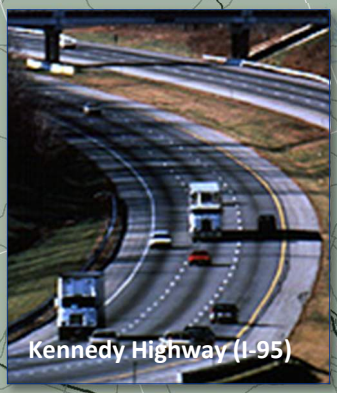
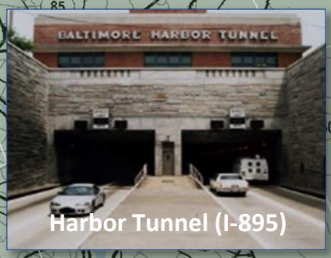
Maryland Transportation Authority 2018 Traffic and Toll Revenue Forecast Update (Legacy Facilities)

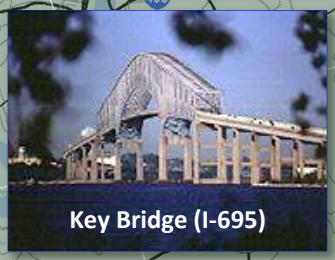

Kennedy Highway (I-95)


Hatem Bridge (US 40)


Fort McHenry Tunnel (I-95)



Harbor Tunnel (I-895)


Key Bridge (I-695)


Nice Bridge (US 301)


Bay Bridge (US 50/301)

Chesapeake Bay

FINAL REPORT
October 23, 2018

MDTA

Maryland Transportation Authority

CDM Smith

Table of Contents

Executive Summary ES-1
Historical Transaction and Revenue Trends ES-1
Socioeconomic Review ES-4
Forecast of Traffic and Revenue ES-5
Forecast Comparison ES-5

1. Introduction 1-1
1.1 System Description and History 1-1
1.1.1 System Description 1-1
1.1.2 Toll Rate Structure and History 1-3
1.2 Report Structure 1-8

2. Historical Traffic and Revenue Trends 2-1
2.1 Regional Traffic Review 2-1
2.1.1 Vehicle Miles Traveled 2-1
2.1.2 Historical Traffic on Other Major Highways 2-2
2.2 MDTA Toll Transaction and In-Lane Revenue Trends 2-7
2.2.1 Short-Term Traffic and Revenue Impacts 2-7
2.2.2 Thomas J. Hatem Memorial Bridge 2-7
2.2.3 John F. Kennedy Memorial Highway 2-9
2.2.4 Baltimore Harbor Tunnel 2-11
2.2.5 Fort McHenry Tunnel 2-11
2.2.6 Francis Scott Key Bridge 2-14
2.2.7 William Preston Lane Jr. Memorial (Bay) Bridge 2-16
2.2.8 Harry W. Nice Memorial Bridge 2-16
2.2.9 MDTA Legacy Facilities Total 2-19
2.2.10 Vehicle Class Distribution 2-19
2.2.11 E-ZPass® Market Share 2-21

3. Socioeconomic Review 3-1
3.1 Introduction 3-1
3.2 Socioeconomic Variables 3-3
3.2.1 Population 3-3
3.2.2 Employment 3-5
3.2.3 Unemployment 3-6
3.2.4 Real Income Per Capita 3-8
3.2.5 Real Gross Domestic Product (GDP) 3-9
3.2.6 Inflation 3-10
3.2.7 Fuel Prices 3-11
3.3 Summary and Conclusion 3-13

4. Traffic and Revenue Forecast 4-1
4.1 Traffic and Toll Revenue Forecasts 4-1
4.1.1 Traffic and Toll Revenue Forecast Model 4-1
4.1.1.1 Toll Rates and Fee Adjustments 4-2

4.1.1.2 Normal Traffic Growth 4-2
4.1.1.3 Planned Roadway Improvements 4-2
4.1.1.4 Baltimore Harbor Tunnel (I-895) Construction Impact Analysis 4-4
4.2 Basic Assumptions 4-7
4.3 Transaction and In-Lane Toll Revenue Forecasts 4-8
4.3.1 Annual Transactions and In-Lane Toll Revenue by Facility 4-8
4.3.1.1 John F. Kennedy Memorial Highway (I-95) 4-8
4.3.1.2 Thomas J. Hatem Memorial Bridge 4-8
4.3.1.3 Baltimore Harbor Tunnel 4-11
4.3.1.4 Fort McHenry Tunnel 4-11
4.3.1.5 Francis Scott Key Bridge 4-14
4.3.1.6 William Preston Lane Jr. Memorial (Bay) Bridge 4-14
4.3.1.7 Harry W. Nice Memorial Bridge 4-17
4.3.2 Systemwide Annual Transactions and In-Lane Toll Revenue Forecasts 4-17
4.4 Other Revenue 4-20
4.4.1 Unused Commuter and Shoppers Plan Trips 4-20
4.4.2 Transponder Fees and Sales 4-20
4.4.3 Hatem E-ZPass Program 4-22
4.4.4 Violation Recovery 4-22
4.4.5 Commercial Vehicles Fees and Discounts 4-22
4.4.6 Concession Revenues 4-25
4.5 Total Annual Revenue Forecasts 4-25
4.6 Total Monthly Transaction and Toll Revenue Forecasts 4-27
4.7 Disclaimer 4-31

List of Figures

Figure ES-1. Legacy Facilities Location Map ES-2
Figure ES-2. Systemwide Historical Transaction and Revenue Trends – FY 2005 through FY 2018 ..... ES-3
Figure ES-3. Historical and Forecasted Transactions and In-Lane Toll Revenue ES-7
Figure 1-1. Legacy Facilities Location Map 1-2
Figure 2-1. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Thomas J. Hatem Memorial Bridge 2-8
Figure 2-2. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, John F. Kennedy Memorial Highway 2-10
Figure 2-3. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Baltimore Harbor Tunnel 2-12
Figure 2-4. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Fort McHenry Tunnel 2-13
Figure 2-5. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Francis Scott Key Bridge 2-15
Figure 2-6. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, William Preston Lane Jr. Memorial (Bay) Bridge 2-17
Figure 2-7. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Harry W. Nice Memorial Bridge 2-18
Figure 2-8. Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018, Legacy System 2-20
Figure 2-9. E-ZPass® Market Share Trends 2-23
Figure 3-1. National and Maryland Geographies Profiled 3-2
Figure 3-2. Historical Unemployment Rates (Macro Geographies) 3-6
Figure 3-3. Historical Unemployment Rates (Sub-State Maryland Geographies) 3-7
Figure 3-4. Forecast National Unemployment Rates 3-7
Figure 3-5. Forecast National Real GDP Growth 3-10
Figure 3-6. Historical Inflation (CPI-U) Growth 3-11
Figure 3-7. Forecast National Inflation Growth 3-12
Figure 3-8. Historical Fuel Prices (Current $) 3-12
Figure 3-9. Forecast Fuel Prices (Current $) 3-13
Figure 4-1. Superzones for Baltimore Metropolitan Council Travel Demand Model Area 4-5
Figure 4-2. Approximate Distribution of Baltimore Harbor Tunnel Trips 4-6
Figure 4-3. Historical and Forecasted Transactions and Total Toll Revenue 4-26

List of Tables

Table ES-1. Historical and Forecasted Transactions and In-Lane Toll Revenue ES-6
Table ES-2. Historical and Forecasted In-Lane and "Other" Toll Revenue ES-8
Table ES-3. Comparison of MDTA Forecasted Revenue versus Actual, FY 2015 through FY 2018 ..... ES-9
Table ES-4. Comparison of 2016 Forecast versus 2017 Forecast of Total Toll Revenue (In-Lane and "Other" Toll Revenue) ES-10
Table 1-1. Northern Region Tolls 1-4
Table 1-2. Central Region Tolls 1-5

Table 1-3. Southern Region Tolls....1-6
Table 2-1. National and Statewide Trends in Vehicle Miles Traveled....2-2
Table 2-2. Average Annual Daily Traffic for Selected Northern Region Facilities....2-4
Table 2-3. Average Annual Daily Traffic for Selected Central Region Facilities....2-5
Table 2-4. Average Annual Daily Traffic for Selected Southern Region Facilities....2-6
Table 2-5. Comparison of FY 2017 Forecasted Versus Actual Legacy Transactions and Revenue....2-7
Table 2-6. Vehicle Class Distribution for the MDTA Legacy Facilities....2-21
Table 2-7. Method of Payment Distribution for the MDTA Legacy Facilities....2-22
Table 3-1. Socioeconomic Variables by Term, Historical Source, Forecast Source and Date....3-3
Table 3-2. Historical Population....3-4
Table 3-3. Forecast Population....3-4
Table 3-4. Historical Employment....3-5
Table 3-5. Forecast Employment....3-6
Table 3-6. Historical Real Income Per Capita (2009$)....3-8
Table 3-7. Forecast Real Income Per Capita Growth....3-9
Table 3-8. Historical Real GRP (millions of 2009$)....3-9
Table 3-9. Forecast Real GRP Growth....3-10
Table 4-1. John F. Kennedy Memorial Highway (I-95) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-9
Table 4-2. Thomas J. Hatem Memorial Bridge (US 40) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-10
Table 4-3. Baltimore Harbor Tunnel (I-895) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-12
Table 4-4. Fort McHenry Tunnel (I-95) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-13
Table 4-5. Francis Scott Key Bridge (I-695) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-15
Table 4-6. William Preston Lane Jr. Memorial Bridge (US 50/301) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-16
Table 4-7. Harry W. Nice Memorial Bridge (US 301) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class....4-18
Table 4-8. Historical and Forecasted Transactions and In-Lane Toll Revenue....4-19
Table 4-9. Historical and Forecasted Legacy Facilities “Other Toll Revenue”....4-21
Table 4-10. New Facilities Historical and Forecasted “Other Toll Revenue”....4-23
Table 4-11. Historical and Forecasted In-Lane and “Other Toll Revenue”....4-24
Table 4-12. In-Lane, “Other” and Total Revenue Forecasts....4-27
Table 4-13. Monthly Transactions by Method of Payment – FY 2018 and FY 2019....4-28
Table 4-14. Monthly In-Lane Toll Revenue by Method of Payment – FY 2018 and FY 2019....4-29
Table 4-15. Monthly Forecasted Transactions, In-Lane and “Other” Toll Revenue....4-30

Appendices

Appendix A Detailed Traffic and Revenue Forecasts by Facility

This page intentionally left blank.

Executive Summary

As one of the traffic and revenue consultants for the Maryland Transportation Authority (MDTA), CDM Smith conducted a traffic and revenue study for the seven legacy toll facilities operated by the MDTA shown in Figure ES-1. These seven facilities provide critical transportation infrastructure links for both local and regional movement of people and goods and fulfill varied roles within the local and regional transportation system. Accordingly, they therefore serve a varied mix of passenger car and commercial vehicle traffic that make toll payments by E-ZPass®, video and cash methods. Collectively, these facilities generated $605.3 million of In-Lane Toll Revenue in Fiscal Year (FY) 2018.

The objective of this study was to develop updated 10-year forecasts for each of the seven legacy facilities. The forecasts cover the period extending from FY 2019, beginning July 1, 2018, through FY 2028, ending June 30, 2028. The study made maximum use of all available data, including historical trend information by vehicle classification and methods of toll payment for each facility. The analysis also included a general overview of socioeconomic trends, both nationally and within the service areas of the tolled facility. A review and update of the socioeconomic and demographic data that help explain travel demand used to aid in forecasting transactions and revenue for each toll facility was also performed.

Transaction and toll revenue forecasts for the Intercounty Connector (ICC/MD 200), the State's first all-electronic, congestion-managed toll road, connecting the I-370 and I-95/US 1 corridors and the all-electronic, congestion-managed I-95 Express Toll Lanes℠ project were not included in this report. Separate traffic and revenue studies have been performed for these facilities.

What follows is an overview of the complete study effort, including a review of historical transaction and revenue trends, relevant socioeconomic conditions, and the 10-year transaction and revenue forecasts.

Historical Transaction and Revenue Trends

Historical transaction and revenue trend data provided by the MDTA for each of the seven legacy toll facilities were reviewed, including regional traffic trends on adjacent competing highways, as these trends served as inputs to updating future traffic growth rates used in developing the 10-year transaction and revenue forecasts. Additionally, E-ZPass® market penetration rates and vehicle classification distributions were also reviewed.

While transaction and revenue trends were reviewed for each facility, historical transaction and revenue data on a system-wide basis between FY 2005 and FY 2018 are described below and presented in Figure ES-2. Also shown in Figure ES-2 is the duration of recent recessions, as well as the years in which toll increases and decreases occurred. During the pre-recession period from FY 2005 through FY 2007, transaction growth slowed to an average of 0.9 percent per annum, tempered by three toll increases that occurred each year from FY 2002 through FY 2004.

Figure ES-1
Legacy Facilities Location Map

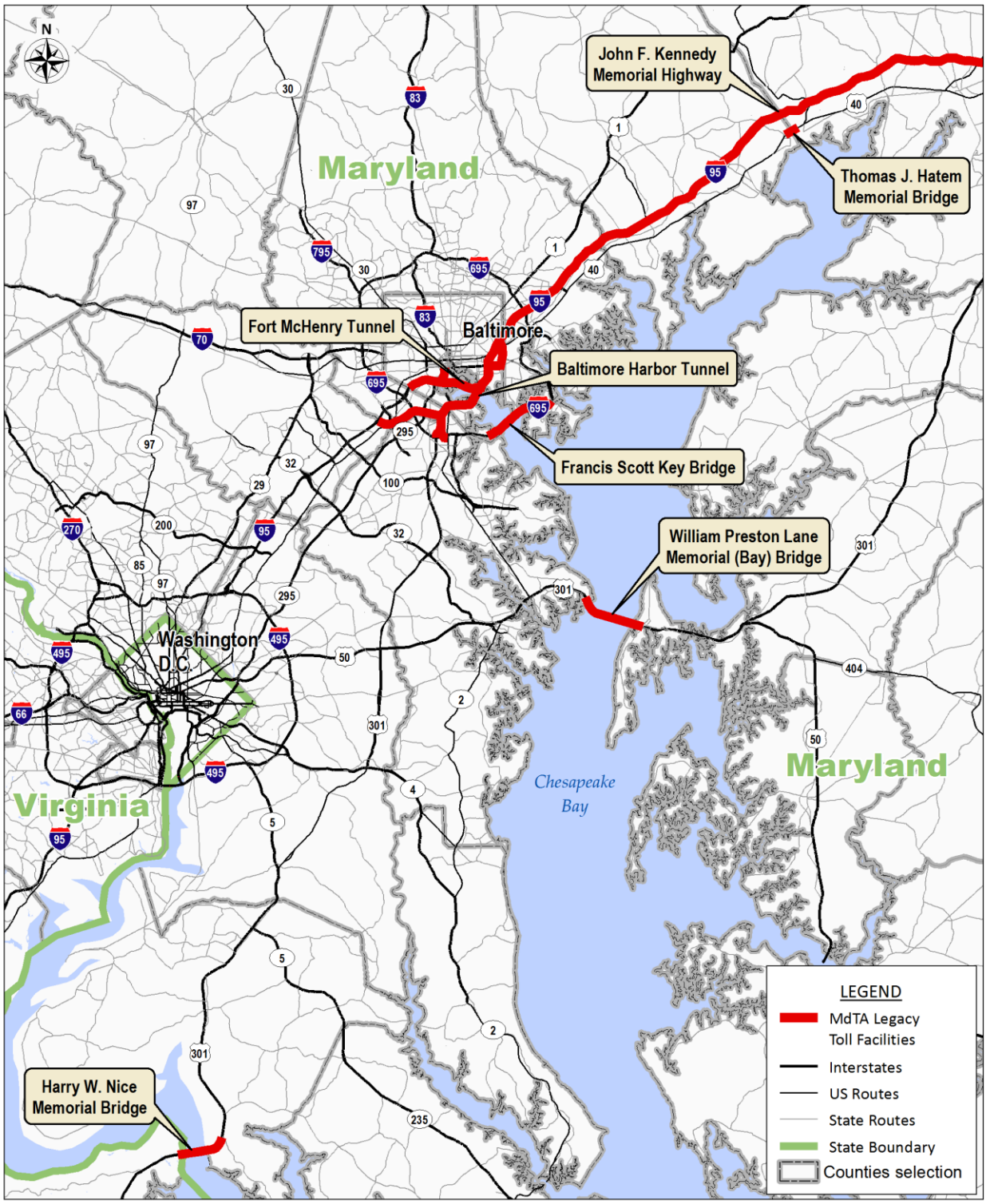
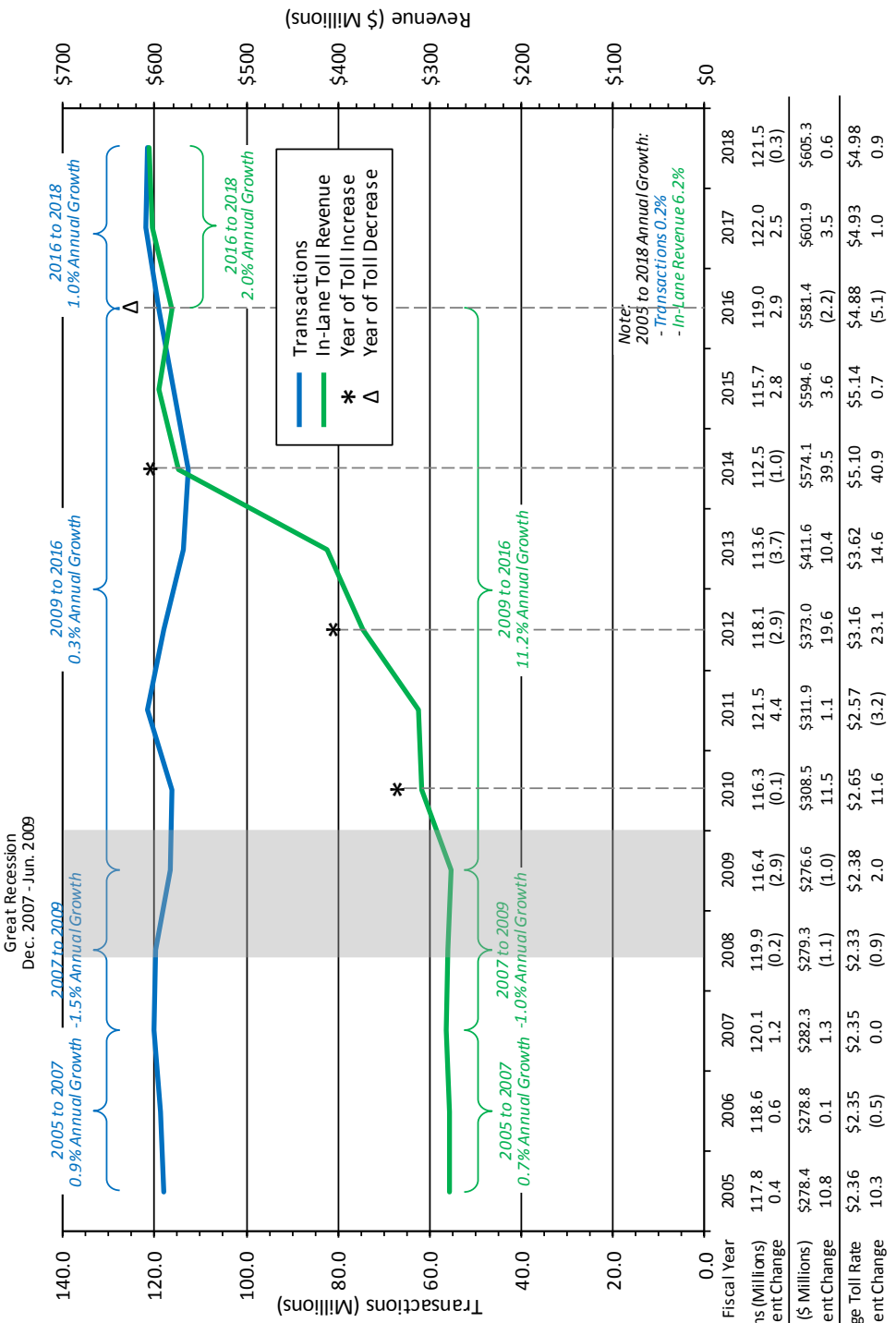


Figure ES-2
Systemwide Historical Transaction and Revenue Trends
FY 2005 through FY 2018



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	117.8	118.6	120.1	119.9	116.4	116.3	121.5	118.1	113.6	112.5	115.7	119.0	122.0	121.5
Percent Change	0.4	0.6	1.2	(0.2)	(2.9)	(0.1)	4.4	(2.9)	(3.7)	(1.0)	2.8	2.9	2.5	(0.3)
In-Lane Toll Revenue ($ Millions)	$278.4	$278.8	$282.3	$279.3	$276.6	$308.5	$311.9	$373.0	$411.6	$574.1	$594.6	$581.4	$601.9	$605.3
Percent Change	10.8	0.1	1.3	(1.1)	(1.0)	11.5	1.1	19.6	10.4	39.5	3.6	(2.2)	3.5	0.6
Average Toll Rate	$2.36	$2.35	$2.35	$2.33	$2.38	$2.65	$2.57	$3.16	$3.62	$5.10	$5.14	$4.88	$4.93	$4.98
Percent Change	10.3	(0.5)	0.0	(0.9)	2.0	11.6	(3.2)	23.1	14.6	40.9	0.7	(5.1)	1.0	0.9

During the ensuing Great Recession which officially began in December 2007 and ended in June 2009, transactions declined by an average of 1.5 percent per year. During the ensuing seven-year post-recession period from FY 2009 through FY 2016, that included three toll increases (FY 2010, FY 2012 and FY 2014) and a toll decrease in FY 2016, transactions increased by a modest 0.3 percent per annum. During this period, systemwide transactions peaked at 121.5 million, before decreasing annually through FY 2014 to 112.5 million due mainly to the annual toll increases. Transactions then increased in FY 2015 by 2.8 percent to 115.7 million and increased again in FY 2016 by 2.9 percent to 119.0 million. The increases in FY 2015 were primarily the result of the precipitous decline in the price of gasoline which began in early FY 2015. Gasoline prices fell by more than 50 percent per gallon from approximately $3.69 in July 2014 to a low of $1.87 in February 2016. Low gasoline prices continued through 2016, averaging close to $2.25 per gallon. These low prices, along with the FY 2016 systemwide toll reductions for a select number of payment methods and vehicle categories were the key factors that contributed to the transaction growth in FY 2016. Between FY 2016 and FY 2018, transactions increased by slightly more than 1.0 percent per annum from 119.0 million to 121.5 million. Transactions in FY 2018 declined by 0.3 percent from the 122.0 million processed in FY 2017. The continued modest increases in gasoline prices coupled with several major construction projects are the likely factors resulting in the modest decline in FY 2018 systemwide transactions.

As shown in Figure ES-2, during the pre-recession period from FY 2005 through FY 2007, revenue growth averaged 0.7 percent per annum. It should be noted that between FY 2000 and FY 2005 revenue had grown at a considerably greater average annual rate of 13.6 percent, fueled by annual toll increases from FY 2002 through FY 2004. As a result of the decreases in transaction growth related to the Great Recession, revenues declined in FY 2008 by 1.1 percent and in FY 2009 by 1.0 percent. During the post-recession period from FY 2009 through FY 2016, revenues increased considerably, aided the above-mentioned series of toll increases. Revenues increased by 11.2 percent during the seven-year pre-recession period from $276.6 million in FY 2009 to $581.4 million in FY 2016. Due to the systemwide select toll rate reductions in FY 2016 revenues declined by 2.2 percent from FY 2015 ($594.6 million). Between FY 2016 and FY 2018, In-Lane Toll Revenue increased by 2.0 percent per annum from $581.4 million to $605.3 million. In-Lane Toll Revenue in FY 2018 increased by 0.6 percent from $601.9 million in FY 2017. This modest increase may have been influenced by negative traffic impacts resulting from continued modest increases in gasoline prices and construction projects on the legacy facilities. Annual In-Lane Toll Revenue growth has averaged 6.2 percent per annum between FY 2005 and FY 2018.

Socioeconomic Review

The latest historical and forecast socioeconomic data were collected and analyzed in this update, with the findings summarized in Chapter 3. One of the more noteworthy takeaways from the historical data is an improvement in the labor markets as employment increased and the unemployment rates steadily declined since the recession that officially occurred from December 2007 through June 2009. Additionally, gasoline prices have been relatively low and stable since the peak in early 2008 and since the prices reached $3.00 a gallon between 2011 and 2014. Both of these factors are likely favorable in terms of having contributed to stronger traffic growth/demand on the MDTA facilities. As an example of the positive economic growth, the Bureau of Labor Statistics from the last five full years (2012 through 2017) for which data were available shows that the economic recovery from the recent recession resulted in growth in State of Maryland employment of 1.2 percent per annum, and regional employment growth ranging from 0.3 percent to 1.5 percent per annum depending on the geography. This growth in employment is significant, especially when compared with the employment

contraction from 2007 to 2010 in the amount of -0.3 percent per annum for the State of Maryland. Additionally, during the same period, and depending on geography, employment growth ranged from a low of -3.5 percent per annum (Lower Eastern Shore) to a high of 0.6 percent per annum (Washington Suburban).

Based on the analysis of the forecast data, the overall growth in traffic demand is anticipated to be moderate over the coming decade, and the recently experienced strong pace of traffic growth is expected to decelerate as the socioeconomic forecasts generally exhibit deceleration of growth relative to the recent rebound period from the last recession. These updated growth forecasts were incorporated into the current traffic and toll revenue forecast model.

Forecasts of Traffic and Revenue

A summary of both historical and forecasted transactions and In-Lane Toll Revenue from FY 2008 through FY 2028 by facility and aggregated to the total MDTA system is presented in Table ES-1 and shown graphically in Figure ES-3. The forecasts are also provided by facility and vehicle class in Appendix A. In FY 2019, the initial year of the forecast, 121.7 million transactions have been forecasted, a 0.1 percent increase over FY 2018. In-Lane Toll Revenues are forecasted at $611.1 million, a 1.0 percent increase over FY 2018. Transaction and revenue growth between FY 2019 and FY 2021 will be impacted considerably by the Canton Viaduct Replacement Project on I-895. Traffic diversions from the BHT are estimated at 30,000 vehicles per day. And, while the vast majority of this traffic will divert to either the FMT or FSK, it is estimated that approximately 4,500 vehicles per day will divert to alternative toll-free routes during the construction period. The resultant revenue loss has been estimated at just over $5 million per year, or more than $10 million over the 24-month construction period.

Following the robust transaction increases between FY 2015 and FY 2017, which were heavily influenced by historically low gasoline prices, the delayed economic recovery, and the FY 2016 toll reductions, annual transaction and revenue growth rates going forward are estimated to increase at more moderate rates ranging between 0.1 to 1.7 percent, consistent with long-term historical trends. Total transactions are forecasted to grow to 130.5 million by FY 2028, or a total of 7.2 percent during the forecast period. This equates to a growth rate of 0.8 percent per annum. In-Lane Toll Revenue follows similar growth trends, increasing by a total of 6.7 percent from $611.1 million in FY 2019 to $652.2 million in FY 2028, equating to an average annual change of 0.7 percent.

In addition to the forecasted transactions and In-Lane Toll Revenue, forecasts of various “Other Toll Revenue” sources for the MDTA were developed. These include unused toll revenue through the commuter program, transponder sales, civil penalties, commercial discounts, over-size permits, concession revenue and revenue associated with the Hatem E-Z Pass program. The “Other Toll Revenue” forecasts, along with In-Lane and total revenue are provided in Table ES-2.

Forecast Comparison

To set the context for the current forecast, this section provides a comparison of prior revenue forecasts to the actual revenue collected by MDTA, as well as a comparison of the most recent prior forecast to the current forecast.

Table ES-1
Historical and Forecasted Transactions and In-Lane Toll Revenue

Fiscal Year	Transactions (Millions)								Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [1]	
2008 [2]	14.65	5.56	25.77	44.83	12.34	13.37	3.39	**119.91**	
2009	14.64	5.04	25.53	43.45	11.69	12.75	3.35	**116.45**	(2.9)
2010 [3]	14.75	4.99	25.23	44.06	10.96	12.99	3.35	**116.33**	(0.1)
2011	15.38	5.07	26.12	46.29	11.65	13.56	3.40	**121.47**	4.4
2012 [2,3]	14.82	5.03	25.75	44.52	11.05	13.63	3.29	**118.09**	(2.8)
2013 [3]	14.58	4.56	23.97	43.58	10.92	12.74	3.26	**113.61**	(3.8)
2014 [3]	14.38	4.95	24.90	41.88	10.42	12.76	3.24	**112.53**	(1.0)
2015	14.69	5.25	27.10	41.85	10.63	12.86	3.31	**115.67**	2.8
2016 [2,4]	15.16	5.09	28.29	42.64	11.20	13.27	3.38	**119.03**	2.9
2017	15.55	5.10	27.61	45.38	11.31	13.59	3.42	**121.96**	2.5
2018	15.45	5.09	28.01	44.72	11.43	13.52	3.33	**121.54**	(0.3)
2019	15.52	5.09	22.78	48.97	12.50	13.52	3.31	**121.69**	0.1
2020 [2]	15.66	5.12	18.94	52.46	13.88	13.55	3.30	**122.91**	1.0
2021	15.73	5.13	19.05	52.63	13.91	13.53	3.30	**123.28**	0.3
2022	15.84	5.16	29.24	46.91	11.47	13.47	3.31	**125.39**	1.7
2023	15.98	5.19	30.36	46.61	11.30	13.48	3.33	**126.24**	0.7
2024 [2]	16.16	5.23	30.63	47.01	11.40	13.67	3.36	**127.46**	1.0
2025	16.25	5.24	30.73	47.15	11.44	13.67	3.38	**127.86**	0.3
2026	16.39	5.27	30.92	47.43	11.50	13.70	3.40	**128.62**	0.6
2027	16.54	5.29	31.11	47.71	11.57	13.74	3.43	**129.38**	0.6
2028 [2]	16.72	5.34	31.39	48.12	11.67	13.81	3.46	**130.50**	0.9

Fiscal Year	In-Lane Toll Revenue ($ Millions)								Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [1]	
2008 [2]	$ 92.71	$ 3.89	$ 35.33	$ 84.03	$ 19.41	$ 33.88	$ 10.08	**$ 279.33**	
2009	95.14	2.07	35.61	82.97	18.56	32.51	9.77	**276.63**	(1.0)
2010 [3]	107.35	2.61	37.01	94.02	20.54	36.79	10.15	**308.47**	11.5
2011	107.39	2.82	37.85	95.32	20.78	37.62	10.15	**311.93**	1.1
2012 [2,3]	116.01	5.25	48.74	118.82	25.82	46.74	11.60	**372.98**	19.6
2013 [3]	121.86	7.80	52.05	135.61	28.94	52.40	12.97	**411.63**	10.4
2014 [3]	162.80	10.17	77.56	183.13	40.26	79.76	20.40	**574.08**	39.5
2015	166.54	11.19	85.54	185.78	42.97	81.16	21.41	**594.58**	3.6
2016 [2,4]	171.18	11.80	89.87	191.29	43.28	52.79	21.20	**581.41**	(2.2)
2017	175.81	12.09	89.46	204.18	44.94	53.96	21.47	**601.91**	3.5
2018	177.20	11.59	91.39	205.06	45.88	53.43	20.74	**605.29**	0.6
2019	179.26	11.56	74.44	222.57	49.20	53.41	20.61	**611.05**	1.0
2020 [2]	181.53	11.49	61.66	237.15	53.29	53.49	20.57	**619.18**	1.3
2021	182.63	11.42	61.97	237.82	53.46	53.42	20.55	**621.27**	0.3
2022	183.88	11.46	96.12	217.56	46.14	53.24	20.63	**629.04**	1.3
2023	185.35	11.53	99.78	216.40	45.62	53.35	20.78	**632.80**	0.6
2024 [2]	187.26	11.62	100.55	217.89	45.93	54.13	20.99	**638.37**	0.9
2025	188.16	11.65	100.78	218.20	45.99	54.19	21.08	**640.04**	0.3
2026	189.57	11.71	101.28	219.10	46.18	54.40	21.24	**643.48**	0.5
2027	191.01	11.77	101.78	220.01	46.37	54.62	21.39	**646.94**	0.5
2028 [2]	192.98	11.86	102.56	221.53	46.69	54.98	21.61	**652.21**	0.8

[1] Summations may not equal total due to rounding.

[2] Leap Year

[3] Year of toll increase.

[4] Year of toll decrease.

- Represents actual data.

Figure ES-3
Historical and Forecasted Transactions and In-Lane Toll Revenue

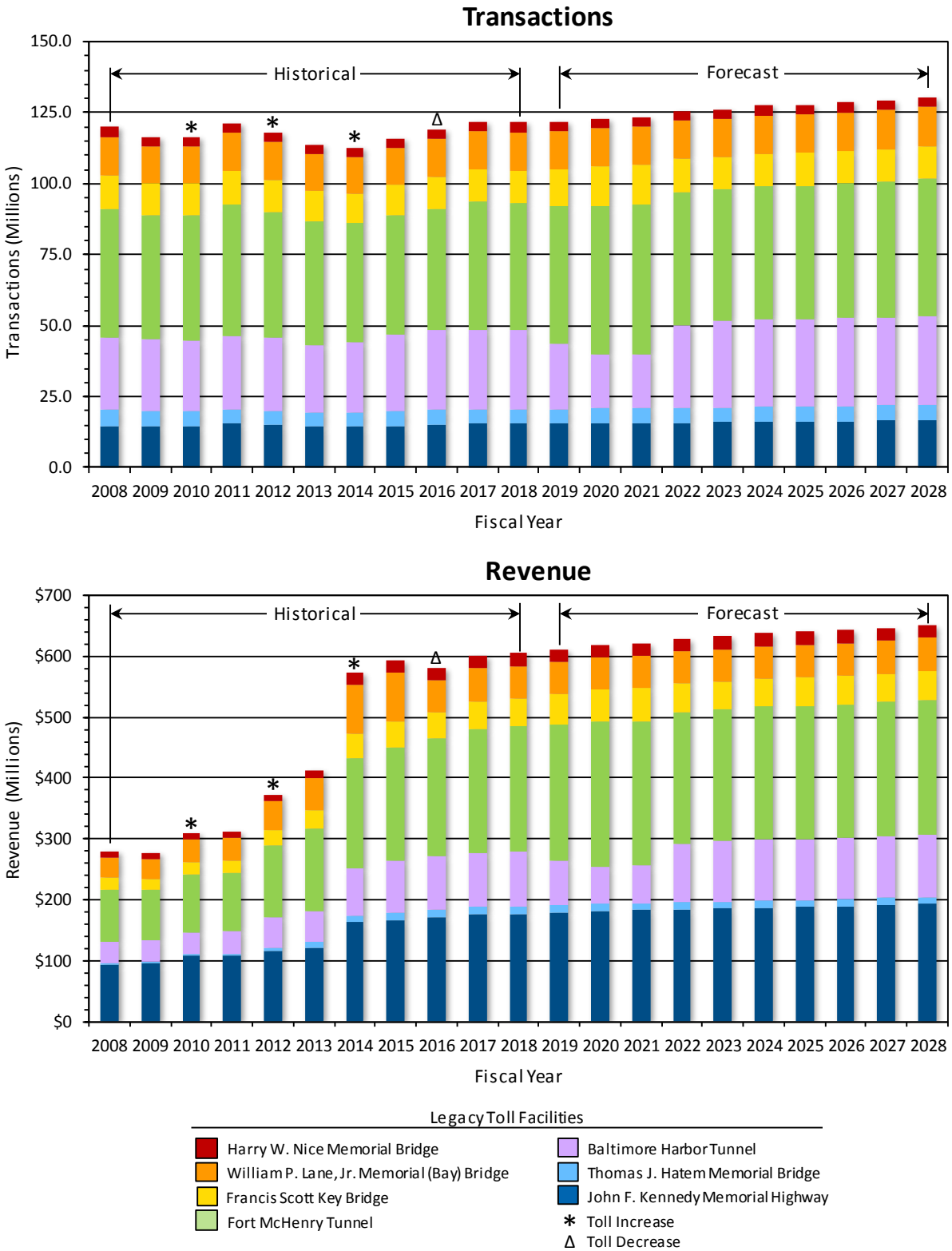


Table ES-2
Historical and Forecasted In-Lane and "Other" Toll Revenue

Fiscal Year	In-Lane Toll Revenue ($ millions)	"Other Toll Revenue" ($ millions)																
		Legacy Facilities												New Facilities "Other Toll Revenue" [5]				
		Service Fees and Sales				Violation Recovery			Commercial Vehicles					Service Fees and Sales		Violation Recovery		
	Total for Legacy Facilities	Unused Pre-Paid Trip Revenue	Trans-ponder Sales	Monthly Account Fees	Hatem E-Z Pass Program	Notice of Toll Due Fees	Civil Penalties [3]	Violation Fees	Post-Usage Discount	High Frequency Discount	Over- size Permit Fee	Concession Revenue [4]		Trans-ponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties [3]	Total "Other Toll Revenue"	Total Revenue [6]
2008	**$ 279.30**	$ 4.30	$ -	$ -	$ -	$ -	$ -	$ 3.00	$ (5.00)	$ -	$ -	$ 8.00		$ -	$ -	$ -	$ -	**$ 10.30**	**$ 289.60**
2009	**276.60**	4.50	-	-	-	-	-	1.90	(4.80)	-	-	8.00		-	-	-	-	**9.60**	**286.20**
2010 [1]	**308.50**	6.60	1.40	9.60	-	1.10	-	2.30	(6.60)	(0.20)	1.00	8.20		-	-	-	-	**23.40**	**331.90**
2011	**312.00**	6.50	1.90	9.90	-	1.30	-	1.30	(6.70)	(0.30)	1.20	7.90		-	-	-	-	**23.00**	**335.00**
2012 [1]	**373.00**	9.10	1.70	4.70	0.30	0.80	-	2.80	(5.90)	(0.20)	1.30	7.60		-	-	-	-	**22.20**	**395.20**
2013 [1]	**411.60**	11.50	1.30	5.30	0.80	0.10	-	4.00	(4.60)	(0.70)	1.30	4.10		-	-	-	-	**23.10**	**434.70**
2014 [1]	**574.08**	18.69	1.22	5.75	1.49	-	4.55	0.04	(5.89)	(0.64)	1.04	3.23		0.16	0.76	0.10	2.35	**32.85**	**606.93**
2015	**594.58**	16.81	1.44	5.87	1.52	-	10.75	0.01	(6.34)	(0.62)	1.15	5.07		0.19	0.79	0.01	5.73	**42.38**	**636.96**
2016 [2]	**581.41**	17.36	1.66	1.29	1.60	-	10.00	-	(6.39)	(1.06)	1.13	6.21		0.27	0.22	-	8.28	**40.57**	**621.98**
2017	**601.91**	14.04	2.00	1.42	1.62	-	20.65	-	(6.79)	(1.16)	1.16	6.01		0.22	0.24	-	21.04	**60.46**	**662.38**
2018	**605.29**	13.64	1.40	1.51	1.67	-	16.13	-	(7.91)	(1.29)	1.16	6.34		0.35	0.26	-	13.61	**46.86**	**652.16**
2019	**611.05**	13.71	0.52	-	1.68	-	18.11	-	(7.99)	(1.30)	1.17	6.39		0.08	-	-	16.66	**49.04**	**660.09**
2020	**619.18**	13.78	0.52	-	1.69	-	18.30	-	(8.07)	(1.30)	1.18	6.40		0.08	-	-	16.74	**49.32**	**668.50**
2021	**621.27**	13.85	0.52	-	1.70	-	18.48	-	(8.15)	(1.31)	1.20	6.42		0.08	-	-	16.83	**49.61**	**670.88**
2022	**629.04**	13.92	0.52	-	1.71	-	18.66	-	(8.23)	(1.32)	1.21	6.44		0.09	-	-	16.91	**49.90**	**678.94**
2023	**632.80**	13.99	0.53	-	1.72	-	18.85	-	(8.32)	(1.32)	1.22	6.45		0.09	-	-	17.00	**50.19**	**682.99**
2024	**638.37**	14.06	0.53	-	1.72	-	19.04	-	(8.40)	(1.33)	1.23	6.47		0.09	-	-	17.08	**50.49**	**688.86**
2025	**640.04**	14.13	0.53	-	1.73	-	19.23	-	(8.48)	(1.34)	1.25	6.48		0.09	-	-	17.17	**50.78**	**690.83**
2026	**643.48**	14.20	0.53	-	1.74	-	19.42	-	(8.57)	(1.34)	1.26	6.50		0.09	-	-	17.25	**51.08**	**694.56**
2027	**646.94**	14.27	0.54	-	1.75	-	19.61	-	(8.65)	(1.35)	1.27	6.52		0.09	-	-	17.34	**51.38**	**698.32**
2028	**652.21**	14.34	0.54	-	1.76	-	19.81	-	(8.74)	(1.36)	1.28	6.53		0.09	-	-	17.43	**51.68**	**703.89**

Source: Historical data from MDTA

[1] Year of toll increase.

[2] Year of toll decrease.

[3] Civil Penalties actuals and estimates provided by MDTA.

[4] Concession revenue forecast provided by MDTA and prepared by Areas Inc.

[5] InterCounty Connector and I-95 ETLs

[6] Summations may not equal total revenue due to rounding.

- Represents actual data.

Table ES-3 provides prior forecasts of In-Lane Toll Revenue and Total Toll Revenue from FY 2015 through FY 2018, as well as the actual In-Lane Toll Revenue and Total Toll Revenue collected by MDTA. In general, this table provides an indication of the reasonableness of recent forecasts. The table identifies the year in which the forecast was prepared, the fiscal year being forecasted and the accuracy of those forecasts for both In-Lane Toll Revenue and Total Toll Revenue. Both actual In-Lane Toll Revenue and actual Total Toll Revenue have exceeded the forecasts prepared in 2014, 2015 and 2016, and underperformed the 2017 forecast. Actual FY 2018 In-Lane Toll Revenues and Total Toll Revenues were 1.4 percent and 3.2 percent below the last forecast, respectively. Several unanticipated factors may have resulted in actual traffic and toll revenues underperforming the FY 2018 forecast. These include higher than expected increases in motor fuel prices and higher than expected impacts from the construction activity at the Harbor Crossings that typically suppress discretionary passenger car trips. Based on short-term fuel elasticity in the range of -0.01 to -0.0125, the 12 percent year-over-year increase in fuel prices in FY 2018 potentially resulted in a 1 percent decrease in transactions and revenue systemwide. Without the fuel price impacts, the percent difference in In-Lane Toll Revenue would have been reduced to roughly 0.5 percent.

While In-Lane Toll Revenues were roughly $9 million below the prior forecast, total revenues were an additional $13 million lower because of overestimates in Civil Penalties and Other Revenue. The prior forecast assumed Other revenue would increase over FY 2017 levels based on historical trends. However, due to a reduction in toll administrative revenues collected from civil penalties, less Other Revenue was collected than expected in FY 2018, causing the actual to deviate from the forecast.

Table ES-4 provides a comparison of the last 10-year forecast for legacy facilities (prepared in October 2017) with the current forecast. These forecasts include both In-Lane and "Other" Toll Revenue. Highlighted in blue is the FY 2018 actual total revenue collected, which was 3.2 percent or $21.8 million below the forecast. The latest forecast of Total Revenue is 3.3 percent or $232.7 million less than the prior forecast from FY 2018 to FY 2027.

Table ES-3
Comparison of MDTA Forecasted Revenue versus Actual, FY 2015 through FY 2018

Year Forecast Prepared	Fiscal Year Forecasted	Forecast		Actual		Percent Difference	
		In-Lane Toll Revenue	Total Toll Revenue	In-Lane Toll Revenue	Total Toll Revenue	In-Lane Toll Revenue	Total Toll Revenue
2014	2015	$ 575.1	$ 611.1	$ 594.6	$ 637.0	3.4	4.2
2015	2016	561.7	592.7	581.4	622.0	3.5	4.9
2016	2017	589.6	628.3	601.9	662.4	2.1	5.4
2017	2018	614.0	673.5	605.3	651.7	(1.4)	(3.2)

(1) Forecasts prepared by CDM Smith.

Table ES-4
Comparison of 2017 Forecast versus 2018 Forecast
of Total Toll Revenue (In-Lane and "Other" Toll Revenue)

	Total Revenue			
Fiscal Year	2017 Forecast	2018 Forecast	Difference	Percent Difference
2018	$ 673.5	$ 651.7	$ (21.8)	(3.2)
2019	684.0	654.8	(29.2)	(4.3)
2020	688.3	663.2	(25.1)	(3.6)
2021	691.4	665.5	(25.9)	(3.7)
2022	694.8	673.5	(21.3)	(3.1)
2023	699.0	677.6	(21.4)	(3.1)
2024	705.0	683.4	(21.6)	(3.1)
2025	706.9	685.3	(21.6)	(3.1)
2026	711.4	689.0	(22.4)	(3.1)
2027	715.1	692.7	(22.4)	(3.1)
Total	**$ 6,969.4**	**$ 6,736.7**	**$ (232.7)**	**(3.3)**

- Represents actual data.

Chapter 1
Introduction

Under contract to the Maryland Transportation Authority (MDTA), CDM Smith conducted a Traffic and Revenue Update Study for the legacy bridges, tunnels, and highways currently operated by the MDTA, which is the subject of this report. The study culminated in the development of 10-year transaction and revenue estimates for each facility through FY 2028. This report summarizes the study analysis, including a presentation of historical and current traffic trends, relevant socioeconomic conditions and forecasts, and the 10-year transaction and revenue forecasts.

1.1 System Description and History

The seven legacy toll facilities currently owned and operated by the MDTA include:

- Thomas J. Hatem Memorial Bridge (Hatem Bridge)
- John F. Kennedy Memorial Highway, excluding the Express Toll Lanes (Kennedy Highway)
- Baltimore Harbor Tunnel (Harbor Tunnel)
- Fort McHenry Tunnel (Fort McHenry Tunnel)
- Francis Scott Key Bridge (Key Bridge)
- William Preston Lane Jr. Memorial Bridge (Bay Bridge)
- Harry W. Nice Memorial Bridge (Nice Bridge)

The Intercounty Connector (ICC/MD 200), the State's first all-electronic, congestion-managed toll road connecting the I-370 and I-95 corridors and the all-electronic congestion-managed I-95 Express Toll Lanes℠ project are *not addressed* in this report. Separate traffic and revenue studies have been performed for these facilities.

The objective of this analysis was to develop updated 10-year forecasts for each of the seven legacy facilities. The forecast period extends from FY 2019, beginning July 1, 2018, through FY 2028, ending June 30, 2028. The study made maximum use of all available data, including historical traffic trend information by vehicle category and method of toll payment for each facility. The analysis also includes a general overview of economic trends, both nationally and within the service areas of each facility.

1.1.1 System Description

Figure 1-1 shows the locations of the seven MDTA legacy facilities in a regional context. The legacy facilities fulfill varied roles within the local and regional transportation system and consequently have a mix of traffic, including both E-ZPass®, video and cash customers. Collectively, these facilities generated $605.3 million of In-Lane Toll Revenue in FY 2018.

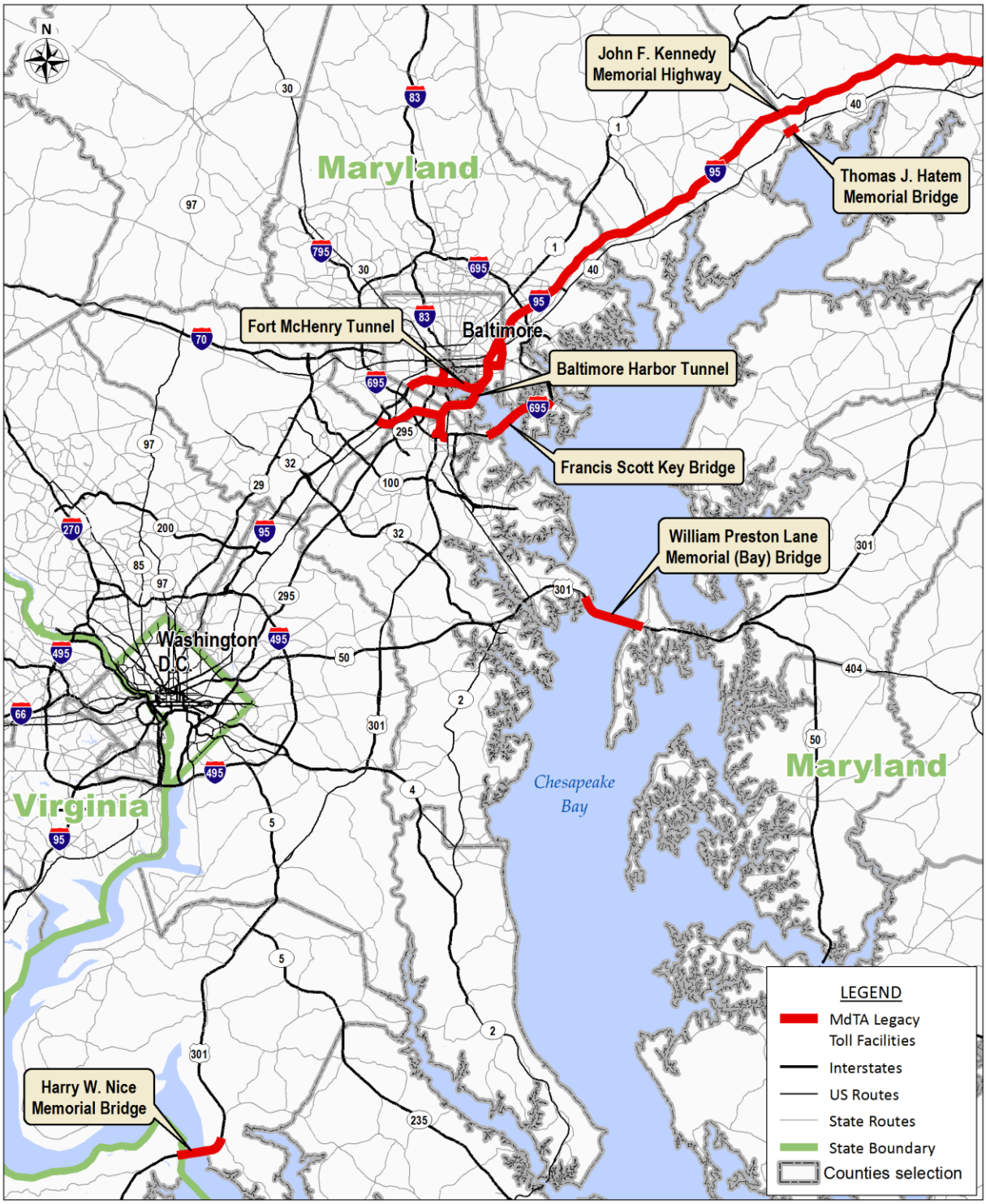


Figure 1-1
Legacy Facilities Location Map

The MDTA has separated the seven toll facilities into three regions. The Northern Region consists of the John F. Kennedy Memorial Highway and the Thomas J. Hatem Bridge. The Central Region consists of the Fort McHenry Tunnel, the Baltimore Harbor Tunnel, and the Francis Scott Key Bridge. The Southern Region consists of the Harry W. Nice Memorial Bridge and the William Preston Lane Jr. Memorial (Bay) Bridge.

In the Northern Region, the Thomas J. Hatem Bridge and the John F. Kennedy Memorial Highway form two parallel crossings of the Susquehanna River. The Hatem Bridge carries US 40 across the river and is the oldest of the MDTA's facilities, having been open to traffic since August 1940. The existing structure replaced an older bridge that first opened in 1910. The John F. Kennedy Memorial Highway is a 50-mile segment of I-95 that was opened in November 1963. The mainline toll plaza is located just northeast of the Susquehanna River.

The Central Region contains three alternative routes that cross Baltimore Harbor: the Baltimore Harbor Tunnel (I-895), the Francis Scott Key Bridge (I-695), and the Fort McHenry Tunnel (I-95). The oldest of the three Baltimore Harbor crossings is the Harbor Tunnel which opened in November 1957. The Key Bridge was built to alleviate congestion and delays at the Harbor Tunnel and was opened in March 1977. The newest of these facilities, the Fort McHenry Tunnel, an eight-lane crossing that opened in November 1985, completed the triplet of existing harbor crossings.

The Southern Region contains two facilities which carry US 301 to diverse destinations. The William Preston Lane Jr. Memorial (Bay) Bridge was first opened to traffic in July 1952 and crosses the Chesapeake Bay. Twenty-one years later in June 1973, a parallel span carrying westbound traffic was opened, with the original span carrying eastbound traffic. The Harry W. Nice Bridge was opened in December 1940, connecting Maryland with Virginia, thereby allowing travelers making regional through-trips to bypass the Washington DC area. As one of MDTA's original bridges, the Nice Bridge will receive a deck replacement between Spring 2020 and 2023 to update and widen the existing structure.

1.1.2 Toll Rate Structure and History

An understanding of the structure of payment options for MDTA customers was necessary in developing the traffic and revenue forecasts. Since different method of payment categories tend to have different travel patterns, values of time and trip frequencies, the traffic and revenue forecasts were also developed by method of payment category. This necessitated an understanding of the various payment options offered by MDTA, a summary of which is provided here.

MDTA customers have the option of paying their toll through a variety of toll payment methods. The MDTA legacy facility customers can pay via E-ZPass®, video tolling or cash. In general, Maryland registered E-ZPass® customers receive a discount over cash customers, while E-ZPass® customers with transponders from out-of-state pay the same base toll rate as the cash customers. In addition, as of May 23, 2018, the $7.50 E-ZPass Maryland transponder fee was eliminated for all new customers. Video tolling customers pay a 50 percent surcharge over the base toll rate. MDTA also offers several discount programs for commuters, shoppers using the Bay Bridge, motorists using the Hatem Bridge, and high-volume and frequent-user commercial vehicle accounts. Some of these discounts are substantial, such as the Hatem Discount Plans, which provide Hatem Bridge customers with unlimited trips for a flat annual fee of $20. The current toll schedules by Region are presented in Tables 1-1 through 1-3.

Table 1-1
Northern Region Tolls

Method of Payment	Vehicle Class	John F. Kennedy Memorial Highway (I-95) Before July 1, 2015	John F. Kennedy Memorial Highway (I-95) After July 1, 2015	Thomas J. Hatem Memorial Bridge (US 40) Before July 1, 2015	Thomas J. Hatem Memorial Bridge (US 40) After July 1, 2015
Maryland E-ZPass® (5)	Commuter, 2-axles (2)	$2.80	**	$2.80 (1)	** (1)
	Class 2 2-axles	$7.20	$6.00	$7.20 (1)	$6.00 (1)
	Class 3 3-axles	$16.00	**	$16.00	$11.20
	Class 4 4-axles	$24.00	**	$24.00	$16.80
	Class 5 5-axles (3)(4)	$48.00	**	$48.00	**
	Class 6 6+-axles (3)(4)	$60.00	**	$60.00	**
Cash / Base / Non-MD E-ZPass®	Class 2 2-axles	$8.00	**	$8.00	**
	Class 3 3-axles	$16.00	**	$16.00	**
	Class 4 4-axles	$24.00	**	$24.00	**
	Class 5 5-axles	$48.00	**	$48.00	**
	Class 6 6+-axles	$60.00	**	$60.00	**
Video	Class 2 2-axles	$12.00	**	$12.00	**
	Class 3 3-axles	$24.00	**	$24.00	**
	Class 4 4-axles	$36.00	**	$36.00	**
	Class 5 5-axles	$63.00	**	$63.00	**
	Class 6 6+-axles	$75.00	**	$75.00	**

** Indicates no change from previous toll rate.

Notes:

(1) Two E-ZPass® Hatem Bridge plans were made available as of Sept. 30, 2012:
- The first replaced the Hatem Bridge AVI Decal Program and was offered for two-axle vehicles only with an existing valid transponder beginning Feb. 1, 2012, providing unlimited trips on the Hatem Bridge only. The plan cost $10 beginning on Feb. 1, 2012 and increased to $20 on July 1, 2013.
- The second plan opened the Hatem Bridge-Only Plan to existing or new E-ZPass® Maryland customers. The primary difference is that accounts under the second plan are subject to a monthly maintenance fee for out-of-state residents with 3 or fewer transactionsand pre-paid toll deposits, while those under the first plan are not.

(2) Commuter rates are for two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 50 trips and costs $70.00. Two "trips" are required per transaction for the Northern Region facilities per trip. All commuter plans (E-ZPass®) are valid for 45 days.

(3) Business accounts operating five-or-more-axle vehicles may qualify for an E-ZPass® post-usage discount based on the tolls paid in every 30-day period, with a 10 percent discount offered for total monthly tolls of $150.00 to $1,999.99, 15 percent for total monthly tolls of $2,000.00 to $7,500.00 and 20 percent for total monthly tolls of over $7,500.00.

(4) A supplemental rebate program is offered to five-or-more-axle vehicles with individual transponders making 60 or more trips per month. As of July 1, 2015, a 10 percent discount is offered for five- or more-axle vehicle transponders making 60-79 trips per month, 15 percent for 80-99 trips per month, and 20 percent for 100 or more per month.

(5) As of May 23, 2018, the $7.50 E-ZPass Maryland transponder fee was eliminated for all new customers.

Table 1-2
Central Region Tolls

Method of Payment	Vehicle Class	Baltimore Harbor Tunnel (I-895), Fort McHenry Tunnel (I-95/I-395) and Francis Scott Key Bridge (I-695)	
		Before July 1, 2015	After July 1, 2015
Maryland E-ZPass® (5)	Commuter, 2-axles (1)	$1.40	**
	Class 2 2-axles	$3.60	$3.00
	Class 3 3-axles (4)	$8.00	**
	Class 4 4-axles (4)	$12.00	**
	Class 5 5-axles (2)(3)(4)	$24.00	**
	Class 6 6+-axles (2)(3)(4)	$30.00	**
Cash / Base / Non-MD E-ZPass®	Class 2 2-axles	$4.00	**
	Class 3 3-axles	$8.00	**
	Class 4 4-axles	$12.00	**
	Class 5 5-axles	$24.00	**
	Class 6 6+-axles	$30.00	**
Video	Class 2 2-axles	$6.00	**
	Class 3 3-axles	$12.00	**
	Class 4 4-axles	$18.00	**
	Class 5 5-axles	$36.00	**
	Class 6 6+-axles	$45.00	**

** Indicates no change from previous toll rate.

Notes:

(1) Commuter rates are for two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 50 trips and costs $70.00. All commuter plans (E-ZPass®) are valid for 45 days.

(2) Business accounts operating five-or-more-axle vehicles may qualify for an E-ZPass® post-usage discount based on the tolls paid in every 30-day period, with a 10 percent discount offered for total monthly tolls of $150.00 to $1,999.99, 15 percent for total monthly tolls of $2,000.00 to $7,500.00 and 20 percent for total monthly tolls of over $7,500.00.

(3) A supplemental rebate program is offered to five-or-more-axle vehicles with individual transponders making 60 or more trips per month. As of July 1, 2015, a 10 percent discount is offered for five- or more-axle vehicle transponders making 60-79 trips per month, 15 percent for 80-99 trips per month, and 20 percent for 100 or more per month.

(4) As of January 1, 2016, commercial-vehicle drivers with a valid Maryland E-ZPass® account and transponder pay $2.00 per axle for 3, 4, 5 and 6+ axle vehicles when using the I-895/Childs Street ramps at the Baltimore Harbor Tunnel or the I-695/Broening Highway turnaround at the Francis Scott Key Bridge.

(5) As of May 23, 2018, the $7.50 E-ZPass Maryland transponder fee was eliminated for all new customers.

Table 1-3
Southern Region Tolls

Method of Payment	Vehicle Class	William Preston Lane, Jr. Memorial (Bay) Bridge (US 50/301) Before July 1, 2015	William Preston Lane, Jr. Memorial (Bay) Bridge (US 50/301) After July 1, 2015	Gov. Harry W. Nice Memorial Bridge (US 301) Before July 1, 2015	Gov. Harry W. Nice Memorial Bridge (US 301) After July 1, 2015
Maryland E-ZPass® (5)	Commuter, 2-axles (1)	$2.10	$1.40	$2.10	**
	Shoppers, 2-axles (2)	$3.00	$2.00	Not Applicable at this Facility	
	Class 2 2-axles	$5.40	$2.50	$5.40	$4.50
	Class 3 3-axles	$12.00	$8.00	$12.00	**
	Class 4 4-axles	$18.00	$12.00	$18.00	**
	Class 5 5-axles (3)(4)	$36.00	$24.00	$36.00	**
	Class 6 6+-axles (3)(4)	$45.00	$30.00	$45.00	**
Cash / Base / Non-MD E-ZPass®	Class 2 2-axles	$6.00	$4.00	$6.00	**
	Class 3 3-axles	$12.00	$8.00	$12.00	**
	Class 4 4-axles	$18.00	$12.00	$18.00	**
	Class 5 5-axles	$36.00	$24.00	$36.00	**
	Class 6 6+-axles	$45.00	$30.00	$45.00	**
Video	Class 2 2-axles	$9.00	$6.00	$9.00	**
	Class 3 3-axles	$18.00	$12.00	$18.00	**
	Class 4 4-axles	$27.00	$18.00	$27.00	**
	Class 5 5-axles	$51.00	$36.00	$51.00	**
	Class 6 6+-axles	$60.00	$45.00	$60.00	**

** Indicates no change from previous toll rate.

Notes:

(1) Commuter rates are for two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 25 trips and are valid for 45 days. The Bay Bridge Plan costs $35.00 and the Nice Bridge Plan costs $52.50.

(2) Shopper rates are for two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 10 trips that can be used Sunday through Thursday and costs $20.00. All shopper plans are valid for 90 days.

(3) Business accounts operating five-or-more-axle vehicles may qualify for an E-ZPass® post-usage discount based on the tolls paid in every 30-day period, with a 10 percent discount offered for total monthly tolls of $150.00 to $1,999.99, 15 percent for total monthly tolls of $2,000.00 to $7,500.00 and 20 percent for total monthly tolls of over $7,500.00.

(4) A supplemental rebate program is offered to five-or-more-axle vehicles with individual transponders making 60 or more trips per month. As of July 1, 2015, a 10 percent discount is offered for five- or more-axle vehicle transponders making 60-79 trips per month, 15 percent for 80-99 trips per month, and 20 percent for 100 or more per month.

(5) As of May 23, 2018, the $7.50 E-ZPass Maryland transponder fee was eliminated for all new customers.

The two Northern Region facilities employ a one-way toll collection system; that is round-trip tolls are collected in the eastbound/northbound direction only. Hence, the round-trip tolls are generally the same as those of the Central Region toll facilities. The base toll is $8.00 for passenger cars, with a video toll of $12.00, including a 50 percent surcharge. Maryland two-axle, E-ZPass® customers receive a 25 percent discount, or a toll of $6.00. For the Northern Region facilities, commuter tolls are offered for two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 50 trips and costs $70.00 or $1.40 per trip. Since the Northern Region facilities utilize one-way tolling, two "trips" are required per transaction, making the effective toll rate $2.80 per transaction or a 65 percent discount over the base toll rate. Vehicles with three-or-more axles are charged progressively higher rates, although as of July 1, 2015, tolls for three and four-axle vehicles with Maryland E-ZPass® using the Hatem Bridge were reduced by 30 percent. With this discount, the toll for three-axle vehicles was reduced from $16.00 to $11.20 and for four-axle vehicles from $24.00 to $16.80. The current tolls for the Northern Region toll facilities are shown in Table 1-1.

Special discounts are available at the Hatem Bridge. Currently, two plans are offered: Hatem Plan A and Hatem Plan B. Both plans provide unlimited trips to two-axle Maryland E-ZPass® account holders for a flat annual fee of $20. Plan A does not include transponder fees, prepaid toll deposits or account statements. However, an E-ZPass® account under Plan A cannot be used at other toll facilities or combined with other Maryland E-ZPass® discounts. Plan B is an add-on to a standard Maryland E-ZPass® account and is subject to a monthly maintenance fee for out-of-state residents with three or fewer transactions and pre-paid toll deposits. In addition, E-ZPass® accounts under Plan B can be used at other toll facilities and combined with other Maryland E-ZPass® discounts.

Tolls are collected in both directions at the three Baltimore Harbor crossings that comprise the Central Region. Passenger cars pay a base toll of $4.00. Video customers pay $6.00, which includes a 50 percent surcharge, while Maryland two-axle, E-ZPass® customers receive a 25 percent discount for a toll of $3.00. Commuter discounts are offered to two-axle vehicles with a Maryland E-ZPass® Commuter Plan. This plan includes 50 trips at a cost of $70.00, making the effective toll rate $1.40 per transaction, or a 65 percent discount over the base toll rate. As shown in Table 1-2, vehicles with three-or-more axles are charged progressively higher rates.

The two Southern Region facilities employ one-way toll collection. The base toll at the Harry W. Nice Bridge is $6.00 for passenger cars. Video toll customers pay a $9.00 toll, including a 50 percent surcharge. Maryland two-axle, E-ZPass® customers receive a 25 percent discount, or a toll of $4.50. Also at the Harry W. Nice Bridge, commuter discounts are offered to two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 25 trips at a cost of $52.50, making the effective toll $2.10 per transaction. This represents a 65 percent discount over the base toll. Progressively higher tolls are charged to vehicles with three-or-more-axles.

Following the July 1, 2015 toll reductions, the base toll at the Bay Bridge was reduced from $6.00 to $4.00 for passenger cars. The video toll is $6.00, including a 50 percent surcharge. Maryland two-axle, E-ZPass® customers receive a 37.5 percent discount which reduces the toll from $5.40 to $2.50. Also, at the William Preston Lane Memorial Bridge, commuter discounts are offered to two-axle vehicles with a Maryland E-ZPass® Commuter Plan, which includes 25 trips at a cost of $35.00, making the effective toll $1.40 per transaction, or a 65 percent discount over the base toll. While the tolls charged to three-or-more-axle vehicles are progressively higher, on July 1, 2015 the tolls for these vehicles were reduced by 33.3 percent. The current tolls for the Southern Region toll facilities are shown in Table 1-3.

Another discount option is offered specifically to motorists using the Bay Bridge. The E-ZPass® Maryland Shoppers' Plan is for Maryland E-ZPass® holders. Following the July 1, 2015 toll reductions, the plan costs $20.00 for 10 trips, or $2.00 per trip. The plan is valid for 90 days and can be used on Sundays through Thursdays, only.

Business accounts that operate vehicles with five-or-more-axles may qualify for a post-usage discount based on total tolls paid in 30-day cycles. The first 30-day cycle begins with the first use of the transponder. Discounts vary from 10 to 20 percent based on the total toll usage during the cycle and are credited back to the account 30 days after the completion of a cycle. In addition, the supplemental rebate program provides rebates to individual vehicles with five-or-more-axles and Maryland E-ZPass® transponders that make 60 or more trips per month.

1.2 Report Structure

Chapter 2, Historical Traffic and Revenue Trends, provides a summary of historical trends and variations of traffic and revenue on the legacy bridges, tunnels, and highways currently operated by the MDTA.

Chapter 3, Socioeconomic Review, provides a summary of updated recent historical trends and forecasts of socioeconomic variables to provide the context for the traffic and revenue growth projections. The socioeconomic trends review and analysis consisted of data collection efforts that included compiling and updating a host of different pertinent variables such as population, employment, income, gasoline prices, and real gross regional product from a variety of public and private sources. These included the Bureau of Economic Analysis (BEA), US Census, Bureau of Labor Statistics (BLS), Maryland State Data Center (MD SDC), U.S. Energy Information Administration (EIA), Woods & Poole Economics (W&P), and Moody's Analytics (Moody's).

Chapter 4, Traffic and Revenue Forecast, provides a summary of the basic underlying assumptions used in the traffic and revenue forecasting process. Also presented are the 10-year traffic and revenue forecasts by facility and vehicle class for each of the legacy facilities and the system as a whole.

Chapter 2
Historical Traffic and Revenue Trends

Regional traffic trends as well as historical transactions and revenue trends provided by MDTA for each of the seven legacy toll facilities have been reviewed, with the results presented in this chapter. The regional trends were reviewed to understand the context within which the MDTA facilities operate, including vehicle miles traveled (VMT), traffic counts and traffic growth on major Maryland highways. Historical transaction and revenue trends for each of the legacy facilities were reviewed, as these trends served as an input in developing the 10-year transaction growth rates for the traffic and revenue forecasts. Current E-ZPass® market penetration rates and vehicle classification distributions were also reviewed.

2.1 Regional Traffic Review

Regional traffic patterns and trends were analyzed to better understand the factors influencing traffic demand on the MDTA legacy facilities. Included in this analysis was a review of regional VMT trends and historical traffic counts on nearby competing routes. This data was used to ensure that near-term and future traffic growth rates developed for the MDTA facilities were reasonable within the context of these historical regional traffic growth and trends.

2.1.1 Vehicle Miles Traveled

VMT represents the total number of miles traveled by all vehicles annually. VMT trends are important to a better understanding of general trends in traffic growth nationally and, more specifically, within a state and region. The Federal Highway Administration develops annual estimates of national and state-wide VMT by roadway type, which have been summarized in Table 2-1 for years 2005 through 2017 for the United States and Maryland.

Maryland VMT trends during the last 12 years have generally followed those of the United States. Between 2005 and 2015, national and Maryland VMT experienced average annual growth rates of 0.3 percent and 0.2 percent, respectively. These recent trends in VMT represent a change from prior long-term historical trends, where VMT grew regionally and nationally by about 2 percent per year. Several factors may be responsible for the change. First, the reduction in employment caused by the Great Recession has led to general reductions in travel by commuters. Additionally, the changes may be indicative of longer-term trends such as adjustments to gasoline prices, shifts in development patterns to revitalize traditional urban centers, and increases in telecommuting, carpooling and transit use.

However, recent national data suggests a change since 2015 from the past slowdown in VMT growth. National VMT increased by 1.6 percent between 2015 and 2017 and Maryland VMT increased by 1.7 percent over the same period. In the near term, this increase may represent a return to the higher growth rates experienced prior to 2005. The favorable factors underpinning traffic increases since 2015, including a relatively robust labor market growth combined with relative declines in fuel prices, are still recent developments and may not continue over the upcoming decade. Nevertheless, forecasts of moderate socioeconomic growth in the short-term may translate into continued modest increases in traffic demand on the legacy facilities over the coming decade.

Table 2-1
National and Statewide Trends in Vehicle Miles Traveled

	United States [1]					Maryland				
	Interstate			Total		Interstate			Total	
Year	VMT (Millions)	Percent Change	Percent of Total	VMT (Millions)	Percent Change	VMT (Millions)	Percent Change	Percent of Total	VMT (Millions)	Percent Change
2005	733,655	---	24.4	3,009,217	---	16,807	---	29.8	56,319	---
2006	741,000	1.0	24.4	3,033,752	0.8	16,850	0.3	29.9	56,302	(0.0)
2007	745,457	0.6	24.4	3,049,027	0.5	17,015	1.0	30.1	56,503	0.4
2008	725,078	(2.7)	24.2	2,992,705	(1.8)	16,710	(1.8)	30.4	55,023	(2.6)
2009	722,655	(0.3)	24.3	2,975,804	(0.6)	16,965	1.5	30.7	55,293	0.5
2010	729,015	0.9	24.4	2,985,854	0.3	17,040	0.4	30.4	56,126	1.5
2011	725,787	(0.4)	24.4	2,968,990	(0.6)	16,964	(0.4)	30.2	56,221	0.2
2012	735,915	1.4	24.6	2,988,021	0.6	17,054	0.5	30.2	56,475	0.5
2013	745,106	1.2	24.8	3,006,911	0.6	17,064	0.1	30.1	56,688	0.4
2014	756,374	1.5	24.9	3,040,220	1.1	17,057	(0.0)	30.2	56,432	(0.5)
2015	782,111	3.4	25.1	3,109,937	2.3	17,102	0.3	29.7	57,516	1.9
2016	810,264	3.6	25.4	3,188,972	2.5	17,584	2.8	29.7	59,137	2.8
2017 [2]	812,500	0.3	25.3	3,213,255	0.8	17,699	0.7	29.7	59,523	0.7
Average Annual Percent Change										
2005-2007		0.8			0.7		0.6			0.2
2007-2009		(1.5)			(1.2)		(0.1)			(1.1)
2009-2016		1.6			1.0		0.5			1.0
2016-2017		0.3			0.8		0.7			0.7
2005-2017		**0.9**			**0.5**		**0.4**			**0.5**

2005-2016 VMT Data source: Table VM-2, Highway Statistics 1994-2016, USDOT FHWA Office of Policy Information.

2017 VMT Data source: Monthly Travel Volume Trends Reports, USDOT FHWA Office of Policy Information.

[1] Includes Puerto Rico.

[2] Interstate-level VMT data for Maryland unavailable for 2017, and was estimated based on the average 2015 and 2016 interstate miles as a percent of total VMT.

The percent of total VMT occurring on Interstate routes has remained relatively constant throughout the past 20 years. Approximately 25 percent of national VMT and 30 percent of Maryland VMT are made on interstate routes, which account for 2.5 percent and 3.9 percent of all roads in the nation and Maryland, respectively.

The annual transaction growth rates from the transaction forecasts presented in Chapter 4, Traffic and Revenue Forecast, were compared with VMT growth to ensure that growth rates were reasonable in light of these trends in VMT.

2.1.2 Historical Traffic on Other Major Highways

In order to better understand regional traffic growth patterns, historical traffic counts on select competing major routes were reviewed dating back to FY 2005. These roads include interstates and major highways that compete with or complement the MDTA legacy facilities. The data presented in this section are based on historical average annual daily traffic volumes and associated growth rates at each location. At MDTA locations where there is a one-way toll, the one-way average annual daily traffic volume was doubled to be more comparable to other locations. For comparative purposes, the roadways are grouped into three regions: Northern, Central, and Southern, corresponding to the MDTA regions.

Historical average annual daily traffic volumes and annual growth rates for the Northern Region facilities, located in proximity to the Susquehanna River, are presented in Table 2-2. Volumes are

provided through 2017. Traffic volumes on the two Northern Region MDTA facilities have generally followed the regional trends over the last 12 years. Between 2005 and 2017, there was almost no growth in average annual traffic volumes on the MDTA facilities, and 0.1 percent per year on the MSHA roads, with the most significant decreases occurring in 2008, 2009 and 2013. This overall trend may be related to reductions in travel associated with the immediate and long-term impacts of the Great Recession of 2008/2009. Toll increases implemented in calendar year 2013 were also likely responsible for the decline in traffic on the MDTA facilities in that year. In 2017, traffic volumes increased by 2.0 percent on the MDTA facilities, 1.9 percent on the MSHA roads, and 2.0 percent for the Northern Region as a whole. Much of this increase is likely due to the continued economic recovery and growth.

Table 2-3 presents the historical average annual daily traffic volumes and annual growth rates for the Central Region, located in the Baltimore area. Historical average annual daily traffic volumes are provided through 2017. Traffic volumes at the three Central Region MDTA facilities have also generally followed the regional trends over the last 12 years. Traffic volumes on the Maryland State Highway Administration (MSHA) facilities decreased by an average of 2.2 percent in 2008, most likely due to the impacts of the Great Recession, while traffic volumes on the Central Region MDTA facilities increased slightly, averaging 0.2 percent. On the MDTA facilities, traffic volumes decreased in 2009 and 2010. These impacts resulted, at least in part, from the Great Recession and the 2010 toll increase. Sizeable traffic volume decreases occurred in both FY 2012 and FY 2014. Toll increases implemented in these years were likely the primary catalyst for the declines. Regional traffic volumes decreased by 0.8 percent in 2015, but recovered in 2016, growing by 2.7 percent over the prior year. This could be due in part to a recovery and return of traffic following the construction-related decreases on MSHA-operated I-695 and I-95 in 2015. In 2017, traffic volumes on the MDTA and MSHA facilities increased by 2.7 percent and 2.4 percent, respectively. These increases were likely due to a continuing economic recovery and growth. Overall, average annual traffic growth between 2005 and 2017 was 0.3 percent per year for the MDTA facilities and 0.4 percent per year for the MSHA and all Central Region highways combined.

Historical average annual daily traffic volumes and annual growth rates for the Southern Region are presented in Table 2-4. Due to the proximity to Virginia, two traffic count locations in northern Virginia have also been included. Historical average annual daily traffic volumes are provided through 2017. Traffic volumes on the two MDTA facilities have generally followed the regional trends over the last 12 years. MSHA and Virginia roadways experienced decreases in volumes during 2008, while MDTA facilities experienced decreases in volume in both 2008 and 2009. This pattern may be the result of some immediate and some lagging impacts of the Great Recession. A traffic volume decrease on the MDTA facilities also occurred in 2013, followed by no growth in 2014. Both impacts are likely the result of toll increases. Following no growth in 2014, traffic has since grown at reasonably high levels, averaging 1.7 percent, 2.0 percent and 1.3 percent in 2015, 2016 and 2017, respectively, for all Southern Region roads. Overall average annual traffic between 2005 and 2017 increased by 0.4 percent for the MDTA facilities, decreased by 0.2 percent for the MSHA facilities and increased by 0.2 percent for both the VDOT facilities and the Region as a whole.

Based on the data available for the selected facilities, the MDTA legacy facilities have generally exhibited traffic growth in line with that of the region. Moreover, traffic volumes have grown at similar rates among the three regions, averaging between 0.1 to 0.4 percent between 2005 and 2017. Trends over the past 12-year period were used as a guide in estimating the ten-year traffic growth for the traffic and revenue forecasts presented in Chapter 4.

Table 2-2
Average Annual Daily Traffic for Selected Northern Region Facilities

Calendar Year	MDTA Facilities: John F. Kennedy Mem. Highway	AAPC [2]	MDTA Facilities: Thomas J. Hatem Mem. Bridge	AAPC [2]	MSHA Facilities [1]: I-83 S of Belfast Rd.	AAPC [2]	US 1 E of Cedar Church Rd.	AAPC [2]	US 301 S of River Rd.	AAPC [2]	MDTA Facilities Average	MDTA Facilities AAPC [2]	MSHA Facilities Average	MSHA Facilities AAPC [2]	Northern Region Average	Northern Region AAPC [2]
2005	81,957	---	30,520	---	61,975	---	9,950	---	11,425	---	56,239	---	27,783	---	39,165	---
2006	80,744	(1.5)	30,450	(0.2)	66,760	7.7	9,852	(1.0)	11,650	2.0	55,597	(1.1)	29,421	5.9	39,891	1.9
2007	81,317	0.7	30,474	0.1	62,068	(7.0)	11,640	18.1	11,531	(1.0)	55,896	0.5	28,413	(3.4)	39,406	(1.2)
2008	80,283	(1.3)	30,445	(0.1)	59,830	(3.6)	11,061	(5.0)	10,952	(5.0)	55,364	(1.0)	27,281	(4.0)	38,514	(2.3)
2009	80,229	(0.1)	27,617	(9.3)	61,620	3.0	11,282	2.0	10,370	(5.3)	53,923	(2.6)	27,757	1.7	38,224	(0.8)
2010	80,815	0.7	27,325	(1.1)	61,971	0.6	10,050	(10.9)	10,451	0.8	54,070	0.3	27,491	(1.0)	38,122	(0.3)
2011	84,739	4.9	27,797	1.7	60,988	(1.6)	9,861	(1.9)	10,252	(1.9)	56,268	4.1	27,034	(1.7)	38,727	1.6
2012	84,402	(0.4)	27,810	0.0	60,165	(1.3)	9,882	0.2	10,620	3.6	56,106	(0.3)	26,889	(0.5)	38,576	(0.4)
2013	80,448	(4.7)	25,002	(10.1)	60,401	0.4	9,310	(5.8)	10,571	(0.5)	52,725	(6.0)	26,761	(0.5)	37,146	(3.7)
2014	78,780	(2.1)	27,115	8.5	60,041	(0.6)	9,301	(0.1)	10,562	(0.1)	52,948	0.4	26,635	(0.5)	37,160	0.0
2015	80,495	2.2	28,747	6.0	61,311	2.1	9,522	2.4	9,920	(6.1)	54,621	3.2	26,918	1.1	37,999	2.3
2016	83,087	3.2	27,889	(3.0)	61,091	(0.4)	11,530	21.1	10,141	2.2	55,488	1.6	27,587	2.5	38,748	2.0
2017	85,195	2.5	27,958	0.2	61,558	0.8	11,781	2.2	11,030	8.8	56,577	2.0	28,123	1.9	39,504	2.0
Average Annual Percent Change																
2005-2007		(0.4)		(0.1)		0.1		8.2		0.5		(0.3)		1.1		0.3
2007-2009		(0.7)		(4.8)		(0.4)		(1.5)		(5.2)		(1.8)		(1.2)		(1.5)
2009-2016		0.5		0.1		(0.1)		0.3		(0.3)		0.4		(0.1)		0.2
2016-2017		2.5		0.2		0.8		2.2		8.8		2.0		1.9		2.0
2005-2017		**0.3**		**(0.7)**		**(0.1)**		**1.4**		**(0.3)**		**0.0**		**0.1**		**0.1**

Source: MDTA and MSHA AADT Reports.

[1] Maryland State Highway Administration.

[2] Annual Average Percent Change.

Table 2-3
Average Annual Daily Traffic for Selected Central Region Facilities

	MSHA Facilities [1]											
Calendar Year	I-95 N of MD 43	AAPC [2]	I-95 N of MD 100	AAPC [2]	I-97 N of MD 176	AAPC [2]	I-695 S of I-70	AAPC [2]	I-695 E of MD 146	AAPC [2]	MD 295 N of MD 100	AAPC [2]
2005	173,825	---	189,825	---	99,325	---	188,325	---	152,650	---	86,250	---
2006	161,780	(6.9)	191,880	1.1	102,610	3.3	188,333	0.0	152,652	0.0	85,392	(1.0)
2007	161,781	0.0	191,881	0.0	102,611	0.0	193,050	2.5	155,270	1.7	91,630	7.3
2008	157,742	(2.5)	188,042	(2.0)	100,562	(2.0)	189,191	(2.0)	152,171	(2.0)	88,881	(3.0)
2009	160,880	2.0	192,100	2.2	105,110	4.5	188,860	(0.2)	153,692	1.0	88,882	0.0
2010	161,521	0.4	192,871	0.4	105,531	0.4	189,621	0.4	150,850	(1.8)	89,423	0.6
2011	161,682	0.1	193,062	0.1	105,642	0.1	189,812	0.1	151,001	0.1	93,390	4.4
2012	162,493	0.5	191,280	(0.9)	106,210	0.5	190,763	0.5	151,762	0.5	92,641	(0.8)
2013	165,972	2.1	193,001	0.9	107,171	0.9	192,484	0.9	149,460	(1.5)	92,832	0.2
2014	165,815	(0.1)	192,812	(0.1)	107,062	(0.1)	192,295	(0.1)	149,311	(0.1)	107,730	16.0
2015	159,150	(4.0)	197,443	2.4	106,490	(0.5)	173,900	(9.6)	152,892	2.4	101,350	(5.9)
2016	162,491	2.1	201,594	2.1	108,731	2.1	186,350	7.2	150,190	(1.8)	103,281	1.9
2017	166,392	2.4	206,435	2.4	111,342	2.4	190,821	2.4	153,801	2.4	105,400	2.1
Average Annual Percent Change												
2005-2007		(3.5)		0.5		1.6		1.2		0.9		3.1
2007-2009		(0.3)		0.1		1.2		(1.1)		(0.5)		(1.5)
2009-2016		0.1		0.7		0.5		(0.2)		(0.3)		2.2
2016-2017		2.4		2.4		2.4		2.4		2.4		2.1
2005-2017		**(0.4)**		**0.7**		**1.0**		**0.1**		**0.1**		**1.7**

	MDTA Facilities								MSHA Facilities		Central Region	
Calendar Year	Baltimore Harbor Tunnel	AAPC [2]	Francis Scott Key Bridge	AAPC [2]	Fort McHenry Tunnel	AAPC [2]	Average	AAPC [2]	Average	AAPC [2]	Average	AAPC [2]
2005	139,720	---	66,324	---	238,453	---	148,166	---	148,367	---	148,300	---
2006	143,902	3.0	65,171	(1.7)	238,754	0.1	149,276	0.7	147,108	(0.8)	147,830	(0.3)
2007	141,042	(2.0)	66,867	2.6	245,776	2.9	151,228	1.3	149,371	1.5	149,990	1.5
2008	141,209	0.1	67,632	1.1	245,639	(0.1)	151,493	0.2	146,098	(2.2)	147,897	(1.4)
2009	139,914	(0.9)	64,045	(5.3)	238,059	(3.1)	147,339	(2.7)	148,254	1.5	147,949	0.0
2010	138,222	(1.2)	60,050	(6.2)	241,443	1.4	146,572	(0.5)	148,303	0.0	147,726	(0.2)
2011	143,746	4.0	64,410	7.3	255,169	5.7	154,442	5.4	149,098	0.5	150,879	2.1
2012	144,402	0.5	63,992	(0.6)	253,771	(0.5)	154,055	(0.3)	149,192	0.1	150,813	(0.0)
2013	131,354	(9.0)	59,847	(6.5)	238,775	(5.9)	143,325	(7.0)	150,153	0.6	147,877	(1.9)
2014	136,398	3.8	57,093	(4.6)	229,454	(3.9)	140,982	(1.6)	152,504	1.6	148,663	0.5
2015	148,480	8.9	58,233	2.0	229,299	(0.1)	145,337	3.1	148,538	(2.6)	147,471	(0.8)
2016	154,995	4.4	61,344	5.3	233,639	1.9	149,993	3.2	152,106	2.4	151,402	2.7
2017	151,300	(2.4)	61,976	1.0	248,657	6.4	153,978	2.7	155,699	2.4	155,125	2.5
Average Annual Percent Change												
2005-2007		0.5		0.4		1.5		1.0		0.3		0.6
2007-2009		(0.4)		(2.1)		(1.6)		(1.3)		(0.4)		(0.7)
2009-2016		1.5		(0.6)		(0.3)		0.3		0.4		0.3
2016-2017		(2.4)		1.0		6.4		2.7		2.4		2.5
2005-2017		**0.7**		**(0.6)**		**0.3**		**0.3**		**0.4**		**0.4**

Source: MDTA and MSHA AADT Reports.
[1] Maryland State Highway Administration.
[2] Annual Average Percent Change.

Table 2-4
Average Annual Daily Traffic for Selected Southern Region Facilities

	MDTA Facilities				MSHA Facilities [1]		Virginia DOT Facilities				MDTA Facilities		VDOT Facilities		Southern Region	
Calendar Year	William P. Lane, Jr. Mem. (Bay) Bridge	AAPC [2]	Harry W. Nice Mem. Bridge	AAPC [2]	US 301 S of MD 234	AAPC [2]	I-95 (Virginia) N of Courthouse Rd	AAPC [2]	US 301 (Virginia) N of Kings Hwy	AAPC [2]	Average	AAPC [2]	Average	AAPC [2]	Average	AAPC [2]
2005	71,123	---	17,592	---	22,975	---	134,000	---	13,000	---	44,358	---	73,500	---	51,738	---
2006	72,716	2.2	18,385	4.5	22,751	(1.0)	138,000	3.0	14,000	7.7	45,551	2.7	76,000	3.4	53,170	2.8
2007	73,941	1.7	18,731	1.9	22,522	(1.0)	137,000	(0.7)	14,000	-	46,336	1.7	75,500	(0.7)	53,239	0.1
2008	73,260	(0.9)	18,580	(0.8)	21,403	(5.0)	133,000	(2.9)	13,000	(7.1)	45,920	(0.9)	73,000	(3.3)	51,849	(2.6)
2009	69,874	(4.6)	18,341	(1.3)	21,834	2.0	136,000	2.3	13,000	-	44,108	(3.9)	74,500	2.1	51,810	(0.1)
2010	71,200	1.9	18,378	0.2	22,520	3.1	136,000	-	12,000	(7.7)	44,789	1.5	74,000	(0.7)	52,020	0.4
2011	74,651	4.8	18,693	1.7	22,091	(1.9)	135,000	(0.7)	12,000	-	46,672	4.2	73,500	(0.7)	52,487	0.9
2012	74,248	(0.5)	18,308	(2.1)	22,142	0.2	135,000	-	12,000	-	46,278	(0.8)	73,500	-	52,340	(0.3)
2013	69,783	(6.0)	17,868	(2.4)	20,840	(5.9)	132,000	(2.2)	13,000	8.3	43,826	(5.3)	72,500	(1.4)	50,698	(3.1)
2014	69,911	0.2	17,770	(0.5)	20,821	(0.1)	131,000	(0.8)	14,000	7.7	43,841	0.0	72,500	-	50,700	0.0
2015	70,442	0.8	18,112	1.9	21,322	2.4	134,000	2.3	14,000	-	44,277	1.0	74,000	2.1	51,575	1.7
2016	72,723	3.2	18,525	2.3	21,880	2.6	136,000	1.5	14,000	-	45,624	3.0	75,000	1.4	52,626	2.0
2017	74,448	2.4	18,736	1.1	22,361	2.2	137,000	0.7	14,000	-	46,592	2.1	75,500	0.7	53,309	1.3
Average Annual Percent Change																
2005-2007		2.0		3.2		(1.0)		1.1		3.8		2.2		1.4		1.4
2007-2009		(2.8)		(1.0)		(1.5)		(0.4)		(3.6)		(2.4)		(0.7)		(1.4)
2009-2016		0.6		0.1		0.0		-		1.1		0.5		0.1		0.2
2016-2017		2.4		1.1		2.2		0.7		-		2.1		0.7		1.3
2005-2017		**0.4**		**0.5**		**(0.2)**		**0.2**		**0.6**		**0.4**		**0.2**		**0.2**

Source: MDTA, MSHA and Virginia DOT AADT Reports.

[1] Maryland State Highway Administration.

[2] Annual Average Percent Change.

2.2 MDTA Toll Transaction and In-Lane Revenue Trends

A review of the historical toll transaction and In-Lane Toll Revenue trends for each of the seven MDTA legacy facilities follows. In-Lane Toll Revenue is the revenue that is collected at the point of transaction and excludes any fees. "Other Revenue", which will be discussed further in Chapter 4, is the revenue produced by service fees and sales, violation recovery, concession revenue, and additional commercial vehicle revenue. What follows is an overview of the recent short-term trends. Historical data are presented by facility on a fiscal year (July 1 to June 30) basis. In addition, current E-ZPass® market penetration rates and vehicle classification percentages are also presented. These data serve as important inputs used in developing the 10-year transaction and revenue forecasts.

2.2.1 Short-Term Traffic and Revenue Impacts

The latest FY 2018 traffic and revenue data were reviewed to understand the factors impacting traffic demand at the MDTA legacy facilities. These data were compared to the prior forecast, as shown in Table 2-5. Actual FY 2018 transactions were 2.45 million, or 2.0 percent less than those previously forecasted. In-lane toll revenue fell short of the forecast by $8.69 million or 1.4 percent, while other toll revenues were lower than the forecast by $5.85 million or 15.3 percent. In addition to lower than forecasted normal traffic growth, two unanticipated factors may have resulted in actual traffic and toll revenues underperforming the FY 2018 forecast. These include (1) higher than expected increases in motor fuel prices, due partly to the impacts of Hurricanes Harvey and Irma, and (2) higher than expected impacts from the construction activity at the Harbor Crossings that typically suppress discretionary passenger car trips. Using available data, each of these impacts were considered in estimating future normal growth rates.

Table 2-5
Comparison of FY 2017 Forecasted Versus Actual Legacy Facility Transactions and Revenue

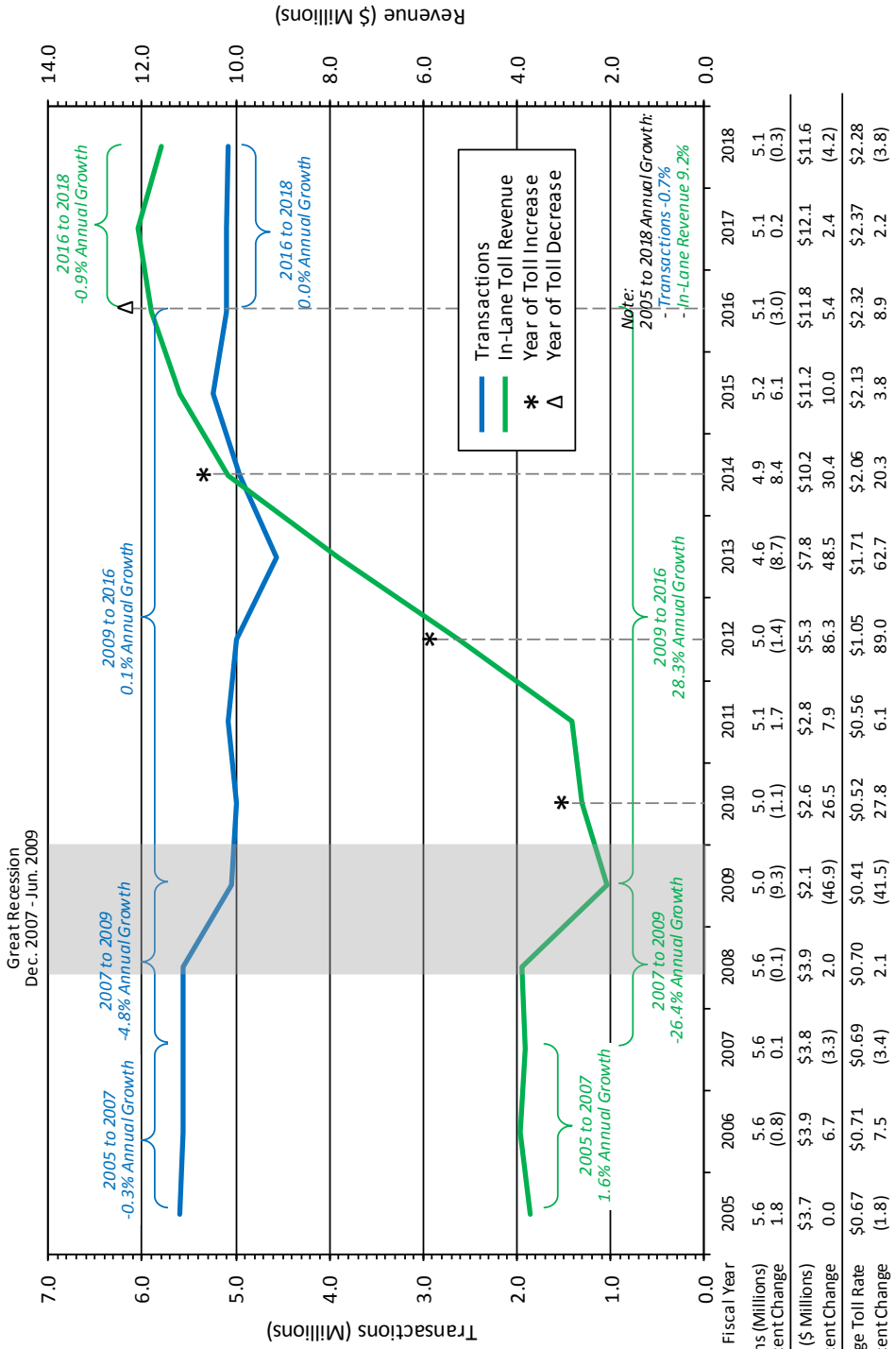
Item	FY 2017 Actual (millions)	FY 2018 Forecasted (millions)			FY 2018 Actual (millions)			FY 2018 Actual versus FY 2018 Forecasted (millions)	
		Amount	Difference versus FY 2017		Amount	Difference versus FY 2017			
			Difference	Percent		Difference	Percent	Difference	Percent
Transactions	121.96	124.06	2.10	1.7	121.60	(0.36)	(0.3)	(2.45)	(2.0)
In-Lane Toll Revenue	$ 601.91	$ 613.99	12.08	2.0	$ 605.29	$ 3.38	0.6	$ (8.69)	(1.4)
Other Toll Revenue	$ 38.96	$ 38.09	(0.87)	(2.2)	$ 32.24	$ (6.72)	(17.2)	$ (5.85)	(15.3)

Note: Includes transactions and revenue for MDTA Legacy Facilities only.

2.2.2 Thomas J. Hatem Memorial Bridge

Historical transactions and revenue for the Thomas J. Hatem Memorial Bridge (Hatem Bridge) between FY 2005 and FY 2018 are provided in Figure 2-1. Also shown is the duration of recent recessions, as well as the years in which toll increases and decreases occurred. Toll rate increases are represented with an asterisk for each fiscal year that an increase occurred. The toll rate decrease of FY 2016 is represented by a triangle. It should be noted that toll rate increases did not necessarily occur at the beginning of the fiscal year but varied by year.

Figure 2-1
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Thomas J. Hatem Memorial Bridge



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	5.6	5.6	5.6	5.6	5.0	5.0	5.1	5.0	4.6	4.9	5.2	5.1	5.1	5.1
Percent Change	1.8	(0.8)	0.1	(0.1)	(9.3)	(1.1)	1.7	(1.4)	(8.7)	8.4	6.1	(3.0)	0.2	(0.3)
In-Lane Toll Revenue ($ Millions)	$3.7	$3.9	$3.8	$3.9	$2.1	$2.6	$2.8	$5.3	$7.8	$10.2	$11.2	$11.8	$12.1	$11.6
Percent Change	0.0	6.7	(3.3)	2.0	(46.9)	26.5	7.9	86.3	48.5	30.4	10.0	5.4	2.4	(4.2)
Average Toll Rate	$0.67	$0.71	$0.69	$0.70	$0.41	$0.52	$0.56	$1.05	$1.71	$2.06	$2.13	$2.32	$2.37	$2.28
Percent Change	(1.8)	7.5	(3.4)	2.1	(41.5)	27.8	6.1	89.0	62.7	20.3	3.8	8.9	2.2	(3.8)

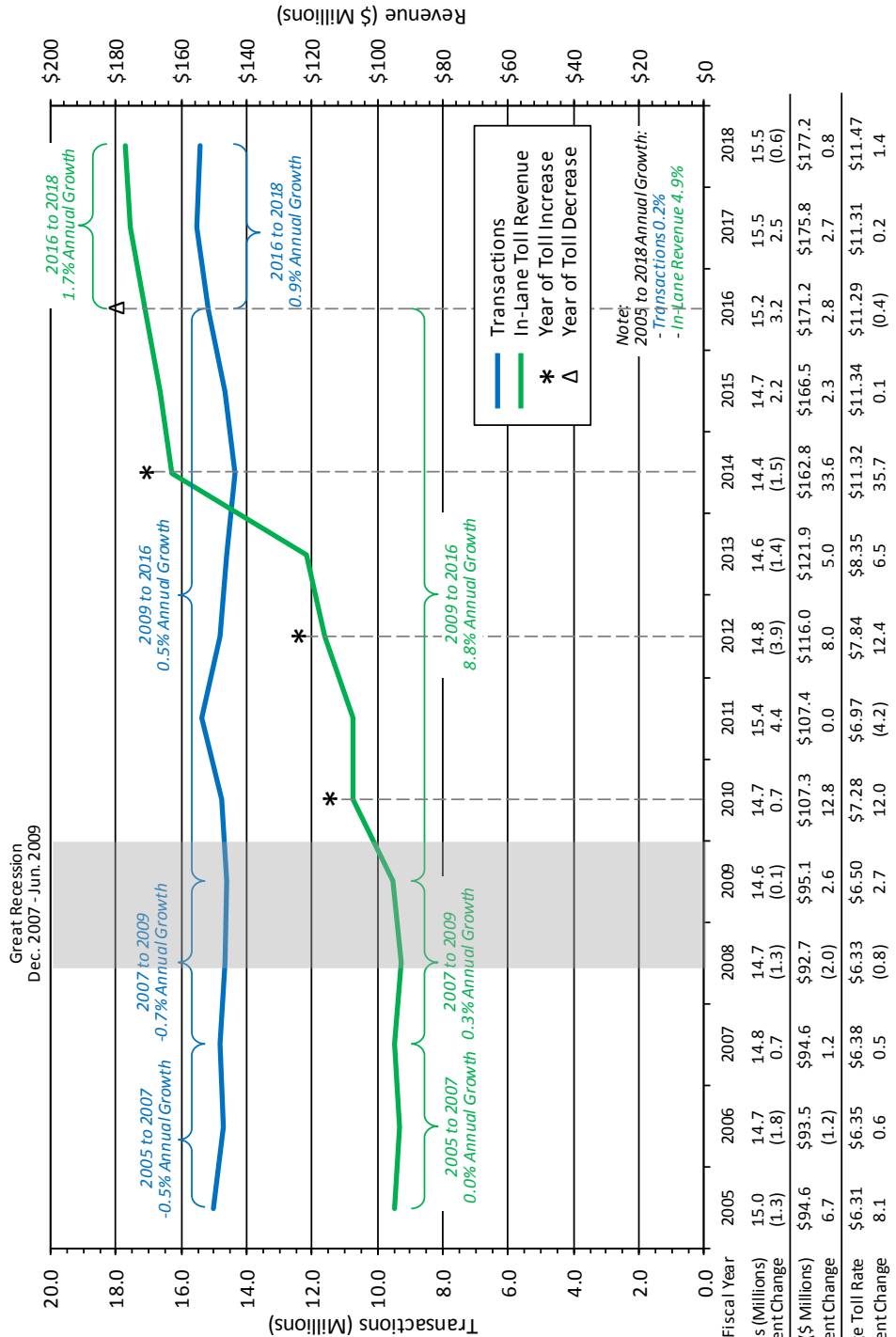
As indicated on the figure, four periods have been identified during the last 13 years: Pre-Recession (FY 2005 – FY 2007), Recession (FY 2007 – FY 2009), Period of Toll Changes (FY 2009 – FY 2016), and Recent Trends (FY 2016 – FY 2018). Prior to the 2008/2009 Great Recession, transactions on the Hatem Bridge peaked in FY 2005 at 5.6 million. Transactions remained at roughly 5.6 million until FY 2009 when they decreased by 9.3 percent to 5.0 million, representing the largest decrease occurring in a year without a toll increase. Following this decrease associated with the Great Recession, continued economic uncertainty and several toll increases resulted in transactions decreasing further to 4.6 million by FY 2013. Transactions recovered slightly to 4.9 million in FY 2014, despite a toll increase that year, and grew again in FY 2015 by 6.1 percent to 5.2 million. Transactions decreased in FY 2016 by 3.0 percent, driven by a correction in Hatem A Discount Plan participation from the prior year. In October 2014, Hatem A Discount Plan participation increased by roughly 250,000 transactions, compared to the prior year. This appears to have been a one-time impact, with October 2015 transactions decreasing over the prior year by roughly 250,000, suggesting that FY 2016 represented a return to normal monthly patterns. Overall, during the period of toll changes between FY 2009 and FY 2016, transactions on the Hatem Bridge increased by an average of 0.1 percent annually. Recent data suggest a continuation of this trend, with transactions remaining at roughly 5.1 million between FY 2016 and FY 2018.

Historical toll revenues are also shown in Figure 2-1. After experiencing a large dip between FY 2008 and FY 2009 because of the Great Recession, revenue steadily grew through FY 2017 to reach $12.1 million. This growth was aided by a series of toll increases, indicated by increases in average toll rates, that led to an average annual revenue growth rate of 28.3 percent between FY 2009 and FY 2016. Toll revenue increased by 2.4 percent in FY 2017. The increase was primarily the result of shifts in the passenger car method of payment from the discount plan to E-ZPass®. Toll revenues decreased by 4.2 percent in FY 2018. Overall average annual In-Lane Toll Revenue growth was 9.2 percent between FY 2005 and FY 2018, due primarily as a result of the four toll increases implemented between FY 2010 and FY 2014.

2.2.3 John F. Kennedy Memorial Highway

Historical transactions and revenue on the John F. Kennedy Memorial Highway (JFK) between FY 2005 and FY 2018 are provided in Figure 2-2. During the last 13 years, transaction growth has been relatively flat, averaging 0.2 percent per year. Between FY 2005 and FY 2007, transactions remained at about 15.0 million, but declined in FY 2008 by 1.3 percent, and again in FY 2009 by 0.1 percent, as a result of the impacts of the Great Recession. Transactions then recovered and reached a peak of 15.4 million in FY 2011. The toll increases in FY 2012 through FY 2014 were likely the impetus for the annual decreases in transactions to 14.4 million in FY 2014. In FY 2016, transactions increased by 3.2 percent, with the majority of growth occurring in all E-ZPass® payment categories, but primarily Maryland E-ZPass®. Transactions increased by 2.5 percent in FY 2017, most notably among E-ZPass® customers. These method of payment shifts and growths in transactions are likely the result of the FY 2016 toll rate decrease. Transactions decreased slightly by 0.6 percent in FY 2018, possibly due to the increasing cost of gasoline. Some of the long-term stability in transaction growth on the JFK may be due to the regional nature of the facility, which serves as a major link in the Northeast Corridor, linking New York City to Washington, D.C., and points south.

Figure 2-2
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
John F. Kennedy Memorial Highway



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	15.0	14.7	14.8	14.7	14.6	14.7	15.4	14.8	14.6	14.4	14.7	15.2	15.5	15.5
Percent Change	(1.3)	(1.8)	0.7	(1.3)	(0.1)	0.7	4.4	(3.9)	(1.4)	(1.5)	2.2	3.2	2.5	(0.6)
In-Lane Toll Revenue ($ Millions)	$94.6	$93.5	$94.6	$92.7	$95.1	$107.3	$107.4	$116.0	$121.9	$162.8	$166.5	$171.2	$175.8	$177.2
Percent Change	6.7	(1.2)	1.2	(2.0)	2.6	12.8	0.0	8.0	5.0	33.6	2.3	2.8	2.7	0.8
Average Toll Rate	$6.31	$6.35	$6.38	$6.33	$6.50	$7.28	$6.97	$7.84	$8.35	$11.32	$11.34	$11.29	$11.31	$11.47
Percent Change	8.1	0.6	0.5	(0.8)	2.7	12.0	(4.2)	12.4	6.5	35.7	0.1	(0.4)	0.2	1.4

In-Lane Toll Revenues were $94.6 million in FY 2005 and generally remained at that level until FY 2009. This included a 2.0 percent decrease in FY 2008, associated with the impacts of the Great Recession, and a 2.6 percent recovery in FY 2009. Since FY 2009, revenues have grown steadily, reaching $177.2 million in FY 2018. This growth was aided by a series of toll increases, indicated by increases in average toll rates, that led to an average annual revenue growth rate of 8.8 percent between FY 2009 and FY 2016. Since FY 2016, toll revenue has increased annually by an average of 1.7 percent. Average annual In-Lane Toll Revenue growth between FY 2005 and FY 2018 averaged 4.9 percent, due primarily to the toll increases implemented between FY 2010 and FY 2014.

2.2.4 Baltimore Harbor Tunnel

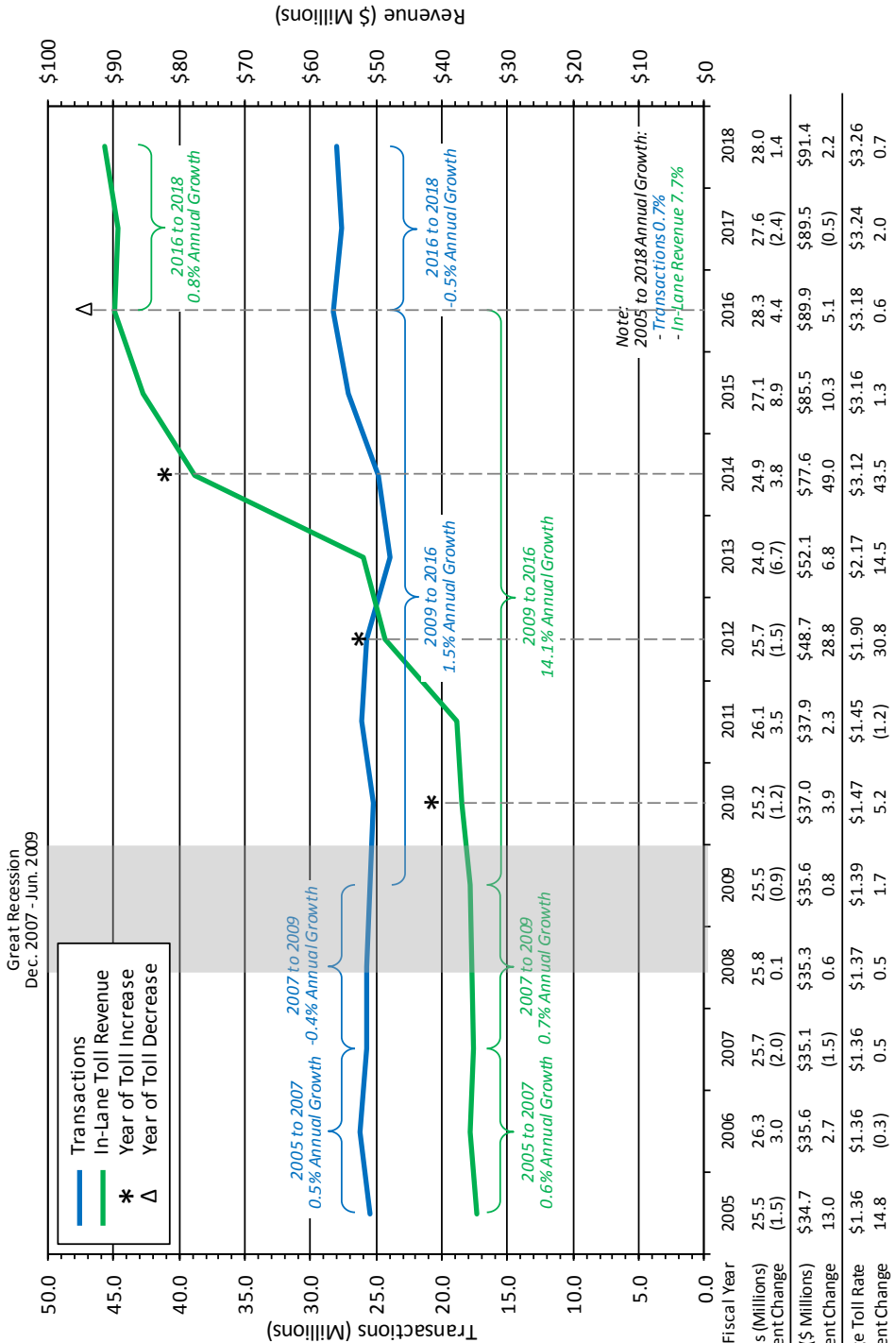
Historical transactions and revenue for Baltimore Harbor Tunnel between FY 2005 and FY 2018 are shown in Figure 2-3. Transactions reached a pre-recession peak of 25.8 million in FY 2008, before declining by 0.9 percent in FY 2009 in the wake of the Great Recession. Despite a 1.2 percent decrease in FY 2010, transaction growth recovered in FY 2011 and reached 26.1 million. Overall, during the period of toll changes between FY 2009 and FY 2016, transactions at the Baltimore Harbor Tunnel increased by an average of 1.5 percent annually. However, transactions since FY 2015 have been significantly affected by a number of major construction projects. These include the deck rehabilitation on I-95 south of the Fort McHenry Tunnel and the deck and superstructure replacement on I-895. These projects have had the impact of diverting traffic between the three Baltimore Harbor crossings, as well as diverting traffic to other routes such as I-395 and US 40. Since FY 2016, transactions have increased an average of 0.8 percent per year, as traffic has shifted to and from the facility as a result of the aforementioned construction projects. On average, transactions have grown by 0.7 percent per annum between FY 2005 and FY 2018.

Historical In-Lane Toll Revenues are also shown in Figure 2-3. Between FY 2005 and FY 2007 revenues increased by 0.6 percent per annum from $34.7 million to $35.1 million. During the recession period, revenues increased by a similar 0.7 percent per annum to $35.6 million in FY 2009. Since FY 2009, revenues have grown steadily at an average annual rate of 14.1 percent to $89.9 million in FY 2016, aided by a series of toll increases traffic diversions, and toll reductions in FY 2016. In addition to affecting total traffic volumes, the construction impacts noted above have also impacted the distribution of vehicles by class and method of payment. These shifts have further impacts on toll revenues by causing significant changes in the facility's average toll rate, as noted in the figure. In FY 2016, toll revenues increased by 5.1 percent and then decreased by 0.5 percent in FY 2017, primarily a result of shifts in passenger car method of payment. The average annual growth in In-Lane Toll Revenue between FY 2016 and FY 2018 was 0.8 percent. The average annual In-Lane Toll Revenue growth was 7.7 percent per year between FY 2005 and FY 2018. As with the other Legacy Facilities, this increase was primarily the result of toll increases between FY 2010 and FY 2014.

2.2.5 Fort McHenry Tunnel

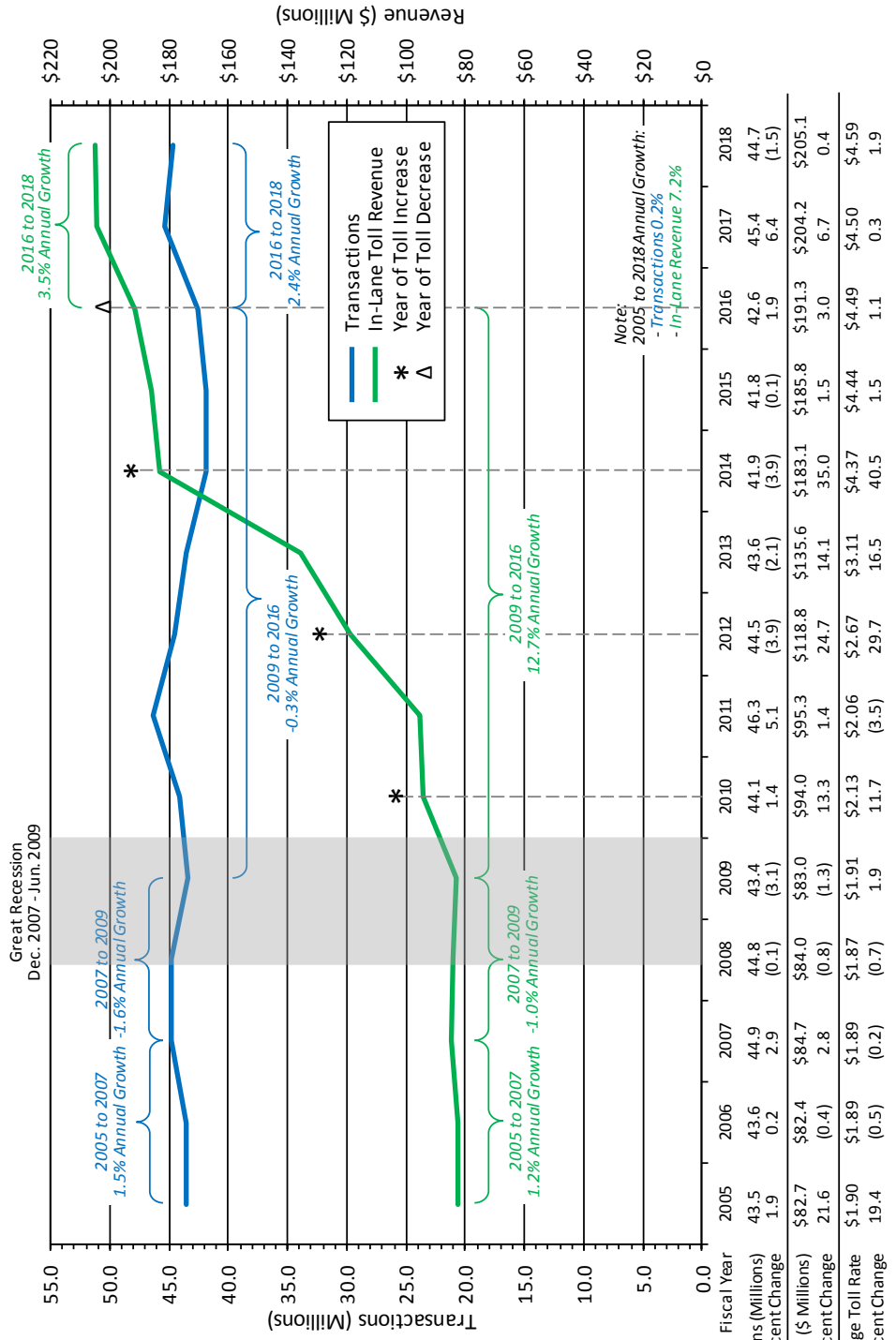
Historical transactions and revenue at the Fort McHenry Tunnel between FY 2005 and FY 2018 are provided in Figure 2-4. Transactions declined in FY 2008 by 0.1 percent, and again in FY 2009 by 3.1 percent, because of the impacts of the Great Recession. Transactions then recovered and reached a peak of 46.3 million in FY 2011, notwithstanding the FY 2010 toll increase. The toll increases in FY 2012 through FY 2014 were the primary impetus for the annual decreases in transactions to 41.9 million by FY 2014. Transactions declined slightly in FY 2015 to 41.8 million, the result of the deck

Figure 2-3
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Baltimore Harbor Tunnel



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	25.5	26.3	25.7	25.8	25.5	25.2	26.1	25.7	24.0	24.9	27.1	28.3	27.6	28.0
Percent Change	(1.5)	3.0	(2.0)	0.1	(0.9)	(1.2)	3.5	(1.5)	(6.7)	3.8	8.9	4.4	(2.4)	1.4
In-Lane Toll Revenue ($ Millions)	$34.7	$35.6	$35.1	$35.3	$35.6	$37.0	$37.9	$48.7	$52.1	$77.6	$85.5	$89.9	$89.5	$91.4
Percent Change	13.0	2.7	(1.5)	0.6	0.8	3.9	2.3	28.8	6.8	49.0	10.3	5.1	(0.5)	2.2
Average Toll Rate	$1.36	$1.36	$1.36	$1.37	$1.39	$1.47	$1.45	$1.90	$2.17	$3.12	$3.16	$3.18	$3.24	$3.26
Percent Change	14.8	(0.3)	0.5	0.5	1.7	5.2	(1.2)	30.8	14.5	43.5	1.3	0.6	2.0	0.7

Figure 2-4
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Fort McHenry Tunnel



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	43.5	43.6	44.9	44.8	43.4	44.1	46.3	44.5	43.6	41.9	41.8	42.6	45.4	44.7
Percent Change	1.9	0.2	2.9	(0.1)	(3.1)	1.4	5.1	(3.9)	(2.1)	(3.9)	(0.1)	1.9	6.4	(1.5)
In-Lane Toll Revenue ($ Millions)	$82.7	$82.4	$84.7	$84.0	$83.0	$94.0	$95.3	$118.8	$135.6	$183.1	$185.8	$191.3	$204.2	$205.1
Percent Change	21.6	(0.4)	2.8	(0.8)	(1.3)	13.3	1.4	24.7	14.1	35.0	1.5	3.0	6.7	0.4
Average Toll Rate	$1.90	$1.89	$1.89	$1.87	$1.91	$2.13	$2.06	$2.67	$3.11	$4.37	$4.44	$4.49	$4.50	$4.59
Percent Change	19.4	(0.5)	(0.2)	(0.7)	1.9	11.7	(3.5)	29.7	16.5	40.5	1.5	1.1	0.3	1.9

rehabilitation on I-95 south of the tunnel. In FY 2017, transactions increased by 6.4 percent, the largest year-over-year growth in the past two decades. This robust growth can be attributed, in part, to diversions from the construction on I-895. In FY 2018, transactions at the Fort McHenry Tunnel decreased by 1.5 percent, likely the result of construction-related impacts. Despite individual years of robust growth, transactions grew by a modest average of 0.2 percent per year between FY 2005 and FY 2018.

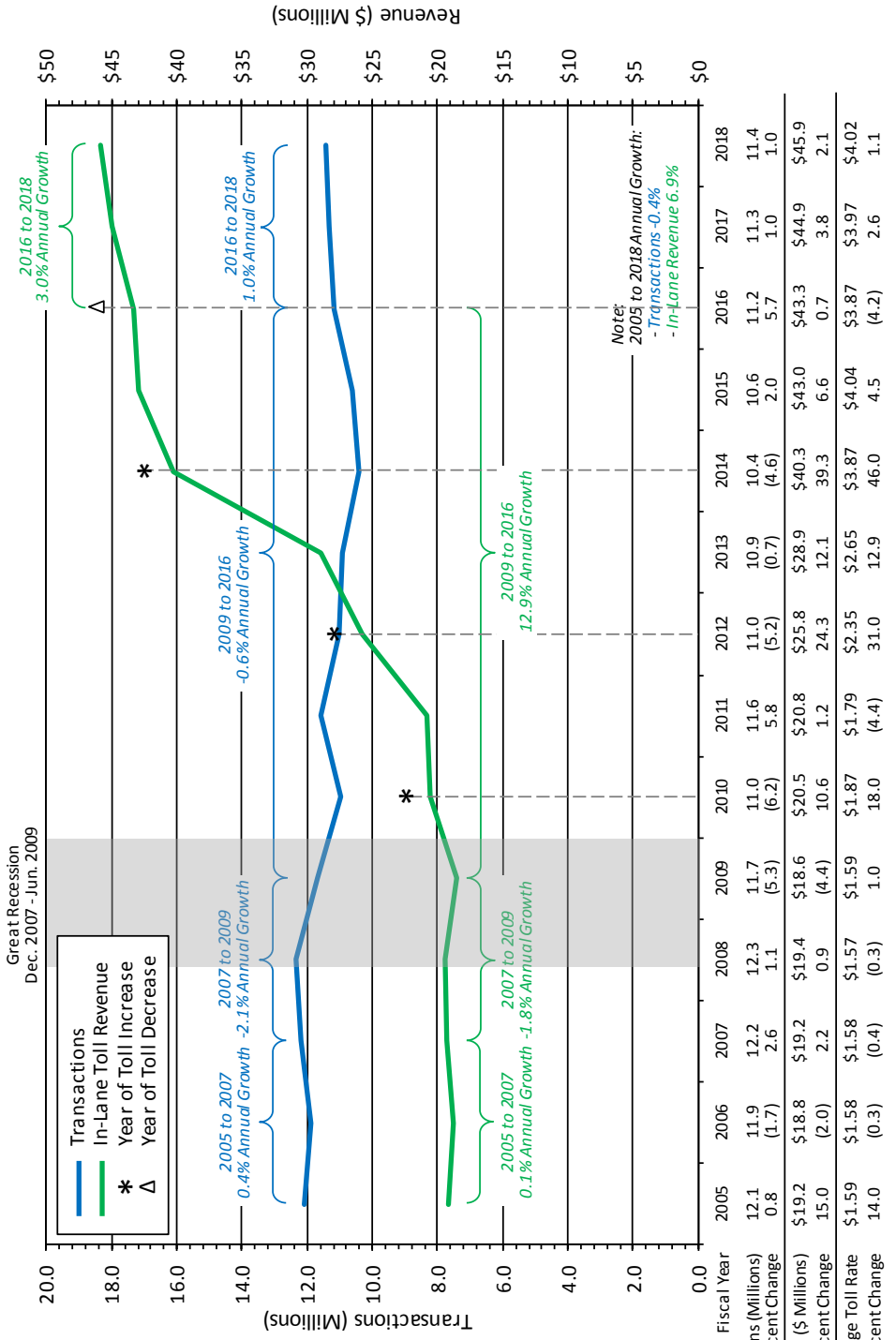
In-Lane Toll Revenue has continually grown during the last 13 years, with minor declines in FY 2006, FY 2008, and FY 2009. Revenues were $82.7 million in FY 2005 and hovered around this amount through FY 2009. Since FY 2009, aided by a series of toll increases, revenues have grown at an average rate of 12.7 percent, reaching $191.3 million in FY 2016. Similar to the Baltimore Harbor Tunnel, construction activities have impacted the distribution of vehicles by class and method of payment, as noted by the changes in the facility's average toll rate since FY 2016. Over the course of the construction period the Fort McHenry Tunnel has benefited from these shifts, as the average annual growth rate in In-Lane Toll Revenue between FY 2016 and FY 2018 was 3.5 percent. The average annual In-Lane Toll Revenue growth was 7.2 percent per year between FY 2005 and FY 2018, with the primary increases resulting from the toll increases between FY 2010 and FY 2014.

2.2.6 Francis Scott Key Bridge

Historical transactions and revenue at the Francis Scott Key Bridge between FY 2005 and FY 2018 are provided in Figure 2-5. Transactions hovered around 12.0 million during the pre-recession period from FY 2005 to FY 2007. During the FY 2007 to FY 2009 recession period, transactions declined by an average of 2.1 percent per annum to 11.7 million. Following this, transactions continued to decrease through FY 2014 to a low of 10.4 million, a result of the toll increases between FY 2010 and FY 2014. Between FY 2009 and FY 2016, transactions decreased by an average 0.6 percent per year. After FY 2015, the Francis Scott Key Bridge served as bypass of the other two MDTA Harbor Crossings for those wishing to avoid ongoing major construction activity. Transactions increased by 5.7 percent to 11.2 million in FY 2016. In FY 2016, the primary growth occurred in the commuter discount program, where an increase of 380,000 transactions occurred. In both FY 2017 and FY 2018, transactions increased by a more modest 1.0 percent to 11.3 million and 11.4 million, respectively. This growth was comprised mostly of commercial vehicles and may be the result of traffic diversion from the other Harbor crossings to avoid construction-related delays. In the long-term, transactions decreased at an average annual rate of 0.4 percent between FY 2005 and FY 2018.

In-Lane Toll Revenue was $19.2 million in FY 2005 and remained at about that level until FY 2008. After experiencing a 4.4 percent decrease in FY 2009, a result of the Great Recession, revenues have grown steadily, reaching $45.9 million in FY 2018. The recent growth is primarily due to a series of toll increases, as well as an increasing percentage of commercial vehicles. Revenue grew at an average annual rate of 3.0 percent between FY 2016 and FY 2018. The long-term average annual In-Lane Toll Revenue growth has been 6.9 percent between FY 2005 and FY 2018.

Figure 2-5
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Francis Scott Key Bridge



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	12.1	11.9	12.2	12.3	11.7	11.0	11.6	11.0	10.9	10.4	10.6	11.2	11.3	11.4
Percent Change	0.8	(1.7)	2.6	1.1	(5.3)	(6.2)	5.8	(5.2)	(0.7)	(4.6)	2.0	5.7	1.0	1.0
In-Lane Toll Revenue ($ Millions)	$19.2	$18.8	$19.2	$19.4	$18.6	$20.5	$20.8	$25.8	$28.9	$40.3	$43.0	$43.3	$44.9	$45.9
Percent Change	15.0	(2.0)	2.2	0.9	(4.4)	10.6	1.2	24.3	12.1	39.3	6.6	0.7	3.8	2.1
Average Toll Rate	$1.59	$1.58	$1.58	$1.57	$1.59	$1.87	$1.79	$2.35	$2.65	$3.87	$4.04	$3.87	$3.97	$4.02
Percent Change	14.0	(0.3)	(0.4)	(0.3)	1.0	18.0	(4.4)	31.0	12.9	46.0	4.5	(4.2)	2.6	1.1

2.2.7 William Preston Lane Jr. Memorial (Bay) Bridge

Historical transaction and revenue data for the William Preston Lane Jr. Memorial (Bay) Bridge between FY 2005 and FY 2018 are provided in Figure 2-6. Following increases averaging 1.9 percent per annum during the FY 2005 to FY 2007 pre-recession period, transactions declined in FY 2008 by 0.9 percent and again in FY 2009 by 4.6 percent, a result of the Great Recession. Transactions then recovered and reached a peak of 13.7 million in FY 2012 despite a toll increase. The toll increases from FY 2012 and FY 2014 were the primary impetus for the declines in transactions to 12.8 million in FY 2014. Transactions increased by 3.2 percent in FY 2016. This growth was primarily a result of the 54 percent toll decrease for Maryland E-Z Pass passenger car customers. Because of this increase in FY 2016, transaction growth during the entire FY 2009 to FY 2016 period of toll changes, averaged 0.6 percent per year. In FY 2017, transactions increased by 2.4 percent to 13.6 million, but then decreased by 0.5 percent in FY 2018 to 13.5 million, possibly due to increases in the price of gasoline. Between FY 2016 and FY 2018, transactions increased by an average of 0.6 percent.

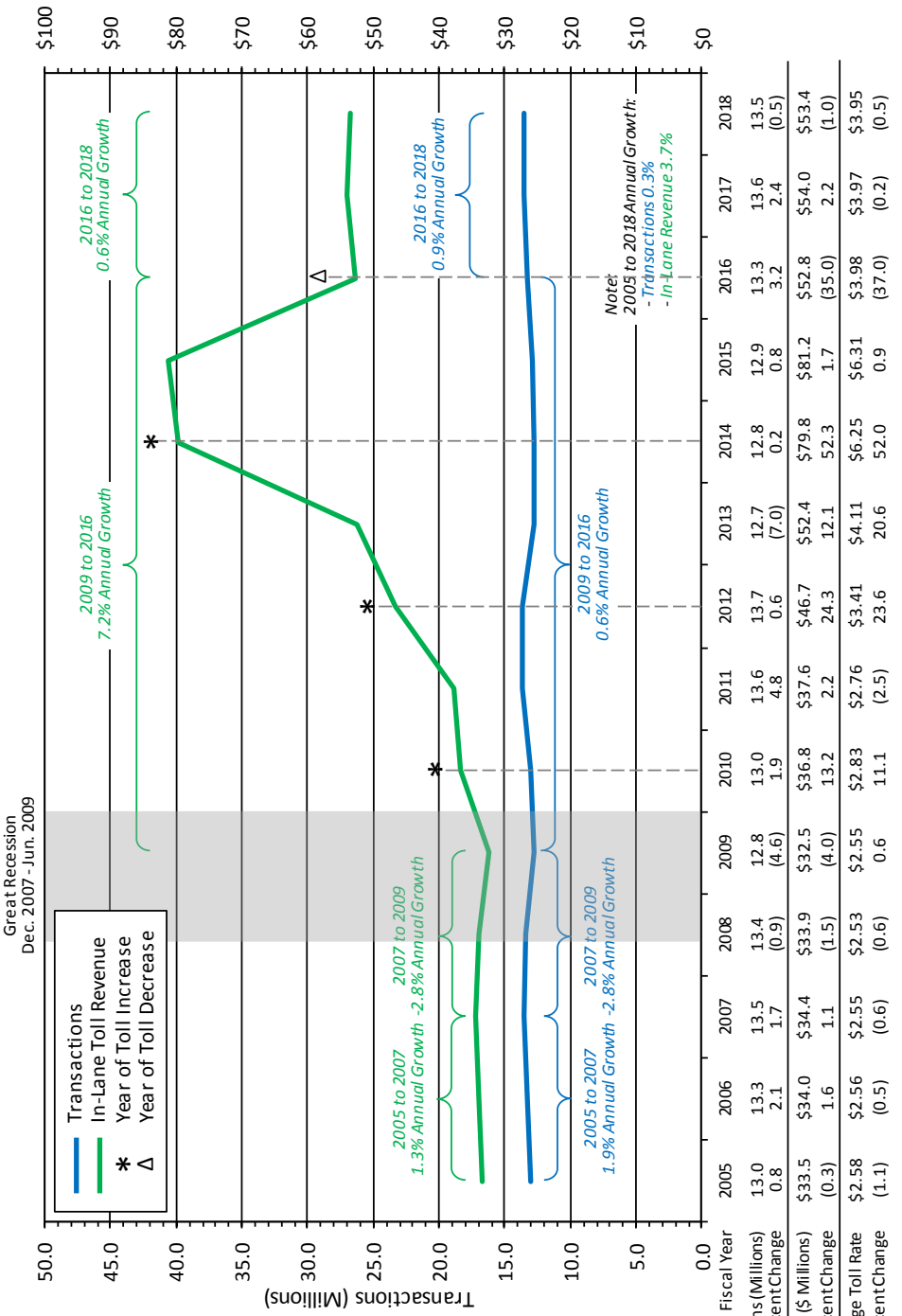
In-Lane Toll Revenue decreased 1.5 percent and 4.0 percent in FY 2008 and FY 2009, respectively, related to the impacts of the Great Recession. Since FY 2009, revenue has grown steadily at an average rate of 7.2 percent per year due, in part, to a series of toll increases. Revenues peaked at $81.2 million in FY 2015 and then decreased to $52.8 in FY 2016 due to the magnitude of the FY 2016 toll decreases at the Bay Bridge. Maryland E-ZPass® toll rates on this facility were reduced by 53.7 percent and all other toll rates were reduced by 33.3 percent. Revenue reached $53.4 million in FY 2018, representing a 1.0 percent decrease over FY 2017. While revenue has grown at an extremely modest rate of 0.6 percent per annum between FY 2016 and FY 2018, the long-term growth between FY 2005 and FY 2018 has been 3.7 percent.

2.2.8 Harry W. Nice Memorial Bridge

Historical transaction and revenue data for the Harry W. Nice Memorial Bridge between FY 2005 and FY 2018 are provided in Figure 2-7. FY 2007 represented the peak transaction level of 3.4 million. Transactions declined in FY 2008 by 0.8 percent and in FY 2009 by 1.3 percent, because of the impacts of the Great Recession. The toll increases from FY 2012 through FY 2014 were the primary impetus for the continued decline in transactions to 3.2 million by FY 2014. However, despite these decreases, transactions grew by an overall rate of 0.1 percent per year between FY 2009 and FY 2016. In FY 2018, transactions decreased by 2.8 percent, which was the largest year over year decrease in the last 13 years. This decrease is likely the result of the increases in gasoline prices, as previously noted. Average annual transaction growth was 0.3 percent between FY 2005 and FY 2018.

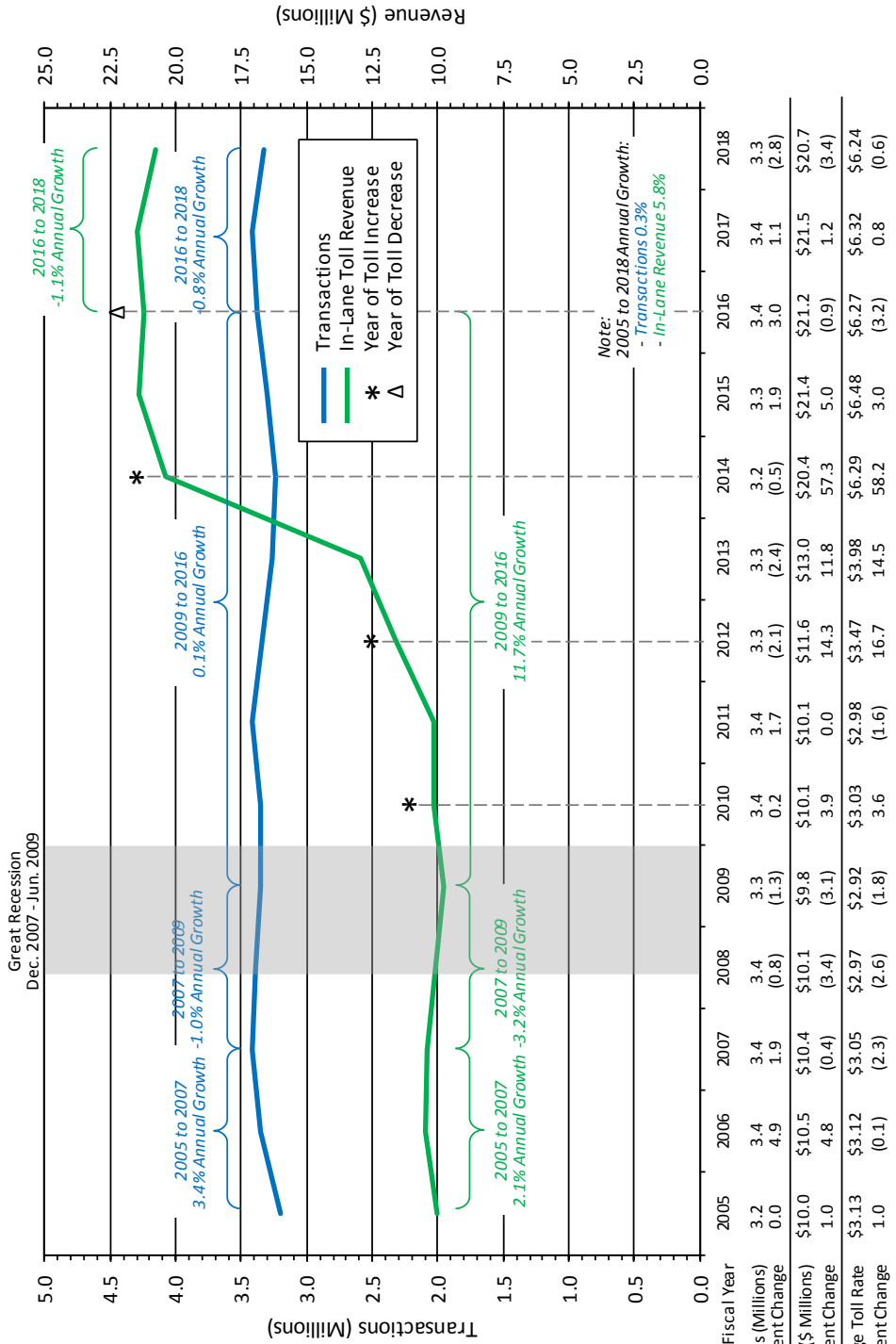
In-Lane Toll Revenues are also shown in Figure 2-7. As a result of the decreases in transactions related to the Great Recession, revenues declined by an average of 3.2 percent per year between FY 2007 and FY 2009. Revenues have recovered in recent years, aided by series of toll increases. Since FY 2009 revenues have grown by an average annual rate of 11.7 percent to $21.2 million in FY 2016. Despite the increases in commuter discount and Maryland E-ZPass® transactions, toll revenues decreased by 0.9 percent in FY 2016. This was due to the shift of transactions from cash to Maryland E-ZPass® due to the toll reduction. Toll revenues then decreased by 3.4 percent in FY 2018, due to the reduction in total transactions. Toll revenue growth between FY 2005 and FY 2018 averaged 5.8 percent, with the increases primarily related to the FY 2010 to FY 2014 toll rate increases.

Figure 2-6
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
William Preston Lane Jr. Memorial (Bay) Bridge



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	13.0	13.3	13.5	13.4	12.8	13.0	13.6	13.7	12.7	12.8	12.9	13.3	13.6	13.5
Percent Change	0.8	2.1	1.7	(0.9)	(4.6)	1.9	4.8	0.6	(7.0)	0.2	0.8	3.2	2.4	(0.5)
In-Lane Toll Revenue ($ Millions)	$33.5	$34.0	$34.4	$33.9	$32.5	$36.8	$37.6	$46.7	$52.4	$79.8	$81.2	$52.8	$54.0	$53.4
Percent Change	(0.3)	1.6	1.1	(1.5)	(4.0)	13.2	2.2	24.3	12.1	52.3	1.7	(35.0)	2.2	(1.0)
Average Toll Rate	$2.58	$2.56	$2.55	$2.53	$2.55	$2.83	$2.76	$3.41	$4.11	$6.25	$6.31	$3.98	$3.97	$3.95
Percent Change	(1.1)	(0.5)	(0.6)	(0.6)	0.6	11.1	(2.5)	23.6	20.6	52.0	0.9	(37.0)	(0.2)	(0.5)

Figure 2-7
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Harry W. Nice Memorial Bridge



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	3.2	3.4	3.4	3.4	3.3	3.4	3.4	3.3	3.3	3.2	3.3	3.4	3.4	3.3
Percent Change	0.0	4.9	1.9	(0.8)	(1.3)	0.2	1.7	(2.1)	(2.4)	(0.5)	1.9	3.0	1.1	(2.8)
In-Lane Toll Revenue ($ Millions)	$10.0	$10.5	$10.4	$10.1	$9.8	$10.1	$10.1	$11.6	$13.0	$20.4	$21.4	$21.2	$21.5	$20.7
Percent Change	1.0	4.8	(0.4)	(3.4)	(3.1)	3.9	0.0	14.3	11.8	57.3	5.0	(0.9)	1.2	(3.4)
Average Toll Rate	$3.13	$3.12	$3.05	$2.97	$2.92	$3.03	$2.98	$3.47	$3.98	$6.29	$6.48	$6.27	$6.32	$6.24
Percent Change	1.0	(0.1)	(2.3)	(2.6)	(1.8)	3.6	(1.6)	16.7	14.5	58.2	3.0	(3.2)	0.8	(0.6)

2.2.9 MDTA Legacy Facilities Total

Transaction and revenue data for the legacy system between FY 2005 and FY 2017 are provided in Figure 2-8. Systemwide transactions declined between FY 2007 and FY 2009 by an average of 1.5 percent per year, due to the impacts of the Great Recession. Following a recovery in FY 2011, where system transactions reached 121.5 million, transactions decreased annually through FY 2014. The decline through FY 2014 to 112.5 million transactions were likely the result of toll increases implemented each year from FY 2012 and FY 2014. In recent years, transaction growth has been impacted by continued economic recovery, relatively lower gasoline prices, and the FY 2016 toll rate decreases. The MDTA legacy facility transactions increased by 2.9 percent in FY 2016, and then by 2.5 percent in FY 2017. However, systemwide transactions decreased by 0.3 percent in FY 2018, due in part to the increasing cost of gasoline (12.5 percent increase over FY 2017) and the impacts of ongoing construction at the Baltimore Harbor crossings. Long-term average annual transaction growth was 0.2 percent between FY 2005 and FY 2018.

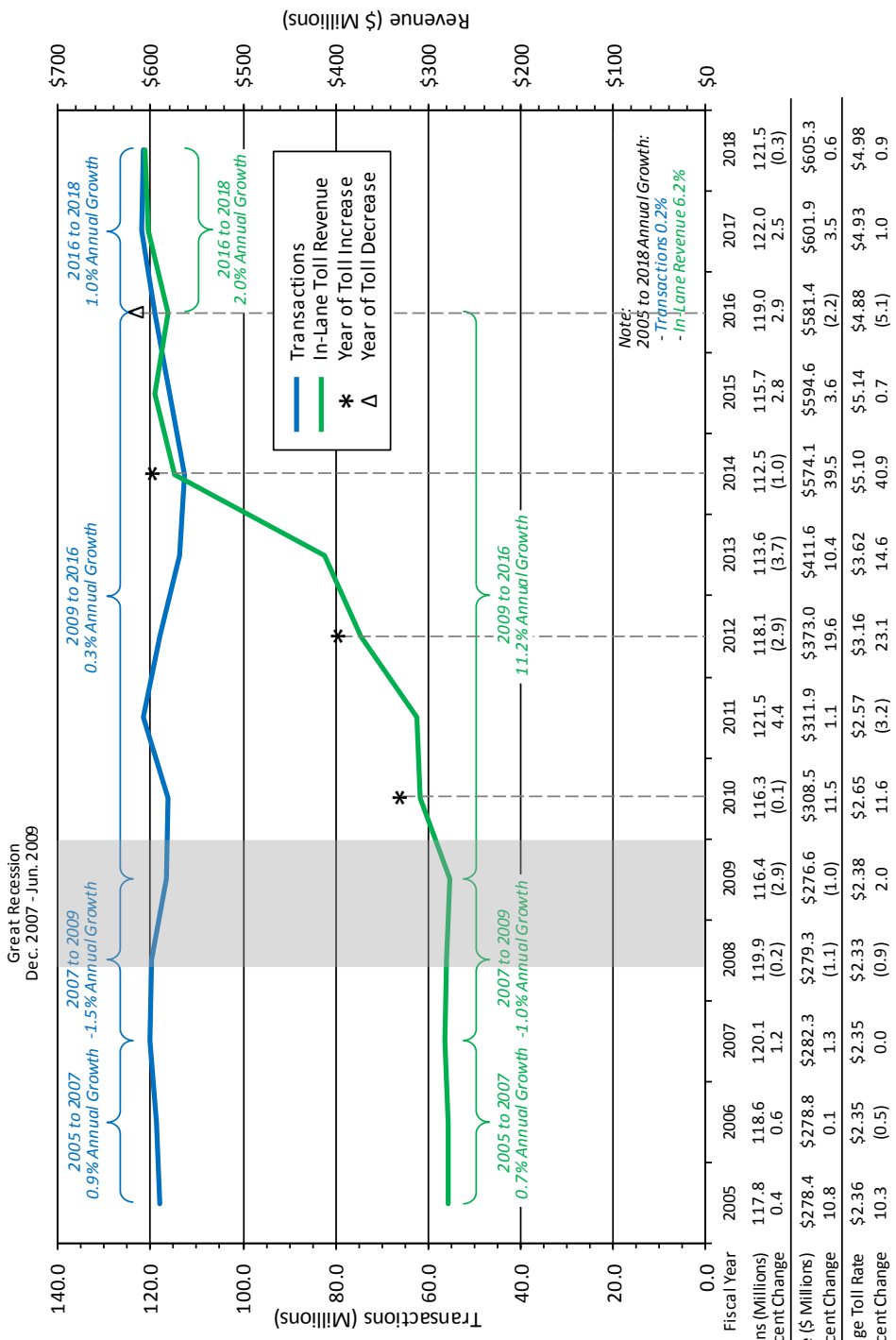
Systemwide In-Lane Toll Revenue increased each year between FY 2005 and FY 2018, except for fiscal years 2008, 2009, and 2016. Because of the decreases in transaction growth related to the Great Recession, revenues declined in FY 2008 by 1.1 percent and again in FY 2009 by 1.0 percent. Revenue has recovered in recent years, aided by a series of toll increases. Revenues increased by 3.5 percent to $581.4 million in FY 2016, resulting in an average annual growth rate of 11.2 percent since FY 2009. In FY 2016, In-Lane Toll Revenue decreased by 2.2 percent following the implementation of select toll rate reductions. The majority of this decrease was due to the toll rate decreases on the Bay Bridge. The Northern and Central Regions, where trips tend to be more commuter- and business-related than discretionary, were able to offset the losses in toll revenue resulting from the toll decrease, with additional revenues generated by shifts in method of payment. In FY 2017, In-Lane Toll Revenue increased by 3.5 percent, reaching $601.9 million. Despite decreases in transactions in FY 2018, systemwide toll revenues increased by 0.6 percent due to strong growth in commercial vehicle transactions. Annual In-Lane Toll Revenue growth has averaged 6.2 percent per year between FY 2005 and FY 2018.

Legacy facility In-Lane Toll Revenue has increased significantly more than the growth in transactions because of the adjustments to toll rates in recent years. Had these toll rate adjustments not been made, it is reasonable to assume that transactions would have been higher, while growth in In-Lane Revenues would have more closely tracked the rate of growth in transactions. Long-term historical growth, based on transaction and revenue data in those years without toll rate increases or economic downturns, is estimated to be roughly 0.5 percent per year.

2.2.10 Vehicle Class Distribution

Table 2-6 presents a summary of the distribution of annual transactions by vehicle class for FY 2018 for each of the legacy facilities and on a total system basis. Two-axle vehicles, which include passenger cars, motorcycles, vans and SUVs, comprised 92.5 percent of all transactions. Vehicles with three-or-more-axles, which include trucks, buses and other commercial vehicles, accounted for the remaining 7.5 percent. The John F. Kennedy Memorial Highway (I-95) had the greatest percentage of commercial vehicle transactions with 12.1 percent, while the Baltimore Harbor Tunnel had the lowest percentage with 2.4 percent of total transactions.

Figure 2-8
Historical Transactions and In-Lane Toll Revenue, FY 2005 through FY 2018
Legacy System



Fiscal Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Transactions (Millions)	117.8	118.6	120.1	119.9	116.4	116.3	121.5	118.1	113.6	112.5	115.7	119.0	122.0	121.5
Percent Change	0.4	0.6	1.2	(0.2)	(2.9)	(0.1)	4.4	(2.9)	(3.7)	(1.0)	2.8	2.9	2.5	(0.3)
In-Lane Toll Revenue ($ Millions)	$278.4	$278.8	$282.3	$279.3	$276.6	$308.5	$311.9	$373.0	$411.6	$574.1	$594.6	$581.4	$601.9	$605.3
Percent Change	10.8	0.1	1.3	(1.1)	(1.0)	11.5	1.1	19.6	10.4	39.5	3.6	(2.2)	3.5	0.6
Average Toll Rate	$2.36	$2.35	$2.35	$2.33	$2.38	$2.65	$2.57	$3.16	$3.62	$5.10	$5.14	$4.88	$4.93	$4.98
Percent Change	10.3	(0.5)	0.0	(0.9)	2.0	11.6	(3.2)	23.1	14.6	40.9	0.7	(5.1)	1.0	0.9

Table 2-6
Vehicle Class Distribution for the MDTA Legacy Facilities

	FY 2018 Transactions (000) [1]							
Vehicle Class	John F. Kennedy Mem. Highway	Thomas J. Hatem Mem. Bridge	Baltimore Harbor Tunnel	Francis Scott Key Bridge	Fort McHenry Tunnel	William P. Lane, Jr. Mem. (Bay) Bridge	Harry W. Nice Mem. Bridge	Total
2-Axle	13,576	4,881	27,325	10,330	40,546	12,630	3,123	**112,410**
Percent of Total	87.9	96.0	97.6	90.4	90.7	93.4	93.9	**92.5**
3+-Axle	1,875	205	685	1,096	4,174	887	203	**9,124**
Percent of Total	12.1	4.0	2.4	9.6	9.3	6.6	6.1	**7.5**
Total	**15,451**	**5,086**	**28,010**	**11,425**	**44,719**	**13,518**	**3,325**	**121,534**
Percent of Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: MDTA
[1] Includes Violation Transactions

2.2.11 E-ZPass® Market Share

In recent years, electronic toll collection has played an increasingly important role in transaction processing for toll agencies across the nation. MDTA collects electronic tolls via E-ZPass®. Toll collection through E-ZPass® provides faster toll processing and decreased collection costs. As such, increases in E-ZPass® market share represent potential increases in total paid (net) revenues.

Table 2-7 provides a concise summary of FY 2018 transactions by method of payment. They are shown individually for each of the seven legacy facilities, as well as on a total system basis. E-ZPass® transactions accounted for 75.1 percent of all transactions, an increase of 1.9 percent over the prior year. Of these, 65.3 percent were made by Maryland E-ZPass® customers, including in-state E-ZPass® customers, commuter plans, shopper plans and Hatem Bridge plans. In terms of individual facilities, the Thomas J. Hatem Memorial Bridge had the greatest percentage of E-ZPass® customers at 93.3 percent of total transactions, primarily due to the Hatem Bridge Toll Plans. The Hatem Bridge Toll Plans provide local residents and commuters with greater access to local businesses and employment centers while also providing the convenience of E-ZPass® and significant travel cost savings. The Harry W. Nice Memorial Bridge had the smallest percentage of E-ZPass® transactions at 58.8 percent. On a total system basis, cash transactions accounted for a combined 22.1 percent of all transactions, a decrease of 1.9 percent over FY 2017. Transactions made by non-revenue vehicles accounted for 1.1 percent of all transactions, while video transactions accounted for 1.7 percent.

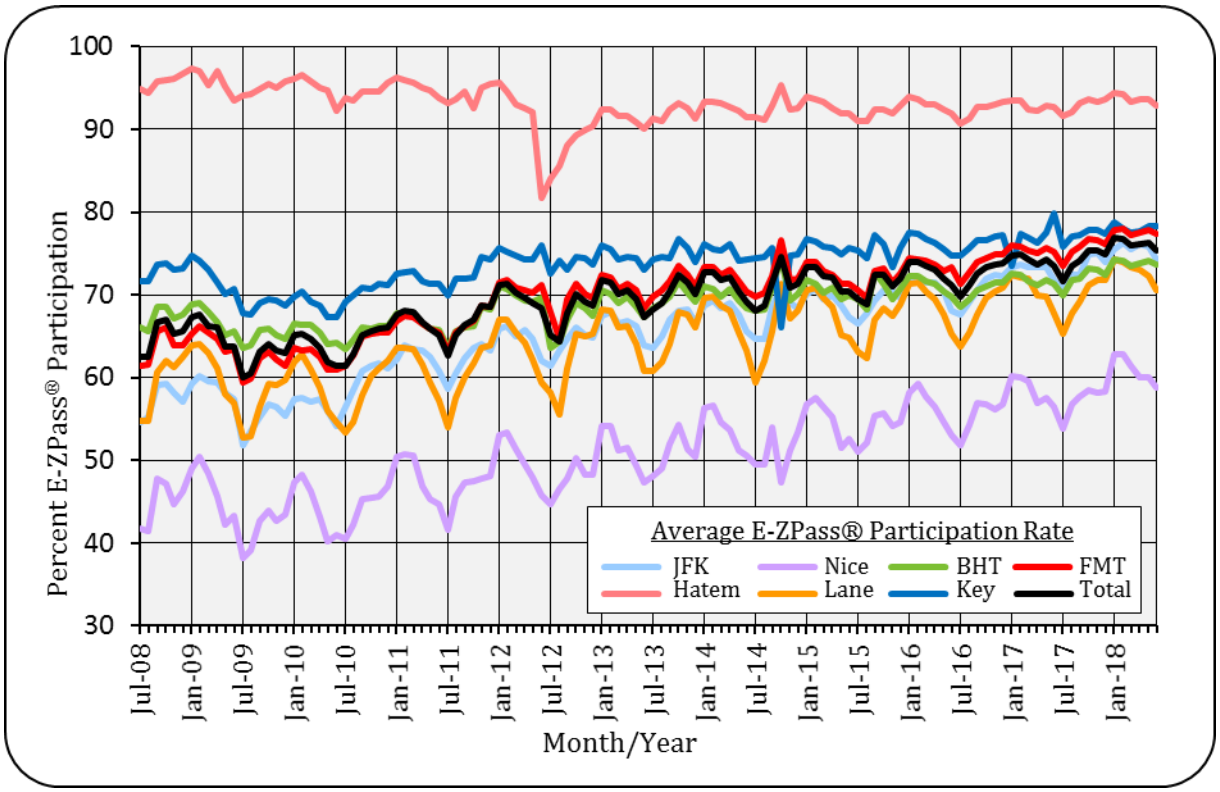
While Table 2-7 presents a snapshot of the FY 2018 E-ZPass® market share, Figure 2-9 provides a graphic summary for each of the seven legacy facilities and the system as a whole from July 2008 through June 2018. As shown, the E-ZPass® market share has gradually increased since FY 2010. Approximately one-quarter (24.0 percent) of all transactions were made by customers that still prefer the cash and video options.

Table 2-7
Method of Payment Distribution for the MDTA Legacy Facilities

		FY 2018 Transactions (000)							
	Method of Payment	John F. Kennedy Mem. Highway	Thomas J. Hatem Mem. Bridge	Baltimore Harbor Tunnel	Francis Scott Key Bridge	Fort McHenry Tunnel	William P. Lane, Jr. Mem. (Bay) Bridge	Harry W. Nice Mem. Bridge	**Total**
E-ZPass	Commuter / Shopper / Hatem Plans	748	4,165	7,810	4,743	11,784	3,198	742	**33,191**
	Percent of Total	4.8	81.9	27.9	41.5	26.4	23.7	22.3	**27.3**
	MD (2-axle and 3+-axle)	2,321	215	6,869	2,663	9,908	3,940	527	**26,444**
	Percent of Total	15.0	4.2	24.5	23.3	22.2	29.1	15.8	**21.8**
	Non-MD (2-axle and 3+-axle)	8,404	367	5,736	1,457	12,552	2,438	686	**31,641**
	Percent of Total	54.4	7.2	20.5	12.7	28.1	18.0	20.6	**26.0**
	Total E-ZPass	**11,473**	**4,747**	**20,416**	**8,863**	**34,244**	**9,576**	**1,955**	**91,275**
	Percent of Total	**74.3**	**93.3**	**72.9**	**77.6**	**76.6**	**70.8**	**58.8**	**75.1**
Cash	2-axle and 3+-axle	3,690	265	6,686	2,089	9,225	3,647	1,296	**26,898**
	Percent of Total	23.9	5.2	23.9	18.3	20.6	27.0	39.0	**22.1**
Non-Revenue	Official Duty	95	44	386	262	401	117	36	**1,341**
	Percent of Total	0.6	0.9	1.4	2.3	0.9	0.9	1.1	**1.1**
Video	Video	193	29	523	210	849	178	38	**2,021**
	Percent of Total	1.2	0.6	1.9	1.8	1.9	1.3	1.2	**1.7**
	Total	**15,451**	**5,086**	**28,010**	**11,425**	**44,719**	**13,518**	**3,325**	**121,534**
	Percent of Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Schedule of Toll Transactions (Unaudited) for FY 2018, MDTA.

Figure 2-9
E-ZPass® Market Share Trends



Chapter 3

Socioeconomic Review

3.1 Introduction

Trips are made on Maryland's tolled facilities for many purposes including commuting, work-related business, personal business, recreation, and commerce, etc. Forecasting facility traffic is a function of evaluating socioeconomic variables that drive trip purposes, such as population, employment, and income, etc. Hence, socioeconomic forecasts comprise critical inputs to traffic forecasts. The following historical and forecasted socioeconomic trends provide context for updating traffic growth forecasts. Such data includes different public and private sources, for different geographies and timeframes.

Socioeconomic Variables – Relevant socioeconomic trends to the MDTA facilities include six socioeconomic variables (population, employment, unemployment, real income per capita, real gross regional product [GRP], inflation) and fuel prices.

Geographies – Socioeconomic profiling begins with a national and census division level overview (Mid-Atlantic, South Atlantic), and narrows to the State of Maryland with sub-state regions. The various profile regions are shown in Figure 3-1.

Data Sources – Sourced government agencies and private sector forecasting companies:

- Thomas J. Hatem Memorial Bridge (Hatem Bridge)
- John F. Kennedy Memorial Highway, excluding the Express Toll Lanes (Kennedy Highway)
- Baltimore Harbor Tunnel (Harbor Tunnel)
- Fort McHenry Tunnel (Fort McHenry Tunnel)
- United States Census Bureau
- United States Bureau of Labor Statistics (BLS)
- United States Bureau of Economic Analysis (BEA)
- Energy Information Administration (EIA)
- Maryland State Data Center (MD SDC)
- Woods & Poole Economics, Inc., 2018 (WP18)[1]
- Moody's Analytics
- Congressional Budget Office (CBO)
- Federal Open Market Committee (FOMC)
- Office of Management and Budget (OMB)

Analysis Horizon - Socioeconomic data trends are presented as compound average annual growth rates (CAAGR); historical data is presented for each respective variable for years 2000, 2005, 2010, and 2017, with corresponding CAAGRs between such years, followed by forecasts in five-year increments from 2017 through 2032. Aggregate historical (2000 to 2017) and forecast (2017 to 2032) growth rates are also discussed.

---

[1] Woods & Poole Economics, Inc. Washington, D.C. Copyright 2018. Complete Economic and Demographic Data Source (CEDDS). Woods & Poole does not guarantee the accuracy of this data. The use of this data and the conclusion drawn from it are solely the responsibility of the Consultant.

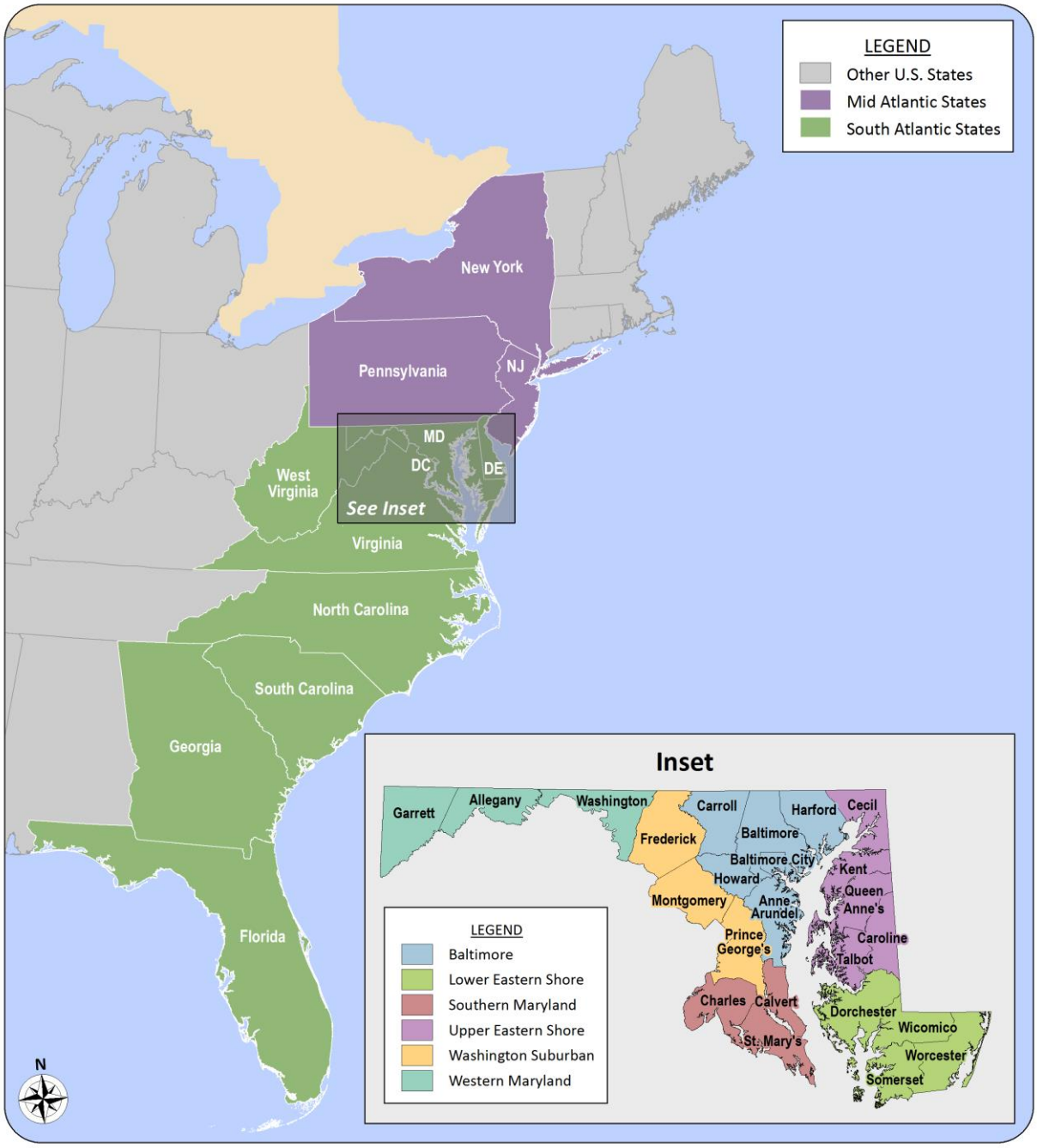


Figure 3-1
National and Maryland Geographies Profiled

Table 3-1
Socioeconomic Variables by Term, Historical Source, Forecast Source and Date

Variable	Terms	History	Forecast
Population	Persons	Census Bureau	Woods & Poole, 2018 Moody's, July 2018 MD SDC, August 2017
Employment	Persons	Bureau of Economic Analysis Bureau of Labor Statistics	Woods & Poole, 2018 Moody's, July 2018 MD SDC, January 2015
Unemployment	Percentage	Bureau of Labor Statistics	CBO, April 2018 FOMC, June 2018 OMB, February 2018 Moody's, July 2018
Real Income/Capita	2009 Dollars	Woods & Poole, 2018	Woods & Poole, 2018 Moody's, July 2018 MD SDC, January 2015
Real GRP	2009 Dollars	Bureau of Economic Analysis Woods & Poole, 2018	CBO, April 2018 FOMC, June 2018 OMB, February 2018 Moody's, July 2018 Woods & Poole, 2018
Inflation	Annual % Δ	Bureau of Labor Statistics	CBO, April 2018 FOMC, June 2018 OMB, February 2018 Moody's, July 2018
Fuel Prices	Price per Gallon, Price per Barrel	Energy Information Administration	Moody's, July 2018

3.2 Socioeconomic Variables

The socioeconomic variables evaluated herein are outlined in Table 3-1 by term, source, and forecast date. Each variable's historical and forecast trends by geography and source(s).

3.2.1 Population

Historical – Historical population, sourced from the United States Census Bureau, are presented in Table 3-2. Population in the United States grew from over 281 million in year 2000 to almost 326 million in 2017, an average growth of 0.9 percent per annum. Comparatively, the South Atlantic Region, which includes Maryland, grew at a faster pace of 1.3 percent, while the Mid-Atlantic Region lagged at a relatively fractional growth of 0.3 percent per year.

Table 3-2
Historical Population

Geography	Population				CAAGR			
	2000	2005	2010	2017	2000-2005	2005-2010	2010-2017	2000-2017
United States	281,421,906	295,516,599	308,745,538	325,719,178	1.0%	0.9%	0.8%	0.9%
Mid Atlantic	39,671,861	40,234,574	40,872,375	41,660,580	0.3%	0.3%	0.3%	0.3%
South Atlantic	51,769,160	56,145,779	59,777,037	64,705,532	1.6%	1.3%	1.1%	1.3%
Maryland	5,296,486	5,592,379	5,773,552	6,052,177	1.1%	0.6%	0.7%	0.8%
Baltimore	2,512,431	2,599,352	2,662,691	2,758,405	0.7%	0.5%	0.5%	0.6%
Lower Eastern Shore	186,608	199,904	209,275	212,693	1.4%	0.9%	0.2%	0.8%
Southern Maryland	281,320	321,725	340,439	363,869	2.7%	1.1%	1.0%	1.5%
Upper Eastern Shore	209,295	229,249	239,951	242,196	1.8%	0.9%	0.1%	0.9%
Washington Suburban	1,870,133	1,996,003	2,068,582	2,223,588	1.3%	0.7%	1.0%	1.0%
Western Maryland	236,699	246,146	252,614	251,426	0.8%	0.5%	-0.1%	0.4%

Source: United States Census Bureau

Maryland population grew by over 0.75 million from almost 5.3 million in 2000 to over 6.0 million in 2017, or 0.8 percent annually. The largest region in the State, Baltimore, grew relatively slowly at 0.6 percent annually, while Southern Maryland grew almost three times faster at 1.5 percent per year. Population per annum growth rates in the remaining regions ranged from a high of 1.0 percent in Washington Suburban to a low of 0.4 percent in Western Maryland.

Forecast – As shown in Table 3-3, while WP18 forecasts US population growth to continue at 0.9 percent per annum over the next fifteen years, Moody's forecasts a slower growth rate of 0.7 percent over the next ten years, with a slight deceleration to 0.6 percent following 2027. Similarly, Moody's Mid-Atlantic forecast of 0.0 percent is smaller than the WP18 estimate of 0.4 percent. However, both Moody's and WP18 South Atlantic annual forecasts hover around 1.2 percent (depending on 5-year increment).

WP18 also forecasts a higher aggregate (year 2017 to 2032) Maryland statewide population annual growth rate of 0.9 percent than the alternative MD SDC rate of 0.6 percent, as shown by five-year increments in Table 3-3. Both sources foresee the highest growth rates in Southern Maryland (1.4% by WP, 1.3% for MD SDC). Regarding the two metro areas, WP18 forecasts higher annual growth rates in both Baltimore (0.8%) and Washington Suburban (0.9%) than MD SDC (0.4%, 0.6%, respectively).

Table 3-3
Forecast Population

Geography	WP18			Moody's			MD SDC		
	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032
United States	0.9%	0.9%	0.9%	0.7%	0.7%	0.6%	-	-	-
Mid Atlantic	0.4%	0.4%	0.4%	0.0%	0.0%	0.0%	-	-	-
South Atlantic	1.3%	1.2%	1.2%	1.3%	1.3%	1.1%	-	-	-
Maryland	0.9%	0.9%	0.8%	-	-	-	0.6%	0.6%	0.5%
Baltimore	0.8%	0.8%	0.7%	-	-	-	0.4%	0.3%	0.3%
Lower Eastern Shore	0.9%	0.9%	0.8%	-	-	-	0.9%	0.9%	0.8%
Southern Maryland	1.5%	1.4%	1.4%	-	-	-	1.2%	1.3%	1.2%
Upper Eastern Shore	1.1%	1.1%	1.0%	-	-	-	0.8%	1.1%	1.0%
Washington Suburban	0.9%	0.9%	0.8%	-	-	-	0.5%	0.7%	0.6%
Western Maryland	0.4%	0.4%	0.3%	-	-	-	0.8%	0.8%	0.7%

Source: Woode and Poole Economics 2018, Moody's Economics, and the Maryland State Data Center

3.2.2 Employment

Historical – BEA employment data through year 2016[2] was extrapolated to year 2017 using annual BLS employment growth rates. Employment trends presented in Table 3-4 are typically more volatile than population and more closely resemble overall economic cycles, with relatively higher growth during pre-recession years (2000-2005), followed by notable declines in the recession period (2005-2010), and a subsequent recovery (2010-2017). Overall, the South Atlantic Region experienced average annual growth in employment of about 1.3 percent between 2000 and 2017, while the Mid-Atlantic region experienced a slower overall growth of 0.8 percent per year, and the overall US grew by 1.0 percent per annum.

Employment in Maryland grew an average 1.1 percent per year, which included a low of 0.2 percent annually in the 2005-2010 recessionary period. Overall, since 2000, employment growth has been slightly faster than total population growth. Employment in the Baltimore Region also grew at 1.0 percent on average, while employment in Maryland's Washington suburbs increased at a 1.2 percent annual rate. Western Maryland performed the weakest, increasing at 0.5 percent per year, while Southern Maryland saw the fastest rate of employment growth at 1.6 percent per annum.

Table 3-4
Historical Employment

Geography	Employment				CAAGR			
	2000	2005	2010	2017	2000-2005	2005-2010	2010-2017	2000-2017
United States	165,370,800	172,557,400	173,034,700	196,756,178	0.9%	0.1%	1.9%	1.0%
Mid Atlantic	22,078,567	22,723,036	23,105,935	25,363,341	0.6%	0.3%	1.3%	0.8%
South Atlantic	30,518,405	32,955,422	32,899,967	38,311,856	1.5%	0.0%	2.2%	1.3%
Maryland	3,092,788	3,315,028	3,347,915	3,721,286	1.4%	0.2%	1.5%	1.1%
Baltimore	1,526,659	1,605,021	1,624,590	1,822,941	1.0%	0.2%	1.7%	1.0%
Lower Eastern Shore	110,766	118,346	114,232	121,624	1.3%	-0.7%	0.9%	0.6%
Southern Maryland	125,688	144,654	150,463	165,116	2.9%	0.8%	1.3%	1.6%
Upper Eastern Shore	100,012	114,691	115,293	125,903	2.8%	0.1%	1.3%	1.4%
Washington Suburban	1,098,455	1,194,181	1,206,743	1,342,828	1.7%	0.2%	1.5%	1.2%
Western Maryland	131,208	138,135	136,594	142,802	1.0%	-0.2%	0.6%	0.5%

Source: United States Bureau of Economic Analysis and Bureau of Labor Statistics

Forecast – National employment growth is projected to average of 1.4 percent per year through 2032 according to WP18, while Moody's Analytics expects growth of less than half that, at 0.6 percent annually through 2032, as shown by five-year increments in Table 3-5. According to Moody's, South Atlantic Region growth (0.9 percent) is expected to outperform both the Nation (0.6 percent) and the Mid-Atlantic Region (0.1 percent). Similar relative geographic growth is forecast by WP18, with South Atlantic growth exceeding the Nation and the Mid Atlantic. The forecasts call for growth rates higher than the corresponding averages experienced during the recessionary period (2005-2010), but below those in the recent post-recessionary period (2010-2017).

Like the national trends, employment in Maryland is expected to continue rebounding relative to both its historical trend and population growth. According to the MD SDC, statewide employment growth is forecasted to fall from 0.9 percent (year 2017 to 2022) to 0.5 percent (year 2027 to 2032), as shown in Table 3-5. Comparatively, WP18 forecasts statewide growth at 1.5 percent and 1.2 percent, respectively. While most other sub-state regions are projected to grow similar to the statewide average, MD SDC forecasts Southern Maryland and the Upper Eastern Shore to grow fastest.

[2] BEA had not published year 2017 data as of July 2018.

Table 3-5
Forecast Employment

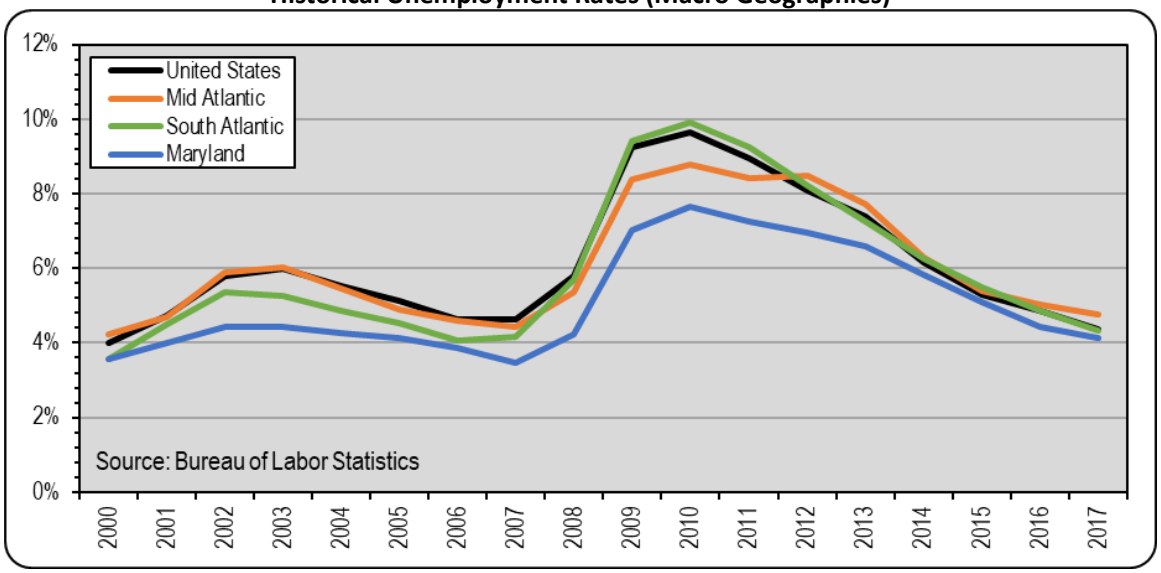
Geography	WP18			Moody's			MD SDC		
	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032
United States	1.5%	1.3%	1.2%	0.7%	0.6%	0.5%	-	-	-
Mid Atlantic	1.2%	1.0%	0.9%	0.1%	0.2%	0.1%	-	-	-
South Atlantic	1.7%	1.5%	1.4%	0.9%	0.9%	0.7%	-	-	-
Maryland	1.5%	1.4%	1.2%	-	-	-	0.9%	0.6%	0.5%
Baltimore	1.6%	1.4%	1.3%	-	-	-	0.9%	0.5%	0.4%
Lower Eastern Shore	1.4%	1.3%	1.2%	-	-	-	1.0%	0.6%	0.5%
Southern Maryland	1.7%	1.5%	1.4%	-	-	-	1.3%	1.0%	0.7%
Upper Eastern Shore	1.6%	1.4%	1.3%	-	-	-	1.3%	0.9%	0.6%
Washington Suburban	1.5%	1.3%	1.2%	-	-	-	1.0%	0.6%	0.5%
Western Maryland	1.2%	1.1%	0.9%	-	-	-	0.9%	0.7%	0.4%

Source: Woode and Poole Economics 2018, Moody's Economics, and the Maryland State Data Center

3.2.3 Unemployment

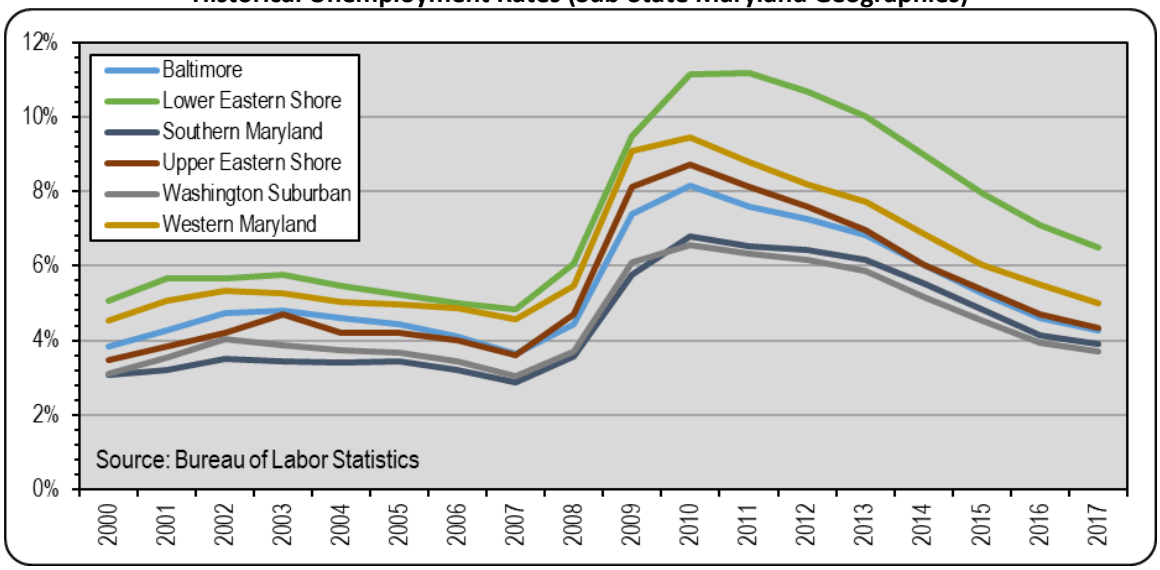
Historical – Figure 3-2 presents annual unemployment rates over the 2000 through 2017 period, based on BLS data. Unemployment rates for the South and Mid-Atlantic Regions generally tracked closely with those for the Nation, with the South Atlantic Region showing wider moves in both directions. Unemployment rates ranged between 4 percent to 6 percent during the pre-recession years, spiked to nearly 10 percent in 2010, and gradually decreased to near 4 percent by the end of 2017. In fact, the national unemployment rate dropped to 3.6 percent in May 2018, a national monthly unemployment rate (not seasonally adjusted) that has not been observed since 1969.

Figure 3-2
Historical Unemployment Rates (Macro Geographies)



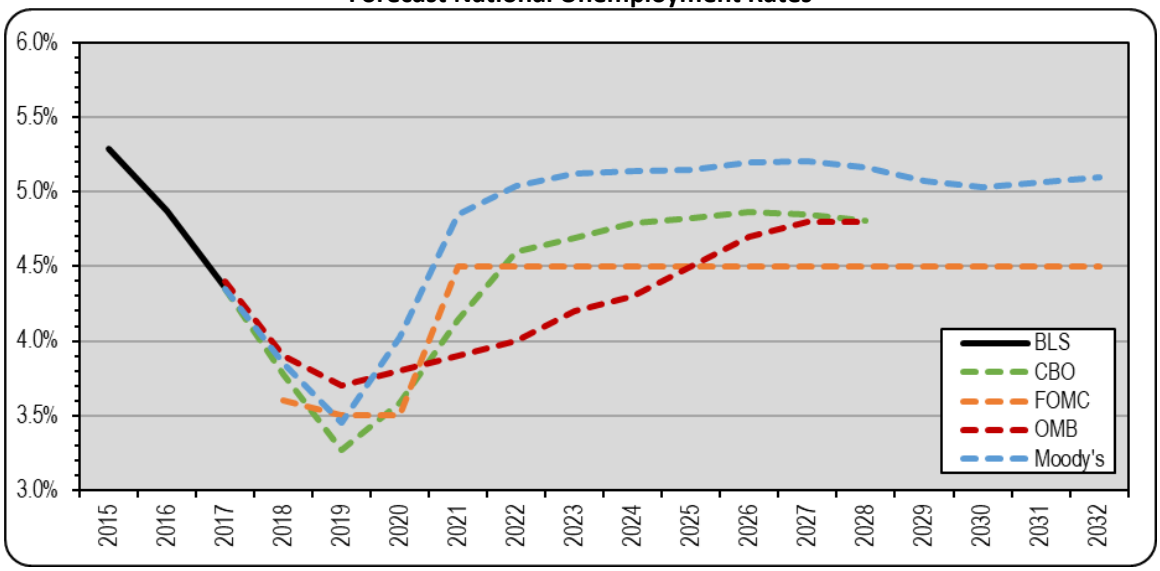
Sub-state annual unemployment rates track similar to one another, as well as to the national and multi-state regions. Figure 3-3 presents annual unemployment rates over the 2000 through 2017 period, based on BLS data. Of these, the Lower Eastern Shore are highest, and lag the other regions. Unemployment rates spiked in 2010, ranging from 6.8 percent in Southern Maryland to 11.1 percent along the Lower Eastern Shore. After which, unemployment rates improved steadily through 2017 ranging between a low of 3.7 percent (Washington Suburban) to 6.5% along the Lower Eastern Shore.

Figure 3-3
Historical Unemployment Rates (Sub-State Maryland Geographies)



Forecast – As employment continues to grow, the national unemployment rate is also forecasted to reach, if not exceed, structural full employment threshold. According to a handful of key national sources that forecast medium to long-term US unemployment through year 2032, the average unemployment rates are projected to decline slightly from the 2017 average rate of 4.4 percent to a low of between 3.3 percent (CBO) and 3.7 percent (OMB) in year 2019. After 2019, unemployment rates are anticipated to increase and level-off between 4.5 and 5.0 percent (varies slightly by source) in year 2022, as shown in Figure 3-4. No source is forecasting a foreseeable problem in the labor market.

Figure 3-4
Forecast National Unemployment Rates



3.2.4 Real Income Per Capita

Historical – Historical real income per capita is presented in Table 3-6. Nationwide, per capita annual income stood at over $45,300 (in 2009 constant dollars) in 2017, which represents real growth of 1.2 percent per annum during the 2000-2017 period. The corresponding income level in the South Atlantic Region is about $2,600 less than the national average, and has recently grown at or below 1.0 percent per annum, which is also below the national average. Per capita income levels are substantially higher in the Mid-Atlantic Region, averaging about $7,500 per year more than the national average in 2017, and have also increased faster than the South Atlantic Region and the US average during the 2000-2017 period.

Historical per capita real income in Maryland stood at about $52,900 in 2017 (in 2009 dollars), having increased by about 1.3 percent per year in real terms since 2000. The Washington Suburban level ($57,400) unsurprisingly surpasses the statewide average, while faster Baltimore income level growth (1.4 percent) has brought the area to par with the statewide averages, as presented in Table 3-6. Per capita incomes in Western Maryland grew at the relatively highest pace of 1.8 percent per year, but is nonetheless still the lowest real income per capita region in the state, at just $38,400 in 2017.

Table 3-6
Historical Real Income Per Capita (2009$)

	Real Income per Capita				CAAGR			
Geography	2000	2005	2010	2017	2000-2005	2005-2010	2010-2017	2000-2017
United States	$36,812	$38,916	$39,622	$45,335	1.1%	0.4%	1.9%	1.2%
Mid Atlantic	$42,041	$44,095	$46,162	$52,802	1.0%	0.9%	1.9%	1.3%
South Atlantic	$35,838	$38,770	$38,376	$42,686	1.6%	-0.2%	1.5%	1.0%
Maryland	$42,688	$46,934	$49,069	$52,860	1.9%	0.9%	1.1%	1.3%
Baltimore	$41,400	$45,449	$47,772	$52,747	1.9%	1.0%	1.4%	1.4%
Lower Eastern Shore	$30,472	$34,384	$35,265	$38,803	2.4%	0.5%	1.4%	1.4%
Southern Maryland	$37,654	$42,864	$47,242	$48,934	2.6%	2.0%	0.5%	1.6%
Upper Eastern Shore	$37,818	$42,298	$42,377	$46,311	2.3%	0.0%	1.3%	1.2%
Washington Suburban	$48,727	$53,030	$54,973	$57,379	1.7%	0.7%	0.6%	1.0%
Western Maryland	$28,480	$33,012	$34,546	$38,366	3.0%	0.9%	1.5%	1.8%

Source: Woods & Poole Economics, 2018

Forecast – According to WP18, US per capita real income is forecast to grow at an average annual rate of around 1.4 percent through 2022, then decelerate to 0.9 percent through 2032, (as shown in Table 3-7). Regional growth by WP18 follows similar deceleration growth forecasts. Conversely, Moody's Analytics projects accelerated growth in the latter five-year period. For example, the South Atlantic Region is forecast to grow 1.4 percent between 2017 to 2022, and 1.8 percent thereafter through year 2032. Mid-Atlantic Region growth is forecast to outpace both the national average and the South Atlantic from both sources.

Maryland per capita real income is projected to grow through 2032 on-par with the recent past. WP18 and the MD SDC forecasts statewide growth of 1.1 percent annually through 2032, the same average annual growth as the recent 2010 to 2017 period. However, the temporal growth differs between the two sources. The MD SDC predicts a notable deceleration of growth past 2022, while the WP18 forecast calls for a relatively steady pace through 2027, as shown in Table 3-7.

Table 3-7
Forecast Real Income Per Capita Growth

Geography	WP18			Moody's			MD SDC		
	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032
United States	1.4%	1.1%	0.9%	1.3%	1.4%	1.7%	-	-	-
Mid Atlantic	1.4%	1.2%	1.0%	1.6%	1.9%	1.9%	-	-	-
South Atlantic	1.4%	1.2%	0.9%	1.4%	1.8%	1.8%	-	-	-
Maryland	1.3%	1.1%	0.9%	-	-	-	1.5%	1.0%	0.8%
Baltimore	1.5%	1.3%	1.1%	-	-	-	1.7%	1.1%	0.8%
Lower Eastern Shore	1.4%	1.2%	0.9%	-	-	-	1.5%	1.0%	0.9%
Southern Maryland	0.9%	0.7%	0.5%	-	-	-	1.6%	1.1%	0.9%
Upper Eastern Shore	1.2%	1.0%	0.7%	-	-	-	1.7%	1.1%	0.8%
Washington Suburban	1.2%	1.0%	0.9%	-	-	-	1.3%	0.9%	0.7%
Western Maryland	1.4%	1.2%	1.0%	-	-	-	1.7%	1.1%	0.9%

Source: Woode and Poole Economics 2018, Moody's Economics, and the Maryland State Data Center

3.2.5 Real Gross Domestic Product (GDP)

Historical – BEA data shows that national real gross domestic product (GDP) growth averaged 1.7 percent annually from 2000-2017. The South Atlantic Region also grew at the same 1.7 percent annual rate, while the Mid-Atlantic Region gross regional product (GRP) grew slightly slower at 1.3 percent. Annual growth rates are presented by five-year increments in Table 3-8. Maryland GRP, $341 billion (in 2009$) in 2017, grew 2.0 percent per annum from 2000 to 2017. All Maryland sub-state region growth rates exceeded the national average except Western Maryland (1.1 percent), with Southern Maryland expanding at a more robust real annual rate of 3.1 percent.

Table 3-8
Historical Real GRP (millions of 2009$)

Geography	Real GRP				CAAGR			
	2000	2005	2010	2017	2000-2005	2005-2010	2010-2017	2000-2017
United States	$12,616,533	$14,203,241	$14,628,165	$16,721,499	2.4%	0.6%	1.9%	1.7%
Mid Atlantic	$1,989,727	$2,171,145	$2,262,843	$2,469,720	1.8%	0.8%	1.3%	1.3%
South Atlantic	$2,253,764	$2,647,477	$2,662,539	$2,986,206	3.3%	0.1%	1.7%	1.7%
Maryland	$242,282	$290,581	$310,702	$341,190	3.7%	1.3%	1.3%	2.0%
Baltimore	$122,879	$145,728	$157,520	$177,433	3.5%	1.6%	1.7%	2.2%
Lower Eastern Shore	$6,966	$8,689	$8,707	$9,328	4.5%	0.0%	1.0%	1.7%
Southern Maryland	$7,967	$10,393	$11,920	$13,375	5.5%	2.8%	1.7%	3.1%
Upper Eastern Shore	$5,672	$7,392	$7,861	$8,732	5.4%	1.2%	1.5%	2.6%
Washington Suburban	$90,908	$109,414	$115,776	$122,851	3.8%	1.1%	0.9%	1.8%
Western Maryland	$7,890	$8,965	$8,919	$9,472	2.6%	-0.1%	0.9%	1.1%

Source: Bureau of Economic Analysis and Woods & Poole Economics, 2018

Forecast – WP18 forecasts the US GDP growth rate to go from 2.0 percent between 2017 and 2022 to 1.7 percent between 2027 to 2032, as shown in Table 3-9. Moody's forecasts 2.3 percent per annum in the next five years, followed by 1.9 percent annually thereafter. Figure 3-5 depicts the annual growth in national real GDP from five sources, most of which exhibit accelerated growth in 2018 and 2019 relative to 2017, followed by a deceleration to around 2.0 percent per annum (OMB as the exception, which projects continued optimistic growth around 3.0 per annum through 2028). Also, Moody's forecasts a considerable deceleration to almost no growth in the upcoming election year 2020.

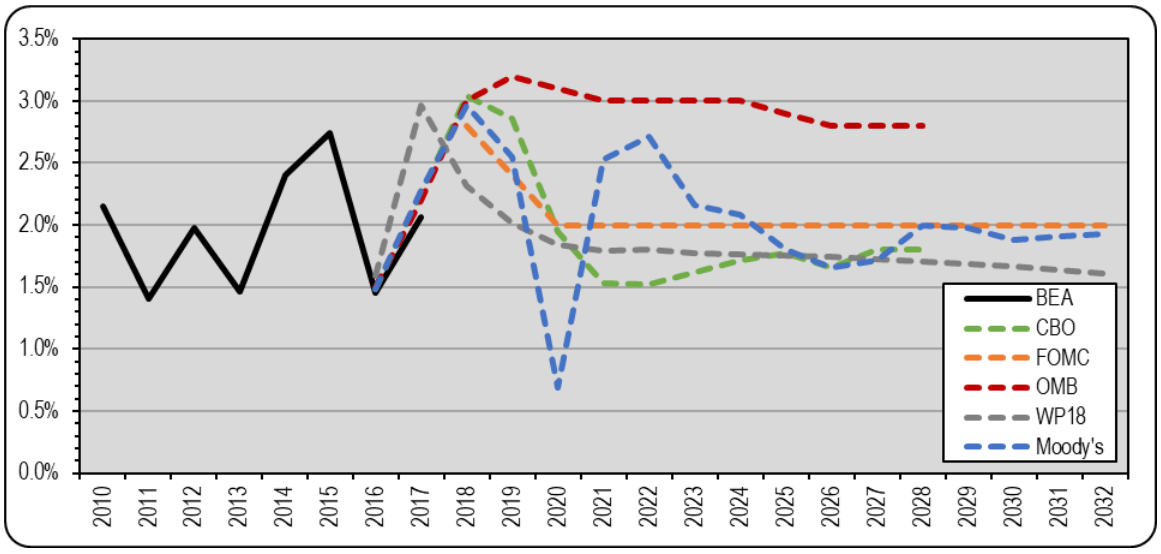
According to WP18, Maryland's Statewide GRP is forecast to slightly lag US totals through year 2032. The Baltimore, Lower Eastern Shore, Upper Eastern Shore, and Southern Maryland regions' GRP growth rates are projected to mirror the State, while the Washington Suburban and Western Maryland growth rates are expected to lag by 0.2 to 0.3 percentage points.

Table 3-9
Forecast Real GRP Growth

Geography	WP18			Moody's		
	2017-2022	2022-2027	2027-2032	2017-2022	2022-2027	2027-2032
United States	2.0%	1.8%	1.7%	2.3%	1.9%	1.9%
Mid Atlantic	1.6%	1.4%	1.3%	-	-	-
South Atlantic	2.2%	2.0%	1.9%	-	-	-
Maryland	1.9%	1.8%	1.7%	-	-	-
Baltimore	2.1%	1.9%	1.8%	-	-	-
Lower Eastern Shore	2.0%	1.8%	1.7%	-	-	-
Southern Maryland	1.9%	1.7%	1.6%	-	-	-
Upper Eastern Shore	1.9%	1.7%	1.6%	-	-	-
Washington Suburban	1.7%	1.6%	1.5%	-	-	-
Western Maryland	1.6%	1.4%	1.3%	-	-	-

Source: Woode and Poole Economics 2018 and Moody's Economics

Figure 3-5
Forecast National Real GDP Growth

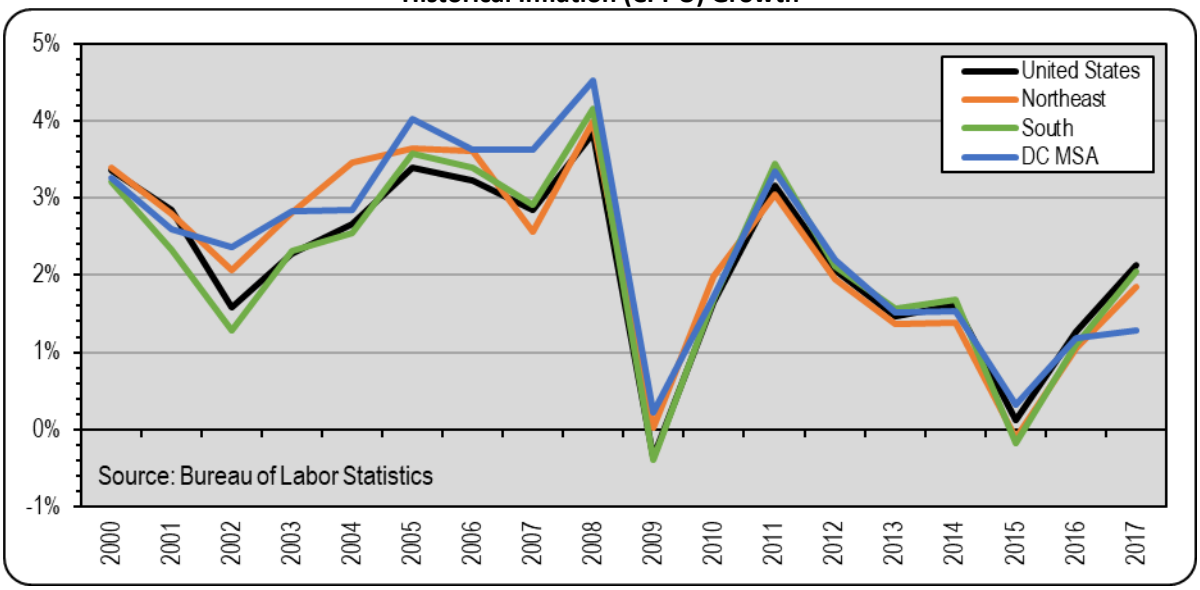


3.2.6 Inflation

Historical – Inflation, as measured by the popular Consumer Price Index, fluctuated considerably between years 2000 to 2017, as shown in Figure 3-6. Prior to the 2008 recession, US inflation peaked at 3.8 percent. It then dropped sharply in 2009 (to -0.4 percent deflation), increased to 3.2 percent by year 2011, and then declined gradually through year 2014. After plummeting to 0.1 percent in 2015, inflation rose to 1.3 percent in 2016 and to 2.1 percent in 2017. Overall, US inflation averaged about 2.2 percent annually during the eighteen-year period.

Inflation in the Northeast Region (proxy for Mid-Atlantic States) followed a similar up/down cycle, averaging 2.3 percent annually, which was slightly higher than the national rate. In the South, including Maryland, prices trended at 2.2 percent annually, closely aligned to the national average since 2000. The Washington-Baltimore Metro area, however, experienced a higher inflation rate compared to the rest of the South and the Nation, averaging 2.4 percent during the same period. However, in 2017, the DC Metro experienced a slightly lower annual inflation than the macro geographies.

Figure 3-6
Historical Inflation (CPI-U) Growth



Forecast – Inflation is expected to inch upward in the near term, per Figure 3-7, but needs to be monitored for potential medium- to longer-term increases. Further removal of spare capacity in the labor markets may lead to increased pressures on wages as markets tighten and approach full employment later in the business cycle. Additionally, as volatile energy prices approach an equilibrium, they are expected to add somewhat to the general increases in prices. A sample of major macroeconomic forecasters expect US annual inflation to stabilize around 2.3 percent from 2019 onward, depending on source. However, FOMC forecasts a lower inflation rate of 2.0 percent.

3.2.7 Fuel Prices

Historical – Figure 3-8 illustrates the monthly change in crude and retail gasoline prices from years 2000 to 2018. Whereas crude oil reflects price per barrel and gasoline reflects cost per gallon (unleaded, all grades, all formulations), both are in nominal retail prices (i.e., current dollars).

Historical EIA-tracked gasoline-prices vary little between US regions (the Nation, Central Atlantic Region[3] and Lower Atlantic Region[4]), with the Central Atlantic Region costing slightly more (typically $0.02 to $0.10 more per gallon). Nationally, gasoline prices per gallon ranged from a low of $1.13 (December 2001) to a high of $4.11 (July, 2008). However, recent national gasoline prices have stabilized below $2.50 per gallon since August 2015, steadily increasing to $2.93 in July 2018.

Retail gasoline prices are strongly influenced by larger trends in crude oil prices, which can be quite volatile and challenging to forecast. Since 2000, monthly crude oil prices (West Texas Intermediate [WTI] benchmark) fluctuated between $19.39 (in December 2001) to $133.88 per barrel (June 2008), as illustrated in Figure 3-8. Recent volatility shows a significant decline from June 2014 ($103.59) to February 2016 ($30.32) but has since rebounded to almost $70 ($67.87 in June 2018).

[3] Central Atlantic region includes: Delaware, District of Columbia, Maryland, New Jersey, New York and Pennsylvania.
[4] Lower Atlantic region includes: Florida, Georgia, North Carolina, South Carolina, Virginia and West Virginia.

Figure 3-7
Forecast National Inflation Growth

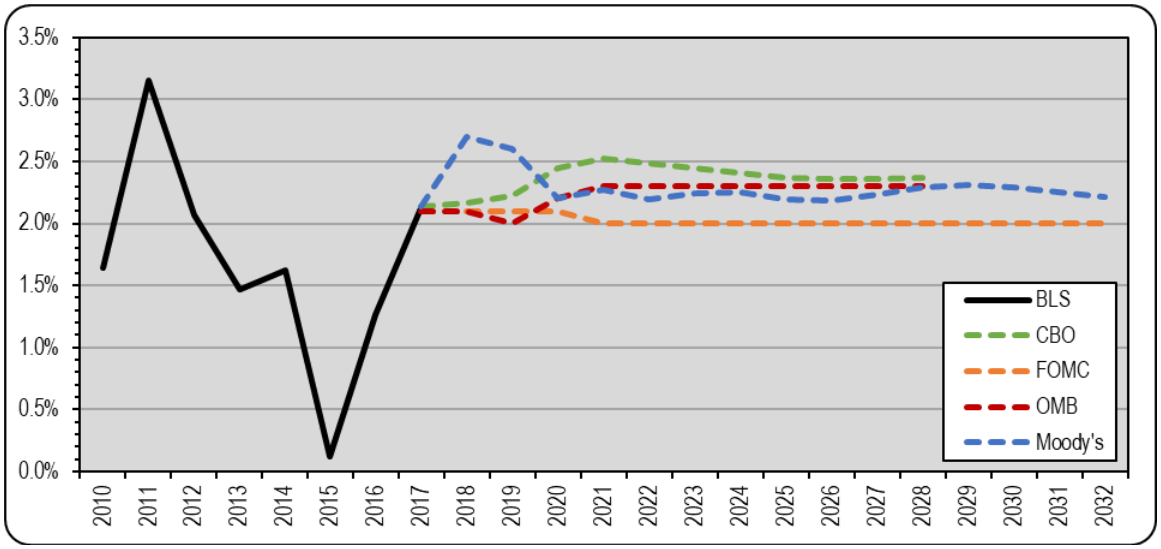
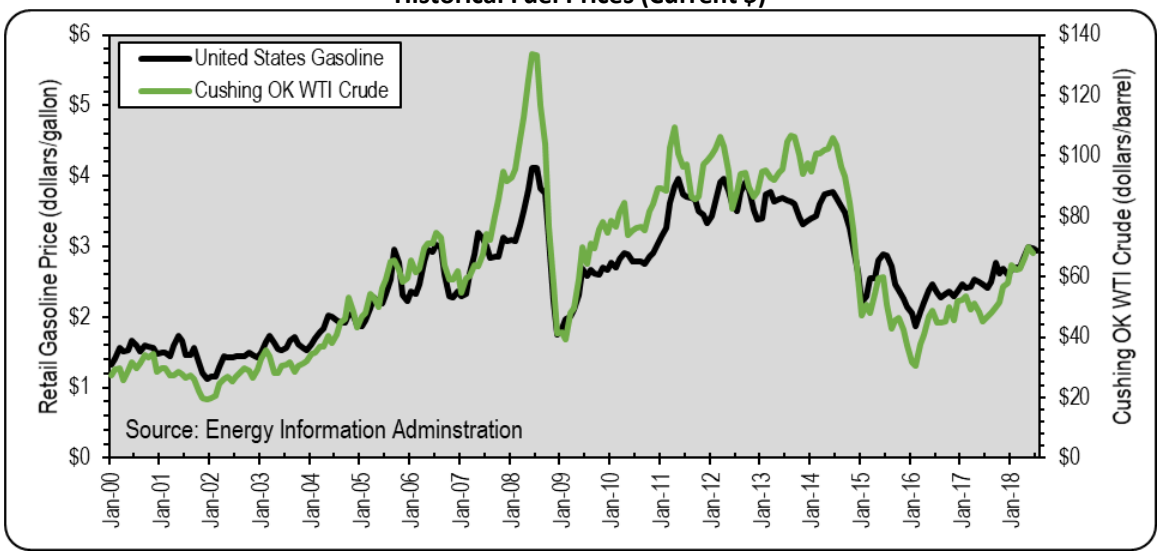
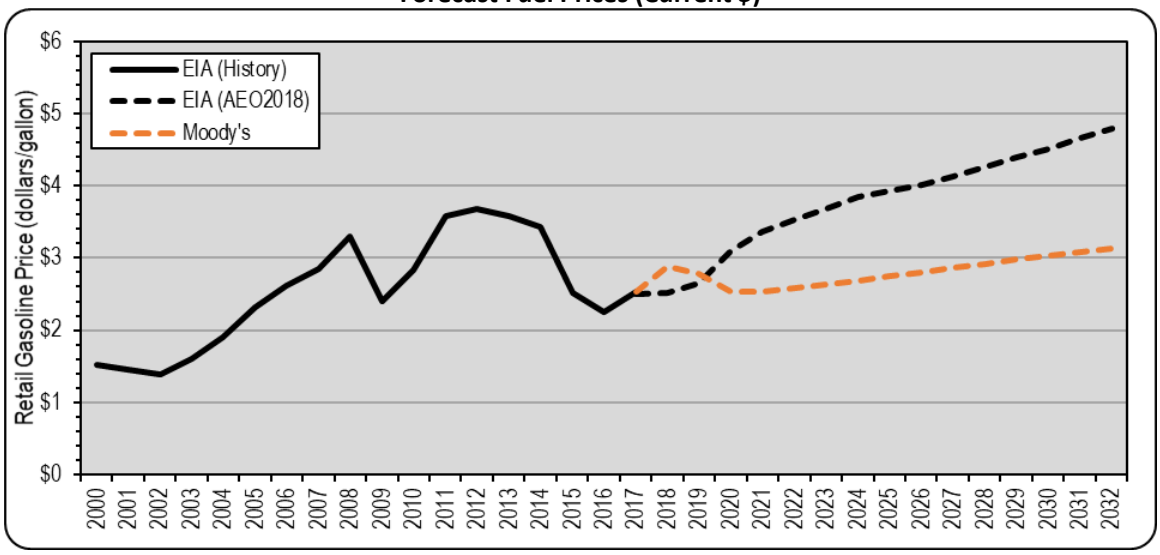


Figure 3-8
Historical Fuel Prices (Current $)



Forecasts – US retail gasoline prices, which hovered around $2.85 per gallon in the first half of 2018, are expected to remain below the $3.00 per gallon through 2020, according to both Moody's recent (July 2018) projection and the Energy Information Agency's 2018 Annual Energy Outlook (AEO2018). In the longer term, annual prices are forecast diverge between the two sources. Moody's forecasts a decline in gasoline prices from 2018 to 2020, and a slow-and-steady increase thereafter to just $3.13 by 2032. Contrastingly, the AEO2018 forecast accelerates fuel price growth in the 2018-2020 timeframe, followed by growth to $4.78 in 2032. These forecasts are illustrated in Figure 3-9

Figure 3-9
Forecast Fuel Prices (Current $)



3.3 Summary and Conclusion

Having endured the Great Recession and the relatively delayed recovery, the general macroeconomic environment in the US, Maryland, and the South and Mid-Atlantic Regions are robust, and depending on metric and perspective, strengthening, which bodes well for the near future. Within Maryland, the Southern sub-state planning region is projected to experience particularly strong growth amongst the analyzed geographies.

Most credible forecasting agencies (both public and private) now expect continued economic output, employment, and income expansion, accompanied by only moderate increases in gasoline prices and general inflation over the short- to medium-term (5-10 years). While labor markets, along with the larger economic activity measures continue to improve into 2018, uneven strengthening persists. Many risks also persist, such as the fragile economic landscapes of trading partners (European, Asian, and Latin American), exacerbated threats of Middle East extremism, commodity fluctuations (especially gasoline), currency markets fluctuations, public sector fiscal difficulties and constraints, and now threats of trade wars. The current shorter-term growth is indefinitely unsustainable, which eventually will be tempered by such persistent risk factors and other unknowns.

While the growth momentum in Maryland and the surrounding regional economies has generally strengthened and broadened, one can be cautiously optimistic about the ongoing economic expansion likely in the MDTA geographic influence area. However, the favorable factors behind the strong traffic increases since 2014, such as relatively robust labor market growth combined with the unexpected declines in fuel prices, are unlikely to prove sustainable over the upcoming decade. Nevertheless, the moderate socioeconomic growth in the influence area may translate into continued modest increases in traffic demand on the MDTA legacy facilities over the coming decade. Moreover, other factors, e.g., toll rates and/or transportation network changes, etc., beyond the overall socioeconomic growth will also influence traffic growth on the legacy system.

Chapter 4

Traffic and Revenue Forecast

This chapter summarizes the development of the forecasts of future year transactions and toll revenue for the seven legacy toll facilities of the MDTA. These 10-year annual forecasts have been prepared by facility and vehicle category through FY 2028 and include monthly forecasts for FY 2019 and 2020.

4.1 Traffic and Toll Revenue Forecasts

This section provides an overview of the development of the traffic and toll revenue forecasts including a description of how the traffic and toll revenue model was developed and the major model data inputs. These data inputs including toll rates by payment method, traffic growth forecasts, E-ZPass® participation percentages, and the impacts associated with planned roadway improvements on the legacy facilities.

4.1.1 Traffic and Toll Revenue Forecast Model

The traffic and toll revenue model with resulting transaction and toll revenue forecasts were made independently by facility based on actual transaction and revenue data from FY 2010 through June 2018. The model developed for this study uses actual transaction and toll revenue data provided by the MDTA as the foundation. The data was provided by facility, month and vehicle classification. The end-product of the model was forecasts of transactions by the following vehicle and payment classes:

- **Passenger Cars:**
  - Cash
  - MD E-ZPass®
  - Non-MD E-ZPass®
  - Video
  - Commuter / Shopper
  - Hatem A and B
  - Official Duty / Non-Revenue
- **Commercial Vehicles (3+ axles):**
  - Cash
  - MD E-ZPass®
  - Non-MD E-ZPass®
  - Video

A passenger car is defined as a two-axle vehicle, while commercial vehicles are those having 3-or-more axles. Passenger car and commercial vehicle transactions were forecasted independently by facility based upon growth rates of the historical and projected correlation with the economic variables described in more detail in Chapter 3. The forecasts by vehicle type were then disaggregated into applicable payment categories based upon historical and projected participation trends. These forecasted transactions by payment type were then converted to toll revenue estimates based on existing toll rates for the respective vehicle and payment classes. Following this, the transaction and revenue impacts of planned roadway improvements were then incorporated.

The major traffic and toll revenue model data input variables are discussed below.

4.1.1.1 Toll Rates and Fee Adjustments

The transaction and toll revenue forecast model used the toll rates shown previously in Tables 1-1 through 1-3. These rates incorporate the select toll reductions effective as of July 1, 2015 and have been used in calculating the revenue forecasts presented later in this report. No other toll rate changes have been assumed to occur during the FY 2019 to FY 2028 forecast period.

4.1.1.2 Normal Traffic Growth

Economic growth is an important driving force for the region and is also linked with traffic growth. Growth in regional population and employment will generally result in an increase in traffic volumes for commuting purposes, as well as for other activities like shopping and recreation. Data for gross regional product, both state and the Baltimore region, were procured as a measure to reflect the relationship with the increasing trend of toll transactions at the legacy facilities. Historic and forecast data were also obtained from:

- The United States Census Bureau;
- The United States Bureau of Economic Analysis (BEA);
- The United States Bureau of Labor Statistics (BLS);
- The United States Energy Information Administration (EIA);
- Maryland State Data Center (MD SDC);
- Woods & Poole Economics (W&P); and
- Moody's Analytics.

Population, employment, gross regional product (GRP), and gasoline prices were obtained from these sources and were used for evaluation of the inputs used in deriving traffic growth forecasts as a function of these measures.

The econometric models developed and used for the traffic growth forecasts in the March 2015 Traffic and Revenue Study sought to establish correlative relationships between various independent variables (such as population, employment, GRP, etc.) and the dependent variable (transactions). The selected independent variables were then used in the forecasting process together with the available-at-the-time future year forecast data. In some cases, adjustments that would have a more local effect on the traffic volumes of the toll facilities were also incorporated. This included localized construction impacts associated with major planned highway improvements.

The latest historical and forecasts of socioeconomic/independent variable-related data were collected and analyzed in this update, with the findings summarized in Chapter 3. As a result of this analysis, it was concluded that while some of the latest socioeconomic growth projections for the next 10 years were slightly higher and some slightly lower (depending on the variable and geography) than those developed for the earlier forecasts, overall the two sets of socioeconomic forecasts balanced to be about the same. Consequently, this update resulted in only minor adjustments, mostly based on the newly-released historical transaction data, to the early years of the forecasts horizon. These updated growth forecasts were incorporated into the traffic and toll revenue forecast model.

4.1.1.3 Planned Roadway Improvements

The six major improvements expected to impact traffic and revenue on the MDTA legacy facilities and included in the forecast model are described below. In reviewing these projects and estimating the traffic impacts, it was estimated that during the construction periods, some traffic would divert to the

next best alternative tolled or toll-free crossing if possible, while a small portion of more discretionary trips would be suppressed.

1. **Baltimore Harbor Tunnel (I-895)** - Replace the deck and superstructure of the bridge over the Patapsco Flats (north of MD 295 to the I-895 Spur merge). Construction began in August 2016 and will extend through May 2019. One lane in each direction is being maintained throughout the construction period;

2. **Fort McHenry Tunnel (I-95)** - This project involves improvements from the tunnel to the I-895 merge. When completed, continuous 4-lanes in each direction will be provided. Construction began in March 2017, and will continue through December 2018, and will involve off-peak lane closures and full-time shoulder closures. This project will also provide capacity on I-95 allowing for some diversion from I-895 when the I-895 Canton Viaduct replacement project begins.

3. **Canton Viaduct Replacement (I-895)** - This project, extending from the tunnel to Interstate Avenue, will be replacing the Canton Viaduct and ramp to Holabird Avenue. Construction is scheduled to run from June 2018 to July 2021. One lane in each direction will be maintained from January 2019 to July 2021. As part of the considerations of this project, lane closures would not occur until January 2019, allowing for the I-95 improvements to be completed to help facilitate any traffic diversions to I-95.

4. **Francis Scott Key Bridge (I-695)** - This project will rehabilitate the structural, mechanical and electrical components of the Curtis Creek Drawbridge, located south of the Francis Scott Key Bridge on I-695. Construction is scheduled to begin in January 2018 and will run through November 2018. While two-way traffic will operate 24/7, MDTA will close the Inner Loop I-695 first and operate two-way traffic on the Outer Loop. Once complete, the Outer Loop will close, and two-way traffic will operate on the Inner Loop. During this stage, the entrance ramp from MD 10 to the Outer Loop will be closed 24/7.

5. **William Preston Lane, Jr Memorial Bridge (US-50)** – This project will rehabilitate the deck of the eastbound span of the William Preston Lane (Bay) Bridge. Construction is scheduled to extend from October 2021 to May 2023. Plans call for single lane closures in off-peak and complete eastbound bridge closures overnight. While the eastbound span is fully closed, the existing contra-flow lane on the westbound span will be used to carry eastbound traffic.

6. **William Preston Lane, Jr Memorial Bridge (US-50) –** This project will rehabilitate the deck of the westbound span of the William Preston Lane (Bay) Bridge. Construction is scheduled to extend from September 2019 to April 2021. Plans call for the long-term closure of the right lane from September through April with the exception of Thanksgiving weekend where all 3 lanes will be reopened to traffic. Single lane closures during off-peak hours and complete westbound bridge closure overnight. The existing contra-flow lane on the westbound span will be used to carry eastbound traffic as necessary.

Additional construction projects on the MDTA facilities and competing arterials, were also reviewed. These include the I-95 improvements between MD 152 and MD 24 and the deck replacement of the I-95 bridge over Little NE Creek. Given the location and details of these additional projects, it was determined that the construction activity associated with these projects will result in minimal, if any, impacts on traffic and toll revenue.

4.1.1.4 Baltimore Harbor Tunnel (I-895) Construction Impact Analysis

Additional focus was applied to the Central Region facilities (Fort McHenry Tunnel/I-95, Baltimore Harbor Tunnel/I-895, and Francis Scott Key Bridge/I-695) because of the extensive construction planned on I-895. As described in Project #3 above, the multi-year construction project, referred to as the Canton Viaduct Replacement or 895 Bridge Project, will begin in December 2018 and will involve reconstruction of the Canton Viaduct bridge. Due to the nature of the work, extensive maintenance of traffic (MOT) plans were prepared. The MOT plans involve lane closures and traffic shifts which will stretch through the Baltimore Harbor Tunnel, located just south of the Canton Viaduct. Significant traffic diversions from the Baltimore Harbor Tunnel are anticipated because of this project. These diversions will impact MDTA revenues, particularly if the traffic does not divert to the Fort McHenry Tunnel or Francis Scott Key Bridge.

In analyzing the impacts of this construction project, the travel demand model for the Baltimore region maintained by the Baltimore Metropolitan Council (BMC) was used. The model was used to quantify the facilities to which traffic will divert from I-895. After obtaining the model from the BMC, the modeling process included network editing and checking to ensure accurate representation of the study area, model calibration to existing regional traffic counts and trip patterns through the Baltimore Harbor Tunnel using StreetLight origin and destination data. The StreetLight data of origins and destinations of traffic through the Baltimore Harbor Tunnel were compared to the origins and destinations of traffic from the BMC model. Adjustments to the model patterns were made to reflect the actual patterns. Once calibrated, the model was then run with the capacity reductions along I-895 due to the construction project to quantify the traffic impacts versus the existing condition.

StreetLight collects anonymous GPS data from various sources, such as in-vehicle navigation systems, cell phones, fitness trackers and, other sources to measure transportation behavior. GPS devices create records of device locations. StreetLight removes any identifying information from the data records and aggregates the information to provide approximations of actual travel OD patterns.

The data location records are linked through algorithms into a series of trips by identifying their origin, destination, and route of travel. The trip data is aggregated and normalized into OD patterns. Reported trip data is aggregated over a period that ranges from a few months to a few years, by time of day, and by weekday versus weekend day conditions. CDM Smith obtained StreetLight data estimates of travel patterns for the Baltimore Harbor Tunnel (BHT) and its two primary competing routes, the Fort McHenry Tunnel (FMT) and Francis Scott Key Bridge (FSK).

Figure 4-1 shows a series of 23 internal superzones representing the BMC travel demand model area. The superzones represent a collection of geographically smaller, more detailed individual traffic zones within the regional travel demand model. Superzones are primarily used for graphical presentation of the travel pattern information and as an aid in refining the calibration of the travel demand model used in this analysis.

Figure 4-2 uses color coding to graphically display the proportion of BHT trips to and from each of the superzones shown in Figure 4-1. Trip distributions north of the bridge are generally coded in varying shades of brown. Trip distributions along the south end of the bridge are coded using varying shades of blue.

On the north end of the bridge, the heaviest concentrations of observed trips come from Superzones 17 and 18, generally along the southeast side of both Baltimore County and the City of Baltimore.

Figure 4-1
Superzones for Baltimore Metropolitan Council Travel Demand Model Area

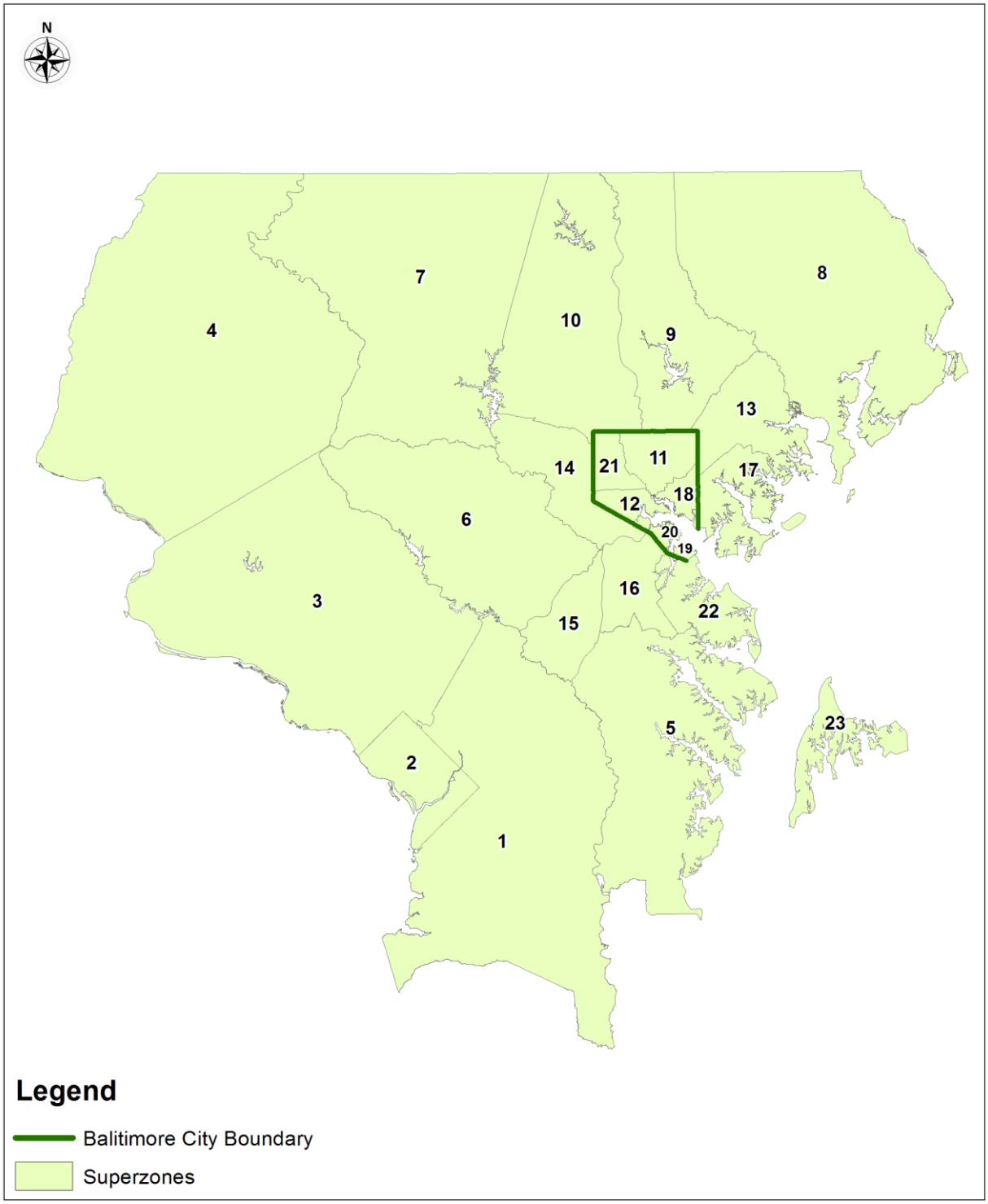
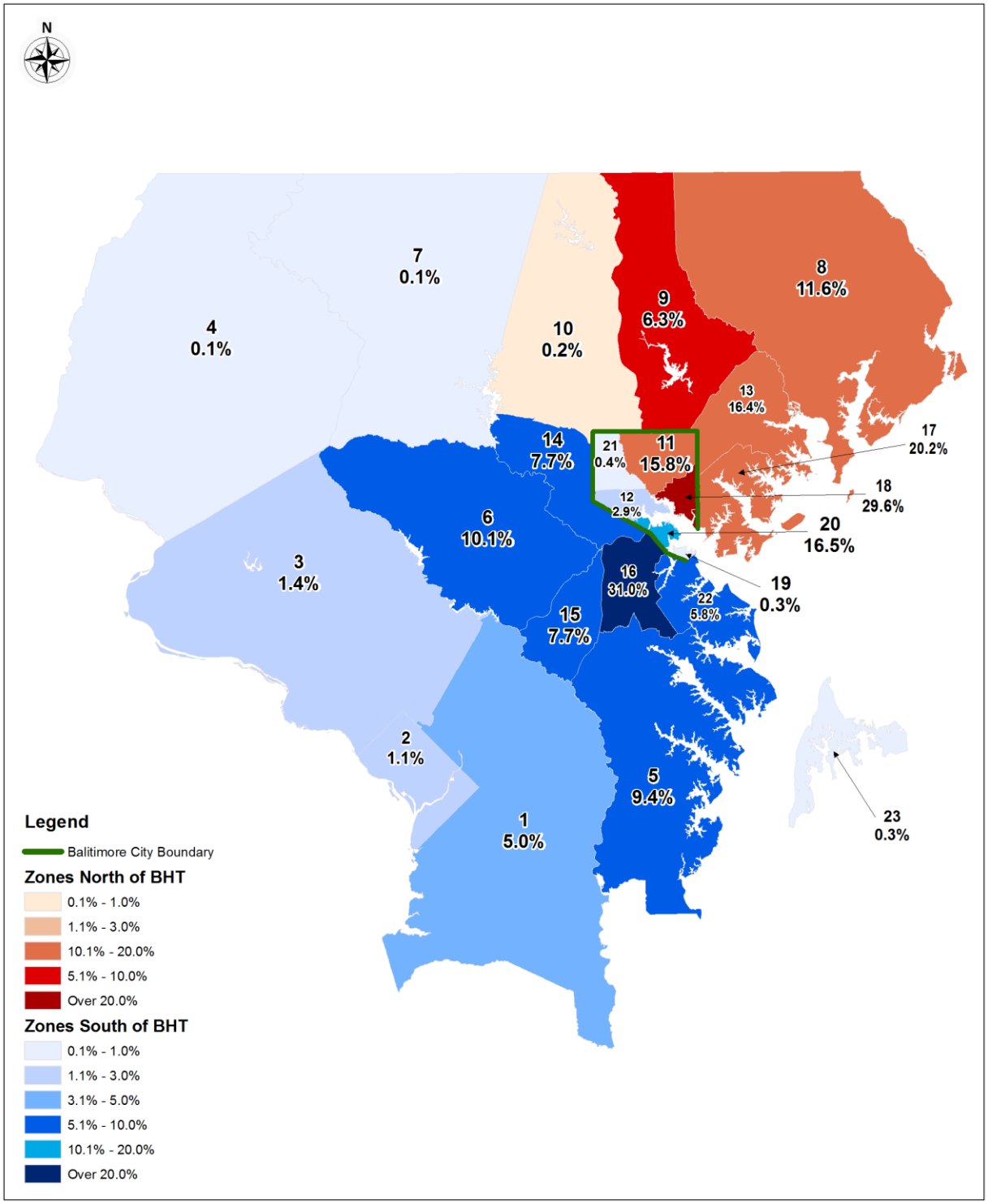


Figure 4-2
Approximate Distribution of Baltimore Harbor Tunnel Trips



These two zones account for almost 50 percent of the trips north of the BHT. Superzone 11, located in the City of Baltimore east of I-83, and Superzone 13, in southeast Baltimore County account for almost one-third of trips north of the BHT. Almost 12 percent of BHT trips come from Superzone 8, Harford County. The remaining trips accounting for less than 7 percent of BHT trips originate from or are destined to Superzones 9 and 10 in northern Baltimore County.

Almost 54 percent of trips south of the BHT, having a northbound origin or southbound destination are in Anne Arundel County (Superzones 5, 15, 16 and 22). Superzone 16 located in the County and home to the Baltimore/Washington International Thurgood Marshall Airport, accounts for 31 percent of trips south of the BHT. Four superzones south of the BHT (Superzones 12, 19, 20 and 21) in the City of Baltimore and Baltimore County account for 28 percent of trips. Howard County accounts for another 10 percent of the southern trips. Together, trips in the above-referenced geographies account for over 90 percent of the trips south of the BHT.

4.2 Basic Assumptions

Transaction and revenue estimates for the MDTA legacy toll facilities were predicated upon the following assumptions, which are considered reasonable by CDM Smith for purposes of the forecast:

1. This study is limited to the seven MDTA legacy facilities and does not include forecasts for the Intercounty Connector or the I-95 Express Toll Lanes℠;
2. The seven legacy toll facilities and approach roads will continue to be well-maintained and effectively signed;
3. No competing highway projects other than those identified in this report will be constructed or significantly improved during the forecast period;
4. MDTA will continue to operate within its business rules and practices;
5. The existing toll collection concept and toll schedules will be in effect throughout the forecast period;
6. For the purposes of this report, it is assumed that no toll adjustments will be made during the forecasting period and that any conversion of facilities to all-electronic tolling will be revenue neutral;
7. Annual revenue estimates are expressed in future year dollars (nominal);
8. No major recession, natural disasters or other significant exogenous events will occur that would significantly reduce travel in the region;
9. Population and employment growth will occur as presented in this study; and
10. Motor fuel will remain in adequate supply, and future price increases will not significantly exceed the long-term rate of inflation.

Any significant departure from these basic assumptions could materially affect forecasted transactions and toll revenue for the seven facilities.

4.3 Transaction and In-Lane Toll Revenue Forecasts

4.3.1 Annual Transactions and In-Lane Toll Revenue by Facility

A summary of estimated transactions and In-Lane Toll Revenue forecasts from FY 2019 through FY 2028 for each of the seven MDTA legacy facilities by passenger car and commercial vehicle classes is presented in this section in Tables 4-1 through 4-7. The forecasts were developed based on the previously described spreadsheet model and modeling process, which in addition to incorporating existing FY 2018 traffic as its base input, included estimated normal traffic growth, estimated traffic impacts from major construction projects on the legacy facilities, and adjustments associated with the impacts of leap year. It should be noted that the forecasts include slightly higher growth rates in FY 2020, FY 2024 and FY 2028, accounting for the positive impact of an extra day in these leap years. Transactions in the following year have been forecasted to grow at slightly lower rates, adding a negative adjustment to account for the higher number of transactions in the leap year.

4.3.1.1 John F. Kennedy Memorial Highway (I-95)

Forecasts of annual transactions and In-Lane Toll Revenue for the John F. Kennedy Memorial Highway (I-95) are provided in Table 4-1. The John F. Kennedy Memorial Highway processed 15.5 million transactions in FY 2018, a decrease of 0.5 percent over FY 2017. In-Lane Toll Revenue increased by 0.9 percent in FY 2018 from $175.8 million in FY 2017 to $177.2 million. Additionally, commercial vehicles, which accounted for roughly 12 percent of transactions in FY 2018, generated more than 43 percent of the revenue. With the positive impacts of the economic recovery and fuel prices already accounted for in the FY 2017 and FY 2018 transaction growth, FY 2018 transactions were estimated to increase at a normal growth rate of 0.4 percent to 15.5 million.

Several construction projects are anticipated on I-95 during the forecast period. One of these projects involves the rehabilitation of bridges is located just north of the toll plaza on the John F. Kennedy Memorial Highway and is anticipated to have some minor impacts during the construction period. Construction is scheduled to extend from March 2019 to October 2020. Following discussions with MDTA staff, it was estimated that the construction efforts will produce no significant trip diversion or suppression on the John F. Kennedy Memorial Highway.

Between FY 2019 to FY 2028, transactions have been estimated to increase by 0.8 percent per annum, reaching 16.7 million by FY 2028. In-Lane Toll Revenue has been forecasted to increase by 0.8 percent per annum from $179.3 million in FY 2019 to $193.0 million in FY 2028. This level of growth is consistent with the forecasted growth in transactions.

4.3.1.2 Thomas J. Hatem Memorial Bridge

Forecasts of annual transactions and In-Lane Toll Revenue for the Thomas J. Hatem Memorial Bridge (US 40) are provided in Table 4-2. The Hatem Bridge processed just under 5.1 million transactions in FY 2018, a decrease of 0.3 percent over FY 2017 transactions of 5.1 million. In-Lane Toll Revenue decreased by 4.0 percent from $12.1 million in FY 2017 to $11.6 million in FY 2018. The difference in year-over-year change between transactions and revenue is due to changes in the method of payment distribution among passenger cars. Hatem Plan transactions increased to 4.1 million in FY 2018, or 84.0 percent of total passenger car transactions. This represents an increase of roughly 1 percentage point, resulting in a decrease in the average passenger car toll rate of almost $0.08.

Table 4-1
John F. Kennedy Memorial Highway (I-95)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	13.58		1.88		15.45	
2019 [5]	13.60	0.2%	1.92	2.4%	15.52	0.4%
2020 [3,5]	13.70	0.8%	1.96	1.9%	15.66	0.9%
2021	13.75	0.4%	1.98	0.9%	15.73	0.4%
2022	13.85	0.7%	1.99	0.7%	15.84	0.7%
2023	13.97	0.9%	2.00	0.7%	15.98	0.9%
2024 [3]	14.14	1.2%	2.02	0.9%	16.16	1.1%
2025	14.23	0.6%	2.03	0.3%	16.25	0.6%
2026	14.35	0.9%	2.04	0.6%	16.39	0.9%
2027	14.48	0.9%	2.05	0.6%	16.54	0.9%
2028 [3]	14.65	1.2%	2.07	0.9%	16.72	1.1%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$100.01		$77.19		$177.20	
2019 [5]	100.25	0.2%	79.01	2.3%	179.26	1.2%
2020 [3,5]	101.00	0.7%	80.54	1.9%	181.53	1.3%
2021	101.34	0.3%	81.29	0.9%	182.63	0.6%
2022	102.02	0.7%	81.86	0.7%	183.88	0.7%
2023	102.92	0.9%	82.44	0.7%	185.35	0.8%
2024 [3]	104.10	1.2%	83.16	0.9%	187.26	1.0%
2025	104.72	0.6%	83.43	0.3%	188.16	0.5%
2026	105.64	0.9%	83.93	0.6%	189.57	0.8%
2027	106.57	0.9%	84.44	0.6%	191.01	0.8%
2028 [3]	107.79	1.2%	85.19	0.9%	192.98	1.0%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on various bridge deck rehabilitations in Cecil County in March 2019 and ends in October 2020.

Table 4-2
Thomas J. Hatem Memorial Bridge (US 40)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	4.88		0.20		5.09	
2019	4.89	0.2%	0.20	-0.6%	5.09	0.1%
2020 [3]	4.92	0.6%	0.20	-1.6%	5.12	0.6%
2021	4.93	0.2%	0.20	-1.2%	5.13	0.1%
2022	4.96	0.6%	0.20	0.2%	5.16	0.6%
2023	4.99	0.6%	0.20	0.6%	5.19	0.6%
2024 [3]	5.03	0.8%	0.20	0.9%	5.23	0.8%
2025	5.04	0.2%	0.20	0.3%	5.24	0.2%
2026	5.06	0.5%	0.20	0.6%	5.27	0.5%
2027	5.09	0.5%	0.20	0.6%	5.29	0.5%
2028 [3]	5.13	0.8%	0.21	0.9%	5.34	0.8%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$5.22		$6.37		$11.59	
2019	5.23	0.2%	6.33	-0.6%	11.56	-0.2%
2020 [3]	5.26	0.6%	6.23	-1.6%	11.49	-0.6%
2021	5.26	0.1%	6.16	-1.2%	11.42	-0.6%
2022	5.29	0.5%	6.17	0.2%	11.46	0.4%
2023	5.32	0.5%	6.20	0.6%	11.53	0.6%
2024 [3]	5.36	0.7%	6.26	0.9%	11.62	0.8%
2025	5.37	0.2%	6.28	0.3%	11.65	0.2%
2026	5.39	0.4%	6.32	0.6%	11.71	0.5%
2027	5.41	0.4%	6.35	0.6%	11.77	0.5%
2028 [3]	5.45	0.7%	6.41	0.9%	11.86	0.8%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.

With the positive impacts of the economic recovery and fuel prices already accounted for in the FY 2017 and FY 2018 transaction growth, FY 2019 transactions were estimated to increase at a normal growth rate of 0.1 percent to 5.1 million. During the FY 2019 to FY 2028 forecast period, transactions have been estimated to increase by 0.5 percent per annum, reaching 5.3 million by FY 2028. In-Lane Toll Revenue has been forecasted to increase by 0.3 percent per annum from $11.6 million in FY 2019 to $11.9 million in FY 2028.

4.3.1.3 Baltimore Harbor Tunnel

Baltimore Harbor Tunnel transactions and In-Lane Toll Revenue are presented in Table 4-3. Transactions in FY 2018 were 28.0 million, a 1.5 percent increase over FY 2017. This increase is generally representative of normal growth trends, since the construction activities to replace the deck and superstructure of the bridge over the Patapsco Flats (north of MD 295 to the I-895 Spur merge), just south of the Baltimore Harbor Tunnel has been on-going since August 2016. Roughly 7 percent of traffic, or approximately 5,000 vehicles per day, were estimated to have shifted to the Fort McHenry Tunnel and the Francis Scott Key Bridge to avoid this construction. These impacts have been moderated in FY 2018 as construction activities on the approaches to the Fort McHenry Tunnel have also begun. Some traffic is assumed to have remained on the Francis Scott Key Bridge to avoid the construction on the other facilities, while some discretionary trips are assumed to have not been made. In-Lane Toll Revenue of $91.4 million was collected in FY 2018, an increase of 2.2 percent over FY 2017.

In the forecast years between FY 2019 and FY 2021, the impacts of various planned construction projects have been incorporated into the estimates of transactions and revenue at the Baltimore Harbor Tunnel. These include the Patapsco Flats bridge reconstruction, which is currently underway and is scheduled to end in May 2019, and the Canton Viaduct Replacement Project, which is scheduled to run from June 2018 to July 2021 with major lane closures beginning in January 2019. The Canton Viaduct Replacement Project in particular, is forecasted to have a significant negative impact on Baltimore Harbor Tunnel traffic in the range of 39 percent, or 30,000 diverted vehicles per day. It has been estimated that 60 percent of this traffic will divert to the FMT and 25 percent to the FSK. The final 15 percent or an estimated 4,500 vehicles per day, will either divert to other toll-free alternative routes or will not make the planned trip at all. This later phenomenon is referred to as trip suppression.

In FY 2020 during the height of the construction activities, transactions are forecasted to decline to 18.9 million, primarily the result of the aforementioned traffic diversions. Due in part to the construction impacts, revenue in FY 2020 is forecasted at $61.7 million. Following the end of the various planned construction projects at the Harbor crossings and approaches, transactions and toll revenues are estimated to increase as normal traffic patterns and discretionary trips return. By FY 2028, transactions are forecasted to increase to 31.4 million, generating $102.6 million in toll revenue. Throughout the forecast period, commercial vehicles represent approximately 2.5 percent of total transactions, but over 10 percent of in-lane toll revenue.

4.3.1.4 Fort McHenry Tunnel

The Fort McHenry Tunnel transactions and In-Lane Toll Revenue forecasts are presented in Table 4-4. This facility recorded the highest total transactions of all the legacy toll facilities at 44.7 million in FY 2018, a decrease of 1.5 percent over FY 2017. This decrease is partly due to the shift of traffic from on-going construction activities on I-95. In-Lane Toll Revenue of $205.1 million was collected in FY 2018, an increase of 0.5 percent over FY 2017.

Table 4-3
Baltimore Harbor Tunnel (I-895)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2,5]	27.33		0.69		28.01	
2019 [5,6]	22.23	-18.7%	0.56	-18.9%	22.78	-18.7%
2020 [3,6]	18.50	-16.8%	0.45	-19.7%	18.94	-16.9%
2021 [6]	18.60	0.6%	0.45	0.8%	19.05	0.6%
2022 [6]	28.45	53.0%	0.79	75.1%	29.24	53.5%
2023	29.54	3.8%	0.82	4.2%	30.36	3.9%
2024 [3]	29.81	0.9%	0.82	0.5%	30.63	0.9%
2025	29.91	0.3%	0.82	0.0%	30.73	0.3%
2026	30.10	0.6%	0.83	0.2%	30.92	0.6%
2027	30.28	0.6%	0.83	0.2%	31.11	0.6%
2028 [3]	30.55	0.9%	0.83	0.5%	31.39	0.9%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2,5]	$81.61		$9.79		$91.39	
2019 [5,6]	66.50	-18.5%	7.93	-18.9%	74.44	-18.6%
2020 [3,6]	55.29	-16.9%	6.37	-19.7%	61.66	-17.2%
2021 [6]	55.54	0.5%	6.42	0.8%	61.97	0.5%
2022 [6]	84.88	52.8%	11.24	75.1%	96.12	55.1%
2023	88.06	3.7%	11.72	4.3%	99.78	3.8%
2024 [3]	88.77	0.8%	11.78	0.5%	100.55	0.8%
2025	88.99	0.3%	11.78	0.0%	100.78	0.2%
2026	89.46	0.5%	11.81	0.3%	101.28	0.5%
2027	89.93	0.5%	11.84	0.3%	101.78	0.5%
2028 [3]	90.66	0.8%	11.91	0.5%	102.56	0.8%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.
[6] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Table 4-4
Fort McHenry Tunnel (I-95)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2,5,6]	40.55		4.17		44.72	
2019 [5,6,7]	44.52	9.8%	4.45	6.6%	48.97	9.5%
2020 [3,7]	47.76	7.3%	4.70	5.6%	52.46	7.1%
2021 [7]	47.92	0.3%	4.72	0.3%	52.63	0.3%
2022 [7]	42.37	-11.6%	4.54	-3.8%	46.91	-10.9%
2023	42.07	-0.7%	4.53	-0.2%	46.61	-0.7%
2024 [3]	42.45	0.9%	4.55	0.5%	47.01	0.9%
2025	42.60	0.3%	4.55	0.0%	47.15	0.3%
2026	42.86	0.6%	4.56	0.2%	47.43	0.6%
2027	43.13	0.6%	4.58	0.2%	47.71	0.6%
2028 [3]	43.52	0.9%	4.60	0.5%	48.12	0.9%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2,5,6]	$121.60		$83.46		$205.06	
2019 [5,6,7]	133.60	9.9%	88.97	6.6%	222.57	8.5%
2020 [3,7]	143.21	7.2%	93.94	5.6%	237.15	6.6%
2021 [7]	143.55	0.2%	94.27	0.4%	237.82	0.3%
2022 [7]	126.83	-11.6%	90.73	-3.8%	217.56	-8.5%
2023	125.82	-0.8%	90.58	-0.2%	216.40	-0.5%
2024 [3]	126.84	0.8%	91.05	0.5%	217.89	0.7%
2025	127.16	0.3%	91.03	0.0%	218.20	0.1%
2026	127.84	0.5%	91.26	0.3%	219.10	0.4%
2027	128.52	0.5%	91.49	0.3%	220.01	0.4%
2028 [3]	129.55	0.8%	91.97	0.5%	221.53	0.7%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.
[6] Construction begins on I-95 improvements in March 2017 and ends December 2018.
[7] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Transactions are forecasted to grow by an estimated 7.1 percent to 52.5 million by FY 2020, a result of traffic diversions from the construction activities at the Baltimore Harbor Tunnel. With the return of normal traffic patterns following completion of construction activities, transactions in FY 2022 were forecasted to decline by almost 11 percent to 46.9 million. By FY 2028, transactions are forecasted at 48.1 million. Given the transactions generated at the Fort McHenry Tunnel, the facility produces the highest estimated toll revenue among the legacy facilities, forecasted to reach $221.5 million by FY 2028. Throughout the forecast period, commercial vehicles represent approximately 10 percent of total transactions on the facility, but almost 42 percent of in-lane toll revenue.

4.3.1.5 Francis Scott Key Bridge

Table 4-5 provides forecasts of transactions and In-Lane Toll Revenue for the Francis Scott Key Bridge. In FY 2018, total transactions processed were 11.4 million, an increase of 1.2 percent over FY 2017. In-Lane Toll Revenue was $45.9 million in FY 2018, an increase of 2.2 percent over FY 2017. Revenues increased at a faster rate than transactions due to greater growth in commercial vehicles than passenger cars, possibly the result of traffic diversions related to construction projects on both I-95 and I-895.

By FY 2020 transactions are forecasted to increase to 13.9 million, the result of traffic diversions from the construction activities at the Baltimore Harbor Tunnel. By FY 2022, traffic volumes are forecasted to return to more normal levels following the completion of construction activities, decreasing by almost 18 percent to 11.5 million transactions. Transactions are then forecasted to reach 11.7 million by FY 2028, while in-lane revenue is forecasted to reach $46.7 million. Throughout the forecast period, commercial vehicles represent approximately 10 percent of total transactions, and over 44 percent of in-lane toll revenue.

4.3.1.6 William Preston Lane Jr. Memorial (Bay) Bridge

As shown in Table 4-6, the William Preston Lane Jr. Memorial (Bay) Bridge processed a total of 13.5 million transactions in FY 2018, a decrease of 0.4 percent over FY 2017. Of these, 6.6 percent or 0.9 million were commercial vehicle transactions. Total In-Lane Toll Revenue decreased by 0.9 percent from $54.0 million in FY 2017 to $53.4 million in FY 2018.

Rehabilitation of the deck along the eastbound span is currently planned to commence in October 2021 and end by May 2023. Plans call for single lane closures in off-peak hours, with complete eastbound bridge closures overnight. The existing contra-flow lane on the westbound span will be used to carry eastbound traffic during peak periods and during full closures of the eastbound span. Due to the recreational nature of many trips made on this facility, and the lack of competing alternative routes, a slight negative impact of less than 500 vehicles per day has been estimated. This impact could have been greater, but it has also been assumed that some motorists will shift their trips to other, less congested times of day. As a result of the construction, transactions are estimated to decrease from 13.6 million in FY 2020 to 13.5 million in FY 2023. Following the end of construction, discretionary trips are expected to return, and more normal patterns of traffic growth have been forecasted.

Table 4-5
Francis Scott Key Bridge (I-695)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2,5,6]	10.33		1.10		11.43	
2019 [5,6,7]	11.37	10.1%	1.13	3.4%	12.50	9.4%
2020 [3,7]	12.70	11.7%	1.18	3.8%	13.88	11.0%
2021 [7]	12.73	0.2%	1.18	0.6%	13.91	0.2%
2022 [7]	10.37	-18.5%	1.11	-6.6%	11.47	-17.5%
2023	10.20	-1.6%	1.10	-0.5%	11.30	-1.5%
2024 [3]	10.29	0.9%	1.11	0.5%	11.40	0.9%
2025	10.33	0.3%	1.11	0.0%	11.44	0.3%
2026	10.39	0.6%	1.11	0.2%	11.50	0.6%
2027	10.46	0.6%	1.11	0.2%	11.57	0.6%
2028 [3]	10.55	0.9%	1.12	0.5%	11.67	0.9%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2,5,6]	$25.67		$20.21		$45.88	
2019 [5,6,7]	28.32	10.3%	20.89	3.4%	49.20	7.3%
2020 [3,7]	31.61	11.6%	21.68	3.8%	53.29	8.3%
2021 [7]	31.64	0.1%	21.82	0.6%	53.46	0.3%
2022 [7]	25.76	-18.6%	20.38	-6.6%	46.14	-13.7%
2023	25.33	-1.7%	20.29	-0.5%	45.62	-1.1%
2024 [3]	25.54	0.8%	20.39	0.5%	45.93	0.7%
2025	25.61	0.3%	20.39	0.0%	45.99	0.1%
2026	25.74	0.5%	20.44	0.2%	46.18	0.4%
2027	25.88	0.5%	20.49	0.2%	46.37	0.4%
2028 [3]	26.10	0.8%	20.60	0.5%	46.69	0.7%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.
[6] Construction begins on I-95 improvements in March 2017 and ends December 2018.
[7] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Table 4-6
William Preston Lane Jr. Memorial Bridge (US 50/301)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	12.63		0.89		13.52	
2019	12.63	0.0%	0.89	-0.1%	13.52	0.0%
2020 [3]	12.66	0.2%	0.89	0.3%	13.55	0.2%
2021	12.64	-0.1%	0.89	0.0%	13.53	-0.1%
2022 [5]	12.58	-0.5%	0.89	0.3%	13.47	-0.5%
2023 [5]	12.58	0.0%	0.90	0.9%	13.48	0.1%
2024 [3]	12.75	1.4%	0.92	1.8%	13.67	1.5%
2025	12.75	-0.1%	0.92	0.7%	13.67	0.0%
2026	12.77	0.2%	0.93	1.0%	13.70	0.3%
2027	12.80	0.2%	0.94	1.0%	13.74	0.3%
2028 [3]	12.86	0.5%	0.95	1.3%	13.81	0.5%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$36.29		$17.14		$53.43	
2019	36.30	0.0%	17.11	-0.1%	53.41	0.0%
2020 [3]	36.33	0.1%	17.16	0.3%	53.49	0.2%
2021	36.25	-0.2%	17.17	0.0%	53.42	-0.1%
2022 [5]	36.01	-0.7%	17.22	0.3%	53.24	-0.3%
2023 [5]	35.97	-0.1%	17.38	0.9%	53.35	0.2%
2024 [3]	36.44	1.3%	17.69	1.8%	54.13	1.5%
2025	36.38	-0.2%	17.82	0.7%	54.19	0.1%
2026	36.41	0.1%	17.99	1.0%	54.40	0.4%
2027	36.44	0.1%	18.17	1.0%	54.62	0.4%
2028 [3]	36.57	0.4%	18.41	1.3%	54.98	0.7%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on deck rehabilitation of the eastbound span in October 2021 and ends May 2023.

Going forward, transactions are forecasted to reach an estimated 13.8 million by FY 2028, representing an average annual growth rate of 0.2 percent over the forecast period. In-Lane Toll Revenue is forecasted to increase from $53.4 million in FY 2019 to $55.0 million by FY 2028, an average annual increase of 0.3 percent. Throughout the forecast period, commercial vehicles represent approximately 7 percent of total transaction, and over 32 percent of in-lane toll revenue.

4.3.1.7 Harry W. Nice Memorial Bridge

Estimates of transactions and In-Lane Toll Revenue for the Harry W. Nice Memorial Bridge are provided in Table 4-7. The Bridge produced the lowest number of total transactions of the seven legacy facilities, reaching 3.3 million in FY 2018, a decrease of 2.7 percent over FY 2017. Commercial vehicles accounted for 6 percent of the total. Passenger car transactions decreased by 2.7 percent in FY 2018, while commercial vehicles experienced a decrease of 3.8 percent. This facility is estimated to have an average annual growth in transactions of 0.5 percent through FY 2028, when transactions are expected to reach 3.5 million. Revenue in FY 2018 was $20.7 million, a 3.3 percent decrease from FY 2017. Revenue is forecasted to grow by 0.5 percent per year on average through FY 2028, when revenue of $21.6 million is forecasted.

4.3.2 Systemwide Annual Transactions and In-Lane Toll Revenue Forecasts

Table 4-8 presents historical and forecasted In-Lane Toll Revenue from FY 2008 to FY 2028. Systemwide transactions have fluctuated between FY 2008 and FY 2015, but overall have decreased from 119.9 million in FY 2008 to 115.7 million in FY 2015, a decrease of 3.5 percent, or 0.5 percent per annum. The historical fluctuations are largely due to both the negative effects of the Great Recession and a series of toll increases, most recently in FY 2012, FY 2013 and FY 2014. The combined effects of normal traffic growth, the continued economic recovery from the Great Recession, historically low gasoline prices, and the toll decreases in FY 2016, have resulted in transactions growing by 2.9 percent in FY 2016 and then by 2.5 percent in FY 2017. During the FY 2008 to FY 2018 period, the number of systemwide transactions peaked at 122.0 million in FY 2017. This resulted in revenue of $601.9 in FY 2017. Actual transactions and in-lane toll revenue for FY 2018, the most recent fiscal year, were 121.6 million and $605.8 million, respectively.

In FY 2019, the initial year of the forecast, transactions of 121.7 million have been forecasted, a 0.1 percent increase over FY 2018. In-Lane Toll Revenue is estimated at $611.1 million, a 1.0 percent increase over FY 2018. Recent observed historical growth trends are carried through to FY 2021, before transactions and revenue growth are assumed to increase at rates more consistent with long-term historical trends. Total transactions are forecasted to grow to 130.5 million by FY 2028, or a total of 7.2 percent during the FY 2019 to FY 2028 forecast period. This equates to a growth rate of 0.8 percent per annum. In-Lane Toll Revenue are estimated to increase by a total of 6.7 percent from $611.1 million in FY 2019 to $652.2 million in FY 2028, an average annual change of 0.7 percent.

Table 4-7
Harry W. Nice Memorial Bridge (US 301)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	3.12		0.20		3.33	
2019	3.10	-0.6%	0.20	-0.7%	3.31	-0.6%
2020 [3]	3.10	-0.2%	0.20	0.1%	3.30	-0.2%
2021	3.09	-0.1%	0.20	0.2%	3.30	-0.1%
2022	3.10	0.3%	0.20	0.7%	3.31	0.3%
2023	3.13	0.7%	0.20	1.0%	3.33	0.7%
2024 [3]	3.16	1.0%	0.21	1.3%	3.36	1.0%
2025	3.17	0.4%	0.21	0.7%	3.38	0.4%
2026	3.19	0.7%	0.21	1.0%	3.40	0.7%
2027	3.21	0.7%	0.21	1.0%	3.43	0.7%
2028 [3]	3.25	1.0%	0.22	1.3%	3.46	1.0%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$14.95		$5.79		$20.74	
2019	14.86	-0.6%	5.75	-0.7%	20.61	-0.6%
2020 [3]	14.82	-0.3%	5.76	0.1%	20.57	-0.2%
2021	14.79	-0.2%	5.77	0.2%	20.55	-0.1%
2022	14.82	0.2%	5.81	0.7%	20.63	0.4%
2023	14.91	0.6%	5.87	1.0%	20.78	0.7%
2024 [3]	15.04	0.9%	5.95	1.3%	20.99	1.0%
2025	15.09	0.3%	5.99	0.8%	21.08	0.5%
2026	15.18	0.6%	6.05	1.0%	21.24	0.7%
2027	15.28	0.6%	6.12	1.0%	21.39	0.7%
2028 [3]	15.41	0.9%	6.20	1.3%	21.61	1.0%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.

Table 4-8
Historical and Forecasted Transactions and In-Lane Toll Revenue

Fiscal Year	Transactions (Millions) JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [1]	Percent Growth
2008 [2]	14.65	5.56	25.77	44.83	12.34	13.37	3.39	**119.91**	
2009	14.64	5.04	25.53	43.45	11.69	12.75	3.35	**116.45**	(2.9)
2010 [3]	14.75	4.99	25.23	44.06	10.96	12.99	3.35	**116.33**	(0.1)
2011	15.38	5.07	26.12	46.29	11.65	13.56	3.40	**121.47**	4.4
2012 [2,3]	14.82	5.03	25.75	44.52	11.05	13.63	3.29	**118.09**	(2.8)
2013 [3]	14.58	4.56	23.97	43.58	10.92	12.74	3.26	**113.61**	(3.8)
2014 [3]	14.38	4.95	24.90	41.88	10.42	12.76	3.24	**112.53**	(1.0)
2015	14.69	5.25	27.10	41.85	10.63	12.86	3.31	**115.67**	2.8
2016 [2,4]	15.16	5.09	28.29	42.64	11.20	13.27	3.38	**119.03**	2.9
2017	15.55	5.10	27.61	45.38	11.31	13.59	3.42	**121.96**	2.5
2018	15.45	5.09	28.01	44.72	11.43	13.52	3.33	**121.54**	(0.3)
2019	15.52	5.09	22.78	48.97	12.50	13.52	3.31	**121.69**	0.1
2020 [2]	15.66	5.12	18.94	52.46	13.88	13.55	3.30	**122.91**	1.0
2021	15.73	5.13	19.05	52.63	13.91	13.53	3.30	**123.28**	0.3
2022	15.84	5.16	29.24	46.91	11.47	13.47	3.31	**125.39**	1.7
2023	15.98	5.19	30.36	46.61	11.30	13.48	3.33	**126.24**	0.7
2024 [2]	16.16	5.23	30.63	47.01	11.40	13.67	3.36	**127.46**	1.0
2025	16.25	5.24	30.73	47.15	11.44	13.67	3.38	**127.86**	0.3
2026	16.39	5.27	30.92	47.43	11.50	13.70	3.40	**128.62**	0.6
2027	16.54	5.29	31.11	47.71	11.57	13.74	3.43	**129.38**	0.6
2028 [2]	16.72	5.34	31.39	48.12	11.67	13.81	3.46	**130.50**	0.9

Fiscal Year	In-Lane Toll Revenue ($ Millions) JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [1]	Percent Growth
2008 [2]	$ 92.71	$ 3.89	$ 35.33	$ 84.03	$ 19.41	$ 33.88	$ 10.08	**$ 279.33**	
2009	95.14	2.07	35.61	82.97	18.56	32.51	9.77	**276.63**	(1.0)
2010 [3]	107.35	2.61	37.01	94.02	20.54	36.79	10.15	**308.47**	11.5
2011	107.39	2.82	37.85	95.32	20.78	37.62	10.15	**311.93**	1.1
2012 [2,3]	116.01	5.25	48.74	118.82	25.82	46.74	11.60	**372.98**	19.6
2013 [3]	121.86	7.80	52.05	135.61	28.94	52.40	12.97	**411.63**	10.4
2014 [3]	162.80	10.17	77.56	183.13	40.26	79.76	20.40	**574.08**	39.5
2015	166.54	11.19	85.54	185.78	42.97	81.16	21.41	**594.58**	3.6
2016 [2,4]	171.18	11.80	89.87	191.29	43.28	52.79	21.20	**581.41**	(2.2)
2017	175.81	12.09	89.46	204.18	44.94	53.96	21.47	**601.91**	3.5
2018	177.20	11.59	91.39	205.06	45.88	53.43	20.74	**605.29**	0.6
2019	179.26	11.56	74.44	222.57	49.20	53.41	20.61	**611.05**	1.0
2020 [2]	181.53	11.49	61.66	237.15	53.29	53.49	20.57	**619.18**	1.3
2021	182.63	11.42	61.97	237.82	53.46	53.42	20.55	**621.27**	0.3
2022	183.88	11.46	96.12	217.56	46.14	53.24	20.63	**629.04**	1.3
2023	185.35	11.53	99.78	216.40	45.62	53.35	20.78	**632.80**	0.6
2024 [2]	187.26	11.62	100.55	217.89	45.93	54.13	20.99	**638.37**	0.9
2025	188.16	11.65	100.78	218.20	45.99	54.19	21.08	**640.04**	0.3
2026	189.57	11.71	101.28	219.10	46.18	54.40	21.24	**643.48**	0.5
2027	191.01	11.77	101.78	220.01	46.37	54.62	21.39	**646.94**	0.5
2028 [2]	192.98	11.86	102.56	221.53	46.69	54.98	21.61	**652.21**	0.8

[1] Summations may not equal total due to rounding.

[2] Leap Year

[3] Year of toll increase.

[4] Year of toll decrease.

- Represents actual data.

4.4 Other Revenue

In addition to In-Lane Toll Revenue, MDTA also collects Other Revenue associated with the operation of its facilities. These have been summarized into six categories:

1. Unused Commuter and Shoppers Plan Trips
2. Transponder Fees and Sales
    a. Transponder sales (legacy and ICC)
    b. Monthly Service Fees (legacy and ICC)
3. Hatem E-ZPass® program
4. Violation Recovery
5. Commercial Vehicles Fees and Discounts
    a. Post-Usage Discount
    b. High Frequency Discount
    c. Over-Size Permit Fee
6. Concession Revenues

The following provides a description of each of the Other Revenue categories. The forecasts of these annual revenue streams are provided in Tables 4-9 through 4-11.

4.4.1 Unused Commuter and Shoppers Plan Trips

MDTA provides customers the option to enroll in commuter plans which provide discounts for frequent trips. MDTA offers three Commuter Plans based on the facilities included in the plan. The first plan allows commuters to pay $1.40 per trip for 50 trips at the Fort McHenry Tunnel, Baltimore Harbor Tunnel, Francis Scott Key Bridge, JFK Memorial Highway, and the Hatem Bridge. However, these trips must be used within 45 days. Another plan gives customers the option to pay $2.10 per trip for 25 trips at the Nice Bridge, and similar to the first plan must be used within 45 days. As of July 1, 2015, the toll per trip for this plan at the Bay Bridge was reduced by one-third from $2.10 to $1.40.

The Shoppers Plan is slightly different. As of July 1, 2015, MDTA gives customers the option to pay $2.00 per trip for 10 trips crossing the Bay Bridge that can be used Sunday through Thursday, with an expiration of 90 days. Prior to July 1, 2015 the toll was $3.00 per trip.

Any remaining balance after the time period from the Commuter or Shoppers Plans have expired is added to a separate account and referred to as Unused Toll Revenue. As seen in Table 4-9, this value is expected to increase gradually through FY 2028 as participation in the program increases due to normal traffic growth.

4.4.2 Transponder Fees and Sales

As of May 23, 2018, the $7.50 cost for the Standard E-ZPass® transponder was eliminated, while costs for the Exterior and Fusion transponders remained unchanged at $15.00 and $50.00, respectively. The Standard is the more typical windshield mounted transponder, the Exterior is mounted to a passenger car's front license plate, and the Fusion is for commercial vehicles such as trucks and RVs. The forecast of future sales revenue is based on data provided by MDTA showing historical trends and the share of each transponder type as a percent of total sales.

Table 4-9
Historical and Forecasted Legacy Facilities "Other Toll Revenue"

Fiscal Year		Service Fees and Sales				Violation Recovery			Commercial Vehicles				Total Legacy Other Revenue (5)
		Unused Pre-Paid Trip Revenue	Trans-ponder Sales	Monthly Account Fees	Hatem E-Z Pass Program	Notice of Toll Due Fees	Civil Penalties (3)	Violation Fees	Post-Usage Discount	High Frequency Discount	Over- size Permit Fee	Concession Revenue (4)	
2008		4.30	-	-	-	-	-	3.00	(5.00)	-	-	8.00	**10.30**
2009		4.50	-	-	-	-	-	1.90	(4.80)	-	-	8.00	**9.60**
2010	(1)	6.60	1.40	9.60	-	1.10	-	2.30	(6.60)	(0.20)	1.00	8.20	**23.40**
2011		6.50	1.90	9.90	-	1.30	-	1.30	(6.70)	(0.30)	1.20	7.90	**23.00**
2012	(1)	9.10	1.70	4.70	0.30	0.80	-	2.80	(5.90)	(0.20)	1.30	7.60	**22.20**
2013	(1)	11.50	1.30	5.30	0.80	0.10	-	4.00	(4.60)	(0.70)	1.30	4.10	**23.10**
2014	(1)	18.69	1.22	5.75	1.49	-	4.55	0.04	(5.89)	(0.64)	1.04	3.23	**29.48**
2015		16.81	1.44	5.87	1.52	-	10.75	0.01	(6.34)	(0.62)	1.15	5.07	**35.66**
2016	(2)	17.36	1.66	1.29	1.60	-	10.00	-	(6.39)	(1.06)	1.13	6.21	**31.81**
2017		14.04	2.00	1.42	1.62	-	20.65	-	(6.79)	(1.16)	1.16	6.01	**38.96**
2018		13.64	1.40	1.51	1.67	-	16.13	-	(7.91)	(1.29)	1.16	6.34	**32.64**
2019		13.71	0.52	-	1.68	-	18.11	-	(7.99)	(1.30)	1.17	6.39	**32.29**
2020		13.78	0.52	-	1.69	-	18.30	-	(8.07)	(1.30)	1.18	6.40	**32.49**
2021		13.85	0.52	-	1.70	-	18.48	-	(8.15)	(1.31)	1.20	6.42	**32.70**
2022		13.92	0.52	-	1.71	-	18.66	-	(8.23)	(1.32)	1.21	6.44	**32.90**
2023		13.99	0.53	-	1.72	-	18.85	-	(8.32)	(1.32)	1.22	6.45	**33.11**
2024		14.06	0.53	-	1.72	-	19.04	-	(8.40)	(1.33)	1.23	6.47	**33.32**
2025		14.13	0.53	-	1.73	-	19.23	-	(8.48)	(1.34)	1.25	6.48	**33.53**
2026		14.20	0.53	-	1.74	-	19.42	-	(8.57)	(1.34)	1.26	6.50	**33.74**
2027		14.27	0.54	-	1.75	-	19.61	-	(8.65)	(1.35)	1.27	6.52	**33.95**
2028		14.34	0.54	-	1.76	-	19.81	-	(8.74)	(1.36)	1.28	6.53	**34.17**

Source: Historical data from MDTA

(1) Year of toll increase.

(2) Year of select toll rate reductions.

(3) Civil Penalties actuals provided by MDTA.

(4) Concession Revenue Forecast provided by MDTA as prepared by Areas Inc.

(5) Summations may not match total due to rounding.

- Represents actual data.

In addition to transponder fees, prior to July 1, 2015, account holders were subject to a monthly account fee of $1.50. Accounts making three-or-more transactions per month were exempt from this fee, but any user with less than three transactions were charged. As of July 1, 2015, this monthly account fee was eliminated for Maryland residents. The forecasts for these fees for both the legacy and the ICC facilities are presented separately in Tables 4-9 and 4-10, respectively. Table 4-11 presents annual In-Lane Toll Revenue forecasts for the legacy facilities, along with Other Toll Revenue forecasts for both the legacy and new facilities through FY 2028.

4.4.3 Hatem E-ZPass® Program

The Hatem Bridge E-ZPass® Program provides drivers with two possible plan options. Choice A allows drivers with a two-axle vehicle to pay $20 per year for unlimited trips plus a transponder fee without any additional fees or prepaid toll deposits. However, this plan allows the E-ZPass® to only be used on the Hatem Bridge, and cannot be used at other toll facilities or with other E-ZPass® discount plans. Choice B is an add-on to a standard Maryland E-ZPass® account. This allows drivers to pay $20 per year for unlimited trips at the Hatem Bridge, plus a transponder charge if it's a new account. There are associated account maintenance fees for non-Maryland accounts as well as a pre-paid toll balance, but this plan also gives drivers a discount off the cash rate for two-axle vehicles at all Maryland toll facilities, excluding the Intercounty Connector and I-95 Express Toll Lanes, and can be combined with other discount plans. The discount provided is 37.5 percent for the Bay Bridge and 25 percent for all other facilities.

4.4.4 Violation Recovery

Prior to FY 2016, violation fees were charged to drivers who choose not to initially pay their toll. Historical data through FY 2018 have been provided by MDTA. Since video customers are no longer assessed violations fees but are instead assessed civil penalties if they do not pay their video tolls within 45 days, no estimates of future violation fee revenue for the legacy facilities, the ICC and I-95 Express Toll Lanes℠ are included in Tables 4-9 and 4-10. Moving forward, in order to assume a conservative estimate of future civil penalty fees, legacy facility civil penalties were forecasted to increase by 1.0 percent per year and ICC civil penalties by 0.5 percent per year.

4.4.5 Commercial Vehicles Fees and Discounts

There are two available discount programs for commercial vehicles with five-or-more-axles. The first plan is the post-usage plan, which is account specific and can be used on all eligible facilities. With this plan, each account is assessed after 30 days and the post-usage discount is calculated based on the total toll usage. The fee estimates for this program were developed from existing data and historical trends.

The other available discount plan is similar in that it is account specific and can be used on all eligible facilities. With this plan however, the account assessment after 30 days calculates the discount based on the total trips per transponder.

In addition to the two discount plans available to commercial vehicles, there is a fee for over-sized and/or overweight vehicles. As of May 1, 2009, a $25 permit fee was charged and covered all Authority maintained roadways along the vehicle's route. This fee is a one-time charge and will not be applied at any tolling location.

Table 4-10
New Facilities Historical and Forecasted "Other Toll Revenue"

		New Facilities Other Revenue ($ millions)													
		InterCounty Connector					I-95 ETLs				New Facilties Total				
		Service Fees and Sales		Violation Recovery			Service Fees and Sales		Violation Recovery		Service Fees and Sales		Violation Recovery		
Fiscal Year		Trans-ponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties [3]	Notice of Toll Due Fees [4]	Trans-ponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties [3]	Trans-ponder Sales	Monthly Account Fees	Violation Fees [5]	Civil Penalties [3]	**Total New Facilities Other Revenue [4]**
2008		-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2009		-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2010	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2011		-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2012	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2013	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2014	(1)	0.16	0.76	0.10	2.35	-	-	-	-	-	0.16	0.76	0.10	2.35	**3.37**
2015		0.18	0.72	0.01	5.61	-	0.01	0.06	0.01	0.12	0.19	0.79	0.01	5.73	**6.72**
2016	(2)	0.23	0.18	-	7.22	-	0.04	0.03	-	1.05	0.27	0.22	-	8.28	**8.77**
2017		0.19	0.20	-	19.30	-	0.04	0.04	-	1.73	0.22	0.24	-	21.04	**21.51**
2018		0.29	0.22	-	12.23	-	0.06	0.04	-	1.38	0.35	0.26	-	13.61	**14.22**
2019		0.07	-	-	15.13	-	0.01	-	-	1.53	0.08	-	-	16.66	**16.75**
2020		0.07	-	-	15.21	-	0.01	-	-	1.54	0.08	-	-	16.74	**16.83**
2021		0.07	-	-	15.29	-	0.01	-	-	1.54	0.08	-	-	16.83	**16.91**
2022		0.07	-	-	15.36	-	0.01	-	-	1.55	0.09	-	-	16.91	**17.00**
2023		0.07	-	-	15.44	-	0.01	-	-	1.56	0.09	-	-	17.00	**17.08**
2024		0.07	-	-	15.52	-	0.01	-	-	1.57	0.09	-	-	17.08	**17.17**
2025		0.07	-	-	15.59	-	0.01	-	-	1.57	0.09	-	-	17.17	**17.25**
2026		0.07	-	-	15.67	-	0.01	-	-	1.58	0.09	-	-	17.25	**17.34**
2027		0.07	-	-	15.75	-	0.01	-	-	1.59	0.09	-	-	17.34	**17.43**
2028		0.08	-	-	15.83	-	0.01	-	-	1.60	0.09	-	-	17.43	**17.51**

Source: Historical data from MdTA

[1] Year of toll increase.

[2] Year of select toll rate reductions.

[3] Civil Penalties actuals and estimates provided by MDTA.

[4] Summations may not match total due to rounding.

- Represents actual data.

Table 4-11
Historical and Forecasted In-Lane and "Other Toll Revenue"

Fiscal Year		In-Lane Toll Revenue	"Other Toll Revenue"			Total Revenue [4]
		Legacy Facilities	Legacy Facilities	New Facilities [3]	Total [4]	
2008		279.30	10.30	-	**10.30**	**289.60**
2009		276.60	9.60	-	**9.60**	**286.20**
2010	(1)	308.50	23.40	-	**23.40**	**331.90**
2011		312.00	23.00	-	**23.00**	**335.00**
2012	(1)	373.00	22.20	-	**22.20**	**395.20**
2013	(1)	411.60	23.10	-	**23.10**	**434.70**
2014	(1)	574.08	29.48	3.37	**32.85**	**606.93**
2015		594.58	35.66	6.72	**42.38**	**636.96**
2016	(2)	581.41	31.81	8.77	**40.57**	**621.98**
2017		601.91	38.96	21.51	**60.46**	**662.38**
2018		605.29	32.64	14.22	**46.86**	**652.16**
2019		611.05	32.29	16.75	**49.04**	**660.09**
2020		619.18	32.49	16.83	**49.32**	**668.50**
2021		621.27	32.70	16.91	**49.61**	**670.88**
2022		629.04	32.90	17.00	**49.90**	**678.94**
2023		632.80	33.11	17.08	**50.19**	**682.99**
2024		638.37	33.32	17.17	**50.49**	**688.86**
2025		640.04	33.53	17.25	**50.78**	**690.83**
2026		643.48	33.74	17.34	**51.08**	**694.56**
2027		646.94	33.95	17.43	**51.38**	**698.32**
2028		652.21	34.17	17.51	**51.68**	**703.89**

Source: Historical data from MdTA

[1] Year of toll increase.

[2] Year of select toll rate reductions.

[3] Intercounty Connector and I-95 ETLs

[4] Summations may not match total due to rounding.

- Represents actual data.

4.4.6 Concession Revenues

There are two travel plazas along the JFK Highway that provide additional revenue to MDTA through concessions. Both facilities were newly renovated and reopened to the public in 2014. The Maryland House Travel Plaza opened on January 16, 2014 and the Chesapeake House Travel Plaza opened on August 5, 2014. In 2012, the MDTA entered into a public private partnership with Areas USA for the redevelopment and long-term operation of the travel plazas. While the MDTA continues to own the facilities, Areas USA will operate the facilities through 2047 under a revenue-sharing agreement.

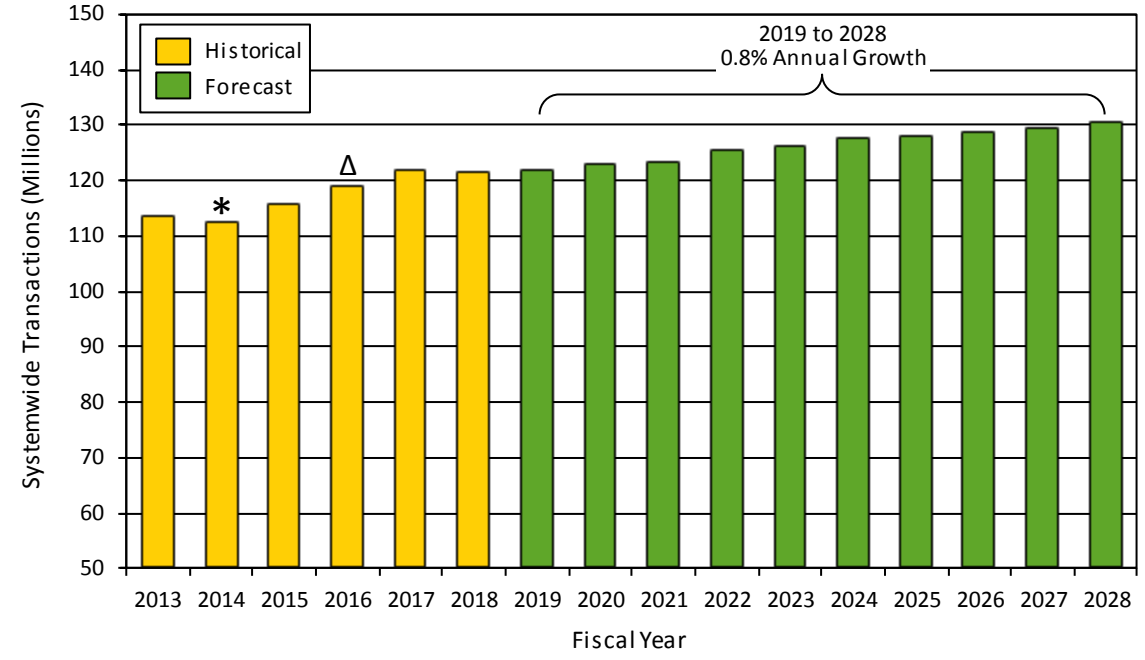
As can be seen in Table 4-9, concession revenue was lower in 2014, a result of closures due to construction activity. However, revenue increased by approximately $1.8 million in FY 2015 and has continued to increase annually since then except for a slight decrease of $0.2 million in FY 2017. Concession revenue is forecasted to increase slightly in FY 2019, to $6.39 million, and then to $6.53 million by 2028. The data and information used to develop the concession revenue forecast was provided by MDTA based on revenue projections developed by Areas USA MDTP, LLC, the company that redeveloped and currently operates the two travel plazas.

4.5 Total Annual Revenue Forecasts

A summary of the total systemwide In-Lane Toll Revenue and Other Revenue forecast for FY 2019 through FY 2028, as well as historical data from FY 2013 to FY 2018, are presented in Figure 4-3 and Table 4-12. The historical data presented in the figure sets the forecast in perspective relative to recent actual trends. Total revenues increased considerably between FY 2013 and FY 2014, growing from $434.7 million to $606.9 million, primarily because of the toll increases implemented in these years. Revenues in FY 2015 then increased by 4.9 percent to $637.0 million. This growth was higher than the average annual increase in revenue in previous years not impacted by toll increases. In those years, growth averaged less than 1 percent. The higher level of growth in FY 2015 was likely related to both the delayed economic recovery from the Great Recession of 2008-2009 and historically low gasoline prices. In FY 2016, revenues decreased by 2.2 percent from $637.0 million to $622.8 million, or by $14.2 million. This was primarily the effect of the toll rate reductions which resulted in In-Lane Toll Revenue declining by $13.2 million, or 91 percent of the total $14.2 million decrease. Revenues in FY 2017 increased by 6.4 percent to $662.4 million. This growth was likely related to higher commercial vehicle traffic, due perhaps to the improving economic conditions, along with continued low and stable gasoline prices, as well as a 46.1 percent increase in Other Revenue. Revenues in FY 2018 decreased by 1.6 percent to $651.7 million. While In-Lane Toll Revenue growth was a modest 0.6 percent, this decline was the result of a 22.5 percent decline in Other Revenue from $60.5 million in FY 2017 to $46.9 million in FY 2018. A decline in revenue from Civil Penalties totaling $12.4 million in FY 2018 accounted for almost 88 percent of the $14.1 million decrease in Other Revenue.

In FY 2019, the initial year of the forecast, total revenues are estimated at $660.1 million, a 1.2 percent increase over FY 2018. In the absence of any toll rate changes, annual revenue growth rates going forward have been estimated to increase at more moderate rates ranging from 0.3 to 1.3 percent. In-Lane Toll Revenue is forecasted to increase to $632.8 million by FY 2023, and to $652.2 million by FY 2028. Other Revenue, representing approximately 7 percent of the total revenue, is forecasted to increase slightly over FY 2018 levels throughout the forecast period. The FY 2018 Other Revenue of $46.9 million is forecasted to increase to $50.2 million in FY 2023, and increase to $51.7 million by FY 2028. In-Lane Toll Revenue and Other Revenue are forecasted to increase by 0.5 percent and 0.50 percent per annum, respectively, over the 10-year forecast period.

Figure 4-3
Historical and Forecasted Transactions and Total Toll Revenue



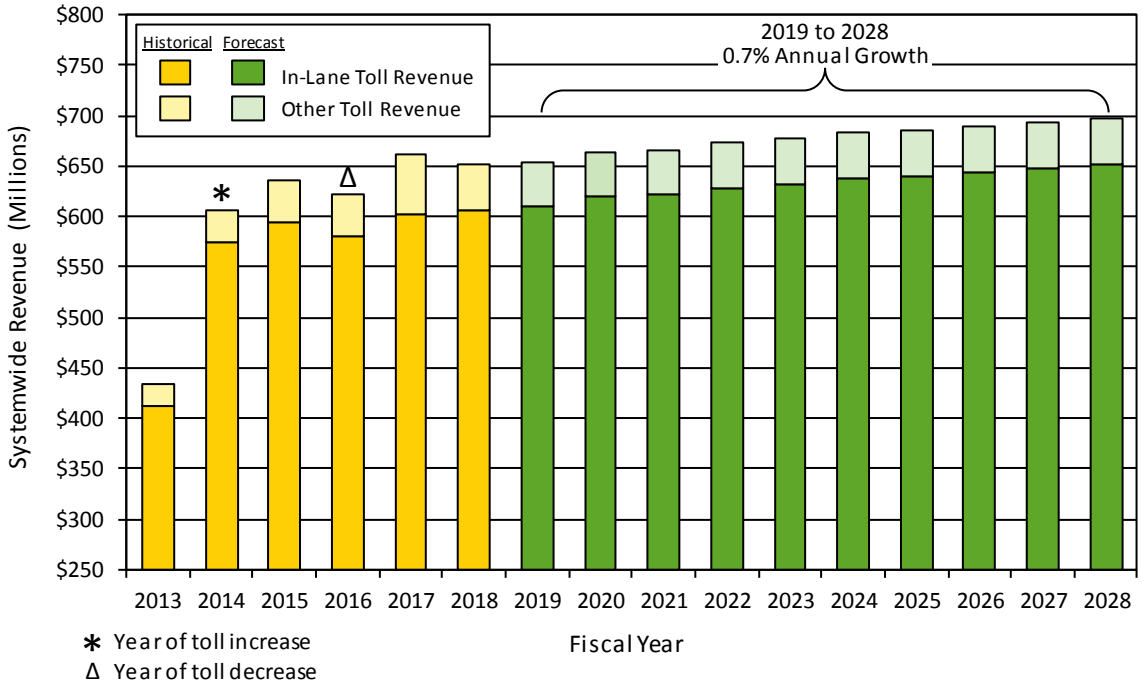


Table 4-12
In-Lane, "Other" and Total Revenue Forecasts

Fiscal Year	Toll Revenue ($ Millions) In-Lane	Percent Change	Other [1]	Percent Change	Total [2]	Percent Change
2013	$ 411.6	10.3	$ 23.1	4.1	$ 434.7	10.0
2014	574.1	39.5	32.9	42.2	606.9	39.6
2015	594.6	3.6	42.4	29.0	637.0	4.9
2016	581.4	(2.2)	40.6	(4.2)	622.0	(2.3)
2017	601.9	3.5	60.5	49.0	662.4	6.5
2018	605.3	0.6	46.9	(22.5)	652.2	(1.5)
2019	611.1	1.0	49.0	4.6	660.1	1.2
2020	619.2	1.3	49.3	0.6	668.5	1.3
2021	621.3	0.3	49.6	0.6	670.9	0.4
2022	629.0	1.3	49.9	0.6	678.9	1.2
2023	632.8	0.6	50.2	0.6	683.0	0.6
2024	638.4	0.9	50.5	0.6	688.9	0.9
2025	640.0	0.3	50.8	0.6	690.8	0.3
2026	643.5	0.5	51.1	0.6	694.6	0.5
2027	646.9	0.5	51.4	0.6	698.3	0.5
2028	652.2	0.8	51.7	0.6	703.9	0.8

[1] Includes "Other Revenue" from the ICC and I-95 ETL

[2] Summation may not match total due to rounding.

- Represents actual data.

4.6 Total Monthly Transaction and Toll Revenue Forecasts

For purposes of budgeting and the tracking of actual versus forecasted transactions and revenue, monthly forecasts of transactions and In-Lane Toll Revenue were also developed for FY 2019 and FY 2020. Tables 4-13 and 4-14 summarize the forecasts of transactions and In-Lane Toll Revenue for the seven legacy facilities.

August was forecasted to have the greatest number of transactions with 11.4 million in FY 2019 and almost 11.5 million in FY 2020. Alternatively, February was forecasted to represent the month with the fewest number of transactions at 8.5 million in FY 2019 and 8.9 million in FY 2020. In FY 2019, the total number of E-ZPass® transactions (including commuters, shoppers, and Hatem A&B Plans) is forecasted to be approximately 197 percent greater than the cash/video transactions for two-axle vehicles, growing to 202 percent greater in FY 2020. Additionally, in both FY 2019 and FY 2020, E-ZPass® transactions are forecasted to represent approximately 74 percent of all two-axle vehicle transactions, and 87 percent of all three-or-more-axle vehicle transactions.

Table 4-13
Monthly Transactions by Method of Payment
FY 2018 and FY 2019

		Transactions (000)											
		2 Axle								3+ Axle			
			E-ZPass										
	Month	Commuters & Shoppers	MD Plan	Out-of-State Plan	Total	Cash / Video	Official Duty	Hatem Plan A + B	Total 2 Axle	E-ZPass	Cash / Video	Total 3+ Axle	Total [1]
Fiscal Year 2019 - Transactions (000's)	July-18	2,487	2,286	2,081	4,368	2,958	118	346	10,277	662	118	780	**11,057**
	August-18	2,646	2,417	2,176	4,593	2,828	124	368	10,559	719	119	838	**11,397**
	September-18	2,395	2,173	1,926	4,099	2,461	112	343	9,410	658	105	764	**10,174**
	October-18	2,509	2,267	2,008	4,274	2,372	116	356	9,628	712	114	826	**10,454**
	November-18	2,411	2,188	1,974	4,162	2,313	112	338	9,335	667	100	767	**10,103**
	December-18	2,336	2,120	1,910	4,030	2,312	109	330	9,118	647	89	736	**9,854**
	January-19	2,209	1,950	1,699	3,649	1,848	98	324	8,128	637	87	724	**8,852**
	February-19	2,102	1,864	1,642	3,506	1,782	93	306	7,789	598	80	678	**8,467**
	March-19	2,393	2,135	1,909	4,044	2,138	107	336	9,018	678	96	774	**9,792**
	April-19	2,450	2,204	2,006	4,211	2,194	110	340	9,304	686	100	786	**10,090**
	May-19	2,613	2,347	2,107	4,454	2,311	117	365	9,860	739	109	849	**10,708**
	June-19	2,586	2,336	2,092	4,428	2,426	117	357	9,914	721	108	828	**10,742**
	FY 2019	**29,137**	**26,288**	**23,530**	**49,818**	**27,942**	**1,332**	**4,110**	**112,339**	**8,125**	**1,226**	**9,351**	**121,690**
Fiscal Year 2020 - Transactions (000's)	July-19	2,540	2,296	2,082	4,379	2,919	118	348	10,304	677	119	796	**11,100**
	August-19	2,705	2,430	2,176	4,606	2,790	124	370	10,594	735	121	855	**11,449**
	September-19	2,447	2,183	1,925	4,108	2,425	112	345	9,437	673	106	779	**10,217**
	October-19	2,566	2,278	2,007	4,286	2,338	116	357	9,663	728	115	843	**10,506**
	November-19	2,462	2,197	1,973	4,170	2,277	112	340	9,360	682	101	783	**10,143**
	December-19	2,377	2,123	1,907	4,031	2,272	109	332	9,120	661	90	752	**9,871**
	January-20	2,240	1,978	1,720	3,699	1,863	100	325	8,227	652	88	740	**8,967**
	February-20	2,208	1,959	1,722	3,681	1,860	99	318	8,166	634	84	718	**8,884**
	March-20	2,427	2,167	1,932	4,099	2,153	109	338	9,126	694	98	792	**9,917**
	April-20	2,484	2,235	2,030	4,266	2,209	112	341	9,411	702	102	804	**10,215**
	May-20	2,648	2,380	2,132	4,511	2,326	119	366	9,971	756	111	867	**10,838**
	June-20	2,604	2,352	2,107	4,459	2,420	118	358	9,959	732	108	840	**10,799**
	FY 2020	**29,708**	**26,579**	**23,714**	**50,294**	**27,851**	**1,348**	**4,137**	**113,337**	**8,326**	**1,244**	**9,569**	**122,906**

[1] Summation may not match total due to rounding.

Table 4-14
Monthly In-Lane Toll Revenue by Method of Payment
FY 2018 and FY 2019

		In-Lane Toll Revenue (000)											
		2 Axle								3+ Axle			
			E-ZPass										
	Month	Commuters & Shoppers	MD Plan	Out-of-State Plan	Total	Cash / Video	Official Duty	Hatem Plan A + B	Total 2 Axle	E-ZPass	Cash / Video	Total 3+ Axle	Total [1]
Fiscal Year 2019 - Transactions (000's)	July-18	$ 3,646	$ 7,454	$ 11,013	$ 18,467	$ 14,278	-	-	$ 36,391	$ 15,937	$ 2,789	$ 18,727	**$ 55,117**
	August-18	3,874	7,856	11,428	19,283	13,694	-	-	36,851	17,241	2,806	20,047	**56,899**
	September-18	3,498	7,025	9,997	17,022	11,797	-	-	32,316	15,853	2,434	18,287	**50,603**
	October-18	3,661	7,327	10,390	17,717	11,352	-	-	32,730	17,127	2,672	19,799	**52,528**
	November-18	3,524	7,119	10,335	17,455	11,151	-	-	32,130	16,105	2,376	18,481	**50,610**
	December-18	3,415	6,894	9,987	16,881	11,131	-	-	31,427	15,783	2,124	17,908	**49,334**
	January-19	3,212	6,266	8,654	14,920	8,904	-	-	27,036	15,490	2,106	17,596	**44,631**
	February-19	3,060	6,008	8,415	14,423	8,574	-	-	26,057	14,561	1,915	16,476	**42,533**
	March-19	3,491	6,915	9,888	16,803	10,289	-	-	30,583	16,524	2,318	18,842	**49,425**
	April-19	3,582	7,182	10,544	17,726	10,563	-	-	31,870	16,775	2,384	19,160	**51,030**
	May-19	3,819	7,620	11,035	18,655	11,133	-	-	33,606	18,054	2,586	20,640	**54,246**
	June-19	3,785	7,579	10,979	18,558	11,715	-	-	34,058	17,484	2,555	20,039	**54,097**
	FY 2019	**$ 42,566**	**$ 85,244**	**$ 122,664**	**$ 207,908**	**$ 134,581**	**-**	**-**	**$ 385,055**	**$ 196,934**	**$ 29,065**	**$ 226,000**	**$ 611,055**
Fiscal Year 2020 - Transactions (000's)	July-19	3,721	7,490	11,037	18,527	14,117	-	-	36,365	16,400	2,838	19,238	**55,603**
	August-19	3,957	7,897	11,451	19,348	13,538	-	-	36,843	17,732	2,856	20,587	**57,430**
	September-19	3,571	7,058	10,010	17,068	11,651	-	-	32,291	16,299	2,477	18,776	**51,067**
	October-19	3,741	7,366	10,406	17,772	11,210	-	-	32,723	17,603	2,719	20,322	**53,045**
	November-19	3,596	7,151	10,349	17,499	11,004	-	-	32,100	16,553	2,421	18,973	**51,073**
	December-19	3,473	6,908	9,993	16,901	10,966	-	-	31,340	16,221	2,166	18,387	**49,727**
	January-20	3,256	6,355	8,753	15,108	8,965	-	-	27,329	15,799	2,137	17,936	**45,265**
	February-20	3,213	6,312	8,815	15,127	8,941	-	-	27,282	15,382	2,013	17,394	**44,676**
	March-20	3,539	7,013	9,999	17,013	10,352	-	-	30,904	16,852	2,351	19,203	**50,107**
	April-20	3,630	7,281	10,659	17,939	10,622	-	-	32,191	17,107	2,418	19,525	**51,716**
	May-20	3,869	7,722	11,154	18,877	11,192	-	-	33,938	18,404	2,621	21,026	**54,963**
	June-20	3,810	7,632	11,062	18,694	11,689	-	-	34,193	17,736	2,577	20,313	**54,506**
	FY 2020	**$ 43,378**	**$ 86,185**	**$ 123,688**	**$ 209,874**	**$ 134,246**	**-**	**-**	**$ 387,498**	**$ 202,087**	**$ 29,594**	**$ 231,681**	**$ 619,178**

[1] Summation may not match total due to rounding.

The highest In-Lane Toll Revenue is forecasted to occur in August of FY 2019 and FY 2020, with totals of $56.9 million and $57.4 million, respectively. Further, the lowest revenue is forecasted in February FY 2019 and FY 2020 at $42.5 million and $44.7 million, respectively. The total forecasted In-Lane Toll Revenue is $611.1 million in FY 2019 and $619.2 million in FY 2020.

Table 4-15 provides a summary of the monthly transactions and In-Lane Toll Revenue, as well as "Other Toll Revenue" and Total Toll Revenue.

Table 4-15
Monthly Forecasted Transactions, In-Lane and "Other" Toll Revenue

	Month	Transactions (millions)	Toll Revenue ($ millions) In-Lane	Other [1]	Total [2]
Fiscal Year 2019	Jul-18	11.06	$ 55.12	$ 4.42	$ 59.54
	Aug-18	11.40	56.90	4.57	61.46
	Sep-18	10.17	50.60	4.06	54.66
	Oct-18	10.45	52.53	4.22	56.74
	Nov-18	10.10	50.61	4.06	54.67
	Dec-18	9.85	49.33	3.96	53.29
	Jan-19	8.85	44.63	3.58	48.21
	Feb-19	8.47	42.53	3.41	45.95
	Mar-19	9.79	49.43	3.97	53.39
	Apr-19	10.09	51.03	4.10	55.13
	May-19	10.71	54.25	4.35	58.60
	Jun-19	10.74	54.10	4.34	58.44
	Total	**121.69**	**$ 611.05**	**$ 49.04**	**$ 660.09**
Fiscal Year 2020	Jul-19	11.10	$ 55.60	$ 4.43	$ 60.03
	Aug-19	11.45	57.43	4.57	62.01
	Sep-19	10.22	51.07	4.07	55.13
	Oct-19	10.51	53.05	4.23	57.27
	Nov-19	10.14	51.07	4.07	55.14
	Dec-19	9.87	49.73	3.96	53.69
	Jan-20	8.97	45.26	3.61	48.87
	Feb-20	8.88	44.68	3.56	48.24
	Mar-20	9.92	50.11	3.99	54.10
	Apr-20	10.21	51.72	4.12	55.84
	May-20	10.84	54.96	4.38	59.34
	Jun-20	10.80	54.51	4.34	58.85
	Total	**122.91**	**$ 619.18**	**$ 49.32**	**$ 668.50**

[1] Includes "Other Toll Revenue" from the ICC and I-95 ETL

[2] Summation may not match total due to rounding.

4.7 Disclaimer

CDM Smith used currently-accepted professional practices and procedures in the development of the traffic and revenue estimates in this report. However, as with any forecast, it should be understood that differences between forecasted and actual results may occur, as caused by events and circumstances beyond the control of the forecasters. In formulating the estimates, CDM Smith reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the Maryland Transportation Authority. CDM Smith also relied upon the reasonable assurances of independent parties and is not aware of any material facts that would make such information misleading.

CDM Smith made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue estimates that must be considered as a whole; therefore, selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit of partial information extracted from this report.

All estimates and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple agencies, including the Maryland Transportation Authority. These estimates and projections may not be indicative of actual or future values and are therefore subject to substantial uncertainty. Future developments, economic conditions cannot be predicted with certainty, and may affect the estimates or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that the projections and other forward-looking statements contained within the report are based on reasonable assumptions as of the date of the report, such forward-looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

The report and its contents are intended solely for use by the Maryland Transportation Authority and designated parties approved by the Maryland Transportation Authority and CDM Smith. Any use by third-parties, other than as noted above, is expressly prohibited. In addition, any publication of the report without the express written consent of CDM Smith is prohibited.

CDM Smith is not, and has not been, a municipal advisor as defined in Federal law (the Dodd Frank Bill) to the Maryland Transportation Authority and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to the Maryland Transportation Authority with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to the Maryland Transportation Authority. The Maryland Transportation Authority should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.

Appendix A

Detailed Traffic and Revenue Forecasts by Facility

Table A-1
John F. Kennedy Memorial Highway (I-95)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	13.58		1.88		15.45	
2019 [5]	13.60	0.2%	1.92	2.4%	15.52	0.4%
2020 [3,5]	13.70	0.8%	1.96	1.9%	15.66	0.9%
2021	13.75	0.4%	1.98	0.9%	15.73	0.4%
2022	13.85	0.7%	1.99	0.7%	15.84	0.7%
2023	13.97	0.9%	2.00	0.7%	15.98	0.9%
2024 [3]	14.14	1.2%	2.02	0.9%	16.16	1.1%
2025	14.23	0.6%	2.03	0.3%	16.25	0.6%
2026	14.35	0.9%	2.04	0.6%	16.39	0.9%
2027	14.48	0.9%	2.05	0.6%	16.54	0.9%
2028 [3]	14.65	1.2%	2.07	0.9%	16.72	1.1%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$100.01		$77.19		$177.20	
2019 [5]	100.25	0.2%	79.01	2.3%	179.26	1.2%
2020 [3,5]	101.00	0.7%	80.54	1.9%	181.53	1.3%
2021	101.34	0.3%	81.29	0.9%	182.63	0.6%
2022	102.02	0.7%	81.86	0.7%	183.88	0.7%
2023	102.92	0.9%	82.44	0.7%	185.35	0.8%
2024 [3]	104.10	1.2%	83.16	0.9%	187.26	1.0%
2025	104.72	0.6%	83.43	0.3%	188.16	0.5%
2026	105.64	0.9%	83.93	0.6%	189.57	0.8%
2027	106.57	0.9%	84.44	0.6%	191.01	0.8%
2028 [3]	107.79	1.2%	85.19	0.9%	192.98	1.0%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on various bridge deck rehabilitations in Cecil County in March 2019 and ends in October 2020.

Table A-2
Thomas J. Hatem Memorial Bridge (US 40)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year	Transactions (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	4.88		0.20		5.09	
2019	4.89	0.2%	0.20	-0.6%	5.09	0.1%
2020 [3]	4.92	0.6%	0.20	-1.6%	5.12	0.6%
2021	4.93	0.2%	0.20	-1.2%	5.13	0.1%
2022	4.96	0.6%	0.20	0.2%	5.16	0.6%
2023	4.99	0.6%	0.20	0.6%	5.19	0.6%
2024 [3]	5.03	0.8%	0.20	0.9%	5.23	0.8%
2025	5.04	0.2%	0.20	0.3%	5.24	0.2%
2026	5.06	0.5%	0.20	0.6%	5.27	0.5%
2027	5.09	0.5%	0.20	0.6%	5.29	0.5%
2028 [3]	5.13	0.8%	0.21	0.9%	5.34	0.8%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$5.22		$6.37		$11.59	
2019	5.23	0.2%	6.33	-0.6%	11.56	-0.2%
2020 [3]	5.26	0.6%	6.23	-1.6%	11.49	-0.6%
2021	5.26	0.1%	6.16	-1.2%	11.42	-0.6%
2022	5.29	0.5%	6.17	0.2%	11.46	0.4%
2023	5.32	0.5%	6.20	0.6%	11.53	0.6%
2024 [3]	5.36	0.7%	6.26	0.9%	11.62	0.8%
2025	5.37	0.2%	6.28	0.3%	11.65	0.2%
2026	5.39	0.4%	6.32	0.6%	11.71	0.5%
2027	5.41	0.4%	6.35	0.6%	11.77	0.5%
2028 [3]	5.45	0.7%	6.41	0.9%	11.86	0.8%

[1] Average Annual Percent Change.

[2] Actual.

[3] Leap Year.

[4] Summation may not match total due to rounding.

Table A-3
Baltimore Harbor Tunnel (I-895)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year	Transactions (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2,5]	27.33		0.69		28.01	
2019 [5,6]	22.23	-18.7%	0.56	-18.9%	22.78	-18.7%
2020 [3,6]	18.50	-16.8%	0.45	-19.7%	18.94	-16.9%
2021 [6]	18.60	0.6%	0.45	0.8%	19.05	0.6%
2022 [6]	28.45	53.0%	0.79	75.1%	29.24	53.5%
2023	29.54	3.8%	0.82	4.2%	30.36	3.9%
2024 [3]	29.81	0.9%	0.82	0.5%	30.63	0.9%
2025	29.91	0.3%	0.82	0.0%	30.73	0.3%
2026	30.10	0.6%	0.83	0.2%	30.92	0.6%
2027	30.28	0.6%	0.83	0.2%	31.11	0.6%
2028 [3]	30.55	0.9%	0.83	0.5%	31.39	0.9%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2,5]	$81.61		$9.79		$91.39	
2019 [5,6]	66.50	-18.5%	7.93	-18.9%	74.44	-18.6%
2020 [3,6]	55.29	-16.9%	6.37	-19.7%	61.66	-17.2%
2021 [6]	55.54	0.5%	6.42	0.8%	61.97	0.5%
2022 [6]	84.88	52.8%	11.24	75.1%	96.12	55.1%
2023	88.06	3.7%	11.72	4.3%	99.78	3.8%
2024 [3]	88.77	0.8%	11.78	0.5%	100.55	0.8%
2025	88.99	0.3%	11.78	0.0%	100.78	0.2%
2026	89.46	0.5%	11.81	0.3%	101.28	0.5%
2027	89.93	0.5%	11.84	0.3%	101.78	0.5%
2028 [3]	90.66	0.8%	11.91	0.5%	102.56	0.8%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.
[6] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Table A-4
Fort McHenry Tunnel (I-95)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year		Transactions (millions)					
		Passenger Cars		Commercial Vehicles		Total [4]	
		Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018	[2,5,6]	40.55		4.17		44.72	
2019	[5,6,7]	44.52	9.8%	4.45	6.6%	48.97	9.5%
2020	[3,7]	47.76	7.3%	4.70	5.6%	52.46	7.1%
2021	[7]	47.92	0.3%	4.72	0.3%	52.63	0.3%
2022	[7]	42.37	-11.6%	4.54	-3.8%	46.91	-10.9%
2023		42.07	-0.7%	4.53	-0.2%	46.61	-0.7%
2024	[3]	42.45	0.9%	4.55	0.5%	47.01	0.9%
2025		42.60	0.3%	4.55	0.0%	47.15	0.3%
2026		42.86	0.6%	4.56	0.2%	47.43	0.6%
2027		43.13	0.6%	4.58	0.2%	47.71	0.6%
2028	[3]	43.52	0.9%	4.60	0.5%	48.12	0.9%

Fiscal Year		In-Lane Toll Revenues (millions)					
		Passenger Cars		Commercial Vehicles		Total [4]	
		Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018	[2,5,6]	$121.60		$83.46		$205.06	
2019	[5,6,7]	133.60	9.9%	88.97	6.6%	222.57	8.5%
2020	[3,7]	143.21	7.2%	93.94	5.6%	237.15	6.6%
2021	[7]	143.55	0.2%	94.27	0.4%	237.82	0.3%
2022	[7]	126.83	-11.6%	90.73	-3.8%	217.56	-8.5%
2023		125.82	-0.8%	90.58	-0.2%	216.40	-0.5%
2024	[3]	126.84	0.8%	91.05	0.5%	217.89	0.7%
2025		127.16	0.3%	91.03	0.0%	218.20	0.1%
2026		127.84	0.5%	91.26	0.3%	219.10	0.4%
2027		128.52	0.5%	91.49	0.3%	220.01	0.4%
2028	[3]	129.55	0.8%	91.97	0.5%	221.53	0.7%

[1] Average Annual Percent Change.

[2] Actual.

[3] Leap Year.

[4] Summation may not match total due to rounding.

[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.

[6] Construction begins on I-95 improvements in March 2017 and ends December 2018.

[7] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Table A-5
Francis Scott Key Bridge (I-695)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year		Transactions (millions)					
		Passenger Cars		Commercial Vehicles		Total [4]	
		Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018	[2,5,6]	10.33		1.10		11.43	
2019	[5,6,7]	11.37	10.1%	1.13	3.4%	12.50	9.4%
2020	[3,7]	12.70	11.7%	1.18	3.8%	13.88	11.0%
2021	[7]	12.73	0.2%	1.18	0.6%	13.91	0.2%
2022	[7]	10.37	-18.5%	1.11	-6.6%	11.47	-17.5%
2023		10.20	-1.6%	1.10	-0.5%	11.30	-1.5%
2024	[3]	10.29	0.9%	1.11	0.5%	11.40	0.9%
2025		10.33	0.3%	1.11	0.0%	11.44	0.3%
2026		10.39	0.6%	1.11	0.2%	11.50	0.6%
2027		10.46	0.6%	1.11	0.2%	11.57	0.6%
2028	[3]	10.55	0.9%	1.12	0.5%	11.67	0.9%

Fiscal Year		In-Lane Toll Revenues (millions)					
		Passenger Cars		Commercial Vehicles		Total [4]	
		Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018	[2,5,6]	$25.67		$20.21		$45.88	
2019	[5,6,7]	28.32	10.3%	20.89	3.4%	49.20	7.3%
2020	[3,7]	31.61	11.6%	21.68	3.8%	53.29	8.3%
2021	[7]	31.64	0.1%	21.82	0.6%	53.46	0.3%
2022	[7]	25.76	-18.6%	20.38	-6.6%	46.14	-13.7%
2023		25.33	-1.7%	20.29	-0.5%	45.62	-1.1%
2024	[3]	25.54	0.8%	20.39	0.5%	45.93	0.7%
2025		25.61	0.3%	20.39	0.0%	45.99	0.1%
2026		25.74	0.5%	20.44	0.2%	46.18	0.4%
2027		25.88	0.5%	20.49	0.2%	46.37	0.4%
2028	[3]	26.10	0.8%	20.60	0.5%	46.69	0.7%

[1] Average Annual Percent Change.
[2] Actual.
[3] Leap Year.
[4] Summation may not match total due to rounding.
[5] Construction begins on Patapsco Flats Bridge in August 2016 and ends May 2019.
[6] Construction begins on I-95 improvements in March 2017 and ends December 2018.
[7] Construction begins on Canton Viaduct replacement in June 2018 and ends July 2021. Major lane closures are assumed to begin in January 2019.

Table A-6
William Preston Lane Jr. Memorial Bridge (US 50/301)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

	Transactions (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	12.63		0.89		13.52	
2019	12.63	0.0%	0.89	-0.1%	13.52	0.0%
2020 [3]	12.66	0.2%	0.89	0.3%	13.55	0.2%
2021	12.64	-0.1%	0.89	0.0%	13.53	-0.1%
2022 [5]	12.58	-0.5%	0.89	0.3%	13.47	-0.5%
2023 [5]	12.58	0.0%	0.90	0.9%	13.48	0.1%
2024 [3]	12.75	1.4%	0.92	1.8%	13.67	1.5%
2025	12.75	-0.1%	0.92	0.7%	13.67	0.0%
2026	12.77	0.2%	0.93	1.0%	13.70	0.3%
2027	12.80	0.2%	0.94	1.0%	13.74	0.3%
2028 [3]	12.86	0.5%	0.95	1.3%	13.81	0.5%

	In-Lane Toll Revenues (millions)					
Fiscal	Passenger Cars		Commercial Vehicles		Total [4]	
Year	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$36.29		$17.14		$53.43	
2019	36.30	0.0%	17.11	-0.1%	53.41	0.0%
2020 [3]	36.33	0.1%	17.16	0.3%	53.49	0.2%
2021	36.25	-0.2%	17.17	0.0%	53.42	-0.1%
2022 [5]	36.01	-0.7%	17.22	0.3%	53.24	-0.3%
2023 [5]	35.97	-0.1%	17.38	0.9%	53.35	0.2%
2024 [3]	36.44	1.3%	17.69	1.8%	54.13	1.5%
2025	36.38	-0.2%	17.82	0.7%	54.19	0.1%
2026	36.41	0.1%	17.99	1.0%	54.40	0.4%
2027	36.44	0.1%	18.17	1.0%	54.62	0.4%
2028 [3]	36.57	0.4%	18.41	1.3%	54.98	0.7%

[1] Average Annual Percent Change.

[2] Actual.

[3] Leap Year.

[4] Summation may not match total due to rounding.

[5] Construction begins on deck rehabilitation of the eastbound span in October 2021 and ends May 2023.

Table A-7
Harry W. Nice Memorial Bridge (US 301)
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year	Transactions (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	3.12		0.20		3.33	
2019	3.10	-0.6%	0.20	-0.7%	3.31	-0.6%
2020 [3]	3.10	-0.2%	0.20	0.1%	3.30	-0.2%
2021	3.09	-0.1%	0.20	0.2%	3.30	-0.1%
2022	3.10	0.3%	0.20	0.7%	3.31	0.3%
2023	3.13	0.7%	0.20	1.0%	3.33	0.7%
2024 [3]	3.16	1.0%	0.21	1.3%	3.36	1.0%
2025	3.17	0.4%	0.21	0.7%	3.38	0.4%
2026	3.19	0.7%	0.21	1.0%	3.40	0.7%
2027	3.21	0.7%	0.21	1.0%	3.43	0.7%
2028 [3]	3.25	1.0%	0.22	1.3%	3.46	1.0%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$14.95		$5.79		$20.74	
2019	14.86	-0.6%	5.75	-0.7%	20.61	-0.6%
2020 [3]	14.82	-0.3%	5.76	0.1%	20.57	-0.2%
2021	14.79	-0.2%	5.77	0.2%	20.55	-0.1%
2022	14.82	0.2%	5.81	0.7%	20.63	0.4%
2023	14.91	0.6%	5.87	1.0%	20.78	0.7%
2024 [3]	15.04	0.9%	5.95	1.3%	20.99	1.0%
2025	15.09	0.3%	5.99	0.8%	21.08	0.5%
2026	15.18	0.6%	6.05	1.0%	21.24	0.7%
2027	15.28	0.6%	6.12	1.0%	21.39	0.7%
2028 [3]	15.41	0.9%	6.20	1.3%	21.61	1.0%

[1] Average Annual Percent Change.

[2] Actual.

[3] Leap Year.

[4] Summation may not match total due to rounding.

Table A-8
Total Legacy Facilities
Transactions and In-Lane Toll Revenue Estimates by Vehicle Class

Fiscal Year	Transactions (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Transactions	AAPC [1]	Transactions	AAPC [1]	Transactions	AAPC [1]
2018 [2]	112.41		9.13		121.54	
2019	112.34	-0.1%	9.35	2.5%	121.69	0.1%
2020 [3]	113.34	0.9%	9.57	2.3%	122.91	1.0%
2021	113.66	0.3%	9.61	0.5%	123.28	0.3%
2022	115.68	1.8%	9.71	1.0%	125.39	1.7%
2023	116.48	0.7%	9.76	0.5%	126.24	0.7%
2024 [3]	117.63	1.0%	9.83	0.7%	127.46	1.0%
2025	118.02	0.3%	9.85	0.1%	127.86	0.3%
2026	118.73	0.6%	9.89	0.4%	128.62	0.6%
2027	119.45	0.6%	9.93	0.4%	129.38	0.6%
2028 [3]	120.51	0.9%	10.00	0.7%	130.50	0.9%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total [4]	
	Revenue	AAPC [1]	Revenue	AAPC [1]	Revenue	AAPC [1]
2018 [2]	$385.35		$219.95		$605.29	
2019	385.06	-0.1%	226.00	2.8%	611.05	1.0%
2020 [3]	387.50	0.6%	231.68	2.5%	619.18	1.3%
2021	388.37	0.2%	232.90	0.5%	621.27	0.3%
2022	395.62	1.9%	233.42	0.2%	629.04	1.3%
2023	398.33	0.7%	234.47	0.5%	632.80	0.6%
2024 [3]	402.09	0.9%	236.28	0.8%	638.37	0.9%
2025	403.32	0.3%	236.72	0.2%	640.04	0.3%
2026	405.67	0.6%	237.81	0.5%	643.48	0.5%
2027	408.03	0.6%	238.91	0.5%	646.94	0.5%
2028 [3]	411.53	0.9%	240.68	0.7%	652.21	0.8%

[1] Average Annual Percent Change.

[2] Actual.

[3] Leap Year.

[4] Summation may not match total due to rounding.