainder of this part of the APE is smaller and includes the first 200 feet of West First Street, Point View Terrace, West Second Street, and West Third Street. North of West Third Street, the APE narrows to include the east blockfronts of JFK Boulevard between West Third Street and West Seventh Street, with the APE extending eastward to include the east blockfronts of Humphrey Avenue at the intersection of West Seventh Street. Most other public views of the Bayonne Bridge from Bayonne, including waterfront views, are obscured or entirely obstructed by waterfront warehouses and/or other industrial structures and facilities.
- Staten Island portion of the APE—The APE for the bridge approach in Staten Island is generally bounded by the eastern blockfronts of John Street and Trantor Place east of the Bayonne Bridge approach, with the APE extending east from John Street to the east side of Port Richmond Avenue to include the areas approximately 400 feet south of Richmond Terrance. This portion of the APE includes the waterfront Faber Park and Pool. West of the Bayonne Bridge approach the APE is generally bounded on the west by the western blockfronts of Morningstar Road until the midblock between the Staten Island Railroad overpass and Richmond Terrace where the APE extends west to Lake Avenue to include the areas approximately 400 feet south of Richmond Terrace. Longer public views to the Bayonne Bridge from Richmond Terrace are generally obscured or entirely obstructed by curves in the road, waterfront structures, and dense vegetation.
- Expanded APE to include longer views to the Bayonne Bridge—The architectural APE is expanded in certain areas to consider more distant views of the Bayonne Bridge from vantage points that include Arthur Kill Park on the western waterfront of the Arthur Kill in Elizabethport, New Jersey, and the approaches and span of the Goethals Bridge over the Arthur Kill connecting Elizabeth, New Jersey to Staten Island, New York. The Bayonne Bridge is visible in eastward views from Arthur Kill Park, located approximately two miles west of the Bayonne Bridge. The Bayonne Bridge is also visible from the Goethals Bridge, located approximately three miles southwest of the Bayonne Bridge, due to the Goethals Bridge's elevation.

7-3-2 IDENTIFYING CULTURAL RESOURCES

Cultural resources can include archaeological remains from Native American people who used or occupied a site. These remains may include tools, refuse from tool-making activities, remnants from habitation sites, etc. These resources are also referred to as "precontact" because they were deposited before Native Americans' contact with European settlers. Archaeological resources can also include remains from activities that occurred during the historic period (beginning with European settlement of the area) that include European contact with Native Americans, as well as battle sites and foundations. Historic resources also include significant built resources, such as structures, buildings, and objects.

In general, cultural resources consist of properties that have been determined to be eligible for listing on, or have been listed on the NR. Criteria for inclusion on the NR are listed in the Code of Federal Regulations, Title 36, Part 63 ("known historic resources"). Districts, sites, buildings, structures, and objects are eligible for the NR if they have integrity of location, design, setting, materials, workmanship, feeling and association, and meet any of the NR Criteria listed below:

- NR Criterion A is associated with events that have made a significant contribution to the broad patterns of history;
- NR Criterion B is associated with significant people;
- NR Criterion C embodies distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic value; or represents a significant and distinguishable entity whose components may lack individual distinction; or
- NR Criterion D may yield [archaeological] information important in prehistory or history.

Properties less than 50 years old are ordinarily not eligible, unless they have achieved exceptional significance. Determinations of eligibility are made by the NYSHPO and NJHPO. For purposes of this analysis, cultural resources were also defined to include properties that may appear to meet the eligibility criteria for local or state listing.

The presence or absence of historic and archaeological resources in the APE has been evaluated in a series of reports that were provided to NYSHPO and NJHPO for review and comment:

- *Phase 1A Archaeological Assessment, Bayonne Bridge Navigational Clearance Program, the Port Authority of New York, and New Jersey, Staten Island, Richmond County, New York, NYSOPRHP 11PR06749, Historical Perspectives, Inc., January 2012.*
- *Phase 1A Archaeological Assessment, Bayonne Bridge Navigational Clearance Program, the Port Authority of New York, and New Jersey, Bayonne, Hudson County, New Jersey, NJHPO 12-0004, Historical Perspectives, Inc., January 2012.*
- *Historic Resources Survey Report, Bayonne Bridge Navigation Clearance Project, the Port Authority of New York and New Jersey,* Li-Saltzman Architects, P.C., January 2012.
- *Intensive Level Survey Report, Bayonne Bridge Navigation Clearance Program, the Port Authority of New York and New Jersey,* Li-Saltzman Architects, P.C., March 2012.
- *Addendum, Phase 1A Archaeological Assessment, Bayonne Bridge Navigational Clearance Program, the Port Authority of New York, and New Jersey, Bayonne, Hudson County, New Jersey, NJHPO 12-0004, Historical Perspectives, Inc., March 2012.*

A summary of conditions as described in these cultural resources surveys are described in Section 7-4, “Affected Environment.”

7-4 AFFECTED ENVIRONMENT

7-4-1 ARCHAEOLOGICAL RESOURCES

7-4-1-1 ARCHAEOLOGICAL ASSESSMENT, STATEN ISLAND, NY APE

Historic Perspectives, Inc. conducted a Phase IA Archaeological Assessment on the Staten Island, New York approach of the Bayonne Bridge. The January 2012 report concluded, through the comparison of soil borings conducted before the construction of the bridge in 1929 and then later conducted in 2010, that no natural soils remained at the top of the soil column, where most precontact sites would be located. Instead, all upper soil levels were documented as fill atop a thick layer of stiff to stiff silty clay. These soils are unlikely to have supported precontact sites. The Phase IA also concluded that the historic period archaeological sensitivity in the APE is low due to extensive disturbance caused by the construction of the Bayonne Bridge and its support areas.

However, a slight portion of St. Mary’s of the Assumption Church Cemetery is located adjacent to the construction work zone portion of the APE where the bridge approach roadway passes under the Walker Street overpass. Located on the south side of Walker Street, immediately adjacent to the Dr. Martin Luther King, Jr. Expressway, the cemetery dates to the 1850s. The church itself was moved to a new location in 1884 and is no longer on the property. The Phase IA recommended that a construction management plan be implemented to protect against any accidental impacts during the construction process adjacent to the cemetery. The Phase IA recommended no further archaeological investigations.

In a letter dated February 24, 2012, NYSHPO concurred with the findings of the January 2012 report and indicated that they have no further archaeological concerns regarding the New York portion of the APE. NYSHPO also concurred that a construction protection plan should be developed to provide that the St. Mary of the Assumption Church Cemetery is not affected.

7-4-1-2 ARCHAEOLOGICAL ASSESSMENT, BAYONNE, NJ APE

Historic Perspectives, Inc. conducted a Phase IA Archaeological Assessment on the Bayonne, New Jersey approach of the Bayonne Bridge. The January 2012 report concluded, through the comparison of soil borings conducted before the construction of the bridge in 1929 and those conducted in 2010, that no natural soils remained at the top of the soil column, where most precontact sites would be located. Instead, all upper soil levels were documented as fill atop a medium stiff to stiff red-brown silty clay. These soils are unlikely to have supported precontact sites. The Phase IA also concluded that the historic period archaeological sensitivity in the APE is low due to extensive disturbance caused by the construction of the Bayonne Bridge and its support areas. The Phase IA, therefore, recommended no further archaeological investigations. In a letter dated February 22, 2012, NJHPO expressed concerns that the APE north of First Street may possess the potential to possess archaeological resources, and that Phase 1B archaeological testing should be undertaken in this area.

In response to NJHPO concerns, an addendum to the Phase IA report was prepared by Historic Perspectives, Inc. in March 2012. This addendum incorporated data from additional soil boring logs and provided an updated assessment of the archaeological sensitivity of the APE. The addendum supported the original Phase IA findings that the sensitivity for precontact and historic resources in the APE is low, and it concluded that additional archaeological investigations do not appear warranted. In a letter dated March 29, 2012, NJHPO concurred with the conclusions of the addendum.

The February 22, 2012 NJHPO letter noted that a NR-eligible shipwreck (the remains of Vessel V36) is located approximately 1,200 feet east of the APE in the Kill Van Kull and recommended placing a buffer around the wreck free of anchor drag lines that would be referenced in project documents and vessel navigation GPS for the undertaking.

7-4-2 HISTORIC RESOURCES

7-4-2-1 BAYONNE BRIDGE

In 2001, NJHPO determined that the Bayonne Bridge was individually eligible for NR listing under National Register Criteria A and C as the longest steel arch bridge in the world when it opened in 1931. In a letter dated March 6, 2012, NYSHPO determined that the Bayonne Bridge remains eligible for listing on the NR.

The Bayonne Bridge crosses the Kill Van Kull linking Bayonne, New Jersey and Staten Island, New York. It is designed with an arch shaped truss measuring 1,652 feet, and was constructed with plate girder approaches. The roadway passes through the arch and is suspended from it in the central part of the span. The bridge's New York approach is approximately 2,014 feet long and the New Jersey approach is approximately 2,995 feet long. The bridge is composed of 40 connected steel trusses. The trusses are approximately 67 feet deep at the base of the arch, and gradually taper toward midspan to a depth of approximately 37 feet. The apex of the arch is approximately 266 feet above the Kill Van Kull, and the roadway is suspended by wire rope hangers 115 feet below the apex of the arch. The abutments for the bridge, supported on four columns, were constructed on solid rock that continues along the Bayonne Peninsula and Staten Island to the New Jersey Palisades.

The Bayonne Bridge was the last of three bridges built by the Port of New York Authority (now the Port Authority of New York and New Jersey [PANYNJ])—Outerbridge and Goethals being the other two—to connect New Jersey with Staten Island as part of a circumnavigational highway system for the Greater New York Area.

Othmar Ammann was the bridge designer and Cass Gilbert was the consulting architect on the project. By the 1920s, Gilbert was a well known and established architect, having designed the Woolworth Building, the world's tallest building when it opened in 1913. The construction company, American Bridge Company, was also well known. American Bridge Company built the steel structural framework of the Woolworth Building as well as Hell Gate Bridge in New York City in 1916.

Preliminary studies for the bridge location began in April 1926. The site selected for the bridge paralleled an existing ferry service between Bayonne, NJ and Port Richmond, NY. The use of the ferry route allowed planners to preserve the street patterns of both towns. This arrangement, however, meant that the bridge could not be built at a 90 degree angle but a 58 degree angle across the Kill, resulting in a longer span. Additionally, to get the roadway to the height of the bridge required a viaduct on either side resting on concrete piers. These viaducts would support one and a quarter miles of elevated roadways. Ground was broken in September 1928 with the bridge completed in November 1931. It was originally planned that the arch be framed by masonry clad abutments and towers. However, the onset of the Great Depression required that this design element be excluded as a cost-cutting measure. The bridge was built with a pedestrian path and room for expansion of vehicular lanes or rail transit. It was the longest arch bridge in the nation until 1977.

7-4-2-2 HISTORIC RESOURCES, STATEN ISLAND, NY APE

Li/Saltzman Architects completed an architectural survey of the Staten Island portion of the APE. The January 31, 2012 report identified two individually listed New York City landmarks, one of which is listed on the National and State Registers of Historic Places and one which is NR-eligible. The Survey Report also assessed thirteen properties previously identified in a 1979 reconnaissance survey undertaken by the Staten Island Institute of Arts and Sciences (SIIAS) and determined that two of the thirteen retained their integrity. Additionally, six properties and one multiple property listing were identified as potentially eligible for listing on the National and State Registers of Historic Places. NYSHPO reviewed the January 31, 2012 Historic Resources Survey report and made eligibility determinations for the properties contained therein in correspondence dated March 6, 2012.[1]

Table 7-1 shows the historic properties included in the APE. Properties that are NYCLS, listed on the NR, or determined SR- and/or NR-eligible, are included, including those properties for which NYSHPO made eligibility determinations on March 6, 2012.

7-4-2-3 HISTORIC RESOURCES, BAYONNE, NJ APE

Li/Saltzman Architects completed an architectural survey of the Bayonne portion of the APE. The March 27, 2012 report included a survey of approximately 297 tax lots in New Jersey, including thirteen properties that had been previously surveyed as part of a reconnaissance level survey in 2000. The architectural survey determined that none of the previously identified thirteen properties retained sufficient integrity to be considered listed or eligible for listing at the local, state, or national levels. The survey did identify six of these properties as potential local landmarks, subject to the review of the City of Bayonne Landmarks Preservation Commission. These six properties are shown in **Table 7-1**. The survey did not identify any properties as potentially eligible for listing on the State or National Registers. In a letter dated April 3, 2012, NJHPO concurred with the March 27, 2012 report that the Bayonne Bridge is the only property within the New Jersey portion of the APE that is eligible for listing on the New Jersey and New York Registers of Historic Places.

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[1] In a letter dated March 6, 2012, NYSHPO made determinations of eligibility on the properties contained in the January 31, 2012 report. SHPO determined the following properties do not meet criteria for listing on the NR: 24 Port Richmond Avenue; 31, 35, 39, & 41 Sharpe Avenue; 36-38 John Street; 40 John Street; 42-46 John Street; 41 John Street; 83 John Street; 179-181 John Street; 2541 Richmond Terrace; 29 Trantor Place; 168 Hooker Place. These include properties identified by SIIAS in their 1979 property and properties identified by Li-Saltzman Architects as potentially NR-eligible.

Table 7-1
Historic Resources within the APE

Reference Number	Name	Location	BLPC-Eligible	NYCL	NR Listed	NR Eligible[2]	NYSR Eligible
1	Bayonne Bridge	Crossing Kill Van Kull between New York and New Jersey				X	
Staten Island, Richmond County, New York							
2	Reformed Church of Staten Island, Sunday School & Cemetery	54 Port Richmond Avenue		X	X		
3	Standard Varnish Works Factory Building	2589 Richmond Terrace		X		X	X
4	Former Staten Island National Bank and Trust Co.	26 Port Richmond Avenue				X	X
5	Former Leo's Empire Theater	2094 Richmond Terrace				X	X
6	Frame House	2172 Richmond Terrace				X	X
7	Faber Park and Pool	2175 Richmond Terrace				X	X
8	St. Mary of the Assumption R.C. Church complex	2234 Richmond Terrace et.al.				X	X
Bayonne, Hudson County, New Jersey							
9	Avenue A Bridge	Avenue A	X				
10	Commercial building	40 Avenue A	X				
11	Industrial building	70-76 Avenue A	X				
12	Commercial/residential building	110 JFK Boulevard	X				
13	Commercial/residential building	23-33 West First Street	X				
14	Residential building	124 West Fifth Street	X				

Notes: [1] In a letter dated March 6, 2012, NYSHPO made determinations of SR and NR eligibility on the properties contained in the January 31, 2012 report. SHPO determined the following properties do not meet criteria for listing on the SR and NR: 24 Port Richmond Avenue; 31, 35, 39, & 41 Sharpe Avenue; 36-38 John Street; 40 John Street; 42-46 John Street; 41 John Street; 83 John Street; 179-181 John Street; 2541 Richmond Terrace; 29 Trantor Place; 168 Hooker Place. These include properties identified by SIIAS in their 1979 property and properties identified by Li-Saltzman Architects as potentially NR-eligible.

[2] As determined in 2001, the Bayonne Bridge is eligible under Criteria A and C. As determined in a NYSHPO resource evaluation dated February 17, 2012, the Standard Varnish Works is eligible under Criterion A as an important visual reminder of Staten Island's industrial history and Criterion C in the area of industrial architecture; the Staten Island National Bank and Trust is eligible under Criterion C as an outstanding local example of Beaux Arts style commercial design; the Leo's Empire Theater is eligible under Criterion A in the area of entertainment and Criterion C as an example of Mediterranean Revival design; the frame house is eligible under Criterion C as an intact example of Second Empire style residential architecture and reflects the prosperity of Port Richmond during the late 19th century; the Faber Park and Pool is eligible under Criterion A in the area of recreation and Criterion C as an outstanding example of Mediterranean Revival design; and the St. Mary of the Assumption R.C. Church complex is eligible under Criterion C as an outstanding example of Gothic Revival ecclesiastical architecture.

NHL: National Historic Landmark.
NR: National Register of Historic Places.
NYSR: New York State Register of Historic Places.
NYCL: New York City Landmark
BLPC-Eligible: City of Bayonne potential local landmark, subject to review of the City of Bayonne Landmarks Preservation Commission

7-5 ENVIRONMENTAL CONSEQUENCES

7-5-1 NO BUILD ALTERNATIVE

The No Build Alternative would involve the continued operation of the existing four-lane Bayonne Bridge. Under the No Build Alternative, there would be no subsurface disturbance or changes to the historic Bayonne Bridge.

7-5-2 RAISE THE ROADWAY ALTERNATIVE

7-5-2-1 ARCHAEOLOGICAL RESOURCES

As described above, the APE is determined to have a low sensitivity for archaeological resources. Therefore, the project would have no adverse impacts on archaeological resources.

However, to avoid construction impacts on St. Mary's of the Assumption Church Cemetery a construction protection plan would be prepared and implemented to avoid accidental impacts during the construction adjacent to the cemetery. The construction protection plan would be submitted to NYSHPO for review as indicated in NYSHPO's letter of February 24, 2012. The commitment to prepare and implement the construction protection plan is included as a stipulation of the Programmatic Agreement contained in **Appendix B**.

As requested by NJHPO in a letter dated February 22, 2012, a 300-foot buffer will be placed around the NR-eligible shipwreck located in the Kill Van Kull (Vessel V36) located approximately 1,200 feet east of the APE. The buffer will be free of anchor drag lines during construction and will be referenced in project documents and vessel navigation GPS for the project. The commitment that Vessel V36 be identified by vessel navigation GPS in the Project records and bid documents is contained as a stipulation of the Programmatic Agreement included in **Appendix B.** As also requested by NJHPO in a letter dated March 29, 2012, although the New Jersey portion of the APE has a low potential for archaeological resources, an Unanticipated Discoveries Plan will be developed for incorporation into project documents in the unlikely event that unexpected archaeological resources are encountered during construction. The development of an Unanticipated Archaeological Discoveries Program is also included as a stipulation in the Programmatic Agreement contained in **Appendix B**.

7-5-2-2 ARCHITECTURAL RESOURCES

Bayonne Bridge

The project seeks to reconstruct the roadway of the Bayonne Bridge with the goal of increasing vertical clearance, improving substandard features, ensuring seismic stability, and with the long-term goal of maintaining the vitality of the Port of New York and New Jersey. The project would result in the demolition of the Bayonne Bridge's approach structures (piers and roadways), towers, pedestrian walkway, wire rope hangers, and the roadway with the arch. A new road deck would be constructed at a higher elevation, requiring modification to the arch structure and changing the relationship between the arch and the roadway. The historic bridge's arch structure would be preserved.

As the project would remove and alter historic features of the bridge, alternatives were considered to avoid adverse effects. As described in greater detail in the historic survey reports prepared in January and March 2012 and discussed in Chapter 2, "Project Alternatives," these included an alternative that evaluated the potential of retrofitting the existing piers, an alternative that utilized a steel supported superstructure in place of pre-cast segmental concrete box sections for the approach viaduct superstructure, and an alternative that retained the shared use path on the west side of the bridge. These alternatives were found not to be viable or feasible. PANYNJ also explored other solutions to address the limitation of the existing navigational clearance of the Bayonne Bridge, including jacking the arch, constructing a lift bridge, building a new bridge or tunnel, replacing the bridge with a ferry service, and developing port facilities at another location. These alternatives were also determined unfeasible, and would also result in an Adverse Effect on the Bayonne Bridge.

The project would result in an Adverse Effect to this historic resource. NYSHPO and NJHPO concurred that the project would have an Adverse Effect in letters dated March 6, 2012 and March 23, 2012 respectively. Measures to mitigate the Adverse Effect have been developed among USCG, NYSHPO, NJHPO, ACHP, PANYNJ, and Consulting Parties, and set forth in the Programmatic Agreement.

To avoid adverse construction related effects on the main arch of the bridge that would be preserved, a Construction Protection Plan would be prepared in consultation with NYSHPO and NJHPO. The commitment to prepare and implement the construction protection plan for the main arch is included as a stipulation of the Programmatic Agreement contained in **Appendix B**.

Historic Resources, Staten Island, NY APE

The project would have no direct effects on historic resources in the Staten Island portion of the APE. The general relationship of the Bayonne Bridge to the surrounding area with its mix of commercial, residential, institutional and industrial buildings would not be altered. The alteration of the height of the roadway and the replacement of the approach structures would not significantly alter the setting or historic character of the historic resources, which are NR eligible for the historic significance and/or architectural design. Therefore the project would not result in an Adverse Effect on the historic resources located in the APE. In a letter dated March 6, 2012, NYSHPO concurred that the possible indirect effects to the historic resources within the APE will not significantly alter the setting or other qualities of the historic resources that make them eligible for SR and NR listing.

Historic Resources, Bayonne, NJ APE

The former John Boyle and Company manufacturing Building at 70-76 Avenue A, which has been identified as a potential local landmark, is in proximity to construction. To avoid adverse construction related effects, this property would be included in the Construction Protection Plan to be prepared in consultation with NJHPO.

There would be no adverse indirect effects to the six potential local landmarks. The general relationship between these resources, their surroundings, and the Bayonne Bridge would remain relatively unchanged. The alterations to the Bayonne Bridge, including replacement of the approach structures and the raising of the height of the roadway, would not significantly alter the setting or historic characteristics of the potential local landmarks.

7-6 MITIGATION

An Adverse Effect finding requires consultation to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties (36 CFR § 800.6). Alternatives considered for the proposed action are described above in Section 7-5, "Environmental Consequences." Mitigation measures for the Bayonne Bridge have been developed through consultation among USCG, NJHPO, NYSHPO, ACHP, PANYNJ, and the project's Section 106 consulting parties, and set forth in the Programmatic Agreement. The Programmatic Agreement in **Appendix B** includes stipulations for mitigation measures.

The project would adversely affect the NR-eligible Bayonne Bridge by removal and replacement of historic features of the bridge. Measures to mitigate this direct Adverse Effect are described in the Programmatic Agreement. They include:

- Design consultation with NYSHPO and NJHPO with respect to development of bridge design documents. The SHPOs review of design documents occurred at 50% and 90% design review phases.
- Construction Protection Plan. PANYNJ will prepare a construction protection plan to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, New Jersey; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. The Construction Protection Plan will be submitted to the SHPOs for review prior to the commencement of construction. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents. USCG will coordinate navigation in the channel of the Kill Van Kull with the USACE.
- Unanticipated Discoveries Plan. PANYNJ will develop an Unanticipated Archaeological Discovery Program, in consultation with the SHPOs and ACHP, for incorporation into the project documents.
- Documentation and Curation. PANYNJ and USCG will locate within their respective collections, to the extent available, original design drawings, photographs, and construction documents relating to the original construction and subsequent improvements to the Bayonne Bridge. To the extent available, these archival materials will be made available to the Newark Historic Preservation Commission, New-York Historical Society, New Jersey Historical Society, the Bayonne Historical Society, New York Public Library, and the Rutgers University Special Collections Library, as originals and/or archival copies. In addition, PANYNJ will coordinate with the New Jersey Division of Archives and Records Management and the New York State Archives and Records Administration to identify needs and requirements for permanent curation and public accessibility. A time lapse video including imagery of the current Bayonne Bridge design, demolition and construction shall be made available for distribution to appropriate repositories. PANYNJ will also develop an educational video about the project for distribution to public television stations in New York and New Jersey. Website application and availability will be applied, as appropriate, to the Bayonne Bridge webpage of the PANYNJ website.

- Historic American Engineering Record (HAER) documentation. Photographic documentation and accompanying narrative shall be prepared to supplement the HAER aerial photography completed in 1987, in consultation with the National Park Service. The HAER documentation will be made available to the United States Library of Congress, the NYSHPO, NJHPO, the New-York Historical Society, the New Jersey Historical Society, the Bayonne Historical Society, the New York Public Library and the Rutgers University Special Collections Library.
- Bayonne Bridge Publication. A publication of the history of the Bayonne Bridge (*Bayonne Bridge: A Landmark by Land, Sea and Air*, Darl Rastorfer, 2007) commissioned by PANYNJ for the 75th anniversary of the bridge will be distributed to the New-York Historical Society, the New Jersey Historical Society, the Bayonne Historical Society, the New York Public Library and the Rutgers University Special Collections Library.
- Lesson Plans. A lesson plan will be produced by PANYNJ in coordination with local Departments of Education and developed by a qualified curriculum developer to satisfy New York and New Jersey state curricula standards for the fourth grade local and state history and/or an aspect of science and/or technology relating to bridge construction and transportation. The lesson plans will be distributed to the Newark Historic Preservation Commission, New-York Historical Society, the New Jersey Historical Society, the Bayonne Historical Society, the New York Public Library and the Rutgers University Special Collections Library, as well as additional parties, as appropriate. Adult education materials will also be developed and distributed.
- Interpretive Exhibits. PANYNJ will develop signage and exhibits that inform the public of the history of the Bayonne Bridge as part of the history of architecture, engineering, navigation and transportation in the port region. The interpretive displays will include plaques and kiosks (the kiosks would be constructed using salvaged elements of the bridge) to be placed in locations as specified in the Programmatic Agreement.
- Re-Dedication Ceremony. A re-dedication ceremony of the Bayonne Bridge will be held upon completion of the project to highlight the bridge's historic architecture and cultural significance.

Chapter 8: Parklands and Recreational Resources

8-1 INTRODUCTION

This chapter describes parks and recreational resources in the study area and evaluates any potential impacts to those resources from the long-term operation of the Raise the Roadway Alternative. Short term impacts from construction of the project are discussed in Chapter 16, “Construction Effects.” Overall, this analysis finds that the project would not result in any significant adverse impacts on parklands and recreational resources.

8-2 METHODOLOGY

The study area for the evaluation of parks and recreational resources is consistent with the social conditions study area, discussed in Chapter 4, “Land Use and Social Conditions.” This study area is generally defined as a ¼-mile perimeter surrounding the limit of the construction work zone. The study area is located within Bayonne, New Jersey and Staten Island, New York. Various sources were used to prepare this chapter, including field surveys; information supplied by Port Authority of New York and New Jersey (PANYNJ); New York City Department of Parks and Recreation (NYCDPR); and City of Bayonne.

8-3 AFFECTED ENVIRONMENT

8-3-1 STATEN ISLAND

Most open space resources in the Staten Island study area are municipal parks under the jurisdiction of New York City Department of Parks and Recreation (NYCDPR). Other open space resources in the study area include private parks, as well as playgrounds on school grounds that are owned by New York City Department of Education (NYCDOE). Parks in the study area are summarized in **Table 8-1**, and **Figure 8-1** shows their locations.

Portions of the grounds of Public School (PS) 21 and PS 22 are open to the public, pursuant to New York City Schoolyards to Playgrounds initiative. These playgrounds are open to the public after school, on weekends, and during school breaks. PS 21’s playground includes a play area, a grass playing field, and a running track. PS 22’s playground includes synthetic playing courts, a synthetic field and a non-regulation running track.

Julius Weissglass Memorial Park is an approximately 6.7-acre private park owned by the West Shore Little League. The park is located on the east side of Lake Avenue, between Walker Street and Dixon Avenue. The park contains 4 baseball diamonds, three of which have lighting for night time play. There is also a miniature baseball

10.15.12

Primary Study Area Boundary (Construction Work Zone)

Secondary Study Area Boundary (1/4-Mile Perimeter)

1 Staten Island Parkland (See Table 8-1)

A Bayonne Parkland (See Table 8-2)

0 2000 FEET
SCALE

Parklands and Recreational Resources Study Area

Figure 8-1

BAYONNE BRIDGE OVER THE KILL VAN KULL

diamond for younger children, a clubhouse structure, and areas for parking and equipment storage.

Table 8-1
Parks and Recreational Resources in the Staten Island Study Area

No.	Name	Agency/Owner	Description
1	PS 21 Margaret Emily-Elm Park	NYCDOE	Playground, grass playing field, and running track open to public after school hours
2	Julius Weissglass Memorial Park	West Shore Little League	6.7-acre private park containing 4 baseball diamonds and clubhouse
3	Egbert Triangle	NYCDPR	0.21-acre fenced in green space with a memorial and flag pole
4	Markham Playground	NYCDPR	2.84-acre park with asphalt playing courts
5	PS 22	NYCDOE	Synthetic playing courts, field, and running track open to public after school hours
6	Graniteville Quarry Park	NYCDPR	4.46-acre natural area
7	Faber Park and Pool	NYCDPR	4.34 acre park with outdoor pool, recreation center, playground, playing courts

Notes: NYCDOE: New York City Department of Education
NYCDPR: New York City Department of Parks and Recreation
Sources: AKRF GIS data, NYCDPR, NYCDOE, West Shore Little League

Egbert Triangle is a small, 0.21-acre, New York City-owned open space bounded by Port Richmond Avenue, Forest Avenue, and Willowbrook Road. The park commemorates Arthur Stanley Egbert (1893-1918), a member of a prominent Staten Island family, who fought and died in World War I. The park is planted with shrubs and encircled by a steel fence. Inside are a flagpole and a large, uncut stone with a plaque dedicated by the American Legion.

Graniteville Quarry Park is a 4.46-acre New York City-owned natural area bound by Forest Avenue to the north and Wilcox Street to the south, between Eunice Avenue and Van Name Place. The park showcases the area’s rock outcrops, and features substantial vegetation and tree coverage.

Markham Playground is a 2.84-acre park located adjacent to the Martin Luther King Junior Expressway, between Forest Avenue and Houston Street. This park, which is adjacent to PS 51, includes numerous amenities, including a baseball field, basketball courts, bocce courts, handball courts, a playground, spray showers, water fountains, a restroom facility, and a concession facility.

Faber Pool and Park is a 4.34-acre New York City-owned park, located along the Kill Van Kull waterfront, on Richmond Terrace between Sharpe Avenue and Faber Street. The park’s 10,640 square foot (sf) outdoor pool is open seasonally from Memorial Day to Labor Day. In addition to an outdoor swimming pool, it contains basketball courts, a playground, and a recreation center, the Faber Park Field House. The field house offers community programming, including a teen room and a computer resource center.

8-3-2 BAYONNE

The City of Bayonne has 22 parks and recreation areas, most of which are under the jurisdiction of the City's Recreation Division. Three of these parks are within the study area as shown in **Figure 8-1** and **Table 8-2**.

Table 8-2
Parks and Recreational Resources in the Bayonne Study Area

No.	Name	Agency/Owner	Description
A	Al Slootsky Playground	City of Bayonne, PANYNJ[1]	0.19-acre park with basketball court, playground, and wading pool.
B	Dennis P. Collins Park	City of Bayonne	20.1-acre waterfront park with playing fields, courts, wading pool, and waterfront walkway.
C	Edward F. Clark Park	City of Bayonne	0.6-acre park with basketball courts and a playground.
D	Ballfieds along West First Street	PANYNJ[2]	Approximately 1–1.5 acres with two ballfields

Notes: [1]The park is operated by the City of Bayonne and the underlying land is the property of PANYNJ.
[2]The ballfields are licensed to the City of Bayonne.
Sources: AKRF GIS data, City of Bayonne.

Al Slootsky Playground is a 0.19-acre park located underneath and adjacent to the Bayonne Bridge, between Juliette Street and West Fourth Street. The park contains playground areas and a spray water play area, directly west of the Bayonne Bridge. There are also swing sets, seating areas, and basketball courts located underneath the Bayonne Bridge.

Dennis P. Collins Park is the largest city-owned park in Bayonne and is located along the Kill Van Kull waterfront, south of West First Street, from near the Bayonne Bridge on the west to Lexington Avenue on the east. The 20.1-acre park includes a playground, bocce court, basketball courts, baseball fields, a spray park, restrooms, a skate park, a dog park, a bike park, a memorial to veterans, and a fishing pier. There is also a waterfront walkway stretching the length of the park, which affords sweeping views of the Kill Van Kull and to Staten Island. Bordering Dennis P. Collins Park are two baseball fields just east of the Bayonne Bridge owned by PANYNJ and licensed to the City of Bayonne for use primarily by the Bayonne Little League.

Edward F. Clark Park is a 0.6-acre park located on the west side of Avenue C between West Eighth and West Ninth Streets. The park contains a playground area and basketball courts.

8-1-1 KILL VAN KULL

The Kill Van Kull is a public waterway that not only provides channel access for commercial vessels, but also provides opportunities for recreational boating and private vessels. The Kill Van Kull connects inland areas such as Newark and Elizabeth, New Jersey to New York Harbor.

8-4 ENVIRONMENTAL CONSEQUENCES

8-4-1 NO BUILD ALTERNATIVE

No major changes to parklands or recreational resources are anticipated in the study area by 2017.

In Staten Island, NYCDPR has plans to upgrade Graniteville Quarry Park in coordination with a new advocacy group for the park that is under development, which will be called Friends of Graniteville Quarry Park. The goal of the upgrades will be to make the park more attractive and add more programming that will showcase the park's geology. In November 2010, New York City Department of City Planning (NYCDCP) and New York City Economic Development Corporation (NYCEDC) released *North Shore 2030* which, among other objectives, recommended the establishment of new open space along the Kill Van Kull waterfront. However, no specific plans have been proposed to date.

In Bayonne, the Hudson River Waterfront Walkway is a planned improvement that would extend from the George Washington Bridge to the Bayonne Bridge. It is intended to provide uninterrupted access to the Hudson River and Upper New York Bay with active and passive recreational opportunities. As there is an existing waterfront walkway in Dennis P. Collins Park, the planned walkway is not expected to result in any changes within the ¼-mile study area.

The No Build Alternative would maintain the existing walkway along the southbound lanes of the Bayonne Bridge. Cyclists would continue to walk their bikes across the bridge since the pathway would not be widened. The pathway across the bridge would continue to serve as a recreational amenity for Staten Island and Bayonne residents.

8-4-2 RAISE THE ROADWAY ALTERNATIVE

The project is not expected to result in any adverse impacts on parklands and recreational resources, due to the following factors:

- No Staten Island parklands or recreational resources are located within the 40-foot construction work zone, and therefore, none would be directly affected by the project.
- Two parks in Bayonne would be affected by the construction of the project. These two recreational areas—comprising the Al Slootsky Playground and two ball fields adjacent to Dennis P. Collins Park—are being operated by the City of Bayonne on PANYNJ property under a license agreement, as indicated in **Table 8-2** above. While the project would result in the closure of Al Slootsky Playground during construction, PANYNJ is working with the City of Bayonne to relocate these facilities for the duration of the temporary closure, and potentially on a permanent basis. In addition, the project would require the closure of the two ball fields and PANYNJ is coordinating with the City of Bayonne regarding this displacement.

  Although the terms of the license agreements allow PANYNJ to reclaim these properties at its discretion, PANYNJ is working with the City of Bayonne to provide funds for additional recreational improvements in Bayonne to address displacement of the existing recreational uses. These funds would likely be used for the upgrade of the North Street Playground (including the addition of handicapped-accessible features), the construction of a smaller playground following construction on PANYNJ property in the area of the present Al Slootsky Playground (including restoration of handicapped-accessible features), and for little league equipment.

- The project would improve certain conditions in adjacent parklands by raising the elevation of the Bayonne Bridge. The increased elevation would improve air, light, and noise conditions and some views that are currently obstructed by the bridge. See Chapter 9, "Visual and Aesthetic Resources," Chapter 11, "Air Quality," and Chapter 13, "Noise," for more information.
- The project would provide for a 12-foot shared use (pedestrian/bicycle) path. The path would be located outside the bridge's eastern arch, providing for views of the New York Harbor. The shared-use path would be an enhanced recreational amenity for both Staten Island and Bayonne residents.
- The project would not affect public access to waterways, including the Kill Van Kull. While the project would allow larger vessels to use the channel, it would result in fewer vessels overall than without the project (see Chapter 6, "Natural Resources"). The future use of larger vessels would not affect the recreational use of the Kill Van Kull, as there is sufficient horizontal clearance in the waterway to accommodate smaller vessels and commercial vessels.

The New Jersey Department of Environmental Protection (NJDEP) implements the Green Acres Program to facilitate a "system of interconnected open spaces, whose protection will preserve and enhance New Jersey's natural environment and its historic, scenic, and recreational resources for public use and enjoyment"[1]. Property that may be subject to Green Acres regulations should be listed in the Recreation and Open Space Inventory (ROSI) and filed by the respective locality.

Of the PANYNJ-owned property located in the construction work zone of the Raise the Roadway Alternative, Al Slootsky Playground—which is licensed to the City of Bayonne by PANYNJ—has been listed by the City of Bayonne on its ROSI since 1980. PANYNJ approached NJDEP and the City of Bayonne to determine the appropriate process for temporary utilization of this property during construction. After careful review, NJDEP confirmed that once PANYNJ, as owner of the property, terminates the license[2] granted to the City of Bayonne, the property in question would no longer be subject to Green Acres program regulations.

8-5 MITIGATION

No mitigation is required since the project would not result in any long-term, adverse impacts on parklands and recreational resources. However, PANYNJ intends to relocate the facilities that would be temporarily closed in Al Slootsky Playground during construction.

[1] http://www.nj.gov/dep/greenacres/

[2] The license contains a 30 day termination clause without cause.

Chapter 9: Visual and Aesthetic Resources

9-1 INTRODUCTION

This chapter describes the potential impacts of the project on the visual character of the study area. It describes the regulatory setting and methodology used to conduct the visual analysis, the affected environment, and the potential environmental impacts for visual and aesthetic resources.

9-2 REGULATORY AND GUIDANCE CONTEXT

In 1987, the Federal Highway Administration (FHWA), jointly with the Federal Transit Administration, established Environmental Impact and Related Procedures (23 CFR § 771) for the evaluation of transportation projects and the compliance of these projects with 23 U.S.C. § 109 (h), which focuses on design criteria relating to social, economic, and environmental effects. FHWA Technical Advisory T6640.8A (1987) identifies visual resources as an item to be included in environmental and Section 4(f) documents. Although the project is not subject to this policy, the FHWA's Visual Impact Assessment for Highway Projects (1981) and FHWA's Environmental Impact Statement Visual Impact Discussion (1990) was used to provide guidance on assessing visual impacts.

Several permits and approvals from the New York Department of Environmental Conservation (DEC) are required for the project. As such, this assessment of visual resources also draws from DEC's recommended procedures in *Assessing and Mitigating Visual Impacts* (2000).

In accordance with these guidelines, the existing visual character and quality of the affected environment, as well as the viewer response to those resources, provide the framework for assessing the change in visual character that would occur as a result of the project. As specified in DEC's guidance, significant impacts may occur if a project may cause a diminishment of the public enjoyment and appreciation of an aesthetic resource or one that impairs the character or quality of such a place.

9-3 METHODOLOGY

The visual analysis study area is defined as the area within visual range of Route 440, located between Bayonne, NJ and Staten Island, NY, and carried by the Bayonne Bridge, as well as for longer distances east and west of the Bayonne Bridge in the waterfront area of the Kill Van Kull and Arthur Kill (see **Figure 9-1**). The potential view shed is shaped by the study area's topography, as well as its built (e.g., structures) and natural (e.g., primarily vegetation) environment.[1] For the most part, the study area of

[1] FHWA's Visual Impact Assessment for Highway Projects (1981) defines a view shed as the surface area visible from a given viewpoint or series of viewpoints; it is also the area from which that viewpoint or series of viewpoints may be seen (see page 26).

Project Site

Study Area Boundary

Photograph Location and View Direction

0 800 2000 FEET

SCALE

Project Location Aerial Map

Figure 9-1

the Bayonne Bridge is similar to the Area of Potential Effect (APE) defined for architectural resources in Chapter 7, “Historic and Cultural Resources” and is generally limited to the residential and industrial inland areas immediately adjacent to the bridge and its north and south approaches. The view shed is more expansive along the Kill Van Kull to account for the many views possible to and from the Bayonne Bridge. Therefore, the study area for the visual analysis consists of three distinct areas.

- **Staten Island portion of the study area**—The study area for the bridge approach in Staten Island is generally bounded by Dixon Avenue to the south, Treadwell Avenue to the east, Lake Avenue to the west, and Richmond Terrace along the waterfront. This portion of the study area includes the waterfront Faber Pool and Park, and Veteran’s Park. Public views to the Bayonne Bridge from Richmond Terrace along the waterfront beyond the delineated study area are generally obscured or entirely obstructed by curves in the road, waterfront structures, and dense vegetation.
- **Bayonne portion of the study area**—The study area for the bridge approach in Bayonne is generally bounded to the north by County Road 703 (North Street), Avenue A to the west, and Trask Avenue to the east. The study area extends along the waterfront from JFK Boulevard to the east end of Mayor Dennis P. Collins Park near Hobart Avenue. Most other public views of the Bayonne Bridge outside the study area are obscured or entirely obstructed by waterfront warehouses and/or other industrial structures and facilities.
- **Expanded view shed to include longer views to and from the Bayonne Bridge**—The expanded view shed considers more distant views to and from the Bayonne Bridge from vantage points that include Arthur Kill Park approximately two miles west on the western waterfront of the Arthur Kill in Elizabethport, NJ. The Bayonne Bridge is visible in eastward views from Arthur Kill Park, located approximately two miles west of the Bayonne Bridge. The Bayonne Bridge is also visible from the approaches and span of the Goethals Bridge, connecting Elizabeth, NJ, to Staten Island, NY, and located approximately three miles southwest of the Bayonne Bridge, due to the Goethals Bridge’s elevation over largely undeveloped areas and industrial waterfront areas containing few buildings. Similarly, extended views from the Bayonne Bridge along the Kill Van Kull, including of Shooters Island, the New Jersey and Staten Island waterfronts, and distant views of the Manhattan skyline to the northeast, are possible due to the structures elevated height.

Visual quality is most frequently the result of the relationship of all the components of a landscape, rather than the presence of a single feature. Therefore, the landscape’s visual features must be objectively identified and their character and quality assessed. In addition, the assessment must identify the importance to people (“viewer groups”), or sensitivity of views, of visual resources in the landscape.

Having established the baseline of existing conditions, proposed changes to the landscape as a result of project improvements are then evaluated for their degree of impact. The degree of impact depends on both the magnitude of change to the visual resource (i.e., visual character and quality) and viewers’ responses to and degree of concern for those changes.

Viewer groups are defined as viewers from Route 440 (e.g., motorists and users of the shared-use path) and viewers of the roadway (e.g., residents, users of recreational resources including parks, boaters, pedestrians and bicyclists on other trails, rail travelers, and motorists on local roadways). Viewers are considered in terms of their sensitivity and view duration, with residents considered among the most sensitive viewers because they may view the proposed visual change from a stationary viewpoint for the most prolonged periods of time. Travelers on the roadways, on the other hand, would be much less sensitive because they may only see the proposed visual change for only a short duration. Also considered in the analysis is the distance of the observer from the visual change; as the distance increases, the ability of the viewer to see the details of an object decreases.

To aid in the determination of visual impacts and improve understanding of the visual character of the project, visualization techniques were employed. Given the visual significance of the Bayonne Bridge and Kill Van Kull, computer-generated photo simulations of the project are included to show the visual changes after project implementation. The locations of the views, significance of view selection, and potential effects of the project are then considered, as they relate to both the visual resources and to the viewer groups. The locations of views depicting existing conditions are shown on **Figure 9-1.**

9-4 AFFECTED ENVIRONMENT

As specified in FHWA's Environmental Impact Statement Visual Impact Discussion (1990), specific visual features create the visual environment of the study area. These include the region's landform or topography that shapes rivers, mountains, and valleys; the vegetation that covers the land surface; the water surfaces that contrast with the land; and the man-made developments that define much of the suburban landscape of the study area.

9-4-1 VISUAL CHARACTER OF ROUTE 440 AND THE BAYONNE BRIDGE

9-4-1-1 ROUTE 440

Route 440 is a heavily travelled New York and New Jersey state highway with a right-of-way generally 200 feet wide that increases at interchanges and the bridge approaches. The New Jersey portion of the highway consists of two segments, one of which links Interstate 287 and the New Jersey Turnpike (Interstate 95), and the other, which is a four-lane highway running from U.S. Route 1 & 9 to the Bayonne Bridge. The two segments are connected by New York State Route 440, which runs along the western edge of Staten Island. Although there are landscaped/vegetative buffers along some portions of the highway, the road is primarily flanked by suburban and industrial development along the shores of the Kill Van Kull and Arthur Kill.

9-4-1-2 BAYONNE BRIDGE

The Bayonne Bridge opened in 1931 and crosses the Kill Van Kull, one of the busiest shipping channels in the United States, linking Bayonne, NJ, and Staten Island, NY. The roadway of the bridge is approximately 40 feet wide with four lanes of traffic plus a 6-foot-wide pedestrian walkway on the western side of the bridge. From Bayonne, NJ, the bridge crosses the Kill Van Kull at a 58 degree westward angle in order to line up with the existing road networks on each side of the bridge. The arch is approximately 84 feet wide. The bottom of the bridge road deck is 151 feet above the Kill Van Kull at Mean High Water (MHW). The bridge's existing Staten Island, NY, approach is approximately 2,014 feet long and the Bayonne, NJ, approach is approximately 2,995 feet long. The approaches are approximately 50 feet wide. The height of the approaches increases gradually to the height of the bridge's road deck spanning the Kull Van Kull with a maximum grade of 4.0 percent.

The bridge is composed of 40 connected steel trusses, constructed of carbon, silicon, and manganese steel, that were fabricated off-site and lifted into place. The trusses are approximately 67 feet deep at the base of the arch, and gradually taper toward midspan to a depth of approximately 37 feet. The apex of the arch is approximately 266 feet above the Kill Van Kull, and the roadway is suspended by wire rope hangers 115 feet below the apex of the arch. The abutments for the bridge, supported on four columns, were constructed on solid rock that continues along the Bayonne Peninsula and Staten Island to the New Jersey Palisades.

The roadway and top of the arch are lit at night. Standard cobra head lamp posts are located along the roadway, and the shape of the steel arch is outlined with individual lights.

The elevated character of the bridge structure, open nature of the Kill Van Kull, and low-lying, relatively flat landscape of both New Jersey and Staten Island, provide motorists with extensive views of the Kill Van Kull, Newark Bay, Upper New York Bay, and the Arthur Kill. Views to and from the Bayonne Bridge are described below.

9-4-2 VISUAL CHARACTER OF THE STUDY AREA AND EXTENDED VIEW SHED

9-4-2-1 LANDFORM

The study area is characterized by low-lying coastal land with industrial development along the waterfront areas and residential development further inland. The Kill Van Kull, an approximately three-mile long and 1,000-foot wide tidal strait between Bayonne, NJ, and Staten Island, NY, connecting Newark Bay with Upper New York Bay, is the most prominent visual and aesthetic resource in the study area.

In the Bayonne study area, the Mayor Dennis P. Collins Park to the east of the bridge stretches along the coastline for approximately three-quarters of a mile. The area north of the park is predominantly suburban development with industrial development extending to the east from the shore of the Kill Van Kull north to Route 440. The Staten Island portion of the study area is also dominated by industrial development along the waterfront and suburban development further inland to the south.

The general flat nature of the topography limits the areas from where the bridge can be seen from street-level in the residential areas of both the Bayonne and Staten Island portions of the study area due to building heights. The bridge is primarily visible from open areas such as parks and school athletic fields. The bridge approaches, as they rise from street level to meet the bridge abutments, are generally visible from the immediately adjacent east-west streets.

In the expanded view shed portion of the study area, Shooters Island, a 43-acre uninhabited island located approximately one-third of a mile west of the study area in the Kill Van Kull, is visible from the Bayonne Bridge. Shooters Island is a bird sanctuary and is not open to the public.

9-4-2-2 VEGETATION

Vegetation in the Bayonne and Staten Island portions of the study area is generally limited to lawns, trees, and variety of shrubs and plants located throughout the residential areas and along streets in both Bayonne and Staten Island (see View 1 of **Figure 9-2**). Other vegetation can be found in the waterfront parks, including Faber Park and the Mayor Dennis P. Collins Park, as well as Veteran's Park in the Staten Island study area (see View 2 of **Figure 9-2**).

9-4-2-3 WATER

Kill Van Kull

The Kill Van Kull is the most prominent visual and aesthetic resource in the study area. Its wide expanse in east-west directions permits distant views in these directions and north into Newark Bay (see View 3 of **Figure 9-3**). Kill Van Kull provides access to the Howland Hook Marine Terminal and the Port Newark-Elizabeth Marine Terminal, respectively the 22nd busiest port in the world and the third largest shipping container port in the United States. The wide expanse of the Kill Van Kull and the relatively flat topography in the area allow for expansive views of northern Staten Island from Bayonne and southern Bayonne, and eastern Elizabethport, NJ, from Staten Island.

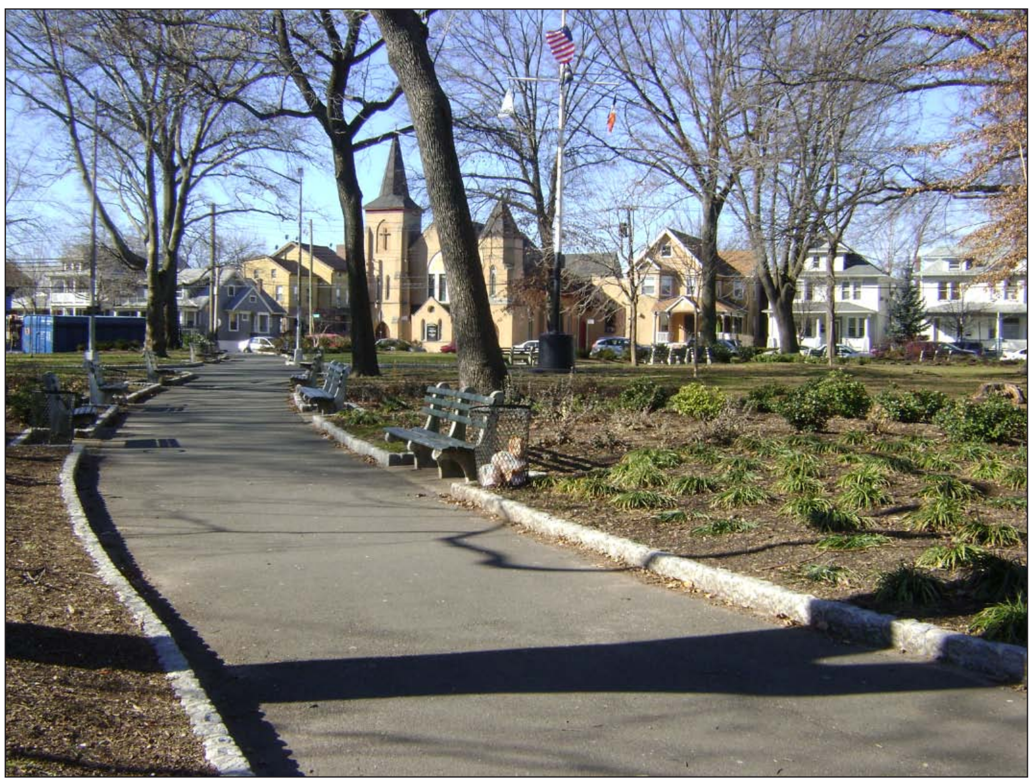
9-4-2-4 MANMADE DEVELOPMENT AND LAND USE

Land uses in the study area vary but generally reflect the suburban and industrial character of the neighborhoods along the Kill Van Kull in Bayonne and Staten Island. The predominant land use in the study area is residential, which is mostly zoned low- to medium-density. Other land uses include industrial, open space, vacant, and public facilities.

Bayonne, NJ

In Bayonne, houses are typically two- to three-story single-family residences located on narrow, deep lots with landscaped areas and surface parking (see View 4 of **Figure 9-3**). Some low-rise, multi-tenant, and office buildings are located throughout the area. The neighborhood east and south of Route 440 is organized in a fairly regular grid pattern. The primary north-south streets in the study area include Avenue A, JFK Boulevard, and the portions of Trask Avenue south of West Third Street. The primary east-west streets in the study area include West First Street and the portions of West Second Street from Humphrey Avenue to Avenue A. Views of the bridge ramp also figure prominently from the sidestreets along Avenue A between West Third Street to Bayview Court. The area west of Avenue A is dominated by industrial and vacant land. The area along the shoreline of the Kill Van Kull east of the bridge and south of First Street is occupied by the Mayor Dennis P. Collins Park, a public park with playgrounds, athletic fields, and walking and biking paths. The residential buildings located along JFK Boulevard are separated from the bridge ramp by shallow vegetated buffer areas.

Tree-lined street in the Staten Island study area. View west from Ann Street and Heberton Avenue **1**



Northwest view of Veteran's Park **2**

View west of the Kill Van Kull and Shooter's Island from the Bayonne Bridge **3**

View north along Kennedy Boulevard Boulevard from Juliette Street **4**

Visual Photographs
Figure 9-3

Staten Island, NY

The houses located in the Staten Island study area are also predominantly two- to three-story single-family residences located on narrow, deep lots with landscaped areas and street parking (see view 5 of **Figure 9-4**). Some low-rise multi-tenant buildings are located in the area. The primary north-south streets in the study area include Granite Avenue and Morningstar Road located west of the Bayonne Bridge, and John Street, Trantor Place, and Nicholas Avenue located east of the bridge. The primary east-west streets include Richmond Terrace along the waterfront and Grove Avenue. Views towards the bridge ramp from adjacent residential streets are generally limited to residences along John Street and Morningstar Road. The study area is predominantly residential, with some low-rise industrial, manufacturing, and transportation buildings located along the north side of Richmond Terrace, and commercial buildings located along Port Richmond Avenue (see View 6 of **Figure 9-4**). The Port Richmond High School is located east of the bridge ramp between Nicholas Avenue and John Street. Two parks, including Faber Pool and Park and Veteran's Park, are also located in the study area.

Further west in the expanded view shed area of the Bayonne Bridge is the Goethals Bridge. The Goethals Bridge spans the Arthur Kill, an approximately 10-mile long tidal strait between Elizabeth, NJ, and Staten Island, NY. For motorists crossing the Goethals Bridge, the Bayonne Bridge is visible and vice versa, given both bridges' elevated height over the surrounding low-lying landscape.

9-4-3 VISUAL QUALITY

In general, the waterfront along the Kill Van Kull in the Bayonne study area has a high visual quality because it is a designated park (Mayor Dennis P. Collins Park), which permits expansive views of the waterfront and the bridge (see View 7 of **Figure 9-5**). The surrounding residential area to the north is a visually cohesive neighborhood of two- to three-story suburban residential development. Similarly, the residential areas located in the study area in Staten Island are visually cohesive suburban developments consisting of two- to three-story residences. In general, low-rise industrial and manufacturing areas located along the north side of Richmond Terrace generally obstruct views of the water and bridge from residential areas to the south. However, the open spaces in the Staten Island study area that provide expansive sky views, waterfront views, and views of the bridge include Faber Pool and Park, Veteran's Park, and the athletic fields of Port Richmond High School.

9-4-4 VIEWS AND VIEWER GROUPS

9-4-4-1 ROUTE 440 MOTORISTS AND PEDESTRIANS

Route 440 motorists, consisting of approximately 92,000 daily travelers, are the largest number of viewers. However, they comprise the least sensitive group because the maximum 45 mph speed limit precludes fixed views of their surroundings. Therefore, the viewer sensitivity of this group is low.

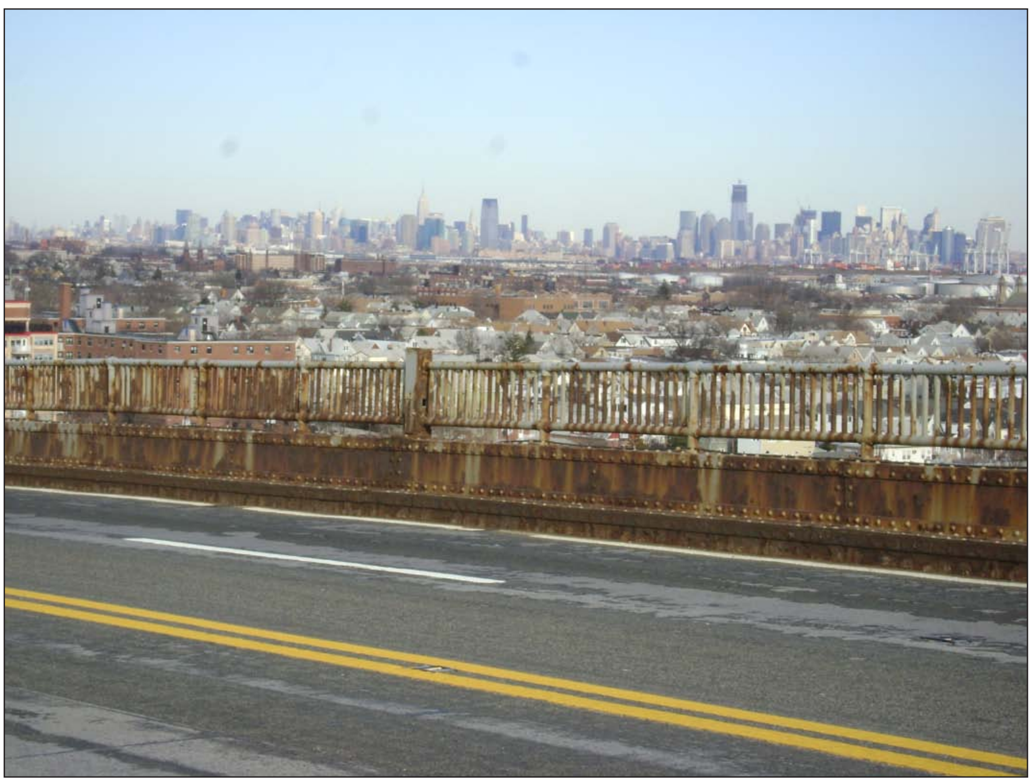
In general, views from the bridge approaches to the surrounding neighborhoods are possible along the elevated portions of the bridge ramps, but are precluded by dense vegetation at the ground level.

View north along Nicholas Avenue from Charles Avenue **5**

View northwest of Bayonne Bridge from Richmond Terrace and Maple Avenue **6**

Visual Photographs
Figure 9-4

View southwest of the Bayonne Bridge from Mayor Dennis P. Collins Park **7**



View northeast towards Manhattan from the Bayonne Bridge **8**

Visual Photographs
Figure 9-5

The Bayonne Bridge provides panoramic views in the expanded view shed of both shorelines and of the east and west expanses along the Kill Van Kull. Looking northeast from the bridge, motorists have distant views of part of the Manhattan skyline, approximately 10 miles away, and residential areas in Bayonne (see View 8 of **Figure 9-5**). Looking west from the bridge, motorists have views of Shooters Island and the industrial areas of Elizabeth, NJ (see Views 9 and 10 of **Figure 9-6**). For pedestrians crossing the path along the west side of the bridge, unobstructed views of the west expanses of the Kill Van Kull, the industrial areas of Elizabeth, NJ, and Shooters Island are possible. However, views northeast towards the Manhattan skyline are somewhat obstructed by the bridge itself.

9-4-4-2 BOATERS

Both commercial and recreational navigation transit the Kill Van Kull. Navigation viewer sensitivity is considered higher than that for motorists due to the longer views and extended viewing time for boaters on the Kill Van Kull.

9-4-4-3 VIEWERS IN BAYONNE, NEW JERSEY

Local Motorists

Motorists on local roads with unobstructed views of the Bayonne Bridge, primarily those traveling along JFK Boulevard, West First Street, and portions of West Third and West Second streets in the study area, are typically traveling at speeds ranging from 25 to 40 mph, and have passing views of the highway and bridge. Although views of the bridge ramps looking east from Avenue A are unobstructed, motorists are typically travelling at a speed of 20 to 25 mph (see View 11 of **Figure 9-7**). Due to the transient nature of views, viewer sensitivity is considered low.

Bicyclists and Pedestrians

Viewers in this group include those out for recreational purposes, and therefore would be more sensitive to their surroundings with moderate viewer sensitivity. There are no biking or hiking trails in the study area; however, West First Street along the edge of Mayor Dennis P. Collins Park provides recreational bicyclists and pedestrians with expansive views of the Kill Van Kull and the bridge.

Park Users

Parks and recreation areas are generally recognized as sensitive locations, though sensitivity depends on the viewer’s activities and view duration. Users of Mayor Dennis P. Collins Park south of West First Street have expansive views of the Kill Van Kull and the Bayonne Bridge for nearly one mile along the coastline, from approximately Hobart Avenue to JFK Boulevard (see view 12 of **Figure 9-7**). These users would have increased sensitivity as views can be stationary.

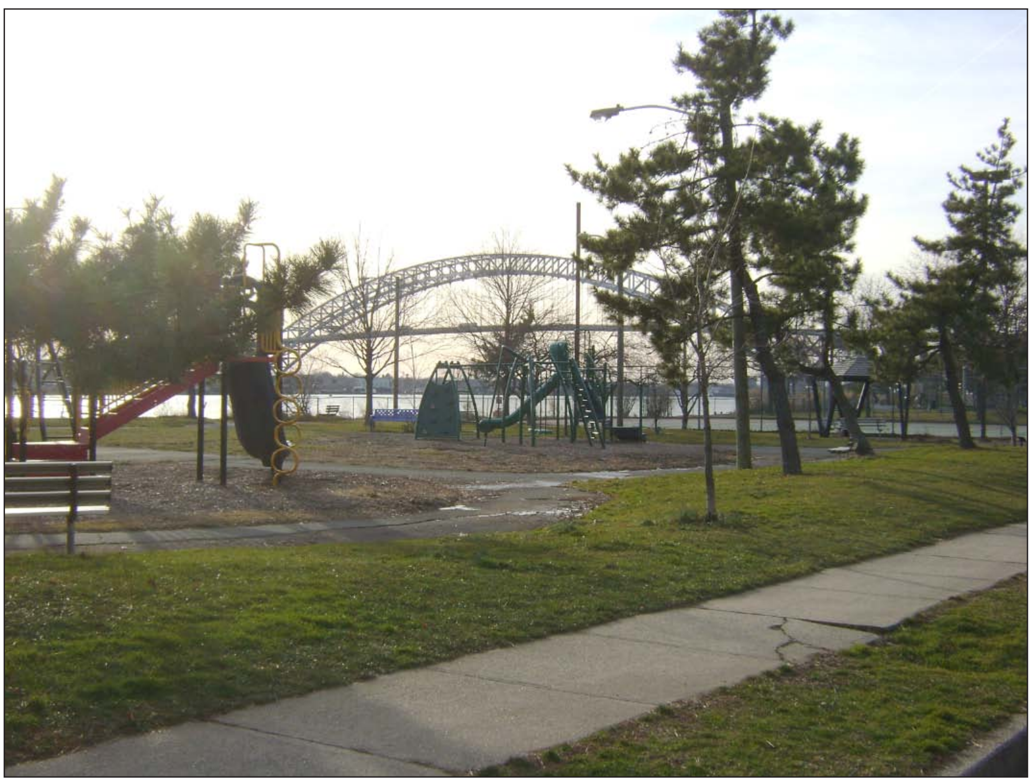
Residents

Residents have high viewer sensitivity due to prolonged stationary views. In general, views of the bridge and bridge approaches are limited to the areas immediately adjacent to the bridge located within the study area boundary. Due to the orientation of the east-west streets, the bridge is not visible from any portion of the residential area south of Route 440 and east of Trask Avenue, with the exception of West First Street.

View northwest from the Bridge towards Shooter's Island, Elizabeth, New Jersey, and the Palisades in the distance **9**

View of the industrial waterfront of Elizabeth, New Jersey **10**

View east of bridge approach from Avenue A and West 4th Street **11**



View southwest of Bayonne Bridge from Mayor Dennis P. Collins Park **12**

Views south toward the bridge are limited to residents along JFK Boulevard (see View 13 of **Figure 9-8**). Due to the slight westward angle of JFK Boulevard, residents located at the southern end of the street are located directly under the bridge ramp (see View 14 of **Figure 9-8**).

Residents with east views of the bridge piers and ramp approaches include those along Avenue A from West Third Street to Bayview Court (see View 15 of **Figure 9-9**). Residents with west views of the bridge ramps include those along West Second and Third streets west of Trask Avenue (see View 16 of **Figure 9-9**).

9-4-4-4 VIEWERS IN STATEN ISLAND

Local Motorists

Views of Route 440 and the bridge approaches from local roads in the Staten Island study area are generally obstructed by buildings and vegetation. Motorists on local roads with unobstructed views of the bridge include those traveling along Richmond Terrace between Simonson Avenue and Port Richmond Avenue (see Views 17 and 18 of **Figure 9-10**). Other views of the bridge from streets in the study area include Granite Avenue north of Walker Street and Nicholas Avenue north of Hatfield Place. Since motorists are typically travelling at speeds ranging from 25 to 40 mph and have only passing views of the bridge, viewer sensitivity is rated low.

Bicyclists and Pedestrians

Although the street has sidewalks, due to the industrial character of the buildings north of Richmond Terrace along the Kill Van Kull, the street is not conducive to recreational walking or cycling. Views of the bridge and waterfront are also generally obstructed by buildings and vegetation (see View 19 of **Figure 9-11**). From the locations where the bridge is visible, views are longer in duration than for those of motorists, but they are also transitory. As such, viewer sensitivity is moderate.

Park Users

Distant views of the bridge are possible from Veteran's Park located in the study area (see View 20 of **Figure 9-11**). Additionally, users of Faber Pool and Park have expansive views of the Bayonne Bridge and bridge ramps (see View 21 of **Figure 9-12**). These users would have increased sensitivity as views can be stationary.

Students

Port Richmond High School is located between John Street and Nicholas Avenue in the study area. There are unobstructed views of the bridge from its athletic fields (see View 22 of **Figure 9-12**).

Residents

In general, views of the bridge from the single and multi-family residences located along the south side of Richmond Terrace west of Route 440 are generally obscured by vegetation and buildings. Limited views of the bridge are possible through waterfront development and may be visible from the upper floor of residences in these locations (see View 18 of **Figure 9-10** and View 19 of **Figure 9-11**). The bridge is minimally visible from the low-rise, mixed-use, commercial and residential buildings located at the

View south along Kennedy Boulevard from West 3rd Street **13**

View west of bridge approach from corner of West 1st Street and Kennedy Boulevard **14**

View west of bridge approach from Avenue A and West 3rd Street **15**

View west of bridge approach from Trask Avenue and West 2nd Street **16**

Visual Photographs
Figure 9-9

View northwest of bridge arch from Richmond Terrace and Port Richmond Avenue **17**

View northeast from Richmond Terrace and Wright Avenue **18**

Visual Photographs
Figure 9-10

View northeast from Richmond Terrace and Lake Avenue **19**

View west of Bayonne Bridge from northeast corner of Veteran's Park **20**

View northwest of Bayonne Bridge from Faber Pool and Park **21**

View northwest from Nicholas Avenue and Charles Street **22**

Visual Photographs
Figure 9-12

junction of Richmond Terrace and Port Richmond Avenue (see View 17 of **Figure 9-10**). Due to the curvature of the road and development along the waterfront, the bridge is not visible to residents along Richmond Terrace until Sharpe Avenue, and views still remain occasionally obstructed by waterfront development (see View 23 of **Figure 9-13**). Residents along Morningstar Road and John Street have views of the bridge to the north (see Views 24 of **Figure 9-13** and 25 of **Figure 9-14**). Residents along the east side of Nicholas Avenue across the street from the Port Richmond High School athletic fields also have expansive views of the bridge (see View 26 of **Figure 9-14**). Residents located along on Bennett Street on the north side of Veteran's Park also have views to the west of the bridge (see View 20 of **Figure 9-11**).

Residents along Morningstar Road have unobstructed views west of the bridge piers and ramp approaches located directly behind them. Additionally, residents along Eaton Place and Newark Avenue have unobstructed views of the bridge piers and ramp approaches directly in front of them. Residents along John Street north of the railroad tracks also have unobstructed views of the bridge piers and ramp approaches located directly behind them.

9-5 ENVIRONMENTAL CONSEQUENCES

9-5-1 NO BUILD ALTERNATIVE

The No Build Alternative would involve the continued operation of the existing four-lane Bayonne Bridge. Under the No Build Alternative, there would be no significant changes to visual quality or views associated with the project. As described in Chapter 4, "Land Use and Social Conditions," other projects may be developed in the study area that may result in additional locations where Bayonne residents would have views of the Bayonne Bridge, including the two residential projects proposed on JFK Boulevard.

9-5-2 RAISE THE ROADWAY ALTERNATIVE

9-5-2-1 CHANGES TO VISUAL CHARACTER

The project would raise the roadway of the Bayonne Bridge within the existing arch. This would require demolition of the bridge's existing road deck, construction of a new road deck at a higher elevation, and alteration of the existing bridge span over the Kill Van Kull, thereby increasing the height of the bridge's north and south approaches.

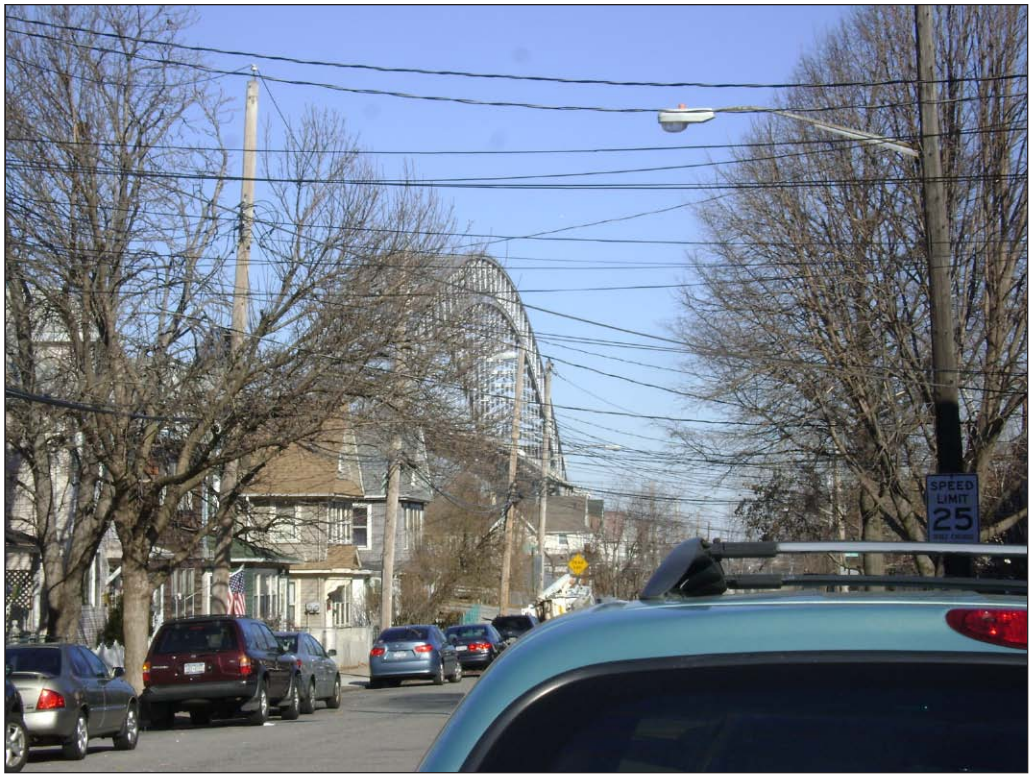
The project would raise the bridge so that the vertical clearance above MHW is increased from 151 to a minimum of 215 feet (see **Figure 9-15**). This change would raise the roadbed from 115 feet to 50 feet below the apex of the arch. The width of the roadway would also increase from 40 to 67.5 feet to include a shared 12-foot-wide walkway and bike path on the east side of the bridge.

The project would also involve raising the bridge's approach roadways, which would be set on new, taller piers. The piers on both the Bayonne and Staten Island sides would range between 25 and 60 feet taller than the existing piers. The spacing of the piers would also be greater than that of the existing piers, increasing in distance from approximately 50 feet to 150 feet and approximately 130 feet to 250 feet, which would require fewer piers to be constructed. The bridge's approach roadways would also be

View northwest from Richmond Terrace between Nicholas Avenue and John Street **23**

View north of bridge arch from Morningstar Road and Walker Street **24**

Visual Photographs
Figure 9-13



View north from John Street and Charles Avenue **25**

View northwest from Nicholas and Charles Avenues **26**

Visual Photographs
Figure 9-14

Existing Bridge

Proposed Bridge

Visual Photographs
Figure 9-15

widened from the existing 50 feet wide (including a 6-foot-wide walkway) to 90 feet wide (including a 12-foot-wide shared-use path).

9-5-2-2 ASSESSMENT OF IMPACTS

Route 440 motorists

From the perspective of the motorist approaching the bridge, the top of the bridge arch would appear lower as the elevated road bed would be located closer to the apex of the arch (see **Figure 9-16**). However, adequate horizontal and vertical clearances and sightlines would be maintained. Similarly, pedestrians crossing the bridge would also see a slightly shallower arch due to the elevated height of the walkway. These changes would not significantly alter the view for pedestrians or motorists, as motorists are typically traveling at high speeds. Additionally, to the benefit of pedestrians, the relocation of the walkway and bike path from the west to the east side of the bridge would allow uninterrupted northeast views towards the Manhattan skyline.

Motorists and pedestrians would continue to have panoramic views of both shorelines and of the east and west expanses along the Kill Van Kull with the raised roadway, as well as distant views of the Manhattan skyline. Therefore, raising the roadway would not have an adverse visual impact on motorist and pedestrian views from the bridge.

Boaters

From the perspective of commercial and recreational boaters, because the overall design of the bridge would remain the same with the exception of the increased height of the roadway, the project would not significantly alter the visual character or quality of views of the bridge or the Kill Van Kull from any vantage point. Therefore, there would be no adverse visual impacts on this viewer group.

9-5-2-3 VIEWERS IN BAYONNE, NJ

Local Motorists

The change in the bridge's appearance due to the elevated roadway would be only slightly discernible to motorists on local roads with views of the bridge primarily from JFK Boulevard and West First Street, given that they are travelling at speeds of 25 to 40 mph. Therefore, there would be no adverse visual impacts on this viewer group.

Bicyclists and Pedestrians

The change in the bridge's appearance would be more discernible to recreational bicyclists and pedestrians than motorists because they have longer view durations. However, the elevated roadway would not significantly alter the visual character and quality of views of the bridge. Therefore, there would be no adverse visual impacts on this viewer group.

Park Users

Users of Mayor Dennis P. Collins Park located in the Bayonne study area are considered a sensitive user group. The visual simulation on **Figure 9-17** is shown from the park and demonstrates what the elevated roadway would look like from the perspective of this viewer group. Views would still consist of the bridge and ramp

Existing Condition

Proposed Condition

Visual Simulation of Elevated Roadway
from Bridge Ramp
Figure 9-16

Existing Condition

Proposed Condition

Visual Simulation of the Raised Roadway from the
Mayor Dennis P. Collins Park, Bayonne New Jersey

Figure 9-17

approaches, as well as expansive views of the Kill Van Kull. While the change in the bridge's appearance would be perceptible to park users, the overall change in the visual character and quality of the bridge would not be significant. Therefore, there would be no adverse visual impacts on this viewer group.

Residents

Due to the orientation of streets in the Bayonne study area, visibility of the bridge is limited to residences along JFK Boulevard. Similar to the park uses, the elevated roadway would be discernible to residents along this street. However, because the overall design of the bridge would remain the same with the exception of the increased height of the roadway, the change in the visual character and quality of the bridge would not be significant. Therefore, there would be no adverse visual impacts on residents along this street.

The increased height of the piers and ramp approaches would be most visible to the immediately adjacent residents along Avenue A and JFK Boulevard. The impact of the increased height of the piers would be greatest for residents located along JFK Boulevard between West First and West Second streets due to their close proximity to the piers. As shown in the visual simulation on **Figure 9-18**, the approximately 50-foot taller piers and ramp approach would create a greater separation between the residences and the bridge ramp, which would open up sky views for these residents. Similarly, the ramp approach as viewed from West Third Street (see View 15 of **Figure 9-9**) would be elevated by approximately 45 feet, which would most likely open up sky views for residents along both sides of the ramp approach. For residents further north in the vicinity of West Fourth Street, the additional 30-foot height of the piers and ramp approach may slightly diminish open sky views but would not obstruct views of any significant visual and aesthetic resources (see View 11 of **Figure 9-7**).

Residents on nearby streets who currently have no view of the ramp approaches may have a view of the new, elevated ramp approaches. However, the elevated ramp approaches would not obstruct views of visual and aesthetic resources in the study area, such as the Kill Van Kull, parks or green space, or the Bayonne Bridge. Therefore, there would be no significant adverse visual impacts on this residential viewer group.

9-5-2-4 VIEWERS IN STATEN ISLAND

Local Motorists

The change in the bridge's appearance due to the elevated roadway would be only slightly discernible to motorists travelling at speeds of 25 to 40 mph. Places from which the bridge will be visible include Richmond Terrace, portions of Morningstar Road and John Street, areas around Veteran's Park, Faber Pool and Park, and the athletic fields of Port Richmond High School. Therefore, there would be no adverse visual impacts on this viewer group.

Bicyclists and Pedestrians

The change in the bridge's appearance would be more discernible to recreational bicyclists and pedestrians from the few locations where the bridge is visible in the Staten Island study area, as noted above. However, the elevated roadway would not

Existing Condition

Proposed Condition

Visual Simulation of the Elevated Roadway and New Piers at the Corner of West 1st Street and Kennedy Boulevard

Figure 9-18

significantly alter the visual character and quality of views of the bridge or other visual and aesthetic resources in the area. Therefore, there would be no adverse visual impacts on this viewer group.

Park Users

Users of Veteran's Park would have limited views of the bridge along Bennett Street, as shown in the visual simulation on **Figure 9-19**. Users of Faber Pool and Park would have clear and expansive views of the elevated roadway and ramp approaches, and the change in the bridge's appearance would be most perceptible to these park users. However, as shown in the visual simulation on **Figure 9-20**, the overall change in the visual character and quality of the bridge would not be significant. Therefore, there would be no adverse visual impacts on this viewer group.

Students

The change in the bridge and bridge ramp appearance would be most perceptible to students and visitors to the Port Richmond High School athletic fields. However, the overall change in visual character and quality of views of the bridge would not be significant. Additionally, views to other visual and aesthetic resources in the area would not be obstructed. Therefore, there would be no adverse visual impacts on this viewer group.

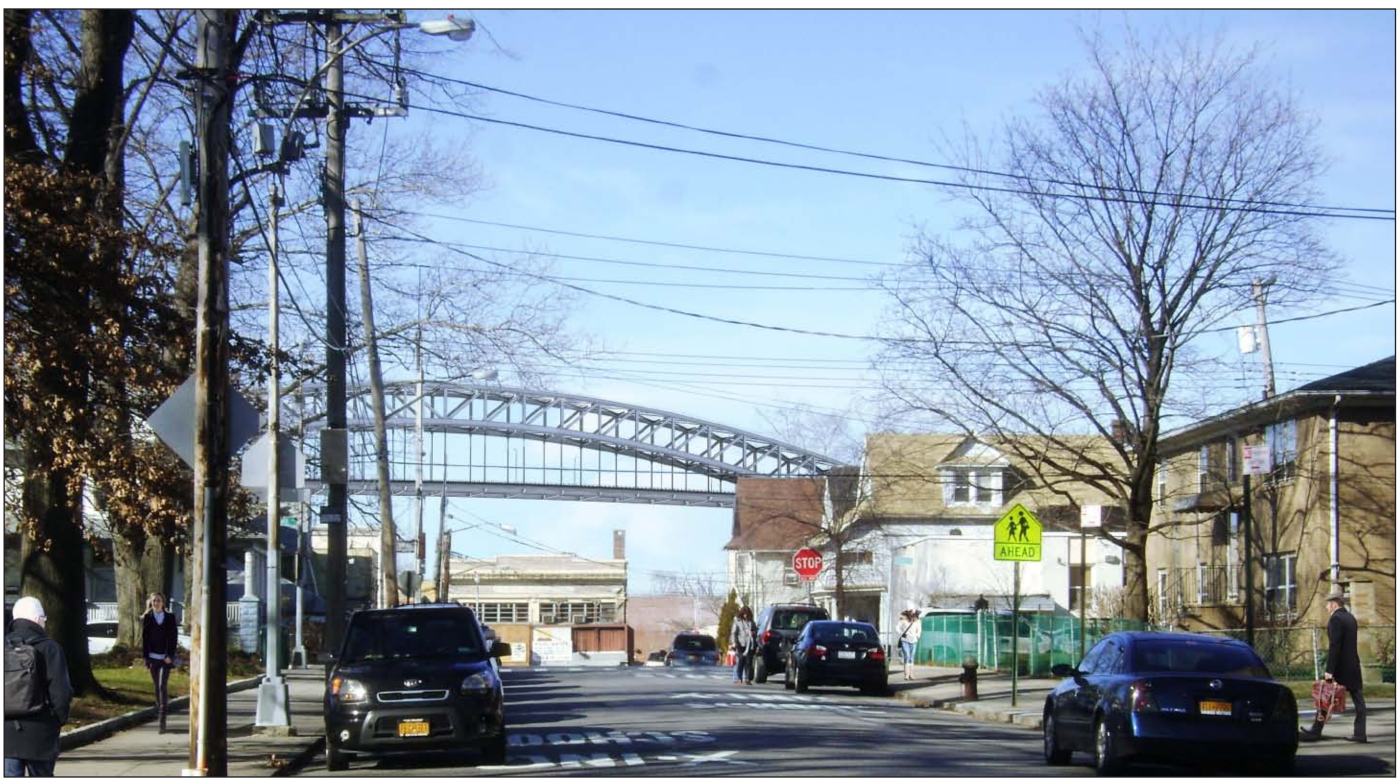
Residents

The change in the bridge's appearance from the single and multi-family residences located along the south side of Richmond Terrace east and west of Route 440 would be only slightly discernible, as views of the bridge are generally obstructed by waterfront development and vegetation. Views north of the bridge from Morningstar Road and John Street are also generally limited. Therefore, the change in the bridge's appearance would have no adverse visual impacts on these residents.

As shown in the visual simulation on **Figure 9-21**, residences along the west side of the athletic fields of Port Richmond High School would have clear views of the change in the bridge's appearance, as would the residences along Bennett Street north of Veteran's Park. However, the overall change in the visual character and quality of the bridge would not be significant from these distant views. Therefore, there would be no adverse visual impacts on these residents.

The increased height of the piers and ramp approach would be most visible to residents along Morningstar Road, Eaton Place, and Newark Avenue. As with the Bayonne study area, the taller piers and elevated ramp approach would be approximately 50 feet taller than the existing piers and ramp approach. For residents along Eaton Place and Newark Avenue with views of the ramp approach in front of their properties, the existing piers and ramp approach range from approximately 40 to 100 feet in height and sit level with or slightly above the roofs of the residences along Eaton Place and somewhat higher above the residences on Newark Avenue. For residents along Eaton Place, the 50-foot taller piers and ramp approach would allow for greater views underneath the structure to adjacent residences along Morningstar Road, currently largely obstructed by the existing height of the approach roadway. For residents on Newark Avenue, the elevated height of the piers and ramp approach would allow for more expanded sky

Existing Condition



Proposed Condition

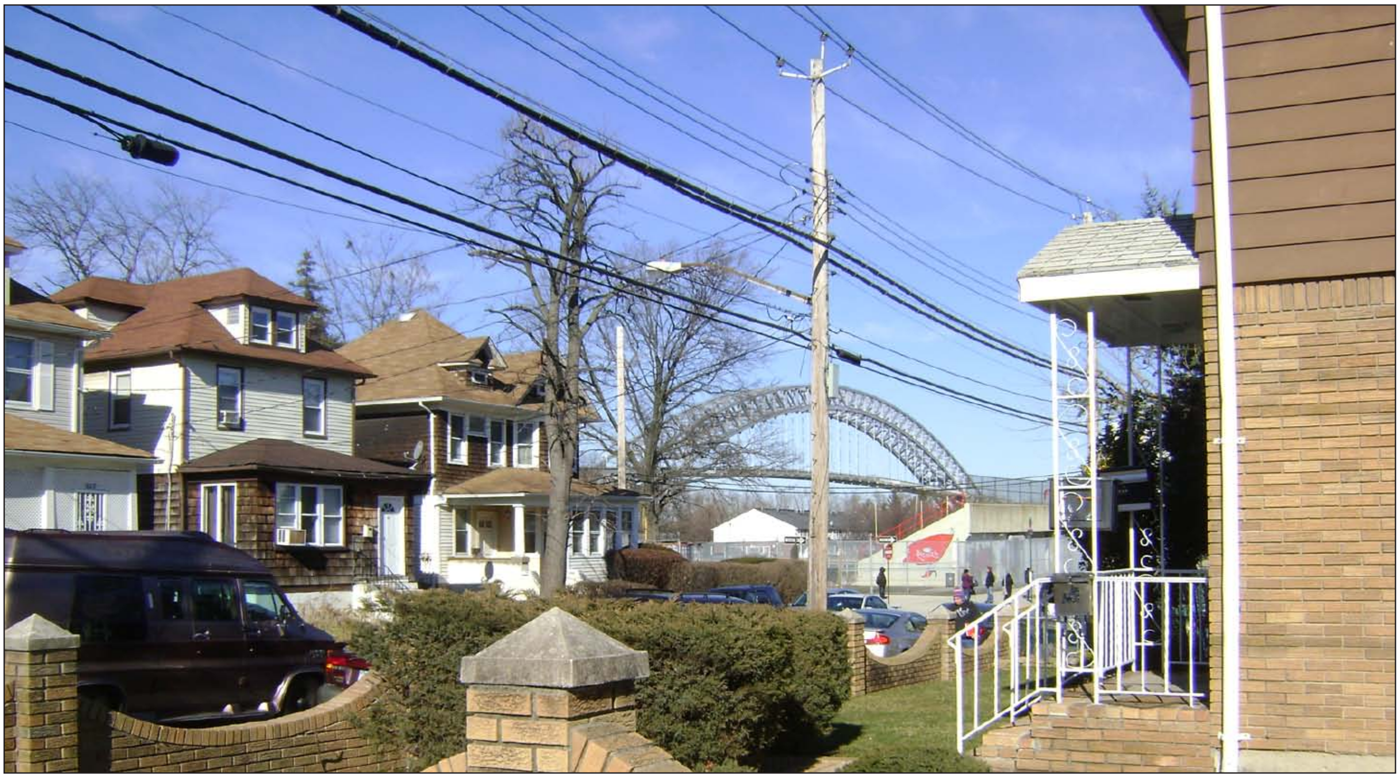
Visual Simulation of the Elevated Roadway
from Veteran's Park
Figure 9-19

Existing Condition

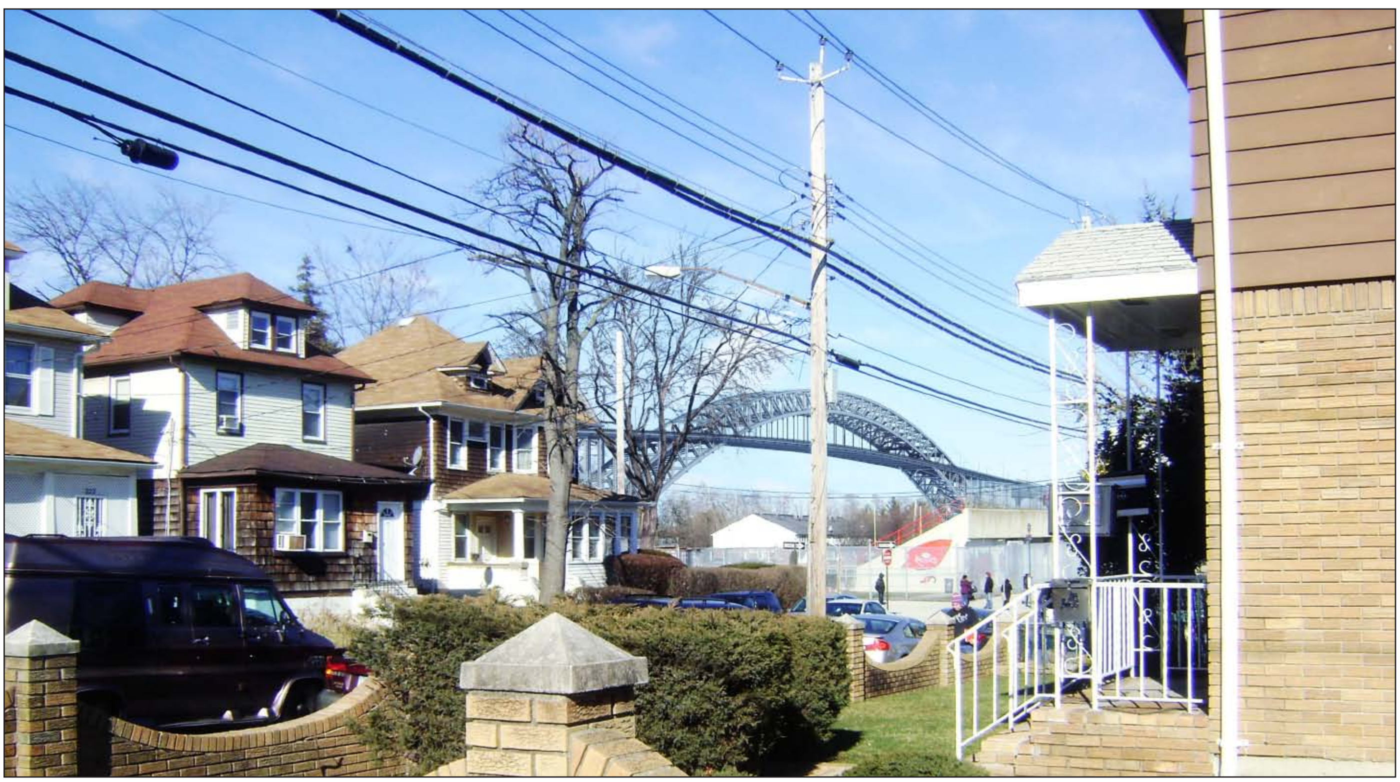
Proposed Condition

Visual Simulation of the Elevated Roadway from Faber Pool and Park

Figure 9-20



Existing Condition



Proposed Condition

Visual Simulation of the Elevated Roadway
from the Corner of Nicholas and Charles Avenues

Figure 9-21

views. For residents along Morningstar Road, with views of the piers and ramp approach from the back of their house, the existing piers and ramp approach also range from approximately 40 to 100 feet in height and sit level with or slightly above the roofs of the residences. Also for these residents, the approximately 50-foot taller piers and ramp approach would allow greater views underneath the structure to residences along Newark Avenue and Eaton Place, as well as expanded sky views. The bridge approaches would not obstruct views to visual and aesthetic resources. Therefore, there would be no adverse visual impacts on this residential viewer group.

As in the Bayonne study area, residents on nearby streets who currently have no view of the ramp approaches may have a view of the new, elevated ramp approaches. However, the elevated ramp approaches would not obstruct views of visual and aesthetic resources in the study area for these residents, such as the Kill Van Kull, parks or green space, or the Bayonne Bridge. Therefore, there would be no significant adverse visual impacts on these residents.

9-5-2-5 EXPANDED VIEW SHED TO AND FROM THE BAYONNE BRIDGE

The elevated height of the bridge roadway and ramp approaches would be slightly discernible to users of Arthur Kill Park, approximately two miles west on the western waterfront of the Arthur Kill in Elizabethport, NJ, and to motorists crossing the Goethals Bridge, approximately three miles southwest of the Bayonne Bridge. However, given the significant distance of these user groups’ views of the Bayonne Bridge, in addition to the short duration of views for motorists crossing the Goethals Bridge, the change in the bridge’s appearance would not have an adverse impact on the visual character and quality of views of the bridge and surrounding Kill Van Kull and Arthur Kull. Therefore, there would be no adverse visual impacts on these viewer groups.

9-6 MITIGATION

The project would not result in any significant adverse impacts to visual and aesthetic resources. Therefore, mitigation measures are not necessary.

Chapter 10: Transportation

10-1 INTRODUCTION

This chapter describes the study of the long-term operational effects on vehicular traffic, pedestrian and bicyclist access, and marine transport. The methodology utilized to collect and analyze data and the criteria for discerning adverse impacts and affected environments are discussed. With the proposed project, no changes to bridge connections to the roadway system and no capacity reduction would occur. The content within this chapter demonstrates that there would be no anticipated adverse operational impacts on vehicular, marine, pedestrian, or cyclist transportation within the project area. Short-term traffic effects during construction are discussed in Chapter 16, "Construction Effects". The complete Traffic Analysis is included in Appendix C.

10-2 METHODOLOGY

10-2-1 TRAFFIC DATA COLLECTION

The software package Synchro 7 was used to perform the operational analysis of all intersections. This methodology produces level of service (LOS) based on the industry standard *Highway Capacity Manual 2000*[1] *(HCM)* methodology. The Highway Capacity Software (HCS 2000), which also supports HCM methodology, was used for the operational analysis of highway ramps and roadway segments. The following methodology was utilized to compile the information for analysis.

10-2-2 AUTOMATIC TRAFFIC RECORDERS

Automatic Traffic Recorders (ATRs) were installed at 34 key locations to assess local roadway traffic volumes (see **Figures 10-1 and 10-2**). ATR locations were chosen based on a review of the proposed detour plans where traffic would be diverted during construction. Eighteen locations in Bayonne and sixteen locations in Staten Island were monitored for continuous 24 hour vehicle traffic counts. The ATRs remained in place for one week, from November 13-19, 2011 in Bayonne, and November 29-December 5, 2011 in Staten Island. Throughout the week, a 30-minute calibration count during the AM (6 AM to 9 AM) and PM (4 PM to 6 PM) peak periods was conducted at each ATR location. Observed traffic counts were consistent with data collected in October 2010 at the same locations. **Table 10-1** lists the ATR identification numbers and their corresponding locations.

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[1] *Highway Capacity Manual*. Transportation Research Board, Washington, D.C., 2000.

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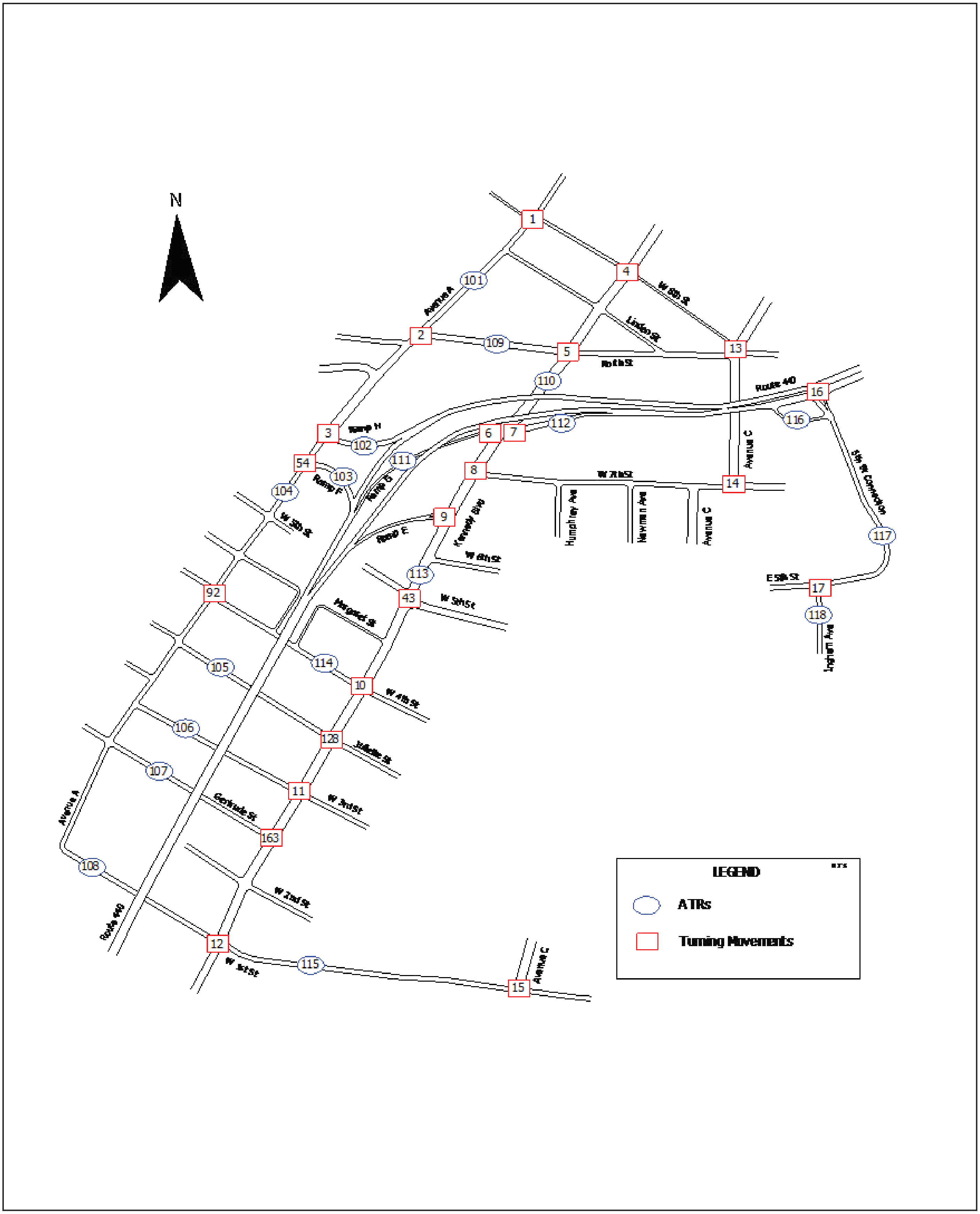
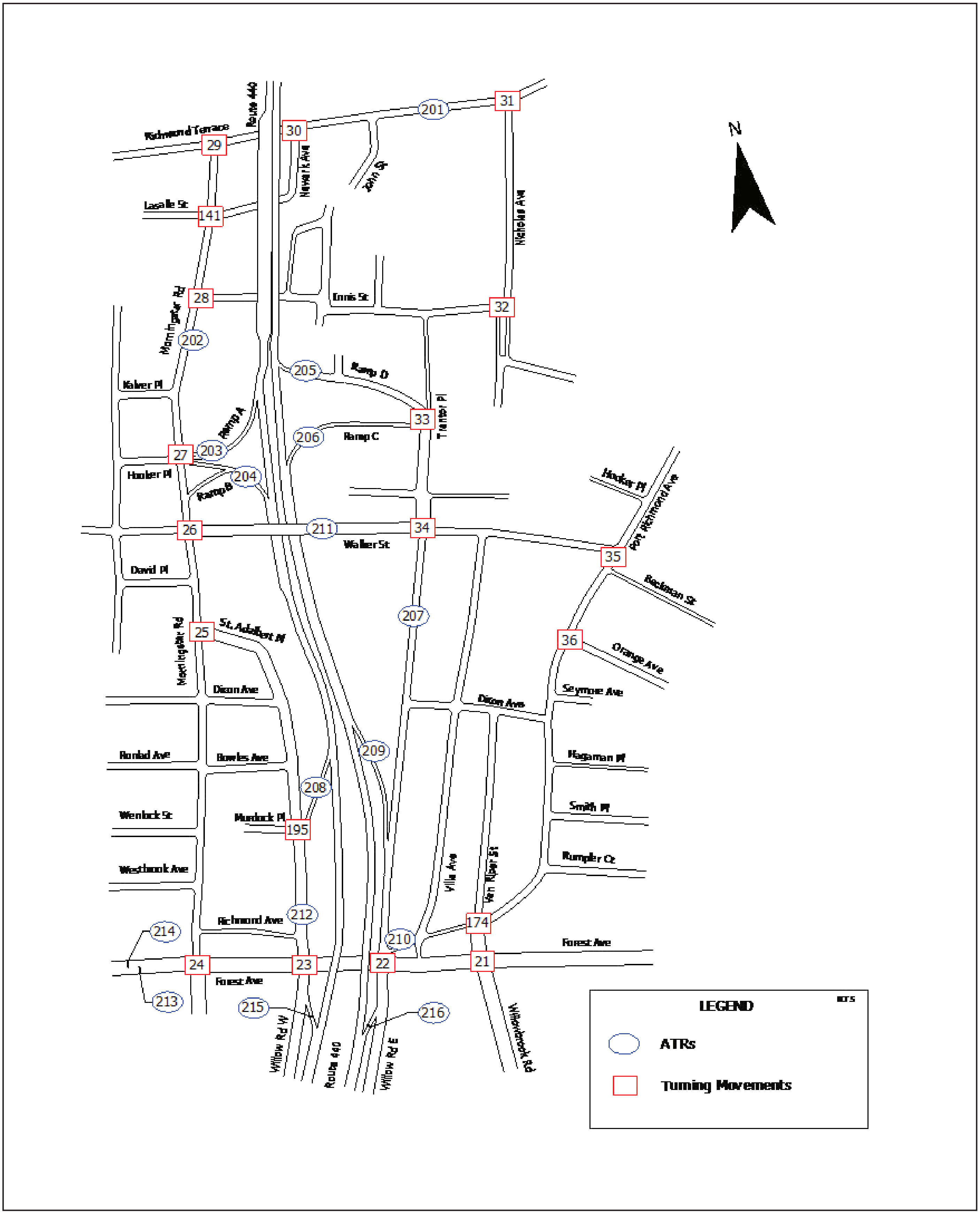


Traffic Count Locations in Bayonne
Figure 10-1



Traffic Count Locations
in Staten Island
Figure 10-2

Table 10-1
ATR Locations

Bayonne, NJ		Staten Island, NY	
ID No.	**Location**	**ID No.**	**Location**
101	Avenue A, North of North Street	201	Richmond Terrace, West of Nicholas Avenue
102	Ramp H (Off-ramp from Route 440 to Avenue A)	202	Morningstar Road, South of Innis Street
103	Ramp F (On-ramp to Route 440 from Avenue A)	203	Ramp A (from Southbound Route 440 to Morningstar Road)
104	Avenue A, North of W. 5th Street	204	Ramp B (from Morningstar Road to Southbound Route 440)
105	Juliette Street, East of Avenue A	205	Ramp D (from Trantor Place to Northbound Route 440)
106	W. 3rd Street, East of Avenue A	206	Ramp C (from Northbound Route 440 to Trantor Place)
107	Gertrude Street, East of Avenue A	207	Trantor Place, South of Walker Street
108	W. 1st Street, East of Avenue A	208	Ramp from Southbound Route 440 to Willow Road West
109	North Street, East of Avenue A	209	Ramp from Trantor Place to NB Route 440 (North of Forest Avenue)
110	JFK Boulevard, South of North Street	210	Right turn from Port Richmond Avenue to Trantor Place
111	Ramp G (from JFK Boulevard to Route 440 South)	211	Walker Street, West of Trantor Place
112	Ramp from JFK Boulevard to Route 440 North	212	Southbound Willow Road, North of Richmond Avenue
113	JFK Boulevard, North of W. 5th Street	213	Eastbound Forest Avenue, West of Morningstar Road
114	W. 4th Street, West of JFK Boulevard	214	Westbound Forest Avenue, West of Morningstar Road
115	W. 1st Street, East of JFK Boulevard	215	Ramp from Willow Road West to SB Route 440
116	Route 440 and 5th Street Connector Jughandle	216	Ramp from NB Route 440 to Willow Road East
117	5th Street Connector, South of Route 440		
118	Ingham Avenue, South of E. 5th Street		

10-2-3 TURNING MOVEMENT COUNTS

Turning movement counts were conducted at 22 intersections in Bayonne and 19 intersections in Staten Island using Miovision Video Collection Units, reflecting key potential impact locations (see **Figures 10-1 and 10-2**). The collected data were then uploaded to the Miovision Server where the recorded traffic was automatically counted by minute and traffic was classified into the following categories: autos, medium trucks, heavy trucks, and buses. In Bayonne, the recordings took place from Tuesday, November 15 to Friday, November 18, 2011. In Staten Island the turning movements were recorded from Tuesday, November 29 to Thursday, December 1, 2011. A separate weekend analysis was not warranted due to the small volume difference. The recordings took place from 6 AM to 7 PM daily, and volumes were calculated for the AM and PM peak periods. **Table 10-2** lists the identification numbers and locations of the video collection units.

Table 10-2
Video Collection Unit Locations

Bayonne, New Jersey		Staten Island, New York	
ID No.	Location	ID No.	Location
1	Avenue A and W. 8th Street	21	Forest Avenue and Willowbrook Road
2	Avenue A and North Street	174	Port Richmond Avenue and Van Riper Street
3	Avenue A and Route 440 SB Exit Ramp H	22	Forest Avenue and Willow Road East
54	Avenue A and Route 440 SB Entrance Ramps F	23	Forest Avenue and Willow Road West
4	JFK Boulevard and W. 8th Street	24	Forest Avenue and Morningstar Road / Richmond Avenue
5	JFK Boulevard and North Street	25	Morningstar Road and St Adalbert Place
6	Ramp G (from JFK Boulevard to Route 440 SB)	26	Morningstar Road and Walker Street
7	JFK Boulevard and ramp to Route 440 NB	27	Morningstar Road and Route 440 SB Ramps A and B
8	JFK Boulevard and W. 7th Street	28	Morningstar Road and Innis Street
9	JFK Boulevard and Ramp E	29	Morningstar Road and Richmond Terrace
10	JFK Boulevard and W. 4th Street	30	Richmond Terrace and Newark Avenue
11	JFK Boulevard and W. 3rd Street	31	Richmond Terrace and Nicholas Avenue
12	JFK Boulevard and W. 1st Street	32	Nicholas Avenue and Innis Street
13	Avenue C and North Street	33	Trantor Place and Route 440 NB Ramps C and D
14	Avenue C and W. 7th Street	34	Trantor Place and Walker Street
15	Avenue C and W. 1st Street	35	Port Richmond Avenue and Walker Street
16	Route 440 and 5th St. Connection	36	Port Richmond Avenue and Orange Avenue
17	Ingham Ave. and E. 5th Street	141	Morningstar Road and Lasalle Street / Newark Avenue
43	JFK Boulevard and W. 5th Street	195	Willow Road West and Off-ramp from Route 440 SB / Murdock Place
92	Avenue A and W. 4th Street		
128	JFK Boulevard and Juliette Street		
163	JFK Boulevard and Gertrude Street		

In addition to using video collection units, some intersections were manually counted for a period of 10 minutes each. Physical inventories of key analysis locations, level of service (LOS) observations, travel time runs, and field observations of timing and phasing plans for the signalized intersections were conducted at the study area intersections. Each of these developments is further described below.

10-2-4 PHYSICAL INVENTORIES

Physical inventories of the analysis locations were performed to document the geometries, existing signage and other pertinent information regarding traffic operations at the analysis locations. These included, but were not limited to, photographs, measuring lane widths, and parking and traffic movement restrictions (e.g., “No Turn on Red” signs). The information gathered from the physical inventories was used to create the Synchro roadway network.

10-2-5 SIGNALIZED INTERSECTION TIMING PLANS

Signal timing data were collected at the signalized intersections. These data included green time, yellow clearance and all red phase times. If the corridor had coordinated signals (i.e., signal progression), field observed offsets were also collected. In addition to collecting the field observed timings, the official timing plans were obtained. The timings were used to assist in the creation of the Synchro model.

10-2-6 LEVEL OF SERVICE OBSERVATIONS

Level of service (LOS) observations were conducted at the analysis locations to assist in the calibration of the Synchro model. These observations included average delays by movement and percentage of traffic arriving on the green signal phase. The observations took place while volume counts were being conducted during the AM and PM peak periods. Multiple observations took place within each hour.

10-2-7 TRAVEL TIME RUNS

Travel time runs were conducted for six corridors within the study area, where traffic would be diverted during construction. Average speeds and delays were computed to assist in the calibration of the Synchro model. **Table 10-3** lists the corridor segments, as well as the start and end streets for each segment.

Table 10-3
Speed Runs

No.	Description	Origin	Destination	City	Run Period	No. of Runs	Run Time
1	Bayonne Bridge	I-278	New Hook Road	Bayonne and Staten Island	AM	5	6:26 AM to 8:53 AM
					PM	6	4:29 PM to 6:16 PM
2	5th Street	JFK Boulevard	Route 440	Bayonne	AM	5	6:35 AM to 8:31 AM
					PM	6	4:38 PM to 6:03 PM
3	1st Street	Avenue A	Lexington Avenue	Bayonne	AM	4	6:40 AM to 8:42 AM
					PM	6	4:43 PM to 5:59 PM
4	Ingham Avenue	East 2nd Street	East 5th Street	Bayonne	AM	6	6:56 AM to 8:16 AM
					PM	6	4:58 PM to 6:13 PM
5	Richmond Terrace	Lake Avenue	Port Richmond Avenue	Staten Island	AM	6	6:10 AM to 8:01 AM
					PM	6	4:09 PM to 6:17 PM
6	Morningstar Road	Richmond Terrace	Forest Avenue	Staten Island	AM	6	6:06 AM to 8:05 AM
					PM	6	4:04 PM to 6:22 PM
Note: All speed runs were conducted on Tuesday, November 29, 2011.							

10-2-8 ADVERSE IMPACT CRITERIA

The traffic impact criteria utilized for this project encompass some of the "best practices" used in similar large traffic studies in the region. These standards have been accepted by transportation agencies in New York City and New Jersey. While these standards reflect analyses conducted on major transportation improvement projects in New York City (such as the Route 9A Reconstruction Project and Second Avenue Subway Project in Manhattan), they do not emulate the *New York City Environmental Quality Review Technical Manual* criteria for significant impacts, which are more focused on development projects than on public sector initiated transportation improvement projects of this magnitude. It is expected that no permanent impact would occur because each roadway feature would either be improved or reconstructed as is. The following conditions define adverse impacts for the purpose of this study:

Adverse Impact for Signalized and Unsignalized Intersections occurs when:

- LOS A, B, C or D under the No Build condition deteriorate to LOS E or F with an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions; and
- LOS E or F under the No Build condition experiences an increase in the average vehicle delay of ≥ 10 seconds under Construction Build conditions.

Adverse Impacts for Analyzed Roadway Segments and Ramp Sections (including main line sections, weaving areas, and ramp junctions) occur when:

- No Build levels of service A, B, and C deteriorate to mid LOS D or worse; and
- No Build levels of service D, E, or F deteriorate by more than one-half of the Construction Build LOS

10-3 AFFECTED ENVIRONMENT

10-3-1 EXISTING CONDITIONS

10-3-1-1 TRAFFIC

Existing peak hour traffic volume maps were developed by balancing traffic volume data gathered from the ATRs and turning movement counts (TMCs) for use in the operational analysis (see **Figures 10-3 and 10-4**). ATR data were used to identify the following AM and PM system peak hours: 7:30 to 8:30 AM and 4:45 to 5:45 PM.

The Bayonne Bridge carries Route 440 across the Kill Van Kull, connecting Staten Island, NY, with Bayonne, NJ. Route 440 has a functional classification of an Urban Principal Arterial Expressway. The roadway across the bridge has four 10-foot-wide lanes with no median barriers or shoulders. The approaches on both the New Jersey and New York sides have a grade of 4 percent.

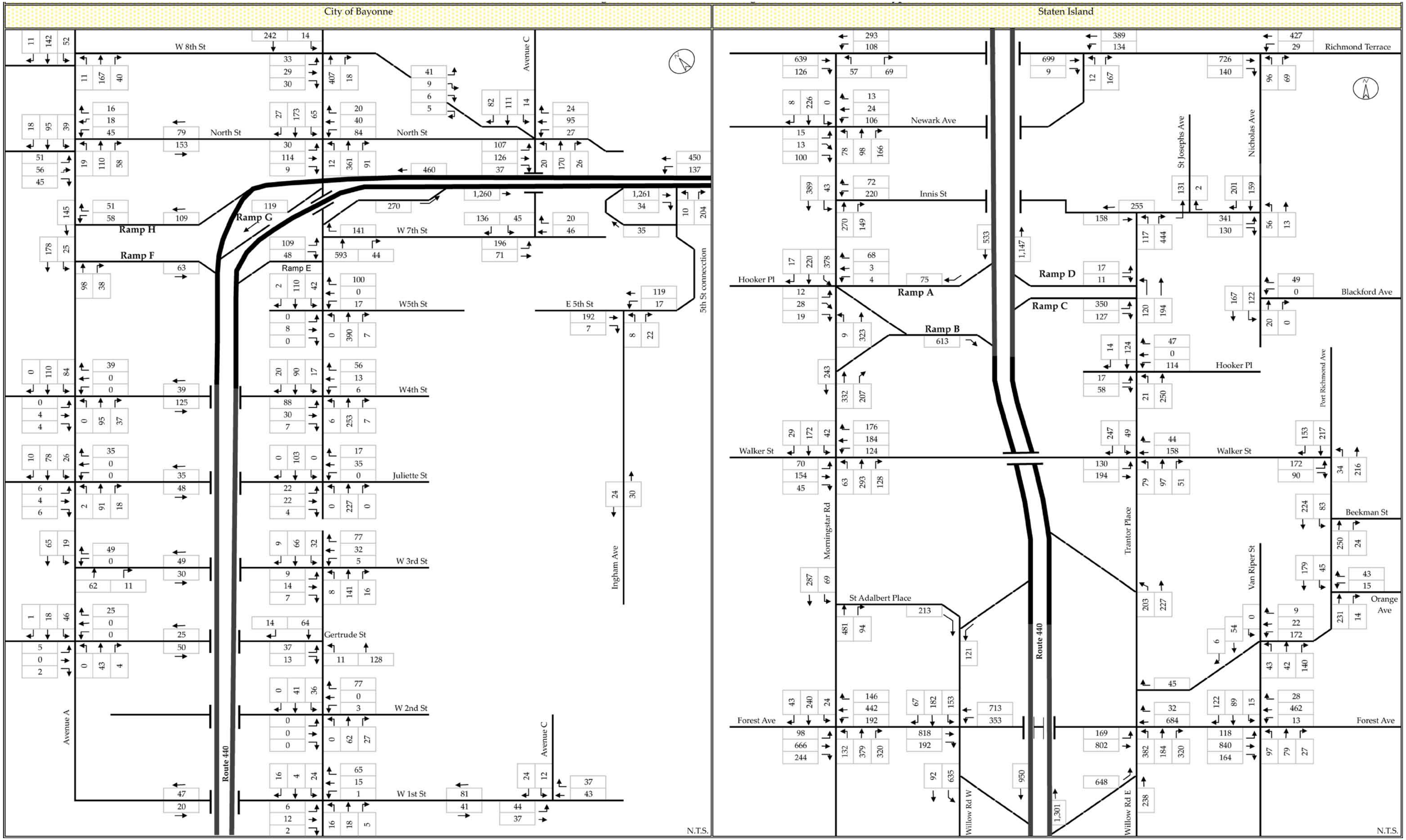
10-3-1-2 PUBLIC TRANSIT

The Metropolitan Transit Authority (MTA) operates a limited-stop bus route (the S89) that crosses the Bayonne Bridge. The route's termini are the Hylan Boulevard bus terminal in Eltingville, Staten Island and the 34th Street Hudson-Bergen Light Rail Station in Bayonne. The S89 bus route is in operation during weekday rush hours only.

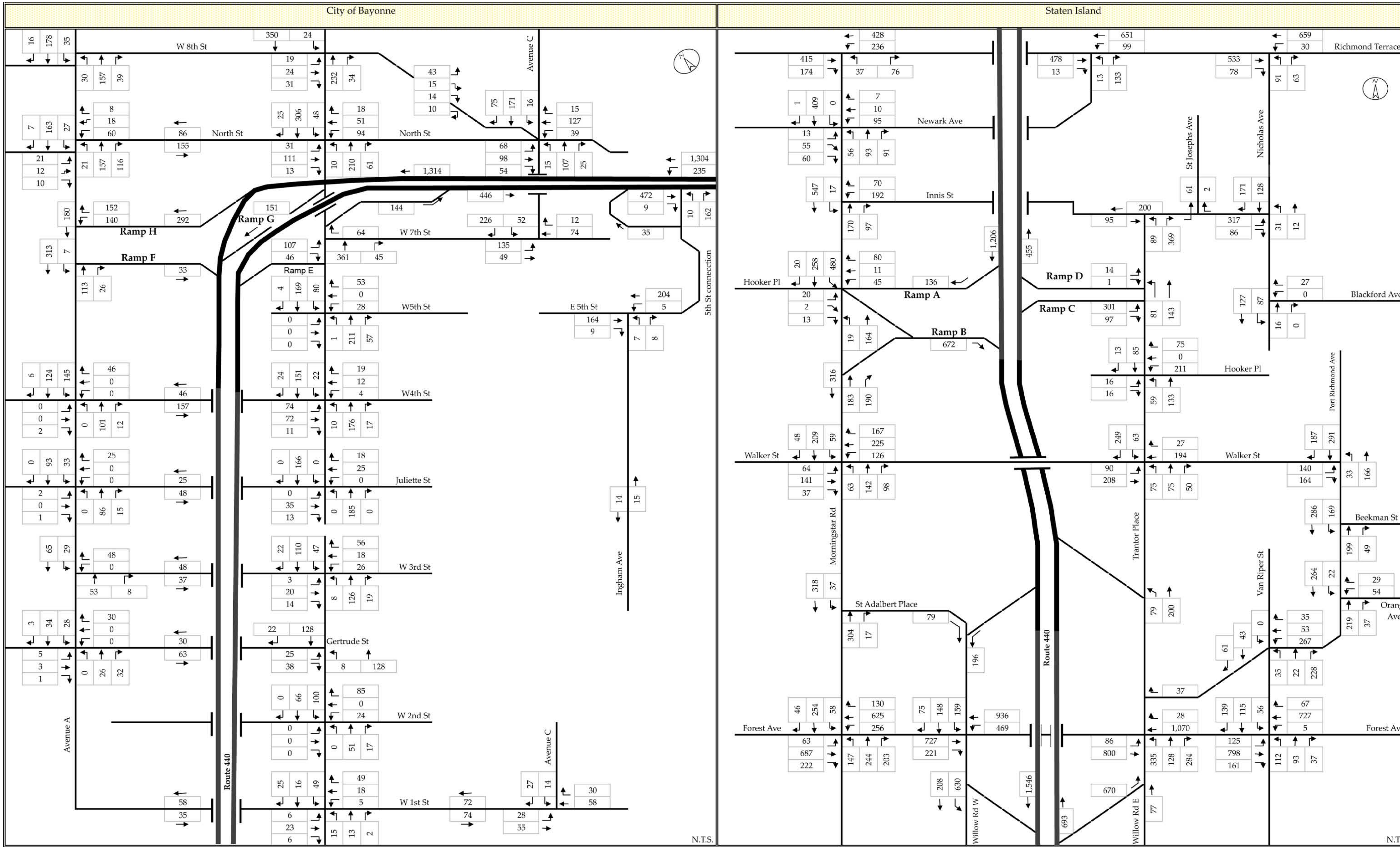
10-3-1-3 MARINE TRANSPORT

The Bayonne Bridge crosses the Kill Van Kull, which is the access channel from New York Harbor to Newark Bay, where the majority of the Port’s container throughput capacity is located. The channel provides access to two of the Port’s facilities—Port Newark-Elizabeth Marine Terminal and Howland Hook Marine Terminal. In 2010, more than 2,085 vessels and more than 4.86 million twenty-foot equivalent units (TEUs) passed beneath the Bayonne Bridge en route to and from these terminals.

The channel also provides access to the Passaic and Hackensack Rivers, flowing through New Jersey to the northern end of Newark Bay. Commercial vessels (e.g.



Existing Conditions Traffic Volumes (All Vehicle Types)
AM Peak Hour
Figure 10-3



Existing Conditions Traffic Volumes (All Vehicle Types)
PM Peak Hour
Figure 10-4

tankers and construction barges) and recreational vessels transit beneath the Bayonne Bridge to these upstream waterways.

10-3-1-4 PEDESTRIANS AND CYCLISTS

The Bayonne Bridge currently accommodates pedestrian and bicycle use via a narrow six-foot wide pedestrian walkway. On a typical weekday, a total of approximately 55 pedestrians and 85 bicyclists make the two-way trip across the bridge. On a typical weekend day, a total of approximately 72 pedestrians and 128 bicyclists cross the bridge.

10-4 ENVIRONMENTAL CONSEQUENCES

10-4-1 NO BUILD ALTERNATIVE

10-4-1-1 TRAFFIC

This scenario represents traffic conditions in 2017 if the proposed reconstruction project is not implemented and traffic volumes increase by a prescribed annual background growth rate. The existing roadway configuration of the bridge would remain; the bridge would continue to carry four 10-foot lanes of traffic with no median barrier and approach grades of 4 percent, along with a 6-foot-wide pedestrian walkway along the west side of the span. No new construction would take place. In Bayonne, the background growth rates were obtained from the NJDOT Access Permit Annual Background Growth Rate Table issued in April 2011, for Principal Arterial Roadways in Hudson County. In Staten Island, the NYCDOT Planning department confirmed the use of the background growth rates published in the CEQR manual updated in May 2010.

Forecasting of the No Build volumes required the separation of the existing traffic volumes into three traffic layers (each one broken down further into autos and heavy vehicles). These traffic layers were: Bayonne local traffic, Staten Island local traffic, and regional by-pass traffic traveling along the bridge (Route 440). Local traffic in each jurisdiction included ramp traffic entering / exiting Route 440. Each layer of traffic was increased independently using the growth rates presented in **Table 10-4**, and then the three layers were added together to calculate the resulting traffic volumes.

Table 10-4
Yearly Background Growth Rates

Jurisdiction	AM Peak Hour	PM Peak Hour
Route 440 New York Bound	2.71 %	1.92 %
Route 440 New Jersey Bound	0.30 %	2.07 %
Bayonne	2%	
Staten Island	1 % from 2011 to 2016, 0.5 % from 2016 to 2017	

Source: PANYNJ, *Bayonne Bridge Travel Demand Forecast*, 2010.
Note: Route 440 background growth was applied at a mid-span point on the Bayonne Bridge.
Background growth in Bayonne and Staten Island applies to all movements within the jurisdiction, including vehicles using the Route 440 ramps.

10-4-1-2 PUBLIC TRANSIT

Under the No Build Alternative, the current limited-stop S89 bus route would remain in service.

10-4-1-3 MARINE TRANSPORT

Table 10-5 illustrates the estimated total number of TEUs delivered to the ports and marine terminals in Newark Bay, west of the Bayonne Bridge in the years 2020 and 2035. The predictions were developed by the U.S. Army Corps of Engineers (USACE) and documented in the Bayonne Bridge Air Draft Analysis. The commerce forecast was derived by applying the growth rates used in the New York and New Jersey Harbor Navigation Study (HNS) and applied to the observed commerce coming through the Port. The values generated by other analytical approaches were within the range of those expected by concurrent commerce forecasts, which are being produced independently and by other methods for other PANYNJ studies (USACE 2009).

Some ocean carriers have chosen to modify larger vessels (between 7,000 and 9,200 TEUs) using the Suez Canal to have dimensions capable of traveling beneath the Bayonne Bridge. Of the approximately 60 weekly shipping services that utilize the Port, two operate these larger vessels at the time of this report. These vessels are not reflected in the 2009 USACE study, since the projected data was based on conditions and information available at that time.

Table 10-5
Vessels and TEUs by Class under the No Build

Vessel Class by TEU Capacity	2020		2035	
	Vessels	**TEUs**	**Vessels**	**TEUs**
Up to 3,999	460	821,570	734	1,365,110
4,000-4,999	2,325	5,312,220	3,106	7,369,550
5,000-5,999	214	598,650	401	1,173,400
6,000-6,999	85	276,160	207	712.740
7,000-7,999	-	-	-	-
8,000-8,999	-	-	-	-
9,000-9,999	-	-	-	-
10,000-11,999	-	-	-	-
12,000 and up	-	-	-	-
Total	3,083	7,008,600	4,447	10,647,800

Note: TEUs Estimated for West of Bayonne Bridge Only
Sources: USACE, PANYNJ

10-4-1-4 PEDESTRIANS AND CYCLISTS

Under the No Build Alternative, the current 6-foot pedestrian walkway would remain.

10-4-2 BUILD ALTERNATIVE

10-4-2-1 TRAFFIC

This alternative represents traffic conditions in 2017 when the project is completed and all planned roadway improvements are implemented. Levels of service under the Build and No Build Alternatives are the same due to the consistent traffic volumes for both scenarios, as well as the fact that the minor design improvements implemented under the Build Alternative do not affect the traffic operational characteristics at the analysis locations (see **Figures 10-5** and **10-6**).

The intersection of Trantor Place with Ramps C and D (which is one of the analysis locations) would be redesigned under the Build Scenario, and all eastbound movements would be consolidated into ramp C's approach. However, the operational analysis of this intersection yields the same results in the Build and the No Build scenarios.

The grades of the approaches would be increased from 4 percent to 4.85 percent on the New Jersey approach and 5 percent on the New York approach. The Bayonne Bridge is categorized as an urban arterial and, as such, AASHTO standards allow for a grade of up to 5 percent. The state of New Jersey also allows for a 5 percent grade on this classification of roadway. The state of New York has a 4 percent grade limitation but allows design exceptions for an additional 1 percent in urban areas. PANYNJ will be requesting a design exception for the grade on the New York side. This issue has been discussed with NYSDOT.

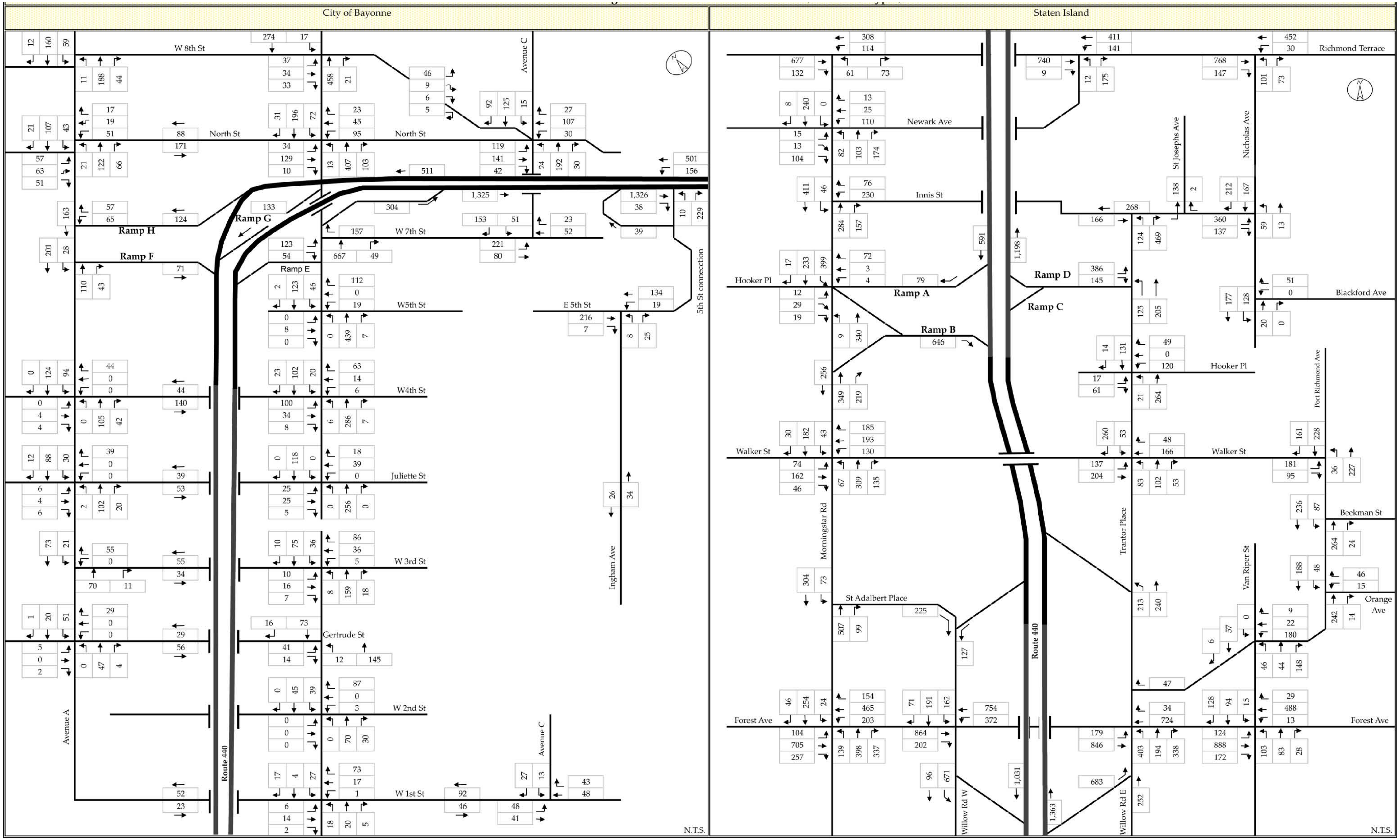
Additionally, the existing toll plaza will be replaced with a gantry structure containing E-Z Pass equipment.

The existing bridge deck, that currently consists of four travel lanes measuring 10 feet each, with no shoulders, no median barrier and a 6-foot-wide pedestrian walkway, would be widened to a proposed configuration of four travel lanes, measuring 12 feet each, two shoulders (2-foot-wide left shoulders and 4-foot, 9-inch-wide right shoulders), a median barrier, and a 12-foot-wide shared-use path. The bridge deck would rise by about 64 feet over the navigational channel, changing the roadway's vertical alignment. An acceleration lane would be built on the western side of southbound Route 440, downstream from Ramp F. The Build Alternative would not result in adverse impacts on long term vehicular traffic.

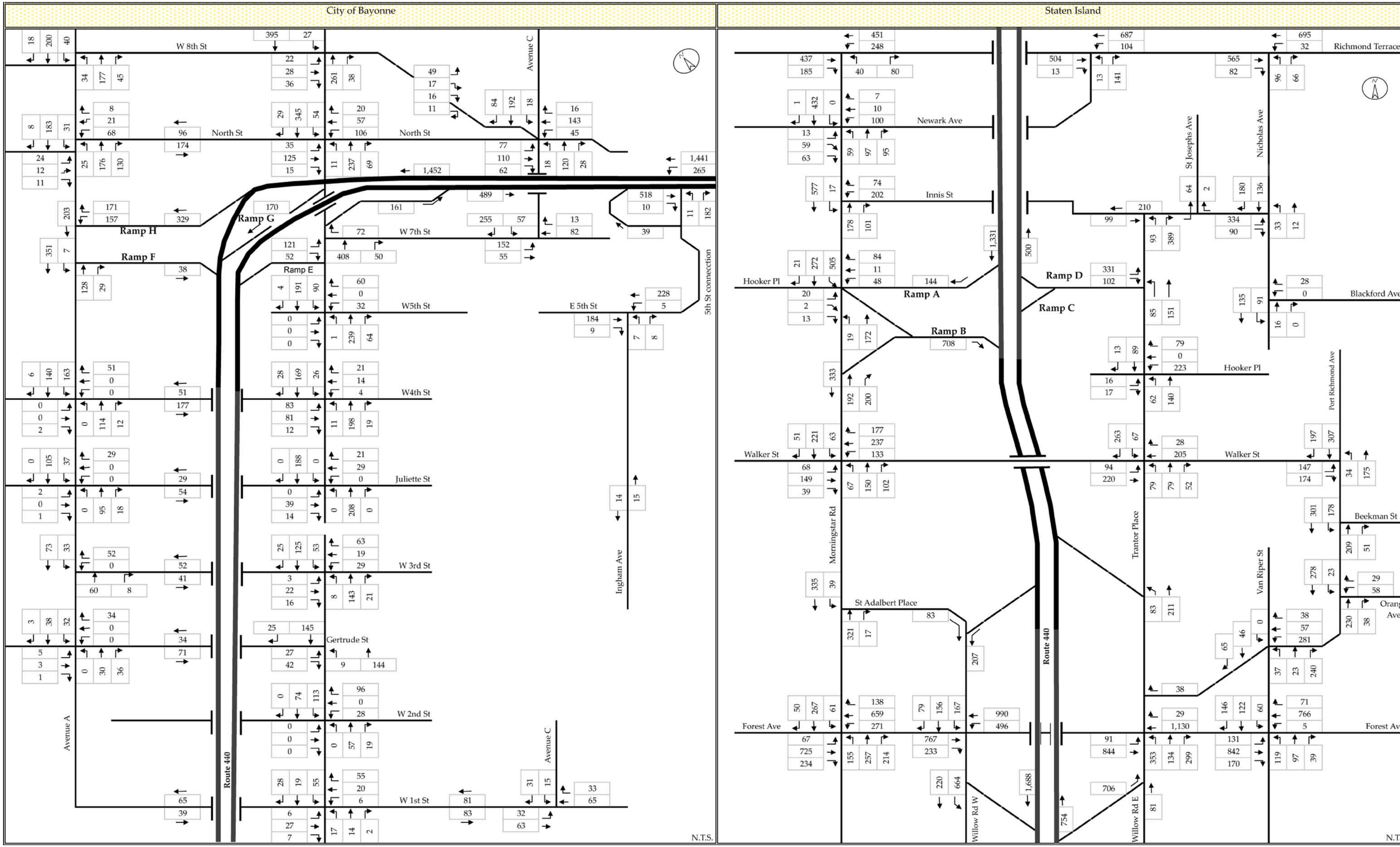
Numerous coordination meetings were conducted with both NJDOT and NYSDOT during the final engineering design phase to discuss operational and construction design considerations. These meetings included review of various program topics including: maintenance of traffic; permanent traffic design; roadway alignment; lighting design; storm water management design; construction staging and access; community outreach; and a formal final engineering design submission review and comment process. This effort resulted in an executed Memorandum of Agreement (MOA) with NJDOT on Design/Construction coordination, which serves as an NJDOT major access permit. The NYSDOT permit will be issued during the construction phase. The New York City Department of Transportation (NYCDOT) was also consulted during the design process. In addition, the engineering design plans have been provided to the Federal Highway Administration (FHWA) for review.

10-4-2-2 PUBLIC TRANSIT

Under the Build Alternative, the limited-stop S89 bus route service would not be affected. The bridge's design would not preclude potential transit service on the bridge in the future.



Build Traffic Volumes (All Vehicle Types)
AM Peak Hour
Figure 10-5



Build Traffic Volumes (All Vehicle Types)
PM Peak Hour
Figure 10-6

10-4-2-3 MARINE TRANSPORT

Table 10-6 forecasts the number of vessels in each class that would be operating with and without the project in the years 2020 and 2035. The data methodology is based on what the New York and New Jersey Harbor Navigation Study (HNS) commonly referred to as "The Overflow Method", which "takes the commerce forecast, the fleet forecast, and the loading pattern, and loads commerce onto the fleet by loading pattern." (USACE 2009). The data illustrate that, with the project, larger ships would likely be utilized, requiring fewer overall ship movements past the Bayonne Bridge. With the project, 240 fewer vessels would be utilized by 2020, resulting in a 7 percent reduction of operating vessels through the Kill Van Kull. By 2035, 828 fewer vessels would be utilized, resulting in an 19 percent reduction of operating vessels in this area. The Build Alternative would not result in adverse impacts on marine transport, and the fewer number of vessels operating through the Kill Van Kull would be a beneficial impact.

Table 10-6
Annual Vessels and TEUs by Class for 2020 and 2035

Vessel Class by TEU Capacity	2020				2035			
	Without Project		With Project		Without Project		With Project	
	Vessels	TEUs	Vessels	TEUs	Vessels	TEUs	Vessels	TEUs
Up to 3,999	460	821,570	400	715,270	734	1,365,110	514	951,180
4,000-4,999	2,325	5,312,220	1,956	4,470,680	3,106	7,369,550	1,961	4,658,140
5,000-5,999	214	598,650	193	539,180	401	1,173,400	300	879,340
6,000-6,999	85	276,160	81	264,720	207	712.740	170	584,130
7,000-7,999	-	-	30	109,720	-	-	68	268,990
8,000-8,999	-	-	85	359,420	-	-	249	1,125,410
9,000-9,999	-	-	30	137,490	-	-	87	432,370
10,000-11,999	-	-	26	134,550	-	-	95	547,290
12,000 and up	-	-	43	277,570	-	-	174	1,200,950
Total	3,083	7,008,600	2,844	7,008,600	4,447	10,647,800	3,629	10,647,800

Note: TEUs Estimated for West of Bayonne Bridge Only
Sources: USACE, PANYNJ

Table 10-7 shows the average vessels per week by class with and without the project. As shown, the project would result in a reduction of 4 vessels per week in 2020 and 17 vessels per week in 2035. In 2020, there would be an average of 6 Post-Panamax vessels per week (larger than 7,000 TEUs) and only 2 ships that would be larger than 10,000 TEUs. In 2035, there would be an average of 13 Post-Panamax vessels per week with five vessels that would be larger than 10,000 TEUs.

The capacity of the landside movement of cargo at the Port of New York and New Jersey is controlled by three factors:

- Berth space;
- Crane capacity; and
- Gate capacity and management.

Table 10-7
Average Vessels by Class per Week for 2020 and 2035

Vessel Class by TEU Capacity	2020			2035		
	Without Project	With Project	Difference	Without Project	With Project	Difference
Up to 3,999	10	8	- 2	15	10	- 5
4,000-4,999	47	39	- 8	62	40	- 22
5,000-5,999	4	4	0	8	6	- 2
6,000-6,999	2	2	0	4	3	- 1
7,000-7,999	0	1	+ 1	0	1	+ 1
8,000-8,999	0	2	+ 2	0	5	+ 5
9,000-9,999	0	1	+ 1	0	2	+ 2
10,000-11,999	0	1	+ 1	0	2	+ 2
12,000 and up	0	1	+ 1	0	3	+ 3
Total	63	59	- 4	89	72	- 17

Note: Vessel Estimated for West of Bayonne Bridge Only
Assumes operations for 50 weeks per year
Numbers are rounded

Berth space is the linear footage of dock area where vessels can pull up and be unloaded. Vessels berth parallel to the docks so that cranes can maneuver their full length. When berth capacity is not available, a vessel must queue in the harbor to await a dockside position. Such a scenario, however, is not desired since it leaves ships and cargo waiting, adding to the transport cost of goods. Once a vessel is berthed, cranes remove cargo containers and place them on dock for transport by truck or rail outside the port. As import cargo is removed, export cargo is loaded. The overall goal of operations is to keep a vessel in berth for the shortest amount of time possible as to maximize its time at sea.

Typically, vessels make multiple port calls. Therefore, the entire load is not left at or picked up from a single location. On average, a vessel unloads and loads approximately 40 percent of its cargo when it calls on the Port of New York and New Jersey. To maintain balance at sea, vessel operators strive to exit the port with as many containers as they enter the port. Using these factors, the average total number of containers that are unloaded and loaded from a 10,000-TEU vessel is 4,235 containers.

Cranes remove cargo from the vessel. PANYNJ uses four cranes simultaneously to unload and load a 5,000-TEU vessel. As the length of vessels increases, the number of cranes that unload and load vessels is increased. However, the number of cranes is limited by space and logistics, and based on these factors, PANYNJ estimates that it would use eight cranes to unload and load a 10,000-TEU, post-Panamax vessel. PANYNJ estimates the productivity of each crane is 28 moves per hour. If eight cranes are employed to unload and load the cargo of a 10,000-TEU vessel, 4,235 containers total, the operation would take approximately 19 hours.

The container terminals can, and regularly do, accommodate more than one 5,000-TEU vessel at a time. Therefore, from a berthing capacity and berth container flow point of view, the simultaneous unloading and loading of two 5000-TEU vessels is the same as the unloading and loading of one 10,000-TEU vessel. In other words, although the capacity of a Post-Panamax vessel may be twice that of an existing vessel, the amount of cargo handled at the Port of New York and New Jersey would not double.

The overland handling of cargo to and from the Port is a key component of the operating logistics. Terminal operators wish to avoid peaks and valleys because they are expensive and can cause congestion. During a peak, they may need extra labor and machines to handle the cargo, which is more costly. During a valley, labor and equipment are not used efficiently, resulting in low productivity. Therefore, the Port operators strive for a continuous flow of containers into and out of the Port.

The flow of export containers into the Port and import containers out of the Port is through the gate. Thus, the efficient and continuous flow of cargo depends on controlling peaks and valleys at the gate. The terminal operator meters and controls its gates in two basic ways—appointment system and gate hours. With appointment system, the port operator assigns an arrival and departure time to truckers and railroads. This allows them to spread operations evenly throughout the day to best manage staff utilization, storage capacity, and equipment use. In some cases, operators may extend gate hours to handle temporary increases in cargo, but extended hours require more staff with a resultant cost. Therefore, the operators usually strive to manage gate logistics through an appointment system.

Putting these factors together—berth operations, crane operations, and gate operations—PANYNJ has prepared sample cargo flows for 5,000-TEU and 10,000-TEU vessels. As previously stated, port facilities quite often handle two 5,000-TEU vessels simultaneously. To show how cargo flow can vary, the scenarios look at the simultaneous arrival of two 5,000-TEU vessels (**Table 10-8**) and at the arrival of two vessels on different days, but with overlapping operations (**Table 10-9**).

In Scenario 1—simultaneous arrival of two 5,000-TEU vessels—the vessels would arrive on Monday. Therefore, export cargo is brought to the port during the preceding week (Wednesday, Thursday, and Friday) according to an appointment schedule at the gate. Cargo is unloaded and loaded when the vessels are in Port on Monday, and import cargo is placed in the yard. Overland transport of the imports occurs during the following four days (Tuesday, Wednesday, Thursday, and Friday) based on an appointment system at the gate. As shown in **Table 10-8**, Scenario 1 results in an average of 706 export containers are arriving at the port each day during Week #1 and an average of 530 import containers are departing the port each day during Week #2.

Table 10-8
Scenario 1—Cargo Movements into and out of the Port for the Simultaneous Arrival of Two 5,000-TEU Vessels

	Week #1					Week #2						
	WD	**TH**	**FR**	**SA**	**SU**	**MO**	**TU**	**WD**	**TH**	**FR**	**SA**	**SU**
Vessel #1 (5,000 TEU)	353	353	353	N/A	N/A	In Port	265	265	265	265	N/A	N/A
Vessel #2 (5,000 TEU)	353	353	353	N/A	N/A		265	265	265	265	N/A	N/A
Total	706	706	706	N/A	N/A	N/A	530	530	530	530	N/A	N/A

Notes: Shaded boxes indicate cargo containers that are exiting the Port by truck or rail.

In Scenario 2---dispersed arrival of two 5,000-TEU vessels---one vessel would arrive on Monday and one vessel would arrive on Wednesday (see **Table 10-9**). In this example, there is overlap of import and export cargo moving through the gate such that operations fluctuate more than in Scenario 1. Scenario 2 results in more peaks and valleys than Scenario 1, making staffing and terminal operations less efficient.

Table 10-9
Scenario 2---Cargo Movements into and out of the Port for the Dispersed Arrival of Two 5,000-TEU Vessels

	Week #1					Week #2						
	WD	**TH**	**FR**	**SA**	**SU**	**MO**	**TU**	**WD**	**TH**	**FR**	**SA**	**SU**
Vessel #1 (5,000 TEU)	353	353	353	N/A	N/A	In Port	265	265	265	265	N/A	N/A
Vessel #2 (5,000 TEU)			353	N/A	N/A	353	353	In Port	265	265	N/A	N/A
Total	353	353	706	N/A	N/A	353	618	265	530	530	N/A	N/A

Notes: Shaded boxes indicate cargo containers that are exiting the Port by truck or rail.

Scenario 3 shows the arrival and departure of overland cargo for a 10,000-TEU vessel (see **Table 10-10**). As noted above, a 10,000-TEU vessel would occupy two 5,000-TEU berths, and eight cranes would be used to load and unload the 10,000-TEU vessel. As a result, the cargo operation for a 10,000-TEU vessel that arrives on a Monday would be the same as for Scenario 1 above.

Table 10-10
Scenario 3—Cargo Movements into and out of the Port for One 10,000-TEU Vessel

	Week #1					Week #2						
	WD	**TH**	**FR**	**SA**	**SU**	**MO**	**TU**	**WD**	**TH**	**FR**	**SA**	**SU**
Vessel #1 (10,000 TEU)	706	706	706	N/A	N/A	In Port	530	530	530	530	N/A	N/A
Total	706	706	706	N/A	N/A	N/A	530	530	530	530	N/A	N/A

Notes: Shaded boxes indicate cargo containers that are exiting the port by truck or rail.

As these scenarios demonstrate, the doubling of vessel size would not double cargo operations at the port facilities. At present, PANYNJ commonly handles two 5,000-TEU vessels simultaneously, and in the future, the two vessels would be replaced by one 10,000-TEU vessel. Certainly, a 10,000-TEU vessel carries more cargo, but the ability to handle this is not proportionately greater with completion of the project. Rather, cargo flow is controlled by a number of factors aimed at efficient logistical operations at the ports, and therefore, the cargo handling capacity of the ports is not expected to change substantially as compared with the future No Build conditions.

10-4-2-4 PEDESTRIANS AND CYCLISTS

The existing bridge deck, which currently contains a 6-foot wide pedestrian walkway, would be widened to a proposed configuration of a 12-foot-wide shared-use path. The

Build Alternative would result in a safer and enhanced path for pedestrians and bicyclists.

10-5 MITIGATION

The Build Alternative would not result in adverse impacts on long term vehicular traffic, marine transport, or pedestrian and bicycle circulation. Therefore, no mitigation measures are required.

11-1 INTRODUCTION

The potential for air quality impacts from the Raise the Roadway Alternative is examined in this chapter. Two potential effects are examined: effects of the project on on-road vehicle trips and roadway alignment, and effects of the project on marine sources. The project is not expected to alter the number of lanes or produce any other changes which might substantially impact traffic patterns, volumes, or speeds, but the new elevation and grade of the bridge approach could affect air pollutant concentrations nearby. Therefore, the on-road analysis examines modifications in roadway configuration (both vertical and horizontal) to evaluate the potential for any differences in air quality in the nearby area resulting from changes in the distance between the roadway and nearby buildings and changes in roadway grade. The marine source analysis examines the effect of changes in vertical clearance on marine emissions and ensuing changes in air quality. The chapter also discusses the emissions from two emergency generators which will be installed as part of the project. The effect of project's construction on air quality is analyzed in Chapter 16, "Construction."

The project would not substantially change on-road emissions. Emissions from ships to and from destinations west of the bridge would be reduced as a consequence of the project. Emergency generators would not result in exceedances of the applicable standards. Therefore, the project would not result in adverse impacts on air quality, and would result in a net reduction in marine emissions, improving air quality in the region.

11-2 POLLUTANTS FOR ANALYSIS

Ambient air quality is affected by air pollutants produced by both motor vehicles and stationary sources. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Ambient concentrations of carbon monoxide (CO) are predominantly influenced by mobile source emissions. Particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (nitric oxide, NO, and nitrogen dioxide, NO_2, collectively referred to as NO_x) are emitted from both mobile and stationary sources. Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, and sources utilizing non-road diesel such as diesel trains, marine engines, and non-road vehicles (e.g., construction engines). On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Ozone is formed in the atmosphere by complex photochemical processes that include NO_x and VOCs. Ambient concentrations of ozone, CO, PM, NO_2, SO_2, and lead are regulated by United States Environmental Protection Agency (EPA) under the Clean Air Act, and are referred to as 'criteria pollutants'; emissions of VOCs, NO_x, and other precursors to criteria pollutants are also regulated by EPA.

11-2-1 CARBON MONOXIDE

CO, a colorless and odorless gas, is produced in the urban environment primarily by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. CO concentrations can diminish greatly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

An analysis of mobile source emissions was conducted to evaluate the effect of the project on future CO concentrations. The potential changes in marine CO emissions attributable to the project were also evaluated.

11-2-2 NITROGEN OXIDES, VOCS, AND OZONE

NO_x are of principal concern because of their role, together with VOCs, as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants are carried downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are therefore generally examined on a regional basis. The contribution of any action or project to regional emissions of these pollutants would include any added stationary or mobile source emissions.

The project would potentially result in changes to regional marine emissions. Therefore, the change in regional NO_x and VOC emissions was analyzed.

In addition to being a precursor to the formation of ozone, NO_2 (one component of NO_x) is also a regulated pollutant. NO_2 is mostly formed from the transformation of NO in the atmosphere, and has mostly been of concern downwind from large stationary point sources. (NO_x emissions from fuel combustion consist of approximately 90 percent NO and 10 percent NO_2 at the source.) However, with the promulgation of the 2010 1-hour average standard for NO_2, vehicular emissions may become of greater concern for this pollutant. Potential impacts on local NO_2 concentrations from the proposed emergency generators were evaluated. NO_2 from mobile sources is also discussed.

11-2-3 LEAD

Airborne lead emissions are currently associated principally with industrial sources. Lead in gasoline has been banned under the Clean Air Act, and is not a significant component in marine fuel. Therefore, lead is not a pollutant of concern for the project.

11-2-4 RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a broad class of air pollutants that includes discrete particles of a wide range of sizes and chemical compositions, as either liquid droplets (aerosols) or solids suspended in the atmosphere. The constituents of PM are both numerous and varied, and they are emitted from a wide variety of sources (both natural and anthropogenic). Natural sources include the condensed and reacted forms of naturally occurring VOC; salt particles resulting from the evaporation of sea spray; wind-borne pollen, fungi, molds, algae, yeasts, rusts, bacteria, and material from live and decaying plant and animal life; particles eroded from beaches, soil, and rock; and particles emitted from volcanic and geothermal eruptions and from forest fires. Naturally occurring PM is generally greater than 2.5 micrometers in diameter. Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating), chemical and manufacturing processes, all types of construction, agricultural activities, as well as wood-burning stoves and fireplaces. PM also acts as a substrate for the adsorption (accumulation of gases, liquids, or solutes on the surface of a solid or liquid) of other pollutants, often toxic and some likely carcinogenic compounds.

As described below, PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$), and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}, which includes $PM_{2.5}$). $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the particles, and is also extremely persistent in the atmosphere. $PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM.

Diesel-powered vehicles, especially heavy duty trucks and buses, are a significant source of respirable PM, most of which is $PM_{2.5}$. PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles. An analysis was conducted to assess potential PM impacts due to the changes in roadway configuration. PM emissions were also included in the regional marine emissions analysis. In addition, use of diesel powered emergency generators would also result in emissions of PM, therefore PM impacts from the emergency generators were also evaluated.

11-2-5 SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels (oil and coal). SO_2 is also of concern as a precursor to $PM_{2.5}$ and is regulated as a $PM_{2.5}$ precursor under the New Source Review permitting program for large sources. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles and most non-road engines, no significant quantities are emitted from vehicular and most non-road sources. Marine fuel used for international ocean-going vessels operating in U.S. waters will be controlled at a higher sulfur level than U.S. fuels, allowing up to 1,000 parts per million (ppm) sulfur content starting in 2015. Alternatively, vessel operators can opt to use emissions controls to reduce sulfur oxides emissions. On-road sources of SO_2 would, therefore, not be significant, but SO_2 emissions from marine sources were included in the analysis. Although SO_2 from the emergency generators would be insignificant, since the generators were analyzed for other pollutants, SO_2 concentrations are presented as well.

11-3 REGULATORY CONTEXT

11-3-1 NATIONAL AND STATE AIR QUALITY STANDARDS

As required by the Clean Air Act (CAA), primary and secondary National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are requisite to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2 (annual), ozone, lead, and PM, and there is no secondary standard for CO and the 1-hour NO_2 standard. The NAAQS are presented in **Table 11-1**.

The NAAQS for CO, annual NO_2, and 3-hour SO_2 have also been adopted as the ambient air quality standards for New York State[1] and New Jersey, but are defined on a running 12-month basis rather than for calendar years only, and in some cases have not been updated when national standards changed. New York State also has standards for the non-criteria pollutants beryllium, fluoride, and hydrogen sulfide.

11-3-2 NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

The CAA, as amended in 1990, defines non-attainment areas as geographic regions that have been designated as not meeting one or more of the NAAQS. When an area is designated as non-attainment by EPA, the state is required to develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the Clean Air Act. Once an area attains the NAAQS, a maintenance SIP is required to demonstrate the continued attainment of the NAAQS for 10 years, and usually extended for an additional 10 years.

In 2002, EPA re-designated New York City, Hudson, Essex, Bergen, and Union Counties and the municipalities of Clifton, Passaic and Paterson in Passaic County in New Jersey as in attainment for CO. These areas are part of the New York City/Northern New Jersey/Long Island CO maintenance area. Under the resulting maintenance plan, New York and New Jersey are committed to implementing site-specific control measures throughout the city to reduce CO levels, should unanticipated localized growth result in elevated CO levels during the maintenance period.

On December 17, 2004, EPA took final action designating the five New York City counties and Nassau, Suffolk, Rockland, Westchester, and Orange Counties in New York and Passaic, Bergen, Morris, Essex, Hudson, Union, Somerset, Middlesex, Monmouth, and Mercer counties in New Jersey as non-attainment area under the Clean Air Act due to exceedance of the annual average $PM_{2.5}$ standard (New York and New Jersey portions of the New York City/Northern New Jersey/Long Island non-attainment area). Based on recent monitoring data (2006-2009), annual average concentrations of $PM_{2.5}$ in these areas no longer exceed the annual standard. EPA has determined that the area has attained the 1997 annual $PM_{2.5}$ NAAQS, effective December 15, 2010.

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[1] With the exception of 24-hour suspended particles.

Table 11-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m³	ppm	µg/m³
Carbon Monoxide (CO)				
8-Hour Average [1]	9	10,000	None	
1-Hour Average [1]	35	40,000		
Lead				
Rolling 3-Month Average [2]	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average [3]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [4,5]	0.075	150	0.075	150
Respirable Particulate Matter (PM_{10})				
24-Hour Average [1]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean [6]	NA	12	NA	15
24-Hour Average [7]	NA	35	NA	35
Sulfur Dioxide (SO_2) [8]				
1-Hour Average[9]	0.075	197	NA	NA
Maximum 3-Hour Average [1]	NA	NA	0.50	1,300

Notes:

ppm – parts per million (unit of measure for gases only)
µg/m³ – micrograms per cubic meter (unit of measure for gases and particles, including lead)
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m³ are presented.

(1) Not to be exceeded more than once a year.
(2) EPA has lowered the NAAQS down from 1.5 µg/m³, effective January 12, 2009.
(3) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(4) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(5) EPA has proposed lowering the primary standard further to within the range 0.060-0.070 ppm, and adding a secondary standard measured as a cumulative concentration within the range of 7 to 15 ppm-hours aimed mainly at protecting sensitive vegetation. A final decision on this standard has been postponed but is expected to occur in 2013.
(6) EPA has lowered the primary standard from 15 µg/m³, effective in March, 2013
(7) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(8) EPA revoked the 24-hour and annual primary standards, replacing them with a 1-hour average standard. Effective August 23, 2010.
(9) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration.

Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

EPA has recently lowered the annual average primary standard to 12 μg/m^3. EPA will make initial attainment designations by December 2014.

EPA revised the 24-hour average $PM_{2.5}$ standard in 2006. In November 2009, EPA designated the New York City Metropolitan Area as non-attainment with the 2006 24-hour $PM_{2.5}$ NAAQS; the non-attainment area includes the same areas originally designated as non-attainment with the 1997 annual $PM_{2.5}$ NAAQS. Based on recent monitoring data (2007–2011), EPA determined that the area has attained the standard. Although not yet a redesignation to attainment status, this determination removes further requirements for related SIP submissions.

Nassau, Rockland, Suffolk, Westchester, Lower Orange County Metropolitan Area (LOCMA), and the five New York City counties in New York, along with Bergen, Essex, Hudson, Hunterdon, Middlesex, Morris, Monmouth, Ocean, Passaic, Somerset, Sussex, and Union Counties of New Jersey had been designated as a severe non-attainment area for ozone (1-hour average standard, 0.12 ppm). Although revoked by EPA (effective 2005), some provisions of the 1-hour standard remained in place for 8-hour non-attainment areas (see below). On June 18, 2012, EPA determined that the area has attained the 1-hour standard. Although not yet a redesignation to attainment status, this determination removes further requirements under the 1-hour standard.

Effective June 15, 2004, EPA designated these same counties as moderate non-attainment for the 1997 8-hour average ozone standard, excluding Ocean County and including Warren County. On February 8, 2008, New York State Department of Environmental Conservation (NYSDEC) submitted final revisions to the SIP to EPA to address the 1997 8-hour ozone standard. Based on recent monitoring data (2007–2011), EPA determined that this area has attained the 1997 8-hour ozone NAAQS (0.08 ppm). Although not yet a redesignation to attainment status, this determination removes further requirements under the 8-hour standard.

In March 2008 EPA strengthened the 8–hour ozone standards. EPA designated the counties of Suffolk, Nassau, Bronx, Kings, New York, Queens, Richmond, Rockland, and Westchester in New York, and Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, and Warren counties in New Jersey, as part of the New York–Northern New Jersey–Long Island, NY-NJ-CT marginal non-attainment area for the 2008 ozone NAAQS, effective July 20, 2012. SIPs will be due in 2015.

New York and New Jersey are currently in attainment of the annual-average NO_2 standard. EPA has designated all areas in the U.S. as "unclassifiable/attainment" of the new 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available (2016 or 2017).

EPA has established a 1-hour SO_2 standard, replacing the former 24-hour and annual standards, effective August 23, 2010. Based on the available monitoring data, all New York State and New Jersey counties currently meet the 1-hour standard. Additional monitoring will be required. EPA plans to make final attainment designations in June 2013 based on 2008 to 2010 monitoring data and refined modeling. SIPs for non-attainment areas will be due by June 2014.

11-3-3 DETERMINING THE SIGNIFICANCE OF AIR QUALITY IMPACTS

New York State Environmental Quality Review Act (SEQRA) regulations state that the significance of a predicted consequence of a project (i.e., whether it is material, substantial, large or important) should be assessed in connection with its setting (e.g., urban or rural), its probability of occurrence, its duration, its irreversibility, its geographic scope, its magnitude, and the number of people affected.[1] In terms of the magnitude of air quality impacts, any action predicted to increase the concentration of a criteria air pollutant to a level that would exceed the concentrations defined by the NAAQS (see **Table 11-1**) would generally be deemed to have a potential significant adverse impact.

In addition, in order to maintain concentrations lower than the NAAQS, New York City has developed *de minimis* criteria to assess the significance of the increase in CO concentrations that would result from the impact of projects or actions on mobile sources, as set forth in the *New York City Environmental Quality Review (CEQR) Technical Manual*. These criteria set the minimum change in CO concentration that defines a significant environmental impact. Significant increases of CO concentrations in New York City are defined as: (1) an increase of 0.5 ppm or more in the maximum 8-hour average CO concentration at a location where the predicted No Action 8-hour concentration is equal to or between 8 and 9 ppm; or (2) an increase of more than half the difference between baseline (i.e., No Action) concentrations and the 8-hour standard, when No Action concentrations are below 8.0 ppm.

No *de minimis* criteria are applied in New Jersey.

11-3-4 CONFORMITY WITH STATE IMPLEMENTATION PLANS

The conformity requirements of the CAA and regulations promulgated thereunder (conformity requirements) limit the ability of federal agencies to assist, fund, permit, and approve projects in non-attainment areas that do not conform to the applicable SIP. When subject to this regulation, the lead agency is responsible for demonstrating conformity for its proposed action. Conformity determinations for federal actions other than those related to transportation plans, programs, and projects which are developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (49 U.S.C. 1601 et seq.) must be made according to the requirements of 40 CFR § 93, Subpart B (federal general conformity regulations). Since the United States Coast Guard (USCG) is the lead agency for the project, general conformity regulations would apply.

The general conformity regulations apply to those federal actions in non-attainment or maintenance areas where the action's direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed rates.

General conformity emissions threshold levels for various non-attainment areas and maintenance areas intersecting the project study area are presented in **Table 11-2**.

[1] State Environmental Quality Review Regulations, 6 NYCRR § 617.7

Table 11-2
General Conformity Threshold Levels
(tons per year)

Ozone, other non-attainment areas inside an ozone transport region:	
VOC	50
NO_x	100
CO, maintenance areas	100
PM_{10}, moderate non-attainment areas	100
$PM_{2.5}$, any non-attainment area:	
$PM_{2.5}$ direct emissions	100
SO_2	100
NO_x	100
Sources: 40 CFR § 93.153(b)	

The general conformity requirements do not apply to federal actions that:

- Do not exceed the prescribed emissions threshold levels;
- Occur in an attainment area;
- Are related to transportation plans, programs, and projects developed, funded, or approved under Title 23 U.S.C. or the Federal Transit Act (49 U.S.C. 1601); or
- Qualify for exemptions or where the emissions are not reasonably foreseeable as defined in § 93.153.

The regulation assumes that a proposed federal action whose criteria pollutant emissions have already been included in the local SIP's attainment or maintenance demonstrations conforms to the SIP.

Since the Coast Guard does not have continuing program responsibility for operational emissions, a general conformity determination is not required for operational emissions. Furthermore, the operation of the project would reduce emissions, as demonstrated in the regional (mesoscale) emissions analysis below.

11-4 METHODOLOGY

11-4-1-1 MOBILE SOURCE SCREENING

The New Jersey Department of Environmental Protection and the New Jersey Department of Transportation do not have any guidance specific to the analysis of projects affecting on-road or marine sources. Therefore, the New York State Department of Transportation (NYSDOT) guidance document *The Environmental Manual (TEM)* was used.[1] The *CEQR Technical Manual* also provides a screening procedure which is similar in its outcome, but less detailed. Both sets of guidance were consulted and are discussed below.

[1] NYSDOT, The Environmental Manual, https://www.dot.ny.gov/divisions/engineering/environmental-analysis/manuals-and-guidance/epm, accessed March 2012.

Since the project would have little to no effect on average speeds, vehicle types, vehicle volumes, or levels of service, the only relevant parameter was the change in distance between the nearest moving lane and the nearest receptor (location at which air quality would be analyzed if screening levels are exceeded). It was conservatively assumed that all intersections would be level of service D or worse. The Capture Criteria from TEM requiring screening in this case would be a 10 percent or more reduction in the source-receptor distance. Although the *CEQR Technical Manual* identifies the creation of new receptors adjacent to a roadway or the introduction of new roadway bridges or ramps as potential sites for analyses, no guidance is given for changes in the distance to such sources.

Although not required by the above guidance, given the advent of the new EPA MOVES vehicular emissions model, enabling the analysis of the effect of roadway grade on emissions, this factor was reviewed as well. Since screening indicated that emission factors for some links could increase in excess of 10 percent due to changes in roadway grade, a more detailed analysis was undertaken (see Section 11-4-1-2 below).

11-4-1-2 MOBILE SOURCE MICROSCALE ANALYSIS

The mobile source analysis for the proposed project employs models approved by EPA that have been widely used for evaluating air quality impacts of projects in New York City, New York State and New Jersey, and throughout the country. As described above, this analysis addresses the change in concentrations associated with proposed changes in roadway grade.

Vehicle Engine Emissions

Vehicular CO and PM engine emission factors were computed using the EPA mobile source emissions model, MOVES.[1] This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type, meteorological conditions, vehicle speeds, vehicle age, roadway type and grade, and various other factors that influence emissions, such as inspection maintenance programs. The inputs and use of MOVES incorporate the most current vehicle registration data available from NYSDEC.

Vehicle classification data were based on field studies and traffic data published by NYSDOT.[2] Appropriate credits were used to accurately reflect the inspection and maintenance program.

County-specific hourly temperature and relative humidity data obtained from DEC were used. The inputs included a road grade of approximately 4 percent for the No Build condition and a worst-case grade of 5 percent for the Build condition. Four representative hours, representing an AM, midday, PM, and overnight hour, were run in MOVES to account for the effects of temperature variation within the 24-hour averaging period.

[1] EPA, Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2010b, June 2012.

[2] NYSDOT, 2010 Pavement Data Report, Region 11, January 2011.

Road Dust

In accordance with the $PM_{2.5}$ interim guidance criteria methodology, $PM_{2.5}$ emission rates were determined with fugitive road dust to account for their impacts in local microscale analyses. However, fugitive road dust was not included in the annual average $PM_{2.5}$ microscale analyses. Road dust emission factors were calculated according to the latest procedure delineated by EPA[1] and the *CEQR Technical Manual*.

Traffic Data

Traffic data for the air quality analysis were derived from existing traffic counts, projected future growth in traffic, and other information developed as part of the traffic analysis for the proposed project. The hourly traffic volumes are shown in Table 16-4 in Chapter 16, "Construction Effects." Traffic data for the 2017 Build year was employed in the air quality modeling scenarios. The weekday PM (5:00 PM to 6:00 PM) peak period was analyzed for CO, and the hourly volumes were used to distribute traffic for the 24-hour period analyzed for $PM_{2.5}$.

Dispersion Model for Microscale Analyses

Maximum CO concentrations adjacent to streets within the surrounding area, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0.[2] The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. This refined version of the model, CAL3QHCR, is employed if maximum predicted future CO concentrations are greater than the applicable ambient air quality standards or when *de minimis* thresholds are exceeded using the first level of CAL3QHC modeling.

To determine motor-vehicle-generated $PM_{2.5}$ concentrations at residences near the portion of the bridge with the greatest grade change, the CAL3QHCR model was applied using hourly traffic and meteorology data.

Meteorology

In general, the transport and downwind concentration of pollutants are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, and atmospheric stability accounts for the effects of vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular prediction location (receptor).

In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor.

[1] EPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, January 2011.

[2] EPA, User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections, Office of Air Quality, Planning Standards, Research Triangle Park, North Carolina, EPA-454/R-92-006.

Following the EPA guidelines[1], CAL3QHC computations were performed using a wind speed of 1 meter per second, and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.70 to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions ensured that worst-case meteorology was used to estimate impacts.

A PM analysis performed with the CAL3QHCR model includes the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The data consists of surface data collected at Newark Liberty International Airport and upper air data collected at Brookhaven, New York in 2007–2011. All hours were modeled.

Analysis Year

The microscale analyses were performed for 2017, the year by which the project is likely to be completed, with and without the proposed project.

Analysis Site

Based on the proximity of sensitive receptors (i.e., residences) to the approach of the bridge, the New Jersey side of the bridge was selected for microscale analysis. While the grade of the new bridge on the New Jersey side is not expected to reach 5 percent as it does on the New York side, a worst-case scenario of 5 percent was assumed for the analysis, combining the largest increase in grade with the location with the nearest nearby sensitive uses. The site was analyzed for CO and $PM_{2.5}$.

Receptor Placement

Multiple receptors (i.e., precise locations at which concentrations are predicted) were modeled at residences at ground level and window heights along the approach of the bridge, where the greatest change in road grade would occur.

11-4-1-3 REGIONAL (MESOSCALE) EMISSIONS

Region-wide changes in emissions associated with the project were estimated by calculating the fuel savings associated with the operation of larger ships traversing the harbor to and from destinations west of the bridge, and then multiplying the fraction of fuel saved by the portion of the emissions inventory and forecast associated with the main engines of ships travelling to and from destinations west of the bridge. This approach is conservative, as the larger ships would be current and would have better emissions controls in early years than the smaller ships they replace, resulting in an even greater reduction in emissions than calculated here.

The Newark Bay portion of the 2008 emissions inventory was obtained from Port Authority of New York and New Jersey (PANYNJ). The following assumptions were used in estimating future emissions reductions:

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[1] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, EPA Office of Air Quality Planning and Standards, Publication EPA-454/R-92-005.

- The shift to larger ships would not affect emissions of auxiliary engines or ships dwelling at port berths. Although larger ships would have larger auxiliary engines, since the increase in auxiliary engine size would be less than the increase in freight carried, auxiliary engine emissions may also decrease overall. Thus, this assumption is conservative.
- The shift to larger ships would not affect emissions from assist tug boat operations. Although for the largest class of ships a third tug may be required to assist for some turn movements (in addition to the two normally used), in other cases, ships with newer, more advanced propulsion systems would require only a single tug to assist them in the harbor. Even if we assume that tug operations only increase for the largest ships and do not decrease for newer propulsion systems, there would be an overall decrease in the number of tug operations because fewer vessel trips would be required with the larger ships. Overall, these changes are expected to be very small and were not included in the analysis.
- The 2008 emissions were assumed to be representative of the 2010 freight data—the earliest year included in the U.S. Army Corps of Engineers (USACE) study used for estimating freight by vessel size.[1] Since emissions may have increased in that period, this assumption leads to lower emissions overall, and therefore lower reductions associated with the project.
- International Maritime Organization (IMO) has adopted energy efficiency design standards for ships, which will result in up to 30 percent improvement of newly manufactured ship engines by 2025, and which will reduce overall emissions.[2] Since these standards will be phased in slowly and since fleet turnover will take many more years, this will have only a very minor effect on emissions in the timescale of this study. These pending design standards have therefore been neglected.
- EPA and international standards will result in pollutant emission reductions for all ships operating in U.S. territorial waters (North American Emission Control Area).[3] According to the EPA estimates, the analysis assumed a 95 percent reduction in sulfur oxides emissions starting in 2015, due to the implementation of clean fuel requirements, and an 80 percent reduction in NO_x and 85 percent reduction in PM emissions by 2030 based on the reductions in emissions from newly manufactured engines. The PM and NO_x reductions were assumed to increase linearly from 2008 to 2030 with the transition to newer engines as older engines are replaced by newer, cleaner engines.
- The emissions were assumed to grow in proportion to the projected freight growth, according to the projections from the USACE study.

[1] USACE, Bayonne Bridge Air Draft Analysis, September 2009 and detailed data from that study, provided by PANYNJ.

[2] EPA, Program Announcement: Adoption of an Energy Efficiency Design Index for International Shipping, EPA-420-F-11-025, July 2011.

[3] EPA, International Maritime Organization Adopts Program to Control Air Emissions from Oceangoing Vessels, EPA420-F-08-033, October 2008.

The fraction of fuel reduced by the project year was calculated by estimating the fuel consumption year with and without the project. Fuel consumption factors in grams per twenty-foot equivalent unit (TEU) per nautical mile (g/TEU-nmi) for each TEU size category were calculated for an assumed 10 knots in-harbor vessel speed, based on the fuel consumption and design speeds by size category presented in **Table 11-3**, using the formula—

$$FC_{V_1} = FC_{V_0} \cdot (V_0/V_1)^{3.3}$$

where FC_{V_1} is the main engine fuel consumption at speed v_1; and
V_0 is the design speed for vessels of that size category.[1]

11-4-1-4 EMERGENCY GENERATORS

The bridge would require two diesel-fueled 500-kW emergency generators to supply backup power for essential systems such as fire standpipes, roadway lights, cameras, and tolling equipment in the event of a sudden loss in utility electric power. The generators would be installed within a new building at each of the bridge abutments, one on either side of the bridge, replacing a single existing generator on the New York side.

Table 11-3
Fuel Consumption Rates in Harbor

Vessel Size Category (TEU)	**Mean Size** (TEU)	**Fuel Consumption**[i] (metric tons/day @design speed, main engine)	**Design Speed**[i] (knots)	**Fuel Consumption**[ii] (g/TEU-nmi @10 knots, main engine)
10,000 & up	11,660	367.0	25.1	6.29
9,000 to 9,999	9,307	292.0	25.1	6.27
8,000 to 8,999	8,293	260.0	24.9	6.44
7,000 to 7,999	7,372	230.0	25.1	6.24
6,000 to 6,999	6,505	203.4	25.3	6.09
5,000 to 5,999	5,491	171.3	24.5	6.76
4,000 to 4,999	4,385	136.4	23.9	7.31
3,000 to 3,999	3,432	106.4	22.4	9.02
Sources: (i) Notteboom, T. and Carriou, P., 2009; (ii) AKRF				

The generators would be operated for testing, for an estimated duration of 15 to 30 minutes every other week. The generators may be utilized in a peak load shaving program, and, therefore, may be used during non-emergency periods as required by that program, estimated at 8 to 10 days per year. The generators would be permitted as necessary according to NYSDEC and NJDEP air permitting requirements, would be operated and tested according to the permit requirements, and would be designed to meet any applicable local requirements.

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[1] Notteboom, T. and Carriou, P., 2009, "Fuel surcharge practices of container shipping lines: Is it about cost recovery or revenue making?", Proceedings of the 2009 International Association of Maritime Economists.

Potential NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$ concentration increments resulting from proposed emergency generators were projected using EPA's AERMOD dispersion model.[1] AERMOD is a state-of-the-art atmospheric dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources. AERMOD is a steady-state plume model that incorporates current concepts with respect to flow and dispersion in complex terrain. As per EPA guidance, 1-hour average NO_2 concentrations were not analyzed since the source would be considered an intermittent source for that standard, and would therefore not cause a violation of the 1-hour average NO_2 NAAQS.

The meteorological data set consisted of five consecutive years of meteorological data (2007–2011), including surface data collected at Newark Liberty International Airport and concurrent upper air data collected in Brookhaven, NY.

Receptors (locations in the model where concentrations are projected) were placed at residential and other sensitive uses at both ground-level and elevated locations (e.g., residential windows), and in open spaces.

The proposed engines would have low exhaust emissions and would comply with EPA Tier 2 non-road engine emission standards. Emission rates for PM were based on EPA Tier 2 regulatory emission standards (actual emissions may be lower); emission rates for NO_x, CO and SO_2 were estimated using EPA's AP-42.[2]

The modeling analysis assumed that the generators could be used for a maximum of 93 hours per year, including 10 days of 8 hours/day operation for peak load shaving and 30 minutes for testing every other week. Stack parameters and emission rates are provided in **Table 11-4**.

Table 11-4
Stack Parameters and Emission Rates

Parameter	Value
Stack Height (ft)	14
Stack Diameter (ft)	0.67
Exhaust Velocity[(1)] (ft/s)	173
Exhaust Temperature[(1)] (F)	901
$PM_{2.5}$ Emission rate (g/s) (24 hour)	0.0166
$PM_{2.5}$ Emission rate (g/s) (Annual)	0.00053
PM_{10} Emission rate (g/s) (24 hour)	0.0171
NO_x Emission rate (g/s) (Annual)	0.0485
CO Emission rate (g/s) (1 hour, 8 hour)	0.5232
SO_2 Emission rate (g/s) (3 hour)	0.0012

Note: (1) Stack Exhaust velocity and temperature are based on vendor data.

[1] EPA, AERMOD: Description of Model Formulation, 454/R-03-004, September 2004; and EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B-03-001, September 2004 and Addendum December 2006.

[2] EPA, AP 42 Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume 1: Stationary Point and Area Sources, Chapter 3.4, Revised 1996.

11-5 AFFECTED ENVIRONMENT

Concentrations of the pollutant of interest measured at the nearest air quality monitoring stations are presented in **Table 11-5** (availability differs by pollutant). Note that although generally indicative of air quality in the vicinity of the project, concentrations immediately adjacent to the roadway may be somewhat higher. The only pollutant currently exceeding the NAAQS in this area is ozone.

Table 11-5
Representative Monitored Ambient Air Quality Data for Criteria Pollutants, 2008 to 2010

Pollutant and Averaging Time	Monitored Data				NAAQS	Monitoring Site Location
	2009	2010	2011	3-year Average		
Carbon monoxide (ppm)						Interchange 13, New Jersey Turnpike, Elizabeth, NJ
8-hour	2	2	2	NR	9	
1-hour	3	3	3	NR	35	
Ozone (ppm)						Susan Wagner HS, 1200 Manor Rd, Staten Island, NY
8-hour 4th-highest Daily Maximum	**0.078**	**0.085**	**0.087**	**0.083**	0.075	
Nitrogen dioxide (ppm)						Veterans Park on Newark Bay, 25th Street near Park Road, Bayonne, NJ
Annual Arithmetic Mean	0.036	0.035	0.034	0.035	0.050	
PM_{10} (µg/m^3)						Consolidated Firehouse, 355 Newark Avenue, Jersey City, NJ
24-Hour Maximum	93	83	63	NR	150	
$PM_{2.5}$ (µg/m^3)						Post Office, 364 Port Richmond Avenue, Staten Island, NY
Annual Arithmetic Mean	9.8	9.7	9.9	9.8	12	
24-Hour 98th Percentile	25	26	23	24.7	35	

Note: NR—not relevant; exceedance of the NAAQS shown in bold.
Source: EPA, AIRS Database, http://www.epa.gov/airdata, accessed March 2012.

11-6 ENVIRONMENTAL CONSEQUENCES

11-6-1 NO BUILD ALTERNATIVE

Since the No Build Alternative would not affect any change, air quality would not be affected.

11-6-2 RAISE THE ROADWAY ALTERNATIVE

11-6-2-1 MOBILE SOURCE SCREENING

The areas in which roadways would be raised in order to increase the grade of the roadway leading up to the raised bridge were reviewed in detail on both sides of the bridge. Buildings adjacent to the roadway accessing the bridge consist of low rise homes and various other uses. In most cases, buildings were currently lower than the roadway, and would therefore be further from the future access road and bridge. In some cases homes were at the same level as the roadway and up to one floor above the roadway level. In those cases, the distance would effectively be the same. The future roadway might be level with the upper floor instead of the lower floor of some homes, but in all cases the change in distance would be very minor, would not exceed the screening threshold of 10 percent change. However, given that the emissions may increase due to change in roadway grade, that effect was analyzed in detail.

In addition, an induced demand study (see Appendix I) was prepared to assess potential increases in cargo at the Port of New York and New Jersey as a result of the project and determine how that may affect traffic and air quality. As described in Appendix I and summarized in Chapter 18, "Indirect and Cumulative Effects," any induced demand at the Port by 2035 may result in an additional 1–2 trucks per hour from each terminal west of the Bayonne Bridge, having a negligible effect on air quality.

11-6-2-2 MOBILE SOURCE MICROSCALE ANALYSIS

As described above, a microscale analysis was prepared to evaluate the impact of changes in roadway grade on air quality.

The future maximum predicted 8-hour average CO concentration based on the hour with the highest projected traffic volumes is estimated to be 2.1 ppm (including background) for both the No Build and the Build conditions and would be below the *de minimis* threshold of 5.5 ppm.

The maximum predicted 24-hour average $PM_{2.5}$ concentration from the roadway emissions (excluding background) in the No Build condition is 1.33 $\mu g/m^3$. The results of this analysis indicate a range of net reductions in $PM_{2.5}$ concentrations at the modeled building receptors, ranging from a net reduction of 0.44 $\mu g/m^3$ to a reduction 0.05 $\mu g/m^3$ at a building location.

The maximum predicted annual average $PM_{2.5}$ concentration from the roadway emissions (excluding background) in the No Build condition is 0.04 $\mu g/m^3$. Similar to the 24-hour averages, the results indicate a range of net reductions from a reduction of 0.016 $\mu g/m^3$ to a reduction of 0.0016 $\mu g/m^3$.

Note that there are several effects that combine to form the net results above:

- *Grade*—increased grade (in the uphill direction) increases emissions; decreased grade (in the downhill direction) decreases emissions, but the decrease in emissions in the downhill is less than the uphill increase for any given vehicle.
- *Elevation*—the bridge elevation overall will be higher. While some segments near residential locations may still be parallel to residential windows, much of the emissions from the new bridge overall will occur above the residential elevations, resulting in increased dispersion and lower ensuing concentrations.
- *Distance from the roadway and time averaging*—receptors will be most affected by the nearest side of the bridge. Traffic will peak in the northbound direction in the AM hours and in the southbound in the PM hours. Since CO concentrations are analyzed for shorter averaging times (1-hour and 8-hour), the increase due to grade may be offset by decrease due to elevation. For $PM_{2.5}$, the averaging time is 24-hour and annual, so differences between AM and PM hours will mostly offset each other, and the net result is a slight decrease associated with elevation changes.

The results indicate that the change in grade, along with the increase in elevation, would not result in any violations of the CO or $PM_{2.5}$ standards and would not result in any significant adverse air quality impacts.

Although PM_{10} was not included in the microscale modeling, the concentrations are expected to be similar in trend and magnitude to $PM_{2.5}$ concentrations. Therefore, given the level of PM_{10} background concentration, as shown in **Table 11-5**, the project would not results in any violations of the PM_{10} NAAQS.

11-6-2-3 REGIONAL (MESOSCALE) EMISSIONS

Fuel savings from the project are expected to reduce main engine fuel consumption in the harbor by 1.6 percent in 2017 and would increase, as freight traffic grows and more large ships enter the fleet, up to 5.5 percent in 2037 (some benefits may occur as early as 2016, prior to the opening of the bridge, when clearance is increased by removing the roadway). The resulting reduction in emissions in the harbor, projected to increase in step with the fuel savings, are presented in **Table 11-6**, and in greater detail in **Appendix D**. As noted above, the estimates do not include the potential fuel savings related to ships sitting at the berths, thereby providing a conservative analysis. Note that the PM and NO_x reductions peak in 2025, as the emissions controls overtake the projected growth in freight movement, and then begin to increase again in 2030 as freight movement continues to grow after emissions controls are fully implemented.

Table 11-6
Emissions Reductions
(tons per year)

year	NO_x	VOC	CO	PM_{10}	PM_{25}	SO_2
2017	12.7	1.0	1.8	1.0	0.8	0.5
2018	14.2	1.1	2.1	1.1	0.9	0.6
2019	15.6	1.3	2.5	1.2	1.0	0.7
2020	16.1	1.5	2.8	1.3	1.0	0.8
2021	16.5	1.6	3.0	1.3	1.0	0.8
2022	16.8	1.8	3.3	1.3	1.0	0.9
2023	16.8	1.9	3.6	1.3	1.0	1.0
2024	17.2	2.1	4.0	1.3	1.0	1.1
2025	17.3	2.4	4.5	1.3	1.0	1.2
2026	17.2	2.6	4.9	1.2	1.0	1.4
2027	16.9	2.9	5.4	1.2	0.9	1.5
2028	16.2	3.1	5.9	1.1	0.9	1.6
2029	14.7	3.3	6.3	1.0	0.8	1.7
2030	13.0	3.5	6.7	0.8	0.6	1.8
2031	13.7	3.7	7.0	0.8	0.7	1.9
2032	14.4	3.9	7.4	0.9	0.7	2.1
2033	15.7	4.3	8.1	1.0	0.8	2.2
2034	17.1	4.6	8.8	1.0	0.8	2.4
2035	18.6	5.0	9.5	1.1	0.9	2.6
2036	20.2	5.5	10.4	1.2	1.0	2.9
2037	21.8	5.9	11.2	1.3	1.1	3.1

Note: Some benefits may occur as early as 2016, prior to the opening of the bridge, when clearance is increased by removing the roadway.

Overall, since the project would result in reduced emissions from ships in the harbor, the net mesoscale impact would be an improvement in air quality. Since the Coast

Guard does not have continuing program responsibility for operational emissions, a general conformity determination is not required for operational emissions.

11-6-2-4 EMERGENCY GENERATORS

The maximum projected concentrations from the modeling analysis, including the maximum ambient background concentrations are presented in **Table 11-7** for the generator on the New York side and **Table 11-8** for the New Jersey side.

The total maximum projected concentrations would be lower than the corresponding NAAQS. There may be some slightly high $PM_{2.5}$ increments, but the frequency of occurrence would be very limited since these generators would be used for limited durations only few times per year, and these would not result in exceedance of the NAAQS. Hence, it can be concluded that potential air quality impacts from the emergency generators would be insignificant.

Table 11-7
Maximum Predicted Pollutant Concentrations from Emergency Generator—New York Side (μg/m^3)

Pollutant	Averaging Period	Maximum Projected Increment	Background	Total Concentration	NAAQS
$PM_{2.5}$	24-hour	1.9	24.7	26.6	35
	Annual	0.01	9.9	9.9	15
PM_{10}	24-hour	2.0	93	95	150
NO_2	Annual	0.6	68	68.6	100
CO	1-hour	0.1 ppm	3.0 ppm	3.1 ppm	35 ppm
	8-hour	0.1 ppm	2.0 ppm	2.1 ppm	9 ppm
SO_2	3-hour	0.3	109.9	110.3	1300

Table 11-8
Maximum Predicted Pollutant Concentrations from Emergency Generator—New Jersey Side (μg/m^3)

Pollutant	Averaging Period	Maximum Projected Increment	Background	Total Concentration	NAAQS
$PM_{2.5}$	24-hour	3.0	24.7	27.7	35
	Annual	0.01	9.9	9.9	15
PM_{10}	24-hour	3.1	93	96.1	150
NO_2	Annual	0.7	68	68.7	100
CO	1-hour	0.3 ppm	3.0 ppm	3.3 ppm	35 ppm
	8-hour	0.2 ppm	2.0 ppm	2.2 ppm	9 ppm
SO_2	3-hour	0.6	109.9	110.6	1300

11-7 MITIGATION

Since no significant air quality impacts would occur, air quality mitigation is not required. The potential air quality impacts of the project's construction are described in Chapter 16, "Construction Effects".

Chapter 12: Climate Change and Greenhouse Gas Emissions

12-1 INTRODUCTION

There is general consensus in the scientific community that the global climate is changing as a result of increased concentrations of greenhouse gases (GHGs) in the atmosphere. GHGs are emitted primarily from combustion of fossil fuels, as well as various other processes. Atmospheric concentrations of GHGs are increasing because the chemical removal processes are limited, and the rate of emission exceeds the rate of the natural removal. The human induced increase in GHG concentrations has led to a noticeable warming of the Earth's atmosphere, surface, and oceans. This warming has and will continue to result in a myriad of complex climatic changes that will vary by geographic location, profoundly affecting human and natural systems.

Potential effects of global climate change on the Raise the Roadway Alternative and potential effects of the project alternatives on energy consumption and GHG emissions are assessed in this chapter. The potential effect on the project alternatives due to changes in sea level resulting from global climate change is discussed first. This is followed by an assessment of potential energy use and GHG emissions resulting from the project's construction and operation. Available scientific, technical, and policy studies and information were reviewed, and relevant information is presented.

While the contribution of any single project to climate change is infinitesimal, the combined GHG emissions from all human activity have a severe adverse impact on global climate. The nature of the impact dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them. Therefore, this chapter does not identify specific contributions of the project to climate impacts, but rather addresses the net changes in GHG emission associated with the project as compared to the No Build Alternative. These changes include the increase in ship efficiency associated with the shift to larger ships serving the Port as a result of the project, and emissions associated with the construction operations necessary to achieve that shift.

Specific technical guidance for this type of analysis is not available. However, the general approach follows the New York State Department of Environmental Conservation (NYSDEC) policy document entitled *Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements*, July 15, 2009 (NYSDEC policy). The Council on Environmental Quality's (CEQ) draft guidance entitled *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, February 18, 2010, was consulted as well. New Jersey Agencies have no guidance for analysis of greenhouse gases and climate.

12-2 REGULATORY CONTEXT

12-2-1 POLLUTANTS OF CONCERN

GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic (human induced), that absorb and emit infrared radiation (heat) emitted by the Earth's surface, the atmosphere, and clouds. This property causes the general warming of the Earth's atmosphere, or the "greenhouse effect." Water vapor, carbon dioxide (CO_2), nitrous oxide (N_2O), methane, and ozone are the primary GHGs in the Earth's atmosphere.

There are also a number of entirely human-made GHGs—mainly halocarbons and other chlorine- and bromine-containing substances—which, in addition to being GHGs, also damage the stratospheric ozone layer (contributing to the "ozone hole"). Since these compounds are being replaced and phased out due to the 1987 Montreal Protocol, and since their emissions are not associated with most projects, there is generally no need to address them in project-related GHG assessments. Although ozone itself is also a major GHG, it does not need to be assessed as such at the project level since it is a rapidly reacting chemical and efforts are ongoing to reduce ozone concentrations as a criteria pollutant (see Chapter 11, "Air Quality"). Similarly, water vapor is of great importance to global climate change, but is not directly of concern as an emitted GHG since the negligible quantities emitted from anthropogenic sources are not of concern.

CO_2 is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, CO_2 is by far the most abundant and, therefore, the most influential GHG. CO_2 is emitted from any combustion process (both natural and anthropogenic), from some industrial processes such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products, from volcanic eruptions, and from the decay of organic matter. CO_2 is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. CO_2 is included in any analysis of GHG emissions.

Methane and N_2O also play an important role since they have limited removal processes and a relatively high impact on global climate change as compared to an equal quantity of CO_2. Emissions of these compounds, therefore, are included in GHG emissions analyses as appropriate.

NYSDEC and CEQ guidance lists six GHGs that could potentially be included in the scope of an environmental assessment: CO_2, N_2O, methane, Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride (SF_6) (also known as the 'Kyoto gases'). This analysis focuses mostly on CO_2, N_2O, and methane resulting from combustion sources such as ship engines and construction engines, as well as sources associated with production of construction materials. There are no significant direct or indirect sources of HFCs, PFCs, or SF_6 associated with the project.

To present a complete inventory of all GHGs, component emissions are added together and presented as CO_2 equivalent (CO_2e)—a unit representing the quantity of each GHG weighted by its effectiveness using CO_2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP). GWPs account for the lifetime and the radiative forcing of each chemical over a period of 100 years (e.g., CO_2 has a much shorter atmospheric lifetime than SF_6, and therefore has a much lower GWP). The GWPs for the main GHGs discussed here are presented in **Table 12-1**.

Table 12-1
Global Warming Potential (GWP) for Major GHGs

Greenhouse Gas	100-year Horizon GWP
Carbon Dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Oxide (N_2O)	298
Hydrofluorocarbons (HFCs)	124 to 14,800
Perfluorocarbons (PFCs)	7,390 to 12,200
Sulfur Hexafluoride (SF_6)	22,800

Sources: Intergovernmental Panel on Climate Change, Climate Change 2007—The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report, Table 2-14, 2007.

12-2-2 POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS

This section reviews policy, regulations, standards, and other benchmarks addressing climate change and GHG emissions relevant to the project.

As a result of the growing consensus that human activity resulting in GHG emissions has the potential to profoundly impact the Earth's climate, countries around the world have undertaken efforts to reduce emissions by implementing both global and local measures addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements which set emissions targets for GHGs, in a step toward the development of national climate change regulation, the U.S. has committed to reducing emissions to 17 percent lower than 2005 levels by 2020 and to 83 percent lower than 2005 levels by 2050 (pending legislation) via the Copenhagen Accord.[1] Without legislation focused on this goal, the U.S. Environmental Protection Agency (EPA) is required to regulate GHGs under the Clean Air Act, and has already begun promulgating regulations. EPA has also established various voluntary programs to reduce emissions and increase energy efficiency.

The Renewable Fuel Standards program (RFS2, February 2010) required 12.95 billion gallons of renewable fuels to be produced in 2010, increasing annually up to 36.0 billion gallons in 2022, and specifies lifecycle GHG reduction thresholds ranging from 20 percent for renewable fuel up to 60 percent for cellulosic biofuel (as compared to the baseline gasoline or diesel replaced). EPA calculates the required fuel volumes every year (the 2012 requirement is 15.2 billion gallons), including specific categories of renewable fuels—cellulosic, biomass-based diesel, and advanced renewable fuels.

[1] Todd Stern, U.S. Special Envoy for Climate Change, letter to Mr. Yvo de Boer, UNFCCC, January 28, 2010.

In March 2009, the U.S. Department of Transportation (USDOT) set combined corporate average fuel economy (CAFE) standards for light duty vehicles for the 2011 model year (MY). In June 2009, EPA granted California a previously denied waiver to regulate vehicular GHG emissions, allowing 19 other states (representing 40 percent of the light-duty vehicle market, including New York) to adopt the California mobile source GHG emissions standards. In April 2010, EPA and USDOT established the first GHG emission standards and more stringent CAFE standards for MY 2012 through 2016 light-duty vehicles. The agencies also proposed the first-ever program to reduce GHG emissions and improve fuel efficiency of medium- and heavy-duty vehicles, such as large pickup trucks and vans, semi-trucks, and vocational vehicles. These regulations will all serve to reduce vehicular GHG emissions over time.

There are also regional, state, and local efforts to reduce GHG emissions. In 2009, Governor Paterson of New York issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York by 80 percent by 2050 as compared with 1990 levels, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal. That effort is currently under way, and an interim draft plan has been published.

[1] Similarly, in 2007, New Jersey enacted the *Global Warming Response Act* codifying in law the targets set previously by New Jersey Governor Executive Order 54 of 2007, mandating that statewide GHG emissions in 2020 not exceed 1990 levels, and be further reduced to 80 percent below 2006 levels by 2050. In December 2009, New Jersey Department of Environmental Protection published recommendations for attaining the 2020 goal.[2]

The 2009 *New York State Energy Plan*,[3] outlines the state's energy goals and provides strategies and recommendations for meeting those goals. One of the State's strategies is to invest in transportation infrastructure in a manner consistent with the GHG reduction goal, focused on multi-modal transportation, and to encourage energy efficient transportation infrastructure and systems. Similarly, the 2011 New Jersey *Energy Master Plan* defined an overarching goal of capitalizing on emerging technologies for transportation, and recommends improving transportation efficiency.

New York State and New Jersey are members of the Transportation Climate Initiative (TCI) which is a collaboration of 12 northeast and mid-Atlantic jurisdictions that are seeking to develop a clean energy economy and reduce GHG emissions in the transportation sector. TCI efforts include work areas focused on clean vehicles and advancing more efficient freight movement.

Many government agencies have also formulated policy statements regarding global climate change. PANYNJ, in its *Environmental Sustainability Policy, 2008*, defined four implementation principles:

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1 http://www.nyclimatechange.us

2 New Jersey Department of Environmental Protection, Meeting New Jersey's 2020 Greenhouse Gas Limit: New Jersey's Global Warming Response Act, Recommendations Report, 2009.

3 New York State, *2009 New York State Energy Plan*, December 2009.

- Reducing emissions related to its facilities, including tenants and customers, by 80 percent from 2006 levels, by 2050;
- By 2010, establishing a goal of net zero GHG emissions from its own operations;
- Encouraging its customers, tenants, and partners to conduct their businesses in a more sustainable fashion, including reductions in their own GHG emissions, and providing support for these efforts where practical; and
- Developing strategies that reduce risk from climate change to its facilities and operations.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term sustainability program, PlaNYC 2030, includes GHG emissions reduction goals, specific initiatives that can result in emission reductions, and initiatives targeted at adaptation to climate change impacts.

A number of benchmarks for energy efficiency and green building design have also been developed. For example, New York State Department of Transportation's (NYSDOT) GreenLITES[1] Project Design Certification Program is a self-certification rating system for enhancing the environmental performance of transportation projects. Envision[2] is a sustainable infrastructure rating system for evaluating and rating the community, environmental, and economic benefits of all types of infrastructure projects, including many credits that affect GHG emissions and energy use, as well as adaptation to the changing climate.

Currently, there are no standards or regulations applicable to GHG emission levels or impacts from actions subject to environmental review under National Environmental Policy Act (NEPA) or New York State Environmental Quality Review Act (SEQRA). Accordingly, the potential effects of the project have been evaluated in the context of their consistency with the objectives stated in federal and state policies. Potential GHG emissions from the project are assessed and disclosed, and the feasibility and practicability of various measures available for reducing GHG emissions are discussed. Commitments to implement such measures are noted, where applicable.

12-3 METHODOLOGY

12-3-1 POTENTIAL IMPACTS OF GLOBAL CLIMATE CHANGE

The analysis of impacts of global climate change on the project focuses on potential changes in sea level in the context of flooding and air draft limitation (vertical distance from the bottom of the bridge to the mean high water, constraining the size of ships that can pass under the bridge). Existing scientific studies and information available from New York City and State sources were reviewed. Relevant information is presented. Due to the uncertain nature of predictions for future climate change impacts, a range of

[1] https://www.dot.ny.gov/programs/greenlites

[2] http://www.sustainableinfrastructure.org

possible effects is presented. While future changes in other climate parameters such as temperature, storm frequency, and precipitation may have some effect on bridge maintenance, the projections for these parameters are much less certain at this time and are therefore not addressed here.

12-3-2 GREENHOUSE GAS EMISSIONS

The project would affect GHG emissions in two ways: (1) by increasing clearance under the bridge, the project would facilitate the shift to larger, more energy-efficient ships traversing the Kill Van Kull to call on facilities west of the bridge (Port Newark, Port Elizabeth, and Howland Hook), reducing GHG emissions; and (2) the construction activity would result in GHG emissions associated with fuel used for construction engines and with the extraction, manufacture, and delivery of construction materials.

12-3-2-1 EXTENT OF ANALYSIS

Since the impact of GHGs emitted in the troposphere is generally the same regardless of where they are emitted, the analysis of GHGs addresses emissions resulting from the project, regardless of their location. Direct emissions include emissions from sources located on-site, such as construction equipment during the construction period. Indirect emissions include emissions from vehicle trips associated with the project (both increased and reduced) and emissions associated with electricity consumption. In addition, there are emissions preceding and following the project, referred to as upstream and downstream emissions, such as emissions associated with the transport and production of fuels and construction materials, and emissions associated with disposal of materials after their use. The GHG analysis addresses both direct and indirect emissions, and, where practicable and significant, upstream and downstream emissions as well, including fuel and materials production.

12-3-2-2 TIME SCALES FOR ANALYSIS

Operational emissions were analyzed for 2017 through 2037, representing 21 years of operations. Although total operational ship emissions (and, therefore, the benefits of increased efficiency) would continue to increase in future years due to background growth, ship emissions (per ship or per ton of freight) may be lower in more distant years if the carbon content of fuels improves and/or additional efficiencies are introduced in ship engines.

Emissions related to construction activity and materials would occur over a period prior to and during construction, and are presented as a total.

12-3-2-3 EMISSIONS CALCULATIONS

The GHG emissions analysis includes the following sources:

- Ship fuel consumption (improved efficiency);
- Fuel use for construction, materials delivery, and worker trips; and
- Building materials production.

The methodology used to calculate the GHG emissions from each included source is provided below.

Ship Fuel Consumption

Changes in annual ship emissions that would occur as a result of project operation were estimated based on the projected change in the size of ships expected to traverse the Kill Van Kull. The magnitude of reasonably anticipated benefits of the project were estimated using a scenario analysis defined by the assumptions below. This is not a precise projection of potential future conditions, but rather a “what if” scenario based on reasonable estimates. Since the objective is to quantify potential benefits, and since no adverse impact would occur (there is no reason that operation of the project would result in an increase in emissions), rigorous modeling of global ship operations to identify precise projections of emissions was not required.

The basis of the scenario analysis was projections for 2010 to 2037 of the number of port calls by ships arriving and departing from Port Newark, Port Elizabeth, and Howland Hook, prepared by the U.S. Army Corps of Engineers (USACE).[1] Since the raised bridge is expected to open in 2017, the analysis focused on 2017 through 2037, although some benefits may occur as early as 2016 when the roadway is raised.

The analysis used the following scenario assumptions:

- If the bridge were not raised, service to and from destinations west of the bridge would be restricted based on the height of the ships above the water, resulting in the smaller ships operating on these lines. Therefore, the net global emissions benefit (which is the relevant metric for GHG emissions) would be the difference between the year-round emissions from those ships calculated by subtracting the emissions expected with the larger ships of the project from those from the smaller ships expected under the No Build Alternative.
- Container shipping operates on a weekly service basis, with 50 port calls per year for a given service of equivalent sized ships, with eight ships required for each service.
- Given fuel costs, many shipping companies have shifted to ‘slow steaming’ whereby ships operate at sea at very low speeds, requiring more ships for the same service (and longer shipping time) but resulting in considerable fuel savings per twenty-foot equivalent units (TEU)-mile.[2] For this analysis we assumed all ships operate at sea at 16 knots (this accounts for and is consistent with the assumption above, that eight ships would be required for each weekly service—higher speed would require more fuel but fewer ships). Since the analysis is demonstrating benefits from reducing shipping fuel, this assumption of less fuel consumption both with and without the raised bridge results in a conservatively low estimate of project benefits.

[1] USACE New York District, Bayonne Bridge Air Draft Analysis, September 2009.

[2] Pierre Cariou, Is slow steaming a sustainable means of reducing CO2 emissions from container shipping?, Transportation Research Part D: Transport and Environment, V16, Issue 3, May 2011, pp 260-264; and John Vidal, Modern cargo ships slow to the speed of the sailing clippers, The Guardian, July 24, 2010.

Fuel consumption for scenarios with and without the raised bridge was estimated as follows:

1. Shipping lines will generally have weekly service of a similar size ship, meaning a ship of similar size will arrive/depart on the same day every week for a given shipping line. The number of port calls in each size category was therefore divided by 50 to estimate the number of weekly services. The remainder was shifted to the next larger size category. This was repeated for each size category, each future year, with and without the project. In a few instances, corrections were made to avoid anomalies such as services appearing for a single year by shifting the service to the next larger or smaller size category. Detailed tables of projected TEU and resulting number of port calls and weekly services are presented in **Appendix E**.
2. Fuel consumption at slow steaming (16 knots) by size category was calculated based on the fuel consumption and design speeds by size category presented in **Table 12-2**, using the formula:

$$FC_{v_1} = FC_{v_0} \cdot (V_0/V_1)^{3.3}$$

where FC_{v_1} is the main engine fuel consumption at speed v_1; and V_0 is the design speed for vessels of that size category.[1]

Table 12-2
Fuel Consumption Rates at Sea

Vessel Size Category (TEU)	**Fuel Consumption**[1] (metric tons/day @design speed, main engine)	**Design Speed**[1] (knots)	**Fuel Consumption**[2] (metric tons/day @slow steaming 16 knots, main engine)
10,000 & up	367.0	25.1	**83.0**
9,000 to 9,999	292.0	25.1	**66.1**
8,000 to 8,999	260.0	24.9	**60.4**
7,000 to 7,999	230.0	25.1	**52.0**
6,000 to 6,999	203.4	25.3	**44.8**
5,000 to 5,999	171.3	24.5	**42.0**
4,000 to 4,999	136.4	23.9	**36.3**
3,000 to 3,999	106.4	22.4	**35.1**
Sources: (1) Notteboom, T. and Carriou, P., 2009; and (2) AKRF.			

3. Emissions were then calculated by multiplying the number of services in each size category by 8 ships per service and by the daily fuel consumption per ship of that size at 16 knots. The total was then summed and multiplied by 208 days of operation at sea per year.[2]

[1] Notteboom, T. and Carriou, P., 2009, "Fuel surcharge practices of container shipping lines: Is it about cost recovery or revenue making?" Proceedings of the 2009 International Association of Maritime Economists.

[2] OECD, 2008, The Environmental Impacts of Increased International Maritime Shipping—Past Trends And Future Perspectives, pg. 29.

This analysis scenario does not include auxiliary engines (both at sea and while docked) or cold ironing (power supplied to ships from shore while docked). It was assumed that this energy consumption would not change as a result of the shift to larger ships. Although auxiliary needs do increase with the size of the ship, they do not increase proportionally to the ship cargo capacity. This would result in some additional energy savings that have been neglected here. Therefore, this assumption is conservative, resulting in a lower calculated project energy benefit.

The analysis also neglects potential changes in assist tug boat emissions. Assist tug emissions may increase when pulling a larger vessel, and for the largest vessels, three tugs may be needed instead of the two normally required; however, the overall number of tug assists would decrease. These two potential changes would offset each other, and any potential change in the assist tug emissions within the harbor would be very minor as compared to the change in ocean going container ship emissions.[1]

Construction and Materials

Direct GHG emissions associated with construction were estimated based on the detailed construction engine operation estimates presented in the Air Quality section of Chapter 16, “Construction Effects” by summing the fuel consumption from the NONROAD emissions model (used to produce air pollutant emissions) for all engines and hours of operation. The project was estimated to require 933 thousand gallons of diesel for nonroad engines.

Indirect emissions associated with materials were calculated based on estimates of iron, steel, and cement needed for the project. Metals and cement represent the majority of materials required by the project and are also the materials with the highest embedded emissions (emissions associated with energy use and direct CO_2 emissions from production).

The construction is estimated to require 145 thousand cubic yards of concrete with a cement content of 400 kilograms per cubic meter, resulting in approximately 44 thousand metric tons of cement used. An emission factor of 0.928 metric tons of CO_2e per metric ton of cement produced was applied to estimate emissions associated with energy consumption and process emissions for cement production.[2]

The construction is estimated to require approximately 18 thousand metric tons of steel (including structural, rebar, post-tensioning strands, and suspender ropes). An emission factor of 0.6 metric tons of CO_2e per metric ton of steel product produced was applied to estimate emissions associated with production energy consumption,[3] and a factor of

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[1] The total tug assist emissions associated with vessels that traverse Kill Van Kull in the 2008 emissions inventory are estimated at approximately 7,800 tons per year CO_2e; any change would be a fraction of that total. Based on emissions and activity data in *PANYNJ, 2008 Multi-Facility Emissions Inventory of Cargo Handling Equipment, Heavy-Duty Diesel Vehicles, Railroad Locomotives and Commercial Marine Vessels, December 2010*.

[2] The Portland Cement Association, Life Cycle Inventory of Portland Cement Manufacture, 2006

[3] Arpad Horvath et al., Pavement Life-cycle Assessment Tool for Environmental and Economic Effects, Consortium on Green Design and Manufacturing, UC Berkeley, 2007.

0.65 metric tons of CO_2e per metric ton of steel product produced was applied for process emissions associated with iron and steel production.[1]

On-road emissions would include emissions from 1,381 thousand truck miles and 3,679 thousand personal vehicle miles (including cars, SUVs, and vans). Personal vehicle miles were based on an average round-trip distance of 19.74 miles[2] and truck miles were calculated for specific destinations. An average combined emission factor of 567 and 1,407 grams CO_2e per mile for cars and trucks, respectively, were applied based on the guidance in the *CEQR Technical Manual*.

12-4 AFFECTED ENVIRONMENT

Consistent with the NYSDEC guidance, the GHG analysis was not prepared for existing conditions, but focuses on the future with the project as compared with the No Build alternative.

12-5 ENVIRONMENTAL CONSEQUENCES

12-5-1 NO BUILD ALTERNATIVE

Under the No Build Alternative scenario, shipping operations would continue to grow, but the size of ships serving destinations west of the bridge would be limited, precluding the use of more fuel-efficient larger ships and the ensuing reduction in GHG emissions. Since construction would not be required, no construction emissions would occur.

12-5-2 RAISE THE ROADWAY ALTERNATIVE

12-5-2-1 POTENTIAL IMPACTS OF GLOBAL CLIMATE CHANGE

In New York City, the Climate Change Adaptation Task Force is tasked with securing the city's critical infrastructure against rising seas, higher temperatures, and fluctuating water supplies projected to result from climate change. The Task Force is composed of over 35 New York City and State agencies, public authorities, and companies that operate, regulate, or maintain critical infrastructure in New York City. To assist the task force, the New York City Panel on Climate Change (NPCC), has prepared a set of climate change projections for the New York City region and has suggested approaches to create an effective adaptation program for critical infrastructure.[3] The NPCC includes leading climatologists, sea-level rise specialists, adaptation experts, and engineers, as well as representatives from the insurance and legal sectors. The climate change projections include a summary of previously published baseline and projected climate conditions throughout the 21st century. The NPCC projects that sea levels are likely to increase by 12 to 23 inches by the end of the century, with possible increase up to 55 inches in the event of rapid ice melt. In general, the probability of higher sea levels is

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[1] Based on 42.3 teragrams of CO_2e emitted and 65,460 thousand tons produced; EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2009, April 15, 2011.

[2] A one-way average commuting distance in the New York City Metropolitan Area of 9.87 miles was obtained from—Oak Ridge National Laboratory, 2001 National Household Travel Survey, New York Add-On—New York City—Bronx, Kings, Queens, New York, Richmond (5 County Area), May 2004.

[3] New York City Panel on Climate Change, *Climate Change Adaptation in New York City: Building a Risk Management Response*, Annals of the New York Academy of Sciences, May 2010.

characterized as “extremely likely,” but there is high uncertainty regarding the probability of a rapid ice melt scenario. Intense hurricanes are characterized as ‘more likely than not’ to increase in intensity and/or frequency, and the likelihood of changes in other large storms (Northeasters) are characterized as unknown. Therefore, the projections for future 1-in-100 coastal storm surge levels for New York City include only sea level rise at this time (excluding the rapid ice melt scenario), and do not account for changes in storm frequency.

Based on the above NPCC data, it is reasonable to assume that sea level and floodplains would increase by up to 2 feet by the end of the century, with a smaller chance of increases up to 4.5 feet.

The extent of the 1-in-100 and 1-in-500 floodplains is presented in **Figure 6-1** in Chapter 6, “Natural Resources.” Based on the NPCC projections, by the end of the century the 1-in-100 floodplain could extend further, encompassing an area roughly equivalent to the current 1-in-500 floodplain. The 1-in-500 floodplain in the future could extend further south in Staten Island and further north in Bayonne (by roughly 750 feet at most). However, neither of these levels would flood the bridge approaches or the bridge itself even in future conditions.

Sea level rise would reduce the air draft (the distance between the bottom of the bridge and the water) for ships traversing under the bridge by 2 feet by the end of the century, with a smaller chance of 4.5 feet. The current design would result in an air draft of 215 feet at mean high tide when constructed, which would likely be reduced by sea level rise to within the range of 210.5 to 213 feet by the end of the century. This may limit somewhat the ability of the tallest ships to traverse Kill Van Kull, especially at high tide, but is expected to affect only a very small number of ships.

Although other climate parameters may be affected, including wind, temperature, and precipitation, the projected changes in these parameters are much more uncertain at this time and would have little or no impact on the project.

12-5-2-2 GREENHOUSE GAS EMISSIONS

Construction Emissions

GHG emissions from construction activity, deliveries, and materials are presented in **Table 12-3**. The total emissions are estimated at approximately 79,000 metric tons CO_2e. This does not include additional emissions which may result from international shipping of materials such as cement, steel, and aggregate. For example, the project would require a total of approximately 62 thousand tons of cement and steel; if shipped from South America or China, an additional 12 to 28 thousand metric tons CO_2e would be emitted, bringing the total construction emissions within the range of 89 to 105 thousand metric tons CO_2e.

Table 12-3
Greenhouse Gas Emissions (Excludes International Shipping)

Component	Quantity	Units	Emission Factor (metric tons CO_2e/unit)	Total Emissions (metric tons CO_2e)
Materials Embedded:*				
Cement	44,344	metric tons	0.928	41,151
Steel	18,144	metric tons	1.25	22,603
Non-road Engines (diesel):	968,127	gal. diesel eq.	0.0101	9,822
On-Road Vehicles:				
Trucks	1,381,534	VMT	0.00141	1,944
Worker vehicles	3,679,530	VMT	0.000567	2,087
Marine Transport (propulsion + auxiliary)*	501,260	kWh	0.000690	346
			Total:	**79,033**

Notes:
Numbers are presented at analysis precision level. Sums may not add up due to independent rounding.
* Emissions do not include extensive additional shipping such as international shipping of steel, if steel is imported.

Operational Emissions

Based on the scenario described above, the increased efficiency of larger ships afforded by raising the bridge would reduce the total annual GHG emissions from all ships serving destinations west of the bridge by 3 to 7 percent, resulting in a net reduction of 11.6 million metric tons of direct CO_2 emissions over a period of 21 years, up to 1.1 million metric tons per year in 2037. As a point of reference, this reduction is equivalent to reducing 0.6 percent on average, and up to 1.3 percent by 2037, of total direct emissions from the transportation sector in New York State—a considerable achievement for a single project.[1]

In addition to the direct emissions benefit, energy and fuel is required to produce, process, and transport the fuels used by ships (upstream emissions), resulting in additional emissions equivalent to approximately 11 percent of those emitted directly by ship engines.[2] Total fuel-cycle benefits including direct and upstream emissions would, therefore, be 11 percent higher than the direct emission presented above.

The total cost of construction is estimated to be in the range of 600 to 800 million dollars, which would represent an investment cost effectiveness in the range of $52 to $69 per ton GHG reduced. The returned fuel savings, assuming the 2011 fuel cost of $2.39 per gallon of bunker fuel,[3] would be approximately 2.3 billion dollars for 20 years of operation, or $203 saved per ton GHG reduced. The net societal cost effectiveness therefore would be a savings in the range of $135 to $150 per ton of GHG reduced. This represents a substantial benefit for a single project.

[1] If compared with emissions in New Jersey, the fraction would be higher since the transportation emissions reported in New Jersey's GHG inventory are lower than New York's.

[2] Energy Use and Emissions from Marine Vessels: A Total Fuel Life Cycle Approach, J. J. Winebrake, J.J. Corbett and P.E. Meyer, Journal of the Air & Waste Management Association, Vol. 57, January 2007.

[3] EIA, Short-Term Energy and Summer Fuels Outlook, 2011 No. 6 Residual Fuel Oil Price, http://www.eia.gov/forecasts, accessed 4/11/2012.

Net Project Benefits

The net benefit from reducing shipping emission far outweighs the emissions associated with construction. Construction emissions would be in the range of 62,000-90,000 metric tons CO_2e. The reduction in shipping emissions by 2017 would be more than 100,000 ton CO_2e per year—more than the total construction emissions—and would grow rapidly in successive years. All reductions in subsequent years would therefore represent a net benefit, and would continue for many years.

12-6 MEASURES TO REDUCE ENERGY USE AND GHG EMISSIONS AND CONSISTENCY WITH POLICIES

The project is expected to result in a net reduction in GHG emissions due to the increased efficiency of larger ships, and mitigation is not required. Nonetheless, bridge construction would result in GHG emissions associated with engine operation and the use of materials and, therefore, this section reviews potential options for reducing GHG emissions from construction.

To reduce energy use and associated emissions from bridge operation, bridge lighting design will be optimized for energy performance.

To address emissions associated with construction, several measures will be required via construction contracts to reduce direct emissions and upstream emissions associated with construction materials and their transportation:

- *Supplementary Cementitious Materials (SCM)*: Construction contracts would require the use of fly ash, slag, silica fume, calcined clay, and/or interground limestone to the extent practicable for all on-site concrete preparation and/or pre-fabricated concrete components, contingent upon meeting the project's concrete specifications. Depending on the practicable level of implementation, these measures may reduce emissions by as much as 10,000 metric tons CO_2e.
- *Reducing Concrete Waste*: Construction contracts would require contractors to make efforts to reduce concrete waste. Concrete is wasted when concrete cannot be poured on site for reasons such as timing, quality control, or quantity estimates (e.g., leftover concrete from the last pour of the day). In such cases, concrete can be poured as blocks or sidewalk slabs for later use.
- *Optimize Cement Content*: Contractors will be required to optimize cement content according to project specifications.
- *Waste Minimization*: The construction contracts will require that excavated materials are reused on-site as fill to the extent practicable. If any materials do need to be removed, they will be transported to the nearest reuse or disposal site practicable.
- *Recycled Steel*: If all steel were recycled, it is estimated that the emission of approximately 9,000 metric tons CO_2e would be avoided. While the strength requirements for the steel on this project prevent use of 100 percent recycled steel, all steel used for structural, rebar, post-tensioning strands, and suspender ropes will consist of 75-95 percent recycled steel, as available. If all project steel consists of

75 percent recycled material, GHG emissions from steel production would be reduced by an estimated 6,800 metric tons CO_2e.

In addition, the following measures will be implemented where practicable:

- *Local Materials Sourcing*: The use of local materials can substantially reduce emissions from transportation. Where practicable, PANYNJ will encourage subcontracting activities, including material delivery and service provision, be procured from local business enterprises.
- *Biodiesel*: Biodiesel could be used for non-road engines during construction. The options for use of biodiesel blends for non-road engines (B5 or B20) will be investigated and incorporated if found to be practicable. This could reduce project emissions by approximately 1,000 metric tons CO_2e if a B20 blend is used.

Chapter 13: Noise

13-1 INTRODUCTION

This chapter assesses the potential noise and vibration effects resulting from operation of the proposed project. Noise is unwanted sound. In a community, noise can come from a wide variety of sources including transportation sources (such as automobiles, trucks, buses, trains, and aircraft), stationary sources (such as manufacturing facilities, HVAC systems, and utility operations), natural sources (such as animals, insects, and wind) and from people (talking, and just going about their business). Environmental noise is composed of sounds from moving as well as stationary sources, and varies from place to place and from time to time.

The level of highway traffic noise primarily depends on the following four factors:

- Volume of traffic;
- Speed of traffic;
- Number of trucks in flow of traffic; and
- Distance from the traffic.

Vibration is a periodic motion or oscillation about an equilibrium position. Vibration can result in the feelable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and even rumbling sounds. High vibration levels can result in architectural or structural damage. Similar to noise, vibration can come from a variety of sources including the operation of mechanical equipment and from transportation. Absent roadway discontinuities vehicular roadways do not result in vibration levels that are perceptible or result in architectural or structural damage. However, sensitive receptor locations near construction-related activities have the potential for exposure to high vibration levels. Consequently, since no significant roadway discontinuities would be expected with the proposed project, vibration resulting from the operation of the proposed project is not of concern, and is discussed only in connection with construction in Chapter 16, “Construction Effects”.

13-2 ACOUSTICAL FUNDAMENTALS

13-2-1 “A”-WEIGHTED SOUND LEVEL (DBA)

Noise is typically measured in units called decibels (dB). Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. One of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network, known as A-weighting in the measurement system, to simulate the response of the human ear. For most noise assessments, the A-weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In the current study, all measured noise levels are reported in dBA or A-weighted decibels.

Table 13-1 lists typical noise levels, in dBA, generated by different sources.

Table 13-1
Common Noise Levels

Sound Source	(dBA)
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters	100
Freight train at 30 meters	
Train horn at 30 meters	90
Heavy truck at 15 meters	
Busy city street, loud shout	80
Busy traffic intersection	
Highway traffic at 15 meters, train	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial areas or residential areas close to industry	
Background noise in an office	50
Suburban areas with medium density transportation	
Public library	40
Soft whisper at 5 meters	30
Threshold of hearing	0

Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decrease halves the apparent loudness.
Source: Cowan, James P. *Handbook of Environmental Acoustics*. Van Nostrand Reinhold, New York, 1994.
Egan, M. David, *Architectural Acoustics*. McGraw-Hill Book Company, 1988.

13-2-2 COMMUNITY RESPONSE TO CHANGE IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well documented (see **Table 13-2**). Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas 10 dBA changes are normally perceived as doublings (or halving) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels. It is also possible to characterize the effects of noise on people by studying the aggregate response of people in communities. The rating method used for this purpose is based on a statistical analysis of the fluctuations in noise levels in a community, and integrating the fluctuating sound energy during a known period of time, most typically during 1 hour or 24 hours. Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating response is incorporated into the community response scale proposed by the International Standards Organization (ISO) of the United Nations (see **Table 13-3**). This scale relates changes in noise level to the degree of community response and permits direct estimations of the probable response of a community to a predicted change in noise level.

Table 13-2
Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A dramatic change
40	Difference between a faintly audible sound and a very loud sound

Sources: Bolt Beranek and Neuman, Inc., *Fundamentals and Abatement of Highway and Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

Table 13-3
Community Response to Increases in Noise Levels

Change (dBA)	Category	Description
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very Strong	Vigorous community action

Sources: International Standards Organization, *Noise Assessment with Respect to Community Responses*, ISO/TC 43 (New York: United Nations, November 1969)

13-2-3 NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit of dBA describes a noise level at just one moment and because very few noises are constant, other ways of describing noise over more extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific period, as if it were a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," or $L_{eq(1)}$, can be computed. This is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as L_{eq24}), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors—such as L_1, L_{10}, L_{50}, and L_{90}—are sometimes used to indicate noise levels that are exceeded 1, 10, 50, and 90 percent of the time, respectively. Discrete event peak levels are given as L_1 levels.

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq} will approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} will be approximately equal to the L_{10} value. If there are extreme fluctuations, the L_{eq} will exceed the background level by 10 or more decibels. Thus, the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise.

In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}. The relationship between L_{eq} and exceedance levels has been used in the current studies to characterize noise sources and to determine the nature and extent of their impact at all receptor locations.

For purposes of the proposed project, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. $L_{eq(1)}$ is a noise descriptor that is widely used for project impact evaluation, including stationary source equipment noise impact evaluation, and is used to provide an indication of highest expected sound levels.

13-3 NOISE STANDARDS AND CRITERIA

There are a variety of noise standards and guidelines that have been promulgated by various federal, state, and city agencies. Some of these agencies criteria are discussed below. However, none of these criteria are directly applicable to the proposed project.

13-3-1 FHWA, NYSDOT, AND NJDOT CRITERIA

The New York State Department of Transportation (NYSDOT) and the New Jersey Department of Transportation (NJDOT) have noise criteria that they use for projects subject to their jurisdiction. These agencies have adopted the noise criteria of the Federal Highway Administration (FHWA). In accordance with FHWA regulations and NYSDOT and NJDOT policy, a traffic noise impact occurs when either one of the following conditions occurs:

- the predicted traffic noise levels associated with a project alternative would approach or exceed the FHWA established noise abatement criteria (NAC); or
- the predicted traffic noise levels would substantially exceed the existing noise levels.

13-3-2 FHWA NOISE ABATEMENT CRITERIA (NAC)

A proposed project is considered to cause a traffic noise impact if predicted noise levels with a project alternative approach or exceed the FHWA NAC shown in **Table 13-4**. "Approach" is defined as being within 1 dBA of the NAC.

Noise impacts also occur when the predicted future traffic noise levels from a roadway project substantially exceed or increase the existing noise levels. NYSDOT defines substantially exceeding or a substantial noise increase as an increase of six (6) decibels or more above existing noise levels. Typically, such an increase could occur if traffic volumes quadrupled (assuming no change in vehicle mix or speed) or the distance between the receptor and the source decreased by a factor of four. A combination of a less than fourfold traffic increase with a less than fourfold decrease in source-receptor distance could also increase noise levels by 6 decibels.

Table 13-4
FHWA Noise Abatement Criteria
Hourly A-Weighted Sound Levels (dBA)

Activity Category(1)	$L_{eq(1)}$(2)	Description of Activity Category
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Residential.
C	67 Exterior	Active sport areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52 Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E(3)	72 Exterior	Hotels, motels, offices, restaurants/bars and other developed lands, properties or activities not included in A to D or F.
F		Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (e.g., water resources, water treatment, electrical), and warehousing.
G		Undeveloped lands that are not permitted.

Note:
(1) Activity Criteria are for impact determination only and design standards for noise abatement measures.
(2) $L_{eq(1)}$ means hourly A-weighted equivalent sound level, in dBA.
(3) Includes undeveloped lands permitted for this Activity Category.

13-3-3 NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION CRITERIA

The New York State Department of Environmental Conservation (NYSDEC) published a guidance document titled “Assessing and Mitigating Noise Impacts” (October 6, 2000). This document states that (1) increases from 0-3 dBA should have no appreciable effect on receptors; (2) increases of 3-6 dBA may have the potential for adverse impact only in cases where the most sensitive of receptors are present; and (3) increases of more than 6 dBA may require a closer analysis of impact potential, depending on existing noise levels and the character of surrounding land uses and receptors. Futhermore it states that in terms of threshold values, the addition of any noise source in a non-industrial setting should not raise the ambient noise level above a maximum of 65 dBA. Ambient noise levels in industrial or commercial areas may exceed 65 dBA with a high end of approximately 79 dBA. Projects that exceed these guidance levels should explore the feasibility of implementing mitigation.

13-3-4 NEW YORK CITY CRITERIA

The 2012 *CEQR Technical Manual* has set external noise exposure standards; these standards are shown in **Table 13-5**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable. Noise exposure limits are dependent upon the receptor land use.

Table 13-5
Noise Exposure Guidelines
For Use in City Environmental Impact Review[1]

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	------- $Ldn \leq 60$ dBA -------						
Hospital, Nursing Home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA	------- $60 < Ldn \leq 65$ dBA -------	$65 < L_{10} \leq 80$ dBA	(I) $65 < Ldn \leq 70$ dBA, (II) $70 \leq Ldn$	$L_{10} > 80$ dBA	------- $Ldn \leq 75$ dBA -------
Residence, residential hotel or motel	7 AM to 10 PM	$L_{10} \leq 65$ dBA		$65 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
	10 PM to 7 AM	$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, out-patient public health facility		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
Commercial or office		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

Notes:
(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more;
[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.
[2] Tracts of land where serenity and quiet are extraordinarily important and serve an important public need and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and old-age homes.
[3] One may use the FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.
[4] External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).
Source: New York City Department of Environmental Protection (adopted policy 1983).

The 2012 *CEQR Technical Manual* specifies criteria for defining when a proposed project would result in a significant adverse noise impact. That criteria is as follows:

- An increase of 5 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over those calculated for the No Build condition, if the No Build levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.

- An increase of 4 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are greater than 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

13-3-5 PROJECT IMPACT CRITERIA

For purposes of determining permanent project noise impacts, an increase of 3 dBA in $L_{eq(1)}$ would be considered a significant adverse noise impact.

13-4 EXISTING CONDITIONS

Existing noise level measurements were performed at four (4) continuous noise measurement sites (i.e., sites A to D) and eight (8) short-term noise measurement sites (i.e., sites 1 to 8) in the vicinity of the Bayonne Bridge. The monitoring locations were chosen based on their proximity to areas with the highest potential for noise impacts (i.e., residential, place of worship, schools, parks). The selected noise monitoring sites are representative of other sensitive noise receptors in the immediate area, and are generally the locations where maximum project impacts would be expected due to their proximity to the construction site and the associated land use. The receptor locations for New Jersey Approach are shown on **Figure 13-1**, and the receptor locations for New York Approach are shown on **Figure 13-2**. The receptor sites are listed in **Table 13-6**.

Table 13-6
Noise Monitoring Sites

Noise Receptor	Location	Land Use(s) Represented	Type of Measurements
New York Approach			
A	Morningstar Road between Walker Street and the Route 440 Entrance	Residential	24-hour
B	Newark Avenue between Richmond Terrace and Morningstar Road	Residential	24-hour
1	St. Adalbert Place between Morningstar Road and Willow Road	Residential, Church	15-minute
2	Richmond Terrace between Winant Street and Morningstar Road	Residential	15-minute
3	Eaton Place between Innis Street and John Street	Residential	15-minute
4	Corner of Trantor Place and Hooker Place	Residential, School	15-minute
New Jersey Approach			
C	Corner of W 1st Street and JFK Blvd	Residential, Park	24-hour
D	Juliette Street between Avenue A and JFK Blvd	Residential, Playground	24-hour

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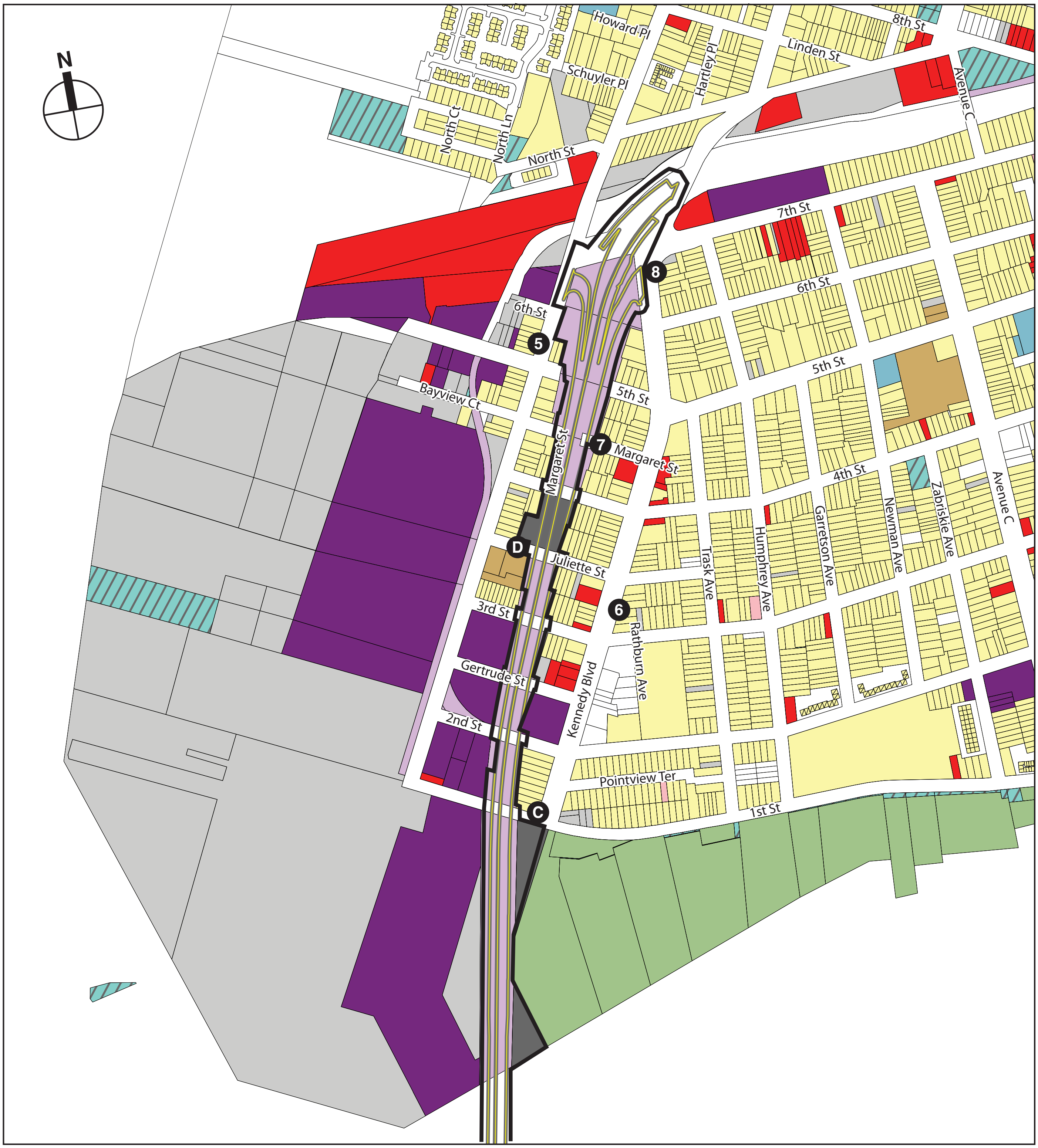


Project Site Boundary

5 Spot Noise Monitoring Receptor

C Continuing Noise Monitoring Receptor

Residential

Residential with Commercial Below

Hotels

Commercial and Office Buildings

Industrial and Manufacturing

Transportation and Utility

Public Facilities and Institutions

Open Space and Outdoor Recreation

Parking Facilities

Vacant Land

Vacant Building

Under Construction

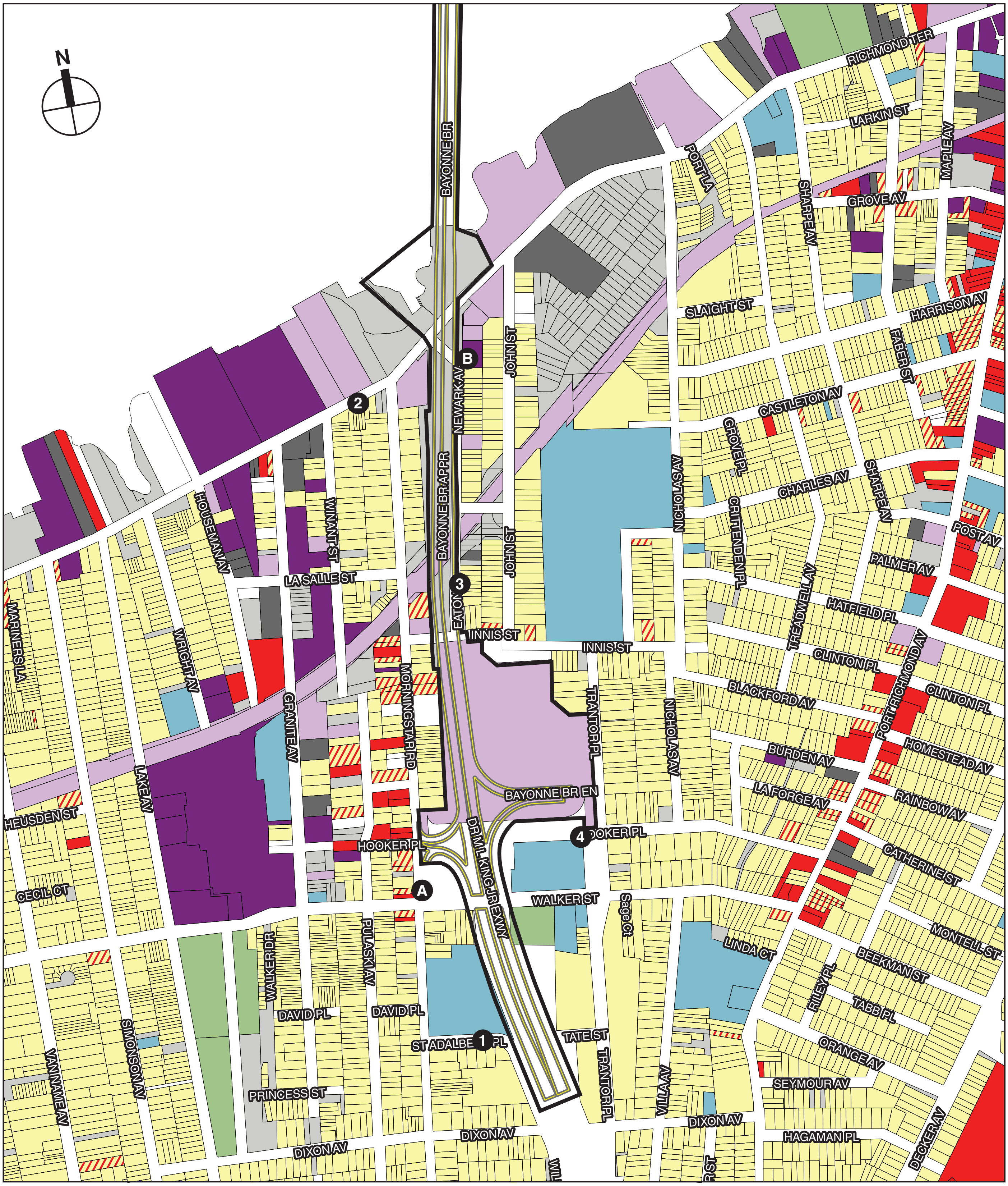
0 580 1160 FEET

SCALE

Noise Receptor Locations – New Jersey

Figure 13-1

6.5.12



Project Site Boundary

1 Spot Noise Monitoring Receptor

A Continuing Noise Monitoring Receptor

Residential

Residential with Commercial Below

Hotels

Commercial and Office Buildings

Industrial and Manufacturing

Transportation and Utility

Public Facilities and Institutions

Open Space and Outdoor Recreation

Parking Facilities

Vacant Land

Vacant Building

Under Construction

0 580 1160 FEET

SCALE

Noise Receptor Locations – New York

Figure 13-2

Table 13-6, cont'd
Noise Monitoring Sites

Noise Receptor	Location	Land Use(s) Represented	Type of Measurements
New Jersey Approach, cont'd			
5	Avenue A between W 5th Street and Bayonne Bridge Entrance	Residential	15-minute
6	JFK Blvd between W 3rd Street and Juliette Street	Residential	15-minute
7	Margaret Street between Avenue A and JFK Blvd	Residential	15-minute
8	JFK Blvd between W 6th Street and 7th Street	Residential	15-minute

13-4-1 NOISE MEASUREMENT PROCEDURES

At each of the continuous measurement locations, 24-hour continuous noise measurements were made on a weekday and a weekend day. At each of the short-term measurement locations, 15-minute spot measurements were taken on weekdays and weekends during peak travel periods: AM (8:00-9:30), Midday (12:00-1:30 PM), PM (5:00-6:30), and Late-Night (after 10:00 PM).

13-4-2 EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLMs) Type 2270 and 2260, Brüel & Kjær Sound Level Calibrators Type 4231, Brüel & Kjær ½-inch microphones Type 4189. The Brüel & Kjær SLMs are Type 1 instruments according to ANSI Standard S1.4-1983 (R2006). For all receptor sites the instrument/microphone was mounted at a height of approximately 5 to 6 feet above the ground. Microphones were mounted at least approximately 5 feet away from any large reflecting surfaces. The SLMs were last factory calibrated on February 23, 2011, July 22, 2010, and July 30, 2010, respectively, which were valid through February of 2012 and July of 2011, respectively. The calibration of the SLMs was field-checked before and after readings using the Brüel & Kjær Type 4231 sound level calibrator with the appropriate adaptors. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the sound level meters and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_{1}, L_{10}, L_{50}, and L_{90} levels. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

13-4-3 NOISE MEASUREMENT RESULTS

At each receptor site, the dominant source of noise was vehicular traffic on the adjacent streets and vehicular traffic from the existing Bayonne Bridge. **Table 13-7** shows the a summary of the measured $L_{eq(1)}$ noise levels at the four continuous 24-hour measurement sites (Sites A though D) and **Table 13-8** shows the measured $L_{eq(1)}$ noise levels at the eight short-term measurement sites (Sites 1 through 8). Detailed tables showing site-specific measured noise parameters are provided in **Appendix F**.

Table 13-7
Existing Spot Measurement L_{eq} Noise Levels at Sites 1 through 8 (dBA)

Site	Measurement Location	Time	AM	MD	PM	LN
1	Saint Adalbert Place South between Morningstar Road and Willow Road West	Weekday	61.2	57.9	58.0	53.6
		Sunday	54.0	56.1	58.9	54.3
2	Richmond Terrace between Winant Street and Morningstar Road	Weekday	71.4	69.2	71.6	65.3
		Sunday	65.0	66.5	67.1	65.1
3	Eaton Place between John and Innis Streets	Weekday	63.7	62.4	60.4	53.7
		Sunday	56.1	57.7	57.3	54.8
4	Corner of Trantor and Hooker Places	Weekday	64.4	65.1	64.6	56.3
		Sunday	63.3	62.4	60.9	61.4
5	Avenue A between West 5th Street and NY Route 440 South Entrance Ramp	Weekday	66.2	69.6	68.0	62.6
		Sunday	64.2	64.7	64.8	57.7
6	JFK Boulevard West between West 3rd and Juliette Streets	Weekday	66.5	68.0	68.4	61.3
		Sunday	61.5	62.9	65.0	56.6
7	Margaret Street between West 4th Street and JFK Boulevard West	Weekday	62.7	61.1	61.7	56.6
		Sunday	55.5	56.9	58.1	54.1
8	JFK Boulevard West between West 6th and West 7th Streets	Weekday	71.0	70.4	72.5	64.8
		Sunday	66.1	70.5	68.2	65.2

Notes: Field measurements were performed by AKRF on June 5, 7, and 8, 2011.

Table 13-8
Existing Continuous Measurement L_{eq} Peak Hour Noise Levels at Sites A through D (dBA)

Site	Measurement Location	Time	AM	MD	PM	LN
A	Morningstar Road between Walker Street and the SR 440 Entrance	Weekday	68.5	66.9	66.9	61.7
		Sunday	62.0	66.1	62.1	59.5
B	Newark Avenue between Richmond Terrace and Morningstar Road	Weekday	68.6	60.2	66.3	61.8
		Sunday	62.4	63.0	63.2	62.1
C	Corner of West 1st Street and JFK Boulevard	Weekday	64.0	63.9	67.1	61.8
		Sunday	56.2	64.6	63.0	60.3
D	Juliette Street between Avenue A and JFK Boulevard	Weekday	64.2	63.4	64.2	58.1
		Sunday	59.2	59.7	60.7	61.6

Notes: Field measurements were performed by AKRF on June 4, 5, 7, 8, 9, 15, 16, and 19, 2011.

13-5 ENVIRONMENTAL CONSEQUENCES

13-5-1 NO BUILD ALTERNATIVE

In the future without the proposed project in the year 2017 (No Build conditions), no significant land use changes are expected in the neighborhoods and areas surrounding the Bayonne Bridge and no significant roadway changes are expected. Future vehicular traffic on roadway segments without the project would be expected to increase by a maximum of approximately 20 percent by the year 2017 (see Chapter 10, “Transportation”). Using proportional modeling techniques, this small increase in traffic would be expected to increase $L_{eq(1)}$ noise levels by less than 1.0 dBA compared with existing noise levels. Increases of this magnitude would not be perceptible.

13-5-2 RAISE THE ROADWAY ALTERNATIVE

In the future with the project in the year 2017 (Build conditions), no significant land use changes are expected in the neighborhoods and areas surrounding the Bayonne Bridge. Future vehicular traffic on roadway segments with the project would be expected to be the same as future traffic levels without the project (see Chapter 10, “Transportation”). However, for Build conditions there would be some small changes in elevation and alignments of the reconstructed bridge. The piers on both the Bayonne and Staten Island sides would be taller than the existing piers by approximately 25’ at the lowest elevation and approximately 60’ at the highest elevation. The bridge’s approach roadways would also be widened from the existing 50 feet wide (including a six-foot-wide pedestrian walkway) to 90 feet wide (including a 12-foot-wide shared-use path). These changes in elevation and alignment would result in increases in $L_{eq(1)}$ noise levels of 0 to approximately 1.5 dBA. Consequently, noise levels in the future with the project would be similar to noise levels in the future without the project. Comparing $L_{eq(1)}$ noise levels with and without the project, the change in noise levels at any receptor location would be expected to be less than 2 dBA, an imperceptible change. Changes of this magnitude would not result in any significant impacts.

13-6 MITIGATION

There is no substantial difference expected in the noise resulting from the project, and the Build and No Build noise levels would not be perceptibly different. Noise levels in the future would be comparable to, and not substantially different from existing noise levels. In addition, no perceptible vibration levels would be expected with the proposed project. Consequently, no significant noise or vibration impacts would be expected due to the proposed project. The potential noise and vibration impacts of the project’s construction are described in Chapter 16, “Construction Effects”.

The project would not result in any significant adverse impacts to noise and vibration. Therefore, mitigation measures are not necessary.

Chapter 14: Hazardous and Contaminated Materials

14-1 INTRODUCTION

This chapter discusses the potential for the long-term operation of the Raise the Roadway Alternative to result in adverse impacts associated with hazardous waste or contaminated materials. Note that the potential for contaminated materials impacts associated with the project's construction phase is discussed in Chapter 16, "Construction Effects." As described below, project operation would not result in any significant adverse impacts related to hazardous materials because the potential for exposure to any such materials in the subsurface (i.e.. soil and groundwater) would be limited and controlled following construction. Also, any hazardous materials used, stored or disturbed following construction would be properly managed to avoid the potential for exposure.

Contaminated materials are potentially harmful substances that may be present in soil, groundwater, or building materials, and may pose a threat to human health or the environment when exposure occurs. These materials are frequently encountered during construction activities in industrial areas that have been subject to past disturbance from construction, excavation, filling and manufacturing or other industrial uses. Generally, the term "contaminated material" is used interchangeably with "regulated material" or "hazardous material," but none should be confused with "hazardous waste," which is a regulatory term.[1] This chapter assesses the potential for the presence of these materials to occur within the project site, the potential exposure to these materials after construction of the project, and the specific measures that would be employed to protect public health, promote worker safety, and safeguard the environment.

14-2 REGULATORY CONTEXT

There are numerous regulations regarding contaminated materials at the federal and state levels. Generally, these regulatory programs focus on the remediation of known site or building contamination, as opposed to screening large areas to identify potentially contaminated sites that could impact a project's construction. As such, this chapter determines whether site or building contamination is reasonably believed to exist within the project right-of-way due to on-site sources or migration of contaminants from nearby sites.

The applicable industry standards, federal regulatory requirements, and guidelines and rules for contaminated materials investigations are as follows:

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[1] "Hazardous waste" is defined in the Environmental Protection Agency (USEPA) regulations (40 C.F.R. Part 261) and refers to a subset of solid wastes that are either specific wastes listed in the regulations (listed wastes) or solid wastes possessing the characteristics of ignitability, reactivity, corrosivity, or toxicity (characteristic wastes).

- United States Environmental Protection Agency (USEPA)—National Environmental Policy Act (NEPA), 42 U.S.C. s/s 4321 (1969);
- USEPA—Clean Water Act (CWA), 33 U.S.C. s/s 1251 et seq. (1977);
- USEPA—Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. s/s 9601 et seq. (1980);
- USEPA—Resource Conservation and Recovery Act (RCRA), 42 U.S.C. s/s 321 et seq. (1976);
- USEPA—Safe Drinking Water Act (SDWA), 42 U.S.C. s/s 300f et seq. (1974);
- USEPA—National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61;
- USEPA—40 C.F.R. Parts 260, 261, 262, 263, 266, 268, and 280;
- USEPA—Asbestos Hazardous Emergency Response Act (AHERA), 40 C.F.R. Part 763;
- Occupational Safety and Health Administration (OSHA) —29 C.F.R. 1910.120, 1910.1001,1910.1101, 1926.62, and 1929.58;
- Toxic Substances Control Act (TSCA), 15 U.S.C. s/s 2601 et seq. (1976);
- OSHA—Lead: Occupational Health and Environmental Controls, 29 C.F.R. 1926.62;
- OSHA—Asbestos, 29 C.F.R. 1926.1101;
- Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986;
- Executive Order 12088—Federal compliance with pollution control standards; and
- Executive Order 12856—Federal Compliance With Right-To-Know Laws and Pollution Prevention Requirements.

The investigation for this Environmental Assessment was designed largely to satisfy the requirements of the “all appropriate inquiry” rule at 40 CFR § 312 under CERCLA. While this rule only defines the minimum requirements to establish an “innocent landowner” or similar defense from liability under CERCLA, industry practice has made this rule a *de facto* standard for establishing whether further investigation is warranted. Therefore, screening investigations meant to satisfy the “all appropriate inquiry” rule are frequently used as a standard screening tool to establish basic environmental conditions at a site.

The initial environmental assessment of a property, referred to as a Phase I Environmental Site Assessment (ESA) generally includes a records search within radii specified in American Society of Testing and Materials Standards (ASTM) E1527-05; a review of available federal, state and local regulatory agency databases; review and interpretation of historical data which may reveal evidence of historical activities and their potential to impact the environment; a site inspection; and interviews with the current and past operators at the parcel. The focus of the investigation is to determine past and current uses of a site as related to contaminated materials usage and potential for subsurface contamination.

14-3 METHODOLOGY

A Phase I ESA was completed for properties owned by Port Authority of New York and New Jersey (PANYNJ), and an Environmental Screening (ES) was completed for properties not owned by PANYNJ (see **Figures 14-1** and **14-2**). Copies of the reports are attached in **Appendix G.**

The Phase I ESA included: site reconnaissance, including a visual review of the interior and exterior portions of accessible onsite structures; a review of standard historical sources including historic aerial photographs; interviews with representatives of PANYNJ; a review of reasonably ascertainable standard Environmental Record Sources; and contact with officials of federal, state, city, and local regulatory agencies.

This ES included completion of site reconnaissance from public roadways, including a visual review of exterior portions where possible; a review of standard historical sources including historic aerial photographs; and a review of reasonably ascertainable standard Environmental Record Sources.

The hazardous and contaminated materials assessment began with identifying potential sites of concern within the study area. Reports summarizing the environmental database search were prepared by FirstSearch Technology Corporation (FirstSearch). **Table 14-1** shows the federal and state databases that were searched in general accordance with ASTM E1527-05, as well as additional sources that were reviewed.

14-4 AFFECTED ENVIRONMENT

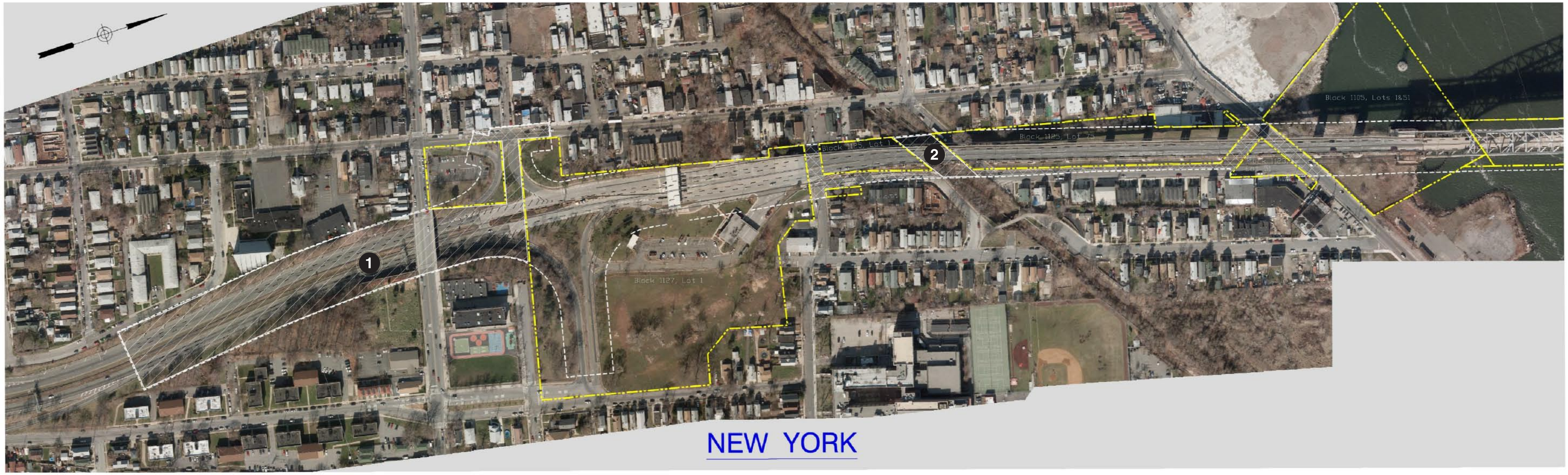
The project site is situated in an area which consists of a combination of residential, commercial, and industrial properties. In general, the project site includes the Bayonne Bridge and its elevated approaches, associated roadways including Route 440 and exit ramps, yard areas associated with residential properties, and vacant vegetated areas. In Staten Island, NY the project site also includes a toll plaza, administration building, and public parking lot. In Bayonne, NJ the project site also includes a community park, little league baseball fields, and buildings associated with a moving company and window manufacturer. Based on the United States Geological Survey (USGS) 7.5 Minute Topographic Map (United States Department of the Interior, Geologic Survey, Elizabeth, New Jersey Quadrangle, 1967, photo-revised in 1981), groundwater is expected to flow in a southwest direction in Bayonne and to the north in Staten Island. However, actual flow may vary from the estimated regional groundwater flow directions. In general, the highest topographic elevations on the project site are at the northern portion of Route 440 in New Jersey and near Walker Place in New York, sloping downward towards the Kill Van Kull.

1.23.12

Port Authority Owned Properties

Figure 14-1

1.23.12



NOTES:
1. THE AERIAL PHOTOGRAPH IS FROM THE PORT AUTHORITY DRAWING ENTITLED 'BAYONNE BRIDGE NAVIGATIONAL CLEARANCE PROGRAM REAL ESTATE - SK01' DATED MAY 27, 2011.

2. THE PROPERTY LINES FOR THE PORT AUTHORITY PROPERTIES, SHOWN IN YELLOW, ARE APPROXIMATE.

3. THE LIMITS OF NON-PORT AUTHORITY PROPERTIES ADJACENT TO PORT AUTHORITY PROPERTIES WERE OUTLINED IN THE DRAWING IDENTIFIED IN NOTE 1.

LEGEND:

NON-PORT AUTHORITY OWNED PROPERTIES LOCATED WITHIN PROJECT SITE

NON-PORT AUTHORITY OWNED PROPERTIES LOCATED WITHIN A PUBLIC ROADWAY IN PROJECT SITE

1 = MAP ID

0 350 FEET
SCALE

Non-Port Authority Owned Properties
Figure 14-2

Table 14-1
ASTM Environmental Database Source

Record/Source	Approximate Minimum Search Distances
ASTM Federal Sources	
United States Environmental Protection Agency (USEPA), National Priorities List, (NPL).	1.00 mile
USEPA, National Priorities List Delisted, (NPL Delisted).	0.50 mile
USEPA, Comprehensive Environmental Response, Compensation and Liability Information System List, (CERCLIS).	0.50 mile
USEPA, CERCLIS Archived Sites List, (NFRAP).	0.50 mile
USEPA, Resource Conservation and Recovery Information System (RCRIS), Corrective Action Sites List, (RCRA CORRACT).	1.00 mile
USEPA, RCRIS, Treatment, Storage and Disposal List, (RCRA TSD).	0.50 mile
USEPA, RCRIS Facilities List, Small and Very Small Quantity Generators List, (RCRA GEN).	0.25 mile
USEPA, Brownfields Management System (BMS), Federal Engineering and Institutional Controls, (Federal IC/EC).	0.50 mile
USEPA and Nuclear Regulatory Commission (NRC), Emergency Response Notification System (ERNS).	0.25 mile
Bureau of Indian Affairs, Indian Lands of the US, (Tribal Lands). Record/Source Distances	1.00 mile
ASTM State Sources	
New Jersey Department of Environmental Protection (NJDEP), Known Contaminated Sites List, (State/Tribal Sites).	1.00 mile
NJDEP, Emergency Response Actions and Spill Release Database, from 1990 until present (State SpillsI990).	0.25 mile
NJDEP, Solid Waste Facilities/Landfills, (State/Tribal SWL).	0.50 mile
NJDEP, Leaking Underground Storage Tanks, (State/Tribal LUST).	0.50 mile
NJDEP, Registered Underground and Aboveground Storage Tanks, (State/Tribal UST/AST).	0.25 mile
NJDEP, Engineering Control Sites, (State/Tribal EC).	0.50 mile
NJDEP, Institutional Control Sites, (State/Tribal IC).	0.25 mile
NJDEP, Voluntary Cleanup Program, (State/Tribal VCP).	0.50 mile
NJDEP, Known Contaminated Brownfields Sites (State/Tribal Brownfields).	0.50 mile
Additional Federal	
USEPA, RCRIS No Longer Regulated Facilities List, (RCRA NLR).	0.25 mile
US Department of Conservation, 2002 Census Bureau's TIGER database-individuals sensitive to environmental change, (Receptors).	0.50 mile
USEPA, National Pollution Discharge Eliminations Systems, (NPDES).	0.25 mile
USEPA, Facility Index System List, (FINDS).	0.25 mile
USEPA Toxic Release Inventory System, (TRIS).	0.25 mile
United States Department of Transportation (USDOT), Hazardous Materials Incident Response System, (HMIRS).	0.25 mile
National Compliance Date Base System (NCDB), Pesticide and Toxic Substances Compliance and Enforcement, (NCDB).	0.25 mile
EPA, PCB Activity Database System, (PADS).	0.25 mile
EPA, Aerometric Information Retrieval System, (AIRS).	0.25 mile
EPA, Integrated Compliance Information System, (DOCKET).	0.25 mile
Nuclear Regulatory Commission (NRC), Permitted Nuclear Facilities (Nuclear Permits).	0.50 mile
EPA, subset of ERNS, Air and Water Impacts Only, (Releases).	0.25 mile
EPA, Section Seven Tracking System (Federal Other).	0.25 mile
Additional State	
NJDEP, Emergency Response Actions and Spill Release Database from 1980 to 1989 (State Spills 1980).	0.25 mile
NJDEP Permits (State Permits).	0.25 mile
NJDEP, Hudson County Chromate Chemical Production Waste Sites (State Other).	0.25 mile

The project site and vicinity were historically developed with industrial activities that are known to have caused subsurface contamination and other activities that may have caused contamination. As discussed in Chapter 16, "Construction Effects," potentially contaminated soil would require characterization and proper disposal. In addition, the project would require some disturbance of structures or equipment containing lead-based paint, asbestos containing materials, or polychlorinated biphenyls (PCBs).

Table 14-2 and **Figures 14-1,** and **14-2** summarize the properties included in the Phase I ESA and ES. The Phase I ESA and ES identified evidence of known or potential concerns, known as Recognized Environmental Conditions (RECs), for the project site, as described below.

Table 14-2
List of Properties Included in Assessment

Owner		Map ID	Property
PANYNJ	Bayonne	Figure 14-1, ID 1	Block 302, Lot 3
PANYNJ	Bayonne	Figure 14-1, ID 2	Block 302, Lot 4
PANYNJ	Bayonne	Figure 14-1, ID 3	Block 312, Lot 16
PANYNJ	Bayonne	Figure 14-1, ID 4	Block 334, Lot 5
PANYNJ	Bayonne	Figure 14-1, ID 5	Block 345, Lot 1
PANYNJ	Bayonne	Figure 14-1, ID 6	Block 346, Lot 11
PANYNJ	Bayonne	Figure 14-1, ID 7	Block 361, Lot 1
PANYNJ	Bayonne	Figure 14-1, ID 8	Block 362, Lot 1
PANYNJ	Bayonne	Figure 14-1, ID 9	Block 373, Lot 3
PANYNJ	Bayonne	Figure 14-1, ID 10	Block 391, Lots 3,4,5
PANYNJ	Staten Island	Figure 14-1, ID 11	Parking Lot (unknown Block/Lot)[1]
PANYNJ	Staten Island	Figure 14-1, ID 12	Block 1127, Lot 1
PANYNJ	Staten Island	Figure 14-1, ID 13	Yard Area (Block 1124, Lot 4)[2]
PANYNJ	Staten Island	Figure 14-1, ID 14	Block 1125, Lot 1
PANYNJ	Staten Island	Figure 14-1, ID 15	Block 1125, Lot 75
PANYNJ	Staten Island	Figure 14-1, ID 16	Block 1123, Lot 51
PANYNJ	Staten Island	Figure 14-1, ID 17	Block 1105, Lots 1 and 51
Private Owner	Staten Island	Figure 14-2, ID 1	East and West of Route 440; Portion of Block 1133, Lot 350; and Block 1136, Lot 131
Private Owner	Staten Island	Figure 14-2, ID 2	Block 1125, Lot 17 (Former Staten Island Railway)
Private Owner	Bayonne	Figure 14-2, ID 3	Block 391, Lot 1 (Former Pirelli Cable Corporation)
Private Owner	Bayonne	Figure 14-2, ID 4	Block 373, Lot 4 through 12 (Portion of)
Private Owner	Bayonne	Figure 14-2, ID 5	Block 392, Lot 1 (Portion of)
Private Owner	Bayonne	Figure 14-2, ID 6	Route 440, Former Route 169, Block 504, Lot 19.02 (Portion of)

Notes:
1. The parking lot with an unknown Block/Lot is located northeast of the intersection of Morningstar Road and Walker Street in Staten Island, New York.
2. The yard area is associated with an eastern adjacent residence (117 Innis Street).

14-4-1 HISTORIC FILL

The project site was disturbed for the construction of the Bayonne Bridge prior to 1931 and was likely filled for site grading. In addition, known filling events occurred at Bayonne Block 391, Lots 3, 4 and 5 and Staten Island Block 1105, Lots 1 and 51 to extend the shoreline into the Kill Van Kull. A quarry was present on Block 1127, Lot 1 prior to 1931. The potential exists for the project site to contain historical fill materials of unknown origin.

14-4-2 POLYCHLORINATED BIPHENYLS

PCBs were detected in site soils at Bayonne Block 345, Lot 1 at concentrations above current NJDEP Soil Remediation Standards. PANYNJ subsequently conducted a remedial action that included the excavation of soil underneath and adjacent to the bridge, and outside the limit of the playground to depths ranging from 4 to 10 inches below grade. As an active case with NJDEP (PI#G000021830), this incident would be remediated in accordance with the policies and procedures established by NJDEP. While no specific documentation was found, PCBs may be present in soil at others areas along the bridge or elsewhere in the project site.

During site reconnaissance activities, structures were inspected for the potential presence of PCB-containing materials. Small capacity transformers were located in the electrical rooms below the bridge as well as the administration building. No indications of spills or leaks from the transformers were noted. The potential exists for these transformers to contain PCBs.

14-4-3 LEAD

In the 1990s, lead was detected in shallow soils (Block 345, Lot 1) in the vicinity of the playground at concentrations ranging from 5 milligrams per kilogram (mg/kg) to 606 mg/kg at 11 locations. Lead was detected at concentrations above the NJDEP Non-Residential Soil Remediation Standard of 600 mg/kg in at least one location. Lead was detected in soil in New York at concentrations ranging from 166 mg/kg to 5,810 mg/kg at nine locations. The detected concentrations are above typical New York Soil Cleanup Objectives. The sampling locations and depths are unknown. The source of the lead is believed to be from peeling paint or previous paint removal activities. PANYNJ completed a remedial action to remove lead in surface soils at Block 391, Lots 3, 4, and 5, and the case was active with NJDEP. However, while no specific documentation was found, lead may remain in soil at Block 391, Lots 3, 4, and 5, or elsewhere near the bridge.

During site reconnaissance activities, painted surfaces on the bridge structure appeared to be in good to fair condition with some peeling areas noted. The Bayonne Bridge was constructed in 1931 and has never been repainted, with the exception of areas in poor condition which are repainted as needed. Some limited paint removal has been completed. A Lead Paint Survey Report by PANYNJ for the Bayonne Bridge confirmed the presence of lead based paint, including at the toll plaza, the steel beams of the bridge, and handrails. Lead abatement of the arch structure below the deck was initiated in 2012 to avoid conflict with the project's construction. Lead abatement work during the project would be performed on the upper bridge structure at the location of the new portals and during demolition of the existing approach structures (steel girders).

14-4-4 ASBESTOS CONTAINING MATERIALS

Suspect asbestos containing materials (ACMs) were observed during the site reconnaissance activities which included floor tile, ceiling tile, drywall, pipe wrap, and boiler insulation in the administration building (Block 1127, Lot 1). Suspect mastic was also observed on the west wall of the east room located below the portion of the Bayonne Bridge on Innis Street (Staten Island Block 1127, Lot 1). Roofing tar and shingles were noted along the main bridge support on Block 1105, Lots 1 and 51. As the site reconnaissance did not include an interior inspection of buildings occupied by tenants (Block 373, Lot 3 and Block 361, Lot 1), the possible presence of ACMs in these structures is unknown.

An Asbestos Survey Report by PANYNJ for the Bayonne Bridge confirmed the presence of ACMs, including within the electrical rooms at the abutments, and transite material at the walkway. In addition, pipe wrapping, caulking, insulation and tarring materials associated with the toll plaza were found to be ACMs.

14-4-5 SOIL STOCKPILES

Soil stockpiles were located at Block 1125, Lot 1; Block 1105, Lots I and 2; and Block 361, Lot 1. PANYNJ was not aware of the source of the soil. The environmental quality of the soil is unknown.

14-4-6 GROUNDWATER MONITORING WELL

A groundwater monitoring well was located at Block 302, Lot 4; Block 312, Lot 16; and Block 1125, Lot 51. PANYNJ was not aware of the wells, nor did they have any information on the wells. The presence of groundwater monitoring wells on the site indicated the potential for contamination.

14-4-7 ARSENIC IN SOIL AND GROUNDWATER

The property located at West First Street and Avenue A in New Jersey (Block 373, Lot 3) is known to contain elevated arsenic levels in soil and groundwater. The arsenic is believed to be attributable to historic fill (not placed by PANYNJ) and past industrial uses of the property. Arsenic concentrations in soil range from 18.3 to 10,800 mg/kg. The concentrations of arsenic in groundwater range from 140 to 144,000 microgram per liter (ug/L). Two separate arsenic plumes have been identified at Block 373, Lot 3. In accordance with the Site Remediation Reform Act (SRRA, N.J.S.A. 58:10C), a Licensed Site Remediation Professional (LSRP) will oversee the remediation of the site.

14-4-8 RAIL TRACKS AND SPUR

A rail spur was previously located on the southwestern portion of Block 362, Lot 1. Rail tracks were previously located on Block 1125, Lot 17, as well as surrounding properties. These sites may have been impacted from historic railroad operations including the loading and unloading of materials and petroleum compounds from locomotives. Additionally, the railroad bedding material is known to contain a variety of contaminants including metals, PCBs, and pesticides. The environmental quality of soil in the vicinity of the rail spur is unknown.

14-4-9 UNDERGROUND STORAGE TANKS

Sanborn maps from 1917 identified an underground storage tank (UST) on the southwestern portion of Block 1105, Lots 1 and 51. The UST appeared to be associated with a former filling station. It is unknown if the UST at the site is still present.

14-4-10 HISTORIC LAND USES

Historically, the site included buildings associated with Texaco Oil Company including a filling station (Block 1105, Lots 1 and 51), Rhem Manufacturing Company (Block 362, Lot 1), John Boyle Company (Block 346, Lot 11), and other industrial operations. While site reconnaissance did not document any impacts, the potential exists for these properties to have been impacted from the former land uses.

14-4-11 ADJACENT PROPERTIES

One or more adjacent properties have an active regulatory status and are located potentially upgradient of the site. These adjacent properties have the potential to adversely impact the project site. In addition, historic land uses for adjacent properties include a range of industrial and commercial operations, including manufacturing, gasoline stations and automotive uses.

The Richmond Terrace Radiological Site (Block 1105, Lot 26) is located adjacent to the east of the project site. This site was previously used to store high-grade uranium ore in warehouses between 1939 and 1942. Radiological contamination was identified in 1980, and several subsequent investigations have been conducted. The impacted area was determined to be isolated in the northwest corner of the site and does not present an immediate health risk. However, engineering controls should be maintained and disturbance of the contaminated area should be avoided. The Richmond Terrace Radiological Site does not appear to pose a threat to the Port Authority's adjacent property.

14-5 ENVIRONMENTAL CONSEQUENCES

14-5-1 NO BUILD ALTERNATIVE

Under the No Build Alternative, the existing bridge and the remainder of the project limits would continue in their current uses. No construction staging areas would be assembled for the project. There would be no significant health risks associated with the No Build Alternative. However, the potential for contamination exists on PANYNJ property due to historical uses, as well as the presence of stockpiles of soil and monitoring wells of unknown origin. The arsenic impacted soil and groundwater at Block 373, Lot 3 would be remediated in accordance with SRRA, N.J.S.A 58:10C. As with the current conditions, all applicable regulatory requirements, for example those relating to asbestos, lead-based paint, chemical storage and waste disposal would need to be followed.

14-5-2 RAISE THE ROADWAY ALTERNATIVE

Following project construction, no significant potential for exposure to subsurface contamination would occur given the following measures:

- Any remaining subsurface contamination not removed or remediated during construction would not present a potential for exposure unless additional subsurface disturbance were to be required, for example for utility repairs. Where potential contamination remained, this would be addressed through a set of institutional and/or engineering controls (e.g., requiring areas to remain paved or requiring implementation of health and safety plans for subsurface utility repairs).

- Any PCBs, ACM and lead-based paint within the project limits not removed as part of construction would be abated or maintained in accordance with applicable regulatory requirements. Similarly any fuel storage tanks, maintenance-related chemicals and wastes generated by routine or non-routine operations would be managed in accordance with the applicable requirements to prevent spills or releases.
- Cleanup of hazardous spills and accidents, and management of solvents, road salt, etc. would be performed in accordance with existing standard New York State and New Jersey Department of Transportation (NYSDOT/NJDOT) procedures.

14-6 MITIGATION

With the measures described above, there would be no potential for the project to have significant adverse impacts, and no additional mitigation measures would be required.

Chapter 15: Coastal Zone Management

15-1 INTRODUCTION

The federal Coastal Zone Management (CZM) Act of 1972 was established to support and protect the distinctive character of the waterfront, and to assist coastal states in establishing policies for managing their coastal zone areas. The Coastal Zone Management Act requires that federal activities within a state's coastal zone be consistent with that state's coastal zone management plan. The New York State program, which is administered by the New York State Department of State (NYSDOS) is consistent with the federal CZM Act and provides for local implementation when a municipality adopts a local waterfront revitalization program that is consistent with the federal CZM Act. The New York City Department of City Planning (DCP) and NYSDOS provided their consistency determination concurrences in February 2013 and March 2013, respectively (see **Appendix A**). New Jersey has a federally approved coastal zone management program, which is administered by the New Jersey Department of Environmental Protection (NJDEP). This chapter reviews the applicable CZM policies for both New York and New Jersey.

15-2 REGULATORY CONTEXT

15-2-1 NEW YORK

In 1982, NYSDOS adopted a state Coastal Management Program, designed to balance economic development and preservation in the coastal zone by promoting waterfront revitalization and water-dependent uses while protecting fish and wildlife, open space and scenic areas, public access to the shoreline and farmland, and minimizing adverse changes to ecological systems and erosion and flood hazards. In accordance with the New York State program, New York City adopted a local waterfront revitalization program, the *New York City Waterfront Revitalization Program* (WRP). The program is administered by the New York City DCP. It establishes New York City's policies for development and use of the waterfront, and provides a framework for evaluating activities proposed in the coastal zone. This project is located within the coastal zone designated by New York City and is subject to New York City's Coastal Zone management policies, contained within the WRP.

The Coastal Zone Management Program consistency review process is described in federal regulation at 15 Code of Federal Regulations (CFR) 930: Federal Consistency with Approved Coastal Management Programs, as amended, as well as in the WRP. Consistency review is required for any project that: is in, or is expected to affect the resources or land or water uses of, the New York coastal zone; and requires a state-listed federal license or permit, is federally or state funded, or is a direct activity of a federal agency.

15-2-2 NEW JERSEY

NJDEP regulates coastal zone activities under N.J.A.C. Section 7:7E, CZM Policies. Section 7:7E sets forth substantive rules of NJDEP regarding the use and development of coastal resources, to be used primarily by NJDEP's Land Use Regulation Program in reviewing permit applications under the Coastal Area Facility Review Act (CAFRA), N.J.S.A. 13:19-1 et seq (as amended to July 19, 1993), Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq, Waterfront Development Law, N.J.S.A. 12:5-3, Water Quality Certification (401 of the Federal Clean Water Act), and Federal Consistency Determinations (307 of the Federal CZM Act). Because the project is outside the CAFRA Zone, consistency with CAFRA is not addressed in this assessment.

N.J.A.C. 7:7E-1.2 defines coastal waters as any tidal waters of the state and all lands lying thereunder. Coastal waters of the State of New Jersey extend from the mean high water (MHW) line out to the three geographical mile limit of the New Jersey territorial sea, and elsewhere to the interstate boundaries of the States of New York, Delaware, and the Commonwealth of Pennsylvania. The definition includes all lands outside of the coastal area as defined by CAFRA, extending from the MHW line of a tidal water body to the first paved public road, railroad, or surveyable property line (existing on September 26, 1980) generally parallel to the waterway, provided that the landward boundary of the upland area shall be no less than 100 feet and no more than 500 feet from the MHW line. The definition also includes all areas containing tidal wetlands and the Hackensack Meadowlands District as defined by N.J.S.A. 13:17-4. In New Jersey, coastal zone consistency is determined through the issuance of a Waterfront Development Permit, and consistency with applicable Coastal Zone Management Policies must be evaluated.

15-3 NEW YORK WATERFRONT REVITALIZATION PROGRAM

15-3-1 NEW YORK WATERFRONT REVITALIZATION PROGRAM POLICIES

Upon review of the New York City WRP Consistency Assessment Form (CAF), the WRP policies applicable to the project are indicated in **Table 15-1**. The following section reviews these policies and assesses their consistency with the project.

Table 15-1
List of New York CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
Policy 1: Support and facilitate commercial and residential development in areas well-suited to such development.			
1.1	Encourage commercial and residential redevelopment in appropriate coastal zone areas.		X
1.2	Encourage non-industrial development that enlivens the waterfront and attracts the public.		X
1.3	Encourage redevelopment in the coastal area where public facilities and infrastructure are adequate or will be developed.		X

Table 15-1 (cont'd)
List of New York CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
Policy 2: Support water-dependent and industrial uses in New York City coastal areas that are well-suited to their continued operation.			
2.1	Promote water-dependent and industrial uses in Significant Maritime and Industrial Areas.	X	
2.2	Encourage working waterfront uses at appropriate sites outside the Significant Maritime and Industrial Areas.	X	
2.3	Provide infrastructure improvements necessary to support working waterfront uses.	X	
Policy 3: Promote use of New York City's waterways for commercial and recreational boating and water-dependent transportation centers.			
3.1	Support and encourage recreational and commercial boating in New York City's maritime centers.	X	
3.2	Minimize conflicts between recreational, commercial, and ocean-going freight vessels.	X	
3.3	Minimize impact of commercial and recreational boating activities on the aquatic environment and surrounding land and water uses.	X	
Policy 4: Protect and restore the quality and function of ecological systems within the New York City coastal area.			
4.1	Protect and restore the ecological quality and component habitats and resources within the Special Natural Waterfront Areas, Recognized Ecological Complexes and Significant Coastal Fish and Wildlife Habitats.		X
4.2	Protect and restore tidal and freshwater wetlands.	X	
4.3	Protect vulnerable plant, fish and wildlife species, and rare ecological communities. Design and develop land and water uses to maximize their integration or compatibility with the identified ecological community.	X	
4.4	Maintain and protect living aquatic resources.	X	
Policy 5: Protect and improve water quality in the New York City coastal area.			
5.1	Manage direct or indirect discharges to waterbodies.	X	
5.2	Protect the quality of New York City's waters by managing activities that generate nonpoint source pollution.	X	
5.3	Protect water quality when excavating or placing fill in navigable waters and in or near marshes, estuaries, tidal marshes, and wetlands.		X
5.4	Protect the quality and quantity of groundwater, streams, and the sources of water for wetlands.	X	
Policy 6: Minimize loss of life, structures and natural resources caused by flooding and erosion.			
6.1	Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the condition and use of the property to be protected and the surrounding area.	X	
6.2	Direct public funding for flood prevention or erosion control measures to those locations where the investment will yield significant public benefit.		X

Table 15-1 (cont'd)
List of New York CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
6.3	Protect and preserve non-renewable sources of sand for beach nourishment.		X
Policy 7: Minimize environmental degradation from solid waste and hazardous substances.			
7.1	Manage solid waste material, hazardous wastes, toxic pollutants, and substances hazardous to the environment to protect public health, control pollution and prevent degradation of coastal ecosystems.	X	
7.2	Prevent and remediate discharge of petroleum products.	X	
7.3	Transport solid waste and hazardous substances and site solid and hazardous waste facilities in a manner that minimizes potential degradation of coastal resources.	X	
Policy 8: Provide public access to and along New York City's coastal waters.			
8.1	Preserve, protect and maintain existing physical, visual, and recreational access to the waterfront.	X	
8.2	Incorporate public access into new public and private development where compatible with proposed land use and coastal location.	X	
8.3	Provide visual access to coastal lands, waters, and open space where physically practical.	X	
8.4	Preserve and develop waterfront open space and recreation on publicly owned land at suitable locations.	X	
8.5	Preserve the public interest in and use of lands and waters held in public trust by the state and city.	X	
Policy 9: Protect scenic resources that contribute to the visual quality of the New York City coastal area.			
9.1	Protect and improve visual quality associated with New York City's urban context and the historic and working waterfront.	X	
9.2	Protect scenic values associated with natural resources.		X
Policy 10: Protect, preserve, and enhance resources significant to the historical, archaeological, and cultural legacy of the New York City coastal area.			
10.1	Retain and preserve designated historic resources and enhance resources significant to the coastal culture of New York City.	X	
10.2	Protect and preserve archaeological resources and artifacts.		X

15-3-2 ANALYSIS OF APPLICABLE POLICIES

Policy 2: Support water-dependent and industrial uses in New York City coastal areas that are well-suited to their continued operation.

Policy 2.1: Promote water-dependent and industrial uses in Significant Maritime and Industrial Areas.

The project is located within a Significant Maritime and Industrial Area (SMIA). The Kill Van Kull SMIA stretches from Howland Hook to Snug Harbor. It contains a concentration of maritime uses including a marine terminal and dry docks for ship repair. The project would preserve the long-term vitality of the area and the ports. By providing increased vertical clearance to support Post-Panamax vessels, the project would facilitate the efficient use of port infrastructure within the SMIA. Therefore, the project would be consistent with this policy.

Policy 2.2: Encourage working waterfront uses at appropriate sites outside the Significant Maritime and Industrial Areas.

By providing increased vertical clearance to support Post-Panamax vessels, the project would maximize the continued use of port infrastructure and maintain long-term vitality within the region. Therefore, the project would be consistent with this policy.

Policy 2.3: Provide infrastructure improvements necessary to support working waterfront uses.

See response to Policies 2.1 and 2.2.

Policy 3: Promote use of New York City's waterways for commercial and recreational boating and water-dependent transportation centers.

Policy 3.1: Support and encourage recreational and commercial boating in New York City's maritime centers.

By providing increased vertical clearance to support Post-Panamax vessels, the project would support commercial boating and New York City's maritime centers. Therefore, the project would be consistent with this policy.

Policy 3.2: Minimize conflicts between recreational, commercial, and ocean-going freight vessels.

The operation of the project would benefit navigation, as raising the roadway would accommodate present and anticipated navigational needs by increasing the vertical clearance of the channel by increasing the vertical clearance under the Bayonne Bridge. The horizontal clearance would remain the same. No in-water elements would be constructed as part of the project, with the exception of a new stormwater outfall from the shoreline in New Jersey. Potential impacts could include the temporary mooring of construction barges in the Kill Van Kull navigational channel. During construction, barges would be used to lower the existing road deck of the main span during demolition. Any limited, temporary closures required during construction would be closely coordinated with the United States Coast Guard (USCG) and follow acceptable protocol. Impacts from sediment re-suspension are expected to be minor, with no impacts to the navigational channel. Therefore, the proposed project would be consistent with this policy.

Policy 3.3: Minimize impact of commercial and recreational boating activities on the aquatic environment and surrounding land and water uses.

As discussed in Chapter 6, "Natural Resources," waves generated by larger vessels would not have an impact on channel bank erosion. After project completion, larger vessels translating to fewer transits and tugboats would use the Kill Van Kull to transport international cargo to the marine terminals west of the Bayonne Bridge.

During construction, the project would not result in significant adverse environmental impacts to the aquatic environment, or to surrounding land and water uses. The only project component requiring the use of barges during construction is the lowering of the main span existing road deck during demolition. A new stormwater outfall constructed on the New Jersey side of the Kill Van Kull would be the only in-water work required. Therefore, the project would be consistent with this policy.

Policy 4: Protect and restore the quality and function of ecological systems within the New York City coastal area.

Policy 4.2: Protect and restore tidal and freshwater wetlands.

As discussed in Chapter 6, "Natural Resources," no federal jurisdictional wetlands are present within the study area in New York. Wetlands identified in the Staten Island portion of the study area are considered Waters of the United States (WOUS). New York State Department of Environmental Conservation (NYSDEC) has mapped the open water portions of the Kill Van Kull as littoral zone (LZ). The LZ encompasses "all lands under tidal waters which are not included in any other category. There shall be no LZ under waters deeper than six feet at mean low water [MLW]." Although LZ wetlands are mapped for all of the open water of the Kill Van Kull within the study area, bathymetry data show that LZ is primarily restricted to a cove area along the western shoreline within the study area.

NYSDEC and NJDEP-approved Stormwater Pollution Prevention Plans (SWPPPs) and Erosion and Sediment Control (ESC) plans would implement measures (e.g., silt fencing, straw bale dikes) to protect adjacent wetlands outside of the area of disturbance and surface waters of the Kill Van Kull from stormwater runoff during construction. Therefore, the construction of the project would not result in any long-term impacts to wetlands of the region, and the project would be consistent with this policy.

Policy 4.3: Protect vulnerable plant, fish and wildlife species, and rare ecological communities. Design and develop land and water uses to maximize their integration or compatibility with the identified ecological community.

New York State-listed endangered willow oak (*Quercus phellos*) trees are present near the construction work zone on Staten Island. Measures would be implemented to avoid impacts to this species during construction, as discussed in Chapter 16, "Construction Effects." However, should these trees be impacted during construction, then any potential long-term adverse impacts to this species would be coordinated with New York Natural Heritage Program (NYNHP) and New York City Department of Parks and Recreation (NYCDPR), and measures to avoid a significant adverse ecological impact, such as planting willow oak trees during the construction of the project, would be developed in consultation with these agencies. With these measures in place, there would be no adverse impacts to the willow oak during the long-term operation of the project.

With the exception of the peregrine falcon and osprey, the threatened, endangered, or special concern species previously listed in Chapter 6, "Natural Resources," Section 6-4-5 would not be expected to occur within the study area due to the lack of appropriate habitat. Because operation of the project is not expected to increase disturbance levels above what is generated by the existing bridge and approach roadways, neither the peregrine falcon nor osprey would be impacted by the operation of the project. Both species would have the potential to occur in the study area with the same likelihood as at present.

As stated above, the peregrine falcon is known to nest on the Bayonne Bridge. The nesting season of peregrine falcons in New York City is generally from February through August. The timing of the construction would be performed in consultation with NYSDEC, NYCDEP, NJDEP, and USFWS wildlife biologists to protect (i.e., avoid nests during construction or relocation of nests/nesting platforms during construction) peregrine falcons during construction. The same procedure would be implemented should wildlife biologists determine that osprey use the bridge and the nearby platform for nesting. As such, if the falcon and osprey are determined to use the study area for nesting, it is expected that they would relocate to the bridge/nesting platforms during the long-term operation of the project. Therefore, there would be no adverse impact to peregrine falcons and osprey due to the long-term operation of the project.

Therefore, the project would be consistent with this policy.

Policy 4.4: Maintain and protect living aquatic resources.

The widening of the roadway would increase the area of overwater coverage and the associated shading of aquatic habitat within the project site. However, given the changing daily and seasonal angles of solar illumination, light would be expected to reach the water under these structures during substantial portions of the day, reducing potential impacts to aquatic biota due to shading. Additionally, the generally high turbidities on the Kill Van Kull would limit any effect of the additional shading to the first few feet of the water column—benthic communities would be relatively unaffected by the increase in shaded habitat. Lastly, because the tidal currents under the bridge(s) are strong and the bridge structure(s) would be comparatively narrow, plankton would be expected to move through the project site quickly and would not be expected to be adversely impacted by shading from the project. The height and width of the proposed bridge would not result in adverse shading impacts to aquatic biota during the long-term operation of the project.

Overall, noise resulting from the long-term operation of the project would not be expected to have any adverse impacts on the fish community. It is expected that the larger vessels would not result in a significant increase in underwater noise levels in the future with the project, as discussed in Chapter 6, "Natural Resources."

As discussed in Policy 5, stormwater management measures would be implemented in the project and would not be expected to result in adverse impacts on aquatic biota during operation. The project would not result in significant adverse impacts to aquatic biota within the project site. Therefore, the project would be consistent with this policy.

Policy 5: Protect and improve water quality in the New York City coastal area.

Policy 5.1: Manage direct or indirect discharges to waterbodies.

The project would not involve construction within the Kill Van Kull with the exception of a new stormwater outfall from the shoreline in New Jersey. During upland construction activities, measures (e.g., silt fences and straw bale dikes) to reduce stormwater runoff to the Kill Van Kull would be implemented in accordance with the SWPPP and ESC plans. Implementation of these measures would minimize the potential for stormwater runoff from upland construction areas to adversely affect water quality of the Kill Van Kull or wetlands within the potential staging area. As stated below, where dewatering is required, it is possible that the water would require treatment prior to its discharge to surface water or sewers. Prior to any such discharge, the water would be tested and the discharge would only be conducted in accordance with applicable requirements of the New York State Pollutant Discharge Elimination System (NY SPDES), New Jersey Pollutant Discharge Elimination System (NJPDES), and USACE permits. Therefore, with these measures in place, stormwater runoff and dewatering discharges during construction would not result in adverse impacts to wetlands, water quality, or aquatic biota of the Kill Van Kull.

The drainage improvements proposed as part of the project would eliminate the direct stormwater discharge from the bridge travel roadway to the Kill Van Kull and would incorporate detention with controlled release rates to the existing conveyance systems. Within New York on the bridge roadway and approach spans, stormwater would be captured, detained, and released through above ground detention ponds to NYCDEP's combined sewer system. These drainage improvements would eliminate direct discharge of stormwater runoff from the bridge travel roadway to the Kill Van Kull. The water quality improvements would provide an 80 percent reduction in total suspended solids (TSS) and 40 percent reduction of total pollutant (TP) loading that is currently discharged to the Kill Van Kull. The implementation of water quality treatment measures would result in improvements in the Kill Van Kull to water quality. Thus, with these measures in place, there would be water quality improvements in the Kill Van Kull during the long-term operation of the project. In fact, over the long term, the project would result in an overall benefit with respect to the policy.

Policy 5.2: Protect the quality of New York City's waters by managing activities that generate non-point source pollution.

Erosion and sediment control measures that comply with the "New York Standards and Specifications for Erosion and Sediment Control" such as straw bales, silt fencing, vegetative covers, and slope stabilization would be used on site to reduce the impacts of erosion and sediment on the water quality of the Kill Van Kull. Furthermore, construction of the project would comply with any conditions set forth in USCG, USACE and NYSDEC permits to protect water quality. Therefore, the project would be consistent with this policy.

Policy 5.3: Protect water quality when excavating or placing fill in navigable waters and in or near marshes, estuaries, tidal marshes or wetlands.

The project would not involve excavation or placement of fill in navigable waters of the Kill Van Kull in New York (see discussion below for New Jersey). In addition, as discussed in Policy 4.2, no federal jurisdictional wetlands are within the study area in

New York and LZ is primarily restricted to a cove area along the western shoreline within the study area. Erosion and sediment control measures implemented during upland construction activities (i.e., straw bales, silt fencing, vegetative covers and slope stabilization) would minimize the potential for water quality impacts. Therefore, the project would be consistent with this policy.

Policy 5.4: Protect the quality and quantity of groundwater, streams, and the sources of water for wetlands.

Dewatering of groundwater would most likely be required in specific locations, including the approach structure piers. Where dewatering is required, it is possible that the water would require treatment prior to its discharge into surface water or existing sewers. Prior to any such discharge, the water would be tested. Discharge of water would be conducted in accordance with applicable requirements, including state and local requirements for sewer discharge. Therefore, the project would be consistent with this policy.

Policy 6: Minimize the loss of life, structures, and natural resources caused by flooding and erosion.

Policy 6.1: Minimize losses from flooding and erosion by employing non-structural and structural management measures appropriate to the condition and use of the property to be protected and the surrounding area.

The project would require the construction of bridge approach footings within the 100-year and 500-year floodplains in both New York and New Jersey. Some of the existing approach footings would be demolished and new footings would be installed and spaced further apart than the existing footings. As discussed in Chapter 6, “Natural Resources,” in the 100-year floodplain there would be a net increase of 0.12 acres of impervious surfaces, and in the 500-year floodplain there would be a net increase of approximately 0.05 acres of additional impervious surface area that would be added through the construction of the new approach piers. The floodplain within, and adjacent to, the study area is affected by coastal flooding and would not be affected by construction or regrading/filling of the floodplain as would occur within a riverine floodplain. The construction and operation of the project would not adversely affect the hydrology of the floodplain or exacerbate flooding conditions within the project site or its immediate vicinity. No structural erosion management measures are required. Therefore, the project would be consistent with this policy.

Policy 7: Minimize environmental degradation from solid waste and hazardous substances.

Policy 7.1: Manage solid waste material, hazardous wastes, toxic pollutants, and substances hazardous to the environment to protect public health, control pollution and prevent degradation of coastal ecosystems.

The nature and origin of the fill materials is unknown throughout much of the area where ground disturbance is proposed. Typical historic fill material may contain contaminants, such as metals and polynuclear aromatic hydrocarbons (PAHs).

Therefore, as part of the project, a Construction Health and Safety Plan (CHASP) would be prepared and implemented during the soil disturbing activities. The CHASP would specify procedures for identifying and managing any encountered contaminated soil and/or underground storage tanks (including procedures for stockpiling and off-site transportation and disposal), and appropriate health and safety procedures, including the need for dust suppression. In addition, all materials (including debris) requiring off-site disposal including any containers of oil/chemicals would be removed and disposed of in accordance with applicable regulatory requirements. All debris and excavated soil requiring off-site disposal would be managed in accordance with applicable regulatory requirements, and, as necessary, tested in accordance with the requirements of the intended receiving facility. Transportation of all material leaving the site would be in accordance with applicable requirements covering licensing of haulers and trucks, placarding, truck routes, manifesting, etc. Therefore, the project would be consistent with this policy.

Policy 7.2: Prevent and remediate discharge of petroleum products.

See response to Policy 7.1.

Policy 7.3: Transport solid waste and hazardous substances and site solid and hazardous waste facilities in a manner that minimizes potential degradation of coastal resources.

See response to Policy 7.1.

Policy 8: Provide public access to and along New York City's coastal waters.

Policy 8.1: Preserve, protect and maintain existing physical, visual, and recreational access to the waterfront.

The project includes the widening of the bridge span and approaches to accommodate a 12-foot-wide shared-use (bike and walkway) path on the east side of the bridge, as opposed to the existing pedestrian path. Motorists and pedestrians would continue to have panoramic views of both shorelines and of the east and west expanses along the Kill Van Kull with the raised roadway, as well as distant views of the Manhattan skyline. Raising the roadway would not have an adverse visual impact on views to or from the bridge. Therefore, the project would be consistent with this policy.

Policy 8.2: Incorporate public access into new public and private development where compatible with proposed land use and coastal location.

See response to Policy 8.1.

Policy 8.3: Provide visual access to coastal lands, waters, and open space where physically practical.

Raising the roadway would not have an adverse visual impact on views from the bridge. Residents on nearby streets who currently have no view of the ramp approaches may have a view of the new, elevated ramp approaches. However, the elevated ramp approaches would not obstruct views of visual and aesthetic resources in the study area for these residents, such as the Kill Van Kull, parks or green space, or the Bayonne Bridge. Therefore, there would be no significant adverse visual impacts on these residents, and the project would be consistent with this policy.

Policy 8.4: Preserve and develop waterfront open space and recreation on publicly owned land at suitable locations.

See response to Policy 8.1.

Policy 8.5: Preserve the public interest in and use of lands and waters held in public trust by the state and city.

The existing Bayonne Bridge, and the land on which it is constructed, is owned and maintained by PANYNJ. All project activities would occur on PANYNJ lands with the exception of aerial easements over public streets.

Therefore, the project would be consistent with this policy.

Policy 9: Protect scenic resources that contribute to the visual quality of the New York City coastal area.

Policy 9.1: Protect and improve visual quality associated with New York City's urban context and the historic and working waterfront.

See response to Policy 8.1.

Policy 10: Protect, preserve, and enhance resources significant to the historical, archaeological, and cultural legacy of the New York City coastal area.

Policy 10.1 Retain and preserve designated historic resources and enhance resources significant to the coastal culture of New York City.

The Bayonne Bridge is eligible for listing on the National Register of Historic Places. The project would require the demolition of the bridge's existing road deck and construction of a new road deck at a higher elevation, while preserving the historic bridge's arch structure. The proposed changes to the bridge would constitute an Adverse Effect to this historic bridge under Section 106 of the National Historic Preservation Act of 1966 (NHPA). USCG has participated in the Section 106 of the NHPA process with the New York State Historic Preservation Officer (NYSHPO) and New Jersey Historic Preservation Office (NJHPO), in addition to other consulting parties. As part of this process, measures were developed to avoid or minimize to the extent practicable any adverse effects to architectural resources. Development of these mitigation measures is set forth in a Programmatic Agreement executed by the USCG, PANYNJ, ACHP, NJHPO, NYSHPO, and consulting parties (see **Appendix B**).

The following mitigation measures would be taken: Unanticipated Archaeological Discovery Program; Documentation and Curation; Historic American Engineering Record (HAER) documentation of the bridge; produce educational materials for use by local libraries, historical societies, and educational institutions; and signage and exhibits that inform the public of the history of the bridge; and a re-dedication ceremony.

A construction protection plan would be prepared to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, NJ; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents. USCG will coordinate navigation in the channel of the Kill Van Kull with the USACE.

Therefore, this project is in compliance with this policy.

15-4 NEW JERSEY COASTAL ZONE MANAGEMENT

15-4-1 NEW JERSEY COASTAL ZONE MANAGEMENT POLICIES

Upon review of the NJDEP CZM Policies with respect to Special Areas identified in the coastal zone as described in New Jersey Administration Code (N.J.A.C. Subchapter 3: Special Areas, Section 7:7E), policies that apply to the project are listed in **Table 15-2**. The following section reviews these policies and assesses the consistency of the proposed bridge project with them. The details of project-specific conditions would be addressed in more detail during the permitting phase of the project.

Table 15-2
List of New Jersey CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
	Location Rules—Special Areas		
7:7E-3.2	Shellfish Habitat		X
7:7E-3.3	Surf Clam Areas		X
7:7E-3.4	Prime Fishing Areas		X
7:7E-3.5	Finfish Migratory Pathways		X
7:7E-3.6	Submerged Vegetation Habitat		X
7:7E-3.7	Navigation Channels	X	
7:7E-3.8	Canals		X
7:7E-3.9	Inlets		X
7:7E-3.10	Marina Moorings		X
7:7E-3.11	Ports		X
7:7E-3.12	Submerged Infrastructure Routes		X
7:7E-3.13	Shipwrecks and Artificial Reefs		X
7:7E-3.14	Wet Borrow Pits		X
7:7E-3.15	Intertidal and Subtidal Shallows	X	
7:7E-3.16	Dunes		X
7:7E-3.17	Overwash Areas		X
7:7E-3.18	Coastal High Hazard Areas		X
7:7E-3.19	Erosion Hazard Areas		X
7:7E-3.20	Barrier Island Corridor		X
7:7E-3.21	Bay Islands		X
7:7E-3.22	Beaches		X
7:7E-3.23	Filled Water's Edge		X
7:7E-3.24	Existing Lagoon Edges		X
7:7E-3.25	Flood Hazard Areas	X	
7:7E-3.26	Riparian Zones	X	
7:7E-3.27	Wetlands	X	
7:7E-3.28	Wetlands Buffers	X	
7:7E-3.31	Coastal Bluffs		X
7:7E-3.32	Intermittent Stream Corridors		X
7:7E-3.33	Farmland Conservation Areas		X
7:7E-3.34	Steep Slopes		X
7:7E-3.35	Dry Borrow Pits		X
7:7E-3.36	Historic and Archaeological Resources	X	
7:7E-3.37	Specimen Trees		X
7:7E-3.38	Endangered or Threatened Wildlife or Vegetation Species Habitats	X	
7:7E-3.39	Critical Wildlife Habitats		X
7:7E-3.40	Public Open Space	X	
7:7E-3.41	Special Hazard Areas		X
7:7E-3.42	Excluded Federal Lands		X
7:7E-3.43	Special Urban Areas	X	

Table 15-2 (cont'd)
List of New Jersey CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
7:7E-3.44	Pinelands National Reserve and Pinelands Protection Area		X
7:7E-3.45	Hackensack Meadowlands District		X
7:7E-3.46	Wild and Scenic River Corridors		X
7:7E-3.47	Geodetic Control Reference Marks	X	
7:7E-3.48:	Hudson River Waterfront Area		X
7:7E-3.49	Atlantic City		X
7:7E-3.50	Lands and Waters Subject to Public Trust Rights		X
	USE RULES—GENERAL WATER AREAS		
7:7E-4.2	Aquaculture		X
7:7E-4.3	Boat Ramps		X
7:7E-4.4:	Docks and Piers for Cargo and Commercial Fisheries		X
7:7E-4.5	Recreational Docks and Piers		X
7:7E-4.6	Maintenance Dredging		X
7:7E-4.7	New Dredging		X
7:7E-4.8	Dredged Material Disposal		X
7:7E-4.9	Solid Waste or Sludge Dumping		X
7:7E-4.10	Filling		X
7:7E-4.11	Mooring		X
7:7E-4.12	Sand and Gravel Mining		X
7:7E-4.13	Bridges	X	
7:7E-4.14	Submerged Pipelines		X
7:7E-4.15	Overhead Transmission Lines		X
7:7E-4.16	Dams and Impoundments		X
7:7E-4.17	Outfalls and Intakes	X	
7:7E-4.18	Realignment Of Water Areas		X
7:7E-4.19	Breakwaters		X
7:7E-4.20	Submerged Cables		X
7:7E-4.21	Artificial Reefs		X
7:7E-4.22	Miscellaneous Uses		X
7:7E-5	Requirements for Impervious & Vegetative Cover for General Land Areas & Special Areas		X
	GENERAL LOCATION RULES		
7:7E-6.1	Rule on Location of Linear Development	X	
7:7E-6.2	Basic Location Rule	X	
7:7E-6.3	Secondary Impacts	X	
	USE RULES		
7:7E-7.2	Housing Use Rules		X
7:7E-7.3	Resort/Recreational Use		X
7:7E-7.4	Energy Facility Use Rule		X
7:7E-7.5	Transportation Use Rule	X	
7:7E-7.6	Public Facility Use Rule		X
7:7E-7.7	Industry Use Rule		X
7:7E-7.8	Mining Use Rule		X
7:7E-7.9	Port Use Rule		X
7:7E-7.10	Commercial Facility Use Rule		X
7:7E-7.11	Coastal Engineering		X
7:7E-7.12	Dredged Material Placement On Land		X
7:7E-7.13	National Defense Facilities Use Rule		X
7:7E-7.14	High Rise Structures	X	
	RESOURCE RULES		
7:7E-8.2	Marine Fish and Fisheries		X
7:7E-8.4	Water Quality	X	
7:7E-8.5	Surface Water Use		X

Table 15-2 (cont'd)
List of New Jersey CZM Policies

CZM Policy Number	CZM Policy Name	Applicable to the Project	Not Applicable to the Project
7:7E-8.6	Groundwater Use	X	
7:7E-8.7	Stormwater Management	X	
7:7E-8.8	Vegetation	X	
7:7E-8.10	Air Quality	X	
7:7E-8.11	Public Trust Rights		X
7:7E-8.12:	Scenic Resources and Design	X	
7:7E-8.14:	Traffic	X	
7:7E-8.21	Subsurface Sewage Disposal Systems		X
7:7E-8.22	Solid and Hazardous Waste	X	
Source: http://www.state.nj.us/dep/landuse/7-7e.pdf			

15-4-2 ANALYSIS OF APPLICABLE POLICIES

7:7E-3.7: NAVIGATION CHANNELS

Navigation channels are tidal water areas including the Atlantic Ocean, inlets, bays, rivers and tidal guts with sufficient depth to provide safe navigation. Navigation channels include all areas between the top of the channel slopes on either side. These navigation channels are often marked with buoys or stakes. Major navigation channels are shown on NOAA/National Ocean Service Charts. The navigability of existing navigation channels must not be impacted by dredging or development, or by siltation as a result of said dredging or development.

The operation of the project would benefit navigation, as raising the roadway would accommodate present and anticipated navigational needs by increasing the vertical clearance of the channel. The horizontal clearance would remain the same. No in-water elements would be constructed as part of the project, with the exception of one new stormwater outfall. Potential impacts could include the temporary mooring of construction barges in the Kill Van Kull navigational channel. During construction, the lowering of the existing road deck during demolition would require the use of barges. Any limited, temporary closures required during construction would be closely coordinated with USCG and would follow acceptable protocol. Impacts from sediment resuspension are expected to be minor, with no impacts to the navigational channel. Therefore, the project would be consistent with this policy.

7:7E-3.15: INTERTIDAL AND SUBTIDAL SHALLOWS

Intertidal and subtidal shallows mean all permanently or temporarily submerged areas from the spring high water line to a depth of four feet below mean low water. Development, filling, and new dredging are generally discouraged in intertidal and subtidal shallows, but may be permitted in accordance with the Use Policy for the applicable water body type (in this case, large rivers). Submerged infrastructure is conditionally acceptable, provided that there is no feasible alternative route that will not disturb intertidal and subtidal shallows, the infrastructure is buried deeply enough to avoid exposure or hazard, and all trenches are backfilled with naturally occurring sediment.

The bridge drainage and a portion of the approaches would be routed to stormwater management basins and underground detention systems within the right-of-way that convey stormwater to one new outfall in New Jersey. Construction of these elements would comply with any conditions set forth in USCG, USACE, and NJDEP permits authorizing the proposed in-water and shoreline activities.

The widening of the roadway would increase the area of overwater coverage and the associated shading of aquatic habitat within the project site. However, given the changing daily and seasonal angles of solar illumination, light would be expected to reach the water under these structures during substantial portions of the day, reducing potential impacts to aquatic biota due to shading. Additionally, the generally high turbidities on the Kill Van Kull would limit any effect of the additional shading to the first few feet of the water column—benthic communities would be relatively unaffected by the increase in shaded habitat. Lastly, because the tidal currents under the bridge(s) are strong and the bridge structure(s) would be comparatively narrow, plankton would be expected to move through the project site quickly and would not be expected to be adversely impacted by shading from the project. The proposed height and width of the proposed bridge would not result in adverse shading impacts to tidal wetlands and open waters during the long-term operation of the project. Therefore, the project would be consistent with this policy.

7:7E-3.25: FLOOD HAZARD AREAS

Flood hazard areas are areas subject to flooding from the flood hazard area design flood, as defined by the Department under the Flood Hazard Area Control Act rules at N.J.A.C. 7:13. Flood hazard areas include those areas mapped as such by the Department, areas defined or delineated as an A or a V zone by the Federal Emergency Management Agency (FEMA), and any unmapped areas subject to flooding by the flood hazard area design flood. Flood hazard areas are subject to either tidal or fluvial flooding and the extent of flood hazard areas shall be determined or calculated in accordance with the procedures at N.J.A.C. 7:13-3. Where flood hazard areas have been delineated by both the Department and FEMA, the Department delineations shall be used. Where flood hazard areas have not been delineated by the Department or FEMA, limits of the 100-year floodplain will be established by computation on a case-by-case basis. The seaward boundary shall be the mean high water line.

The project occurs within both a floodplain and riparian zone (see N.J.A.C. 7:7E-3.26 below). Although a bridge is not specifically identified as a “water dependent use” at N.J.A.C. 7.7E-1.8, the rule provides a test for water dependency. The test for water dependency shall assess both the need of the proposed use for access to the water and the capacity of the proposed water body to satisfy the requirements and absorb the impacts of the proposed use. A proposed use would not be considered water dependent if either the use can function away from the water or if the water body proposed is unsuitable for the use. In this case, because the project includes a segment of Route 440 and must cross the Kill Van Kull, water dependency is affirmed. Furthermore, the water body can absorb the proposed use because the project area includes the existing bridge.

The project would require the construction of bridge approach footings within the 100-year and 500-year floodplains in both New York and New Jersey. Some of the existing approach footings would be demolished and new footings would be installed and spaced further apart than the existing footings. As discussed in Chapter 6, “Natural

Resources," in the 100-year floodplain there would be a net increase of 0.12 acres of impervious surfaces and in the 500-year floodplain there would be a net increase of approximately 0.05 acres of additional impervious surface area that would be added through the construction of the new approach piers. The floodplain within, and adjacent to, the study area is affected by coastal flooding and would not be affected by construction or regrading/filling of the floodplain as would occur within a riverine floodplain. Therefore, the use of a portion of the 100-year and 500-year floodplain within the Staten Island and New Jersey portion of the study area for the expansion of the approach roadways and/or piers would not result in adverse impacts to floodplain resources or result in increased flooding of adjacent areas during the construction of the project. Thus, the construction of the project would be in compliance with this policy and Executive Order 11988.

7:7E-3.26: RIPARIAN ZONES

A riparian zone exists along every regulated water, except there is no riparian zone along the Atlantic Ocean nor along any manmade lagoon, stormwater management basin, or oceanfront barrier island, spit or peninsula. Regulated waters are defined in the Flood Hazard Area Control Act rules at N.J.A.C. 7:13-2.2.

The riparian zone includes the land and vegetation within each regulated water described in N.J.A.C. 7:7E, Coastal Zone Management Rules, as well as the land and vegetation within a certain distance of each regulated water as described in below. The portion of the riparian zone that lies outside of a regulated water is measured landward from the top of bank.

The width of the riparian zone along each regulated water described in (a) above is as follows:

1. The riparian zone is 300 feet wide along both sides of any Category One water, and all upstream tributaries situated within the same HUC-14 watershed;

2. The riparian zone is 150 feet wide along both sides of the following waters not identified above:

i. Any trout production water and all upstream waters (including tributaries);

ii. Any trout maintenance water and all upstream waters (including tributaries) within one linear mile as measured along the length of the regulated water;

iii. Any segment of a water flowing through an area that contains documented habitat for a threatened or endangered species of plant or animal, which is critically dependent on the regulated water for survival, and all upstream waters (including tributaries) within one linear mile as measured along the length of the regulated water; and

iv. Any segment of a water flowing through an area that contains acid producing soils; and

3. The riparian zone is 50 feet wide along both sides of all waters not identified in 1 or 2 above.

The project crosses the riparian zone of the Kill Van Kull. According to the policy for determining the riparian zone at N.J.A.C. 7:13-4.1, the portion of the riparian zone that occurs outside the regulated water is measured landward from the top of bank.

The project is not in a Category One water; therefore, the 300-foot riparian zone established at N.J.A.C. 7:13-4.1 does not apply. Category One waters are defined in the existing Surface Water Quality Standards rules at N.J.A.C. 7:9B-1.4 as "those waters designated in the tables in N.J.A.C. 7:9B-1.15(c) through (h), for purposes of implementing the antidegradation policies set forth in N.J.A.C. 7:9B-1.5(d), for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s)."

The 150-foot riparian zone established at N.J.A.C. 7:13-4.1 does not apply, because the project area is not: a) trout production or maintenance waters; b) documented habitat for a threatened or endangered species (see discussion below under Policy N.J.A.C. 7:7E-3.38 ('Endangered or Threatened Wildlife or Vegetation Species Habitats); or c) flowing through an area with acid producing soils.

The riparian zone policy at N.J.A.C. 7:13-4.1 establishes a 50-foot riparian zone for all waters not requiring the more stringent 300-foot or 150-foot zones; therefore, the riparian zone for the project is 50 feet wide.

Project elements within the riparian zone would conform to the requirements at N.J.A.C. 7:13, as appropriate. Vegetation lost within the riparian zone (if any) due to project elements would be mitigated for under the project's overall mitigation plan. Therefore, the project would be consistent with this policy.

7:7E-3.27: WETLANDS

Wetlands or wetland means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation. Development in wetlands defined under the Freshwater Wetlands Protection Act of 1987 is prohibited unless the development is found to be acceptable under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). Development of all kinds in all other wetlands not defined is prohibited unless the Department can find that the proposed development meets the following conditions:

- *Requires water access or is water oriented as a central purpose of the basic function of the activity;*
- *Has no prudent or feasible alternative on a non-wetland site;*
- *Will result in minimum feasible alteration or impairment of natural tidal circulation (or natural circulation in the case of non-tidal wetlands); and*
- *Will result in minimum feasible alteration or impairment of natural contour or the natural vegetation of the wetlands.*

If an application to disturb or destroy wetlands meets the standards for permit approval, the Department will require the applicant to mitigate for the loss or degradation of the wetlands. All mitigation proposals submitted to the Department shall be prepared in accordance with N.J.A.C. 7:7E-3B.

TEMPORARY LOSS OF WETLAND HABITAT

With respect to New Jersey wetlands, the 1.93-acre wetland area associated with the New Jersey-mapped MODD wetland in the potential staging area, would be temporarily impacted during construction (see Chapter 16, "Construction Effects," for details). In addition, an outfall would require an elevated pile-supported pipe to extend through another federal jurisdictional wetland (Wetland C). The impacts to Wetland C would be minimal and compensatory mitigation would be implemented to offset the temporary impacts during construction and minor impacts related to the outfall pipe as per USACE and NJDEP permit requirements. Therefore, the operation of the bridge would not result in adverse impacts to wetlands during the long-term operation of the project.

SHADING OF WETLAND HABITAT BY OVERHEAD STRUCTURE

The effects of shading on emergent and saline wetlands vary according to the degree of shading. Factors influencing shading include the width and height of the overhead obstruction, as well as the directional orientation of the shading structure. Depending on the amount of shade involved, impacts to vegetation can range from no discernable effect to complete loss of vegetation. In addition, even minor changes to the degree of shading to a wetland area can potentially improve the competitive advantage of invasive species over natives (Weihe and Neely 1997) or exacerbate other stressors such as water-logging (Lenssen et al 2003).[1,2] Additionally, shading may adversely affect, or be exploited by, certain fauna that occupy wetland habitats.

While qualitative effects of shading are widely known, there has been little apparent effort in broad-based development of objective standards by which the structural parameters of an overhead structure (e.g. height to width ratios, directional orientation, effective opacity, etc.) are correlated to environmental impact. In two recent research projects, however, steps to establishing a threshold value for height to width (HW) ratios have been taken. Both studies were conducted in marshes shaded by highway bridges and in adjacent reference sites in North Carolina (Struck et al. 2004 and Sanclements, M.D. 2003).[3, 4] Both studies present data that support a HW ratio of 0.7 as a threshold for impacts, below which impacts were statistically significant. Overhead structures with a HW ratio greater than 0.7 did not appear to result in substantial shading impact to the underlying marsh. Struck et al. (2004) found that bridges with height-to-width ratios greater than 1.5 had the lowest light attenuation beneath the bridge.

With respect to open water and tidal wetlands, the lowest point of the proposed bridge would be above the MHHW line with the greatest height over open water. The existing bridge height at the MHHW mark has a height-to-width ratio of 2.3, well above the 0.7 and 1.5 height-to-width ratio thresholds. The height-to-width ratio under the proposed

[1] Weihe, P.E. and R.K. Neely. The effects of shading on competition between purple loosestrife and broad-leaved cattail. *Aquatic Botany.* 59: 127-138. 1997.

[2] Lenssen, J.P.M., F.B.J. Menting, W.H. Van der Putten. Plant Responses to Simultaneous Stress of Waterlogging and Shade: Amplified or Hierarchical Effects? *New Phytologist.* 157:281-290. 2003.

[3] Struck, S.D., C.B. Craft, S.W. Broome, M.D. Sanclements, J. H. Sacco. Effects of Bridge Shading on Estuarine Marsh Benthic Community Structure and Function. Environmental Management 33-1:99 – 111. 2004.

[4] Sanclements. M.D. Effects of Shading by Bridges on Estuarine Wetlands. Masters Thesis – North Carolina State University – Soil Science. Raleigh, N.C. 2003

condition at the MHHW mark would be lower with a ratio of 2.0, but this ratio is still well above the 0.7 and 1.5 thresholds. The change in bridge deck height and width would not have an adverse impact on shading of aquatic biota or tidal wetlands during the long-term operation of the project. Therefore, the project would be consistent with this policy.

7:7E-3.28: WETLANDS BUFFERS

Wetlands buffer or transition area means an area of land adjacent to a wetland which minimizes adverse impacts on the wetlands or serves as an integral component of the wetlands ecosystem. Wider buffers than those noted below may be required to establish conformance with other Coastal Rules, including, but not limited to, 7:7E-3.38 and 3.39.

1. A wetlands buffer or transition area of up to 150 feet in width shall be established adjacent to all wetlands defined and regulated under the Freshwater Wetlands Protection Act.

2. For all other wetlands, including wetlands regulated under the Coastal Wetlands Act of 1970, a wetlands buffer of up to 300 feet shall be established.

The presence or absence of wetland buffers that could be impacted by the project would be confirmed during the permitting process, and the need for mitigation measures would be coordinated with the permitting agencies.

7:7E-3.36: HISTORIC AND ARCHAEOLOGICAL RESOURCES

Historic and archaeological resources include objects, structures, shipwrecks, buildings, neighborhoods, districts, and man-made or man-modified features of the landscape and seascape, including historic and prehistoric archaeological sites, which either are on or are eligible for inclusion on the New Jersey or National Register of Historic Places.

Development that detracts from, encroaches upon, damages, or destroys the value of historic and archaeological resources is discouraged, while adaptive reuse is encouraged. Mitigation measures must take place if the proposed development will irreversibly and/or adversely affect historic and archaeological resources.

The Bayonne Bridge is eligible for listing on the National Register of Historic Places. The project would require the demolition of the bridge's existing road deck and construction of a new road deck at a higher elevation, while preserving the historic bridge's arch structure. The proposed changes to the bridge would constitute an Adverse Effect to this historic bridge under Section 106 of the NHPA. USCG has participated in the Section 106 of the NHPA process with ACHP, NYSHPO, and NJHPO, in addition to other consulting parties. As part of this process, measures were developed to avoid or minimize to the extent practicable any adverse effects to architectural resources. Development of these mitigation measures is set forth in a Programmatic Agreement executed by USCG, PANYNJ, ACHP, NJHPO, NYSHPO, and consulting parties (see **Appendix B**).

The following mitigation measures would be taken: Unanticipated Archaeological Discovery Program; Documentation and Curation; Historic American Engineering Record (HAER) documentation of the bridge; produce educational materials for use by local libraries, historical societies, and educational institutions; and signage and exhibits that inform the public of the history of the bridge; and a re-dedication ceremony.

A construction protection plan would be prepared to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, NJ; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents. USCG will coordinate navigation in the channel of the Kill Van Kull with the USACE.

Therefore, this project is in compliance with this policy.

7:7E-3.38: ENDANGERED OR THREATENED WILDLIFE OR VEGETATION SPECIES HABITATS

Endangered or threatened wildlife or plant species habitats are areas known to be inhabited on a seasonal or permanent basis by or to be critical at any stage in the life cycle of any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or threatened species, or under active consideration for State or Federal listing. The definition of endangered or threatened wildlife or plant species habitats include a sufficient buffer area to ensure continued survival of the population of the species. Absence of such a buffer area does not preclude an area from being endangered or threatened wildlife or plant species habitat.

The peregrine falcon is known to nest on the Bayonne Bridge. The nesting season of peregrine falcons in New York City is generally from February through August. The timing of the construction would be performed in consultation with NYSDEC, NYCDEP, NJDEP, and USFWS wildlife biologists to protect (i.e., avoid nests during construction or relocation of nests/nesting platforms during construction) peregrine falcons during construction. As stated in Chapter 16, "Construction Effects," the same procedure would be implemented should wildlife biologists determine that osprey use the bridge and the nearby platform for nesting. If falcon and osprey are present in the study area, it is expected that they would relocate to the bridge/nesting platforms after construction of the project is complete.

With the exception of the peregrine falcon and osprey, the threatened, endangered, or special concern species previously listed in Chapter 6, "Natural Resources" would not be expected to occur within the study area due to the lack of appropriate habitat. Because operation of the project is not expected to increase disturbance levels above what is generated by the existing bridge and approach roadways, neither the peregrine falcon nor osprey would be impacted by the operation of the project. Both species would have the potential to occur in the study area with the same likelihood as at present. There would be no adverse impact to peregrine falcons and osprey due to the long-term operation of the project. Therefore, the project would be consistent with this policy.

7:7E-3.40: PUBLIC OPEN SPACE

Public open space constitutes land areas owned or maintained by State, Federal, county and municipal agencies or private groups (such as conservation organizations and homeowner's associations) and used for or dedicated to conservation of natural resources, public recreation, visual or physical public access or, wildlife protection or management. Public open space also includes, but is not limited to, State Forests, State Parks, and State Fish and Wildlife Management Areas, lands held by the New

Jersey Natural Lands Trust (N.J.S.A. 13:1B-15.119 et seq.), lands held by the New Jersey Water Supply Authority (N.J.S.A. 58:1B-1 et seq.) and designated Natural Areas (N.J.S.A. 13:1B-15.12a et seq.) within DEP-owned and managed lands.

Two parks (the ball fields adjacent to Dennis P. Collins Park, and Al Slootsky Playground) are within the PANYNJ right-of-way and fall within the construction work zone. Construction of the project would require closure of the two ball fields and Al Slootsky Playground. PANYNJ is working with the City of Bayonne regarding displacement of the ball fields and potential relocation of Al Slootsky Playground. (See Chapter 8, “Parklands and Recreational Resources.”) Therefore, the project would be consistent with this policy.

7:7E-3.43: SPECIAL URBAN AREAS

Special urban areas are those municipalities defined in urban aid legislation (N.J.S.A. 52:27D-178) qualified to receive State aid to enable them to maintain and upgrade municipal services and offset local property taxes. Under N.J.S.A. 52:27D-178 et seq., the Department of Community Affairs (DCA) establishes a list of qualifying municipalities each fiscal year. DCA’s list of qualifying municipalities may be obtained on request from the Department’s Land Use Regulation Program, PO Box 439, Trenton, New Jersey 08625-0439, (609) 292-0060.

Development that will help to restore the economic and social viability of special urban areas is encouraged. Development that would adversely affect the economic well being of these areas is discouraged when an alternative which is more beneficial to the special urban areas is feasible.

The City of Bayonne is listed in New Jersey's Urban Enterprise Zone (UEZ) Program with the Department of Community Affairs. The UEZ Program exists to foster an economic climate that revitalizes designated urban communities and stimulates their growth by encouraging businesses to develop and create private sector jobs through public and private investment. One of the goals of the project is to maintain the economic viability of the area. Therefore, the project would be consistent with this policy.

7:7E-3.47: GEODETIC CONTROL REFERENCE MARKS

Geodetic control reference marks (monuments, points, and rivets) are traverse stations and benchmarks established or used by the New Jersey Geodetic Control Survey. Overall, the disturbance of a geodetic control reference mark is discouraged. If these marks must be moved due to development, the New Jersey Geodetic Control Survey shall be contacted at least 60 days prior to disturbance.

Specific field investigations that would identify geodetic control reference marks have not been completed at this point in the design process. These markers would be identified and survey efforts completed to support preliminary and final engineering design. Therefore, the project would be consistent with this policy.

7:7E-4.13: BRIDGES

A bridge is any continuous structure spanning a water body, except for an overhead transmission line. Bridges are conditionally acceptable provided:

1. There is a demonstrated need that cannot be satisfied by existing facilities;

2. Pedestrian and bicycle use is provided for unless it is demonstrated to be inappropriate; and

3. Fishing catwalks and platforms are provided to the maximum extent practicable.

This shall be taken into consideration during the design phase of all proposed bridge projects.

The Bayonne Bridge carries Route 440 over the Kill Van Kull between Bayonne, NJ, and Staten Island, NY. Route 440 is a New York and New Jersey State highway that runs from Interstate 278 in Edison, NJ through Staten Island culminating at Routes 1 & 9 in Jersey City. It is the north-south freeway (Dr. Martin L. King, Jr. Expressway) through Staten Island and links the Bayonne Bridge and Outerbridge Crossing. Approximately 1,500 and 2,200 vehicles cross the bridge in the AM and PM peak hours, respectively, at average travel speeds of 50 miles per hour. The bridge carried approximately 7 million vehicles in 2010. The bridge also provides a pedestrian walkway across the Kill Van Kull. The Bayonne Bridge has a vertical navigable clearance of 151 feet above mean high tide. To allow for safe navigation of the channel, vessels are limited to a 204-foot keel to mast height (KTMH) during low tide and 199 KTMH during high tide.[1] However, the available clearance is dependent upon a number of variables including time of arrival, loading patterns, and travel patterns. Therefore, transits when maximum vertical clearance under the Bayonne Bridge is available rarely occur.

The project includes raising the roadway and widening the bridge span and approaches to accommodate a 12-foot-wide shared-use path, accommodating bicycles and pedestrians. The need for the project is documented in this Environmental Assessment, and viable or less impactful alternatives for increasing the navigational clearance do not exist. As discussed elsewhere in this assessment, to the extent safely practicable, mitigation strategies have been incorporated into the design of the project to minimize impacts. Therefore, the project would be consistent with this policy.

7:7E-4.17: OUTFALLS AND INTAKES

Outfalls and intakes are pipe openings that are located in water areas for the purpose of intake of water or discharge of effluent including sewage, stormwater and industrial effluents. Outfalls and intakes are conditionally acceptable provided that the use associated with the intake or outfall meets applicable Coastal Zone Management rules.

All construction activities would be conducted in accordance with applicable water quality regulations as defined in this rule. The stormwater outfall and associated appurtenances would be designed in accordance with best management practices (BMPs), Surface Water Quality Standards (N.J.A.C. 7:9-4), the rules concerning Wastewater Discharge Requirements (N.J.A.C. 7:9-5), Ground-Water Quality Standards (N.J.A.C. 7:9-6), Regulations Concerning the New Jersey Pollutant Discharge Elimination System (N.J.A.C. 7:14A), and in accordance with N.J.A.C. 7:7E-4.17 discussed above and N.J.A.C. 7:7E-8.7 below. Therefore, the project would be consistent with this policy.

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[1] U.S. Army Corps of Engineers, *Bayonne Bridge Air Draft Analysis*, September 2009

7:7E-6.1: RULE ON LOCATION OF LINEAR DEVELOPMENT

A linear development as defined at N.J.A.C. 7:7E-1.8, shall comply with the specific location rules to determine the most acceptable route, to the maximum extent practicable. If part of the proposed alignment of a linear development is found to be unacceptable under the specific location rules, that alignment (perhaps not the least possible distance) may nonetheless be acceptable, provided the following conditions are met:

1. There is no prudent or feasible alternative alignment which would have less impact on sensitive areas and marine fish or fisheries as defined at N.J.A.C. 7:7E-8.2;

2. There will be no permanent or long-term loss of unique or irreplaceable areas;

3. Appropriate measures will be used to mitigate adverse environmental impacts to the maximum extent feasible, such as restoration of disturbed vegetation, habitats, and land and water features; and

4. The alignment is located on or in existing transportation corridors and alignments, to the maximum extent practicable.

The project is a linear development located on the existing transportation corridor and alignment. This rule may be applicable for some project elements. As discussed above under N.J.A.C. 7:7E-4.13 (‘Bridges’), no reasonable alternatives would have less impact. The bridge alignment would not change with the exception of the widening and lengthening of the approaches. There would be no permanent or long-term loss of unique or irreplaceable areas as part of the discussion of policies under N.J.A.C. 7:7E-3.2 et. seq. above, and any impacts to natural resources would be mitigated in accordance with an NJDEP-approved mitigation plan. To the extent safely practicable, mitigation strategies have been incorporated into the design of the project to minimize these impacts. Therefore, the project would be consistent with this policy.

7:7E-6.2: BASIC LOCATION RULE

A location may be acceptable for development under N.J.A.C. 7:7E-3, 4, 5, 5A, 5B, and 6, but the Department may reject or conditionally approve the proposed development of the location as reasonably necessary to:

1. Promote the public health, safety, and welfare;

2. Protect public and private property, wildlife and marine fisheries; and

3. Preserve, protect and enhance the natural environment.

As discussed throughout this assessment (e.g. under N.J.A.C. 7:7E-4.13 - ‘Bridges’, and under the Policies of N.J.A.C. 7:7E-3 regarding special areas), the project is designed to enhance public safety and welfare by providing for a shared-use path, 12-foot vehicle lanes and a median consistent with American Association of State Highway and Transportation Officials (AASHTO) highway design standards. The bridge location would not change with the exception of the widening and lengthening of the approaches. To the extent safely practicable, the project was designed to protect public and private property, wildlife, and marine fisheries, as well as other natural resources such as wetlands and subtidal shallows, through design. Therefore, the project would be consistent with this policy.

7:7E-6.3: SECONDARY IMPACTS

Secondary impacts are the effects of additional development likely to be constructed as a result of the approval of a particular proposal. Secondary impacts can also include traffic increases, increased recreational demand and any other offsite impacts generated by onsite activities which affect the site and surrounding region.

The main goal of the project is to provide navigational clearance over the Kill Van Kull to allow larger vessels access to the Port. As discussed in Chapter 18, "Indirect and Cumulative Effects", the project is not expected to have any significant effect on broad maritime or land-based shipping patterns and is not expected to markedly alter the hinterland of the Port of New York and New Jersey relative to other ports. Allowing larger vessels would reduce the overall number of vessels, resulting in regional benefits to marine traffic and air quality. The project could have certain localized indirect effects, but these are not expected to result in significant adverse impacts. Therefore, the project would be consistent with this policy.

7:7E-7.5: TRANSPORTATION USE RULE

Standards relevant to public transportation are as follows:

1. New and improved public transportation facilities, including bus, rail, air, boat travel, people mover systems and related parking facilities, are encouraged.

2. Development of existing rights-of-way which would preclude either their use for public transportation or public recreation trails is discouraged.

The widening of vehicle lanes and a median consistent with AASHTO highway design standards would improve the safety of the roadway. In addition, the bridge's design would not preclude potential transit service on the bridge in the future, including any necessary environmental approvals, if such a project were to be advanced. Therefore, the project would be consistent with this policy.

7:7E-7.14: HIGH RISE STRUCTURES

High-rise structures are structures which are more than six stories or more than 60 feet in height as measured from existing preconstruction ground level. High-rise structures are encouraged to locate in an urban area of existing high density, high-rise and/or intense settlements. High-rise structures within the view of coastal waters shall be separated from coastal waters by at least one public road or an equivalent area (at least 50 feet) physically and visually open to the public except as provided by N.J.A.C. 7:7E-3.48. The proposed structure must not block the view of dunes, beaches, horizons, skylines, rivers, inlets, bays, or oceans that are currently enjoyed from existing residential structures, public roads or pathways, to the maximum extent practicable. The proposed structure must be in character with the surrounding transitional heights and residential densities, or be in character with a municipal comprehensive development scheme requiring an increase in height and density which is consistent with all applicable Coastal Zone Management rules. The proposed structure must not have an adverse impact on air quality, traffic, and existing infrastructure; and the proposed structure must be architecturally designed so as to not cause deflation of the beach and dune system or other coastal environmental waterward of the structure.

In light of the need to accommodate maritime vessels with 215 feet vertical clearance, only the height of the bridge roadway would be elevated. The project does not change the height of the existing arch structure. Therefore, this is not applicable and the project would be consistent with this policy.

7:7E-8.4: WATER QUALITY

As required by Section 307(f) of the Federal Coastal Zone Management Act (P.L. 92-583), Federal, State and local water quality requirements established under the Clean Water Act (33 U.S.C. § 1251) shall be the water resource standards of the coastal management program. These requirements include not only the minimum requirements imposed under the Clean Water Act but also the additional requirements adopted by states, localities, and interstate agencies pursuant to Section 510 of the Clean Water Act and such statutes as the New Jersey Water Pollution Control Act. In the waters under the jurisdiction of the Interstate Sanitation Commission in the New Jersey-New York metropolitan area, the requirements include the Interstate Sanitation Commission's Water Quality Regulations. Department rules related to water pollution control and applicable throughout the entire coastal zone include, for example, the Surface Water Quality Standards (N.J.A.C. 7:9-4), the rules concerning Wastewater Discharge Requirements (N.J.A.C. 7:9-5), the Ground-Water Quality Standards (N.J.A.C. 7:9-6), and the Regulations Concerning the New Jersey Pollutant Discharge Elimination System (N.J.A.C. 7:14A).

The project would not require any in-water work in the Kill Van Kull, with the exception of the construction of one new stormwater outfall. Therefore, the project would only affect water quality from the discharge of stormwater to the Kill Van Kull. Currently stormwater runoff from the existing bridge and the Route 440 approaches is conveyed in a system of catch basins that ultimately discharge untreated stormwater directly to the Kill Van Kull. As part of the project, the bridge travel roadway and approaches would be improved to meet the current NYSDEC, NYCDEP, and NJDEP rules and regulations for stormwater management through the NY SPDES and NJPDES programs, respectively, as approved by the National Pollutant Discharge Elimination System (NPDES) permit program. Pursuant to Section 401 of the Clean Water Act (CWA), a New Jersey Water Quality Certificate would be obtained prior to the discharge of treated stormwater to the Kill Van Kull from the outfall on the New Jersey shoreline to ensure compliance with the State’s water quality standards.

The drainage improvements would eliminate the direct stormwater discharge from the bridge travel roadway to the Kill Van Kull, provide stormwater water quality treatment, and would incorporate detention with controlled release rates to the existing conveyance systems. Within New Jersey, the bridge drainage and a portion of the approaches would be routed to stormwater management basins and underground detention systems within the right-of-way that convey stormwater to one new outfall. These stormwater management basins would incorporate a combination of best management practices (BMPs) and meet the Stormwater Management Rules requirements of NJDEP. Within New York on the bridge travel roadway and approach spans, stormwater would be captured, detained, and released to the NYCDEP system through above ground detention ponds. The detention ponds, which have been developed through consultation with NYCDEP, would connect to NYCDEP’s combined sewer system upstream of the regulator. These drainage improvements would eliminate direct discharge of stormwater runoff from the bridge travel roadway to the Kill Van Kull.

The water quality improvements would provide an 80 percent reduction in total suspended solids (TSS) and 40 percent reduction of total pollutant (TP) loading that is currently discharged to the Kill Van Kull. The implementation of water quality treatment measures would result in water quality improvements in the Kill Van Kull. Thus, with these measures in place, there would be water quality improvements in the Kill Van Kull during the long-term operation of the project. Therefore, the project would be consistent with this policy.

7:7E-8.6: GROUNDWATER USE

Groundwater is all water within the soil and subsurface strata that is not at the surface of the land. It includes water that is within the earth that supplies wells and springs. Coastal development shall demonstrate, to the maximum extent practicable, that the anticipated groundwater withdrawal demand of the development, alone and in conjunction with other groundwater diversions proposed or existing in the region, will not cause salinity intrusions into the groundwaters of the zone, will not degrade groundwater quality, will not significantly lower the water table or piezometric surface, or significantly decrease the base flow of adjacent water sources.

Dewatering of groundwater would most likely be required in specific locations, including the approach structure piers. Where dewatering is required, it is possible that the water would require treatment prior to its discharge to surface water or existing sewers. Prior to any such discharge, the water would be tested. Discharge of water would be conducted in accordance with applicable requirements, including NPDES for discharge to surface water, and state and local requirements for sewer discharge. The project would not degrade the groundwater quality or lower the water table in the area. Therefore, the project would be consistent with this policy.

7:7E-8.7: STORMWATER MANAGEMENT

If a project or activity meets the definition of "major development" at N.J.A.C. 7:8-1.2, then the project or activity shall comply with the Stormwater Management rules at N.J.A.C. 7:8.

All construction activities would be conducted in accordance with applicable stormwater and water quality regulations as defined in this rule. The stormwater outfall and associated appurtenances would be designed in accordance with best management practices (BMPs), Surface Water Quality Standards (N.J.A.C. 7:9-4), the rules concerning Wastewater Discharge Requirements (N.J.A.C. 7:9-5), the Ground-Water Quality Standards (N.J.A.C. 7:9-6), the Regulations Concerning the New Jersey Pollutant Discharge Elimination System (N.J.A.C. 7:14A), and in accordance with N.J.A.C. 7:7E-4.17 discussed above. Therefore, the project would be consistent with this policy.

7:7E-8.8: VEGETATION

Vegetation is the plant life or total plant cover that is found on a specific area, whether indigenous or introduced by humans. Coastal development shall preserve, to the maximum extent practicable, existing vegetation within a development site. Coastal development shall plant new vegetation, particularly appropriate coastal species native to New Jersey to the maximum extent practicable.

The project would impact wetland and upland vegetation through direct loss and temporary construction disturbance. The temporary loss of the 1.93-acre wetland and minor impacts related to an outfall pipe through a small portion of another wetland (Wetland C) would be mitigated, as discussed under N.J.A.C. 7:7E-3.27 (Wetlands) and N.J.A.C. 7:7E-3.28 (Wetlands Buffers). As discussed in Chapter 16, "Construction Effects," low-value terrestrial cultural ecological communities and a low value red-maple sweetgum swamp lot would be partially impacted. The operation of the project would not preclude these communities from developing or impact the quality and species composition of these communities throughout the region. The long-term operation of the project would not result in an adverse impact to terrestrial ecological communities of the region. Therefore, the project would be consistent with this policy.

7:7E-8.10: AIR QUALITY

The protection of air resources refers to the protection from air contaminants that injure human health, welfare or property, and the attainment and maintenance of State and Federal air quality goals and the prevention of degradation of current levels of air quality.

Coastal development shall conform to all applicable State and Federal regulations, standards and guidelines and be consistent with the strategies of New Jersey's State Implementation Plan (SIP). See N.J.A.C. 7:27 and New Jersey SIP for ozone, particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and visibility.

Coastal development shall be located and designed to take full advantage of existing or planned mass transportation infrastructures and shall be managed to promote mass transportation services, in accordance with the Traffic rule, N.J.A.C. 7:7E-8.14.

As amended in 1990, the Clean Air Act (CAA) defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the National Ambient Air Quality Standards (NAAQS). When an area is designated as non-attainment by USEPA, the state is required to develop and implement a State Implementation Plan (SIP), which documents how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA**.** As discussed in Chapter 16, "Construction Effects", measures to mitigate any potential adverse effects during construction would be implemented. As discussed in Chapter 11, "Air Quality", no significant change in air quality would be expected due to the long-term operation of the project. Furthermore, the bridge's design would not preclude potential transit service on the bridge in the future. Therefore, the project would be consistent with this policy.

7:7E-8.12: SCENIC RESOURCES AND DESIGN

Scenic resources include the views of the natural and/or built landscape. Large-scale elements of building and site design are defined as the elements that comprise the developed landscape such as size, geometry, massing, height and bulk structures. New coastal development that is visually compatible with its surroundings in terms of building and site design, and enhances scenic resources is encouraged. New coastal development that is not visually compatible with existing scenic resources in terms of large-scale elements of building and site design is discouraged.

The project would be consistent with existing land uses. The project would only raise the roadway of the bridge and not change the height and bulk of the bridge. The additional height of the roadway and approach structures would improve the view in some areas. Motorists and pedestrians would continue to have panoramic views of both shorelines and of the east and west expanses along the Kill Van Kull with the raised roadway, as well as distant views of the Manhattan skyline. Raising the roadway would not have an adverse visual impact on views, to or from the bridge. Therefore, the project would be consistent with this policy.

7:7E-8.14: TRAFFIC

Traffic is the movement of vehicles, pedestrians or ships along a route. Coastal development shall be designed, located and operated in a manner to cause the least possible disturbance to traffic systems. Alternative means of transportation, that is, public and private mass transportation facilities and services, shall be considered and, where feasible, incorporated into the design and management of a proposed development, to reduce the number of individual vehicle trips generated as a result of the facility.

The project is being proposed as an improvement to a marine cargo transportation route. The increased navigational clearance of the bridge would decrease the overall number of vessels in the Kill Van Kull. In addition, the project is designed to enhance public safety by providing for 12-foot vehicle lanes and a median consistent with AASHTO highway design standards. The bridge's design would not preclude potential transit service on the bridge in the future. Therefore, the project directly alleviates vehicle and maritime traffic, and would be consistent with this policy.

7:7E-8.22 SOLID AND HAZARDOUS WASTE

Solid waste means any garbage, refuse, sludge or other waste material, including solid, liquid, semi-solid or contained gaseous material. A material is a solid waste if it is "disposed of" by being discharged, deposited, injected, dumped, spilled, leaked or placed into or on any land or water so that such material or any constituent thereof may enter the environment or be emitted into the air or discharged into ground or surface waters. Solid waste becomes a hazardous waste when it exhibits any of the characteristics which are specified in the Federal Regulations on Identification and Listing of Hazardous Waste (40 C.F.R. 261). The general characteristics of hazardous waste include, but are not limited to, characteristics of ignitibility, characteristics of corrosivity, characteristics of reactivity and characteristics of toxicity. Coastal development shall conform with all applicable State and Federal regulations, standards and guidelines for the handling and disposal of solid and hazardous wastes, including the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., the Solid Waste Management rules, N.J.A.C. 7:26, the Recycling rules, N.J.A.C. 7:26A, and the Hazardous Waste rules, N.J.A.C. 7:26G.

The construction of the project may generate solid and/or hazardous waste as may be related to demolition of existing structures, site preparation, and excavation, as applicable. All activities would conform to the applicable State and Federal regulations, standards and guidelines for the handling and disposal of solid and hazardous wastes, including the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., the Solid Waste Management rules, N.J.A.C. 7:26, the Recycling rules, N.J.A.C. 7:26A, and the Hazardous Waste rules, N.J.A.C. 7:26G.

16-1 INTRODUCTION

Construction activities, although temporary in nature, can sometimes result in adverse environmental impacts. This chapter summarizes the construction plan for the Raise the Roadway Alternative and assesses the potential for construction-period impacts. The results of a thorough construction review and coordination effort are summarized below. The stages of construction and their associated activities and equipment are then described, followed by the types of impacts likely to occur. This assessment also describes methods that may be employed to minimize construction-period impacts. The construction means and methods presented in this chapter are based on current conceptual engineering design and the project sponsors' past experience on similar projects. While the construction techniques ultimately utilized for the project may vary, the potential for environmental impacts and types of mitigation measures described herein would likely be the same.

As described below, the analysis concludes that with the proposed impact reduction measures the project would not result in construction-related effects with respect to any of the analyzed areas of concern. Therefore, no adverse impacts would be expected to occur as a result of construction.

16-2 CONSTRUCTION REVIEW SUMMARY

In support of the Bayonne Bridge Navigational Clearance Program, a comprehensive engineering construction review and coordination effort has been completed. A detailed engineering design for the Raise the Roadway Alternative has been advanced through preliminary and final engineering design to 100 percent completion. The final engineering design effort includes a detailed final design for replacement of: the New Jersey and New York approach roadways, including piers and foundations; replacement of the main span suspended roadway deck; arch structure strengthening; local access ramp replacement; stormwater management; replacement of supporting mechanical, electrical, and plumbing systems; construction staging; traffic operations and safety during construction; and related design and construction coordination concerns, as outlined below.

16-2-1 CONSTRUCTABILITY REVIEW

An independent constructability review was performed on the preliminary engineering design by Parsons Brinckerhoff, and the final report was issued in September 2011. The scope of the review included: review of preliminary engineering design plans; staging plans; maintenance of traffic plans; cost estimate; construction schedule; and a construction industry review utilizing resources of experts in heavy bridge construction through the Association of General Contractors (AGC) and General Contractors

Association (GCA). The final report concluded that the conceptual design for the Raise the Roadway Alternative offers a viable solution.

An independent constructability review was performed on the final engineering design by Greenman Pedersen, Inc., and the final report was issued in October 2012. The scope of review included review of: 90 percent final engineering design plans; staging plans; maintenance of traffic plans; cost estimate; and construction schedule. The report concluded that there were no fatal flaws. The plans were found to be consistent with good construction practices and demonstrative of a very comprehensive, detailed, and logical overall engineering design.

16-2-2 CITY, STATE, AND FEDERAL DEPARTMENTS OF TRANSPORTATION REVIEW

Numerous coordination meetings were conducted with both New Jersey and New York State Departments of Transportation during the final engineering design phase. These meetings included review of various program topics including: maintenance of traffic; permanent traffic design; roadway alignment; lighting design; stormwater management design; construction staging and access; community outreach; and a formal final engineering design submission review and comment process. This effort resulted in an executed Memorandum of Agreement (MOA) with New Jersey Department of Transportation (NJDOT) on Design/Construction coordination, which serves as an NJDOT major access permit. The New York State Department of Transportation (NYSDOT) permit will be issued during the construction phase. The New York City Department of Transportation (NYCDOT) was also consulted during the design process. In addition, the engineering design plans have been provided to the Federal Highway Administration (FHWA) for review.

16-3 CONSTRUCTION AND DESIGN CONSIDERATIONS

16-3-1 ROADWAY ALIGNMENT

The roadway vertical and horizontal alignments are contained within PANYNJ existing right-of-way. All access to local existing ramps will be maintained in the permanent condition. The roadway will be widened from four 10-foot lanes and a 6-foot-wide pedestrian walkway to four 12-foot lanes with partial shoulders, a median barrier, and a 12-foot wide shared use path. In order to achieve the main span roadway vertical increase to provide sufficient air draft navigational clearance, the approach structure grade profile was increased from 4.0 to 4.85 percent on the New Jersey approach structure and 5.0 percent on the New York approach structure. The Bayonne Bridge is categorized as an urban principal arterial expressway, and as such AASHTO standards allow for a grade up to 5.0 percent. The NJDOT requirements also allow for a 5.0 percent grade on this functional roadway classification. The NYSDOT has a 4.0 percent grade limitation but allows exceptions of an additional 1 percent in urban applications such as this.

16-3-2 TRAFFIC

An analysis of the effect construction will have on both the local and regional road networks was performed. That analysis is summarized later in this chapter and presented in full in **Appendix C**. This work was utilized to support the engineering design, including but not limited to selecting detour routes, determining optimal road closure times, and determining whether the proposed construction phasing is acceptable from a traffic perspective. This analysis was subsequently used in discussions with outside agencies to develop the Traffic Management Plan (TMP).

16-3-3 UTILITY COORDINATION

Identification of necessary utility relocations as a result of construction has been prepared by the engineering design team, and an overall utility coordination plan has been established to manage the scope, schedule, and budget of all such utility coordination. Initial meetings have already been held and additional meetings are currently being scheduled with all utility owners to coordinate all utility relocation work with the proposed construction-staging plan. Typical coordination items include relocation of electric power, communication, gas and drainage lines, and equipment in both New Jersey and New York. Certain relocations will be performed by the utility owners and others will be performed by the contractor.

16-3-4 EMERGENCY RESPONSE

Emergency vehicles will be allowed to access and traverse the bridge at all times, including during overnight and weekend road closures.

All emergency operations across the Bayonne Bridge are managed out of an existing post at the Bayonne Bridge Administration Building, located adjacent to the toll plaza in Staten Island, New York. However, due to the reduced lane configuration during construction, a second guard post (with appropriate emergency response vehicle) will be provided on the New Jersey side of the bridge throughout the construction duration to improve incident response time.

Channelizer posts separating the two directions of traffic across the bridge during construction are easily removed to allow emergency vehicles to cross traffic lanes, switch directions, and access construction areas if needed.

16-3-5 SAFETY

The project team is committed to protecting the safety of the traveling public during all phases of the construction of the new bridge and approach roadways. Due to urban and structural constraints, a physical buffer cannot always be provided between the work area and active travel lanes. This is particularly true where heavy construction elements are erected above and in close proximity to active travel lanes. To mitigate this condition, positive protection (a temporary concrete barrier) will be provided between the work area and open travel lanes in order to protect the traveling public during normal construction activities. Additionally, overhead lifting operations in proximity to travel lanes will only proceed with adequate controls for safety, including limited traffic holds and full roadway closures, as appropriate.

In addition, in order to protect both pedestrians and vehicles, the contractor will be required to provide protective shields, platforms, nets, screens or other protective devices to catch any potential falling debris below the bridge during demolition and other operations. The designs of such devices are the responsibility of the contractor, subject to review by PANYNJ.

Finally, access to virtually the entire bridge construction work zone below the bridge is restricted by security fencing that will be maintained throughout the construction of the bridge. Construction activities would remain within the PANYNJ right-of-way. While some residential properties abut the right-of-way, heavy equipment would be operated by licensed individuals with all proper safety protocols in place.

16-4 CONSTRUCTION SEQUENCING

With the project, the new roadway of the main span would be reconstructed at a higher level within the existing arch of the Bayonne Bridge. The raised superstructure outside of the arch would increase in height and be supported by additional cross bracing. The approach structures would be demolished and constructed at a higher elevation through the use of new taller piers. **Figures 16-1A** through **16-1E** depict the project's five stages of construction, which occasionally overlap. A summary of the project's construction sequence is as follows:

Stage 1 (26 months): Reduce traffic to two lanes 12-foot 6-inch (one in each direction) at east side of existing roadway. Remove sidewalk on west side (southbound). Extend roadway on west side. Install temporary E-Z Pass gantry and system (west side).

Stage 2 (24 months): Shift two lanes of traffic (one 12-foot 6-inch lane in each direction) to west side of existing structure. Demolish east side of existing roadway and approach structures. Begin construction of eastern side of raised roadway in arch span (floorbeams, stringers, and deck) and new piers and roadway of approaches on east side.

Stage 3 (15 months): Install temporary toll collection gantry and system (east side). Complete construction of approach structure, new roadway deck in arch span, approach embankments and walls on east side.

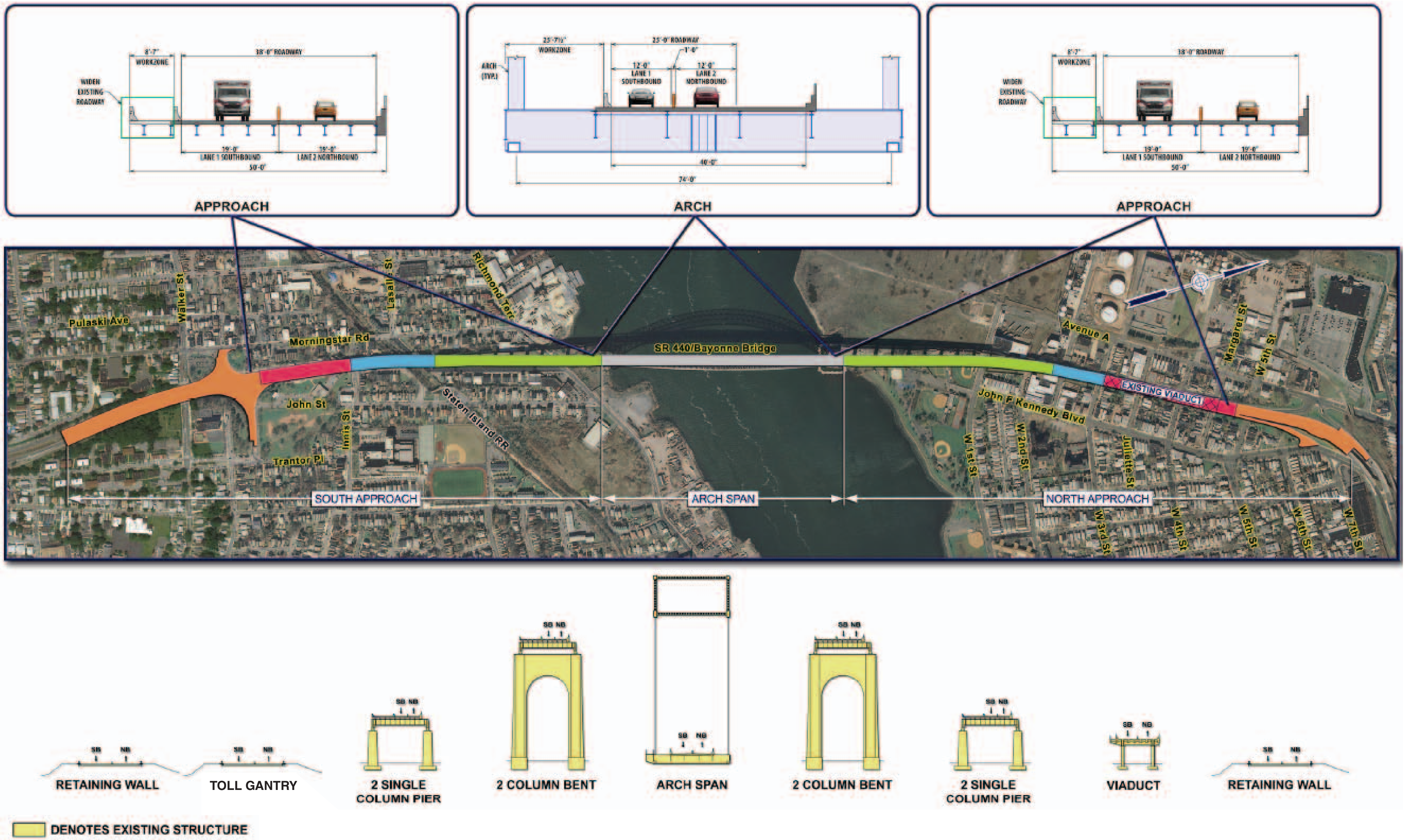
Stage 4 (17 months): Shift traffic to new elevated roadway on east side, one 12-foot 6-inch lane in each direction. Open temporary E-Z Pass gantry and system (east side). Demolish remainder of existing roadway and approach structures.

Stage 5 (19 months): Construct western portion of raised roadway in arch span (floorbeams, stringers, and deck). Construct new piers and roadway on west side of approaches. Construct approach embankments and walls. Install permanent E-Z Pass gantry and system. Install permanent barriers. Open final roadway to traffic, two 12-foot lanes in each direction.

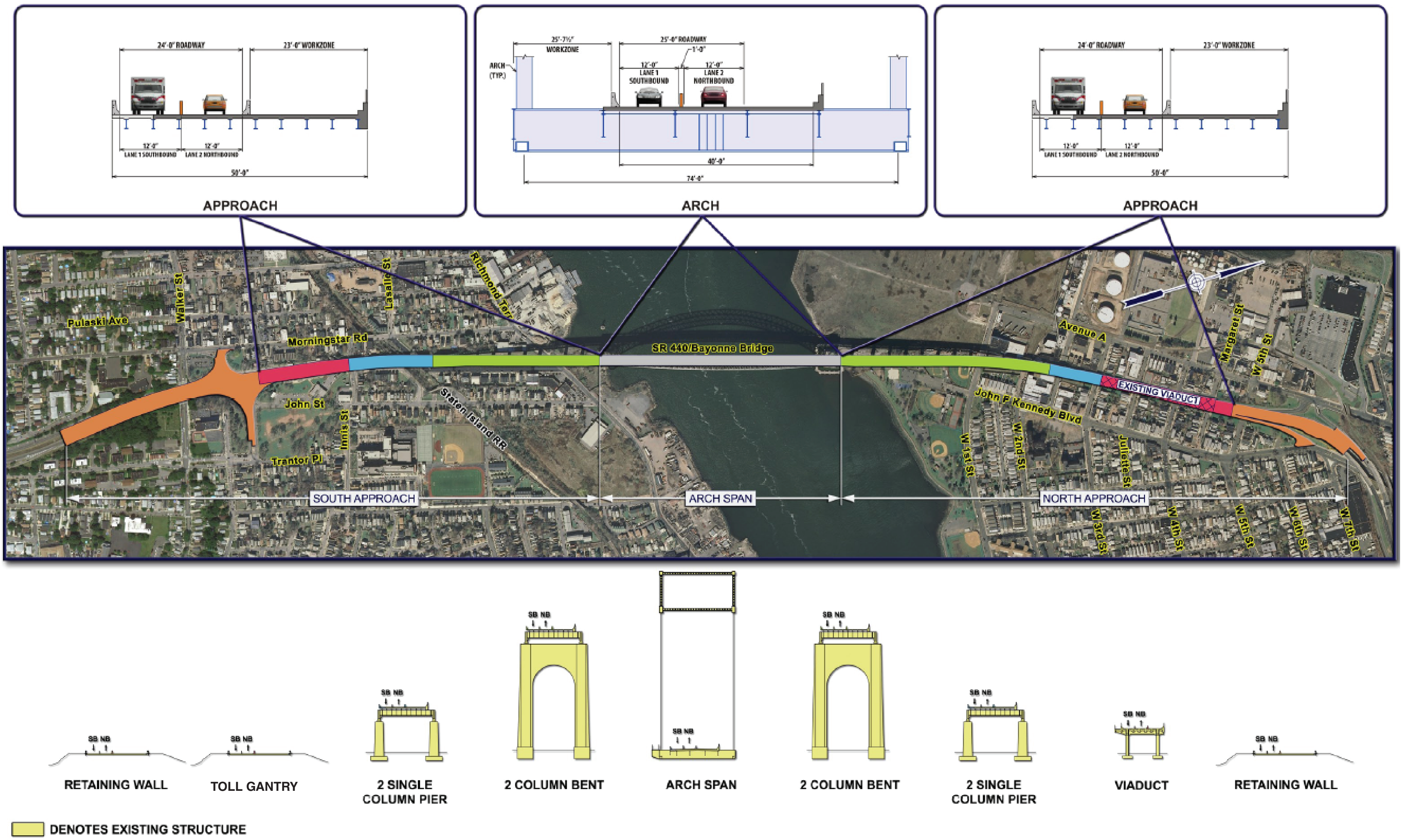
16-5 CONSTRUCTION SCHEDULE

It is anticipated that project construction would require a total of approximately 45 months to complete. As shown in **Figure 16-2**, assuming construction would begin in June 2013 and using one segment gantry on each side of the approaches, it would be completed by March 2017.

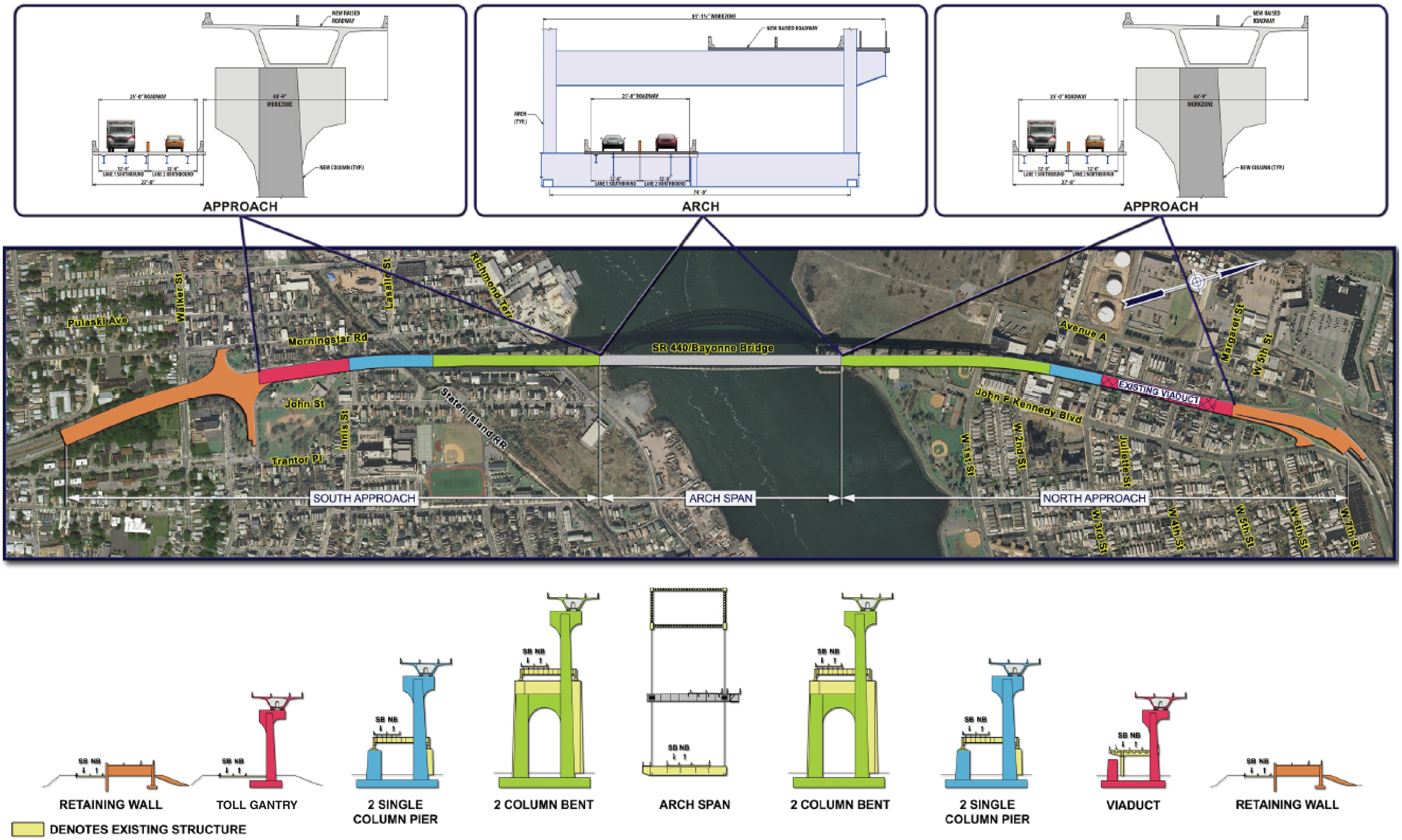
The majority of construction activities would take place Monday through Friday. Almost all work could occur between 7 AM and 6 PM on weekdays, although some workers would arrive and begin to prepare work areas before 7 AM. Night hours would be required in order to complete tasks involving road closures.



Construction Stage 1
Figure 16-1A



Construction Stage 2
Figure 16-1B



Construction Stage 3
Figure 16-1C

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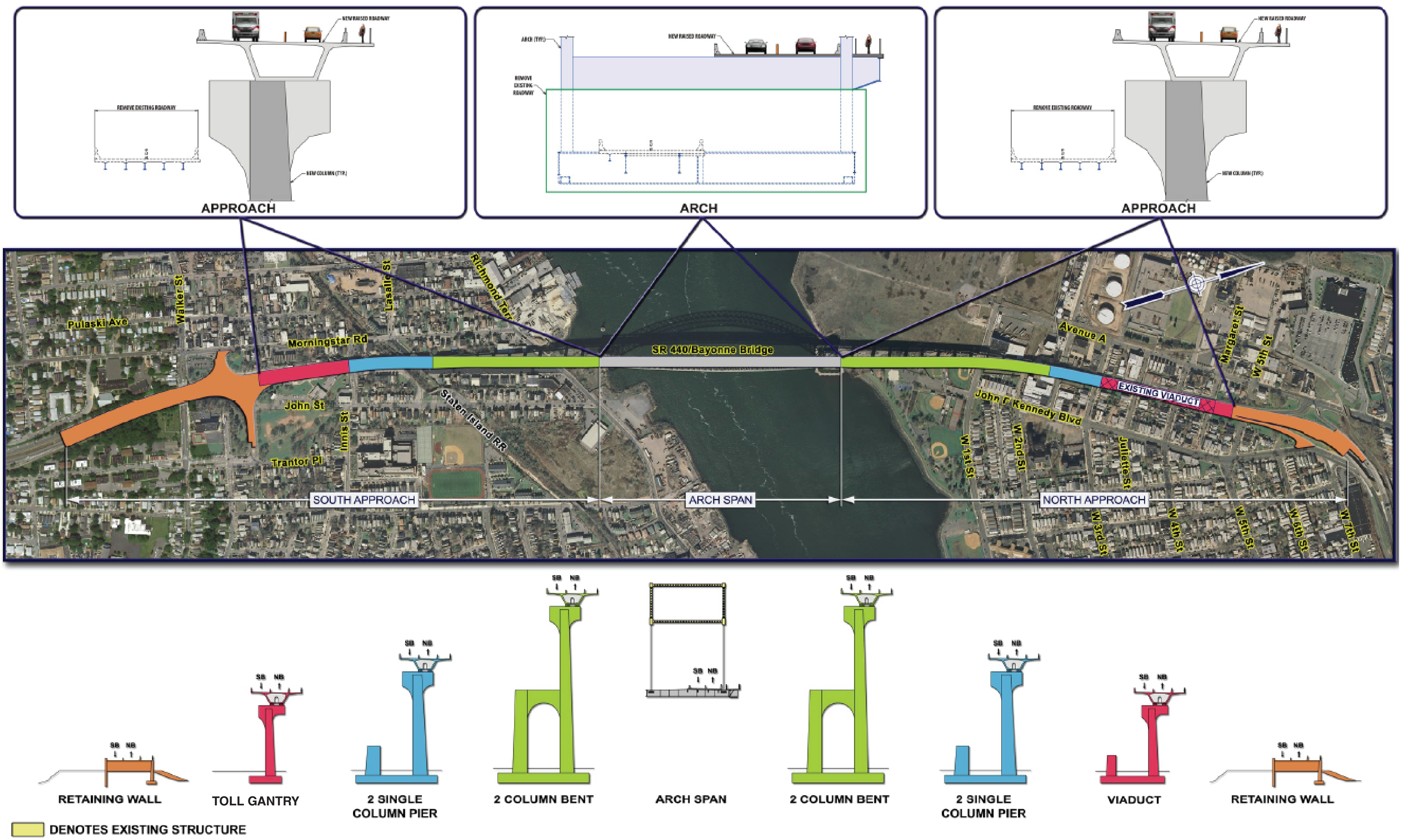
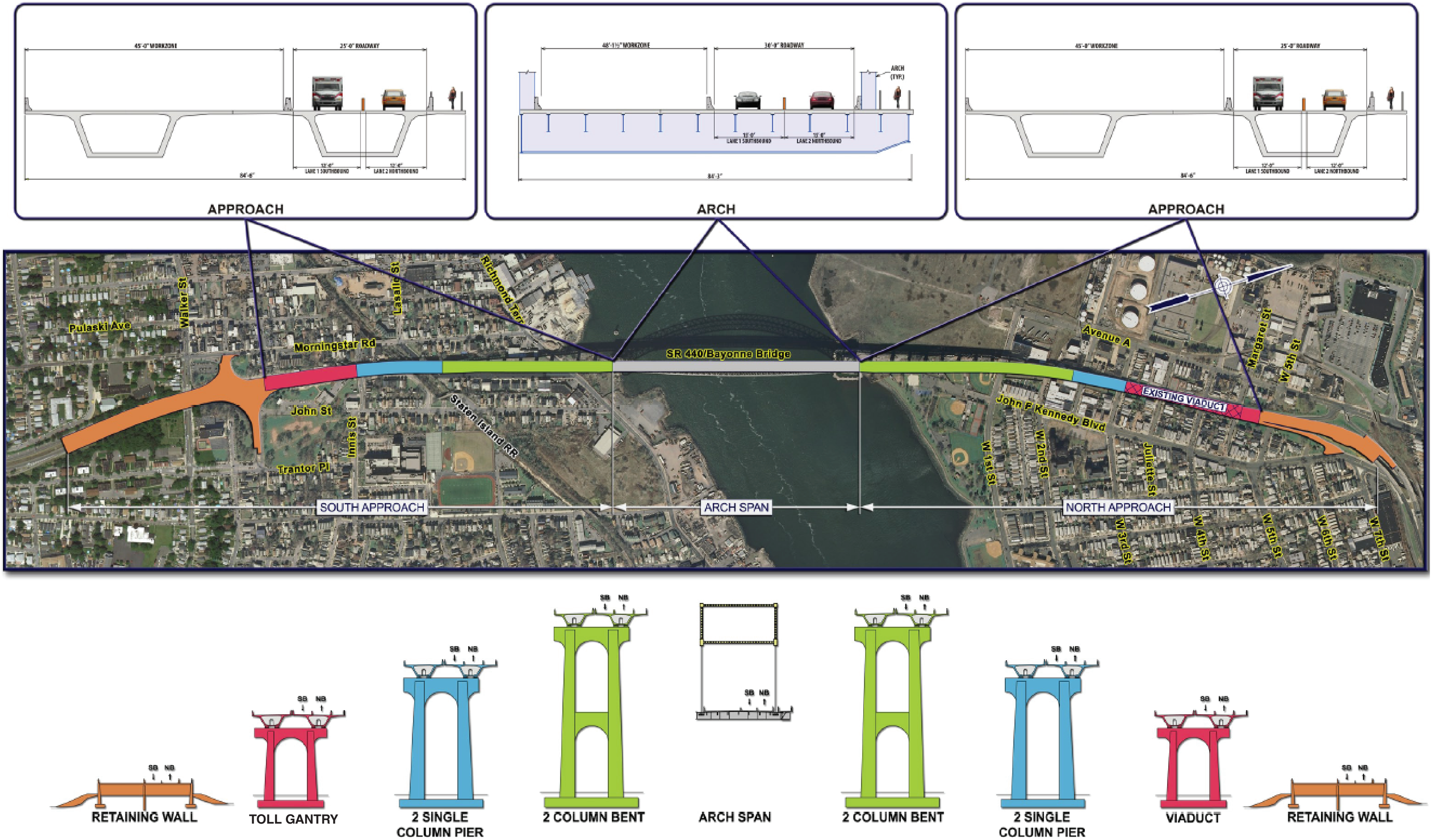


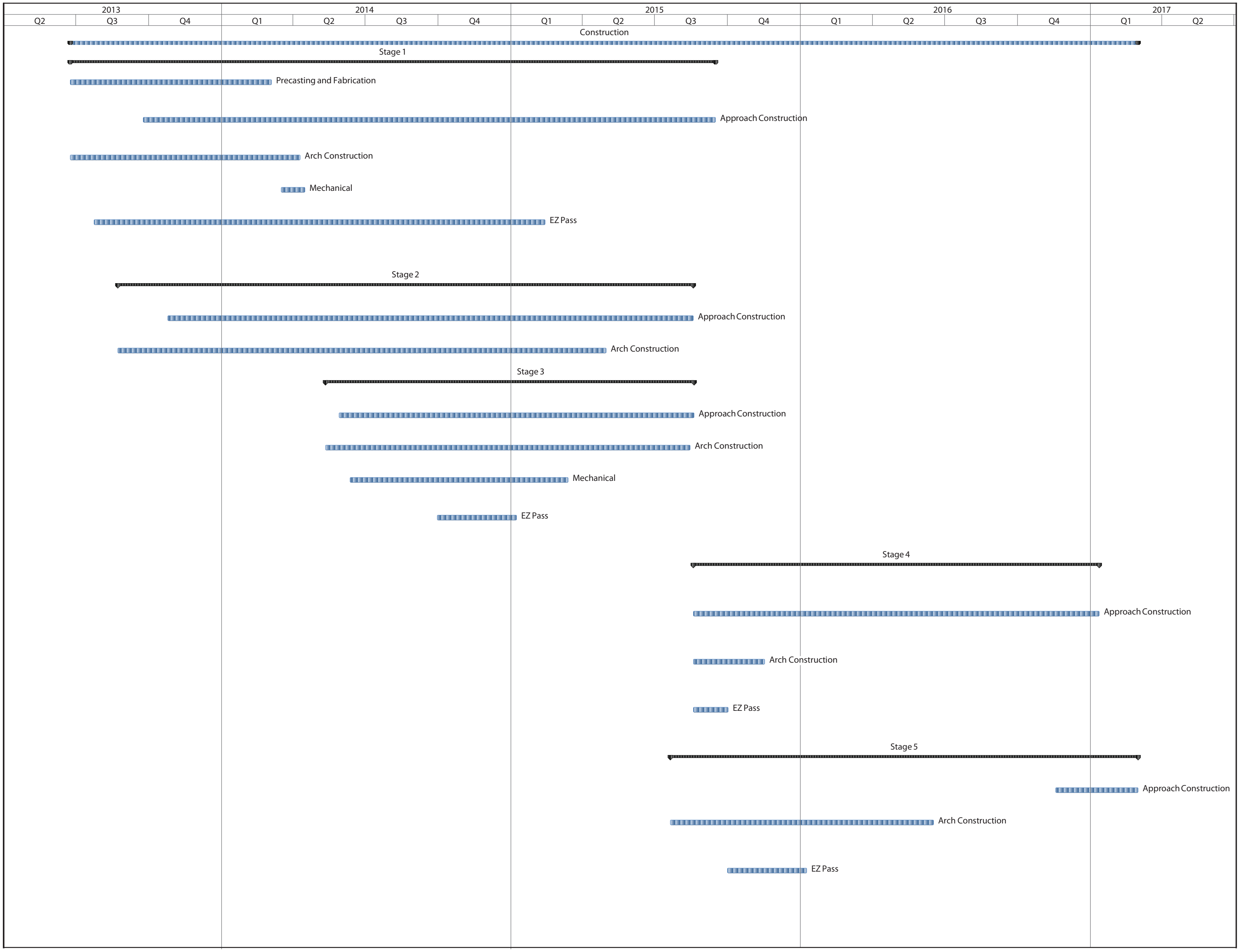
BAYONNE BRIDGE OVER THE KILL VAN KULL

Construction Stage 4
Figure 16-1D



Construction Stage 5
Figure 16-1E

BAYONNE BRIDGE OVER THE KILL VAN KULL



Construction Schedule
Figure 16-2

Construction activities occurring after hours (weekdays between 6 PM and 7 AM and on weekends) may be permitted only to accommodate: (1) emergency conditions, (2) public safety, (3) construction projects by or on behalf of City agencies, (4) construction activities with minimal noise impacts, and (5) undue hardship resulting from unique site characteristics, unforeseen conditions, scheduling conflicts and/or financial considerations. In such cases, the numbers of workers and pieces of equipment in operation would be limited to those needed to complete the particular authorized task. Therefore, the level of activity for any after hours or weekend work would be less than the activity of a normal workday. The typical weekend workday would be on Saturday, beginning with worker arrival and site preparation at 7 AM, and ending with site cleanup at 5 PM. Movement of certain oversized materials, to comply with the requirements of the New York City Department of Transportation (NYCDOT), would occur at night. Also, as a result of safety concerns, oversized deliveries that will impact traffic flow will be performed during off-hours.

Much of the project's construction staging would occur within the approximately 40-foot construction work zone, thereby limiting any effects on surrounding roadways and pedestrian elements. However, certain construction activities may require the temporary closing, narrowing, or otherwise impeding of the surrounding streets and sidewalks. While there would be no in-water work (with the exception of construction of an outfall from the New Jersey shoreline), there will be eight to ten 8-hour partial channel closures that are required to accommodate the use of temporary barges to remove the existing bridge deck. These closures would only occur during high tide; channel access would be restored in time for low tide. PANYNJ's Port Commerce Department, the Harbor Operations Committee and the Sandy Hook Pilot's Association were consulted on and approved this closure plan, on the condition that they be notified well in advance of the closure dates and times in order to coordinate with ship arrival schedules.

16-5-1 BRIDGE CLOSURES

Full overnight closures at varying times depending on the day of the week will be permitted subject to seasonality, weather, holidays and special events. Additionally, an estimated 8 full weekend closures would be expected annually during construction (from 9 PM Friday through 5 AM Monday). These weekend closures would not be permitted during summer months (i.e., June, July, and August).

16-6 DESCRIPTION OF CONSTRUCTION ACTIVITIES

The proposed construction sequence and schedule would require simultaneous work on both sides of the Kill Van Kull. Construction to raise the roadway within the arch would utilize an overhead gantry system. With the exception of the construction of a new stormwater outfall from the shoreline in New Jersey, no in-water work would be required. It is likely that the bridge and approach components would be pre-fabricated outside of the study area and transported to the site.

The new profile would raise the bridge 64 feet at the centerline of the navigation channel. The elevation change of the arch deck controls the new approach roadway profile, raising it by 25 to 60 feet along its length. The new height of the approach piers would vary from approximately 35 to 160 feet. The highest locations, closest to the arch portal, would be associated with the longer span lengths to minimize the number of piers at these locations. The raised profile would provide adequate clearance over each of the roadway underpasses located in New York and New Jersey.

In order to achieve the increase in clearance, the Route 440 longitudinal grades on both the New York and New Jersey approaches would be increased from an existing 4.0 percent grade to 4.85 percent on the New Jersey side and 5 percent on the New York side. The vertical realignment would require the Route 440 mainline to be reconstructed from approximately 700 feet south of the Walker Street overpass in New York, to approximately 800 feet north of the Avenue A and JFK Boulevard exit and entrance ramps in New Jersey. The proposed approaches would consist of two 12-foot lanes in each direction with 4-foot-wide left shoulders and 8-foot-wide right shoulders. The roadway within the arch span would consist of two 12-foot lanes in each direction with 2-foot-wide left shoulders and 4-foot 9-inch-wide right shoulders. A 12-foot-wide, shared-use (pedestrian and bicycle) path would be provided along the east of the northbound lanes along the outside of the arch.

16-6-1 SAFETY

The project team is committed to protecting the safety of the traveling public. Due to urban and structural constraints, a buffer cannot be provided between the construction work-zone and the open travel lanes. To mitigate this condition, positive protection, including a temporary concrete barrier, is being provided between the construction work-zone and open travel lanes to protect the traveling public. Additionally, overhead work in proximity to traffic lanes will proceed with adequate controls for safety, including limited traffic holds and full roadway closures, as appropriate. Overnight roadway closures and an estimated 8 full weekend closures per year will be permitted to carry out work that would otherwise put the traveling public at risk.

In addition, to protect both pedestrians and vehicles, the contractor will be required to provide protective shields, platforms, nets, screens or other protective devices to catch any potential falling debris below the bridge during demolition and other operations. The designs of such devices are the responsibility of the contractor, subject to review by PANYNJ.

Finally, access to virtually the entire construction work-zone below the bridge is restricted by the existing security fencing that will be maintained throughout the construction of the bridge.

16-6-2 MOBILIZATION AND INITIAL START-UP

Prior to initiation of construction, the contractor would establish construction staging areas and mobilize heavy equipment. It is anticipated that a construction staging area would be established on the property occupied by the Port Authority of New York and New Jersey (PANYNJ) Administration Building in Staten Island. A second potential staging area would be located on a portion of the approximately 50-acre property owned by Texaco in Bayonne (see **Figure 16-3**). Additional staging areas would be established within PANYNJ right-of-way and at the discretion of the contractor. Heavy equipment needed for the early stages of construction (such as the gantry and crawler cranes) would be brought to the site during this stage. The superstructure would be precast in segments at a casting yard outside of the region.

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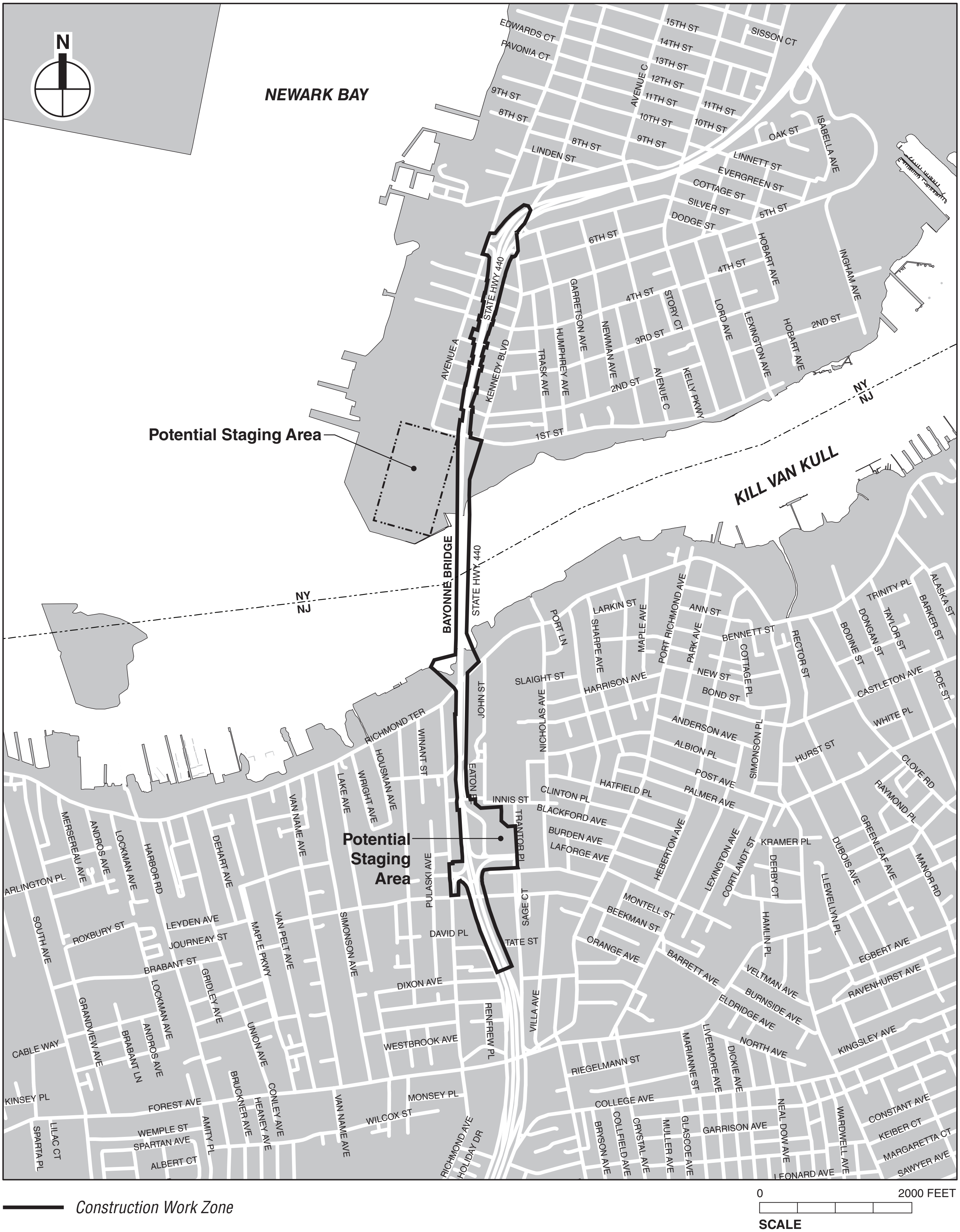

Potential Staging Areas

Figure 16-3

16-6-3 TYPICAL CONSTRUCTION EQUIPMENT

Typical equipment used for demolition, site clearing, excavation, and foundation work would include excavators, bulldozers, backhoes, chainsaws and tree stump grinders (for tree removal), compaction equipment, tractors, jackhammers, and concrete-pumping trucks. Other equipment that would be used includes hoist complexes, dump trucks and loaders, concrete trucks, and back hoes. Trucks would deliver concrete and other building materials, and remove excavated material as well as demolition and construction debris. The construction equipment likely to be used during erection of the superstructure would include overhead gantries, compressors, cranes, derricks, hoists, bending jigs, and welding machines. Trucks would remain in use for material supply and construction waste removal. However, removal of the existing main span road deck during demolition would enlist the use of barges, requiring eight to ten 8-hour partial channel closures.

16-6-4 MATERIAL TRANSPORT AND DEBRIS REMOVAL

Material transport and debris removal would be accomplished through a combination of barge and truck transport at the discretion of the contractor. Materials such as steel sheeting, precast concrete piers, steel beams and stringers would all be transported to the project site by barge. It is anticipated that material transport would be delivered via the waterway to the Duraport Marine and Rail Terminal facility, located east of the Bayonne Bridge along the Kill Van Kull in New Jersey. Materials would then be delivered to the project site by truck using designated truck routes along Route 440 (see **Figure 16-4**). As a result of safety concerns, oversized deliveries that will impact traffic flow will be performed during off-hours. Similarly, most of the construction and demolition debris would likely be removed by truck. However, lowering of the existing road deck during demolition would require the use of barges.

16-6-5 RAISE THE ROADWAY WITHIN ARCH

16-6-5-1 RETROFITTING OF ARCH

One of the first construction steps in Stage 1 would be to allow two traffic lanes for north and south bound travel to be shifted to the west side of the bridge with new barrier walls. Preparation work would include the retrofitting of arch chords and construction of the deck extension adjacent to the outside southbound lane. This would require the removal of two bays of diagonal sway bracing and one transverse strut in both the upper chord and lower chord bracing, in order to gain clearance for the new (upper) roadway. After the existing roadway is removed, new cross-bracing members would be installed in the bay immediately below the existing portal frames. The existing roadway would be removed by lowering segments to a barge below.

16-6-5-2 ERECTION OF NEW FLOOR BEAM, STRINGERS AND DECK UNITS

Two options are available to change out the existing hangers (suspenders) with new hangers that would have the capacity to support both the upper and lower roadways in the interim conditions. The first option involves new hangers that would be installed at the same location as the existing hangers and would have an extension (either wire rope, wire strand, or threaded rods) to pick up the existing lower roadway in the interim condition. These hanger extensions would then be removed with the existing lower

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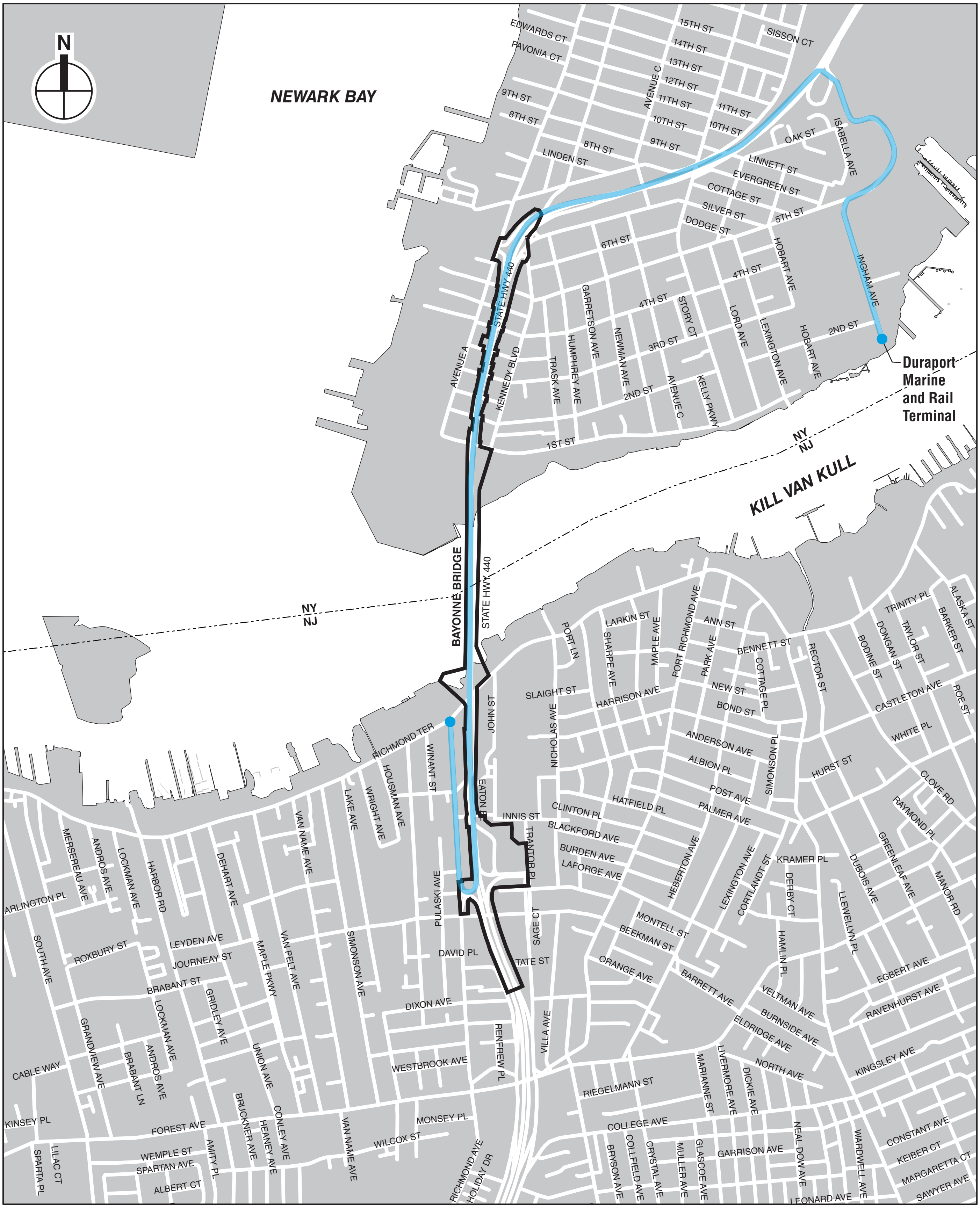


Construction Work Zone

Proposed Truck Route

0 2000 FEET

SCALE

Proposed Truck Route

Figure 16-4

floorbeams following completion of the first half of the upper deck and transition of traffic to the upper deck. The second option would be to leave the existing hangers in place and install new hangers to pick up the upper roadway deck only. The new hangers would need to be offset from the existing hanger ropes, either transversely or longitudinally, and the hanger connection to the lower arch chord would need to be modified to accept the new hangers while still supporting the lower deck on the existing hangers.

The new upper roadway floorbeams would be erected in one piece. Since the new floorbeams extend outside the plane of the hangers, the floorbeams would be angled to pass between the hangers as they erected. The new floorbeams would be stabilized during installation, bay-by-bay. This would be accomplished by installing longitudinal edge girders as the floorbeams are erected. Temporary bracing would be required to stabilize the floorbeams until the installation of the permanent bottom lateral bracing system.

The new (upper) roadway stringers and deck system would be installed during nightly full bridge closures with a moveable overhead derrick system.

16-6-6 NEW APPROACHES

16-6-6-1 PIER FOUNDATIONS

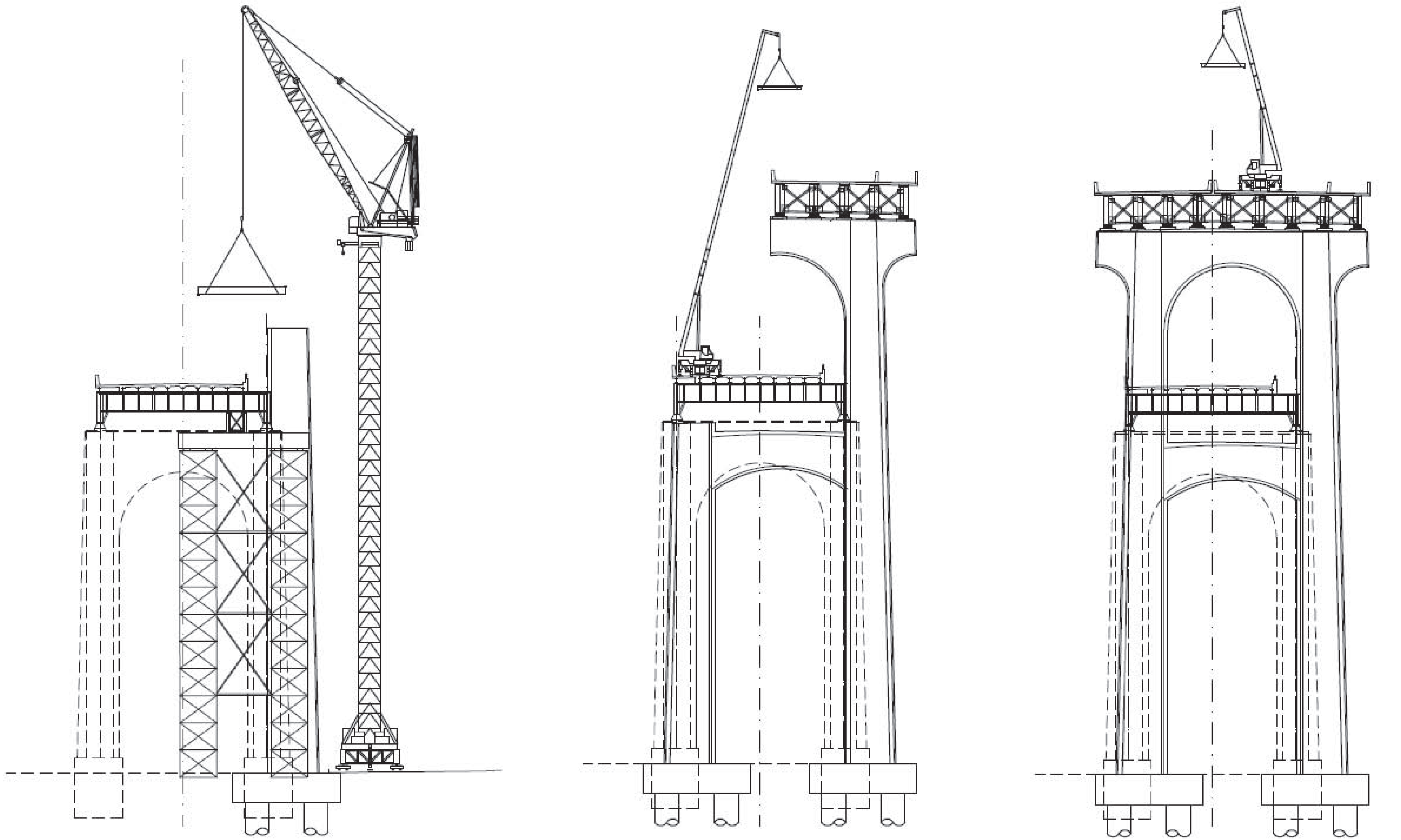
The pier foundations would consist of either drilled shafts or micro-piles with the selection primarily dependent upon the overhead clearance and the proximity of the new foundation to the existing piers. The use of low head room drilling equipment would be expected for some of the foundations. Excavation in excess of 12 feet would be expected for the footing construction, and the installation of sheet pile cofferdams would be used to minimize the excavation area and water seepage. Upon installation of the footing reinforcing steel, the concrete foundations would be cast. After curing, the sheet piling would be removed and the footing would be backfilled.

16-6-6-2 PIER CONSTRUCTION

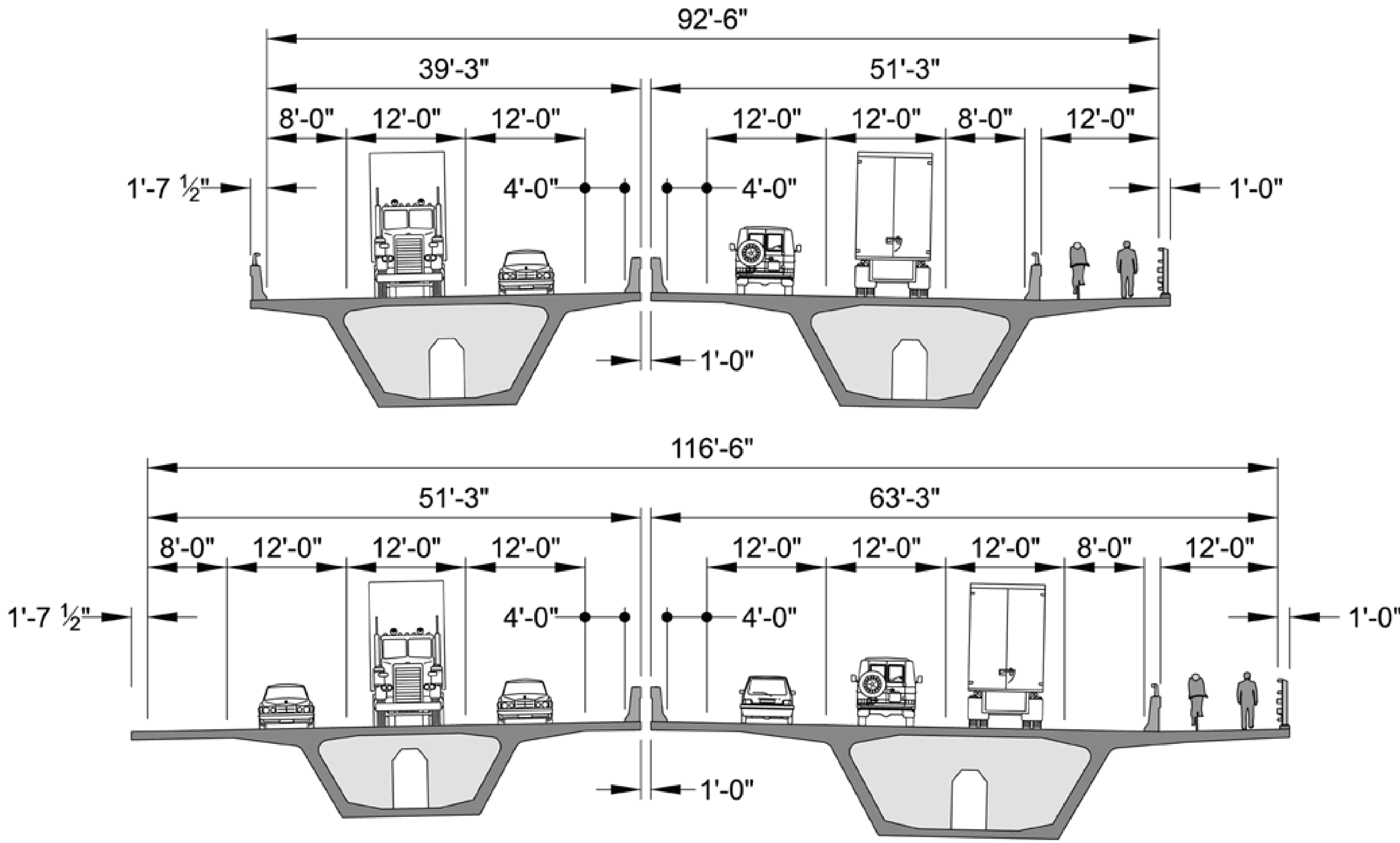
The approach piers would be constructed using precast segmental concrete (see **Figure 16-5**). Heavy cranes would lift and stack the segments to form pier columns and cap beams. To make room for the east pier column construction, a portion of the existing superstructure would be demolished. In some cases, the steel framing that remains would need to be shored to support the west roadway. After construction of the east side pier foundations, columns, and pier caps, the superstructure would be erected. Construction would begin on the west side after opening the east side to traffic. The existing structure would be demolished in advance of or at the same time as the west side construction, minimizing interference for the pier construction.

16-6-6-3 APPROACH SEGMENT ERECTION

The approach superstructure would consist of two trapezoidal shaped variable depth box girders, one for northbound traffic and one for southbound traffic. As seen in **Figure 16-6**, the structure would vary in width as a result of the acceleration and deceleration traffic lanes on the alignment. The elevated approach structure would be composed of 12 spans of varying length on the New York side and 14 spans of varying length on the New Jersey side. In general, the spans near the arch would be greater in length in order



Approach Pier Construction
Figure 16-5



Typical and Widest Roadway
Figure 16-6

to minimize the number of tall piers. It is assumed that the first four spans on the New York side (starting from the abutment) would be constructed utilizing the span-by-span erection method, and the remaining eight spans would be erected in balanced cantilever fashion. On the New Jersey side, it is assumed that the first seven spans would be constructed utilizing the span-by-span erection method, and the remaining seven spans would be erected in balanced cantilever fashion. Both methods would utilize an overhead gantry system to erect the precast concrete variable depth box girder segments (which would be delivered along previously constructed spans).

To protect the safety of passing motorists, segments would be erected at night (9 PM - 5 AM Sunday through Thursday nights and 12 AM - 8 AM Friday and Saturday nights). While segments would be stockpiled during the day on the completed deck, the three operations that would be done at night include: (1) Moving segments along the gantry between the gantry chords; (2) Lowering segments into position for attachment to previously erected segments; and (3) Launching the gantry to the next pier.

16-6-6-4 TOWERS

New six-column steel towers would replace the existing four-column steel towers at each end of the arch over the arch abutment. Each of the new towers would be open steel framing with an electrical room at the top. The new steel towers would provide support to the approach superstructure, and they would be approximately 60 feet taller than the existing towers. The deck system, stringers and edge girders from the arch would also extend across to the top of the tower. An expansion deck joint would be provided to accommodate the combined longitudinal movements of the approach and the arch.

16-6-6-5 INTERCHANGE RAMPS

Interchange ramps in New York and New Jersey would need to be reconstructed to accommodate the increase in grade of the mainline vertical alignment. Acceleration and deceleration lanes would be constructed with adequate lengths to accommodate the ramp design speed. Longitudinal grades would vary up to 6 percent on the ramps to accommodate the increase in grade of the mainline profile. Retaining walls as high as 25 to 30 feet would be installed along the new ramp alignments to support the fill required for the increase in profile grades.

16-6-6-6 TOLL PLAZA AND ADMINISTRATION BUILDING

The existing toll barrier on Route 440 would be completely demolished and replaced with a gantry structure containing E-Z Pass equipment. The existing toll facility parking area would be partially reconfigured to accommodate the horizontal and vertical geometry of the Route 440 mainline and interchange ramps. Ingress and egress to and from the toll facility would occur via the Trantor Place ramp. A new entrance to the toll facility and administration building would be located east of its present location.

16-6-6-7 EMERGENCY GENERATORS

The bridge would require two diesel-fueled 500-kW emergency generators to supply backup power for essential systems such as fire standpipes, roadway lights, cameras, and tolling equipment in the event of a sudden loss in utility electric power. The generators would be installed within a new building at each of the bridge abutments and replacing a single existing generator on the New York side. These structures would be located within existing PANYNJ right-of-way.

16-6-7 PRELIMINARY DRAINAGE DESIGN

Within New Jersey, the bridge deck drainage and a portion of the approaches would be routed to stormwater management basins and underground detention systems within the right-of-way. The stormwater management basins would convey stormwater to a new outfall from the New Jersey shoreline to the Kill Van Kull. Within New York on the bridge travel roadway and approach spans, stormwater would be captured, detained, and released through aboveground detention ponds to the NYCDEP combined sewer system. A few locations, such as the base of access ramps, would continue to drain as they do currently.

Bridge deck drainage would be collected by providing bridge scuppers every 125 to 250 feet along the length of the roadway within the arch. The scuppers would be placed along both outside shoulders of the travel lanes. Stormwater collected through scuppers would discharge to ductile iron pipes that would follow the slope of the arch. The pipes would be suspended from the bridge, running along both faces, and routed to the New York and New Jersey approach sections. The collection pipes would be extended along the approach sections to a landside point where stormwater would be routed down a pier to a receiving swale.

16-6-7-1 UTILITIES

Existing utilities on or around the Bayonne Bridge would be maintained during construction and after the new deck and approaches are installed. Some utilities may need to be relocated either temporarily for construction or permanently for the new structure and approach roadways.

16-7 ENVIRONMENTAL CONSEQUENCES

As with any large-scale transportation project, construction of the project may be disruptive to the surrounding area for limited periods of time throughout construction. The following analyses describe the project's temporary effects on transportation systems, air quality, noise, historic resources, hazardous materials, natural resources, land use, socioeconomic conditions, and open space, as well as the economic benefits associated with the construction. Most of the analyses considered effects throughout the construction period, assuming June 2013 through March 2017. However, the quantitative analyses for air quality, noise, and transportation focused on specific time periods (Stages 2 and 3) that were determined to be the worst case scenario. In an effort to further reduce construction-related impacts, PANYNJ will make provisions for an assistance program to accommodate impacted residents accordingly.

16-7-1 LAND USE AND SOCIAL CONDITIONS

As discussed in Chapter 4, "Land Use and Social Conditions," there are ecologically sensitive land uses and parkland adjacent to the construction work zone. Construction would not require any land acquisition. The businesses in the study area would not be adversely affected during construction of the project.

Construction-related activities would not have a noticeable effect on local land uses. Potential construction activities that may temporarily affect these land uses include construction traffic and temporary increases in noise and dust. However, the most disruptive construction activities would be of limited duration, which would minimize the adverse effect on adjacent land uses. Access to existing roads and businesses would be maintained through implementation of maintenance and protection of traffic (MPT) plans.

Overall, the project would not adversely impact the economic and social conditions of the study area, including land use, public policy, and population and employment. The project would result in temporary jobs for construction workers. The potential for disruptive construction activities to impact local property owners and businesses is considered in Chapter 5, "Economic Conditions." And the potential for the project to disproportionately impact minority and low-income groups is assessed in Chapter 17, "Environmental Justice."

The project will not result in adverse impacts for land use or social conditions. While some localized adverse impacts could occur in the study area during the construction phase of the project, these impacts will be temporary and will end once construction is complete. Moreover, mitigation measures will be employed to minimize any potential adverse effects on other technical areas during construction.

16-7-2 ECONOMIC CONDITIONS

As discussed in Chapter 5, "Economic Conditions," in some cases private property encroaches on PANYNJ right-of-way. Private property that encroaches on PANYNJ right-of-way would be reclaimed by PANYNJ during construction. The following section assesses impacts in Bayonne, NJ and Staten Island, NY.

16-7-2-1 ENVIRONMENTAL CONSEQUENCES IN BAYONNE, NEW JERSEY

Six properties or uses in Bayonne, NJ encroach on PANYNJ right-of-way and are within the construction work zone. None of these properties or uses are residential dwellings. Three of the encroaching properties contain industrial or warehouse uses, and two are parks. In one case, PANYNJ property is being used without authorization as a thoroughfare and for parking by the public, though it is not a mapped street.

The two sites that are used as park space in Bayonne that are within PANYNJ right-of-way would be affected by the project, but no long-term adverse impacts to parks and recreational resources are expected from construction activities in the area. Two parks (the ball fields adjacent to Dennis P. Collins Park and Al Slootsky Playground) encroach on PANYNJ right-of-way. The park areas within PANYNJ property are owned by PANYNJ and licensed to the City of Bayonne. Construction of the project would require the two ball fields and the Al Slootsky Playground to be closed to the public. Vehicles would be cleared from the area within 10 days of written notice prior to the start of construction. PANYNJ is working with the City of Bayonne regarding displacement of the ball fields and to relocate the Al Slootsky Playground facilities during construction, and potentially on a permanent basis. (See Chapter 8, "Parklands and Recreational Resources").

There are two commercial properties that encroach on PANYNJ right-of-way that fall within the construction work zone and would experience displacement of a portion of their facilities due to construction. Williams Industries and Ideal Windows would both experience displacement of a portion of their facilities due to construction. Williams Industries occupies a lot containing a four-story industrial building and a one-story warehouse shed that includes a loading dock. The four-story industrial building does not encroach on PANYNJ property and would not be directly affected by the construction. However, the one-story warehouse shed encroaches on the PANYNJ, but it does not fall within the construction work zone and could remain during construction. The driveway that provides access to a loading dock, which is within the PANYNJ right-of-way, would need to be modified, but it appears that the use of the loading dock could continue. Williams Industries would have to vacate the encroaching portion of the driveway by the start of construction. These modifications would not affect the overall economic viability of the company.

Similarly, the single-story building addition owned by Ideal Windows encroaches on PANYNJ right-of-way while their larger structure does not. The single-story addition at this location falls within the work zone and the encroachment would need to be vacated prior to construction. However, independent of the Raise the Roadway Alternative, Ideal Properties' use of the area under the bridge, particularly for the parking of trucks, represents a security concern. The portion of the Ideal Windows operations that are conducted in the non-encroaching building, which does not fall within the PANYNJ right-of-way, would not be impacted. The loss of the use of the area under the bridge could affect their operation; however, this use was not covered by Ideal Properties' lease and the modification to Ideal Properties' use is related to security concerns of the PANYNJ and not to the Raise the Roadway Alternative. While operations at Ideal Properties could be affected, this would not adversely affect overall economic conditions in the study area.

The building at 54 Juliette Street is occupied by the Bayonne Board of Education and used as a bus storage and maintenance facility. While access to these facilities may be limited during portions of the construction period, this is not expected to significantly affect the operations of the Bayonne Board of Education.

The encroaching unmapped street segments on the east and west sides of the bridge between Margaret Street and West Fourth Street are being used as thoroughfares and for on-street parking. These street segments would be closed during construction and returned to existing use after construction. As these street segments are in a residential neighborhood with ample off-street parking for residents, their closures would not significantly affect any businesses or residents. JFK Boulevard, one block east, could be used as an alternate thoroughfare during construction.

No easements of private property would be required in Bayonne, NJ. However, portions of West First Street, West Second Street, Gertrude Street, West Third Street, Juliette Street, and West Fourth Street that are underneath the bridge would require temporary construction easements. Temporary easements would be required for the reconstruction of Ramp Q, which provides access to the bridge from Avenue A, Route 440 and JFK Boulevard. These streets would experience full or partial closures during portions of construction. Closures would be staggered according to the construction schedule to minimize disruption to traffic. Although street closures may inconvenience some local businesses and deliveries, these closures would not be long-term, and alternative access would be available. Business operations are expected to be able to continue during construction, and long-term adverse impacts to local businesses are not anticipated.

16-7-2-2 ENVIRONMENTAL CONSEQUENCES IN STATEN ISLAND, NEW YORK

There are no properties in Staten Island that encroach on PANYNJ right-of-way and are located in the construction work zone. Aerial easements from the City of New York would be required for a permanent wider structure overhead for portions of Innis Street, Eaton Place, Newark Avenue, Richmond Terrace, and the rail right-of-way (between Newark Avenue and Eaton Place) underneath the bridge. Temporary easements would be required for the reconstruction of Martin Luther King, Jr. Expressway and the Morningstar Ramp. As described above, these streets would most likely experience staggered, temporary or full closures during construction. As alternative access would be available, business operations are expected to be able to continue during construction, and long-term adverse impacts to local businesses are not anticipated, as the rail right-of-way between Newark Avenue and Eaton Place are not in use, and the easement over this portion of rail right-of-way would not preclude any future redevelopment and reuse of the tracks. Therefore, the project would not adversely impact the rail right-of-way.

A temporary construction easement would be required for the public parking lot on the northeast corner of Walker Street and Morningstar Road. While approximately half of the parking lot would be closed, it is expected that a portion of the parking lot would remain in use throughout construction. Following construction, the lot would be returned to its former use. There is alternative parking nearby, and overall, the construction easement for this parking lot would not adversely affect businesses.

16-7-3 NATURAL RESOURCES

Project construction would not result in impacts to terrestrial communities, wildlife, federally-listed and/or New York and New Jersey-protected species, wetlands, floodplains, or aquatic resources in the study area.

16-7-3-1 FLOODPLAINS

As discussed in Chapter 6, “Natural Resources,” the use of a portion of the 100-year and 500-year floodplain within the Staten Island and New Jersey portion of the study area for the expansion of the approach roadways and piers would not result in adverse impacts to floodplain resources or result in increased flooding of adjacent areas. Similarly, increased flooding would not be expected during project construction.

16-7-3-2 WETLANDS

As stated in Chapter 6, “Natural Resources,” federal or state jurisdictional wetlands are not present within the study area in New York. In New Jersey, a 1.93-acre United States Army Corps of Engineers (USACE) jurisdictional wetland (Wetland B) is present within the potential staging area. It is conservatively assumed that all of the 1.93-acres of this wetland may be temporarily impacted by the construction of the potential staging area. However, in light of available space within the PANYNJ right-of-way, it is unlikely that this potential staging area would be used.

In addition, a stormwater outfall would extend beneath a small portion of Wetland C. The outfall would be constructed by "jacking" (a technique similar to horizontal directional drilling) starting from an area landward of the wetland. The end of the outfall will be located in state open waters. Disturbance to Wetland C is not expected. New York State Department of Environmental Conservation (NYSDEC) and New Jersey Department of Environmental Protection (NJDEP)-approved Stormwater Pollution Prevention Plans (SWPPPs) and Erosion and Sediment Control (ESC) plans would implement measures (i.e., silt fencing, hay bales) to protect adjacent wetlands outside of the area of disturbance from stormwater runoff during construction.

Although wetlands may be impacted during construction, the project would not result in any long-term impacts to wetlands of the region.

16-7-3-3 TERRESTRIAL RESOURCES

Topography and Soils

As described in Chapter 6, "Natural Resources," the study area is characterized by level to gently sloped topography. The primary concern related to soils is erosion. Ground disturbance can expose soils to wind, rain, and other erosive forces, thereby potentially creating dust or sedimentation in adjacent waterbodies.

During construction, the approach roadways would be raised to match the bridge deck height, and sloped embankment fills are anticipated at several locations. All slopes would be designed to avoid erosion by rainfall and runoff, as drainage and erosion control provisions would be incorporated in the design and construction of the embankments. In addition, to minimize potential impacts associated with soil erosion, all construction activities would be conducted in accordance with applicable NYSDEC and NJDEP-approved SWPPPs and ESC plans developed pursuant to NYSDEC's SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) in accordance with the New York State Stormwater Management Design Manual (NYSSMDM) (last revised August, 2010) and a New Jersey Construction Activity Stormwater General Permit (Permit No. NJ0088323). Following construction, areas of exposed soils would be re-vegetated thereby limiting long-term erosion concerns. Therefore, with these measures in place, the project would not result in an adverse impact with respect to soil erosion during construction.

Ecological Communities

As discussed in Chapter 6, "Natural Resources," the ecological communities of the study area are defined as "terrestrial cultural communities" that mainly consist of invasive plant species or successional native species that are common to the region. One exception is a low value red-maple sweetgum lot, which contains native species in the canopy, but is dominated by invasive species in the understory. As stated in Chapter 6, "Natural Resources," this woodlot is the location of the state-endangered willow oak (*Quercus phellos*) noted within the study area and described in more detail below. A portion of these low value terrestrial cultural ecological communities and of this low value red-maple sweetgum swamp lot would be removed during construction.

Tree removal would be conducted in accordance with all applicable City of New York and Bayonne regulations. However, the removal of these terrestrial cultural communities would not represent a significant adverse impact as the terrestrial ecological communities are wide-spread throughout the region and better representations of the red-maple sweetgum swamp with respect to structure, composition, and size are present elsewhere in the region. Therefore, the removal of portions of these communities during project construction would not result in a significant adverse impact to ecological communities of the region.

Wildlife

As described in Chapter 6, "Natural Resources," the terrestrial wildlife communities in the bridge study area are largely composed of disturbance-tolerant species that are associated with fragmented habitats and forest edges and can co-exist with anthropogenic activities in highly disturbed areas. The loss of the ecological communities described above under "Terrestrial Vegetation" for construction of the project would not result in adverse impacts to wildlife habitat of the region. To the extent practicable, PANYNJ would limit tree removal to outside of the breeding season (generally between March 15 and July 31) to avoid potential impacts to nesting birds, and any trees that need to be removed during the breeding season would first be inspected for signs of nesting activity. Any trees with active nests would not be removed until after the nests are no longer active.

Wildlife occurring elsewhere within the study area has the potential to be exposed to noise and increased human activity resulting from project construction. Noise pollution and other forms of human disturbance can alter wildlife community composition (Bayne et al. 2008, Francis et al. 2009), and at the individual level, cause increased acute stress and avoidance of the area of disturbance (Bowles 1995). However, several studies have also found loud noises, such as those associated with construction, to have no effect on the condition, behavior, or reproductive success of wildlife, including rare and specialist species (e.g., Butler et al. 2009, Bisson et al. 2009, Barron et al. 2012, Lackey et al. 2012).

Because the study area has been developed and maintained under its present land use for many years, the local assemblage of wildlife has been shaped in part by the high existing levels of noise and other human disturbances. The wildlife community in the study area has been established under these existing disturbances, and as such, is composed of primarily urban-adapted, generalist species (cf. Bonier et al. 2007, Francis et al. 2009). Project construction would not be expected to increase disturbance levels above the existing condition to the extent that it would alter species assemblages or otherwise negatively affect wildlife in the surrounding area from its present state. Some waterbirds would potentially temporarily avoid the area of the Kill Van Kull in the immediate vicinity of the bridge during construction, but any temporary avoidance of this small section of open water would not result in significant adverse effects (Gill et al. 2001), particularly given the extensive availability of comparable areas throughout New York Harbor. In addition, avoidance of the project site by waterbirds would be unlikely because waterbirds occurring in and over the Kill Van Kull are mostly limited to extremely urban-adapted and disturbance-tolerant species, such as double-crested cormorants, Canada geese, and ring-billed gulls that commonly inhabit areas with heavy levels of human activity. Wading birds, such as egrets and herons, are unlikely to occur in the Kill Van Kull because it lacks appropriate shoreline conditions for foraging, and the Kill Van Kull is not among the primary foraging areas used by wading birds from the breeding colonies of New York Harbor (Gelb 2004). No waterbird colonies are present on Shooters Island Bird Sanctuary (Craig 2010), and wildlife inhabiting Shooters Island would not be affected by construction activity given the island's distance from the project site.

As discussed below, measures would be implemented to protect peregrine falcons nesting on the bridge. Peregrine falcons are common in urban areas and highly tolerant of human disturbance (Cade et al. 1996, White et al. 2002), and with proper measures in place, would not be impacted by project construction. Overall, construction of the project would not be expected to have any significant adverse impacts to birds or other wildlife.

16-7-3-4 AQUATIC RESOURCES

As stated above, the project would not involve construction within the Kill Van Kull, with the exception of a new stormwater outfall from the shoreline in New Jersey. Barges would be used for removing the existing roadway for eight to ten 8-hour periods with partial channel closures, but no in-water work would be conducted during the removal of the existing roadway. During upland construction activities, measures (e.g., silt fences and straw bale dikes) to reduce stormwater runoff to the Kill Van Kull would be implemented in accordance with the SWPPP and ESC plans. Implementation of these measures would minimize the potential for stormwater runoff from upland construction areas to adversely affect water quality and wetlands of the Kill Van Kull or wetlands within the potential staging area. As stated below, where dewatering is required, it is possible that the water would require treatment prior to its discharge to surface water or sewers. Prior to any such discharge, the water would be tested and the discharge would only be conducted in accordance with applicable requirements of the NY SPDES and NJPDES permits. Therefore, with these measures in place, stormwater runoff and dewatering discharges during construction would not result in adverse impacts to wetlands, water quality, or aquatic biota of the Kill Van Kull.

16-7-3-5 SEDIMENT QUALITY

The project would not involve the disturbance or removal of sediments from the Kill Van Kull since no in-water construction would be conducted. Therefore, the construction of the project would not result in adverse impacts to the sediment quality of the Kill Van Kull.

16-7-3-6 ENDANGERED, THREATENED, RARE, AND SPECIAL CONCERN SPECIES AND ECOLOGICAL COMMUNITIES

Plants

As stated above, New York State-listed endangered willow oak trees are present within the construction work zone on Staten Island[1]. Measures would be implemented to avoid impacts to the trees during construction. These measures may include protective fencing around the trees and their critical root zones to keep construction activities and construction equipment from damaging the trees. However, should the project construction require the removal of some or all of the willow oak trees, then a mitigation plan would be developed to plant willow oak trees on- or off-site at a mitigation ratio developed in consultation with the New York Natural Heritage Program (NYNHP) and/or New York City Department of Parks and Recreation (NYCDPR). Thus, while there would be a short-term impact to willow oak trees within the study area, the project construction would not result in a long-term adverse impact on willow oak populations within the region.

Wildlife

As stated in Chapter 6 "Natural Resources" and above, the peregrine falcon is known to nest on the Bayonne Bridge. It would be expected that the peregrine falcon would habituate to and tolerate the increased levels of noise and human activity that would occur during project construction, and continue to utilize the current nest site based on their successful nesting amidst construction and maintenance work on the bridge in past years (Loucks and Nadareski 2005, Loucks 2008). Nest site abandonment in urban peregrine falcons is extremely rare when successful nesting has occurred in prior years (Cade et al. 1996). Nesting in an urban environment inherently involves frequent introduction of new and unfamiliar sources of disturbance, and this strong nest site fidelity of peregrine falcons in cities is further testament to their tolerance of noisy and unpredictable conditions.

The nesting season of peregrine falcons in New York City is generally from February through August. Protocols developed in consultation with USFWS, NYSDEC, NYCDEP, and NJDEP would be implemented to minimize disturbance to the peregrine falcon. However, the timing of the construction would be performed in consultation with NYSDEC, NYCDEP, and NJDEP wildlife biologists to protect peregrine falcons during construction (e.g., avoid nests during construction or relocation of nests/nesting platforms during construction). The same procedure would be implemented should wildlife biologists determine that osprey use the bridge and the nearby platform for nesting. As stated in Chapter 6, "Natural Resources," it is expected that the peregrine falcon and osprey (if present) would relocate to the bridge/nesting platforms post construction. With these measures in place, there would be no adverse impact to peregrine falcons and osprey due to project construction.

[1] As stated above, willow oak is commonly planted as a street tree in New York City and listed on the NYCDPR approved tree planting list for sidewalk and right-of-way areas and one of the trees observed during the field inspection appears to have been planted within the ROW.

16-7-3-7 ESSENTIAL FISH HABITAT

As stated above, in-water and wetlands work in the Kill Van Kull would be limited to the construction of a new stormwater outfall in New Jersey. This stormwater outfall would require a pile-supported pipe that would extend from the shoreline through a small portion of Wetland C, and to the outfall structure in the open waters of the Kill Van Kull. As stated above, the impacts to Wetland C would be minimal and mitigation for these minor disturbances would be determined through the USACE and NJDEP wetlands permitting process. Mitigation may include restoration or enhancement of onsite wetlands.

As described above, during upland construction activities, measures (e.g., silt fences and straw bale dikes) to reduce stormwater runoff to the Kill Van Kull would be implemented in accordance with the SWPPP and ESC plans. Implementation of these measures would minimize the potential for stormwater runoff from upland construction areas to adversely affect Essential Fish Habitat (EFH) (i.e., water quality and wetlands of the Kill Van Kull). Where dewatering is required, it is possible that the water would require treatment prior to its discharge to surface water or sewers.

Coordination with NMFS would occur during the permitting phases of the project. Any measures to minimize potential impacts to EFH, as identified during agency coordination, would be implemented during project construction. Therefore, no adverse impacts on EFH species or EFH would occur during the construction of the project.

16-7-4 HISTORIC AND CULTURAL RESOURCES

16-7-4-1 ARCHAEOLOGICAL RESOURCES

As described in Chapter 7, “Historic and Cultural Resources”, the Area of Potential Effect (APE) is determined to have a low sensitivity for archaeological resources. Therefore, the project would have no adverse impacts on archaeological resources.

However, a construction protection plan would be prepared and implemented to avoid accidental impacts during the construction adjacent to St. Mary’s of the Assumption Church Cemetery. The construction protection plan would be submitted to NYSHPO for review as indicated in NYSHPO’s letter of February 24, 2012. The commitment to prepare and implement the construction protection plan is included as a stipulation of the Programmatic Agreement contained in **Appendix B**.

As requested by NJHPO in a letter dated February 22, 2012, a buffer will be placed around the National Register (NR)-eligible shipwreck located in the Kill Van Kull (Vessel V36) located approximately 1,200 feet east of the APE. The buffer will be free of anchor drag lines during construction and will be referenced in project documents and vessel navigation global positioning system (GPS) for the project. The commitment that Vessel V36 be identified by vessel navigation GPS in the project records and bid documents is contained as a stipulation of the Programmatic Agreement contained in **Appendix B**. As also requested by NJHPO in a letter dated March 29, 2012, although the New Jersey portion of the APE has a low potential for archaeological resources, an Unanticipated Discoveries Plan was developed for incorporation into project documents in the unlikely event that unexpected archaeological resources are encountered during construction.

16-7-4-2 ARCHITECTURAL RESOURCES

Bayonne Bridge

The project seeks to reconstruct the roadway of the Bayonne Bridge's approach structures (piers and roadways), towers, pedestrian walkway, wire rope hangers, and the roadway with the arch. A new road deck would be constructed at a higher elevation, requiring modification to the arch structure and changing the relationship between the arch and the roadway. The historic bridge's arch structure would be preserved.

The project would result in an Adverse Effect to this historic resource. NYSHPO and NJHPO concurred that the project would have an Adverse Effect in letters dated March 6, 2012 and March 23, 2012 respectively. However, the Adverse Effect under Section 106 would not be a significant adverse environmental effect under NEPA regulations, because the project would preserve the bridge and extend its useful life, rather than demolish and replace the Bayonne Bridge. Measures to mitigate the Adverse Effect have been developed among USCG, ACHP, NYSHPO, NJHPO, PANYNJ, with the input of other consulting parties, and set forth in the Programmatic Agreement.

To avoid adverse construction related effects on the main arch of the bridge that would be preserved, a Construction Protection Plan was prepared in consultation with NYSHPO and NJHPO. The commitment to prepare and implement the construction protection plan for the main arch is included as a stipulation of the Programmatic Agreement contained in **Appendix B**.

Historic Resources, Staten Island, NY APE

The project would have no direct effects on historic resources in the Staten Island portion of the APE. The general relationship of the Bayonne Bridge to the surrounding area with its mix of commercial, residential, institutional and industrial buildings would not be altered. The alteration of the height of the roadway and the replacement of the approach structures would not substantially alter the setting or historic character of the historic resources, which are NR eligible for the historic significance and/or architectural design. Therefore the project would not result in an Adverse Effect on the historic resources located in the APE. In a letter dated March 6, 2012, NYSHPO concurred that the possible indirect effects to the historic resources within the APE will not significantly alter the setting or other qualities of the historic resources that make them eligible for SR and NR listing.

Historic Resources, Bayonne, NJ APE

The former John Boyle and Company manufacturing Building at 70-76 Avenue A, which has been identified as a potential local landmark, is in proximity to construction. To avoid adverse construction-related effects, this property would be included in the Construction Protection Plan to be prepared in consultation with NJHPO. There would be no adverse indirect effects to the six potential local landmarks. The general relationship between these resources, their surroundings, and the Bayonne Bridge would remain relatively unchanged.

16-7-4-3 MITIGATION

Measures to mitigate this direct Adverse Effect are described in the Programmatic Agreement. They include:

- Design consultation with NYSHPO and NJHPO with respect to development of bridge design documents.
- PANYNJ will prepare a construction protection plan to avoid or minimize adverse effects during construction on the following historic properties: the historic main arch span of the Bayonne Bridge; the property at 70-76 Avenue A in Bayonne, New Jersey; and a portion of the St. Mary's of the Assumption Church Cemetery in Port Richmond, NY. In addition, PANYNJ and USCG will identify Vessel 36 by vessel navigation GPS in the Proposed Project records and bid documents.
- PANYNJ will develop an Unanticipated Archaeological Discovery Program for incorporation into the project documents.
- PANYNJ and USCG will locate within their respective collections, to the extent available, original design drawings, photographs, and construction documents relating to the original construction and subsequent improvements to the Bayonne Bridge.
- Photographic documentation and accompanying narrative shall be prepared to supplement the Historic American Engineering Record (HAER) aerial photography completed in 1987, in consultation with the National Park Service.
- A publication of the history of the Bayonne Bridge (Bayonne Bridge: A Landmark by Land, Sea and Air, Darl Rastorfer, 2007) commissioned by PANYNJ for the 75th anniversary of the bridge will be distributed to historical societies and libraries.
- Educational lesson plans for use by local libraries, historical societies, and educational institutions.
- PANYNJ will develop signage and exhibits that inform the public of the history of the Bayonne Bridge as part of the history of architecture, engineering, navigation and transportation in the port region.
- Re-Dedication Ceremony. A re-dedication ceremony of the Bayonne Bridge will be held upon completion of the project to highlight the bridge's historic architecture and cultural significance.

16-7-5 PARKLANDS AND RECREATIONAL RESOURCES

The project is not expected to result in any permanent or long-term changes in land use or traffic patterns. Therefore, this analysis considers the impact of project construction on nearby parks and recreational resources.

16-7-5-1 PROBABLE IMPACTS IN THE STATEN ISLAND STUDY AREA

The project is not expected to adversely impact any parks or recreational resources in the Staten Island study area. No Staten Island open spaces resources are located within the 40-foot construction work zone, and therefore, none would be directly affected by construction. Some of the open space resources, such as the playground at

Public School 21, are located in close proximity to the 40-foot construction work zone, and could experience indirect effects, such as increased traffic levels and noise, due to construction activities. However, the most disruptive construction activities would be of limited duration, which would minimize the adverse effect on nearby parks and recreational resources. Overall, no long-term, significant adverse impacts are expected from construction activities to parks and recreational resources on Staten Island.

16-7-5-2 PROBABLE IMPACTS IN THE BAYONNE STUDY AREA

Two parks in Bayonne are located within the 40-foot construction work zone and encroach upon PANYNJ property: Al Slootsky Playground and two ball fields adjacent to Dennis P. Collins Park. These two parks would be directly affected by construction. As noted in Chapter 5, "Economic Conditions," these two park areas within PANYNJ right-of-way are owned by PANYNJ but licensed to the City of Bayonne. Construction of the project would require the two ball fields to be closed to the public, and vehicles would be cleared from the area within 10 days of written notice prior to the start of construction. PANYNJ is coordinating with the City of Bayonne regarding this closure. Al Slootsky Playground would also be closed during construction. PANYNJ is working with the City of Bayonne to relocate these facilities for the duration of the temporary closure, and potentially on a permanent basis.

The necessary closure of these parks would be of limited duration and coordinated with the City of Bayonne, which would minimize the adverse effect on adjacent parks and recreational resources. As discussed above, some park facilities may be relocated permanently. Overall, no long-term, significant adverse impacts are expected from construction activities to parks and recreational resources in Bayonne.

16-7-5-3 PROBABLE IMPACTS ON THE KILL VAN KULL

The Kill Van Kull would remain navigable throughout the construction period. However, it is estimated that eight to ten 8-hour partial closures of the channel would be necessary. Any temporary closures would be coordinated with USCG and include any appropriate notifications or signage, as required. Because the Kill Van Kull is an important shipping route, partial channel closures may require that recreational boaters and shippers temporarily share narrowed navigational routes, in which case recreational boaters would need to use caution and likely yield to shipping vessels. However, these temporary inconveniences would not result in significant effects on recreational boating during construction.

16-7-6 TRANSPORTATION

This section identifies regional and local impacts resulting from the extended closure of local streets in Bayonne and Staten Island during construction, closure of ramps leading to and from Route 440 in Bayonne and Staten Island, limited periodic weekend closures, and nightly closures that would divert traffic to other regional facilities such as the Goethals Bridge, the Holland Tunnel, the Outerbridge Crossing, and the Verrazano Narrows Bridge. Measures to address those impacts are also discussed.

As the overall weekend traffic volumes in the local roadway network are lower than weekday volumes (approximately 10 percent lower on Saturday and 20 percent lower on Sundays), the weekday analysis conducted for this study represents the reasonable worst case scenario for overnight bridge closures. Since the results are a reasonable worst case scenario, the impacts may decrease with additional design work and further discussion with local permitting agencies. The analysis methodology and study area for the assessment of potential construction impacts is presented in Chapter 10, "Transportation," but the results are reported here.

16-7-6-1 CONSTRUCTION STAGES

The first step in the traffic analysis of the local roadway network was to review the five construction stages developed for this project. Each stage accounts for the reconstruction of specific roadway sections along Route 440 and/or the bridge structure itself, and requires the extended closure of several local streets and ramps in Staten Island and Bayonne. Listed below are the streets and ramps that would be closed at certain times during construction; **Table 16-1** shows the street closure schedule.

Streets and ramps to be closed in Staten Island include:

- Ramp A: Route 440 off-ramp to Morningstar Road;
- Ramp B: Route 440 on-ramp from Morningstar Road;
- Ramp C: Route 440 off-ramp to Trantor Place;
- Ramp D: Route 440 on-ramp from Trantor Place; and
- Northbound Newark Avenue and Eastbound Innis Street.

Table 16-1
Street Closure by Construction Stage

	Street Closures in Staten Island						**Street Closures in Bayonne**			
Constr. Stage	Ramp A	Ramp B	Ramp C	Ramp D	NB Newark Avenue	EB Innis Street	Ramp E	Ramp F	Ramp G	Bayonne Bridge Underpasses[1]
1	-	-	-	-	-	-	-	Closed	-	Closed
2	-	-	Closed	Closed	Closed	Closed	-	-	Closed	Closed
3	-	-	Closed	Closed	Closed	Closed	Closed	-	Closed	Closed
4	Closed	Partially Closed	-	-	-	-	-	Closed	-	Closed
5	Closed	Partially Closed	-	-	-	-	-	Closed	-	Closed

Notes: [1] For analysis purposes, it is assumed that the underpasses of Juliette Street, West Third Street, and Gertrude Street will be closed at all times during construction. Their traffic will be diverted to West Fourth Street and West First Street, which will remain open at all times.

Streets and ramps to be closed in Bayonne include:

- Ramp E: Route 440 off-ramp to JFK Boulevard;
- Ramp G: Route 440 on-ramp from JFK Boulevard;
- Ramp F: Route 440 on-ramp from Avenue A; and

- Bayonne Underpasses (Juliette Street, West Third Street, and Gertrude Street).

Once the main detour routes for each closure were identified, 38 analysis locations, consisting of intersections (signalized and unsignalized), roadway segments and ramps that could experience an increase in traffic as a result of the closures and related detours were selected for analysis. The detour routes represent the shortest and most probable path(s) that vehicles would take once a roadway closure is implemented. The detour routes are estimated from key movement counts and field observations of existing vehicle paths in the neighborhood of the proposed roadway closure. **Table 16-2** lists the analysis locations by construction stage. **Figures 16-1A** through **16-1E** depict the project's five stages of construction.

16-7-6-2 TRAFFIC COUNTS AND PEAK HOURS

Once the analysis locations were identified, an extensive traffic count program was conducted in November 2011 to obtain the data to establish the existing traffic conditions during the AM and PM peak hours. The program consisted of Turning Movement Counts (TMCs) at all analysis intersections, Automatic Traffic Recorders (ATRs) at strategic roadway segments, and 10-minute sample counts at other supplemental local intersections as detailed in Chapter 10, "Transportation".

16-7-6-3 CONSTRUCTION BUILD STAGES

Since project construction is anticipated to last from 2013 to 2017, the traffic impact analysis conservatively used the baseline traffic volumes for 2017 for all stages. The actual baseline traffic in the other years would be lower. Therefore, potential effects of some stages may be overstated. Note that the traffic staging described here does not align with the construction staging discussed earlier in the chapter, as construction stages overlap.

Although it is likely that street closures would be intermittent and of short duration, for analysis purposes it was assumed that the underpasses of Juliette Street, West Third Street and Gertrude Street would be closed during all five construction stages. Their combined traffic, which is expected to reach 280 vehicles per hour in both directions, would be diverted to West First and West Fourth Streets.

PANYNJ toll supervising staff currently working in the administration building near Trantor Place would be relocated to another facility during construction. The building would be made available to the contractor to provide easy access to the construction site. Traffic volumes generated by the building were removed from the roadway network in all construction stages.

Table 16-2
Analysis Locations by Construction Stage

Analysis Location				Construction Stage				
	Int ID	Type	Description	1	2	3	4	5
Bayonne	1	U	Avenue A and W. 8th Street	✓			✓	✓
	2	S	Avenue A and North Street	✓	✓	✓	✓	✓
	3, 54	U	Avenue A and Route 440 SB Ramps H and F	✓	✓	✓	✓	✓
	4	S	JFK Boulevard and W. 8th Street	✓			✓	✓
	5	S	JFK Boulevard and North Street	✓	✓	✓	✓	✓
	6	R	Ramp G (from JFK Boulevard to Route 440 SB)	✓			✓	✓
	9	S	JFK Boulevard and Ramp E			✓		
	10	S	JFK Boulevard and W. 4th Street	✓	✓	✓	✓	✓
	11	U	JFK Boulevard and W. 3rd Street	✓	✓	✓	✓	✓
	12	U	JFK Boulevard and W. 1st Street	✓	✓	✓	✓	✓
	16	S	Route 440 and 5th Street Connection			✓		
	17	U	Ingham Avenue and E. 5th Street			✓		
	43	U	JFK Boulevard and W. 5th Street			✓		
	92	S	Avenue A and W. 4th Street	✓	✓	✓	✓	✓
	128	U	JFK Boulevard and Juliette Street	✓	✓	✓	✓	✓
	163	U	JFK Boulevard and Gertrude Street	✓	✓	✓	✓	✓
Staten Island	21, 174	S	Forest Avenue / Willowbrook Road / Port Richmond Avenue		✓	✓		
	22	S	Forest Avenue and Willow Road East		✓	✓		
	22b	U	Port Richmond Avenue and Trantor Place		✓	✓		
	23	S	Forest Avenue and Willow Road West				✓	✓
	24	S	Forest Avenue and Morningstar Road / Richmond Avenue				✓	✓
	25	U	Morningstar Road and St. Adalbert Place				✓	✓
	26	S	Morningstar Road and Walker Street		✓	✓	✓	✓
	27	U	Morningstar Road and Route 440 SB Ramps A and B				✓	✓
	28	S	Morningstar Road and Innis Street		✓	✓		
	29	S	Morningstar Road and Richmond Terrace		✓	✓		
	30	U	Richmond Terrace & Newark Avenue		✓	✓		
	31	S	Richmond Terrace and Nicholas Avenue		✓	✓		
	32	S	Nicholas Avenue and Innis Street		✓	✓		
	33	U	Trantor Place and Route 440 NB Ramps C and D		✓	✓		
	34	S	Trantor Place and Walker Street		✓	✓		
	35	S	Port Richmond Avenue and Walker Street		✓	✓		
	36	U	Port Richmond Avenue & Orange Avenue		✓	✓		
	141	U	Morningstar Road and Newark Avenue		✓	✓		
	194	R	Trantor Place ramp to Route 440 NB (North of Forest Avenue)		✓	✓		
	195	U	Route 440 SB ramp to Willow Road West				✓	✓
	216	D	Route 440 NB ramp to Willow Rd East		✓	✓		
	217	U	Route 440 NB ramp to Willow Rd East		✓	✓		

Notes:

S *Signalized Intersection*
U *Unsignalized Intersection*
D *Diverge*
R *Roadway Segment*

Construction Stage 1

In this Stage 1, Ramp F would be closed for about seven months, and its traffic, expected to reach 70 vehicles per hour by 2017, would be diverted to Ramp G via West Eighth Street in Bayonne.

Construction Stage 2

Stage 2 is expected to last about 12 months. In Bayonne, Ramp G would be closed, and its traffic, expected to reach 170 vehicles per hour by 2017, would be diverted to Ramp F via North Street.

In Staten Island, Route 440 Ramps C and D would also be closed. About 500 vehicles expected to travel on Ramp C during the peak hour in 2017 would be diverted to the Route 440 off-ramp to Willow Road East, and travel north on Trantor Place towards their final destinations. Ramp D traffic, expected to reach 125 vehicles per hour, would be diverted to the Route 440 on-ramp located south of Walker Street via Port Richmond Avenue and Trantor Place.

In this stage, Newark Avenue would be open only in the southbound direction, and Innis Street would be open only in the westbound direction. As a result of these closures, about 450 vehicles would be diverted during the peak hour, and would travel mostly along westbound Richmond Terrace and southbound Morningstar Road.

Construction Stage 3

Stage 3 would be similar to Stage 2. The only difference being that construction would last about eight months, and that ramp E (from northbound Route 440 to JFK Boulevard) in Bayonne would also be closed. The 170 vehicles using that ramp during the peak hour would be diverted back to JFK Boulevard via northbound Route 440, the southbound Fifth Street connection roadway, and westbound Fifth Street.

Construction Stages 4 and 5

These two construction stages would be very similar and were therefore combined into one for the analysis. The combined stages are expected to last about 17 months and would consist of the full closure of Ramps A and F, as well as the partial closure of Ramp B.

Ramp A’s closure would cause an additional 140 vehicles per hour to travel southbound on Route 440 to the Willow Road West exit ramp towards westbound Forest Avenue, and then along northbound Morningstar Road. Ramp F’s closure would cause about 70 vehicles per hour to be diverted to Ramp G via West Eighth Street.

Ramp B is expected to carry approximately 700 vehicles per hour in 2017. Due to this substantial volume, the ramp would never be fully closed. Work would be performed in two stages, keeping one lane open to traffic at all times. The northern side of the ramp would be built in Stage 4 and the southern part in Stage 5.

Ramp B’s operational characteristics are basically the same for the No Build, Stage 4, and Stage 5 scenarios (one-lane ramp). Ramp B was therefore not included as an analysis location.

Construction Build Alternative for the Bridge Roadway

During times when the Bayonne Bridge would be open to traffic during construction, the worst case scenario would occur with one lane open to traffic in each direction. This condition was analyzed using the Multilane Highway Methodology presented in the 2000 Highway Capacity Manual.

The analysis assumed that under the No Build Alternative, the bridge would operate with two lanes per direction and a free flow speed of 50 miles per hour, as it does today. During project construction, the bridge would operate with one lane per direction, and a speed limit of 25 miles per hour.

16-7-6-4 CONSTRUCTION TRAFFIC

A moderate volume of additional trips would also enter the local network during construction, with construction Stage 2 generating the most additional traffic (see **Figures 16-7** and **16-8**).

In Stage 2, construction worker trips between their homes, their designated parking areas and the construction work zone are expected to reach 270 auto trips per day. Construction material deliveries are expected to generate 104 truck trips per day.

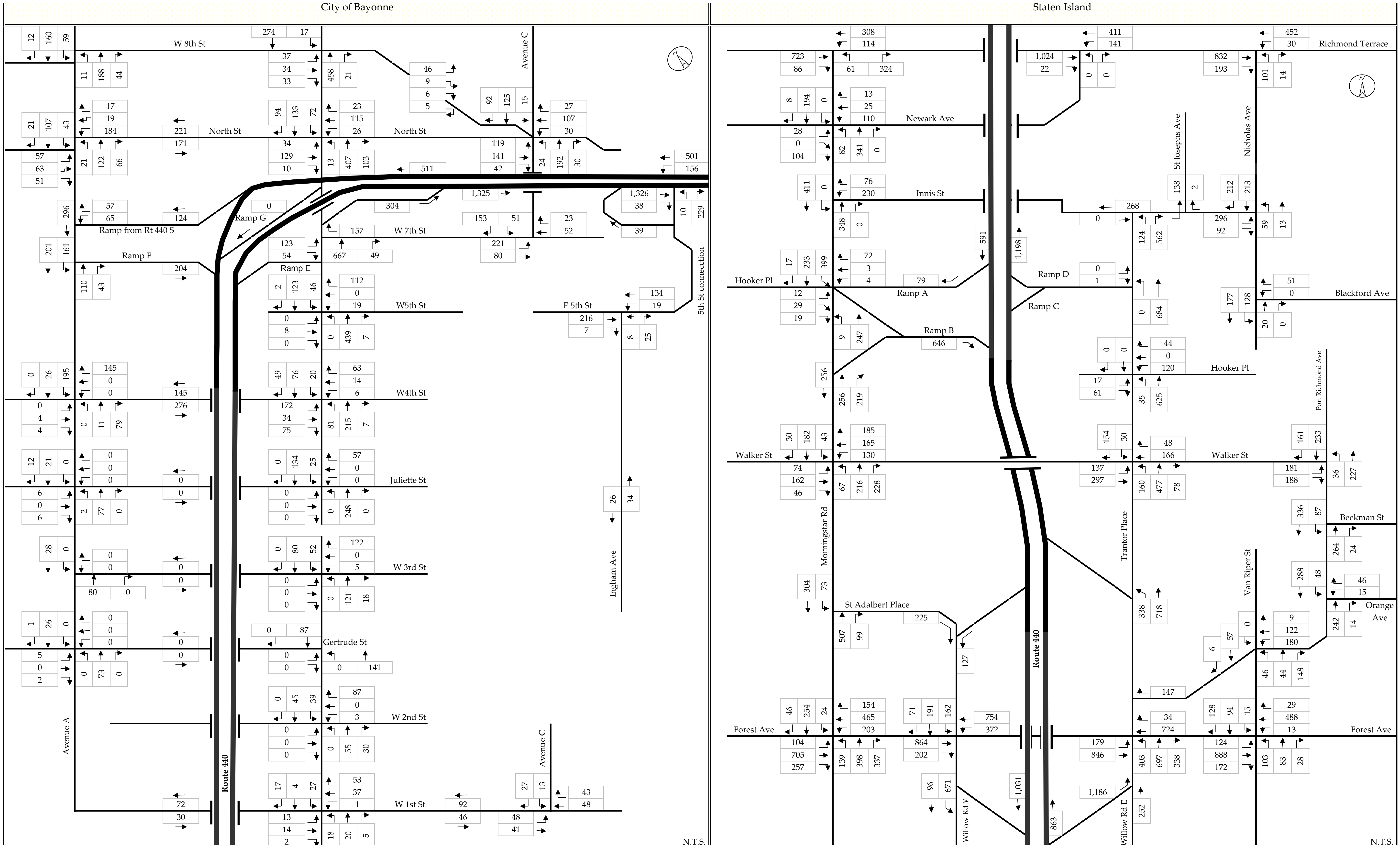
The highest construction traffic volumes generated in an hour would be 86 autos trips from 5 to 6 AM, with 35 truck trips generated from 9 to 10 AM. For analysis purposes, it was assumed that all of these trips would occur in hours outside of the peak periods (6 to 9 AM, and 4 to 7 PM), which is typical for construction activities.

16-7-6-5 REGIONAL ANALYSIS METHODOLOGY

A regional spreadsheet model was developed to calculate the traffic volumes diverted to key facilities in the regional roadway network resulting from the late night closure of the Bayonne Bridge. The diversion scenario evaluated in this study consists of the full closure of both directions of the bridge from 9 PM to 5 AM Sunday through Thursday for the duration of construction. No closures are planned during the period from 5 AM to 9 PM. Weekend overnight closures (midnight to 8 AM Friday and Saturday nights) are also planned. The effects of these closures are covered by the full weekend closure analysis below, as they would fall within the window analyzed for the full weekend closures.

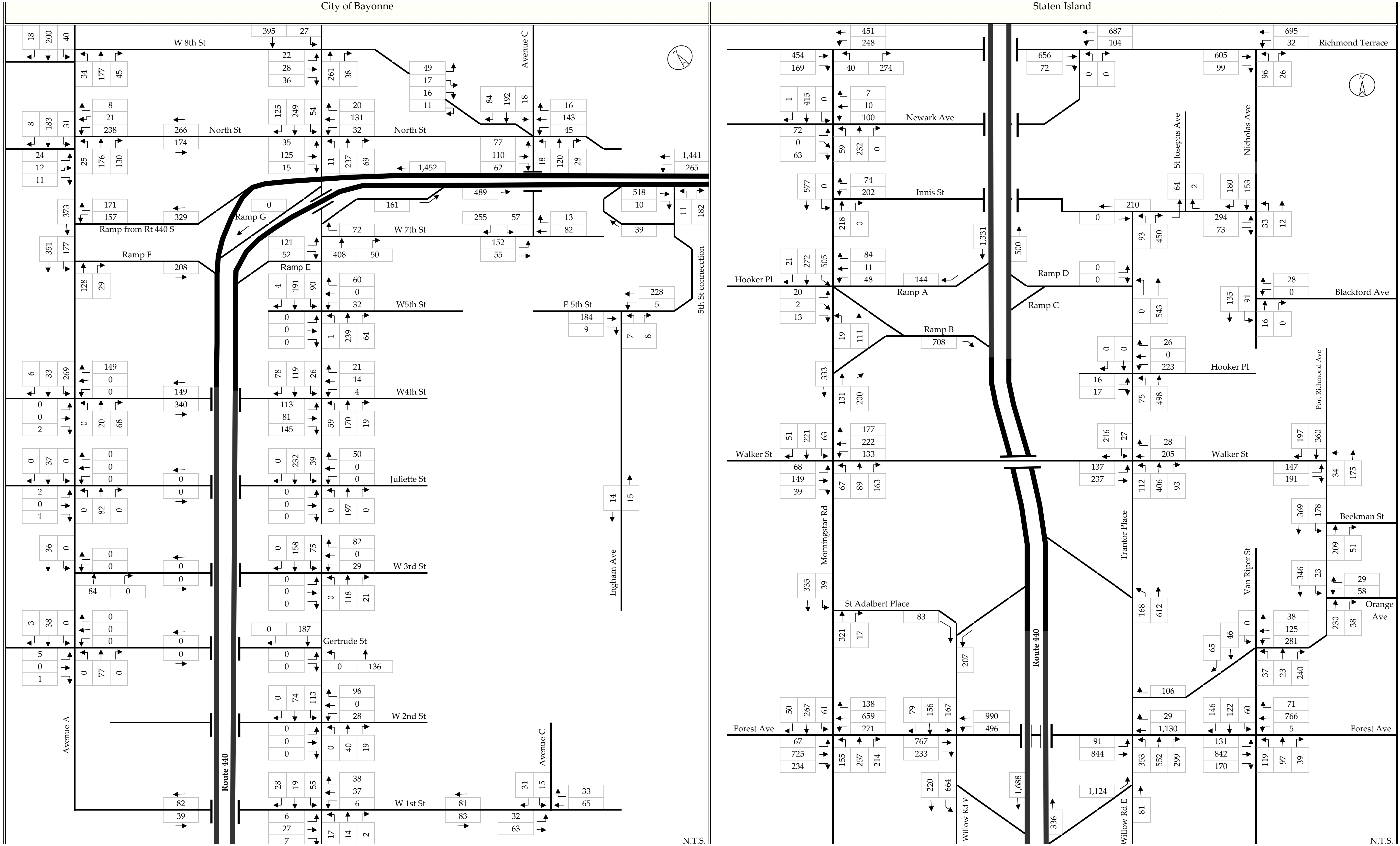
An additional analysis was performed to evaluate the traffic impacts of full weekend closures of Bayonne Bridge during construction. It is anticipated that the bridge will be closed for an estimated 8 weekends per year. The regional locations selected for the analysis are the following four key facilities: Goethals Bridge (GB), Outerbridge Crossing (OBX), Verrazano-Narrows Bridge (VNB), and the Holland Tunnel (HT). Special care will ensure closures occur on low volume weekends, avoiding the peak travel weekends of the year - including the summer months of June, July and August. The typical weekend closure will be from 9 PM Friday through 5 AM Monday.

Diverted traffic was assigned to other routes using a similar methodology as the weeknight closure analysis described in Section 16-5-6-5, based on Origin Destination surveys. This analysis calculates traffic impacts in 2017, since that would be the highest volume year due to background growth.



Construction Conditions Traffic Volumes (All Vehicle Types)
AM Peak Hour

Figure 16-7



Construction Conditions Traffic Volumes (All Vehicle Types)
PM Peak Hour
Figure 16-8

It is important to note that that the analysis presented in this section assumed all weekend trips across the Bayonne Bridge were diverted to other facilities. In all likelihood, discretionary trips, assumed to be shopping and recreational trips, may not occur should conditions warrant, or alternate destinations for the discretionary trips will be selected that avoid congested facilities altogether. **Table 16-3** shows the breakdown of discretionary trips observed across the bridge on weekends in 2003 and 2011. Discretionary trips accounted for 31 percent of all weekend trips in the 2003 survey, and 51 percent of all trips in the 2011 survey, a large percentage of trips in both years. The actual delays at other facilities would therefore be significantly lower than those presented in this section due to the large number of discretionary trips.

Table 16-3
Breakdown of Bayonne Bridge Weekend Trips by Trip Purpose

Trip Purpose	2003 Trips	2011 Trips
Company Business	3%	2%
Other	1%	0%
Personal Business	40%	16%
Recreation	**24%**	**45%**
School	1%	0%
Shopping	**7%**	**6%**
Work/Commuting	24%	31%

The Spreadsheet Traffic Diversion Model

There are three main components in the spreadsheet model. They are as follows: the 2017 Bayonne Bridge volumes (New York bound and New Jersey bound), the Origin-Destination (O/D) survey conducted by PANYNJ in spring 2003, and the traffic diversion routes developed as part of this study. An updated O/D survey was conducted concurrently with this analysis and indicated no significant differences in O/D patterns.

Bridge Volumes

The hour by hour 2017 traffic volumes for the Bayonne Bridge that were used in the traffic analysis are shown in **Table 16-4**. The table shows the time windows when the bridge would be closed, causing its traffic to be diverted to other regional facilities. The 2017 hourly volumes were calculated from existing counts that were increased using their corresponding background growth rates provided by PANYNJ.

Table 16-4
2017 Bayonne Bridge Hourly Volumes

	Hour	Weekday Volumes		Sunday Volumes	
		NY Bound	NJ Bound	NY Bound	NJ Bound
Bayonne Bridge Closed	12 AM to 1 AM	164	66	307	80
	1 AM to 2 AM	116	49	176	66
	2 AM to 3 AM	92	41	150	37
	3 AM to 4 AM	85	42	135	30
	4 AM to 5 AM	128	80	110	34
Bayonne Bridge Open	5 AM to 6 AM	257	247	98	50
	6 AM to 7 AM	468	714	142	107
	7 AM to 8 AM	590	1,146	197	145
	8 AM to 9 AM	592	1,104	228	180
	9 AM to 10 AM	488	603	291	230
	10 AM to 11 AM	466	397	374	289
	11 AM to 12 PM	469	387	437	352
	12 PM to 1 PM	478	429	500	427
	1 PM to 2 PM	542	406	530	385
	2 PM to 3 PM	708	455	538	382
	3 PM to 4 PM	884	435	559	391
	4 PM to 5 PM	1,059	557	551	420
	5 PM to 6 PM	1,424	500	583	388
	6 PM to 7 PM	1,298	400	612	375
	7 PM to 8 PM	854	378	530	363
	8 PM to 9 PM	558	283	481	293
Bayonne Bridge Closed	9 PM to 10 PM	421	241	372	258
	10 PM to 11 PM	351	194	298	172
	11 PM to 12 AM	271	116	208	121
	24-Hr Total	12,763	9,270	8,407	5,575

Notes: [1] New York Bound traffic at Bayonne Bridge is expected to growth at 2.71% and 1.92% for the AM and PM periods, respectively.
[2] New Jersey Bound traffic at Bayonne Bridge is expected to growth at 0.30% and 2.07% for the AM and PM periods, respectively.
[3] At the Bayonne Bridge, New York Bound is the southbound direction, and New Jersey Bound is the northbound direction.

O/D Trip Data

The raw O/D trip data consists of origin and destination zip codes (zones) of New York bound trips grouped into five time periods (Weekday AM, Midday, PM, Nighttime, and Weekend) (see **Figure 16-9**). These data were used to calculate the percentage of Staten Island bound traffic that will be allocated to each individual O/D pair for analysis purposes. New Jersey bound O/D trip percentages were calculated by reversing the origins and destinations of the Staten Island bound O/D trip percentages. The resulting O/D trip percentages were applied to the 2017 volumes (in 15-minute intervals) to calculate the 2017 O/D trip tables that were used in the diversion analysis.

Table 16-5 shows the Staten Island bound trip percentages used in the weekday analysis during the AM period that extended from 6 AM to 10 AM. Similar tables were also developed for the Weekday Midday, PM, Nighttime and Weekend time periods and were used in the regional analysis.

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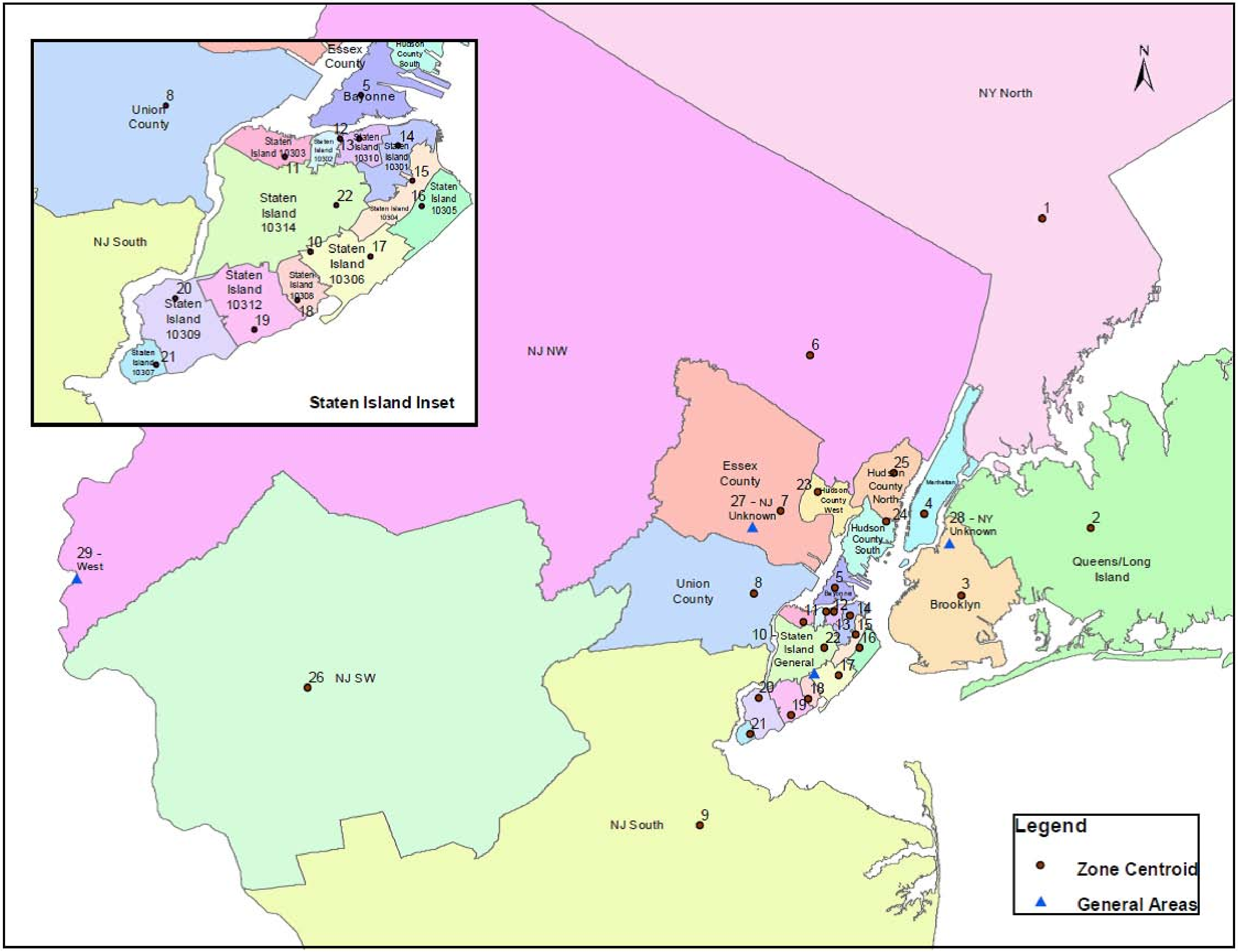


Regional Zones
Figure 16-9

Table 16-5
Weekday AM Trips: Origin/Destination Percentages

Origin #	Origin Zone	2 Queens/Long Island	3 Brooklyn	4 Manhattan	8 Union County	9 NJ South	10 Staten Island General	11 Staten Island 10303	12 Staten Island 10302	13 Staten Island 10310	14 Staten Island 10301	15 Staten Island 10304	16 Staten Island 10305	17 Staten Island 10306	18 Staten Island 10308	19 Staten Island 10312	20 Staten Island 10309	21 Staten Island 10307	22 Staten Island 10314	Grand Total
1	NY North												0.9%							0.9%
2	Queens/Long Island											0.9%								0.9%
4	Manhattan							1.4%	1.8%			0.9%		2.4%	1.8%		0.9%		3.8%	13.1%
5	Bayonne	4.3%	6.2%	0.9%	0.9%	7.3%	2.4%	3.6%	0.9%	1.8%			1.8%			2.4%	0.5%	1.8%	3.4%	38.3%
6	NJ NW		0.9%								0.5%						0.9%			2.4%
7	Essex County		4.2%					1.1%	1.1%										1.4%	7.8%
8	Union County													0.9%					0.9%	1.8%
23	Hudson County West		0.9%						0.5%	0.9%									0.5%	2.9%
24	Hudson County South	4.9%	4.0%				2.7%	0.5%	0.5%	0.5%		0.5%				0.9%			1.1%	15.7%
25	Hudson County North		2.0%						2.4%		0.9%	2.7%	1.8%	0.9%					2.4%	13.1%
26	NJ SW									0.9%										0.9%
27	NJ Unknown	0.9%											0.5%							1.4%
28	NY Unknown															0.9%				0.9%
Grand Total		10.1%	18.1%	0.9%	0.9%	7.3%	5.1%	6.7%	7.2%	4.2%	1.4%	5.1%	5.1%	4.2%	1.8%	4.2%	2.4%	1.8%	13.5%	100%

In an effort to optimize the spreadsheet model, the 2017 O/D trip tables were re-arranged. Adjacent remote zones with few trips were grouped together to form a new, larger zone, as long as the possible routes used by those trips with and without bridge closure would remain the same. Zones in the neighborhood of the bridge and zones generating significant numbers of trips were kept as is (i.e. zones in Staten Island and Bayonne). A total of 29 zones were used in the analysis, and they are shown in **Figure 16-9**.

Among all 841 possible O/D pairs (29 zones x 29 zones), only the 333 pairs that generated trips were used to calculate the diversion routes. As an average, five routes were developed for each O/D pair, but depending on the specific conditions, some O/D pairs had only one route while others had up to 10.

Diversion Routes

Each diversion route is made up of multiple links, each representing a roadway segment. These routes were identified using the NJTPA North Jersey Regional Transportation Model's (NJRTM-E) 2010 Highway Network, supported by ArcGIS software version 10.0. The NJTPA model is a four-step travel demand model that accounts for capacity constraints in the roadway network and uses HCM 2000 methodologies in some of its calculations. The network consists mainly of arterial roadways in the NJTPA region and major regional roadways outside the region. Distance, toll, and travel times during the AM, Midday, PM and Nighttime periods were available from the NJTPA model for each network link.

The "Network Analyst" extension of the software was run iteratively to identify possible routes not using the Bayonne Bridge between each O/D pair. In each iteration, a trip start and end position (Origin and Destination) was selected, as well as mandatory intermediate points in between (i.e. Goethals Bridge or Outerbridge Crossing), and prohibited points on the roads that cannot be used (i.e. Bayonne Bridge). At the end of the process, a total of 2,041 diversion routes were selected, and the distance, travel time and toll for the AM, Midday, PM and Nighttime periods were calculated for each. A sample of these routes is shown in **Table 16-6**. Diversion routes are shown in **Figures 16-10 and 16-11**.

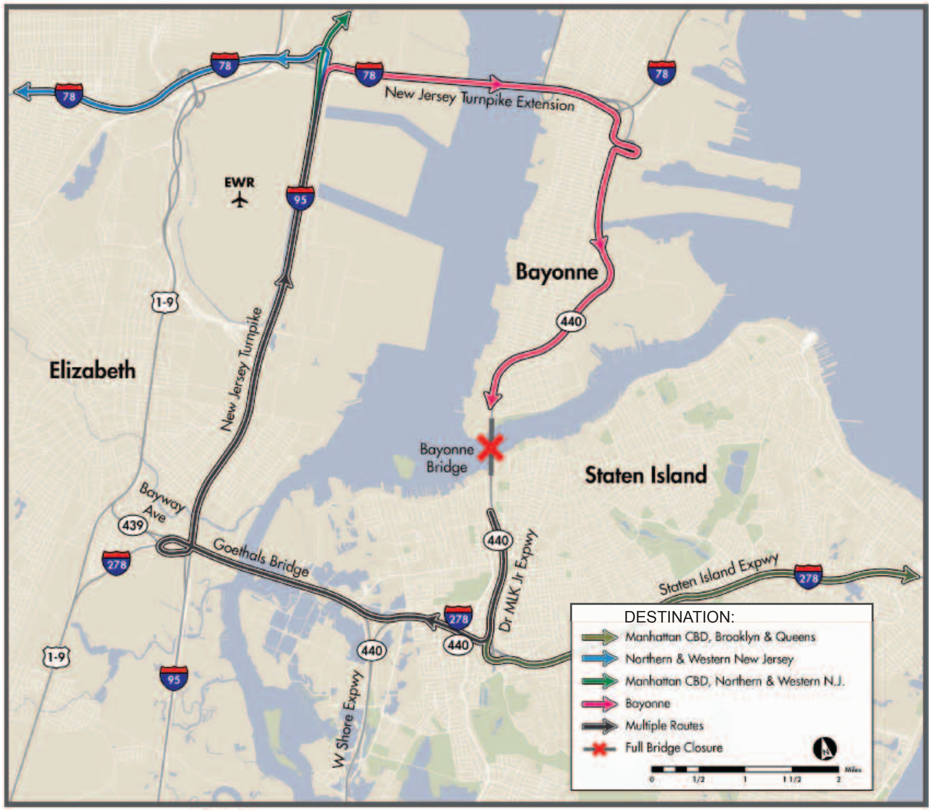
Table 16-6
Diversion Routes (sample)

Assignment Route		**Trip**	**Trip O/D**		**Avg. Travel Time by Period (in Minutes)**				**Distance**	**Toll**
ID	Description	Direction	Origin	Destin	AM	Midday	PM	Night	(miles)	($)
1	Direct Route	NY Bound	1	2	35	29	34	29	28	4.80
2	Via Holland-WB, NJTP Newark Bay-WB, NJTP-SB(Exit 13), Goethals-EB, Verrazano-EB	NY Bound	1	2	135	88	147	96	70	9.90
3	Via Holland-WB, NJTP Newark Bay-WB, NJTP-SB(Exit 11), Outerbridge-EB, Verrazano-EB	NY Bound	1	2	163	107	186	115	89	10.50
4	Via Holland-WB, US 1&9-WB, Goethals-EB,Verrazano-EB	NY Bound	1	2	146	96	168	104	71	8.40
5	Via Holland-WB, US1&9-WB, Rt1&9-SB(North of Rt 35), Outerbridge-EB, Verrazano-EB	NY Bound	1	2	175	119	208	126	89	8.40
6	Direct Route	NY Bound	1	3	53	38	49	36	33	4.00
7	Via Holland-WB, NJTP Newark Bay-WB,NJTP-SB(Exit 13), Goethals-EB, Verrazano-EB	NY Bound	1	3	113	72	125	81	58	9.90
8	Via Holland-WB, NJTP Newark Bay-WB,NJTP-SB(Exit 11), Outerbridge-EB, Verrazano-EB	NY Bound	1	3	141	91	164	100	77	10.50
9	Via Holland-WB, US1&9-WB, Goethals-EB, Verrazano-EB	NY Bound	1	3	125	80	147	89	59	8.40
10	Via Holland-WB, US 1&9-WB, Rt1&9-SB(North of Rt 35), Outerbridge-EB, Verrazano-EB	NY Bound	1	3	153	103	186	111	77	8.40

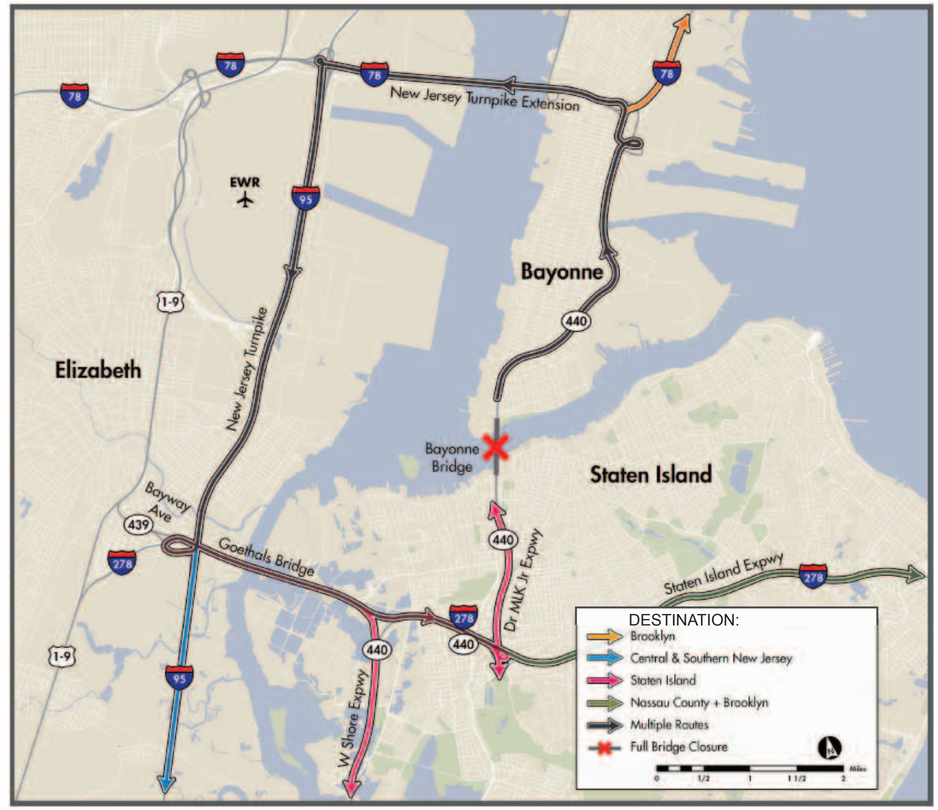
Route Selection

Once the possible diversion routes between each O/D pair were identified, each route's cost was calculated for the AM, Midday, PM and Nighttime periods. The cost function consisted of the sum of the route's distance, its travel time, and its toll dollar amount (if applicable). The cost function unit is miles/minutes/$.

To calculate the number of diverted vehicles using each route, a multi-path traffic assignment algorithm developed for this study was applied to each O/D pair. The first step in the algorithm was to identify the route with the lowest cost (minimum cost route). The second step was to identify, among all other routes, those with costs up to 10 miles/minutes/$ greater than the minimum cost route. The third step was to assign the O/D trips among the competing routes proportionally to the inverse of the route's cost. With this method, routes with lower costs are assigned higher percentages of traffic.

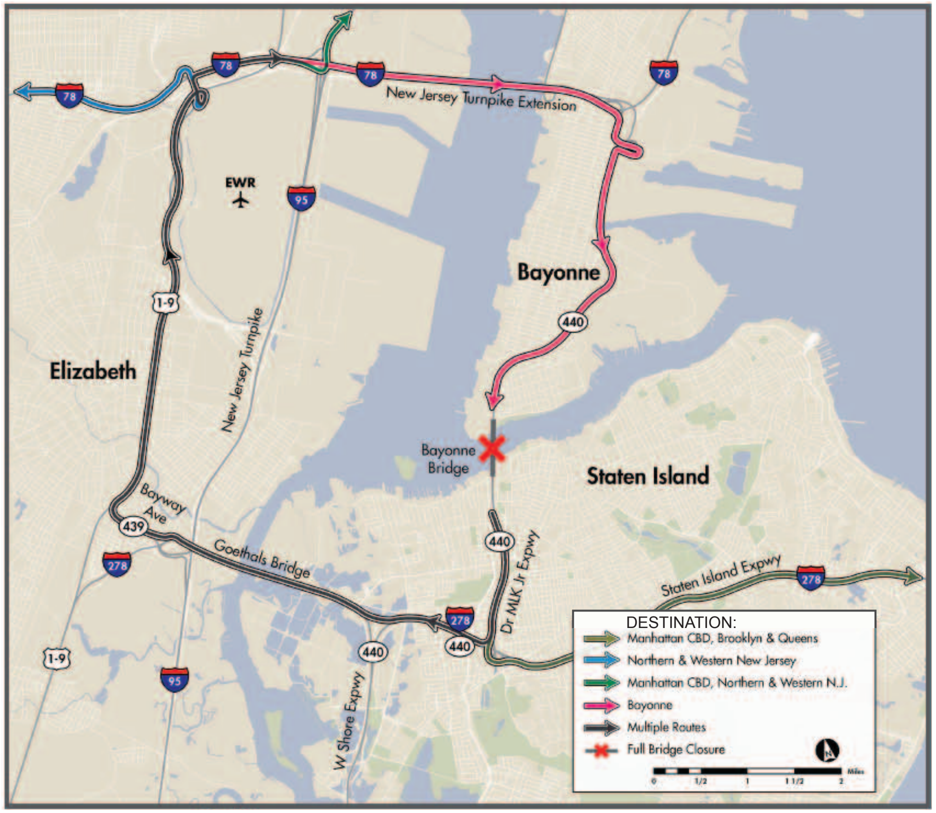


Origin: Staten Island

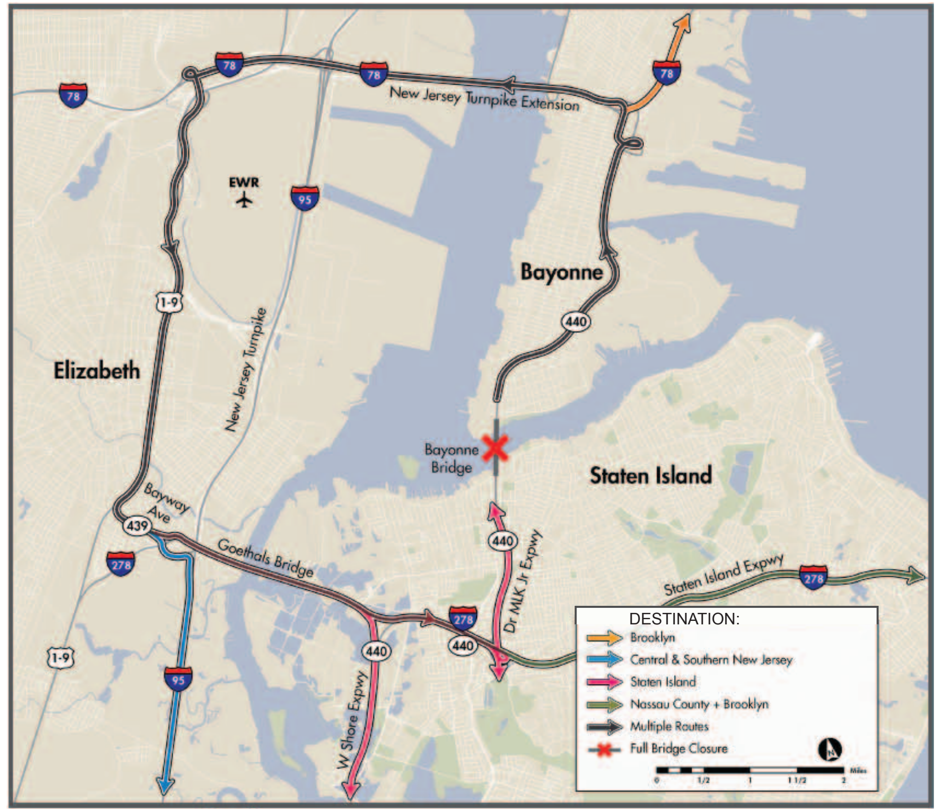


Origin: Bayonne

Full Bridge Closure
Primary Regional Diversion Routes
Figure 16-10



Origin: Staten Island



Origin: Bayonne

Full Bridge Closure
Alternate Regional Diversion Routes
Figure 16-11

Spreadsheet Model Results

Once the traffic assignment was performed for all O/D pairs and all closure hours, the resulting traffic volumes assigned to each route were aggregated at a link (roadway segment) level, allowing the identification of the most affected roadway segments. **Table 16-7** shows the results for the analysis locations during the hour of maximum diversions (9 PM to 10 PM) for the overnight diversion scenario.

Table 16-7
Bayonne Bridge Volumes Diverted to Other Facilities (9PM to 10PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12

Calculation of Regional Impacts

A customized analysis was developed to assess the traffic impacts at the key regional facilities chosen for the analysis (GB, OBX, VNB, and HT). In this analysis, the facility's traffic demand "with" and "without" the Bayonne Bridge closure are calculated and compared with the roadway capacity on an hour by hour basis. Any demand in excess of the capacity is considered a capacity shortfall that is carried over as un-met demand (queue) for the following analysis hour. The average delay (in minutes per vehicle) is also calculated on an hourly basis by dividing the queue length at the end of the hour (in vehicles) by the roadway capacity (in vehicles per minute).

Existing 24-hour traffic demand profiles were calculated (hour by hour) for each facility using the November 2011 counts at each facility and queuing information (*2010 Annual Report of Interstate Toll Delay*, Skycomp, Inc). The existing demand was increased to 2017 by applying the yearly growth rates shown in **Table 16-8**.

Table 16-8
Background Growth Rates for Regional Analysis Locations

Facility	Eastbound	Westbound
Goethals Bridge	2.76%	1.29%
Holland Tunnel	2.12%	1.62%
Outerbridge Crossing	1.02%	2.77%
Verrazano Narrows Bridge	2.76%	1.29%

Notes: Yearly growth rates were applied to existing traffic volumes to calculate 2017 traffic demand at the regional analysis locations.
Sources: PANYNJ, *Bayonne Bridge Travel Demand Forecast*, 2010.

The roadway capacity used in the analysis does not remain constant throughout the days, as it takes into consideration not only the facility capacity itself, but other parameters such as downstream congestion during peak periods (i.e. the roadway capacity at the eastbound Holland Tunnel is slightly higher from 6 to 7 AM than one hour later; this occurs due to congestion in the New York side of the tunnel). Another parameter that affects the capacity is the lower EZ-Pass penetration found on weekends at certain facilities (e.g., EZ-Pass penetration at the eastbound Holland Tunnel is lower on weekends than on weekdays). This lower EZ-Pass penetration causes non EZ-Pass vehicles to queue upstream from the toll plaza, blocking access to the EZ-Pass toll lanes at times.

16-7-6-6 ANALYSIS FINDINGS

Local Analysis

For each of the intersections listed in **Table 16-2**, relevant Measures of Effectiveness (MOEs) calculated during each construction stage (e.g., level of service, average vehicular delay, traffic density), were compared with the No Build Alternative. A total of seven locations that would experience adverse effects (e.g., increased delay, reduced LOS) were identified. Measures were developed for these locations and are discussed in detail in this section. Impact reduction measures were identified to minimize adverse impacts; however, none of the impacts are considered to be significant. **Table 16-9** shows, amongst all analysis locations, the locations that are impacted, as well as the peak hour and scenarios in which the impacts would be expected to occur.

Location 2—Intersection of Avenue A and North Street

Without impact reduction measures described herein, an adverse traffic impact is expected to occur at the westbound approach of this signalized intersection during Construction Stages 2 and 3. The impact would occur when Ramp G, which provides access from southbound JFK Boulevard to southbound Route 440, is closed. The diverted traffic, which reaches 170 vehicles per hour, would travel westbound on North Street, turn left onto Avenue A, and turn left again onto Ramp F towards southbound Route 440. The level of service of the impacted approach would degrade from LOS D to F, as average traffic delays increase from just under 50 seconds to over 140 seconds.

Table 16-9
Locations With Adverse Traffic Impacts

	Locations		Construction Stage									
			1		2		3		4		5	
	Int ID	Description	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Bayonne	1	Avenue A and W. 8th Street	-	-					-	-	-	-
	2	Avenue A and North Street	-	-	√	√	√	√	-	-	-	-
	3, 54	Avenue A and Route 440 SB Ramps H and F	-	-	-	-	-	-	-	-	-	-
	4	JFK Boulevard and W. 8th Street	-	-					-	-	-	-
	5	JFK Boulevard and North Street	-	-	-	-	-	-	-	-	-	-
	6	Ramp G (from JFK Boulevard to Route 440 SB)	-	-					-	-	-	-
	9	JFK Boulevard and Ramp E					-	-				
	10	JFK Boulevard and W. 4th Street	√	√	√	√	√	√	√	√	√	√
	11	JFK Boulevard and W. 3rd Street	-	-	-	-	-	-	-	-	-	-
	12	JFK Boulevard and W. 1st Street	-	-	-	-	-	-	-	-	-	-
	16	Route 440 and 5th Street Connection					-	-				
	17	Ingham Avenue and E. 5th Street					-	-				
	43	JFK Boulevard and W. 5th Street					-	-				
	92	Avenue A and W. 4th Street	-	-	-	-	-	-	-	-	-	-
	128	JFK Boulevard and Juliette Street	-	-	-	-	-	-	-	-	-	-
	163	JFK Boulevard and Gertrude Street	-	-	-	-	-	-	-	-	-	-
Staten Island	21, 174	Forest Avenue / Willowbrook Road / Port Richmond Avenue			√	√	√	√				
	22	Forest Avenue and Willow Road East			√	√	√	√				
	22b	Port Richmond Avenue and Trantor Place			-	-	-	-				
	23	Forest Avenue and Willow Road West							-	-	-	-
	24	Forest Avenue and Morningstar Road / Richmond Avenue							-	-	-	-
	25	Morningstar Road and St. Adalbert Place							-	-	-	-
	26	Morningstar Road and Walker Street			-	-	-	-	-	-	-	-
	27	Morningstar Road and Route 440 SB Ramps A and B			-	-	-	-	-	-	-	-
	28	Morningstar Road and Innis Street			-	-	-	-				
	29	Morningstar Road and Richmond Terrace			√	√	√	√				
	30	Richmond Terrace & Newark Avenue			-	-	-	-				
	31	Richmond Terrace and Nicholas Avenue			-	-	-	-				
	32	Nicholas Avenue and Innis Street			-	-	-	-				
	33	Trantor Place and Route 440 NB Ramps C and D			-	-	-	-				
	34	Trantor Place and Walker Street			√	√	√	√				
	35	Port Richmond Avenue and Walker Street			√	-	√	-				
	36	Port Richmond Avenue & Orange Avenue			-	-	-	-				
	141	Morningstar Road and Newark Avenue			-	-	-	-				
	194	Trantor Place ramp to Route 440 NB (North of Forest Avenue)			-	-	-	-				
	195	Route 440 SB ramp to Willow Road West							-	-	-	-
	216	Route 440 NB ramp to Willow Rd East (D)			-	-	-	-				
	217	Route 440 NB ramp to Willow Rd East (U)			-	-	-	-				

Notes: √ Adverse Impact; - Location was analyzed, and no traffic impact was identified; [blank cell] = location not analyzed

This projected impact can be reduced to an insignificant level by shifting seven seconds of green from the 35 seconds currently allocated to the northbound-southbound phase (Avenue A), to the westbound phase (North Street), enabling the approach to operate at LOS D. **Table 16-10** shows the average delays and levels of service under the No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Table 16-10
Adverse Impact and Mitigation Results Avenue A and North Street: Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	**Delay[1]**	**LOS**	**Movements**	**Delay[1]**	**LOS**	**Movements**	**Delay[1]**	**LOS**
AM	LTR	47.8	D	LTR	140.7	F	LTR	54.3	D
PM	LTR	46.3	D	LTR	150.6	F	LTR	47.6	D

Notes: [1] Average delay in seconds per vehicle.

Location 10—Intersection of JFK Boulevard and West Fourth Street

Without impact reduction measures described herein, an adverse impact would occur at the eastbound approach of this signalized intersection during all construction stages. The impact would occur as the Bayonne Bridge underpasses of Juliette Street, West Third Street and Gertrude Street are closed during construction, causing additional traffic volumes of up to about 180 vehicles per hour to travel through this intersection during the peak hours.

For the impacted approach, the level of service is projected to degrade from LOS C to F during the AM peak hour, and from LOS C to E during the PM peak hour. This impact can be reduced to an insignificant level by shifting six seconds of green from the 55 seconds currently allocated to the northbound-southbound phase (JFK Boulevard) to the eastbound-westbound phase (West Fourth Street). **Table 16-11** shows the average delays and levels of service under the No Build, Construction Build, and Mitigated Scenarios for the impacted approach.

Table 16-11
Adverse Impact and Mitigation Results
JFK Boulevard and West Fourth Street: Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 1,2,3,4,5)			Mitigated Construction-Build (Stages 1,2,3,4,5)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	27.7	C	LTR	103.2	F	LTR	54.0	D
PM	LTR	26.8	C	LTR	62.2	E	LTR	37.6	D

Notes: [1] Average delay in seconds per vehicle.

Location 174—Intersection of Port Richmond Avenue and Van Riper Street

Without avoidance measures described herein, an adverse impact is expected to occur in the westbound approach of this signalized intersection during Construction Stages 2 and 3 as Ramp D is closed. The diverted traffic would reach 100 vehicles during the peak hour, and would travel eastbound on Walker Street, turn right onto Port Richmond Avenue, and turn right again onto northbound Trantor Place towards the entrance ramp (just north of Forest Avenue) to northbound Route 440.

The level of service along the westbound approach, which consists of one 21-foot wide lane shared by all movements (left, through, and right), would degrade from LOS D to E during the AM peak hour. During the PM peak hour, the level of service would remain at LOS F, however the average delay would increase by 54 seconds.

This impact can be avoided by restriping the westbound approach to accommodate a 10-foot wide left turn bay, and an 11-foot wide shared through and right lane. **Table 16-12** shows the average delays and levels of service under the No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Table 16-12
Adverse Impact and Mitigation Results
Port Richmond Avenue and Van Riper Street: Westbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	43.4	D	LTR	71.6	E	L	45.8	D
							TR	37.2	D
PM	LTR	83.8	F	LTR	137.8	F	L	67.9	E
							TR	38.4	D

Notes: [1] Average delay in seconds per vehicle.

Location 22—Intersection of Forest Avenue and Willow Road East

Without avoidance measures described herein, an adverse impact is projected to occur along the northbound approach to this signalized intersection during Construction Stages 2 and 3 as Ramp C is closed. Diverted traffic would reach up to 500 vehicles during the peak hour, and would leave the northbound roadway of Route 440 at exit 12 (one exit before its usual exit) and travel northbound on Willow Road East through its intersection with Forest Avenue towards the intersection of Trantor Place with Walker Street.

The northbound approach of this signalized intersection consists of three exclusive lanes. One lane is dedicated for vehicles turning left onto Forest Avenue, one is dedicated for vehicles continuing straight towards Trantor Place, and the remaining lane is dedicated for vehicles turning right onto Forest Avenue.

Level of service in the through lane would degrade from LOS C to F during the peak hours, creating an adverse impact that can be avoided by converting the exclusive right turn lane into a shared through / right lane. **Table 16-13** shows the average delays and levels of service under the No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Table 16-13
Adverse Impact and Mitigation Results
Forest Avenue and Willow Road East: Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	**Delay[1]**	**LOS**	**Movements**	**Delay[1]**	**LOS**	**Movements**	**Delay[1]**	**LOS**
	L	107.2	F	L	107.2	F	L	34.4	C
	T	30.6	C	T	291.6	F			
AM	R	63.0	E	R	63.0	E	TR	48.5	D
	L	48.2	D	L	48.2	D	L	38.3	D
	T	28.0	C	T	164.1	F			
PM	R	41.3	D	R	41.3	D	TR	50.2	D

Notes: [1] Average delay in seconds per vehicle.

Location 29—Intersection of Morningstar Road and Richmond Terrace

Under the No Build Alternative, the worst operating conditions at this signalized intersection would occur during the AM peak hour. During this period, the eastbound and northbound approaches would operate at acceptable LOS C and D, respectively, and the westbound approach would operate at LOS E, causing the intersection to operate at an overall LOS D. Excessive westbound delays were observed, and occur mainly due to left turning vehicles having to wait an average of one minute for a gap in the opposing traffic, which also results in the blockage of through vehicles. Field observations revealed that a significant number of vehicles (up to 300 vehicles per hour) use Newark Avenue in both directions to bypass this busy intersection during the peak hours.

By 2017, this intersection would continue to operate at overall LOS D during the AM peak hour (worst condition), but the westbound approach operation would degrade to LOS F as average vehicular delays would be close to two minutes.

This intersection would experience an adverse impact during Construction Stages 2 and 3 as Newark Avenue and Innis Street, which are currently two-way streets with one lane per direction, would be narrowed to only one lane, allowing traffic circulation in one direction only.

A preliminary operational analysis was conducted to assess the traffic impacts resulting from closing Newark Avenue and Innis Street in the southbound and westbound directions, respectively. This closure scheme was discarded as it would divert a significant amount of traffic (from 300 to 450 vehicles per hour) to the worst operating approach of the intersection (westbound approach), causing the intersection to fail. To mitigate this impact, it would be necessary to widen Richmond Terrace to two lanes per direction.

A scenario in which Newark Avenue and Innis Street are closed in the northbound and eastbound directions, respectively, was chosen. This would divert about 200 vehicles per hour to the northbound approach of the intersection, causing the service to degrade from LOS D to E in the AM peak hour and from LOS D to F in the PM peak hour.

This impact can be avoided by allowing right turn on red at the northbound approach. This way, traffic gaps in the eastbound approach generated by regular randomness in the traffic arrival patterns can be more effectively used by northbound right turners. **Table 16-14** shows the average delays and levels of service under the No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Table 16-14
Adverse Impact and Mitigation Results
Morningstar Road and Richmond Terrace: Northbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LTR	35.8	D	LTR	70.1	E	LTR	24.4	C
PM	LTR	45.0	D	LTR	104.4	F	LTR	15.2	B

Notes: [1] Average delay in seconds per vehicle.

Location 34—Intersection of Trantor Place and Walker Street

By 2017, this signalized intersection is expected to process a traffic demand of about 1,100 vehicles during the peak hours under the No Build Alternative. The closure of Ramp C and eastbound Innis Street in Construction Stages 2 and 3, would divert about 400 additional vehicles per hour to this intersection, resulting in an adverse impact for the northbound through-right approach, without the impact reduction measures described herein. Service would degrade from LOS D to F, and the approach would fail to process the anticipated traffic demand, creating queues that will extend several blocks.

At the impacted approach, street parking is permitted on one side of the street, and even though the approach operates as one through-right lane, its curb-to-curb width of 33 feet makes it wide enough to be able to accommodate two 11-foot wide travel lanes, and one 11-foot wide parking lane. This re-striping measure would allow the approach to operate at LOS D, reducing the adverse impact to an insignificant level. **Table 16-15** shows the average delays and levels of service under No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Location 35—Port Richmond Avenue and Walker Street

Without avoidance measures described herein, an adverse traffic impact would occur along the eastbound approach of this signalized intersection during the AM peak hour of Construction Stages 2 and 3, mainly due to the closure of Ramp D. This closure would divert about 400 additional vehicles through this intersection during the peak hour causing service to degrade from LOS D to F.

Table 16-15
Adverse Impact and Mitigation Results
Trantor Place and Walker Street: Northbound Thru-Right Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	TR (1 lane)	45.6	D	TR (1 lane)	463.3	F	TR (2 lanes)	49.9	D
PM	TR (1 lane)	47.0	D	TR (1 lane)	369.1	F	TR (2 lanes)	50.8	D
Notes: [1] Average delay in seconds per vehicle.									

This impact can be avoided by shifting 10 seconds of green from the 80 seconds currently allocated to the northbound-southbound phase (Port Richmond Avenue), to the eastbound phase (Walker Street). This measure would allow the approach to operate at LOS D.

Table 16-16 shows the average delays and levels of service under the No Build and Raise the Roadway Alternatives, with and without mitigation, for the impacted approach.

Table 16-16
Adverse Impact and Mitigation Results
Port Richmond Avenue and Walker Street: Eastbound Approach

Peak Hour	No-Build			Construction-Build (Stages 2,3)			Mitigated Construction-Build (Stages 2,3)		
	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS	Movements	Delay[1]	LOS
AM	LR	52.5	D	LR	90.1	F	LR	45.3	D
Notes: [1] Average delay in seconds per vehicle.									

Table 16-17 shows the seven locations that present an adverse impact and a brief description of the measures identified to avoid or reduce the impacts.

16-7-6-7 REGIONAL ANALYSIS

Traffic Diversions

It is anticipated that the Bayonne Bridge would be frequently closed from 9 PM to 5 AM Sunday through Thursday during construction. However, since traffic volumes and daily patterns on weekdays at the bridge are very similar, only two closure time windows were necessary to evaluate in this study: from Sunday 9 PM to Monday 5 AM, and from Monday 9 PM to Tuesday 5 AM. The latter is meant to address traffic impacts on any given weekday.

During the hours of closure, the highest hourly volumes at the bridge would be expected to occur from 9 PM to 10 PM every day of the week. On weekdays, these volumes are estimated to be approximately 420 vehicles per hour in the peak direction and 660 vehicles per hour in both directions. On Sundays, the volumes would be slightly lower as they would reach about 370 vehicles per hour in the peak direction and 630 vehicles per hour in both directions.

Table 16-17
Impact Reduction Plan

Location ID	Location Description	Signal Retiming	Pavement Restriping	Allow Right Turn on Red	Prohibit Left Turns during AM Peak	Jurisdiction	Proposed Mitigation Measure
2	Avenue A and North St.	√				Bayonne	Modify signal timing: Shift 7 seconds of green time from the NB/SB phase to the WB phase.
10	JFK Blvd. and W 4th St.	√				Bayonne	Modify signal timing: Shift 6 seconds of green time from the NB/SB phase to the EB/WB phase.
174	Port Richmond Ave. and Van Riper St		√			Staten Island	Restripe the WB approach of Port Richmond Avenue from one shared lane to two lanes: one exclusive left turn bay and one thru/right shared lane.
22	Forest Ave. and Willow Road East	√	√			Staten Island	Restripe NB exclusive right turn lane to a thru/right shared lane. Modify signal timing: Shift green time from the EB/WB thru phases to the NB phase (9 seconds and 3 seconds during the AM and PM peak periods, respectively).
29	Morningstar Rd. and Richmond Terrace			√		Staten Island	Allow "Right Turn On Red" for vehicles turning right from northbound Morningstar Road to eastbound Richmond Terrace.
34	Trantor Pl. and Walker St.	√	√			Staten Island	Restripe NB thru/right turn approach from one shared thru/right lane to two lanes (one thru and one shared thru/right. Modify signal timing: Shift 7 seconds from the SB phase to the NB phase.
35	Port Richmond Ave. and Walker St.	√				Staten Island	Modify signal timing: Shift 10 seconds of green time from NB/SB phase to the EB phase.

Notes: √= Adverse Impact

The percentage of the total diverted traffic using other facilities, and the resulting volumes diverted to each facility are shown in **Table 16-18**. These values were calculated using the regional spreadsheet diversion model developed for this study.

The diversion model showed that the Goethals Bridge would capture 52 percent of the total traffic diverted to the four facilities. Although the Goethals Bridge replacement project would also be under construction, the existing bridge would function until completion of the new bridge. The Holland Tunnel and the Verrazano Narrows Bridge combined, would capture 45 percent of this traffic (23 percent and 22 percent, respectively), and the Outerbridge Crossing would capture the remaining three percent.

The highest diverted volume at any facility would be 202 vehicles per hour, which would be expected to occur along the eastbound roadway of the Goethals Bridge on Sundays. At the Holland Tunnel, the highest volume is expected to reach 104 vehicles per hour along its eastbound roadway on weekdays. At the Verrazano Narrows Bridge, the highest volume is expected to reach 103 vehicles per hour along its westbound roadway on weekdays, and at the Outerbridge Crossing, the highest volume of 18 vehicles per hour would occur along its eastbound roadway on Sundays.

Table 16-18
Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday			Sunday			Overall Percentage
	Eastbound	Westbound	Total	Eastbound	Westbound	Total	
Goethals Bridge	201	121	322	202	147	349	52%
Holland Tunnel	104	57	161	84	54	138	23%
Verrazano Narrows Bridge	59	103	162	51	71	122	22%
Outerbridge Crossing	4	4	8	18	12	30	3%
Total	368	285	653	355	284	639	100%

It should be noted that the sum of the facility volumes shown in **Table 16-17** does not equal the volumes diverted from the Bayonne Bridge. This differential occurs mainly because of the following two reasons:

1. With the Bayonne Bridge closed, a portion of the diverted traffic would find alternate routes that do not use any of the four facilities. For example, Staten Island pass-through trips originating in Bayonne and destined for areas in Union County such as Elizabeth and Linden would use Route 1&9 or the New Jersey Turnpike in their new trip.

2. With the Bayonne Bridge closed, a portion of the diverted traffic would travel through two facilities. For example, the model identified a small percentage of traffic travelling from the eastern side of Staten Island to the eastern side of Hudson County (New Jersey) that would use both the Verrazano Narrows Bridge and the Holland Tunnel in their new trip.

Traffic Impacts

Table 16-19 shows the average peak hour volumes circulating in one direction through each facility, the highest hourly volumes that would divert to each facility upon closure of the Bayonne Bridge and the percentage the diverted volume represents from the facility's peak hour volumes.

Table 16-19
Hourly Volumes at Regional Facilities vs. Traffic Diverted

Facility	Facility Peak Hour Volumes[1]	Highest Hourly Volume Diverted in One Direction	Volume Diverted/Peak Hour Volume Ratio (%)
Goethals Bridge	3,000	202	6.7%
Holland Tunnel	2,800	104	3.7%
Verrazano Narrows Bridge	8,000	103	1.3%
Outerbridge Crossing	3,000	18	0.6%

Notes: [1] Approximate hourly traffic volumes processed by those facilities in one direction during peak periods.
[2] Traffic volumes in this table represent the highest hourly volume estimated to divert to each facility on any given day (Sunday or Weekday).

In all, these volume increases represent a small percentage of the facility peak hour volumes and are within the margin of typical volume fluctuations that occur at these facilities regularly.

Tables 16-20 and **16-21** show the average traffic delays and levels of service expected at the eastbound and westbound roadways of the Goethals Bridge, with and without the closure of the Bayonne Bridge as planned.

Table 16-20
Construction Period Delays and Level of Service at the Goethals Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,437	202	9.39	E	11.45	E	2.06
Sunday	10 PM to 11 PM	1,926	162	1.88	C	3.94	D	2.06
Sunday	11 PM to 12 AM	1,558	114	0	B	0	C	0
Monday	12 AM to 1 AM	833	79	0	A	0	A	0
Monday	1 AM to 2 AM	599	54	0	A	0	A	0
Monday	2 AM to 3 AM	473	44	0	A	0	A	0
Monday	3 AM to 4 AM	546	41	0	A	0	A	0
Monday	4 AM to 5 AM	822	61	0	A	0	A	0
Monday	9 PM to 10 PM	1,686	201	0	C	0	C	0
Monday	10 PM to 11 PM	1,413	169	0	B	0	B	0
Monday	11 PM to 12 AM	1,070	130	0	B	0	B	0
Tuesday	12 AM to 1 AM	833	79	0	A	0	A	0
Tuesday	1 AM to 2 AM	599	54	0	A	0	A	0
Tuesday	2 AM to 3 AM	473	44	0	A	0	A	0
Tuesday	3 AM to 4 AM	546	41	0	A	0	A	0
Tuesday	4 AM to 5 AM	822	61	0	A	0	A	0

Table 16-21
Construction Period Delays and Level of Service at the Goethals Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,579	147	0	B	0	C	0
Sunday	10 PM to 11 PM	1,210	98	0	B	0	B	0
Sunday	11 PM to 12 AM	784	70	0	A	0	A	0
Monday	12 AM to 1 AM	382	34	0	A	0	A	0
Monday	1 AM to 2 AM	302	26	0	A	0	A	0
Monday	2 AM to 3 AM	271	22	0	A	0	A	0
Monday	3 AM to 4 AM	298	22	0	A	0	A	0
Monday	4 AM to 5 AM	517	40	0	A	0	A	0
Monday	9 PM to 10 PM	1,132	121	0	B	0	B	0
Monday	10 PM to 11 PM	935	98	0	A	0	B	0
Monday	11 PM to 12 AM	743	58	0	A	0	A	0
Tuesday	12 AM to 1 AM	382	34	0	A	0	A	0
Tuesday	1 AM to 2 AM	302	26	0	A	0	A	0
Tuesday	2 AM to 3 AM	271	22	0	A	0	A	0
Tuesday	3 AM to 4 AM	298	22	0	A	0	A	0
Tuesday	4 AM to 5 AM	517	40	0	A	0	A	0

The No Build demand represents the vehicular traffic expected at the facility by 2017 and excludes any diversions resulting from the Bayonne Bridge closure. The diversion volumes represent the traffic volumes expected to divert to this facility once the Bayonne Bridge is closed.

Both roadways are expected to operate mostly at LOS C or better with no increase in delay, except the eastbound roadway on Sundays from 9 PM to 11 PM. Sundays, from 9 PM to 10 PM, service would remain LOS E with and without closure, and delays per vehicle would increase from 9.39 minutes to 11.45 minutes for a net increase of 2.06 minutes. From 10 PM to 11 PM the level of service would degrade from LOS C to LOS D and delays would increase from 1.88 minutes to 3.94 minutes with a net delay increase of 2.06 minutes. These delay increases are relatively modest.

Full Weekend Closure Analysis

The Goethals Bridge will handle the largest share of diverted traffic and have the most significant traffic impacts.

By 2017, under the No Build scenario, the eastbound roadway will operate near capacity during weekend PM peak periods, resulting in occasional traffic backups. The average delay under the No Build scenario is around 5 minutes on Saturday between 6 PM and 8 PM, and 17 minutes on Sunday between 7 PM and 9 PM. With the diverted traffic from Bayonne Bridge, the demand at the eastbound Goethals Bridge will be over capacity during most of the PM hours in the weekend, resulting in a degradation of service. On Saturday, the queue will reach 1000 vehicles from 4 PM to 11 PM and more than half an hour additional delay will occur from 6 PM to 11 PM. The LOS is expected to degrade from E to F. On Sunday, the eastbound queue is expected to exceed 1000 vehicles from 3 PM to 1 AM Monday morning. More than half an hour additional delay will occur during this time. The maximum additional delay will reach 1 hour between 9 PM and 10 PM, resulting in a degradation of the LOS from E to F.

The westbound Goethals Bridge will also reach capacity in 2017 during the weekend PM peak periods. The average delay under the No Build scenario is expected to be greater than 10 minutes on Saturday between 12 PM and 6 PM, and greater than 10 minutes on Sunday between 2 PM and 5 PM. With the diverted traffic from Bayonne Bridge, both the vehicle queue and delay will increase significantly. On Saturday, more than 1000 vehicles are expected to queue from 12 PM to 8 PM and more than half an hour additional delay will occur from 2 PM to 8 PM. The maximum additional delay will reach one hour between 6 PM and 7 PM, resulting in a degradation of LOS from D to F. On Sunday, the expected queue will be greater than 1000 between 1 PM and 7 PM. More than half an hour additional delay will occur from 4 PM to 7 PM, resulting in a degradation of the LOS from D/E to F.

While the additional delays shown here are large, a reduction in the number of discretionary trips is expected to result in a lower additional delay.

Tables 16-22 and **16-23** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Holland Tunnel, with and without the closure of the Bayonne Bridge.

Table 16-22
Construction Period Delays and Level of Service at the Holland Tunnel: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions: Delay (min/veh)	Without Diversions: Level of Service	With Diversions: Delay (min/veh)	With Diversions: Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,229	84	34.64	F	35.58	F	0.93
Sunday	10 PM to 11 PM	2,115	68	20.77	E	23.40	E	2.63
Sunday	11 PM to 12 AM	1,433	47	6.61	C	8.30	C	1.70
Monday	12 AM to 1 AM	835	40	0	A	0	A	0
Monday	1 AM to 2 AM	534	28	0	A	0	A	0
Monday	2 AM to 3 AM	413	22	0	A	0	A	0
Monday	3 AM to 4 AM	460	21	0	A	0	A	0
Monday	4 AM to 5 AM	699	33	0	A	0	A	0
Monday	9 PM to 10 PM	1,862	104	0	B	0	C	0
Monday	10 PM to 11 PM	1,845	86	0	C	0	C	0
Monday	11 PM to 12 AM	1,379	67	0	B	0	B	0
Tuesday	12 AM to 1 AM	835	40	0	A	0	A	0
Tuesday	1 AM to 2 AM	534	28	0	A	0	A	0
Tuesday	2 AM to 3 AM	413	22	0	A	0	A	0
Tuesday	3 AM to 4 AM	460	21	0	A	0	A	0
Tuesday	4 AM to 5 AM	699	33	0	A	0	A	0

Table 16-23
Construction Period Delays and Level of Service at the Holland Tunnel: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions: Delay (min/veh)	Without Diversions: Level of Service	With Diversions: Delay (min/veh)	With Diversions: Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,920	53	31.22	E	31.80	F	0.58
Sunday	10 PM to 11 PM	1,859	36	10.64	D	12.19	D	1.55
Sunday	11 PM to 12 AM	1,008	25	0.01	B	0.99	B	0.98
Monday	12 AM to 1 AM	1,135	16	0	B	0	B	0
Monday	1 AM to 2 AM	872	12	0	A	0	A	0
Monday	2 AM to 3 AM	816	10	0	A	0	A	0
Monday	3 AM to 4 AM	1,036	10	0	B	0	B	0
Monday	4 AM to 5 AM	1,528	18	0	B	0	B	0
Monday	9 PM to 10 PM	2,629	57	42.53	F	43.18	F	0.65
Monday	10 PM to 11 PM	2,354	46	23.06	E	24.90	E	1.84
Monday	11 PM to 12 AM	2,065	28	5.93	C	7.11	C	1.19
Tuesday	12 AM to 1 AM	1,135	16	0	B	0	B	0
Tuesday	1 AM to 2 AM	872	12	0	A	0	A	0
Tuesday	2 AM to 3 AM	816	10	0	A	0	A	0
Tuesday	3 AM to 4 AM	1,036	10	0	B	0	B	0
Tuesday	4 AM to 5 AM	1,528	18	0	B	0	B	0

For the eastbound roadway, the level of service is expected to degrade from LOS B to LOS C only on Mondays (and any other weekday) from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected on Sundays from 9 PM to 12 AM, with the greatest increase reaching 2.63 minutes from 10 PM to 11 PM.

For the westbound roadway, the level of service is expected to degrade from LOS E to LOS F only on Sundays from 9 PM to 10 PM. For the rest of the closure hours the level of service would not degrade. However, delay increases are expected every day from 9 PM to 12 AM, with the greatest increase reaching 1.84 minutes on Mondays (and any other weekday) from 10 PM to 11 PM.

The delay increases expected for both roadway segments are relatively modest.

Full Weekend Closure Analysis

The Holland Tunnel is expected to be congested by 2017. The Bayonne Bridge weekend full closure will deteriorate the already unfavorable level of service.

Under the No Build scenario, the delay in the eastbound direction will reach 1 hour from 6 PM to 10 PM. Diverted traffic from Bayonne Bridge, will increase the delay by over 30 minutes from 6 PM Saturday to 2 AM Sunday morning, while the LOS remains at F. The maximum additional delay will reach 45 minutes during this time. The delay will increase by over 20 minutes on Sundays from 6 PM to midnight. The LOS will remain at F from 6 PM to 11 PM and increase from D to F from 11 PM to midnight. The maximum additional delay is approximately 30 minutes during this time.

Under the No Build scenario, the delay in the westbound direction will be greater than one hour for extended hours on both Saturday and Sunday. The diverted Bayonne Bridge traffic will increase the delay. The maximum additional delay will reach 30 minutes Saturday evening from 10 PM to 3 AM Sunday morning, and the LOS will remain at F or degrade from D or E to F during this time. The maximum additional delay will be greater than 20 minutes between 8 PM and midnight on Sunday. The LOS will remain at F from 8 PM to 11 PM and degrade from D to E from 11 PM to midnight.

While the additional delays shown here are large, a reduction in the number of discretionary trips is expected to result in a lower additional delay.

Tables 16-24 and **16-25** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Verrazano Narrows Bridge, with and without the closure of the Bayonne Bridge as planned.

For both roadways (eastbound and westbound), the LOS is not expected to degrade and no delay increases are expected during closure.

Full Weekend Closure Analysis

The Verrazano Narrow Bridge will receive a similar amount of diverted Bayonne Bridge traffic as the Holland Tunnel. The diverted traffic from the Bayonne Bridge closure will slightly increase the delay on Sunday evenings from 3 PM to 8 PM by a maximum of 4 minutes. This is a small increase, and will not result in any degradation of LOS. No additional delay is expected to occur on Saturdays.

Table 16-24
Construction Period Delays and Level of Service at the Verrazano Narrows Bridge: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	6,079	51	0	C	0	C	0
Sunday	10 PM to 11 PM	6,029	37	0	C	0	C	0
Sunday	11 PM to 12 AM	5,751	25	0	C	0	C	0
Monday	12 AM to 1 AM	3,479	17	0	B	0	B	0
Monday	1 AM to 2 AM	1,909	12	0	A	0	A	0
Monday	2 AM to 3 AM	1,078	11	0	A	0	A	0
Monday	3 AM to 4 AM	933	10	0	A	0	A	0
Monday	4 AM to 5 AM	949	19	0	A	0	A	0
Monday	9 PM to 10 PM	4,187	59	0	B	0	B	0
Monday	10 PM to 11 PM	3,774	47	0	B	0	B	0
Monday	11 PM to 12 AM	3,729	30	0	B	0	B	0
Tuesday	12 AM to 1 AM	3,479	17	0	B	0	B	0
Tuesday	1 AM to 2 AM	1,909	12	0	A	0	A	0
Tuesday	2 AM to 3 AM	1,078	11	0	A	0	A	0
Tuesday	3 AM to 4 AM	933	10	0	A	0	A	0
Tuesday	4 AM to 5 AM	949	19	0	A	0	A	0

Table 16-25
Construction Period Delays and Level of Service at the Verrazano Narrows Bridge: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions		With Diversions		Delta Increase (min/veh)
				Delay (min/veh)	Level of Service	Delay (min/veh)	Level of Service	
Sunday	9 PM to 10 PM	5,031	71	0	C	0	C	0
Sunday	10 PM to 11 PM	4,204	56	0	B	0	B	0
Sunday	11 PM to 12 AM	3,586	39	0	B	0	B	0
Monday	12 AM to 1 AM	1,959	40	0	A	0	A	0
Monday	1 AM to 2 AM	1,147	28	0	A	0	A	0
Monday	2 AM to 3 AM	779	22	0	A	0	A	0
Monday	3 AM to 4 AM	690	21	0	A	0	A	0
Monday	4 AM to 5 AM	827	33	0	A	0	A	0
Monday	9 PM to 10 PM	5,268	103	7.62	D	7.62	D	0
Monday	10 PM to 11 PM	4,065	86	0	B	0	B	0
Monday	11 PM to 12 AM	2,967	65	0	B	0	B	0
Tuesday	12 AM to 1 AM	1,959	40	0	A	0	A	0
Tuesday	1 AM to 2 AM	1,147	28	0	A	0	A	0
Tuesday	2 AM to 3 AM	779	22	0	A	0	A	0
Tuesday	3 AM to 4 AM	690	21	0	A	0	A	0
Tuesday	4 AM to 5 AM	827	33	0	A	0	A	0

Tables 16-26 and **16-27** show the traffic delays and levels of service expected at the eastbound and westbound roadways of the Outerbridge Crossing, with and without the closure of the Bayonne Bridge as planned.

Table 16-26
Construction Period Delays and Level of Service at the Outerbridge Crossing: Eastbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	2,503	18	14.95	E	15.12	E	0.17
Sunday	10 PM to 11 PM	1,785	15	4.21	C	4.38	C	0.17
Sunday	11 PM to 12 AM	1,161	10	0	B	0	B	0
Monday	12 AM to 1 AM	617	1	0	A	0	A	0
Monday	1 AM to 2 AM	438	0	0	A	0	A	0
Monday	2 AM to 3 AM	392	0	0	A	0	A	0
Monday	3 AM to 4 AM	446	0	0	A	0	A	0
Monday	4 AM to 5 AM	966	0	0	A	0	A	0
Monday	9 PM to 10 PM	1,527	4	0	B	0	B	0
Monday	10 PM to 11 PM	1,207	4	0	B	0	B	0
Monday	11 PM to 12 AM	887	4	0	A	0	A	0
Tuesday	12 AM to 1 AM	617	1	0	A	0	A	0
Tuesday	1 AM to 2 AM	438	0	0	A	0	A	0
Tuesday	2 AM to 3 AM	392	0	0	A	0	A	0
Tuesday	3 AM to 4 AM	446	0	0	A	0	A	0
Tuesday	4 AM to 5 AM	966	0	0	A	0	A	0

Table 16-27
Construction Period Delays and Level of Service at the Outerbridge Crossing: Westbound Roadway

Day	Hour	No Build Demand (vph)	Diversion Volume (vph)	Without Diversions Delay (min/veh)	Without Diversions Level of Service	With Diversions Delay (min/veh)	With Diversions Level of Service	Delta Increase (min/veh)
Sunday	9 PM to 10 PM	1,519	12	0	B	0	B	0
Sunday	10 PM to 11 PM	1,131	8	0	B	0	B	0
Sunday	11 PM to 12 AM	760	5	0	A	0	A	0
Monday	12 AM to 1 AM	464	0	0	A	0	A	0
Monday	1 AM to 2 AM	347	0	0	A	0	A	0
Monday	2 AM to 3 AM	250	0	0	A	0	A	0
Monday	3 AM to 4 AM	288	0	0	A	0	A	0
Monday	4 AM to 5 AM	350	0	0	A	0	A	0
Monday	9 PM to 10 PM	1,619	4	0	B	0	C	0
Monday	10 PM to 11 PM	1,138	4	0	B	0	B	0
Monday	11 PM to 12 AM	836	0	0	A	0	A	0
Tuesday	12 AM to 1 AM	464	0	0	A	0	A	0
Tuesday	1 AM to 2 AM	347	0	0	A	0	A	0
Tuesday	2 AM to 3 AM	250	0	0	A	0	A	0
Tuesday	3 AM to 4 AM	288	0	0	A	0	A	0
Tuesday	4 AM to 5 AM	350	0	0	A	0	A	0

For the eastbound roadway, the LOS is not expected to degrade during closure. A modest delay increase of just 0.17 minutes, not requiring additional attention, is expected on Sundays from 9 PM to 11 PM.

For the westbound roadway, the LOS is not expected to degrade and no delay increases are expected during closure.

Full Weekend Closure Analysis

The Outerbridge Crossing will handle the smallest amount of diverted traffic from Bayonne Bridge on weekends and experience minor traffic impacts.

By 2017, under the No Build scenario, the eastbound roadway will operate at or over the capacity during weekend PM peak periods and occasional traffic backups are likely to occur. The average delay under the No Build scenario is expected to be approximately 10 minutes on Saturday between 6 PM and 9 PM and greater than 15 minutes on Sunday between 5 PM and 9 PM. The diverted traffic from Bayonne Bridge will slightly increase the existing delay by 2 minutes on Saturday between 6 PM and 8 PM and by 5 minutes on Sunday between 6 PM and 9 PM. The LOS will remain at F under this scenario. Similar effects are expected for the westbound Outerbridge Crossing during these times.

In general, a modest traffic impact is expected at the major regional river crossings expected to capture most of the traffic diverted from Bayonne Bridge. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less. Considering the ongoing construction, these delay increases are relatively modest.

Table 16-28 shows a summary of the highest delay increases expected at the four regional facilities, should the Bayonne Bridge be closed overnight. It shows the absolute highest delay increase and level of service degradation expected at the four regional analysis locations during any given day (includes all 7 days) during the Bayonne Bridge closure (9 PM to 5 AM of the following day).

Full weekend closures result in a worse LOS at the Goethals Bridge. This delay will be mitigated by minimizing the number of weekend closures to those only for essential work, and ensuring the public is made aware of these closures and is able to plan accordingly.

16-7-6-8 BAYONNE BRIDGE ROADWAY ANALYSIS

During weekdays of the project construction, a reduction in the number of bridge lanes from two lanes per direction to one would cause a degradation of service for New York bound traffic from 6 AM to 10 PM. An adverse traffic impact would occur from 4 PM to 7 PM service would deteriorate from LOS B in the No Build Alternative to LOS D and LOS E with the Raise the Roadway Alternative.

For New Jersey bound traffic, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 6 AM to 7 PM, and adverse traffic impacts would occur from 7 AM to 9 AM as level of service would deteriorate from LOS B to LOS D. **Table 16-29** shows the level of service analysis results for weekdays.

Table 16-28
Delays and Level of Service by Regional Facility

Facility	Direction	Bayonne Bridge Open		Bayonne Bridge Closed		Delay Difference (min/veh)	Time Period when delay would occur
		Avg. Delay (min/veh)	Level of Service	Avg. Delay (min/veh)	Level of Service		
Goethals Bridge	Eastbound	1.88	C	3.94	D	2.06	Sunday (9 PM to 10 PM)
	Westbound	0	-	0	-	0	-
Holland Tunnel	Eastbound	20.77	E	23.40	E	2.63	Sunday (10 PM to 11 PM)
	Westbound	23.06	E	24.90	E	1.84	Monday (10 PM to 11 PM)
Verrazano Narrows Bridge	Eastbound	0	-	0	-	0	-
	Westbound	0	-	0	-	0	-
Outerbridge Crossing	Eastbound	4.21	C	4.38	C	0.17	Sunday (9 PM to 10 PM)
	Westbound	0	-	0	-	0	-

Table 16-29
Bayonne Bridge Roadway Level of Service Summary: Weekdays

Hour Beg.	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Adverse Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Adverse Impact ?
0:00	210	2.1	A	5.2	A	0.9	-	88	0.9	A	2.2	A	0.9	-
1:00	164	1.6	A	4.1	A	0.9	-	73	0.7	A	1.8	A	0.9	-
2:00	131	1.3	A	3.3	A	0.9	-	51	0.5	A	1.3	A	0.9	-
3:00	133	1.3	A	3.3	A	0.9	-	46	0.5	A	1.1	A	0.9	-
4:00	212	2.1	A	5.3	A	0.9	-	44	0.4	A	1.1	A	0.9	-
5:00	423	4.2	A	10.6	A	0.9	-	261	2.6	A	6.5	A	0.9	-
6:00	684	6.8	A	17.1	B	0.9	-	786	7.9	A	19.6	C	0.9	-
7:00	847	8.5	A	21.2	C	0.9	-	1,310	13.1	B	32.8	D	0.9	Yes
8:00	850	8.5	A	21.2	C	0.9	-	1,285	12.8	B	32.1	D	0.9	Yes
9:00	734	7.3	A	18.4	C	0.9	-	802	8.0	A	20.0	C	0.9	-
10:00	709	7.1	A	17.7	B	0.9	-	510	5.1	A	12.8	B	0.9	-
11:00	702	7.0	A	17.6	B	0.9	-	546	5.5	A	13.6	B	0.9	-
12:00	672	6.7	A	16.8	B	0.9	-	676	6.8	A	16.9	B	0.9	-
13:00	736	7.4	A	18.4	C	0.9	-	618	6.2	A	15.5	B	0.9	-
14:00	924	9.2	A	23.1	C	0.9	-	647	6.5	A	16.2	B	0.9	-
15:00	1,086	10.9	A	27.2	D	0.9	-	646	6.5	A	16.1	B	0.9	-
16:00	1,252	12.5	B	31.3	D	0.9	Yes	745	7.4	A	18.6	C	0.9	-
17:00	1,641	16.4	B	42.3	E	1.0	Yes	621	6.2	A	15.5	B	0.9	-
18:00	1,490	14.9	B	37.6	E	0.9	Yes	537	5.4	A	13.4	B	0.9	-
19:00	1,003	10.0	A	25.1	C	0.9	-	424	4.2	A	10.6	A	0.9	-
20:00	663	6.6	A	16.6	B	0.9	-	362	3.6	A	9.1	A	0.9	-
21:00	489	4.9	A	12.2	B	0.9	-	267	2.7	A	6.7	A	0.9	-
22:00	413	4.1	A	10.3	A	0.9	-	238	2.4	A	5.9	A	0.9	-
23:00	319	3.2	A	8.0	A	0.9	-	148	1.5	A	3.7	A	0.9	-

Notes:
[1] Traffic volumes are expressed in passenger car equivalents (PCE).
[2] The conversion to passenger car equivalent is based 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
[3] Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
[4] The free flow speed assumed under the No Build Alternative is 50 mph. The free flow speed assumed under the Construction Build Alternative is 40 mph.
[5] Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build Alternative.

For both directions, however, delay increases would be expected to be just one minute or less.

On weekends, a reduction in the number of bridge lanes from two lanes per direction to one would cause a modest level of service degradation from 9 AM to 9 PM for New York bound traffic, and from 11 AM to 7 PM for New Jersey bound traffic. No adverse traffic impacts are expected at any time. **Table 16-30** shows the level of service analysis results for weekends.

Table 16-30
Bayonne Bridge Roadway Level of Service Summary: Weekends

	New York Bound							New Jersey Bound						
		No Build		Const. Build					No Build		Const. Build			
Hour Beg.	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min	Adverse Impact ?	2017 Traffic Volume	Density (pc/mi/ln)	Level of Service	Density (pc/mi/ln)	Level of Service	Delay (min)	Adverse Impact ?
0:00	319	3.2	A	8.0	A	0.9	-	114	1.1	A	2.9	A	0.9	-
1:00	227	2.3	A	5.7	A	0.9	-	121	1.2	A	3.0	A	0.9	-
2:00	173	1.7	A	4.3	A	0.9	-	78	0.8	A	1.9	A	0.9	-
3:00	180	1.8	A	4.5	A	0.9	-	50	0.5	A	1.2	A	0.9	-
4:00	161	1.6	A	4.0	A	0.9	-	48	0.5	A	1.2	A	0.9	-
5:00	188	1.9	A	4.7	A	0.9	-	111	1.1	A	2.8	A	0.9	-
6:00	249	2.5	A	6.2	A	0.9	-	180	1.8	A	4.5	A	0.9	-
7:00	342	3.4	A	8.6	A	0.9	-	326	3.3	A	8.2	A	0.9	-
8:00	432	4.3	A	10.8	A	0.9	-	319	3.2	A	8.0	A	0.9	-
9:00	489	4.9	A	12.2	B	0.9	-	327	3.3	A	8.2	A	0.9	-
10:00	543	5.4	A	13.6	B	0.9	-	340	3.4	A	8.5	A	0.9	-
11:00	562	5.6	A	14.0	B	0.9	-	446	4.5	A	11.2	B	0.9	-
12:00	623	6.2	A	15.6	B	0.9	-	459	4.6	A	11.5	B	0.9	-
13:00	657	6.6	A	16.4	B	0.9	-	513	5.1	A	12.8	B	0.9	-
14:00	728	7.3	A	18.2	C	0.9	-	470	4.7	A	11.8	B	0.9	-
15:00	694	6.9	A	17.3	B	0.9	-	507	5.1	A	12.7	B	0.9	-
16:00	701	7.0	A	17.5	B	0.9	-	503	5.0	A	12.6	B	0.9	-
17:00	740	7.4	A	18.5	C	1.0	-	518	5.2	A	13.0	B	0.9	-
18:00	681	6.8	A	17.0	B	0.9	-	481	4.8	A	12.0	B	0.9	-
19:00	612	6.1	A	15.3	B	0.9	-	422	4.2	A	10.5	A	0.9	-
20:00	522	5.2	A	13.0	B	0.9	-	320	3.2	A	8.0	A	0.9	-
21:00	437	4.4	A	10.9	A	0.9	-	315	3.1	A	7.9	A	0.9	-
22:00	406	4.1	A	10.1	A	0.9	-	267	2.7	A	6.7	A	0.9	-
23:00	372	3.7	A	9.3	A	0.9	-	216	2.2	A	5.4	A	0.9	-

Notes:
[1] Traffic volumes are expressed in passenger car equivalents (PCE).
[2] The conversion to passenger car equivalent is based 1.7 PCEs for buses and small trucks; 3 PCEs for large trucks.
[3] Growth rates are derived from TB&T Bayonne Bridge Demand Forecast.
[4] The free flow speed assumed under the No Build Alternative is 50 mph. The free flow speed assumed under the Construction Build Alternative is 40 mph.
[5] Delays shown represent the additional time it would take to travel the two mile long roadway segment under construction in comparison with the No Build Alternative.

The adverse traffic impacts identified at the Bayonne Bridge roadway could be partially reduced, if necessary, by informing the public that additional delays would be expected at the facility. However, even during the busiest hours, the additional time it would take to travel the length of the two-mile construction work zone is expected to be one minute or less. This is a relatively modest delay that should not greatly inconvenience bridge patrons.

16-7-6-9 PUBLIC TRANSIT

One limited-stop public bus route (the S89 bus), operated by the Metropolitan Transportation Authority's (MTA) New York City Transit (NYCT), crosses the Bayonne Bridge. As discussed above, the bridge would remain open to traffic throughout construction, with the exception of overnight closures (9 PM to 5 AM from Sunday through Thursday and between Midnight to 8 AM on Friday and Saturday) and an estimated 8 annual weekend closures (9 PM Friday to 5 AM Monday). Because the S89 bus only operates during weekday rush hours, it would not be affected by these closures. While the bridge would be reduced from two lanes in both directions to one lane in each direction for extended periods during construction, delay increases are expected to be one minute or less, as shown in **Table 16-29**.

Temporary closures off Route 440 southbound ramps at Morningstar Road/Walker Street and northbound ramps at Trantor Place/Walker Street in Staten Island would require minor re-routing of the S89 bus during portions of the construction period. During these periods, the S89 bus would likely use the ramps near Forest Avenue but would likely still operate all existing bus stops. Any minor detours would be coordinated with NYCT and would not be expected to substantially affect route times. In Bayonne, the project would not affect the S89 bus route or bus stops.

Temporary street closures in Staten Island, primarily occurring overnight, would require minor re-routing of NYCT's S40/S90 and S46/S96 buses during these periods. Because alternate routes are available nearby, these changes are not expected to substantially affect bus routes. Several existing bus stops may be closed or relocated during periods of construction, but relocated stops or alternate existing stops are expected to be located in close proximity, thereby limiting adverse effects on bus riders.

Because overnight closures of local streets would be intermittent, temporary, and primarily occur during low ridership periods, they would not result in adverse effects on transit users. PANYNJ is coordinating with NYCT to ensure that any temporary bus route modifications limit or avoid disruption to existing public transit services.

16-7-6-10 PEDESTRIAN WALKWAY

The existing bridge has a 6-foot-wide pedestrian walkway, currently accessible by a staircase. While the project would include an improved 12-foot-wide shared-use pedestrian and bicycle path along the new roadway, the bridge would be closed to pedestrians and cyclists during much of the construction period. PANYNJ has chosen the proposed engineering design in an effort to keep the existing bridge open to vehicular traffic to the maximum extent practicable during the construction period. However, it would not be feasible to keep the pedestrian pathway open throughout construction. In order to construct the new roadway while keeping the Bayonne Bridge open to motorists, there is insufficient space to accommodate the work zone, travel roadway, and a walkway while ensuring the safety of pedestrians. As such, the walkway would need to be closed for much of the construction period to prevent pedestrian activities near the work zone. However, once the first half of the new elevated roadway is completed, along with the new shared-use path, PANYNJ would consider opening the shared-use path (potentially on a limited basis) if it is determined that it can be done without jeopardizing the safety of pedestrians. To accommodate pedestrians and cyclists when the walkway is closed during construction, PANYNJ is investigating opportunities for providing shuttle services.

16-7-6-11 CONCLUSIONS

Local Volume Increases

The highest traffic volume increases expected in Bayonne due to the extended closure of local streets would be approximately 180 vehicles per hour and would occur at the following analysis locations:

- Intersection of Avenue A and North Street, during Construction Stages 2 and 3
- Intersection of Avenue A and Route 440 ramps, during Construction Stages 2 and 3
- Intersection of Route 440 with Fifth Street Connector Road, during Construction Stage 3
- Intersection of Ingham Avenue and East Fifth Street, during Construction Stage 3
- Intersection of JFK Boulevard and West Fifth Street, during Construction Stage 3
- Intersection of JFK Boulevard and West Fourth Street, during all construction stages

Traffic volume increases at the remaining analysis locations in Bayonne are not expected to exceed 80 vehicles per hour during peak periods.

In Staten Island, the largest volume increases of approximately 450 to 500 vehicles per hour are expected to occur at the following analysis locations:

- Intersection of Forest Avenue and Willow Road East, during Construction Stages 2 and 3
- Intersection of Trantor Place and Walker Street, during Construction Stages 2 and 3
- Ramp from northbound Route 440 to Willow Road East, during Construction Stages 2 and 3

The intersection of Morningstar Road and Richmond Terrace is expected to experience a traffic volume increase of approximately 250 vehicles per hour during Construction Stages 2 and 3, while at the remaining analysis locations, traffic volume increases are not expected to exceed 140 vehicles per hour.

Avoidance and Reduction of Potential Local Impacts

A total of seven adverse traffic impact locations were identified. Proposed improvements developed for these impacted locations consist of signal retiming, pavement restriping, and allowance of right turns on red. They are summarized in **Table 16-31**.

Newark Avenue and Innis Street Closures

During Construction Stages 2 and 3, Newark Avenue and western Innis Street would be open to traffic in one direction only. The preferred option, for which the traffic analysis results are presented in this report, allows traffic circulation along southbound Newark Avenue and westbound Innis Street, which minimizes the traffic impact to the intersection of Morningstar Road and Richmond Terrace. If traffic were to circulate in the opposite direction along these streets, impacts to the intersection would require major reconstruction to reduce or avoid the impact.

Table 16-31
Proposed Improvements for Impacted Locations

Analysis Location	Jurisdiction	Signal Retiming	Pavement Restriping	Allow Right Turn on Red
Avenue A and North Street	Bayonne	√		
JFK Blvd. and W 4th Street	Bayonne	√		
Port Richmond Ave. and Van Riper Street	Staten Island		√	
Forest Ave. and Willow Road East	Staten Island	√	√	
Morningstar Rd. and Richmond Terrace	Staten Island			√
Trantor Pl. and Walker Street	Staten Island	√	√	
Port Richmond Ave. and Walker Street	Staten Island	√		

Construction Traffic

No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The contractor would be limited to generate construction traffic outside of these peak periods. The highest construction traffic volume generated would be 86 auto trips from 5 AM to 6 AM and 35 truck trips from 9 PM to 10 AM. These volumes would be spread throughout the roadway network.

Regional Traffic Diversions and Impacts

In general, a modest traffic increase (not exceeding 202 vehicles per hour) is expected at the major regional river crossings. The greatest delay increase of 2.63 minutes is expected to occur at the eastbound roadway of the Holland Tunnel, followed by the eastbound roadway of the Goethals Bridge and the westbound roadway of the Holland Tunnel with 2.06 minutes and 1.84 minutes, respectively. All other regional roadway segments evaluated in the study are expected to experience a delay increase of 0.17 minutes or less, as shown in **Tables 16-32** and **16-33 below**. These delay increases are relatively modest and do not require additional attention.

Table 16-32
Bayonne Bridge Volumes Diverted to Other Facilities (9 PM to 10 PM)

Facility	Weekday		Sunday	
	Eastbound	Westbound	Eastbound	Westbound
Goethals Bridge	201	121	202	147
Holland Tunnel	104	57	84	54
Verrazano Narrows Bridge	59	103	51	71
Outerbridge Crossing	4	4	18	12
Total	368	285	355	284

Table 16-33
Delay Increase at Regional Facilities

Facility	Direction	Delay Increase (min/veh)
Goethals Bridge	Eastbound	2.06
	Westbound	0.00
Holland Tunnel	Eastbound	2.63
	Westbound	1.84
Verrazano Narrows Bridge	Eastbound	0.00
	Westbound	0.00
Outerbridge Crossing	Eastbound	0.17
	Westbound	0.00

Full weekend closure impacts are anticipated to have more severe effects on delay and LOS. The number of full weekend closures will be minimized.

Bayonne Bridge Roadway

During construction, the Bayonne Bridge roadway would be open to traffic with one lane per direction, instead of the normal two. An adverse impact would be expected to only occur on weekdays. For New York bound traffic, the impact would occur from 4 PM to 7 PM as the roadway would operate at LOS E and would create one additional minute of delay to travel through the length of the two-mile construction zone. In the opposite direction, an adverse impact would occur from 7 AM to 9 AM, as the roadway would operate at LOS D; delays through the construction work zone would also be approximately one minute. These modest delays over the 2-mile span of the bridge would not greatly inconvenience bridge patrons.

Marine Transportation

During construction, the lowering of the existing road deck sections would require the temporary mooring of barges in the Kill Van Kull navigational channel. It is estimated that eight to ten 8-hour partial closures of the channel would be necessary. Marine transportation would not be affected, as no full closures are required. Any limited, temporary closures required during construction would be approved by the USCG and be closely coordinated with waterway users, facilities and USACE.

16-7-7 AIR QUALITY

This section examines the potential air quality impacts from the project construction. Emissions from on-site construction equipment and on-road construction-related vehicles, and the effect of construction vehicles on traffic congestion, have the potential to affect air quality. The analysis of potential impacts of project construction on air quality includes a quantitative analysis of both on-site and on-road sources of air pollutants, and the overall combined impact of both sources, where applicable.

In general, most construction engines are diesel-powered, and produce relatively high levels of nitrogen oxides (NO_x) and particulate matter (PM). Some construction activities also emit fugitive dust. Although diesel engines emit much lower levels of carbon monoxide (CO) than gasoline engines, the stationary nature of construction emissions and the large quantity of engines could lead to elevated CO concentrations, and impacts on traffic could increase mobile source-related emissions of CO as well. As defined in 40 Code of Federal Regulations (CFR) Part 80 Subpart I, diesel fuel supplied by large refiners and exporters must be limited to a sulfur content of 15 parts per million (ppm) for nonroad engines beginning June 1, 2010. Ultra-low-sulfur diesel (ULSD) would be used exclusively for all diesel engines throughout the construction sites; therefore, sulfur oxides emitted from construction activities would be negligible (For more information on air pollutants and the relevant regulations, see Chapter 11, “Air Quality”).

Therefore, the pollutants analyzed for the construction period are nitrogen dioxide (NO_2) -a regulated criteria pollutant that is a component of NO_x, particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}), particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$), and CO. For each pollutant, concentrations were modeled for each averaging period regulated in the National Ambient Air Quality Standards (NAAQS): short-term analyses address 24-hour averages for PM, and 8-hour and 1-hour concentration averages for CO, and long-term analyses address annual averages for $PM_{2.5}$ and NO_2. For more details on air pollutants and NAAQS see Chapter 11, “Air Quality.”

Construction activity in general, and large-scale construction in particular, has the potential to adversely affect air quality as a result of diesel emissions. The main component of diesel exhaust that has been identified as having an adverse effect on human health is $PM_{2.5}$. To provide that the construction of the project results in the lowest practicable diesel particulate matter (DPM) emissions, the construction contracts will require the following emissions reduction measures:

- *Diesel Equipment Reduction*. Construction of the project would minimize the use of diesel engines and would utilize electric engines to the extent practicable. The project sponsors would apply for a grid power connection early on so as to ensure the availability of grid power, reducing the need for on-site generators, and require the use of electric engines in lieu of diesel where practicable. Equipment that would use grid power instead of diesel/gasoline engine power would include, but may not be limited to, light towers and welding machines. In addition, all illuminated traffic control signals and signs will be solar powered or connected to the electrical power grid.

- *Clean Fuel*. All diesel fuel used for the project would contain 15 parts per million (ppm) or less sulfur by weight. This includes on-road and non-road engines operating on-site.
- *Best Available Tailpipe Reduction Technologies*. Nonroad diesel engines with a power rating of 50 horsepower (hp) or greater would utilize the best available tailpipe (BAT) technology for reducing DPM emissions. Diesel particle filters (DPF) have been identified as being the tailpipe technology currently proven to have the highest PM reduction capability. Construction contracts would specify that all diesel nonroad engines rated at 50 hp or greater would utilize DPFs, either installed on the engine by the original equipment manufacturer (OEM) or retrofit with a DPF verified by the United States Environmental Protection Agency (USEPA) or the California Air Resources Board, and may include active DPFs[1] if necessary; or other technology proven to reduce DPM by at least 90 percent.
- *Utilization of Newer Equipment*. EPA's Tier 1 through 4 standards for nonroad engines regulate the emission of criteria pollutants from new engines, including PM, CO, NO_x, and hydrocarbons (HC). All nonroad construction equipment in the project would meet at least the Tier 3 emissions standard, and construction equipment meeting Tier 4 emissions standard would be used where conforming equipment is widely available, and the use of such equipment is practicable.
- *Idling Restrictions*. All efforts will be made to address heavy duty vehicle idling at the project site in order to reduce fuel usage (and associated costs) and emissions. On-road diesel fueled trucks are subject to New York City's and New Jersey's heavy duty vehicle idling prohibition. These vehicles may not idle for more than three consecutive minutes except under certain specific conditions as described in Subpart 217-3, New York City Administrative Code Section 24-163, and New Jersey Administrative Code 7:27-14.3. In addition to enforcing the on-road idling prohibition, all reasonable efforts will be made to reduce non-productive idling of nonroad diesel powered equipment.
- *Dust Control*. Fugitive dust control plans would be prepared and implemented. For example, all trucks hauling loose material will be equipped with tight fitting tailgates and their loads securely covered prior to leaving the sites. In addition to regular cleaning by city agencies, streets adjacent to the sites would be cleaned as frequently as needed. Water sprays will be used for all excavation, demolition, and transfer of spoils to provide that materials are dampened as necessary to avoid the suspension of dust into the air. The fugitive emissions reduction program is expected to reduce dust emissions by at least 50 percent for demolition, excavation, stockpiles, and handling of materials.

The Resident Engineer would be responsible for the enforcement of contract provisions, including quality assurance and compliance with emissions reduction measures.

[1] There are two types of DPFs currently in use: passive and active. Most DPFs currently in use are the "passive" type, which means that the heat from the exhaust is used to regenerate (burn off) the PM to eliminate the buildup of PM in the filter. Some engines do not maintain temperatures high enough for passive regeneration. In such cases, "active" DPFs can be used (i.e., DPFs that are heated either by an electrical connection from the engine, by plugging in during periods of inactivity, or by removal of the filter for external regeneration).

16-7-7-1 METHODOLOGY

Chapter 11, "Air Quality," contains a review of the pollutants for analysis; applicable regulations, standards, and benchmarks; and background concentrations. Additional details relevant only to the construction air quality analysis methodology are presented in this section.

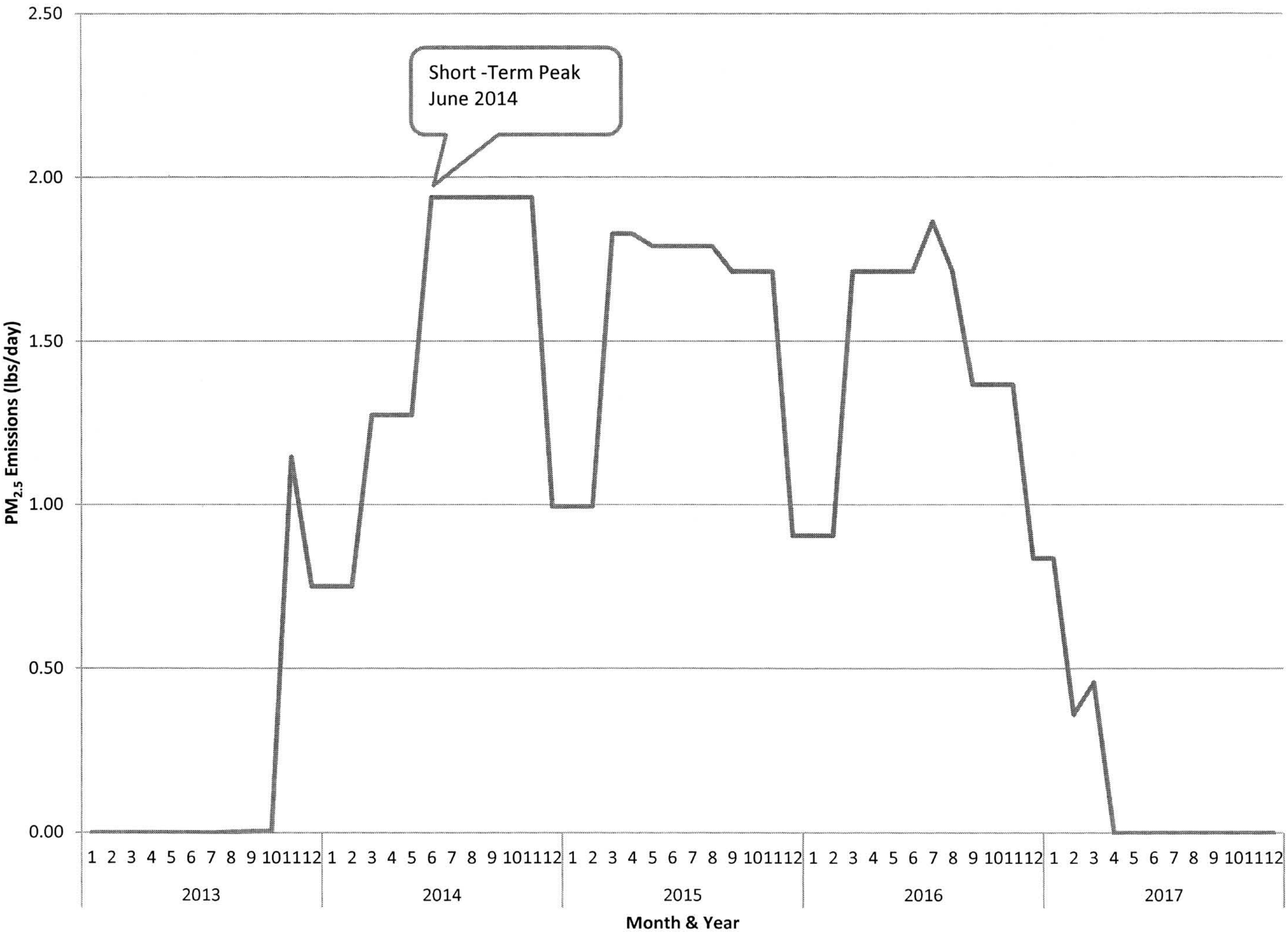
Local (Microscale) On-Site Construction Activity Assessment

To determine which construction periods constitute the worst-case periods for the pollutants of concern (PM, CO, NO_2), construction-related emissions were calculated throughout the duration of construction on an annual and peak day basis for $PM_{2.5}$. $PM_{2.5}$ was selected for determining the worst-case periods for all pollutants as analyzed, because the ratio of $PM_{2.5}$ emissions to impact criteria is higher than that of other pollutants, and therefore the maximum predicted $PM_{2.5}$ concentrations are more likely to exceed the impact criteria as compared with other pollutants. Therefore, initial estimates of $PM_{2.5}$ emissions throughout the construction years were used for determining the worst-case periods for analysis of all pollutants. Generally, emission patterns of PM_{10} and NO_2 would follow $PM_{2.5}$ emissions, since they are related to diesel engines by horsepower (hp). CO emissions may have a somewhat different pattern but generally would also be highest during periods when the most activity would occur. Based on the resulting multi-year profiles of annual average and peak day average emissions of $PM_{2.5}$, and the proximity of the construction activities to residences, academic buildings, and publicly accessible open spaces, a worst-case year and a worst-case short-term period for the New York side and the New Jersey side were identified for dispersion modeling of annual and short-term (i.e., 24-hour, 8-hour, and 1-hour) averaging periods. Dispersion of the relevant air pollutants from the site during these periods was then analyzed, and the highest resulting concentrations are presented in the following sections. Broader conclusions regarding potential concentrations during other periods, which were not modeled, are presented as well, based on the multi-year emissions profiles and comparison with the worst-case period results.

Based on the $PM_{2.5}$ construction emissions profiles, peak short-term and annual periods were selected for modeling, representing the reasonable worst-case. As indicated in **Figures 16-12** and **16-13**, June 2014 and the 12-month period from June 2014 through May 2015 were identified as the worst-case short-term and annual periods for both the New York and New Jersey sides, since the highest project-wide emissions were predicted in these periods and the construction activities will take place in close proximity to residential locations (see **Figures 16-14** and **16-15**). During these peak periods, pier excavation, laying foundations for the new approaches, pier column construction, and pier deck construction would occur simultaneously and would involve the use of heavy diesel equipment such as cranes, excavators, and loaders.

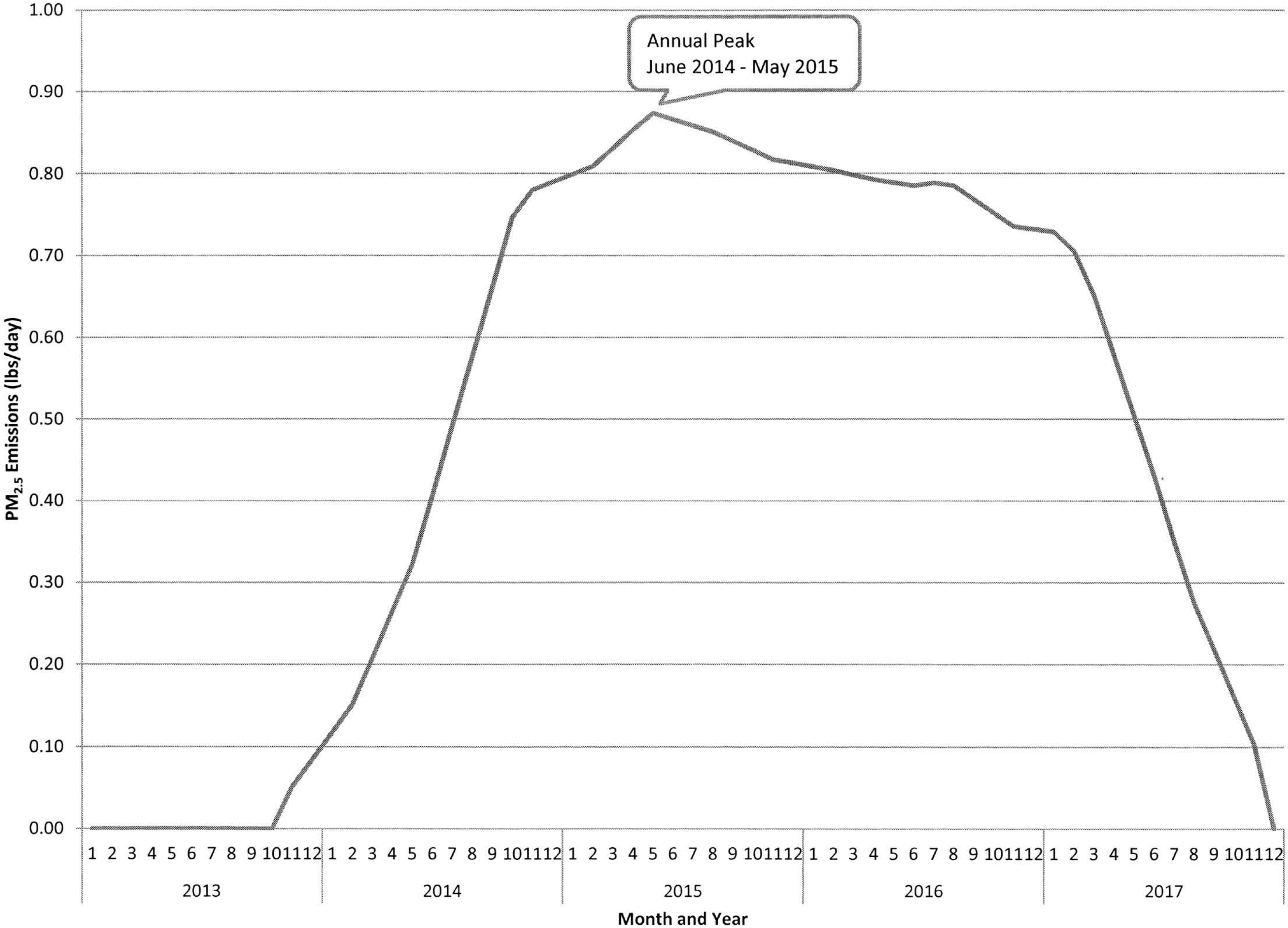
Engine Exhaust Emissions

The projected engine usage factors (estimates of the fraction of time engines operate), sizes, types, and numbers of construction equipment were estimated based on the construction activity schedule. Emission factors for NO_x, CO, PM_{10}, and $PM_{2.5}$ from on-site construction engines were developed using USEPA's NONROAD2008 Emission



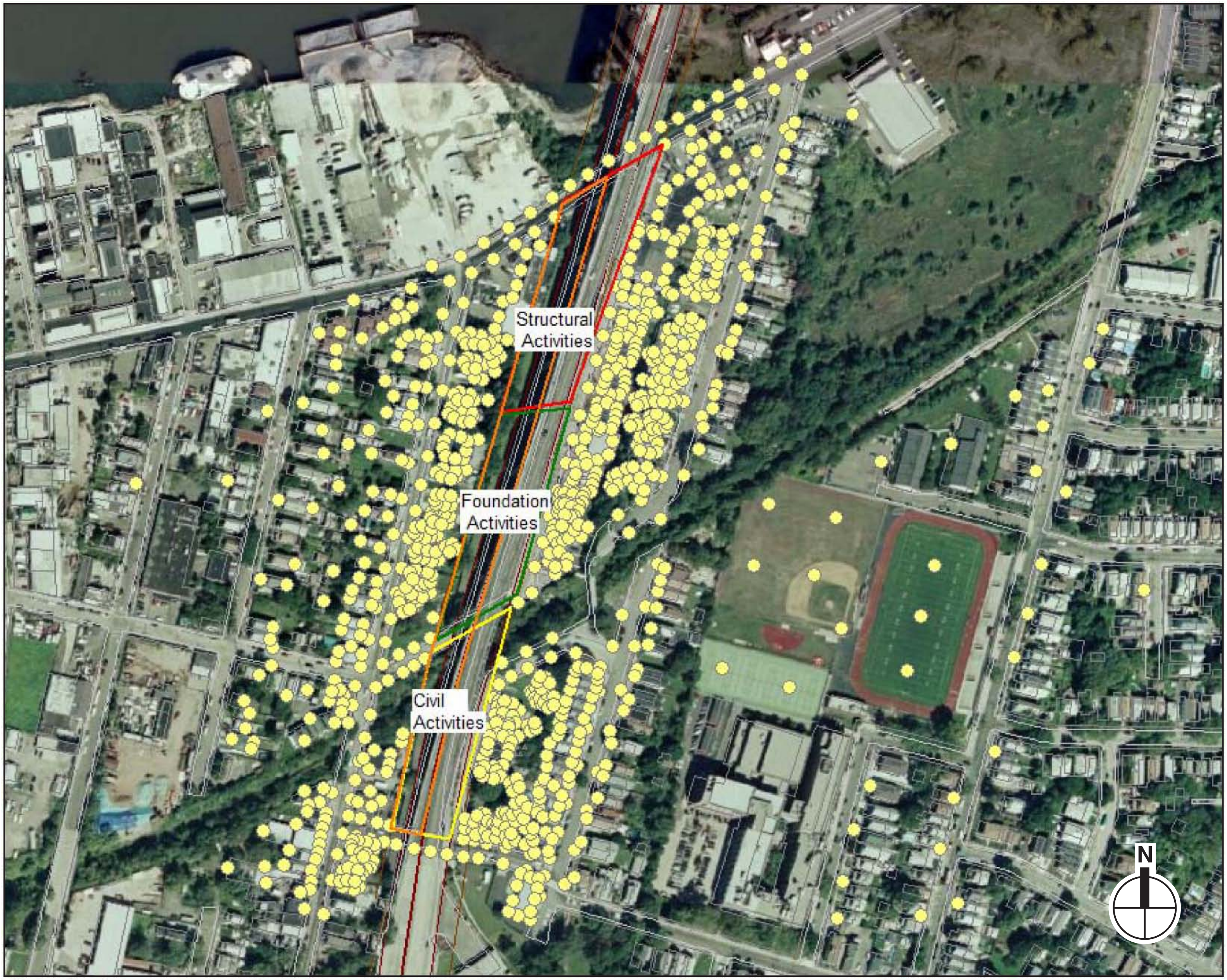
Short-Term (24-Hour Average) PM2.5 Construction Emissions Profile

Figure 16-12



Annual (Moving 12-Month Average) PM2.5 Construction Emissions Profile

Figure 16-13



Sensitive Receptor Location

Bridge Construction – New York Approach
Figure 16-14

Bridge Construction – New Jersey Approach
Figure 16-15

Model (NONROAD). With respect to trucks, emission rates for NO_X, CO, PM_{10}, and $PM_{2.5}$ for truck engines were developed using MOBILE6. A maximum of 3-minute idle time was assumed for truck deliveries.

Fugitive Emission Sources

In addition to engine emissions, PM emissions would also be generated by material handling activities (e.g., loading/drop operations for fill materials and excavate) and truck movement on unpaved surfaces. Estimates of air emissions from these activities were developed based on USEPA procedures delineated in AP-42 Table 13.2.3-1.

Dispersion Modeling

Projected NO_2, CO, PM_{10} and $PM_{2.5}$ concentration increments resulting from project construction were predicted using the USEPA/AMS AERMOD dispersion model[1]. AERMOD is a state-of-the-art dispersion model, applicable to rural and urban areas, flat and complex terrain, surface and elevated releases, and multiple sources. AERMOD is a steady-state plume model that incorporates current concepts with respect to flow and dispersion in complex terrain.

For the short-term model scenarios, all stationary sources that idle in a single location while unloading were simulated as point sources. Other engines, which would move around the site on any given day, were simulated as area sources. In the annual analyses, all sources would move around the site throughout the year and were therefore simulated as area sources.

Meteorological Data

The meteorological data set consisted of five consecutive years of meteorological data: surface data collected at Newark Liberty International Airport (2007–2011) and concurrent upper air data collected in Brookhaven, NY.

Receptor Locations

Thousands of receptors (locations in the model where concentrations are predicted) were placed along the sidewalks closest to the construction sites which would remain publicly accessible, at residential and other sensitive uses at both ground-level and elevated locations (e.g., residential windows), and in open spaces. In addition, a ground-level receptor grid of approximately two thousand receptors was also included in the dispersion modeling to assist in the analysis of potential impacts.

Local (Microscale) Mobile Source Assessment

Traffic flow on Route 440 and Bayonne Bridge would be maintained throughout the construction period. However, during certain construction periods, Route 440 entrance and exit ramps would be closed. During those times, traffic would be diverted to other roadway segments. A shift in the traveling pattern due to ramp closures would increase traffic volumes at some intersections, potentially increasing pollutant concentrations at

[1] EPA, AERMOD: Description Of Model Formulation, 454/R-03-004, September 2004; and EPA, User's Guide for the AMS/EPA Regulatory Model AERMOD, 454/B-03-001, September 2004 and Addendum December 2006.

those locations. Therefore, microscale analyses were performed for both the New York and the New Jersey sides to assess the effect of the traffic diversion on air quality.

Vehicle Emissions

Vehicular CO and PM engine emission factors were computed using the USEPA mobile source emissions model, MOBILE6.2[1]. This emissions model is capable of calculating engine emission factors for various vehicle types, based on the fuel type (gasoline, diesel, or natural gas), meteorological conditions, vehicle speeds, vehicle age, roadway types, number of starts per day, engine soak time, and various other factors that influence emissions, such as inspection and maintenance programs.

Road Dust

The contribution of re-entrained road dust to PM_{10} concentrations, as presented in the PM_{10} SIP, is considered to be significant; therefore, the PM_{10} estimates include both exhaust and road dust. According to USEPA's guidance[2] and in agreement with NYSDOT, $PM_{2.5}$ fugitive dust is considered negligible and does not need to be included in mobile source microscale modeling analysis. Road dust emission factors were calculated according to the latest procedure delineated by USEPA[3].

Traffic Data

Traffic data were derived from existing traffic counts, projected diversion in traffic, and other information developed as part of the traffic analysis presented above in the "Transportation" section, including the speed reduction on the bridge during project construction. The weekday morning and evening peak periods were analyzed, having been selected for the mobile source analysis because they produce the highest traffic volumes and the maximum anticipated traffic diversions. Therefore, these time periods have the greatest potential for air quality impacts.

For PM, the projected weekday peak period traffic volumes were used as a baseline for determining off-peak volumes. Off-peak traffic volumes in the No Build Alternative, and off-peak diversions from the ramp closures, were determined based on the hourly distribution of weekday vehicle counts collected at appropriate locations by applying the diurnal distribution to the projected peak period volumes.

Dispersion Model for Microscale Analyses

Maximum CO concentrations adjacent to the analysis sites, resulting from vehicle emissions, were predicted using the CAL3QHC model Version 2.0[4]. The CAL3QHC model employs a Gaussian (normal distribution) dispersion assumption and includes an

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[1] EPA, User's Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model, EPA420-R-03-010, August 2003.

[2] EPA, Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas, EPA-420-B-10-040, December 2010.

[3] EPA, Compilations of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Ch. 13.2.1, NC, http://www.epa.gov/ttn/chief/ap42, November 2006.

[4] EPA, User's Guide to CAL3QHC, A Modeling Methodology for Predicted Pollutant Concentrations Near Roadway Intersections, Office of Air Quality, Planning Standards, Research Triangle Park, North Carolina, EPA-454/R-92-006.

algorithm for estimating vehicular queue lengths at signalized intersections. CAL3QHC predicts emissions and dispersion of CO from idling and moving vehicles. The CAL3QHC model has been updated with an extended module, CAL3QHCR, which allows for the incorporation of hourly meteorological data into the modeling, instead of worst-case assumptions regarding meteorological parameters. The CAL3QHCR model was used to determine motor vehicle generated PM concentrations adjacent to the analysis sites.

Meteorology

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the direction in which pollutants are dispersed, while wind speed and atmospheric stability account for the effects of horizontal and vertical mixing in the atmosphere. These factors, therefore, influence the concentration at a particular receptor.

In applying the CAL3QHC model, the wind angle was varied to determine the wind direction resulting in the maximum concentrations at each receptor.

Following the USEPA guidelines[1], CAL3QHC computations were performed using a wind speed of 1 meter per second, and the neutral stability class D. The 8-hour average CO concentrations were estimated by multiplying the predicted 1-hour average CO concentrations by a factor of 0.70, to account for persistence of meteorological conditions and fluctuations in traffic volumes. A surface roughness of 3.21 meters was chosen. At each receptor location, concentrations were calculated for all wind directions, and the highest predicted concentration was reported, regardless of frequency of occurrence. These assumptions provided that worst-case meteorology was used to estimate impacts.

PM analyses were performed with the CAL3QHCR model, which include the modeling of hourly concentrations based on hourly traffic data and five years of monitored hourly meteorological data. The meteorological data consists of surface measurements collected at Newark Liberty International Airport and upper air data collected in Brookhaven, NY for the period 2007 to 2011. All hours were modeled, and the highest resulting concentration for each averaging period is presented.

Analysis Year

The microscale analyses were performed for 2017, the year by which the maximum traffic diversions are anticipated.

Analysis Sites

Diversions from ramp closures would result in increased traffic volumes along routes to the nearest available ramps. The site that represents the New York side that could be most affected by these changes is the intersection of Forest Avenue and Morningstar Road since It has the highest overall traffic increments with high traffic volumes and

[1] *Guidelines for Modeling Carbon Monoxide from Roadway Intersections, EPA Office of Air Quality Planning and Standards*, Publication EPA-454/R-92-005.

long vehicle delays. The site that represents the New Jersey side that would be most affected by these changes is the intersection of JFK Boulevard and West Fourth Street since it has the highest overall traffic increments with high traffic volumes and long vehicle delays. Each of these intersections was analyzed for CO, PM_{10} and $PM_{2.5}$.

Receptor Placement

Multiple receptors were modeled at each of the selected sites where they were placed along the approach and departure links at spaced intervals. Receptors were placed at sidewalk or roadside locations near intersections with continuous public access.

Combined Impact

Since emissions from on-site construction equipment and mobile sources may contribute to concentration increments concurrently at the same location, the combined effect was assessed. Total concentrations were estimated by combining the results from the on-site construction analysis with the construction-related mobile source increments at the same location. The combined total is a conservatively high estimate of potential impacts, since it is likely that the highest results from different sources would occur under different meteorological conditions (e.g., different wind direction and speed) and would not necessarily occur when the highest background concentrations are present.

Conformity with State Implementation Plans

As described in Chapter 11, “Air Quality”, the conformity requirements of the Clean Air Act (CAA) and regulations promulgated thereunder (conformity requirements) limit the ability of federal agencies to assist, fund, permit, and approve projects in non-attainment or maintenance areas that do not conform to the applicable State Implementation Plan (SIP). Since USCG is the lead agency for the project, general conformity regulations would apply.

The pollutants of concern on a regional basis are CO, PM_{10}, $PM_{2.5}$, NO_x, and volatile organic compounds (VOC). (Although CO reacts rapidly in the atmosphere and is therefore not transported throughout the region, it is accounted for on a mesoscale in order to ensure that area-wide emissions do not exceed the emissions budgets in the applicable maintenance plan.) Emissions from on-road trucks and worker vehicles and from non-road construction equipment were calculated on an annual basis based on the emissions modeling procedures described above for the microscale analysis.

Under the general conformity regulations, a general conformity determination for federal actions is required for each criteria pollutant or precursor in non-attainment or maintenance areas where the action’s direct and indirect emissions have the potential to emit one or more of the six criteria pollutants at rates equal to or exceeding the prescribed de minimis rates for that pollutant. In the case of this project, the prescribed annual rates are 50 tons of VOCs and 100 tons of NO_x (ozone precursors, ozone non-attainment area in transport region), 100 tons of CO (CO maintenance area), and 100 tons of $PM_{2.5}$, SO_2, or NO_x ($PM_{2.5}$ and precursors in $PM_{2.5}$ non-attainment area).

16-7-7-2 PROJECTED EFFECT ON AIR QUALITY

Local (Microscale) On-Site Construction Activity Assessment

New York Approach

Maximum predicted concentrations (including background[1]) from peak construction activities along the New York approach are presented in **Table 16-34**. As shown, total maximum concentrations from the on-site sources are projected to be lower than the corresponding NAAQS for $PM_{2.5}$, PM_{10}, NO_2, and CO.

Table 16-34
Maximum Predicted Pollutant Concentrations from Construction Site Sources—New York Approach (μg/m³)

Pollutant	Averaging Period	No Build	Increment	Project	NAAQS
$PM_{2.5}$	24-hour	24.7	2.8	27.5	35
	Annual Local	9.9	0.5	10.4	12
PM_{10}	24-hour	93	4	97	150
NO_2	Annual	68	29	97	100
CO	1-hour	3.0 ppm	0.7 ppm	3.7 ppm	35 ppm
	8-hour	2.0 ppm	0.1 ppm	2.1 ppm	9 ppm

New Jersey Approach

Maximum predicted concentrations (including background[2]) from peak construction activities along the New Jersey Approach are presented in **Table 16-35**. As shown, the predicted concentrations of $PM_{2.5}$, PM_{10}, NO_2, and CO from the on-site sources would not exceed the NAAQS.

Table 16-35
Maximum Predicted Pollutant Concentrations from Construction Site Sources—New Jersey Approach (μg/m³)

Pollutant	Averaging Period	No Build	Increment	Project	NAAQS
$PM_{2.5}$	24-hour	24.7	7.5	32.2	35
	Annual Local	9.9	0.5	10.4	12
PM_{10}	24-hour	93	8	101	150
NO_2	Annual	68	27	95	100
CO	1-hour	3.0 ppm	0.8 ppm	3.8 ppm	35 ppm
	8-hour	2.0 ppm	0.3 ppm	2.3 ppm	9 ppm

[1] Background concentrations and the monitoring stations at which they were measured are discussed in Chapter 11, "Air Quality" and presented in Table 11-3. Background concentrations are assumed to be the most recently measured concentrations (2009-2011).

[2] Background concentrations and the monitoring stations at which they were measured are discussed in Chapter 11, "Air Quality" and presented in Table 11-3. Background concentrations are assumed to be the most recently measured concentrations (2009-2011).

Other Construction Periods

The modeled results are based on construction scenarios for specific worst-case periods. Lower concentration increments from construction would generally be expected during periods with lower construction emissions. Since worst-case short-term results may often be indicative of very local impacts, similar maximum local impacts may occur at any stage at various locations but would not persist in any single location, since emission sources would not be located continuously at any single location throughout construction, and would not exceed the concentrations projected for the worst-case scenarios.

Local (Microscale) Mobile Source Assessment

Maximum predicted concentrations (including background) from mobile sources due to ramp closures to Route 440 at both the New York and New Jersey sides are presented in **Tables 16-36** and **16-37**. The values shown are the highest predicted concentrations for the time periods analyzed. The results indicate that the maximum predicted concentrations from mobile sources would not result in any violations of the NAAQS. In addition, the incremental increases in 8-hour average CO concentrations are very small, and consequently would not result in a violation of the CEQR *de minimis* CO criteria.

Table 16-36
Maximum Predicted Pollutant Concentrations from Mobile Sources—New York (μg/m^3)

Pollutant	Averaging Period	No Build	Increment	Project	NAAQS
$PM_{2.5}$	24-hour	28.5	1.3	29.8	35
	Annual Local	10.1	0.1	10.2	<u>12</u>
PM_{10}	24-hour	107	5	112	150
CO	1-hour	9.7 ppm	1.1 ppm	10.8 ppm	35 ppm
	8-hour	6.7 ppm	0.8 ppm	7.5 ppm	9 ppm

Table 16-37
Maximum Predicted Pollutant Concentrations from Mobile Sources—New Jersey (μg/m^3)

Pollutant	Averaging Period	No Build	Increment	Project	NAAQS
$PM_{2.5}$	24-hour	26.5	0.8	27.3	35
	Annual Local	9.9	0.1	10.0	<u>12</u>
PM_{10}	24-hour	100	3	103	150
CO	1-hour	4.4 ppm	0.6 ppm	5.0 ppm	35 ppm
	8-hour	3.0 ppm	0.4 ppm	3.4 ppm	9 ppm

Summary of Total Combined Concentrations

Total combined concentrations were estimated by conservatively combining the maximum concentrations from the on-site construction analysis with the construction-related mobile source analysis.

As shown in **Table 16-38**, the maximum total combined $PM_{2.5}$ 24-hour concentration on the New York side is estimated to be 32.6 µg/m^3, which is less than the applicable air quality standard of 35 µg/m^3. This maximum concentration includes a background value of 24.7 µg/m^3, a stationary source contribution of 2.8 µg/m^3 (at a sidewalk receptor location immediately adjacent to the construction activities), and a mobile source contribution of 5.1 µg/m^3 (at a sidewalk location adjacent to the analyzed intersection of Forest Avenue and Morningstar Road). The maximum total combined $PM_{2.5}$ annual concentration on the New York side is estimated to be 10.7 µg/m^3, which is less than the applicable air quality standard of 15 µg/m^3. Similarly, the maximum combined PM_{10} and CO concentrations are estimated to be 116 µg/m^3 and 7.6 ppm, less than the applicable air quality standards of 150 µg/m^3 and 9 ppm respectively. Therefore, no adverse air quality impacts for $PM_{2.5}$, PM_{10}, and CO are expected to occur due to the combined impacts of mobile and on-site sources during construction.

Table 16-38
Maximum Combined Pollutant Concentrations—New York (µg/m^3)

Pollutant	Averaging Period	Background	On-site Sources	Mobile Sources	Total Concentration	NAAQS
$PM_{2.5}$	24-hour	24.7	2.8	5.1	32.6	35
$PM_{2.5}$	Annual	9.9	0.5	0.3	10.7	12
PM_{10}	24-hour	93	4	19	116	150
CO	8-hour	2.0 ppm	0.1 ppm	5.5 ppm	7.6 ppm	9 ppm

As shown in **Table 16-39**, the maximum total combined $PM_{2.5}$ 24-hour concentration on the New Jersey side is estimated to be 34.8 µg/m^3, which is also less than the applicable air quality standard of 35 µg/m^3. This maximum concentration includes a background value of 24.7 µg/m^3, a stationary source contribution of 7.5 µg/m^3 (at a residential receptor location immediately adjacent to the construction activities), and a mobile source contribution of 2.7 µg/m^3 (at a sidewalk location adjacent to the analyzed intersection of JFK Boulevard and West Fourth Street). The maximum total combined $PM_{2.5}$ annual concentration on the New Jersey side is estimated to be 10.5 µg/m^3, which is less than the applicable air quality standard of 15 µg/m^3. The total combined concentrations were estimated by conservatively combining the maximum concentrations from the on-site construction analysis with the construction-related mobile source analysis. These analyses were performed separately with different dispersion models, as appropriate for the different types of analyses. The combination of the highest results is therefore a conservatively high estimate of potential impacts, since it is likely that the highest results from different sources would occur under different meteorological conditions (e.g., different wind direction and speed) and would not actually occur simultaneously. Nevertheless, the predicted maximum total combined PM2.5 24-hour concentration is still less than applicable air quality standard of 35 µg/m^3. Similarly, the maximum combined PM_{10} and CO concentrations are estimated to be 111 µg/m^3 and 3.7 ppm, less than the applicable air quality standards of 150 µg/m^3 and 9 ppm respectively.

Table 16-39
Maximum Combined Pollutant Concentrations—New Jersey (μg/m^3)

Pollutant	Averaging Period	Background	On-site Sources	Mobile Sources	Total Concentration	NAAQS
$PM_{2.5}$	24-hour	24.7	7.5	2.6	34.8	35
$PM_{2.5}$	Annual	9.9	0.5	0.1	10.5	12
PM_{10}	24-hour	93	8	10	111	150
CO	8-hour	2.0 ppm	0.3 ppm	1.4 ppm	3.7 ppm	9 ppm

Conformity with State Implementation Plans

Annual construction activity and on-road emissions are presented in **Table 16-40**. The annual emissions would be lower than the *de minimis* rates defined in the general conformity regulations. Since all diesel engines will be using ultra low sulfur diesel, SO_2 emissions would be negligible.

Table 16-40
Emissions from Construction Activities (ton/yr)

	$PM_{2.5}$	NO_x	VOC	CO
De minimis level:	*100*	*100*	*50*	*100*
Year 1*	0.04	2.6	0.2	1.1
Year 2	0.39	26.4	2.7	14.0
Year 3	0.43	24.2	2.5	12.4
Year 4	0.31	14.5	1.4	6.4
Year 5*	0.03	1.1	0.1	0.4

Note: * The first and last year of construction include only a few months of activity.

16-7-7-3 1-HOUR NO_2 NATIONAL AMBIENT AIR QUALITY STANDARD

USEPA recently established a new 1-hour average NO_2 standard of 100 parts per billion (ppb), effective April 12, 2010, in addition to the current annual standard. The statistical form is the 3-year average of the 98th percentile of daily maximum 1-hour average concentrations in a year. USEPA is considering the need for changes to the secondary NO_2 standard under a separate review.

By promulgating the 1-hour NO_2 standard, USEPA has initiated a process under the CAA that will ultimately result in the adoption of strategies designed to attain and maintain ambient NO_2 concentrations at levels below the standard. This process will first involve installation of additional ambient NO_2 monitoring stations near roadways. With respect to those areas that are designated as non-attainment, states will be required to develop SIPs designed to meet the standard by specified time frames. USEPA and the states also can be expected to issue new regulations and guidance that will address methodologies and criteria for performing assessments of 1-hour NO_2 concentrations from project-level emission sources and for evaluating their impacts. This information is not currently available. Therefore, although USEPA has promulgated the 1-hour standard, it has yet to be fully implemented.

Uncertainty exists as to 1-hour NO_2 background concentrations at ground level, especially near roadways, since these concentrations have not been measured within the current monitoring network. In the New York downstate region and adjacent counties in New Jersey, background concentrations at existing rooftop monitors range from 41 ppb to 67 ppb. In addition, there are no clear methods to predict the rate of transformation of NO to NO_2 at ground-level given the level of existing data and models. USEPA, in promulgating the standard, has expressed specific concern regarding mobile source impacts, and estimated that ambient concentrations of NO_2 adjacent to roadways could be 30 to 100 percent higher than the concentrations measured at community scale (rooftop) monitoring stations. Similar concerns exist regarding areas adjacent to large construction sites.

Therefore, predicted construction impacts cannot be based on comparison with the new 1-hour NO_2 NAAQS, since total 98th percentile values, including local area roadway contributions, cannot be estimated. In addition, methods for accurately predicting 1 hour NO_2 concentrations from construction activities have not been developed. However, given the magnitude of the NO_x emissions associated with the project's construction, exceedances of the 1-hour NO_2 standard resulting from construction activities cannot be ruled out. However, the requirement to use EPA Tier 3-rated equipment or better would reduce NO_x emissions to the extent practicable.

16-7-8 CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

Since construction will take place in the near future, impacts of climate change on construction activities are not of concern.

Construction engine activity and the extraction, production, and transportation of construction materials will result in some greenhouse gas emissions. Since the appropriate measure for greenhouse gas emissions is the net lifecycle emissions of the project, including construction and operations, the detailed emissions analysis for construction is consolidated with operational emissions and presented in Chapter 12, "Climate Change and Greenhouse Gas Emissions." The chapter discusses long-term climate change impacts on the operation of the project, lifecycle emissions (including construction emissions and operational emissions reductions), and measures to further reduce energy consumption and greenhouse gas emissions from construction. Overall, project construction is estimated to result in the emission within the range of 89 to 105 thousand metric tons of carbon dioxide equivalent (CO_2e), while the increased shipping efficiency afforded by the project would reduce global shipping emissions substantially, resulting in a net reduction in emissions and offsetting the construction emissions within a single year. In addition, the PANYNJ is committed, where practicable, to measures aimed at reducing GHG emissions associated with construction, including the use of supplementary cementitious materials, reducing concrete waste, optimizing cement content, reusing excavated materials and reducing transport distance of waste materials, and using recycled steel. The use of biodiesel for construction engines is also being investigated and will be incorporated if found to be practicable. For more details, see Chapter 12, "Climate Change and Greenhouse Gas Emissions."

Overall, the reduction in long term GHG emissions, and the efforts to incorporate GHG emission reduction measures wherever practicable are consistent with state and local policies.

16-7-9 NOISE AND VIBRATION

Although they are temporary, construction activities can create noise levels sufficient to cause community annoyance and interfere with daily activities. Similarly, certain construction activities can cause vibration levels that may result in structural or architectural damage, and/or community annoyance or interference with vibration-sensitive activities. This section assesses the potential noise and vibration effects resulting from construction of the project.

Construction noise differs from traffic noise in a number of ways, including the following:

- Construction noise is temporary and only lasts for the duration of the construction activities;
- Construction activities generally take place for a limited period of time at any specific location;
- Construction noise is generally intermittent and variable depending upon the type of construction activities taking place at a specific location and time period; and
- Construction noise is sporadic in nature, whereas traffic noise occurs continuously over the life of a facility.

Noise and vibration levels due to construction at specific locations are a function of the number and types of construction equipment that would be utilized for a specific phase of project construction, and are highly variable throughout the various phases of construction.

At locations where construction-related noise and/or vibration levels would have the potential for resulting in adverse impacts, the feasibility and practicability of implementing noise control and abatement measures to reduce or eliminate potential adverse impacts has been examined.

16-7-9-1 NOISE

Methodology

For this construction noise analysis, the Federal Highway Administration (FHWA) Road Construction Noise Model (RCNM 1.1) was used to predict noise levels due to stationary highway construction operations. This model is based on a compilation of empirical data and the application of acoustical propagation formulas. The model takes into account the noise emission generated by the equipment used for various construction operations, an acoustical usage factor (which accounts for the percentage of time the equipment is operating at full power), attenuation with distance, attenuation due to shielding, etc. The RCNM 1.1 determines the total noise level by combining the noise resulting from the ambient noise levels combined with significant pieces of construction equipment operating during the analysis time period.

Noise emission levels and acoustical use factors for generic types of heavy equipment are contained in a database within the model. The data contained in the model is largely based upon data gathered as part of the noise studies for the Central Artery/Tunnel project in Boston, Massachusetts in the 1990s. However, the model allows users to supplement and modify the data contained in the model to reflect the use of quiet equipment and source and path controls. **Table 16-41** shows the highway construction equipment noise reference levels and usage factors contained in the RCNM 1.1. Because the project is primarily a land-based construction project, the analysis focuses on land-based construction equipment to assess the worst-case condition. Limited numbers of tug-assisted barges (used for eight to ten 8-hour periods) would be used to for demolition of the existing roadway and material transport, but would be located greater distances from sensitive receptors than the land-based equipment listed in **Table 16-41** and assessed in this analysis.

Table 16-41
Selected Construction Equipment Noise Reference Levels and Usage Factors from RCNM 1.1

Equipment Description	Acoustical Usage Factor (Percent)	Typical L_{max} Noise Levels at 50 feet (dBA)[2]
Compressor (air)	40	77.7
Concrete Mixer Truck	40	78.8
Crane	16	80.6
Dozer	40	81.7
Drill Rig Truck	20	79.1
Dump Truck	40	76.5
Excavator	40	80.7
Flat Bed Truck	40	74.3
Forklift	40	79.1
Front End Loader	40	79.1
Generator	50	80.6
Grader	40	85.0
Light Tower	50	72.8
Man Lift	20	74.7
Oscillator	50	85.0
Pickup Truck	40	75.0
Vacuum Truck	40	85.3
Vibratory Pile Hammer	16	80.6
Water Blaster	20	92.1
Welder	40	74.0

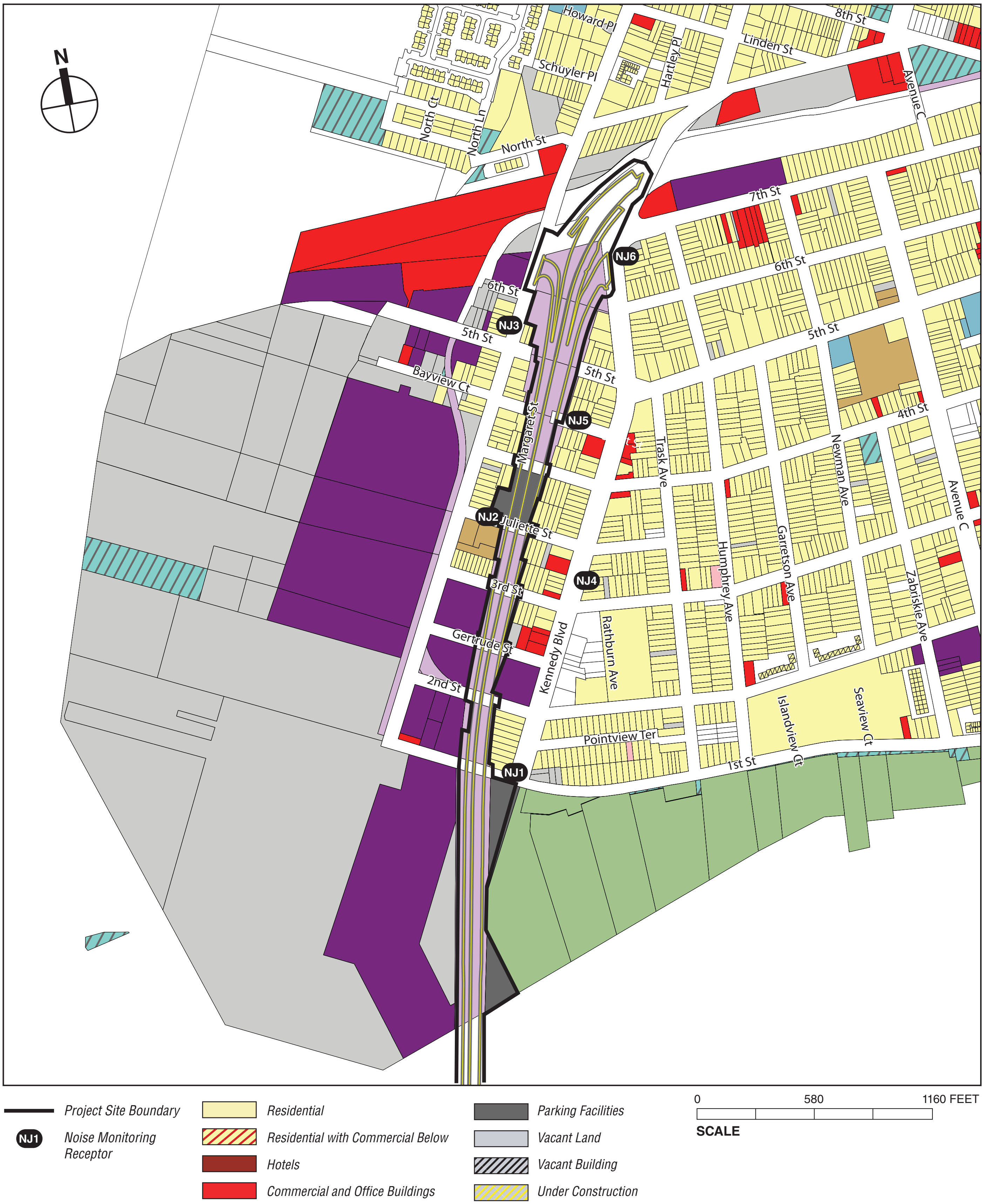
Notes: [1] An estimation of the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during construction operation.
[2] A-Weighted maximum sound level, measured at a distance of 50 feet from the construction equipment.

To minimize construction noise and reduce potential noise impacts, PANYNJ has committed to taking a proactive approach during construction of the proposed project. The approach would employ a wide variety of measures that exceed standard construction practices, but the implementation of which is deemed logistically feasible and practicable. Prior to the start of any work, the Contractor would be required, pursuant to contract specifications, to perform a noise analysis based on their anticipated construction activities and submit for approval a Noise Mitigation Plan that would adhere to the noise criteria indicated in the contract documents, as described below. These measures include a variety of source and path controls. Some examples of the types of measures that may be utilized are as follows:

- Where practicable and feasible, construction procedures that reduce noise levels and equipment that are quieter than that typically utilized for similar construction would be used.
- Where practicable and feasible, diesel or gas-powered equipment would be replaced with electrical-powered equipment.
- Where practicable and feasible, dump trucks with bed liners would be used to minimize the noise due to loading.
- Where practicable and feasible, automatic or community sensitive back-up alarms would be used on equipment.
- Contractors and subcontractors would be required to properly maintain their equipment and have quality mufflers installed.
- Where practicable and feasible, quiet impact construction equipment or construction operations which would minimize the need for noisy impact equipment would be utilized.
- Noise barriers would be used around the work zone to provide shielding and, where logistics allow, truck deliveries would take place behind these barriers.
- Path noise control measures (i.e., portable noise barriers, panels, enclosures, and acoustical tents, where feasible) would be used for certain dominant noise equipment.
- Noise shrouds would be placed around equipment heads whenever feasible and practicable.

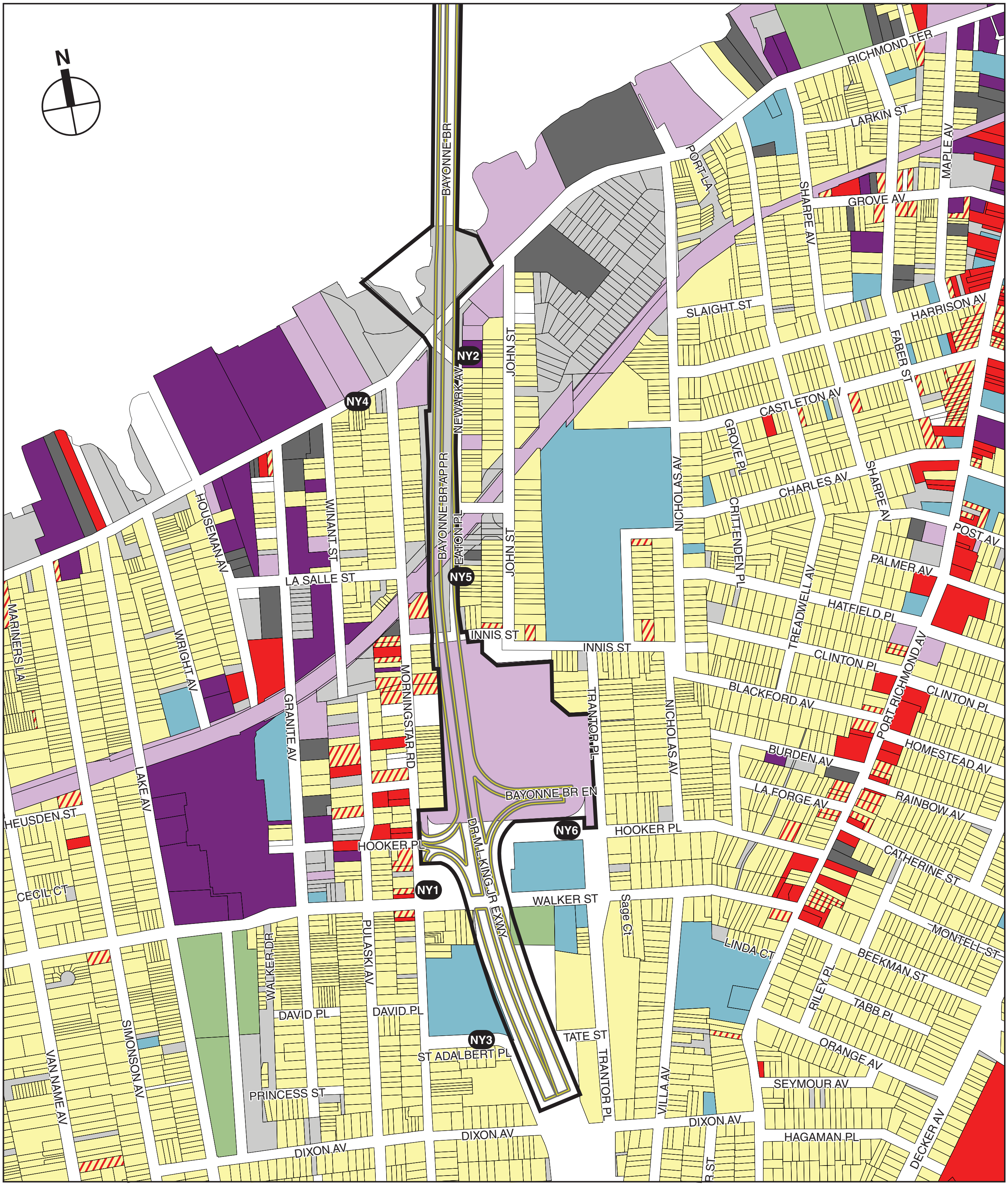
Receptor Locations

For purposes of assessing potential noise impacts due to construction-related activities, 12 locations were selected as noise receptor locations for the construction noise analysis (six on the New York approach and six on the New Jersey approach). The selected noise receptor locations are representative of sensitive noise receptor locations in the immediate area, and include the locations where maximum project impacts would be expected due to their proximity to the construction site. That way, any measures developed to abate noise levels at locations most susceptible to construction noise (i.e., those closest to construction activities) would effectively abate noise levels at locations farther away. **Table 16-42** lists each of the selected noise receptor locations (see **Figures 16-16** and **16-17**).



Noise Receptor Location

Figure 16-16



Project Site Boundary

NY1 Noise Monitoring Receptor

Residential

Residential with Commercial Below

Hotels

Commercial and Office Buildings

Industrial and Manufacturing

Transportation and Utility

Public Facilities and Institutions

Open Space and Outdoor Recreation

Parking Facilities

Vacant Land

Vacant Building

Under Construction

0 580 1160 FEET

SCALE

Noise Receptor Location

Figure 16-17

Table 16-42
Noise Receptor Sites

Receptor	Location	Land Use(s) Represented
New York Approach		
NY1	Morningstar Road between Walker Street and the Route 440 Entrance	Residential
NY2	Newark Avenue between Richmond Terrace and Morningstar Road	Residential
NY3	Saint Adalbert Place between Morningstar Road and Willow Road	Residential, Church
NY4	Richmond Terrace between Winant Street and Morningstar Road	Residential
NY5	Eaton Place between Innis Street and John Street	Residential
NY6	Corner of Trantor Place and Hooker Place	Residential, School
New Jersey Approach		
NJ1	Corner of West First Street and JFK Blvd	Residential, Park
NJ2	Juliette Street between Avenue A and JFK Blvd	Residential, Playground
NJ3	Avenue A between West Fifth Street and Bayonne Bridge Entrance	Residential
NJ4	JFK Blvd between West Third Street and Juliette Street	Residential
NJ5	Margaret Street between Avenue A and JFK Blvd	Residential
NJ6	JFK Blvd between West Sixth Street and Seventh Street	Residential

Existing Noise Levels

Existing noise levels utilized for this construction noise analysis were approximated from field measurements at each of the 12 construction noise receptor locations. These measurements are described in Chapter 13, “Noise,” and include both continuous 24-hour weekday noise measurements and 15-minute spot weekday measurements taken during the AM (8:00–9:30), Midday (12:00–1:30 PM), and PM (5:00–6:30) time periods. Detailed monitoring results are provided in **Appendix F**.

Analysis Results

There are no federal or state regulations which definitively define what constitutes a construction noise impact. In general, three factors should be considered when determining whether construction-related activities would result in a noise impact at a receptor location—(1) the magnitude of noise produced by construction-related noise activities (alone); (2) the magnitude of the increase in noise levels (the difference in noise levels with construction-related activities minus existing or No Build noise levels); and (3) the duration of the increased noise levels.

In general, in terms of magnitude of construction-related activities (alone), when construction-related L_{max} noise levels are under 85 dBA, some governmental agencies do not consider that construction noise will cause a significant adverse impact. In terms of magnitude of increase in $L_{eq(1)}$ noise levels, typically, an increase of less than 2 decibels is considered by most people to be imperceptible, an increase in noise level of 2-3 decibels is considered by most people as barely perceptible, an increase in noise level of 5 decibels is considered by most people as readily noticeable, an increase in noise level of 10 decibels is considered by most people as a doubling in noise level, and an increase of 20 decibels is considered by most people as a dramatic change in noise level. Noise level increases which substantially exceed the existing noise levels may not be considered impacts if they would occur for only a limited duration.

Table 16-43 shows the results of the construction noise analysis. The values shown in this table consist of the following: existing noise levels, noise levels due to construction, total noise levels, and the magnitude of the increase in noise levels due to construction. The values shown in the table are $L_{eq(1)}$ noise levels.

Table 16-43
Construction Noise Analysis Results

Noise Receptor	Time Period	Existing $L_{eq(1)}$	Construction Only $L_{eq(1)}$	Total with Construction $L_{eq(1)}$	Increase $L_{eq(1)}$
New York Approach					
NY1	Day	67.0	50.0	67.1	0.1
	Night	56.0	47.0	56.5	0.5
NY2	Day	67.4	69.6	71.6	4.2
	Night	57.7	67.5	67.9	10.2
NY3	Day	61.2	44.5	61.3	0.1
	Night	53.6	42.3	53.9	0.3
NY4	Day	71.4	59.2	71.7	0.3
	Night	65.3	57.8	66.0	0.7
NY5	Day	63.7	66.9	68.6	4.9
	Night	53.7	65.5	65.8	12.1
NY6	Day	64.4	49.9	64.6	0.2
	Night	56.3	47.2	56.8	0.5
New Jersey Approach					
NJ1	Day	64.0	52.0	64.3	0.3
	Night	53.0	49.1	54.5	1.5
NJ2	Day	64.1	67.3	69.0	4.9
	Night	54.4	67.3	67.5	13.1
NJ3	Day	66.2	65.7	69.0	2.8
	Night	62.6	62.0	65.3	2.7
NJ4	Day	66.5	59.1	67.2	0.7
	Night	61.3	56.8	62.6	1.3
NJ5	Day	62.7	70.5	71.2	8.5
	Night	56.6	65.2	65.8	9.2
NJ6	Day	71.0	63.8	71.8	0.8
	Night	64.8	58.8	65.8	1.0

The noise levels shown in the **Table 16-43** assume implementation of the proactive approach, described above, of path controls to reduce potential construction-related noise impacts. It is assumed that noise barriers around the construction site will be utilized to provide shielding and that truck deliveries would take place behind these barriers.

Based on this analysis, in terms of the magnitude of the noise produced by construction-related activities (alone), due to proactive construction noise abatement program, these levels are relatively modest. The maximum $L_{eq(1)}$ noise level due to construction (alone) during the daytime is predicted to be 70.5 dBA at receptor site NJ5. Similarly, the maximum $L_{eq(1)}$ noise level due to construction (alone) during the nighttime is predicted to be 67.5 dBA at receptor site NY2. These noise levels are relatively modest in terms of magnitude, especially considering the relatively short distance between where the construction is taking place and the receptors. At locations further away from construction-related activities, $L_{eq(1)}$ noise levels are significantly lower than the maximum levels.

In terms of the magnitude of the increases in noise levels due to construction activities, at locations not immediately adjacent to the Bayonne Bridge and its approaches, noise from construction activities are not predicted to perceptibly increase existing noise levels given implementation of the noise reduction measures described earlier. According to the results of this analysis, this would be the case at receptor locations NY1, NY3, NY4, and NY6 on the New York approach and at receptor locations NJ1, NJ4, and NJ6 on the New Jersey approach. At receptor locations NY2, NY5, NJ2, NJ3, and NJ5, which are immediately adjacent to the bridge, the increase in $L_{eq(1)}$ noise levels due to construction activities is predicted to range from barely perceptible (receptor location NJ3 during the daytime and nighttime), to perceptible (receptor location NY2 during the daytime, receptor location NY5 during the daytime, and receptor location NJ2 during the daytime), to readily noticeable (receptor location NJ5 during the daytime and nighttime), to more than a doubling of noise levels (receptor location NY2 during the nighttime, receptor location NY5 during the nighttime, and receptor location NJ2 during the nighttime). This analysis indicates the maximum increase in $L_{eq(1)}$ noise levels would be 13.1 dBA at receptor location NJ2 during the nighttime. However, this increase occurs because the observed $L_{eq(1)}$ noise levels at this location are relatively low (54.4 dBA), and the total $L_{eq(1)}$ noise level is 67.5 dBA, which is not a relatively high noise level.

The analysis above conservatively assumes that all heavy equipment is being operated simultaneously, which is unlikely, with a limited number of control measures in place. However, additional analysis determined that with the implementation of additional control measures, such as quieter equipment and portable noise barriers, noise levels increases could be reduced to 8 dBA or less, as shown in **Table 16-44**. The results shown in **Table 16-44** still conservatively assume all equipment operating at the same time.

As discussed above, the magnitude of the increases in noise levels due to construction-related activities at locations immediately adjacent to the bridge are expected to range from barely perceptible to an approximate doubling of noise levels. These increases are likely to be noisy and intrusive to some residences and users of public facilities and institutions located in this immediate corridor.

Tables 16-43 and **16-44** present the magnitude of potential noise level increases, but do not reflect that these noise levels would be of limited duration. In terms of the duration of time that any receptors would be subject to perceptible increases in noise levels due to construction-related activities, construction activities would occur for only a limited time period (up to 20 months, or potentially less in some instances) at any specific location. These noise levels would not occur every hour, but could be quieter depending on the equipment being used at any one time. In addition, as discussed above, PANYNJ has committed to implementing various measures to minimize the magnitude to construction-related noise levels and noise level increases

Table 16-44
Results of Construction Noise Analysis with Additional Control Measures

Noise Receptor	Time Period	Existing $L_{eq(1)}$	Construction Only $L_{eq(1)}$	Total with Construction $L_{eq(1)}$	Increase $L_{eq(1)}$
New York Approach					
NY1	Day	67.0	53.5	67.2	0.2
	Night	56.0	45.5	56.4	0.4
NY2	Day	67.4	67.0	70.2	2.8
	Night	57.7	65.0	65.7	8.0
NY3	Day	61.2	49.4	61.5	0.3
	Night	53.6	42.1	53.9	0.3
NY4	Day	71.4	66.0	72.5	1.1
	Night	65.3	59.8	66.4	1.1
NY5	Day	63.7	69.9	70.8	7.1
	Night	53.7	60.8	61.6	7.9
NY6	Day	64.4	54.4	64.8	0.4
	Night	56.3	45.8	56.7	0.4
New Jersey Approach					
NJ1	Day	64.0	55.1	64.5	0.5
	Night	53.0	49.1	54.5	1.5
NJ2	Day	64.1	66.9	68.7	4.6
	Night	54.4	59.5	60.7	6.3
NJ3	Day	66.2	65.6	68.9	2.7
	Night	62.6	60.4	64.6	2.0
NJ4	Day	66.5	63.3	68.2	1.7
	Night	61.3	57.7	62.9	1.6
NJ5	Day	62.7	68.0	69.1	6.4
	Night	56.6	57.4	60.0	3.4
NJ6	Day	71.0	67.3	72.5	1.5
	Night	64.8	58.5	65.7	0.9

In an effort to further reduce interior noise levels at residences, public facilities, and institutions, if the project is undertaken, PANYNJ has set aside funding, and will provide, for a voucher program designed to reduce community impacts. Interior noise level reductions could be achieved through storm windows and/or window air conditioning units for buildings without double-glazed windows and/or storm windows and/or alternative ventilation. Assistance would generally be provided to structures in close proximity of the work zone. In addition, an off-site hotel voucher program would also be considered. Additional details regarding the implementation of this assistance program are currently being developed and would be discussed with communities in both Staten Island and Bayonne as part of a comprehensive public outreach program. This program would significantly reduce interior noise levels and is likely to eliminate the increases in noise levels predicted by this analysis to occur due to construction-related activities. For instance, storm windows could reduce interior noise levels during construction up to 10 dBA, as compared with single-glazed windows alone, depending on the glazing configuration of the interior window and the amount of space between the primary window and the storm window. Replacement of single-glazed windows with double-glazed windows could reduce interior noise levels during construction up to 20 dBA, as compared with the single-glazed windows, depending on the glazing configuration of the replacement windows.

In terms of duration, the total construction time period is expected to be 45 months. Construction–related activities would occur for only a limited time period (less than 20 months) at any specific location adjacent to bridge approaches. However, as work progresses noise levels similar in magnitude to those shown in **Table 16-43** or **Table 16-44** would be expected to occur at locations along and adjacent to the bridge right-of-way.

Based primarily upon the limited duration of construction-related activities at any specific location and a consideration of the relatively modest magnitude of the noise levels produced by construction-related activities, it can be concluded that construction-related activities due to the proposed project would not be expected to result in any adverse noise impacts.

As previously stated, the PANYNJ is committed to implementing a program to minimize the potential for adverse noise impacts to the extent feasible. The program would require contractors to utilize construction equipment and path controls which in combination do not produce L_{max} noise levels at sensitive receptors which would exceed 85 dBA during weekday daytime hours (i.e., between 7 AM and 6 PM), and which produce L_{max} noise levels at sensitive receptors which would be no more than 8 dBA above existing noise levels during nighttime and weekend work periods. These criteria would be stipulated in the construction documents to ensure compliance by the contractor. In addition, this program would include noise monitoring during construction, as well as the use of community liaison personnel. Continuous noise monitoring would be performed by a certified noise monitor, independent of the contractor, using real-time monitoring equipment to determine that construction-related activities do not exceed the noise limits specified above. These measurements would determine the Contractors' adherence to the noise criteria. If at any time the activities exceed the noise limits, PANYNJ would inform the general contractor of their non-conformance and direct it to implement additional noise abatement measures. Immediate measures could include steps such as removing noisy equipment, limiting the number of work activities, and/or spreading out equipment, closely followed by the installation of (additional) noise barriers. If initial steps do not address the exceedances, then the offending work activities would be stopped. Community liaison personnel would be available to notify the public of construction activities that may be perceived as noisy and intrusive prior to and during construction, and to provide a means for the public to contact the construction contractor to handle any noise complaints.

16-7-9-2 VIBRATION

Construction activities have the potential to result in vibration levels that may in turn result in structural or architectural damage, and/or annoyance or interference with vibration-sensitive activities. In general, vibration levels at a location are a function of the source strength (which is dependent upon the construction equipment and methods utilized), the distance between the equipment and the location, the characteristics of the transmitting medium, and the building construction type at the location. Construction equipment operation causes ground vibrations that spread through the ground and decrease in strength with distance. Vehicular traffic, even construction-related vehicular and equipment traffic, typically does not result in perceptible vibration levels unless there are discontinuities in the roadway surface. With the exception of the case of fragile and possibly historically significant structures or buildings, construction activities typically do not reach vibration levels that can cause architectural or structural damage. Vibration can, however, achieve levels that may be perceptible and annoying in buildings very close to a construction site. An assessment has been prepared to quantitatively assess potential vibration impacts of construction activities on structures and residences near the project area.

Construction Vibration Criteria

For purposes of assessing potential structural or architectural damage, the determination of an adverse impact was based on the vibration impact criterion of a peak particle velocity (PPV) of 0.50 inches per second (ips) near historical or other sensitive structures and 2.0 ips for other structures. For historical or sensitive structures a stop work order would be established for vibration exceeding 0.50 ips. In order to help avoid exceedances of the stop work order an “Alert” level of 0.30 ips would be established. Similarly for non-historical or non-sensitive buildings a stop work level would be established for vibrations at 2 ips. In order to help avoid exceedances of the stop work level, an “Alert” level of 1 ips (1/2 of stop work) would be established. If the Alert level is reached, the Contractor would evaluate the construction activities to preemptively avoid exceeding the stop work level.

For purposes of evaluating potential annoyance or interference with vibration-sensitive activities, vibration levels greater than 65 vibration decibels (VdB) would have the potential to result in adverse impacts if they were to occur for a prolonged period of time.

Methodology

For purposes of assessing potential structural or architectural damage, PPV was used, while the vibration level in VdB $L_v(D)$ was used to assess potential annoyance or interference with vibration sensitive activities.

Table 16-45 shows vibration source levels for typical construction equipment.

Table 16-45
Vibration Source Levels for Construction Equipment

Equipment		PPVref (in/sec)	Approximate Lv (ref) (VdB)
Pile Driver (sonic)	upper range	0.734	105
	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Vibratory Roller		0.210	94
Ram Hoe		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58
Source: Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06, May 2006.			

Analysis Results

Typically, the types of construction equipment involved in construction activities that have the highest potential for resulting in architectural damage due to vibration are pile driving, ram hoes, truck loading/unloading, and jackhammers. While there are structures within close proximity to the locations where construction-related activities would take place, based upon the equipment expected to be utilized for this project, it is not expected that vibration levels from any of the equipment, at any nearby structures would exceed the 2.0 ips or 0.50 ips PPV criteria near historical structures and result in architectural damage. For example, vibration levels exceeding the 0.50 ips PPV limit would occur within approximately 8 feet from the operation of a drill rig, ram hoe or truck loading/unloading; and approximately 5 feet from the operation of a jackhammer. Since all receptors are located beyond these distances, there would not be potential for architectural damage due to construction activities.

In terms of potential vibration levels that would be perceptible and annoying, the operations of a number of pieces of construction equipment, including drilling rigs, hoe rams, and truck loading activities would be expected to produce levels which exceed the 65 VdB criteria. It is likely that at receptor locations within a distance of approximately 135 feet from construction-related activities, equipment would produce perceptible and annoying vibration levels. However, these operations would not be expected to occur for prolonged periods of time at a particular location and therefore would not result in any adverse impacts.

Where practicable and feasible, measures would be implemented to reduce potential vibration effects. These measures would include the use of alternative construction methods (utilizing equipment which produces lower vibration levels), use of newer equipment with lower vibration levels, and use of abatement measures (such as vibration reducing pads). In particular, drilled shafts and drilled piles, instead of driven piles, will be used for the bridge foundation, resulting in significantly lower levels of vibration. Vibration monitoring will be conducted during construction. In the unlikely event that the pre-determined threshold vibration limit is exceeded, the Contractor will be required to suspend the vibration-causing activities, until the construction equipment and procedure are modified and the vibration level is kept under the threshold.

16-7-10 HAZARDOUS AND CONTAMINATED MATERIALS

Chapter 14, "Hazardous and Contaminated Materials," describes the findings of the Phase I Environmental Site Assessments (ESA) and Environmental Screening (ES) that were conducted for the project site.

To some degree, the entire project area has the potential for the presence of subsurface contaminated materials and fill of unknown origin (categorized generally as urban fill), similar to many areas within metropolitan New York. Construction of the project would involve some demolition of existing structures, as well as excavation and removal of some existing soil for off-site disposal. Dewatering of groundwater would most likely also be required in some locations. Detailed procedures would be incorporated into the project's construction documents to govern activities that would entail surface and subsurface disturbance. Preventive measures would be undertaken to protect the safety of the public, construction workers, as well as the broader environment. The Resident Engineer would be responsible for the enforcement of contract provisions, including applicable preventive measures. All work would be performed in accordance with applicable local, state, and federal requirements.

The presence of contaminated materials only presents a threat when exposure to these materials occurs. Even then, a health risk requires both a complete exposure pathway to the contaminants and a sufficient dose to produce adverse health effects. The most likely route of exposure would be through breathing volatile/semi-volatile compounds or particulate-laden air released during demolition, excavation, and construction activities. Following construction of the project, there would be no significant potential for continued exposure. In order to prevent such exposure pathways and doses, the project would include appropriate health and safety and investigative/remedial measures (conducted in consultation with the appropriate regulatory authorities).

16-7-10-1 EXISTING STRUCTURES

Asbestos-Containing Materials (ACM) Management Plan

Proper handling, removal, and disposal of ACM are governed by both federal and state requirements. Appropriate engineering controls (e.g., wetting and other dust control measures) to minimize asbestos exposure would be implemented prior to and throughout the project.

Lead-Based Paint (LBP) Management Plan

Lead abatement work during the project would be performed on the upper bridge structure at the location of the new portals and during demolition of the existing approach structures (steel girders). Since lead-coated surfaces are present, an exposure assessment would be performed to determine whether lead exposure would occur during construction of the project including demolition and/or removal of the existing Bayonne Bridge superstructure. If the exposure assessment were to indicate the potential to generate airborne dust or fumes with lead levels exceeding health-based standards, a higher personal protection equipment standard would be employed to counteract the exposure. In all cases, appropriate methods to control dust and air monitoring, as required by OSHA (OSHA 29 CFR 1926.62 - Lead Exposure in Construction), would be implemented.

The contractor would be required to take precautions to ensure that loose paint does not chip off of the existing steel. Precautions such as containment, debris shields, netting, and screens would be used to protect the area below. In addition, ambient air monitoring would be conducted during paint removal activities to confirm that emissions do not exceed the relevant guidelines. It is anticipated that the approach steel members would be removed from the bridge and then the lead would be removed at an off-site licensed facility prior to recycling of the steel.

PCB-Containing Equipment

Suspected PCB-containing equipment (e.g., electrical equipment, caulk, adhesive, or other building materials) that would require disturbance for construction of the project would be surveyed and evaluated. PCB-containing equipment that would be disturbed by the work would be removed and disposed of in accordance with applicable federal and state regulations. Generally, unless suspected PCB-containing equipment is labeled to be "non-PCB," it must be tested or assumed to be PCB-containing and disposed of at properly licensed facilities.

16-7-10-2 SURFACE AND SUBSURFACE DISTURBANCE

Agency Consultation and Additional Investigation

The property located at West First Street and Avenue A in New Jersey (Block 373, Lot 3) is known to contain elevated arsenic levels in soil and groundwater. The arsenic is believed to be attributable to past industrial uses at the property and historic fill (placed by others than Port Authority). The potential exists for arsenic impacted groundwater to extend onto the project site. In accordance with the Site Remediation Reform Act (SRRA, N.J.S.A. 58:10C), a Licensed Site Remediation Professional (LSRP) will oversee the remediation of the arsenic contamination as part of the proposed project. A perimeter air monitoring and action plan will be provided and approved by the LSRP, designed to monitor and prevent off-site excursion of dust, vapor, and odors. As necessary, the PANYNJ would perform additional subsurface testing at this site to guide health and safety procedures and measures necessary to protect both workers and the community, and to indicate whether special handling or disposal of soils or excavated materials is likely to be required.

Construction Health and Safety Plan (CHASP)

The nature and origin of the fill materials is unknown throughout much of the area where ground disturbance would occur. Typical historic fill material may contain contaminants, such as metals and polynuclear aromatic hydrocarbons (PAHs). Other contaminants of concern include asbestos, lead, and PCBs. Prior to commencing site disturbance, a Construction Health and Safety Plan (CHASP) would be prepared to address both the known and suspected contamination issues and contingency items (e.g., finding unexpected contamination or petroleum storage tanks). The CHASP would describe in detail the health and safety procedures to minimize exposure of contaminated materials to workers and the public. The known or suspected surficial or subsurface contaminants of concern would be evaluated, and their chemical and physical characteristics assessed, to determine the potential exposure associated with the work to be performed, and thus any corollary health hazards. The CHASP would be developed in accordance with OSHA regulations and guidelines. The CHASP is expected to include designation and training of appropriate personnel, monitoring for the presence of contamination (e.g., buried tanks, drums or other containers, sludges, or soil which shows evidence of potential contamination, such as discoloration, staining, or odors) and appropriate response plans.

To prevent the potential off-site transport of dust, dust control measures would be implemented as necessary during all earth-disturbing operations. Dust suppression would be achieved through the use of a water truck or appropriate wetting/misting device to reach the full extent of the area of the soil disturbance and stockpiles. If excavation activities are generating dust, the work area, including equipment and excavation faces, would be wetted.

The CHASP would include the following:

1. Identify key personnel responsible for site safety, including name and qualifications of Safety Officer.

Address levels of personal protection to be employed during work.

3. Designate work area exclusion zone(s) and decontamination zone(s) as defined by OSHA.

4. Establish site emergency procedures and describe emergency equipment to be made available on site.

5. Identify, provide location of, and list arrangements with the nearest medical facility.

6. Dust control measures to restrict soil disturbance and air borne emissions such as water spray, dust retardant and/or truck wheel wash, will be implemented during site disturbance or excavation activities. In addition to these approved dust containment controls, the construction contract would contain provisions for perimeter ambient air monitoring for materials including lead to supplement the development of an action plan for the arsenic contaminated area by a Licensed Site Remediation Professional (LSRP).

This comprehensive program for real-time dust monitoring in and where necessary, around the work area, would take into consideration any data on known or suspected soil contaminants, the Phase I Environmental Assessment, the locations of potential human and environmental receptors and other information, to assure that the dust control measures (noted above) are preventing exposure of the public and the environment to respirable particulates and other contaminants of concern. In this regard, it should be noted that the principal contaminants of concern, metals, PAHs and PCBs, are adsorbed onto soil particles, and thus real-time dust monitoring would address potential exposure to these contaminants. Appropriate action levels, based on applicable law and guidance, would be established that, if exceeded for specified periods of time, would necessitate additional measures, such as limiting the extent of areas of exposed soil and increasing the application of dust control measures.

7. Provide action levels based on air monitoring to upgrade personal protection against airborne contaminants.

8. Set forth procedures for decontamination of personnel, materials and equipment.

Waste Management

The excavation and stockpiling of materials within the construction work zone would be performed using methods that minimize the dispersion of soil into water or land (i.e., silt fencing or hay bales). All soil and groundwater to be taken off site would be sampled and analyzed. The material would be disposed of at a permitted or state-authorized facility. Measures would be taken in known contaminated areas or areas adjacent to contaminated areas to prevent migration of contaminants. Excavated soil requiring off-site disposal would be managed in accordance with applicable laws and requirements, and, as necessary, tested in accordance with the requirements of the intended receiving facility. Transportation of all material leaving the site would be in accordance with applicable requirements covering licensing of haulers and trucks, placarding, truck routes, manifesting, etc.

Groundwater

Where dewatering is required, it is possible that the water would require treatment prior to its discharge to surface water or existing sewers. Prior to any such discharge, the water would be tested and discharge, whether to surface water or sewer, would only be conducted in accordance with applicable requirements including NPDES for discharge to surface water and local and state requirements for sewer discharge.

Chapter 17: Environmental Justice

17-1 INTRODUCTION

This chapter analyzes the potential impacts of the Raise the Roadway Alternative to determine whether the project would result in disproportionately high and adverse impacts on minority and low-income populations. The principal conclusion of the analysis is that the project is not expected to result in any disproportionately high and adverse effects on minority and low-income populations and no environmental justice impacts are anticipated. In addition, the project would be in compliance with applicable regulations under National Environmental Policy Act (NEPA) related to environmental justice protections.

17-2 REGULATORY CONTEXT

In August 2011, Department of Homeland Security (DHS), which includes United States Coast Guard (USCG), as the lead agency for the project, joined a Memorandum of Understanding on Environmental Justice (EJ MOU) to participate in government-wide environmental justice efforts. In accordance with Executive Order (E.O.) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), and EJ MOU, federal agencies, including DHS, agreed to fulfill certain commitments related to environmental justice strategies, public input, and annual reporting.

DHS released its *Environmental Justice Strategy* in February 2012. The Environmental Justice Strategy is intended to meet the goals of E.O. 12898, which requires each federal agency to make environmental justice part of its mission by identifying and addressing any disproportionately high and adverse human health and environmental effects of its programs, policies, or activities on minority or low-income populations. E.O. 12898 also requires federal agencies to work to ensure greater public participation in the decision making process.

As noted in DHS's *Environmental Justice Annual Implementation Progress Report for the period through FY2011*, the main tool that DHS employs to ensure mission compliance with environmental justice is its NEPA implementing procedures and policy. Additionally, the Environmental Justice Strategy is rooted in Title VI of the Civil Rights Act of 1964, which prohibits discrimination on the basis of race, color, or national origin in programs and activities receiving federal financial assistance.

The environmental justice analysis for the project follows the guidance and methodologies recommended by DHS as well as the federal Council on Environmental Quality (CEQ) in its publication: *Environmental Justice Guidance under the National Environmental Policy Act* (December 1997).

17-3 METHODOLOGY

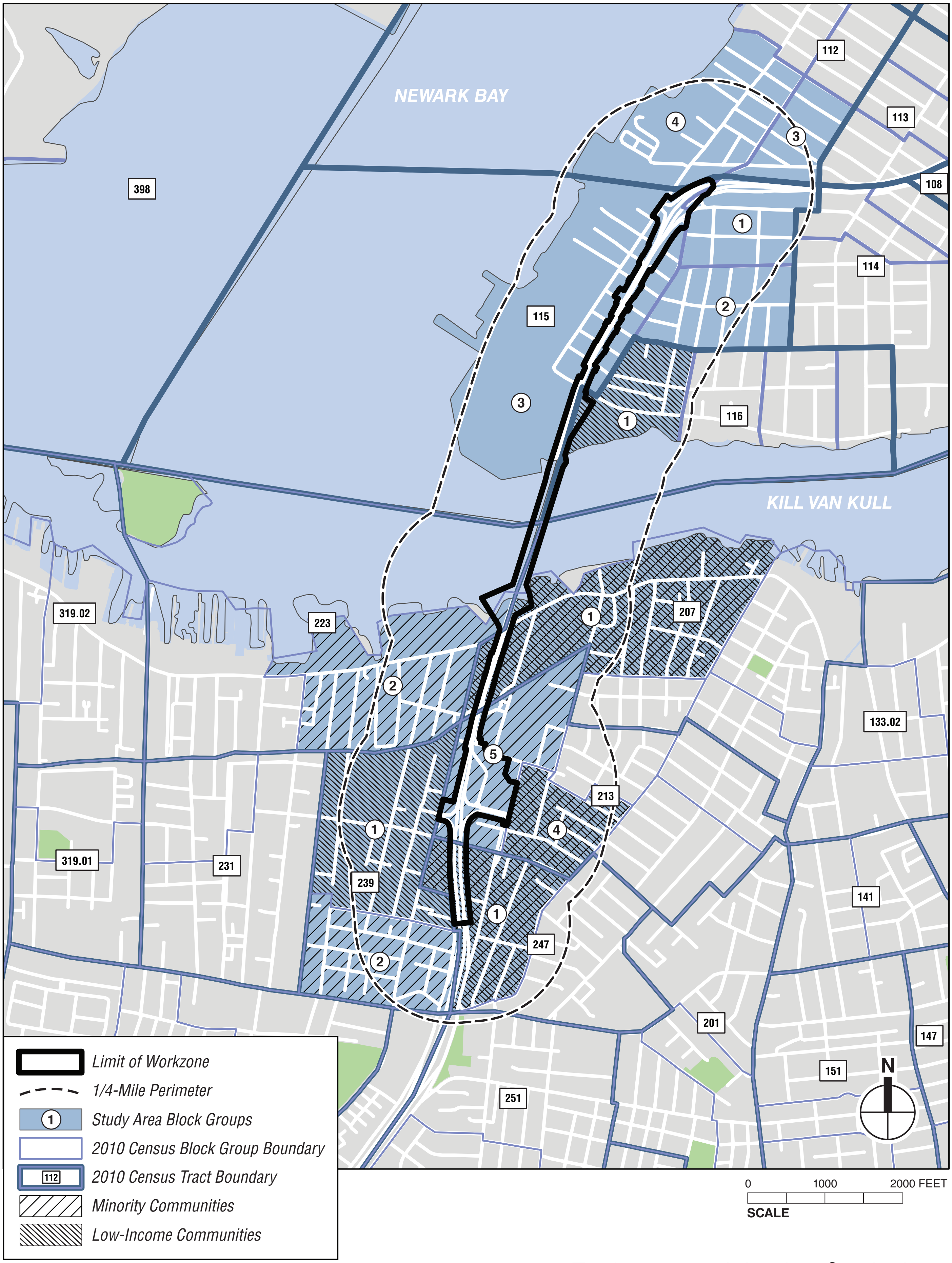
The assessment of environmental justice for the project was based on the CEQ and DHS documents identified above. It involved five basic steps:

1. Identify the area where the project may cause adverse impacts (i.e., the study area);
2. Compile minority and low-income data for the census block groups within the study area and identify minority or low-income populations;
3. Identify the project's potential adverse impacts on minority and low-income populations; and
4. Evaluate the project's potential adverse effects on minority and low-income populations relative to its overall effects to determine whether any potential adverse impacts on those communities would be significant and disproportionately high, taking into account relevant factors such as the potential for impaired resiliency of low-income and minority populations to particular types of impacts.
5. Discuss measures to avoid or reduce any identified disproportionate adverse impacts, with a concomitant increased attention to any reasonable alternatives to avoid any such effect, mitigation strategies, monitoring and community preferences, and describe the public outreach and participation process for effectively engaging minority and low-income populations in the decision-making process.

17-3-1 DELINEATION OF STUDY AREA

The study area for environmental justice encompasses the area most likely to be affected by the project and accounts for the potential impacts resulting from its construction and operation. For the evaluation of environmental justice for the project, the study area includes those census block groups that are at least 50 percent within the study area defined for the project's assessment of Land Use and Social Conditions (generally the area within a ¼ mile surrounding the limit of the construction work zone) (see **Figure 17-1**). The study area extends into Bayonne, Hudson County, New Jersey on the north and Staten Island, Richmond County, New York on the south. The study area includes a portion of the Kill Van Kull, the waterway passing under the Bayonne Bridge. As shown on **Figure 17-1** and in **Table 17-1**, there are 13 census block groups (based on 2010 Census block group boundaries) captured by the environmental justice study area: six in Hudson County, NJ and seven in Staten Island, NY. All of the study area block groups are located directly adjacent to or include portions of the 40-foot construction work zone on Port Authority of New York and New Jersey (PANYNJ) rights-of-way.

The study area chosen for an analysis of potential environmental justice impacts was chosen based on the study areas chosen for other analyses included in this Environmental Assessment (EA), and includes the area where any potential for impacts is expected. In addition, the North Shore of Staten Island has been identified as one of ten Environmental Justice Showcase Communities and is working with United States Environmental Protection Agency (EPA) to address environmental justice issues. According to USEPA, this designation is because of an increased number of children with elevated lead levels in their blood due to former industrial uses in the area.



Environmental Justice Study Area
Figure 17-1

Table 17-1
Study Area Race and Ethnicity

2010 Census Block Groups in Study Area	2010 Total Population	Race and Ethnicity*										Total Minority (%)
		White	%	Black	%	Asian	%	Other	%	Hispanic	%	
Hudson County, CT 112 BG 3	662	496	74.9	51	7.7	11	1.7	14	2.1	90	13.6	25.1
Hudson County, CT 112 BG 4	2,217	1,534	69.2	73	3.3	173	7.8	33	1.5	404	18.2	30.8
Hudson County, CT 115 BG 1	985	658	66.8	12	1.2	58	5.9	11	1.1	246	25.0	33.2
Hudson County, CT 115 BG 2	1,469	1,108	75.4	41	2.8	49	3.3	16	1.1	255	17.4	24.6
Hudson County, CT 115 BG 3	719	462	64.3	40	5.6	14	1.9	12	1.7	191	26.6	35.7
Hudson County, CT 116 BG 1	948	538	56.8	113	11.9	33	3.5	14	1.5	250	26.4	43.2
Staten Island, CT 207 BG 1	2,304	266	11.5	778	33.8	18	0.8	62	2.7	1,180	51.2	88.5
Staten Island, CT 213 BG 4	1,084	330	30.4	194	17.9	24	2.2	34	3.1	502	46.3	69.6
Staten Island, CT 213 BG 5	743	136	18.3	185	24.9	13	1.7	29	3.9	380	51.1	81.7
Staten Island, CT 223 BG 2	1,336	279	20.9	434	32.5	25	1.9	39	2.9	559	41.8	79.1
Staten Island, CT 239 BG 1	1,944	402	20.7	450	23.1	180	9.3	56	2.9	856	44.0	79.3
Staten Island, CT 239 BG 2	1,306	423	32.4	177	13.6	113	8.7	25	1.9	568	43.5	67.6
Staten Island, CT 247 BG 1	1,383	371	26.8	420	30.4	93	6.7	54	3.9	445	32.2	73.2
Study Area	17,100	7,003	41.0	2,968	17.4	804	4.7	399	2.3	5,926	34.7	59.0
Staten Island, NY	468,730	300,169	64.0	44,313	9.5	34,697	7.4	8,500	1.8	81,051	17.3	36.0
Hudson County, NJ	634,266	195,510	30.8	71,315	11.2	83,825	13.2	15,763	2.5	267,853	42.2	69.2

Notes:
Shading denotes environmental justice area.
* The racial and ethnic categories provided are further defined as: White (White alone, not Hispanic or Latino); Black (Black or African American alone, not Hispanic or Latino); Asian (Asian alone, not Hispanic or Latino); Other (American Indian and Alaska Native alone, not Hispanic or Latino; Native Hawaiian and Other Pacific Islander alone, not Hispanic or Latino; Some other race alone, not Hispanic or Latino; Two or more races, not Hispanic or Latino); Hispanic (Hispanic or Latino; Persons of Hispanic origin may be of any race).
Source: U.S. Census Bureau, *Census 2010*.

17-3-2 IDENTIFICATION OF ENVIRONMENTAL JUSTICE POPULATION

Data were gathered from the U.S. Census Bureau's *Census 2010* and *2007–2011 American Community Survey* for all census block groups within the study areas. For comparison purposes, data were aggregated for the study area as a whole, and compiled for Staten Island, NY, and Hudson County, NJ, since the study areas include portions of both of these regions. Minority and low-income populations were identified as follows:

- *Minority Populations.* The guidance documents define minorities to include American Indian or Alaskan natives, Asian and Pacific Islanders, Black persons, and Hispanic persons. This environmental justice analysis also considers minority populations to include persons who identified themselves as being either "some other race" or "two or more races" in the *Census 2010*. Following CEQ guidance, minority populations were identified where either: (1) the minority population of the affected area exceeds 50 percent; or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For this analysis, Richmond County was used as the project's primary statistical reference area for the census block groups located in Staten Island. In Staten Island, the minority population in 2010 was 36.0 percent. Hudson County was used as the reference area for the study area's census block groups located in Bayonne. In Hudson County, the minority population in 2010 was 69.2 percent. As a conservative approach, any block groups having total minority populations greater than 50 percent were identified as minority communities based on the following determinations: 1) all of the study area's block groups located in Staten Island exceed the 50 percent threshold and also have minority population percentages that are meaningfully greater than for Staten Island as a whole; and 2) the study area's block groups in Bayonne do not exceed the 50 percent threshold and do not have minority population percentages that are greater than in Hudson County as a whole.

- *Low-Income Populations.* The percent of individuals below poverty level in each census block group, available in the *2007-2011 American Community Survey,* was used to identify low-income populations. Since the available guidance documents do not specify thresholds to be used to identify low-income areas, all census block groups whose percentage of individuals below poverty level was meaningfully greater than that of their respective reference area (i.e., Richmond or Hudson Counties) as a whole were considered low-income areas. In Staten Island, approximately 11.0 percent of individuals live below the federal poverty threshold. Thus, for a conservative approach, any census block group located in the Staten Island portion of the study area with more than 11.0 percent of its individuals living below the poverty level was considered to be low-income and, therefore, a potential environmental justice area. Similarly, any census block group in the Hudson County portion of the study area having a low-income population greater than the percentage of individuals living below poverty in Hudson County (15.1 percent) was considered to be a low-income area (i.e., low-income community).

17-4 AFFECTED ENVIRONMENT

17-4-1 MINORITY STATUS ANALYSIS

Of the study area's 13 census block groups, 7 are considered minority populations or communities of concern for environmental justice (see **Figure 17-1** and **Table 17-1**).

The identified minority populations are all located in Staten Island in the southern portion of the study area (and comprise all of the study area's block groups in Staten Island). These communities have minority population percentages ranging from 67.6 to 88.5 percent—greater than CEQ's 50 percent threshold for identifying minority populations, and considered meaningfully greater than in the study area as a whole (59.0 percent) and Staten Island (36 percent). Of the minority populations in the study area, the Hispanic population accounts for the greatest proportion of the total population in the study area (34.7 percent), followed by Black or African American populations (17.4 percent), and then by Asian populations (4.7 percent) and "Other" minority populations (2.3 percent of the study area population).

17-4-2 POVERTY STATUS ANALYSIS

In addition, as discussed above, low-income populations were identified for the 13 census block groups in the study area where the low-income population exceeds the low-income population in Staten Island (11.0 percent) and Hudson County (15.1 percent), depending on the county in which the block group is located (see **Table 17-2** and **Figure 17-1**).

Table 17-2
Study Area Poverty Status

2000 Census Block Groups	ACS 2007–2011 Individuals Below Poverty Level (%)*
Hudson County, CT 112 BG 3	8.6
Hudson County, CT 112 BG 4	1.0
Hudson County, CT 115 BG 1	14.9
Hudson County, CT 115 BG 2	9.3
Hudson County, CT 115 BG 3	1.5
Hudson County, CT 116 BG 1	24.0
Staten Island, CT 207 BG 1	34.4
Staten Island, CT 213 BG 4	43.0
Staten Island, CT 213 BG 5	10.6
Staten Island, CT 223 BG 2	3.9
Staten Island, CT 239 BG 1	13.8
Staten Island, CT 239 BG 2	10.6
Staten Island, CT 247 BG 1	20.6
Study Area	14.5
Staten Island, NY	11.0
Hudson County, NJ	15.1

Notes:
Shading denotes environmental justice area.
*Percent of individuals with incomes below established poverty level. The U.S. Census Bureau's established income threshold for poverty level defines poverty level.
Sources: U.S. Census Bureau, *2007–2011 American Community Survey.*

Of the study area's 13 block groups, 5 were identified as low-income populations (i.e., having low-income population percentages exceeding the low-income percentages in their counties). Four of the low-income population areas, which are also minority areas, are located in Staten Island and one (CT 116 BG 1) is located in Hudson County, which is a non-minority area. These low-income areas have low-income populations ranging from 13.8 to 43.0 percent, and are considered meaningfully greater than in the study area as a whole (14.5 percent).

17-5 ENVIRONMENTAL CONSEQUENCES

17-5-1 SUMMARY OF ADVERSE IMPACTS

As discussed throughout this EA, the project would result in only one long-term impact. This impact is the adverse effect on the historic bridge itself. The project would not result in any other significant adverse impacts during its long-term operation. While some localized adverse effects would occur in the study area during the construction phase of the project, these effects would be temporary and would end once construction is complete, and do not violate any National Ambient Air Quality Standards (NAAQS). The construction analysis included in Chapter 16, "Construction Effects," concludes that with the proposed measures to reduce or avoid impacts, the project would not result in extensive construction-related effects with respect to any of the analysis areas of concern. Therefore, no significant adverse impacts are expected to occur as a result of construction. Nevertheless, measures would be employed to minimize any potential impacts during construction, ensuring that they would not be disproportionately high and adverse in the low-income and minority populations living near the bridge. Since the project has been determined to have no direct or indirect effect on regional traffic capacity or vehicle miles traveled, and no substantial effect on the volume of port activity or overall maritime trade patterns, it would have no cumulative effect in combination with other projects. Moreover, the project is not expected to have adverse impacts on low-income or minorities in the greater area because the potential for induced truck or train traffic is minimal.

The project's impact on historic resources is summarized below. An analysis of the project's potential for disproportionately high and adverse impacts on environmental justice populations is provided in the next section.

17-5-1-1 HISTORIC RESOURCES IMPACT

The bridge has been determined to be eligible for listing on the New Jersey and New York State Registers of Historic Places. The proposed changes to the bridge would constitute an Adverse Effect to this historic bridge. The project would result in a long-term historic resources impact that is addressed in a Programmatic Agreement pursuant to Section 106 of the National Historic Preservation Act that includes measures to minimize harm (see **Appendix B**).

17-5-2 ANALYSIS OF THE POTENTIAL FOR DISPROPORTIONATELY HIGH AND ADVERSE IMPACTS

In accordance with CEQ environmental guidance, disproportionately high and adverse impacts are project effects that are significant (as employed by NEPA) and will have an adverse impact on minority or low-income populations that appreciably exceeds that on the general population. The determination of disproportionately high and adverse impacts should reflect the potentially impaired resiliency of the affected population and also consider existing, multiple, and cumulative environmental burdens on the affected populations. As discussed throughout this EA, the project would not result in any significant adverse impacts other than a long-term impact on the historic Bayonne

Bridge, which is addressed in a Programmatic Agreement pursuant to Section 106 of the National Historic Preservation Act that includes measures to minimize harm.

The Bayonne Bridge approaches are located in both minority (located in the Richmond County portion of the study area) and non-minority areas (located in the Bayonne portion of the study area). Both low-income and non-low-income areas are located in Richmond County and Bayonne. The potential impacts associated with changes to the historic bridge would not be disproportionately borne by the low-income and minority populations living near the bridge. There are no factors that amplify these effects to be disproportionate on these communities. In terms of the temporary construction impacts, no disproportionate and adverse effects are expected. PANYNJ would work the City of Bayonne regarding any affected recreational facilities. Construction traffic effects are limited in area and duration and would not disproportionately affect neighborhood character or businesses. Air emissions would comply with the NAAQS of the Clean Air Act, which sets standards to protect sensitive populations, and thus would not be adverse. The project is not expected to result in adverse noise impacts and a number of measures would be implemented to reduce potential noise impacts and allow for the public to communicate any concerns. Further, any hazardous materials would be properly managed.

Therefore, the project would not result in any disproportionately high and adverse impacts on environmental justice populations.

While the intent of an environmental justice analysis is to ensure that government actions do not disproportionately affect populations based on race or income status, it is also recognized that environmental justice communities, particularly low-income populations, may be at risk for greater exposure to health risk factors (such as air quality) and have less access to health care resources. Therefore, health conditions in the study area were examined.

As noted above, the North Shore of Staten Island is a showcase environmental justice community because of the increased number of children with elevated lead levels in their blood due to residual contamination from the area's former industrial uses. As part of the project, the approach structures containing lead-based paint and excavated lead-contaminated soil would be removed thereby reducing the potential for exposure to lead in the long-term. A Construction Health and Safety Plan (CHASP) would address the procedures to follow for the disturbance of lead. Lead-contaminated materials would be removed and disposed in compliance with all applicable standards, thereby avoiding exposure during the removal process.

Often, in urban environments, air quality and related respiratory illnesses, such as asthma, are primary concerns. According to data collected by the New York City Department of Health and Mental Hygiene (NYCDOH), the Port Richmond neighborhood (which encompasses much of Staten Island's north shore) shows asthma rates in adults over 18 years old as about 7 percent, similar to the 5 percent recorded for Staten Island overall and 5 percent for New York City overall. For children 0–14 years old, asthma hospitalizations were higher in Port Richmond than Staten Island overall, but less than New York City overall. In addition, the 3-year annual average for $PM_{2.5}$ (fine particulate matter with an aerodynamic diameter of less than or equal to 2.5 micrometers) is 9.8 micrograms per cubic meter ($\mu g/m^3$) in the Port Richmond neighborhood, which is on the low end of average $PM_{2.5}$ concentrations among neighborhoods in New York City, where concentrations range from 9.5 to 13.5 μg/m^3 (outside of Staten Island, only one station of the 22 located in New York City monitored a concentration lower than 9.8 μg/m^3.)[1] Although these ambient air quality data cover a broad area, they provide an indication of typical air quality conditions in different regions of New York City and show that ambient air quality conditions in the area of the project are below the annual NAAQS for $PM_{2.5}$. More localized air quality conditions are examined in Chapter 16, "Construction Effects," and it was determined that construction of the project, by implementing emission control strategies, would comply with the NAAQS, thereby protecting the public health and well-being.

In New Jersey, health data is compiled at the county level by the New Jersey Department of Health and Senior Services (NJDOH). While it is difficult to extrapolate county-level data to more localized neighborhoods, it provides an overview of conditions for a relatively small region. Asthma rates among adults in Hudson County reported in November 2010 were 8.7 percent, which is about halfway between the lowest and highest rates for counties in New Jersey, with Somerset County having rates of 5.4 percent and Camden County having rates of 11.5 percent.

While the exact causes of respiratory illnesses vary, NAAQS have been established to protect human health, including vulnerable populations. As discussed above, the project would not cause an exceedance of the NAAQS and therefore would not have adverse health effects on any environmental justice (or other) communities.

17-6 PUBLIC PARTICIPATION

As discussed above, the main tool that DHS and USCG employ to provide mission compliance with environmental justice is its NEPA implementing procedures and policy. The NEPA process encourages citizen involvement in the environmental assessment of DHS actions at each appropriate stage of development of the proposed action. Accommodations have been made to engage Spanish speaking communities in the environmental review process including developing summary documents in Spanish and providing for interpreters at public meetings. As lead federal agency, the Coast Guard has met with several groups representing minority and low-income communities including the Elm Park Civic Association and the North Shore Water Conservancy on Staten Island, and Healthy Ports Coalition and others in Newark, NJ. Concerns raised by these communities have been discussed in this EA and will continue to be addressed and coordinated with the minority and low-income communities, as necessary, throughout the project as part of the project's public outreach program in accordance with applicable regulations.

17-7 MITIGATION

The project would not result in any disproportionately high and adverse effects on minority or low-income populations during operation or construction. Therefore, no mitigation would be required.

[1] NYSDEC, New York State Ambient Air Quality Report for 2011, http://www.dec.ny.gov/chemical/8536.html, accessed April 25, 2013.

18-1 INTRODUCTION

This chapter assesses the potential for the Raise the Roadway Alternative to result in indirect and cumulative impacts. Potential indirect effects are generally defined as those induced or "caused by an action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR § 1508.8(b)). Potential cumulative effects may result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions (40 CFR § 1508.7).

18-2 INDIRECT EFFECTS

18-2-1 OVERVIEW

Comprehensive guidance literature on assessing indirect impacts is found in the National Cooperative Highway Research Program (NCHRP)-initiated Project 25-10, the results of which were published as Report 403, "Guidance for Estimating the Indirect Effects of Proposed Transportation Projects,"[1] and its desk reference, Report 466[2]. These reports identify and provide examples for the types of transportation projects more likely to result in induced or indirect growth.

For this project, which is local and site-specific, but was initiated due to increasing use of larger Post-Panamax vessels on major world trade routes in an attempt to lower the per unit cost of transporting cargo—it is necessary to evaluate indirect effects on two levels. After describing the role of the Port of New York and New Jersey in maritime trade and an analysis of current cargo activity and forecast predictions, this section will take a global view of indirect effects, examining whether the project could have an impact on shipping patterns, including market share captured by the Port of New York and New Jersey relative to other ports, and whether the project could induce substantial shifts in inland cargo transport patterns. The section will then assess the potential for significant indirect effects in a more local area, as related to technical analyses analyzed in this Environmental Assessment (EA) (e.g., see Chapter 11, "Air Quality" with an assessment of reduced air emissions profile due to fewer and more efficient vessels arriving and departing the Port). This potential is examined for both the operational and construction periods.

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[1] NCHRP Project 25-10, Report 403, Guidance for Estimating the Indirect Effects of Proposed Transportation Projects, May 2002.

[2] NCHRP Project 25-10, Report 466, Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects, May 2002.

The analysis of indirect effects is organized into five sections:

- Overview of maritime transport, port operation, and trends;
- Description of the role of the Port of New York and New Jersey in maritime trade, specifically containerized shipping;
- Analysis of current cargo activity and forecast projections for the Port of New York and New Jersey;
- Assessment of the potential for the project to result in significant adverse indirect impacts from a global perspective; and
- Assessment of the potential for the project to result in significant adverse indirect impacts in the study areas for the technical analyses presented in other chapters of this EA.

The study accounts for the uncertainties inherent in predicting potential shifts in container volumes among ports due to the myriad of maritime global shipping and economic factors by using conservative assumptions and a sensitivity analysis. The analysis concludes that there is limited potential for adverse indirect impacts that can be reasonably foreseen. Similarly, any potential diversions of freight to other ports resulting from a No Build alternative where the bridge remains as an air draft restriction would be limited based on manifold global shipping and economic factors. Therefore, no mitigation is necessary.

18-2-2 OVERVIEW OF MARITIME TRANSPORT, PORT OPERATION AND TRENDS

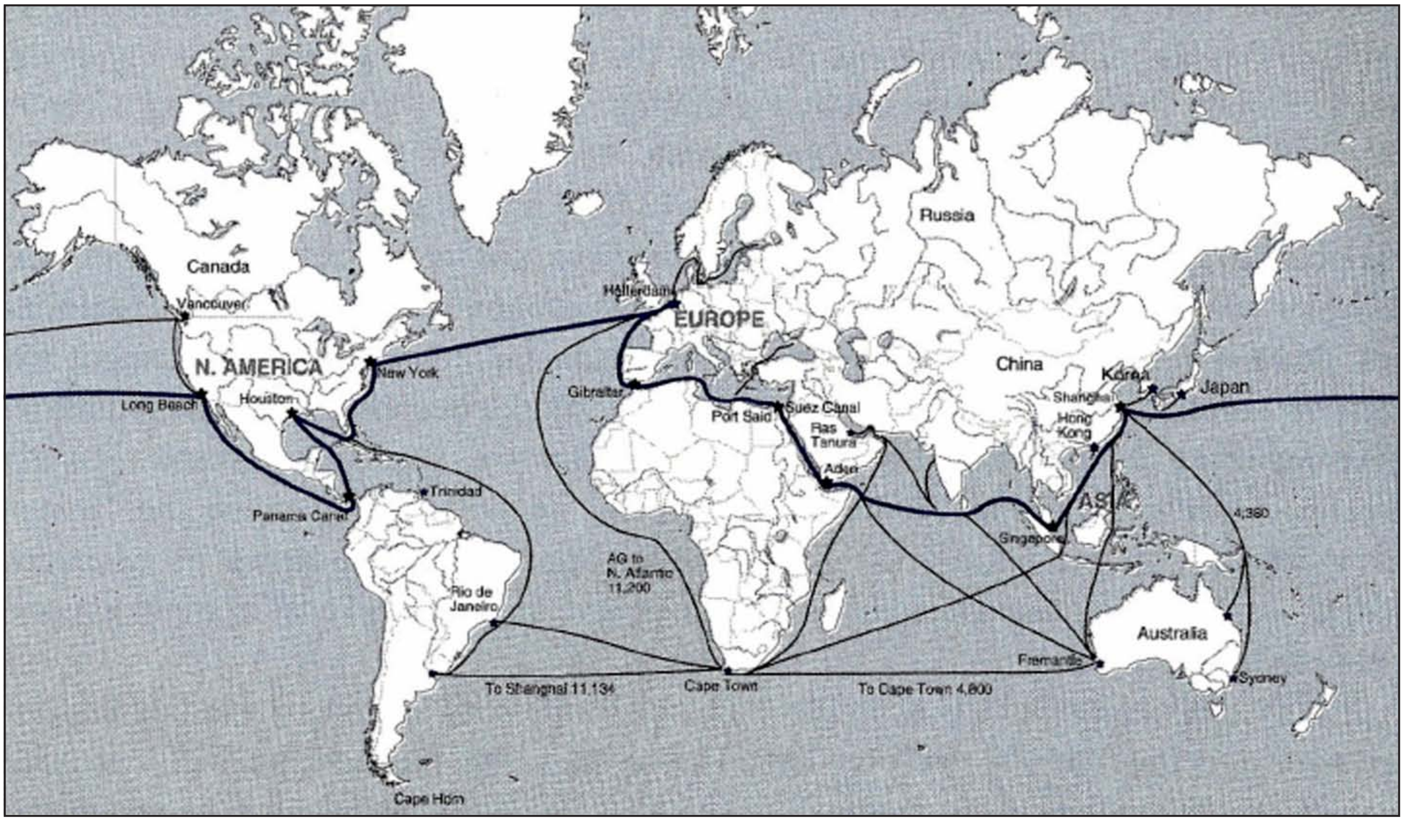
Maritime trade is a world of perpetual circulation, with ships circling the globe on established trade routes and stopping at multiple ports along the way to load and unload cargo. Decisions about which trade routes to follow, which ports to call and how often, and which inland modes of transport to use are affected by numerous factors. These factors include the origin and final destination of cargo (i.e., consumer generated demand that drives the export and import of goods), the weight and/or volume of cargo, and the time sensitivity of delivery, among others.

18-2-2-1 GLOBAL TRADE ROUTES

Broadly speaking, maritime trade is dominated by three economic centers: North America, Europe, and Asia. **Figure 18-1** depicts the shipping routes between these centers. These are the routes followed by container ships and other specialized vessels. The dark line on the map shows the main global shipping route, and the light lines mark main routes followed by vessels carrying raw materials such as oil, coal, and grain into North America, Europe, and Asia.[1]

The United States plays a major role in this global maritime trade network. According to U.S. Department of Transportation (USDOT), 1 container in every 11 that is engaged in

[1] Martin Stopford, Maritime Economics, 3rd Edition (New York: Routledge, 2009), Page 348.



SOURCE: Martin Stopford, Maritime Economics, 3rd Edition (New York: Routledge, 2009), page 348.

Main Global Shipping Routes

Main Routes Used by Vessels Carrying Raw Materials into North America, Europe, and Asia

Major World Shipping Routes
Figure 18-1

global trade is either bound for or originates in the U.S. This accounts for nine percent of worldwide container traffic.[1]

A majority of container ship calls to the U.S. are made to a relatively small number of ports. USDOT reports that approximately 77 percent of container ship calls to the U.S. were made to the country's top 10 container ports.[2] **Table 18-1** shows container activity, measured in twenty-foot equivalent units (TEUs)[3], at the busiest ports in the U.S. in 2010.

Table 18-1
Top U.S. Container Ports in TEUs, 2010

Port	Coast	Millions of TEUs[1]
Los Angeles, CA	West	7.83
Long Beach, CA	West	6.26
New York and New Jersey, NY, NJ	**East**	**5.29**
Savannah, GA	East	2.83
Oakland, CA	West	2.33
Seattle, WA	West	2.13
Hampton Roads, VA	East	1.90
Houston, TX	Gulf of Mexico	1.81
Tacoma, WA	West	1.46
Charleston, SC	East	1.36

Notes: [1]Twenty-Foot Equivalent Units

Sources: American Association of Port Authorities (AAPA), Table titled *North America: Container Port Traffic 1990 – 2010*. Last accessed via web site (www.aapa-ports.org) in March 2012.

18-2-2-2 KEY ELEMENTS OF CONTAINER SHIP AND CONTAINER PORT OPERATIONS

Maritime trade involves the balancing of multiple variables including ship capacity and travel speed, location of ports of call (i.e., ports where stops are made), frequency of calls to various ports en-route, and inland transport mode (primarily rail versus truck). Container ship operators are continually adjusting operations based on factors such as fluctuations in fuel costs, rail and truck carrier costs, access to container warehousing facilities, and cargo type.

In general, container ship operators use large ships for long-distance hauls and smaller ships for "feeder services," operations in which cargo is shipped by water in smaller vessels to or from a major port for loading or unloading from larger ocean-going vessels. Ships call at a number of ports along a route in order to deliver and load cargo.

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[1] U.S. Department of Transportation, Research and Innovative Technology Administration. *America's Container Ports: Linking Markets at Home and Abroad, 2011*, Page 2.

[2] U.S. Department of Transportation, Research and Innovative Technology Administration. *America's Container Ports: Linking Markets at Home and Abroad, 2011*, Page 2.

[3] The TEU is the standard unit for measuring the volume of containers that seaports handle. One 20 foot ISO container equals one TEU.

The regularity with which a ship calls on a given port is dictated by a balance between frequency of service and efficiency necessary to maintain lower costs.

Ports-of-call depend on the market being served. The geographic area comprising a port's market (the area from which its customers are drawn) is generally referred to as its hinterland. A port's hinterland is defined by a number of factors including geographic distance, transportation and warehousing infrastructure, and cost of transport by various modes. Often, port hinterlands are thought of in two parts: the main hinterland, where the port has a monopolistic position in drawing cargo, and the competition margin hinterland where there is competition for cargo between or among ports.[1] The hinterland for the Port of New York and New Jersey is described below under Section 18-3.

According to a 2011 United Nations report on maritime transport, a carrier chooses its ports of call based on three main considerations: (1) the port's position within the global shipping network, (2) the port's hinterland, and (3) the port's pricing and quality of services and infrastructure.[2]

18-2-2-3 TRENDS IN PORT OPERATIONS AND CONTAINERIZATION

A number of current trends in maritime trade and port operations are affecting ports throughout the U.S., including the Port of New York and New Jersey. These include:

- The amount and proportion of cargo being containerized is increasing. A 2011 United Nations report on maritime transport indicates that in recent years worldwide seaborne trade has grown faster than industrial production and Gross Domestic Product (GDP), reflecting the rapid expansion in container trade. Also, between 1991 and 2011, containers in use for transporting seaborne trade grew fourfold, from just under 7 million to 29 million TEUs.[3]
- Container vessel calls as a share of total vessel calls at U.S. ports is rising. Between 2004 and 2009, container ship calls as a percent of total calls rose from 31 percent to 33 percent.[4] Over this same time period, the percent of container ship calls at the Port of New York and New Jersey rose from 49 percent to 52 percent. In 2010, container ships at the Port of New York and New Jersey accounted for 53 percent of all vessel calls, followed by tankers (29 percent).[5]

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[1] United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and Korea Maritime Institute, Free Trade Zone and Port Hinterland Development (Thailand: United Nations, 2005), page 14.

[2] United Nations Conference on Trade and Development (UNCTAD), Review of Maritime Transport 2011 (New York: United Nations, 2011), page 90.

[3] United Nations Conference on Trade and Development (UNCTAD), Review of Maritime Transport 2011 (New York: United Nations, 2011), pages 3 and 39.

[4] U.S. Department of Transportation, Research and Innovative Technology Administration. *America's Container Ports: Linking Markets at Home and Abroad, 2011*. Page 19.

[5] US Department of Transportation, Maritime Administration, Vessel Calls at US Ports By Vessel Type (updated 6/13/11), available at: http://www.marad.dot.gov/library_landing_page/data_and_statistics/Data_and_Statistics.htm#Vessel%20Calls (Web site last accessed March 2012).

- Ship sizes are increasing. This trend is projected to continue, particularly with the completion of the Panama Canal expansion, which will allow larger ships ("Post-Panamax" vessels) to pass through the canal. Between 2004 and 2009, the average size of container vessels calling at U.S. ports increased by more than 19 percent from 3,200 TEUs to 3,800 TEUs, and calls to U.S. ports by Post-Panamax sized container ships of 5,000 TEUs or greater rose by 156 percent.[1]
- Newer ships can travel at faster speeds, but rising energy costs and a desire for more environmentally sustainable shipping practices are leading ship operators to adopt slower speeds. This practice is known as "slow steaming."
- Newer automation technologies on ships and at ports, such as real time container and equipment tracking, computer assisted navigation, and Post-Panamax-geared tandem lift cranes, have increased shipping efficiencies.
- Trade is being channeled through fewer ports. Containerization has allowed greater flexibility in routes and modes of transport, allowing shippers to adopt the itinerary that gives them the cheapest unit transport costs. This has resulted in the channeling of trade through fewer ports, with each major port having an enlarged hinterland.[2]
- The movement of containerized freight in the U.S. is increasingly affected by the capacity and location of new inland freight warehousing and distribution centers and available rail services. Large-scale integrated freight logistic distribution centers are being developed at inland locations such as Kansas City, Memphis, Columbus, and Chicago to serve both east coast and west coast container ports. Meanwhile, railroads are developing integrated hubs and renovating some of their rail tracks and tunnels for double-stack trains.[3] Many academics and maritime transport experts agree that what happens inland in terms of freight handling has equal if not greater import in today's environment than what happens offshore or portside.[4]

18-2-3 PORT OF NEW YORK AND NEW JERSEY

The Port of New York and New Jersey is comprised of the waterbodies, shipping channels, passenger terminals, and container and cargo facilities located around the New York Harbor (see **Figure 18-2**). The Port includes four marine terminals—the Howland Hook Marine Terminal, the Port Jersey Marine Terminal, the Port Newark-

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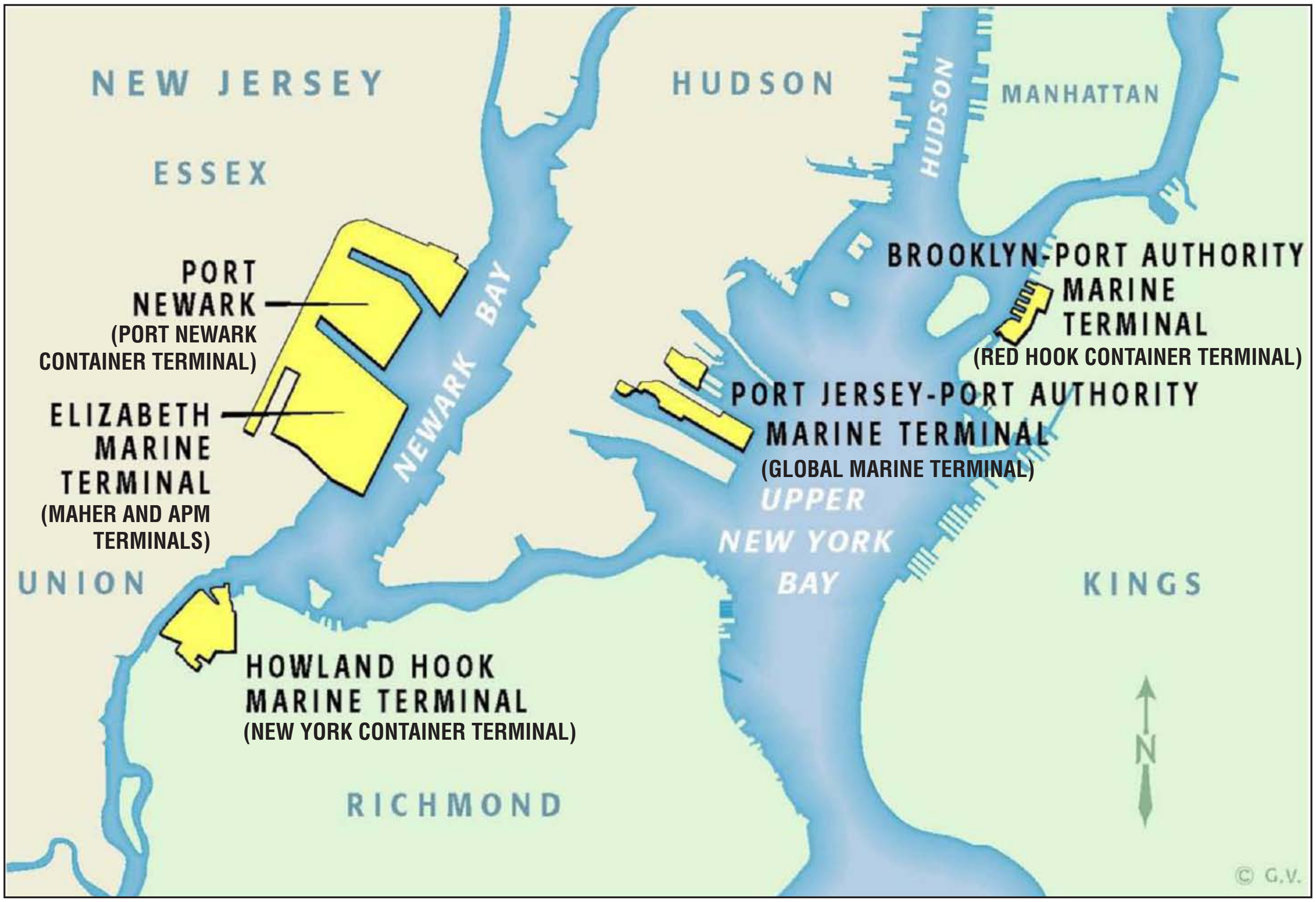
[1] Ibid, pages 2 and 19.

[2] Martin Stopford, Maritime Economics, 3rd Edition (New York: Routledge, 2009), page 559.

[3] Bill Mongelluzzo, The Port Moves Inland, Journal of Commerce, September 13, 2010.

[4] This theme recurs in academic and trade literature and presentations addressing a variety of freight- and port-related topics. Examples include: "Functions and Actors of Inland Ports: European and North American Dynamics" which studies the emergence and supply chain functions of inland ports [Jean-Paul Rodrigue, Jean Debrie, Antoine Fremont, and Elisabeth Gouvernal, 2012]; "Port and Modal Elasticity Study, Phase II," a study commissioned by the Southern California Association of Governments to examine flows of waterborne containerized imports from Asia to the U.S. through North American ports and landside supply-chain channels [Leachman & Associates LLC, 2010]; The Southern California Association of Government's "Comprehensive Regional Goods Movement Plan and Implementation Strategy" [2011]; and contributions by Dr. Peter V. Hall, Tom O'Brien, PhD, and Michael Vanderbeek to the American Planning Association webinar "Planning for Goods Movement: Players, Trends, and Challenges," 2012.

3.29.12



Port of New York and New Jersey
Marine Terminals and Operations
Figure 18-2

Elizabeth Marine Terminal (sometimes referred to as two separate terminals), and the Brooklyn Marine Terminal. There are six container terminals located within the Port of New York and New Jersey: New York Container Terminal (in the Howland Hook Marine Terminal); Global Marine Terminal (in the Port Jersey Marine Terminal); Port Newark Container Terminal; Maher and APM Terminals (in the Port Newark-Elizabeth Marine Terminal); and Red Hook Container Terminal (in Brooklyn Marine Terminal). Combined, the four Port Authority of New York and New Jersey (PANYNJ) marine terminals comprise the third busiest container port in the U.S. and the largest on the Eastern Seaboard. In 2010, the Port of New York and New Jersey handled more than 2,725 vessels and 5.29 million TEUs of cargo.

The Kill Van Kull is a primary shipping channel of the Port of New York and New Jersey and one of the busiest in the world. It provides access between the New York Harbor and two of PANYNJ's facilities—Port Newark-Elizabeth Marine Terminal and Howland Hook Marine Terminal. The Port Newark-Elizabeth Marine Terminal complex is by far the largest and busiest cargo facility in the Port of New York and New Jersey. Of the three remaining container facilities, Howland Hook is located west of the Bayonne Bridge while Global Marine Terminal and Brooklyn Marine Terminal are east of the bridge. In 2010, more than 2,085 vessels and more than 4.86 million TEUs (of the total of 5.29 million TEUS for the Port) passed beneath the Bayonne Bridge en route to and from these terminals.

Although the Port of New York and New Jersey handles a large proportion of cargo on the East Coast, its primary hinterland is relatively narrow in geographic scope. The *Bayonne Bridge Air Draft Analysis* completed by the U.S. Army Corps of Engineers (USACE) in 2009 considers two hinterland areas for the Port: a 31-county metropolitan area that includes counties in New York State, northern New Jersey, and southwestern Connecticut; and a 260-mile radius from the Port. These hinterland definitions are consistent with prior USACE reports, which indicate that approximately 70 percent of containerized cargo moving through the Port was destined for or originated from the 31-county area, and that approximately 82 percent of containerized cargo moving through the Port was destined for locations within the 260-mile radius.[1] Thus, while the Port of New York and New Jersey handles a large proportion of cargo on the Eastern Seaboard, it is essentially a port with a very large, but essentially local, market.

The Port is located in one of the most densely populated areas of the U.S., providing a robust local market. The Port is serviced by a well-developed transport network including rail, highway, and fluvial networks, and it has made capital investments in recent years to increase transportation efficiencies. For example, the Port has implemented the ExpressRail System, which has created dedicated rail facilities and additional support track and rail yards for each of the Port's major container terminals.[2]

18-2-3-1 ONGOING PORT EXPANSION AND IMPROVEMENT INITIATIVES

The Port of New York and New Jersey and the operators of the Port's container terminals have made a number of capacity and operational improvements over the past

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[1] USACE, New York District, *Bayonne Bridge Air Draft Analysis*, September 2009, page 15.

[2] PANYNJ web site: http://www.panynj.gov/port/express-rail.html. Site last accessed on February 28, 2012.

several years in order to meet ongoing and forecasted demand (see Section 18-2-4, below). Key investments include:

- Rail and capacity improvements in New Jersey: In New Jersey, the Port Newark-Elizabeth Marine Terminal are benefitting from an ExpressRail Elizabeth expansion to 18 tracks. Other rail projects completed or underway, including a new support yard, will further add to the throughput capacities and efficiencies at both the Elizabeth Marine Terminal and Port Newark. In addition, in Bayonne, PANYNJ has acquired 120 acres of the former Military Ocean Terminal at Bayonne (MOTBY) facility to landbank for future Port-related uses. APM Terminal: APM Terminal recently added 84 acres to its terminal site, increasing the site's total acreage from 266 to 350 acres. The terminal recently installed four new cranes and refrigerated container racks, tripling its reefer capacity to 1,284 reefers at a time.[1]
- Maher Terminal: Maher Terminal has invested nearly $400 million over the past five years in infrastructure, equipment acquisition, and technology. Maher Terminals and APM jointly operate Elizabeth ExpressRail, a 45,000-foot on-dock intermodal rail facility with enough capacity to accommodate four 10,000-foot trains. The terminal has also doubled the number of reefer plugs at its facility, allowing it to handle 900 refrigerated containers, and is planning to upgrade its data-processing capabilities to speed the handling of containers.[2]
- Port Newark Container Terminal: Since 2000, Port Newark Container Terminal has invested approximately $250 million, increasing its throughput capacity to 750,000 containers annually. Further expansion plans include berth deepening and upgraded capital equipment including three new ship-to-shore cranes and mobile container-handling equipment. In addition, PANYNJ has allocated approximately 80 additional acres of contiguous property to the container terminal, which would further increase capacity. [3]
- New York Container Terminal (Howland Hook Marine Terminal): In 2010, the New York City Department of Small Business Services as lead agency began environmental review of a proposed expansion of the New York Container Terminal. The application to the USACE for the expansion was recently withdrawn by the applicant. The proposal was to add to New York Container Terminal a new 50-foot deep container ship berth and associated modernization of the marine container terminal on a 39-acre site located adjacent to the existing facility.[4]
- Global Marine Terminal: Global Marine Terminal has several expansion measures underway, including installation of 20 automated rail-mounted gantries, addition of 900 feet of dock, and an increase of the terminal's acreage

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[1] PANYNJ web site: http://www.panynj.gov/port/terminal-improvements.html.

[2] Ibid.

[3] PANYNJ web site: http://www.panynj.gov/port/terminal-improvements.html and PNCT web site: http://www.pnct.net/ Sites last accessed on August 2, 2012.

[4] Environmental review documents available on the New York City Economic Development Corporation (NYCEDC) web site: http://www.nycedc.com/project/new-york-container-terminal-expansion. Site last accessed on April 29, 2013.

from 98 to 170 acres. Combined, these measures will more than double the capacity of the terminal, from 680,000 to 1.7 million TEUs per year. In addition, PANYNJ is developing adjacent Greenville rail yard (north of the terminal) into an intermodal rail transfer facility with 8 working tracks.[1]

18-2-3-2 CONSTRAINTS ON TERMINALS EAST OF BAYONNE BRIDGE

As indicated above, there are two terminals located east of the Bayonne Bridge: the Brooklyn-Port Authority Marine Terminal (Red Hook Container Terminal) and the Port Jersey-Port Authority Marine Terminal (Global Marine Terminal). Both of these facilities, while important components of the Port system, have smaller land area and cargo capacity than facilities west of the Bridge and are limited in their ability to expand, making it impossible for them to absorb all of the additional container traffic anticipated in the No Build condition.

Table 18-2 compares terminal area, number of container cranes, berth area, rail access, and highway access for the six container terminals in the Port of New York and New Jersey. As shown in the table, the terminals east of the Bayonne Bridge currently have a combined land area of 250 acres, which is about one fifth of the combined land area of container terminals west of the bridge (1,242 acres). Terminals east of the bridge have a total of 10 container cranes, compared with 49 container cranes west of the bridge, and have a combined ship berth of 3,880 feet compared with 23,541 feet of ship berth west of the bridge.

Rail and highway access are also more limited at terminals east of the Bayonne Bridge. All of the Port's intermodal rail terminal capacity is located west of the bridge. There is no vessel-to-rail capacity at the Red Hook terminal, and access to the region's major highways is restricted largely to the Brooklyn Queens Expressway, which is subject to heavy congestion. Global Marine Terminal has direct access to the New Jersey Turnpike and, as mentioned above, will soon have access to a new Greenville rail yard just north of the terminal. However, compared with the Port Newark-Elizabeth Marine Terminal, which has easy on-off access to the New Jersey Turnpike and regional interstate roadway system, and access to a number of express rail lines, and Howland Hook Marine Terminal, which has direct access to the Staten Island Expressway leading to Interstate 95 and includes an on-site intermodal rail facility that connects to the national rail network, rail and highway access to and from Global Marine Terminal is more limited.

The Red Hook Container Terminal is heavily constrained by the density and proximity of commercial and residential uses on inland blocks. In addition, without a 50-foot channel depth, the Red Hook Container Terminal will not be able to accommodate any Post-Panamax ships. Expansion at Global Marine Terminal is also somewhat limited by adjacent land area and existing land uses and, like Red Hook, can presently accommodate only one Post-Panamax ship at a time but with a berth expansion presently under way will be able to accommodate two. Upon completion of the improvements described above, Global Marine Terminal will still not be able to meet

[1] Global Marine Terminal press release dated May 9, 2012: http://expansion.global-terminal.com/pdf/GCT_PressRelease.pdf and PANYNJ web site: http://www.panynj.gov/port/terminal-improvements.html. Sites last accessed on April 29, 2013.

any substantial portion of the anticipated future demand. Therefore, a combination of capacity expansions at Global Marine and Red Hook is not a viable alternative to the elimination of the Bayonne Bridge air draft restriction for accommodating larger ships at the Port.

Viewed from the perspective of the project's National Economic Development benefits, the USACE determined in its *Bayonne Bridge Air Draft Analysis* that 400 acres of additional container handling capacity would have to be added to land east of the bridge in order to eliminate the NED justification for even the most expensive alternative analyzed (the immersed tunnel). For the least costly alternative, which involves keeping the existing bridge arch and rebuilding the roadway to 215 feet, the benefit-to-cost ratio remained well above the break-even point at 2.3 even with the addition of 400 acres of capacity added east of the bridge, which would more than triple the existing capacity of those east-of-bridge terminals[1].

Table 18-2
Selected Factors Affecting Capacity and Expansion Potential for PANYNJ Container Terminals

Marine Terminal: Container Terminal Operator	Terminal Area (Acres)	Container Cranes	Length of Ship Berth (feet)	Rail Access	Nearby Highway Access
West of Bayonne Bridge					
Howland Hook: New York Container	187	9	3,012	Good	Staten Island Expressway (leading to I-95)
Port Newark-Elizabeth: Port Newark	260	9	4,400	Excellent	New Jersey Turnpike; I-95
Port Newark-Elizabeth: Maher	445	16	10,128	Excellent	New Jersey Turnpike; I-95
Port Newark-Elizabeth: APM	350	15	6,001	Excellent	New Jersey Turnpike; I-95
Total West of Bridge	1,242	49	23,541		
East of Bayonne Bridge					
Brooklyn: Red Hook	80	4	2,080	None	Brooklyn-Queens Expressway
Port Jersey: Global Marine	170	6	1,800	Anticipated	New Jersey Turnpike
Total East of Bridge	250	10	3,880		

Notes: 100 percent of the Port's intermodal rail capacity is located west of the Bayonne Bridge.
Sources: Port of New York and New Jersey: http://www.panynj.gov/port/containerized-cargo.html. Site last accessed on August 2, 2012.

18-2-4 CARGO PROJECTIONS FOR PORT OF NEW YORK AND NEW JERSEY

As noted above, the operational characteristics of the Port are based on larger economic trends that affect global trade, trade routes, and the size and stability of the hinterland demand for both import and export products.

[1] USACE, New York District, *Bayonne Bridge Air Draft Analysis*, September 2009, Appendix B.

Long-term forecasting is a critical component of planning and investment for PANYNJ. The Comprehensive Port Improvement Plan (CPIP), a multi-agency effort that evolved from the 1999 Harbor Navigation Study, looked at several aspects of port capacity, cargo forecasts, and necessary terminal improvements to meet future demand. The CPIP extended forecast of 11.3 million TEUs by 2060 is most notable in that total TEU activity was projected to surpass overall port capacity in 2037. Thus, a series of port capacity and supporting infrastructure improvements were identified to accommodate future demand. While the year in which demand outpaces capacity and the phasing for the recommended improvements have materially varied from what is outlined in the CPIP—actual cargo growth has outpaced CPIP projections (i.e., sooner than 2037)—CPIP's Port capacity improvement recommendations remain a basis for ongoing port planning.

While CPIP was primarily focused on Port capacity, this Project is focused on Port access. As set forth in Chapter 1, "Purpose and Need," the project would allow for the port facilities west of the Bayonne Bridge to accept larger Post-Panamax vessels that would reduce cargo transportation costs, which in turn would enable the Port to operate with maximum flexibility to accommodate global shipping trends. For this reason, while not a Port capacity improvement in and of itself, CPIP identified the project as a "risk" factor to be monitored specific to the future operations of terminals west of the bridge (i.e., the absence of the Program could factor into the long-term competitiveness of those terminals). CPIP did not undertake to quantify this risk. As identified elsewhere in this document (e.g., Chapter 11: "Air Quality"), the use of larger vessels also provides for economic and environmental benefits associated with more efficiency on a per-TEU basis.

While not the focus of an indirect effects analysis (which specifically examines the relationship of potential foreseeable changes attributable to a proposed action), it is noted that the absence of the project (the No Build Alternative) would continue to pose a risk to the ability of the Port to efficiently and economically meet anticipated future cargo demand. As set forth in Chapter 1, "Purpose and Need," this could have a direct cost of shipping implication that may affect end-user costs. As described in the USACE Bayonne Bridge Air Draft Study, which uses the difference in vessel operating costs of fleets that could call at the Port with and without the air draft restriction as the basis for the benefit side of its cost-benefit calculations, vessel operating costs decrease on a per TEU basis with the size of a vessel. Eliminating the air draft restriction and allowing Post-Panamax vessels to call at terminals west of the bridge would therefore decrease the average cost per TEU of shipping at the Port of New York and New Jersey.

While these cost savings may not be passed along to the consumer in their entirety, the inability to realize these savings (No Build scenario), could put the Port of New York and New Jersey or the region it serves at a disadvantage relative to other ports or regions on the Eastern Seaboard.[1] As noted in the *Bayonne Bridge Air Draft Analysis*

[1] Ports all along the Eastern Seaboard are undertaking expansion and improvement projects to meet ongoing demand and in anticipation of greater reliance on Post-Panamax vessels. For example: the Delaware River is being dredged from 40 feet to 45 feet, which affects both the Wilmington and Philadelphia ports; the Port Miami channel is being deepened to 50 feet; Jacksonville is developing a new intermodal container transfer facility and is planning to construct a new 90-acre terminal; and terminal operators at multiple ports, including Savannah, Charleston, Baltimore, and Jacksonville are adding cranes and taking other measures to prepare for Post-Panamax vessels

and as indicated by the overall growth predicted for the Port (see Table 18-4, below), this potential dynamic is not expected to affect the geographic scope of the Port's hinterland or the volume of cargo throughput at the Port, which are determined primarily by the overall demand for goods, but it could affect shipping cost which is ultimately borne by consumers. In summary, as evidenced by the manifold variables that go into the economic decision-making of cargo movements and the multitude of factors influencing global shipping patterns described in this chapter, it is highly speculative to attribute specific local economic outcomes to the Build or No Build Alternatives.

The importance of the project in allowing the Port to efficiently accommodate projected demand can be seen most clearly in the *Bayonne Bridge Air Draft Analysis*, which utilized short- and near-term forecast demand for TEUs at port facilities west of the Bayonne Bridge with and without the ability to accommodate larger vessels. As shown in **Table 18-3**, total TEU demand was projected to increase an average of 6.6 percent per year from the present 2012 estimate through 2020 and then by 3.5 percent between 2020 and 2035. The rate of growth for TEUs west of the Bayonne Bridge is relatively higher than the overall long-term growth rate. The difference reflects the short term spike of demand over the past decade as well as the faster growth rate in activity west of the Bayonne Bridge when compared with the Port as a whole. The difference in rate of growth for activity west of the bridge versus the Port as a whole is due to the increasing share of containerization as a percent of overall cargo and the fact that marine terminals west of the Bayonne Bridge handle the vast majority of container volume in the Port.[1] Nonetheless, it is noted that the short term 2012 volume estimate used in the USACE study of 4.5 million TEUs, as derived from the earlier Harbor Navigation Study, is somewhat lower than the actually measured volume of 4.8 million TEUs for 2010. Thus, the assessment of potential TEU distribution by vessel type based on the USACE study for the future year estimate demand in 2020 and 2035 could be proportionately higher but would not alter the trends and patterns established in the analysis.

The analysis shows that the number and size of vessels required to meet forecasted demand would change substantially with the completion of the project. **Table 18-4** shows the forecasted numbers of TEUs by each vessel class in the years 2020 and 2035 to the marine terminals west of the Bayonne Bridge. USACE used predictions supplied by PANYNJ along with trade route data and projected rates in commerce for each route (USACE 2009, p. 29). Some ocean carriers have chosen to modify larger vessels (between 7,000 and 9,200 TEUs) using the Suez Canal to have dimensions capable of traveling beneath the Bayonne Bridge. Of the approximately 60 weekly shipping services that utilize the Port, two operate these larger vessels at the time of this report. These vessels are not reflected in the 2009 USACE study, since the projected data was based on conditions and information available at that time.

The table illustrates the difference in the delivery vessels and TEUs expected to be used with and without the project. As discussed below, the study predicted that

[1] The methodology utilized by USACE is described as follows, "The commerce forecast was derived by applying the growth rates used in the New York and New Jersey Harbor Navigation Study (HNS) and applied to the observed commerce coming through the Port." It is noted that, "the values generated by other analytical approaches were within the range of those expected by concurrent commerce forecasts, which are being produced independently and by other methods for other PANYNJ studies." (USACE 2009)

because of the proximity of the Port to a large majority of its market share, there would not be any difference in the total number of TEUs between the two scenarios.

Table 18-3
Total Forecasted TEUs West of Bayonne Bridge

Year	Total TEUs	Average Annual Percent Change
2012	4,567,519	
2020	7,008,612	6.6%
2035	10,647,805	3.5%

Note: These forecasts are based on 2009 USACE Bayonne Bridge Navigational Clearance Program study derived from earlier forecasts and are likely to be lower than actual 2012 TEU volume.
Sources: USACE, New York District, *Bayonne Bridge Air Draft Analysis*, September 2009.

Table 18-4
Vessels and TEUs by Class for 2020 and 2035

Vessel Class by TEU Capacity	2020				2035			
	Without Project		With Project		Without Project		With Project	
	Vessels	TEUs	Vessels	TEUs	Vessels	TEUs	Vessels	TEUs
Up to 3,999	460	821,570	400	715,270	734	1,365,110	514	951,180
4,000-4,999	2,325	5,312,220	1,956	4,470,680	3,106	7,369,550	1,961	4,658,140
5,000-5,999	214	598,650	193	539,180	401	1,173,400	300	879,340
6,000-6,999	85	276,160	81	264,720	207	712.740	170	584,130
7,000-7,999	-	-	30	109,720	-	-	68	268,990
8,000-8,999	-	-	85	359,420	-	-	249	1,125,410
9,000-9,999	-	-	30	137,490	-	-	87	432,370
10,000-11,999	-	-	26	134,550	-	-	95	547,290
12,000 and up	-	-	43	277,570	-	-	174	1,200,950
Total	3,083	7,008,600	2,844	7,008,600	4,447	10,647,800	3,629	10,647,800

Note: TEUs Estimated for West of Bayonne Bridge Only.
Sources: USACE, New York District, *Bayonne Bridge Air Draft Analysis*, September 2009.

18-2-5 INDIRECT EFFECTS OF THE PROJECT: GLOBAL PERSPECTIVE

This section examines whether the project could indirectly lead to adverse impacts on broader maritime and land-based shipping patterns, and changes generated to the Port of New York and New Jersey's market share and hinterland relative to other ports. This effect is referred to as induced demand. Key questions include: Would the project lead to increased trade volumes at the Port of New York and New Jersey? Would the project alter established maritime shipping routes along the Eastern Seaboard or beyond? Would the project enable the Port to capture substantial volumes of trade currently passing through other ports?

There are many complexities and uncertainties with assessing potential induced demand at the Port of New York and New Jersey associated with raising the Bayonne Bridge roadway. The exact financial benefits and their probability to alter shipping patterns are highly speculative. Nevertheless, an analysis was conducted by CH2M Hill/Halcrow in which a probability distribution was used to evaluate potential induced demand at the Port resulting from various shipping incentives that could be indirectly related to the project. The analysis, described later in this section, presents the likelihood of induced demand based on the probability of certain scenarios to occur. However, there remain many uncertainties associated with this type of analysis, as discussed below.

18-2-5-1 UNCERTAINTIES WITH INDUCED DEMAND ANALYSIS

The competitive position of the Port is affected by a multitude of factors and ongoing trends.

As indicated above, there are a multitude of factors and trends that affect port operations and shipping patterns in the U.S. These trends will continue to influence the maritime shipping trade and the Port of New York and New Jersey with or without the project. For example, the trends in the industry will continue to pressure ports and railways to expand container services and utilize equipment and technologies that move and track containers most efficiently. At the same time, integrated freight logistics distribution centers are being developed at inland locations such as Kansas City, Memphis, Columbus, and Chicago to serve both east coast and west coast container ports. The presence of these distribution centers is affecting decisions about which ports of call and modes of inland transportation will yield the greatest cost efficiencies. Relative costs of fuel and different methods of transport are other highly unpredictable factors.

As containerization has led to port consolidation, certain ports have emerged as major gateway ports and others have lost dominance or taken on roles as intermediate ports. The Port of New York and New Jersey has established itself as a gateway port. Due in part to the density of its hinterland population and its well-developed inland transportation network, the Port's status as a major gateway is unlikely to be challenged without substantial shifts taking place across a multitude of market factors or trends. The elimination of the Bayonne Bridge air draft restriction would allow for increases in economic efficiency of the Port of New York and New Jersey. However, given the number and complexity of factors involved in maritime trade and freight distribution, the removal of the air draft restriction in itself would not be expected to produce a substantial difference in cargo movement.[1]

The project is unlikely to substantially alter the Port's hinterland.

As described above, a port's hinterland is the geographic area from which most of its customers are drawn. Recent studies of hinterland activity for the Port of New York and

[1] It should be noted that a 2010 Final Environmental Impact Report/Environmental Assessment for the Gerald Desmond Bridge replacement project in California, near the Port of Long Beach, drew a similar conclusion regarding the likelihood of that project to affect cargo movement in and around the Port of Long Beach. The study determined that raising the height of the bridge would not generate meaningfully more container throughput than would occur without the project that predicting the level of any such modest change in throughput is speculative.

New Jersey indicate that approximately 70 percent of the Port's customers are drawn from a 31-county area and over 80 percent are drawn from a larger 260-mile radius.

The major ports located closest to the Port of New York and New Jersey are Boston to the north and Philadelphia, Baltimore and Norfolk to the south. The ports of Boston, Philadelphia, and Baltimore are located within the Port of New York and New Jersey's 260-mile hinterland, but have trade volumes that are far lower than the Port of New York and New Jersey (141 containership calls in 2010 at the Port of Boston and 385 in Baltimore compared with 2,421 containership calls at the Port of New York and New Jersey). The Port of Norfolk (1,908 containership calls in 2010) is located just outside of the 260-mile hinterland.[1]

As part of the *Bayonne Bridge Air Draft Analysis*, USACE estimated the "shipper indifference line" between the Port of New York and New Jersey and the Port of Norfolk. A shipper indifference line is the line at which the shipper is indifferent to whether its goods are shipped through one port or another because shipping costs such as transport costs by ship, rail, and/or truck, and cargo transfer fees, are the same. USACE study placed the shipper indifference line between the Port of New York and New Jersey and the Port of Norfolk towards the southern perimeter of the Port of New York and New Jersey's 260-mile hinterland (see **Figure 18-3)** and concluded that if the Bayonne Bridge air draft restriction were not removed, even in the unlikely event that all other factors remained the same, diversion of cargo from New York and New Jersey to Norfolk would be minimal, since the added truck cost of moving cargo to locations currently served by the Port of New York and New Jersey through the Port of Norfolk would be high enough to overcome cost savings related to economies of scale from larger Post-Panamax vessels that might be able to call at Norfolk versus New York and New Jersey.[2] Therefore, it is conceivable that some limited portion of the approximately 20 percent of goods that are drawn from or destined for areas outside of the Port's 260-mile hinterland may be affected by the air draft restriction.

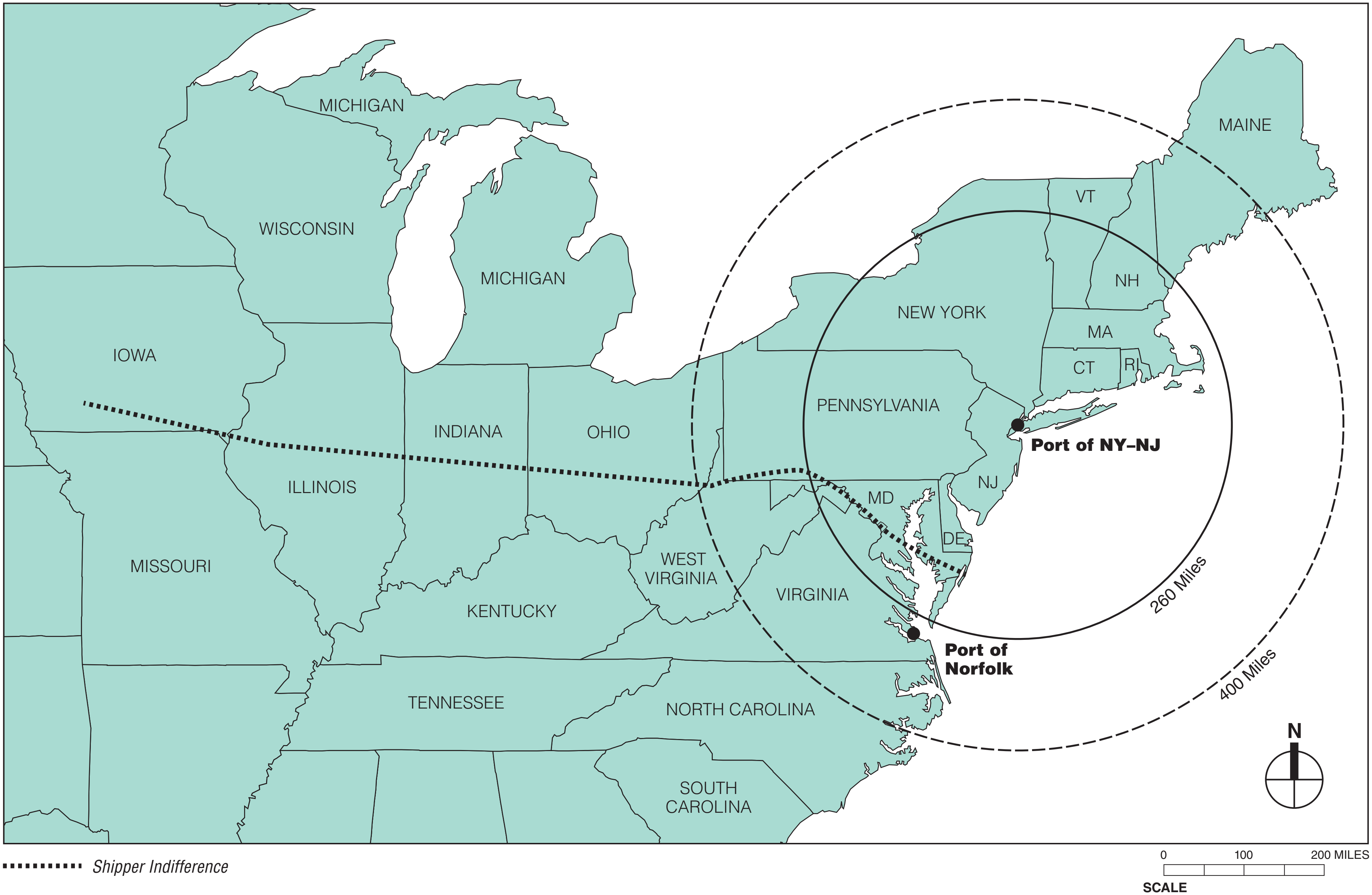
USACE projections indicate that Post-Panamax ships would increase cost efficiency for ships using the Port but not the overall volume of trade at the Port.

As noted above, growth of TEU movement through the Port is expected to increase over time, based on larger economic and global shipping trends. While the amount of cargo would not be expected to vary in the future with or without the project, the ability to accommodate Post-Panamax ships is seen as an important factor in cost efficiency for ships using the Port, as it leads to an overall decrease in the number of ships delivering or receiving the same amount of cargo. This has benefits in the per unit costs of shipping as well as sustainable benefits such as improvements to conservation of energy and reduced air quality emissions profile as discussed in earlier chapters of the EA.

Implementation of the project would essentially allow for a more efficient realization of the total demand for cargo movement as established by long-term forecasts of growth

[1] U.S. Department of Transportation, Maritime Administration, Table titled "Vessel Calls at U.S. Ports by Vessel Type," updated 6/13/11 (http://www.marad.dot.gov/library_landing_page/data_and_statistics/Data_and_Statistics.htm).

[2] USACE, New York District, *Bayonne Bridge Air Draft Analysis*, September 2009, Appendix E.



Shipper Indifference Line
Figure 18-3

in the region. As set forth in guidance materials such as NCHRP Project 25-10, Reports 403 and 466, indirect effects for transportation projects look for the potential of induced growth that can alter land development patterns, stimulate complementary development, or influence interregional locational decisions. Since growth in the Port is based on the continuation and enhancement of existing resources, and the project would not alter long-term projections of overall cargo demand, it would not be expected to result in substantial induced growth. However, to assess potential induced growth at the Port related to the project, an induced demand analysis was conducted, as discussed further below.

18-2-5-2 INDUCED DEMAND ANALYSIS

As noted above, there are a number of factors that affect the attractiveness of a port or the ability of a port to compete with other ports for cargo, including, for example, terminal capacity, handling efficiency, ease and speed of access, efficiency of inland transportation, number of service providers and competition between them, and size of market served by the port. For the Port of New York and New Jersey, the elimination of the navigational clearance restriction of the existing Bayonne Bridge would be relevant to one of these many factors, as it would primarily serve to enhance the accessibility of terminals west of the bridge, thereby potentially allowing ocean carriers, shippers, and the region to benefit from the reduction in shipping costs associated with the larger, more environmentally efficient vessels.

As stated in this EA, one aspect of the purpose and need for this project is to preserve economic efficiency through use of larger vessels. Chapter 1, "Purpose and Need," of the EA explains these efficiencies from the perspective of the ocean carriers (a reduction in transportation costs), regional consumers (some portion of the savings associated with the reduction in transportation costs), and the Port itself (attractiveness for goods destined for the margins of its secondary hinterlands).

The Bayonne Bridge Air Draft Analysis (BBADA) found that, as a result of the unique nature of the regional market, the project would have minimal impact on the actual amount of cargo that would come through the Port. Specifically, as detailed in Appendix E of the BBADA, approximately 80 percent of the goods coming through the Port are directly attributable to economic activities within the region, as defined by the Port's primary hinterland.

The analyses in Appendix E of the BBADA demonstrate that the added cost of moving those TEUs by land transportation modes, through other ports into the region, would be of an order-of-magnitude that would likely not allow any cost savings related to economies of scale from larger vessels to overcome the costs of land transportation modes. For example, the average cost for trucking in 2011 according to the American Trucking Research Institute was $1.71 per mile per container trucked. The BBADA calculated that using non-air draft constrained vessels would result in $26 per TEU savings in shipping costs, which can be converted to $44 per container by multiplying it by the Port average of 1.7 TEUs per container. The additional distance in truck transportation that would offset this shipping cost savings would be only 26 miles ($44 per container divided by $1.71 per mile per container) assuming that the per mile trucking cost does not increase in the future. Therefore, the cost of transporting goods by truck from other ports into the Port's market area would limit the impact of lower shipping costs such ports would enjoy over the Port in the No Build Alternative to a 26-

mile incursion into the Port's secondary hinterland. In addition, there would be a business incentive for ocean carriers to enjoy at least some of the benefits of economies of scale rather than passing them through to the shippers and ultimately to area consumers. Also, it is likely that trucking costs will continue to increase in the future. In other words, the actual benefits that could be realized at the regional level will likely be less than $44 per container and trucking costs are likely to be higher than $1.71 per mile per container, which in turn would mean that the additional distance over which truck transportation costs would offset shipping savings would be further reduced, thereby further negating the competitive reach of other ports into the Port's secondary hinterland.

As demonstrated in the Induced Demand Analysis described below, the benefits of the project with respect to the ability of the Port to compete for market share are thereby limited to goods destined for, or originating from, the outer margins of its hinterlands (i.e., its secondary hinterland), where the relative land transportation costs of shipping to or from the Port or other port facilities might not favor the Port to the same extent.

Although there are numerous uncertainties concerning future shipping patterns and competitiveness among ports, an induced demand study using a probability distribution was conducted to evaluate potential increases in cargo at the Port of New York and New Jersey that could result from raising the Bayonne Bridge roadway to accommodate larger vessels (see **Appendix I**). The analysis looked at how variations in three landed-cost variables could affect induced demand: 1) ocean freight rates; 2) port-related charges; and 3) intermodal rail rates. The price that shippers pay, the "landed-cost," is built up from an aggregation of the rates that these shippers are charged by ocean carriers, terminal operators, and truckers/railroads. By overlaying a normal random variable (or normal distribution) over these variables, an estimate of induced demand at the Port was determined. Simply put, the analysis evaluated the extent to which decreases in these cost components would result in increases in cargo volume.

Each of the cost variables was assessed individually, as well as cumulatively to determine a reasonable worst-case for the assessment. **Appendix I** shows the relationship between decreases in landed-cost components and increases in cargo volume. The estimated induced demand occurs where the normal distribution intersects the induced demand probability. The analysis provided a conservative estimate by assessing induced demand that would result if decreases in the cost components only accrued at the Port of New York and New Jersey, even though the cost-saving benefits associated with larger more efficient vessels would be experienced at competitor ports.

The elasticities applied in the Induced Demand Analysis, specifically those applicable to the secondary hinterland cargo volumes, can be found in Table 2 of Appendix I in the EA. These elasticities were applied to total landed costs calculations, which incorporated ocean freight rates, port-related charges, and intermodal rail rates. On the basis of general knowledge of market practices and available information, the "landed costs," (i.e., the aggregate of the above rates) included estimated average industry profit margins for different ocean carriers, terminal operators, and/or railroads (a sensitivity analysis was not conducted on trucking costs as they are not impacted by vessel size). To quantify impacts on the basis of relative competitiveness between ports, the relative differences in rates were used as an estimate to drive the model.

The "landed costs" were then decreased by 0–25 percent to account for potential economies of scale from the use of larger ships in the Build condition, and the associated impact on demand at the Port (and competitor ports) and the likelihood of each scenario was calculated. The results of those calculations are provided on Page 13 of Appendix I. A normalized distribution was then used to simulate expected values; however, these values were only presented for illustrative purposes. While an unlikely scenario, the induced demand impact associated with a 25 percent decrease in total landed cost at the Port of New York and New Jersey in an environment where competing ports did not alter their pricing patterns to retain market share was utilized—a very conservative approach to the estimate of induced demand associated with the project.

The induced demand model compared changes of ocean freight rates, port-related charges and intermodal rail rates (i.e., the landed costs potentially affected by the project) at the Port of New York and New Jersey with Los Angeles/Long Beach, Charleston, Savannah, and Norfolk. These ports account for approximately 71 percent of U.S. container volume, or 37 million TEUs. Other mid-Atlantic ports, such as Wilmington, Baltimore, and Philadelphia, are relatively minor ports that do not offer major competition to New York and New Jersey for a variety of reasons. All three are river ports far from the main trade lanes and require up to 8 hours of additional steaming each way for a container vessel, which is especially costly today and in the future due to the use of the required ultra-low sulfur fuel). Combined, their cargo represents only 1 percent of the PONYNJ's containerized cargo volume.[1]

Jacksonville, Miami, and Halifax are simply too far away to competitively serve the PONYNJ's market area. Miami almost exclusively handles Florida-originated or -destined cargo. Jacksonville primarily serves the Southeastern U.S. and competes with Miami, Savannah, and Charleston for that market area. Halifax has significant costs associated with land transportation challenges. None of these ports competes with either the Ports of New York and New Jersey or Long Beach/LA.[2]

Ocean Freight Rate Decreases

Decreases in ocean freight rates could occur as a result of larger, more economical (i.e., less cost per TEU), vessels being deployed in the shipping industry. While this would likely be a universal benefit at competitor ports, the analysis conservatively assumed that these benefits would only accrue at the Port of New York and New Jersey. This would result in an induced volume in 2035 of approximately 34,200 TEUs. Because 80 percent of cargo at the Port is handled at terminals west of the Bayonne Bridge, the induced demand at these terminals would be approximately 27,400 TEUs. Typically, 80 percent of cargo is transported by rail and 20 percent by truck. Therefore, the induced demand under this scenario could result in approximately 5,160 truck trips[3]

[1] Cambridge Systematics, Inc. conducted a "Peer Review of the Induced Demand Analysis for Bayonne Navigational Clearance Program", which reflects this information. See Appendix I to the EA.

[2] See the Cambridge Systematics, Inc. Peer Review.

[3] Truck trips are calculated by converting TEUs to containers (using the prevalent TEU-to-container ratio of 1.7) and then multiplying by 1.6 (accounting for the fact that some drivers will arrive and depart with a container as opposed to arriving or departing empty).

per year, or 20 truck trips per day. These truck trips would be dispersed throughout the day and among three terminals west of the Bayonne Bridge.

Port-Related Charge Decreases

Decreases in port-related charges may occur as a result of increased efficiencies in cargo-handling due to deployment of larger vessels. Again, this scenario would likely be experienced at competitor ports, but the analysis conservatively assumed these benefits would only accrue at the Port of New York and New Jersey. Based on this conservative approach, it was estimated that reductions in port-related charges could result in an induced cargo volume in 2035 of 37,600 TEUs, or 30,100 TEUs (80 percent) at terminals west of the Bayonne Bridge. This would equate to approximately 5,670 truck trips per year, or 22 additional truck trips per day, dispersed throughout the day and among the three terminals west of the Bayonne Bridge.

Intermodal Rail Rate Decreases

The induced demand analysis also evaluated potential effects from decreases in intermodal rail rates that could emerge in response to efficiencies in the shipping industry from deployment of larger vessels. As with the two scenarios discussed above, decreases in intermodal rail rates would likely be experienced at competitor ports, but the analysis conservatively assumes that only the Port of New York and New Jersey would benefit from these rate reductions. In 2035, induced demand at the Port related to decrease in intermodal rail rates would be approximately 20,600 TEUs, or 16,500 TEUs (80 percent) west of the Bayonne Bridge. While it is likely that a higher percentage of cargo would be transported by rail under this scenario, the analysis conservatively assumed that only 80 percent of cargo would be handled by rail, consistent with the scenarios above. As such, induced demand under this scenario could result in about 12 truck trips per day, dispersed throughout the day and among three terminals west of the Bayonne Bridge.

Cumulative Induced Demand

Combining each of the conditions above, total potential induced demand at the Port from the project would be approximately 92,400 TEUS, or 74,000 TEUs (80 percent) at terminals west of the Bayonne Bridge. This would be a minimal increase in cargo at the Port (less than one percent) from the 10.65 million TEUs estimated by the USACE's Bayonne Bridge Air Draft Analysis without the project, thereby having negligible impacts on global shipping patterns. In terms of environmental effects, this induced growth at the Port would reflect local growth as a change in destination, rather than a global growth in TEU-miles. This might result in a negligible change in fuel consumption, but would not change the conclusions regarding fuel savings and GHG emissions reductions associated with the project.

18-2-6 INDIRECT EFFECTS OF PROJECT: LOCAL AREA PERSPECTIVE

18-2-6-1 OPERATIONAL PERIOD

As discussed above, the project is not expected to have any substantial effect on broad maritime or land-based shipping patterns, and is not expected to markedly alter the market share or hinterland of the Port of New York and New Jersey relative to other ports. Therefore, the project is not expected to result in significant adverse indirect impacts related to overall regional shipping and market conditions.

A review of the technical areas analyzed in earlier portions of this document indicates that the project also would not lead to significant adverse indirect impacts on a more local or site-specific level. Overall, since the project is not expected to alter regional mobility or capacity, and is in an area with well-established land use patterns, it is not expected to induce new or indirect effects. The project would occupy the right-of-way of the existing Bayonne Bridge, with limited additional area to account for increased width. The landing points for the bridge would be similar to those currently in place, and the bridge would not include any new access points. The project would not result in any substantial changes in traffic capacity and therefore is not anticipated to result in any long-term effects on the local or regional traffic network. As such, this project would not result in the induced or indirect effects typical of transportation projects listed above.

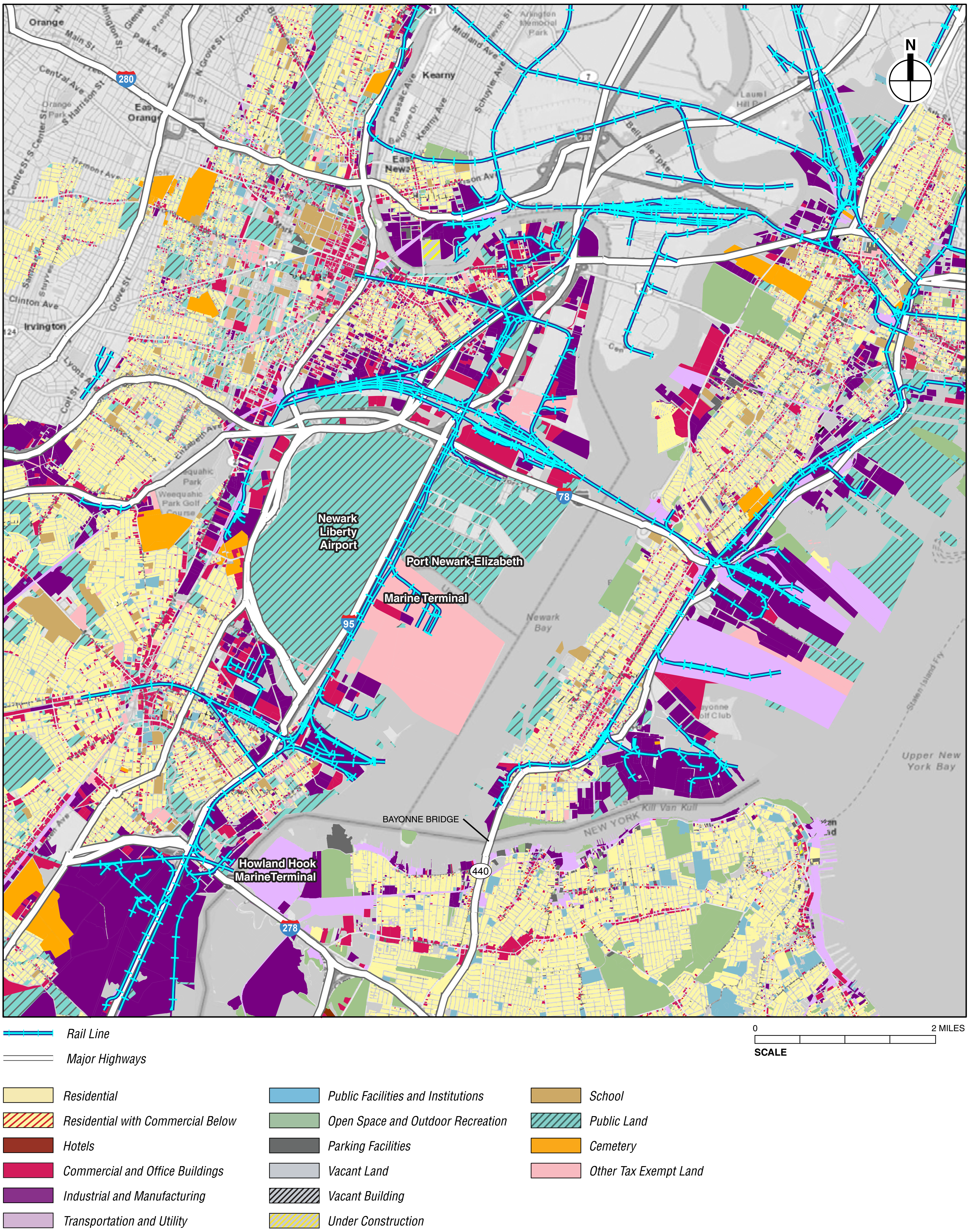
While cost-saving shipping benefits could indirectly occur from the project and induce some cargo demand at the Port (based on the conservative analysis discussed above), indirect localized impacts would not be expected. As presented above, if decreases in ocean freight rates, port-related charges, and intermodal rail rates associated with larger vessels and the project only accrued at the Port of New York and New Jersey and not its competitors, induced demand in 2035 could be 74,000 TEUs at terminals west of the Bayonne Bridge. This would result in approximately 54 additional truck trips per day, or 5.4 truck trips per hour (assuming a 10-hour working day).[1] This induced volume could also result in 136 additional daily rail containers, equating to an average rate of approximately 0.5 new trains per day. These truck trips and rail increases would be dispersed among the Port terminals west of the Bayonne Bridge (i.e., Howland Hook Marine Terminal and Port Newark-Elizabeth Marine Terminal), having negligible effects on traffic, air quality, and noise. Regarding region-wide air emissions, the induced growth would represent a small increase in truck trips within the nonattainment area; however, the reduction in marine engine emissions (described in Chapter 11, "Air Quality") would far exceed any increase associated with the induced growth.

The Port terminals west of the Bayonne Bridge are within areas classified as environmental justice communities. However, much of Port Newark-Elizabeth is adjacent to Newark Liberty International Airport or other industrial and commercial land uses (see **Figure 18-4**), which are not sensitive to Port activities. In addition, Port Newark-Elizabeth has immediate access to major highways, such as Interstate 95/New Jersey Turnpike and Interstate 78, as well as direct access to rail lines. Howland Hook Marine Terminal is also largely surrounded by industrial or vacant land uses with proximate access to Interstate 278 and Route 440 (see **Figure 18-4**). Therefore, potential induced truck traffic of approximately 5 truck trips per hour (or an average of 1 to 2 trucks per hour from each terminal) and potential induced rail traffic of 0.5 new trains per day (resulting in either a longer train on given days or an average of one additional train every other day) would avoid residential areas and other sensitive land uses, thereby avoiding adverse impacts on these areas. This small number of additional

[1] These calculations assume a 52-week year, but if a 50-week year is assumed (to account for holiday closures at the Port), daily truck trips from induced cargo growth could be calculated as 56 truck trips per day, having effectively the same results.

11.28.12

SOURCE: NYC Dept of City Planning/State of New Jersey Division of Taxation • • Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2012



Transportation Network and Land Uses
Around West of Bayonne Bridge Port Terminals
Figure 18-4

truck and rail trips would not affect the local or regional traffic network, noise levels, or air quality. As discussed in Chapter 11, "Air Quality," the project would not result in exceedances of the National Ambient Air Quality Standards (NAAQS), and that conclusion would be unaffected by these induced truck and rail trips.

Although overall growth projections for the Port, and the increased containerization of cargo globally, is expected to occur independent of the project and therefore is not attributable to it, PANYNJ has committed to implementing recommendations of USEPA set forth in the agency's March 5, 2013 letter to the U.S. Coast Guard. To ensure these commitments are implemented, they have been stipulated in a Memorandum of Agreement (MOA) between PANYNJ and NJDEP, where NJDEP will provide guidance, oversight (if necessary), and enforcement of these measures (see **Appendix I**). PANYNJ would build upon its previously developed Clean Air Strategy[1] (which was developed prior to the project to reduce emissions from Port activities) with additional measures to address emissions from anticipated (and potentially unanticipated) growth at the Port. Because of the uncertainties associated with assessing potential induced growth from the project, commitments include expanding the Port's emissions inventory and monitoring the Port's compound annual growth rate (CAGR) to be conducted on an annual basis to determine whether growth at the Port exceeds its projection of 4 percent in the EA. If it is found that the Port's CAGR is higher than expected (i.e., greater than 4 percent) and emissions are found to increase significantly, then certain measures would be implemented in consultation with the Clean Air Strategy Group and NJDEP. In addition, an Environmental Justice Executive Review Board (EJERB) would be established to communicate concerns from environmental justice communities to the PANYNJ Board of Commissioners. Further, PANYNJ would conduct a traffic study in the Ironbound neighborhood of the City of Newark to improve traffic flow and enforcement of truck roadway restrictions. See the full MOA in **Appendix I** for further details.

When considering the potential for induced demand, it is also important to consider Port operations and terminal capacity. As noted above, the increase in efficiency and the potential cost savings to shippers from larger ships primarily results from the lower per unit cost on the waterborne portion of a container shipment. There is little difference in stevedore operations once a ship is in port since the ship-to-land transfer is basically using the same technology (crane) and the same rate (container moves per hour) regardless of ship size.[2]

Moreover, as detailed in Chapter 10, "Transportation," container movements in and out of the terminal tend to be in a relatively constant state of activity since outbound containers arrive at the terminal well ahead of a ship's arrival and off-loaded containers

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[1] The Clean Air Strategy was developed by the Port's Clean Air Strategy Group, which comprises EPA Region II, NYSDEC, NJDEP, local municipalities, NY Shipping Association, and NYC EDC). This group would continue to participate in future developments of the Port's Clean Air Strategy in conjunction with the executed MOA provided in **Appendix I**.

[2] At any given point in time, it is common for two or three vessels to be in port simultaneously. To the extent that one large vessel can be unloaded more efficiently and with fewer cranes than a simultaneous servicing of two or more smaller vessels, there is some potential that larger capacity vessels can increase the efficiency of stevedoring operation by reducing peak employee and equipment demand (although total container movements would be essentially unchanged).

typically are transferred to rail or truck for up to 5 days after the ship leaves port (referred to as container dwell time). Based on recent and projected ship berthing levels between July 29, 2012 and August 19, 2012, and of the 24 entries with date of arrival data and date of first receipt of cargo data, there is an average length of about 8 days of outbound cargo being assembled at the terminal.[1] As summarized in **Table 18-5**, the combination of arriving containers and dwell time for inbound containers results in average elapsed time of 14 days of container marshaling around a typical 24-hour port-of-call. Over this time period, whether a set number of containers are arriving by one larger Post-Panamax vessel or on multiple calls by smaller vessels, the actual throughput of containers is going to be the same. For example, the port and or terminal could receive two 5,000-TEU ships on same day covering same geographic trade routes or, alternatively, it could receive one 10,000-TEU ship delivering and picking up the same number of containers and generating the same number of intermodal truck or rail transfers, particularly over the extended period described above.

It is also important to consider that a port-of-call is not the same as the loading and unloading of all a vessel's containers. As noted above in the description of global trade routes, ships are making multiple stops along a route, dropping off some of their containers and picking up others. Based on the very strong demand in and out of the Port of New York and New Jersey, the Port Authority estimates that during a typical call about 40 percent[2] of the containers may be off-loaded in New York (estimated as an average of about 1,000 containers off an average sized vessel of 4,000 TEUs which has a total capacity of about 2,300 containers at 1.7 containers per TEU[3]). On the outbound side, about 500 to 1,000 TEUs (a mix of outbound cargo and empty containers) are typically loaded onto a vessel. While the mix of fleet size may alter the per-vessel, per-berth number of movements, the overall throughput is not expected to change. Thus, it is not akin to saying that a 10,000-TEU vessel will be unloading all of its roughly 6,000 individual containers in one call compared with 3,000 containers for a 5,000-TEU ship, thereby doubling the processing rate at the terminal.

As a result of these local terminal operating characteristics in combination with global shipping patterns there is not a wide range or cycle of large peaks and valleys of container movements to and from the terminal that could be exaggerated by a larger capacity vessel, so the introduction of Post-Panamax vessels would not substantially change terminal operations or result in substantial localized increases or decreases in truck trips or rail transfers to and from the Port's container terminals, as discussed above.

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[1] http://www.pnct.net/VesselSchedule.aspx

[2] The 40 percent unloading rate is based on Port Authority discussions with terminal operators. Although not all vessels load/unload/unload precisely 40 percent of their cargo at the Port, terminal operators have provided this figure as an average suitable for statistical purposes. PANYNJ looked at all container vessels calling at the Port in a sample month. By summing total containers loaded/off-loaded and dividing by vessel used capacity, the average amount of containers loaded/off-loaded at the Port is 40 percent. Note that as per page 28 of the USACE Bayonne Bridge Air Draft Analysis (BBADA), the average vessel calling at PONYNJ is loaded to 86 percent capacity, and this was factored into the calculation.

[3] The 1.7 ratio is a long-term average that is derived from PANYNJ statistics, which can be found at http://www.panynj.gov/port/pdf/port-trade-statistics-summary-2001-2011.pdf.

Table 18-5
Port Newark Container Terminal Schedule Analysis

Actual/ *Scheduled* Events	Start Receiving Date	Actual/ *Estimated* Arrival	Receiving Days	Actual/ *Estimated* Departure	Vessel Berth Days	Cargo Dwell Days	Total Elapsed Days
1	7/23/2012	7/28/2012	6	7/29/2012	1	5	12
2	7/23/2012	7/30/2012	8	7/31/2012	1	5	14
3	7/23/2012	7/30/2012	8	8/1/2012	2	5	15
4	7/27/2012	8/1/2012	6	8/2/2012	1	5	12
5	7/25/2012	*8/2/2012*	9	*8/3/2012*	1	5	15
6	7/24/2012	*8/3/2012*	11	*8/4/2012*	1	5	17
7	7/23/2012	*8/3/2012*	12	*8/4/2012*	1	5	18
8	7/30/2012	*8/4/2012*	6	*8/5/2012*	1	5	12
9	7/30/2012	*8/5/2012*	7	*8/6/2012*	1	5	13
10	7/30/2012	*8/6/2012*	8	*8/7/2012*	1	5	14
11	8/1/2012	*8/8/2012*	8	*8/9/2012*	1	5	14
12	8/1/2012	*8/9/2012*	9	*8/10/2012*	1	5	15
13	8/2/2012	*8/9/2012*	8	*8/10/2012*	1	5	14
14	8/2/2012	*8/9/2012*	8	*8/10/2012*	1	5	14
15	7/25/2012	*8/9/2012*	16	*8/10/2012*	1	5	22
16	8/2/2012	*8/11/2012*	10	*8/12/2012*	1	5	16
17	8/6/2012	*8/11/2012*	6	*8/12/2012*	1	5	12
18	8/6/2012	*8/12/2012*	7	*8/13/2012*	1	5	13
19	8/6/2012	*8/13/2012*	8	*8/14/2012*	1	5	14
20	8/7/2012	*8/14/2012*	8	*8/15/2012*	1	5	14
21	8/8/2012	*8/15/2012*	8	*8/16/2012*	1	5	14
22	8/8/2012	*8/15/2012*	8	*8/16/2012*	1	5	14
23	8/9/2012	*8/16/2012*	8	*8/17/2012*	1	5	14
24	8/13/2012	*8/18/2012*	6	*8/19/2012*	1	5	12
AVERAGE DAYS			8.29		1.04	5.00	14.33

Sources: http://www.pnct.net/VesselSchedule.aspx

The project could have certain localized indirect effects related to property acquisition and encroachment, but these are not expected to result in significant adverse impacts. For example, as described in Chapter 5, “Economic Conditions,” a lot owned by the Ideal Windows encroaches onto PANYNJ property within the construction work zone. This property includes a building that may need to be relocated prior to start of construction on the project. Any localized environmental effects of this relocation (i.e., effects on traffic, noise, open spaces, etc.) would be evaluated once the need for relocation has been confirmed and the relocation site has been identified, but are not foreseeable at this time. Similarly, while the project would result in the closure of Al Slootsky Playground during construction, PANYNJ is working with the City of Bayonne to relocate these facilities for the duration of the temporary closure, and potentially on a permanent basis. In addition, two ball fields within PANYNJ property are in the construction work zone and would be closed. PANYNJ is coordinating with the City of

Bayonne regarding this closure. Any localized environmental effects of relocations would be evaluated once relocation sites have been identified, but are not foreseeable at this time.

18-2-6-2 CONSTRUCTION PERIOD

Apart from the relocation of a limited number of facilities, as described above under Operational Period, construction of the project is not likely to result in any significant indirect effects. Section 18-3 analyzes the potential for significant adverse impacts due to an overlap in the construction of the project with other projects planned in the study area or broader region. As discussed in the construction impacts section, the majority of adverse effects during construction are related to traffic, air quality, and noise impacts in a localized area surrounding the construction site.

18-3 CUMULATIVE EFFECTS

The following analysis assesses the potential cumulative effects that may result from the construction and operation of the project. The direct effects of an individual action may be negligible, but may contribute to a measurable environmental impact when considered cumulatively with indirect effects and with other past and/or reasonably foreseeable future projects.

18-3-1 OPERATIONAL PERIOD

NCHRP Project 25-10, Report 466, Course Module 1 provides an overview of the relationship of indirect and cumulative impacts, identifies the types of large-scale linkages that can lead to noticeable cumulative impacts, and provides examples of major transportation improvements combined with: other transportation projects (i.e., a new highway in combination with a new/expanded airport resulting in new locations for commercial and industrial development); new major development projects (i.e., a new interchange and a new shopping mall that could change local and regional traffic patterns); and regional shifts in development patterns (i.e., a new highway in combination with new suburban development creating increased traffic volumes and congestion). Since the project has been determined to have no direct or indirect effect on regional traffic capacity or vehicle miles traveled (VMT), and no substantial effect on volume of port activity or overall maritime trade patterns, it would have no cumulative effect in combination with other projects.

18-3-2 CONSTRUCTION PERIOD

Chapter 16, “Construction Effects,” identifies several potential adverse impacts that would result from direct construction activities associated with the project. As identified in that Chapter 16, “Construction Effects,” impacts would be localized and temporary in nature.

Currently planned projects were reviewed to determine whether construction of these projects would, combined with the reconfiguration of the Bayonne Bridge, have a cumulative adverse construction impact. Two types of projects were considered: those located in close proximity to the project, and those that could affect regional traffic patterns or freight transport patterns during their construction period.

The analysis finds that there are no planned projects that would combine with the project to result in cumulative construction impacts. Examples of the projects reviewed as part of this cumulative impact analysis are listed below.

- **Projects located in ¼-mile study area:** Planned projects located within ¼-mile of the construction work zone are all residential. In Staten Island, these projects are three two-family homes and one accessory garage. These projects are small-scale and site-specific and therefore would have no potential to result in cumulative construction impacts. In Bayonne, there are three residential projects ranging from 48-units to 96-units. Construction activities for these projects would be largely confined to the project sites and would not result in cumulative construction impacts.
- **New Jersey Turnpike Interchange 14A and Newark Bay-Hudson County Bridge:** Interchange 14A of Route 440 in Bayonne will be reconstructed and enlarged. The interchange connects to the Newark Bay-Hudson County Bridge, whose deck will be replaced in two phases. Phase One started in 2010 and will be complete by 2013, before construction on the project would start. Phase Two will start in 2013 and be completed by 2015. If implemented, Phase Three would include replacement of the ramps to the bridge between 2016 and 2017. Construction will be performed in stages and during off-peak hours to maintain existing traffic lanes through the construction work zone, and the Bayonne Bridge and Newark Bay-Hudson County Bridge are located more than five miles apart. Therefore, this project does not have the potential to result in a cumulative construction impact.
- **West Shore Expressway Improvement Study**: A series of improvements have been proposed at several locations along the West Shore Expressway in Staten Island, and are currently in various phases of design. Though the improvements are extensive, they would not require road closure and would not involve a fundamental change to the configuration of the road, and the northernmost portion of the roadway is located more than three miles from the Bayonne Bridge. Therefore, this project does not have the potential to result in a cumulative construction impact.
- **North Shore Alternatives Analysis:** The North Shore Alternatives Analysis, a study being undertaken by the Metropolitan Transit Authority (MTA)–New York City Transit (NYCT), is examining potential public transit alternatives for Staten Island's North Shore. Three Short List Alternatives currently were considered and in May 2012, MTA announced its recommendation to advance Bus Rapid Transit as the Locally Preferred Alternative. This project has not yet entered into environmental review or preliminary design. Therefore, it is unlikely that any construction for the project would overlap with construction on the project.
- **Howland Hook Marine Terminal:** The Howland Hook Marine Terminal is planning for both on-site and associated transportation expansions and improvements (although the application to USACE for the expansion was recently withdrawn). In addition, PANYNJ's 10-Year Capital Plan covers the design and construction of an eastbound ramp from the Goethals Bridge into the New York Container Terminal at the Howland Hook Marine Terminal. The planned improvements associated with Howland Hook, if reinstated, approved, and implemented, would be confined to the terminal and immediate vicinity, the closest portion of which is located

approximately two miles west of the Bayonne Bridge. Therefore, construction activities associated with the Howland Hook Marine Terminal do not have the potential to result in a cumulative construction impact.

- **Goethals Bridge:** PANYNJ is replacing the Goethals Bridge, which links Staten Island to Elizabeth, New Jersey. A Final EIS and Record of Decision were completed and plans for the project were approved in January 2011. The project is expected to start mid-2013 and PANYNJ has indicated that the project will be completed by 2017. The EIS completed for the project identified no significant adverse impacts from project construction. According to PANYNJ, construction will involve minimal delays and closures, most of which will occur during the transition from the existing bridge to the new bridge. As described in Chapter 16, “Construction Effects,” delays and closures during the Bayonne Bridge construction period would also be limited. In general, construction activities on the Bayonne Bridge are expected to result in a modest traffic increase at the major regional river crossings, with a delay increase of 2.06 minutes anticipated for the eastbound roadway of the Goethals Bridge. Therefore, although the construction periods for the Goethals Bridge replacement and the project would overlap, the projects would not be expected to result in a cumulative significant adverse impact. As noted in Chapter 11: “Air Quality,” both projects have been accounted for in under General Conformity so there would be no additional cumulative air quality impacts.
- **Outerbridge Crossing:** In 2013, PANYNJ will be conducting full pavement replacement of eastbound and westbound spans and approach asphalt roadway surfaces of the Outerbridge Crossing, as well as the replacement of the concrete pavement in the toll plaza area. Additional work will include structural rehabilitation of the roadway deck, curbs, safety walk, and parapets. This work will require overnight closures in both directions of the Outerbridge Crossing from mid-summer to November 2013. This accelerated schedule would allow work that requires overnight closures to be complete prior to Bayonne Bridge closures to avoid potential cumulative effects on traffic.
- **New Jersey-New York Expansion Project (Natural Gas Transmission Pipeline):** Environmental review is currently underway for a project that would modify and expand existing natural gas transmission pipeline systems in New Jersey, New York, and Connecticut. A portion of the pipeline project is located in the vicinity of the project, running from the northwestern portion of Staten Island northeast across the southern portion of Newark Bay to Bergen Point, New Jersey. According to the DEIS completed for the project, construction of the pipeline project would occur from the end of the second Quarter of 2012 through November 2013, with some restoration activities possibly continuing into 2014. Because there would be no substantial overlap between the two construction periods, there would be no potential for a cumulative construction impact.
- **GATX Site Remediation:** The “GATX site,” located in northwestern Staten Island along the Arthur Kill waterfront, is a 440-acre site historically occupied by industrial uses. The New York State Department of Environmental Conservation (NYSDEC) and GATX Terminals Corporation have entered into an agreement whereby dredge material from local waterways will be transported to the GATX site and used for fill material for site remediation. The site will begin accepting fill material sometime during 2013 and the remediation work plan calls for capping the site over 36 to 48

months. All dredge material would be transported to the site via barge and the project would not result in any additional truck traffic on local roadways. Therefore, activities associated with site remediation at the GATX site do not have the potential to result in a cumulative construction impact.

- **Global Marine Terminal:** Global Marine Terminal has several expansion measures underway, including the addition of 900 feet of dock, and an increase of the terminal's acreage from 98 to 170 acres. In addition, PANYNJ is developing the adjacent Greenville rail yard (north of the terminal) into an intermodal rail transfer facility. There would be some overlap in the construction periods for the Global Marine Terminal and Greenville rail yard expansion (scheduled to be complete in 2014) and the proposed project (scheduled to begin in June 2013). However, the Global Marine Terminal is located more than 3.5 miles from the New Jersey side of the Bayonne Bridge, and construction activities for Global Marine would take place on the pier and rail yard properties, having limited effects on local roadways. Therefore, there would be no potential for a cumulative construction impact.

19-1 INTRODUCTION

In accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality's (CEQ's) implementing procedures (40 CFR Part 1502), this chapter examines the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources that would occur with construction of the Raise the Roadway Alternative.

19-2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the project would involve the irreversible and irretrievable commitment of construction materials such as concrete, steel, and other construction materials. Energy in the form of fossil fuels and electricity would be consumed during the construction and operation of the project. None of these materials are in short supply and their use for the project would not have a significant impact on their continued availability for other purposes. In addition to materials, funding and human labor would be required to design, build, and operate the project.

19-3 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term effects on the environment typically result from construction impacts. Long-term effects relate to the maintenance and enhancement of long-term productivity, including consistency of a project with local and regional economic, social, planning, and sustainability objectives.

19-3-1 SHORT-TERM USES

Construction of the project would have greater short-term impacts on the environment than the No Build Alternative, which would not involve any substantial construction beyond routine maintenance and repair. However, the temporary environmental impacts that would result from construction activities would not be significant, as described in Chapter 16, "Construction Effects." The Port Authority of New York and New Jersey (PANYNJ) would endeavor to reduce construction-related environmental effects through the implementation of best management practices.

19-3-2 LONG-TERM PRODUCTIVITY

In addition to increased vertical clearance, improved substandard features, and seismic stability, the project would also preserve the long-term efficiency and sustainability of

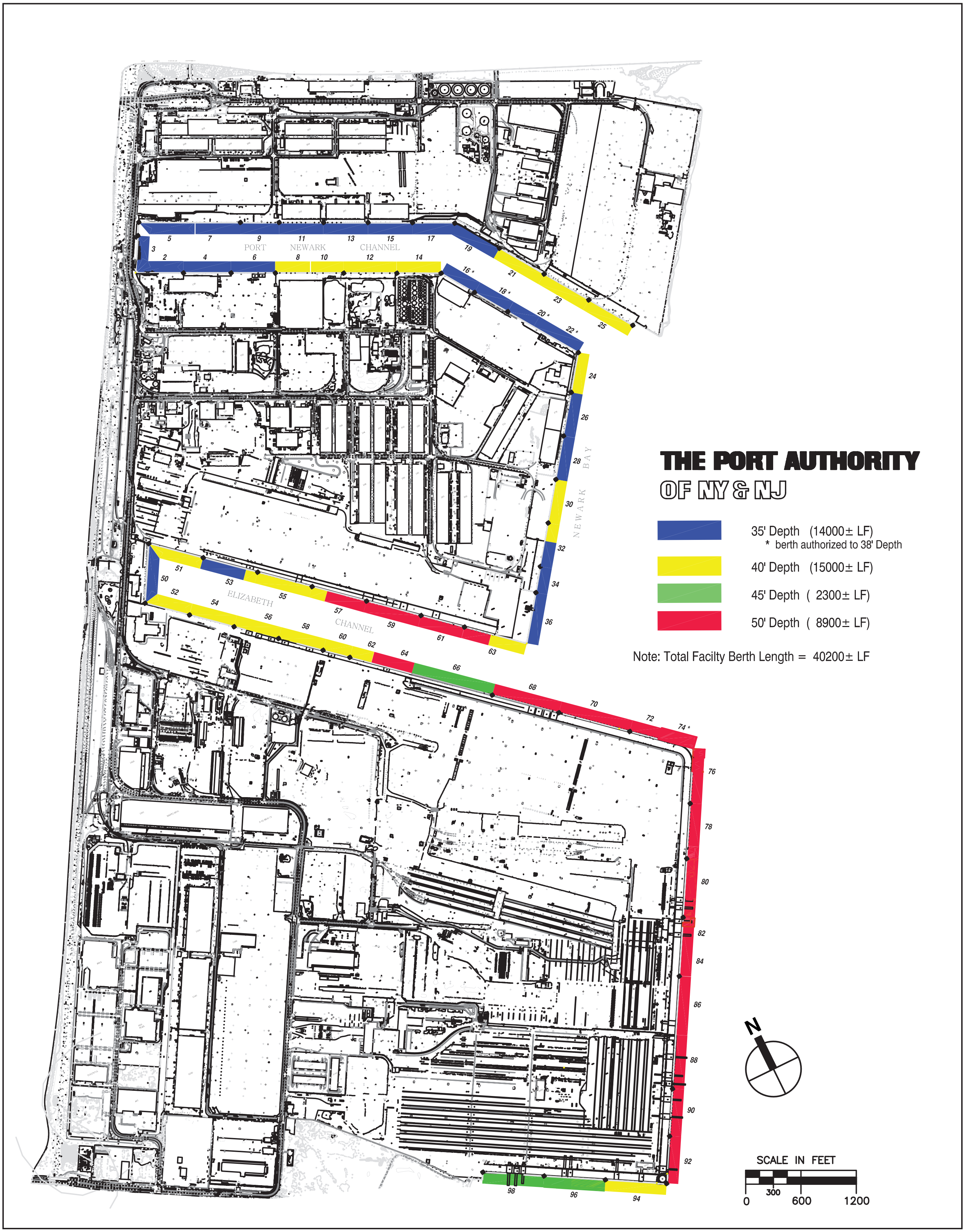
PANYNJ. While existing berths at PANYNJ have adequate capacity to accommodate Post-Panamax vessels (as shown on **Figure 19-1**), the ability to accommodate Post-Panamax vessels through the navigational channel is an essential component to preserve the long-term productivity of the surrounding area. The proposed project would enhance the marine operations in the Port and help promote the region's economic sustainability, as well as the enhancement of the movement of goods throughout the region. Benefits also include transportation cost savings that can be attributed to economies of scale as a result of allowing larger vessels to utilize Port facilities west of the Bayonne Bridge. Larger vessels require less fuel and crew per unit of cargo, and therefore, transport goods at a lower cost per container.

The project includes improvements to bring the bridge into conformance with modern highway and structural design standards and enhance the safety of the roadway. Thus, the project would improve the efficiency of bridge operations, including reductions in vehicle delays and air quality emissions. As discussed in Chapter 11, "Air Quality," and Chapter 12, "Climate Change and Greenhouse Gas Emissions," air quality and energy benefits would also be attained through an overall reduction in the number of marine vessels. The larger ships would also be current and would have better emissions controls than the smaller ships they replace, resulting in additional benefits.

Overall, the resources used to construct and operate the project would be beneficial to the region and the nation. The project would enhance marine and roadway traffic at the Bayonne Bridge while minimizing effects on the surrounding area.

19-3-3 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

Based on the information presented above, the localized short-term impacts that would result from project construction would not be significant, and would facilitate the maintenance and enhancement of long-term productivity in the region through the provision of enhanced marine operations.



Existing Berths - Locations and Depths
(as of April 2009)
Figure 19-1

20-1 INTRODUCTION

This chapter summarizes and responds to comments on the Draft Environmental Assessment (EA) for the Bayonne Bridge Navigational Clearance Program. The U.S. Coast Guard (USCG) as the lead agency, in consultation with the Port Authority of New York and New Jersey (PANYNJ), prepared this environmental documentation. A notice of its availability was published in the Federal Register on January 4, 2013, which established the public comment period on the document.

In response to public comments, the public comment period was extended to March 5, 2013. Three public meetings were held during the public comment period: February 5, 2013 at the Bayonne High School in Bayonne, New Jersey; February 7, 2013 at Snug Harbor in Staten Island, New York; and February 13, 2013 at the Leroy Smith Public Safety Building in Newark, New Jersey. A court reporter was on hand to accept oral comments on the Draft EA at the meetings. Written comments were accepted throughout the public comment period. Written comments received after March 5, 2013 were also accepted. All substantive comments on the Draft EA have been responded to in this Final EA.

Section 20-2 contains a summary of these relevant comments and a response to each. These summaries convey the substance of the comments made, but do not necessarily quote the comments verbatim. Comments are organized by subject matter and generally parallel the chapter structure of the EA. Where more than one commenter expressed similar views, those comments have been grouped and addressed together.

Some commenters did not make specific comments related to the proposed approach or methodology for the impact assessments. Others suggested editorial changes. Where relevant and appropriate, these edits, as well as other substantive changes to the Draft EA, have been incorporated into this Final EA.

Section 20-3 lists the agencies, elected officials, organizations, and individuals that provided relevant comments on the Draft EA. Volume III of this Final EA contains the written comments received on the Draft EA, including transcripts of the public meetings.

20-2 RESPONSES TO COMMENTS

20-2-1 GENERAL COMMENTS ABOUT THE PROJECT

Comment 0-1: Commenters want to know how the Bayonne Bridge is going to impact those people who live near the Bayonne Bridge. Community impacts are dismissed, and mitigation is often non-specific.

Response 0-1: As with any construction project, potential short-term effects related to traffic, air quality, and noise will result from the project, particularly for residents in close proximity to the work zone. A detailed analysis, including a construction schedule, is provided in Chapter 16, "Construction Effects," of the EA to determine the extent of potential impacts and to identify measures that will be taken to minimize potential impacts. As discussed in Chapter 16, construction activities would be subject to strict requirements with respect to traffic management, noise levels, and equipment emission levels, which would be stipulated in the construction contract documents. In addition, as will also be stipulated in contract documents, PANYNJ would closely monitor construction activities and enforce the requirements stipulated in the construction specifications. For further discussion, see responses to Comments 0-5 and 16-55. PANYNJ would also establish a community liaison to allow the public to communicate any concerns during construction. With these measures in place, short-term impacts during construction would be minimized.

As described in the EA, the project would provide a number of benefits, including: benefits to regional air quality as a result of accommodating larger, more efficient vessels; improvements to water quality by providing treatment measures for stormwater runoff on the new roadway, which is not currently provided; a wider, safer, and improved shared-use bike and pedestrian pathway on the bridge; wider travel lanes, shoulders, and a median barrier; enhancements to the structure's seismic stability; and enhancements to the bridge's capability to accommodate future transit services.

Comment 0-2: The Bayonne Bridge project must work with the North Shore Waterfront Greenway, including restoration of this extraordinary American waterway with benches, lighting, and signage along Richmond Terrace and across the Bayonne Bridge. The Greenway connects with the international icon of the Staten Island Ferry with two million tourists a year.

Response 0-2: Although outside the scope of the project, the project would not preclude future connections to the North Shore Waterfront Greenway.

Comment 0-3: Staten Island recently fought the Port Authority tolls that just keep going up and up for projects like this. It's not for the benefit of the people driving over the bridge. It's for the benefit of the people going under the bridge, our container and our shipping companies. Some commenters suggested that the Port Authority ask the shipping companies to pay for this project. However, representatives of the maritime transportation industry noted that the Port is already expensive to process a container and request that PANYNJ fund the project in its entirety.

Response 0-3: The USCG has no discretion, control, or jurisdiction over these matters.

Comment 0-4: The many conclusions of “no impact” are misinformed, not justified, and indeed seem to often represent wishful thinking.

Response 0-4: The environmental review process and conclusions in the EA were prepared in accordance with the National Environmental Policy Act (NEPA). The EA is a robust document that provides detailed and quantified analyses of potential long-term and short-term effects of the project. Conclusions are based on these analyses, and applicable criteria, as described in each technical chapter.

Comment 0-5: Specific mitigation measures are not clearly defined.

Response 0-5: A detailed analysis of short-term construction effects was provided in Chapter 16, “Construction Effects.” As detailed in the EA, the project would not result in any significant long-term adverse effects.

Comment 0-6: Many reports and studies are mentioned in the report. The report should identify where the reader can find these studies/reference documents.

Response 0-6: All references in the EA are listed in a “References” chapter at the end of this document, and where applicable, website addresses are provided for resource documents.

Comment 0-7: We note on February 20th, under Supporting Documents, a submission by the New Jersey Business & Industry Association. This is not an official supporting document. Remove immediately, repost under comments. Who with the authority to post supporting documents gave this gift to the NJ Business & Industry Association? And who is responsible for this post remaining as a "Supporting Document" for more than a week?

Response 0-7: The comment letter in question was inadvertently posted under the "Supporting Document" section of the docket website and was subsequently moved to the "Comments" section.

Comment 0-8: The last two winters have seen unprecedented natural disasters in our region and along our shorelines. They have dramatically changed the public's understanding of the harbor and the estuary, and the result has been a host of new ideas and new discussions, new political initiatives, and new planning processes. Now is not the time to race ahead with a multi--billion--dollar infrastructure project whose true environmental and economic costs have yet to be analyzed. Commenters urged the Coast Guard to rethink the fast--tracking of the Bayonne Bridge project, and to relaunch, with partners other than just the Port Authority, a more independent, wide-ranging and critical assessment of this project's potential impacts. Commenters also questioned why this project was fast-tracked.

Response 0-8: The project was identified as a high-priority infrastructure project by the Obama Administration in accordance with Executive Order 13604. The purpose and need of the project is detailed in response to Comment 1-1 and in Chapter 1, "Purpose and Need" of the EA.

Comment 0-9: What is the Coast Guard's response to the EPA's concerns over environmental impacts?

Response 0-9: USEPA's comments on the Draft EA have also been considered in preparation of the Final EA, and are addressed in responses to those comments.

Comment 0-10: We note that the proposed schedule calls for construction beginning in June of 2013. If the schedule has changed, the schedule in the report should be modified.

Response 0-10: This comment has been noted.

20-2-2 CHAPTER 1: PURPOSE AND NEED

Comment 1-1: Several commenters expressed concern as to whether the project is actually needed and see it as a waste of funds. Some opined that duplicate facilities exist on the East Coast.

Response 1-1: The Coast Guard is neither a proponent nor opponent of any project; rather we are committed to the fair and diligent processing of the applications received. In evaluating applications, and preparing the appropriate environmental documentation, the Coast Guard analyzes whether the alternatives considered and evaluated meet the purpose and need of the project. Goals and objectives, while articulated in the environmental document, are crafted by the project proponent and are not part of the Coast Guard's purpose and need analysis.

Comment 1-2: The specific needs that this project is intended to address should be clearly identified. Alternatives are then developed to meet the stated (and supported) needs, and are assessed by their relative ability to meet project needs.

Response 1-2: As discussed in Chapter 1, "Purpose and Need," the project is needed to remove an existing air draft restriction to adapt to changes in the shipping industry in which larger more efficient vessels are being deployed and to upgrade the Bayonne Bridge to modern design, traffic, and seismic standards.

Comment 1-3: The purpose statement should directly state the threshold for raising the vertical clearance (to allow passage of Post-Panamax ships) instead of simply "increase vertical clearance."

Response 1-3: The introductory purpose statement in Chapter 1, "Purpose and Need," provides an overview of the purpose and need of the project. A more detailed discussion, including an elaboration of the need for the increased vertical clearance to meet the needs of future navigation, is provided in subsequent sections of the chapter.

Comment 1-4: The objective, "Deliver the project at reasonable cost and within a reasonable timeframe," does not meet the measurable criteria for an objective.

Response 1-4: The Coast Guard is neither a proponent nor opponent of any project; rather we are committed to the fair and diligent processing of the applications received. In evaluating applications, and preparing the appropriate environmental documentation, the Coast Guard analyzes whether the alternatives considered and evaluated meet the purpose and need of the project. Goals and objectives, while articulated in the environmental document, are crafted by the project proponent and are not part of the Coast Guard's purpose and need analysis.

Comment 1-5: [The EA fails] to consider how many giant container ships will actually ply the seas and berth in the United States. I have no numbers, but I don't imagine more than 30 such ships in the world. Will there really be much business lost if we don't accommodate a few big global shipping companies (Maersk and their Asian competitors) at Port Newark. The giant ships will not likely replace all the smaller container ships and freighters.

Response 1-5: As discussed in detail in Chapter 18 in the EA, the shipping industry is trending worldwide toward deployment of larger vessels due to their improved efficiencies and economies of scale. In addition, larger vessels would result in environmental benefits, including a smaller environmental footprint per TEU.

Comment 1-6: I am confused by [statements that] the project is not revenue enhancing. I would think that the increased efficiency should when looked at holistically induce revenue enhancement for the port.

Response 1-6: Several commenters noted what appears to be potential for significant growth in port operations as a result of the proposed project. As evaluated in Chapter 18, and the Analysis at Appendix I, growth at the Port of New York and New Jersey which is attributable to this project is not significant. Overall growth projections for the port, and the increased containerization of cargo globally, is expected to occur independent of the proposed project and therefore is not attributable to it. As articulated in the Chapter 1, this project is intended to increase the vertical clearance of the roadway thereby eliminating the existing air draft restriction, resulting in the preservation of the economic efficiency and sustainability of the Port. The project is not intended to draw commerce or additional cargo, but merely to maintain Port competitiveness by accommodating larger more efficient vessels that are currently and increasingly being deployed within the shipping industry.

Comment 1-7: The safety statement is not fully supported in the Draft EA. The Draft EA identifies no accident rates or refers to any statistics that indicate the current bridge is unsafe. There is some mention of [bicyclists] having to walk bicycles across the bridge. I support safety enhancements that are cost effective. I would expect that there are structural measures that could enhance safety, and railing improvements for the pedestrian and bike facilities, but that does not warrant the substantial removal of much of the historic structure if reasonable alternative exist.

Seismic standards are likely reasonable. However the cost benefit of creating 12-foot lanes is not an essential goal if there currently is not an accident or safety issue. What is the monetary value of the improved safety for increasing the lane widths and shoulders? If the complete deck is rebuilt 12-foot lanes are reasonable; however if the existing bridge is performing at an acceptable safety standard, precluding utilizing the existing deck is not reasonable.

Response 1-7: Any new project must meet current engineering, design and safety standards.

Comment 1-8: As stated in Section1-1-2.4, "This growth is predicted to occur with or without increasing the vertical navigational clearance of the Bayonne Bridge." I would disagree with this statement. If true it would be a huge impediment to justifying the project. If larger ships are more efficient, then reduced cost of shipping due to efficiency should increase the demand for the facilities west of the Bayonne Bridge. This is why this is a good project. The evolving shipping industry is exactly why determining if there is a cost effective solution is appropriate.

Response 1-8: Several commenters noted what appears to be potential for significant growth in port operations as a result of the proposed project. As evaluated in Chapter 18, and the Analysis at Appendix I, growth at the Port of New York and New Jersey which is attributable to this project is not significant.

Response 1-9: Overall growth projections for the port, and the increased containerization of cargo globally, is expected to occur independent of the proposed project and therefore is not attributable to it. As articulated in the Chapter 1, this project is intended to increase the vertical clearance of the roadway thereby eliminating the existing air draft restriction, resulting in the preservation of the economic efficiency and sustainability of the Port.

Comment 1-9: Seismic improvements seem a reasonable element to include to meet current standards; however reviewing the total seismic fatalities from bridge collapse across the U.S. one may find that it may not be as cost effective as one may think in terms of economic return.

Response 1-10: Any new project must meet current engineering, design and safety standards.

Comment 1-10: Minimize adverse impacts on the built and Natural Environment. These are all outstanding except, those reductions in vehicle delays should be placed in context of the costs associated with preventing delays.

Response 1-11: Reducing traffic delays can have a number of benefits, including reduced emission concentrations, better fuel economy and associated savings, and improved travel time. As noted above, the project has several purposes.

20-2-3 CHAPTER 2: PROJECT ALTERNATIVES

Comment 2-1: The project should consider additional alternatives, including the use of other locations and existing port terminals east of the Bayonne Bridge, such as Global Marine Terminal and the Military Ocean Terminal at Bayonne (MOTBY). These terminals could accommodate larger shipping vessels and accommodate forecasted demand.

Response 2-1: As detailed in Chapter 2, “Project Alternatives,” several alternatives were evaluated for the Bayonne Bridge Navigational Clearance Program, some of which were eliminated due to engineering and operational considerations. Suggestions to use other existing port locations to accommodate larger ships would not be feasible due to the lack of infrastructure needed for the movement of freight.

Comment 2-2: Commenters advocated for provision of transit services, such as bus rapid transit (BRT) or rail, particularly a rail connection to the Hudson-Bergen Light Rail. Rail could be provided on the bridge or through a separate tunnel. Some commenters urged that the project at least be designed with the structural capacity to accommodate rail.

Response 2-2: Transit is not within the scope of this project. However, the project would not preclude transit and would be designed with the capability to accommodate any future bus or light rail transit initiatives.

Comment 2-3: Commenters noted that in the past, the Port Authority has said it would allow use of the area around Trantor Place and Walker

Street as a park-and-ride. Commenters would like that considered as part of this project.

Response 2-3: This is not within the scope of the project.

Comment 2-4: The former MOTBY should be developed as a container terminal because it would be the closest port to deep channels; it would save billions of public dollars; it would avoid rebuilding the Bayonne Bridge; it would reduce the significant environmental impact that would be caused by continuing to attempt to deepen the dangerous, narrow Kill Van Kull and dredging more of the contaminated sediments of Newark Bay; it would be close to Global Terminal and the Greenville rail yards; and it would be positioned to easily link with the cross-harbor rail float system and cross-harbor railroad. The Bayonne Redevelopment Authority planned to use the MOTBY site for high-rise housing and offices, with a yacht harbor in the last huge graving dry dock (a space to repair ships) in the harbor. Only a minimum amount of port commerce space was set aside.

Response 2-4: As detailed in Chapter 2, “Project Alternatives,” several alternatives were evaluated for the BBNCP, some of which were eliminated due to engineering and operational considerations.

Comment 2-5: The Port of New York and New Jersey and the New Jersey Turnpike Authority are investing over $850M to develop terminal capacity at the Port Jersey Marine Terminal and improve the local roadway and rail networks. These investments will readily accommodate the 7,000 and up twenty-foot equivalent units (TEU) vessels projected through 2020. The No Build alternative should consider these improvements.

Response 2-5: This was included in the No-Build alternative and is addressed in Chapter 2, “Project Alternatives,” and Chapter 18, “Indirect and Cumulative Effects.”

Comment 2-6: The 2009 Bayonne Air Draft Analysis indicates the Raise the Roadway Alternative is $1.32B. The 2012 Environmental Assessment indicates the Raise to Roadway Alternative will cost $500M to $700M less. The probable construction cost should be clarified.

Response 2-6: The $1.32 billion is a forecasted total program cost which captures all soft costs in addition to hard construction costs. These soft costs include items such as planning, environmental review, preliminary and final engineering design, administrative, overhead, financial expense, contingency, etc. The $600-$800 million figure presented in the Draft EA is the forecasted hard construction cost portion.

Comment 2-7: The EA discarded the New Cargo Terminals alternative. Full build out of the Global Marine Terminal and development of marine container terminal on the land acquired by the Port Authority of New York and New Jersey at the Military Ocean Terminal at Bayonne peninsula will accommodate the 7,000 and up TEU vessels projected through 2035 and fully satisfy the forecasted demand. Development of New Cargo Terminals east of the Bayonne Bridge should be considered as an alternative to raising the Bayonne Bridge.

Response 2-7: This was included in the No Build Alternative and is addressed in Chapter 2, “Project Alternatives,” and Chapter 18, “Indirect and Cumulative Effects.”

Comment 2-8: We recommend including plan sheets for the build alternative to more clearly convey the affected area and understand the impacts of the proposed work.

Response 2-8: Graphics are provided throughout the EA showing the proposed work zone and potentially affected area.

Comment 2-9: The alternatives discarded need to be directly compared with the objectives presented in Chapter 1 so that it is clear why they were dismissed.

Response 2-9: Reasons for eliminating the discarded alternatives are discussed in Chapter 2, “Project Alternatives.” As discussed in Chapter 2, alternatives were rejected based on construction risks, environmental impacts, and costs, which can be directly correlated to the project’s purpose and need.

Comment 2-10: In [Figure] 2-2, one-way dimensions shown for shoulder and travel lane widths add up to 30'-9"; 32'-6" is given as the total.

Response 2-10: Figure 2-2 has been updated to reflect the refined design of the project with one-way travel lane and shoulder widths totaling 30 feet 9 inches.

Comment 2-11: Add existing cross-section of roadway for comparison with Figure 2-2 Proposed Roadway; Table 2-1 doesn't have the same data as depicted in Figure 2-2, and Figure 2-2 conflicts with the information given in Chapter 16, which shows 4'-0" and 8'-0" shoulders.

Response 2-11: Figure 2-2 has been updated to show a comparison between the existing roadway and the proposed roadway. Chapter 16, "Construction Effects," of the Draft EA indicated that the left and right shoulders on the approach roadways would be 4 feet and 8 feet, respectively, whereas these shoulders within the arch span would be 2 feet and 4 feet 9 inches, respectively, consistent with Figure 2-2. However, Figure 2-2 has been updated to reflect recent design refinements, which include 6-foot-wide right shoulders. The text of the EA has also been updated accordingly.

Comment 2-12: Table 2-1: State the design speed and the way it was determined. Design Criteria should be modified to develop a typical design criteria table (existing, criteria, proposed), identify the highway classification for NY 440 (functional class is Urban Principal Arterial Expressway; design class for NYS is Other Freeways), and include critical design elements such as vertical clearance widths, accel/decel lane lengths, superelevation. In addition, design criteria for NY 440 should be expanded to include critical design elements and all non-standard features should be identified, to include at a minimum, shoulder and median widths. All non-standard features should be justified. [Note that the use of a 5 percent grade is allowed for Urban Principal Arterial Expressways and does not require a non-standard feature justification.]

Response 2-12: A speed study of Route 440 (Bayonne Bridge) under New York State Department of Transportation's (NYSDOT's) jurisdiction (northbound and southbound) was conducted in September 2012. Data was collected between September 17 and September 24, 2012. These data were used to determine the 85th percentile speed (or the speed at which 85 percent of free-flowing traffic is traveling at or below) to support the design speed determination. The free-flow 85th percentile speed was found to be 56.1 mph and the existing design speed then determined to be 60 mph. The new approaches and main span (which has a speed limit of 45 mph) were designed for 55 mph in consultation with NYSDOT. For this study, only the off-peak period speed data were used to calculate the 85th percentile speed for the free-flowing traffic condition since peak periods have a higher likelihood of congestion and may not best represent free-flowing conditions. In addition, the design vehicles used for loading requirements of the main span roadway were WB-67.

Comment 2-13: Design criteria are also necessary for ramps where work is being done.

Response 2-13: Ramp design has been conducted in consultation with NYSDOT and other appropriate regulatory agencies. The design vehicle used for the exit/entrance ramps was WB-67, with the exception of a WB-50 design vehicle for the Morningstar Road entrance and exit ramps because modifications to existing local roads off Port Authority property would have otherwise been required.

Comment 2-14: The widths of the acceleration and deceleration lanes should be included in the design criteria. Discuss the lengths of the acceleration and deceleration lanes and compare them to standards.

Response 2-14: All new acceleration and deceleration lanes would be compliant with American Association of State Highway and Transportation Officials (AASHTO) standards.

Comment 2-15: Vertical clearances of 60' and 65' are given in the report; what is the intended value?

Response 2-15: The vertical clearance of the Bayonne Bridge over the navigational channel of the Kill Van Kull would be increased from 151 feet to 215 feet above mean high water (MHW), an increase of 64 feet. The EA has been revised to be consistent.

Comment 2-16: The report includes annual average daily traffic (AADT) but lists no change from existing volumes to proposed volumes, despite growth rates of 0.3 to 2.7 percent listed in Chapter 10, Table 10-4, and an anticipated life of the new structure of 75 years. State the design year (e.g., ETC+30) and inflate the proposed traffic using the growth rates; state and use the peak hour design volumes. All permanent highway design should be based on these proposed traffic volumes.

Response 2-16: The project would not increase capacity, but rather would maintain two travel lanes in each direction and would not affect traffic volumes. Therefore, traffic volumes under the Raise the Roadway Alternative would be the same as the No Build

Alternative. The engineering design was based on projected 2017 traffic volumes.

Comment 2-17: Figure 2-2: The top dimensions add up to 67ft; the bottom ones to 63'-6"; check/revise inconsistency.

Response 2-17: Figure 2-2 has been updated to reflect the most recent project refinements and calculations.

Comment 2-18: We recommend that design criteria be provided for the shared use path (12ft walkway/bikeway).

Response 2-18: The shared-use path was designed based on AASHTO criteria, PANYNJ directives, inspection vehicle loading requirements, and emergency vehicle access requirements. The design was conducted in consultation with NYSDOT and other applicable regulatory agencies.

Comment 2-19: Failure to consider berthing the big container ships on the Hudson River side of Bayonne, where the channel is naturally deeper and more accessible to the Harbor. Remember, there was a huge Military Ocean Terminal there until decommissioning a few years ago. With the present focus on Port Newark, whatever the costs, the Port Authority will have to dredge Newark Bay and maintain shipping channels for an eternity.

Response 2-19: See responses to Comments 2-1 and 2-4. As explained therein, Port terminals east of the Bayonne Bridge do not have the space or extensive infrastructure in place needed to accommodate greater portions of the Port’s cargo.

Comment 2-20: The proposal to raise the roadway of the Bayonne Bridge from 150 feet to 210 feet to provide clearance for the monster ships would necessarily raise the steepness/grade of the roads leading to the bridge. The Port Authority promises to minimally impact the current landscape around the Bridge. Which might prevent the Bridge being used for the often-proposed extension of the Hudson Bergen Light Rail—from Bayonne's 8th St. to Staten Island—if the grade is too steep for current HBLRT technology. Wouldn't extension of the HBLRT serve a useful environmental purpose?

Response 2-20: The project is designed not to preclude transit. The grade of the proposed roadway would be able to accommodate light rail.

Comment 2-21: A managed approach to lifting the roadway would be needed. It should be noted that the bridge belongs to the Port of NYNJ and that the navigational property right belongs to water-borne traffic over the roadway traffic. If a lift takes 20 minutes, an average traffic the delay would affect 500 vehicles and at $20 per hour value of time cost it would result in about $5000 roadway vehicle delay cost per lift. For 500 lifts per year the cost would only be $2,700,000 capitalized at 7 percent interest that would be $38,000,000. Given the $1,300,000,000 price of the improvement and the ability to reduce tolls for those that are delayed the delay does not justify discarding the option if the lift bridge price is substantial less than the raise the bridge option.

The need for fenders would add a cost, but the lift bridge option would also eliminate the need for demolishing both historic approaches of the Bayonne bridge not only preserving history but saving money for other investments in the port to keep the port competitive. One could also ask if innovative measures such as providing tugs to either:

- move the fenders into place during the lifts, or
- tugs providing effective physical barrier to in essence provide a moving fender to direct the large ships under the bridge.

Retractable fenders (retracted to bottom of the channel) during lifts are also an option but far less desirable compared to tug options, because of impacts to the aquatic habitat. The presumed result of a permanent narrower channel of 600 feet is not fully vetted and should not be stated as fact.

Marine traffic would not be disrupted to a level causing more delay cost than can be saved in capital cost. Lowering tolls to compensate the marine traffic when delayed could effectively address the issue. The impact of removing 90 percent of the mass of the structure is more of an effect on the historic nature of the bridge than the impact of the lift mechanism. The navigational channel would not need to be narrowed. The current bridge does not have significant roadway safety or roadway operational issues that warrant the expenditures being proposed. Indeed, complex mechanical systems would need to be installed and maintained, but the order of magnitude of lift bridge operational costs could possibly be more than offset by a substantial reduction in capital cost. A life span of 50 years is an awesome time frame with the potential to discover new needs for the bridge and new technology to possible preserve the bridge and history longer.

Response 2-21: As discussed in Chapter 2, “Project Alternatives,” a Lift Bridge Alternative was examined. This alternative was eliminated from further consideration for a number of reasons, including potential for traffic delays, marine navigational safety issues, the limited life span of this alternative, the required maintenance and replacement of extensive mechanical equipment, and potential impacts on historic resources. In addition, the bridge includes a walkway and the Lift Bridge Alternative would either require removal of the walkway or pose a safety risk by requiring all pedestrians to be off the lifted section each time it was raised.

Comment 2-22: We note that the cables supporting the roadway will be more vulnerable in the proposed configuration.

Response 2-22: Bridge component security concerns were analyzed as part of the final engineering design and appropriate security mitigations were incorporated in the final design**.**

Comment 2-23: Several commenters supported the Raise the Roadway Alternative, citing it as an innovative and cost-effective approach to meeting the project goals.

Response 2-23: Comment noted.

20-2-4 CHAPTER 3: PROCESS, AGENCY COORDINATION, AND PUBLIC PARTICIPATION

Comment 3-1: Some commenters felt that a hard look at potential impacts has not been conducted. A number of commenters suggested that an Environmental Impact Statement (EIS), rather than an Environmental Assessment (EA), would be more appropriate for this project for the following reasons:

- To fully evaluate potential effects (direct and indirect);
- To evaluate project alternatives with lesser impacts;
- To fully consider mitigation measures;
- To allow for additional public notification and involvement;
- To consider the historic waterfront and community;
- To study construction impacts to adjacent residences;
- To analyze concentrations of lead in the soil and potential exposure to contaminants;

- To account for the size and scope of the project;
- To include a more robust analysis of impacts to environmental justice communities;
- To expand the study area beyond the immediate bridge construction area and include additional analysis of induced growth at the port;
- To include an analysis of existing environmental health conditions;
- Due to controversial aspects of the project;
- Due to uncertainty of certain potential effects.

Response 3-1: NEPA provides multiple processes by which to evaluate a proposed action's impact on the environment. The Coast Guard chose to prepare a draft EA as a means to evaluate the significance of potential impacts on the environment. The EA process allowed the Coast Guard to assemble and analyze evidence in order to determine whether to prepare an EIS, develop a mitigated finding of no significant impact (FONSI), or issue a FONSI. The Coast Guard has determined the project will not result in significant impacts to the quality of the human environment, thereby concluding its environmental review with issuance of a FONSI. The NEPA process does not establish a size and scope threshold which alone triggers a certain level or type environmental review. The significance of impacts dictates the appropriate environmental document. A careful examination of the items specifically outlined in comment 3.1 was conducted, to include: potential impacts of the proposed project (direct, indirect, and cumulative), project alternatives, potential mitigation measures, potential effects on historic and cultural resources, potential construction impacts, potential effects from contaminants, potential impacts to environmental justice communities, in addition to all other aspects of evaluation required by CEQ regulations. In conducting this analysis, no significant impacts have been identified; therefore an EA has been determined to be the appropriate NEPA document. With respect to controversy and uncertainty of impacts, in evaluating the significance of an action’s environmental impacts, agencies must consider a number of factors. Some of these factors are noted in the CEQ regulations; see 40 CFR 1500.27. Two such factors are the degree to which the effects on the quality of the human environment are likely to be highly controversial, and the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. While some members of the public commenting on the Draft EA have expressed disagreement with its conclusions concerning the likelihood of significant impacts, particularly as related to induced growth in Port cargo volumes, such disagreement does not necessarily warrant preparation of an EIS. Rather, these disagreements are considered along with the numerous other relevant factors. Moreover, as discussed further in the responses to comments on Chapter 18, “Indirect and Cumulative Effects,” of the Draft EA, the EA and project address the posited uncertainty concerning the effect of raising the Bayonne Bridge roadway on cargo volumes, by taking into consideration plans for annual review by a stakeholder coalition of an annual inventory of Port air emissions and cargo volume growth, and consideration of measures to reduce emissions where annual growth (CAGR) exceeds 4 percent and any increase in Port air emissions is determined to be significant.

Comment 3-2: Support for the BBNCP was noted, including the following justification for the project:

- The project allows newer, larger ships to access the Port of New York and New Jersey. The newer ships meet the highest environmental standards and would result in overall reduction in the number of ships. As such, the project would have the added benefit of improving risk management in the port.
- The Raise the Roadway alternative would have little impact to natural resources and the benefit of emission reductions.
- The project preserves the historic arch of the NR-eligible bridge.
- The BBNCP would address substandard design features with wider travel lanes and roadway shoulders.
- The shared use bicycle and pedestrian path would provide a safe means to cross the channel improved with a ramp and wider path.
- By providing the larger vessels access to local ports, the project preserves the sustainability of local commerce and existing jobs.
- The project allows the maritime industry to use the newest generation of fuel-efficient greener cargo ships resulting in cleaner air for the region.
- The project provides long term construction jobs for the region’s building trades, as well as permanent career opportunities in the shipping and allied transportation fields.

- The project does not preclude the option for transit on the bridge in the future.
- Without the project, more trucks would be required to carry freight from other port regions, increasing roadway congestion and diesel pollution.
- The project provides for minimal bridge closing time, maintaining mobility in the region.

Response 3-2: These comments have been noted.

Comment 3-3: Requests were made for an expanded public review process. Considering the length of the EA, an extended public comment period would allow more time to review the document. Requests for extensions ranged from no expression of how much additional time to requests for as much as 90 more days. Considering potential impacts to the community in Newark, a third public meeting in Newark would allow residents to participate in the environmental review of the project.

Response 3-3: Adequate and extensive public participation opportunities were provided as described in Chapter 3. The public comment period exceeded regulatory requirements. In addition, special focus meetings were held with Environmental Justice communities.

Comment 3-4: Several commenters expressed that outreach efforts must better engage the area residents, including residents near the construction site as well as residents near the port terminals, and consider their concerns. Outreach efforts have been inadequate and public meetings have been poorly advertised. The scope is too narrow and the community must be participants in these discussions. USCG held the meetings and hearings too late in this process to garner and/or utilize meaningful community input.

Response 3-4: Adequate and extensive public participation opportunities were provided as described in Chapter 3. The public comment period exceeded regulatory requirements. In addition, special focus meetings were held with Environmental Justice communities. The Coast Guard has taken into consideration that PANYNJ would also establish an Environmental Justice Executive Review Board (EJERB), which would report annually to the PANYNJ Board of Commissioners to communicate issues of concern from environmental justice communities.

Comment 3-5: Several commenters stated that a substantial proportion of residents near the Bayonne Bridge are Hispanic, as noted in the Draft EA, but were excluded from the NEPA process because of lack of translated materials. Some commenters noted that earlier translation requests, including during scoping and community meetings, were ignored. Commenters requested that materials be translated into Spanish, including the entire EA document.

Response 3-5: While the Draft EA identified census block groups near the Bayonne Bridge with high percentages of Hispanic and other minority populations, these data are based on ethnic background, as opposed to language proficiency. However, recognizing that some individuals may have native languages other than English or may have less proficiency in English as compared with their native languages, translated summaries of the Draft EA were provided. A project summary, detailing potential effects and measures to minimize effects was provided in Spanish and Portuguese, in response to requests for these languages. The summary was available on the federal docket website (with links from USCG's website and PANYNJ's project website), at the repositories, and at the public meetings.

The purpose of the translated summaries was to provide a comprehensive overview of the project so that non-English speaking residents would have an opportunity to evaluate potential effects and submit any comments if they had any concerns. In addition, even though no requests were received for interpreters at the public meetings, an interpreter who was fluent in both Spanish and Portuguese was made available at each of the public meetings to translate important procedural logistics, answer questions, and translate any comments made in Spanish or Portuguese to a stenographer so that they could be made part of the record.

Comment 3-6: Multiple requests were made under the Freedom of Information Act (FOIA) for copies of records related to the project, in an effort to better understand the project and its potential impacts.

Response 3-6: The USCG is responding to all FOIA requests.

Comment 3-7: No federal action is required on behalf of the Federal Aviation Administration (FAA) with regard to the proposed project. However, a Notice of Proposed Construction or Alternation must be filed with the FAA prior to the initiation of any construction activities in order to determine any potential impacts to the navigable airspace surrounding Newark Liberty International Airport (EWR).

Response 3-7: A Notice of Proposed Construction or Alteration would be filed with FAA, as required.

Comment 3-8: The Draft EA continues the notion that impacts need only be reviewed for an area of one-half mile from the bridge itself. The exit/entrance ramp to the bridge on Morningstar Road is more than one-half mile from the bridge; the very same ramp that will be among those revamped to accommodate the steeper decline from the apex of the bridge. This project will affect the entire North Shore. It will have especially heavy impacts on the Elm Park and Port Richmond communities. It will affect the business and residential quality of life on or near Richmond Terrace. It will intersect with the other major projects scheduled for development during the same three year period.

Response 3-8: In general, the study area was defined as the ¼-mile perimeter surrounding the limit of the construction work zone, as this would be the area with the greatest potential to experience effects from the project. The study area was modified for specific analyses, as needed. As shown in Figure 16-3 of Chapter 16, "Construction Effects," the construction work zone extends along Route 440 from about West 7th Street in Bayonne across the Bayonne Bridge to about Dixon Avenue in Staten Island. As such, the Morningstar Road ramps are within the construction zone and the study area incorporates surrounding residences. Potential effects to residents in close proximity to the work zone, as well as those within the study area, are assessed in detail in the EA. Where the potential for temporary and localized adverse effects was identified, measures were developed to protect those residences closest to the construction work zone (i.e., worst-case scenario), therein also protecting residences at a greater distance outside of the immediate study area.

As noted above, the on/off ramps at Morningstar Road are included as part of the construction work zone and are therefore evaluated as part of the EA.

Other major projects in the area scheduled during the construction period are assessed in Chapter 18, "Indirect and Cumulative Effects." The analysis finds that there are no planned projects that would combine with the project to result in cumulative construction impacts. Please also see response to Comment 18-28.

Comment 3-9: The entire document was difficult to follow primarily in its design because there was no visible sequence in terms of chapters and appropriately number pages. It is available on the disk that was provided to some members of the community, that a reader can actually see the number of pages in this document because the word provides page numbers. For people not familiar with a document such as this, this too, would be a deterrent in them proceeding forward in reviewing the document and participating in the process.

Response 3-9: Comment noted. A copying error was made in one of the two copies of the EA at the Port Richmond Library repository location, in which page numbers do not appear. When the project team was made aware of the error, a corrected copy was immediately sent as a replacement on February 8, 2013.

Comment 3-10: A document of this size can be over a thousand pages, not including the appendices, but also requires any person to read and understand what they were reading to spend a great deal of time, memory, and hours beyond a 40-hour work week.

Response 3-10: Comment noted.

Comment 3-11: Commenters asked how the surrounding neighborhood will be notified during construction. For example, what hours will construction take place?

Response 3-11: The project would include both daytime and nighttime construction activities. As discussed throughout this document, construction activities would be subject to strict noise, emissions, and traffic limitations. The Port Authority would maintain a website with notifications for the public during construction. In addition, PA staff would work closely with the community to keep them updated on all construction activities. The Port Authority would also staff project information offices in both Bayonne and Staten Island to assist in responding to construction related concerns.

An outreach liaison would be designated by PANYNJ for the Bayonne Bridge construction project. This person would be in continual contact with the Staten Island and Hudson County communities affected by the construction. They would also serve as a liaison to the various agencies responsible for traffic management measures and improvements throughout the area affected by construction on a regional basis. The liaison would be responsible for regular meetings with key stakeholders and producing weekly travel advisories to elected officials, Staten Island, and community boards any other community groups and representatives from key stakeholder agencies/organizations. The liaison would meet with a TRANSCOM-run agency working group and provide updates regarding construction progress, providing responses to concerns motorists may have about current and future work as well as the final design.

As a means to directly target motorists, a signage and wayfinding program would be implemented and maintained during all phases of construction, using static as well as variable message signs. Additionally, commercial radio stations would be used to broadcast significant traffic pattern changes in advance of full closures of the bridge during weeknight overnight hours and on weekends. A commercial would carry a clear, concise message alerting motorists to the upcoming closure or potential delays and advising them to take the prescribed alternate route. Furthermore, the project offers a regularly-updated website that provides information on the construction: http://www.panynj.gov/bayonnebridge/.

Comment 3-12: In regards to Table 3-1, involvement by the Metropolitan Transit Authority (MTA) is critical, including approval to move bus stops. Since public transportation is used by 27.8 percent of area residents (Table 4-5), there will be a significant impact on our community. The MTA must be involved, and provision for timely community notification, including impact on travel times, is required.

Response 3-12: Table 3-1 has been revised to include the MTA. The project team is coordinating with MTA to obtain all necessary approvals.

Comment 3-13: The EA states, "In February 2012, USCG extended invitations to … local property owners to participate as Section 106 Consulting Parties." Local property owners did not receive invitations. Why are no Native American groups included on Table 3-2?

Response 3-13: The EA has been clarified to explain that USCG extended invitations to local historic preservation organizations, local governments, and federal and state listed tribal nations with property interests in the region. Invitations were determined under consultation with the New York and New Jersey State Historic Preservation Officers (SHPOs) to identify those parties who meet the regulatory criteria under Section 106 of the National Historic Preservation Act.

Comment 3-14: The Draft EA presents a recitation of facts, with a de minimus, pro forma consideration of impact. The Draft EA repeatedly proclaims “No impact” or short term impact during construction. This reflects the total disconnect with our community. Construction activity for more than three years, taking place within 35 feet (or less) of people’s homes, schools, community facilities, and businesses, will most certainly have an impact. Mitigation measures are either not considered at all, or are inadequately addressed. We submit that the deliberate attempt to negate community involvement reflects an awareness of these negative impacts, and an intention to issue a permit, notwithstanding those negative impacts, post-haste, without consideration of mitigating measures. We assert a failure of the U.S. Coast Guard’s obligations, and request an investigation. We submit this process has been fatally flawed, and request the required study be properly performed ab initio.

Response 3-14: Adequate and extensive public participation opportunities were provided as described in Chapter 3. The public comment period exceeded regulatory requirements. In addition, special focus meetings were held with Environmental Justice communities. Potential long-term and short-term effects of the project were carefully considered and discussed.

Comment 3-15: There is no draft EA document; remove "Draft" from second bullet in 3-2-1. The fourth bullet can be entitled "Revise Environmental Assessment."

Response 3-15: For this project, USCG prepared a Draft EA that was made available for public review. Subsequent to the public review period, USCG prepared this Final EA addressing public comments, as appropriate, and also prepared a determination of significance of impacts. Chapter 3, “Process, Agency Coordination, and Public Participation,” has been revised to more clearly reflect this process.

Comment 3-16: It should be stated in Section 3-2-1 that if significant impacts are discovered, an EIS will be prepared.

Response 3-16: Comment noted.

Comment 3-17: The Public Participation section does not discuss public hearings; are any required?

Response 3-17: Public hearings are not universally required for an EA. However, USCG held three public meetings to provide further information on the project to the community and to provide an opportunity for the public to give oral testimony on the Draft EA, in addition to written comments.

Comment 3-18: In Table 3-1, the Section 404 permit should be labeled "Discharge of Dredging or Fill Permit."

Response 3-18: Table 3-1 is intended to provide a summary of permits and approvals and in some instances provides abbreviated descriptions.

Comment 3-19: In Section 3-2-5, it should be noted that translation services are distinct from Environmental Justice and that Title VI requirements for Limited English Proficiency apply outside of the identified Environmental Justice areas.

Response 3-19: Comment noted. Section 3-2-5 specifically describes the process of engaging environmental justice communities, which has included distribution of translated materials to the public as a whole, to accommodate individuals with limited English proficiency.

Comment 3-20: If the U.S. Coast Guard is the federal agency for NEPA and will review and approve the draft of the EA, who is overseeing the action of the U.S. Coast Guard?

Response 3-20: The Department of Homeland Security and the Council on Environmental Quality have been consulted by the USCG on a regular basis.

Comment 3-21: There are several inaccuracies in the EA which relate to the City's action and environmental review. In Chapter 3, Process, Agency Coordination and Public Participation, on page 3-2, section 3-2-2, State Environmental Quality Review (SEQRA) the second paragraph contains an inaccuracy:

> The project is classified as a SEQRA Type I action (6 NYCRR Part 617.4), indicating that it has the potential for environmental impacts that should be evaluated under SEQRA. Therefore, this EA would assist in achieving compliance with the requirements of SEQRA. In accordance with 6 NYCRR Part 617.15, the NEPA and SEARA processes are coordinated. Accordingly, when an EA for an action has been prepared under NEPA, a New York State agency may prefer not to prepare an additional EA under SEQRA, provided that the NEPA EA is sufficient to make required SEQRA findings.

The three instances of "EA" in the last sentence above should be changed to "EIS" and to add the following to the paragraph: On the other hand, when NEPA compliance requires only preparation of an EA, as is the case for this project, SEQRA requires preparation of an Environmental Assessment Statement under SEQRA, or, when a New York City agency is involved and acts as lead agency, an Environmental Assessment Statement under City Environmental Quality Review. For this project, which requires a discretionary approval by the New York City Mayor, the Mayor's Office will propose to act as lead agency for SEQRA/CEQR.

Response 3-21: Chapter 3, “Process, Agency Coordination, and Public Participation,” has been revised to provide clarification, per the comment.

Comment 3-22: The paragraph cited above states that this is a SEQRA Type I action but does not identify which Type I applies. The Type I classification may be the mistaken result of the work proposed to the Bayonne Bridge, which is eligible for, but not listed on the National Register, as noted several times throughout the EA.

Response 3-22: The project was classified as a SEQRA Type I action because of its potential for adverse effects on the environment and the surrounding community. Because the project also requires New York City approvals, the State Environmental Quality Review (SEQR) process is being coordinated with the City Environmental Quality Review (CEQR) process.

Comment 3-23: On page 3-3 many City approvals are listed, but that they all appear to be nondiscretionary, and the approval of the lease/easement by the Mayor is not listed, nor does that approval appear to be mentioned anywhere else in the document.

Response 3-23: Table 3-1 has been updated to reflect the required City approvals pertaining to aerial easements and modified connections to the Bayonne Bridge. As appropriate, sections of the EA (e.g., Chapter 5, "Economic Conditions") have also been modified to clarify City approvals needed with respect to aerial easements.

20-2-5 CHAPTER 4: LAND USE AND SOCIAL CONDITIONS

Comment 4-1: Figure 4-1 represents the boundaries of the study area, but is not an accurate depiction of land use. For example, the parcel located at 2400 Richmond Terrace, is a Fed Ex shipping center, not a "parking facility." This project will have a profound impact on their business. Similarly, the characterization of the railroad right-of-way as vacant land was questioned.

Response 4-1: The Land Use map (Figure 4-1) is based on New York City Department of Finance building classes, which were verified through site visits. The example given at 2400 Richmond Terrace is listed as 'Garage' by Department of Finance, which New York City Department of City Planning assigns to the parking facility classification. As discussed in Chapter 16, "Construction Effects," of the EA, business operations are expected to be able to continue during construction, and long-term adverse impacts to local businesses are not anticipated. Also, it should be noted that the railroad right-of-way is classified as 'Transportation and Utility' on Figure 4-1.

Comment 4-2: The study area contains several residential alternative facilities for persons with developmental disabilities, as well as a housing complex for senior citizens. A study of the impact on specific vulnerable populations concentrated in the work area must be performed. Mitigation measures must be considered, including temporary relocation and support for attendant transition stresses.

Response 4-2: As noted throughout Chapter 4, "Land Use and Social Conditions," noise and emissions from construction activities may affect neighboring land uses. However, these impacts would be temporary and would not result in long-term impacts to land use and social conditions. PANYNJ would work with residents in close proximity to construction to minimize any potential impacts. The temporary impacts of construction activities associated with the project and measures that would be required of contractors to minimize the short-term construction impacts are analyzed in Chapter 16, "Construction Effects."

Comment 4-3: Due to exclusionary zoning practice in the 1960's, zoning resulted in residential districts adjoining heavy industrial, including many homes within M3-1 zones. This presents a group of residents already experiencing extreme environmental stress.

Response 4-3: This comment has been noted.

Comment 4-4: In Section 4-3-1-3 of the EA, the data used is not current. There have been significant changes in the community since 2009—particularly the tremendous increase in immigrant households, underlining the critical need for Spanish translations of all materials associated with this process. Update is needed to accurately represent current conditions.

Response 4-4: In addition to the 2010 Census, the EA used data from the U.S. Census Bureau, American Community Survey (ACS) 2005–2009 for Tables 4-5, 4-6, 4-11, and 4-12 (Mode of Transportation to Work and Income and Poverty Characteristics). The ACS 2005–2009 was the most up-to-date data available at the time the Draft EA was prepared. The Final EA reflects the most recent data from the ACS 2007–2011. See response to Comment 3-5 with respect to translated materials.

Comment 4-5: In Section 4-4-1-1 of the EA, Table 4-13: Approximately 86 two-family homes are planned for the area bounded by Richmond Terrace, Nicholas Avenue, the railroad right-of-way and John Street. In addition, the waterfront greenway, and waterfront access combined with enhanced sight-line standards are in development. Accurately portray Staten Island in this Table 4-13, and include consideration of potential impacts and specific mitigations which may be required to avoid negative impacts.

Response 4-5: The information on development projects in Staten Island presented in Table 4-13 was collected primarily by searching for building permits in the study area from the New York City Department of Building's Building Information System online tool, and through consultations with the New York City Department of City Planning. Table 4-13 has been updated to reflect the most recent available information on development projects that are expected to be built by 2017 within the ¼-mile study area. The additional known development projects do not affect the conclusions of the analyses.

Comment 4-6: The project most certainly will "result in adverse impacts to land use or social conditions." The resulting increase in truck traffic cannot be ignored. Furthermore, we anticipate many residents will leave the area, shredding our social fabric. Further justification of this conclusion is necessary. If unable to provide justification, specific mitigation measures must be presented, i.e., direct compensation of local populations and businesses.

Response 4-6: While the project would disrupt certain land uses during construction, these impacts would be temporary and would not result in long-term impacts to land use and social conditions, as discussed in Chapter 4, "Land Use and Social Conditions." Upon completion of the project, there would not be any increase in truck traffic. The temporary effects of increased truck traffic during construction are analyzed in Chapter 16, "Construction Effects." No construction generated traffic is expected in the roadway network during peak periods (6 AM to 9 AM and 4 PM to 7 PM). The contractor would be limited to generate construction traffic outside of these peak periods, and traffic volumes would be spread throughout the roadway network. In addition, as discussed in various other responses and in Chapter 16, "Construction Effects," of the EA, measures to minimize short-term construction impacts would be taken.

20-2-6 CHAPTER 5: ECONOMIC CONDITIONS

Comment 5-1: The socioeconomic effects of the project and bringing in goods from China are harmful to America. The project should not take place.

Response 5-1: The origin of freight is not germane to the environmental effects of the proposed action. The project is not expected to affect the ultimate origins or destinations of imported goods.

Comment 5-2: A number of commenters wanted to see more Port employment opportunities for residents near the ports, and see a community benefits agreement established. Residents suffer from the environmental effects of the Ports but do not share in the economic benefits that they generate.

Response 5-2: Comment noted.

Comment 5-3: Table 5-1: Newark Avenue, between the rail tracks and Richmond Ave. [sic] calls for an aerial easement for permanent wider structure overhead. There are private residences on the east side of the street; we submit that this is much more significant than an aerial easement. Similar conditions prevail at Eaton Place. Condemnation and relocations should be considered and offered to the affected households.

Response 5-3: Although the roadway would be wider, it would not substantially alter existing conditions. The roadway would remain within PANYNJ right-of-way and continue to be a pier-supported elevated roadway, similar to existing conditions.

Comment 5-4: Regarding the parking lot at Walker and Morningstar, reference is made to "alternative parking nearby." We would like to know where that alternative parking is located. During busy periods the restaurants using that lot are double-parking across Morningstar Rd. During construction the situation will worsen. This has a negative impact on our community, impacting both traffic and trade. Remove reference to alternative parking, or provide justification for this conclusion to support "no negative impact" finding.

Response 5-4: As the construction plans have been refined, it has been determined that a construction easement would not be required for the public parking lot on the northeast corner of Walker Street and Morningstar Road. The parking lot would remain in its existing state during construction and would continue to provide public parking. Therefore, there would be no effects on area businesses or their customers using this parking lot as a result of the project. Chapter 5, "Economic Conditions," has been updated accordingly.

Comment 5-5: 16-7-2-2: Furthermore, widening aerial easements over Eaton Place and Newark Avenue impacts the residents already living in the shadow of the Bridge. Mitigating measures must be included. These may include offering permanent relocation to residents.

Response 5-5: See response to Comment 9-1. The project may result in a slight change in the timing and duration of daily shadows due to the change in width and elevation of the roadway, but shadows would continue to be temporary and would not be substantially different than existing conditions.

Comment 5-6: This chapter discusses only displacement of businesses or residents; the impacts related to business operations and residents affected by road closures, detours and work zone operations are typically discussed to determine if significant impacts or adverse effects exist under NEPA and SEQRA.

Response 5-6: See response to Comment 16-17.

Comment 5-7: Section 5-2, 2nd sentence implies that this project is federally funded. However, section 2-3-2-3 indicates "federal funding is not anticipated for the completion of the Bayonne Bridge Navigational Clearance Program." Please clarify.

Response 5-7: Section 5-2 provides background information regarding the typical methodology for analyzing potential effects related to property acquisition or displacement. The discussion related to the applicability of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 for federally-funded projects is provided for informational purposes. If federal funding was being used for the project, and property was being acquired, then this policy would be applicable. However, the project does not anticipate federal funding, as stated in Section 2-3-2-3, nor would the project require any property acquisition.

Comment 5-8: Section 5-4-2-2 should include a discussion of the aerial easements required for the permanent wider structure overhead.

Response 5-8: Section 5-4-2-2 has been updated to reflect the aerial easements.

Comment 5-9: S-6, Last Paragraph: There is a statement that the project would be developed within the existing PANYNJ right of way, but the CEQR Project Description (page 2a - 2b) explains that the SI approach changes would be subject to aerial easements of the City and requires a disposition through the Mayor.

Response 5-9: At the Bayonne Bridge approach in Staten Island, the existing PANYNJ right-of-way is elevated above City streets. The project would result in a wider roadway over these streets, but would remain within the PANYNJ right-of-way. To widen the highway over City streets, a mayoral approval is required. Chapter 5, “Economic Conditions,” has been updated to clarify the relevant City actions pertaining to these aerial easements.

20-2-7 CHAPTER 6: NATURAL RESOURCES

Comment 6-1: The proposed project impacts wetlands and waters of the United States. Please note there is a wetland mitigation bank that serves this area; Evergreen MRI3 Mitigation Bank. Mitigation Banks are the first alternative in wetland mitigation according to the federal rules. Please consider the use of mitigation bank credits as mitigation for project impacts.

Response 6-1: This comment has been noted.

Comment 6-2: Multiple facilities are proposed in New Jersey to protect from the storm water drain surges from the bridge, yet there is no plan to do anything like that on Staten Island. This is totally unacceptable. The sewer treatment plant on Staten Island when it opened was operating above capacity and this would create a disaster. Staten Island should have the same protection as New Jersey.

Response 6-2: Stormwater improvements were designed in consultation with New Jersey and New York City Department of Environmental Protection (NJDEP and NYCDEP). Within New Jersey, the bridge drainage and a portion of the approaches would be routed to stormwater management basins and underground detention systems within the right-of-way that convey stormwater to a new outfall into the Kill Van Kull. These stormwater management basins would incorporate a combination of best management practices (BMPs), and meet the Stormwater Management Rules requirements of NJDEP. Within New York on the bridge travel roadway and approach spans, stormwater would be captured, detained, and released to the NYCDEP system through above ground detention ponds. The detention ponds, which have been developed through consultation with NYCDEP, would connect to NYCDEP's combined sewer system upstream of the regulator. The drainage improvements would eliminate direct discharge of stormwater runoff from the bridge travel roadway to the Kill Van Kull.

The preliminary design originally proposed an outfall to the Kill Van Kull on the New York side. However, at the request of NYCDEP, the outfall was eliminated, and the NYCDEP combined sewer would be upgraded from John Street to Morningstar Road. The stormwater would be discharged into this newly constructed NYCDEP sewer. All connections to the combined sewer system have been designed with control flow devices or orifices to reduce flow rates. The predetermined flow rates, determined by NYCDEP, would result in a system that does not exceed existing flows to the combined sewer.

Comment 6-3: Shooter's Island Bird Sanctuary and nesting birds on the bridge environment and our environment must be protected. Shooter's Island has special significance as part of the Harbor Herons Complex. The peregrine falcon (*Falco peregrinus*), a New Jersey State protected species, has been documented nesting on the Bayonne Bridge. It is recommended that the applicant contact officials of New Jersey Department of Environmental Protection's Endangered and Non-game Species Program and the New York State Department of Environmental Conservation to determine the best course of action that would be employed to protect these nesting birds during all phases of Project construction.

Response 6-3: See Chapters 6 and 16 for more detailed information. Information on threatened and endangered species and significant ecological communities was requested from the New York Natural Heritage Program for a 0.5-mile radius from the project site, and all records returned in the database search were addressed in the EA. With respect to the peregrine falcon and osprey, the timing of the construction would be performed in consultation with NYSDEC, NYCDEP, and NJDEP wildlife biologists to protect peregrine falcons and/or osprey during the construction period (e.g., avoid construction during nesting period, avoid nests during construction, or relocate nests/nesting platforms during construction). These species, if present, would be expected to relocate to the study area during the long-term operation of the project.

Comment 6-4: Mitigation is necessary because the bridge is in a tidal wetland. Port Authority has not maintained the tidal wetland beneath the bridge.

Response 6-4: The project is not expected to have any effect on wetlands beneath the bridge. Any disturbance to wetlands would be expected to be minor and appropriate protective measures would be developed in accordance with any applicable USACE and NJDEP permitting requirements. For more information, see Chapter 6, Section 6-4-2.

Comment 6-5: The size of ships is causing a problem in the harbors because of the size of the wakes. Current research in the distribution and dynamics of wave energy indicates that we should be concerned with an increased rate of marsh retreat through a beam-failure mechanism. Larger container ships mean larger pilot boats escorting them. The suspension of benthic sediments would occur and contribute to higher levels of turbidity, which can effect populations of sport fish and shellfish. Sensitive areas, such as Arlington Marsh, are situated along the vessel traffic route and might sustain some minor impacts.

Response 6-5: As detailed in Chapter 6, “Natural Resources,” Section 6-5-2-5, larger vessels that would use the Kill Van Kull as a result of the taller bridge clearance would not result in adverse impacts with respect to coastal erosion. Furthermore, as detailed in Chapter 6, “Natural Resources,” the anticipated shift in the shipping industry to larger vessels would reduce vessel traffic overall relative to the No Build Alternative. In addition, there would also be a decrease in the use of the Kill Van Kull by tug vessels, which tend to have a greater impact on shoreline erosion. Regardless of the size of the tug vessels, the overall number is expected to decrease.

Additional information with respect to marsh retreat and sediment re-suspension is included in Chapter 6, “Natural Resources,” Section 6-5-2-5.

Comment 6-6: The definition of the study area is extremely limited encompassing only the Kill Van Kull and not recognizing offsite or cumulative impacts. You cannot simply say there are no impacts by redefining artificially the study area. It does not appear that any actual field studies were completed for aquatic biota, including shell fish, a particular concern for Baykeeper as we're in the middle of restoring the oyster in the harbor area.

Response 6-6: Natural resources are discussed in Chapter 6. As stated in Chapter 16, “Construction Effects,” no in-water work would be conducted as part of the project, with the exception of the construction of one stormwater outfall. Due to the lack of intensive in-water work (e.g., dredging, pile driving, new bridge piers or construction platforms, or changes to the shoreline, etc.), indirect and cumulative impacts would not occur. Therefore, the size of the study area was developed commensurate with the level of potential impacts.

Federally listed and New York and New Jersey state-listed species and aquatic resources were assessed within a 0.5-mile radius of the Bayonne Bridge. With respect to aquatic resources, water quality was considered using data from the closest New York City Department of Environmental Protection (NYCDEP) Harbor Survey station (K2), which is located in the Kill Van Kull, less than one mile west of the Bayonne Bridge. Published studies of sediments and aquatic biota were also examined for both the Harbor Estuary and the Kill Van Kull. While targeted field studies for aquatic biota were not completed, it is reasonable (and conservative) to assume that the taxa identified in the literature as occurring in the New York Harbor area in general are also characteristic of the Kill Van Kull. As such, the existing conditions presented in Chapter 6, "Natural Resources," are considered to be an accurate description of the aquatic communities in the project site. Overall, the project would not have the potential to significantly impact oysters or ongoing oyster restoration efforts.

As stated in Chapter 16, "Construction Effects," measures would be implemented to offset the minor temporary impacts during the construction period as per USACE and NJDEP permit requirements. The project would benefit water quality as a result of the drainage improvements eliminating the direct stormwater discharge from the bridge travel roadway to the Kill Van Kull. This stormwater treatment would result in an approximate 80 percent decrease in the total suspended solids (TSS) and 40-percent decrease in total pollutant (TP) loadings to the Kill Van Kull.

Comment 6-7: Were NYSDEC, NYCDEP, and DCP mapped wetlands considered? For example, there is a substantial area (9.5) acres of freshwater wetlands, bounded roughly by Richmond Terrace, Nicholas Avenue, the railroad right-of-way, and John Street. Wetlands exist with and without jurisdictional determinations, and should be identified using topographic references. Properly assess and consider impact on wetlands areas, factor in necessary buffer zones, and develop mitigation measures where needed.

Response 6-7: As detailed in Chapter 6 of the EA, existing conditions of mapped and potential wetland areas were documented through wetland reconnaissance investigations.

Comment 6-8: Residents report red-tail hawks, peregrine falcons, snowy egrets, great blue herons, geese and brandts, mallards, and turkeys. The mallards nest in the area bounded by Richmond Terrace, Nicholas Avenue, the railroad right-of-way and John Street.

Response 6-8: With the exception of the peregrine falcon and osprey, the threatened, endangered, or special concern species listed in Section 6-4-5 of the EA would not be expected to occur within the study area due to the lack of appropriate habitat. Natural resources are discussed in Chapter 6.

Comment 6-9: The use of above-ground detention ponds raises questions as to impact on current water drainage patterns (possibility of increased mosquito population is a concern). Furthermore, anything that adds to the over-taxed combined sewer system in Staten Island without improvements to that system is unacceptable. The potential toxic conditions throughout the site lead to concerns regarding the use of detention ponds. The siting of those ponds is unclear, and testing must be performed.

Response 6-9: At the request of NYCDEP, the NYCDEP storm sewer would be upgraded from John Street to Morningstar Road. The stormwater would be discharged into this newly constructed NYCDEP combined sewer. As discussed in response to Comment 6-2, NYSDEC has been involved throughout the design process, and flow controls would ensure that the upgraded sewer would not affect the capacity of the system. All project detention structures/ponds have been designed to drain down dry over a relatively short duration (24-hrs). Standing water will not remain long enough to provide habitat for mosquito breeding. Groundwater elevations on the NY side were verified and tested for contamination. No contamination was found and groundwater depth varied. However in all cases the New York detention ponds were designed maintaining a minimum separation of two feet between the bottom of the pond and seasonal high ground water, thus avoiding the potential for cross-contamination of storm and groundwater.

Groundwater elevations on the New Jersey side were found to be relatively high and contaminated with arsenic. As a result of this, a clay layer and poly layer were design to provide a ground water barrier to prevent cross contamination of ground water and surface water. The high groundwater was taken into account in the design by providing an extra thick clay layer to surcharge the soil and account for any buoyancy that may occur.

Comment 6-10: In reference to Section 6-5-2-5, it is disingenuous to describe the impact of vessel traffic on noise as insignificant when using studies which are more than eight years old and which presumably did not involve the Post-Panamax class vessels. The discussion of the size of those vessels does not address this, and is merely a distraction.

Response 6-10: The scientific studies (Jasny et al. 1999; Stocker 2002; Hildebrand 2004) are referenced in the EA for the point that commercial vessels are a greater source of low-frequency underwater noise than smaller vessels, not as a means of predicting future noise levels with the project. The EA thus does not disregard the overall noise effect of vessels. However, as discussed in Section 6-5-2-5, it is expected that the larger vessels would not result in a significant increase in underwater noise levels in the future with the project, because the overall number of vessels is expected to be significantly fewer with the project than in the future without the project.

Comment 6-11: We are very concerned by the indication that the long term impact includes a significant reduction in the number of tugboats operating in the Kill van Kull. This will have a negative impact on our local economy, notwithstanding any reduction in coastal erosion. In any event, most of our "coast" has bulkheads: does coastal erosion apply to bulkheads?

Response 6-11: The coastline in the project area is not solely bulkheads; thus, coastal erosion is applicable. Please see response to Comment 6-5 for additional information. Overall, the slight reduction in the number of tugboats is not expected to affect the local economy.

Comment 6-12: As the project may affect threatened and endangered species, it is recommended that the applicant commence, if not done so already, consultation with the National Marine Fisheries Services (NMFS) in accordance with the ESA.

Response 6-12: NMFS was consulted regarding federal and state listed threatened and endangered species, species of special concern, habitats of special concern and marine mammals under jurisdiction of NMFS in and around the project area. In addition, NMFS was included in the review process of the EA.

Comment 6-13: Checking for terrapin nests in or near the proposed work site is best done in June. Please provide more information on any surveys carried out for terrapin nests.

Response 6-13: Field reconnaissance was conducted in early July, and no reptiles (including terrapin nests) were observed in the study area.

20-2-8 CHAPTER 7: HISTORIC AND CULTURAL RESOURCES

Comment 7-1: There must also be a specific archeological assessment that must be done by a reputable, academic, professional company.

Response 7-1: See Chapter 7, “Historic and Cultural Resources,” for a detailed discussion on archaeological resources conducted by qualified cultural resources analysts. The potential for the presence of archaeological resources in the area of potential effect (APE) was evaluated in a series of reports that were provided to and approved by the New York and New Jersey State Historic Preservation Offices (SHPOs).

Comment 7-2: Since October 2011, the NJDEP’s Historic Preservation Office (HPO) has been involved in extensive consultation regarding this undertaking, pursuant to Section 106 of the National Historic Preservation Act. The history of this consultation is outlined in the Draft EA. Both the New York State Historic Preservation Office (SHPO) and the New Jersey HPO determined that the project will have an adverse effect upon the National Register eligible Bayonne Bridge. The HPO is currently working with the United States Coast Guard, the Port Authority of New York and New Jersey, the New York SHPO, the Advisory Council on Historic Preservation, and additional consulting/interested parties to develop and execute an agreement document that will incorporate measures to avoid/minimize/mitigate the effects of the project upon historic properties.

Response 7-2: This comment has been noted.

Comment 7-3: 16-7-4-3 Mitigation: Will the PANY/NJ and USCG collections of documents relating to the Bayonne Bridge be made available to the public? Where, and under what conditions? We have two concerns: one is the ability to access, and the other is the ability of persons with terrorist intent to access. Will there be controls? Additional information is needed.

Response 7-3: All of the information in the comment is addressed in the executed Section 106 Programmatic Agreement.

Comment 7-4: 16-7-4-3: Where will the signage and exhibits developed by the PANY/NJ be displayed/sited? Additional information is needed.

Response 7-4: All of the information in the comment is addressed in the executed Section 106 Programmatic Agreement.

Comment 7-5: 16-7-4-3: Develop age appropriate lesson plans for all "educational institutions" including elementary and high schools. Develop presentations for adults and children for use in local libraries, historical societies, and community group use.

Response 7-5: All of the information in the comment is addressed in the executed Section 106 Programmatic Agreement.

Comment 7-6: 16-7-4-3: PANY/NJ is directed to develop an "Undiscovered Archeological Program"—more detail is needed to evaluate the effectiveness and/or appropriateness of this mitigation. A title alone is insufficient. Additional information is needed.

Response 7-6: All of the information in the comment is addressed in the executed Section 106 Programmatic Agreement.

Comment 7-7: The submitted written description, design matrix, renderings, and project plans illustrate the currently proposed design for the railings along the pedestrian/shared use path. The New Jersey Historic Preservation Office concurs with the design changes and advances that have taken place since review of the 90 percent Design Review submission in November 2012.

Response 7-7: Comment noted.

Comment 7-8: [Chapter 7] is acceptable for architectural and archaeological resources. Additionally, in regard to archeology, the [New York City Landmarks Preservation Commission (NYCLPC)] would like to be consulted about the unanticipated discovery plan, the construction protection plan for St. Mary's of the Assumption Church Cemetery, and if the APE is extended, would like to review the potential impact of the revised work area.

Response 7-8: Comment noted. As an agency with an interest in historic resources in New York City, the NYCLPC will continue to be consulted with respect to the unanticipated discovery plan, the construction protection plan for St. Mary's of the Assumption Church Cemetery, and any extensions of the area of potential effect (APE).

20-2-9 CHAPTER 8: PARKLANDS AND RECREATIONAL RESOURCES

Comment 8-1: There needs to be a better assessment on any impact on public access to these waterways as well as recreational use of the Kill Van Kull and surrounding waterways both during construction and operation of the project. The subsequent use of the waterways by larger vessels, which may require assistance of more tugs, needs to be considered. In addition, recreational boating is expanding in the harbor and the possibility of conflict over public access of the waterway should be addressed.

Response 8-1: Public access to the waterways and their use for recreational boaters would not be affected during construction or operation of the project (see Chapter 8, “Parklands and Recreational Resources,” and Chapter 16, “Construction Effects,” for further discussion). In addition, as discussed in Chapter 6, “Natural Resources,” overall vessel traffic is expected to be less in the future with the project than without the project.

Comment 8-2: The Draft EA discussed displacement of two recreational areas (Al Slootsky Playground and Dennis P. Collins Park), but did not provide any solution. What happens to the neighborhood recreation that gets destroyed during this project?

Response 8-2: The two recreational areas that would be displaced by the project—comprising the Al Slootsky Playground and two ball fields adjacent to Dennis P. Collins Park—are areas being operated by the City of Bayonne on PANYNJ property under a license agreement. See Chapter 8, “Parklands and Recreational Resources,” for a discussion of measures being coordinated between PANYNJ and the City of Bayonne regarding these displacements, which would include funding for other recreational improvements in Bayonne.

Comment 8-3: The proposed project will not impact Green Acres encumbered property at the Edward F. Clark Park or the Dennis P. Collins Park since all work, including temporary construction and staging areas, will take place within the established right-of-way of the PANYNJ, which they own in fee. There are two ball fields located along West First Street (on Block 391, Lot 3 currently owned by PANYNJ, separated from the Dennis P. Collins Park and not currently listed on the City's Recreation and Open Space Inventory (ROSI)) that will need to be permanently relocated. It is [NJDEP’s] understanding that the PANYNJ is working with the

City of Bayonne to relocate these fields. Martha Sullivan Sapp, Green Acres Program Acting Administrator, clarified our ROSI requirements as they apply to the Al Slootsky Playground in her letter dated June 19, 2012.

Response 8-3: Comment noted. As noted in response to Comment 8-2, because the project would displace two recreational areas, PANYNJ is working with the City of Bayonne to provide funds for additional recreational improvements in the City of Bayonne.

Comment 8-4: 8-2: The descriptions regarding the NYC parks should be altered - property is not owned by NYCDPR, but has jurisdiction of city-owned property.

Response 8-4: The text in Chapter 8, “Parklands and Recreational Resources,” has been updated per this comment.

20-2-10 CHAPTER 9: VISUAL AND AESTHETIC RESOURCES

Comment 9-1: The block immediately adjacent to the bridge on Newark Avenue consists of a row of modest homes. Studies have shown that this same block will be without any significant sunlight on the east side when the bridge is raised and widened. As a result, property values of these homes are expected to decline.

Response 9-1: The new bridge alignment would not greatly alter existing shadows as compared to the current structure. A shadows analysis was conducted in accordance with CEQR, which illustrates that impacts from the project would be nominal (see **Appendix J**). Because the bridge is not a solid structure from ground level to roadway, daily shadows would change throughout the day, as they do currently. There may be a slight change in timing and duration of shadows due to the change in elevation and width of the roadway, but it would not be substantially different than existing conditions.

Comment 9-2: It should be mentioned in Section 9-2 that the evaluation of impacts to aesthetic resources is required by NY SEQRA.

Response 9-2: As discussed in Section 9-2, several guidelines were used in the evaluation of impacts to aesthetic resources. In accordance with these guidelines, the existing visual character and quality of the affected environment, as well as the viewer response to those resources, provide the framework for assessing the change in visual character that would occur as a result of the project.

Comment 9-3: EAS Attachment 1: For the Kill Van Kull, it would be helpful to include at least one representative graphic to illustrate the de minimus change in shading on the Kill van Kull.

Response 9-3: The Shadows Analysis has been updated to include a graphic depicting shadows over the Kill Van Kull. The Shadows Analysis has also been included as an appendix to the EA (see **Appendix J**).

20-2-11 CHAPTER 10: TRANSPORTATION

Comment 10-1: The Port Authority should rehabilitate the bridge to accept mass transit meaning light rail and bus rapid transit.

Response 10-1: Transit is not within the scope of this project. However, the Raise the Roadway Alternative was designed not to preclude mass transit in the future. Several options to configure mass transit are possible on the bridge. Also, see response to Comment 2-2.

Comment 10-2: The problem of maneuvering large Panamax vessels in the narrow Kill van Kull and the turn up the Hackensack River should be looked at. This is a question of channel width, channel depth, and maritime safety.

Response 10-2: As concluded by USACE's BBADA navigational study, Post-Panamax vessels would be able to access Port terminals west of the Bayonne Bridge.

Comment 10-3: Table 10-5 projects 3,920 and 5,920 vessels west of the Bayonne Bridge in the years 2020 and 2035 for the No Build alternative. Table 10-6 projects 3,083 and 4,447 vessels for the same years without the project. The discrepancy between vessel projections in 2020 and 2035 between Tables 10-5 and 10-6 for the No Build alternative should be corrected.

Response 10-3: Table 10-6 was updated prior to publication of the Draft EA to reflect refinements in calculations of numbers of vessels expected to call on the Port in the future without the project. Table 10-5 inadvertently included preliminary calculations, and has been updated.

Comment 10-4: Include the highway classification for NY 440 (functional class is Urban Principal Arterial Expressway; design class for NYS is Other Freeways), describe the existing cross-section, and provide a crash analysis for existing roadway. If the primary intent is to increase vertical clearance do you need to widen lanes from 10 to 12ft? A crash analysis should be done to justify improvements proposed and/or to verify if what is being proposed is adequate. Identify any existing non-standard features that exist, as well as any NS features proposed to be retained.

Response 10-4: As discussed in the EA, and noted in the comment, the existing roadway does not meet current traffic design standards with substandard lane widths and no shoulders or median. As such, one of the principal objectives of the project is to upgrade the roadway to modern AASHTO design standards, which would include 12-foot-wide lanes, left and right shoulders, and a median barrier. The roadway design has been conducted in consultation with NYSDOT, NJDOT, NYCDOT, and FHWA.

Comment 10-5: State whether or not there have been any accidents on existing narrow 6-foot pedestrian walkway (see 10-3-1-4). It is used by both pedestrians and bicyclists. 12ft wide walkway/bikeway is a good idea (Figure 2-2) but is that adequate? Identify anticipated future ped/bike usage/volumes.

Response 10-5: Incidents of pedestrian and bicycle accidents are not recorded. However, the existing walkway is narrow and in close proximity to the travel roadway, thereby increasing the potential for safety issues. As discussed in Chapter 10, “Transportation,” on a typical weekday, approximately 55 pedestrians and 85 bicyclists use the walkway. On weekend days, an average of 72 pedestrians and 128 bicyclists use the walkway. The proposed shared-use path would allow continued non-motorized transportation across the bridge. While enhanced access and safety may attract some additional pedestrians and cyclists, the proposed 12-foot width is expected to adequately accommodate these users and has been designed in accordance with AASHTO standards. It should be noted that the shared-use path would not include any amenities such as restrooms or parking and therefore is not expected to be a destination recreational use.

Comment 10-6: [Section] 10-2-7 shows Travel Time Runs that were made for "the areas where traffic would be diverted during construction" per the report. However, the table doesn't compare travel times before construction with times DURING construction, so there is no way to review if the diversions may have significant impacts on traffic. The table needs significant additional data.

Response 10-6: The table shows the results of surveys conducted to develop the baseline for existing conditions. The results of the effect of traffic diversions during construction on traffic operations and congestion are shown in Chapter 16, “Construction Effects,” Section 16-7-6, “Transportation.”

Comment 10-7: No plans are provided, making it difficult to review the proposed reconstruction of Tranter Place/Ramps C and D as mentioned in Section 10-4-2-1.

Response 10-7: Throughout the design phase of the project, PANYNJ has consulted with and met with NYSDOT, NJDOT, NYCDOT, and FHWA. PANYNJ has provided design plan sets to these agencies for review and has incorporated any comments. Consultation with appropriate agencies will continue through the permitting process.

Comment 10-8: At present, how many Post-Panamax are now using the route under the Bayonne Bridge? How many more proposed Post-Panamax ships will be scheduled if the bridge is raised? What are the projected effects on air and water discharges?

Response 10-8: The majority of Post-Panamax vessels do not have the vertical clearance to travel beneath the existing Bayonne Bridge**.** According the *Bayonne Bridge Air Draft Analysis* (USACE, 2009), all of the vessels larger than 10,000 TEU, 92 percent of the world fleet of vessels between 8,000 and 9,999 TEU, and 56 percent of the world fleet of vessels between 6,000 and 7,999 TEU could not call Newark Bay with the current height of the Bayonne Bridge. Please see Tables 10-6 and 10-7 of the EA for the projected number of vessels. Impacts to water and air are discussed in Chapters 6 and 11, respectively.

Comment 10-9: 10-4-2-4: The Raise the Roadway Alternative will impact pedestrian and bicycle crossings by making the bridge traverse longer. In addition, existing and proposed bike routes should be taken into consideration in the design of the bridge transitions to city streets.

Response 10-9: Although the project would elevate the Bayonne Bridge roadway, the locations of the bridge abutments would not be substantially different than the existing locations, achieved by increasing the grade of the roadway. The increased grade would range from 0.85 percent to 1 percent greater than the existing roadway, which would not be expected to greatly affect use of the pathway. The proposed shared-use pedestrian and bicycle path would be an improvement over the existing walkway by providing ramp access (current access is via a staircase), widening the pathway from 6 to 12 feet, and providing greater separation and enhanced safety barriers between traffic and pedestrians. The project would provide safe access to the shared-use path from local streets, allowing connection to any existing or future bike routes.

20-2-12 CHAPTER 11: AIR QUALITY

Comment 11-1: Emissions from roadway sources should be considered (in addition to marine vessels), since increases to bridge use and the area surrounding the bridge are likely as a result of this project.

Response 11-1: As discussed in Chapter 10, "Transportation," the project would maintain the bridge's 4-lane configuration in a similar alignment as the exiting roadway but would improve safety by widening lanes to 12 feet, providing shoulders, and providing a median barrier. The project would not alter operation or capacity of the Bayonne Bridge and the local traffic network and the project would not affect traffic volumes. As discussed in Chapter 11, "Air Quality," since the project would have little to no effect on average speeds, vehicle types, vehicle volumes, or levels of service, the only relevant parameter was the change in distance between the nearest moving lane and the locations at which air quality would be analyzed if screening levels are exceeded. The screening analysis determined that no significant change in air quality would be expected due to the operation of the new bridge and access roads. However, with the advent of the new EPA MOVES emissions model, an analysis of an additional parameter (i.e., changes in roadway grade) is now possible, and has been included in Chapter 11, "Air Quality".

Comment 11-2: As stated in the EA, "fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere." PM is also directly released from mobile sources.

Response 11-2: Please note that the preceding sentence on page 11-1 in Chapter 11, "Air Quality," notes that particulate matter (PM) can be emitted from both mobile and stationary sources. The section referenced by the commenter is a short introduction, which is followed by a more detailed description of pollutants, such as PM, including a statement that "$PM_{2.5}$ is mainly derived from combustion material that has volatilized and then condensed to form primary PM (often soon after the release from a source exhaust) or from precursor gases reacting in the atmosphere to form secondary PM." The analysis was conducted accordingly.

Comment 11-3: As stated in the EA, "the regulation assumes that a proposed federal action whose criteria pollutant emissions have already been included in the local SIP's attainment or maintenance." This is true, but if an action changes the roadway emissions assumed by the SIP, the analysis must include roadway emissions as well as marine vessel emissions.

Response 11-3: Although the commenter's assertion is correct as a general matter, it is not relevant to the project, as described in Chapter 11, "Air Quality" and in response to Comment 11-1. The project would not result in any significant long-term increase in emissions from vehicles using the roadway and will result in a decrease in marine emissions from more efficient larger vessels.

Comment 11-4: As shown in Tables 11-7 and 11-8, while the absolute value of air quality levels associated with this single source is small, the percent increase in estimated emissions from this single source is actually high. A similar analysis should be completed for on-road emissions.

Response 11-4: The commenter's assertion is incorrect. Note that the results in the quoted tables, relating to emissions associated with proposed emergency generators, demonstrate not only that the increments are low, but also that the results represent "maximum predicted" increments, which, as described in the text, would occur very infrequently. The fractional ('percent') increase, although irrelevant, is generally low. Regarding on-road sources, as described in response to Comment 11-1 above and in detail in Chapter 11, "Air Quality," the potential increments in local on-road emissions, related to changes in grade, have been analyzed.

Comment 11-5: As stated in the EA, "as discussed throughout this EA, the project would result in only one long-term impact. This impact is the adverse effect on the historic bridge itself." The impacts to air quality are also high, and so this conclusion is not correct.

Response 11-5: See responses to Comments 11-1 and 11-6 and further detail in Chapter 11, "Air Quality."

Comment 11-6: The analysis needs to look at how increasing the grade of the Bayonne Bridge could increase diesel exhaust.

Response 11-6: As presented in Chapter 11, "Air Quality", an analysis of air quality effects from the proposed change in roadway grade on the bridge approaches has been included in the final EA, as MOVES (the newly established air model) became available for use and made this analysis possible (it was not possible with the previous model). The analysis supports a conclusion that no significant adverse impacts on air quality would occur.

Comment 11-7: The EA states, "Since the operation of the project would reduce emissions as demonstrated in the regional (mesoscale) emissions analysis, the project would conform to the relevant SIP and maintenance plan and does not require a General Conformity Determination."

In accordance with the requirements of the Federal General Conformity regulation (40 CFR Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans), an Applicability Analysis, which identifies the total direct and indirect air emissions associated with construction of the project, and a Conformity Determination (If necessary) are required to determine if a project conforms to a SIP. The United States Environmental Protection Agency's (USEPA's) General Conformity Guidance: Questions and Answers (July 13, 1994) states, "Before any approval is given for an action to go forward, an agency must apply the applicability requirements to a proposed Federal action to determine if a conformity determination is required." In addition, Section 93.153(b) of the Federal General Conformity regulation states, "... a conformity determination is required for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs (b) (1) or (2) of this section."

The regional (mesoscale) emission analysis analyzes the region-wide changes in emissions due to fuel savings from the operation of larger ships; not the total of the direct and indirect emissions. Please indicate how this project conforms to the SIP based on the results of the Applicability Analysis and/or the Conformity Determination for this project.

Response 11-7: The project would have a small effect on direct emissions associated with the change in grade on the bridge; other than that, as described above in response to Comment 11-1, there would be no change in direct emissions. The analysis shows that there would be a net reduction in pollutant emissions within the nonattainment area. The sentence in the EA cited in the first paragraph of the comment has been revised to indicate that a general conformity determination is not required for other reasons (see the response to Comment 11-8).

Comment 11-8: While the conclusion that operational emissions do not need to be included in the general conformity determination is correct, the statement, "since the operation of the project would reduce emissions, as demonstrated in the regional (mesoscale) emissions analysis below, the project would conform to the relevant SIPs and maintenance plans, and does not require a general conformity determination," is incorrect. There is no need to include operational emissions in the project's general conformity determination because the Coast Guard does not have continuing program responsibility for those emissions. The decision should not be based on the results of the mesoscale analysis, as the general conformity rule (40 CFR 93 Subpart B) does not allow for such an applicability determination based on mesoscale modeling. (A similar statement is made again on Page II-14)

Response 11-8: The text has been revised accordingly.

Comment 11-9: The Environment Assessment Air Pollution Section contains factual inaccuracies, specifically that discussing the perceived volatility of carbon monoxide. I note the statement (section 11-2-1) that CO is "…a reactive gas which does not persist in the atmosphere." This statement is incorrect; CO has a typical atmospheric lifetime of 5-7 days and is fairly unreactive. While dilution does occur near emission sources, exposure to CO is a cumulative concern in inhalation toxicology as CO interacts with hemoglobin (the oxygen-carrying compound in blood) to induce anemic hypoxia. This interaction is strongly bound and thus carboxyhemoglobemia can persist over time. Hemoglobin-bound

CO will dissociate from the blood if the exposure is removed, but in the case of chronic exposure conditions (as one would expect near a busy roadway with a large number of trucks), CO concentration will not appreciably decrease and thus, CO remains a perilous concern for this community. The EA inadequately articulates the risk of CO arising from this change.

Response 11-9: The statement has been removed. The EA addresses the potential for CO emissions associated with the project, as required, and identified no potential significant adverse impacts. Overall, the project would reduce CO emissions in the region due to the increase in ship engine efficiency.

Comment 11-10: The region is already in non-attainment for $PM_{2.5}$, based upon annual standards of 15 µg/m^3. These communities are already in non-attainment status for $PM_{2.5}$ (Section 11-3-2), which are based upon previous $PM_{2.5}$ standards. This standard has recently been lowered and new designations will be determined in December 2014. Even ignoring the likely increase in air pollution levels attributed to truck/rail traffic, it is unlikely that this region will be removed from non-attainment status for $PM_{2.5}$ with estimated emissions increases as proposed in the Environmental Assessment, and this has statewide implications. While $PM_{2.5}$ concentrations have decreased recently, the bulk of this is most likely attributed to declines in commerce due to the economic recession, which has resulted in lower emissions; as the economy continues to rebound, increase $PM_{2.5}$ levels are very likely. The EA does not sufficiently discuss these issues.

Response 11-10: All ambient air quality monitors in the region have demonstrated compliance with all $PM_{2.5}$ standards, including the new standard of 12 µg/m^3. Although EPA has not yet formally changed the nonattainment designation, it has concurred with New York and New Jersey that concentrations in recent years have demonstrated that the area does meet the 24-hour (2006) and annual (1997) standards. As stated by EPA in response to state Clean Data Submissions, "*Based on updated air quality monitoring data from the New York, New Jersey and Connecticut portions of the New York-N. New Jersey-Long Island, NY-NJ-CT nonattainment area, the 2006 24-hour $PM_{2.5}$ NAAQS is now being met. Specifically, the 2009 design values demonstrate levels below the 35 µg/m^3 [24-hour] standard in all three states.*" A similar statement was made for annual average $PM_{2.5}$. New York and New Jersey have each submitted a formal redesignation request for 24-hour and annual $PM_{2.5}$. It is anticipated that the long term trend of reduced concentrations will continue, supported by federal regulation to reduce emissions (e.g., engine standards), by the states' efforts to reduce their emissions to ensure compliance with the federal standards and with State Implementation Plan commitments, as well as efforts such as the Port Authority's programs aimed at reducing system-wide emissions, as described further in the response to Comment 18-13. The efforts to reduce emissions and the long term trend of diminishing concentrations in the region are expected to continue, even with short-term fluctuations in traffic that may be associated with changes in the economy. Furthermore, the EA demonstrates that regional emissions would decrease as a result of the project, not increase per the comment. See response to Comment 11-7 above. Moreover, the small number of truck trips to and from port facilities that may be associated with avoidance of cargo diversion to other ports as the result of the project would have an unmeasurable and insignificant effect on $PM_{2.5}$ concentrations in nearby communities. The project is not projected to cause any violation of standards and would not affect the attainment status of the region.

Comment 11-11: NOx standard promulgation concerns. While the region is considered in attainment for annual average NO_2, the region is now considered as 'unclassifiable/attainment' as a result of new NO_2 standards promulgated in February 2012. There were two changes to National Ambient Ari Quality Standards (NAAQS) as a result of this decision: the implementation of an hourly 100 ppb NO_2 standard, and new siting requirements for monitor locations. The latter, which requires states to monitor NO_2 near roadways in order to capture maximum likely concentrations, may have substantial implications for future NO_2 attainment status for this region. The state of New Jersey has proposed a location in Fort Lee, near the entrance to the George Washington Bridge. This is a major truck thoroughfare north of the proposed port and may be detrimental to future NO_2 attainment designation for the State of New Jersey.

Response 11-11: Comment noted. As discussed in Chapter 18, "Indirect and Cumulative Effects", and in detail in Appendix I, "Induced Demand Analysis", the potential for increased emissions due to induced demand is negligible and would not significantly affect local or regional emissions.

Comment 11-12: Diesel particulate matter is now known to be carcinogenic (IARC, Group 1) and any increase in this contaminant must pose de minimis risk to the community. Diesel exhaust is now classified as a known carcinogen, thus burdening the community with exposure to these environmental contaminants. The most recent National-Scale Air Toxics Assessment (NATA) in 2005 clearly delineates that communities surrounding this port to be of very high cancer risk—typically around 100 cancers per million. While this tool is not designed to empirically determine communitywide cancer risk, it is highly effective at prioritizing locations and communities which are disproportionately burdened with high levels of cancer-causing toxins. The communities surrounding the port are at risk for excess cancer, at levels well above the rest of the New Jersey, and any increased capacity of the port that results in additional diesel exhaust exposure presents additional risk of cancer. The Environmental Assessment does not adequately address this issue.

Response 11-12: The project would not increase capacity of the port. However, Chapter 18, "Indirect and Cumulative Effects," does evaluate potential effects associated with any growth which may occur as a result of the project. As discussed above, the analysis concludes that the minimal growth projected would not cause any significant adverse air quality impacts locally or regionally. Furthermore, the air quality analysis has demonstrated that the regional burden of diesel particulate matter will be reduced due to reductions in marine emissions. The Coast Guard is aware and has considered the Memorandum of Agreement (MOA), in which the PANYNJ has entered with NJDEP, which will provide guidance, oversight, and enforcement of measures to reduce port-related emissions.

Comment 11-13: [NYC]DEP concurs with the consultant's conclusion that the project would result in reduced emissions from ships in the harbor, and that potential air quality impacts from the emergency generators would be insignificant.

Response 11-13: Comment noted.

20-2-13 CHAPTER 12: CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

[No comments received on this chapter.]

20-2-14 CHAPTER 13: NOISE

Comment 13-1: 16-6-6-7 Emergency Generators: Specification of allowable noise levels is required.

Response 13-1: Emergency generators would be within enclosed structures, thereby shielding any noise from the surrounding community.

Comment 13-2: The Noise section states that "There is no substantial difference expected in the noise resulting from the project, and the Build and No Build noise levels would not be perceptibly different." This is supported by the information provided. The existing noise levels at several locations, however, approach or exceed the FHWA noise abatement criteria. This indicates an existing noise impact as defined in NYSDOT (and assumed NJDOT) noise policies. These impacts are not identified or addressed.

Response 13-2: Existing noise levels at various locations near the project site are presented in Chapter 13, “Noise,” and identified in Tables 13-7 and 13-8. While the FHWA Noise Abatement Criteria (NACs) are used as guidance for analyzing potential noise impacts, highway noise regulations requiring abatement measures where existing conditions exceed those criteria only apply to highway construction projects where a state department of transportation has requested federal funding, pursuant to “Procedures for Abatement of Highway Traffic Noise and Construction Noise” (23 CFR 772). As such, the project is not subject to provision of noise abatement measures for existing noise conditions. However, as appropriate under NEPA, an analysis was conducted to evaluate the potential for the project to increase noise levels in comparison to the No Build Alternative. As discussed in Chapter 13, “Noise,” no substantial changes in land use or operation of the bridge would result from the project, and any minor increases in noise due to changes in elevation of the roadway would be imperceptible. Therefore, existing exceedances of FHWA NACs are appropriately not identified as impacts of the project.

Comment 13-3: [NYC]DEP concurs that the project would not result in any significant adverse impacts to noise and vibration.

Response 13-3: Comment noted.

20-2-15 CHAPTER 14: HAZARDOUS AND CONTAMINATED MATERIALS

[No comments received on this chapter. See “Chapter 16: Construction Effects” below for construction-related comments and responses]

20-2-16 CHAPTER 15: COASTAL ZONE MANAGEMENT

Comment 15-1: Based on the information submitted, the Waterfront Open Space Division, on behalf of the New York City Coastal Commission, having reviewed the waterfront aspect of this action, finds that the actions will not substantially hinder the achievement of any Waterfront Revitalization Program (WRP) policy and hereby recommends that this action is found consistent with the WRP policies. This consistency determination is only applicable to the information received and the current proposal. Any additional information or project modifications would require an independent consistency review.

Response 15-1: Comment noted.

20-2-17 CHAPTER 16: CONSTRUCTION EFFECTS

GENERAL COMMENTS

Comment 16-1: Reference to EA: “Three of these ideas were incorporated into the final engineering design and resulted in approximately $73.9 million in estimated cost savings, as well as an over six-month reduction in total project schedule.” For transparency purposes, these ideas should be discussed further, to make it clear how they actually reduce impact and result in cost savings. If these considerations are presented elsewhere in this chapter, this should be made clearer in the document.

Response 16-1: The reference in the above comment has been deleted from the EA because it was discussed early in the design process and is no longer relevant.

Comment 16-2: Commenters expressed concern regarding safety of the public during construction, particularly with large cranes and other equipment in close proximity to residences.

Response 16-2: As discussed in Chapter 16, “Construction Effects,” Section 16-3-5, all applicable federal and state Occupation Health and Safety Administration (OSHA) and public safety requirements would be followed.

Comment 16-3: To protect the safety of passing motorists approach segments will be erected at night (9PM–5AM Sun–Thurs, 12AM–8AM Fri & Sat). This protects the safety of motorists passing through the area, however the health and safety of the residents, who are fixed and immovable, will be extreme, particularly in the case of vulnerable populations (i.e., the elderly and persons with special-needs. This is not acceptable. Period. A different schedule must be developed, in consideration of the well-documented danger this poses to our community.

Response 16-3: As described in the EA, construction activities would remain within the PANYNJ right-of-way. Because some activities would pose safety risks when conducted in close proximity to the traveling public using the right-of-way, these activities would be conducted at night and on weekends during road closures. However, these activities would not pose safety risks to structures or residents outside of the right-of-way. For a discussion on measures to minimize potential noise and air quality impacts, see responses to Comments16-48 and 16-55.

Comment 16-4: Utilities in the area are not identified. Disruption to local businesses and residents, even if temporary, is a certainty when relocation is proposed, Identify utilities. Correct findings regarding impact of relocations.

Response 16-4: The Port Authority has completed an extensive utility survey in connection with utility companies that service the Bayonne and Staten Island areas. The proposed construction of the new foundations and piers will interfere with selected overhead and underground utility lines. The primary impacts are to overhead power, telephone and cable lines with a few minor impacts to underground gas and water lines that are adjacent to or under the bridge. Additionally the project will include an extensive reconstruction of the underground utilities in Richmond Terrace in the area between John Street and Morningstar Road to provide upgrades for the City to the existing sewer and water lines. The Port Authority is coordinating with the impacted utility owners to modify the facilities as required. While there will be some disruptions to the traffic during the construction of the underground facilities, these impacts have been reviewed with the City and will be further coordinated during construction. Disruption of utility services related to this reconstruction is not anticipated.

Comment 16-5: We note that the proposed schedule calls for construction beginning in June of 2013. If the schedule has changed, the schedule in the report should be modified.

Response 16-5: Comment noted. As of now, the construction schedule has not changed.

Comment 16-6: Section 16-4 In Construction Sequencing Stage 2, is it necessary to demolish the east side of the existing roadway at this stage, or can it be used to stage construction from and removed at a later date?

Response 16-6: The construction phasing plan has been carefully developed based on many considerations, including cost-effectiveness, efficiency, minimization of disruption to the traveling public and residents, minimization of potential environmental effects, etc. In order to construct the higher elevated roadway above the existing roadway in Stage 2, taller piers would need to be constructed, which would require removal of the existing roadway since the new piers would pass through the space occupied by the eastern half of the existing roadway. Additionally, the load represented by the eastern half of the existing roadway must be removed from the arch prior to strengthening of the arch for the new load of the elevated roadway. Further, this method of construction helps minimize the work zone footprint and stay within PANYNJ's right-of-way.

Comment 16-7: In Section 16-5, it is mentioned that construction activities may require temporary closing or narrowing of surrounding streets and sidewalks. It should be mentioned that closing or narrowing of sidewalks will be done in accordance with ADA regulations.

Response 16-7: The project would involve limited and temporary sidewalk closures and associated alternative provisions for pedestrian access. Maintenance and protection of traffic measures (including provision of alternative pedestrian access) would be developed in accordance with local New York City and City of Bayonne requirements, following the guidance of FHWA's Manual on Uniform Traffic Control Devices. ADA accessibility standards would be met to the extent practicable within the confines of the work zone.

Comment 16-8: Since the sidewalk will not be in place for construction stages 1, 2, and 3 (5 years), there should be an evaluation of potential effects to pedestrians, (especially those who may use the walkway for trips to work, etc.) in Section 16-7-1.

Response 16-8: The walkway would need to be closed for much of the construction period to protect pedestrians near the work zone. However, once the first half of the new elevated roadway is completed, along with the new shared-use path, PANYNJ would consider opening the shared-use path (potentially on a limited basis) if it is determined that it can be done safely and would not put pedestrians in jeopardy. To accommodate pedestrians and cyclists when the walkway is closed during construction, PANYNJ is investigating opportunities for providing shuttle services.

Comment 16-9: The EA states that construction is "temporary"; therefore details on the environmental effects of construction are unnecessary. Yet, construction is meant to extend over a period of several years, long enough to have substantial effects on surrounding populations.

Response 16-9: Chapter 16, "Construction Effects," of the EA provides a detailed analysis of potential effects related to construction of the project. As discussed in the EA, as well as responses to Comments 16-48 and 16-45, a number of measures would be implemented during construction to reduce potential effects related to areas such as noise and air quality.

Various guidance indicates that construction activities of certain timeframes are considered short-term activities and therefore unlikely to have significant effects. For instance, the CEQR Technical Manual generally considers construction activities of 2 years or less as short-term and not requiring detailed quantitative analysis in environmental review documents. In another example, transportation conformity regulations do not require inclusion of construction emissions for construction activities occurring for less than 5 years at individual sites. Since construction activities are expected to be 20 months or less in any specific location, they would be considered to have short-term effects. Nevertheless, as discussed above and throughout Chapter 16, "Construction Effects," of the EA, the effects of construction activities are analyzed in quantitative detail in the EA, and extensive control measures would be implemented to minimize any adverse effects.

Comment 16-10: What is the operational time for the use of equipment and machines during construction?

Response 16-10: Construction activities may occur at any time as long the contractor adheres to the restrictions (e.g., noise levels) stipulated in the construction documents. It is expected that nighttime activities would generally consist of lifting of structural elements over the closed roadway.

LAND USE AND SOCIAL CONDITIONS

Comment 16-11: As stated in the EA, “The project will not result in adverse impacts for land use or social conditions. While some localized adverse impacts could occur in the study area during the construction phase of the project, these impacts will be temporary and will end once construction is complete.” The short-term impacts should be determined so that it is clear that they are actually "not adverse". This is especially important since the duration of construction is not short.

Response 16-11: As discussed in Section 16-7-1, “Land Use and Social Conditions” of Chapter 16, “Construction Effects,” temporary localized adverse effects from the project may occur as a result of construction traffic and temporary increases in noise levels and emissions. These effects, which are quantified in Chapter 16, “Construction Effects,” would not substantially alter land use, social conditions, or economic conditions and they would end once construction is complete. A number of measures to minimize adverse effects would be implemented during construction, such as a Traffic Management Plan, strict noise level restrictions, and emission control measures for equipment to ensure compliance with applicable regulations.

Comment 16-12: The businesses in the area will be adversely affected during the construction phase. Parking is already a significant problem; construction can only exacerbate the situation.

Response 16-12: Business operations would be able to continue during construction, and long-term adverse impacts to local businesses are not anticipated. Additional information is provided in response to Comment 16-7.

Comment 16-13: Commenters are concerned about the impact of construction activity in direct proximity to two schools: Port Richmond High School and PS 21. Impacts may include: lack of sleep, constant noise, traffic considerations (travel times and access), and, the increased proximity to PS 21 of traffic when construction is completed. Appropriate mitigations must be identified and mandated, and should be developed in consultation with PTAs and the Department of Education.

Response 16-13: As discussed in Chapter 16, "Construction Effects," construction activities with the traffic improvement measures, noise abatement, and emission control measures proposed would not result in any significant adverse impacts. The noise analysis evaluated a receptor site at Trantor Place and Hooker Place (in close proximity to PS 21) as well as Eaton Place (in close proximity to Port Richmond High School). As discussed in the EA, noise levels, both during construction and operation of the project, would not increase substantially at these locations. As noted above, construction noise levels would be minimized through implementation of various control measures (see response to Comment 16-55 for further discussion), and would be prohibited from exceeding certain limits even in areas much closer than the schools to the construction work zone.). The elevated roadway closest to PS 21 would remain in a similar horizontal alignment to the existing roadway, resulting in imperceptible changes to noise levels over existing conditions.

ECONOMIC CONDITIONS

Comment 16-14: As stated in the EA, “Private property that encroaches on PANYNJ right-of-way would be reclaimed by PANYNJ during construction.” This and other statements later in the document are in direct conflict with the statement on page 23 that "no easements of private property would be required in Bayonne, NJ".

Response 16-14: Encroachments refer to non-PANYNJ entities that currently use land within PANYNJ’s right-of-way. These encroachments would be removed. The project would not require PANYNJ to acquire any land or rights to land (i.e., easements) outside of its right-of-way.

Comment 16-15: The economic impact analysis was really poor and did not consider the impact on residents, who may rent or sell in the project area. Some commenters request compensation, such as tax breaks and reparation for resale value, cleaning costs, and potential health care costs.

Response 16-15: The economic analysis examines the potential of the project to result in adverse economic impacts by directly or indirectly displacing businesses or residents. Since the project would not require any permanent property acquisition, the analysis focuses on easements and encroachments within the construction work zone. Streets would likely experience staggered, temporary closures during construction, which may result in short-term inconvenience to some residents (see further discussion in response to Comment 16-17 below). However, access to residences and businesses would be maintained.

Comment 16-16: Commenters questioned whether the project would employ local residents during construction (including those who are not part of unions), particularly in cities affected by the project and the Ports. Some commenters were also concerned that New York unions tend to dominate for projects that also concern New York, but New Jersey unions should also be given equal opportunities.

Response 16-16: While matters raised in this comment are beyond the scope of this action, the Port Authority has implemented a Local Business Enterprise (LBE) program designed to maximize participation of businesses located in Hudson, Richmond, Union, and Essex counties during construction. As part of this program, the Port Authority has conducted outreach events with local businesses in each county. The contractor would also be required to divide work, services and materials to be subcontracted into small portions where feasible, solicit bids in local media, hold and attend outreach events, develop and implement a Participation Plan, and submit monthly reports on the participation of Local Businesses.

Comment 16-17: Local businesses have asked how access to their properties may be affected during construction. For example, a manufacturer near West 5th Street and Bayview Court in Bayonne requires access to their facilities by large motor vehicle trucks.

Response 16-17: As discussed in Chapter 5, “Economic Conditions,” some streets would most likely experience temporary closures during construction. Closures would be staggered according to the construction schedule to minimize disruption of traffic (see Chapter 16, “Construction Effects”). Although street closures may inconvenience some local businesses and deliveries, the closures would not be long-term and alternative access would be available. Business operations are expected to be able to continue during construction and long term adverse impacts to local businesses are not anticipated.

Comment 16-18: 16-7-2-2 Environmental Consequences in Staten Island: The Port Authority encroaches on public property in Staten Island, and the plans fail to indicate that encroachment. The City of New York owns lots 8900 and 8901 in tax block 1127. These belong to the community, and should not be subject to site clearing or other modifications in the course of construction. Correction needed. See previous re. landscape protection and access considerations.

Response 16-18: The two parcels mentioned are outside of the PANYNJ right-of-way and are not within the construction work zone. Therefore, these parcels would not be subject to site clearing or other modifications during the course of construction. However, within Lot 8900 of Block 1127 is a paved area that acts as an undesignated extension of John Street. Subject to the approval of the City, the project would utilize this paved area for access to the parking area for the proposed site of the Project's New York Field Office during construction. This use would not involve modifications to the current limits of the paving on the parcel or any other modifications to the parcel. At the completion of construction, the existing paved area would be restored to its present condition.

Comment 16-19: The conclusion that there will be no impact on parking is ill-considered. There are already serious parking problems affecting both residents and businesses in the community—as documented by the records of numerous complaints of double-parking in the vicinity of Hooker Place—across the street from the parking area which will be partially closed. We also fail to see provision for the constructions workers' parking requirements. See comments at Chapter 5. This section must be re-written to reflect a genuine study of conditions and impact. Specific measures for work crew parking needs must be delineated. Specific measures to mitigate negative impact on local businesses and residents are required.

Response 16-19: As stated in the response to Comment 5-4, as construction plans have been refined, it has been determined that a construction easement would not be required for the public parking lot on the northeast corner of Walker Street and Morningstar Road. Therefore, there would be no effects on area businesses and their customers using this parking lot as a result of the project. As discussed in Chapter 5, "Economic Conditions," the streets in Staten Island and Bayonne that would be affected by the project could experience temporary closures during construction. Closures would be staggered according to the construction schedule to minimize disruption of traffic (see Chapter 16, “Construction Effects”). Although street closures may inconvenience some local businesses and deliveries, the closures would not be long-term and alternative access would be available. Business operations are expected to be able to continue during construction and long-term adverse impacts to local businesses are not anticipated. As discussed in Chapter 16, "Construction Effects," PANYNJ would require the contractor to use designated off-street parking areas for construction workers and would require the contractor to provide transportation from designated parking areas to construction sites. Therefore, there would be no additional demand placed on area parking due to construction workers.

NATURAL RESOURCES

Comment 16-20: The EA states, “New Jersey, a 1.93-acre United States Army Corps of Engineers (USACE) jurisdictional wetland (Wetland B) is present within the potential staging area. It is estimated that all of the 1.93 acre wetland may be temporarily impacted by the construction of the potential staging area.” This statement is in direct contrast with a later statement that no natural resources within the wetland (e.g., ecological systems, wildlife) will be impacted.

Response 16-20: In light of available space within the PANYNJ right-of-way, it is likely that the potential staging area would not be used, and if it is, that the wetland area within the site would be avoided. The outfall would be constructed beneath the wetland area by jacking, similar to directional drilling, from an upland area. Thus, no adverse impacts to wetlands are expected as a result of the project. If disturbance of a wetland proves necessary, as accounted for in the EA, measures would be implemented to minimize and/or offset any temporary impacts during construction in accordance with any USACE and NJDEP permit requirements.

With respect to wildlife, as described in Chapter 16, “Construction Effects,” the terrestrial wildlife communities in the bridge study area are largely composed of disturbance-tolerant species to which the project would not result in adverse impacts.

Comment 16-21: The EA states, “waterbirds that forage in the Kill Van Kull would in most cases be expected to temporarily avoid these areas of construction activity and instead utilize other areas that provide similar foraging habitat.” If the waterbirds relocate from their habitat, then they are adversely impacted.

Response 16-21: Waterbirds that are likely to occur in the Kill Van Kull and those that are abundant in open water areas throughout New York Harbor are detailed in Chapter 6, “Natural Resources.” Disturbance generated by construction of the project is discussed in Chapter 16, “Construction Effects.”

Comment 16-22: For this project, it is necessary to base the construction on a more accurate and careful estimate for floodplains. Flood estimates at Bayonne Bridge should consider sea-level rise and hurricane pattern change. This project report EA could underestimate the flood at the bridge site and it might be needed to consider more serious flood situations, especially in conditions of sea-level rise and changes in hurricane patterns. Consideration is needed for:

1. The construction needs to be strong enough and able to survive impact of storm surge, given the fact that Sandy has destroyed many coastal structures;

2. If a larger impervious surface zone is designed near the approaching piers in correspondence with a large flood zone, then, drainage capacity for this zone needs an increase to deal with runoff during heavy rainfall and prevent potential inland flooding; and

3. Consideration of appropriate design standards and consideration of base flood elevations in siting emergency generators.

Response 16-22: Subsequent to publication of the Draft EA, the Federal Emergency Management Agency (FEMA) enacted a program to develop FEMA Advisory Base Flood Elevation (ABFE) maps to show a more accurate flood risk for certain areas of New Jersey and New York that were impacted by Hurricane Sandy. As of March 1, 2013, ABFEs have been developed for the study area within Bayonne and Staten Island. These revised ABFE maps have been added to Chapter 6, “Natural Resources” (see Figure

6-1). Within the 100-year and 500-year floodplains in Staten Island, there will be no increase in impervious surface. All impervious surfaces being introduced within the limits of these areas would be on structures and located well above the ABFEs. Based on the ABFE maps for Bayonne, the area of impervious surface calculations for the proposed piers has been revised. As discussed in Chapter 6, “Natural Resources,” there would be a net decrease of 0.04 acres of impervious surfaces as compared to the 0.12-acre increase that was presented in the EA. Within the 500-year floodplain, there would be a net decrease of 0.002 acres of impervious surfaces as compared to the 0.048-acre increase as presented in the Draft EA. As the net area of impervious surface would decrease, they would have no substantial effect on floodplains. Furthermore, a discussion of the project elements with respect to storm surges and sea level rise has been incorporated into the operational analysis in Chapter 6, “Natural Resources.” The conclusions based on these analyses show that there would be no substantial difference in the conclusions presented in the Draft EA. Significant impacts with respect to floodplains during the construction and long-term operation of the project are not expected.

The elevations of permanent installations, including the emergency generators and other mechanical and electrical systems supporting bridge operations, were compared against actual observed high water during Hurricane Sandy as well as the ABFE maps recently published by FEMA. These systems are located above both of these critical elevations.

The project is consistent with Floodplain Management Executive Order 11988 (42 FR 26951), which requires federal agencies to avoid adverse impacts to floodplains and seek alternatives where practicable.

Comment 16-23: Based on information provided in the summary fact sheet that no in-water work, other than a single stormwater outfall will be required. The Bureau of Marine Fisheries foresees minimal to no impacts to marine species from this installation.

Species Occurrence Area (v8) and Landscape mapping (v3.1) indicates threatened / endangered (T / E—*Federally listed*) and species of concern may be in the area. (*Atlantic and Short-nose Sturgeon*, Least Tern, Black and Yellow-crowned night-heron, Osprey, Cattle Egret) Little Blue heron, Tri-colored heron, Glossy

Ibis & Snowy Egret. The Endangered and Nongame Species Program (ENSP) does not expect any adverse impact to these species from this project.

Response 16-23: This comment has been noted.

Comment 16-24: A general timing restriction on mechanical trimming or removal of trees from March 15th through July 31st is recommended to protect nesting birds covered under the Migratory Bird Treaty Act. Non-mechanical tree trimming may be permitted once the tree is checked for nesting activity.

Response 16-24: The protection of nesting birds is discussed in Chapter 16, “Construction Effects,” Section 16-7-3-3.

Comment 16-25: The Department's Division of Land Use Regulation received an application for a Flood Hazard Area Individual Permit and Waterfront Development Individual Permit- Upland and In-water on February 14, 2013. This application is currently under review by the Division. The Division agrees with the project's purpose and need of raising the navigational clearance of the Bayonne Bridge in order to solve the constraints of the existing Bridge for future local, regional and national economic growth as well as to bring the Bridge into conformance with modem highway design standards.

Response 16-25: Comment noted

Comment 16-26: The indication that endangered species will be “addressed” by various agencies lacks specificity.

Response 16-26: No federally listed threatened or endangered species would be significantly impacted by the proposed project. See Chapter 6, “Natural Resources”, and response to Comment 6-8 for additional information on measures that would be taken to protect species of concern.

Comment 16-27: The section on noise disturbance and wildlife describes the negative effects of people-generated noise on wildlife impact. However, it then states that local species are habituated to noise, and that there will be no long term effect. If the wildlife flees the area there is, indeed, a significant effect. Correction and amplification needed. Source information should be cited. Should the finding of “no impact” lack support, mitigation measures must be considered.

Response 16-27: As discussed in response to 16-21, avoidance around the project site by waterbirds could have a minor and temporary adverse effect by requiring them to use alternative areas. However, given the extensive amount of comparable open-water habitat available nearby and throughout New York Harbor, there would be no significant impact to the birds' foraging ability, energetic condition, survival, reproductive success, or other aspects of their overall fitness. Citations regarding human activity's influence on wildlife are noted in Section 16-7-3 of the EA.

Comment 16-28: The Audubon Society should be included in consultations regarding the osprey and peregrine falcons. Timing is irrelevant when conducting a multi-year project and careful consideration of the translocation of nesting areas is needed. If these birds leave the area and never return, there will be an adverse impact.

Response 16-28: A professional ornithologist who is an advisor to the Audubon Society, co-authored Chapter 6 and will be closely involved with the project's efforts to avoid impacts to peregrine falcons, osprey, and other birds. As discussed in Chapter 6, "Natural Resources", the timing of the construction would be performed in consultation with NYSDEC, NYCDEP, and NJDEP wildlife biologists to protect osprey and peregrine falcons during the construction period (e.g., avoid nests during construction or relocate nests/nesting platforms during construction). Peregrine falcons are generally indifferent to disturbances, including large maintenance vehicles and work crews, that would be in addition to consistent visual disturbance, noise, and vibration associated with the high volume of cars and trucks moving across the bridge during normal operation. Thus, it is not expected that any falcons currently present in the study area would leave the area and never return.

Comment 16-29: Revegetation plans should consider opportunities for phyto- and rhizo-remediation, using appropriate native species. Any fill required must be certified clean. Historic fill is a leading source of toxins in the area.

Response 16-29: This comment has been noted. Any fill material to be imported to the project site would be uncontaminated material.

Comment 16-30: The temporary wetland impact should also include a requirement for five years of monitoring to ensure that the wetland hydrology and vegetation has not been significantly impacted by construction. Well monitoring equipment to measure water elevation should be installed at least one season prior to construction. If temporary construction and laydown compact the soils, this will negatively impact hydrology, creating a permanent negative wetland impact to a water of the United States. Ideally, the permit should include an agreement for a secondary plan, such as the purchase of wetland credits from a wetland mitigation bank within the same basin as the impact. This plan should not allow wetland credits in different parts of the state(s) or watersheds

Response 16-30: All construction activities would meet the terms of all permit conditions as defined by the regulatory agencies.

Comment 16-31: Any unavoidable wetlands that are proposed to be impacted should be compensated pursuant to the Final Rule. Temporary wetland impacts that are expected to last for more than 6 months should be considered permanent impacts to the aquatic environment and be properly mitigated. Please consider the use of displacement mats over the entire surface of any wetland disturbance.

Response 16-31: Any disturbance to wetlands would be expected to be minor and appropriate minimization or mitigation measures would be developed in accordance with any applicable USACE and NJDEP permitting requirements. As discussed in the response to Comment 16-20, it is not anticipated that the potential staging area, particularly the wetland area, would be used, and the outfall would be constructed beneath the wetland area by jacking. Thus, no adverse impacts to wetlands are expected as a result of the project.

Comment 16-32: All post construction planting of the Project site should be accomplished utilizing coastal vegetation that is found in the Kill Van Kull region. To ensure success of any mitigation, the applicant should incorporate an invasive species management plan that would be implemented during any post monitoring period. A 5 percent threshold of any invasive species encountered in the planting area would trigger implementation of the plan.

Response 16-32: Any mitigation would be developed and monitored in accordance with any applicable permitting requirements. The appropriate vegetation for the area would be included in the landscaping plan to be developed in coordination with NYSDEC and NJDEP.

Comment 16-33: USFW recommend that any potential nesting habitat be cleared and maintained as a non-bird nesting habitat during the construction of the project. All clearing of bird nesting habitat shall occur outside the nesting window: April 1 to September 1 of any given year. All bird nesting habitat shall be replaced, where possible, at the conclusion of the Project and the habitat be maintained during any post construction monitoring period for the duration of the post monitoring period.

Response 16-33: As discussed in response to Comment 16-24, to the extent practicable, PANYNJ would limit tree removal to outside of the breeding season identified in consultation with USFWS, NJDEP and NYSDEC to avoid potential impacts to nesting birds, and any trees that need to be removed during the breeding season would first be inspected for signs of nesting activity. Any trees with active nests would not be removed until after the nests are no longer active.

Comment 16-34: The current evening lighting scheme of the Bayonne Bridge is a documented threat to passing avifauna. As discussed in the Draft EA, it is recommended that coordination efforts with the Service continue with a focus on implementing a new lighting alternative for the modified 215 bridge that avoids the lighting threat that currently exists for the avifauna.

Response 16-34: Avian collision risk would be highly dependent on the light characteristics, and could be diminished through the selection of particular lighting schemes. The new bridge lighting design would be a marked improvement over the current lighting scheme, and would follow USFWS recommendations, including the following:

- Use low-intensity, low-wavelength blue, turquoise, or green lights. Avoid red and yellow lights.
- Use blue jelly jar LED (light-emitting diodes) lights on suspension cables and rectangular blue LED lights on bridge deck. These lights have low energy consumption, produce bright but directional light (25 percent as bright as a 100-watt bulb), and provide long-distance viewing while minimizing light pollution.
- Minimize the use of lights during spring and fall bird migration periods, particularly during overcast, cloudy, or foggy conditions.
- In addition, collision risk may be dramatically reduced by using flashing obstruction lights Instead of steady-burning lights

Comment 16-35: Federal agencies also have a responsibility to protect, conserve, and manage natural resources under various Federal statues and Executive Orders (EO). According to EO 13186, each Federal agency taking actions that are likely to have a measurable adverse effect on migratory bird populations is directed to develop and implement a Memorandum of Understanding (MOU) with the United States Fish and Wildlife (USFW) Service to promote the conservation of migratory bird populations. The USFW New Jersey Field Office understands that a draft MOU is under development with the Service and the USCG. We encourage the USCG to continue its efforts to finalize a MOU that will further the conservation goals of migratory birds.

Response 16-35: This comment has been noted.

Comment 16-36: The applicant should employ best management practices to avoid or minimize potential impacts during the life stages of any fish found in the Project area. This shall include a time of year construction for all in water work from March 1 through June 30 to protect the river herring and American Shad (*Alosa sp.*) and striped bass (*Morone saxatalis*) during their annual migration to many New York and New Jersey waterways to spawn.

Response 16-36: The only project element requiring in-water work is the construction of one stormwater outfall. The outfall will be constructed by "jacking" (a technique similar to horizontal directional drilling) starting from an area landward of Wetland C, as identified in the EA. The contractor would be required to comply with the proposed seasonal restriction on in-water construction between March 1st and June 30th, as well as any other site-specific permit conditions. Any in-water work associated with the outfall would be completed in accordance with permits from the appropriate regulatory agencies and would incorporate typically required protective measures (e.g., the construction of a cofferdam prior to start of the window, so that work can be done in the dry).

Comment 16-37: The Kill Van Kull sediment is noted for its history of contamination. For any dredging or excavation that may be necessary for the Project, we recommend the river sediment be properly characterized and disposed of in a manner that meets current dredged material disposal standards. The applicant shall ensure that no contaminated sediments are exposed upon Project completion.

Response 16-37: While dredging is not part of the project, any excavation required for construction of the outfall would be conducted in accordance with all applicable regulations and permitting requirements. Excavated material would be disposed of in a manner appropriate to its characteristics and levels of contamination, if any.

PARKLANDS AND RECREATIONAL RESOURCES

Comment 16-38: 16-7-5-1: Two parcels of open land belong to the City of New York, tax block 1127, lots 8900 and 8901. These belong to the community, and should not be subject to site clearing or other modifications in the course of construction. Correction needed; controls required.

Response 16-38: The two parcels mentioned are outside of the PANYNJ right-of-way and are not within the construction work zone. Therefore, these parcels would not be subject to site clearing or other modifications during the course of construction. However, within Lot 8900 of Block 1127 is a paved area that acts as an undesignated extension of John Street. Subject to the approval of the City, the project would utilize this paved area for access to the parking area for the proposed site of the Project's New York Field Office during construction. This use would not involve modifications to the current limits of the paving on the parcel or any other modifications to the parcel. At the completion of construction, the existing paved area would be restored to its present condition.

TRANSPORTATION

Comment 16-39: Several commenters were pleased that the Bayonne Bridge walkway would be improved but expressed concern that the walkway would be closed during construction. It not only serves recreational users, but also non-motorized transportation users. In addition, in the aftermath of Hurricane Sandy, NYU Rudin Center issued a report highlighting the need to closely evaluate a pathway over the Verrazano Bridge for safety reasons because of gas shortages and transportation problems during the hurricane. Until that happens, the Bayonne Bridge pathway is the only non-vehicular, non-marine access and egress from Staten Island and needs to be maintained. Accommodations should be made during construction for emergency access and transportation such as shuttle services across the bridge (current MTA bus services only serve rush hour and do not accommodate bikes). Other suggestions included working with municipalities to create seamless connections between a bike network in Staten Island and in Bayonne.

Response 16-39: PANYNJ has chosen the proposed engineering design in an effort to keep the existing bridge open to traffic as much as possible during the construction period. However, it would not be feasible to keep the pedestrian pathway open throughout construction due to space constraints and safety considerations. Please see Section 16-7-6-10 in Chapter 16, “Construction Effects,” for further discussion regarding temporary impacts to pedestrian and bicycle access on the Bayonne Bridge during construction of the project.

Comment 16-40: Several commenters expressed concerned about traffic congestion during construction, and that construction equipment and vehicles will cause additional traffic delays.

Response 16-40: Both regional and local traffic impacts were evaluated in the EA for the construction and operation of the project. During construction, the Bayonne Bridge roadway would be open to traffic with one lane per direction, instead of the normal two. Traffic modeling indicates that this would create up to one additional minute of delay to travel through the length of the two-mile construction zone. These are considered modest delays over the 2-mile span of the bridge and would not greatly inconvenience bridge patrons.

As discussed in Chapter 16, “Construction Effects,” street closures would be staggered according to the construction schedule to minimize disruption to traffic. Although street closures may be an inconvenience, these closures would not be long-term, and alternative access would be available. Construction activities would be subject to strict requirements with respect to equipment and traffic, which would be stipulated in the construction documents. With these measures in place, short-term impacts during construction would be minimized, thereby minimizing disruption to the community to the extent practicable and feasible.

Comment 16-41: 16-7-6 Transportation: This section focuses exclusively on motor-vehicle traffic. Our area is heavily reliant on mass transit, walking, and bicycles. We are appalled that this is not considered, and ask that the impact on these forms of transportation be assessed, and plans for mitigating the negative impacts be developed and presented for comment. The closure of the underpass throughout all phases of construction effectively bisects our community, impacting emergency vehicle access as well as ordinary travel. This section must be re-written to reflect a genuine study of conditions and impact. The needs of the fixed population, our community, take precedence over transient vehicular traffic, and must be considered, and require delineation of appropriate mitigation measures.

Response 16-41: The discussion in Chapter 10, "Construction Effects," of the EA has been updated to reflect potential temporary effects on bus routes and bus stops. As discussed in the Draft EA, local streets and the Bayonne Bridge would remain open to the traveling public, as well as transit operators, throughout construction, with temporary overnight and weekend closures. Underpasses serving local streets may be subject to overnight closures but several weeks advance notice would be given. Temporary closures of Route 440 on/off ramps and local streets would require modification to several local public bus routes, but would be coordinated with the MTA and New York City Transit (NYCT). Please see Section 16-7-6-9 in Chapter 16, "Construction Effects," for a more detailed discussion of potential temporary effects on transit.

As stated in Chapter 16, "Construction Effects," emergency vehicles would be able to traverse the bridge at all times, even when closed to the traveling public. Temporary overnight local street closures are not expected to substantially affect emergency response as a number of alternate routes are available in the study area.

AIR QUALITY

Comment 16-42: As stated in the EA, "…and construction equipment meeting Tier 4 emissions standard would be used where conforming equipment is widely available, and the use of such equipment is practicable." To what extent is conforming equipment available and practicable for this project?

Response 16-42: The precise extent of Tier 4 equipment use for the project is unknown at this time. However, the construction documents require use of Tier 3 engines and best available retrofit technology, except in limited instances where it is not practicable, to be authorized only through a waiver request from the contractor and approval by PANYNJ. This combination effectively reduces $PM_{2.5}$ emissions to a level equivalent to Tier 4. Because they are a fairly recent technology, Tier 4 engines are not widespread and are therefore not required, but their use would be encouraged. Note that the analyses did not assume the use of Tier 4 engines.

Comment 16-43: As stated in the EA, "the microscale analyses were performed for 2017, the year by which the maximum traffic diversions are anticipated." This study year will not result in the most adverse impacts, since LOS is consistently and significantly lower prior to the implementation of the traffic diversions, as described in the transportation impacts section of this chapter.

Response 16-43: The microscale mobile source analyses were performed for a period when the maximum traffic diversions from ramp closures are anticipated. While there may be instances where the No Build Alternative may have poorer levels of service than the construction period, during which improvement measures would be implemented, this is not an impact of the project. Therefore, the microscale analyses performed were representative of the worst-case scenarios as a result of the project, which included increased delays, reduced LOS, and maximum traffic diversions.

Comment 16-44: As stated in the EA, "the combined total is a conservatively high estimate of potential impacts, since it is likely that the highest results from different sources would occur under different meteorological conditions (e.g., different wind direction and speed) and would not necessarily occur when the highest background concentrations are present." This statement is not necessarily true. Construction activities and on-road sources will be in close proximity to each other, and therefore subject to the same meteorological conditions. Further, the analysis considers on-road emissions when the level of service (LOS) has been increased, which is not a worst-case scenario.

Response 16-44: The statement is true in this case, as stated, because the worst-case analyses are not located together in space and time. See response to Comment 16-43 above regarding the LOS question.

Comment 16-45: As shown in table 16-34, the incremental construction impacts to NO2 levels are extremely high and, when combined with background levels, are at 97 ppm which is very close to the

NAAQS level of 100 ppm. While this isn't actually an exceedance, the analysis doesn't consider the higher emissions that are expected before occur traffic diversions are implemented.

Response 16-45: Environmental impact analyses require very conservative modeling assumptions, such as those employed in the EA (see Chapter 16, "Construction Effects") to ensure that exceedances would not occur, as demonstrated with regard to NO_2. Thus, there is no reason for concern regarding concentrations that are not predicted to exceed the standard. See response to Comment 16-43 above regarding the traffic comment.

Comment 16-46: As shown in tables 16-35 and 16-37, the incremental construction impacts to NO2 and $PM_{2.5}$ are extremely high and, when combined with background levels, are very close to the NAAQS levels. When the $PM_{2.5}$ impacts from on-road sources are combined with the background and construction impacts, the resulting $PM_{2.5}$ level is even closer to the NAAQS level of 35 $\mu g/m^3$. While they aren't actually exceedances, the analysis doesn't consider the higher emissions that are expected before occur traffic diversions are implemented.

Response 16-46: Environmental impact analyses require very conservative modeling assumptions, such as those employed in the EA, to ensure that exceedances would not occur, as demonstrated for NO_2 and $PM_{2.5}$. See the responses to Comments 16-43 and 16-44 above.

Comment 16-47: As shown in Table 16-38, the incremental mobile source values are not consistent with the earlier tables.

Response 16-47: The incremental mobile source values in Table 16-38 are consistent with Table 16-36. The mobile source concentrations in Table 16-38 are the same as the Project mobile source concentrations (excluding background) in Table 16-36. Background concentrations are accounted for in a separate column (third column) in Table 16-38.

Comment 16-48: A number of commenters expressed concerns with respect to air quality during construction related to emissions, dust particles, and toxic materials and debris from the existing bridge. The effects on birds and fish from toxins in the air and water also need to be addressed. Further detail on monitoring, reporting of any issues, timeframes for correcting issues, and keeping residents informed should be provided.

Response 16-48: As described in Chapter 16, “Construction Effects,” concentrations would comply with NAAQS of the Clean Air Act, which have been established by USEPA to protect sensitive populations. Emissions would be controlled in order to ensure compliance with these standards, including measures such as diesel equipment reduction, use of clean fuel, best available tailpipe reduction technologies, utilization of newer equipment, enforcing idling restrictions, and dust control measures, all detailed in Chapter 16, “Construction Effects.”

See response to Comment 16-62 for a discussion of measures to avoid impacts related to release of materials and particles from work on the existing roadway. As detailed in Chapter 6, “Natural Resources,” further coordination with natural resource agencies would occur during the permitting phases of the project, and specific measures to minimize potential impacts to wildlife species, if needed, would be implemented during project construction in accordance with applicable regulatory agency requirements.

Comment 16-49: Federal General Conformity regulation requires that the total direct and indirect emissions from an action/project are to be included in the analysis for the action/project. Section 93.153 (b) (Applicability) states, "... a conformity determination is required for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs (b)(1) or (2) of this section."

Please clarify if the emissions associated with the following project components have been included in the Applicability Analysis and Table 16-40, Emissions and Construction Activities:

- Construction of the storm water outfall located in New Jersey
- Transport of materials by barge and truck
- Transport of the existing deck via the use of barges
- Removal of debris by truck
- Disposal of the existing deck (truck emissions to the disposal facility/site)
- Transport of bridge and approach components pre-fabricated outside of the study area

- Utility relocations, such as electric power, communication, gas and drainage lines, and equipment in both New Jersey and New York
- Annual construction activity and on-road emissions
- Annual total direct and indirect construction emissions for the entire action/project and not just the construction emissions for certain stages
- Emissions from on-road trucks and worker vehicles and from non-road construction equipment

Please also clarify that the quantified analyses that focused on the worst-case scenario (Stages 2 and 3) also considered the above.

Response 16-49: The worst case periods were analyzed for microscale analyses, and the total annual emissions in each year were analyzed for regional analysis and conformity. The analysis has been updated to ensure all of the project components listed above are included; the few minor components that were not included in the draft EA analyses have been added in the current analysis. The conformity analysis concludes that annual emissions from project construction would be well below de minimis thresholds established by EPA.

Comment 16-50: The EA states, "Much of the project's construction staging would occur within the approximately 40-foot construction work zone, thereby limiting any effects on surrounding roadways and pedestrian elements."

The EA indicates that it is anticipated that the construction staging area would be established on the property occupied by the Port Authority of New York and New Jersey (PANYNJ) Administration Building in Staten Island. The EA also states that a second potential staging area would be located on a portion of the approximately 50-acre property owned by Texaco in Bayonne and additional staging areas would be established within PANYNJ right-of-way and at the discretion of the contractor. Have there been any changes to the location of the construction staging areas since Superstorm Sandy? If the construction staging area has been relocated due to Superstorm Sandy, have the emissions in the Applicability Analysis and in Table 16-40 Emissions from Construction Activities been changed to reflect the new location?

Response 16-50: See response to Comment 16-22 for a discussion regarding flood elevations and FEMA, ABFE maps. Following Hurricane Sandy, the observed high water line was evaluated and it was determined that permanent installations, including the emergency generators, were above this elevation. Location of staging areas would ultimately be up to the discretion of the contractor; however, the potential staging areas analyzed in the EA have not changed. Delivery sites have not been changed since Hurricane Sandy because the majority of the work site that is connected to local roadways is located higher than the ABFE. The under bridge area between West 1st Street and the shore line is below the ABFE and accounts for about 50 percent of the New Jersey approach structure work, but there would be no practicable or feasible area to relocate this work zone and construction staging area. Because the construction work areas have not been relocated, no related modifications to the air quality analysis have been necessary.

Comment 16-51: Motor vehicle emissions simulator (MOVES) is the appropriate model for predicting on-road mobile emissions to be used in microscale analyses. We note that while the current analysis was not done to satisfy EPA's transportation conformity requirements (nor was it required for conformity); the MOVES model has been available since December 2009 and recently became the required model for use in EPA-mandated localized "hot-spot" analyses. MOVES should be used for similar types of analyses, such as this one.

Response 16-51: The MOVES model was officially released by EPA for hot-spot analyses in December 2010, and a two-year phase-in or grace period, until December 2012, was provided to allow for implementation of the model and development of requisite data inputs by states. At the time the construction mobile source analysis for the EA was initiated, New York and New Jersey had not made critical data inputs for use in MOVES publicly available. Therefore, MOBILE6.2 was used for this analysis. (Recently, to address a comment on the Draft EA, a MOVES-based analysis specifically to assess potential impacts from the proposed change in roadway grade on the bridge and approaches during the operational phase of the project, which was not possible using MOBILE6.2, was conducted.)

Comment 16-52: Appendix H—Construction Air Quality: This appendix lacks sufficient detail to allow reviewers to evaluate how the construction period emissions for general conformity were determined. All assumptions should to be documented. For example:

- Please provide the inputs to the NONROAD model
- Please provide the inputs to the MOBILE model
- Please explain how the Control Factor was determined and used in the calculation
- Please provide the assumed engine tier levels for non-road equipment
- Please explain how the Daily Use and Average Use percentages were used in the calculation

Response 16-52: Detailed model backup is available for review upon request.

Comment 16-53: Appendix H—Construction Air Quality: It is not clear whether marine sources were included in the construction phase general conformity applicability analysis. Chapter 16 references the use of barges to transport materials and to remove the existing bridge deck (Sections 16-6-4 and 16-6-5). Tug emissions associated with barge towing and placement must be included in the analysis to the extent that those emissions occur in the nonattainment area (40 CFR 93.153).

Response 16-53: Because the project would not be a marine-based construction project, marine emissions were expected to be minimal. However, in response to comments, marine emissions have been added to the analysis. The results of the analysis support previous conclusions (see **Appendix H**).

Comment 16-54: New Jersey Environmental Federation (NJEF) questions the use of the AERMOD dispersion model for projecting air emissions related to construction. The model tends to under report what actually occurs. As a result, the project is likely to exceed pollution limits for diesel with no recourse in place. Given the existing impacts of pollution in the surrounding environmental justice communities, the model used for estimating air emissions should be more conservative in its approach—i.e., take a more precautionary approach and suggest mitigation measures that should be installed during construction to minimize potential for exposure to these health harming air toxics.

Response 16-54: As mentioned by the commenter, AERMOD is a dispersion model. It does not project emissions. It is also EPA's preferred model for dispersion modeling, with the most capabilities of estimating dispersion from complex sources such as construction. Furthermore, while a dispersion model may under-predict pollutant concentrations (as opposed to emissions) for a given event, the analysis accounts for this possibility by using a robust range of conditions (i.e., using 5 years of meteorological data and taking periods of high background emission concentrations) to provide a conservative analysis. As detailed in the analysis, the project has incorporated a comprehensive emissions reduction program, as suggested in the comment—See Chapter 16, "Construction."

NOISE AND VIBRATION

Comment 16-55: A number of commenters expressed concern over noise levels during construction from the project in residential areas. In addition to daytime activities, commenters were concerned about noise levels during nighttime construction activities. Further, some commenters felt that the EA does not adequately account for the debilitating effect of low or medium noise levels over extended periods of time that could last several years.

Response 16-55: Section 16-7-9 in Chapter 16, "Construction Effects," of the EA provides a detailed quantified analysis of potential noise impacts related to construction. The analysis examines peak construction effects during both daytime and nighttime periods. In addition, the construction noise analysis examines worst-case conditions during construction by assessing potential noise impacts at sensitive receptor locations in closest proximity to construction activities.

Impacts were assessed based upon three factors: the magnitude of the noise produced by construction-related activities alone, the magnitude of the increases in (total) ambient noise levels due to construction activities, and the duration of time that any receptors would be subject to perceptible increases in noise levels due to construction-related activities.

The analysis results presented in the EA show:

- The magnitude of the noise produced by construction-related activities alone is relatively modest (i.e., the maximum daytime $L_{eq(1)}$ value is predicted to be 70.5 dBA, and the maximum nighttime $L_{eq(1)}$ value is predicted to 67.5 dBA);
- The magnitude of the increases in (total) ambient noise levels due to construction activities: (1) at locations not immediately

adjacent to the Bayonne Bridge and its approaches would be barely perceptible, and (2) at locations immediately adjacent to the Bayonne Bridge and its approaches would range from barely perceptible to appreciable increases (with the largest increases occurring during time periods when existing ambient noise levels are relatively low).

- In terms of the duration of time that any receptors would be subject to perceptible increases in noise levels due to construction-related activities, construction activities would occur for only a limited time period (up to 20 months, or potentially less in some instances) at any specific location.

Comment 16-56: The Draft EA's construction noise analysis is deficient. The Draft EA does not disclose what the pre-mitigation noise levels from construction of the Project would be even though it appears that the Coast Guard quantified them. NEPA requires that the lead agency provide the data on which it bases its analysis. Indeed, such information is needed to understand whether mitigations are needed and which mitigations are appropriate.

Response 16-56: There is no need or requirement to provide the analysis information requested. PANYNJ has committed to implementing extensive measures and the noise analysis assumes implementation of certain control measures since they would be included as part of the project. Therefore, the noise analysis presented in Chapter 16, "Construction Effects," provides an adequate assessment of potential construction-related noise impacts.

Comment 16-57: It appears that the construction of the Project will, in fact, create a significant amount of noise. While the Draft EA argues that there "are no federal or state regulations which definitively define what constitutes a construction noise impact," the operational noise chapter of the Draft EA outlines standards that the Table 16-43 appears to violate. Draft EA at 16-69, 16-70. Specifically, the Draft EA provides the following thresholds in its operational noise chapter:

- From the New York City CEQR Technical Manual: an increase of 3–5 dBA or more at sensitive receptors over a No Build condition ranging from 60 to 62 dBA $L_{eq(1)}$, and an increase of 3 dBA at night (10 pm to 7 am), are significant. Draft EA at 13-6–13-7.

- From the Federal Highway Administration: a substantial noise increase is defined as an increase of 6 dBA. Draft EA at 13-4.

Table 16-43 reports $L_{eq(1)}$ increases ranging as high as 13.1 dBA at night, and a number of day and night increases above 8 dBA. The table reports a number of receptors that will experience day or night time noise levels above 70 dBA. By way of reference, the sound of a highway or train traffic at 15 meters is 70 dBA. See Draft EA at 13-2. The Draft EA reports that the construction will occur for as many as 20 months in particular locations, and for 45 months overall. Draft EA at 16-71. Further, the Draft EA explains that "an increase in noise level of 10 decibels is considered…as a doubling in noise level," and Table 16-43 reports that some areas will see an increase of 10.2, 12.1, 13.1, and a few close to 10—8.5 and 9.2. Moreover, considering the three factors that the Draft EA asserts "should be considered when determining whether construction-related activities would result in a noise impact"—magnitude of the noise, magnitude of the increase in noise, and duration of the increased noise levels—the noise impacts seem to be significant. See Draft EA at 16-69. The Draft EA's own data and analysis contradicts the Draft EA's repeated assertions that the construction noise levels are "relatively modest." See Draft EA at 16-70, 16-71.

Additionally, the Draft EA appears to admit that noise impacts will be significant—and need to be mitigated—without coming right out and stating it. The Draft EA explains that "[t]hese increases are likely to be noisy and intrusive to some residences and users of public facilities and institution[s]," and that PANYNJ will even set up a program to provide storm windows, air conditioning units, and alternative ventilation, presumably in addition to the other mitigation options. Draft EA at 16-71. Mitigation of this type would only be initiated if impacts were deemed significant.

Response 16-57: The criteria referenced from Chapter 13, "Noise," apply to operational conditions (i.e., once the project is complete) and are not applicable to construction. As discussed in Chapter 13, "Noise," noise levels after completion of the project would remain within accepted thresholds and not be substantially different than existing conditions.

Noise from construction activities is subject to a separate set of guidelines that take into account three factors: the magnitude of the noise produced by construction-related activities alone; the magnitude of the increases in (total) ambient noise levels due to construction activities; and the duration of time that any receptors would be subject to perceptible increases in noise levels due to construction-related activities.

Table 16-43 in Chapter 16, "Construction Effects," presents the magnitude of potential noise level increases, but does not reflect that these noise levels would be of limited duration. In terms of the duration of time that any receptors would be subject to perceptible increases in noise levels due to construction-related activities, construction activities would occur for only a limited time period (up to 20 months, or potentially less in some instances) at any specific location. These noise levels would not occur every hour, but could be quieter depending on the equipment being used at any one time. In addition, as discussed in the EA, PANYNJ has committed to implementing various measures to minimize the magnitude to construction-related noise levels and noise level increases (see response to Comment 16-55).

Based upon the limited duration of construction-related increases in noise levels at any receptor location, and in consideration of the extensive measures that PANYNJ has committed to implementing, construction activities would not be expected to result in any significant adverse noise impacts.

Comment 16-58: The Draft EA explains that analysis of the expected noise levels and commitment to mitigations will occur after the Project would be approved. The Draft EA explains that "[p]rior to the start of any work the Contractor is to perform a noise analysis based on their anticipated construction activities and submit for approval a Noise Mitigation Plan that will adhere to the noise criteria indicated in the contract documents." Draft EA at 16-68. This turns NEPA on its head. NEPA requires this analysis to occur before the project is approved, not after. Further, the Draft EA also does not explain what the "noise criteria indicated in the contract documents" would be. This is a critical omission, preventing decision makers and the public from understanding what noise levels the contractors are going to be required to stay within. The last paragraph of the construction noise analysis states that contractors will be required to "utilize construction equipment and path controls which in combination do not produce L_{max} noise levels at 50 feet which would exceed 85 dBA during weekday daytime hours (i.e., between 7 AM and 6 PM), and which produce L_{max} noise levels at 50 feet which would be no more than 8 dBA above existing noise levels during nighttime and weekend work periods." Draft EA at 16-72. It is not clear if this is the "noise criteria" that will be in the "contract documents." If so, this would allow for a significant amount of noise, especially if there are multiple contractors operating simultaneously. Also troublesome is that 8 dBA is a lower noise level than what Table 16-43 projects for some locations, even though Table 16-43 "assume[s] implementation" of "path controls." See Draft EA at 16-70.

Response 16-58: As discussed above, the noise analysis assumed certain control measures would be included as part of the project. Construction documents are not typically complete prior to the NEPA process, but the environmental review process, as well as applicable local, state, and federal regulations, dictate the thresholds with which the contractor must comply. The thresholds and criteria described in the EA and in response to Comment 16-55, above, would be included in the construction documents. The criteria stated in Chapter 16, "Construction Effects," and noted in the comment, are the criteria that would be stipulated in the construction documents. The EA has been modified to make this clarification.

Comment 16-59: The Draft EA lists "examples of the types of measures that may be utilized" for noise mitigation but does not provide any information, analysis, or evidence about the measures' effectiveness or substantiate that the mitigation options are sufficient to reduce potentially significant noise levels. As part of demonstrating the effectiveness of any proposed mitigation, the Coast Guard should ensure that there is adequate enforcement and regular monitoring of the mitigation measures.

Response 16-59: As discussed above, the noise analysis assumed the implementation of certain noise abatement or control measures as part of the project. Further analysis was conducted to determine the effectiveness of additional control measures, as depicted in Table 16-44 in Chapter 16, "Construction Effects." Contractors would be required to provide equipment and, where necessary, employ path controls, which satisfy PANYNJ project requirements described above—which would be contained in the construction documents. In addition, extensive noise monitoring and enforcement would occur (see response to Comment 16-55 for further discussion).

Comment 16-60: The Draft EA does not contain any discussion on how noise affects public health and quality of life. Without such a discussion, it is impossible for decision makers and the public to understand the real-life impacts of Project-generated noise.

Response 16-60: Various guidelines for regulating noise levels have been established by governmental agencies such as FHWA and New York City to protect the health and well-being of people to the extent practicable, and these guidelines have provided the framework upon which the construction noise analysis was conducted. USCG and PANYNJ are sensitive to the potential effects of noise level increases on residents near the proposed construction work zone and are committed to ensuring that the project complies with all applicable noise restrictions. As discussed in the response to Comment 16-55, PANYNJ has made a commitment to implement a proactive program to minimize adverse noise impacts on affected residents.

Comment 16-61: Commenters expressed concern regarding blasting and potential damage to surrounding structures, especially in light of past blasting activities conducted by the U.S. Army Corps of Engineers (USACE) to deepen and widen the navigational channel.

Response 16-61: The project would not require any blasting.

HAZARDOUS AND CONTAMINATED MATERIALS

Comment 16-62: Commenters were concerned whether the USCG or the Port Authority have taken into consideration the effects of construction with respect to lead paint chips from the bridge, dust, and dirt particles. Commenters expressed concern how this may effect outdoor spaces, such as pools.

Response 16-62: All construction activities are required to meet the terms of all permit conditions as defined by the regulatory agencies. The Port Authority has included safeguards in its contract documents that will help to protect its neighbors and the environment.

As discussed in Chapter 16, “Construction Effects”, Section 16-7-10, a Construction Health and Safety Plan (CHASP) would address the procedures to follow for the disturbance of lead. In addition, the Port Authority would have an independent monitor to oversee this work. During the course of the contract as part of its outreach plan, PANYNJ would work closely with neighbors to resolve any concerns that might arise during construction. The removal of the approach structures and associated lead-based paint would remove the potential for exposure as a result of construction.

Comment 16-63: Commenters are concerned over whether the EA has adequately analyzed how construction of the project may increase exposure in residential areas to hazardous materials, such as lead paint, PCBs, asbestos, arsenic, and radioactive waste. In particular, residents are concerned with the health effects on children. Commenters question the adequacy of testing for existing contamination and potential for exposure (air, water, soil, dust) during construction.

Response 16-63: PANYNJ has completed a Phase I Environmental Site Assessment in conformance with the ASTM E1527 standard. As discussed in Chapter 16, “Construction Effects”, Section 16-7-10, a Construction Health and Safety Plan (CHASP) would be followed to reduce the risk of exposure to contaminants.

Comment 16-64: Several commenters have noted the radioactive site nearby on Richmond Terrace in Staten Island. What precautions will be taken not to disturb that site? What coordination with EPA is anticipated to assure safety to the community and to the workers?

Response 16-64: The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) site called “Richmond Terrace Radiological Site” is located at 2351 Richmond Terrace, adjacent to the construction work zone to the east. As discussed in the Phase I, radiological contamination was determined to be isolated in the northwest corner of the CERCLIS site and does not present an immediate health risk. The project would not result in any construction activities or disturbance on the Richmond Terrace Radiological Site.

Comment 16-65: The Draft Environmental Assessment refers to the removal of toxic items and the possible disposal options. There is no clear description of how the public, water and air will be protected from those toxins during transport from the bridge site to the disposal site. For example, the U.S. Environmental Protection Agency undertook a massive information, commentary and reporting campaign to ensure that the options for removal of toxic waste from the Jewett-White Lead site in Port Richmond were properly handled. Trucking such materials through the community without serious precaution will endanger thousands of residents and visitors.

Response 16-65: The removal and transportation of any hazardous materials would be handled in accordance with all applicable regulations. PANYNJ would require oversight by the Site Safety Officer and strict adherence to the CHASP. The entity performing off-site transportation would hold current valid permits and possess a Spill Prevention, Countermeasures, and Containment Plan (SPCC). Protective measures would be taken when transporting contaminated materials, such as decontamination and covering of material in trucks. All trucks would be required to follow designated truck routes, as designated by New York City and the City of Bayonne. Truck routes for New York City can be found online here: http://www.nyc.gov/html/dot/html/motorist/truckrouting.shtml.

Comment 16-66: The consultant hired to analyze the risk of toxic exposure to this waste was told by the Port not to study chemicals at adjacent sites or even to speak to local, state or federal regulatory agencies. This was the case even though construction will occur at or close to Little League fields, parks and a public school. The consultant did not have access to all the Port Authority owned property under or near the bridge. The consultant revealed the Port Authority was unable to provide fundamental information about the property to satisfy the most basic requirements of the investigation. The Coast Guard and the public are not allowed to rely on the hazardous materials and contamination investigation. Only the Port Authority may rely on the investigation to avoid liability. The consultant spent only four days at the site. They did not test any soil or water, even if they knew that there were impacts or potential impacts from hazardous substances, including PCBs and lead. The Draft EA states that the details about the construction risks due to hazardous materials and contamination will be investigated and taken care of after the project is approved even though the entire area around the bridge has the potential to be contaminated. The Draft EA also states that the measures to protect the public, workers and the environment will be decided later and then they will consult with the appropriate regulatory officials.

Response 16-66: The investigation for the EA was designed largely to satisfy the requirements of EPA's "all appropriate inquiry" rule at 40 CFR § 312. While this rule defines the minimum requirements to establish an "innocent landowner" or similar defense from liability under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), industry practice has made this rule a *de facto* guideline for ascertaining whether further investigation is warranted. Therefore, screening investigations meant to satisfy the "all appropriate inquiry" rule are frequently used as a standard screening tool to establish basic environmental conditions at a site. In addition, deviations from the full ASTM E1527 Phase I standard were appropriate given the size of the project and associated study area. However, an updated Phase I Environmental Site Assessment (ESA) was performed during March and April of 2013 for the construction work zone (Port Authority-owned property) in accordance with the ASTM E1527 standard.

All necessary control measures would be implemented by the project specific Construction Health and Safety Plan (CHASP), as discussed in Chapter 16, "Construction Effects," Section 16-7-10.

Comment 16-67: Excavations in excess of 12 feet are expected for pier foundations. The proximity of a Superfund site makes commenters nervous, and there is no mention of testing or controls. We demand full and proper consideration of this site. We further demand testing in any area with proposed site disturbance of any kind, noting recommendations for "further testing" in publicly records relating to potential radiological contamination in the area. Mitigation measures should include full abatement.

Response 16-67: As discussed in response to Comments 16-63 and 16-64, the project would not result in any construction activities or disturbance on the Richmond Terrace Radiological Site. The excavation and stockpiling of materials within the construction work zone would be performed using methods that minimize the dispersion of soil into water or land and would follow the CHASP. All soil and groundwater will be taken off site after it is sampled and analyzed. The material would be disposed of at a permitted or state-authorized facility.

Comment 16-68: The NYCDEP concurs with the recommended health and safety and investigative/remedial measures for the proposed project including:

- A site specific CHASP is to be developed to outline appropriate handling and disposal methods for any identified hazardous or contaminated materials).
- Any remaining subsurface contamination not removed or remediated during construction activities which would not present a potential for exposure unless additional subsurface disturbance were to be required (e.g., utility repairs), would be addressed through a set of institutional and/or engineering controls (e.g., requiring areas to remain paved or requiring implementation of health and safety plans for subsurface utility repairs).
- Any polychlorinated biphenyl (PCBs), asbestos containing materials (ACMs) and lead-based paint within the project limits not removed as part of construction would be abated or maintained in accordance with applicable regulatory requirements.
- Any fuel storage tanks, maintenance-related chemicals and wastes generated by routine or non-routine operations would be managed in accordance with the applicable requirements to prevent spills or releases.
- Cleanup of hazardous spills and accidents, and management of solvents, road salt, etc. would be performed in accordance with existing standard NYSDOT/NJDOT procedures.

With the measures described above, there would be no potential for the project to have significant adverse impacts due to hazardous materials.

Response 16-68: Comment noted.

20-2-18 CHAPTER 17: ENVIRONMENTAL JUSTICE

Comment 17-1: Reference to EA: "Evaluate the project's potential adverse effects on minority and low-income populations relative to its overall effects to determine whether any potential adverse impacts on those communities would be significant and disproportionately high." It seems that the analysis identified that low income or minority populations exist across the study area. As a result, the analysis doesn't actually determine whether impacts to these communities are disproportionally high, relative to other populations.

Response 17-1: The environmental justice analysis in the Draft EA follows the guidelines set forth in Executive Order 12898. The initial step in any environmental justice analysis is to identify the potential impact area, and especially those portions of the impact area that contain low-income and minority population. The next step is to determine whether an action would have a disproportionally high and adverse effect on the low-income or minority populations as compared with other non-environmental justice areas.

The environmental justice analysis in the Draft EA follows this approach in accordance with the Executive Order. In the local area surrounding the project, it was first determined that construction of the project may result in short-term adverse effects and therefore a detailed traffic, air quality, and noise quantitative modeling analysis was conducted to determine the potential environmental impacts of the project. Additionally, Chapter 17, “Environmental Justice,” has been expanded to include an analysis of public health assessments in order to inform the evaluation of whether potential impacts would have a disproportionately high and adverse impact on the low-income or minority populations. As explained in Chapter 16, "Construction Effects," and Chapter 17, "Environmental Justice," the construction methods to be employed would include measures to reduce construction-related pollutant emissions, including a Construction Health and Safety Plan to protect communities near the work zone from airborne particulates that might otherwise be released during construction activities,. As a result, the project would not have a long term effect on the air quality in the impact area, or result in exceedances of National Ambient Air Quality Standards during the construction period. In light of relevant health assessments, it has been determined that the project would not have a disproportionately high and adverse effect on the environmental justice populations within the impact area.

Comment 17-2: Commenters suggested the consideration of indirect and cumulative impacts of the project on the environmental justice communities near the Ports of Newark and Elizabeth.

Response 17-2: Because the analysis found that there would be no adverse indirect or cumulative effects from the project, a more detailed analysis of potential effects in communities near the Ports of Newark and Elizabeth was not warranted. Because PANYNJ expects growth at its ports in the future unrelated to the project, it has implemented and plans to implement various measures to reduce emissions from Port activities and associated truck traffic. USCG is aware and has considered the Memorandum of Agreement (MOA) in which PANYNJ has entered with NJDEP (see **Appendix I**). Those measures are further discussed in the response to Comment 18-14.

For the discussion of potential indirect effects in the larger regional area such as the City of Newark, see Chapter 18, “Indirect and Cumulative Effects,” and Appendix I, “Induced Demand Analysis.”

Comment 17-3: Reference to EA: “Air emissions would comply with the NAAQS of the Clean Air Act, which sets standards to protect sensitive populations, and thus would not be adverse.” An EJ analysis compares the impacts to EJ communities to those to other communities. Therefore, this conclusion is not consistent with an EJ analysis.

Response 17-3: Air quality is discussed in Chapter 11, “Air Quality,” and further discussion of the Coast Guard’s Environmental Justice Analysis is located in Chapter 17, “Environmental Justice.” See the response to Comment 17-1 with respect to the appropriateness of the EA's environmental justice assessment.

Comment 17-4: While the analysis goes into considerable detail on the percent of minority and low-income populations across the study area, it doesn't actually address the differences in impacts across the study area. Therefore, fundamentally, an EJ analysis has not been completed.

Response 17-4: As discussed in Chapter 17, "Environmental Justice," the impacts of the project would not be substantially different in different parts of the study area. Chapter 17 has been modified to include a discussion of health assessments relating to communities within the study area, as well as a discussion of the impacts across the study area in light of that information.

Comment 17-5: In Section 17-5-1, it is unclear how the term "no substantial effects on the volume of port activity" relates to significance under NEPA. Does the increase cause any a significant impact under NEPA? This comment also applies to Sec. 18.3.1.

Response 17-5: As discussed in Chapter 18, "Indirect and Cumulative Effects," because the project would not significantly affect the volume of activity at the Port, there would be no corresponding significant impact related to induced growth, as defined under NEPA.

Comment 17-6: In Section 17-6, "potentially providing interpreters", should be replaced with "interpreters will be provided upon request."

Response 17-6: The notice of availability (NOA) published in the Federal Register on January 4, 2013 for publication of the Draft EA announced that interpreters would be provided at any of the scheduled public meetings upon request. At the time the Draft EA was published, it was unknown whether interpreters would be requested for the public meetings. Even though no such requests were received, USCG provided an interpreter at each of the three public meetings. The EA will be updated as requested.

Comment 17-7: Perhaps the most significant problem in the EA is its refusal to address the very serious problem of cumulative impacts. As the EA itself notes, the study area already contains a high number of environmental hazards and minority and low income communities, especially when compared to the rest of Staten Island. This fact is evidenced by the EPA’s naming the North Shore as one of ten Environmental Justice Showcase communities in 2010. It seems especially important, then, that this EA consider the cumulative impacts of this project. Indeed, this is an important part of the NEPA standard. Thus, even if the project on its own complied with NAAQS (and this is debatable), it seems obvious that any emissions should be evaluated as being additions to existing emissions. At minimum, we need to see analysis of existing air quality conditions, and then an evaluation of how the project combines with those.

Response 17-7: The air quality analysis for operation of the project provided in Chapter 11, “Air Quality,” and the construction-related air quality analysis provided in Chapter 16, “Construction Effects,” provides a detailed evaluation of existing air quality conditions and potential effects of the project. The analysis necessarily accounts for existing conditions because it specifically examines whether any additions to existing conditions potentially resulting from the project would lead to NAAQS noncompliance. Because air quality would comply with the NAAQS (which were developed by USEPA to protect sensitive populations) and therefore not result in any adverse impacts, as discussed in the EA, no disproportionate effects on environmental justice communities would result.

Comment 17-8: Any negative environmental impacts during construction must not be disproportionately borne by low-income communities and therefore should be offset with investments in public health monitoring. Investments in capital improvements in affected communities must be considered as well.

Response 17-8: As discussed in the Draft EA and responses to comments in this document, construction activities would be subject to strict controls to protect the safety and well-being of the public. With numerous measures in place to ensure compliance with regulated standards, adverse impacts would be minimized and would not be disproportionately borne by environmental justice communities. Nevertheless, PANYNJ would establish a community liaison during construction and work with residents and communities in close proximity to the construction zone to minimize any potential adverse effects.

20-2-19 CHAPTER 18: INDIRECT AND CUMULATIVE EFFECTS

Comment 18-1: A number of commenters believed that the Draft EA underestimated potential induced growth at the Port of New York and New Jersey (the Port) that could result from the project. Commenters expressed that communities near the Port—including Newark, Elizabeth, and Jersey City—currently suffer from poor air quality related to activities at the Port and trucks traveling to and from the Port's terminals. Commenters asserted that any induced growth would exacerbate these conditions and continue to compromise the health of residents in these communities. Commenters stated that USEPA and other federal agencies had expressed similar concerns. Commenters were also concerned that induced growth at the Port would lead to increased traffic congestion, noise, transport of hazardous materials, and impacts on environmental justice communities. On the basis hereof, commenters posited that the Induced Demand Analysis was intrinsically flawed, which in turn was seen to render certain conclusions in the EA inaccurate.

Response 18-1: A number of commenters noted what appears to be potential for significant growth in Port operations as a result of the project. As evaluated in Chapter 18, "Indirect and Cumulative Effects," and the Induced Demand Analysis in **Appendix I**, growth at the Port of New York and New Jersey which is attributable to this project would be nominal and would not result in measurable differences in air quality as compared to the No Build Alternative as a result of additional trucks. Overall growth projections for the Port and the increased containerization of cargo globally are expected to occur independently of the project and therefore are not attributable to it. A peer review of the Induced Demand Analysis was conducted by Cambridge Systematics, Inc. (CSI), which found that its assumptions and conclusions were reasonable (see **Appendix I**). As articulated in the Chapter 1, "Purpose and Need," this project is intended to increase the vertical clearance of the roadway thereby eliminating the existing air draft restriction, resulting in the preservation of the economic efficiency and sustainability of the Port, as well as to have the bridge meet current traffic engineering and seismic standards.

Please see response to Comment 11-10 for additional information with respect to air quality.

Comment 18-2: Previous statements by PANYNJ, including those made in the 2010 TIGER Grant Application, the scoping work plan, and others, contradict conclusions in the EA. The Port Authority has previously stated that the project is needed to maintain the Port's competitiveness, by maintaining its position as the third largest port in the U.S., and by extension its contribution to the regional and local economy. It has also stated that without the project, cargo could potentially be diverted to other ports and decrease economic activity in the region. However, the EA states that the project would have very little effect on aggregate cargo volumes at the Port.

Response 18-2: Previous statements and documents referenced by the commenter were supported by information available at the time; in contrast, the EA is based on more extensive documentation and detailed analyses. For example, the 2010 TIGER Grant Application in question was submitted prior to the initiation of the NEPA process and the undertaking of the induced growth analysis conducted for the EA. Likewise, the scoping work plan outlined the analyses to be undertaken, but did not provide conclusions. The more detailed analysis conducted in support of the environmental review process has confirmed the conclusions in the BBADA that the diversion of cargo from the Port's primary hinterland is unlikely.

Comment 18-3: Commenters asserted that the Induced Demand Analysis provided in the EA used an inflated baseline by not accurately considering future conditions without the project (i.e., the No Build scenario, in which the air draft restriction would remain) and asserted that in such circumstances cargo volumes could be 25 percent lower than what is projected at the Port in 2035.

Response 18-3: The analysis referenced by commenters as showing a potential 25 percent diversion of cargo from the Port in the No Build condition was based on an analogy to assumptions in the Comprehensive Port Improvement Plan (CPIP) effort. The 2003 CPIP draft report relied upon to predict future cargo demand posited that the market share of containerized cargo volume maintained by the Port in the future could depend in part on whether the navigational channel was deepened to 50 feet. See the response to Comment 18-4 for a discussion of why CPIP does not undercut the Induced Demand Analysis conducted for the project

To confirm the reasonableness and appropriateness of the Induced Demand Analysis and in response to comments on the Draft EA, PANYNJ retained an independent consulting firm with expertise in the maritime industry, Cambridge Systematics, Inc. (CSI), to conduct a peer review of that study (see **Appendix I**). As detailed in **Appendix I**, CSI found that the assumptions and conclusions of the Induced Demand Analysis were reasonable, including the estimate of diversion to or from other ports in the absence of the project.

Comment 18-4: Commenters stated that the Induced Demand Analysis does not define the elasticities, costs, or expected values that are used to analyze potential induced growth, thereby questioning the validity of the analysis. Commenters, extrapolating from the conclusions of a draft report prepared for the Comprehensive Port Improvement Plan (CPIP), suggested that the project could account for up to 34 percent of the expected cargo volumes west of the Bayonne Bridge in 2035, as opposed to the 0.7 percent stated in the EA.

Response 18-4: The elasticities applied in the Induced Demand Analysis, specifically those applicable to the secondary hinterland cargo volumes, and how they were applied, are described in Chapter 18, “Indirect and Cumulative Effects,” and **Appendix I**. CPIP predicted that there would be major differences between volumes of containerized cargo at the Port depending on the depth of its harbor relative to those at other ports. To confirm the reasonableness and appropriateness of the Induced Demand Analysis and in response to comments on the Draft EA, PANYNJ retained an independent consulting firm with expertise in the maritime industry, Cambridge Systematics, Inc. (CSI), to conduct a peer review of that study (see **Appendix I**). CSI found that the assumptions and conclusions of the Induced Demand Analysis were reasonable, including the estimate of diversion to or from other ports; and the estimate that 20 percent of cargo destined for or originating from the secondary hinterland moves by truck and 80 percent by rail.

Comment 18-5: It is not clear how other ports (i.e., Los Angeles/Long Beach, Charleston, Savannah, and Norfolk) enter the induced demand model or affect the results. In addition, the following ports, which were not discussed, may become more serious market participants and should be considered: Baltimore, Wilmington, Philadelphia, Miami, Jacksonville, and Halifax.

Response 18-5: The induced demand model compared changes of ocean freight rates, port related charges and intermodal rail rates at the Port of New York and New Jersey with Los Angeles/Long Beach, Charleston, Savannah, and Norfolk. These ports account for approximately 71 percent of U.S. container volume or 37 million TEUs. Wilmington, Baltimore, and Philadelphia container are relatively minor ports that do not offer major competition to New York and New Jersey. Jacksonville, Miami, and Halifax are simply too far away to competitively serve the PONYNJ's market area. See Chapter 18, "Indirect and Cumulative Effects," as well as the CSI peer review in **Appendix I**, for further discussion.

Comment 18-6: Previous studies for PANYNJ, such as the Comprehensive Port Improvement Plan (CPIP), indicated that improving access to Port terminals (through harbor deepening, in that case) would have a much higher effect on future demand and cargo volumes at the Port than indicated in the EA's Induced Demand Analysis.

Response 18-6: The nature of the shipping industry has changed in ways that were not contemplated at the time CPIP was completed. For example, innovations in vessel design adjusted the relationship between the width and depth of a vessel and its carrying capacity. In other words, as vessel capacity has increased, draft (depth) has not necessarily increased in a proportional manner; rather, vessels' beams (widths) have increased. This has been achieved through changing vessel design parameters like a U-shaped hull which can accommodate more containers than a V-shaped hull while requiring the same channel depth or less. Thus, the upper limit for TEU capacity of vessels that can be accommodated at shallower channel depths has increased. CPIP's assumption about the effect of channel depth (i.e., accessibility) on the market share of a port is not applicable within the context of current best-practices for vessel designs.

Comment 18-7: Commenters suggested that the 20/80 percent truck/rail mode split used in the EA is unlikely. CPIP indicated that 85 percent of cargo is transported by truck. The EA should consider several factors: most sources cite 400 miles as the distance for rail to be competitive, rather than 260 miles stated in the EA; mode splits from each Port terminal may vary; and some cargo transported by rail may first be transported by trucks to intermodal yards or warehouses. Using these assumptions, the project could result in additional truck trips ranging from 2,450-10,390 additional truck trips per day, as opposed to 54 truck trips per day presented in the EA.

Response 18-7: To clarify, the EA analysis did not assume a modal split of 20/80 percent truck/rail for all cargo leaving and entering the Port. This modal split only applies to the outer hinterland (beyond 260 miles from the Port), where the potential induced container volumes would be originating from or destined to, as a result of the project. In contrast, the modal split used by the commenter refers to all containers moving through the Port. This assumption is in accordance with statistics gathered by the New York Shipping Association.

The EA assumed that by 2035, 20 percent of the Port's containers would be destined for the Port of New York and New Jersey (PONYNJ's) outer hinterland and that 80 percent of those containers would travel by rail. Therefore, the EA assumed that by 2035, 16 percent (80 percent of 20 percent) of the Port's total containers would travel into or out of the Port by rail to or from the Port's secondary hinterland, plus a much smaller percentage of containers to or from the Port's primary hinterland. Compared to 14 percent of total Port containers today, and considering the increasing investment in on-dock rail at the Port, this is a relatively conservative assumption with respect to growth in rail traffic. Less conservative assumptions would result in a lower percentage increase in truck traffic than predicted in the Induced Demand Analysis. Cambridge Systematics, Inc. confirmed the reasonableness of this assumption (see **Appendix I)**.

Comment 18-8: The EA considers uniform travel throughout the day and does not consider peak travel periods. The EA states that the Port schedules departures to maintain an even flow, but this cannot be confirmed without actual observed truck or rail movement counts. The EA also divides annual truck trips by 52 weeks per year, 5 days per week, and 10 hours per day. However, elsewhere in the EA, a 50-week year is assumed, which would increase peak travel estimates by 4 percent. Peak hourly truck trips could range from 78-739 truck trips per hour at Elizabeth Terminal, 40-168 truck trips per hour at Newark, and 31-132 truck trips per hour at Howland Hook.

Response 18-8: Port terminal operators strive to avoid peaks and valleys of container movement into and out of the Port because it is more efficient, cost-effective, and reduces congestion. Port operators plan to continue improving container movement efficiencies. The 50-week year referenced by the commenter accounts for holidays when the Port is closed. Applying the 50-week year to the Induced Demand Analysis would yield 56 daily truck trips, similar to the 54 additional truck trips noted in the EA.

For comparison, based on 4.86 million TEUs moving through the Port terminals west of the Bayonne Bridge in 2010 (as described in Chapter 18, “Indirect and Cumulative Effects”), existing daily truck trips associated with this cargo are on the order of about 14,000 trucks trips per day (or about 14,600 truck trips per day assuming a 50-week year). With the projected 10,647,800 TEUs moving through Port terminals west of the Bayonne Bridge by 2035, total daily truck trips would be on the order of about 30,800 truck trips per day (or about 32,000 truck trips per day assuming a 50-week year). As such, the additional 54 (or 56) truck trips associated with potential induced growth would be a small fraction of overall truck trips at the Port (approximately 0.2 percent). It should be noted that this assumes that 80 percent of overall cargo leaving the terminals is transported by truck, although PANYNJ advises that it will continue efforts to increase rail-share of freight movement.

The truck volumes quoted by the commenter are based on the assumptions of container cargo diverting to other ports without the project derived by relying on the CPIP analysis. A discussion of why that analysis is not supported by more recent information or applicable to the project can be found in response to Comment 18-4. For a detailed discussion of efforts to reduce air quality impacts from Port activities, see response to Comment 18-13.

Comment 18-9: Commenters questioned that the EA and its Induced Demand Analysis assume a constant 20 percent/80 percent share of Port cargo east and west of the Bayonne Bridge, respectively, over time, even though historic trends have shown that growth west of the bridge is greater due to increasing containerization, as described in the EA.

Response 18-9: The EA analysis uses acreage as the starting point to measure capacity. Currently, 84 percent of the acreage in the PONYNJ is located west of the Bayonne Bridge. The EA then adjusted that percentage to account for the fact that recent development east of the bridge includes high capacity semi-automated facilities (i.e., Global Terminal). This additional acreage east of the Bayonne Bridge reduces the share of acreage for terminals west of the Bayonne Bridge to approximately 80 percent, which relates to the share of the goods moving through the Port that would come under the bridge in the future.

Comment 18-10: The EA concluded that potential air quality impacts related to the 54 additional truck trips per day would be negligible without providing the criteria on which that conclusion was based. Air quality impacts associated with increased truck trips, tug boats, ships, drayage trucks, loading equipment, and other machinery should be analyzed, as well as associated health risks. Commenters suggested that increases in emission levels at the Port from the project related to NO_x, PM_{10}, and $PM_{2.5}$ could range from 2-55 percent, 0-38 percent, and -1-5 percent, respectively.

Response 18-10: As discussed in Chapter 18, "Indirect and Cumulative Effects," and Appendix I, the project would not result in a substantial increase in cargo at the Port. As such, there would be no substantial increase in emissions from additional truck trips or from operations at the Port, as a result of the project. The additional truck trips associated with the potential for induced growth as determined in the EA would be de minimis because of the small number of additional trucks that the conservative analysis concluded may result from the project, spread over time and between different terminals. As discussed in the EA, the additional 54 truck trips would be distributed throughout a 10-hour day among three terminals. Even if the additional 54 trucks per day (or 56 trucks based on a 50-week year, noted in response to Comment 18-8) were concentrated at Port Newark/Port Elizabeth, the multiple arrival and departure patterns would result in approximately one truck per hour on any given roadway in each hour. This level of increase would not measurably change air quality concentrations to what they would be without the project. In addition, as detailed in the EA, by allowing the Port to accommodate larger, more efficient vessels, the project would result in reduced emissions. The statistics provided by the commenter are based on an application of an analogy to the logic utilized by the CPIP effort. See the responses to Comments 18-3 and 18-4 for a discussion of the applicability of that approach and the accuracy of those results.

For comparison, as noted above, based on 2010 cargo throughput, current truck trips at Port terminals west of the Bayonne Bridge are estimated to be approximately 14,000 trucks per day based (or about 14,600 truck trips per day assuming a 50-week year). In 2035, total daily truck trips would be 30,800 truck trips per day (or about 32,000 truck trips per day for a 50-week year). The estimated 54 induced daily truck trips would be a small fraction of the overall daily truck trips projected without the project.

Comment 18-11: A health risk assessment (HRA) and a health impact assessment (HIA) should be prepared by an independent consultant agreeable to the effected communities to evaluate the health implications from elevated emission levels.

Response 18-11: Detailed analyses of short-term effects from construction and long-term effects from operation of the project are provided in the EA. Accounting for the number of control measures that would be implemented during construction on equipment, the air quality model found that emissions would remain within the NAAQS, thereby protecting the health of residents near the construction zone. As the Induced Demand Analysis determined that no substantial induced growth would occur as a result of the project, as described in the EA and discussed above, the project would not result in indirect health effects. As explained in response to Comment 18-10, there would be only de minimis increases in air pollutant concentrations as a result of induced demand that the EA analysis predicts could result from the project, the preparation of a Health Impact Assessment and a Health Risk Assessment (HRA) are not warranted. Independently, the Port Authority has adopted the recommendations of the USEPA to actively monitor cargo volumes and air emissions at the Port and develop a series of actions in conjunction with other stakeholders to address the general health related impacts of Port activity, as further discussed in response to Comment 18-14.

In addition, as described in Chapter 11, “Air Quality,” the use of larger, more efficient vessels in the future would have long-term regional benefits in air quality. While the potential induced growth discussed in Chapter 18, "Indirect and Cumulative Effects," and Appendix I might result in a negligible change in fuel consumption, it would not change the conclusions regarding fuel savings and GHG emissions reductions associated with the project.

Comment 18-12: The economic benefits realized by elimination of the air draft limitation of the Bayonne Bridge based on the 2009 Bayonne Bridge Air Draft Analysis may not be accurate. Significant developments in the container shipping industry have occurred in the past four years as indicated on Page 10-7 but were not considered. These include:

1. The U.S. Army Corp's Fifty Foot Harbor Deepening Project is nearing completion in 2013 after over a decade of dredging.

2. Prior to 2010, there were no regularly scheduled services with 7,000 to 10,000 TEU vessels.

3. Larger TEU vessels have begun regular services to the Port of New York and New Jersey and are able to start realizing the benefit of fifty foot navigational channels.

4. 7,000 to 10,000 TEU vessels have been calling ports west of the existing Bayonne Bridge regularly since 2010. These vessels are operated by CMA, Maersk, MSC, and Northern.

5. The number of 7,000 to 10,000 TEU vessels calling ports west of the existing Bayonne Bridge in 2012 has more than doubled since 2010.

6. In 2012, more than one hundred 7,000 to 10,000 TEU vessels called ports west of the existing Bayonne Bridge.

7. The number of 7,000 to 10,000 TEU vessels calling ports west of the existing Bayonne Bridge in 2012 is already half of the projected number of vessels in 2020 after the bridge is raised.

8. The Port of New York and New Jersey is the first port of call through the Suez Canal for nearly all of the 7,000 to 10,000 TEU vessels calling ports west of the existing Bayonne Bridge since 2010.

9. Nearly all of the 7,000 to 10,000 TEU vessels calling ports west of the existing Bayonne Bridge since 2010 then continue on to other east coast ports such as Baltimore, Norfolk, and Savannah. The 2009 Bayonne Bridge Air Draft Analysis should be updated to include these developments.

Response 18-12: The Bayonne Bridge Air Draft Analysis (BBADA) (http://www.panynj.gov/about/pdf/Bayonne-Bridge-Air-Draft-Analysis.pdf) accounted for the concerns expressed in this comment. Specifically, a sensitivity analysis was conducted to incorporate the effect of the Harbor Deepening project (Page 14 of the BBADA), and some larger vessels had already been calling or could call at the Port when the analysis was completed. Moreover, the Bayonne Bridge Air Draft Analysis was conducted by USACE prior to the initiation of the NEPA process for this program. When appropriate, facts presented in the BBADA were updated for the purposes of the EA. While vessels may not have become deeper, they have become taller and wider.

Table 18-4 in Chapter 18, "Indirect and Cumulative Effects," is a representation of data from the 2009 Army Corps of Engineers BBADA. The BBADA shows that, in general, the 8,000+ TEU containerships surveyed could not safely pass under the Bayonne Bridge. Only a few containerships with a capacity of 7,000 TEU or greater could safely pass under the Bayonne Bridge. Note that the BBADA survey would not include all container ships in existence at that time or any container ships produced after 2009. As the Cambridge Systematics Inc. report shows, there are "Bayonnemax" container ship designs being contemplated that would be capable of carrying 9,000–10,500 TEUs. While these vessels have not yet been built, they indicate that the BBADA likely presents a conservative upper limit to the capacity of containerships that could call on marine terminals west of the Bayonne Bridge under the No Build scenario.

Comment 18-13: Commenters stated that mitigation measures must be implemented to address the adverse effects related to induced growth. Some commenters suggested measures such as reducing truck traffic, promoting clean-fuel initiatives, increasing rail share of freight movement, electrifying Port equipment, implementing programs to assist truckers to retrofit vehicles, developing small parks or green spaces, creating vegetative buffers, and developing a community benefits program. Other suggestions included investing in berthside facilities for "cold-ironing" so that ships can plug into the electrical grid and shut down their diesel engines, dramatically their cutting emissions while at the port, which has been successfully implemented at the Port of Los Angeles.

Response 18-13: The EA does not identify significant induced growth associated with this program, or any measurable adverse air quality impacts associated with induced growth. Because there would be no significant adverse effects related to induced growth from the project, no mitigation is required within the context of this permit amendment application. However, independent of the project, PANYNJ has taken a proactive and aggressive approach to limiting the impact of Port growth (regardless of the cause, be it navigational access, regional economic growth, or any other factor) on air quality. Further information can be found in the Port Authorities Clean Air Strategy, which can be found at: http://www.panynj.gov/about/pdf/CAS-FINAL.pdf.

Comment 18-14: Given the above-noted uncertainties as to the extent of the impact of the project on neighboring communities, EPA recommends that the Coast Guard work with the Port to plan now to reduce impacts, should they occur. Many members of the communities have also requested the same in their comments made during the public meetings. That plan would have two components.

First, EPA recommends that the Coast Guard require as a condition of the permit that the Port conduct monitoring of port activity and truck traffic patterns and volumes so that if the project does have an impact, action can be taken. It is recommended that monitoring would include collecting relevant data as well as establishing community advisory groups that would work with the Coast Guard and the PANYNJ to identify impacts that are occurring in their communities.

Second, EPA recommends that the permit require PANYNJ to commit now to mitigate impacts for the communities adjacent to PANYNJ owned marine terminals, especially air quality impacts, should changes in port activity result from the project. These requirements would be implemented should the conclusion that there will be no significant impacts turn out to be incorrect. It is expected that mitigation plans would be incorporated and expand upon efforts underway as part of the Port's Clean Air Strategy. This includes measures such as early replacement or repowering of cargo handling equipment with cleaner technologies, reducing drayage truck idling times, expanding the throughput of on-dock rail and using the cleanest support vessels. In addition to air quality considerations, the environmental mitigation plans would also provide for analyzing and mitigating traffic, noise and other environmental impacts that may occur. Such measures might include changes in traffic flow patterns and parking, improved signage, improved street cleaning and maintenance, traffic enforcement measures, environmental buffers and other host community assistance.

This approach would be consistent with efforts taken by other ports to develop community benefit agreements/mitigation plans..

Response 18-14: Overall growth projections for the Port and the increased containerization of cargo globally are expected to occur independently of the project and are therefore not attributable to it. Further, USCG permits must address matters associated with this particular project. USCG's General Bridge Permit extends only to construction, operation, and maintenance of the bridge. As articulated in the Chapter 1, "Purpose and Need," this project is intended to increase the vertical clearance of the roadway thereby eliminating the existing air draft restriction, resulting in the preservation of the economic efficiency and sustainability of the Port. Even though these concerns are independent of the project and are therefore beyond the scope of the EA, it is noted that PANYNJ has committed to implementing recommendations of USEPA set forth in the agency's March 5, 2013 letter. USCG is aware and has considered that PANYNJ has entered into a MOA with NJDEP, which will provide guidance, oversight, and (if necessary) enforcement of these measures (see MOA in **Appendix I**). As explained below (and in further detail in **Appendix I**), if the project is undertaken, PANYNJ will inventory Port air emissions (i.e., emissions from sources within the Port) and track annual cargo growth and implement measures as described below, as needed, regardless of their relationship to the project.

- PANYNJ will expand its existing Port air emissions inventory program to an annual, rather than bi-annual, basis. Air emissions inventory data, as well as annual statistics on cargo volumes, including CAGR, will be publicly available on PANYNJ's website. The Strategy Group, which created the Clean Air Strategy described in response to Comment 18-13 (and comprises EPA Region II, NYSDEC, NJDEP, local municipalities, NY Shipping Association, and NYC EDC) will be reconvened at least annually to report on the progress of the existing program and identify any necessary additional emissions reduction actions, as described below.
- Following review of the annual CAGR and Air Emissions Inventory, the Clean Air Strategy Group will ascertain whether CAGR has exceeded the 4 percent assumed in the EA and whether there has been an increase in Port air emissions as compared to the prior year's inventory. NJDEP will actively

participate in annual meetings of the Strategy Group. If CAGR has increased above the assumed 4 percent, but air emissions have not increased, no emissions reduction measures in addition to those already to be undertaken as part of PANYNJ's Clean Air Strategy described in response to Comment 18-13 will be required.

- If CAGR has exceeded the assumed 4 percent and Port air emissions have increased, the Port Authority, after consultation with the Clean Air Strategy Group, will determine whether the increase in Port air emissions is significant. PANYNJ will confer with NJDEP in making this determination. If any such annual increase is considered to be significant, the Clean Air Strategy Group will consider and make recommendations with respect to additional or expanded measures to reduce the increased emissions, which measures may include the following: incentivizing the procurement of alternative power cargo handling equipment (CHE); additional roadway improvements to alleviate congestion and reduce idling on Port roadways, expansion of clean support vessel programs including replacing engines and installing Diesel Oxidation Catalysts on private ferries and harbor craft. After consultation with the Clean Air Strategy Group, the Port Authority would implement one or more of these or other emissions reduction measures.
- PANYNJ will conduct a truck traffic study in the Ironbound Community, including meetings with Ironbound neighborhood residents, identifying origin and destination patterns, recommendations to improve traffic flow, and recommendations to improve enforcement of City truck roadway restrictions.
- PANYNJ will establish an Environmental Justice Executive Review Board (EJERB), which will report annually to PANYNJ Board of Commissioners to communicate issues of concern from environmental justice communities. The EJERB may also include PANYNJ management staff, the Newark Mayor's Office, New Jersey State Assembly and Senate representatives, Essex County, representatives of the Ironbound Community, and the Director of Pulmonary and Critical Care at University of Medicine and Dentistry, New Jersey (UMDNJ), as a technical advisor on asthma and respiratory diseases.

Comment 18-15: Many of the subleasing contractors who operate the berths at Port Elizabeth and Newark are eager to note they are currently undergoing substantial capital improvement initiatives to procure additional storage facilities, purchase additional cargo handling equipment (straddle carriers, gantry cranes, and on-dock rail tracks), increased refrigeration capacity via electrical upgrades, several hundred acres of additional storage and processing space, and computerized tracking totaling some $1 billion in improvements. PNCT boasts they are preparing for an increase in capacity from 3,000 to 6,000 containers per day, and Maher and APM have both installed new cranes. NYCT, located at Howland Hook, is currently building an additional berth to handle just under 1 million containers per year. While these investments are only suggestive, it appears the private operators of this facility are preparing for substantially increased cargo beyond the meager few percent increase estimated by PANYNJ and articulated in this Environmental Assessment. As such, this would represent evidence to strongly suggest estimates of increased capacity by PANYNJ are, at best, grossly underreported. If so, then the surrounding communities will be impacted by the increased traffic—both heavy truck and rail—to accommodate this increase in freight capacity far beyond the proposed 5.4 trucks per day. On the whole, it appears that estimates of increased truck and rail traffic that burden these communities stated in this document are, at best disingenuous and likely far underestimate the true impact that will be experienced by the surrounding communities. These are the emissions that are most concerning to the community and to human health, and this EA provides only a superficial narrative, based on likely inaccurate estimates.

Response 18-15: The EA's No Build Alternative projects that the PONYNJ's amount of containerized cargo handled west of the Bayonne Bridge will increase from 4.6 million TEUs in 2012 to 10.6 million TEUs in 2035 (using the USACE's BBADA forecast—see table 18-3 in the EA). PONYNJ marine terminal operators are expected to prepare to increase their ability to handle this baseline increase in cargo volume even if the Bayonne Bridge's air draft remains as is. The container terminals at the Ports are all private operations in competition with each other. They are expanding to reflect the current reality of the shipping industry (it should be noted that Howland Hook Terminal is not currently undergoing expansion).

Similar to the airline industry, ocean lines have been consolidating to form blocs to increase their operational efficiency. In order to attract new tenants, terminal operators need to accommodate a whole bloc of lines, not an individual line. As an example, APL, MOL and Hyundai formed a bloc called the New World Alliance, and Hapag-Lloyd, NYK and OOCL formed a bloc called the Grand Alliance. These two blocs merged to form a bloc called the G6. As a result, container terminal operators need to ensure they have the facilities in place to accommodate all 6 of these lines, and have been making the improvements demanded by the ocean carriers.

Comment 18-16: All vessels are uniformly assumed to unload and load 40 percent of their cargo when stopping at the PANYNJ (Draft EA pp. 10-10, 18-18, Appendix I page 9). What is the data source or reference for this value?

Response 18-16: The source of this information is Port Authority discussions with terminal operators. Although not all vessels load/unload/unload precisely 40 percent of their cargo at the PONYNJ, terminal operators have provided this figure as an average suitable for statistical purposes. PANYNJ looked at all container vessels calling at the Port in a sample month. By summing total containers loaded/off-loaded and dividing by vessel used capacity, the average amount of containers loaded/off-loaded at the Port is 40 percent. **Table 20-1** below shows the calculation. Note that as per page 28 of the USACE Bayonne Bridge Air Draft Analysis (BBADA), the average vessel calling at PONYNJ is loaded to 86 percent capacity, and this was factored into the calculation.

Table 20-1
Calculation of Average Container Loading/Unloading Rates

Month	Vessel Calls	Total Imports	Total Exports	Total Containers	Vessel Capacity
July 2012	215	151,612	146,044	297,656	867,161
Percentage @ 86% Utilization (USACOE)					**39.9%**

Comment 18-17: What is the basis of the assumption that goods traveling to and from the PANYNJ from farther than 260 miles comprise 20 percent of port cargo?

Response 18-17: This breakdown is contained in Appendix E of the USACE BBADA. The range in that report was from 18-20 percent, based on average numbers provided by the New York Shipping Association. The Induced Growth Analysis conservatively used 20 percent (which is the high end of the range of containers shipped farther than 260 miles from PONYNJ).

Comment 18-18: What is the data source for the elasticities used in the induced demand analysis (Table 1 of Appendix I of the Draft EA)?

Response 18-18: The elasticities reflect a sensitivity analysis that looked at possible cost component changes whose probability ranged from highly likely to highly unlikely. Based on the history of actual annual changes in those cost components over the past twenty years, the historical range of changes in those cost components are well below the 25 percent high end of the range used in the sensitivity analyses. Thus, that percentage is extremely conservative.

Elasticities are not a measure that is published; rather they are derived from analyzing the relationships between sets of data. The elasticities in the model used to estimate the induced demand were derived by using a "gravity model of trade" for competitiveness of ports (PONYNJ, Norfolk, Charleston, Savannah, POLA/POLB), in relation to the bilateral trade flows between the inland locations, such as Chicago, Ohio Valley, Atlanta, etc. that these ports serve. The gravity model of trade is a commonly used forecasting model in economics. Data relating to railroad and trucking rates were collected from public sources, e.g., http://www.trb.org/Main/Blurbs/165551.aspx, as well as internal databases that Halcrow, the consulting firm that prepared the induced demand analysis, has maintained for decades, based on the work that the firm performs in the shipping, (intermodal) transportation and logistics industries. The change in one set of data in relation to a change in another was then used to derive the elasticities.

Comment 18-19: What is the reference or document that describes the 'Halcrow model' (mentioned in Appendix I of the Draft EA)?

Response 18-19: The Halcrow model is proprietary information and cannot be released publicly. The methodology used in the Induced Demand Analysis is described in Appendix I.

Comment 18-20: What is the data or document used to determine the 'percentage change in each of the landed-cost components at each port' (page 12 of Appendix I)?

Response 18-20: Since the model employs a sensitivity analysis over a range of values, specific data for the "percent change in each of the landed-cost components at each port" are not used. Rather, the analysis uses a range of values (from 0 to 25 percent) coupled with a probability distribution to produce an expected value of the change in TEUs under a given landed-cost scenario. This avoids the issue of assuming a future value for a number of variables which may change over time. By using a probabilistic approach, the analysis provides conservative estimate, by coupling the three land-cost variables together.

Comment 18-21: Page 12 of Appendix I states that the calculations of the expected values "have been presented separately" although an example is provided. Is there an additional memo or report to support these calculations, or is the document referring to splitting up the estimates into categories?

Response 18-21: The term "separately" refers to the report's presentation of the induced volumes resulting from potential project-induced changes in ocean freight rates, port-related charges and intermodal rail rates individually. Additionally, the report includes an aggregate induced volume from combining changes in all three cost factors. All of these results are included in the report and there is no additional documentation describing these calculations.

Comment 18-22: What is the source for the statement that for the area beyond the 260-mile radius from the Port, 80 percent of cargo is transported by rail and 20 percent by truck (Draft EA page 18-15)?

Response 18-22: See response to Comment 18-7.

Comment 18-23: The Draft EA determines the number of trucks per TEU by assuming a TEU-to-container ratio of 1.7 and then factoring in empty arrivals and departures with a factor of 1.6 (footnote on page 18-15). Is there a data source for these values?

Response 18-23: The 1.7 TEU/containers ratio can be obtained from statistics on the Port Authority website by dividing yearly TEU/yearly containers; 1.7 is a long-term average. **Table 20-2** below, which is derived from http://www.panynj.gov/port/pdf/port-trade-statistics-summary-2001-2011.pdf, is the basis of the 1.7 ratio.

Table 20-2
TEU per Container Ratio

Year	TEUs	Containers	Ratio
1991	1,111,894	1,865,471	1.68
1992	1,205,338	2,014,052	1.67
1993	1,180,861	1,972,692	1.67
1994	1,219,139	2,033,879	1.67
1995	1,327,448	2,262,792	1.70
1996	1,335,379	2,269,145	1.70
1997	1,460,373	2,456,886	1.68
1998	1,475,913	2,465,993	1.67
1999	1,685,368	2,828,878	1.68
2000	1,828,636	3,050,746	1.67
2001	1,953,006	3,316,276	1.70
2002	2,200,922	3,749,014	1.70
2003	2,382,639	4,067,811	1.71
2004	2,620,113	4,478,480	1.71
2005	2,800,007	4,785,318	1.71
2006	2,991,086	5,142,059	1.72
2007	3,099,644	5,299,105	1.71
2008	3,068,935	5,265,053	1.72
2009	2,652,209	4,561,527	1.72
2010	3,076,395	5,292,020	1.72
2011	3,197,016	5,503,485	1.72

The 1.6 truck trips-per-container ratio is from Port Authority general experience at the terminals in the PONYNJ and an anticipation of future industry trends. This lower number was used in the induced growth analysis for the following reasons:

1. The ratio of truck trips per container has trended downwards over time due to a drive for efficiency by both truckers and terminal operators. When compared with global best practices, a ratio of 1.71 trips represents an inherent embedded level of inefficiency. In 2035, it can be assumed that, both from the perspective of cost-efficiency, as well as the regulatory environment for greenhouse gases, the inherent level of inefficiency that 1.71 trips per container represents will not prevail. Consequently, a figure of 1.6 trips per container, which represents a highly conservative efficiency gain of a little more than 6 percent over a 22-year horizon, was considered extremely realistic and therefore adopted in the induced growth analysis. This estimate is backed up by the fact that similar, and greater,

efficiency gains have been realized in a shorter timeframe (less than 22 years) at other ports worldwide, such as Rotterdam.

2. The trend of consolidation leading to larger beneficial cargo owners (BCOs) will continue over the 22-year timeframe under analysis. These large BCOs (e.g., Wal-Mart) run highly efficient supply-chain and logistics management platforms, taking advantage of economies of scale afforded by running a larger operation. This helps them optimize transportation efficiencies and reap their benefits in terms of cost reductions, benefitting profitability and the end price to the consumer. The latter is largely achieved, in practice, by eliminating as many dead-haul moves as possible, which is more easily achieved as these BCOs increase the economies of scale of their operations. Economies of scale are most often realized through consolidation rather than organic growth.

3. By 2035, it is anticipated that a greater number of marine terminal operators will use an appointment system to schedule truck arrivals and departures, leading truckers to maximize the use of these limited slots. Current practices for collection/delivery of containers from marine terminals are generally ad-hoc, especially in the case of owner-operated carriers. A primary driver behind this inherent inefficiency stems from the lack of appointment systems to schedule truck arrivals/departures at present. It is expected that, by 2035, gates at marine terminals will be operating appointment systems, which in turn will incentivize truckers to make maximum use of their booking slots. As these slots will be perceived as a scarce commodity, truckers will aim to achieve maximum efficiency by trying to minimize the possibility of having to utilize a slot for a dead-haul move.

4. The implementation of equipment tracking technology, such as GPS tracking for fleets and RFID tags for containers, has led to greater efficiencies in fleet management. This has resulted in a reduction of dead-haul moves.

5. Consolidation in the trucking industry is expected to continue, whereby a greater proportion of trucks calling at the terminals will be represented by fleet operators, rather than owner-operators, driving additional efficiency gains. Studies have indicated that, whereas owner-operators' average dead-haul moves are a little less than 30 percent across the industry, the comparable figure for fleet operators is only 10 percent.

By taking these five factors into account over the 22-year analysis period, their combined impact is likely to be a little more than a 6 percent reduction in trips. Therefore, using a ratio of 1.6 trips per container (1.7 trips per container minus 6 percent = 1.6 trips per container) is considered both reasonable and defensible.

Comment 18-24: What is the “New York and New Jersey Harbor Navigation Study” (noted on page 10-8 of the Draft EA)?

Response 18-24: This is the study by the United States Army Corps of Engineers (USACE) of the 50 foot deepening project in the Port of New York and New Jersey and can be obtained on their website (http://www.nan.usace.army.mil/).

Comment 18-25: Is there additional information that follows up on the analysis in Appendix E of the Bayonne Bridge Air Draft Analysis, or is what has been provided the complete analysis for this section?

Response 18-25: Backup data was provided by USACE for the analysis presented in Appendix E of the BBADA, “Port Cargo and Truck Diversion Analysis.”

Comment 18-26: Several commenters indicated that allowing larger ships to use the channel would require further deepening of the channel. The channel depth of the Kill Van Kull would need to be increased to 60 feet, from the current 50 feet (as the Panamax ships have a draft of 50 feet themselves). A February 14, 2011 letter from the Port Authority to the Federal Energy Regulatory Commission concerning the Spectra Energy NY/NJ Pipeline Expansion specifically mentions plans for port development that “take into consideration the next generation of container ships, which require a channel depth of 60 feet” and asks Spectra Energy to coordinate drilling plans with the Army Corps of Engineers, “which will enable future deepening of the Kill Van Kull navigable channel to 60'.”

To judge from the language of the EA, the Port Authority has since backtracked from that position and currently has no plans to deepen the Kill van Kull beyond the authorized 50 feet. Commenters are asking when and how that reversal took place. Furthermore, even if there are no current plans, why would the Coast Guard refuse to consider the possibility that future commercial pressures might force a change in those plans?

It is not unreasonable to think that the reconfiguration of the Bayonne Bridge could serve as a gateway to further dredging and port development. Before that happens, it seems irresponsible not to assess the cumulative impact of dredging and harbor infrastructure on the harbor's hydrology, its ecological function and its waterfront and environmental justice communities. Among other things, that should include a study of the connection between deeper shipping channels and increased storm surge risk.

There needs to be a better understanding and transparency of the interconnectedness of other Port projects (e.g., New York Container Terminal expansion, redevelopment at MOTBY, the Harbor Deepening Project) and their total impacts on the environment.

Response 18-26: The Port Authority does not have any current plans or funding set aside to further deepen the port, nor is it anticipated that the project would trigger any harbor deepening projects. Moreover, any channel deepening efforts would require the U.S. Congress and USACE to assess the need for the additional depth and authorize the program following a series of analyses, including an environmental review. As such, it is not a reasonably foreseeable action appropriate for consideration in this EA. The New York Container Terminal expansion project was withdrawn. See Chapter 2, "Project Alternatives," with respect to MOTBY.

Comment 18-27: Labor unions support this project precisely because this change will increase activity at the ports. To claim that there will only be an additional five truck trips per hour each day is overly simplifying impacts. After all, there will be an increase in hires at the ports—or perhaps existing workers will be provided additional hours. There is no discussion of short term (if 3-5 years should accurately be described as "short term") impacts. There will be an increase in traffic, noise and fumes to persons living and working in those areas. Finally, cumulative effects are just that: cumulative. To state there is no cumulative effect is plainly incorrect. There will be short term construction impacts of noise, traffic and equipment fumes. Heavy equipment and diesel equipment generally have higher particulate matter in their emissions; absolutely a cumulative impact. Depending on the results of an examination of the impacts of large ships vs. small ships, there will likely be other potential impacts. Clearly, there is a cumulative impact; it just may be relatively small when considering all the polluting sources in that portion of NYC/NJ.

Response 18-27: The Cumulative Effects analysis contained in Chapter 18, “Indirect and Cumulative Effects,” of the EA appropriately examines the potential cumulative impacts of the project in both construction and operational phases. It concludes that since the project has been determined to have no direct or indirect effect on regional traffic capacity or vehicle miles traveled (VMT), and no substantial effect on volume of Port activity or overall maritime trade patterns, it would have no cumulative effect in combination with other projects. In terms of cumulative construction impacts, the EA examines several planned projects in the region and finds that that there are no planned projects that would combine with the project to result in cumulative construction impacts. In addition, construction impacts associated with the project and proactive measures being taken to minimize those impacts are also discussed in the EA. Further, the use of larger, more efficient vessels in the future would result in reductions in emissions, as described further in Chapter 11, “Air Quality.”

Comment 18-28: The environmental assessment should consider other nearby large-scale projects that are in advanced planning stages, such as the Staten Island Expressway access plan, the Verrazano HOV lane and redecking project, as well as the Goethals Bridge construction. This will regionally affect how traffic flows in and out of the area and the project should focus on traffic mitigation.

Response 18-28: Other major projects in the area scheduled during the construction period were assessed in Chapter 18, “Indirect and Cumulative Effects.” The analysis found that there are no planned projects that would combine with the project to result in cumulative construction impacts.

20-2-20 CHAPTER 19: COMMITMENT OF RESOURCES

[No comments received.]

20-3 LIST OF COMMENTERS

Alexandrov, Oleg. S., Laborers' International Union of North America (LIUNA)—Local 3: Written Comment dated March 4, 2013; Comment No. 3-2

Alexis, Ruthver, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Allen, Adam, Institute of Transportation Engineers—Metropolitan Section of New York and New Jersey: Written Comments dated February 1, 2013; Comment No. 3-2

Amone, Anthony, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Arena, Phillip, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Oral Testimony dated February 13, 2013; Comment No. 3-2

Arvanites, Michael, Representative for New York State Senator, Diane Savino: Oral Testimony dated February 7, 2013; Comment Nos. 3-2, 18-28

Atkins, John: Oral Testimony dated February 5, 2013; Comment No. 3-2

Aughey, Joseph, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Austin, Allan: Written Comments dated March 4, 2013; Comment No. 3-2

Aviles, Raul: Written Comments dated March 4, 2013; Comment No. 3-2

Bailey, Casienbi: Written Comments dated March 4, 2013; Comment No. 3-2

Balestrieri, Nicholas, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Baran, Linda, CEO, Staten Island Chamber of Commerce: Oral Testimony dated February 7, 2013; Comment Nos. 2-2, 2-3, 3-2, 18-28

Barlament, Laura, Transportation Alternatives State Island Committee: Oral Testimony dated February 7, 2013; Comment No. 16-39

Benson, Eric: Written Comments dated February 14, 2013; Comment No. 18-1

Berezansky, Nick: Written Comments dated February 22, 2013; Comment No. 1-1

Beverly, Chaz: Written Comments dated March 4, 2013; Comment No. 3-2

Blevins, Darryl, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Blevins, Steven, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Bluhm, Sara, New Jersey Business and Industry Association (NJBIA): Written Comments dated February 13, 2013; Comment No. 3-2

Bollwage, Chris, Mayor, City of Elizabeth: Oral Testimony dated February 13, 2013; Comment No. 3-2

Booker, Cory, Mayor, City of Newark: Written Comments dated February 13, 2013; Comment Nos. 3-2, 5-2, 16-16, 18-1

Borkowski, Jeanine, Community Board 1: Oral Testimony dated February 7, 2013; Comment No. 0-1

Borrero, Oscar: Written Comments dated March 4, 2013; Comment No. 3-2

Bouler, Marshall, Heavy Construction Laborers—Local 472: Oral Testimony dated February 13, 2013; Comment No. 3-2

Boyle, David, M., Elm Park Civic Association: Written Comments dated January 16, 2013; Comment No. 3-5

Bragon, Tom: Oral Testimony dated February 5, 2013; Comment No. 2-1

Brennan, Neil, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Brooks, Andrew, Federal Aviation Administration, Eastern Region Airports Division: Written Comments dated February 6, 2013; Comment No. 3-7

Brooks, Pearl: Written Comments dated March 5, 2013; Comment Nos. 1-1, 1-2, 3-11, 3-13, 3-20, 10-2, 10-8, 16-10, 16-48, 16-62, 16-63, 16-64, 16-65, 18-1

Bubulka, Michael, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Cabarle, Dennis: Written Comments dated March 4, 2013; Comment No. 3-2

Cabrera, Jeovanny, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Calavano, James, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Carr, David, Chief of Staff to New York State Assemblyman Joseph Borelli: Oral Testimony dated February 7, 2013; Comment Nos. 0-3, 2-2, 3-2

Caterino, Steven: Written Comments dated March 4, 2013; Comment No. 3-2

Checker, Melissa, Associate Professor, City College of New York: Written Comments dated March 5, 2013; Comment Nos. 0-1, -5, 3-1, 3-3, 3-4, 16-9, 17-1, 17-7, 18-1

Chernetz, Janna, Tri-State Transportation Campaign: Oral Testimony dated February 13, 2013; Comment Nos. 3-1, 17-2, 18-1, 18-13, 18-14

Citizens Advisory Committee of the New York—New Jersey Harbor & Estuary Program (HEP): Written Comments dated March 5, 2013; Comment Nos. 0-8, 3-5, 8-1, 18-1, 18-26

Clark, Brian, APM Terminals: Written Comments dated February 28, 2013; Comment No. 3-2

Coalition for Healthy Ports: Written Comments dated January 23, 2013; Comment Nos. 18-16, 18-17, 18-18, 18-19, 18-20, 18-21, 18-22, 18-23, 18-24, 18-25

Collins, Deborah, Esq., Essex County: Oral Testimony dated February 13, 2013; Comment No. 3-2

Conover, Barbara, Sierra Club—New Jersey Chapter: Written Comments dated March 6, 2013; Written Comments dated March 6, 2013; Oral Testimony dated February 13, 2013; Comment Nos. 0-1, 0-5, 3-1, 3-3, 3-4, 3-5, 3-6, 17-1, 17-2, 17-4, 18-1, 18-10, 18-11, 18-13, 18-14, 18-26

Corless, Richard, Laborers' International Union of North America (LIUNA)—Local 3: Written Comments dated March 4, 2013; Comment No. 3-2

Coutinho, Albert, Assemblyman, New Jersey General Assembly—29th Legislative District: Written Comments dated February 5, 2013; Oral Testimony dated February 5, 2013; Oral Testimony dated February 13, 2013; Comment Nos. 3-2, 18-1, 18-13, 18-14

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Schulte, William, J., Coalition for Healthy Ports: Written Comments dated January 3, 2013; Comment Nos. 3-3, 3-6, 17-1, 17-2, 17-3, 17-4, 18-1

Schulte, William, Jersey City Environmental Commission: Written Comments dated March 4, 2013; Comment Nos. 18-1, 18-10, 18-13, 18-14, 18-28

Schumacher, Steve: Written Comments dated March 5, 2013; Written Comments dated March 6, 2013; Comment No. 0-1, 0-4, 8-2, 10-8, 16-30, 16-31, 18-1

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Stack, Brian, P, Senator, New Jersey Senate—33rd District: Written Comments dated February 1, 2013; Comment No. 3-2

Stapleton, Charles, New Jersey Maritime Pilot and Docking Commission: Written Comments dated March 1, 2013; Comment No. 3-2

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Sykes, Thomas F.: Written Comments dated March 4, 2013; Comment No. 3-2

Tang, Hansong, City College of New York: Written Comments dated January 27, 2013; Comment No. 16-22

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Turner, Richard, F., Office of U.S. Congressman, Albio Sires: Oral Testimony dated February 5, 2013; Comment No. 3-2

Turonis, Emily, Resident: Oral Testimony dated February 13, 2013; Comment Nos. 3-1, 5-2, 18-1

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Valdner, Anthony, M., President, Teamsters Local Union No. 560: Written Comments dated February 5, 2013; Comment No. 3-2

Van Guilder, Carol, Bayonne Chamber of Commerce: Oral Testimony dated February 7, 2013; Comment Nos. 3-11, 16-2, 16-15, 16-55, 16-60

van Riemsdyk, Frans, Maher Terminals, LLC: Written Comments dated March 4, 2013; Comment No. 3-2

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Willner, Andrew, Baykeeper NY/NJ: Written Comments dated January 23, 2013; Written Comments dated January 30, 2013; Comment Nos. 1-1, 2-1, 2-4

Wimbish, Mitchell, New York City Department of Environmental Protection (NYCDEP): Written Comments dated February 8, 2013; Comment Nos. 11-13, 13-3, 16-68

Winckler, Patricia: Oral Testimony dated February 13, 2013; Comment No. 18-1, 18-13, 18-14

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Wood, David, Tennessee Valley Pipeline: Written Comments dated January 22, 2013

Wowkanech, Charles, New Jersey State ALF-CIO: Written Comments dated February 13, 2013; Comment No. 3-2

Wright, Joseph O.: Written Comments dated March 4, 2013; Comment No. 3-2

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Zorovich, Simon, Harbor Pilots of New York and New Jersey: Oral Testimony dated February 5, 2013; Comment No. 3-2

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CHAPTER 1 PURPOSE AND NEED

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