

Maryland Transportation Authority FY2020 Traffic and Toll Revenue Forecast Update (Legacy Facilities)



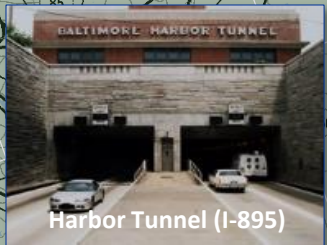
Kennedy Highway (I-95)



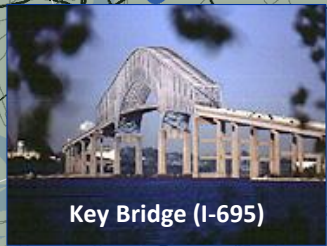
Hatem Bridge (US 40)



Fort McHenry Tunnel (I-95)



Harbor Tunnel (I-895)



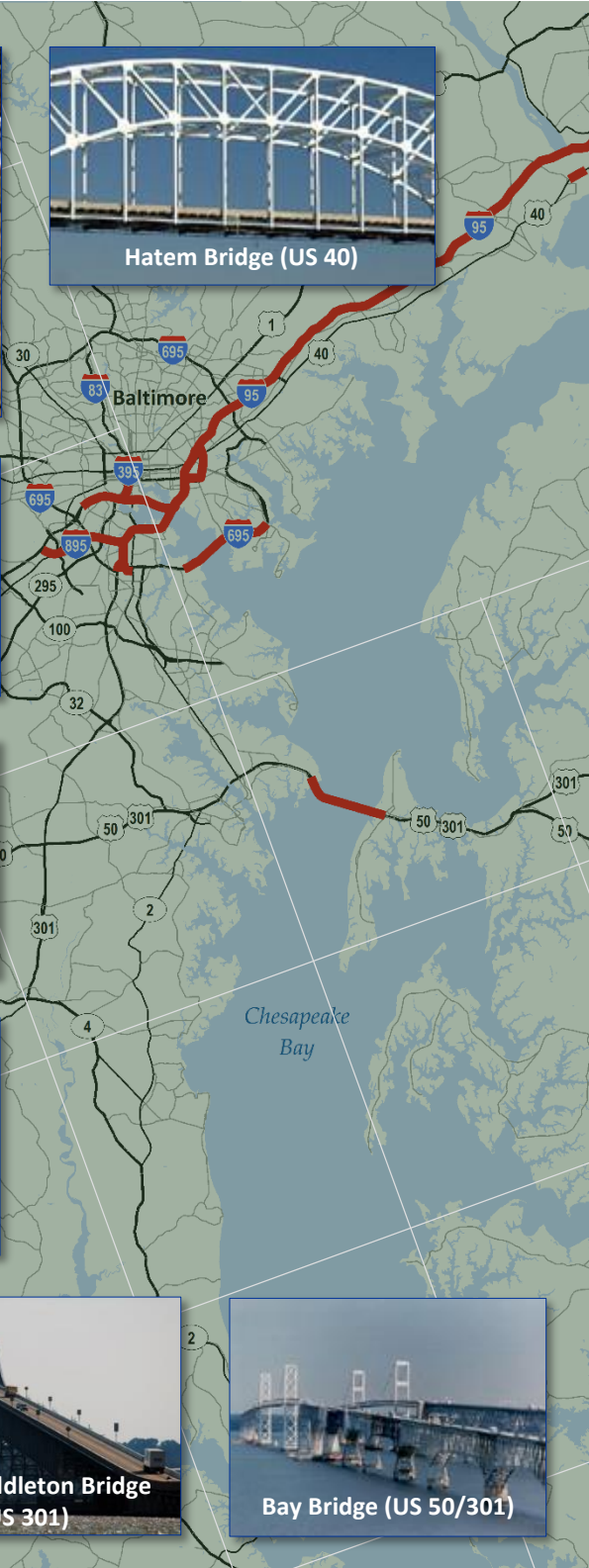
Key Bridge (I-695)



Nice/ Middleton Bridge
(US 301)



Bay Bridge (US 50/301)



FINAL REPORT
October 28, 2019



Maryland
Transportation
Authority



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-9
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	1-9
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	2-6
2.2.1 Short-Term Traffic and Revenue Impacts	2-8
2.2.2 Thomas J. Hatem Memorial Bridge.....	2-8
2.2.3 John F. Kennedy Memorial Highway.....	2-10
2.2.4 Baltimore Harbor Tunnel	2-12
2.2.5 Fort McHenry Tunnel.....	2-12
2.2.6 Francis Scott Key Bridge	2-15
2.2.7 William Preston Lane Jr. Memorial (Bay) Bridge.....	2-17
2.2.8 Governor Harry W. Nice/ Senator Thomas “Mac” Middleton Memorial Bridge	2-17
2.2.9 MDTA Legacy Facilities Total.....	2-20
2.2.10 Vehicle Class Distribution.....	2-20
2.2.11 E-ZPass® Market Share	2-22
3. Socioeconomic Review.....	3-1
3.1 Introduction	3-1
3.2 Socioeconomic Variables.....	3-1
3.2.1 Population.....	3-3
3.2.2 Employment.....	3-4
3.2.3 Unemployment.....	3-6
3.2.4 Real Income Per Capita.....	3-6
3.2.5 Real Gross Domestic Product (GDP).....	3-8
3.2.6 Inflation.....	3-9
3.2.7 Fuel Prices.....	3-11
3.3 Summary of Risks and Conclusion	3-12
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 4-3

4.1.1.4 Baltimore Harbor Tunnel (I-895) Construction Impacts 4-4

4.2 Basic Assumptions..... 4-4

4.3 Transaction and In-Lane Toll Revenue Forecasts..... 4-5

4.3.1 Impacts of Classification and Payment Type Toll Rate Changes..... 4-5

4.3.2 Annual Transactions and In-Lane Toll Revenue by Facility..... 4-6

4.3.2.1 John F. Kennedy Memorial Highway (I-95)..... 4-6

4.3.2.2 Thomas J. Hatem Memorial Bridge 4-7

4.3.2.3 Baltimore Harbor Tunnel..... 4-10

4.3.2.4 Fort McHenry Tunnel..... 4-10

4.3.2.5 Francis Scott Key Bridge..... 4-13

4.3.2.6 William Preston Lane Jr. Memorial (Bay) Bridge..... 4-13

4.3.2.7 Governor Harry W. Nice/ Senator Thomas “Mac” Middleton Memorial
Bridge 4-16

4.3.3 Systemwide Annual Transactions and In-Lane Toll Revenue Forecasts..... 4-16

4.4 Other Revenue..... 4-19

4.4.1 Unused Commuter and Shoppers Plan Trips 4-19

4.4.2 Transponder Fees and Sales..... 4-19

4.4.3 Hatem E-ZPass Program..... 4-21

4.4.4 Violation Recovery..... 4-21

4.4.5 Commercial Vehicles Fees and Discounts..... 4-21

4.4.6 Concession Revenues..... 4-25

4.5 Total Annual Revenue Forecasts 4-25

4.6 Total Monthly Transaction and Toll Revenue Forecasts 4-28

4.7 Disclaimer 4-32

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 2009 through FY 2019, Thomas J. Hatem Memorial Bridge.....	2-9
Figure 2-2. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, John F. Kennedy Memorial Highway	2-11
Figure 2-3. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, Baltimore Harbor Tunnel	2-13
Figure 2-4. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, Fort McHenry Tunnel	2-14
Figure 2-5. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, Francis Scott Key Bridge.....	2-16
Figure 2-6. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, William Preston Lane Jr. Memorial (Bay) Bridge	2-18
Figure 2-7. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, Governor Harry W. Nice/ Senator Thomas “Mac” Middleton Memorial Bridge	2-19
Figure 2-8. Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019, Legacy System.....	2-21
Figure 2-9. E-ZPass® Market Share Trends	2-24
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.....	3-10
Figure 3-7. Forecast National Inflation Growth	3-11
Figure 3-8. Historical Fuel Prices (Current \$).....	3-12
Figure 3-9. Forecast Fuel Prices (Current \$)	3-13
Figure 4-1. 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-10
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.....	1-5
Table 1-2. Central Region Tolls.....	1-6
Table 1-3. Southern Region Tolls	1-7
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.....	2-7
Table 2-5. Comparison of FY 2019 Forecasted Versus Actual Legacy Transactions and Revenue.....	2-8
Table 2-6. Vehicle Class Distribution for the MDTA Legacy Facilities.....	2-22
Table 2-7. Method of Payment Distribution for the MDTA Legacy Facilities.....	2-23
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.....	3-5
Table 3-6. Historical Real Income Per Capita (2012\$).....	3-8
Table 3-7. Forecast Real Income Per Capita Growth.....	3-8
Table 3-8. Historical Real GRP (millions of 2012\$).....	3-9
Table 3-9. Forecast Real GRP Growth.....	3-9
Table 4-1. Impact of Toll Rate Changes.....	4-6
Table 4-2. John F. Kennedy Memorial Highway (I-95) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-8
Table 4-3. Thomas J. Hatem Memorial Bridge (US 40) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-9
Table 4-4. Baltimore Harbor Tunnel (I-895) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-11
Table 4-5. Fort McHenry Tunnel (I-95) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-12
Table 4-6. Francis Scott Key Bridge (I-695) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-14
Table 4-7. William Preston Lane Jr. Memorial Bridge (US 50/301) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-15
Table 4-8. Governor Harry W. Nice/ Senator Thomas “Mac” Middleton Memorial Bridge (US 301) Transactions and In-Lane Toll Revenue Estimates by Vehicle Class.....	4-17
Table 4-9. Historical and Forecasted Transactions and In-Lane Toll Revenue.....	4-18
Table 4-10. Historical and Forecasted Legacy Facilities “Other Toll Revenue”.....	4-20
Table 4-11. New Facilities Historical and Forecasted “Other Toll Revenue”.....	4-23
Table 4-12. Historical and Forecasted In-Lane and “Other Toll Revenue”.....	4-24
Table 4-13. In-Lane, “Other” and Total Revenue Forecasts.....	4-27
Table 4-14. Monthly Transactions by Method of Payment – FY 2018 and FY 2019.....	4-29
Table 4-15. Monthly In-Lane Toll Revenue by Method of Payment – FY 2018 and FY 2019.....	4-30
Table 4-16. Monthly Forecasted Transactions, In-Lane and “Other” Toll Revenue.....	4-31

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Executive Summary

This Traffic and Revenue Update Study for the Legacy bridges, tunnels, and highways currently was conducted by CDM Smith while under contract with the Maryland Transportation Authority (MDTA). 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 \$601.1 million of in-lane toll revenue in Fiscal Year (FY) 2019.

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 2020, beginning July 1, 2019, through FY 2029, ending June 30, 2029. 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. These trends served as additional reference for updating the 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 2009 and FY 2019 are described below and presented in Figure ES-2. Also shown in Figure ES-2 is the duration of recent Great Recession, as well as the years in which toll increases and decreases occurred. While not shown in Figure ES-2, during the pre-recession period from FY 2005 through FY 2007, transaction growth averaged of 0.9 percent per annum.

Figure ES-1
Legacy Facilities Location Map

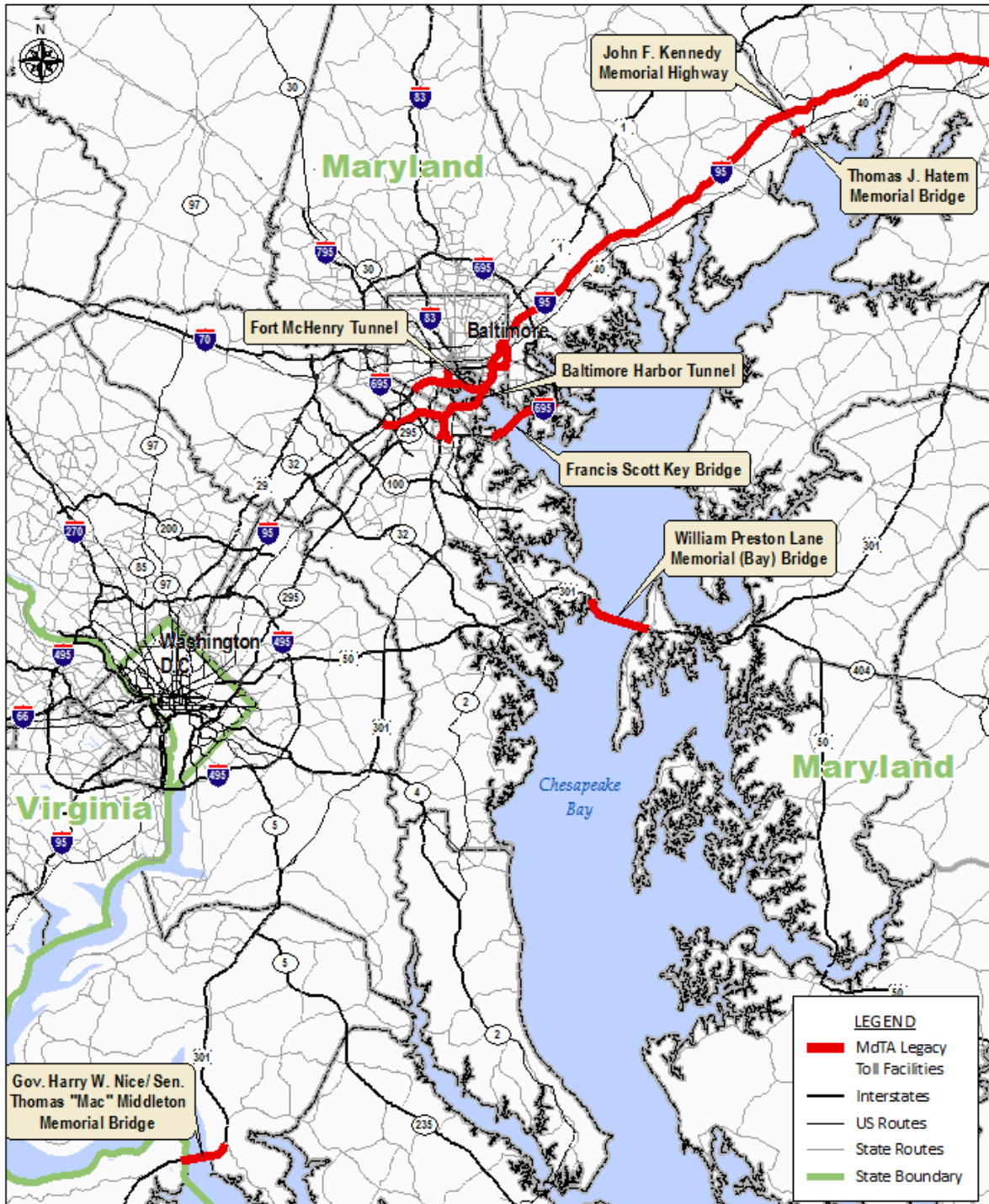
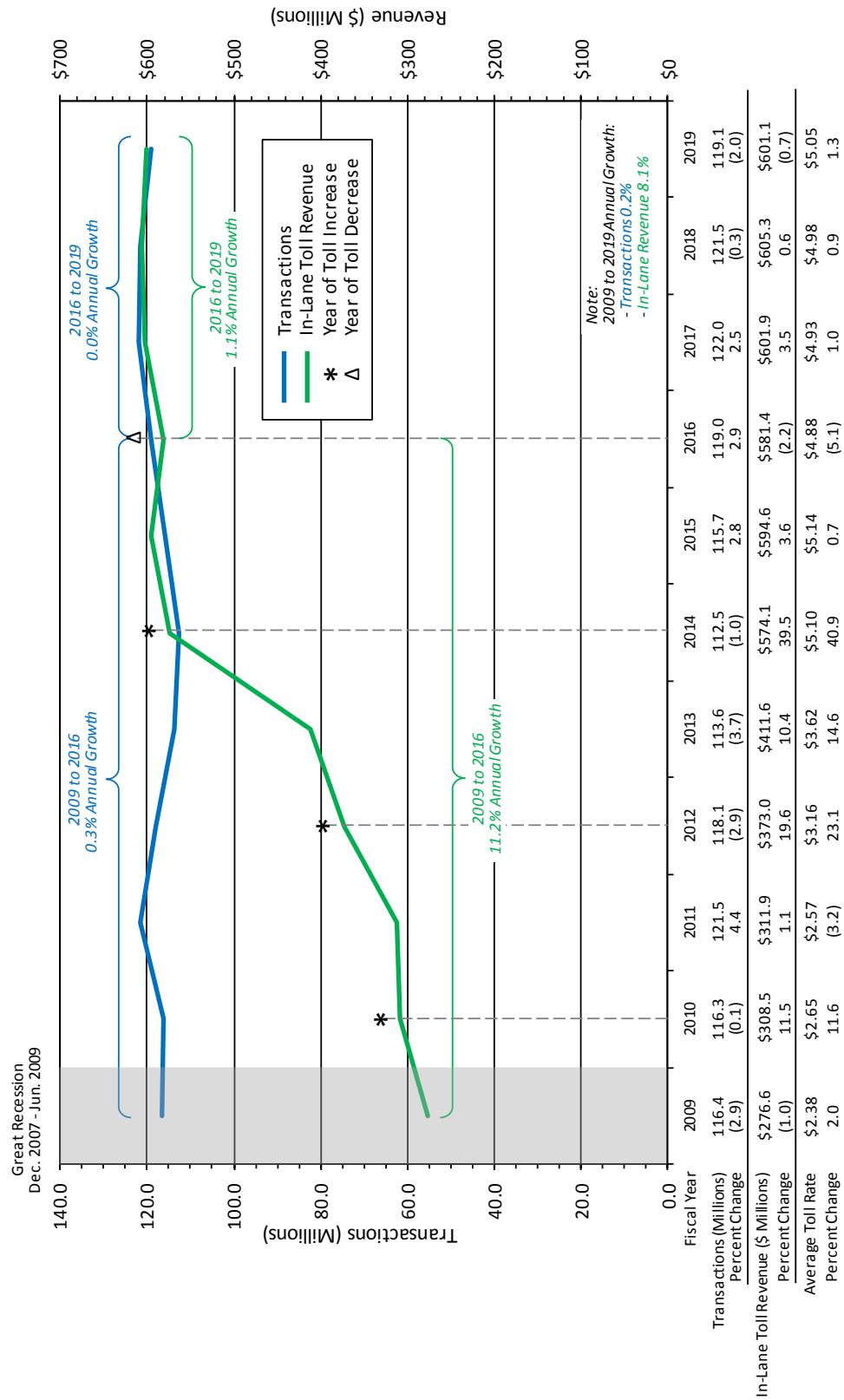


Figure ES-2
Systemwide Historical Transaction and Revenue Trends
FY 2009 through FY 2019



However, during the Great Recession, which began in December 2007 and ended in June 2009, transactions declined by an average of 1.5 percent per annum. In 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 in FY 2011, 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. However, transactions in FY 2018 declined by 0.3 percent from 122.0 million in FY 2017. The continued modest increases in gasoline prices coupled with several major construction projects were the likely factors resulting in the modest decline in FY 2018 transactions. Systemwide transactions declined by 2.0 percent in FY 2019. The primary factor for the decline was traffic diversions related to the Canton Viaduct Reconstruction project near the Baltimore Harbor Tunnel (BHT). While much of this traffic diverted from the BHT to either the Fort McHenry Tunnel (FMT) or the Francis Scott Key Bridge (FSK), it has been estimated that more than 30 percent either diverted to non-tolled roadways or chose to defer making a trip due to construction-related delays/impacts. Weather events in FY 2019 also contributed to the decline. Hurricane Florence in September 2018 and a large winter storm in February 2019 resulted in disruptions to normal travel patterns and reductions in transactions.

As a result of the decreases in transaction growth related to the Great Recession, revenues declined by 1.0 percent in FY 2009 as shown in Figure ES-2. Not shown is the 1.1 percent revenue decline in FY 2008. During the post-recession period from FY 2009 through FY 2016, revenues increased considerably, aided by 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. In-lane toll revenue decreased by 0.7 percent from \$605.3 million in FY 2018 to \$601.1 million in FY 2019. Annual in-lane toll revenue growth has averaged 8.1 percent per annum between FY 2009 and FY 2019.

Socioeconomic Review

The latest historical and forecast socioeconomic data were collected and analyzed in this update, with findings summarized in Chapter 3. In the preceding decade, labor markets improved, with employment increases and unemployment rates steadily declining to historically low levels. Bureau of Labor Statistics data shows employment growth in Maryland of 1.0 percent per annum for the last five years (2013-2018), and sub-state regional growth ranging from -0.1 percent (Western Maryland) to 1.3 percent (Southern Maryland) per annum. Unemployment in Maryland in 2018 was 3.9 percent after steadily declining from 7.7% in 2010. 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.

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 strong pace of traffic growth between FY 2015 and FY 2017 is expected to continue to decelerate as the socioeconomic forecasts generally exhibit deceleration 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 2009 through FY 2029 by facility and aggregated to the total MDTA system is presented in Table ES-1 and shown graphically in Figure ES-3. In FY 2020, the initial year of the forecast, 117.1 million transactions have been forecasted, a 1.7 percent decrease over FY 2019. In-lane toll revenue are forecasted at \$594.7 million, a 1.1 percent decrease over FY 2019. Transaction and revenue growth in FY 2020 and FY 2021 will be impacted considerably by the Canton Viaduct Replacement project on I-895 and construction on the Bay Bridge. For example, traffic diversions from the BHT in FY 2020 are estimated at 36,700 vehicles per day. While the majority of this traffic will divert to either the FMT or FSK, it is estimated that approximately 11,300 vehicles per day or about 30 percent, will either divert to alternative toll-free routes or defer trip-making during the construction period. The resultant revenue loss of diversions off the system due to the Canton Viaduct project has been estimated at between \$14 to \$15 million per year.

The robust transaction increases between FY 2015 and FY 2017, which were heavily influenced by historically low gasoline prices, economic recovery, and the FY 2016 toll reductions, were followed by decreases in both FY 2018 and FY 2019. Based on some economic uncertainties going forward, and discounting the impacts of construction, forecasts of normal annual transaction and revenue growth are at more moderate rates ranging between 0.0 to 1.2 percent. Total transactions are forecasted to grow to 126.0 million by FY 2029, or a total of 8.0 percent during the FY 2020 to FY 2029 forecast period. This equates to a growth rate of 0.9 percent per annum. In-lane toll revenue follows similar growth trends, increasing by a total of 6.7 percent from \$593.6 million in FY 2020 to \$633.5 million in FY 2029, equating to an average annual change of 0.7 percent.

These forecasts include assumptions of classification changes (for motorcycles and 3 and 4-axle “light” vehicles), a new Pay-by-Plate payment program, and a new early payment of NOTD payment program. The implementation of cashless tolling on the FSK, the Thomas J. Hatem (TJH) bridge, and the Bay Bridge are also included.

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. The civil penalties assume changes to account for a \$50 to \$25 civil penalty reduction for certain accounts and increased civil penalty revenue due to the implementation of cashless tolling.

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⁾	
2009	14.64	5.04	25.53	43.45	11.69	12.75	3.35	116.45	
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	15.20	5.09	20.84	48.25	12.83	13.59	3.31	119.11	(2.0)
2020 ⁽²⁾	14.96	5.07	16.70	49.91	13.87	13.25	3.31	117.08	(1.7)
2021	14.98	5.01	18.03	49.98	13.07	12.09	3.27	116.44	(0.6)
2022	14.94	5.02	30.48	44.63	10.19	12.08	3.27	120.62	3.6
2023	15.05	5.05	31.67	44.86	8.92	12.11	3.28	120.93	0.3
2024 ⁽²⁾	15.22	5.08	33.97	45.24	6.71	12.58	3.31	122.12	1.0
2025	15.31	5.10	34.08	45.38	6.74	12.58	3.33	122.51	0.3
2026	15.44	5.12	31.70	45.65	9.86	12.62	3.35	123.74	1.0
2027	15.57	5.15	31.39	45.91	10.48	12.65	3.38	124.54	0.6
2028 ⁽²⁾	15.75	5.19	31.67	46.31	10.57	12.72	3.41	125.62	0.9
2029	15.84	5.20	31.78	46.45	10.61	12.73	3.42	126.03	0.3

Fiscal Year	In-Lane Toll Revenue (\$ Millions)								Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total ⁽¹⁾	
2009	\$ 95.14	\$ 2.07	\$ 35.61	\$ 82.97	\$ 18.56	\$ 32.51	\$ 9.77	\$ 276.63	
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	175.99	12.17	70.26	217.45	50.53	53.74	20.97	601.12	(0.7)
2020 ⁽²⁾	174.41	11.98	54.99	223.91	56.03	52.35	21.04	594.71	(1.1)
2021	174.14	11.67	58.75	223.75	52.84	48.92	20.54	590.60	(0.7)
2022	174.33	11.61	99.95	208.61	43.77	48.82	20.50	607.59	2.9
2023	175.47	11.64	104.02	209.60	39.53	48.96	20.59	609.82	0.4
2024 ⁽²⁾	177.28	11.74	112.19	211.11	32.11	51.12	20.80	616.36	1.1
2025	178.14	11.77	112.46	211.46	32.19	51.20	20.90	618.13	0.3
2026	179.50	11.84	103.59	212.39	43.12	51.42	21.06	622.92	0.8
2027	180.86	11.91	102.63	213.33	44.78	51.65	21.22	626.38	0.6
2028 ⁽²⁾	182.73	12.01	103.47	214.87	45.10	52.01	21.44	631.64	0.8
2029	183.62	12.04	103.75	215.23	45.18	52.10	21.55	633.47	0.3

⁽¹⁾ Summations may not equal total due to rounding.

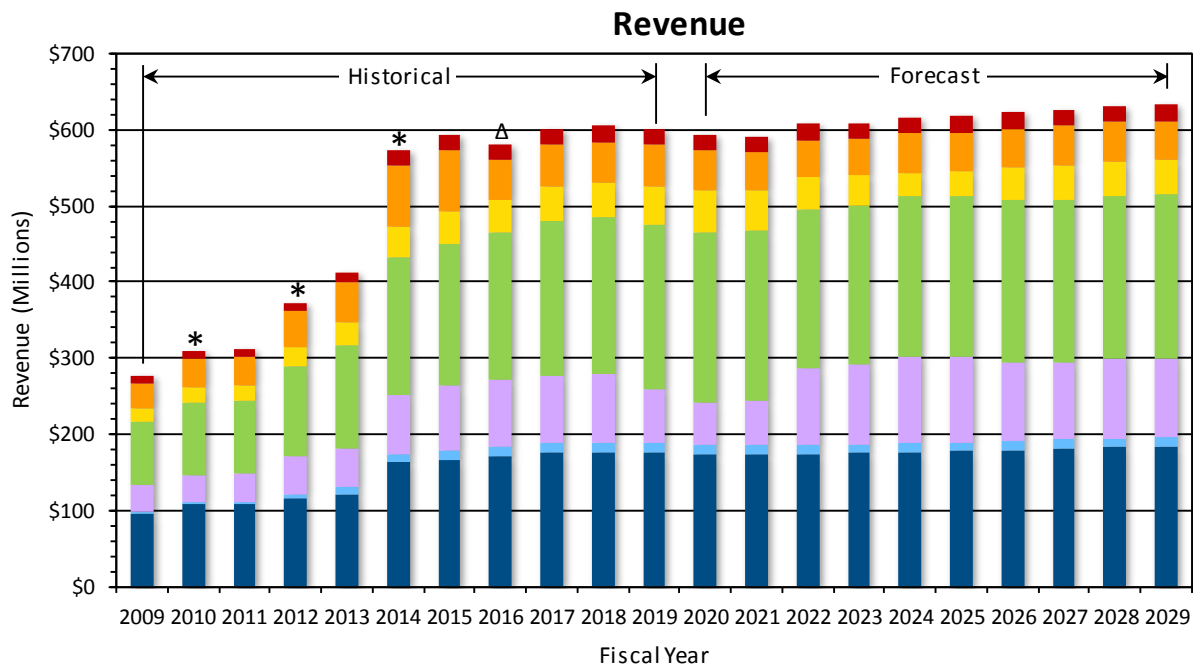
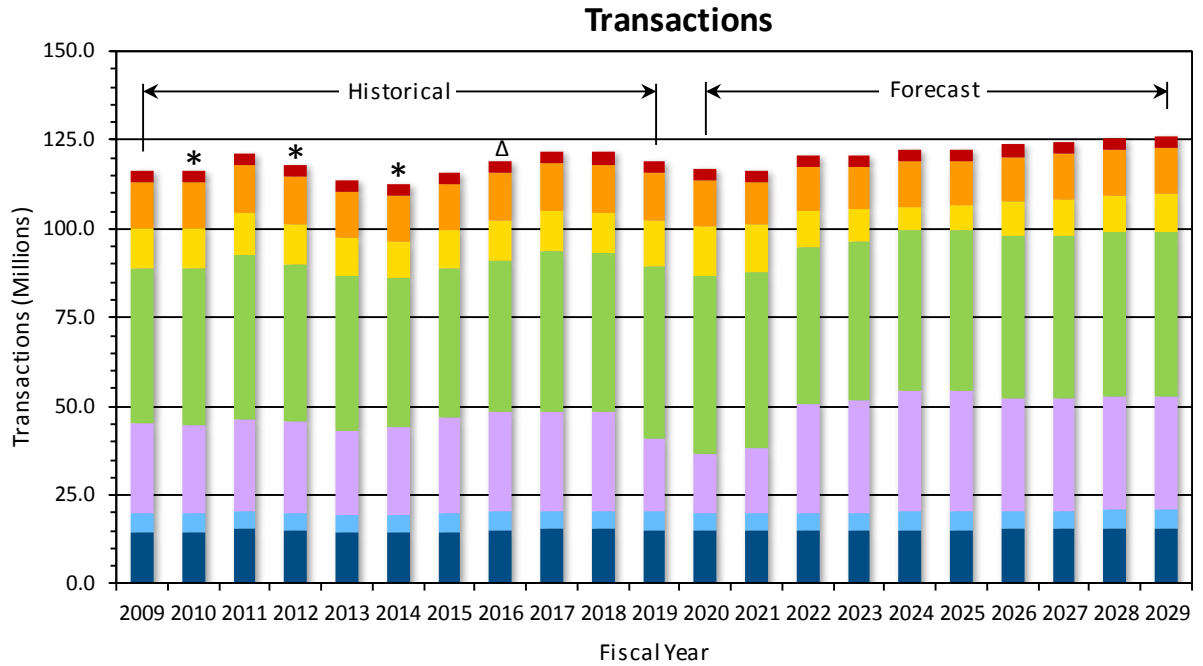
⁽²⁾ Leap Year

⁽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



- Legacy Toll Facilities**
- | | |
|--|---|
| <ul style="list-style-type: none"> ■ Gov. Harry W. Nice Memorial / Sen. Thomas "Mac" Middleton Memorial Bridge ■ William P. Lane, Jr. Memorial (Bay) Bridge ■ Francis Scott Key Bridge ■ Fort McHenry Tunnel | <ul style="list-style-type: none"> ■ Baltimore Harbor Tunnel ■ Thomas J. Hatem Memorial Bridge ■ John F. Kennedy Memorial Highway * Toll Increase Δ Toll Decrease |
|--|---|

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

Fiscal Year	"Other Toll Revenue" (\$ millions)															Total "Other" Revenue ⁽⁶⁾			
	Legacy Facilities					Commercial Vehicles					New Facilities "Other Toll Revenue" ⁽⁶⁾								
	Service Fees and Sales			Violation Recovery		Post-Usage			High Frequency Discount		Over-size Permit Fee		Concession Revenue ⁽⁴⁾		Transponder Sales		Monthly Account Fees		Violation Recovery
	Unused Pre-Paid Trip Revenue	Transponder 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⁾	Transponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties ⁽³⁾	Total "Other" Revenue ⁽⁶⁾			
2009	276.60	4.50	-	-	-	-	1.90	-	(4.80)	-	8.00	-	-	-	-	9.60			
2010 ⁽¹⁾	308.50	6.60	1.40	9.60	1.10	-	2.30	(6.60)	(0.20)	1.00	8.20	-	-	-	-	23.40			
2011	312.00	6.50	1.90	9.90	1.30	-	1.30	(6.70)	(0.30)	1.20	7.90	-	-	-	-	23.00			
2012 ⁽¹⁾	373.00	9.10	1.70	4.70	0.30	-	2.80	(5.90)	(0.20)	1.30	7.60	-	-	-	-	22.20			
2013 ⁽¹⁾	411.60	11.50	1.30	5.30	0.80	-	4.00	(4.60)	(0.70)	1.30	4.10	-	-	-	-	23.10			
2014 ⁽¹⁾	574.08	18.69	1.22	5.75	1.49	-	4.55	(5.88)	(0.64)	1.04	3.23	0.16	0.76	0.10	2.35	32.85			
2015	594.58	16.81	1.44	5.87	1.52	-	10.75	(6.34)	(0.62)	1.15	5.07	0.19	0.79	0.01	5.73	42.38			
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			
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			
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			
2019	601.12	14.00	(0.60)	1.59	1.68	-	21.27	(8.58)	(1.20)	1.26	6.65	(0.10)	0.27	-	10.19	46.43			
2020	594.71	14.07	-	1.60	1.68	-	22.40	(8.67)	(1.21)	1.28	6.29	-	0.28	-	10.03	47.75			
2021	590.60	14.14	-	1.61	1.69	-	20.50	(8.75)	(1.21)	1.29	6.31	-	0.28	-	7.56	43.40			
2022	607.59	14.21	-	1.62	1.70	-	23.67	(8.84)	(1.22)	1.30	6.33	-	0.28	-	7.59	46.64			
2023	609.82	14.28	-	1.62	1.71	-	23.26	(8.93)	(1.23)	1.31	6.34	-	0.28	-	7.63	46.28			
2024	616.36	14.35	-	1.63	1.72	-	26.65	(9.02)	(1.23)	1.33	6.36	-	0.28	-	7.67	49.73			
2025	618.13	14.42	-	1.64	1.73	-	26.63	(9.11)	(1.24)	1.34	6.37	-	0.28	-	7.71	49.77			
2026	622.92	14.49	-	1.65	1.74	-	27.57	(9.20)	(1.25)	1.35	6.39	-	0.28	-	7.75	50.78			
2027	626.38	14.57	-	1.66	1.74	-	27.76	(9.29)	(1.25)	1.37	6.41	-	0.29	-	7.79	51.03			
2028	631.64	14.64	-	1.67	1.75	-	27.80	(9.39)	(1.26)	1.38	6.42	-	0.29	-	7.83	51.13			
2029	633.47	14.71	-	1.67	1.76	-	27.78	(9.48)	(1.26)	1.39	6.44	-	0.29	-	7.86	51.17			

Source: Historical data from MDTA

⁽¹⁾ Year of toll increase.

⁽²⁾ Year of toll decrease.

⁽³⁾ Civil penalty actuals provided by MDTA. Forecasts developed by CDM Smith incorporate cashless tolling impacts and the civil penalty reduction for accounts with less than six outstanding transactions.

⁽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.

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-3 provides prior forecasts of in-lane toll revenue and Total Toll Revenue from FY 2015 through FY 2019, 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 exceeded the forecasts prepared in 2014, 2015 and 2016, and underperformed the 2017 and 2018 forecasts. Actual FY 2019 in-lane toll revenue and Total Toll Revenue were 1.6 percent and 1.9 percent below the last forecast, respectively. There are several factors which have contributed to actual traffic and toll revenue underperforming the FY 2019 forecast. These include greater than estimated impacts from the construction activity at the Harbor Crossings, particularly traffic diversions to non-tolled alternate roadways a higher than estimated share of transactions paying with E-ZPass, and lower than estimated traffic growth. In addition, weather related impacts from Hurricane Florence in September 2018 and a severe winter storm in February 2019 also contributed to the underperformance.

While actual in-lane toll revenue was \$10.0 million below the prior forecast, total actual revenue was \$12.6 million lower. This means that actual Other revenue collected was \$2.6 million below forecast. Total civil penalty revenue from the Legacy, ICC and I-95 toll facilities was estimated at \$34.8 million versus actual collections of \$31.5 million.

Table ES-4 provides a comparison of the last 10-year forecast for Legacy facilities (prepared in October 2018) with the current forecast. These forecasts include both In-Lane and “Other” Toll Revenue. Highlighted in blue is the FY 2019 actual total revenue collected, which was 1.9 percent or \$12.6 million below the forecast. The latest forecast of Total Revenue is 3.9 percent or \$264.2 million less than the prior forecast from FY 2019 to FY 2028. The current revenue forecasts are lower than those contained in last year’s traffic and toll revenue study report due to many factors. The most significant factors are an increased share of transactions paying with E-ZPass lowering underlying traffic growth in the next few years to reflect recent performance, the impact of which carries through to the outer years. Additionally, more significant construction impacts are included in several forecast years, especially in the next few years due to the Canton Viaduct project.


Table ES-3
Comparison of MDTA Forecasted Revenue versus Actual, FY 2015 through FY 2019

Year Forecast Prepared	Fiscal Year Forecasted	Forecast		Actual		Percent Difference	
		In-Lane Toll	Total Toll	In-Lane Toll	Total Toll	In-Lane Toll	Total Toll
		Revenue	Revenue	Revenue	Revenue	Revenue	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)
2018	2019	611.1	660.1	601.1	647.5	(1.6)	(1.9)

⁽¹⁾ Forecasts prepared by CDM Smith.

Table ES-4
Comparison of 2018 Forecast versus 2019 Forecast
of Total Toll Revenue (In-Lane and "Other" Toll Revenue)

Fiscal Year	Total Revenue			Percent Difference
	2018 Forecast	2019 Forecast	Difference	
2019	\$ 660.1	\$ 647.5	\$ (12.6)	(1.9)
2020	668.5	642.5	(26.0)	(3.9)
2021	670.9	634.0	(36.9)	(5.5)
2022	678.9	654.2	(24.7)	(3.6)
2023	683.0	656.1	(26.9)	(3.9)
2024	688.9	666.1	(22.8)	(3.3)
2025	690.8	667.9	(22.9)	(3.3)
2026	694.6	673.7	(20.9)	(3.0)
2027	698.3	677.4	(20.9)	(3.0)
2028	703.9	682.8	(21.1)	(3.0)
Total	\$ 6,837.9	\$ 6,602.2	\$ (235.7)	(3.4)

 - Represents actual data.

Chapter 1

Introduction

This Traffic and Revenue Update Study for the Legacy bridges, tunnels, and highways currently was conducted by CDM Smith while under contract with the Maryland Transportation Authority (MDTA). The study culminated in the development of 10-year transaction and revenue estimates for each facility through FY 2029. 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)
- Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge (Nice/Middleton Bridge)

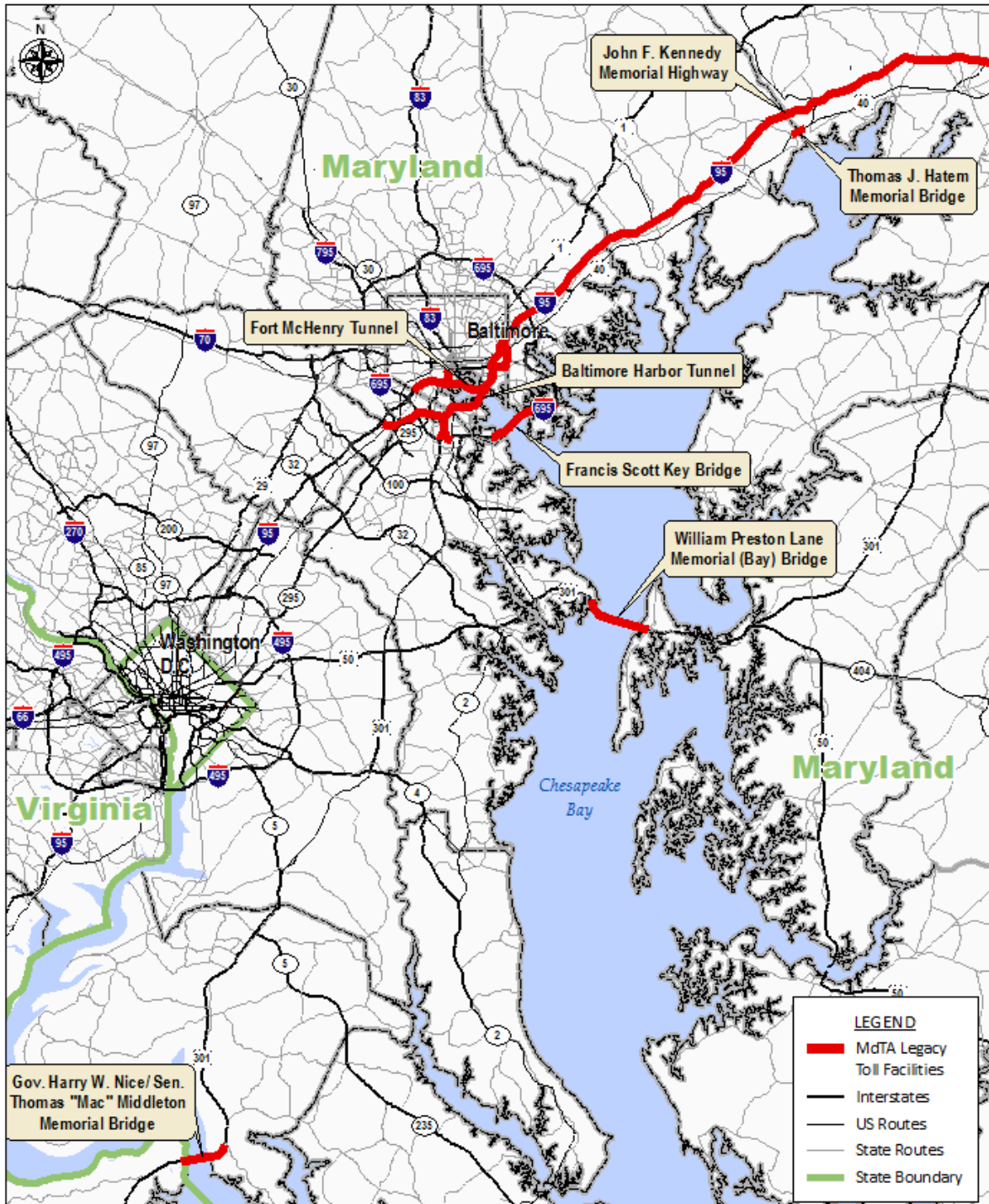
The Intercounty Connector (ICC/MD 200), the State’s first all-electronic, congestion-managed toll road connecting the I-370 and I-95 corridors and the all-electronic congestion-managed I-95 Express Toll LanesSM project are not included in this report. Separate traffic and revenue studies have been performed 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 2020, beginning July 1, 2019, through FY 2029, ending June 30, 2029. 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 E-ZPass®, video, and cash customers. Collectively, these facilities generated \$601.1 million of In-Lane Toll Revenue in FY 2019.

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 Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton 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 Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge was opened in December 1940, connecting Maryland with Virginia, thereby allowing travelers making regional through-trips to bypass the Washington DC area.

1.1.2 Toll Rate Structure

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, the MDTA offers Maryland E-ZPass® transponders free of charge to 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.

While these are the currently adopted toll schedules, several changes been incorporated into the 10-year transaction and revenue forecasts presented in Chapter 4. These include several rate changes and new toll payment options as listed below:

- **New vehicle classes with lower rates.** Toll rates are assumed to be reduced 50 percent for motorcycles, and 25 percent and 17 percent, respectively, for light vehicles towing one-axle and two-axle trailers, such as those used for watercraft or landscaping equipment. These changes are assumed to be effective September 1, 2020.
- **Pay by plate.** This new payment method is assumed to allow tolls to be automatically billed to credit cards at the same rate as cash customers. This method of toll payment is intended to benefit infrequent toll customers as well as those who do not wish to maintain a prepaid E-ZPass® balance. This option is assumed to be available on May 1, 2020.
- **Discount for early payment of video tolls.** This new payment method is assumed to provide video toll customers with a 15 percent discount if they pay their toll before their invoices are mailed. Because MDTA would not have to send a bill, these savings will be passed on to the customer. This option is assumed to be available on May 1, 2020.

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.

Additionally, beginning on October 16, 2019, the Hatem Bridge began cashless toll collection. Tolls are collected via E-ZPass® or video tolling options, only. Those customers without an E-ZPass® transponder will be billed by mail and will pay a video toll that for 2-axle vehicles is 100 percent greater than the toll paid by Maryland E-ZPass® customers.

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.

**Table 1-1
Northern Region Tolls**

Method of Payment	Vehicle Class	John F. Kennedy Memorial Highway (I-95)		Thomas J. Hatem Memorial Bridge ⁽⁶⁾ (US 40)	
		Before	After	Before	After
		July 1, 2015	July 1, 2015	July 1, 2015	July 1, 2015
Maryland E-ZPass [®] ⁽⁵⁾	Commuter, 2-axes ⁽²⁾	\$2.80	**	\$2.80 ⁽¹⁾	** ⁽¹⁾
	Class 2 2-axes	\$7.20	\$6.00	\$7.20 ⁽¹⁾	\$6.00 ⁽¹⁾
	Class 3 3-axes	\$16.00	**	\$16.00	\$11.20
	Class 4 4-axes	\$24.00	**	\$24.00	\$16.80
	Class 5 5-axes ⁽³⁾⁽⁴⁾	\$48.00	**	\$48.00	**
	Class 6 6+-axes ⁽³⁾⁽⁴⁾	\$60.00	**	\$60.00	**
Cash / Base / Non-MD E-ZPass [®]	Class 2 2-axes	\$8.00	**	\$8.00	**
	Class 3 3-axes	\$16.00	**	\$16.00	**
	Class 4 4-axes	\$24.00	**	\$24.00	**
	Class 5 5-axes	\$48.00	**	\$48.00	**
	Class 6 6+-axes	\$60.00	**	\$60.00	**
	Video	Class 2 2-axes	\$12.00	**	\$12.00
Class 3 3-axes		\$24.00	**	\$24.00	**
Class 4 4-axes		\$36.00	**	\$36.00	**
Class 5 5-axes		\$63.00	**	\$63.00	**
Class 6 6+-axes		\$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 and 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 deducted per transaction at the Kennedy Highway and Hatem Bridge. Plans end after 45 days or when all of the trips are used, whichever comes first.
- ⁽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.
- ⁽⁶⁾ Cashless toll collection will begin on October 16, 2019 at the Thomas J. Hatem Memorial Bridge. Once implemented, tolls will only be collected via E-ZPass[®] or video tolling.

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 ⁽⁶⁾ (I-695)	
		Before	After
		July 1, 2015	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.
- ⁽⁶⁾ Cashless toll collection will begin on October 30, 2019 at the Francis Scott Key Bridge. Once implemented, tolls will only be collected via E-ZPass[®] or video tolling.

**Table 1-3
Southern Region Tolls**

Method of Payment	Vehicle Class	William Preston Lane, Jr. Memorial (Bay) Bridge (US 50/301)		Gov. Harry W. Nice /Sen. Thomas "Mac" Middleton Memorial Bridge (US 301)	
		Before	After	Before	After
		July 1, 2015	July 1, 2015	July 1, 2015	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	**
Cash / Base / Non-MD E-ZPass [®]	Class 6 6+-axles (3)(4)	\$45.00	\$30.00	\$45.00	**
	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.

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.

In addition to the Hatem Bridge as noted above, cashless toll collection is assumed to be implemented at the Francis Scott Key Bridge on October 30, 2019. When implemented, those customers without an E-ZPass® transponder will be billed by mail and will pay a video toll that for 2-axle vehicles is 100 percent greater than the toll paid by Maryland E-ZPass® customers.

The two Southern Region facilities employ one-way toll collection. The base toll at the Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton 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 Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton 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.

Beginning October 3, 2019, temporary cashless tolling was implemented on the Bay Bridge on Thursdays and Fridays from noon to 10 p.m. This policy was implemented to reduce congestion caused by the Bay Bridge rehabilitation project which started in September 2019. This policy provides a discount to existing video customers, as the video toll rate charged when the policy is in effect is the cash rate. The temporary cashless tolling policy is assumed to continue through April 2020. On May 1, 2020 full cashless toll collection with typical toll rates is assumed to be implemented on the Bay Bridge. When full cashless toll collection is implemented, those customers without an E-ZPass® transponder will be billed by mail and will pay a video toll that for 2-axle vehicles is 100 percent greater than the toll paid by Maryland E-ZPass® customers.

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 operated by the MDTA.

Chapter 3, Socioeconomic Review, provides a summary of updated historical trends and forecasts of socioeconomic variables to provide the context for the traffic and revenue growth projections. The socioeconomic trend review consisted of data collection including the compilation and updating of pertinent variables such as population, employment, income, gasoline prices, and real gross regional product from a number 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 in this chapter are the 10-year traffic and revenue forecasts by facility and vehicle class for each of the Legacy facilities and the Legacy system.

Chapter 2

Historical Traffic and Revenue Trends

This chapter includes the results of reviews of regional traffic trends as well as historical transactions and revenue trends for each of the seven Legacy toll facilities. 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 2018 for the United States (U.S.) and Maryland.

Total VMT growth trends for both Maryland and the U.S. have been generally similar during the 13-year period from 2005 to 2018 shown in Table 2-1. In general, the longer-term trends indicate that while total VMT growth is similar, growth on Maryland's interstate highways is one-half the U.S. average, 0.4 percent per annum versus 0.9 percent per annum, respectively. This however is not an uncommon occurrence on more mature, established facilities. The important takeaway is that long-term growth is still occurring, albeit at a lower rate than the nation.

These trends in VMT represent a change from pre-2005 long-term historical trends (not shown on this table), where VMT grew regionally and nationally by about 2 percent per year. Several factors may be responsible for the change. First, the Great Recession caused some years of decline in VMT within this period. Beyond the Great Recession, the changes are indicative of socioeconomic and travel pattern changes in Maryland and the U.S.

While the long-term trends present a picture of modest but steady growth, the recovery from the contractions in travel brought about by the Great Recession are evident by post-recession VMT growth rates. Excluding the declines in VMT in 2018 for both the U.S. and Maryland, total average annual VMT growth between 2009 and 2017 was 1.0 percent for both the U.S. and Maryland. Growth in VMT on the interstate system was 1.7 percent per annum for the U.S. and 0.7 percent in Maryland. The favorable factors underpinning traffic increases since 2009, including a relatively robust labor market growth combined with relative declines and stability of fuel prices, which may not continue

over the upcoming years. This is evidenced somewhat by 2018 VMT data that shows slight declines over 2017 by 0.1 to 0.2 percent on the nation’s roadways, but even larger decreases of 0.6 to 0.9 percent in Maryland. However, the decreases may be the result, at least in part, from their extraction from a different data source. Annual 2018 VMT data for both the U.S. and Maryland was unavailable from the same source as the 2005 through 2017 data.

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

Year	United States ⁽¹⁾					Maryland				
	Interstate		Percent of Total	Total		Interstate		Percent of Total	Total	
	VMT (Millions)	Percent Change		VMT (Millions)	Percent Change	VMT (Millions)	Percent Change		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	824,910	1.8	25.6	3,227,358	1.2	17,937	2.0	29.9	60,045	1.5
2018 ⁽²⁾	823,194	(0.2)	25.5	3,224,877	(0.1)	17,782	(0.9)	29.8	59,663	(0.6)
Average Annual Percent Change										
2005-2007		0.8			0.7		0.6			0.2
2007-2009		(1.5)			(1.2)		(0.1)			(1.1)
2009-2018		1.5			0.9		0.5			0.8
2005-2018		0.9			0.5		0.4			0.4

2005-2017 VMT Data source: Table VM-2, Highway Statistics 1994-2017, USDOT FHWA Office of Policy Information.
2018 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 2018, and was estimated on the average of 2016 and 2017 interstate miles as a percent of total VMT.

The percent of total VMT occurring on Interstate routes has remained relatively constant throughout the past 13 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 considering 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 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 calendar year 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 are presented in Table 2-2. Volumes are provided through 2018. Traffic volumes on the two Northern Region MDTA facilities have generally followed the regional trends over the last 13 years. Between 2005 and 2018, there was a slight loss in average annual daily traffic volumes on the MDTA facilities, influenced primarily by a 0.7 percent per annum loss in traffic at the Hatem Bridge over the 13-year period. In fact, average daily traffic volumes on the Hatem have remained in the range of 27,000 to 28,000 since the end of the Great Recession in 2009. There was a slight increase of 0.1 percent per annum on the MSHA roads over the same 13-year period accentuated mostly by year-over-year decreases in traffic with a couple of years of robust increases in the range of six percent.

Considering the years since the Great Recession, where traffic between 2007 and 2009 declined by 1.8 and 1.2 percent per annum on the MDTA and MSHA facilities, respectively, post-recession volumes between 2009 and 2018 on both MDTA and MSHA roads have experienced modest annual increases. These were 0.4 and 0.2 percent per annum on the MDTA and MSHA roadways, respectively. Toll increases implemented in 2012, 2013 and 2014 may also be partly responsible for the modest growth trends on the MDTA-operated facilities. Much of the traffic increases in 2015 through 2017 on the MDTA facilities were likely the result of economic recovery and a growing economy. However, the three successive years of growth on the MDTA roads came to an end in 2018 with traffic declining by 1.4 percent, while traffic grew by 0.7 percent on the MSHA roads.

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 2018. Traffic volumes at the three Central Region MDTA facilities have also generally followed the regional trends over the last 13 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 did not experience significant effects of the recession until 2009 with volumes decreasing by 2.7 percent. Sizeable traffic volume decreases occurred in 2013, with smaller decreases in both 2012 and 2014. Toll increases implemented in FY 2012 and FY 2014 were the primary catalyst for the declines. Regional traffic volumes increased by 1.1 percent in 2015, influenced by the 3.0 percent traffic growth on the MDTA facilities, partially the result of toll decreases implemented on July 1. Traffic volumes in years 2016 and 2017 on the MDTA facilities increased by 2.9 percent and 2.0 percent, respectively, and by 2.4 percent in 2017 on the MSHA facilities. These increases were likely due to a continuing economic recovery and growth. In 2018, traffic decreased on both MDTA and MSHA facilities. On the MDTA facilities, these impacts are likely related to major projects in various stages of construction either at or in proximity to the FMT, BHT and FSK facilities.

Overall, pre-recession (2005-2007) traffic growth averaged 1.0 percent, 0.3 percent, and 0.6 percent per year on MDTA, MSHA and Central Region facilities, respectively. During the Great Recession years (2007-2009) traffic declined by 1.3 percent, 0.4 percent and 0.7 percent per annum on the MDTA, MSHA and Central Region facilities, respectively.

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

Calendar Year	MDTA Facilities			MSHA Facilities ⁽¹⁾			MDTA Facilities			MSHA Facilities			Northern Region		
	John F. Kennedy	Thomas J. Hatem	US 301	US 1	US 301	US 301	MDTA Facilities	MSHA Facilities	Northern Region	MDTA Facilities	MSHA Facilities	Northern Region	MDTA Facilities	MSHA Facilities	Northern Region
	Mem. Highway	Mem. Bridge	Mem. Highway	Mem. Highway	Mem. Highway	Mem. Highway	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾
2005	81,957	30,520	61,975	9,950	11,425	56,239	---	27,783	---	39,165	---	---	---	---	---
2006	80,744	30,450	66,760	9,852	11,650	55,597	(1.0)	29,421	(1.1)	39,891	5.9	27,889	(1.1)	29,421	5.9
2007	81,317	30,474	62,068	11,640	11,531	55,896	18.1	28,413	0.5	39,406	(3.4)	27,281	(1.1)	28,413	(3.4)
2008	80,283	30,445	59,830	11,061	10,952	55,364	(5.0)	27,281	(1.0)	38,514	(4.0)	27,281	(1.0)	27,281	(4.0)
2009	80,229	27,617	61,620	11,282	10,370	53,923	2.0	27,757	(2.6)	38,224	1.7	27,757	(2.6)	27,757	1.7
2010	80,815	27,325	61,971	10,050	10,451	54,070	(10.9)	27,491	0.3	38,122	(1.0)	27,491	0.3	27,491	(1.0)
2011	84,739	27,797	60,988	9,861	10,252	56,268	(1.9)	27,034	4.1	38,727	1.6	27,034	4.1	27,034	1.6
2012	84,402	27,810	60,165	9,882	10,620	56,106	0.2	26,889	(0.3)	38,576	(0.4)	26,889	(0.3)	26,889	(0.4)
2013	80,212	27,306	60,401	9,310	10,571	53,759	(5.8)	26,761	(4.2)	37,560	(0.5)	26,761	(4.2)	26,761	(0.5)
2014	79,083	28,500	60,041	9,301	10,562	53,792	(0.1)	26,635	0.1	37,497	(0.2)	26,635	0.1	26,635	(0.2)
2015	82,215	27,659	64,455	10,092	10,520	54,937	8.5	28,356	2.1	38,988	4.0	28,356	2.1	28,356	4.0
2016	83,628	27,930	61,091	11,530	10,141	55,779	14.2	27,587	1.5	38,864	(0.3)	27,587	1.5	27,587	(2.7)
2017	85,471	27,812	61,558	11,781	11,030	56,642	2.2	28,123	1.5	39,530	1.7	28,123	1.5	28,123	1.9
2018	84,009	27,715	62,254	11,712	10,961	55,862	(0.6)	28,309	(1.4)	39,330	(0.5)	28,309	(1.4)	28,309	0.7
Average Annual Percent Change															
2005-2007	(0.4)	(0.1)	0.1	8.2	0.5	(0.3)	8.2	0.5	(0.3)	1.1	0.3	1.1	(0.3)	1.1	0.3
2007-2009	(0.7)	(4.8)	(0.4)	(1.5)	(5.2)	(1.8)	(1.5)	(5.2)	(1.8)	(1.2)	(1.5)	(1.2)	(1.8)	(1.2)	(1.5)
2009-2018	0.5	0.0	0.1	0.4	0.6	0.4	0.4	0.6	0.4	0.2	0.3	0.2	0.4	0.2	0.3
2005-2018	0.2	(0.7)	0.0	1.3	(0.3)	(0.1)	1.3	(0.3)	(0.1)	0.1	0.0	0.1	(0.1)	0.1	0.0

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**

Calendar Year	MSHA Facilities ⁽¹⁾											
	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	3.3	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	0.2	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	146,418	(11.7)	207,323	7.5	111,820	4.4	182,600	(5.0)	160,542	7.5	108,450	0.7
2016	162,491	11.0	201,594	(2.8)	108,731	(2.8)	186,350	2.1	150,190	(6.4)	103,281	(4.8)
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
2018	165,393	(0.6)	205,205	(0.6)	121,110	8.8	184,100	(14.0)	152,882	(0.6)	104,451	(0.9)
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)
2009-2018		0.3		0.7		1.6		(1.5)		(0.1)		1.8
2005-2018		(0.4)		0.6		1.5		(1.1)		0.0		1.5

Calendar Year	MDTA Facilities				MSHA Facilities				Central Region	
	Baltimore Harbor Tunnel	Francis Scott Key Bridge	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	65,171	238,754	(1.7)	149,276	0.1	147,108	(0.8)	147,830	(0.3)
2007	141,042	66,867	245,776	2.6	151,228	2.9	149,371	1.3	149,990	1.5
2008	141,209	67,632	245,639	1.1	151,493	(0.1)	146,098	(2.2)	147,897	(1.4)
2009	139,914	64,045	238,059	(5.3)	147,339	(2.7)	148,254	1.5	147,949	0.0
2010	138,222	60,050	241,443	(6.2)	146,572	(0.5)	148,303	0.0	147,726	(0.2)
2011	143,746	64,410	255,169	7.3	154,442	5.4	149,098	0.5	150,879	2.1
2012	144,402	63,992	253,771	(0.6)	154,055	(0.3)	149,192	0.1	150,813	(0.0)
2013	135,647	58,123	237,157	(6.1)	143,642	(6.8)	150,153	0.6	147,983	(1.9)
2014	143,041	56,946	228,818	(3.5)	142,935	(0.5)	152,504	1.6	149,314	0.9
2015	153,191	60,812	227,545	6.8	147,183	3.0	152,859	0.2	150,967	1.1
2016	150,327	61,323	242,542	(1.9)	151,397	2.9	152,106	(0.5)	151,870	0.6
2017	152,771	63,178	247,489	1.6	154,479	2.0	155,699	2.4	155,292	2.3
2018	147,132	61,344	248,791	(3.7)	152,422	(1.3)	152,190	(2.3)	152,268	(1.9)
Average Annual Percent Change										
2005-2007		0.5		0.4		1.5		1.0		0.6
2007-2009		(0.4)		(2.1)		(1.6)		(0.7)		(0.7)
2009-2018		0.6		(0.5)		0.5		0.4		0.3
2005-2018		0.4		(0.6)		0.3		0.2		0.2

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

During the 2009 to 2018 post-recession period, traffic has increased by 0.4 percent on the MDTA facilities, 0.3 percent on the MSHA facilities, and 0.3 percent per annum on the Central Region as a whole. Traffic during the 13 years presented in Table 2-3 grew by 0.2 percent per year for the MDTA, 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 calendar 2018. Traffic volumes on the two MDTA facilities have generally followed the regional trends of over the last 13 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. Traffic volume decreases on the MDTA facilities also occurred in years 2012, 2013 and 2014. Toll increases implemented in FY 2012 and FY 2014 were likely the primary catalyst for the declines. Following these traffic declines both on the MDTA and the Southern Region facilities combined, traffic has since grown at reasonably high levels, averaging 2.7 percent, 0.9 percent and 1.3 percent in 2015, 2016 and 2017, respectively, for all Southern Region roads. In 2018, traffic on all the Southern Region facilities declined by an average of 0.9 percent.

Overall, pre-recession (2005-2007) traffic growth averaged 2.2 percent, 1.4 percent, and 1.4 percent per year on MDTA, VDOT and Southern Region facilities, respectively. During the Great Recession years (2007-2009) traffic declined by 2.4 percent, 0.7 percent and 1.4 percent per annum on the MDTA, VDOT and Southern Region facilities, respectively. During the 2009 to 2018 post-recession period, traffic has increased modestly, averaging 0.5 percent per annum on the MDTA facilities, 0.1 percent on the VDOT facilities, and 0.2 percent on the Southern Region as a whole. Traffic during the 13 years presented in Table 2-4 grew by 0.3 percent per annum for the MDTA facilities, and 0.2 percent per annum on the VDOT and all Southern Region highways combined.

In summary, between 2005 and 2018, traffic volumes have grown at similar per annum rates across all three regions, averaging between almost no growth in the Northern Region to 0.2 percent in both the Central and Southern Regions. Trends over the past 13-year period were used as a guide in estimating the ten-year traffic growth for the traffic and revenue forecasts presented in Chapter 4.

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 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.

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

Calendar Year	MDTA Facilities			MSHA Facilities ⁽¹⁾			Virginia DOT Facilities			MDTA Facilities		VDOT Facilities		Southern Region	
	William P. Lane, Jr. Mem. (Bay) Bridge	Gov. Harry W. Nice/ Sen. Thomas "Mac" Mem. Bridge	AAPC ⁽²⁾	US 301 S of MD 234	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⁾	Average AAPC ⁽²⁾	Average AAPC ⁽²⁾	Average AAPC ⁽²⁾	
	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾	AAPC ⁽²⁾		
2005	71,123	17,592	---	22,975	134,000	---	13,000	---	44,358	---	73,500	---	51,738		
2006	72,716	18,385	2.2	22,751	138,000	(1.0)	14,000	7.7	45,551	2.7	76,000	3.4	53,170		
2007	73,941	18,731	1.7	22,522	137,000	(1.0)	14,000	-	46,336	1.7	75,500	(0.7)	53,239		
2008	73,260	18,580	(0.9)	21,403	133,000	(5.0)	13,000	(7.1)	45,920	(0.9)	73,000	(3.3)	51,849		
2009	69,874	18,341	(4.6)	21,834	136,000	2.0	13,000	-	44,108	(3.9)	74,500	2.1	51,810		
2010	71,200	18,378	1.9	22,520	136,000	3.1	12,000	(7.7)	44,789	1.5	74,000	(0.7)	52,020		
2011	74,651	18,693	4.8	22,091	135,000	(1.9)	12,000	-	46,672	4.2	73,500	(0.7)	52,487		
2012	74,248	18,308	(0.5)	22,142	135,000	0.2	12,000	-	46,278	(0.8)	73,500	-	52,340		
2013	70,375	17,931	(5.2)	20,840	132,000	(5.9)	13,000	8.3	44,153	(4.6)	72,500	(1.4)	50,829		
2014	69,957	17,952	(0.6)	20,821	131,000	(0.1)	14,000	7.7	43,945	(0.5)	72,500	-	50,742		
2015	71,625	18,460	2.4	22,602	134,000	8.6	14,000	-	45,043	2.5	74,000	2.1	52,137		
2016	72,821	18,352	1.7	21,880	136,000	(3.2)	14,000	-	45,587	1.2	75,000	1.4	52,611		
2017	74,559	18,616	2.4	22,361	137,000	2.2	14,000	-	46,588	2.2	75,500	0.7	53,307		
2018	73,842	18,102	(1.0)	22,232	136,000	(0.6)	14,000	-	45,972	(1.3)	75,000	(0.7)	52,835		
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)		
2009-2018	0.6	(0.1)	---	0.2	---	---	-	0.8	0.5	---	---	0.1	0.2		
2005-2018	0.3	0.2	---	(0.3)	---	---	0.1	0.6	0.3	---	---	0.2	0.2		

Source: MDTA, MSHA and Virginia DOT ADOT Reports.

⁽¹⁾ Maryland State Highway Administration.

⁽²⁾ Annual Average Percent Change.

2.2.1 Short-Term Traffic and Revenue Impacts

The latest FY 2019 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 2019 transactions were 2.58 million, or 2.1 percent less than those previously forecasted. In-lane toll revenue fell short of the forecast by \$9.94 million or 1.6 percent, while other toll revenues were higher than the forecast by \$3.34 million or 10.3 percent. In addition to lower than forecasted normal traffic growth, another unanticipated impact is believed to be the primary factor contributing to actual traffic and toll revenues underperforming the FY 2019 forecast. Most of the divergence between actual and forecast appears to be primarily related to a greater than anticipated diversion of construction-impacted Baltimore Harbor Tunnel traffic to non-MDTA facilities. While the actual number of vehicles diverting from the Baltimore Harbor Tunnel was slightly less than forecasted for the first several months of construction, a lower share of the diverted traffic than anticipated diverted their travel route to the Fort McHenry Tunnel or Francis Scott Key Bridge. Put another way, a higher share than anticipated appears to be diverting to non-MDTA roadways or not making trips altogether.

Table 2-5
Comparison of FY 2019 Forecasted Versus Actual Legacy Facility Transactions and Revenue

Item	FY 2018 Actual (millions)	FY 2019 Forecasted (millions)			FY 2019 Actual (millions)			FY 2019 Actual versus FY 2019 Forecasted (millions)	
		Amount	Difference versus FY 2018		Amount	Difference versus FY 2018		Difference	Percent
			Difference	Percent		Difference	Percent		
Transactions	121.60	121.69	0.09	0.1	119.11	(2.49)	(2.0)	(2.58)	(2.1)
In-Lane Toll Revenue	\$ 605.29	\$ 611.05	5.76	1.0	\$ 601.12	\$ (4.18)	(0.7)	\$ (9.94)	(1.6)
Other Toll Revenue	\$ 32.64	\$ 32.29	(0.35)	(1.1)	\$ 35.63	\$ 2.99	9.1	\$ 3.34	10.3

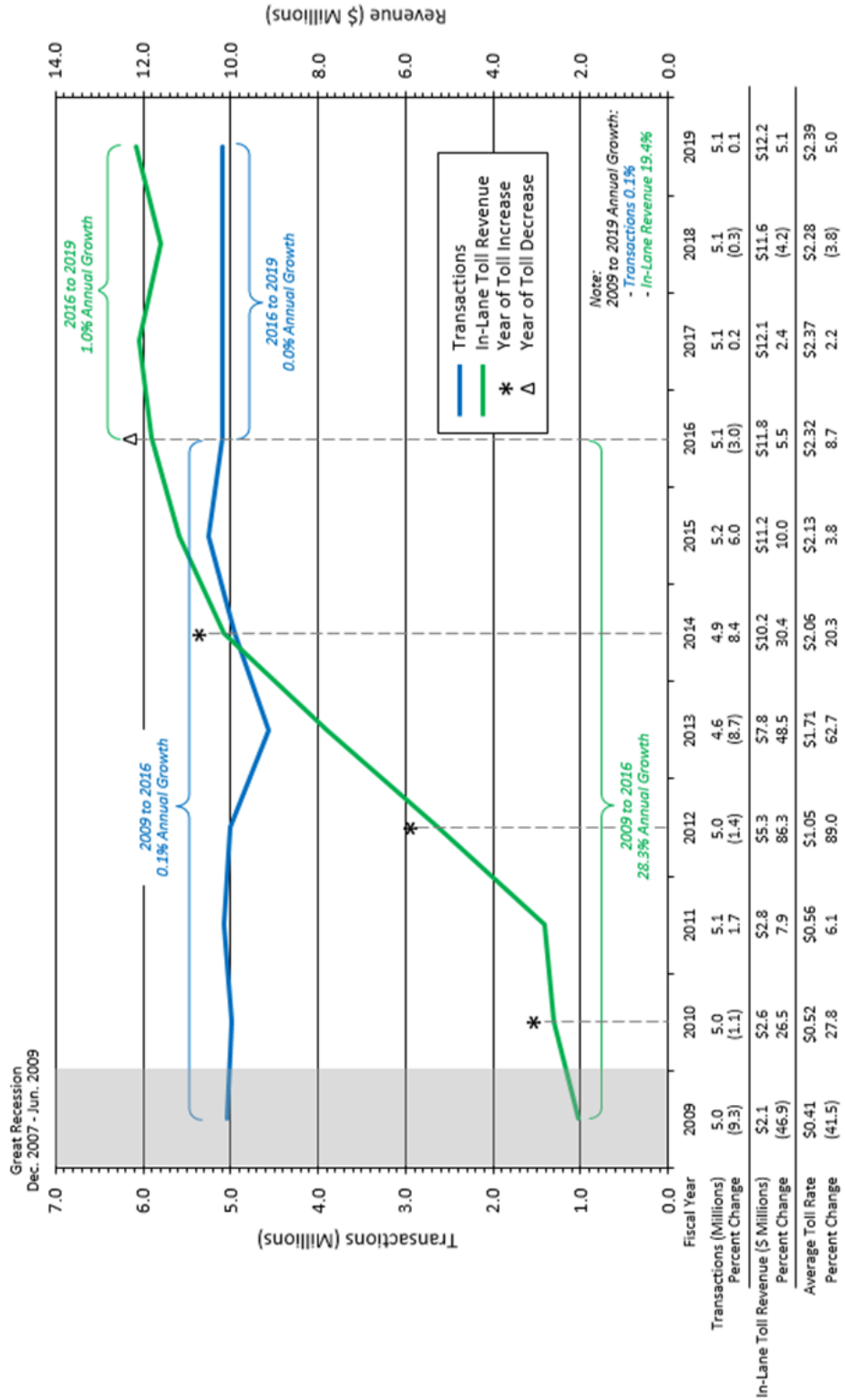
Note: Includes transactions and revenue for MDTA legacy facilities only.

2.2.2 Thomas J. Hatem Memorial Bridge

Historical transactions and revenue for the Thomas J. Hatem Memorial Bridge (Hatem Bridge) between FY 2009 and FY 2019 are provided in Figure 2-1. Also shown is the duration of recent recession, 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.

As indicated on the figure, two periods have been identified during the last 10 years: Post-Recession/Period of Toll Changes (FY 2009 – FY 2016) and Recent Trends (FY 2016 – FY 2019). In FY 2009, transactions 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

Figure 2-1
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Thomas J. Hatem Memorial Bridge



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 2019.

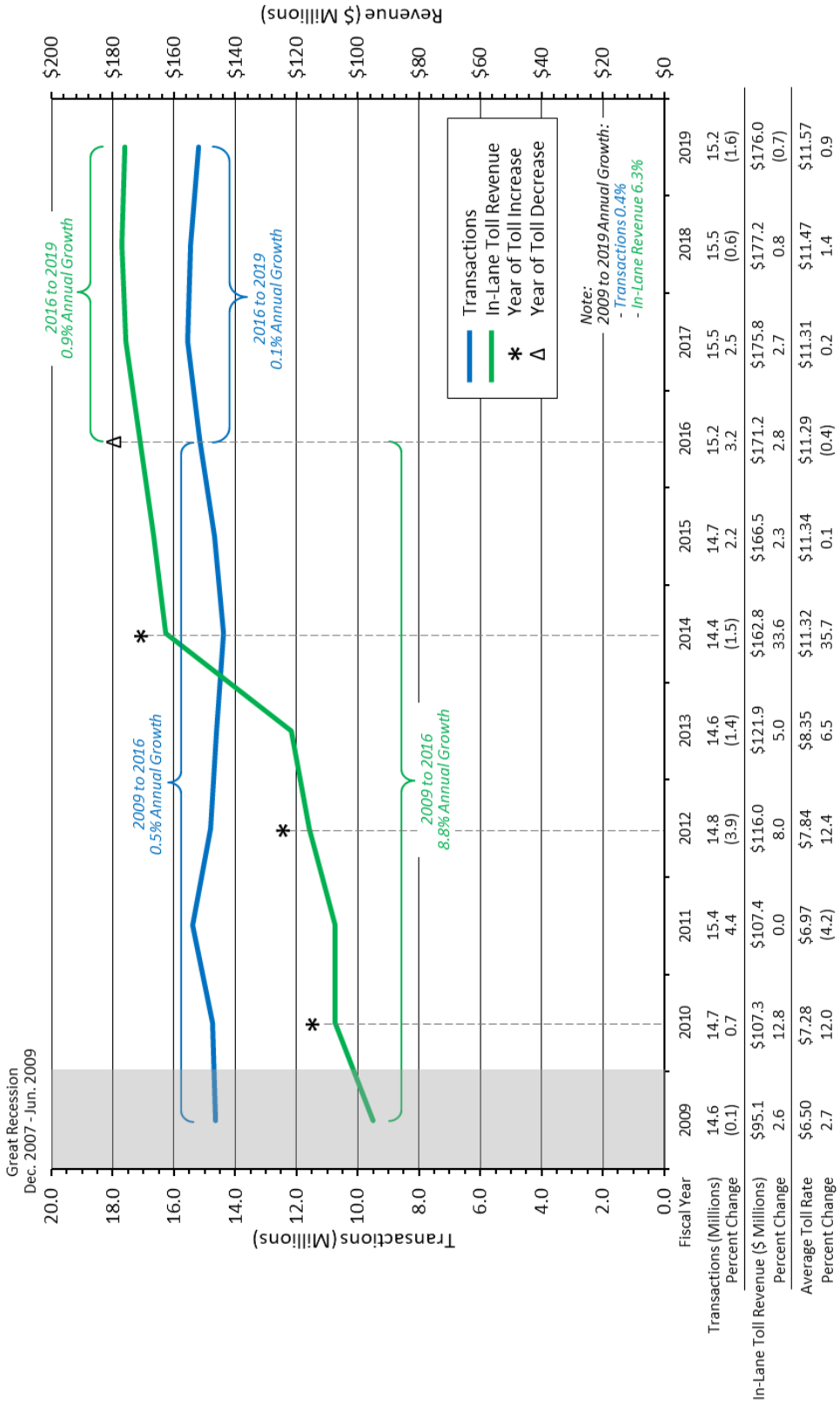
Historical toll revenues are also shown in Figure 2-1. After experiencing a large drop between FY 2008 and FY 2009 because of the Great Recession, revenue steadily grew through FY 2017, reaching \$12.1 million. This growth was aided by a series of toll increases, indicated by increases in average toll 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, primarily the result of a comparable decrease in the average toll rate. Revenue increased by 5.1 percent to \$12.2 million in FY 2019. Overall average annual In-Lane Toll Revenue growth was 19.4 percent between FY 2009 and FY 2019, due primarily as a result of the three 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 2009 and FY 2019 are provided in Figure 2-2. During the last 10 years, transaction growth has been relatively modest, averaging 0.4 percent per year. As a result of the Great Recession, transactions which had hovered in the vicinity of 15.0 million for several years prior, dropped to 14.6 million in FY 2009. 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 most 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 to 15.5 million in FY 2018, possibly due to the increasing cost of gasoline, and then again in FY 2019 by 1.6 percent to 15.2 million. Some of the general long-term trends 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.

In-Lane Toll Revenues were \$95.1 million in 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, which was the result of a comparable 2.7 percent increase in the average toll in that year. Since FY 2009, revenues, aided by a series of toll increases, had grown steadily, reaching \$177.2 million in FY 2018. However, in FY 2019, revenue declined by 0.7 percent to \$176.0 million, the first drop in revenue since 2008. Even with this decrease, revenue between FY 2016 and FY 2019 has increased at an annual average rate of 0.9 percent. Average annual In-Lane Toll Revenue growth between FY 2009 and FY 2019 averaged 6.3 percent, due primarily to the toll increases implemented between FY 2010 and FY 2014.

Figure 2-2
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
John F. Kennedy Memorial Highway



2.2.4 Baltimore Harbor Tunnel

Historical transactions and revenue for Baltimore Harbor Tunnel between FY 2009 and FY 2019 are shown in Figure 2-3. Transactions declined by 0.9 percent to 25.5 million in FY 2009 in the wake of the Great Recession. Despite a 1.2 percent decrease in FY 2010, transactions recovered in FY 2011, growing by 3.5 percent and exceeded 26.1 million. Overall, during the period of toll changes between FY 2009 and FY 2016, transactions increased by an average of 1.5 percent annually. However, transactions since FY 2015 have been significantly affected by several major construction projects. These include the deck rehabilitation on I-95 south of the Fort McHenry Tunnel, the deck and superstructure replacement on I-895, and the Canton Viaduct Replacement project which began in FY 2019. These projects have had the impact of diverting traffic between the three Baltimore Harbor crossings, as well as diverting traffic to other non-tolled routes such as I-395 and US 40. The most severe of these projects is the currently ongoing Canton Viaduct Replacement. The project which began in June 2018 and is scheduled to be completed in July 2021, has resulted in a traffic decrease of 25.6 percent from 28.0 million transactions in 2018 to 20.8 million in 2019. Put another way, if this decrease in transactions occurred over the course of a full year, the impact would have been a loss of 20,000 vehicles per day to other facilities. Fortunately for MDTA, much of this traffic has diverted to either the Fort McHenry Tunnel or the Francis Scott Key Bridge, resulting in a less severe net impact on systemwide transactions and revenue. Transactions between FY 2016 and FY 2019 have decreased by 9.7 percent per annum as a result of the Canton Viaduct Replacement project. However, if the temporary impacts of the project were not considered, the long-term growth trend at the BHT from FY 2009 to FY 2018 has been a healthy 1.0 percent per annum.

Historical In-Lane Toll Revenues are also shown in Figure 2-3. Between FY 2005 and FY Revenues increased by 0.8 percent to \$35.6 million from FY 2008 to 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 the toll reductions in FY 2016. Revenue peaked at \$91.4 million in FY 2018, before dropping by 23.1 percent to \$70.3 million in FY 2019, the direct result of the construction project. 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 changes in the facility's average toll rate, as noted in the figure. Discounting the temporary FY 2019 toll revenue impacts, the average annual growth in In-Lane Toll Revenue between FY 2016 and FY 2018 was 0.8 percent. Similarly, the average annual In-Lane Toll Revenue growth was 11.0 percent per year between FY 2009 and FY 2018. As with the other Legacy facilities, this increase was primarily the result of the 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 2009 and FY 2019 are provided in Figure 2-4. Transactions declined in FY 2009 by 3.1 percent to 43.4 million because of the impacts of the Great Recession. They then rebounded 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 steady 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 rehabilitation on I-95 south of the tunnel. In FY 2017, transactions increased by 6.4 percent, at that time, the largest year-over-year growth in the past two decades. This robust growth was attributed, in part, to diversions from the construction on I-895. In FY 2018, transactions decreased by 1.5 percent, likely the result of construction-related impacts. In FY 2019, transactions increased by 7.9 percent to 48.2 million, the

Figure 2-3
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Baltimore Harbor Tunnel

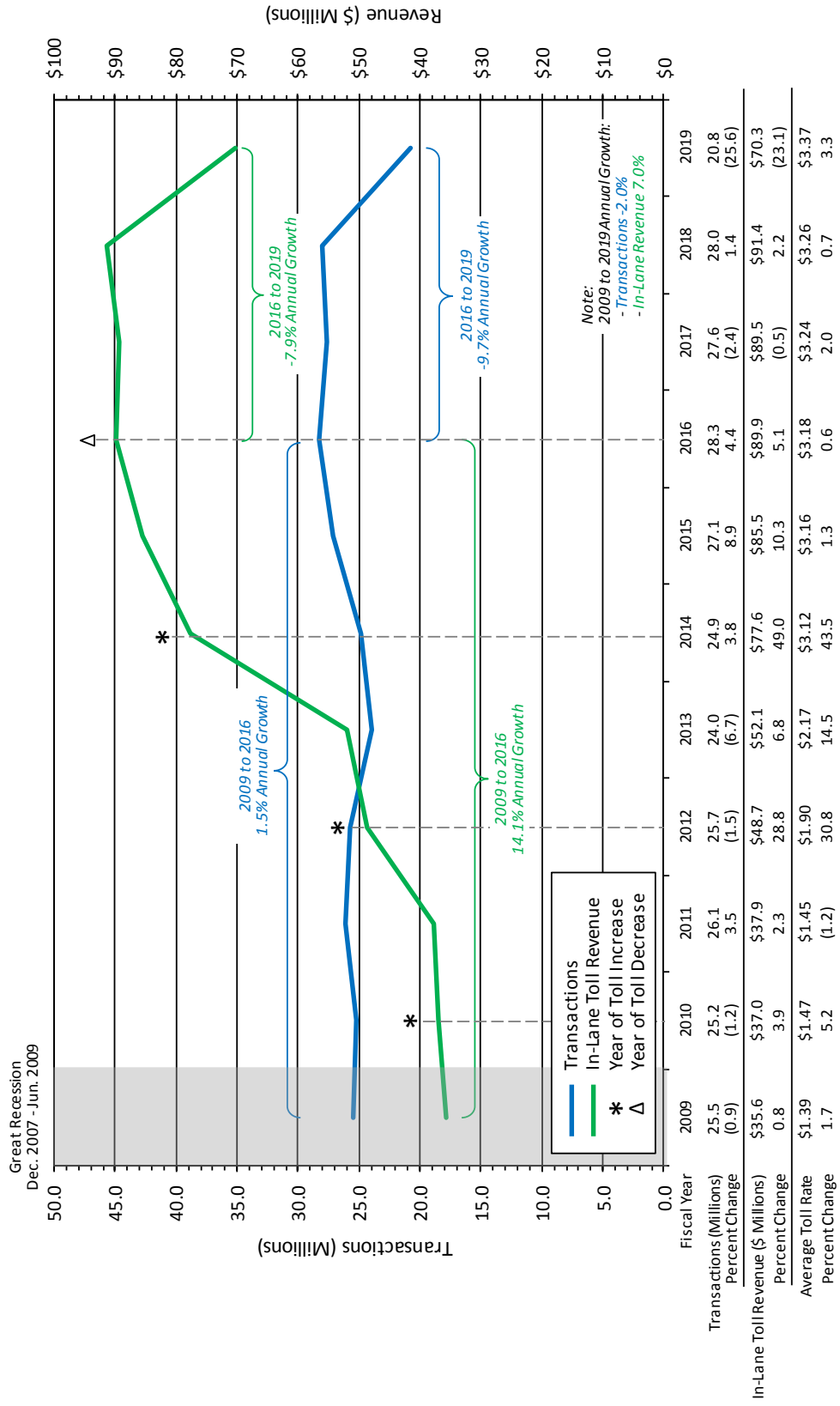
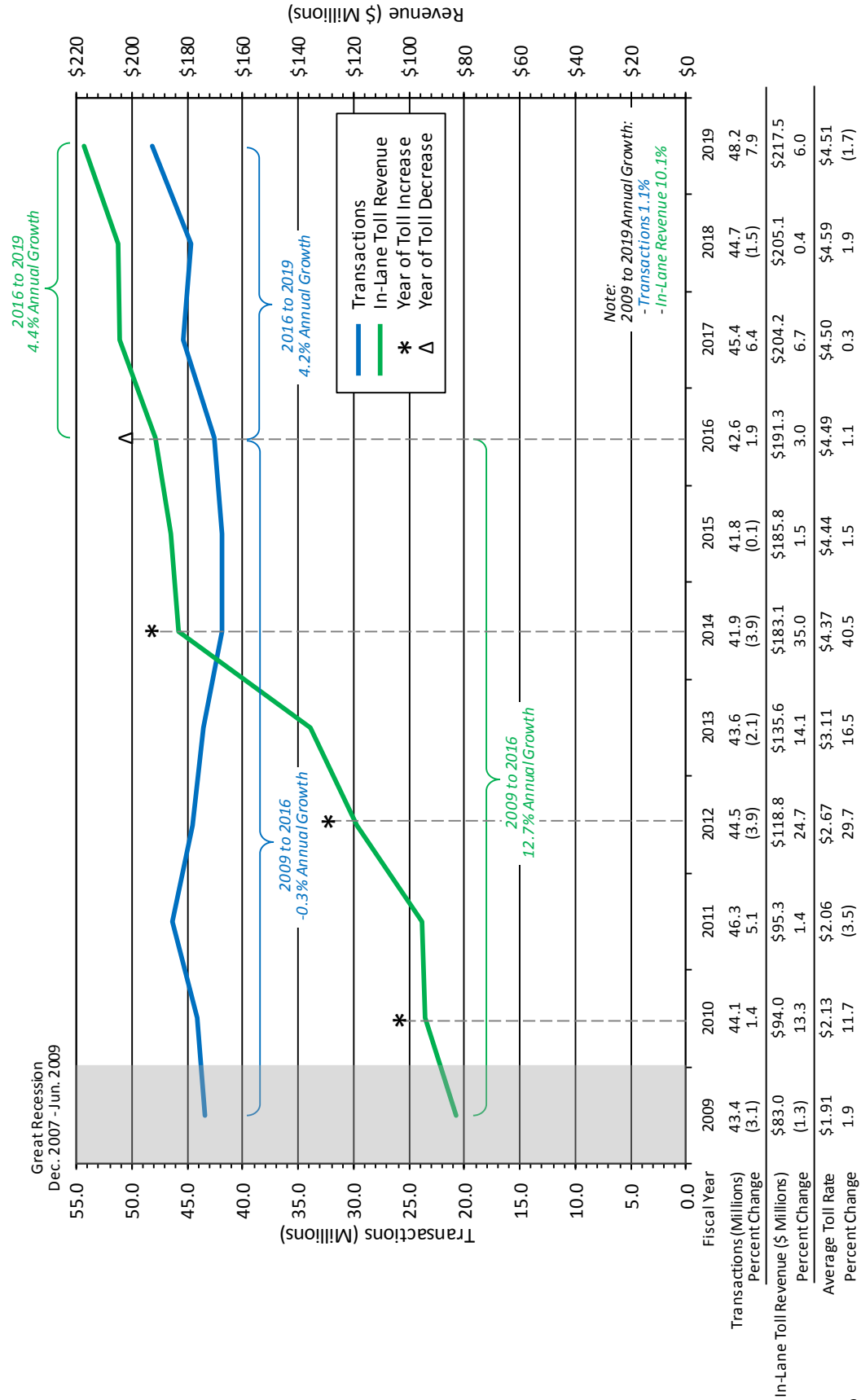


Figure 2-4
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Fort McHenry Tunnel



result of traffic diversions from the Canton Viaduct Replacement project at the BHT. The 48.2 million transactions represented an approximate annualized increase of 10,000 vehicles per day over FY 2018 volumes, representing approximately 50 percent of the traffic diverted from the BHT. Discounting the temporary traffic diversions, transactions grew by a modest average of 0.3 percent per year between FY 2009 and FY 2018.

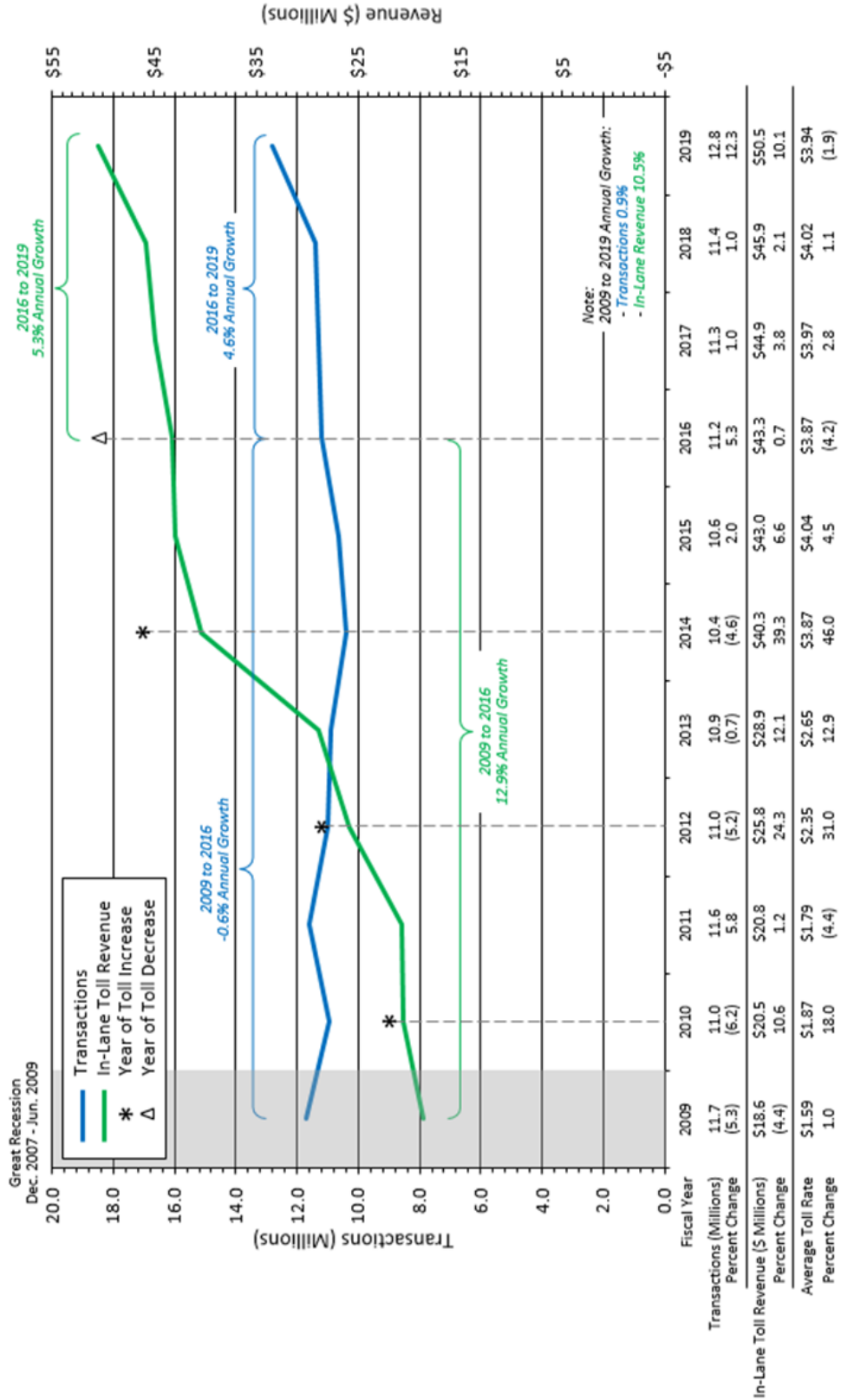
In-Lane Toll Revenue has continually grown during the last 10 years, with minor decline in FY 2009. Revenues were \$83.0 million in FY 2009, a 1.3 percent decrease over FY 2008. Since FY 2009, aided by a series of toll increases, revenues have grown at an average rate of 12.7 percent, reaching \$191.3 million in FY 2016. Like the Baltimore Harbor Tunnel, construction activities have impacted the distribution of vehicles by class and method of payment. This is evidenced by the changes in the facility's average toll rate in FY 2018 and FY 2019. 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 2019 was 4.4 percent. Discounting the temporary revenue increase associated with traffic diversions from the BHT's Canton Viaduct Replacement project, average annual In-Lane Toll Revenue growth was 10.6 percent per year between FY 2009 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 2009 and FY 2019 are provided in Figure 2-5. In FY 2009, transactions declined by 5.3 percent 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 5.3 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 FY 2019, transactions increased by 12.3 percent to 12.8 million as some BHT customers diverted to the FSK to avoid construction-related delays from the Canton Viaduct Replacement project. The 12.8 million transactions represented an approximate annualized increase of 4,000 vehicles per day over FY 2018 volumes, representing approximately 20 percent of the traffic diverted from the BHT. Discounting the temporary traffic diversions, transactions declined by an average of 0.3 percent per year between FY 2009 and FY 2018.

Following a 4.4 percent decrease in In-Lane Toll Revenue in FY 2009, a result of the Great Recession, revenues have grown steadily from \$18.6 million in FY 2009, reaching \$50.5 million in FY 2019. The recent growth is primarily due to a series of toll increases, an increasing percentage of commercial vehicles, and traffic diversions from BHT-related construction. Discounting the FY 2019 revenue related to temporary traffic diversions, 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 10.5 percent between FY 2009 and FY 2018.

Figure 2-5
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Francis Scott Key Bridge



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 2009 and FY 2019 are provided in Figure 2-6. Transactions declined 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. Transactions increased by 0.5 percent in FY 2019. Between FY 2016 and FY 2019, transactions increased by an average of 0.8 percent. Over the 10-year period from FY 2009 to FY 2019, transactions increased by 0.6 percent per annum.

In-Lane Toll Revenue decreased by 4.0 percent in FY 2009 to \$32.5 million. The decrease was related to the impacts associated with the Great Recession. Between FY 2009 and FY 2016, revenue grew 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 37.5 percent and all other toll rates were reduced by 33.3 percent. Revenue increased to \$53.7 million in FY 2019, representing a 0.6 percent increase over FY 2018. While revenue has grown at a modest rate of 0.6 percent per annum between FY 2016 and FY 2019, the longer-term growth between FY 2009 and FY 2019 has been 5.2 percent.

2.2.8 Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge

Historical transaction and revenue data for the Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge between FY 2009 and FY 2019 are provided in Figure 2-7. Transactions declined 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 10 years. This decrease was likely the result of increases in gasoline prices. Transactions decreased by 0.3 percent in FY 2019, negatively impacted by the effects of Hurricane Florence in September 2018 and a severe winter storm in late February 2019. Average annual transaction growth was -0.1 percent between FY 2009 and FY 2019.

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 3.4 percent in FY 2008 and 3.1 percent in FY 2009, respectively. Revenues have recovered in recent years, aided by series of toll increases. From FY 2009 to FY 2016 revenues have grown by an average annual rate of 11.7 percent to \$21.2 million. 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 a reduction in total transactions, but increased by 1.1 percent to \$21.0 million in FY 2019.

Figure 2-6
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
William Preston Lane Jr. Memorial (Bay) Bridge

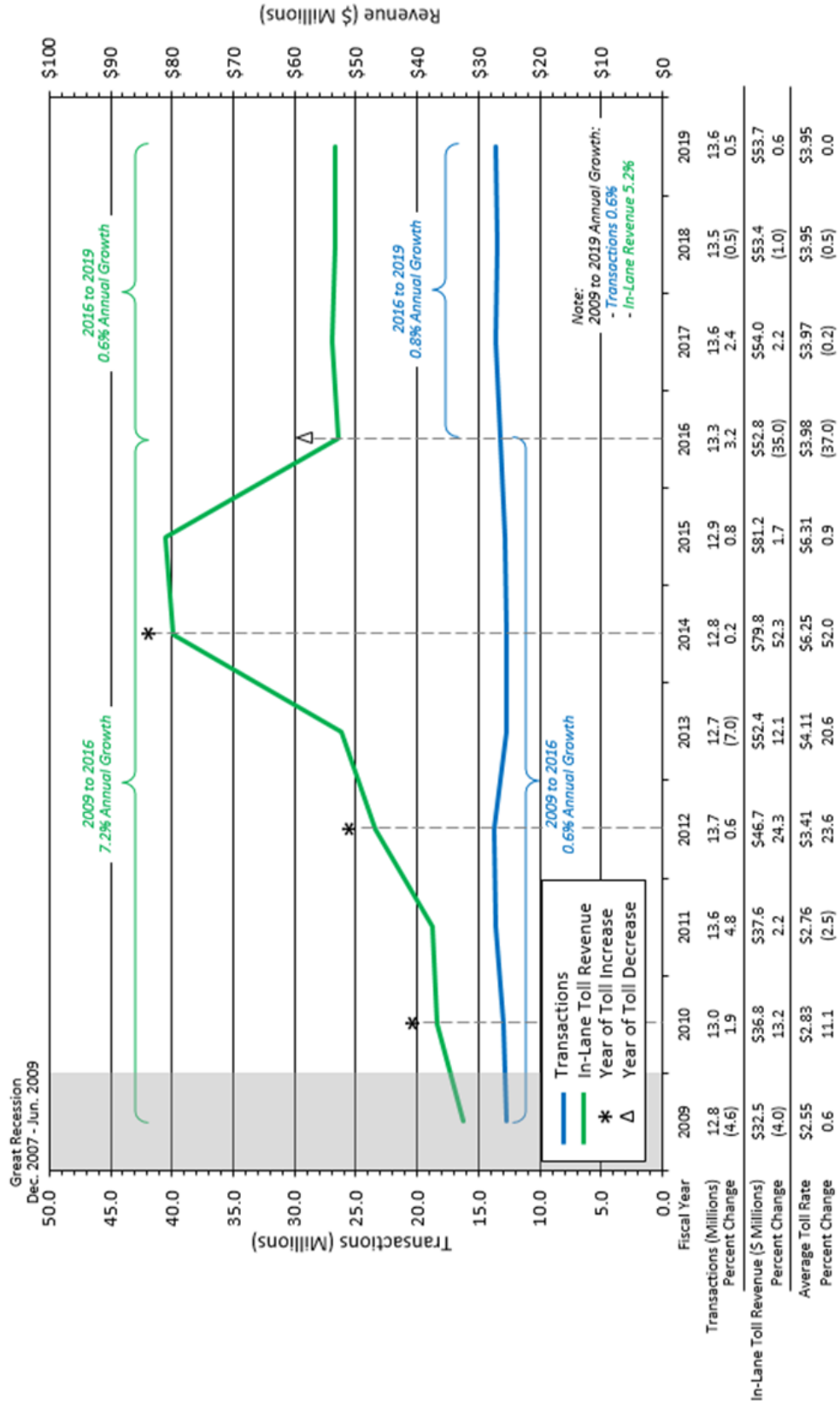
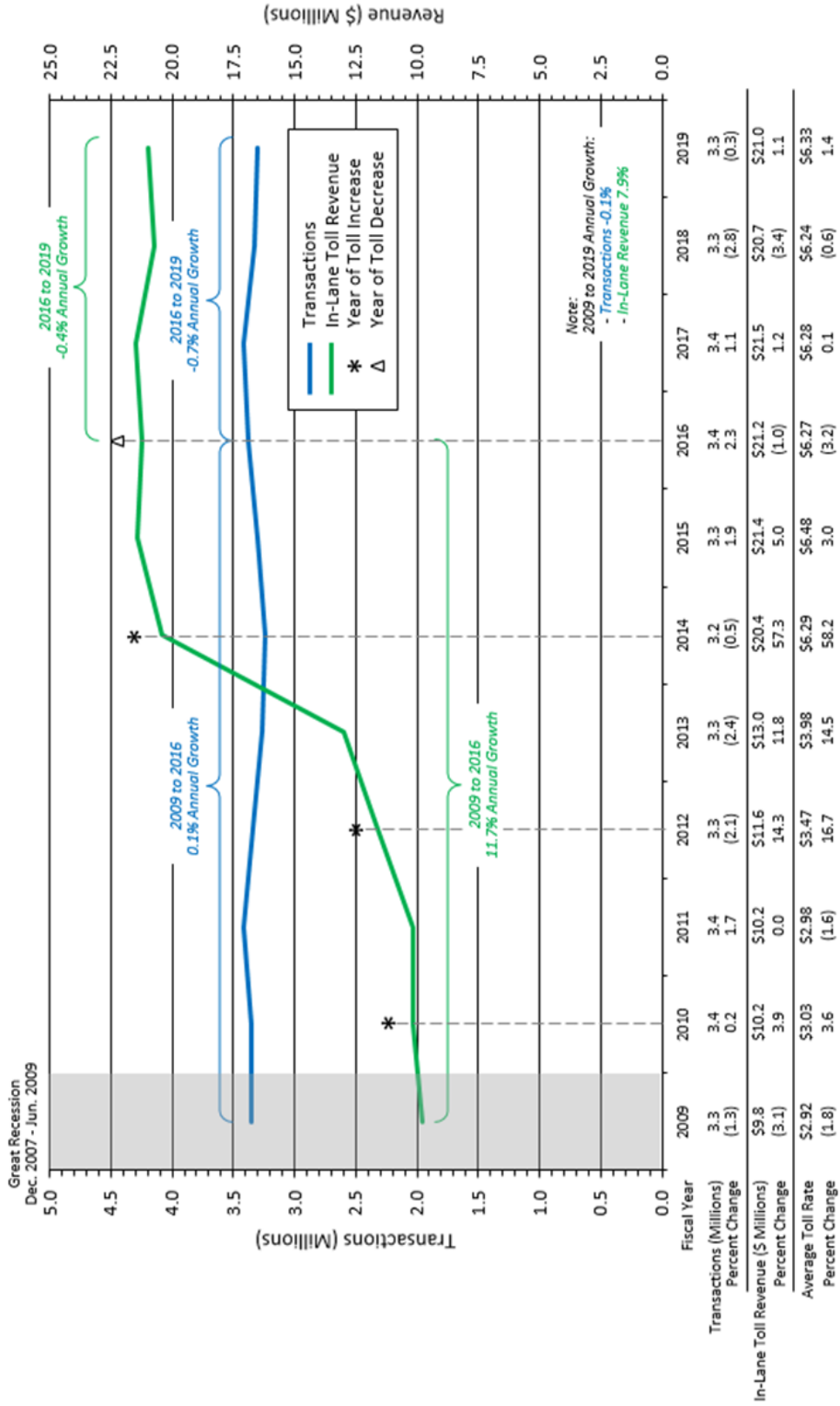


Figure 2-7
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge



2.2.9 MDTA Legacy Facilities Total

Transaction and revenue data for the Legacy system from FY 2009 to FY 2019 are provided in Figure 2-8. Systemwide transactions declined during the 18 months of the Great Recession (December 2007 to June 2009), which is evidenced by the largest decline during that period of 2.9 percent in FY 2009. Following a recovery in FY 2011, where system transactions of 121.5 million exceeded the pre-recession high of 120.1 million in FY 2007, transactions decreased annually through FY 2014. The decreases through FY 2014 to 112.5 million transactions were likely the result of toll increases implemented in FY 2012 and FY 2014. More recently, 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 2.8 percent in FY 2015, 2.9 percent in FY 2016, and 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. With continuing major construction projects, most notably the Canton Viaduct Replacement at the Baltimore Harbor Tunnel, systemwide transactions declined by 2.0 percent in FY 2019. It is believed that the majority, if not all, of the decline can be explained by customers whose trips could not be easily accommodated at one of the other two MDTA-operated Baltimore Harbor crossings and therefore, have opted to defer some trips and/or have taken alternative toll-free routes to avoid construction-related delays at the BHT. Longer-term average annual transaction growth was 0.2 percent between FY 2009 and FY 2019. Excluding the temporary construction impacts in FY 2019, longer-term average annual growth would more likely been 0.5 percent per annum.

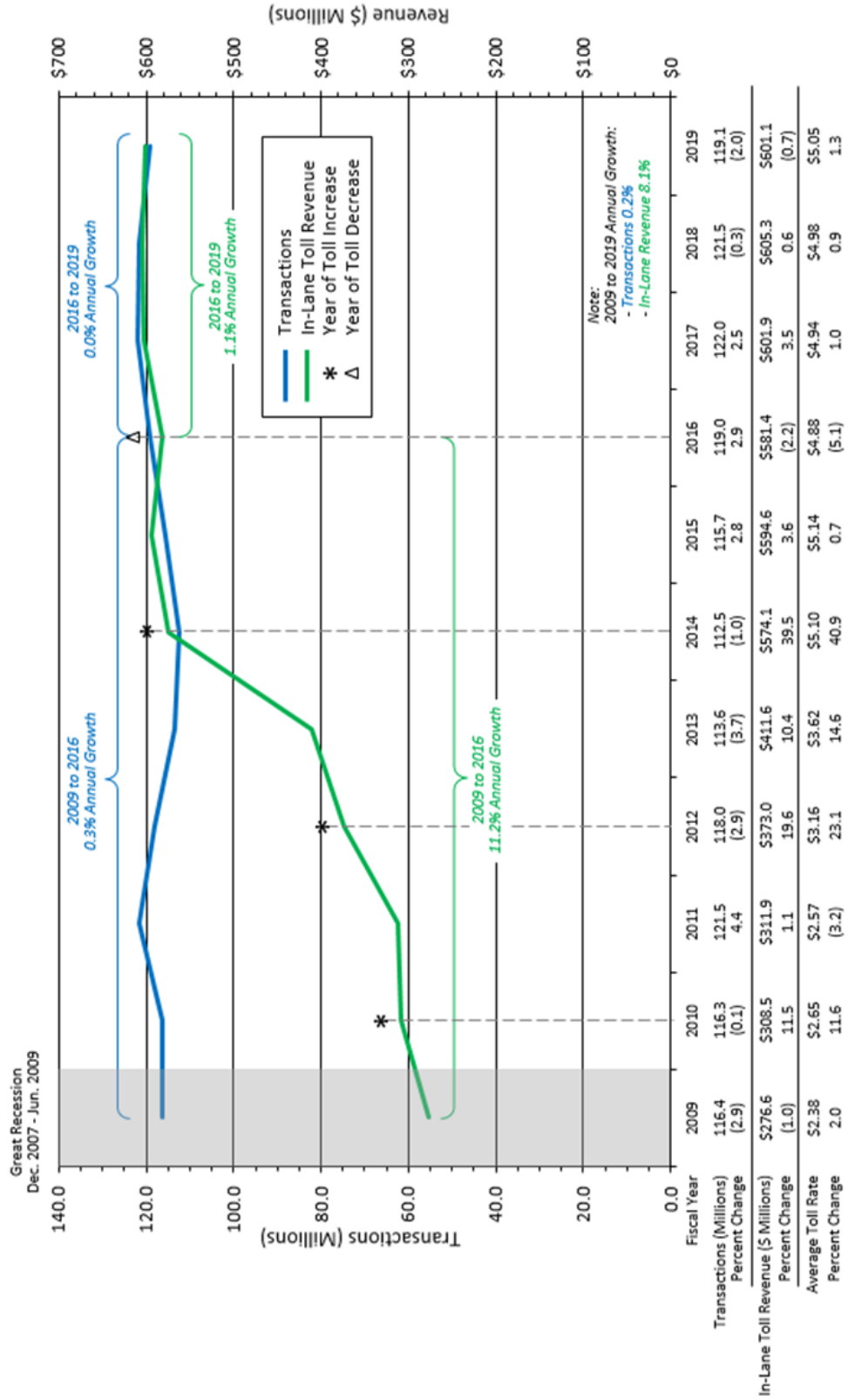
Systemwide In-Lane Toll Revenue increased each year between FY 2009 and FY 2019, except for fiscal years 2009, 2016 and 2019. Because of the decreases in transaction growth related to the Great Recession, revenues declined by 1.0 percent in FY 2009. Revenue then recovered, aided by toll increases in FY 2010, FY 2012 and FY 2014. In FY 2016, principally the result of select toll rate reductions, the majority of which were at the Bay Bridge, revenue decreased by 2.2 percent to \$581.4 million. However, even with this decrease, the average annual growth in revenue between 2009 and 2016 was 11.2 percent. 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. In FY 2019, In-Lane Toll Revenue decreased by 0.7 percent, which was primarily the result of trips deferred or made on non-tolled alternative routes to avoid construction-related delays at the BHT. Annual In-Lane Toll Revenue growth has averaged 8.1 percent per annum between FY 2009 and FY 2019.

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 2019 for each of the Legacy facilities and on a total system basis. Two-axle vehicles, which include

Figure 2-8
Historical Transactions and In-Lane Toll Revenue, FY 2009 through FY 2019
Legacy System



passenger cars, motorcycles, vans and SUVs, comprised 92.2 percent of all transactions. Vehicles with three-or-more-axles, which include trucks, buses and other commercial vehicles, accounted for the remaining 7.8 percent. The John F. Kennedy Memorial Highway (I-95) had the greatest percentage of commercial vehicle transactions with 12.4 percent, while the Baltimore Harbor Tunnel had the lowest percentage with 2.8 percent of total transactions.

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

Vehicle Class	FY 2019 Transactions (000) ⁽¹⁾							Total
	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 Memorial/Thomas "Mac" Middleton Bridge	
2-Axle	13,316	4,869	20,254	11,674	43,955	12,706	3,104	109,878
Percent of Total	87.6	95.7	97.2	91.0	91.1	93.5	93.6	92.2
3+-Axle	1,889	220	585	1,153	4,292	887	211	9,236
Percent of Total	12.4	4.3	2.8	9.0	8.9	6.5	6.4	7.8
Total	15,205	5,089	20,839	12,827	48,247	13,593	3,315	119,113
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 2019 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 77.3 percent of all transactions, an increase of 2.2 percent over the prior year. Of these, 73.2 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 93.8 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 Governor Harry W. Nice Memorial/Senator Thomas "Mac" Middleton Bridge had the smallest percentage of E-ZPass® transactions at 61.4 percent. On a total system basis, cash transactions accounted for a combined 20.0 percent of all transactions, a decrease of 2.1 percent over FY 2018. Transactions made by non-revenue vehicles accounted for 1.1 percent of all transactions, while video transactions accounted for 1.7 percent.

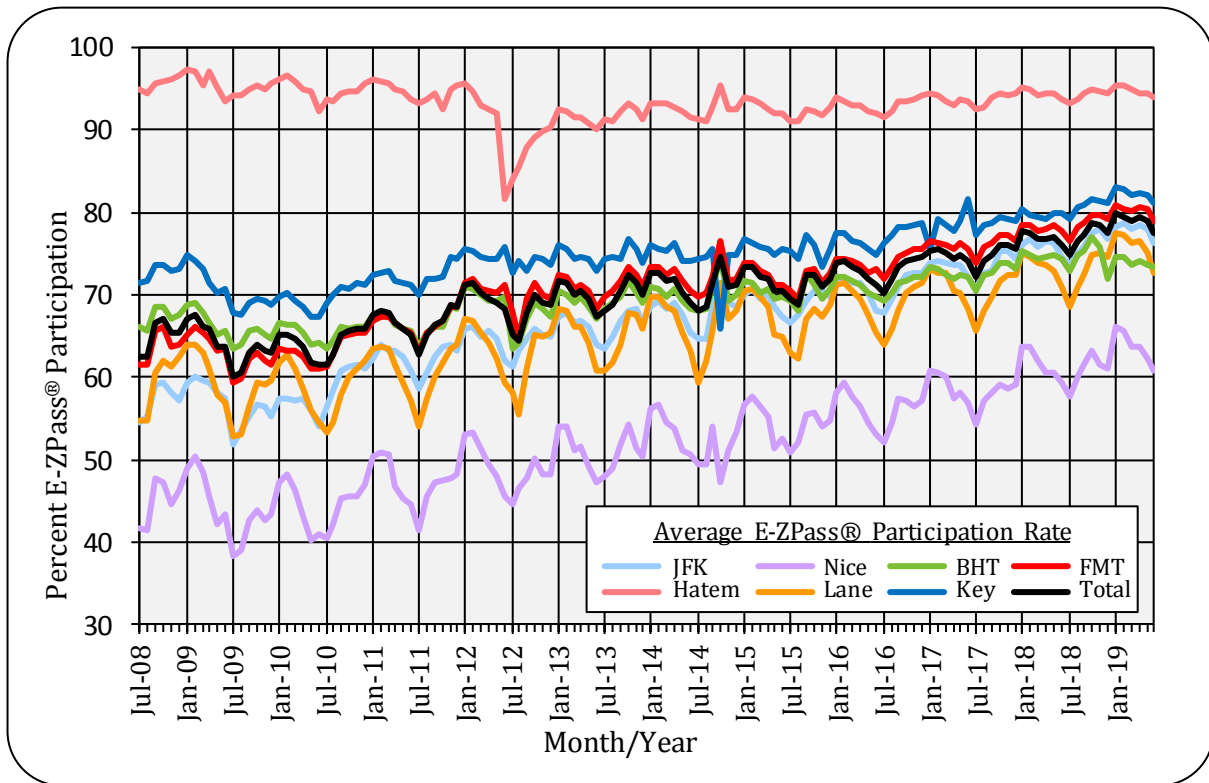
While Table 2-7 presents a snapshot of the FY 2019 E-ZPass® market share, Figure 2-9 provides a graphic summary for each of the seven Legacy facilities and the system from July 2008 through June 2019. As shown, the E-ZPass® market share has gradually increased from approximately 65 percent in FY 2010 to 77 percent in FY 2019. Less than one in four (21.7 percent) transactions were made by customers that still preferred the cash and video toll payment options.

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

Method of Payment	FY 2019 Transactions (000)										Total	
	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	Gov. Harry W. Nice Memorial/Sen. Thomas "Mac" Middleton Bridge					
E-ZPass												
Commuter / Shopper / Hatem Plans	699	4,140	5,259	5,130	12,161	2,971	699					31,059
Percent of Total	4.6	81.3	25.2	40.0	25.2	21.9	21.1					26.1
MD (2-axle and 3+-axle)	4,190	370	6,044	4,446	15,602	4,946	757					36,355
Percent of Total	27.6	7.3	29.0	34.7	32.3	36.4	22.8					30.5
Non-MD (2-axle and 3+-axle)	6,745	264	4,037	692	10,292	2,070	579					24,679
Percent of Total	44.4	5.2	19.4	5.4	21.3	15.2	17.5					20.7
Total E-ZPass	11,634	4,774	15,340	10,268	38,055	9,987	2,036					92,093
Percent of Total	76.5	93.8	73.6	80.1	78.9	73.5	61.4					77.3
Cash												
2-axle and 3+-axle	3,285	247	4,755	2,079	8,885	3,328	1,205					23,785
Percent of Total	21.6	4.9	22.8	16.2	18.4	24.5	36.4					20.0
Non-Revenue												
Official Duty	92	39	285	261	429	110	36					1,252
Percent of Total	0.6	0.8	1.4	2.0	0.9	0.8	1.1					1.1
Video												
Video	195	28	460	218	878	167	38					1,984
Percent of Total	1.3	0.5	2.2	1.7	1.8	1.2	1.2					1.7
Total	15,205	5,089	20,839	12,827	48,247	13,593	3,315					119,113
Percent of Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0					100.0

Source: Schedule of Toll Transactions for FY 2019, 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 includes 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:

- United States Census Bureau (Census)
- United States Bureau of Labor Statistics (BLS)
- United States Bureau of Economic Analysis (BEA)
- Energy Information Administration (EIA)
- Maryland State Data Center (MD SDC)⁽¹⁾
- Woods & Poole Economics, Inc., 2019 (WP19)⁽²⁾
- 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 are presented by respective variable for years 2000, 2005, 2010, and 2018, with corresponding CAAGRs between such years. Subsequent forecasts are in five-year increments from 2018 through 2033. Aggregate historical (2000 to 2018) and forecast (2018 to 2033) growth rates are also discussed.

3.2 Socioeconomic Variables

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

⁽¹⁾ Woods & Poole Economics, Inc. Washington, D.C. Copyright 2019. Complete Economic and Demographic Data Source (CEDDS).

⁽²⁾ Woods & Poole Economics, Inc. Washington, D.C. Copyright 2019. Complete Economic and Demographic Data Source (CEDDS).

**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, 2019 Moody's, July 2019 MD SDC, August 2017
Employment	Persons	Bureau of Economic Analysis Bureau of Labor Statistics	Woods & Poole, 2019 Moody's, July 2019 MD SDC, January 2015
Unemployment	Percentage	Bureau of Labor Statistics	CBO, January 2019 FOMC, June 2019 OMB, March 2019 Moody's, July 2019
Real Income/Capita	2012 Dollars	Woods & Poole, 2019	Woods & Poole, 2019 Moody's, July 2019 MD SDC, January 2015
Real GRP	2012 Dollars	Bureau of Economic Analysis Woods & Poole, 2019	CBO, January 2019 FOMC, June 2019 OMB, March 2019 Moody's, July 2019 Woods & Poole, 2019
Inflation	Annual % Δ	Bureau of Labor Statistics	CBO, January 2019 FOMC, June 2019 OMB, March 2019 Moody's, July 2019
Fuel Prices	Price per Gallon, Price per Barrel	Energy Information Administration	Moody's, July 2019

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 over 327 million in 2018, an average growth of 0.8 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 0.2 percent per year.

Maryland population grew by over 0.75 million from almost 5.3 million in 2000 to over 6.0 million in 2018, or 0.7 percent annually. The largest region in the State, Baltimore, grew at 0.5 percent annually, while Southern Maryland grew 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 0.3 percent in Western Maryland.

Forecast – As shown in Table 3-3, WP19 forecasts US population growth to continue at about 0.7 percent per annum over the next fifteen years, while Moody's forecasts a slower growth rate of 0.6

Table 3-2
Historical Population

Geography	Population				CAAGR			
	2000	2005	2010	2018	2000-2005	2005-2010	2010-2018	2000-2018
United States	281,421,906	295,516,599	308,745,538	327,167,434	1.0%	0.9%	0.7%	0.8%
Mid Atlantic	39,671,861	40,234,574	40,872,375	41,257,789	0.3%	0.3%	0.1%	0.2%
South Atlantic	51,769,160	56,145,779	59,777,037	65,322,408	1.6%	1.3%	1.1%	1.3%
Maryland	5,296,486	5,592,379	5,773,552	6,042,718	1.1%	0.6%	0.6%	0.7%
Baltimore	2,512,431	2,599,352	2,662,691	2,752,538	0.7%	0.5%	0.4%	0.5%
Lower Eastern Shore	186,608	199,904	209,275	212,691	1.4%	0.9%	0.2%	0.7%
Southern Maryland	281,320	321,725	340,439	366,170	2.7%	1.1%	0.9%	1.5%
Upper Eastern Shore	209,295	229,249	239,951	242,732	1.8%	0.9%	0.1%	0.8%
Washington Suburban	1,870,133	1,996,003	2,068,582	2,217,523	1.3%	0.7%	0.9%	1.0%
Western Maryland	236,699	246,146	252,614	251,064	0.8%	0.5%	-0.1%	0.3%

Source: United States Census Bureau

percent. Similarly, Moody's Mid-Atlantic growth forecast of 0.0 percent is lower than the WP19 estimate of 0.2 percent. However, both Moody's and WP19 South Atlantic annual forecasts hover around 0.9 percent (depending on 5-year increment).

WP19 forecasts similar aggregate (year 2018 to 2033) Maryland statewide population annual growth relative to MD SDC, both at 0.6 percent, as shown by five-year increments in Table 3-3. Both sources foresee the highest growth rates in Southern Maryland (1.0% by WP, 1.2% for MD SDC). Regarding the two metro areas, WP19 forecasts slightly higher annual growth rates than MD SDC in Baltimore (0.5% versus 0.4%) and Washington Suburban (0.7% versus 0.6%).

Table 3-3
Forecast Population

Geography	WP19			Moody's			MD SDC		
	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033
United States	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%	-	-	-
Mid Atlantic	0.3%	0.2%	0.2%	0.0%	0.0%	0.0%	-	-	-
South Atlantic	1.0%	1.0%	0.9%	1.0%	1.0%	0.9%	-	-	-
Maryland	0.6%	0.6%	0.5%	-	-	-	0.6%	0.6%	0.5%
Baltimore	0.5%	0.5%	0.4%	-	-	-	0.4%	0.3%	0.3%
Lower Eastern Shore	0.6%	0.5%	0.5%	-	-	-	0.9%	0.9%	0.8%
Southern Maryland	1.0%	1.0%	1.0%	-	-	-	1.2%	1.3%	1.1%
Upper Eastern Shore	0.6%	0.6%	0.6%	-	-	-	0.9%	1.1%	1.0%
Washington Suburban	0.7%	0.6%	0.6%	-	-	-	0.6%	0.7%	0.6%
Western Maryland	0.2%	0.2%	0.2%	-	-	-	0.8%	0.8%	0.6%

Source: Woode and Poole Economics 2019, Moody's Economics, and the Maryland State Data Center

3.2.2 Employment

Historical – BEA employment data through year 2017⁽³⁾ was extrapolated to year 2018 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 (2010-2018). Overall, the South Atlantic Region experienced average annual growth in employment of about 1.4 percent between 2000 and 2018, 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.

⁽³⁾ BEA had not published year 2018 data as of August 2019.

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 was slightly faster than total population growth (1.1% vs. 0.7%, respectively). 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 0.4 percent per year, while Southern Maryland saw the fastest rate of employment growth at 1.5 percent per annum.

Table 3-4
Historical Employment

Geography	Employment				CAAGR			
	2000	2005	2010	2018	2000-2005	2005-2010	2010-2018	2000-2018
United States	165,370,800	172,338,400	172,901,700	199,136,506	0.8%	0.1%	1.8%	1.0%
Mid Atlantic	22,078,410	22,699,340	23,086,139	25,622,592	0.6%	0.3%	1.3%	0.8%
South Atlantic	30,519,464	32,913,494	32,872,117	38,900,009	1.5%	0.0%	2.1%	1.4%
Maryland	3,092,125	3,310,820	3,345,423	3,744,575	1.4%	0.2%	1.4%	1.1%
Baltimore	1,526,365	1,603,038	1,623,510	1,833,039	1.0%	0.3%	1.5%	1.0%
Lower Eastern Shore	110,743	118,255	114,129	120,936	1.3%	-0.7%	0.7%	0.5%
Southern Maryland	125,653	144,426	150,327	164,886	2.8%	0.8%	1.2%	1.5%
Upper Eastern Shore	99,981	114,578	115,179	126,247	2.8%	0.1%	1.2%	1.3%
Washington Suburban	1,098,196	1,192,633	1,206,184	1,359,264	1.7%	0.2%	1.5%	1.2%
Western Maryland	131,187	137,890	136,094	140,237	1.0%	-0.3%	0.4%	0.4%

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

Forecast – National employment growth is projected to average 1.2 percent per year through 2033 according to WP19, while Moody's Analytics expects annual growth of less than half that, at 0.5 percent, as shown by five-year increments in Table 3-5. According to Moody's, South Atlantic Region growth (0.7 percent) is expected to outperform both the Nation (0.6 percent) and the Mid-Atlantic Region (0.3 percent). Similar relative growth is forecast by WP19, with South Atlantic growth exceeding the Nation and the Mid Atlantic. The forecasts call for higher growth than the recessionary period (2005-2010), but below those in the recent post-recessionary period (2010-2018).

According to the MD SDC, statewide employment growth is forecasted to fall from 0.8 percent (year 2018 to 2023) to 0.5 percent (year 2028 to 2033), as shown in Table 3-5. Comparatively, WP19 forecasts statewide growth at 1.2 percent and 1.0 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.

Table 3-5
Forecast Employment

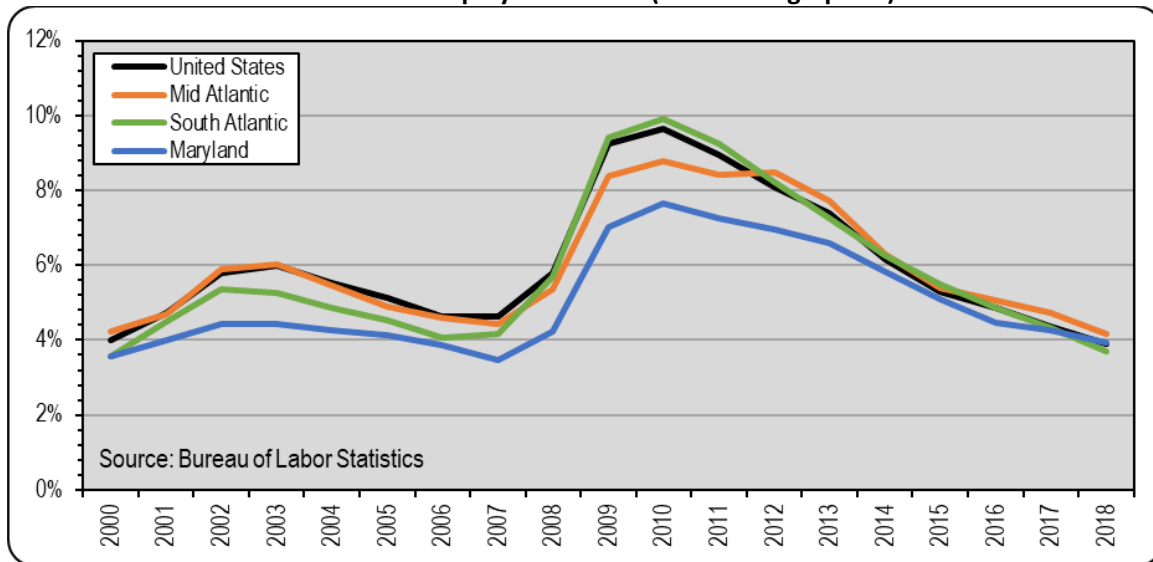
Geography	WP19			Moody's			MD SDC		
	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033
United States	1.3%	1.2%	1.1%	0.6%	0.6%	0.5%	-	-	-
Mid Atlantic	1.1%	1.0%	0.8%	0.3%	0.2%	0.0%	-	-	-
South Atlantic	1.5%	1.4%	1.3%	0.7%	0.7%	0.6%	-	-	-
Maryland	1.2%	1.1%	1.0%	-	-	-	0.8%	0.6%	0.5%
Baltimore	1.3%	1.2%	1.1%	-	-	-	0.8%	0.5%	0.4%
Lower Eastern Shore	1.0%	0.9%	0.8%	-	-	-	0.9%	0.6%	0.5%
Southern Maryland	1.4%	1.3%	1.3%	-	-	-	1.3%	0.9%	0.7%
Upper Eastern Shore	1.3%	1.2%	1.1%	-	-	-	1.2%	0.8%	0.6%
Washington Suburban	1.1%	1.0%	0.9%	-	-	-	0.9%	0.6%	0.5%
Western Maryland	0.8%	0.7%	0.6%	-	-	-	0.9%	0.6%	0.4%

Source: Woode and Poole Economics 2019, 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 2018 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 2018. In fact, the national unemployment rate dropped to 3.3 percent in April 2019, a national monthly unemployment rate (not seasonally adjusted) that has not been observed since 1969.

Figure 3-2
Historical Unemployment Rates (Macro Geographies)



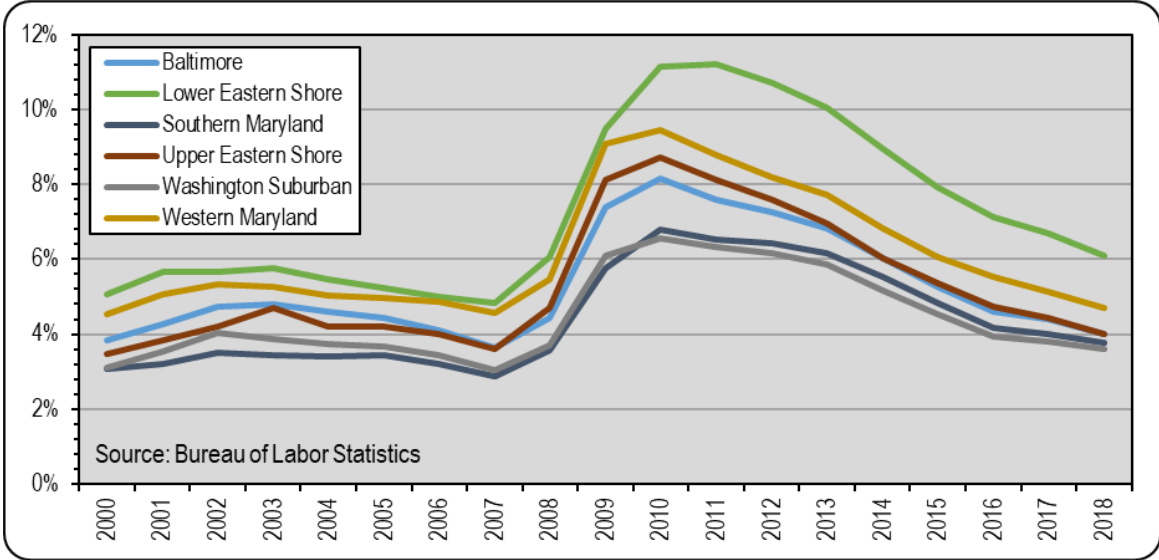
Sub-state annual unemployment rates track similar to one another, as well as to the national and multi-state regions. Figure 3-3 presents annual unemployment rates over the 2000 through 2018 period, based on BLS data. Of these, the Lower Eastern Shore are highest, and lag the other regions. Unemployment rates spiked in 2010, ranging from 6.5 percent in Washington Suburban to 11.1 percent along the Lower Eastern Shore. After which, unemployment rates improved steadily through 2018 ranging between a low of 3.6 percent (Washington Suburban) to 6.1% along the Lower Eastern Shore.

Forecast – 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 2018 average rate of 3.9 percent to a low of between 3.6 percent (CBO) and 3.7 percent (Moody's) in year 2019. After 2019, unemployment rates are anticipated to increase and level-off between 4.0 and 5.0 percent (varies slightly by source) in the early 2020s, as shown in Figure 3-4. No source is forecasting a foreseeable problem in the labor market.

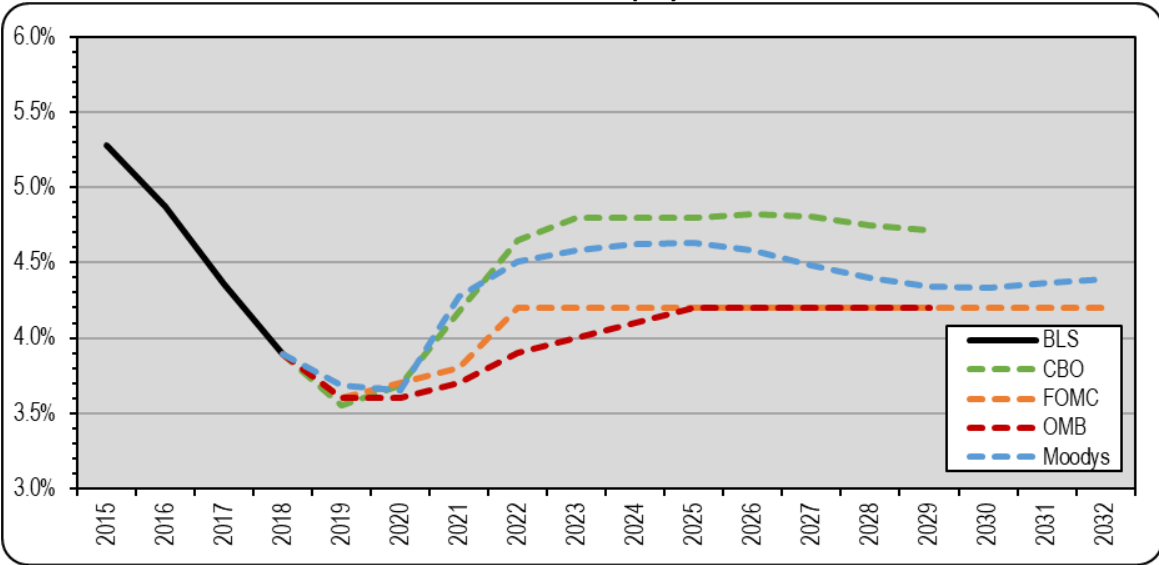
3.2.4 Real Income Per Capita

Historical – Historical real income per capita is presented in Table 3-6. Nationwide, per capita annual income stood at nearly \$49,500 (in 2012 constant dollars) in 2018, which represents real growth of 1.3 percent per annum during the 2000-2018 period. The corresponding income level in the South Atlantic Region is about \$3,000 less than the national average, and has grown at 1.6 percent per

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



**Figure 3-4
Forecast National Unemployment Rates**



annum since 2010, which is also below the national average. Per capita income levels are substantially higher in the Mid-Atlantic Region, averaging over \$9,000 per year more than the national average in 2018, and have also increased faster than the South Atlantic Region and the US average during the 2000-2018 period.

Historical per capita real income in Maryland stood at about \$57,900 in 2018 (in 2012 dollars), having increased by about 1.4 percent per year in real terms since 2000. The Washington Suburban level (\$63,900) unsurprisingly surpasses the statewide average, and Baltimore levels are on par with the statewide averages, as presented in Table 3-6. Per capita incomes in Western Maryland grew at the

relatively highest pace of 1.7 percent per year, but is nonetheless still the lowest real income per capita region in the state, at just \$41,300 in 2018.

Table 3-6
Historical Real Income Per Capita (2012\$)

Geography	Real Income per Capita				CAAGR			
	2000	2005	2010	2018	2000-2005	2005-2010	2010-2018	2000-2018
United States	\$39,186	\$41,295	\$42,364	\$49,448	1.1%	0.5%	2.0%	1.3%
Mid Atlantic	\$44,754	\$46,556	\$49,550	\$58,502	0.8%	1.3%	2.1%	1.5%
South Atlantic	\$37,973	\$41,141	\$40,801	\$46,415	1.6%	-0.2%	1.6%	1.1%
Maryland	\$45,469	\$50,330	\$52,100	\$57,897	2.1%	0.7%	1.3%	1.4%
Baltimore	\$44,120	\$48,680	\$50,745	\$57,068	2.0%	0.8%	1.5%	1.4%
Lower Eastern Shore	\$32,512	\$36,876	\$37,588	\$41,648	2.6%	0.4%	1.3%	1.4%
Southern Maryland	\$40,160	\$45,711	\$50,222	\$52,976	2.6%	1.9%	0.7%	1.6%
Upper Eastern Shore	\$40,227	\$44,676	\$45,200	\$50,856	2.1%	0.2%	1.5%	1.3%
Washington Suburban	\$51,856	\$57,047	\$58,278	\$63,914	1.9%	0.4%	1.2%	1.2%
Western Maryland	\$30,396	\$35,529	\$36,784	\$41,299	3.2%	0.7%	1.5%	1.7%

Source: Woods & Poole Economics, 2019

Forecast – According to WP19, US per capita real income is forecast to grow at an average annual rate of around 1.5 percent through 2023, then decelerate to 1.2 percent through 2033, (as shown in Table 3-7). Regional growth by WP19 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 1.8 percent from 2018 to 2023, and 2.0 percent thereafter through year 2032. Mid-Atlantic Region growth is forecast to be similar to both the national and the South Atlantic averages from both sources.

Maryland per capita real income is projected to grow through 2033 on-par with the recent past. WP19 and the MD SDC forecasts statewide growth of 1.3 and 1.0 percent annually through 2033, respectively, close to the average annual growth between 2010 to 2018. Both sources forecast a growth deceleration in growth after 2023, as shown in Table 3-7.

Table 3-7
Forecast Real Income Per Capita Growth

Geography	WP19			Moody's			MD SDC		
	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033
United States	1.5%	1.4%	1.2%	1.7%	1.7%	1.9%	-	-	-
Mid Atlantic	1.6%	1.5%	1.2%	1.5%	2.0%	2.0%	-	-	-
South Atlantic	1.6%	1.4%	1.2%	1.8%	2.0%	2.0%	-	-	-
Maryland	1.5%	1.3%	1.1%	-	-	-	1.4%	0.9%	0.8%
Baltimore	1.6%	1.5%	1.3%	-	-	-	1.5%	1.0%	0.8%
Lower Eastern Shore	1.5%	1.3%	1.0%	-	-	-	1.4%	0.9%	0.9%
Southern Maryland	1.3%	1.1%	0.9%	-	-	-	1.5%	1.0%	0.9%
Upper Eastern Shore	1.6%	1.4%	1.1%	-	-	-	1.5%	1.0%	0.8%
Washington Suburban	1.3%	1.1%	1.0%	-	-	-	1.2%	0.8%	0.7%
Western Maryland	1.6%	1.4%	1.1%	-	-	-	1.6%	1.0%	0.9%

Source: Woode and Poole Economics 2019, 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 1.9 percent annually from 2000-2018. The South Atlantic Region grew slightly slower, at 1.8 percent, while the Mid-Atlantic Region gross regional product (GRP) grew at a slower 1.4 percent. Annual growth rates are presented in five-year increments in Table 3-8. Maryland GRP, \$368 billion (in 2012\$) in 2018, grew 2.1 percent per annum from 2000 to 2018. All Maryland sub-state region

growth rates equaled or exceeded the national average except Western Maryland (1.3 percent), with Southern Maryland expanding at a more robust real annual rate of 3.0 percent.

Table 3-8
Historical Real GRP (millions of 2012\$)

Geography	Real GRP				CAAGR			
	2000	2005	2010	2018	2000-2005	2005-2010	2010-2018	2000-2018
United States	\$13,130,987	\$14,912,509	\$15,598,753	\$18,566,442	2.6%	0.9%	2.2%	1.9%
Mid Atlantic	\$2,098,264	\$2,272,605	\$2,408,543	\$2,703,730	1.6%	1.2%	1.5%	1.4%
South Atlantic	\$2,341,804	\$2,772,494	\$2,805,723	\$3,241,766	3.4%	0.2%	1.8%	1.8%
Maryland	\$250,982	\$305,993	\$327,235	\$367,915	4.0%	1.4%	1.5%	2.1%
Baltimore	\$126,854	\$153,527	\$165,465	\$189,786	3.9%	1.5%	1.7%	2.3%
Lower Eastern Shore	\$7,271	\$9,218	\$9,276	\$11,110	4.9%	0.1%	2.3%	2.4%
Southern Maryland	\$8,309	\$10,902	\$12,516	\$14,150	5.6%	2.8%	1.5%	3.0%
Upper Eastern Shore	\$6,043	\$8,088	\$8,699	\$10,044	6.0%	1.5%	1.8%	2.9%
Washington Suburban	\$94,274	\$114,757	\$121,793	\$132,395	4.0%	1.2%	1.0%	1.9%
Western Maryland	\$8,231	\$9,502	\$9,485	\$10,431	2.9%	0.0%	1.2%	1.3%

Source: Bureau of Economic Analysis and Woods & Poole Economics, 2019

Forecast – WP19 forecasts the US GDP growth rate to go from 1.9 percent between 2018 and 2023 to 1.7 percent between 2028 to 2033, as shown in Table 3-9. Moody's forecasts 2.3 percent per annum in the next five years, followed by 2.0 percent annually thereafter. Figure 3-5 depicts the annual growth in national real GDP from five sources, most of which generally exhibit decelerated growth following 2018, down to around 2.0 percent per annum (OMB as the exception, which projects continued optimistic growth around 3.0 per annum through 2029). Also, Moody's forecasts a slight acceleration/rebounded growth in the post-presidential election years (2021-2023).

According to WP19, Maryland's Statewide GRP growth is forecast to slightly lag US totals through year 2033. The Baltimore, Upper Eastern Shore, and Southern Maryland regions' GRP growth rates are projected to mirror the State, while the Washington Suburban, Lower Eastern Shore, and Western Maryland growth rates are expected to lag by 0.2 to 0.5 percentage points.

Table 3-9
Forecast Real GRP Growth

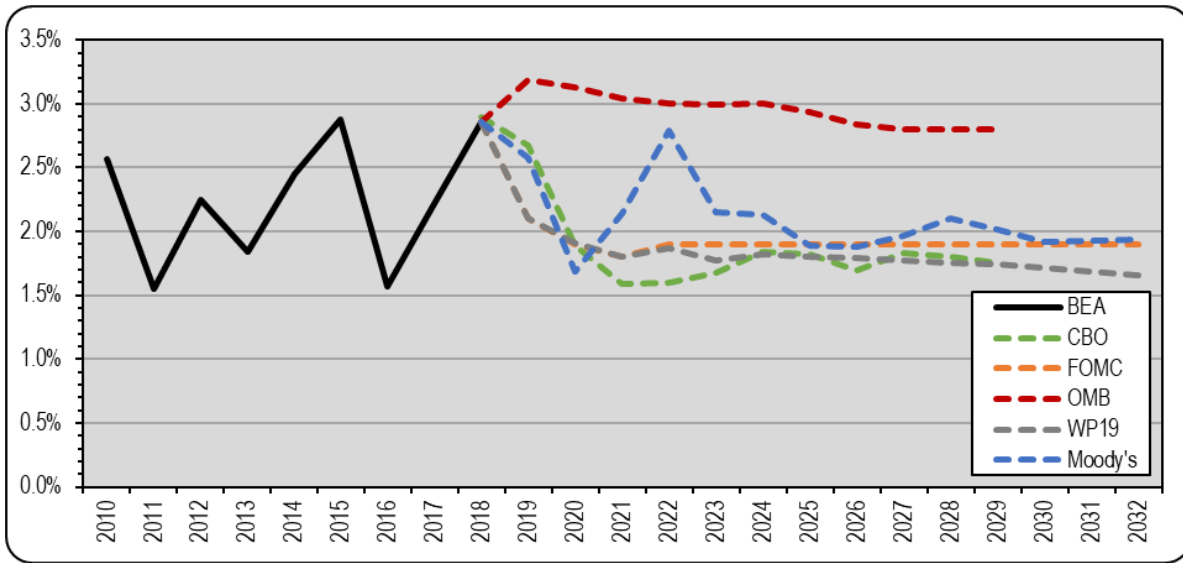
Geography	WP19			Moody's		
	2018-2023	2023-2028	2028-2033	2018-2023	2023-2028	2028-2033
United States	1.9%	1.8%	1.7%	2.3%	2.0%	2.0%
Mid Atlantic	1.8%	1.7%	1.5%	-	-	-
South Atlantic	2.1%	2.0%	1.9%	-	-	-
Maryland	1.8%	1.7%	1.6%	-	-	-
Baltimore	2.0%	1.8%	1.7%	-	-	-
Lower Eastern Shore	1.6%	1.5%	1.4%	-	-	-
Southern Maryland	1.7%	1.6%	1.5%	-	-	-
Upper Eastern Shore	1.9%	1.8%	1.7%	-	-	-
Washington Suburban	1.7%	1.6%	1.5%	-	-	-
Western Maryland	1.3%	1.2%	1.1%	-	-	-

Source: Woode and Poole Economics 2019 and Moody's Economics

3.2.6 Inflation

Historical – Inflation, as measured by the popular Consumer Price Index, fluctuated considerably between years 2000 to 2018, 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

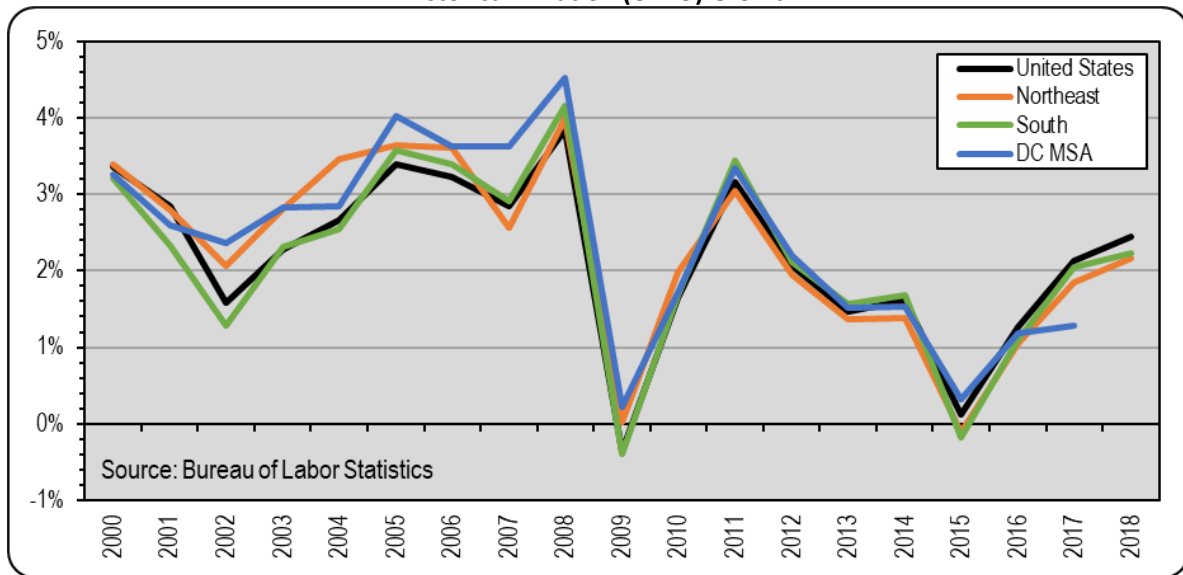
Figure 3-5
Forecast National Real GDP Growth



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, 2.1 percent in 2017, and 2.4 percent in 2018. Overall, US inflation averaged about 2.2 percent annually during the nineteen-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. In 2017, the DC Metro experienced a slightly lower annual inflation than the macro geographies. Year 2018 data is currently unavailable.

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



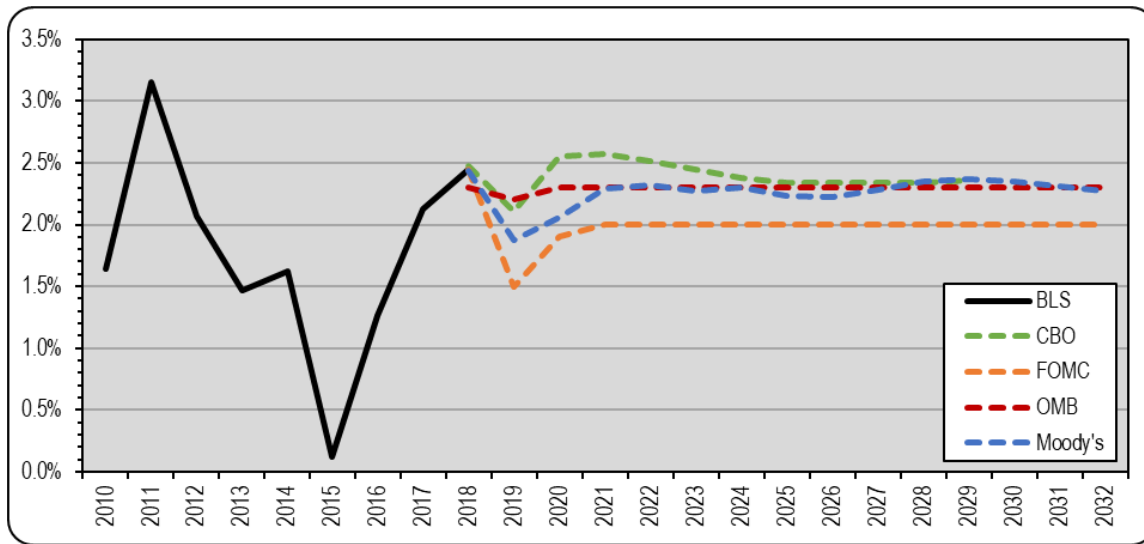
Forecast – Inflation is expected to inch downward in the near term (2019), per Figure 3-7, but needs to be monitored for potential medium- to longer-term increases. Further removal of spare capacity in the labor markets may lead to increased pressures on wages as markets tighten and approach full employment. 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 2019. 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⁽⁴⁾ and Lower Atlantic Region⁽⁵⁾), 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 \$3.00 per gallon since August 2015, and were at \$2.82 in July 2019.

Figure 3-7
Forecast National Inflation Growth



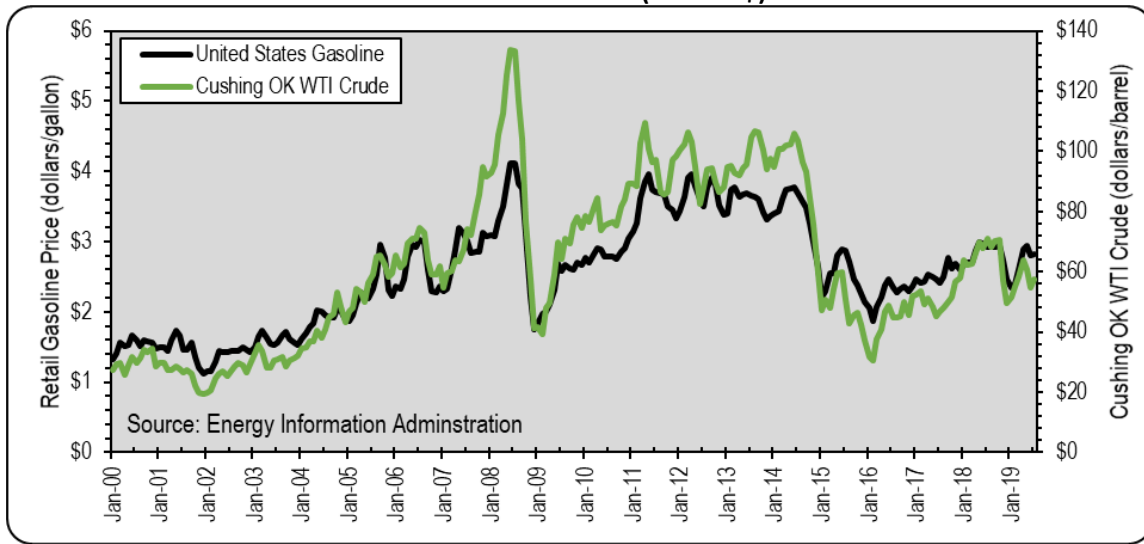
Retail gasoline prices are strongly influenced by larger trends in crude oil prices, which can be quite volatile and challenging to forecast. Since 2000, monthly crude oil prices (West Texas Intermediate [WTI] benchmark) fluctuated between \$19.39 (in December 2001) to \$133.88 per barrel (June 2008), as illustrated in Figure 3-8. A significant decline occurred from June 2014 (\$103.59) to February 2016 (\$30.32) but since rebounded to \$70 (\$67.87 in Summer 2018); in July 2019, it was \$57.35.

Forecasts – US retail gasoline prices, which hovered around \$2.68 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 2019) projection and the Energy Information Agency's 2019 Annual Energy Outlook (AEO2019).

⁽⁴⁾ Central Atlantic region includes: Delaware, District of Columbia, Maryland, New Jersey, New York and Pennsylvania.

⁽⁵⁾ Lower Atlantic region includes: Florida, Georgia, North Carolina, South Carolina, Virginia and West Virginia.

Figure 3-8
Historical Fuel Prices (Current \$)



In the longer term, annual prices are forecast diverge between the two sources. Moody's forecasts unchanged prices through 2023, and a slow-and-steady increase thereafter to just \$3.33 by 2032. Contrastingly, the AEO2019 forecast growth to \$4.75 in 2032, as illustrated in Figure 3-9. Per the preceding two figures, gasoline prices tend to be more volatile than average inflation trends and other commodity price swings, due to the unique international markets. As such there is inherent short-term uncertainty with gasoline forecasts; any major geopolitical shift can affect prices.

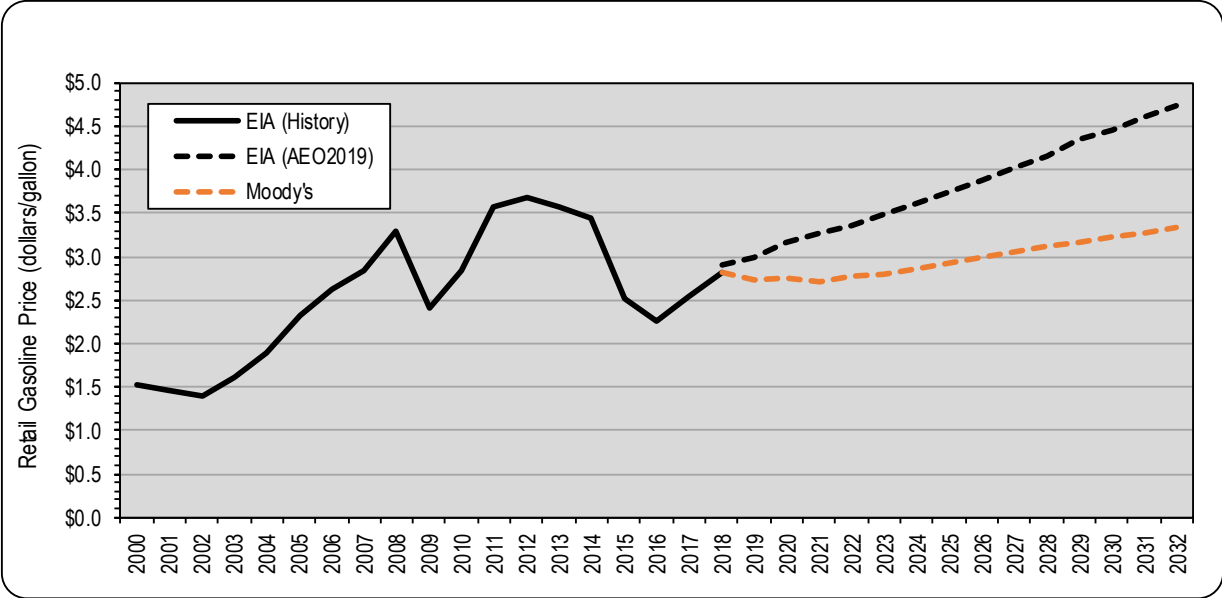
3.3 Summary of Risks and Conclusion

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. However, some socioeconomic data suggest decelerating growth patterns, which has greater potential for stalling and reversing course than under high growth periods. Within Maryland, the Southern sub-state planning region is projected to experience particularly strong growth amongst the analyzed geographies.

Considering the next few years, while labor markets, along with the larger economic activity measures continue to improve into 2019, uneven strengthening persists. Many risks also persist, such as the fragile economic landscapes of trading partners and trade wars (China, European, Asian, and Latin American), exacerbated threats of Middle East extremism, commodity fluctuations (especially gasoline), currency markets fluctuations, public sector fiscal difficulties and constraints. The current shorter-term growth is unsustainable, which eventually will be tempered by such persistent risk factors and other unknowns.

Considering the next decade, most credible forecasting agencies (both public and private) expect continued economic output, employment, and income expansion, accompanied by only moderate increases in gasoline prices and general inflation. 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.

Figure 3-9
Forecast Fuel Prices (Current \$)



However, the favorable factors behind the 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. The 10-year annual forecasts have been prepared by facility and vehicle category through FY 2029 and include monthly forecasts for FY 2020 and FY 2021.

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 2019. 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

Several toll rate and toll payment option changes were assumed in calculating the FY 2020 to FY 2029 forecasts presented later in this chapter. The changes and the assumed implementation dates are identified below:

- **New vehicle classes with lower rates** - Toll rates are assumed to be reduced by 50 percent for motorcycles, 25 percent for light vehicles towing a one-axle trailer, and 17 percent for light vehicles towing a two-axle trailer. Using the one-way non-MD E-ZPass®/cash toll as an example, the current \$4.00 toll for motorcycles would be reduced to \$2.00, the \$8.00 toll for light vehicles towing one-axle trailers would be reduced \$6.00, and the \$12.00 toll for light vehicles towing two-axle trailers would be reduced \$10.00. The same percentage reductions would apply to MD E-ZPass® and video toll transactions. These changes are assumed to be effective on September 1, 2020.
- **Pay-by-Plate** - This new payment method is assumed to allow tolls to be automatically billed to credit cards at the same rate as cash customers and is intended to benefit infrequent toll customers as well as those who do not wish to maintain a prepaid E-ZPass® balance. This option is assumed to be available on May 1, 2020.
- **Discount for early payment of video tolls** - This new payment method is assumed to provide video toll customers with a 15 percent discount if they pay their toll before their invoices are mailed. Because MDTA would not have to send a bill, these savings will be passed on to the customer. Using the one-way video toll as an example, the current \$6.00 video toll for a two-axle passenger car would be discounted to \$5.10, and the \$36.00 video toll for a 5-axle commercial vehicle would be discounted to \$31.00. This option is assumed to be available on May 1, 2020.

No other permanent toll rate changes have been assumed to occur during the forecast period. Note that, as described in Chapter 1, a temporary cashless tolling policy on Thursdays and Fridays from noon to 10 p.m. on the Bay Bridge will reduce video toll rates on this facility to the existing cash toll rate. This temporary policy is assumed to be effective during only the days and hours listed from October 2019 to April 2020. It is assumed that the Bay Bridge toll rates will return to typical rates on May 1, 2020 with the implementation of full, permanent cashless tolling on this facility.

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 from Maryland and the Baltimore region, were procured as a measure to reflect the relationship with trend of toll transactions on the Legacy facilities. Various historic and forecasted socioeconomic 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.

Econometric models were developed and used for the traffic growth forecasts in the March 2015 Legacy system Traffic and Revenue Study. The models 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 four 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. **Canton Viaduct Replacement (I-895)** - This project, extending from the tunnel to Interstate Avenue, is replacing the Canton Viaduct and ramp to Holabird Avenue. The overall project is scheduled to run from June 2018 to July 2021, with lane closures from late November 2018 to July 2021. As discussed in Section 4.1.1.4, this project is having significant impacts on all three MDTA Legacy facilities in Baltimore.
2. **Westbound Span of 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 on the westbound span from after Memorial Day weekend to before Labor Day weekend 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 closures overnight are also planned. Two-way operations on the westbound span may be used on Thursdays and Fridays when the facility is experiencing severe backups to reduce those backups, weather permitting.
3. **Eastbound Span of 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, with similar construction plans as the westbound span applied to the eastbound.

- 4. Francis Scott Key Bridge (I-695)** – This project involves replacing the deck of the approach spans of the bascule spans of both inner loop and outer loop bridges of the Curtis Creek bridge. The project is tentatively scheduled to begin in the spring of 2023. Construction will require long term closure of one direction of I-695 and placing contra flow traffic in the other travel direction. Once the deck replacement of the closed side is complete, traffic will be switched on to the completed deck while the other side will be closed to perform deck replacement. The estimated construction duration is 18 months.

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 negligible impacts on traffic and toll revenue.

4.1.1.4 Baltimore Harbor Tunnel (I-895) Construction Impacts

Additional analysis was conducted related to the Legacy 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 on I-895. As described in Project #1 above, lane closures related to the multi-year construction project, referred to as the Canton Viaduct Replacement or 895 Bridge Project, began in late November 2018. Due to the nature of the work, extensive maintenance of traffic (MOT) is ongoing. The MOT involves lane closures and traffic shifts which stretch through the Baltimore Harbor Tunnel (BHT), located just south of the Canton Viaduct. An analysis of recent traffic data has shown that significant traffic diversions from the BHT have occurred because of this project. These diversions have impacted MDTA revenues, particularly since it is estimated over 30 percent of the average annual daily traffic diverting from the BHT is not diverting to the Fort McHenry Tunnel or Francis Scott Key Bridge. These trips are now diverted to alternative non-tolled roads or are not made at all. More detail on the specific impact analysis results assumed are provided later in this chapter.

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, including the changes identified above, will be in effect throughout the forecast period;
6. For the purposes of this report, it is assumed that no toll rate or toll schedule adjustments will be made during the forecasting period other than those presented above;

7. Other than the conversion of the Thomas J. Hatem Memorial Bridge and the Francis Scott Key Bridge to all-electronic tolling in October 2019, permanent conversion of the remaining five Legacy facilities to all-electronic tolling has not been assumed to occur during the forecast period;
8. Annual revenue estimates are expressed in future year dollars (nominal);
9. No major recession, natural disasters or other significant exogenous events will occur that would significantly reduce travel in the region;
10. Population and employment growth will occur as presented in this study; and
11. 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 Impacts of Classification and Payment Type Toll Rate Changes

This section provides the impact results of the Pay-by-Plate program, motorcycle, and “light” new vehicle classes, and early payment of Pay-by-Invoice video tolls. The assumed toll rates and implementation schedules associated with these changes are described previously in this report. Other assumptions are listed below:

- **Pay-by-Plate:** A 12.5 percent share of total video tolls were assumed to be Pay-by Plate.
- **New Vehicle Classes:** Based on data collection results provided by MDTA, on the total system, 0.5 percent of the current 2-axle class were assumed to be motorcycles, 21.9 percent of current 3-axle vehicles were assumed to be “light” vehicles pulling trailers, and 37.1 percent of current 4-axle vehicles were assumed to be “light” vehicles pulling trailers.
- **Early Payment of Video Tolls:** A 25 percent share of remaining video tolls after Pay-by-Plate (25 percent of Pay-by-Invoice) were assumed to pay early.

The results of these impacts on a Legacy systemwide basis are provided in Table 4-1.

Table 4-1
Impact of Toll Rate Changes

Fiscal Year	Estimated Collected Revenue Impact (\$millions)			
	Pay-by-Plate	Early Pay	New Vehicle	Total Impact
		NOTD	Classes	
2020	\$ (0.65)	\$ (0.57)	\$ (2.40)	\$ (3.61)
2021	(0.65)	(0.57)	(2.41)	(3.64)
2022	(0.69)	(0.60)	(2.52)	(3.81)
2023	(0.69)	(0.60)	(2.54)	(3.83)
2024	(0.70)	(0.61)	(2.60)	(3.90)
2025	(0.70)	(0.61)	(2.60)	(3.91)
2026	(0.70)	(0.62)	(2.59)	(3.91)
2027	(0.71)	(0.62)	(2.60)	(3.93)
2028	(0.71)	(0.62)	(2.62)	(3.96)
2029	(0.71)	(0.63)	(2.63)	(3.97)
Total	\$ (6.91)	\$ (6.05)	\$ (25.51)	\$ (38.47)

4.3.2 Annual Transactions and In-Lane Toll Revenue by Facility

A summary of transactions and in-lane toll revenue forecasts from FY 2020 through FY 2029 for each of the seven MDTA Legacy facilities by passenger car and commercial vehicle classes is presented in this section in Tables 4-2 through 4-8. The forecasts were developed based a spreadsheet model and modeling process, which in addition to incorporating existing FY 2019 traffic as its base input, included estimated normal traffic growth, estimated traffic impacts from major construction projects on the Legacy facilities, adjustments for the new payment methods and classification changes, and impacts of cashless tolling at the Francis Scott Key and Hatem Memorial Bridges. 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.

4.3.2.1 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 4-2. The John F. Kennedy Memorial Highway processed 15.2 million transactions in FY 2019, a decrease of 1.9 percent over FY 2018. In-lane toll revenue decreased by 0.7 percent in FY 2019 from \$177.2 million in FY 2018 to \$176.0 million. Additionally, commercial vehicles, which accounted for roughly 12 percent of transactions in FY 2019, generated 44 percent of the revenue.

Between FY 2020 to FY 2029, transactions have been estimated to decrease in the near term due to the downward trend shown in the last few years, but have been forecasted to grow at 0.6 percent per annum over the nine-year period. By FY 2023, transactions are forecasted to have positive growth and return to normal growth, reaching 15.8 million in FY 2029. In-lane toll revenue has been forecasted to increase by 0.6 percent per annum from \$174.4 million in FY 2020 to \$183.6 million in FY 2029. This level of growth is consistent with the forecasted growth in transactions.

4.3.2.2 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 4-3. The Hatem Bridge processed just under 5.1 million transactions in FY 2019, exhibiting no growth over FY 2018 transactions of 5.1 million. In-lane toll revenue increased by 5.0 percent from \$11.6 million in FY 2018 to \$12.2 million in FY 2019. 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 decreased to 4.0 million in FY 2019, accounting for less than 80 percent of transactions, and commuter transactions decreased by 5.6 percent. This yielded higher shares of E-ZPass MD and Full Fare transactions.

Due to the absence of growth in FY 2019 over FY 2018 and in anticipation of cashless tolling in October, FY 2020 transactions were estimated to decrease by 0.3 percent to 5.0 million. Transactions are estimated to continue to decrease in FY 2021 before returning to a positive growth trend in FY 2022. During the FY 2020 to FY 2029 forecast period, transactions have been estimated to increase by 0.3 percent per annum, reaching 5.2 million by FY 2029. In-lane toll revenue has been forecasted to increase by 0.1 percent per annum from \$11.98 million in FY 2020 to \$12.04 million in FY 2029, largely due to impacts from the implementation of cashless tolling.

Table 4-2
John F. Kennedy Memorial Highway (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⁾
2019 ⁽²⁾	13.32		1.89		15.20	
2020 ⁽³⁾	13.06	-1.9%	1.90	0.4%	14.96	-1.6%
2021	13.07	0.0%	1.91	0.5%	14.98	0.1%
2022	13.02	-0.4%	1.92	0.7%	14.94	-0.2%
2023	13.11	0.7%	1.93	0.6%	15.05	0.7%
2024 ⁽³⁾	13.27	1.2%	1.95	0.9%	15.22	1.1%
2025	13.35	0.6%	1.95	0.3%	15.31	0.6%
2026	13.47	0.9%	1.97	0.6%	15.44	0.9%
2027	13.59	0.9%	1.98	0.6%	15.57	0.9%
2028 ⁽³⁾	13.75	1.2%	2.00	0.9%	15.75	1.1%
2029	13.84	0.6%	2.00	0.3%	15.84	0.6%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ⁽²⁾	\$97.88		\$78.10		\$175.99	
2020 ⁽³⁾	95.96	-2.0%	78.45	0.4%	174.41	-0.9%
2021	95.85	-0.1%	78.29	-0.2%	174.14	-0.2%
2022	95.50	-0.4%	78.83	0.7%	174.33	0.1%
2023	96.16	0.7%	79.30	0.6%	175.47	0.6%
2024 ⁽³⁾	97.28	1.2%	80.00	0.9%	177.28	1.0%
2025	97.88	0.6%	80.27	0.3%	178.14	0.5%
2026	98.74	0.9%	80.75	0.6%	179.50	0.8%
2027	99.62	0.9%	81.24	0.6%	180.86	0.8%
2028 ⁽³⁾	100.78	1.2%	81.95	0.9%	182.73	1.0%
2029	101.40	0.6%	82.22	0.3%	183.62	0.5%

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

Table 4-3
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⁾
2019 ⁽²⁾	4.87		0.22		5.09	
2020 ⁽³⁾	4.85	-0.3%	0.22	0.8%	5.07	-0.3%
2021	4.79	-1.2%	0.22	-2.5%	5.01	-1.3%
2022	4.81	0.3%	0.21	-1.1%	5.02	0.2%
2023	4.83	0.5%	0.21	0.2%	5.05	0.5%
2024 ⁽³⁾	4.87	0.8%	0.22	0.9%	5.08	0.8%
2025	4.88	0.2%	0.22	0.3%	5.10	0.2%
2026	4.90	0.5%	0.22	0.6%	5.12	0.5%
2027	4.93	0.5%	0.22	0.6%	5.15	0.5%
2028 ⁽³⁾	4.97	0.8%	0.22	0.9%	5.19	0.8%
2029	4.98	0.2%	0.22	0.3%	5.20	0.2%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ⁽²⁾	\$5.30		\$6.87		\$12.17	
2020 ⁽³⁾	5.12	-3.4%	6.86	-0.1%	11.98	-1.5%
2021	5.02	-2.0%	6.65	-3.2%	11.67	-2.6%
2022	5.03	0.3%	6.57	-1.1%	11.61	-0.5%
2023	5.06	0.5%	6.59	0.2%	11.64	0.3%
2024 ⁽³⁾	5.10	0.8%	6.64	0.9%	11.74	0.8%
2025	5.11	0.2%	6.67	0.3%	11.77	0.3%
2026	5.13	0.5%	6.71	0.6%	11.84	0.6%
2027	5.16	0.5%	6.75	0.6%	11.91	0.6%
2028 ⁽³⁾	5.20	0.8%	6.81	0.9%	12.01	0.8%
2029	5.21	0.2%	6.83	0.3%	12.04	0.3%

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

4.3.2.3 Baltimore Harbor Tunnel

Baltimore Harbor Tunnel transactions and in-lane toll revenue are presented in Table 4-4. Transactions in FY 2019 were 20.8 million, a 25.6 percent decrease over FY 2018. This decrease is due to the impacts of the Canton Viaduct Replacement project. In last year's forecast, this construction was forecasted to cause diversions of 30,000 vehicles per day off the Baltimore Harbor Tunnel, with majority of that traffic shifting to the Fort McHenry Tunnel and Francis Scott Key, and about 15 percent diverting to non-toll roads. At the peak of construction activity thus far, an estimated 36,700 vehicles per day diverted from the Baltimore Harbor Tunnel and approximately 30 percent diverted to non-toll roads or chose to not make the trip at all. These impacts have been incorporated into the forecast period.

In the forecast years between FY 2020 and FY 2021, the impacts of the Canton Viaduct Replacement project have been incorporated into the estimates of transactions and revenue at the Baltimore Harbor Tunnel. The Canton Viaduct Replacement project is forecasted to continue to have a significant negative impact on Baltimore Harbor Tunnel traffic in the range of 35,000 to 38,000 diverted vehicles per day, resulting in a 19.9 percent decrease in FY 2020. The decrease in FY 2020 compared to FY 2019 is also due to major construction impacts due to construction-related lane closures being in place for a full year rather than about seven months (December through June). In FY 2021, construction is anticipated to taper at the end of the fiscal year, yielding an increase of 8.0 percent in transactions. In FY 2022, construction is assumed to be complete by the end of July 2021 and diverted traffic is assumed to have returned. In FY 2024, diverted traffic from the Francis Scott Key, which will be under construction for rehabilitation, is estimated to cause a 7.3 percent increase in transactions over FY 2023. In FY 2026, this construction will end and cause a 7.0 percent decrease. In-lane toll revenue is forecasted to reach \$103.8 million in FY 2029.

4.3.2.4 Fort McHenry Tunnel

The Fort McHenry Tunnel transactions and In-lane toll revenue forecasts are presented in Table 4-5. This facility recorded the highest total transactions of all the Legacy toll facilities at 48.3 million in FY 2019, an increase of 7.8 percent over FY 2018 due to diverted trips from the Canton Viaduct Replacement project. In-lane toll revenue of \$217.4 million was collected in FY 2019, an increase of 6.0 percent over FY 2018.

Transactions are forecasted to grow by an estimated 4.3 percent to 49.9 million by FY 2020, continuing the trend of traffic diversions from the Canton Viaduct Replacement project. With the return of normal traffic patterns following completion of construction activities, transactions in FY 2022 are forecasted to decline by almost 11 percent to 44.6 million. By FY 2029, transactions are forecasted to be 46.4 million. Given the number transactions on the Fort McHenry Tunnel, the facility also produces the highest estimated toll revenue among the Legacy facilities, forecasted to reach \$215.2 million by FY 2029. Throughout the forecast period, commercial vehicles represent approximately 10 percent of total transactions on the facility and almost 42 percent of in-lane toll revenue.

Table 4-4
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⁾
2019 ^(2,5,6)	20.25		0.59		20.84	
2020 ^(3,5,6)	16.36	-19.2%	0.34	-42.3%	16.70	-19.9%
2021 ⁽⁶⁾	17.68	8.0%	0.36	5.6%	18.03	8.0%
2022 ⁽⁶⁾	29.82	68.7%	0.66	85.9%	30.48	69.0%
2023	30.96	3.8%	0.71	6.8%	31.67	3.9%
2024 ⁽³⁾	33.16	7.1%	0.82	15.2%	33.97	7.3%
2025	33.26	0.3%	0.82	0.0%	34.08	0.3%
2026	31.03	-6.7%	0.67	-17.7%	31.70	-7.0%
2027	30.72	-1.0%	0.67	0.2%	31.39	-1.0%
2028 ⁽³⁾	30.99	0.9%	0.68	0.5%	31.67	0.9%
2029	31.10	0.3%	0.68	0.0%	31.78	0.3%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ^(2,5,6)	\$61.58		\$8.69		\$70.26	
2020 ^(3,6)	49.94	-18.9%	5.04	-42.0%	54.99	-21.7%
2021 ⁽⁶⁾	53.60	7.3%	5.15	2.1%	58.75	6.8%
2022 ⁽⁶⁾	90.39	68.6%	9.56	85.7%	99.95	70.1%
2023	93.82	3.8%	10.21	6.8%	104.02	4.1%
2024 ⁽³⁾	100.42	7.0%	11.76	15.2%	112.19	7.8%
2025	100.70	0.3%	11.76	0.0%	112.46	0.2%
2026	93.91	-6.7%	9.68	-17.7%	103.59	-7.9%
2027	92.92	-1.1%	9.70	0.3%	102.63	-0.9%
2028 ⁽³⁾	93.71	0.9%	9.76	0.5%	103.47	0.8%
2029	94.00	0.3%	9.75	0.0%	103.75	0.3%

⁽¹⁾ Average Annual Percent Change.
⁽²⁾ Actual.
⁽³⁾ Leap Year.
⁽⁴⁾ Summation may not match total due to rounding.
⁽⁵⁾ Construction began on Patapsco Flats Bridge in August 2016 and was completed in May 2019.
⁽⁶⁾ Construction began on the Canton Viaduct Replacement in November 2018 and is scheduled to be completed in July 2021.

**Table 4-5
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⁾
2019 ^(2,5,6,7)	43.96		4.29		48.25	
2020 ^(3,7)	45.50	3.5%	4.41	2.8%	49.91	3.5%
2021 ⁽⁷⁾	45.50	0.0%	4.47	1.4%	49.98	0.1%
2022 ⁽⁷⁾	40.19	-11.7%	4.44	-0.7%	44.63	-10.7%
2023	40.39	0.5%	4.46	0.5%	44.86	0.5%
2024 ⁽³⁾	40.75	0.9%	4.49	0.5%	45.24	0.9%
2025	40.90	0.3%	4.49	0.0%	45.38	0.3%
2026	41.15	0.6%	4.50	0.2%	45.65	0.6%
2027	41.41	0.6%	4.51	0.2%	45.91	0.6%
2028 ⁽³⁾	41.78	0.9%	4.53	0.5%	46.31	0.9%
2029	41.92	0.3%	4.53	0.0%	46.45	0.3%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ^(2,5,6,7)	\$132.38		\$85.07		\$217.45	
2020 ^(3,7)	136.85	3.4%	87.06	2.3%	223.91	3.0%
2021 ⁽⁷⁾	135.77	-0.8%	87.98	1.1%	223.75	-0.1%
2022 ⁽⁷⁾	121.30	-10.7%	87.31	-0.8%	208.61	-6.8%
2023	121.85	0.5%	87.75	0.5%	209.60	0.5%
2024 ⁽³⁾	122.89	0.9%	88.21	0.5%	211.11	0.7%
2025	123.27	0.3%	88.19	0.0%	211.46	0.2%
2026	123.98	0.6%	88.41	0.3%	212.39	0.4%
2027	124.70	0.6%	88.64	0.3%	213.33	0.4%
2028 ⁽³⁾	125.76	0.9%	89.10	0.5%	214.87	0.7%
2029	126.14	0.3%	89.09	0.0%	215.23	0.2%

⁽¹⁾ Average Annual Percent Change.
⁽²⁾ Actual.
⁽³⁾ Leap Year.
⁽⁴⁾ Summation may not match total due to rounding.
⁽⁵⁾ Construction began on Patapsco Flats Bridge in August 2016 and was completed in May 2019.
⁽⁶⁾ Construction began on I-95 improvements in March 2017 and was completed in December 2018.
⁽⁷⁾ Construction began on the Canton Viaduct Replacement in November 2018 and is scheduled to be completed in July 2021.

4.3.2.5 Francis Scott Key Bridge

Table 4-6 provides forecasts of transactions and In-lane toll revenue for the Francis Scott Key Bridge. In FY 2019, total transactions processed were 12.8 million, a substantial increase of 12.3 percent over FY 2018 due to diverted traffic from the Canton Viaduct Replacement project. In-lane toll revenue was \$50.5 million in FY 2019, an increase of 10.1 percent over FY 2018. Revenues increased at a faster rate than transactions due to greater growth in commercial vehicles than passenger cars, most likely the result of traffic diversions related to the construction project.

By FY 2020 transactions are forecasted to increase to 13.9 million, due to continuing traffic diversions from the Canton Viaduct Replacement project. In FY 2022, traffic volumes are forecasted to return to more normal levels following the completion of construction activities, decreasing by over 22 percent compared to FY 2021 to 10.1 million transactions. Transactions are forecasted to reach 10.6 million in FY 2029. In-lane revenue is forecasted to reach \$45.2 million in FY 2029. Throughout the forecast period, commercial vehicles represent approximately 10 percent of total transactions, and over 45 percent of in-lane toll revenue.

4.3.2.6 William Preston Lane Jr. Memorial (Bay) Bridge

As shown in Table 4-7, the William Preston Lane Jr. Memorial (Bay) Bridge had 13.6 million transactions in FY 2019, an increase of 0.5 percent over FY 2018. Of these, 6.8 percent or 0.9 million were commercial vehicle transactions. Total In-lane toll revenue increased by 0.6 percent from \$53.4 million in FY 2018 to \$53.7 million in FY 2019.

Rehabilitation of the deck along the westbound span began in September 2019 and is planned to end in April 2021, followed by the rehabilitation of the eastbound span through May 2023. Plans call for single lane closures in off-peak hours, with complete bridge closures overnight. Construction will be halted in the summer months from Memorial Day to Labor Day. Considering the construction activities in general, a five percent AADT diversion or trip suppression impact is estimated during the impacted months. Additionally, to alleviate congestion on Thursday and Friday, a temporary cashless tolling policy has been implemented on these days from noon to 10 p.m. This policy provides a discount to existing video customers, as the video toll rate charged when the policy is in effect is the cash rate. Using historic data, and accounting for leakage in cash customers who are converted to video payment method, a revenue impact of \$40,000 per month is estimated due to this temporary cashless tolling policy. Full cashless tolling is assumed beginning May 1, 2020.

As a result of the construction and due to the implementation of full cashless tolling, transactions are estimated to decrease from 13.6 million in FY 2019 to 12.1 million in FY 2023. Following the end of construction, some trips are expected to return, and more normal patterns of annual traffic growth are forecasted. Transactions are forecasted at 12.7 million and revenue is forecasted at \$52.1 million by FY 2029. Throughout the forecast period, commercial vehicles represent approximately 7 percent of total transaction, and over 33 percent of in-lane toll revenue.

Table 4-6
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⁾
2019 ^(2,5,6,7)	11.67		1.15		12.83	
2020 ^(3,7)	12.58	7.8%	1.28	11.4%	13.87	8.1%
2021 ⁽⁷⁾	11.84	-5.9%	1.24	-3.6%	13.07	-5.7%
2022 ⁽⁷⁾	9.09	-23.2%	1.09	-11.5%	10.19	-22.1%
2023 ⁽⁸⁾	7.88	-13.4%	1.04	-5.3%	8.92	-12.5%
2024 ^(3,8)	5.78	-26.7%	0.93	-10.3%	6.71	-24.8%
2025	5.81	0.6%	0.93	0.0%	6.74	0.5%
2026	8.75	50.6%	1.11	19.3%	9.86	46.3%
2027	9.37	7.1%	1.11	0.3%	10.48	6.3%
2028 ⁽³⁾	9.46	0.9%	1.12	0.5%	10.57	0.9%
2029	9.49	0.3%	1.12	0.0%	10.61	0.3%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ^(2,5,6,7)	\$29.34		\$21.20		\$50.53	
2020 ^(3,7)	32.31	10.1%	23.72	11.9%	56.03	10.9%
2021 ⁽⁷⁾	30.01	-7.1%	22.83	-3.7%	52.84	-5.7%
2022 ⁽⁷⁾	23.55	-21.5%	20.22	-11.4%	43.77	-17.2%
2023 ⁽⁸⁾	20.39	-13.4%	19.14	-5.3%	39.53	-9.7%
2024 ^(3,8)	14.95	-26.7%	17.16	-10.3%	32.11	-18.8%
2025	15.03	0.6%	17.16	0.0%	32.19	0.2%
2026	22.64	50.6%	20.48	19.3%	43.12	33.9%
2027	24.25	7.1%	20.53	0.3%	44.78	3.9%
2028 ⁽³⁾	24.47	0.9%	20.64	0.5%	45.10	0.7%
2029	24.55	0.3%	20.63	0.0%	45.18	0.2%

⁽¹⁾ Average Annual Percent Change.
⁽²⁾ Actual.
⁽³⁾ Leap Year.
⁽⁴⁾ Summation may not match total due to rounding.
⁽⁵⁾ Construction began on Patapsco Flats Bridge in August 2016 and was completed in May 2019.
⁽⁶⁾ Construction began on I-95 improvements in March 2017 and was completed in December 2018.
⁽⁷⁾ Construction began on the Canton Viaduct Replacement in November 2018 and is scheduled to be completed in July 2021.
⁽⁸⁾ Construction to replace the deck of the approach spans of the bascule spans of the Curtis Creek bridge is scheduled to begin in the spring of 2023 and is estimated to last for 18 months.

Table 4-7
William Preston Lane Jr. Memorial Bridge (US 50/301)
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⁾
2019 ⁽²⁾	12.71		0.89		13.59	
2020 ^(3,5)	12.38	-2.5%	0.87	-1.9%	13.25	-2.5%
2021 ⁽⁵⁾	11.31	-8.7%	0.78	-10.4%	12.09	-8.8%
2022 ⁽⁶⁾	11.31	-0.1%	0.78	-0.4%	12.08	-0.1%
2023 ⁽⁶⁾	11.33	0.2%	0.78	0.6%	12.11	0.3%
2024 ⁽³⁾	11.75	3.7%	0.83	6.2%	12.58	3.8%
2025	11.75	0.0%	0.84	0.7%	12.58	0.0%
2026	11.77	0.2%	0.84	1.0%	12.62	0.3%
2027	11.80	0.2%	0.85	1.0%	12.65	0.3%
2028 ⁽³⁾	11.86	0.5%	0.86	1.3%	12.72	0.6%
2029	11.86	0.0%	0.87	0.7%	12.73	0.0%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ⁽²⁾	\$36.71		\$17.03		\$53.74	
2020 ^(3,5)	35.74	-2.7%	16.61	-2.4%	52.35	-2.6%
2021 ⁽⁵⁾	33.84	-5.3%	15.08	-9.2%	48.92	-6.6%
2022 ⁽⁶⁾	33.80	-0.1%	15.02	-0.4%	48.82	-0.2%
2023 ⁽⁶⁾	33.85	0.2%	15.11	0.6%	48.96	0.3%
2024 ⁽³⁾	35.08	3.6%	16.05	6.2%	51.12	4.4%
2025	35.04	-0.1%	16.16	0.7%	51.20	0.2%
2026	35.10	0.2%	16.33	1.0%	51.42	0.4%
2027	35.15	0.2%	16.50	1.0%	51.65	0.4%
2028 ⁽³⁾	35.31	0.4%	16.71	1.3%	52.01	0.7%
2029	35.27	-0.1%	16.83	0.7%	52.10	0.2%

⁽¹⁾ Average Annual Percent Change.
⁽²⁾ Actual.
⁽³⁾ Leap Year.
⁽⁴⁾ Summation may not match total due to rounding.
⁽⁵⁾ Construction began on the deck rehabilitation of the westbound span in September 2019 and is scheduled to be completed in April 2021.
⁽⁶⁾ Construction is scheduled to begin on deck rehabilitation of the eastbound span in October 2021 and is scheduled to be completed in May 2023.

4.3.2.7 Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge

Estimates of transactions and In-lane toll revenue for the Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton Bridge are provided in Table 4-8. The Bridge had the lowest number of total transactions of the seven Legacy facilities, reaching 3.3 million in FY 2019, a decrease of 0.3 percent compared to FY 2018. Commercial vehicles accounted for 6 percent of the total. Passenger car transactions decreased by 0.6 percent in FY 2019, while commercial vehicles experienced an increase of 4.0 percent. This facility is estimated to have an average annual growth in transactions of 0.4 percent through FY 2029, when transactions are expected to reach 3.4 million. Revenue in FY 2019 was \$21.0 million, a 1.1 percent increase from FY 2018. Revenue is forecasted to grow by 0.4 percent per year on average through FY 2029, when revenue of \$21.6 million is forecasted.

4.3.3 Systemwide Annual Transactions and In-Lane Toll Revenue Forecasts

Table 4-9 presents historical and forecasted In-lane toll revenue from FY 2009 to FY 2029.

Considering more recent years, 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, resulted in transactions growing by 2.9 percent in FY 2016 and then by 2.5 percent in FY 2017. During the FY 2009 to FY 2019 period, the number of systemwide transactions peaked at 122.0 million in FY 2017. This resulted in revenue of \$601.9 million in FY 2017. Actual transactions and in-lane toll revenue for FY 2019, the most recent fiscal year, were 119.1 million and \$601.1 million, respectively.

In FY 2020, the initial year of the forecast, transactions of 117.1 million have been forecasted, a 1.7 percent decrease over FY 2019. In-lane toll revenue is estimated at \$594.7 million, a 1.1 percent decrease over FY 2019. Recent observed historical growth trends are carried through to FY 2021 along with Canton Viaduct Replacement project impacts, 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 126.0 million by FY 2029, or a total of 7.6 percent during the FY 2020 to FY 2029 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 6.5 percent from \$594.7 million in FY 2020 to \$633.5 million in FY 2029, an average annual change of 0.7 percent.

Table 4-8
Governor Harry W. Nice Memorial/Senator Thomas “Mac” Middleton 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⁾
2019 ⁽²⁾	3.10		0.21		3.31	
2020 ⁽³⁾	3.10	-0.2%	0.21	1.9%	3.31	-0.1%
2021	3.06	-1.1%	0.21	-2.0%	3.27	-1.2%
2022	3.06	-0.2%	0.21	0.0%	3.27	-0.2%
2023	3.07	0.4%	0.21	0.6%	3.28	0.4%
2024 ⁽³⁾	3.10	1.0%	0.21	1.3%	3.31	1.0%
2025	3.11	0.4%	0.22	0.7%	3.33	0.4%
2026	3.13	0.7%	0.22	1.0%	3.35	0.7%
2027	3.16	0.7%	0.22	1.0%	3.38	0.7%
2028 ⁽³⁾	3.19	1.0%	0.22	1.3%	3.41	1.0%
2029	3.20	0.4%	0.22	0.7%	3.42	0.4%

Fiscal Year	In-Lane Toll Revenues (millions)					
	Passenger Cars		Commercial Vehicles		Total ⁽⁴⁾	
	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾	Revenue	AAPC ⁽¹⁾
2019 ⁽²⁾	\$14.90		\$6.07		\$20.97	
2020 ⁽³⁾	14.88	-0.1%	6.17	1.6%	21.04	0.4%
2021	14.63	-1.6%	5.90	-4.3%	20.54	-2.4%
2022	14.59	-0.3%	5.91	0.1%	20.50	-0.2%
2023	14.65	0.4%	5.94	0.6%	20.59	0.4%
2024 ⁽³⁾	14.78	0.9%	6.02	1.3%	20.80	1.0%
2025	14.84	0.4%	6.06	0.7%	20.90	0.5%
2026	14.94	0.7%	6.13	1.0%	21.06	0.8%
2027	15.03	0.7%	6.19	1.0%	21.22	0.8%
2028 ⁽³⁾	15.18	0.9%	6.27	1.3%	21.44	1.0%
2029	15.23	0.4%	6.32	0.7%	21.55	0.5%

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

Table 4-9
Historical and Forecasted Transactions and In-Lane Toll Revenue

Fiscal Year	Transactions (Millions)							Total ⁽¹⁾	Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice		
2009	14.64	5.04	25.53	43.45	11.69	12.75	3.35	116.45	
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	15.20	5.09	20.84	48.25	12.83	13.59	3.31	119.11	(2.0)
2020 ⁽²⁾	14.96	5.07	16.70	49.91	13.87	13.25	3.31	117.08	(1.7)
2021	14.98	5.01	18.03	49.98	13.07	12.09	3.27	116.44	(0.6)
2022	14.94	5.02	30.48	44.63	10.19	12.08	3.27	120.62	3.6
2023	15.05	5.05	31.67	44.86	8.92	12.11	3.28	120.93	0.3
2024 ⁽²⁾	15.22	5.08	33.97	45.24	6.71	12.58	3.31	122.12	1.0
2025	15.31	5.10	34.08	45.38	6.74	12.58	3.33	122.51	0.3
2026	15.44	5.12	31.70	45.65	9.86	12.62	3.35	123.74	1.0
2027	15.57	5.15	31.39	45.91	10.48	12.65	3.38	124.54	0.6
2028 ⁽²⁾	15.75	5.19	31.67	46.31	10.57	12.72	3.41	125.62	0.9
2029	15.84	5.20	31.78	46.45	10.61	12.73	3.42	126.03	0.3

Fiscal Year	In-Lane Toll Revenue (\$ Millions)							Total ⁽¹⁾	Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice		
2009	\$ 95.14	\$ 2.07	\$ 35.61	\$ 82.97	\$ 18.56	\$ 32.51	\$ 9.77	\$ 276.63	
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	175.99	12.17	70.26	217.45	50.53	53.74	20.97	601.12	(0.7)
2020 ⁽²⁾	174.41	11.98	54.99	223.91	56.03	52.35	21.04	594.71	(1.1)
2021	174.14	11.67	58.75	223.75	52.84	48.92	20.54	590.60	(0.7)
2022	174.33	11.61	99.95	208.61	43.77	48.82	20.50	607.59	2.9
2023	175.47	11.64	104.02	209.60	39.53	48.96	20.59	609.82	0.4
2024 ⁽²⁾	177.28	11.74	112.19	211.11	32.11	51.12	20.80	616.36	1.1
2025	178.14	11.77	112.46	211.46	32.19	51.20	20.90	618.13	0.3
2026	179.50	11.84	103.59	212.39	43.12	51.42	21.06	622.92	0.8
2027	180.86	11.91	102.63	213.33	44.78	51.65	21.22	626.38	0.6
2028 ⁽²⁾	182.73	12.01	103.47	214.87	45.10	52.01	21.44	631.64	0.8
2029	183.62	12.04	103.75	215.23	45.18	52.10	21.55	633.47	0.3

⁽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 4-10 through 4-12.

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/Middleton 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 2029 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 4-10
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	Transponder 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⁾		
2009	4.50	-	-	-	-	-	1.90	(4.80)	-	-	8.00	9.60	
2010	6.60 ⁽¹⁾	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	9.10 ⁽¹⁾	1.70	4.70	0.30	0.80	-	2.80	(5.90)	(0.20)	1.30	7.60	22.20	
2013	11.50 ⁽¹⁾	1.30	5.30	0.80	0.10	-	4.00	(4.60)	(0.70)	1.30	4.10	23.10	
2014	18.69 ⁽¹⁾	1.22	5.75	1.49	-	4.55	0.04	(5.89)	(0.64)	1.04	3.23	29.48	
2015	16.81 ⁽²⁾	1.44	5.87	1.52	-	10.75	0.01	(6.34)	(0.62)	1.15	5.07	35.66	
2016	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	14.00	(0.60)	1.59	1.68	-	21.27	-	(8.58)	(1.20)	1.26	6.65	36.06	
2020	14.07	-	1.60	1.68	-	22.40	-	(8.67)	(1.21)	1.28	6.29	37.45	
2021	14.14	-	1.61	1.69	-	20.50	-	(8.75)	(1.21)	1.29	6.31	35.57	
2022	14.21	-	1.62	1.70	-	23.67	-	(8.84)	(1.22)	1.30	6.33	38.76	
2023	14.28	-	1.62	1.71	-	23.26	-	(8.93)	(1.23)	1.31	6.34	38.37	
2024	14.35	-	1.63	1.72	-	26.65	-	(9.02)	(1.23)	1.33	6.36	41.78	
2025	14.42	-	1.64	1.73	-	26.63	-	(9.11)	(1.24)	1.34	6.37	41.78	
2026	14.49	-	1.65	1.74	-	27.57	-	(9.20)	(1.25)	1.35	6.39	42.75	
2027	14.57	-	1.66	1.74	-	27.76	-	(9.29)	(1.25)	1.37	6.41	42.96	
2028	14.64	-	1.67	1.75	-	27.80	-	(9.39)	(1.26)	1.38	6.42	43.02	
2029	14.71	-	1.67	1.76	-	27.78	-	(9.48)	(1.26)	1.39	6.44	43.02	

Source: Historical data from MDTA

⁽¹⁾ Year of toll increase.

⁽²⁾ Year of select toll rate reductions.

⁽³⁾ Civil penalty actuals provided by MDTA. Forecasts developed by CDMSmith incorporate cashless tolling impacts and the civil penalty reduction for accounts with less than six outstanding transactions.

⁽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 4-10 and 4-11, respectively. Table 4-12 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

Historical violation recovery data through FY 2019 have been provided by MDTA. Prior to FY 2016, “violation fees” were charged to drivers who choose not to initially pay their toll. 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 4-10 and 4-11. Future forecasts of civil penalty revenue are based on the following assumptions:

- Baseline Legacy system civil penalty revenue was initially forecasted to remain flat in the future and new facilities civil penalty revenue was forecasted to increase by 0.5 percent per year.
- However, baseline civil penalty forecasts were lowered by about 24 percent due to the implementation of a civil penalty program change which was assumed to begin December 1, 2020. This program change assumes civil penalties will be reduced from \$50 to \$25 for only accounts with less than six outstanding transactions with civil penalties. The 24 percent revenue impact was estimated based on CDM Smith analysis of historical civil penalty payment rates.
- Additional civil penalty revenue was included due to the implementation of full cashless tolling on the Francis Scott Key Bridge, Hatem Memorial Bridge, and Bay Bridge.

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 4-11
New Facilities Historical and Forecasted "Other Toll Revenue"**

Fiscal Year	New Facilities Other Revenue (\$ millions)											Total New Facilities Other Revenue ⁽⁴⁾			
	Intercounty Connector					I-95 ETLs					New Facilities Total				
	Service Fees and Sales		Violation Recovery		Notice of Toll Due Fees ⁽⁴⁾	Service Fees and Sales		Violation Recovery		Violation Recovery	Service Fees and Sales		Violation Recovery		
	Transponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties ⁽³⁾		Transponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties ⁽³⁾		Transponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties ⁽³⁾	
2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2014	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	0.19	0.79	0.01	5.73	6.72
2016	0.23	0.18	-	7.22	-	0.04	0.03	-	1.05	0.27	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	0.24	-	21.04	21.51
2018	0.29	0.22	-	12.23	-	0.06	0.04	-	1.38	0.35	0.26	0.26	-	13.61	14.22
2019	(0.08)	0.23	-	8.98	-	(0.02)	0.05	-	1.21	(0.10)	0.27	0.27	-	10.19	10.36
2020	-	0.23	-	8.84	-	-	0.05	-	1.19	-	0.28	0.28	-	10.03	10.30
2021	-	0.23	-	6.66	-	-	0.05	-	0.89	-	0.28	0.28	-	7.56	7.83
2022	-	0.23	-	6.70	-	-	0.05	-	0.90	-	0.28	0.28	-	7.59	7.87
2023	-	0.23	-	6.73	-	-	0.05	-	0.90	-	0.28	0.28	-	7.63	7.91
2024	-	0.23	-	6.76	-	-	0.05	-	0.91	-	0.28	0.28	-	7.67	7.95
2025	-	0.23	-	6.80	-	-	0.05	-	0.91	-	0.28	0.28	-	7.71	7.99
2026	-	0.24	-	6.83	-	-	0.05	-	0.92	-	0.28	0.28	-	7.75	8.03
2027	-	0.24	-	6.87	-	-	0.05	-	0.92	-	0.29	0.29	-	7.79	8.07
2028	-	0.24	-	6.90	-	-	0.05	-	0.93	-	0.29	0.29	-	7.83	8.11
2029	-	0.24	-	6.93	-	-	0.05	-	0.93	-	0.29	0.29	-	7.86	8.15

Source: Historical data from MDTA

⁽¹⁾ Year of toll increase.

⁽²⁾ Year of select toll rate reductions.

⁽³⁾ Civil penalty actuals provided by MDTA. Forecasts developed by CDM Smith incorporate the civil penalty reduction for accounts with less than six outstanding transactions.

⁽⁴⁾ Summations may not match total due to rounding.

- Represents actual data.

Table 4-12
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⁾	
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	601.12	36.06	10.36	46.43	647.54
2020	594.71	37.45	10.30	47.75	642.46
2021	590.60	35.57	7.83	43.40	634.00
2022	607.59	38.76	7.87	46.64	654.23
2023	609.82	38.37	7.91	46.28	656.10
2024	616.36	41.78	7.95	49.73	666.09
2025	618.13	41.78	7.99	49.77	667.90
2026	622.92	42.75	8.03	50.78	673.70
2027	626.38	42.96	8.07	51.03	677.41
2028	631.64	43.02	8.11	51.13	682.77
2029	633.47	43.02	8.15	51.17	684.64

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

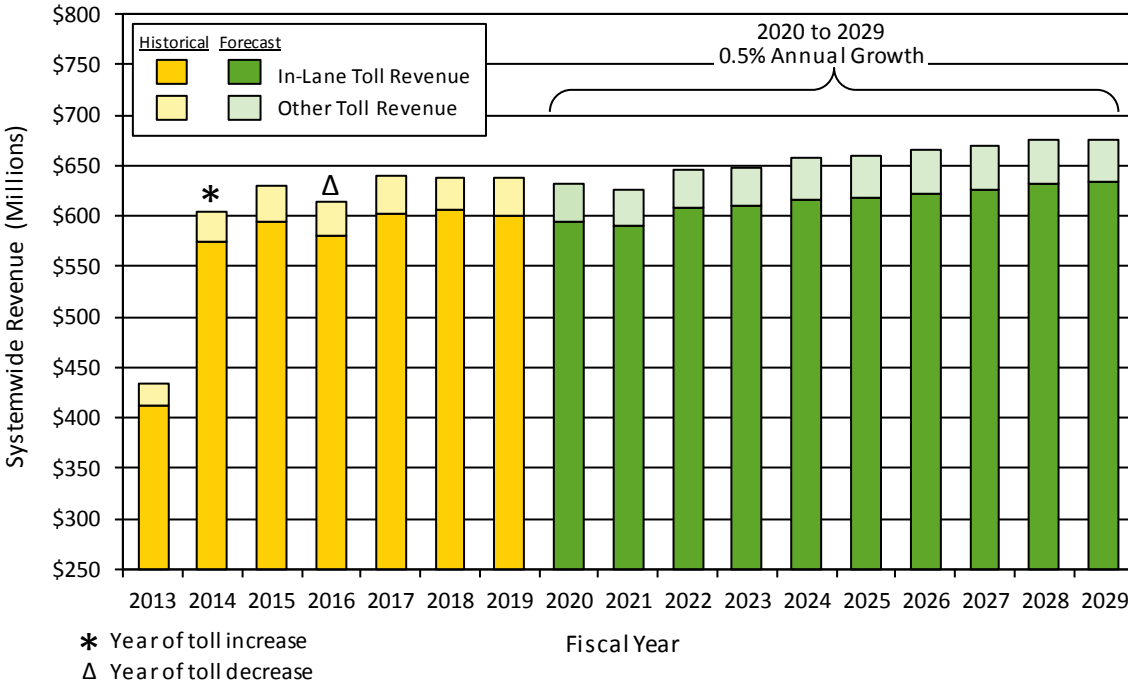
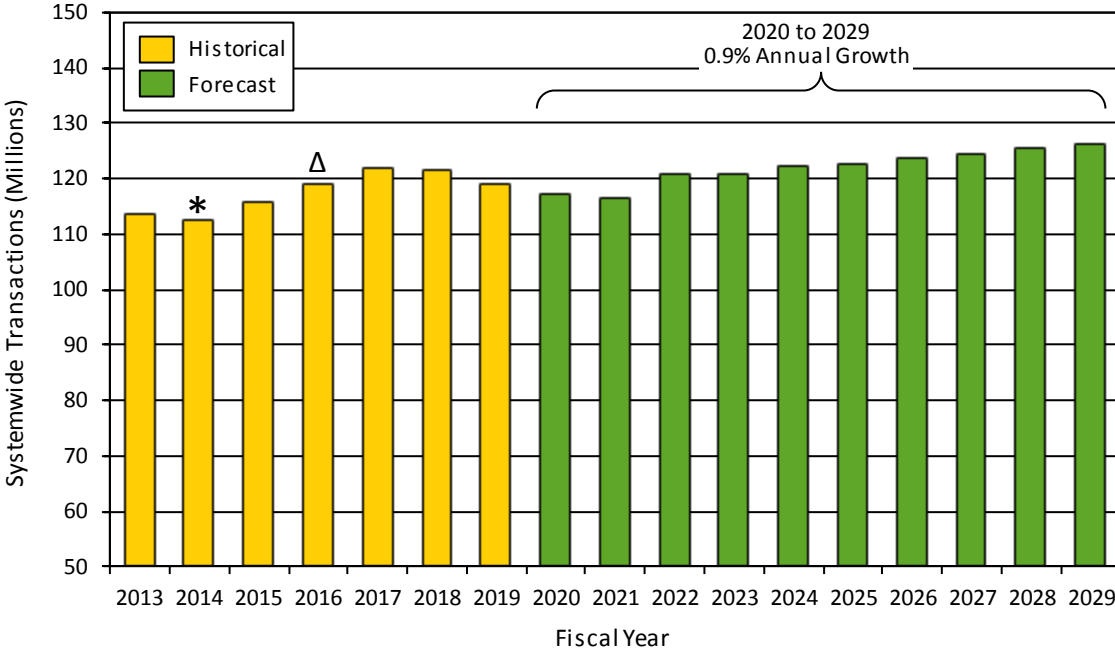
There are two travel plazas along the JFK Highway that provide additional revenue to MDTA through concessions. Both facilities were newly renovated and reopened to the public in 2014. The Maryland House Travel Plaza opened on January 16, 2014 and the Chesapeake House Travel Plaza opened on August 5, 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 4-10, 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 2020, to \$6.65 million, and then decrease to \$6.44 million by 2029. 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 2020 through FY 2029, as well as historical data from FY 2013 to FY 2018, are presented in Figure 4-1 and Table 4-13. 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 1.5 percent to \$652.2 million, and the decline continued in FY 2019 with a decrease of 0.7 percent to reach \$647.5 million. While In-lane toll revenue growth was a modest 0.6 percent in FY 2018, FY 2019 showed a 0.7 percent decrease. This is in part due to declining trends of passenger car vehicles, as well as construction impacts from the Canton Viaduct Replacement project and the share of diverted traffic. Other revenue showed a large decrease in FY 2018 due to the elimination of the transponder fee. However, in FY 2019 increases in unused pre-paid trip revenue and civil penalties countered the small reimbursement for transponder fees for a slight decrease of 0.9 percent over FY 2018.

Figure 4-1
Historical and Forecasted Transactions and Total Toll Revenue



* Year of toll increase
 Δ Year of toll decrease

In FY 2020, the initial year of the forecast, total revenues are estimated at \$642.5 million, a 0.8 percent decrease over FY 2019. In the absence of any toll rate changes beyond the changes accounted for in this document and detailed prior in this chapter, annual revenue growth rates going forward have been estimated to increase at more moderate rates ranging from -1.3 to 1.5 percent, excluding FY 2022 which shows a return to normal conditions after the Canton Viaduct Replacement project. In-lane toll revenue is forecasted to increase to \$684.6 million by FY 2029. Other Revenue, representing approximately 7 percent of the total revenue, is forecasted to increase over FY 2019 levels in FY 2020. In FY 2020 to FY 2021, other revenue is forecasted to decrease due to the civil penalty reduction for certain accounts. The FY 2019 Other Revenue of \$46.4 million is forecasted to increase to \$51.2 million by FY 2029. In-lane toll revenue and Other Revenue are forecasted to increase by 0.7 percent and 0.8 percent per annum, respectively, over the 10-year forecast period.

Table 4-13
In-Lane, "Other" and Total Revenue Forecasts

Fiscal Year	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	(4.3)	622.0	(2.4)
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	601.1	(0.7)	46.4	(0.9)	647.5	(0.7)
2020	594.7	(1.1)	47.7	2.8	642.5	(0.8)
2021	590.6	(0.7)	43.4	(9.1)	634.0	(1.3)
2022	607.6	2.9	46.6	7.5	654.2	3.2
2023	609.8	0.4	46.3	(0.8)	656.1	0.3
2024	616.4	1.1	49.7	7.5	666.1	1.5
2025	618.1	0.3	49.8	0.1	667.9	0.3
2026	622.9	0.8	50.8	2.0	673.7	0.9
2027	626.4	0.6	51.0	0.5	677.4	0.5
2028	631.6	0.8	51.1	0.2	682.8	0.8
2029	633.5	0.3	51.2	0.1	684.6	0.3

⁽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 2020 and FY 2021. Tables 4-14 and 4-15 summarize the forecasts of transactions and in-lane toll revenue for the seven Legacy facilities. Actual data is presented for the months of July 2019 through September 2019 from preliminary TVI reports. However, due to issues in TVI reporting, the transactions for the shopper plan, official duty, and Hatem plans was not included. These values have been estimated by CDM Smith for July 2019 through September 2019.

August has the greatest number of transactions with around 11.0 million in FY 2020 and FY 2021. February was forecasted to have the fewest number of transactions at around 8.2 million in FY 2020 and FY 2021. In both FY 2020 and FY 2021, E-ZPass® transactions are forecasted to represent approximately 77 percent of all two-axle vehicle transactions, and 89 percent of all three-or-more-axle vehicle transactions.

The highest in-lane toll revenue is forecasted to occur in August of FY 2020 and FY 2021, with totals of \$55.5 million and \$54.9 million, respectively. Further, the lowest revenue is forecasted in February of FY 2020 and FY 2021 at \$41.3 million and \$41.8 million, respectively. The total forecasted In-lane toll revenue is \$594.7 million in FY 2020 and \$590.6 million in FY 2021.

Table 4-16 provides a summary of the monthly transactions and In-lane toll revenue, as well as “Other Toll Revenue” and Total Toll Revenue.

**Table 4-14
Monthly Transactions by Method of Payment
FY 2018 and FY 2019**

Month	Transactions (000's)														
	Full Fare						2 Axle			3+ Axle					
	E-ZPass						Total			Cash / Video		E-ZPass		Cash / Video	
	Commuters + Shoppers (1)	MD Plan	Out-of-State Plan	Total	Cash / Video	Official Duty (1)	Hatem Plan A + B (1)	Total	2 Axle	E-ZPass	Total	Cash / Video	Total	3+ Axle	Total
July-19	2,230	2,610	2,297	4,907	2,242	100	325	9,805	734	82	816	10,620			
August-19	2,262	2,729	2,408	5,137	2,328	100	325	10,152	731	83	814	10,966			
September-19	2,164	2,331	1,753	4,084	1,885	100	325	8,558	635	76	711	9,269			
October-19	2,465	2,385	1,911	4,296	1,839	112	355	9,066	731	92	823	9,889			
November-19	2,211	2,270	2,070	4,339	1,815	104	325	8,794	658	75	733	9,528			
December-19	2,047	2,266	2,082	4,348	1,975	97	322	8,789	639	72	711	9,500			
January-20	2,195	2,014	1,572	3,586	1,575	108	327	7,791	664	71	735	8,526			
February-20	2,043	1,974	1,556	3,529	1,490	96	307	7,464	603	66	669	8,133			
March-20	2,291	2,317	1,891	4,208	1,833	105	344	8,780	682	74	756	9,536			
April-20	2,342	2,417	2,244	4,661	1,902	102	348	9,354	722	81	803	10,158			
May-20	2,377	2,612	2,247	4,858	2,041	101	359	9,738	746	87	833	10,571			
June-20	2,155	2,607	2,255	4,862	2,137	94	341	9,590	704	90	794	10,384			
FY 2020	26,782	28,530	24,285	52,815	23,062	1,220	4,002	107,882	8,249	950	9,199	117,080			
July-20	2,140	2,292	2,290	4,581	2,308	100	327	9,455	662	96	758	10,213			
August-20	2,403	2,520	2,363	4,883	2,264	106	355	10,010	717	96	812	10,822			
September-20	2,187	2,221	1,837	4,059	1,854	102	326	8,527	617	79	696	9,223			
October-20	2,455	2,375	1,902	4,278	1,825	112	353	9,023	721	91	812	9,835			
November-20	2,203	2,261	2,061	4,321	1,802	104	323	8,753	652	75	726	9,480			
December-20	2,038	2,255	2,072	4,327	1,955	97	320	8,737	642	72	713	9,451			
January-21	2,182	2,002	1,563	3,565	1,559	108	325	7,738	668	71	740	8,478			
February-21	2,046	1,973	1,552	3,525	1,532	96	305	7,505	628	68	696	8,200			
March-21	2,278	2,304	1,879	4,183	1,817	104	342	8,724	688	75	762	9,486			
April-21	2,329	2,404	2,232	4,636	1,887	101	347	9,300	725	81	806	10,106			
May-21	2,364	2,597	2,234	4,831	2,024	101	358	9,677	750	88	838	10,515			
June-21	2,157	2,677	2,307	4,984	2,245	99	340	9,825	710	91	801	10,626			
FY 2021	26,781	27,881	24,292	52,172	23,071	1,229	4,022	107,274	8,180	982	9,161	116,435			

Fiscal Year 2020 - Transactions (000's)

Fiscal Year 2021 - Transactions (000's)

(1) Preliminary TVI data for July through September did not include transactions for official duty, Hatem plans, or shoppers. These values are estimated.

- Represents actual data.

**Table 4-15
Monthly In-Lane Toll Revenue by Method of Payment
FY 2018 and FY 2019**

Month	In-Lane Toll Revenue (000)											Total	
	2 Axle					3+ Axle					Total	Cash / Video	Total
	Full Fare					E-ZPass							
	Commuters + Shoppers	MD Plan	Out-of-State Plan	Total	Cash / Video	Official Duty	Hattem Plan A + B	Total 2 Axle	E-ZPass	Cash / Video	Total 3+ Axle		
July-19	3,255	8,514	11,889	20,403	10,776	-	-	34,433	17,574	1,819	19,393	53,827	
August-19	3,304	8,918	12,465	21,383	11,447	-	-	36,134	17,495	1,863	19,358	55,492	
September-19	3,160	7,600	9,197	16,797	9,254	-	-	29,211	15,520	1,730	17,250	46,461	
October-19	3,621	7,772	9,910	17,682	8,962	-	-	30,265	17,723	2,130	19,853	50,118	
November-19	3,247	7,442	10,842	18,284	8,890	-	-	30,421	16,152	1,803	17,955	48,376	
December-19	3,011	7,454	10,850	18,304	9,677	-	-	30,992	15,703	1,782	17,486	48,478	
January-20	3,223	6,527	8,093	14,620	7,668	-	-	25,511	16,498	1,797	18,295	43,806	
February-20	3,002	6,418	8,054	14,472	7,241	-	-	24,715	14,878	1,652	16,530	41,245	
March-20	3,368	7,555	9,850	17,405	8,913	-	-	29,686	16,841	1,794	18,635	48,321	
April-20	3,440	7,863	11,666	19,530	9,296	-	-	32,266	17,590	1,945	19,535	51,801	
May-20	3,494	8,505	11,644	20,149	9,881	-	-	33,525	18,180	2,034	20,214	53,740	
June-20	3,171	8,546	11,657	20,204	10,436	-	-	33,812	17,164	2,073	19,237	53,049	
FY 2020	\$ 39,297	\$ 93,115	\$ 126,118	\$ 219,233	\$ 112,441	\$ -	\$ -	\$ 370,971	\$ 201,319	\$ 22,422	\$ 223,741	\$ 594,712	
July-20	3,153	7,511	11,990	19,501	11,261	-	-	33,915	16,247	2,206	18,453	52,368	
August-20	3,540	8,257	12,384	20,641	11,075	-	-	35,255	17,514	2,168	19,681	54,937	
September-20	3,220	7,269	9,577	16,846	9,006	-	-	29,073	15,057	1,807	16,865	45,937	
October-20	3,611	7,748	9,864	17,611	8,822	-	-	30,045	17,443	2,050	19,493	49,538	
November-20	3,239	7,419	10,792	18,211	8,763	-	-	30,213	15,938	1,745	17,682	47,895	
December-20	3,001	7,425	10,796	18,221	9,512	-	-	30,733	15,620	1,736	17,356	48,089	
January-21	3,208	6,495	8,047	14,542	7,520	-	-	25,270	16,459	1,755	18,213	43,484	
February-21	3,010	6,421	8,030	14,450	7,376	-	-	24,836	15,344	1,666	17,010	41,846	
March-21	3,352	7,518	9,793	17,311	8,764	-	-	29,427	16,812	1,754	18,566	47,993	
April-21	3,426	7,829	11,603	19,433	9,144	-	-	32,003	17,483	1,890	19,373	51,376	
May-21	3,480	8,466	11,578	20,044	9,784	-	-	33,308	18,090	2,001	20,091	53,399	
June-21	3,179	8,763	11,852	20,614	10,856	-	-	34,649	17,046	2,041	19,087	53,736	
FY 2021	\$ 39,420	\$ 91,121	\$ 126,305	\$ 217,426	\$ 111,882	\$ -	\$ -	\$ 368,728	\$ 199,053	\$ 22,818	\$ 221,871	\$ 590,599	

- Represents actual data.

Table 4-16
Monthly Forecasted Transactions, In-Lane and "Other" Toll Revenue

	Month	Transactions (millions)	Toll Revenue (\$ millions)		
			In-Lane	Other ⁽¹⁾	Total ⁽²⁾
Fiscal Year 2020	Jul-18	10.62	\$ 53.83	\$ 4.32	\$ 58.15
	Aug-18	10.97	55.49	4.46	59.95
	Sep-18	9.27	46.46	3.73	50.19
	Oct-18	9.89	50.12	4.02	54.14
	Nov-18	9.53	48.38	3.88	52.26
	Dec-18	9.50	48.48	3.89	52.37
	Jan-19	8.53	43.81	3.52	47.32
	Feb-19	8.13	41.24	3.31	44.56
	Mar-19	9.54	48.32	3.88	52.20
	Apr-19	10.16	51.80	4.16	55.96
	May-19	10.57	53.74	4.31	58.05
	Jun-19	10.38	53.05	4.26	57.31
	Total	117.08	\$ 594.71	\$ 47.75	\$ 642.46
Fiscal Year 2021	Jul-19	10.21	\$ 52.37	\$ 3.85	\$ 56.22
	Aug-19	10.82	54.94	4.04	58.97
	Sep-19	9.22	45.94	3.38	49.31
	Oct-19	9.83	49.54	3.64	53.18
	Nov-19	9.48	47.90	3.52	51.42
	Dec-19	9.45	48.09	3.53	51.62
	Jan-20	8.48	43.48	3.20	46.68
	Feb-20	8.20	41.85	3.08	44.92
	Mar-20	9.49	47.99	3.53	51.52
	Apr-20	10.11	51.38	3.78	55.15
	May-20	10.51	53.40	3.92	57.32
	Jun-20	10.63	53.74	3.95	57.69
Total	116.44	\$ 590.60	\$ 43.40	\$ 634.00	

⁽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.