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

Prepared for:
Triborough Bridge and Tunnel Authority

Prepared by:
Stantec Consulting Services, Inc.

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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

HISTORY AND PROJECTION OF TRAFFIC, TOLL REVENUES AND EXPENSES AND REVIEW OF PHYSICAL CONDITIONS OF THE FACILITIES OF TRIBOROUGH BRIDGE AND TUNNEL AUTHORITY

April 30, 2021

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 ongoing maintenance and capital programs with TBTA's Business Unit engineering staff responsible for those programs.

This report provides a summary of past traffic and revenue performance of the TBTA facilities and information related to potential future traffic and revenue for a ten-year period. The projections presented in this report have taken into account: (1) the general physical condition of TBTA's toll facilities; (2) traffic and toll revenue data, reflecting the 20 toll increases since 1972, including the most recent toll increase effective April 11, 2021; (3) the impact of the E-ZPass electronic toll collection system; (4) the impact of systemwide Cashless Tolling implementation; (5) the toll structure; (6) planned and possible future toll increases; (7) economic, population, employment, and other demographic forecasts in the New York Metropolitan Area; (8) fuel availability and prices; (9) 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; (10) 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; (11) mass transit network projects; (12) the implementation of split tolling at the Verrazzano-Narrows Bridge on December 1, 2020; and (13) the ongoing impact of the COVID-19 pandemic and the associated government restrictions that have followed ("pandemic").

Based on data currently available, the response to the pandemic has affected the United States and global economy; unemployment in the United States rose abruptly to levels not seen in recent history. The national and local governments are acting based on these conditions. On March 27, 2020, Congress passed, and the President signed, a $2.2 trillion Coronavirus Aid Relief and Economic Security Act ("CARES"). In December 2020, Congress passed a second pandemic related relief package, the Consolidated Appropriations Act, 2021 for $900 billion. A third pandemic related relief package, the American Rescue Plan Act, was signed into law on March 11, 2021. On March 22, 2021, Mayor Bill de Blasio announced that the 80,000 City municipal workers that had been working remotely could begin to return to the office on May 3; additionally, major private employers such as JPMorgan Chase, Citigroup, and Goldman Sachs Group plan on their staff beginning to return to City offices this summer. Many employers are also adopting greater flexibility allowing their staff to work part-time from remote locations. As of the date of this report, preliminary audited traffic and revenue data are available for January and February 2021, as well as unaudited traffic volumes through April 27, 2021.

The effects of the Central Business District Tolling Program (described later in this report) have not been included in Stantec's analysis. Since the program is still under development, there is insufficient information available to make assumptions regarding any impacts on the TBTA facilities

or projected revenues. However, such a program could have an observable impact on travel patterns and a tangible impact on TBTA revenue, none of which is reflected in this report.

Stantec's previous Independent Engineer Report entitled "History and Calculation of Traffic, Toll Revenues and Expenses and Review of Physical Conditions of the Facilities of Triborough Bridge and Tunnel Authority" (2020 Report), dated April 29, 2020, was published at the beginning of the pandemic. As a result, the 2020 Report included a range of calculated potential traffic and revenues ("What-if" Scenario 1 and "What-if" Scenario 2) as opposed to the forecast included in this report. In 2020, final audited total toll revenues for the TBTA facilities were $1.640 billion, or 19.3 percent greater than our 2020 "What-if" Scenario 1 (Less Severe/Shorter Term) calculation of $1.370 billion and 44.8 percent greater than our "What-If" 2020 Scenario 2 (More Severe/Longer Term) calculation of $1.129 billion. Final audited 2020 toll revenues were 21.1 percent lower than final audited 2019 toll revenue. Final audited total revenue traffic in 2020 was 253.2 million vehicles, which was 16.1 percent higher than our 2020 Scenario 1 (Less Severe/Shorter Term) forecast of 218.0 million vehicles, 40.4 percent higher than our 2020 Scenario 2 (More Severe/Longer Term) forecast of 180.3 million vehicles, and 23.1 percent lower than final audited 2019 traffic.

The full set of comprehensive data provided through February 2021 were used in the analysis through 2031. Stantec receives daily preliminary unaudited traffic data from the TBTA. Although the preliminary unaudited data from March 1, 2021 through April 27, 2021 were reviewed to determine a reasonable order of magnitude of the pandemic's impact, these data were not directly used in the future analysis due to insufficient level of available detail because preliminary unaudited data are still subject to change.

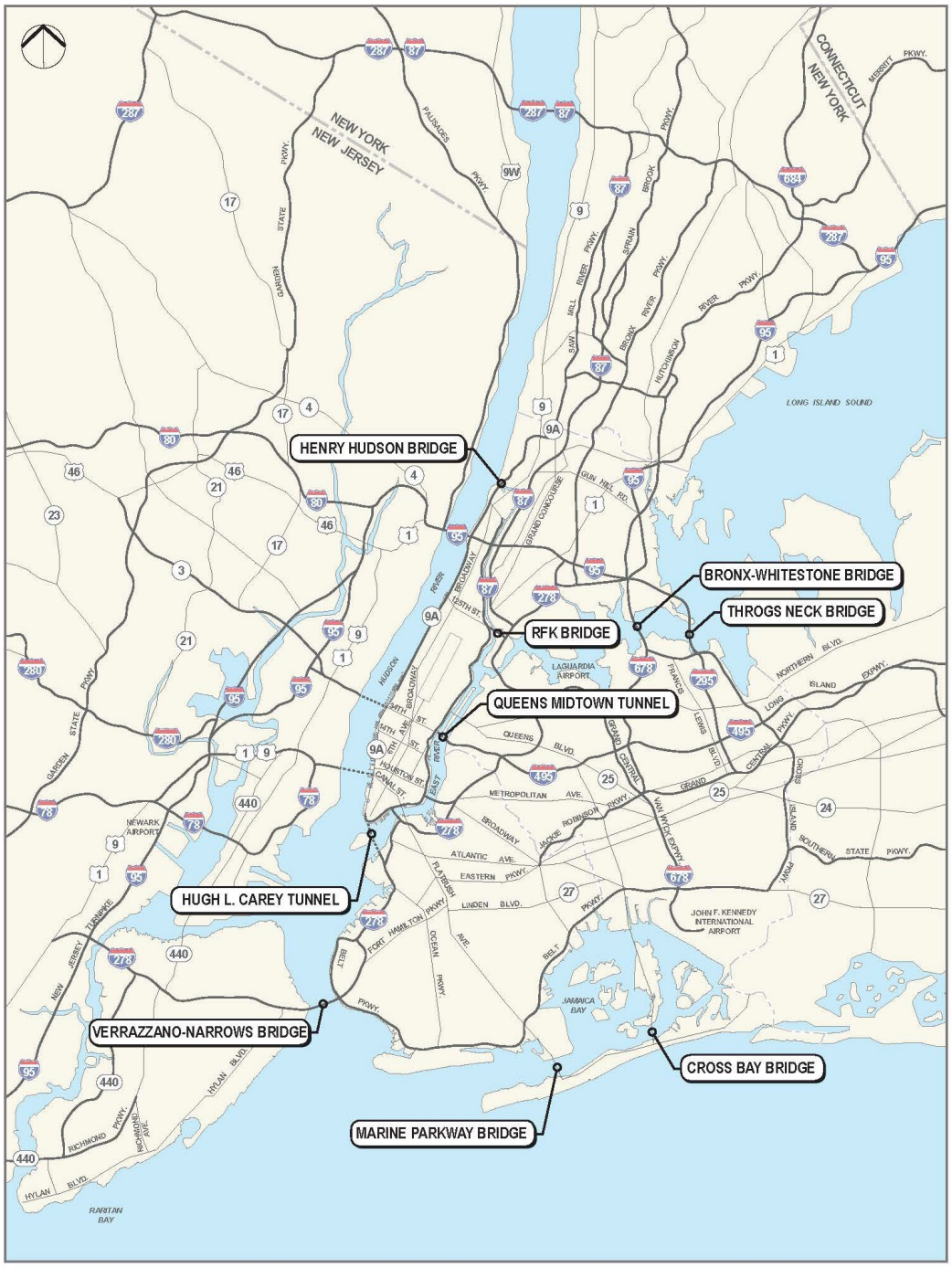
TRANSPORTATION INFRASTRUCTURE

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.

TBTA Facilities

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 2020, these facilities carried 253.2 million total toll-paying vehicles and generated $1.640 billion 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 TBTA Toll Facilities Location Map



The facilities are briefly described as follows:

Verrazzano-Narrows Bridge - a two-level suspension bridge that crosses the entrance to New York Harbor and connects Brooklyn and Staten Island, with seven lanes of traffic on the upper level, including a reversible HOV lane, and six lanes of traffic on the lower level. The fully reversible lane on the upper level was implemented in September 2017. Split tolling on this bridge was implemented on December 1, 2020.

Robert F. Kennedy (RFK) Bridge (formerly the *Triborough Bridge*) - a three bridge structure with connecting viaducts or elevated expressways, which crosses the East River the Harlem River, and Bronx Kill connecting the boroughs of Queens, Manhattan, and the Bronx. Opened to traffic in 1936, it generally carries eight traffic lanes between Queens and the Bronx crossing Astoria Park, Wards Island and Randall's Island. The bridge widens out to nine lanes over Astoria Park and Wards Island to provide dedicated exit lanes for Hoyt Avenue and Wards Island from the Queens bound roadway. The bridge also generally carries six traffic lanes between Randall's Island and Manhattan. These three major crossings are interconnected by viaducts and the Randall's Island Interchange, which facilitates traffic flow in two directions. A new ramp connecting the RFK Bridge to the northbound Harlem River Drive was opened to traffic on November 23, 2020, providing an alternate direct connection to the northbound Harlem River Drive.

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 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 inbound into Manhattan.

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 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 connecting the Rockaway peninsula in Queens with the Queens mainland, via Broad Channel. The bridge has three lanes of traffic in each direction crossing Beach Channel in Jamaica Bay, dropping to two lanes to align with the Cashless Tolling gantries and Cross Bay Boulevard.

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 were also shown in Figure 1.

The Verrazzano-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 joins I-495 (Long Island Expressway) with 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 (Route 9A), 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 (the "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, to the RFK Bridge via the Harlem River Drive in Manhattan, and to the Henry Hudson Bridge via the Henry Hudson Parkway in Manhattan, while the Bayonne Bridge, Goethals Bridge, and Outerbridge Crossing are linked to the Verrazzano-Narrows Bridge via the expressway system in Staten Island. 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 and the toll facilities they operate are the New York State Thruway Authority's (the "Thruway") Governor Mario M. Cuomo Bridge (formerly Tappan Zee Bridge) and several New York State Thruway System sections, New York State Bridge Authority (five upstate Hudson River bridges), and the New Jersey Turnpike Authority (Garden State Parkway and New Jersey Turnpike).

The E-ZPass System

All of these authorities, together with many others outside of the New York Metropolitan Area, are linked through the E-ZPass Interagency Group (E-ZPass Group) originally designed to better serve the regional traveler through a common electronic toll collection tag. To further expand its footprint, the E-ZPass Group streamlined its membership categories to align with the future needs of national interoperability. On March 8, 2018, a "Sponsored Affiliate" membership category was approved, permitting public and private toll road operators to become interoperable with E-ZPass Group members by using equipment that is compatible with the E-ZPass system and allowing them to use a sponsoring Full Member's customer service center for transaction processing. The E-ZPass Group is also conducting ongoing discussions about regional electronic toll interoperability with representatives of toll agencies in the Central, Southeastern, and Western states, exploring solutions that would allow the regions to process each other's transactions. E-ZPass and its impact on the TBTA facilities are discussed further in this report.

Cashless Tolling in the Region

All nine of the TBTA's bridges and tunnels are exclusively Cashless Tolling crossings. The Port Authority's Staten Island crossings (Bayonne Bridge, Goethals Bridge, and Outerbridge Crossing) and George Washington Bridge's Palisades Interstate Parkway toll lanes are cashless. On March 22, 2020, in response to adverse impacts of the pandemic, the Port Authority temporarily discontinued cash collection on the George Washington Bridge, Lincoln Tunnel and Holland Tunnel. On October 26, 2020, cash toll collection was temporarily restored at the Lincoln Tunnel and upper level of the George Washington Bridge until mid-2022 when the cashless system will be fully installed. Cashless tolling was activated at the Holland Tunnel on December 3, 2020. The lower level of the George Washington Bridge remains cashless permanently. Additionally, the Thruway and several New York State Thruway System sections are cashless as of November 14, 2020. Under Cashless Tolling, toll equipment is mounted on gantries, traditional toll plazas are demolished, and roadways reconfigured so that traffic flows freely across the facilities. Tolls continue to be paid using E-ZPass tags which are mounted on vehicles (typically windshields) and associated with E-ZPass accounts; the gantry-based E-ZPass antennas read the on-board tags and tolls are electronically debited from the associated E-ZPass accounts. For vehicles without E-ZPass tags, license plate images are taken and matched with information from the applicable Department of Motor Vehicles (DMV) so that toll bills can be sent to registered owners under the authorities' Tolls by Mail (TBM) program.

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.

For those TBTA facilities directly serving Manhattan — Henry Hudson Bridge, RFK Bridge, Queens Midtown Tunnel, and Hugh L. Carey Tunnel — motorists can, for the most part, choose to use public transit as an alternative. For the outlying bridges, however, the choice is more difficult due to more limited availability of public transportation options or different trip characteristics (e.g., trip purpose, trip origin and destination).

The Central Business District Tolling Program

In April 2019, New York State enacted the MTA Reform and Traffic Mobility Act, which establishes the Central Business District (CBD) Tolling Program, the goals of which are to reduce traffic congestion in the Manhattan central business district, improve air quality, and provide a stable and reliable funding source for the repair and revitalization of MTA's public transportation systems. TBTA has been directed to establish the CBD Tolling Program. The program will operate in the CBD, defined as Manhattan south of and inclusive of 60th Street, not including the FDR Drive or the West Side Highway (which includes the Battery Park underpass and or any surface roadway portion of the Hugh L. Carey Tunnel that connects to West Street). TBTA has entered into an MOU with New York City Department of Transportation (NYCDOT) to coordinate the planning, design, installation, construction and maintenance of the CBD Tolling Program infrastructure.

In October 2019, TBTA awarded to TransCore LLP a contract to design, build, operate, and maintain the toll system equipment and infrastructure required to implement the CBD Tolling Program in NYC ("DBOM contract").

Authorization is required from the Federal Highway Administration ("FHWA") under its Value Pricing Pilot Program ("VPPP") to implement the CBD Tolling Program on federal-aid roadways within the CBD. FHWA approval to participate in the VPPP makes this project subject to National Environmental Policy Act review. Because FHWA regulations provide that final design and construction cannot proceed before FHWA issues an environmental finding, the project is proceeding in two phases, subject to receipt of FHWA approval. On March 30, 2021, FHWA issued a letter stating that an Environmental Assessment (EA) is the appropriate form of environmental review required. As of the date of this report, there is no timeframe for the completion of the EA.

After the early design phase is complete and upon issuance of the second notice to proceed, TransCore will complete the final design, build the infrastructure and install the toll system equipment. Once operational, TransCore will be responsible for operating and maintaining the infrastructure and toll system for an additional six years under the DBOM contract. The total cost of this DBOM contract is $507 million, which includes incentive payments to encourage on-time delivery.

The construction and implementation costs for the CBD Tolling Program are being funded through available sources of money including, among others, the recently enacted Real Estate Transfer Tax (Mansion Tax) and Internet Marketplace Tax (IMT), all of which are expected to be reimbursed through net operating revenues generated through the program when it is operational.

Since details relating to the tolling structure, tolling rates and possible credits, as well as the date of implementation, of the CBD Tolling Program have not been established, Stantec is unable to

assess the impact of the future CBD Tolling Program on either transactions or revenues for TBTA at this time.

TOLL COLLECTION ON THE TBTA FACILITIES

The nine TBTA toll facilities are divided into three toll pricing structures: major crossings, minor crossings, and the Henry Hudson Bridge. The major crossings for this purpose include the RFK Bridge, Bronx-Whitestone Bridge, Throgs Neck Bridge, Queens Midtown Tunnel, Hugh L. Carey Tunnel, and the Verrazzano-Narrows Bridge. As of December 1, 2020, the Verrazzano-Narrows Bridge implemented split tolling, with one-way and round-trip toll rates matching those at other major crossings. Previously, tolls at the Verrazzano-Narrows Bridge were only collected in the westbound direction. The minor crossings are the Marine Parkway Bridge and Cross Bay Bridge. The Henry Hudson Bridge is the only facility limited to vehicles that are authorized to use parkways.

Present and Proposed Toll Structures and Operation

The current toll structure, in place since the April 11, 2021 toll increase, is shown in Table 1. Toll rates are determined using a basic rate as modified by variables specific to a number of factors, including:

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

This study uses the phrase "Tolls by Mail" ("TBM") to refer to crossing rates charged for the use of fare media other than E-ZPass by New York E-ZPass Customer Service Center ("NYCSC") customers, historic cash customers through September 29, 2017, and current TBM customers. (see 21 NYCRR §1021.1). As presented in Table 1, E-ZPass toll rates apply only to properly mounted customer tags issued by the NYCSC (this includes TBTA, the Port Authority, the Thruway, the Buffalo and Fort Erie Public Bridge Authority Peace Bridge, and New York State Bridge Authority).

Effective April 11, 2021, a "NYCSC Mid-Tier" ("Mid-Tier"), toll rate was introduced. The Mid-Tier toll rate is charged to NYCSC E-ZPass customers when their E-ZPass tag is not properly mounted while crossing TBTA toll facilities. The Mid-Tier toll rate is higher than the E-ZPass toll rate that is charged to E-ZPass NYCSC customers when their E-ZPass tag is properly mounted, but lower than the full toll charged to customers without a NYCSC E-ZPass tag or account. The goal of the new Mid-Tier toll rate is to incentivize NYCSC E-ZPass customers to properly mount their E-ZPass tag. The Mid-Tier toll rate will offset the additional costs incurred by TBTA to process these tolls. NYCSC E-ZPass customers subject to the Mid-Tier toll rate that subsequently properly mount their E-ZPass tag will resume paying the lowest E-ZPass toll rate.

TBM toll rates are charged to non-NYCSC E-ZPass customers (effective July 12, 2009), as well as to TBM customers at all nine TBTA facilities, reflecting the systemwide implementation of Cashless Tolling completed in 2017. Under the TBM program, license plate images for vehicles without

E-ZPass tags are matched with information from the applicable DMV and a toll bill is mailed to the vehicle's owner. Only NYCSC E-ZPass customers are eligible for the lower E-ZPass toll rates. Any motorist, regardless of residence, can obtain a NYCSC transponder.

Table 1 Current Toll Rates at TBTA Facilities, Effective Since April 11, 2021

Classification	RFK Bridge Bronx-Whitestone Bridge Throgs Neck Bridge Queens Midtown Tunnel Hugh L. Carey Tunnel Verrazzano-Narrows Bridge[a]			Henry Hudson Bridge			Marine Parkway- Gil Hodges Memorial Bridge Cross Bay Veterans Memorial Bridge		
	TBM/ Non-NYCSC E-ZPass	Mid-Tier (NYCSC)[c]	E-ZPass (NYCSC)[b]	TBM/ Non-NYCSC E-ZPass	Mid-Tier (NYCSC)[c]	E-ZPass (NYCSC)[b]	TBM/ Non-NYCSC E-ZPass	Mid-Tier (NYCSC)[c]	E-ZPass (NYCSC)[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	$10.17	$8.36	$6.55	$7.50	$4.62	$3.00	$5.09	$3.77	$2.45
Each additional axle costs	4.28	4.28	4.28	3.21	3.21	3.21	3.21	3.21	3.21
The following reduced rate prepaid charges are presently available for the two-axle vehicles referenced above:									
Charge per crossing for E-Tokens							3.39[d]		
Charge per crossing for E-Tokens for registered Rockaway Peninsula/Broad Channel Residents using an eligible vehicle							2.20[d]		
Registered Rockaway Residents using an eligible vehicle									1.60[e]
Charge per crossing for registered Staten Island Residents using an eligible vehicle			3.68[d]						
Charge per crossing for VNB for registered Staten Island Residents using an eligible vehicle through paying with E-Tokens --	5.24[d]								
All two-axle vehicles greater than 7,000 lbs. and buses (other than franchise buses and motor homes)	20.35	16.10	11.84	(f)	(f)	(f)	10.17	8.05	5.92
3 Axle	33.51	26.46	19.40				16.76	13.23	9.70
4 Axle	41.89	33.35	24.80				20.94	16.67	12.40
5 Axle	55.05	43.69	32.33				27.53	21.85	16.17
6 Axle	63.43	50.58	37.72				31.72	25.29	18.87
7 Axle	78.98	62.12	45.25				39.49	31.06	22.63
Each additional axle above 7	11.97	9.77	7.56				5.99	4.88	3.78
Two-axle franchise buses	9.90	7.32	4.74				4.82	3.60	2.37
Three-axle franchise buses	10.98	8.31	5.63				5.62	4.30	2.97
Motorcycles	4.28	3.57	2.85	4.28	3.17	2.05	4.28	3.17	2.05
Each additional axle	1.80	1.75	1.70	1.80	1.75	1.70	1.80	1.75	1.70

Notes:

(a) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020.

(b) E-ZPass crossing charges apply to NYCSC E-ZPass customers only when using their properly mounted NYCSC E-ZPass tag; customers of other E-ZPass CSCs are charged the TBM toll. Any motorist, regardless of residence, can obtain a NYCSC transponder.

(c) Mid-Tier crossing charges apply to NYCSC E-ZPass customers only when not using their properly Mounted NYCSC E-ZPass tag; For crossing charges posted to NYCSC E-ZPass accounts based on license plates; and for NYCSC third-party account providers.

(d) Tolls are charged per transaction for E-Tokens using a registered E-ZPass tag.

(e) Effective April 1, 2012, eligible Rockaway Peninsula and Broad Channel residents ("Rockaway 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.

(f) Passage prohibited except with NYCDOT permit.

Passenger Car Tolls

As noted, TBTA crossings are separated into three categories for toll pricing structure purposes: major crossings, minor crossings, and the Henry Hudson Bridge. The single trip passenger car TBM toll is $10.17 for the major crossings. The minor crossing passenger car TBM toll is $5.09 on the Marine Parkway and Cross Bay Bridges, which is half the level ($10.17) of those on the major crossings. On the Henry Hudson Bridge, the passenger car toll is $7.50 for TBM customers. All tolls are collected in each direction. As of December 1, 2020, the Verrazzano-Narrows Bridge implemented split tolling, with one-way and round-trip toll rates matching those at other major crossings. Previously, tolls at the Verrazzano-Narrows Bridge were only collected in the westbound (Staten Island-bound) direction since 1986, initially in accordance with Section 324(a) of the federal Department of Transportation and Related Appropriations Act of 1986. In December 2019, Section 126 of the federal Further Consolidated Appropriations Act, 2020, which eliminated one-way tolling and restores split tolling, was enacted.

As noted earlier in this report, on April 11, 2021, TBTA implemented a Mid-Tier toll rate for NYCSC E-ZPass customers when not using their properly mounted E-ZPass tag. The single trip passenger car NYCSC Mid-Tier toll is $8.36 for the major crossings. The minor crossing passenger car NYCSC Mid-Tier toll is $3.77 on the Marine Parkway and Cross Bay Bridges. On the Henry Hudson Bridge, the passenger car NYCSC Mid-Tier toll is $4.62.

Tolls for passenger cars are reduced by TBTA under the following programs: (1) NYCSC E-ZPass; (2) E-Tokens required by Sections 553-f, 553-h, and 553-i of the New York Public Authorities Law; (3) place of residence/crossing used; (4) place of residence; 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 Verrazzano-Narrows Bridges. MTA reimburses TBTA in full for these rebates with a combination of its own funds, New York State appropriated funds, and the Outer Borough Transportation Account ("OBTA") created in 2018 under Public Authorities Law Section 1270-i. It was announced in April 2019 that the OBTA, would also be used to provide rebates beginning in 2020 to Queens residents using the Cross Bay Bridge and Bronx residents crossing the Henry Hudson Bridge, and to partly fund the Staten Island Resident rebate at the Verrazzano-Narrows Bridge as described in greater detail below under the heading, "Outer Borough Transportation Account Rebates."

Open road, Cashless Tolling has been implemented at all TBTA crossings, enabling a free flow of traffic past overhead gantries with vehicle classification, license plate image cameras and E-ZPass sensors. For vehicles without an E-ZPass, a TBM invoice is sent to the vehicle's registered owner. Under the current toll schedule, passenger cars equipped with a properly mounted NYCSC E ZPass tag receive a $3.62 reduction per trip at all major crossings, a $2.64 reduction at the Cross Bay and Marine Parkway Bridges, and a $4.50 reduction at the Henry Hudson Bridge when compared to the standard, undiscounted rate. Passenger cars with NYCSC E-ZPass accounts but improperly mounted or missing tags would be subject to the Mid-Tier toll rate and would receive a lower toll rate reduction: a $1.81 reduction per trip at major crossings, a $1.32 reduction at the Cross Bay and Marine Parkway Bridges, and a $2.88 reduction at the Henry Hudson Bridge. Passenger cars equipped with a transponder not issued by the NYCSC pay the same standard, undiscounted toll

rate as TBM customers. It should be noted that any motorist, regardless of residence, can obtain a NYCSC transponder and avail themselves of the E-ZPass discounts.

Toll Discounts for Passenger Cars

TBTA provides toll discounts by means of resident E-Tokens and NYCSC E-ZPass to Rockaway Residents on the Cross Bay and Marine Parkway Bridges and registered residents of Staten Island ("Staten Island Residents") on the Verrazzano-Narrows Bridge. Under the current toll schedule, eligible Rockaway Residents paying with an E-Token using a registered E-ZPass tag receive a $1.70 reduction per trip at the Cross Bay and Marine Parkway Bridges. Rockaway Residents using a registered Rockaway Resident E-ZPass tag receive a $3.49 reduction per trip at the Cross Bay and Marine Parkway Bridges. Eligible Staten Island Residents paying with an E-Token using a registered E-ZPass tag will receive a $4.93 reduction per trip at the Verrazzano-Narrows Bridge.

Tolls for Vehicles over 7,000 Pounds

The toll charges for vehicles over 7,000 pounds are a function of number of axles as well as the crossing used. For the major crossings, the present TBM rate for these vehicles is $20.35 for two axles, increasing to $78.98 for a seven-axle vehicle. These vehicles receive a reduction of approximately 42 percent with a properly mounted NYCSC E-ZPass and a 21 percent reduction in the Mid-Tier category. Vehicles with more than seven axles pay a TBM rate of $11.97 for each additional axle over seven, a properly mounted NYCSC E-ZPass rate of $7.56 for each additional axle over seven, and a Mid-Tier rate of $9.77 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.

For the minor crossings, the two-axle TBM rate for vehicles over 7,000 pounds is $10.17, increasing to $39.49 for a seven-axle vehicle. These vehicles presently receive a reduction of approximately 42 percent with a properly mounted NYCSC E-ZPass tag and a 21 percent reduction in the Mid-Tier category. Vehicles with three to six axles pay varying rates, which increase with the number of axles, as shown in Table 1. Vehicles with more than seven axles pay a TBM rate of $5.99 for each additional axle over seven, a properly mounted NYCSC E-ZPass rate of $3.78 for each additional axle over seven, and a Mid-Tier rate of $4.88 for each additional axle over seven. Commercial vehicles are not permitted on the Henry Hudson Bridge without a NYCDOT permit.

The MTA also has a partial toll rebate program for NYCSC E-ZPass business and commercial customers using eligible vehicles at the Verrazzano-Narrows Bridge. As of April 11, 2021, this partial rebate is 15 percent of tolls transacted on eligible vehicles.

MTA's Toll Rebate Programs

Toll rebate programs have been and remain available for: (1) registered Rockaway Residents for use of the Cross Bay Bridge; (2) Staten Island Residents participating in the Staten Island Resident ("SIR") E-ZPass discount program (the "SIR Rebate Program") for use of the Verrazzano-Narrows Bridge; and (3) commercial vehicles participating in the Verrazzano-Narrows Bridge Commercial Rebate Program ("VNB Commercial Rebate Program" and, together with the SIR Rebate Program, the "VNB Rebate Programs"). In this section there is a discussion of the two new toll

rebate programs approved by the MTA Board in December 2019 for Queens residents over the Cross Bay Bridge and Bronx residents over the Henry Hudson Bridge. The MTA toll rebate programs are available only to residents with registered NYCSC E-ZPass tags, and to commercial vehicles with more than 20 trips per month across the Verrazzano-Narrows Bridge using the same NYCSC E-ZPass account. These rebate programs do not affect TBTA revenues since TBTA collects the full toll, 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 tag were eligible for the rebate. The full rebate was restored on April 1, 2012. In June 2020, the MTA reimbursed the TBTA in the amount of approximately $5.85 million in toll rebates relating to the Cross Bay Bridge rebate program. The TBTA estimates that the required reimbursements in 2021 will total approximately $5.85 million based on a combination of reduced traffic and a higher resident discount toll.

Verrazzano-Narrows Bridge Rebate Programs

Since 2014, MTA has had two toll rebate programs at the Verrazzano-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 NYCSC E-ZPass account. Since they are partially funded by the State, the VNB Rebate Programs follow the New York State Fiscal Year.

In December 2019, the federal Further Consolidated Appropriations Act 2020 was enacted, which eliminated the one-way tolling requirement at the Verrazzano-Narrows Bridge and restored split tolling so that tolls could be collected in the Staten Island-bound and Brooklyn-bound directions, which was implemented on December 1, 2020. In March 2020, the MTA Board approved changing the method of toll collection at the Verrazzano-Narrows Bridge to split tolling and authorized TBTA to make the required revisions to the toll schedule regulation under the New York State Administrative Procedure Act. As a result, the SIR Rebate Program was changed so that the effective, post-rebate toll for Staten Island residents was $2.75 in each direction (from $5.50 in the Staten Island-bound direction) and the VNB Commercial Rebate Program's eligibility threshold was changed to more than 20 trips per month in either direction for trucks and other commercial vehicles using the same New York Customer Service Center E-ZPass account (from ten trips a month, collected Staten-Island bound). In February 2021, the MTA Board adopted increases in the SIR resident discount toll and eliminated the minimum trip threshold so that the resident toll would increase to $3.68 (from $3.44). The State, in the fiscal year 2021-22 budget, appropriated additional funding to keep the effective toll after rebate at $2.75, increasing the rebate to $0.93 (from $0.69).

As a result of the change to the SIR resident toll and MTA rebate program, the projected annualized cost of the 2021-2022 VNB Rebate Program is approximately $33.4 million with $7 million for the 2021-2022 VNB Commercial Rebate Program and $26.4 million for the 2021-2022 SIR Rebate Program. The MTA's annual contribution is $7.0 million ($3.5 million for the resident rebate and $3.5 million for the commercial rebate), with the balance provided by the State's contribution via appropriations to MTA.

The money to fund a year's estimated costs for the VNB Rebate Programs is transferred by MTA to TBTA during the New York State Fiscal Year. The 2021-2022 VNB Rebate Programs will be implemented as specified herein only for such periods during which both (a) MTA's total financial responsibility, net of New York State actions or available offsets, does not exceed $7 million for the 2021-2022 SIR Rebate and VNB Commercial Rebate Programs and (b) New York State provides (i) at least $7 million for the 2021-2022 SIR Rebate Program and VNB Commercial Rebate Program and (ii) New York State provides such additional funds as are necessary to keep the effective post-rebate SIR E-ZPass toll at $2.75 under the 2021-2022 SIR Rebate Program. If, as a result of unexpected toll transaction activity, TBTA estimates that such MTA and State funds allocated to MTA for the 2021-2022 VNB Rebate Programs, net of offsets, will be insufficient to fund the 2021-2022 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, as allowed by the February 2021 MTA Board resolution. However, in the event that such MTA and State funds allocated to MTA for the 2021-2022 VNB Rebate Programs are fully depleted at any time during the 2021-2022 VNB Rebate Programs annual period, the 2021-2022 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 Verrazzano-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) New York State provides to MTA funds sufficient for at least half the expenses of each continuing annual period.

Under the 2021-2022 SIR Rebate Program, for Staten Island Residents crossing the Verrazzano-Narrows Bridge, MTA will rebate $0.93 of the $3.68 SIR E-ZPass toll paid in each direction. As a result of these MTA toll rebates and due to an appropriation in the New York State Fiscal Year 2021-22 enacted budget, Staten Island residents will pay an effective post-rebate toll of $2.75 per trip under the current SIR toll rates collected at the VNB starting on April 11, 2021.

Under the 2020-2021 VNB Commercial Rebate Program, the rebate was 16.25 percent of the E-ZPass toll for trucks and other commercial vehicles with more than twenty trips per month (after implementation of split tolling) across the Verrazzano-Narrows Bridge, using the same NYCSC E-ZPass Account and the $7 million allocation was sufficient in covering the cost of the rebate.

Under the 2021-2022 VNB Commercial Rebate Program, the new rebate is 15.00 percent of the E-ZPass toll for trucks and other commercial vehicles with more than twenty trips per month across the Verrazzano-Narrows Bridge, using the same NYCSC E-ZPass Account. Implementing a 15.00%

rebate of the E-ZPass toll for trucks and other eligible commercial vehicles is expected to ensure that the $7 million allocated for the 2021-2022 VNB Commercial Rebate Program is sufficient to provide funding from April 1, 2021 through March 31, 2022.

Outer Borough Transportation Account Rebates

Henry Hudson Bridge Bronx Resident Rebate Program and Cross Bay Bridge Queens Resident Rebate Program

Two new MTA toll rebate programs relating to MTA Bridges and Tunnels' crossings were approved by the MTA Board in December 2019. They are (i) a Queens resident rebate for passenger vehicles with E-ZPass tags using the Cross Bay Bridge, and (ii) a Bronx resident rebate for passenger vehicles with E-ZPass tags using the Henry Hudson Bridge. In each case, the E-ZPass toll will be charged to the customer's NYCSC resident E-ZPass account, and then an immediate credit will be issued by the MTA for the amount of the toll using funds in the OBTA established under Section 1270-i(3) of the Public Authorities Law. Due to the impacts of COVID-19 on traffic, the funding for these rebate programs was not available in 2020-2021 and implementation of the two rebate programs has been delayed until a future date when OBTA funds may become available.

Cashless Tolling System

The E-ZPass Electronic Toll Collection ("ETC") system has been fully installed at all TBTA bridges and tunnels since December 1996. When a vehicle with an E-ZPass tag enters the toll payment area, an electronic reader identifies the tag code at the toll facility and the toll is deducted from the customer's account. TBTA had over 5.953 million E-ZPass tags in use in 2020 (compared to 5.826 million in December 2019). As of December 2020, E-ZPass participation rates were 94.2 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, 2019 was over 41.7 million[1].

With the introduction of E-ZPass at all TBTA crossings, toll plaza operations improved, and vehicle-hours of delay were reduced. This, in turn, led to even more motorists enrolling in E-ZPass. With the implementation of Cashless Tolling at all TBTA facilities by fall 2017 and the subsequent removal of TBTA toll plazas, throughput capacity has increased to levels comparable to the capacity of a free-flowing lane of traffic (about 1,800 vehicles per hour).

As Cashless Tolling was fully implemented by the end of 2017, E-ZPass participation rates increased considerably at the facilities, with the year-end TBTA-wide E-ZPass participation rate increasing by 7.4 percent from 2016 to 2017. This change was far greater than the 1.3 percent decrease to 2.3 percent increase year-end over year-end experienced TBTA-wide over the rest of the previous 10-year period. In 2020, the 1.3 percent decrease in year-end TBTA-wide E-ZPass participation rates compared to 2019 was the result of changes in traffic using TBTA facilities in response to the pandemic. E-ZPass participation rates continue to be above 90 percent at each facility.

[1] Information for 2020 is not yet available from the E-ZPass Group.

Table 2 lists the year-end TBTA-wide E-ZPass participation rates starting in 2011, the fifteenth year since all nine crossings had E-ZPass in operation. Implementation of E-ZPass started in October 1995 on the Verrazzano-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 December 2020.

As Cashless Tolling was fully implemented by the end of 2017, E-ZPass participation rates increased considerably at the facilities, with the year-end TBTA-wide E-ZPass participation rate increasing by 7.4 percent from 2016 to 2017. This change was far greater than the 1.3 percent decrease to 2.3 percent increase year-end over year-end experienced TBTA-wide over the rest of the previous 10-year period. In 2020, the 1.3 percent decrease in year-end TBTA-wide E-ZPass participation rates compared to 2019 was the result of changes in traffic using TBTA facilities in response to the pandemic. E-ZPass participation rates continue to be above 90 percent at each facility.

Table 2 Year-End E-ZPass Participation Rates

Year	Year-End E-ZPass Participation Rates for all TBTA Facilities									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percent Participation (All TBTA Facilities)	80.2%	81.5%	83.8%	84.5%	85.6%	86.2%	93.6%	94.6%	95.2%	94.2%
TBTA Facility	Year-End TBTA E-ZPass Participation Rate by Facility (2020)									
	Throgs Neck	Bronx-Whitestone	Robert F. Kennedy	Queens Midtown	Hugh L. Carey	Verrazzano-Narrows	Henry Hudson	Marine Parkway	Cross Bay	
Percent Participation	93.7%	92.7%	93.6%	94.6%	95.6%	95.0%	94.8%	96.4%	95.3%	

Source: TBTA data.

TBTA's Role in E-ZPass

TBTA was a founding member of the E-ZPass Group. Originally comprised of toll authorities in Delaware, Pennsylvania, New Jersey, and New York, the E-ZPass Group now encompasses 34 toll agencies in 19 states, including five 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 E-ZPass tags on any E-ZPass-equipped facility operated by another E-ZPass Group member. In 2019, the E-ZPass Group processed over 3.7 billion toll transactions[2]. 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.

The transportation network includes, in addition to TBTA, the following agencies and bridges:

- The six interstate crossings of the Port Authority;

[2] Information for 2020 is not yet available from the E-ZPass Group.

- New Jersey Turnpike and Garden State Parkway operated by the New Jersey Turnpike Authority;
- New York State Thruway including the Governor Mario M. Cuomo Bridge (formerly the 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 Thousand Island Bridges of the Thousand Island Bridge Authority;
- 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:

- Central Florida Expressway Authority
- Cline Avenue Bridge (Chicago)
- Delaware Department of Transportation
- Illinois State Toll Highway Authority
- Indiana Toll Road Concession Company, LLC
- Kentucky Public Transportation Infrastructure Authority
- Maine Turnpike Authority
- Massachusetts Department of Transportation
- Maryland Transportation Authority
- New Hampshire Department of Transportation
- North Carolina Turnpike Authority
- 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
- Cape May County Bridge Commission (New Jersey)
- Kane County Department of Transportation (Illinois)
- Florida Department of Transportation
- State Roads and Toll Authority (Georgia)

With the exception of TBTA customers enrolled in the E-ZPass Pay Per Trip plan, all TBTA E-ZPass 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 toll 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 2019, TBTA transferred $1.1 billion to, and received $625.1 million from, other members within the E-ZPass Group[3].

Cashless, Open Road Tolling ("Cashless Tolling")

TBTA completed full implementation of Cashless Tolling on September 30, 2017. Cashless Tolling eliminates traditional toll plazas by allowing tolls to be collected in a free-flow environment through E-ZPass sensors and license-plate cameras mounted on overhead gantries. Drivers without E-ZPass receive a "Tolls by Mail" invoice mailed to the vehicle's registered owner.

In spring 2016, TBTA began asking the DMV to suspend the vehicle registrations of violators who fail to pay their tolls and violation fees or have them dismissed or transferred in response to violation notices for five toll violations within 18 months, in accordance with the initial DMV regulation for persistent or habitual toll violators. In January 2017, the DMV changed its regulation for persistent or habitual violators so that vehicle registrations can be suspended for three toll violations within five years and commercial vehicle registrations can be suspended for $200.00 or more in unpaid tolls within five years.

TBTA employs and develops measures to enhance collection and enforcement of tolls under the Cashless Tolling system. License plate recognition technology on gantries and in patrol vehicles is being used for the detection of persistent toll violators and toll violation enforcement. Additionally, TBTA continues to issue exclusion orders barring the vehicles of out-of-state toll violation scofflaws from TBTA facilities and for those persistent violators, engages in summonsing vehicle operators and towing those vehicles from TBTA facilities.

In April 2017, the New York State DMV received legislative authorization to enter into reciprocal compacts with other states to suspend the vehicle registrations of persistent or habitual toll violators. This allows MTA Bridges and Tunnels to have the home states of the out-of-state violators suspend or place holds on vehicle registrations for toll violations committed on MTA Bridges and Tunnels' facilities. MTA Bridges and Tunnels entered into such an agreement with Massachusetts and began submitting registration hold packages to the Massachusetts Registry of Motor Vehicles in February 2020 to place holds on the registrations of toll-evading Massachusetts owners. In time, MTA Bridges and Tunnels anticipates being able to discontinue issuing exclusion orders to out-of-state toll violators barring their vehicles from MTA Bridges and Tunnels facilities.

TBTA has continually undertaken efforts to increase E-ZPass market share and to assist customers in managing toll bill payments and E-ZPass accounts. The Tolls NY smartphone application (app), which had a soft launch in mid-June 2020, was officially launched in December 2020 through a TBTA press release, highlighting the functionality available to E-ZPass and Tolls by Mail customers

[3] Information for 2020 is not yet available from the E-ZPass Group.

for managing their accounts. As of year-end, there were more than 446,000 installations of the app.

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 50 years. Tolls are shown for cash passenger car transactions from 1971 to implementation of Cashless Tolling at each facility and TBM transactions thereafter 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 TBM toll rate. From 2009 through 2020, Table 3 shows the cash or TBM rate and the NYCSC E-ZPass rate on each of the TBTA's facilities. Beginning in 2021, Table 3 shows the cash or TBM rate, the NYCSC E-ZPass rate, and the Mid-Tier toll rate on each of the TBTA's facilities.

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 crossing prior to the 2008 toll increase) – a crossing restricted to passenger vehicles; and
- Verrazzano-Narrows Bridge – a major crossing with one-way toll collection from 1986 through November 30, 2020. Split tolling was implemented on December 1, 2020.

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.

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

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

Year	Verrazzano-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	$2.50 / $1.55
2009[d]	$5.50 / $4.57[b]	$5.50 / $4.57	$3.00 / $2.09	$2.75 / $1.71
2010 – 2013[f]	$6.50 / $4.80[b]	$6.50 / $4.80	$4.00 / $2.20[e]	$3.25 / $1.80
2013-2014[g]	$7.50 / $5.33[b]	$7.50 / $5.33	$5.00 / $2.44	$3.75 / $2.00
2015-2016[h]	$8.00 / $5.54[b]	$8.00 / $5.54	$5.50 / $2.54	$4.00 / $2.08
2017-2018[i]	$8.50 / $5.76[b][l]	$8.50 / $5.76[l]	$6.00 / $2.64[l]	$4.25 / $2.16[l]
2019-2020[j]	$9.50 / $6.12[b]	$9.50 / $6.12	$7.00 / $2.80	$4.75 / $2.29
2020-2021[k]	$10.17 / $8.36 / $6.55[m]	$10.17 / $8.36 / $6.55	$7.50 / $4.62 / $3.00	$5.09 / $3.77 / $2.45

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) From March 20, 1986 through November 30, 2020, round-trip tolls (twice the amount shown) were collected on the Verrazzano-Narrows Bridge in only the westbound direction. During this period of time, eastbound traffic used the bridge toll-free. Amounts shown were the equivalents of collecting tolls in each direction. Split tolling began at the Verrazzano-Narrows Bridge on December 1, 2020. The toll is no longer doubled in the westbound direction and tolls are collected in each direction of travel.
(c) E-ZPass introduced to all TBTA facilities in December 1996. For the periods 1996-2003 through 2020, the cash/TBM toll rate is shown first, followed by the E-ZPass rate.
(d) Effective July 12, 2009, when the lower E-ZPass rate became available only to NYCSC E-ZPass customers.
(e) Beginning November 10, 2012, customers without E-ZPass tags at the Henry Hudson Bridge paid via the TBM program. Full Cashless Tolling began at the Henry Hudson Bridge in November 2016.
(f) Toll increase effective December 30, 2010.
(g) Toll increase effective March 3, 2013.
(h) Toll increase effective March 22, 2015.
(i) Toll increase effective March 19, 2017.
(j) Toll increase effective March 31, 2019.
(k) Toll increase effective April 11, 2021 with Mid-Tier toll introduced. The TBM/non-NYSCS E-ZPass toll rate is shown first, followed by the Mid-Tier rate, and then E-ZPass NYCSC rate.
(l) Customers without E-ZPass tags receive toll bills under the TBM program. Cash collection was eliminated when Cashless Tolling was implemented in 2017 at the Queens Midtown and Hugh L. Carey Tunnels in January, at the Cross Bay and Marine Parkway Bridges in April, at the RFK Bridge in June, at the Verrazzano-Narrows Bridge in July and at the Bronx-Whitestone and Throgs Neck Bridges in September.
(m) Split tolling was implemented on the Verrazzano-Narrows Bridge on December 1, 2020.

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 most of the transactions on TBTA facilities are made by customers using an E-ZPass tag registered with the NYCSC, we have compared cumulative CPI-U alongside the TBTA major crossing passenger car NYCSC 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 April 2021 (after the April 11th toll increase) are 2.2 times higher than the 1996 E-ZPass toll rate while the CPI-U is 1.7 times higher than the 1996 level. If adjusted for changes in the CPI-U, current tolls are 1.3 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, Throgs Neck, and Verrazzano- Narrows [k] Bridges and Queens Midtown and Hugh L. Carey Tunnels	Tolls Adjusted to 1982 - 1984 dollars[b]
1996[c]	166.90	3.00	1.80
2003	197.80	3.50	1.77
2005	212.70	4.00	1.88
2008	235.80	4.15	1.76
2009[d]	236.80	4.57	1.93
2010[e]	240.90	4.80	1.99
2013[f]	256.80	5.33	2.08
2015[g]	260.60	5.54	2.13
2017[h]	268.50	5.76	2.15
2019[i]	278.20	6.12	2.20
2021[j]	286.50	6.55	2.29
Ratio 2021/1996	1.72	2.18	1.27

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 became available only to NYCSC E-ZPass customers.
(e) Effective December 30, 2010.
(f) Effective March 3, 2013.
(g) Effective March 22, 2015.
(h) Effective March 19, 2017.
(i) Effective March 31, 2019.
(j) Effective April 11, 2021.
(k) Split tolling was implemented on December 1, 2020.

HISTORICAL TRAFFIC, REVENUES AND EXPENSES AND ESTIMATED/BUDGETED NUMBERS FOR 2020

Historical traffic, toll revenues, and expenses were reviewed for the nine TBTA bridges and tunnels. Over the last 51 years, paid traffic volumes on the crossings have ranged from a low of 218 million in 1976 to a high of 329 million in 2019. 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 19 periodic toll increases (through the end of 2019 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.

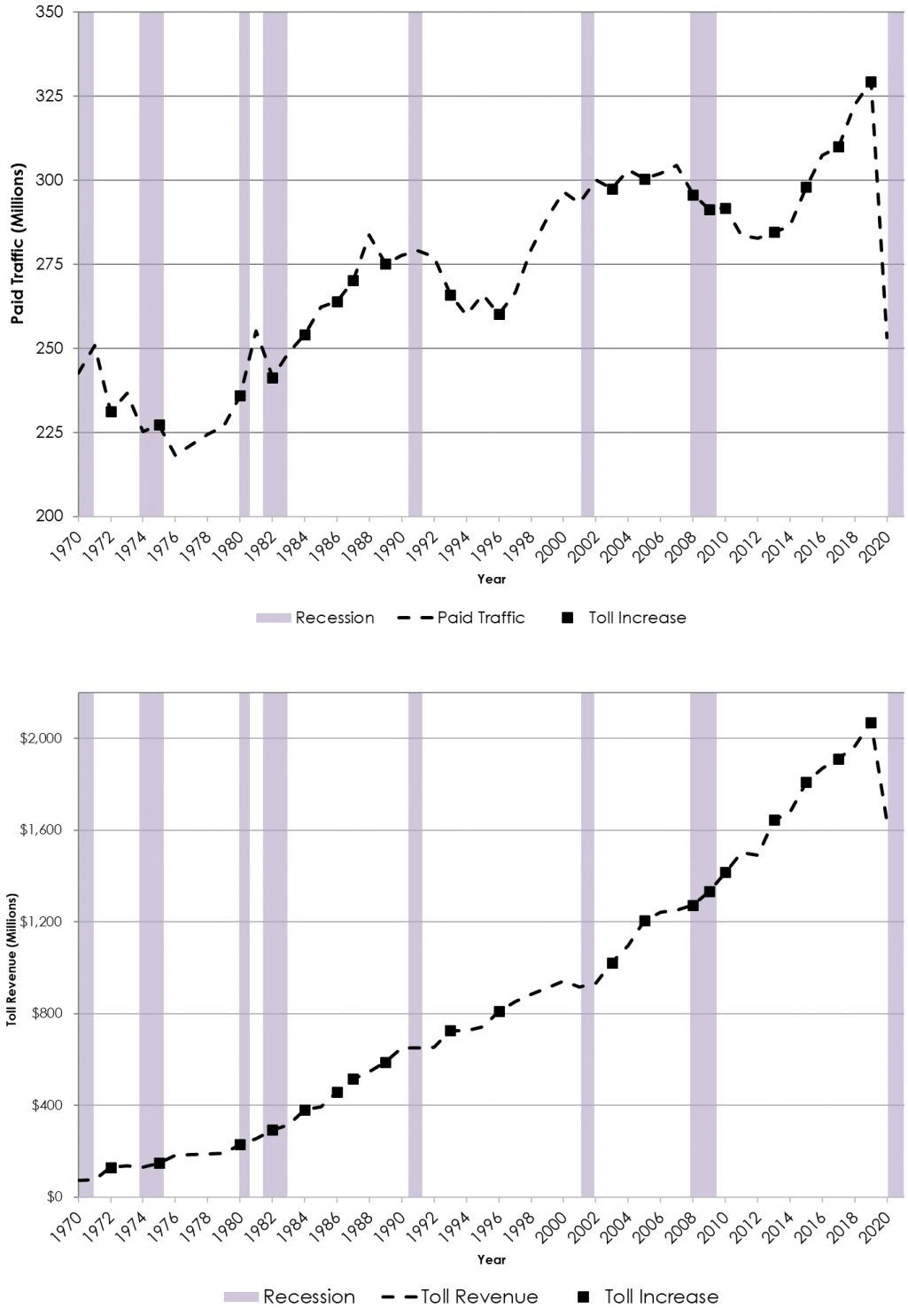
Toll increases in July 2009 and December 2010 resulted in annual revenue increases in 2010 and 2011. In 2012, toll revenues were $1.491 billion, $11 million less than the 2011 level of $1.502 billion, primarily due to temporary closures caused by Superstorm Sandy, partially offset by modest improvements in the regional and national economies. Toll revenues in 2013 increased to $1.645 billion 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 billion, 1.9 percent higher than 2013 toll revenues. That increase in toll revenue was attributed to a continuing modest economic recovery and the March 2013 toll increase. Toll revenues in 2015 were $1.809 billion (7.9 percent higher than 2014 toll revenues) primarily due to the March 2015 toll increase, generally overall favorable weather conditions, relatively low gas prices, and a continued modest recovery in the economy. In 2016, these conditions continued resulting in traffic reaching a then historical high of 307 million vehicles, which was a 3.2 percent increase from the previous year. Toll revenues in 2016 were $1.870 billion, 3.4 percent higher than 2015 toll revenues. In 2017, with a toll increase in March, traffic surpassed the 2016 historical high with 310 million vehicles, a 0.9 percent increase from the previous year. Toll revenues in 2017 were $1.912 billion, 2.2 percent higher than 2016 toll revenues. In 2018, traffic continued to surpass the historical high with 322 million vehicles, a 4.0 percent increase from the previous year. Toll revenues in 2018 were $1.965 billion, 2.8 percent higher than 2017 toll revenues. In 2019, traffic continued to surpass the historical high with 329 million vehicles, a 2.2 percent increase from the previous year. Toll revenues in 2019 were $2.071 billion, 5.4 percent higher than 2018 toll revenues. In 2020, due to the impact of the pandemic, traffic was 253 million vehicles, a 23.1 percent decrease from the previous year. Final audited toll revenues in 2020 were $1.640 billion, 20.8 percent lower than 2019 toll revenues. Major regional toll facilities such as those operated by the Port Authority and Thruway have experienced similar trends in traffic reduction and recovery throughout the duration of the pandemic thus far.

Also note in Figure 2A/2B that, prior to the onset of the pandemic, despite the periodic toll increases, the traffic trend through 2019 was 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 began to show positive signs of growth, with increasing employment levels and decreases in gasoline prices, transaction growth has returned. Overall traffic at TBTA facilities continued to increase to historically high levels despite the periodic toll increases implemented in March 2013, March 2015, March 2017, and March 2019. Beginning in March 2020, the impact of the pandemic and government-imposed closures and other actions caused significant decreases in traffic on all TBTA facilities. Although there has been some recovery in traffic, it has not returned to the historically high levels seen in recent years. According to the National Bureau of Economic Research, a recession began in February 2020, concluding the longest economic expansion in US history.

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, all periods of difficult and prolonged economic downturns.

Figure 2A/2B Aggregated TBTA Facilities Paid Traffic and Toll Revenue, 1970 to 2020



Source: TBTA data.

Traffic and Toll Revenue, 2010 to 2020

Table 5 lists the traffic and toll revenue recorded for each of the nine TBTA crossings for the most recent 11-year time period, 2010-2020. Total TBTA traffic and toll revenue are shown in Table 6. Within this 11-year period toll-paying traffic reached historic peaks three times, first in 2017 with 310 million crossings, again in 2018 with 322 million crossings, and again in 2019 with 329 million crossings. Due to the ongoing pandemic, toll-paying traffic decreased to 253 million crossings in 2020.

The first toll increase within this most recent 11-year time period occurred on December 30, 2010. 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. 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.

TBTA traffic following the March 2013, March 2015, March 2017, and March 2019 toll increases has not followed the typical pattern outlined above. Lower gasoline prices, among other factors, resulted in a 0.7 percent increase in traffic following the March 2013 toll increase, a 4.0 percent increase in traffic following the March 2015 toll increase, a 0.9 percent increase in traffic following the March 2017 toll increase, and a 2.2 percent increase in traffic following the March 2019 toll increase. The five toll increases reflected in Table 5 and Table 6 in 2010, 2013, 2015, 2017, and 2019 are evident in the jump in average tolls in the years following the increase. The historical relationship between toll increases and their effects on TBTA traffic volumes is further discussed in the Toll Impacts and Elasticity section of this report.

The December 30, 2010 toll increase resulted in an overall increase in toll revenue from $1.417 billion in 2010 to $1.502 billion 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, Verrazzano-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, 2010 to 2020

(000s)[a]

Year	Verrazzano-Narrows Bridge				RFK Bridge				Bronx-Whitestone Bridge			
	Traffic		Revenue	Average Toll[c]	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll
	Volume[b]	Percent Change			Volume	Percent Change			Volume	Percent Change		
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
2015	66,215	3.5	372,347	5.62	62,227	3.9	422,756	6.79	42,062	9.3	294,022	6.99
2016	69,756	5.3	393,017	5.63	62,921	1.1	428,083	6.80	45,816	8.9	320,486	7.00
2017	71,922	3.1	416,459	5.79	63,810	1.4	437,335	6.85	46,023	0.5	327,320	7.11
2018	74,809	4.0	433,121	5.79	66,398	4.1	448,600	6.76	47,958	4.2	332,715	6.94
2019	76,102	1.7	454,303	5.97	66,880	0.7	461,797	6.90	49,561	3.3	350,778	7.08
2020	62,789	-17.5	386,978	6.16	50,416	-24.6	355,004	7.04	38,958	-21.4	282,204	7.24

Year	Throgs Neck Bridge				Hugh L. Carey Tunnel				Queens Midtown Tunnel			
	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll	Traffic		Revenue	Average Toll
	Volume	Percent Change			Volume	Percent Change			Volume	Percent Change		
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
2015	42,189	3.3	324,702	7.70	17,655	4.2	106,881	6.05	28,697	-1.0	182,382	6.36
2016	43,245	2.5	335,732	7.76	17,961	1.7	109,250	6.08	26,824	-6.5	171,121	6.38
2017	43,694	1.0	344,882	7.89	17,510	-2.5	105,649	6.03	25,065	-6.6	158,683	6.33
2018	44,347	1.5	344,565	7.77	18,799	7.4	113,395	6.03	27,552	9.9	173,021	6.28
2019	44,182	-0.4	356,533	8.07	19,421	3.3	121,645	6.26	30,344	10.1	199,624	6.58
2020	34,277	-22.4	293,274	8.56	14,786	-23.9	93,783	6.34	19,875	-34.5	134,251	6.75

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	Percent Change			Volume	Percent Change			Volume	Percent Change		
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
2015	23,194	4.3	71,388	3.08	7,753	4.8	16,906	2.18	7,954	5.3	17,517	2.20
2016	24,620	6.2	76,309	3.10	7,902	1.9	17,263	2.18	8,300	4.3	18,431	2.22
2017	25,555	3.8	85,424	3.34	7,977	1.0	17,451	2.19	8,441	1.7	18,655	2.21
2018	25,831	1.1	83,836	3.25	8,072	1.2	17,396	2.15	8,522	1.0	18,575	2.18
2019	26,050	0.8	88,947	3.41	8,259	2.3	18,421	2.23	8,598	0.9	19,361	2.25
2020	17,726	-32.0	59,958	3.38	6,968	-15.6	16,560	2.38	7,389	-14.1	17,741	2.40

Source: TBTA data.

Notes:

(a) Toll rate increases occurred on July 12, 2009, December 30, 2010, March 3, 2013, March 22, 2015, March 19, 2017, and March 31, 2019.

(b) Split tolling was implemented on December 1, 2020. Previously, westbound toll traffic volume was doubled since traffic was not registered in the eastbound direction.

(c) Prior to December 2020, the average toll was calculated on the basis of revenues divided by doubled westbound volume.

Table 6 Summary of Annual Paid Traffic and Toll Revenue, 2010 to 2020

Year	Total Paying Traffic Volume (000s)	Percent Change	Total Toll Revenue (000s)	Percent Change	Average Toll
2010[a]	291,714	-	$1,417,046	-	$4.86
2011	283,471	-2.8%	1,501,589	6.0%	5.30
2012	282,647	-0.3%	1,490,982	-0.7%	5.28
2013[a]	284,528	0.7%	1,645,193	10.3%	5.78
2014	286,361	0.6%	1,676,445	1.9%	5.85
2015[a]	297,946	4.0%	1,808,901	7.9%	6.07
2016	307,346	3.2%	1,869,693	3.4%	6.08
2017[a]	309,997	0.9%	1,911,857	2.3%	6.17
2018	322,290	4.0%	1,965,223	2.8%	6.10
2019[a]	329,397	2.2%	2,071,411	5.4%	6.29
2020	253,184	-23.1%	1,639,753	-20.8%	6.48

Source: TBTA data.
Notes: Toll rate increases occurred on March 16, 2008, July 12, 2009, December 30, 2010, March 3, 2013, March 22, 2015, March 19, 2017, and March 31, 2019.

In 2012, traffic volumes decreased by 0.3 percent to 282.6 million and toll revenues decreased 0.7 percent to $1.491 billion. 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.

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 the replacement of the Bronx approach spans of the Bronx-Whitestone Bridge, which occurred for most of 2010 and 2011 and 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. This trend continued in 2013 and 2014 during the Queens approach structure replacement project on the Bronx-Whitestone Bridge where a reduction in travel lanes on the bridge resulted in motorists again diverting to the Throgs Neck Bridge to avoid congestion.

The March 22, 2015 toll increase resulted in an overall increase in toll revenue from $1.676 billion in 2014 to $1.809 billion, an increase of 7.9 percent. The increase in traffic is attributed to a continuing modest economic recovery, generally overall favorable weather conditions, and relatively low gas prices, all of which appeared to offset the impacts associated with the toll increase.

In 2016, traffic volumes increased by 3.2 percent to 307.3 million vehicles. The increase in traffic is attributed to a continued modest recovery of the economy, favorable gas prices, and generally overall favorable weather conditions throughout the year. Another possible factor for the increase in year over year traffic is the substantial increase in housing construction activity throughout the City as developers were motivated to secure 421-a property tax exemptions before the program's expiration in January 2016.

The March 19, 2017 toll increase resulted in an overall increase in toll revenue of 2.3 percent from $1.870 billion in 2016 to $1.912 billion in 2017. Traffic volumes increased by 0.9 percent to a new historical high of 310.0 million vehicles. The increase in traffic is attributed to continued growth of the economy and sustained favorable gasoline prices.

In 2018, traffic volumes increased by 4.0 percent to a new historical high of 322.3 million vehicles. Revenue grew by 2.8 percent from $1.912 billion in 2017 to $1.965 billion in 2018. The increase in traffic is attributed to continued growth of the economy and sustained favorable gasoline prices.

The March 31, 2019 toll increase resulted in an overall increase in toll revenue of 5.4 percent from $1.965 billion in 2018 to $2.071 billion in 2019. Traffic volumes increased by 2.2 percent to a new historical high of 329.4 million vehicles. The increase in traffic is attributed to continued growth of the economy and sustained favorable gasoline prices.

In 2020, traffic volumes decreased by 23.1 percent to 253.2 million vehicles. Toll Revenue decreased by 20.8 percent from $2.071 billion in 2019 to $1.640 billion in 2020. The decrease in both traffic and revenue was caused by the ongoing pandemic and related government actions.

Preliminary audited results for January and February 2021 indicate that traffic on the TBTA facilities decreased by 21.3 percent over the same period in 2020 (prior to the onset of the pandemic). Estimated changes by facility are shown below in Table 7.

Table 7 Estimated Changes in January and February Traffic, 2020 to 2021

Facility	Actual Percent Change January - February 2020 to 2021[a]
Throgs Neck Bridge	-23.0%
Bronx-Whitestone Bridge	-20.5%
RFK Bridge	-20.8%
Queens Midtown Tunnel	-32.9%
Hugh L. Carey Tunnel	-21.7%
Verrazzano-Narrows Bridge	-14.0%
Henry Hudson Bridge	-29.9%
Marine Parkway-Gil Hodges Memorial Bridge	-22.8%
Cross Bay Veterans Memorial Bridge	-17.7%
Total	-21.3%

Notes:
(a) Based on preliminary audited traffic data for January and February 2021 (subject to final audit). 2021 traffic levels are lower due to the pandemic and the associated government responses to curtail the pandemic.

Traffic by Facility and Vehicle Class, 2020

TBTA maintains traffic counts for each crossing in 14 categories, ranging from passenger cars to trucks with seven axles. Displayed in Table 8 are the 2020 traffic volumes by facility. Passenger cars totaled 232.5 million crossings and represented 91.8 percent of the total toll-paying vehicles (which has remained relatively constant over time). Of the TBTA facilities, the Verrazzano-Narrows Bridge registered the highest toll-paying traffic volume of 62.8 million vehicles. The lowest toll-paying volume, 7.0 million vehicles, was recorded at the Marine Parkway Bridge.

Table 8 Traffic by Facility and Vehicle Classification, 2020

(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	29,729	79	63	1,749	1	4	352	311
Bronx-Whitestone Bridge	35,902	32	19	1,507	40	115	326	186
RFK Bridge	45,912	36	21	2,834	4	257	563	140
Queens Midtown Tunnel	18,229	10	3	1,127	4	248	184	18
Hugh L. Carey Tunnel	13,658	13	1	446	1	430	160	16
Verrazzano-Narrows Bridge[c]	57,995	58	37	2,337	88	291	557	283
Henry Hudson Bridge[d]	17,506	7	2	159	0	0	7	2
Marine Parkway Bridge	6,712	4	2	194	6	0	17	4
Cross Bay Bridge	6,843	7	3	281	7	89	115	7
Total	232,487	245	151	10,634	151	1,434	2,281	966
Percent of Paid Vehicles	91.8%	0.1%	0.1%	4.2%	0.1%	0.6%	0.9%	0.4%

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	1,830	53	64	42	0	34,277	106	34,384
Bronx-Whitestone Bridge	746	67	16	4	0	38,958	113	39,071
RFK Bridge	509	117	17	6	0	50,416	247	50,663
Queens Midtown Tunnel	8	43	0	0	0	19,875	109	19,984
Hugh L. Carey Tunnel	3	58	0	0	0	14,786	126	14,912
Verrazzano-Narrows Bridge[c]	978	117	44	3	0	62,789	225	63,014
Henry Hudson Bridge[d]	1	42	0	0	0	17,726	54	17,780
Marine Parkway Bridge	13	15	0	0	0	6,968	28	6,996
Cross Bay Bridge	16	21	1	0	0	7,389	23	7,412
Total	4,103	533	143	54	1	253,184	1,032	254,216
Percent of Paid Vehicles	1.6%	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) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020. Previously, westbound traffic was doubled since traffic was 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, 2020

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 typically decline or traffic growth slows 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, largely 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 pandemic also caused significant shifts in the monthly

variation in traffic. In 2020, traffic was significantly lower in March through June due to the pandemic and associated government actions. As a result, the monthly traffic distribution was unusually high during January and February 2020 since these months occurred just prior to the onset of the pandemic. Typically, these two months have the lowest proportion of annual traffic.

The data in Table 9 indicate that total traffic on the nine crossings in 2020 peaked in February. January was the second highest month in 2020. The monthly variations on the nine crossings in 2020 ranged from 53 percent and 30 percent below the annual average daily traffic in April and May, respectively, to 22 percent and 18 percent above in February and January, respectively.

Table 9 Monthly Traffic Variations, 2020

Month	Average Daily Toll-Paying Traffic[a]										Ratio to AADT[c], [d]
	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazzano-Narrows Bridge[b]	Henry Hudson Bridge	Marine Pkwy Bridge	Cross Bay Bridge	Total	
January	106,029	126,198	163,607	75,277	48,288	194,675	63,826	19,489	20,950	818,339	1.18
February	110,572	128,369	170,291	80,000	51,814	198,593	66,703	19,145	20,743	846,230	1.22
March	82,792	94,315	122,319	50,844	34,339	152,472	41,225	15,195	17,299	610,801	0.88
April	49,799	50,342	62,324	19,280	13,585	91,674	15,009	10,136	12,197	324,346	0.47
May	73,860	73,349	95,526	28,966	22,614	130,220	25,561	15,235	17,056	482,387	0.70
June	96,626	98,403	135,174	45,487	37,342	169,380	40,308	21,485	22,524	666,728	0.96
July	104,757	114,260	148,438	53,619	43,485	184,016	50,844	26,707	26,199	752,325	1.09
August	106,500	124,246	153,508	59,113	46,519	192,072	56,102	25,403	24,406	787,870	1.14
September	105,822	124,307	158,229	62,816	49,237	194,487	60,076	22,582	22,521	800,078	1.16
October	103,100	122,548	158,055	64,204	49,815	191,073	60,044	18,790	20,638	788,266	1.14
November	96,174	113,324	147,277	57,758	44,852	179,661	53,409	17,753	19,458	729,666	1.05
December	88,066	107,802	138,771	54,896	43,091	180,435	48,452	16,412	18,178	696,103	1.01
AADT[d]	93,654	106,443	137,747	54,303	40,398	171,555	48,432	19,038	20,189	691,760	1.00

Notes:
(a) Totals may not add due to rounding.
(b) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020. Previously, westbound traffic was doubled.
(c) Annual Average Daily Traffic.
(d) For total traffic on the nine crossings. The ratio to AADT is the quotient of a month's AADT and the annual average for the year; e.g. a ratio to AADT of 0.88 signifies that the monthly traffic is 12 percent below the AADT for 2020.

Changes in Monthly Traffic, 2019 to 2020

Table 10 lists the monthly average daily traffic changes that have occurred between 2019 and 2020.

Table 10 Changes in Monthly Average Daily Traffic, 2019 to 2020

Month	Percent Change Comparing 2019 Monthly Average Daily Traffic to 2020								
	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazzano-Narrows Bridge	Henry Hudson Bridge	Marine Pkwy Bridge	Cross Bay Bridge
January	-1.9%	4.8%	1.2%	0.9%	-1.8%	2.0%	2.9%	3.5%	-0.5%
February	-2.3%	4.3%	-0.8%	1.0%	-0.3%	1.3%	1.3%	3.0%	-0.9%
March	-29.9%	-27.8%	-32.6%	-38.5%	-35.7%	-25.0%	-41.0%	-24.6%	-21.5%
April	-59.2%	-63.3%	-66.8%	-77.2%	-75.1%	-56.4%	-79.8%	-50.4%	-46.5%
May	-41.8%	-48.1%	-50.7%	-66.8%	-59.1%	-39.0%	-66.5%	-36.3%	-32.3%
June	-25.1%	-31.7%	-30.5%	-47.7%	-32.5%	-23.2%	-47.2%	-19.0%	-15.5%
July	-16.7%	-19.8%	-20.4%	-34.9%	-15.5%	-14.3%	-27.6%	-8.0%	-7.4%
August	-17.6%	-15.2%	-19.4%	-31.5%	-11.2%	-12.0%	-23.5%	-6.4%	-6.6%
September	-15.4%	-10.9%	-16.2%	-26.0%	-9.9%	-8.4%	-17.6%	-5.2%	-6.4%
October	-15.0%	-10.6%	-13.5%	-25.7%	-8.2%	-8.0%	-18.6%	-11.8%	-7.6%
November	-19.7%	-16.2%	-19.2%	-30.2%	-16.7%	-13.3%	-27.2%	-15.3%	-10.6%
December	-22.8%	-17.8%	-21.3%	-30.8%	-17.8%	-12.6%	-29.0%	-19.8%	-14.2%
Annual	-22.6%	-21.6%	-24.8%	-34.7%	-24.1%	-17.7%	-32.1%	-15.9%	-14.3%

As previously mentioned, the pandemic was the primary cause of the large reductions in monthly traffic starting in March 2020.

Operating Expenses, 2010 to 2020

Table 11 displays the historical operating expenses for the TBTA facilities from 2010 through 2020. 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 New York E-ZPass Customer Service Center, and other non-personnel expenses are included in non-labor.

TBTA labor expenses increased from $211.8 million in 2010 to $227.8 million in 2020, an increase of $16.0 million. The increase was entirely due to higher actuarial assessments of pension commitments ($10.8 million) and increases in net costs for fringe benefits including health and welfare benefits for current employees and retirees, workers' compensation, and others ($15.3 million). Payroll costs, including regular wages and overtime pay, declined by $10.1 million over this period. Year-end headcount in 2010 was 1,670, and it fell to 1,221 at year-end 2020. This was the result, over the eleven-year period shown, of numerous managerial initiatives aimed at achieving operational efficiencies, several MTA-wide workforce consolidation efforts, and headcount reductions achieved solely through attrition that were realized through the move to Cashless Tolling.

Table 11 Historical Operating Expenses, 2010 to 2020

Year	Operating Expenses (000s)[a]			Percent Change
	Labor[b]	Non-Labor[c]	Total	
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%
2015	235,099	217,660	452,759	2.0%
2016	243,436	221,418	464,854	2.7%
2017	248,347	241,838	490,185	5.4%
2018	243,115	258,150	501,265	2.3%
2019	252,269	259,158	511,427	2.0%
2020	227,823	214,389	442,212	-13.5%

Source: TBTA
Notes:
(a) Totals may not add due to rounding.
(b) Labor 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.

Non-labor includes the following categories: major maintenance and supplies, bridge painting, outside services, insurance, power, leases and rentals and other expenses. Non-labor expenses increased from $174.0 million in 2010 to $214.4 million in 2020. Most of this growth is attributable to back-office costs for administering E-ZPass toll collection, along with the introduction of TBM at the Henry Hudson Bridge in 2012 and the expansion of TBM to all facilities in 2017. Over this eleven-year period, TBTA has been successful in negotiating lower unit costs for E-ZPass tags and has achieved contracted efficiency savings associated with running the NYCSC, which also administers the TBM program. However, the growth in overall transactions have driven up NYCSC expenses, credit/debit card transaction fees (which have also been impacted by higher E-ZPass and TBM tolls) and the costs of maintaining toll collection equipment. Expenses in other areas have generally grown at rates approximating CPI-U inflation.

The following is a brief discussion of the major year-to-year shifts in operating expenses.

Operating expenses in 2010 were $383.4 million, which was 3.6 percent below expenses in 2009. TBTA undertook a major organizational assessment in 2010 that included staff reductions and the elimination of redundant or unnecessary organizational levels. These actions resulted in a 4.9 percent decline in labor expenses. 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, 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 emergency response and facility restoration efforts associated with Superstorm Sandy totaling $11.7 million. In addition, pension costs were greater by $8.5 million due to a revised valuation by the New York City Office of the Actuary that included a drop in the assumed rate of investment return, from 8 percent to 7 percent, retroactive to July 2011.

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; and another $2.7 million in New York E-ZPass Customer Service Center costs stemming from account growth and the first full year of Cashless Tolling at the Henry Hudson Bridge.

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 Workers' 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.

In 2015, total operating expenses were $452.8 million, which was $9.0 million, or 2.0 percent above 2014 expenses. Labor expenses declined by $3.4 million, or 1.4 percent, primarily due to unfilled vacancies throughout the year and the transfer of 53 technology positions to the MTA as part of an agency-wide IT consolidation effort. Non-labor expenses grew by $12.4 million, or 6.1 percent, primarily due to additional major maintenance and bridge painting projects and higher credit card fees associated with the toll increase implemented on March 22, 2015.

In 2016, total operating expenses were $464.9 million, which was $12.1 million, or 2.7 percent above 2015 expenses. Labor expenses increased by $8.3 million, or 3.5 percent, primarily due to wage inflation and actuarial adjustments to pension expenses. Non-labor expenses grew by $3.8 million, or 1.7 percent, which was slightly above the national inflation rate of 1.3 percent. Growth exceeded inflation primarily due to additional major maintenance projects and higher bond issuance costs.

In 2017, total operating expenses were $490.2 million, which was $25.3 million, or 5.4 percent above 2016 operating expenses. Labor expenses increased by $4.9 million, or 2.0 percent, primarily due to wage inflation. Non-labor expenses grew by $20.4 million, or 9.2 percent, primarily due to implementation costs for Cashless Tolling and back-office costs for administering the TBM program.

Total operating expenses in 2018 were $501.3 million, which was 2.3 percent above costs in 2017. Labor expenses declined by 2.1 percent primarily due to vacant positions and headcount reductions achieved solely through attrition that were realized through the move to Cashless

Tolling. Non-labor costs increased by 6.7 percent primarily due to a full year's facility-wide impact on back-office and other non-labor costs related to Cashless Tolling operations.

Total operating expenses in 2019 were $511.4 million, which was 2.0 percent above costs in 2018. Labor expenses grew by 3.8 percent primarily due to revised actuarial assessments of pension costs and higher healthcare costs. Non-labor costs increased by only 0.4 percent. Higher tolling operations and collections costs due to increased traffic and the toll increase implemented in March 2019 were almost entirely offset by efficiencies achieved across a variety of maintenance projects and other operating contracts.

Total operating expenses in 2020 were $442.2 million, which was 13.5 percent below costs in 2019. Labor expenses decreased by 9.7 percent primarily due to restricted hiring and attrition. Non-labor costs decreased by 17.3 percent. Most of the non-labor savings are due to a program of significant additional savings actions that reduced reliance on outside consultants and contractors, and non-service-related expenses. Although total year-over-year operating expenses decreased in 2020, TBTA incurred additional operating expenses because of the pandemic. This includes $1.4 million for Personal Protective Equipment ("PPE"), cleaning and sanitizing contracts, and janitorial supplies for buildings and vehicles to comply with Centers of Disease Control and Prevention guidelines.

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 analyses, past practice has been to consider factors affecting future traffic, including the projected trends in employment and population, fuel availability and prices, TBTA and regional construction impacts, the capacity constraints in the regional highway network, and toll and elasticity impacts.

Urbanomics, Inc. ("Urbanomics") was contracted as a subconsultant to Stantec to prepare short- and long-term employment and population forecasts in the New York Metropolitan Area. Additionally, Urbanomics researched other factors affecting future traffic, including labor force conditions, housing construction conditions, Manhattan office market conditions, motor vehicle registrations, and fuel availability and prices. The information provided by Urbanomics was incorporated into Stantec's traffic and toll revenue analyses.

This section of the report concludes with a summary of the assumptions and conditions upon which the traffic and toll revenue analyses 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[4] and 21 surrounding counties in New York, New Jersey, and Connecticut. The latest forecasts available, which are included in the following tables, were released in October 2020 and range from 2010 to 2055 on a 5-year interval basis.

NYMTC's Socioeconomic and Demographic (SED) Forecasts are long-term in scope with the intention of providing reliable projections of future socioeconomic conditions over a 40-year period. Due to the structure of forecasts, which are projected in 5-year intervals, NYMTC does not attempt to reliably forecast cyclical trends in the economy as related to business cycles and natural disasters. Development of the forecasts began in 2018 and were finalized at the height and early recovery period of the pandemic and associated recession. Reliable data detailing the extent of the economic damage was not yet available for analysis during the forecasting process, therefore only future NYMTC forecasts will reliably incorporate historic data that fully captures the impact of the pandemic on regional employment and population trends.

Given the unavailability of adequate local data, a near-term adjustment to the 2055 SED Forecasts employment projections was prepared by Urbanomics to address the economic damage associated with the pandemic based on the consensus of key regional stakeholders informed by near-term trends in unemployment and deaths, reactions from other major metropolitan planning organizations, and professional opinions from several of the nation's leading economists. The agreed-upon uniform adjustment to the 2055 SED Forecasts was applied at the county-level in the employment model to create a "lag" in employment in 2020, roughly back to 2017 levels with full recovery (return to projected employment trend line) occurring over the five-year period from 2025 to 2030.

The NYMTC forecasting approach begins with modeling of the regional growth in employment relative to national trends and forecasts prepared by IHS Global Insight, Moody's Analytics ("Moody's"), and the Bureau of Labor Statistics (BLS), calibrated at the county level on an industry-specific basis (IHS Global Insight and Moody's are major vendors of economic and financial analysis, forecasts, and market intelligence worldwide). Employment then drives population growth which is forecasted at the sub-regional and county levels by a model that includes fertility, mortality, and recent past trends in net migration and induced labor force growth.

Typically, traffic volumes in the region are affected by changes in employment and population. The demand on TBTA facilities normally 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 analyses in the short term to account for current economic conditions.

[4] The 10-County NYMTC Territory includes the five boroughs of New York City as well as Nassau, Suffolk, Rockland, Westchester and Putnam Counties.

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.

As Table 12 shows, the City's employment decreased from a peak of 4.1 million jobs in 1970 to 3.6 million in 1980. Since 1980, the City has shown consistent employment growth in each decade, having returned to 1970 levels in the 1990s and reached 5.7 million jobs in 2020. The Long Island and Mid-Hudson suburbs, otherwise known as the New York Region, have reflected continuous growth in the decades since 1970, expanding from 1.6 million jobs in 1970 to 2.9 million in 2020. Similar rates of suburban growth occurred in New Jersey and Connecticut between 1970 and 2020. Between 1970 and 2020, New Jersey added 1.8 million jobs while Connecticut gained 430,000 jobs and the New York suburbs grew by 1.4 million jobs.

While annual employment growth over the past decade through February 2020 exceeded annual growth from 1970 to 2010 in New York City and New Jersey suburban counties, with the New York and Connecticut suburban counties not far behind, significant job losses associated with the pandemic resulted in a sharp reversal of recent trends. Only New York City had a higher annual growth rate in the past decade through the end of 2020 while the suburban counties all had significantly lower growth rates versus years past. Among the four sub-regions, the City accounted for the largest employment base in 2020 with 40.3 percent of 14.0 million regional jobs, followed by New Jersey with 30.5 percent, the New York suburbs with 21.0 percent and Connecticut with 8.2 percent.

Due to travel and work restrictions associated with the pandemic, over the months from February to April 2020, New York City lost 926,500 wage/salary jobs (-19.8 percent). However, by January 2021, the post-February decline had been reduced to a loss of 672,200 jobs (-14.4 percent). Job losses were less intense in the suburban regions with wage/salary job reductions from February 2020 to January 2021 of 214,300 (-9.4 percent) in the New York suburban counties, 688,400 (-8.9 percent) in the New Jersey suburban counties and 61,200 (-7.4 percent) in the Connecticut suburban counties.

National survey data from the Bureau of Labor Statistics indicates that the share of workers carrying out their work from home is steadily declining. Monthly survey data from May 2020 to February 2021 indicate that the share among US workers aged 16 or over that teleworked dropped from 35.4 percent in May to 22.7 percent the following February. Although office workers[5]

[5] Including workers employed in the industries of Information; Finance & Insurance; Real Estate, Rental & Leasing; Professional & Technical Services; Management, Administrative & Waste Services.

are more likely to telework, the share of such workers also dropped by nearly 13 percentage points over that period from 54.7 percent to 42.0 percent. As the region's workforce is increasingly gaining access to vaccines, local employers expect more workers to return to the City's office buildings. According to the Partnership for New York City's monthly Return to Office Survey, in the month of March 2021, major employers indicated that nearly half of office workers would return by September 2021 and just 9 percent of employers would no longer require workers to return to work. Most workers are expected to continue to work remotely at least part-time and 81 percent of workers would rely on public transit for travel to offices.

As of early March 2021, roughly 10 percent of Manhattan office workers had returned to the office, nearly unchanged from late October. The Real Estate sector currently has over half of workers working in-office, more than all other sectors. On March 22, 2021, NYC Mayor Bill de Blasio announced some 80,000 of the City's 300,000 municipal workers could begin to return to the office on May 3, 2021. Major banks including JPMorgan Chase, Citigroup, and Goldman Sachs Group all plan on having more staff return to offices in the City this summer including 30 percent of Citigroup employees. As of March 22, 2021, more than 937,000 people in the City had been fully vaccinated against COVID-19 according to the New York City Health Department.

Table 12 Employment Trends

Number of Jobs (000s)[a]

Year	New York City	New York Region[b]	New Jersey Region[c]	Connecticut Region[d]	NYC and All Regions[e]
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	3,962.3	2,343.6	3,419.2	1,001.7	10,726.8
2000	4,300.3	2,565.7	3,741.5	1,084.2	11,691.7
2005	4,411.1	2,720.0	3,951.1	1,109.0	12,191.2
2010	4,788.6	2,789.0	3,924.7	1,111.3	12,613.6
2015[f]	5,599.4	3,008.6	4,250.5	1,185.8	14,044.2
2016	5,723.6	3,048.1	4,322.4	1,195.7	14,289.7
2017	5,818.0	3,072.4	4,373.7	1,193.3	14,457.4
2018	5,958.5	3,120.5	4,454.2	1,203.0	14,736.3
2019	6,112.1	3,153.4	4,517.3	1,212.2	14,995.0
2020	5,651.9	2,943.1	4,288.6	1,157.4	14,041.0
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%	1.4%	1.5%
1990 to 2000	0.8%	0.9%	0.9%	0.8%	0.9%
2000 to 2005	0.5%	1.2%	1.1%	0.5%	0.8%
2005 to 2010	1.7%	0.5%	0.0%	0.0%	0.7%
2010 to 2015	3.2%	1.5%	1.6%	1.3%	2.2%
2015 to 2016	2.2%	1.3%	1.7%	0.8%	1.7%
2016 to 2017	1.7%	0.8%	1.2%	-0.2%	1.2%
2017 to 2018	2.4%	1.6%	1.8%	0.8%	1.9%
2018 to 2019	2.6%	1.1%	1.4%	0.8%	1.8%
2019 to 2020	-7.5%	-6.7%	-5.1%	-4.5%	-6.4%

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

Notes:

(a) Historic employment estimates are modeled using data inputs from the BLS Current Employment Statistics Program (CES) Quarterly Census of Employment and Wages (QCEW) program as well as the Bureau of Economic Analysis' Table 25N Proprietors statistics. Final revisions to statewide and local area CES data, called a "Benchmark," are made each March for the previous five years based on payroll tax reports submitted by employers covered by the Unemployment Insurance program to individual states. In March 2021, the BLS released its 2020 re-benchmarked CES data with revisions to employment of specific industries going back as far as 1990.

(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.

(e) Totals may not add due to rounding.

(f) In 2015, the City of New York changed its methodology of reporting local government workers to more accurately reflect the geographic distribution of the workforce.

NYMTC prepared a series of 40-year employment forecasts, released in final form in October 2020. Forecasted trends are compressed to 5-year intervals, which masks cyclical trends between these years, a common practice in long term forecasting. Given the unavailability of adequate local data, a near-term adjustment to the 2055 employment forecasts was prepared to address the economic damage associated with the pandemic based on the consensus of key regional stakeholders informed by near-term trends in unemployment and deaths, reactions from other major metropolitan planning organizations, and professional opinions from several of the nation's

leading economists. The agreed-upon uniform adjustment to the 2055 employment forecasts was applied at the county-level in the employment model to create a "lag" in employment in 2020, roughly back to 2017 levels with full recovery (return to projected employment trend line) occurring before 2025

NYMTC projects regional employment growth would increase at an average annual rate of 0.45 percent between 2015 and 2055. From 2020 to 2025, NYMTC projects annual employment growth of 0.38 percent, rising to 0.56 percent from 2025 to 2030. Based on spring 2020 employment trends prior to the job recovery that ensued in the following months, NYMTC forecasted a full recovery to pre-pandemic levels at some point over the five-year period from 2020 to 2025 with a return to the long-term growth trendline expected in 2030. While NYMTC only projects in five-year increments and therefore does not forecast employment on a quarterly or annual basis, Moody's forecasts provide more specific detail. The Q4 2020 forecasts prepared by Moody's, the same source for one of several drivers used in the NYMTC employment model, project a total job increase of 6.7 percent in 2021 and 3.9 percent in 2022 for the New York metropolitan area. Based on the extent of the local monthly job recovery and stimulus activity, Moody's expects a recovery to the 2019 high in 2023. NYMTC's employment projections from its current employment forecast are presented in Table 13.

Table 13 NYMTC Employment Projections

(000s)[a]

Year	New York City	New York Region [b]	New Jersey Region [c]	Connecticut Region [d]	NYC and All Regions
Average Annual Percent Change					
2015 to 2020	1.19%	0.41%	0.35%	0.14%	0.70%
2020 to 2025	0.38%	0.39%	0.39%	0.37%	0.38%
2025 to 2030	0.57%	0.52%	0.60%	0.50%	0.56%
2030 to 2035	0.46%	0.44%	0.48%	0.42%	0.46%
2035 to 2040	0.44%	0.30%	0.33%	0.30%	0.37%
2040 to 2045	0.39%	0.31%	0.36%	0.31%	0.36%
2045 to 2050	0.48%	0.28%	0.38%	0.33%	0.40%
2050 to 2055	0.47%	0.28%	0.37%	0.32%	0.39%
2015 to 2055	**0.55%**	**0.36%**	**0.41%**	**0.33%**	**0.45%**

Source: New York Metropolitan Transportation Council

Notes:

(a) Future employment projections are modeled using an amalgam of data inputs from IHS Global Insight, Moody's, State DOLs, US BLS's Current Employment Statistics Program (CES) Quarterly Census of Employment and Wages (QCEW) program, and the US Census Bureau's American Community Survey.

(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.

Based on national forecasts to 2044, regional forecasts to 2050, and pandemic recovery expectations, the existing regional outlook suggested that jobs would expand by 0.45 percent annually over the period from 2015 to 2055, as mentioned above, roughly half the annual average growth rate of 0.91 percent between 1970 and 2010. Employment in the City was expected to

expand at an annual rate of 0.55 percent, slightly greater than the 0.38 percent annual average gain projected in the suburban regions of New Jersey, Connecticut, and New York. According to NYMTC, with a full pandemic recovery to 2019 levels expected no later than 2025, no sub-regions were projected to experience a period of interim employment losses, as each tends to grow with cyclical contractions and expansions ranging between 0.14 and 1.19 percent annually on average over the period from 2015 to 2055.

Labor Force Conditions

Prior to the pandemic, the region had nearly recovered from the 2007-2009 recession in terms of unemployment and wages with unemployment rates below 2007 pre-recession levels and rising inflation adjusted wages nearing 2007 levels. Sharp monthly job losses in 2020 have contributed to among the worst short-term unemployment levels the region has seen since the Great Depression, however monthly trends show a robust recovery underway in the second half of 2020 and early 2021 (see Figure 3). The Bureau of Labor Statistics reported that the City's annual average jobless rate had climbed up from 5.6 percent in 2015 to 12.3 percent in 2020. On average in 2020, 480,900 residents were unemployed in a labor force of 3.9 million, while 431,800 workers had lost employment between 2015 and 2020. The City's rate of unemployment in 2020 was considerably higher than that of the three suburban regions. The Connecticut suburban region had the lowest unemployment rate at 7.2 percent, followed by the New York suburban region (8.3 percent) and the New Jersey suburban region (9.5 percent). Recent labor force conditions are summarized in Table 14.

Table 14 Labor Force[a] Conditions, 2015 & 2020

Year	New York City	New York Suburban Region[b]	New Jersey Suburban Region[c]	Connecticut Suburban Region[d]
Labor Force				
2015	4,089,100	2,598,200	3,585,100	1,038,900
2020	3,909,800	2,601,900	3,611,700	1,022,000
Employed				
2015	3,860,700	2,480,800	3,388,700	979,500
2020	3,428,900	2,386,500	3,268,700	948,200
Unemployed				
2015	228,400	117,500	196,400	59,400
2020	480,900	215,400	343,000	73,900
Unemployment Rate				
2010	5.6%	4.5%	5.5%	5.7%
2020	12.3%	8.3%	9.5%	7.2%

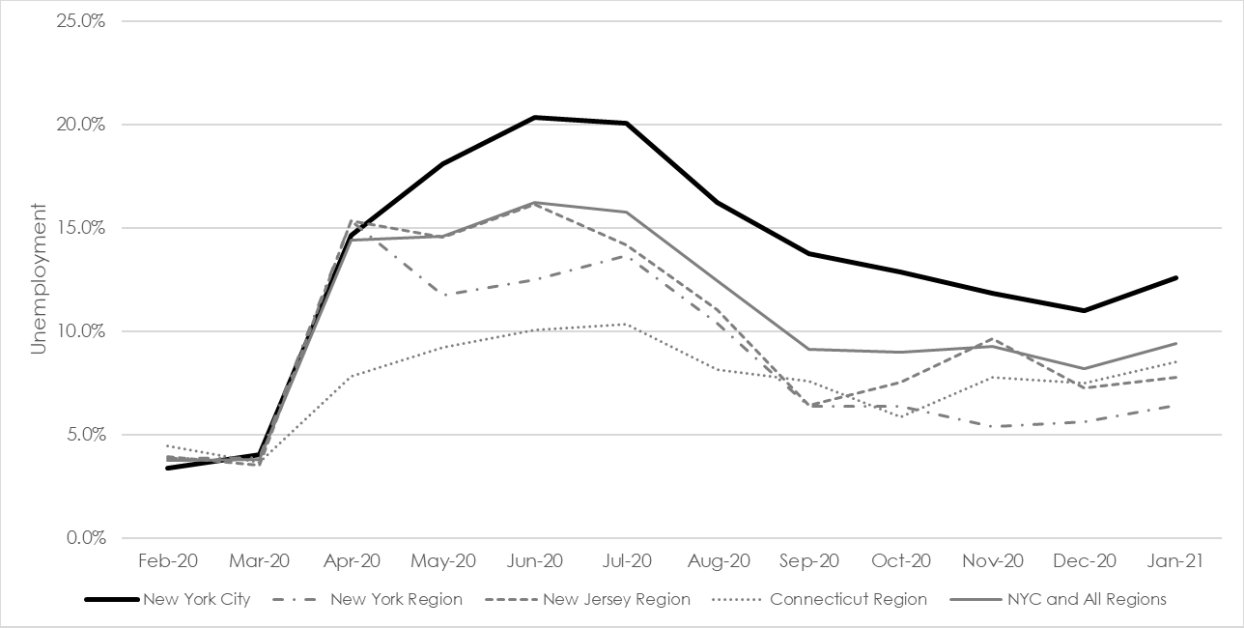
Source: BLS, Local Area Unemployment Statistics (LAUS) Program.
Notes:
(a) This table includes the jobs of self-employed (i.e., non-payroll) workers, some of which are part-time jobs, as reported by the US Department of Commerce and Bureau of Labor Statistics. These non-payroll jobs are added to the payroll employment.
(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.

Monthly unemployment rates shown in Figure 3 illustrate the depth of job losses during the spring of 2020 followed by the expected improvement in unemployment rates from the peak spring 2020 levels. The March 2020 executive orders by the governors of New York State, New Jersey and Connecticut to close non-essential businesses contributed to sharply increased rates of regional unemployment. In July 2020, the City's restrictions were relaxed to a Phase 4 reopening scenario with low-risk outdoor activities at 33 percent capacity (outdoor zoos, botanical gardens, nature parks, historical sites, outdoor museums, etc.); low-risk indoor activities at 25 percent capacity are allowed in Phase 4 regions outside of the City. Restrictions as of April 2021 allow for indoor dining capacity of 50 percent in the City and 75 percent elsewhere in New York State. Over these months the City's monthly unemployment rate climbed from 3.4 percent in February 2020 to 20.4 percent in June 2020, falling back down to 12.6 percent in January 2021.

Among the suburban counties, unemployment rates rose the least in the Connecticut counties during the early months of the pandemic. However, by the later months of 2020, the Connecticut region's unemployment rate increased to levels above that of the New Jersey and New York suburban counties. During the latter half of 2020, the New York suburban counties had the lowest unemployment rate among the five regions, reaching a low of 5.6 percent in December.

Unemployment rates increased in all regions from December to January. The NYDOL stated this rise was due to efforts to contain the pandemic after a post-holiday increase in COVID-19 cases.

Figure 3 Monthly Unemployment Rates, February 2020 to January 2021



Source: BLS, Local Area Unemployment Statistics (LAUS) Program.
Notes:
(a) This figure includes the jobs of self-employed (i.e., non-payroll) workers, some of which are part-time jobs, as reported by the US Department of Commerce and Bureau of Labor Statistics. These non-payroll jobs are added to the payroll employment.
(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.

Over the 12-month period from January 2020 to January 2021, the City lost 636,100 Nonfarm jobs (a measure of the number of U.S. workers in the economy that excludes proprietors, private household employees, unpaid volunteers, farm employees, and the unincorporated self-employed) with 626,400 jobs lost in the private sector. None of the major industry sectors saw job gains over this period. Job losses were largest in the following sectors: Accommodation and Food Services (-193,500); Retail Trade (-60,000); Arts, Entertainment, and Recreation (-49,300); Health Care and Social Assistance (-44,200); Other Services (including Religious, Grant Making, Civic and Professional occupations (-40,800 jobs); Administrative and Support and Waste Management (-40,700); Transportation and Warehousing (-31,300); Professional, Scientific, and Technical Services (-30,700); Educational Services (-26,000); Natural Resources, Mining and Construction (-23,000); Information (-21,800); Wholesale Trade (-21,100); Manufacturing (-12,800); and Real Estate and Rental and Leasing (-11,900 jobs). Several industries lost less than 10,000 jobs including Government (-9,700); Finance and Insurance (-9,600); Management of Companies and Enterprises (-9,000); and Utilities (-700).

Housing Constructions

In the housing market, annual building permits authorizing new housing construction decreased in the City to 19,000 units in 2020, a decline of 7,500 units or -28.3 percent over 2019 (as shown in Table 15). The number of permits approved in 2020 was down by 66.3 percent or 37,500 units compared to the recent high of 56,500 permits approved in 2015. The significant reduction was primarily due to the conclusion of a rush by multi-family housing developers in 2015 to secure 421-a property tax exemptions before the program's expiration in January 2016. The actual number of constructed housing units each year is roughly 25,000, as many of the 2015 permit authorizations have been spread over successive years. Annual average growth in housing permits has dropped over the period from 2015 to 2020 by 19.6 percent. The largest number of permits issued in the period since 2015 has occurred in Brooklyn (61,100 units), followed by Queens (36,200 units) and Manhattan (32,400 units).

Table 15 Housing Building Permits Issued within the City, 2015 – 2020

Borough	2015	2016	2017	2018	2019	2020	Total, 2015-2020	Average Annual Growth (2015-2020)	Annual Growth (2019-2020)
Bronx	4,682	4,003	5,401	3,698	5,541	4,632	27,957	-0.2%	-16.4%
Brooklyn	26,026	4,503	6,130	8,445	9,696	6,264	61,064	-24.8%	-35.4%
Manhattan	12,612	4,024	4,811	3,584	5,512	1,896	32,439	-31.5%	-65.6%
Queens	12,667	2,838	5,104	4,577	5,137	5,840	36,163	-14.3%	13.7%
Staten Island	541	901	685	606	661	408	3,802	-5.5%	-38.3%
Total	56,528	16,269	22,131	20,910	26,547	19,040	161,425	-19.6%	-28.3%

Source: US Census Bureau, Building Permit Survey.

Office Market

In other property markets, notably office, Cushman & Wakefield reported that leasing activity had sharply declined in 2020 to an all-time low of 12.8 million square feet, down from 34.7 million square feet (-63.0 percent) in 2019. Reflecting a historical high in Manhattan unemployment, demand for office space remained very low in the fourth quarter of 2020 with office-using employment roughly 130,000 jobs below the February 2020 total, despite gains of 51,000 office jobs from June to November 2020. Roughly one-third of new lease activity was drawn from the sectors of technology, advertising, media and information services, primarily in large spaces of 10,000 SF square feet or more.

Increasing vacancies in sublease space put further pressure on asking rents. The overall vacancy rate, including both direct and sublet vacancies climbed from 11.1 percent to 15.2 percent from the fourth quarter of 2019 to 2020 (see Table 16) with the share of sublet vacancies increasing from 24.6 percent to 31.4 percent. Manhattan's office submarkets were disproportionately impacted by the pandemic with areas with high shares of sublet vacancies such as Hudson Square/West Village, Penn Station, and Financial East hit the hardest. The vacancy rate increased by 6.3 percentage points in Midtown South compared with a gain of 2.0 percentage points in Downtown

and 4.2 percentage points in Midtown as a whole. In both Midtown South and Downtown, sublet vacancies more than doubled in area.

Table 16 Manhattan Office Market Overall Vacancy Rates, Q4 2019- Q4 2020

SUBMARKET	Q4 2019	Q4 2020	Percentage Point Change
East Side/UN	12.2%	13.5%	+1.3%
Grand Central	13.1%	18.2%	+5.1%
Madison/Fifth	16.0%	20.9%	+4.9%
Murray Hill	10.2%	15.5%	+5.3%
Park Avenue	11.0%	15.9%	+4.9%
Penn Station	8.3%	11.4%	+3.1%
Sixth Avenue/Rock Center	8.7%	10.9%	+2.2%
Times Square South	11.3%	18.4%	+7.1%
West Side	13.2%	17.2%	+4.0%
MIDTOWN TOTALS	**11.6%**	**15.8%**	**+4.2%**
Chelsea	9.3%	12.9%	+3.6%
Greenwich/NoHo	6.2%	12.7%	+6.5%
Hudson Square/West Village	6.5%	15.1%	+8.6%
Madison/Union Square	8.4%	16.1%	+7.7%
SoHo	13.1%	14.8%	+1.7%
MIDTOWN SOUTH TOTALS	**8.5%**	**14.8%**	**+6.3%**
City Hall	8.9%	8.8%	-0.1%
Financial East	12.9%	13.0%	+0.1%
Financial West	19.9%	18.8%	-1.1%
Insurance	9.2%	12.0%	+2.8%
TriBeCa	3.0%	6.3%	+3.3%
World Trade	11.9%	17.3%	+5.4%
DOWNTOWN TOTALS	**11.7%**	**13.7%**	+2.0%
MANHATTAN TOTALS	**11.1%**	**15.2%**	+4.1%

Note: Overall vacancies include both direct and sublet vacancies.
Source: Cushman & Wakefield, Office Marketbeat, Q4 2019 & Q4 2020.

Despite reduced demand, Cushman & Wakefield reported that Class A rental rates increased to $80.18 per square foot from $79.82 in 2019, while among all classes average rental rates edged down from $73.41 per square foot in 2019 to $73.16 in 2020. Net absorption for the borough's office market was down from 2.6 million square feet in 2019 to -15.3 million square feet in 2020, a 17.8 million square foot loss in new occupancy. Manhattan's inventory of office space decreased from 408.9 million square feet in 2019 to 404.7 million square feet in 2020, a net loss of 4.2 million square feet. Loss in space is likely due to renovations and conversions from office to other uses. As of March 2021, state legislators were determining whether to support Governor Cuomo's proposal to override local zoning regulations to incentivize the conversion of commercial buildings, including office and hotel properties, in Midtown Manhattan into affordable housing. These incentives would apply to class B and C office buildings as well as hotels with fewer than 150 rooms over a 5-year period. During the fourth quarter of 2020, Cushman & Wakefield reported that 14.7 million square feet of office space was under construction or proposed to start in Manhattan. Table 17 identifies 22 office buildings being built or announced for development between 2020 and 2025. In the aggregate, these buildings will contribute over 24.2 million gross square feet of space to the Manhattan market if all are completed within the next five years. Four towers are expected to exceed 2.5 million square feet each, while seven others will range between one and two million

square feet. In 2020, seven buildings were expected to account for 3.7 million square feet of construction, followed by the build out of 0.75 million square feet in 2021, 6.0 million in 2022, and lesser amounts in subsequent years. This data is current as of 2019; many developers have not yet shared their construction intentions under current pandemic conditions.

Table 17 Major Manhattan Office Buildings Proposed for Completion by 2025[(a)]

Year of Project Completion	Address	Developer/Occupant	Gross Square Feet
2020	74 Trinity Place	Trinity Real Estate	325,000
	542 West 22nd St	Hauser & Wirth	31,985
	100 East Broadway	Yeung Real Estate	93,000
	1 Vanderbilt Ave	SL Green	1,600,000
	Farley Building Conversion	Related & Vornado	850,000
	425 Park	L&L Holdings	670,000
	106 W. 56th St	Savanna	90,000
2021	322-326 Seventh Ave (28 & 7)	Klovern & GDS Development	105,000
	25 11th Ave (Pier 57)	Youngwoo & RXR	350,000
	76 8th Ave	Chun Woo Realty	37,166
	124 East 14th St (ZERO Irving)	RAL Development	258,000
2022	50 Hudson Yards (415 10 Ave)	Related	2,900,000
	2 Madison West (435 West 31 St)	Brookfield	1,700,000
	550 Washington St	Oxford Properties	1,300,000
	46 Gansevoort St	Wm Bottliev & Aurora Capital	100,000
2023	66 Hudson Blvd (The Spiral)	Tishman Speyer	2,850,000
	3 Hudson Blvd (555 West 34th St)	Moinian/Boston Properties	1,800,000
2024	5 World Trade Center (130 Liberty St)	Port Authority of NY & NJ	1,300,000
	200 Greenwich Street (WTC #2)	Silverstein Properties	2,800,000
	99 Hudson Blvd (444 11th Ave)	Tishman Speyer	1,300,000
2025	270 Park Ave	JP Morgan Chase	2,500,000
	4 Hudson Square (137 Varick)	Disney/Silverstein Properties	1,200,000

Source: New York Building Congress.
Notes: (a) Current as of 2019.

Population Trends and Projections

Since 1980, US Census data indicate that the City's population has increased by 1.3 million persons to 8.3 million residents in 2019 (see Table 18). In recent years, the City has continued to be 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 who have aged in place. Three of the City's boroughs, Manhattan, Queens, and Staten Island are now more populous than in 1970, a City high point, while Brooklyn and the Bronx remain only marginally less populated than in earlier years.

While the City's population has recorded historical periods of contraction, the commuter suburbs of New York, New Jersey and Connecticut have grown largely continuously over the past 48 years. Compared to 8.3 million residents in the City, northern and central New Jersey now houses 7.1 million residents while the nine counties of Long Island and the Mid-Hudson are home to 5.2 million residents. Over the period from 1980 to 2019 in which the City added 1.3 million more inhabitants, the New Jersey region saw an increase of 1.2 million residents and the New York region added 620,200. The Connecticut region, with 2.0 million residents, has added 253,200 residents since 1980. All subregions experienced modest population losses from a peak year in 2017 to 2019. This represents the latest data available.

Recent population losses in the New York metropolitan area follow national trends for major urban areas where residents have emigrated elsewhere due to living costs and slow salary growth. As public spaces, entertainment venues, and restaurants closed and white-collar employment transitioned from office buildings in central business districts to remote home-based work locations during the spring and summer of 2020, outward migration from the New York metropolitan area, especially among young adults, has been accelerating. Realtors have reported increased suburban home purchases and rental lease signings in the outer suburban areas of the region as apartment vacancies in Midtown West and the Upper West Side climbed upward. Overall New York City's apartment market experienced a sharp drop in net absorption, from 6,200 units in 2019, down to just under 800 in 2020 according to REIS, a leading real estate analytics data provider. The suburban counties all experienced drops in net absorption but at a far lesser scale than New York City. While areas such as Suffolk and Sullivan counties in New York, Hunterdon and Somerset counties in New Jersey, and Litchfield County in Connecticut saw increases in single-family home sales prices, it is not clear whether increased demand in those areas is the result of a growing appetite for secondary homes or long-term relocations of year-round residents.

Population growth was further affected by the direct loss of life due to the pandemic as COVID-19 infections spread quickly in the New York metropolitan area earlier than in other large urban areas of the United States. New York City, in particular, was in effect the laboratory for treatment protocols. COVID-19 related deaths, both in total and per capita (27.6 per 10,000), were highest in New York City compared with the surrounding suburban counties. The Mid-Hudson and Connecticut suburban counties (17.7 and 18.0 per 10,000, respectively) fared better than Long Island and the New Jersey suburban counties (21.4 and 21.6 per 10,000, respectively). While the regional death toll early in the pandemic was devastating, the treatment protocols established, and the rollout of widespread vaccinations have curtailed the excess morbidity rate.

Table 18 Population Trends 1970 to 2019

(000s)

Year	New York City	New York Region [a]	New Jersey Region [b]	Connecticut Region [c]	NYC and All Regions
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
2015	8,550.4	5,192.8	7,116.4	1,991.1	22,850.8
2016	8,537.7	5,182.0	7,110.1	1,983.6	22,813.4
2017	8,622.7	5,203.6	7,175.3	1,992.5	22,994.2
2018	8,398.7	5,161.4	7,093.1	1,982.6	22,635.8
2019	8,336.8	5,157.3	7,071.1	1,978.4	22,543.7
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 2015	0.9%	0.3%	0.5%	0.2%	0.6%
2015 to 2016	-0.1%	-0.2%	-0.1%	-0.4%	-0.2%
2016 to 2017	1.0%	0.4%	0.9%	0.4%	0.8%
2017 to 2018	-2.6%	-0.8%	-1.1%	-0.5%	-1.6%
2018 to 2019	-0.7%	-0.1%	-0.3%	-0.2%	-0.4%

Source: US Census Bureau.

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 prepared a series of 40-year population forecasts, released in final form in October 2020 and presented in Table 19. Between 2015 and 2055, NYMTC projects a 0.33 percent annual rate of growth, compared to a 0.27 percent increase from 1970 to 2019. Of this gain, the City is expected to account for an estimated 33 percent of the regional growth. The New Jersey suburbs are expected to have 40 percent of the increase, while Long Island and the Mid-Hudson are expected to account for 22 percent of the total. The Connecticut region, by contrast, will likely account for only 5 percent of the regional growth.

Population growth traditionally will positively effect traffic demand on crossings, although employment trends appear to have had a more noticeable effect on traffic volumes on TBTA facilities. 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 in the past. These were projected to be offset by other years that will be characterized by growth. In general, an upward trend has been expected over the long term through the end of NYMTC's current forecast period in 2055, excluding any consideration of impacts from the pandemic.

Table 19 Population Projections

(000s)[a]

Year	New York City	New York Region [b]	New Jersey Region [c]	Connecticut Region [d]	NYC and All Regions
Average Annual Percent Change					
2015 to 2020	0.42%	0.06%	0.25%	-0.02%	0.25%
2020 to 2025	0.64%	0.21%	0.33%	0.16%	0.41%
2025 to 2030	0.40%	0.31%	0.35%	0.24%	0.35%
2030 to 2035	0.24%	0.69%	0.67%	0.52%	0.50%
2035 to 2040	0.20%	0.48%	0.52%	0.33%	0.37%
2040 to 2045	0.19%	0.23%	0.40%	0.16%	0.26%
2045 to 2050	0.15%	0.27%	0.39%	0.12%	0.25%
2050 to 2055	0.11%	0.26%	0.38%	0.12%	0.23%

Source: New York Metropolitan Transportation Council.

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 has been a predictor of growth or stability in levels of vehicular traffic. Motor vehicle registrations in New York State, New Jersey and Connecticut peaked in 2005 and dropped sharply following the financial crisis. By 2011 Tri-State registrations neared peak 2005 levels though they have declined in recent years. Over the period from 2011 to 2019, registrations in the Tri-State area dropped by 898,600 due to a loss of 1.9 million registrants in New Jersey while New York City added 220,200 registrants, New York State added 958,600 registrants and Connecticut added 49,800 registrants (see Table 20). Since 2019, registrations have declined by 0.3 percent in New York City as New York State, as a whole, declined by 5.0 percent. Population decline in New York City may account for the drop in motor vehicle registrations.

Although motor vehicle registrations are not projected for future years, auto sales increased nationally following the 2007-2009 recession with a record number of annual sales in both 2015 and 2016. According to the United States Bureau of Economic Analysis, monthly auto sales

declined marginally in recent years from a peak in 2016 as average monthly finance rates for 48-month new auto loans increased from a 50-year low in November 2015 of 4.0 percent to 5.5 percent in November 2019. A sharp dip in sales occurred in 2020 as consumer confidence plummeted, although sales numbers remained above annual levels from 2008 to 2012. The outlook for future motor vehicle registrations will continue to depend on consumer confidence levels, which currently stand relatively low as of February 2021, with an index level of 91.3 compared with a reading of 85.7 at the low of the pandemic in April 2021 and 130.7 in February 2020 just before the onset of 2020 travel restrictions. If mass vaccinations in the United States prove to be effective from new virus variants and consumers return to past economic activities, consumer confidence may return to healthy levels in the next few years.

Table 20 Motor Vehicle Registrations
(000s)[a]

Year	New York City	New York State[b]	New Jersey	Connecticut[c]
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
2014	2,057	10,904	6,874	2,866
2015	2,107	10,639	5,939	2,842
2016	2,162	11,122	5,941	2,842
2017	2,189	10,857	6,058	2,826
2018	2,186	11,482	6,055	2,880
2019	2,182	11,389	6,033	2,879
2020	2,175	10,820	N/A	N/A
Average Annual Growth				
2009-2019	1.1%	-0.2%	-0.4%	-0.9%
2010-2020	1.0%	0.2%	N/A	N/A

Source: United States Federal Highway Administration and New York State Department of Motor Vehicles

Notes:
(a) This represents the most recent available data for New Jersey and Connecticut.
(b) Including New York City.
(c) Includes the totals for New York State, New Jersey and Connecticut.

Annual year-end motor vehicle registrations for the period from 2015 through 2020 are shown for each of the City's five boroughs in Table 21. The annual change in citywide registrations fell from a 2.6 percent increase from 2015 to 2016 to a 0.3 percent decrease from 2019 to 2020 as auto loan interest rates increased. When comparing 2015 to 2020, New York City gained 67,900 registrations; Brooklyn saw the largest gain in new registrations (+46,300), followed by the Bronx (+14,700), Queens (+9,000), and Staten Island (+900). Only Manhattan saw a decrease in the number of registrations, a drop of 3,000 vehicles. It is worth noting that the availability and usage levels of for-hire services have had impacts on traffic and contributed to a portion of the increase in vehicular travel in recent years. For example, the number of unique ride-hailing vehicles

dispatched in New York City (including Uber, Lyft, Juno and Via vehicles) increased from 36,500 in December 2015 to a peak of 158,200 vehicles in April 2019. Ride-hailing vehicles have since declined to a low of 32,100 vehicles in April 2020, climbing back up to 80,500 vehicles in December 2020.

Table 21 New York City Motor Vehicle Registrations, 2015 to 2020

Borough	2015	2016	2017	2018	2019	2020	2019 - 2020 Growth	2015-2020 Average Annual Rate of Change
Bronx	272,483	284,084	288,788	290,055	288,754	287,166	-0.5%	1.1%
Brooklyn	498,282	512,374	521,434	524,701	535,265	544,623	1.7%	1.8%
Manhattan	254,159	256,017	254,572	250,270	248,322	251,147	1.1%	-0.2%
Queens	808,122	830,603	841,513	837,319	831,600	817,102	-1.7%	0.2%
Staten Island	274,275	279,271	283,067	283,928	277,617	275,154	-0.9%	0.1%
Total	2,107,321	2,162,349	2,189,374	2,186,273	2,181,558	2,175,192	-0.3%	0.6%

Source: New York State Department of Motor Vehicles

Fuel Availability and Prices

Traffic and revenue on the TBTA crossings have been affected in varying degrees by the availability and price of gasoline since 1970. Volatility driven by major events have contributed to fuel shortages and increases in gasoline prices. Such events include the 1973-1974 period due to the OPEC oil embargo and reduced OPEC output in 1979 associated with disruptions during the Iranian Revolution, during the first war in the Persian Gulf in the early 1990's and during the war in Iraq in the 2000's. Figures 3A/3B illustrate the trend in rolling average[6] monthly VMT and gas prices since the 2011. Major recent events over the past two decades include reduced local supplies due to damage to refineries caused by Hurricane Katrina in 2005 and lower prices during the 2007-2009 recession as global demand declined. In some instances, such as in 2011, economic conditions and toll increases also contributed to the reduction of traffic volumes at TBTA crossings. After Superstorm Sandy in 2012, odd-even gasoline rationing was implemented in the City from November 9, 2012 until November 24, 2012 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.

During the second week of July 2008, the average price of regular grade gasoline was the highest recorded at $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, during the second week of May 2011, saw prices at $3.965 per gallon in the U.S. and $4.069 in the City. As of April 19, 2021, the U.S. Energy Information Administration ("EIA") stated that the price of regular grade gasoline averaged $2.855 per gallon nationally, and $2.774 in the City. These price

[6] 12-month rolling averages (using average values of the past 12 months instead of single months of data) were utilized in Figures 3A/3B to smooth out cyclical and seasonal month-to-month trends.

decreases are likely a result of the reduced demand during the pandemic. See the discussion of the factors contributing to changes in price and availability of gasoline below.

Sharp increases in the price of gasoline in 2008 and 2011 resulted in decreases in Vehicle Miles Traveled ("VMT") in the United States and in the New York metropolitan area. Data from the FHWA indicates that VMT decreased between 2007 and 2008 by 1.9 percent nationally and by 4.1 percent in New York State. In 2011, largely in response to the recession, national VMT was 2.6 percent below the 2007 level and New York State VMT was 7.1 percent below 2007. From 2014 to 2019 national travel demand continued to increase by an average annual rate of 1.5 percent as statewide levels decreased by 1.4 percent. At the national level, low gas prices contributed to increased travel, while VMT declined in New York State as average transit ridership increased and new travel options including car shares, bike shares and taxi-booking services emerged. In 2020, COVID-19 pandemic related travel restrictions contributed to a sharp drop in travel across the nation with an annual decline in VMT of 13.2 percent nationally and 16.6 percent in New York State where travel restrictions were longer and more intense than in other areas of the country. In New York City, TBTA total transactions declined on an annual basis by 23.1 percent from 2019 to 2020 following annual average gains of 2.9 percent over the period from 2014 to 2019.

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 – Generally, the United States' dependence on imported fuel has continued to fall as the country continues to increase its reliance on domestic resources. The EIA, in the March 2021 Short-Term Energy Outlook ("STEO"), reported their outlook remains subject to heightened levels of uncertainty because responses to COVID-19 continue to evolve. Reduced economic activity related to the COVID-19 pandemic has caused changes in energy demand and supply during the past year and will continue to affect these patterns in the future. Global supply is expected to expand in the months ahead as OPEC+ generally increases crude oil output to supply rising global oil consumption. On March 9, 2021, the EIA projected that daily domestic crude oil production will average 11.1 million barrels per day in 2021 and climb to 12.0 million barrels per day in 2022. Even with this near-term reduction, the projected levels of production continue to surpass the historic high of 10.6 million barrels per day previously set in 2018 that exceeded the long-time record of 9.6 million barrels per day set in 1970;

- Use of substitute fuels – Since 2010 the use of biofuels, including biomass-based diesel, ethanol and biofuel losses and co-products, has increased in the United States as domestic production has ramped up following reductions in foreign imports since 2013. In February 2021 the EIA projected that biofuel consumption would return to 2019 levels in 2021, slightly faster than petroleum-based motor fuels. This trend is expected due to regulatory support such as the federal Renewable Fuel Standard program which sets annual domestic renewable fuel volume targets. Increased levels of domestic production and net imports of biomass-based

diesel were expected given the renewal of the biodiesel blender's tax credit in December 2019. Fluctuations in biofuel imports have an impact on the need for gasoline.

- Political conditions – Ongoing political developments and conflicts in oil producing countries and elsewhere produce instability in gasoline availability and prices; however, these factors are partially reflected in current oil prices; and

- Motor vehicle fuel efficiency – The projected real world model year 2020 fuel economy of 25.69 miles per gallon (mpg), if achieved, will be the highest level of fuel efficiency since the 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 a real-world fuel economy of approximately 36 mpg for new vehicles in 2025. On April 2, 2018, the EPA announced the completion of the Midterm Evaluation process for the greenhouse gas (GHG) emissions standards for cars and light trucks for model years 2022-2025. The EPA was expected to submit a formal proposal to replace CAFE standards in 2020 with Safer Affordable Fuel Efficient (SAFE) standards that will limit future fuel- efficient mileage gains from 0.5 percent to 1 percent per year, down from the CAFE standards' 5 percent annual mileage increases. On March 31, 2020, the EPA and the National Highway Traffic Safety Administration finalized the SAFE Vehicles Rule that sets fuel economy and carbon dioxide standards which increase 1.5% in stringency each year for passenger cars and light trucks from model years 2021 through 2026. In recent years, electric vehicles (EV) have increased in popularity, rising from 0.75% of total US light vehicle deliveries in Q1 2018 to 2.64% in Q1 2021. Sales of EVs generated regulatory credits to EV manufacturers from automakers not in compliance with CAFE standards however the federal government's system for regulatory credits changed for the 2021 model year as SAFE emissions regulations were set into policy. Changes to federal emissions standards are not expected to contribute to reduced demand for EV vehicles as nearly all major car manufacturers have released plans to offer 2022 model year EV vehicles to US consumers. The EIA, in the April 2020 STEO indicated that they expect the national price of regular grade gasoline to average $2.61 per gallon in 2021, compared with $2.18 per gallon in 2020. The EIA forecasts the national price of regular grade gasoline to average $2.71 per gallon during the April-September 2020 summer driving season, primarily due to lower forecasted crude oil prices and significantly lower gasoline demand in the second quarter of 2020 that was attributed to the impact of the pandemic.

Depicted on the following page are Figure 4A and Figure 4B, which illustrate the historical relationship between gas prices and travel. As shown with both New York State VMT and TBTA Total Transactions, a reduction in the price of gas generally has correlated with a rise in vehicular travel demand. However, Figure 4B shows that the rise in monthly transactions began prior to the drop in gas price, indicating that although gas prices can affect travel, the increase in transactions cannot entirely be attributed to the movement in gas prices. Following a sharp reduction in TBTA transactions throughout most of 2020 due to COVID-19 travel restrictions, recent trends in the late months of 2020 and early 2021 suggest a recovery in travel is currently underway.

Figure 4A/4B New York City Gas Prices Compared to New York State VMT and TBTA Bridges and Tunnels Total Transactions

Toll Increase Impacts, Collection Methods, and Elasticity

Tolls that are increased periodically can affect traffic usage, especially if they outpace the rate of inflation and in those instances where competing facilities provide a good alternative. Elasticity, as used herein, is the relationship between the change in traffic volume and the toll rate change. It represents the relative decrease in traffic in response 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 attributable 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 elasticity factors for the Throgs Neck and Bronx-Whitestone Bridges indicate their relative isolation from the nearest toll-free competitor, the Ed Koch Queensboro Bridge. On the East River at the RFK Bridge and at 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. The effects of construction on main thoroughfares and feeder routes also affect drivers' choices of toll facilities.

Two sets of forecasts were developed for this report: one at constant (current) tolls (including only the effects of the recent toll increase on April 11, 2021) and the other which also factors in an additional toll increase in March 2023 as included in the MTA 2021-2024 Financial Plan adopted by the MTA Board in December 2020. Elasticity factors used for the analyses in this report are based on factors Stantec developed from analyzing the elasticity exhibited following the March 2017 toll increase. Because the calculated transactions in the 2019 report were so close to actual transactions for 2019, the toll increase in March 2019, the most recent toll increase for which there is data, did not merit a reassessment in the toll elasticity factors for the forecasts. Despite the pandemic, Stantec does not anticipate any changes to the usual driver behavior caused by a toll increase.

To evaluate the impact of any toll increase on transactions, transactional data at each of the TBTA facilities are split into four groups by payment type: NYCSC E-ZPass customers, non- NYCSC E-ZPass customers, NYCSC Mid-Tier E-ZPass customers (effective with the April 11, 2021 toll increase), and TBM customers. Stantec then estimated the revenue split by payment type; this enabled the tracking of the average toll rate throughout the months following the toll increase. The conversion to Cashless Tolling also occurred throughout 2017 at eight of the nine facilities and greatly induced cash customers to switch to E-ZPass. Overall E-ZPass usage increased by 3.4 percent (Throgs Neck Bridge) to 6.6 percent (RFK Bridge) in 2017 with the conversion to Cashless

Tolling, which is a combination of background growth and payment method shifts, which vary by facility. Background growth rates were studied using historical and projected population growth, fuel prices, and VMT. Incorporating these various factors, seasonal trends in the data were also reviewed to determine the patterns and length of the toll increase impact. This process, generally, isolated the background growth and Cashless Tolling effects from the toll increase elasticities.

When reviewing changes in usage exhibited after the March 2017 toll increase, Stantec recognizes that it was unlike most prior toll increases in that, generally, total transactions at TBTA facilities continued to increase. This indicated, in Stantec's opinion, that the sensitivity to toll increases was diminishing and the background growth was increasing. Our analysis of the previous toll increases, prior to the existence of Cashless Tolling, found that cash motorists are more sensitive to toll rates when compared to E-ZPass users; that is to say, the analysis indicated a significantly higher elasticity for cash customers than for E-ZPass customers. With regard to tolling elasticities, TBM customers are expected to behave more like E-ZPass customers than traditional cash customers, as there is no out-of-pocket cash transaction at the toll gantry for either customer. Stantec made separate analyses for both the E-ZPass customers and for the TBM customers. As a result, Stantec has seen that based on historical data elasticity rates for TBM customers may continue to be closer to those found for E-ZPass customers as behavior stabilizes between the two collection methods. These elasticities were used in Stantec's 2019 report. Elasticity factors used to develop Stantec's analyses of toll revenue including the recent toll increase and a future potential toll increase are shown in Table 22.

As discussed earlier, there was a significant shift from cash to E-ZPass in response to the implementation of Cashless Tolling. In 2018, the unprecedented shift to E-ZPass continued with total E-ZPass market-share reaching 94.6 percent by December 2018. In December 2019, E-ZPass market-share remained at 95.2 percent. As of December 2020, E-ZPass marketshare was 94.2 percent. The slight drop in E-ZPass marketshare was caused by travel changes due to the pandemic. February 2021 E-ZPass marketshare increased to 95.9 percent. Stantec estimates that a shift will continue throughout the duration of the forecast, but as participation increases, the incremental changes will be smaller.

For purposes of the calculations provided, we have assumed toll increases in accordance with the 2021-2024 MTA Financial Plan. This plan includes the toll increase effective April 11, 2021 and a projected toll increase on March 1, 2023. Accordingly, the revenue analysis with the toll increase laid out in this report includes the already implemented 7.0 percent toll increase on April 11, 2021 to achieve a 6 percent revenue yield for the year 2021 and a 5.3 percent toll increase on March 1, 2023 to achieve a 4 percent revenue yield for the year 2023. Any such toll increases or other adjustments are subject to future action by the TBTA Board.

Since the April 11, 2021 toll increase has already gone into effect, it has been incorporated into all forecasts. For the scenario which includes future toll increases, it was assumed that the NYCSC E-ZPass toll for passenger cars would be increased by 5.3 percent in 2023 to achieve a 4 percent revenue yield, as noted previously. Further, it was assumed that truck tolls would be increased

proportionately, and that the relationships between TBM and NYCSC E-ZPass tolls for passenger cars would remain the same as those implemented for the toll increase on April 11, 2021.

As previously noted, the NYCSC Mid-Tier toll is a new toll rate effective with the April 11, 2021 toll increase and is charged to NYCSC E-ZPass customers who do not properly mount their E-ZPass tag when crossing TBTA facilities. It was assumed that these customers will have a similar behavior to E-ZPass customers since they often do not realize their improperly mounted E-ZPass was not read and therefore have the same elasticity. It is also assumed that some NYCSC customers subject to the higher Mid-Tier toll rate will properly mount their E-ZPass tag in order to pay the lowest E-ZPass toll rate.

Table 22 Elasticity Factors

Facility	Elasticity Factors[a]		
	TBM	E-ZPass	Mid-Tier
Throgs Neck Bridge	-0.152	-0.087	-0.087
Bronx-Whitestone Bridge	-0.152	-0.087	-0.087
RFK Bridge	-0.152	-0.134	-0.134
Queens-Midtown Tunnel	-0.188	-0.130	-0.130
Hugh L. Carey Tunnel	-0.226	-0.178	-0.178
Verrazzano-Narrows Bridge	-0.174	-0.011	-0.011
Henry Hudson Bridge	-0.165	-0.099	-0.099
Marine Parkway Bridge	-0.116	-0.033	-0.033
Cross Bay Bridge	-0.163	-0.020	-0.020

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 TBM toll at the Queens Midtown Tunnel, TBM traffic would decrease by 0.188%.

As for the impacts of the potential future toll increases on traffic demand, the elasticity factors from Table 22, as described previously, were used by Stantec to calculate changes in traffic, as shown in Table 23. These traffic impacts represent the reduction in volume from the corresponding annual traffic levels that would be expected in the constant tolls scenario (that includes the April 11, 2011 increase). Future transactions are calculated by adding background growth to existing transactions, and, when there is a toll increase, factoring in traffic loss due to toll elasticity (excluding any additional impacts which might occur as a result of the pandemic).

Table 23 Estimated Percent Change in Average Toll Rates and Traffic in 2021 and 2023

Facility	Elasticity Factors			Estimated Percent Change with 2021 Toll Increase[a]				Estimated Percent Change with Assumed 2023 Toll Increase					
				Average Toll Rate		Traffic		Average Toll Rate			Traffic		
	TBM	E-ZPass	Mid-Tier	TBM	E-ZPass	TBM	E-ZPass	TBM	E-ZPass	Mid-Tier	TBM	E-ZPass	Mid-Tier
Throgs Neck Bridge	-0.152	-0.087	-0.087	7.0%	7.0%	-1.1%	-0.6%	5.3%	5.3%	5.3%	-0.8%	-0.5%	-0.5%
Bronx-Whitestone Bridge	-0.152	-0.087	-0.087	7.0%	7.0%	-1.1%	-0.6%	5.3%	5.3%	5.3%	-0.8%	-0.5%	-0.5%
RFK Bridge	-0.152	-0.134	-0.134	7.0%	7.0%	-1.1%	-0.9%	5.3%	5.3%	5.3%	-0.8%	-0.7%	-0.7%
Queens-Midtown Tunnel	-0.188	-0.130	-0.130	7.0%	7.0%	-1.3%	-0.9%	5.3%	5.3%	5.3%	-1.0%	-0.7%	-0.7%
Hugh L. Carey Tunnel	-0.226	-0.178	-0.178	7.0%	7.0%	-1.6%	-1.2%	5.3%	5.3%	5.3%	-1.2%	-0.9%	-0.9%
Verrazzano-Narrows Bridge	-0.174	-0.011	-0.011	7.0%	7.0%	-1.2%	-0.1%	5.3%	5.3%	5.3%	-0.9%	-0.1%	-0.1%
Henry Hudson Bridge	-0.165	-0.099	-0.099	7.0%	7.0%	-1.2%	-0.7%	5.3%	5.3%	5.3%	-0.9%	-0.5%	-0.5%
Marine Parkway Bridge	-0.116	-0.033	-0.033	7.0%	7.0%	-0.8%	-0.2%	5.3%	5.3%	5.3%	-0.6%	-0.2%	-0.2%
Cross Bay Bridge	-0.163	-0.020	-0.020	7.0%	7.0%	-1.1%	-0.1%	5.3%	5.3%	5.3%	-0.9%	-0.1%	-0.1%

Notes:
(a) Effective April 11, 2021, a Mid-Tier toll category was introduced. Prior to the implementation of this category, these customers paid the NYCSC E-ZPass rate.

Availability of Capacity on TBTA Facilities

Stantec's assessment of TBTA's bridges and tunnels indicates that historically during most, if not all hours of the day, most facilities are operating below carrying capacity and more growth can be accommodated. The exception is the Queens Midtown Tunnel where historical data show the 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 acts wherever feasible to alleviate those constraints through targeted investments.

TBTA completed the implementation of Cashless Tolling at all of its facilities by fall 2017. The Cashless Tolling system utilizes tolling equipment mounted on overhead gantries to capture E-ZPass tag-reads and license plate images in an environment without traditional toll plazas, enabling customers to traverse tolling areas in free-flow fashion.

Actual traffic observed after the conversion to Cashless Tolling and subsequent removal of traditional toll plazas showed that the removal of the toll booths eliminated any localized queuing and congestion associated with cash collection and E-ZPass interventions. The conversion to Cashless Tolling, however, does not address any recurring upstream or downstream congestion issues that exist at some facilities. These capacity constraints are typically located outside TBTA's jurisdictional boundaries, but can impact traffic flow within the tolling areas during peak commuter and recreational periods. Flow through the former plaza areas continues to be affected by these off-site conditions even with the facilities operating in a Cashless Tolling environment. TBTA completed a study to identify post Cashless Tolling traffic improvements that will mitigate some of these off-site constraints to the extent feasible and in coordination with NYCDOT and New York State Department of Transportation (NYSDOT). The results of the study have helped inform TBTA's capital plan with current and future planned capital projects which will

address some of the identified post Cashless Tolling traffic bottlenecks that serve to constrain capacity at certain facilities.

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 Queens Approach structure on the Bronx Whitestone Bridge began in 2011, 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 non-TBTA construction activity was obtained from NYSDOT, NYCDOT, NYMTC, and the Port Authority.

Construction on TBTA Facilities

TBTA has an active program of regional transportation planning and coordinates closely with regional partners on all projects in common corridors. TBTA is part of a regional Interagency Program Coordination group that meets regularly to discuss ongoing and future projects in order to coordinate and align projects among the regional agencies to minimize adverse regional traffic impacts of construction by different regional agencies.

In general, the majority of construction activities programmed for the TBTA facilities are scheduled to take place during off-peak hours, including nighttime and weekend lane closures in the tunnels. They are expected to have minimal impacts on daily bridge and/or tunnel traffic.

TBTA's current capital construction projects are progressing per New York State Executive Order 202.6, under which construction of roads, bridges, and transit facilities is deemed an essential construction activity for continuation during the current COVID-19 restrictions. In addition, design and planning efforts for the rest of the capital plan continue. Ongoing construction projects at each of the TBTA facilities include the following:

- The **Verrazzano-Narrows Bridge** is undergoing steel repair/painting on the suspended spans, planned for completion in 2022. Projects for the concrete rehabilitation of the anchorages and widening of the Gowanus approach to the VNB are also ongoing, and planned to be complete in 2021. Rehabilitation of the Staten Island and Brooklyn approach upper level elevated ramps is ongoing and is planned to be complete in 2023. In addition, there is an

ongoing bridge preservation program which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items.

- The **Cross Bay Bridge** is undergoing pier fender system replacement which is planned to be complete in the summer of 2021. In addition, there is an ongoing bridge preservation program which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items.

- The **Marine Parkway Bridge** is undergoing pier fender system replacement which is planned to be complete in the summer of 2021. In addition, there is an ongoing bridge preservation program which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items.

- The **Bronx-Whitestone Bridge** is undergoing installation of fender protection around the tower piers along with the installation of fire standpipes at the towers, planned for completion in late 2021. In addition, there is an ongoing bridge preservation program which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items. As noted below, 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 construction contract was awarded in late 2018. Staged construction of the roadway deck is in progress with the use of a movable barrier to implement a reversible lane. Three lanes will be maintained throughout construction in the peak direction to maximize traffic flow. This traffic management strategy has been successfully deployed on recent projects at TBTA's other suspension bridges and has been effective in minimizing traffic impacts. The deck replacement and associated painting work is projected to be complete in 2022. In addition, a construction contract for the Approach Viaducts structural rehabilitation was awarded in 2019 and is projected to be complete in 2023. There is also an ongoing bridge preservation program at the TNB which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items. 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.

- The **Henry Hudson Bridge** is undergoing a project to perform structural steel repairs and full overcoating of the steel structure, planned for completion in 2022. A project to install maintenance catwalks and lighting inside of the Dyckman Street Bridge abutments is also ongoing and planned to be complete in 2022. In addition, there is an ongoing bridge preservation program which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items.

- The **RFK Bridge** is undergoing a project to evaluate the main cables of the RKF Queens Suspension Bridge. There are also projects to install fire standpipes and to demolish the former Bronx Plaza West widening, both of which are planned both of which are planned to be

completed in the summer of 2021. Rehabilitation of the Bronx pedestrian ramp is ongoing and projected for completion in 2022, and there is an ongoing project to perform superstructure steel upgrades and associated painting for all facility structures except the suspended spans which is projected to be complete in 2022. In addition, there is an ongoing project to address power resiliency and flood mitigation which is projected to be completed in 2022. There is also an ongoing bridge preservation program at the RFK which addresses cleaning of drainage systems, joint repairs, roadway striping, and other miscellaneous as needed maintenance items.

- The **Queens Midtown Tunnel** has an ongoing tunnel preservation program which addresses cleaning of drainage systems, cleaning of plaza walls, and other miscellaneous as needed maintenance items.

- The **Hugh L. Carey Tunnel** is undergoing the rehabilitation of its Ventilation Systems which is projected to be complete in the fall of 2021. A project to rehabilitate the Manhattan Blower Building façade is ongoing and planned to be complete in 2022. In addition, there is an ongoing tunnel preservation program which addresses cleaning of drainage systems, cleaning of plaza walls, and other miscellaneous as needed maintenance items.

Competing East River Crossings Construction

Programmed construction along competing East River crossings include:

- **Ed Koch Queensboro Bridge** – The project to replace the upper level roadway deck started in 2018 and is expected to be completed by 2024. There are ongoing off-peak lane closures on the bridge. Permanent lane closures have not yet commenced but are expected to begin on the Manhattan-bound upper roadway in June/July 2021. Queens-bound upper roadway closures are anticipated to follow in March/April 2022. Bike lanes will be included as part of this project. This project may result in increased usage of the Queens Midtown Tunnel and, to a lesser extent, the RFK Bridge.

- **Brooklyn Bridge** – Rehabilitation of approach arches on the Brooklyn Bridge began in fall 2019 and is expected to be completed in spring 2024. This project will include a bike lane. This project may result in increased usage of the Hugh L. Carey Tunnel and, to a lesser extent, the Queens Midtown Tunnel.

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 2020-2024, 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 began at the end of 2018 and is expected to end in July 2022. The project includes electrical, mechanical, and miscellaneous operating system-related work. Minimal diversions to the RFK Bridge are anticipated.

- **Broadway Bridge** – Reconstruction of the bridge was scheduled to start in early 2019, however, problems with the operating system of the bridge delayed the start of the project. Installation of shielding in preparation for demolition work began in late 2019 and is almost complete. The project is scheduled to be completed in May 2024. 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. The project will involve a single lane closure from 7am-3pm every day. Minimal diversions to the Henry Hudson Bridge are anticipated.

- **I-87/Major Deegan Expressway** – Rehabilitation of various overpasses along the Major Deegan Expressway from East 160th Street to East 232nd Street is scheduled for design and construction through 2026. Construction of the 138th Street bridge is scheduled to start construction in summer 2021 and end in early 2025.

  The Major Deegan Expressway between West 161st Street and the Alexander Hamilton Bridge project includes the addition of a northbound auxiliary lane and the replacement of the northbound and southbound viaducts to improve traffic flow and safety along the corridor. The Depot Place Bridge over the Expressway will also be rehabilitated as part of this project. This project began in 2019 and is expected to be completed in spring 2022.

  These projects may result in minimal diversions to the RFK Bridge.

- **I-95/Cross Bronx Expressway** – Several rehabilitation projects are in development for the Cross Bronx Expressway.

  The rehabilitation of the six Cross Bronx Expressway bridges (replacement of deck and superstructure) over the Sheridan Expressway and Amtrak right-of-way from Boston Road to the Bronx River Parkway is a potential design-build project with construction currently scheduled to begin in late 2024 and extend to February 2028.

  The rehabilitation of the Arthur Avenue and 176th Street bridges over the Cross Bronx Expressway is currently under development. Construction is scheduled to begin in spring 2026 and be completed in spring 2028.

  The rehabilitation of the E.L. Grant Highway, Nelson Avenue, and Jesup Avenue bridges over the Cross Bronx Expressway is currently under development. The project, which includes deck and bearings replacement and steel repairs to address structural deficiencies and extend the

service life of the structures, is scheduled to begin in late spring 2026 and be completed in early 2029.

The rehabilitation of Jerome Avenue and East 174th Street Bridges over the Cross Bronx Expressway (to extend the service life of the two bridges) is scheduled to begin in spring/summer 2026 and end in spring 2027. 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.

The rehabilitation of the Cross Bronx Expressway over Webster Avenue, Third Avenue, and the Metro-North Railroad is scheduled to begin in late 2026 and end in early 2029. The scope will include replacing the concrete deck and replacing/repairing other deteriorated bridge elements to ensure continued safe operations.

These projects may result in minimal diversions to the RFK, Bronx-Whitestone, and/or the Throgs Neck bridges.

- **I-278/Bruckner Expressway** – The Bruckner Expressway/Sheridan Boulevard Interchange 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 project will be completed under three contracts.

  Contract 1 includes two elements:

  A) Bruckner Expressway/Sheridan Boulevard Interchange – The Bruckner Expressway will be widened east of the interchange over the Amtrak Bridge to carry a third lane in both directions of the Bruckner Expressway through the interchange. The bridge deck over Amtrak will need to be widened to accommodate the additional lanes.

  B) Hunts Point Truck Access Improvements – New ramp connections will be constructed between Edgewater Road and both the Sheridan Boulevard (both directions) and the northbound/eastbound Bruckner Expressway. A new deck will be constructed over the Bruckner Expressway and Amtrak to provide the new connections. The Hunts Point Avenue ramp to the northbound Sheridan Expressway would be permanently closed and all on-ramp traffic will be rerouted to Edgewater Road to access the northbound Sheridan Boulevard.

  A design-build contract was awarded in summer 2019 and construction began in early 2020. Contract 1 is scheduled to be substantially completed in winter 2022/2023.

  Contract 2 includes deck replacement of the Bruckner Expressway from East 141st Street to Barretto Street, widening of the Bruckner Expressway from East 149th Street to Barretto Street to maintain three lanes in both directions, removal of the westbound Bruckner Expressway

off-ramp to East 138th Street, and a new westbound Bruckner Expressway interchange at Leggett Avenue, including new on- and off-ramps for improved access to Hunts Point. Other improvements to Bruckner Boulevard below the viaduct are included in this contract. A design-build contract was awarded in March 2021 and construction is expected to be substantially completed in fall 2023.

Contract 3 includes deck replacement of the Bruckner Expressway between Barretto Street and the Sheridan Boulevard interchange. A third lane will be added along both directions of the Bruckner Expressway between these segments, which would now provide a continuous third lane along both directions of the Bruckner Expressway between the Bronx River and East 149th Street. A pedestrian bridge at Bryant Avenue will also be replaced. Construction on this contract is scheduled to begin in winter 2022/2023 and be completed at the end of 2025.

- **I-95/Bruckner Expressway** – The addition of a fourth northbound lane from Exit 8B (to Orchard Beach/City Island) to Exit 9 (to northbound Hutchinson River Parkway) and a northbound Hutchinson River Parkway exit ramp to Co-Op City at Bartow Avenue in Bronx County, NYC is slated to begin in late summer/fall 2021 and be completed in fall 2023.

  Construction to repair and replace deteriorated components of the Bruckner Expressway Bridge over Rosedale Avenue is expected to begin in winter 2022/2023 and end in winter 2025/2026.

  The Unionport Bridge, which carries the northbound and southbound Bruckner Expressway service roads over the Westchester Creek, is undergoing a complete replacement. The new bridge would be expanded from four to six lanes and all of the approaches will be completely rebuilt. Traffic flow across the bridge is expected to continue uninterrupted through the estimated four-year construction period, which is anticipated to be completed in winter 2022.

  These projects may result in minimal diversions to the RFK, Bronx-Whitestone, and/or the Throgs Neck bridges.

- **Bronx River Parkway** – This project involves the removal and installation of a new Bronx River Parkway Bridge over Metro-North Railroad. A replacement with highway realignment is being considered. Construction is expected to begin in summer 2021 and be completed in summer 2024.

  Replacement of three deteriorated bridges on the Bronx River Parkway, specifically the two-span bridge over AMTRAK/CSX (near the Cross Bronx Expressway interchange), the single span bridge over East Tremont Avenue and the seventeen-span viaduct over East 180th Street/Morris Park Avenue and along the NYCTA's East 180th Street subway yard is expected to begin in summer 2023 and is expected to be completed in late spring 2027. 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.

These projects may result in minimal diversions to the RFK, Bronx-Whitestone, and/or the Throgs Neck bridges.

I-278/Gowanus Expressway – Active Traffic Management improvements to provide improved incident response, reduce secondary incidents, and improve reliability and level-of-service on the Gowanus Expressway. Improvements include barrier gates for HOV Lane, HOV Lane Monitoring, tow truck staging, center-to-center communication between bus operations center and highway operations center. As of the date of this report, this project is on hold. If the project proceeds, it may result in minimal diversions to the Hugh L. Carey Tunnel and the Verrazzano-Narrows Bridge.

- **Hutchinson River Parkway** – The rehabilitation of the Westchester Avenue bridge over the Hutchinson River Parkway will repair abutments, piers, approaches, steel superstructure and replace the reinforced concrete deck. Currently under construction, the project is expected to be completed at the end of 2021.

  Minimal impact to traffic at the Bronx-Whitestone Bridge may occur.

- **I-278/Brooklyn-Queens Expressway (BQE)** - The replacement of four bridge decks over the BQE from South 3rd Street to Grand Street in Kings County, which will replace concrete decks, repair concrete substructures, and repair other deteriorated elements, is in development and construction expected to begin in late summer/fall 2026 and expected to be completed in winter 2029/2030. This project has potential for lane closures that could impact traffic at the Hugh L. Carey Tunnel and Verrazzano-Narrows Bridge.

- **BQE Triple Cantilever Project** – The long-term plan for the BQE is being redeveloped following the release of the Expert Panel Report. NYC DOT continues structural monitoring and evaluation of the BQE and is conducting repairs on an ongoing basis. Current on-going repairs at Hicks Street will continue through summer 2021. Additional repairs are being evaluated. This project has potential for lane closures that could impact traffic at the Hugh L. Carey Tunnel and Verrazzano-Narrows Bridge.

- **Belt Parkway** – Installation of Advanced Traffic Management System equipment including CCTV, VMS, detection system and travel time system from the Gowanus Expressway to Cross Bay Boulevard is anticipated to start in June 2021 and end in December 2021.

  The reconstruction of six bridges and their approaches on the Belt Parkway (over two local streets and four waterways) began in the fall of 2009 and have been completed. The Nostrand Avenue Bridge was originally part of this contract and will be included with the Sheepshead Bay Road, Ocean Avenue and Bedford Avenue bridges, in a future design-build contract.

  Reconstruction of the 17th Avenue Pedestrian Bridge and 27th Avenue Pedestrian Bridge over the Belt Parkway is anticipated to begin in the summer of 2021 with an expected date of completion in 2024.

There are plans to add an additional lane on the Belt Parkway from the Verrazzano-Narrows Bridge to Bay Parkway which will help alleviate back-ups on the Verrazzano-Narrows Bridge Belt Parkway exits and the Verrazzano-Narrows Bridge main span. The project began preliminary design in 2019, with construction currently planned for 2023.

The Shore Parkway Bridge rehabilitation over Shell Road will replace the concrete decks; repair the superstructure, substructure and other deteriorated elements. Construction is expected to begin in early fall 2028 with an expected date of completion in summer 2031.

These projects may result in some impacts to traffic at the Verrazzano-Narrows Bridge, Cross Bay Bridge, and Marine Parkway Bridge.

- **I-278 (BQE)/Grand Central Parkway Interchange**- The project to reconstruct the Grand Central Parkway and BQE (east leg) interchange at Astoria Blvd started in summer 2020 and is expected to be completed in summer 2022 while the reconstruction of BQE and Grand Central Parkway (west leg) interchange is expected to start in mid-2024 and be completed in mid-2027.

- **Grand Central Parkway** – The Kew Gardens Interchange reconstruction – Phase IV project will replace highway viaducts and ramp structures; realign ramps and add highway shoulders; install multi-use path for pedestrian and bicycle usage along the Kew Gardens Interchange (an intersection of the Grand Central Parkway, the Van Wyck Expressway, the Jackie Robinson Parkway and Union Turnpike) located in central Queens. The contract was awarded in October 2018 with an estimated completion date of Spring 2022.

  The planned rehabilitation of the Grand Central Parkway Bridge over Winchester Boulevard and ramp over the Cross Island Parkway is scheduled to begin in late 2024 and be completed in winter 2027/2028.

  These projects may result in minimal impacts to traffic at the RFK Bridge and Queens Midtown Tunnel.

  I-678/Whitestone Expressway Bridge over the Cross Island Parkway – The Whitestone Expressway/Van Wyck Expressway bridge over the Cross Island Parkway (Exit 16) is scheduled for replacement. Construction began in fall 2019 and is expected to be completed in summer 2021. A 10-foot travel lane will be maintained at all times on the bridge during both stages of construction. No detours are proposed for the construction.

  A sewer and water main project planned on the service road of the Whitestone Expressway is anticipated to start fall 2021 and end fall 2024.

  These projects may result in some impacts to traffic at the Bronx-Whitestone Bridge and Throgs Neck Bridge.

- **I-678/Van Wyck Expressway** – The rehabilitation of the Roosevelt Avenue Bridge began in January 2016 and is expected to be complete in winter 2021. Major reconstruction plans include installation of new girders, a new deck, new lighting, and an approximate two-foot widening of the sidewalk to allow for a bike lane. One lane in each direction would be available to traffic.

  Van Wyck Expressway/Long Island Expressway Interchange structural rehabilitation project will replace concrete deck, perform corrective repairs of bridge steel and concrete elements on College Point Boulevard ramp and concrete deck replacement and concrete piers repairs on selected spans of the Van Wyck Expressway viaduct over the Long Island Expressway. The project began in fall 2020 and is expected to be completed in summer 2024. Three lanes of traffic will be maintained on the Van Wyck Expressway during peak hours and parking will be maintained underneath the viaduct (up to 80 parking spaces will be eliminated/relocated at any one time).

  These projects may result in minimal impacts to traffic at the Bronx-Whitestone Bridge and RFK Bridge.

- **Van Wyck Expressway/JFK Airport Access Improvements** – This project will widen Van Wyck Expressway (VWE) from three to four lanes (five lanes at some locations) in each direction from Queens Boulevard to 133rd Avenue in the vicinity of John F. Kennedy (JFK) Airport located in Queens County, New York City. This project will replace overpass bridges and Long Island Rail Road (LIRR) bridges; install new pavement, noise and retaining walls and other associated elements as part of the contract. The project consists of 3 contracts:
    - Contract 1 - Replace/retrofit 9 bridges between Hillside Avenue and 133rd Avenue, relocate the NB VWE Exit 3 Ramp 400 feet to the south and relocate the North Conduit Avenue Entrance Ramp to WB Belt Parkway 200 feet to the east. Reconstruction of the bridges will accommodate an additional future lane. Construction began Summer 2020 and will end December 2023.
    - Contract 2 - Retrofit and replace three LIRR bridges over the VWE north of Atlantic Avenue and replace the Atlantic Avenue roadway bridge over the VWE. Reconstruction of the bridges will accommodate an additional future lane. Construction began January 2021 and will end summer 2024.
    - Contract 3 - Widen the VWE between Federal Circle JFK and Hoover Avenue to add one managed use lane, replace VWE mainline bridges below 133rd Avenue, and construct retaining walls, build new ramps and reconstruct existing ramps. Construction is expected to begin January/February 2022 and end spring/summer 2025.

  These projects may result in minimal impacts to traffic at the Bronx-Whitestone Bridge, Throgs Neck Bridge, the Queens Midtown Tunnel, and the RFK Bridge.

- **I-495/Long Island Expressway** – A project will construct an auxiliary lane on the eastbound Long Island Expressway to connect the entrance ramp from the Clearview with the exit ramp

to Springfield Boulevard. The provision of a continuous lane for entering and exiting traffic will alleviate congestion and reduce delays. This project will also include the replacement of the Oceania Street Bridge over the Long Island Expressway. Construction is expected to begin in February 2022 and last until February 2024.

An Active Traffic Management (ATM) system on the Eastbound and Westbound Long Island Expressway, between the Queens Midtown Tunnel and Main Street, Queens is currently under development. The system will result in improved safety, reduced congestion and delays, and improved route choices. Construction is expected to begin in fall 2022 and be completed in fall 2024.

A safety improvements project is planned for the Long Island Expressway from 48th Street to Little Neck Parkway. Construction is expected to begin in July 2021 and last two years. This project includes:

- Acceleration/Deceleration lane improvements at six (6) locations along the expressway corridor: 1) Westbound LIE: Exit Ramp to Kissena Boulevard, 2) Eastbound LIE: Entrance Ramp from Kissena Boulevard, 3) Eastbound LIE: Exit Ramp to Utopia Parkway, 4) Westbound LIE: Entrance Ramp from Utopia Parkway, 5) Eastbound LIE: Entrance Ramp from Utopia Parkway, 6) Westbound LIE: Exit Ramp to Francis Lewis Boulevard.
- Construction of auxiliary lanes at three (3) locations along the expressway corridor: 1) Westbound LIE: Main Street to College Point Boulevard, 2) Westbound LIE: Kissena Boulevard to Main Street 3) Eastbound LIE: Main Street to Kissena Boulevard.
- Installation of traffic safety appurtenances or equipment along the expressway corridor at various locations from 48th Street to Little Neck Parkway. (e.g., reflective markers/delineators on guiderail/concrete barriers, object markers on abutments, guiderail/concrete barriers, and impact attenuators).

These projects may result in minimal impacts to traffic at the Queens Midtown Tunnel and Bronx-Whitestone Bridge.

- **Route 9A/West Side Highway** – Henry Hudson Parkway Viaduct reconstruction from West 72nd to 82nd Street is currently scheduled for completion in summer 2021. The viaduct reconstruction from West 94th Street to West 98th Street is also scheduled for completion in summer 2021. This project has the potential for lane closures that could affect the Henry Hudson Bridge and possibly alternative routes.

- **Harlem River/FDR Drive** – Rehabilitation of three bridges on the Harlem River Drive between 135th and 139th streets is anticipated to begin winter 2025 and end spring 2028.

  Replacement of the deck on the Trans-Manhattan Expressway Connector ramp is currently in design. Construction is expected to begin in summer 2025.

FDR Drive, northbound from East 42nd to 49th Street is scheduled for rehabilitation. Currently under design, construction is expected to begin in late 2023 and be completed in 2027.

These projects may result in minimal adverse impacts to traffic at the RFK Bridge and the Queens Midtown Tunnel.

- **Holland Tunnel** – In February 2018, the Port Authority authorized $364.2 million for a rehabilitation and resiliency project for the Holland Tunnel to repair and restore critical mechanical, electrical and plumbing systems damaged by Superstorm Sandy, and to install protective measures to mitigate future flooding in the facility. Construction began in April 2020. One tube at a time will be closed for two years overnight (11pm – 5am) all nights except Saturday, which started with the eastbound tunnel, followed by the westbound tunnel beginning in 2022. Potential lane closures may result in a minimal positive impact to the traffic at the Hugh L. Carey Tunnel and the Verrazzano-Narrows Bridge.

- **Lincoln Tunnel Helix Replacement** – In 2015, the Lincoln Tunnel Helix went through a three-year rehabilitation program which has extended its estimated service life to 2025. Currently in the planning stage, the Port Authority is evaluating replacement of the Lincoln Tunnel Helix. The purpose of the project is to replace the aging and deteriorated structure with a new roadway that meets current highway and safety standards. If the project proceeds, construction is anticipated to start in 2022 and end in 2027.

- **George Washington Bridge Rehabilitation** – Ongoing and planned projects include rehabilitation of upper level spans over Hudson Terrace and New Jersey anchorage (2016-2020) suspender ropes replacement and rehabilitation of the main cables (2017-2026), rehabilitation of Trans-Manhattan Expressway (TME) median barriers (2018-2023), rehabilitation of 178th Street & 179th Street ramps and bus ramps (2017-2025), main span upper level structural steel rehab (2019-2024), upper level eastbound main span pavement rehabilitation (2019-2024), rehabilitation of six TME overpass bridges in Manhattan (2021-TBD), Rehabilitation of Structural Steel Lead Paint Removal and Recoating Underside LL (2019-2025), Rehabilitation of Center and Lemoine Bridges (2018-2025), Hydrant and Water System B (2018-2020), Intelligent Transportation System Replacement of Signs and Field Devices (2019-2021).

- **Gowanus Canal Superfund Site** – In 2010, Gowanus Canal, an EPA Superfund site was added to the National Priorities List (NPL) as a hazardous waste site requiring clean up. In September 2013, the EPA issued its Record of Decision (ROD), which explained the remediation plan for the Gowanus Canal. The project involves removing contaminated sediment from the canal via dredging, installing a cap, and restoring the 5th Street basin. It is anticipated that active construction will occur over a six- to ten-year period. Dredging of the canal began in late 2020 just south of the Carroll Street bridge and will continue between the Carroll and Union Street bridges, followed by dredging north of the Union Street bridge and then between the Carroll and 3rd Street bridges. The project will necessitate frequent bridge openings. Temporary traffic disruptions will occur at 3rd Street, Union Street and 9th Street during bridge openings which will continue through mid-2023, with extended closures during periods of heavy construction

activity. Huntington Street east of Smith Street will be closed through September 2021, with additional closures if needed. Proposed plans for Hamilton Avenue over Gowanus Canal are not yet available so it is not possible to assess the impact to traffic at the Hugh L. Carey Tunnel.

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 service opened to the public on January 1, 2017. Service from new stations at East 96th, East 86th, and East 72nd Streets along Second Avenue now connects to the 63rd Street line at Lexington Avenue. The 2015-2019 Capital Program includes funding to complete design and begin initial construction of Phase 2 (125th Street to 96th Street). The 2020-2024 Capital Program includes the cost to construct Phase 2 of the Second Avenue Subway. Construction of the new stations is expected to be completed in 2029.

- **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. Project completion is scheduled for December 2022. MTA anticipates that some travelers to Manhattan's East Side will shift to the LIRR from other modes, including the Queens Midtown Tunnel and the RFK Bridge.

- **Penn Station Access** – The Penn Station Access (PSA) project would take Metro-North's New Haven Line directly to Penn Station using Amtrak's Hell Gate line and will add four new stations in the East Bronx. Currently, conceptual engineering, program management, and design activities are underway for planned infrastructure improvements on the Hell Gate line in the East Bronx. Metro-North service to Penn Station will begin after completion of the East Side Access project.

- **The Gateway Program (Amtrak)** – The Gateway Program is a comprehensive program of strategic rail infrastructure improvements designed to improve current services and create new capacity that will allow the doubling of passenger trains running under the Hudson River. The program will increase track, tunnel, bridge, and station capacity, eventually creating four mainline tracks between Newark, New Jersey, and Penn Station, New York, including a new, two-track Hudson River tunnel. Due to the high level of traffic in the existing Hudson River Tunnel (450 trains per weekday, 600,000 riders), taking one of its two tubes out of service for necessary repairs would reduce total capacity for Amtrak and NJ TRANSIT from 24 trains per hour to approximately six trains per hour in the peak direction. This very significant reduction in capacity would impact New York and New Jersey commuters who cross the Hudson on a daily basis along with Amtrak passengers. This Program will allow NJ TRANSIT and Amtrak to continue to operate and maintain existing levels of passenger rail service in the new tunnel while the North River Tunnel is taken out of service for critical rehabilitation and repairs. This

Program is currently in the planning stages and has reached 30% design. Procurement materials for Package 1 (Tunnel Boring & Civil Works) are currently under development.

The Hudson Tunnel Component of the Gateway Program includes the design and construction of a new Hudson River rail tunnel serving Penn Station, New York, and the rehabilitation and modernization of the existing North River Tunnel which incurred serious and ongoing damage during Super Storm Sandy. This project is currently in the environmental review phase. A Draft Environmental Impact Statement was released in July 2017. A draft Final Environmental Impact Statement was submitted to USDOT in December 2018 and has been under review since that submittal. The preliminary schedule as of the August 2019 FY21 Financial Plan submittal to USDOT, aims to complete the new tunnel in 2029 to enable the planned rehabilitation of the existing tubes to be complete in 2030. Unexpected closures in existing tubes for emergency repairs during weekday hours may force some rail commuters to switch to PATH trains, busses, or cars. Federal funding is not yet committed to fully finance this project. TBTA facilities may experience a sporadic increase in usage with commuters choosing to travel to/from the City via any of the tolled Hudson River bridges and tunnel facilities or the Verrazzano-Narrows Bridge.

- **AirTrain extension to LGA** – This Port Authority capital project will provide a new AirTrain service between the LGA airport and a new intermodal station at Willets Point with connections to LIRR and MTA-NYCT ("7" Subway line). The project is still in conceptual design stage. LGA AirTrain received PA Board Project Authorization of $2.05 Billion in October 2019. The port authority expects to award contracts for both AirTrain projects in 2021, and complete construction in 2024. This project can impact traffic at the RFK Bridge and the Queens Midtown Tunnel as some airport travelers and employees may shift to LIRR or subway. Some impacts to traffic may also be seen at the Bronx-Whitestone and Throgs Neck Bridges. This would impact the other East River crossings as well.

All of the information presented herein for planned construction dates are based on the best available data and do not reflect any changes which might be caused as a result of the pandemic.

Summary of Assumptions and Conditions

TBTA traffic, toll revenues and expenses have been analyzed 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 historic traffic elasticity due to toll variations, impacts of construction projects and the following assumptions and conditions, which we believe are reasonable. It is noted, the following presents information related to potential future traffic and revenue for a ten-year period.

Notwithstanding the above, the forecast analyses assume:

- All TBTA facilities will be operated efficiently and maintained in a state of good repair in order to attract customers and to sustain traffic demand levels.

- The TBTA 2020-2024 Capital Program that was approved by the MTA Board on September 25, 2019 will be carried out throughout the analysis period. Future capital programs sufficient to maintain the structural integrity of bridges and tunnels will be adopted and implemented throughout the analysis 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 interagency agreements. As of the end of 2020, 94.2 percent of all tolls paid on TBTA facilities were E-ZPass transactions. As a result of the E-ZPass participation rate increases that have been experienced at the TBTA facilities, future growth in E-ZPass market share is planned to be limited. However, a small number of customers will shift to NYCSC accounts so that the toll discounts can be captured. It is projected that E-ZPass participation rates will experience small annual growth until a maximum of 98 percent is reached.
- Since the exact date of activation, tolling structure, tolling rates, and possible credits have not yet been established for the CBD Tolling Program, Stantec cannot draw any meaningful and dependable conclusions about the potential impacts of congestion pricing initiatives on usage of TBTA facilities and, therefore, Stantec is unable to include the effects of the CBD Tolling Program into its forecast.
- Competing East River crossings will continue to operate toll-free and be maintained in efficient operating condition. At this time, it is too uncertain for Stantec to draw any meaningful conclusions about the potential impacts of tolling the competing East River crossings on TBTA facilities.
- For the analysis with current tolls, the present toll schedule that began on April 11, 2021, will be in effect during the remainder of the analysis period through 2031. For the analysis with toll increases, tolls on TBTA facilities will be increased on March 1, 2023, and is projected to yield an estimated 4 percent in revenue compared to the current toll analysis, in accordance with the 2021-2024 MTA Financial Plan.
- 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 for TBTA traffic prior to evaluating the adverse effects related to the pandemic.
- Although City and State budget difficulties continue, highway/crossing improvements, in general, for the competing bridges and highway 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.
- Growth assumptions, based on trends in regional employment and population, forecast by NYMTC through 2055, 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 planned 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 December 2022.
- 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 E-Token customers and for Staten Island residents at the Verrazzano-Narrows Bridge and for Rockaway Residents at the Cross Bay and Marine Parkway Bridges. TBTA's reduced rate programs provide, by statute, a toll rate lower than the TBM rate for Staten Island Residents using resident E-Tokens to cross the Verrazzano-Narrows Bridge and for Rockaway Residents using resident E-Tokens and non-residents using minor E-Tokens to cross the Cross Bay and Marine Parkway Bridges. The reduced rate programs provide, by MTA Board policy, a toll rate lower than the TBM rate to non-resident NYCSC E-ZPass customers. TBTA's reduced rate programs also provide, by MTA Board Policy, a toll rate lower than the NYCSC E-ZPass rate to Staten Island Residents crossing the Verrazzano-Narrows Bridge, to Queens Residents crossing the Cross Bay Bridge, and to Bronx Residents crossing the Henry Hudson Bridge. 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 Verrazzano-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 and MTA's rebate programs both result in increased traffic. TBTA's toll revenue is impacted unfavorably by charging a reduced rate for residents but there are no adverse revenue impacts stemming from the rebate programs because the rebate values are fully reimbursed by MTA and New York State.
- 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, are generally expected to improve over the duration of the forecast period. It is important to note that Stantec assumes the economy to be cyclical and thus it will both grow and contract at certain points within the forecast period.
- No future natural disaster or local, state or national emergency will occur that would materially alter travel patterns and divert traffic from the TBTA facilities.
- The forecast accounts for estimated changes in both vehicular demand and transit demand due to the pandemic, related government actions, and economic impacts.
- The forecast does not account for major policy changes that would limit the use of personal vehicles, consequently altering the proportion of vehicle use versus transit use related to the effects of the pandemic.

While the forecast is made and presented year by year by Stantec, they are intended to show trends on the basis of our 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

The following presents information related to potential future traffic and revenue for a ten-year period. Notably, since March 2020, the facilities have been affected negatively by a steep decline in travel due to the pandemic. However, now that we are more than a year into the pandemic, and traffic is now within approximately fifteen percent of its pre-pandemic levels, Stantec believes there is enough data about the trajectory of the pandemic to produce a forecast.

Current and future traffic and toll revenues are estimated for the 11-year (2021-2031) analysis 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 2021 budget, 2020-2024 MTA Financial Plan, 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.

Traffic and Toll Revenue, 2021

Stantec's development of the traffic and toll revenue estimates for 2021 took into account the previous economic conditions reported for the region, fuel prices, unusual weather events, construction projects, the ongoing pandemic, and post-pandemic projected behavioral changes such as increased remote home-based work.

Actual data through February 2021 was available for use in the analysis. The forecast for the remainder of 2021 estimates that the base traffic levels at TBTA facilities for the remaining ten months of calendar year 2021 will be 27.9 percent more than volumes in the same months of 2020, which had been heavily impacted by the pandemic.

The range of percent changes are shown in Table 24 for the forecast. In January through February 2021, traffic decreased at all of the facilities when compared to January and February 2020, which were prior to the onset of the pandemic.

Table 24 Potential Changes in Annual Traffic, 2020 to 2021

Facility	Actual Percent Change January - February 2020 to 2021[a]	Percent Change March - December 2020 to 2021	Percent Change Full Year 2021
Throgs Neck Bridge	-23.0%	18.2%	10.4%
Bronx-Whitestone Bridge	-20.5%	29.1%	19.3%
RFK Bridge	-20.8%	27.0%	17.5%
Queens Midtown Tunnel	-32.9%	45.3%	27.0%
Hugh L. Carey Tunnel	-21.7%	29.5%	19.1%
Verrazzano-Narrows Bridge	-14.0%	27.2%	19.5%
Henry Hudson Bridge	-29.9%	42.1%	26.2%
Marine Parkway-Gil Hodges Memorial Bridge	-22.8%	14.0%	7.9%
Cross Bay Veterans Memorial Bridge	-17.7%	13.2%	8.0%
Total	-21.3%	27.9%	18.2%

Notes:

(a) Based on preliminary audited traffic data for January and February 2021 (subject to final audit) and unaudited traffic volumes through April 27, 2021. January and February 2020 were prior to the onset of pandemic-related travel impacts.

As shown in Table 24, total 2021 traffic is forecasted to increase at an average rate of 18.2 percent for the full year.

The resulting traffic and toll revenue is presented in Table 25. The toll revenue in 2021 is based on average toll rates developed from the new toll schedule in effect as of April 11, 2021 and the 2020 and projected 2021 distribution by vehicle class and payment method.

In 2021, there is an 18.2 percent increase in traffic, a 5.2 percent increase in the systemwide average toll, and a 24.4 percent increase in systemwide revenue over 2020, which reflects actual performance through February 2021 and estimated traffic volumes for the remainder of the year.

Table 25 2021 Toll-Paying Traffic and Toll Revenue[a]

Facility	Traffic (millions)	Average Toll	Revenue (millions)
Throgs Neck Bridge	37.8	$8.88	$335.9
Bronx-Whitestone Bridge	46.5	$7.62	$354.5
RFK Bridge	59.2	$7.42	$439.6
Queens Midtown Tunnel	25.2	$7.17	$181.0
Hugh L. Carey Tunnel	17.6	$6.75	$118.9
Verrazzano-Narrows Bridge[b]	75.0	$6.51	$488.4
Henry Hudson Bridge	22.4	$3.63	$81.3
Marine Parkway-Gil Hodges Memorial Bridge	7.5	$2.57	$19.3
Cross Bay Veterans Memorial Bridge	8.0	$2.59	$20.7
Total	299.3	$6.81	$2,039.5
Percent Change			
2020-2021 (All Facilities)	18.2%	5.2%	24.4%

Notes:
(a) Includes implementation of April 11, 2021 toll increase.
(b) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020.

Table 25 provides the transition between the historical traffic and revenue data presented earlier in the report and the 10-year analyses in Table 26 and Table 27.

Traffic and Toll Revenue at Current Tolls

Traffic and toll revenues were first projected on the basis that the tolls placed into effect on April 11, 2021 will be continued throughout the analysis period. The methodology employed by Stantec to analyze traffic was based on the development of an annual growth rate for each facility (based on historical traffic trends), the construction activity (historical and projected) throughout the highway network (bridges, tunnels, and arterials), and the traffic capacity constraints in the transportation network. From these reference levels, estimates of the impacts of the pandemic were made based on traffic trends since the onset of the pandemic in March 2020. The forecast, represented in Table 26 below, is a projection of traffic and revenue throughout the remainder of the pandemic and beyond to 2031.

Starting with the calculation for 2021 as a reference base, Stantec projected the traffic and toll revenue for the analysis period through 2031 (at constant tolls at the current rates established on April 11, 2021), as shown in Table 26. As previously discussed, this is based on the actual change in traffic on each facility in January through February 2021 and Stantec's projections by facility for the March through December period.

Changes in traffic volumes are in the range of 7.9 to 27.0 percent in 2021 depending on the facility. For 2022, traffic is approximated to increase at 7.5 percent systemwide, with growth rates varying by facility. For 2023, traffic is calculated to increase at 1.4 percent annually, with growth rates varying by facility. Although traffic recovery under this scenario is anticipated to continue through 2031, traffic will return to 2019 levels by 2024.

The forecast is based on specific assumptions regarding potential changes in traffic volume, both from pandemic-related behaviors, as well as the longer-term economic impacts. Once the recovery has occurred, the economy is assumed to be cyclical and thus will both grow and contract in certain periods; this trendline growth assumption accounts for the overall growth pattern through these cycles. Impacts associated with a general increase in total (NYCSC and non-NYCSC) E-ZPass usage and toll increases are computed separately.

Traffic and Toll Revenue with Assumed 2023 Toll Increase

The traffic analysis with an assumed toll increase in 2023 was built upon the base analysis (from Table 26), to which the elasticity impacts (from Table 22) were applied. In addition to the April 11, 2021 toll increase which is already in effect, in accordance with the 2020-2024 MTA Financial Plan, Stantec applied the appropriate projected future increase in toll rates (from Table 23) effective March 1, 2023 (a 5.3 percent toll increase) to calculate the corresponding toll revenues. The traffic and revenue analyses with the planned toll increase in 2023 are presented in Table 27.

Table 26 Traffic and Toll Revenue Forecast, Current Tolls

Year	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazzano-Narrows [a] Bridge	Henry Hudson Bridge	Marine Parkway-Gil Hodges Bridge	Cross Bay Bridge	All Facilities
Traffic Change										
2020-2021	10.36%	19.34%	17.47%	27.02%	19.14%	19.47%	26.22%	7.90%	7.96%	18.21%
2021-2022	9.70%	6.03%	7.76%	13.00%	7.02%	4.65%	10.50%	8.35%	5.03%	7.50%
2022-2023	2.16%	0.97%	1.67%	2.50%	1.28%	0.69%	2.00%	1.59%	0.94%	1.44%
2023-2024	2.46%	1.11%	1.91%	2.84%	1.47%	0.78%	2.27%	1.81%	1.07%	1.65%
2024-2025	0.79%	0.40%	0.63%	0.90%	0.50%	0.30%	0.74%	0.60%	0.39%	0.56%
2025-2026	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2026-2027	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2027-2028	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2028-2029	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2029-2030	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2030-2031	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Annual Traffic (millions)										
2020	34.3	39.0	50.4	19.9	14.8	62.8	17.7	7.0	7.4	253.2
2021[b]	37.8	46.5	59.2	25.2	17.6	75.0	22.4	7.5	8.0	299.3
2022	41.5	49.3	63.8	28.5	18.9	78.5	24.7	8.1	8.4	321.7
2023	42.4	49.8	64.9	29.2	19.1	79.0	25.2	8.3	8.5	326.4
2024	43.4	50.3	66.1	30.1	19.4	79.7	25.8	8.4	8.5	331.8
2025	43.8	50.5	66.5	30.3	19.5	79.9	26.0	8.5	8.6	333.6
2026	43.8	50.6	66.6	30.4	19.5	80.0	26.0	8.5	8.6	333.9
2027	43.9	50.6	66.7	30.4	19.5	80.1	26.0	8.5	8.6	334.3
2028	43.9	50.7	66.7	30.4	19.5	80.1	26.1	8.5	8.6	334.6
2029	44.0	50.7	66.8	30.5	19.5	80.2	26.1	8.5	8.6	334.9
2030	44.0	50.8	66.9	30.5	19.6	80.3	26.1	8.5	8.6	335.3
2031	44.0	50.8	66.9	30.5	19.6	80.4	26.1	8.5	8.6	335.6
Average Toll										
2020	$8.56	$7.24	$7.04	$6.75	$6.34	$6.16	$3.38	$2.38	$2.40	$6.48
2021[b]	$8.88	$7.62	$7.42	$7.17	$6.75	$6.51	$3.63	$2.57	$2.59	$6.81
2022	$8.86	$7.68	$7.50	$7.21	$6.80	$6.49	$3.66	$2.50	$2.53	$6.84
2023	$8.78	$7.65	$7.48	$7.17	$6.78	$6.46	$3.66	$2.43	$2.46	$6.80
2024	$8.74	$7.64	$7.46	$7.15	$6.77	$6.44	$3.66	$2.40	$2.42	$6.79
2025	$8.72	$7.63	$7.46	$7.14	$6.76	$6.43	$3.66	$2.38	$2.40	$6.78
2026	$8.71	$7.62	$7.45	$7.14	$6.76	$6.43	$3.66	$2.38	$2.40	$6.78
2027	$8.71	$7.62	$7.45	$7.14	$6.76	$6.43	$3.66	$2.38	$2.40	$6.77
2028	$8.71	$7.62	$7.45	$7.14	$6.76	$6.43	$3.65	$2.38	$2.40	$6.77
2029	$8.71	$7.62	$7.45	$7.14	$6.76	$6.43	$3.65	$2.38	$2.40	$6.77
2030	$8.71	$7.62	$7.45	$7.14	$6.76	$6.42	$3.65	$2.38	$2.40	$6.77
2031	$8.71	$7.62	$7.45	$7.14	$6.76	$6.42	$3.65	$2.38	$2.40	$6.77
Toll Revenue (millions)										
2020	$293.3	$282.2	$355.0	$134.3	$93.8	$387.0	$60.0	$16.6	$17.7	$1,639.8
2021[b]	$335.9	$354.5	$439.6	$181.0	$118.9	$488.4	$81.3	$19.3	$20.7	$2,039.5
2022	$367.5	$378.5	$478.4	$205.7	$128.2	$509.6	$90.5	$20.4	$21.2	$2,199.9
2023	$372.1	$380.8	$485.1	$209.8	$129.4	$510.4	$92.4	$20.1	$20.8	$2,220.9
2024	$379.6	$384.3	$493.6	$215.1	$131.1	$513.0	$94.5	$20.2	$20.7	$2,252.1
2025	$381.6	$385.3	$496.2	$216.8	$131.7	$513.8	$95.1	$20.2	$20.6	$2,261.2
2026	$381.8	$385.5	$496.5	$216.9	$131.8	$514.2	$95.1	$20.2	$20.6	$2,262.7
2027	$382.1	$385.8	$496.9	$217.1	$131.9	$514.6	$95.2	$20.2	$20.6	$2,264.3
2028	$382.4	$386.1	$497.3	$217.3	$132.0	$515.0	$95.2	$20.2	$20.7	$2,266.2
2029	$382.8	$386.5	$497.7	$217.5	$132.1	$515.5	$95.3	$20.2	$20.7	$2,268.2
2030	$383.1	$386.8	$498.2	$217.7	$132.2	$516.0	$95.4	$20.3	$20.7	$2,270.3
2031	$383.5	$387.1	$498.6	$217.9	$132.4	$516.4	$95.5	$20.3	$20.7	$2,272.4

Notes:

(a) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020.

(b) Includes implementation of April 11, 2021 toll increase.

Table 27 Traffic and Toll Revenue Forecast with Assumed 2023 Toll Increase

Year	Throgs Neck Bridge	Bronx-Whitestone Bridge	RFK Bridge	Queens Midtown Tunnel	Hugh L. Carey Tunnel	Verrazzano-Narrows [a] Bridge	Henry Hudson Bridge	Marine Parkway-Gil Hodges Bridge	Cross Bay Bridge	All Facilities
Traffic Change										
2020-2021	10.36%	19.34%	17.47%	27.02%	19.14%	19.47%	26.22%	7.90%	7.96%	18.21%
2021-2022	9.70%	6.03%	7.76%	13.00%	7.02%	4.65%	10.50%	8.35%	5.03%	7.50%
2022-2023	1.75%	0.56%	1.05%	1.89%	0.47%	0.61%	1.53%	1.43%	0.82%	1.04%
2023-2024	2.39%	1.04%	1.80%	2.73%	1.32%	0.77%	2.19%	1.79%	1.05%	1.57%
2024-2025	0.79%	0.40%	0.63%	0.90%	0.50%	0.30%	0.74%	0.60%	0.39%	0.56%
2025-2026	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2026-2027	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2027-2028	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2028-2029	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2029-2030	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
2030-2031	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Annual Traffic (millions)										
2020	34.3	39.0	50.4	19.9	14.8	62.8	17.7	7.0	7.4	253.2
2021 [b]	37.8	46.5	59.2	25.2	17.6	75.0	22.4	7.5	8.0	299.3
2022	41.5	49.3	63.8	28.5	18.9	78.5	24.7	8.1	8.4	321.7
2023	42.2	49.6	64.5	29.1	18.9	79.0	25.1	8.3	8.4	325.1
2024	43.2	50.1	65.6	29.9	19.2	79.6	25.7	8.4	8.5	330.2
2025	43.6	50.3	66.1	30.1	19.3	79.8	25.8	8.5	8.6	332.0
2026	43.6	50.3	66.1	30.2	19.3	79.9	25.9	8.5	8.6	332.4
2027	43.7	50.4	66.2	30.2	19.3	80.0	25.9	8.5	8.6	332.7
2028	43.7	50.4	66.3	30.2	19.3	80.1	25.9	8.5	8.6	333.0
2029	43.7	50.5	66.3	30.2	19.4	80.2	25.9	8.5	8.6	333.4
2030	43.8	50.5	66.4	30.3	19.4	80.2	26.0	8.5	8.6	333.7
2031	43.8	50.6	66.5	30.3	19.4	80.3	26.0	8.5	8.6	334.0
Average Toll										
2020	$8.56	$7.24	$7.04	$6.75	$6.34	$6.16	$3.38	$2.38	$2.40	$6.48
2021 [b]	$8.88	$7.62	$7.42	$7.17	$6.75	$6.51	$3.63	$2.57	$2.59	$6.81
2022	$8.86	$7.68	$7.50	$7.21	$6.80	$6.49	$3.66	$2.50	$2.53	$6.84
2023	$9.17	$7.99	$7.81	$7.49	$7.08	$6.75	$3.82	$2.54	$2.57	$7.11
2024	$9.19	$8.03	$7.85	$7.53	$7.12	$6.78	$3.85	$2.52	$2.55	$7.14
2025	$9.17	$8.02	$7.85	$7.52	$7.12	$6.77	$3.85	$2.50	$2.53	$7.13
2026	$9.17	$8.02	$7.84	$7.52	$7.12	$6.77	$3.84	$2.50	$2.52	$7.13
2027	$9.16	$8.02	$7.84	$7.51	$7.11	$6.76	$3.84	$2.50	$2.52	$7.13
2028	$9.16	$8.01	$7.84	$7.51	$7.11	$6.76	$3.84	$2.50	$2.52	$7.12
2029	$9.16	$8.01	$7.84	$7.51	$7.11	$6.76	$3.84	$2.50	$2.52	$7.12
2030	$9.16	$8.01	$7.84	$7.51	$7.11	$6.76	$3.84	$2.50	$2.52	$7.12
2031	$9.16	$8.01	$7.84	$7.51	$7.11	$6.76	$3.84	$2.50	$2.52	$7.12
Toll Revenue (millions)										
2020	$293.3	$282.2	$355.0	$134.3	$93.8	$387.0	$60.0	$16.6	$17.7	$1,639.8
2021 [b]	$335.9	$354.5	$439.6	$181.0	$118.9	$488.4	$81.3	$19.3	$20.7	$2,039.5
2022	$367.5	$378.5	$478.4	$205.7	$128.2	$509.6	$90.5	$20.4	$21.2	$2,199.9
2023	$387.1	$396.0	$503.5	$217.8	$134.1	$532.8	$96.0	$21.0	$21.7	$2,309.8
2024	$397.4	$402.2	$515.5	$224.8	$136.7	$539.5	$98.7	$21.2	$21.7	$2,357.8
2025	$399.5	$403.4	$518.3	$226.5	$137.3	$540.3	$99.4	$21.2	$21.6	$2,367.4
2026	$399.8	$403.6	$518.6	$226.7	$137.4	$540.7	$99.4	$21.2	$21.7	$2,369.0
2027	$400.1	$403.9	$519.0	$226.8	$137.5	$541.1	$99.5	$21.2	$21.7	$2,370.7
2028	$400.4	$404.2	$519.4	$227.0	$137.6	$541.6	$99.5	$21.2	$21.7	$2,372.7
2029	$400.8	$404.6	$519.9	$227.3	$137.7	$542.1	$99.6	$21.3	$21.7	$2,374.9
2030	$401.1	$404.9	$520.4	$227.5	$137.9	$542.6	$99.7	$21.3	$21.7	$2,377.1
2031	$401.5	$405.3	$520.8	$227.7	$138.0	$543.1	$99.8	$21.3	$21.7	$2,379.3

Notes:

(a) Split tolling was implemented at the Verrazzano-Narrows Bridge on December 1, 2020.

(b) Includes implementation of April 11, 2021 toll increase.

Effects of Second Avenue Subway Construction in Forecast Years

The foregoing tables forecasting traffic and toll revenues incorporate estimated effects of the continued construction of the Second Avenue Subway. Phase 2 of the project, which would extend the Second Avenue Subway north to 125th Street, is currently in the design phase. Environmental reviews are also ongoing.

Activity associated with such construction could result in changes to traffic patterns, possibly resulting in a shift of traffic volumes from the RFK Bridge 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.

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.

Cashless Tolling Accounting in Forecast Years

Consistent with current TBTA practices, the foregoing tables of traffic and toll revenues assume that revenues associated with TBM transactions will be accounted for within the month that the transaction takes place. A liability on the balance sheet will be maintained to offset the toll revenue associated with TBM revenues and this liability will decrease as tolls are collected. Therefore, there is no delay in revenue collection assumed in our forecast due to the implementation of Cashless Tolling.

Operating Expenses

The projection of operating expenses for 2021 through 2031 is shown in Table 29. Total operating expenses, consisting of labor and non-labor, are estimated to increase from $521.9 million in 2021 to $707.5 million in 2031. Labor expenses consist of wages, salaries, overtime and fringe benefits. Non-labor expenses include items such as maintenance, tolling operations, supplies, utilities and other expenses. The table includes operating expenses budgeted by TBTA for 2021, operating expenses projected by TBTA through 2024 and Stantec's projections of operating expenses from 2025 through 2031. In 2021, expenses have been budgeted by TBTA at $521.9 million, an increase of 18 percent over 2020 expenses of $442.2 million. These expenses are split into the following categories: labor expenses of $252.0 million (an increase of 10.6 percent over 2020) and non-labor expenses of $269.9 million (an increase of 25.9 percent over 2020). Labor expenses are higher primarily due to the filling of 2020 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, higher E-ZPass expenses associated with expected continued growth in usage, and general inflationary adjustments. Stantec does not project any variation in operating expenses resulting from the reduced traffic levels brought about by periodic toll increases.

At this point Stantec is unable to determine the effects of the pandemic and related government actions on 2021 or future year operating expenses for the TBTA. As a result, Stantec is assuming for purposes of this study that the operating expenses listed in Table 28 and Table 29 will not change throughout the duration of our forecast.

Table 28 Projected Operating Expenses
(millions)

Year	Labor[a]	Non-Labor[b]	Total[c]
2021[d]	$252.0	$269.9	$521.9
2022[d]	$258.1	$283.1	$541.2
2023[d]	$260.2	$284.1	$544.3
2024[d]	$265.7	$289.3	$555.0
2025[e]	$273.7	$300.9	$574.5
2026[e]	$281.9	$312.9	$594.8
2027[e]	$290.3	$325.4	$615.8
2028[e]	$299.0	$338.4	$637.5
2029[e]	$308.0	$352.0	$660.0
2030[e]	$317.3	$366.1	$683.3
2031[e]	$326.8	$380.7	$707.5

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) Budgeted by TBTA for 2021 and from TBTA estimates for 2022-2024.
(e) Forecasted by Stantec for 2025-2031.

Net Revenues from Toll Operations

Finally, the projected operating expenses were deducted from the respective toll revenue calculations to produce the two sets of estimated net toll revenues (before debt service on outstanding TBTA obligations), one at current tolls and the other with a toll increase in 2023, as shown in Table 29. For 2021, net toll revenue under either scenario is estimated at $1.52 billion. By 2031, annual net toll revenue is estimated to be between $1.56 to $1.67 billion, depending on the number of toll increases included in the forecast.

Table 29 Net Toll Revenue Forecast
(millions)

Year	Gross Toll Revenues		Operating Expenses	Net Toll Revenues	
	Current Tolls	With 2023 Toll Increase		Current Tolls	With 2023 Toll Increase
2021	$2,039.5	$2,039.5	$521.9	$1,517.6	$1,517.6
2022	$2,199.9	$2,199.9	$541.2	$1,658.7	$1,658.7
2023	$2,220.9	$2,309.8	$544.3	$1,676.6	$1,765.5
2024	$2,252.1	$2,357.8	$555.0	$1,697.1	$1,802.8
2025	$2,261.2	$2,367.4	$574.5	$1,686.7	$1,792.9
2026	$2,262.7	$2,369.0	$594.8	$1,667.9	$1,774.2
2027	$2,264.3	$2,370.7	$615.8	$1,648.6	$1,755.0
2028	$2,266.2	$2,372.7	$637.5	$1,628.7	$1,735.2
2029	$2,268.2	$2,374.9	$660.0	$1,608.3	$1,714.9
2030	$2,270.3	$2,377.1	$683.3	$1,587.0	$1,693.8
2031	$2,272.4	$2,379.3	$707.5	$1,564.9	$1,671.8

Sensitivity Analysis

Stantec performed two sensitivity analyses to estimate the upper and lower range of possible transaction and revenue outcomes resulting from different rates of pandemic recovery. Both severity and duration, as well as trends seen throughout the first year of the pandemic were taken into account when determining the limits of these ranges.

Both sensitivity analyses were measured by when traffic and revenue levels return to the record high of 2019.

- Traffic with Aggressive Recovery (Aggressive Recovery): Under this condition, traffic returns to 2019 levels by 2023 with current tolls.

- Traffic with Longer Duration Recovery (Longer Duration Recovery): Under this condition, traffic returns to 2019 levels by 2025 with current tolls.

- Toll revenues: Due to the April 2021 toll increase, revenues are expected to return to 2019 levels faster than traffic: by 2021 with an aggressive recovery, and by 2022 with a longer duration recovery.

- Despite the likelihood that more people will work from home post-pandemic than did in 2019, it is still assumed that many people will drive using the available capacity on TBTA facilities.

Table 30 and Figure 5 below compare the annual revenue under each sensitivity analysis for constant tolls. Figure 5 Annual Revenue Sensitivity Analysis, Constant Tolls

(millions)

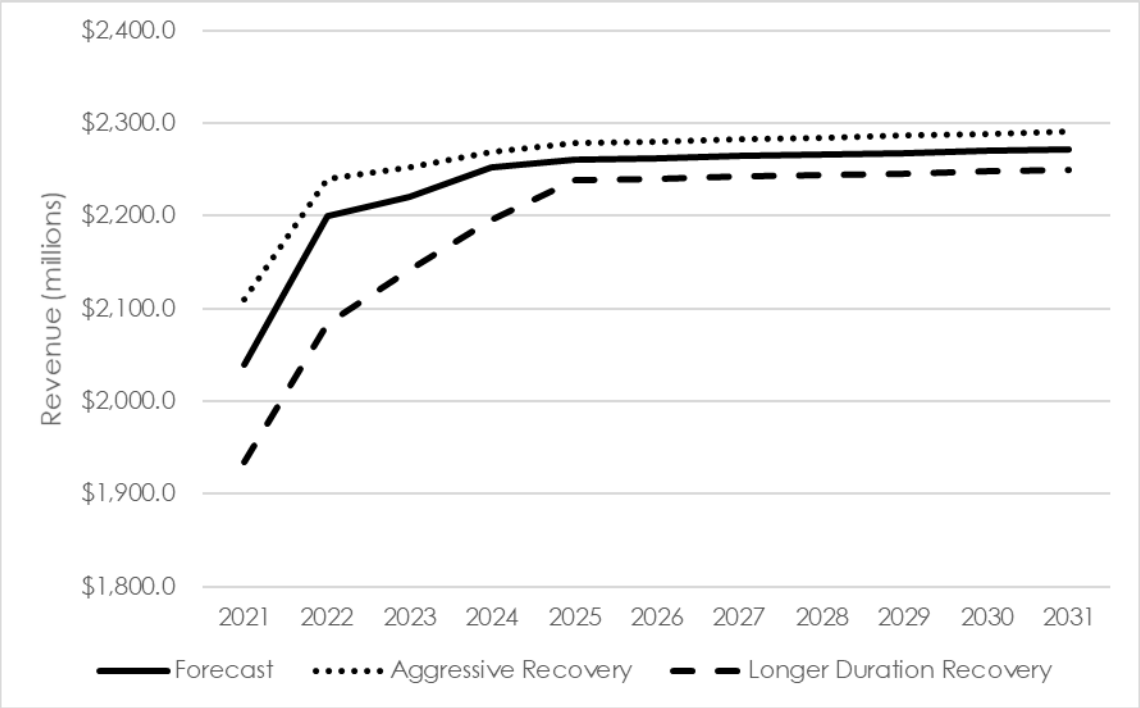


Table 31 and Figure 6 below compare the annual revenue under each sensitivity analysis toll increase.

Table 30 Annual Revenue Sensitivity Analysis, Current Tolls

(millions)

Year	Forecast	Aggressive Recovery	Longer Duration Recovery	Aggressive Recovery vs. Forecast	Longer Duration Recovery vs. Forecast
2021	$2,039.5	$2,110.4	$1,934.2	3.5%	-5.2%
2022	$2,199.9	$2,240.2	$2,083.7	1.8%	-5.3%
2023	$2,220.9	$2,251.8	$2,142.4	1.4%	-3.5%
2024	$2,252.1	$2,268.6	$2,196.4	0.7%	-2.5%
2025	$2,261.2	$2,279.3	$2,239.2	0.8%	-1.0%
2026	$2,262.7	$2,280.7	$2,240.6	0.8%	-1.0%
2027	$2,264.3	$2,282.4	$2,242.2	0.8%	-1.0%
2028	$2,266.2	$2,284.3	$2,244.1	0.8%	-1.0%
2029	$2,268.2	$2,286.3	$2,246.1	0.8%	-1.0%
2030	$2,270.3	$2,288.4	$2,248.2	0.8%	-1.0%
2031	$2,272.4	$2,290.5	$2,250.2	0.8%	-1.0%

Figure 5 Annual Revenue Sensitivity Analysis, Constant Tolls
(millions)

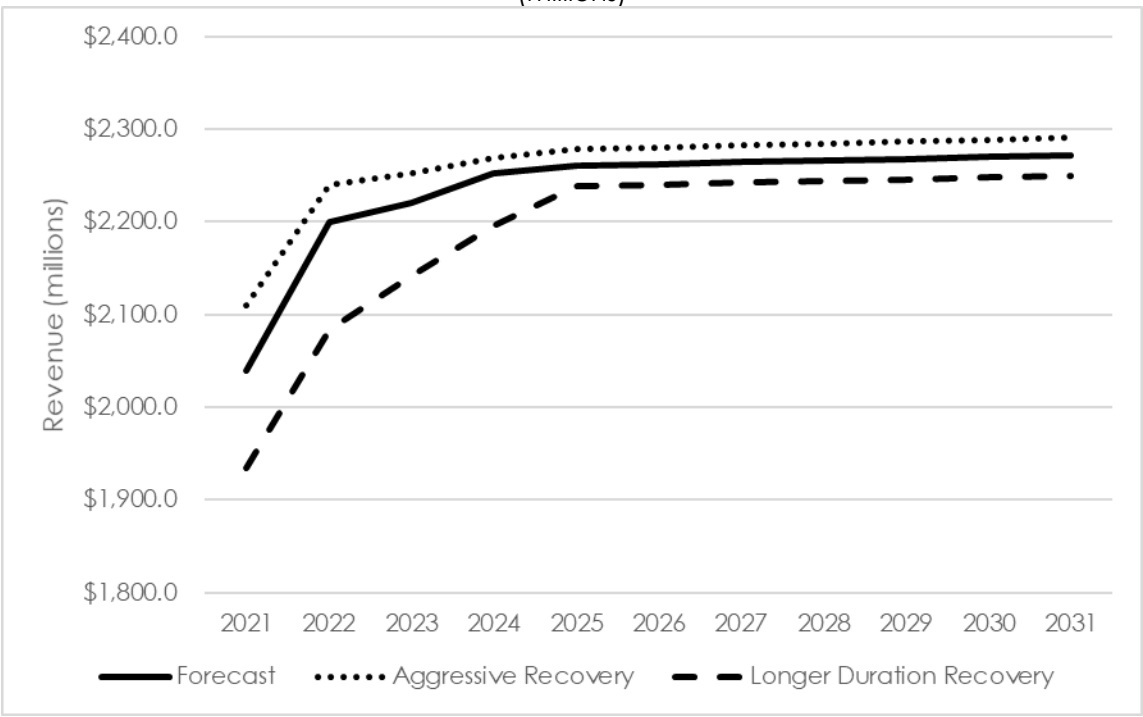


Table 31 Annual Revenue Sensitivity Analysis, Toll Increase
(millions)

Year	Forecast	Aggressive Recovery	Longer Duration Recovery	Aggressive Recovery vs. Forecast	Longer Duration Recovery vs. Forecast
2021	$2,039.5	$2,110.4	$1,934.2	3.5%	-5.2%
2022	$2,199.9	$2,240.2	$2,083.7	1.8%	-5.3%
2023[(a)]	$2,309.8	$2,341.9	$2,228.2	1.4%	-3.5%
2024	$2,357.8	$2,375.1	$2,299.6	0.7%	-2.5%
2025	$2,367.4	$2,386.3	$2,344.3	0.8%	-1.0%
2026	$2,369.0	$2,387.9	$2,345.9	0.8%	-1.0%
2027	$2,370.7	$2,389.6	$2,347.6	0.8%	-1.0%
2028	$2,372.7	$2,391.6	$2,349.6	0.8%	-1.0%
2029	$2,374.9	$2,393.8	$2,351.7	0.8%	-1.0%
2030	$2,377.1	$2,396.0	$2,353.9	0.8%	-1.0%
2031	$2,379.3	$2,398.2	$2,356.0	0.8%	-1.0%

Notes:
(a) Includes Assumed 2023 toll increase on March 1, 2023.

Figure 6 Annual Revenue Sensitivity Analysis, Toll Increase
(millions)

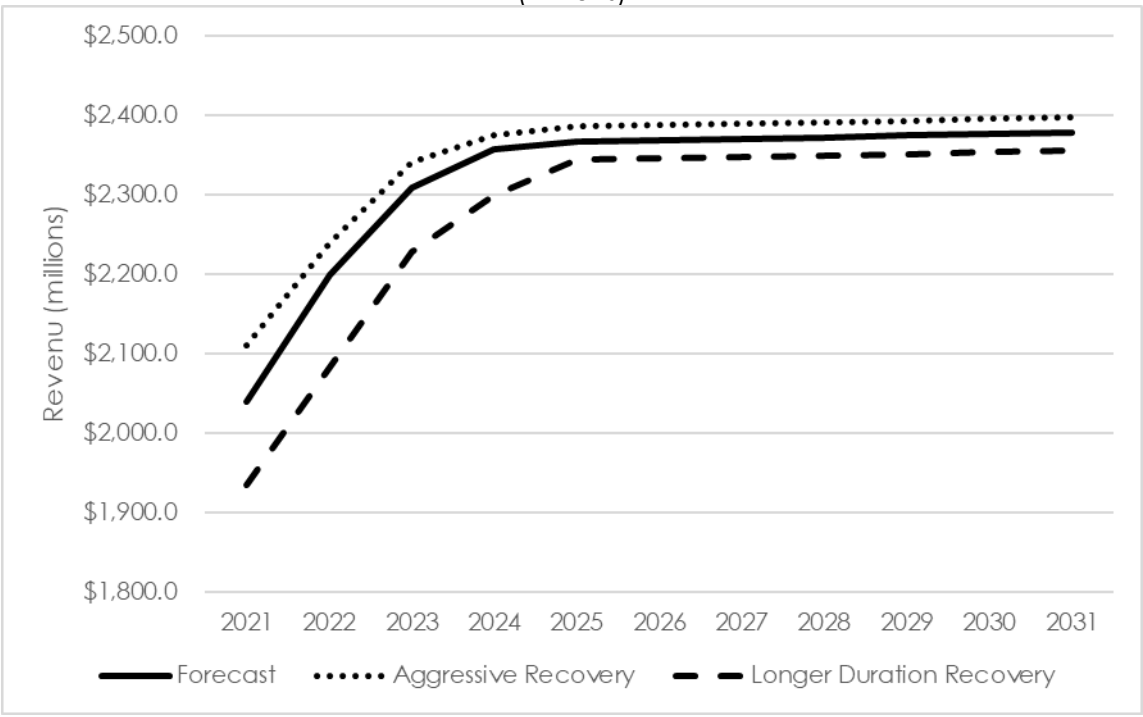
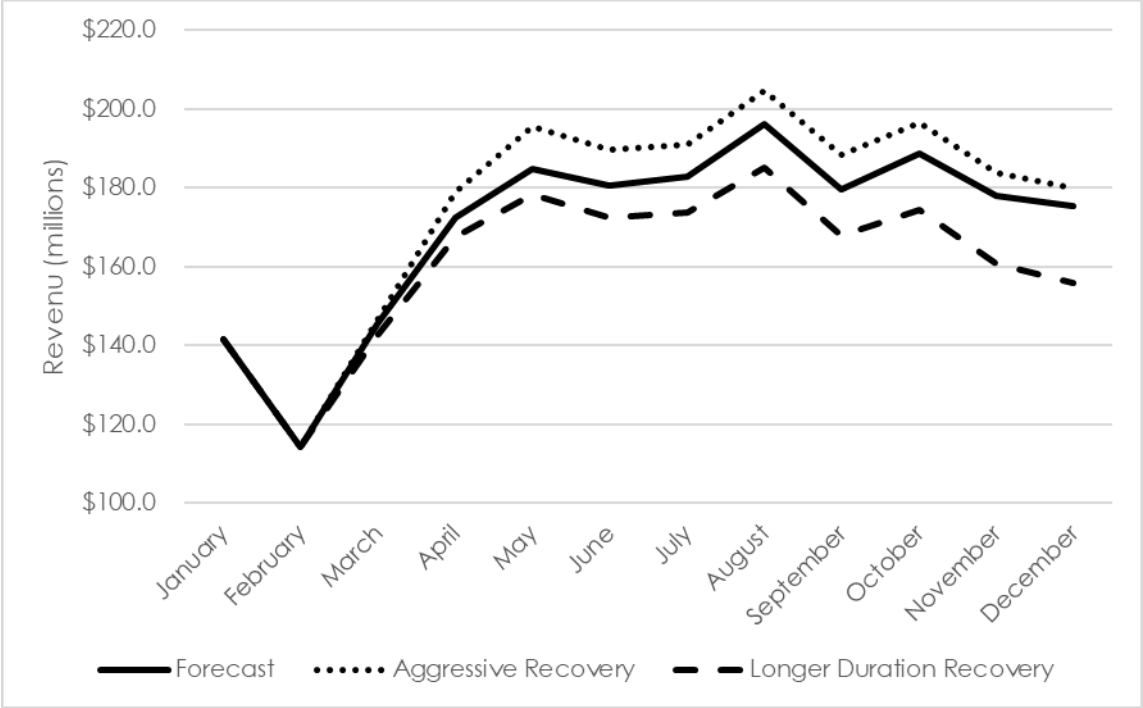


Figure 7, below, compares the forecasted monthly distribution of traffic in 2021 to both an aggressive recovery and a longer duration recovery. Since the April 11, 2021 toll increase is included in both the current tolls and toll increase forecast, the 2021 monthly revenue results are the same for each forecast.

Figure 7 2021 Monthly Revenue Sensitivity Analysis
(millions)



REVIEW OF PHYSICAL CONDITIONS

The facilities under TBTA's jurisdiction include the two tunnels and seven bridges listed in Table 32, 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 Verrazzano-Narrows in 1964 (lower level in 1969). The present Cross Bay 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 33 lists TBTA's capital investments for each facility between 1992 and 2020, and within 2020 itself.

Table 32 Opening Dates of TBTA Facilities

Facility	Open to Traffic	Years in Use
RFK Bridge	1936	85
Bronx-Whitestone Bridge	1939	82
Throgs Neck Bridge	1961	60
Henry Hudson Bridge	1936	85
Queens Midtown Tunnel	1940	81
Hugh L. Carey Tunnel	1950	71
Verrazzano-Narrows Bridge	1964	57
Cross Bay Veterans Memorial Bridge	1970	51
Marine Parkway-Gil Hodges Memorial Bridge	1937	84

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

- TBTA's Capital Investments at each facility during the year 2020;
- Ongoing Rehabilitation & Maintenance Projects;
- Biennial and Special In-Lieu of Interim Bridge Inspection Reports;
- Tunnel Inspection Reports;
- Rehabilitation Projects addressing recommendations on previous inspection reports; and
- Repairs to alleviate flagged conditions on previous inspection reports.

Table 33 Capital Investments by Facility, 1992 through 2020[a]

(Millions of dollars – Includes Superstorm Sandy Capital Investments)

Facility	Total by Facility 1992 through 2020[b]
Bronx-Whitestone Bridge	$941.36
Cross Bay Veterans Memorial Bridge	$200.19
Henry Hudson Bridge	$566.64
Marine Parkway-Gil Hodges Memorial Bridge	$348.21
RFK Bridge	$2,121.90
Throgs Neck Bridge	$1,125.23
Verrazzano-Narrows Bridge	$1,499.92
Hugh L. Carey Tunnel	$988.15
Queens Midtown Tunnel	$752.20
Agency Wide[c]	$781.83
Total	$9,325.62

Notes:
(a) Values are as of December 31, 2020.
(b) Data from TBTA.
(c) Agency wide refers to projects that have been, or will be, carried out at two or more facilities.

Inspection Reports, Flagged[7] Conditions and Rehabilitation Projects

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.

TBTA's seven bridges and two tunnel facilities undergo periodic condition inspections. Bridges and tunnels 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 and tunnels.

Bridge and Tunnel Inspections. NYSDOT maintains a program of comprehensive bridge and tunnel management, maintenance and inspection applicable to TBTA's bridges and tunnels. That program includes the uniform codes for bridge inspection and tunnel inspection, which:

- meet or exceed applicable federal law;
- require that bridges and tunnels be inspected at least every two years in accordance with the provisions of that code;
- prescribe qualifications for licensed professional engineers who inspect bridges and tunnels; and
- require that all bridge and tunnel inspections be performed or supervised by such persons.

Bridge and tunnel inspection reports must be filed with NYSDOT and NYSDOT may close bridges or tunnels found unsafe for public use. TBTA is in compliance with the NYSDOT program.

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."

[7] The New York State Bridge Inspection Manual defines the following "flags" for reporting purposes: Red Flag – A structural flag that is used to report the failure or potential failure of a primary structural component that is likely to occur within two years from the current inspection. Red Flag PIA (Prompt Interim Action) – A designation that is made when a Red Flag condition is considered extremely serious and in need of immediate attention. This designation requires appropriate action by the responsible party within twenty-four hours. Yellow Flag - A structural flag that is used to report a potentially hazardous structural condition which if left unattended could become a clear and present danger within two years from the current inspection, or the actual or imminent failure of a non-critical structural component, where such failure may reduce the reserve capacity or redundancy of the bridge, but would not result in a structural collapse. Safety Flag PIA (Prompt Interim Action) – A flag that is used to report a condition presenting a clear and present danger to vehicular or pedestrian traffic, but poses no danger of structural failure or collapse. Safety Flag PIA can be issued on closed bridges where conditions present a threat to vehicular or pedestrian traffic underneath the structure or in the immediate vicinity. This designation requires appropriate action by the responsible party within twenty-four hours.

The TBTA bridges and tunnels were last inspected and their physical condition appraised in 2019-2020 by various consultants, under the New York State Biennial Bridge and Tunnel Inspection Program, as shown in Table 34. 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 percent hands-on inspection of designated critical elements, sounding concrete, and taking appropriate measurements to determine the physical conditions of the bridges and tunnels. All bridge inspections beginning in 2017 and continuing thereafter were performed in accordance with the updated 2017 New York State Bridge Inspection Manual (BIM) and the AASHTO Manual for Bridge Element Inspection. All tunnel inspections beginning in 2017 and continuing thereafter were performed in accordance with the FHWA's National Tunnel Inspection Standards (NTIS), the 2015 Specifications for the National Tunnel Inventory (SNTI), and the 2015 Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual; and NYSDOT Technical Advisory, TA 16-001. Under these guidelines, all bridge and tunnel components are inspected and assigned a quantitative condition 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 or tunnel require more comprehensive inspection and rehabilitation. Required rehabilitation are then awarded as contracts under the Capital and Maintenance Programs. Bridge and tunnel components which warrant more frequent monitoring due to their condition are monitored annually with a special in-lieu of interim 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 and tunnels remain in good condition.

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 was maintained in the 2015-2019 Capital Program and will continue in the approved 2020-2024 Capital Program.

The consulting engineering firms who performed the 2019 and 2020 biennial bridge or special in-lieu of interim inspections and the 2019 tunnel inspections for each facility are shown in Table 34.

Table 34 Facility Inspection Firms

Facility	Consulting Firm (Inspection Year)
RFK Bridge	H&H (2020), WSP / Stantec (2019), WSP
Throgs Neck Bridge	HNTB (2021, 2020, 2019)
Bronx-Whitestone Bridge	Thornton Tomasetti (2020, 2019)
Henry Hudson Bridge	Hardesty & Hanover (2020, 2019)
Queens Midtown Tunnel	HNTB (2019)
Queens Midtown Tunnel facility approach bridges	Hardesty & Hanover (2019)
Hugh L. Carey Tunnel	H&H (2020), HNTB (2019)
Verrazzano-Narrows Bridge	HNTB / Prime (2020), Hardesty & Hanover (2019)
Marine Parkway-Gil Hodges Memorial Bridge	WSP (2019)
Cross Bay Veterans Memorial Bridge	WSP (2019) / In-House (2019)

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.

Current Work Under Both Capital Programs

Funds previously programmed for TBTA's 2015-2019 Capital Program are summarized in Table 35. The plan, which totals $2.936 billion, 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 addressed all high priority recommendations in the current 2015-2019 Capital Program or maintenance programs that were not addressed as part of the previous 2010-2014 Capital Program. All of these high priority needs will continue to be met. The approved 2020-2024 Capital Program is shown in Table 36 at $3.327 billion is in the early implementation stage. The Central Business District Tolling Program is projected to cost approximately $503 million to implement, although TBTA expects to be fully reimbursed from non-toll revenues in the CBD Tolling Lockbox.

Table 35 TBTA 2015-2019 Capital Program by Facility

(in Millions of dollars)[a]

Facility	2015-2019[b]	Percent
Bronx-Whitestone Bridge	$185.02	6%
Cross Bay Veterans Memorial Bridge	$88.58	3%
Henry Hudson Bridge	$283.73	10%
Marine Parkway-Gil Hodges Memorial Bridge	$22.91	1%
RFK Bridge	$473.85	16%
Throgs Neck Bridge	$681.96	23%
Verrazzano-Narrows Bridge	$595.34	20%
Hugh L. Carey Tunnel	$138.68	5%
Queens Midtown Tunnel	$93.58	3%
Agency Wide[b]	$372.65	13%
Total	$2,936.30	100%

Notes:

(a) Values are as of December 31, 2020.
(b) Agency wide refers to projects that have been, or will be, carried out at two or more facilities.

Table 36 Capital Investments 2020-2024 Capital Program by Facility

(in Millions of dollars)[a]

Facility	2020-2024	Percent
Bronx-Whitestone Bridge	$110.57	4%
Cross Bay Veterans Memorial Bridge	47.79	2%
Henry Hudson Bridge	136.59	5%
Marine Parkway-Gil Hodges Memorial Bridge	91.05	3%
RFK Bridge	721.77	25%
Throgs Neck Bridge	241.43	9%
Verrazzano-Narrows Bridge	1,127.30	40%
Hugh L. Carey Tunnel	52.72	2%
Queens Midtown Tunnel	46.25	1%
Agency Wide[b]	248.40	9%
Total	$2,823.87	100%

Central Business District Tolling Program (CBDTP)	$503	100%

GRAND TOTAL (2020-2024 Capital Program)	$3,327

Notes:

(a) Values are as of December 31, 2020.
(b) Agency wide refers to projects that have been, or will be, carried out at two or more facilities.

Bronx-Whitestone Bridge (BWB)

The special in-lieu of interim inspection of the BWB was performed in 2020. The 21 yellow flags issued during the 2019 biennial inspection were inspected and 9 flags were removed during the special in-lieu of interim inspection. During the 2020 special inspection, 1 new yellow flag was issued resulting in 13 active yellow flags on the bridge.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing or planned projects in the approved 2020-2024 Capital Program at the BWB include:

- Fender Protection Around Tower Piers – Design-Build awarded in late 2019. This project is ongoing and projected to be complete in late 2021.
- Miscellaneous Structural Repairs Phase II Construction was awarded in early 2019 and was completed in 2020. In-house design is ongoing for additional miscellaneous structural repairs with construction planned to begin in late 2021.
- Installation of Facility-wide Electronic Monitoring and Detection Systems – Contract was awarded in late 2017 and completed in late 2020.
- Installation of Fire Standpipe Connection from Tower Pedestals to Roadway Level – Design-Build awarded in late 2019. This project is ongoing and projected to be complete in late 2021.
- Queens Approach Roadway Improvements – Construction contract was awarded in late 2019 and completed in summer of 2020.
- Bridge structural lighting, power redundancy and resiliency improvements. Design contract was awarded in May 2020. Design is ongoing with construction planned for 2022.
- Cable Dehumidification and Miscellaneous Work. Funding is programmed for preliminary design in 2022. Construction is planned for the following capital program.
- BW facility wide painting program - In-house design is ongoing with construction planned to begin in late 2021.

Henry Hudson Bridge ("HHB")

The special in lieu of interim inspection of the HHB was performed in 2020. Of the 2 yellow flags issued in the 2019 biennial inspection, both remain active. During the 2020 special in lieu of interim inspection, no new yellow flags were issued resulting in 2 active yellow flags on the bridge.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the HHB include:

- Skewbacks Retrofit – Design-build awarded in 2017. This project was completed in the fall of 2020.
- Replacement of the Upper and Lower Plaza and Southbound Approach – The design contract was awarded in January 2013. Phase I construction contract was awarded in December 2014 and was substantially complete in 2016. Phase II construction was awarded in April 2017 and was completed 1 month early in December 2020.

- Structural Rehabilitation Consisting of High Priority Structural Steel Repairs – Phase I is complete and Phase II construction was awarded in late 2019. This project is ongoing and projected to be complete in 2022.
- Replacement of Overcoat System – Construction was awarded in late 2019. This project is ongoing and projected to be complete in 2022.
- Replacement of Facility Lighting System – Construction was awarded in 2017. This project was completed several months early in April 2020.
- Dyckman Street Bridge substation upgrades. In house preliminary design is ongoing with a design-build project planned to begin in early 2022.
- Installation of maintenance catwalks and lighting in Dyckman Street Bridge abutments. This project is ongoing and projected to be compete in 2022.
- Upper Level North Abutment and Retaining Wall Reconstruction. Design is planned for the 2020-2024 Capital Program. Construction is planned for the following capital program.

Hugh L. Carey Tunnel ("HCT")

The routine NTIS Tunnel Inspection of the HCT was performed in 2019. During the 2019 NTIS Inspection, one (1) new yellow flag was issued, then removed before the special inspection. During the 2019 biennial inspection of the Governor's Island Pedestrian Bridge (part of the HCT Facility), one (1) new yellow flag was issued and one (1) was reissued resulting in 2 active yellow flags. A special in lieu of interim inspection was performed at the Governors Island Pedestrian Bridge (access to the ventilator building) in 2020. The two (2) yellow flags issued in 2019 are still active. Outstanding flags for this facility remain at two (2). There were no additional inspections during 2020.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the HCT include:

- Rehabilitation of HCT Ventilation Systems – Design-Build contract was awarded in 2018. It is an ongoing project and is projected to be complete in the fall of 2021.
- Rehabilitation of the Ventilation Buildings – Design contract was awarded in late 2019. It is an ongoing project and is projected to be complete in late 2021. Identified rehabilitation needs will be addressed in various small construction projects. A construction project to address façade rehabilitation at the Manhattan Blower Building was awarded in March 2021 and is planned for completion in 2022. Remaining identified needs are being packaged for construction award starting in 2022.
- Install Smoke Detection/Alarm Systems - Design-Build Contract was awarded in 2018 and completed in December 2020.
- Rehabilitation of Tunnel Entrance/Exit – Manhattan. Preliminary design funding is programmed for 2022 to 2023 with construction planned for the following program.
- Installation of Fire Suppression System. Preliminary design funding is programmed for 2023 with construction planned for the following program.

Queens Midtown Tunnel ("QMT")

The routine NTIS Tunnel inspection of the QMT and the biennial inspection of the QMT approach bridges were performed in 2019. No flags were issued during the 2019 biennial inspection of the QMT approach bridges. No additional inspections took place in 2020.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the QMT include:

- Rehabilitation of Tunnel Controls and Communication Systems – Design-Build Contract was awarded in 2018 and completed several months early in December 2020.
- Rehabilitation of the Ventilation Buildings – Design contract was awarded in late 2019. It is an ongoing project and is projected to be complete in late 2021. Identified rehabilitation needs will be addressed in various small construction projects planned for 2022 or later, funded in the 2020-2024 Capital Program.
- Installation of facility-wide smoke detections systems – Design-Build Contract was awarded in 2018 and was completed in December 2020.
- Installation of Fire Suppression System. Preliminary design funding is programmed for 2023 with construction planned for the following program.

Robert F. Kennedy Bridge ("RFK")

The biennial inspection was performed at the RFK in 2020. Out of a total of 170 previously issued yellow flags recorded under this facility, 27 have been repaired and removed prior to or during the biennial inspection. During the biennial inspection, 44 new yellow flags were issued, and 99 yellow flags were superseded and reissued, resulting in 143 active yellow flags remaining. There were no red flags issued during the biennial inspection.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the RFK include:

- Study and Monitoring for the Rehabilitation of the Queens Anchorage – The study was awarded in 2016 and was completed in March 2020.
- Monitoring, Inspection, Testing, and Rehabilitation of the RFK Queens Suspension Bridge Main Cables and Cable Wires – Construction contract was awarded in late 2019 and was completed three months early in October 2020.
- Miscellaneous Structural Repair – Phase I construction was substantially complete in 2016. Phase II construction was awarded in late 2019, is ongoing, and is projected to be completed in 2022.
- Seismic and Wind Load Study – The study was awarded in December 2012 and completed in 2015. Conceptual design was awarded in 2017 and final design was awarded in 2018. Construction for Phase I (superstructure upgrades for all facility structures except the suspended spans) was awarded in 2019, is ongoing, and is projected to be complete in 2022.

- Construction of New Harlem River Drive Ramp – Design-Build contract was awarded in 2019 and was completed in late 2020.
- Installation of Facility-wide Electronic Monitoring and Detection Systems – Design-Build contract was awarded in 2017 and was completed in December 2020.
- Installation of Fire Standpipe and Upgrade of Fire Protection Systems – Design-Build contract was awarded in 2017 and was completed in March 2020. Phase 2 of the project was awarded in July 2020 and is projected to be completed in May 2021.
- Painting of Lift Span and Bronx Truss Steel – Construction contract awarded in 2019, is ongoing, and is projected to be complete in 2022.
- Concrete Repairs at Queens Approach Structure – Construction contract was awarded in 2019, is ongoing, and is projected to be completed in late 2021.
- Accelerated Roadway Paving at the RFK Bridge – Construction contract was awarded in 2020 and was substantially completed in 2020.
- Demolition of the Former Bronx Plaza West Widening (Facility Interoperability Improvements) – Construction contract was awarded in 2020, is ongoing, and is projected to be completed in mid-2021.
- Suspended Span Retrofit. Preliminary design was awarded in late 2020 and is ongoing with construction planned for late 2022 or early 2023.
- Ward's Island/Queens Anchorage Rehabilitation – In-house design is ongoing with construction planned for late 2022 or early 2023.
- New Major Deegan to Bronx Approach Ramp - Preliminary design funding is programmed in the 2020-2024 Capital Program, with construction planned for the following program
- Lift Span Fender Upgrades - In house design is ongoing with construction planned for late 2021 or early 2022.
- Reconstruct/Relocate RI Ramps (QR and RM) - In house design is ongoing with construction planned for late 2022 or early 2023.
- Widening of S/B FDR Drive (125 St to 116 St) - Design is planned to begin in 2021. Construction is currently planned for the following program.
- RK Facility-Wide Painting Program – Phase 1 construction is planned for award in April 2021. Phase 2 design is ongoing with construction planned for either 2022 or 2023.

Throgs Neck Bridge ("TNB")

The special in-lieu of interim inspection of the TNB was performed in 2020. Of the 117 yellow flags which remained active from the 2019 biennial inspection, 2 were removed prior to or during the 2020 special in-lieu of interim inspection. During the 2020 special in-lieu of interim inspection, 44 new yellow flags were issued resulting in 159 active yellow flags on the bridge. During the 2020 special in-lieu of interim inspection, 1 new red flag was issued and 11 were removed, resulting in 1 active red flag on the bridge. During the 2020 special in-lieu of interim inspection, 1 PIA Safety Flag was issued and 1 was removed. A supplemental special in-lieu of interim inspection was completed in 2021 to encompass elements in spans 38 and 39 that were inaccessible during the 2020 special in-lieu of interim inspection. No additional flags were issued during the supplemental inspection.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the TNB include:

- Approach Viaducts Seismic Retrofit & Structural Rehabilitation Construction was awarded in 2019. It is an ongoing project and is projected to be complete in 2023.
- Replacement of Grid Decks on Suspended Span and Painting on Suspended Span – Construction contract was awarded in 2018 and is projected to be complete in late 2022.
- Anchorage and Tower Protection – Preliminary design contract was awarded in late 2019 and is ongoing. Construction is funded in the 2020-2024 Capital Program and is projected to begin in 2023.
- Study for Bronx-Queens Viaduct Replacement – Study was awarded in 2017 and was completed in March 2021.
- Miscellaneous Structural Rehabilitation – In house design is ongoing with construction planned for late 2022 or early 2023.
  TNB Facility-Wide Painting Program – Painting of the towers is planned to begin in 2023.

Verrazzano-Narrows Bridge ("VNB")

The biennial inspection was performed at the VNB upper and lower levels including the approach ramps in 2020. Out of the 6 yellow flags which remained active from the 2019 special in-lieu of interim inspection of the VNB, none were removed prior to or during the 2020 biennial inspection. During the 2020 biennial inspection, 6 new yellow flags were issued and 6 were superseded and re-issued, resulting in 12 active yellow flags on the bridge upper and lower levels. At the approach ramps, three (3) yellow flags and one (1) Safety-PIA flag were issued during the 2020 biennial inspection. The Safety-PIA flag has been removed, resulting in 3 yellow flags remain active at VNB approach ramps.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the VNB include:

- Rehabilitation of the Staten Island and Brooklyn Upper Level Approach Ramps – The feasibility study and conceptual design for the reconstruction and reconfiguration of the ramps and approaches was awarded in 2013. Construction for Phase I was awarded in late 2019. It is an ongoing project and is projected to be complete in 2023. Preliminary design for Phase 2 of the project is ongoing with construction planned to begin in 2023.
- Anchorage & Piers Rehabilitation and Sealing – Construction Contract was awarded in 2018. It is an ongoing project and is projected to be complete in May 2021.
- Elevator Rehabilitation – Design-Build contract was awarded in 2018 and was completed several months early in May 2020.
- Steel Repair and Concrete Rehabilitation – Construction contract was awarded in 2019. It is an ongoing project and is projected to be complete in 2022.
- Tower Pier Rehabilitation/Mooring Platform – Design-Build was awarded in 2018 and was completed several months early in July 2020.

- Painting of Suspended Span Upper & Lower Level Steel – Construction was awarded in 2019. It is an ongoing project and projected to be complete in 2022.
- Gowanus Widening at the 92nd Street On-Ramp (EB). Construction was awarded in 2019. It is an ongoing project and is projected to be completed in June 2021.
- Safety Fence Installation at the Upper and Lower Level Main Suspended Spans. Project was awarded in March 2021 and is projected to be completed in late 2022.
- Lower Level Main Suspended Span Deck Rehabilitation. Design contract was awarded in 2019 and is projected to be complete in late 2021. Construction is funded in the 2020-2024 Capital Program and is planned to begin in late 2022.
- Widening of Belt Parkway Ramp, Phase 1B. Design was awarded in late 2019 and is projected to be completed in the fall of 2021. Construction is funded in the 2020-2024 Capital Program and is projected to begin in late 2022 or early 2023.
- Miscellaneous Bridge Lighting and Electrical Improvements/Repairs. Design contract was awarded in March 2020. Design is ongoing with construction planned for 2022 and 2023.
- Painting of the towers at the VNB – In house design is planned for 2022 with construction planned for 2023.

Marine Parkway Bridge ("MPB")

The biennial inspection of the MPB was performed in 2019. No flags were issued during the 2019 biennial inspection. No additional inspections were completed in 2020.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the MPB include:

- Gusset Plate Steel Repairs – Contract was awarded in late 2019 and was substantially complete in 2020.
- Rehabilitation of Pier Fender System at the MPB and CBB – Design-build Contract was awarded in 2018. It is an ongoing project and is projected to be complete in mid-2021.
- Miscellaneous Steel Repairs – Funding is included in the program for any necessary repairs identified under future inspections.
- Electrical Rehabilitation of the Elevator – Construction is projected to begin in late 2021 with a projected completion of late 2023.
- Replacement of On Grade Light Poles - Construction is projected to begin in mid-2021 with a projected completion of late 2022.
- Painting of the Above Roadway Steel – Construction is planned to begin in mid-2021 with a projected completion of mid-2023.

Cross Bay Bridge ("CBB")

The biennial inspection of the CBB and Ramp B were performed in 2019. No flags were issued during the 2019 biennial inspection. No additional inspections were completed in 2020.

Recently completed and ongoing projects in the 2015-2019 Capital Program and ongoing and planned projects in the approved 2020-2024 Capital Program at the CBB include:

- Rehabilitation of Pier Fender System at the MPB and CBB – Design-build contract was awarded in late 2018. It is an ongoing project and is projected to be complete in mid-2021.
- Structural Rehabilitation of CBB – In house design is ongoing with construction planned for late 2022.

Other System Wide Improvements

Agency-Wide ("AW") – 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.

Recently completed and ongoing AW projects in the 2015-2019 Capital Program and ongoing and planned AW projects in the approved 2020-2024 Capital Program include:

Overhaul and Replace Facility Monitoring and Safety Systems – This project includes upgrades for traffic detection, incident management, operational command, safety systems, and other agency-wide systems.

Intelligent Transportation System Enhancements – This project completed the installation of CCTV cameras at the TNB, BWB and RFK, improving the monitoring and observation of traffic flow on these bridges. Hardware upgrades will also be made for the Advanced Traffic Management Systems ("ATMS").

Open Road Tolling Initiative – This project implemented cashless tolling at the TBTA facilities, and also included transformation of the former toll plaza areas to meet current highway geometric standards for free flow traffic. The cashless tolling infrastructure was installed at all facilities and cashless tolling implemented at all facilities by September 2017. The transformation of the former toll plaza areas at all facilities except the BWB and the TNB was completed by 2019. The BWB and TNB work was completed in the spring of 2020.

Hazardous Materials Abatement – This project will remove hazardous materials at various facility work sites.

Additional projects:

- Structural Health Monitoring
- Toll Collection System Rehabilitation/Upgrades
- Fiber Optic Infrastructure and Integration
- SCADA Systems
- Rehab/Replace Facility Monitoring and Safety Systems
- Service Building Upgrades

As part of the Capital Program planning process for each five-year plan, TBTA personnel conduct a capital needs assessment. The assessment is compiled from data from biennial inspections and system improvements suggested by the Engineering and Construction department and includes factors such as service life of various structural components and normal replacement cycles. Scheduling of Major Maintenance projects is closely coordinated to ensure that the optimal level of service to the traveling public both locally and systemwide is maintained while balancing operating and capital expenditures.

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. 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 review 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, 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 2030 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 2050, assuming maintenance and rehabilitation consistent with past practice.

CONCLUDING REMARKS

It is Stantec's opinion that the revenue projections presented in this report have been prepared in accordance with accepted industry-wide 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 take into consideration 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 or demographic developments, which 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 stated conditions should change due to changes in the economy or competitive environment, the pandemic recovery trajectory, 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,

Stantec Consulting Services Inc.
475 Fifth Avenue, 12th Floor
New York, NY 10017

Rick Gobeille, PE
Senior Principal

Christopher Mojica, PE, PTOE, RSP
Associate

Julianne DiGennaro, PE
Transportation Engineer