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Date November 1, 2017
To Jaclyn Hartman
From Phil Eshelman
Subject **I-95 ETL T&R Update – Final Report**

Jacobs was retained to conduct an update to the traffic and toll revenue estimates for Interstate 95 Express Toll Lanes (ETLs) operated and maintained by the Maryland Transportation Authority (MDTA).

Jacobs conducted and developed the original forecast of traffic and toll revenue for the I-95 ETLs in 2013 in anticipation of the opening in late 2014. The original analysis is documented in the report titled "I-95 Express Toll Lanes Comprehensive Traffic and Toll Revenue Study" dated December 2013. The majority of the analysis was conducted in the spring of 2013 with finalization of the report at the end of the year.

Since the original analysis was conducted, Jacobs has updated the forecast against actual results annually similar to the analysis documented in this memo.

This memo reviews the existing conditions of the facility including traffic levels, speeds and frequency of use, and revised estimates of traffic and toll revenue for the facility. Thus the sections are as follows:

1. Project Description
2. Data Collection/Summary
3. Updated Traffic and Toll Revenue Forecasts

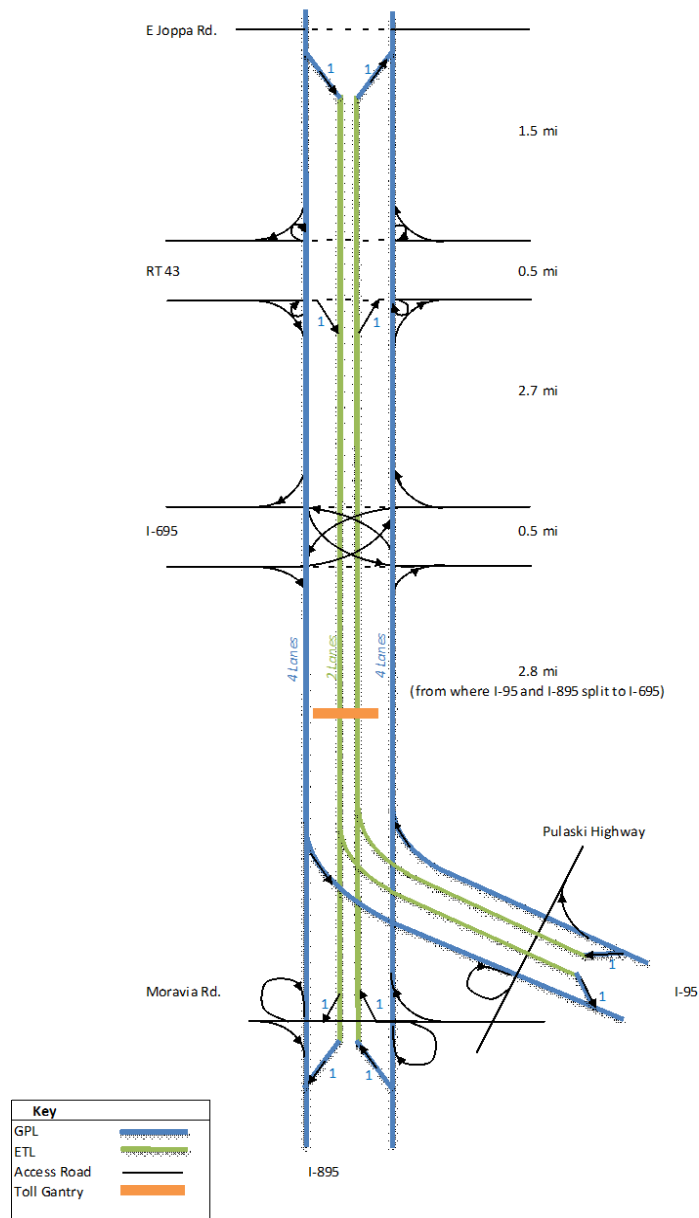
1. Project Description

The I-95 Express Toll Lanes (ETLs) are two lanes in each direction running parallel to the I-95 general purpose (GP) lanes for approximately 7.5 miles north of Baltimore from north of White Marsh Boulevard (MD 43) to the split of I-95/I-895 about 4 miles north of the Baltimore Harbor. Figure 1 and Figure 2 provide the project location and the details as to access to the ETLs from the GP lanes, respectively.

Figure 1: I-95 ETL Project Location Map



Figure 2: I-95 ETL Stick Diagram



The facility offers faster travel speeds as compared to the general purpose lanes during congested times of the day. Key to the forecast of traffic and toll revenue on these ETLs is the determination of the levels of congestion on the GP lanes into the future and the propensity for motorists to pay a toll to avoid such congestion.

The toll schedule for the I-95 ETLs is by time of day, specific by direction and day of the week. The toll rates were lowered in FY16 (July 1, 2015), and remain unchanged since that time. The passenger car toll

rates and time period for the toll rates are shown in the following tables. It is assumed that the current toll rates will be in effect throughout the forecast period.

Table 1: I-95 ETL Passenger Car Toll Rates

Time Period	FY15 Rates	FY17 Rates
Peak	\$1.75	\$1.54
Off-Peak	\$1.40	\$1.19
Night	\$0.70	\$0.49

Table 2: I-95 ETL Toll Schedule Time Periods

Time Period	Weekday	Saturday	Sunday
	Southbound		
Peak	6 AM to 9 AM	12 PM to 2 PM	2 PM to 5 PM
Off-Peak	5 AM to 6 AM; 9 AM to 9 PM	5 AM to 12 PM; 2 PM to 9 PM	5 AM to 2 PM; 5 PM to 9 PM
Night	9 PM to 5 AM		
Northbound			
Peak	3 PM to 7 PM	12 PM to 2 PM	2 PM to 5 PM
Off-Peak	5 AM to 3 PM; 7 PM to 9 PM	5 AM to 12 PM; 2 PM to 9 PM	5 AM to 2 PM; 5 PM to 9 PM
Night	9 PM to 5 AM		

2. Data Collection/Summary

In this section the data that was collected for this analysis is identified and the salient elements from those data as they affect the T&R forecast are analyzed.

2.1 Data Collected

For this analysis the following data were collected from the MDTA for the time period from September 2016 to August 2017 to supplement our existing databases:

1. Traffic Data
 - a. Hourly ETL traffic by payment type
 - b. Every transaction by payment type and zip code
 - c. SHA traffic counts
 - d. Speed data from MDTA readers on the ETLs and GP lanes separately
2. Revenue Data
 - a. Monthly E-ZPass toll revenue by vehicle class
 - b. Monthly paid video revenue

In addition to the data collected above specifically for this analysis, our databases and experience with existing managed lane systems and usage were used, as is typical on these projects.

2.2 Traffic and Toll Revenue

The historical annual traffic and toll revenue for FY15 through FY17 are presented by vehicle class and payment type in the following tables. The data show that there is an extremely high passenger car share as well as E-ZPass percentage for FY15 through FY17. The vehicle class percent share in each table adds to 100% reading down the table with sums provided by car and truck. The percent ETC shown in the final column of the tables is to each specific vehicle class across the rows of the table.

Table 3: ETL Traffic and Toll Revenue by Vehicle Class and Payment Type – FY15 (December 2014 to June 2015)

Vehicle Class	E-ZPass	Video	Total	% Vehicle Class	% ETC
Transactions					
Car	3,747,950	57,847	3,805,797	96.5%	98.5%
Truck	133,882	5,954	139,836	3.5%	95.7%
Total	3,881,832	63,801	3,945,633	100.0%	98.4%
Toll Revenue					
Car	\$5,244,604	\$120,329	\$5,364,933	87.3%	97.8%
Truck	\$771,721	\$9,055	\$780,776	12.7%	98.8%
Total	\$6,016,325	\$129,384	\$6,145,709	100.0%	97.9%

Table 4: ETL Traffic and Toll Revenue by Vehicle Class and Payment Type – FY16 (July 2015 to June 2016)

Vehicle Class	E-ZPass	Video	Total	% Vehicle Class	% ETC
Transactions					
Car	7,752,270	204,022	7,956,292	96.3%	97.4%
Truck	295,749	13,584	309,333	3.7%	95.6%
Total	8,048,019	217,606	8,265,625	100.0%	97.4%
Toll Revenue					
Car	\$9,641,558	\$412,271	\$10,053,829	88.3%	95.9%
Truck	\$1,303,913	\$27,452	\$1,331,365	11.7%	97.9%
Total	\$10,945,471	\$439,723	\$11,385,194	100.0%	96.1%

Table 5: ETL Traffic and Toll Revenue by Vehicle Class and Payment Type – FY17 (July 2016 to June 2017)

Vehicle Class	E-ZPass	Video	Total	% Vehicle Class	% ETC
Transactions					
Car	8,367,883	263,322	8,631,205	95.6%	96.9%
Truck	382,620	17,085	399,705	4.4%	95.7%
Total	8,750,503	280,407	9,030,910	100.0%	96.9%
Toll Revenue					
Car	\$10,240,285	\$524,730	\$10,765,014	86.3%	95.1%
Truck	\$1,678,824	\$34,124	\$1,712,948	13.7%	98.0%
Total	\$11,919,108	\$558,854	\$12,477,962	100.0%	95.5%

Traffic and toll revenue by month were also reviewed and are presented in the tables and figures that follow. Monthly growth in traffic and toll revenue is quite large in specific months, which is common for managed lane facilities, specifically in the early years.

Table 6: ETL Traffic by Month (FY15 to FY18)

Traffic										
Month	FY15	Absolute Growth	% Growth	FY16	Absolute Growth	% Growth	FY17	Absolute Growth	% Growth	FY18
Jul				646,335	162,951	25.2%	809,286	31,676	3.9%	840,962
Aug				833,649	19,014	2.3%	852,663	50,435	5.9%	903,098
Sep				648,335	54,533	8.4%	702,868			
Oct				749,627	11,559	1.5%	761,186			
Nov				755,746	627	0.1%	756,373			
Dec	398,374	324,201	81.4%	722,575	31,551	4.4%	754,126			
Jan	439,591	86,760	19.7%	526,351	120,623	22.9%	646,974			
Feb	406,215	154,842	38.1%	561,057	14,011	2.5%	575,068			
Mar	553,842	167,096	30.2%	720,938	-31,590	-4.4%	689,348			
Apr	719,665	-44,941	-6.2%	674,724	155,434	23.0%	830,158			
May	734,606	-41,005	-5.6%	693,601	130,380	18.8%	823,981			
Jun	693,340	39,347	5.7%	732,687	96,192	13.1%	828,879			
Total	3,945,633	4,319,992	109.5%	8,265,625	765,285	9.3%	9,030,910			
Dec to Jun ¹	3,945,633	686,300	17.4%	4,631,933						
Jul to Aug ²							1,661,949	82,111	4.9%	1,744,060
Fiscal Year				6,164,613	383,279	6.2%	6,547,892			

¹December to June is shown to provide like comparison between FY15 and FY16 (ETLs opened in December 2014)

²Aug and July to provide like comparisons between FY17 and FY18

Figure 3: ETL Traffic by Month (FY15 to FY18)

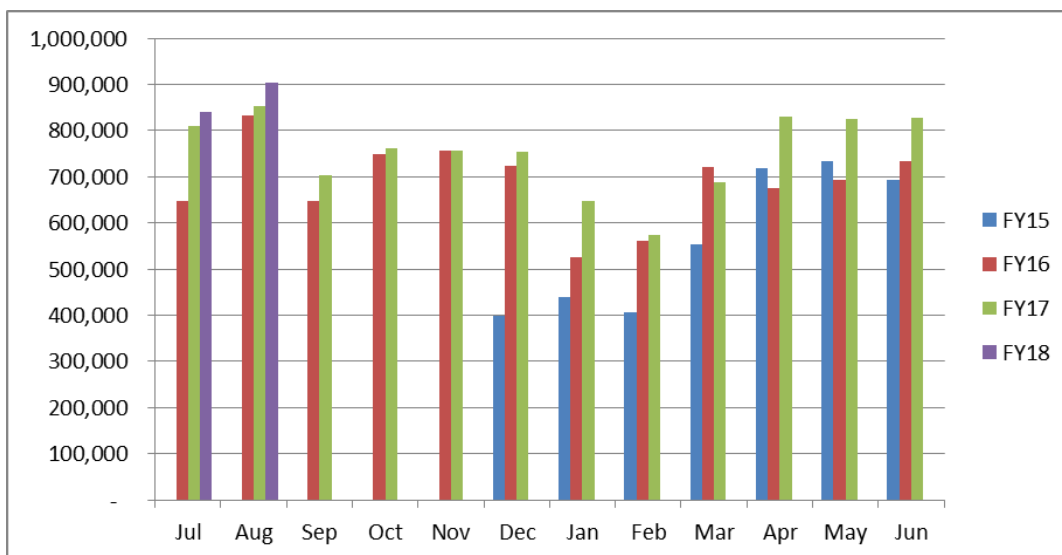


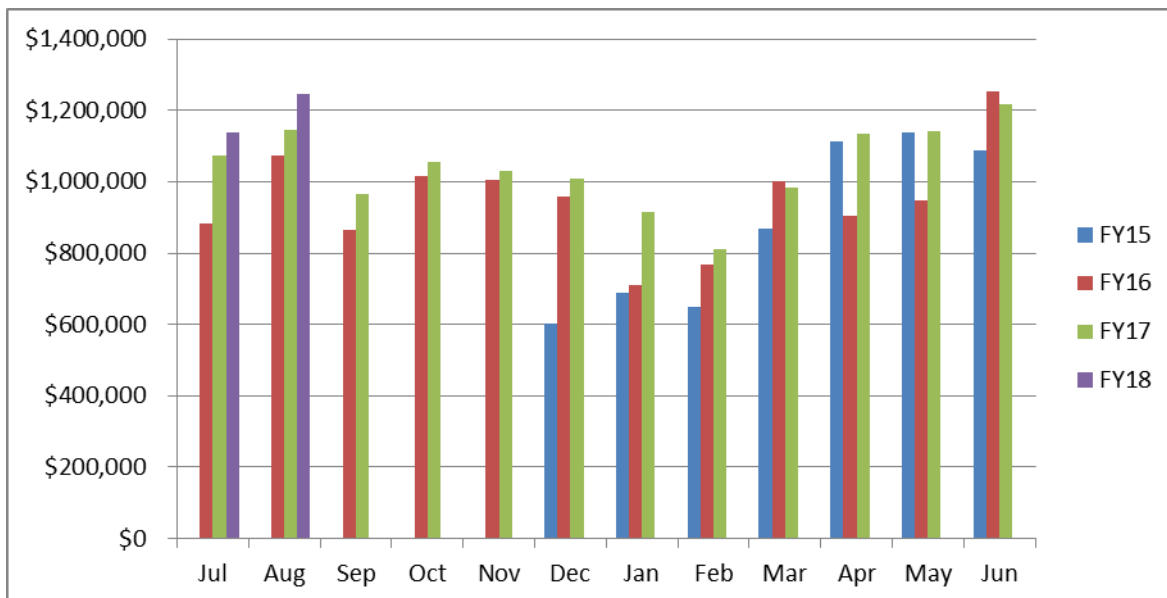
Table 7: ETL Toll Revenue by Month (FY15 to FY18)

Gross Toll Revenue										
Month	FY15	Absolute Growth	% Growth	FY16	Absolute Growth	% Growth	FY17	Absolute Growth	% Growth	FY18
Jul				\$882,454	\$189,306	21.5%	\$1,071,759	67,285	6.3%	1,139,045
Aug				\$1,073,767	\$70,329	6.5%	\$1,144,096	102,539	9.0%	1,246,635
Sep				\$864,654	\$99,680	11.5%	\$964,334			
Oct				\$1,016,845	\$37,377	3.7%	\$1,054,222			
Nov				\$1,003,773	\$28,017	2.8%	\$1,031,790			
Dec	\$602,088	\$355,609	59.1%	\$957,697	\$49,495	5.2%	\$1,007,192			
Jan	\$687,419	\$22,388	3.3%	\$709,807	\$204,727	28.8%	\$914,534			
Feb	\$650,605	\$116,762	17.9%	\$767,367	\$43,065	5.6%	\$810,432			
Mar	\$867,064	\$135,188	15.6%	\$1,002,253	-\$18,585	-1.9%	\$983,668			
Apr	\$1,112,133	-\$206,064	-18.5%	\$906,069	\$227,705	25.1%	\$1,133,774			
May	\$1,138,891	-\$192,925	-16.9%	\$945,966	\$197,486	20.9%	\$1,143,452			
Jun	\$1,087,509	\$167,033	15.4%	\$1,254,542	-\$35,832	-2.9%	\$1,218,710			
Total	\$6,145,709	\$5,239,484	85.3%	\$11,385,193	\$1,092,769	9.6%	\$12,477,962			
Dec to Jun ¹	\$6,145,709	\$397,992	6.5%	\$6,543,701						
Jul to Aug ²							\$2,215,855	\$169,824	7.7%	\$2,385,679
Fiscal Year				\$8,278,616	\$703,411	8.5%	\$8,982,027			

¹December to June is shown to provide like comparison between FY15 and FY16 (ETLs opened in December 2014)

²Aug and July to provide like comparisons between FY17 and FY18

Figure 4: ETL Toll Revenue by Month (FY15 to FY18)



These growth rates were taken into account when considering the continuation of growth on the ETLs outside of that due to benefits of travel time savings from congestion in the general purpose lanes, discussed in the next section.

2.3 Speed Review

One of the critical data to review are the speeds in the ETLs and the general purpose lanes by time of day and day of the week. As the tolled ETLs are adjacent to the toll-free general purpose lanes, it is the travel time savings in the form of higher travel speeds that provide value to motorists. A small portion of travel time savings is imbedded in the speed limit differential, such that the ETLs have a speed limit that is 5 miles per hour (mph) higher than the GPs. There are other benefits as well such as an increase in perceived safety, ease of use and other items detailed later in this memo. For the purely quantitative part of the analysis the following tables and figures present the average southbound and northbound speeds for the ETLs as well as the general purpose lanes. Note that the average speeds in the general purpose lanes dip to about 55 mph during the SB peak period and about 45 mph for the NB peak period during the week. During off-peak times the speeds are very similar. These speed differentials from the ETLs provide about a 1 to 3 minute time savings on average during the peak period. There is certainly volatility to those peak periods speeds over the course of a year and perceived time savings could be slightly more as a result.

Table 8: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Southbound Express Toll Lanes for the Past 12 Months

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12:00AM - 1:00AM	69.4	69.8	67.9	68.3	68.3	68.9	68.8
1:00AM - 2:00AM	69.0	69.4	67.9	68.1	68.4	68.5	68.6
2:00AM - 3:00AM	68.8	68.7	67.4	67.7	68.5	68.6	68.4
3:00AM - 4:00AM	68.8	68.8	68.3	68.3	68.5	68.7	68.6
4:00AM - 5:00AM	69.5	71.8	70.8	70.8	71.0	70.7	68.9
5:00AM - 6:00AM	71.0	73.1	72.4	72.8	72.7	72.6	70.4
6:00AM - 7:00AM	72.6	70.9	70.5	71.2	70.6	71.6	71.7
7:00AM - 8:00AM	72.2	66.5	64.8	66.7	65.1	69.8	72.3
8:00AM - 9:00AM	72.1	67.7	66.7	68.1	65.8	70.4	71.8
9:00AM - 10:00AM	72.2	71.2	70.1	70.8	70.3	70.6	70.3
10:00AM - 11:00AM	71.8	70.7	69.7	70.4	70.1	70.4	70.5
11:00AM - 12:00PM	71.7	70.5	69.8	70.3	69.8	70.6	70.7
12:00PM - 1:00PM	71.9	70.5	69.8	70.4	69.8	70.7	70.8
1:00PM - 2:00PM	71.6	70.5	69.6	70.1	69.8	70.5	70.7
2:00PM - 3:00PM	71.1	68.7	69.9	69.9	69.7	69.8	70.5
3:00PM - 4:00PM	71.1	70.0	69.9	70.1	69.8	69.5	70.1
4:00PM - 5:00PM	71.3	68.8	70.2	70.6	70.5	69.3	70.9
5:00PM - 6:00PM	71.0	70.1	70.4	70.5	70.3	69.9	71.0
6:00PM - 7:00PM	70.9	70.3	70.3	70.2	70.6	70.3	71.2
7:00PM - 8:00PM	70.9	70.5	69.9	70.1	70.2	70.2	70.9
8:00PM - 9:00PM	70.5	70.2	69.5	69.8	70.0	70.1	70.3
9:00PM - 10:00PM	70.1	69.8	69.5	69.7	69.7	69.7	69.8
10:00PM - 11:00PM	70.9	69.7	69.7	69.3	69.5	69.5	69.8
11:00PM - 12:00AM	70.5	69.0	68.9	69.2	69.1	69.0	69.6

Figure 5: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Southbound Express Toll Lanes for the Past 12 Months

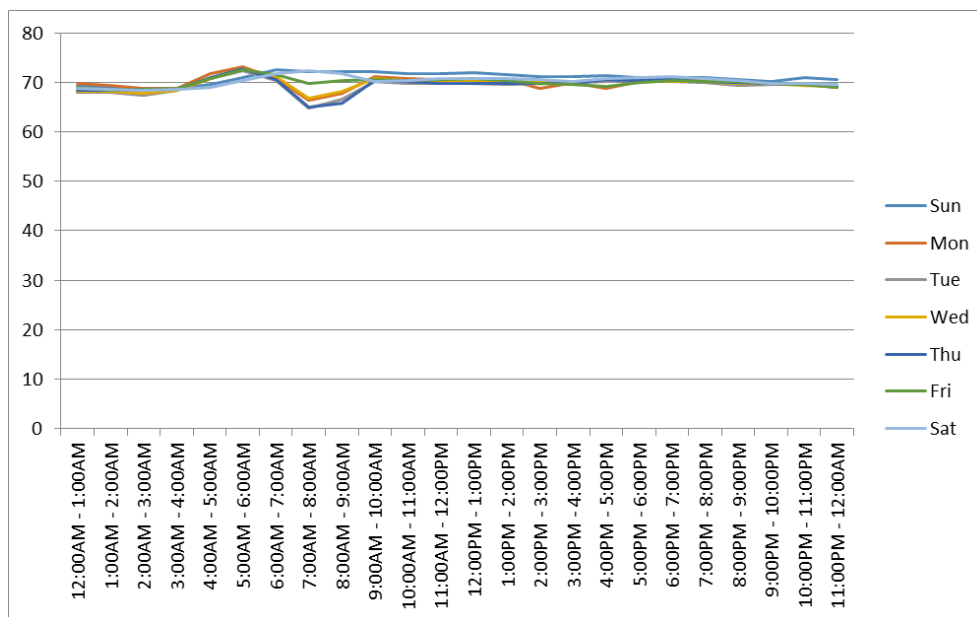


Table 9: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Northbound Express Toll Lanes for the Past 12 Months

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12:00AM - 1:00AM	71.2	70.5	69.5	69.4	69.9	69.9	69.8
1:00AM - 2:00AM	70.2	69.4	68.5	68.5	68.8	68.8	69.6
2:00AM - 3:00AM	69.5	69.0	67.6	68.3	68.0	68.0	69.0
3:00AM - 4:00AM	70.2	69.1	68.0	68.5	68.1	68.7	69.2
4:00AM - 5:00AM	69.6	69.8	69.4	69.1	69.4	69.5	69.2
5:00AM - 6:00AM	70.6	71.3	70.4	70.2	70.1	69.9	69.7
6:00AM - 7:00AM	72.5	71.2	70.6	71.2	70.8	71.2	72.2
7:00AM - 8:00AM	73.6	72.0	71.7	72.3	72.0	72.1	73.2
8:00AM - 9:00AM	73.3	71.3	70.8	71.3	71.3	71.7	73.1
9:00AM - 10:00AM	72.9	71.0	70.1	71.0	70.6	71.1	72.7
10:00AM - 11:00AM	72.7	70.9	70.5	70.7	70.6	71.2	72.5
11:00AM - 12:00PM	72.7	70.8	70.3	70.6	70.6	71.4	72.6
12:00PM - 1:00PM	72.6	71.1	70.7	71.2	71.1	71.8	72.8
1:00PM - 2:00PM	72.4	71.2	70.7	71.0	71.1	71.8	72.6
2:00PM - 3:00PM	71.4	71.7	71.7	71.4	71.3	71.1	72.6
3:00PM - 4:00PM	71.8	70.3	71.6	70.3	70.2	69.1	72.7
4:00PM - 5:00PM	72.5	69.9	70.3	69.7	68.2	60.6	72.6
5:00PM - 6:00PM	72.5	67.9	69.4	68.8	64.9	57.5	72.2
6:00PM - 7:00PM	72.3	70.3	70.7	70.7	69.4	68.0	71.8
7:00PM - 8:00PM	72.4	72.0	71.6	71.7	71.8	71.6	71.6
8:00PM - 9:00PM	71.9	71.1	70.8	71.2	71.1	71.7	71.2
9:00PM - 10:00PM	71.2	70.4	70.4	70.7	70.7	70.9	70.8
10:00PM - 11:00PM	69.8	69.6	69.8	69.9	70.2	70.7	70.9
11:00PM - 12:00AM	70.6	69.2	69.7	69.8	70.0	70.3	71.0

Figure 6: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Northbound Express Toll Lanes for the Past 12 Months

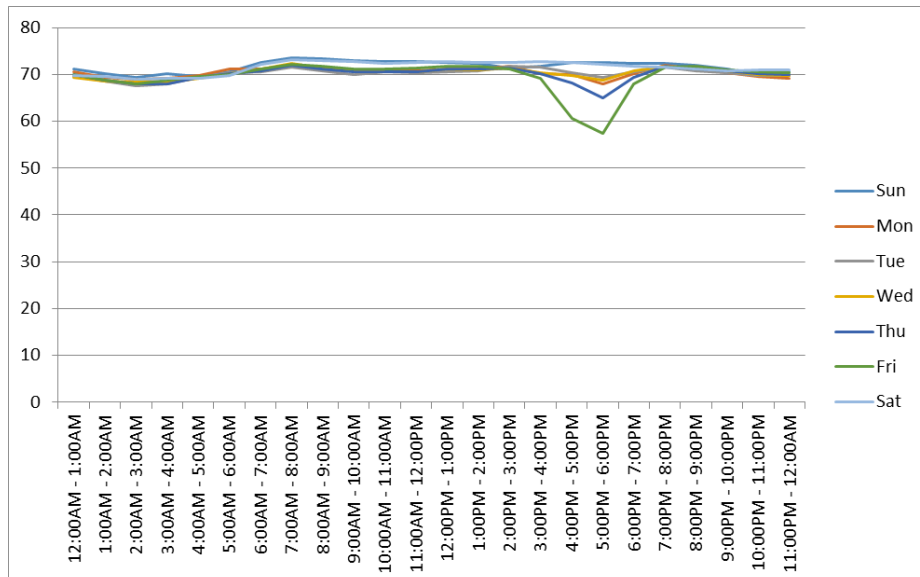


Table 10: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Southbound General Purpose Lanes for the Past 12 Months

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12:00AM - 1:00AM	69.6	70.2	68.3	68.1	68.0	68.8	68.9
1:00AM - 2:00AM	69.8	69.8	68.3	68.8	68.8	69.4	68.8
2:00AM - 3:00AM	69.6	69.8	68.2	69.0	68.5	68.5	69.2
3:00AM - 4:00AM	70.5	69.5	68.5	69.0	69.4	69.3	69.3
4:00AM - 5:00AM	69.9	70.7	69.9	69.8	69.8	70.1	70.1
5:00AM - 6:00AM	71.3	69.6	68.9	69.3	68.8	69.2	70.5
6:00AM - 7:00AM	72.4	64.4	63.9	64.2	63.9	66.1	70.8
7:00AM - 8:00AM	72.9	56.3	54.2	55.0	53.9	63.5	71.4
8:00AM - 9:00AM	72.7	63.1	55.2	59.1	55.9	65.7	70.5
9:00AM - 10:00AM	71.7	69.0	67.4	67.5	66.1	68.3	69.0
10:00AM - 11:00AM	70.7	68.7	67.9	68.7	67.8	68.5	69.2
11:00AM - 12:00PM	70.3	69.0	68.6	69.0	68.3	68.6	69.2
12:00PM - 1:00PM	70.3	69.1	67.8	68.8	67.1	68.8	69.1
1:00PM - 2:00PM	68.9	69.0	68.6	68.6	68.4	67.0	68.8
2:00PM - 3:00PM	69.7	68.4	68.4	68.5	68.1	66.6	68.8
3:00PM - 4:00PM	69.6	68.8	68.6	68.8	67.9	65.8	68.3
4:00PM - 5:00PM	69.2	69.1	68.7	69.3	68.3	66.3	68.7
5:00PM - 6:00PM	68.8	68.7	68.7	68.9	68.0	66.8	68.8
6:00PM - 7:00PM	68.7	68.0	68.9	69.0	68.8	68.0	68.9
7:00PM - 8:00PM	68.8	68.1	69.2	69.1	69.2	67.9	69.3
8:00PM - 9:00PM	68.7	67.8	69.0	69.2	68.4	68.5	69.0
9:00PM - 10:00PM	68.9	69.0	68.5	69.0	68.7	68.4	68.9
10:00PM - 11:00PM	69.8	69.0	68.6	68.9	68.9	68.8	69.2
11:00PM - 12:00AM	70.4	69.0	68.7	68.7	68.9	68.4	69.5

Figure 7: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Southbound General Purpose Lanes for the Past 12 Months

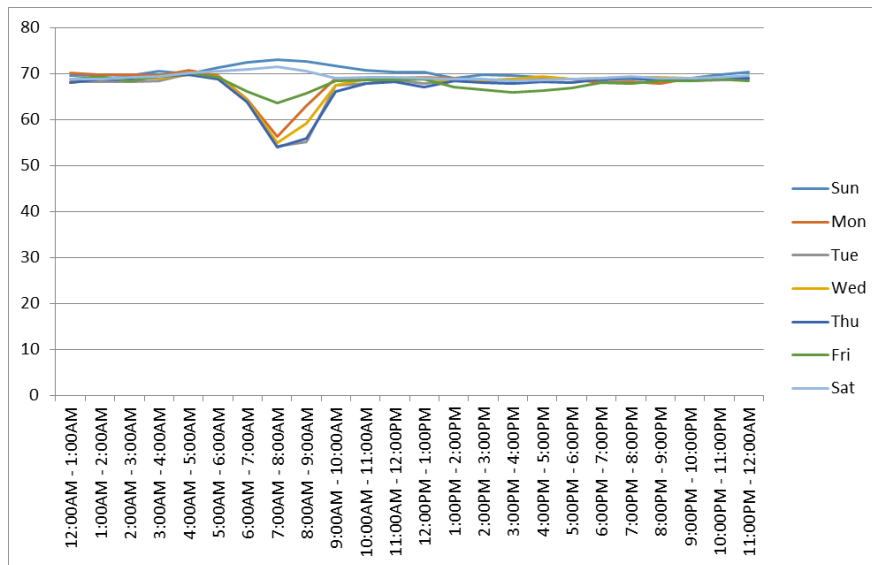
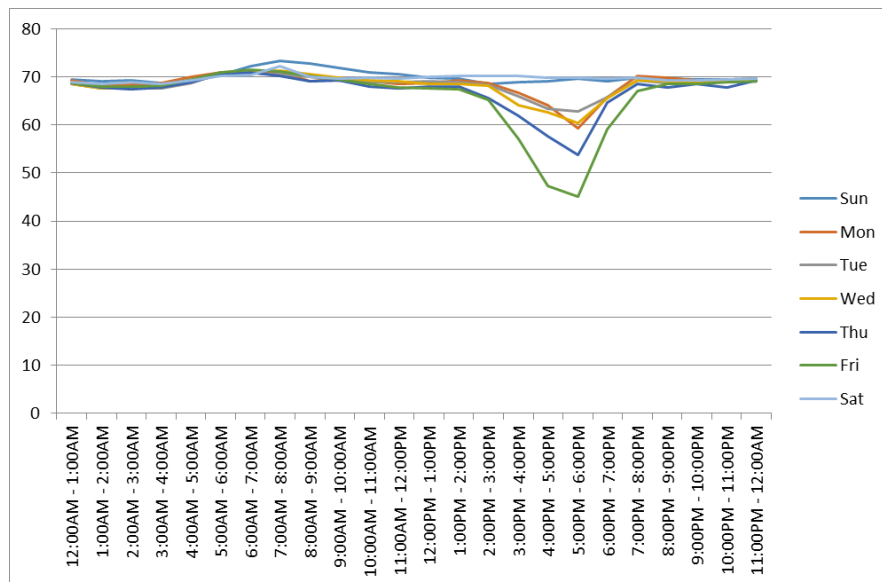


Table 11: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Northbound General Purpose Lanes for the Past 12 Months

Hour	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12:00AM - 1:00AM	69.4	69.1	68.5	68.5	68.6	68.7	68.9
1:00AM - 2:00AM	69.1	68.2	67.6	67.7	67.7	67.9	68.5
2:00AM - 3:00AM	69.1	68.4	67.6	67.6	67.4	68.0	68.8
3:00AM - 4:00AM	68.7	68.8	67.6	67.8	67.7	68.2	68.5
4:00AM - 5:00AM	69.0	70.0	68.7	69.1	68.9	69.5	69.2
5:00AM - 6:00AM	70.3	71.0	70.6	70.8	70.5	70.8	70.1
6:00AM - 7:00AM	72.2	71.1	70.8	71.2	70.9	71.4	70.4
7:00AM - 8:00AM	73.3	71.0	70.5	71.3	70.1	71.1	72.2
8:00AM - 9:00AM	72.7	69.1	69.9	70.5	69.1	70.1	70.0
9:00AM - 10:00AM	71.8	69.6	69.2	69.8	69.3	69.4	69.5
10:00AM - 11:00AM	70.9	69.1	68.8	69.2	68.0	68.5	69.7
11:00AM - 12:00PM	70.4	68.6	68.9	69.0	67.5	67.7	69.6
12:00PM - 1:00PM	69.8	68.7	69.1	68.5	68.0	67.6	70.0
1:00PM - 2:00PM	69.5	69.3	68.9	68.4	67.9	67.3	70.1
2:00PM - 3:00PM	68.5	68.6	68.4	68.0	65.5	65.2	70.1
3:00PM - 4:00PM	68.9	66.7	65.9	64.1	61.9	57.2	70.2
4:00PM - 5:00PM	69.1	64.1	63.4	62.6	57.6	47.3	69.9
5:00PM - 6:00PM	69.6	59.3	62.8	60.4	53.7	45.1	69.7
6:00PM - 7:00PM	69.1	65.8	65.7	65.6	64.7	59.1	69.7
7:00PM - 8:00PM	69.9	70.1	69.3	69.3	68.5	67.1	69.8
8:00PM - 9:00PM	69.6	69.7	68.7	69.0	67.8	68.6	69.3
9:00PM - 10:00PM	69.5	69.2	68.9	69.0	68.5	68.6	69.2
10:00PM - 11:00PM	69.5	69.0	68.9	69.0	67.8	68.9	69.4
11:00PM - 12:00AM	69.5	69.0	69.0	69.3	69.2	69.0	69.6

Figure 8: Average Speeds (MPH) by Hour and Day of the Week in the Corridor, Northbound General Purpose Lanes for the Past 12 Months



Previously in this section, the volatility of speeds in the general purpose lanes was mentioned as a potential indication of perceived time savings by motorists as opposed to actual average time savings. This volatility can be shown in the distribution of peak period speeds in the general purpose lanes for the peak period in each direction. While the average is 45 to 55 miles per hour during these peak time periods, as shown in the figures that follow, there are occurrences of much lower speeds that influence driver behavior. This volatility is considered in the forecasting model as well.

Figure 9: Southbound General Purpose Lanes Speeds, Weekday AM Peak Hour (7AM to 8AM)

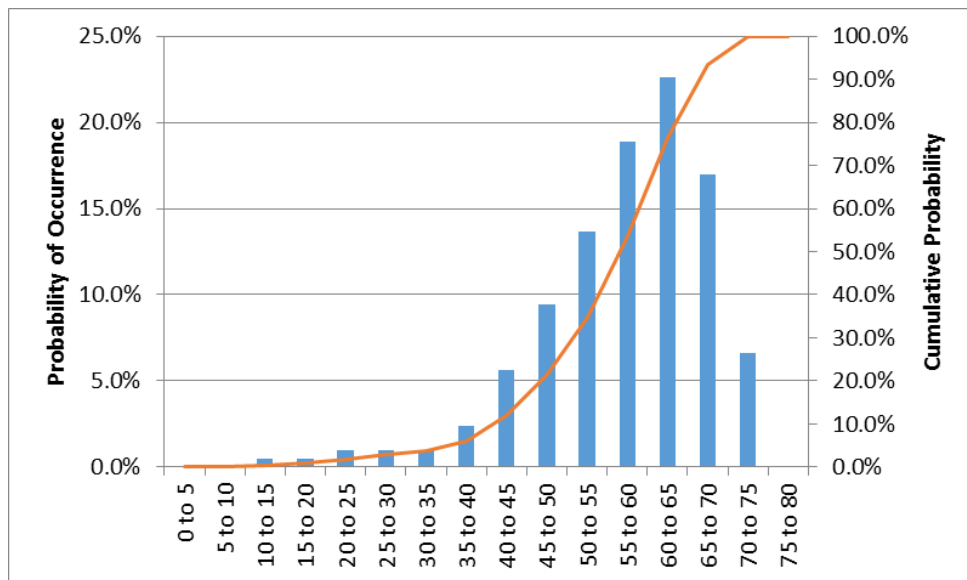
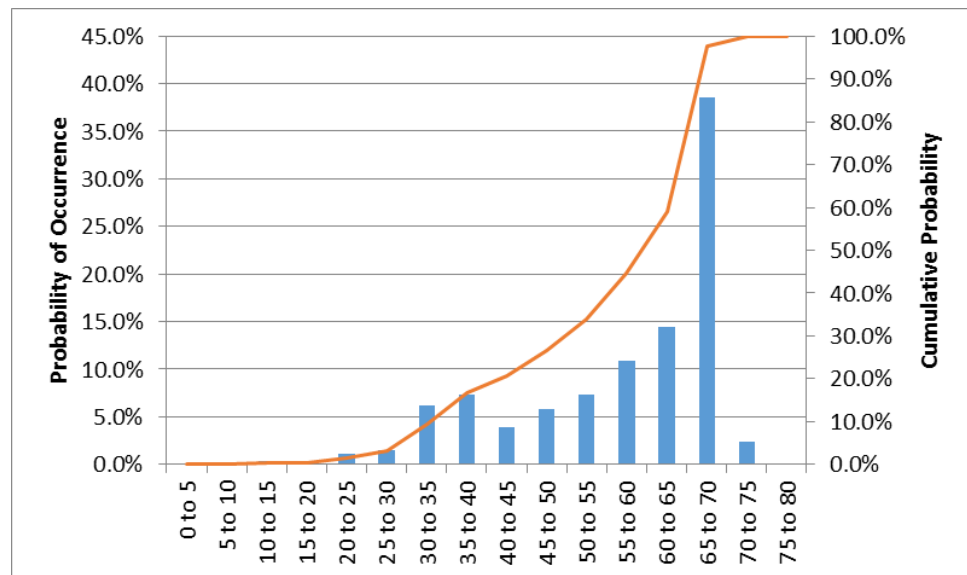


Figure 10: Northbound General Purpose Lanes Speeds, Weekday PM Peak Hour (5PM to 6PM)



A similar analysis was conducted for the ETLs to understand the potential need for changes in the toll rate. One of the goals of the ETLs is to provide free flow speeds which are generally considered to be between 45 and 50 mph. As shown this is achieved the vast majority of the time for each direction during their respective peak. In the future it may be the case that the toll rate for the northbound PM peak hour should be raised to maintain speed goals for the MDTA.

Figure 11: Southbound Express Toll Lanes Speeds, Weekday AM Peak Hour (7AM to 8AM)

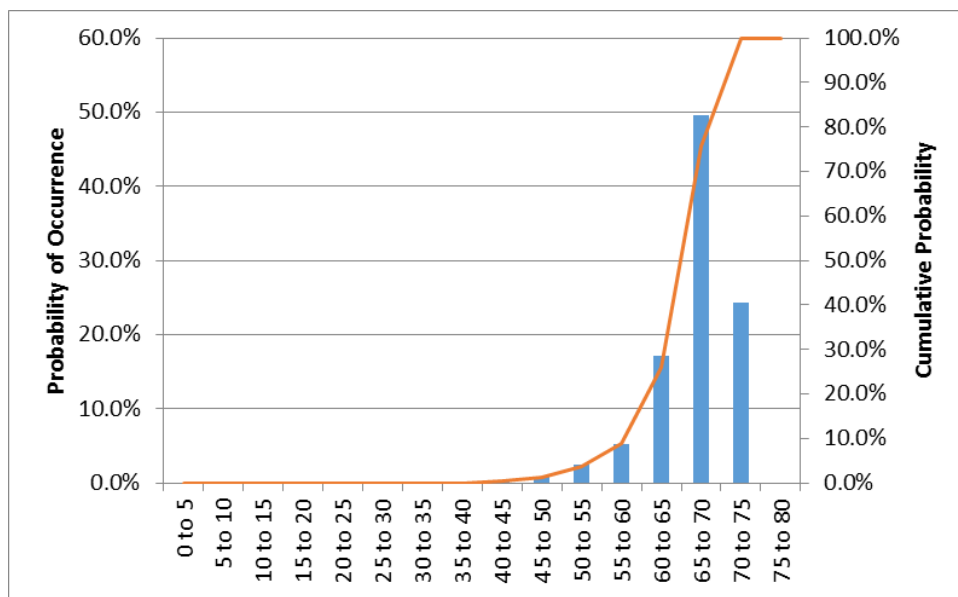
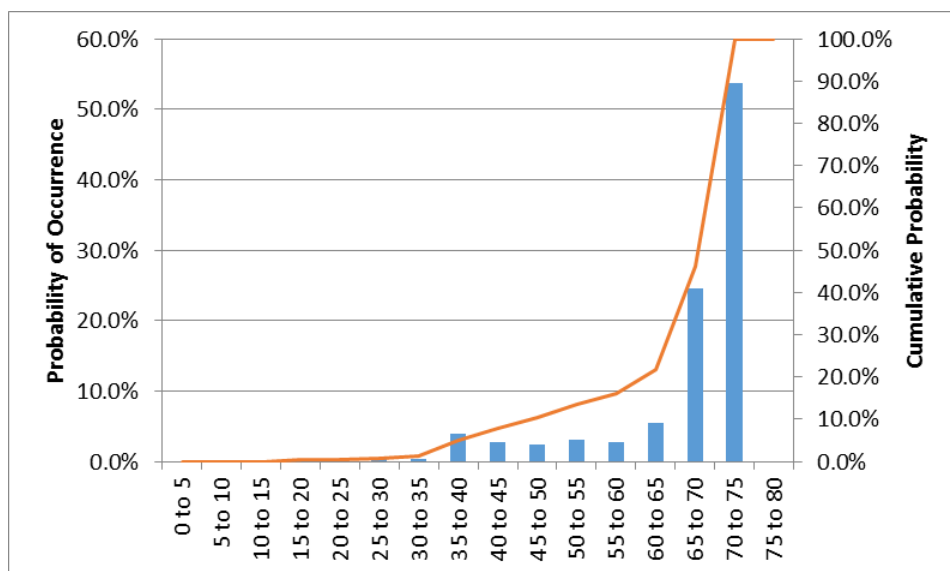


Figure 12: Northbound Express Toll Lanes Speeds, Weekday PM Peak Hour (5PM to 6PM)



2.4 Frequency of Use

The limited time savings presented in the previous section requires us to look elsewhere for less straight-forward reasons for usage. In previous analyses we reviewed the frequency of use of the ETLs by unique transponder to understand the potential sustainability of usage of the ETLs as motorists become more familiar with the relative benefits.

The previous 24 months were reviewed on a 12 month basis and are presented in the following tables. As can be seen, the results are almost identical when considering infrequent users, indicating that users that use the ETLs ten times per year or less (less than once per month) represent over 95 percent of the unique users and approximately 50 percent of the transactions. While infrequent use is common on managed lanes operated like the ETLs, it is the one-time users that are the most concerning with regard to the forecast. Again, as familiarity with the value of the ETLs increases it is possible that these one-time users do not continue to show up year after year. It should also be noted that the frequency data includes both directions, meaning those one time users did not take the ETLs on their return trip.

Table 12: ETL Frequency of Use – Annual from September 2015 to August 2016

I-95 ETL Frequency for Transponders (September 2015 to August 2016)					
Frequency	Volume		Transactions Per Year	Percent Share	
	Individual Transponder (People)	Transactions		Individual Transponder (People)	Transactions
1	1,132,804	1,132,804	1.0	50.9%	14.1%
2-5	892,435	2,326,473	2.6	40.1%	29.0%
6-10	110,143	814,735	7.4	4.9%	10.2%
11-20	48,171	687,688	14.3	2.2%	8.6%
21-50	25,541	788,827	30.9	1.1%	9.8%
> 50	16,394	2,261,432	137.9	0.7%	28.2%
Total	2,225,488	8,011,959	3.6	100.0%	100.0%

Table 13: ETL Frequency of Use – Annual from September 2016 to August 2017

I-95 ETL Frequency for Transponders (September 2016 to August 2017)					
Frequency	Volume		Transactions Per Year	Percent Share	
	Individual Transponder (People)	Transactions		Individual Transponder (People)	Transactions
1	1,140,295	1,140,295	1.0	52.0%	13.5%
2-5	850,073	2,215,824	2.6	38.7%	26.3%
6-10	108,162	801,739	7.4	4.9%	9.5%
11-20	49,445	708,800	14.3	2.3%	8.4%
21-50	27,485	852,639	31.0	1.3%	10.1%
> 50	19,306	2,708,257	140.3	0.9%	32.1%
Total	2,194,766	8,427,554	3.8	100.0%	100.0%

Furthermore, the frequent users (11 transactions per year or more), some 96,000 motorists that make up the remaining 50 percent of trips are estimated to be less than five percent of the total motorists in the corridor. The inability to predict the decisions of a very small selection of the population (frequent users) coupled with large usage of the facility by non-repeat customers (infrequent users) continues to provide reasons for conservatism in the forecast going forward.

With these data and previous frequency data for the Baltimore Harbor Tunnel, Fort McHenry Tunnel and John F. Kennedy Memorial Highway motorists, it is estimated that the total number of unique motorists in the I-95 corridor each year adjacent to the ETLs is approximately 4 million. With just over 1 million one-time ETL users in a year it will take a few years for all users to understand the new system. Of course new users will enter the corridor each year; therefore the forecast extends the time for removal of unfamiliar motorists from the ETLs and keeps a portion of the lanes filled with those motorists who choose the lanes for a number of reasons that are outside of time savings. A more detailed list of these reasons and the cause for such decision making is provided in a subsequent section of this documentation.

2.5 Possible Reasons for ETL Usage Apart from Time Savings

During the course of the analysis we reviewed potential reasons for high ETL usage in the face of limited time savings so as to mitigate these during the modeling effort if necessary. The high level of one-time users points to a potential correction of behavior after taking it once or twice. The following table provides a description of potential reasons and the resulting action taken for the modeling process. Generally, it is estimated that over time, usage of the ETLs will be more dependent upon travel time savings and not curiosity, unfamiliarity or the like.

Table 14: Possible Reasons for ETL Usage

Potential Reason	Analysis	Modeling Mitigation
Construction on General Purpose Lanes causing restrictions	No known construction on GP lanes that would encourage ETL usage	None
Spot congestion at entry points	No known spot congestion at entries	None
Confusion over signage	The signs show that E-ZPass should use the left lanes as motorists approach the entries to the ETLs. This signage is similar to signage at the tunnels and JFK Memorial where E-ZPass uses the leftmost lanes. It is possible that motorists with E-ZPass simply follow the signs.	Phase out one time users
Navigation directions pushing motorists into ETLs	Apple Maps, Yahoo Maps and Tom Tom provided guidance to use the ETLs; Google Maps, Mapquest and Bing Maps directs motorists to GP Lanes	Users will use navigation advice once or twice before making decision to take GP Lanes
Perceived value of lanes because of pricing	Possibly a Veblen Good - provides status of relatively low cost	Continue some usage regardless of future time savings
"Tourist" usage - i.e. trying something once to see how it works	Frequency data seems to suggest that this may be the case	Removal of one time users over the years as motorists become familiar with the corridor
Fear of potential slowdown in GP lanes with value seen in the reliability and perceived safety/comfort of the ETLs	This is a reason for managed lane usage across the nation and appears to be applicable to this facility	Continue some usage regardless of future time savings

3. Updated Traffic and Revenue Forecasts

Due to the unique nature of the facility, motorists will slowly learn the relative benefit of the facility and for the various reasons stated in the preceding documentation; usage will lower to match actual travel time savings between the ETLs and the general purpose lanes.

The forecasting model was revised to account for the current level of usage with slow removal of that usage over the course of few years as unfamiliar motorists become familiar with the corridor. The forecasting model does take into account the continual introduction of first-time users to the facility, which allows for more usage throughout the forecast.

The Draft FY 2018-2023 Consolidated Transportation Program was reviewed to address potential impacts that any proposed projects may have on the ETLs. This forecast assumes the improvements to I-95 between MD 152 and MD 24 will be implemented according to the current schedule.

The forecast assumes the current toll schedule will be in place through 2027. The estimates of traffic and toll revenue are provided in the following table. The figures shown for FY2015 through FY2017 are actual results. The high growth from FY2015 to FY2016 is mostly a function of FY2015 only being open for 6.5 months. Even with this accommodation there is higher growth than would normally be considered as a function of the ramp-up for any new facility. The growth from FY2016 to FY2017 did continue to be strong, with one-time users continually entering the corridor.

The forecast assumes limited growth through FY2020 and then increasing growth in both traffic and toll revenue as congestion increases slightly in the corridor. The one percent growth rate for the next few years is a function of estimated general background growth on the I-95 corridor. Revenue is expected to grow slightly higher than traffic due to more of the traffic within the peak period during which toll rates are higher. In the longer term, growth is expected to increase above the estimated background growth rate of one percent as congestion builds as compared to current conditions. During the peak period it is estimated that average speeds in the general purpose lanes will not change dramatically over the forecast period, but that the reliability of travel will continue to deteriorate and therefore motorists will increasingly choose the ETLs as an insurance policy against delay. The forecast presented represents a conservative view of potential revenue. The ETLs are highly sensitive to congestion in the general purpose lanes. The forecasting model estimates that the congestion in the general purpose lanes will be limited during the forecast period but if background growth exceeds one percent, specifically in the peak periods, it is possible that the transactions and toll revenue will exceed forecast.

Table 15: I-95 ETL Traffic and Toll Revenue Estimates

Fiscal Year	Traffic		Toll Revenue	
	Volume	Annual Growth	Volume	Annual Growth
2015 *	3,945,633		\$6,145,709	
2016 *	8,265,625	109.5%	\$11,385,193	85.3%
2017 *	9,030,910	9.3%	\$12,477,962	9.6%
2018	9,186,000	1.7%	\$12,852,000	3.0%
2019	9,278,000	1.0%	\$13,111,000	2.0%
2020	9,371,000	1.0%	\$13,373,000	2.0%
2021	9,558,000	2.0%	\$13,788,000	3.1%
2022	9,845,000	3.0%	\$14,367,000	4.2%
2023	10,140,000	3.0%	\$14,985,000	4.3%
2024	10,444,000	3.0%	\$15,644,000	4.4%
2025	10,757,000	3.0%	\$16,348,000	4.5%
2026	11,080,000	3.0%	\$17,100,000	4.6%
2027	11,412,000	3.0%	\$17,887,000	4.6%

*FY2015 - FY2017 are actual results

4. Future Toll Schedule Changes to Manage Traffic

The forecast in the preceding section is predicated on the existing toll schedule being in place for the full forecast period. On average, it is estimated that the current toll schedule by hour by day will be sufficient to manage traffic into the future. Furthermore, for the traffic and toll revenue forecast for the ten-year period it is estimated that any small changes to the toll schedule to manage traffic that is discussed in this section will not have a significant impact on revenue.

It is anticipated that there may be individual days into the future that may require increased tolls to effectively manage traffic demand on the ETLs. This would exclude any anomalies such as traffic accidents.

From review of the speed and traffic data on the ETLs on individual days and hours there is currently sufficient capacity to handle the future demands but the Friday PM peak period does demonstrate volatility that could require management techniques if so desired by the MDTA. On average the traffic can double during the Friday PM Peak and speeds in the non-merging section of the ETLs will be maintained to 45 miles per hour.

It is recommended that any changes to the toll schedule for the Friday PM Peak be consistent with overall goals of the corridor and project. There would be opportunities to manage traffic in real time, through dynamic pricing, if the MDTA would like to do so. However if the MDTA would consider the average day as the basis for any toll changes then the current schedule should be sufficient for the forecast period.

5. Limits and Disclaimers

It is Jacobs' opinion that the traffic and toll revenue estimates provided herein are reasonable and that they have been prepared in accordance with accepted industry-wide practice. However, given the uncertainties within the current economic climate, it is important to note the following assumptions which, in our opinion, are reasonable:

- This limited synopsis presents the highlighted results of Jacobs' consideration of the information available as of the date hereof and the application of our experience and professional judgment to that information. It is not a guarantee of any future events or trends.
- The traffic and toll revenue estimates will be subject to future economic and social conditions, demographic developments and regional transportation construction activities that cannot be predicted with certainty.
- The estimates contained in this report, while presented with numeric specificity, are based on a number of estimates and assumptions which, though considered reasonable to us, are inherently subject to economic and competitive uncertainties and contingencies, most of which are beyond the control of the MDTA and cannot be predicted with certainty. In many instances, a broad range of alternative assumptions could be considered reasonable. Changes in the assumptions used could result in material differences in estimated outcomes.
- Jacobs' traffic and toll revenue estimations only represent our best judgment and we do not warrant or represent that the actual toll revenues will not vary from our estimates.
- We do not express any opinion on the following items: socioeconomic and demographic forecasts, proposed land use development projects and potential improvements to the regional transportation network.
- The standards of operation and maintenance on all of the system will be maintained as planned within the business rules and practices.
- The general configuration and location of the system and its interchanges will remain as discussed in this report.
- Access to and from the system will remain as discussed in this report.
- No other competing highway projects, tolled or non-tolled are assumed to be constructed or significantly improved in the project corridor during the project period, except those identified within this report.
- Major highway improvements that are currently underway or fully funded will be completed as planned.
- The system will be well maintained, efficiently operated, and effectively signed to encourage maximum usage.
- No reduced growth initiatives or related controls that would significantly inhibit normal development patterns will be introduced during the estimate period.

- There will be no future serious protracted recession during the estimate period.
- There will be no protracted fuel shortage during the estimate period.
- No local, regional, or national emergency will arise that will abnormally restrict the use of motor vehicles.

In Jacobs' opinion, the assumptions underlying the projections provide a reasonable basis for the revenue projections and operating expenses. However, any financial projection is subject to uncertainties. Inevitably, some assumptions used to develop the projections will not be realized, and unanticipated events and circumstances may occur. There are likely to be differences between the projections and actual results, and those differences may be material. Because of these uncertainties, Jacobs makes no guaranty or warranty with respect to the projections disclosed in this Study

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