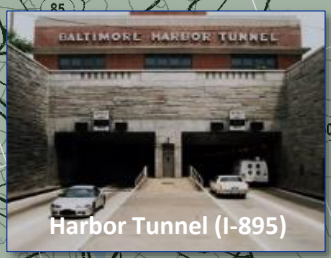
Maryland Transportation Authority FY2021 Traffic and Toll Revenue Forecast Update

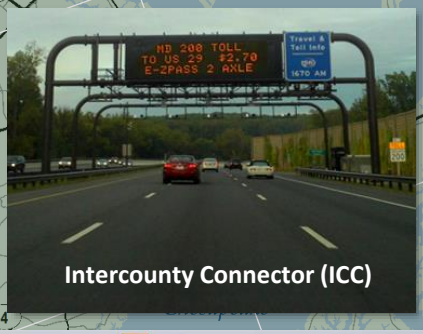

Kennedy Highway (I-95)


Hatem Bridge (US 40)

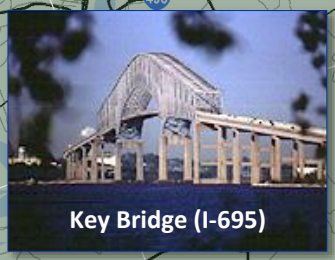

Fort McHenry Tunnel (I-95)



Harbor Tunnel (I-895)



Intercounty Connector (ICC)


Key Bridge (I-695)

I-95 Express Toll Lanes (ETL)


Nice/ Middleton Bridge (US 301)


Bay Bridge (US 50/301)

FINAL REPORT
November 6, 2020

MDTA

Maryland Transportation Authority

CDM Smith

Table of Contents

List of Figures

List of Tables

Chapter 1
Introduction

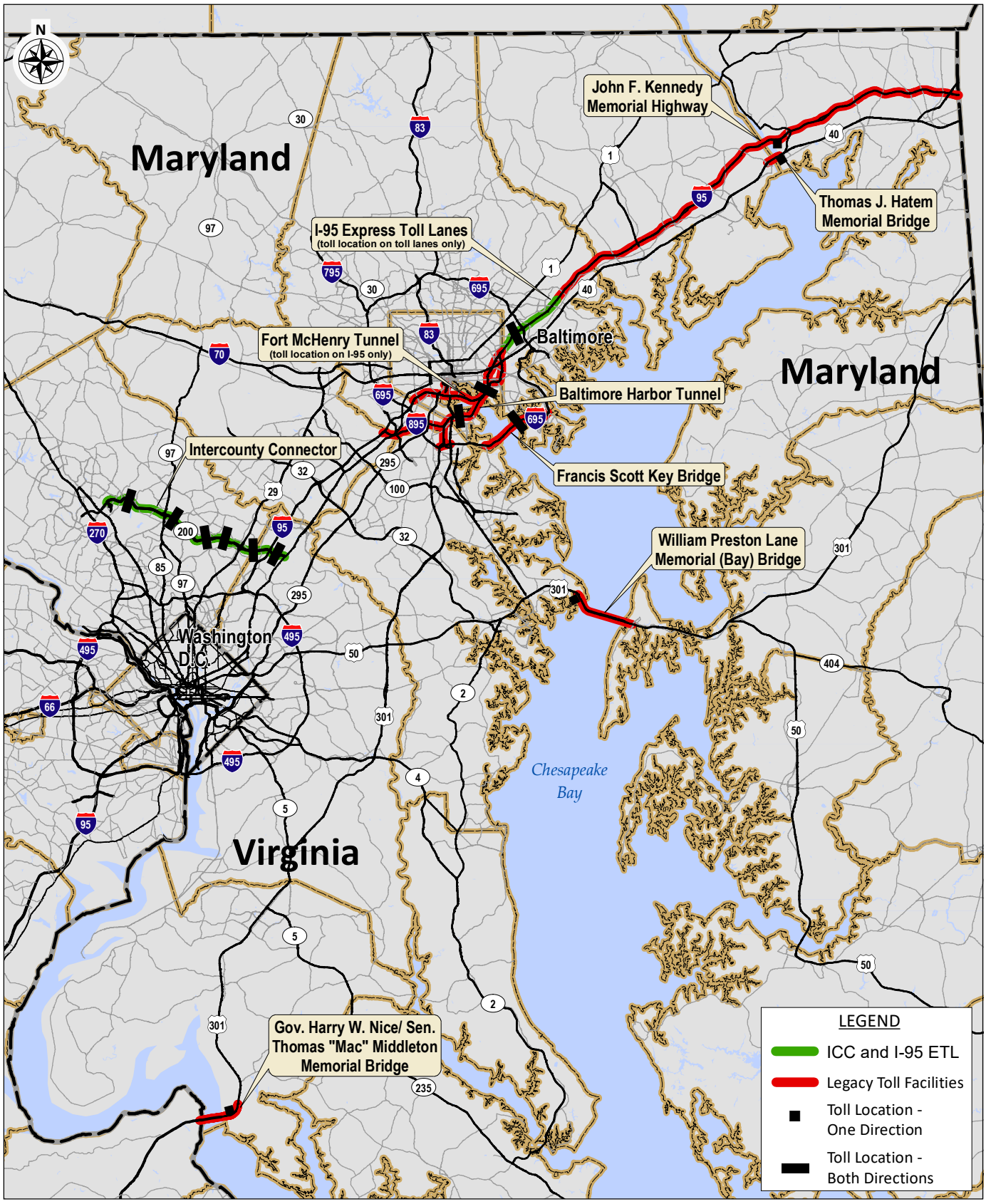
This letter report includes ten-year forecasts through FY 2030 for the seven "Legacy" toll facilities operated by MDTA, for the Intercounty Connector (ICC), and for the I-95 Express Toll Lanes (ETLs). It summarizes the study analysis, including a presentation of historical traffic and revenue trends, relevant socioeconomic conditions and forecasts, and the ten-year forecast results.

1.1 System Description

The nine facilities operated by MDTA are listed below. Collectively, the first seven facilities in the list below are referred to as the Legacy System.

- Thomas J. Hatem Memorial Bridge (Hatem Bridge, TJH)
- John F. Kennedy Memorial Highway, excluding the I-95 Express Toll Lanes (Kennedy Highway, JFK)
- Baltimore Harbor Tunnel (Harbor Tunnel, BHT)
- Fort McHenry Tunnel (Fort McHenry Tunnel, FMT)
- Francis Scott Key Bridge (Key Bridge, FSK)
- William Preston Lane Jr. Memorial Bridge (Bay Bridge, WPL)
- Governor Harry W. Nice Memorial/Senator Thomas "Mac" Middleton Bridge (Nice/Middleton Bridge, HWN)
- Intercounty Connector (ICC/MD 200)
- I-95 Express Toll Lanes (I-95 ETLs)

Figure 1-1 shows the locations of the MDTA Legacy system, ICC, and I-95 ETLs toll facilities and toll gantries in a regional context. As can be implied by the geographic distribution of the different facilities, the MDTA system serves a variety of travel purposes within the regional transportation system and consequently has a diverse mix of traffic classes and payment types.



X:\TFT Group\Projects\MD Read Only (Moved to ProjectWise)\MD 236880 MDTA Task 24 - 2020 Legacy T&R Update\Graphics\ArcMAP\Legacy Facility Location Map - Fig 1-1_2020.mxd \ 5-20-20

FACILITY LOCATION MAP
MARYLAND TOLL FACILITIES

FIGURE 1-1

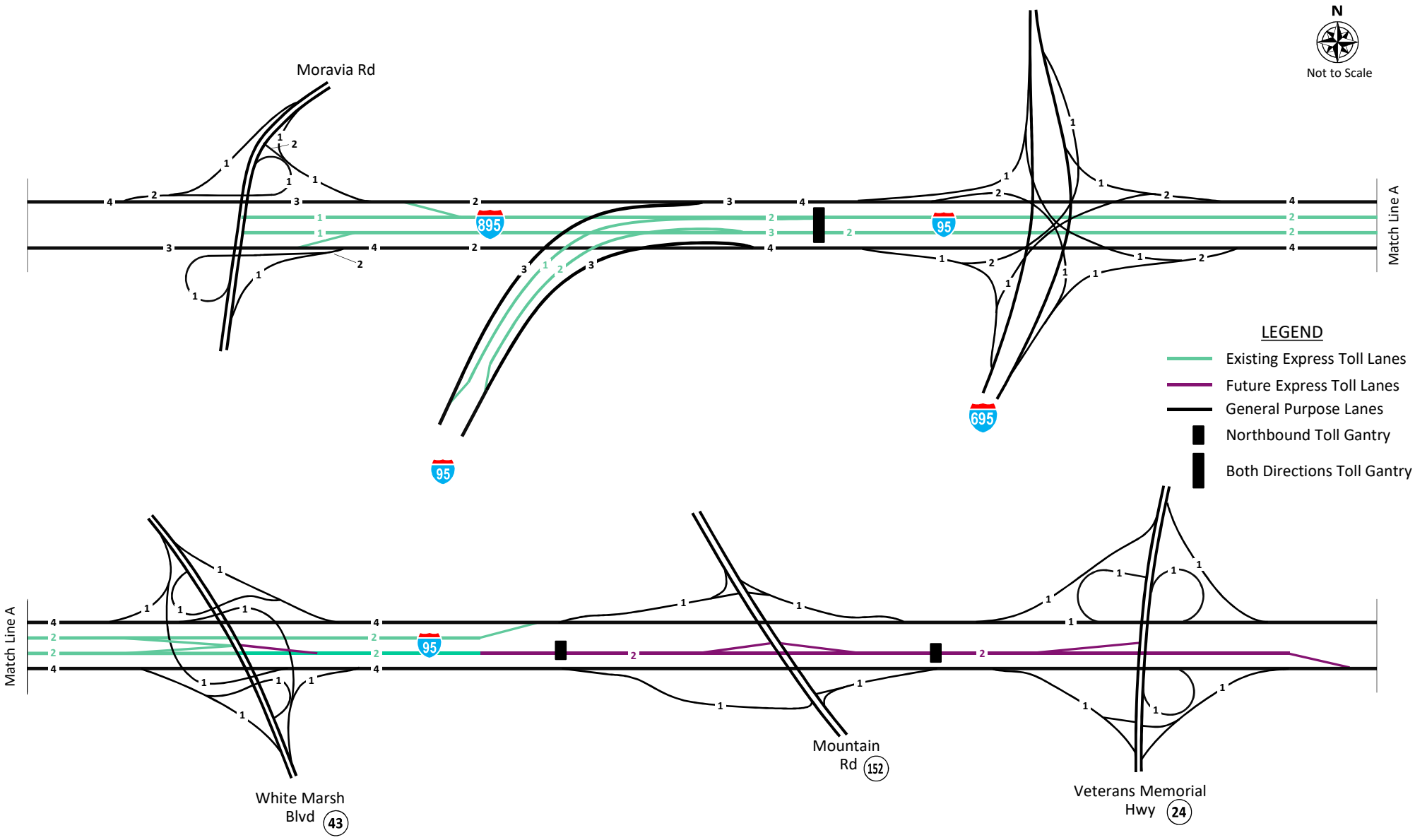
In the north, the Hatem Bridge and the Kennedy Highway form two parallel crossings of the Susquehanna River. The Hatem Bridge carries US 40 over the river and is the oldest of the MDTA's facilities, having been open to traffic since August 1940. The existing structure replaced an older bridge that first opened in 1910. The John F. Kennedy Memorial Highway is a 50-mile segment of I-95 that was opened in November 1963. It currently has one mainline toll plaza located just east of the Susquehanna River. The I-95 ETLs are a separate eight-mile toll facility on the Kennedy Highway between I-895 and MD 43 in Northeast Baltimore. The facility, which opened in December 2014, includes two express toll lanes in each direction in between the general purpose lanes on this segment of I-95. A northern extension of only the northbound I-95 ETL facility is planned to open in phases within the forecasting horizon. The assumed opening dates of this extension are included in the assumptions in Chapter 4. **Figure 1-2** shows the assumed access and tolling points on the I-95 ETL extension.

There are three alternative MDTA toll routes that cross the Baltimore Harbor in the center of the region: the Baltimore Harbor Tunnel (I-895), the Francis Scott Key Bridge (I-695), and the Fort McHenry Tunnel (I-95), which are collectively referred to as the Baltimore Harbor crossings. 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, is an eight-lane crossing that opened in November 1985.

The ICC facility is in the northern Washington D.C. metro region and connects I-370 in the Gaithersburg area to I-95 and US 1 near Laurel. The ICC opened in phases. The initial segment between I-370 and MD 97 opened to traffic in February 2011 and began collecting tolls in March 2011. The segment from MD 97 to I-95 opened to traffic in November 2011 and began collecting tolls in December 2011, and the final segment between I-95 and US 1 opened and began collecting tolls in November 2014.

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.

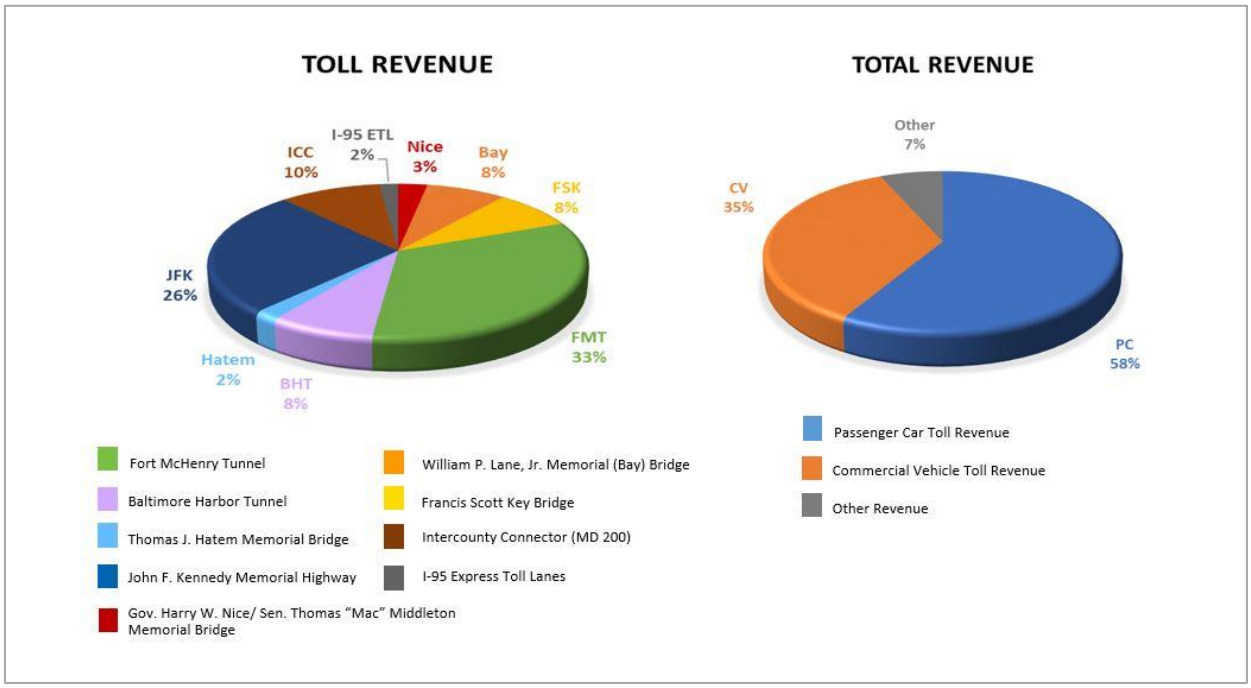
For context in this letter report, **Figure 1-3** shows the share of MDTA toll revenue by facility and total revenue by type for the most recent full fiscal year. As shown, about three quarters of toll revenue is from the Kennedy Highway, Fort McHenry Tunnel, Harbor Tunnel, and Key Bridge, which make up the I-95 corridor and parallel Interstate crossings near downtown Baltimore. Total revenue includes about 35 percent commercial vehicle toll revenue, about 58 percent passenger car toll revenue, and about 7 percent other revenue. Other revenue includes a combination of revenue collected and revenue deductions from unused Commuter Plan and Shoppers Plan trips, transponder fees and sales, the Hatem Bridge E-ZPass program, violation recovery (civil penalties), commercial vehicle fees and discounts (post-usage discount, high frequency discount, and over-sized permit fees), and concessions.



I-95 EXPRESS TOLL LANES (ETL)
EXISTING & FUTURE CONFIGURATION

FIGURE 1-2

Figure 1-3
FY 2020 MDTA Share of Toll Revenue by Facility and Total Revenue by Type



1.2 Toll Rate and Civil Penalty Structure

1.2.1 Standard Toll Rates

The toll rates described in this sub-section are standard toll rates. Several temporary toll rate changes were made in response to the COVID-19 pandemic and are described in the next sub-section.

Table 1-1 provides the standard Legacy system toll rates and toll collection direction. Toll rates vary by facility, method of payment, and vehicle class. The toll rates are grouped into three categories: Maryland E-ZPass, base toll rates which includes out-of-state E-ZPass and the former cash payment method, and video payment. Maryland E-ZPass toll rates apply to drivers who register an E-ZPass account and receive a transponder from MDTA. In general, these customers receive a discount over the base toll rate customers and can also enroll in discounts like the shopper and commuter rates and programs further described in **Table 1-2**. The base toll rate applies to out-of-state registered E-ZPass and former cash customers, and video customers pay a 50 percent surcharge over the base toll rate. Cash was a payment option at five of the seven Legacy facilities up until March 17, when cashless collection was initiated as a safety precaution related to the COVID-19 pandemic. The Hatem Bridge and Key Bridge facilities had already been converted to all-electronic tolling in October 2019. Permanent cashless tolling on these facilities that offered a cash payment option before the pandemic was announced on August 6, 2020.

Table 1-1
Standard MDTA Legacy System Toll Rates and Toll Collection Direction

Class	Hatem Bridge (Eastbound)	Kennedy Highway (Eastbound)	Harbor Facilities: FMT, BHT, FSK (Both)	Bay Bridge (Eastbound)	Nice/ Middleton Bridge (Westbound)
Maryland E-ZPass Payment Type					
Commuter[1]	$2.80	$2.80	$1.40	$1.40	$2.10
Shopper[1]	NA	NA	NA	$2.00	NA
2-axle	$6.00	$6.00	$3.00	$2.50	$5.40
3-axle	$11.20	$16.00	$8.00	$8.00	$12.00
4-axle	$16.80	$24.00	$12.00	$12.00	$18.00
5-axle	$48.00	$48.00	$24.00	$24.00	$36.00
6-axle+	$60.00	$60.00	$30.00	$30.00	$45.00
Base Toll Rates: Other E-ZPass Payment Type and Former Cash Payment Type					
2-axle	$8.00	$8.00	$4.00	$4.00	$6.00
3-axle	$16.00	$16.00	$8.00	$8.00	$12.00
4-axle	$24.00	$24.00	$12.00	$12.00	$18.00
5-axle	$48.00	$48.00	$24.00	$24.00	$36.00
6-axle+	$60.00	$60.00	$30.00	$30.00	$45.00
Video Payment Type					
2-axle	$12.00	$12.00	$6.00	$6.00	$9.00
3-axle	$24.00	$24.00	$12.00	$12.00	$18.00
4-axle	$36.00	$36.00	$18.00	$18.00	$27.00
5-axle	$63.00	$63.00	$36.00	$36.00	$51.00
6-axle+	$75.00	$75.00	$45.00	$45.00	$60.00

[1]Commuter and shopper programs for 2-axle vehicles only. Rates shown are if all trips are used

Table 1-2 provides a description of the other MDTA Legacy system discount toll rate programs available to Maryland E-ZPass customers. The programs available for two-axle vehicles aim to provide discounts for drivers who use the MDTA facilities frequently. Commuter plans are available for the Baltimore crossings, the Nice/Middleton Bridge, and the Bay Bridge. These plans allow customers to complete a set number of trips within a 45-day period at a fixed price on specific facilities. Specific details of the commuter programs is shown in **Table 1-2**. In addition to the commuter plan at the Bay Bridge, there is a shopper plan that allows drivers to take ten trips Sunday through Thursday for $20 over a 90-day period on the Bay Bridge. The Hatem Bridge has two plans offered: Hatem Plan A and Hatem Plan B. Both plans provide unlimited trips for a flat annual fee of $20 and vary slightly in account setup and associated fees.

Two discount plans are offered for commercial vehicles with five-or-more axles: the post usage discount and supplemental rebate plan. The post usage discount reimburses business accounts a percentage of monthly tolls in the range of 10 to 20 percent based on the toll amount accrued in a 30-day period. The supplemental rebate program provides a similar structure for individual accounts by providing a discount in the range of 10 to 20 percent for accounts that make more than 60 trips per month. Also listed in **Table 1-2** is the Baltimore Harbor Tunnel Childs Street

ramp toll which is a lower toll rate for three-or-more axle vehicles using a specific ramp near the Harbor Tunnel.

Table 1-2
Other MDTA Legacy System Discount Toll Rate Programs and Rates

Program	Details
Baltimore Region Commuter Discount Plan	For E-ZPass Maryland accounts holders driving **two-axle vehicles**. The Baltimore Regional Plan is $70 for 50 trips on the Fort McHenry Tunnel, Harbor Tunnel, Key Bridge, Kennedy HIghway, or Hatem Bridge. Two "trips" are deducted for each crossing of the Kennedy Highway and Hatem Bridge . Plans end after 45 days or when all of the trips are used, whichever comes first.
Nice Bridge Commuter Discount Plan	For E-ZPass Maryland accounts holders driving **two-axle vehicles**. The Nice bridge plan is $52.50 and offers 25 trips. The plans ends after 45 days or when all of the trips are used, whichever comes first.
Bay Bridge Commuter Discount Plan	For E-ZPass Maryland accounts holders driving **two-axle vehicles**. The Bay Bridge Plan is $35.00 and offers 25 trips. The plan ends after 45 days or when all of the trips are used, whichever comes first.
Bay Bridge Shopper Discount Plan	For E-ZPass Maryland accounts holders driving **two-axle vehicles**. The Bay Bridge Shopper plan is $20.00 for ten two-axle trips that can be used Sunday through Thursday. The plan ends after 90 days or when all of the trips are used, whichever comes first.
Hatem Bridge Discount Plan A	An E-ZPass account with transponders valid only at the Hatem Bridge. This plan applies only to **two-axle vehicles**, and includes unlimited trips. This plan is subject to a flat annual fee of $20.00. There are NO account fees, prepaid toll deposits or account statements.
Hatem Bridge Discount Plan B	This discount plan is attached to a normal Maryland E-ZPass account. This plan applies only to **two-axle vehicles**, and includes unlimited trips. This plan is subject to a flat annual fee of $20.00. Account fees apply as with the normal Maryland E-ZPass account.
Post Usage Discount Plan	Business accounts operating **five-or-more-axle vehicles** 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.
Supplemental Rebate Plan	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.
Baltimore Harbor Childs Street Ramps Toll	Vehicles with a valid E-ZPass Maryland account and transponder will pay $2 per axle for **3, 4, 5 and 6+ axle vehicles** to use the I-895/Childs Street ramps at the Baltimore Harbor Tunnel.

Tolls on the ICC differ from the Legacy system in that they're assessed on particular interchange-to-interchange movements, as shown in **Table 1-3.** The ICC is a cashless facility with either E-ZPass or video payment types. This table provides the two-axle E-ZPass toll rates, which vary from $0.40 to $3.86 depending on the length of the trip and time of day. Higher toll rates are assessed on weekdays during the Peak Periods, which are 6:00 to 9:00 AM and 3:00 to 7:00 PM, compared to the Overnight (11:00 PM to 5:00 AM) and Off-Peak (all other hours) time periods. Tolls differ on the weekends for the Overnight and Off-Peak periods. E-ZPass toll rates are higher for commercial and recreational (boat and camper) vehicles based on the number of axles, and all video toll customers pay a 50 percent surcharge over the E-ZPass rate with a minimum of $1 and maximum of $15 above the E-ZPass rates.

Table 1-3
Intercounty Connector Two-Axle E-ZPass Toll Rates by Movement and Time Period

Entrance	Time Period[1]	Exit						
		I-370 / Shady Grove Rd.	SR 97 / Georgia Ave.	SR 182 / Layhill Rd.	SR 650 / New Hampshire Ave.	US 29 / Briggs Cheney Rd.	I-95	Konterra Dr. / US 1
I-370; Shady Grove Rd.	Peak		$1.24	$1.74	$2.37	$2.92	$3.52	$3.86
	Off-Peak		$0.96	$1.35	$1.83	$2.26	$2.72	$2.98
	Overnight		$0.40	$0.56	$0.75	$0.93	$1.12	$1.23
SR 97 / Georgia Ave.	Peak	$1.24		$0.50	$1.13	$1.68	$2.28	$2.61
	Off-Peak	$0.96		$0.40	$0.87	$1.30	$1.76	$2.02
	Overnight	$0.40		$0.40	$0.40	$0.53	$0.72	$0.83
SR 182 / Layhill Rd.	Peak	$1.74	$0.50		$0.62	$1.18	$1.78	$2.11
	Off-Peak	$1.35	$0.40		$0.48	$0.91	$1.37	$1.63
	Overnight	$0.56	$0.40		$0.40	$0.40	$0.56	$0.67
SR 650 / New Hampshire Ave.	Peak	$2.37	$1.13	$0.62		$0.55	$1.15	$1.49
	Off-Peak	$1.83	$0.87	$0.48		$0.43	$0.89	$1.15
	Overnight	$0.75	$0.40	$0.40		$0.40	$0.40	$0.47
US 29 / Briggs Cheney Rd.	Peak	$2.92	$1.68	$1.18	$0.55		$0.60	$0.94
	Off-Peak	$2.26	$1.30	$0.91	$0.43		$0.46	$0.72
	Overnight	$0.93	$0.53	$0.40	$0.40		$0.40	$0.40
I-95	Peak	$3.52	$2.28	$1.78	$1.15	$0.60		$0.44
	Off-Peak	$2.72	$1.76	$1.37	$0.89	$0.46		$0.40
	Overnight	$1.12	$0.72	$0.56	$0.40	$0.40		$0.40
Konterra Dr. / US 1	Peak	$3.86	$2.61	$2.11	$1.49	$0.94	$0.44	
	Off-Peak	$2.98	$2.02	$1.63	$1.15	$0.72	$0.40	
	Overnight	$1.23	$0.83	$0.67	$0.47	$0.40	$0.40	

[1]Time periods are:
Peak Period is defined as 6:00 to 9:00 AM and 4:00 to 7:00 PM on Weekdays (excluding federal holidays).
Off-Peak Period is defined as 5:00 to 6:00 AM, 9:00 AM to 4:00 PM, and 7:00 to 11:00 PM on Weekdays and 5:00 AM to 11:00 PM on Weekends and federal holidays.
Overnight is defined as 11:00 PM to 5:00 AM every day.

The I-95 ETLs are an express lane facility with a single tolling point in each direction. Similar to the ICC, toll rates vary by vehicle type and time period. It is a cashless facility with payment method options of E-ZPass or video tolling. As shown previously in **Figure 1-2**, a northbound extension of the I-95 ETLs is also planned to open within the forecasting period. **Table 1-4** provides the toll rates by axle and payment type for the existing section from I-895 to MD 43. Toll rates for the extension were assumed to be consistent with the existing section at $0.22/mile during the peak period, $0.17/mile during the off-peak period, and $0.07/mile during the overnight period for two-axle passenger car vehicles. More than two-axle vehicles will receive the same multiplier as the existing section. Video toll customers pay a 50 percent surcharge over the E-ZPass rate with a minimum of $1 and maximum of $15 above the E-ZPass rates.

Table 1-4
I-95 Express Toll Lane Toll Rates

Class	Existing Section (I-895 to MD 43)		
	Peak	Off-Peak	Overnight
E-ZPass Payment Type			
2-axle	$1.54	$1.19	$0.49
3-axle	$3.08	$2.38	$0.98
4-axle	$4.65	$3.57	$1.47
5-axle	$9.24	$7.14	$2.94
6-axle+	$11.55	$8.93	$3.68
Video Payment Type			
2-axle	$2.54	$2.19	$1.49
3-axle	$4.62	$3.57	$1.98
4-axle	$6.93	$5.36	$2.47
5-axle	$13.86	$10.71	$4.41
6-axle+	$17.33	$13.39	$5.51

Time Periods:

Peak Period is defined as southbound from 6:00 to 9:00 AM Mon to Fri, northbound from 3:00 to 7:00 PM Mon to Fri, and both directions from 12:00 to 2:00 PM Sat and 2:00 to 5:00 PM Sun.

Off-Peak Period is defined as southbound from 5:00 to 6:00 AM/9:00 AM to 9:00 PM Mon to Fri, northbound from 5:00 AM to 3:00 PM/7:00 to 9:00 PM Mon to Fri, and both directions from 5:00 AM to 12:00 PM/2:00 to 9:00 PM Sat and 5:00 AM to 2:00 PM/5:00 to 9:00 PM Sunday.

Overnight is defined as 9:00 PM to 5:00 AM every day.

1.2.2 COVID-19 Toll Rates and Business Rules

On March 17, 2020 MDTA implemented systemwide cashless tolling until further notice. Most other larger toll agencies in the United States that had the capability to do so also converted to cashless (also called all-electronic) tolling around this time to prevent the potential spread of COVID-19 during exchanges of cash at toll booths. The MDTA cashless program was implemented by applying video tolling at cash toll rates at facilities where cash is normally accepted. The MDTA cashless tolling was applied to five facilities, the Kennedy Highway, Harbor Tunnel, Fort McHenry

Tunnel, Bay Bridge, and Nice/Middleton Bridge. The other four MDTA facilities, the Hatem Bridge, Key Bridge, ICC, and I-95 ETLs, already operated with cashless tolling before the pandemic. The Bay Bridge was already being planned to convert to cashless tolling before the pandemic. This facility officially converted to permanent cashless tolling on May 12, 2020, but former cash toll rates for video customers are still being charged. The cashless tolling implemented during the pandemic was initially announced as temporary. Permanent cashless tolling on all facilities was announced on August 6, 2020 to provide convenience for motorists, less engine idling for better fuel efficiency and reduced emissions, decreased congestion, and increased safety. However, cash toll rates are still being charged on the Kennedy Highway, Harbor Tunnel, Fort McHenry Tunnel, Bay Bridge, and Nice/Middleton Bridge for the video payment type. Additionally, mailing of Notice of Toll Due (NOTD) video invoices has been paused during the pandemic. The assumed date for implementing video toll rates on the facilities continuing to charge cash toll rates and the assumed date for returning to mailing NOTDs are included in the assumptions in Chapter 4.

Another change due to the pandemic was the extension of the time limits required to use trips for the Commuter and Shopper plans. These time limits were originally extended to 90 and 150 days, respectively, but have since been extended beyond these limits. The assumed date for reinstating the Commuter and Shopper plan time limits is included in the assumptions in Chapter 4.

1.2.3 Upcoming Toll Rate and Payment Type Changes

Several toll rate and toll payment option changes are assumed for MDTA in FY 2021. These changes are listed below. The assumed implementation date of these changes is provided in the assumptions in Chapter 4.

- Pay-by-Plate: A new Pay-by-Plate payment method will be offered. This new payment method allows tolls to automatically bill to credit cards at a lower rate than the current standard video rate. For the legacy system Pay-by-Plate rates will be the same as former cash rates. For the ICC, customers who use this method will pay at least 20 percent less than the current standard video rate and 25% more than the E-ZPass rate.

- Early Payment of Video Tolls: Current standard video rate customers who pay their video toll before their invoices are mailed will receive a 15 percent toll discount from the full current standard video (Pay-by-Invoice) rate.

- New Vehicle Classes: New vehicle class toll rate categories will be created with lower toll rates. These new classes are motorcycles and certain three and four-axle vehicles, specifically “light” vehicles towing one and two-axle trailers such as those towing watercraft or landscaping equipment. Motorcycles will pay a 50 percent lower toll than current two-axle rates. Three and four-axle light vehicles will pay 25 and 17 percent, respectively, lower toll than current three and four-axle rates.

With the exception of the assumed payment type and classification changes listed above and temporary changes due to COVID-19, no other future toll rate changes were assumed in this MDTA system forecast for the forecasting period through FY 2030.

1.2.4 Civil Penalties

Before the pandemic MDTA assessed a $50 Civil Penalty per unpaid transaction for drivers that do not pay their video tolls within 45 days. A reduction in the Civil Penalty amount from $50 to $25 per unpaid transaction will be implemented for all unpaid transactions when NOTD mailing is resumed.

1.3 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, including recent trends due to the COVID-19 pandemic. Trends in different payment shares are also provided.

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.

Chapter 4, Forecasts by Facility, provides a summary of the underlying assumptions and methodology 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 MDTA facilities. The chapter also includes forecast for Other Revenue.

Chapter 5, Total Forecast Results, summarizes the forecasts for the MDTA system.

Chapter 6, Forecast Comparisons, provides a comparison of the updated forecasts to previous forecasts for the MDTA facilities.

Chapter 2
Historical Trends

This chapter includes the results of analysis of traffic, revenue, and payment type trends on the MDTA facilities. Analysis of traffic trends on other routes in Maryland is also provided for context. Recent historical data is especially important as an input to developing the updated forecast documented in this report. A critical factor in this forecast update is an assessment of the latest traffic impacts due to the ongoing COVID-19 pandemic. As such, this chapter begins with discussion and analysis of impacts on traffic on the MDTA system due to COVID-19.

2.1 MDTA Traffic Impacts Due to COVID-19

The COVID-19 pandemic is impacting nearly all aspects of society and the economy, including travel. Beginning in March, the pandemic caused significant reductions in transactions and revenue on toll facilities around the U.S., including on the MDTA system. **Table 2-1** provides COVID-19-related impact factors that are currently being discussed in the transportation industry that are likely causing impacts on MDTA traffic. The factors are grouped into positive, negative, and uncertain travel impacts. It should be noted that discussion of outcomes still remains uncertain related to the timing and magnitude of impacts for some factors, including those in the positive and negative categories. These factors will continue to be monitored given the evolving pandemic situation in Maryland and across the country. How the pandemic evolves and how responses to the pandemic change, including vaccine development, could change these factors. The COVID-19 pandemic and its impacts on underlying socioeconomic factors related to MDTA traffic is discussed in more detail in Chapter 3.

Table 2-1
Potential COVID-19 Impact Factors Related to MDTA Traffic

Positive Traffic Impacts		Negative Traffic Impacts		Uncertain Traffic Impacts	
Passenger Cars	**Commercial Vehicles**	**Passenger Cars**	**Commercial Vehicles**	**Passenger Cars**	**Commercial Vehicles**
• Health concerns with transit causing shifts to vehicular travel in urban areas • Lower fuel prices • Less carpooling in favor of single occupant travel due to health concerns	• Accelerated trends in e-commerce growth	• Reduced travel due to stay at home orders • Employment losses • Telecommuting, especially for white collar, relatively higher income jobs • Ongoing avoidance of less-critical travel due to health concerns • Accelerated trends in e-commerce growth • Lower population growth due to lower immigration	• Less shipping activitiy and deliveries related to declines in economic activity	• Potential shift to relatively more local vacation and leisure activity • Potential shifts in residential and job location patterns	• Potential supply chain changes, for example related to international trade

CDM Smith performed analysis using daily in-lane data from each of the MDTA facilities to determine impacts due to the COVID-19 pandemic. For the Legacy system, which includes several facilities with significant commercial vehicle usage, the analysis was conducted separately for passenger cars and commercial vehicles. The analysis methodology used is described below:

- The most recent raw daily in-lane traffic data for each of the MDTA facilities was obtained.
- Data by day for 2020 before the COVID-19 impact (from January to early March) was compared to similar data by day for 2019 to estimate the most recent actual 2019 to 2020 growth rate by facility (and passenger car versus commercial vehicle). Note that the 2019 to 2020 comparison was made by shifting the comparison dates to the same day of week rather than the same exact date. For example, Sunday March 1, 2020 was compared to Sunday March 3, 2019.
- The 2019 to 2020 pre-COVID-19 growth rates were applied to data by day from 2019 to the days corresponding to the 2020 days after the COVID-19 impact. This resulted in an estimate of 2020 traffic without the COVID-19 impact.
- Adjustments were made when necessary to better compare data. For example, the estimated 2020 without COVID-19 traffic was adjusted to account for the Easter weekend occurring at a different time in 2019 than 2020 and for Labor Day occurring earlier in September in 2019 compared to 2020.
- The estimated 2020 traffic was compared with actual 2020 traffic on a seven-day rolling average basis to estimate an impact due to COVID-19. This analysis methodology accounts for seasonal impacts on traffic, which are significant on some MDTA facilities.

The results of the impact analysis are shown in three figures below. **Figure 2-1** shows the results for Legacy system passenger cars, **Figure 2-2** for Legacy system commercial vehicles, and **Figure 2-3** for the ICC and I-95 ETLs.

Total Legacy system passenger car impacts are estimated to have bottomed on April 15th at about -63 percent, meaning that about 37 percent of normal passenger car traffic was retained on the system. The Kennedy Highway(I-95) experienced the most severe COVID-19 passenger car impacts in mid-April at about -80 percent and the Harbor Tunnel experienced the least severe passenger car impacts in mid-April. Ongoing construction on the Harbor Tunnel may be impacting the trend analysis, as well as on the parallel Fort McHenry Tunnel and Key Bridge facilities which receive some additional traffic that has diverted off the Harbor Tunnel. The construction was accounted for in the analysis methodology to a certain extent, but week-to week variations in construction-related maintenance of traffic may be impacting the trends beyond what can be accounted for. Between the most severe impact on April 15th and June, a steady recovery can be observed in passenger car traffic. Between April 15th and June 30th, the recovery averaged about 3.8 percentage points per week, reaching an impact of -20 percent in late June. Beginning in early July, the recovery plateaued. The Legacy systemwide average passenger car estimated impacts based on the most recent data in September are about -17 percent.

Figure 2-1
Legacy System Passenger Car Seven Day Rolling Average Impacts due to COVID-19

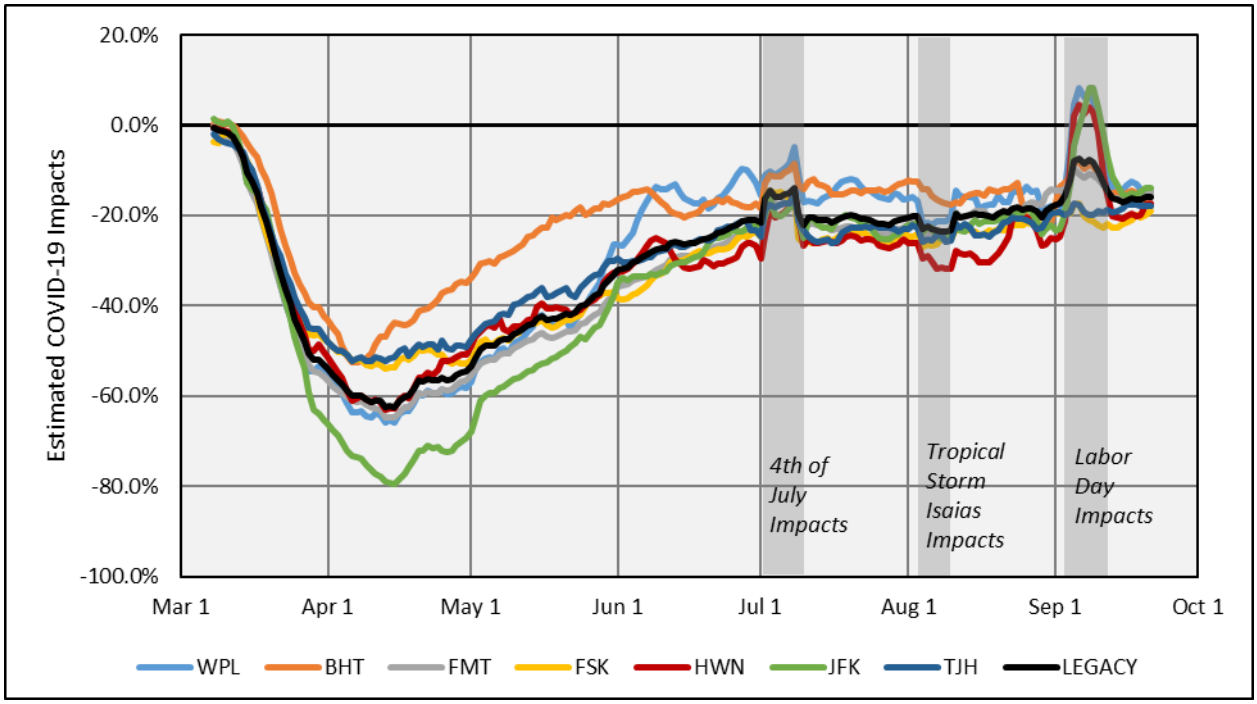


Figure 2-2
Legacy System Commercial Vehicle Seven Day Rolling Average Impacts due to COVID-19

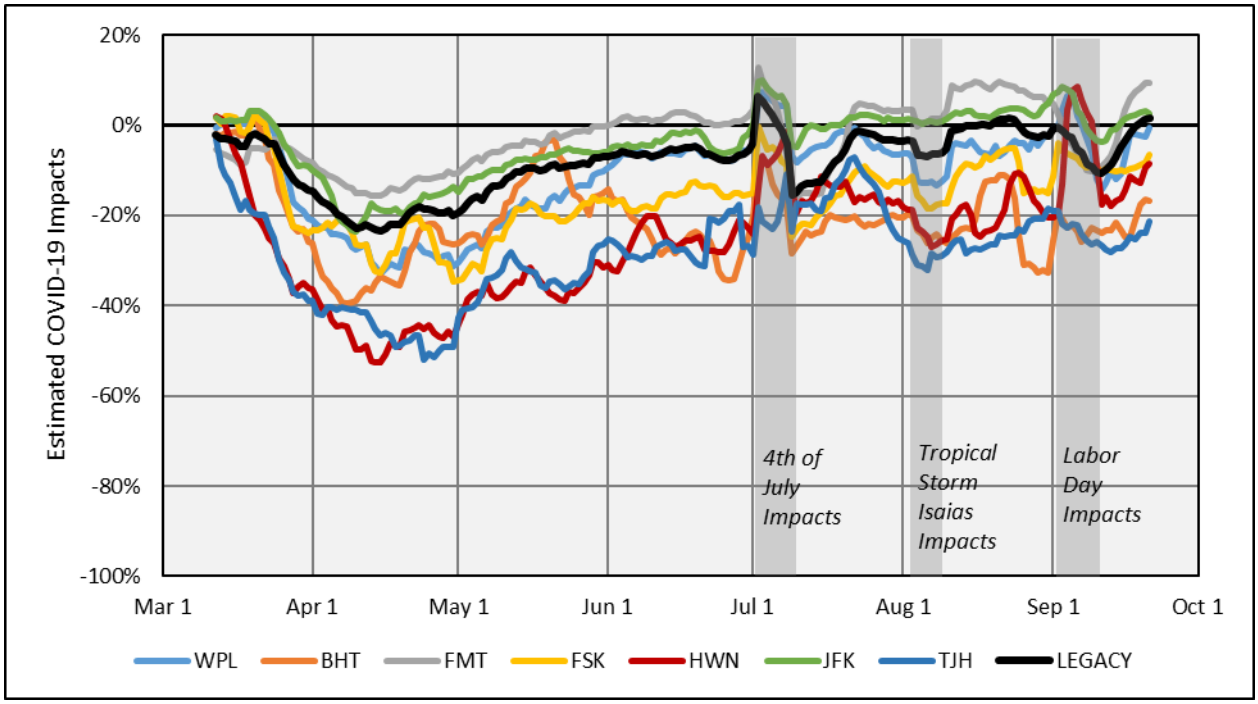
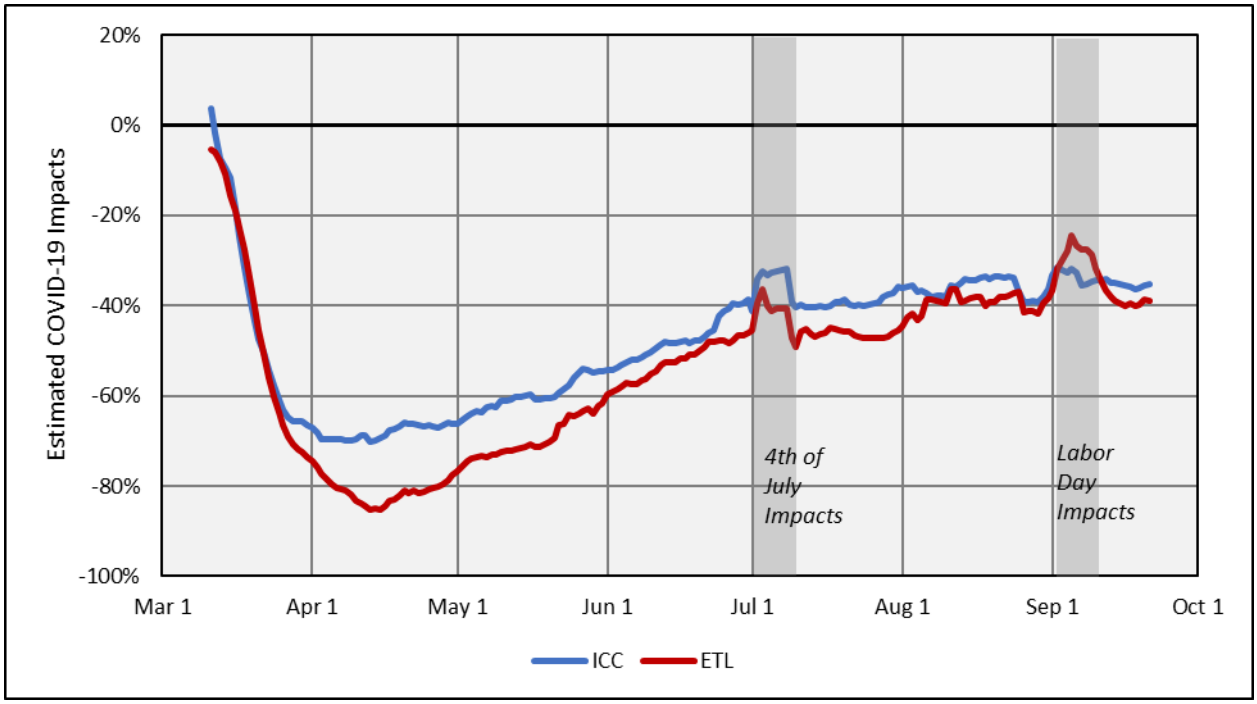


Figure 2-3
ICC and I-95 ETL Seven Day Rolling Average Impacts due to COVID-19



Improvement in the trends was observed over both the 4th of July and Labor Day holidays. Labor Day was especially strong (positive impact) on facilities that handle significant vacationing traffic including the Kennedy Highway, Bay Bridge, and Nice/Middleton Bridge. This is likely due in part to more local and regional vacationing over the holiday weekend.

Considering Legacy system commercial vehicles in **Figure 2-2**, impacts have been much less severe than passenger cars which also has been observed on other toll facilities around the country. Total Legacy system commercial vehicle impacts are estimated to have bottomed out on April 15th at about -23 percent, meaning that about 77 percent of normal commercial vehicle traffic was retained on the system. The Nice Bridge and Hatem Bridge experienced the most severe COVID-19 commercial vehicle impacts in mid-April at about -50 percent and the Fort McHenry Tunnel experienced the least severe mid-April COVID-19 commercial vehicle impacts at about -15 percent. Since the most severe impact in mid-April, a gradual recovery can be observed in commercial vehicle traffic. The Legacy systemwide trend has been generally positive since mid-August. In general, more variability is also observed in the trend analysis for commercial vehicles compared to passenger cars which is due to relatively small commercial vehicle volumes on some facilities, the Harbor Tunnel construction impacts mentioned previously, and potentially more variability in responses to shipping relating to quickly changing economic conditions.

As shown in **Figure 2-3,** total ICC impacts are estimated to be the most severe on April 15 at about -70 percent of normal traffic, which is more severe than the Legacy passenger car systemwide average. I-95 ETL impacts bottomed out at-85 percent, which is the most severe impact of any MDTA facility. Relatively more severe impacts have also been observed on similar priced managed lane-type facilities in other parts of the country. Between April 15 and the end of

June a steady recovery of about 2.8 percentage points per week and 3.6 percentage points per week was observed for the ICC and I-95 ETLs, respectively. Since then, the recovery has been more gradual. Most recently the COVID-19 impacts are estimated to be -35 percent for the ICC and -40 percent for the I-95 ETLs.

Table 2-2 summarizes the average estimated COVID-19 impacts by month shown for each of the MDTA facilities.

Table 2-2
Summary of Estimated Average COVID-19 Impacts by Month

Month	Legacy System Passenger Cars	Legacy System Commercial Vehicles	Intercounty Connector	I-95 ETL
March	-19%	-4%	-27%	-29%
April	-58%	-20%	-68%	-81%
May	-43%	-11%	-60%	-70%
June	-27%	-6%	-49%	-53%
July	-20%	-5%	-38%	-45%
August	-20%	-2%	-36%	-40%

2.2 Maryland Vehicle Miles Traveled

Vehicle miles traveled (VMT) trends were reviewed to better understand the general trends in traffic growth nationally and within Maryland. The Federal Highway Administration develops annual estimates of national and state-wide VMT by roadway type, which have been summarized in **Table 2-3** for years 2007 through 2019 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 Great Recession impacted years (2007 to 2009) and years following (2009 to 2019). In general, the trends indicate that total national and statewide Maryland VMT growth is similar. However, growth on Maryland's interstate highways has been much lower than the U.S. average between 2009 and 2019, at 0.6 percent per annum versus 1.5 percent per annum, respectively. Growth in the last decade on the Maryland interstate system is still occurring, albeit at a lower rate than the nation. 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.

These trends in VMT since 2007 are different from pre-2007 long-term historical trends (not shown on this table). Before the mid-2000s, VMT had been growing regionally and nationally by about 2 percent per year. In the years following the Great Recession VMT growth was about half of this, at 0.9 percent nationally and 0.8 percent in Maryland. These changes are indicative of changes in travel driven by underlying socioeconomic factors in Maryland and the U.S. Similar to the changes observed after the Great Recession, the potential for long-term changes in travel due to the ongoing COVID-19 pandemic will continue to be closely monitored.

Table 2-3

National and Statewide Trends in Vehicle Miles Traveled

Calendar Year	United States [1]					Maryland				
	Interstate			Total		Interstate			Total	
	VMT (Millions)	Percent Change	Percent of Total	VMT (Millions)	Percent Change	VMT (Millions)	Percent Change	Percent of Total	VMT (Millions)	Percent Change
2007	745,457	-	24.4	3,049,027	-	17,015	-	30.1	56,503	-
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	59,892	1.3
2018	833,803	1.1	25.6	3,255,347	0.9	17,928	(0.1)	30.0	59,775	(0.2)
2019 [2]	836,200	0.3	25.6	3,269,008	0.4	18,051	0.7	30.0	60,230	0.8
Average Annual Percent Change										
2007 to 2009		(1.5)			(1.2)		(0.1)			(1.1)
2009 to 2019		1.5			0.9		0.6			0.8

2005-2018 VMT Data source: Table VM-2, Highway Statistics 1994-2017, USDOT FHWA Office of Policy Information.

2019 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 2019, and was estimated on the average of 2017 and 2018 interstate miles as a percent of total VMT.

2.3 MDTA Transaction and Revenue Trends

This section provides a review of the historical toll transaction/trip trends and toll revenue trends for each of the seven MDTA Legacy facilities, I-95 Express Toll Lanes (ETLs), and the Intercounty Connector (ICC). Toll revenue is the revenue that is collected by transponder or by various forms of video payment (and formerly by in-lane cash payment) for payment of published toll rates. Other revenue includes a combination of revenue collected and revenue deductions from unused Commuter Plan and Shoppers Plan trips, transponder fees and sales, the Hatem Bridge E-ZPass program, violation recovery (civil penalties), commercial vehicle fees and discounts (post-usage discount, high frequency discount, and over-sized permit fees), and concessions. The historical transaction/trip and revenue trends by facility for passenger cars, commercial vehicles and total traffic are presented by fiscal year in **Table 2-4**, **Table 2-5**, and **Table 2-6**, respectively. The historical transaction/trip and revenue trends for total vehicles by facility are graphically presented in **Figure 2-4.**

Table 2-4
MDTA Passenger Car Historic Transactions and Toll Revenue

Fiscal Year	Hatem Bridge		Kennedy Highway		Harbor Tunnel		Fort McHenry Tunnel		Key Bridge		Bay Bridge		Nice/Middleton Bridge		ICC [1]		I-95 ETL [1]	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Passenger Car Transactions (in millions)																		
2007	5.286	-	12.874	-	24.891	-	40.945	-	10.970	-	12.409	-	3.112	-	-	-	-	-
2008	5.296	0.2	12.722	(1.2)	24.921	0.1	40.879	(0.2)	11.093	1.1	12.312	(0.8)	3.107	(0.2)	-	-	-	-
2009	4.942	(6.7)	12.794	0.6	24.795	(0.5)	39.851	(2.5)	10.601	(4.4)	11.902	(3.3)	3.097	(0.3)	-	-	-	-
2010	4.890	(1.1)	12.977	1.4	24.553	(1.0)	40.583	1.8	9.953	(6.1)	12.093	1.6	3.134	1.2	-	-	-	-
2011	4.961	1.4	13.565	4.5	25.397	3.4	42.704	5.2	10.587	6.4	12.608	4.3	3.181	1.5	-	-	-	-
2012	4.884	(1.5)	13.154	(3.0)	25.113	(1.1)	41.103	(3.7)	10.048	(5.1)	12.766	1.3	3.100	(2.5)	-	-	-	-
2013	4.391	(10.1)	12.912	(1.8)	23.414	(6.8)	40.116	(2.4)	9.982	(0.7)	11.865	(7.1)	3.071	(0.9)	-	-	-	-
2014	4.779	8.8	12.690	(1.7)	24.325	3.9	38.290	(4.6)	9.427	(5.6)	11.878	0.1	3.040	(1.0)	-	-	-	-
2015	5.064	6.0	13.022	2.6	26.517	9.0	38.353	0.2	9.632	2.2	12.008	1.1	3.095	1.8	-	-	-	-
2016	4.880	(3.6)	13.401	2.9	27.653	4.3	38.876	1.4	10.185	5.7	12.398	3.2	3.172	2.5	-	-	-	-
2017	4.893	0.3	13.745	2.6	26.974	(2.5)	41.381	6.4	10.257	0.7	12.692	2.4	3.209	1.2	31.758	-	8.614	-
2018	4.881	(0.2)	13.576	(1.2)	27.327	1.3	40.546	(2.0)	10.330	0.7	12.631	(0.5)	3.123	(2.7)	33.433	5.3	8.915	3.5
2019	4.869	(0.2)	13.316	(1.9)	20.254	(25.9)	43.955	8.4	11.674	13.0	12.706	0.6	3.104	(0.6)	35.231	5.4	9.331	4.7
2020	4.182	(14.1)	10.669	(19.9)	13.709	(32.3)	38.242	(13.0)	10.793	(7.5)	10.723	(15.6)	2.481	(20.1)	31.850	(9.6)	7.341	(21.3)
Passenger Car Revenue (in millions of dollars)																		
2007	1.119	-	58.915	-	29.926	-	56.924	-	10.805	-	24.652	-	7.154	-	-	-	-	-
2008	1.242	11.1	58.013	(1.5)	30.320	1.3	56.381	(1.0)	10.822	0.2	24.452	(0.8)	7.055	(1.4)	-	-	-	-
2009	1.255	1.0	58.467	0.8	30.840	1.7	55.224	(2.1)	10.512	(2.9)	23.740	(2.9)	7.020	(0.5)	-	-	-	-
2010	1.468	16.9	59.246	1.3	31.141	1.0	57.211	3.6	10.299	(2.0)	24.510	3.2	7.190	2.4	-	-	-	-
2011	1.622	10.5	59.906	1.1	31.856	2.3	58.288	1.9	10.658	3.5	25.105	2.4	7.233	0.6	-	-	-	-
2012	2.354	45.1	67.640	12.9	42.558	33.6	75.089	28.8	13.800	29.5	31.786	26.6	8.589	18.7	-	-	-	-
2013	3.993	69.6	73.602	8.8	46.871	10.1	87.559	16.6	16.450	19.2	36.113	13.6	9.577	11.5	-	-	-	-
2014	5.007	25.4	94.931	29.0	69.466	48.2	114.982	31.3	22.863	39.0	54.346	50.5	14.616	52.6	-	-	-	-
2015	5.113	2.1	97.301	2.5	77.033	10.9	115.294	0.3	24.330	6.4	55.630	2.4	15.198	4.0		-	-	-
2016	5.279	3.2	98.677	1.4	80.650	4.7	115.994	0.6	24.474	0.6	35.598	(36.0)	15.156	(0.3)	54.197	-	10.054	-
2017	5.619	6.5	101.363	2.7	80.207	(0.5)	124.262	7.1	25.478	4.1	36.562	2.7	15.419	1.7	58.795	8.5	10.765	7.1
2018	5.215	(7.2)	100.008	(1.3)	81.602	1.7	121.604	(2.1)	25.670	0.8	36.294	(0.7)	14.947	(3.1)	61.320	4.3	11.055	2.7
2019	5.298	1.6	97.883	(2.1)	61.575	(24.5)	132.376	8.9	29.335	14.3	36.714	1.2	14.897	(0.3)	62.688	2.2	11.529	4.3
2020	4.852	(8.4)	77.730	(20.6)	40.715	(33.9)	113.816	(14.0)	26.513	(9.6)	30.174	(17.8)	12.012	(19.4)	51.830	(17.3)	8.820	(23.5)

[1] Data for the ICC and I-95 ETL are presented beginning in FY 2017 for trips and FY 2016 for revenue due to vehicle class availability in data reporting. ICC transactions reported are trips.

Table 2-5
MDTA Commercial Vehicle Historic Transactions and Toll Revenue

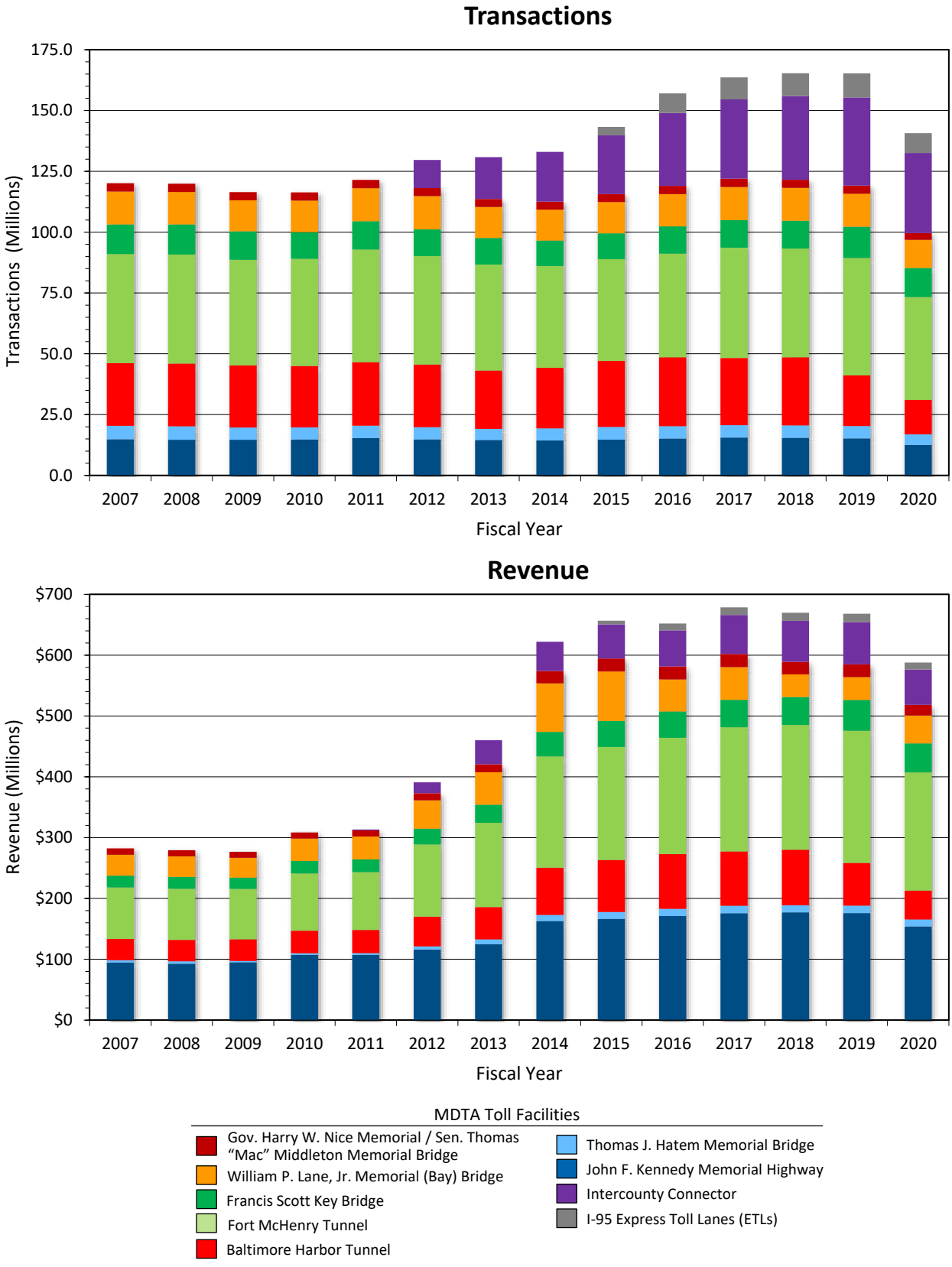
Fiscal Year	Hatem Bridge		Kennedy Highway		Harbor Tunnel		Fort McHenry Tunnel		Key Bridge		Bay Bridge		Nice/Middleton Bridge		ICC [1]		I-95 ETL [1]	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Commercial Vehicle Transactions (in millions)																		
2007	0.276	-	1.966	-	0.849	-	3.909	-	1.233	-	1.086	-	0.306	-	-	-	-	-
2008	0.260	(5.6)	1.930	(1.8)	0.850	0.1	3.950	1.1	1.250	1.3	1.058	(2.5)	0.284	(7.3)	-	-	-	-
2009	0.098	(62.1)	1.848	(4.2)	0.739	(13.1)	3.595	(9.0)	1.087	(13.0)	0.850	(19.7)	0.250	(12.0)	-	-	-	-
2010	0.103	4.9	1.773	(4.1)	0.672	(9.0)	3.480	(3.2)	1.006	(7.5)	0.901	6.0	0.220	(12.1)	-	-	-	-
2011	0.110	6.3	1.810	2.1	0.720	7.1	3.590	3.2	1.060	5.4	0.950	5.4	0.220	0.1	-	-	-	-
2012	0.150	36.6	1.670	(7.7)	0.637	(11.6)	3.420	(4.7)	1.000	(5.7)	0.900	(5.3)	0.190	(13.6)	-	-	-	-
2013	0.172	15.0	1.670	-	0.558	(12.3)	3.460	1.2	0.940	(6.0)	0.871	(3.2)	0.190	-	-	-	-	-
2014	0.169	(1.8)	1.687	1.0	0.568	1.6	3.586	3.6	0.993	5.6	0.881	1.1	0.203	7.0	-	-	-	-
2015	0.182	7.3	1.668	(1.1)	0.580	2.2	3.494	(2.6)	0.995	0.2	0.847	(3.8)	0.211	3.5	-	-	-	-
2016	0.210	15.6	1.762	5.7	0.633	9.1	3.763	7.7	1.010	1.5	0.874	3.2	0.209	(0.6)	-	-	-	-
2017	0.210	(0.2)	1.803	2.3	0.639	0.8	3.999	6.3	1.054	4.4	0.895	2.4	0.210	0.5	0.875	-	0.400	-
2018	0.205	(2.3)	1.875	4.0	0.685	7.3	4.174	4.4	1.096	3.9	0.887	(0.8)	0.203	(3.7)	0.968	10.6	0.478	19.5
2019	0.220	7.3	1.889	0.7	0.585	(14.6)	4.292	2.8	1.153	5.2	0.887	(0.1)	0.211	4.0	1.056	9.1	0.538	12.5
2020	0.212	(3.7)	1.830	(3.1)	0.459	(21.5)	4.055	(5.5)	1.142	(0.9)	0.824	(7.1)	0.177	(15.8)	1.096	3.8	0.448	(16.6)
Commercial Vehicle Revenue (in millions)																		
2007	2.699	-	35.704	-	5.183	-	27.761	-	8.437	-	9.741	-	3.277	-	-	-	-	-
2008	2.652	(1.7)	34.695	(2.8)	5.007	(3.4)	27.652	(0.4)	8.586	1.8	9.427	(3.2)	3.024	(7.7)	-	-	-	-
2009	0.811	(69.4)	36.671	5.7	4.770	(4.7)	27.746	0.3	8.051	(6.2)	8.770	(7.0)	2.750	(9.1)	-	-	-	-
2010	1.145	41.2	48.103	31.2	5.869	23.0	36.809	32.7	10.238	27.2	12.284	40.1	2.956	7.5	-	-	-	-
2011	1.197	4.5	47.484	(1.3)	5.995	2.1	37.029	0.6	10.117	(1.2)	12.512	1.9	2.916	(1.4)	-	-	-	-
2012	2.896	142.0	48.370	1.9	6.176	3.0	43.730	18.1	12.020	18.8	14.956	19.5	3.011	3.3	-	-	-	-
2013	3.972	37.2	51.104	5.7	6.203	0.5	51.125	16.9	13.170	9.6	17.263	15.4	3.588	19.1	-	-	-	-
2014	5.168	30.1	67.872	32.8	8.093	30.5	68.147	33.3	17.396	32.1	25.410	47.2	5.781	61.1	-	-	-	-
2015	6.076	17.6	69.234	2.0	8.505	5.1	70.486	3.4	18.645	7.2	25.529	0.5	6.214	7.5		-		-
2016	6.524	7.4	72.499	4.7	9.222	8.4	75.293	6.8	18.805	0.9	17.193	(32.7)	6.047	(2.7)	5.116	-	1.331	-
2017	6.468	(0.9)	74.448	2.7	9.254	0.3	79.920	6.1	19.464	3.5	17.399	1.2	6.046	(0.0)	5.522	7.9	1.713	28.7
2018	6.368	(1.6)	77.192	3.7	9.786	5.8	83.458	4.4	20.208	3.8	17.136	(94.9)	5.794	(4.2)	6.190	12.1	2.093	22.2
2019	6.874	8.0	78.103	1.2	8.690	(11.2)	85.073	1.9	21.196	4.9	17.030	(0.1)	6.072	4.8	6.627	7.1	2.392	14.3
2020	6.534	(5.0)	76.356	(2.2)	6.794	(21.8)	80.530	(5.3)	21.036	(0.8)	15.823	(7.1)	5.307	(12.6)	6.312	(4.8)	1.931	(19.3)

[1] Data for the ICC and I-95 ETL are presented beginning in FY 2017 for trips and FY 2016 for revenue due to vehicle class availability in data reporting. ICC transactions reported are trips.

Table 2-6
MDTA Total Traffic Historic Transactions and Toll Revenue

Fiscal Year	Hatem Bridge		Kennedy Highway		Harbor Tunnel		Fort McHenry Tunnel		Key Bridge		Bay Bridge		Nice/Middleton Bridge		ICC [1]		I-95 ETL	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
Total Transactions (in millions)																		
2007	5.561	-	14.840	-	25.740	-	44.854	-	12.203	-	13.494	-	3.418	-	-	-	-	-
2008	5.556	(0.1)	14.652	(1.3)	25.771	0.1	44.829	(0.1)	12.343	1.1	13.370	(0.9)	3.391	(0.8)	-	-	-	-
2009	5.040	(9.3)	14.642	(0.1)	25.534	(0.9)	43.446	(3.1)	11.688	(5.3)	12.752	(4.6)	3.347	(1.3)	-	-	-	-
2010	4.993	(0.9)	14.750	0.7	25.226	(1.2)	44.063	1.4	10.959	(6.2)	12.994	1.9	3.354	0.2	-	-	-	-
2011	5.070	1.5	15.375	4.2	26.117	3.5	46.294	5.1	11.647	6.3	13.558	4.3	3.401	1.4	-	-	-	-
2012	5.034	(0.7)	14.824	(3.6)	25.750	(1.4)	44.523	(3.8)	11.048	(5.1)	13.666	0.8	3.290	(3.3)	11.562	-	-	-
2013	4.563	(9.4)	14.582	(1.6)	23.973	(6.9)	43.576	(2.1)	10.922	(1.1)	12.736	(6.8)	3.261	(0.9)	17.198	48.7	-	-
2014	4.948	8.4	14.377	(1.4)	24.893	3.8	41.875	(3.9)	10.419	(4.6)	12.759	0.2	3.243	(0.6)	20.476	19.1	-	-
2015	5.246	6.0	14.690	2.2	27.098	8.9	41.847	(0.1)	10.627	2.0	12.856	0.8	3.305	1.9	24.118	17.8	3.483	-
2016	5.090	(3.0)	15.163	3.2	28.287	4.4	42.639	1.9	11.195	5.3	13.272	3.2	3.381	2.3	29.975	24.3	8.048	131.0
2017	5.102	0.2	15.548	2.5	27.612	(2.4)	45.380	6.4	11.311	1.0	13.587	2.4	3.419	1.1	32.634	8.9	9.014	12.0
2018	5.086	(0.3)	15.451	(0.6)	28.012	1.4	44.720	(1.5)	11.425	1.0	13.518	(0.5)	3.325	(2.8)	34.401	5.4	9.393	4.2
2019	5.089	0.1	15.205	(1.6)	20.839	(25.6)	48.247	7.9	12.827	12.3	13.593	0.5	3.315	(0.3)	36.287	5.5	9.868	5.1
2020	4.394	(13.6)	12.499	(17.8)	14.168	(32.0)	42.297	(12.3)	11.935	(6.9)	11.547	(15.1)	2.658	(19.8)	32.946	(9.2)	7.789	(21.1)
Total Revenue (in millions of dollars)																		
2007	3.817	-	94.619	-	35.109	-	84.685	-	19.243	-	34.393	-	10.432	-	-	-	-	-
2008	3.894	2.0	92.707	(2.0)	35.328	0.6	84.032	(0.8)	19.408	0.9	33.879	(1.5)	10.079	(3.4)	-	-	-	-
2009	2.066	(46.9)	95.138	2.6	35.610	0.8	82.970	(1.3)	18.563	(4.4)	32.510	(4.0)	9.770	(3.1)	-	-	-	-
2010	2.613	26.5	107.349	12.8	37.010	3.9	94.020	13.3	20.537	10.6	36.794	13.2	10.146	3.8	-	-	-	-
2011	2.819	7.9	107.390	0.0	37.851	2.3	95.316	1.4	20.775	1.2	37.617	2.2	10.149	0.0	1.474	-	-	-
2012	5.250	86.2	116.010	8.0	48.734	28.8	118.819	24.7	25.820	24.3	46.742	24.3	11.601	14.3	18.063	1,125.4	-	-
2013	7.966	51.7	124.706	7.5	53.074	8.9	138.684	16.7	29.619	14.7	53.376	14.2	13.165	13.5	39.586	119.2	-	-
2014	10.174	27.7	162.803	30.5	77.559	46.1	183.130	32.0	40.260	35.9	79.756	49.4	20.397	54.9	48.029	21.3	-	-
2015	11.189	10.0	166.535	2.3	85.538	10.3	185.780	1.4	42.975	6.7	81.159	1.8	21.412	5.0	56.018	16.6	6.146	-
2016	11.803	5.5	171.176	2.8	89.872	5.1	191.287	3.0	43.279	0.7	52.791	(35.0)	21.203	(1.0)	59.312	5.9	11.385	85.3
2017	12.087	2.4	175.811	2.7	89.461	(0.5)	204.182	6.7	44.942	3.8	53.960	2.2	21.465	1.2	64.317	8.4	12.478	9.6
2018	11.582	(4.2)	177.199	0.8	91.388	2.2	205.063	0.4	45.878	2.1	53.429	(1.0)	20.741	(3.4)	67.511	5.0	13.148	5.4
2019	12.172	5.1	175.987	(0.7)	70.265	(23.1)	217.449	6.0	50.531	10.1	53.744	0.6	20.968	1.1	69.316	2.7	13.921	5.9
2020	11.386	(6.5)	154.086	(12.4)	47.509	(32.4)	194.346	(10.6)	47.549	(5.9)	45.997	(14.4)	17.319	(17.4)	58.142	(16.1)	10.751	(22.8)

[1] ICC transactions reported are trips.



HISTORICAL TRANSACTIONS AND TOLL REVENUE BY FACILITY

FIGURE 2-4

Table 2-7 summarizes the average annual percent change in passenger car and commercial vehicle transactions and revenue trends by facility during the Great Recession years (FY 2007 to 2009) and post-recession years (FY 2009 to 2019) for the Legacy facilities, based on the data provided in **Table 2-4** and **Table 2-5**. For all facilities, including the ICC and I-95 ETL, average annual percent change in passenger car and commercial vehicles transactions/trips and revenue are shown for the period from 2017 to 2019 due to data by vehicle class availability for the ICC and I-95 ETLs. Additionally, FY 2019 to 2020 is shown for all facilities to isolate the AAPC for the period including the beginning of the COVID-19 pandemic impacts.

Table 2-7
Average Annual Percent Change by Facility

Fiscal Year	Hatem Bridge	Kennedy Highway	Harbor Tunnel	Fort McHenry Tunnel	Key Bridge	Bay Bridge	Nice/ Middleton Bridge	ICC [1]	I-95 ETL [1]
Passenger Car Transactions (in millions)									
2007 to 2009	(3.3)	(0.3)	(0.2)	(1.3)	(1.7)	(2.1)	(0.2)	-	-
2009 to 2019	(0.1)	0.4	(2.0)	1.0	1.0	0.7	0.0	-	-
2017 to 2019	(0.2)	(1.6)	(13.3)	3.1	6.7	0.1	(1.6)	5.3	4.1
2019 to 2020	(14.1)	(19.9)	(32.3)	(13.0)	(7.5)	(15.6)	(20.1)	(9.6)	(21.3)
Passenger Car Revenue (in millions of dollars)									
2007 to 2009	14.8	(1.0)	3.8	(3.8)	(3.4)	(4.7)	(2.4)	-	-
2009 to 2019	38.7	13.2	17.9	22.8	27.0	11.1	19.5	-	-
2017 to 2019	(2.9)	(1.7)	(12.4)	3.2	7.3	0.2	(1.7)	3.3	3.5
2019 to 2020	(8.4)	(20.6)	(33.9)	(14.0)	(9.6)	(17.8)	(19.4)	(17.3)	(23.5)
Commercial Vehicle Transactions (in millions)									
2007 to 2009	(40.2)	(3.0)	(6.7)	(4.1)	(6.1)	(11.5)	(9.7)	-	-
2009 to 2019	8.4	0.2	(2.3)	1.8	0.6	0.4	(1.7)	-	-
2017 to 2019	2.4	2.3	(4.3)	3.6	4.6	(0.4)	0.1	9.8	16.0
2019 to 2020	(3.7)	(3.1)	(21.5)	(5.5)	(0.9)	(7.1)	(15.8)	3.8	(16.6)
Commercial Vehicle Revenue (in millions of dollars)									
2007 to 2009	(112.9)	3.4	(10.2)	(0.1)	(5.8)	(12.8)	(21.0)	-	-
2009 to 2019	59.6	19.6	15.5	29.6	25.4	17.2	20.6	-	-
2017 to 2019	3.1	2.4	(3.1)	3.2	4.4	(1.1)	0.2	9.6	18.2
2019 to 2020	(5.0)	(2.2)	(21.8)	(5.3)	(0.8)	(7.1)	(12.6)	(4.8)	(19.3)

[1] AAPC for ICC and I-95 ETL transactions/trips and revenue presented beginning FY 2017 due to vehicle class data availability.

As shown in **Table 2-7**, between FY 2007 and FY 2009, the passenger car transactions decreased on all seven legacy facilities, with the largest decrease of 3.3 percent per annum on the Hatem bridge. The smallest decrease in passenger car transactions during this period was 0.2 percent per annum on the Harbor Tunnel and Nice/Middleton Bridge. The commercial vehicle transactions decreased significantly between FY 2007 and FY 2009 on all the legacy facilities, with the largest decrease of 40.2 percent per annum on the Hatem Bridge. Following these decreases associated with the Great Recession, continued economic uncertainty and several toll increases resulted in the total Legacy system transactions decreasing by 3.4 percent from 116.5 million in FY 2009 to 112.5 million in FY 2014. Due to the toll increases, the Legacy system revenue grew from about 277 million in FY 2009 to 595 million in FY 2015. Total transactions increased by 2.8 percent in FY 2015 reaching FY 115.7

million, mostly due to the high growth on Hatem Bridge and Baltimore Harbor Tunnel, where transactions increased by 6.0 percent and 8.9 percent respectively, compared to FY 2014. Similarly, the Legacy system transactions grew by 2.9 percent in FY 2016 and 2.5 percent in FY 2017 compared to previous years. The revenue decreased in FY 2016 by 2.2 percent due to the toll decrease implemented on July 1, 2015. The traffic increases between FY 2015 and FY 2017 on the system were the result of strong economic performance and the FY 2016 toll decrease. This upward trend came to an end in FY 2018, when the system transactions decreased by 0.3 percent. In FY 2019, the transactions decreased further by 2.0 percent, driven especially by the 25.6 drop in transactions on the Baltimore Harbor Tunnel due to construction. Revenue followed a similar trend decreasing by 2.1 percent and 0.7 percent in FY 2018 and FY 2019 respectively. Overall, between FY 2009 and FY 2019, the total legacy system transactions increased by 0.2 percent per annum and revenue increased by 7.8 per annum. Beginning in March 2020, the COVID-19 pandemic caused significant reductions in traffic on the MDTA system. This has caused the FY 2020 Legacy system transaction to decrease by 16.5 percent and revenue to decrease by 13.8 percent compared to FY 2019.

For the Intercounty Connector, tolling began on the second segment of the ICC from MD-97/Georgia Avenue to I-95 in FY 2012, making FY 2013 the first full fiscal year of I-370 to I-95 operations on the ICC. Trips then increased by 19.1 percent in FY 2014. This was due primarily to facility "ramp-up," when motorists adjust their travel patterns over time as they become aware of a new facility and the benefits that it offers over their current route of travel. This ramp-up period continued into FY 2015, with a 17.8 percent growth in trips and a 16.6 percent growth in toll revenue. FY 2015 growth also included the opening of the final segment of the ICC in November 2014; a 1.53-mile extension on the eastern end between I-95 and US 1. Trips in FY 2016 grew at a faster rate than FY 2015, which can be attributed in part to the toll reduction implemented on July 1, 2015. Toll revenue for FY 2016 was 5.9 percent higher than FY 2015, which reflects continued robust growth in trips offset in part by the negative revenue impact of the lower tolls. Trips growth for FY 2017 was strong at 8.9 percent. FY 2018 and FY 2019 had trips growth at 5.4 and 5.5 percent, respectively. This strong growth is likely due to increasing regional population and employment as well as the ICC serving as a congestion relief route as an uncongested facility in a region where congestion is growing. As was seen with the Legacy facilities, due to the COVID-19 pandemic, there was a 9.2 decrease in trips and 16.1 percent decrease in revenue in FY 2020 compared to FY 2019.

The I-95 ETLs opened in FY 2015, and FY 2016 was the first full fiscal year of operations. In FY 2017, transactions and revenue on the ETLs increased by 12.0 percent and 9.6 percent, respectively, compared to FY 2016. This was due primarily to facility ramp-up, the phenomenon that occurs with the opening of a new facility as explained above. This growth continued in FY 2018 and FY 2019, when transactions increased by 4.2 percent and 5.1 percent, respectively, over their previous years. Revenue grew at slightly higher levels than transactions with a 5.4 percent growth in FY 2018 and 5.9 percent growth in FY 2019. Due to COVID-19 pandemic, FY 2020 transactions and revenue decreased significantly by 21.1 percent and 22.8 percent, respectively, compared to FY 2019.

2.4 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 2007. 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 average annual daily traffic volumes and associated growth rates at each location. Historical average annual daily traffic volumes and annual growth rates on six Maryland State Highway Authority (MSHA) roadways and one Virginia roadway are presented in **Table 2-8**. Volumes are provided through 2019.

As shown in **Table 2-8**, the traffic volumes on the northern region MSHA roadway, US 1 (east of Cedar Church Road), followed a more positive trend compared to the northern MDTA facilities, with a growth of 1.1 percent between 2009 and 2019. This compares to a transaction growth of 0.4 percent for passenger cars and 0.2 percent for commercial vehicles during this period on the Kennedy highway. Toll increases implemented during this period would contribute to the more modest growth trends on the MDTA facilities.

The historical average annual daily traffic volumes and annual growth rates for the central region MSHA roadways are represented in **Table 2-8** by I-95 (N of MD 100), I-97 (N of MD 176) and I-695 (E of MD 146), which are all located in the Baltimore area. Traffic volumes on the 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. Traffic volume decreases on the central MDTA facilities also occurred in years 2012 and 2013 due to toll rate increases. Overall, during the great recession years (2007 to 2009), traffic decreased by an average of 0.1 percent and 1.3 percent per year on central region MSHA and MDTA facilities, respectively. During the 2009 to 2019 post-recession period, traffic has increased by 0.2 percent on the MDTA facilities and 0.5 percent on the MSHA facilities in the central region.

The historical average annual daily traffic volumes and annual growth rates on one southern region MSHA roadway is represented by US 301 (South of MD 234) in **Table 2-8**. Due to the proximity of the Bay Bridge (US 50) to Virginia, one traffic count location in northern Virginia has also been included in the table. On an average, traffic volumes on the two southern region MDTA facilities (Bay Bridge and Nice/Middleton Bridge) have grown higher than the comparison locations. During the 2009 to 2019 post-recession period, traffic has increased modestly, averaging 0.5 percent per annum on the MDTA facilities and 0.1 percent on the combined MSHA and VDOT facilities. Traffic volume decreases on the southern MDTA facilities occurred in years 2012 and 2013 due to toll rate increases. Following this, both on the MDTA and on the combined Southern Region MSHA and Virginia facilities, traffic has grown at relatively higher levels. Between 2015 and 2017 growth averaged 2.1 percent on the two southern MDTA facilities and 1.6 percent on the MSHA and Virginia roads. Since then, traffic has been flat or declined on both southern region MDTA and MSHA facilities.

Trends over the past 13-year period for both the MDTA system and the other major highways were used as a guide in estimating the ten-year traffic growth for the traffic and revenue forecasts presented in Chapter 4.

Table 2-8
Average Annual Daily Traffic Trends on Major Highways

Calendar Year	US 1 E of Cedar Church Rd.		I-95 N of MD 100		I-97 N of MD 176		I-695 E of MD 146		MD 295 N of MD 100		US 301 S of MD 234		I-95 (Virginia) N of Courthouse Rd	
	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change	Value	Change
2007	11,600	-	191,900	-	102,600	-	155,300	-	91,600	-	22,500	-	137,000	-
2008	11,100	(4.3)	188,000	(2.0)	100,600	(1.9)	152,200	(2.0)	88,900	(2.9)	21,400	(4.9)	133,000	(2.9)
2009	11,300	1.8	192,100	2.2	105,100	4.5	153,700	1.0	88,900	-	21,800	1.9	136,000	2.3
2010	10,100	(10.6)	192,900	0.4	105,500	0.4	150,900	(1.8)	89,400	0.6	22,500	3.2	136,000	-
2011	9,900	(2.0)	193,100	0.1	105,600	0.1	151,000	0.1	93,400	4.5	22,100	(1.8)	135,000	(0.7)
2012	9,900	-	191,300	(0.9)	106,200	0.6	151,800	0.5	92,600	(0.9)	22,100	-	135,000	-
2013	9,300	(6.1)	193,000	0.9	107,200	0.9	149,500	(1.5)	92,800	0.2	20,800	(5.9)	132,000	(2.2)
2014	9,300	-	192,800	(0.1)	107,100	(0.1)	149,300	(0.1)	107,700	16.1	20,800	-	131,000	(0.8)
2015	10,100	8.6	207,300	7.5	111,800	4.4	160,500	7.5	108,500	0.7	22,600	8.7	134,000	2.3
2016	11,500	13.9	201,600	(2.7)	108,700	(2.8)	150,200	(6.4)	103,300	(4.8)	21,900	(3.1)	136,000	1.5
2017	11,800	2.6	206,400	2.4	111,300	2.4	153,800	2.4	105,400	2.0	22,400	2.3	137,000	0.7
2018	11,700	(0.8)	205,200	(0.6)	121,100	8.8	152,900	(0.6)	104,500	(0.9)	22,200	(0.9)	136,000	(0.7)
2019	12,600	7.7	180,200	(12.2)	122,000	0.7	161,300	5.5	104,500	-	21,800	(1.8)	137,000	0.7
Average Annual Percent Change														
2007 to 2009		(1.3)		0.1		1.2		(0.5)		(1.5)		(1.6)		(0.4)
2009 to 2019		1.1		(0.6)		1.5		0.5		1.6		-		0.1

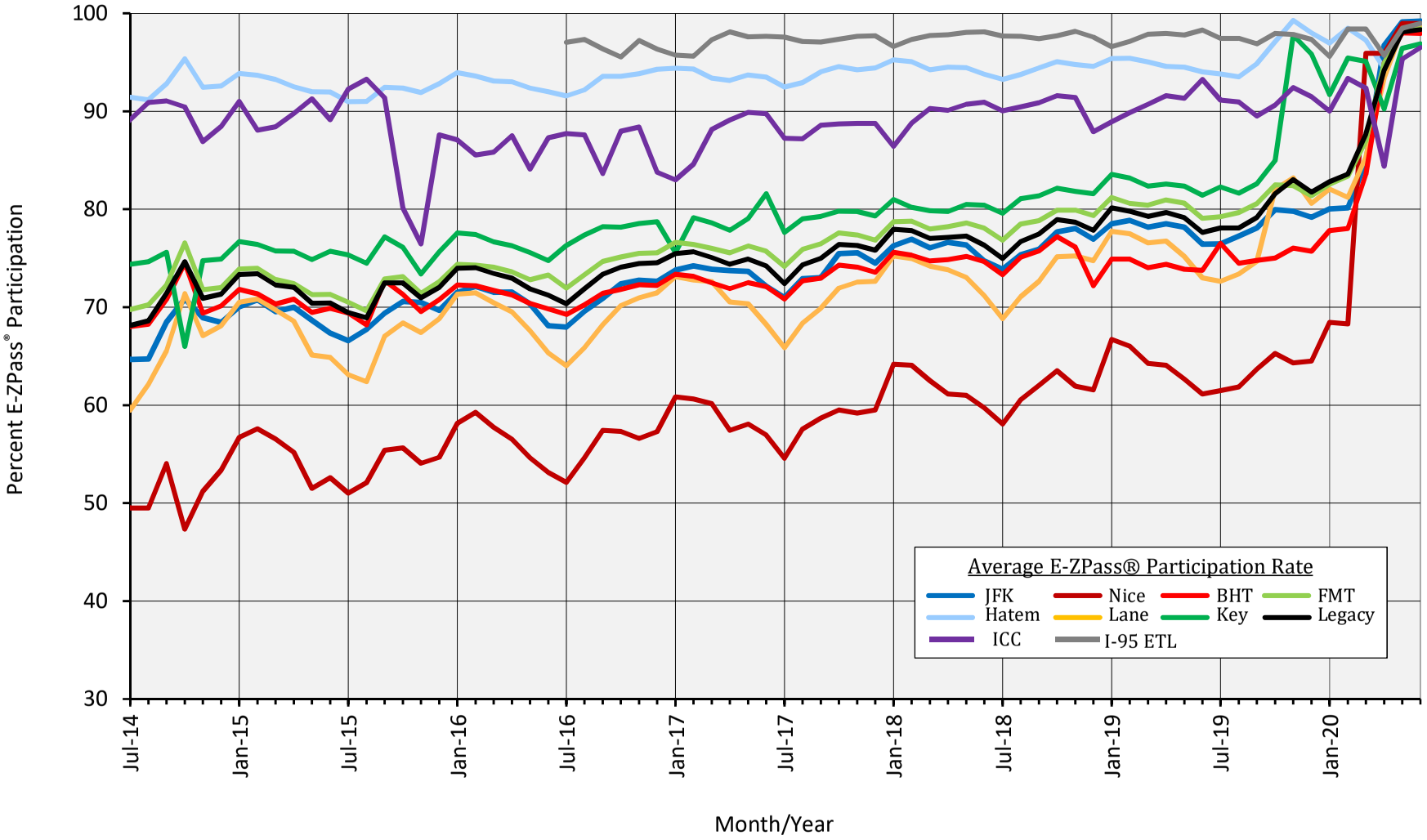
Source: MSHA and VDOT AADT Reports.

2.5 MDTA 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®. **Figure 2-5** provides a graphic summary of the E-ZPass® market share for each of the seven Legacy facilities, the total Legacy system, the Intercounty Connector, and the I-95 Express Toll Lanes (ETL) from July 2008 through June 2020.

From July 2019 to February 2020, E-ZPass® transactions accounted for an average of 80.8 percent of the total Legacy system transactions, an increase of 2.9 percent over the same period in FY 2019. Of these, 66.8 percent were made by Maryland E-ZPass® customers, including in-state E-ZPass® customers, commuter plans, shopper plans and Hatem Bridge plans. Over the same time period, in terms of individual facilities, the Thomas J. Hatem Memorial Bridge had the greatest percentage of E-ZPass® customers at 96.3 percent of total transactions over this time period, primarily due to the Hatem Bridge Toll Plans and its conversion to cashless tolling prior to March. The Governor Harry W. Nice Memorial/Senator Thomas "Mac" Middleton Bridge had the lowest percentage of E-ZPass® transactions during this time period at 64.4 percent. On a total system basis, between July 2019 and February 2020, cash transactions accounted for a combined 17.0 percent of all transactions, a decrease of 3.3 percent over same period in FY 2019. Video transactions accounted for 2.1 percent of all transactions made between July 2019 and February 2020.

On March 17, 2020 MDTA implemented systemwide cashless tolling to prevent the potential spread of COVID-19 during exchanges of cash at toll booths. Additionally, mailing of Notice of Toll Due (NOTD) video invoices has been paused during the pandemic. Due to these changes, E-ZPass® transactions accounted for 94 percent of all Legacy system transactions in April 2020 and about 98 percent of the total transactions in May and June 2020.



E-ZPass® Marketshare Trends by Facility

FIGURE 2-5

Chapter 3
Corridor Growth 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. Preparing facility traffic forecasts requires evaluating socioeconomic variables that drive trip purposes, such as population, employment, and income. Therefore, historical and projected socioeconomic data are an important component in developing traffic forecasts. Socioeconomic data are provided by public and private sources for different geographies and time periods. This introduction provides an overview of the socioeconomic data reviewed when preparing this forecast.

Socioeconomic Variables – Socioeconomic variables reviewed for this forecast include: population, employment, unemployment, real per capita personal income, real gross domestic/regional product (GDP/GRP), inflation, and fuel prices.

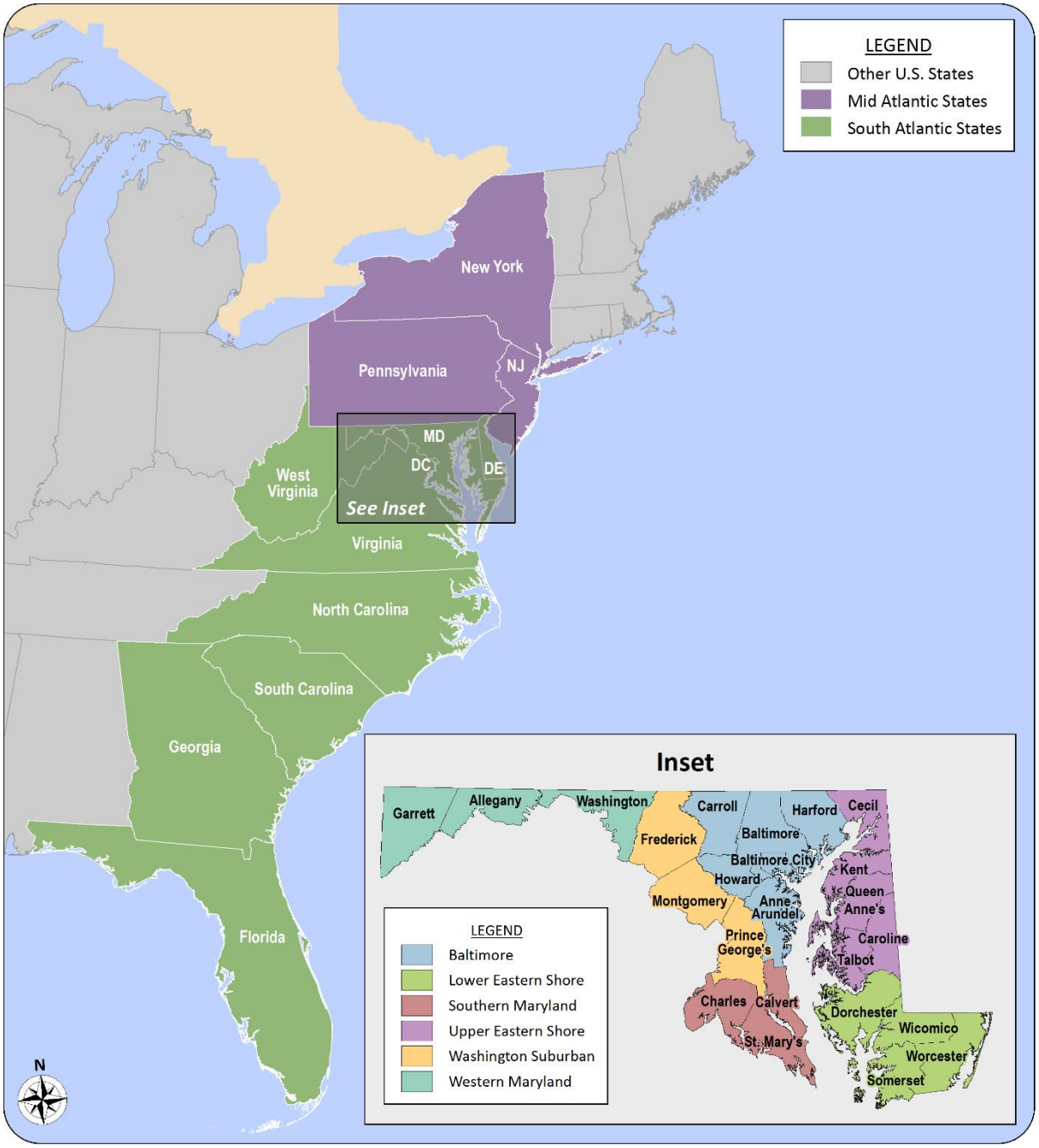
Geographies – Geographies profiled include national and census divisions (U.S., Mid-Atlantic, South Atlantic), as well as the state of Maryland and six sub-state regions. A map of the regions profiled is shown in **Figure 3-1**.

Data Sources – Government and private sector forecast sources include:

- United States Bureau of Economic Analysis (BEA)
- United States Bureau of Labor Statistics (BLS)
- Congressional Budget Office (CBO)
- United States Census Bureau (U.S. Census)
- Energy Information Administration (EIA)
- Federal Open Market Committee (FOMC)
- Office of Management and Budget (OMB)
- The State of Maryland Department of Planning State Data Center (MD SDC)
- Moody's Analytics (Moody's)
- Woods & Poole Economics, Inc., *2020 Complete Economic and Demographic Data Source* (WP20)

Analysis Horizon – Historical socioeconomic data are presented and include annual growth rate trends. Data forecasts are provided for 2019-2024 and 2025-2030. Aggregate historical and forecast growth rates are also discussed.

Figure 3-1
National and Maryland Geographies Profiled



The COVID-19 pandemic has resulted in significant short-term volatility and future uncertainty related to many of the socioeconomic variables. Given the pandemic's importance related to this forecast, impacts observed thus far are discussed in a separate section of this chapter before discussion of the specific socioeconomic variables. Future considerations related to the pandemic including risk factors are discussed in the final section of this chapter, **3.4 Summary of Risks and Conclusion**.

3.2 COVID-19 Pandemic Timeline

The COVID-19 pandemic continues to pose systemic economic and transport risks which may continue until broad vaccination, improved treatment protocols, or virus mutation to a less-severe strain occurs. Individual and collective behavior changes have been observed, especially related to how we physically interact and travel. Significant impacts and changes have also occurred related to the economy. Beginning in March, COVID-19 triggered withdrawals from most physical interactions to stem contagion, with tremendous impacts to economies and transportation systems. Governments closed borders, restricted migration, temporarily closed nonessential industries, and ordered quarantines, stay-at-home, and other restrictions. Businesses furloughed or laid-off millions of employees. Telecommuting has been required in many industries. Individuals self-isolated, retrenching from "normal" activities, including sports, social and family gatherings, vacations, conferences, and discretionary spending.

Beginning in May, many states and local authorities, including in Maryland, began to gradually ease restrictions. The pandemic also brought an unprecedented policy response from both fiscal and monetary authorities to support the recovery. Significant recovery has been observed since May. However, activity is still well below pre-COVID-19 levels and the pace of the recovery slowed during the summer. The recovery has also been uneven, with some industries recovering or exceeding pre-pandemic levels while others remain far below pre-pandemic levels.

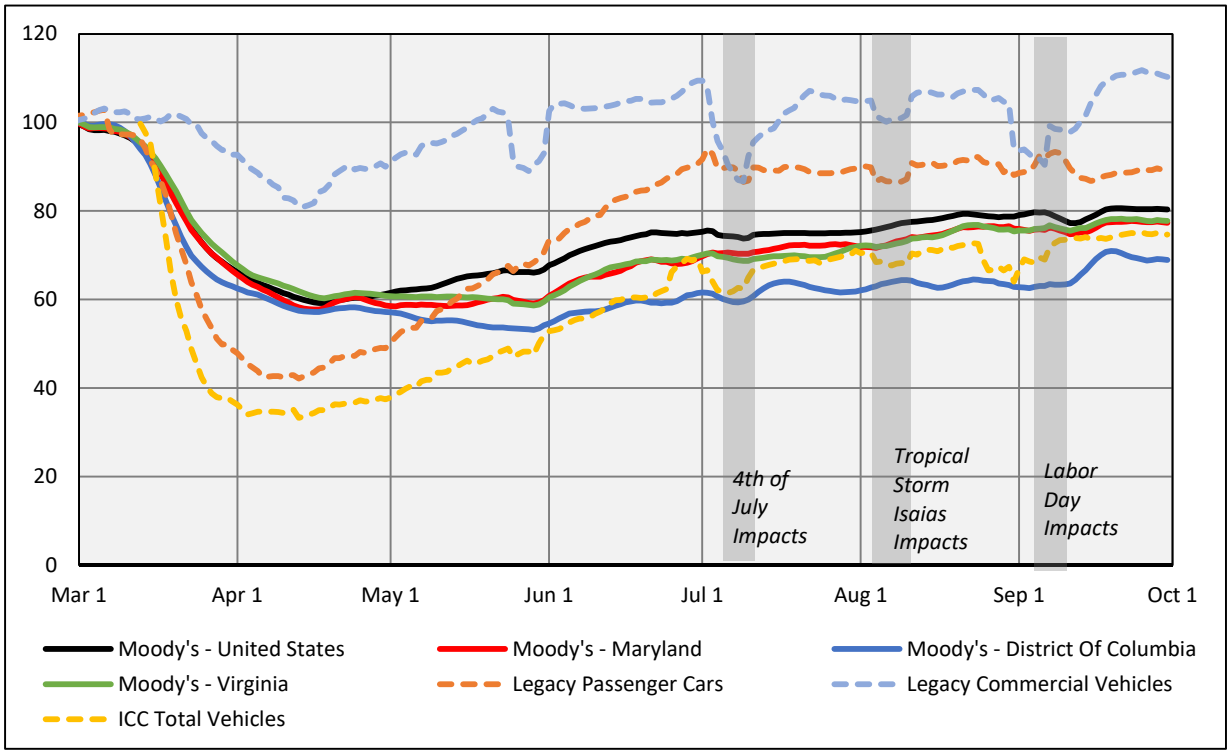
Related to the pandemic timeline, **Table 3-1** provides the events, mandates, and other announcements related to COVID-19 that have contributed to impacts to and recovery of traffic and revenue on the MDTA system. Related to the MDTA announcements listed in **Table 3-1** and of relevance to this letter report, on March 17, 2020 MDTA implemented systemwide cashless tolling until further notice. These and other COVID-19-related changes made by MDTA related to toll rates and toll payment types are discussed in more detail in **Section 1.2.2** of **Chapter 1**. As seen in the table, easing of COVID-19 restrictions has continued in September and October 2020 with the state moving into Stage Three of the "Maryland Strong: Roadmap to Recovery". This has included easing of restrictions related to outdoor venues, retail establishments, religious facilities, indoor theaters, indoor dining, child care facilities, and nursing homes.

Table 3-1 – National, Maryland, and MDTA Mandates Related to COVID-19

Date	Location	Description
March 11	USA	- International travel is halted (excluding Great Britain)
March 12	MD	- Gatherings of more than 250 people banned - Schools closed until March 27th
March 13	USA	- National Emergency declared
March 16	MD	- Gatherings of more than 50 people banned - All bars and restaurants closed
March 17	MDTA	- MDTA implements all-electronic (cashless) tolling statewide until further notice
March 18	MDTA	- All E-ZPass® Maryland customer service centers closed until further notice. Motorists can still open accounts online and have their transponder mailed to them
March 18-20	USA	- U.S./Canada and U.S./Mexico borders closed for non-essential travel
March 19	MD	- Gatherings of more than 10 people banned - Transit for essential travel only
March 23	MD	- Non-essential businesses closed
March 27	MDTA	- Paused mailing for all Notices of Toll Due (NOTD) and assessing civil penalties on unpaid NOTDs. Customers can pay online rather than waiting for NOTDs to be mailed - Due dates extended until 30 days after the state of emergency is lifted for previously mailed NOTDs that have a due date of March 17, 2020 or later - E-ZPass® customers who replenish their accounts with cash have 30 days after Maryland's state of emergency is lifted to add funds to their accounts - Expiration dates for Commuter Plans were extended from 45 to 90 days and for Shoppers Plans from 90 to 150 days to give drivers more time to use their remaining trips. These expiration dates were eventually extended through November 1. These plan holders may also change or cancel their plans due to COVID-19 - Referrals of unpaid tolling accounts to the Central Collections Unit and to the Motor Vehicle Administration for registration flagging are on hold until 30 days after the state of emergency is lifted
March 30	MD	- Residents ordered to stay-at-home indefinitely, persons traveling into Maryland are required to self-quarantine for 14 days.
April 17	MD	- Schools closed through May 15th
April 18	MD	- Residents ordered to wear face masks in public settings
May 6	MD	- Schools closed through the end of the academic year
May 15	MD	- Statewide Stay at Home order replaced by Safer at Home advisory. Some jurisdictions began Stage One of "Maryland Strong: Roadmap to Recovery" program but most social distancing measures generally remain in place.
June 5	MD	- Maryland began moving to Stage Two of "Maryland Strong: Roadmap to Recovery" with the opening of businesses including manufacturing, construction, retail shops, speciality vendors, wholesalers, warehouses, and professional offices. Additionally, personal services(including salons, massage, and tattoo parlors) resumed operations at 50 percent capacity and the state government returned to more normal operations
June 12	MD	- Additional Stage Two openings occurred including indoor dining and pools at 50 percent capacity and outdoor amuements at full capacity
June 15	MDTA	- MDTA E-ZPass customer service centers reopen with limited capacity
June 19	MD	- Additional Stage Two openings occurred including indoor fitness activities at 50 percent capacity and casinos, arcades, and malls at full capacity. Schools and child care centers also began partial reopening
July 29	MD	-Maryland's reopening plan put on hold. Out-of-state travel advisory involving nine states is issued and the statewide face mask order is expanded
August 27	MD	- All schools in Maryland authorized to reopen
August 6	MDTA	- All-Electronic Tolling made permanent at all MDTA Facilities Statewide
September 4	MD	- Maryland began moving to Stage Three of the "Maryland Strong: Roadmap to Recovery" with additional safe and gradual openings. Effectve September 4th at 5 PM, outdoor venues may open to general public at 50% capacity or 250 people, whichever is less. Capacity for retail establishments and religious facilities increased from 50 to 75 percent. Indoor theaters may open to the general public at 50% capacity, or 100 people per auditorium—whichever is less
September 21	MD	- Expanded capacity for indoor dining, from 50 to 75 percent, was put into place
September 24	MDTA	- MDTA started accepting proactive toll payments for trips made on or before June 30, 2020 - MDTA announced that standard plan cycles will resume for discount plans on November 1 - MDTA announced that mailing of NOTDs will resume in mid-October
October 1	MDTA	- Capacity limits on child care facilities lifted; indoor visitings allowed at nursing homes

To illustrate the impact national and state-level COVID-19 policies have had on the economy and society, **Figure 3-2** shows the Moody's/CNN Business "Back-to-Normal Index" (BNI) for the U.S., Maryland, Virginia, and Washington, D.C. This index is composed of a composite trend of 37 indicators. Some of the key indicators are Moody's GDP model, Seated restaurant diners from OpenTable, the Google Workplace Mobility Index, airline traveler throughput from the Transportation Security Administration, small businesses hours worked from Homebase, new home listings from Zillow, petroleum products supplied from the Energy Information Administration, railroad traffic from the Association of American Railroads, unemployment insurance claims, the Purchase Activity Index from Mortgage Bankers Association the Moody's Business Confidence Index, and employment rates from the Bureau of Labor Statistics. The composite trend is indexed to February 29, 2020 equals one. MDTA Legacy passenger car, Legacy commercial vehicle, and ICC data is also shown in a similar index format for comparison in **Figure 3-2**. As shown, both the BNI and MDTA traffic data indices showed steep declines through mid-April. The BNI for Maryland and Virginia was then flat through late June while the U.S. BNI rose somewhat and the Washington D. C. BNI declined somewhat. Since early July, all the BNI indices shown have experienced gradual recovery. The MDTA traffic indices showed rapid improvement between mid-April and late June and have since also shown gradual recovery.

Figure 3-2
Moody's/CNN Business Back-to-Normal Index Compared to MDTA Traffic Indices



3.3 Socioeconomic Variables

Table 3-2 shows the sources for historical and forecast socioeconomic variables as well as their term and forecast date. **Subsections 3.3.1-3.3.5** discuss historical and forecast trends for population, employment, unemployment, real per capita personal income, real gross domestic/regional product, inflation, and fuel prices. Note that the latest available MD SDC data source is from 2015 which is several years old. This should be considered when reviewing MD SDC forecasts.

Table 3-2
Socioeconomic Variables by Term, Historical Source, Forecast Source, and Date

Variable	Term(s)	Historical Data	Forecast Date
Population	Persons	U.S. Census Bureau	Woods & Poole, 2020 Moody's, Aug. 2020 MD SDC, Aug. 2017
Employment	Persons	U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics	Woods & Poole, 2020 Moody's, Aug. 2020 MD SDC, Jan. 2015
Unemployment	Percentage	U.S. Bureau of Labor Statistics	CBO, Jul. 2020 FOMC, Jun. 2020 OMB, Feb. 2020 Moody's, Aug. 2020
Real Per Capita Income	2019 Dollars	Woods & Poole, 2020	Woods & Poole, 2020 Moody's, Aug. 2020 MD SDC, Jan. 2015
Real Gross Domestic/Regional Product	2019 Dollars	U.S. Bureau of Economic Analysis, Woods & Poole, 2020	CBO, Jul. 2020 FOMC, Jun. 2020 OMB, Feb. 2020 Moody's, Aug. 2020 Woods & Poole, 2020
Inflation	Annual Percentage Change	U.S. Bureau of Labor Statistics	CBO, Jul. 2020 FOMC, Jun. 2020 OMB, Feb. 2020 Moody's, Aug. 2020
Fuel Prices	Price per Gallon, Price per Barrel	Energy Information Administration	Moody's, Aug. 2020

3.3.1 Population

Historical

Table 3-3 shows population data from the U.S. Census Bureau for 2010 to 2019. The U.S. population increased from approximately 309.3 million in 2010 to 328.2 million in 2019, a compound annual growth rate (CAGR) of 0.7 percent. Over the same period, the South Atlantic Region, which includes Maryland, grew at a faster rate of 1.0 percent annually. The growth rate in the Mid-Atlantic Region was below that of both the U.S. and the South Atlantic Region, at only 0.1 percent annually.

The population of Maryland grew by approximately 257,000 between 2010-2019, increasing from approximately 5.8 million in 2010 to over 6.0 million in 2019, reflecting a CAGR of 0.5 percent. The most populous sub-state region, Baltimore, grew at a CAGR of 0.3 percent while Southern Maryland grew at 0.9 percent between 2010-2019. The population in Maryland's other sub-state regions had CAGR ranging from a low of -0.1 percent in Western Maryland to a high of 0.7 percent in Washington Suburban to over the same period.

Considering more recent trends, the rate of population growth has been declining in Maryland. The Maryland annual population growth dropped from 0.9 percent in 2010 to 2011 to 0.2 percent in both 2017 to 2018 and 2018 to 2019. Baltimore population was about flat in 2018 to 2019 after seeing healthy population increases earlier in the decade.

Table 3-3
Historical Population

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019
Census Population (Thousands)											
United States	309,322	311,557	313,831	315,994	318,301	320,635	322,941	324,986	326,688	328,240	
Mid Atlantic	40,910	41,073	41,185	41,258	41,304	41,307	41,287	41,263	41,217	41,138	
South Atlantic	59,939	60,509	61,145	61,729	62,382	63,117	63,907	64,620	65,230	65,785	
Maryland	5,789	5,839	5,887	5,923	5,957	5,986	6,003	6,024	6,036	6,046	
Baltimore	2,668	2,686	2,706	2,720	2,731	2,741	2,745	2,749	2,751	2,750	
Lower Eastern Shore	210	211	211	211	211	211	212	212	213	213	
Southern Maryland	342	346	349	352	355	357	360	363	366	369	
Upper Eastern Shore	240	241	241	241	241	241	241	242	243	243	
Washington Suburban	2,076	2,103	2,127	2,147	2,168	2,184	2,194	2,207	2,213	2,220	
Western Maryland	253	253	253	253	252	251	251	251	251	250	
Census Population (Thousands) Annual Percent Change											
United States		0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.5%	0.5%	0.7%
Mid Atlantic		0.4%	0.3%	0.2%	0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	0.1%
South Atlantic		1.0%	1.1%	1.0%	1.1%	1.2%	1.3%	1.1%	0.9%	0.9%	1.0%
Maryland		0.9%	0.8%	0.6%	0.6%	0.5%	0.3%	0.3%	0.2%	0.2%	0.5%
Baltimore		0.7%	0.8%	0.5%	0.4%	0.4%	0.1%	0.1%	0.1%	0.0%	0.3%
Lower Eastern Shore		0.4%	0.1%	0.1%	0.0%	0.1%	0.2%	0.1%	0.3%	0.4%	0.2%
Southern Maryland		1.2%	0.9%	0.9%	0.7%	0.7%	0.8%	0.9%	0.8%	0.8%	0.9%
Upper Eastern Shore		0.3%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.4%	0.3%	0.1%
Washington Suburban		1.3%	1.2%	0.9%	1.0%	0.8%	0.5%	0.6%	0.3%	0.3%	0.7%
Western Maryland		0.3%	-0.2%	-0.2%	-0.3%	-0.3%	0.0%	-0.1%	0.0%	-0.1%	-0.1%

Forecast

Table 3-4 shows average annual population growth rate forecasts for 2019 to 2024 and 2025 to 2030 by Wood's and Poole (WP20), Moody's, and the Maryland State Data Center (MD SDC). WP20 projects that the U.S. population will have a CAGR of 0.7 percent between 2019 and 2024, a rate that is slightly higher than Moody's forecasted CAGR of 0.5 percent. WP20 predicts that between 2019 and 2024, the population in the Mid-Atlantic Region will have a CAGR of 0.2 percent and the South Atlantic Region's population will have a CAGR of 0.9 percent. As with its U.S. population forecast, Moody's projected 2019 to 2024 CAGRs for the Mid-Atlantic and South Atlantic Regions are slightly lower than WP20's, at 0.1 percent and 0.7 percent, respectively. The growth rates for 2025 to 2030 are predicted to be about the same as 2019 to 2024 in WP20 and much lower than 2019 to 2024 in Moody's. Moody's forecasts appear to be more closely in line with the actual historical population growth trends shown in **Table 3-3**.

Both WP20 and MD SDC project that Maryland's population will have a CAGR of 0.6 percent between 2019 and 2024 and that Southern Maryland will have a relatively higher population growth rate compared to other regions. Between 2019 and 2024, Southern Maryland's population CAGR is projected to be 1.0 percent by WP20 and 1.2 percent by MD SDC. For Baltimore and Washington Suburban, the state's two major metro areas, WP20 projects a CAGR of 0.5 percent (Baltimore) and 0.7 percent (Washington Suburban) from 2019 to 2024. The MD SDC forecast projects similar growth rates. The growth rates for 2025 to 2030 are similar to those for 2019 to 2024. Note that the latest available Maryland State Data Center forecasted are still from 2015 so these forecasts are several years old at this point. These Maryland state-level and sub-region forecasts from WP20 and MD SDC appear to be optimistic given the actual population growth trends observed in recent years.

These trends in recent declining population growth rates for Maryland and its sub-regional geographies will continue to be monitored as they pose a risk for traffic growth on the MDTA system.

Table 3-4
Population Average Annual Forecasted Growth

	WP20			Moody's			MD SDC		
Geography	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030
United States	0.7%	0.6%	0.6%	0.5%	0.1%	0.3%	-	-	-
Mid Atlantic	0.2%	0.2%	0.2%	0.1%	0.0%	0.1%	-	-	-
South Atlantic	0.9%	0.9%	0.9%	0.7%	0.1%	0.4%	-	-	-
Maryland	0.6%	0.5%	0.6%	-	-	-	0.6%	0.6%	0.6%
Baltimore	0.5%	0.4%	0.5%	-	-	-	0.4%	0.3%	0.4%
Lower Eastern Shore	0.5%	0.5%	0.5%	-	-	-	0.9%	0.9%	0.9%
Southern Maryland	1.0%	1.0%	1.0%	-	-	-	1.2%	1.4%	1.3%
Upper Eastern Shore	0.5%	0.5%	0.5%	-	-	-	1.0%	1.1%	1.0%
Washington Suburban	0.7%	0.6%	0.6%	-	-	-	0.7%	0.6%	0.7%
Western Maryland	0.3%	0.3%	0.3%	-	-	-	0.8%	0.7%	0.8%

3.3.2 Employment

Historical

Employment (civilian nonfarm employment) data in **Table 3-5** are provided by the U.S. Bureau of Economic Analysis (BEA). Sub-regional data for Maryland employment has not yet been released for 2019. Employment trends presented in **Table 3-5** show strong employment growth between 2010 and 2019. Employment growth in the South Atlantic Region between 2010 and 2019 reflects a CAGR of 2.2 percent, higher than the rate for the Mid-Atlantic Region (1.5 percent) and the U.S. overall (1.9 percent).

Between 2010 and 2019, employment in Maryland had a CAGR of 1.4 percent. Since 2010, Maryland's annual employment growth has been significantly higher than its population growth (1.4 percent vs. 0.5 percent, respectively). Employment growth in the Baltimore and Washington Suburban metro areas both was strong in the last decade. Western Maryland had the weakest employment growth over the period, with around flat trends since 2013.

Table 3-5
Historical Nonfarm Civilian Employment

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019
Bureau of Economic Analysis: Non-Farm Employment (Thousands)											
United States	170,266	173,453	176,357	179,680	183,591	187,675	190,735	193,715	197,679	201,209	
Mid Atlantic	22,946	23,389	23,624	23,955	24,362	24,767	25,094	25,354	25,825	26,245	
South Atlantic	32,553	33,226	33,705	34,351	35,231	36,216	37,007	37,853	38,893	39,687	
Maryland	3,330	3,379	3,422	3,477	3,520	3,586	3,637	3,673	3,733	3,786	
Baltimore	1,619	1,651	1,681	1,707	1,728	1,761	1,785	1,808	1,839	-	
Lower Eastern Shore	112	112	113	114	115	116	117	118	119	-	
Southern Maryland	149	150	150	152	154	158	161	163	163	-	
Upper Eastern Shore	112	112	113	116	117	118	120	120	123	-	
Washington Suburban	1,203	1,218	1,227	1,250	1,269	1,294	1,316	1,336	1,361	-	
Western Maryland	134	135	137	137	137	139	139	138	138	-	
Bureau of Economic Analysis: Non-Farm Employment (Thousands) Annual Percent Change											
United States		1.9%	1.7%	1.9%	2.2%	2.2%	1.6%	1.6%	2.0%	1.8%	1.9%
Mid Atlantic		1.9%	1.0%	1.4%	1.7%	1.7%	1.3%	1.0%	1.9%	1.6%	1.5%
South Atlantic		2.1%	1.4%	1.9%	2.6%	2.8%	2.2%	2.3%	2.7%	2.0%	2.2%
Maryland		1.5%	1.3%	1.6%	1.2%	1.9%	1.4%	1.0%	1.6%	1.4%	1.4%
Baltimore		2.0%	1.8%	1.6%	1.2%	1.9%	1.4%	1.3%	1.7%	-	-
Lower Eastern Shore		0.2%	0.9%	0.7%	0.5%	1.0%	0.7%	0.9%	1.2%	-	-
Southern Maryland		0.8%	0.1%	1.0%	1.3%	2.4%	2.5%	0.8%	0.3%	-	-
Upper Eastern Shore		0.1%	1.1%	2.3%	1.4%	0.7%	1.3%	0.3%	2.3%	-	-
Washington Suburban		1.2%	0.7%	1.9%	1.5%	2.0%	1.7%	1.5%	1.9%	-	-
Western Maryland		1.1%	1.2%	0.2%	0.0%	0.9%	-0.2%	-0.4%	0.3%	-	-

Forecast

Table 3-6 shows that U.S. employment has a projected CAGR of 1.3 percent from 2019-2030 according to WP20, while Moody's expects far lower CAGR of 0.4 percent over the same 11-year period. According to Moody's, the South Atlantic Region's CAGR (0.6 percent) is expected to be higher than the employment CAGR for both the U.S. (0.4 percent) and the Mid-Atlantic Region (0.0 percent).

Similar relative growth is projected by WP20, with South Atlantic growth exceeding that of the U.S. and the Mid-Atlantic. The forecasts from WP20 and Moody's project higher employment growth rates than compared to the recessionary period of 2005-2010, but lower rates than in the post-recessionary years of 2010-2019.

According to the MD SDC, the forecast Maryland's employment CAGR is 0.6 percent between 2019-2030. WP20's forecast, by contrast, projects a CAGR for Maryland's employment of 1.2 percent over the same 11-year period. For the state's two major metro areas, Baltimore and Washington Suburban, WP20 projects CAGRs of 1.3 percent (Baltimore) and 1.2 percent (Washington Suburban) between 2019-2030. WP20 predicts that Southern Maryland will have a higher employment CAGR compared to other regions, at 1.5 percent between 2019-2030.

The COVID-19 pandemic has added significant uncertainty to the short and medium term economic and employment outlook. A summary of unemployment forecasts is provided in the next sub-section of this chapter.

Table 3-6
Nonfarm Civilian Employment Forecasted Growth

	WP20			Moody's			MD SDC		
Geography	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030
United States	1.4%	1.2%	1.3%	0.3%	0.5%	0.4%	-	-	-
Mid Atlantic	1.2%	1.0%	1.1%	-0.2%	0.3%	0.0%	-	-	-
South Atlantic	1.6%	1.4%	1.5%	0.5%	0.7%	0.6%	-	-	-
Maryland	1.3%	1.1%	1.2%	-	-	-	0.8%	0.5%	0.6%
Baltimore	1.4%	1.2%	1.3%	-	-	-	0.7%	0.4%	0.6%
Lower Eastern Shore	1.0%	0.8%	0.9%	-	-	-	0.8%	0.5%	0.6%
Southern Maryland	1.6%	1.4%	1.5%	-	-	-	1.2%	0.7%	1.0%
Upper Eastern Shore	1.4%	1.2%	1.3%	-	-	-	1.1%	0.6%	0.9%
Washington Suburban	1.3%	1.0%	1.2%	-	-	-	0.8%	0.5%	0.6%
Western Maryland	0.8%	0.6%	0.7%	-	-	-	0.9%	0.4%	0.7%

3.3.3 Unemployment

Historical

Figure 3-3 shows annual unemployment rates from 2000 to 2019 based on BLS data. Maryland's annual unemployment rate was lower than that of both the Mid-Atlantic Region and the U.S. as a whole in every year from 2000 to 2019. Maryland's unemployment rate was below that of the South Atlantic Region from 2000 to 2017, though it was slightly higher than the South Atlantic's rate in 2018 and 2019.

Figure 3-3
Historical Unemployment Rates (Macro Geographies)

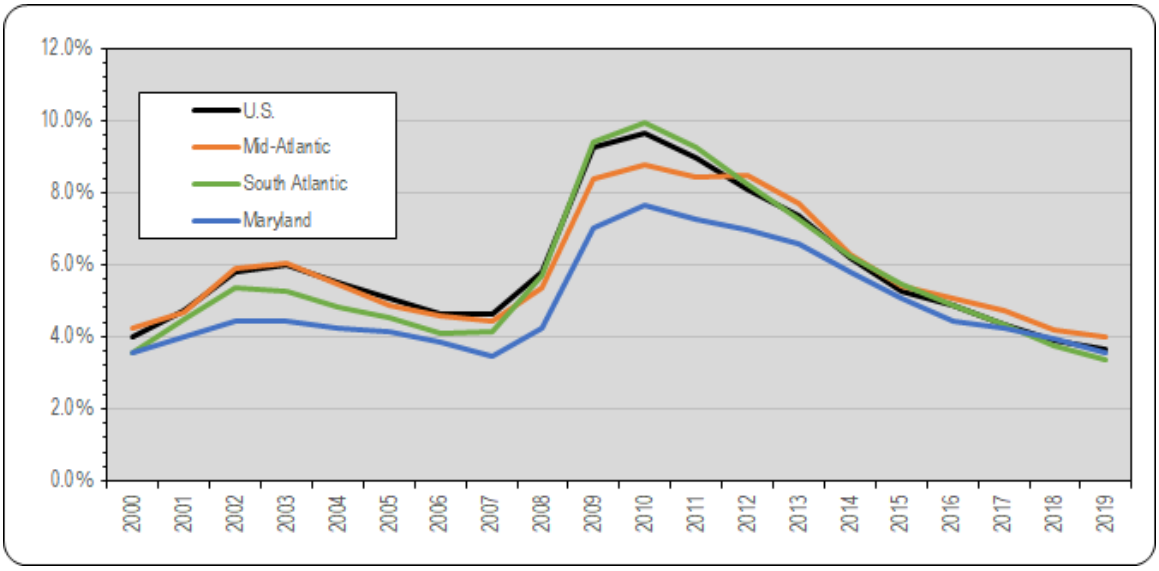
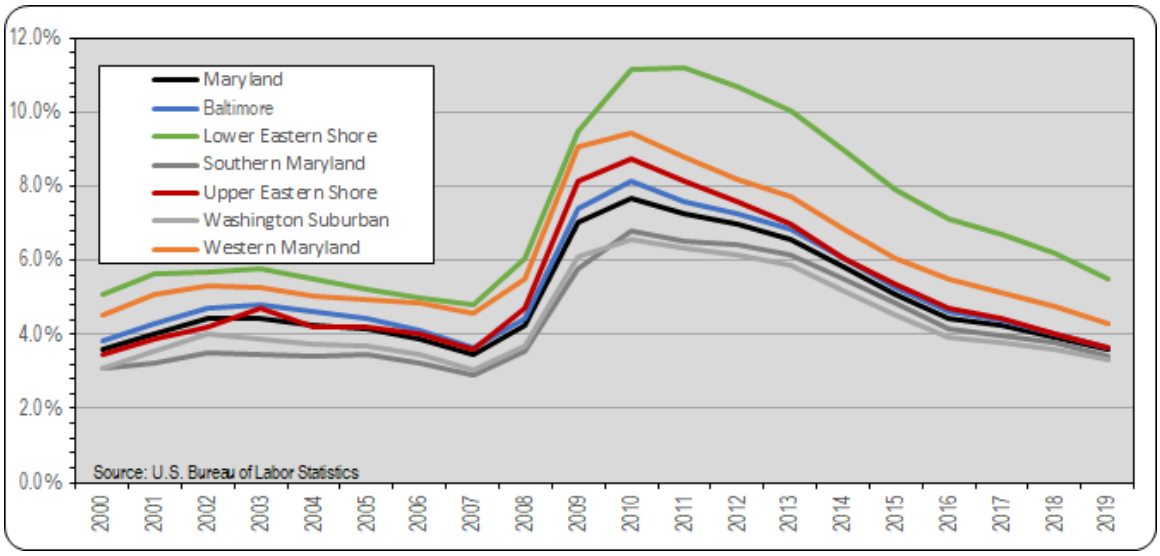


Figure 3-4 shows annual unemployment rates for Maryland and its six sub-regions from 2000 to 2019 based on BLS data. In every year from 2000 to 2019, unemployment rates in Southern Maryland and Washington Suburban were lower than Maryland's overall state unemployment rate. Conversely, the unemployment rates in Baltimore, Lower Eastern Shore, and Western Maryland were higher than the statewide rate in every year from 2000 to 2019. The Upper Eastern Shore's unemployment rate was higher than the state rate from 2000 to 2019, except in 2000 to 2002 and 2004 when it was slightly lower than the statewide rate.

In Maryland and its sub-state regions, annual unemployment peaked in 2010 to 2011, reaching 11.2 percent in the Lower Eastern Shore, 9.4 percent in Western Maryland, 8.7 percent in the Upper Eastern Shore, and 8.2 percent in the Baltimore sub-state region. In the Washington Suburban sub-state region, unemployment peaked at 6.5 percent while Maryland's statewide rate reached 7.7 percent. By 2016, Maryland's annual unemployment rate was below 5.0 percent and, except for the Lower Eastern Shore and Western Maryland, most of its six sub-state regions had similarly low unemployment rates.

Figure 3-4
Historical Unemployment Rates (Maryland and Sub-State Regions)



Forecast

Forecasts for the U.S. show a significant spike in the unemployment rate in 2020 as a result of the closure of portions of the economy and consequent job loss caused by the outbreak of the COVID-19 virus. Projections from the Congressional Budget Office, Federal Reserve, and Moody's expect the annual unemployment rate to reach 9.0 percent (Moody's) to 10.6 percent (CBO) in 2020, and then fall to 6.5 percent (FOMC) or stay flat at 9.0 percent (Moody's) in 2021. All of the forecasters project that the U.S. unemployment rate will be below 5.0 percent by 2025.

The OMB unemployment rate forecast was released in February 2020, prior to layoffs, business closures, and job losses caused by COVID-19. The inclusion of the OMB forecast in **Figure 3-5** illustrates unemployment expectations before the COVID-19 crisis. The FOMC projects that the U.S. unemployment rate will return to the OMB's pre-COVID-19 forecast level of approximately 4.0 percent by 2023. However, forecasts from CBO and Moody's expect the U.S. unemployment rate to remain above 4.0 percent through 2030.

Table 3-7 provides more detail on the short-term unemployment outlook for calendar year 2020 and 2021 from a wider variety of forecasts with short term forecasts available. The table is organized from most optimistic to most pessimistic forecasts for 2020. As shown, a variety of outlooks are predicted for 2021.

Figure 3-5
U.S. Unemployment Rate Forecasts

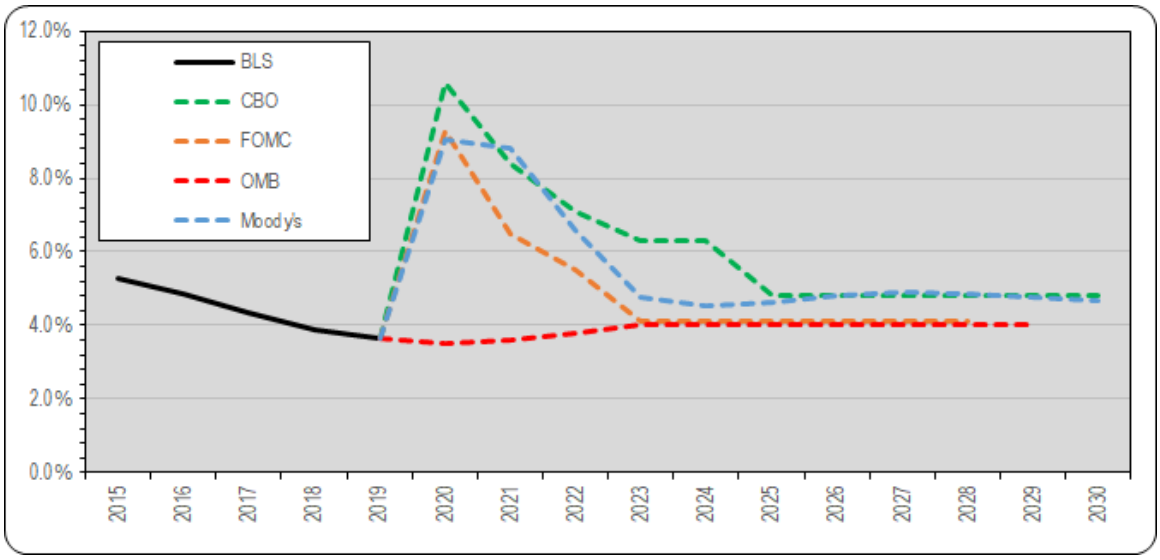


Table 3-7
U.S. Short-Term Unemployment Rate Forecasts

Source	Release Date	2020	2021
TD Economics	June 17, 2020	8.5%	7.0%
Bank of Montreal (BMO) Capital Markets Economics	September 4, 2020	8.5%	6.8%
ScotiaBank Global Economics	September 3, 2020	8.5%	5.7%
Energy Information Administration (EIA): Short-Term Energy Outlook	September 9, 2020	8.6%	7.6%
Royal Bank of Canada (RBC) Economics	June 10, 2020	8.7%	6.0%
Wells Fargo Securities Economics Group	August 12, 2020	8.7%	6.9%
PNC Financial Services Group	August 2020	8.9%	7.6%
National Association for Business Economics (NABE)[1]	April 10, 2020	9.0%	7.0%
Federal Reserve Bank of Philadelphia: Survey of Professional Forecasters[1]	August 14, 2020	9.0%	8.0%
National Association of Realtors	August 27, 2020	9.0%	7.7%
Moody's Analytics	May 11, 2020	9.0%	9.0%
University of Michigan: Research Seminar in Quantitative Economics (RSQE)	August 24, 2020	9.2%	8.1%
Federal Reserve Bank: Federal Open Market Committee (FOMC)	June 10, 2020	9.3%	6.5%
International Monetary Fund (IMF): World Economic Outlook	June 24, 2020	10.4%	9.1%
Congressional Budget Office (CBO)	July 2, 2020	10.6%	8.4%
Conference Board	April 9, 2020	11.1%	10.8%
Organization for Economic Cooperation and Development (OECD) - Single Hit	June 10, 2020	11.3%	8.5%
Organization for Economic Cooperation and Development (OECD) - Double Hit	June 10, 2020	12.9%	11.5%
Average		**9.5%**	**7.9%**

(1) Average from a Survey of Professional Forecasters

3.3.4 Per Capita Personal Income

Personal income is a key indicator of the relative affluence of a region's residents and includes the sum of wages and salaries, other labor income, proprietors' income, rental income of persons, dividend income, personal interest income, and transfer payments, less personal contributions for government social insurance. Real (above inflation) increases in per capita income can lead to an increased willingness to pay tolls so this variable is important to track related to toll facility usage.

Historical

Historical per capita personal income, shown in constant 2019 dollars, is presented in **Table 3-8**. Per capita personal income in the U.S. increased from $46,454 in 2010 to $56,276 in 2019, reflecting a CAGR of 2.2 percent. Over the same 10-year period, per capita personal income in the Mid-Atlantic States and South Atlantic States had CAGRs of 2.4 percent and 1.8 percent, respectively. Maryland's per capita personal income had a CAGR of 1.5 percent between 2010-2019. Per capita personal income in Maryland's sub-state regions also had lower CAGRs compared to the U.S., ranging from 1.1 percent in Southern Maryland to 1.6 percent in Baltimore between 2010-2019.

At $65,310, Maryland's per capita personal income was 16.1 percent higher than per capita personal income in the U.S., and 24.3 percent higher than per capita personal income in the South Atlantic States in 2019. However, 2019 per capita personal income in the Mid-Atlantic States ($66,939) was 2.5 percent higher than Maryland's in the same year.

Per capita personal income in the Washington Suburban sub-state region of $72,034 was 28.0 percent higher than U.S. per capita personal income in 2019. The Baltimore sub-state region's 2019 per capita income of $64,401 was 14.4 percent higher than that of the U.S.

Forecast

Table 3-9 provides the per capita personal income forecast, shown in constant 2019 dollars. According to WP20, U.S. per capita personal income is projected to have a CAGR of 1.8 percent between 2019-2024, and then decelerate to 1.6 percent between 2025-2030. Per capita personal income CAGR projections for the Mid-Atlantic Region, South Atlantic Region, Maryland, and its sub-state regions are also expected to follow similar decelerating patterns. Conversely, Moody's per capita personal income forecast for the U.S., Mid-Atlantic, and South Atlantic regions predicts lower CAGRs than WP20 from 2019-2024, and then higher growth rates from 2025-2030.

Similar to its U.S. per capita personal income forecast, WP20 projects that Maryland and its sub-state regions will have lower CAGRs from 2025-2030 compared to 2019-2024. However, in spite of this deceleration, from 2025-2030 Maryland's per capita personal income CAGR of 1.6 percent is expected to equal that of the U.S. Among Maryland's six sub-state regions, the per capita personal income CAGR for three of them (Baltimore, Lower Eastern Shore, Upper Eastern Shore) is expected to equal or exceed that of the U.S. at 1.6 percent from 2025-2030.

Similar to the other variables in this chapter, the pandemic has added significant uncertainty to the future outlook of real per capita income growth. One trend thus far is white collar professional industries with telecommuting opportunities and typically higher salaries have been

less affected than blue collar industries with typically lower salaries. It remains to be seen how this short-term trend since the pandemic began will play out in the coming years related to overall per capita income.

Table 3-8
Historical Per Capita Personal Income (2019$)

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019
Total Personal Income Per Capita (in 2019 dollars)											
United States	46,454	47,751	48,903	48,526	50,179	52,117	52,533	53,707	55,204	56,276	
Mid Atlantic	54,246	55,544	56,862	56,610	58,200	60,496	61,695	63,779	65,614	66,939	
South Atlantic	44,768	45,687	46,247	45,268	46,839	48,906	49,235	50,267	51,437	52,530	
Maryland	57,293	58,593	58,713	57,400	58,314	60,801	62,181	62,638	64,236	65,310	
Baltimore	55,796	56,965	57,178	56,461	57,810	59,953	61,017	61,612	63,227	64,401	
Lower Eastern Shore	41,361	41,750	41,880	42,143	43,432	45,443	45,256	46,023	46,479	46,811	
Southern Maryland	55,156	56,084	55,534	54,460	54,999	56,977	57,759	57,985	59,185	60,633	
Upper Eastern Shore	49,756	50,829	51,158	51,207	52,178	53,929	54,858	55,482	56,764	57,138	
Washington Suburban	64,102	65,764	65,769	63,143	63,461	66,677	68,810	69,108	70,945	72,034	
Western Maryland	40,432	41,126	41,408	41,416	42,474	43,889	44,603	44,593	45,688	46,149	
Total Personal Income Per Capita (in 2019 dollars) Annual Percent Change											
United States		2.8%	2.4%	-0.8%	3.4%	3.9%	0.8%	2.2%	2.8%	1.9%	2.2%
Mid Atlantic		2.4%	2.4%	-0.4%	2.8%	3.9%	2.0%	3.4%	2.9%	2.0%	2.4%
South Atlantic		2.1%	1.2%	-2.1%	3.5%	4.4%	0.7%	2.1%	2.3%	2.1%	1.8%
Maryland		2.3%	0.2%	-2.2%	1.6%	4.3%	2.3%	0.7%	2.6%	1.7%	1.5%
Baltimore		2.1%	0.4%	-1.3%	2.4%	3.7%	1.8%	1.0%	2.6%	1.9%	1.6%
Lower Eastern Shore		0.9%	0.3%	0.6%	3.1%	4.6%	-0.4%	1.7%	1.0%	0.7%	1.4%
Southern Maryland		1.7%	-1.0%	-1.9%	1.0%	3.6%	1.4%	0.4%	2.1%	2.4%	1.1%
Upper Eastern Shore		2.2%	0.6%	0.1%	1.9%	3.4%	1.7%	1.1%	2.3%	0.7%	1.5%
Washington Suburban		2.6%	0.0%	-4.0%	0.5%	5.1%	3.2%	0.4%	2.7%	1.5%	1.3%
Western Maryland		1.7%	0.7%	0.0%	2.6%	3.3%	1.6%	0.0%	2.5%	1.0%	1.5%

Table 3-9
Per Capita Personal Income Forecast (2019$)

	WP20			Moody's			MD SDC		
Geography	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030
United States	1.8%	1.6%	1.7%	1.3%	2.0%	1.7%	-	-	-
Mid Atlantic	1.9%	1.7%	1.8%	0.8%	1.8%	1.3%	-	-	-
South Atlantic	1.8%	1.7%	1.8%	1.5%	2.2%	1.8%	-	-	-
Maryland	1.7%	1.6%	1.7%	-	-	-	1.2%	0.8%	1.0%
Baltimore	1.9%	1.8%	1.8%	-	-	-	1.4%	0.9%	1.1%
Lower Eastern Shore	1.6%	1.6%	1.6%	-	-	-	1.1%	0.7%	0.9%
Southern Maryland	1.6%	1.4%	1.5%	-	-	-	1.3%	0.9%	1.1%
Upper Eastern Shore	1.8%	1.7%	1.7%	-	-	-	1.4%	0.9%	1.2%
Washington Suburban	1.6%	1.4%	1.5%	-	-	-	1.3%	0.9%	1.1%
Western Maryland	1.7%	1.5%	1.5%	-	-	-	1.2%	0.9%	1.0%

3.3.5 Gross Domestic/Regional Product

Gross domestic product (national level) and gross regional product (state- and county-level) are measures of the value of all final goods and services produced within a geographic area and are general indicators of a region's economic health.

Historical

Historical gross domestic product (GDP) and gross regional product (GRP), shown in constant 2019 dollars, are presented in **Table 3-10**. Real U.S. GDP grew at a rate of 2.5 percent between 2010-2019. By comparison, real GRP growth in the Mid-Atlantic and South Atlantic Regions was slightly lower at 2.1 percent and 2.4 percent, respectively, between 2010-2019. At 1.8 percent, Maryland's real GRP growth was lower than the U.S. rate over the same 9-year period.

Data in **Tables 3-3** and **3-5** show that in 2019, Maryland made up 9.1 percent of the South Atlantic Region's population and 9.6 percent of its nonfarm civilian employment. **Table 3-10** shows that in 2019, Maryland accounted for 11.2 percent of the South Atlantic Region's real GRP. Within Maryland, the sub-state regions of Baltimore and Washington Suburban accounted for 87.1 percent of Maryland's real GRP in 2019.

Table 3-10
Historical Gross Domestic/Regional Product

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2010-2019
Gross Regional Product (in billions of 2019 dollars)											
United States	17,057	17,243	17,636	18,038	18,568	19,274	19,596	20,088	20,749	21,262	
Mid Atlantic	2,645	2,631	2,723	2,762	2,842	2,946	3,000	3,047	3,117	3,191	
South Atlantic	3,096	3,099	3,128	3,184	3,271	3,441	3,538	3,618	3,717	3,820	
Maryland	363	367	367	369	375	391	405	408	418	427	
Baltimore	176	178	180	183	186	193	200	201	206	211	
Lower Eastern Shore	10	9	9	10	10	11	11	11	11	11	
Southern Maryland	17	17	17	17	17	18	18	19	18	19	
Upper Eastern Shore	10	9	10	10	10	10	11	11	11	11	
Washington Suburban	139	141	140	139	141	147	153	154	159	161	
Western Maryland	11	11	11	12	12	12	13	13	13	13	
Gross Regional Product (in billions of 2019 dollars) Annual Percent Change											
United States		1.1%	2.3%	2.3%	2.9%	3.8%	1.7%	2.5%	3.3%	2.5%	2.5%
Mid Atlantic		-0.5%	3.5%	1.4%	2.9%	3.7%	1.8%	1.6%	2.3%	2.4%	2.1%
South Atlantic		0.1%	0.9%	1.8%	2.7%	5.2%	2.8%	2.3%	2.7%	2.8%	2.4%
Maryland		1.1%	0.2%	0.6%	1.7%	4.1%	3.8%	0.7%	2.5%	2.0%	1.8%
Baltimore		1.0%	1.0%	1.5%	1.8%	3.7%	3.7%	0.5%	2.7%	2.5%	2.0%
Lower Eastern Shore		-1.1%	-0.1%	4.9%	2.8%	3.6%	1.9%	2.1%	1.1%	-0.1%	1.7%
Southern Maryland		1.5%	-2.9%	0.0%	3.1%	3.3%	4.4%	2.4%	-2.4%	1.9%	1.2%
Upper Eastern Shore		-1.8%	1.3%	2.4%	0.6%	4.8%	2.5%	1.3%	5.8%	1.1%	2.0%
Washington Suburban		1.5%	-0.5%	-1.1%	1.3%	4.7%	4.1%	0.6%	2.8%	1.7%	1.7%
Western Maryland		1.7%	-0.6%	2.2%	2.1%	3.2%	3.0%	-0.2%	1.5%	0.3%	1.5%

Forecast

Table 3-11 provides the gross domestic/regional product forecast. Moody's 2019-2030 forecast for U.S. real GDP growth is lower than WP20's forecast for the same period. WP20 projects that the U.S. economy will have a real growth rate of 2.1 percent from 2019-2030 while Moody's expects a slightly lower real growth rate of 1.9 percent. WP20 projects that the South Atlantic Region will have a higher real growth rate (2.3 percent) compared to the U.S. over the 11-year period, but that Maryland's GRP will have lower real growth (2.0 percent) compared to the U.S. and South Atlantic Region. Within Maryland's sub-state regions, the highest real GRP growth rates between 2019-2030 are expected in Baltimore (2.2 percent), Upper Eastern Shore (2.1 percent) and Washington Suburban (2.0 percent) according to WP20's forecast.

Table 3-11
Gross Domestic/Regional Product Forecast

	WP20			Moody's		
Geography	2019-2024	2025-2030	2019-2030	2019-2024	2025-2030	2019-2030
United States	2.2%	2.0%	2.1%	1.8%	2.0%	1.9%
Mid Atlantic	2.1%	1.8%	1.9%	-	-	-
South Atlantic	2.4%	2.2%	2.3%	-	-	-
Maryland	2.1%	1.9%	2.0%	-	-	-
Baltimore	2.3%	2.1%	2.2%	-	-	-
Lower Eastern Shore	1.9%	1.7%	1.8%	-	-	-
Southern Maryland	1.7%	1.5%	1.6%	-	-	-
Upper Eastern Shore	2.2%	2.0%	2.1%	-	-	-
Washington Suburban	2.1%	1.8%	2.0%	-	-	-
Western Maryland	1.4%	1.2%	1.3%	-	-	-

Table 3-12 provides more detail on the short-term GDP outlook for calendar year 2020 and 2021 from a wider variety of forecasts with short term forecasts available. The table is organized from most optimistic to most pessimistic forecasts for 2020. As shown, a variety of outlooks are predicted for 2021 which shows the continued uncertainty related to the pandemic and corresponding recovery.

Figure 3-6 shows the real GDP historical growth from 2010 – 2019 and forecasted growth between 2020-2030 for the U.S. by the CBO, FOMC, OMB, WP20, and Moody's.[1] The CBO, FOMC, and Moody's expect real U.S. GDP to decline -4.9 percent to -6.5 percent in 2020. In 2021, Moody's expects U.S. GDP to grow at a rate of 2.6 percent and the FOMC projects 5.0 percent growth. While Moody's predicts real GDP growth of 5.2 percent in 2022, the other forecasters expect real GDP growth in 2022 to range from 2.2 percent (CBO and WP20) to 3.5 percent (FOMC). OMB's forecast, which was released in February 2020, illustrates GDP growth expectations before the COVID-19 crisis. By 2024, all of the other forecasters expect real GDP growth to fall below the OMB's pre-COVID-19 forecast level of approximately 3.0 percent. From 2025-2030, the CBO, FOMC, WP20, and Moody's expect real GDP growth in the U.S. to range from 1.8 to 2.1 percent.

[1] The FOMC forecast is for 2020-2028.

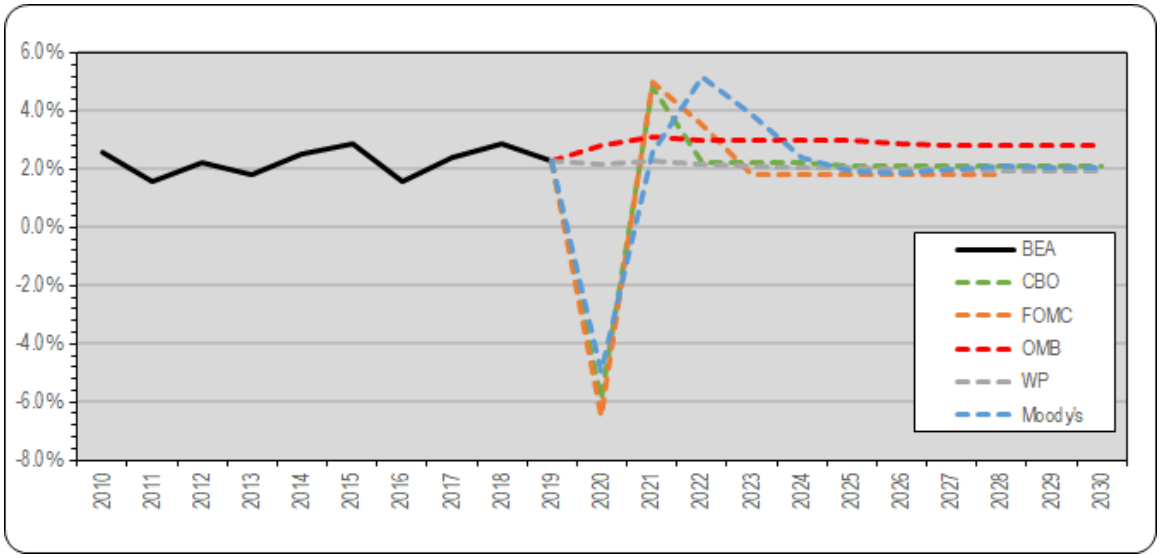
With the exception of OMB, none of the forecasters projects the U.S. economy to achieve pre-COVID growth rates between 2025-2030.

Table 3-12
U.S. Short-Term Gross Domestic Product Forecasts

Source	Release Date	2020	2021
ScotiaBank Global Economics	September 3, 2020	-4.2%	4.4%
TD Economics	June 17, 2020	-4.5%	4.3%
Bank of Montreal (BMO) Capital Markets Economics	September 4, 2020	-4.5%	4.0%
Energy Information Administration (EIA): Short-Term Energy Outlook	September 9, 2020	-4.8%	3.1%
University of Michigan: Research Seminar in Quantitative Economics (RSQE)	August 24, 2020	-4.9%	3.6%
Conference Board	August 13, 2020	-4.9%	2.0%
Wells Fargo Securities Economics Group	August 12, 2020	-4.9%	3.8%
Federal Reserve Bank of Philadelphia: Survey of Professional Forecasters[1]	August 14, 2020	-5.2%	3.2%
Economist Intelligence Unit (EIU): Global Forecasting Service	August 18, 2020	-5.3%	3.7%
PNC Financial Services Group	August 2020	-5.3%	3.5%
Royal Bank of Canada (RBC) Economics	June 10, 2020	-5.5%	4.8%
National Association for Business Economics (NABE)[1]	June 1, 2020	-5.6%	
Moody's Analytics	May 11, 2020	-5.7%	1.5%
Congressional Budget Office (CBO)	July 2, 2020	-5.8%	4.0%
National Association of Realtors	August 27, 2020	-6.0%	4.0%
World Bank	June 1, 2020	-6.1%	4.0%
Federal Reserve Bank: Federal Open Market Committee (FOMC)	June 10, 2020	-6.5%	5.0%
Organization for Economic Cooperation and Development (OECD) - Single Hit	June 10, 2020	-7.3%	4.1%
International Monetary Fund (IMF): World Economic Outlook	June 24, 2020	-8.0%	4.5%
Organization for Economic Cooperation and Development (OECD) - Double Hit	June 10, 2020	-8.4%	1.9%
Average			

(1) Average from a Survey of Professional Forecasters

Figure 3-6
U.S. Real GDP Growth Forecast



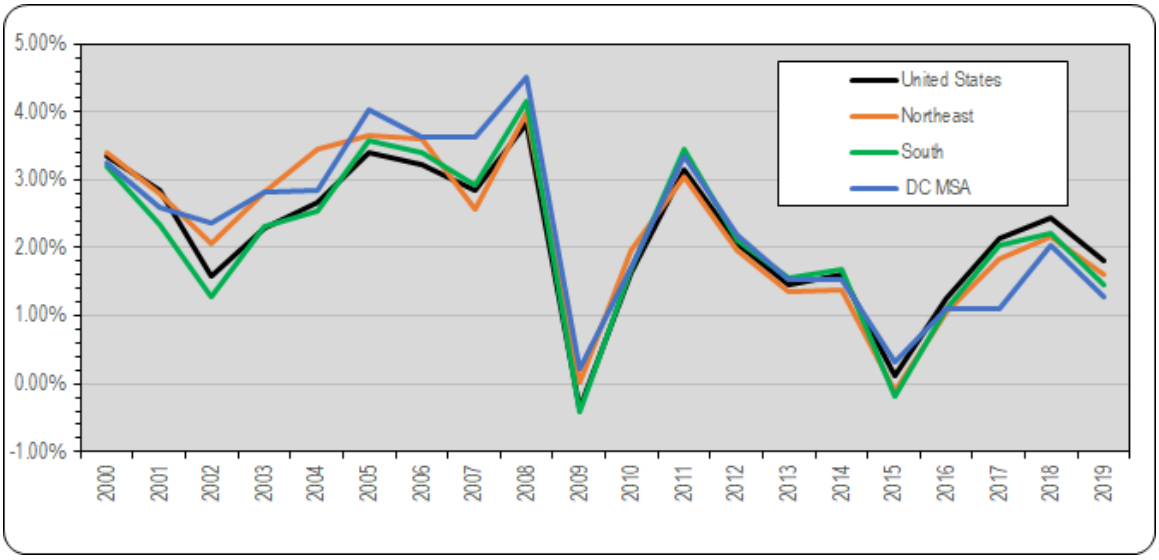
3.3.6 Inflation

Comparing the inflation rate with future toll policy plans can be an indicator of the relative cost of tolls over time. For example, if toll rates are unchanged while inflation is occurring, tolls would become relatively less expensive compared to other goods.

Historical

From 2000-2019, the U.S. inflation rate[2] averaged 2.2 percent, ranging from a high of 3.8 percent in 2008 to a low of -0.4 percent in 2009, and ending at 1.8 percent in 2019. **Figure 3-7** shows that from 2009-2015, the rate of inflation in the Northeast,[3] South,[4] and Washington DC MSA[5] closely tracked the U.S. rate. However, from 2016-2019, the U.S. inflation rate was slightly higher than those of the Northeast, South, and DC MSA.

Figure 3-7
Historical Inflation (CPI-U)



Forecast

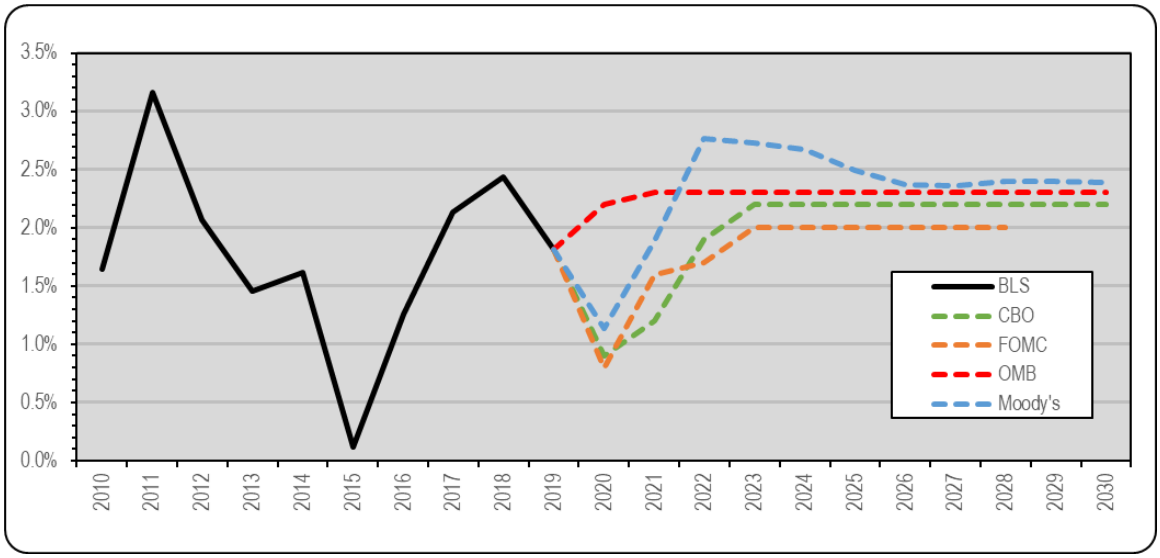
Figure 3-8 shows the U.S. inflation forecast from 2020-2030 by the CBO, FOMC, OMB, and Moody's.[6] In 2020, the CBO, FOMC, and Moody's expect U.S. inflation to range from 0.8 percent to 1.6 percent, and then to increase to 1.3 percent to 1.9 percent in 2021. While Moody's predicts a

[2] Measured by the Consumer Price Index for urban consumers (CPI-U).
[3] Northeast census region, defined as Connecticut, Maine, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.
[4] South census region, defined as Arkansas, Alabama, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.
[5] Washington-Arlington-Alexandria, DC-MD-VA-WV Metropolitan Statistical Area.
[6] The FOMC forecast is for 2020-2028.

U.S. inflation rate of 2.8 percent in 2022, lower rates are expected by the FOMC (1.7 percent) and the CBO (1.9 percent) in 2022.

OMB's forecast, which was released in February 2020, illustrates inflation expectations prior to the COVID-19 crisis. While the CBO and FOMC expect U.S. inflation to be lower than the OMB's pre-COVID-19 forecast level of approximately 2.3 percent, Moody's predicts that inflation will range between 2.4 percent and 2.7 percent from 2023-2030.

Figure 3-8
Inflation (CPI-U) Forecast



3.3.7 Fuel Prices

Fuel prices are another variable that is important to monitor related to traffic forecasting. Increasing fuel prices beyond the rate of inflation leads to increasing vehicle operating cost and generally less travel, including less travel on toll facilities. In the reverse, declining fuel prices results in generally more travel.

Historical

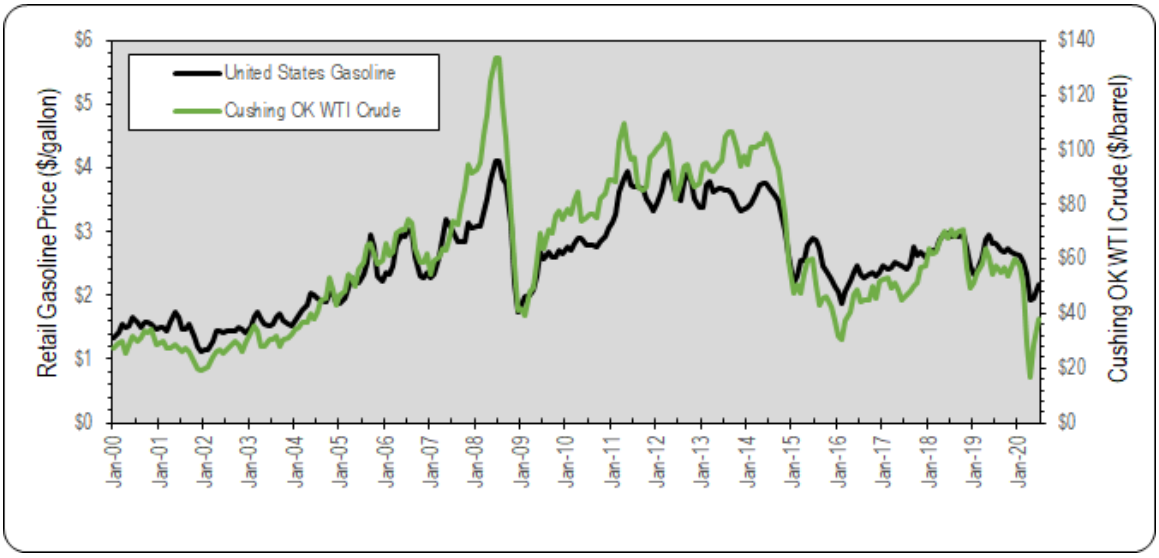
Figure 3-9 illustrates the monthly change in crude oil[7] and retail gasoline prices[8] from 2000-2019. The price data in **Figure 3-9** are shown in nominal dollars (i.e., current dollars)[9] and are measured by price per barrel (crude oil) and price per gallon (gasoline).

U.S. gasoline prices ranged from a low of $1.13 per gallon in December 2001 to a high of $4.11 per gallon in July 2008. Monthly gasoline prices in the U.S. have remained below $3.00 per gallon since November 2014 and were $2.17 per gallon in June 2020. From 2000-2019, retail gasoline

[7] Cushing OK WTI (West Texas Intermediate) spot price per barrel, free on board delivery.
[8] Retail price per gallon of unleaded gasoline, all grades, all formulations.
[9] 2000 data are presented in 2000 dollars, 2001 data in 2001 dollars, etc.

prices in the Central Atlantic Region[10] and Lower Atlantic Region[11] generally tracked those of the U.S. Gasoline prices in the Central Atlantic Region were typically 2.0 percent higher compared to the U.S. On average, the Lower Atlantic Region had gasoline prices 2.7 percent lower than in the U.S. overall.

Figure 3-9
Historical Fuel Prices (Current $)



The retail price of gasoline generally mirrors the price of crude oil since crude oil has historically accounted for approximately 50 percent of gasoline's production cost. Figure 3-8 shows that prior to the COVID-19 crisis, the Cushing OK WTI crude oil benchmark ranged from a low of $19.39 in December 2001 to high of $133.88 in June 2008. The price of oil averaged approximately $65.00 per barrel in 2018 and dropped to an average of $57.00 per barrel in 2019. The WTI benchmark price declined from $57.68 to $16.55 per barrel between January and April 2020,[12] but then increased to $38.31 per barrel in June 2020.

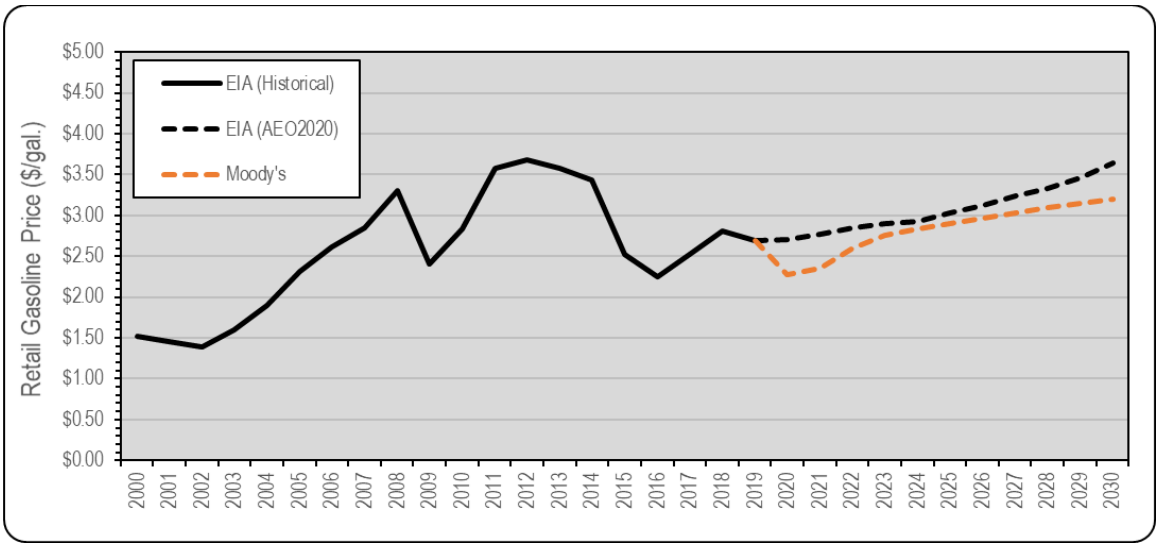
Forecast

Figure 3-10 provides the fuel price forecasts in current dollars. U.S. retail gasoline prices, which have ranged from $1.94 and $2.64 per gallon in the first six months of 2020, are expected to

[10] The Central Atlantic region includes Delaware, District of Columbia, Maryland, New Jersey, New York and Pennsylvania.
[11] Lower Atlantic region includes Florida, Georgia, North Carolina, South Carolina, Virginia and West Virginia.
[12] On April 20, 2020, for the first time since trading began in 1983, Cushing, OK WTI crude oil futures were priced in negative dollars (-$37.63 per barrel) as a result of panic selling caused by a combination of low demand, high inventory, and limited available storage. Trading was positive the following day and there is little sign of a repeat of the historic plunge as oil producers worldwide cut output rapidly, thus easing the pressure on storage.

remain below $3.00 per gallon through 2024, according to forecasts from Moody's Analytics (August 2020) and the Energy Information Agency's *2020 Annual Energy Outlook* (January 2020).

Figure 3-10
Fuel Price Forecasts (Current $)



3.4 Risks and Conclusion

The COVID-19 pandemic has had a significant impact on the economy and travel. Prior to the COVID-19 crisis, economic growth in the U.S. and Maryland was generally supported by low unemployment, low inflation, and gains in per capita personal income. The outbreak of COVID-19 in the U.S. has caused significant and ongoing disruptions to the economy and job market at the national, state, and local levels. This section is intended to bring together discussion of potential impacts and risks related to COVID-19.

Because of the pandemic, many U.S. businesses will continue to experience significant financial hardship which will continue to impact employment. Some of the immediate and acute impacts were mitigated by Federal stimulus programs in the months after the pandemic. However, the prospects for additional stimulus programs and the long-term impacts of increased federal spending are uncertain. Federal Reserve Chairman Jerome Powell has repeatedly stated that the Federal Reserve expects the U.S. economic recovery to be prolonged and erratic. The COVID-19 economic recession is different from the 2007 to 2008 Great Recession since it is a public health emergency and was not caused by an inherent problem such as a housing bubble, lax lending standards, or a troubled financial system. Even if the virus is contained many mid-term economic ripple effects and longer-term structural changes may persist. The short term COVID-19 impacts will accelerate preexisting early-stage trends and induce new changes.

In the mid-term, supply chain industries will be indirectly impacted (for example, professional, financial, and real estate) by the more significantly impacted industries (for example, leisure, hospitality, education, and retail). Pessimistic consumer confidence coupled with employment losses may contract spending. Increasing rates of defaults and bankruptcies will hinder the

recovery. Such deep-cut economic and financial impacts may alter trade patterns, supply chains, and demand. International trade may be impacted due to changes in demand, border restrictions, and accelerated reshoring and supply-chain redundancy trends. Consumer spending may continue to focus more on essentials (for example, groceries, medical emergencies, and necessary home improvements), and will be more often purchased via e-commerce, if possible.

In the long term, some impacts and shifts will be institutionalized. Some industries may not fully recover or may structurally change. For example, this may include some medical care switching to telehealth and in-person college attendance switching to e-learning. Some population trend changes and impacts may occur including deferral of planned births, lower immigration, and a shift of some urban residents to rural locales. If e-commerce and telecommuting increase even moderately, shifts may arise in commercial real estate, warehousing, distribution, and land use patterns.

Considering travel more specifically, the potential changes discussed above would impact travel demand and patterns. Much of the immediately observed travel demand contraction has already rebounded. However, the recovery has become much more gradual and protracted. The risk for a winter increase in COVID-19 impacts and further slowing of the recovery or temporary retraction also remains for travel. In the mid and long term, some baseline travel demand may disappear or shift. Other new changes in travel demand may also emerge. Telecommuting trends are expected to accelerate from pre-COVID-19 levels. E-commerce will likely accelerate the shift of trips from passenger to delivery vehicles and change overall travel patterns as a result.

Considering this forecast, a series of COVID-19 impact factors were developed by CDM Smith to incorporate potential future pandemic impacts into this forecast. The factors were developed based on the COVID-19 travel impacts observed thus far as summarized in **Chapter 2** and previously in this chapter as well as consideration of the future outlooks and risks. However, many factors are actively in play that could change the dynamics of overall travel demand to the positive or negative in the mid and long term. Additionally, the evolving pandemic situation, for example related to vaccine development, could change these factors.

Chapter 4
Forecasts by Facility

This chapter summarizes the development of the forecasts of future year transactions and toll revenue for the MDTA system. Separate sections and discussions are provided for the overall assumptions, the Legacy facilities, ICC, I-95 ETLs, and other revenue. The 10-year annual forecast results by facility through FY 2030 are included in this chapter. Monthly forecasts for FY 2021 and FY 2022 are also included.

4.1 Assumptions

Transaction and revenue forecasts were predicated upon the following basic assumptions, which are considered reasonable by CDM Smith for purposes of the forecast:

1. The MDTA toll facilities and approach roads will continue to be well-maintained and effectively signed;
2. No competing highway projects other than those identified in this report will be constructed or significantly improved during the forecast period;
3. MDTA will continue to operate within its business rules and practices;
4. For the purposes of this forecast, it is assumed that no toll rate or toll schedule adjustments will be made during the forecasting period other than those presented in **Chapter 1**;
5. Annual revenue estimates are expressed in future year dollars (nominal);
6. No major recession, natural disasters, future pandemics, or other significant exogenous events will occur that would significantly reduce travel in the region;
7. Socioeconomic growth, including related to population and employment, will occur as presented in this study; and
8. 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.

Detailed Assumptions

In addition to the basic assumptions listed above, several other more specific assumptions were made as provided in **Table 4-1**.

Table 4-1
Detailed Forecast Assumptions

Assumption Category	Assumption Detail
COVID-19 Impacts	Future COVID-19 impact factors assumed based on the lastest COVID-19 impact analysis.
Construction	Construction projects assumed with significant impacts to traffic and revenue include: Canton Viaduct project, Bay Bridge Eastbound Rehabilitation, Rehabilitation of Decks at the Curtis Creek Bascule Span Approaches, Nice/Middleton Bridge replacement, I-95 Northbound ETL extension, and subgrade Improvements east of Bear Creek (I-695).
Legacy cashless tolling	Permanent cashless tolling assumed for all Legacy facilities as of press release on 8/6/2020.
Video Toll Rates	Cash toll rates for Kennedy Highway, Fort McHenry Tunnel, Harbor Tunnel, Nice/Middleton Bridge, and Bay bridge video payment type transactions assumed through 12/31/2020. Video rates assumed on these facilities beginning 1/1/2021. The Key and Hatem Bridges, which converted to cashless in FY 2020 before the pandemic, continued to charge video toll rates along with the ICC and I-95 ETLs for video payment type transactions during the pandemic.
Video Invoices	Assumed the mailing of Notice of Toll Due video invoices will resume on 10/15/2020.
NOTD Processing Capacity	Assumed 1.8 million NOTD transactions can be processed per month beginning in January 2021. Between October and December 2020 a linear ramp up period in NOTD transaction processing was assumed.
Civil Penalties	Assumed $25 civil penalties for all citations beginning in FY 2021, but with delays and reductions in civil penalty collections due to the pandemic.
Vehicle Registration Holds	Assumed the vehicle registration hold enforcement measure won't be applied in FY 2021 but will resume in FY 2022
Tax Intercept	Assumed the tax intercept enforcement measure won't be applied in FY 2021 but will resume in FY 2022
Pay-by-Plate and Early Pay NOTD Payment Options	Assumed the availability of new payments methods will coincide with 3G go-live on 1/1/2021.
New Vehicle Classifications	Assumed the new motorcyle, 3-axle light, and 4-axle light vehicle classifications and toll rates will go into effect on 4/1/2021. This corresponds to 90 days after the assumed 3G go-live date of 1/1/2021.
Commuter & Shopper Discount Programs	The time limits for all discount plans will restart on 11/1/2020.
Forecasting Approach	Unregistered video transactions and revenue as well as civil penalty revenue are forecasted in the month of collection (cash accounting). All other payment types are forecasted in the month of travel.

As discussed previously in **Chapter 1** and shown in **Table 4-1**, several business rules were changed due the COVID-19 pandemic that led to changes in assumptions for this forecast. The latest COVID-19 impact analysis was discussed previously in **Chapter 2**. The Pay-by-Plate payment option, Early Pay NOTD payment option, and New Vehicle Classifications are discussed in **Chapter 1**. Assumptions related to the construction projects listed in **Table 4-1** are discussed in more detail later in this chapter.

4.2 Legacy System

This section provides an overview of the development of the traffic and toll revenue forecasts for the Legacy system. The inputs to the forecast included toll rates by payment method, traffic growth forecasts, E-ZPass® participation percentages, and the impacts associated with planned roadway improvements on the Legacy facilities.

4.2.1 Forecast Methodology

Econometric models were developed and used for the Legacy system traffic growth forecasts in the March 2015 Legacy system Traffic and Revenue Study. The econometric models sought to establish correlative relationships between various socioeconomic independent variables (such as population, employment, GRP, etc.) and the dependent variable, transactions. The selected independent variables were then used in the forecasting process in the 2015 study based on the latest future year forecast data available at the time. The normal traffic growth used in this current study is based on the growth estimated in the 2015 study with growth adjustments as necessary to account for the most recent actual traffic and revenue performance. The latest historical data and forecasts of socioeconomic/independent variable data were collected and analyzed in this update, with the findings summarized in **Chapter 3**. This latest socioeconomic data was also used to form any adjustment made to normal traffic growth. Passenger car and commercial vehicle transactions were forecasted independently by facility using these normal growth rates and by benchmarking to actual pre-COVID-19 trends.

Assumptions including those related to construction impacts, the new Pay-by-Plate payment program, Early Pay NOTD payment program, and new toll rates for some vehicle classifications were then applied to the estimated normal growth rates. The end-product of the model was a baseline 10-year forecast of transactions and revenue by facility, by passenger cars and commercial vehicles, and by method of payment (electronic, video, and cash) without COVID-19 impacts and without cashless tolling. These results were then processed through a "Waterfall" analysis spreadsheet model developed by CDM Smith to estimate the impacts of cashless tolling, including leakage and violation processing. Video revenue was then adjusted using a spreadsheet model to account for the changes in MDTA business rules and NOTD mailing limits listed in **Table 4-1**. Finally, transactions and revenue by facility, vehicle class, and payment type from the different files were adjusted using forecasted COVID-19 impact factors to account for impacts related to the ongoing pandemic.

4.2.2 Construction Impacts

The four major construction projects expected to impact traffic and revenue on the MDTA Legacy system 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 Harbor 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.

2. **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 was assumed from October 2021 to May 2023 for the purposes of this study.

3. **Rehabilitation of Decks at Curtis Creek Bascule Span, 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.

4. **Subgrade Improvements east of Bear Creek, Francis Scott Key (I-695) -** This project involves drainage repairs and replacement, major roadway subgrade improvements, and roadway paving necessary to address road and barrier settlement. The project is scheduled to begin in the Spring of 2023. Construction will require long term closure of one direction of I-695 (two lanes) and placing single lane contra flow traffic in the other travel direction. The estimated construction duration is 24 months.

Additional construction projects on the MDTA facilities and competing arterials were also reviewed, but it was determined that the construction activity associated with these projects will result in negligible impacts on traffic and toll revenue.

4.2.3 Forecast Results

Table 4-2 presents actual transactions and toll revenue for the Legacy system for FY 2020 and forecasted transactions and toll revenue for FY 2021 through FY 2030 for passenger cars and commercial vehicles, separately. Estimated revenue reflects collected toll revenue by MDTA after assumed reductions due to unbillable and unpaid trips. **Table 4-3** provides historical and forecasted total transactions and toll revenue for the Legacy system by facility.

For purposes of budgeting and the tracking of actual versus forecasted transactions and revenue, monthly forecasts of transaction and toll revenue were developed for FY 2021 and FY 2022. **Table 4-4** provides the forecasted monthly transactions and **Table 4-5** provides the forecasted monthly toll revenue for the total Legacy system. All data presented in **Table 4-4** and **Table 4-5** is forecasted and does not include any actual data for fiscal year-to-date.

Table 4-2
Total Legacy System Forecasted Transactions and Toll Revenue by Class

Fiscal Year	Transactions (Millions)			Toll Revenue ($ Millions) [1]		
	PC	CV	Total	PC	CV	Total
2020 [2]	90.9	8.7	**99.6**	305.8	212.4	**518.2**
2021	77.8	8.5	**86.3**	247.8	205.8	**453.6**
2022	98.8	9.0	**107.7**	351.9	217.0	**568.9**
2023	103.1	9.0	**112.1**	376.5	219.1	**595.5**
2024	103.1	8.9	**112.0**	377.9	217.3	**595.2**
2025	102.1	8.9	**111.0**	369.2	216.6	**585.8**
2026	103.5	9.2	**112.6**	372.8	222.7	**595.5**
2027	105.1	9.2	**114.3**	376.8	223.7	**600.6**
2028	105.8	9.3	**115.1**	379.2	224.8	**604.0**
2029	106.5	9.3	**115.8**	381.6	225.9	**607.5**
2030	107.1	9.3	**116.5**	384.0	227.0	**611.0**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Represents actual data.

Table 4-3
Legacy System Historical and Forecasted Transactions and Toll Revenue by Facility

Fiscal Year [1]	Transactions (Millions)								Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [2]	
2015	14.7	5.2	27.1	41.8	10.6	12.9	3.3	**115.7**	2.8
2016 [3,4]	15.2	5.1	28.3	42.6	11.2	13.3	3.4	**119.0**	2.9
2017	15.5	5.1	27.6	45.4	11.3	13.6	3.4	**122.0**	2.5
2018	15.5	5.1	28.0	44.7	11.4	13.5	3.3	**121.5**	(0.3)
2019	15.2	5.1	20.8	48.2	12.8	13.6	3.3	**119.1**	(2.0)
2020 [3]	12.5	4.4	14.2	42.3	11.9	11.5	2.8	**99.6**	(16.4)
2021	10.9	4.0	12.5	37.1	10.0	9.7	2.0	**86.3**	(13.4)
2022	13.2	4.7	26.4	39.5	9.6	11.6	2.7	**107.7**	24.8
2023	13.8	4.9	28.8	41.3	8.3	12.2	2.8	**112.1**	4.1
2024 [3]	13.9	4.9	31.0	41.5	5.2	12.6	2.9	**112.0**	(0.1)
2025	13.8	4.9	30.6	41.2	5.2	12.4	2.8	**111.0**	(0.9)
2026	14.0	4.9	29.6	41.5	7.3	12.4	2.8	**112.6**	1.4
2027	14.1	5.0	28.1	41.7	10.1	12.5	2.9	**114.3**	1.5
2028 [3]	14.2	5.0	28.3	42.0	10.2	12.5	2.9	**115.1**	0.6
2029	14.3	5.0	28.5	42.2	10.3	12.5	2.9	**115.8**	0.6
2030	14.5	5.0	28.6	42.5	10.3	12.6	2.9	**116.5**	0.6
Fiscal Year [1]	Toll Revenue ($ Millions) [5]								Percent Growth
	JFK	Hatem	BHT	FMT	FSK	Bay	Nice	Total [2]	
2015	$166.5	$11.2	$85.5	$185.8	$43.0	$81.2	$21.4	**$594.6**	3.6
2016 [3,4]	171.2	11.8	89.9	191.3	43.3	52.8	21.2	**581.4**	(2.2)
2017	175.8	12.1	89.5	204.2	44.9	54.0	21.5	**601.9**	3.5
2018	177.2	11.6	91.4	205.1	45.9	53.4	20.7	**605.3**	0.6
2019	176.0	12.2	70.3	217.4	50.5	53.7	21.0	**601.1**	(0.7)
2020 [3]	154.1	11.4	47.5	194.3	47.5	46.0	17.3	**518.2**	(13.8)
2021	139.1	9.2	39.0	174.8	41.3	37.3	12.9	**453.6**	(12.5)
2022	163.6	11.0	91.3	194.9	41.9	47.8	18.5	**568.9**	25.4
2023	170.7	11.5	101.1	203.7	37.7	50.9	19.9	**595.5**	4.7
2024 [3]	172.0	11.6	110.8	204.5	23.4	53.0	20.0	**595.2**	(0.1)
2025	170.5	11.4	108.1	201.4	23.2	51.7	19.5	**585.8**	(1.6)
2026	171.8	11.5	101.7	202.3	36.7	51.9	19.6	**595.5**	1.7
2027	173.2	11.5	96.7	203.3	44.0	52.1	19.8	**600.6**	0.9
2028 [3]	174.5	11.6	97.3	204.2	44.2	52.3	19.9	**604.0**	0.6
2029	175.9	11.7	97.8	205.1	44.4	52.5	20.1	**607.5**	0.6
2030	177.2	11.7	98.3	206.1	44.6	52.8	20.3	**611.0**	0.6

[1] Actual data presented for FY 2015 through FY 2020.

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

[3] Leap Year

[4] Year of toll decrease.

[5] Includes revenue impacts due to leakage, including unpaid transactions.

Table 4-4
Monthly Transactions by Method of Payment
FY 2021 and FY 2022

Month	Passenger Cars (2-Axle)							Commercial Vehicles (3+ Axle)			Total
	Commuters & Shoppers	MD E-ZPass	Full Fare E-ZPass	Video	Official Duty	Hatem Plan A & B	Total 2-Axle	E-ZPass	Video	Total 3+ Axle	
FY 2021											
July	1.790	2.194	1.856	-	0.074	0.268	**6.182**	0.699	-	**0.699**	**6.882**
August	1.740	2.192	1.891	-	0.070	0.265	**6.157**	0.692	-	**0.692**	**6.849**
September	1.822	2.204	1.598	0.086	0.078	0.275	**6.062**	0.679	0.003	**0.683**	**6.745**
October	1.973	2.167	1.676	0.085	0.084	0.278	**6.261**	0.715	0.004	**0.719**	**6.980**
November	1.787	2.200	1.711	0.088	0.073	0.261	**6.120**	0.656	0.003	**0.659**	**6.779**
December	1.663	2.158	1.701	0.319	0.068	0.256	**6.164**	0.701	0.012	**0.713**	**6.877**
January [1]	1.779	1.902	1.293	0.613	0.072	0.245	**5.904**	0.643	0.025	**0.668**	**6.572**
February	1.632	1.904	1.255	0.756	0.068	0.237	**5.853**	0.615	0.028	**0.643**	**6.496**
March	1.943	1.970	1.601	0.864	0.084	0.296	**6.758**	0.711	0.038	**0.748**	**7.506**
April [2]	1.995	2.083	1.966	0.893	0.082	0.299	**7.320**	0.714	0.038	**0.752**	**8.072**
May	2.002	2.228	1.967	0.901	0.081	0.306	**7.485**	0.697	0.037	**0.734**	**8.219**
June	1.908	2.314	2.001	0.916	0.080	0.312	**7.530**	0.725	0.038	**0.764**	**8.294**
FY TOTAL	**22.031**	**25.516**	**20.517**	**5.521**	**0.914**	**3.297**	**77.797**	**8.248**	**0.226**	**8.474**	**86.271**
FY 2022											
July	2.048	2.566	2.159	1.251	0.088	0.316	**8.427**	0.720	0.045	**0.765**	**9.192**
August	2.008	2.577	2.204	1.440	0.084	0.320	**8.633**	0.715	0.049	**0.764**	**9.396**
September	1.960	2.481	1.749	1.357	0.088	0.313	**7.949**	0.701	0.054	**0.754**	**8.703**
October	2.195	2.418	1.902	1.344	0.099	0.313	**8.270**	0.699	0.051	**0.750**	**9.020**
November	2.008	2.532	1.938	1.286	0.086	0.303	**8.154**	0.677	0.045	**0.722**	**8.876**
December	1.969	2.601	2.037	1.343	0.083	0.309	**8.341**	0.719	0.043	**0.762**	**9.103**
January	2.114	2.317	1.535	1.275	0.088	0.297	**7.626**	0.657	0.045	**0.702**	**8.328**
February	1.937	2.297	1.511	1.226	0.083	0.285	**7.340**	0.617	0.038	**0.655**	**7.994**
March	2.193	2.277	1.852	1.411	0.100	0.333	**8.165**	0.718	0.054	**0.771**	**8.937**
April	2.168	2.320	2.214	1.442	0.094	0.329	**8.565**	0.700	0.054	**0.754**	**9.320**
May	2.144	2.437	2.158	1.455	0.091	0.336	**8.621**	0.713	0.055	**0.768**	**9.388**
June	2.034	2.532	2.183	1.493	0.088	0.335	**8.665**	0.729	0.058	**0.787**	**9.451**
FY TOTAL	**24.777**	**29.354**	**23.443**	**16.321**	**1.071**	**3.789**	**98.755**	**8.365**	**0.589**	**8.954**	**107.709**

[1] Pay-by-Plate and early pay NOTD assumed to begin 1/1/2021.

[2] New vehicle classes assumed to be implemented 4/1/2021.

Table 4-5
Monthly Toll Revenue by Method of Payment
FY 2021 and FY 2022

Month	Passenger Cars (2-Axle)							Commercial Vehicles (3+ Axle)			Total [1]
	Commuters & Shoppers	MD E-ZPass	Full Fare E-ZPass	Video	Official Duty	Hatem Plan A & B	Total 2-Axle	E-ZPass	Video	Total 3+ Axle	
FY 2021											
July	$ 2.562	$ 6.955	$ 9.364	$ -	$ -	$ -	**$ 18.882**	$ 17.085	$ -	**$ 17.085**	**$ 35.966**
August	2.480	6.955	9.553	-	-	-	**18.989**	16.792	-	**16.792**	**35.780**
September	2.675	7.156	8.331	0.437	-	-	**18.598**	16.526	0.089	**16.615**	**35.213**
October	2.912	7.114	8.779	0.429	-	-	**19.235**	17.422	0.093	**17.514**	**36.749**
November	2.572	7.061	8.800	0.453	-	-	**18.886**	16.022	0.088	**16.110**	**34.995**
December	2.363	6.828	8.640	1.635	-	-	**19.466**	16.980	0.308	**17.288**	**36.754**
January [2]	2.674	6.317	6.853	3.267	-	-	**19.111**	15.643	0.619	**16.262**	**35.373**
February	2.390	6.220	6.544	4.107	-	-	**19.261**	14.978	0.698	**15.676**	**34.937**
March	2.880	6.470	8.329	4.201	-	-	**21.880**	17.189	0.858	**18.046**	**39.926**
April [3]	2.894	6.688	10.109	4.377	-	-	**24.068**	17.280	0.866	**18.146**	**42.215**
May	2.902	7.185	10.163	4.444	-	-	**24.695**	16.985	0.834	**17.819**	**42.513**
June	2.720	7.367	10.090	4.527	-	-	**24.705**	17.585	0.873	**18.458**	**43.162**
FY TOTAL	**$ 32.025**	**$ 82.318**	**$ 105.555**	**$ 27.877**	**$ -**	**$ -**	**$ 247.774**	**$ 200.485**	**$ 5.326**	**$ 205.811**	**$ 453.585**
FY 2022											
July	$ 2.943	$ 8.189	$ 10.965	$ 6.163	$ -	$ -	**$ 28.260**	$ 17.184	$ 0.988	**$ 18.173**	**$ 46.433**
August	2.869	8.200	11.136	8.975	-	-	**31.179**	17.053	1.372	**18.425**	**49.604**
September	2.870	8.011	9.017	8.290	-	-	**28.187**	16.719	1.478	**18.197**	**46.384**
October	3.246	7.955	9.913	8.636	-	-	**29.750**	16.826	1.491	**18.316**	**48.066**
November	2.890	8.101	9.863	8.365	-	-	**29.219**	16.315	1.327	**17.642**	**46.861**
December	2.801	8.217	10.259	8.671	-	-	**29.948**	17.192	1.273	**18.465**	**48.413**
January	3.179	7.678	8.064	8.147	-	-	**27.068**	15.788	1.296	**17.083**	**44.151**
February	2.840	7.497	7.805	7.963	-	-	**26.105**	14.842	1.108	**15.950**	**42.055**
March	3.250	7.465	9.572	8.636	-	-	**28.924**	17.133	1.512	**18.645**	**47.568**
April	3.146	7.452	11.361	9.023	-	-	**30.982**	16.747	1.530	**18.276**	**49.259**
May	3.109	7.849	11.082	9.052	-	-	**31.092**	17.151	1.554	**18.704**	**49.797**
June	2.905	8.065	10.985	9.241	-	-	**31.197**	17.453	1.623	**19.077**	**50.274**
FY TOTAL	**$ 36.048**	**$ 94.679**	**$ 120.022**	**$ 101.163**	**$ -**	**$ -**	**$ 351.911**	**$ 200.402**	**$ 16.551**	**$ 216.953**	**$ 568.864**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Pay-by-Plate and early pay NOTD assumed to begin 1/1/2021.

[3] New vehicle classes assumed to be implemented 4/1/2021.

4.3 Intercounty Connector

4.3.1 Forecast Methodology and Assumptions

Base ICC annual trip and toll revenue forecasts were made using a review and analysis of the most recent historical trends and adjusting base growth rates estimated in the most recent previous ICC forecast update, as necessary. Additionally, updated COVID-19 impact factors were applied to the resulting base forecasts. Estimated revenue reflects collected toll revenue by MDTA after assumed reductions due to leakage of unbillable and unpaid trips. The forecasts assume the assumptions listed in **Section 4.1**, including the assumptions listed in **Table 4-2** related to MDTA business rules, such as NOTD invoicing, new payment methods, and new classifications.

Related to other projects that may potentially impact the ICC, previous sketch-level modeling of the impacts of the I-495 and I-270 Managed Lanes project on the ICC showed the potential for a negative impact on ICC traffic. The sketch-level modeling assumed two priced managed lanes in both directions for the entirety of the I-495 and I-270 project limits. The ICC impacts appeared to be most dependent on managed lanes on the I-495 north beltway between I-270 and I-95, as this section of I-495 is parallel to and serves as an alternative route to the ICC for some trips. Because information on project phasing assumptions and construction timeline is not currently available for this section of the I-495 and I-270 project, impacts are not included in this forecast update. However, especially due to the potential for negative impacts on ICC transactions and revenue, I-495 and I-270 project updates will continue to be closely monitored. Once more detailed information becomes available, CDM Smith recommends that a detailed modeling and analysis exercise be undertaken to understand and quantify the potential impacts on the ICC and determine whether forecast adjustments are warranted.

4.3.2 Forecast Results

Table 4-6 provides the Intercounty Connector actual trips and revenue for FY 2020 and the forecasted trips and revenue for FY 2021 through FY 2030, by ETC and video. ETC transactions and revenue will decrease in FY 2021 due to ongoing COVID-19 impacts but will begin to recover in FY 2022. Due to the changes in MDTA business rules, video transactions and revenue are forecasted to drop significantly in FY 2021 but will be back to normal levels by FY 2023.

Table 4-6
Intercounty Connector Forecasted Annual Trips and Collected Toll Revenue

Fiscal Year	Trips (Millions)			Toll Revenue ($ Millions) [1]		
	E-ZPass	Video	Total	E-ZPass	Video	Total
2020 [2]	30.2	2.8	**32.9**	50.0	8.1	**58.1**
2021	23.6	0.8	**24.5**	41.4	2.0	**43.4**
2022	33.0	2.6	**35.6**	57.8	7.5	**65.3**
2023	35.8	3.2	**39.0**	62.5	9.4	**71.9**
2024	36.5	3.2	**39.7**	63.8	9.5	**73.3**
2025	37.2	3.0	**40.2**	65.0	8.8	**73.9**
2026	38.0	3.1	**41.0**	66.3	9.0	**75.4**
2027	38.7	3.1	**41.8**	67.7	9.2	**76.9**
2028	39.5	3.2	**42.7**	69.0	9.4	**78.4**
2029	40.3	3.3	**43.5**	70.4	9.6	**79.9**
2030	41.1	3.3	**44.4**	71.8	9.8	**81.5**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Represents actual data.

For purposes of budgeting and the tracking of actual versus forecasted transactions and revenue, monthly forecasts of transaction and toll revenue were developed for FY 2021 and FY 2022. **Table 4-7** presents the Intercounty Connector monthly forecasted trips and collected toll revenue for FY 2021 and FY 2022. All monthly data presented in this table is forecasted and does not include any actual data for fiscal year-to-date.

Table 4-7
Intercounty Connector Forecasted Monthly Trips and Collected Toll Revenue

Month	Trips (Millions)				Toll Revenue ($ Millions) [1]			
	PC E-ZPass	CV E-ZPass	Video	Total	PC E-ZPass	CV E-ZPass	Video	Total
FY 2021								
July	1.828	0.058	-	**1.886**	$ 2.943	$ 0.379	$ (0.000)	**$ 3.322**
August	1.852	0.058	-	**1.910**	2.982	0.382	(0.000)	**3.364**
September	1.873	0.054	0.013	**1.940**	3.016	0.353	0.045	**3.414**
October	1.978	0.059	0.014	**2.051**	3.186	0.387	0.049	**3.621**
November	1.828	0.051	0.016	**1.895**	2.944	0.333	0.057	**3.334**
December	1.717	0.051	0.051	**1.818**	2.765	0.332	0.184	**3.281**
January [2]	1.543	0.042	0.093	**1.678**	2.486	0.276	0.216	**2.978**
February	1.521	0.043	0.134	**1.698**	2.450	0.284	0.321	**3.055**
March	1.965	0.058	0.118	**2.142**	3.165	0.383	0.255	**3.803**
April [3]	2.127	0.066	0.125	**2.317**	3.422	0.420	0.268	**4.110**
May	2.278	0.066	0.137	**2.481**	3.665	0.420	0.294	**4.379**
June	2.444	0.076	0.148	**2.668**	3.932	0.490	0.319	**4.741**
FY TOTAL	**22.954**	**0.682**	**0.848**	**24.484**	**$ 36.955**	**$ 4.440**	**$ 2.006**	**$ 43.402**
FY 2022								
July	2.497	0.079	0.168	**2.744**	$ 4.018	$ 0.504	$ 0.392	**$ 4.914**
August	2.560	0.083	0.194	**2.837**	4.119	0.532	0.563	**5.215**
September	2.545	0.074	0.214	**2.833**	4.095	0.475	0.617	**5.187**
October	2.727	0.081	0.225	**3.032**	4.387	0.518	0.676	**5.582**
November	2.660	0.077	0.230	**2.967**	4.280	0.492	0.693	**5.465**
December	2.541	0.075	0.213	**2.828**	4.088	0.479	0.640	**5.206**
January	2.390	0.067	0.207	**2.663**	3.845	0.428	0.619	**4.892**
February	2.345	0.068	0.232	**2.645**	3.773	0.434	0.705	**4.912**
March	2.874	0.087	0.208	**3.169**	4.625	0.555	0.603	**5.783**
April	2.889	0.089	0.211	**3.189**	4.649	0.568	0.617	**5.835**
May	3.020	0.090	0.228	**3.337**	4.859	0.575	0.663	**6.097**
June	3.033	0.096	0.238	**3.367**	4.879	0.616	0.691	**6.186**
FY TOTAL	**32.080**	**0.964**	**2.567**	**35.612**	**$ 51.618**	**$ 6.176**	**$ 7.479**	**$ 65.273**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Pay-by-Plate and early pay NOTD assumed to begin 1/1/2021

[3] New vehicle classes assumed to be implemented 4/1/2021

4.3.3 Capacity Check

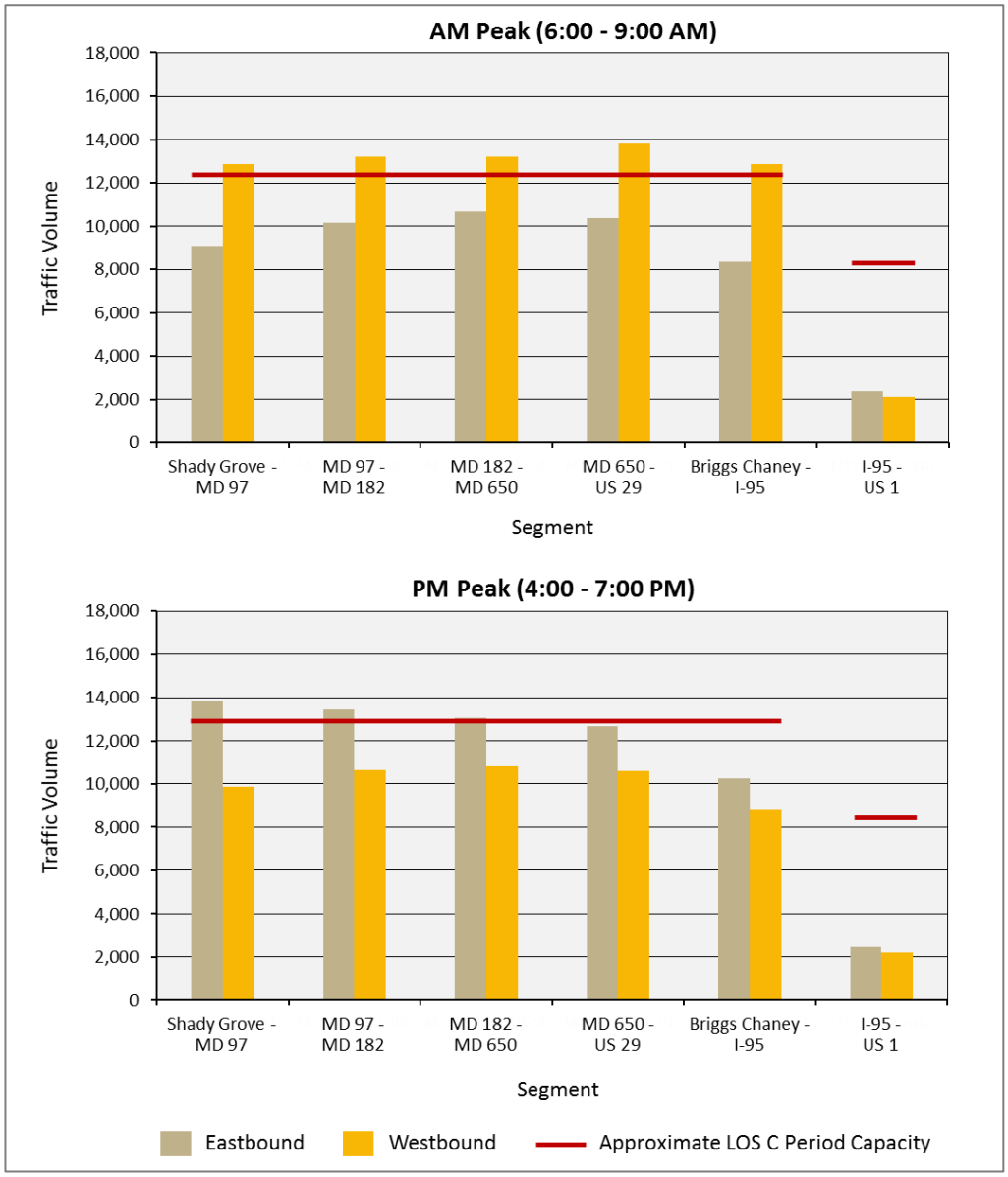
One consideration for the future-year traffic volumes was whether travel demand along the individual mainline segments would exceed a theoretical capacity of the ICC. Although MDTA has not determined what threshold might trigger congestion-managed toll increases, for the purposes of this analysis it was assumed that "Level of Service C" represented that threshold. **Figure 4-1** illustrates the relationship between the theoretical "Level of Service C" Peak Period capacity and the estimated FY 2040 volumes during the AM Peak (6:00 to 9:00 AM) and PM Peak (4:00 to 7:00 PM) Periods on the ICC by segment and direction. Other important assumptions related to this analysis are listed below:

- This analysis focused on the mainlines of the ICC and not any potential future operational issues that could be experienced at ramp junctions or intersections.
- Given the uncertainty in peak period future volumes due to COVID-19, this capacity check analysis is unchanged from last year's forecast.
- This capacity analysis does not include potential impacts on the ICC due to the proposed I-495 and I-270 Managed Lanes project.

As is shown in the figure, FY 2040 estimated average Peak Period volumes on the ICC range between about 8,500 and 14,000 vehicles during the AM and PM Peak Periods and directions west of I-95, with the westbound direction in the AM Peak forecasted to exceed "Level of Service C" in all segments by 2040. The eastbound direction in the PM Peak is forecasted to exceed capacity in three of the five segments. The ICC section between I-95 and US 1 is estimated to carry between 2,000 and 2,500 vehicles during both the AM and PM Peak Periods, which is much less than the theoretical "Level of Service C" capacity for this section.

This analysis, which is based on estimated average weekday travel volumes along the ICC mainline travel segments in the peak month of travel, indicates toll increases would be required to maintain "Level of Service C" travel conditions. It is estimated that the westbound travel direction during the AM Peak could begin exceeding capacity in FY 2033 and the eastbound direction in the PM Peak in FY 2036. However, specific hourly traffic volumes will vary by day and hour within the peaks, and it is probable that the "Level of Service C" threshold will be reached in certain segments, travel directions, and hours sooner than FY 2030.

Figure 4-1
FY 2040 Estimated AM and PM Period Segment Volumes
by Mainline Segment and Direction



Note: Although MDTA has not determined what Level of Service threshold might trigger congestion managed toll increases, for purposes of this analysis, it is assumed that "Level of Service C" would be the maximum threshold (indicated by the red line).

4.4 I-95 ETLs

4.4.1 Forecast Methodology and Assumptions

The I-95 ETL forecasts, which were developed by CDM Smith for this forecast update, were made using a spreadsheet modeling methodology. The spreadsheet model was calibrated to existing I-95 ETL traffic and revenue performance and was then used to forecast future traffic and revenue for the existing ETL section and the future ETL extensions.

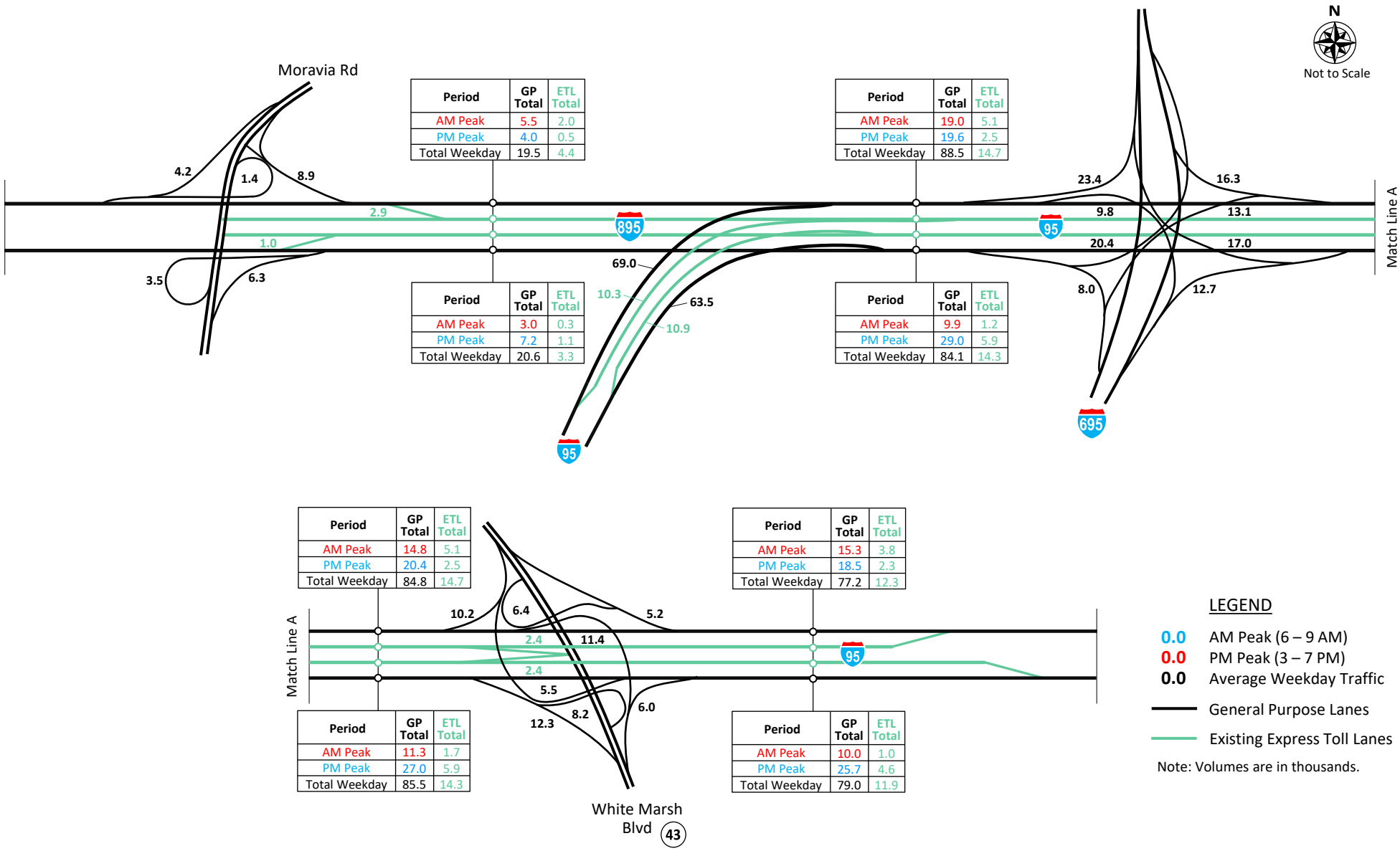
To develop the I-95 ETL forecast spreadsheet model, a series of counts were first obtained from the Maryland ITMS count monitoring site to produce a 2019 average weekday traffic profile. The profile was balanced to 2019 levels so to provide a "normal" traffic profile excluding any impacts of the COVID-19 pandemic in 2020. Using the available mainline and ramp locations within the I-95 ETL corridor, the traffic data was balanced through the corridor on an hourly basis and by total passenger cars and commercial vehicles. The results of this balancing analysis are summarized for the AM and PM peak period and total weekday in **Figure 4-2**. In addition to the traffic profile, average weekday speeds in the general purpose and express lanes were obtained from the speed data provider INRIX and incorporated into the model.

The balanced traffic profile and speed data were used to calibrate the tolling algorithms built into the spreadsheet model and to recognize the different peaking patterns by time of day and direction. Similar to a full travel demand model for a priced managed lane forecast, the spreadsheet model tolling algorithm considered value of time, toll rates, travel time savings, and travel time reliability to estimate demand for the ETL.

Once the spreadsheet model was calibrated, it was used to develop the 10-year forecast. The I-95 ETL forecast used the assumptions described in **Section 4.1**, including the detailed assumptions related to methods of payment and vehicle classifications. Also included for the I-95 ETL forecast was the assumption of the future northbound extension. This project will include widening and construction of the I-95 ETLs northbound from MD 43 to beyond MD 24 to accommodate two ETL lanes. Phase 1 of the extension, from MD 43 to MD 152, is scheduled to be complete in the fall of 2024. For the purposes of this analysis, opening of Phase 1 was assumed on January 1, 2025. Phase 2 of the extension, from MD 152 to MD 24, is scheduled to be complete in the fall of 2027. For the purposes of this study, opening of Phase 2 was assumed on January 1, 2028. A schematic showing the I-95 ETL extensions is included in **Chapter 1**. A baseline growth forecast was applied to estimate future volumes on the corridor Based on the calibrated settings within the model, the future year models estimated what percent of traffic will choose to use the ETLs based on capacity, estimated future speeds within the corridor, value of time, toll rates, and travel time reliability.

The spreadsheet model was developed without COVID-19 impacts. As with the Legacy system and ICC forecasts, updated COVID-19 impact factors were applied to the forecast results without COVID-19.

2020 Traffic and Toll Revenue Forecast Update – Total System



I-95 EXPRESS TOLL LANES (ETL)
2019 AVERAGE WEEKDAY TRAFFIC

FIGURE 4-2

4.4.2 Forecast Results

Table 4-8 provides the forecasted annual trips and collected toll revenue for the I-95 ETL existing section through MD 43. **Table 4-9** provides the forecasted annual trips and toll revenue for the total of the existing section and extensions of the I-95 ETLs.

Table 4-8
I-95 ETL Existing Section Forecasted Annual Trips and Collected Toll Revenue

Fiscal Year	Trips (Millions)			Toll Revenue ($ Millions) [1]		
	PC	CV	Total	PC	CV	Total
2020 [2]	7.3	0.4	**7.8**	8.8	1.9	**10.8**
2021	6.4	0.4	**6.8**	7.9	1.7	**9.6**
2022	9.4	0.6	**10.0**	11.6	2.6	**14.2**
2023	10.8	0.7	**11.5**	13.4	3.0	**16.4**
2024	11.3	0.7	**12.0**	14.0	3.2	**17.2**
2025	11.9	0.8	**12.7**	14.7	3.5	**18.2**
2026	12.5	0.9	**13.3**	15.5	3.7	**19.2**
2027	13.0	0.9	**14.0**	16.2	4.0	**20.2**
2028	13.6	1.0	**14.6**	16.9	4.3	**21.2**
2029	14.3	1.1	**15.3**	17.7	4.6	**22.3**
2030	14.9	1.1	**16.1**	18.5	4.9	**23.5**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Represents actual data.

Table 4-9
I-95 ETL Total with Extensions Forecasted Annual Trips and Collected Toll Revenue

Fiscal Year	Trips (Millions)			Toll Revenue ($ Millions) [1]		
	PC	CV	Total	PC	CV	Total
2020 [2]	7.3	0.4	**7.8**	8.8	1.9	**10.8**
2021	6.4	0.4	**6.8**	7.9	1.7	**9.6**
2022	9.4	0.6	**10.0**	11.6	2.6	**14.2**
2023	10.8	0.7	**11.5**	13.4	3.0	**16.4**
2024	11.3	0.7	**12.0**	14.0	3.2	**17.2**
2025	11.4	0.7	**12.1**	15.8	3.5	**19.3**
2026 [3]	11.4	0.7	**12.1**	17.8	3.7	**21.6**
2027	11.9	0.8	**12.7**	18.7	4.0	**22.7**
2028 [4]	12.7	0.8	**13.5**	20.3	4.4	**24.8**
2029	13.4	0.9	**14.4**	22.1	4.9	**27.0**
2030	14.1	1.0	**15.1**	23.3	5.3	**28.6**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Represents actual data.

[3] Phase 1 of northbound extension assumed opening on Jan 1, 2025.

[4] Phase 2 of northbound extension assumed opening on Jan 1, 2028.

For purposes of budgeting and the tracking of actual versus forecasted transactions and revenue, monthly forecasts of transaction and toll revenue were developed for FY 2021 and FY 2022. **Table 4-10** provides the monthly forecasted trips and collected toll revenue for the I-95 ETLs by passenger car and commercial vehicle. All monthly data presented in this table is forecasted and does not include any actual data for fiscal year-to-date.

Table 4-10
I-95 ETL Forecasted Monthly Trips and Collected Toll Revenue

Month	Trips (Millions)			Toll Revenue ($ Millions) [1]		
	PC	CV	Total	PC	CV	Total
FY 2021						
July	0.523	0.030	**0.553**	0.646	0.133	**0.779**
August	0.558	0.032	**0.590**	0.690	0.140	**0.830**
September	0.498	0.032	**0.530**	0.615	0.141	**0.756**
October	0.559	0.034	**0.592**	0.691	0.148	**0.839**
November	0.527	0.031	**0.558**	0.652	0.138	**0.790**
December	0.493	0.031	**0.524**	0.609	0.136	**0.745**
January [2]	0.371	0.024	**0.395**	0.458	0.108	**0.566**
February	0.435	0.025	**0.460**	0.538	0.111	**0.649**
March	0.474	0.031	**0.505**	0.586	0.139	**0.725**
April [3]	0.622	0.035	**0.657**	0.769	0.156	**0.925**
May	0.645	0.038	**0.684**	0.798	0.170	**0.968**
June	0.669	0.041	**0.711**	0.828	0.182	**1.010**
FY TOTAL	**6.373**	**0.385**	**6.758**	**$ 7.879**	**$ 1.703**	**$ 9.582**
FY 2022						
July	0.781	0.046	**0.827**	0.966	0.201	**1.167**
August	0.773	0.046	**0.819**	0.955	0.201	**1.157**
September	0.668	0.044	**0.712**	0.825	0.194	**1.019**
October	0.811	0.049	**0.860**	1.003	0.215	**1.218**
November	0.782	0.048	**0.830**	0.967	0.212	**1.179**
December	0.795	0.051	**0.847**	0.983	0.225	**1.209**
January	0.604	0.041	**0.645**	0.747	0.180	**0.927**
February	0.711	0.042	**0.754**	0.879	0.186	**1.065**
March	0.751	0.051	**0.802**	0.928	0.226	**1.154**
April	0.921	0.053	**0.973**	1.138	0.232	**1.370**
May	0.907	0.056	**0.964**	1.122	0.247	**1.369**
June	0.899	0.057	**0.956**	1.111	0.249	**1.361**
FY TOTAL	**9.402**	**0.586**	**9.988**	**$ 11.626**	**$ 2.568**	**$ 14.194**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Pay-by-Plate and early pay NOTD assumed to begin 1/1/2021

[3] New vehicle classes assumed to be implemented 4/1/2021

4.5 Other Revenue

4.5.1 Forecast Methodology and Assumptions

In addition to In-lane toll revenue, MDTA also collects Other Revenue associated with the operation of its facilities. These have been summarized into the following categories:

1. Unused Commuter and Shoppers Plan Trips
2. Transponder Fees and Sales
    a. Transponder sales
    b. Monthly Service Fees
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 section provides a description of each of the Other Revenue categories.

Unused Commuter and Shoppers Plan Trips

MDTA provides customers the option to enroll in commuter plans which provide discounts for frequent trips. As discussed previously in **Chapter 1,** MDTA offers three different Commuter Plans based on the facilities included in the plan as well as a Shoppers Plan. All plans allow customers to purchase a large number of discounted trips that must be used in a specific time period. Any remaining balance after the time periods have expired is included in other revenue as "unused pre-paid trip revenue".

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.

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 E-ZPass account holders.

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. Revenue associated with these plans is included in the other revenue.

Violation Recovery

Historical violation recovery data through FY 2020 have been provided by MDTA. Prior to FY 2016, "violation fees" were charged to drivers who chose 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 the other revenue forecast. Future forecasts of civil penalty revenue are based on the following assumptions:

- Baseline civil penalty revenue forecasts were lowered by about 24 percent due to the implementation of a civil penalty program change which was assumed to begin with all civil penalties assessed in FY 2021. This program change assumes civil penalties will be reduced from $50 to $25 for all transactions with civil penalties. The 24 percent revenue impact was estimated based on CDM Smith analysis of historical civil penalty payment rates. Note that this change was already included in the most recent June 2020 forecasts.
- Additional civil penalty revenue was included due to the implementation of full cashless tolling on the remaining Legacy facilities.
- Civil penalty collections were adjusted due to MDTA business rule changes related to the pandemic.

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 MDTA maintained roadways along the vehicle's route. This fee is a one-time charge and is not applied at any specific tolling location.

Concession Revenues

There are two travel plazas along the JFK Highway that provide additional revenue to MDTA through concessions. In 2012, the MDTA entered into a public private partnership with Areas USA for the redevelopment and long-term operation of the travel plazas. 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. While the MDTA continues to own the facilities, Areas USA will operate the facilities through 2047 under a revenue-sharing agreement. The concession revenue forecast used in the other revenue forecast was provided by MDTA.

4.5.2 Forecast Results

Table 4-11 provides the historical and forecasted other toll revenue for the Legacy facilities, ICC, and I-95 ETLs. Historical data is shown for FY 2015 through FY 2020. Due to COVID-19, other revenue declined by 13 percent from FY 2019 to FY 2020. Other revenue is forecasted to significantly decline in FY 2021 due to business rule changes implemented by MDTA due to COVID-19. The MDTA business rule changes will cause a delay in the processing of civil penalty revenue, which accounts for a majority of other revenue. Additionally, unused prepaid trip revenue is forecasted to decline further in FY 2021 due to reduced trip frequency for commuters.

Table 4-12 provides the FY 2021 and FY 2022 monthly other revenue forecast for the Legacy facilities, ICC, and I-95 ETLs. Due to the change in MDTA business rules due to the pandemic, other revenue is forecasted to be negative through November from usage and frequency discounts.

Table 4-11
Other Revenue by Facility

Fiscal Year [1]	Legacy Facilities										Intercounty Connector & I-95 ETLs				Total Other Toll Revenue [4]
	Service Fees and Sales				Violation Recovery		Commercial Vehicles				Service Fees and Sales		Violation Recovery		
	Unused Pre-Paid Trip Revenue	Trans-ponder Sales	Monthly Account Fees	Hatem E-Z Pass Program	Civil Penalties	Violation Fees	Post-Usage Discount	High Frequency Discount	Over-size Permit Fee	Concession Revenue [3]	Trans-ponder Sales	Monthly Account Fees	Violation Fees	Civil Penalties	
2015	16.81	1.44	5.87	1.52	10.75	0.01	(6.34)	(0.62)	1.15	5.07	0.19	0.79	0.19	0.79	**37.62**
2016 [2]	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	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	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	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	10.64	0.22	2.05	1.69	16.93	-	(8.63)	(1.30)	1.06	5.32	0.04	0.34	-	11.93	**40.28**
2021	6.51	-	1.61	1.41	3.30	-	(8.62)	(1.20)	1.27	3.83	-	0.28	-	0.48	**8.87**
2022	12.72	-	1.62	1.60	14.33	-	(8.75)	(1.21)	1.29	3.84	-	0.28	-	1.64	**27.34**
2023	13.14	-	1.62	1.65	18.95	-	(8.84)	(1.22)	1.30	3.85	-	0.28	-	2.08	**32.81**
2024	13.20	-	1.63	1.66	31.61	-	(8.93)	(1.23)	1.31	3.86	-	0.28	-	3.22	**46.63**
2025	13.27	-	1.64	1.67	37.84	-	(9.02)	(1.23)	1.33	3.87	-	0.28	-	3.74	**53.39**
2026	13.33	-	1.65	1.67	38.01	-	(9.11)	(1.24)	1.34	3.88	-	0.28	-	3.84	**53.66**
2027	13.40	-	1.66	1.68	38.14	-	(9.20)	(1.25)	1.35	3.89	-	0.29	-	4.08	**54.04**
2028	13.47	-	1.67	1.69	38.24	-	(9.29)	(1.25)	1.37	3.90	-	0.29	-	4.19	**54.26**
2029	13.54	-	1.67	1.70	38.34	-	(9.39)	(1.26)	1.38	3.91	-	0.29	-	4.30	**54.49**
2030	13.60	-	1.68	1.71	38.44	-	(9.48)	(1.26)	1.39	3.92	-	0.29	-	4.42	**54.71**

Source: Historical data from MDTA

(1) FY 2015 - 2020 represents actual data.

(2) Year of select toll rate reductions.

(3) Concession Revenue Forecast provided by MDTA.

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

Table 4-12
Forecasted Monthly Other Revenue

Month	Total Other Revenue
FY 2021	
July	(0.136)
August	(0.132)
September	(0.125)
October	(0.144)
November	(0.104)
December	0.451
January [(2)]	0.975
February	1.319
March	1.504
April [(3)]	1.740
May	1.773
June	1.752
FY TOTAL	**$ 8.873**
FY 2022	
July	1.858
August	2.034
September	1.994
October	2.357
November	2.357
December	2.355
January	2.266
February	2.259
March	2.325
April	2.513
May	2.514
June	2.503
FY TOTAL	**$ 27.337**

Chapter 5
Total Forecast Results

This chapter provides a summary of the total MDTA system transactions/trips and revenue for all facilities. **Table 5-1** provides the total annual transactions for the Legacy system and total trips for the Intercounty Connector (ICC) and I-95 ETLs for FY 2020 actual and the FY 2021 to FY 2030 forecast.

Table 5-1
Total System Transactions/Trips

Fiscal Year	Transactions (millions)				
	Legacy	ICC	I-95 ETL	Total [1]	Percent Change
2020 [2]	99.6	32.9	7.8	**140.3**	-
2021	86.3	24.5	6.8	**117.5**	(16.3)
2022	107.7	35.6	10.0	**153.3**	30.5
2023	112.1	39.0	11.5	**162.6**	6.0
2024	112.0	39.7	12.0	**163.8**	0.7
2025	111.0	40.2	12.1	**163.4**	(0.3)
2026	112.6	41.0	12.1	**165.8**	1.5
2027	114.3	41.8	12.7	**168.9**	1.9
2028	115.1	42.7	13.5	**171.3**	1.4
2029	115.8	43.5	14.4	**173.6**	1.4
2030	116.5	44.4	15.1	**176.0**	1.3

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

[2] Represents actual data.

Table 5-2 provides the total system revenue, summarized by Legacy system toll revenue, ICC toll revenue, I-95 ETL toll revenue, and other revenue for all MDTA facilities for FY 2020 actual and the FY 2021 to FY 2030 forecast.

Figure 5-1 provides a graphical representation of the share of transactions/trips by facility for the first and last years of the 10-year forecast, FY 2021 and 2030. In FY 2021, the Legacy system is forecasted to account for nearly 73 percent of total transactions and trips, and the I-95 ETLs are forecasted to account for the smallest share at six percent. By FY 2030, due to comparatively higher growth rates on the ICC and I-95 ETLs, more significant recovery from the COVID-19 impacts, and the I-95 ETL extension, the Legacy system is forecasted to decrease to 66 percent of total transactions. ICC trips are forecasted to increase from 21 to 25 percent, and the I-95 ETL trips are forecasted to increase to 9 percent by FY 2030.

Table 5-2
Total System Toll and Other Revenue

Fiscal Year	Revenue ($ millions)					
	Legacy	ICC	I-95 ETL	Other [1]	Total [2]	Percent Change
2020 [3]	518.2	58.1	10.8	40.3	**627.4**	-
2021	453.6	43.4	9.6	8.9	**515.4**	(17.8)
2022	568.9	65.3	14.2	27.3	**675.7**	31.1
2023	595.5	71.9	16.4	32.8	**716.6**	6.1
2024	595.2	73.3	17.2	46.6	**732.4**	2.2
2025	585.8	73.9	19.3	53.4	**732.4**	0.0
2026	595.5	75.4	21.6	53.7	**746.1**	1.9
2027	600.6	76.9	22.7	54.0	**754.2**	1.1
2028	604.0	78.4	24.8	54.3	**761.5**	1.0
2029	607.5	79.9	27.0	54.5	**768.9**	1.0
2030	611.0	81.5	28.6	54.7	**775.8**	0.9

[1] Includes Other Revenue from Legacy, ICC, and I-95 ETL.

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

[3] Represents actual data.

Figure 5-1
Share of Transactions/Trips, FY 2021 and FY 2030

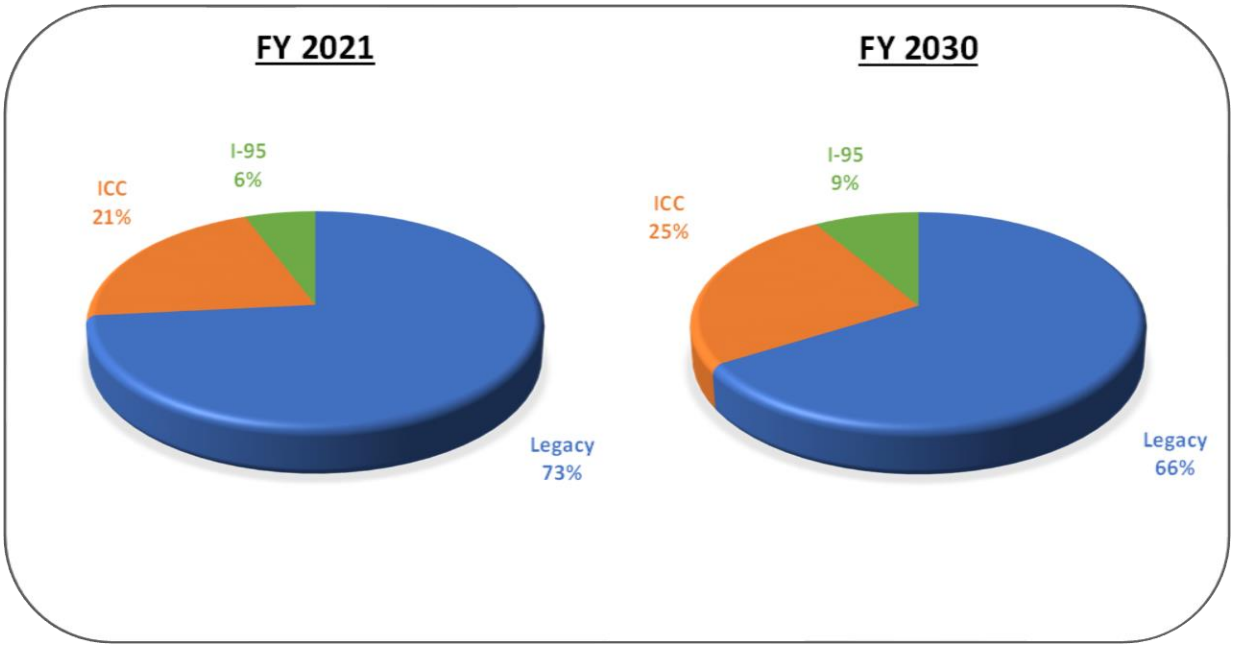


Figure 5-2 provides the same graphical representation for total revenue, separated by facility toll revenue and other revenue. Due to the higher share of transactions, the Legacy system also provides the highest share of total revenue and is forecasted to decrease from 88 percent in FY 2021 to 79 percent by FY 2030 for the same reasons as the transaction share changes. The ICC and I-95 ETLs will increase slightly from FY 2021 to FY 2030, while other revenue is forecasted to have the biggest increase in share of total revenue from two percent in FY 2021 to seven percent in FY 2030 due to the conversion to all cashless-tolling and forecasted corresponding increase in civil penalty revenue.

Figure 5-2
Share of Total Revenue, FY 2021 and FY 2030

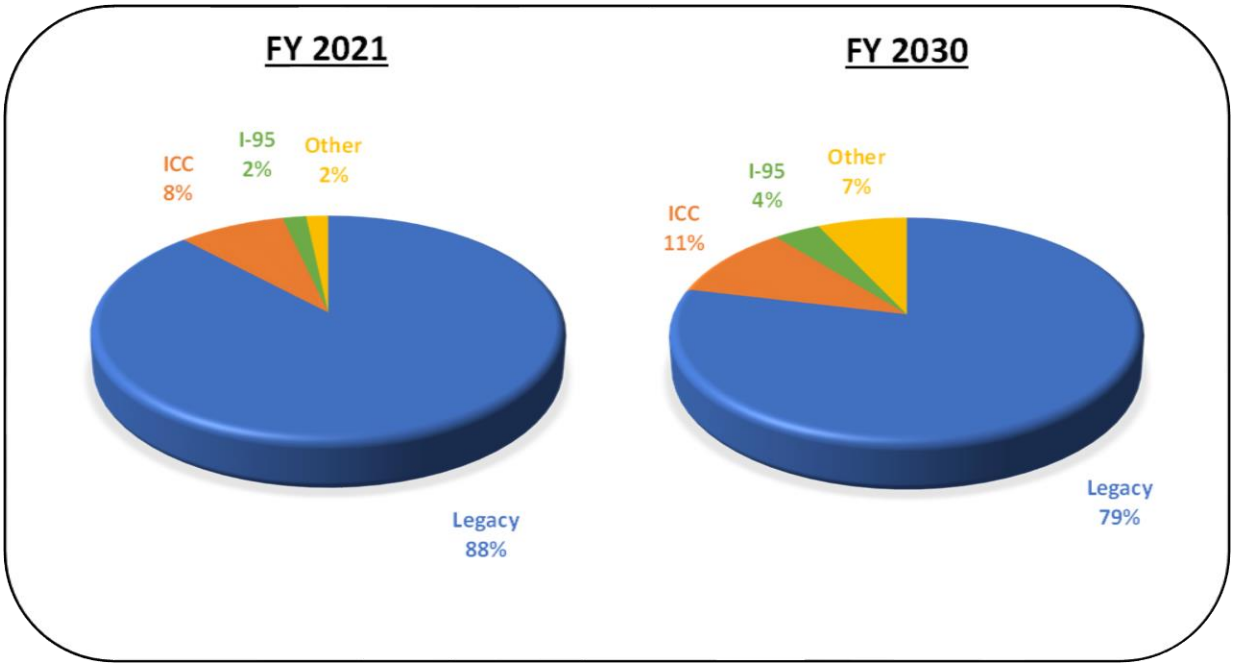


Table 5-3 summarizes the FY 2021 and FY 2022 monthly forecasted transactions, toll revenue, and other revenue for the combined Legacy system, ICC, and I-95 ETL's.

Table 5-3
Total System Monthly Transactions, Toll Revenue, and Other Revenue

Month	Transactions (Millions)	Revenue ($ Millions) [1]		
		Toll	Other	Total
FY 2021				
July	9.320	40.068	(0.136)	**39.932**
August	9.349	39.974	(0.132)	**39.842**
September	9.214	39.384	(0.125)	**39.259**
October	9.624	41.209	(0.144)	**41.065**
November	9.232	39.119	(0.104)	**39.015**
December	9.218	40.780	0.451	**41.231**
January [2]	8.645	38.917	0.975	**39.892**
February	8.654	38.640	1.319	**39.960**
March	10.153	44.454	1.504	**45.958**
April [3]	11.046	47.249	1.740	**48.989**
May	11.384	47.861	1.773	**49.634**
June	11.673	48.913	1.752	**50.665**
FY TOTAL	**117.513**	**$ 506.569**	**$ 8.873**	**$ 515.442**
FY 2022				
July	12.763	52.515	1.858	**54.373**
August	13.052	55.975	2.034	**58.010**
September	12.248	52.590	1.994	**54.584**
October	12.913	54.866	2.357	**57.223**
November	12.673	53.504	2.357	**55.861**
December	12.778	54.828	2.355	**57.183**
January	11.636	49.970	2.266	**52.236**
February	11.393	48.032	2.259	**50.291**
March	12.908	54.505	2.325	**56.831**
April	13.483	56.464	2.513	**58.976**
May	13.689	57.262	2.514	**59.776**
June	13.774	57.820	2.503	**60.323**
FY TOTAL	**153.309**	**$ 648.331**	**$ 27.337**	**$ 675.668**

[1] Includes revenue impacts due to leakage, including unpaid transactions.

[2] Pay-by-Plate and early pay NOTD assumed to begin 1/1/2021

[3] New vehicle classes assumed to be implemented 4/1/2021

Chapter 6
Forecast Comparisons

This chapter provides comparisons of the current forecasts for the Legacy system, Intercounty Connector, and I-95 ETL's against previous forecasts. The Legacy system and Intercounty Connector forecasts are compared to the October 2019 CDM Smith forecasts summarized in the reports "Maryland Transportation Authority FY 2020 Traffic and Toll Revenue Forecast Update (Legacy Facilities)" and "FY 2020 Intercounty Connector Forecast Update" as well as the June 2020 updated forecasts summarized in "Maryland Transportation Authority COVID-19 Traffic and Revenue Analysis Letter Report." The comparison provided for the I-95 ETLs includes the October 2019 forecast prepared by Jacobs Engineering Group, Inc., summarized in the report "I-95 ETL T&R Update Existing and Extension ", and a June 2020 adjusted forecast which was estimated using the October 2019 Jacobs forecast and applying forecasted COVID impacts and a shift in opening date assumptions for the northbound I-95 ETL extension.

Table 6-1 provides the forecast comparison for the Legacy system. The June 2020 forecasted toll revenue was considerably lower than the October 2019 forecast primarily due to forecasted COVID-19 impacts and business rule changes related to the pandemic. Compared to the June 2020 forecast, current passenger car revenue is forecasted to be down in FY 2021 by 19.7 percent and down in FY 2022 by 4.4 percent. FY 2023 and FY 2024 are forecasted to be one to two percent higher than the June forecast. The outer years of the forecast are about one percent lower than previously forecasted. Commercial vehicle toll revenue is currently forecasted to be higher than in June 2020 in FY 2021 to FY 2023, lower in FY 2024 and FY 2025, and then about the same in the outer years. These changes in Legacy system forecasts are due to updated COVID-19 impact forecasts, business rule changes related to the pandemic, the implementation of systemwide cashless tolling, and including updated construction project assumptions.

Table 6-1
Legacy System Toll Revenue Comparison

Fiscal Year	Passenger Cars					Commercial Vehicles				
	Oct. 2019	% Diff - Oct. vs. June	June 2020	% Diff - June vs. Current	Current	Oct. 2019	% Diff - Oct. vs. June	June 2020	% Diff - June vs. Current	Current
2019	$ 378.1	0.0%	$ 378.1	0.0%	$ 378.1	$ 223.0	0.0%	$ 223.0	0.0%	$ 223.0
2020	370.8	-17.7%	305.0	0.3%	305.8	223.9	-5.5%	211.7	0.3%	212.4
2021	368.7	-16.3%	308.6	-19.7%	247.8	221.9	-8.1%	203.9	0.9%	205.8
2022	384.2	-4.2%	368.2	-4.4%	351.9	223.4	-6.5%	209.0	3.8%	217.0
2023	385.8	-4.2%	369.5	1.9%	376.5	224.0	-4.0%	215.0	1.9%	219.1
2024	390.5	-4.2%	374.2	1.0%	377.9	225.8	-2.5%	220.1	-1.3%	217.3
2025	391.9	-4.2%	375.5	-1.7%	369.2	226.3	-2.5%	220.5	-1.8%	216.6
2026	394.4	-4.2%	377.8	-1.3%	372.8	228.5	-2.6%	222.6	0.0%	222.7
2027	396.8	-4.2%	380.1	-0.9%	376.8	229.5	-2.6%	223.7	0.0%	223.7
2028	400.4	-4.2%	383.5	-1.1%	379.2	231.2	-2.6%	225.3	-0.2%	224.8
2029	401.8	-4.2%	384.9	-0.8%	381.6	231.7	-2.6%	225.7	0.1%	225.9
2030	-	0.0%	-	0.0%	384.0	-	0.0%	-	0.0%	227.0

Table 6-2 provides the forecast comparison for the Intercounty Connector. Similar to the Legacy system, the June 2020 forecasted toll revenue for the ICC was considerably lower than the October 2019 forecast due to COVID-19 impacts. Compared to the June 2020 forecast, the current forecast includes estimated COVID-19 impacts for the ICC that are higher than forecasted in June and updates to the forecast due to MDTA business rule changes related to the pandemic. The current forecast compared to the June 2020 forecast has much lower revenue in FY 2021, lower revenue in FY 2022, higher revenue in FY 2023 and FY 2024, and the same revenue by the end of FY 2024.

Table 6-2
Intercounty Connector Comparison

Fiscal Year	Oct. 2019	% Diff - Oct. vs. June	June 2020	% Diff - June vs. Current	Current
2019	$ 69.3	0.0%	$ 69.3	0.0%	$ 69.3
2020	70.1	-15.8%	59.0	-1.5%	58.1
2021	71.0	-19.7%	57.0	-23.8%	43.4
2022	72.5	-5.5%	68.5	-4.7%	65.3
2023	74.0	-4.0%	71.0	1.2%	71.9
2024	75.5	-4.0%	72.5	1.2%	73.3
2025	77.0	-4.0%	73.9	0.0%	73.9
2026	78.5	-4.0%	75.4	0.0%	75.4
2027	80.1	-4.0%	76.9	0.0%	76.9
2028	81.7	-4.0%	78.4	0.0%	78.4
2029	83.3	-4.0%	79.9	0.0%	79.9
2030	-	0.0%	-	0.0%	81.5

Table 6-3 provides the forecast comparison for the I-95 ETLs. Changes in the current forecast compared to June are due to differences in CDM Smith's forecast results compared to Jacobs and incorporating the latest COVID-19 impact forecasts.

Table 6-3
I-95 ETLs Comparison

Fiscal Year	Oct. 2019 (Jacobs)	% Diff - Oct. vs. June	June 2020 (Jacobs*)	% Diff - June vs. Current	Current
2019	$ 13.9	0.0%	$ 13.9	0.0%	$ 13.9
2020	14.7	-20.0%	11.8	-8.6%	10.8
2021	15.2	-30.0%	10.6	-9.7%	9.6
2022	15.7	-7.0%	14.6	-2.6%	14.2
2023	16.2	-5.0%	15.4	6.2%	16.4
2024	21.2	-24.7%	16.0	7.8%	17.2
2025	23.9	-13.1%	20.8	-6.9%	19.3
2026	25.4	-8.1%	23.3	-7.7%	21.6
2027	26.4	-6.0%	24.8	-8.3%	22.7
2028	27.4	-6.0%	25.8	-3.9%	24.8
2029	28.5	-5.9%	26.8	0.5%	27.0
2030	-	0.0%	-	0.0%	28.6

Table 6-4 provides the forecast comparison for other revenue. The June 2020 forecasted other revenue was lower than the October 2019 forecast mostly due to incorporation of forecasted COVID-19 impacts and the incorporation of the $25 civil penalty rate change. The current forecast is lower than the June 2020 forecast primarily due to COVID-19 impacts and the MDTA business rule changes related to the pandemic. These will impact civil penalty collection timing, causing FY 2021 to be nearly 70 percent lower than the June 2020 forecast. Other revenue is forecasted to return to 2019 levels due to the conversion to cashless tolling on all facilities.

Table 6-4
Other Revenue Comparison

Fiscal Year	Oct. 2019	% Diff - Oct. vs. June	June 2020	% Diff - June vs. Current	Current
2019	$ 46.4	0.0%	$ 46.4	0.0%	$ 46.4
2020	47.7	-18.5%	38.9	3.5%	40.3
2021	43.4	-33.7%	28.8	-69.1%	8.9
2022	46.6	-25.4%	34.8	-21.5%	27.3
2023	46.3	-23.9%	35.2	-6.8%	32.8
2024	49.7	-24.3%	37.6	23.9%	46.6
2025	49.8	-24.1%	37.8	41.4%	53.4
2026	50.8	-23.6%	38.8	38.4%	53.7
2027	51.0	-23.6%	39.0	38.5%	54.0
2028	51.1	-23.2%	39.2	38.3%	54.3
2029	51.2	-23.0%	39.4	38.4%	54.5
2030	-	0.0%	-	0.0%	54.7

Table 6-5 provides the forecasted total revenue comparison for the entire MDTA system.

Table 6-5
Total System Revenue Comparison

Fiscal Year	Total System				
	Oct. 2019	% Diff - Oct. vs. June	June 2020	% Diff - June vs. Current	Current
2019	$ 730.8	0.0%	$ 730.8	0.0%	$ 730.8
2020	727.2	-13.9%	626.4	0.2%	627.4
2021	720.1	-15.5%	608.8	-15.3%	515.4
2022	742.4	-6.4%	695.0	-2.8%	675.7
2023	746.3	-5.4%	706.2	1.5%	716.6
2024	762.8	-5.6%	720.4	1.7%	732.4
2025	768.8	-5.2%	728.5	0.5%	732.4
2026	777.6	-5.1%	738.0	1.1%	746.1
2027	783.9	-5.0%	744.4	1.3%	754.2
2028	791.9	-5.0%	752.3	1.2%	761.5
2029	796.5	-5.0%	756.8	1.6%	768.9
2030	-	0.0%	-	0.0%	775.8

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 MDTA. 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 MDTA. These estimates and projections may not be indicative of actual or future values and are therefore subject to substantial uncertainty. Certain variables such as future developments, economic cycles, global pandemics and impacts related to advances in automotive technology etc. 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 MDTA and designated parties approved by MDTA 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 MDTA and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to MDTA with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to MDTA. MDTA 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.