

APPENDIX E

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



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Triborough Bridge and Tunnel
Authority

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January 5, 2018

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

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January 5, 2018

To the Triborough Bridge and Tunnel Authority:

In accordance with our review of recent performance at the bridge and tunnel facilities, Stantec Consulting Services Inc. (Stantec) elected to conduct a supplemental study to update projections of traffic and toll revenues for the toll bridge and tunnel facilities previously included in the April 28, 2017 Report (the "April 2017 Report") titled "History and Projection of Traffic, Toll Revenues and Expenses and Review of Physical Conditions of the Facilities of Triborough Bridge and Tunnel Authority." This document serves as an addendum ("Addendum") to the April 2017 Report and should be read with the full April 2017 Report. This Addendum provides updates to specific sections of the April 2017 Report. All other sections of the April 2017 Report not referenced within this Addendum are not materially revised and remain valid.

Stantec's review of actual performance at the bridge and tunnel facilities through October 2017 indicate that actual performance is moderately lower than the April 2017 Report's forecast of traffic volumes and toll revenues for 2017. The following factors primarily contributed to moderately lower forecasted results:

- A greater increase in year-over-year E-ZPass participation than originally forecast in the April 2017 Report. Preliminary data through October 2017 indicate that the year-to-date E-ZPass participation rate is 89.7 percent, 3.9 percent greater than the 2016 E-ZPass participation rate of 85.9 percent. With the acceleration of Open Road Tolling (ORT) implementation, and due to its success in encouraging E-ZPass usage, all of the TBTA facilities by the month of October 2017 have exceeded 90 percent penetration and most have exceeded 95 percent. In the April 2017 Report, with evidence from the Henry Hudson Bridge and two months of experience at the Queens Midtown Tunnel and Hugh L. Carey Tunnel, Stantec estimated a lower percentage increase in E-ZPass participation due to conversion to ORT. Our estimates ranged between approximately two and three percent, varying by the location of the facility. The April 2017 Report projected fewer E-ZPass transactions which led to a higher average toll. This contributed meaningfully to a higher forecast of revenues than what was realized;
- Sandy restoration construction at the Queens Midtown Tunnel and the Hugh L. Carey Tunnel has had a greater unfavorable impact on traffic than originally projected. Through October, overall volume at the two tunnels declined by 8.7 percent and 2.9 percent, respectively on a year-over-year basis, while the combined volume at all of TBTA's other facilities grew by 1.6 percent. Despite this greater growth, traffic volumes on all facilities grew by 0.4 percent, this 0.4 percent level is well below the April 2017 Report's projection of 1.1 percent;
- Adverse weather conditions in 2017 when compared to 2016 (greater amounts of snowfall in March and rainfall in April, May, June, and August also contributed to lower volumes); and
- The March 19, 2017 toll increase, while historically an occurrence that reduces traffic volumes somewhat because of diversion and shrinkage, also contributed but in a slight manner, on the reduced volumes at the TBTA facilities. These effects were included in the April 2017 Report forecast.

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Due to the aforementioned factors, the forecast of traffic volumes and toll revenues contained within the April 2017 Report is no longer valid. The revised forecast contained herein was developed using actual traffic and revenue data for January through October 2017, which represents eight additional months of actual data for 2017 than what was included as part of the April 2017 Report. Furthermore, ORT is now in effect systemwide, so the effects of this change are apparent and do not require as much of an approximation.

The subsequent sections of this Addendum address material revisions to the April 2017 Report. Other sections of the April 2017 Report not referenced herein are not materially revised.

CASHLESS OPEN ROAD TOLLING (ORT) ACTIVATION SCHEDULE

This section contains material changes to the **Cashless Open Road Tolling (ORT) and Toll Violation Enforcement** subsection of the April 2017 Report.

Under the direction of the Governor, TBTA implemented ORT at all TBTA facilities earlier than originally scheduled at the time of the April 2017 Report. Table 1 below compares the original and actual dates of ORT activation at each facility.

Table 1 ORT Activation Schedule – Original vs. Actual Dates of Activation

Facility	Original Date of Activation	Actual Date of Activation
Throgs Neck Bridge*	End of 2017	9/30/2017
Bronx-Whitestone Bridge*	End of 2017	9/30/2017
RFK Bridge	Summer 2017	6/15/2017
Queens Midtown Tunnel	1/10/2017	1/10/2017
Hugh L. Carey Tunnel	1/4/2017	1/4/2017
Verrazano-Narrows Bridge*	End of 2017	7/8/2017
Henry Hudson Bridge	11/20/2016	11/20/2016
Marine Parkway-Gil Hodges Memorial Bridge	4/30/2017	4/30/2017
Cross Bay Veterans Memorial Bridge	4/30/2017	4/30/2017

Note: "*" denotes a change in ORT activation at the toll facility.

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E-ZPASS PARTICIPATION RATES

This section contains material changes to the **E-ZPass Electronic Toll Collection System** subsection of the April 2017 Report.

Stantec, with preliminary actual traffic/revenue data through February 2017, had projected an increase of 2 to 3 percent in E-ZPass participation rates at each facility with the implementation of ORT. The increase was due to a combination of trip shrinkage and payment method shifts; both of which vary by facility. As a starting point to gauge this conversion, Stantec examined both the long-term experience of ORT on the Henry Hudson Bridge and the two months of ORT experience at the Queens Midtown Tunnel and Hugh L. Carey Tunnel. However, the actual increase in E-ZPass participation rates (3.9 percent) through October 2017 was larger than originally projected.

In examining detailed E-ZPass usage at each facility, we have determined there are four distinct stages in the process of converting an entire tolling system.

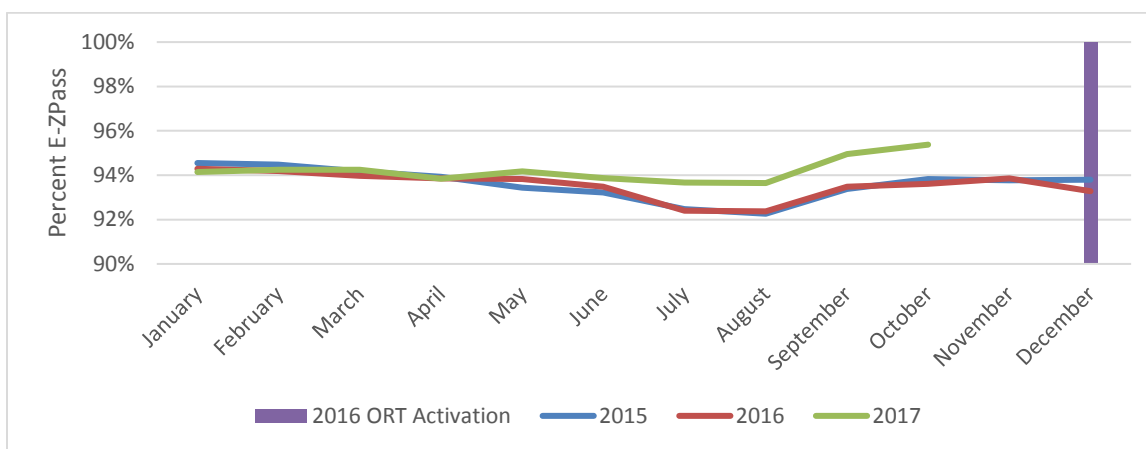
- The first stage involves a general increase in E-ZPass participation rates several months prior to implementation. This is assumed to be a reaction to the system-wide announcement of the plan and the fact that motorists use more than one facility.
- The second stage is the pre-ORT ramp up, about one month long, when a visible change in the usage of E-ZPass occur. Motorists in this stage see the construction and know ORT is coming from the signs at the facility. In response, some motorists convert to E-ZPass.
- The conversion activity continues in the first month after implementation. Motorists may still use Tolls by Mail (TBM), but some additional users switch over to ORT now that the toll booths are gone.
- The final stage involves a continued increase in E-ZPass participation rates. E-ZPass participation rates stabilize after month two or three after ORT implementation.

Since Stantec's forecast was created on a monthly basis, the acceleration of ORT implementation would also result in an increased E-ZPass participation rate. Additionally, based on actual data received through October 2017, and as explained above, the biggest increase in E-ZPass participation rates occurs during the actual month of activation with residual effects continuing until it stabilizes. The figures below compare the E-ZPass monthly participation rates at each facility from 2015 to October 2017. We have noted on the graphics the timing of ORT implementation.

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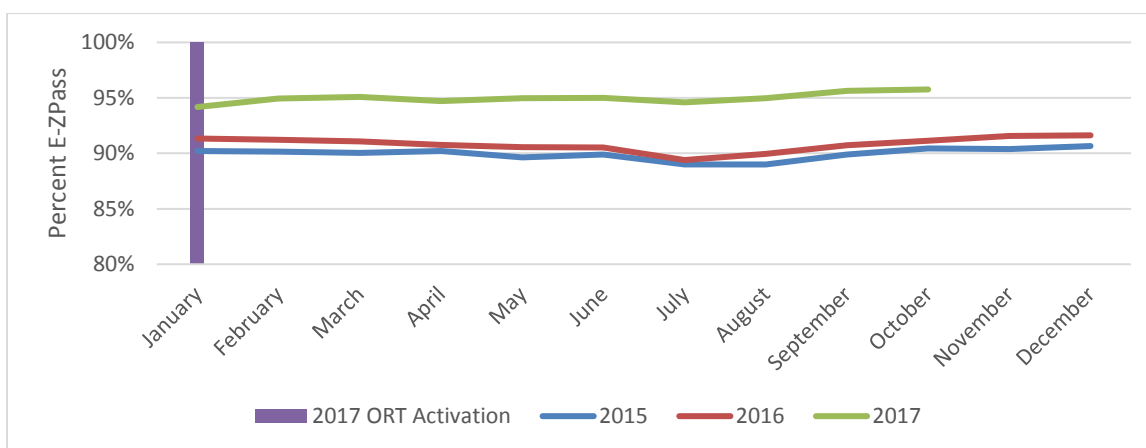
Henry Hudson Bridge - As shown in Figure 1, cashless tolling was implemented as a pilot at the Henry Hudson Bridge in November 2012. Since then cashless tolling at the HHB was adopted permanently and toll booths were dismantled in December 2016. Because of the time operating in a cashless environment, it was assumed that the E-ZPass participation rate had stabilized. However, there was an increase E-ZPass usage that began in the 2017 summer months. This is likely a byproduct of other TBTA facilities implementing ORT. The E-ZPass participation rate, currently over 95 percent, appears to have stabilized.

Figure 1 Henry Hudson Bridge E-ZPass Participation Rates



Hugh L. Carey Tunnel - As shown in Figure 2, E-ZPass participation rates at the Hugh L. Carey Tunnel grew 2.8 percent in the month of activation when compared to the same month in 2016. Since this facility was one of the first to change to ORT, there was no extra shift to E-ZPass before ORT activation due to other facilities. E-ZPass participation rates grew in the summer months and seem to have stabilized at a level above 95 percent.

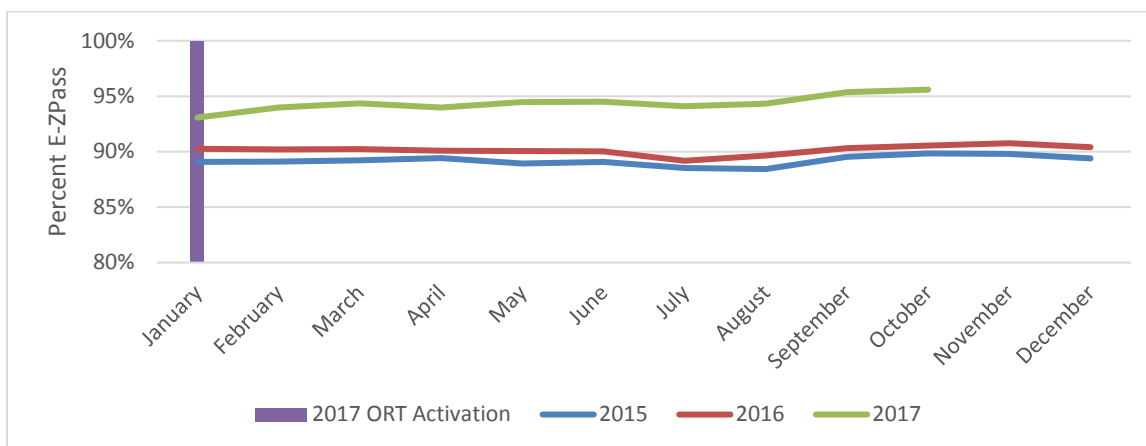
Figure 2 Hugh L. Carey Tunnel E-ZPass Participation Rates



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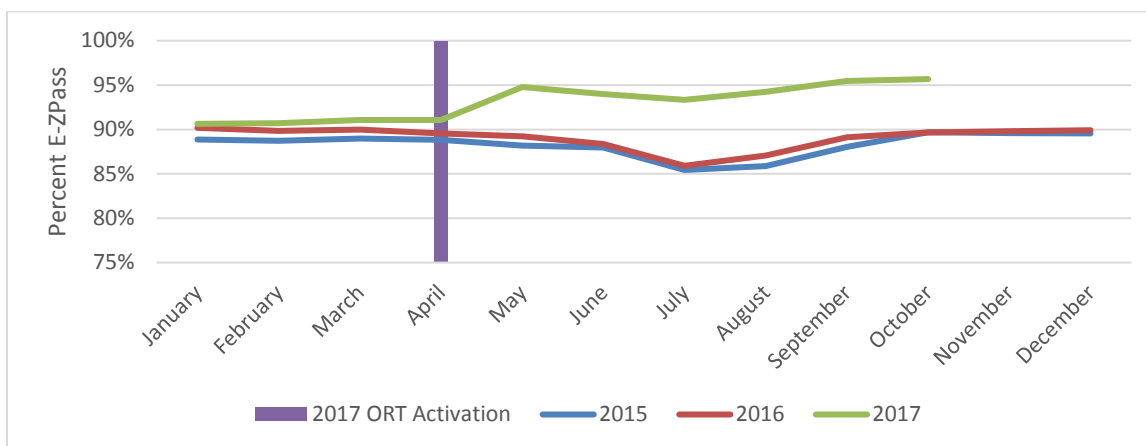
Queens Midtown Tunnel - As shown in Figure 3, E-ZPass participation rates at the Queens Midtown Tunnel grew 2.8 percent in the month of activation when compared to the same month in 2016. Since this was one of the first facilities to change to ORT, there was no extra shift to E-ZPass before ORT activation due to other facilities. While E-ZPass participation rates at this facility have stabilized, current construction on the tunnel has affected overall use of the facility. It appears that E-ZPass participation rates have stabilized at slightly above 95 percent.

Figure 3 Queens Midtown Tunnel E-ZPass Participation Rates



Marine Parkway-Gil Hodges Memorial Bridge - As shown in Figure 4, E-ZPass participation rates at the Marine Parkway-Gil Hodges Memorial Bridge grew 1.5 percent in the month of activation when compared to the same month in 2016. Unlike several other facilities, an ORT related increase in E-ZPass participation rates did not occur at this facility until ORT was implemented on the bridge itself. This E-ZPass participation rate increase continued for roughly one month and appears to have begun stabilizing according to the normal seasonality at this bridge. It would appear that this facility will stabilize at an E-ZPass participation rate of 95 percent.

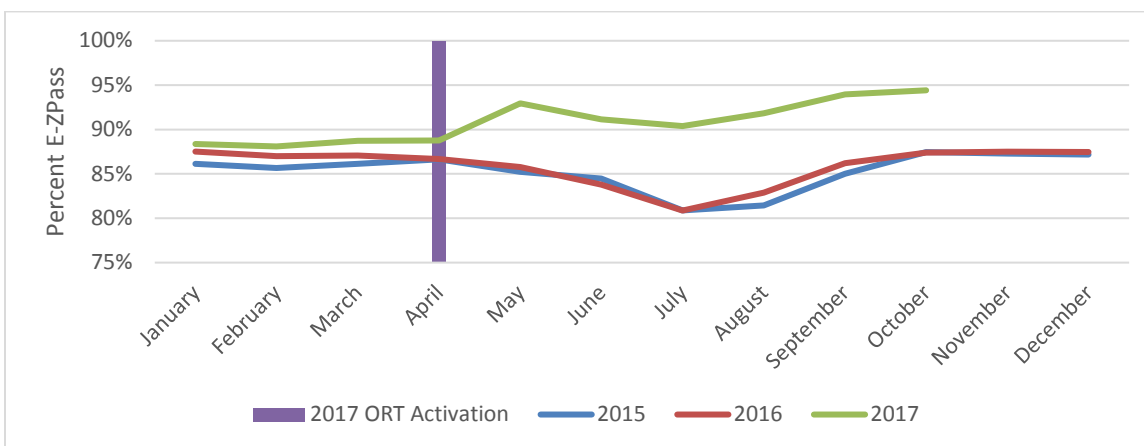
Figure 4 Marine Parkway-Gil Hodges Memorial Bridge E-ZPass Participation Rates



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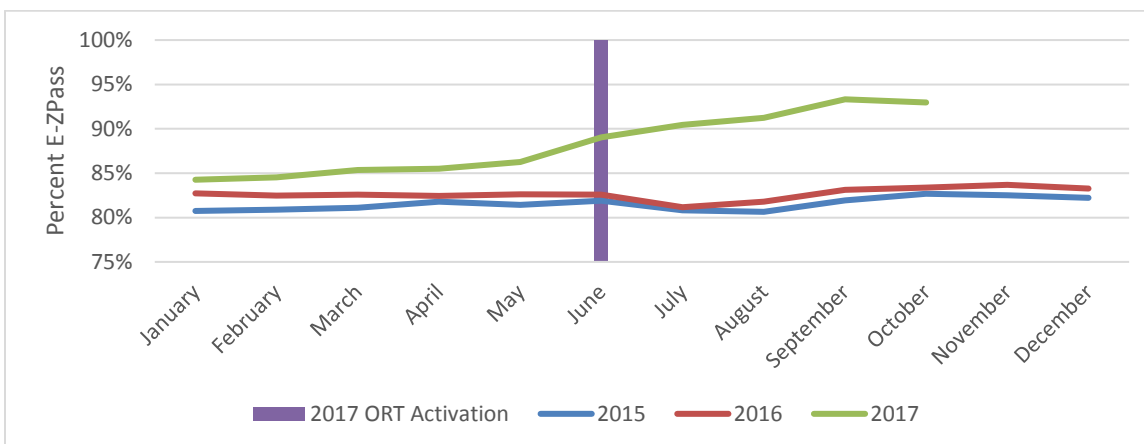
Cross Bay Veterans Memorial Bridge - As shown in Figure 5, E-ZPass participation rates at the Cross Bay Veterans Memorial Bridge grew 2.1 percent in the month of activation when compared to the same month in 2016. Similar to the Marine Parkway Bridge, an ORT related increase in E-ZPass participation did not occur until ORT was implemented on the bridge itself. This E-ZPass participation rate increase continued for roughly one month and appears to have begun stabilizing between 90 and 95 percent.

Figure 5 Cross Bay Veterans Memorial Bridge E-ZPass Participation Rates



Robert F. Kennedy (RFK) Bridge - As shown in Figure 6, E-ZPass participation rates at the RFK Bridge grew 6.4 percent in the month of activation when compared to the same month in 2016. This increase is somewhat accounted for by a higher participation of motorists using the Bronx span. Because toll gantry locations were changed, a direct comparison of the Bronx and Manhattan spans are not possible. However, the consolidated increase in E-ZPass participation began several months earlier due to ORT activation at other TBTA facilities. This E-ZPass increase continued for roughly three months and appears to have stabilized between 90 and 95 percent. This is significant considering that the Bronx span historically had E-ZPass participation rates below 80 percent.

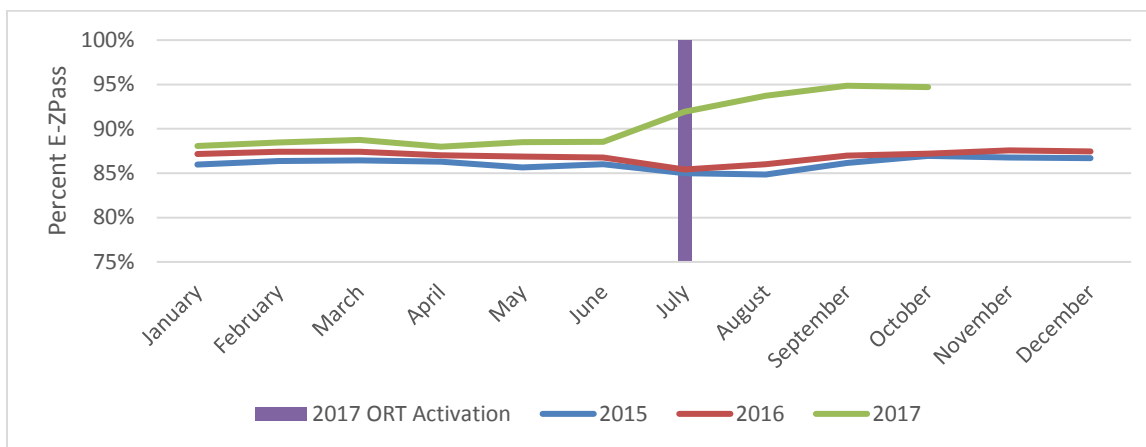
Figure 6 RFK Bridge E-ZPass Participation Rates



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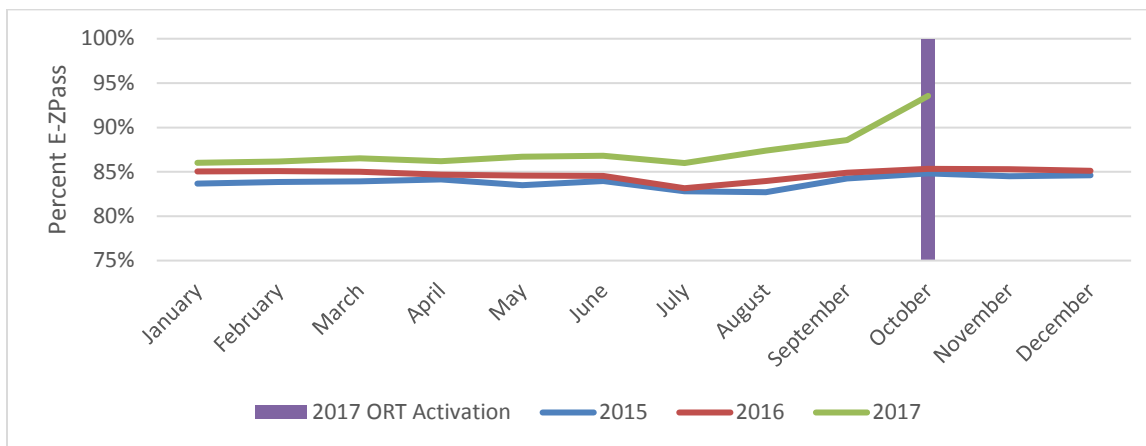
Verrazano-Narrows Bridge - As shown in Figure 7, E-ZPass participation rates at the Verrazano-Narrows Bridge grew 6.5 percent in the month of activation when compared to the same month in 2016. Unlike several other facilities, this facility experienced only a small ORT related increase in E-ZPass participation rates until June, the month before ORT was implemented at the bridge. This E-ZPass participation rate increase continued for roughly two months and appears to have begun leveling out. It should be noted that there was also a capacity increase at this bridge due to the addition of a reversible HOV-3+ lane. In October, E-ZPass has likely stabilized at 95 percent.

Figure 7 Verrazano-Narrows Bridge E-ZPass Participation Rates



Throgs Neck Bridge - As shown in Figure 8, E-ZPass participation rates at the Throgs Neck Bridge grew 8.2 percent in the month of activation when compared to the same month in 2016. However, this increase in E-ZPass participation began several months earlier due to ORT activation at other TBTA facilities. While there is only one month of data available at the Throgs Neck Bridge with ORT, it is assumed that the E-ZPass participation rate increase will continue for two or three months until it stabilizes. It is expected that the E-ZPass participation rate will stabilize at or above 95 percent.

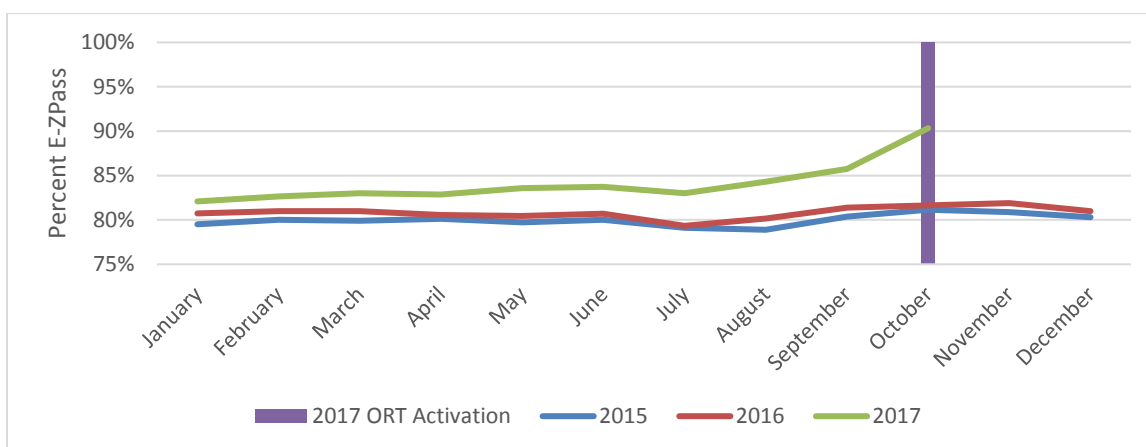
Figure 8 Throgs Neck Bridge E-ZPass Participation Rates



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Bronx-Whitestone Bridge - As shown in Figure 9, E-ZPass participation rates at the Bronx-Whitestone Bridge grew 8.7 percent in the month of activation when compared to the same month in 2016. The increase in E-ZPass participation began several months earlier due to ORT activation at other TBTA facilities. While there is only one month of data available at the Bronx-Whitestone with ORT, it is assumed, like the Throgs Neck Bridge, that the E-ZPass participation rate increase will continue for two to three months until it stabilizes. It is expected that the E-ZPass participation rate would approach 93 to 95 percent at stabilization. This is significant considering that the Bronx-Whitestone Bridge historically had E-ZPass participation rates in the 79 to 81 percent range.

Figure 9 Bronx-Whitestone Bridge E-ZPass Participation Rates



STANTEC FORECAST ASSUMPTIONS

This section contains material changes to the **Summary of Assumptions and Conditions** subsection of the April 2017 Report.

E-ZPass Participation Rate Growth

As a result of the E-ZPass participation rate increases that have been experienced at the TBTA facilities, future growth is expected to be limited. It is projected that E-ZPass participation rates will experience small annual growth, with rates of 0.1 to 0.2 percent a year for the duration of the forecast until a maximum of 97 percent is reached.

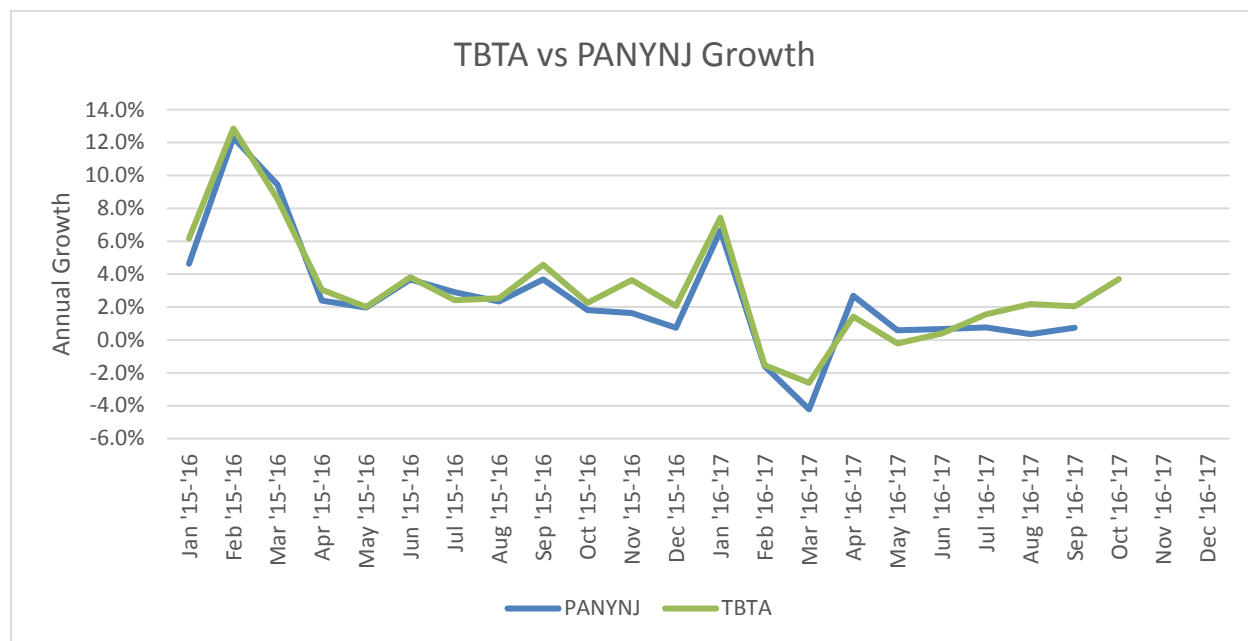
Background Traffic Volume Growth

Overall transactions were forecasted to grow at 1.1 percent for 2017, but despite growth of 1.6 percent on all the bridges, the tunnels (Queens Midtown Tunnel and Hugh L. Carey Tunnel) traffic losses reduced overall transactional growth to 0.4 percent. The forecast associated with the April 2017 Report used conservative growth rates but did not account for the level of lost traffic in the tunnels due, largely, to Superstorm Sandy repairs and ensuing delays or closures. As a cross check for background growth, Stantec performed a comparison of usage on Port Authority of New York

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and New Jersey (PANYNJ) facilities with selected TBTA facilities. Total growth was therefore compared between the George Washington Bridge, Goethals Bridge, and Outerbridge Crossing versus the Throgs Neck Bridge, Bronx-Whitestone Bridge, RFK Bridge, and the Verrazano-Narrows Bridge. These TBTA facilities account for approximately 72.0 percent of all transactions and approximately 79.0 percent of toll revenues. In Figure 10, we compared TBTA data with PANYNJ data available from January 2015 through September 2017. Facilities from both agencies follow the same overall traffic trends.

Figure 10 Comparison of TBTA and PANYNJ Annual Growth



Traffic and Revenue Forecast Scenarios

Two sets of forecasts were developed as part of this Addendum: one at constant tolls and the other with tolls at the current level in 2017 and 2018 and factoring in a toll increase in March 2019 and March 2021 as included in the 2018-2021 MTA Financial Plan adopted by the MTA Board in December 2017. For the scenario with constant tolls, the present toll schedule will be in effect during the remainder of the forecast period through 2027. For the scenario with toll increases, tolls on TBTA facilities are assumed to increase by 4 percent for most customers on March 1, 2019 and again on March 1, 2021 in accordance with the 2018-2021 MTA Financial Plan.

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ELASTICITY FACTORS AND TOLL INCREASE IMPACTS

This section contains material changes to the **Toll Increase Impacts, Collection Methods, and Elasticity** subsection of the April 2017 Report.

For the periodic toll-increase scenario, it was assumed that the New York Customer Service Center (NYCSC) E-ZPass toll for passenger cars on the major and minor crossings would be increased by 4 percent in March 2019 and March 2021. Further, it was assumed that truck tolls would be increased proportionately, and that the relationships between Tolls by Mail (TBM) and NYCSC E-ZPass tolls for passenger cars would remain the same as those implemented for the toll increase on March 19, 2017.

As for the impacts of the toll increase on traffic demand, the elasticity factors from Table 2, as shown below, were used by Stantec to calculate traffic decreases due to the toll increases. These traffic impacts represent the reduction in volume from the corresponding annual traffic levels that would be expected if the tolls were not increased. The elasticity factors listed in Table 2 remain unchanged from the April 2017 Report. However, in the April 2017 Forecast, Stantec assumed that the impacts of a toll increase could be seen for twelve months. After a further evaluation of the March 2015 and March 2017 toll increases, Stantec has shortened this impact period to three months.

Table 2 Estimated Percent Change in Average Toll Rates and Traffic in 2019 and 2021

Facility	Elasticity Factors ^(a)		Estimated Percent Change with Assumed 2019 and 2021 Toll Increases			
			Toll		Traffic	
	TBM ^(b)	E-ZPass	TBM ^(b)	E-ZPass	TBM ^(b)	E-ZPass
Throgs Neck Bridge	-0.187	-0.082	4.0%	4.0%	-0.7%	-0.3%
Bronx-Whitestone Bridge	-0.187	-0.082	4.0%	4.0%	-0.7%	-0.3%
RFK Bridge	-0.193	-0.155	4.0%	4.0%	-0.8%	-0.6%
Queens-Midtown Tunnel	-0.252	-0.158	4.0%	4.0%	-1.0%	-0.6%
Brooklyn-Battery Tunnel	-0.322	-0.284	4.0%	4.0%	-1.3%	-1.1%
Verrazano Narrows Bridge	-0.213	-0.086	4.0%	4.0%	-0.9%	-0.3%
Henry Hudson Bridge	-0.100	-0.225	4.0%	4.0%	-0.4%	-0.9%
Marine Parkway Bridge	-0.165	-0.036	4.0%	4.0%	-0.7%	-0.1%
Cross Bay Bridge	-0.161	-0.029	4.0%	4.0%	-0.6%	-0.1%

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 rate at the Queens Midtown Tunnel, TBM traffic would decrease by 0.252%.

(b) Assume TBM customers have similar elasticity to former cash customers.

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UPDATED PROJECTIONS OF TRAFFIC, REVENUES, AND EXPENSES

This section contains material changes to the **PROJECTED TRAFFIC, REVENUES, AND EXPENSES** section of the April 2017 Report.

Current and future traffic and toll revenues have, within this Addendum, been estimated for the 11-year (2017-2027) forecast period for each TBTA facility. Projections continue to be based on historical trends in traffic and toll revenue, elasticity factors for future toll increases, toll collection operations, capacities of the nine crossings, facility maintenance, E-ZPass participation levels and the experience of ORT implementation, externalities such as area roadway improvement plans and regional demographic projections, and the assumptions and conditions summarized previously.

Estimated Traffic and Toll Revenue, 2017

Stantec's development of the traffic and toll revenue estimates for the remaining two months of 2017 took into account the economic condition of the region and the first ten months of actual performance. In developing the traffic and toll revenue estimates for 2017, Stantec reviewed data for the previous four-year period (2013-2016) as well as preliminary 2017 data through October. In addition, Stantec reviewed data from competing toll and toll-free facilities to determine recent regional traffic trends. The estimates for the remainder of 2017 assume that the base traffic levels at TBTA facilities for each of the remaining months of calendar year 2017 will be, in aggregate, 0.5 percent greater than volumes in the same months of 2016. The forecast percent changes are shown in Table 3. Traffic volumes in January through October 2017 increased at seven of the facilities (all the bridges) when compared to the same months in 2016. However, volumes decreased at the Queens Midtown Tunnel and the Hugh L. Carey Tunnel. This is likely due to Sandy restoration construction at both the Queens Midtown and Hugh L. Carey Tunnels and the related lane closures and construction activities impact on vehicle movement.

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Table 3 Estimated Changes in Annual Traffic, 2016 to 2017

Facility	Actual Percent Change January - October 2016 to 2017	Estimated Percent Change November - December 2016 to 2017	Projected Percent Change Full Year 2017
Throgs Neck Bridge	0.9%	0.9%	0.9%
Bronx-Whitestone Bridge	0.2%	0.1%	0.2%
RFK Bridge	0.9%	0.9%	0.9%
Queens Midtown Tunnel	-8.7%	-8.7%	-8.7%
Hugh L. Carey Tunnel	-2.9%	-2.9%	-2.9%
Verrazano-Narrows Bridge ^e	2.9%	2.9%	2.9%
Henry Hudson Bridge	3.8%	3.8%	3.8%
Marine Parkway-Gil Hodges Memorial Bridge	1.0%	1.0%	1.0%
Cross Bay Veterans Memorial Bridge	1.5%	1.5%	1.5%
Total	0.4%	0.5%	0.4%

Note: Based on preliminary actual data, subject to final audit.

As shown in Table 3, total 2017 traffic at the crossings is forecasted to increase at an average rate of 0.4 percent for the year, which is the result of an actual 0.4 percent gain in January through October and net systemwide growth of 0.5 percent in November and December. With the exception of the Queens Midtown Tunnel and the Hugh L. Carey Tunnel, traffic is estimated to increase at all facilities stemming largely from a continued modest economic recovery, significant construction activity around the City, and sustained lower gasoline prices. The resulting traffic and toll revenue estimates for 2017 are presented in Table 4. Estimated toll revenue for 2017 is based on average toll rates developed from the toll schedule in effect as of the March 19, 2017 toll increase and the projected vehicle class distribution and payment method (E-ZPass vs. TBM) for 2017.

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Table 4 Estimated 2017 Toll-Paying Traffic and Toll Revenue

Facility	Traffic (000s)	Average Toll	Revenue (000s)
Throgs Neck Bridge	43,647	\$7.92	\$345,616
Bronx-Whitestone Bridge	45,887	\$7.05	\$323,500
RFK Bridge	63,515	\$6.88	\$436,779
Queens Midtown Tunnel	24,482	\$6.33	\$155,032
Hugh L. Carey Tunnel	17,442	\$6.04	\$105,376
Verrazano-Narrows Bridge ^(a)	71,780	\$5.76	\$413,485
Henry Hudson Bridge	25,568	\$3.34	\$85,310
Marine Parkway-Gil Hodges Memorial Bridge	7,981	\$2.19	\$17,441
Cross Bay Veterans Memorial Bridge	8,422	\$2.20	\$18,562
Total	308,722	\$6.16	\$1,901,102
Percent Change			
2016-2017 (All Facilities)	0.4%	1.2%	1.7%

Notes:

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

Summarizing, our estimates for the full year of 2017 show a 0.4 percent increase in traffic, a 1.2 percent increase in the systemwide average toll, and a 1.7 percent increase in systemwide revenue over 2016, which reflects actual performance through October 2017 and anticipated traffic volumes for the remainder of the year.

Traffic and Toll Revenue at Current Tolls

Traffic and toll revenues were first projected on the basis that the tolls placed into effect on March 19, 2017 will be continued throughout the forecast period. The methodology employed by Stantec to forecast traffic was based on the development of an annual growth rate for each facility (based on historical traffic trends), the construction activities (historical and projected) throughout the highway network (bridges, tunnels and arterials), and the traffic capacity constraints in the network. Regional demographic projections were also taken into consideration.

All indicators point to the potential for low level of traffic growth in the short-term, reflecting continuing moderate economic conditions, buoyed by the sustained low cost of motor fuel. An additional factor affecting growth on TBTA facilities is the potential capacity constraints in the regional transportation network due to construction projects on facilities that compete with TBTA facilities.

The 2017 estimated traffic and revenue from Table 4, which includes the impacts of the March 2017 toll increase and implementation of nearly all the effects of ORT implementation is the starting point for the forecast period through 2027. As in previous forecasts, this one assumes constant tolls at the current rates established on March 19, 2017.

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For 2018, traffic is projected to increase at 0.77 percent systemwide, with growth rates varying by facility. For 2019, traffic is projected to increase at 0.53 percent annually, with growth rates varying by facility. For 2020 through 2027, Stantec assumes a long-term growth rate of 0.25 percent to approximate the trendline background growth rate accounting for changes in population, employment and other economic factors. Over the forecast period 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 E-ZPass and toll increases are computed separately. Completion of the super storm sandy repairs at the Queens Midtown and Hugh L. Carey Tunnels is expected to be in 2018, and traffic levels are assumed to recover towards their individual trend lines in the following few years.

Traffic and Toll Revenue with Assumed 2019 and 2021 Toll Increases

The traffic forecast with toll increases in 2019 and 2021 was built upon the base forecast (from Table 5), to which the elasticity impacts (from Table 3) were applied. In accordance with the 2018-2021 MTA Financial Plan, Stantec applied a four percent increase in toll rates (from Table 2) effective March 1, 2019 and March 1, 2021. These new toll rates, along with all the other forecasting inputs referred to above were used to calculate the corresponding toll revenues. The traffic and revenue forecasts with the planned toll increases in 2019 and 2021 are listed in Table 6.

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Table 5 Traffic and Toll Revenue Forecast, Constant Tolls

Year	Throgs Neck	Bronx-Whitestone	RFK	Queens Midtown	Hugh L. Carey	Verrazano-Narrows (a)	Henry Hudson	Marine Parkway-Gil Hodges Br	Cross Bay	All Facilities
Traffic Change										
2016-2017	0.93%	0.15%	0.94%	-8.73%	-2.89%	2.90%	3.85%	1.00%	1.47%	0.45%
2017-2018	0.47%	0.47%	0.47%	3.00%	1.25%	0.47%	0.56%	0.37%	0.38%	0.72%
2018-2019	0.35%	0.35%	0.35%	2.25%	0.75%	0.35%	0.42%	0.28%	0.28%	0.53%
2019-2020	0.25%	0.25%	0.25%	1.50%	0.25%	0.25%	0.25%	0.25%	0.25%	0.35%
2020-2021	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2021-2022	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2022-2023	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2023-2024	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2024-2025	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2025-2026	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2026-2027	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Annual Traffic (000s)										
2016	43,245	45,816	62,921	26,824	17,961	69,756	24,620	7,902	8,300	307,346
2017	43,647	45,887	63,515	24,482	17,442	71,780	25,568	7,981	8,422	308,722
2018	43,851	46,102	63,813	25,216	17,660	72,117	25,711	8,011	8,454	310,934
2019	44,005	46,264	64,037	25,784	17,792	72,370	25,820	8,033	8,477	312,583
2020	44,115	46,380	64,197	26,170	17,837	72,551	25,884	8,053	8,498	313,686
2021	44,226	46,496	64,358	26,236	17,881	72,732	25,949	8,073	8,520	314,471
2022	44,336	46,612	64,518	26,301	17,926	72,914	26,014	8,094	8,541	315,257
2023	44,447	46,729	64,680	26,367	17,971	73,097	26,079	8,114	8,562	316,045
2024	44,558	46,845	64,841	26,433	18,016	73,279	26,144	8,134	8,584	316,835
2025	44,670	46,962	65,004	26,499	18,061	73,462	26,210	8,155	8,605	317,627
2026	44,781	47,080	65,166	26,565	18,106	73,646	26,275	8,175	8,627	318,421
2027	44,893	47,198	65,329	26,632	18,151	73,830	26,341	8,195	8,648	319,217
Average Toll										
2016	\$7.76	\$7.00	\$6.80	\$6.38	\$6.08	\$5.64	\$3.10	\$2.18	\$2.22	\$6.08
2017	\$7.92	\$7.05	\$6.88	\$6.33	\$6.04	\$5.76	\$3.34	\$2.19	\$2.20	\$6.16
2018	\$7.92	\$7.05	\$6.88	\$6.33	\$6.04	\$5.76	\$3.34	\$2.19	\$2.20	\$6.16
2019	\$7.92	\$7.05	\$6.88	\$6.33	\$6.04	\$5.76	\$3.34	\$2.18	\$2.20	\$6.16
2020	\$7.92	\$7.05	\$6.87	\$6.33	\$6.04	\$5.76	\$3.34	\$2.18	\$2.20	\$6.16
2021	\$7.92	\$7.05	\$6.87	\$6.33	\$6.04	\$5.76	\$3.34	\$2.18	\$2.20	\$6.16
2022	\$7.92	\$7.05	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.16
2023	\$7.91	\$7.05	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.16
2024	\$7.91	\$7.04	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.15
2025	\$7.91	\$7.04	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.15
2026	\$7.91	\$7.04	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.15
2027	\$7.91	\$7.04	\$6.87	\$6.33	\$6.04	\$5.76	\$3.33	\$2.18	\$2.20	\$6.15
Toll Revenue (000s)										
2016	\$335,792	\$320,543	\$428,159	\$171,151	\$109,270	\$393,086	\$76,309	\$17,266	\$18,434	\$1,870,009
2017	\$345,616	\$323,500	\$436,779	\$155,032	\$105,376	\$413,485	\$85,310	\$17,441	\$18,562	\$1,901,102
2018	\$347,209	\$324,982	\$438,786	\$159,675	\$106,689	\$415,388	\$85,780	\$17,504	\$18,629	\$1,914,641
2019	\$348,403	\$326,090	\$440,289	\$163,259	\$107,484	\$416,813	\$86,131	\$17,551	\$18,678	\$1,924,697
2020	\$349,247	\$326,870	\$441,349	\$165,700	\$107,748	\$417,819	\$86,337	\$17,592	\$18,722	\$1,931,383
2021	\$350,093	\$327,653	\$442,412	\$166,106	\$108,012	\$418,828	\$86,542	\$17,634	\$18,765	\$1,936,045
2022	\$350,941	\$328,437	\$443,478	\$166,512	\$108,278	\$419,840	\$86,748	\$17,676	\$18,809	\$1,940,719
2023	\$351,791	\$329,224	\$444,546	\$166,920	\$108,544	\$420,854	\$86,955	\$17,717	\$18,853	\$1,945,404
2024	\$352,643	\$330,012	\$445,617	\$167,329	\$108,810	\$421,871	\$87,162	\$17,759	\$18,897	\$1,950,101
2025	\$353,497	\$330,802	\$446,691	\$167,739	\$109,077	\$422,890	\$87,370	\$17,802	\$18,941	\$1,954,809
2026	\$354,354	\$331,594	\$447,767	\$168,150	\$109,345	\$423,912	\$87,578	\$17,844	\$18,985	\$1,959,529
2027	\$355,213	\$332,389	\$448,846	\$168,562	\$109,614	\$424,936	\$87,787	\$17,886	\$19,029	\$1,964,261

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

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Table 6 Traffic and Toll Revenue Forecast, with Assumed 2019 and 2021 Toll Increases

Year	Throgs Neck	Bronx-Whitestone	RFK	Queens Midtown	Hugh L. Carey	Verrazano-Narrows ^(a)	Henry Hudson	Marine Parkway-Gil Hodges Br	Cross Bay	All Facilities
Traffic Change										
2016-2017	0.93%	0.15%	0.94%	-8.73%	-2.89%	2.90%	3.85%	1.00%	1.47%	0.45%
2017-2018	0.47%	0.47%	0.47%	3.00%	1.25%	0.47%	0.56%	0.37%	0.38%	0.72%
2018-2019	0.24%	0.23%	0.18%	2.07%	0.44%	0.23%	0.16%	0.23%	0.23%	0.38%
2019-2020	0.25%	0.25%	0.25%	1.50%	0.25%	0.25%	0.25%	0.25%	0.25%	0.35%
2020-2021	0.15%	0.15%	0.10%	0.09%	-0.04%	0.15%	0.03%	0.21%	0.21%	0.12%
2021-2022	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2022-2023	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2023-2024	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2024-2025	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2025-2026	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
2026-2027	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Annual Traffic (000s)										
2016	43,245	45,816	62,921	26,824	17,961	69,756	24,620	7,902	8,300	307,346
2017	43,647	45,887	63,515	24,482	17,442	71,780	25,568	7,981	8,422	308,722
2018	43,851	46,102	63,813	25,216	17,660	72,117	25,711	8,011	8,454	310,934
2019	43,955	46,209	63,926	25,738	17,737	72,286	25,753	8,029	8,473	312,106
2020	44,065	46,324	64,086	26,124	17,781	72,466	25,817	8,049	8,494	313,208
2021	44,133	46,394	64,148	26,146	17,774	72,576	25,825	8,066	8,512	313,573
2022	44,243	46,509	64,308	26,212	17,819	72,757	25,890	8,086	8,534	314,357
2023	44,354	46,626	64,469	26,277	17,863	72,939	25,954	8,106	8,555	315,143
2024	44,464	46,742	64,630	26,343	17,908	73,121	26,019	8,127	8,576	315,931
2025	44,576	46,859	64,792	26,409	17,953	73,304	26,084	8,147	8,598	316,721
2026	44,687	46,976	64,953	26,475	17,998	73,487	26,150	8,167	8,619	317,513
2027	44,799	47,094	65,116	26,541	18,043	73,671	26,215	8,188	8,641	318,307
Average Toll										
2016	\$7.76	\$7.00	\$6.80	\$6.38	\$6.08	\$5.64	\$3.10	\$2.18	\$2.22	\$6.08
2017	\$7.92	\$7.05	\$6.88	\$6.33	\$6.04	\$5.76	\$3.34	\$2.19	\$2.20	\$6.16
2018	\$7.92	\$7.05	\$6.88	\$6.33	\$6.04	\$5.76	\$3.34	\$2.19	\$2.20	\$6.16
2019	\$8.01	\$7.13	\$6.95	\$6.40	\$6.11	\$5.82	\$3.38	\$2.21	\$2.23	\$6.23
2020	\$8.01	\$7.13	\$6.95	\$6.40	\$6.11	\$5.82	\$3.38	\$2.21	\$2.23	\$6.23
2021	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.23	\$2.25	\$6.29
2022	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.23	\$2.25	\$6.29
2023	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.23	\$2.25	\$6.29
2024	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.23	\$2.25	\$6.29
2025	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.22	\$2.24	\$6.29
2026	\$8.09	\$7.20	\$7.02	\$6.46	\$6.17	\$5.88	\$3.42	\$2.22	\$2.24	\$6.29
2027	\$8.09	\$7.20	\$7.01	\$6.46	\$6.17	\$5.88	\$3.42	\$2.22	\$2.24	\$6.29
Toll Revenue (000s)										
2016	\$335,792	\$320,543	\$428,159	\$171,151	\$109,270	\$393,086	\$76,309	\$17,266	\$18,434	\$1,870,009
2017	\$345,616	\$323,500	\$436,779	\$155,032	\$105,376	\$413,485	\$85,310	\$17,441	\$18,562	\$1,901,102
2018	\$347,209	\$324,982	\$438,786	\$159,675	\$106,689	\$415,388	\$85,780	\$17,504	\$18,629	\$1,914,641
2019	\$352,049	\$329,525	\$444,373	\$164,720	\$108,307	\$421,041	\$87,124	\$17,713	\$18,858	\$1,943,710
2020	\$352,902	\$330,314	\$445,443	\$167,182	\$108,573	\$422,057	\$87,331	\$17,755	\$18,902	\$1,950,457
2021	\$357,081	\$334,227	\$450,229	\$169,019	\$109,629	\$426,926	\$88,277	\$17,956	\$19,122	\$1,972,464
2022	\$357,946	\$335,026	\$451,312	\$169,432	\$109,899	\$427,957	\$88,487	\$17,998	\$19,166	\$1,977,223
2023	\$358,812	\$335,828	\$452,399	\$169,847	\$110,168	\$428,990	\$88,697	\$18,041	\$19,211	\$1,981,993
2024	\$359,681	\$336,631	\$453,488	\$170,263	\$110,439	\$430,026	\$88,908	\$18,084	\$19,255	\$1,986,775
2025	\$360,552	\$337,436	\$454,580	\$170,680	\$110,710	\$431,064	\$89,120	\$18,127	\$19,300	\$1,991,569
2026	\$361,425	\$338,244	\$455,674	\$171,098	\$110,982	\$432,105	\$89,332	\$18,169	\$19,345	\$1,996,374
2027	\$362,300	\$339,053	\$456,771	\$171,517	\$111,254	\$433,148	\$89,545	\$18,213	\$19,390	\$2,001,192

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

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Operating Expenses

The projection of operating expenses for 2017 through 2027 is shown in Table 7. Total operating expenses, consisting of labor and non-labor, are estimated to increase from \$545.6 million in 2017 to \$835.8 million in 2027. Labor expenses consist of wages, salaries, overtime and fringe benefits. Non-labor expenses include items such as maintenance, revenue management, supplies, utilities and other expenses. The table includes operating expenses budgeted by TBTA for 2017, operating expenses projected by TBTA through 2021 and Stantec's projections of operating expenses from 2022 through 2027.

In 2017, expenses have been budgeted by TBTA at \$545.6 million, an increase of 17.4 percent over 2016 expenses of \$464.9 million. These expenses are split into the following categories: labor expenses of \$255.2 million (an increase of 4.8 percent over 2016) and non-labor expenses of \$290.4 million (an increase of 31.2 percent over 2016). Labor expenses are higher primarily due to the filling of 2016 vacancies, contractual payroll adjustments, and inflationary increases to fringe benefits. The major factors behind growth in non-labor expenses are anticipated implementation and back-office costs associated with ORT, increases in major maintenance, including bridge painting projects that will not be eligible for capital funding, higher credit card fees resulting from the toll increase implemented in March 2017, and inflationary adjustments.

TBTA's projection for 2018 baseline expense growth is around 2 percent but the back-office expenses for a full year of ORT at all facilities pushes year-to-year growth up to around 9 percent. Thereafter, TBTA's expense growth estimates generally reflect inflationary assumptions of 2 percent to 3 percent each year through 2021. For 2021 through 2027, Stantec projected that labor expenses would increase at a rate of 4 percent annually while non-labor expenses would increase at a rate of 5 percent per year.

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

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Table 7 Projected Operating Expenses

(000s)

Year	Labor ^(a)	Non-Labor ^(b)	Total ^(c)
2017 ^(d)	\$255,180	\$290,422	\$545,602
2018 ^(d)	278,335	318,069	596,404
2019 ^(d)	287,739	322,414	610,153
2020 ^(d)	290,586	330,845	621,431
2021 ^(d)	297,144	343,095	640,239
2022	309,030	360,250	669,280
2023	321,391	378,262	699,653
2024	334,247	397,175	731,422
2025	347,616	417,034	764,651
2026	361,521	437,886	799,407
2027	375,982	459,780	835,762

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 2017 and from TBTA estimates for 2018-2021.

Net Revenues from Toll Operations

The projected operating expenses were deducted from the respective toll revenue forecasts to produce the two sets of estimated net toll revenues (before debt service on outstanding TBTA obligations), one at constant tolls and the other with toll increases in 2019 and 2021, as shown in Table 8. For 2017, net toll revenue under either scenario is estimated at \$1.36 billion. By 2027, annual net toll revenue is estimated to be between \$1.13 in the constant toll scenario to \$1.17 billion with toll increases in 2019 and 2021.

Table 8 Net Toll Revenue Forecast

(000s)

Year	Gross Toll Revenues		Operating	Net Toll Revenues	
	Constant Tolls	With Assumed 2019 and 2021 Toll Increases		Constant Tolls	With Assumed 2019 and 2021 Toll Increases
2017	\$1,901,102	\$1,901,102	\$545,602	\$1,355,500	\$1,355,500
2018	1,914,641	1,914,641	596,404	1,318,237	1,318,237
2019	1,924,697	1,943,710	610,153	1,314,544	1,333,557
2020	1,931,383	1,950,457	621,431	1,309,952	1,329,026
2021	1,936,045	1,972,464	640,239	1,295,806	1,332,225
2022	1,940,719	1,977,223	669,280	1,271,439	1,307,943
2023	1,945,404	1,981,993	699,653	1,245,751	1,282,340
2024	1,950,101	1,986,775	731,422	1,218,679	1,255,353
2025	1,954,809	1,991,569	764,651	1,190,158	1,226,918
2026	1,959,529	1,996,374	799,407	1,160,122	1,196,967
2027	1,964,261	2,001,192	835,762	1,128,499	1,165,430

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CONCLUDING REMARKS

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

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

Many statements contained in this Addendum 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 Addendum.

It should be noted that the April 2017 Report as revised by this Addendum is expected by Stantec to be valid through late April 2018. Stantec will conduct its annual study to provide updated projections of traffic, toll revenues, and expenses for the toll bridge and tunnel facilities operated by TBTA, and to provide an updated assessment of the physical conditions of each facility, in early 2018. The 2018 annual report will be prepared in late April 2018.

**ADDENDUM: HISTORY AND PROJECTION OF TRAFFIC, TOLL REVENUES AND EXPENSES AND
REVIEW OF PHYSICAL CONDITIONS OF THE FACILITIES OF TRIBOROUGH BRIDGE AND TUNNEL
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Respectfully,

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