2.0 PURPOSE AND NEED

2.1 Overview of Purpose and Need

The purpose of the Proposed Project 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 Proposed 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 Proposed Project are:

- the existing bridge's functional and physical obsolescence due to inadequate design features, including narrow lanes in relation to increasing traffic and wider trucks and buses using the bridge, no emergency shoulders, and substandard alignment, resulting in deteriorating traffic service, safety conditions, and management of traffic incidents on the bridge;
- the existing bridge's age, including the bridge deck, which is beyond its normal service life and consequently requires high and ongoing maintenance, repair, and rehabilitation costs, as well as structural seismic retrofitting;
- 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 due to continued economic and population growth on Staten Island and in surrounding counties, resulting in deteriorating traffic conditions and relatively higher accident levels on the facility; and
- the layout of the existing bridge and its approaches are inadequate to provide for priority-lane treatment or dedicated capacity for potential future transit service on the facility.

The Proposed 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.

2.2 Background

2.2.1 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 in combination comprise the Staten Island Bridges system, are owned and operated by the Port Authority.

2.2.2 Traffic Growth Trends

The opening of both the Goethals Bridge and Outerbridge Crossing on the same day in 1928 was hailed as a major improvement for residents and businesses on Staten Island and in the neighboring communities of New Jersey. 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 intensive 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 of New York 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 rapid 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 those years. Compared to weekday peak-period traffic volumes totaling approximately 7,100 vehicles in both directions in 1964, the bridge currently (2004) carries approximately 7,200 eastbound and 10,000 westbound vehicles (a total of 17,200 vehicles) in the weekday AM peak period and approximately 11,000 eastbound and 8,400 westbound vehicles (a total of 19,400 vehicles) in the PM peak period. On a daily basis, 2004 traffic volumes totaled approximately 69,000 vehicles per day in both directions[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, existing (2004) traffic data show the highest truck volumes reaching 15 percent of total traffic in the AM peak hour (i.e., 7:30 - 8:30 AM) in the eastbound direction.

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). Post-9/11 restrictions imposed by the Port Authority for purposes of security bans tractor-trailers and larger trucks in classes 4, 5 and 6 (four, five and six-axle trucks) from the Holland Tunnel in both directions and at all times. Due to these various restrictions in the tunnels, 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.

2.2.3 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 the National Environmental Policy Act (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 Draft Environmental Impact Statement (DEIS) for the SIBP – Modernization and Capacity Enhancement Project in 1995 and the Final Environmental Impact Statement (FEIS) in 1997.

[1] These 2004 figures, which reflect the existing condition for the Proposed Project, are based on the comprehensive traffic data collection program conducted in 2004 for the EIS. See Section 4.19 of the EIS.

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 a concurrent high occupancy vehicle (HOV) lane on the new parallel span, as well as on the existing bridge. These alternatives sought to address the transportation deficiencies articulated in the 1997 SIBP FEIS purpose and need documentation, including: 1) the existing span's functional obsolescence caused by deficient physical features (specifically, narrow lanes, restrictive horizontal alignment, no emergency shoulder, and approach span bend in the alignment); 2) peak-period traffic congestion and projections of future traffic growth, and anticipated growth in Howland Hook Marine Terminal activities and other goods movements; and 3) consequent safety concerns. The definition and screening evaluation of potential alternatives, and the subsequent detailed comparative evaluation of the "No-Build," Goethals South, Goethals North, and Expanded Goethals with HOV Lane alternatives in the 1997 FEIS focused on each alternative's ability to address these deficiencies while minimizing adverse environmental impacts.

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. This Expanded Goethals with HOV Lane alternative provided for rehabilitation of the existing span and reconfiguration to accommodate three lanes of westbound traffic, with a shoulder lane. The new span incorporated three lanes for eastbound traffic and additional right-of-way width for a potential future transit service. The project also included an enhanced pedestrian/bikeway. A Record of Decision (ROD) for that project was not issued, due to various unresolved issues at that time.

2.3 The Need for the Proposed Project

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 commenced the Proposed Project to address this expanded purpose and need for modernizing the Goethals Bridge since the SIBP studies, as well as to reassess the operational constraints identified in the earlier analyses.

In addition to the various needs that had been identified in the 1997 SIBP FEIS, the Port Authority determined that due to the age and condition of the bridge, there is also an ongoing need to enhance structural integrity of the bridge and to reduce life-cycle costs associated with long-term maintenance, repair and rehabilitation of the bridge. Given the constrained financial resources available for the Port Authority to maintain and, as necessary, upgrade its regional network of transportation facilities, structural integrity of the bridge and the extensive long-term monetary investment required to keep the bridge in a safe working condition has become increasingly important to the Port Authority. As a result, the goal of addressing structural integrity issues associated with the aging bridge has been added for the current Proposed Project.

Additional factors underlying the current need for a modernized bridge that were not previously identified as project goals include: 1) improving bridge structural security by enhancing transportation system redundancy and by meeting applicable Federal security guidelines for bridges in the post-9/11 era; and 2) restoring and enhancing pedestrian access and providing for bicycle access.

The Proposed Project seeks to provide for a modernized Goethals Bridge crossing that will address the following needs:

- address design deficiencies that make the span functionally obsolete;
- enhance structural integrity and reduce life-cycle cost concerns with the aging bridge;

- provide transportation system redundancy;
- improve traffic service on the bridge and its approaches;
- provide safer operating conditions and reduce accidents on the bridge;
- provide for safe and reliable truck access for regional goods movement; and
- provide for potential future transit in the corridor.

Each of these elements of the Proposed Project is described below.

2.3.1 The Need to 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) and supported by the Federal Highway Administration (FHWA). These deficiencies contribute to the reduction of traffic efficiency, traffic service levels, and safety conditions on the bridge, resulting in diminished traffic performance, driver safety, and heightened 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. While 10-foot lanes were consistent with standard highway design when the bridge was built and for many years after, average vehicle dimensions have continued to increase. As a result, AASHTO now recommends a standard lane width of 12 feet. Another factor contributing to the adverse effect of narrow lane widths is the increasing number of larger-sized trucks and buses that 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 (i.e., the distance between the edge of the travel lanes and physical obstructions such as roadway barriers) are less than 6 feet, 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 reduces safety conditions, as stalled vehicles themselves become safety hazards.

- *Approach Span 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 more 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, because trucks operating on the approach span tend to travel at comparatively slower speeds due to the span's incline, truck weight and acceleration requirements, the presence of the bend, and the narrow lane widths.

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

Based on review of the Port Authority's *2002 Biennial Inspection Report* prepared for the Goethals Bridge, as well as a more recent 2004 visual structural verification and inspection (see Appendix A.1 of this EIS for the *Structural Inspection Report* [July 2004]) conducted on the bridge and its approach structures as part of the EIS effort, the existing structure is currently in overall good to satisfactory condition. This is principally due to significant expenditures for maintenance and repairs to extend the structure's effective life span. In the 18-year period from 1987 to 2005, almost $121 million was spent, approximating $6.7 million in repair and maintenance costs per year.[2] A substantial portion of the total expenditures was spent since 2001, including repainting of the entire structure and performance of miscellaneous structural and deck repairs.

Based on these data, it is concluded that repair costs associated with the Goethals Bridge can be expected to continue to increase in future years, despite the work that was performed under a major rehabilitation and repair contract ($63 million) between 2004 and 2006. The 81-year old bridge is beyond its normal service life; the recent major rehabilitation work provided interim repairs that are expected to extend the life of the bridge for no more than six years from present, after which time additional repair contracts will most likely be needed to maintain the structure at the same level of service. In addition, a bridge rehabilitation and complete deck replacement with seismic retrofit, security upgrades and other related repairs will most likely be required by 2014 or 2015 to keep the bridge in service; the cost of this near-term rehabilitation and deck replacement is estimated at $276 million (2007 dollars).[3]

An analysis has also been conducted of the life-cycle cost of bridge rehabilitation. This analysis considered the activities and associated costs for rehabilitation and maintenance of the existing Goethals Bridge for an additional 100 years beyond any near-term rehabilitation (i.e., the costs associated with a 100-year service life, until 2110), consistent with the design life for a replacement bridge. These life cycle costs are estimated at approximately $804 million in 2007 dollars (net present value), including the near-term rehabilitation and bridge deck replacement required by 2014 or 2015.[4] Depending on the specific nature of each of the maintenance repairs, the frequency of this work would vary from 10 to 50 years. The recurring cycles of maintenance and rehabilitation needs contribute to the increasing cost of extending the structure's life span, while also impacting travelers with repetitive construction-related delays. In addition, these costs would be encountered without the benefit of addressing the bridge's fundamental functional obsolescence and related traffic service, safety, emergency response, and system redundancy needs. Necessary future repairs and rehabilitation would also not provide any ability to accommodate potential future transit on the Goethals Bridge, should future travel patterns warrant such consideration.

2.3.3 The Need to Provide Transportation System Redundancy

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 severely impacted for an extensive period, despite the continued operation of the Bayonne Bridge.

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[2] These costs are based on Port Authority data on past and anticipated repair contracts.

[3] Based on updating costs for inflation that are presented in the *EIS Assessment of Bridge Rehabilitation Needs and Maintenance Costs to Extend the Life of the Existing Bridge for Life Span Comparable to Design Life for Proposed Replacement Bridge* (April 2006). This document is included in Appendix A.2 of this EIS.

[4] Ibid.

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 involving one or more of the existing bridge crossings. Such incidents could be related to an accident or other emergency, or a bridge closing due to routine or emergency maintenance or repairs.

Particularly in the post-9/11 era, 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. The increasing recognition of the importance of transportation-system redundancy in the New York/New Jersey metropolitan region reinforces the purpose and need for the Proposed Project. It underscores the need for a solution that provides adequate operational flexibility and safe travel conditions in the Goethals Bridge corridor in order to accommodate traffic diverting from other transportation facilities during closure incidents in other corridors.

2.3.4 The Need to Improve Traffic Service

2.3.4.1 Existing Travel Conditions

To understand current travel conditions on the Goethals Bridge, a comprehensive traffic data collection program was conducted in May and October 2004. Average weekday traffic volumes on the bridge were approximately 69,000 vehicles, with eastbound and westbound vehicular trips constituting 37,000 and 32,000 vehicles, respectively. Of these volumes, 92.3 percent of total trips were by automobile and 7.7 percent were by truck. While the 2004 traffic data collection program did not include a survey about trip purposes, a 2003 traffic survey conducted by the Port Authority showed that about 62 percent of the trips each weekday were work- and 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. The westbound Goethals Bridge carries approximately 2,900 and 10,000 vehicles in the AM peak hour (7:30 – 8:30 AM) and AM peak period (6:00 – 10:00 AM), respectively. Eastbound volumes in the AM peak-hour and AM peak-period total approximately 1,800 and 7,200 vehicles, respectively. These volumes compare to the carrying capacity in each direction of 3,200 vehicles, such that westbound AM traffic operates at level-of-service (LOS) E[5]. LOS E defines the theoretical capacity of a roadway, or the maximum stop-and-go flow of vehicles, given existing physical conditions, and is typically considered below the threshold of acceptable operating conditions.

In the PM peak hour (5:00 – 6:00 PM) and PM peak period (3:00 – 7:00 PM), the predominant (eastbound) traffic volumes are approximately 3,000 and 11,000 vehicles, respectively. Westbound volumes are approximately 2,100 and 8,400 vehicles, respectively, during the PM peak hour and PM peak period. The eastbound traffic flow in the PM peak period of travel operates at LOS E.

According to 2002-2003 Port Authority traffic surveys, the average number of weekday trips destined to Staten Island was about equal to the number of "through-trips" that originated in or were destined for

[5] The quality of traffic service provided by a roadway facility is typically characterized for peak-period travel conditions and is measured in terms of levels of service (LOS). As defined by the Transportation Research Board, LOS 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 travel 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.

locations east of the Verrazano-Narrows Bridge. Of the through trips, 36 percent were going to Brooklyn or Queens. During the typical weekend day, slightly more trips, (approximately 60%) travel east of Staten Island, primarily for recreational purposes.

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

This profile of traffic conditions on the Goethals Bridge changes markedly on the weekend, when approximately 87 percent of all trips across the bridge are non-work-related; during the weekend period, approximately 10 percent of the Goethals Bridge automobile trips are journey-to-work and another 3 percent are business-related. The greater number of non-work-related trips during the weekend is accompanied by an increase in overall traffic volumes. Average daily weekend traffic volumes on the Goethals Bridge exceed weekday levels. Whereas average weekday traffic volumes on the bridge are approximately 69,000 vehicles, average weekend Saturday traffic volumes on the bridge are approximately 76,000 vehicles, with eastbound and westbound vehicular trips constituting 40,000 and 36,000 vehicles, respectively. Average weekend Sunday traffic volumes on the bridge are approximately 73,000 vehicles, with eastbound and westbound vehicular trips constituting 41,000 and 32,000 vehicles, respectively. However, the non-work-related weekend trips are more evenly dispersed over the day than on weekdays. 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 different recreational locations in New Jersey.

At the Goethals Bridge, peak-hour truck percentages in the existing condition range from 5 to 15 percent of total traffic. The highest truck percentages occur in the non-peak eastbound direction in the morning (15 percent) and in the non-peak westbound direction in the evening (11 percent). In the predominant westbound direction in the morning, trucks account for 8 percent of total vehicles while in the peak eastbound direction in the evening, trucks account for 5 percent of total vehicles. On the New Jersey Turnpike, truck percentages in the Interchange 13 area range from 11 percent of total traffic to as high as 37 percent during both AM and PM peak periods. Along Bayway Avenue approaching the Goethals Bridge, truck volumes comprise 10 to 15 percent of total traffic in the morning peak period; in the PM peak period, trucks comprise 5 to 14 percent of total traffic. On the street network near the Howland Hook Marine Terminal, truck percentages exceed 25 percent on the east- and westbound off-ramps from the Staten Island Expressway and along Forest Avenue, Goethals Road North, and Gulf Avenue in the AM peak period; in the PM peak period, truck percentages range between 17 and 23 percent on these local roads.

2.3.4.2 Future Traffic Growth and Travel Conditions

Population and employment forecasts prepared by the New York Metropolitan Transportation Council (NYMTC), 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, forecasted growth of the New York Container Terminal (NYCT – formerly the Howland Hook Marine Terminal) in the northwestern corner of Staten Island will reinforce the importance of the Goethals Bridge as a critical link for truck-based goods movement in the region, despite recent improvements in rail-based cargo-carrying capacity at the Terminal.

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.

For purposes of travel demand forecasting and related traffic impact analyses for the EIS, a Goethals Transportation Model (GTM) has been developed from the BPM (see Appendix A.3 of this EIS for the *Model Development and Travel Demand Forecast Report* [January 2008]). The GTM focuses specifically on the Goethals Bridge corridor, with a greater degree of detail than is available in the BPM for this project's study area, to better reflect existing traffic and transportation conditions and forecast future conditions (i.e., for the future analysis year of 2034).

Based on GTM modeling conducted for the EIS, traffic conditions on the Goethals Bridge in the future No-Build condition have been forecasted for 2034. The forecasted westbound traffic on the Goethals Bridge in the AM peak hour (7:30 – 8:30 AM) and AM peak period (6:00 – 10:00 AM) will be approximately 3540 and 11,800 vehicles, respectively. Eastbound volumes in the AM peak-hour and AM peak-period would total approximately 2,915 and 9,700 vehicles, respectively. During the AM peak-hour travel period, the predominant westbound traffic flow would operate at LOS F, while eastbound traffic would operate at LOS E. Both LOS E and F represent undesirable traffic conditions below the LOS D threshold that is typically considered acceptable.

In the PM peak hour (5:00 – 6:00 PM) and PM peak period (3:00 – 7:00 PM), eastbound traffic on the Goethals Bridge would approximate 3,630 and 12,800 vehicles, respectively. Westbound PM peak-hour and PM peak-period volumes would total approximately 3,045 and 10,800 vehicles, respectively. During the PM peak-hour travel period, the predominant eastbound traffic flow would operate at LOS F, while westbound traffic would operate at LOS E. As in the AM peak period of travel, both east- and westbound directions of travel would operate with undesirable traffic conditions.

Overall truck volumes in the future (2034) without the Proposed Project would increase in both directions in both the AM and PM peak hours. However, the truck traffic as a percentage of total traffic volume would decrease slightly to 14 percent in the non-peak eastbound direction of traffic in the AM peak hour. In the predominant westbound direction in the AM peak hour, the truck percentage is forecast to increase to 13 percent (from the existing 8 percent). In the PM peak hour, truck traffic in the westbound direction would remain at 11 percent while, in the predominant eastbound direction, truck traffic would increase marginally to 7 percent (from existing 5 percent) of total traffic volumes.

2.3.5 The Need to Provide Safer Operating Conditions and Reduce Accidents

An analysis of crash (accident) characteristics and trends for the Goethals Bridge was conducted for the years 2000 through 2007. The crash data, obtained from the Port Authority, provide a summary of crash reports filed by the Port Authority Police at the Bridge during each of the eight analysis years. A summary of the data is provided in Table 2.3-1. The calculated rates presented in the table represent the bridge span only and do not include the toll plaza area, approach ramps, or departure ramps[6]. Crash rates were calculated using annual traffic volumes and bridge centerline miles provided by the Port Authority.

[6] The crash rates at the toll plaza area, approach ramps, or departure ramps do not contribute to the overall Purpose and Need for the Proposed Project.

TABLE 2.3-1
GOETHALS BRIDGE CRASH SUMMARY
(INCLUDING "DAMAGED WHILE PARKED" AND "OFF-FACILITY" CRASHES)

Year	Total Crashes	Bridge Span Crashes	Volume (millions)	Crash Rate (per MVM)	Statewide Average Crash Rate (per MVM)	
					NJ	NY
2000	205	119	27.778	3.18	4.35	1.09
2001	224	141	28.472	3.68	3.50	1.09
2002	220	106	31.364	2.51	3.75	1.09
2003	173	85	28.486	2.22	3.78	Not Avail.
2004	151	90	28.292	2.36	3.73	Not Avail.
2005	158	82	28.072	2.17	3.51	0.79
2006	143	90	26.050	2.57	3.08	0.89
2007	155	101	28.446	2.64	2.99	0.89

Notes:
- MVM – million vehicle miles.
- The Goethals Bridge elevated structure length of 7,109 ft was used to obtain a centerline length of 1.35 miles (http://www.panynj.gov/CommutingTravel/bridges/html/goethals.html#stats).
- The Goethals Bridge and NY Statewide Crash Rates shown are for four-lane, divided roadways with shoulders less than six feet wide, mainline only.
- The NJ Statewide Crash Rates shown are for four-lane, divided roadways with shoulders less than six feet wide, but include mainline and junctions (e.g., ramps, intersections, etc.).

Source: Port Authority, 2008.

During the 8-year period, approximately 55 percent (more than 2,400) of the total crashes recorded for the Port Authority's three Staten Island bridges occurred at the Goethals Bridge. A large portion of these (40 percent) occurred during midday between the AM and PM peak periods of travel; Friday was the weekday with the highest number of crashes. Most of the recorded crashes were rear-end and sideswipe incidents (each representing about 40 percent of the total), which generally relate to the Bridge's narrow lanes and lack of shoulders. Nearly 85 percent of the crashes occurred in good weather, with dry roadway pavement, which also indicates that the crashes were related to Bridge conditions and were not weather-related. Approximately 85 percent of the crashes resulted in property damage only.

As shown in the tabulated data above, the annual crash rate at the Goethals Bridge over the 8-year period was consistently above, in some years well above, 2 crashes per million vehicle miles (mvm); in comparison, annual crash rates at the Outerbridge Crossing were all well below 2 per mvm during every year between 2000 and 2007. The higher annual crash rates at the Goethals Bridge may be attributable to the Bridge's steeper grade, sharper geometry, and higher truck volumes than exist at the Outerbridge Crossing.

2.3.6 The Need to Provide for Safe and 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 New York Container Terminal (formerly, the Howland Hook Marine Terminal) in Staten Island with the mainland interstate highway system through a direct connection with the New Jersey Turnpike. Significant growth in cargo volume is forecasted for the entire Port of New York and New Jersey, including at the New York

Container Terminal. At the time that the SIBP Final EIS was completed in 1997, what was then the Howland Hook Marine Terminal had recently been reactivated with relatively small cargo throughput and modest growth forecasts, compared to the current New York Container Terminal's throughput, ongoing operations and infrastructure improvements, and growth forecasts. The forecasted trend of continued cargo volume growth in the Port, and notably at the New York Container Terminal despite its recent improvements in rail-based cargo-carrying capacity, heightens the Goethals Bridge's importance for accommodating goods movement in the region.

Based on the findings of the traffic data collection program conducted for this EIS, a total of approximately 8,600 trucks crossed the Goethals Bridge in both directions on a typical weekday in May 2004. The Goethals Bridge is used principally for truck trips originating near Port Newark and Port Elizabeth, the South Kearny freight yards, and Middlesex County, New Jersey. According to the Port Authority's 2005 *Marine Container Terminals Truck Origin-Destination Survey*, 71 percent of trucks bound for the New York Container Terminal accessed it via the Goethals Bridge, and 72 percent of trucks leaving the Terminal similarly used the Goethals Bridge.

Truck traffic on the Goethals Bridge is constrained by the physically obsolete configuration of the Goethals Bridge – narrow lanes, no emergency shoulder, and substandard approach span horizontal curvature. Slow-moving truck traffic contributes to inefficient traffic service on the span by affecting passenger vehicle flows, as autos queue behind trucks navigating the narrow lanes. Forecasted increases in truck-based goods movement to/from the New York Container Terminal and within and through the region will be increasingly constrained in the Goethals Bridge corridor. As the crossing's geographic significance for goods movement in the region continues to grow, the existing span's continued inefficient handling of the demand will act counter to the need for safe and reliable truck access through this corridor.

2.3.7 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. Although the New York/New Jersey region's transit network has grown during the past decade, evidenced most recently with the implementation of the Hudson-Bergen light-rail transit (LRT) system and the studies of further transit system expansion throughout the region (e.g., consideration of bus rapid transit [BRT] and possible LRT routes in Staten Island), the constrained design of the existing bridge does not offer a viable option to further enhance the region's transit goals. The Proposed Project includes a cross-sectional design that could accommodate potential future introduction of transit service on the new bridge, at such time as it may be warranted.

2.4 Project Purpose

Given the various needs presented above, the primary purpose of the Proposed Project is to eliminate the functional and physical obsolescence of current design features on the bridge, thereby improving: 1) safety conditions; 2) emergency access and the ability to manage traffic incidents on the bridge; 3) system redundancy to better accommodate incident management of Port Authority interstate crossings and the regional highway network; and 4) traffic conditions on the bridge and its approaches. The Proposed Project would address concerns regarding the structural integrity and increasingly costly repairs and maintenance of the aging bridge, as well as the existing span's deficiencies related to current bridge design standards. The Proposed Project would consider modernization options for accommodation of potential future transit system expansion in the corridor. The Proposed Project could also provide a means for improved efficiency and reliability in truck-based goods movement in the Goethals Bridge corridor and, more broadly, within the metropolitan region. And, finally, the Proposed Project would address post-9/11 concerns that require structural security of the bridge, as well as the need for transportation system redundancy in the event that another regional crossing becomes inoperable due to routine maintenance or repairs or an emergency condition.

2.5 Project Goals

The Proposed Project's goals have been defined on the basis of the stated purpose and need for the project, as discussed above. The project goals, in turn, have served during the environmental review process as the basis for: 1) identifying potential project alternatives; and 2) defining criteria and related performance measures that have been 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 this EIS.

Based on the purpose and need for the Proposed Project, the following project goals have been defined:

- Address the Functional Obsolescence of the Existing Goethals Bridge – to improve safety conditions and performance reliability; to meet current geometric design standards; and provide the ability to manage traffic volumes and respond to traffic incidents on the bridge in an efficient manner;
- Address Structural Integrity Issues Associated with the Aging Bridge – to reduce escalating maintenance/emergency repair costs and provide a bridge crossing that meets current structural and seismic standards;
- Reduce Roadway Congestion and Delays and Enhance Mobility on the Goethals Bridge – and thereby upgrade the overall function and capacity of the regional transportation network;
- Improve the Flow of Goods to and from Staten Island and in the New York – New Jersey Region – to serve the economic growth of commerce locally and in the broader metropolitan region;
- Accommodate Future Transit Services – and other single-occupant auto commuting alternatives that are emerging as regional responses to increasing highway congestion in both states;
- Restore and Enhance Pedestrian Access and Provide for Bicycle Access – to further promote alternatives to the use of single-occupant auto commuting;
- Improve Bridge Structural Security – to enhance transportation system redundancy by providing adequate access in the Goethals Bridge corridor in the event that another transportation facility becomes inoperable, and to meet applicable Federal security guidelines for bridges; and
- Minimize Environmental Consequences – to serve projected future traffic needs and access while minimizing adverse environmental impacts to the maximum extent feasible.

2.6 Coordination with Other Projects

In addition to the Proposed Project, other projects proposed within the general vicinity of the Goethals Bridge corridor will have long-term benefit to users of the regional transportation system and the region's overall economy as well. All of these other transportation projects are identified in Section 4.4.5 of the EIS.

Identification of the purpose and need for the Proposed Project, as well as its assessment within this EIS, has been performed while taking these other projects and studies into account. This is especially true for those projects and studies of transportation improvements involving facilities in relative proximity to, or within the zone of influence of, the Goethals Bridge corridor. (The specific programmed and committed projects incorporated into the traffic modeling for the Proposed Project are identified and described in Section 3.3.1.) Coordination with the key agencies responsible for constructing, operating and maintaining transportation facilities and services within the region has also been an integral aspect of studying the Proposed Project. These agencies include the New York State Department of Transportation, the New York City Department of Transportation, the New Jersey Department of Transportation, the New Jersey Turnpike Authority, and various departments within the Port Authority, as well as others. One of the primary intentions of such coordination is to ensure consideration of other proposed projects in the evaluation of project-related impacts and cumulative impacts within the study area and the region of the Proposed Project.