DRAFT SCOPING DOCUMENT FOR EIS PREPARATION IN CONJUNCTION WITH PROPOSED REPLACEMENT OF THE GOETHALS BRIDGE

Project is Identified as the
Goethals Bridge Modernization Program (GBMP) EIS

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1.0 INTRODUCTION

The Port Authority of New York and New Jersey (the Port Authority) has proposed a Goethals Bridge Modernization Program (GBMP), featuring a new crossing to replace the existing Goethals Bridge. The Goethals Bridge provides a direct connection between Staten Island, New York, and Elizabeth, New Jersey (see Figure 1). It facilitates mobility between the two states as part of the Port Authority's Interstate Transportation Network, comprised of the George Washington Bridge, the Holland and Lincoln Tunnels, and the three Staten Island Bridges (i.e., Goethals Bridge, Outerbridge Crossing and Bayonne Bridge). In addition, the bridge is considered a primary path of travel within the Southern Corridor, connecting Interstate 278 (the Staten Island Expressway) near Staten Island's north shore with the New Jersey Turnpike (Interstate 95) and U.S. Routes 1 and 9 in New Jersey.

The existing bridge has substandard 10-foot-wide lanes, no emergency shoulders, and escalating repair and maintenance costs. The functional obsolescence of the 76-year-old bridge impedes efforts to improve safety and reliability, accommodate current vehicle sizes, maintain efficient traffic operations and improve incident response. The design of the proposed new facility would reflect current traffic design standards, modern structural and seismic codes, national-security safeguards, and technology enhancements. It would also incorporate operational flexibility, which is not feasible with the existing bridge, in order to facilitate future transit-service opportunities. By ensuring the ability to meet current and future interstate travel demand, the GBMP is expected to support long-term economic growth and improved mobility for the local communities, as well as enhance overall performance, flexibility and reliability of the transportation network serving the greater metropolitan area.

The Port Authority notified the U.S. Coast Guard (Coast Guard) by letter of June 3, 2004, of its intent to submit a formal application for a Bridge Permit under the General Bridge Act of 1946. Accordingly, the Coast Guard assumed the role of the Federal lead agency for preparation and issuance of an Environmental Impact Statement (EIS) for this project, in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969.

This Draft Scoping Document has been prepared as part of the formal scoping process pursuant to NEPA and the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Part 1500 et seq.). The Draft Scoping Document provides information to the public and agencies on the Draft EIS (DEIS) process, issues and alternatives that will be addressed, and analytical methodologies that will be employed. The broader purpose of the scoping process is to provide opportunity for the public and agencies to comment on and provide input to the scope of the DEIS as it is initiated.

Goethals Bridge Modernization Program EIS REGIONAL LOCATION

Figure 1

2.0 EIS OVERVIEW

2.1 Initiating the EIS Process

Figure 2 highlights the general steps in the EIS process. The process officially began with the Port Authority's submittal of a Letter of Intent to File a Bridge Permit Application to the Coast Guard for the GBMP. In response to this letter, the Coast Guard, as Federal lead agency, published a Notice of Intent (NOI) to prepare a DEIS in the *Federal Register* (August 10, 2004). This initiated the scoping process.

2.2 EIS Scoping Process

The purpose of the scoping process is to provide an opportunity for agencies and the general public to comment on and provide input to the scope of issues to be addressed in the DEIS and in the identification of the significant issues related to the proposed action. Agency and public scoping meetings will be held to review the study scope and approach and to receive comments and suggestions for consideration from agencies and the general public. Federal, state, and local agencies were invited by letter to participate in the scoping process; the general public, elected officials, special interest groups and other potential stakeholders will be invited to participate via various advertising and outreach mechanisms.

The agency scoping meeting will be held on September 14, 2004, at the offices of the U.S. Coast Guard, First Coast Guard District, One South Street, Battery Building, New York, NY. Two sets of public scoping meetings will be held in October 2004, one on Staten Island, NY, and one in Elizabeth, New Jersey.

Scoping comments may be made orally at the scoping meetings, or in writing throughout the scoping process, and will be accepted for a minimum of 30 days following the scoping meetings.

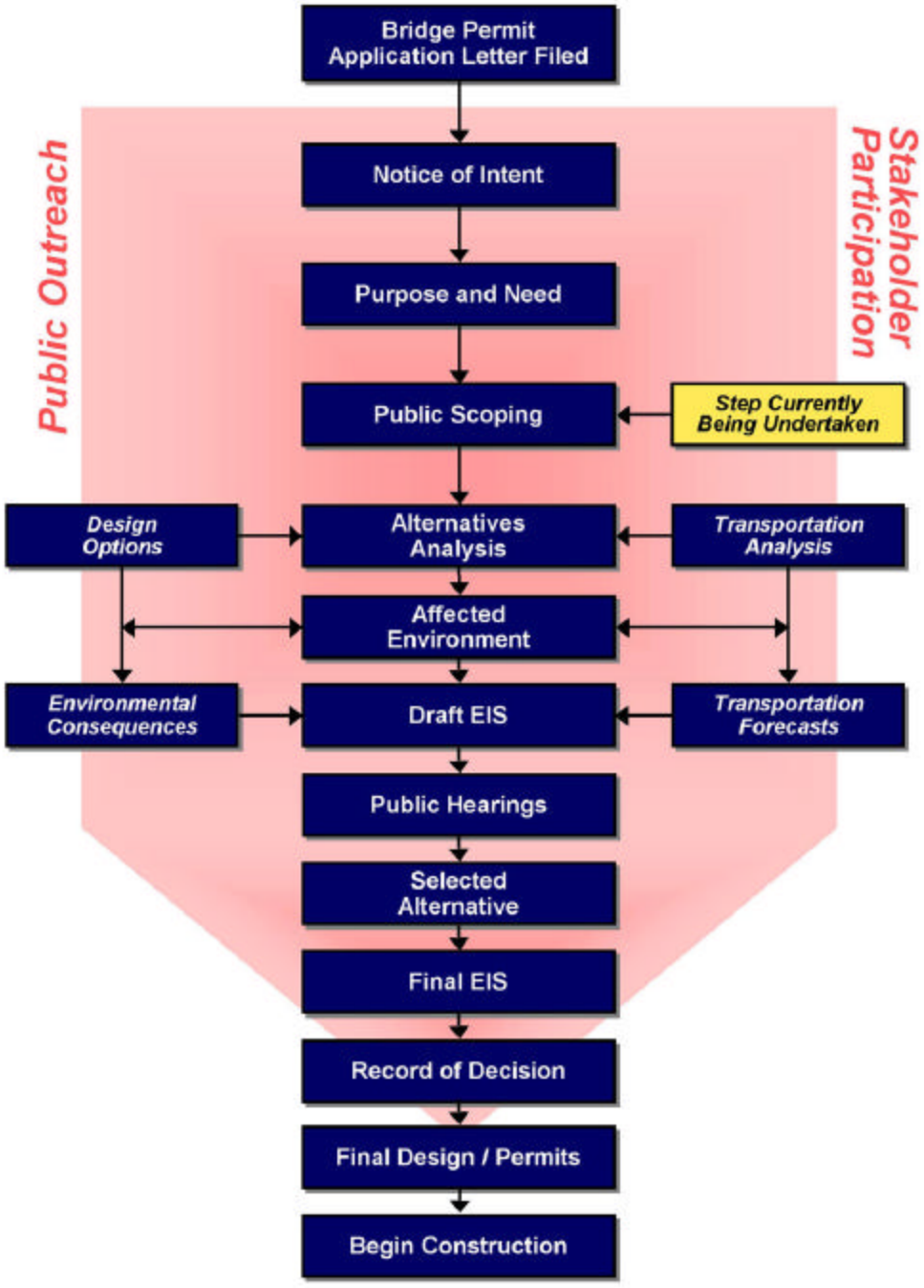
2.3 DEIS Preparation

The GBMP DEIS will be prepared in accordance with NEPA regulations designed to identify significant environmental issues at an early stage and promote cooperative consultation among agencies before the DEIS is prepared. The DEIS will specifically follow the CEQ regulations implementing NEPA (40 CFR Part 1500 et seq.).

After its publication, the DEIS will be available for public and agency review and comment for a minimum 45-day period. Public hearing(s) will be held to receive comments from the public and agencies on the document; comments may be provided orally at the hearing(s) or in writing during the DEIS comment period.

2.4 EIS Study Areas

Potential direct, indirect and cumulative impacts of the proposed project will be evaluated within the boundaries of primary, secondary and regional study areas. Within these study areas, existing conditions will be examined and described, and future conditions and potential impacts without and with the proposed project will be assessed. The primary study area for evaluation of potential direct impacts is proposed to encompass approximately one square mile of industrial waterfront in New Jersey, principally in Elizabeth, with a smaller portion in Linden, and nearly two square miles of less-developed acreage in northwestern Staten Island, New York. More specifically, the prospective primary study area is expected to parallel the immediate right-of-way of the Goethals Bridge corridor, extending between 400 and 500 feet north and south of the existing Goethals Bridge and approach alignments. The secondary study area,



Goethals Bridge Modernization Program EIS PROJECT DEVELOPMENT PROCESS

Figure 2

within which indirect, or secondary, project-related impacts may occur, is proposed to extend approximately one-half mile in all directions from the Goethals Bridge corridor. These proposed study area limits will be further refined and expanded, if necessary, following identification of project alternatives for detailed evaluation in the DEIS.

Recognizing the Goethals Bridge's role in the metropolitan area's transportation network, a larger regional study area is proposed for the assessment of traffic and transportation, and related air quality conditions and potential impacts. Potential cumulative impacts of the proposed project, as well as other major transportation and development projects in the Goethals Bridge corridor's vicinity and in the region, will also be assessed. The regional study area will likely encompass the 23 counties in New York and New Jersey that are included in the Best Practice Model (BPM), a multi-modal travel-forecasting model developed by the New York Metropolitan Transportation Council (NYMTC) for use in transportation studies in the New York metropolitan area. The BPM is currently being updated and modified (BPM-Goethals) by the EIS Consultant to provide greater specificity for the Goethals Bridge/Outerbridge Crossing Southern Corridor, for use in the traffic and transportation analyses for this EIS.

In addition to the regional study area for the traffic and air quality assessments, individual analysis sites will be selected at major roadways in the vicinity of the proposed project and at other major travel routes in the region where localized impacts may occur.

3.0 PURPOSE AND NEED

3.1 Overview of Purpose and Need

The purpose of the GBMP is to eliminate the functional and physical obsolescence of the current Goethals Bridge and address the aging structure's escalating maintenance, repair, and structural retrofit needs, and associated costs. The GBMP, which features the proposed replacement of the Goethals Bridge (the project), would also serve to improve traffic flows; safety conditions and management of traffic incidents on the bridge; and overall performance, reliability, flexibility, and redundancy of the transportation network serving the greater New York/New Jersey metropolitan area.

The principal factors that underlie the need for the project are:

- the existing bridge's functional and physical obsolescence due to inadequate design features, including narrow lanes, no emergency shoulders, and substandard alignment, resulting in worsening traffic service, safety conditions, and management of traffic incidents on the bridge;
- the existing bridge's age, including the bridge deck, which is past its normal service life and requires ongoing maintenance, repair, and rehabilitation costs, and the need for a seismic retrofit of the substructure and superstructure;
- the existing bridge's deficiency as a reliable transportation link for system redundancy within the Staten Island Bridges system and, more broadly, the New York/New Jersey region in the event of emergency;
- increasing traffic volumes, including truck traffic, across the existing Goethals Bridge, resulting in worsening traffic conditions and relatively higher accident levels on the facility; and
- the layout of the existing bridge and its approaches, which limits the ability to maximize traffic flow improvements afforded by E-ZPass technology, and which is inadequate to provide for priority-lane treatment or dedicated capacity for potential future transit service on the facility.

The project is intended to address each of these critical factors and thereby provide for an adequate, efficient, and safe crossing in the Goethals Bridge corridor to meet present and anticipated future transportation system needs.

3.2 Background

3.2.1 Introduction

The Goethals Bridge was constructed in the 1920s to span the Arthur Kill and provide a roadway connection between Staten Island, New York, and Elizabeth, New Jersey. The two other roadway connections between Staten Island and New Jersey are the Bayonne Bridge, connecting northern Staten Island with Bayonne, New Jersey, and the Outerbridge Crossing, connecting southern Staten Island with Perth Amboy, New Jersey. These three bridges, which comprise the Staten Island Bridges system, are owned and operated by the Port Authority.

3.2.2 Traffic Growth Trends

The importance of the Goethals Bridge within the regional roadway network grew with the opening in 1964 of the Verrazano-Narrows Bridge. The two bridges, connected by the Staten Island Expressway (part of I-278), became elements of an increasingly busy travel corridor between and including New Jersey, Staten Island, and geographic Long Island (i.e., Brooklyn, Queens, and Nassau and Suffolk counties). In the larger regional transportation context, I-278 serves as a critical spine within New York

City's expressway system, linking the City to northern and central New Jersey via the Goethals Bridge, and to Long Island, upstate New York, and New England via the Verrazano-Narrows Bridge and, for northern destinations, via subsequent connection to I-95.

The opening of the Verrazano-Narrows Bridge and the resultant population growth on Staten Island had a substantial impact on traffic patterns and volumes across Staten Island. Traffic across the Goethals Bridge increased an average of 33 percent annually between 1964 and 1973. Traffic during the weekday peak periods (i.e., 6:00 to 10:00 AM and 3:00 to 7:00 PM) grew at an even steeper rate throughout these years. Compared to 1964 peak-period traffic volumes of approximately 7,100 vehicles (both directions), the bridge currently carries approximately 18,000 to 20,000 vehicles (both directions), with approximately 10,500 vehicles in the peak direction during the weekday peak periods. This totals approximately 76,000 vehicles (both directions) on a daily basis[1].

The ratio of truck traffic to overall traffic also increased as the Goethals Bridge became a critical component in the regional network of expressways. Regional and national trends toward more spatially dispersed manufacturing and distribution facilities and a shift in goods movement toward more shipments by truck rather than rail led to an increasing proportion of trucks as a component of overall traffic. These factors and trends are reflected in the changing makeup of Goethals Bridge traffic over time. For example, in 1953, trucks represented less than two percent of all traffic across the bridge, and tractor-trailers constituted only one-tenth of all truck traffic. In contrast, the Port Authority's 2003 traffic survey indicated that nine percent of trips across the span were by truck.

In addition, recent national trends toward increased motor-vehicle heights, widths, and lengths have limited truck movements through the Lincoln and Holland Tunnels (Port Authority, *Interstate Goods Movement Study*, 1992). As a result, the Port Authority's interstate bridges, including the Goethals Bridge, have taken on increased importance as routes for goods movement in the New York/New Jersey metropolitan region.

As traffic volumes have grown, travel conditions have become increasingly congested and traffic flows on the Goethals Bridge have begun to operate below acceptable service levels during peak travel periods.

3.2.3 Previous Studies

In response to these trends, the Port Authority initiated its Staten Island Bridges Program (SIBP) in 1989 to investigate potential improvement concepts for the Staten Island Bridges system. In 1992, an environmental review of alternative improvement concepts that appeared to best address identified needs was completed. In accordance with NEPA, a comprehensive environmental analysis of the SIBP was undertaken by the U.S. Coast Guard in conjunction with its bridge permitting responsibilities, resulting in the completion of the DEIS for the SIBP in 1995; the Final Environmental Impact Statement (FEIS) was completed in 1997.

The SIBP DEIS identified two primary alternative Goethals Bridge improvement concepts: 1) a parallel bridge to the north of the existing Goethals Bridge; and 2) a parallel bridge to its south. Both of the parallel-bridge options were proposed to operate in conjunction with the existing bridge. In addition, an enhancement that was considered for both alternatives was provision of one concurrent high-occupancy-vehicle (HOV) lane on the new bridge, as well as one on the existing bridge. These alternatives sought to address the transportation deficiencies articulated in the 1997 SIBP FEIS purpose and need documentation.

[1] Current figures are based on 2003 traffic counts conducted by the Port Authority, part of a series of surveys conducted at its vehicular toll facilities to determine inter-zonal commuter usage between New York and New Jersey.

The environmental analyses concluded that the preferred alternative for addressing the SIBP purpose and need was the construction of a new bridge, parallel and to the south of the Goethals Bridge, to operate in conjunction with the existing bridge. A Record of Decision (ROD) for that project was not issued, due to various unresolved issues.

3.3 The Need for Replacement of the Goethals Bridge

In the years since the 1997 SIBP FEIS, the project purpose and need have evolved, reflecting physical and operational changes to the Goethals Bridge, existing and future transportation needs, and enhanced focus on needs for system redundancy and improved security. The Port Authority has recently reassessed the operational conditions identified in the earlier analyses and has now proposed a replacement of the Goethals Bridge as an important element of the GBMP to address the expanded purpose and need.

The GBMP seeks to provide for a new Goethals Bridge crossing that will:

- have structural design that eliminates the span's functional obsolescence;
- address concerns about the structure's age and related repair, maintenance, and rehabilitation needs and associated costs;
- enhance security and transportation system redundancy;
- improve traffic service, including incorporation of the expanding use of E-ZPass toll collection to improve traffic flow;
- improve travel safety and the ability to manage traffic incidents on the bridge;
- facilitate safe and reliable access for wider trucks currently using the Goethals Bridge crossing; and
- provide capability to accommodate and promote transit services and other alternatives in lieu of single-occupant-vehicle (SOV) commutation.

Each of these elements of the GBMP is described below.

3.3.1 The Need to Provide Standard Features and Address Design Deficiencies

As the Goethals Bridge was designed and constructed in the 1920s for narrower vehicles and significantly lower traffic volumes than currently exist, several of the existing bridge's physical features are now functionally obsolete, in terms of current highway design standards defined by the American Association of State Highway and Transportation Officials (AASHTO). These deficiencies contribute to reduced traffic efficiency, traffic service levels, and safety conditions on the bridge, resulting in diminished traffic performance, driver safety, and increased operational concerns.

The following substandard design features adversely affect traffic operations on the Goethals Bridge:

- *Ten-Foot Lane Widths.* The travel lanes on the Goethals Bridge and its approaches are 10 feet wide. AASHTO now recommends a standard lane width of 12 feet, a standard which is applied by the Federal Highway Administration. Further, increasing numbers of larger-sized trucks and buses now cross the Goethals Bridge. Typical truck-trailer and full-size passenger bus widths are now 102 inches (8.5 feet). When lane widths are less than 12 feet and lateral clearances are less than 6 feet due to physical obstructions such as roadway barriers, typical driver reaction is to reduce speed due to uncomfortable driving conditions, and to lengthen the distances between vehicles in the same lane. Drivers often hesitate to pass slow-moving trucks or buses because of limited sight

distances and constrained lateral clearances due to the bridge's narrow lane widths. Therefore, traffic queues often build up in both lanes behind slow-moving trucks and buses.

- *Lack of Emergency Shoulder Lanes.* Stalled vehicles and minor accidents on the Goethals Bridge frequently result in significant delays. Due to the narrow lane width and lack of emergency shoulders, clearing accidents sometimes requires blocking all traffic in the affected direction or closing one lane to through traffic. The lack of a shoulder breakdown lane on the bridge main span and approaches also degrades safety conditions, as stalled vehicles themselves become safety hazards.
- *Approach Span Grade and Alignment.* There is a pronounced bend in the alignment of the New Jersey approach span of the Goethals Bridge at a point approximately 2,300 feet from the western bridge abutment. To maneuver through the bend, drivers of wider trucks and buses traveling in the right lane often encroach on the left travel lane, making it difficult for vehicles operating in the left lane to pass slower-moving trucks. This phenomenon results in slower travel speeds for all vehicles and reduced bridge capacity.

3.3.2 The Need to Enhance Structural Integrity and Reduce Life-Cycle Costs

Based on review of the most recent inspection report prepared for the Goethals Bridge (*2002 Biennial Inspection Report*) and on recent (May 2004) visual structural verification and inspection conducted on the bridge and its approach structures as part of this EIS effort, the existing structure is currently in overall good to satisfactory condition. Significant expenditures, averaging approximating $6.7 million per year, for maintenance and repairs to extend the structure's effective life span have been made in the period from 1987 to fiscal year 2005.[2] A substantial portion of the total expenditures has been spent since 2001, including repainting of the entire structure, replacement of the existing sidewalks, and performance of miscellaneous structural and deck repairs.

Based on these data, the repair costs associated with the Goethals Bridge can be expected to continue to increase in future years, despite the work that is being performed under a current rehabilitation and repair contract ($63 million) begun in 2004. The 76-year old bridge is well past its normal service life; the current major rehabilitation work will provide interim repairs that are expected to extend the life of the bridge 7 to 10 years. After that period, a complete deck replacement and seismic retrofit will most likely be required to keep the bridge in service. The cost of the deck slab replacement could range from $104 to $226 million (in 2001 dollars), depending on the type of deck system employed, construction-period traffic staging schemes, and deck replacement schemes. In addition to the deck replacement, various superstructure and substructure maintenance repairs may also be required at that time.

Other significant repair, maintenance, and rehabilitation contracts will continue to be required every 20 to 25 years, contributing to the increasingly high cost of extending the structure's life span, while also inconveniencing travelers with construction-related delays. However, as none of the repairs will correct the bridge's deficient geometry, needs related to traffic service, safety, emergency response, and system redundancy will not be addressed. Also, while it will be feasible to re-open the bridge walkway to pedestrians following the completion of current repairs[3], safety/security issues may preclude this without, at minimum, implementation of safety- and security-related modifications at additional costs. Finally, future repairs will also not provide any ability to fully capitalize on traffic flow improvements that could be afforded by E-ZPass technology, nor to accommodate potential future transit on the Goethals Bridge, should future travel patterns warrant such consideration.

[2] These expenditures are based on Port Authority data on repair contracts.
[3] Pedestrian access has been unavailable for nearly a decade due to deterioration of the sidewalk deck and supports.

3.3.3 The Need to Provide System Redundancy and Resilience

Operational redundancy of the region's transportation network, including the system of bridges serving Staten Island and providing bi-state access, is a critical need. In March of 2004, a fatal accident on the Goethals Bridge involving four trucks and a car necessitated that the Port Authority shut down the bridge in both directions. A second five-vehicle accident on the Outerbridge Crossing, possibly attributed to additional volume diverted from the accident scene, created an extensive traffic backup for several miles and several hours of congestion and delays. As a result of these two separate but chronologically overlapping incidents, the potential for traveling between Staten Island and New Jersey was virtually eliminated for an extensive period, despite the continued operation of the Bayonne Bridge.

While such a dual-accident scenario is rare, it demonstrates the importance of having adequate lane widths to alleviate the pressure from trucks and buses using the facility between Staten Island and New Jersey, and to provide relief in the event of any type of incident[4] involving one or more of the existing bridge crossings. More broadly, adequate operational flexibility and safe travel conditions in the Goethals Bridge corridor are critical to accommodate traffic diverting from other transportation facilities during closure incidents in other corridors.

3.3.4 The Need to Improve Traffic Service

3.3.4.1 Existing Travel Conditions

To understand current travel conditions on the Goethals Bridge, a comprehensive review was initiated of available traffic-related data sources and the results of traffic surveys performed in 2000, 2002, and 2003 by the Port Authority. Average weekday traffic volumes on the bridge, as determined from the Port Authority's 2003 Spring/Fall counts, were approximately 76,000 vehicles, with eastbound and westbound vehicular trips constituting 39,000 and 37,000 vehicles, respectively. The 2002 traffic survey indicated that 89 percent of total eastbound trips were by automobile and 11 percent were by truck. About 62 percent of the trips each weekday were work- and company business-related while about 20 percent were for personal business and 12 percent were for recreational purposes.

The peak directions of travel on the bridge are westbound (leaving Staten Island) in the morning, and eastbound (returning to Staten Island) in the afternoon. During the 6:00 to 10:00 AM peak period of travel, westbound traffic in 2003 (10,200 vehicles) was 34 percent higher than eastbound traffic (7,600 vehicles). During the 3:00 to 7:00 PM peak period of travel, 2003 eastbound volumes (10,700 vehicles) were 24 percent higher than westbound levels (8,600 vehicles). During the midday peak period, traffic flows were generally the same in both directions, with westbound traffic just slightly higher than eastbound traffic.

According to the 2002-2003 Port Authority traffic surveys, the average number of weekday trips to Staten Island was about equal to the number of through-trips that originated in or were destined for locations east of the Verrazano-Narrows Bridge. Of the through-trips, 36 percent were going to Brooklyn or Queens. During the typical weekend day, approximately 60 percent of trips have destinations east of Staten Island, primarily for recreational purposes.

Statistics on truck trips, according to the Port Authority's 2000 truck commodity and cordon survey study, were somewhat different, with 33 percent of truck trips across the Goethals Bridge during an average

[4] Such incidents could be related to an accident, a bridge closing due to emergency or routine maintenance or repairs, or an emergency condition.

weekday (in November 2000) bound for destinations in Staten Island, while 35 percent were destined for Brooklyn, 14 percent for Queens, and the remainder for Long Island.

The quality of traffic service provided by a roadway facility is typically characterized for peak-period travel conditions and measured in terms of levels of service (LOS).[5] In the Port Authority's 2001 *Staten Island Bridges Access Study*, traffic volumes in the peak travel hour were counted and analyzed. The analysis of volumes, which are similar to today's volumes, indicate that the Goethals Bridge operates at LOS "E" in the westbound peak-travel direction during the weekday AM peak period. The bridge operates at LOS "F" in the eastbound peak-travel direction during the weekday PM peak period.

This profile of traffic service on the Goethals Bridge changes markedly during the weekend, when approximately 87 percent of all trips across the bridge are non-work-related. On a typical Saturday, average traffic volumes on the Goethals Bridge exceed weekday levels, with 41,000 eastbound and 37,500 westbound automobile trips; on a typical Sunday, the average traffic volumes are somewhat less. with 40,700 eastbound and 31,900 westbound trips. However, the non-work-related weekend trips are more evenly dispersed over the day. With less pronounced peaking patterns during the weekend, LOS conditions remain relatively stable throughout the day, with the exception of Saturday and Sunday evenings, particularly during summer months, when many residents return to Staten Island and other New York communities from points in New Jersey.

3.3.4.2 Future Traffic Growth and Travel Conditions

Population and employment forecasts prepared by the New York Metropolitan Transportation Council (NYMTC)[6], the Port Authority, and other entities indicate that the regional economy and population will continue to grow in the foreseeable future. Projected growth in some of the areas served by the Goethals Bridge is expected to continue to place increasing traffic demands on the existing crossing, which will likely result in further deterioration of traffic conditions in future years. In addition, with the recent redevelopment and forecasted growth of the Howland Hook Marine Terminal in the northwestern corner of Staten Island, the importance of the Goethals Bridge, already a critical link for truck-based cargo transport in the region, will likely be reinforced, even with current and planned rail freight improvements.

NYMTC has developed a set of transportation models to meet federal requirements for long-range planning. NYMTC's travel-forecasting model, the Best Practices Model (BPM), was developed as the regional model to be used for sub-regional, corridor-level and conformity-related travel demand forecasting. The model's study area includes 28 counties in New York, New Jersey, and Connecticut and includes over 3,600 transportation analysis zones. The model also includes the study area's transit route system, comprised of more than 1,180 routes, including commuter rail, subway, express bus, local bus, and ferry services. The model has recently been updated to reflect year 2002 socioeconomic characteristics in the region, based on 2000 U.S. Census data. The model is also being updated and modified by the Consultant for this EIS for the Goethals Bridge/Outerbridge Crossing Southern Corridor (BPM-Goethals) to provide more network and zonal information to better reflect actual conditions and forecast future growth.

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[5] Level of service (LOS), as defined by the Transportation Research Board, ranges from level "A" to level "F," where LOS "A" indicates free-flowing traffic conditions with high travel speeds and LOS "F" describes breakdown conditions with excessive congestion and delays. LOS "C" indicates stable traffic flows and overall good conditions and is generally used as an optimal design objective. LOS "D" represents heavy traffic flow conditions without excessive delays and is considered to be the minimum acceptable operating condition for urban areas. LOS "E" is defined as the theoretical capacity of the roadway, or the maximum stop-and-go flow of vehicles, given existing physical conditions. It is generally considered that LOS E and LOS F are below the threshold of acceptable operating conditions.

[6] NYMTC is the metropolitan New York region's Metropolitan Planning Organization.

Preliminary travel forecasts developed by NYMTC as part of its regional modeling update indicate that by 2025, traffic is likely to grow by as much as 20 to 25 percent during the peak travel periods. Given this increase, it is projected that traffic operations will continue to deteriorate during both the AM and PM weekday peak periods, resulting in unstable traffic flows, queues on the Goethals Bridge and its approaches, and increased safety problems potentially resulting in more accidents and traffic-delaying incidents. It is anticipated that without improvements, traffic service on the Goethals Bridge will deteriorate to LOS "F" in both the AM and PM peak hours, with extremely unstable, breakdown traffic operations. Accidents and traffic incidents on the bridge will likely increase while truck flows across the bridge and regional access and connectivity will become further constrained. These delays in travel across the bridge would lead to reduced productivity and corresponding higher user costs for all trip purposes.

These preliminary travel forecasts will be refined and updated as part of the comprehensive EIS process for the proposed project, using the BPM-Goethals travel-forecasting model to verify and refine forecasts of future conditions.

3.3.5 The Need to Provide Safer Operating Conditions and Reduce Accidents

Accident data for the Goethals Bridge has been compiled by the Port Authority for the period from 2000 through 2003. The total number of accident occurrences on the bridge over the four-year period and the number of accidents per millions of vehicle miles traveled is shown below:

Year	No. of Accidents	No. of Accidents/MVM	Volume (Millions)
2000	214	4.23	27.78
2001	226	4.36	28.47
2002	222	3.89	31.36
2003	186	3.59	28.49

The number of accident occurrences during each year is substantially higher than the annual levels reported in the 1997 SIBP FEIS for the three-year period from 1993 to 1995; annual accident occurrences reported during that earlier period totaled 139, 170, and 158 during 1993, 1994, and 1995, respectively.

Accident rates on the Goethals Bridge are the highest among the three Port Authority's Staten Island Bridges and are higher than the normal statewide rates for four-lane highways in both New York and New Jersey. The average accident rate for the four-year period from 2000 through 2003, based on accidents per million vehicle miles (MVM), is 4.02 for the Goethals Bridge. Similar to the trend in accident occurrences, this rate is higher than it was in the mid-1990s, when the 1997 SIBP FEIS reported the average accident rate for the three-year period from 1993 to 1995 as 3.53 accidents per MVM.

Despite some reduction in the last two years, the accident rates on the Goethals continue to be the highest of the three Staten Island Bridges and are well above the averages for similar facilities in New York and New Jersey. For example, the overall average rate is markedly higher than the latest 2002 New York statewide average of 1.09 accidents per MVM for four-lane divided access-controlled urban mainline highways, as compiled by the New York State Department of Transportation. The overall average rate on the Goethals Bridge is also above the 2002 average accident incident rate of 3.75 accidents per MVM in New Jersey for four-lane, median barrier divided, full-access-controlled state and interstate highways with no shoulders, as compiled by the New Jersey Department of Transportation. The comparatively high number of accidents on the Goethals Bridge can be attributed to the undesirable combination of narrow lane widths, lack of emergency shoulders, and steep grade constraints.

3.3.6 The Need to Provide for Safe, Reliable Truck Access for Regional Goods Movement

The Goethals Bridge serves as a key freight link with several roles: serving Staten Island and nearby New Jersey consumer and business needs; connecting distribution centers in New Jersey with businesses and consumers in Brooklyn, Queens, and the Long Island suburbs; and connecting the Howland Hook Marine Terminal with the mainland interstate highway system through a direct connection with the New Jersey Turnpike. Significant growth in cargo volume is forecast for the entire Port of New York and New Jersey, including the Howland Hook Marine Terminal. This trend will heighten the Goethals Bridge's importance for goods movement.

Vehicle classification counts (Port Authority, 2002) indicate that the westbound, peak-period mix of truck traffic on the Goethals Bridge is relatively evenly split between small (2 - 3 axle) and large (3-axle or more) trucks. A total of approximately 4,500 trucks crossed the Goethals Bridge on a typical weekday in November 2000. The Goethals Bridge is used principally for truck trips originating near Port Newark and Port Elizabeth, the South Kearny freight yards, and Middlesex County.

Truck traffic on the Goethals Bridge is already constrained by the physically obsolete configuration of the Goethals Bridge, notably narrow lanes and no emergency shoulder. Slow-moving truck traffic further exacerbates inefficient traffic service on the span by affecting passenger vehicle flows, as autos queue behind trucks navigating the narrow lanes.

The Port Authority and the City of New York are making investments to restore mainland rail freight connections to the Howland Hook Marine Terminal. While this and other rail freight improvement projects are anticipated to result in some shift of goods movement from truck to rail, truck-based goods movement is nevertheless expected to increase to/from Howland Hook and within and through the region. Goods movement in the Goethals Bridge corridor will become increasingly constrained and inefficient with increasing demand.

3.3.7 The Need to Provide for Potential Future Transit in the Corridor

The existing configuration of the Goethals Bridge precludes consideration of accommodating a transit system or priority-lane treatment for transit/ridesharing vehicles on the structure in the future, should travel patterns and ridership forecasts indicate that these would be feasible transportation options in the Goethals Bridge corridor. The structure's overall narrow width and its limited number of lanes for vehicular travel do not provide any excess space that could be dedicated for a transit system. The preferred alternative in the SIBP FEIS (1997) included a proposed structure with cross-sectional design that could accommodate potential future introduction of transit service on the new bridge, at such time as it might have been warranted. Since that earlier study, the New York/New Jersey region's transit network has grown, evidenced most recently with implementation of the Hudson-Bergen LRT system; further transit system expansions are under study throughout the region. However, given the existing structure's constrained layout, consideration of future transit system enhancement in the Goethals Bridge corridor would not be a viable option.

3.4 Project Goals

Project goals have been defined on the basis of the stated purpose and need for the proposed project. The project goals, in turn, serve as the basis for: 1) identifying potential project alternatives; and 2) defining criteria and related performance measures that will be used to select reasonable and feasible alternatives that may best satisfy the project goals, address the project purpose and need, and, therefore, warrant detailed evaluation in the EIS.

Based on the purpose and need for the Goethals Bridge Modernization Program, the following project goals have been defined:

- Address the functional obsolescence of the existing Goethals Bridge.
- Address structural integrity issues associated with the aging bridge.
- Reduce roadway congestion and delays and enhance mobility on the Goethals Bridge.
- Improve the flow of goods to and from Staten Island and and New Jersey and in the New York/New Jersey region.
- Correct the inability of the existing bridge to physically accommodate transit services and other single-occupant-vehicle commuting alternatives.
- Restore and enhance pedestrian access and provide for bicycle access.
- Implement measures to improve bridge structural security.
- Minimize environmental consequences of the improvement.

3.5 Related Studies and Projects

There are a number of recently completed and ongoing studies, projects, and programs from which the GBMP EIS will obtain data and information and with which the EIS studies will be coordinated, as necessary. These include studies of facility-specific and more regional transportation improvements and land use development projects in the study area. A comprehensive list of these studies will be included in the DEIS.

Projects that are programmed and committed to be implemented prior to the time that the GBMP alternatives would come on line will be incorporated in the definition of the No-Action alternative to be assessed in the EIS. Programmed and committed projects will also be addressed in the evaluation of cumulative effects.

The list of related studies and projects will be compiled with input principally from the scoping process and from the other studies' and projects' sponsoring agencies, as well as from technical literature reviews being conducted for the EIS. A partial list of key related studies and projects includes:

- Staten Island Expressway median bus lane extension, Staten Island;
- West Shore Expressway Corridor/Service Road improvements, Staten Island;
- North Shore Railroad reactivation for freight rail and connection to the Chemical Coast Line, Staten Island and New Jersey;
- Comprehensive Port Improvement Plan for the Port of New York and New Jersey;
- Gowanus Expressway viaduct replacement, Brooklyn, New York;
- Intelligent Transportation Systems (ITS) limited access highway improvements, New York City;
- Elizabeth Ferry Terminal and service, Elizabeth, New Jersey;
- Portway extensions transportation improvements, New Jersey;
- Cross Harbor Freight Movement Project, New York and New Jersey.

4.0 ALTERNATIVES

Project alternatives that will be evaluated in detail in the DEIS will be selected through a tiered screening evaluation of potentially reasonable and feasible alternatives. Preliminary alternatives will be identified and screening criteria and related performance measures will be defined based on the purpose and need of the GBMP. Comments and input received during the scoping process relative to alternatives will be considered in the formulation of the list of preliminary alternatives and the screening criteria to reflect pertinent agency and public issues and concerns. Subsequent public meetings will be held to present and discuss the alternatives screening process, pertinent data and information, analysis results, and conclusions. Categories of alternatives that are anticipated to be considered, and the alternatives screening process, are described below.

4.1 Preliminary Alternatives and Initial Screening Analysis

Preliminary alternatives will be identified through:

- review of previous studies prepared of the Goethals Bridge, the broader Staten Island Bridges system (i.e., Goethals Bridge, Outerbridge Crossing, Bayonne Bridge), and other transportation facilities (e.g., Staten Island Expressway, North Shore Railroad) in the study area;
- review of the alternatives analysis conducted for the Staten Island Bridges Program Modernization and Capacity Enhancement Program EIS (1997);
- analysis of the study area's existing transportation infrastructure and technology to identify significant system gaps or deficiencies; and
- the EIS scoping process through which agency and public comment and input is solicited.

The preliminary alternatives will represent a broad range of modal solutions that have the potential to address the purpose and need and respond to the project goals. They will include both structural and non-structural alternatives, as well as the No-Action alternative, as described below:

No-Action Alternative: The No-Action alternative defines future baseline conditions, inclusive of major rehabilitation of the existing Goethals Bridge to extend its service life, and transportation projects and improvements that are programmed and committed, but not including replacement of the Goethals Bridge.

Project Sponsor's Proposal: The Port Authority's preferred proposal is to replace the existing Goethals Bridge. Incorporated into the design of the proposed new facility will be elements to reflect current traffic design standards, modern structural and seismic codes, national-security safeguards and technology enhancement, and operational flexibility to facilitate future transit-service opportunities. A replacement bridge may be considered south of or within the existing alignment, with subsequent demolition and removal of the existing span.

Goethals Bridge Rehabilitation for Significant Life-Span Extension: While the Goethals Bridge is currently undergoing a $60 million major structural rehabilitation program to extend the span's service life for an additional 7 to 10 years, significant additional, ongoing rehabilitation would be required to extend the existing facility's service life for a period comparable to what would be anticipated with a replacement bridge.

Other Structural Alternatives: Other structural alternatives may include, but not be limited to: a replacement bridge north of the existing Goethals Bridge; a parallel bridge in conjunction with the existing bridge either north or south of the existing Goethals Bridge; twin replacement bridges, one either north or south of the existing bridge and one in the existing bridge's right-of-way, following demolition and removal of the existing structure; a tunnel crossing to replace the existing bridge; fixed-guideway

transit (light rail transit, commuter rail), roadway-based transit (bus rapid transit, high-occupancy-vehicle (HOV) facility for ridesharing, car/van pools), and/or ferry services.

Non-Structural Alternatives: Non-structural alternatives may include new and/or modified congestion pricing strategies at the Goethals Bridge and/or other transportation facilities in the study area; other Travel Demand Management (TDM) programs designed to reduce recurrent peak-period traffic congestion; Transportation System Management (TSM) programs designed to maximize use of existing transportation facilities to improve efficiency of traffic operations; and transit options that do not require new infrastructure (expanded local and/or express bus services and routes).

The identified preliminary alternatives will be screened against an initial set of criteria to determine each one's fundamental feasibility and likely ability to satisfy the project purpose and need. Preliminary alternatives that are clearly infeasible or unreasonable due to identifiable major flaws, or do not have the potential to minimally satisfy the majority of project goals, will be eliminated from further consideration. Preliminary alternatives that warrant further investigation will be advanced to the next phase of the screening process.

4.2 Intermediate Alternatives and Comparative Screening Analysis

Alternatives surviving the initial screening analysis will be further developed in terms of alignments, system components, operations, ancillary facilities, institutional requirements for implementation and operation, and other characteristics. Certain individual intermediate alternatives may be combined to create multimodal alternatives with the expectation that combinations of complementary transportation improvements would more fully address the project purpose and need.

The further definition and screening of intermediate alternatives will be focused, rather than encyclopedic, to provide necessary and sufficient information for selection of a short list of alternatives that warrant detailed evaluation in the DEIS.

The second screening phase will compare the intermediate alternatives against criteria and associated evaluation measures to assess the alternatives':

- transportation performance in the Goethals Bridge corridor, including considerations of capacity, congestion, system reliability, and safety;
- effect on enhancing the Staten Island Bridges' transportation system redundancy;
- effect on goods movement through the Goethals Bridge corridor and in the region;
- relevance to and potential effect on the existing bridge's structural integrity;
- local and regional environmental considerations of primary concern; and
- practical construction and cost considerations.

The comparative screening analysis will serve to identify principal advantages and shortcomings of each alternative; highlight key differences among the alternatives; and determine the respective merits of each. Evaluation matrices will be prepared both to display discrete findings of the screening evaluation for each alternative, and to highlight their comparative performance relative to each criterion and their responsiveness in satisfying the project purpose and need.

In addition to the No-Action alternative, build alternatives that satisfy the project purpose and need will be advanced for detailed evaluation in the DEIS. The future baseline No-Action alternative will be supplemented with the congestion pricing alternative that is judged, via the comparative screening, to best satisfy the project purpose and need related to reduced congestion and delays on the Goethals Bridge.

5.0 SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS

The social, economic, and environmental setting for the area potentially affected by the alternatives will be described. This description will be of sufficient scope to assess all potential effects of the alternatives, including their direct, indirect, and cumulative impacts. Data and analyses commensurate with the importance of the impact will be included. It is assumed that the Affected Environment Study Area limits will be coincident with identified project alternatives.

The following sections present the technical disciplines that will be addressed with descriptions of the approach to characterizing existing conditions and the means of analyzing impacts and mitigation.

5.1 Traffic and Transportation

5.1.1 Comprehensive Traffic Count and Analysis Program

This study, conducted in the Spring and Fall of 2004, will update a traffic count program and access study for the Goethals Bridge previously conducted in 1993 and 2000. The major roadways providing access to the Staten Island bridges include the Staten Island Expressway (Interstate Route 278), the West Shore Expressway (SR- 440), the New Jersey Turnpike (Route I-95), the Garden State Parkway, Routes 1/9 and 169 in New Jersey, and Victory Boulevard, Richmond Avenue, Richmond Parkway, and Hylan Boulevard on Staten Island. In support of the DEIS and for the purpose of updating this comprehensive traffic count program and access study, the region has been segregated into fourteen (14) Primary Traffic Study Areas (PTSAs) (see Figure 3).

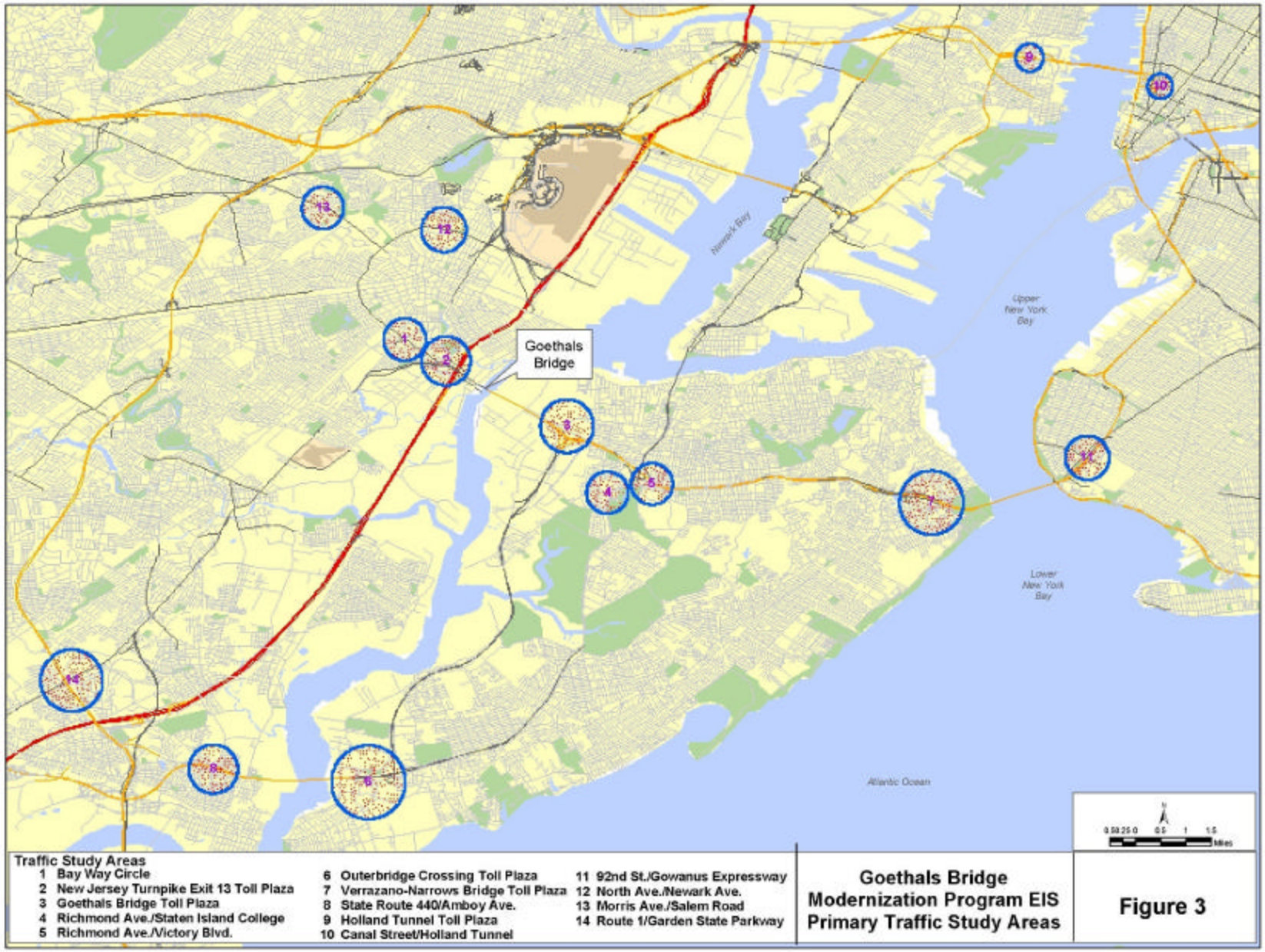
In each of the 14 PTSAs, signalized and unsignalized intersection locations will be analyzed. Key intersection locations were chosen based on their proximity to access and egress ramps of the arterial highways and to major approach travel routes. The resulting dataset will provide the ability to determine changes in traffic conditions within the Staten Island corridor, as well as in the region.

The initial task activities include:

- Manual counts and Automatic Traffic Recorders (ATRs) to collect the traffic data.
- Obtaining the Port Authority's 24-hour, westbound traffic counts at its four bridges and two tunnels taken during the spring and fall of each year. This information for prior years will be needed along with the corresponding eastbound traffic volumes.
- Speed and delay surveys along 10 corridors for the air quality studies.
- Up to 40 detailed classification counts for the air quality and noise studies.
- Collecting 3 years of accident data for the three Staten Island Bridge crossings.

Once the initial data collection has been completed, the following analyses will occur:

- Staten Island Bridges 2004 traffic volumes will be developed.
- Existing (2004) level of service at the signalized and unsignalized intersections in the primary study area will be determined for the peak hour(s) within the 6:00-10:00 AM and 3:00-7:00 PM weekday periods.
- Staten Island Expressway capacity analyses for the existing condition (2004) will be determined for the peak hour(s) within the 6:00-10:00 AM and 3:00-7:00 PM weekday periods.
- Accident statistics for each of the three Staten Island Bridges from 2001 to 2003 will be developed. The Port Authority will provide raw accident information.



Goethals Bridge Modernization Program EIS Primary Traffic Study Areas

Figure 3

5.1.2 Forecasts of Future Traffic Conditions and Assessment of Alternative Improvement Strategies

The regional BPM is being updated and modified (BPM-Goethals) by the EIS Consultant to improve the model's calibration specifically for analysis of the Goethals Bridge and the Southern Corridor. General model parameter adjustments are focused on total person travel, origin-destination flow (peak period, 24-hour volumes), mode shares, and on overall performance of the model in the Southern Corridor. Model refinements to create the BPM-Goethals include:

- Updating to include NYMTC's incorporation of 2002 US Census information;
- Adjustments using the updated set of traffic counts; and
- A comprehensive review of the existing and potential future applications of congestion pricing (by mode, type of day, time of day) to reduce vehicular trips in the study corridor will be made and a congestion pricing subroutine will be incorporated into the BPM-Goethals.

After base conditions have been developed, the study will focus on modeling and forecasting future conditions. This will include:

- Identifying primary, secondary, and local streets for modeling based on their significance to the overall vehicular movements/capacity in the Southern Corridor;
- Inputting network coding such as capacity, speed, number of lanes, etc.;
- Coordinating with transportation agencies, including the New York Metropolitan Transportation Council (NYMTC) and the New Jersey Transportation Planning Authority (NJTPA), to review the list of committed and expected highway and transit projects that should be included in the future network;
- Adding all roadway and transit projects that are not presently in the model; and
- Performing traffic modeling for existing conditions and for No-Action and project alternatives.

The forecasting effort will assume the following:

- No-Action Year 2030
- No-Action Year 2030 with congestion pricing
- Project alternatives to be determined through the scoping process and alternatives analyses, including transit alternatives or alternatives with a transit component.

The BPM-Goethals assignment outputs will be used to develop base year and future year traffic volumes for the AM and PM peak hours for each of the alternatives. The future analyses will include:

- Using the methodologies outlined in the latest Transportation Research Board Special Report 209, the *Highway Capacity Manual*, level-of-service (LOS) estimates will be developed for major Port Authority crossings and key critical links, for AM and PM peak hours in both directions.
- Highway Capacity Software (HCS) will be used to determine traffic and operational characteristics for existing and future years.

For potentia l transit alternatives, or alternatives with a transit component, the BPM-Goethals will include coding of transit modes (e.g., commuter rail, light-rail transit (LRT), bus, subway, PATH, etc.) and will be used to forecast future transit ridership and multi-modal travel demand. The coding of transit modes will include transit routes, service plan, headways, travel time, transit fares, access and egress links, transfer links, and route passenger capacity. Based on the BPM-Goethals' multi-modal transportation networks, the model will be used to forecast future multi-modal travel demand and will permit comprehensive assessment of the effects of alternatives on person-trip generation, trip destination choice, travel-mode choice, and travelers' route choice (through highway and transit trip assignments). The modeling of a potential transit alternative will forecast potential ridership with the alternative and

resultant change (e.g., reduction) in vehicle trips due to shifts in travelers' mode choices (e.g., travelers who shift from auto to transit for commutation).

For the base conditions and for each of the alternatives, a traffic simulation model will be developed that will evaluate traffic operations in the corridor between NJ Routes 1/9 and the Route 440 interchange on Staten Island for the future years. The model will be a VISSIM simulation that will use existing conditions to calibrate the model operational analysis. This will be used to compare the results of future traffic conditions.

5.2 Air Quality

Analyses will be conducted to estimate the following:

- Pollutant levels near heavily traveled roadways and congested intersections that may be affected by the proposed alternatives under existing and future No Action conditions;
- Pollutant levels near heavily traveled roadways and congested intersections that may be affected by the proposed alternatives under future conditions with the proposed project alternatives, and the potential localized impacts associated with project-generated changes in traffic volumes or traffic patterns;
- Changes in the amounts of vehicular emissions generated in the NY and NJ portions of the study area under each of the proposed alternatives, with respect to the requirements of each State Implementation Plan (SIP); and
- Potential impacts associated with the construction phase of the proposed alternatives.

The pollutants to be considered in this analysis include:

- Carbon monoxide (CO), particulate matter less than 10 microns (PM10) and less than 2.5 microns (PM2.5) for the localized (microscale) mobile source analyses; and
- CO, PM10 and ozone precursors [i.e., nitrogen oxides (NO_x) and hydrocarbons (HCs)] for the regional (mesoscale) analysis.

Existing and future CO and PM10 pollutant levels will be compared with established National Ambient Air Quality Standards (NAAQS) and, where applicable, the NYCDEP's "de minimis" criteria for CO and Significant Threshold Values (STV) for PM2.5, and with one another to determine impacts of the Project Alternatives.

Analysis sites will include critical heavily congested roadways, interchanges, and intersections that may be affected by the proposed project alternatives. Sites will be selected for analysis as follows:

- Traffic data (volumes, levels of service, etc.) at the major intersections affected by the proposed project will be reviewed and those that will be subject to a screening level analysis will be selected. The selection of these screening level sites will be based on criteria outlined in EPA's Guideline for Modeling CO from Roadway Intersections (EPA-454/R-92-005) and the New York State Department of Transportation's Environmental Procedures Manual (NYSDOT's EPM). Intersections that have level of service (LOS) designations of D, E or F, or will change to D, E or F as a result of the proposed project, will be considered for detailed modeling.
- Each of the screened sites will be ranked by LOS, volumes, and distances to sensitive land uses to determine those locations most likely to have elevated pollutant levels. This will provide an estimate of the potential of project alternatives to significantly impact air quality levels near these sites, based on projected Build and No-Build levels of service. Intersection locations will be ranked by LOS and overall approach volume and air quality sites will be selected for detailed CO analysis; and
- The CO analysis sites will be further screened to select sites that have a high percentage of truck traffic for detailed PM10 and PM2.5 analysis.

Emission factors for CO, volatile organic compounds (VOC) and NOx will be estimated using the EPA MOBILE 6 mobile emission factor algorithm model, which was released by the EPA on January 29, 2002. Mobile 6.2 (the currently most updated version), which includes emission factors for particulate matter, was released November 12, 2002.

For the analysis sites located in the New York portion of the study area, the following inputs will be applied:

- NYSDEC input files with default engine operating parameters;
- SUVs will be assumed to be light-duty gasoline trucks (LDGTs) that have the same engine operating parameters as automobiles;
- Emission factors for LDGTs will be based on data supplied by the New York Metropolitan Transportation Council (NYMTC), which will be converted to MOBILE 6.2 formats.
- An average winter temperature of 52.5° F will be used, as calculated using the methodology approved by NYCDEP and NYSDEC.

For analysis sites located in the New Jersey portion of the study area, the most current NJDEP inputs, including vehicular age-distribution rates, inspection/maintenance (I/M) and anti-tampering program (ATP) credits, and low emission vehicle (LEV) program will be used.

PM10 and PM2.5 emission factors will also be estimated using EPA's MOBILE 6.2 emission model. Exhaust, brake, and tire wear emissions from moving vehicles will be estimated for all vehicle types; idle emissions, however, will be estimated only for heavy-duty diesel trucks and buses, because this information is estimated only for these vehicles (PM idle emissions from other vehicle types are considered trivial).

Emissions of fugitive dust will be estimated using the latest AP-42 equation (dated December 2003) for paved roads. The following silt loading factors will be used:

- 0.16 for collector roadways with more than 5,000 vehicles per day (vpd);
- 0.10 for principal and minor arterials with more than 5,000 vpd;
- 0.4 for roadways with fewer than 5,000 vpd; and
- 0.015 for expressways.

An average vehicle fleet weight of 6,000 pounds will be used for most of the mobile source analyses; this weight may be changed at locations with very high or low truck percentages.

Vehicle classification data required to determine composite emission factors will be based on traffic survey data for the following categories: light duty gasoline vehicles (LDGVs), sport utility vehicles (SUVs), light-duty trucks, heavy-duty trucks, and buses. Light duty gasoline trucks will be divided into four groups (LDGT1 through LDGT4) based on local registration data.

Vehicle classification data required to determine composite emission factors will be based on traffic survey data and include percentages of LDGVs, SUVs, light-duty trucks, heavy-duty trucks, and buses. SUVs will be classified as light-duty gasoline trucks and 75 percent of SUV emissions will be considered as LDGT1&2, while the remaining 25 percent will be LDGT3&4. Light duty gasoline trucks will be divided into four groups (LDGT1 thru LDGT4) based on local registration data. The registered split between LDGT1&2 and LDGT3&4 is 73 percent to 27 percent, respectively.

For analysis sites located in New York, the split between heavy-duty gasoline vehicles (HDGVs) and heavy-duty diesel vehicles (HDDVs) will be based on NYSDEC's registration for MOBILE 6 for each appropriate analysis year. For analysis sites located in New Jersey, the split between heavy-duty gasoline vehicles (HDGVs) and heavy-duty diesel vehicles (HDDVs) will be developed using MOBILE 6 and

NJDEP's forecast for vehicle classification and registration data. All buses will analyzed as heavy-duty diesel vehicles (HDDVs).

For sites located in New Jersey, CO emission factors will be estimated using MOBILE 6 model national default values (20.6% of all vehicles will be in the cold-start engine operating mode and 27.5% of vehicles in the hot-start mode). For sites located in New York, CO emission factors will be estimated using NYSDEC input files with default engine operating parameters.

SUVs will be assumed to be light-duty gasoline trucks (LDGTs) that have the same engine operating parameters as automobiles. Emission factors for LDGTs in New York will be based on data supplied by the New York Metropolitan Transportation Council (NYMTC), which will be converted to MOBILE 6.2 formats.

Pollutant estimates will be made for existing conditions (2004), the project's first year of operation, and its design year. Future year analyses will be conducted with and without the proposed roadway alternatives. Weekday AM and PM peak time periods will be evaluated for each of these analysis years.

Mobile source dispersion modeling will be conducted using:

- EPA's CAL3QHC, with worst-case meteorological data and the use of persistence factors, to estimate one-hour and eight-hour CO concentrations; and
- EPA's CAL3QHCR, with five years of actual meteorological data from Newark Airport, to estimate peak 24-hour and annual average PM10 concentrations, and peak project-generated 24-hour and annual average PM2.5 impacts.

The analyses will follow EPA's Intersection Modeling Guidelines for modeling methodology. All major roadway segments (links) within approximately 1,000 feet from each analysis site (i.e., congested intersection) will be considered. So as not to double count queued vehicles at intersections downstream of an analysis site, CAL3QHC-estimated queues will be truncated at the end of each roadway link.

For the CAL3QHC CO microscale analyses the following set of reasonable worst case meteorological conditions will be utilized to estimate peak one hour concentrations:

- Wind Speed: 1 m/s
- Stability Class: D
- Mixing Height: 1000 Meters
- Wind Angles: 5 degree increments from 0 to 360
- Surface Roughness Factor: 108 cm

For the CAL3QHCR PM10 and PM2.5 microscale analyses, a set of five consecutive years of recent meteorological data from Newark Airport will be used.

Eight-hour CO concentrations will be obtained by multiplying the highest peak-hour CO concentration by the EPA-recommended default persistence factor for urban area of 0.7. This factor accounts for the fact that over eight hours (as distinct from a single hour) vehicle volumes will fluctuate downwards from the peak, vehicle speeds may vary, and meteorological conditions including wind speed and wind direction will vary as compared to the very conservative assumptions used for the single hour.

Twenty-four hour and annual PM10 and PM2.5 concentrations will be estimated directly using five years of meteorological data.

Applicable background CO and PM10 concentrations will be added to the modeling results to obtain total pollutant concentrations at each receptor site for each analysis year. These background values used in the analysis will be determined in consultation with NYCDEP and NJDEP.

The 8-hour CO level, and 24-hour, and annual PM10 levels estimated using the methodologies described above will be added to appropriate background levels, and the resulting total pollutant concentrations will be compared with NAAQS standards to determine whether any of the proposed alternatives have the potential to cause or exacerbate an exceedance of an air quality standard. Project-generated changes in PM2.5 levels will be compared with Significant Threshold Values (STV).

A regional (mesoscale) emissions analysis will compare transportation-related emissions (CO, NOx, VOCs, and PM10) generated in both the New York and New Jersey portions of study area under each alternative under the future analysis years. The analysis will be for the same study area boundaries utilized in the transportation analysis.

A qualitative impact assessment of the potential construction-phase impacts will be conducted and appropriate mitigation measures will be considered.

5.3 Noise and Vibration

Coast Guard directions require that all authorized bridge construction work must comply with the provisions of the Noise Control Act of 1972 (42 USC 4331), as amended.

Noise impact data requirements are directly related to two key elements: sensitive receptors and traffic noise generation. Sensitive receptors must be cataloged and identified as part of the land use data collection effort. Noise generation from traffic sources is directly obtained from the traffic data and is correlated to vehicle classification mix, speeds, time of day, and distance from sensitive receptors. A noise study will be conducted and the findings documented, as specified below and in accordance with the FHWA, NYSDOT, NJDOT, NYS SEQRA and NYC CEQR, as well as with the methodology refined through collective scoping with the pertinent agencies. If a major transit infrastructure alternative is included among the three build alternatives, FTA's *Transit Noise and Vibration Impact Assessment* (1995) methodology will also be applied.

Existing land use maps will be reviewed and field surveys will be conducted in order to identify existing activities, developed lands, and undeveloped lands for which development is planned, designed, and programmed. Existing land use along both sides of all roads within the project limits will be determined and a land use area (rather than each site or set of points) will be assigned to a corresponding Activity Category as defined by the guidance mentioned above.

Sensitive individual noise receptors, such as schools, churches, residences, libraries, auditoriums, parks, recreational/preserved natural areas, hospitals, senior citizen homes, rehabilitation centers, etc., located within the study area will be identified. A distance of 500 feet from the right-of-way will be used to define each impact zone for the purpose of identifying these uses.

Existing noise levels throughout the project study area will be determined by field-measuring noise levels using the procedures specified in the NYSDOT manual Field Measurement of Existing Noise Levels, and FHWA and FTA guidelines. The measurement results and existing noise levels will be provided in a format acceptable to applicable agencies. A total of 12 locations in the study area within Staten Island and the cities of Elizabeth and Linden are initially assumed for this noise-monitoring effort. The selection of the locations will be based on the preliminary traffic study findings, land use and activity categories, as well as the noise-sensitivity of the specific locations.

The noise monitoring effort will include site locations receiving 24 hour measurements (assume 4 locations) and/or short-term measurements (assume 8 locations at 20 minutes during noise-critical hours) during weekday periods.

Future traffic noise levels will be calculated within the project study area for each alternative (including any transit component) and the No-Action alternative. The site locations will each be representative of a community or neighborhood. These predictions will be consistent with the FHWA Highway Traffic Noise Prediction Model (Report No. FHWA-RD-77 -108) and will use the FHWA Traffic Noise Model Version 1.1. In predicting noise levels and assessing noise impacts, traffic characteristics that will yield the worst-case hourly traffic noise impact on a regular basis for the design year will be used. In the case of transit components, noise levels will be evaluated based on FTA guidelines.

The potential noise impacts for each design alternative and the No-Action alternative will be determined. The determination of impact will include both the type (e.g., residential, nonresidential, and others) and number or extent of receptors impacted by each design alternative and the No-Action alternative.

For the impacted areas, alternative noise abatement measures will be evaluated to reduce or eliminate the noise impact. In accordance with the FHWA Noise Regulation 23 CFR 772, NYSDOT, and NJDOT, the acoustical and cost effectiveness of the various abatement measures will be analyzed and measures which are feasible and reasonable will be determined. In addition, for those noise impacts for which no apparent solution is available, discussion will be provided as to why abatement will not be recommended.

Toll plaza noise levels will be estimated at nearby sensitive receptors. If noise impacts are identified, suitable mitigation measures will be recommended, as applicable.

Construction noise caused by the project will be analyzed and specific appropriate construction noise abatement measures for the plans and specifications will be recommended, as applicable.

5.4 Waterway Navigation

Through the use of navigational charts and other publications such as the United States Coast Pilots, and through interviews with local and regional commercial users and user organizations, the following will be evaluated: existing waterway characteristics, channel conditions, requirements for ship movements, profiles for vessel and barge utilization, special restrictions on marine traffic, existing and proposed navigational aids, natural and man-made obstacles, and hazards to navigation. The long-term navigational uses and requirements on the Arthur Kill will be characterized on the basis of information to be provided by the USCG, the USACE (U.S. Army Corps of Engineers), Sandy Hook Pilots, New York Harbor Ops, and commercial users interviewed.

The possible effects that the various schemes may have on such factors as pilot/vessel response time and control distance, channel visibility, water currents, turning radii of vessels, restrictions on waterborne traffic, such as speed and vessel or flotilla size, and restrictions on or interference with activities of waterfront operators will be assessed. The potential effects are likely to be most important in terms of temporary obstructions or interference with navigation due to construction methods and durations for different structural schemes.

Construction methods and durations will be developed to avoid and minimize potential impacts to waterway traffic in the Arthur Kill. Bridge piers/dolphin locations will be developed to avoid and minimize potential impacts to waterway traffic in the Arthur Kill.

5.5 Energy

Direct and indirect energy expenditures associated with construction and operation of project alternatives will be estimated. Direct energy expenditures involve fuel consumption by vehicles operating on roadways and, if project alternatives include transit element(s), fuel consumption by transit vehicles in transit rights-of-way. Indirect expenditures represent the one-time, non-recoverable energy costs associated with constructing new roadway or fixed-guideway transit infrastructure.

Energy consumed by vehicles operating on the affected roadway network will be estimated using data from the project traffic analysis on vehicle miles of travel (VMT) in the study area and average travel speeds. Direct energy consumption figures will be calculated using speed-sensitive formulae presented in the FHWA report entitled, *A Method for Estimating Fuel Consumption and Vehicle Emissions on Urban Arterials and Networks* (FHWA-TS-81-210). These formulae are available for different vehicle types; separate calculations will be made for automobiles and gasoline- and diesel-powered trucks. Vehicle classifications will be obtained from the traffic analyses, as a percentage breakdown of vehicles by type, e.g., automobiles, light trucks, and heavy trucks. The analysis will make an allowance for anticipated improvements in vehicle fuel efficiency, based on information from FHWA best-practice consumption guidance. Fuel consumption with each of the project alternatives will be measured in gallons consumed, and will be compared with anticipated consumption levels with the future No-Action and future No-Action with Congestion Pricing alternatives.

Propulsion requirements for transit alternatives will be estimated for rail transit vehicles using per-car-miles, based on industry standards and readily available data from transit system operators (e.g., New Jersey Transit, Metropolitan Transportation Authority). The estimates will include provision for the operation of signals, communications, and stations, as appropriate. Annual direct energy consumption for operation and maintenance of rail alternatives will be estimated based on conceptual operating plans developed for a given alternative.

Indirect construction energy requirements for project alternatives will be estimated, by dividing the total number of lane or track miles to be constructed at grade, on retained fill, as an elevated structure, or in a tunnel for a given alternative by the length of all new roadways or rail lines to be built with that alternative. These figures will then be multiplied by Joule factors approximating the amount of energy necessary to construct one lane-mile of the various types of construction. These factors will be derived from the Congressional Budget Office's December 1977 report Urban Transportation and Energy: The Potential Savings of Different Modes, which is the most current source for roadway energy construction factors. This analysis provides an estimate of the one-time, nonrecoverable construction energy expenditure for each alternative. A pay-back period for construction energy will also be derived by dividing the total construction energy by anticipated annual savings in fuel consumption by vehicles operating in the project area.

5.6 Topography, Geology, and Soils

The topography, geology, and soils within the study area will be described from existing data. The sediment quality of the Arthur Kill will be characterized from existing data, including those developed by applicants for dredge permits. Information in the Goethals Bridge area will be supplemented with the results of any environmental borings conducted by the Port Authority, as available.

The potential for increased sedimentation around bridge abutments will be evaluated using bathymetric data from the environmental borings and the bathymetric survey conducted by the Port Authority and available tidal current velocity data.

Impacts associated with disposal of dredged materials will be discussed. Construction impacts resulting from resuspension of sediments will also be discussed. The use of containment devices such as silt curtains and sheet piles will be discussed in conjunction with the discussion of potential water quality impacts.

Potential construction mitigation methods will be evaluated. Disposal alternatives for dredged material will also be addressed.

5.7 Flooding, Floodplains, and Hydrology

Appropriate Federal Emergency Management Agency (FEMA) Flood Insurance Rate maps and state/local flood surveys will be reviewed to determine the presence and location of floodplains in areas surrounding the proposed build alternatives.

Potential impacts on floodplains and flood storage capacity resulting from the build alternatives will be assessed and documented. Potential impacts include project fills that reduce flood-detaining capabilities, as well as changes in infiltration/runoff resulting from changes in area and location of pervious/impervious surfaces, and any alternatives placed within flood-prone areas.

Appropriate mitigation measures to increase infiltration capability and capacity or to create water retention to counterbalance loss in floodplain capacity will be identified. This effort will be coordinated with the wetland mitigation program to incorporate flood storage capacity as part of the creation/enhancement design.

5.8 Water Resources

5.8.1 Surface Water

Existing conditions in the Arthur Kill and Old Place Creek will be reviewed, including existing water and sediment quality data. Information from prior mathematical modeling and field studies performed in the waterways and information from previous reports will be used to document existing conditions. Sources of data available include:

- Tide gauge, current velocity and wind measured in Arthur Kill during December 2000, and March 2001
- 3-D hydrodynamic and water quality model (MIKE3) simulations
- NYCDEP Harbor Survey water quality data

Water Quality Standards and criteria applicable to the area will be identified, including New York and New Jersey Phase II Stormwater Regulations, which went into effect January 2003 and February 2004, respectively.

Available bathymetric survey data stored by the National Oceanographic and Atmospheric Administration (NOAA) and the U.S Army Corps of Engineers will be obtained to show existing conditions in the Arthur Kill and Old Place Creek.

Construction impacts will be analyzed including those resulting from resuspension of sediments. The impacts of temporary and localized increases in turbidity and suspended sediment concentrations caused by in-water construction activities (e.g., pile driving, dredging), as well as land-based construction site and staging area disturbance will be addressed. This will include application of the criteria set forth in the Standards and Specifications for Erosion and Sediment Control Plans (NYSDEC February 2004 draft document) and Technical Manual for Stormwater Permitting (NJDEP 1999), Section 404(b) (1) of the

Federal Water Pollution Control Act (33 USC 1251 I), water quality standards, and stormwater discharge permits.

Potential impacts during construction on water quality will be analyzed using methods of analysis such as the Revised Universal Soils Loss Equation (RUSLE), Soil Conservation District permit requirements and the time-variable water quality model (MIKE3).

Post-construction impacts of stormwater runoff on water quality will be analyzed under existing and future conditions for road surface areas using number of vehicles, data on the water quality (total suspended solids, nutrients, oil & grease, metals, total organic carbon (TOC), and polyaromatic hydrocarbons (PAHs) and the time-variable water quality model (MIKE3).

Construction impacts will be mitigated in accordance with a stormwater management plan, which includes an Erosion and Sediment Control Plan, developed in compliance with stormwater discharge permit requirements. The major components of this plan will be summarized in the DEIS. Use of full-depth and partial-depth silt curtains will be evaluated to control turbidity and suspended sediments during in-water construction activities such as pile driving and dredging operations, along with other alternatives such as sheet piles. Methods to stabilize slopes with mulch, vegetation, and/or riprap where appropriate will be evaluated.

The potential for the alternatives to alter the hydraulics in the Arthur Kill will be assessed by comparing the size of the within-water structure of the existing bridge to the alternative designs; key size features are the cross-sectional area and the bottom surface area. The long-term future condition, when the existing bridge is removed and the new bridge is in place, will be assessed for each alternative. The potential for the alternatives to alter sediment scour and deposition in the Arthur Kill will be assessed by evaluating the alteration in hydraulics and the changes in solids loading due to construction activities and post-construction conditions.

Mitigation effects on the water quality impacts of highway runoff will be estimated. If mitigation is required, the type(s) of systems will be recommended for the collection of stormwater and means of removing suspended sediment and oil and grease prior to discharge. Mitigation defined in the surface water and ground water sections will also be considered for hydraulics and bathymetry.

5.8.2 Ground Water

In order to clearly define groundwater resources, existing data will be collected and reviewed. The relationship between wetlands, streams, and superficial aquifers will be inferred from maps of soil types, elevations, and hydrogeological studies of the area. The basic data will be used to assist in the selection and design of wetland mitigation alternatives, if such mitigation is necessary. The data will also be used to identify areas that should not be used for vehicle and material storage or temporary roadways during construction periods (to protect against contamination by oil, grease, and other substances).

Groundwater recharge criteria that are applicable to the project, such as the stormwater infiltration criteria in New Jersey's recently updated Stormwater Management Rules (N.J.A.C. 7:8), will be identified.

The potential for the alternatives to alter the quantity of water available to recharge existing groundwater will be assessed, such as alterations due to any increase in impervious surface area. Changes to the quality of recharge water, if any, will be described.

The potential use of porous pavement to maintain groundwater recharge will be evaluated, if necessary. Detention basins and other storm water management systems will be discussed, as appropriate.

5.9 Biological Resources

5.9.1 Vegetative Communities

Available information and data will be researched and reviewed concerning the potentially affected vegetative communities in both New York and New Jersey in the vicinity of the project site. Past project-specific studies concerning vegetative communities will be reviewed along with site-specific topographic survey maps, and aerial photographs.

A field investigation survey will be conducted to confirm existing conditions, previous studies, and historical information on vegetative communities. The assessment of the vegetation will be conducted in concert with the tidal and freshwater wetlands field survey and the wildlife habitat field reconnaissance survey. Based on the field surveys and available data, a vegetative cover map will be prepared showing the major vegetative communities within both New York and New Jersey in the vicinity of the project site.

Following review of construction plans, vegetative communities will be identified that will be lost or modified resulting from the project. Impacts will be described in terms of acres directly affected by vegetative community type as well as indirect affects from potential project impacts including runoff, shading and temporary construction impacts.

In order of priority, mitigation measures will include the following: 1) avoidance through changes in project design; and 2) minimization of impacts. Design changes may potentially be made to avoid certain impacts. Having exhausted avoidance possibilities, concentration will be placed on minimizing impacts through shifting of alignments or reducing cross-sectional width of access roads. If, after avoidance and minimization options have been exhausted, there are still certain unavoidable impacts, then the acreage and value of those impacted vegetative communities will be identified. This will serve as the basis for developing a generic mitigation plan.

To compensate for unavoidable impacts, mitigation options will be assessed for the project including creation, enhancement, and restoration opportunities, as well as regional mitigation banks with service areas covering the project site.

5.9.2 Tidal and Freshwater Wetlands

Available data will be researched and reviewed concerning the potentially affected wetlands in both New York and New Jersey in the vicinity of the project site. Past project-specific studies concerning the wetlands will be reviewed along with National Wetlands Inventory (NWI) maps, NYSDEC and NJDEP wetland maps, site-specific topographic survey maps, and aerial photographs.

Wetland boundaries will be delineated within the study area. The limits of wetland boundaries will be marked in the field with sequentially numbered flags or stakes in accordance with the 1987 Federal Manual for Delineating Wetlands, as required by the Corps; the 1989 Federal Wetland Manual procedures as required by the NJDEP; and NYSDEC procedures and mapping for delineating the extent of tidal wetlands and adjacent areas. The location of wetland markers will be surveyed using Global Positioning Systems (GPS) and plotted on a topographic map.

The direct and indirect impacts of the proposed project will be determined as defined by the type, area, and functions performed by the area wetlands. All observations of degraded/damaged wetlands will be entered on the site(s) maps. Also, the invasion of wetlands by common reed grass (*Phragmites australis*) is quite common in the New York-New Jersey area. Reed grass tends to form dense monocultures that

alter the wildlife value, marine food production, and recreational capabilities of the wetland. All wetland areas consisting of common reed grass monocultures will be noted on the site(s) maps.

In order of priority, mitigation measures will include the following:

- Avoidance through changes in project design;
- Minimization of impacts; and
- Mitigation of unavoidable impacts through restoration, enhancement, creation, preservation or banking.

For this project, design changes may potentially be made to avoid certain impacts. Having exhausted avoidance possibilities, concentration will be placed on minimizing impacts through shifting of alignments or reducing cross-sectional width of access roads. If, after avoidance and minimization options have been exhausted, there are still certain unavoidable impacts, then the acreage and value of those impacted wetlands will be identified. This will serve as the basis for devising a mitigation plan.

An Interagency Mitigation Group (IMG) will be formed. The IMG was formed in the course of the previous Staten Island Bridges Program specifically for wetland mitigation, which proved highly successful in the development of a consensus among the various regulatory agencies on the level and type(s) of mitigation during the permitting process.

Mitigation options available for the project will be assessed including creation, enhancement, preservation, and restoration opportunities, as well as regional mitigation banks with service areas covering the project site. Potential mitigation sites will be evaluated for environmental and political suitability for conversion to or enhancement of wetland systems, either equivalent to or of greater value than those lost due to the project. Field inspections of the potential mitigation sites will include an assessment of existing vegetation, soils, hydrology and current land use.

If necessary, a wetland mitigation/enhancement plan will be prepared to compensate for unavoidable loss of wetlands resulting from the project. This wetland mitigation/enhancement plan will be prepared in coordination with the resource agencies.

5.9.3 Wildlife

Previous wildlife and waterfowl studies will be compiled and information on wildlife resources in the project area will be updated. Existing data will be reviewed to identify wildlife species that are known to use the project site and surrounding area. This information will provide a historical reference, assist in establishing baseline conditions and serve as a guide for field reconnaissance activities.

A field reconnaissance survey will be conducted to confirm existing conditions, previous studies and historical information on wildlife habitat, and the likelihood of species occurrence and use of the study area. The ecological community and habitat occurring in the project and surrounding area will be described, including the seasonality and utilization (nesting, breeding, feeding, migration) of selected species and groups of species occurring or likely to occur in the study area.

Following review of project alternatives and construction plans, wildlife will be identified, based on their occurrence and habitat requirements, which may be temporarily or permanently displaced from the area(s) as a result of the project. The presence of similar suitable habitat adjacent to or near the project area will be considered when determining relative magnitude of the impact. The seasonality of the proposed disturbances (land clearing, grading, and construction) will be evaluated in terms of their impact on wildlife using the study area and surrounding areas.

Potential project impacts to regional wildlife movements, as well as potential habitat fragmentation effects, will be assessed. Of particular concern will be waterfowl in the region, including harbor heron populations.

Potential impacts of bird strikes will be addressed and will focus on the effects of bridge design components, including cables and lighting.

Mitigation measures will be evaluated to avoid, eliminate, or reduce project related impacts (construction and operational) to wildlife, including seasonal restrictions on certain activities, control of construction materials and runoff, reduced work area, off-site staging areas, use of visual and noise barriers, and others to be identified and considered.

Where applicable, areas will be identified and considered for habitat creation, restoration, or enhancement to increase the value of undisturbed upland areas and disturbed and undisturbed lowland and wetland areas for wildlife. Habitat improvements should consider: permanent and temporary pools (freshwater and brackish) for potential amphibian breeding and as foraging areas for shore birds and wading birds, sand and gravel areas for potential mud turtle and northern diamondback terrapin nesting sites, wildlife food and cover plantings, marsh enhancement to increase abundance of forage species including meadow voles and forage fish, and others.

5.9.4 Aquatic Biota and Essential Fish Habitat

Existing literature on the aquatic resources in the Arthur Kill and Old Place Creek will be reviewed, including existing fish and invertebrate data. Information from prior field studies performed in the Arthur Kill and adjacent waters and the 1995 DEIS and 1997 FEIS will be used to document existing conditions.

Essential Fish Habitat (EFH) will be identified for those species actively managed under Federal fishery management plans (FMPs) as defined under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265), as amended by the Sustainable Fisheries Act (SFA) of 1996 (PL 104-267).

Based on existing data, the aquatic community and habitat occurring in the project and surrounding area will be determined and described, including the seasonality and utilization (e.g., spawning, feeding, and migration) of selected species and groups of species occurring or likely to occur in the study area.

Species occurrence and life history information will be used to predict the habitat use before and after construction by temporary and permanent resident species and those that use the area as a migratory corridor. This will be supplemented with historical data on specific species. For example, habitat preference data for striped bass will be used to assess the value of habitat for striped bass under different conditions of water depth, current velocity, water quality, and other habitat features.

An analytical model will be used to predict impacts associated with shading, including evaluation of incident light, light attenuation in the water column, transit time for planktonic organisms, and mitigating factors. This analysis can be used to evaluate both the potential for loss of organisms and the loss of primary productivity in the region.

Existing bathymetric data will be used to estimate the areas (square footages) of new hard surface habitat created by bridge piers and fenders. Existing and future habitat value for fish species (based on depth preference criteria) and effects of shadowing on light penetrating to bottom and new structures will be evaluated.

An EFH assessment will be prepared as per the NMFS guidelines for all designated species located in the project area. The assessment will begin with a summary of the life history information for each EFH-designated species. This information will be used to identify impacts specific to the habitat used by EFH species and forage species critical to EFH species that may result from the project. Anticipated sources of impacts include the loss of benthic and vertical habitat resulting from bridge abutments, loss of wetland and marsh habitat, a temporary increase in local turbidity resulting from dredging operations and/or the temporary loss of habitat from equipment and cofferdams. These impacts include:

- Direct impacts: those that would directly affect the habitat of the EFH species, or cause direct mortality. These impacts include physical alterations to the useable habitat for each species.
- Indirect impacts: potential direct impacts to the forage species of the EFH designated species in the form of displacement, temporary loss of forage species habitat and/or temporary loss of forage species individuals.
- Cumulative impacts: those impacts on the habitat of the EFH species resulting from the project and other simultaneous projects in the area. These impacts would be a combination of the direct and indirect impacts to habitat associated with each project.

Strategies to mitigate for construction impacts to aquatic resources will be developed through consultation with the National Marine Fisheries Service (NMFS). Mitigation measures may include the use of potential work windows to minimize impact during critical periods (e.g. spawning) for fish species.

5.9.5 Endangered and Threatened Species

Previous studies will be compiled and information will be updated on endangered and threatened species likely to occur in the project area. Sources of information will include:

- Data collected from literature and field surveys for the 1995 DEIS and 1997 FEIS
- New York State Natural Heritage Program
- New Jersey Endangered and Nongame Species Program
- US Fish and Wildlife Service
- NOAA Fisheries National Marine Fisheries Service

Existing data will be reviewed to identify endangered or threatened species that are known or likely to use the project site and surrounding area. This information will provide a historical reference, assist in establishing baseline conditions and serve as a guide for field reconnaissance activities.

A field reconnaissance survey will be conducted to confirm existing conditions, previous studies and historical information on endangered or threatened species occurrence and likelihood of using the study area. The field reconnaissance survey would be conducted once over a 2-3 day period.

The habitat occurring in the project and surrounding area will be described, and the potential for endangered or threatened species to occur in the study and surrounding area will be idenified. If species are known to occur or are likely to occur, the seasonality and habitat utilization (nesting, breeding, feeding, migration) of these species in the study area will be determined and evaluated. Endangered or threatened species likely to occur in the study area include: peregrine falcon, northern harrier, short-eared owl, pied-billed grebe, and eastern mud turtle. Special concern and rare species will also be considered, including: northern diamondback terrapins (nesting and foraging sites), eastern spadefoot toads (potential presence), southern leopard frog, and others.

Following review of project alternatives and construction plans, endangered or threatened species will be identified, based on their occurrence and habitat requirements, that may be temporarily or permanently displaced from the area(s) as a result of the project. The presence of similar suitable habitat adjacent to or near the project area will be considered when determining relative magnitude of the impact.

The U.S. Fish and Wildlife Service and NMFS will be contacted for Section 7 Consultations on federally listed species present in the project area.

Mitigation measures will be evaluated to avoid, eliminate, or minimize project-related impacts (construction and operational) to wildlife. Mitigation actions could include seasonal restrictions on certain activities, control of construction materials and runoff, reduced work area, off-site staging areas, use of visual and noise barriers, and others to be identified and considered.

Where applicable, areas will be identified to be considered as habitat creation, restoration, preservation, or enhancement sites to increase the value of undisturbed upland areas and disturbed and undisturbed lowland and wetland areas for endangered or threatened species and special concern species.

If project-related impacts can not be mitigated, species, habitat requirements, and areas outside the project area suitable for potential relocation of endangered or threatened species and special concern species of limited mobility from the area of direct impact will be identified.

5.9.6 Shading Created by Structure

Shadows will be modeled from the existing bridge and other nearby structures on the surrounding area, for four days of the year (March 21, June 21, September 21, and December 21) and at three times per day (9AM, 12 Noon, and 3PM).

Shadows from the proposed alternatives will be modeled and will include the existing structures nearby for the same days and periods listed above. The shadow diagrams will show the extent of shadows cast by each of the alternatives. The discussion of impacts will focus on any effects on parks and other areas regularly used by the public in the vicinity. Any effect related to natural resources, particularly aquatic biota within the Arthur Kill, will be evaluated in the assessment of aquatic biota.

Design options will be evaluated to minimize shadow impacts on natural resources.

5.10 Land Use, Zoning and Recommended Development Initiatives

The study area is defined as the area within ½ mile of affected bridge approaches or transportation nodal points of selected alternatives. The general land use patterns in the Borough of Richmond, and the cities of Linden and Elizabeth, as well as a more specific description of existing land use patterns and zoning regulations within the study area will be provided.

The inventory of current land uses and zoning regulations for the potentially affected communities will be conducted not only via a review of available documents/databases/maps/studies/plans, but also via field reconnaissance surveys and interviews with local planning officials and affected parties in order to reflect current conditions and trends, as well as any changes that have occurred since the publication of the 1997 SIBP FEIS.

A brief development history and trends analysis of the study areas, including a description of recent development trends and proposed development initiatives will be prepared. The 1997 SIBP FEIS will be consulted for determining trends. Land use constraints and opportunities along the affected traffic corridor of the study area will be identified in order to provide input to the screening of the preliminary alternatives. Any New Jersey planning efforts and initiatives within the study area under the Smart Growth Plan as well as the NJ State Development and Redevelopment Plan, both implemented by the NJ

Department of Community Affairs (NJDCA) will be identified. Additionally, the Staten Island Growth Management Task Force Final Report (December 2002) will be reviewed.

Changes that may occur with the No Action alternative will be described. These changes may result from expected growth in population due to planned residential developments or increases (or decreases) in local manufacturing or commercial activity. Pending zoning actions will be identified, as well as land use plans and other public policy actions that could affect land use in the study area. Smart growth and development initiatives and planned developments in the area will be identified, such as transportation projects, highway projects, and housing projects.

The changes that may occur in land use patterns and zoning regulations in the study area as a result of the build alternatives will be identified and analyzed. Issues will include compatibility of each alternative with the surrounding land uses; potential for induced residential, commercial, and industrial development; consistency with zoning and other public policy; and their effect on development trends in the area.

An assessment will also be conducted to determine the proposed project's consistency with public policy in Elizabeth, Linden and Staten Island. This will entail inventorying applicable policies and approved plans, and documentation of any potential inconsistencies through consultation with local planning officials.

The land use impacts of the ramp alignment alternatives with the market value of the respective surrounding land and the potential land use changes induced by the proposed action and other alternatives under consideration will be investigated.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to land use; zoning; and development initiatives will be identified and discussed. While evaluating the alternatives for their consistency with community plans and policies, consideration will be given to measures to reduce or mitigate the severity of these impacts, if any.

5.11 Residential or Business Displacement

Property acquisition needs will be quantified and evaluated, including:

- Full property takings – an acquisition that involves the taking of the original parcel in its entirety.
- Partial property takings – an acquisition in which the original property is severed to form two parcels, leaving a remainder.
- Construction and or utility easements – an interest in land of another entitling the owner of that interest to a limited use of the land in which it exists, or a right to preclude specified uses in the easement area by others.

Utilizing preliminary design drawings developed during the EIS phase of the proposed project (which would depict existing property lines and existing buildings, as well as proposed right-of-way lines and proposed toe-of-slope lines), all potentially affected properties will be visually identified. Once identified and compiled, each parcel will be digitized to obtain its total land area. For each identified parcel, its assessed value and tax liability will be obtained from the appropriate tax assessor's office in either Elizabeth or Richmond County.

The existing uses of properties to be potentially acquired will be field-verified. The field visits will confirm the use and occupancy of residential properties, and the nature of affected businesses, details of tenants, and whether the site is active or derelict. This information will be presented in table form in the DEIS.

The proposed right-of-way line and proposed toe-of-slope line will be overlain onto the parcels and digitized, with the result being a parcel-specific list of segments to be acquired for right-of-way and for slope easements. Once the area of each segment proposed for acquisition is known, its percentage of each parcel will then be calculated. For properties where no buildings are impacted, the percentage to be acquired will be applied to that property's assessed value (land only) to derive the assessed value of the acquisition. For properties where buildings are impacted, it is assumed that the entire parcel would be acquired; therefore its total assessed value would be utilized. If the extent of acquisition is unclear at the time of the DEIS, in order to assess potential impacts conservatively, a full taking would be assumed.

The areas of proposed easements will be calculated in the same way, although the resulting percentages will not be applied to the property's assessed value because the cost of an easement is entirely variable and not wholly dependent upon assessed value. Consequently, only the area of the easement will be reported in the DEIS.

The sum of the assessed values of all affected segments will then be compared to the total ratable base in both Elizabeth and New York City to derive the percentage of each municipality's ratable base that would be removed from local property tax rolls as a result of the proposed project. The direct fiscal impact of property acquisition for the proposed project will be estimated based upon an analysis of the tax revenue changes from the loss of these tax-paying properties. Total taxes paid for the most recent fiscal year will be summed for all affected properties. This total represents the net loss of fiscal revenue to either Elizabeth or New York City due to property acquisitions.

In order for a direct displacement to create a significant adverse effect on the local community, the displaced residents or businesses must represent a defining element of the character of the area. This evaluation will consider land-use adjacent to acquired properties in order to determine the potential for the residential and commercial property acquisitions to disrupt the character, unity, and cohesiveness of an existing neighborhood.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to residential or business displacement will be identified and discussed.

5.12 Socioeconomics

5.12.1 Demographics

A profile of the population of the region and the study area will be prepared. Based on 1970, 1980, 1990, and 2000 Census data, population trends in the affected counties (e.g., Union and Richmond Counties) and cities (e.g., Elizabeth, Linden, Richmond Borough) will be described. A demographic profile of the study area (i.e., within one half mile of affected bridge approaches or transportation nodal points of the alternatives) will be developed to include population, age, racial and ethnic composition, household characteristics, income and poverty status, employment, and housing characteristics.

The assessment of potential socioeconomics effects will focus principally on the project alternatives' comparative benefits in terms of generated economic activity, tax revenues, and construction and related jobs.

As part of this analysis, those neighborhoods within the project area that are clearly defined by physical/economic/ethnic boundaries, or community facilities, as supported or defined under local master plans or community boards will be identified and described. This discussion will also serve to identify specific cohesive elements that serve to define neighborhood communities that are not clearly defined.

Based on planned or proposed projects identified in the land use/zoning/community facilities data collection effort and on population estimates derived from the traffic modeling forecasts, future conditions with the No Action alternative, including estimates of population will be assessed. Residential properties that would be affected by the build alternatives will be identified and direct impacts, if any, on their respective residents will be described.

The potential of the alternatives, including No Action, to stimulate secondary (or indirect) impacts on existing residents in the area will be analyzed, particularly in terms of displacement of low and moderate income residents who may be vulnerable to displacement pressures.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to demographics will be identified and discussed.

5.12.2 Economics

In conjunction with the land use task, current economic activity in the study area will be described, including a discussion of key industries and types of employment. Businesses within the study area will be identified, as necessary. Additional effort will be conducted during the public outreach process in order to identify all existing businesses. Economic data from local economic development agencies (e.g., Staten Island Economic Development Corporation, Union County Economic Development Corporation) will also be reviewed.

Based on planned development projects and an assessment of predominant development trends, changes that can reasonably be expected in the economic base of the study area in the future with the No Action alternative will be described.

Short-term impacts resulting from construction of the build alternatives, including direct and generated employment, wages and salaries, and city and state tax revenues (exclusive of real property-related taxes), will be determined using the Regional Input-Output Modeling System II (RIMS) developed by the U.S. Department of Commerce.

The potential loss of existing businesses in the study area resulting from No Action, as well as proximity impacts related to any of the build alternatives will also be determined.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to economics will be identified and discussed.

5.12.3 Community Facilities

All community facilities and public services within the study area, defined as the area within ½ mile of affected bridge approaches or transportation nodal points of selected alternatives, will be identified, inventoried, and described. Field reconnaissance surveys and interviews will be conducted in order to supplement and/or corroborate the findings of public documents and maps.

Community facilities include facilities such as parks, schools, churches, libraries, institutional residences, hospitals, and health care facilities, as well as public services such as police, ambulance and fire stations. Any future or planned community facilities will also be identified in order to evaluate their potential interactions of the proposed project and its respective design alternatives.

The changes and impacts that may occur on community facilities and public services in the study area as a result of the build alternatives will be identified and analyzed. Issues could include compatibility of each alternative on public services and their effect on community facilities in the area.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to community facilities and public services will be identified and discussed. Consideration will be given to measures for reducing or mitigating the severity of these impacts, if any.

5.12.4 Neighborhood Character and Cohesion

Neighborhood character is generally comprised of physical features and social qualities that contribute to the continuity and integrity of a particular geographic area. Factors that influence neighborhood character include land use, demographic and ethnic characteristics, density, scale, architectural style of residential, commercial, industrial buildings, street and sidewalk conditions, traffic, views, noise, employment opportunities, transportation network, and open space, among others.

The inventory of clearly identifiable neighborhoods and existing communities, and the assessment of potential impacts to neighborhood character within the project area will be based and supported by the results of the other impact assessments (e.g., land use, visual quality, traffic, air quality, noise, etc.). Those potential impacts are anticipated to be incremental rather than significant, given the setting of the existing Goethals Bridge. For this evaluation, the neighborhood character analysis encompasses not only the study area, but also a region of greater extent into New Jersey and Staten Island.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts related to neighborhood character and cohesion will be identified and discussed.

5.13 Parkland and Public Recreation Areas

The detailed alternatives will be reviewed to determine an appropriate study area for parkland and public recreation analysis. Data from available city and state resources will be collected. Detailed data on open space and parkland uses such as active play areas, passive uses, natural features or visual buffers will be gathered within the study area. Weekday and weekend park utilization will be observed at selected locations. The respective state and local agencies including the New Jersey State Park Service, the New York State Office of Parks, Recreation and Historic Preservation, the Union County Department of Parks and Recreation, the New York City Department of Parks and Recreation and the Elizabeth Department of Parks and Recreation will be consulted.

All pertinent state, county, and local agencies/departments will be contacted to collect information on future plans for parks in the study area. Proposed or planned park improvements will be described, including vehicular, bicycle, and pedestrian access, as appropriate; which will provide the basis for a profile of future conditions in the study area with the No Action alternative. How the inventoried parks would be directly or indirectly affected by the selected alternative will be assessed, largely in terms of potential changes to use/access, noise, and aesthetics.

All reasonable and practicable mitigation measures to reduce or eliminate significant impacts to parks and open space will be identified and discussed.

5.14 Human Health

Potential impacts to human health will be assessed, taking into consideration construction as well as operational impacts associated with the selected alternative. Impacts to human health will be assessed in conjunction with potential impact vectors, including effects attributable to changes in quality of soil, air, water and noise resources. All reasonable and practicable mitigation measures to reduce or eliminate significant impacts to parks and open space will be identified and discussed.

5.15 Cultural Resources

5.15.1 Historic Resources

Any known historic resources within the land use study area(s) will be identified and described. Historic resources will include any New York City Landmarks, pending New York City Landmarks, sites listed on or determined eligible for inclusion on the State (New York and New Jersey) and/or National Registers of Historic Places (NRHP), and National Historic Landmarks.

A map indicating the location of any historic resources within the land use study area(s) will be prepared. A reconnaissance or "windshield" survey will be conducted. The areas proximal to the alternatives' rights-of-way and abutments (to a maximum of one block or 400 feet from the rights-of-way) will be surveyed for potential historic resources. Available surveys, including any information available from the New York City Landmarks Preservation Commission (LPC), the New Jersey Historic Preservation Office (NJHPO), and the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) will also be used. A report listing potential historic resources and a map identifying their locations will be prepared.

For the SIBP FEIS, the Goethals Bridge was determined by the State Historic Preservation Offices (SHPOs) to be eligible for listing on the NRHP under Criteria C and A. The documentation which addressed the eligibility and the significance of the bridge for the New York and New Jersey SHPOs will be reviewed and updated, if necessary.

Inventory forms will be prepared for sites along the alignments that were surveyed. Photographs of such sites will also be obtained.

The length of time that has lapsed between the 1997 Staten Island Bridges Program EIS and the present time necessitates a review of documentary resources from all relevant repositories. This includes an examination of all historic resources added to the New York City Landmarks, pending New York City Landmarks, or sites listed on or determined eligible for inclusion in the State (New York and New Jersey) and/or National Registers of Historic Places, and National Historic Landmarks since the initial research was conducted for this project. Additional historic properties/sites may be added to existing inventories included in the 1997 EIS.

Any potential physical, contextual, or visual impacts on any historic resources within the land use study area(s) will be assessed. If impacts are identified and dictate that a case report be prepared for submission to the Advisory Council on Historic Preservation, the case report will consist of four sections excerpted from the EIS: the project description, cultural resources, visual resources, and discussion of the selection and conceptual development of alternatives. It will contain information about the cost and feasibility of alternatives that would mitigate any impacts to historic resources.

Potential mitigation measures will be identified for any potentially adverse impacts to historic resources, and consultation with the SHPOs of New York and New Jersey and the National Historic Preservation Office will occur in accordance with the Section 106 procedures of the National Historic Preservation Act and with state regulations.

5.15.2 Archaeological Resources

Known archaeological resources will be identified and the potential for finding archaeological artifacts within the proposed right-of-way will be based on information obtained collected previously for the Staten Island Bridges Program FEIS prepared in 1997. If necessary, the information will be supplemented

by limited documentary and cartographic research and an on-site reconnaissance and walkover of the right-of-way. A contextual assessment of cultural resources will also be derived from earlier reports.

Archaeological reports for the surrounding areas will be reviewed. Research will be conducted at the New York and New Jersey State Historic Preservation Offices (NYSHPO, NJHPO), the New York and New Jersey State Libraries, the New York City Landmarks Preservation Commission (NYCLPC), the New York City Library, the New York Historical Society Library, the Port Authority of New York and New Jersey, the Elizabeth Library, the Linden Library, and the Staten Island Library.

Cartographic research will be conducted to examine the numerous historical maps and atlases in the one-tenth mile study area(s) of the alternatives corridor. The presence of standing structures and features within the study area and throughout documented history, as well as prehistoric topographic and environmental conditions, will be established. Maps and atlases will be reviewed at 5- to 10-year intervals, since buildings that stood for shorter durations would probably not contribute greatly to the archeological record. In addition, short-term temporary structures standing less than 5 to 10 years usually lack permanent subterranean foundation and, therefore, do not cause substantial disturbance.

The NYCLP will be contacted for information on culturally significant areas previously identified in the study area(s) and within a one-half mile radius of the other alternatives corridor. Site files will be reviewed at the New York State Museum, New Jersey State Museum, the NYSHPO, and the NJHPO.

A Phase IB Archaeological Site Survey, including soil sampling throughout the project area, will be conducted to determine the presence/absence of any intact archaeological deposits and/or features. The NJSHPO and NYSHPO recommend a Phase IB survey if a proposed project could result in significant changes in the character of archaeological properties and such properties may be located in the area of potential effect (APE). Projects that could result in such changes usually involve earthmoving, but also include construction staging areas and areas where fill is to be borrowed.

The length of time that has lapsed between the 1997 Staten Island Bridges Program EIS and the present time necessitates a review of documentary resources from all relevant repositories. This includes an examination of all archaeological resources added to the New York State Museum, New Jersey State Museum, the NYSHPO, and the NJHPO since the initial research was conducted for this project.

All cultural resource reports for projects conducted after the 1997 EIS report will be reviewed to create an updated predictive model for site archaeological sensitivity. Any archaeological sites identified on or near the project area will be added to the existing map of known sites.

Based on the conceptual development of the selected alternatives and the Phase 1B inventory of archeologically sensitive locations in the alternatives vicinities, the potential for any disturbance and of the need for further investigation will be assessed. The analysis will be documented in a technical report including a definition of the study area(s), a prehistoric and historic overview, a discussion of the data sources, a consideration of potential impacts in the project area(s) and recommendation for further study, as needed.

5.16 Visual Resources/Aesthetics

The visual environment that exists in the vicinity of the three build alternatives will be described and analyzed in coordination with the land use, cultural resource, and parkland studies, etc. Any sensitive visual resources such as significant views and view corridors, etc. will be identified. A total of four existing views will be produced as a baseline for comparison with the proposed alternatives. These views

would be taken of and from the existing bridge, as well as from points potentially affected by the alternatives and used as the basis for photosimulations.

In coordination with the related studies mentioned above, any changes that are proposed to occur in the study area will be assessed and described for the two No-Action alternatives.

The potential change in the visual environment will be analyzed, projected, and described for each of the build alternatives, including a discussion of proposed bulk, height, design and scale of the new construction. The discussion will be supported with photosimulations of four views for each build alternative. As part of this analysis, motorists' views will be described from the bridge and build alternatives, as well as visual conditions at night, when new structural alternatives would be lit and visible from the surrounding areas.

Potential mitigation scenarios will be assessed such as design options to reduce potential impacts on aesthetic resource(s) within the project's viewshed.

5.17 Solid Waste Management

The volume of solid waste generated by the existing bridge operations will be estimated, including sand blast grit, and the current solid waste disposal practices of bridge operation will be quantified from information obtained from the Port Authority.

The volume of construction debris will be estimated for a bridge replacement alternative.. In addition, this volume's effect on the capacity of existing construction debris facilities will be assessed. Transport options (i.e., trucking versus barging) of demolition debris to disposal facilities will be evaluated.

The volume of solid waste generated from construction activities will be estimated and this volume's effect on the capacity of existing construction debris facilities will be assessed.

Future solid waste disposal practices will be documented, including the status of landfilling and resource recovery plants, in New York and New Jersey. The volume of solid waste from new bridge operations will be estimated, including sand blast grit, in order to assess the impact of new solid waste generation on the disposal system. Options to minimize solid waste generation from the preferred alternative will be assessed.

5.18 Infrastructure

The existence, availability, capacity and encumbrances of the infrastructure located in the project area will be documented. Infrastructure to be inventoried will include water, sanitary sewer, storm sewer, combined sewers, electricity, natural gas, telecommunications and fiber optic/cable.

Utility data will be compiled based on as-built information and other data collected from available services, including:

- PSE&G Electric
- PSE&G Gas
- NUI Gas
- Elizabethtown Water
- The Joint Meeting of Essex and Union Counties
- Verizon
- ATT
- Con Edison

- NYCDEP
- Transco Pipeline

As the project's engineering progresses, additional information would be incorporated into the infrastructure evaluation. This information would be supplemented by field verification. All inventoried infrastructure will be mapped.

Potential impacts to local infrastructure resulting from construction and operation of the proposed project will be identified and discussed such as service disruption, displacement or relocation. The discussion will also include any planned improvements or expansion of infrastructure services, as well as the adequacy and capacity of the infrastructure to support any secondary and cumulative impacts resulting from the proposed action.

All reasonable and practicable mitigation measures to reduce or eliminate significant project-induced impacts to infrastructure will be identified and discussed.

5.19 Contaminated Materials

The area surrounding the bridge will be classified into different categories as described below. Each classification of property will require a different level of effort with regard to the contaminated materials evaluation. The three property classifications are:

- Class 1 – Property located within 500 feet of either side of the bridge site that will not be acquired by the Port Authority or directly impacted by construction;
- Class 2 – Property to be either acquired by the Port Authority or directly impacted by construction.
- Class 3 – Special properties as identified by the USCG and/or the Port Authority.

<u>Class 1 Properties</u>
For Class 1 properties, a *Screening-Level Analysis* will be conducted that would enable the USCG to assess, at a preliminary level, each property's potential to impact the proposed action. The screening will not include sampling or testing of soil, groundwater, or structures. Specific tasks to be performed include the following:

- *Historical Review* – A review of available historical aerial photography and mapping to identify potential areas of concern (AOCs) (e.g., landfills, areas of illicit dumping, etc.). Aerial photography to be reviewed would include existing data, to be supplemented by commercially available photographs and photography located at NJDEP's Bureau of Tidelands Management and in the collections of the Elizabeth Public Library, the Newark Public Library, the New Jersey State Library, the New York City Public Library and the New Jersey Historical Society. Mapping to be reviewed would include Sanborn Fire Insurance maps; historical atlases prepared by Bromley, Beers and others located in the collections of the Elizabeth Public Library, the Newark Public Library, the New York City Public Library, the New Jersey State Library and the New Jersey Historical Society.
- *Regulatory Review* – A review of a commercially-prepared regulatory agency database to identify any listed sites (e.g.; CERCLIS, NPL, Known Contaminated Sites List) located within the study area.
- *Site Reconnaissance* – A windshield reconnaissance, from exterior public areas only, to observe general site conditions, including neighboring land uses, aboveground storage tanks, hazardous materials storage, septic/disposal fields, and other evidence of on-site contamination, or threat of a release of contamination. The reconnaissance will also "ground-truth" sites identified through the historical and regulatory reviews.

Class 2 Properties

For each Class 2 property, a *Phase I Environmental Site Assessment (ESA)* will be conducted. Each ESA will seek to identify, to the extent feasible, the presence or likely presence of contaminated materials on or near each Class 2 property. Potential contaminants of concern include polychlorinated biphenyls (PCBs), heavy metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), asbestos and petroleum storage tanks. Each ESA will conform to the American Society for Testing and Materials' (ASTM) *Standard Practice for Phase I Environmental Site Assessments* (E 1527-00), in accordance with the "due diligence" regulations of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and in accordance with Section 9601 (35)(b) of the Superfund Amendments and Reauthorization Act (SARA), which requires that "all appropriate inquiry" be made into the presence or potential presence of contaminated substances on each site. Specific tasks to be performed include the following:

- *Project Setting* – An evaluation of the physical setting of the project (in terms of topography and drainage; geology and soils; groundwater, and surface water) for use in assessing specific hazards presented, as well as to evaluate information obtained through performance of the historical and regulatory reviews.
- *Historical Review* – A review of available historical information as described in the screening-level analysis above, back to at least 1944, as available.
- *Regulatory Review* – A review of a commercially-prepared regulatory agency database will be conducted to identify any Class 2 sites that are listed with state and federal regulatory agencies (US EPA, NJDEP, NYSDEC, NYCDEP). Follow-up with Freedom of Information Act (FOIA) requests and agency file reviews which will be undertaken on a site-by-site basis, as appropriate.
- *Site Reconnaissance* – A physical inspection of each property will be undertaken subject to receipt of property owner permission to enter said property. During the inspection, present conditions, as well as evidence of past uses and conditions of the property and adjacent properties will be observed. Evidence of the use, treatment, storage or disposal of petroleum or potentially contaminated materials will be examined, and physical indicators of possible contamination, such as discolored soil; stressed vegetation; storage tanks; fill or vent pipes suggesting underground storage tanks; presence of chemical or petroleum storage drums; strong or pungent odors; pits, ponds or lagoons; transformers or other potentially PCB-contaminated electrical equipment; water or discharge wells; solid waste; and any other indications of potential contamination that are observed will be reported. Appropriate photographs of significant visible indicators will be taken.
- *Interviews* – The purpose of the interview process is to collect unrecorded information concerning past usage of and activities associated with each property and adjacent properties. To the extent possible, interviews with the owners of each property or their representatives, neighbors, tenants and local government officials who would have knowledge of the site will be conducted.
- *Identification of Areas of Concern (AOCs)* – Through performance of the Project Setting, Historical and Regulatory Reviews, Site Reconnaissance, and Interview subtasks, AOCs will be identified. Their locations, nature of the environmental concern and potential impacts to the proposed work will be presented and discussed.

Class 3 Properties

For any additional properties, as identified by the USCG or the Port Authority, a level of effort tailored to each individual request (e.g., undertake a review of NYSDEC's files on the R.T. Baker property) will be developed.

For each property, the conclusions of the Project Setting, Historical and Regulatory Review, Site Reconnaissance, and Interview subtasks will be reviewed so that a judgment can be made as to the likelihood of contamination present at each site, if any.

Construction activities will then be considered with respect to those contaminants in order to assess potential risks to public health and the environment. This assessment is based on a review of the degree of toxicity of the contaminants, the likelihood of exposure for workers and the public, and the potential extent of exposure.

5.20 Environmental Justice and Community Impact Analysis

5.20.1 Environmental Justice

The Environmental Justice (EJ) analysis will generally follow the guidance of the US EPA Region 2's Interagency Working Group (IWG) on Environmental Justice, the CEQ's Environmental Justice Guidance under NEPA, the USDOT/FHWA/FTA guidance on EJ, and the USDOT Final Order on Environmental Justice. The major steps in the assessment process are:

- Identify the study area;
- Compile population characteristics and identify locations with populations of concern for environmental justice;
- Conduct public outreach;
- Identify adverse effects on populations of concern; and
- Evaluate project's overall effects.

The principal focus will be the existing minority and low-income populations in the cities of Elizabeth and Linden as well as in the study area of Staten Island, including the Goethals Mobile Home Park. Depending on any geographically broader impact findings with the build alternatives (e.g., traffic, air quality), the study area for EJ analysis may need to be expanded. The EJ analysis will be conducted in conjunction with the findings from the land use/zoning/community facilities, socioeconomics/demographic, residential/business displacement, air/noise, traffic, water/natural resources, construction, and visual/aesthetic analyses in order to determine the degree of any direct, indirect, and cumulative impacts to EJ populations.

It will be necessary to definitively determine the limits of the study area for field reconnaissance efforts and GIS analysis related to EJ issues. At this time, it is assumed that the geography for EJ will include the census blocks/block groups of the project study area with additional reference to sub-municipal, municipal, and county census areas (e.g., City of Linden or Elizabeth, and Union County).

Minority and low-income populations will be identified through the use of the 2000 census data (race, income, percent poverty, etc.) with respect to the overall population distribution and characteristics surrounding the study area. The locations of EJ populations will be depicted graphically. In locations where census geographic units are too large to identify small areas of EJ population concentration, information gathered through the public outreach and/or discussion with local planners will supplement the census data analyses.

In the event that no EJ populations are identified, the EJ analysis would be deemed completed with the finding that the project would have no disproportionately high and adverse impacts on minority and low-income populations.

Analysis of EJ impacts will be coordinated closely with the public outreach and stakeholder participation effort, within which certain techniques/strategies will be used to target EJ populations to encourage their participation in the EIS development and process. Public involvement is an essential element for this EJ analysis in order to ensure that any potentially affected minority and low-income populations are

effectively engaged in the process. Highlights of the public involvement process and recorded feedback from EJ populations will be presented.

For each project alternative, the direct, indirect, and cumulative impacts to EJ populations will be assessed as identified through the other EIS analyses in order to determine whether these impacts meet a "high and adverse" threshold. The evaluation of any potential impacts will be supported with the review of the engineering drawings (CADD and GIS files) for all ramp alignment alternatives including their respective rights-of-way with respect to existing EJ populations. For each project alternative, any potential offsetting beneficial effects (such as jobs, local economic activity) attributable to the proposed project will be identified.

An analysis of disproportionately high and adverse effects for each alternative will be prepared. Consideration will be given to measures for reducing or mitigating the severity of these impacts, if any. If necessary, final mitigation, enhancement, or avoidance strategies to address any identified EJ concerns will be developed, using input from the community involvement as appropriate.

A disproportionately high and adverse effect to EJ populations may only be carried out if further avoidance, minimization, and mitigation measures are deemed not practicable. In determining whether a measure is "practicable", the social, economic, and environmental effects of avoiding, minimizing or mitigating the adverse effects will be taken into account and the rationale for findings will be documented in the EIS document.

5.20.2 Community Impact Analysis

A community impact assessment (CIA) will evaluate the cumulative effect that the range of potential beneficial and adverse effects the proposed Goethals Bridge project may have on the local communities, their resources, and populations. This task will be based on the evaluation of the potential for impacts examined in other tasks, particularly land use/zoning/community facilities, socioeconomics/demographic, residential/business displacement, air/noise, traffic, construction, visual/aesthetic, and environmental justice. This task will also be closely integrated with the public outreach program to ensure that the decision-making process encompasses considerations important to surrounding communities and that the proposed alternatives are compatible with the surrounding communities' needs and vision for the future.

The evaluation of potential community impacts will be conducted in accordance with the general steps outlined in the USDOT Community Impact Analysis Handbook (1996), as follows:

- Community Identification – To encompass the broad range of trends and issues, the context for presentation of data and discussion of potential impacts will be the study area utilized in the evaluation of land use and socioeconomic impacts and the larger communities of which the study area is part.
- Review of Social and Economic Characteristics – Current community demographic and employment conditions will be presented along with future trends and projections so that the present character of the community and its character at the time of operation of the proposed alternatives will be considered.
- Inventory of Community Features – A key indicator of socio-economic impacts is the effect that the proposed alternatives will have upon local land use patterns. A land use analysis assesses the distribution of residential, commercial, and institutional and community facility land use in the area, and projects future baseline conditions in order to highlight potential impacts of the proposed alternatives on the land use mix of the neighborhood. Existing and projected changes in land use also assist in establishing the assessment parameters of other forms of environmental impacts, such as economics, air quality, noise, vibration and vehicle traffic.

- Identification Community Issues and Attitudes – Complementary to a discussion of land use is a summary of public policy in relation to the study areas, which will determine the compatibility of the proposed alternatives with the neighborhood's own vision of its future state. Policies and plans will be reviewed along with the comments received during the public outreach program.
- Evaluation of Impacts/Identification of Solutions – The effects of the proposed alternatives on the character of the community will be evaluated as described below. As necessary, solutions to promote the avoidance, minimization, or mitigation of significant adverse effects or the enhancement of beneficial impacts will be presented.

Data for the community profile will be collected using data sets, master plans, maps, and other existing documents. Field surveys, interviews, and public involvement will be fundamental components in the data collection process as well. Community input received as part of the public outreach program will also be a source of information for the resource inventory.

For each project alternative, the direct, indirect, and cumulative impacts identified in other tasks will be evaluated for their potential effect on the character, economy or land use composition of the community as a whole. Potential impacts for consideration include:

Potential impacts on the character of a community:

- The displacement and relocation of community facilities or residents
- Changes in the use of community facilities
- Changes in the population or demographic composition of the community or parts of the community
- A change to the perceived quality-of-life in the community
- Changes in the aesthetic character of the community
- Changes in pedestrian, bicycle, or vehicle mobility
- Changes related to safety in the community

Potential impacts on economic conditions:

- Business displacements and relocations
- Changes in the employment trends in the community
- Economic impacts of construction and operations on local businesses
- Fiscal impacts of project alternatives on the community
- Property value changes
- Changes in the tax base
- Changes in the economic base

Potential land use impacts:

- Introduction of physical barriers to movement in the community
- Changes to the existing infrastructure in the community
- Changes to the land use patterns or zoning contrary to community plans and policies.
- Impacts of the project on proposed or planned development projects

A discussion of potential benefits, adverse impacts, and practical mitigation/avoidance alternatives will be integrated into the public outreach process while making special efforts to encourage the participation of a wide range of community residents. The alternatives will be evaluated for their consistency with community plans and policies. Consideration will be given to measures for reducing or mitigating the severity of these impacts, if any.

The final mitigation, enhancement, or avoidance strategies will be summarized to address any impacts identified in other tasks that would mitigate community impacts.

5.21 Construction Impacts

The DEIS will present a description of the bridge construction process for the purposes of quantification of impact-causing activities as it is not intended to describe the precise construction methods that may ultimately be used nor is it intended to dictate or confine the construction process. As such, where the scope of the design, the likely construction methods, and the sequencing of activities is uncertain, the DEIS will assume the reasonable worst-case scenario for the purpose of impact analysis. Where a variety of construction methods or techniques could be utilized, the analysis evaluates the method that is considered to have the greatest potential for adverse environmental impact. This approach ensures that, irrespective of the methods ultimately used to construct the replacement of the Goethals Bridge, the potential environmental impacts that could be associated with construction actually will have been analyzed.

The DEIS will include a detailed assessment of the potential impacts of the project's construction and demolition activities for each of the technical areas covered in the document. The analyses will consider the potential effects of the various stages of construction, as well as the cumulative effects of other projects under construction at the same time. This analysis will identify any potential for significant adverse impacts and identify specific mitigation measures.

5.22 Indirect and Cumulative Impacts

Indirect and cumulative impacts result when the effects of an action or project are added to or interact with other effects in a particular place and within a particular time. The cumulative impacts of an action or project can be viewed as the total effects on a resource, ecosystem, or human community of that action or project and all other activities affecting that resource no matter what entity is taking the actions. Indirect and cumulative impacts may occur outside the immediate study area and may be generated as a result of changes in development patterns. These impacts may include increases in traffic volumes outside the study corridor, or changes in population, housing, employment, tax base, or other land use changes.

The indirect and cumulative impact analysis will follow existing CEQ guidance (1987, 1997) as well as other suggested considerations or supporting documents from USEPA (1999), FHWA (2004), and others.

The potential for indirect and cumulative impacts will be assessed primarily using information collected from, but not limited to, findings of the land use, zoning, construction, socioeconomics, air, noise, water quality, wildlife, traffic, human health, and environmental justice analyses. Past trends will also be evaluated in order to evaluate all range of cumulative impacts.

The indirect and cumulative impact analysis will proceed on a case-by-case basis for each of the specific resources of concern, and will include the following steps:

- Clearly identify and establish the most appropriate geographical and temporal boundaries for each of those potential issues in order to evaluate adequately any indirect and cumulative impacts. This determination will be based on all resources of concern and of all the actions that may contribute, along with the project direct effects, into indirect and cumulative impacts. The selection of the geographical and temporal boundaries will be, whenever possible, based on the boundaries of the resources of concern and the period of time that the proposed action's impacts will persist, even beyond the project life.
- Identify the other past, present, and reasonably foreseeable actions that have impacted or will impact these same resources. Such actions may include planned or proposed transportation

projects in the region and Arthur Kill deepening or waterfront development projects in the vicinity. All these other actions and respective descriptions will be extracted from the contemplated future actions and other planned or developed activities that have already been identified within each respective EIS section. The impacts' nature and the extent of those other actions will be described, as well as their overall impact from the accumulation of the other actions.

- Through consultation with the Environmental Task Force (see Section 6.0), corroborate preliminary findings on other actions, as well as define the assessment goals, techniques, and methodology for analysis of the identified potential indirect and cumulative effects for the proposed project and its alternatives.

The consideration of indirect and cumulative impacts will ensure that the range of actions will include not only the proposed project and its design alternatives but also all actions that could contribute to cumulative impacts and/or result with indirect impacts. During this process, the following mitigating considerations should be taken:

- While identifying any initial project alternatives to avoid and minimize harm to the natural and built environment, consideration will be given to any alternatives that have the potential to minimize indirect and/or cumulative impacts. This will be based upon inter-agency coordination and extent of the indirect and cumulative impacts in order to focus attention on real issues while de-emphasizing consideration on minor issues.
- While the preliminary corroboration of the work plan and preferred alternatives with key reviewing agencies is critical; a continued coordination should also be performed in order to revisit certain issues as new information becomes available and eventually mitigate for some of the identified impacts.

6.0 PUBLIC PARTICIPATION AND INTERAGENCY COORDINATION PROGRAM

Throughout the course of the environmental analyses and documentation for the EIS, the Coast Guard will conduct a program for public participation and interagency coordination. The overriding goal of the program is to engage a diverse group of public and agency participants in order to solicit relevant input and provide timely information throughout the environmental review. In order to best accomplish this, the following objectives will be pursued:

- Establish ongoing, inclusive and meaningful two-way communication with stakeholders, agencies, and the general public.
- Educate the public about the environmental review process and the role of government, stakeholders and the general public.

The principal program activities bracket the development of the DEIS:

- DEIS scoping, including interagency and public scoping meetings, at the outset of the environmental review process to provide information about the proposed project and the environmental review process, and elicit agency and public input and comment; and
- DEIS public hearings, to present the results of the environmental review of the No-Action and project alternatives, and elicit agency and public comments for consideration in selection of a preferred alternative and completion of the Final EIS (FEIS).

Between DEIS scoping and public hearings, multiple additional mechanisms and opportunities for public participation and interagency coordination will be available for periodic dissemination of project information and continued receipt of public comment and input. Public participation mechanisms and opportunities will include, at minimum:

- EIS website (www.goethalseis.com);
- periodic issuance of newsletters to the project's mailing list and through convenient public repositories (e.g., libraries, communities);
- periodic press releases;
- public open houses, preceded by meeting announcements on the website, to the mailing list, and at public repositories; and
- a Stakeholder Committee, to be comprised of a cross-section of key stakeholders, organizations, and interests, which will meet periodically to provide an open forum for discussion about the proposed project, as it progresses. Stakeholder Committee members will agree to bring their members' concerns to the attention of the project team, and bring project information back to their membership.

Interagency coordination will be effected through:

- an Environmental Task Force (ETF) comprised of federal, state, and local agencies with jurisdiction and expertise in all environmental categories, other than traffic/transportation and mobile-source air quality and noise (which will be the focus of the Technical Advisory Committee (TAC), described below), to provide guidance on environmental issues through the course of EIS development; and,
- a TAC comprised of federal, state, local, and Metropolitan Planning Organization (NYMTC, NJTPA) agencies to provide guidance on the traffic/transportation and mobile-source air quality and noise issues through the course of EIS development.