APPENDIX E

History and Projection of Traffic, Toll Revenues and Expenses and Review of Physical Conditions of the Facilities of Triborough Bridge and Tunnel Authority

Stantec

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Triborough Bridge and Tunnel Authority

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To the Triborough Bridge and Tunnel Authority:

In accordance with your request, Stantec Consulting Services Inc. (Stantec) conducted this annual study to develop projections of traffic, toll revenues and expenses for the toll bridge and tunnel facilities operated by the Triborough Bridge and Tunnel Authority (TBTA), and to provide an overview of the physical conditions of each facility. We have reviewed the bridge and tunnel inspection reports provided by TBTA and discussed TBTA's on-going maintenance and capital programs with its engineering staff.

Our projections have taken into account: (1) the general physical condition of TBTA's toll facilities; (2) traffic and toll revenue data, reflecting the 17 toll increases since 1972; (3) the impact of the E-ZPass electronic toll collection system; (4) the toll structure; (5) planned and possible future toll increases; (6) economic, population, employment and other demographic forecasts in the New York Metropolitan Area; (7) the traffic capacities of the bridges and tunnels and the existing roadway network that feeds the facilities in terms of the potential for future growth of peak versus non-peak period traffic; (8) current and programmed construction activities on TBTA's facilities and the arterial highway network serving the New York Metropolitan Area, including the toll-free Harlem and East River bridges; and (9) mass transit network projects.

In 2014, actual total toll revenues for the TBTA facilities were $1,676.4 million, or 0.8 percent higher than our 2014 forecast of $1,663.9 million and 1.9 percent higher than actual 2013 toll revenue. Total revenue traffic was 286.4 million vehicles, or 1.2 percent higher than previously forecasted at 283.0 million vehicles and 0.6 percent higher than actual 2013 traffic.

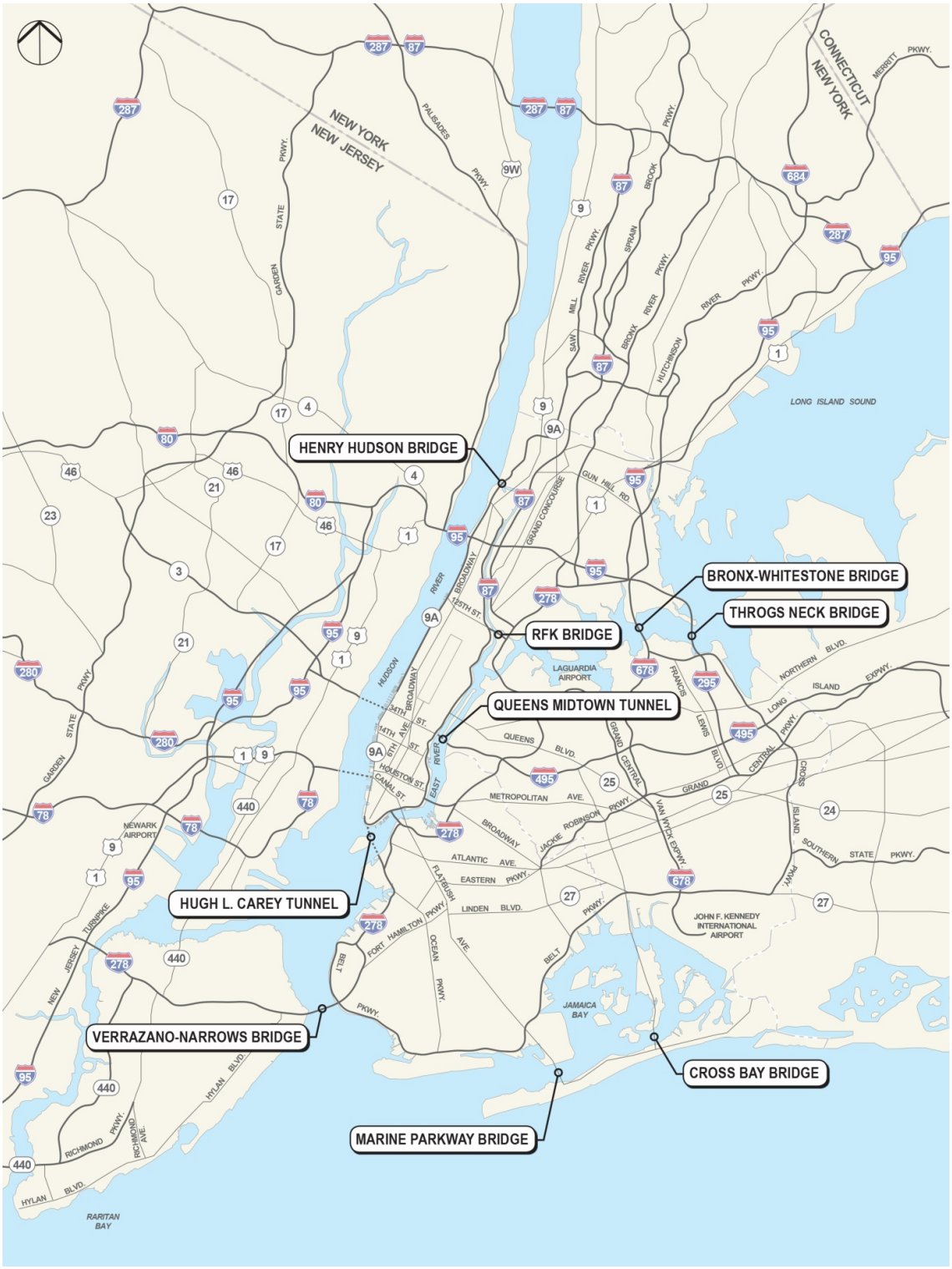
TRANSPORTATION INFRASTRUCTURE

The New York Metropolitan Area's transportation infrastructure consists of an extensive network of highways, tunnels and bridges (both tolled and toll-free), regional bus and commuter rail and the New York City transit system.

Triborough Bridge and Tunnel Authority (TBTA)

TBTA operates nine toll facilities within New York City (the "City"), consisting of seven bridges and two tunnels that provide vital links across the City's rivers and bays. In 2014, these facilities carried 286.4 million total toll paying vehicles, and generated $1,676.4 million in total toll revenue. The locations of the facilities are shown in the context of the regional highway network on the following map.

Figure 1 Location Map



The facilities are briefly described as follows:

Verrazano-Narrows Bridge - a two-level suspension bridge, with three lanes of traffic in each direction on both decks. It crosses the entrance to New York Harbor and connects Brooklyn and Staten Island.

Robert F. Kennedy (RFK) Bridge (formerly the *Triborough Bridge*) - Crosses the East River and the Harlem River and connects the boroughs of Queens, the Bronx and Manhattan. Opened to traffic in 1936, it generally carries eight traffic lanes between Queens and the Bronx via Wards Island and Randall's Island except where the Wards Island Viaduct has been widened to nine lanes; the bridge also generally carries six traffic lanes between Randall's Island and Manhattan. These three major crossings are interconnected by viaducts.

Bronx-Whitestone Bridge - a suspension bridge, with three lanes of traffic in each direction, which crosses the East River connecting the boroughs of Queens and the Bronx.

Throgs Neck Bridge - a suspension bridge, with three lanes of traffic in each direction, which crosses the upper East River also connecting the boroughs of Queens and the Bronx.

Queens Midtown Tunnel - a twin-tube tunnel with each tube carrying two lanes of traffic under the East River between the boroughs of Queens and Manhattan. During normal morning commuting hours, three lanes are operated in the peak traffic direction.

Hugh L. Carey Tunnel (formerly the *Brooklyn-Battery Tunnel*) - a twin-tube tunnel with each tube carrying two lanes of traffic under the East River connecting the southern tip of Manhattan with Brooklyn. During normal morning commuting hours, three lanes are operated in the peak traffic direction.

Henry Hudson Bridge - a two-level steel arch bridge, with three southbound lanes on its lower deck and three northbound lanes on its upper deck, which crosses the Harlem River to connect the northern tip of Manhattan with the Spuyten Duyvil section of the Bronx.

Marine Parkway - Gil Hodges Memorial Bridge (*Marine Parkway*) - a four-lane crossing of the Rockaway Inlet that connects the Rockaway peninsula in Queens with Brooklyn.

Cross Bay Veterans Memorial Bridge (*Cross Bay*) - a precast post-tensioned concrete T-girder bridge with three lanes of traffic in each direction crossing Beach Channel in Jamaica Bay, connecting the Rockaway peninsula in Queens with the Queens mainland, via Broad Channel.

Metropolitan Area Arterial Network

The New York Metropolitan Area is served by an extensive network of highway facilities. Many of the bridges and tunnels operated by TBTA are links in the Interstate highway network, as these limited-access expressways pass through the City to serve both local and long distance traffic. These regional facilities are shown on the map on the previous page.

The Verrazano-Narrows Bridge is adjacent to I-278 (Staten Island, Gowanus and Brooklyn-Queens Expressways), which connects with the Hugh L. Carey Tunnel and the RFK Bridge. The Queens Midtown Tunnel carries I-495 (Long Island Expressway) into Manhattan. The RFK Bridge joins I-87 (Major Deegan Expressway) and I-278 (Bruckner Expressway) with I-278/Grand Central Parkway in Queens and the FDR and Harlem River Drives in Manhattan. The Bronx-Whitestone Bridge carries traffic between the Hutchinson River and Merritt Parkways and Long Island via I-678 (Whitestone and Van Wyck Expressways) and the Cross Island Parkway. The Throgs Neck Bridge carries traffic between I-95 (New England Thruway and George Washington Bridge) and Long Island via I-295. The Henry Hudson Bridge is part of the Henry Hudson Parkway, a major commuter route into Manhattan from the extensive parkway network in western Westchester County and beyond.

In addition to TBTA facilities and their expressway/parkway connections, the City's toll-free East River bridges — Brooklyn, Manhattan, Williamsburg and Ed Koch Queensboro — also connect Manhattan with Brooklyn and Queens; and nine toll-free bridges over the Harlem River connect Manhattan with the Bronx. Unlike the TBTA facilities, the approaches to these bridges are mostly surface arterials, such as Flatbush Avenue and Queens Boulevard. Only a few have expressway ramp connections (such as the Brooklyn-Queens Expressway connections to the Brooklyn, Manhattan, and Williamsburg Bridges). The Alexander Hamilton Bridge, as part of I-95, connects the Trans-Manhattan Expressway and the Cross Bronx Expressway.

Other Regional Toll Facilities

TBTA is one of a number of toll authorities that operate bridge, tunnel and highway facilities in the New York Metropolitan Area. The agency whose facilities are geographically closest to TBTA's bridges and tunnels is the Port Authority of New York and New Jersey (Port Authority). The Port Authority's George Washington Bridge is linked to the RFK, Bronx-Whitestone and Throgs Neck Bridges via the expressway system in the Bronx (plus the George Washington-RFK Bridge connection in Manhattan via the Harlem River Drive and the George Washington-Henry Hudson Bridge connection in Manhattan via the Henry Hudson Parkway), while the Bayonne Bridge, Goethals Bridge and Outerbridge Crossing are linked to the Verrazano-Narrows Bridge via the expressway system in Staten Island. Only motorists using the Port Authority's two tunnels — Holland and Lincoln — must traverse surface streets (in Manhattan) to reach TBTA's and the City's East River crossings. The other toll authorities in the region are the New York State Thruway Authority (Tappan Zee Bridge and several Thruway sections), New York State Bridge Authority (five upstate Hudson River bridges) and the New Jersey Turnpike Authority (Garden State Parkway and New Jersey Turnpike).

All of these authorities, together with twenty-one others beyond the New York Metropolitan Area, are linked through the E-ZPass Interagency Group (E-ZPass Group) to better serve the regional traveler through a common electronic toll collection tag. On March 13, 2012, the E-ZPass Group announced a new "National Affiliate" membership category which would allow other tolling agencies to join the E-ZPass Group and become interoperable with the E-ZPass Group by using equipment that is compatible with the E-ZPass system. Since then, the E-ZPass Group has further expanded its footprint, continuing to work towards national interoperability. E-ZPass and its impact on the TBTA facilities are discussed further, in this report.

Regional Public Transportation

In addition to the TBTA facilities, most of the public transportation facilities within the City and the suburban counties north and east of the City are part of the Metropolitan Transportation Authority (MTA) system. These include the New York City Transit Authority and the Manhattan and Bronx Surface Transit Operating Authority (its subsidiary), MTA Bus Company, Staten Island Rapid Transit Operating Authority, Metro-North Commuter Railroad Company, and the Long Island Rail Road Company. Effective January 1, 2012, the Long Island Bus system (in Nassau County, and serving adjacent portions of Queens and Suffolk County), formerly part of the MTA system, was privatized and is now known as Nassau Inter-County Express (NICE).

For those major TBTA facilities directly serving Manhattan — Henry Hudson Bridge, RFK Bridge, Queens Midtown Tunnel and Hugh L. Carey Tunnel — the motorist can, for the most part, choose to use transit as an alternative. For the outlying bridges, however, the choice is more difficult, due to fewer transit options or different trip characteristics.

Potential Regional Tolling Proposals

From time to time, the possibility of tolling the City's free East River crossings has been discussed by City and State policy makers, as well as other interested parties. Variations of this proposal have included discussions of imposing tolls on the Harlem and East River crossings, the establishment of a "cordon" in Manhattan that would be tolled, and a discussion of congestion pricing on tolled facilities, including the possibility of lower tolls on TBTA facilities. Currently, a proposal by a consortium of organizations, private companies, and interested individuals (the group is called MOVE NY) advocates many of the same elements as previously discussed. At this time, the MOVE NY concept has not been incorporated into a legislative proposal. MTA and TBTA staff are nevertheless reviewing the plan to try to assess the possible effects on the MTA system should it move into the legislative realm. At this time, the public discussion is too speculative to draw any conclusion about the potential impacts on the MTA or TBTA.

TOLL COLLECTION ON THE TBTA FACILITIES

The nine TBTA toll facilities have four toll structures, in terms of toll levels and methods of collection: major, minor, Henry Hudson Bridge, and the Verrazano-Narrows Bridge. The major crossings for this purpose include the RFK Bridge, Bronx-Whitestone Bridge, Throgs Neck Bridge, Queens Midtown Tunnel, and Hugh L. Carey Tunnel. The minor crossings are the Marine Parkway Bridge and Cross Bay Bridge. The Henry Hudson Bridge is the only facility limited to vehicles which are authorized to use parkways. The Verrazano-Narrows Bridge is the only facility on which tolls are collected in one direction only, while the cash[1] tolls for passenger cars on the minor bridges are half the level of those on the major facilities.

Present and Proposed Toll Structures and Operation

The current toll structure, in place since the March 22, 2015 toll increase, is shown in Table 1. Tolls are determined using a basic rate as modified by variables specific to a number of factors. These factors include:

- crossing used;
- vehicle classification;
- toll payment method;
- place of residence; and
- vehicle occupancy.

[1] This study uses the phrase "cash tolls" to refer to crossing charge rates charged for the use of fare media other than E-ZPass by New York E-ZPass Customer Service Center (NYCSC) customers. *See* 21 NYCRR §1021.1. Cash toll rates are charged to cash customers and non-NYCSC E-ZPass customers (effective July 12, 2009), as well as to Tolls by Mail customers at the Henry Hudson Bridge since the inception of cashless All-Electronic Tolling (AET) at the crossing on November 10, 2012. Only NYCSC E-ZPass customers are eligible for the lower E-ZPass toll rates.

Table 1 Current Toll Rates at TBTA Facilities, Effective March 22, 2015

Classification	Verrazano-Narrows Bridge[a]		RFK Bridge Bronx-Whitestone Bridge Throgs Neck Bridge Queens Midtown Tunnel Hugh L. Carey Tunnel		Henry Hudson Bridge		Marine Parkway-Gil Hodges Memorial Bridge Cross Bay Veterans Memorial Bridge	
	Cash	*E-ZPass*[b]	Cash	*E-ZPass*[b]	Tolls by Mail[c]	*E-ZPass*[b]	Cash	*E-ZPass*[b]
Two-axle vehicles, including: Passenger vehicles, SUVs, station wagons, self-propelled mobile homes, ambulances, hearses, vehicles with seating capacity of not more than 15 adult persons (including the driver) and trucks with maximum gross weight of 7,000 lbs. and under	$16.00	$11.08	$8.00	$5.54	$5.50	$2.54	$4.00	$2.08
Each additional axle costs	6.50	6.50	3.25	3.25	2.50	2.50	2.50	2.50
The following reduced rate prepaid charges are presently available for the two-axle vehicles referenced above:								
Prepaid charges through reduced rate token roll purchase							2.67	
Prepaid charges per crossing for registered Rockaway Peninsula/Broad Channel Residents using an eligible vehicle							1.86	1.36[d]
Prepaid charges per crossing for registered Staten Island Residents using an eligible vehicle with three or more occupants (HOV)	3.08							
Prepaid charges per crossing for registered Staten Island Residents using an eligible vehicle through token roll purchase	8.87							
Registered Staten Island Residents using an eligible vehicle taking 3 or more trips per month		6.24[e]						
Registered Staten Island Residents using an eligible vehicle taking less than 3 trips per month		6.60[f]						
All two-axle vehicles greater than 7,000 lbs. and buses (other than franchise buses and motor homes)	32.00	20.00	16.00	10.00			8.00	5.00
3 Axle	52.00	32.78	26.00	16.39			13.00	8.20
4 Axle	66.00	41.90	33.00	20.95			16.50	10.48
5 Axle	86.00	54.62	43.00	27.31			21.50	13.66
6 Axle	100.00	63.74	50.00	31.87	(g)	(g)	25.00	15.94
7 Axle	124.00	76.46	62.00	38.23			31.00	19.12
Each additional axle above 7	18.00	12.78	9.00	6.39			4.50	3.20
Two-axle franchise buses		8.02		4.01				2.00
Three-axle franchise buses		9.52		4.76				2.51
Motorcycles	6.50	4.82	3.25	2.41	3.25	1.73	3.25	1.73

Notes:

(a) Under the Verrazano-Narrows Bridge one-way crossing charge collection program, all per crossing charges shown should be doubled; toll is collected in the westbound direction only in accordance with federal law. As discussed in this report, the MTA also has two toll rebate programs at the Verrazano-Narrows Bridge for eligible Staten Island residents and qualifying commercial vehicles using the same New York Customer Service Center (NYCSC) E-ZPass account.

(b) E-ZPass crossing charges apply to NYCSC E-ZPass customers only; customers of other E-ZPass CSCs are charged the cash toll. Any motorist, regardless of residence, can obtain a NYCSC transponder.

(c) Cash toll collection at the Henry Hudson Bridge was discontinued as of November 10, 2012 with the inception of the cashless phase of the AET pilot program; as approved by the Board in May 2014, All-Electronic Tolling became the permanent method of toll collection at the Henry Hudson Bridge on January 1, 2015. Vehicles without an NYCSC E-ZPass tag pay the higher cash toll rate via the Tolls by Mail program.

(d) Effective April 1, 2012, eligible Rockaway Peninsula and Broad Channel residents using E-ZPass at the Cross Bay Bridge (CBB) receive a full rebate of the Rockaway Resident E-ZPass toll from the MTA. It is likely that the MTA will continue the CBB rebate program at its current level only if there is sufficient funding to do so. Should there not be sufficient funding to continue the CBB rebate program at its current level, the rebate program would likely revert to the level that existed prior to April 1, 2012, where Rockaway Residents paid the Rockaway Resident E-ZPass toll for the first two trips and received the rebate only for subsequent trips taken during a calendar day using the same E-ZPass tag.

(e) After $0.74 rebate, effective toll is $5.50 per trip.

(f) After $1.10 rebate, effective toll is $5.50 per trip.

(g) Passage prohibited.

Passenger Car Tolls

As noted, TBTA crossings are separated into four categories for toll classification purposes: major facilities, minor facilities, the Verrazano-Narrows Bridge, and the Henry Hudson Bridge. The single trip passenger car cash toll is $8.00 for the major crossings and $16.00 for the Verrazano-Narrows Bridge. The minor crossing passenger car cash toll is $4.00 on the Marine Parkway and Cross Bay Bridges. On the Henry Hudson Bridge, where cashless tolling is now in effect, the passenger car toll is $5.50 for Tolls by Mail customers; the Tolls by Mail method is currently used only at the Henry Hudson Bridge).[2] All tolls are collected in each direction except on the Verrazano-Narrows Bridge where the round-trip tolls are collected only in the westbound (Staten Island-bound) direction in accordance with federal law.

Tolls for passenger cars are reduced by TBTA under the following programs: (1) NYCSC E-ZPass (2) tokens required by statute; (3) place of residence/crossing used; (4) place of residence/vehicle occupancy; and (5) some combination of the foregoing. The MTA also has toll rebate programs for certain eligible residents using NYCSC E-ZPass at the Cross Bay and Verrazano-Narrows Bridges. MTA reimburses TBTA in full for these rebates with a combination of its own funds and New York State funds.

E-ZPass electronic toll collection is available on all TBTA toll facilities (see the following section for a more complete description of E-ZPass and its impact). Motorists open an E-ZPass account and receive a transponder that they mount on their vehicles (typically their windshields). TBTA toll plazas are all equipped with E-ZPass antennas that identify and read the on-board tags and electronically debit the toll from the motorist's account. Under the current toll schedule, passenger cars equipped with a NYCSC E-ZPass receive a $2.46 reduction per trip at all major facilities and a $4.92 reduction at the Verrazano-Narrows Bridge where the round-trip toll is collected only in the westbound direction, and $1.92 at the Cross Bay and Marine Parkway Bridges. On the Henry Hudson Bridge, passenger cars with a NYCSC E-ZPass receive a $2.96 reduction per trip. Passenger cars equipped with a non-NYCSC transponder pay the same toll rate as cash customers, except at the Henry Hudson Bridge, where non-NYCSC E-ZPass customers pay the same toll rate as Tolls by Mail customers. Any motorist, regardless of residence, can obtain a NYCSC transponder.

TBTA also provides toll discounts by means of resident tokens and NYCSC E-ZPass to registered Rockaway Peninsula and Broad Channel residents on the Cross Bay and Marine Parkway Bridges and registered Staten Island residents on the Verrazano-Narrows Bridge.

Tolls for Vehicles over 7,000 Pounds

The toll charges for vehicles over 7,000 pounds are a function of weight/number of axles as well as the crossing used. For the major crossings, the present cash rate for these vehicles is $16.00 for two axles, increasing to $62.00 for a seven axle vehicle. These vehicles receive a reduction of

[2] Under the Tolls by Mail program at the Henry Hudson Bridge, license plate images for vehicles without E-ZPass tags are matched with information from the Department of Motor Vehicles and a toll bill is mailed to the vehicle owner.

approximately 37 percent with a NYCSC E-ZPass. Vehicles with more than seven axles pay a cash rate of $9.00 for each additional axle over seven and a NYCSC E-ZPass rate of $6.39 for each additional axle over seven (rates at the Verrazano-Narrows Bridge are doubled since the toll is collected in the westbound direction only). Vehicles with three to six axles pay varying rates, which increase with the number of axles, as shown in Table 1.

For the minor crossings, the two-axle cash rate for vehicles over 7,000 pounds is $8.00, increasing to $31.00 for a seven axle vehicle. These vehicles presently receive approximately a 37 percent reduction with a NYCSC E-ZPass. Vehicles with more than seven axles pay a cash rate of $4.50 for each additional axle over seven and a NYCSC E-ZPass rate of $3.20 for each additional axle over seven. Vehicles with three to six axles pay varying rates, which increase with the number of axles, as shown in Table 1. Commercial vehicles are not permitted on the Henry Hudson Bridge without a New York City Department of Transportation (NYCDOT) permit.

The MTA also has a partial toll rebate program for eligible NYCSC E-ZPass commercial customers at the Verrazano-Narrows Bridge.

MTA's Toll Rebate Programs

Toll rebate programs are available for (1) residents of Broad Channel and the Rockaway Peninsula ("Rockaway Residents") for use on the Cross Bay Bridge; (2) Staten Island residents participating in the Staten Island Resident ("SIR") E-ZPass discount program (the "SIR Rebate Program"); and (3) commercial vehicles participating in the Verrazano-Narrows Bridge Commercial Rebate Program ("VNB Commercial Rebate Program"). These rebate programs do not affect TBTA revenues since TBTA collects the full toll from customers, with a portion paid by the motorist and the remainder paid by the MTA with a combination of its own funds and New York State funds.

Cross Bay Bridge Rebate Program

A toll-rebate program for the benefit of E-ZPass customers who are Rockaway Residents was implemented by the MTA on January 1, 1998 for use on the Cross Bay Bridge. This program was modified during the period from July 23, 2010 to March 31, 2012, during which eligible Rockaway residents were charged the reduced resident toll rate for the first two trips over the Cross Bay Bridge and only subsequent trips during the same calendar day using the same E-ZPass transponder were eligible for the rebate. Effective April 1, 2012, the MTA has been using funds allocated by New York State to restore the rebate for tolls incurred on the first two trips made on the same day over the Cross Bay Bridge by eligible residents. In 2014 the MTA reimbursed the TBTA in the amount of approximately $4.8 million in toll rebates. The TBTA estimates that the reimbursements in 2015 will total approximately $5.0 million.

Verrazano-Narrows Bridge Rebate Programs

The MTA has two toll rebate programs at the Verrazano-Narrows Bridge: the SIR Rebate Program, available for residents of Staten Island participating in the SIR E-ZPass toll discount plan, and the VNB Commercial Rebate Program, available for commercial vehicles making more than ten trips per month using the same New York Customer Service Center ("NYCSC") E-ZPass account.

The projected annualized cost of the VNB Rebate Programs in 2014-2015 was $14 million, with $7 million allocated for the SIR Rebate Program and $7 million for the VNB Commercial Rebate Program. The $14 million cost of the 2014-2015 VNB Rebate Programs was funded equally by the State and MTA, with the State's contribution provided by the waiving of $7 million of cost recovery assessments levied by the State and otherwise payable by MTA pursuant to Public Authorities Law §2975.

The projected annualized cost of the 2015-2016 VNB Rebate Programs is $17.3 million, with $7 million for the 2015-2016 VNB Commercial Rebate Program and $10.3 million for the 2015-2016 SIR Rebate Program. Under the 2015-2016 VNB Rebate Programs, $7 million of the cost for the 2015-2016 SIR Rebate Program and $7 million of the cost of the 2015-2016 VNB Commercial Rebate Program are to be funded equally by the State and the MTA, with the State's contribution provided by appropriations to the MTA. An additional $3.3 million in appropriations is being provided by the State to the MTA to keep an effective toll rate of $5.50 for Staten Island Residents under the SIR Rebate Program (i.e., the effective toll prior to the March 22, 2015 toll increase).

The money to fund a year's estimated costs for the VNB Rebate Programs is transferred by the MTA to TBTA prior to the implementation of the VNB Rebate Programs each year. The 2015-2016 VNB Rebate Programs will be implemented as specified herein only for such periods during which both (a) MTA's total financial responsibility, net of State actions or available offsets, does not exceed $3.5 million for the 2015-2016 SIR Rebate Program (which is half of the $7 million allocated to such Program) and $3.5 million for the 2015-2016 VNB Commercial Rebate Program (which is half of the $7 million allocated to such Program) and (b) the State provides (i) at least $3.5 million for the 2015-2016 SIR Rebate Program and $3.5 million for the 2015-2016 VNB Commercial Rebate Program and (ii) such additional funds as are necessary (currently estimated to be $3.3 million) to keep an effective toll rate of $5.50 for Staten Island Residents under the 2015-2016 SIR Rebate Program (i.e., the effective SIR toll prior to the March 22, 2015 toll increase). MTA shall apply the $3.3 million of additional funds provided by the State as necessary to keep an effective toll rate of $5.50 for Staten Island Residents under the 2015-2016 SIR Rebate Program (i.e., the effective SIR toll prior to the March 22, 2015 toll increase).

If, as a result of unexpected toll transaction activity, TBTA estimates that such MTA and State funds allocated to the MTA for the 2015-2016 VNB Rebate Programs, net of offsets, will be insufficient to fund the 2015-2016 VNB Commercial Rebate Program for the full Program year, TBTA may reduce the rebate amount under such Program to a percentage that is forecast to be payable in full for the remainder of the Program year with the available funds. However, in the

event that such MTA and State funds allocated to the MTA for the 2015-2016 VNB Rebate Programs are fully depleted at any time during the 2015-2016 VNB Rebate Programs annual period, the 2015-2016 VNB Rebate Programs will cease and Staten Island residents will be charged the applicable resident discount toll and trucks and other commercial vehicles will be charged the applicable NYCSC E-ZPass toll for the Verrazano-Narrows Bridge.

The VNB Rebate Programs will continue into future years provided that (a) MTA's annual period contribution does not exceed $7 million, (b) the MTA Board approves a budget that includes MTA's contribution to such program, and (c) the State provides to MTA funds sufficient for at least half the expenses of each continuing annual period.

The 2014-2015 SIR Rebate Program began on April 25, 2014 and was retroactive to April 1, 2014. Only Staten Island Residents participating in the SIR E-ZPass toll discount plan through the NYCSC are eligible for the SIR rebate. Under the 2014-2015 SIR Rebate Program, the MTA rebated $0.50 of the $6.00 SIR E-ZPass toll paid by Staten Island residents with three or more trips per month across the Verrazano-Narrows Bridge, and $0.86 of the $6.36 SIR E-ZPass toll paid by Staten Island residents with one or two trips per month across the Verrazano-Narrows Bridge where tolls are collected only in the Staten Island-bound direction in accordance with federal law. As a result of these MTA toll rebates, Staten Island residents paid an effective toll of $5.50 per trip across the Verrazano-Narrows Bridge through March 21, 2015; from the March 22, 2015 toll increase through March 31, 2015, they paid an effective toll of $5.74 per trip.

Under the 2015-2016 SIR Rebate Program, the MTA is rebating $0.74 of the $6.24 SIR E-ZPass toll paid by Staten Island residents with three or more trips per month across the Verrazano-Narrows Bridge, and $1.10 of the $6.60 SIR E-ZPass toll paid by Staten Island residents with one or two trips across the bridge. As a result of these MTA toll rebates, Staten Island residents pay an effective toll of $5.50 per trip. The 2015-2016 SIR Rebate Program is retroactive to April 1, 2015 and will continue through March 31, 2016.

The 2014-2015 VNB Commercial Rebate Program began on June 13, 2014 and was also retroactive to April 1, 2014. Trucks and eligible commercial vehicles paying with cash or non-NYCSC E-ZPass tags are not eligible for the rebate. Under the 2014-2015 VNB Commercial Rebate Program, the MTA rebated 20 percent of the E-ZPass toll for trucks and other eligible commercial vehicles that make more than ten trips per month across the Verrazano-Narrows Bridge using the same NYCSC E-ZPass account each month through February 2015. However, the funds allocated by the State for the VNB Commercial Rebate Program were not sufficient to provide a 20 percent rebate for the entire New York State Fiscal Year. As a result, VNB Commercial Rebate customers received a 14.75 percent rebate for the month of March 2015.

Under the 2015-2016 VNB Commercial Rebate Program, the initial rebate is 18 percent of the E-ZPass toll for trucks and other commercial vehicles with more than ten (10) trips per month across the Verrazano-Narrows Bridge, using the same New York Customer Service Center (NYCSC) E-ZPass Account. Implementing an 18 percent rebate of the E-ZPass toll for trucks and other eligible commercial vehicles, rather than the 20 percent rebate as specified in the

2014-2015 VNB Commercial Rebate Program, is expected to ensure that the $7 million allocated for the 2015-2016 VNB Commercial Rebate Program is sufficient to provide funding from April 1, 2015 through March 31, 2016. The 2015-2016 SIR Rebate Program is retroactive to April 1, 2015 and will continue through March 31, 2016.

E-ZPass Electronic Toll Collection System

The E-ZPass Electronic Toll Collection (ETC) system has been fully installed at all TBTA bridges and tunnels since December 1996. Unlike cash transactions, vehicles equipped with E-ZPass tags can use the E-ZPass-only lanes. With the exception of the Henry Hudson Bridge, where gates were removed from the E-ZPass-only lanes on January 20, 2011, all E-ZPass-only lanes are gated. When a vehicle with an E-ZPass transponder enters an E-ZPass-only lane, an electronic reader identifies the tag code at the toll plaza and the toll is deducted from the customer's account. TBTA has over 4.4 million E-ZPass tags in use. For calendar year 2014, E-ZPass participation rates averaged 84.2 percent of toll-paying traffic TBTA-wide. The total number of active E-ZPass Group tags in use for all participating agencies as of December 31, 2014 was over 26 million.

With the introduction of E-ZPass at all TBTA crossings, toll plaza operations have improved and vehicle-hours of delay have been reduced. This, in turn, has led to even more motorists enrolling in E-ZPass. Electronic payment of tolls has accelerated vehicle processing through the E-ZPass lanes, thereby reducing the overall vehicle queues at the plazas. TBTA estimates that manual toll lanes are able to process approximately 250 vehicles per hour and dedicated (gated) E-ZPass lanes are able to process approximately 800 vehicles per hour. Prior to implementation of E-ZPass, vehicle processing through the TBTA toll plazas during peak periods was a primary cause of congestion at the crossings. Reports from the TBTA indicate that travel time through the gateless lanes at the Henry Hudson Bridge has decreased due to the elimination of E-ZPass interventions and the collection of cash, which provides free-flowing traffic conditions in both directions.

TBTA began the initial phase of a pilot program in January 2011 at the Henry Hudson Bridge to test All Electronic Toll Collection (AET) operations. The removal of E-ZPass toll lane gates boosted peak hour throughput from around 800 vehicles per hour to approximately 1,000 vehicles per hour, or 25 percent. In November 2012, TBTA implemented cashless tolling at the Henry Hudson Bridge. All motorists are now able to use any lane to drive through the toll plaza without stopping. Under the cashless tolling system, automatic billing remains the same for drivers with E-ZPass. For drivers without an E-ZPass tag, the image of their license plate is matched with Department of Motor Vehicle (DMV) information and a bill for the toll is mailed to the vehicle's registered owner. In 2014, 93.8 percent of crossings at the Henry Hudson Bridge were processed through E-ZPass and 6.2 percent were Tolls by Mail transactions.

TBTA requested and received Board approval in May 2014 to continue the all-electronic collection of tolls at the Henry Hudson Bridge following the completion of the pilot at the end of 2014. Initially, tolls will be collected through the AET system being used for the AET pilot, with

vehicles traveling in gateless, channelized lanes and tolling equipment mounted on the existing infrastructure.

In the fall of 2016 or early 2017, a gantry-based Open Road Tolling (ORT) system will be put into revenue service at the Henry Hudson Bridge and the existing toll plazas including the booths will be demolished. It is expected that the new ORT system will continue to utilize the current methods employed at the Henry Hudson Bridge to capture E-ZPass transponder-reads and license plate images, but will do so in an environment absent a traditional toll plaza, enabling customers to traverse the bridge's two tolling areas in free-flow fashion. This project is being executed in concert with a planned structural reconstruction of the Henry Hudson Bridge's upper and lower level plaza roadways and lower level south approach roadway reconstruction.

Table 2 lists the E-ZPass annual TBTA-wide participation rates starting in 2005, the ninth year since all nine crossings had E-ZPass in operation. Implementation of E-ZPass started in October 1995 on the Verrazano-Narrows Bridge and was phased in gradually on the remaining crossings through December 1996. Also shown are the participation rates for each of the facilities for 2014. Based on customer acceptance of the technology, TBTA expects that the E-ZPass share of total transactions will continue to increase moderately over time.

Table 2 E-ZPass Participation Rates

Year	Annual Participation Rates for all Facilities									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Percent Participation	71.5%	72.6%	73.5%	74.0%	73.9%	75.8%	80.3%	81.0%	83.3%	84.2%
Facility	2014 Participation Rate by Facility									
	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bronx Bridge	RFK Manhattan Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazano-Narrows Bridge	Henry Hudson Bridge	Marine Parkway Bridge	Cross Bay Bridge
Percent Participation	83.1%	78.7%	75.7%	84.4%	88.3%	89.0%	85.1%	93.8%	87.2%	84.0%

Source: TBTA data.

TBTA continues to undertake efforts to increase E-ZPass market share. The most recent toll increase continued to widen the gap between E-ZPass and cash tolls, which has contributed toward a bigger shift toward E-ZPass. In addition, TBTA began selling E-ZPass "On-the-Go" pre-paid tags in the cash toll lanes at each facility in 2012. The program has been very successful with more than 500,000 tags sold in the lanes since the program began, including 171,000 in 2014.

In another initiative, TBTA launched its MTA Cash Reload Card pilot program in February 2012. This program allows customers who wish to replenish their accounts with cash to receive a MTA credit/debit type card that is directly linked to their E-ZPass accounts. Customers can go to any one of thousands of Visa ReadyLink retail merchants throughout the New York region and use the card to reload their E-ZPass accounts with cash through a self-service kiosk or through a sales clerk. This eliminates the need for customers who previously had to travel to one of three walk-in centers in Yonkers, Queens, or Staten Island to add cash to their E-ZPass accounts. The card is

designed for people who want greater cash control and either do not have or do not want to use a credit card for E-ZPass. Receipts are provided to the customers at the completion of the reload transaction. Through December 2014, more than 112,000 cards have been issued to customers and nearly 16 percent of total cash replenishments are being made using the reload cards.

In November 2012, TBTA introduced E-ZPass "Pay Per Trip", which enables customers to set up an E-ZPass account without a pre-paid balance. Those interested in this program pay for their tolls each day through an automated checking account debit. Through December 2014, over 40,000 account holders have signed up for this initiative.

TBTA's Role in E-ZPass

TBTA was a founding member of the E-ZPass Interagency Group (E-ZPass Group), originally comprising toll authorities in Delaware, Pennsylvania, New Jersey and New York and now encompassing 26 toll agencies in 15 states, including four international border crossings. Since the inception of the E-ZPass Group more than 20 years ago, customers of the member E-ZPass Group agencies have been able to use their tags on any E-ZPass-equipped facility operated by another E-ZPass Group member. The E-ZPass Group processes over 2.7 billion toll transactions annually. As the E-ZPass Group has grown, the E-ZPass customer base has increased, which has helped increase usage of E-ZPass on TBTA facilities.

E-ZPass is fully integrated at facilities located in 15 states. The transportation network includes, in addition to TBTA, the following agencies and bridges:

- The six interstate crossings of the Port Authority of New York and New Jersey;
- New Jersey Turnpike and Garden State Parkway operated by the New Jersey Turnpike Authority;
- New York State Thruway including its Tappan Zee Bridge;
- The five bridges of the New York State Bridge Authority (from Bear Mountain northward);
- The Buffalo and Fort Erie Public Bridge Authority's Peace Bridge;
- The three bridges of the Niagara Falls Bridge Commission;
- The Atlantic City Expressway (operated by the South Jersey Transportation Authority);
- The four toll bridges between New Jersey and Pennsylvania operated by the Delaware River Port Authority;
- The seven toll bridges between New Jersey and Pennsylvania operated by the Delaware River Joint Toll Bridge Commission;
- The Delaware Memorial Bridge between New Jersey and Delaware operated by the Delaware River and Bay Authority; and
- The two toll bridges between New Jersey and Pennsylvania operated by the Burlington County Bridge Commission.

Also included are the toll facilities operated by the following agencies and companies across the United States:

- Delaware Department of Transportation
- Illinois State Toll Highway Authority
- Indiana Toll Road Concession Company, LLC
- Massachusetts Department of Transportation
- Maryland Transportation Authority
- Maine Turnpike Authority
- New Hampshire Department of Transportation
- Ohio Turnpike and Infrastructure Commission
- The Pennsylvania Turnpike Commission
- Rhode Island Turnpike and Bridge Authority
- Skyway Concession Company (Chicago)
- Virginia Department of Transportation
- West Virginia Parkway Authority
- North Carolina Turnpike Authority

With the exception of TBTA customers enrolled in the E-ZPass Pay Per Trip plan, all TBTA customers must pre-pay their E-ZPass accounts. These pre-payments are based on a customer's E-ZPass usage at both TBTA and other E-ZPass Group member facilities. Through the E-ZPass Group system, TBTA and other member agencies transfer payments associated with inter-operability to each other on a routine basis. For 2014, TBTA transferred $796.0 million to, and received $417.1 million from, other members within the E-ZPass Group.

Passenger Car Toll Rate Trends and Inflation

Since 1971, toll rates have been increased periodically on the TBTA facilities. Table 3 displays passenger car toll rates for the nine TBTA bridges and tunnels over the past 44 years. Tolls are shown for cash passenger car transactions since 1971 and for all E-ZPass transactions from 1996, when E-ZPass was introduced on the TBTA system until July 12, 2009. Effective July 12, 2009, only NYCSC E-ZPass customers are eligible for the lower E-ZPass rate and non-NYCSC E-ZPass customers paid the cash toll. Beginning in 2009, Table 3 shows the cash rate and the NYCSC E-ZPass rate.

Passenger Car Toll Rate Trends

Since 1982, passenger car toll rates have been separated into four categories, as follows:

- Major crossings - RFK, Bronx-Whitestone and Throgs Neck Bridges, and the Queens Midtown and Hugh L. Carey Tunnels;
- Minor crossings - Marine Parkway and Cross Bay Bridges;
- Henry Hudson Bridge (treated as a minor facility prior to the 2008 toll increase) – a crossing restricted to passenger vehicles; and
- Verrazano-Narrows Bridge – a major crossing with one-way toll collection since 1986 in accordance with federal law.

Table 3 Historical Trends in Cash and E-ZPass Passenger Car Toll Rates

Year	Verrazano-Narrows Bridge	RFK, Bronx-Whitestone and Throgs Neck Bridges, and Queens Midtown and Hugh L. Carey Tunnels[a]	Henry Hudson Bridge	Marine Parkway-Gil Hodges Memorial and Cross Bay Veterans Memorial Bridges
1971	$0.50	$0.25	$0.10	$0.10
1972 – 1975	$0.75	$0.50	$0.25	$0.25
1975 – 1980	$1.00	$0.75	$0.50	$0.50
1980 – 1982	$1.00	$1.00	$0.60	$0.75
1982 – 1984	$1.25	$1.25	$0.90	$0.90
1984 – 1986	$1.50	$1.50	$0.90	$0.90
1986 – 1987	$1.75[b]	$1.75	$1.00	$1.00
1987 – 1989	$2.00[b]	$2.00	$1.00	$1.00
1989 – 1993	$2.50[b]	$2.50	$1.25	$1.25
1993 – 1996	$3.00[b]	$3.00	$1.50	$1.50
1996 – 2003[c]	$3.50 / $3.00[b]	$3.50 / $3.00	$1.75 / $1.25	$1.75 / $1.25
2003 – 2005	$4.00 / $3.50[b]	$4.00 / $3.50	$2.00 / $1.50	$2.00 / $1.50
2005 – 2008	$4.50 / $4.00[b]	$4.50 / $4.00	$2.25 / $1.75	$2.25 / $1.50
2008	$5.00 / $4.15[b]	$5.00 / $4.15	$2.75 / $1.90	$2.5 / $1.55
2009[d]	$5.50 / $4.57[b]	$5.50 / $4.57	$3.00 / $2.09	$2.75 / $1.71
2010 – 2013	$6.50 / $4.80[b]	$6.50 / $4.80	$4.00 / $2.20[e]	$3.25 / $1.80
2013 – 2014	$7.50 / $5.33[b]	$7.50 / $5.33	$5.00 / $2.44	$3.75 / $2.00
2015	$8.00 / $5.54[b]	$8.00 / $5.54	$5.50 / $2.54	$4.00 / $2.08

Notes:
(a) At the Hugh L. Carey Tunnel, the cash passenger car toll rates were $0.35 in 1971 and $0.70 in 1972.
(b) Since March 20, 1986, round-trip tolls (twice the amount shown) have been collected on the Verrazano-Narrows Bridge in the westbound direction only in compliance with a federal legislative mandate. Eastbound traffic uses the bridge toll-free. These amounts are the equivalents of collecting tolls in each direction.
(c) E-ZPass introduced to all TBTA facilities in December 1996.
(d) Effective July 12, 2009, when the lower E-ZPass rate was available only to NYCSC E-ZPass customers.
(e) Since November 10, 2012, customers without E-ZPass transponders at the Henry Hudson Bridge pay via the Tolls by Mail program, under which a license plate image is matched with information from the applicable Department of Motor Vehicles and a toll bill is sent to the registered vehicle owner.

In general, tolls for vehicles over 7,000 pounds have also been adjusted upward whenever passenger car toll rates were increased. Notable exceptions occurred in 1987 and 1989 when these toll rates were not raised while there was a general increase for passenger cars. Historically, these vehicles received toll reductions on any TBTA facility when they used pre-paid NYCSC E-ZPass accounts. As of February 5, 2013, pre-paid accounts are no longer required to obtain a reduced toll rate.

Over the years, TBTA has implemented various resident toll discount programs at the Cross Bay, Marine Parkway, and Verrazano-Narrows Bridges. The MTA also has toll rebate programs for certain eligible residents using NYCSC E-ZPass at the Cross Bay and Verrazano-Narrows Bridges, as well as a toll rebate program for eligible NYCSC E-ZPass commercial customers at the Verrazano-Narrows Bridge. While the rebate programs do not have an effect on revenues, as noted above, the toll discount programs have a negative effect on revenues but a positive effect on traffic by attracting additional traffic to the facilities.

Inflation

The Consumer Price Index Urban (CPI-U), compiled by the US Department of Labor, Bureau of Labor Statistics for United States Cities, is often used to compare toll rate increases. Since over 80 percent of transactions on TBTA facilities are by E-ZPass, we have compared cumulative CPI-U alongside the TBTA major crossing passenger car E-ZPass toll rates. The comparison starts in 1996 when E-ZPass was instituted on TBTA facilities. As indicated in Table 4, TBTA E-ZPass tolls in 2015 are 1.8 times higher than the 1996 E-ZPass toll rate while the CPI-U was 1.6 times higher than the 1996 level. If adjusted for changes in the CPI-U, current tolls are 1.2 times higher than the 1996 rate.

Table 4 E-ZPass Passenger Toll Rates versus Consumer Price Index

Year	Consumer Price Index [a]	RFK, Bronx-Whitestone and Throgs Neck Bridges and Queens Midtown and Hugh L. Carey Tunnels	Tolls Adjusted to 1982 - 1984 dollars[b]
1996[c]	166.9	$3.00	$1.80
2003	197.8	3.50	1.77
2005	212.7	4.00	1.88
2008	235.8	4.15	1.76
2009[d]	236.8	4.57	1.93
2010[e]	240.9	4.80	1.99
2013[f]	254.8	5.33	2.09
2015[g]	259.2	5.54	2.14
Ratio 2015/1996	1.6	1.8	1.2

Notes:
(a) New York Metropolitan Statistical Area: New York–Northern New Jersey-Long Island, NY-NJ-CT-PA, All Urban Consumers, All Items. Base period: 1982-1984 = 100.0. Not seasonally adjusted. Source: US Department of Labor, Bureau of Labor Statistics.
(b) The current toll divided by the CPI and expressed in dollars.
(c) E-ZPass introduced to all TBTA facilities in December 1996.
(d) Effective July 12, 2009, when the lower E-ZPass rate was available only to NYCSC E-ZPass customers.
(e) Effective December 30, 2010.
(f) Effective March 3, 2013.
(g) Effective March 22, 2015.

HISTORICAL TRAFFIC, REVENUES AND EXPENSES AND ESTIMATED/BUDGETED NUMBERS FOR 2014

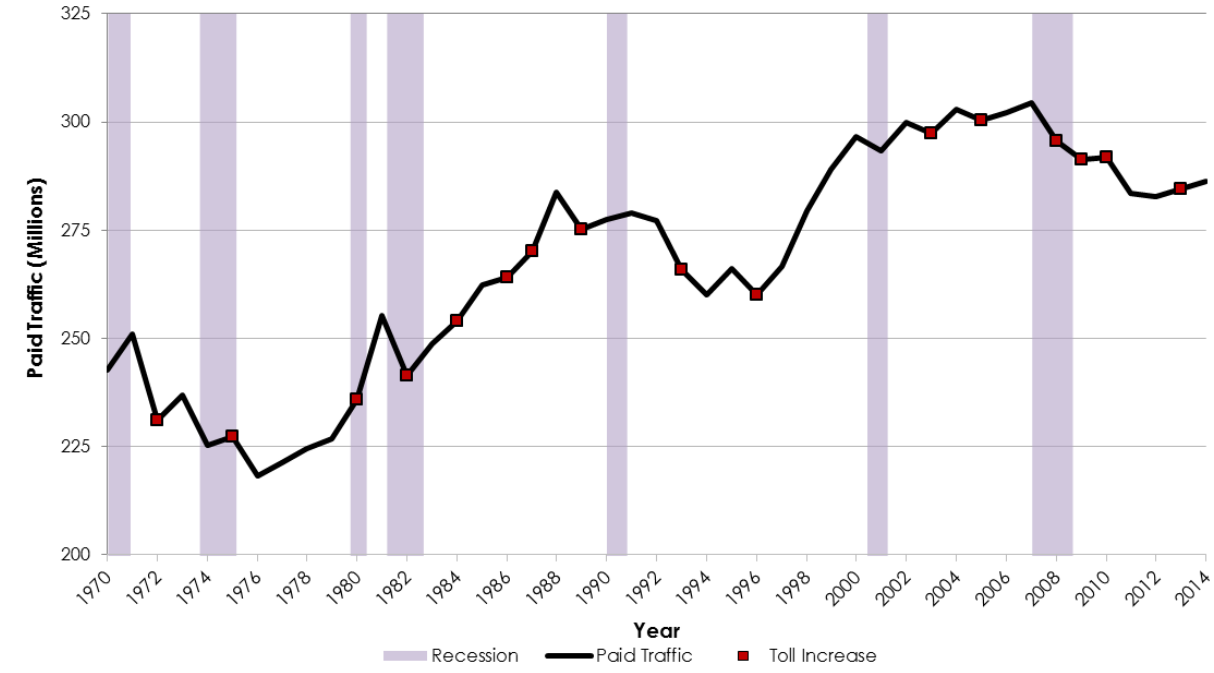
Historical traffic, toll revenues and expenses were reviewed for the nine TBTA bridges and tunnels. Over the last 45 years, paid traffic volumes on the crossings have ranged from a low of 218 million in 1976 to a high of 304 million in 2007. As displayed in Figure 2A/2B, the growth of traffic and revenue has been affected by the region's overall growth in population and employment, offset by the impact of 16 periodic toll increases (through the end of 2014 and represented by the boxes in the graph). By 2000, after 10 toll increases and 18 percent higher traffic volume, toll revenues had increased more than 13-fold, from $72 million to $941 million in 2000. Revenues declined to $915 million in 2001 primarily due to the closures and restrictions on TBTA facilities following the September 11 terrorist attack on the World Trade Center and the regional decline in employment.

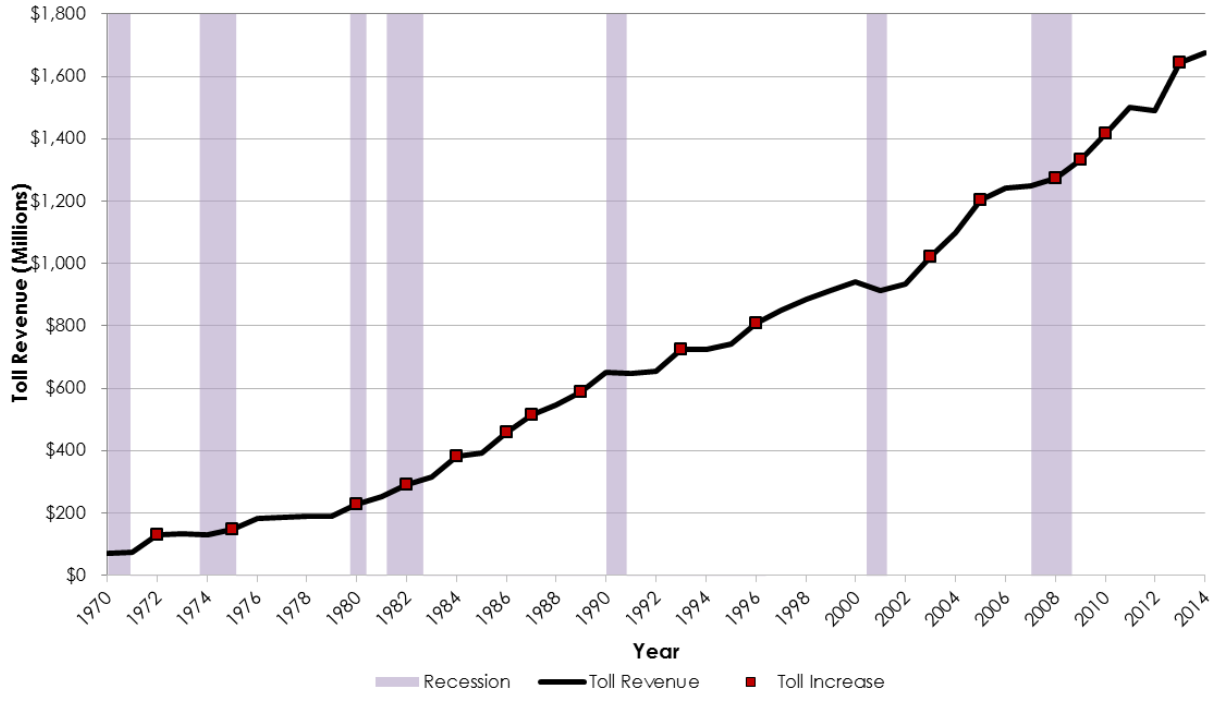
In 2007, with tolls having been increased again in 2003 and 2005, and traffic reaching a historical high of 304 million vehicles, revenue reached $1,251 million, $9 million greater than revenues in 2006. Toll increases in March 2008, July 2009 and December 2010 resulted in annual revenue increases through 2011. In 2012, toll revenues were $1,491 million, $11 million less than the 2011 level of $1,502 million, reflecting the negative impacts including temporary closures caused by Superstorm Sandy, partially offset by modest improvements in the regional and national economies. Toll revenues in 2013 increased to $1,645 million primarily due to the rebound from Superstorm Sandy and the March 2013 toll increase. In 2014, total toll revenues for the TBTA facilities were $1,676 million, 1.9 percent higher than 2013 toll revenues. The increase in toll revenue is attributed to a continuing moderate economic recovery and the March 2013 toll increase.

Also note in Figure 2A/2B that, despite the periodic toll increases, the traffic trend is generally upward. Recessionary conditions in 2008 and 2009 led to a decrease in overall travel as unemployment rose and overall economic growth declined. Though the recession technically ended in 2009, the economy was slow to recover with several years of little to no growth. Tepid economic conditions, combined with toll increases in 2008, 2009, 2010 and 2011, led to continued modest declines in total transactions. Since 2012, as the economy has begun to show positive signs of growth, with increasing employment levels and recent decreases in gasoline prices, transaction growth has returned.

Other noticeable declines in traffic have occurred during the fuel crises of the 1970s and during the economic recessions in the late 1980s, early 1990s, and 2008-2009, all periods of difficult and prolonged economic downturns.

Figure 2A/2B Aggregated TBTA Facilities Paid Traffic and Toll Revenue, 1970 to 2014





Source: TBTA data.

Traffic and Toll Revenue, 2004 to 2014

Table 5 lists the traffic and toll revenue record for each of the nine crossings for the 2004-2014 period. Total TBTA traffic and toll revenue are shown in Table 6. Toll-paying traffic peaked in 2007 at 304 million crossings. In general, the pattern historically has been that when toll rates are increased, traffic declines moderately and then traffic begins to rise until the next rate increase. However, the toll rate increase in 2008 was also accompanied by rising fuel prices through mid-2008 and the deteriorating economy, resulting in a 2.9 percent drop in traffic. In contrast, with gasoline prices dropping in the latter portion of 2008, traffic decreased only 1.5 percent between 2008 and 2009, even with a toll increase occurring in July 2009. The December 2010 toll increase was also in the midst of a slowly recovering economy and accelerating gasoline prices, resulting in a 2.8 percent decrease in traffic in 2011. The five toll increases reflected in Table 5 and Table 6 in 2005, 2008, 2009, 2010 and 2013 are evident in the jump in average tolls in the years following the increase. The historical relationship between toll increases and its effects on TBTA traffic volumes are further discussed in the Toll Impacts and Elasticity section of this report.

After the March 2005 toll increase, 2005 traffic volumes decreased 0.9 percent and revenue rose to $1,205 million for the year, and both traffic and revenue increased in each of the next two years. In 2008, traffic volumes decreased 2.9 percent from 304 million in 2007 to 296 million as a result of the March 16, 2008 toll increase and also in part due to the nationwide recession and the increase in gas prices, while toll revenues increased 1.9 percent to $1,274 million, as a result of the toll increase.

The July 12, 2009 toll increase resulted in an overall increase in toll revenue from $1,274 million in 2008 to $1,332 million, an increase of 4.6 percent, while traffic decreased by 1.5 percent from 295.7 million to 291.4 million vehicles. Traffic grew by 0.1 percent in 2010 to 291.7 million vehicles and toll revenue grew 6.4 percent to $1,417 million, primarily due to a full year's impact of the July 2009 toll increase. The December 30, 2010 toll increase resulted in an overall increase in toll revenue from $1,417 million in 2010 to $1,502 in 2011, an increase of 6.0 percent, while traffic decreased by 2.8 percent from 291.7 million to 283.5 million. The reduction in toll traffic was a result of severe winter weather, high gas prices, Tropical Storm Irene in August 2011 (tolls were not collected for approximately two days at the Marine Parkway, Cross Bay, Verrazano-Narrows, Throgs Neck, and Bronx-Whitestone Bridges), decreased overall travel and the December 2010 increase in toll rates, among other factors.

Table 5 Annual Toll-Paying Traffic and Toll Revenue, 2004 to 2014

(000s)[a]

Year	Verrazano-Narrows Bridge				RFK Bridge				Bronx-Whitestone Bridge			
	Traffic		Revenue	Average Toll[c]	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll
	Volume[b]	Change			Volume	Change			Volume	Change		
2004	71,404	0.4%	$246,322	$3.45	61,638	5.7%	$247,937	$4.02	45,223	1.8%	$187,231	$4.14
2005	69,980	-2.0	267,276	3.82	62,841	2.0	280,516	4.46	41,198	-8.9	188,808	4.58
2006	70,381	0.6	274,100	3.89	63,063	0.4	288,300	4.57	39,488	-4.2	186,384	4.72
2007	70,382	0.0	272,837	3.88	62,511	-0.9	285,847	4.57	42,397	7.4	200,076	4.72
2008	68,884	-2.1	278,906	4.05	59,741	-4.4	287,877	4.82	42,803	1.0	212,125	4.96
2009	68,600	-0.4	295,901	4.31	59,449	-0.5	304,794	5.13	42,675	-0.3	225,224	5.28
2010	68,097	-0.7	312,873	4.59	60,107	1.1	326,103	5.43	41,050	-3.8	229,428	5.59
2011	66,020	-3.1	330,886	5.01	57,510	-4.3	339,791	5.91	37,643	-8.3	230,669	6.13
2012	65,626	-0.6	326,797	4.98	57,239	-0.5	336,781	5.88	39,478	4.9	240,236	6.09
2013	65,035	-0.9	352,370	5.42	58,224	1.7	376,769	6.47	39,558	0.2	264,174	6.68
2014	64,007	-1.6	345,466	5.40	59,902	2.9	393,622	6.57	38,488	-2.7	260,756	6.77

Year	Throgs Neck Bridge				Hugh L. Carey Tunnel				Queens Midtown Tunnel			
	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll
	Volume	Change			Volume	Change			Volume	Change		
2004	39,439	0.9%	$184,338	$4.67	17,700	-0.6%	$64,366	$3.64	28,181	2.4%	$107,067	$3.80
2005	41,199	4.5	210,242	5.10	17,426	-1.5	70,294	4.03	28,751	2.0	121,666	4.23
2006	43,186	4.8	223,756	5.18	17,718	1.7	73,868	4.17	28,966	0.7	127,075	4.39
2007	41,931	-2.9	217,958	5.20	18,139	2.4	75,980	4.19	29,375	1.4	129,348	4.40
2008	40,492	-3.4	219,855	5.43	16,899	-6.8	73,590	4.35	28,620	-2.6	131,264	4.59
2009	39,050	-3.6	222,825	5.71	15,899	-5.9	73,248	4.61	27,702	-3.2	134,927	4.87
2010	39,381	0.8	240,343	6.10	16,096	1.2	79,225	4.92	28,459	2.7	146,934	5.16
2011	40,391	2.6	266,307	6.59	16,570	2.9	87,879	5.30	28,481	0.1	158,668	5.57
2012	39,376	-2.5	260,468	6.61	15,902	-4.0	83,814	5.27	27,759	-2.5	153,825	5.54
2013	39,958	1.5	291,433	7.29	16,547	4.1	95,549	5.77	27,850	0.3	168,982	6.07
2014	40,840	2.2	302,110	7.40	16,940	2.4	99,135	5.85	28,998	4.1	178,631	6.16

Year	Henry Hudson Bridge				Marine Parkway-Gil Hodges Memorial Bridge				Cross Bay Veterans Memorial Bridge			
	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll
	Volume	Change			Volume	Change			Volume	Change		
2004	24,703	0.5%	$40,149	$1.63	7,719	0.2%	$10,102	$1.31	6,989	1.0%	$9,477	$1.36
2005	24,136	-2.3	43,920	1.82	7,673	-0.6	11,234	1.46	7,182	2.8	10,988	1.53
2006	24,159	0.1	44,901	1.86	7,737	0.8	11,536	1.49	7,361	2.5	11,630	1.58
2007	24,117	-0.2	44,779	1.86	7,833	1.2	11,635	1.49	7,679	4.3	12,090	1.57
2008	22,823	-5.4	46,126	2.02	7,829	-0.1	12,019	1.54	7,589	-1.2	12,212	1.61
2009	22,584	-1.0	49,581	2.20	7,876	0.6	12,921	1.64	7,548	-0.5	12,694	1.68
2010	23,058	2.1	54,452	2.36	7,838	-0.5	13,774	1.76	7,627	1.0	13,914	1.82
2011	22,185	-3.8	59,246	2.67	7,523	-4.0	14,003	1.86	7,148	-6.3	14,139	1.98
2012	21,939	-1.1	57,828	2.64	7,829	4.1	15,698	2.00	7,498	4.9	15,535	2.07
2013	21,830	-0.5	62,444	2.86	7,814	-0.2	16,633	2.13	7,712	2.9	16,840	2.18
2014	22,235	1.9	64,879	2.92	7,399	-5.3	15,578	2.11	7,553	-2.1	16,269	2.15

Source: TBTA data.

Notes:

(a) Toll rate increases occurred on March 13, 2005, March 16, 2008, July 12, 2009, December 30, 2010 and March 3, 2013.

(b) Westbound toll traffic volume doubled, since traffic is not registered in the eastbound direction.

(c) Average toll on basis of revenues divided by doubled westbound volume.

Table 6 Summary of Annual Paid Traffic and Toll Revenue, 2004 to 2014

Year	Total Paying Traffic Volume (000s)	Total Toll Revenue (000s)	Average Toll
2004	302,995	$1,096,989	$3.62
2005[a]	300,385	1,204,944	4.01
2006	302,059	1,241,551	4.11
2007	304,364	1,250,549	4.11
2008[a]	295,680	1,273,974	4.31
2009[a]	291,383	1,332,115	4.57
2010[a]	291,714	1,417,046	4.86
2011	283,471	1,501,589	5.30
2012	282,647	1,490,982	5.28
2013[a]	284,528	1,645,193	5.78
2014	286,361	1,676,445	5.85

Source: TBTA data.
Notes:
(a) Toll rate increases occurred on March 13, 2005, March 16, 2008, July 12, 2009, December 30, 2010 and March 3, 2013.

In 2012, traffic volumes decreased by 0.3 percent to 282.6 million and toll revenues decreased 0.7 percent to $1,491 million. The reduction in toll traffic and toll revenue is primarily due to Superstorm Sandy, which occurred on October 29, 2012 and resulted in travel restrictions on transportation facilities in the New York City area. All of TBTA's facilities were closed at some point during the storm on October 29th. While TBTA bridges were reopened the following day (except for the Cross Bay Bridge, which opened two days later), both the Queens Midtown Tunnel and the Hugh L. Carey Tunnel sustained a substantial amount of damage. The Queens Midtown Tunnel was closed to all traffic until November 6th, when it was reopened to peak period, peak directional buses only. On November 9th, passenger cars and buses were permitted at all times. Truck restrictions were lifted on November 16th, restoring Queens Midtown Tunnel traffic to pre-Superstorm Sandy operations. The Hugh L. Carey Tunnel was closed to all traffic until November 12th when it was reopened to peak period, peak directional buses only. The following day, November 13th, the Hugh L. Carey Tunnel was reopened to passenger car and bus traffic during peak periods. Unrestricted access for passenger car and bus traffic was restored on November 19th. Truck restrictions were lifted on December 10th, restoring the Hugh L. Carey Tunnel to pre-Superstorm Sandy operations. In addition, by order of the Governor, tolls were suspended at the Marine Parkway Bridge and the Cross Bay Bridge for the month of November (retroactive to when the bridges reopened after Superstorm Sandy). The total revenue loss of the suspension was $2.5 million and was reimbursed to MTA by New York State. MTA reimbursed TBTA by the equivalent amount.

Traffic on the Bronx-Whitestone and Throgs Neck Bridges has been of similar magnitude over the years. These two bridges generally serve similar areas in the Bronx and Queens, and historically traffic has shifted back and forth to the crossing providing the better level of service, at times based on lane restrictions due to construction activity. Lane closures associated with deck replacement on the Bronx approach spans of the Bronx-Whitestone Bridge, which occurred for the most of 2010 and 2011 resulted in a reduction of travel lanes on the bridge. As a result, some motorists diverted onto the Throgs Neck Bridge in order to avoid congestion.

Of the nine TBTA toll facilities, the RFK Bridge reported the highest toll revenue for 2014 at $393.6 million, while the Marine Parkway-Gil Hodges Memorial Bridge registered the lowest revenue at $15.6 million. Total annual TBTA toll traffic volume and revenue are shown in Table 6 for the period 2004 through 2014.

In 2014, total toll traffic on all TBTA facilities increased 0.6 percent to 286.4 million and toll revenues increased 1.9 percent to $1,676.4 million. The increase in revenue is attributed to a continuing moderate economic recovery and impact of the toll increase implemented in March 2013.

Preliminary results for January through March 2015 indicate that traffic on the TBTA facilities increased by 3.1 percent. This increase is primarily attributed to more severe weather conditions (snow storms and extreme cold weather) in both January and February 2014. Changes by facility are shown below in Table 7.

Table 7 Actual Changes in January – March Traffic, 2014 to 2015

Facility	Actual Percent Change January-March 2014 to 2015[(a)]
Throgs Neck Bridge	3.6%
Bronx-Whitestone Bridge	2.9%
RFK Bridge	3.7%
Queens Midtown Tunnel	2.6%
Hugh L. Carey Tunnel	6.8%
Verrazano-Narrows Bridge	2.6%
Henry Hudson Bridge	0.9%
Marine Parkway-Gil Hodges Memorial Bridge	1.0%
Cross Bay Veterans Memorial Bridge	2.9%
Total	3.1%

Notes:
(a) Based on preliminary actual data, subject to final audit.

Traffic by Facility and Vehicle Class, 2014

TBTA maintains traffic counts for each crossing in 13 toll-paying categories, ranging from passenger cars to trucks with seven axles. Displayed in Table 8 are the 2014 traffic volumes by facility. Passenger cars totaled 265.0 million crossings and represented 93 percent of the total toll-paying vehicles (which has remained relatively constant over time). Of the TBTA facilities, the Verrazano-Narrows Bridge registered the highest traffic v1olume of 64.0 million toll-paying vehicles. The lowest toll-paying volume, 7.4 million vehicles, was recorded at the Marine Parkway Bridge.

Table 8 Traffic by Facility and Vehicle Class, 2014

(000s)[a,b]

Facility	1 Passenger Cars	2 Pass. Cars w/one-axle Trailer	3 Pass. Cars w/two-axle Trailer	4 Trucks 2 Axles	Franchise Buses		6 Trucks 3 Axles	7 Trucks 4 Axles
					5 2 Axles	11 3 Axles		
Throgs Neck Bridge	36,636	58	53	1,639	1	1	324	303
Bronx-Whitestone Bridge	35,625	16	10	1,376	51	102	287	194
RFK Bridge	54,893	27	15	3,225	30	318	590	111
Queens Midtown Tunnel	26,621	8	5	1,691	51	253	260	44
Hugh L. Carey Tunnel	15,546	4	2	620	2	555	123	17
Verrazano-Narrows Bridge[c]	59,681	32	28	1,947	178	375	377	231
Henry Hudson Bridge[d]	21,989	2	1	200	0	0	2	0
Marine Parkway Bridge	7,084	2	1	205	56	1	20	4
Cross Bay Bridge	6,969	4	2	316	147	35	37	7
Total	265,044	152	117	11,219	516	1,641	2,020	911
Percent of Paid Vehicles	92.6%	0.1%	0.0%	3.9%	0.2%	0.6%	0.7%	0.3%

Facility	8 Trucks 5 Axles	9 Motor-cycles	12 Trucks 6 Axles	13 Trucks 7 Axles	14 Other Vehicles	Total Toll-Paying Vehicles	10 Non-Revenue Vehicles[e]	Total Vehicles
Throgs Neck Bridge	1,652	69	90	9	3	40,840	194	41,034
Bronx-Whitestone Bridge	747	65	13	1	1	38,488	190	38,678
RFK Bridge	565	111	15	1	2	59,902	1,036	60,938
Queens Midtown Tunnel	14	49	1	0	1	28,998	386	29,384
Hugh L. Carey Tunnel	2	67	1	0	0	16,940	477	17,417
Verrazano-Narrows Bridge[c]	984	128	39	3	3	64,007	615	64,622
Henry Hudson Bridge[d]	0	41	0	0	0	22,235	55	22,290
Marine Parkway Bridge	12	13	1	0	0	7,399	82	7,481
Cross Bay Bridge	14	20	2	0	0	7,553	137	7,690
Total	3,992	564	161	13	10	286,361	3,173	289,534
Percent of Paid Vehicles	1.4%	0.2%	0.1%	0.0%	0.0%	100.0%		

Source: TBTA
Notes:
(a) Totals may not add due to rounding.
(b) Based on preliminary actual data, subject to final audit.
(c) Westbound traffic doubled, since traffic is not registered in the eastbound direction.
(d) Truck passage prohibited except with NYCDOT permit.
(e) Includes police, fire and other emergency vehicles and TBTA vehicles.

Monthly Traffic, 2014

Monthly variations in traffic volumes on the nine crossings have been attributed to several factors historically, including severe weather, either winter or tropical storms, which result in lower volumes; and, conversely, traffic reaching its highest levels during the summer months when recreational travel peaks. Traffic volumes also tend to decline in the aftermath of a toll increase. Furthermore, individual facilities can be affected by construction projects on the facility itself or its approaches, and on adjacent arterials or competing bridges. The limited number of crossings in the region, however, sustains the overall demand for TBTA's bridges and tunnels. In addition to these normal impacts, there are extraordinary events such as the effects of September 11th and Superstorm Sandy.

The data in Table 9 indicate that total traffic on the nine crossings in 2014 peaked in June. August was the second highest month in 2014. For the combined facilities, the monthly variations in 2014 ranged from 15 percent below the annual average in both January and February (due to extremely harsh weather) to 8 percent above in June. This traffic mix is relatively stable comprising a solid base of commuting, discretionary and commercial traffic.

Table 9 Monthly Traffic Variations, 2014

Month	Average Daily Toll-Paying Traffic[a]										Ratio to AADT[c]
	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazano-Narrows Bridge[b]	Henry Hudson Bridge	Marine Pkwy Bridge	Cross Bay Bridge	Total	
January	92,344	91,660	137,385	68,715	39,777	153,930	51,456	16,638	17,363	669,268	0.85
February	92,556	91,823	137,854	69,014	39,776	152,452	50,550	16,342	17,551	667,918	0.85
March	105,599	102,489	156,137	79,586	45,056	170,599	58,289	18,457	19,644	755,857	0.96
April	112,829	107,296	165,892	81,730	46,068	178,659	62,943	18,888	20,187	794,492	1.01
May	118,544	109,918	175,840	83,753	47,747	183,274	65,535	21,637	21,781	828,030	1.06
June	120,620	112,196	178,843	84,746	48,454	187,060	65,835	24,088	23,989	845,831	1.08
July	121,165	111,224	171,292	79,566	45,824	182,459	61,581	24,326	23,061	820,498	1.05
August	121,804	115,028	175,322	81,374	47,609	185,900	62,783	24,266	23,074	837,160	1.07
September	118,199	106,923	173,015	83,292	48,717	179,293	63,878	21,167	21,555	816,039	1.04
October	115,252	107,091	171,457	84,139	51,208	178,229	65,068	19,674	20,463	812,582	1.04
November	112,252	104,176	163,005	78,687	47,838	172,892	61,630	18,566	19,655	778,701	0.99
December	110,174	104,502	161,595	78,080	48,375	177,906	60,810	18,872	19,766	780,081	0.99
AADT[d]	111,890	105,447	164,116	79,446	46,410	175,362	60,918	20,271	20,692	784,552	1.00

Notes:
(a) Totals may not add due to rounding.
(b) Westbound traffic doubled.
(c) For total traffic on the nine crossings.
(d) Annual Average Daily Traffic.

Changes in Monthly Traffic, 2013 to 2014

Table 10 lists the monthly average daily traffic changes that have occurred between 2013 and 2014.

Table 10 Changes in Monthly Average Daily Traffic, 2013 to 2014

Month	Percent Change Comparing 2013 Monthly Average Daily Traffic to 2014								
	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazano-Narrows Bridge	Henry Hudson Bridge	Marine Pkwy Bridge	Cross Bay Bridge
January	-6.2%	-9.2%	-4.3%	-0.5%	-4.5%	-9.0%	-5.5%	-20.2%	-16.6%
February	-2.6	-7.3	-3.8	-0.9	-6.0	-8.3	-5.8	-15.0	-11.5
March	1.3	-4.2	2.5	4.8	6.2	-2.8	3.1	-6.3	-3.2
April	4.0	-4.1	1.6	11.9	-0.7	-0.8	1.8	-11.1	-6.5
May	5.0	-3.9	6.3	6.0	5.0	0.2	4.2	-4.1	-2.3
June	1.0	0.1	6.1	7.0	4.4	-0.8	5.7	-2.1	2.0
July	1.4	-1.9	6.2	7.2	4.2	0.2	4.6	-5.2	-3.1
August	1.9	-2.0	3.6	2.0	1.4	-0.8	4.2	0.1	3.7
September	5.4	-3.2	4.9	4.2	7.9	0.6	4.3	1.7	4.2
October	3.7	-1.4	1.5	3.0	-0.2	-1.2	-0.1	-2.7	0.2
November	2.6	0.7	2.1	0.9	0.0	-0.6	-1.2	-3.6	1.5
December	7.7	3.3	5.8	3.2	9.9	3.1	5.2	2.9	6.4
Annual	2.2	-2.7	2.9	4.1	2.4	-1.6	1.9	-5.3	-2.1

Major reasons for monthly traffic changes include:

- Severe winter weather in 2014 including approximately 17 inches of snow in January followed by 28 inches of snow in February, compared to one inch and 13 inches, respectively, in January and February of 2013;
- Only one inch of snow in December 2014 compared to eight inches in December 2013; and
- Lower gasoline prices in 2014 than in 2013 (particularly in the last six months of 2014).

Operating Expenses, 2004 to 2014

Table 11 displays the historical operating expenses for the TBTA facilities from 2004 through 2014. TBTA divides operating expenses into two major categories: labor and non-labor. Labor includes salaries, overtime and fringe benefits, net of capital reimbursements. Major maintenance, some bridge painting, outside services, insurance, TBTA's share of the E-ZPass Customer Service Center, and other non-personnel expenses are included in non-labor.

TBTA labor expenses increased from $158.4 million in 2004 to $238.5 million in 2014. Part of this increase over the years is due to inflation. A significant part of this increase was due to the creation of 265 new security positions after the events of September 11, 2001. Incremental labor expenses in 2012 related to Superstorm Sandy amounted to approximately $1.0 million in additional overtime for emergency response and service restoration efforts. TBTA has also taken

steps to keep labor costs down. In 2010, TBTA implemented several budget reduction initiatives that have produced ongoing savings of approximately $10 million per year in labor expenses.

Non-labor expenses increased from $160.8 million in 2004 to $200.7 million in 2008. The primary driving factors in TBTA's non-labor expense growth were inflation, an increase in major maintenance and bridge painting activities. Since 2008, non-labor operating expenses have decreased primarily due to capitalization of the bridge painting program in 2010 and rescheduling of E-ZPass tag purchases to leverage a new contract commencing in 2011 with lower unit costs. In 2014, non-labor expenses were $205.2 million. Non-labor operating expenses related to Superstorm Sandy amounted to $10.7 million in 2012, primarily for de-watering of the tunnels, clean-up efforts at the Rockaway crossings, facility inspections and assessments, and other restoration activities.

Between 2004 and 2008, increases in labor costs were primarily the result of the hiring of additional security staff, adjustments to worker's compensation, and increases in health and welfare fringe benefit rates. In non-labor expenses, increases due to major maintenance and bridge painting were partially offset by decreases in insurance costs, E-ZPass NYCSC costs, and other business expenses.

Table 11 Historical Operating Expenses, 2004 to 2014

Year	Operating Expenses (000s)[a]			Percent Change
	Labor[b]	Non-Labor[c]	Total	
2004	$158,403	$160,811	$319,214	-3.0%
2005	173,549	170,123	343,672	7.7
2006	183,268	169,642	352,910	2.7
2007	196,755	172,270	369,025	4.6
2008	207,305	200,686	407,991	10.6
2009	220,400	177,400	397,800	-2.5
2010	209,499	173,950	383,449	-3.6
2011	208,343	150,503	358,846	-6.4
2012	220,576	157,463	378,039	5.3
2013	220,692	188,804	409,496	8.3
2014	238,528	205,224	443,752	8.4

Source: TBTA
Notes:
(a) Totals may not add due to rounding.
(b) Includes salaries, overtime and fringe benefits, net of capital reimbursements.
(c) Non-labor includes the following categories: major maintenance and supplies, bridge painting, outside services, insurance, power, leases and rentals and other expenses.

The operating expenses for 2009 saw a net decrease in expenditures from 2008 of 2.5 percent. Labor expenses increased by 6.3 percent, offset by a decrease in non-labor expenses of 11.6 percent. Total operating expenses in 2010 declined 3.6 percent from 2009. TBTA undertook a major organizational assessment in 2010 which reduced staff and organizational layers. Non-labor expenditures declined 1.9 percent primarily due to the capitalization of much of the

bridge painting program. In 2011, total operating expenses decreased for the third year in a row. Expenses in 2011 decreased 6.4 percent from 2010 to $358.8 million, with the majority of the decrease attributed to reductions in non-labor expenses.

Total operating expenses for 2012 increased $19.2 million, or 5.3 percent from 2011 primarily due to the previously discussed emergency response and facility restoration efforts associated with Superstorm Sandy ($11.7 million) and additional pension costs ($8.5 million) caused by an increased valuation required by the New York City Office of the Actuary requiring an increase in contributions due to a decrease in the rate of return, which included retroactive adjustments to July 2011. These additional costs were partially offset by a net of $1.0 million in reduced expenses across a variety of areas.

Total operating expenses for 2013 increased $31.5 million, or 8.3 percent above 2012 primarily due to: $12.6 million in additional bond issuance costs associated with the implementation of Government Accounting Standards Bureau (GASB) 65, which requires that certain expenses that were previously allowed to be amortized over the life of the bonds must now be realized in full when incurred; $5.2 million in Superstorm Sandy restoration costs; $4.4 million in higher insurance premiums; additional credit/debit card fees of $2.7 million due to the March increase in E-ZPass tolls; another $2.7 million in E-ZPass Customer Service Center costs stemming from account growth and the first full year of cashless tolling at the Henry Hudson Bridge; and an increase of $1.8 million to the annual write-off of bad debt associated with outstanding E-ZPass account balances.

Total operating expenses for 2014 increased $34.3 million, or 8.4 percent above 2013 primarily resulting from: $13.3 million in additional wage and associated fringe benefit costs primarily stemming from payments and provisions for actual and projected union contract settlements retroactive to 2009; an actuarial adjustment of $3.8 million for Worker's Compensation; $9.5 million to fund additional major maintenance and bridge painting projects; and a total increase of $6.5 million in property and general liability insurance premiums.

FACTORS AFFECTING TRAFFIC GROWTH

A previous section of this report identified the historical trends in traffic, revenue and expenses of the nine TBTA bridges and tunnels. Before developing the forecasts, several factors affecting future traffic were considered, including the projected trends in population and employment, TBTA and regional construction impacts, the capacity constraints in the regional highway network, and toll and elasticity impacts. This section of the report concludes with a summary of the assumptions and conditions upon which the traffic and toll revenue forecasts were based.

Employment, Population and Motor Vehicle Registrations

In keeping with federal requirements mandating the preparation of long term demographic and socioeconomic forecasts for travel demand modeling purposes, the New York Metropolitan Transportation Council (NYMTC) prepares and periodically updates employment and population forecasts for the 10-county NYMTC territory and 21 surrounding counties in New York, New Jersey and Connecticut. The latest forecasts, which are included in the following tables and are updated from the prior report submission, range from 2010 to 2050 on a 5-year interval basis. They are consistent with historical trends from 1970 to 2014.

The NYMTC forecasting approach begins with econometric modeling of the regional growth in employment relative to national trends and forecasts prepared by IHS Global Insight, calibrated at the county level on an industry-specific basis (IHS Global Insight is a major vendor of economic and financial analysis, forecasts, and market intelligence worldwide and provides the New York State Department of Transportation with socioeconomic projections for the state and upstate regions). Employment then drives population growth which is forecasted at the sub-regional level by a model that includes fertility, mortality, net migration of labor force, aged workers, dependents, and foreign migrants factors.

Typically, traffic volumes in the region are affected by changes in employment and population. Normally, the demand on TBTA facilities tends to be influenced less by regional employment and population trends than other toll facilities because available water crossings are limited. Motor vehicle registrations are another indicator of trends in traffic volumes. To better understand how these indicators may influence traffic volumes on TBTA crossings over the long term, Stantec first reviewed historical trends and forecasts by NYMTC and others, and then adjusted traffic forecasts in the short term to account for current economic conditions.

Employment Trends and Projections

Job growth traditionally has had an impact on traffic generation. Generally, when the economy is robust and jobs are growing, there is an increase in traffic. Conversely, when employment trends downward traffic volumes generally decline. However, the rate of decline depends upon the severity of employment losses. Table 12 depicts the long term trend in total employment in the region since 1970. The region is defined as consisting of 31 counties that comprised the commuter-shed: the five boroughs of the City; 9 suburban counties of New York State in Long Island and the Mid-Hudson; 14 counties of northern and central New Jersey; and 3 counties of Connecticut. Historic data are summarized by decade followed by NYMTC's projected employment estimate for 2015.

Table 12 Employment Trends
(000s)

Year	New York City	New York Region[a]	New Jersey Region[b]	Connecticut Region[c]	Total[d]
1970	4,066.5	1,554.6	2,447.6	727.4	8,796.1
1980	3,614.0	1,918.6	2,828.2	869.3	9,230.1
1990	3,966.1	2,339.0	3,403.9	1,008.9	10,717.9
2000	4,570.9	2,185.3	3,467.7	1,022.5	11,246.3
2005	4,408.5	2,245.6	3,491.6	991.7	11,137.4
2010	4,529.6	2,190.9	3,352.8	952.7	11,026.0
2015 (Projected)	4,904.8	2,317.2	3,541.9	996.5	11,760.4
Average Annual Percent Change					
1970 to 1980	-1.2%	2.1%	1.5%	1.8%	0.5%
1980 to 1990	0.9%	2.0%	1.9%	1.5%	1.5%
1990 to 2000	1.4%	-0.7%	0.2%	0.1%	0.5%
2000 to 2005	-0.7%	0.5%	0.1%	-0.6%	-0.2%
2005 to 2010	0.5%	-0.5%	-0.8%	-0.8%	-0.2%
2010 to 2015	1.6%	1.1%	1.1%	0.9%	1.3%

Source: New York Metropolitan Transportation Council, New York State Department of Labor, Connecticut Department of Labor, New Jersey Department of Labor and Workforce Development, and United States Bureau of Economic Analysis.

Notes:
(a) Consists of the following counties: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster and Westchester.
(b) Consists of the following counties: The 13 counties of the North Jersey Transportation Planning Authority (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, Warren) plus Mercer County of the Delaware Valley Regional Planning Commission.
(c) Consists of the following counties: Fairfield, Litchfield, and New Haven.
(d) Totals may not add due to rounding.

As Table 12 shows, the City's employment, from a peak of 4.1 million jobs in 1970, decreased during the 1980s to 3.6 million. Since 1980, the City has shown consistent employment growth in each decade, having returned to 1970 levels in the 1990s and is expected to reach 4.9 million jobs by 2015, despite the downturn which occurred in the severe 2007-2009 recession. The Long Island and Mid-Hudson suburbs have reflected continuous growth in the decades since 1970, expanding from 1.6 million jobs in 1970 to an estimated 2.3 million by 2015. Slower rates of suburban growth occurred in New Jersey and Connecticut between 1970 and 2010, although by the current decade, growth rates for Connecticut and New Jersey accelerated. Between 1970 and 2015, New Jersey is expected to add 1.1 million jobs while Connecticut will gain some

270,000. Among the four sub-regions, the City will account for the largest employment base with 42 percent of 11.8 million regional jobs, followed by New Jersey with 30 percent, the New York suburbs with 20 percent and Connecticut with 8 percent.

NYMTC prepared a series of 40-year employment forecasts, released in draft form in December 2014. Forecasted trends are compressed to 5-year intervals which masks cyclical trends between these years, a common practice in long term econometric forecasting. NYMTC projected regional employment growth would increase at an average annual rate of 0.5 percent between 2010 and 2050. However, regional employment levels increased at an average annual growth rate of 5.1 percent between 2010 and 2014, more than ten times greater than the average annual growth rate NYMTC forecasted between 2010 and 2050 in 2014. In all sub-regions, annual growth between 2010 and 2014 exceeds the NYMTC forecasted annual average rate of gain between 2010 and 2015, suggesting that NYMTC forecasts understate the near term expansion over the remaining decade. NYMTC's employment projections from its 2014 40-year employment forecast are presented in Table 13.

Table 13 Employment Projections

(000s)

Year	New York City	New York Region [a]	New Jersey Region [b]	Connecticut Region [c]	Total
Average Annual Percent Change					
2010 to 2015	1.6%	1.1%	1.1%	0.9%	1.3%
2015 to 2020	0.5%	0.6%	0.8%	0.7%	0.6%
2020 to 2025	0.2%	0.4%	0.3%	0.3%	0.3%
2025 to 2030	0.2%	0.4%	0.3%	0.4%	0.3%
2030 to 2035	0.2%	0.4%	0.5%	0.4%	0.4%
2035 to 2040	0.2%	0.4%	0.5%	0.5%	0.4%
2040 to 2045	0.2%	0.4%	0.4%	0.5%	0.3%
2045 to 2050	0.2%	0.4%	0.4%	0.5%	0.4%
2010 to 2050	0.4%	0.5%	0.5%	0.5%	0.5%

Source: New York Metropolitan Transportation Council, New York State Department of Labor, Connecticut Department of Labor, New Jersey Department of Labor and Workforce Development, and United States Bureau of Economic Analysis.

Notes:

(a) Consists of the following counties: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster and Westchester.

(b) Consists of the following counties: The 13 counties of the North Jersey Transportation Planning Authority (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, Warren) plus Mercer County of the Delaware Valley Regional Planning Commission.

(c) Consists of the following counties: Fairfield, Litchfield, and New Haven.

Based on long term national forecasts to 2050, taking into account the moderate recovery since the 2007-2009 recession, the existing regional outlook suggests that jobs will expand by 0.5 percent annually over the period, slightly less than the annual average growth rate of 0.6 percent between 1970 and 2010. The City is expected to expand at a rate slightly less than the suburban regions of New Jersey, Connecticut and New York. Past 2015 no sub-regions are projected to experience a period of interim decline as each tends to grow with cyclical contractions between a range of 0.2 and 0.8 percent annually on average over the period.

While the economic recovery has resumed in the region and the nation, the New York State Department of Labor reports that the City's annual average jobless rate had only dropped to 7.3 percent in 2014[3]. On average, 301,000 residents were unemployed in a labor force of 4.1 million, while more than 222,600 had gained employment between 2010 and 2014. The City's rate of unemployment is marginally greater than the New Jersey and Connecticut suburban counties, but considerably more than that of the New York suburbs which averaged 5.2 percent unemployed in 2014. Labor force conditions are summarized in Table 14.

Table 14 Labor Force Conditions, 2010 & 2014

	New York City	New York Region[(a)]	New Jersey Region[(b)]	Connecticut Region[(c)]
Labor Force				
2010	3,958,700	2,608,000	3,580,200	1,042,200
2014	4,103,400	2,580,300	3,577,000	1,032,900
Employed				
2010	3,579,800	2,412,300	3,248,100	945,200
2014	3,802,400	2,445,100	3,349,100	964,400
Unemployed				
2010	378,900	195,600	332,000	97,000
2014	301,000	135,200	227,900	68,500
Unemployment Rate				
2010	9.6%	7.5%	9.3%	9.3%
2014	7.3%	5.2%	6.4%	6.6%

Source: State Departments of Labor.
Notes:
(a) Consists of the following counties: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster and Westchester.
(b) Consists of the following counties: The 13 counties of the North Jersey Transportation Planning Authority (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, Warren) plus Mercer County of the Delaware Valley Regional Planning Commission.
(c) Consists of the following counties: Fairfield, Litchfield, and New Haven.

Over the year 2014, the City gained 115,600 payroll jobs, with 112,300 jobs added in the private sector. Leading industries included Education and Health Services, which accounted for a gain of 40,800 jobs, Health Care and Social Assistance with 30,700 more jobs, Professional and Business Services with 24,800 new jobs, and Leisure and Hospitality with 14,400 added employment opportunities. Following several years of losses, Government added 3,300 jobs while Financial Activities added 8,300 jobs. Construction posted gains of 4,300 jobs.

In the housing market, building permits authorizing new housing construction increased in the City to 20,483 units or by 13.8 percent in 2014. Housing foreclosures remain less of a problem than nationally, although the City still has approximately 500 stalled construction sites for mostly residential developments. In other property markets, notably office, vacancy rates have fallen

[3] As of February 2015, the City's monthly unemployment rate had fallen to 6.6 percent.

while office rents have risen as demand for Manhattan office market has increased. At the top, Class A rental rates climbed to $73.69 per square foot from $69.84 in 2013. Among all classes, average rental rates climbed from $63.40 per square foot to $67.70 in 2014. Net absorption for the borough's office market was up by 10.9 million square feet by year end 2014, an increase from a 3.6 million square foot drop in 2013. With 3.5 million square feet of new construction delivered to the market during the year offset by the loss of 2.1 million square feet of office space due to demolition or conversion, Manhattan's inventory of office space edged up from 395.3 million square feet in 2013 to 396.7 million square feet in 2014, a net gain of 1.4 million square feet. An additional 2.2 million square feet is anticipated to be completed, largely at 10 Hudson Yards, in 2015. This is expected to increase the borough's vacancy rate further, as office employment is expanding more slowly than available space and firms are consolidating their use of office space.

Population Trends and Projections

Since 1980, US Census data indicate that the City's population has increased by 1.3 million persons to 8.4 million residents in 2013. Although the Census Bureau's 2010 population count was disputed by the City of New York as under-counted by several hundred thousand, the City has nonetheless become a desirable place of residence for many young professionals, foreign immigrants and international investors who maintain multiple residences, as well as the City's long-standing residents that have aged in place. Manhattan's population is now larger than in 1970, a City high point, while the Bronx and Brooklyn remain only marginally less populated than in earlier years. Queens and Staten Island have continued to grow with Queens, in particular, a destination of many immigrant groups.

While the City's population has recorded recent and historical periods of contraction, as shown in Table 15, the commuter suburbs of New York, New Jersey and Connecticut have grown continuously over the past 43 years. Compared to 8.4 million residents in the City, northern and central New Jersey now houses 7.1 million residents while the 9 counties of Long Island and the Mid-Hudson are home to 5.2 million. Over the period in which the City added 1.3 million more inhabitants, New Jersey acquired 1.2 million residents and the New York suburbs added 630,000. Connecticut, with less than 2 million residents, has attracted 260,000 since 1980.

Table 15 Population Trends
(000s)

Year	New York City	New York Region [a]	New Jersey Region [b]	Connecticut Region [c]	Total
1970	7,894.9	4,371.5	5,799.7	1,681.9	19,748.0
1980	7,071.6	4,537.1	5,856.8	1,725.2	19,190.8
1990	7,322.6	4,635.2	6,079.5	1,806.0	19,843.2
2000	8,008.3	4,933.1	6,661.8	1,888.8	21,491.9
2005	8,013.4	5,059.8	6,830.6	1,933.7	21,837.5
2010	8,175.1	5,123.7	6,946.4	1,969.2	22,214.5
2011	8,244.9	5,146.5	6,975.3	1,975.8	22,342.5
2012	8,336.7	5,158.0	7,014.8	1,984.2	22,493.7
2013	8,405.8	5,171.4	7,051.1	1,989.1	22,617.5
Average Annual Percent Change					
1970 to 1980	-1.1%	0.4%	0.1%	0.3%	-0.3%
1980 to 1990	0.3%	0.2%	0.4%	0.5%	0.3%
1990 to 2000	0.9%	0.6%	0.9%	0.4%	0.8%
2000 to 2005	0.0%	0.5%	0.5%	0.5%	0.3%
2005 to 2010	0.4%	0.3%	0.3%	0.4%	0.3%
2010 to 2011	0.9%	0.4%	0.4%	0.3%	0.6%
2011 to 2012	1.1%	0.2%	0.6%	0.4%	0.7%
2012 to 2013	0.8%	0.3%	0.5%	0.2%	0.6%

Source: US Census Bureau and New York Metropolitan Transportation Council.
Notes:
(a) Consists of the following counties: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster and Westchester.
(b) Consists of the following counties: The 13 counties of the North Jersey Transportation Planning Authority (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, Warren) plus Mercer County of the Delaware Valley Regional Planning Commission.
(c) Consists of the following counties: Fairfield, Litchfield, and New Haven.

NYMTC's 40-year projections of regional population are presented in Table 16. Between 2010 and 2050, the NYMTC forecast represents a 0.4 percent annual rate of growth between 2010 and 2050, compared to a 0.3 percent increase since 1970. Of this gain, the City is expected to attract 25 percent of the regional growth. The New Jersey suburbs are expected to have 37 percent of the increase, while Long Island and the Mid-Hudson are expected to attract 28 percent of the total. Connecticut, by contrast, will likely account for 10 percent of the regional growth.

Although employment trends appear to have had a more noticeable effect on traffic volumes on TBTA facilities, population growth will positively affect traffic demand on crossings. However, TBTA traffic variations do not always correlate year by year with regional demographic trends. As evident, demand for TBTA facilities has been strong overall and NYMTC's long term regional population projections indicate a trend for such demand to increase over the projected period. With regard to employment, there may be some years that will show declines, but that is

projected to be offset by other years that will be characterized by growth. In general, an upward trend is expected over the long term through the end of NYMTC's current forecast period in 2050.

Table 16 Population Projections

(000s)[a]

Year	New York City	New York Region [b]	New Jersey Region [c]	Connecticut Region [d]	Total
Average Annual Percent Change					
2010 to 2015	0.5%	0.3%	0.4%	0.4%	0.4%
2015 to 2020	0.4%	0.2%	0.3%	0.3%	0.3%
2020 to 2025	0.3%	0.4%	0.4%	0.4%	0.4%
2025 to 2030	0.3%	0.7%	0.5%	0.6%	0.5%
2030 to 2035	0.2%	0.7%	0.6%	0.6%	0.5%
2035 to 2040	0.2%	0.6%	0.5%	0.5%	0.4%
2040 to 2045	0.2%	0.6%	0.5%	0.5%	0.4%
2045 to 2050	0.1%	0.6%	0.5%	0.5%	0.4%
2010 to 2050	0.3%	0.5%	0.5%	0.5%	0.4%

Source: New York Metropolitan Transportation Council, New York State Department of Labor, Connecticut Department of Labor, New Jersey Department of Labor and Workforce Development, and United States Bureau of Economic Analysis.

Notes:

(a) Forecast is the most recent available, unchanged from the previous year.

(b) Consists of the following counties: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster and Westchester.

(c) Consists of the following counties: The 13 counties of the North Jersey Transportation Planning Authority (Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, Warren) plus Mercer County of the Delaware Valley Regional Planning Commission.

(d) Consists of the following counties: Fairfield, Litchfield, and New Haven.

Motor Vehicle Registrations

The trend in motor vehicle registrations in an area is a predictor of growth or stability in levels of vehicular traffic. As Table 17 shows, over the 2003 to 2013 period, motor vehicle registrations in the region remained relatively constant through that period. However, in 2013, there was an increase in vehicular registrations in New York City and New York State while registrations declined in New Jersey. As of April 24, 2015, motor vehicle registration data for 2014 has not been released.

Although motor vehicle registrations are not projected for future years, there has been a recent increase in auto sales nationally. Over the long term, with full economic recovery and the restoration of consumer confidence in spending, the growth in registrations will likely keep pace with population and employment growth.

Table 17 Motor Vehicle Registrations
(000s)[a]

Year	New York City	New York State[b]	New Jersey	Connecticut
2003	1,869	10,952	6,852	3,027
2004	1,849	11,269	6,374	3,106
2005	1,857	12,053	6,420	3,124
2006	1,833	11,487	6,122	3,117
2007	1,926	11,811	6,411	3,112
2008	1,945	11,429	6,411	3,160
2009	1,952	11,591	6,272	3,137
2010	1,962	10,603	6,956	3,148
2011	1,961	10,431	7,940	2,829
2012	1,978	10,449	7,911	2,706
2013	2,016	10,674	7,061	2,856
Average Annual Growth				
2003-2013	0.76%	-0.26%	0.30%	-0.58%

Source: United States Federal Highway Administration.
Notes:
(a) This represents the most recent available data for New Jersey and Connecticut and differs in reporting source from the prior year's report, which was based solely upon state data.
(b) Including New York City.

Annual motor vehicle registrations for the period 2009 through 2013 are shown for each of the City's five boroughs in Table 18. Throughout the City, the changes in registrations were minimal year-by-year through 2012, but by 2013 significant increases were evident in Brooklyn and Queens. Over the four year period, the average annual City-wide growth rate was 0.8 percent, with Brooklyn recording a 1.4 percent increase. Manhattan registered the lowest average annual growth of 0.4 percent. However, the four outer boroughs are the most significant contributors to trips on the TBTA facilities.

Table 18 New York City Motor Vehicle Registrations, 2009 to 2013

Borough	2009	2010	2011	2012	2013	Average Annual Rate of Change
Bronx	248,963	248,600	246,748	251,398	254,752	0.6%
Brooklyn	442,124	447,265	448,510	452,775	466,646	1.4%
Manhattan	248,064	247,965	248,410	250,510	251,751	0.4%
Queens	748,982	753,743	752,933	758,587	774,517	0.8%
Staten Island	263,571	264,658	264,727	265,122	268,492	0.5%
Total	1,951,704	1,962,231	1,961,328	1,978,392	2,016,158	0.8%

Source: New York State Department of Motor Vehicles

Fuel Conditions

Traffic and revenue on the TBTA crossings have been affected in varying degrees by the availability and price of gasoline since 1970, with the most recent effects seen following the high prices throughout 2011. The effects on TBTA traffic resulting from fuel shortages and increases in gasoline prices in 1973-1974 and in 1979, during the first war in the Persian Gulf in the early 1990s, during the war in Iraq and after Hurricane Katrina can be seen in Figure 2A/2B. In some instances, such as 2011, economic conditions and toll increases also contributed to the reduction of traffic volumes. After Superstorm Sandy in 2012, odd-even gasoline rationing was implemented in the City from November 9th until November 24th whereby motorists could purchase gasoline on alternate days based on the last digit of their license plate. The effects were seen as part of the decrease in traffic after the storm.

In July 2008, the average price of regular grade gasoline was the highest recorded – $4.114 per gallon in the U.S. and $4.179 in the City. Prices then dropped in the second half of 2008, remaining steady through 2009 and increasing through 2010. The next peak, in May, 2011, saw prices at $3.965 per gallon in the U.S. and $4.069 in the City. As of April 27, 2015, the U.S. Energy Information Administration (EIA) states that the price of regular grade gasoline averaged $2.821 per gallon nationally, and $2.570 in the City.

Sharp increases in the price of gasoline in 2008 and 2011 resulted in decreases in vehicle miles of travel in the United States and in the New York metropolitan area. Data from the United States Federal Highway Administration indicates that Vehicle Miles of Travel (VMT) decreased between 2007 and 2008 by 2.5 percent nationally and by 4.1 percent in New York State. In 2011, largely in response to the recession, national VMT was 1.4 percent below the 2007 level and New York State VMT was 4.1 percent below 2007. New York State VMT decreased by 0.6 percent from 2012 to 2013, in part due to the availability of significant and reliable public transportation in the New York City area. In 2014, national travel demand increased 1.7 percent and travel demand within New York State increased 1.3 percent, reflecting the continued improvement in the economy.

Factors contributing to changes in the price and availability of gasoline are both upward and downward and each has an unknown element that contributes to uncertainty. These factors include:

- Dependence on imported crude oil – United States dependence on imported fuel has decreased as a result of continued domestic development of light oil and increased development of offshore resources in the Gulf of Mexico, North Dakota, Texas, and New Mexico. In March 2015 the EIA reported that domestic crude oil production in 2014 experienced its highest annual growth in more than six decades (16.2 percent);
- Use of substitute fuels – The use of biofuels has decreased in the United States primarily due to a large reduction of imported biofuels from Argentina which expanded its trade with the United States in late 2013 due to tariffs imposed by the European Union. Fluctuations in biofuel imports have an impact on the need for gasoline;

- Increase in demand – Domestic economic recovery is expected to be the slowest growth of any recovery since 1960 and, while the total energy consumption is estimated to increase over the next 25 years, per capita consumption is expected to decrease, according to EIA; The slowing of domestic demand should result in lower prices; however, this may be offset by increased demand overseas as world economic conditions improve;
- Political conditions – The political situation in oil producing countries creates tension and uncertainty; however, economists say these factors are partially reflected in current oil prices; and
- Motor vehicle fuel efficiency – The preliminary adjusted composite model year 2014 fuel economy of 24.2 miles per gallon (mpg) was the highest level of fuel efficiency since the United States Environmental Protection Agency (EPA) began its analysis of light-duty automotive vehicles in 1975. In April 2010, both the National Highway Traffic Safety Administration and the EPA raised the fleet-wide Corporate Average Fuel Economy (CAFE) requirements to 34.1 mpg for 2016, which is an average of passenger cars (37.8 mpg) and light trucks (28.8 mpg).

The EIA, in the April 2015 Short-Term Energy Outlook, indicates that they expect the price of regular grade gasoline to average $2.40 per gallon in 2015 and $2.73 per gallon in 2016, compared with $3.36 per gallon in 2014.

Toll Impacts and Elasticity

Tolls that are increased periodically affect traffic usage, especially if they outpace the rate of inflation, as they have on the TBTA facilities, as well as in those instances where competing facilities provide a good alternative. Elasticity, as used herein, is the relationship between traffic volume and the toll rate change, and represents the relative decrease in traffic corresponding to a given increase in toll. Elasticity is expressed as a negative value and the higher the absolute value, the more apt a facility is to lose traffic, which can be due to diversions to competing facilities, switches in travel modes, consolidation of trips and elimination of trips. Elasticity, in this sense, is used to analyze the relationship between tolls and use, i.e., when tolls are increased, motorists react and travel patterns may change.

Elasticity factors vary, demonstrating that users react differently to toll increases depending on influencing conditions. On the TBTA crossings, elasticity tends to be influenced by the proximity of the toll-free City bridges and other considerations. The low factors for the Throgs Neck and Bronx-Whitestone Bridges indicate their relative isolation from the nearest toll-free competitor, the Ed Koch Queensboro Bridge. Further south on the East River at the RFK Bridge and the Queens Midtown and Hugh L. Carey Tunnels, elasticity increases as the degree of toll-free competition increases. The TBTA tunnels tend to lose traffic particularly when the competing crossings are operating under reasonable levels of traffic service and providing motorists with viable toll-free alternatives during non-peak periods. In addition, trip purpose influences demand, i.e., peak-period, work-related trips are less elastic than off-peak or discretionary trips that have fewer travel-time constraints.

Two sets of forecasts were developed for this report: one at constant tolls and the other with tolls at the current level in 2015 and 2016 and then a toll increase in March 2017 as included in the MTA Financial Plan 2015-2018 adopted by the MTA Board in February 2015. Elasticity factors used for the forecasts in this report are based on factors developed by Stantec in analyzing the elasticity exhibited by historical elasticity factors previously developed for the TBTA facilities and the toll increase in December 2010.

After adjusting for normal traffic changes in the New York City metropolitan area in 2011, including the effects of changes to fuel prices, economic conditions and severe weather, elasticity factors for the December 2010 toll increases were developed as a composite first and then disaggregated into elasticity factors for both cash and NYCSC E-ZPass vehicles. The analysis of the effects of the 2010 toll increase on traffic volumes indicated a significantly higher elasticity for cash transactions than for E-ZPass users. This behavior was generally exhibited also after the March 2013 toll increase although elasticities from this toll increase could not be quantified with adequate specificity due to other factors affecting traffic in 2012 and 2013. These include the impacts of Superstorm Sandy, other severe weather events and the slow stabilization of regional economic growth.

Our analysis of the 2010 toll increase found that cash-paying motorists are more sensitive to tolls since they are generally less frequent users of the facilities, travel during less congested off-peak periods and have fewer time constraints than E-ZPass users. Conversely, most E-ZPass users pay relatively lower tolls and are less sensitive to toll increases since some drivers may not immediately be aware of the additional amounts they pay. The historical elasticity factors for total traffic and the factors for cash and E-ZPass transactions based on the analysis of the December 2010 toll increase are shown in Table 19.

For purposes of this report and Stantec's projections, we have assumed future toll increases in accordance with the MTA Financial Plan 2015-2018 adopted by the MTA Board in February 2015. This plan includes another toll increase on March 1, 2017. Accordingly, the revenue forecast with a toll increase included in this report includes a toll increase averaging 4 percent to be implemented on March 1, 2017. Any such toll increase or other adjustments are subject to future action by the TBTA Board.

For the toll-increase scenario, it was assumed that, to the extent practical, the toll levels (i.e., the NYCSC E-ZPass toll for passenger cars) on the major and minor crossings would be increased by 4 percent in 2017, as noted above. Further, it was assumed that truck tolls would be increased proportionately, and that the relationships between cash and NYCSC E-ZPass tolls for passenger cars would remain the same as those implemented for the toll increase on March 22, 2015. Cash tolls will be rounded up to the nearest $0.50 for efficient toll collection.

Table 19 Elasticity Factors

Facility	Elasticity Factors used in this Report[a]		Historical Elasticity Factors
	Cash	E-ZPass	
Throgs Neck Bridge	-0.136	-0.098	-0.109
Bronx-Whitestone Bridge	-0.136	-0.098	-0.109
RFK Bridge	-0.205	-0.147	-0.164
Queens Midtown Tunnel	-0.240	-0.173	-0.192
Hugh L. Carey Tunnel	-0.448	-0.322	-0.358
Verrazano-Narrows Bridge	-0.160	-0.115	-0.128
Henry Hudson Bridge[b,c]	-0.352	-0.254	-0.282
Marine Parkway Bridge	-0.126	-0.091	-0.101
Cross Bay Bridge	-0.171	-0.123	-0.137

Notes:
(a) For each 1% increase in toll the volume is expected to decrease by the elasticity factor; e.g. for each 1% increase in the cash toll at the Queens Midtown Tunnel, cash traffic would decrease by 0.240%.
(b) Elasticity factors for cash transactions at the Henry Hudson Bridge were developed prior to the implementation of the AET Pilot Program in November 2012.
(c) Assume Tolls By Mail customers have similar elasticity to cash.

As for the impacts of the toll increases on traffic demand, the elasticity factors from Table 19, as described above, were used by Stantec to calculate traffic decreases, as shown in Table 20. These traffic impacts represent the reduction in volume from the corresponding annual traffic levels that would be expected if the tolls were not increased.

Table 20 Estimated Percent Change in Average Toll Rates and Traffic in 2017

Facility	Elasticity Factors		Estimated Percent Change			
			Toll		Traffic	
	Cash	E-ZPass	Cash	E-ZPass	Cash	E-ZPass
Throgs Neck Bridge	-0.136	-0.098	4.0%	4.0%	-0.5%	-0.4%
Bronx-Whitestone Bridge	-0.136	-0.098	4.0%	4.0%	-0.5%	-0.4%
RFK Bridge	-0.205	-0.147	4.0%	4.0%	-0.8%	-0.6%
Queens-Midtown Tunnel	-0.240	-0.173	4.0%	4.0%	-1.0%	-0.7%
Brooklyn-Battery Tunnel	-0.448	-0.322	4.0%	4.0%	-1.8%	-1.3%
Verrazano Narrows Bridge	-0.160	-0.115	4.0%	4.0%	-0.6%	-0.5%
Henry Hudson Bridge[a]	-0.352	-0.254	4.0%	4.0%	-1.4%	-1.0%
Marine Parkway Bridge	-0.126	-0.091	4.0%	4.0%	-0.5%	-0.4%
Cross Bay Bridge	-0.171	-0.123	4.0%	4.0%	-0.7%	-0.5%

Notes:
(a) Assume Tolls By Mail customers have similar elasticity to cash.

Availability of Capacity on TBTA Facilities

Stantec's assessment of TBTA's bridges and tunnels indicates that during most, if not all hours of the day, most facilities are operating at below the carrying capacity and more growth can be accommodated. The exception is the Queens Midtown Tunnel where capacity is somewhat constrained during specific hours within peak periods. This may limit potential traffic growth during these specific times, but the great majority of the hours have sufficient available capacity to absorb any volume growth that may occur. Overall, wherever capacity constraints are observed, TBTA takes action wherever feasible to alleviate those constraints through targeted investments.

We also reviewed toll plaza operations with the E-ZPass payment system. Characteristics of the E-ZPass system are discussed throughout this report. The acceleration of vehicle throughput for E-ZPass customers has mitigated congestion at the toll plazas. With the E-ZPass participation rate at 84 percent in 2014 and the E-ZPass customer base increasing, efficient toll plaza operations are anticipated throughout the forecast period.

TBTA requested and received Board approval in May 2014 to continue the all-electronic collection of tolls at the Henry Hudson Bridge following the completion of the pilot at the end of 2014. The removal of E-ZPass toll lane gates boosted peak hour throughput from around 800 vehicles per hour to approximately 1,000 vehicles per hour, or 25 percent, further improving traffic flows on the facility.

TBTA and Regional Operational and Construction Impacts

Traffic volumes on TBTA facilities are in some instances influenced by construction and rehabilitation projects involving roadways and bridges in the New York City area.

Major projects that result in long-term closures on the competing bridges may increase volumes on TBTA's facilities. Also, long-term lane closures on the roadway network serving the TBTA crossings or on the TBTA crossings themselves may affect TBTA traffic volumes or cause traffic to shift from the affected crossing to either another TBTA facility or to one of the City's toll-free bridges. For example, when replacement of the Bronx Approach on the Bronx-Whitestone Bridge began in early 2009, some traffic diverted to the Throgs Neck Bridge, as the Bronx-Whitestone Bridge and the Throgs Neck Bridge serve similar traffic and a delay on one of the bridges results in a shift to the other crossing. A number of roadway construction/rehabilitation projects, over the past few years, have influenced traffic volumes on TBTA facilities, and future construction will also affect traffic. The following descriptions also highlight area construction activities and measures that have influenced TBTA volumes and other planned and proposed projects that may affect traffic during the forecast period. Information on future construction activity was obtained from the New York State Department of Transportation, New York City Department of Transportation, NYMTC, and the Port Authority of New York and New Jersey.

In general, the majority of construction activities programmed for the TBTA facilities themselves is scheduled to take place during off-peak hours, including nighttime and weekend lane closures in the tunnels. Therefore, they are expected to have no discernible effect on toll revenue.

- On the **Verrazano-Narrows Bridge**, the construction contract for the upper level suspended spans involving the removal and replacement of the existing concrete filled grid deck with a steel orthotropic deck, reconfiguring the widening of the deck to accommodate a Bus/HOV lane, and painting of the superstructure was awarded in November 2012 and will continue into 2018. The construction contract for the widening of the ramp providing Bus/HOV access to the Verrazano-Narrows Bridge upper level was awarded in December of 2013 and will continue into 2017. Improvements to the eastbound and westbound toll plaza ramps was awarded in 2011, is currently substantially complete and should have no further impact on traffic flows. Upcoming work included in the 2015-2019 Capital Program includes the Brooklyn approach reconstruction and replacement of upper level elevated approach decks.

- The **Cross Bay Veterans Memorial Bridge** superstructure/deck rehabilitation was completed in May 2010. Substructure rehabilitation was completed in December 2012. There are no upcoming roadway projects for the Cross Bay Bridge in the near future.

- The **Marine Parkway-Gil Hodges Memorial Bridge** deck rehabilitation on the Rockaway Point Boulevard and Jacob Riis Park Pedestrian Bridges, construction of which will occur in 2015, will be staged to avoid traffic impacts. In addition, the bridge will undergo electrical and mechanical rehabilitation of the lift span along with miscellaneous steel repairs and painting of the trusses, and installation of a fire line, starting in 2015. Due to low traffic volumes on this bridge, these projects should not have a detrimental effect on traffic flows.

- On the **Bronx-Whitestone Bridge**, the replacement of the Bronx approach structure began in late 2008 and was completed in 2012. The Queens approach replacement work started in mid-2011, with no impact to the roadway until staged deck replacement started in mid-2013 and is now substantially complete and should not result in any further impact of traffic flows As noted above, the Bronx-Whitestone Bridge and the Throgs Neck Bridge serve the same traffic and delays on one of the bridges results in a shift to the other crossing.

- The **Throgs Neck Bridge** suspended span deck replacement design is ongoing with construction planned to begin in mid-2017. With a contraflow lane, three lanes will be maintained in the peak direction. As noted above, the Bronx-Whitestone Bridge and the Throgs Neck Bridge serve similar traffic and a delay on one of the bridges results in a shift to the other crossing.

  Redecking of the lower level of the **Henry Hudson Bridge** was completed in 2010. Construction to replace the upper level curb stringers and sidewalks began in December 2010 and was completed in July 2013. An enabling project to facilitate replacement of both the upper and lower level toll plazas was awarded in late 2014; however, due to heavy AM peak volumes, some traffic impact is expected.

- At the **RFK Bridge,** the reconstruction of the Manhattan-to-Queens ramp is substantially complete and should not result in any further impact of traffic flows. Reconstruction and rehabilitation of the Manhattan Approach ramps will begin in early 2015 and will continue into 2017. The replacement of the Bronx Toll Plaza will begin in early 2015 and will continue into 2019. Construction of a new ramp to the northbound Harlem River Drive is scheduled to start in mid-2018 and will continue into 2020.

- A major **Queens Midtown Tunnel** electrical rehabilitation project was awarded in late 2012 and is scheduled for completion in mid-2017. Major tunnel restoration work primarily attributable to Superstorm Sandy impacts will begin in the second quarter of 2015. Rehabilitation of the exit plaza has been combined with the major tunnel restoration project to minimize traffic impacts. Work will be carried out via night and weekend closures.

- **Hugh L. Carey Tunnel** plaza rehabilitation in Brooklyn as well as ceiling and wall repairs and rehabilitation of tunnel ventilation and electrical systems are planned in the current Capital Program. Major tunnel restoration work primarily attributable to Superstorm Sandy impacts began in early 2015. To minimize traffic impacts, construction work on the Brooklyn Plaza and in the tunnel have been combined and work will be performed during routine nighttime and weekend tube closures from 2015 to 2019. A major electrical rehabilitation project was completed in September 2014.

Competing East River Crossings Construction

- **Ed Koch Queensboro Bridge** – Seismic retrofitting of the Ed Koch Queensboro Bridge was completed in 2014.

  Truss repairs adjacent to the upper roadway will result in sporadic nighttime closures of the South Upper Roadway through May 2015. The replacement of the upper roadways is scheduled to begin in 2017 and to be completed in 2019. Two lanes on the upper level will be closed during each phase of construction. TBTA should anticipate increased usage of the Queens Midtown Tunnel.

- **Manhattan Bridge** – Seismic retrofitting was completed in 2014.

- **Brooklyn Bridge** – Painting of the entire bridge, to prevent steel corrosion and improve aesthetics, is estimated to be completed by the end of 2015. The majority of the rehabilitation work has been completed, while several operations still remain on the Manhattan side, including installation of Super Slabs on the Manhattan-bound roadway, grid deck installation at the Park Row Structure, rehabilitation of the North Cantilever, and pier replacement at Ramp C. The latter two operations will likely continue through early 2016. The Manhattan-bound weekend closure will continue through this rehabilitation process, diverting traffic to the Manhattan Bridge and/or nearby facilities such as the Hugh L. Carey Tunnel and Williamsburg Bridge, while the Brooklyn-bound roadway remains operational at

all times. There will be no more closures on the Brooklyn-bound roadway, eliminating the need for any further "contraflow" configuration for Brooklyn-bound traffic.

Other Major Bridge and Roadway Construction

During the forecast period, several major roadway and bridge projects, which are part of NYMTC's current Transportation Improvement Program (TIP) for federal Fiscal Years 2011-2015, will potentially have traffic implications for the TBTA facilities. Other bridges, roads and overpasses programmed for construction include:

- **Madison Avenue Bridge** — Rehabilitation of the Madison Avenue Bridge over the Harlem River is scheduled to be performed between March 2017 and September 2018, which includes electrical, mechanical, and miscellaneous operating system-related work. This may result in minimal diversions to the RFK Bridge.

- **Macombs Dam Bridge** — Rehabilitation of fender system and repair/replacement of the superstructure and bridge deck of the 155th Street Viaduct is scheduled to begin in spring 2015 and end in September 2017. Reductions in traffic may result in minimal diversions to the RFK Bridge.

- **127th Street Viaduct (Harlem River Drive 125th Street Exit)** — Replacement of existing bridge and reconstruction of the Harlem River Drive between Willis Avenue and Third Avenue bridges. Construction was awarded in late 2014 and work is expected to begin in mid- to late 2015 and is expected to be completed in 2018. Construction will result in the full closure of the northbound East 125th Street exit for 33 months and full closure of the southbound East 125th Street exit for ten months. Any restrictions on the approach ramps may induce some diversions to the RFK Bridge. This project has been closely coordinated with TBTA's RFK Bridge construction program.

- **Broadway Bridge** — Currently in its final design phase, the reconstruction of the bridge is scheduled to start in August 2016. The project's scope of work includes a major rehabilitation of the roadway deck, superstructure steel and substructure elements of the vertical lift span, as well as the approach spans. It will also include the replacement and rehabilitation of electrical and mechanical components of the vertical lift span, as well as replacement of the existing fender system with a new larger and stronger one. Construction is expected to be completed in July 2019. The construction may result in minimal diversions to the Henry Hudson Bridge, however impact to traffic at the Henry Hudson Bridge is expected to be minimal.

- **I-87/Major Deegan Expressway** – Rehabilitation of various overpasses along the Major Deegan Expressway between the RFK Bridge and Mosholu Parkway is scheduled for design and construction through 2021. The anticipated schedule for construction is:
    - RFK Bridge to 138th Street – winter 2018/2019 – spring 2021
    - 160th Street to 232nd Street – spring 2017 – spring 2019

- 232nd Street to City Line – fall 2019 – summer 2021
- Over Mosholu Parkway – Construction began in January 2015 and is scheduled to continue through June 2017

The Major Deegan Expressway between East 138th Street and the 161st Street/Macombs Dam Bridge interchange will be reconstructed to address structural deficiencies. The concrete deck will be replaced and approximately one mile of the steel structure will be repaired. The substructure will also be repaired. Construction began in spring 2014 and is expected to be completed in spring 2019.

Two bridges over the subway and Metro-North rail yard (on the Major Deegan Expressway in the Bronx) will be eliminated. This project will also include operational improvements to the southbound and northbound roadways to ensure motorist safety. This project commences in fall 2017 and expected to be completed in fall 2019.

Safety and operational improvements northbound from Burnside Avenue to Van Cortlandt Park, including West 230th Street, are scheduled from summer 2021 to spring 2023. Traffic impacts at the RFK Bridge should not be significant.

- **I-95/Alexander Hamilton Bridge and Highbridge interchange ramps rehabilitation** – This project will rehabilitate the I-95 corridor between Amsterdam Avenue in Manhattan and Undercliff Avenue in the Bronx. Major construction commenced in spring of 2009 and was completed in July 2014.

- **I-95/Cross Bronx Expressway** – Several rehabilitation projects are in development for the Cross Bronx Expressway. Rehabilitation of six bridges through replacement of deck and superstructure from Boston Road to the Bronx River Parkway is expected to begin in summer 2020 and extend through summer 2024.

  Replacement of the deck on three bridges (Pennyfield Avenue, Lafayette Avenue and Castle Hill Avenue). Other deteriorated elements such as the concrete substructure and bearings will also be repaired to address the structural deficiencies. Construction is currently underway and is expected to be completed in winter 2016.

  Rehabilitation of the Grant Avenue Bridge to address structural deficiencies is scheduled to begin in winter 2015/2016 and expected to be completed in fall 2018.

  General rehabilitation work from Rosedale Avenue to Havemeyer Avenue was completed in 2014. Resurfacing is currently underway between University Avenue and Havemeyer Avenue and is expected to be completed in spring 2015. Since alternative routes are limited, it is anticipated that there will be limited effect on TBTA crossings.

  Rehabilitation and deck replacement of three bridges in the Highbridge Interchange. These bridges carry ramps between the Cross Bronx Expressway and Major Deegan Expressway.

Construction is expected to begin in summer 2018 and is expected to be completed in spring 2020.

Rehabilitation of Nelson Avenue Bridge over Cross Bronx Expressway in the Bronx. The scope will include replacing the bridge deck, repairing concrete substructures, replacing bearings, and repairing other deteriorated elements to assure continued safe operations. The steel superstructure is in fair condition and will require minor repairs. Construction is expected to begin in spring 2018.

Rehabilitation of Jerome Avenue and East 174th Street Bridges over Cross Bronx Expressway to extend the service life of the two bridges. The scope of work will include replacement of the bridge decks/slabs, the repair of superstructures, the repair of concrete substructures, the replacement of bearings, and the repair of other deteriorated elements to assure continued safe operations. Construction is expected to begin in summer 2020.

- **Bruckner/Sheridan Expressway Interchange** – The project consists of reconstruction of the Bruckner Expressway viaduct and the related ramps to address the poorly rated deck, deteriorated concrete columns, repair/replacement of the bearings, pedestals and other minor work elements. The twelve bridges in this project include ten vehicular bridges and two pedestrian bridges. It is anticipated that reconstruction will start in 2017 and be completed in 2020.

- **I-95/Bruckner Expressway** – Addition of fourth lane northbound between Pelham Parkway and East Gun Hill Road and between Wilkinson Avenue and Hutchinson River Parkway. Construction for the former is slated for spring 2016 to spring 2017 and the latter is slated for winter 2018/2019 to spring 2021. Pavement resurfacing of Bruckner Expressway from Evergreen Avenue to Throgs Neck Expressway to ensure motorist safety is in future development, scheduled to start in fall 2016 and expected to be completed in fall 2018. Construction of access improvements between Brush Avenue and Pelham Parkway, which would involve the construction of new bridges, is scheduled from summer 2019 to summer 2020. Since alternative routes are limited, it is anticipated that there will be limited effect on TBTA crossings.

- **Bronx River Parkway** – General repairs on the Bronx River Parkway Bridge (State Route 907H) over Metro-North at 236th Street will address corrective maintenance issues. Construction is scheduled to begin in the summer of 2015 and to be completed by spring 2017.

  Replacement of deteriorated bridges on the Bronx River Parkway, specifically the two span bridge over AMTRAK/CSX (near the Cross Bronx Expressway), the single span bridge over East Tremont Avenue and the seventeen-span viaduct over E. 180th St/Morris Park Avenue and along the MTA's East 180th Street subway yard. The project will improve the roadway geometry, eliminate the structural deficiencies and provide standard travel lanes and shoulders. In addition, the project will provide a fully ADA compliant shared-use path and a

new exit ramp structure spanning over the AMTRAK/CSX tracks. Construction is expected to begin in summer 2022 and expected to be completed in summer 2026.

Reconstruction of the Gun Hill Road interchange to implement safety improvements along the northbound and southbound off ramps. The recommended improvements include an upgrade of the deceleration lane, extension of the two lane northbound ramp configuration limits, and the improvement of the geometry of the northbound off ramp geometry. Additionally, the southbound travel lanes as well as the southbound on ramp from Gun Hill Road will be resurfaced. Construction is expected to begin in winter 2017 and expected to be completed in winter 2018.

- **I-278/Gowanus Expressway** repair and deck replacement — The project includes replacement of the concrete deck and deteriorated elements, until a permanent improvement is constructed. Construction on the eastbound Brooklyn-Queens Expressway connector ramp, from the Hugh L. Carey Tunnel to the Prospect Expressway, the Prospect Expressway to the Belt Parkway and the southern section of the Gowanus Expressway is currently underway. The Belt (Shore) Parkway interchange began construction in 2010 and is expected to be complete in 2015. The project is being designed to minimize lane closures and traffic disruption, although there may be limited impacts on the Hugh L. Carey Tunnel and Verrazano-Narrows Bridge. The eastbound Bus/HOV lane is being maintained from the Verrazano-Narrows Bridge to the Hugh L. Carey Tunnel during the morning peak period.

  Replacement of decks between 4th Avenue and 52nd Street began in summer 2010 and is expected to be completed in May 2015.

  Replacement of decks on the 79th Street Bridge is scheduled to begin in winter 2018 and expected to be completed in winter 2022.

  Emergency repair and deck replacement on the Gowanus Expressway Viaduct near the Hugh L. Carey Tunnel is underway to replace 54,000 square feet of bridge deck and repair deteriorated structural steel and is expected to be completed in June 2016. One lane will be closed approaching and departing from the tunnel to the Gowanus Expressway on weekends to limit impacts during construction. This work is being closely coordinated with repairs to the Brooklyn plaza of the Hugh L. Carey Tunnel.

  Installation of TRANSMIT Readers & Travel Time Signs that will provide the Real Travel Time information to the motorists along the Gowanus Expressway from the Verrazano Narrows Bridge to the Hugh L. Carey Tunnel. The project, which began in 2014, is currently under construction and is estimated to be completed in spring 2016.

- **I-278/Brooklyn-Queens Expressway (BQE)** — Replacement of girder/floor beam system on eastbound BQE ramp to Grand Central Parkway is scheduled to begin in summer 2015 and expected to be completed in summer 2018.

In addition to the above, NYSDOT is scoping future safety and operational improvements. The project is expected to go to construction in 2017 and last one year.

The BQE Environmental Shield at 63rd Street project proposes the construction of an environmental shield along the south side of the eastbound Brooklyn-Queens Expressway at exit 36 off ramp. The primary objective is to offer some shield over the Nathan Weidenbaum Park which is located between 63rd and 64th Streets along Laurel Hill Blvd. The project began in fall 2013 and expected to be completed in winter 2015.

These above projects could have potential limited impacts on the RFK Bridge and Queens Midtown Tunnel.

Rehabilitation of the Grand Central Parkway interchange complex from 71st Street to 82nd Street and 25th Avenue on the Brooklyn-Queens Expressway to the Grand Central Parkway ramp is scheduled to begin in 2020, preceded by the section of Grand Central Parkway from Astoria Boulevard to 44th Street in 2019. The projects involve reconstruction of the highway interchange and both stages are currently in development. This project has the potential for lane closures that could affect the Queens Midtown Tunnel and the RFK Bridge; however, this would affect alternative routes as well. Maintenance and Protection of Traffic (MPT) plans for maintaining traffic flows during construction for these projects are not available at this time and therefore the impacts cannot be assessed.

FHWA and NYSDOT completed the Final Environmental Impact Statement (FEIS) for the I-278/BQE Kosciuszko Bridge project (Phase I and Phase II) on November 25, 2008. The FEIS recommended a replacement of the existing bridge by building a new permanent, parallel structure on the east side of the existing bridge. The recommended alternative provides for maintaining all lanes on the Brooklyn-Queens Expressway and local connections, while constructing a replacement bridge. The project will be a Design-Build project. Phase I has been awarded to the design-build team, and construction began in fall 2014 and is estimated to be completed in fall 2017. Phase II of the project is expected to begin in spring 2018, with completion expected in summer 2020. This project has the potential for lane closures that could affect the Queens Midtown Tunnel; however, this would affect alternative routes as well. Maintenance and Protection of Traffic (MPT) plans to maintain the existing number of lanes during peak periods on the Brooklyn-Queens Expressway with off-peak closures. Due to construction activities, there may be delays which could cause diversions that would affect traffic at the Queens Midtown Tunnel.

- **Belt Parkway** – Installation of Advanced Traffic Management System equipment from the Gowanus Expressway to Cross Bay Boulevard is scheduled to begin in fall 2018 and end in summer 2020. Traffic to/from the Verrazano-Narrows Bridge, Cross Bay Bridge, and Marine Parkway Bridge may be affected.

  Reconstruction of the seven bridges and their approaches on the Belt Parkway (over three local streets and four waterways) began in the fall of 2009. Paerdegat Basin, Fresh Creek,

and the Rockaway Parkway bridges were substantially completed in fall 2014. Gerritsen Inlet Bridge started in February 2013 and is expected to be complete in summer 2017. Mill Basin Bridge is expected to start in early to mid-2015 and to be complete in summer 2020. Bay Ridge Avenue Bridge started in November 2013 and is expected to be complete in fall 2015. Nostrand Avenue Bridge is expected to start in Fiscal Year 2022.

Traffic to/from the Verrazano-Narrows Bridge, Cross Bay Bridge, and Marine Parkway Bridge may be affected by these construction projects.

- **Grand Central Parkway/94th Street interchange** – This project involves implementing safety and operational improvements at the intersection of 94th Street and Ditmars Boulevard, plus bridge rehabilitation of the 94th Street Bridge and the 62nd Drive pedestrian bridge over the Grand Central Parkway and bridge painting and maintenance of approximately 30-40 bridges. The project began in 2010 and was completed at the end of 2014. NYSDOT will also be letting an Intelligent Transportation Systems (ITS) project along the Grand Central Parkway.

  Grand Central Parkway and Jackie Robinson Parkway lighting improvement projects are scheduled to start in fall 2019 and expected to be completed in spring 2021.

  Reconstruction of the Grand Central Parkway and Brooklyn-Queens Expressway (east leg) interchange project is scheduled to start in spring 2020 and expected to be completed in spring 2021.

  Grand Central Parkway bridge rehabilitation over Winchester Blvd and ramp over Cross Island Parkway - Construction is expected to begin in Winter 2018/2019 and be completed in spring 2022.

- **I-678/Whitestone Expressway** Bridge over the Flushing River – The project will replace the existing fender system on the Whitestone Expressway bridges to protect the bridge piers as part of corrective maintenance. The project is under construction and is expected to be completed in winter 2016. Major impacts are not anticipated.

- **I-678/Van Wyck Expressway** – Rehabilitation of Roosevelt Avenue Bridge is scheduled to begin in 2015 with completion in 2017.

  Replacement of steel girders on the Rockaway Boulevard Bridge on Van Wyck Expressway is scheduled to begin in summer 2018 and expected to be completed in spring 2021. Major impacts are not anticipated.

  The New York State DOT currently has two contracts underway to reconstruct the Kew Gardens Interchange: The first contract, begun in the summer of 2010, involves the reconstruction of a half-mile section of the Van Wyck Expressway between Union Turnpike and Hillside Avenue, as well as a quarter-mile section of Queens Boulevard over the Van

Wyck Expressway. Work includes the construction of auxiliary lanes on the Van Wyck Expressway to ease the flow of traffic in both directions at the interchange with the Grand Central Parkway. This project is expected to be completed by the beginning of 2016. The second contract, which began in the spring of 2012, continues the reconstruction of the Van Wyck Expressway north to 72nd Avenue. The contract will replace the northbound Van Wyck Expressway two-lane viaduct with a three-lane version that includes shoulders. It will also replace the ramp connecting the westbound Jackie Robinson Parkway and Union Turnpike with the northbound Van Wyck, widening it from one lane to two. This project is slated for completion in the beginning of 2017. Major impacts to TBTA facilities are not anticipated.

Safety improvements are underway for repaving roads using multiple overlays of pavement on the Van Wyck Expressway southbound ramp to the Nassau Expressway. Construction was completed in December 2014.

- **I-495/Long Island Expressway** – Van Wyck Expressway to Grand Central Parkway — Various projects are underway to improve infrastructure, traffic operations and safety conditions on the Long Island Expressway, the Grand Central Parkway, the connecting cloverleaf interchange ramps, the service roads and the collector distributor roads in the project area. Interim rehabilitation of three bridges at the Long Island Expressway/Grand Central Parkway interchange, involving the replacement of the bridge superstructure, began in fall 2014 and is estimated to be completed in fall 2018. Major impacts are not anticipated.

  Long Island Expressway lighting improvement from the Grand Central Parkway to Main Street will start in winter 2014/2015 and expected to be completed in summer 2016. Major impacts are not anticipated.

  Plans are in development to extend the existing managed HOV/Bus contraflow lane from its current terminus at 58th Avenue to a new terminus in the vicinity of 102nd Street in Queens. The contraflow lane, operating on the left lane of the eastbound side of the Long Island Expressway, will operate on weekdays from 6AM to 1PM. Construction is expected to begin in winter 2018/2019 and be completed in fall 2020.

- **Route 9A** – After Route 9A (West Street) was heavily damaged when the World Trade Center was attacked; a six-lane temporary road was opened, allowing the Hugh L. Carey Tunnel to re-open. Further construction to improve Route 9A to a six- to eight-lane urban highway is ongoing. Upon completion, this may have a positive impact on traffic using the Hugh L. Carey Tunnel as motorists achieve the comfort level with the permanent traffic patterns that will be in place after completion. Construction is expected to be completed in fall 2016.

  The World Trade Campus Security project, in the vicinity of World Trade Center site, is also expected to affect Hugh L. Carey Tunnel traffic when implemented in 2019. A final Environmental Impact Statement for the project was completed in August 2013 and involves the implementation of a comprehensive perimeter vehicle security plan for the World Trade Center site.

Other projects include restoration and reconstruction of pavement joints and pavements striping, markings, urban design elements, pedestrian bridges, irrigation equipment, ITS equipment, drainage system, traffic signals, street lights, pedestrian bridge elevators/escalators on Route 9A damaged by Superstorm Sandy in addition to the required repairs of pavement joints, and bikeway/walkway pavement resurfacing and striping. Construction began in spring 2014 and is expected to be completed in winter 2016.

- **Harlem River/FDR Drive** — Replacement of decks on the Harlem River Drive exit ramp to 139th Street is scheduled to begin in Winter 2018/2019 and is expected to be completed in Winter 2021/2022.

  Design of safety alignment improvements southbound between East 125th and East 116th Streets is scheduled to begin in 2016 and is expected to be completed in spring 2018.

  The NYSDOT plans to rebuild the ramps connecting the Harlem River Drive to the Trans-Manhattan Expressway (I-95, US 1 and US 9).

  Replacement of the deck on the I-95 ramp is expected to begin in fall 2020 and finish in winter 2022/2023. These projects could have an impact on the RFK Bridge.

  Safety improvements on Harlem River Drive from 131st St. to 166th St. Improvements will include pavement resurfacing, replacement of median barriers and installation of median fence in high accident locations to eliminate pedestrian fatalities. Construction is expected to begin in winter 2016/2017 and be completed in fall 2017.

- **I-278/Goethals Bridge Replacement –** The environmental review process for The Port Authority of New York and New Jersey's Goethals Bridge Replacement Project was concluded with the United States Coast Guard's issuance of the Final Environmental Impact Statement in August 2010 and the Record of Decision in January 2011. The new bridge construction began in May 2014 and is forecasted to be in operation by late 2018. After the new bridge is in operation, the old bridge will be demolished. Impacts to the Verrazano-Narrows Bridge should be negligible given that the Goethals Bridge will not be closed during construction.

- **I-278/Staten Island Expressway** – A recent Bus Lane/Priority Lane Study analyzed the feasibility of extending the bus lanes west to the Goethals Bridge toll plaza; and allowing use of the lanes by high-occupancy vehicles (HOV3+). These improvements would provide alternatives to single-occupant automobile use, particularly during peak periods. Construction contract for Bus/HOV lane between Slosson Avenue and Victory Boulevard was awarded in December 2011 and is scheduled for completion in fall 2015. This project could have limited impact on the Verrazano-Narrows Bridge.

  An ongoing project to improve access on the Staten Island Expressway (I-278) between the Verrazano Narrows Bridge toll plaza and Clove Road in Richmond County was scheduled for

completion in early 2015. Improvements will include the construction of five new ramps, relocation of two ramps, reconfiguration of one ramp and addition of auxiliary lanes. The replacement of the Fingerboard Road Bridge over the expressway has been completed. These improvements are largely complete and have been extensively coordinated with the toll plaza reconstruction work at the Verrazano-Narrows Bridge under an inter-agency agreement between TBTA and the New York State Department of Transportation, thereby minimizing impacts to traffic at the Verrazano-Narrows Bridge.

Replacement of the decks of two bridges (Hylan Boulevard over northbound and southbound Staten Island Expressway) to address structural deficiency issues began in January 2015 and is expected to be completed in January 2017. Some impact to the Verrazano-Narrows Bridge is expected as a result of this project.

Additional projects in Staten Island scheduled for the long term would likely have little negative impacts on the Verrazano-Narrows Bridge during construction but positive impact upon completion.

- **Pulaski Skyway (Routes 1 & 9 in New Jersey)** – The contract for reconstruction and rehabilitation of the Pulaski Skyway, an elevated roadway for automobiles only, extending from the vicinity of Newark Airport to the approach to the Holland Tunnel, was awarded in May 2012 and is scheduled for completion in 2020. During construction, the Skyway will be closed in the north/east bound direction for two years (this began in April 2014). The Verrazano-Narrows Bridge could provide an alternative route for traffic between southern New Jersey and Manhattan but the shift of traffic is anticipated to be minimal. There will be no impact on TBTA toll revenues since the Skyway closure is in the eastbound toll-free direction on the Verrazano-Narrows Bridge.

- **Route 440/Bayonne Bridge** – In December 2010, the Port Authority announced that the Bayonne Bridge would be raised to solve the navigational clearance restrictions. The construction began in May 2013 and will be completed by the second quarter of 2017.

- **Intelligent Transportation Systems (ITS)** – Funds are programmed for ITS planning, coordination and management, and for operational support of NYCDOT's Joint Transportation Management Center (JTMC) and Integrated Incident Management System. Active management of traffic and incidents could result in smoother flow on the highway system including TBTA facilities.

Transit Improvements

Significant transit improvements, when completed, are expected to affect TBTA traffic levels during the forecast period through the year 2024.

- **MTA Second Avenue Subway** – Construction of Phase 1 started in April 2007 and is scheduled for completion in 2016. Service from new stations at East 96th, East 86th and East 72nd Streets along Second Avenue will connect to the 63rd Street line. Four traffic lanes will be maintained through construction zones, and cross streets will be kept open. The 2015-2019 Capital Program includes funding to complete design and initial construction of Phase 2 (125th St. to 96th St.) of the Second Avenue Subway, Phase 3 (63rd St. to Houston St.) and Phase 4 (to Lower Manhattan; Houston St. to Hanover Square) is not yet funded and is not included in the current MTA Capital Program. It is anticipated that some travelers to the East Side may shift to MTA New York City Transit from other modes, including TBTA facilities.

- **MTA/LIRR East Side Access** – This project will result in a new connection from the LIRR Main and Port Washington lines in Queens to a new LIRR terminal beneath Grand Central Terminal in Manhattan. Excavations to create caverns within Grand Central Terminal were completed in 2013. Four new tunnels are being bored in Queens. Tunneling began in 2007. In Manhattan, new tunnels will be bored from the existing bellmouth structure at Second Avenue and 63rd Street, west and then south, under Park Avenue and Metro-North Railroad's four-track right-of-way into Grand Central Terminal. Project completion is scheduled for 2023. MTA anticipates that some travelers to the East Side will shift to the LIRR from other modes, including TBTA facilities.
- **Penn Station Access Study** – This study is to evaluate proposed additional rail services for the New York Metropolitan Area, which would improve access between Metro-North east-of-Hudson service area to the West Side of Manhattan, creating two new stations on the West Side of Manhattan and four in the East Bronx. The MTA is preparing a federal Environmental Assessment, and will update key technical analysis that were previously prepared for Draft Environmental Impact Statement (DEIS). MTA expects environmental and federal reviews to be completed by 2017.

Summary of Assumptions and Conditions

TBTA traffic, toll revenues and expenses have been projected by Stantec on the basis of the historical record of traffic, toll revenues and expenses, the capacities of the TBTA facilities, traffic growth forecasts, the estimated traffic elasticity due to toll variations, impacts of construction projects and the following assumptions and conditions, which we believe are reasonable.

- All TBTA facilities will be operated efficiently and maintained in good physical condition in order to attract customers and to sustain traffic demand levels.

- The TBTA 2015 – 2019 Capital Program that was approved by the MTA Board on September 24, 2014 will be carried out throughout the forecast period. Future capital programs

sufficient to maintain the structural integrity of bridges and tunnels will be adopted and implemented throughout the forecast period.

- Electronic toll payment by E-ZPass will continue to be available on all TBTA crossings, and the payment of revenue in full to TBTA will continue to be in accordance with current inter-agency agreements. More than 84 percent of all tolls paid on TBTA facilities are E-ZPass transactions.

- It is assumed that congestion pricing in Manhattan will not be implemented in the time period included in these forecasts.

- Competing East River crossings will continue to operate toll-free and to be maintained in efficient operating condition.

- For the scenario with constant tolls, the present toll schedule will be in effect during the remainder of the forecast period through 2025. For the scenario with toll increases, tolls on TBTA facilities will be increased by 4 percent for most customers on March 1, 2017, in accordance with the MTA Financial Plan 2015-2018 adopted by the MTA Board in February, 2015.

- Capacity constraints on the local and arterial highway networks which may be somewhat mitigated by stagnant traffic growth in the near term will, however, continue to limit traffic growth on the nine TBTA crossings. This is reflected in conservative growth rates used to forecast TBTA traffic.
- Although city and State budget difficulties continue, highway/crossing improvements, in general, for the competing bridges and roadway network will be made in accordance with the plans and schedules described herein.

- Major TBTA roadway and structural improvements will continue to be performed during nighttime and non-peak hours, and/or in the off-peak direction, and approaches to the nine TBTA crossings will not be significantly impaired by construction work.

- The forecasts are based on the assumption that E-ZPass usage will grow at the rate of 0.50 percent in 2015 through 2020 and 0.25 percent in 2021and following years. While usage at a higher level would improve toll plaza operating conditions, it would also result in lower average tolls and, therefore, could reduce the rate of increase in gross toll revenues relative to traffic growth. However, growth in traffic volumes would be limited without E-ZPass at the toll plazas. For the purposes of this report, it has been assumed that AET would not be implemented at any other facilities throughout the duration of this forecast.

- Growth assumptions, based on trends in regional employment and population, forecast by New York Metropolitan Transportation Council (NYMTC) through 2050, will be realized in the Tri-State area and in the City.

- If gasoline prices in the New York metropolitan area were to increase again to and above the levels they did when they spiked in 2008 and 2011, discretionary travel could decline and there may be fewer recreational trips. Also, the reduced non-work travel could also make the toll-free alternatives more competitive. In general, however, TBTA facilities carry regular commuters and other non-discretionary trips so that the overall impact on toll volumes and toll revenues is not expected to be significant if prices do not increase substantially above previously experienced high levels.

- LIRR East Side Access may shift some Long Island auto commuters to rail, after its planned completion in 2023.

- Current TBTA reduced rate toll programs and MTA rebate programs remain in effect at current projected levels, including reduced rates for NYCSC E-ZPass and token customers and for Staten Island residents at the Verrazano-Narrows Bridge and for Rockaway Peninsula and Broad Channel residents at the Cross Bay and Marine Parkway Bridges. TBTA's reduced rate programs provide, by statute, a toll rate lower than the cash rate for Staten Island Residents using resident tokens to cross the Verrazano-Narrows Bridge and for Rockaway Residents using resident tokens and non-residents using minor tokens to cross the Cross Bay and Marine Parkway Bridges. The reduced rate programs provide, by Board policy, a toll rate lower than the cash rate to non-resident NYCSC E-ZPass customers. TBTA's reduced rate programs also provide, by Board Policy, a toll rate lower than the NYCSC E-ZPass rate to Staten Island Residents crossing the Verrazano-Narrows Bridge and to Rockaway Residents crossing the Cross Bay and Marine Parkway Bridges. The MTA's rebate programs lower the effective toll rates below the reduced rates discussed above for Rockaway Residents at the Cross Bay Bridge and Staten Island Residents and certain commercial vehicles with NYCSC commercial and business accounts at the Verrazano-Narrows Bridge by using a combination of MTA funds and New York State funds to pay for all or a portion of the toll. TBTA's "reduced rate" programs result in reduced revenues to TBTA while MTA's rebate programs are revenue neutral to TBTA; both result in increased traffic.

- No other reduced rate toll programs will be introduced that would adversely affect the TBTA toll facilities' revenue stream.

- Economic conditions, nationally and in the New York Metropolitan Area, will slowly continue to improve in the next five years at a very moderate pace.

- No material natural disaster or local, state or national emergency will occur that would materially alter travel patterns and divert traffic from the TBTA facilities.

While the projections are made and presented year-by-year by Stantec, they are intended to show trends on the basis of its analysis of historical data and the assumptions and conditions set forth above. Variations in the year-to-year forecasted results may occur and such variations may be significant.

PROJECTED TRAFFIC, REVENUES, AND EXPENSES

Current and future traffic and toll revenues are estimated for the 11-year (2015-2025) forecast period for each TBTA facility based on historical trends in traffic and toll revenue, elasticity factors for the future toll increase, toll collection operations, capacities of the nine crossings, facility maintenance, E-ZPass participation levels, externalities such as area roadway improvement plans and regional demographic projections, and the assumptions and conditions summarized previously. Trends in operating expenses for the toll facilities, TBTA's 2015 budget and 2016 through 2018 financial plans, and growth estimates based on the Consumer Price Index and historical trends are reflected in the future operating expense forecast. Future operating expense estimates are used to develop net toll revenue projections over the forecast period.

Estimated Traffic and Toll Revenue, 2015

Stantec's development of the traffic and toll revenue estimates for 2015 took into account the economic condition of the region, fuel prices, unusual weather events and construction projects. The impacts in the long term, regarding the national and regional economies, projected employment in the Manhattan business districts and the traffic and toll revenue forecasts beyond 2015, are covered in a previous section of this report. In developing the traffic and toll revenue estimates for 2015, Stantec reviewed data for the previous four year period (2011-2014) as well as preliminary 2015 data. In addition, Stantec reviewed data from competing toll and toll-free facilities to determine recent regional traffic trends. The estimates for the remainder of 2015 assume that the base traffic levels for the remaining months of calendar year 2015 will be 0.2 percent greater than volumes in the same months of 2014. The forecast percent changes are shown in Table 21. Traffic volumes in January through March 2015 increased when compared to the same months in 2014, primarily due to the severe winter storms that occurred during January and February 2014.

Table 21 Estimated Changes in Annual Traffic, 2014 to 2015

Facility	Actual Percent Change January-March 2014 to 2015[a]	Estimated Percent Change April-December 2014 to 2015	Estimated Percent Change Full Year 2014 to 2015
Throgs Neck Bridge	3.6%	0.6%	1.2%
Bronx-Whitestone Bridge	2.9	0.6	1.1
RFK Bridge	3.7	0.6	1.2
Queens Midtown Tunnel	2.6	0.6	1.0
Hugh L. Carey Tunnel	6.8	-0.1	1.3
Verrazano-Narrows Bridge	2.6	-0.5	0.2
Henry Hudson Bridge	0.9	-0.8	-0.5
Marine Parkway Bridge	1.0	-0.4	-0.1
Cross Bay Bridge	2.9	-0.2	0.5
All	3.1	0.2	0.8

Notes:
(a) Based on preliminary actual data, subject to final audit.

As shown in Table 21, total 2015 traffic at the crossings is forecasted to increase at an average rate of 0.8 percent for the year, which is the result of an actual 3.1 percent gain in January through March primarily due to less severe weather this year, and net system-wide growth of 0.2 percent from April through December is projected, reflecting continued economic improvement partially offset by reduced volumes following the March 2015 toll increase. Traffic is estimated to decrease from March through December at the Hugh L. Carey Tunnel, the Verrazano-Narrows Bridge, the Henry Hudson Bridge, Marine Parkway Bridge, and Cross Bay Bridge primarily due to the toll increase; however, at the remaining facilities, projected net system-wide growth stemming largely from continued modest economic improvement is estimated to more than offset the negative impacts of the toll increase. Average tolls are projected to increase due to the higher rates implemented in March 2015. The resulting traffic and toll revenue estimates for 2015 are presented in Table 22. Estimated toll revenue for 2015 is based on average toll rates developed from the March 2015 toll schedule and the projected vehicle class distribution and payment method for 2015.

Table 22 Estimated 2015 Toll-Paying Traffic and Toll Revenue

Facility	Traffic (000s)	Average Toll	Revenue (000s)
Throgs Neck Bridge	41,323	$7.65	$315,979
Bronx Whitestone Bridge	38,897	7.00	272,327
RFK Bridge	60,630	6.79	411,648
Queens Midtown Tunnel	29,289	6.37	186,546
Hugh L. Carey Tunnel	17,160	6.05	103,818
Verrazano-Narrows Bridge	64,118	5.57	357,199
Henry Hudson Bridge	22,120	3.02	66,707
Marine Parkway Bridge	7,390	2.17	16,037
Cross Bay Bridge	7,591	2.22	16,870
Total	288,518	$6.06	$1,747,132
Percent Change			
2014-2015 (All Facilities)	0.8%	3.4%	4.2%

Summarizing, our estimates show a 0.8 percent increase in traffic, a 3.4 percent increase in the system-wide average toll and a 4.2 percent increase in system-wide revenue over 2014, which reflects actual performance through March 2015 and anticipated traffic volumes for the remainder of the year. Table 22 provides the transition between the historical traffic and revenue data presented earlier in the report and the 10-year forecasts in Table 23 and Table 24.

Traffic and Toll Revenue at Current Tolls

Traffic and toll revenues were first projected on the basis that the tolls placed into effect on March 22, 2015 will be continued throughout the forecast period. The methodology employed by Stantec to forecast traffic was based on the development of an annual growth rate for each facility (based on historical traffic trends), the construction activities (historical and projected) throughout the highway network (bridges, tunnels and arterials) and the traffic capacity constraints in the network. Regional demographic projections were also taken into consideration.

All indicators point to the potential for traffic growth in the short-term, reflecting gradually improving economic conditions, constrained by the uncertainty regarding cost and supply of motor fuel. An additional factor affecting growth is the potential capacity constraints in the regional transportation network due to construction projects.

The 2015 estimated traffic and revenue from Table 22 includes the impacts of the March 2015 toll increase. Starting with the estimate for 2015 as a base, Stantec projected the traffic and toll revenue for the forecast period through 2025 (at constant tolls at the current rates established on March 22, 2015), as shown in Table 23.

Changes in traffic volumes are in the range of -0.5 to +1.3 percent in 2015, depending on the facility. As previously discussed this is based on the actual change in traffic on each facility in January through March 2015 (for which preliminary data are available) and projections by facility for the April through December period. For 2016, traffic is projected to increase at 0.5 percent system-wide, with growth rates varying by facility. For 2017, traffic is projected to increase at 0.5 percent annually at all facilities. For 2018 through 2025, it is forecast that traffic will grow at 0.25 percent per year at all facilities. With respect to employment forecasts, our growth assumptions are based on NYMTC's employment projections.

Traffic and Toll Revenue with Assumed 2017 Toll Increase

The traffic forecast with a toll increase in 2017 was built upon the base forecast (from Table 23), to which the elasticity impacts (from Table 19) were applied. In accordance with the MTA Financial Plan 2015 to 2018 adopted by the MTA Board in February 2015, Stantec applied the appropriate increase in toll rates (from Table 20) effective March 1, 2017 (4 percent toll increase) to calculate the corresponding toll revenues in the respective years. The traffic and revenue forecasts with a toll increase in 2017 are listed in Table 24.

Table 23 Traffic and Toll Revenue Forecast, Constant Tolls

Year	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazano-Narrows Bridge[a]	Henry Hudson Bridge	Marine Parkway Bridge	Cross Bay Bridge	Total
Traffic Change										
2014-2015	1.18%	1.06%	1.21%	1.00%	1.30%	0.17%	-0.52%	-0.12%	0.50%	0.75%
2015-2016	0.69	0.69	0.91	0.91	0.80	-0.07	0.11	-0.05	-0.02	0.51
2016-2017	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
2017-2018	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2018-2019	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2019-2020	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2020-2021	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2021-2022	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2022-2023	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2023-2024	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2024-2025	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Annual Traffic (000s)										
2014	40,840	38,488	59,902	28,998	16,940	64,007	22,235	7,399	7,553	286,361
2015	41,323	38,897	60,630	29,289	17,160	64,118	22,120	7,390	7,591	288,518
2016	41,609	39,165	61,182	29,555	17,297	64,073	22,144	7,386	7,589	290,000
2017	41,817	39,361	61,488	29,703	17,384	64,393	22,254	7,423	7,627	291,450
2018	41,921	39,460	61,642	29,777	17,427	64,554	22,310	7,442	7,646	292,179
2019	42,026	39,558	61,796	29,852	17,471	64,715	22,366	7,460	7,665	292,909
2020	42,131	39,657	61,950	29,926	17,514	64,877	22,422	7,479	7,684	293,641
2021	42,236	39,756	62,105	30,001	17,558	65,039	22,478	7,498	7,703	294,375
2022	42,342	39,856	62,260	30,076	17,602	65,202	22,534	7,516	7,723	295,111
2023	42,448	39,955	62,416	30,151	17,646	65,365	22,590	7,535	7,742	295,849
2024	42,554	40,055	62,572	30,227	17,690	65,528	22,647	7,554	7,761	296,589
2025	42,660	40,155	62,729	30,302	17,734	65,692	22,703	7,573	7,781	297,330
Average Toll										
2014	$7.40	$6.77	$6.57	$6.16	$5.85	$5.40	$2.92	$2.11	$2.15	$5.85
2015	$7.65	$7.00	$6.79	$6.37	$6.05	$5.57	$3.02	$2.17	$2.22	$6.06
2016	$7.68	$7.03	$6.82	$6.40	$6.08	$5.59	$3.03	$2.16	$2.22	$6.08
2017	$7.68	$7.03	$6.82	$6.40	$6.08	$5.59	$3.03	$2.18	$2.23	$6.09
2018	$7.67	$7.02	$6.81	$6.40	$6.08	$5.59	$3.03	$2.18	$2.23	$6.08
2019	$7.66	$7.02	$6.80	$6.40	$6.08	$5.58	$3.03	$2.18	$2.23	$6.08
2020	$7.66	$7.01	$6.79	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.07
2021	$7.65	$7.01	$6.79	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.07
2022	$7.65	$7.00	$6.78	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.07
2023	$7.65	$7.00	$6.78	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.06
2024	$7.64	$6.99	$6.78	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.06
2025	$7.64	$6.99	$6.77	$6.40	$6.08	$5.57	$3.03	$2.18	$2.23	$6.06
Toll Revenue (000s)										
2014	$302,110	$260,756	$393,622	$178,631	$99,135	$345,466	$64,879	$15,578	$16,269	$1,676,445
2015	$315,979	$272,327	$411,648	$186,546	$103,818	$357,199	$66,707	$16,037	$16,870	$1,747,132
2016	$319,546	$275,420	$417,115	$189,161	$105,153	$357,946	$67,029	$15,977	$16,815	$1,764,162
2017	$321,149	$276,801	$419,208	$190,235	$105,769	$360,260	$67,472	$16,192	$17,044	$1,774,131
2018	$321,636	$277,191	$419,732	$190,711	$106,034	$360,655	$67,641	$16,233	$17,086	$1,776,918
2019	$322,123	$277,580	$420,257	$191,188	$106,299	$361,049	$67,810	$16,273	$17,129	$1,779,708
2020	$322,611	$277,970	$420,782	$191,666	$106,565	$361,443	$67,979	$16,314	$17,172	$1,782,501
2021	$323,258	$278,513	$421,570	$192,145	$106,831	$362,346	$68,149	$16,355	$17,215	$1,786,382
2022	$323,906	$279,057	$422,359	$192,625	$107,098	$363,252	$68,320	$16,396	$17,258	$1,790,271
2023	$324,556	$279,601	$423,150	$193,107	$107,366	$364,160	$68,491	$16,437	$17,301	$1,794,168
2024	$325,207	$280,147	$423,942	$193,590	$107,634	$365,071	$68,662	$16,478	$17,344	$1,798,074
2025	$325,859	$280,693	$424,736	$194,073	$107,903	$365,983	$68,834	$16,519	$17,387	$1,801,988

Note: (a) Westbound traffic doubled, since traffic is not registered in the eastbound direction.

Table 24 Traffic and Toll Revenue Forecast, with Assumed 2017 Toll Increase

Year	Throgs Neck	Bronx-Whitestone	RFK	Queens Midtown	Hugh L. Carey	Verrazano-Narrows[a]	Henry Hudson	Marine Parkway Bridge	Cross Bay Bridge	Total
Traffic Change										
2014-2015	1.18%	1.06%	1.21%	1.00%	1.30%	0.17%	-0.52%	-0.12%	0.50%	0.75%
2015-2016	0.69	0.69	0.91	0.91	0.80	-0.07	0.11	-0.05	-0.02	0.51
2016-2017	-0.37	-0.37	-0.55	-0.29	-0.90	-0.42	-0.85	-0.59	-0.38	-0.48
2017-2018	-0.07	-0.07	-0.09	0.15	0.05	-0.08	-0.10	-0.31	-0.28	-0.06
2018-2019	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2019-2020	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2020-2021	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2021-2022	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2022-2023	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2023-2024	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2024-2025	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Annual Traffic (000s)										
2014	40,840	38,488	59,902	28,998	16,940	64,007	22,235	7,399	7,553	286,361
2015	41,323	38,897	60,630	29,289	17,160	64,118	22,120	7,390	7,591	288,518
2016	41,609	39,165	61,182	29,555	17,297	64,073	22,144	7,386	7,589	290,000
2017	41,456	39,022	60,847	29,469	17,141	63,802	21,955	7,342	7,560	288,593
2018	41,428	38,995	60,789	29,514	17,149	63,750	21,934	7,319	7,538	288,417
2019	41,532	39,093	60,941	29,588	17,192	63,909	21,988	7,338	7,557	289,138
2020	41,636	39,191	61,094	29,662	17,235	64,069	22,043	7,356	7,576	289,861
2021	41,740	39,289	61,246	29,736	17,278	64,229	22,099	7,374	7,595	290,586
2022	41,844	39,387	61,400	29,810	17,321	64,390	22,154	7,393	7,614	291,312
2023	41,949	39,485	61,553	29,885	17,365	64,551	22,209	7,411	7,633	292,041
2024	42,054	39,584	61,707	29,960	17,408	64,712	22,265	7,430	7,652	292,771
2025	42,159	39,683	61,861	30,034	17,452	64,874	22,320	7,448	7,671	293,503
Average Toll										
2014	$7.40	$6.77	$6.57	$6.16	$5.85	$5.40	$2.92	$2.11	$2.15	$5.85
2015	$7.65	$7.00	$6.79	$6.37	$6.05	$5.57	$3.02	$2.17	$2.22	$6.06
2016	$7.68	$7.03	$6.82	$6.40	$6.08	$5.59	$3.03	$2.16	$2.22	$6.08
2017	$7.94	$7.27	$7.04	$6.62	$6.28	$5.76	$3.13	$2.22	$2.27	$6.28
2018	$7.97	$7.30	$7.07	$6.66	$6.32	$5.79	$3.15	$2.25	$2.30	$6.32
2019	$7.96	$7.29	$7.06	$6.66	$6.32	$5.79	$3.15	$2.25	$2.30	$6.31
2020	$7.96	$7.28	$7.05	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.31
2021	$7.95	$7.28	$7.05	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.30
2022	$7.95	$7.27	$7.05	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.30
2023	$7.94	$7.27	$7.04	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.30
2024	$7.94	$7.27	$7.04	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.30
2025	$7.94	$7.26	$7.03	$6.66	$6.32	$5.78	$3.15	$2.25	$2.30	$6.29
Toll Revenue (000s)										
2014	$302,110	$260,756	$393,622	$178,631	$99,135	$345,466	$64,879	$15,578	$16,269	$1,676,445
2015	$315,979	$272,327	$411,648	$186,546	$103,818	$357,199	$66,707	$16,037	$16,870	$1,747,132
2016	$319,546	$275,420	$417,115	$189,161	$105,153	$357,946	$67,029	$15,977	$16,815	$1,764,162
2017	$329,065	$283,550	$428,633	$194,977	$107,665	$367,658	$68,635	$16,307	$17,182	$1,813,671
2018	$330,239	$284,572	$429,941	$196,455	$108,423	$369,348	$69,049	$16,465	$17,370	$1,821,864
2019	$330,739	$284,972	$430,478	$196,946	$108,694	$369,751	$69,221	$16,506	$17,414	$1,824,722
2020	$331,239	$285,372	$431,015	$197,438	$108,966	$370,153	$69,394	$16,548	$17,457	$1,827,582
2021	$331,904	$285,929	$431,822	$197,932	$109,239	$371,078	$69,568	$16,589	$17,501	$1,831,561
2022	$332,569	$286,487	$432,630	$198,427	$109,512	$372,006	$69,742	$16,631	$17,545	$1,835,547
2023	$333,236	$287,046	$433,440	$198,923	$109,785	$372,936	$69,916	$16,672	$17,588	$1,839,543
2024	$333,905	$287,605	$434,251	$199,420	$110,060	$373,868	$70,091	$16,714	$17,632	$1,843,546
2025	$334,574	$288,166	$435,064	$199,919	$110,335	$374,803	$70,266	$16,756	$17,676	$1,847,559

Note: (a) Westbound traffic doubled, since traffic is not registered in the eastbound direction.

Effects of Second Avenue Subway Construction in Forecast Years

The foregoing tables forecasting traffic and toll revenues incorporate estimated effects of the construction of the Second Avenue Subway. While not likely, activity associated with such construction could result in changes to traffic patterns, possibly resulting in a shift of traffic volumes to other TBTA facilities, as well as the toll-free East River Bridges or a diversion to mass transit. Such changes in traffic patterns could have an adverse effect on the forecasts set forth in Table 23 and Table 24 as described in the following paragraph.

Various stages of the project will result in visible construction activity on segments of Second Avenue at any given time. In addition, tunnel construction, either through the use of a tunnel boring machine or cut-and-cover, will affect vehicular activity not only on Second Avenue, but also on adjacent avenues and streets. The first phase of the project is between 96th Street and 63rd Street. With four lanes being maintained on Second Avenue, there have been no discernible impacts on RFK Bridge traffic levels.

Operating Expenses

Operating expenses have been budgeted by TBTA for 2015 at $495.2 million, an increase of 11.6 percent over 2014 operating expenses of $443.8 million. These expenses are split into the following categories: labor expenses of $254.0 million (an increase of 6.5 percent over 2014) and non-labor expenses of $241.2 million (an increase of 17.5 percent over 2014). Labor expenses are higher primarily due to fewer expected vacancies, contractual payroll adjustments, and inflationary increases to fringe benefits. The major factors behind growth in non-labor expenses are anticipated increases in major maintenance, including bridge painting projects that will not be eligible for capital funding, and higher E-ZPass expenses associated with expected continued growth in usage.

The projection of operating expenses for 2015 through 2025 is shown in Table 25. Total operating expenses, consisting of labor and non-labor, are estimated to increase from $495.2 million in 2015 to $719.5 million in 2025. Labor expenses consist of wages, salaries, overtime and fringe benefits. Non-labor expenses include items such as maintenance, supplies, utilities and other expenses. The table includes operating expenses budgeted by TBTA for 2015, operating expenses projected by TBTA through 2018 and Stantec's projections of operating expenses from 2019 through 2025. Stantec projected that labor expenses would increase at a rate of 4 percent annually while non-labor expenses would increase at a rate of 5 percent per year.

Stantec does not project any variation in operating expenses resulting from the reduced traffic levels brought about by periodic toll increases.

Table 25 Projected Operating Expenses
(000s)

Year	Labor[a]	Non-Labor[b]	Total[c]
2015[d]	$253,965	$241,229	$495,194
2016[d]	256,666	240,905	497,571
2017[d]	263,475	247,715	511,190
2018[d]	270,749	258,114	528,863
2019	281,579	271,020	552,599
2020	292,842	284,571	577,413
2021	304,556	298,799	603,355
2022	316,738	313,739	630,477
2023	329,408	329,426	658,834
2024	342,584	345,897	688,481
2025	356,287	363,192	719,480

Notes:
(a) Salaries, overtime and fringe benefits, net of capital reimbursement.
(b) Non-labor includes the following categories: maintenance and supplies, outside services, insurance, power, leases, rentals and other expenses.
(c) Totals may not add due to rounding.
(d) From TBTA estimates.

Net Revenues from Toll Operations

Finally, the projected operating expenses were deducted from the respective toll revenue forecasts to produce the two sets of estimated net toll revenues (before debt service on outstanding TBTA obligations), one at constant tolls and the other with a toll increase in 2017, as shown in Table 26. For 2015, net toll revenue under either scenario is estimated at $1.2 billion. By 2025, annual net toll revenue under either scenario is estimated to be on the order of $1.1 billion.

Table 26 Net Toll Revenue Forecast
(000s)

Year	Gross Toll Revenues		Operating Expenses	Net Toll Revenues	
	Constant Tolls	With Assumed 2017 Toll Increase		Constant Tolls	With Assumed 2017 Toll Increase
2015	$1,747,132	$1,747,132	495,194	$1,251,938	$1,251,938
2016	1,764,162	1,764,162	497,571	1,266,591	1,266,591
2017	1,774,131	1,813,671	511,190	1,262,941	1,302,481
2018	1,776,918	1,821,864	528,863	1,248,055	1,293,001
2019	1,779,708	1,824,722	552,599	1,227,109	1,272,123
2020	1,782,501	1,827,582	577,413	1,205,088	1,250,170
2021	1,786,382	1,831,561	603,355	1,183,027	1,228,206
2022	1,790,271	1,835,547	630,477	1,159,794	1,205,070
2023	1,794,168	1,839,543	658,834	1,135,335	1,180,709
2024	1,798,074	1,843,546	688,481	1,109,593	1,155,065
2025	1,801,988	1,847,559	719,480	1,082,509	1,128,079

REVIEW OF PHYSICAL CONDITIONS

The facilities under TBTA's jurisdiction include two tunnels and seven bridges listed in Table 27, together with facilities on Randall's Island and a parking garage in Manhattan near the Hugh L. Carey Tunnel. Some of these crossings have been in service since the 1930s, i.e., the RFK, Henry Hudson, Marine Parkway-Gil Hodges Memorial, and Bronx-Whitestone Bridges. The Queens Midtown Tunnel opened to traffic in 1940. The Hugh L. Carey Tunnel opened to traffic in 1950. Two bridges opened to traffic in the 1960s: the Throgs Neck in 1961 and the Verrazano-Narrows in 1964 (lower level in 1969). The present Cross Bay Veterans Memorial Bridge opened to traffic in 1970 replacing the previous structure that had been in service since 1939. The aging of the TBTA facilities will influence the overall upkeep and capital improvements that will be necessary to maintain the infrastructure over the forecast period and beyond. Table 28 lists TBTA's capital investments for each facility from 1992 through 2014.

Table 27 Opening Dates of TBTA Facilities

Facility	Open to Traffic	Years in Use
RFK Bridge	1936	79
Bronx-Whitestone Bridge	1939	76
Throgs Neck Bridge	1961	54
Henry Hudson Bridge	1936	79
Queens Midtown Tunnel	1940	75
Hugh L. Carey Tunnel[a]	1950	65
Verrazano-Narrows Bridge	1964	51
Cross Bay Veterans Memorial Bridge	1970	45
Marine Parkway-Gil Hodges Memorial Bridge	1937	78

Stantec has reviewed material pertaining to the physical condition of the TBTA seven bridges and two tunnels. The material reviewed includes pertinent sections and updates of the following:

- Biennial Bridge Inspection Reports;
- Scheduled Tunnel Inspection Reports;
- Post-Superstorm Sandy Inspection Reports;
- TBTA's current Capital Program;
- Current Quality Assurance Plan; and
- TBTA's Routine and Major Maintenance Program.

Table 28 Capital Investments by Facility, 1992 to 2014
(Millions of dollars)

Facility	Total by Facility 1992 through 2014[a]
Agency Wide[b]	$386.2
Hugh L. Carey Tunnel	952.4
Bronx-Whitestone Bridge	763.6
Cross Bay Veterans Memorial Bridge	108.5
Henry Hudson Bridge	275.2
Marine Parkway-Gil Hodges Memorial Bridge	196.1
Queens Midtown Tunnel	355.8
RFK Bridge	1,576.8
Throgs Neck Bridge	450.2
Verrazano-Narrows Bridge	927.1
Total	$5,991.9

Notes:
(a) Data from TBTA.
(b) Agency-wide refers to projects that have been, or will be, carried out at two or more facilities.

The review by Stantec of the pertinent material consists of the following subtasks:

- Comparison of condition ratings of the current inspection reports with the previous inspection reports to note significant changes in observed deterioration, and repairs to priority conditions from previous inspections, if any.
- Review of the current TBTA Capital Program to verify that the repairs recommended by the latest inspection reports are being addressed.
- Review of TBTA's Routine Maintenance Program to verify that the maintenance-related recommendations of the current inspection reports are being addressed.

Review of Inspection Reports

TBTA's seven bridges and two tunnel facilities undergo periodic condition inspections. Bridges are inspected biennially per federal and State mandate, with interim yearly inspections of any components that require monitoring. The purpose of the biennial inspection program is to maintain the safety and structural integrity of bridges. TBTA's Bridge Inspection Program was assessed from 2006 to 2007 by an independent engineering firm well known in the field of structural inspection and appraisal, which noted that "the program is meeting the minimum State and federal standards" and "in several respects the program exceeds the minimum standards" and "with respect to the accuracy, clarity, and thoroughness of the reports generated, we find them to be of the highest quality."

While there is no federal or State mandate, TBTA performs regular tunnel inspections of selected tunnels elements as needed, with more comprehensive inspections performed approximately every ten years. The Federal Highway Administration/Federal Transit Administration (FHWA/FTA) Tunnel Inspection Manual recommends an interval of 2-5 years between inspections, thus TBTA is

in conformance with this guideline. In 2013, an inspection was performed on the approach bridges on the Manhattan side of the Queens Midtown Tunnel. An inspection of the Hugh L. Carey Tunnel was awarded in 2011 and completed in 2012. An inspection of the Queens Midtown Tunnel was awarded in early 2013 and completed in 2014.

The TBTA bridges were last inspected and their physical condition appraised in 2013-2014 by various consultants, under the New York State Biennial Bridge Inspection Program, as shown in Table 29. Separate underwater and substructure inspections were performed in accordance with the five-year cycles of NYSDOT to obtain riverbed contours and to assess potential scour conditions at the substructure.

These ongoing inspections, performed by the inspection consultants, consist of close visual examination, 100% hands-on inspection of designated critical elements, sounding concrete, and taking appropriate measurements to determine the physical conditions of the bridges and tunnels. The biennial bridge inspection is performed per the guidelines of the New York State Bridge Inspection Manual and the Federal Guidelines. Under these guidelines, each bridge component is inspected and assigned a rating. Any priority conditions are reported immediately to the TBTA for prompt attention. The ratings are reviewed by TBTA personnel to assess what components of the bridge require more comprehensive inspection and rehabilitation, which are then awarded as contracts under the Capital and Maintenance Programs. Bridge components which warrant more frequent monitoring to ensure public safety are monitored annually with a special inspection.

After performing a comparison of the individual overall ratings of the current inspection reports against the previous inspection reports, it was noted that there has been no significant change in the overall ratings and the bridges remain in good condition.

The regular inspections of the tunnels fulfill a similar function. Inspections consist of an overall assessment and rating of the various tunnel components, as documented in TBTA's ECP-318 guidelines, and provide a method of documenting ongoing monitoring of the tunnels for safety, operations and overall structural integrity. Since some tunnel components are not as readily accessible as bridge components, the comprehensive inspections will complement the regular inspections by providing a more in-depth assessment at regularly spaced intervals.

TBTA has an ongoing seismic retrofit program to identify and implement necessary seismic retrofits in order to bring critical facilities to current seismic code standards. This program has made substantial progress in identifying necessary seismic upgrades and incorporating them into various Capital facility rehabilitation design and construction projects when applicable. This effort will continue in the current 2015-2019 Capital Program.

On October 29th 2012, Superstorm Sandy struck the East Coast of the United States, including the New York Metropolitan Area. In response to this, the TBTA initiated a post-event assessment of all TBTA bridges and tunnels. This assessment was to assure that bridge/tunnel elements identified as vulnerable/susceptible to a major flooding or wind event did not sustain any damage, or that any noted damage was not detrimental to the safe operation of the

bridge/tunnel. These inspections and assessments were performed by experienced bridge/structural engineers and inspectors familiar with the structures. The bridges experienced sustained winds of 70 mph with gusts of up to 103 mph. In advance of the major crux of the storm and as a safety precaution due to the wind velocity, all bridges and tunnels were closed to all vehicular traffic. When the Post-Superstorm Sandy inspection was finalized, it was found that no significant damages were caused by Superstorm Sandy in any of the bridges; however, some of the ancillary facilities of the Rockaway Bridges (Cross Bay Veterans Memorial Bridge and Marine Parkway-Gil Hodges Memorial Bridge) sustained damage. TBTA's bridges reopened the day after the storm (except the Marine Parkway-Gil Hodges Bridge which reopened October 31st). TBTA's two tunnels sustained structural, electrical and mechanical damage due to flooding. Because of TBTA's engineering and maintenance staff working in conjunction with outside contractors around the clock, both tunnels were back on line in a relatively short period of time.

The consulting engineering firms who performed the 2013 and 2014 biennial bridge inspections and those who performed the 2011/2012 and 2013/2014 tunnel inspections for each facility are shown in Table 29.

Table 29 Facility Inspection Firms

Facility	Consulting Firm
RFK Bridge	HNTB / Hardesty & Hanover (2014)
Throgs Neck Bridge	HNTB (2013)
Bronx-Whitestone Bridge	WSP Sells (2013)
Henry Hudson Bridge	Ammann & Whitney / Pennoni (2013)
Queens Midtown Tunnel	Ammann & Whitney (2013)
Facility approach bridges	Ammann & Whitney / Pennoni (2013); URS (2013-2014)
Hugh L. Carey Tunnel	Parsons Brinckerhoff (Now part of WSP) (2011/2012)[a]; Hatch Mott McDonald (2013-2014)
Verrazano-Narrows Bridge	URS (Now part of AECOM) (2014)
Marine Parkway-Gil Hodges Memorial Bridge	URS (Now part of AECOM) (2013)
Cross Bay Veterans Memorial Bridge	URS (Now part of AECOM) (2013)

Notes:
(a) Comprehensive inspection of components for rehabilitation.

These firms are well known in the field of structural inspection and appraisal. Copies of pertinent sections of the final inspection reports for the various facilities were requested and made available by TBTA. Bridges that are part of the odd-year inspection cycle listed above will be undergoing inspections this summer, and therefore, the results of these inspections are not available at this time. The results of these inspections, also done by experts in the field, will generally be available at the end of the year.

TBTA Infrastructure Losses from Superstorm Sandy

One of the most significant impacts on the development of the proposed 2015-2019 Capital Program is Superstorm Sandy. The Facility Master Plans for the Hugh L. Carey Tunnel and Queens Midtown Tunnel and the Rockaway bridges (Cross Bay and Marine Parkway) were severely affected by the storm which hit the City on October 29, 2012. As a result, the sequence of normal replacement life cycle rehabilitation work at these facilities has been modified from earlier master plans, resulting in some accelerations and deferrals affecting the proposed 2015-2019 Capital Program in order to better coordinate with the work being performed in the 2010-2014 Superstorm Sandy Restoration and Mitigation plans.

As noted, the Hugh L. Carey and Queens Midtown Tunnels were severely affected by the aftermath of Superstorm Sandy. As a result, major structural rehabilitation projects at these facilities are underway under the 2010-2014 Capital Program in conjunction with Superstorm Sandy restoration and mitigation work. Together, these investments will comprehensively address all the damaged tunnel assets destroyed by corrosive salt-waters that inundated the tubes in October 2012, along with other non-damaged tunnel elements that were already scheduled for capital investment in the tunnel facility master plans.

Funds currently proposed for TBTA's 2015-2019 Capital Program total approximately $3.056 billion. (The $778 million program for Superstorm Sandy Repair and Restoration and $96 million program for Superstorm Sandy Mitigation are part of the 2010-2014 Capital Program). The plan separates this amount into specific projects by facility as well as agency-wide projects. Comparisons between the 2015-2019 Capital Program planned projects and total repair item lists for each facility, as prepared by inspection consultants in the biennial reports, confirm that the 2015-2019 Capital Program gives high priority to key rehabilitation projects. By prioritizing necessary facility rehabilitation projects, TBTA addresses all high priority recommendations in the current 2015-2019 Capital Program or under maintenance programs that have not been addressed as part of the previous 2010-2014 Capital Program. All of these high priority needs will continue to be met.

Current major rehabilitation projects (and designs) addressing the recommendations of the latest inspection consultants' reports and the maintenance and programmatic needs of the facilities include:

RFK Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Miscellaneous Structural Repair – The construction contract was awarded in December 2014. Projected completion in December 2016. An additional miscellaneous structural repair contract is included in the 2015-2019 Capital Program.
- Reconstruction and Rehabilitation of the Manhattan Approach Ramps – The design contract was awarded in May 2012 and the construction contract was awarded in December 2014. Projected completion in December 2017.

- Seismic and Wind Load Study – The study was awarded in December 2012. Projected completion in June 2015. The phase I retrofit is scheduled to start in late 2018 and projected to complete in 2022.
- Construction of New Harlem River Drive Ramp – Design-Build award projected for 2018 with completion in 2020.
- Bronx Toll Plaza Structure Reconstruction – The construction contract was awarded in December 2014. Projected completion in June 2019.
- Reconstruction of Manhattan-to-Queens Ramp – The design-build contract was awarded in July 2012. It is substantially complete.
- Interim Repairs to the Manhattan Toll Plaza Structure – The design contract was awarded in December 2011, with Phase II construction contract award scheduled for late 2015.
- Installation of Facility-wide Electronic Monitoring and Detection Systems – Design-Build project is scheduled to start in 2016 with projected completion in 2018.
- Installation of Fire Standpipe and Upgrade of Fire Protection Systems – Design-Build project is scheduled to start in 2016 with projected completion in 2018.
- Electrical/Mechanical Rehabilitation of Harlem River Lift Span – Design-Build project is scheduled to start in 2017 with projected completion in 2020.
- Design and Construction of the Training Facility – Project was awarded in June 2014. Projected completion in December 2015.

Projects completed within recent years include: replacement of T-48 Roadway Wearing Surface with Bridge Master overlay at Queens Suspension span, Harlem River Lift Span and approach spans, and the Bronx Kill orthotropic deck span of the RFK Bridge, replacement of the Harlem River Drive Ramp Deck, rehabilitation of decks at Randall's Island, Ward's Island, and construction of a new ramp, miscellaneous steel and concrete rehabilitation, dehumidification of anchorages and additional strand re-anchoring, numerous repair projects such as repair of the bridge deck joints, drains, cracked decks, piers, superstructure, substructure, and maintenance painting of the Ward's Island viaduct and suspended span.

Bronx-Whitestone Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Fender Protection Around Tower Piers – The study/scope development contract was awarded in September 2013. Projected completion in 2015.
- Miscellaneous Structural Rehabilitation – The design contract was awarded in September 2013 with the construction contract scheduled for late 2015.
- Installation of Necklace Lighting System and Acoustic Monitoring of Main Cables – The design contract was awarded in December 2011, and the construction contract was awarded in July 2013. It is an ongoing project with a 49 percent completion rate.
- Continued Cable Investigation/Monitoring – The design contract was awarded in September 2013 with the construction contract scheduled for fall 2015. Projected completion in 2017.
- Elevated and On Grade Queens Approach Structure Replacement – The construction contract was awarded in July 2011. It is an ongoing project which is substantially complete.

- Bronx Concrete Anchorage Repairs and installation of Dehumidification System – The construction contract was awarded in March 2013. It is substantially complete.
- Installation of Facility-wide Electronic Monitoring and Detection Systems – Design-Build project is scheduled to start in 2016 with projected completion in 2018.
- Installation of Fire Standpipe Connection from Tower Pedestals to Roadway Level – Construction award is scheduled for 2018.

Projects completed within recent years include: painting of the main cables, suspender ropes and towers, installation of orthotropic bridge deck in the suspended span with the removal of the truss system, installation of the fairing system for wind mitigation, concrete repairs and installation of the dehumidification system at the Queens Anchorage, and the replacement of the Bronx approach.

Throgs Neck Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Seismic Retrofit and Replacement of Concrete Fill Steel Grid Suspended Span Deck – The design contract was awarded on March 2012 and the construction award is scheduled for mid-2017.
- Miscellaneous Structural Rehabilitation – The construction contract was awarded in June 2011. It is an ongoing project which is substantially complete.
- Anchorage Dehumidification – The design contract was awarded in July 2013, with construction scheduled for late 2015.
- Painting of the Bronx Approach Span – It is an ongoing project, awarded in July 2011, and is substantially complete.
- Rehabilitation of Orthotropic Deck – The construction contract was awarded in July 2011. It is an ongoing contract which is substantially complete.
- Approach Viaducts Seismic Retrofit & Structural Rehabilitation – Construction award scheduled for 2017.
- Replacement of Grid Decks on Suspended Span and Painting on Suspended Span – Construction award scheduled for 2017.
- Anchorage and Tower Protection (Design Only) – Design award scheduled for 2017.

Projects completed within recent years include: deck replacement and rehabilitation on the Queens approach, tower and structural steel painting, repair of the tower floodlights, steel repairs of the suspended span superstructure, main cables and suspender ropes investigation, structural steel re-habilitation, drainage system repairs and improvements, replacement of concrete deck, rehabilitation of the abutment and retaining walls at the Queens approach, steel repairs at the Bronx approach, painting of the Queens and Bronx Tower Fender System, repair work at the anchorage and tower protection at both Queens and Bronx towers, and roadway lighting repairs.

Henry Hudson Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Skewbacks Retrofit (of the sloping surface that supports the arch ends) – The design contract was awarded in November 2013 with construction scheduled for 2016.
- Replacement of the Upper and Lower Plaza and Southbound Approach – The design contract was awarded in January 2013. Phase I construction contract awarded in December 2014. Phase 2 construction scheduled for award in December 2016.
- Structural Rehabilitation Consisting of High Priority Structural Steel Repairs – Phase I is complete and Phase II contract award is scheduled for 2018.
- Replacement of Overcoat System - Construction award scheduled for 2018.
- Replacement of Facility Lighting System (Part A) and Substation upgrade (Part B) – Part A of construction is scheduled for 2016. Part B is scheduled for 2018.

Projects completed within recent years include: upper level sidewalk and curb stringer replacements, and painting of the new curb stringers, construction of the lower level deck replacement which replaces the lower level deck and sidewalk, northern approach structure, drainage system and roadway lighting, rehabilitation of cross drainage of the approaches between Dyckman Street and the main span, rehabilitation of the lower level garage consisting of concrete repairs, repaving and waterproofing the roadway above the garage, major maintenance projects including spall repairs at the towers, resealing the upper level deck, and light pole rehabilitation on the parkway approaches, stone wall guide rail repairs, structural rehabilitation of high priority elements.

Queens Midtown Tunnel

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Service and FE Building Rehabilitation – The design contract was awarded in March 2012 and the construction contract was awarded in September 2014. It is an ongoing project with a 15 percent completion rate.
- Rehabilitation of the Tunnel Walls, Roadway Drainage, Firelines, and rehabilitation of Manhattan Exit Plaza – The design contracts were awarded in April 2012 and December 2012. The construction contract was awarded in second quarter 2015. Projected completion in 2019.
- Tunnel Ventilation Building Electrical Upgrade – The construction contract was awarded in December 2012. It is an ongoing project with a 30 percent completion rate.
- Rehabilitation of Tunnel Controls and Communication Systems – Design is ongoing. Construction planned for 2018.
- Rehabilitation of the Ventilation Buildings. (Design Only) - Design award is scheduled for 2017.
- Rehabilitation of the Manhattan Entrance Plaza and Queens Toll Plaza – Design contract scheduled for 2018.
- Installation of facility-wide smoke detections systems – Design-Build contract scheduled for award in 2018.

- Tunnel Vulnerability Improvements – Construction scheduled for 2019.

Projects completed within recent years include: rehabilitation of the service building and related facilities, replacement of all the tunnel ventilation exhaust fans and minor repairs to the supply fans, the rehabilitation of two overpasses including deck repair and beam encasement repair in the Manhattan approach area, replacement of drainage pumps inside the ventilation building and at the plazas, and reconfiguration of the traffic island in the Manhattan entrance plaza to provide better traffic flow.

Hugh L. Carey Tunnel

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Service Building Alterations – The design contract was awarded in March 2012. The construction contract was awarded in July 2014. It is an ongoing project with a 20 percent completion rate.
- Rehabilitation of the Tunnel Walls, Roadway Drainage, Firelines, and Repair/Replacement of Brooklyn Plaza Structural Slab – The design contracts were awarded in April 2012 and December 2012. The construction contract was awarded in December 2014. Projected completion in 2019.
- Tunnel Vulnerability Improvements – Construction scheduled for 2019.
- Rehabilitation of HCT Ventilation Systems – Design-Build project scheduled for 2018.
- Rehabilitation of the Ventilation Buildings (Design Only) – Design scheduled for 2017.
- Tunnel Repairs and Rehabilitation of the Tunnel Entrance/Exit (Design Only) – Design-Build scheduled for 2018.
- Rehabilitation of Tunnel Entrance/Exit – Manhattan (Design Only) – Design-Build scheduled for 2018.
- Electrical Rehabilitation at the Brooklyn Service Building – Design-Build scheduled for 2018.

Projects completed within recent years include: Battery Parking Garage elevator replacement, replacement of electrical switchgear and power distribution equipment, construction of structural and architectural repairs for vent structures, modernization and upgrade of the control room, tunnel leakage repairs and wall tile replacement and structural repairs and lighting system improvements to the Battery Parking Garage and Emergency Garage.

Verrazano-Narrows Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Toll Plaza East and West Bound Ramps Improvements – The construction contract was awarded in September 2011. It is an ongoing project which is substantially complete.
- Main Cable and Suspender Rope Testing Phase I – The contract was awarded in October 2014. Construction to be started in 2017.
- Steel Repairs, Concrete Rehabilitation and Repair/Rehabilitation of Drainage Systems – The design contract was awarded in April 2012 with the construction contract awarded in

December 2013. It is an ongoing project with a 33 percent completion rate. Projected completion in 2017.

- Widening of Belt Parkway Ramps – The feasibility study and conceptual design for the reconstruction and reconfiguration of the ramps and approaches was awarded in December 2013.
- Replacement and Painting of the Upper Level Suspended Span – The construction contract was awarded in November 2012. It is an ongoing project with a 37 percent completion rate.
- Bus and HOV Ramp Improvement – The construction contract was awarded in December 2013. It is an ongoing project with a 33 percent completion rate.
- Substation #1 Rehabilitation – The design-build contract was awarded in February 2014. It is an ongoing project with a 41 percent completion rate.
- Restore Fender Lights – The construction contract was awarded in April 2014. It is an ongoing project with an 18 percent completion rate.
- Anchorage & Piers Rehabilitation and Sealing – Construction is scheduled for 2017.
- Brooklyn Approach Reconstruction – Construction is scheduled for 2019.
- Steel and Concrete Rehabilitation – Construction is scheduled for 2019.
- Replacement of Upper Level Elevated Approach & Anchorage Decks – Construction is scheduled for 2018.
- Tower Pedestal Rehabilitation/Mooring Platform – Design-Build award is scheduled for 2017.

Projects completed within recent years include: oiling of cable strands and eyebars at anchorages/painting of cable and suspender ropes, miscellaneous steel repairs to the tower legs and struts (interior and exterior), rehabilitation of the lower level approaches with the deck replacement on the lower level Brooklyn and Staten Island approaches and Lily Pond Avenue Bridge, maintenance bridge painting of the entire suspended spans, rehabilitation of the service building roof, construction of the salt storage facility, maintenance painting of the Brooklyn approaches and tower painting, the installation of sensors with the provision of real time under bridge clearance, repair of flagged conditions on the structural steel superstructure from anchorage to anchorage, removal of eight eastbound toll booths, repair of the toll plaza canopy roof, relocation of the HVAC Unit, Bus/HOV access improvements, and the painting of the towers below roadway level.

Marine Parkway-Gil Hodges Memorial Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Electrical and Mechanical Rehabilitation – The design contract for the project was awarded in December 2011 with the first phase of work planned for award in late 2014 and Phase II construction contract award is scheduled for mid-2015.
- Substructure and Underwater Scour Protection – The design contract was awarded in December 2010 and the construction contract was awarded in November 2013. It is an ongoing project with a 40 percent completion rate. Projected completion scheduled in late 2015.
- Miscellaneous Steel Repairs – The design contract was awarded in January 2013. Construction contract award is scheduled for mid-2015.

- Rehabilitation and Painting of the Rockaway Point Boulevard Overpass and the Jacob Riis Park Pedestrian Bridge – The design contract was awarded in June 2012 and the design-build contract was awarded in early 2015.

Projects completed within recent years include: replacement and elevation of Superstorm Sandy damaged security and navigation lighting, the installation of a pre-engineered service building, structural steel repairs, deck replacement and bridge widening, and replacement of the elevators in the towers.

Cross Bay Veterans Memorial Bridge

Projects in the 2015-2019 Capital Program (or ongoing from the 2010-2014 Capital Program):

- Scour Protection and Rehabilitation of Pier Fender System – Scoping is complete. Design-Build award scheduled for 2018.
- Replace Mechanical & Electrical Equipment – Contract award scheduled for 2015.

Projects completed within recent years include: Deck and superstructure rehabilitation, substructure and underwater work, electrical rehabilitation, and the complete concrete and drainage rehabilitation of the promenade and seawall at the Rockaway approach.

Other System-wide Improvements

Agency-Wide – Since the September 11th attack on the World Trade Center, TBTA has engaged consultants to assess security risks of their facilities. As a result of these risk assessments, increased security improvements including various monitoring, surveillance and hardening projects have been implemented or will begin construction shortly at TBTA facilities. Video surveillance software and hardware upgrades have been installed at many facilities. TBTA has also maintained a security department and incorporates mitigation measures into their operations, capital and maintenance programs.

The 2015-2019 Capital Program will continue with Intelligent Transportation System project initiatives including:

- RWIS (Road Weather Information Systems) provide information about the roadway surface and environmental conditions, including temperatures, atmosphere (air temperature, visibility, precipitation and wind speed/gust and direction) states at TBTA's bridges. The AW-35 project will upgrade the current weather systems to provide redundant, reliable and accurate real time weather conditions for all TBTA bridges. The scope includes upgrading the RPU (Remote Processing Unit) of the Roadway Weather Information Systems, which was awarded in December 2014. The RPUs or better known as Weather Stations will be replaced at all four major bridges – Robert F. Kennedy, Verrazano-Narrows, Bronx-Whitestone, and Throgs Neck.
- TRANSMIT (an E-ZPass-based system) is currently operational at all facilities. Future plans include installation of additional TRANSMIT readers to provide full coverage on the plaza approaches. Travel times (between TRANSMIT locations) are being measured, stored, and

displayed on TBTA's internal website and displayed on the MTA website. Travel time messages for destinations within the NYC region are being displayed on Variable Message Signs (VMS).

- Second Generation E-ZPass in-lane subsystem evaluation and modernization started in late 2010. The project will continue to conduct evaluations to determine how to best modernize the E-ZPass system, concurrent with studies performed by the E-ZPass Group, with funding available for the anticipated replacement of some of TBTA's existing equipment. The pilot study for All-Electronic Tolling (AET) at the Henry Hudson Bridge is part of this project. As approved by the Board in May 2014, AET became the permanent method of toll collection at the Henry Hudson Bridge on January 1, 2015. In the fall of 2016, a gantry-based Open Road Tolling (ORT) System will be placed into revenue service at the Henry Hudson Bridge. The existing toll plazas will subsequently be removed as part of the 2015-2019 Capital Program.
- The Variable Message Sign (VMS) program is proceeding. These signs allow TBTA to expand the provision of travel time messages to regional destinations at additional facilities. Many of these signs will reach the end of their useful life during the 2015-2019 Capital Program and will be replaced by new, updated versions.
- Closed Circuit TV and Fiber Optic Cable installation started mid-2013. The project will install and deploy an integrated and extensive fiber optic network at the RFK Bridge and construct connections to the NYSDOT/NYCDOT Joint Traffic Management Center (JTMC) in Queens. The existing Hugh L. Carey Tunnel fiber network will be investigated and tested. The recently upgraded fiber network at the Bronx-Whitestone Bridge will be integrated into the system.
- The Advanced Traffic Management (ATM) system is currently used to manage traffic on all facilities. The system is operational 24-7 and provides real time status of all traffic and incident related activities, with full access to traffic cameras, VMS, variable speed limit signs, lane status, lane-use signal control, regional incident alerts, real time link travel time, and weather sensor data and alarms. Under the operating budget, the ATM IDEAS system, which includes an operations command center and control video wall were replaced, as well as the CCTV subsystem hardware and software for camera viewing.
- Agency-wide painting project provides for unplanned painting needs that may arise from ongoing Biennial Inspections. It also includes painting toll plazas, the Hugh L. Carey Tunnel and Queens Midtown Tunnel ventilation buildings and facility buildings, and emergency lead paint removal.

Other projects completed within recent years include the installation of the Video Incident Detection System, traffic and safety improvements, and the restoration of the Robert Moses Building façade at Randall's Island.

As part of the Capital Program planning process, TBTA personnel conduct a 20-year capital needs assessment every five years with the most recent dated October 2013. The assessment is compiled from data from biennial inspections and system improvements suggested by the technical departments, and include factors such as service life of various structural components and normal replacement cycles. Plans for scheduling major maintenance under the 20-year capital needs assessment are developed with input from operating personnel, which consider how to implement construction properly to maintain the optimal level of service to the traveling public both locally and system wide.

Stantec's review of pertinent sections of the recent facility inspection reports found them to be extensive and detailed. The reports, based on Stantec's limited review, appear, in the opinion of Stantec, to be reasonable.

Stantec reviewed the reports of each of TBTA's crossings. The purpose of the reviews was to obtain an update of the respective facility's status relative to the following issues:

- Ongoing rehabilitation projects;
- Ongoing maintenance projects;
- Rehabilitation projects addressing the recommendations of the previous inspection reports; and
- Repairs to alleviate the flagged conditions of the previous inspection reports.

The reviews proved informative. Facility projects and agency-wide projects specific to each structure were discussed.

It is important to note, however, that Stantec's testing or inspection of portions of the work of other parties shall not relieve such other parties from their responsibility for performing their work in accordance with applicable requirements and the customary standard of care. Stantec shall not be responsible for the acts or omissions of other parties engaged by TBTA.

Long-Term Outlook for TBTA Facilities

The useful lives of bridges and tunnels, in general, could possibly be cut short for two main reasons: (a) they are geometrically and functionally unsatisfactory because they are too narrow, too steep, lacking in clearance or sufficient spatial capacity to handle the traffic; or (b) they are structurally unsafe because of deterioration or because their load-carrying capacity is inadequate to handle the loads imposed under current conditions. Deterioration may occur for a variety of reasons, including aging, but it will occur sooner if there has been inadequate or improper maintenance.

On the basis of the foregoing review and information available to us from reports of others, it is our opinion that the TBTA bridges, tunnels and approaches are all geometrically and functionally adequate and structurally sound and generally maintained to good standards. Ongoing maintenance requirements of the structures are assessed, prioritized and addressed in an appropriate manner by TBTA to maintain a high level of safety to the traveling public, and to maintain the structures for many years to come.

TBTA is looking forward, exploring ways to add capacity at its facilities (where possible) while maintaining and rehabilitating its structures in order to ensure their future serviceability. We are of the opinion that all the TBTA facilities are and will be physically capable of accommodating traffic volumes at the levels projected for 2025 through the duration of the outstanding bonds that have been issued and future bonds to be issued based on a pledge of TBTA revenues through 2045, assuming maintenance and rehabilitation consistent with past practice.

It is Stantec's opinion that the revenue projections are reasonable and have been prepared in accordance with accepted practice for investment-grade studies. However, given the uncertainties within the current international and economic climate, Stantec considers it is necessary to state that the traffic and revenue projections are based on the following caveats:

- This report presents the results of Stantec's consideration of the information available to us as of the date hereof and the application of Stantec's experience and professional judgment to that information. It is not a guarantee of any future events or trends.
- The traffic and revenue forecasts will be subject to future economic and social conditions and demographic developments that cannot be predicted with certainty.
- The projections contained in this report, while presented with numerical specificity, are based on a number of estimates and assumptions which, though considered reasonable to us, are inherently subject to significant economic and competitive uncertainties and contingencies, many of which will be beyond Stantec's control and that of TBTA. In many instances, a broad range of alternative assumptions could be considered reasonable. Changes in the assumptions used could result in material differences in projected outcomes.
- If, for any reason, any of these conditions should change due to changes in the economy or competitive environment, or other factors, Stantec's opinions or estimates may require amendment or further adjustments.

- Stantec's toll revenue projections only represent its best judgment and Stantec does not warrant or represent that actual toll revenues will not vary from its projections, estimates and forecasts.

Many statements contained in this report that are not historical facts are forward-looking statements, which are based on Stantec's opinions, as well as assumptions made by, and information currently available to, the management and staff of Stantec. Because the statements are based on expectations about future events and economic performance and are not statements of fact, actual results may differ materially from those projected. The words "anticipate", "assume", "estimate", "expect", "objective", "projection", "plan", "forecast", "goal", "budget", or similar words are intended to identify forward-looking statements. The words or phrases "to date", "now", "currently", and the like are intended to mean as of the date of this report.

Respectfully,

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